STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

October 18, 2012

U. S. Army Corps of Engineers
Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28801-5006

ATTN: Ms. Sarah Elizabeth Hair
NCDOT Coordinator

Subject: **Application for Individual Section 404 Permit and Section 401 Water Quality Certification** for George Liles Parkway – from South of SR 1304 (Roberta Road) to SR 1341 (Weddington Road), Cabarrus County; Federal ID No. STP-00S(46), NCDOT Division 10; TIP No. R-2246B.
Debit $570.00 from WBS Element No. 34408.1.1

Dear Ms. Hair:

The North Carolina Department of Transportation (NCDOT) proposes to construct an extension of the George Liles Parkway. This section of the Parkway (Section B) will extend from just south of Roberta Road northward to Weddington Road, the southern extent of the existing Parkway. The proposed project consists of constructing a four-lane, median divided facility on a minimum of 200 feet of right-of-way. The section of the project extending from US 29 (Concord Parkway) to Weddington Road will be on new location, and will include a Multi-Use Path (MUP), to be constructed adjacent to this section of the Parkway.

This application package consists of: the cover letter, Purpose and Need Statement, ENG form 4345, EEP mitigation acceptance letter, interagency hydraulic design review (4B) meeting minutes, interagency permit drawing review (4C) meeting minutes and actions taken, Stormwater Management Plan, Monitoring Plan, permit (hydraulic) drawings, and half-size roadway plan sheets.

PURPOSE AND NEED

Please see that attached "Purpose and Need" statement that highlights the relevant information from the Environmental Assessment, as provided by FHWA and NCDOT-PDEA.

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

TELEPHONE: 919-707-6100
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WEBSITE: WWW.NCDOT.ORG

LOCATION:
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610-4328

Project Schedule

Table 1 provides the project limits and let dates for each section of the George W. Liles Parkway project.

Table 1 – Project Schedule

Section	Project Limits	Let Date
A	NC 49 to just south of SR 1304 (Roberta Rd)	"post-year"
B	just south of SR 1304 (Roberta Rd) to SR 1431 (Weddington Rd)	04/16/2013
C	SR 1431 (Weddington Rd) to SR 1555 (Grand Canyon Rd)	Constructed*

* A permit for R-2246C was issued on October 1, 2003, and construction has been completed.

NEPA DOCUMENT STATUS

In September 1996, NCDOT prepared an Environmental Assessment (EA), and in January 1999, NCDOT prepared a Finding of No Significant Impacts (FONSI) for the entire R-2246 project, which was referred to as the "Concord-Kannapolis Westside Bypass Extension" at that time. The R-2246C section of the project was permitted in 2003, as noted in Table 1 (above). Subsequently, a Right-of-Way Consultation was prepared for the R-2246B section of the project in 2009. Copies of these documents are available upon request.

INDEPENDENT UTILITY

R-2246B is in compliance with 23 CFR Section 771.111(f) which lists the Federal Highway Administration (FHWA) characteristics of independent utility of a project:

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

The following is in support of logical termini for the B section of the project: R-2246B ends at Roberta Road and the design year (2035) traffic drops by 50%. The B section (north of Roberta Rd.) carries over 33,000 vpd (almost double present day traffic), which is well over capacity for a two-lane road. The A section (south of Roberta Rd.) drops down to under 22,000 vpd which is far less critical in terms of capacity. Roberta itself carries over 17,000 vpd with the heaviest movements to/from the B section, which further demonstrates the need for additional capacity in the B section.

RESOURCE STATUS

The project is located in the Yadkin-Pee Dee River Basin and lies within USGS Hydrologic Unit 03040105. All of the streams (unnamed tributaries) within the project flow directly or indirectly to Coddle Creek.

Jurisdictional Delineations

A Notification of Jurisdictional Determination (JD) (Action ID SAW-2009-1452) was issued by the U.S. Army Corp of Engineers (USACE) on November 30, 2009, for the delineation of jurisdictional resources, and an "On-Site Determination for Applicability to the Mitigation Rules" was issued by NCDWQ on July 20, 2009. Subsequent to the Multi-Use Path (MUP) becoming part of the project, a site visit with the Agencies was conducted on October 4, 2011, to assess the resources in this area. The NCDWQ issued an "On-Site Determination for Applicability to the Mitigation Rules" for the MUP portion of the project on November 22, 2011. The USACE issued a JD for the MUP portion of the project on July 23, 2012 (Action ID 2012-01175).

WILD AND SCENIC RIVERS

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

303(d) LIST

Section 303(d) of the Clean Water Act (CWA) requires states to develop a list of waters not meeting water quality standards or which have impaired uses. Coddle Creek, in the reach to which the tributaries in the project area flow, is listed in the Final 2010 303(d) Impaired Waters List for Turbidity. As such, *Design Standards in Sensitive Watersheds* will be implemented.

IMPACTS TO WATERS OF THE U.S.

Surface Waters

Permanent impacts are proposed to 1,377 linear feet (lf) of jurisdictional streams, 38 lf of which is for streambank stabilization. All jurisdictional streams within the project are perennial. The impacts are for the placement of roadway fill, the installation and/or replacement of various pipes and culverts, the creation of low-flow benches with associated bank stabilization at inlets and outlets of the culverts, and the placement of riprap for stream bank stabilization. Temporary impacts are proposed on 0.04 acre (209 lf) of jurisdictional streams. Temporary impacts will be necessary for construction and removal of various pipes and culverts. Detailed impact data are presented below in Table 2.

Additionally, permanent impacts are proposed to <0.01 acre [12 square feet (sf)] of a jurisdictional pond for the installation of 26 sets of 8" X 8" piles for construction of the MUP boardwalk.

Table 2. Impacts to jurisdictional streams in Yadkin-Pee Dee River Basin (HUC 03040105)

Permit Site No.	Station No.	Stream Type	DWQ Stream Classification	Impact Type	Impact Length	Impact Acreage	Mitigation Requirement
1	29+77-L- to 29+80-L-	Perennial	C	Perm. fill (RCBC)	156 lf	--	USACE & DWQ
				Perm. fill (channel fill/ excavation)	179 lf		USACE & DWQ
				Temp. fill	--	<0.01 ac	--
2	35+30-L-	Perennial	C	Bank stabilization	38 lf[a/]	--	DWQ
				Temp. fill	--	<0.01 ac.	--
3	98+39-L-	Perennial	C	Perm. fill (RCBC)	266 lf	--	USACE & DWQ
				Perm. fill (channel excavation)	113 lf	--	USACE & DWQ
				Temp. fill	--	0.01 ac.	--
4	109+05 to 112+00-L-	Perennial	C	Perm. fill	384 lf	--	USACE & DWQ
	109+17 -L-	Perennial	C	Perm. fill (channel excavation)	32 lf	--	USACE & DWQ
5	122+00 to 123+00-L-	Perennial	C	Perm. fill	209 lf	--	USACE & DWQ
				Temp. fill	--	<0.01 ac.	--
Total Temporary Impacts:					--	0.03 [b/]	--
Total Permanent Impacts:					1,377 lf		
Permanent Impacts Requiring NCDWQ Mitigation (1:1):					1,377 lf		1,377 lf
Permanent Impacts Requiring USACE Mitigation (2:1):					**1,339 lf** [c/]		2,678lf [c/]
On-site mitigation (removal of existing pipe/roadway @ Site 2):					54 lf		
Mitigation Acquired from EEP:					**1,285 lf**		2,570 lf

[a/] Mitigation for bank stabilization impact required by DWQ – not required by USACE.
[b/] value based on rounding, due to some of the individual impacts being <0.01 acre (4 X 0.01ac. = 0.02 ac.)
[c/] Impacts requiring mitigation (based on total mitigation required by the USACE [2:1] exceeding that required by DWQ [1:1]).
Note: The 12 sf of pond impacts and 6 sf of wetland impacts from the installation of the MUP boardwalk piles are not included in the table and do not require mitigation.

Wetlands

Permanent impacts are proposed on 0.27 acre of riparian wetlands, comprised of the placement of 0.25 acre of permanent fill, the excavation of 0.01 acre, and the mechanized clearing of 0.01 acre (and 6 sf for the MUP boardwalk piles). The wetlands occur within the Yadkin-Pee Dee River Basin (USGS Hydrologic unit 03040105). There will be 0.02 acre of non-jurisdictional impacts to a wetland at Site 4 for hand-clearing for the construction of the MUP boardwalk.

Detailed impact data are presented below in Table 3. A brief description of each impact is included in the permit site descriptions on the following pages.

Table 3. Impacts to jurisdictional wetlands in Yadkin-Pee Dee River Basin (HUC 03040105)

Site No.	Riparian / Non-Riparian	Impact Type		Permanent Impacts	Mitigation
1	Riparian	Permanent Fill		0.04 ac.	yes
4 [a/]	Riparian	Fill / 36" RCP		0.12 ac.	yes
		Mechanized clearing		<0.01 ac.	
5	Riparian	48" RCP	Fill	0.08 ac.	yes
			Excavation	<0.01 ac.	
			Mechanized clearing	<0.01 ac.	
		MUP / 54" RCP	Fill	0.01 ac.	yes
			Excavation	<0.01 ac.	
			Mechanized clearing	<0.01 ac.	
Total:				**0.27 ac [b/].**	

[a/] 0.02ac of wetland impacts for hand-clearing associated with the construction of the MUP boardwalk are not included in table (not a jurisdictional impact).

[b/] The 0.27 acre of wetland impacts is based on rounding the values, due to some of the individual impacts being <0.01 acre.

Site by Site Summary of Jurisdictional Impacts

Permit Site 1: A UT to Coddle Creek will be impacted by the installation of a 150-foot long, 2@13'X10' Reinforced Concrete Box Culvert (RCBC), and from the excavation of the stream bottom and banks to match the stream grade and width upstream and downstream of the RCBC, and a small amount of fill for the stream segment between the adjacent end of the RCBC and the excavated channel. One of the culvert barrels will be an overflow barrel and will have a 2-foot sill at the inlet end, and the RCBC will be installed one foot below grade to facilitate aquatic passage. One-foot low flow benches (with associated bank stabilization) will be constructed within the area of stream excavation impacts at the inlet and outlet ends of the overflow barrel to facilitate natural stream conditions. There will be temporary stream impacts from the installation of riprap that extends beyond the stream excavation impacts. An adjacent wetland will be impacted by roadway fill.

- Permanent Stream Impacts: 335 lf
  - 156 lf: stream routed through RCBC
  - 179 lf: stream fill/channel excavation
- Temporary Stream Impacts: <0.01 ac
- Permanent Wetland Impacts: 0.04 ac

Permit Site 2: A UT to Coddle Creek will be impacted by riprap for bank stabilization associated with the installation of an Energy Dissipater Basin.

- Bank stabilization Impacts: 38 lf
- Temporary Stream Impacts: <0.01 ac (for pipe removal - see below*)

* As part of construction, a 72-inch Corrugated Metal Pipe (CMP) carrying an unnamed tributary (UT) to Coddle Creek, located approximately 130 feet upstream of the Energy Dissipater Basin at Permit Site 2, will be removed. This will result in 54 feet of daylighting to the UT. After the pipe is removed, NCDOT proposes to match the stream and floodplain grade with the existing upstream and downstream portions of natural ground (see Mitigation Plan). The site is already within NCDOT right-of-way. NCDOT proposes to replant the affected area with native vegetation. The area is currently a maintained/disturbed community. This will restore approximately 25 feet of riparian buffer to either side of the UT. Please refer to the attached planting schedule (Mitigation Plan). NCDOT will visually monitor the site for three years to ensure vegetation reaches jurisdictional status. The removal of the pipe, matched grading, and planting will mitigate 54 feet of stream impacts.

Permit Site 3: A UT to Coddle Creek will be impacted by the installation of a 200-foot long, 2@13'X 9' RCBC and from the excavation of the stream bottom and banks to match the stream grade and width upstream and downstream of the RCBC. One of the culvert barrels will be an overflow barrel and will have a 2-foot sill at the inlet end, and the RCBC will be installed one foot below grade to facilitate aquatic passage. One-foot low flow benches (with associated bank stabilization) will be constructed within the area of stream excavation impacts at the inlet and outlet ends of the overflow barrel to facilitate natural stream conditions. There will be temporary stream impacts from the installation of riprap that extends beyond the stream excavation impacts.

- Permanent Stream Impacts: 379 lf
  - 266 lf: stream routed through RCBC
  - 113 lf: stream channel excavation
- Temporary Stream Impacts: 0.01 ac

Permit Site 4: Two sections of a UT to Coddle Creek and two wetlands will be impacted by the placement of roadway fill. Reinforced Concrete Pipe (RCP) will be installed to maintain hydraulic connectivity through this area. Additionally, a small section of the downstream end of the UT to Coddle Creek near the pond will incur permanent and temporary impacts from channel excavation for tying the created channel into the existing stream. The construction of the Multi-Use Path (MUP) boardwalk will require non-jurisdictional impacts from hand-clearing of vegetation in the wetland abutting the pond. Additionally, there will be 12 square feet (sf) of impact to the pond, and 6 sf of impact to the abutting wetland, respectively, for the installation of 8-inch X 8-inch MUP boardwalk piles.

- Permanent Stream Impacts: 416 lf
  - 384 lf: fill/RCP
  - 32 lf: channel excavation
- Temporary Stream Impacts: <0.01 ac channel excavation
- Permanent Wetland Impacts: 0.12 ac
  [including <0.01 ac for mechanized clearing and 6 sf for MUP boardwalk piles]
- Non-jurisdictional wetland Impacts: 0.02 ac (MUP boardwalk hand-clearing)
- Permanent Pond Impacts: 12 sf (MUP boardwalk piles)

Permit Site 5: A UT to Coddle Creek and two wetlands will be permanently impacted by the placement of roadway fill, and an RCP will be installed to maintain hydraulic connectivity. Temporary stream impacts will be incurred at the upstream side (inlet side) of the RCP from tying it into the existing stream. Additionally, permanent wetland impacts will be incurred for the placement of fill for the construction of the MUP. Temporary wetland impacts will be incurred for associated hand-clearing of wetlands for the roadway fill and MUP fill.

- Permanent Stream Impacts (fill/RCP): 209 lf
- Temporary Stream Impacts: <0.01 ac
- Permanent Wetland impacts: 0.11 ac
  - 0.09 ac: stream fill (0.08 ac: roadway fill, 0.01ac: MUP fill)
  - 0.01 ac: excavation (<0.1 ac: 48" RCP, <0.01 ac: 54" RCP in MUP)
  - 0.01 ac: mechanized clearing (<0.01ac: roadway fill, <0.01 ac: MUP fill)

Compensatory Mitigation

NCDOT will be providing 54 feet of on-site mitigation (see Permit Site 2 description). All other mitigation for the project will be provided by EEP (acceptance letter attached). The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. The NCDOT has avoided and minimized impacts to jurisdictional resources to the greatest extent practicable.

Compensatory mitigation for this project consists of the following:

Compensatory Stream Mitigation

Unavoidable impacts to jurisdictional streams on the project total 1,377 linear feet. The USACE recognizes 1,339 lf of permanent stream impacts that require mitigation, as 38 lf feet is streambank stabilization. Stabilizing the bank of a stream does not require fill in the stream bed and, therefore, under Section 404 of the Clean Water Act, does not constitute Loss of Waters of the U.S. and is not subject to compensatory mitigation by the USACE. As the USACE mitigation requirement is at a 2:1 ratio, the mitigation required by the USACE for impacts to 1,339 lf of stream exceeds the mitigation required by the NCDWQ for impacts to 1,377 lf of stream, which mitigates at a 1:1 ratio (see Table 2). As previously mentioned, NCDOT will provide 54 lf of on-site mitigation at Permit Site 2; therefore, mitigation for unavoidable permanent impacts to 1,285 lf (1,339 lf – 54 lf = 1,285 lf) of stream has been obtained from EEP within the Yadkin-Pee Dee River Basin (HUC 03040105).

Compensatory Wetland Mitigation

Compensatory mitigation has also been acquired through EEP for the 0.27 acre of permanent wetland impacts within the Yadkin-Pee Dee River Basin (HUC 03040105).

FEDERALLY PROTECTED SPECIES

Plants and animals with a Federal classification of Endangered (E) or Threatened (T) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of September 22, 2010, the United States Fish and Wildlife Service (USFWS) lists two species for Cabarrus County (Table 4).

Table 4. Federally protected species listed for Cabarrus County.

Scientific Name	Common Name	Federal Status*	Habitat Present	Biological Conclusion
Helianthus schweinitzii	Schweinitz's sunflower	E	Yes	No Effect
Lasmigona decorata	Carolina heelsplitter	E	No	No Effect

*E = Endangered

An initial survey for Schweinitz's sunflower was performed in all areas of suitable habitat along the entire R-2246 project on October 27-28, 1998. The results of the survey resulted in a Biological Conclusion of No Effect (presented in Section V of the FONSI). Subsequent surveys were conducted by NCDOT biologists throughout areas of suitable habitat within the R-2246B project area on October 8, 2008 and October 12, 2010. No occurrence of Schweinitz's sunflower was observed. A review of NCNHP records, updated in April 2012, indicates no known occurrences within 1.0 mile of the study area. As such, the Biological Conclusion for Schweinitz's sunflower remains No Effect. The project is scheduled for an updated survey in the Fall of 2012.

An initial survey to assess all perennial streams along the entire R-2246 project for Carolina heelsplitter habitat was conducted on October 27-28, 1998. The results of the survey resulted in a Biological Conclusion of No Effect (presented in Section V of the FONSI). On October 6, 2008, a subsequent mussel survey and habitat assessment was conducted on Coddle Creek and a UT to Coddle Creek (designated Stream SA in NRTR Update, June 2009) by NCDOT biologists. The survey determined that there was water quality degradation and a lack of suitable habitat for mussels, and no further surveys are warranted. Review of the NCNHP database, updated in April 2012, indicates that there are no known occurrences of the federally protected Carolina heelsplitter within the project study area, in Coddle Creek, or in nearby receiving waters. As a result of these surveys, and a review of historical data, it appears that the Carolina heelsplitter does not exist in the project vicinity. Therefore, the Biological Conclusion is No Effect. The Freshwater mussel survey report is available upon request.

TROUT WATERS AND MORATORIA

The project is not located within a Trout County. As such, there is no trout moratorium. There are no other moratoria for this project.

CULTURAL RESOURCES

Archaeology

An investigation was conducted by NCDOT's staff archaeologists in 1994, to determine whether any archaeological resources could potentially qualify for nomination to the National Register of Historic Places (NRHP) within the entire R-2246 project and, if identified, whether they would be affected by the project. No archaeological resources were found within the Area of Potential Effect (APE). NCDOT recommended that no further investigations are warranted.

The State Historic Preservation Office (SHPO) concurred with NCDOT's findings in a Memorandum dated September 15, 1994, stating that "For purposes of compliance with Section

106 of the National Historic Preservation Act, we concur that no archaeological resources eligible for listing in the NRHP are within the project area of potential effect, and, therefore, none will be affected by the proposed undertaking (see Appendix F of the Environmental Assessment)".

Historic Architecture

A Phase II (abridged) survey was conducted by NCDOT Architectural Historians in 1994 to determine the APE for the entire R-2246 project, and to identify and evaluate all significant resources within the APE according to the NRHP. Cabarrus County survey files were consulted in the SHPO in Raleigh, as was the National Register and State Study List. Background research of the architecture and history of the project area, as well as existing roads and residential development in the area, determined the boundary of the APE. An intensive survey was then conducted by car and foot on May 18, 1994, which covered the entire APE to identify those properties that appeared potentially eligible for the National Register. Twelve properties were surveyed within the APE: nine residences, two residences converted to commercial use, and one commercial building, all dating to the years between c. 1920 and c. 1940. None of the buildings surveyed were determined to be eligible for listing in the NRHP.

The investigation was done in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 4(f) of the Department of Transportation Act of 1966, as amended, in conjunction with the guidelines issued by the Advisory Council on Historic Preservation. In a Memorandum, dated November 14, 1994, the SHPO concurred with NCDOT's survey report (see Appendix F of the Environmental Assessment).

UTILITY IMPACTS

There will be no jurisdictional impacts associated with utilities on this project.

FEMA COMPLIANCE

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

INDIRECT AND CUMULATIVE EFFECTS ANALYSIS

A qualitative ICI Study as well as a Quantitative Assessment of Sediment and Nutrients report (ICI Report) was prepared for NCDOT in September, 2003. This report assessed the potential indirect and cumulative impacts of both STIP's U-2009C (Westside Bypass) and R-2246 (Westside Bypass Extension). U-2009C, from Weddington Rd. to Mooresville Rd., has already been constructed and traverses the more undeveloped portions of the study area, providing the greatest change in access to the study area because of its interchange with I-85. Further, some improved accessibility has already been realized immediately north of Weddington Rd. with the completed construction. Therefore, many of the indirect and cumulative effects of the overall Bypass and Bypass Extension are already likely to occur with or without R-2246.

Land use forecasts and the subsequent water quality modeling from the 2003 ICI Assessment were based on a future build year of 2015. These forecasts were made during the peak period of the most recent housing construction boom. Therefore, NCDOT decided to review the 2015

Build and No Build land use scenarios from the 2003 report, and provide an updated qualitative review of the potential indirect and cumulative impacts for R-2246.

The October, 2012 updated ICE review documents that since the 2003 report, Concord has revised its Unified Development Ordinance and Cabarrus County updated its Zoning Ordinance as has Rowan County. Only the Concord and Cabarrus County updates directly address stream protection.. The Cities of Concord and Kannapolis also obtained NPDES Phase II Stormwater Permits in 2005 and 2007 respectively.

Overall though, the updated ICE Report shows that current land use in the study area is not substantially different to the 2003 land use. The Concord Parkway/Roberta Church Rd. Small Area Plan has been developed by the City of Concord because planning staff expects the construction of R-2246. The780 acre conceptual plan incorporates low impact development approaches including complete protection of the Coddle Creek floodplain, a linear rain garden in the mixed use campus, and substantial open space requirements.

Discussions with the local planners in preparation of the updated ICE Report confirmed that the type of induced development forecasted in the 2003 ICI Report captures the potential development attributable to the construction of the Bypass and the Bypass Extension. However this development has simply been delayed due to economic conditions. The overall level of development indicated for 2015 in the 2003 study is more appropriate for a 2020 or 2025 forecast today.

The updated ICE Report has been reviewed by NCDWQ, and comments are being incorporated into the Final Updated ICE Report. The Report will be forwarded upon completion.

MITIGATION OPTIONS

The USACE 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 Merger 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.

Avoidance and minimization efforts and techniques were implemented as follows:

- The asymmetrical widening design of this project best uses the existing right of way, the existing roadways, and generally minimizes impacts to the project area.
- A partial cloverleaf was initially proposed for the US 29 / Roberta Church Road interchange. The interchange was re-designed to be a single-point diamond interchange, reducing the required right of way, and avoiding wetland impacts. In addition to the reduced right of way, this also allowed the interchange intersection with US 29 to be shifted approximately 150 feet further southwest, reducing impacts on the identified McLaughlin Road Basic Forest, a Natural Heritage Priority Area. This relocation also addressed the Philip Morris Company's concern about the proximity of the original interchange to their main employee and visitor entrance.
- The NCDOT's Best Management Practices for Protection of Surface Waters will be implemented.
- Storm drainage is being discharged as far away from jurisdictional streams as practicable throughout the project.
- Grass-lined ditches have been used throughout the project where feasible, to reduce velocity and promote infiltration.
- *Design Standards in Sensitive Watersheds* will be implemented to minimize erosion and sedimentation loss during the construction phase.
- At Site 1, two preformed scour holes (PSH) will be constructed at to minimize erosion.
- At Permit Site 1, the RBCB will be buried 1 foot below grade to facilitate aquatic passage.
- At Permit Site 1, a 2-foot sill (buried one foot) with an associated 1-foot low flow bench will be installed at the inlet and outlet of the overflow barrel to retain natural stream conditions. Bank stabilization will be installed along the length of the low flow benches to maintain integrity and minimize erosion and sedimentation.
- At Permit Site 2, an Energy Dissipater Basin will be constructed, with riprap installed on the streambank to reduce erosion and sedimentation.
- At Permit Site 3, the RBCB will be buried 1 foot below grade to facilitate aquatic passage.
- At Permit Site 3, a 2-foot sill (buried one foot) with an associated 1-foot low flow bench will be installed at the inlet and outlet of the overflow barrel to retain natural stream conditions. Bank stabilization will be installed along the length of the low flow benches to maintain integrity and minimize erosion and sedimentation.
- At Permit Site 4, a boardwalk will be constructed over the pond and adjacent wetland for the MUP, avoiding impacts for filling the pond and wetland.
- At Permit Site 5, coir matting and riprap will be installed on the side slopes and banks, respectively, at the outlet of the 48-inch pipe to reduce erosion potential.
- At Permit Site 5, coir matting will be installed on the side slopes at the inlet of the 48-inch pipe to reduce erosion potential.
- Hand clearing in wetlands, where possible, to reduce jurisdictional impacts.

SUMMARY OF JURISDICTIONAL IMPACTS

The project has been designed to avoid and minimize impacts to jurisdictional areas throughout the Merger process and design process. However, construction of the proposed project will

necessitate impacts to jurisdictional waters. Table 4 presents an overview of the impacts associated with this project.

Table 4 - Summary of Impacts

River Basin	Permanent Wetland (ac)	Permanent Stream (lf)	Temporary Stream (ac)	Surface Water [pond] (sf)
Yadkin-Pee Dee	0.27	1,377 [a/]	0.05	12 [b/]

[a/] see the "Compensatory Mitigation" section of this application for a discussion of the mitigation required for the 1,285 lf out of the total 1,377 lf of stream impacts.

[b/] Impacts to the pond are from the installation of 26 sets of 8" X 8" piles associated with the Multi-Use Path boardwalk.

SUMMARY OF MITIGATION

NCDOT will be providing 54 lf of on-site stream mitigation through natural stream design at Permit Site 2 (see Monitoring Plan Sheets). The 1,339 lf of stream impact for which the USACE is requiring mitigation, minus the 54 lf of on-site mitigation, results in 1,285 lf of stream impact that requires off-site mitigation. Additionally, there are no additional on-site mitigation opportunities, other than that which is occurring at Site 2, for this project. As such, NCDOT has obtained mitigation for permanent impacts to 1,285 lf of stream and 0.27 ac of permanent wetland impacts from EEP.

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 $570.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line).

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 contact Mr. Bill Barrett by telephone at (919) 707-6103 or by e.mail at wabarrett@ncdot.gov. A copy of this application will also be posted at: www.ncdot.org/doh/preconstruct/pe/neu/permit.html.

Sincerely,

E. L. Lusk

for Gregory J. Thorpe, Ph.D., Manager
Project Development and Environmental Analysis Unit

cc:

R-2246 Purpose and Need Statement

The purpose of this project is to implement a segment of the Kanlacon (Concord-Kannapolist-Landis-China Grove) Thoroughfare Plan[1] by providing an important link in the outer loop thoroughfare system. This facility, which provides connection to I-85 and improved access to the western segments of Cabarrus County, will remove traffic from existing congested facilities (US 29 and US 29A) and major traffic arterials linking Concord, Kannapolis, Landis and China Grove. The existing facilities are encumbered by signals, numerous street and driveway connections, substantial roadside interference due to abutting development, speed zone restrictions and turning traffic. These conditions result in limited capacity, slow travel speeds, time delays, congestion and an unacceptable level of service. The proposed facility will improve all these conditions.

Traffic Volumes and Capacity (Level of Service)

The estimated 1998/2020 AADT (Annual Average Daily Traffic) volumes for the project are shown in Figures 5A thru 6C of the Environmental Assessment (EA). The percentages of truck-tractor semi-trailers and dual tired vehicles for the project area are shown in Figure 4 of the EA.

The traffic carrying ability of a roadway is described by levels of service which range from A through F. Level of service A, the highest level of service, is characterized by very low delay in which most vehicles do not stop at all. Typically, drivers are unrestricted and turns are freely made. In level of service B, traffic operation is stable but more vehicles are stopping and causing higher levels of delay. Level of service C is characterized by stable operation with drivers occasionally having to wait through more than one red indication. Most drivers feel somewhat restricted in these circumstances. At a level of service D, the influence of congestion becomes more noticeable. Delay to approaching vehicles may be substantial during short periods of the peak hour. Level of service E is considered to be the limit of acceptable delay and represents the theoretical capacity of the facility. Level of service F represents over saturated or jammed conditions which are considered unacceptable to most drivers.

All intersections were analyzed (both existing and proposed) by the Traffic Engineering Branch using Transyt 7 -F, a traffic signal operations modeling tool. Figure 8 shows the anticipated level of service with the design year 2020 traffic for each signalized intersection with the proposed geometries. The proposed intersection geometries recommended as a part of this project are shown in Figures 15 through 18. The results for the "worst case" intersections are summarized below.

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[1] The mutually adopted (February 8, 1988) Concord-Kannapolis Thoroughfare Plan designates Crisco Road, Poplar Tent Road, US 29, Roberta Church Road, Roberta Road, Stough Road, and NC 49 as a major thoroughfare. This route will serve several functions in the area transportation network. It will become an important part of a north-south arterial route serving western Cabarrus and Rowan Counties by linking NC 49, US 29, I-85, NC 73, NC 136, and yet to be determined intersections in Rowan County. The arterial will also function as part of a circumferential route west of Kannapolis and Concord.

Congestion at signalized intersections can be expressed as a restriction or interference to normal free traffic flow. Four intersections will be signalized as part of this project: NC 49, Stough Road, Roberta Church Road, Weddington Road, and Poplar Tent Road. Based on the recommended cross section, Roberta Church Road and Weddington Road will operate at LOS C or better and Poplar Tent Road will operate at LOS D or better in the year 2020. NC 49 will operate at LOS C or better in the year 2020 using the ADT volumes. However, using AM Peak volumes, NC 49 will operate at LOS D or better until approximately the year 2017; Using PM Peak volumes, NC 49 will operate at LOS D or better until approximately the year 2012.

A partial cloverleaf interchange will be constructed at the intersection of the proposed project and US 29. Signalized ramps will be used at their intersections with the proposed bypass. Both signalized intersections are projected to operate at a level of service B in the year 2020 (See Figure 2 of the EA for configuration of interchange on aerial).

1. Signalized Intersections

No existing signalized intersections are present along the proposed project. Signalized ramps are proposed at the us 29 interchange.

2. Unsignalized Intersections

Several unsignalized intersections exist along the project. These include the Crisco Road/Poplar Tent Road intersection, the Crisco Road/Weddington Road intersection, the Roberta Church Road/US 29 intersection, the Roberta Church Road/Roberta Road, the Stough Road/Roberta Road intersection, and the Stough Road/NC 49 intersection.

Accident History

An accident study of the subject sections of Stough Road, Roberta Church Road, and Crisco Road was conducted by the Traffic Engineering Branch for the time period March 1, 1993 through February 29, 1996. During this time, a total of 6 accidents with no fatalities were reported on Stough Road~ a total of 24 reported accidents with no fatalities were reported on Roberta Church Road~ and a total of 19 accidents with no fatalities were reported on Crisco Road. The following is a listing of the accidents by type:

Type	Number of Accidents	% of Total Accidents
Stough Road		
Angle Collision	2	33.3
Vehicle Ran Off Roadway	2	33.3
Left/Right Turn Collision	1	16.7
Rear-End Collision	1	16.7

Roberta Church Road		
Vehicle Ran Off Roadway	13	54.2
Angle Collision	5	20.8
Left/Right Turn Collision	2	8.3
Rear-End Collision	2	8.3
Sideswipe Collision	2	8.3
Crisco Road		
Angle Collision	6	31.6
Vehicle Ran Off Roadway	4	21.0
Rear-End Collision	4	21.0
Left/Right Turn Collision	3	15.8
Head-On Collision	1	5.3
Sideswipe Collision	1	5.3

The resulting total accident rate for the studied sections are 6I. 7 accidents per I 00 million vehicle kilometers (acc/IOO mvk) for Stough Road, 254.5 acc/IOO mvk for Roberta Church Road, and 227.8 acc/IOO mvk for Crisco Road. The statewide three-year average for similar routes for the years 1992 through 1994 was 212.7 acc/100 mvk (see Figures 9, 11, and 13 of the EA). The accident rate for the majority of the subject project's existing roads is higher than the statewide average for similar routes. This rate will likely continue to increase unless provisions are made to accommodate the projected traffic volumes. The proposed improvements will reduce the potential for the types of accidents occurring along Stough Road, Roberta Church Road, and Crisco Road. The proposed project will improve the overall safety and convenience of motorists.

U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

OMB APPROVAL NO. 0710-0003
EXPIRES: 28 FEBRUARY 2013

Public reporting for this collection of information is estimated to average 11 hours per response, including 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 the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). 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

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. 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, and the public and may be made available as part of a public notice as required by Federal law. 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/or 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 COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Middle - Last -	First - Middle - Last -
Company - North Carolina Department of Transportation	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address- 1598 Mail Service Center	Address-
City - Raleigh State - NC Zip - 27699 Country - USA	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE	10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. 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.

_____ SIGNATURE OF APPLICANT _____ DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
TIP No. R-2246B. George Liles Parkway (Section B)

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
Unnamed tributaries to Coddle Creek	Address
15. LOCATION OF PROJECT Latitude: °N 35.3843 Longitude: °W 80.6430	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality
Section - Township - Range -

17. DIRECTIONS TO THE SITE
Please see attached Vicinity Map and Cover Letter

18. Nature of Activity (Description of project, include all features)
The North Carolina Department of Transportation (NCDOT) proposes to construct an extension of the George Liles Parkway. This section of the Parkway (Section B) is 3.237 miles in length and will extend from just south of Roberta Road northward to Weddington Road, the southern extent of the existing Parkway. The proposed project consists of constructing a four-lane, median divided facility on a minimum of 200 feet of right of way. The section of the project extending from US 29 (Concord Parkway) to Weddington Road will be on new location, and will include a Multi-Use Path (MUP), to be constructed adjacent to this section of the Parkway.
The project will permanently impact a total of 1,377 linear feet of perennial streams, all of which are unnamed tributaries to Coddle Creek, and a total of 0.27 acre of wetlands.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)
Please see the Purpose and Need Statement, included as an attachment with the Cover Letter.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
Needed in order to provide road base for new section of roadway and wider road base for road-widening.

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

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards

see attached drawings.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)
Acres The project will permanently impact a total of 0.27 acre of wetlands (see permit attached drawings).
or
Linear Feet Impact a total of 1,377 linear feet of perennial streams, all of which are unnamed tributaries to Coddle Creek.

23. Description of Avoidance, Minimization, and Compensation (see instructions)
NCDOT will be creating 54 lf of on-site stream mitigation through natural stream design at Permit Site 2 (see Monitoring Plan Sheets). The 1,307 lf of stream impact for which the USACE is requiring mitigation, minus the 54 lf of on-site mitigation, results in 1,253 lf of stream impact that requires mitigation. There are no additional on-site mitigation opportunities, other than that which is occurring at Site 2, for this project. As such, NCDOT has obtained mitigation for permanent impacts to 1,253 lf of stream and 0.27 ac of permanent wetland impacts from EEP.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☐ No IF YES, DESCRIBE THE COMPLETED WORK

Please note: Section C of the project was permitted in 2003, and construction has been completed. NCDOT is applying for an IP for Section B independently.

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

a. Address- Please see Permit Sheet of for property owners list.

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates 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

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this 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.

E. L. Lusk 10·18·12

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

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.

Ecosystem
ENHANCEMENT
PROGRAM

October 11, 2012

Mr. Gregory J. Thorpe, Ph.D.
Manager, Project Development and Environmental Analysis Unit
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Dr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

R-2246B, Concord-Kannapolis Westside Bypass Extension from SR 1304 (Roberta Road) to SR 1431, Cabarrus County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the compensatory stream and riparian wetland mitigation for the subject project. Based on the information supplied by you on October 10, 2012, the impacts are located in CU 03040105 of the Yadkin River basin in the Southern Piedmont (SP) Eco-Region, and are as follows:

Yadkin 03040105 SP	Stream			Wetlands			Buffer (Sq. Ft.)	
	Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh	Zone 1	Zone 2
Impacts (feet/acres)	0	0	1,339	0.27	0	0	0	0

This mitigation acceptance letter replaces the mitigation acceptance letter issued on September 18, 2012. EEP commits to implementing sufficient compensatory stream and riparian wetland mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies in accordance with the N.C. Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from EEP.

If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-715-1929.

Sincerely,

James B. Stanfill for

Suzanne Klimek
EEP Acting Director

cc: Ms. Liz Hair, USACE – Asheville Regulatory Field Office
Ms. Amy Chapman, Division of Water Quality, Wetlands/401 Unit
File: R-2246B Revised

Subject: Minutes from Interagency Hydraulic Design 4B Permit Review Meeting May 12, 2010 for R-2246B in Cabarrus County

Team Members:

Liz Hair- USACE	(present)
Marella Buncick- USFWS	(present)
Marla Chambers-NCWRC	(present)
Polly Lespinasse- NCDWQ	(present)
Chris Militscher-EPA	(present)
Donnie Brew-FHWA	(present)
Carla S. Dagnino-NCDOT-NEU	(present)
Bill Barrett-NCDOT-NEU	(present)
Elizabeth Lusk -NCDOT-NEU	(present)
Ryan White- NCDOT-PDEA	(present)

Participants:
Galen Cail, NCDOT Hydraulics
Joe Dunnehoo, NCDOT Hydraulics
Greg Brew, NCDOT Roadway
Imad Younis, NCDOT Roadway
Charles Hunt, NCDOT Structures
Mark Staley, NCDOT REU
Larry Thompson, NCDOT Division 10

GENERAL NOTES:

Proposed ditches will have 3:1 or flatter side slopes and meet grass swale criteria where practical.

Where practical, rock check dams or preformed scour holes will be provided at the end of ditches tying into wetlands.

Toe protection will be used to protect the toe of fill in wetland areas.

Culverts at JS crossings will be buried 20% of diameter up to 1'.

Sheet # 4 Station 9+52.95-L1-

Discussed the possibility of replacing (30 feet long) bridge as part of the B project. Pending replacement schedule. If include with the B section, it is anticipated a 3@10'x8' RCBC would be needed.

Sheet #5

At station 29+50+/- -L1- Rt. & Lt., there are proposed preformed scour holes (PSH) at each pipe outlet. These PSHs were accepted since stormwater is treated from grass lined ditches.

At station 30+50+/- -L1- Rt., the installation of a grass line swale with the proposed PSH will be investigated if additional right-of-way is acquired.

Hydro discussed the possibility of stream mitigation by removing the existing two 42" cm pipes and driveway at station 31+75+/- -L1- Rt. Additional Right of Way would be needed for this stream mitigation.

There was discussion on the relocation of the energy dissipater at station 35+50+/- -L1- Rt. The energy dissipater is located at the toe of hill, so it was decided to leave the energy dissipater as is.

Sheet # 6

At station 38+00+/- -L1- Rt. on Roberta Church Rd., there was discussion to moving the cul-de-sac to the east to allow for the removal of the existing roadway and pipes for a possible stream mitigation site. This will need further investigation with the Roadway Unit.

Sheets # 7 through #9

No discussion.

Sheet # 10

It was discussed that the hydraulic unit is investigating the possibility of detaining some of the stormwater in the grass areas of the interchange.

Sheet # 11

At station 98+26-L-, it was discussed that the proposed drainage system would tie into the side of the proposed box culvert. Upon review, it was requested that the drainage system coming from the east discharge be investigated as to the possibility of discharging into an energy dissipater or any other BMP which would provide treatment of the stormwater from the shoulder berm gutter collection system. The drainage system coming from the west could tie into the box culvert since it was collecting stormwater from the grass ditches.

Sheet # 12

It was discussed to lower the grade on the 36" pipe at station 110+00+/- -L- Lt. and possibly install an energy dissipater at the outlet of the pipe. Also, discussed lowering the grade of the outlet ditch and placing coir matting on the side banks.

Sheet # 13

At station 122+00+/- -L- Lt., it was discussed to place more of a curve for the tie in of the proposed ditch to the existing stream.

At station 122+50+/- -L-Rt., it was discussed that a better tie in is needed for the proposed ditch to the 42" pipe.

Also, discussed that the 2GIs between the two walls could be raised to allow for detention and treatment of the stormwater.

Sheets # 14 through # 18

No comments.

Meeting adjourned

Subject: Minutes from Interagency Hydraulic Design 4C Permit Review Meeting November 9, 2011 for R-2246B in Cabarrus County

Team Members:

Liz Hair- USACE	(absent)
Marella Buncick- USFWS	(absent)
Marla Chambers-NCWRC	(absent)
Polly Lespinasse- NCDWQ	(absent)
Chris Militscher-EPA	(absent)
Donnie Brew-FHWA	(absent)
Carla S. Dagnino-NCDOT-NES	(present)
Bill Barrett-NCDOT-NES	(present)
Elizabeth Lusk -NCDOT-NES	(present)
Phil Harris- NCDOT-PDEA	(present)
John Conforti – NCDOT-PDEA	(present)

Participants:
Joe Dunnehoo, NCDOT Hydraulics
Larry Clawson, NCDOT Hydraulics
Greg Brew, NCDOT Roadway
Imad Younis, NCDOT Roadway
Mark Staley, NCDOT REU
James Swinson, NCDOT Utilities
Greg Sealy, NCDOT Utilities

GENERAL NOTES:

Chris Miltscher and Polly Lespinasse were not present but provided comments prior to meeting. See comments and responses below.

Sheet # 11

How do we minimize the impacts of the Multi Use Path (MUP) downstream from the box culvert at sta. 98+39-L-(Lt)? It was determined that placing the MUP on the same slope as the culvert would result in the lease stream impacts.

Sheet # 12

How do we minimize the impacts of the Multi Use Path (MUP) on the jurisdictional pond and wetlands at sta. 110+50 to 112+50-L- (Lt)? It was determined that the MUP would be an elevated boardwalk. The only impacts would be from the piles in the pond and the hand clearing of the wetlands for the boardwalk.

Meeting adjourned

The following comments are those submitted by Polly Lespinasse with DWQ. The responses will be in Italics.

DWQ Comments on R-2246B, 4C Hydraulics Meeting, November 9, 2011

Site 1:

- Detail "LL" depicts the use of Class 1 on the benches. Given that 2-13x10 RCBCs are being installed, is Class I adequate? We require the use of Class II on the face of the floodplain bench at a minimum in order to stabilize the bench initially. The coir fiber matting must be used on the top of the bench to promote vegetation growth and hold the backfilled soils.

  The outlet velocity from the box culverts are 7.1 fps. The Class I rip rap is adequate to handle this velocity.

- The 4B notes/plans depict a PSH on the downstream left bank. The 4C plans no longer show it – it appears to be riprap pad. Why was this changed?

  It was determined that the proposed drainage structure and pipe on the left bank as show in the 4B plans were not needed and therefore the PSH was removed.

Site 2:

- Please provide Detail KK. I could not locate it in the drawings I received. Please be advised that if mitigation credit is being sought, a forested buffer must be provided on both sides of the stream.

  Detail "KK" is located on Sheet 2-I.

- The 4B plans show the dissipator pad set back from the stream. The 4C plans show the dissipator up to the edge of the stream with impacts actually occurring within the stream due to the installation. Why is this necessary? Why is Class I being used on the dissipator and on the stream banks?

  Moving the energy dissipater closer to the stream reduced the amount of excavation and stream bank disturbance to construct it. The velocity across the apron pad before going into the stream is 1.4 fps which Class I rip rap can handle.

Site 3:

- Is any stormwater being directly discharged into the 13x9 RCBCs?

  Yes. The discharge from the grass lined median.

- The 4B plans show another stream coming into the main channel on the inlet side of the proposed culvert, where the proposed lateral base ditch is being installed. Are there additional stream impacts due to the installation of the base ditch?

  No. This site is not a Jurisdictional Stream.

- Please provide the slope of the base ditch on the inlet side of the proposed culvert. Detail EE shows Class I riprap as the material being proposed to stabilize the lower reach of the ditch. Larger riprap may be appropriate where the ditch ties into the stream.

  The proposed ditch slope is 2.8%. The velocity in the ditch shown in Detail EE for the ten year event is 3.7 fps. The Class I rip rap can handle this velocity.

- Please provide the slope of the base ditch on the outlet side of the proposed culvert. Detail GG shows PSRM as the material being proposed to stabilize the ditch. If the slope is steep, then it would be appropriate to use larger riprap in the ditch, especially where it ties into the stream. Coddle Creek is a 303d listed stream for turbidity.

  The proposed ditch slope is 5.2%. Detail GG has been revised to show Class I Rip Rap. The velocity in the ditch shown in detail GG for the ten year event is 4.3 fps.

- Detail "MM" depicts the use of Class 1 on the benches. Given that 2-13x9 RCBCs are being installed, is Class I adequate? We require the use of Class II on the face of the floodplain bench at a minimum in order to stabilize the bench initially. The coir fiber matting must be used on the top of the bench to promote vegetation growth and hold the backfilled soils.

  Detail "MM" has been updated to show Class II rip rap at the face of the floodplain bench. The outlet velocity for the ten year event is 7.1 fps. Class I rip rap can handle this velocity. As for the coir fiber matting being used on the top of the bench, Detail "MM" shows the use of coir fiber matting on the top of the benches.

Site 4:

- The permit summary table indicates that 416 feet of stream will be impacted by fill and a 36" RCP. Will this stream be conveyed through the 24" and 30" RCPs before entering the 36" RCP?

  Yes. The discharge from the subdivision pipe system is collected in proposed 18" reinforce concrete pipes (RCP) and 24" and 30" RC pipes before connecting to the proposed 36" RCP.

- The permit summary table indicates there will be wetland impacts due to mechanized clearing. I could not locate these impacts on the plans.

  The mechanized clearing is located at station 110+20-L-(Lt). This wetland is a total take due to the mechanized clearing and fill of the wetland.

- Is the pond fill accounted for? Is this the 0.03 acres on the permit summary table?

  There is no fill being placed in the pond. A proposed boardwalk will span the entire pond. However, there will be 12 SF of surface water impacts and 6 SF of wetland impacts due to piles being placed for the boardwalk. (See Wetland Permit Impact Summary Sheet)

- Is stormwater dropping directly into the stream from the 15" RCP (where it ties into the 24" RCP)? If so, is this stormwater getting any treatment prior to entering the 15" RCP?

  There will be no treatment for inlets in the shoulder.

- What is the slope of the "ditch" section at the outlet end of the culvert where it ties back into the stream? Please provide a detail for the construction of this ditch.

  The proposed slope for the tail ditch for the 36" RCP is 0.5%. Detail "M' provides a sketch for the construction of the ditch.

Site 5:

- How is the ditch on the outlet end of the culvert tying into the existing stream? It appears to be tying in at a right angle to the existing stream.

  The proposed Special Lateral Base Ditch (Detail 'AA') will be curved to tie into the proposed outlet ditch.

- What is the slope of this ditch as it ties into the stream?

  The proposed Special Lateral Base Ditch (Detail 'AA') has a slope of 1.23% before it ties into the stream.

- The plans show Class B riprap in this ditchline, but the detail drawings (Detail AA) don't show anything stabilizing the ditch. Please clarify.

  The rip rap shown in the ditch is just rip rap outlet protect pads for the discharge pipes which connect to this ditch. This ditch is not a jurisdictional stream.

- Detail Z shows coir fiber matting in the stream. The plans indicate coir fiber on the slopes only (along with Class I riprap). Please clarify.

  Detail 'Z' was revised to show coir fiber matting on the side slopes and not in the stream bed. The Class I rip rap shown is for pipe outlet protection only. The rip rap will only be placed on the side slopes.

The following comments are those submitted by Christ A. Militscher with USEPA Region 4. The response will be in Italics.

USEPA Comments on R-2246B, 4C Hydraulics Meeting, November 9, 2011

I have reviewed the drawings and other information provided. At Site #2, plan sheet 5; I ask that you try to get the energy dissipater pad aligned at more of an angle to the stream. Currently, the proposed outlet from the pad is aimed perpendicular to the stream.

Turning the energy dissipater pad to a 45 degree angle with the stream would cause approximately 14 more linear feet of stream and bank impacts and an increase in the amount of excavation work to construct it. The velocity across the apron pad before going into the stream is 1.4 fps.

R-2246B
George Liles Parkway Widening
CABARRUS COUNTY
MERGER PROCESS 4C MEETING
WEDNESDAY 9 Nov. 2011

Sign in Sheet

NAME	ORGANIZATION	PHONE NUMBER	EMAIL ADDRESS
JOE DUNNEHOO	NCDOT HYDRAULICS	707-6717	JWDUNNEHOO@NCDOT.GOV
JOHN CONFORTI	NCDOT - PDEA	707-6015	JGCONFORTI@NCDOT.GOV
Greg Brew	NCDOT- Roadway Design	707-6220	gbrew@ncdot.gov
Imad Younis	" "	" -6345	iyounis@ "
Mark Staley	NCDOT-REU	919-733-2920	mstaley@ncdot.gov
JAMES SWINSON	" UTILITIES	707-6987	JESWINSON@NCDOT.GOV
Greg Sealy	Utilities	707-7170	gsealy@ncdot.gov
Carla Dagnino	NEU - PMG	707-6110	cdagnino@ncdot.gov
BILL BARRETT	NEU - PMG	707-6103	wabarrett@ncdot.gov
Phil Harris	PDEA - NES	707-6123	pharris@ncdot.gov
Larry Clawson	Hydro	707-6717	ldclawson@ncdot.gov
Elizabeth Lusk	PDEA-NES	707-6133	ellusk@ncdot.gov

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

Project/TIP No.: R-2246B (34408.1.1) **County(ies):** Cabarrus

General Project Information

Project No.:	R-2246B (34408.1.1)	**Project Type:**	New Location	**Date:**	7/5/2011
NCDOT Contact:	Galen Cail	**Contractor / Designer:**	Joe Dunnehoo		
Address:	1020 Birch Ridge Dr. Raleigh, N.C. 27610	**Address:**	1020 Birch Ridge Dr. Raleigh, N.C. 27610		
Phone:	919.707.6711	**Phone:**	919.707.6711		
Email:	gcail@ncdot.gov	**Email:**	jwdunnehoo@ncdot.gov		
City/Town:	Concord, N.C.	**County(ies):**	Cabarrus		
River Basin(s):	Yadkin-Pee Dee	**CAMA County?**	No		
Primary Receiving Water:	Coddle Creek	**NCDWQ Stream Index No.:**	C		
NCDWQ Surface Water Classification for Primary Receiving Water	**Primary:**	Class C			
	Supplemental:	None			
Other Stream Classification:	None				
303(d) Impairments:	None				
Buffer Rules in Effect	N/A				

Project Description

Project Length (lin. Miles or feet):	3.237 miles	**Surrounding Land Use:**	Residential, Commercial, and Undeveloped

	Proposed Project	Existing Site
Project Built-Upon Area (ac.)	47.1 Ac RDWY & 1.5 Ac MUP ac.	16.50 ac.
Typical Cross Section Description:	4 lane divided with 46 ft grass median; 12 ft lanes and 4ft paved shoulders	Two 12 ft lanes with 6ft grass shoulders
Average Daily Traffic (veh/hr/day):	Design/Future: 42,000	Existing: 22,852

General Project Narrative:

This project involves the widening of Roberta Road (SR 1304), construction on new location, and construction of a multi use path (MUP). There are 2 major stream crossings on this project. There are 5 sites where streams are impacted for a total of 1240 ft, 4 wetland site are being impacted, and 1 pond crossed. Grass swales are used whereever possible. Grass shoulders and grass medians will provide infiltration. The side slopes of the ditches are 4:1 or flatter for most ditches. Pipes that are in jurisdictional streams are buried 20% or up to one foot. Preformed scour holes are used in 7 different locations. Three dry detention basins are being installed at the interchange ramps . These basins are not required, however, will provide a total of 5618 cf of storage or 65% of the require one inch of treatment.

References

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

Project/TIP No.: R-2246B (34408.1.1) **County(ies):** Cabarrus

Preformed Scour Holes and Energy Dissipators

Sheet No.	Station	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)		V10 (fps)
5	29+22-L1-(Rt)	PFSH	Class 'B'	2.30	Pipe	18	6.7		
5	30+40-L1-(Rt)	PFSH	Class 'B'	0.38	Pipe	15	1.9		
5	35+54-L1-(Rt)	Riprap Energy Dissipator Basin	Class I	13.88	Pipe	36	43.1		1.4
9	51+50-L-(Rt)	PFSH	Class 'B'	0.87	Pipe	15	3.4		
9	51+86-L-(Rt)	PFSH	Class 'B'	0.53	Pipe	18	1.3		
10	62+00-L-(Rt)	PFSH	Class 'B'	1.98	Pipe	18	6.8		
10	17+05-RPC-(Rt)	PFSH	Class 'B'	0.18	Pipe	15	0.5		
10	19+36-RPD-(Lt)	PFSH	Class 'B'	2.71	Pipe	18	7.1		

☐ YES ☐ NO Have minimum design criteria, as presented in the NCDOT Best Management Practices Toolbox (2008), NCDOT Standard Details, or FHWA HEC-14 (July 2006), been met and verified, as applicable? If No, provide further explanantion of why design criteria was not met.

Additional Comments

* Refer to the NCDOT Best Management Practices Toolbox, Version 1 (March 2008), NCDOT Standard Details, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

Project/TIP No.: R-2246B (34408.1.1) **County(ies):** Cabarrus

Other Stormwater Control Measures

Sheet No.	Station	SCM Type	Drainage Area (ac)	Required / Minimum Treatment			Design Treatment		All Design Criteria Met?
10	19+50-RPD-(Lt)	Dry Detention Basin	2.47	WQv (cf)	1484.00	cf	[illegible]	cf	[illegible]
10	24+15-Y4-(Lt)	Dry Detention Basin	4.68	WQv (cf)	5900.00	cf	[illegible]	cf	[illegible]
10	19+85-Y4-(Rt)	Dry Detention Basin	0.98	WQv (cf)	1242.00	cf	1888.00	cf	Yes

Additional Comments

These basins are not required, however, will provide a total of 5618 cf of storage or 65% of the require one inch of treatment. These three basins treat 2.5 ac. of impervious area.

* Equalizer Pipes to be noted as a minimization of impacts.

MONITORING PLAN

R-2246B Site 2

As part of the construction, a 72" corrugated metal pipe carrying an unnamed tributary (UT) to Coddle Creek at Permit Site 2 will be removed. This will result in 54 feet of daylighting to the UT. After the culvert is removed, NCDOT proposes to match the stream and floodplain grade with the existing upstream and downstream portions of natural ground (refer to attached Detail KK). The site is already within NCDOT right-of way. NCDOT proposes to replant the affected area with native vegetation (refer to attached Streambank Reforestation Sheets 1 & 2). The area is currently a maintained/disturbed community. This will restore approximately 25 feet of riparian buffer to either side of the UT. Please refer to the attached planting schedule. NCDOT will visually monitor the site for three years to ensure vegetation reaches jurisdictional status. The removal of the culvert will mitigate 54 feet of stream impacts at a 1:1 ratio.

MONITORING PLAN

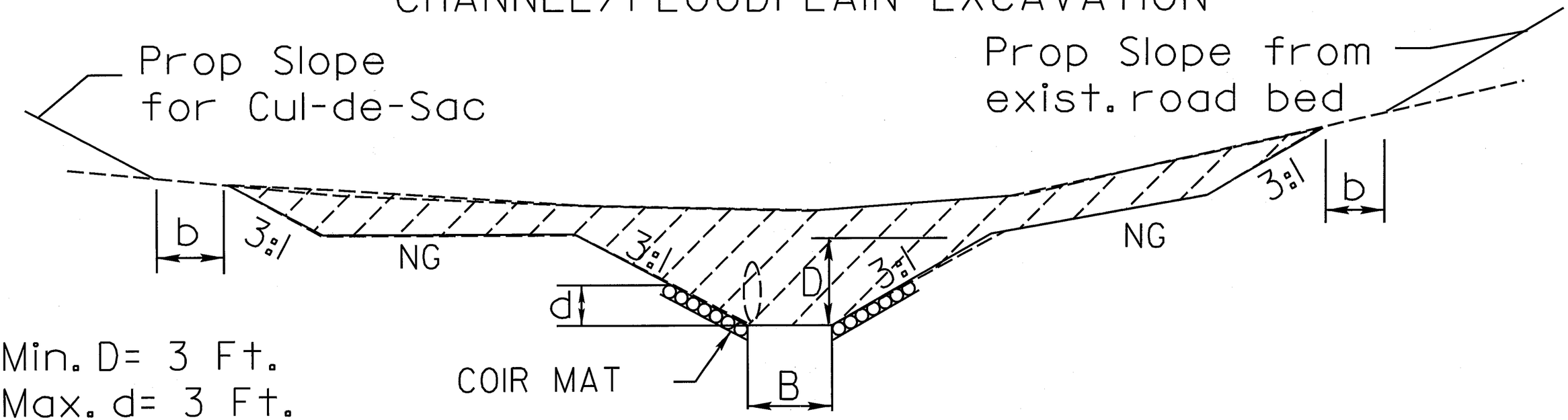
R-2246B Site 2

As part of the construction, a 72" corrugated metal pipe carrying an unnamed tributary (UT) to Coddle Creek at Permit Site 2 will be removed. This will result in 54 feet of daylighting to the UT. After the culvert is removed, NCDOT proposes to match the stream and floodplain grade with the existing upstream and downstream portions of natural ground (refer to attached Detail KK). The site is already within NCDOT right-of way. NCDOT proposes to replant the affected area with native vegetation (refer to attached Streambank Reforestation Sheets 1 & 2). The area is currently a maintained/disturbed community. This will restore approximately 25 feet of riparian buffer to either side of the UT. Please refer to the attached planting schedule. NCDOT will visually monitor the site for three years to ensure vegetation reaches jurisdictional status. The removal of the culvert will mitigate 54 feet of stream impacts at a 1:1 ratio.

(Not to Scale)

DETAIL 'KK'

CHANNEL/FLOODPLAIN EXCAVATION



Min. D= 3 Ft.
Max. d= 3 Ft.
B= Var 8 Ft. to Existing
b= 5 Ft.

Type of Liner= COIR MAT

Excavate existing road fill
to Up and Downstream
Natural Ground

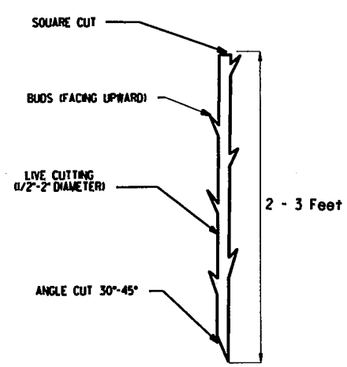
FROM STA. 36+70 TO STA. 37+26 –L1– RT
EST EXCAV = 630 CY
EST COIR MAT = 120 SY

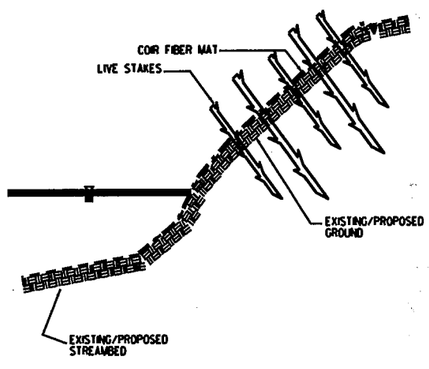
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	RF-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANTING DETAILS

LIVE STAKES PLANTING DETAIL

LIVE STAKE

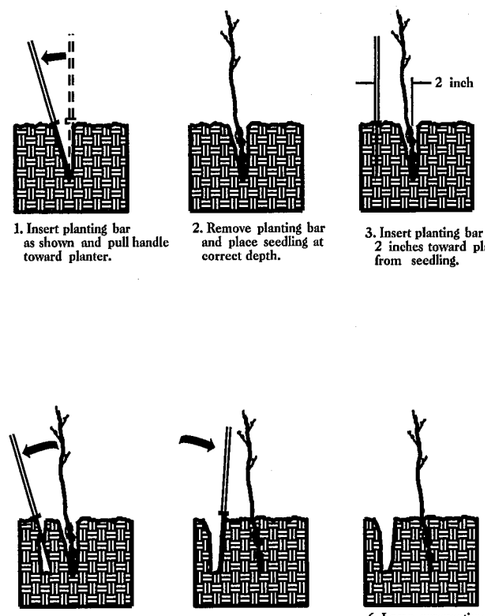




BANK STABILIZATION WITH LIVE STAKES

NOTE:
LIVE STAKES SHALL BE SPACED APPROXIMATELY 4 FEET ON CENTER
LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY ¾ OF LIVE STAKE IS WITHIN GROUND

BAREROOT PLANTING DETAIL
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



1. Insert planting bar as shown and pull handle toward planter.
2. Remove planting bar and place seedling at correct depth.
3. Insert planting bar 2 inches toward planter from seedling.
4. Pull handle of bar toward planter, firming soil at bottom.
5. Push handle forward firming soil at top.
6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

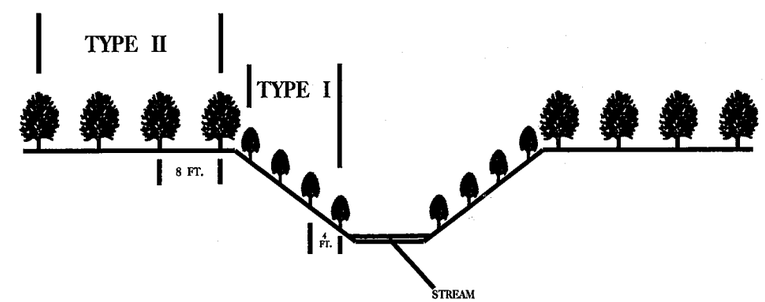
PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

- ☐ TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.
- ☐ TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.
- ☐ NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"

STREAMBANK REFORESTATION TYPICAL



STREAMBANK REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

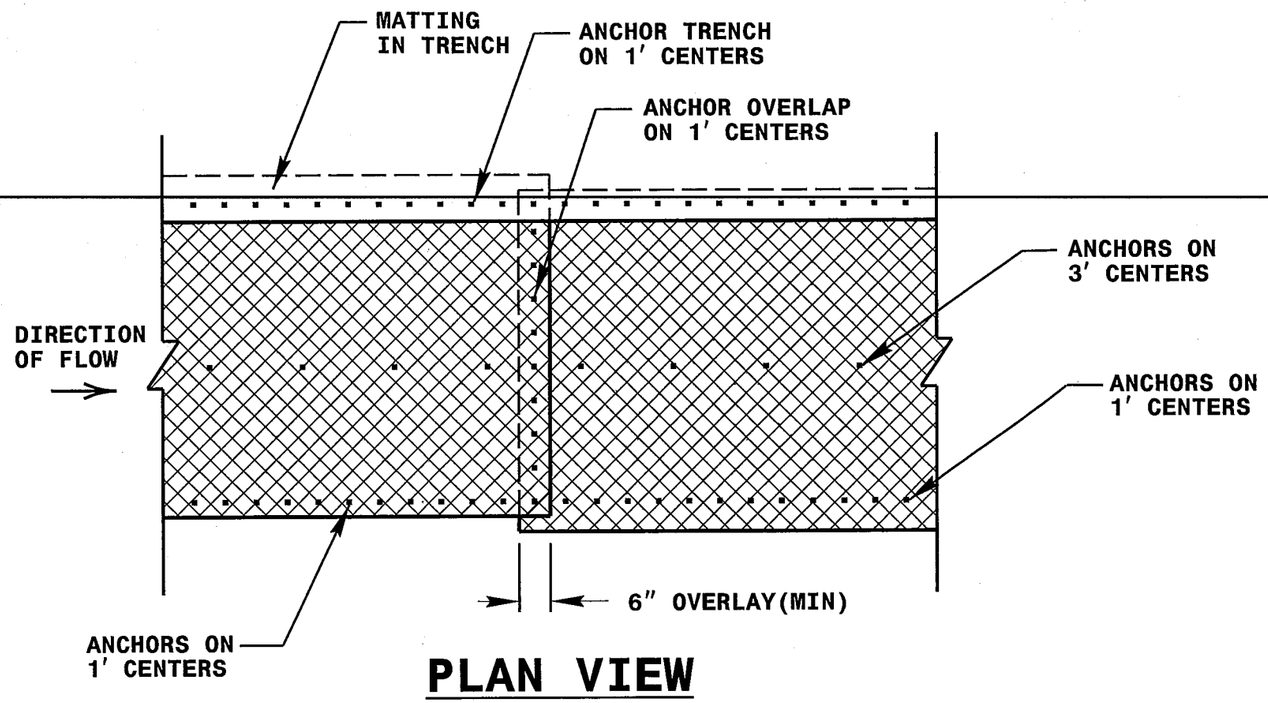
TYPE 1			
50%	SALIX NIGRA	BLACK WILLOW	2 ft - 3 ft LIVE STAKES
50%	CORNUS AMOMUM	SILKY DOGWOOD	2 ft - 3 ft LIVE STAKES
TYPE 2			
25%	FRAXINUS PENNSYLVANICA	GREEN ASH	12 in - 18 in BR
25%	PLATANUS OCCIDENTALIS	SYCAMORE	12 in - 18 in BR
25%	QUERCUS NIGRA	WATER OAK	12 in - 18 in BR
25%	BETULA NIGRA	RIVER BIRCH	12 in - 18 in BR

- ☐ SEE PLAN SHEETS FOR AREAS TO BE PLANTED

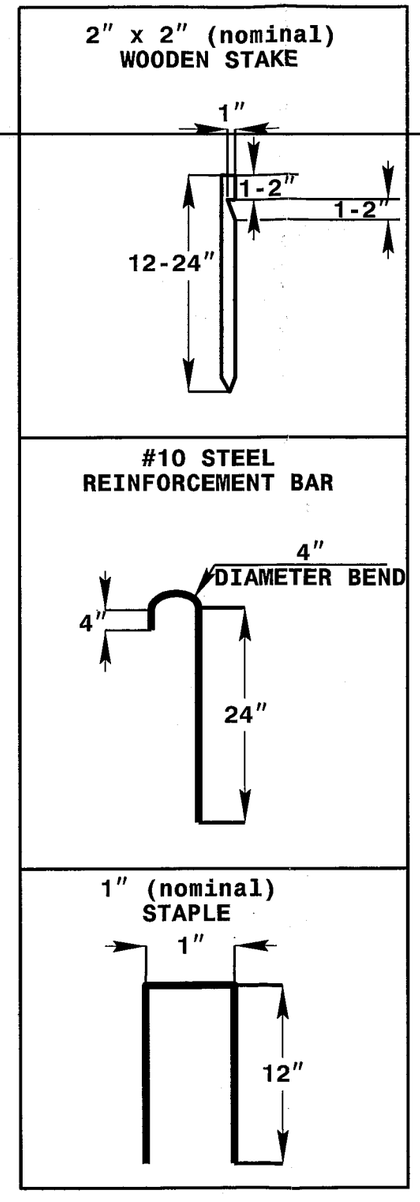
STREAMBANK REFORESTATION DETAIL SHEET 1 OF 2

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

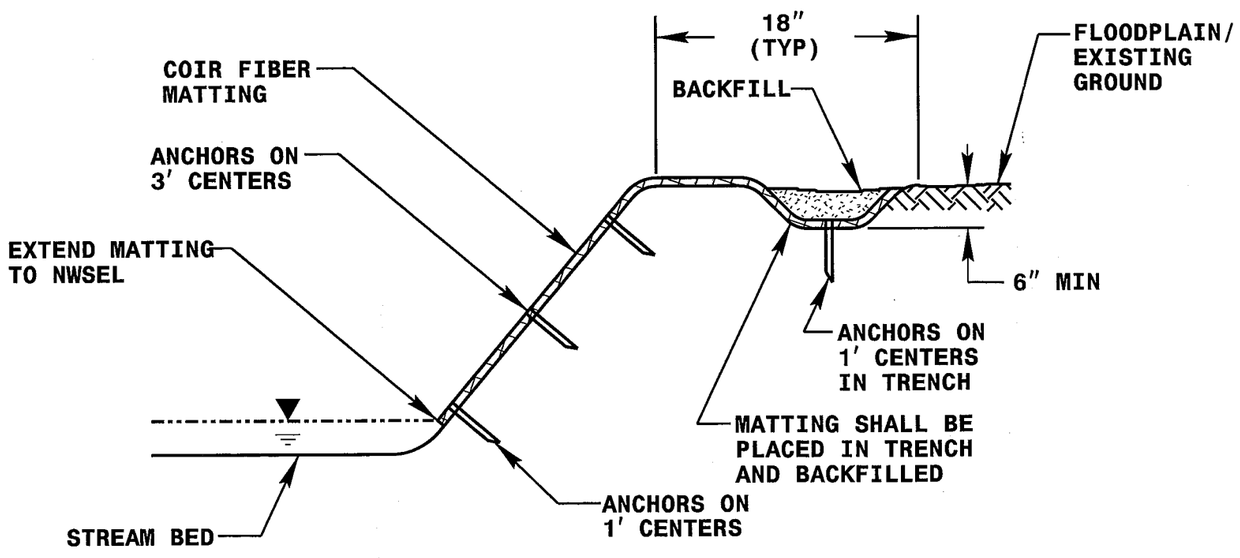
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	RF-3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



PLAN VIEW



ANCHOR OPTIONS



TYPICAL CROSS SECTION

COIR FIBER MATTING DETAIL

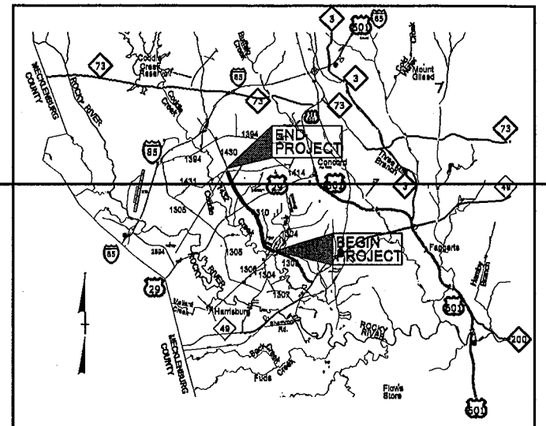
NOT TO SCALE

STREAMBANK REFORESTATION
DETAIL SHEET 2 OF 2
N.C.D.O.T.- ROADSIDE ENVIRONMENTAL UNIT

09/08/09

TIP PROJECT: R-2246B

See Sheet 1-A For Index of Sheets



VICINITY MAP

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF CONCORD

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CABARRUS COUNTY

LOCATION: GEORGE LILES PARKWAY FROM SOUTH OF SR 1304 (ROBERTA ROAD) TO SR 1431 (WEDDINGTON ROAD)

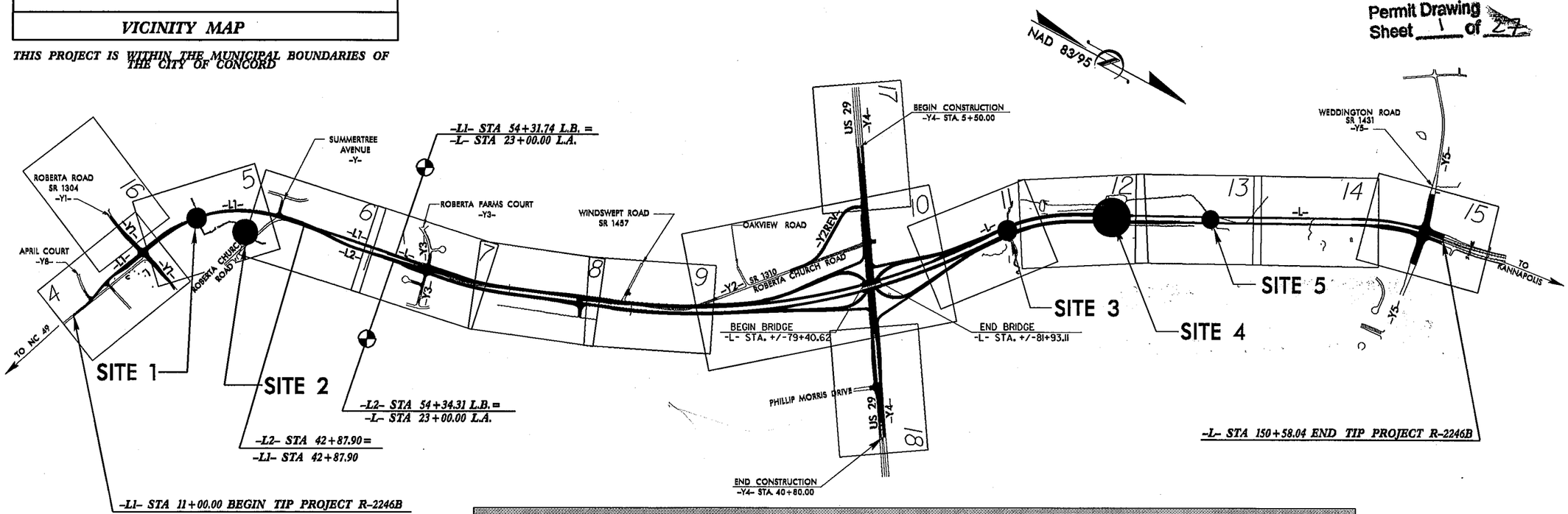
TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2246B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34408.1.1	STP-000S(46)	PE
34408.2.6	STP-000S(684)	R/W & UTIL

STATEWIDE TIER PROJECT

Permit Drawing Sheet 1 of 27



WETLAND AND SURFACE WATER IMPACTS PERMIT

NOTE: PART OF THIS PROJECT IS A PARTIAL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS AND THE OTHER PART IS A FULL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$

GRAPHIC SCALES

50 25 0 50 100 — PLANS

50 25 0 50 100 — PROFILE (HORIZONTAL)

10 5 0 10 20 — PROFILE (VERTICAL)

DESIGN DATA

ADT 2013 = 22,852
ADT 2035 = 42,000
DHV = 55 %
D = 10 %
T = 5 % *
V = 60 MPH
* TTST 1% DUAL 4%

FUNCTIONAL CLASSIFICATION
URBAN ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2246B = 3.189 MILES

LENGTH STRUCTURE TIP PROJECT R-2246B = 0.048 MILES

TOTAL LENGTH TIP PROJECT R-2246B = 3.237 MILES

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MARCH 18, 2011

LETTING DATE: APRIL 16, 2013

G.E. BREW, PE
PROJECT ENGINEER

I.T. YOUNIS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER P.E.

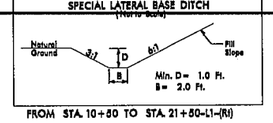
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-H
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 2 of 27

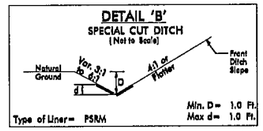
DRAINAGE DITCH DETAILS

DETAIL 'A'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 10+50 TO STA. 21+50-L1-(Rt)

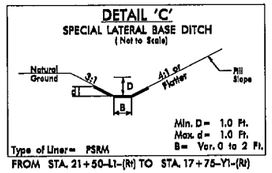
DETAIL 'B'
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner= PSRM

FROM STA. 14+17.65 TO STA. 14+50-L1-(Lt)
FROM STA. 12+50 TO STA. 12+97.48-Y8-(Lt)
FROM STA. 14+50 TO STA. 16+50-Y5-(Rt)
FROM STA. 37+00 TO STA. 39+00-Y4-(Lt)

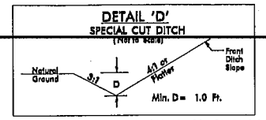
DETAIL 'C'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner= PSRM

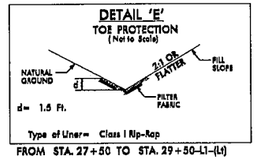
FROM STA. 21+50-L1-(Rt) TO STA. 17+75-Y1-(Rt)

DETAIL 'D'
SPECIAL CUT DITCH
(Not to Scale)



FROM STA. 12+18.55 TO STA. 15+00 -SPURB-(Lt)
FROM STA. 17+75 TO STA. 20+50 -Y1-(Lt)
FROM STA. 17+75 TO STA. 20+71.95 -Y1-(Rt)
FROM STA. 13+31.32 TO STA. 13+87.46 -Y1-(Lt)
FROM STA. 33+61.46 TO STA. 35+50 -L1-(Lt)
FROM STA. 23+00 TO STA. 24+00 -L-(Rt)
FROM STA. 50+00 TO STA. 54+31.74 -L1-(Rt)
FROM STA. 20+15 TO STA. 22+50 -Y5-(Rt)
FROM STA. 44+20 TO STA. 46+00 -L1-(Lt)
FROM STA. 40+00 TO STA. 43+90 -L1-(Lt)

DETAIL 'E'
TOE PROTECTION
(Not to Scale)



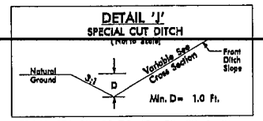
Type of Liner= Class I Rip-Rap

FROM STA. 27+50 TO STA. 29+50-L1-(Lt)

DETAIL 'HH'
MEDIAN 'V' DITCH
(Not to Scale)

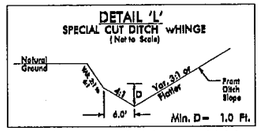
FROM STA. 31+53.82 TO STA. 32+50-L-(Med.)
FROM STA. 46+00 TO STA. 48+00-L1-(Med.)

DETAIL 'J'
SPECIAL CUT DITCH
(Not to Scale)



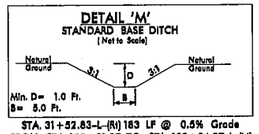
FROM STA. 37+50 TO STA. 50+00-L1-(Rt)

DETAIL 'L'
SPECIAL CUT DITCH wHINGE
(Not to Scale)



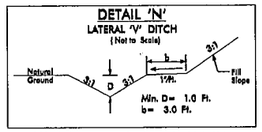
FROM STA. 40+50 TO STA. 41+30.96-L-(Rt)
FROM STA. 31+53.82 TO STA. 33+50-L-(Rt)
FROM STA. 29+50 TO STA. 31+53.82-L-(Rt)

DETAIL 'M'
STANDARD BASE DITCH
(Not to Scale)



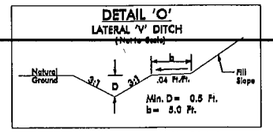
STA. 31+52.83-L-(Rt) 183 LF @ 0.5% Grade
FROM STA. 109+01.87 TO STA. 109+84.87-L-(Lt) 113 LF @ 0.50% grade

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



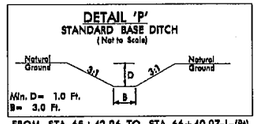
FROM STA. 24+00 TO STA. 26+50-L-(Rt)

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



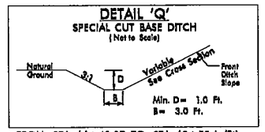
FROM STA. 51+00 TO STA. 51+86-L-(Lt)
FROM STA. 51+86 TO STA. 53+75-L-(Lt)

DETAIL 'P'
STANDARD BASE DITCH
(Not to Scale)



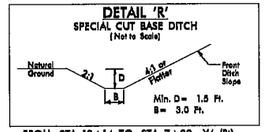
FROM STA. 65+42.96 TO STA. 66+40.07-L-(Rt)
172 LF @ .26% Grade

DETAIL 'Q'
SPECIAL CUT DITCH
(Not to Scale)



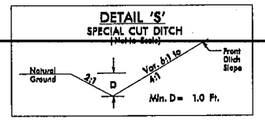
FROM STA. 66+40.07 TO STA. 68+50-L-(Rt)

DETAIL 'R'
SPECIAL CUT BASE DITCH
(Not to Scale)



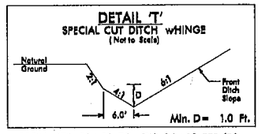
FROM STA. 12+14 TO STA. 7+00 -Y4-(Rt)
FROM STA. 25+03.94 TO STA. 27+37.65 -Y4-(Rt)

DETAIL 'S'
SPECIAL CUT DITCH
(Not to Scale)



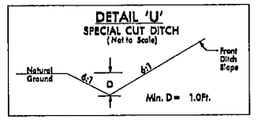
FROM STA. 24+36.38 TO STA. 25+50-RPC-(Lt)
FROM STA. 27+37.65 TO STA. 28+00-Y4-(Rt)

DETAIL 'T'
SPECIAL CUT DITCH wHINGE
(Not to Scale)



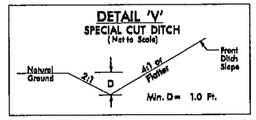
FROM STA. 23+50 TO STA. 24+50-RPB-(Rt)
FROM STA. 31+00 TO STA. 32+00-L-(Lt)

DETAIL 'U'
SPECIAL CUT DITCH
(Not to Scale)



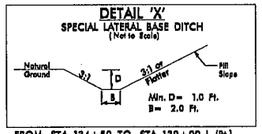
FROM STA. 24+50 TO STA. 23+50-RPD-(Rt)

DETAIL 'V'
SPECIAL CUT DITCH
(Not to Scale)



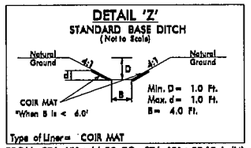
FROM STA. 37+00 TO STA. 37+66.53 -Y2Rev-(Rt)
FROM STA. 26+00 TO STA. 32+00 -Y2Rev-(Lt)
FROM STA. 26+50 TO STA. 31+50 -Y2Rev-(Rt)
FROM STA. 32+50 TO STA. 35+50 -Y2Rev-(Rt)
FROM STA. 13+00 TO STA. 18+00 -Y4-(Rt)
FROM STA. 5+50 TO STA. 6+95 -Y4-(Lt)
FROM STA. 11+50 TO STA. 6+95 -Y4-(Lt)
FROM STA. 19+16.94 TO STA. 17+21 -Y4-(Lt)
FROM STA. 13+87.13 TO STA. 13+52 -SPURA-(Rt)

DETAIL 'X'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



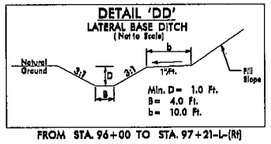
FROM STA. 134+50 TO STA. 139+00-L-(Rt.)
FROM STA. 139+00 TO STA. 140+00-L-(Rt.)

DETAIL 'Z'
STANDARD BASE DITCH
(Not to Scale)



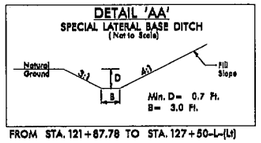
FROM STA. 121+66.58 TO STA. 121+92.13-L-(Lt)
44 LF @ 2.05% grade
FROM STA. 122+89.40 TO STA. 123+22.25-L-(Rt)
35 LF @ 4.14% grade

DETAIL 'DD'
LATERAL BASE DITCH
(Not to Scale)



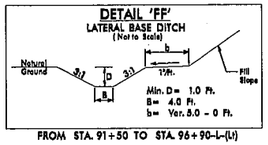
FROM STA. 96+00 TO STA. 97+21-L-(Rt)

DETAIL 'AA'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



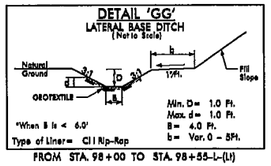
FROM STA. 121+87.78 TO STA. 127+50-L-(Lt)

DETAIL 'FF'
LATERAL BASE DITCH
(Not to Scale)



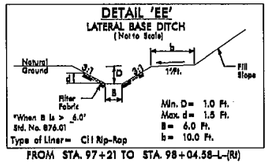
FROM STA. 91+50 TO STA. 96+90-L-(Lt)

DETAIL 'GG'
LATERAL BASE DITCH
(Not to Scale)



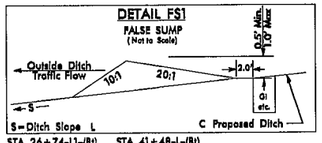
FROM STA. 98+00 TO STA. 98+55-L-(Lt)

DETAIL 'EE'
LATERAL BASE DITCH
(Not to Scale)



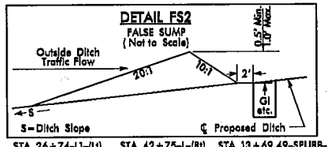
FROM STA. 97+21 TO STA. 98+04.58-L-(Rt)

DETAIL FS1
FALSE SUMP
(Not to Scale)



STA. 26+74-L1-(Rt)
STA. 27+74-L1-(Rt)
STA. 13+07-Y1-(Lt)
STA. 40+00-L1-(Lt)
STA. 47+74-L1-(Rt)
STA. 49+74-L1-(Rt)
STA. 41+48-L-(Rt)
STA. 140+76-L-(Lt)
STA. 146+74-L-(Rt)

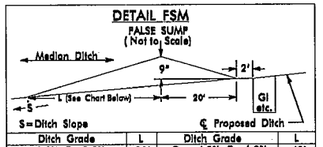
DETAIL FS2
FALSE SUMP
(Not to Scale)



STA. 26+74-L1-(Lt)
STA. 37+26-L1-(Rt)
STA. 40+26-L1-(Rt)
STA. 44+26-L1-(Rt)
STA. 24+26-L-(Rt)
STA. 42+75-L-(Rt)
STA. 6+67-Y4-(Rt)
STA. 100+05-L-(Rt)
STA. 104+26-L-(Rt)
STA. 107+26-L-(Rt)
STA. 110+26-L-(Rt)
STA. 13+69.49-SPURB-(Lt)
STA. 15+24-SPURB-(Lt)
STA. 140+76-L-(Rt)

STA. 31+74-Y2REV-(Rt)

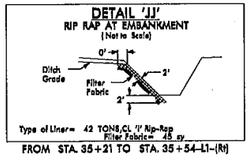
DETAIL FSM
FALSE SUMP
(Not to Scale)



Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 32+26-L-Med.
STA. 34+26-L-Med.
STA. 36+76-L-Med.
STA. 39+76-L-Med.
STA. 51+74-L-Med.
STA. 101+26-L-Med.
STA. 104+26-L-Med.
STA. 107+26-L-Med.
STA. 110+26-L-Med.
STA. 113+38-L-Med.
STA. 58+74-L-Med.
STA. 62+24-L-Med.
STA. 65+74-L-Med.
STA. 68+26-L-Med.
STA. 72+26-L-Med.
STA. 116+76-L-Med.
STA. 120+13-L-Med.
STA. 123+26-L-Med.
STA. 126+76-L-Med.
STA. 131+26-L-Med.
STA. 76+26-L-Med.
STA. 86+24-L-Med.
STA. 91+74-L-Med.
STA. 95+24-L-Med.
STA. 97+74-L-Med.
STA. 99+24-L-Med.
STA. 134+26-L-Med.
STA. 136+26-L-Med.
STA. 138+26-L-Med.
STA. 140+76-L-Med.

DETAIL 'JJ'
RIP RAP AT EMBANKMENT
(Not to Scale)



Type of Liner= 42 TONS CL 'I' Rip-Rap
Filter Fabric= 45 sy

FROM STA. 35+21 TO STA. 35+54-L1-(Rt)

REVISIONS

9/17/99

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

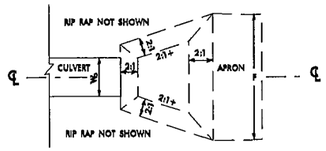
Permit Drawing
Sheet 3 of 27

SPECIAL DRAINAGE DETAILS

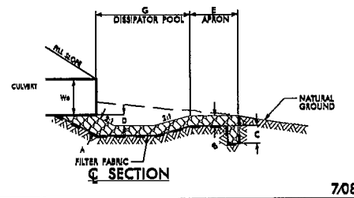
DETAIL 'II'
RIP-RAPPED ENERGY DISSIPATOR BASIN

DIM. (ft)	RIP RAP BASIN # 1	#	#
A	2.5'	#	#
B	1.7'	#	#
C	2.0'	#	#
D	1.5'	#	#
E	10.0'	#	#
F	33.0'	#	#
G	20.0'	#	#

ALL DIMENSIONS APPROXIMATE



PLAN



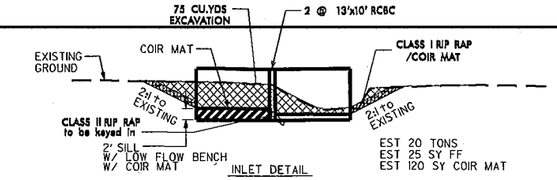
℄ SECTION

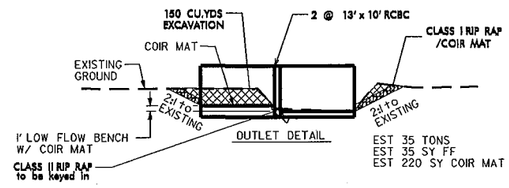
BASIN #	LOCATION (AT OUTLET)
1	Sta. 35+54-L1-(Rt) @
#	#
#	#

NOTE:
USE CLASS "I" RIP RAP FOR BASIN #1
APRON ELEVATION TO BE SET 0.5' ABOVE INVERT OF PIPE

7/08

DETAIL 'LL'
CHANNEL EXCAVATION FOR CULVERT

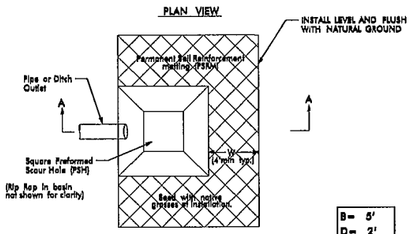




RCBC STA. 29+96-L1-

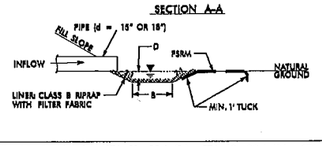
PREFORMED SCOUR HOLE
*NOT TO SCALE

PLAN VIEW



B= 5'
D= 2'
W= 4'

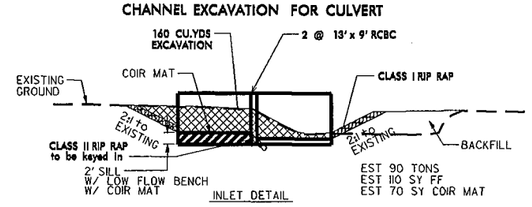
SECTION A-A

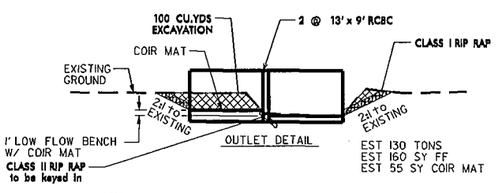


3/08

STA. 29+22-L1-(Rt) STA. 51+50-L-(Rt) STA. 62+00-L-(Rt) STA. 19+36-RPD-(Lt)
STA. 30+40-L1-(Rt) STA. 51+86-L-(Rt) STA. 17+05-RPC-(Rt)

DETAIL 'MM'
CHANNEL EXCAVATION FOR CULVERT

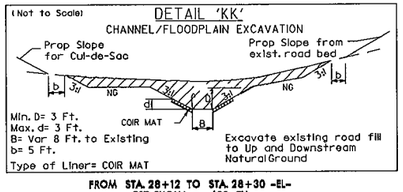




RCBC STA. 98+39-L-

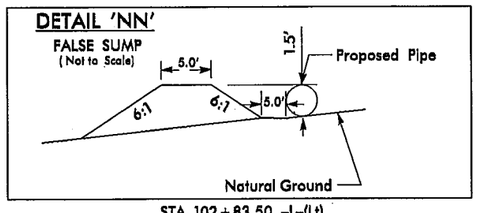
(Not to Scale)

DETAIL 'KK'
CHANNEL/FLOODPLAIN EXCAVATION



FROM STA. 28+12 TO STA. 28+30 -EL-
EST EXCAV = 630 CY
EST COIR MAT = 120 SY

DETAIL 'NN'
FALSE SUMP
(Not to Scale)



STA. 102+83.50 -L-(Lt)
STA. 114+83.50 -L-(Lt)
STA. 138+83.50-L-(Lt)

REVISIONS

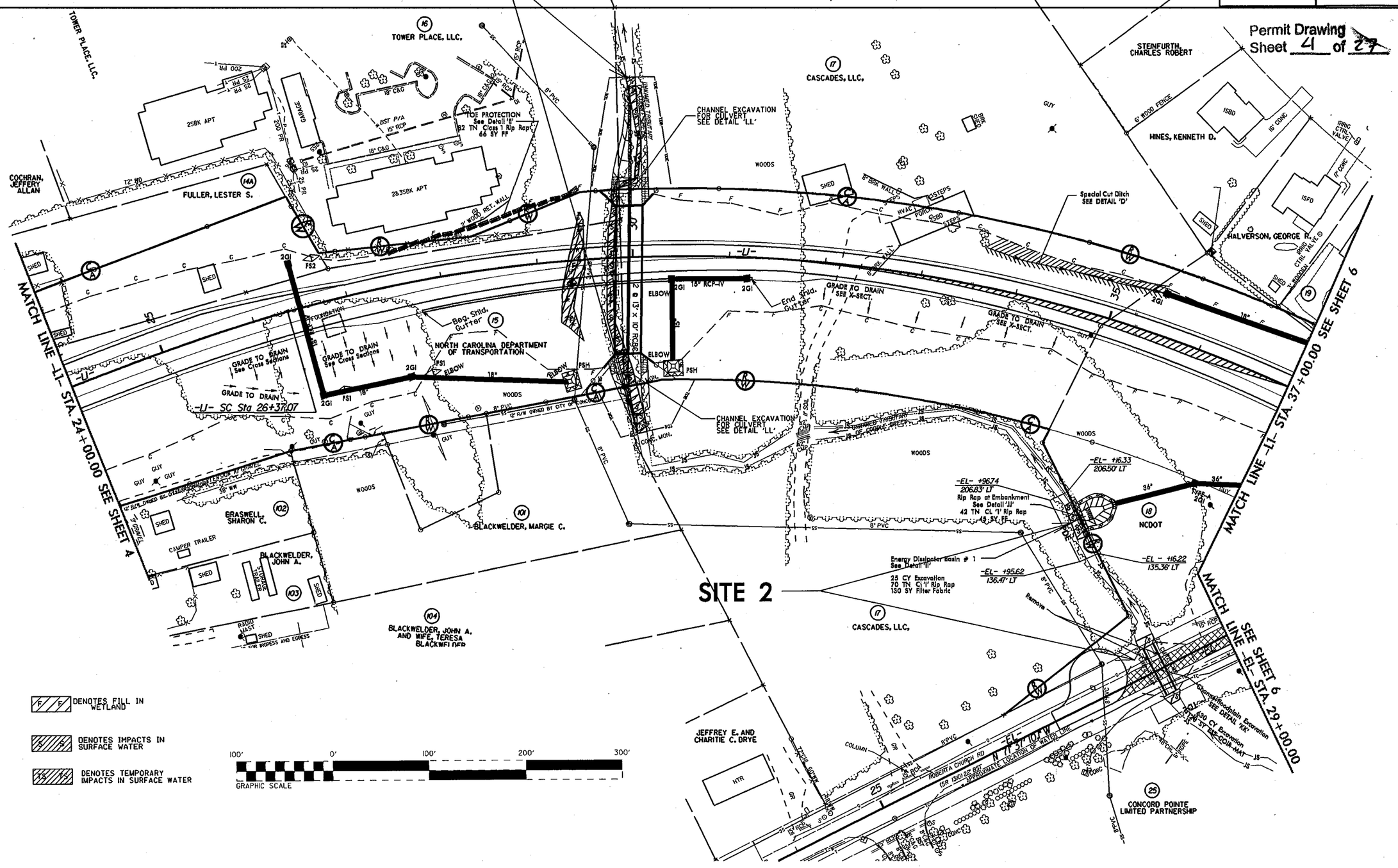
8/17/99

$$$$$SYSTIME$$$$$DGN$$$$$
$$$$$FILENAME$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 4 of 27



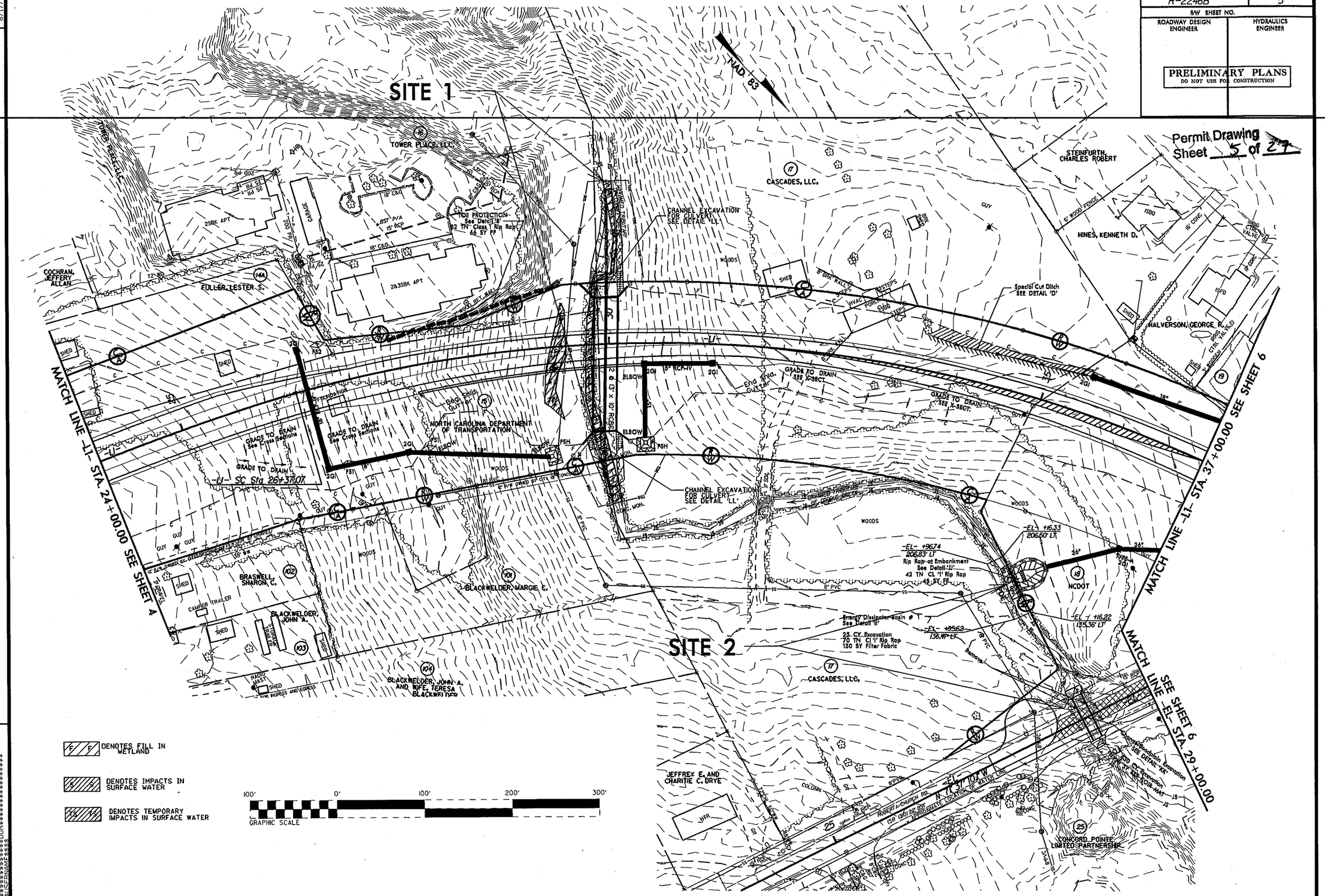
REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 5 of 27

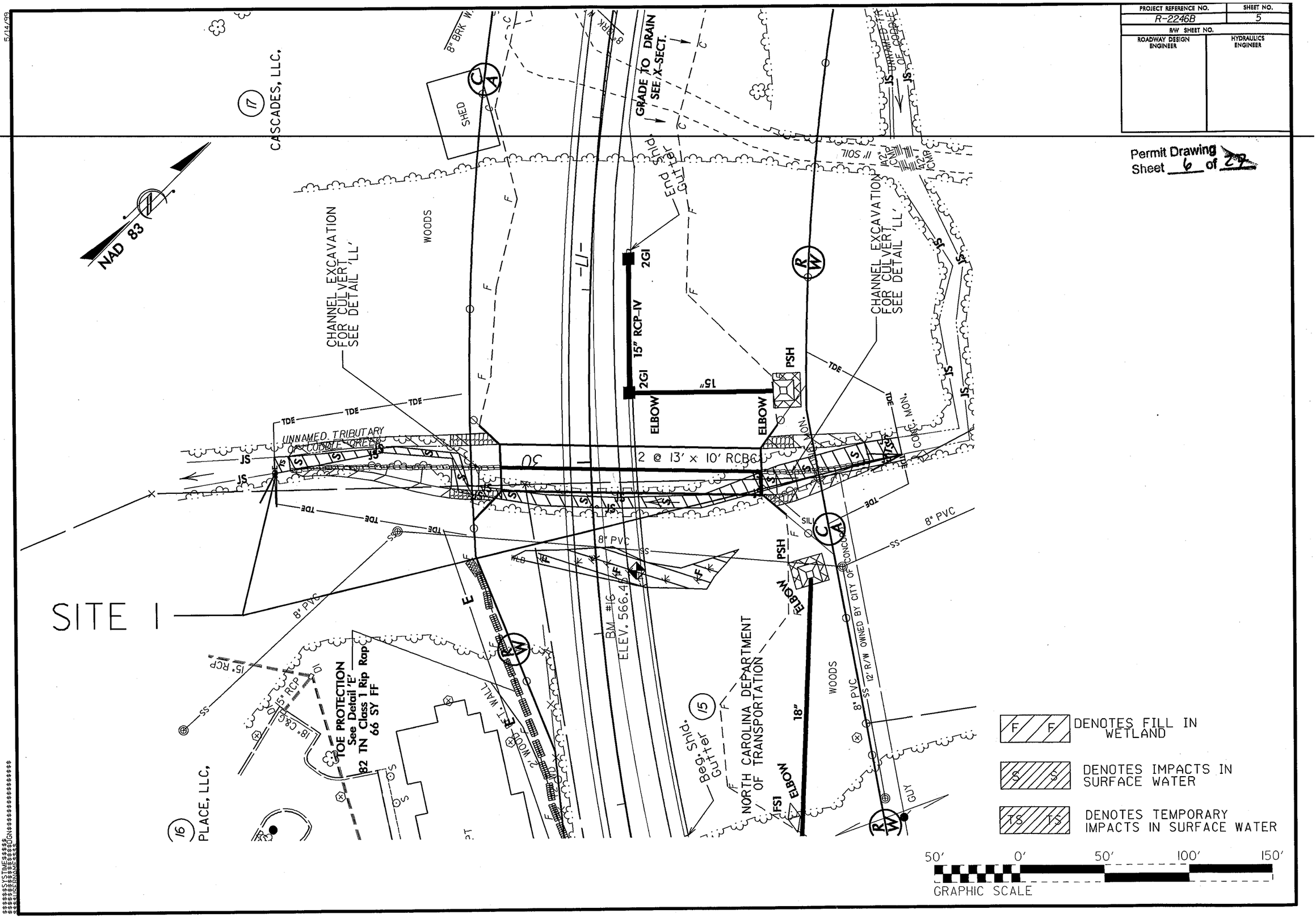


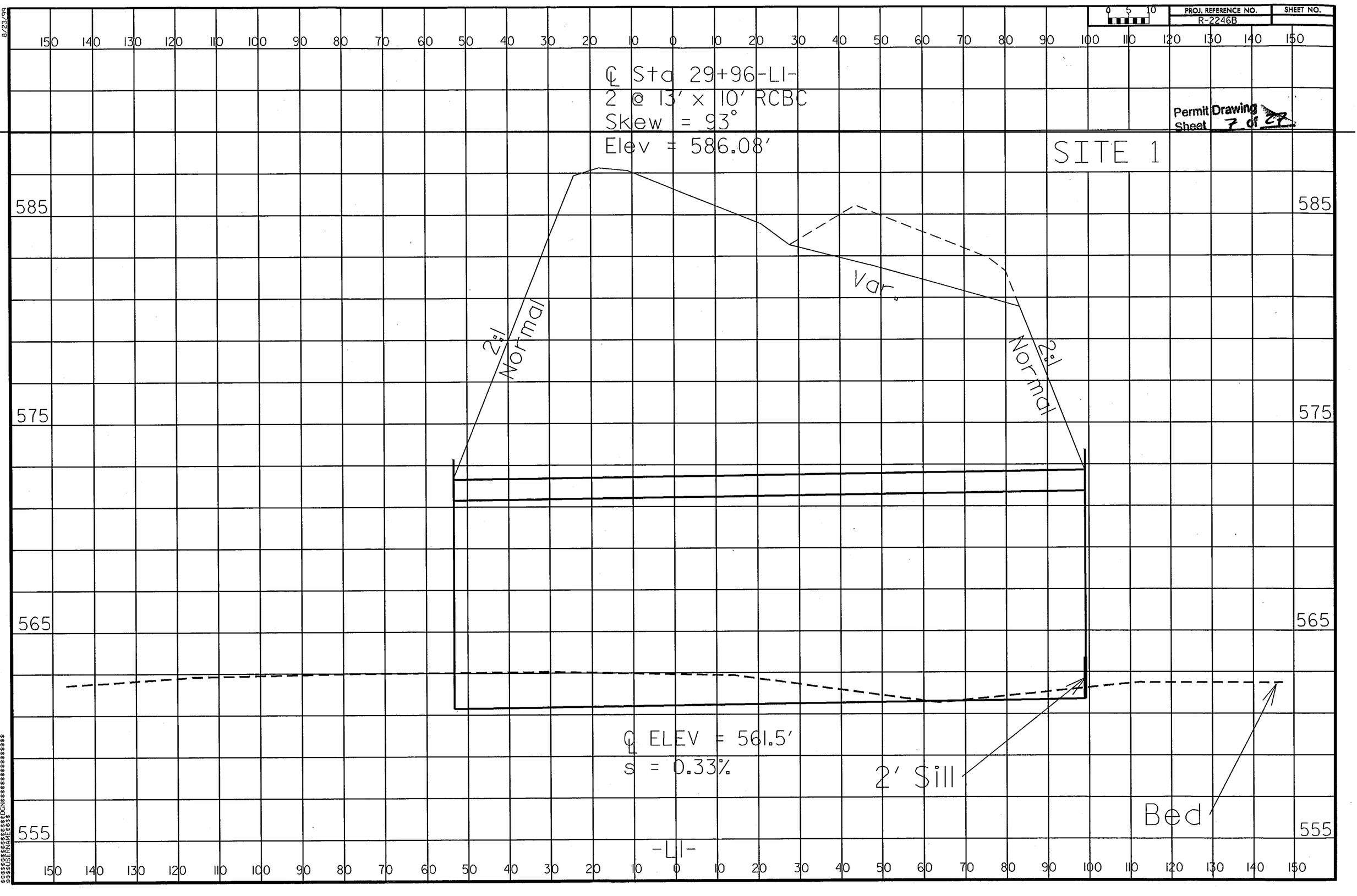
REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Permit Drawing
Sheet 6 of 27



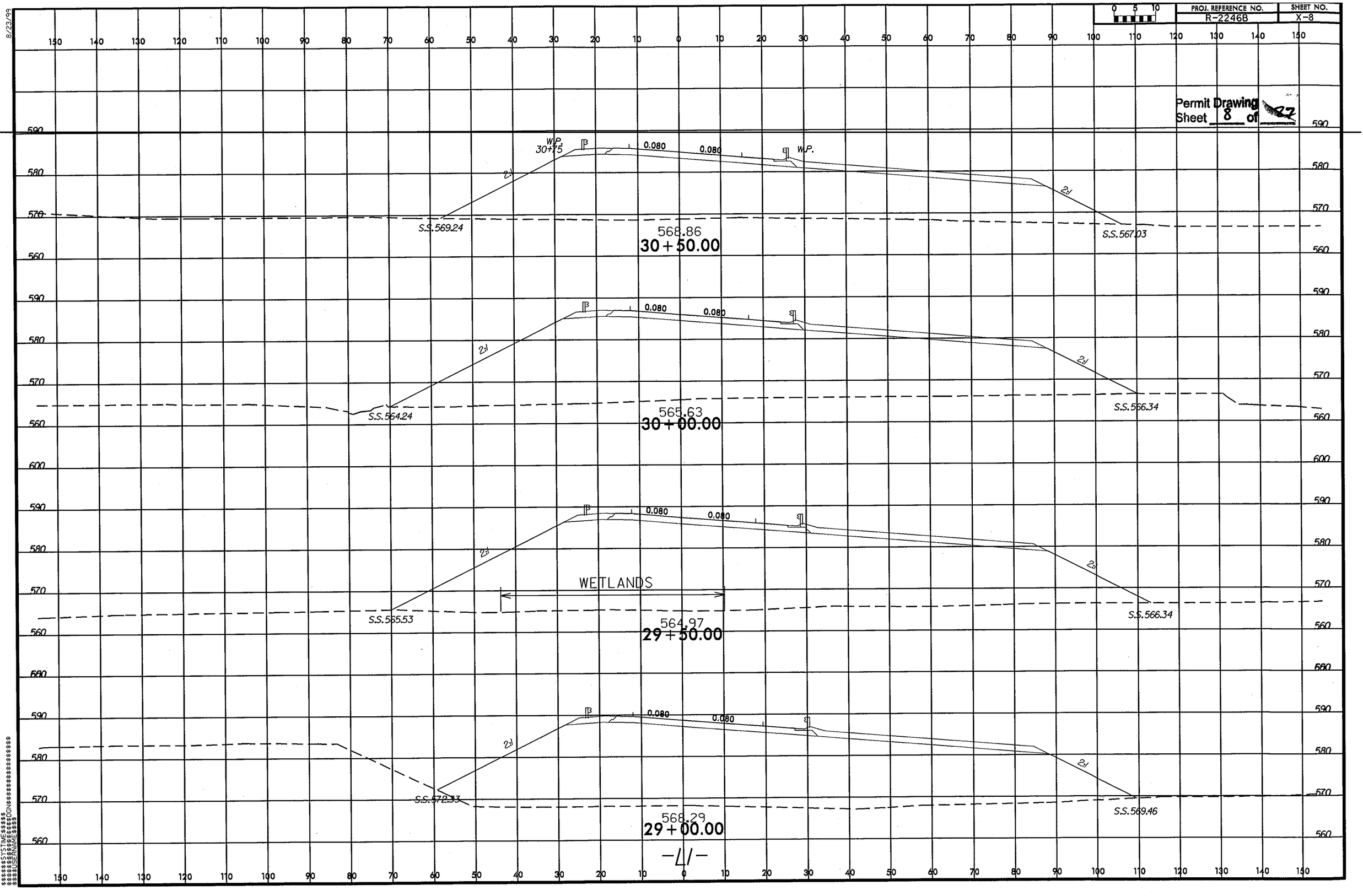

PROJ. REFERENCE NO.
R-2246B
SHEET NO.
0 5 10
Permit Drawing
Sheet 7 of 27
SITE 1
℄ Sta 29+96-L1-
2 @ 13' x 10' RCBC
Skew = 93°
Elev = 586.08'
585
575
565
555
2:1 Normal
Var.
2:1 Normal
℄ ELEV = 561.5'
s = 0.33%
2' Sill
Bed
-L1-
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
8/23/99
$$$$$$SYSTIME$$$$$$
$$$$$$

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-2246B	X-8

0 5 10

Permit Drawing
Sheet 8 of 22

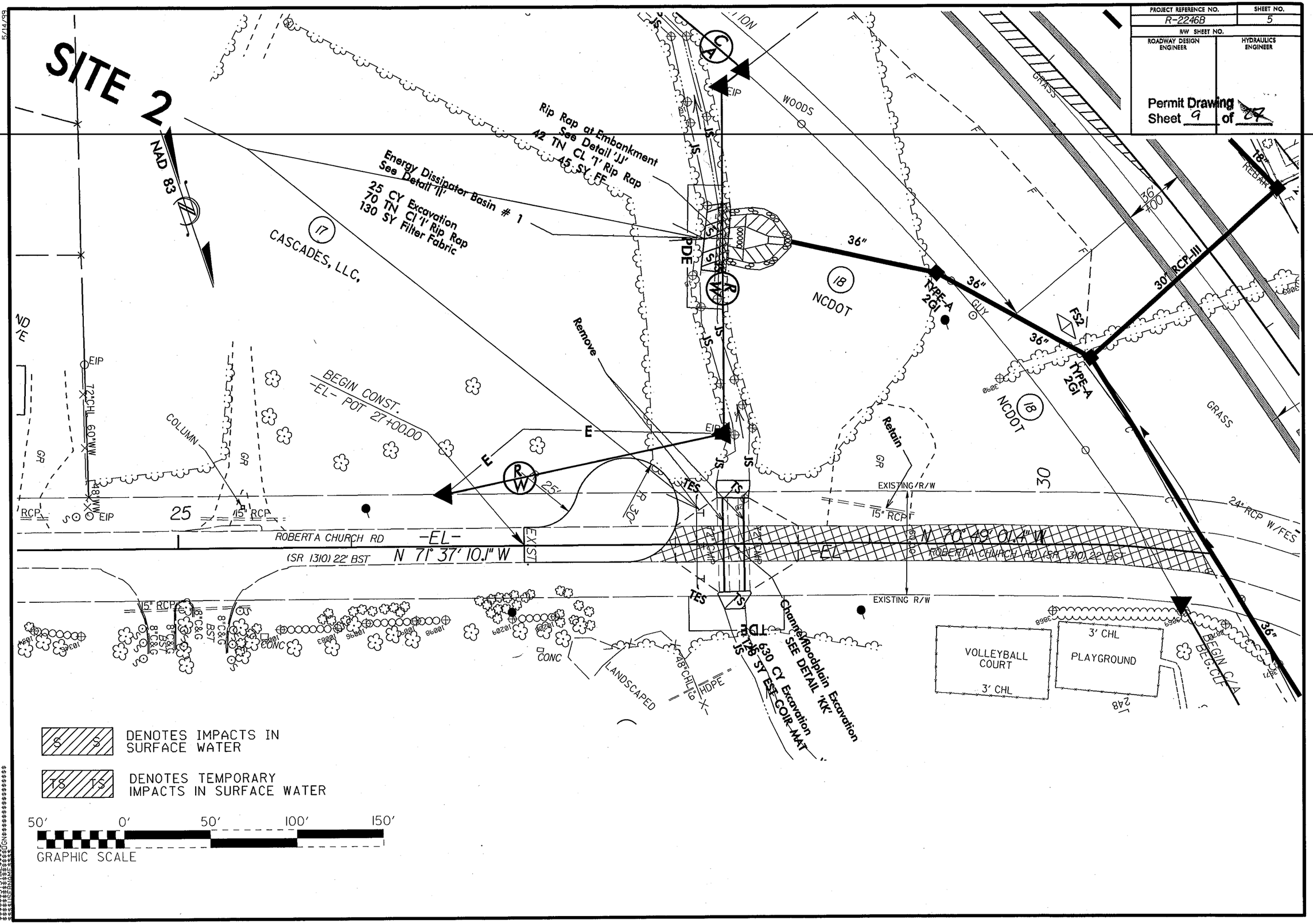


-11-

$$$$$SYSTIME$$$$$
$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Permit Drawing
Sheet 9 of 27



PROJECT REFERENCE NO.	SHEET NO.
R-2246B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

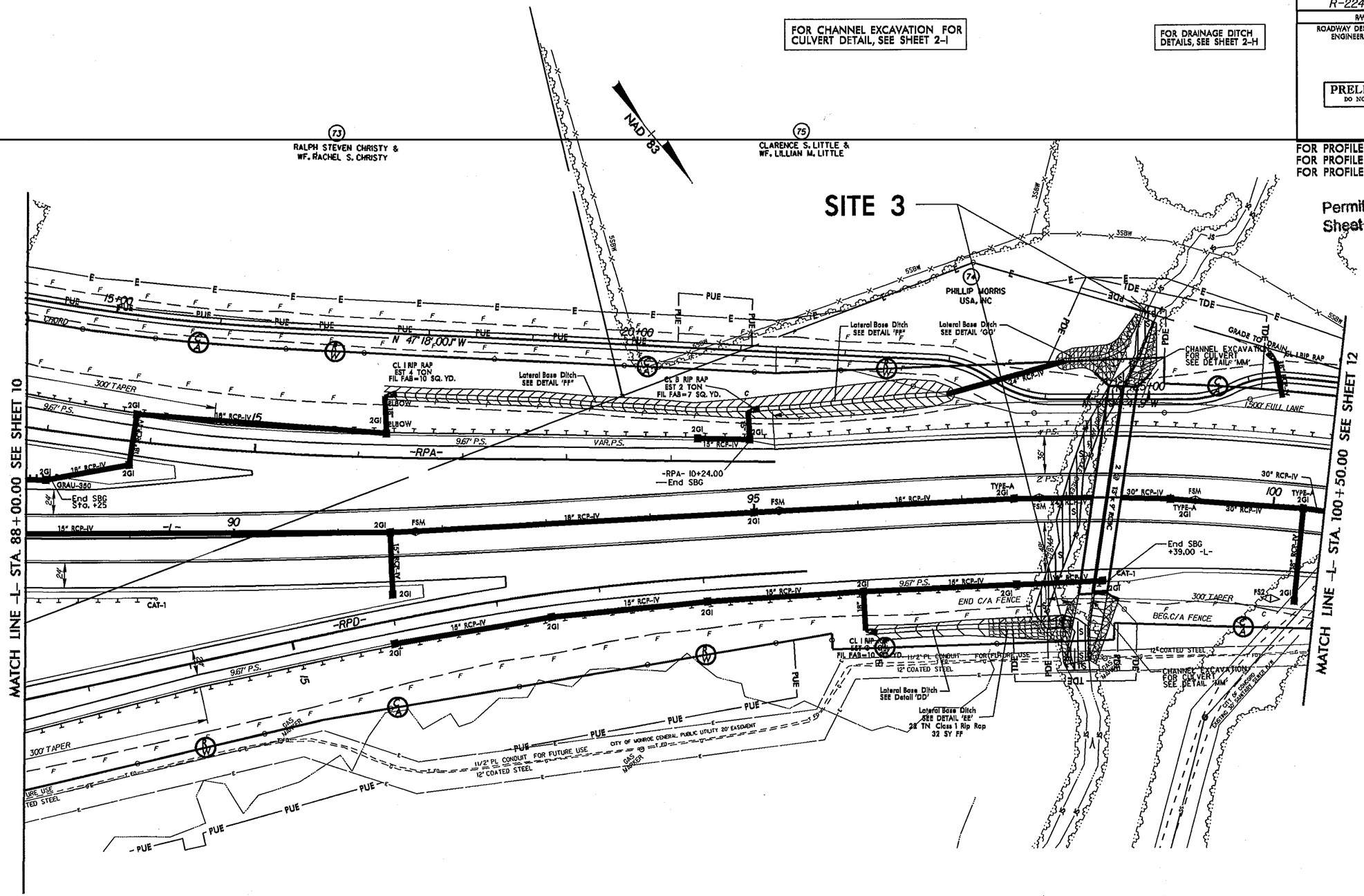
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR CHANNEL EXCAVATION FOR CULVERT DETAIL, SEE SHEET 2-I

FOR DRAINAGE DITCH DETAILS, SEE SHEET 2-H

FOR PROFILE OF -L- SEE SHEET 24
FOR PROFILE OF -RPA- SEE SHEET 31
FOR PROFILE OF -RPD- SEE SHEET 34

Permit Drawing
Sheet 10 of 27



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100' 200' 300'
GRAPHIC SCALE

REVISIONS

8/17/99

SYLTIME$$$$$
SYLDATE$$$$$
SYLFILENAME$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

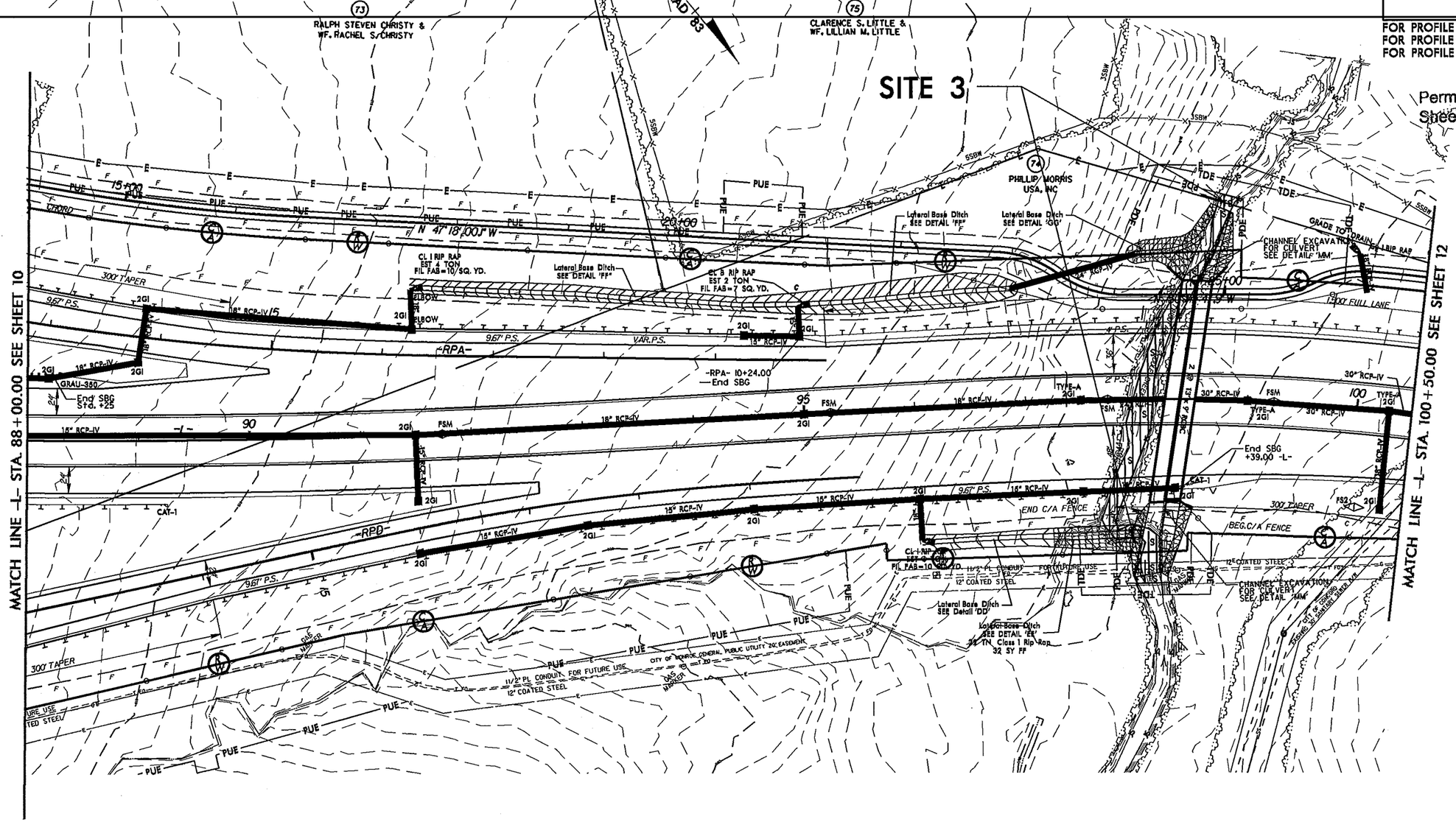
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR CHANNEL EXCAVATION FOR CULVERT DETAIL, SEE SHEET 2-I

FOR DRAINAGE DITCH DETAILS, SEE SHEET 2-H

FOR PROFILE OF -L- SEE SHEET 24
FOR PROFILE OF -RPA- SEE SHEET 31
FOR PROFILE OF -RPD- SEE SHEET 34

Permit Drawing
Sheet 11 of 27

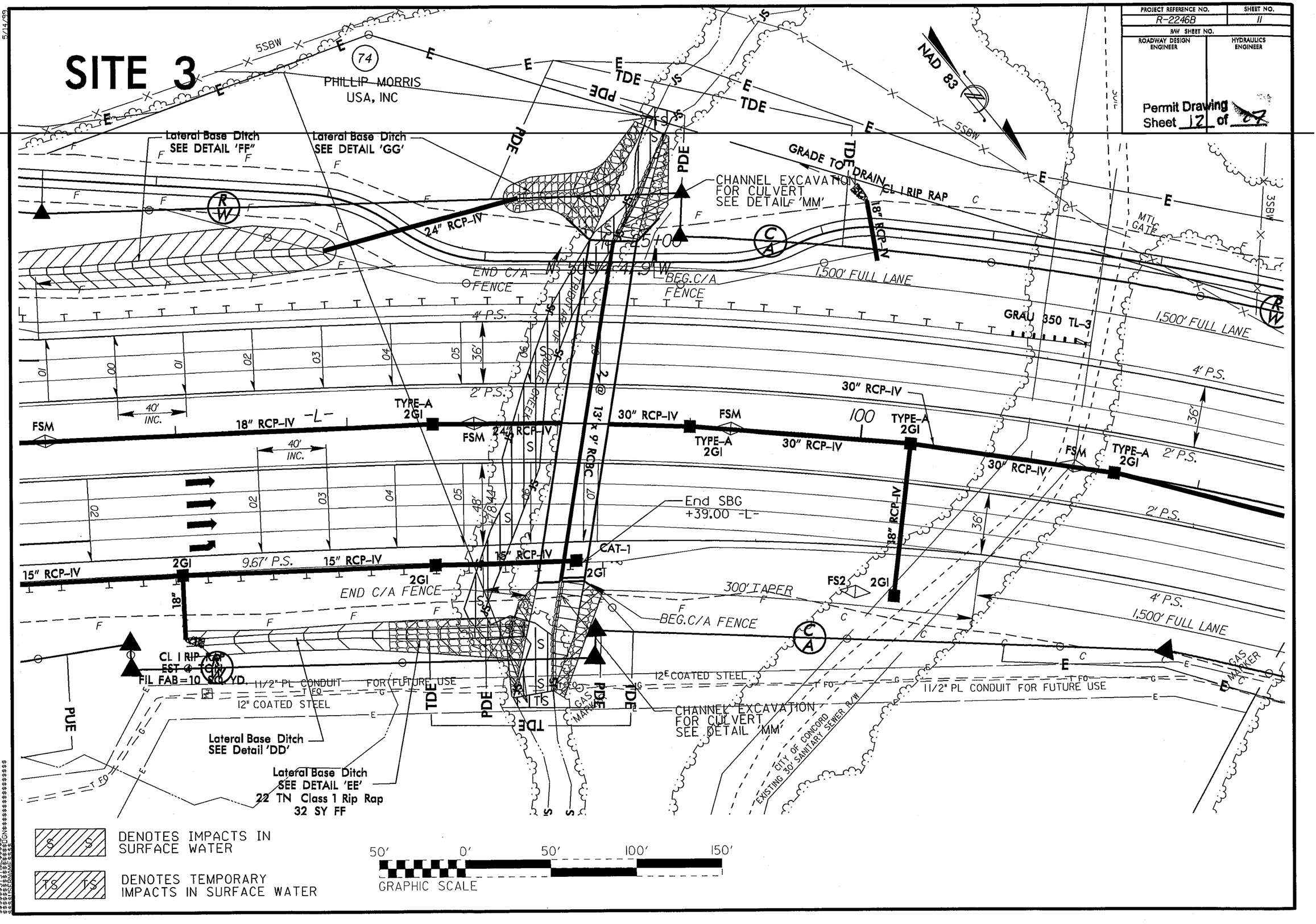


REVISIONS

8/17/99

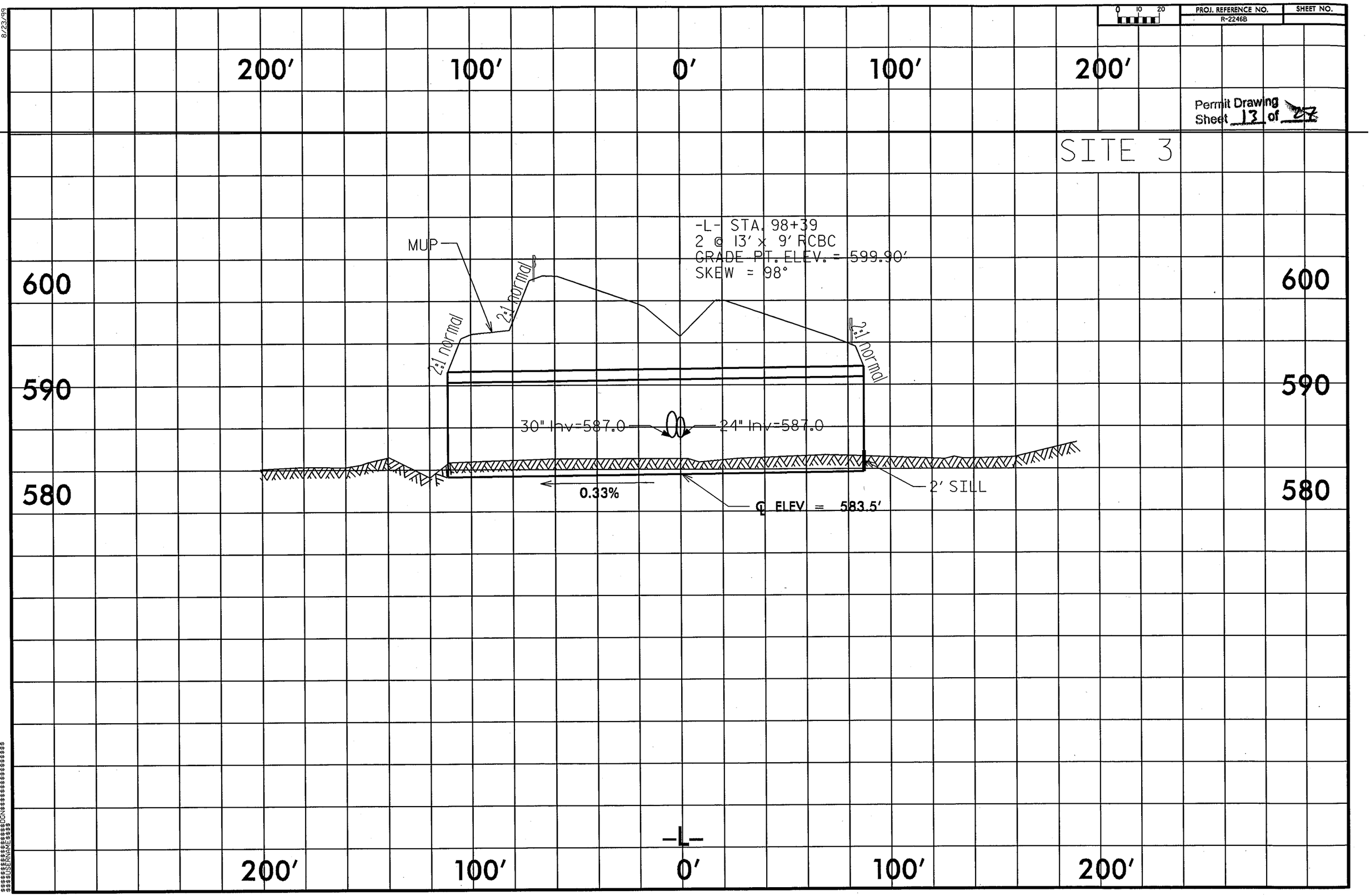
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Permit Drawing
Sheet 12 of 27



Permit Drawing Sheet 13 of 27

SITE 3



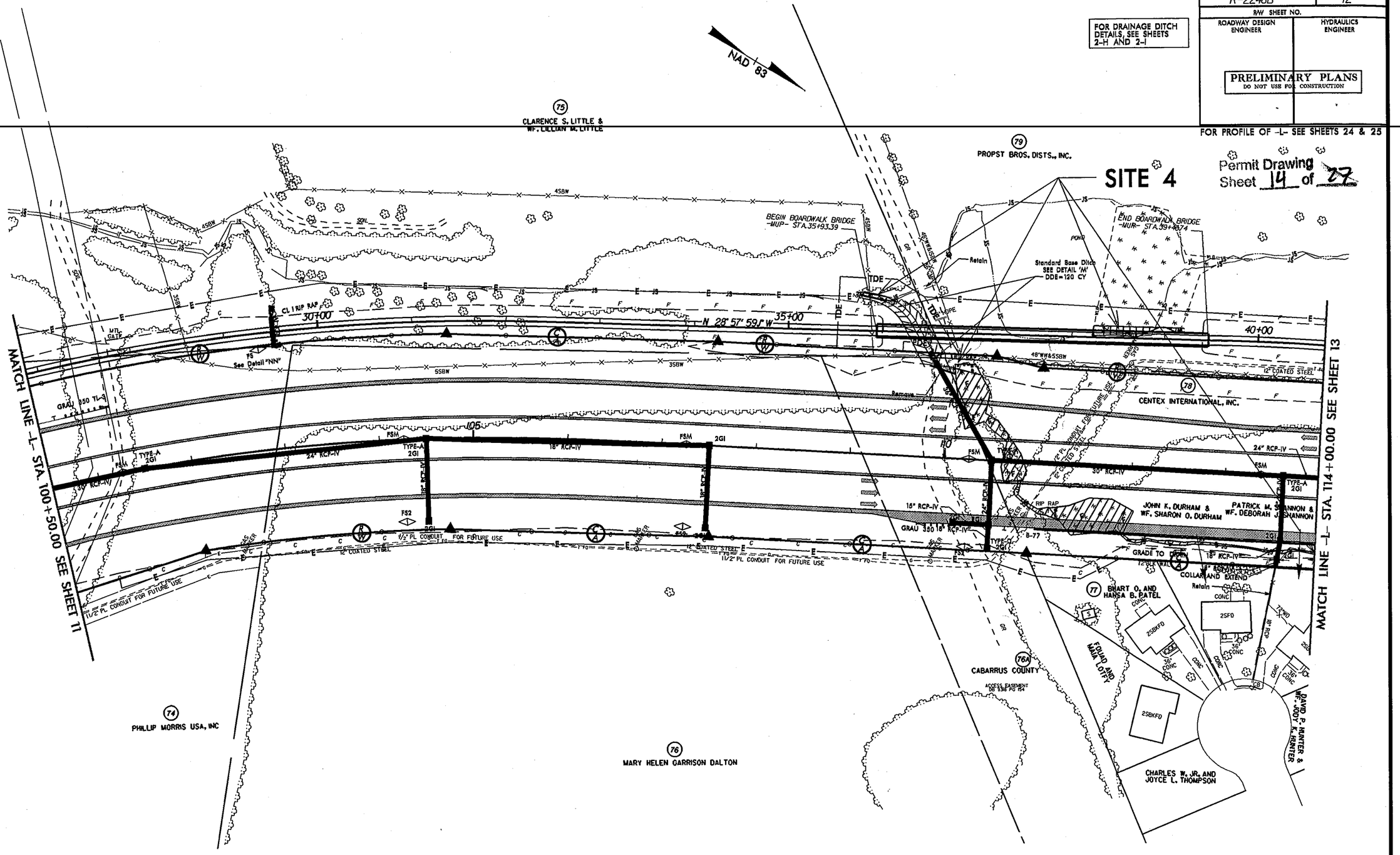
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L- SEE SHEETS 24 & 25

Permit Drawing
Sheet 14 of 27



DENOTES FILL IN WETLAND

DENOTES HAND CLEARING

DENOTES IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100' 200' 300'
GRAPHIC SCALE

REVISIONS

8/17/99

$$$

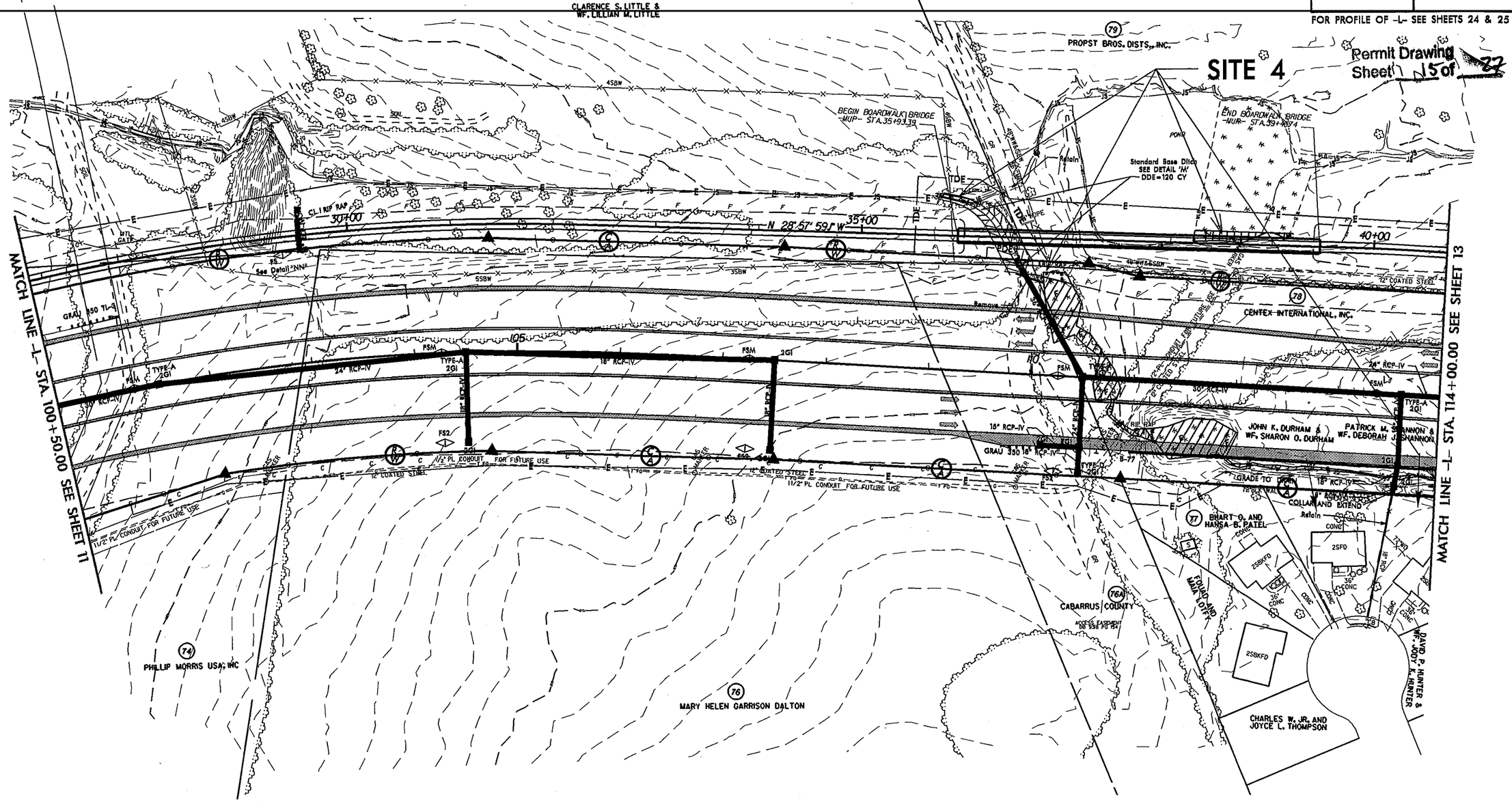
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L- SEE SHEETS 24 & 25

Permit Drawing Sheet 15 of 27



F/F DENOTES FILL IN WETLAND

HC/HC DENOTES HAND CLEARING

S/S DENOTES IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

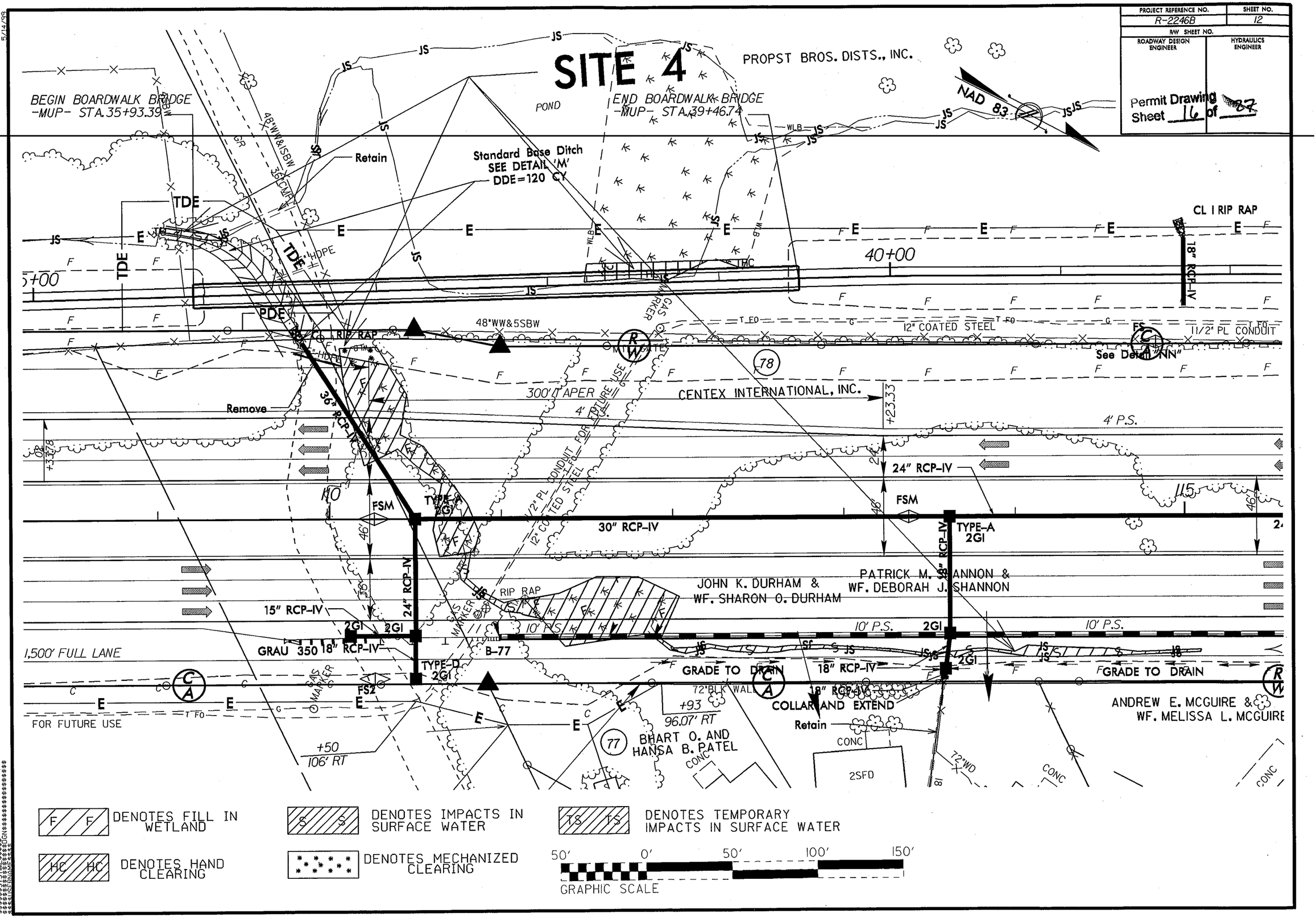
100' 0' 100' 200' 300'
GRAPHIC SCALE

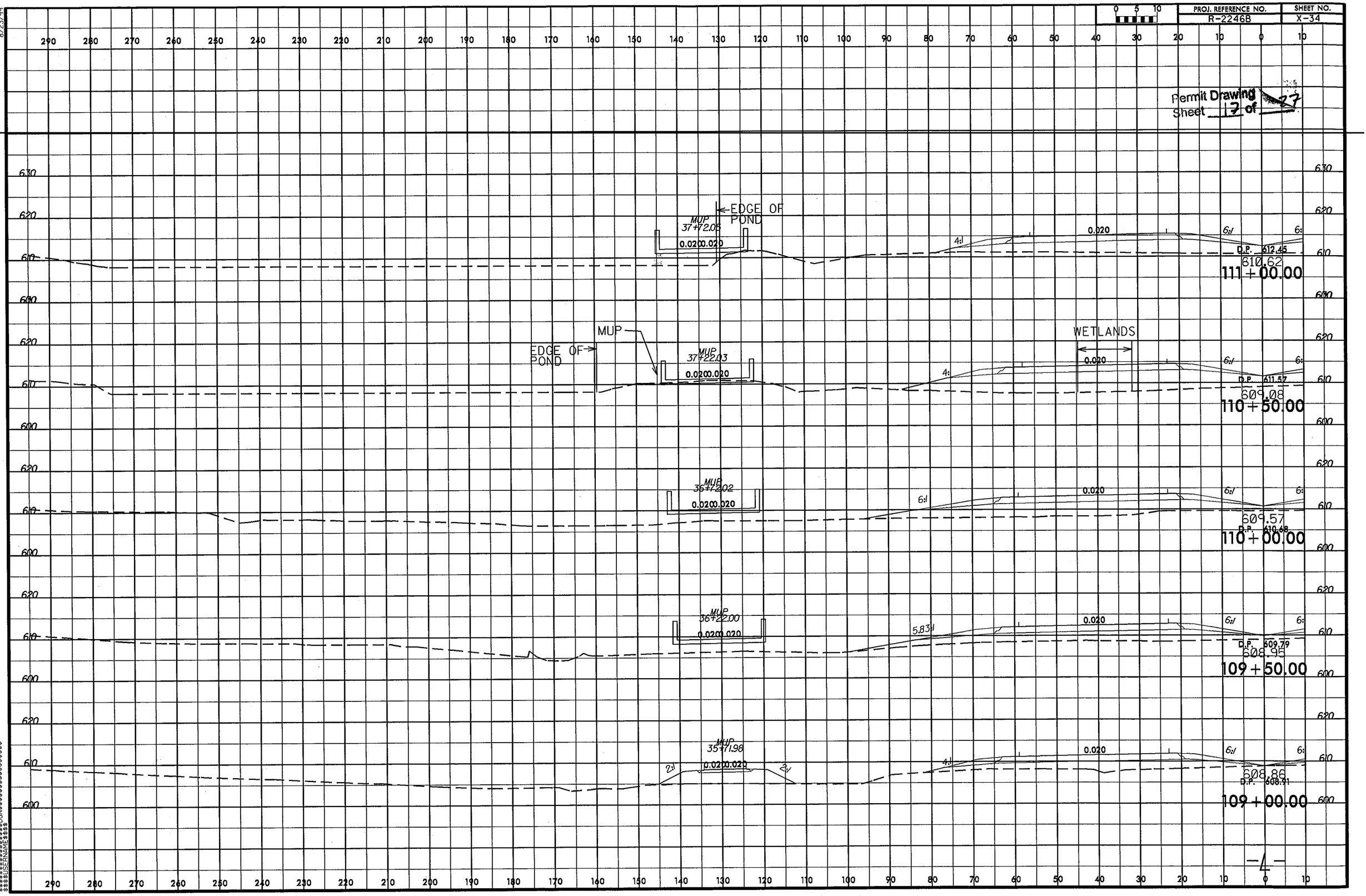
REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

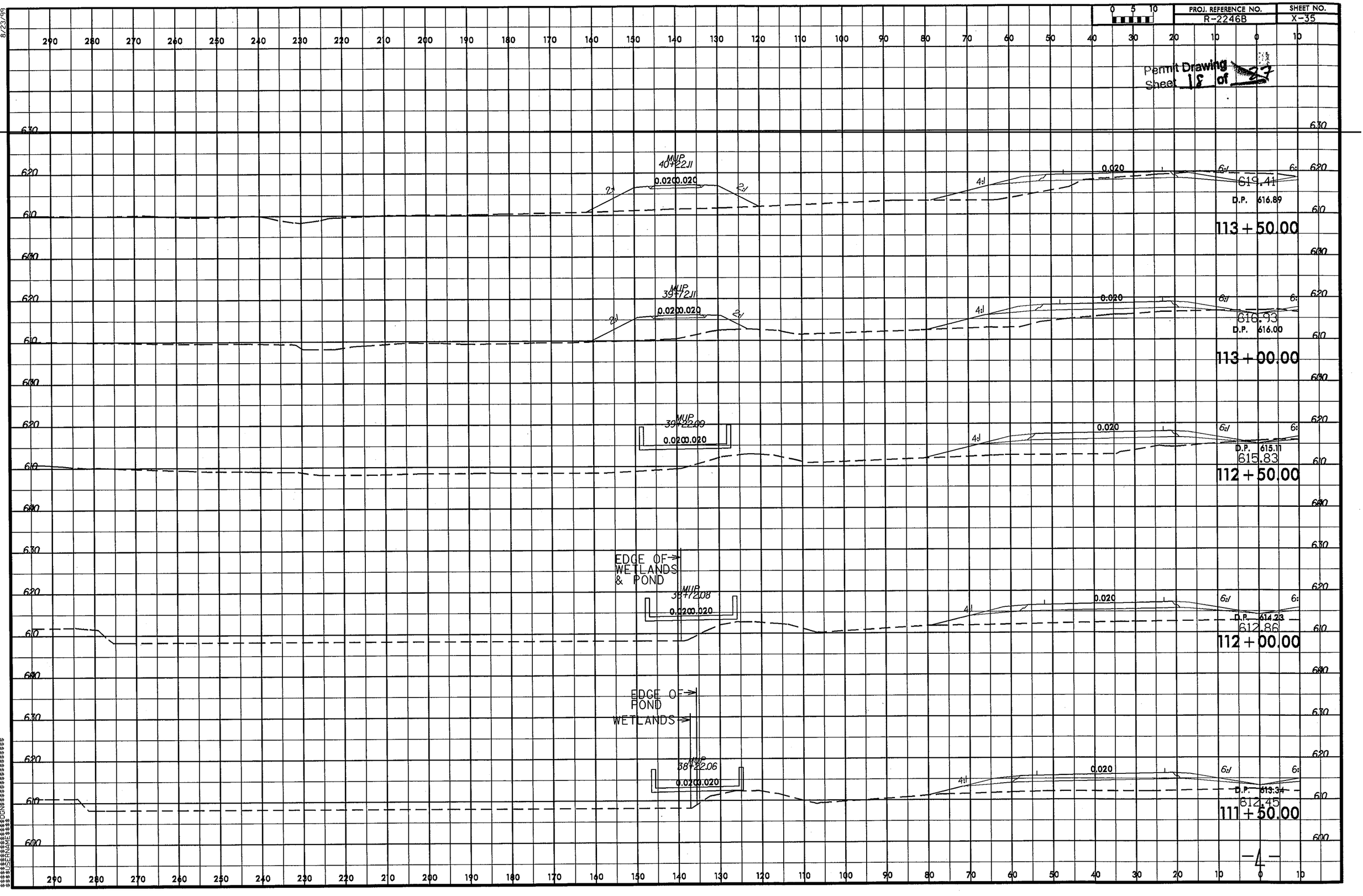
Permit Drawing
Sheet 16 of 87



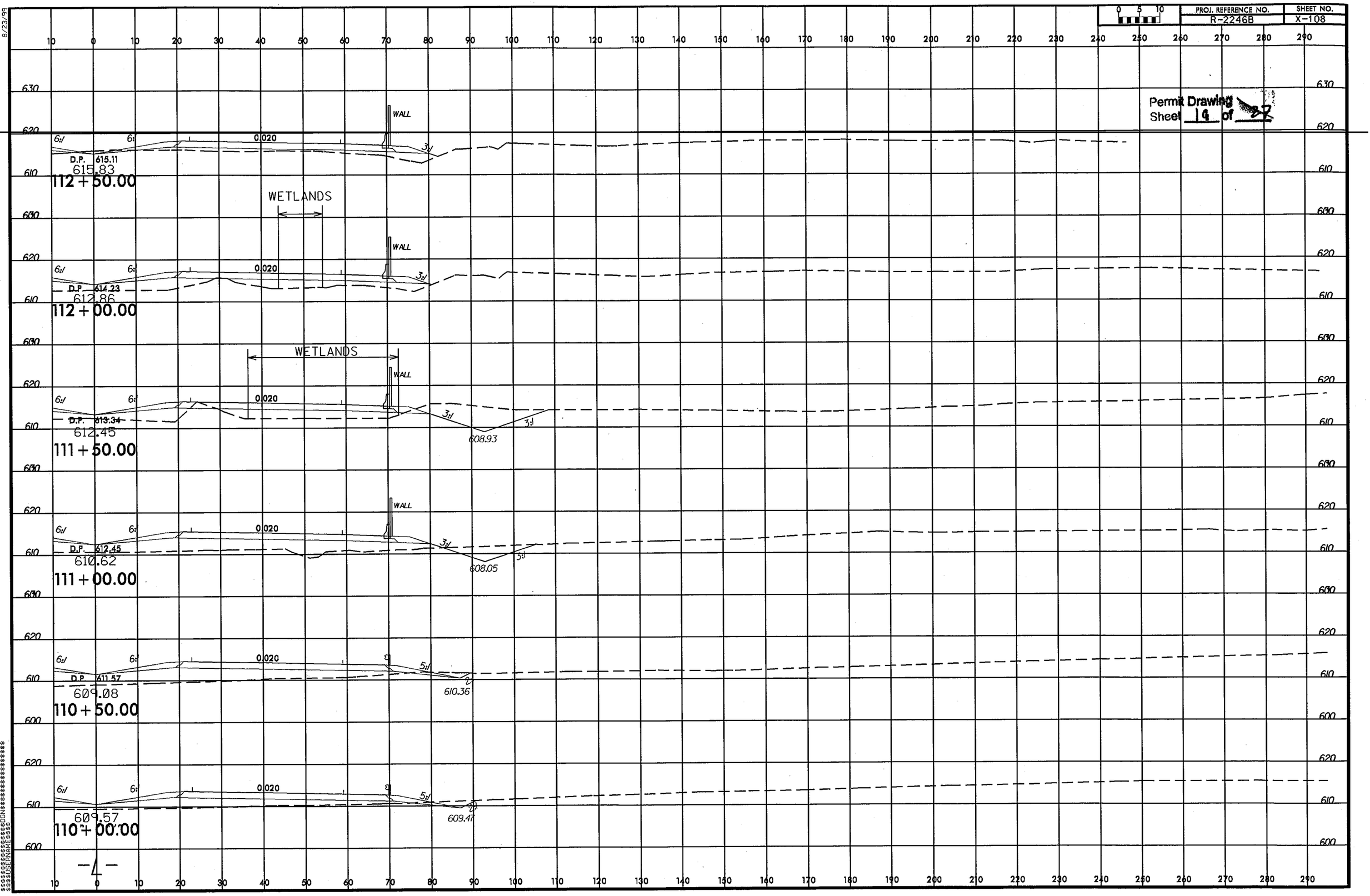


PROJ. REFERENCE NO.
R-2246B
SHEET NO.
X-34
Permit Drawing
Sheet 17 of 27
EDGE OF POND
MUP
37+72.05
0.020
0.020
4:1
6:1
D.P. 612.45
610.62
111+00.00
MUP
EDGE OF POND
MUP
37+22.03
WETLANDS
D.P. 611.57
609.08
110+50.00
MUP
36+72.02
609.57
D.P. 610.68
110+00.00
MUP
36+22.00
5.83:1
D.P. 609.79
608.95
109+50.00
MUP
35+71.98
2:1
608.86
D.P. 608.91
109+00.00
-4-

Permit Drawing
Sheet 18 of 27



8/23/99
SYSTIME$$$



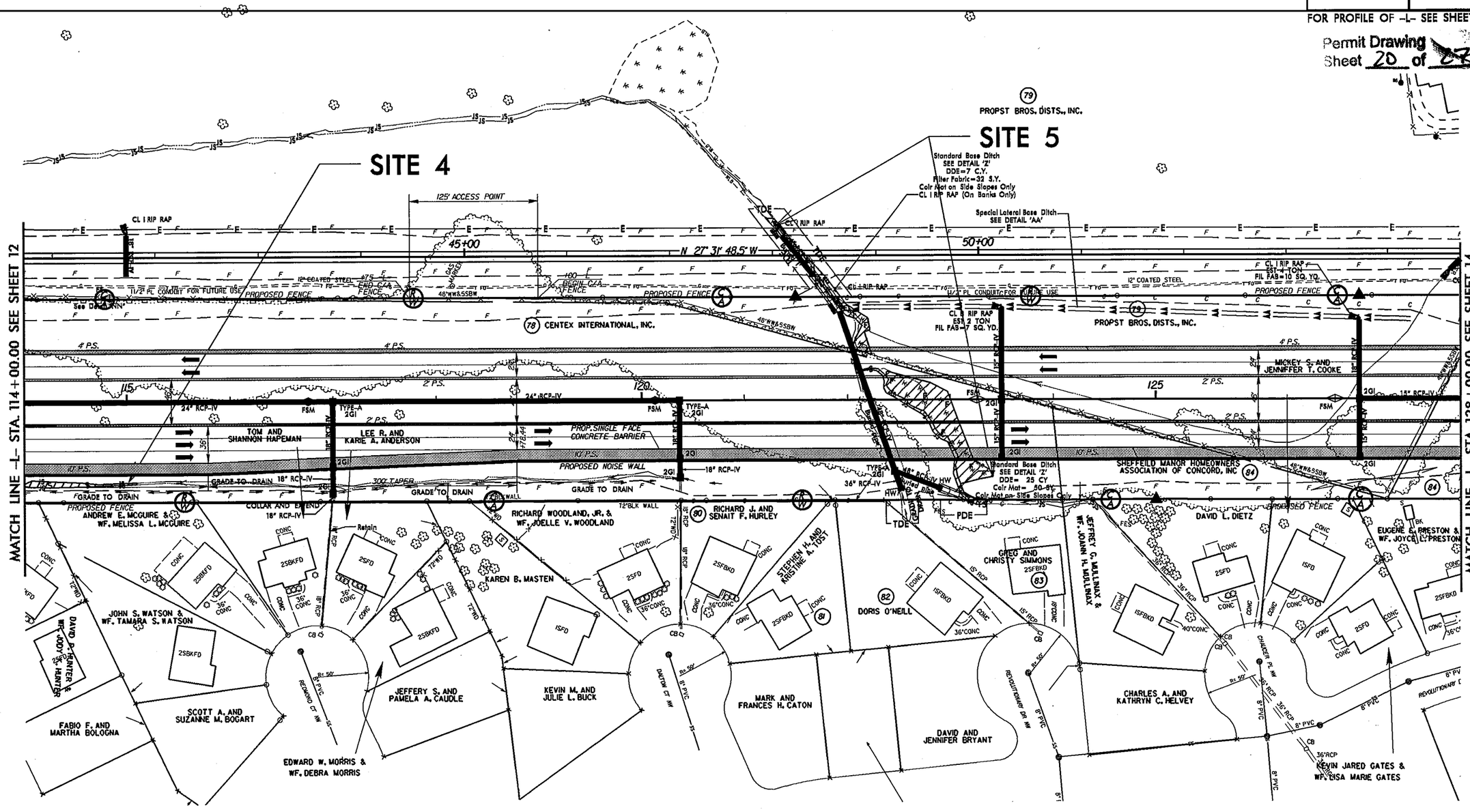
PROJ. REFERENCE NO.
R-2246B
SHEET NO.
X-108
Permit Drawing
Sheet 14 of 27
WALL
6:1
0.020
3:1
D.P. 615.11
615.83
112 + 50.00
WETLANDS
D.P. 614.23
612.86
112 + 00.00
D.P. 613.34
612.45
111 + 50.00
608.93
D.P. 612.45
610.62
111 + 00.00
608.05
D.P. 611.57
609.08
110 + 50.00
5:1
610.36
609.57
110 + 00.00
609.47

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -L- SEE SHEET 25

Permit Drawing
Sheet 20 of 27



REVISIONS

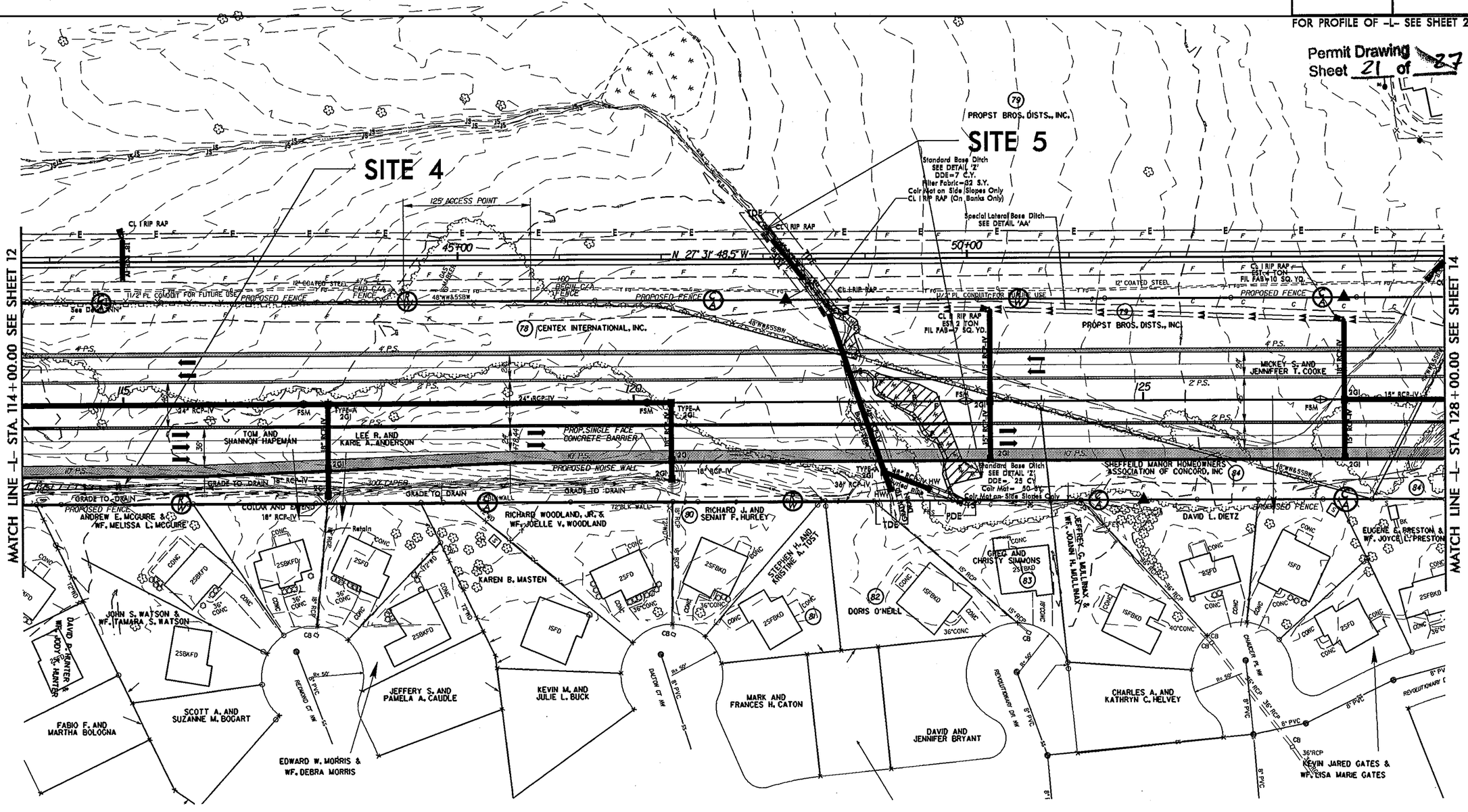
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

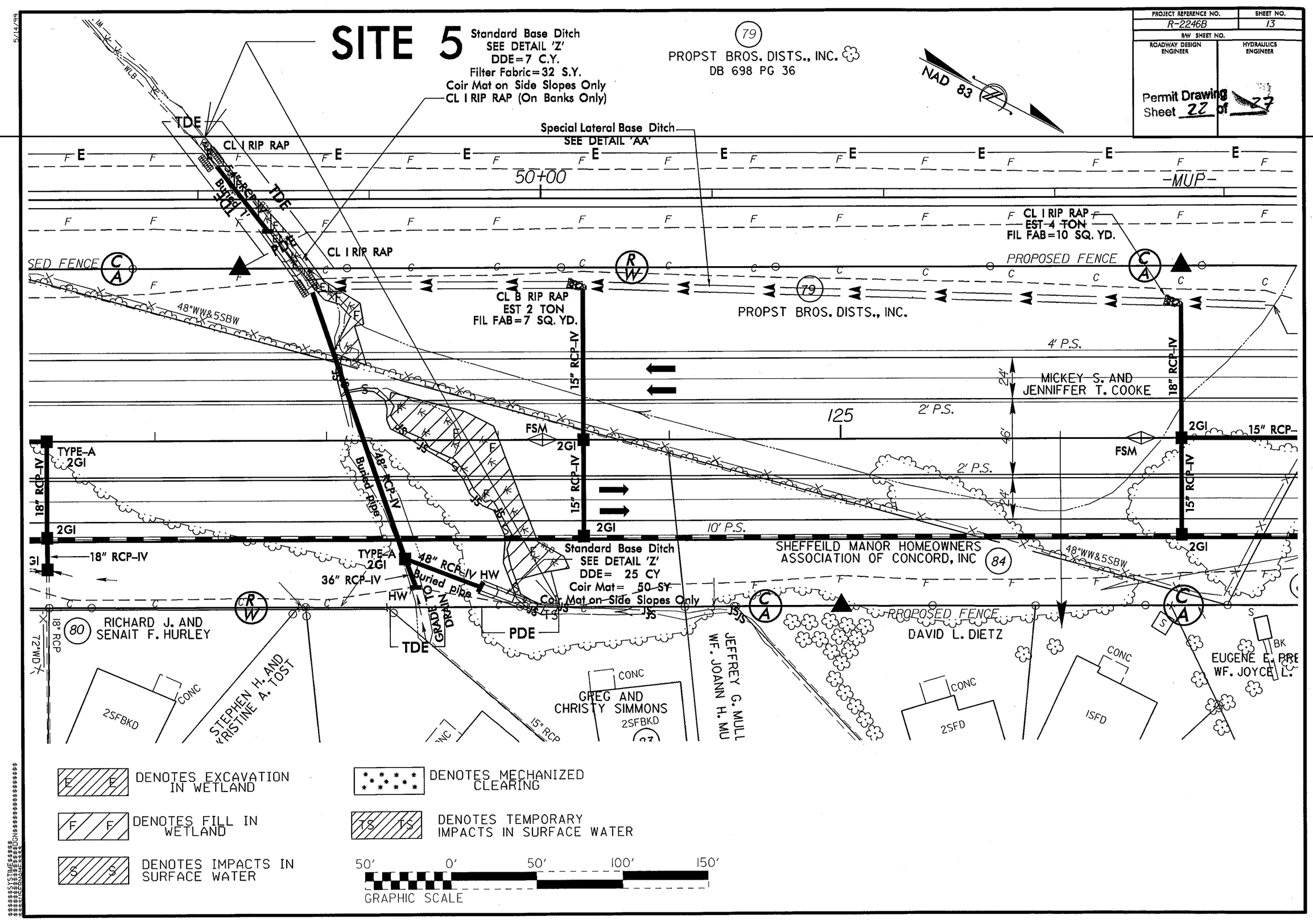
FOR PROFILE OF -L- SEE SHEET 25

Permit Drawing
Sheet 21 of 27

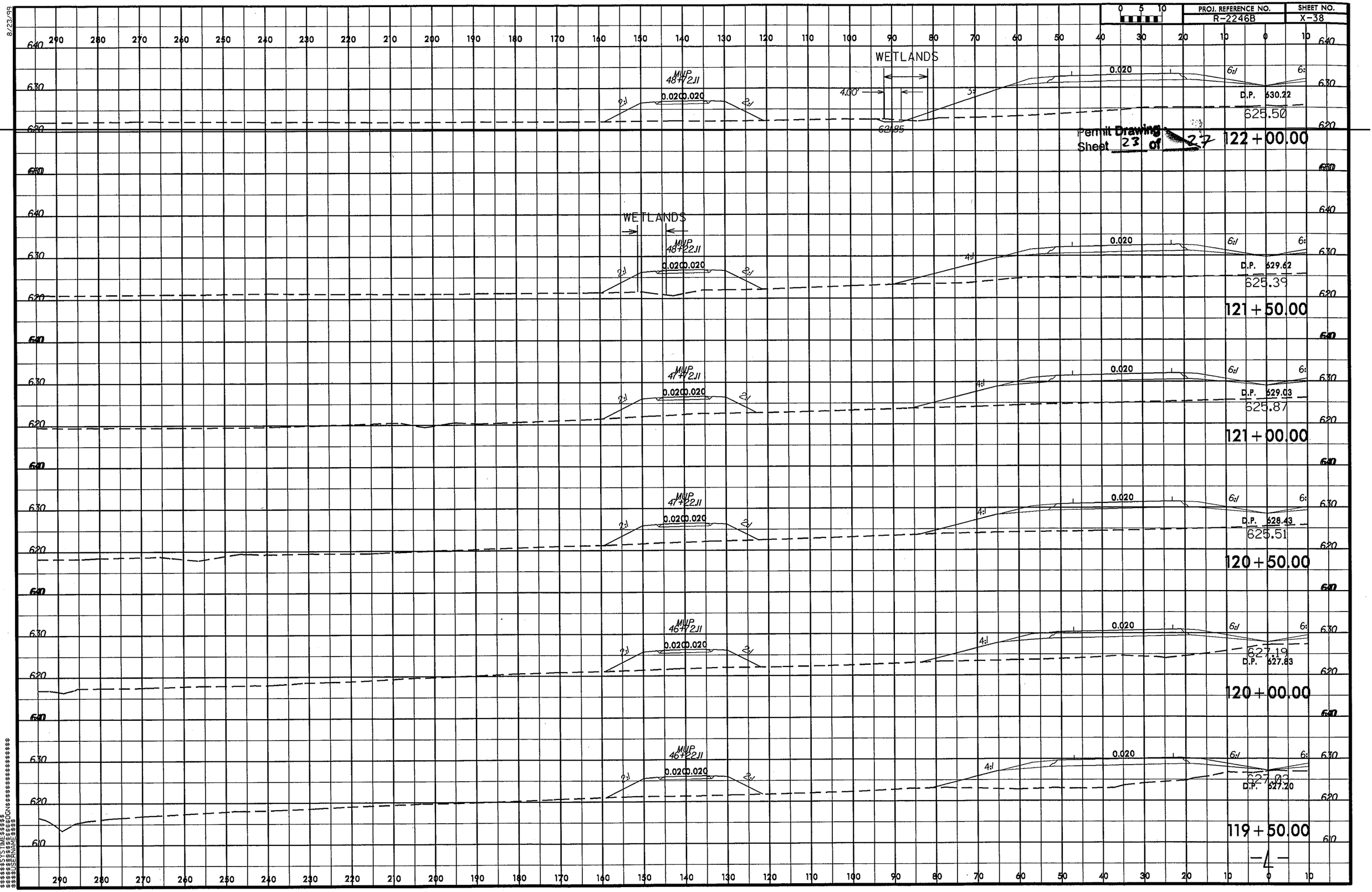


REVISIONS

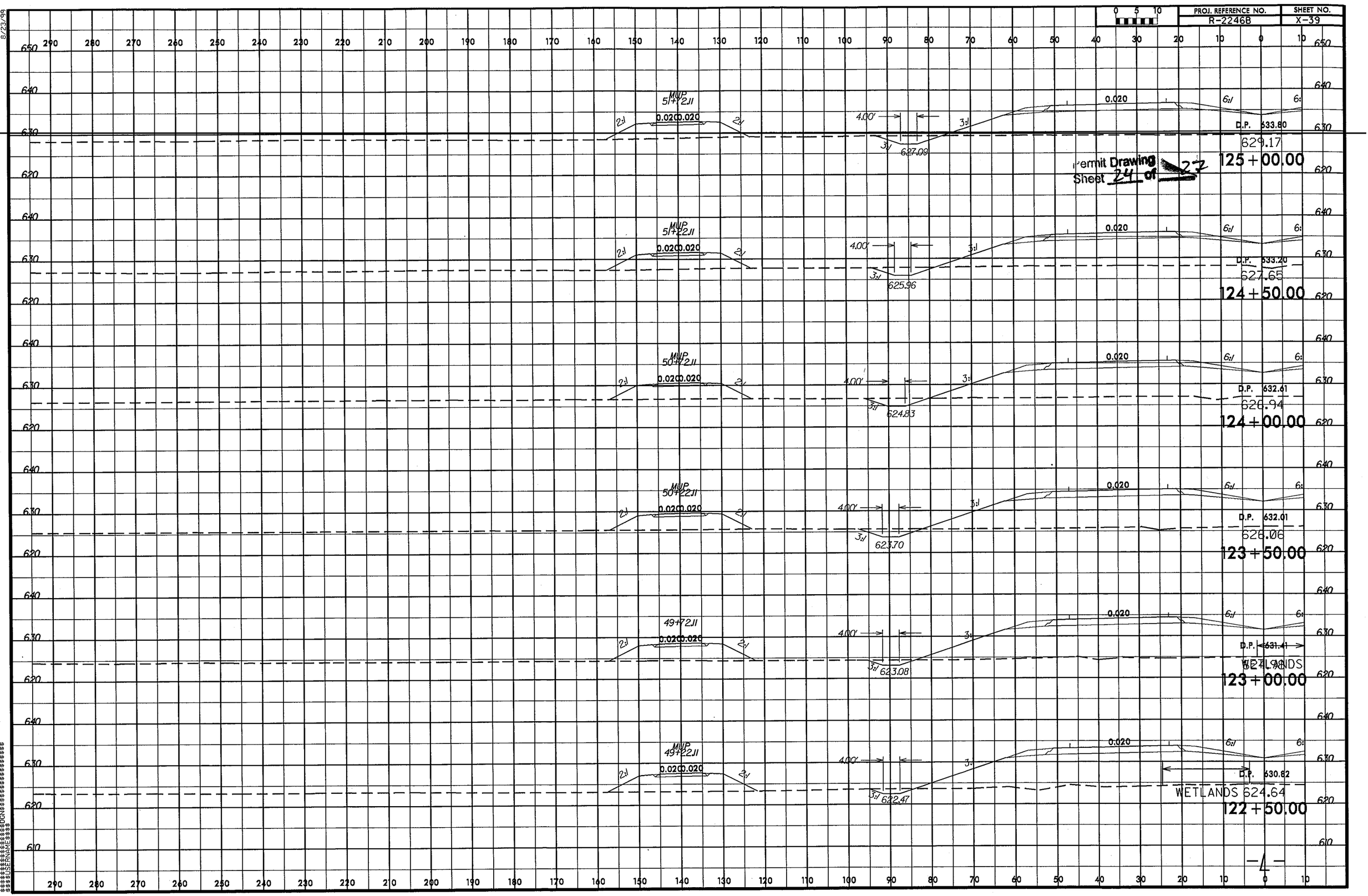
8/17/99



SITE 5
Standard Base Ditch
SEE DETAIL 'Z'
DDE=7 C.Y.
Filter Fabric=32 S.Y.
Coir Mat on Side Slopes Only
CL I RIP RAP (On Banks Only)
PROPST BROS. DISTS., INC.
DB 698 PG 36
NAD 83
PROJECT REFERENCE NO.
R-2246B
SHEET NO.
13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
Permit Drawing
Sheet 22 of 27
Special Lateral Base Ditch
SEE DETAIL 'AA'
TDE
CL I RIP RAP
50+00
-MUP-
CL I RIP RAP
EST 4 TON
FIL FAB=10 SQ. YD.
PROPOSED FENCE
CL B RIP RAP
EST 2 TON
FIL FAB=7 SQ. YD.
PROPST BROS. DISTS., INC.
48"WW&5SBW
4' P.S.
MICKEY S. AND
JENNIFFER T. COOKE
15" RCP-IV
18" RCP-IV
125
2' P.S.
FSM
2GI
TYPE-A
2GI
48" RCP-IV
Buried pipe
10' P.S.
SHEFFEILD MANOR HOMEOWNERS
ASSOCIATION OF CONCORD, INC
84
Standard Base Ditch
SEE DETAIL 'Z'
DDE= 25 CY
Coir Mat= 50 SY
Coir Mat on Side Slopes Only
36" RCP-IV
HW
GRADE TO DRAIN
PDE
RICHARD J. AND
SENAIT F. HURLEY
80
72"WD
STEPHEN H. AND
KRISTINE A. TOST
2SFBKD
CONC
GREG AND
CHRISTY SIMMONS
JEFFREY G. MULL
WF. JOANN H. MU
DAVID L. DIETZ
2SFD
1SFD
EUGENE E. PRE
WF. JOYCE L.
DENOTES EXCAVATION IN WETLAND
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50' 100' 150'
GRAPHIC SCALE



PROJ. REFERENCE NO.
R-2246B
SHEET NO.
X-38
WETLANDS
MUP 48+72.11
0.020
0.020
2:1
4.00'
3:1
6:1
D.P. 630.22
625.50
Permit Drawing
Sheet 23 of 27
122+00.00
WETLANDS
MUP 48+22.11
4:1
D.P. 629.62
625.39
121+50.00
MUP 47+72.11
D.P. 629.03
625.87
121+00.00
MUP 47+22.11
D.P. 628.43
625.51
120+50.00
MUP 46+72.11
627.19
D.P. 627.83
120+00.00
MUP 46+22.11
627.03
D.P. 627.20
119+50.00
-L-

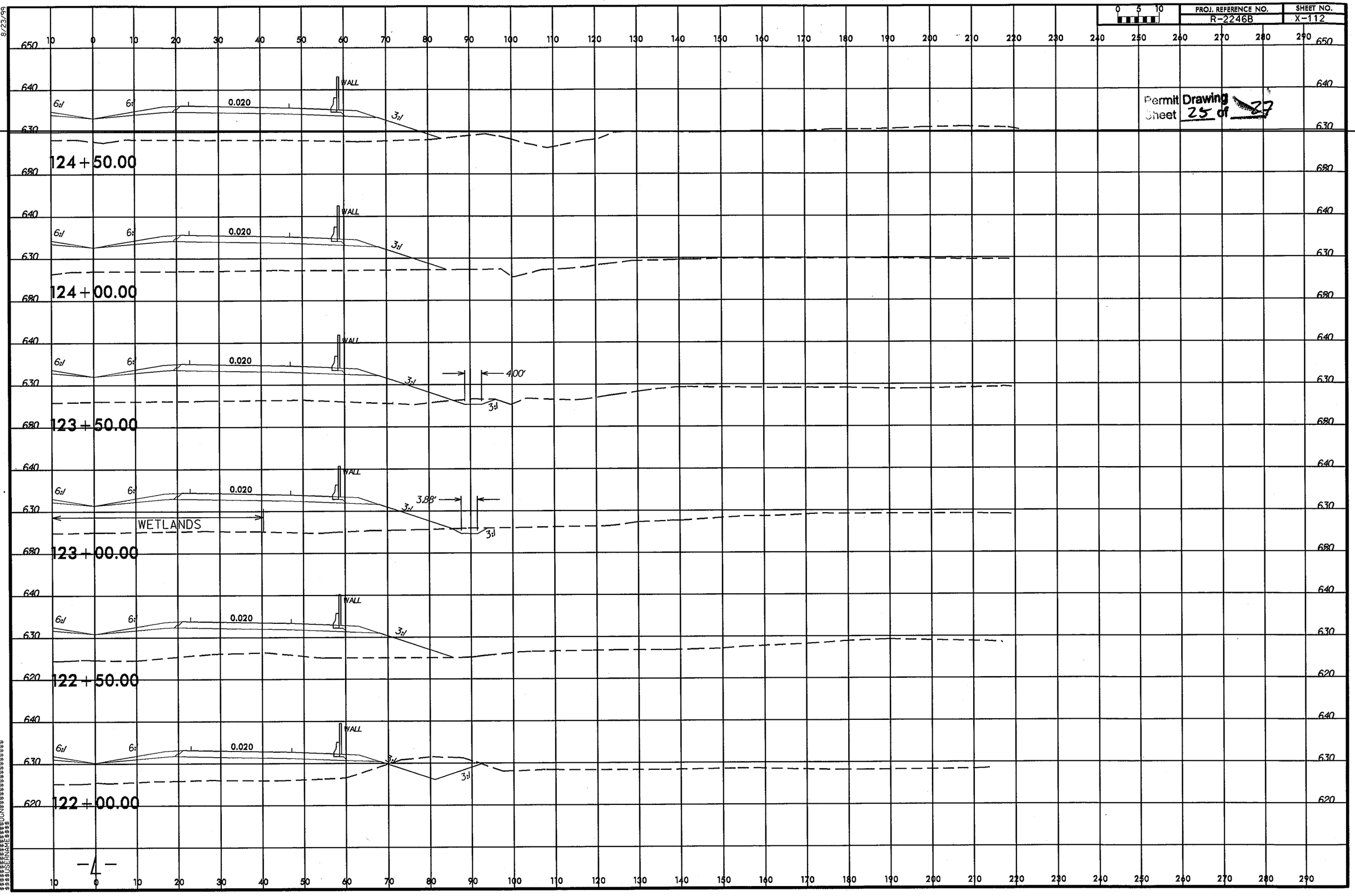

PROJ. REFERENCE NO.
R-2246B
SHEET NO.
X-39
MUP 51+72.11
0.020 0.020
2:1
4.00'
3:1
0.020
6:1
D.P. 633.80
629.17
627.09
125+00.00
Permit Drawing
Sheet 24 of 27
MUP 51+22.11
D.P. 633.20
627.65
625.96
124+50.00
MUP 50+72.11
D.P. 632.61
626.94
624.83
124+00.00
MUP 50+22.11
D.P. 632.01
626.06
623.70
123+50.00
49+72.11
D.P. 631.41
WETLANDS
623.08
123+00.00
MUP 49+22.11
D.P. 630.82
WETLANDS 624.64
622.47
122+50.00
-L-

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-2246B	X-112

0 5 10

Permit Drawing
Sheet 25 of 27



-4-

$$$$SYSTIME$$$$
$$$$SYSLIMIT$$$$
$$$$SYSLIMIT$$$$
$$$$BDEPTH$$$$
$$$$BDEPTH$$$$
$$$$BDEPTH

PROPERTY OWNERS

NAMES AND ADDRESSES

SITE	PARCEL NO.	NAMES	ADDRESSES
1 & 2	15	NC DOT	
1	16	TOWER PLACE, LLC	1610 WAYBRIDGE LANE CHARLOTTE NC 28220
1 & 2	17	CASCADS, LLC	WAYBRIDGE LANE CHARLOTTE NC 28220
2	25	CONCORD POINTE LIMITED PARTNERSHIP	7800 EAST KAMPER ROAD CINCINNATI OH 45249
3	74	PHILLIP MORRIS USA, INC	PO BOX 26603 RICHMOND VA 23261
3 & 4	75	CLARENCE LITTLE	2555 CONCORD FARMS RD CONCORD NC 28027
4	76A	CABARRUS COUNTY	P.O. BOX 707 CONCORD NC 28026
4 & 5	78	CENTEX INTERNATIONAL	PO BOX 11231 CHARLOTTE NC 28220
4 & 5	79	PROPST BROS. DISTS. INC.	829 DAVIDSON DR CONCORD NC 28027
5	83	GREG & CHRISTY SIMMONS	1563 REVOLUTIONARY DR CONCORD NC 28027

NCDOT

DIVISION OF HIGHWAYS

CABARRUS COUNTY

PROJECT: 34408.1.1 (R-2246B)

CONCORD-KANNAPOLIS

GEORGE LILES PARKWAY FROM

SR 1304 TO SR 1431

SHEET OF 06/29/12

Permit Drawing
Sheet 24 of 27

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	29+40 -L-	Fill	0.04									
1	29+77 -L-	2@13x10 RCBC						0.03		156		
1	29+80 -L-	Stream Fill/						0.03	<.01	179	30	
		Channel Excavatiion										
2	35+30 -L-	Bank Stabilization						0.01		38		
2	28+20 -EL-	Remove Roadway							<.01		20	*54
3	98+39 -L-	2@13x9 RCBC						0.09		266		
3	98+39 -L-	Channel Excavation						0.03	0.01	113	24	
4	109+05 to 112+00-L-	Fill/36" RCP	0.12			<.01		0.03		384		
4	110+25 to 112+85-L-	MUP Boardwalk					0.02					
4	109+17-L-	Channel Excavation						<.01	<.01	32	5	
5	122+00 to 123+00-L-	Fill/48" RCP	0.08		<.01	<.01		0.01	<.01	209	13	
5	121+52-L-	MUP Fill/54" RCP	0.01		<.01	<.01						
TOTALS:			0.25		0.01	0.01	0.02	0.23	0.03	1377	92	*54

* Removal of existing pipe and roadway.

Site 4: 26 sets of 8"x8" MUP Boardwalk Piles = 12 SF of sw impacts (Pond)
Site 4: 12 sets of 8"x8" MUP Boardwalk Piles = 6 SF of wetland impacts

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

CABARRUS COUNTY
WBS - 34408.1.1 (R-2246B)

SHEET 10/10/2012

ATN Revised 3/31/05

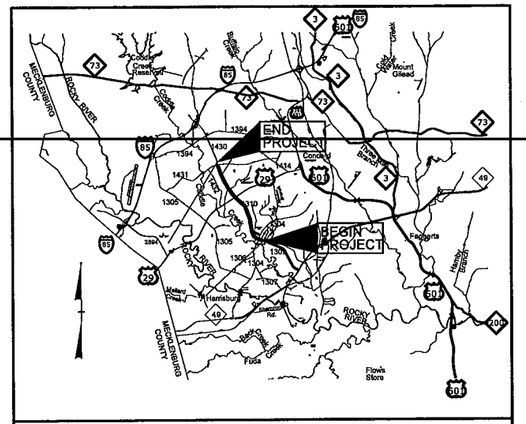
Permit Drawing
Sheet 27 of 27

09/08/99

TIP PROJECT: R-2246B

CONTRACT:

See Sheet 1-A For Index of Sheets



VICINITY MAP

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF CONCORD

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CABARRUS COUNTY

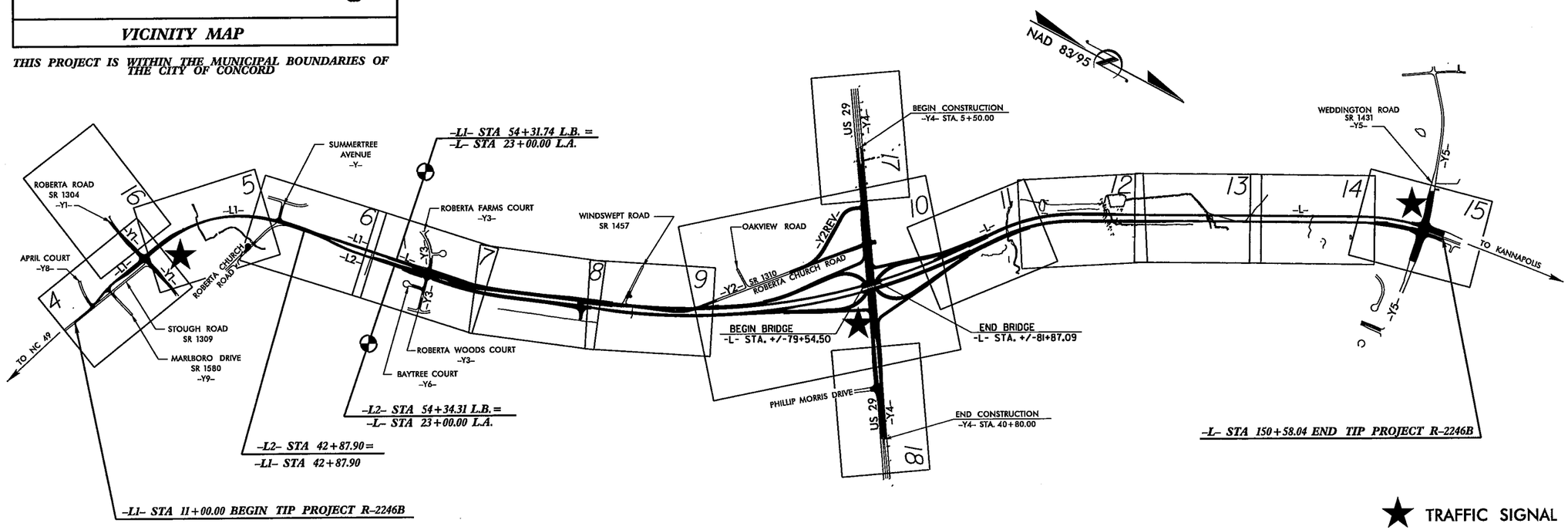
LOCATION: GEORGE LILES PARKWAY FROM SOUTH OF SR 1304 (ROBERTA ROAD) TO SR 1431 (WEDDINGTON ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2246B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34408.1.1	STP-(0005)46	PE

STATEWIDE TIER PROJECT



NOTE: PART OF THIS PROJECT IS A PARTIAL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS AND THE OTHER PART IS A FULL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100 — PLANS

50 25 0 50 100 — PROFILE (HORIZONTAL)

10 5 0 10 20 — PROFILE (VERTICAL)

DESIGN DATA

ADT 2011	=	18,600
ADT 2035	=	42,000
DHV	=	55 %
D	=	10 %
T	=	5 % *
V	=	60 MPH

* TTST 1% DUAL 4%

FUNCTIONAL CLASSIFICATION
URBAN ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2246B = 3.193 MILES

LENGTH STRUCTURE TIP PROJECT R-2246B = 0.043 MILES

TOTAL LENGTH TIP PROJECT R-2246B = 3.237 MILES

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MARCH 18, 2011

LETTING DATE: APRIL 16, 2013

G.E. BREW, PE
PROJECT ENGINEER

I.T. YOUNIS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER P.E.

18-MAR-2011 11:28
R:\Roadway\Proj\r2246b_rdy_tsh.dgn
$$$$USERNAME$$$$

09/08/09

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	1-B

Note: Not to Scale

**S.U.E. = Subsurface Utility Engineering*

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — IP
- Property Corner
- Property Monument — CM
- Parcel/Sequence Number — 23
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FWD
- False Sump

RAILROADS:

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

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite Marker — RW
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Drainage / Utility Easement — DUE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC HW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line
- Designated U/G Water Line (S.U.E.*)
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

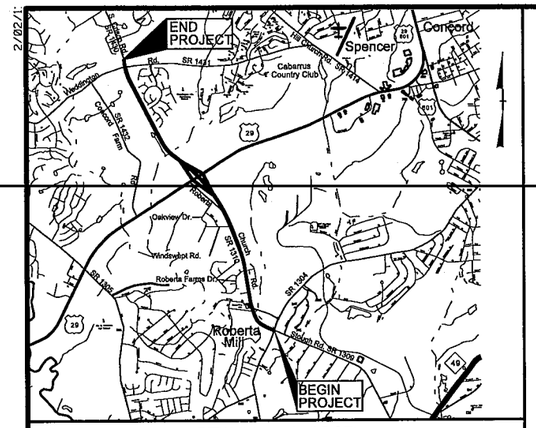
- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	1 C
Location and Surveys	

SURVEY CONTROL SHEET



VICINITY MAP

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "WINDSOR"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 626437.435(ft) EASTING: 1510910.502(ft)
ELEVATION: (ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999849030
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "WINDSOR" TO -L1- STATION 11+00.00 IS
S 5°01'00.27" E 36,329.1943 (ft)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTES:

1. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
HTTP:/WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

THE FILES TO BE FOUND ARE AS FOLLOWS:
R2246B_LS_CONTROL.TXT
R2246B_LS_LOCAL.TXT

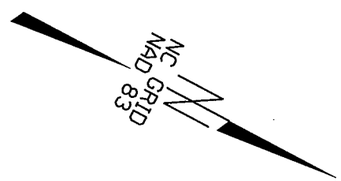
2. SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION & SURVEYS UNIT.

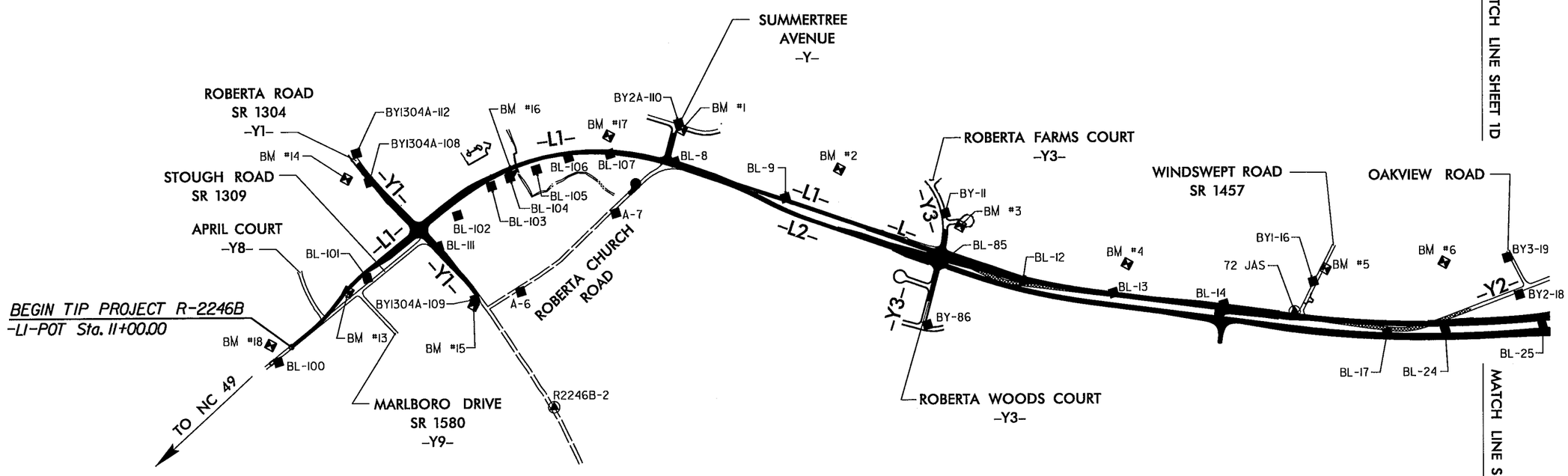
3. PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM. NETWORK ESTABLISHED FROM EXISTING (NON-HARN) MONUMENTATION. SEE SURVEY CONTROL SHEET 1E FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

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

INDICATES BASELINE TRAVERSE MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION & SURVEYS UNIT.

INDICATES BENCHMARKS USED OR SET FOR VERTICAL PROJECT CONTROL BY THE NCDOT LOCATION & SURVEYS UNIT.





NOTE: DRAWING NOT TO SCALE

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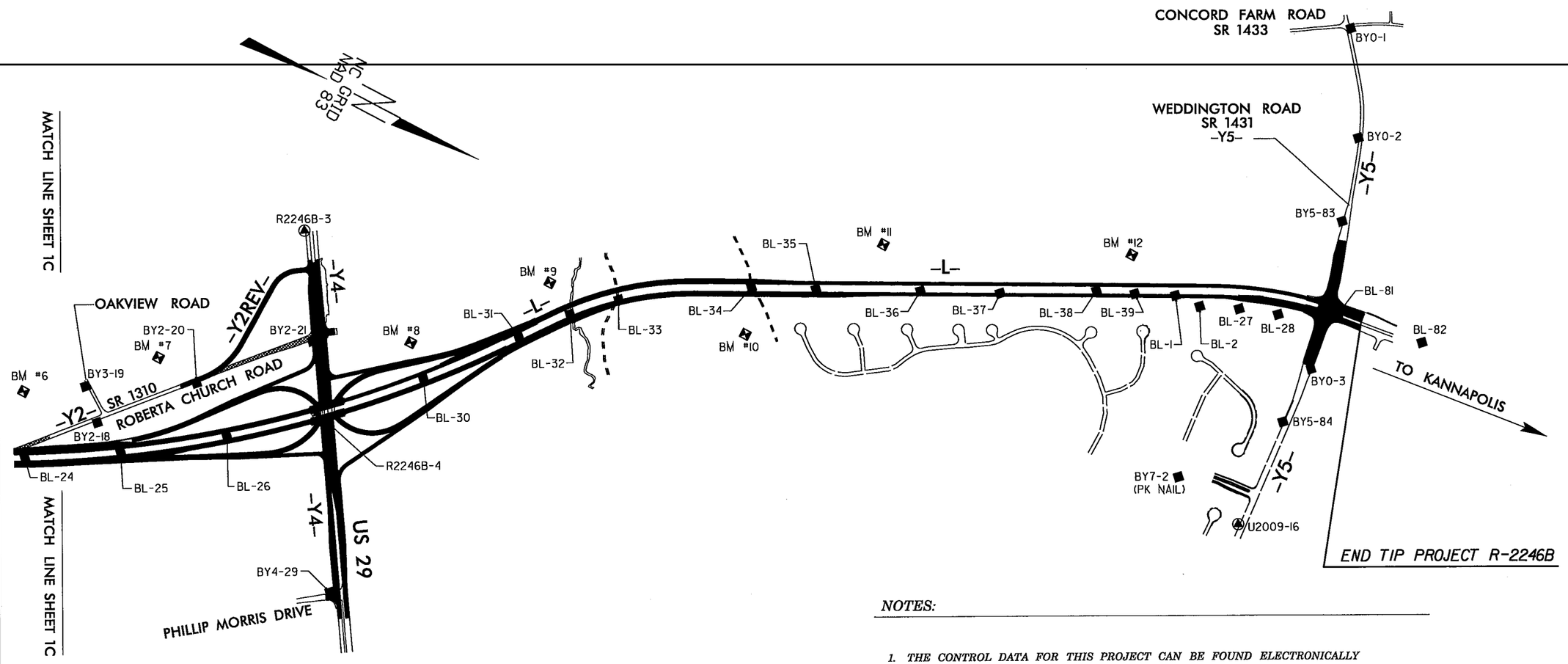
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	1D
Location and Surveys	

SURVEY CONTROL SHEET



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "WINDSOR"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 626437.435(ft) EASTING: 1510910.502(ft)
ELEVATION: (ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 0.999849030
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"WINDSOR" TO -L1- STATION 11+00.00 IS
S 5°01'00.27" E 36,329.1943 (ft)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTES:

1. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
   HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:
   R2246B_LS_CONTROL.TXT
   R2246B_LS_LOCAL.TXT

2. *SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION & SURVEYS UNIT.*

3. *PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM. NETWORK ESTABLISHED FROM EXISTING (NON-HARN) MONUMENTATION. SEE SURVEY CONTROL SHEET 1E FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.*

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

INDICATES BASELINE TRAVERSE MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION & SURVEYS UNIT.

INDICATES BENCHMARKS USED OR SET FOR VERTICAL PROJECT CONTROL BY THE NCDOT LOCATION & SURVEYS UNIT.

NOTE: DRAWING NOT TO SCALE

2/02/11
18-MAR-2011 11:28
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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	1 E
Location and Surveys	

SURVEY CONTROL SHEET

BM1 ELEVATION - 589.51
N 591828 E 1511675
Y STATION 10+15 45 LEFT
2" CHISELED SQUARE IN A BOX CULVERT ON
THE EAST SIDE OF CEDAR SPRINGS DRIVE

BM2 ELEVATION - 599.49
N 592850 E 1511423
L1 STATION 50+43 299 LEFT
RR SPIKE SET IN THE BASE OF A 12"
QUADRUPLE ELM

BM3 ELEVATION - 605.88
N 593714 E 1511377
Y3 STATION 10+83 100 LEFT
RR SPIKE SET IN THE BASE OF A 16" ELM

BM4 ELEVATION - 622.41
N 594700 E 1511087
L STATION 39+27 239 LEFT
RR SPIKE SET IN THE BASE OF A 16"
SWEETGUM

BM5 ELEVATION - 619.30
N 595932 E 1510511
L STATION 52+22 365 LEFT
1" CHISELED SQAURE ON THE EDGE OF A 12"
CONCRETE PIPE

BM6 ELEVATION - 621.67
N 596597 E 1510111
L STATION 60+37 435 LEFT
RR SPIKE SET IN THE BASE OF A 50" OAK

BM7 ELEVATION - 619.88
N 597281 E 1509497
Y2REV STATION 25+29 229 LEFT
RR SPIKE SET IN THE BASE OF A 26"
WILLOW OAK

BM8 ELEVATION - 618.91
N 598704 E 1508633
L STATION 87+39 250 LEFT
RR SPIKE SET IN THE BASE OF A 14" ASH

BM9 ELEVATION - 599.99
N 599331 E 1507857
L STATION 97+48 231 LEFT
RR SPIKE SET IN THE BASE OF A 48" OAK

BM10 ELEVATION - 617.04
N 600629 E 1507553
L STATION 109+72 306 RIGHT
RR SPIKE SET IN THE BASE OF A 30" OAK

BM11 ELEVATION - 619.03
N 601155 E 1506608
L STATION 118+75 289 LEFT
RR SPIKE SET IN THE BASE OF A 28" OAK

BM12 ELEVATION - 639.59
N 602632 E 1505901
L STATION 135+11 234 LEFT
RR SPIKE SET IN THE BASE OF A 44" OAK

BM13 ELEVATION - 584.77
N 590405 E 1513606
L1 STATION 16+08 12 RIGHT
RR SPIKE IN BASE OF 18" OAK

BM14 ELEVATION - 587.58
N 590058 E 1512971
Y1 STATION 10+86 120 RIGHT
RR SPIKE IN BASE OF 36" TRIPLE WILD
CHERRY

BM15 ELEVATION - 610.33
N 591164 E 1513381
Y1 STATION 22+14
S 83°56'12.59" E DIST 61.02
RR SPIKE IN BASE OF 24" OAK

BM16 ELEVATION - 566.45
N 590982 E 1512428
L1 STATION 29+35 23 RIGHT
RR SPIKE IN BASE OF 12" BOX ELDER

BM17 ELEVATION - 593.26
N 591428 E 1511935
L1 STATION 35+78 99 LEFT
RR SPIKE IN BASE OF 24" ELM

BM18 ELEVATION - 559.72
N 590123 E 1514141
L1 STATION 10+01 93 LEFT
RR SPIKE IN BASE OF 14" BIRCH

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L1 STATION	OFFSET
6	A-6	591393.9332	1513081.2802	617.39	25+11.20	727.71 RT
7	A-7	591699.4348	1512359.6215	577.77	26+67.45	391.47 RT
8	BL-8	591886.2055	1511879.7284	594.01	40+17.79	13.17 LT
9	BL-9	592628.4082	1511748.2585	612.70	47+71.24	14.02 LT

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
6	A-6	591393.9332	1513081.2802	617.39	OUTSIDE PROJECT LIMITS	
7	A-7	591699.4348	1512359.6215	577.77	OUTSIDE PROJECT LIMITS	
8	BL-8	591886.2055	1511879.7284	594.01	OUTSIDE PROJECT LIMITS	
9	BL-9	592628.4082	1511748.2585	612.70	OUTSIDE PROJECT LIMITS	
85	BL-85	593725.2140	1511617.1860	607.89	27+43.09	1.53 LT
12	BL-12	594236.1345	1511501.0431	608.98	32+68.12	19.86 LT
13	BL-13	594788.6347	1511291.4062	620.51	38+62.31	45.28 LT
14	BL-14	595457.7900	1511021.4010	639.25	45+83.73	60.42 LT
15	72 JAS	595882.6700	1510849.1140	626.79	50+43.00	70.19 LT
17	BL-17	596481.3475	1510680.0835	631.67	56+61.25	17.12 RT
24	BL-24	596804.3565	1510487.0078	624.78	60+36.67	4.68 LT
25	BL-25	597352.2977	1510161.2141	622.29	66+74.40	2.10 RT
26	BL-26	597922.4704	1509743.1564	630.25	73+81.40	3.70 RT
4	R2246B-4	598378.1800	1509329.3080	627.67	79+97.17	6.10 LT
30	BL-30	598888.1878	1508804.7313	615.06	87+29.28	1.23 RT
31	BL-31	599313.1476	1508265.9147	601.61	94+15.66	0.01 RT
32	BL-32	599544.0240	1507977.1245	589.04	97+85.63	10.73 RT
33	BL-33	599782.9995	1507744.7022	596.05	101+21.99	23.70 RT
34	BL-34	600520.3800	1507261.3905	609.76	110+10.00	2.97 LT
35	BL-35	600900.3766	1507074.3367	620.12	114+33.43	6.80 RT
36	BL-36	601513.5193	1506761.4839	626.54	121+21.75	12.77 RT
37	BL-37	601984.7116	1506529.2057	631.67	126+46.95	24.59 RT
38	BL-38	602536.4697	1506219.3951	655.14	132+79.43	4.89 RT
39	BL-39	602769.2987	1506116.6296	642.14	135+33.39	21.38 RT
61	BL-1 R2246C	603011.5925	1506000.9250	647.18	138+01.73	38.76 RT
62	BL-2 R2246C	603186.6480	1505988.4970	652.46	139+62.77	100.65 RT
27	BL-27 R2246C	603421.8040	1505981.7960	664.20	142+28.61	107.33 RT
28	BL-28 R2246C	603664.2454	1505795.3775	662.27	144+97.25	110.79 RT
81	BL-81	604016.6130	1505607.9310	651.19	148+92.32	8.11 RT
82	BL-82	604602.4690	1505508.2310	640.40	OUTSIDE PROJECT LIMITS	

BL1

POINT	DESC.	NORTH	EAST	ELEVATION	L1 STATION	OFFSET
100	BL-100	590217.6010	1514212.3430	557.72	9+73.49	22.40 RT
101	BL-101	590473.9848	1513470.6651	586.81	17+61.86	36.57 RT
111	BL-111	590786.9477	1513075.7459	608.77	22+48.64	169.42 RT
102	BL-102	590803.8269	1512841.2709	613.91	24+73.33	91.46 RT
103	BL-103	590900.7076	1512573.1446	588.13	27+70.90	53.37 RT
104	BL-104	590989.2145	1512468.0770	566.12	29+88.17	54.81 RT
105	BL-105	591118.0260	1512342.8482	571.69	30+94.97	63.89 RT
106	BL-106	591263.6015	1512177.7583	580.81	33+19.21	28.54 RT
107	BL-107	591487.1832	1512033.2709	577.62	35+89.36	15.61 RT
EQ08	BL-8	591886.2055	1511879.7284	594.01	40+17.79	13.17 LT

BY

POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
110	BY2A-110	591792.1303	1511648.9592	589.20	OUTSIDE PROJECT LIMITS	
EQ08	BL-8	591886.2055	1511879.7284	594.01	12+28.07	54.95 LT

BY1

POINT	DESC.	NORTH	EAST	ELEVATION	Y1 STATION	OFFSET
112	BY1304A-112	590038.4124	1512796.0416	583.15	OUTSIDE PROJECT LIMITS	
108	BY1304A-108	590197.9955	1512928.1474	590.59	11+90.55	18.18 RT
EQ111	BL-111	590786.9477	1513075.7459	608.77	17+97.48	21.44 LT
109	BY1304A-109	591156.1360	1513262.6742	610.59	22+10.96	26.84 RT
2	R2246B-2	591929.6400	1513635.1390	0.00	OUTSIDE PROJECT LIMITS	

BY2

POINT	DESC.	NORTH	EAST	ELEVATION	Y2REV STATION	OFFSET
68	BL-17	596481.3475	1510680.0835	631.67	OUTSIDE PROJECT LIMITS	
18	BY2-18	597124.5660	1510061.3727	623.28	OUTSIDE PROJECT LIMITS	
20	BY2-20	597580.0515	1509528.4780	626.03	27+02.77	16.80 RT
21	BY2-21	598127.8538	1508927.1677	619.39	33+43.42	399.03 RT

BY2A

POINT	DESC.	NORTH	EAST	ELEVATION	Y2REV STATION	OFFSET
19	BY3-19	596944.3818	1509888.8729	617.52	OUTSIDE PROJECT LIMITS	
69	BY2-18	597124.5660	1510061.3727	623.28	OUTSIDE PROJECT LIMITS	

BY3

POINT	DESC.	NORTH	EAST	ELEVATION	Y3 STATION	OFFSET
11	BY-11	593588.5959	1511351.6443	604.20	OUTSIDE PROJECT LIMITS	
78	BL-85	593725.2140	1511617.1860	607.89	12+92.40	34.23 LT
86	BY-86	593821.6020	1512036.8350	590.36	OUTSIDE PROJECT LIMITS	

BY4

POINT	DESC.	NORTH	EAST	ELEVATION	Y4 STATION	OFFSET
3	R2246B-3	597743.1940	1508310.9630	608.54	10+01.23	42.70 RT
70	BY2-21	598127.8538	1508927.1677	619.39	17+27.57	52.63 RT
74	R2246B-4	598378.1800	1509329.3080	627.67	22+01.21	59.70 RT
29	BY4-29	598999.5353	1510325.3431	633.26	33+75.05	76.09 RT

BY5

POINT	DESC.	NORTH	EAST	ELEVATION	Y5 STATION	OFFSET
71	BY0-1 R2246C	603210.9392	1503913.1503	634.14	OUTSIDE PROJECT LIMITS	
72	BY0-2 R2246C	603594.6491	1504522.9949	639.26	OUTSIDE PROJECT LIMITS	
83	BY5-83	603755.7500	1505056.1520	635.48	12+72.62	35.49 RT
77	BL-81	604016.6130	1505607.9310	651.19	18+69.50	63.58 LT
84	BY5-84	604023.8930	1506402.6530	657.78	26+59.00	31.63 RT
63	U2009-16	604081.3607	1507131.0441	666.86	OUTSIDE PROJECT LIMITS	

BY1457

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
16	BY1-16	595901.1729	1510620.0347	622.15	51+48.01	275.83 LT
67	72 JAS	595882.6700	1510849.1140	626.79	50+43.00	70.19 LT

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "WINDSOR"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 626437.435(ft) EASTING: 1510910.502(ft)
ELEVATION: (ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 0.999849030
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"WINDSOR" TO -L1- STATION 11+00.00 IS
S 5°01'00.27" E 36,329.1943 (ft)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
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NOTES:

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   R2246B_LS_LOCAL.TXT

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3. *PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM. NETWORK ESTABLISHED FROM EXISTING (NON-HARN) MONUMENTATION.*

2/02/11
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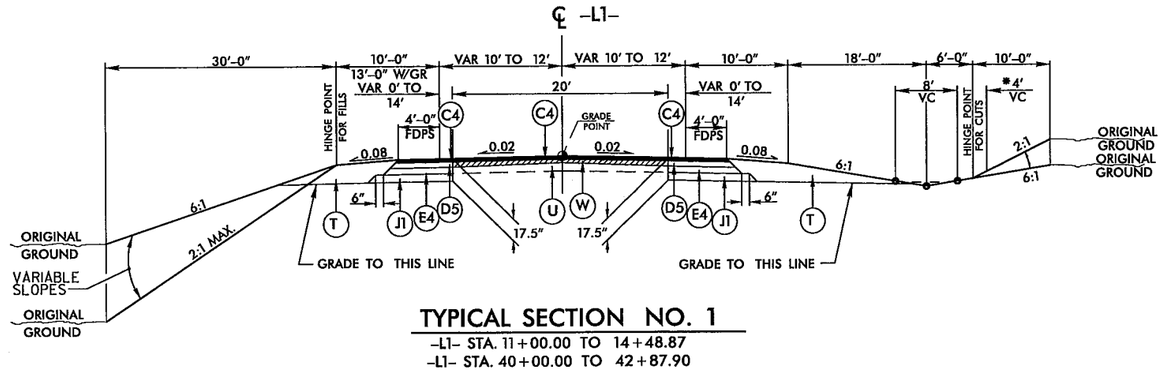
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PRELIMINARY PAVEMENT SCHEDULE

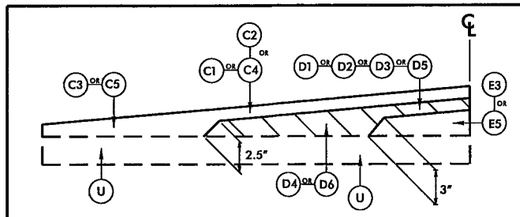
C1	PROP. APPROX. 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	E5	PROP. APPROX. 7" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	E6	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5.5" IN DEPTH.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.	J1	PROP. 8" AGGREGATE BASE COURSE.
C4	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	J2	PROP. 10" AGGREGATE BASE COURSE.
C5	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.	P	PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YD.
D1	PROP. APPROX. 2.5" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.	R1	2'-6" CONCRETE CURB AND GUTTER.
D2	PROP. APPROX. 3.5" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD.	R2	5" MONOLITHIC ISLAND.
D3	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	R3	STD. CONCRETE BARRIER (SINGLE FACE).
D4	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2.5" IN DEPTH OR GREATER THAN 4" IN DEPTH.	R4	SHOULDER BERM GUTTER.
D5	PROP. APPROX. 3.5" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD.	R5	CONCRETE VALLEY GUTTER.
D6	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2.5" IN DEPTH OR GREATER THAN 4" IN DEPTH.	S	PROP 4" CONCRETE SIDEWALK
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	T	EARTH MATERIAL.
E2	PROP. APPROX. 6" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	U	EXISTING PAVEMENT.
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5.5" IN DEPTH.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL).
E4	PROP. APPROX. 3" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.		

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



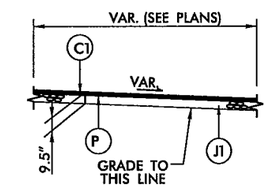
TYPICAL SECTION NO. 1

-L1- STA. 11+00.00 TO 14+48.87
-L1- STA. 40+00.00 TO 42+87.90



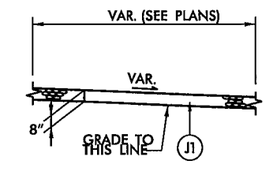
LINE	SURFACE C3	SURFACE C5				INTERMEDIATE D4	INTERMEDIATE D6		BASE E3	BASE E5
L1 (USE WITH T.S. 1 & 3)		X					X			X
L (USE WITH T.S. 4 & 6)		X					X			X
Y & Y3 (USE WITH T.S. 7)	X					X			X	
Y1, Y2REV, Y8 & Y9 (USE WITH T.S. 9, 10, 16)	X					X			X	
Y4 & Y5 (USE WITH T.S. 12 THRU 15)	X					X			X	

DETAIL SHOWING METHOD OF WEDGING



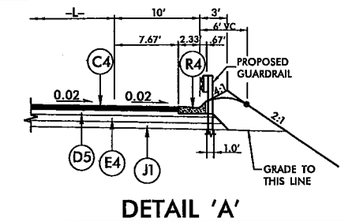
ROADWAY
MISC. PAVED PRIVATE DRIVES AND TURNAROUNDS

REMARKS
SEE PLANS FOR LOCATIONS



ROADWAY
MISC. UNPAVED PRIVATE DRIVES

REMARKS
SEE PLANS FOR LOCATIONS



DETAIL 'A'

GUARDRAIL WHERE SHOULDER BERM GUTTER IS REQUIRED
(USE IN CONJUNCTION W/TS NO. 2, 4 & 5)

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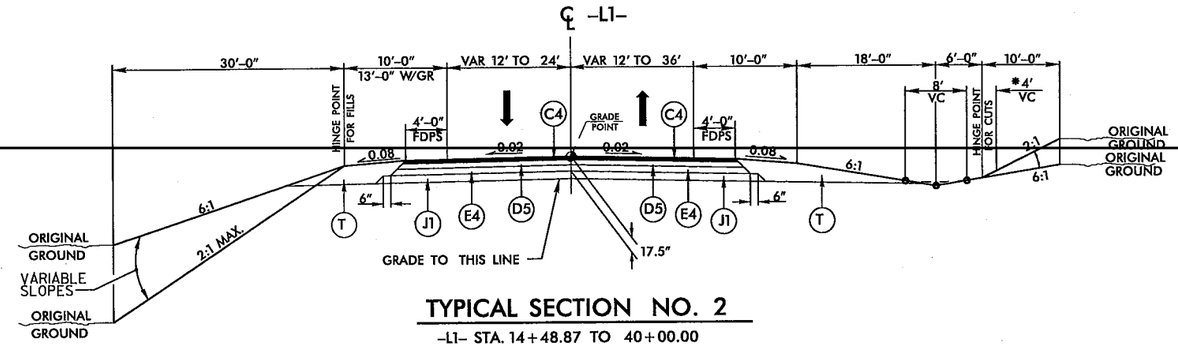
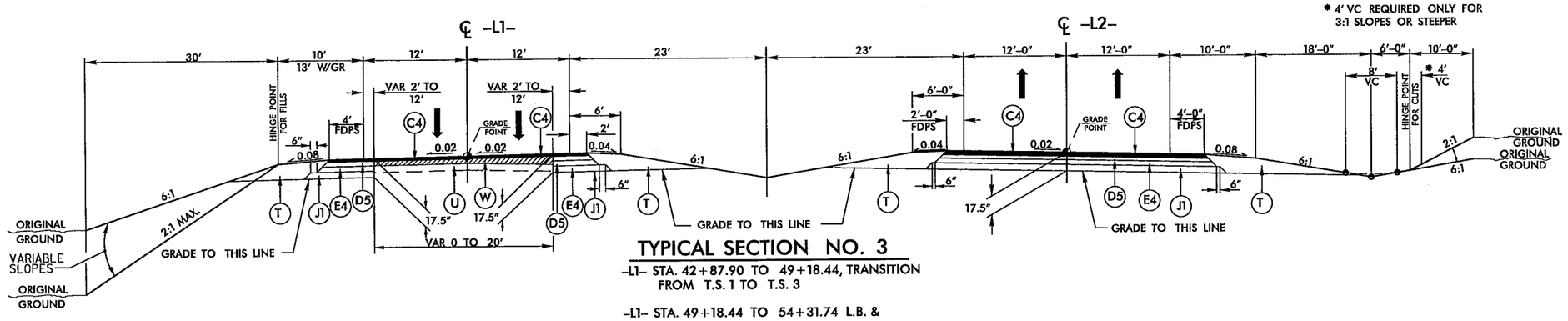
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION NO. 2

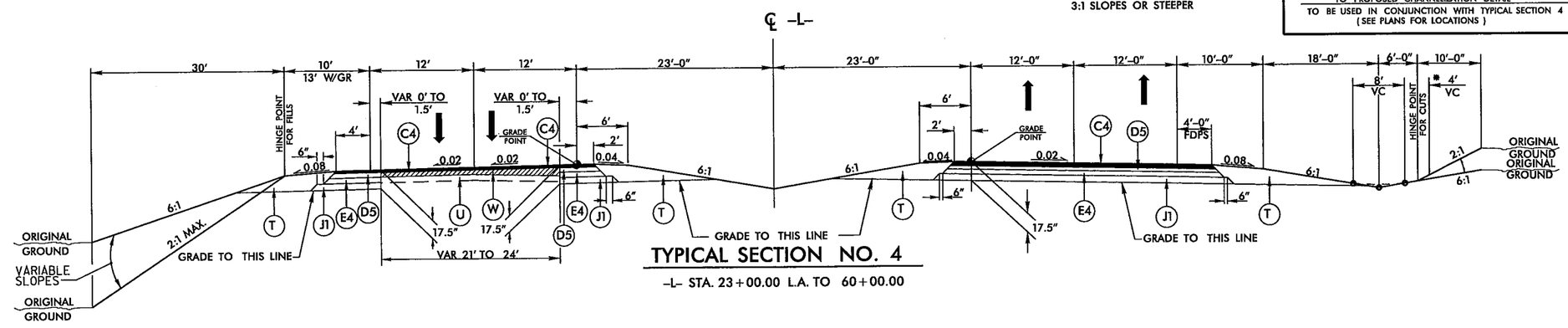
-L1- STA. 14+48.87 TO 40+00.00



TYPICAL SECTION NO. 3

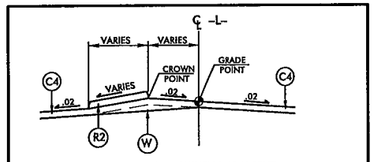
-L1- STA. 42+87.90 TO 49+18.44, TRANSITION FROM T.S. 1 TO T.S. 3

-L1- STA. 49+18.44 TO 54+31.74 L.B. &
-L2- STA. 49+21.02 TO 54+34.31 L.B.



TYPICAL SECTION NO. 4

-L- STA. 23+00.00 L.A. TO 60+00.00



SUPERELEVATION TREATMENT ADJACENT TO PROPOSED CHANNELIZATION DETAIL
TO BE USED IN CONJUNCTION WITH TYPICAL SECTION 4
(SEE PLANS FOR LOCATIONS)

PAVEMENT SCHEDULE	
C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

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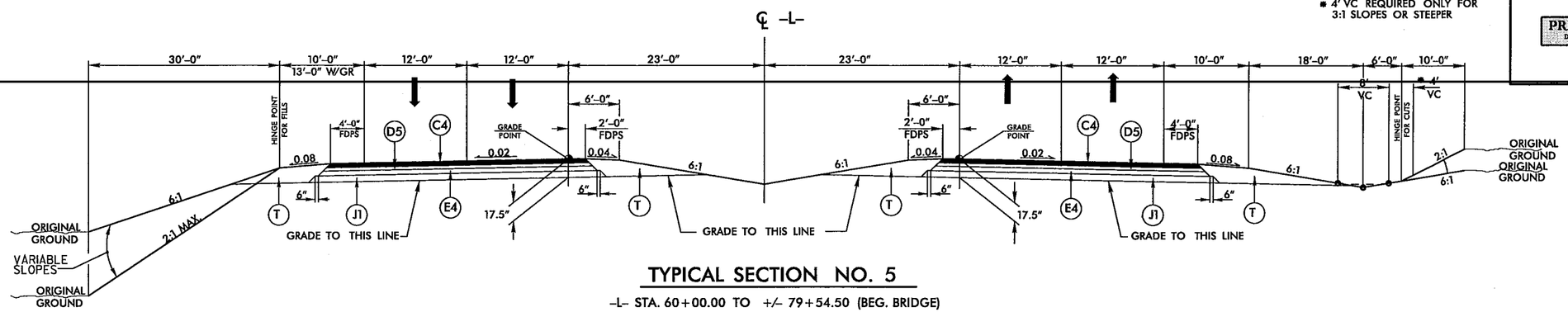
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-B
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

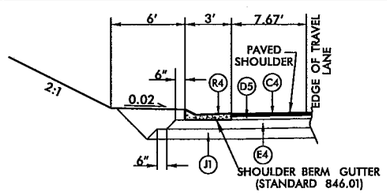
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

* 4' VC REQUIRED ONLY FOR 3:1 SLOPES OR STEEPER

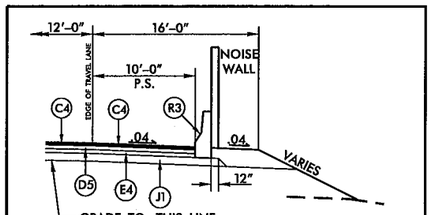


TYPICAL SECTION NO. 5

-L- STA. 60+00.00 TO +/- 79+54.50 (BEG. BRIDGE)
-L- STA. +/- 81+87.09 (END BRIDGE) TO 148+00.00



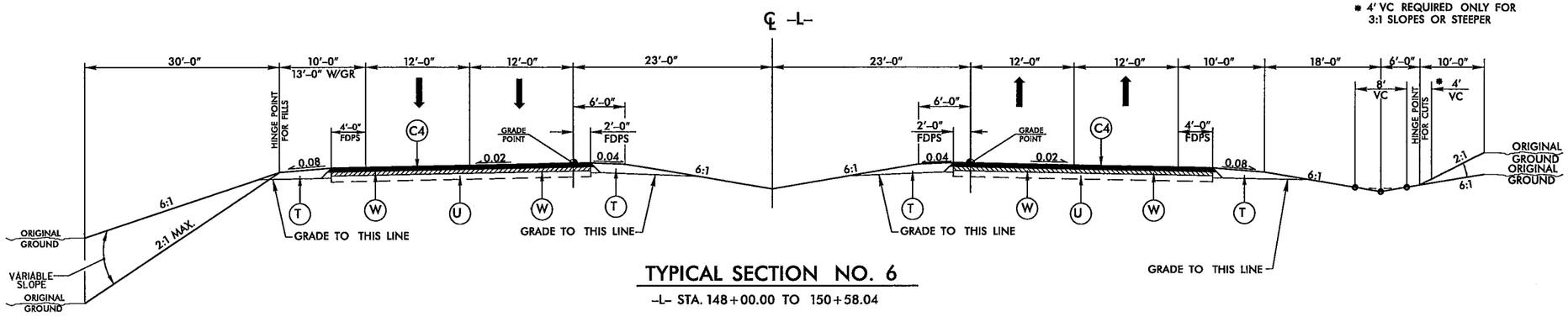
DETAIL SHOWING SHOULDER BERM GUTTER
USE WITH TYPICAL SECTION NO. 5
-L- STA. 141+00.00 TO 147+32.65 LEFT



NOISE WALL DETAIL
TO BE USED IN CONJUNCTION WITH TYPICAL SECTION 5
-L- STA. 110+08.44 TO 139+58.23 RT.

PAVEMENT SCHEDULE	
C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

* 4' VC REQUIRED ONLY FOR 3:1 SLOPES OR STEEPER



TYPICAL SECTION NO. 6

-L- STA. 148+00.00 TO 150+58.04

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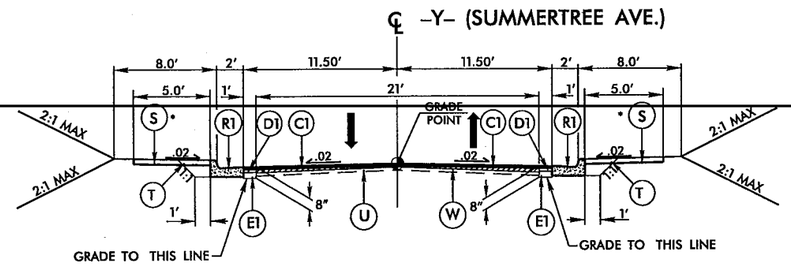
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-C
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

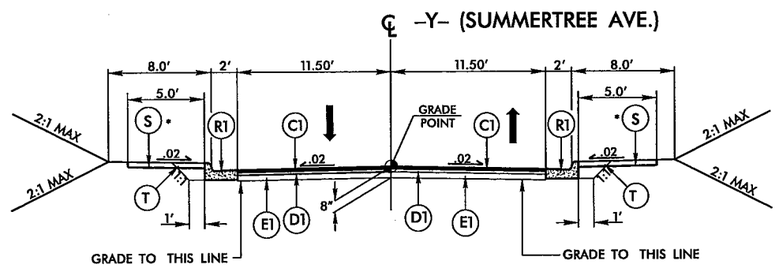
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



* SEE PLANS FOR LOCATION OF SIDEWALK

TYPICAL SECTION NO. 7

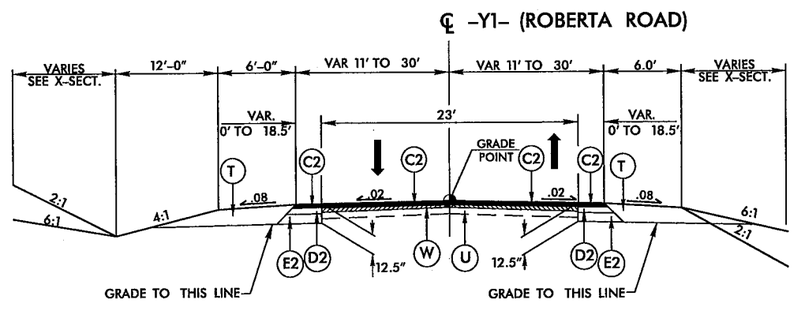
-Y- STA. 11+00.00 TO 12+00.00



* SEE PLANS FOR LOCATION OF SIDEWALK

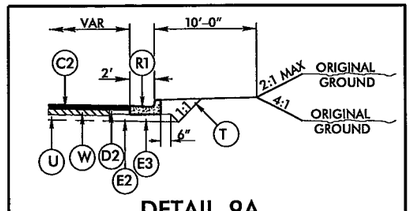
TYPICAL SECTION NO. 8

-Y- STA. 12+00.00 TO 12+50.00



TYPICAL SECTION NO. 9

-Y1- STA 10+50 TO 22+00



DETAIL 9A

TO BE USED IN CONJUNCTION WITH TYPICAL SECTION 9

-Y1- STA. 10+50.00 TO 12+60.00 RT.

PAVEMENT SCHEDULE	
C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

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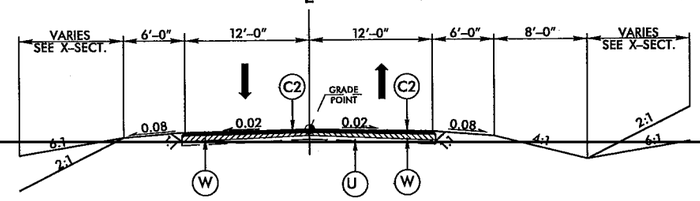
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-D
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

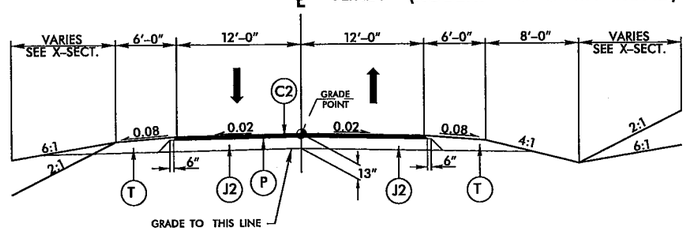
℄ –Y2REV– (ROBERTA CHURCH ROAD)



TYPICAL SECTION NO. 10

–Y2REV– STA. 26+00.00 TO 27+53.09

℄ –Y2REV– (ROBERTA CHURCH ROAD)

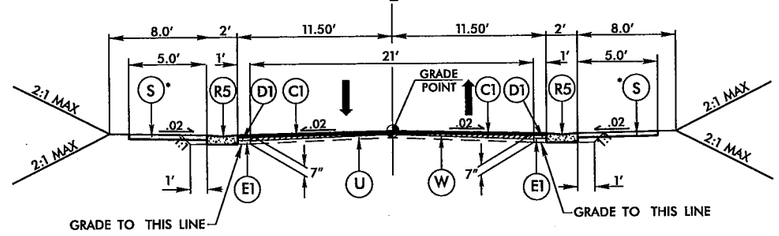


TYPICAL SECTION NO. 11

–Y2REV– STA. 27+53.09 TO 29+00, TRANSITION FROM T.S. 10 TO T.S. 11

–Y2REV– STA. 29+00.00 TO 37+75.48

℄ –Y3–

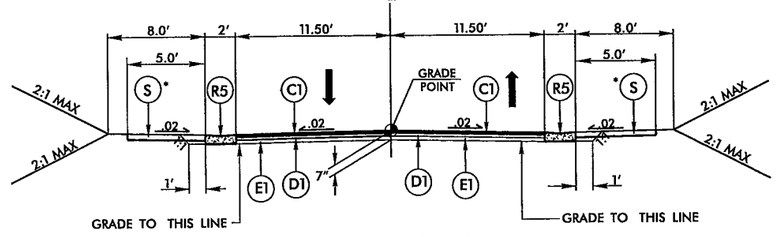


* SEE PLANS FOR LOCATION OF SIDEWALK

TYPICAL SECTION NO. 12

–Y3– STA. 11+00.00 TO 12+00.00
–Y3– STA. 15+25.00 TO 16+00.00

℄ –Y3–



* SEE PLANS FOR LOCATION OF SIDEWALK

TYPICAL SECTION NO. 13

–Y3– STA. 14+00.00 TO 15+25.00

PAVEMENT SCHEDULE

C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

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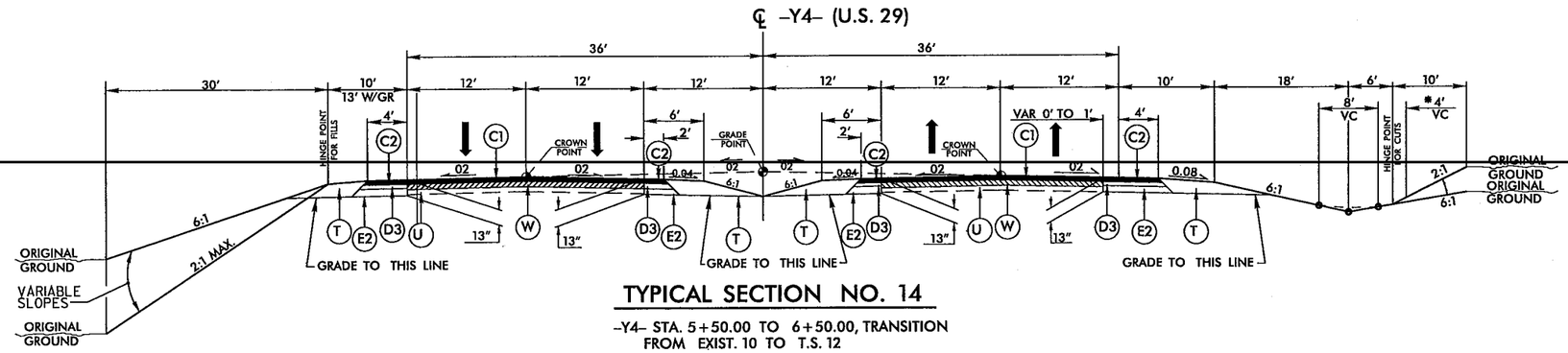
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-E
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

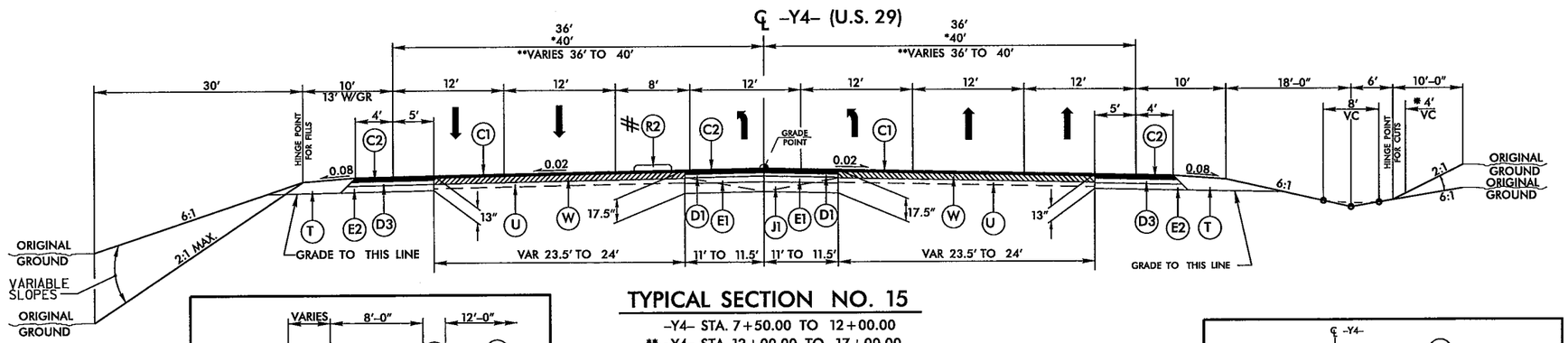
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION NO. 14

-Y4- STA. 5+50.00 TO 6+50.00, TRANSITION FROM EXIST. 10 TO T.S. 12

-Y4- STA. 6+50.00 TO 7+50.00, TRANSITION FROM T.S. 12 TO T.S. 13



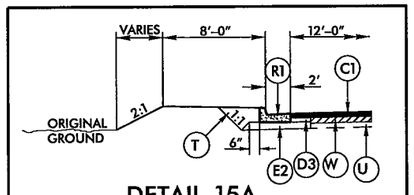
TYPICAL SECTION NO. 15

-Y4- STA. 7+50.00 TO 12+00.00

** -Y4- STA. 12+00.00 TO 17+00.00

*-Y4- STA. 17+00.00 TO 26+74.29

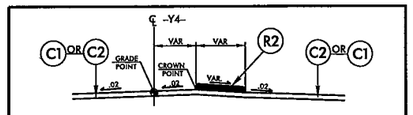
SEE PLANS FOR ISLAND LOCATION



DETAIL 15A

TO BE USED IN CONJUNCTION WITH TYPICAL SECTION 13

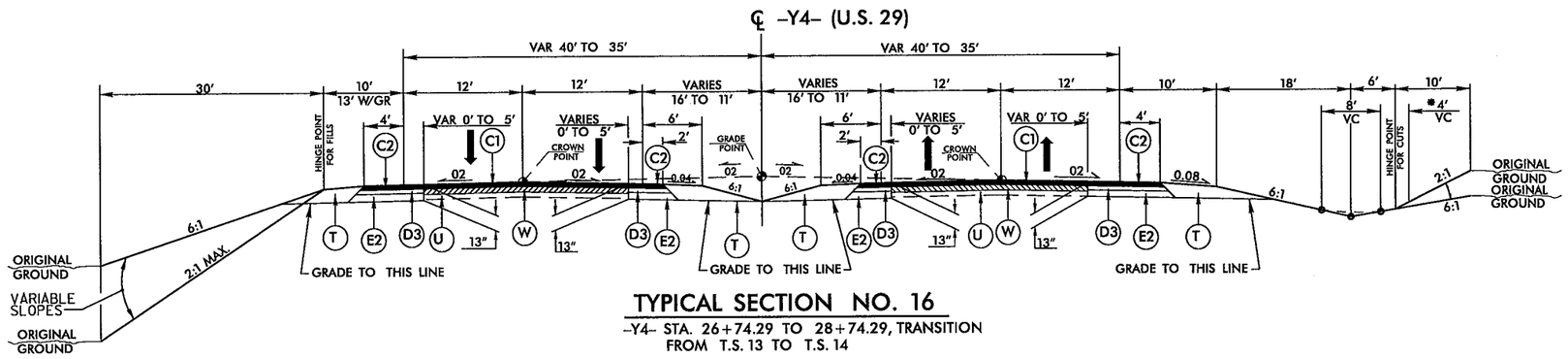
-Y4- STA. 11+85.00 TO 16+00.00 LT.



DETAIL 15B

SUPERELEVATION TREATMENT ADJACENT TO PROPOSED CHANNELIZATION

TO BE USED IN CONJUNCTION WITH TYPICAL SECTIONS 13
(SEE PLANS FOR LOCATIONS)



TYPICAL SECTION NO. 16

-Y4- STA. 26+74.29 TO 28+74.29, TRANSITION FROM T.S. 13 TO T.S. 14

-Y4- STA. 28+74.29 TO 40+00.00

PAVEMENT SCHEDULE	
C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

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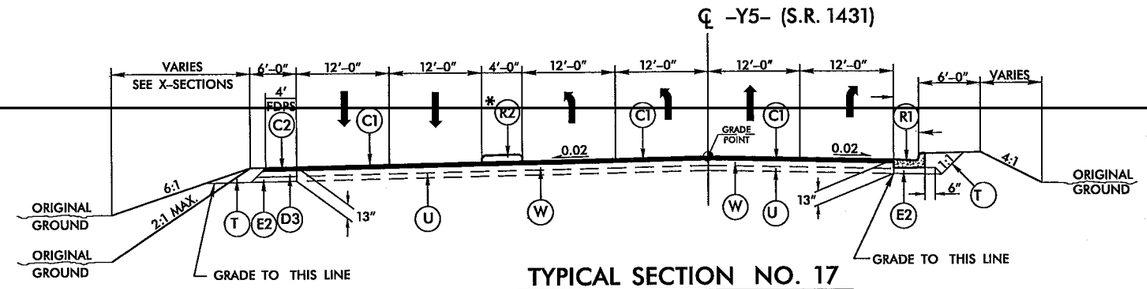
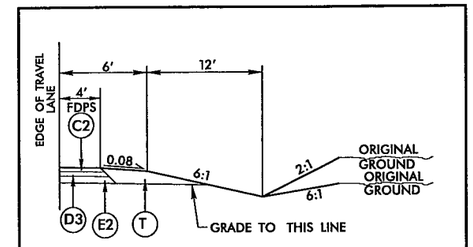
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-F
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



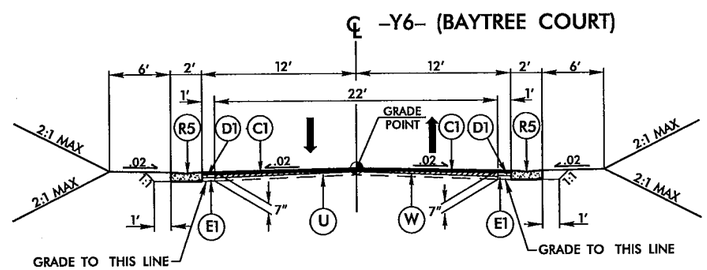
TYPICAL SECTION NO. 17

-Y5- STA. 15+00.00 TO 25+00.00
* SEE PLANS FOR ISLAND LOCATION



DETAIL 17A

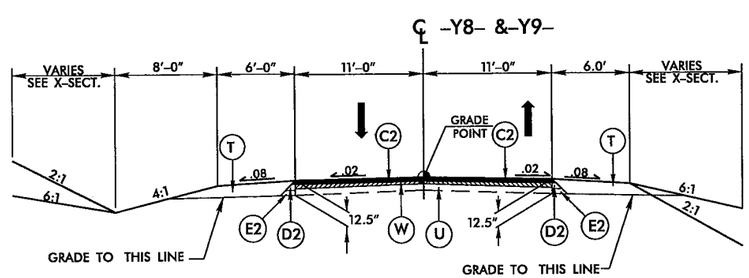
TO BE USED IN CONJUNCTION WITH TYPICAL SECTION 15
-Y5- STA. 14+00.00 TO 15+00.00 RT.



TYPICAL SECTION NO. 18

-Y6- STA. 10+46.76 TO 11+50.00

* SEE PLANS FOR LOCATION OF SIDEWALK



TYPICAL SECTION NO. 19

-Y8- STA. 11+50.00 TO 13+32.68
-Y9- STA. 10+12.02 TO 11+50.00

PAVEMENT SCHEDULE	
C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC. ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

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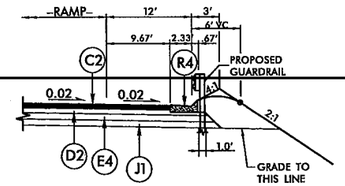
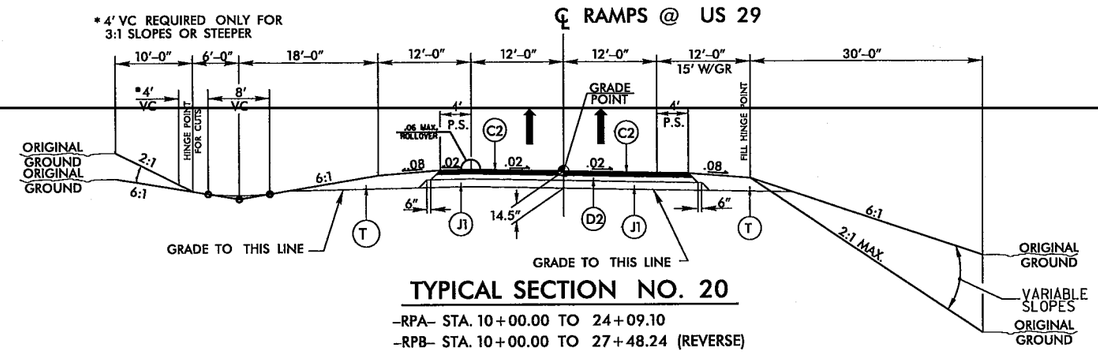
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-G
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



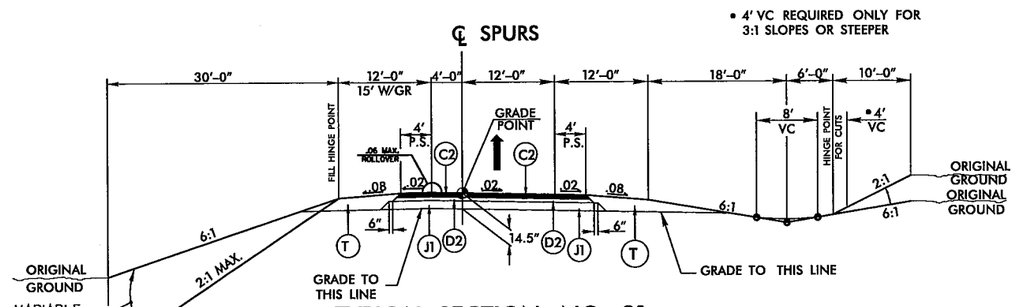
DETAIL 20A

GUARDRAIL WHERE SHOULDER BERM GUTTER IS REQUIRED (USE IN CONJUNCTION W/TS NO. 17)



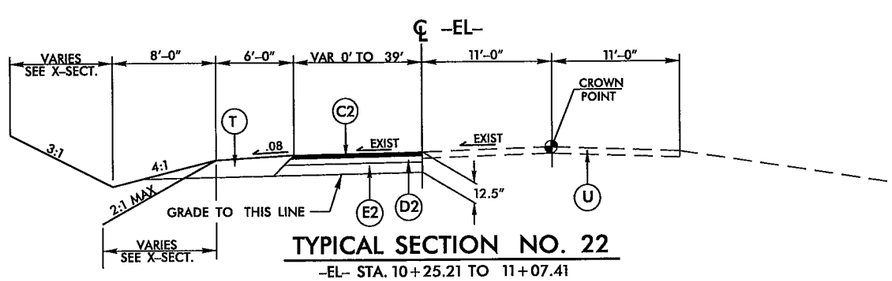
TYPICAL SECTION NO. 20

-RPA- STA. 10+00.00 TO 24+09.10
-RPB- STA. 10+00.00 TO 27+48.24 (REVERSE)
-RPC- STA. 10+00.00 TO 22+89.76
-RPD- STA. 10+00.00 TO 25+54.64 (REVERSE)



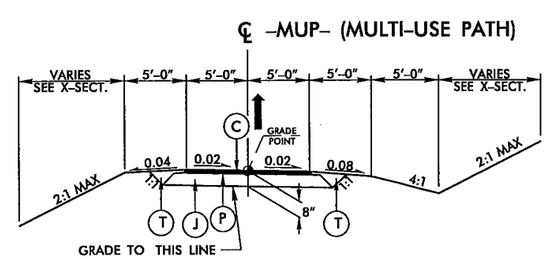
TYPICAL SECTION NO. 21

-SPURA- STA. 10+00.00 TO 13+02.01
-SPURB- STA. 10+00.00 TO 16+88.53 (REVERSE)
-SPURC- STA. 10+00.00 TO 13+80.74
-SPURD- STA. 10+00.00 TO 15+42.87 (REVERSE)



TYPICAL SECTION NO. 22

-EL- STA. 10+25.21 TO 11+07.41



TYPICAL SECTION NO. 23

-MUP- STA. 10+00.00 TO 74+54.49

PAVEMENT SCHEDULE	
C1	1.5" S9.5B
C2	3.0" S9.5B
C3	VAR S9.5B
C4	3.0" S9.5C
C5	VAR S9.5C
D1	2.5" I19.0B
D2	3.5" I19.0B
D3	4.0" I19.0B
D4	VAR. I19.0B
D5	3.5" I19.0C
D6	VAR. I19.0C
E1	4.0" B25.0B
E2	6.0" B25.0B
E3	VAR. B25.0B
E4	3.0" B25.0C
E5	7.0" B25.0C
E6	VAR. B25.0C
J1	8.0" ABC
J2	10.0" ABC
P	PRIME COAT
R1	2'-6" C & G
R2	5" MONOLITHIC CONC ISLAND
R3	STD. CONC. BARRIER (SINGLE FACE)
R4	SHOULDER BERM GUTTER
R5	VALLEY GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING

6/2/99

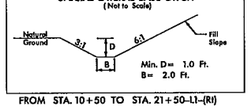
18-MAR-2011 11:29
R:\Roadway\Proj\r-2246b_rdy_typ.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-H
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

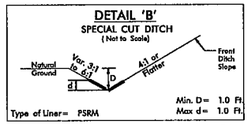
DRAINAGE DITCH DETAILS

DETAIL 'A'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



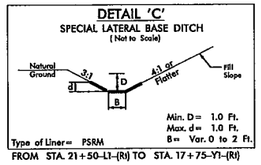
FROM STA. 10+50 TO STA. 21+50-L1-(Rt)

DETAIL 'B'
SPECIAL CUT DITCH
(Not to Scale)



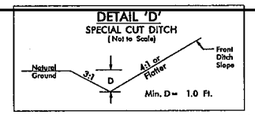
FROM STA. 14+17.65 TO STA. 14+50-L1-(Lt)
FROM STA. 12+50 TO STA. 12+97.48-Y8-(Lt)
FROM STA. 14+50 TO STA. 16+50-Y5-(Rt)
FROM STA. 37+00 TO STA. 39+00-Y4-(Lt)

DETAIL 'C'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



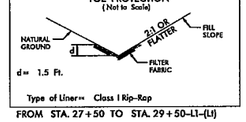
FROM STA. 21+50-L1-(Rt) TO STA. 17+75-Y1-(Rt)

DETAIL 'D'
SPECIAL CUT DITCH
(Not to Scale)



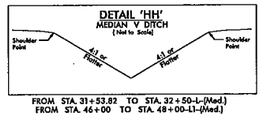
FROM STA. 12+18.55 TO STA. 15+00 -SPURB-(Lt)
FROM STA. 17+75 TO STA. 20+50 -Y1-(Lt)
FROM STA. 17+75 TO STA. 20+71.95 -Y1-(Rt)
FROM STA. 13+31.32 TO STA. 13+87.46 -Y1-(Lt)
FROM STA. 33+61.46 TO STA. 35+50 -L1-(Lt)
FROM STA. 23+00 TO STA. 24+00 -L-(Rt)
FROM STA. 50+00 TO STA. 54+31.74 -L1-(Rt)
FROM STA. 20+15 TO STA. 22+50 -Y5-(Rt)
FROM STA. 44+20 TO STA. 46+00 -L1-(Lt)
FROM STA. 40+00 TO STA. 43+90 -L1-(Lt)

DETAIL 'E'
TOE PROTECTION
(Not to Scale)



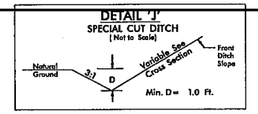
FROM STA. 27+50 TO STA. 29+50-L1-(Lt)

DETAIL 'HH'
MEDIAN V DITCH
(Not to Scale)



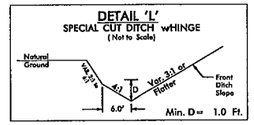
FROM STA. 31+53.82 TO STA. 32+50-L-(Med.)
FROM STA. 46+00 TO STA. 48+00-L1-(Med.)

DETAIL 'J'
SPECIAL CUT DITCH
(Not to Scale)



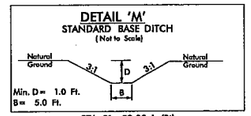
FROM STA. 37+50 TO STA. 50+00-L1-(Rt)

DETAIL 'L'
SPECIAL CUT DITCH wHINGE
(Not to Scale)



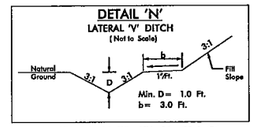
FROM STA. 40+50 TO STA. 41+30.96-L-(Rt)
FROM STA. 31+53.82 TO STA. 33+50-L-(Rt)
FROM STA. 29+50 TO STA. 31+53.82-L-(Rt)

DETAIL 'M'
STANDARD BASE DITCH
(Not to Scale)



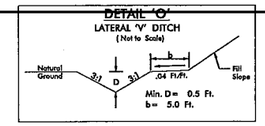
STA. 31+52.83-L-(Rt)
183 LF @ 0.5% Grade
FROM STA. 109+05.38 TO STA. 109+84.87-L-(Lt)
112 LF @ 0.4% grade

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



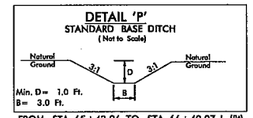
FROM STA. 24+00 TO STA. 26+50-L-(Rt)

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



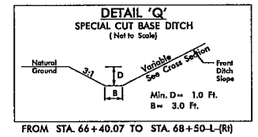
FROM STA. 51+00 TO STA. 51+86-L-(Lt)
FROM STA. 51+86 TO STA. 53+75-L-(Lt)

DETAIL 'P'
STANDARD BASE DITCH
(Not to Scale)



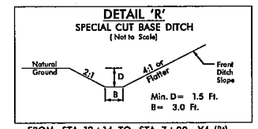
FROM STA. 65+42.96 TO STA. 66+40.07-L-(Rt)
172 LF @ .26% Grade

DETAIL 'Q'
SPECIAL CUT BASE DITCH
(Not to Scale)



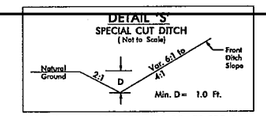
FROM STA. 66+40.07 TO STA. 68+50-L-(Rt)

DETAIL 'R'
SPECIAL CUT BASE DITCH
(Not to Scale)



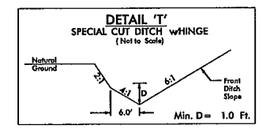
FROM STA. 12+14 TO STA. 7+00 -Y4-(Rt)
FROM STA. 25+03.94 TO STA. 27+37.65 -Y4-(Rt)

DETAIL 'S'
SPECIAL CUT DITCH
(Not to Scale)



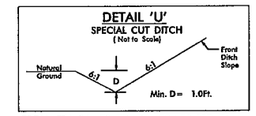
FROM STA. 24+36.38 TO STA. 25+50-RPC-(Lt)
FROM STA. 27+37.65 TO STA. 28+00-Y4-(Rt)

DETAIL 'T'
SPECIAL CUT DITCH wHINGE
(Not to Scale)



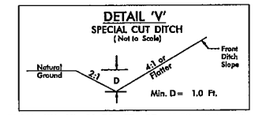
FROM STA. 23+50 TO STA. 24+50-RPB-(Rt)
FROM STA. 31+00 TO STA. 32+00-L-(Lt)

DETAIL 'U'
SPECIAL CUT DITCH
(Not to Scale)



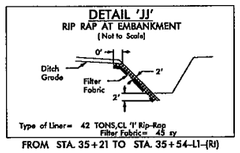
FROM STA. 24+50 TO STA. 23+50-RPD-(Rt)

DETAIL 'V'
SPECIAL CUT DITCH
(Not to Scale)



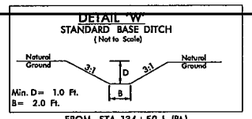
FROM STA. 37+00 TO STA. 37+66.53 -Y2Rev-(Rt)
FROM STA. 26+00 TO STA. 32+00 -Y2Rev-(Lt)
FROM STA. 26+50 TO STA. 31+50 -Y2Rev-(Rt)
FROM STA. 32+50 TO STA. 35+50 -Y2Rev-(Rt)
FROM STA. 13+00 TO STA. 18+00 -Y4-(Rt)
FROM STA. 5+50 TO STA. 6+95 -Y4-(Lt)
FROM STA. 11+50 TO STA. 6+95 -Y4-(Lt)
FROM STA. 19+16.94 TO STA. 17+21 -Y4-(Lt)
FROM STA. 13+87.13 TO STA. 13+52 -SPURA-(Rt)

DETAIL 'JJ'
RIP RAP AT EMBANKMENT
(Not to Scale)



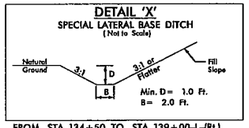
FROM STA. 35+21 TO STA. 35+54-L1-(Rt)

DETAIL 'W'
STANDARD BASE DITCH
(Not to Scale)



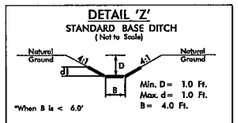
FROM STA. 134+50-L-(Rt.)
52 LF @ 2.61% grade

DETAIL 'X'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



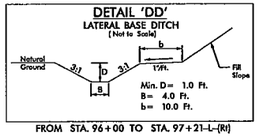
FROM STA. 134+50 TO STA. 139+00-L-(Rt.)
FROM STA. 139+00 TO STA. 140+00-L-(Rt.)

DETAIL 'Z'
STANDARD BASE DITCH
(Not to Scale)



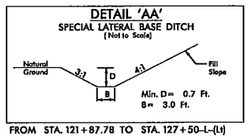
FROM STA. 121+73.33 TO STA. 121+87.78-L-(Lt)
23 LF @ 1.42% grade
FROM STA. 122+89.40 TO STA. 123+22.25-L-(Rt)
35 LF @ 4.14% grade

DETAIL 'DD'
LATERAL BASE DITCH
(Not to Scale)



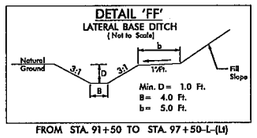
FROM STA. 96+00 TO STA. 97+21-L-(Rt)

DETAIL 'AA'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



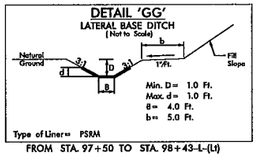
FROM STA. 121+87.78 TO STA. 127+50-L-(Lt)

DETAIL 'FF'
LATERAL BASE DITCH
(Not to Scale)



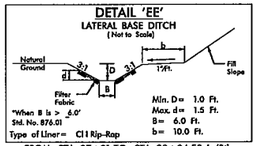
FROM STA. 91+50 TO STA. 97+50-L-(Lt)

DETAIL 'GG'
LATERAL BASE DITCH
(Not to Scale)



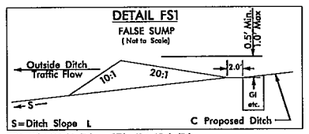
FROM STA. 97+50 TO STA. 98+43-L-(Lt)

DETAIL 'EE'
LATERAL BASE DITCH
(Not to Scale)



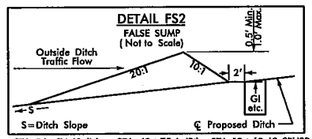
FROM STA. 97+21 TO STA. 98+04.58-L-(Rt)

DETAIL FS1
FALSE SUMP
(Not to Scale)



STA. 26+74-L1-(Rt)
STA. 27+74-L1-(Rt)
STA. 13+07-Y1-(Lt)
STA. 40+00-L1-(Lt)
STA. 47+74-L1-(Rt)
STA. 49+74-L1-(Rt)
STA. 41+48-L-(Rt)
STA. 140+76-L-(Lt)
STA. 146+74-L-(Rt)

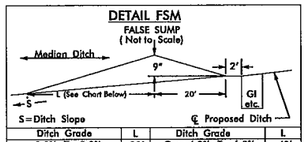
DETAIL FS2
FALSE SUMP
(Not to Scale)



STA. 26+74-L1-(Lt)
STA. 37+26-L1-(Rt)
STA. 40+26-L1-(Rt)
STA. 44+26-L1-(Rt)
STA. 24+26-L-(Rt)
STA. 42+75-L-(Rt)
STA. 6+67-Y4-(Rt)
STA. 100+05-L-(Rt)
STA. 104+26-L-(Rt)
STA. 107+26-L-(Rt)
STA. 110+26-L-(Rt)
STA. 13+69.49-SPURB-(Lt)
STA. 15+24-SPURB-(Lt)
STA. 140+76-L-(Rt)

STA. 31+74-Y2REV-(Rt)

DETAIL FSM
FALSE SUMP
(Not to Scale)



Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 32+26-L-Med.
STA. 34+26-L-Med.
STA. 36+76-L-Med.
STA. 39+76-L-Med.
STA. 51+74-L-Med.
STA. 101+26-L-Med.
STA. 104+26-L-Med.
STA. 107+26-L-Med.
STA. 110+26-L-Med.
STA. 113+38-L-Med.
STA. 58+74-L-Med.
STA. 62+24-L-Med.
STA. 65+74-L-Med.
STA. 68+26-L-Med.
STA. 72+26-L-Med.
STA. 116+76-L-Med.
STA. 120+13-L-Med.
STA. 123+26-L-Med.
STA. 126+76-L-Med.
STA. 131+26-L-Med.
STA. 76+26-L-Med.
STA. 86+24-L-Med.
STA. 91+74-L-Med.
STA. 95+24-L-Med.
STA. 97+74-L-Med.
STA. 99+24-L-Med.
STA. 134+26-L-Med.
STA. 136+26-L-Med.
STA. 138+26-L-Med.
STA. 140+76-L-Med.

REVISIONS

8/17/99

18-MAR-2011 11:29
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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	2-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

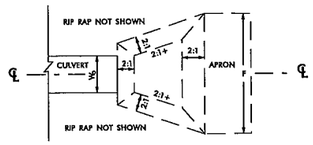
SPECIAL DRAINAGE DETAILS

DETAIL 'II'

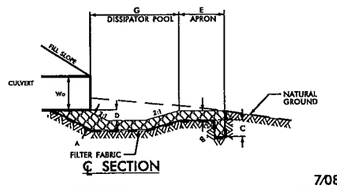
RIP-RAPPED ENERGY DISSIPATOR BASIN

DIM. (ft)	RIP RAP BASIN # 1	#	#
A	2.5'	#	#
B	1.7'	#	#
C	2.0'	#	#
D	1.5'	#	#
E	10.0'	#	#
F	33.0'	#	#
G	20.0'	#	#

ALL DIMENSIONS APPROXIMATE



PLAN



℄ SECTION

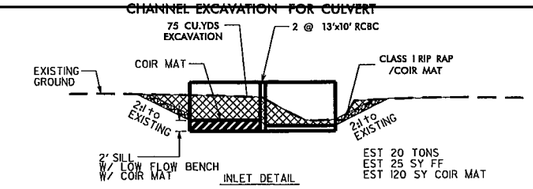
BASIN #	LOCATION (AT OUTLET)
1	Sta. 35+54-L1-(Rt) @
#	#
#	#

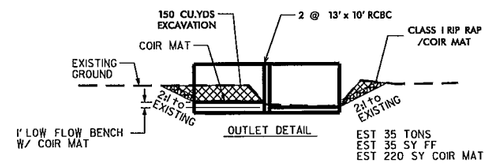
NOTE:
USE CLASS "I" RIP RAP FOR BASIN #1
APRON ELEVATION TO BE SET 0.5' ABOVE INVERT OF PIPE

7/08

DETAIL 'LL'

CHANNEL EXCAVATION FOR CULVERT



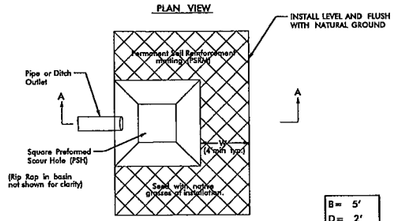


RCBC STA. 29+96-L1-

PREFORMED SCOUR HOLE

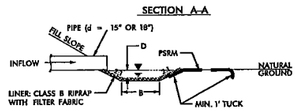
*NOT TO SCALE

PLAN VIEW



B= 5'
D= 2'
W= 4'

SECTION A-A

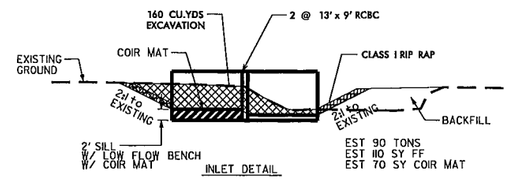


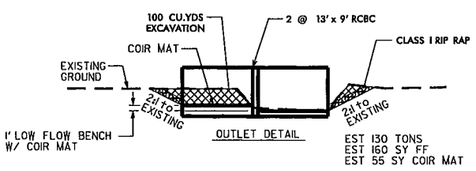
308

STA. 29+22-L1-(Rt) STA. 51+50-L-(Rt) STA. 62+00-L-(Rt) STA. 19+36-RPD-(Lt)
STA. 30+40-L1-(Rt) STA. 51+86-L-(Rt) STA. 17+05-RPC-(Rt)

DETAIL 'MM'

CHANNEL EXCAVATION FOR CULVERT



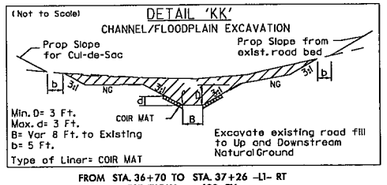


RCBC STA. 98+39-L-

DETAIL 'KK'

(Not to Scale)

CHANNEL/FLOODPLAIN EXCAVATION



Min. D= 3 Ft.
Max. d= 3 Ft.
B= Var 8 Ft. to Existing
b= 5 Ft.
Type of Liner= COIR MAT

FROM STA. 36+70 TO STA. 37+26 -L1- RT
EST EXCAV = 630 CY
EST COIR MAT = 120 SY

REVISIONS

8/17/99

18-MAR-2011 11:29
R:\Versions\Workgroup\2246B_Hyd_DET2.dgn
$$$$USERNAME$$$$

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

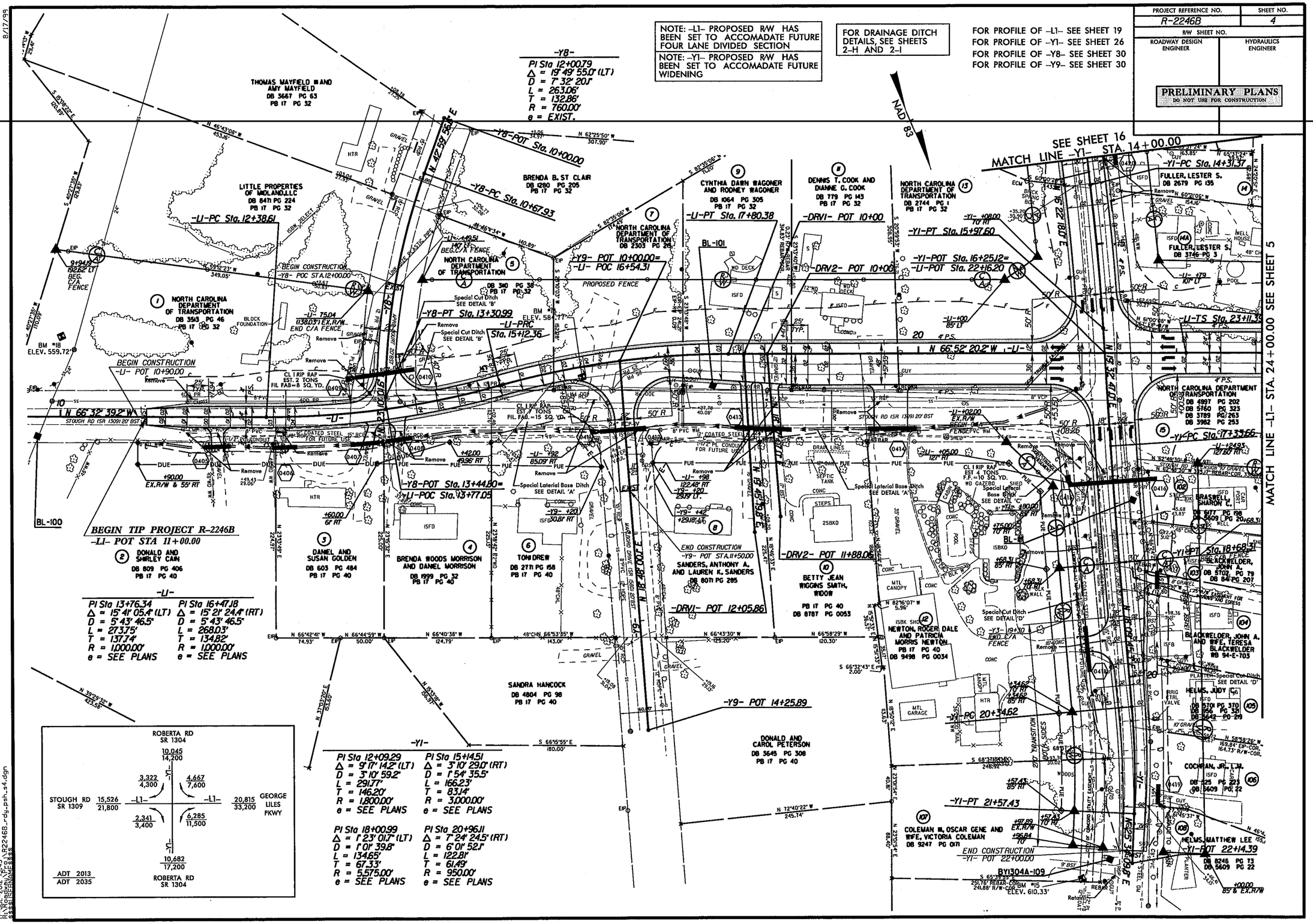
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE: -L1- PROPOSED R/W HAS BEEN SET TO ACCOMADATE FUTURE FOUR LANE DIVIDED SECTION

NOTE: -Y1- PROPOSED R/W HAS BEEN SET TO ACCOMADATE FUTURE WIDENING

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L1- SEE SHEET 19
FOR PROFILE OF -Y1- SEE SHEET 26
FOR PROFILE OF -Y8- SEE SHEET 30
FOR PROFILE OF -Y9- SEE SHEET 30



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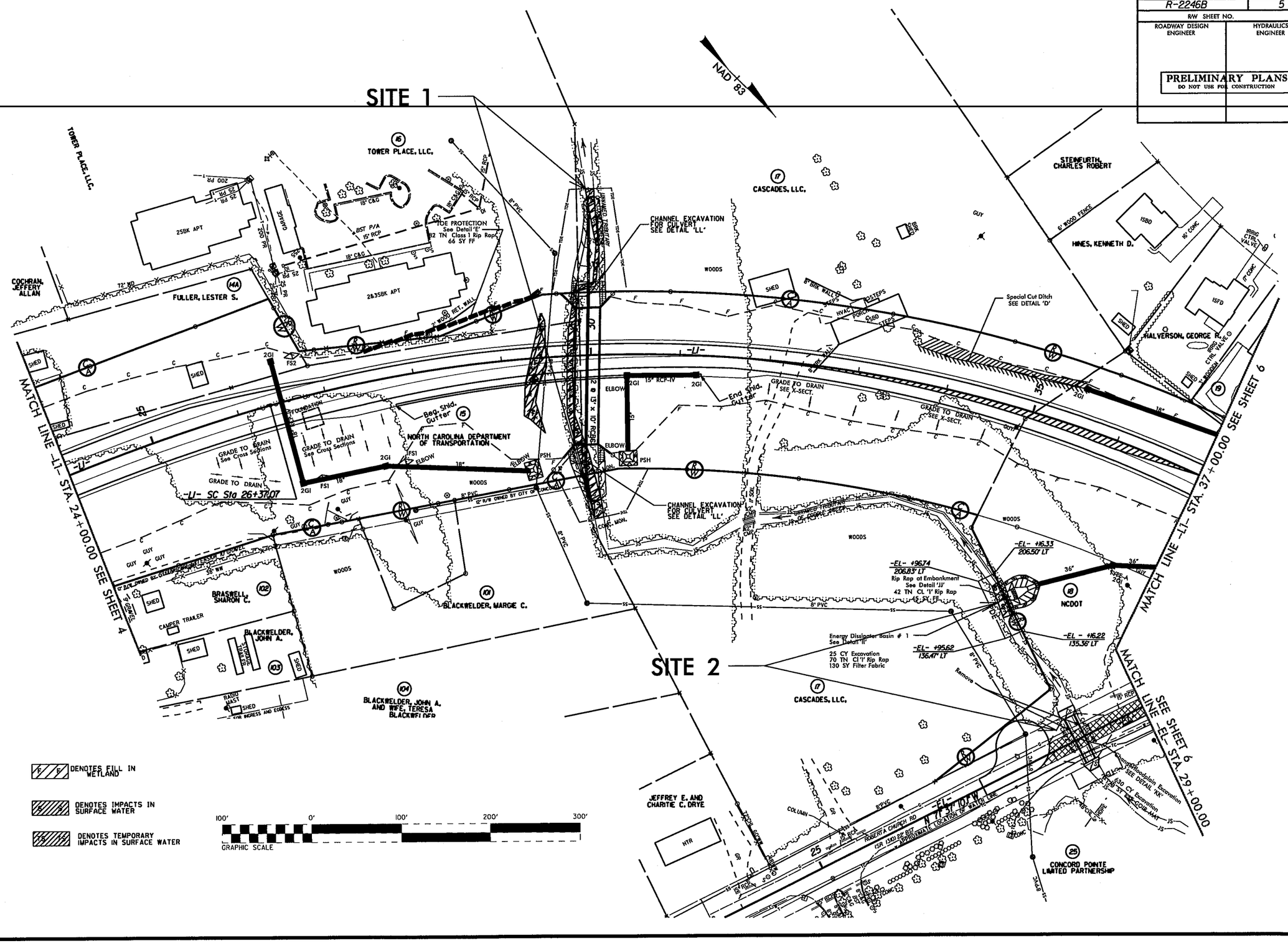
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS



8/17/99

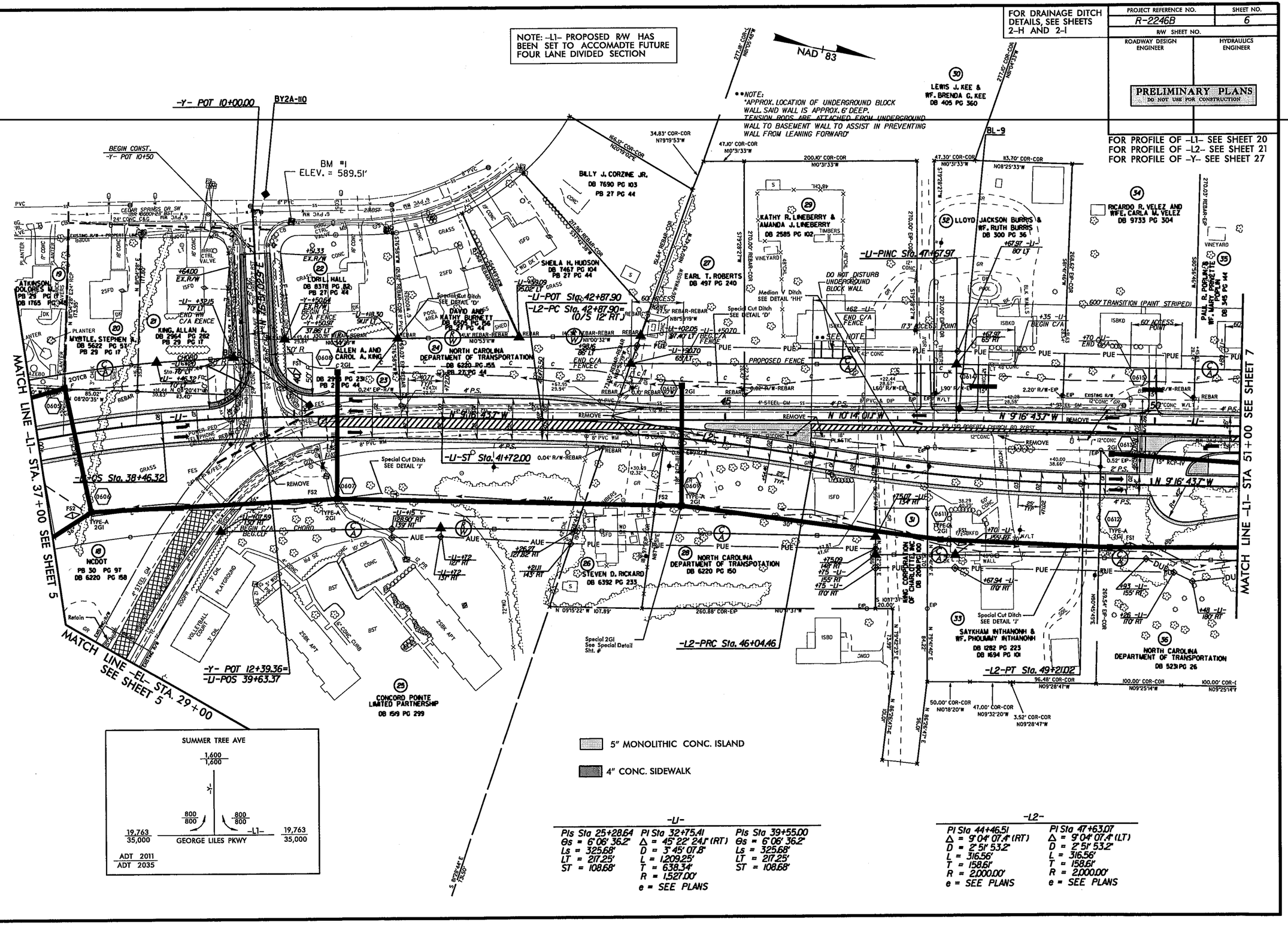
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L1- SEE SHEET 20
FOR PROFILE OF -L2- SEE SHEET 21
FOR PROFILE OF -Y- SEE SHEET 27

NOTE: -L1- PROPOSED R/W HAS BEEN SET TO ACCOMADTE FUTURE FOUR LANE DIVIDED SECTION



-L1-

PIs Sta 25+28.64	PI Sta 32+75.41	PIs Sta 39+55.00
Θs = 6° 06' 36.2"	Δ = 45° 22' 24.1" (RT)	Θs = 6° 06' 36.2"
Ls = 325.68'	D = 3° 45' 07.8"	Ls = 325.68'
LT = 217.25'	L = 1,209.25'	LT = 217.25'
ST = 108.68'	T = 638.34'	ST = 108.68'
	R = 1,527.00'	
	e = SEE PLANS	

-L2-

PI Sta 44+46.51	PI Sta 47+63.07
Δ = 9° 04' 07.4" (RT)	Δ = 9° 04' 07.4" (LT)
D = 2° 51' 53.2"	D = 2° 51' 53.2"
L = 316.56'	L = 316.56'
T = 158.61'	T = 158.61'
R = 2,000.00'	R = 2,000.00'
e = SEE PLANS	e = SEE PLANS

17-JUL-2012 15:53
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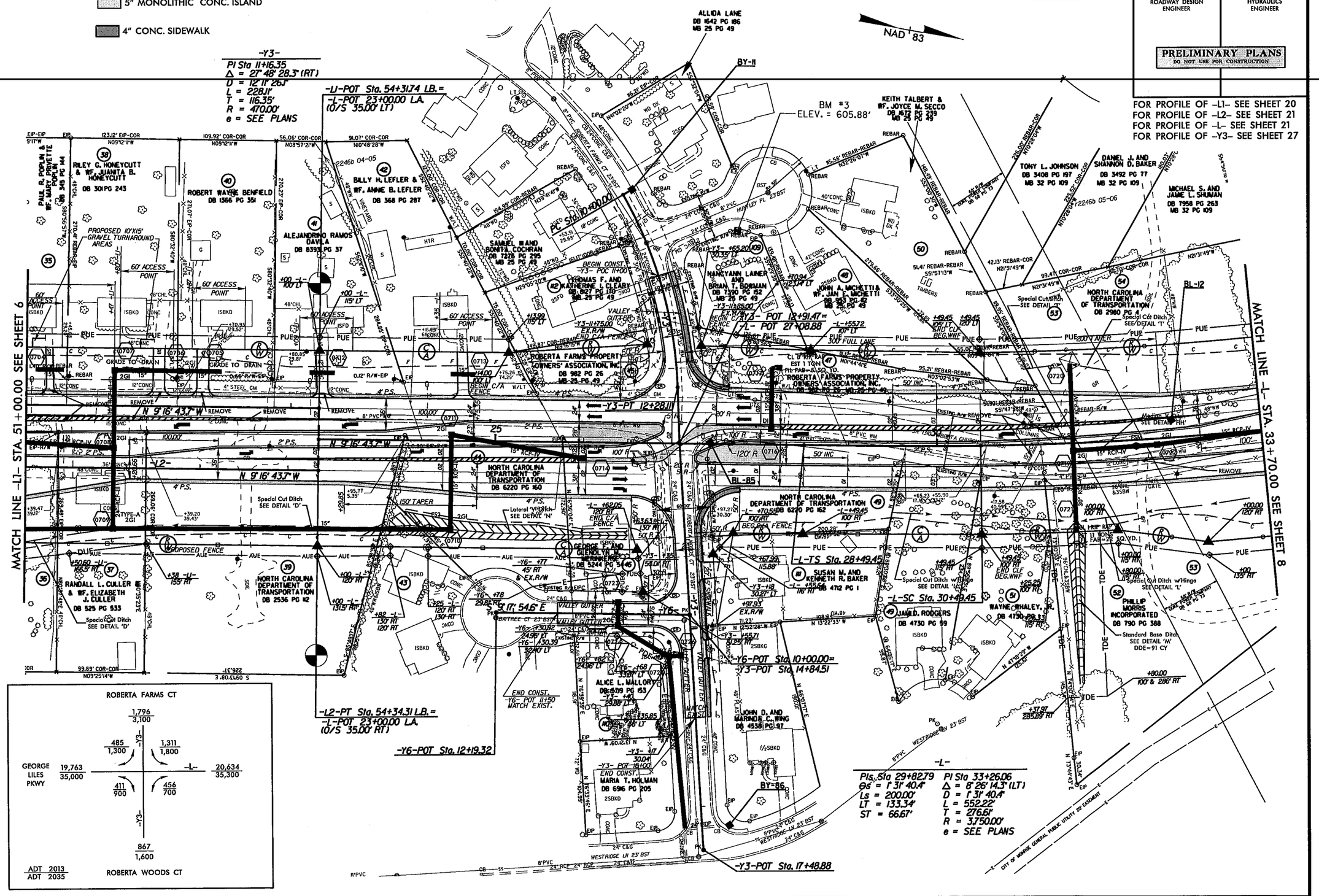
8/17/99

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I	PROJECT REFERENCE NO. R-2246B	SHEET NO. 7
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

FOR PROFILE OF -L1- SEE SHEET 20
FOR PROFILE OF -L2- SEE SHEET 21
FOR PROFILE OF -L- SEE SHEET 21
FOR PROFILE OF -Y3- SEE SHEET 27



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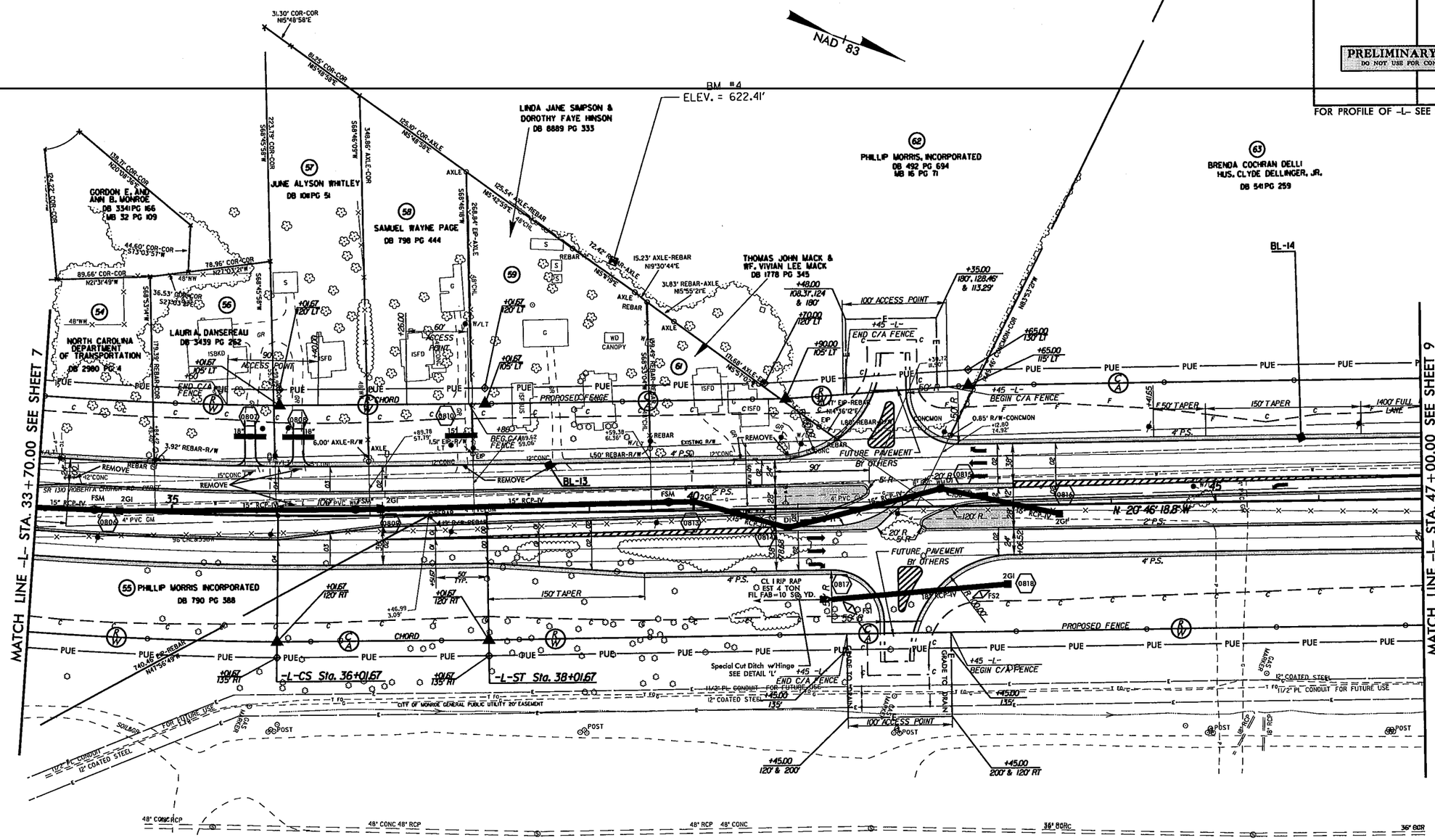
8/17/99

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	8
R/W SHEET NO.	
ROADWAY DESIGN	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -L- SEE SHEETS 21 & 22



-L-	
PI Sta 33+26.06	PIs Sta 36+68.34
Δ = 8° 26' 14.3" (LT)	Θs = 1° 31' 40.4"
D = 1° 31' 40.4"	Ls = 200.00'
L = 552.22'	LT = 133.34'
T = 276.61'	ST = 66.67'
R = 3,750.00'	
θ = SEE PLANS	

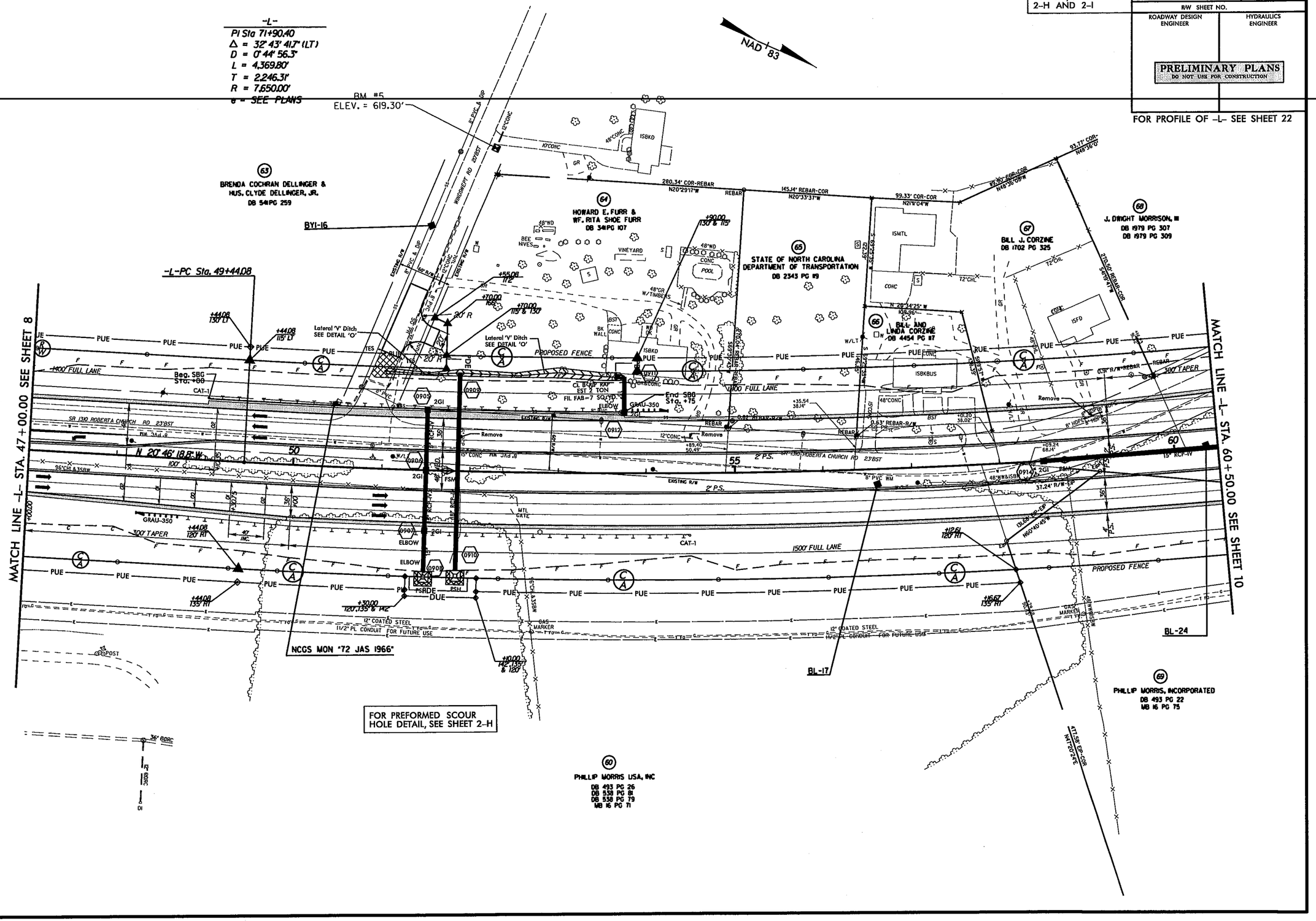
5" MONOLITHIC CONC. ISLAND

17-JUL-2012 15:56
R:\Roadway\Proj\R2246B_rdy_psh_s8.dgn
$$$$USERNAME$$$$

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I	PROJECT REFERENCE NO.	SHEET NO.
	R-2246B	9
	R/W SHEET NO.	
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -L- SEE SHEET 22



FOR PREFORMED SCOUR HOLE DETAIL, SEE SHEET 2-H

8/17/99

17-JUL-2012 15:57
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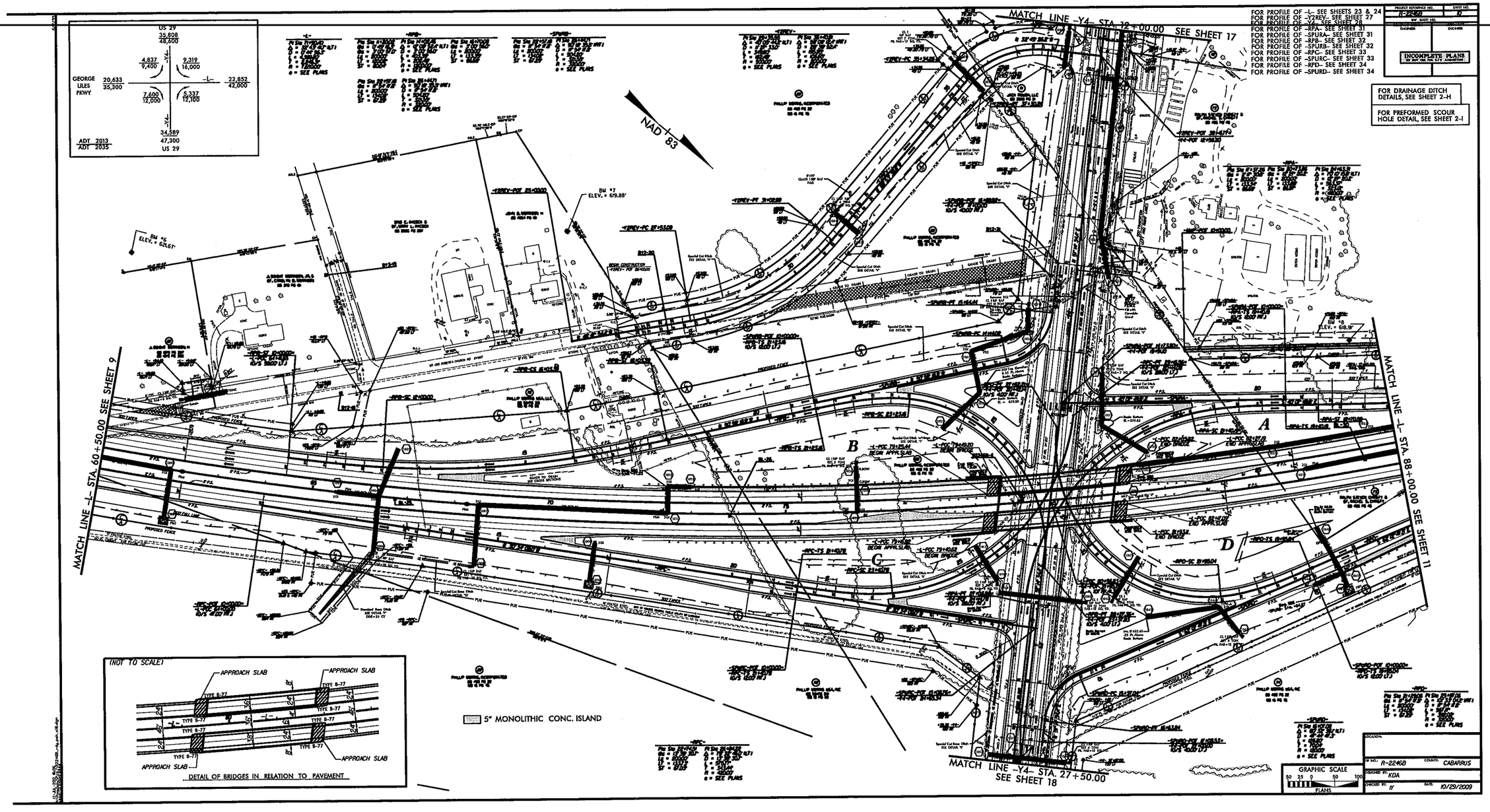
$$$$USERNAME$$$$


US 29
35,808
48,000
4,837
9,400
9,319
16,000
GEORGE ILES PKWY
20,633
35,300
22,852
42,000
7,600
12,000
5,337
12,100
34,589
47,300
ADT 2013
ADT 2035
US 29
NAD 83
MATCH LINE -Y4- STA. 12+00.00 SEE SHEET 17
MATCH LINE -L- STA. 60+50.00 SEE SHEET 9
MATCH LINE -L- STA. 88+00.00 SEE SHEET 11
MATCH LINE -Y4- STA. 27+50.00 SEE SHEET 18
FOR PROFILE OF -L- SEE SHEETS 23 & 24
FOR PROFILE OF -Y2REV- SEE SHEET 27
FOR PROFILE OF -Y4- SEE SHEET 28
FOR PROFILE OF -RPA- SEE SHEET 31
FOR PROFILE OF -SPURA- SEE SHEET 31
FOR PROFILE OF -RPB- SEE SHEET 32
FOR PROFILE OF -SPURB- SEE SHEET 32
FOR PROFILE OF -RPC- SEE SHEET 33
FOR PROFILE OF -SPURC- SEE SHEET 33
FOR PROFILE OF -RPD- SEE SHEET 34
FOR PROFILE OF -SPURD- SEE SHEET 34
FOR DRAINAGE DITCH DETAILS, SEE SHEET 2-H
FOR PREFORMED SCOUR HOLE DETAIL, SEE SHEET 2-I
INCOMPLETE PLANS
A
B
C
D
5" MONOLITHIC CONC. ISLAND
(NOT TO SCALE)
APPROACH SLAB
TYPE B-77
DETAIL OF BRIDGES IN RELATION TO PAVEMENT
GRAPHIC SCALE
PLANS
R-2246B
CABARRUS
KDA
10/29/2009

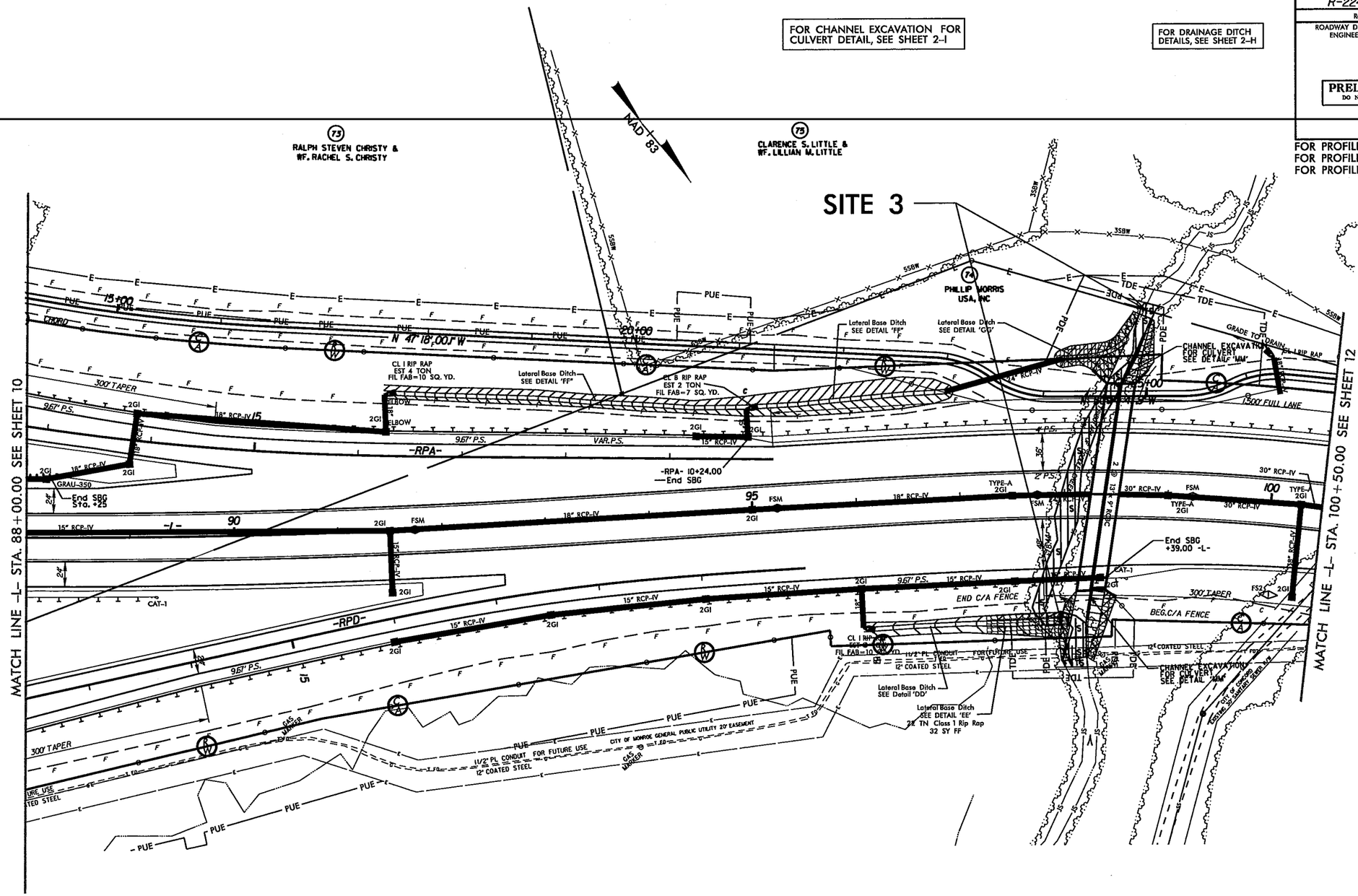
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -L- SEE SHEET 24
FOR PROFILE OF -RPA- SEE SHEET 31
FOR PROFILE OF -RPD- SEE SHEET 34

FOR CHANNEL EXCAVATION FOR CULVERT DETAIL, SEE SHEET 2-I

FOR DRAINAGE DITCH DETAILS, SEE SHEET 2-H



REVISIONS

8/17/99

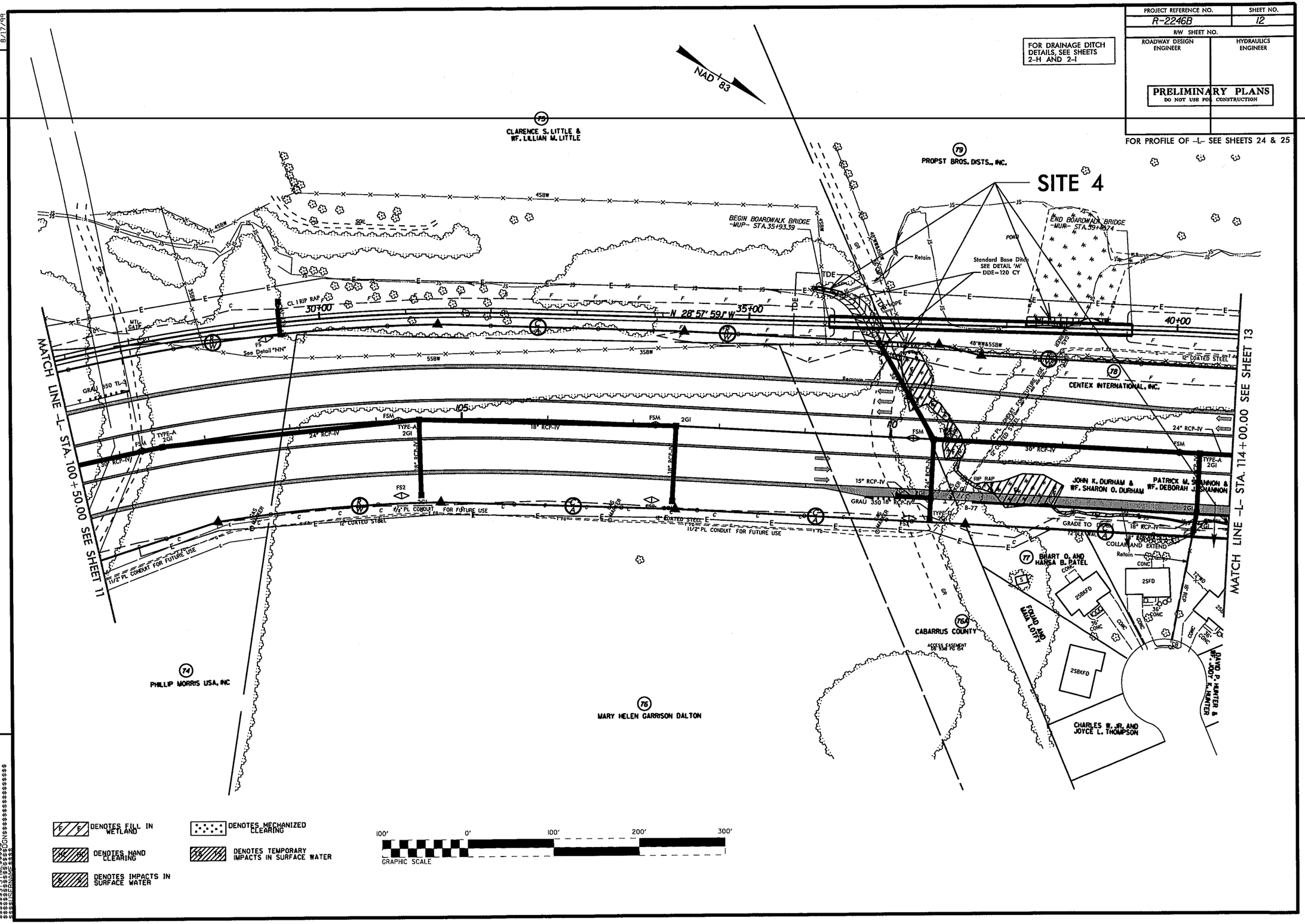
SYSTIME 6/8/99
SYSUID DONG
SYSDRIVE DRAWING

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L- SEE SHEETS 24 & 25



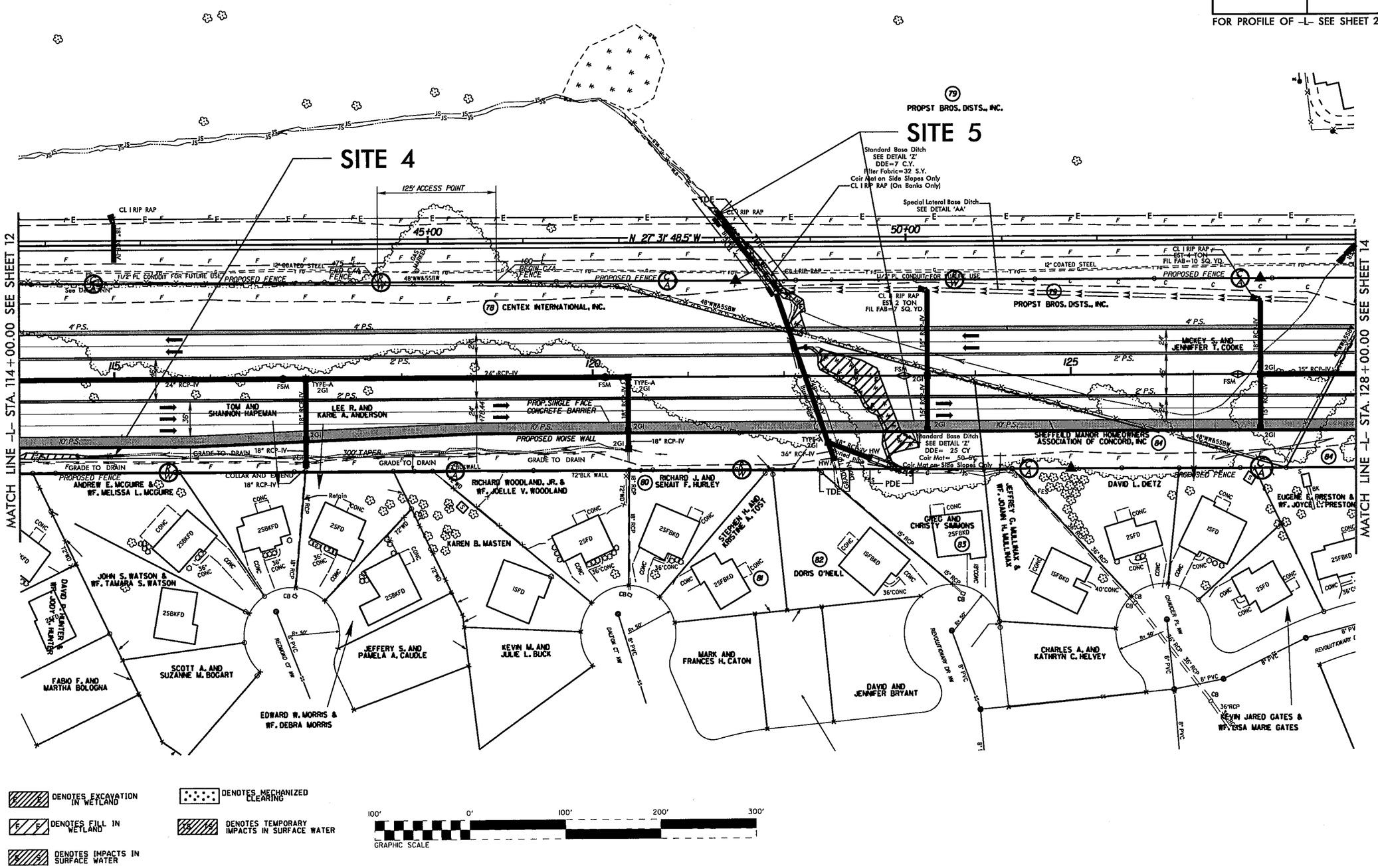
REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -L- SEE SHEET 25



REVISIONS

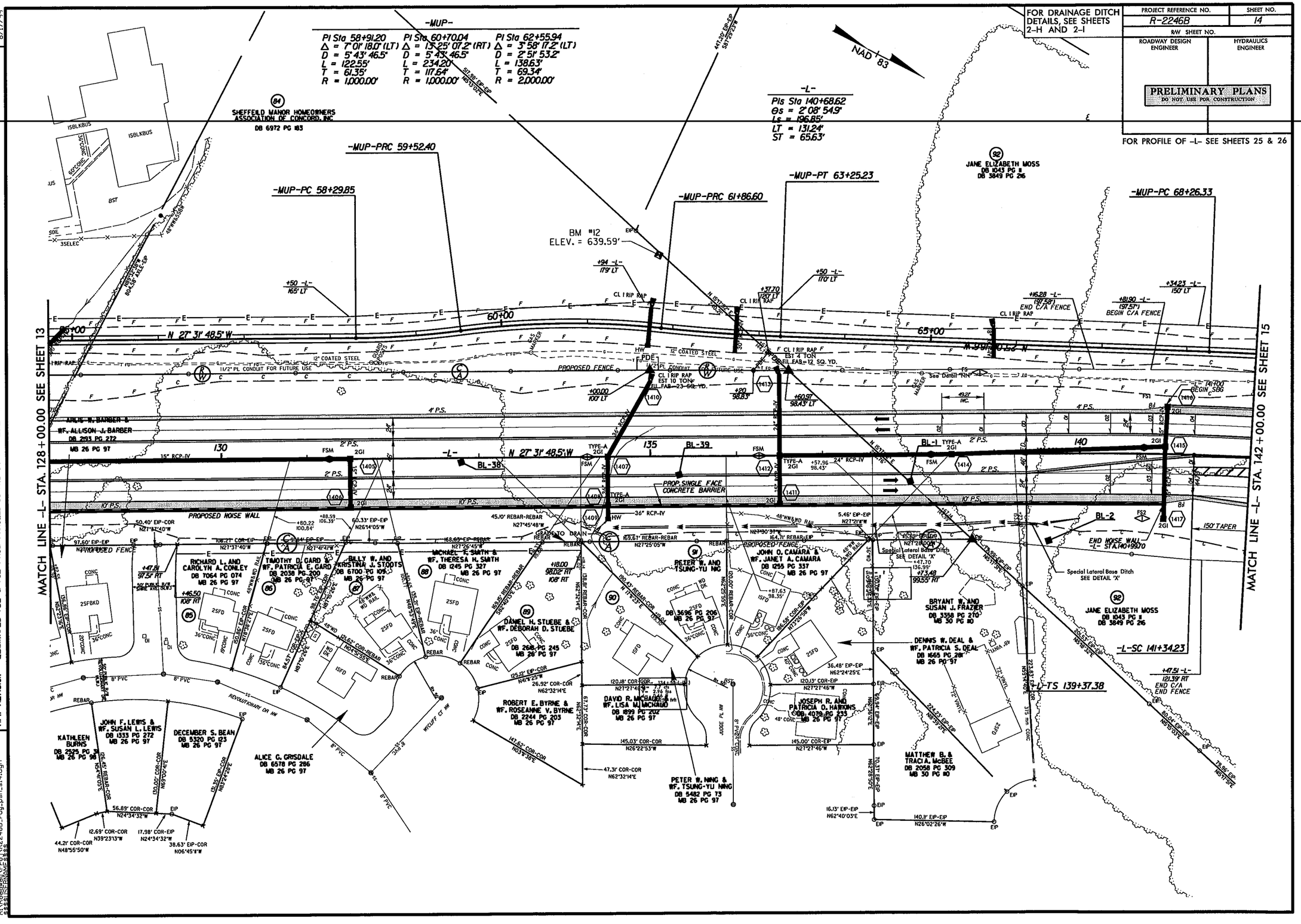
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L- SEE SHEETS 25 & 26



R/W REVISION 9-9-2011.1Y - REVISED R/W AND ADDED PDE ON PARCEL 84 NEAR -L- STA 135+00 AND 136+60.97 & ELIMIATED ACCESS POINT ON PARCEL 84

R/W REVISION 3-06-2012.1Y - ELIMIATED PROPOSED R/W FROM PARCELS 85,86,87,88,89,90 & 91.
R/W REVISION - ADDED ACCESS POINT ON PARCEL 92 BETWEEN -L- STA.141+47.51 TO 142+13.13 RT. 3/30/2012- 1Y
R/W REVISION - ELIMINATED TDE & TCE FROM PARCELS 90 AND 91.7/ /2012- 1Y

REVISIONS

8/17/99

19-JUL-2012 15:39
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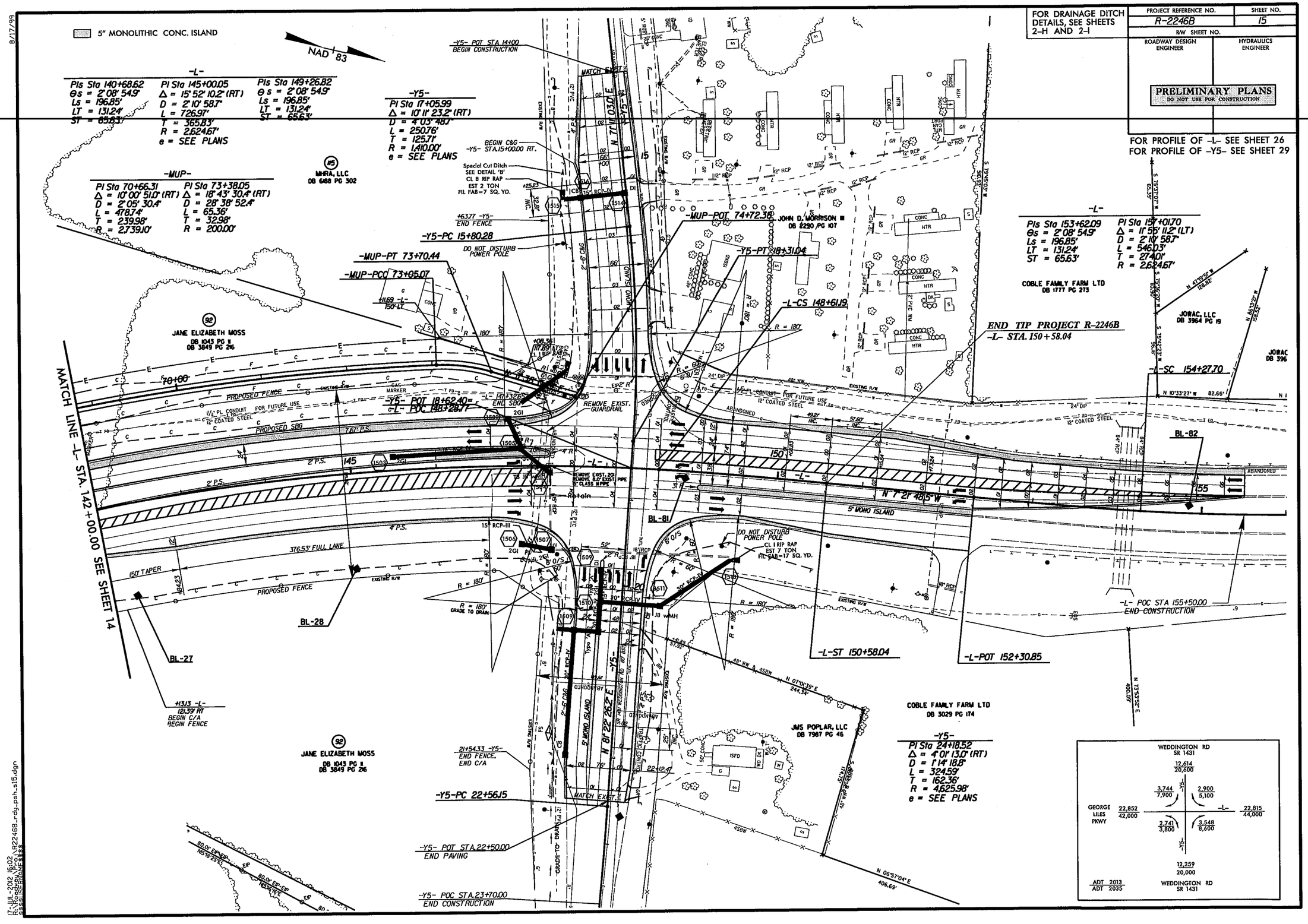
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

FOR PROFILE OF -L- SEE SHEET 26
FOR PROFILE OF -Y5- SEE SHEET 29



8/17/99

17-JUL-2012 16:02
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$$$$USERNAME$$$$

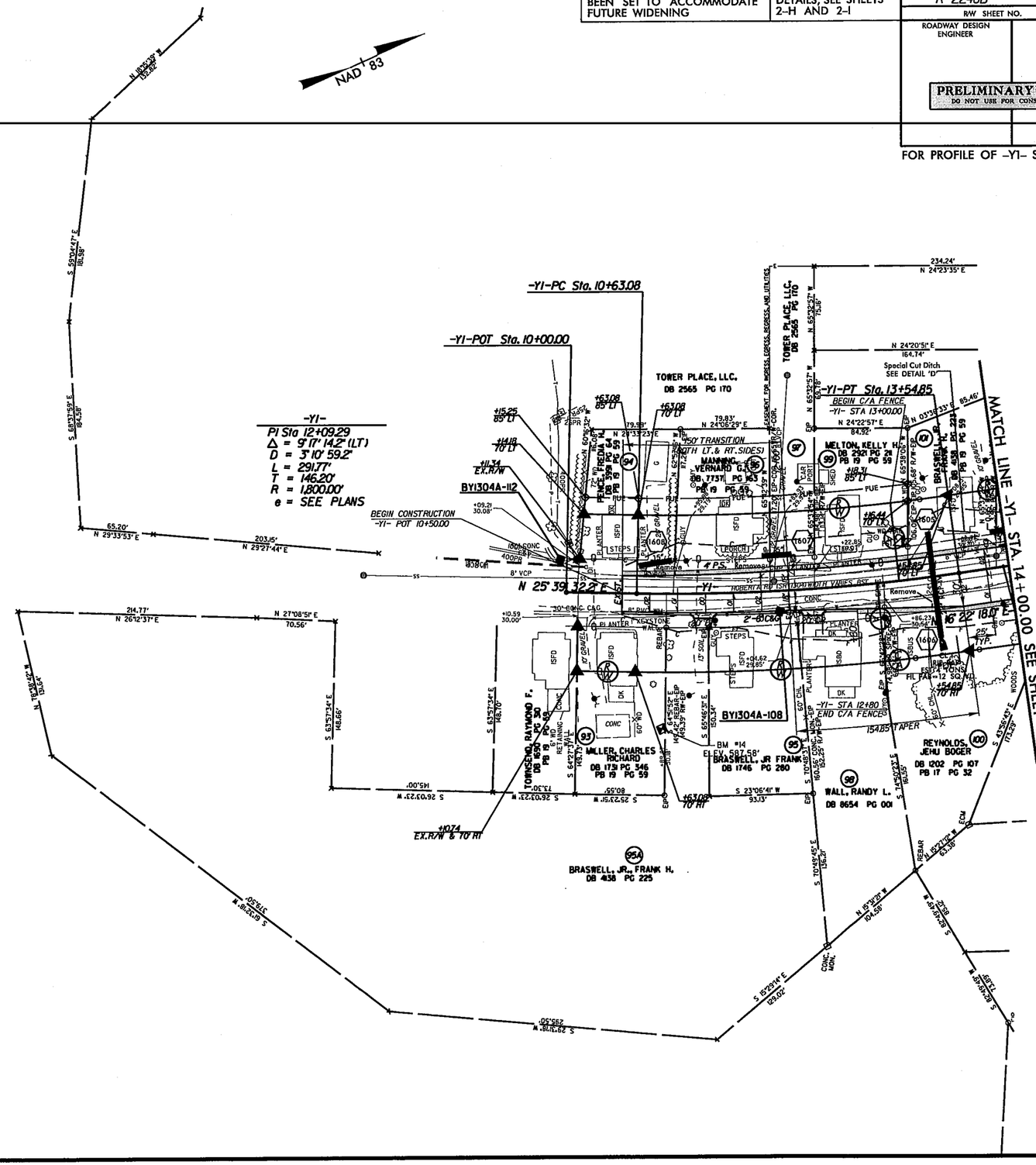
NOTE: -Y1- PROPOSED R/W HAS BEEN SET TO ACCOMMODATE FUTURE WIDENING

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -Y1- SEE SHEET 26



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8/17/99

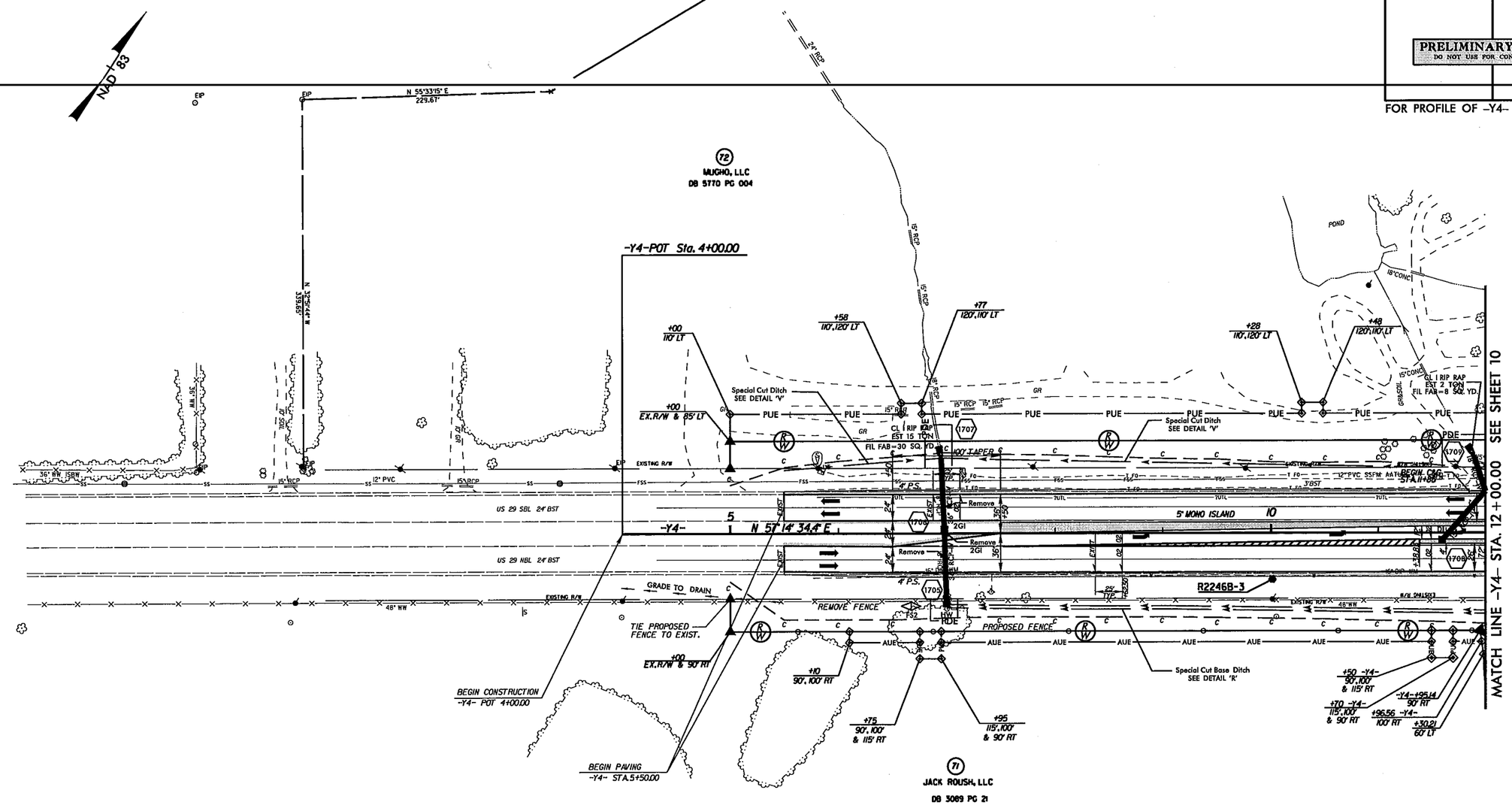
8/17/99

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -Y4- SEE SHEET 28



5" MONOLITHIC CONC. ISLAND

17-JUL-2012 16:04
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$$$$USERNAME$$$$

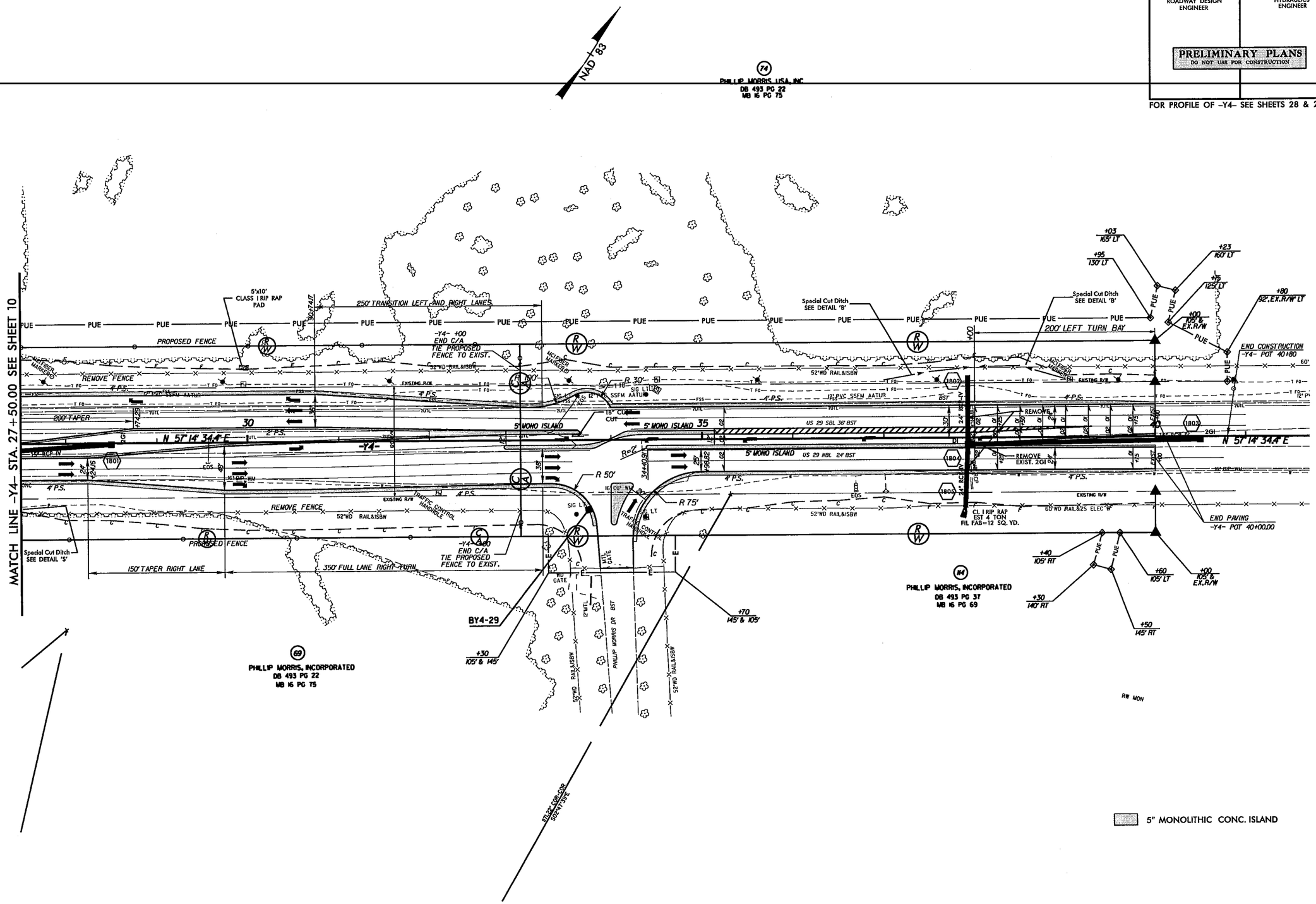
8/17/99

FOR DRAINAGE DITCH DETAILS, SEE SHEETS 2-H AND 2-I

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

FOR PROFILE OF -Y4- SEE SHEETS 28 & 29



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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DITCH LEGEND

LEFT DITCH — - - — -

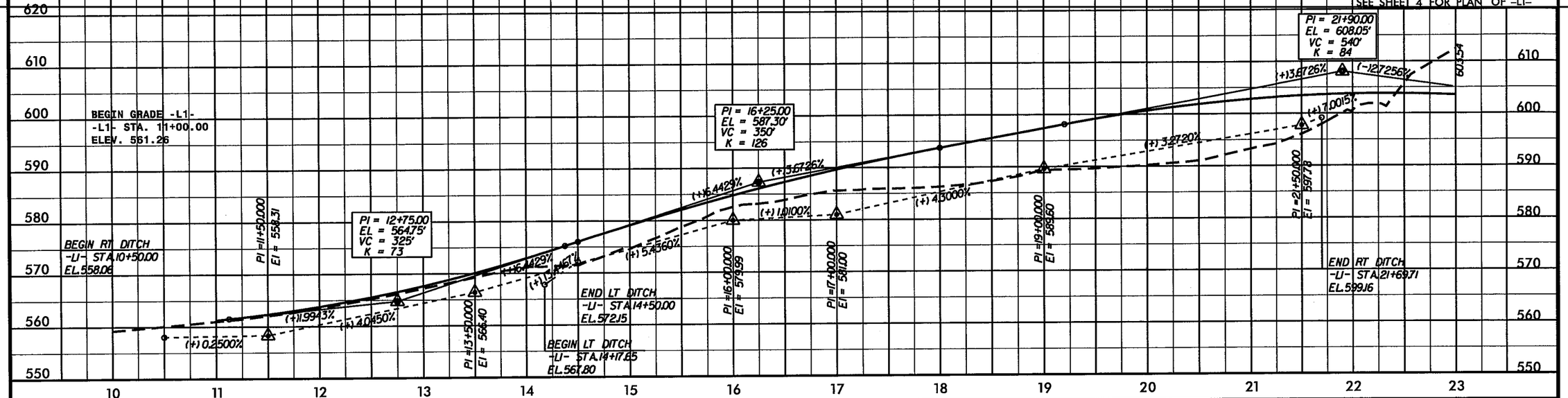
RIGHT DITCH - - - - - - -

BM #13 ELEV.584.77'
-BL1- STA 5+00 S 63°02' 21.9" E DIST 152.17'
RR SPIKE IN BASE OF 18" OAK

-L1-

BM #16 ELEV.566.45'
-BL1- STA 16+81.34' LEFT
RR SPIKE IN BASE OF 12" BOX ELDER

SEE SHEET 4 FOR PLAN OF -L1-

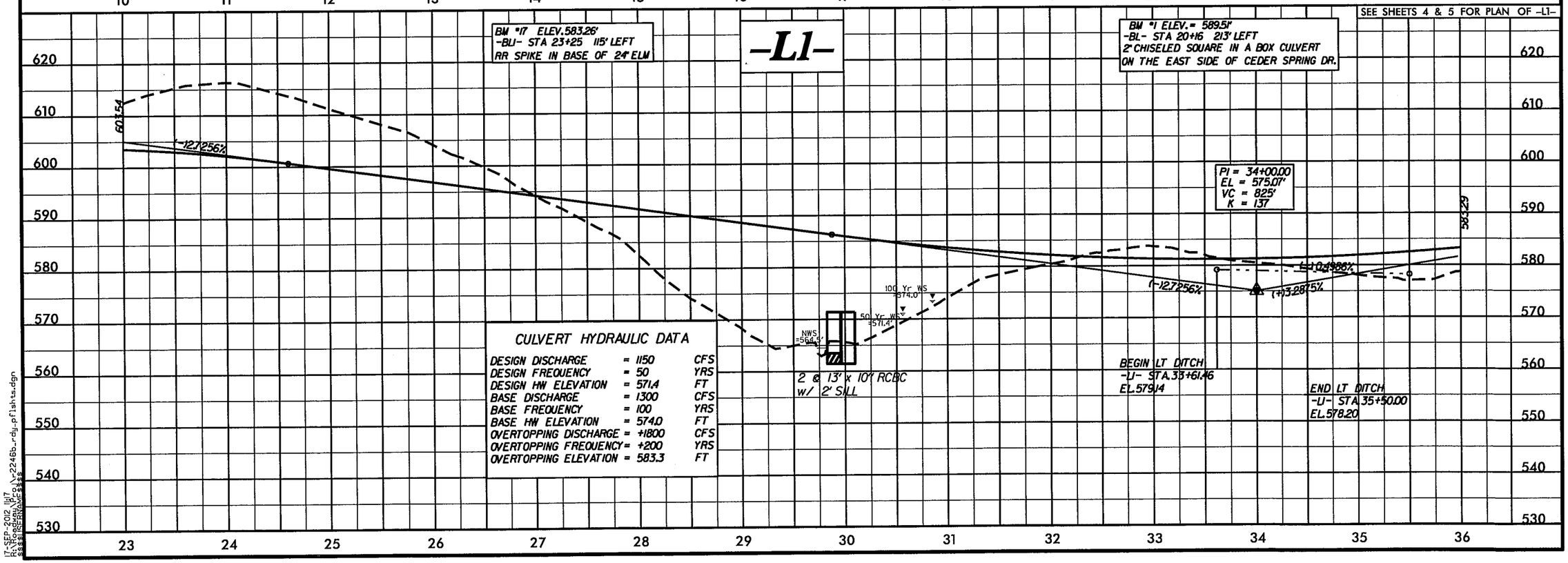


SEE SHEETS 4 & 5 FOR PLAN OF -L1-

BM #17 ELEV.583.26'
-BL1- STA 23+25 115' LEFT
RR SPIKE IN BASE OF 24" ELM

-L1-

BM #1 ELEV.= 589.51'
-BL- STA 20+16 21.3' LEFT
2" CHISELED SQUARE IN A BOX CULVERT
ON THE EAST SIDE OF CEDER SPRING DR.



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1150	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 571.4	FT
BASE DISCHARGE	= 1300	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 574.0	FT
OVERTOPPING DISCHARGE	= +1800	CFS
OVERTOPPING FREQUENCY	= +200	YRS
OVERTOPPING ELEVATION	= 583.3	FT

5/28/99

17-SEP-2012 14:17
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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DITCH LEGEND

LEFT DITCH — · · — ·

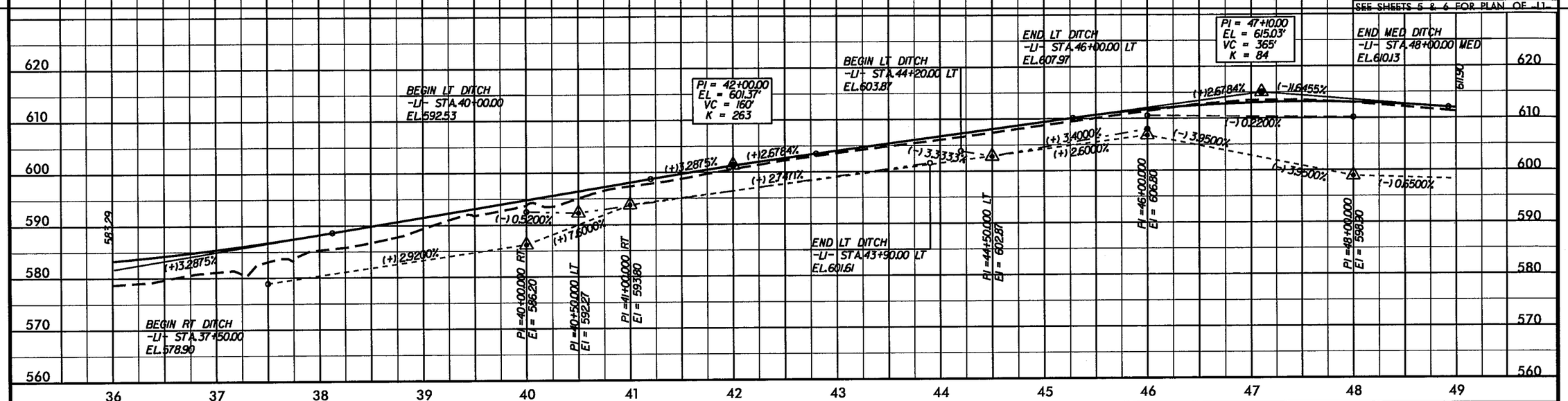
RIGHT DITCH - - - - - - -

MEDIAN DITCH — — — ·

BM #2 ELEV. = 599.49'
-BL- STA 30+29 297' LEFT
RR SPIKE IN BASE OF 12" QUADRUPLE ELM

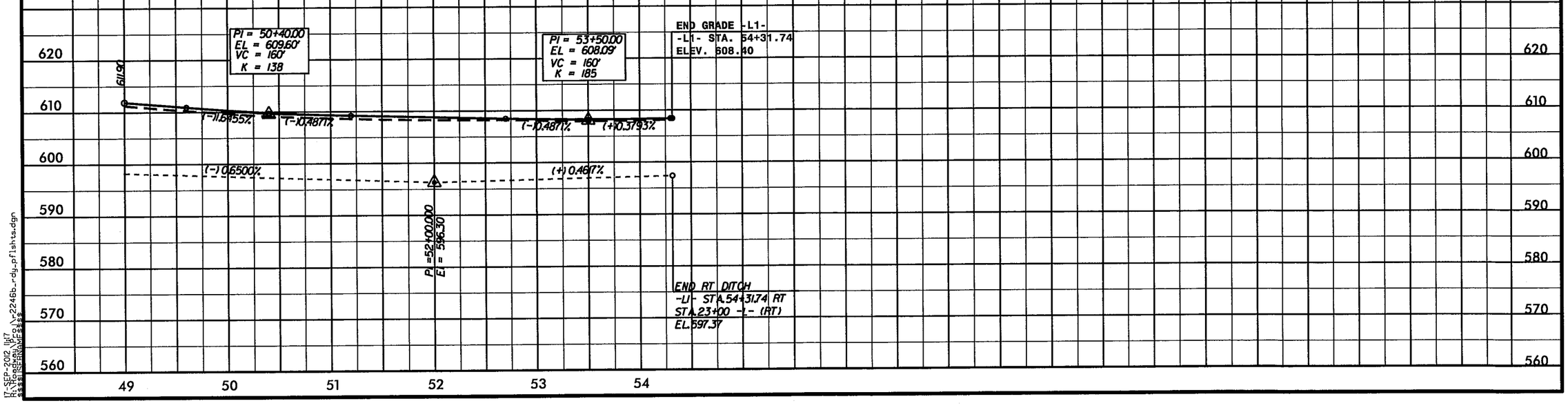
-L1-

SEE SHEETS 5 & 6 FOR PLAN OF -L1-



-L1-

SEE SHEETS 6 & 7 FOR PLAN OF -L1-



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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DITCH LEGEND

LEFT DITCH — - - — -

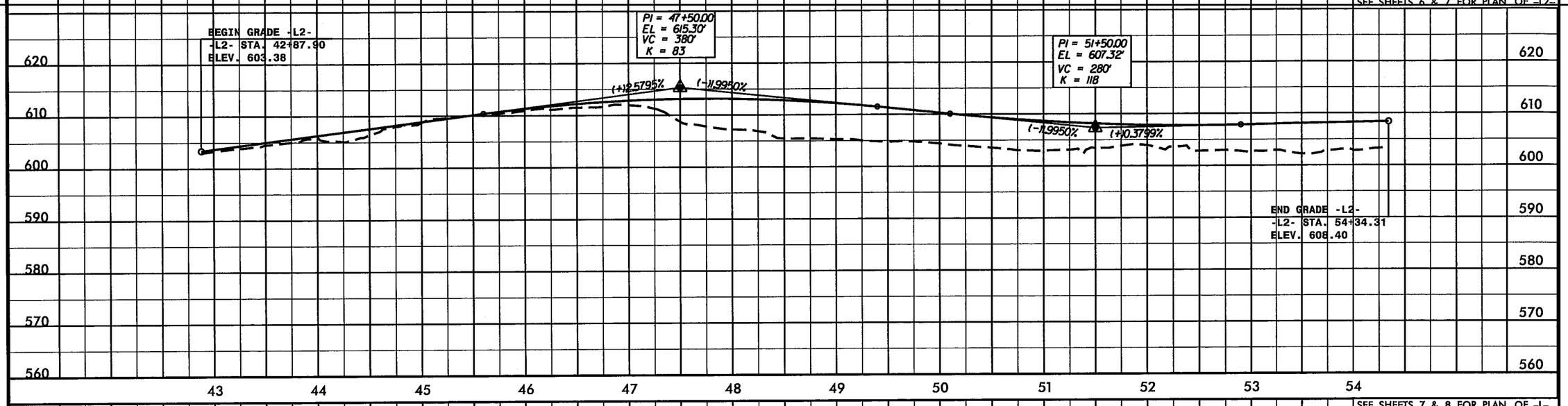
RIGHT DITCH - - - - - - -

MEDIAN DITCH — — — -

BM #3 ELEV.= 605.88'
-L- STA 27+71 240' LEFT
RR SPIKE SET IN THE BASE OF 16" ELM

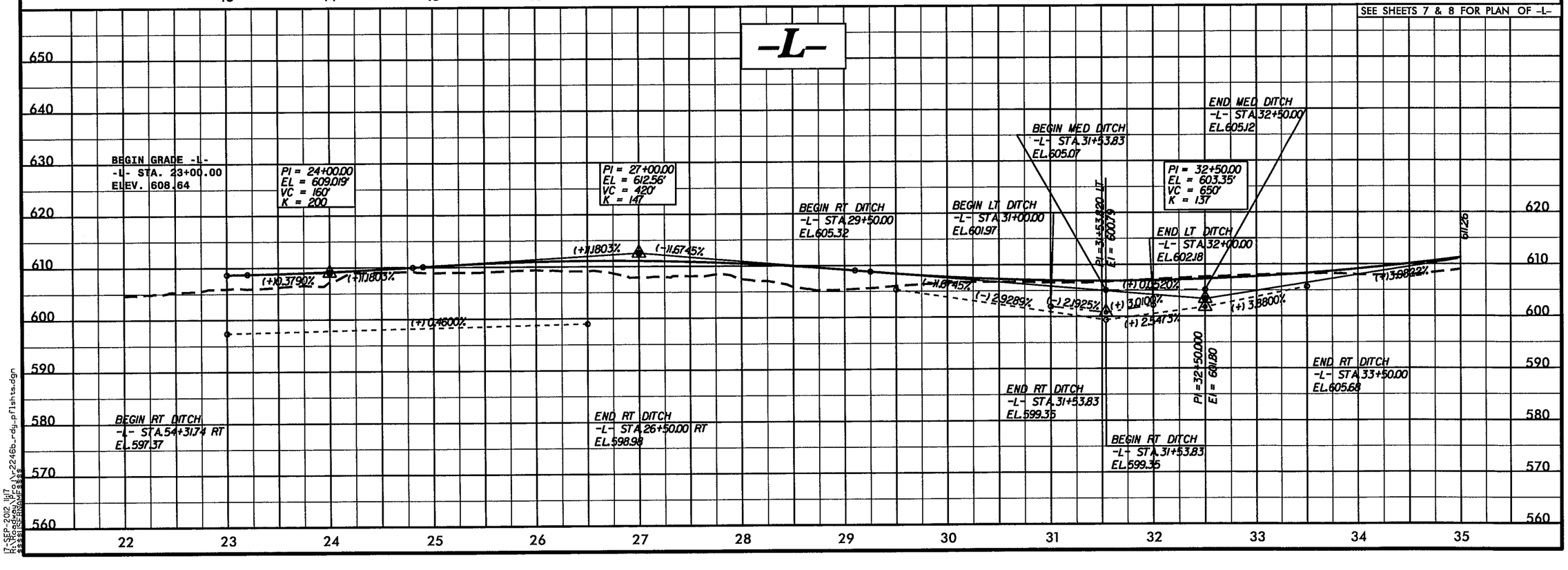
-L2-

SEE SHEETS 6 & 7 FOR PLAN OF -L2-



-L-

SEE SHEETS 7 & 8 FOR PLAN OF -L-



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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SEE SHEETS 7 & 8 FOR PLAN OF -L-

DITCH LEGEND

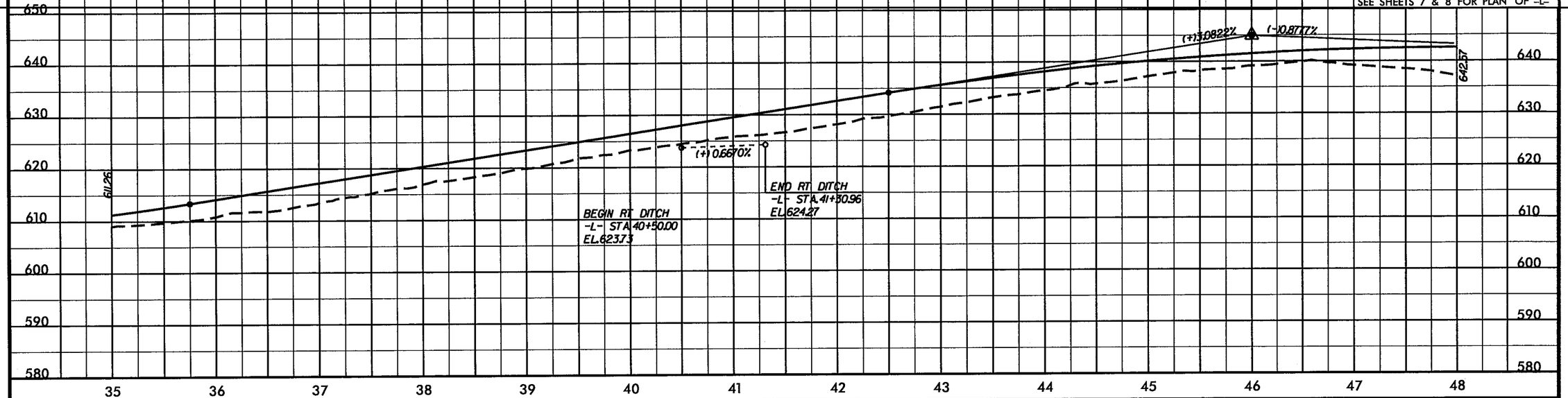
LEFT DITCH — - - — -

RIGHT DITCH - - - - - - -

BM #4 ELEV.= 622.41'
-L- STA 39+27 239' LEFT
RR SPIKE SET IN THE BASE OF 16" SWEETGUM

-L-

PI = 46+00.00
EL = 644.96'
VC = 700'
K = 177

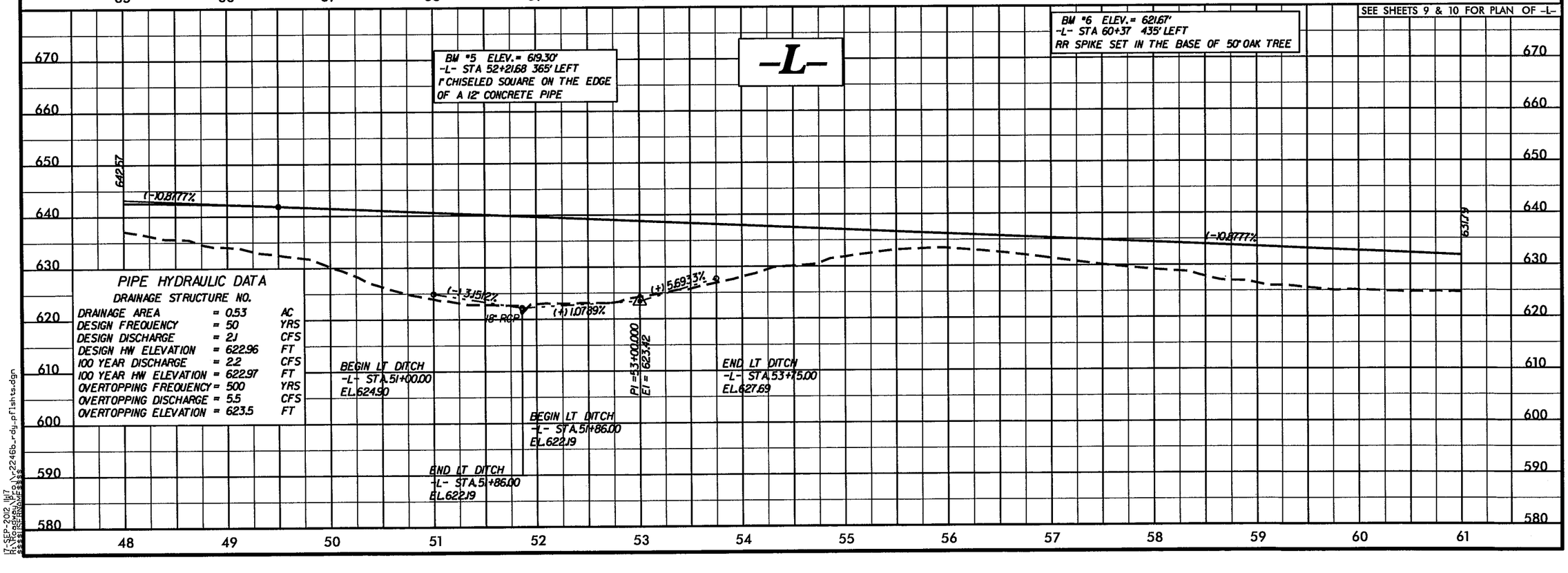


SEE SHEETS 9 & 10 FOR PLAN OF -L-

BM #5 ELEV.= 619.30'
-L- STA 52+21.68 365' LEFT
r CHISELED SQUARE ON THE EDGE
OF A 12" CONCRETE PIPE

-L-

BM #6 ELEV.= 621.67'
-L- STA 60+37 435' LEFT
RR SPIKE SET IN THE BASE OF 50" OAK TREE



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 0.53	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 2.1	CFS
DESIGN HW ELEVATION	= 622.96	FT
100 YEAR DISCHARGE	= 2.2	CFS
100 YEAR HW ELEVATION	= 622.97	FT
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 5.5	CFS
OVERTOPPING ELEVATION	= 623.5	FT

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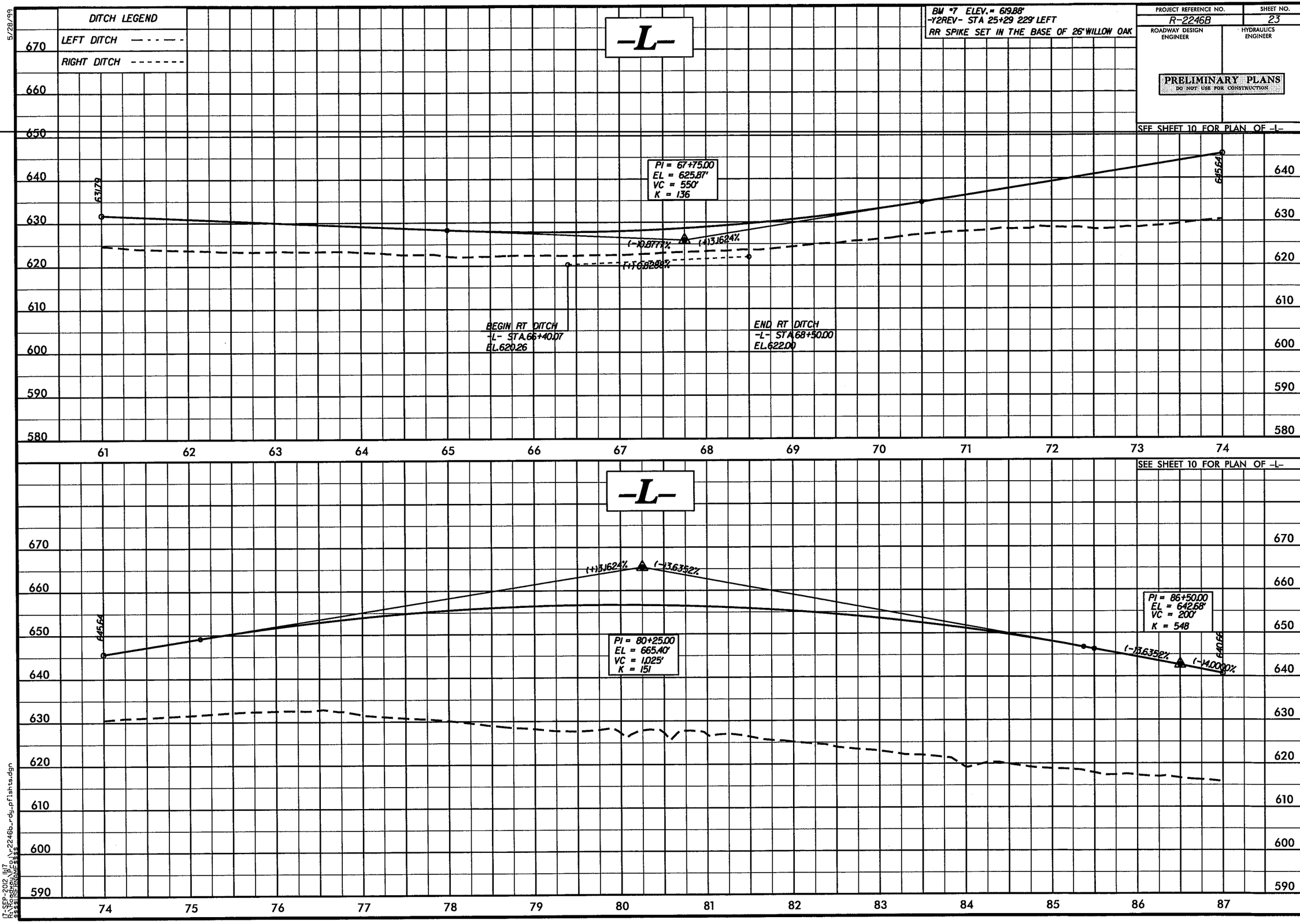
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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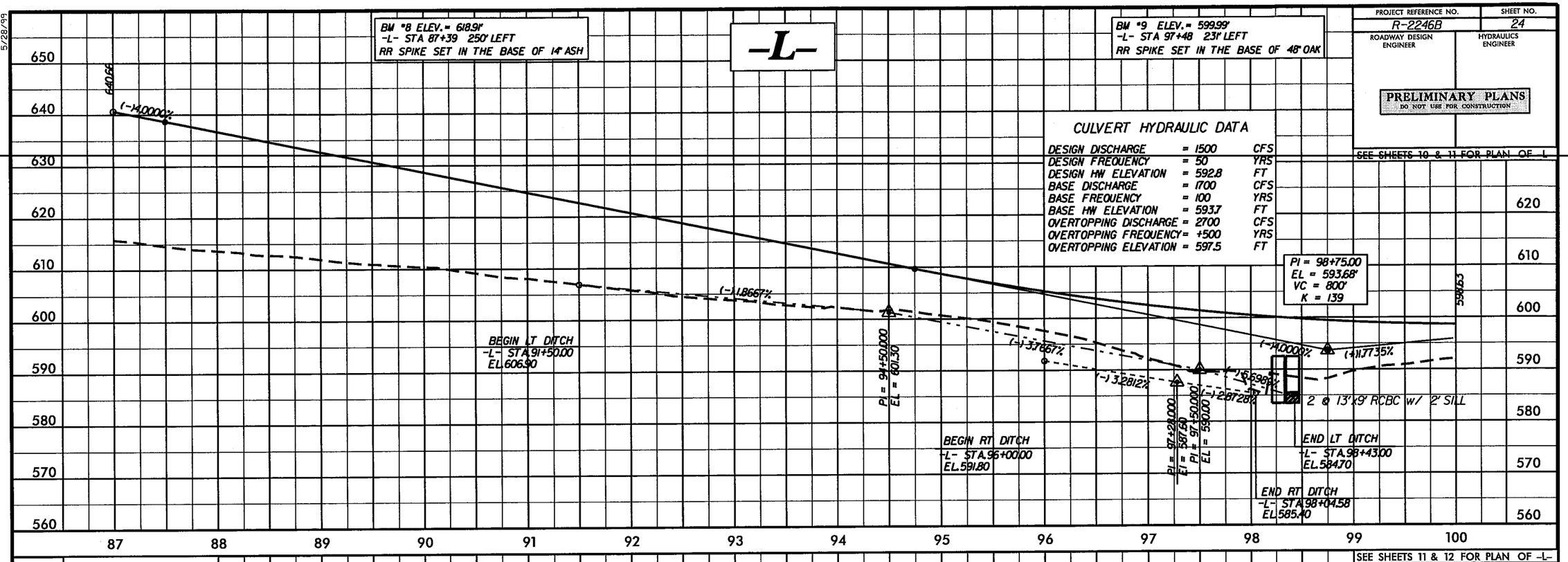
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

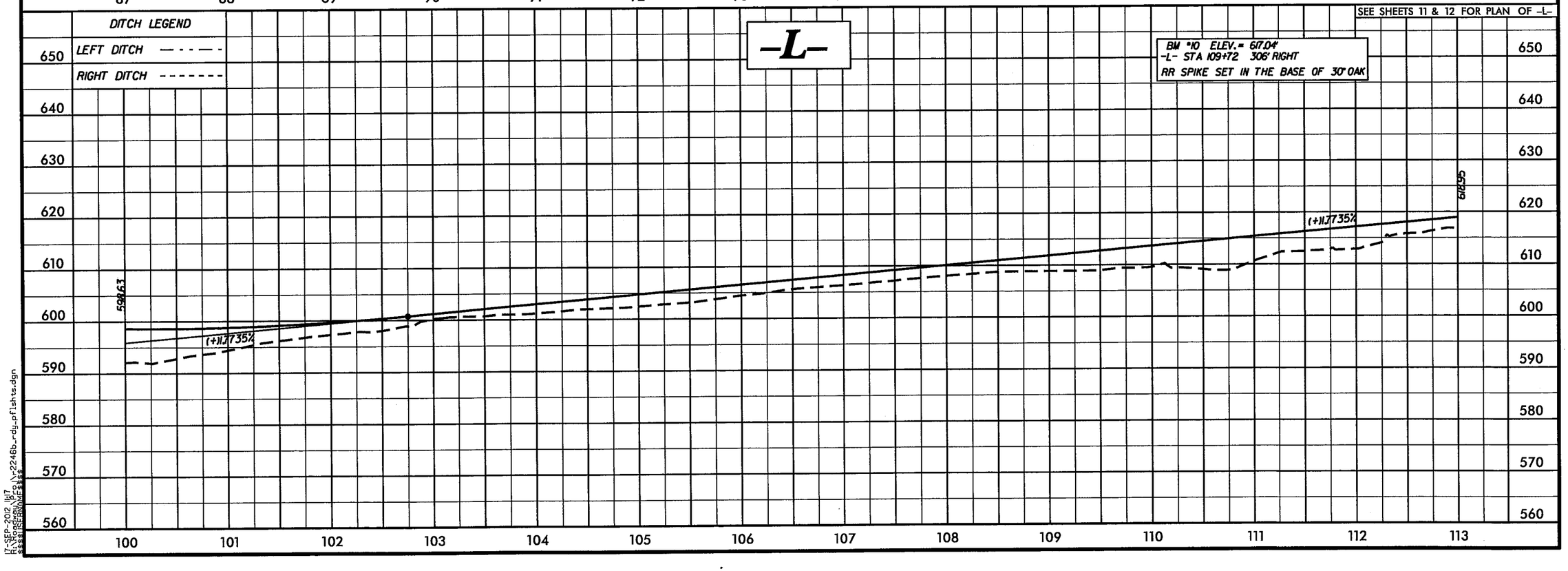
SEE SHEETS 10 & 11 FOR PLAN OF -L-



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1500	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 592.8	FT
BASE DISCHARGE	= 1700	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 593.7	FT
OVERTOPPING DISCHARGE	= 2700	CFS
OVERTOPPING FREQUENCY	= +500	YRS
OVERTOPPING ELEVATION	= 597.5	FT

SEE SHEETS 11 & 12 FOR PLAN OF -L-



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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

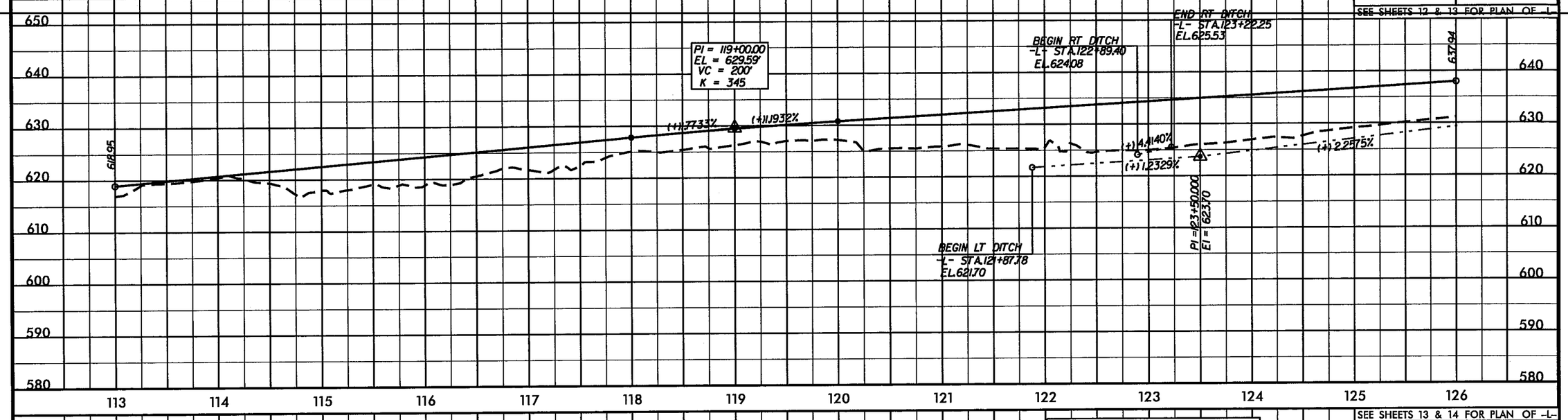
SEE SHEETS 12 & 13 FOR PLAN OF -L-

DITCH LEGEND

LEFT DITCH — - - — -

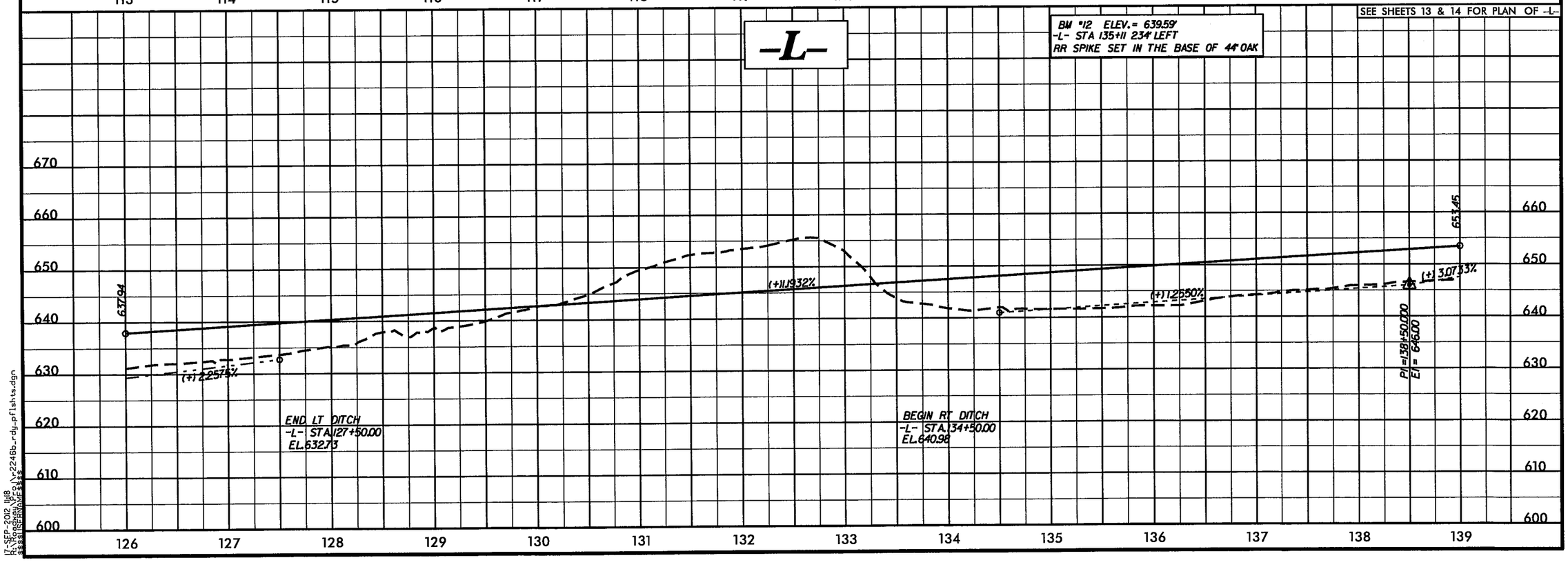
RIGHT DITCH - - - - - - -

BM #11 ELEV.= 619.03'
-L- STA 118+75 289' LEFT
RR SPIKE SET IN THE BASE OF 28" OAK



SEE SHEETS 13 & 14 FOR PLAN OF -L-

BM #12 ELEV.= 639.59'
-L- STA 135+11 234' LEFT
RR SPIKE SET IN THE BASE OF 44" OAK



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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SEE SHEETS 14 & 15 FOR PLAN OF -L-

-L-

DITCH LEGEND
LEFT DITCH — · · — ·
RIGHT DITCH - - - - - - -

PI = 143+90.00
EL = 659.30'
VC = 400'
K = 155

653.45

(+)1.3073%

(+)1.1932%

(-)1.3953%

END RT DITCH
-L- STA. 140+00.00
EL.650.61

END GRADE -L-
-L- STA. 150+50.00
ELEV. 650.090

670, 660, 650, 640, 630, 620, 610, 600

139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152

SEE SHEETS 4 & 16 FOR PLAN OF -Y1-

-Y1-

BM #14 ELEV.587.58'
-BY1- STA 6+23 126' RIGHT
RR SPIKE IN BASE OF 36" TRIPLE WILD CHERRY

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 0.84	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 3.9	CFS
DESIGN HW ELEVATION	= 588.44	FT
100 YEAR DISCHARGE	= 4.40	CFS
100 YEAR HW ELEVATION	= 588.44	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 28.0	CFS
OVERTOPPING ELEVATION	= 591.26	FT

BM #15 ELEV.610.33'
-BY1- STA 17+49 31' RIGHT
RR SPIKE IN BASE OF 24" OAK

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 1.17	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 3.20	CFS
DESIGN HW ELEVATION	= 604.15	FT
100 YEAR DISCHARGE	= 3.60	CFS
100 YEAR HW ELEVATION	= 604.22	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 15.0	CFS
OVERTOPPING ELEVATION	= 606.43	FT

PI = 11+50.00
EL = 590.70'
VC = 125'
K = 30

PI = 12+50.00
EL = 591.53'
VC = 75'
K = 225

PI = 14+25.00
EL = 592.40'
VC = 270'
K = 49

PI = 17+25.00
EL = 606.91'
VC = 100'
K = 40

PI = 18+85.00
EL = 610.05'
VC = 120'
K = 71

PI = 20+50.00
EL = 616.07'
VC = 130'
K = 24

BEGIN LT DITCH
-Y1- STA.17+75.00
EL.603.20

585.74

(+)4.9600%

(+)10.8300%

(+)10.4971%

(+)10.4971%

(+)5.9125%

24" RCP

(+)5.4328%

(+)4.7702%

(+)11.3625%

18" RCP

(+)5.4800%

(+)3.6485%

(+)3.6545%

(+)3.2969%

(-)11.8067%

BEGIN RT DITCH
-Y1- STA.17+50.04
EL.599.16

PI = 17+75.00
El = 600.53

END LT DITCH
-Y1- STA.20+50.00
EL.613.25

END GRADE-Y1RT-
-Y1- STA. 22+00.00
ELEV. 613.360

END GRADE -Y1LT-
-Y1- STA. 16+14.09
ELEV. 603.69

END RT DITCH
-Y1- STA.20+71.95
EL.610.32

BEGIN GRADE -Y1LT-
-Y1- STA. 10+50.00
ELEV. 585.74

BEGIN LT DITCH
-Y1- STA.13+31.32
EL.587.44

END LT DITCH
-Y1- STA.13+87.46
EL.590.49

BEGIN GRADE -Y1RT-
-Y1- STA. 16+50.16
ELEV. 603.58

620, 610, 600, 590, 580, 570, 560

10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SEE SHEET 7 FOR PLAN OF -Y3-

SEE SHEET 6 FOR PLAN OF -Y

SEE SHEET 10 FOR PLAN OF -Y2REV-

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-Y3-

BM #3 ELEV.= 605.88'
-L- STA 27+71 240' LEFT
RR SPIKE SET IN THE BASE OF 16" ELM

END GRADE -Y3LT-
-Y3- STA. 12+44.41
ELEV. 610.56

BEGIN GRADE -Y3RT-
-Y3- STA. 13+38.59
ELEV. 610.55

PI = 11+60.00
EL = 609.95'
VC = 100'
K = 45

PI = 13+80.00
EL = 608.89'
VC = 60'
K = 8

PI = 15+25.00
EL = 592.70'
VC = 90'
K = 9

END GRADE -Y3RT-
-Y3- STA. 16+00.00
ELEV. 591.50

(-)2.9333%
(+)0.7227%
(-)4.0087%
(-)11.6555%
(-)11.6000%

BEGIN GRADE -Y3LT-
-Y3- STA. 11+00.00
ELEV. 608.19

-Y-

BM #1 ELEV.= 589.51'
-BL- STA 20+16 213' LEFT
2" CHISELED SQUARE IN A BOX CULVERT
ON THE EAST SIDE OF CEDER SPRING DR.

PI = 11+95.00
EL = 594.52'
VC = 40'

PI = 11+00.00
EL = 590.49'
VC = 60'

(+)1.3000%
(+)4.2421%
(-)0.9889%

END GRADE -Y-
-Y- STA. 12+37.36
ELEV. 592.40

BEGIN GRADE -Y-
-Y- STA. 10+50.00
ELEV. 589.84

-Y2REV-

DITCH LEGEND

LEFT DITCH — - - — -

RIGHT DITCH - - - - - - -

BM #7 ELEV.= 619.88'
-Y2REV- STA 25+29 229' LEFT
RR SPIKE SET IN THE BASE OF 26" WILLOW OAK

BEGIN GRADE -Y2REV-
-Y2REV- STA. 26+00.00
ELEV. 627.76

BEGIN RT DITCH
-Y2- STA.26+50.00 RT
EL.624.88

PI = 29+00.00
EL = 626.21'
VC = 290'
K = 134

END LT DITCH
-Y2- STA.31+50.00
EL.615.35

PI = 32+50.00
EL = 616.80'
VC = 200'
K = 65

PI = 35+77.00
EL = 618.00'
VC = 180'
K = 42

PI = 37+50.00
EL = 611.22'
VC = 100'
K = 17

(-)0.5167%
(-)12.6886%
(-)0.8400%
(-)2.6400%
(-)2.2133%
(-)0.6250%
(-)2.1600%
(-)3.4400%
(-)0.2200%
(-)1.4800%
(-)0.5000%
(-)1.2867%
(-)2.5400%
(+)0.3670%
(-)13.9216%
(-)6.8090%
(+)11.9733%

18" RCP
30" RCP
36" RCP

BEGIN LT DITCH
-Y2- STA.26+00.00
EL.625.89

PI =27+00.00
El = 623.25

PI =28+50.00
El = 623.60

PI =29+00.00
El = 622.00

PI =30+25.00
El = 619.50

PI =30+75.00
El = 618.62

PI =31+50.00
El = 615.00

PI =33+00.00
El = 614.10

PI =33+50.00
El = 613.25

PI =35+00.00
El = 611.92

BEGIN RT DITCH
-Y2- STA.37+00.00
EL.609.90

END RT DITCH
-Y2- STA.37+66.53
EL.605.37

END LT DITCH
-Y2- STA.32+00.00
EL.614.89

BEGIN RT DITCH
-Y2- STA.32+50.00
EL.614.84

END RT DITCH
-Y2- STA.35+50.00
EL.610.45

END GRADE -Y2REV-
-Y2REV- STA. 38+06.47
ELEV. 612.33

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 3.9	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 14.0	CFS
DESIGN HW ELEVATION	= 612.24	FT
100 YEAR DISCHARGE	= 17.0	CFS
100 YEAR HW ELEVATION	= 612.43	FT
OVERTOPPING FREQUENCY	= 100 +	YRS
OVERTOPPING DISCHARGE	= 21.0	CFS
OVERTOPPING ELEVATION	= 612.65	FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 8.69	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 23.0	CFS
DESIGN HW ELEVATION	= 607.54	FT
100 YEAR DISCHARGE	= 26.0	CFS
100 YEAR HW ELEVATION	= 607.66	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 80.0	CFS
OVERTOPPING ELEVATION	= 611.81	FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 2.2	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 7.0	CFS
DESIGN HW ELEVATION	= 616.95	FT
100 YEAR DISCHARGE	= 8.0	CFS
100 YEAR HW ELEVATION	= 617.19	FT
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 6.0	CFS
OVERTOPPING ELEVATION	= 616.73	FT

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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DITCH LEGEND

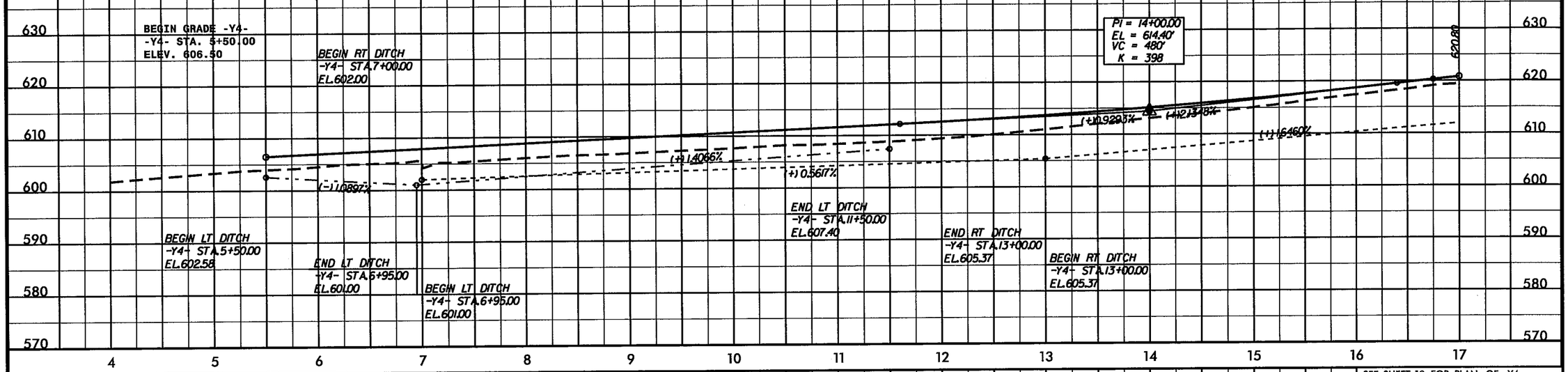
LEFT DITCH — - - — -

RIGHT DITCH - - - - - - -

-Y4-

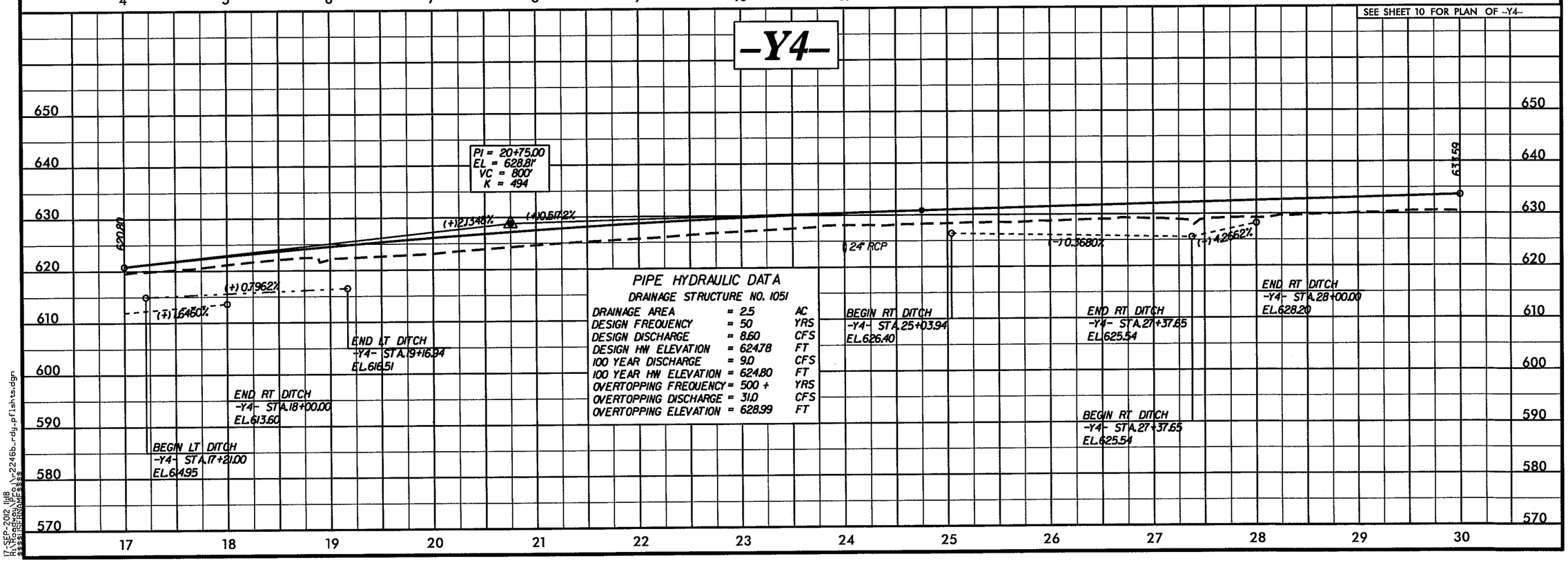
BM #8 ELEV.= 618.91'
-L- STA 87+39 250' LEFT
RR SPIKE SET IN THE BASE OF 14" ASH

SEE SHEETS 17 & 19 FOR PLAN OF Y4



SEE SHEET 10 FOR PLAN OF -Y4-

-Y4-



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 1051

DRAINAGE AREA	= 2.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 8.60	CFS
DESIGN HW ELEVATION	= 624.78	FT
100 YEAR DISCHARGE	= 9.0	CFS
100 YEAR HW ELEVATION	= 624.80	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 31.0	CFS
OVERTOPPING ELEVATION	= 628.99	FT

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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

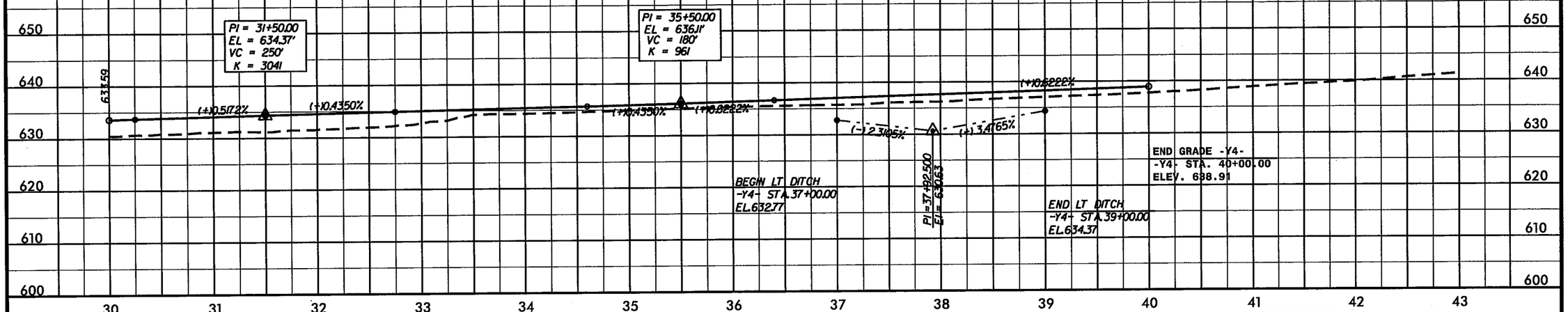
DITCH LEGEND

LEFT DITCH — - - — -

RIGHT DITCH - - - - - - -

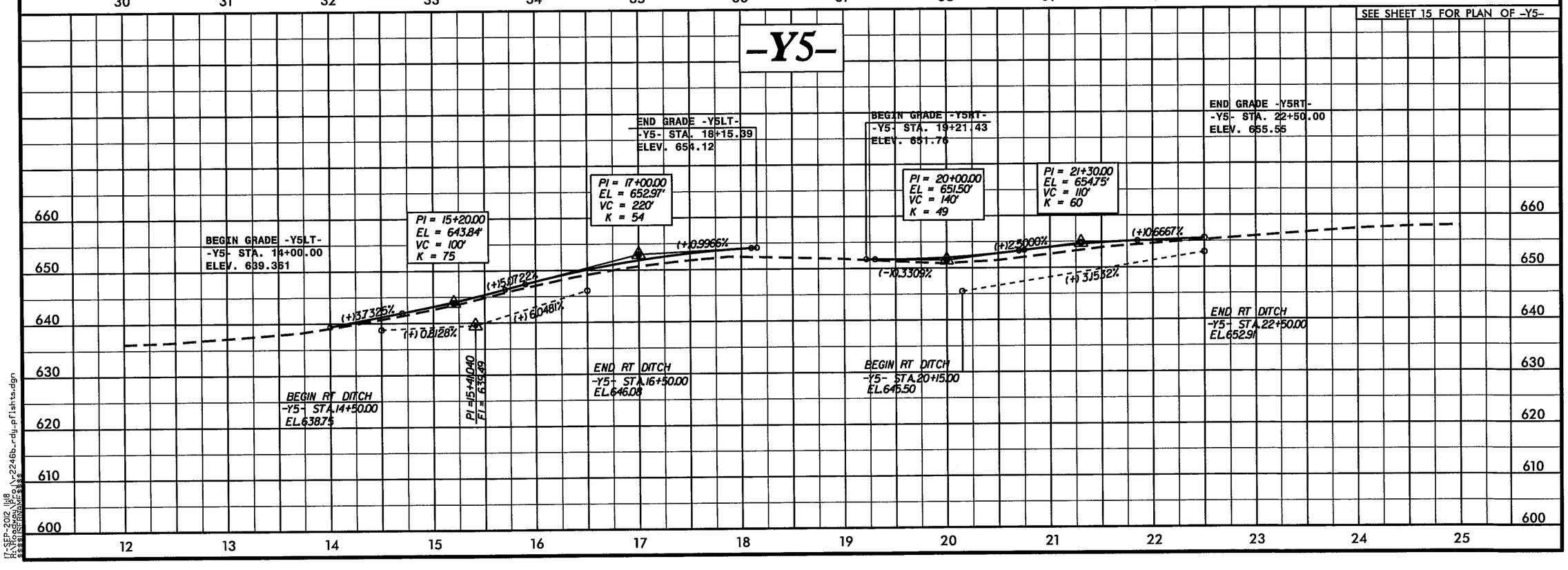
-Y4-

SEE SHEET 18 FOR PLAN OF -Y4-



-Y5-

SEE SHEET 15 FOR PLAN OF -Y5-



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PROJECT REFERENCE NO.	SHEET NO.
R-2246B	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

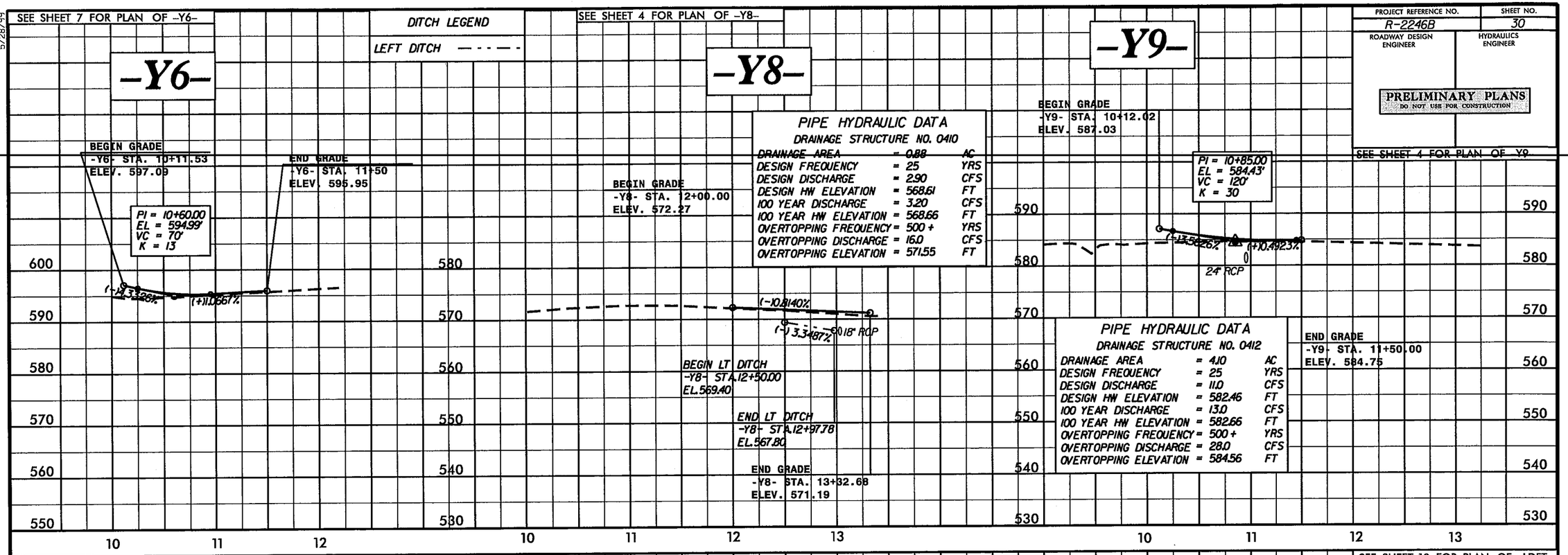
DITCH LEGEND

LEFT DITCH — - - — -

SEE SHEET 7 FOR PLAN OF -Y6-

SEE SHEET 4 FOR PLAN OF -Y8-

SEE SHEET 4 FOR PLAN OF -Y9

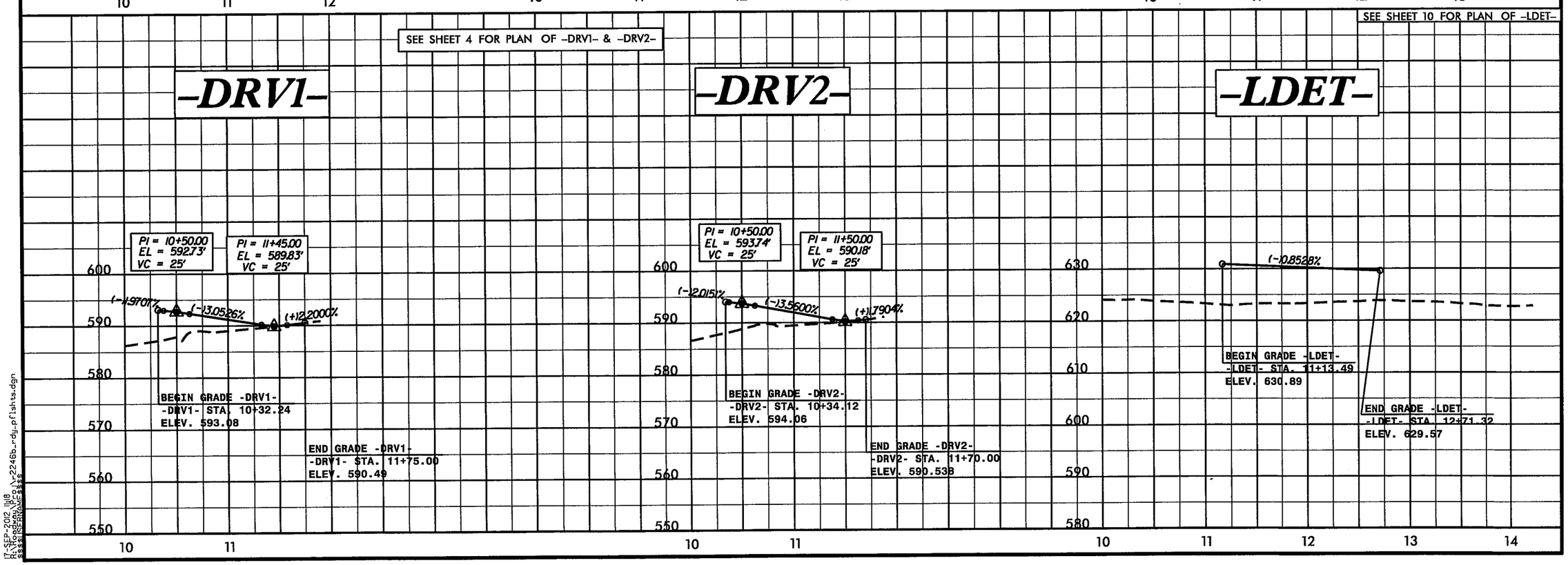


PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO. 0410		
~~DRAINAGE AREA~~	= 0.88	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 2.90	CFS
DESIGN HW ELEVATION	= 568.61	FT
100 YEAR DISCHARGE	= 3.20	CFS
100 YEAR HW ELEVATION	= 568.66	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 16.0	CFS
OVERTOPPING ELEVATION	= 571.55	FT

PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO. 0412		
DRAINAGE AREA	= 4.10	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 11.0	CFS
DESIGN HW ELEVATION	= 582.46	FT
100 YEAR DISCHARGE	= 13.0	CFS
100 YEAR HW ELEVATION	= 582.66	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 28.0	CFS
OVERTOPPING ELEVATION	= 584.56	FT

SEE SHEET 4 FOR PLAN OF -DRV1- & -DRV2-

SEE SHEET 10 FOR PLAN OF -LDET-



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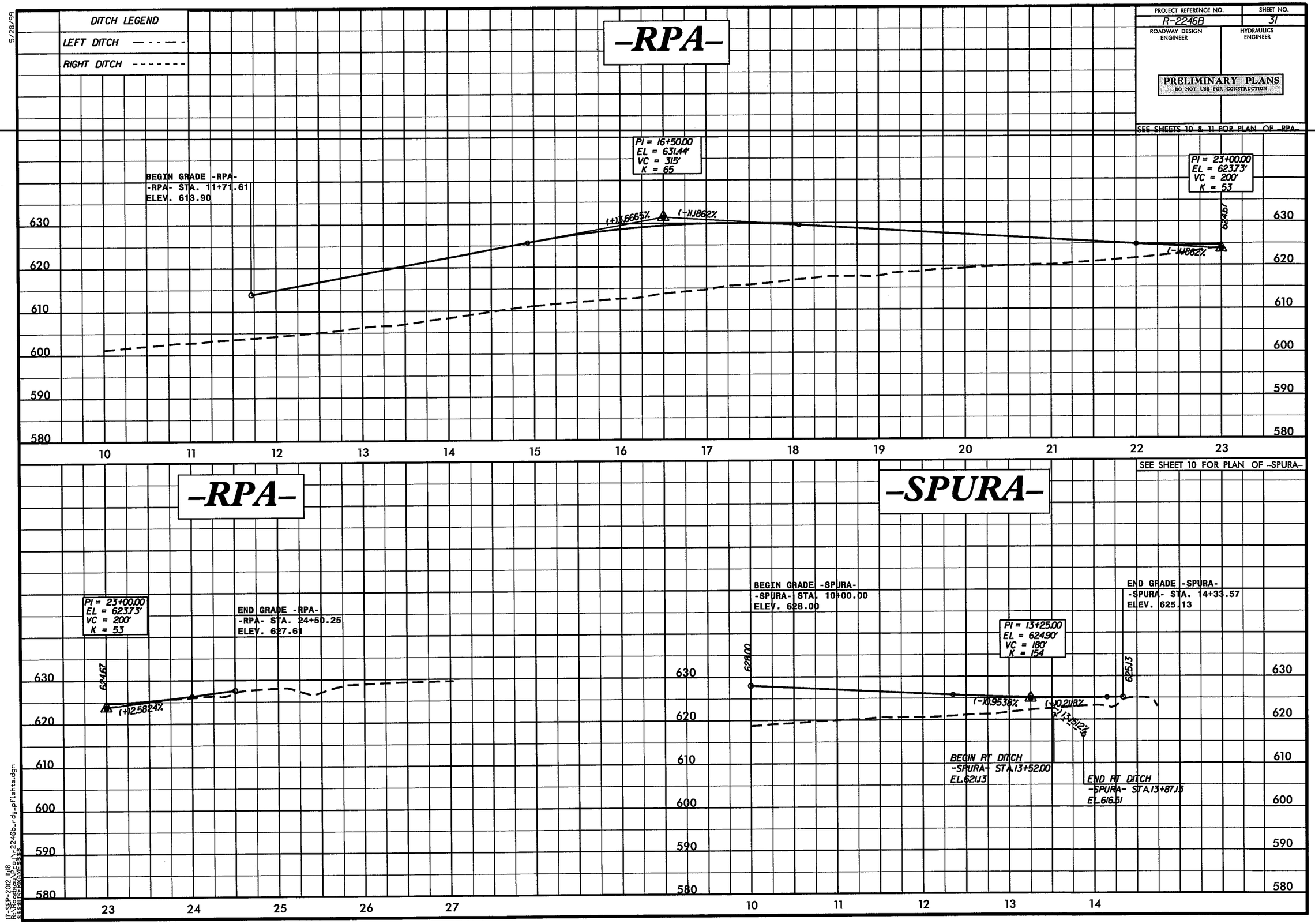
$$$$$$ENGINEER$$$$$$



5/28/99
DITCH LEGEND
LEFT DITCH
RIGHT DITCH
-RPA-
PROJECT REFERENCE NO.
R-2246B
SHEET NO.
31
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SEE SHEETS 10 & 11 FOR PLAN OF -RPA-
BEGIN GRADE -RPA-
-RPA- STA. 11+71.61
ELEV. 613.90
PI = 16+50.00
EL = 631.44'
VC = 315'
K = 65
(+)3.6665%
(-)1.1862%
PI = 23+00.00
EL = 623.73'
VC = 200'
K = 53
624.67
(-)1.1862%
630
620
610
600
590
580
10
11
12
13
14
15
16
17
18
19
20
21
22
23
SEE SHEET 10 FOR PLAN OF -SPURA-
-RPA-
-SPURA-
PI = 23+00.00
EL = 623.73'
VC = 200'
K = 53
624.67
(+)2.5824%
END GRADE -RPA-
-RPA- STA. 24+50.25
ELEV. 627.61
BEGIN GRADE -SPURA-
-SPURA- STA. 10+00.00
ELEV. 628.00
628.00
PI = 13+25.00
EL = 624.90'
VC = 180'
K = 154
(-)0.9538%
(+)0.2118%
(-)1.3512%
625.13
END GRADE -SPURA-
-SPURA- STA. 14+33.57
ELEV. 625.13
BEGIN RT DITCH
-SPURA- STA.13+52.00
EL.621.13
END RT DITCH
-SPURA- STA.13+87.13
EL.616.51
23
24
25
26
27
10
11
12
13
14
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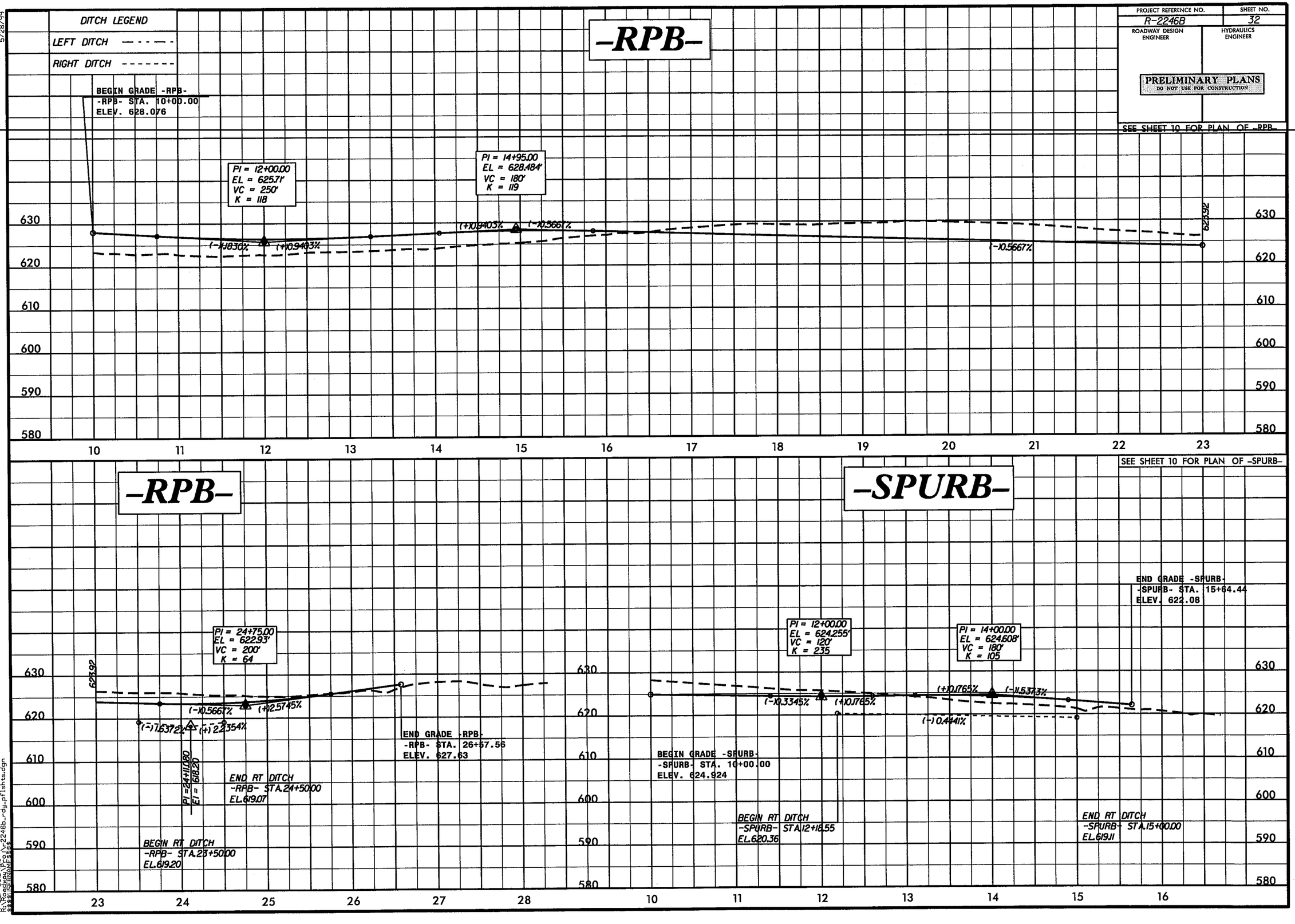
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SEE SHEET 10 FOR PLAN OF -RPB-



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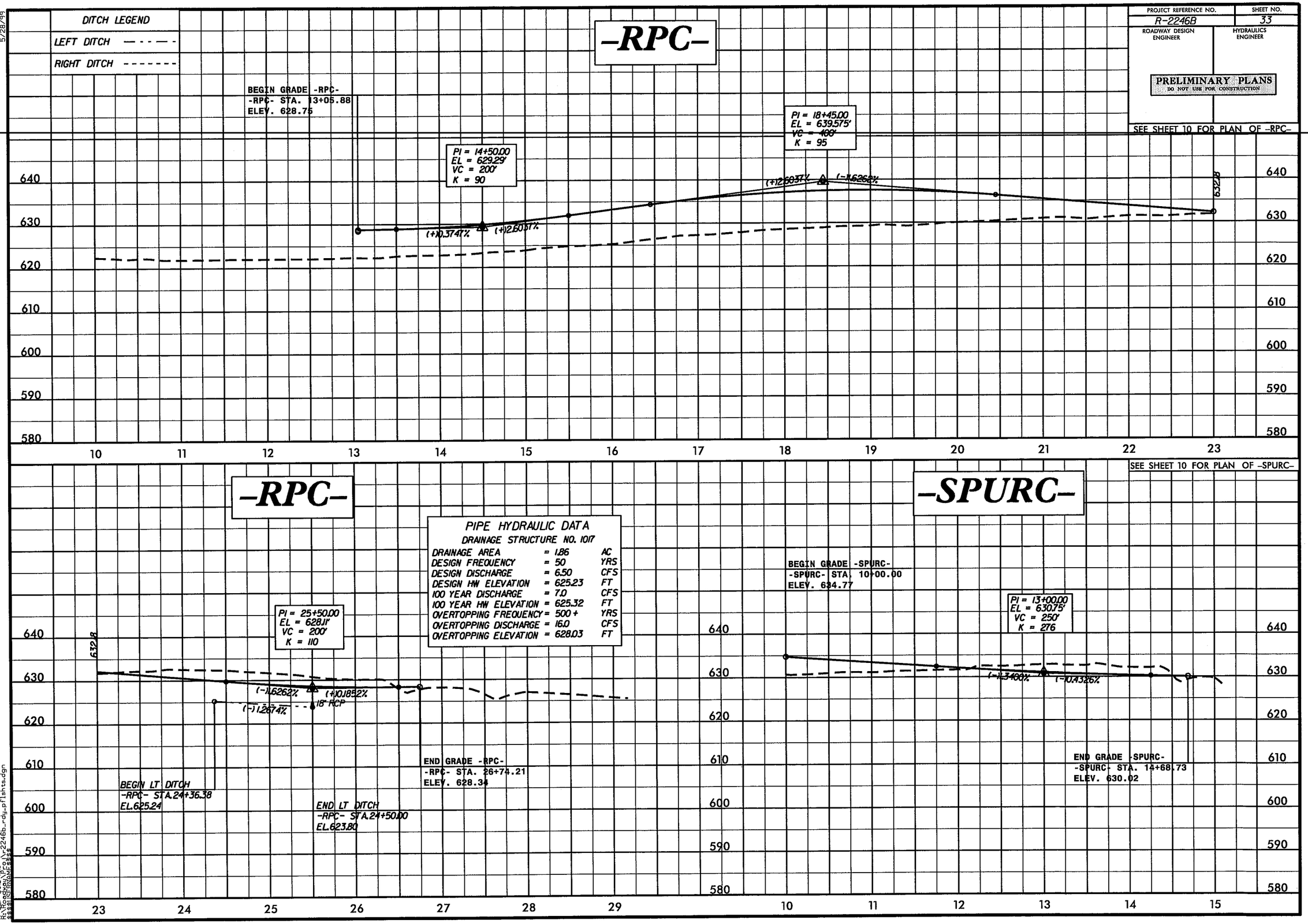
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	33
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DITCH LEGEND
LEFT DITCH — - - — -
RIGHT DITCH - - - - - - -



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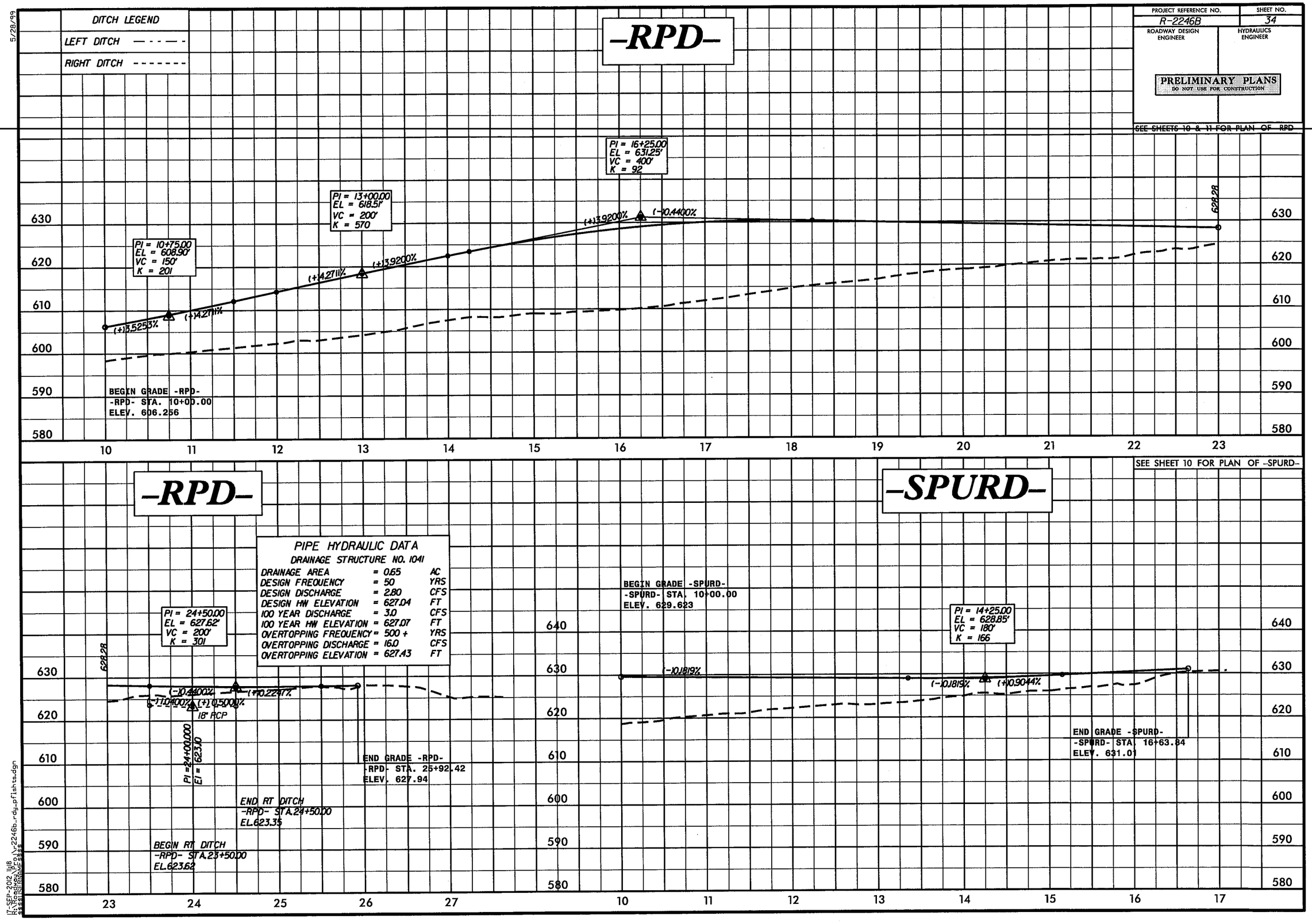

PROJECT REFERENCE NO.
R-2246B
SHEET NO.
34
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SEE SHEETS 10 & 11 FOR PLAN OF RPD
DITCH LEGEND
LEFT DITCH
RIGHT DITCH
-RPD-
PI = 10+75.00
EL = 608.90'
VC = 150'
K = 201
PI = 13+00.00
EL = 618.51'
VC = 200'
K = 570
PI = 16+25.00
EL = 631.25'
VC = 400'
K = 92
(+)3.5253%
(+)4.2711%
(+)4.2711%
(+)3.9200%
(+)3.9200%
(-)0.4400%
628.28
BEGIN GRADE -RPD-
-RPD- STA. 10+00.00
ELEV. 606.256
SEE SHEET 10 FOR PLAN OF -SPURD-
-RPD-
-SPURD-
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1041
DRAINAGE AREA = 0.65 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 2.80 CFS
DESIGN HW ELEVATION = 627.04 FT
100 YEAR DISCHARGE = 3.0 CFS
100 YEAR HW ELEVATION = 627.07 FT
OVERTOPPING FREQUENCY = 500 + YRS
OVERTOPPING DISCHARGE = 16.0 CFS
OVERTOPPING ELEVATION = 627.43 FT
PI = 24+50.00
EL = 627.62'
VC = 200'
K = 301
628.28
(-)0.4400%
(+)0.2247%
(-)1.0400%
(+)0.5000%
18" RCP
PI = 24+00.000
EL = 623.10
END GRADE -RPD-
-RPD- STA. 25+92.42
ELEV. 627.94
END RT DITCH
-RPD- STA.24+50.00
EL.623.35
BEGIN RT DITCH
-RPD- STA.23+50.00
EL.623.62
BEGIN GRADE -SPURD-
-SPURD- STA. 10+00.00
ELEV. 629.623
PI = 14+25.00
EL = 628.85'
VC = 180'
K = 166
(-)0.1819%
(-)0.1819%
(+)0.9044%
END GRADE -SPURD-
-SPURD- STA. 16+63.84
ELEV. 631.01

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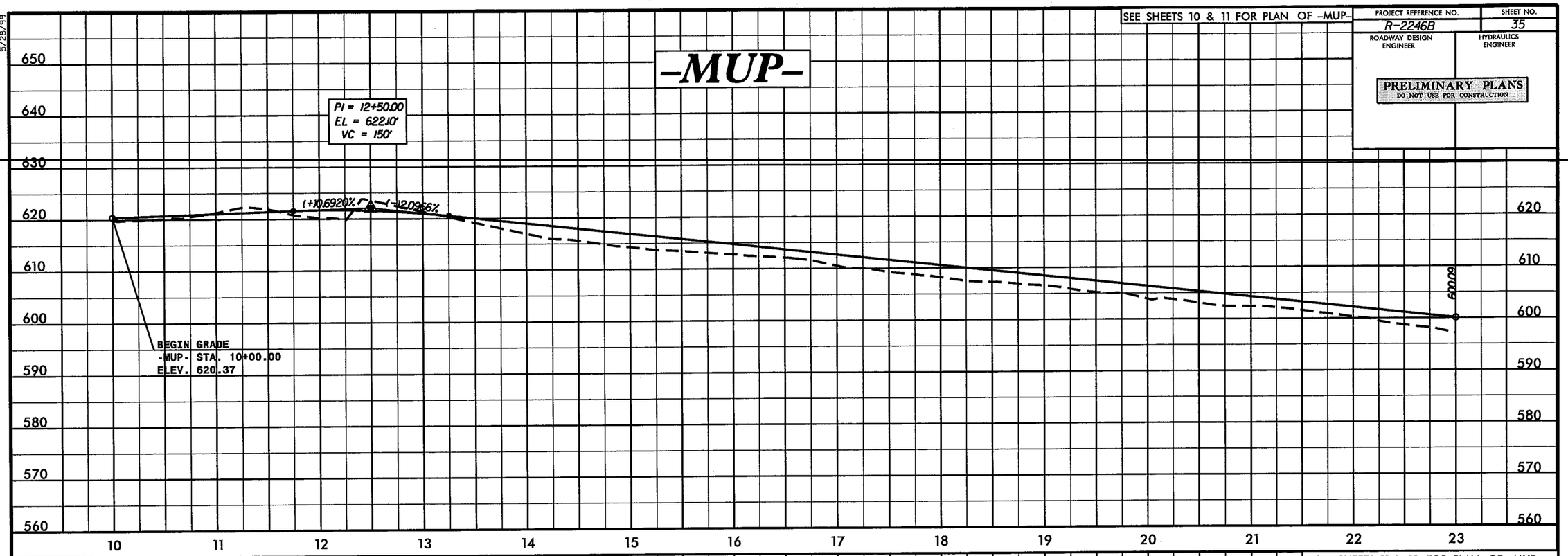
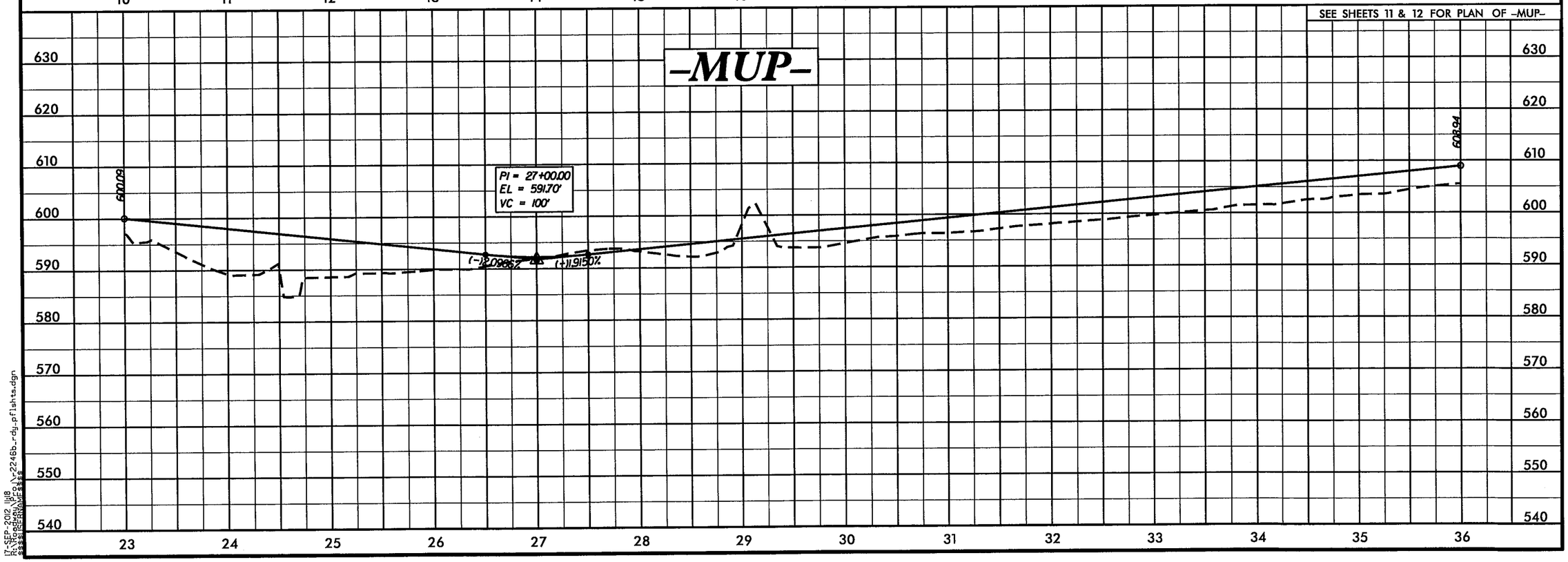
SEE SHEETS 10 & 11 FOR PLAN OF -MUP-

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SEE SHEETS 11 & 12 FOR PLAN OF -MUP-



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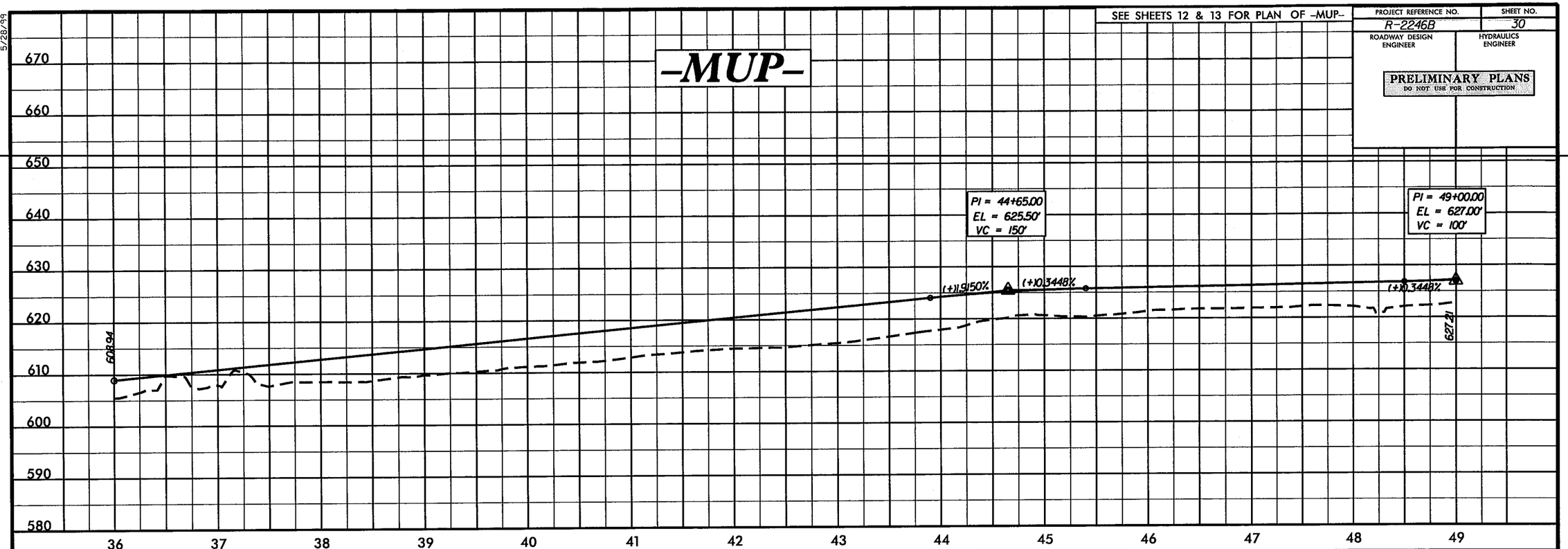
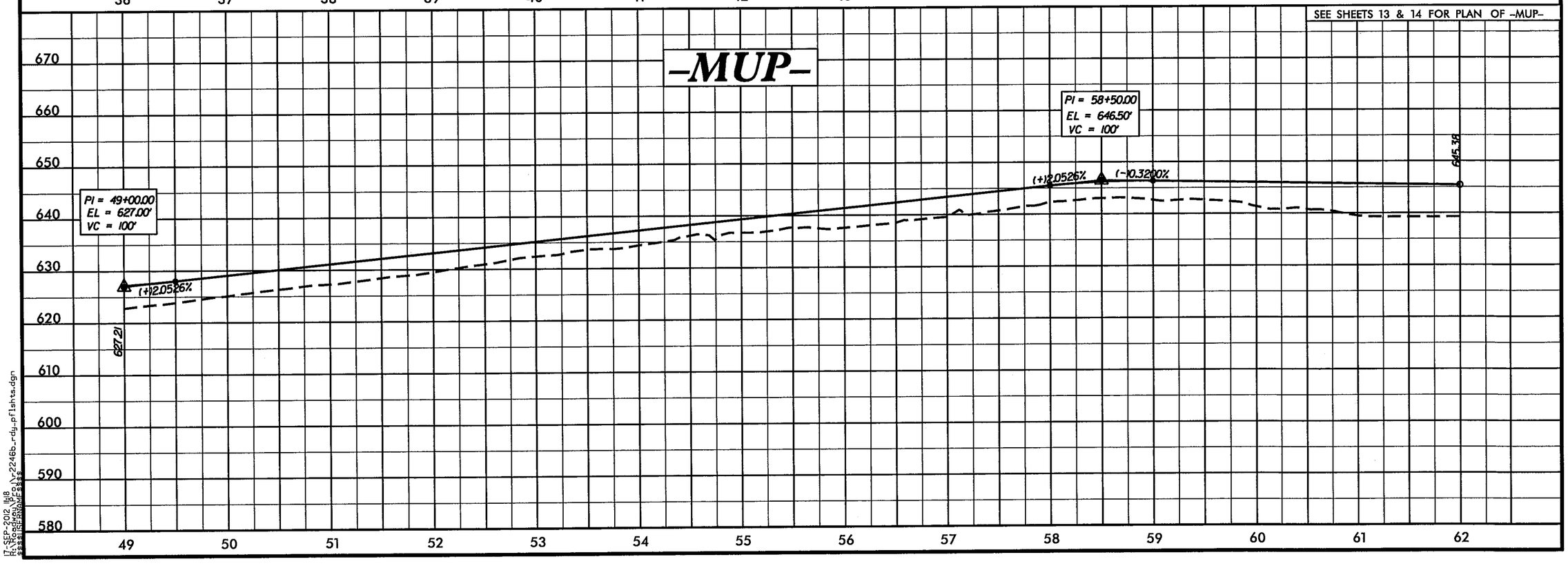
PROJECT REFERENCE NO.	SHEET NO.
R-2246B	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SEE SHEETS 12 & 13 FOR PLAN OF -MUP-



SEE SHEETS 13 & 14 FOR PLAN OF -MUP-



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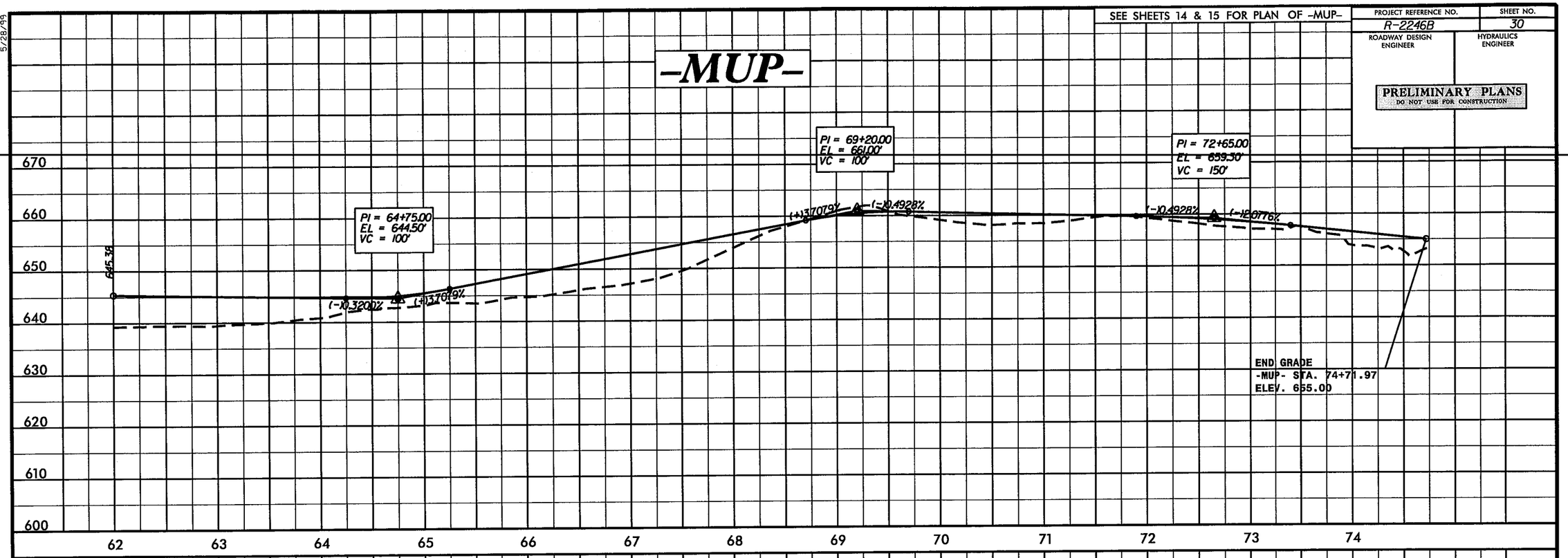
SEE SHEETS 14 & 15 FOR PLAN OF -MUP-

PROJECT REFERENCE NO.	SHEET NO.
R-2246B	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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