STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT L.MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

May 14, 2013

U. S. Army Corps of Engineers
Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

ATTN: Mr. Andy Williams
NCDOT Coordinator

SUBJECT: **Application for Section 404 Individual Permit and Section 401 Individual Water Quality Certification** for the proposed new location facility from SR 2011 (Edgefield Road) to the Haw River at US 220 in Greensboro, Guilford County; Division 7; TIP No. R-2413 A & B

Debit $570.00 from WBS Element No. 34429.1.1

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to construct a new location facility that is a four-lane divided, controlled-access highway between NC 68 and US 220 at the Haw River, also known as NC68/US220 Connector.

In addition to this cover letter, the application package consists of an ENG Form 4345, the North Carolina Ecosystem Enhancement Program (NCEEP) acceptance letter, State Historic Preservation Office (SHPO) Eligibility Memorandums (April, August, and November 2007), Interagency Hydraulic Design Review Concurrence Points 4B and 4C meeting minutes, Stormwater Management Plans, R-2413 On-Site Mitigation Document and Plans, permit drawings, and half-size roadway plan sheets.

PROJECT SCHEDULE

For construction purposes this project has been divided into two sections, R-2413 A & B. Section A starts at SR 2011 (Edgefield Road) and extends to SR 2127 (Brookbank Road) and Section B starts at SR 2127 and extends to the Haw River at US 220.

The project has a review date of February 25, 2014 and a letting date of April 15, 2014 for Sections A & B. However, letting of project may advance as funding becomes available.

PURPOSE AND NEED

The purpose of this project is to improve traffic flow by providing a full control access facility and by providing level of service (LOS) D or better in the design year, from an existing upgraded section of US 220 in the general vicinity between Stokesdale and Summerfield, to the existing four-lane section of NC 68 north of Piedmont Triad International Airport.

NEPA DOCUMENT STATUS

A State EA (SEA) was approved in September 1993 and a State FONSI (SFONSI) was approved in March 1995. A re-evaluation of SEA and SFONSI was done in August 2009. All documents have been provided to regulatory review agencies. Additional copies of documents will be provided upon request. Also, under separate cover a Detailed Study Analysis Memo (April 2013) has been completed and sent to USACE, Andy Williams.

INDEPENDENT UTILITY

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

(1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope;
(2) The project is usable and a reasonable expenditure due to both sections being constructed at the same time;
(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

RESOURCE STATUS

Wetland delineations for the R -2413 A & B study area followed the field delineation method outlined in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987). Stream identification and classification followed the *Identification Methods for the Origins of Intermittent and Perennial Streams* (North Carolina Division of Water Quality [NCDWQ]).

Within the R-2413 A & B study area for the preferred alternative, 43 streams, and 14 wetlands sites were identified. Jurisdictional areas were verified by USACE Regulatory Specialist Monte Matthews and NCDWQ Representative Sue Homewood in July and August 2006. Jurisdictional features were revisited in February 2009 with agency visits occurring in December 2009 and February 2009. The most recent agency field visit occurred on June 17, 2010 to discuss several previous stream determinations and mitigation status as well as to identify new jurisdictional areas added or extended for the addition of the service road. USACE Regulatory Specialist Andy Williams and Amy Euliss were the agency representatives in attendance. No written JD (JD request packet sent July 19, 2010) was received from the USACE for the re-verification.

IMPACTS TO WATERS OF THE UNITED STATES

The project lies within the Piedmont Physiographic Province in the Cape Fear River Basin in Guilford County, HUC 03030002. Jurisdictional features within the construction footprint that will be impacted by this project include Reedy Fork [(NCDWQ Classification WSIII; NSW; NCDWQ Index No. 16-11-(1)], and 42 unnamed tributaries (UTs) to Brush Creek [(NCDWQ Classification

WSIII; NSW; NCDWQ Index No. 16-11-4-(1)], Reedy Fork and the Haw River [(NCDWQ Classification WSIV; NSW; NCDWQ Index No. 16-(1)]. There are 13 riparian wetlands located within the project area that will be impacted.

There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply I (WS-I), or Water Supply II (WS-II) waters within 1.0 mile of the project area. Reedy Fork, the Haw River, and Brush Creek are all three listed on the 2012 303(d) List of Impaired Waters of North Carolina. All three are listed as impaired due to ecological/biological integrity for benthos and/or fish community.

Utility Impacts

There will be no impacts from utilities to jurisdictional sites on Sections A or B.

Surface Waters

R-2413A

Surface water impacts for R-2413A are 8,917 linear feet of permanent stream impacts and 866 linear feet of temporary stream impacts. There are also 0.60 acres of surface water impacts for the installation of a corrugated steel pipe (CSP) in pond 4 (P4) along with 0.29 acres of temporary surface water impacts for installation of pipes, a culvert, and bents of the bridge at Reedy Fork Creek. The jurisdictional stream impacts are summarized below in Table 1.

R-2413B

Surface water impacts for R-2413B are 3,441 linear feet of permanent stream impacts and 197 linear feet of temporary stream impacts. There are also 0.03 acres of temporary surface water impacts for three UTs to Reedy Fork and five UTs to the Haw River. The jurisdictional stream impacts are summarized below in Table 2.

In considering onsite mitigation sites for both R-2413 A and B, any onsite mitigation impacts that fell inside the slope/stake lines were calculated as part of the impacts listed in this application. Any onsite mitigation impacts that fell outside of the slope/stake lines are calculated as part of the On-site Mitigation Plan Document, specifically the On-Site Non-Mitigable Stream Mitigation Plan Sheets (see attached).

Table 1. R-2413A Surface Water Impacts

Site	Stream JD ID	Classification	Impact Type	Permanent Impacts (ft.)	Impacts Requiring USACE Mitigation (ft.)	USACE Proposed Mitigation Ratio	Impacts Requiring NCDWQ Mitigation (ft.)	Temporary Impacts (ft.)
1	S73A	Perennial	Fill	699	699	2:1	699	22
			BS[2]	20	0	0[1]	20	
2A	S68	Perennial	Fill	60	60	2:1	0	18
2B	S70	Perennial	Fill	44	44	2:1	0	7
2C	S67	Perennial	Fill	366	366	2:1	366	22
			BS[2]	20	0	0[1]	20	
3	S65	Perennial	Fill	212	212	2:1	212	36
			BS[2]	32	0	0[1]	32	
4	S63	Perennial	Fill	523	523	2:1	523	42
			BS[2]	30	0	0[1]	30	
5	S56	Perennial	Fill	408	408	2:1	408	33
			BS[2]	20	0	0[1]	20	
6	S53	Perennial	Fill	409	409	2:1	409	21
			BS[2]	23	0	0[1]	23	
7A	S51	Perennial	Fill	379	379	2:1	379	21
			BS[2]	45	0	0[1]	45	
Impacts Subtotal:				**3,290**	**3,100**		**3,186**	**222**

[1] Mitigation for bank stabilization not required by USACE. [2]BS = Bank Stabilization

Table 1. R-2413A Surface Water Impacts (continued)

Site	Stream JD ID	Classification	Impact Type	Permanent Impacts (ft.)	Impacts Requiring USACE Mitigation (ft.)	USACE Proposed Mitigation Ratio	Impacts Requiring NCDWQ Mitigation (ft.)	Temporary Impacts (ft.)
7B	S50	Perennial	Fill	26	26	2:1	0	10
7C	S49	Perennial	Fill	31	31	2:1	0	
8A	S46	Perennial	Fill	654	654	2:1	654	50
			BS[2]	21	0	0[1]	21	
8B	S47	Perennial	Fill	50	50	2:1	0	
8C	S45	Perennial	Fill	34	34	2:1	0	
10A	S40	Perennial	Fill	426	426	2:1	426	41
			BS[2]	20	0	0[1]	20	
10B	S42	Perennial	Fill	49	49	2:1	0	
10C	S41	Perennial	Fill	116	116	2:1	0	
11	S39A	Perennial	Fill	47	47	2:1	0	17
12A	S37A	Perennial	Fill	299	299	2:1	299	
12B	S37C	Perennial	Fill	131	131	1:1	0	
13A	S35	Perennial	Fill	525	525	2:1	525	10
13B	S36	Perennial	Fill	106	106	2:1	0	
Impacts Subtotal:				**2,535**	**2,494**		**1,945**	**128**

[1] Mitigation for bank stabilization not required by USACE. [2]BS = Bank Stabilization

Table 1. R-2413A Surface Water Impacts (continued)

Site	Stream JD ID	Classification	Impact Type	Permanent Impacts (ft.)	Impacts Requiring USACE Mitigation (ft.)	USACE Proposed Mitigation Ratio	Impacts Requiring NCDWQ Mitigation (ft.)	Temporary Impacts (ft.)
14A	S31	Perennial	Fill	486	486	2:1	486	
14B	S32	Perennial	Fill	172	172	2:1	172	
15A	S29A	Perennial	Fill	513	513	2:1	513	41
			BS[2]	20	0	0[1]	20	
15B	S30	Perennial	Fill	46	46	2:1	0	
16A	S27	Perennial	Fill	342	342	2:1	342	29
			BS[2]	20	0	0[1]	20	
16B	S28	Perennial	Fill	33	33	2:1	0	
18	S25	Perennial	Fill					128
19	S23B	Perennial	Fill	507	507	2:1	507	34
20	S34	Perennial	Fill	240	240	2:1	240	
21A	S22A/S 22B	Perennial	Fill	288	288	2:1	288	262
21B	S22.5	Perennial	Fill	149	149	2:1	0	
22	S62	Perennial	Fill	256	256	2:1	256	22
			BS[2]	20	0	0[1]	20	
Impacts Subtotal:				3,092	3,032		2,864	516
Total Impacts:			**Fill**	**8,626**	**8,626**		**7,704**	**866**
			BS[2]	**291**	**0**		**291**	
			Total	**8,917**	**8,626**		**7,995**	**866**

[1] Mitigation for bank stabilization not required by USACE. [2]BS = Bank Stabilization

Table 2. R-2413B Surface Water Impacts

Site	Stream JD ID	Classification	Impact Type	Permanent Impacts (ft.)	Impacts Requiring USACE Mitigation (ft.)	USACE Proposed Mitigation Ratio	Impacts Requiring NCDWQ Mitigation (ft.)	Temporary Impacts (ft.)
1	S22	Perennial	Fill	260	260	2:1	260	45
			BS[2]	24	0	0[1]	24	
2	S31	Perennial	Fill	235	235	2:1	235	15
			BS[2]	11	0	0[1]	11	
3	S13	Perennial	Fill	726	726	2:1	726	30
4	S12	Intermittent	Fill	39	39	2:1	0	15
			BS[2]	11	0	0[1]	0	
5	S10	Perennial	Fill	554	554	2:1	554	24
			BS[2]	11	0	0[1]	11	
5A	S11	Perennial	Fill	146	146	2:1	0	17
6	S9B	Perennial	Fill		0	0	0	21
7	S6A	Perennial	Fill	411	411	2:1	411	30
8	S3A	Perennial	Fill	645	645	2:1	645	
8d	S3A	Perennial	Fill	339	339	1:1	339	
8e	S5	Perennial	Fill	29	29	2:1	0	
Total Impacts:			**Fill**	**3,384**	**3,384**		**3,159**	**197**
			BS[2]	**57**	**0**		**57**	
			Total	**3,441**	**3,384**		**3,216**	**197**

[1] Mitigation for bank stabilization not required by USACE. [2]BS = Bank Stabilization

Wetlands

R-2413A

There will be a total of 3.32 acres of permanent riparian wetland impacts associated with this section. These impacts will result from 3.13 acres of permanent fill, less than 0.01 acres of excavation, and 0.19 acres of mechanized clearing. Permanent wetland impacts are summarized below in Table 3. There will also be 0.04 acres of temporary wetland fill and 0.13 acres of hand clearing at Site 18.

Table 3. R-2413A Permanent Wetland Impacts

Site	Wetland JD ID	Impact Type	Permanent Impacts (acres)
1	Wetland 40	Permanent Fill	0.01
4	Wetland 35	Permanent Fill	0.24
		Mechanized Clearing	0.02
6	Wetland 34	Permanent Fill	<0.01
10A	Wetland 28	Permanent Fill	0.01
		Excavation	<0.01
10C	Wetland 27	Permanent Fill	<0.01
		Mechanized Clearing	0.01
11	Wetland 25	Permanent Fill	0.12
15A	Wetland 19	Permanent Fill	0.01
16A	Wetland 18	Permanent Fill	0.15
17	Wetland 17	Permanent Fill	0.35
		Mechanized Clearing	0.03
20	Wetland 22	Permanent Fill	0.11
21A	Wetland 14A	Permanent Fill	2.11
		Mechanized Clearing	0.13
Total Impacts			**3.32***

***Total impacts due to rounding.**

R-2413B

There will be a total of 2.15 acres of permanent riparian wetland impacts associated with this section. These impacts will result from 2.14 acres of permanent fill and 0.01 acres of excavation. Permanent wetland impacts are summarized below in Table 4. There will also be 0.01 temporary riparian wetland impacts at Site 8C, for the onsite mitigation.

Table 4. R-2413B Wetland Impacts

Site	Wetland JD ID	Impact Type	Permanent Impacts (acres)
1	Wetland 14	Permanent Fill	1.87
		Mechanized Clearing	0.23
8A	Wetland 7	Permanent Fill	0.02
8B	Wetland 6	Permanent Fill	0.03
Total Impacts			**2.15**

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. CEQ has defined mitigation of wetland and surface water impacts to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20).

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 phase and 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

Avoidance and minimization has been employed in the project area to the maximum extent practicable. Listed below are some of the measures implemented on each section of the project:

- NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be enforced;
- NCDOT will provide a bridge crossing of Reedy Fork (S25) that allows wildlife, pedestrian, and equestrian access along both sides of the waterway.
- Where possible, drainage systems were designed to outlet away from surface waters to allow time for infiltration in ditches or natural areas;
- Rip-rapped ditches and rip-rap along stream banks will be used where warranted to control erosion;
- Bank stabilization activities will not place rip-rap on the stream bottom;
- Burying cross drainage structures below the streamed in order to minimize impacts to aquatic life. Pipes up to 48 inches will be buried by approximately 20% of the structure depth and pipes greater than 48 inches will be buried 1 foot deep.
- Ditches have been designed to convey flow with non-erosive velocities and are grass-lined where appropriate;
- Median ditches with 6:1 side slopes along the length of the project;
- Several pre-formed scour holes will be constructed;
- Energy dissipater basins will be located at Stations 219+36 and 277+08 for R-2413A and 417+40 (RT) for R-2413B
- Dry detention basins at Stations 423+40 (RT) and 444+35 (LT) will be constructed to attenuate stormwater flows before leaving project for R-2413B

- An additional 10' x 10" culvert will be installed instead of equalizer pipes to accommodate flow of water through wetland 40 at Site 1 on Section B.

On Site 1 for Section A 4:1 side slopes were proposed instead of 2:1 side slopes. Reducing side slopes did not change the wetland impact area. For additional avoidance/minimization for R-2413 A and B see attached Stormwater Management Plans and the Re-evaluation document.

There were no linear stream impacts reported in the SFONSI. At the time it was written streams were only reported as number of crossings. However, the R-2413 Detailed Study Analysis Memo reported a total of 5,946 linear feet of impacts for 21 streams. This impact information was based on conceptual design and GIS calculations. Actual impacts are 12,358 linear feet on 43 streams based on final design. The increase of 6,412 feet of stream impacts is due to the addition of an access road near NC 68 and SR 2133 (Pleasant Ridge Road), bank stabilization, actual stream delineations, and the fact that at least half of the streams that rated out as intermittent according to the NCDWQ Stream Identification Form were called perennial by NCDWQ at the onsite field visit and would not have been counted with the use of GIS to estimate stream impacts.

Wetland impacts were reported as 8.88 acres in the SFONSI and 6.01 acres in the R-2413 Detailed Study Analysis Memo. After final design, wetland impacts decreased to 5.47 acres.

Compensatory Mitigation

R-2413A

Compensatory mitigation requirements for R-2413A are summarized below in Table 5. Section A will permanently impact 8,917 feet of warm water streams. Of these 8,917 feet, there are 291 feet of bank stabilization that do not require mitigation by the USACE, resulting in 8,626 feet of stream impacts requiring USACE mitigation.

The USACE is requiring 2:1 mitigation for 8,495 feet and requiring 1:1 mitigation for 131 feet of stream impacts. NCDWQ is requiring mitigation for 7,995 feet at 1:1. Therefore, the total USACE mitigation requirement exceeds the NCDWQ requirement. NCDOT is providing onsite mitigation of 2,732 feet of warm water stream by enhancing, relocating, or restoring streams at four sites. See Table 1 of the attached On-site Mitigation Plan Document for further information. The remaining mitigation requirements for 5,894 feet of permanent warm water stream impacts will be provided by the NCEEP for R-2413A (Table 5).

NCEEP will also provide mitigation for the 3.32 acres (2:1 ratio) of permanent riparian wetland impacts resulting from roadway fill, excavation, and mechanized clearing.

Table 5. R-2413A Required Compensatory Mitigation Summary

	Stream Impacts in Length (ft.)	Riparian Wetland Impacts (ac.)
Impacts Requiring Mitigation	8,626*	3.32
Onsite Mitigation Credits	2,732	
Total Mitigable Impacts Less Onsite Mitigation	5,894	3.32
Required EEP Mitigation	5,763 @ 2:1 131 @ 1:1	3.32 @ 2:1
Total EEP Mitigation	**11,657**	**6.64**

*Does not include the 291 feet of bank stabilization.

R-2413B

Compensatory mitigation requirements for R-2413B are summarized below in Table 6. Section B will permanently impact 3,441 feet of warm water streams. Of these 3,441 feet, there are 57 feet of bank stabilization that do not require mitigation by the USACE, resulting in 3,384 feet of stream impacts requiring USACE mitigation.

The USACE is requiring 2:1 mitigation for 3,045 feet and requiring 1:1 mitigation for 339 feet of stream impacts. NCDWQ is requiring mitigation for 3,216 feet at 1:1. Therefore, the total USACE mitigation requirement exceeds the NCDWQ requirement. NCDOT is providing onsite mitigation of 765 feet of warm water stream by relocating and restoring one stream at site five. See Table 1 of the attached On-site Mitigation Plan Document for further information. The remaining mitigation requirements of 2,619 feet of permanent warm water stream impacts will be provided by the NCEEP for R-2413B (Table 6).

NCEEP will also provide mitigation for the 2.15 acres (2:1 ratio) of permanent riparian wetland impacts resulting from roadway fill, excavation, and mechanized clearing.

Table 6. R-2413B Required Compensatory Mitigation Summary

	Stream Impacts in Length (ft.)	Riparian Wetland Impacts (ac.)
Impacts Requiring Mitigation	3,384*	2.15
Onsite Mitigation Credits	765	
Mitigable Impacts Less Onsite Mitigation	2,619	2.15
Required Mitigation	2,619 @ 2:1	2.15 @ 2:1
Total EEP Mitigation	**5,238**	**4.30**

*Does not include the 57 feet of bank stabilization.

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 (ESA) of 1973, as amended. As of December 03, 2012, the U.S. Fish and Wildlife Service (USFWS) list one federally protected species for Guilford County: Small whorled pogonia (*Isotria medeoloides)*. A species description and biological conclusion for the small whorled pogonia was not stated in either the SEA or SFONSI because the species was not added to the USFWS county list of protected species until after the documents were completed.

Small whorled pogonia was later addressed in the re-evaluation memo in August 2009 that updated the SEA and SFONSI and an NRTR addendum in June 2010. The project area was surveyed in July 2008 by Environmental Services Inc. biologists along with an additional section for R-2413A in June 2010 by NCDOT biologists for habitat for the small whorled pogonia. Habitat was primarily found adjacent to streams and wetlands on slopes with highly acidic soils based upon the soil survey for Guilford County. The species specific survey revealed no small whorled pogonia plants. A search of the North Carolina Natural Heritage Database on March 11, 2013 revealed no known occurrences of any federally protected species within 1.0 mile of the limits. A biological conclusion of "No Effect" was given for both sections. Due to the last survey date in May 2008 for small whorled pogonia, NCDOT plans to do a re-survey in May

2013. If NCDOT finds a biological conclusion other than No Effect, we will request USFWS consultation.

CULTURAL RESOURCES

The North Carolina Department of Cultural Resources State Historic Preservation Office, (NC HPO, SHPO) reviewed the project regarding the identification of historical sites. The SHPO stated in a memorandum dated November 7, 2007 that they are not aware that any registered properties, or properties listed as being eligible are located with the Area(s) of Potential Effect(s) (APE). Therefore, this proposed project will have no effect on historic structures. See attached November 2007 memorandum.

Archaeological consultations have occurred between the NCDOT, the North Carolina Department of Cultural Resources Office of State Archeology (NC HPO, OSA), and the USACE, the lead federal agency for the undertaking. The USACE defined the undertaking and APE and consulted with the NC HPO in a memorandum dated April 23, 2007. The NC HPO notes that there are no documented archaeological sites, but recommends an archaeological survey to identify and evaluate any new archaeological properties that may be eligible for listing on the National Register of Historic Places prior to construction in a memorandum dated August 3, 2007. Consultation between NCDOT and OSA continued, most recently in March 2013 when new project design mapping, aerials, soils information, and detailed permit drawings were available for review. Locations were identified for more concentrated effort about 25% of the APE and likewise for areas requiring less intensive survey were noted during a methodological discussion. The resulting recommendations from OSA were incorporated into the survey strategy. See attached April and August 2007 memorandums.

An intensive archaeological survey is underway as of April 2013. At the conclusion of that fieldwork, a Management Summary will be produced that compiles the archaeological survey results and conclusions, and recommendations relevant to Section 106 of the National Historic Preservation Act. A full report will be prepared detailing the results and recommendations from the Management Summary for review and acceptance by the NCHPO, OSA and USACE.

FEMA COMPLIANCE

There are streams within the project limits that are within Federal Emergency Management Agency (FEMA)-designated flood zones. Coordination between the NCDOT Hydraulics Unit and FEMA will occur prior to Let to ensure that NCDOT is in full compliance with applicable floodplain ordinances.

INDIRECT AND CUMULATIVE EFFECTS

A Qualitative Indirect and Cumulative Effects Report for the entire R-2413 corridor was completed in September 2005. The report stated that heavy commercial and industrial growth is "...expected to occur in the western portion of Guilford County, due to the availably of infrastructure and the close proximity to the Piedmont Triad International Airport (PTIA). Local officials indicated that growth taking place within this area is primarily due to the airport and not from various transportation projects."

The report also stated that cumulative effects from "Construction of TIP Project R-2413, especially in conjunction with TIP Project R-2309 and TIP Project U-2524/U-2525 (Greensboro

Urban Loop), could make the northern portion of the GISA [Growth Impact Study Area] more attractive for residential development by improving access and mobility."

The report concluded that "Potential impacts to water quality throughout the project area should be minimized due to the presence of state and local water supply watershed protection regulations, the creation and implementation of Guilford County's Phase II stormwater plan, and land use plans/zoning regulations enforced by the various municipalities throughout the GISA (including riparian buffers and the preservation of open space/natural land)."

Additionally, a 2003 PTIA Water Quality Modeling Study was prepared for the expansion of the Piedmont Triad International Airport. This study was used as part of the preparation for NCDOT's 401/404 water quality certification for U-2524BB. Modeling results showed that land use ordinances and controls, including water supply watershed protections, buffer rules (in this report's case the Randleman Rules) and storm water BMP's were effective in reducing subsequent ICE studies of related projects (U-2525 and I-5110) have confirmed that the potential indirect and cumulative effects to land use and water quality due to R-2413 and connecting/adjacent projects will be controlled by local regulations, planning, water supply watershed restrictions, Phase II Stormwater regulations, and the Jordan Buffer Rules.

WILD AND SCENIC RIVERS

This 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) or North Carolina Natural and Scenic Rivers.

ESSENTIAL FISH HABITAT

The project will not impact any essential fish habitat afforded protection under the Magnuson-Stevens Act of 1996 (16 U.S.C 1801 *et seq.*).

REGULATORY APPROVALS

Application is hereby made for a Department of the Army Section 404 Individual Permit as required for the above-described activities for the proposed T.I.P. Project R-2413 A and B.

We are also hereby requesting a Section 401 Individual Water Quality Certification from 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. We are providing two copies of this application to the North Carolina Department of Environment and Natural Resources (NCDENR), NCDWQ, for their review and approval.

Project R-2413 does fall within the Jordan Lake Water Supply Watershed. However, NCDOT is not requesting a Jordan Buffer Authorization because an approved SFONSI was issued for this project in March 1995, which is prior to the adoption of the Jordan Lake Riparian Buffer Rules. Please see the memorandum submitted to NCDWQ regarding this subject, dated August 20, 2010.

A copy of this permit application and its distribution list will be posted on the NCDOT website at https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx. Thank you for your time and assistance with this project. Please contact Deanna Riffey at either driffey@ncdot.gov or (919) 707-6151 if you have any questions or need additional information.

Sincerely,

E. L. Rush

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

Cc:
NCDOT Permit Application Standard Distribution List

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 - Gregory Middle - J. Last - Thorpe	First - Middle - Last -
Company - NCDOT-PDEA	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 - 1598	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business 919-707-6151 c. Fax 919-212-5785	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)
R-2413 A & B

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
Reedy Fork &Unnamed tributaries to Reedy Fork & Brush Creek	Address
15. LOCATION OF PROJECT Latitude: °N 36.177458 Longitude: °W -79.935028	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality
Section - Guilford County Township - Greensboro 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 a new location facility that is a four-lane divided, controlled-access highway between NC 68 and US 220 at the Haw River, also known as NC68//US220 Connector.

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

Please see attached cover letter.

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

20. Reason(s) for Discharge

Impacts will result from widening the roadway and shoulders, construction of roadway on new location, and bridge construction.

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 cover letter & permit drawings		

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

Acres See attached cover letter & permit drawings.

or

Linear Feet See attached cover letter & permit drawings.

23. Description of Avoidance, Minimization, and Compensation (see instructions)

See attached cover letter.

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

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- See attached property owners in permit drawings packet.

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

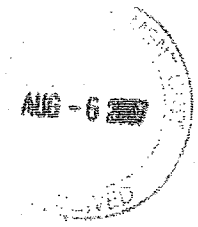
27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized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

E.L. Lusk for Gregory J. Thorpe, PhD — May 14, 2013

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.



North Carolina Department of Cultural Resources

State Historic Preservation Office

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

August 3, 2007

Andrew Williams
Regulatory Project Manager
Raleigh Field Office
6508 Falls of the Neuse Road, Suite 120
Raleigh, NC 27615

Re: NC DOT Project R-2413 A&B, NC 68/US 220 Connector, Guilford and Rockingham Counties, CH 90-1045

Dear Mr. Williams:

Thank you for your letter of April 23, 2007, concerning the above project. We apologize for the delay in our response.

We recommend that a Department of Transportation architectural historian conduct a reconnaissance survey to determine if any historic structures are located within the undertaking's area of potential effects.

With regard to archaeological resources, there are no recorded archaeological sites that will be directly affected by the proposed new location highway. However, our previous consultation with the archaeologists at the North Carolina Department of Transportation concerning this project resulted in the recommendation that some archaeological survey would be undertaken prior to project implementation. These areas were to be selected after the corridor was chosen and the selection was to be based on examination of historic maps, soil surveys, land use information, and comparison of survey results in similar topographic areas.

Archaeological surveys west of the proposed project area have resulted in the discovery of several Native American and historic period archaeological sites. Recent interaction with several of the avocational collectors in the Guilford/Rockingham county area has brought a number of previously unrecorded sites to our attention. The occupation range of these sites includes Clovis and Hardaway paleoindian materials through to the Late Woodland period. It is our opinion that the proposed project area is likely to contain such resources as well.

We recommend that the archaeologists at the NC DOT consult with the staff of the Office of State Archaeology to determine which areas within the project contain a high probability for the presence of eligible archaeological sites and conduct a comprehensive survey of those areas.

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801

Two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

Peter Sandbeck

cc: Matt Wilkerson, NCDOT

Ecosystem

PROGRAM

May 7, 2013

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-2413A / B, NC 68 Connector, US 220 from SR 2127 (Brook Bank Road) to the Haw River, Guilford 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 May 3, 2013, the impacts are located in CU 03030002 of the Cape Fear River basin in the Central Piedmont (CP) Eco-Region, and are as follows:

Cape Fear 03030002 CP	Stream			Wetlands			Buffer (Sq. Ft.)	
	Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh	Zone 1	Zone 2
Impacts (feet/acres)	0	0	8,513.0	5.47	0	0	0	0

*Some of the stream and wetland impacts may be proposed to be mitigated at a 1:1 mitigation ratio. See permit application for details.

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 919-707-8420.

Sincerely,

James B. Stanfill

James B. Stanfill
EEP Asset Management Supervisor

cc: Mr. Andy Williams, USACE – Raleigh Regulatory Field Office
Ms. Amy Chapman, Division of Water Quality, Wetlands/401 Unit
File: R-2413A / B

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

REPLY TO
ATTENTION OF

April 23, 2007

APR 24 2007
RECEIVED

Regulatory Branch/1145b

SUBJECT: North Carolina Department of Transportation Project R-2412 A&B, Guilford County, NC 68 Connector, State Project # 34429

Ms. Renee Gledhill-Earley
Environmental Review Coordinator
Administration Branch
North Carolina Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Dear Ms. Gledhill-Earley:

By letter dated January 29, 2007, we received a request from the North Carolina Department of Transportation to define the undertaking and establish the Area(s) of Potential Effects (APE) or permit area for both historic structures and archaeology for a proposed multi-lane improvement from the US 220/NC 68 junction in Rockingham County to the existing four-lane section of NC 68 north of the Piedmont Triad Airport (R-2413 A&B), in Guilford County, North Carolina.

Based on the current information available regarding this project, the undertaking is the proposed construction of the connector road from the US 220/NC 68 junction in Rockingham County to the existing four-lane section of NC 68 north of the Piedmont Triad Airport (R-2413 A&B), in Guilford County, North Carolina. There are approximately 33 acres of jurisdictional wetlands and approximately 54,200 linear feet of jurisdictional streams within the proposed corridor. Therefore, the permit area extends the entire width of the proposed Right-of-Way, which has yet to be established, but will be confined within the proposed corridor and is bounded by US 220 at SR 2011 (Edgefield Road) and the existing NC 68/US 220 intersection. A map is attached for your review.

The proposed corridor (preferred alternative) was selected during a NEPA/404 Merger Meeting on or around January 15, 2004, and was based, in part, on the absence of properties listed on the National Register of Historical Places. Alternatives are discussed

in the state environmental assessment for this project dated September 14, 1993, which includes comments from the North Carolina Department of Cultural Resources.

We have conducted a preliminary review of the latest published version of the National Register of Historic Places and are not aware that any registered properties, or properties listed as being eligible for inclusion therein are located within the APE or will be affected by the proposed work. Therefore, we have concluded, based on the information we have available at this time, that this proposed project will have no effect on historic structures or archeological sites. Please provide any comments you may have regarding this project, including any information regarding the presence or absence of prehistoric or historic structures on or before May 19, 2007. Alternatively, if you agree that the project will have no effect on structures eligible or potentially eligible for the NRHP, your written concurrence is appreciated.

Thank you for your cooperation in this review process. If you have any questions concerning our review or if we can be of further assistance, please contact me at the Raleigh Regulatory Field Office at 919-876-8441, extension 26.

Sincerely,

Andrew Williams

Andrew Williams
Regulatory Project Manager
Raleigh Field Office

Enclosure

Copies Furnished (w/out enclosure)

Mr. Carl Goode
NC Department of Transportation
Human Environment Unit
1583 Mail Service Center
Raleigh, NC 27699-1583

US Army Corps of Engineers
Wilmington District
Attn: CESAW-RG/Mr. Scott McLendon
P.O. Box 1890
Wilmington, NC 28402

North Carolina Department of Cultural Resources

State Historic Preservation Office

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

November 7, 2007

MEMORANDUM

To: Penne Sandbeck
Office of Human Environment, PDEA
NC Department of Transportation

From: Renee Gledhill-Earley
Environmental Review Coordinator

Re: NC 68/US 220 Connector, R-2413 AB, Guilford County, CH90-1045

Thank you for your letter of September 7, 2007, concerning the above project and providing additional information on the Saunders Inn (GF 1683), a property located within the area of potential effects for the connector project.

I have reviewed the additional information in your letter, your outline of our review of the property, spoken with the former Guilford County Preservation Planner, and checked the Guilford County tax and property records. Based on this information, it appears that the Saunders Inn may be potentially eligible for listing in the National Register of Historic Places for its historical significance as an inn along the old Oak Ridge Road. However, any determination of eligibility for the property would be limited to the building and its frontage along that road and not include the portion of the tax parcel that is within the study area for the corridor of the connector. This means that the inn will not be affected by the proposed undertaking, if the project is contained to the west of the red line shown on your map and described as the limits of the study area.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact me at 919-807-6579. In all future communication concerning this project, please cite the above referenced tracking number.

cc: Mary Pope Furr, NCDOT
Guilford County HPC

TIP # R-2413 *County:* Guilford

CONCURRENCE FORM FOR PROPERTIES NOT ELIGIBLE FOR THE NATIONAL REGISTER OF HISTORIC PLACES

Project Description: **NC 68 Connector—US 220 from Existing four lanes at SR 2011 (Edgefield Road) North of I-40 to the Existing NC 68/US 220 Intersection** ***NOTE*****: this project is in three sections; for this form, we are only covering Sections A and B, from the intersection of NC 68 with SR 2011 and SR 2133 north to US 220 at the Haw River)**

On September 5, 2006 , representatives of the

- ☒ North Carolina Department of Transportation (NCDOT)
- ☐ Federal Highway Administration (FHWA)
- ☒ North Carolina State Historic Preservation Office (HPO)
- ☐ Other

Reviewed the subject project at

- ☐ Scoping meeting
- ☒ Historic architectural resources photograph review session/consultation
- ☐ Other

All parties present agreed

- ☐ There are no properties over fifty years old within the project's area of potential effects.
- ☐ There are no properties less than fifty years old which are considered to meet Criteria Consideration G within the project's area of potential effects.
- ☒ There are properties over fifty years old within the project's Area of Potential Effects (APE), but based on the historical information available and the photographs of each property, the properties identified as **(List Attached)** are considered not eligible for the National Register and no further evaluation of them is necessary.
- ☐ There are no National Register-listed or Study Listed properties within the project's area of potential effects.
- ☐ All properties greater than 50 years of age located in the APE have been considered at this consultation, and based upon the above concurrence, all compliance for historic architecture with Section 106 of the National Historic Preservation Act and GS 121-12(a) has been completed for this project.
- ☐ There are no historic properties affected by this project. *(Attach any notes or documents as needed)*

Signed:

Renee Sandbeck — Nov 13, 2007

Representative, NCDOT — Date

FHWA, for the Division Administrator, or other Federal Agency — Date

Representative, HPO — Date

Renee Gledhill-Earley — 11-13-07

State Historic Preservation Officer — Date

If a survey report is prepared, a final copy of this form and the attached list will be included.

1. House, 1025 NC 68
2. Tobacco Barn, SE side NC 68, across from 1049 NC 68
3. Tenant Farm, 3529 Edgefield Road
4. House, 6883 Brookbank Road
5. McCuiston Farm, 6882 Brookbank Road
6. House, 7620 Deboe Road

Pell, 1755 11/10/07

MOORES LANDING

Guilford County, NC

Parcel Number	131006540097200025	*Plat Book*	
Owner Name	HENSON DONALD L	*Plat Page*	
Mailing Address 1	& SANDRA L	*Condo Book*	
Mailing Address 2	7506 FOREST CREEK RIDGE CT	*Condo Page*	
Mailing Address 3		*Total Assessed Value*	$1,747,200
Mailing Address City	SUMMERFIELD	*Total Building Value*	$4,000
Mailing Address State	NC	*Total Out Building Value*	$0
Mailing Address Zip	273589152	*Total Land Value*	$1,743,200
Property Address	3655-NEAR OAK RIDGE RD	*Total Deferred Value*	$0
Legal Desc 1	41.26AC HARRIS PROP	*Building Count*	4
Legal Desc 2		*Building Number*	1
Land Units	+41.26	*Year Built*	1956
Land Type	AC	*Heated Area*	865
Deed Date		*Bedrooms*	2
Deed Document Type	CJ	*Full Bathrooms*	1
Deed Book	5481	*Use Code*	1
Deed Page	0954	*Appraisal Model Code*	1

Disclaimer: While every effort is made to keep information provided over the internet

Draft Minutes of the 30% Hydraulic Design Review (4B) Meeting on January 13, 2010 for R-2413A. NC 68 Connector – From Four Lanes at SR 2011 (Edgefield Road) to SR 2127 (Brookbank Road) in Guilford County.

Participant:

Team Members

Randy Henegar, NCDOT Hydraulics (present)
Andrew Williams, USACE (present)
Gary Jordan, USFWS (present)
Travis Wilson, NCWRC (absent)
Amy Euliss, NCDWQ (present)
Chris Militscher , USEPA-Raleigh
Tony Houser, Roadway Design (present)
Roy Girolami, Structure Design (present)
Derrick G. Weaver, PDEA (absent)
Rachelle Beauregard, NEU (present)
David Harris, REU (absent)
Patty Eason, Division 7 (absent)

Other Attendees

Zach McNeill, NCDOT
Rick DeCola, NCDOT
Gene Nocerino, NCDOT
Jason Talley, Roadway Design
Ahmad Al-Sharawneh, PDEA
Rusty Lassiter, Hydraulics
Jonathan Moore, Hydraulics
Marc Shown, Hydraulics
Deanna Riffey, NEU

The 4B meeting held on 1-13-10 began with Andrew Williams (USACE) reviewing the past history of the project as to the 2A, 4A and if a LEDPA existed. He indicated that we need to make sure that the alternatives have been looked at. There was some discussion of the history of the project and how it had proceeded through the merger process.

It was brought up that the original FONSI was dated 1995 and that a re-evaluation was done in August 2009 of the preferred alternative.

Felix Davila (FHWA) then excused himself due the lack of a Federal Document.

An electronic copy of the FONSI will be sent to Team Members. (Attached with Draft Minutes.)

Randy Henegar then started a sheet by sheet review of the project.

Sheet 4:

No Impacts – No Comments

Sheet 5:

66" RCP will be retained. No Impacts- No Comments

Sheet 6:

72" RCP will be retained with no impacts on inlet end. An attempt will be made to eliminate impacts at outlet by raising existing HW. Some question concerning outlet velocity at 15" CMP @ -Y1- STA. 29+50 rt. This pipe is an outlet for median drainage and is stable at the outlet at present. 66" RCP @ -Y1- STA. 31+90 is being retained. No Impacts anticipated.

Sheet 7:

S73A and W40 are being impacted by –RP1B-. NEU is looking for potential stream mitigation sites. There was some discussion concerning removing the existing 30" RCP under the abandoned –Y- line @ -Y1- STA. 55+50 lt. The 30" pipe ties into a system draining across NC 68 and is proposed to be retained.

Sheet 8:

S67 and S68 are being impacted by the new location @ -L- STA. 117+20. Amy Euliss (DWQ) indicated that these streams were tributaries to a stream on the 303d list. Hydraulics indicated that grassed swales are being used to treat the stormwater runoff from the project. S66 and S70 are not shown on planimetric file. The existing 18" RCP under Edgefield Road @ -Y1- STA. 71+50 lt. is being removed. S65 and S64 are being impacted by the new location @ -L- STA. 133+50 lt. There was some question as to why the proposed 36" CSP was laid in the proposed location. This is to keep the pipe in the bottom of the draw and reduce the amount of excavation necessary to install the pipe. This pertains to numerous other pipes throughout the project.

Sheet 9:

S63 and W35 are being impacted by fill from the new location @ -L- STA. 137+80. S56 is being impacted as well @ -L- STA. 162+00. S54 does not show up on planimetric file. Roadway design indicated that they would contact Location and Surveys to get missing jurisdictional streams to show up in planimetric file.

Sheets 10-11:

No Impacts-No Comments

Sheet 12:

S53 and W34 are being impacted.

Sheet 13:

S51 is being impacted and conveyed under the proposed roadway through a 60" CSP. Chris Militscher (EPA) questioned why the HW at Structure # 1307 was so far from the slope stake line. Hydraulic indicated that this was because there is a draw draining toward the roadway and in order to have the proposed pipe function properly it will be necessary to construct an earth berm across the draw. There was then a question as to the need for rip rap around the headwall and Hydraulics indicated that rip rap is not typically called for at pipe inlets.

Sheet 14:

S46 is being impacted and conveyed under the proposed roadway through a 66" CSP. S47 is not shown on planimetric file.

Sheet 15:

S45 and S46 are being impacted @ -L- STA. 233+00 lt. Pond P4 is being filled by proposed roadway with the remaining remnant being drained. NEU indicated that this is a possible mitigation site in the drained pond bed and that the drainage courses coming to the pond need to be looked at to determine if they are jurisdictional. NEU also indicated that S46 is not in good shape and is not a good candidate for mitigation. S40 and S42 are being impacted @ -L- STA. 247+00 rt. Stream mitigation will be investigated on S42 in this area.

Sheet 16:

S40, S41, W27 and W28 are being impacted. S40 will be conveyed by pipe under the proposed roadway. S39A and W25 are also being impacted with the runoff being conveyed by pipe under the roadway. S39A is depicted as ending when it enters W25 and no jurisdictional stream was depicted exiting the wetland. NEU will verify this in the field.

Sheet 17:

S37A will be impacted and conveyed by pipe under the proposed roadway @ -L- STA. 269+50. S37A at the downstream end of this crossing is being considered by NEU for a mitigation site.

Sheet 18:

S36 and S35 will be impacted and conveyed by pipe under the proposed roadway @ -L- STA. 278+00. S35 at both the up and downstream end of this crossing is being considered by NEU for a mitigation site.

Sheet 19:

No Impacts-No Comments

Sheet 20:

S31 and S32 will be impacted and conveyed by pipe under the proposed roadway @ -L- STA. 307+00. NEU will look at mitigation opportunity around proposed pipe inlet. S33 is not shown on the planimetric file.

Sheet 21:

S29A, S30 and W19 will be impacted and conveyed by pipe under the proposed roadway @ -L- STA. 324+50. S27, S28 and W18 will be impacted and conveyed by pipe under the proposed roadway @ -L- STA. 328+00. Andrew Williams (USACE) indicated that W18 would be a total take.

Sheet 22:

W17 will be impacted at several locations with an equalizer pipe placed @ -L- STA. 335+00. This is downstream of pond P7 which needs to be shown as a pond in the planimetric file. A question was raised as to why the bridge does not span this impacted section of W17. It would take 250+/- more bridge to span entire wetland. Hydraulics indicated that in the 1995 FONSI a commitment was made to provide Hazardous Spill Catch Basins at this structure. Hydraulics then proposed that since the site is 1.9 miles +/- upstream of the Watershed Critical Area that the Basins

should not be required. Furthermore at this site the fill height is approximately @ 30 ft. high with no good access to a proposed basin which due to the nature of the topography at the site would necessitate the basins being constructed in the floodplain which would increase impacts to wetlands and surface waters. It was generally agreed that this was not an appropriate site for the spill basins. Drainage from the structure will be discharged in the floodplain into a preformed scour hole as far away from the wetlands and surface water as practicable.

Sheet 23:

S23B will be impacted and conveyed by pipe under the proposed roadway @ -L- STA. 351+00.

Sheets 24 and 25:

No Impacts-No Comments

Sheet 26:

There is a stormwater treatment pond with a JS designation @ -Y2- STA. 44+00 lt. It was indicated that the JS designation should be removed.

Sheets 27, 28, 29 and 30:

No Impacts-No Comments

Sheet 31:

S34 and W22 will be impacted and conveyed by pipe under the proposed roadway @ -Y4- STA. 18+00. It was indicated that as currently shown this site would only have wetland impacts. NEU will investigate whether there is JS downstream of the wetland. This area downstream of the wetland was originally not in the study corridor.

Sheet 32:

No Impacts-No Comments

Sheet 33:

S23A will be impacted slightly @ -Y5- STA. 16+50 rt. The JS starts at the outlet of the existing 24" RCP.

Sheet 34:

S22, S22A, S22.5, W14 and W14A will be impacted at this site. A reinforced concrete box culvert is being proposed to convey the drainage under the proposed roadway @ -Y5- STA. 31+00. Steepening the fill slopes to 1.5:1 to reduce the environmental impacts was discussed and will be investigated. A question was raised as to the need for equalizer pipes in the wetland at this site. At this time there is no need because of the existing embankment downstream. The removal of the existing pipe arch is being investigated. This will reduce the size of the proposed RCBC and create potential mitigation opportunities. If this is the case, equalizer pipe(s) will be investigated to determine their benefit.

Sheets 35 and 36:

No Impacts-No Comments

Draft Minutes of the Permit Drawing Review (4C) Meeting on March 21, 2013 for R-2413A. NC 68 Connector – From Four Lanes at SR 2011 (Edgefield Road) to SR 2127 (Brookbank Road) in Guilford County.

Participant:

Team Members	Other Attendees
Randy Henegar, NCDOT Hydraulics (present)	Randy Griffin, NCDOT-NES
Andrew Williams, USACE (present)	Pete Allen, NCDOT-NES
Gary Jordan, USFWS (absent)	Elizabeth Lusk, NCDOT-NES
Travis Wilson, NCWRC (absent)	Jeffrey Teague, Roadway Design
Amy Euliss, NCDWQ (present)	Ahmad Al-Sharawneh, PDEA
Chris Militscher , USEPA-Raleigh(absent)	Rusty Lassiter, Hydraulics
Tony Houser, Roadway Design (present)	Jonathan Moore, Hydraulics
Roy Girolami, Structure Design (absent)	Marc Shown, Hydraulics
Derrick G. Weaver, PDEA (absent)	Deanna Riffey, NCDOT NES-PMG
Rachelle Beauregard, NCDOT NES-PMG (present)	David Boyd, NCDOT-Utilities
David Harris, REU (absent)	Daniel Oliver, NCDOT- Utilities
Patty Eason, Division 7 (present)	John Nigro, NCDOT-Utilities
	Mark Staley, NCDOT-REU
	Karen Capps, NCDOT-Design Build
	Jillian Hinson, NCDOT-Design Build
	Colin Mellor, NCDOT-NES
	Amy Chapman, NCDWQ
	David Shaeffer, USACE

The 4C meeting held on 3-21-13 began with introductions. Randy Henegar then started a site by site review of the permit drawings.

Site I:

It was requested that the impacts due to project I-5110 be removed. Impacts will be removed and summary revised.

Site II:

There was a question as to why the inlet end of the 66" CSP did not show up in the stream. It was explained that the pipe inlet was placed using the contours and that the impacts were accounted for. It was indicated that intermittent stream (S66) should be shown on drawing. S66 will be shown on drawing.

Site III:

DWQ had a question as to whether there was any rip rap being placed in the streambed at the pipe outlets. It was indicated that the rip rap was being placed on the banks only. A Detail will be added showing that no rip rap is to be placed in the streambed. This applies for all piped JS crossings throughout the project.

Site IV:

It was commented that mechanized clearing was being reported on the summary sheet and that there was no mechanized clearing at this site. The mechanized clearing will be removed from the summary sheet.

Site V:

It was commented on that the proposed lateral 'V' ditch was eliminating flow from the JS stream adjacent to it. The 'V' ditch will outlet into the existing stream.

Site VI:

No Comments.

Site VII:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets.

Site VIII:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets.

Site IX:

No Comments.

Site X:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets.

Site XI:

It was requested that the 15" pipe outlet discharging adjacent to the stream be moved further from the stream. The outlet will be moved as far from the stream as practicable.

Site XII:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets. Mitigation Site 1 is up and downstream of this site. NES will verify the limits of S37C and coordinate with Locations and Surveys to correct file if necessary.

Site XIII:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets. Mitigation Site 2 is up and downstream of this site.

Site XIV:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets. Mitigation Site 3 is up and downstream of this site. It was commented that S33 was not shown on the drawings and needs to be. NES will coordinate with Location and Surveys to ensure that S33 is shown properly.

Site XV:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets.

Site XVI:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets. W18 will be a total take of the wetland per USACE at 4B meeting. This will be revised and the summary sheet will be updated.

Site XVII:

No Comments.

Site XVIII:

It was requested that hand clearing be shown in the wetlands under the proposed bridge. This will be revised. The Division will advise as to the need for workpads for construction of the bridge.

Site XIX:

This site is one individual site. Hydraulics will add a detail for the channel change.

Site XX:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets. There was some discussion as to whether the feature downstream of the wetland is jurisdictional. NES will make a determination and coordinate with Location and Surveys to have it shown properly if necessary.

Site XXI:

It was indicated that the impacts needed to be broken down separately for each individual stream. The sites will be labeled accordingly and the impacts will be reported separately on the summary sheets. Mitigation site 4 is at this site. The structure is a 12ft. x 12 ft. RCBC with one foot sills at each end.

Site XXII:

No Comments

Summary Sheet:

It was requested that the Fill In Pond (ac) column be removed and replaced with a column labeled Natural Stream Design (ft) be added in its place. It was indicated that surface water impacts from ponds should be noted on a per site basis on summary sheet. The summary sheet will be revised to reflect these changes.

Sites:

It was requested that the site numbering be revised from Roman to Arabic numerals. This will be revised on permit drawings and summary sheet.

Stormwater Management Plan:

It was requested that the SMP be beefed up by adding stationing for PSH's, describing how grass lined ditches throughout the project were designed to convey flow with non-erosive velocities and stormwater being discharged as far away from JS streams as practicable. The SMP will be revised accordingly.

Final Minutes for Hydraulic Design Review Meeting
R-2413B

State Project 34429.1.1
NC 68 CONNECTOR-US220 FROM SR 2127 (BROOK BANK ROAD) TO HAW RIVER IN GUILFORD COUNTY
Division 7

A Hydraulic Design Review Meeting was held on Wednesday, January 13, 2010 in the Hydraulics Conference Room at the NCDOT Century Center Complex, Raleigh.

Team Members:
Andrew Nottingham – Hydraulics (Absent)
Andrew E. Williams – USACE (Present)
Gary Jordan – USFWS (Present)
Travis Wilson – NCWRC (Absent)
Amy Euliss – NCDWQ (Present)
Chris Militscher – EPA (Absent)
Felix Davila – FHWA (Absent)
Tony Houser – Roadway (Present)
Roy Girolami – Structures (Present)
Derrick G. Weaver – PDEA (Absent)
Rachelle L. Beauregard – NEU (Present)
David Harris – NEU (Absent)
Patty Eason – Division 7 (Absent)

Participants:
Jason Talley – Roadway
Rick Decola – Roadway
Stephen Morgan – Hydraulics (For Andrew Nottingham)
Melanie Nguyen – Hydraulics
Gene J. Nocerino – NEU (Mitigation)
Zach McNeill – NEU
Deanna Riffey – NCDOT NEU
Ahmad Al-Sharawneh – PDEA (For Derrick G. Weaver)

- The meeting began at 11:07 a.m. with introductions initiated by Stephen Morgan (NCDOT Hydraulics). The overall project configuration was described briefly. The project was then reviewed sheet by sheet.

Sheet 4

- Jurisdictional stream (JS) and wetland are located at station +/-374+50 –L-. NCDWQ requested that the design for the proposed culvert at this location incorporate low-flow sills. Hydraulics will incorporate low flow sills in the culvert design. EPA inquired about the spacing of the overflow pipes in the floodplain/wetland area at this location. After some discussion, the team was ok with using one overflow pipe in instead of two.
- A preformed scour hole is proposed right of station 373+50 –L- outside of the wetland.
- A dry detention basin is proposed left of station 376+00 –L- outside of the wetland.

Sheet 5

- No impact.

Sheet 6

- EPA questioned if the Junction Box (JB) at the bottom right of sheet 6 was designed for aquatic passage and if the stream was jurisdictional from beginning to end. NEU replied that the JS starts at the center of the proposed 42" RCP on sheet 7; therefore, the JB from sheet 6 is not required to be designed for aquatic passage.

Sheet 7

- NEU noted that the JS at the beginning of sheet 7 starts near the middle of the proposed 42" RCP at station 412+00 –L-.
- USACE requested more specific JS labeling on the plans. NCDOT will investigate all sites to insure the JS labeling is clear.
- JS located at station 419+00 –L-. A 48" rcp is proposed in this location.
- A natural rock energy dissipator basin is proposed right of station 417+50 –L- at the outlet of the 48" pipe.
- Dry detention basin proposed right of station 423+00 –L- between the main line and Ramp C.

Sheet 8

- NEU noted that the JS at the top left of sheet 8 (left of station 22+00 –Y6-) starts after other drainage features joined to one single stream inside the proposed slope stake line.

Sheet 9

- NCDOT Hydraulics will consider sizing the dry detention basin left of station 444+00 –L- so it will minimize the impact to right of way at this location.
- Preformed scour hole proposed right of station 451+50 –L-.

Sheet 10

- Jurisdictional stream(s) located at station 452+50 –L-. NCDOT Hydraulics will consider having one proposed pipe instead of the current configuration, which has two pipes converging into a JB to a single pipe under the fill at the beginning of sheet 10 near station 452+00 –L-.
- Preformed scour hole located left of station +/- 463+50 –L-

Sheet 11

- Jurisdictional stream located left of station 464+50 –L- begins outside of the project fill slope. A head cut has formed where the stream begins. NCDOT proposes a rip rap lined ditch from the project to where the stream begins. The ditch will be designed to eliminate the head cut in the stream.
- Jurisdictional stream located at station 489+00 –L-. A 72" rcp is proposed in this location.

Sheet 12

- Pedestrian culvert proposed at the old railroad near station 492+00 –L-

Sheet 13 and 14

- Possible detention basin located left of station 506+50 –L-.
- A energy dissipator basin is proposed right of station 509+00 –L-. A riprap ditch will be required to connect the basin to the stream in this location.
- A JS and two small wetlands are located near station 514+00 –L-. The wetlands will be a total take. A 7'x 8' box culvert is proposed at this location. NCDOT Hydraulics noted that the project traverses an old pond location at this site. The old pond dam has been breached, resulting in eroding stream banks and a head-cutting stream. The culvert design may need to be adjusted slightly to result in a more stable stream grade.
- EPA recommended removal of the existing perched 24"RCP upstream of the culvert at the center and bottom of sheet 13 for possible mitigation credit. A wetland is located upstream from this pipe location. NCDOT will investigate if that would be feasible to do without compromising the wetland in this location.

- A stream relocation will be required left of station 517+00 –L- to 520+00 –L downstream of the culvert where the old dam is located. NCDOT will investigate

a natural stream design for this section of stream from the outlet of the culvert to just downstream of the old dam.

Sheet 15

- No comments

This concluded the review of the plans.
There was no further discussion.

The meeting was adjourned at 12:17 pm.

Addendum March 28, 2013

Sheet 4

- A single barrel box culvert will be used in the wetland for an overflow structure rather than a pipe.
- A dry detention basin is no longer proposed left of -L- 346+00.

Sheet 7

- A 54" reinforced concrete pipe (RCP) will be used at station -L- 419+00.
- The dry detention basin is located between the mainline and ramp 6C.

Note: The layout of sheets 8 through 15 has been revised since the 4B meeting. See attached title sheet.

Draft Minutes for Permit Drawing Review Meeting
R-2413B

State Project 34429.1.1
NC 68 CONNECTOR-US220 FROM SR 2127 (BROOK BANK ROAD) TO HAW RIVER IN GUILFORD COUNTY
Division 7

A Permit Drawing Review 4C Meeting was held on Wednesday, March 21, 2013 in the Structures Conference Room at the NCDOT Century Center Complex, Raleigh.

Team Members:
Stephen Morgan – NCDOT Hydraulics (Present)
Andrew E. Williams – USACE (Present)
Amy Euliss – NCDWQ (Present)
Chris Militscher – EPA (Present via teleconference)
Rachelle L. Beauregard – NCDOT NEU (Present)
Phillip Harris – NCDOT NES (Present)
Patty Eason – Division 7 (Present via teleconference)
Gary Jordan – USFWS (Absent)
Travis Wilson – NCWRC (Absent)
Felix Davila – FHWA (Absent)
Tony Houser – NCDOT Roadway (Absent)
Roy Girolami – NCDOT Structures (Absent)
Derrick G. Weaver – NCDOT PDEA (Absent)

Participants:
Ahmad Al-Sharawneh – NCDOT PDEA (For Derrick G. Weaver)
David Shaeffer – USACE
Randy Griffin – NCDOT NEU (Mitigation)
Colin Mellor – NCDOT NEU (Mitigation)
Pete Allen – NCDOT NEU (Mitigation)
Elizabeth Lusk – NCDOT PDEA
Deanna Riffey – NCDOT PDEA
Mark Staley – NCDOT REU
John Nigro – NCDOT Utilities
Thomas Koch – NCDOT Structures Maintenance Unit
Mack Bailey – NCDOT Structures Maintenance Unit
Kristy Alford – NCDOT-Structures Maintenance Unit
Karen Capps – NCDOT Design Build
Michael Abuya – NCDOT Traffic (via teleconference)
Jeffrey Teague – NCDOT Roadway
Amy Billings – NCDOT Hydraulics
Austin Moore – NCDOT Hydraulics

- The meeting began at 2:45 p.m. with introductions initiated by Stephen Morgan (NCDOT Hydraulics). The permit drawings were then reviewed sheet by sheet.

Cover Sheet

- Add sheet numbers to cover sheet.

Stormwater Management Plan

- DWQ requested DOT to list all BMPs that are providing treatment (including grassed swales). Although the project was grandfathered for buffer rules, the BMPs used will show how the project complies with the NPDES permit to meet stormwater controls to the maximum extent practicable (MEP).

4B Meeting minutes

- NCDOT commented that the sheet numbers referenced in the 4B minutes have been revised. A copy of the plan sheet used for the 4B plans will be included in the 4B minutes as reference.

Impacts Summary Sheet

- Add natural stream design to Site 8 and Site 8B.

Site 1 (Sheet 4)

- Add Stream name to plan sheet.
- Profile sheet was reviewed. NCDOT stated no sills were in the culvert and asked if the team still preferred sills given the flat grade of the culvert. DWQ was concerned about the head cut upstream given that there will be over-excavation during the construction of the culvert and prefers some grade control near the culvert entrance if no sill is used. A grade control structure will be shown on the plans.
- DWQ commented that the overflow culvert does not need to be buried like the main culvert.
- NES commented that the Special Provisions will specify that an experienced contractor will be used for on-site stream mitigation.
- The pedestrian culvert will eventually connect to a greenway that is planned by the community.

- Earlier in the design phase of the project, a basin was considered near the top of the sheet outside the R/W. That idea has been abandoned now.
- There was discussion about a cross referencing system to match the unique stream identifier to the site numbers. NCDOT will provide the index in the permit application.

Site 2/Site 3 (Sheet 7)

- It is noted that the JS at the beginning of sheet 7 starts near the middle of the proposed 42" RCP at station 411+50 –L-.
- USACE requested Non JS labeling on the plans for the stream on the right side of the plans.
- DWQ would like more detail including a cross vane on the natural rock energy dissipator basin proposed right of station 417+50 –L- at the outlet of the 54" pipe. (This basin was approved in the previous R-2413A Meeting.) The detail sheet will be provided with the permit drawings.
- DWQ would like the dry detention basin right of station 423+00 –L- between the main line and Ramp 6C included in the Stormwater Management Plan.
- Site 2 will include bank stabilization on summary sheet.

Site 4 (Sheet 8)

- DWQ asked if the TDE left of station 445 should be PDE. NCDOT will investigate, with initial thinking that it should be PDE.
- Include bank stabilization on summary sheet with site 4 and include detail.

Site 5 (Sheet 9)

- Separate the stream impacts into stream 10 and stream 11. (See NRTR for stream info.)
- Include bank stabilization in summary sheet for site 5.

Site 6/Site 7 (Sheet 10)

- Site 6: Label the beginning of the jurisdictional stream.
- Site 7: Include detail on north side (outlet end) of 72" RCP.
- Site 7: Need profile.

Site 8 (Sheet 12)

- Reverse flow arrows on sheets 12 and 13 to show flow direction to the north.
- Separate wetland 6 and wetland 7 on summary sheet.
- The impacts upstream of the box culvert are for stream mitigation and need to be separated on the summary sheet.
- Include a small impact in the wetland right of station 507 for floodplain grading.

- The stream mitigation centerline and major elements will be shown in the plans and permit drawings with reference given to the mitigation plans.
- The base ditch right of station 509 will be extended to the new stream in the riffle section.
- Mitigation plans will need to be "cleaned up" through plan and permit drawing coordination.
- On detail of low flow channel and sills, DWQ questioned where the bed material would come from. The team agreed class 'B' rip rap should be used to establish the stream pattern in the culvert. The wording in the detail will be revised to specifically state to use class 'B' rip rap.
- Reverse flow arrows on mitigation plans.
- USACE would like to see an accounting of the impacts versus restoration in the permit package for the mitigation efforts.

Site 8B (Sheet 13)

- The stream impacts downstream (north) of the culvert are primarily for stream relocation. Roadway fill will impact the stream as it meanders around the old dam breach near station 418. The impacts will be broken out accordingly.
- NES recommended matching the wording in the mitigation plan with the wording in the permit plans.
- USACE recognized that the streams were being improved even if the numbers on the summary sheet did not make it apparent. USACE may be discussing new policy on stream improvements and how the ratios may be modified in the future. It was decided that this was a discussion for a later time.
- Permit package is scheduled for distribution in April 2013.

The meeting was adjourned at 4:20 pm.

STORMWATER MANAGEMENT PLAN

April 3, 2013

T.I.P. No.: R-2413B (NC 68 Connector)
State Project: 34429.1.1
Guilford County
NCDOT Hydraulics Project Engineer: Stephen Morgan, P.E.

Project Description:

This roadway project is a portion of the NC 68 Connector, a 4-lane divided facility on new location. The R-2413B portion is from SR 2127 (Brookbank Road) to just south of US220 and the Haw River. The project length is 2.8 miles. It involves the design of a new interchange at existing NC 150 (Oak Ridge Road) and a grade separation at SR 2155 (Deboe Road).

The project mainline will have typical sections that predominately consist of a 46' median, where 38' is grass lined. Cut sections of the roadway will have a grass lined V-ditches. In fill sections, the drainage will be allowed to sheet flow across the fill slopes except in areas of high fill. In these areas a gutter system will be used to direct stormwater to drainage systems. The outlets of these systems will be directed as far away from receiving waters as is practicable by use of open-channels.

Environmental Description:

The project is located in the Cape Fear River Basin. All streams draining from this project are tributaries to Reedy Fork Creek or Tributaries of the Haw River. Reedy Fork Creek is a tributary to the Haw River. The Haw River is a tributary of Jordan Lake; however, R-2413B has been grandfathered out of the Jordan Lake Buffer Rules.

South of NC 150, all stream crossings are unnamed tributaries of Reedy Fork Creek. North of NC 150, all stream crossings are unnamed tributaries of the Haw River. Reedy Fork Creek and its tributaries carry a WS-III, NSW classification and tributaries to the Haw River carry a stream classification of C, NSW.

The surrounding land uses are predominately woods and agricultural with some residential neighborhoods interspersed.

Best Management Practices:

The primary goal of the Best Management Practices (BMPs) is to prevent degradation of the state's surface waters by the location, construction and operation of the highway system. BMPs are activities, practices and procedures taken to prevent or reduce stormwater pollution. BMPs used on R-24123B are primarily efforts to diffuse, disperse, and attenuate flows before entering the receiving waters. The primary non-structural bmp for the project is the grass lined ditch. Other BMPs including structural BMPs are as follows:

Pre-formed Scour Holes by -L- Station
-L- 373+25 right –Structure No. 0417: 8.2 cfs
-L- 413+50 right –Structure No. 0704: 2.1 cfs
-L- 451+65 right –Structure No. 0902: 5.9 cfs
-L- 463+78 left –Structure No. 0920: 2.6 cfs

Dry Detention Basins by -L- Station
-L- 423+40 right: 809 c.y. needed 960 c.y. provided
-L- 444+35 left: 193 c.y. needed 221 c.y. provided

Energy Dissipator Basin by -L- Station
-L- 417+40 right

Grassed Swale by -L- Station
-L- 377+00 to 378+82 right: 661 ft. required; 366 ft. provided

The storm drainage system in the grass-lined ditch left of station 377+00 –L- will outlet inside the box culvert at station 376 for energy dissipation before storm drainage enters the wetlands. The outlet of the grass swale right of station 377+00 –L- will also outlet into the culvert via a 36" pipe for energy dissipation.

Lateral base ditches are used to the maximum extent practicable for pipe outlet conveyances. Very long lateral base ditches are used left and right of stations 511+00 – L- to 516+00 –L- to convey roadway stormwater before it enters the unnamed tributary to the Haw River (Site 8).

The badly eroded stream at Site 8 from station 510 to station 520 will be restored using natural stream design at the inlet side and outlet side of the proposed culvert. The site is located in the bed of a remnant pond with a dam breach. Whether intentional or not, the breach has allowed huge quantities of sediment to flow downstream and continues to

erode the streambed and banks until the stream finds equilibrium. The stream mitigation efforts will establish the appropriate stream function and stability.

Major Structures:

- Station 374+36: 10' x 10' box culvert with a 10' x 10' box culvert overflow structure at station 376+00. Both are buried one foot below streambed. The main flow culvert at 374+36 will have a grade control structure at the inlet to eliminate a potential head cut from migrating upstream. Grade = 0.23%

- Station 513+42: 10' x 8' box culvert buried one foot below stream bed with low flow sills and baffles. Grade = 1.1%

STORMWATER MANAGEMENT PLAN

April 4, 2013

T.I.P. No.: R-2413A (NC 68 Connector)
State Project: 34429.1.1
Guilford County
NCDOT Hydraulics Project Engineer: Randy Henegar, P.E.

Project Description:

This roadway project is a portion of the NC 68 Connector, a 4-lane divided facility on new location. The R-2413A portion is from four lanes at SR 2011 (Edgefield Road) to SR 2127 (Brookbank Road) and is 4.953 miles long. It involves the design of a new interchange at existing NC 68 (Lynwood Smith Expressway) and grade separations at SR 2133 (Pleasant Ridge Road), SR 2269 (Alcorn Road), SR 2128 (Bunch Road), and SR 2127 (Brookbank Road).

The project mainline will have typical sections that predominately consist of a 70' median, of which 62' is grass lined, and a 46' median, where 38' is grass lined. In cut sections of the bypass, the typical will have a grass V-ditch. In addition to these ditches, drainage will be facilitated by one bridge, a box culvert, cross pipes, storm sewer systems, and lateral ditches.

The surrounding area is predominately wooded and agricultural with some residential neighborhoods and businesses along existing NC 68 (Lynwood Smith Expressway).

Environmental Description:

The project is located in the Cape Fear River Basin. All streams draining from this project are tributaries to Reedy Fork or Brush Creek, which are tributaries to the Haw River. The Haw River is a tributary of Jordan Lake; however, R-2413A has been grandfathered out of the Jordan Lake Buffer Rules.

Reedy Fork and Tributary No. 7 to Reedy Fork are the only named water resources crossed by R-2413A. All other stream crossings are unnamed tributaries to Reedy Fork or Brush Creek. Both Reedy Fork and Tributary No. 7 to Reedy Fork carry a WS-III, NSW classification, meaning it has no categorical restrictions on watershed development or discharges, and they are Nutrient Sensitive Waters (NSW), and therefore require limitations on nutrient inputs.

Best Management Practices:

The primary goal of the Best Management Practices (BMP's) is to prevent degradation of the state's surface waters by the location, construction and operation of the highway system. BMP's are activities, practices and procedures taken to prevent or reduce stormwater pollution. The BMP's and measures used on this project to reduce stormwater impacts include:

- Pre-formed scour holes at stations: 116+70 –L-, 246+00 –L-, 252+20 –L-, 326+00 –L-, 330+25 –L-, 335+95 –L-, 341+80 –L-, 108+50 –Y1-, and 34+50 –Y5-
- Burying cross drainage structures below the streambed in order to minimize impacts to aquatic life. Pipes up to 48 in. will be buried by approximately 20% of the structure depth and pipes greater than 48 in. will be buried 1'deep.
- Elimination of riprap in streambeds at cross pipe outlets (riprap specified on stream banks only)
- Median ditches with 6:1 side slopes along the length of the project
- Energy dissipater basins were located at Sta. 219+36 and Sta. 277+08 to diffuse excessive outlet velocities.
- Throughout the project, ditches have been designed to convey flow with non-erosive velocities, and are grass-lined where practicable.
- Stormwater has been discharged as far away from streams as practicable.

In general, all storm drainage will be diffused and designed for non-erosive velocities before entering wetland areas to the maximum extent practicable.

Major Structures:

There is one box culvert and one bridge. The following summarizes the structures and their locations.

Culvert
Station +/- 30+96.7 –Y5- (Brookbank Rd.)
The culvert conveys Tributary No. 7 to Reedy Fork at Site 21. The required size is 1 @ 12 ft. x 12 ft. reinforced concrete box culvert with a 1' sill at the inlet and outlet. The existing 16.8' x 9.7' oval corrugated metal pipe downstream of the proposed culvert will be removed and the stream restored.

Bridge
Station +/- 338+86.7 -L- (520' OAL)
The bridge will span Reedy Fork at Site 18. Stormwater runoff from the bridge has been discharged as far away from the stream as practicable.

On-Site Stream Mitigation Plan
R-2413 A&B NC 68 Connector from SR 2011 to the Haw River
Guilford County, North Carolina
T.I.P. Number R-2413 A&B
WBS No's: 34429.1.1, 34429.2.2, 34429.2.3
APRIL 23, 2013

The North Carolina Department of Transportation (NCDOT) plans to use on-site stream mitigation to offset unavoidable impacts to existing streams from the construction of the proposed NC 68 Connector corridor (R-2413A&B) in Guilford County. Five potential stream mitigation sites associated with the R-2413 A&B project were assessed in December 2010. This mitigation project will provide approximately 3,258 linear feet of stream mitigation credits in the Cape Fear River Basin. The sites are located along the proposed R-2413 A corridor in Guilford County between SR 2011 (Edgefield Road) and SR 2127(Brookbank Road) and along the proposed R-2413 B corridor in Guilford County between SR 2127 (Brookbank Road) and the Haw River.

Field reviews confirmed that all five stream reaches are perennial. The combined existing length of the stream reaches is approximately 3,270 linear feet. The combined proposed length of the stream reaches is approximately 3,496 linear feet. A summary of the stream locations, mitigation approaches, and lengths are provided in Table 1. More detailed descriptions of the existing and proposed conditions of each site are presented in the following sections.

TABLE 1. STREAM INFORMATION

Mitigation Site	JD Stream No.	Roadway Plan Sheet	Roadway Station	Existing Length (ft.)	Mitigation Type	Proposed Length (ft.)
Site 1	S37a/ 38	17 (R-2413A)	269+00 to 271+50	1,300	Enhancement	350
					Restoration	813
Site 2	S35/ 36	18 (R-2413A)	274+50 to 282+50	1,000	Relocation/ Restoration	906
					Enhancement	71
Site 3	S31/ 32	20 (R-2413A)	302+00 to 307+70	190	Restoration	287
					Enhancement	55
Site 4	S22a/ 22b	34 (R-2413A)	-Y5-Sta. 30+50 to -Y5 Sta. 32+10	170	Restoration	250
Site 5	S3a	12 (R-2413B)	508+30 to 511+20	610	Restoration/ Relocation	765
		13 (R-2413B)	517+10 to 519+30			

1.0 BASELINE

The R-2413 A&B mitigation sites are located in Guilford County between State Route 2011 (Edgefield Road) and State Route 2127 (Brookbank Road) and between State Route 2127 (Brookbank Road) and the Haw River. See Figures 1 and 2A – 2E at the end of this report. The eight digit USGS Hydrologic Unit Code (HUC) for all five sites is 03030002 (Cape Fear Basin). Sites 1 through 4 lie within the 11 digit USGS HUC 03030002010, and the North Carolina Division of Water Quality (NCDWQ) sub-basin number for these four sites is 03-06-02. Site 5 lies within the 11 digit USGS HUC 03030002020 and the NCDWQ sub-basin number is 03-06-01. All sites are designated by the North Carolina Division of Water Quality (NCDWQ) as Nutrient Sensitive Waters. All stream Sites, 1 through 5, were classified as perennial in NCDOT's 2009 State EA/FONSI Reevaluation. Table 2 provides NCDWQ Stream Classifications of the proposed mitigation reaches.

TABLE 2. SITE LOCATION INFORMATION

Mitigation Site	Roadway Station	Stream Name	Stream Classification	Stream Index Number
Site 1 WM 041-034	269+00 to 271+50	UT to Reedy Creek	WS-III; NSW	16-11-(1)
Site 2 WM 041-035	274+50 to 282+50	UT to Reedy Creek	WS-III; NSW	16-11-(1)
Site 3 WM 041-036	302+00 to 307+70	UT to Reedy Creek	WS-III; NSW	16-11-(1)
Site 4 WM 041-037	-Y5-Sta. 30+50 to -Y5 Sta. 32+10	UT to Reedy Creek	WS-III; NSW	16-11-(1)
Site 5 WM 041-038	508+30 to 511+20			
	517+10 to 519+30	UT to Haw River	WS-V; NSW	16-(1)

WS-III = Water Supply III - Moderately Developed; WS-V = Water Supply V - Upstream; NSW Nutrient Sensitive Waters

2.0 SITE SELECTION

A discussion of the watershed information and existing conditions for each project stream site is provided in the sections that follow. Existing condition geomorphology parameters and measurements are provided in Appendix B.

GENERAL WATERSHED INFORMATION

The watersheds for the project reaches are primarily rural, ranging from low density residential to agricultural land uses. The watersheds are estimated to range from 5 to 50 percent low density residential and commercial development with the remainder agriculture and forest. Future zoning for most of the watersheds is primarily low to moderate density residential so changes in land use are expected over the next 10 years. Watershed drainage areas are summarized in Table 3 for the project sites.

TABLE 3. DRAINAGE AREAS FOR PROJECT REACHES

Mitigation Site	Stream Name	Drainage Area (square miles)
Site 1	UT to Reedy Creek	0.13
Site 2	UT to Reedy Creek	0.09
Site 3	UT to Reedy Creek	0.05
Site 4	UT to Reedy Creek	3.04
Site 5	UT to Haw River	0.41

SITE 1 (WM 041-034)

An unnamed tributary (UT) to Reedy Fork flows approximately 2,700 feet from its headwaters to its confluence with Reedy Creek (Figure 2A). The stream is shown on the USGS topographic quadrangle as an intermittent stream. Observations during field investigations indicate that the upper portion of the stream is likely intermittent and the lower portion appears to be perennial. The UT flows through two distinct valley sections. The upper valley section has a relatively steep down valley slope with a tighter cross valley slope. The lower valley becomes less steep down valley and the cross valley slope becomes broader as the stream approaches its confluence with Reedy Creek. Much of the stream within the upper valley is entrenched and the stream within the lower valley is deeply incised. Both portions of the stream show signs of instability. A riparian buffer surrounds the stream with early successional woody vegetation adjacent to the stream banks. Based on a review of available aerial photography, the riparian areas appear to have been logged between 1999 and 2002. The channel materials are primarily sands with intermixed gravel-sized material. The upper and lower portions of the existing stream channel are classified as Rosgen G5 stream types. The watershed for this UT to Reedy Creek is approximately 0.13 square miles at its confluence with the larger stream at the downstream end of the site. The watershed is approximately 70% wooded and 30% agricultural or light residential. According to Guilford County Geographic Information System (GIS) data, future land use of the watershed is low residential (1 to 2 dwelling units/acre).

SITE 2 (WM 041-035)

This UT to Reedy Creek flows within Site 2 from its headwaters approximately 2,500 feet toward a confluence with the Site 1 UT to Reedy Creek (Figure 2B). This upper portion of the UT is not shown on the USGS topographic quadrangle as a blue line stream. Similar to Site 1, observations during field investigations indicate that the upper portion of the stream is likely intermittent and the lower portion appears to be perennial. The Site 2 UT to Reedy Creek has a relatively steep down valley slope within the upper reach with a tight cross valley slope. The lower reach valley becomes less steep and the cross valley slope becomes broader as the stream approaches its confluence with the Site 1 UT to Reedy Creek. The upper reach of this existing channel near the proposed area of impact is relatively stable and classifies as a Rosgen E5 channel. The lower portion of Site 2 varies from an E5 to G5 channel and has a severe headcut that is gradually moving up through the system. The UT is moderately sinuous. Sand materials with inclusions of gravel material dominate the upper channel and gravel materials dominate the lower channel. A riparian buffer surrounds the stream with early successional woody vegetation adjacent to the stream banks. As with Site 1, based on a review of available aerial photography, the riparian areas appear to have been logged between 1999 and 2002. Kudzu has invaded an adjacent hill side in the upper portion of the reach. The watershed for this UT to Reedy Creek is 0.09 square miles at the downstream end of the site. The watershed is approximately 70% forested and 30% agricultural or light residential. According to Guilford County GIS data, future land use of the watershed is low residential (1 to 2 dwelling units/acre).

SITE 3 (WM 041-036)

Site 3 consists of a UT to Reedy Creek (Figure 2C). The UT is shown as an intermittent stream on the USGS topographic quadrangle. Site conditions during field investigations indicate that the stream is at least intermittent and likely perennial in the lower reach below the confluence. The valley section along the upper reach of the site has a steep down valley slope with a tighter cross valley slope. The lower cross valley slope becomes broader as the stream approaches its confluence with Reedy Creek. The channel is moderately sinuous. The existing channel is incised and dominated by sand material. The stream classifies as a Rosgen G5 stream type. The watershed is 0.05 square miles at the downstream end of the site and is approximately 50% forested and 50% light residential or agricultural. According to Guilford County GIS data, future land use of the watershed is low residential (1 to 2 dwelling units/acre).

SITE 4 (WM 041-037)

A UT to Reedy Creek flows through Site 4 within a broad and gently sloping valley (Figure 2D). The UT is depicted as perennial on the USGS topographic quadrangle and observations during the field investigations confirmed that the reach is perennial. The channel within Site 4 appears to have frequent access to its floodplain and has an entrenchment ratio of 5.4. The UT has a low sinuosity within the project reach and classifies as a Rosgen E5 stream type. The channel flows through an existing culvert under Brookbank Road. The riparian area upstream of Brookbank

Road consists of mature woody vegetation and the riparian area downstream of Brookbank Road appeared to be impacted by Kudzu during the site visit. The watershed is approximately 3.04 square miles at the downstream end of the site. The watershed is 40% forested and the remainder is residential or agricultural.

SITE 5 (WM 041-038)

Site 5 consists of a UT to Haw River (Figure 2E). The stream valley is relatively broad with a flat down valley slope. The lower portion of the UT is depicted as perennial on the USGS topographic quadrangle. An instream pond is depicted on the USGS topographic quadrangle between the lower and upper portions. Site investigations revealed that the pond is no longer present because the stream has routed around the East side of the old dam resulting in significant bank erosion. The lower cross valley slope becomes broader as the stream approaches its confluence with Haw River. The riparian buffer consists of mature woody vegetation. The channel is incised and straightened and shows signs of instability. Within the upper reach the stream classifies as an E5 channel but is slightly entrenched and is trying to re-establish pattern by eroding the existing banks. The watershed is 0.41 square miles at the downstream end of the site. The watershed is 60% forested and 40% residential or agricultural.

3.0 SITE PROTECTION INSTRUMENT

The mitigation areas are presently located within or will be located within the NCDOT Right-of-Way for the project. There is a 20' utility easement crossing through Site 5. This easement will be managed to prohibit all use inconsistent with its use as mitigation property, including any activity that would materially alter the biological integrity or functional and educational value of the site, consistent with the mitigation plan.

The site is designated on the plan sheets as a mitigation area and will placed on the Natural Environment Section's Mitigation GeoDatabase. This database is provided to all NCDOT personnel as a record of mitigation sites and their attributes, including prohibited activities. NCDOT is held by virtue of the permit associated with this mitigation site and the associated roadway impacts to protect the site in perpetuity.

4.0 OBJECTIVES

The goals for these projects are to restore/relocate 3,020 linear feet of stream and enhance 476 linear feet of stream. This will be achieved by: improving floodplain function by matching floodplain elevation with bankfull stage; establishing native stream bank and floodplain vegetation; improving water quality in the Cape Fear River watershed by reducing sediment and nutrient inputs; and improving aquatic and riparian habitat by creating deeper pools and areas of re-aeration, planting a riparian buffer, and reducing bank erosion.

5.0 MITIGATION WORK PLAN

The stream mitigation plan for each of the five project sites is described in the sections that follow. Detailed plan sheets have been provided to NCDOT with the submittal of this mitigation plan narrative.

SITE 1 (WM 041-034)

A combination of Priority II and Priority I restoration is proposed for the upper reach of the Site 1 stream channel. A portion of the upper reach of Site 1 will only require enhancement measures with occasional log vanes, some boulder toe protection, and minor bank grading (see OSM-4, -12 and XS-01, -02). The channel is currently an incised G5 Rosgen stream type channel that will be restored to a stable C5 channel by establishing a lower valley at the bankfull elevation for the upstream portion then gradually elevating the stream channel to allow bankfull and higher flows access to the existing floodplain prior to flowing into the proposed 72" culvert under the new roadway alignment. Priority I restoration is proposed for the lower reach of Site 1. The existing channel classifies as an incised G5 Rosgen stream type that will also be restored to a stable C5 channel. As channel flow exits the 72" culvert under the proposed roadway it will flow into a stream channel that will be elevated to allow proper floodplain access at the bankfull elevation on new location. The stream channel will be relocated back to the center of the existing valley.

Proper sinuosity and radius of curvature will be restored to both the upper and lower stream reaches to provide stability. Proper riffle-pool sequencing will also be returned to the channels along with in-stream rock and log structures to provide immediate grade control of the newly excavated channels. The installation of these structures will increase stability of the profile and banks while allowing time for vegetation to establish and natural bed materials to be transported throughout the system.

Special attention must also be given to the possible change in flow regime in this system as it may be influenced by storm water runoff from the proposed roadway. The proposed stream channel design anticipates the increased impervious area and increased flashy flows from contributing adjacent roadway stormwater runoff. This is achieved by maximizing radii of curvature to ensure that bends in the stream channel are gradual enough to accommodate flashy flows. Similarly, the belt width of the proposed stream channel is narrowed, slightly straightening the flood plain to convey flood flows without excessively increasing shear stress along the edges of the newly constructed floodplain.

All floodplains and floodplain slopes will be over-excavated 6 inches starting 3 feet from top of stream bank and backfilled with topsoil to final grade (see detail on OSM-2 in design plan sheets). Additionally, per NCDOT's Native Seeding and Mulching Provision, 4000 lbs/acre of lime will be applied and 500 lbs/acre of 10-20-20 fertilizer will be applied.

The proposed riparian buffer for Site 1 upper extends a minimum of 50 feet from the top of bank from both sides of the stream channel and totals approximately 1.97 acres. The required buffer will be included within proposed right-of-way. The proposed riparian buffer for Site 1 lower will extend a minimum of 50 feet from the top of bank on both sides and would require a minimum of 1.27 acres. Due to the fact that Site 1 lower and Site 2 lower are located adjacent to each other on the north side of the proposed roadway, the proposed right-of-way will include Site 1 lower, Site 2 lower, their respective riparian buffers and the forested drainage area between the two. Design parameters for the proposed stream can be found in the morphological table in Appendix B.

SITE 2 (WM 041-035)

The upper reach of the existing stream channel on Site 2 will be relocated away from the toe of fill material using a Priority I restoration approach. The existing channel in this location is fairly stable but will be directly impacted by the fill slope as shown in the on-site mitigation construction drawings. The existing upper reach channel transitions from a B5 at the upper extent of the project to an E5 where the channel will be impacted by the future roadway work. The relocated channel will be designed as a C5 channel with gradual 3:1 side slopes that will be planted and will eventually transition to an E5 channel over time as the channel narrows. The lower reach of Site 2 Classifies as an E5 channel that transitions to a G5 channel downstream of a large 4.0 foot head cut that is moving up through the system. This lower reach begins at the outlet of the proposed 54 inch culvert and it is anticipated that the roadway drainage would expedite the upstream progression of the existing head cut. The proposed restored lower reach channel will also be designed as a C5 channel with gradual 3:1 side slopes that will be planted and eventually transition to an E5 channel as the channel narrows over time.

Appropriate sinuosity and radius of curvature will be restored to both the upstream and downstream reach channels to provide stability. The channels will be elevated to their historic floodplain in some locations where possible, improving their cross sectional dimension and allowing bankfull and higher flows to access the floodplain. Proper riffle-pool sequencing will also be returned to the channels with corrected pattern and the installation of rock and log structures. The installation of these in-stream structures will increase stability of the profile and banks while allowing time for vegetation to establish and natural bed materials to be transported throughout the system.

Special attention must also be given to the possible change in flow regime in this system as it may be influenced by storm water runoff from the proposed roadway. The proposed stream channel design anticipates the increased impervious area and increased flashy flows from contributing adjacent roadway stormwater runoff. This is achieved by maximizing radii of curvature to ensure that bends in the stream channel are gradual enough to accommodate flashy flows. Similarly, the belt width of the proposed stream channel is narrowed, slightly

straightening the flood plain to convey flood flows without excessively increasing shear stress along the edges of the newly constructed floodplain.

All floodplains and floodplain slopes will be over-excavated 6 inches starting 3 feet from top of stream bank and backfilled with topsoil to final grade (see detail on OSM-2 in design plan sheets). Additionally, per NCDOT's Native Seeding and Mulching Provision, 4000 lbs/acre of lime will be applied and 500 lbs/acre of 10-20-20 fertilizer will be applied.

The proposed riparian buffer for Site 2 upper extends a minimum of 50 feet from the top of bank from both sides and would require approximately 1.33 acres. The required buffer will be included within proposed right-of-way. The proposed riparian buffer for Site 2 lower will extend a minimum of 50 feet from the top of bank on both sides and would require a minimum of 1.48 acres. Due to the fact that Site 1 lower and Site 2 lower are located adjacent to each other on the north side of the proposed roadway, the proposed right-of-way will include Site 1 lower, Site 2 lower, their respective riparian buffers and the forested drainage area between the two. Design parameters for the proposed stream can be found in the morphological table in Appendix B.

Some Kudzu is present adjacent to the very upper reaches of Site 2. NCDOT proposes to minimize the potential spread of this species from construction-related activities. NCDOT will also attempt to suppress the Kudzu within the ROW of the mitigation sites by herbicide applications prior to reforestation and during the required post construction monitoring period.

SITE 3 (WM 041-036)

A Priority II restoration approach is proposed for the Site 3 upstream east branch and west branch. The existing channels classify as G5 stream types and will be realigned to establish a more stable pattern as the future drainage flows into the proposed 78 inch diameter culvert under the proposed roadway. The relocated channels will be designed as a C5 channels with gradual 3:1 side slopes that will be planted and will eventually transition to an E5 channel over time as the channel narrows. Appropriate sinuosity and radius of curvature will be restored to both the upstream and downstream reach channels to provide stability. A floodplain bench will be established to the extent feasible to allow the restored channels to access a floodplain bench. Proper riffle-pool sequencing will also be returned to the channels with corrected pattern and the installation of in-stream rock and log structures. The installation of these in-stream structures will increase stability of the profile and banks while allowing time for vegetation to establish and natural bed materials to be transported throughout the system.

The downstream reach at the outlet of the proposed 78 inch diameter culvert will be stabilized for approximately 26 linear feet. This proposed stabilization will consist of the installation of a single rock cross vane at the outlet invert of the proposed culvert. This will provide the hydraulic effect of a preformed scour hole that will transition into a riffle further downstream. This will provide a natural transition to the channels proper riffle-pool spacing.

Special attention will be given to the possible change in flow regime in this downstream system as it may be influenced by storm water runoff from the proposed roadway. The proposed stream channel design anticipates the increased impervious area and increased flashy flows from contributing adjacent roadway stormwater runoff. This is achieved by maximizing radii of curvature to ensure that bends in the stream channel are gradual enough to accommodate flashy flows. Similarly, the belt width of the proposed stream channel is narrowed, slightly straightening the flood plain to convey flood flows without excessively increasing shear stress along the edges of the newly constructed floodplain.

All floodplains and floodplain slopes will be over-excavated 6 inches starting 3 feet from top of stream bank and backfilled with topsoil to final grade (see detail on OSM-2 in design plan sheets). Additionally, per NCDOT's Native Seeding and Mulching Provision, 4000 lbs/acre of lime will be applied and 500 lbs/acre of 10-20-20 fertilizer will be applied.

Design parameters for the proposed stream reaches can be found in the morphological table in Appendix B. The proposed riparian buffer for this channel would extend 50 feet from the top of bank from both sides and would total approximately 0.97 acres. In order to provide appropriate riparian buffers on all reaches of Site 3, the required buffer will be included within proposed right-of-way.

SITE 4 (WM 041-037)

A Priority II restoration approach is proposed for the stream reach at Site 4. The current channel classifies as a Rosgen E5 stream channel and flows through an existing culvert under Brookbank Road. The proposed restoration of this reach will consist of excavating a new stream channel and floodplain through the existing Brookbank Road fill material. This road will be abandoned with the proposed improvements associated with R-2413A&B and presents an opportunity to re-connect the upstream floodplain with the floodplain downstream of the existing roadway fill. The proposed channel through this reach will be a C5 channel. Banks and floodplain will be planted with native species and the channel is expected to narrow over time to an E5 channel. The proposed reach is not long enough to establish pattern within the restored reach, but in-stream log cross vanes will be installed to provide profile stabilization and in-stream habitat. Preliminary design parameters for the proposed stream can be found in the morphological table in Appendix B.

Presently, Kudzu grows in areas adjacent to this site. NCDOT proposes to minimize the potential spread of this species from construction-related activities. NCDOT will also attempt to suppress the Kudzu within the ROW of the mitigation sites by herbicide applications prior to reforestation and during the required post construction monitoring period. The proposed riparian buffer for this channel would extend 50 feet from the top of bank from both sides and would total approximately 1.01 acres. The revised right-of-way encompasses the required easement area.

SITE 5 (WM 041-038)

The upper reach of Site 5 will be restored using Priority I restoration. At the upstream end of the proposed restoration a pipe and causeway will be removed and floodplain connectivity restored to both the right and left floodplains. Causeway removal and grading will result in 0.01 acres of temporary wetland impacts. Downstream, the existing channel will be relocated to the center of the existing floodplain and elevated so that bankfull and higher flows can access the existing floodplain. The lower reach of Site 5 will be relocated by re-establishing a natural stream channel and proper floodplain through the existing dam. The existing stream channel breached the dam along the east side of the floodplain and is therefore currently eroding the toe of the existing floodplain and the fill material of the old dam. The channel will be relocated back to the center of the existing floodplain and a significant portion of the dam will be removed to ensure the upstream floodplain is hydraulically connected to the lower floodplain. The existing channels at Site 5 classify as incised E5 channels that are actively eroding in an effort to re-establish appropriate pattern and dimension. The appropriate dimension, pattern, and profile will be restored to the relocated channels in both the upper and lower reaches.

Special attention will be given to the change in flow regime that could occur from the storm water runoff of the proposed roadway. The proposed stream channel design anticipates the increased impervious area and increased flashy flows from contributing adjacent roadway stormwater runoff. This is achieved by maximizing radii of curvature to ensure that bends in the stream channel are gradual enough to accommodate flashy flows. Similarly, the belt width of the proposed stream channel is narrowed, slightly straightening the flood plain to convey flood flows without excessively increasing shear stress along the edges of the newly constructed floodplain.

All floodplains and floodplain slopes will be over-excavated 6 inches starting 3 feet from top of stream bank and backfilled with topsoil to final grade (see detail on OSM-2 in design plan sheets). Additionally, per NCDOT's Native Seeding and Mulching Provision, 4000 lbs/acre of lime will be applied and 500 lbs/acre of 10-20-20 fertilizer will be applied.

A Rosgen type C5 channel is proposed for both the upstream and downstream reaches. Rock and log in-stream structures will be installed along the restored reaches to ensure that the newly constructed stream channels remain stable until mature vegetation is established on the banks and native bed material is transported into the relocated channels. Preliminary design parameters for the proposed stream can be found in the morphological table in Appendix B. The proposed riparian buffer for this channel would extend 50 feet from the top of bank from both sides and would total approximately 2.18 acres. The required buffer will be included within proposed right-of-way in order to provide easements along proposed cut lines associated with the proposed stream restoration and to ensure a 50 foot minimum riparian buffer is provided on all stream reaches.

6.0 PERFORMANCE STANDARDS

Success for vegetation monitoring within the riparian buffer and wetland areas is based on the survival of at least 320 stems at year three and 260 stems of five year old trees at year five. Assessment of channel stability will be based on the survival of riparian vegetation and lack of significant bank erosion, channel widening or down-cutting.

7.0 MONITORING REQUIREMENTS

An As-built will be submitted within 60 days of completion of the project. The As-built will document changes in the dimension, pattern, profile, vegetation plantings, and structures of the constructed channels.

The following components of Level 1 monitoring will be performed each year of the 5-year monitoring period: Reference photos, plant survival (i.e., identify specific problem areas (missing, stressed, damaged or dead plantings), estimated causes and proposed/required remedial action); visual inspection of channel stability. Physical measurements of channel stability/morphology will not be performed. A monitoring report will be submitted within 60 days after completing the monitoring.

8.0 OTHER INFORMATION

STREAM REFERENCE RESTORATION STUDIES

A reference reach is a stream segment that represents a stable channel within particular valley morphology. A stable stream is defined as a stream, which over time and in the present climate transports the flows and sediment produced by its watershed in such a manner that the dimension, pattern, and profile are maintained without either aggrading or degrading (Rosgen, 1996, 1998).

The methodology used for the reference reach analysis consisted of the following tasks: (1) identify reference quality sections of the project reaches that could be used for dimension and/or pattern analysis, (2) identify nearby reference reaches that have been previously located and surveyed and can be used to provide pattern data, (3) survey and classify the stream morphology for the on-site reference reaches, and (4) develop dimensionless ratios based on reference reach data and past project data under similar morphological conditions.

Reference data collected during field investigations for on-site mitigation work for U-2525B were utilized as regional reference reaches. U-2525B is the Greensboro Eastern Loop project located in Guilford County between US Highway 70 and US Highway 29. These stable reference sections were identified within the project reaches where stable bankfull features had developed and provided information regarding bankfull dimension. These locations were identified by the presence of a consistent bankfull indicator, typically a well formed bankfull bench, and stable,

vegetated stream banks. Cross-section surveys were conducted in these locations to evaluate stream dimension. The bankfull cross-section areas were then plotted versus drainage area and compared to published Rural Piedmont regional curve data, provided by the North Carolina Stream Restoration Institute (SRI) (See Figure on next page).

As illustrated in Figure labeled "Regional Curve Information Used for Design" on the following page, the cross sectional areas surveyed at stable reference reach locations correlates with the Rural Piedmont Regional Curve Data. Also, three of the four off-site reference reach locations agree with the Rural Piedmont Regional Curve Data. The stream designs were based on the collected data since this data was verified by the Rural Piedmont Regional Curve Data.

The majority of the work proposed for this project will consist of restoration or relocation approaches, with the exception of approximately 350 linear feet of Site 1, 71 linear feet of Site 2, and 55 linear feet of Site 3 which will be enhancement. All of the sites will be designed as type "C" channels to provide for stable banks during construction and floodplain connectivity. With time the "C" channel will adjust to a stable "E" channel as vegetation establishes on the banks and width/depth ratios decrease. The enhancement work will consist of installing in-stream structures, along with limited channel grading, and planting the banks and riparian buffer. The in-stream structures will stabilize channel banks and halt progression of head cuts, and provide increased habitat.

Shear stress calculations were completed for all reaches and are included in Appendix C. The data show that the shear stresses for the proposed designs will generally be kept approximately the same or slightly increased with a few exceptions. Site 1 Lower shear stress will be increased to ensure proper sediment transport. Site 2 shear stress will be greatly increased from the existing conditions. This is because a significant 4.0 foot headcut exists in the current channel resulting in abnormally flat reaches upstream and downstream of the headcut. The proposed conditions for Site 2 will distribute this drop over several grade control structures. Shear stress for Site 4 is increased to an appropriate level for sediment transport as compared to the very low existing conditions shear stress which currently does not provide proper sediment transport. Although most reaches do not have significant increases in shear stress, incorporation of in-stream structures for grade control is implemented on all reaches. This is especially important since all restoration/relocation sites will be excavated on new location and will not immediately have the properly sorted materials transported in from upstream. Constructed riffles and harvesting of existing bed material will be used to the extent feasible to provide this immediate supply of properly sorted bed material.

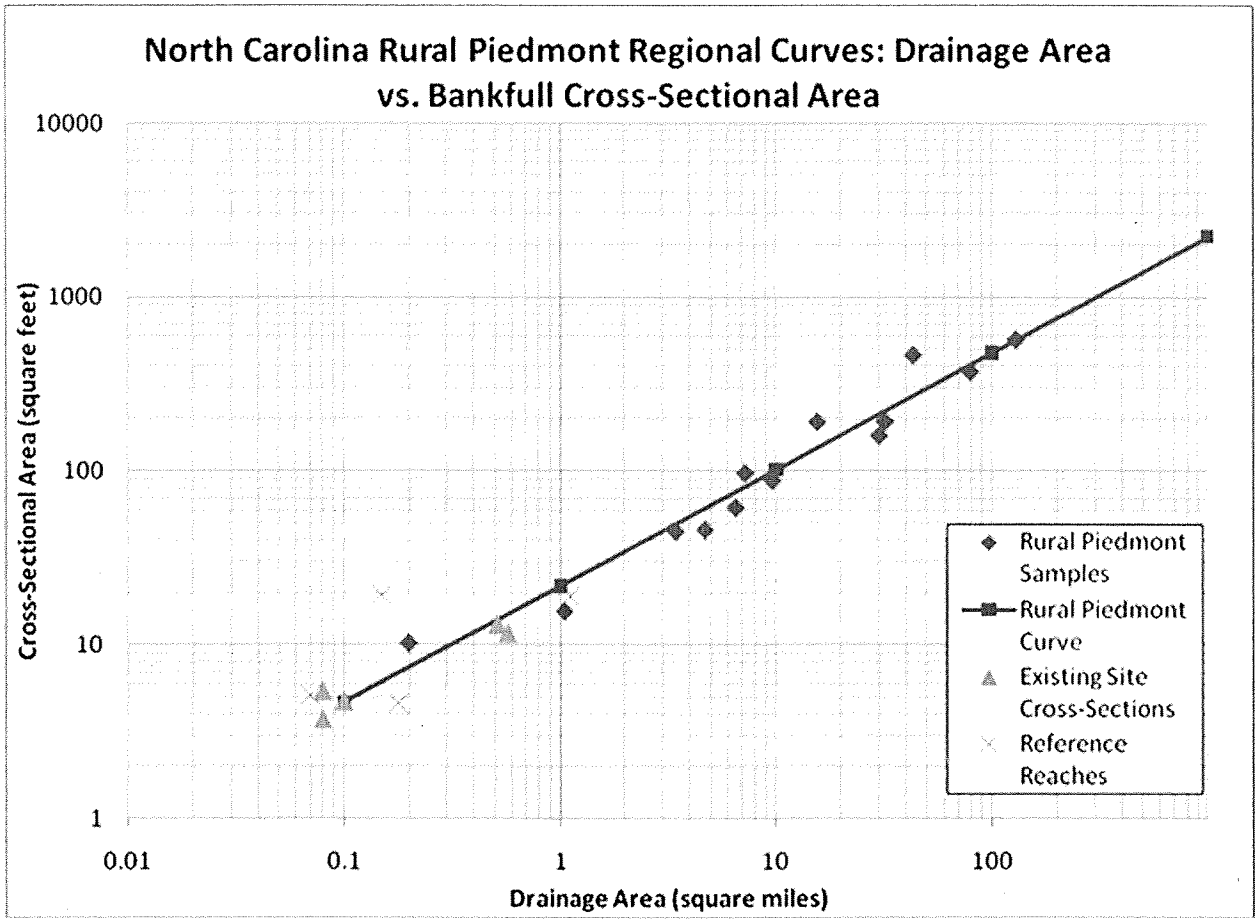


FIGURE: REGIONAL CURVE INFORMATION USED FOR DESIGN

9.0 DETERMINATION OF CREDITS

NCDOT has made an effort to restore/relocate and enhance approximately 3,496 feet of streams adjacent to the R-2413A&B project to meet mitigation requirements. The streams are being purchased as right-of-way for the roadway project. These sites will have controlled access to ensure they are protected from local landowner encroachment. Also, placing these streams and riparian buffers into right-of-way guarantees that no future impacts will occur directly to these channels due to commercial or residential development along the corridor.

Sites 1, 2, and 3 are first order streams that drain directly into Reedy Creek, with NCDWQ classifications of WSWS-III and NSW. USACE stream quality assessments scored 47 and 43 for Sites 1 and 2 respectively. The UT at Site 3 scored 68 but the surrounding drainage has since been clear cut. Site 4 is a third order stream also draining into Reedy Creek. This UT scored 60 on the USACE stream quality assessments. The UT to the Haw River to be restored/relocated at Site 5 scored 63 on the USACE stream quality assessment. However, this evaluation was completed on a section of the stream outside the proposed mitigation work. UT's within the

proposed mitigation work area (JD streams S4 and S5) scored only 40 points on the stream quality assessment. Further, significant timber logging has taken place at the upstream end of Site 5 since the assessments were performed.

The planned stream mitigation proposed by NCDOT for the R-2413A & B projects will restore significant lengths of degraded headwater streams that drain directly into water supply and nutrient sensitive streams. The proposed stream designs also take into account potential future watershed conditions. Sites 1, 2, 3, and 5 all address degrading streams with USACE assessment scores of 47 or less. Site 4 removes an existing culvert and removes roadway embankment daylighting 70+ feet of stream and restoring floodplain connectivity and capacity. By placing the mitigation projects within right-of-way NCDOT has protected these sites for the future. Based on these efforts NCDOT proposes the credit ratios shown below in Table 4.

All remaining unavoidable stream impacts will be offset by compensatory mitigation provided by the Ecosystem Enhancement Program (EEP).

MITIGATION SUMMARY

TABLE 4. MITIGATION IMPACT SUMMARY AND PROPOSED CREDITS*

Mitigation Site No.	Mitigation Description	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Credit Ratio	Proposed Credit (ft)
1 Upper	Enhancement		350	350	2:1	175
	Restoration	368		304	1:1	304
1 Lower	Restoration	505	53	509	1:1	509
2 Upper	Relocation	308		424	1:1	424
2 Lower	Restoration	513		482	1:1	482
	Enhancement		87	71	2:1	36
3 Upper (west)	Restoration/ Relocation	192		175	1:1	175
	Enhancement		30	30	2:1	15
3 Upper (east)	Restoration/ Relocation	65		86	1:1	86
	Enhancement		25	25	2:1	13
3 Lower	Restoration		27	26	1:1	26
4	Restoration		**	250	1:1	250
5 Upper***	Restoration	403	20	373	1:1	373
5 Lower	Restoration/ Relocation	410		392	1:1	392
TOTALS		2764	592	3497		3260

Table 4. notes:

* Impacts associated roadway fill slopes, culverts, and pipes are listed on the Wetland Impact Summary Sheet for Sites 12, 13, 14, and 21 on R-2413A and Site 8 for R-2413B.

** Impacts for Mitigation Site 4 are included in the impact summary sheet for R-2413A, Site 21

*** Temporary wetland impacts associated with Mitigation Site 5 Upper are included in the Wetland Impact Summary Sheet for R-2413B, Site 8

9.1 CREDIT RELEASE SCHEDULE

NCDOT proposes immediate, full release of the proposed stream mitigation as outlined above as on-site mitigation for unavoidable stream impacts associated with R-2413 A&B.

10.0 GEOGRAPHIC SERVICE AREA

The proposed Geographic Service Area (GSA) for the mitigation sites is composed of the 8-digit Hydrologic Cataloging Unit (HUC) 03030002.

11.0 MAINTENANCE PLAN

The mitigation site will be held by NCDOT and placed on the NES mitigation geodatabase. Once monitoring is completed and the site is closed out, it will be placed in the NCDOT Stewardship Program for long term maintenance and protection.

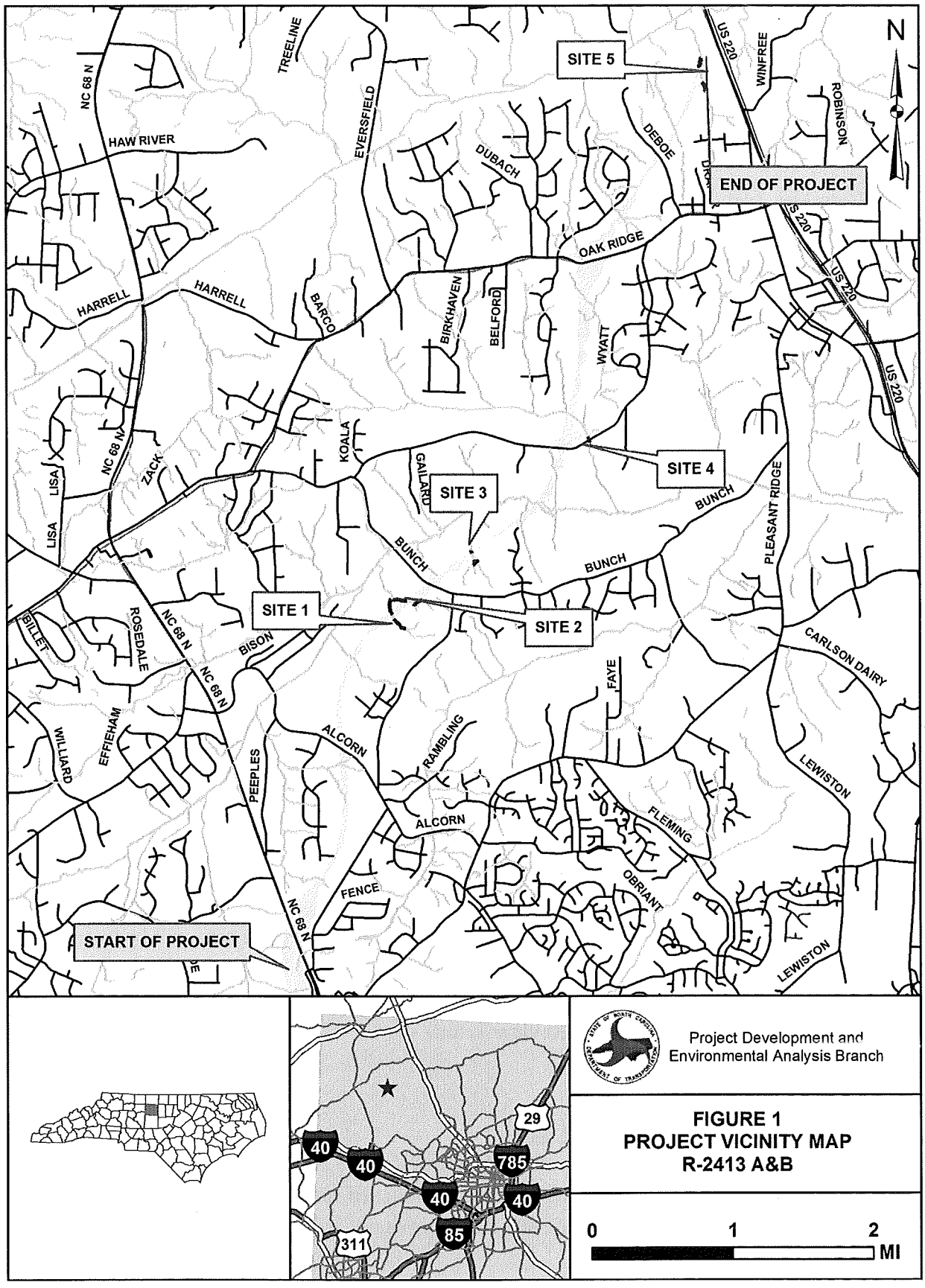
If an appropriate third party recipient is identified in the future, then the transfer of the property will include a conservation easement or other measure to protect the natural features and mitigation value of the site in perpetuity.

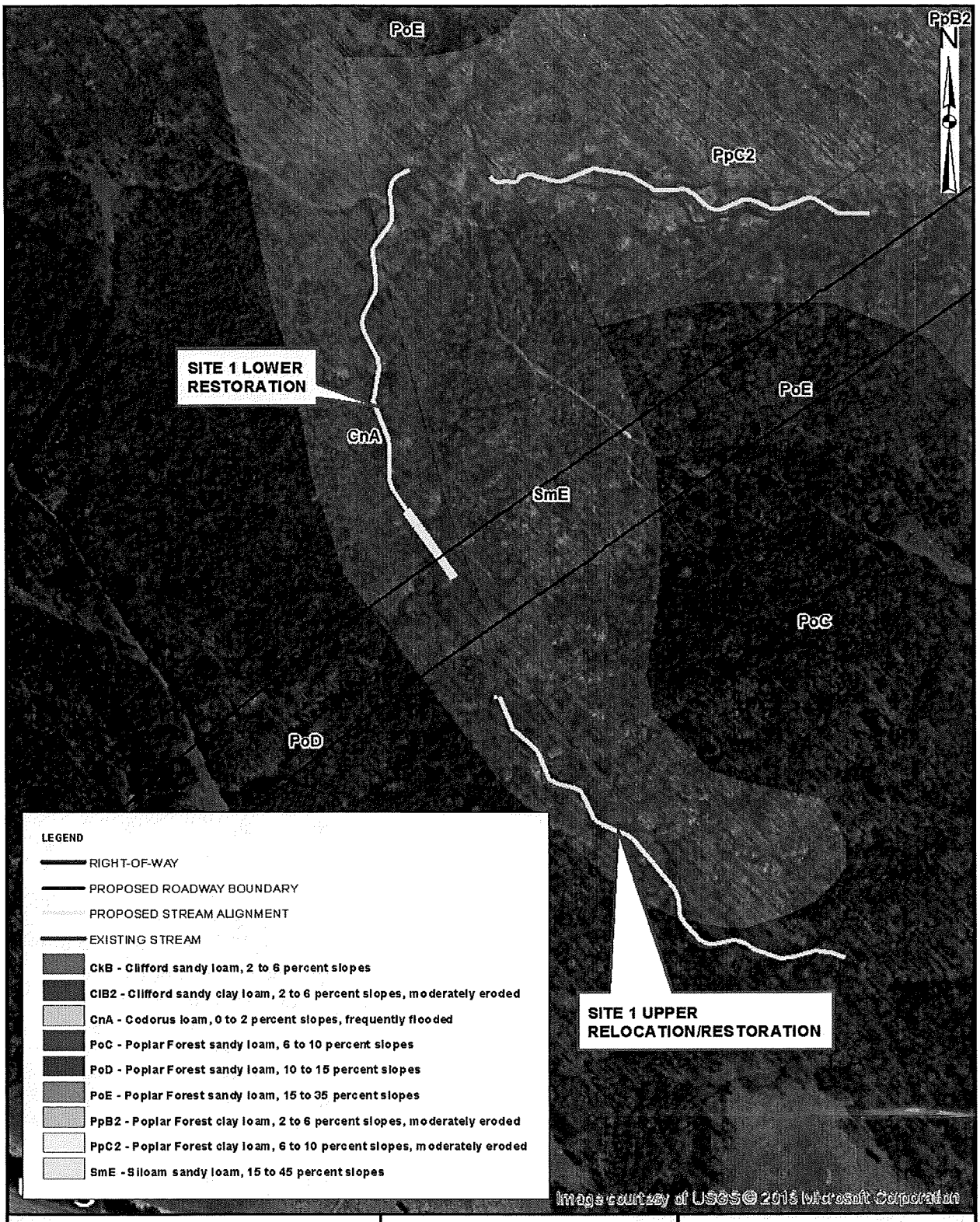
12.0 LONG TERM ADAPTIVE MANAGEMENT PLAN

The sites will be managed by the NCDOT according to the mitigation plan. Beaver management will be instituted during the monitoring period. Encroachments into the area will be investigated and appropriate measures taken to minimize any negative effects. In the event that unforeseen issues arise that affect the management of the site, any remediation will be addressed by NCDOT in coordination with the Interagency Review Team.

13.0 FINANCIAL ASSURANCES

NCDOT is held by permit conditions associated with R-2413 A&B to preserve the stream restoration and enhancement areas. NCDOT has established funds for each project and within each Division to monitor the mitigation site and to protect it in perpetuity.

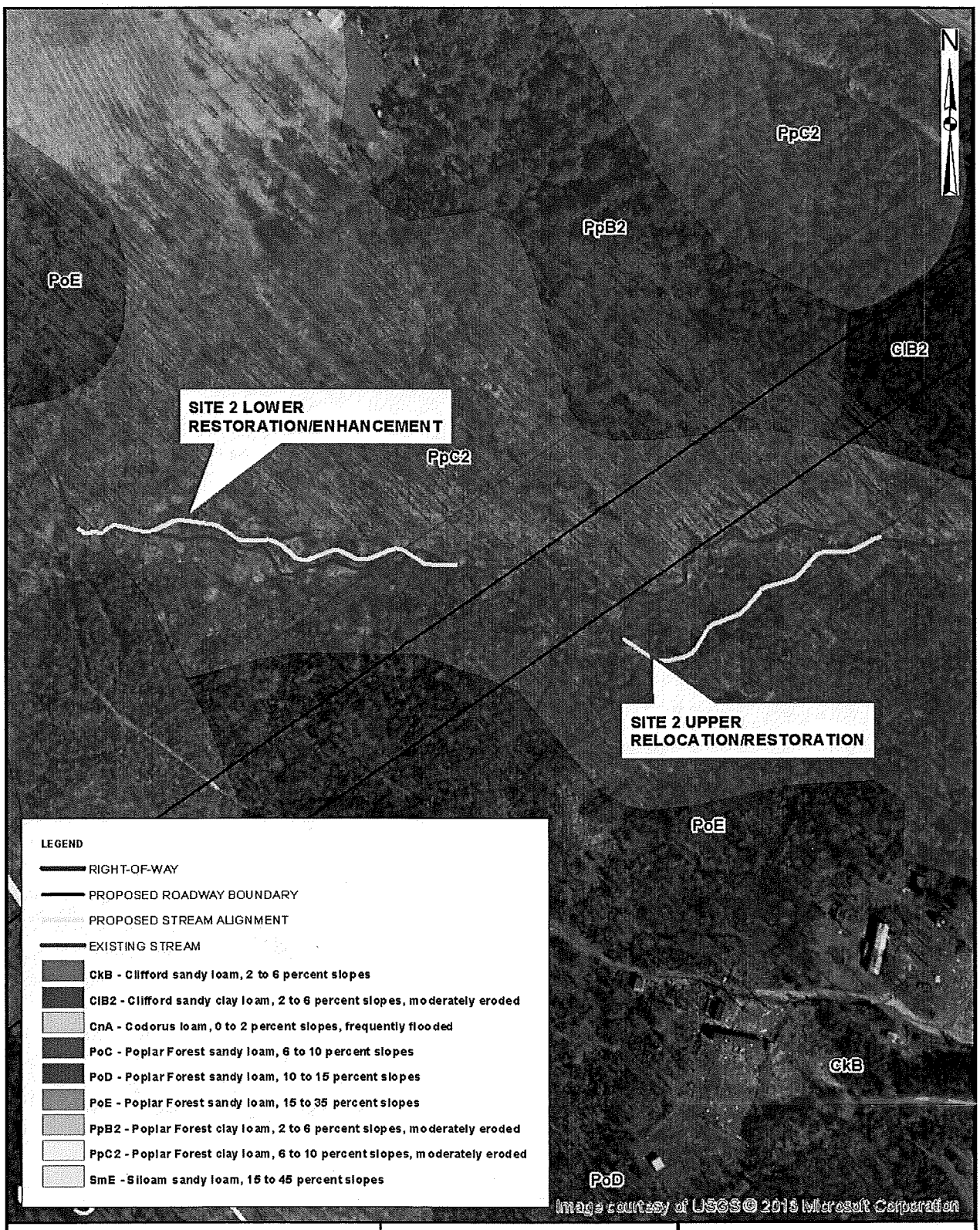

N
SITE 5
END OF PROJECT
SITE 4
SITE 3
SITE 2
SITE 1
START OF PROJECT
TREELINE
EVERSFIELD
DUBACH
DEBOE
WINFREE
ROBINSON
US 220
NC 68 N
HAW RIVER
HARRELL
BARCO
BIRKHAVEN
BELFORD
WYATT
OAK RIDGE
KOALA
GAILARD
ZACK
LISA
BUNCH
PLEASANT RIDGE
BILLET
ROSEDALE
BISON
CARLSON DAIRY
FAYE
WILLIARD
EFFIEHAM
PEEPLES
ALCORN
RAMBLING
LEWISTON
FLEMING
OBRIANT
FENCE
29
40
785
85
311
Project Development and Environmental Analysis Branch
FIGURE 1
PROJECT VICINITY MAP
R-2413 A&B
0
1
2
MI



Project Development and Environmental Analysis Branch

0 100 200 Feet

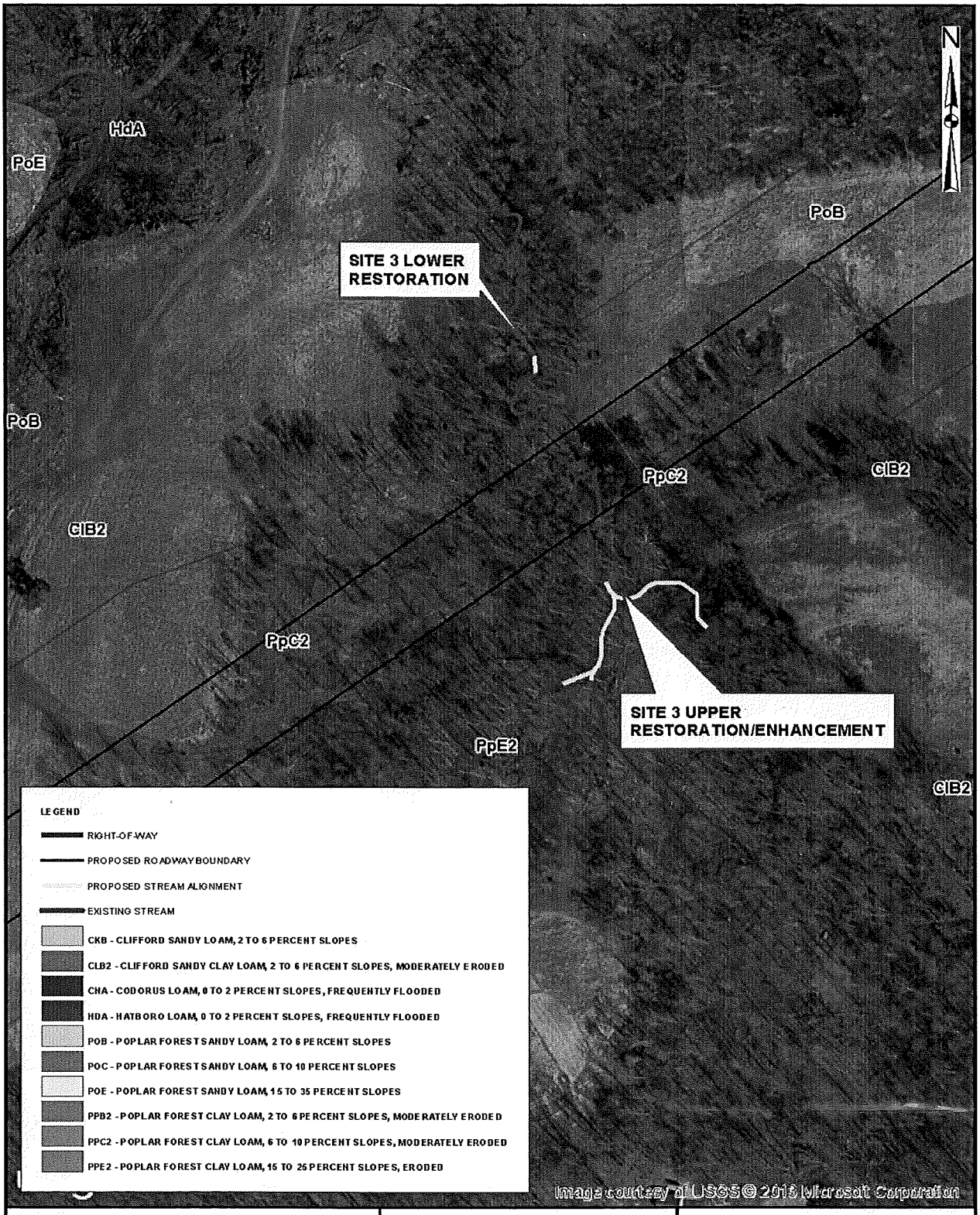
FIGURE 2A
SOILS MAP
R-2413 A&B, SITE 1



Project Development and Environmental Analysis Branch

0 100 200 Feet

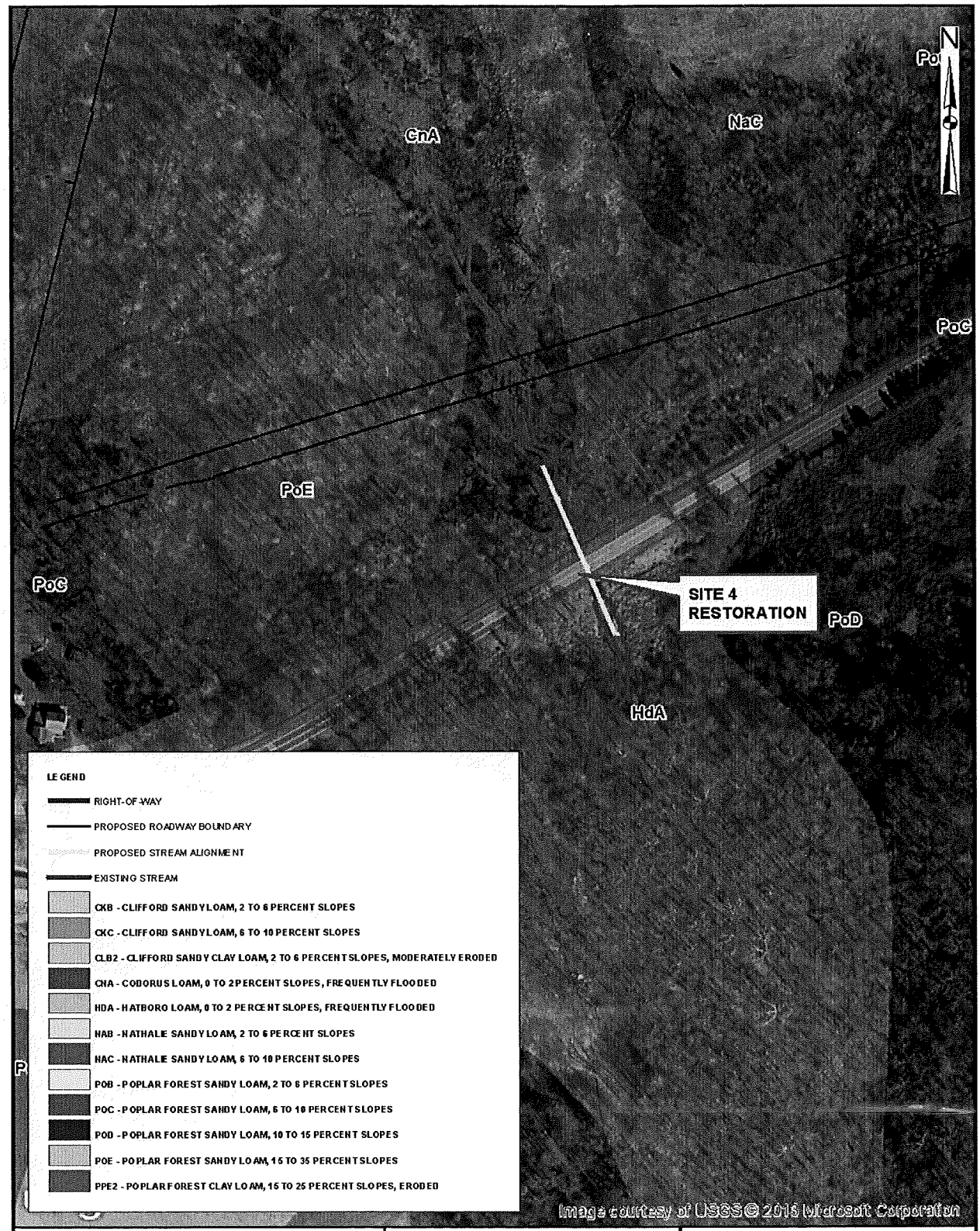
FIGURE 2B
SOILS MAP
R-2413 A&B, SITE 2



Project Development and Environmental Analysis Branch

0 115 230 Feet

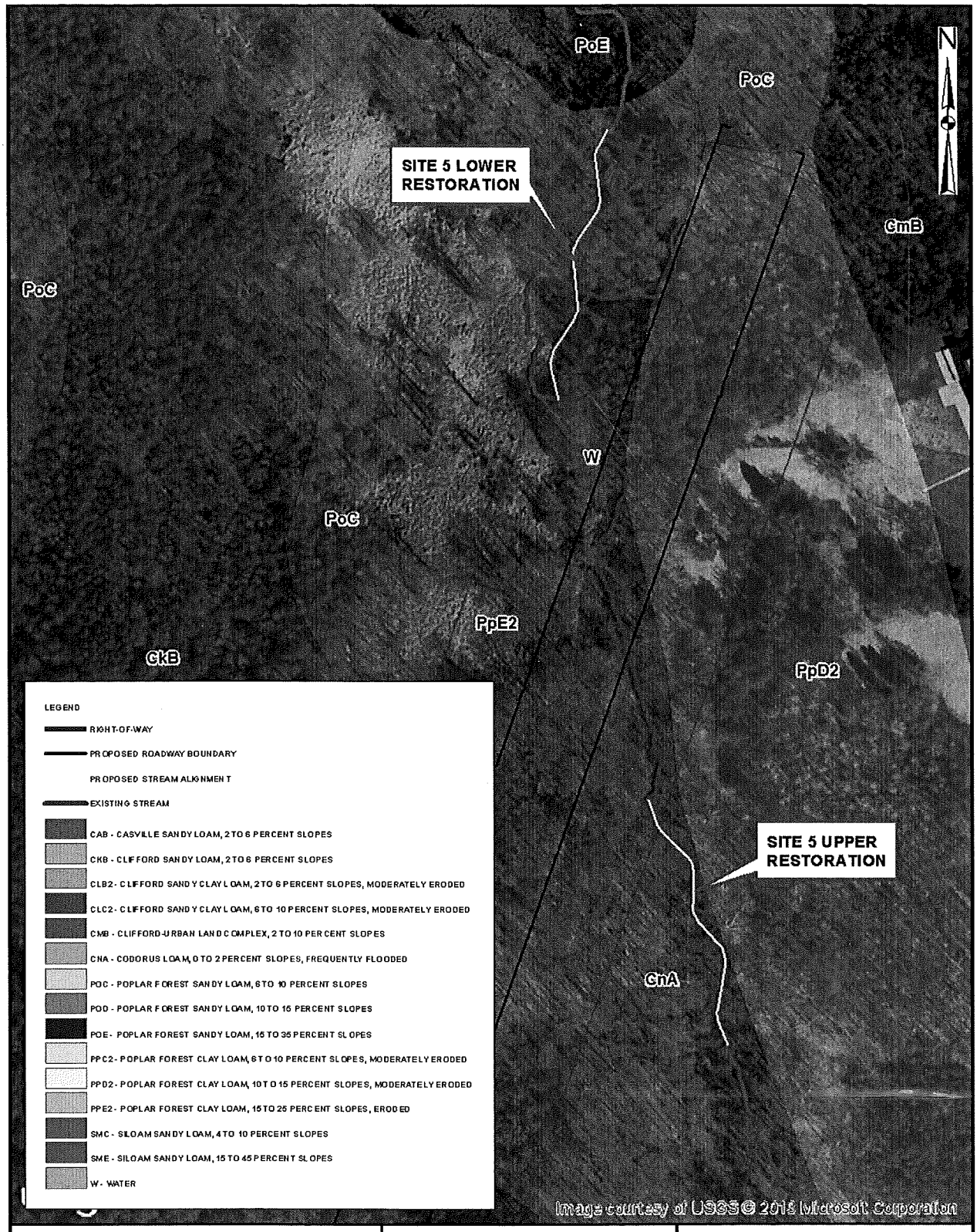
FIGURE 2C
SOILS MAP
R-2413 A&B, SITE 3



Project Development and Environmental Analysis Branch

0 137.5 275 Feet

FIGURE 2D
SOILS MAP
R-2413 A&B, SITE 4



Project Development and Environmental Analysis Branch

0 145 290 Feet

FIGURE 2E
SOILS MAP
R-2413 A&B, SITE 5

09/26/11

TIP PROJECT: R-2413 A&B

STATE	STATE PROJECT REFERENCE NO.	NO.	SHEETS
N.C.	R-2413A&B	OSM-1	52

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
		PE
		ROW

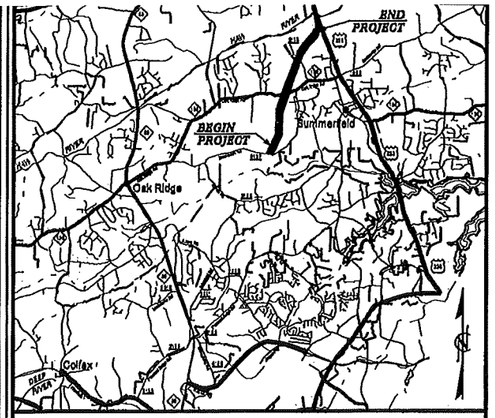
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR ON-SITE MITIGATION GUILFORD COUNTY

NAD 83

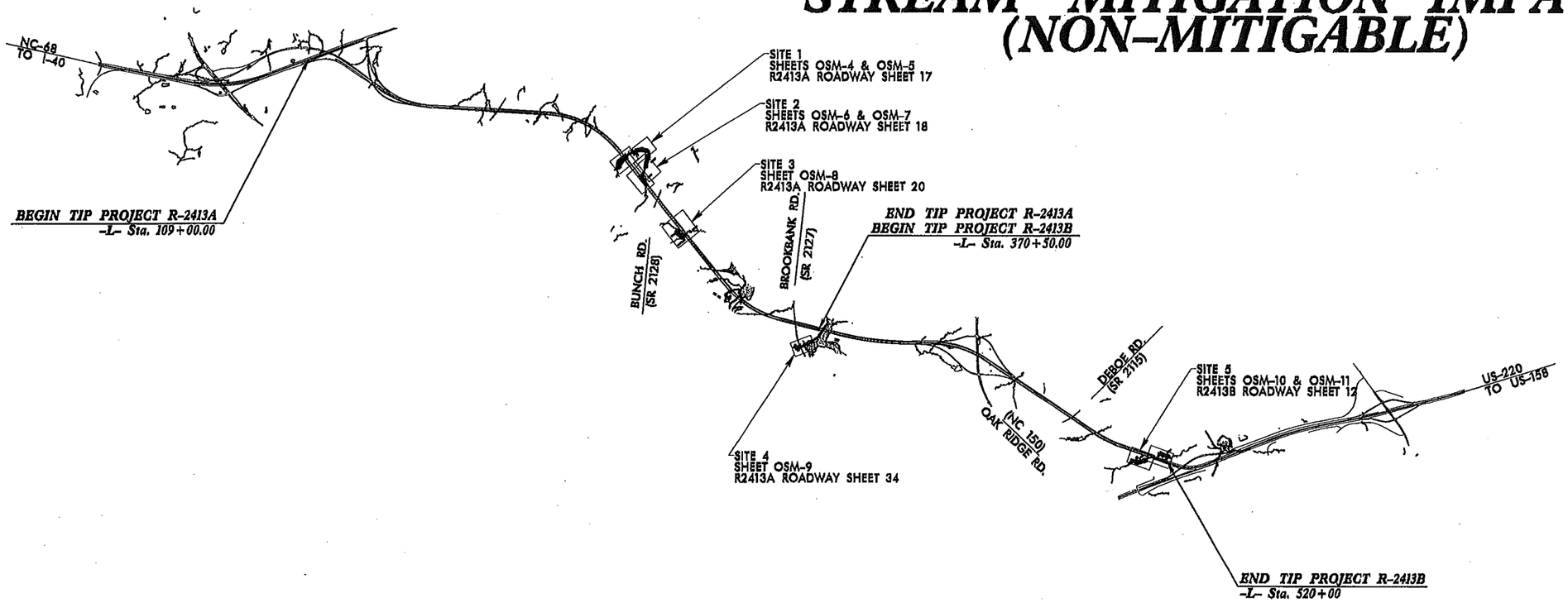
LOCATION: *NC 68 CONNECTOR – FROM SR 2011 (EDGEFIELD ROAD) TO HAW RIVER*

TYPE OF WORK: *STREAM RELOCATION, STREAM RESTORATION, STREAM ENHANCEMENT*



VICINITY MAP

STREAM MITIGATION IMPACTS (NON-MITIGABLE)

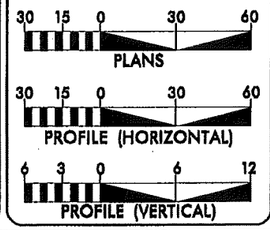


NC DOT CONTACT: PETE ALLEN

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

GRAPHIC SCALES



DESIGN DATA

PROJECT LENGTH

MITIGATION SITE	MITIGATION TYPE	LENGTH
SITE 1	RESTORATION/ENHANCEMENT	870LF
SITE 2	RELOCATION/RESTORATION/ENHANCEMENT	900LF
SITE 3	RESTORATION/RELOCATION	353LF
SITE 4	RESTORATION	250LF
SITE 5	RESTORATION/RELOCATION	760LF

2012 STANDARD SPECIFICATIONS

DESIGN ENGINEER

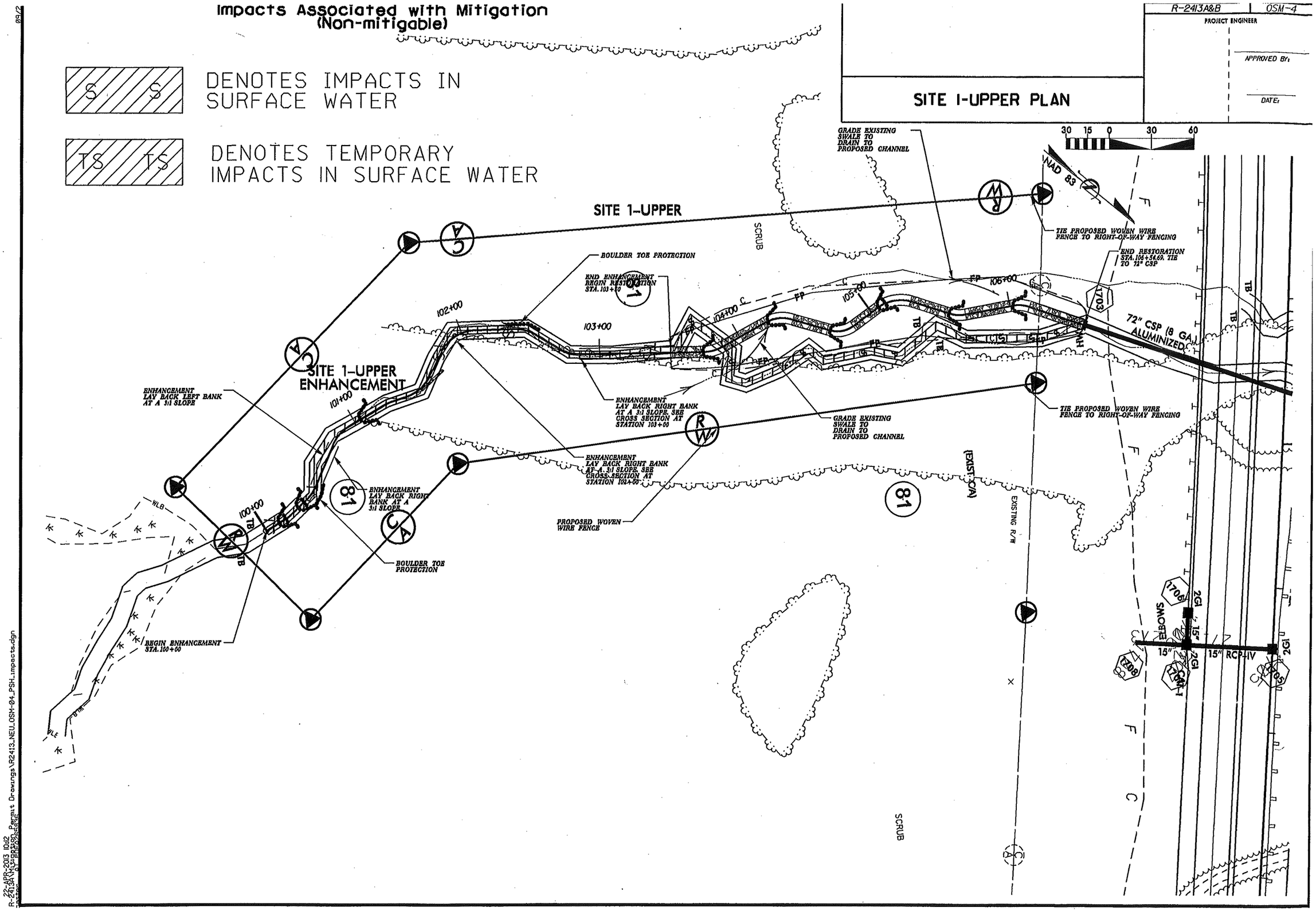
SIGNATURE/ *P.E.*

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

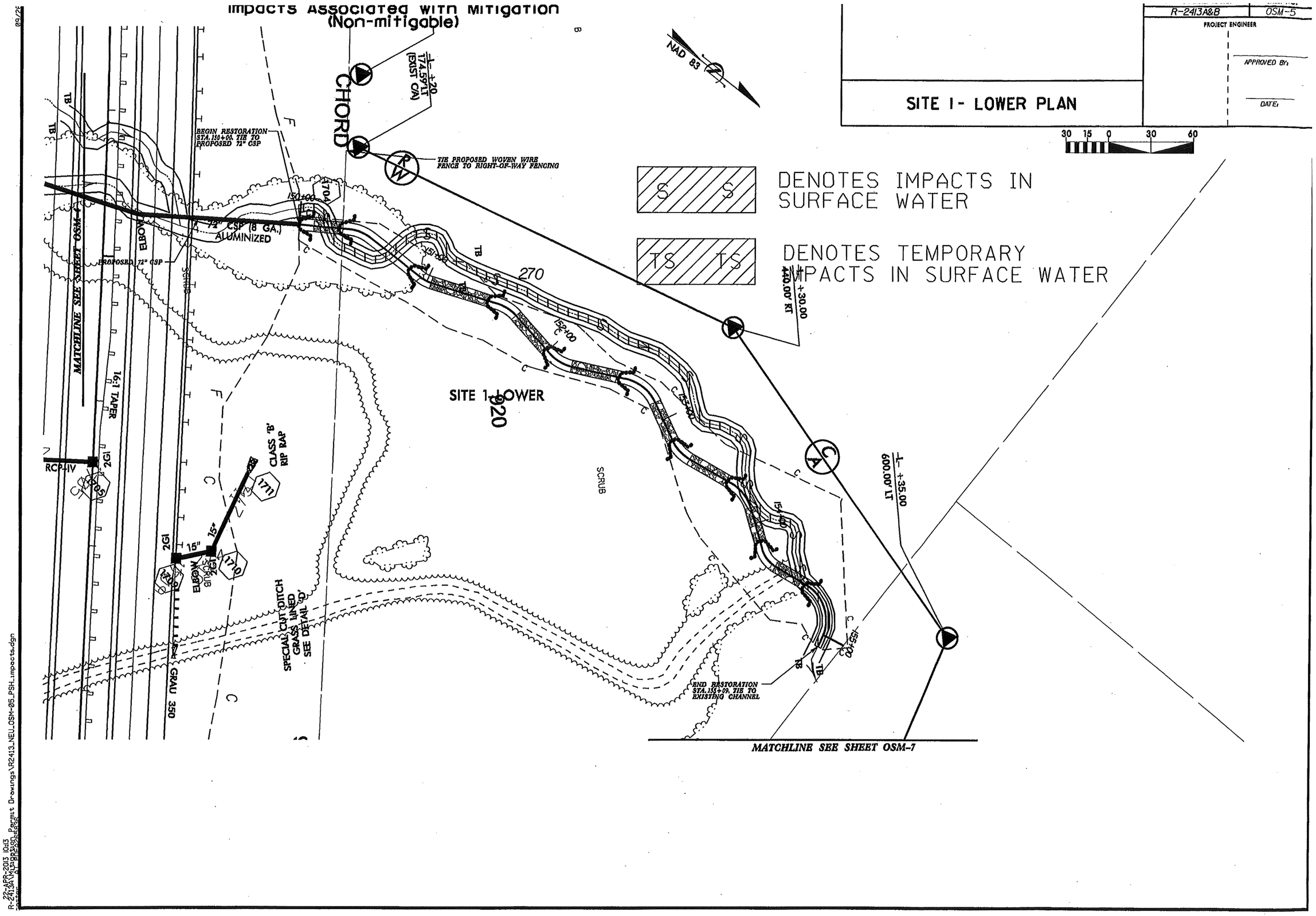
P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

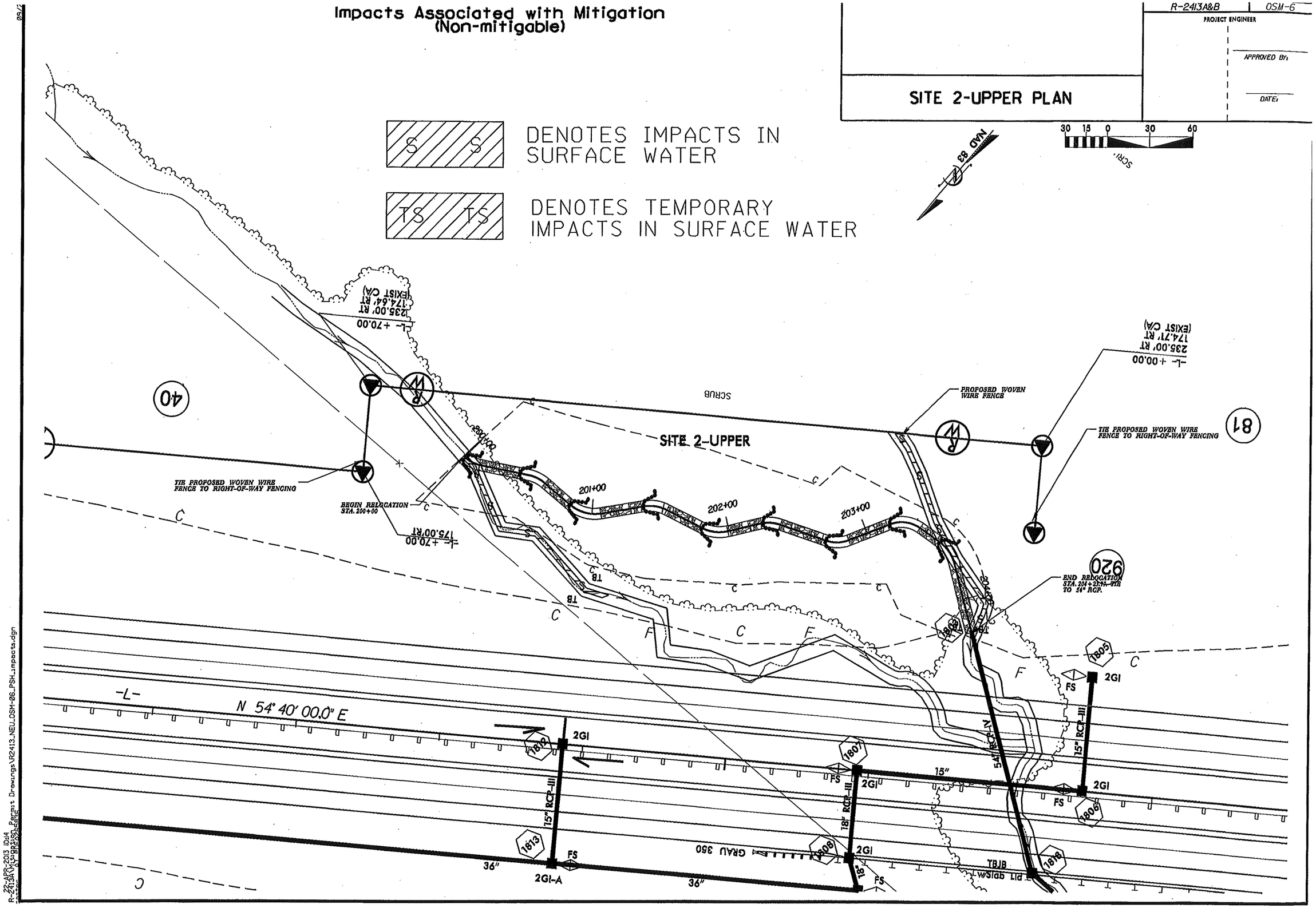


Impacts Associated with Mitigation
(Non-mitigable)
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
SITE 1-UPPER PLAN
R-2413A&B
OSM-4
PROJECT ENGINEER
APPROVED BY:
DATE:
SITE 1-UPPER
SITE 1-UPPER ENHANCEMENT
GRADE EXISTING SWALE TO DRAIN TO PROPOSED CHANNEL
TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING
END RESTORATION STA. 106+54.69, TIE TO 72" CSP
72" CSP (8 GA.) ALUMINIZED
BOULDER TOE PROTECTION
END ENHANCEMENT BEGIN RESTORATION STA. 103+10
ENHANCEMENT LAY BACK LEFT BANK AT A 3:1 SLOPE
ENHANCEMENT LAY BACK RIGHT BANK AT A 3:1 SLOPE, SEE CROSS SECTION AT STATION 103+00
ENHANCEMENT LAY BACK RIGHT BANK AT A 3:1 SLOPE, SEE CROSS SECTION AT STATION 102+00
ENHANCEMENT LAY BACK RIGHT BANK AT A 3:1 SLOPE
PROPOSED WOVEN WIRE FENCE
BEGIN ENHANCEMENT STA. 100+00
NAD 83
SCRUB
EXISTING R/W
(EXIST. C/A)
15" RCP-IV
2GI
1703
1706
1708
1705
81

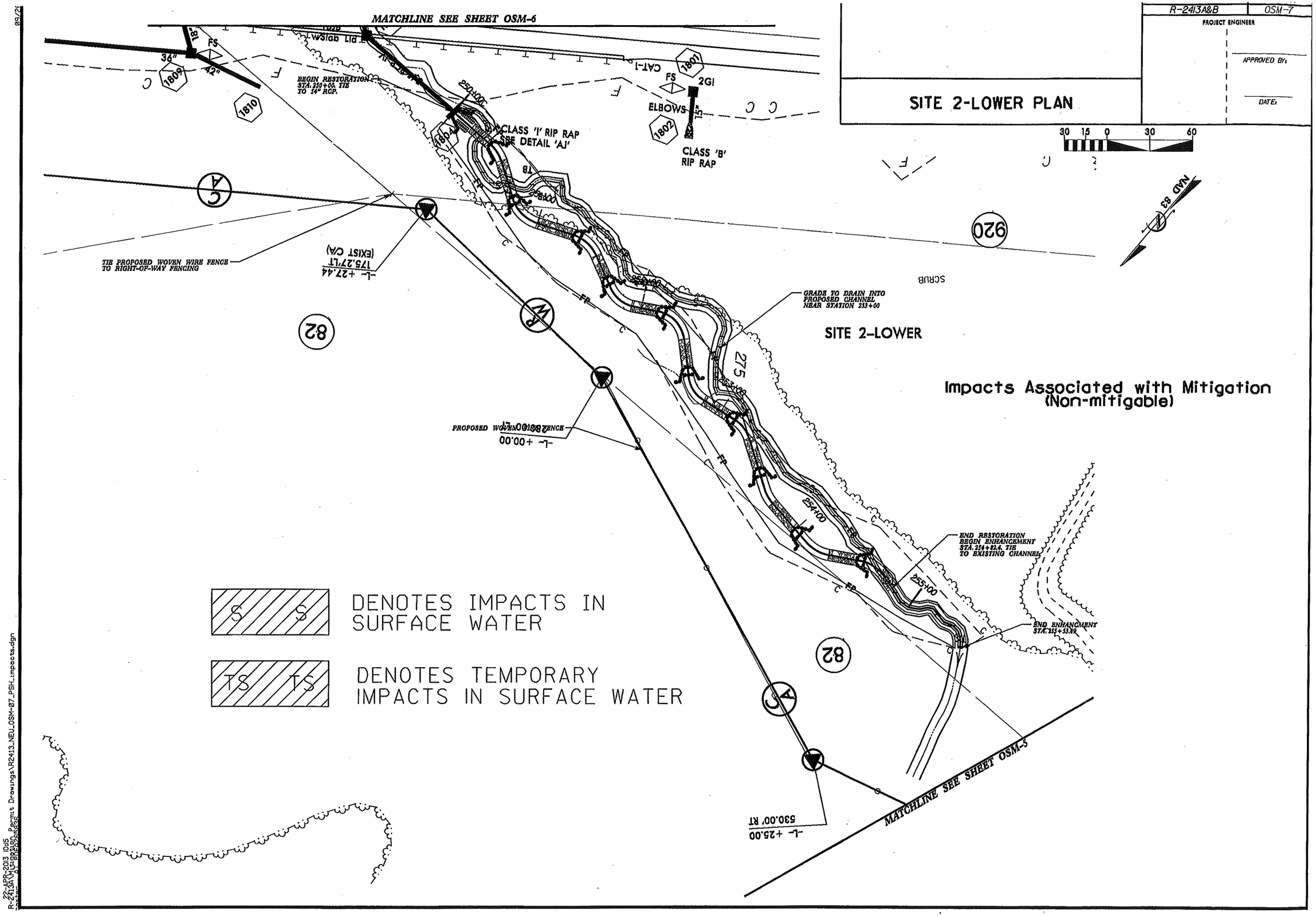


Impacts Associated with Mitigation
(Non-mitigable)
R-2413A&B
OSM-5
PROJECT ENGINEER
APPROVED BY:
DATE:
SITE 1- LOWER PLAN
30 15 0 30 60
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHORD
BEGIN RESTORATION STA. 150+00, TIE TO PROPOSED 72" CSP
TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING
72" CSP (8 GA.) ALUMINIZED
PROPOSED 72" CSP
MATCHLINE SEE SHEET OSM-4
16:1 TAPER
RCP-IV
2GI
CLASS 'B' RIP RAP
SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'
GRAU 350
SITE 1-LOWER
SCRUB
270
END RESTORATION STA. 155+09, TIE TO EXISTING CHANNEL
MATCHLINE SEE SHEET OSM-7

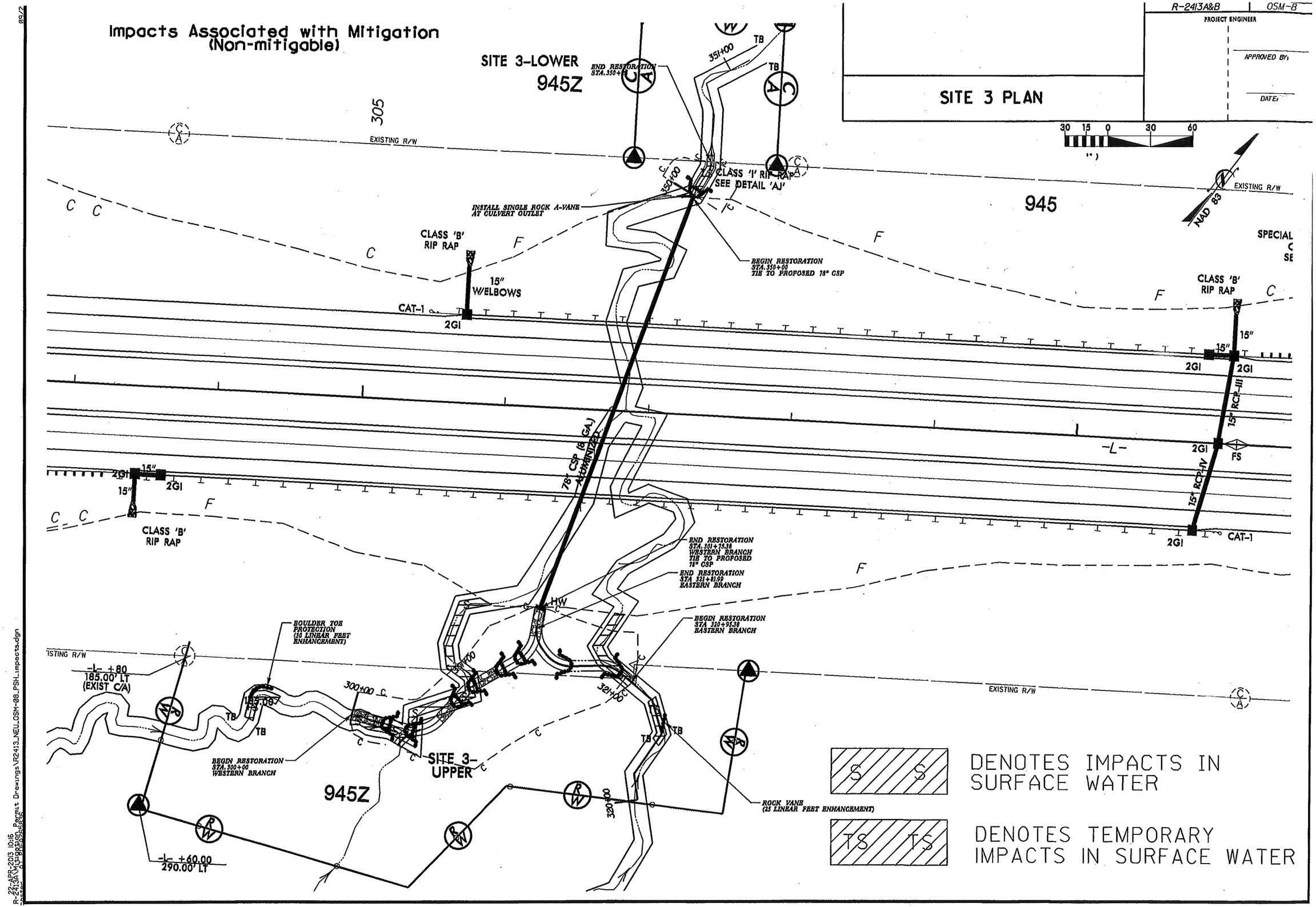
Impacts Associated with Mitigation (Non-mitigable)



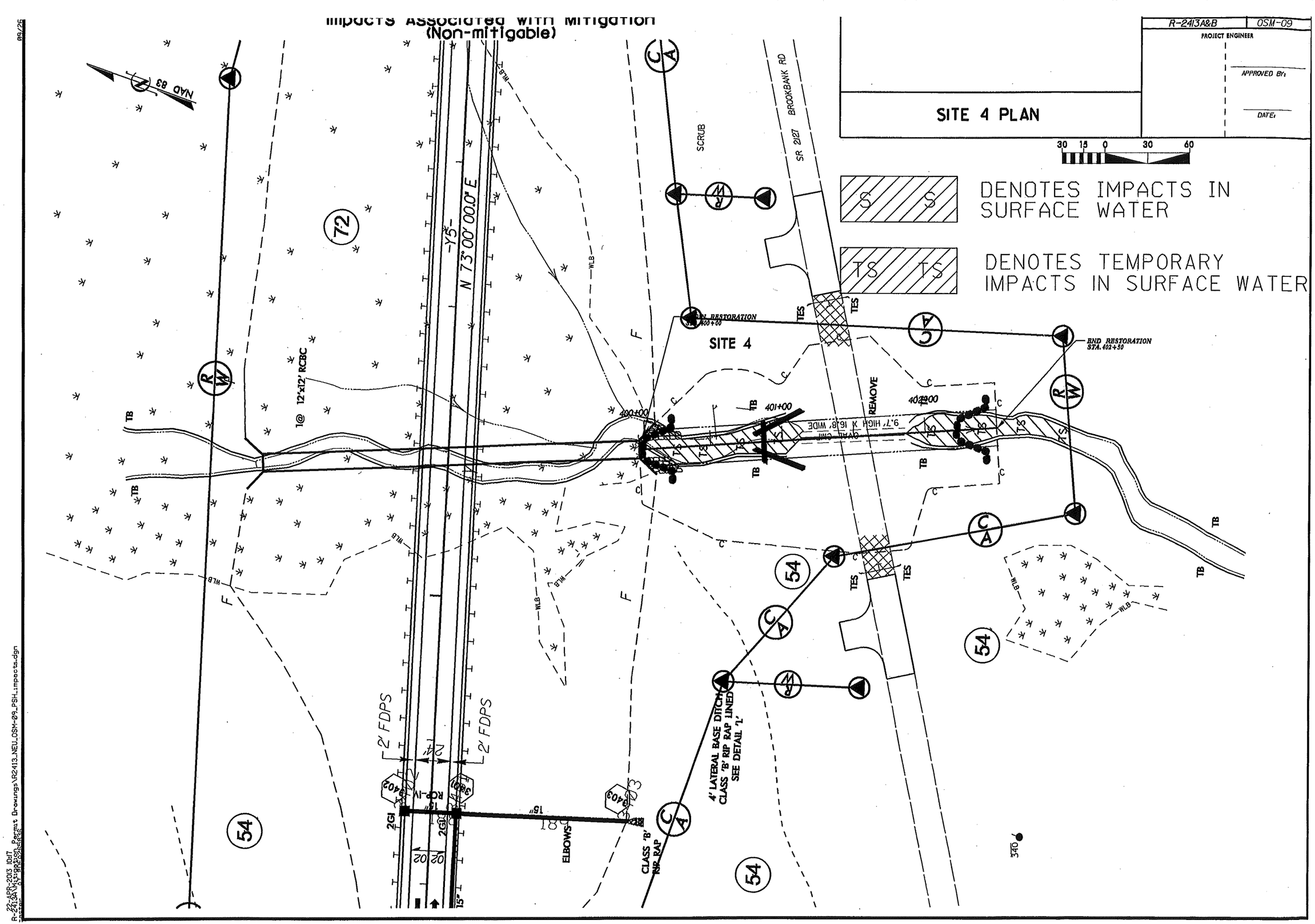
22-APR-2013 10:14
R-2413A\Mitigation Permit Drawings\R2413_NEU_OSM-06_PSH_impacts.dgn



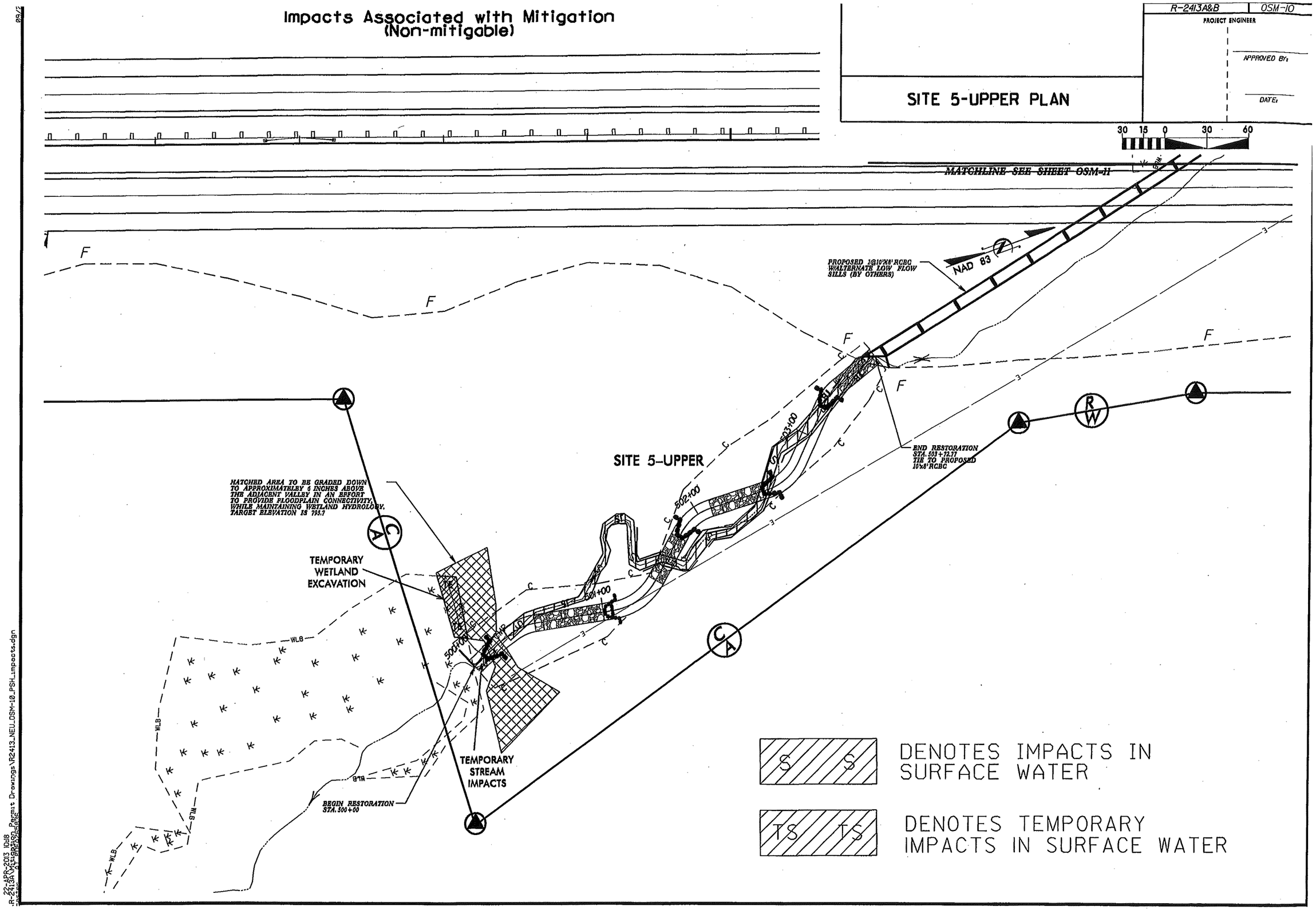
R-2413A&B
OSM-7
PROJECT ENGINEER
APPROVED BY:
DATE:
SITE 2-LOWER PLAN
30 15 0 30 60
NAD 83
MATCHLINE SEE SHEET OSM-6
MATCHLINE SEE SHEET OSM-5
BEGIN RESTORATION STA. 250+00. TIE TO 54" RCP.
CLASS 'I' RIP RAP SEE DETAIL 'AJ'
CLASS 'B' RIP RAP
ELBOWS
2GI
CAT-1
TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING
-L- +27.44 175.27'LT (EXIST CA)
GRADE TO DRAIN INTO PROPOSED CHANNEL NEAR STATION 253+00
SITE 2-LOWER
Impacts Associated with Mitigation (Non-mitigable)
PROPOSED WOVEN WIRE FENCE
-L- +00.00
END RESTORATION BEGIN ENHANCEMENT STA. 254+82.4. TIE TO EXISTING CHANNEL
END ENHANCEMENT STA. 255+53.89
-L- +25.00 530.00' RT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER



Impacts Associated with Mitigation
(Non-mitigable)
SITE 3-LOWER
945Z
305
EXISTING R/W
END RESTORATION STA. 350+00
351+00
TB
CLASS 'I' RIP RAP SEE DETAIL 'AJ'
350+00
INSTALL SINGLE ROCK A-VANE AT CULVERT OUTLET
BEGIN RESTORATION STA. 350+00 TIE TO PROPOSED 78" CSP
945
NAD 83
SPECIAL
CLASS 'B' RIP RAP
15" W/ELBOWS
CAT-1
2GI
15"
15" RCP-III
15" RCP-IV
FS
-L-
78" CSP (8 GA.) ALUMINIZED
END RESTORATION STA. 301+75.38 WESTERN BRANCH TIE TO PROPOSED 78" CSP
END RESTORATION STA 321+81.99 EASTERN BRANCH
BEGIN RESTORATION STA 320+95.38 EASTERN BRANCH
HW
BOULDER TOE PROTECTION (30 LINEAR FEET ENHANCEMENT)
-L- +80
185.00' LT
(EXIST C/A)
185.00
300+00
321+00
320+00
BEGIN RESTORATION STA. 300+00 WESTERN BRANCH
SITE 3-UPPER
945Z
ROCK VANE (25 LINEAR FEET ENHANCEMENT)
-L- +60.00
290.00' LT
S S
DENOTES IMPACTS IN SURFACE WATER
TS TS
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
R-2413A&B
OSM-8
PROJECT ENGINEER
APPROVED BY:
DATE:
SITE 3 PLAN
30 15 0 30 60



Impacts Associated with Mitigation
(Non-mitigable)
R-2413A&B
OSM-09
PROJECT ENGINEER
APPROVED BY:
DATE:
SITE 4 PLAN
30 15 0 30 60
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
NAD 83
SCRUB
SR 2127 BROOKBANK RD
N 73° 00' 00.0" E
-Y5-
SITE 4
END RESTORATION STA. 400+00
END RESTORATION STA. 402+50
REMOVE
9.7' HIGH X 16.8' WIDE
1@ 12'x12' RCBC
2' FDPS
2' FDPS
ELBOWS
CLASS 'B' RIP RAP
4' LATERAL BASE DITCH CLASS 'B' RIP RAP LINED SEE DETAIL 'L'
400+00
401+00
402+00
72
54
340



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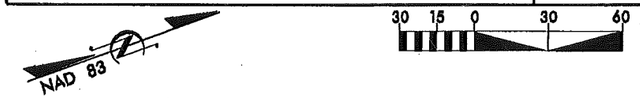
R-2413A\Mitigation Permit Drawings\R2413_NEU_OSM-10_PSH_impacts.dgn

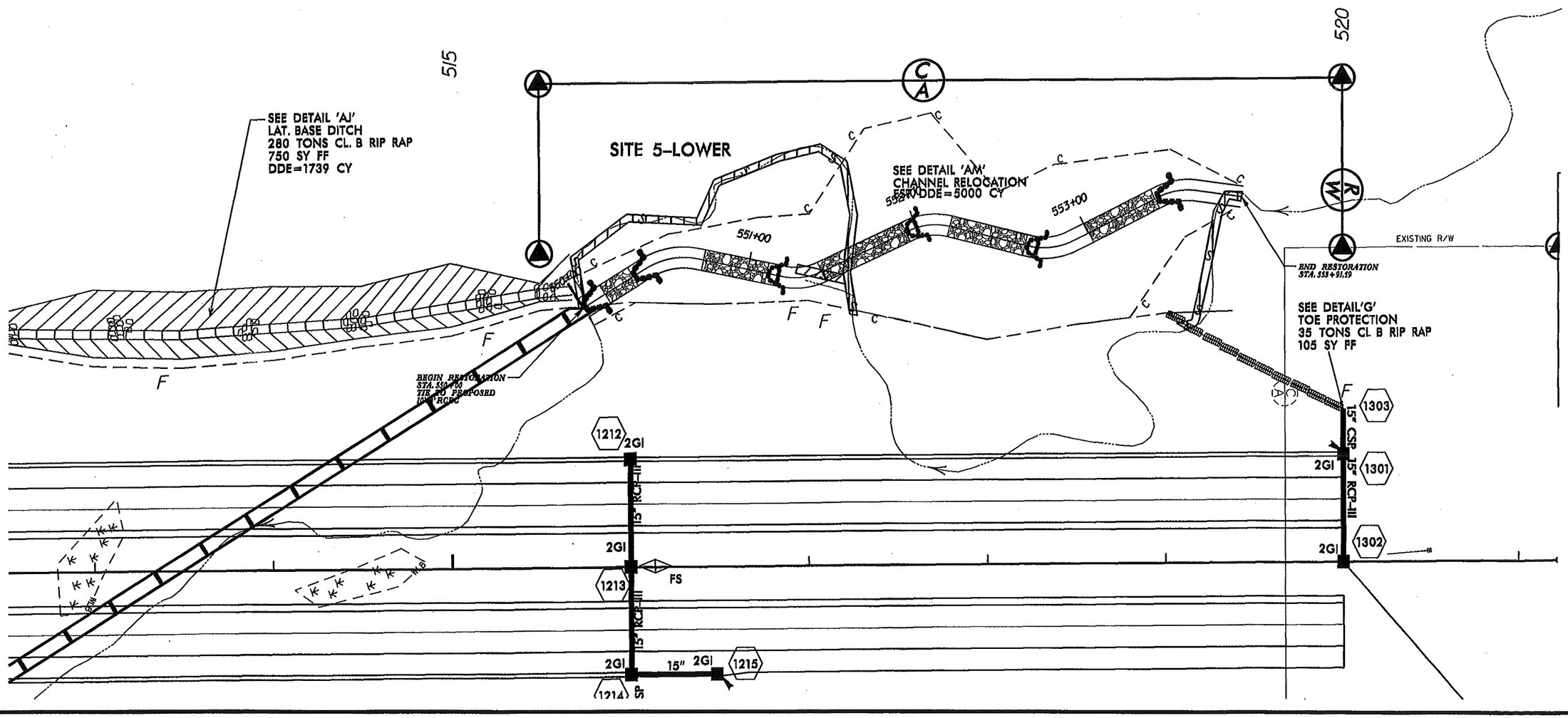
Impacts Associated with Mitigation (Non-mitigable)

S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER

R-2413A&B	OSM-11
PROJECT ENGINEER	
APPROVED BY:	
DATE:	

SITE 5-LOWER PLAN





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09/26/11

TIP PROJECT: R-2413 A&B

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	NO.	SHEETS
N.C.	R-2413A&B	OSM-1	52

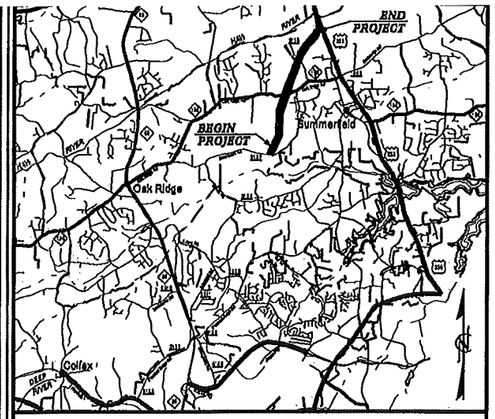
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
		PE
		ROW

PLAN FOR ON-SITE MITIGATION GUILFORD COUNTY

NAD 83

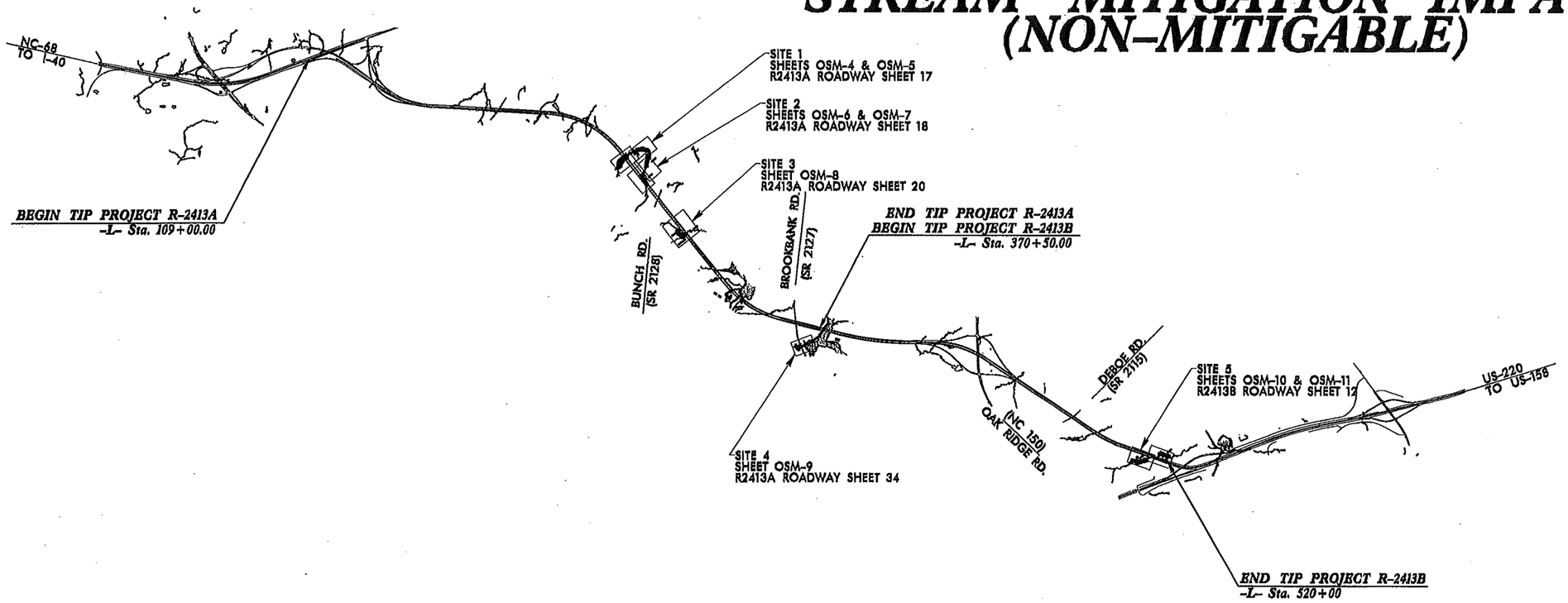
LOCATION: *NC 68 CONNECTOR – FROM SR 2011 (EDGEFIELD ROAD) TO HAW RIVER*

TYPE OF WORK: *STREAM RELOCATION, STREAM RESTORATION, STREAM ENHANCEMENT*



VICINITY MAP

STREAM MITIGATION IMPACTS (NON-MITIGABLE)



NC DOT CONTACT: PETE ALLEN

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

PLANS: 30 15 0 30 60

PROFILE (HORIZONTAL): 30 15 0 30 60

PROFILE (VERTICAL): 6 3 0 6 12

DESIGN DATA

PROJECT LENGTH

MITIGATION SITE	MITIGATION TYPE	LENGTH
SITE 1	RESTORATION/ENHANCEMENT	870LF
SITE 2	RELOCATION/RESTORATION/ENHANCEMENT	900LF
SITE 3	RESTORATION/RELOCATION	353LF
SITE 4	RESTORATION	250LF
SITE 5	RESTORATION/RELOCATION	760LF

2012 STANDARD SPECIFICATIONS

DESIGN ENGINEER

SIGNATURE: *P.E.*

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED DIVISION ADMINISTRATOR *DATE*

MITIGATION IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Mitigation Site No.	Mitigation Station Station (From/To)	Mitigation Description	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 Upper	100+00 to 103+50	Enhancement									350	350
	103+50 to 106+55	Restoration								368		304
1 Lower	150+00 to 155+09	Restoration								505	53	509
2 Upper	200+00 to 204+24	Relocation								308		424
2 Lower	250+00 to 255+54	Restoration								513		482
		Enhancement									87	71
3 Upper Western	300+00 to 301+75	Restoration/ Relocaiton								192		175
		Enhancement									30	30
3 Upper East	320+00 to 321+82	Restoration/ Relocation								65		86
		Enhancement									25	25
3 Lower	350+00 to 350+26	Restoration									27	26
4	400+00 to 402+50	Restoration									*	250
5 Upper	500+00 to 503+73	Restoration								403	20	373
5 Lower	550+00 to 553+92	Restoration/ Relocation								410		392
TOTALS:										2764	592	3497

* - Impacts for Site 4 are included in the impact summary table for R-2413A Site 21

For impacts associated with the roadway fill slopes, culverts and pipes please see Wetland Impact Summary Sheet for Site 12, Site 13, Site 14 and Site 21 on R-2413A and Site 8 for R-2413B

Temporary Wetland Impacts associated with Site 5 Upper are shown in the Wetland Impact Summary Sheet for R-2413B Site 8

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A & B)

SHEET 1 OF 1 4/22/2013

ATN Revised 3/31/05

09/26/11

TIP PROJECT: R-2413 A&B

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR ON-SITE MITIGATION GUILFORD COUNTY

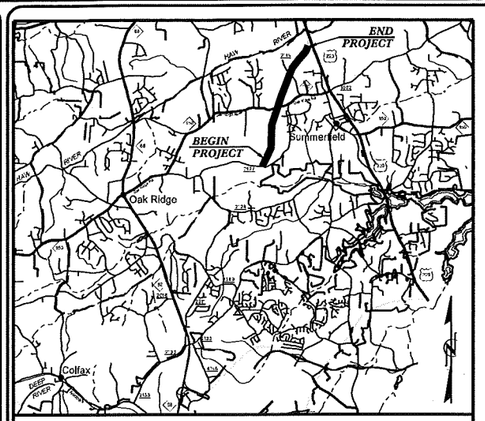
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413A&B	OSM-1	50

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34429.1.1		PE
34429.2.2		ROW-A
34429.2.3		ROW-B

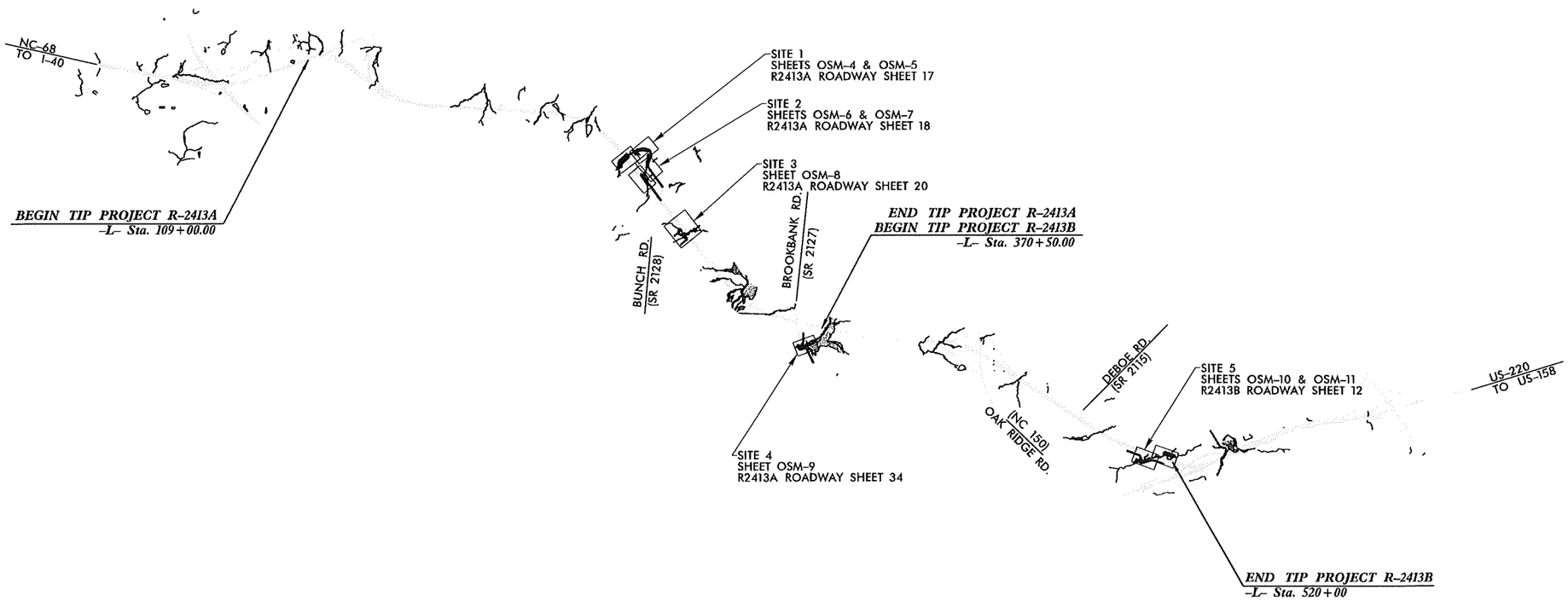
NAD 83

LOCATION: *NC 68 CONNECTOR – FROM SR 2011 (EDGEFIELD ROAD) TO HAW RIVER*

TYPE OF WORK: *STREAM RELOCATION, STREAM RESTORATION, STREAM ENHANCEMENT*



VICINITY MAP



NC DOT CONTACT: PETE ALLEN

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

30 15 0 30 60
PLANS

30 15 0 30 60
PROFILE (HORIZONTAL)

6 3 0 6 12
PROFILE (VERTICAL)

DESIGN DATA

PROJECT LENGTH

MITIGATION SITE	MITIGATION TYPE	LENGTH
SITE 1	RESTORATION/ENHANCEMENT	1163 LF
SITE 2	RELOCATION/RESTORATION/ENHANCEMENT	977 LF
SITE 3	RESTORATION/RELOCATION/ENHANCEMENT	342 LF
SITE 4	RESTORATION	250 LF
SITE 5	RESTORATION/RELOCATION	764 LF

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 80068 - RALEIGH, NORTH CAROLINA 27623-0068
PHONE (919) 677-2000 FAX (919) 677-2050
NC License F-0102

2012 STANDARD SPECIFICATIONS

DESIGN ENGINEER

P.E.
SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

09/26/11

PREPARED IN THE OFFICE OF:

Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050
NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-1A

PROJECT ENGINEER

APPROVED BY:

DATE:

INDEX OF SHEETS, CONSTRUCTION SEQUENCING, AND GENERAL NOTES

GENERAL NOTES

ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:

A) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION 'STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, DATED JANUARY 2012, AND ANY SUPPLEMENTS THERETO ISSUED PRIOR TO THE DATE OF RECEIPT OF BIDS.

B) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION 'ROADWAY STANDARD DRAWINGS, ENGLISH' DATED JANUARY 2012, AND ANY SUPPLEMENTS ISSUED THERETO PRIOR TO THE DATE OF RECEIPT OF BIDS.

ALL RIGHT OF WAY CORNER MARKERS OR FENCING SHALL BE PLACED BY OTHERS AS NECESSARY.

THE CONTRACTOR IS RESPONSIBLE FOR AVOIDING ANY DISTURBANCE OR DAMAGE TO EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING ANY DAMAGES AT A COST INCIDENT TO THIS CONTRACT.

ABANDONED SECTIONS OF THE EXISTING CHANNEL SHALL BE FILLED TO THE MAXIMUM EXTENT FEASIBLE WITH MATERIAL EXCAVATED ON-SITE. THIS EXCAVATED MATERIAL SHALL BE STOCKPILED ADJACENT TO THE REACHES OF CHANNEL OR DITCHES TO BE BACKFILLED.

THE CONTRACTOR MAY UTILIZE THE DESIGNATED STAGING AREA AND THE AREA INSIDE THE PROPOSED RIGHT OF WAY FOR STAGING AND STOCKPILING EQUIPMENT AND MATERIALS.

THE STREAM SHALL BE CONSTRUCTED IN ACCORDANCE TO THE TYPICAL SECTIONS.

SUBSURFACE PLANS: NO SUBSURFACE PLANS ARE AVAILABLE ON THE PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

ROADWAY STANDARD DRAWINGS

(REV. JANUARY 2012)

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN 'ROADWAY STANDARD DRAWINGS' - ROADWAY DESIGN UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 AND THE LATEST REVISION THERETO ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS.

CONSTRUCTION SEQUENCING

THIS STREAM MITIGATION PROJECT CONSISTS OF FIVE SITES. ONCE WORK BEGINS ON A STREAM SITE, THE CONTRACTOR MUST COMPLETE THAT SITE BEFORE MOVING WORK CREWS AND EQUIPMENT TO A DIFFERENT SITE, UNLESS APPROVED TO DO SO BY THE ENGINEER.

LAYOUT LOCATION OF THE NEW STREAM CHANNEL, CONSTRUCTION EASEMENT LIMITS, AND GRADE STAKES. THE ENGINEER MUST INSPECT AND APPROVE ALL LAYOUT WORK BEFORE CONSTRUCTION MAY BEGIN.

MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.

INSTALL CONSTRUCTION ENTRANCE PER EROSION CONTROL PLAN.

ESTABLISH STAGING AREAS AND MARK CONSTRUCTION EQUIPMENT ACCESS LOCATIONS WITH VISIBLE MARKERS. CONSTRUCTION EQUIPMENT SHALL BE CONTAINED WITHIN THE LIMITS OF CONSTRUCTION AS DEPICTED IN THE PLANS OR SPECIFIED BY THE ENGINEER.

INSTALL TEMPORARY EROSION CONTROL MEASURES.

BEGIN FLOODPLAIN GRADING, INCLUDING EXCAVATION OF BANKFULL BENCHES AT LOCATIONS DEPICTED IN THE PLANS AND AS DIRECTED BY THE ENGINEER. STOCKPILE MATERIALS IN AREAS DESIGNATED ON THE PLANS. KEEP TOPSOIL SEPARATE FROM OTHER STOCKPILE MATERIAL. TOPSOIL MATERIAL WILL BE USED LATER ON FLOODPLAIN.

TOPSOIL SHALL BE EXCAVATED AND STOCKPILED SEPARATELY FROM THE WASTE MATERIAL SO THAT IT CAN BE PLACED BACK ON THE FLOODPLAIN ONCE GRADING IS COMPLETE. NO DIRECT PAYMENT WILL BE MADE FOR THIS EXCAVATION.OVER-EXCAVATE FLOODPLAIN AND FLOODPLAIN SLOPES TO A DEPTH OF 6" BELOW FINAL GRADE AND PLACE 6" OF TOPSOIL TO FILL TO FINAL GRADE. OVER-EXCAVATION SHOULD BEGIN 3' FROM TOP OF BANK AND EXTEND TO EXCAVATION LIMITS. SEE TYPICAL SECTIONS FOR DETAIL.

INSTALL IMPERVIOUS DIKES AND PUMP AROUND SYSTEM TO PUMP STREAM DISCHARGE AROUND THE IMMEDIATE WORK AREA AS NECESSARY.

CONSTRUCTION SHALL PROCEED IN SUCCESSIVE REACHES WITH THE UPSTREAM REACH BEING COMPLETED PRIOR TO INITIATING CONSTRUCTION OF THE ADJACENT DOWNSTREAM REACH. EACH REACH SHALL BE LIMITED IN LENGTH TO WORK THAT CAN BE COMPLETED BEFORE ALLOWING WATER TO FLOW THROUGH THAT REACH. COMPLETION OF A REACH SHALL CONSIST OF CHANNEL CONSTRUCTION, FLOODPLAIN GRADING, IN-STREAM STRUCTURE INSTALLATION, BED MATERIAL INSTALLATION, AND EROSION CONTROL MEASURES. CONSTRUCTION SHALL BE DONE IN THE DRY, WITH THE CHANNEL FLOW PUMPED AROUND THE REACH UNDER CONSTRUCTION AS NECESSARY.

AT THE END OF EACH DAYS CONSTRUCTION WORK, THE CONTRACTOR SHALL SEED ALL DISTURBED AREAS AND COVER THE STREAM BANKS AND BANKFULL BENCHES WITH COIR FIBER MATTING. IN ADDITION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TEMPORARY EROSION CONTROL MEASURES ON A DAILY BASIS THROUGHOUT THE CONSTRUCTION PROCESS.

ONCE NEW CHANNEL CONSTRUCTION IS COMPLETE, THE CONTRACTOR SHALL INSTALL STREAM PLUGS TO DIRECT STREAM FLOW INTO THE NEW CHANNEL. THE CONTRACTOR SHALL THEN FILL IN THE ABANDONED SECTIONS OF THE EXISTING CHANNEL TO THE EXTENT FEASIBLE AND AS DIRECTED BY THE ENGINEER. CONTRACTOR WILL ENSURE THAT VEGETATION HAS BEEN ESTABLISHED ALONG THE BANKS OF THE NEW STREAM CHANNEL BEFORE DIRECTING FLOW INTO THE NEW STREAM CHANNEL. FOR NEW STREAM CHANNEL REACHES WHERE THIS IS NOT POSSIBLE, THE CONTRACTOR SHOULD GET APPROVAL FROM THE ENGINEER BEFORE DIRECTING FLOW INTO THE NEW STREAM CHANNEL.

AFTER ALL IN-STREAM WORK IS COMPLETED, THE CONTRACTOR SHALL REMOVE TEMPORARY EROSION CONTROL MEASURES AND TEMPORARY STREAM ACCESS AND SCARIFY ANY COMPACTED AREAS AS DIRECTED BY THE ENGINEER. ALL PORTIONS OF THE SITE SHALL BE STABILIZED WITH TEMPORARY EROSION CONTROL MEASURES.

INDEX OF SHEETS

OSM-1	TITLE SHEET
OSM-1A	INDEX OF SHEETS, CONSTRUCTION SEQUENCING, GENERAL NOTES
OSM-1B	CONVENTIONAL PLAN SHEET SYMBOLS
OSM-2	TYPICAL SECTIONS
OSM-2A	DETAILS -COIR FIBER MATTING -ROCK CROSS VANE -LOG CROSS VANE
OSM-2B	-CONSTRUCTED RIFFLE -ROOT WAD -ROCK A VANE -BOULDER TOE PROTECTION
OSM-2C	-ROCK VANE -LOG VANE -STREAM PLUG
OSM-2D	-EXAMPLE OF PUMP AROUND OPERATION
OSM-2E-OSM-2G	-MORPHOLOGICAL TABLES
OSM-3	SUMMARY OF QUANTITIES EARTHWORK SUMMARY
OSM-4-11	PLAN SHEETS
OSM-12-19	PROFILE SHEETS
XS-01-XS-22	CROSS SECTIONS

REFORESTATION NOTES, DETAILS, AND PLANS WILL BE INCLUDED IN REU PLANS

STREAM SYMBOLS

PLAN VIEW SYMBOLS

- ROCK VANE
- LOG VANE
- LOG CROSS VANE
- LOG SILL
- STORMWATER OUTLET STEP POOL
- BACK OF FLOODPLAIN BENCH (—BB———BB—)
- BOULDER TOE PROTECTION
- ROCK A-VANE
- ROCK CROSS VANE
- CONSTRUCTED RIFFLE
- STREAM PLUG
- BACKFILL EXISTING CHANNEL

PROFILE SYMBOLS

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE
- PROPOSED STEP POOL STRUCTURE

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

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-1B

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 — 123
- 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 — W
- 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 — FLOW
- 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

EXISTING STRUCTURES:

MAJOR:

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

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 — W
- Designated U/G Water Line (S.U.E.*) — W
- 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 — SS
- 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.

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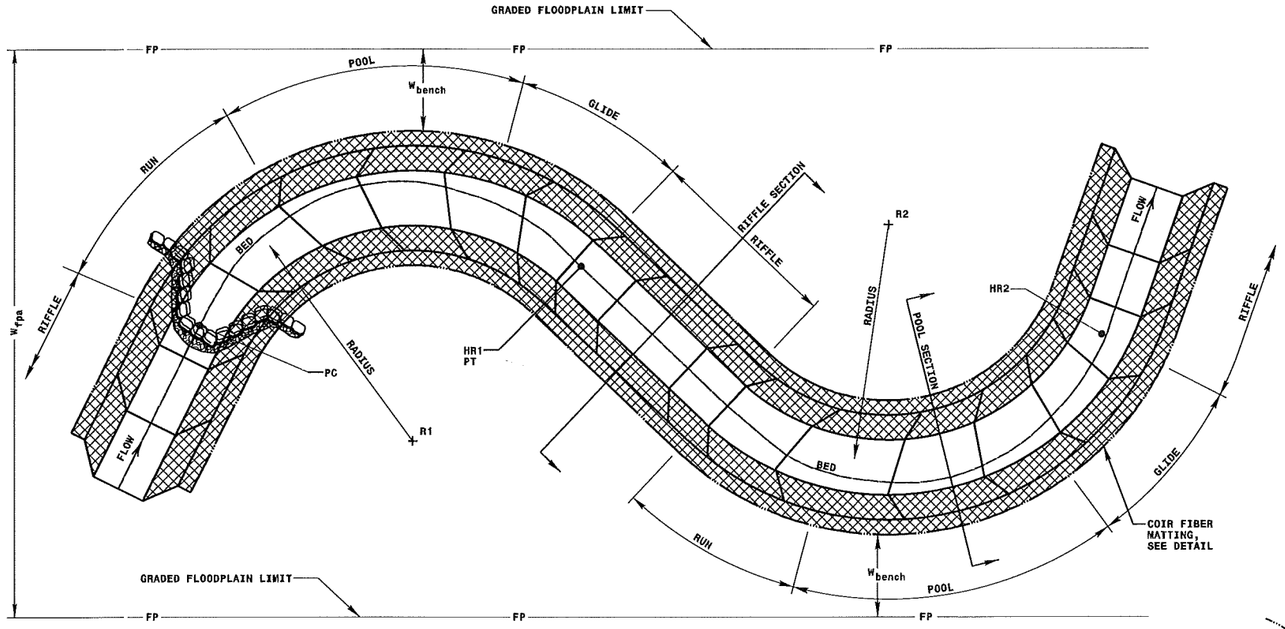
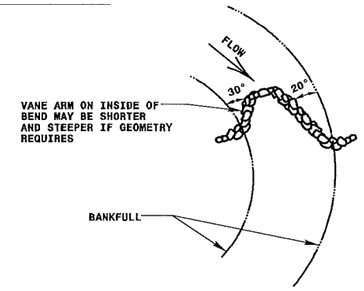
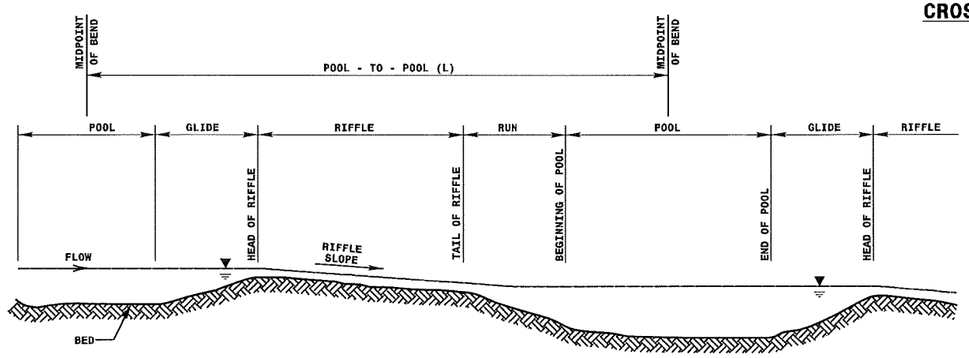


TYPICAL PLAN



CROSS VANE CONSTRUCTION IN MEANDER-BEND PLAN VIEW



TYPICAL PROFILE

CHANNEL TYPICAL DETAIL

NOT TO SCALE

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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
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PROJECT ENGINEER

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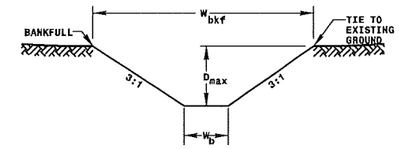
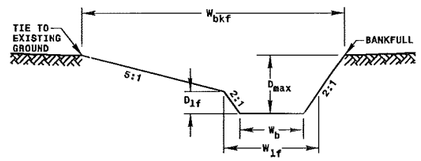
DATE:

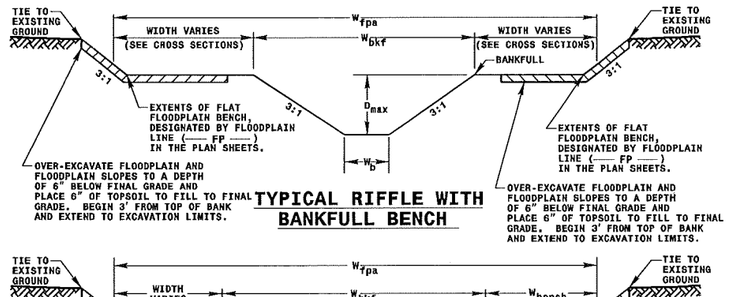
TYPICAL SECTIONS



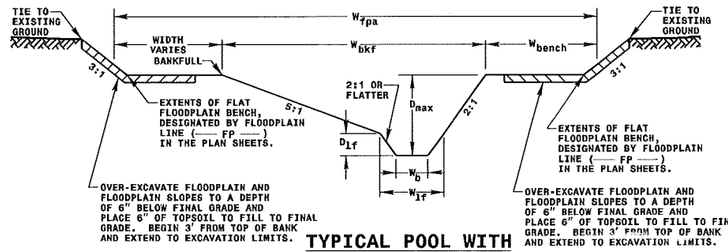
TYPICAL RIFFLE



TYPICAL POOL



TYPICAL RIFFLE WITH BANKFULL BENCH



TYPICAL POOL WITH BANKFULL BENCH

NOTES:
1. THE COORDINATES FOR EACH CENTER OF RADIUS (EX. "R1","R2") AND EACH HEAD OF RIFFLE (EX. "HR1", "HR2") ARE INDICATED ON THE PLAN SHEETS.

W_{bkf} = BANKFULL WIDTH
D_{max} = MAXIMUM DEPTH
W_b = BOTTOM WIDTH
W_{fpa} = FLOOD PRONE AREA WIDTH
W_{lf} = LOW FLOW WIDTH
D_{lf} = LOW FLOW DEPTH

CROSS-SECTION DIMENSIONS (IN FEET)

		RIFFLE				POOL							
SITE	REACH	W_{bkf}	D_{max}	W_b	W_{fpa}	W_{bkf}	W_{lf}	D_{lf}	D_{max}	W_b	W_{fpa}	W_{bench}	Width/Depth Ratio
SITE 1-UPPER	SEE PLAN SHEETS FOR DRAFT STATIONS	7.6	0.8	2.8	SEE CROSS SECTIONS	9.4	3.8	0.7	1.5	1.0	SEE CROSS SECTIONS	3.8 MIN.	13.9
SITE 1-LOWER	SEE PLAN SHEETS FOR DRAFT STATIONS	8.4	0.9	3.0	SEE CROSS SECTIONS	10.6	4.3	0.7	1.6	1.5	SEE CROSS SECTIONS	4.2 MIN.	13.8
SITE 2	SEE PLAN SHEETS FOR DRAFT STATIONS	7.6	0.8	2.8	SEE CROSS SECTIONS	9.4	3.8	0.7	1.5	1.0	SEE CROSS SECTIONS	3.8 MIN.	13.9
SITE 3	SEE PLAN SHEETS FOR DRAFT STATIONS	7.3	0.8	2.5	SEE CROSS SECTIONS	9.4	3.8	0.7	1.5	1.0	SEE CROSS SECTIONS	3.7 MIN.	13.6
SITE 4	SEE PLAN SHEETS FOR DRAFT STATIONS	25.0	2.5	10.0	SEE CROSS SECTIONS	30.5	13.0	2.0	4.5	5.0	SEE CROSS SECTIONS	12.5 MIN.	14.3
SITE 5	SEE PLAN SHEETS FOR DRAFT STATIONS	11.7	1.2	4.5	SEE CROSS SECTIONS	14.4	6.0	1.0	2.2	2.0	SEE CROSS SECTIONS	5.9 MIN.	14.1

$$$$$$$SYSTIME$$$$$$$
$$$$$$$USERNAME$$$$$$$
$$$$$$$DGN$$$$$$$
$$$$$$$RFNAME$$$$$$$
$$$$$$$LEVELS$$$$$$$

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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-2A

PROJECT ENGINEER

APPROVED BY:

DATE:

DETAILS 1 OF 4

PLAN VIEW

SECTION A-A

SECTION B-B

BOULDER SIZE DATA CHART			
REACH	BOULDER DIMENSIONS		
	HEIGHT	WIDTH	LENGTH
SITE 1	2'	3'	4'
SITE 2	2'	3'	4'
SITE 3	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK CROSS VANE DETAIL

NOT TO SCALE

PLAN VIEW

SECTION A-A

SECTION B-B

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

LOG CROSS VANE DETAIL

NOT TO SCALE

PLAN VIEW

TYPICAL CROSS SECTION

ANCHOR OPTIONS

COIR FIBER MATTING DETAIL

NOT TO SCALE

PLAN VIEW

SECTION B-B

SITE NUMBER	STREAM STATION	CULVERT SIZE	RIP RAP BASIN A	B	C	D	E	F	G	H
2	250+02	54" RCP	2.5	2.0	4.0	2.0	3.0	0.3	20	10

ALL DIMENSIONS APPROXIMATE IN FEET

NOTE: DISSIPATOR ROCKS SHOULD BE NATIVE STONE OR SHOT ROCK, ANGULAR AND OBLONG WITH AN APPROXIMATE d50 SIZE OF CLASS I.

SECTION A-A

NATURAL ROCK ENERGY DISSIPATOR DETAIL

NOT TO SCALE

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

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R-2413A&B	OSM-2B

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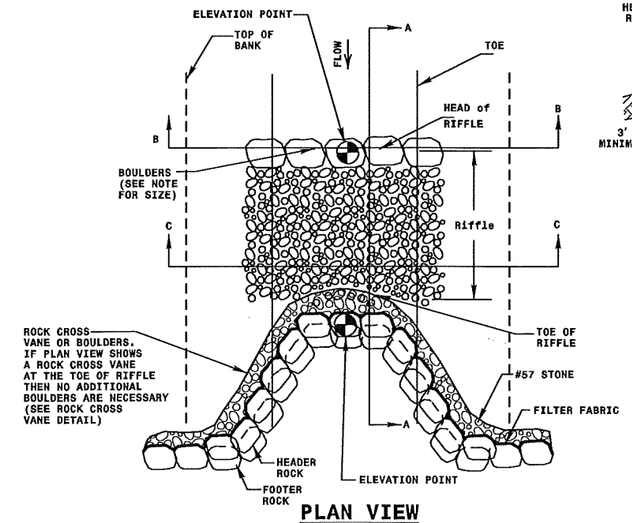
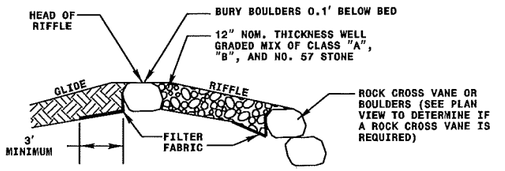
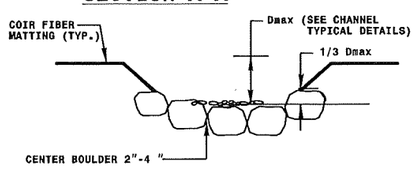
DETAILS 2 OF 4



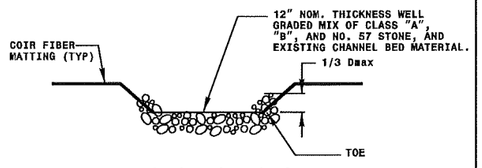
PLAN VIEW



SECTION A-A



SECTION B-B

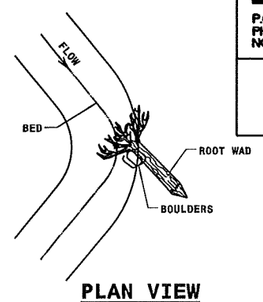


SECTION C-C

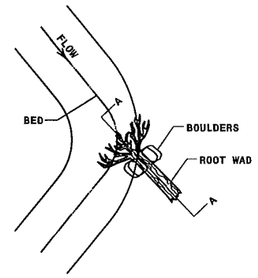
NOTE:
1. BOULDERS SHOULD BE NATIVE STONES OR SHOT ROCK, ANGULAR AND OBLONG, WITH AN AXIS APPROXIMATELY 4'Lx3'Wx2'D
2. NOT ALL CONSTRUCTED RIFFLES REQUIRE A ROCK CROSS VANE ON THE TOE OF RIFFLE.
3. IF NO ROCK CROSS VANE IS PROPOSED AT THE TOE OF RIFFLE, INSTALL BOULDERS AT THE TOE OF RIFFLE TO SECURE CONSTRUCTED RIFFLE MATERIAL.

CONSTRUCTED RIFFLE DETAIL

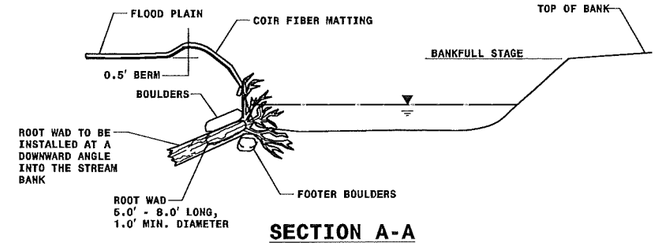
NOT TO SCALE



PLAN VIEW DRIVE POINT METHOD



PLAN VIEW TRENCHING METHOD



SECTION A-A

NOTES:

ORIENT ROOT WADS SO THAT THE STREAM FLOW MEETS THE ROOT WAD STRAIGHT ON, DEFLECTING THE WATER AWAY FROM THE BANK.

METHODS OF INSTALLATION:

DRIVE POINT METHOD:

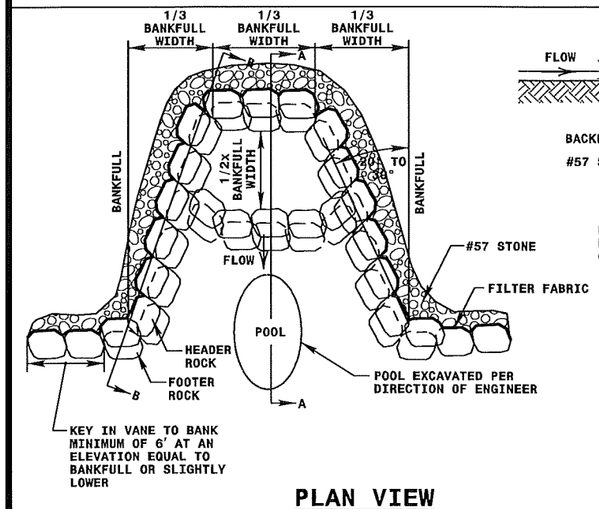
SHARPEN THE END OF THE LOG BEFORE "DRIVING" AT A DOWNWARD ANGLE INTO THE BANK. BOULDER SHOULD BE PLACED ON EACH SIDE OF THE ROOT WAD TO PIN IT IN PLACE. THE BOULDERS SHALL BE APPROXIMATELY 2' X 3' X 4'. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

TRENCHING METHOD:

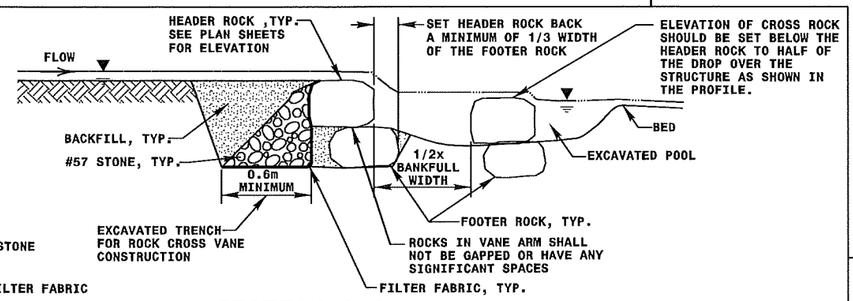
IF THE ROOT WAD CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. IN THIS CASE, FOOTER BOUDERS SHOULD BE INSTALLED UNDERNEATH THE ROOT WAD IN A TRENCH EXCAVATED PARALLEL TO THE BANK AND WELL BELOW THE STREAM BED. BOULDERS SHOULD BE PLACED ON EACH SIDE OF THE ROOTWAD TO PIN IT IN PLACE. THE BOULDERS SHOULD BE APPROXIMATELY 2' X 3' X 4'. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

ROOT WAD DETAIL

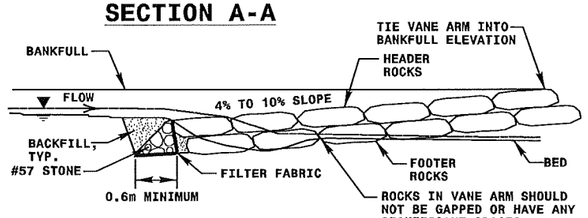
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

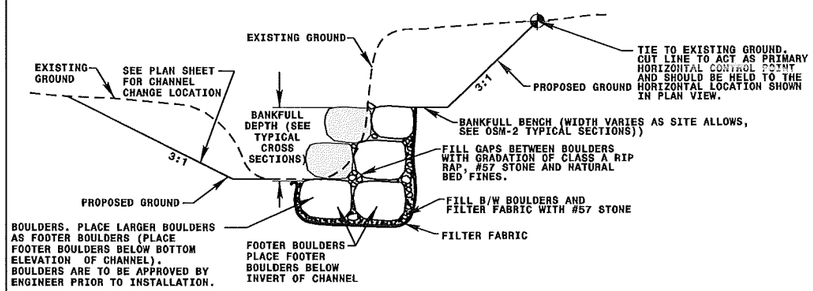
BOULDER SIZE DATA CHART			
	BOULDER DIMENSIONS		
REACH	HEIGHT	WIDTH	LENGTH
SITE 1	2'	3'	4'
SITE 2	2'	3'	4'
SITE 3	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BANKFULL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK A VANE DETAIL

NOT TO SCALE



BOULDER TOE PROTECTION

NOT TO SCALE

09/26/11
\\SETNET\Projects\063200101\CAD\Civil\OSM\OSM-2B.dgn
USER:mbernard

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NC LICENSE F-0102

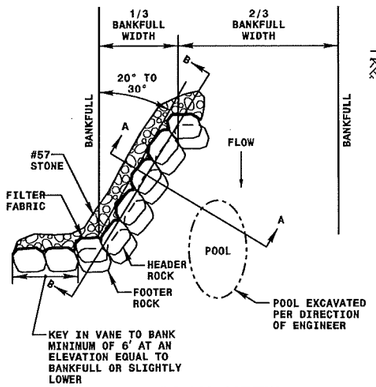
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-2C

PROJECT ENGINEER

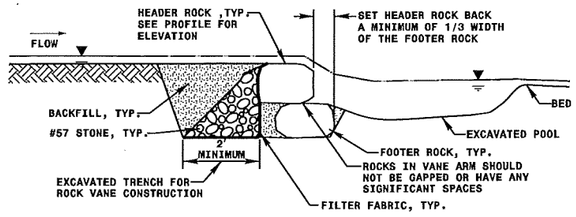
APPROVED BY:

DATE:

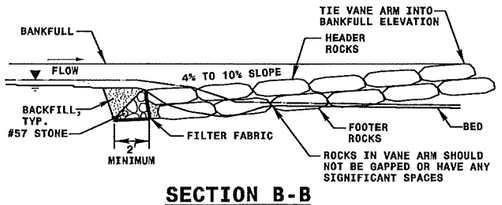
DETAILS 3 OF 4



PLAN VIEW



SECTION A-A



SECTION B-B

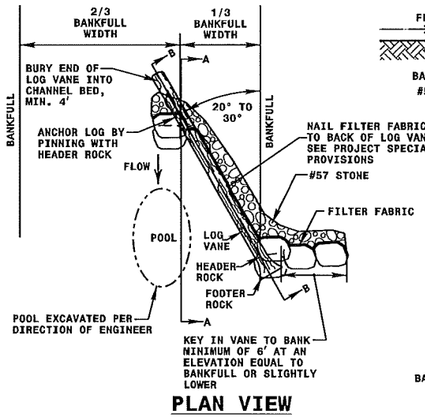
BOULDER SIZE DATA CHART			
	BOULDER DIMENSIONS		
REACH	HEIGHT	WIDTH	LENGTH
SITE 1	2'	3'	4'
SITE 2	2'	3'	4'
SITE 3	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

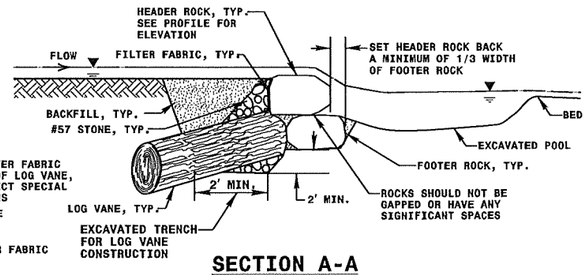
NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK VANE DETAIL

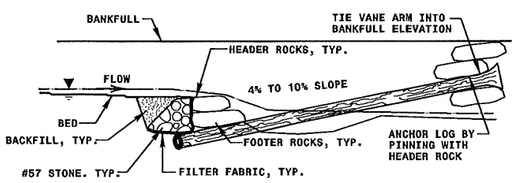
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

BOULDER SIZE DATA CHART			
	BOULDER DIMENSIONS		
REACH	HEIGHT	WIDTH	LENGTH
SITE 1	2'	3'	4'
SITE 2	2'	3'	4'
SITE 3	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

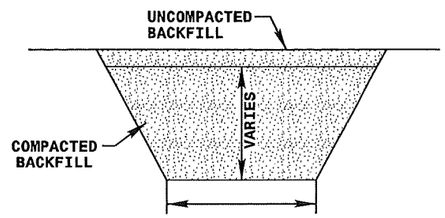
NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

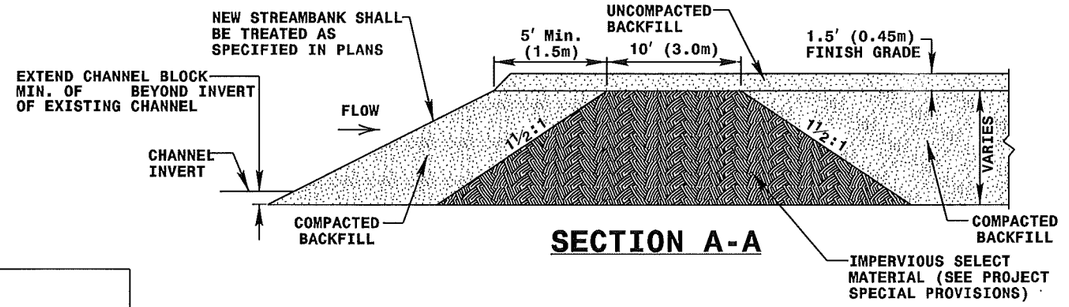
LOG VANE DETAIL

NOT TO SCALE

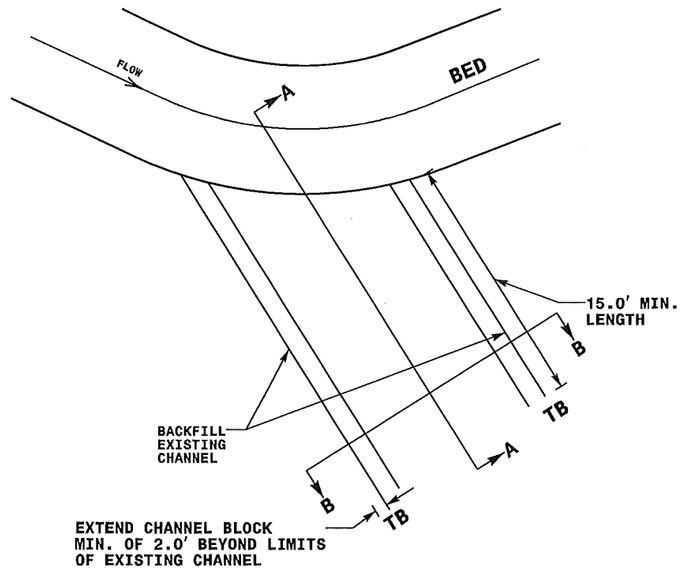
NOTES:
1) CHANNEL BLOCK SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
2) BLOCK SHOULD BE INSTALLED AT THE INTERFACE BETWEEN EXISTING CHANNEL AND PROPOSED CHANNEL.
3) BOTTOM OF BLOCK SHOULD BE A MINIMUM OF 2.0' BELOW THE INVERT OF THE EXISTING CHANNEL.
4) BLOCK SHOULD EXTEND A MINIMUM OF 2.0' BEYOND THE LIMITS OF THE EXISTING STREAM CHANNEL.
5) INSTALL EROSION CONTROL MATTING AND SEED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS IMMEDIATELY AFTER GRADING.
6) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.



SECTION B-B



SECTION A-A



PLAN VIEW

STREAM PLUG

NOT TO SCALE

09/26/11
USER NAME = $USER
DESIGNED $$$$$$$$$$$$$$$$$$$$
DRAWN $$$$$$$$$$$$$$$$$$$$
CHECKED $$$$$$$$$$$$$$$$$$$$
SUBMITTED $$$$$$$$$$$$$$$$$$$$
DATE = $$$$$$$$$$$$$$$$$$$$
SEAL $$$$$$$$$$$$$$$$$$$$
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE = AS SHOWN

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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-2D

PROJECT ENGINEER

APPROVED BY:

DATE:

DETAILS 4 OF 4

PLAN VIEW

SECTION A-A

NOTES:

1. DO NOT EXCAVATE POOL CLOSE TO FOOTER LOG.
2. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
3. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
4. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.
5. BOULDERS TO BE 2'x3'x4' MIN.

LOG SILL DETAIL

NOT TO SCALE

NOTES:
1) All excavation shall be performed in only dry or isolated sections of channel.
2) Impervious dikes are to be used to isolate work from stream flow when necessary.
3) All graded areas shall be stabilized within 24 hours.
4) Maintenance of stream flow operations shall be incidental to the work. This includes polyethylene sheeting, diversion pipes, pumps and hoses.
5) Pumps and hoses shall be of sufficicient size to dewater the work area.

SEQUENCE OF CONSTRUCTION FOR PUMP AROUND OPERATION

1. INSTALL SPECIAL STILLING BASIN(S).
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM IMPERVIOUS DIKES FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED IN ONE DAY WITHIN THE PUMP AROUND AREAS BETWEEN THE IMPERVIOUS DIKES. THE IMPERVIOUS DIKE LOCATIONS AS SHOWN ON THIS SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKE(S) FOR EACH DAY'S WORK.
8. REMOVE SPECIAL STILLING BASIN(S) AND BACKFILL. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

EXAMPLE OF PUMP-AROUND OPERATION

NOT TO SCALE

09/26/11

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MORPHOLOGICAL TABLE

PROJECT REFERENCE NO. R-2413A&B
SHEET NO. OSM-2E
PROJECT ENGINEER
APPROVED BY:
DATE:

VARIABLES		Reference Reach Tributary to Riddicks Creek (KHA)		Reference Reach Riddicks Creek (KHA)		Reference Reach Triburary to Lake Jeanette (NCDOT)		Reference Reach Tributary to Rich Fork (KHA)	
STATION		–		–		–		–	
1. Stream Type (Rosgen)		C5		E5		E5		B4	
2. Drainage Area (sq. mile)		0.18		0.07		0.15		1.12	
3. Bankfull Width	Mean:	7.9		6.6		12.0		15.2	
(W_{bkf})	Range:	–	–	5.7	7.5	12.0	13.5	–	–
4. Bankfull Mean	Mean:	0.6		0.8		1.6		1.2	
depth (d_{bkf})	Range:	–	–	0.7	0.8	1.4	1.7	–	–
5. Width/Depth Ratio	Mean:	13.5		8.7		8.4		12.7	
(W_{bkf}/d_{bkf})	Range:	–	–	8.2	9.2	7.1	9.6	–	–
6. Bankfull cross-sectional	Mean:	4.6		5.1		19.4		19.0	
Area (Abkf)	Range:	–	–	4.0	6.1	18.8	20.0	–	–
7. Bankfull Mean Velocity	Mean:	Not Reported		Not Reported		5.6		5.1	
(V_{bkf})	Range:	–	–	–	–	5.2	6.2	–	–
8. Bankfull Discharge, cfs	Mean:	Not Reported		Not Reported		109.3		90.9	
(Q_{bkf})	Range:	–	–	–	–	100.7	119.6	–	–
9. Bankfull Maximum Depth	Mean:	1.0		1.5		2.9		1.9	
(d_{max})	Range:	–	–	1.3	1.6	–	–	–	–
10. Max d_{max}/d_{bkf}	Mean:	1.7		2.0		2.4		1.6	
ratio	Range:	–	–	1.9	2.0	–	–	–	–
11. Low Bank Height to max	Mean:	1.0		1.3		Not Reported		1.1	
d_{bkf} ratio	Range:	–	–	1.20	2.50	–	–	–	–
12. Width of Flood Prone	Mean:	36.0		27.4		49.0		23.3	
Area (W_{fpa})	Range:	–	–	20.0	34.0	–	–	–	–
13. Entrenchment Ratio	Mean:	4.6		4.2		4.4		1.5	
(W_{fpa}/W_{bkf})	Range:	–	–	3.5	4.6	4.1	4.7	–	–
14. Meander Length	Mean:	80.5		32.0		22.0		–	
(L_m)	Range:	64.0	97.0	25.0	45.0	22.0	69.0	–	–
15. Ratio of Meander Length to	Mean:	10.2		4.8		1.8		–	
Bankfull Width (L_m/W_{bkf})	Range:	8.1	12.3	3.8	6.8	1.8	5.8	–	–
16. Radius of Curvature	Mean:	13.4		11.3		7.3		–	
(R_c)	Range:	8.5	22.0	5.7	18.8	7.3	17.3	–	–
17. Ratio of Radius of Curvature	Mean:	1.7		1.7		0.6		–	
to Bankfull Width (R_c/W_{bkf})	Range:	1.1	2.8	0.9	2.8	0.6	1.4	–	–
18. Belt Width	Mean:	34.0		15.8		45.0		–	
(W_{blt})	Range:	–	–	10.5	22.0	–	–	–	–
19. Meander Width Ratio	Mean:	4.3		2.4		3.8		–	
(W_{blt}/W_{bkf})	Range:	–	–	1.6	3.3	–	–	–	–
20. Sinuosity (k)	Mean:	1.30		1.40		Not Reported		1.07	
(Stream Length / Valley Length)	Range:	–	–	–	–	–	–	–	–
21. Valley Slope (S_{valley})	Mean:	0.0022		0.0130		Not Reported		0.0168	
(ft/ft)	Range:	–	–	–	–	–	–	–	–
22. Average Stream Slope	Mean:	0.0017		0.0093		0.0033		0.0157	
(S_{avg}) = (S_{valley}/k)	Range:	–	–	–	–	–	–	–	–
23. Riffle Slope	Mean:	0.0049		0.0540		Not Reported		0.0522	
(S_{riff})	Range:	0.0000	0.0257	0.0100	0.0800	–	–	0.0077	0.0961
24. Ratio of Riffle Slope to Avg.	Mean:	2.9		5.8		–		3.3	
Slope (S_{riffle}/S_{avg})	Range:	0.0	15.3	0.6	4.5	–	–	–	–
25. Pool Slope	Mean:	0.0002		0.0024		Not Reported		0.0032	
(S_{pool})	Range:	0.0000	0.0007	0.0000	0.0100	–	–	0.0009	0.0065
26. Ratio of Pool Slope to Avg.	Mean:	0.1		0.3		–		0.2	
Slope (S_{pool}/S_{avg})	Range:	0.0	0.4	0.0	0.6	–	–	0.1	0.4
27. Maximum Pool	Mean:	2.0		2.0		3.1		3.0	
Depth (d_{pool})	Range:	–	–	–	–	–	–	2.3	3.9
28. Ratio of Pool Depth to Avg.	Mean:	3.4		2.3		2.0		2.5	
Depth (d_{pool}/d_{bkf})	Range:	–	–	–	–	–	–	1.9167	3.2833
29. Pool Width	Mean:	11.5		8.1		19.6		16.3	
(W_{pool})	Range:	–	–	–	–	–	–	–	–
30. Ratio of Pool Width to	Mean:	1.5		1.2		1.6		1.1	
Bankfull Width (W_{pool}/W_{bkf})	Range:	–	–	–	–	–	–	–	–
31. Pool Area	Mean:	Not Reported		Not Reported		27.0		22.7	
(A_{pool})	Range:	–	–	–	–	–	–	–	–
32. Ratio of Pool Area to	Mean:	–		–		1.4		1.2	
Bankfull Area (A_{pool}/A_{bkf})	Range:	–	–	–	–	–	–	–	–
33. Pool to Pool Spacing	Mean:	38.3		22.9		Not Reported		33.1	
(p - p)	Range:	18	78	8	48	–	–	20	52
34. Ratio of Pool to Pool Spacing	Mean:	4.8		3.5		–		2.2	
to Bankfull Width (p-p/Wbkf)	Range:	2.3	9.9	1.1	7.3	–	–	1.3	3.4

VARIABLES		SITE 1 UPPER EXISTING		Regional Curves Peidmont Rural/Rosgen Reference Values		SITE 1 UPPER DESIGN		SITE 1 LOWER EXISTING		Regional Curves Peidmont Rural/Rosgen Reference Values		SITE 1 LOWER DESIGN	
STATION		–		–		–		–		–		–	
1. Stream Type (Rosgen)		G5		C/E		C5		G5		C/E		C5	
2. Drainage Area (sq. mile)		0.13		0.13		0.13		0.13		0.13		0.13	
3. Bankfull Width	Mean:	5.9		5.0		7.6		6.8		5.0		8.4	
(W_{bkf})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
4. Bankfull Mean	Mean:	1.18		0.8		0.5		1.78		0.8		0.6	
depth (d_{bkf})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
5. Width/Depth Ratio	Mean:	5.0		6.3		13.9		3.8		6.3		13.8	
(W_{bkf}/d_{bkf})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
6. Bankfull cross-sectional	Mean:	4.0		5.4		4.2		12.0		5.4		5.1	
Area (Abkf)	Range:	–	–	–	–	–	–	–	–	–	–	–	–
7. Bankfull Mean Velocity	Mean:	4.3		3.8		4.2		2.5		3.8		5.9	
(V_{bkf})	Range:	4.0	4.7	–	–	3.9	4.6	2.4	2.8	–	–	5.5	6.5
8. Bankfull Discharge, cfs	Mean:	17.4		20.0		17.4		30.2		20.0		30.2	
(Q_{bkf})	Range:	16.2	19.0	–	–	16.2	19.0	28.2	33.4	–	–	28.2	33.4
9. Bankfull Maximum Depth	Mean:	1.4		–		0.8		1.8		–		0.9	
(d_{max})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
10. Max d_{max}/d_{bkf}	Mean:	1.2		1.4		1.5		1.0		1.4		1.5	
ratio	Range:	–	–	1.2	1.5	–	–	–	–	1.2	1.5	–	–
11. Low Bank Height to max	Mean:	3.5		–		1.0		2.1		–		1.0	
d_{bkf} ratio	Range:	–	–	–	–	–	–	–	–	–	–	–	–
12. Width of Flood Prone	Mean:	8.0		–		80.0		9.0		–		84.0	
Area (W_{fpa})	Range:	–	–	–	–			–	–	–	–	–	–
13. Entrenchment Ratio	Mean:	1.4		–		10.5		1.3		–		10.0	
(W_{fpa}/W_{bkf})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
14. Meander Length	Mean:	73.5		–		85.0		79.5		–		103.0	
(L_m)	Range:	43.0	104.0	–	–	68.4	106.4	75.0	84.0	–	–	89.0	117.0
15. Ratio of Meander Length to	Mean:	12.5		11.5		11.2		11.6		11.5		12.3	
Bankfull Width (L_m/W_{bkf})	Range:	7.3	17.7	9.0	14.0	9.0	14.0	11.0	12.3	9.0	14.0	9.0	14.0
16. Radius of Curvature	Mean:	29.0		–		22.8		31.0		–		25.2	
(R_c)	Range:	18.0	40.0	–	–	19.0	26.6	20.0	42.0	–	–	21.0	29.4
17. Ratio of Radius of Curvature	Mean:	4.9		2.8		3.0		4.5		2.8		3.0	
to Bankfull Width (R_c/W_{bkf})	Range:	3.1	6.8	2.5	3.0	2.5	3.5	2.9	6.1	2.5	3.0	2.5	3.5
18. Belt Width	Mean:	20.6		–		24.4		30.5		–		23.1	
(W_{blt})	Range:	13.1	28.1	–	–	19.0	25.1	25.0	36.0	–	–	21.0	25.2
19. Meander Width Ratio	Mean:	3.5		4.0		3.2		4.5		4.0		2.8	
(W_{blt}/W_{bkf})	Range:	2.2	4.8	3.0	5.0	2.5	3.3	3.7	5.3	3.0	5.0	2.5	3.0
20. Sinuosity (k)	Mean:	1.15		–		1.11		1.24		–		1.14	
(Stream Length / Valley Length)	Range:			–	–	–	–			–	–		
21. Valley Slope (S_{valley})	Mean:	0.0175		–		0.0175		0.0205		–		0.0205	
(ft/ft)	Range:			–	–					–	–		
22. Average Stream Slope	Mean:	0.0152		–		0.0150		0.0053		–		0.0185	
(S_{avg}) = (S_{valley}/k)	Range:	–	–	–	–	–	–	–	–	–	–	–	–
23. Riffle Slope	Mean:	0.0154		–		0.0162		0.0200		–		0.0193	
(S_{riff})	Range:	0.0138	0.0170	–	–	0.0101	0.0224	0.0125	0.0275	–	–	0.0102	0.0284
24. Ratio of Riffle Slope to Avg.	Mean:	1.0		1.8		1.1		3.8		1.8		1.0	
Slope (S_{riffle}/S_{avg})	Range:	0.9	1.1	1.5	2.0	0.7	1.5	2.4	5.2	1.5	2.0	0.6	1.5
25. Pool Slope	Mean:	0.0054		–		0.0001		0.0001		–		0.0001	
(S_{pool})	Range:	0.0043	0.0060	–	–	0.0001	0.0015	0.0001	0.0010	–	–	0.0001	0.0015
26. Ratio of Pool Slope to Avg.	Mean:	0.4		0.0		0.0		0.0		0.0		0.0	
Slope (S_{pool}/S_{avg})	Range:	0.3	0.4	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.1	0.0	0.1
27. Maximum Pool	Mean:	1.5		–		1.5		1.3		–		1.6	
Depth (d_{pool})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
28. Ratio of Pool Depth to Avg.	Mean:	1.3		3.0		2.7		0.7		3.0		2.6	
Depth (d_{pool}/d_{bkf})	Range:	–	–	2.5	3.5	–	–	–	–	2.5	3.5	–	–
29. Pool Width	Mean:	6.3		–		9.4		7.9		–		10.6	
(W_{pool})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
30. Ratio of Pool Width to	Mean:	1.1		1.5		1.2		1.2		1.5		1.3	
Bankfull Width (W_{pool}/W_{bkf})	Range:	–	–	1.3	1.7	–	–	–	–	1.3	1.7	–	–
31. Pool Area	Mean:	7.6		–		7.0		8.0		–		8.8	
(A_{pool})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
32. Ratio of Pool Area to	Mean:	1.9		–		1.7		0.7		–		1.7	
Bankfull Area (A_{pool}/A_{bkf})	Range:	–	–	–	–	–	–	–	–	–	–	–	–
33. Pool to Pool Spacing	Mean:	38.0		–		46.0		32.7		–		52.5	
(p - p)	Range:	32.0	56.0	–	–	38.0	53.2	25.0	37.0	–	–	44.0	61.0
34. Ratio of Pool to Pool Spacing	Mean:	6.5		6.0		6.1		4.8		6.0		6.3	
to Bankfull Width (p-p/Wbkf)	Range:	5.4	9.5	5.0	7.0	5.0	7.0	3.7	5.4	5.0	7.0	5.0	7.0

1. Geomorphic feature was not visibly present due to channelization and/or urban impacts to stream channel.
2. Feature was not measured as part of the project field effort

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09/26/11

PREPARED IN THE OFFICE OF:
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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-2F

PROJECT ENGINEER

APPROVED BY:

DATE:

MORPHOLOGICAL TABLE

VARIABLES		SITE 2 EXISTING		Regional Curves Peidmont Rural/Rosgen Reference Values		SITE 2 DESIGN		SITE 3 EXISTING		Regional Curves Peidmont Rural/Rosgen Reference Values		SITE 3 DESIGN	
STATION		–		–		–		–		–		–	
1. Stream Type (Rosgen)		E5		C/E		C5		G5		C/E		C5	
2. Drainage Area (sq. mile)		0.09		0.09		0.09		0.05		0.05		0.05	
3. Bankfull Width (W_{bkf})	Mean:	6.2		4.3		7.6		5.6		3.3		7.3	
	Range:	–	–	–	–	–	–	--	--	–	–	–	–
4. Bankfull Mean depth (d_{bkf})	Mean:	0.62		0.7		0.5		0.89		0.6		0.5	
	Range:	–	–	–	–	–	–	--	--	–	–	--	--
5. Width/Depth Ratio (W_{bkf}/d_{bkf})	Mean:	10.0		6.1		13.9		6.3		5.7		13.6	
	Range:	–	–	–	–	–	–	--	--	–	–	--	--
6. Bankfull cross-sectional Area (Abkf)	Mean:	3.9		4.3		4.2		5.0		2.8		3.9	
	Range:	–	–	--	--	–	–	--	--	–	–	--	--
7. Bankfull Mean Velocity (V_{bkf})	Mean:	4.4		3.8		4.0		6.5		3.7		8.3	
	Range:	4.1	4.8	–	–	3.8	4.5	6.1	7.2	–	–	7.7	9.1
8. Bankfull Discharge, cfs (Q_{bkf})	Mean:	16.8		16.3		16.8		32.4		10.3		32.4	
	Range:	15.7	18.6	–	–	15.7	18.6	30.3	35.8	–	–	30.3	35.8
9. Bankfull Maximum Depth (d_{max})	Mean:	1.1		–		0.8		1.1		–		0.8	
	Range:	–	–	–	–	–	–	--	--	–	–	–	–
10. Max d_{max}/d_{bkf} ratio	Mean:	1.8		1.4		1.5		1.2		1.4		1.5	
	Range:	–	–	1.2	1.5	–	–	--	--	1.2	1.5	–	–
11. Low Bank Height to max d_{bkf} ratio	Mean:	1.0		–		1.0		2.8		–		1.0	
	Range:	–	–	–	–	–	–	--	--	–	–	–	–
12. Width of Flood Prone Area (W_{fpa})	Mean:	15.9		–		34.0		8.0		–		65.0	
	Range:	–	–	–	–	25.0	38	--	--	–	–		
13. Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean:	2.6		–		4.5		1.4		–		8.9	
	Range:	–	–	–	–	3.3	5.0	--	--	–	–	--	--
14. Meander Length (L_m)	Mean:	77.5		–		89.0		47.0		–		81.0	
	Range:	75.0	80.0	–	–	72.0	100.0	47.0	47.0	–	–	–	–
15. Ratio of Meander Length to Bankfull Width (L_m/W_{bkf})	Mean:	12.4		11.5		11.7		8.4		11.5		11.1	
	Range:	12.0	12.8	9.0	14.0	9.0	14.0	9.0	14.0	9.0	14.0	9.0	14.0
16. Radius of Curvature (R_c)	Mean:	28.0		–		22.8		20.0		–		21.9	
	Range:	18.0	38.0	–	–	19.0	26.6	14.0	26.0	–	–	18.3	25.6
17. Ratio of Radius of Curvature to Bankfull Width (R_c/W_{bkf})	Mean:	4.5		3.0		3.0		3.6		3.0		3.0	
	Range:	2.9	6.1	2.5	3.5	2.5	3.5	2.5	4.6	2.5	3.5	2.5	3.5
18. Belt Width (W_{blt})	Mean:	21.8		–		23.4		26.8		–		18.9	
	Range:	6.5	37.0	–	–	19.0	25.1	21.6	31.9	–	–	18.3	21.9
19. Meander Width Ratio (W_{blt}/W_{bkf})	Mean:	3.5		4.0		3.1		4.8		4.0		2.6	
	Range:	1.0	5.9	3.0	5.0	2.5	3.3	3.9	5.7	3.0	5.0	2.5	3.0
20. Sinuosity (k) (Stream Length / Valley Length)	Mean:	1.16		–		1.18		1.25		–		1.04	
	Range:			–	–			--	--	–	–	--	--
21. Valley Slope (S_{Valley}) (ft/ft)	Mean:	0.0506		–		0.0506		0.0237		–		0.0237	
	Range:			–	–			--	--	–	–		
22. Average Stream Slope (S_{avg}) = (S_{valley} /K)	Mean:	0.0158		–		0.0257		0.0350		–		0.0400	
	Range:	0.0054	0.0158	–	–	–	–	--	--	–	–	--	--
23. Riffle Slope (S_{rff})	Mean:	0.0295		–		0.0288		0.0471		–		0.0339	
	Range:	0.0090	0.0500	–	–	0.0106	0.0469	0.0232	0.0710	–	–	0.0246	0.0432
24. Ratio of Riffle Slope to Avg. Slope (S_{rff}/S_{avg})	Mean:	1.9		1.8		1.1		1.3		1.8		0.8	
	Range:	0.6	3.2	1.5	2.0	0.4	1.8	0.7	2.0	1.5	2.0	0.6	1.1
25. Pool Slope (S_{pool})	Mean:	0.0001		–		0.0001		0.0001		–		0.0001	
	Range:	0.0001	0.0010	–	–	0.0001	0.0015	0.0001	0.0010	–	–	0.0001	0.0015
26. Ratio of Pool Slope to Avg. Slope (S_{poo}/S_{avg})	Mean:	0.0		0.0		0.0		0.0		0.0		0.0	
	Range:	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1
27. Maximum Pool Depth (d_{pool})	Mean:	1.5		–		1.5		1.9		–		1.5	
	Range:	–	–	–	–	–	–	--	--	–	–	–	–
28. Ratio of Pool Depth to Avg. Depth (d_{poo}/d_{bkf})	Mean:	2.4		3.0		2.7		2.1		3.0		2.8	
	Range:	–	–	2.5	3.5	–	–	--	--	2.5	3.5	--	--
29. Pool Width (W_{pool})	Mean:	5.9		–		9.4		7.0		–		9.4	
	Range:	–	–	–	–	–	–	--	--	–	–	--	--
30. Ratio of Pool Width to Bankfull Width (W_{poo}/W_{bkf})	Mean:	0.9		1.5		1.2		1.2		1.5		1.3	
	Range:	–	–	1.3	1.7	–	–	--	--	1.3	1.7	--	--
31. Pool Area (A_{pool})	Mean:	5.0		–		7.0		9.1		–		7.0	
	Range:	–	–	–	–	–	–	--	--	–	–	--	--
32. Ratio of Pool Area to Bankfull Area (A_{poo}/A_{bkf})	Mean:	1.3		–		1.7		1.8		–		1.8	
	Range:	–	–	–	–	–	–	--	--	–	–	--	--
33. Pool to Pool Spacing (p - p)	Mean:	23.5		–		46.5		16.3		–		38.0	
	Range:	18.0	29.0	–	–	39.0	54.0	15.5	17.0	–	–	36.5	51.1
34. Ratio of Pool to Pool Spacing to Bankfull Width (p-p/Wbkf)	Mean:	3.8		6.0		6.1		2.9		6.0		5.2	
	Range:	2.9	4.7	5.0	7.0	5.0	7.0	2.8	3.0	5.0	7.0	5.0	7.0

1. Geomorphic feature was not visibly present due to channelization and/or urban impacts to stream channel.
2. Feature was not measured as part of the project field effort

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MORPHOLOGICAL TABLE

	VARIABLES	SITE 4 EXISTING			Regional Curves Peidmont Rural/Rosgen Reference Values			SITE 4 DESIGN			SITE 5 EXISTING			Regional Curves Peidmont Rural/Rosgen Reference Values			SITE 5 DESIGN		
	STATION	–			–			–			–			–			–		
1.	Stream Type (Rosgen)	E5			C/E			C5			E5 –> F5			C/E			C5		
2.	Drainage Area (sq. mile)	3.04			3.04			3.04			0.41			0.41			0.41		
3.	Bankfull Width	Mean:	15.7		Mean:	19.2		Mean:	25.0		Mean:	6.6		Mean:	8.1		Mean:	11.7	
	(W_{bkf})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
4.	Bankfull Mean	Mean:	2.06		Mean:	2.1		Mean:	1.8		Mean:	0.98		Mean:	1.1		Mean:	0.8	
	depth (d_{bkf})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
5.	Width/Depth Ratio	Mean:	7.6		Mean:	9.0		Mean:	14.3		Mean:	6.8		Mean:	7.2		Mean:	14.1	
	(W_{bkf}/d_{bkf})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
6.	Bankfull cross-sectional	Mean:	32.4		Mean:	45.6		Mean:	43.8		Mean:	6.6		Mean:	11.7		Mean:	9.7	
	Area (Abkf)	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
7.	Bankfull Mean Velocity	Mean:	1.5		Mean:	4.3		Mean:	1.1		Mean:	3.4		Mean:	4.0		Mean:	2.3	
	(V_{bkf})	Range:	1.4	1.7	Range:	–	–	Range:	1.0	1.2	Range:	3.2	3.8	Range:	–	–	Range:	2.2	2.6
8.	Bankfull Discharge, cfs	Mean:	49.0		Mean:	198.3		Mean:	49.0		Mean:	22.6		Mean:	46.9		Mean:	22.6	
	(Q_{bkf})	Range:	45.7	54.1	Range:	–	–	Range:	45.7	54.1	Range:	21.1	25.0	Range:	–	–	Range:	21.1	25.0
9.	Bankfull Maximum Depth	Mean:	2.85		Mean:	–		Mean:	2.5		Mean:	1.4		Mean:	–		Mean:	1.2	
	(d_{max})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
10.	Max d_{max}/d_{bkf}	Mean:	1.4		Mean:	1.4		Mean:	1.4		Mean:	1.4		Mean:	1.4		Mean:	1.4	
	ratio	Range:	–	–	Range:	1.2	1.5	Range:	–	–	Range:	–	–	Range:	1.2	1.5	Range:	–	–
11.	Low Bank Height to max	Mean:	1.1		Mean:	–		Mean:	1.0		Mean:	2.0		Mean:	–		Mean:	1.0	
	d_{bkf} ratio	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
12.	Width of Flood Prone	Mean:	85.0		Mean:	–		Mean:	85.0		Mean:	14.5		Mean:	–		Mean:	80.0	
	Area (W_{fpa})	Range:	–	–	Range:	–	–	Range:			Range:	–	–	Range:	–	–	Range:		
13.	Entrenchment Ratio	Mean:	5.4		Mean:	–		Mean:	3.4		Mean:	2.2		Mean:	–		Mean:	6.8	
	(W_{fpa}/W_{bkf})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
14.	Meander Length	Mean:	101.0		Mean:	–		Mean:	180.0		Mean:	70.0		Mean:	–		Mean:	140.5	
	(L_m)	Range:	94.0	108.0	Range:	–	–	Range:	–	–	Range:	37.5	115.0	Range:	–	–	Range:	112.0	169.0
15.	Ratio of Meander Length to	Mean:	6.4		Mean:	11.5		Mean:	7.2		Mean:	10.6		Mean:	11.5		Mean:	12.0	
	Bankfull Width (L_m/W_{bkf})	Range:	6.0	6.9	Range:	9.0	14.0	Range:	–	–	Range:	5.7	17.3	Range:	9.0	14.0	Range:	9.0	14.0
16.	Radius of Curvature	Mean:	78.0		Mean:	–		Mean:	75.0		Mean:	35.0		Mean:	–		Mean:	35.1	
	(R_c)	Range:	56.0	100.0	Range:	–	–	Range:	62.5	87.5	Range:	18.0	52.0	Range:	–	–	Range:	29.3	41.0
17.	Ratio of Radius of Curvature	Mean:	5.0		Mean:	2.8		Mean:	3.0		Mean:	5.3		Mean:	2.8		Mean:	3.0	
	to Bankfull Width (R_c/W_{bkf})	Range:	3.6	6.4	Range:	2.5	3.0	Range:	2.5	3.5	Range:	2.7	7.8	Range:	2.5	3.0	Range:	2.5	3.5
18.	Belt Width	Mean:	39.8		Mean:	–		Mean:	28.0		Mean:	26.0		Mean:	–		Mean:	32.0	
	(W_{blt})	Range:	37.5	42.0	Range:	–	–	Range:	25.0	75.0	Range:	17.0	35.0	Range:	–	–	Range:	29.0	35.0
19.	Meander Width Ratio	Mean:	2.5		Mean:	4.0		Mean:	1.1		Mean:	3.9		Mean:	4.0		Mean:	2.7	
	(W_{blt}/W_{bkf})	Range:	2.4	2.7	Range:	3.0	5.0	Range:	1.0	3.0	Range:	2.6	5.3	Range:	3.0	5.0	Range:	2.5	3.0
20.	Sinuosity (k)	Mean:	1.02		Mean:	–		Mean:	1.00		Mean:	1.14		Mean:	–		Mean:	1.15	
	(Stream Length / Valley Length)	Range:			Range:	–	–	Range:			Range:	–	–	Range:	–	–	Range:		
21.	Valley Slope (S_{valley})	Mean:	0.0200		Mean:	–		Mean:	0.0200		Mean:	0.0155		Mean:	–		Mean:	0.0155	
	(ft/ft)	Range:			Range:	–	–	Range:			Range:	–	–	Range:	–	–	Range:		
22.	Average Stream Slope	Mean:	0.0019		Mean:	–		Mean:	0.0020		Mean:	0.0097		Mean:	–		Mean:	0.0138	
	(S_{avg}) = (S_{valley}/k)	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
23.	Riffle Slope	Mean:	0.0012		Mean:	–		Mean:	0.0027		Mean:	0.0103		Mean:	–		Mean:	0.0158	
	(S_{riff})	Range:	0.0005	0.0019	Range:	–	–	Range:	0.0021	0.0033	Range:	–	–	Range:	–	–	Range:	0.0126	0.0189
24.	Ratio of Riffle Slope to Avg.	Mean:	0.6		Mean:	1.8		Mean:	1.4		Mean:	1.1		Mean:	1.8		Mean:	1.2	
	Slope (S_{riffle}/S_{avg})	Range:	0.3	1.0	Range:	1.5	2.0	Range:	1.1	1.7	Range:	–	–	Range:	1.5	2.0	Range:	0.91	1.4
25.	Pool Slope	Mean:	0.0001		Mean:	–		Mean:	0.0001		Mean:	0.00010		Mean:	–		Mean:	0.0001	
	(S_{pool})	Range:	0.0001	0.0010	Range:	–	–	Range:	0.0001	0.0015	Range:	0.0001	0.0010	Range:	–	–	Range:	0.0001	0.0015
26.	Ratio of Pool Slope to Avg.	Mean:	0.1		Mean:	0.0		Mean:	0.1		Mean:	0.0		Mean:	0.0		Mean:	0.0	
	Slope (S_{pool}/S_{avg})	Range:	0.1	0.5	Range:	0.0	0.1	Range:	0.0	0.1	Range:	0.0	0.1	Range:	0.0	0.1	Range:	0.0	0.1
27.	Maximum Pool	Mean:	2.4		Mean:	–		Mean:	4.5		Mean:	1.6		Mean:	–		Mean:	2.2	
	Depth (d_{pool})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
28.	Ratio of Pool Depth to Avg.	Mean:	1.1		Mean:	3.0		Mean:	2.6		Mean:	1.6		Mean:	3.0		Mean:	2.6	
	Depth (d_{pool}/d_{bkf})	Range:	–	–	Range:	2.5	3.5	Range:	–	–	Range:	–	–	Range:	2.5	3.5	Range:	–	–
29.	Pool Width	Mean:	16.2		Mean:	–		Mean:	30.5		Mean:	8.7		Mean:	–		Mean:	14.4	
	(W_{pool})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
30.	Ratio of Pool Width to	Mean:	1.0		Mean:	1.5		Mean:	1.2		Mean:	1.3		Mean:	1.5		Mean:	1.2	
	Bankfull Width (W_{pool}/W_{bkf})	Range:	–	–	Range:	1.3	1.7	Range:	–	–	Range:	–	–	Range:	1.3	1.7	Range:	–	–
31.	Pool Area	Mean:	36.8		Mean:	–		Mean:	72.4		Mean:	8.8		Mean:	–		Mean:	16.2	
	(A_{pool})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
32.	Ratio of Pool Area to	Mean:	1.1		Mean:	–		Mean:	1.7		Mean:	1.3		Mean:	–		Mean:	1.7	
	Bankfull Area (A_{pool}/A_{bkf})	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–	Range:	–	–
33.	Pool to Pool Spacing	Mean:	78.5		Mean:	–		Mean:	97.0		Mean:	43.0		Mean:	–		Mean:	78.0	
	(p - p)	Range:	50.0	107.0	Range:	–	–	Range:	58.0	136.0	Range:	26.0	60.0	Range:	–	–	Range:	60.0	90.0
34.	Ratio of Pool to Pool Spacing	Mean:	5.0		Mean:	6.0		Mean:	3.9		Mean:	6.5		Mean:	6.0		Mean:	6.7	
	to Bankfull Width (p-p/Wbkf)	Range:	3.2	6.8	Range:	5.0	7.0	Range:	2.3	5.5	Range:	3.9	9.0	Range:	5.0	7.0	Range:	5.0	7.0

1. Geomorphic feature was not visibly present due to channelization and/or urban impacts to stream channel.
2. Feature was not measured as part of the project field effort

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SUMMARY OF QUANTITIES,
SUMMARY OF EARTHWORK
FOR MITIGATION

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-3

PROJECT ENGINEER

APPROVED BY:

DATE:

SUMMARY OF QUANTITIES

DESCRIPTION	SECTION	QUANTITIY	UNIT	ITEM DESCRIPTION
0000400000-N	SP		LS	CONSTRUCTION SURVEYING FOR MITIGATION
0043000000-N	SP		LS	GRADING FOR MITIGATION
1077000000-M	1610		TON	#57 STONE
3656000000-M	1042		SY	FILTER FABRIC FOR DRAINAGE
3651000000-M	SP		TON	BOULDER
3642000000-M	SP		TON	PLAIN RIP RAP, CLASS A
3649000000-M	SP		TON	PLAIN RIP RAP, CLASS B
6133000000-N	SP		LS	DIVERSION PUMPING FOR MITIGATION
6133000000-N	SP		EA	LOGS
6133000000-N	SP		EA	ROOTWADS

SUMMARY OF EARTHWORK FOR MITIGATION

LOCATION	MITIGATION UNCLASSIFIED EXCAV. (CU.YD.)	MITIGATION EMBANKMENT	MITIGATION BORROW (CU.YD.)	MITIGATION WASTE (CU.YD.)
SITE 1				
SITE 2				
SITE 3				
SITE 4				
SITE 5				
SUBTOTAL				

APPROXIMATE QUANTITIES ONLY, MITIGATION UNCLASSIFIED EXCAVATION, MITIGATION BORROW EXCAVATION, MITIGATION FINE GRADING AND MITIGATION CLEARING AND GRUBBING WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING FOR MITIGATION".

09/26/11

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

PREPARED IN THE OFFICE OF:
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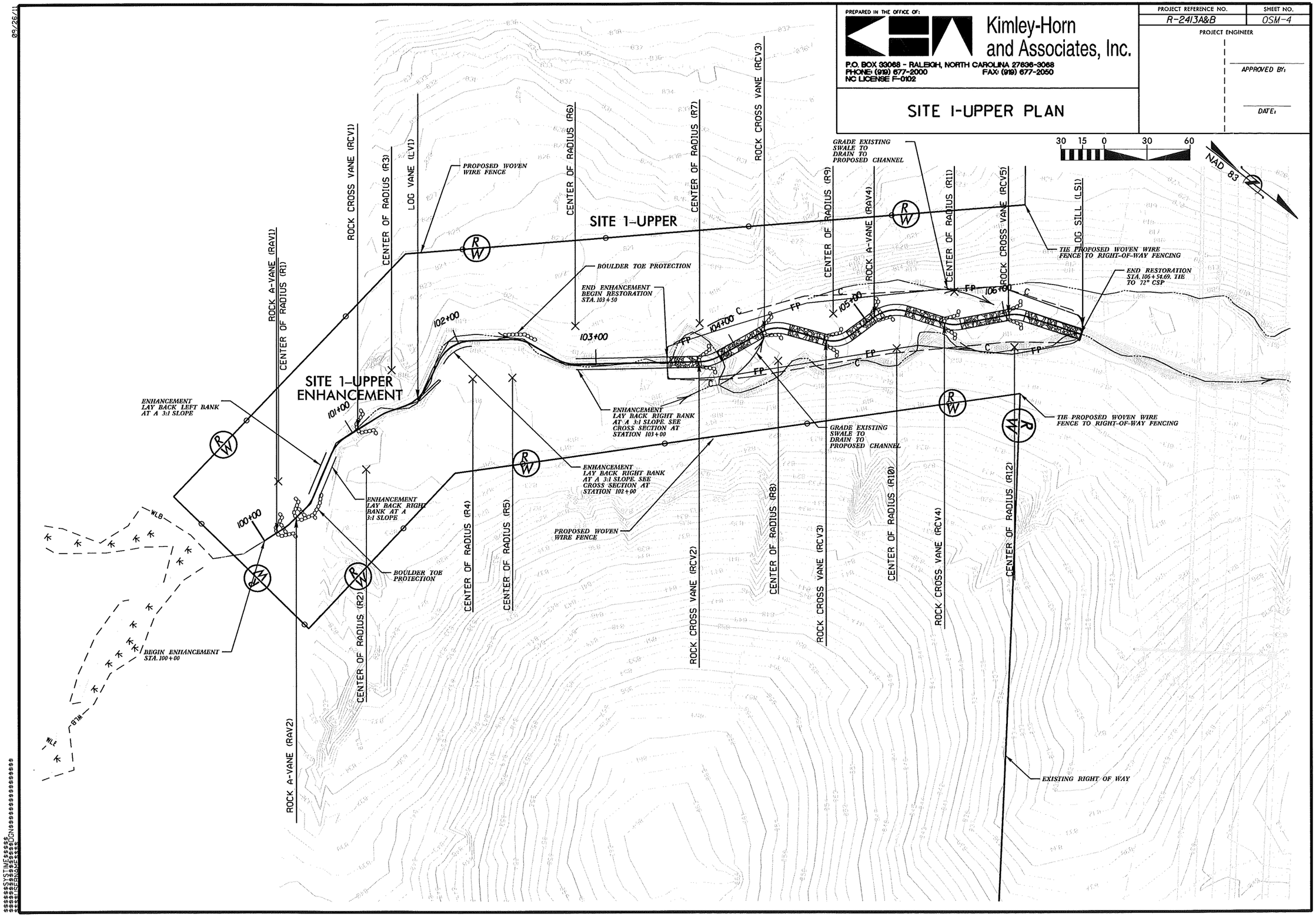
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-4

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 1-UPPER PLAN



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SITE 1- LOWER PLAN

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-5

PROJECT ENGINEER

APPROVED BY:

DATE:

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

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-6

PROJECT ENGINEER

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DATE:

SITE 2-UPPER PLAN

30 15 0 30 60

NAD 83

ROCK CROSS VANE (RCV1)
CENTER OF RADIUS (R1)
ROCK CROSS VANE (RCV2)
ROCK CROSS VANE (RCV3)
CENTER OF RADIUS (R3)
ROCK CROSS VANE (RCV4)
ROCK CROSS VANE (RCV5)
CENTER OF RADIUS (R5)
ROCK CROSS VANE (RCV6)
ROCK CROSS VANE (RCV7)
CENTER OF RADIUS (R7)
ROCK CROSS VANE (RCV8)
ROCK CROSS VANE (RCV9)
ROCK A-VANE (RAV1)

SITE 2-UPPER

PROPOSED WOVEN WIRE FENCE

TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING

TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING

BEGIN RELOCATION STA. 200+00

END RELOCATION STA. 204+23.77. TIE TO 54" RCP.

200+00
201+00
202+00
203+00
204+00

CENTER OF RADIUS (R2)
CENTER OF RADIUS (R4)
CENTER OF RADIUS (R6)
CENTER OF RADIUS (R8)
CENTER OF RADIUS (R9)

FP
C
RW

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SITE 2-LOWER PLAN

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-7

PROJECT ENGINEER

APPROVED BY:

DATE:

09/26/11

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

09/26/11

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SITE 3 PLAN

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-8

PROJECT ENGINEER

APPROVED BY:

DATE:

30 15 0 30 60

NAD 83

PROPOSED WOVEN WIRE FENCE

SITE 3-LOWER

END RESTORATION STA. 350+26

INSTALL SINGLE ROCK A-VANE AT CULVERT OUTLET

ROCK A-VANE (RAV7)

BEGIN RESTORATION STA. 350+00
ENSURE INVERT OF ROCK A-VANE (RAV7) IS PLACED 1.0' ABOVE OUTLET INVERT OF PROPOSED 78" CSP

ROCK A-VANE (RAV1)
CENTER OF RADIUS (R1)
ROCK A-VANE (RAV3)
ROCK A-VANE (RAV4)
CENTER OF RADIUS (R3)
ROCK A-VANE (RAV6)
LOG SILL (LS1)
CENTER OF RADIUS (R5)
ROCK CROSS VANE (RCV1)
ROCK VANE (RV1)

END RESTORATION STA. 301+75.38 WESTERN BRANCH TIE TO PROPOSED 78" CSP

END RESTORATION STA 321+81.99 EASTERN BRANCH

BEGIN RESTORATION STA 320+95.38 EASTERN BRANCH

TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING

BOULDER TOE PROTECTION (30 LINEAR FEET ENHANCEMENT)

BEGIN RESTORATION STA. 300+00 WESTERN BRANCH

SITE 3-UPPER

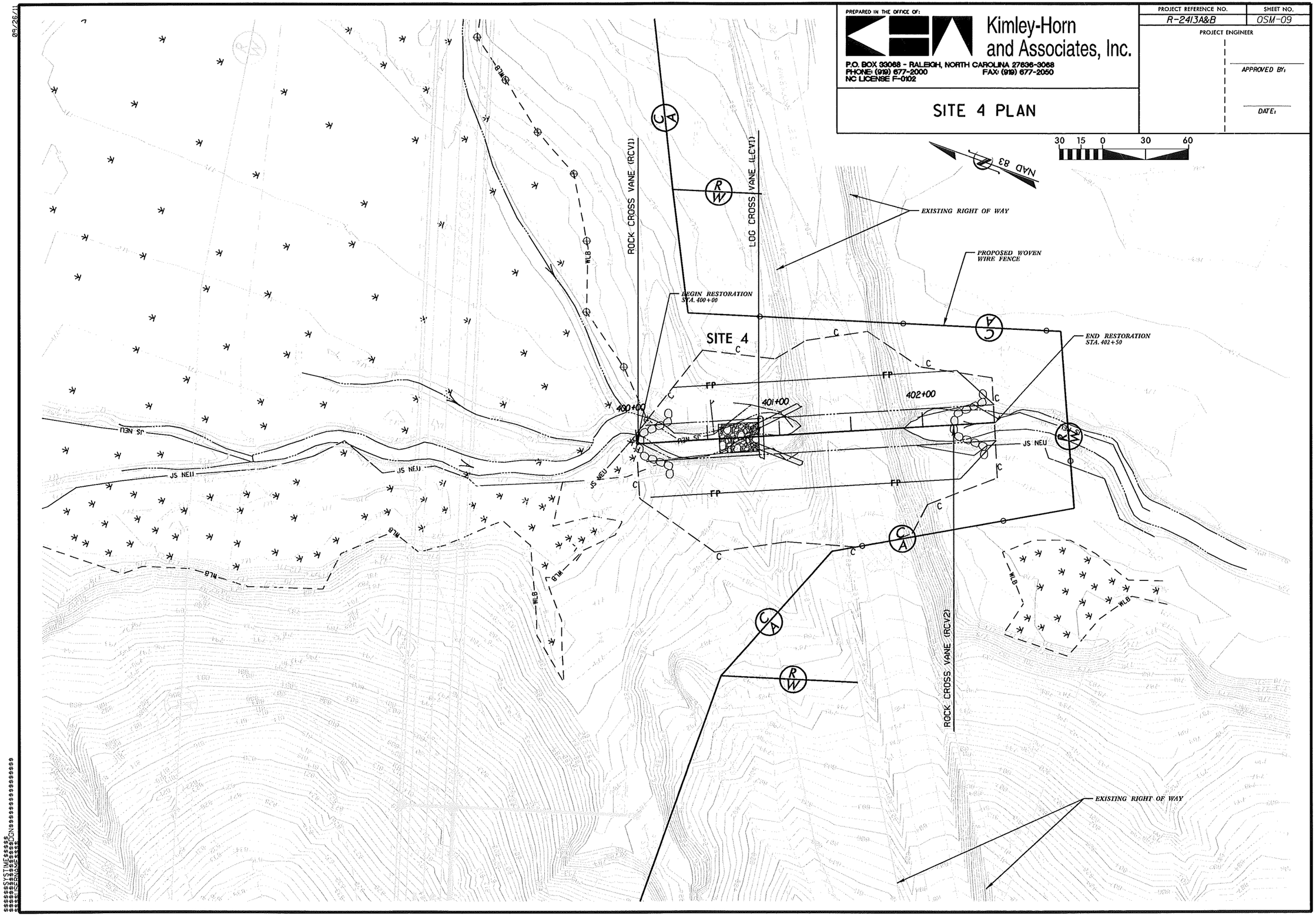
ROCK A-VANE (RAV2)
CENTER OF RADIUS (R2)
ROCK A-VANE (RAV5)
ROCK CROSS VANE (RCV2)
CENTER OF RADIUS (R4)

TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING

ROCK VANE (25 LINEAR FEET ENHANCEMENT)

PROPOSED WOVEN WIRE FENCE

$$$$SYSTIME$$$$
$$$$FILENAME$$$$



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SITE 4 PLAN
PROJECT REFERENCE NO.
R-2413A&B
SHEET NO.
OSM-09
PROJECT ENGINEER
APPROVED BY:
DATE:
30 15 0 30 60
NAD 83
EXISTING RIGHT OF WAY
PROPOSED WOVEN WIRE FENCE
BEGIN RESTORATION STA. 400+00
END RESTORATION STA. 402+50
SITE 4
ROCK CROSS VANE (RCV1)
LOG CROSS VANE (LCV1)
ROCK CROSS VANE (RCV2)
400+00
401+00
402+00
JS NEU
WLB
FP
C
EXISTING RIGHT OF WAY

PREPARED IN THE OFFICE OF:
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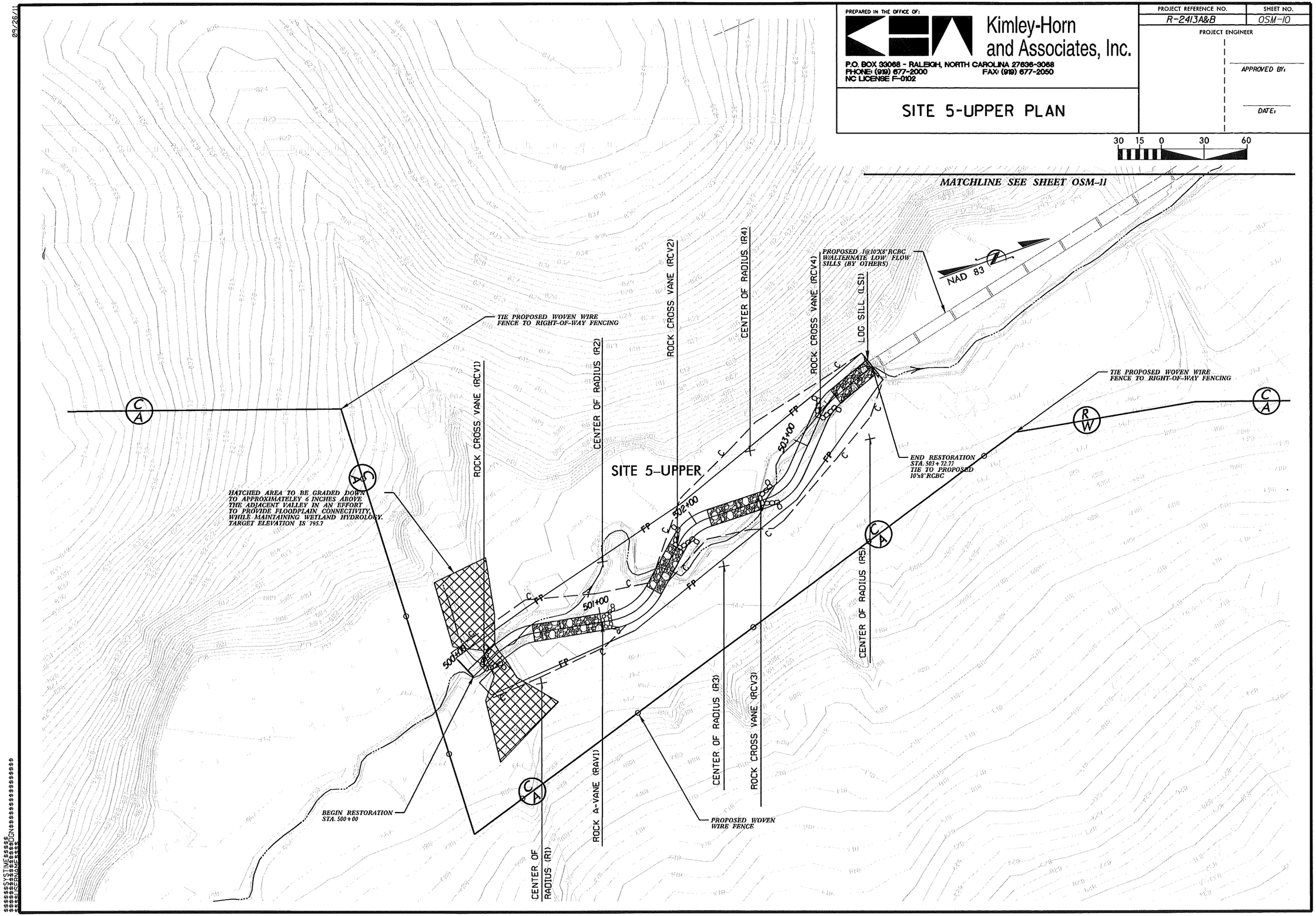
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-10

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 5-UPPER PLAN



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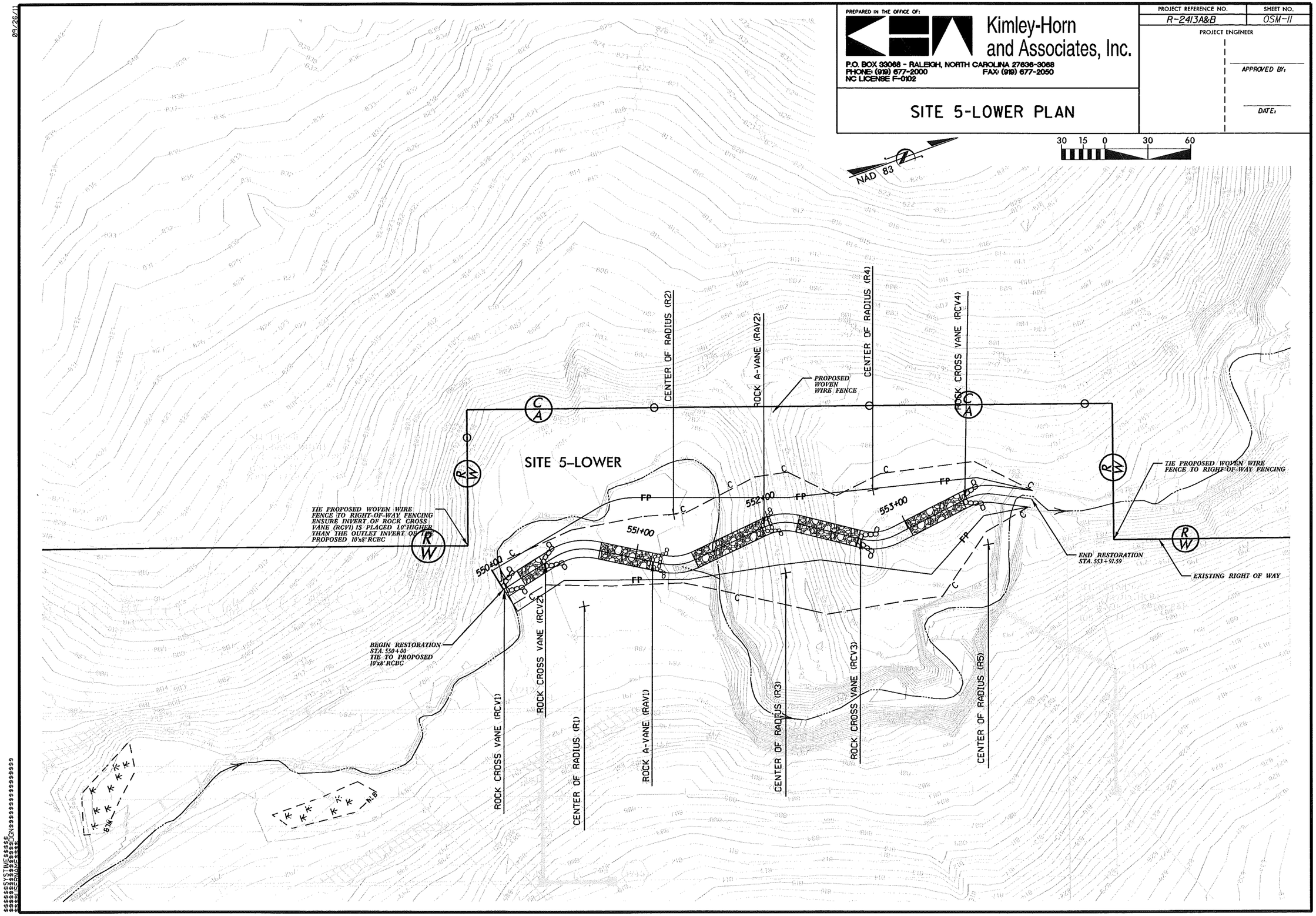
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-11

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 5-LOWER PLAN



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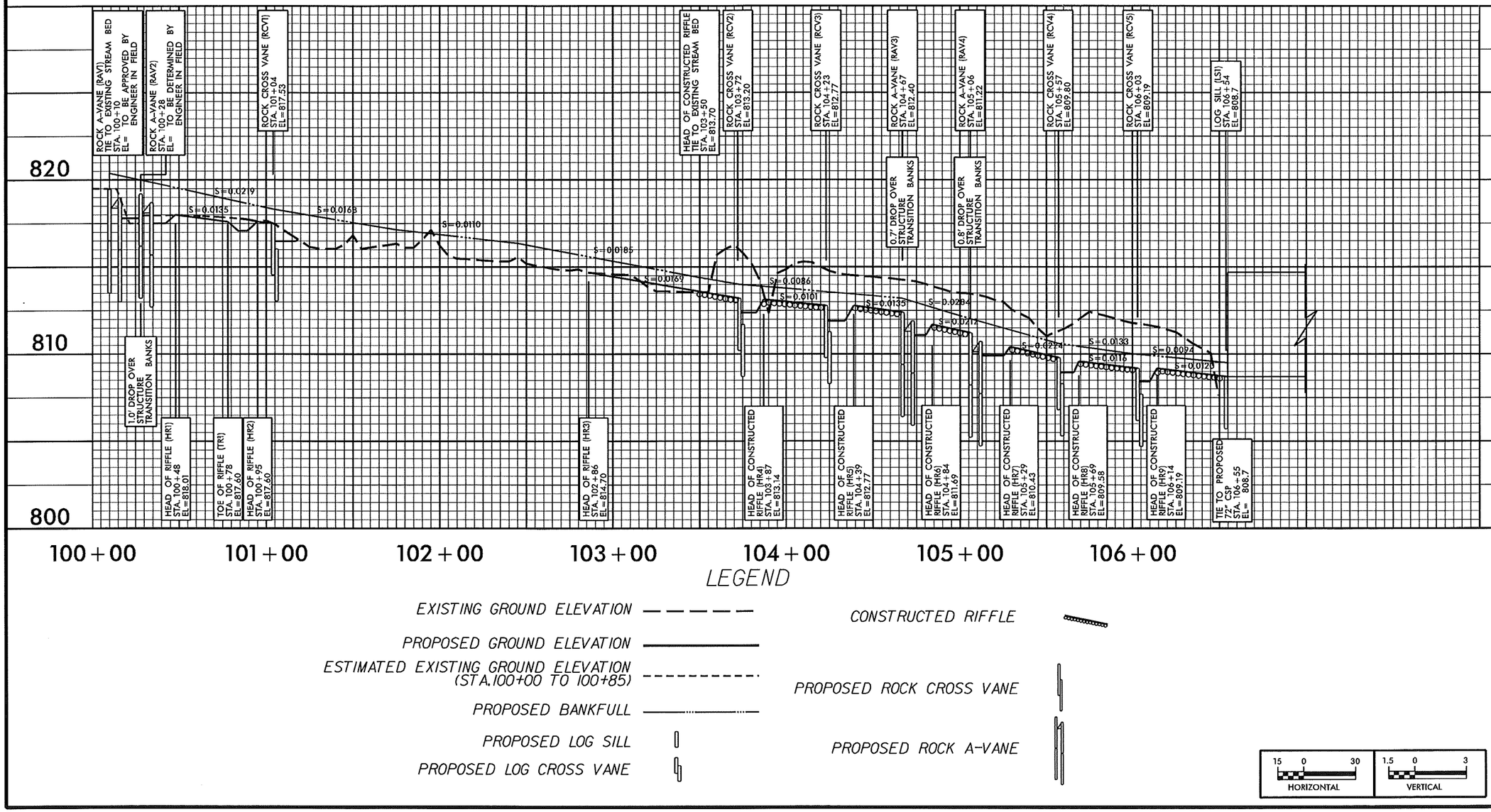
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-12

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 1 UPPER PROFILE



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- ESTIMATED EXISTING GROUND ELEVATION (STA.100+00 TO 100+85)
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

HORIZONTAL 15 0 30

VERTICAL 1.5 0 3

09/26/11

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-13

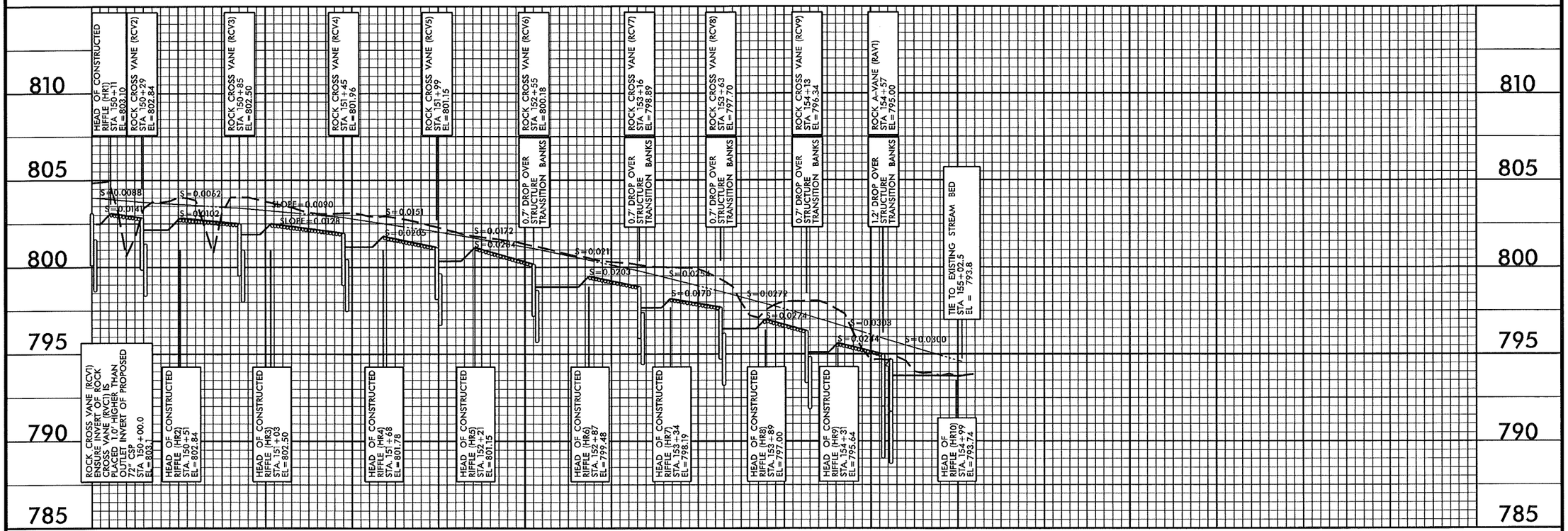
PROJECT ENGINEER

APPROVED BY:

DATE:

SITE I LOWER PROFILE

SITE 1 LOWER



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

09/26/11

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-14

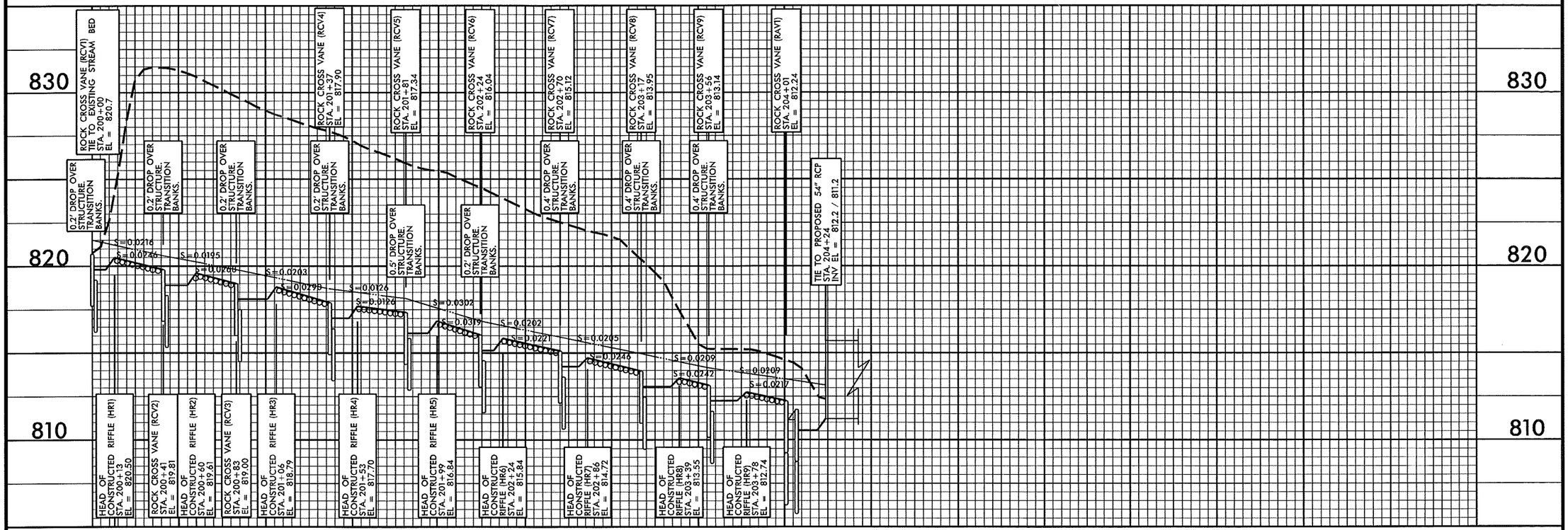
PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2 UPPER PROFILE

SITE 2 UPPER



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

HORIZONTAL 15 0 30

VERTICAL 1.5 0 3

09/26/11

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-15

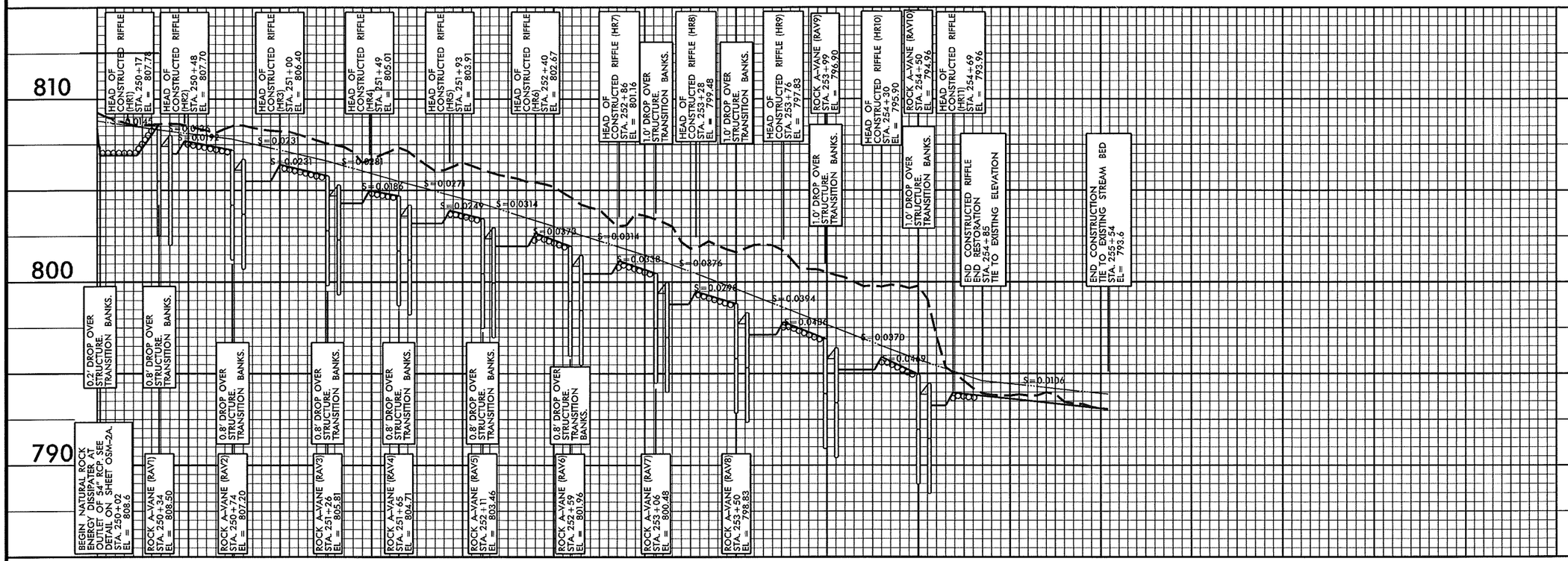
PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2 LOWER PROFILE

SITE 2 LOWER



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

HORIZONTAL 15 0 30

VERTICAL 1.5 0 3

09/26/11

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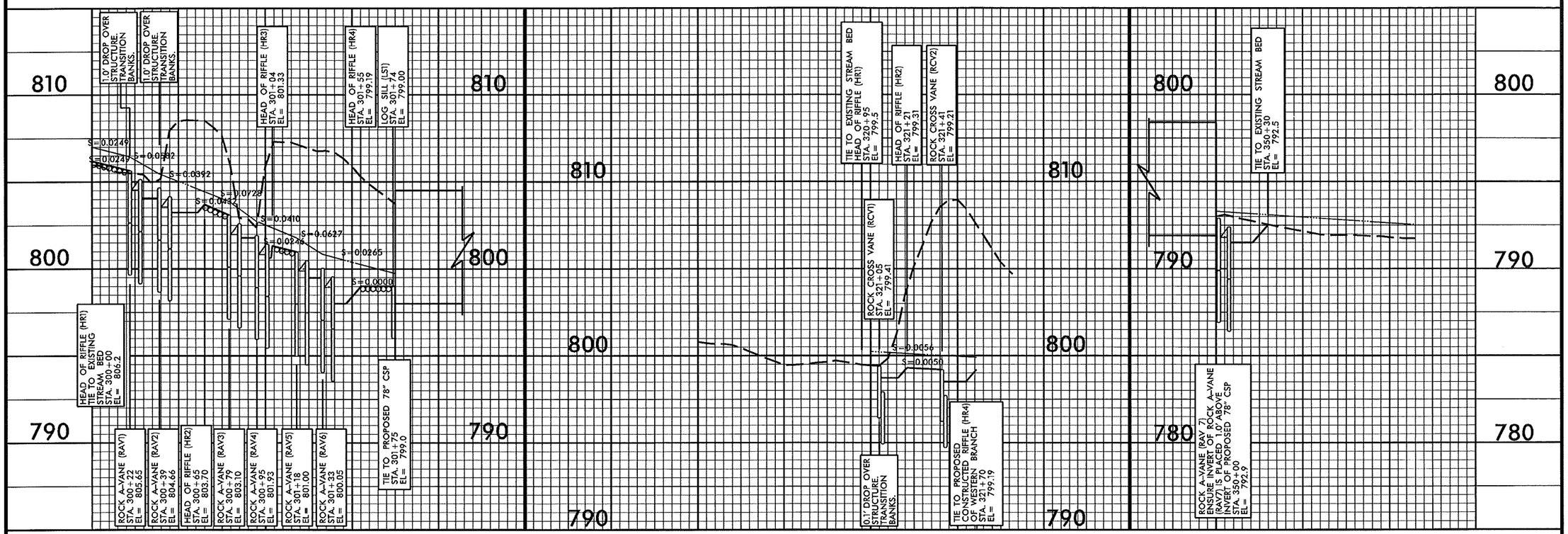
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-16

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 3 UPPER EAST PROFILE
SITE 3 UPPER WEST PROFILE
SITE 3 LOWER PROFILE



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

HORIZONTAL 15 0 30

VERTICAL 1.5 0 3

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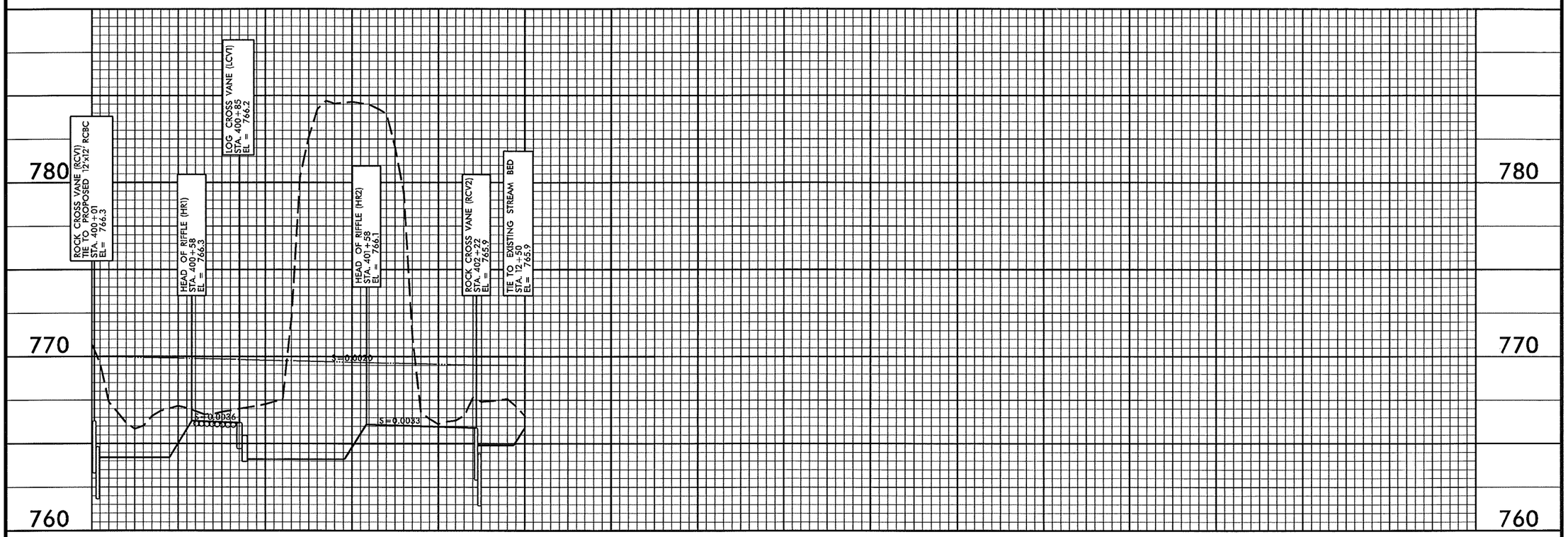
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-17

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 4 PROFILE



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-18

PROJECT ENGINEER

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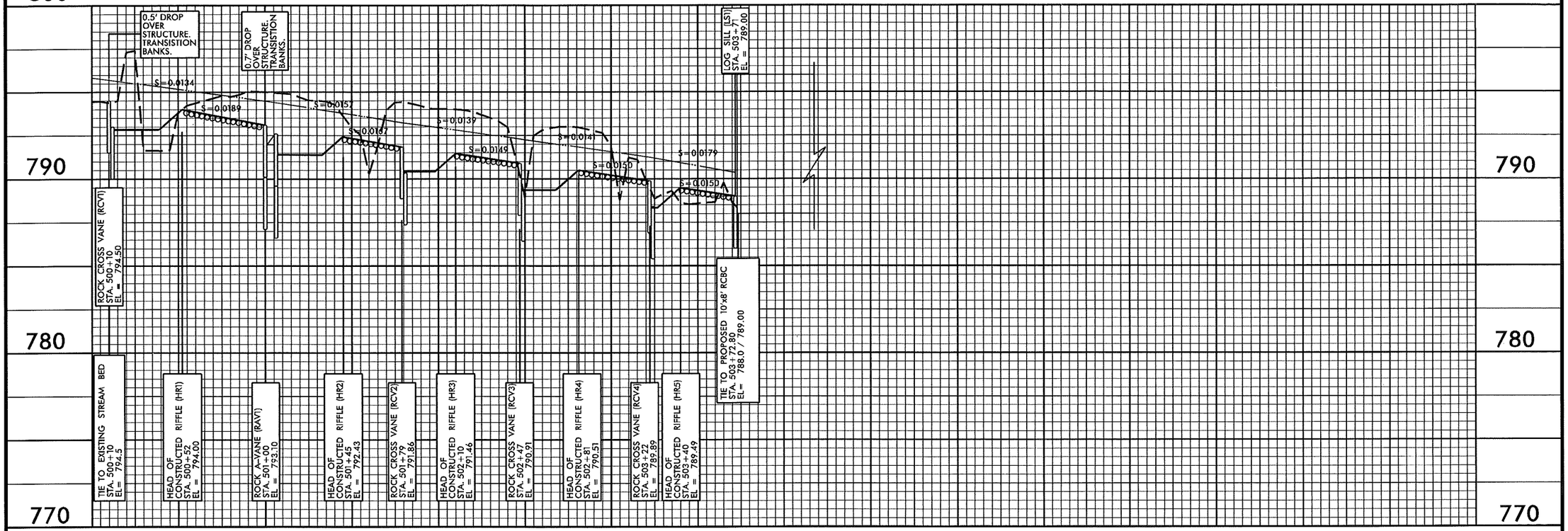
SITE 5 UPPER PROFILE



LEGEND

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

PROPOSED LOG SILL

PROPOSED LOG CROSS VANE

CONSTRUCTED RIFFLE

PROPOSED ROCK CROSS VANE

PROPOSED ROCK A-VANE

HORIZONTAL	VERTICAL
15 0 30	1.5 0 3

09/26/11

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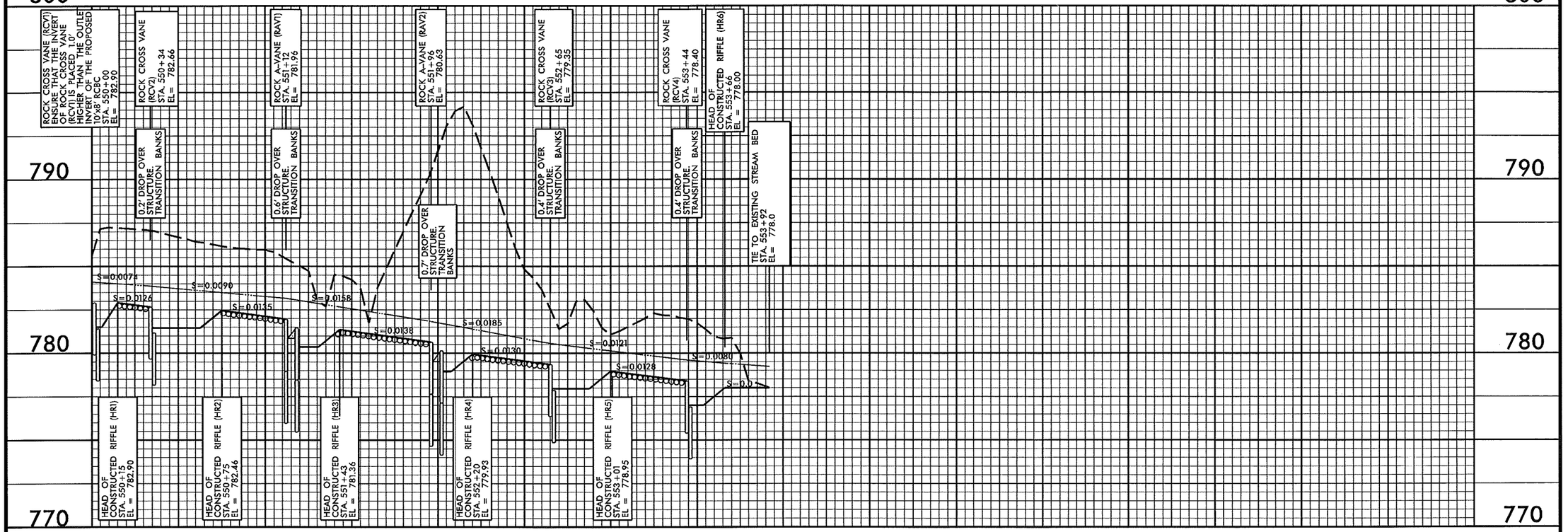
PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-19

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 5 LOWER PROFILE



LEGEND

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

PROPOSED LOG SILL

PROPOSED LOG CROSS VANE

CONSTRUCTED RIFFLE

PROPOSED ROCK CROSS VANE

PROPOSED ROCK A-VANE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

04/03/12

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

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-02

104+00.00

103+50.00

EXCAVATE BANKFULL BENCH FOR ENHANCEMENT OF EXISTING CHANNEL

103+00.00

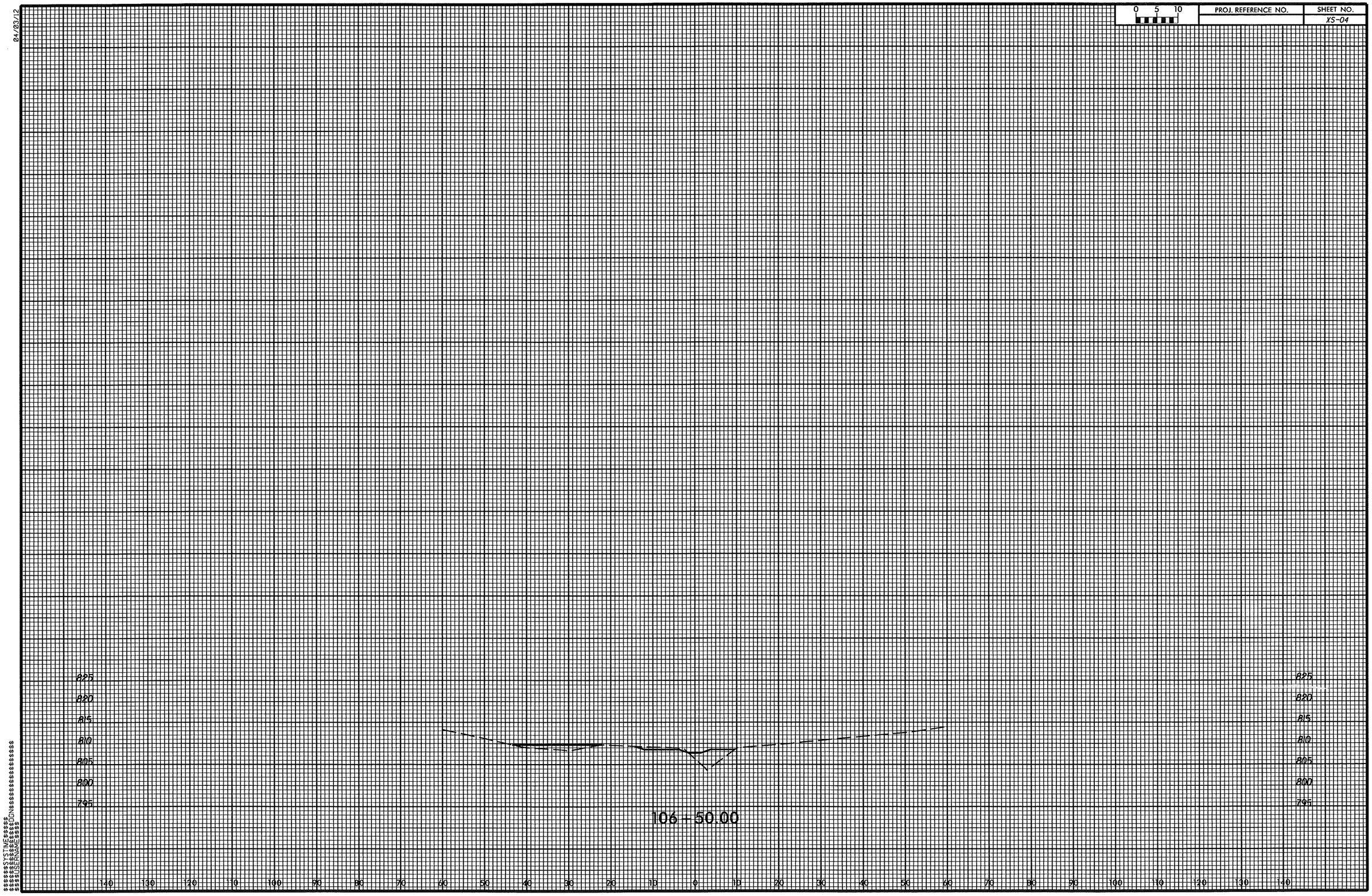
EXCAVATE BANKFULL BENCH FOR ENHANCEMENT OF EXISTING CHANNEL

102+50.00

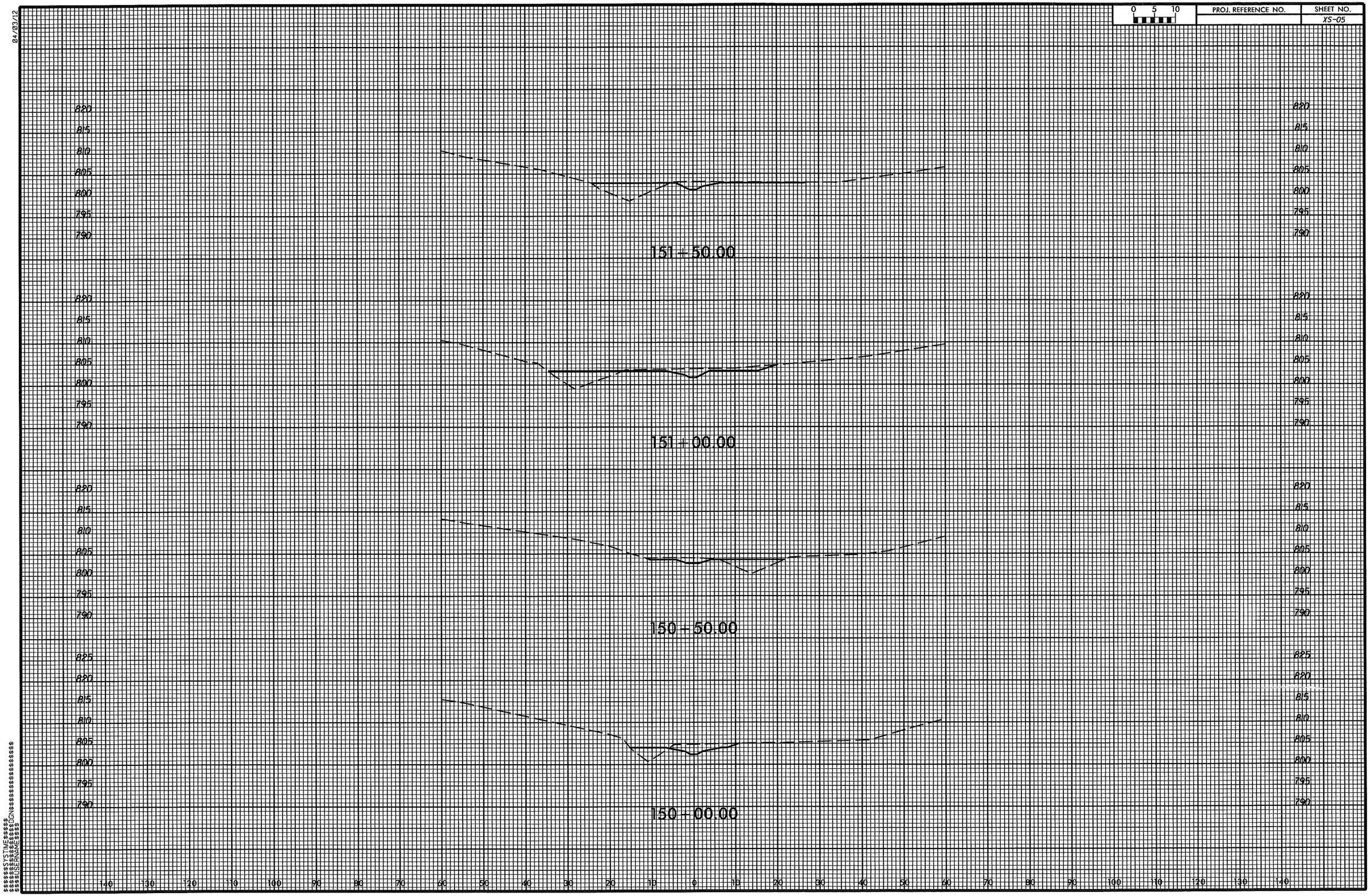
$$$$SYSTEM$$$$
$$$$ENGINEERING$$$$

04/03/12

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



0 5 10
PROJ. REFERENCE NO.
SHEET NO.
XS-04
04/03/12
825
820
815
810
805
800
795
106+50.00
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



0 5 10
PROJ. REFERENCE NO.
SHEET NO.
XS-05
04/03/12
151+50.00
151+00.00
150+50.00
150+00.00
820
815
810
805
800
795
790
825
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
$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

Ø4/Ø3/12

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

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-07

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

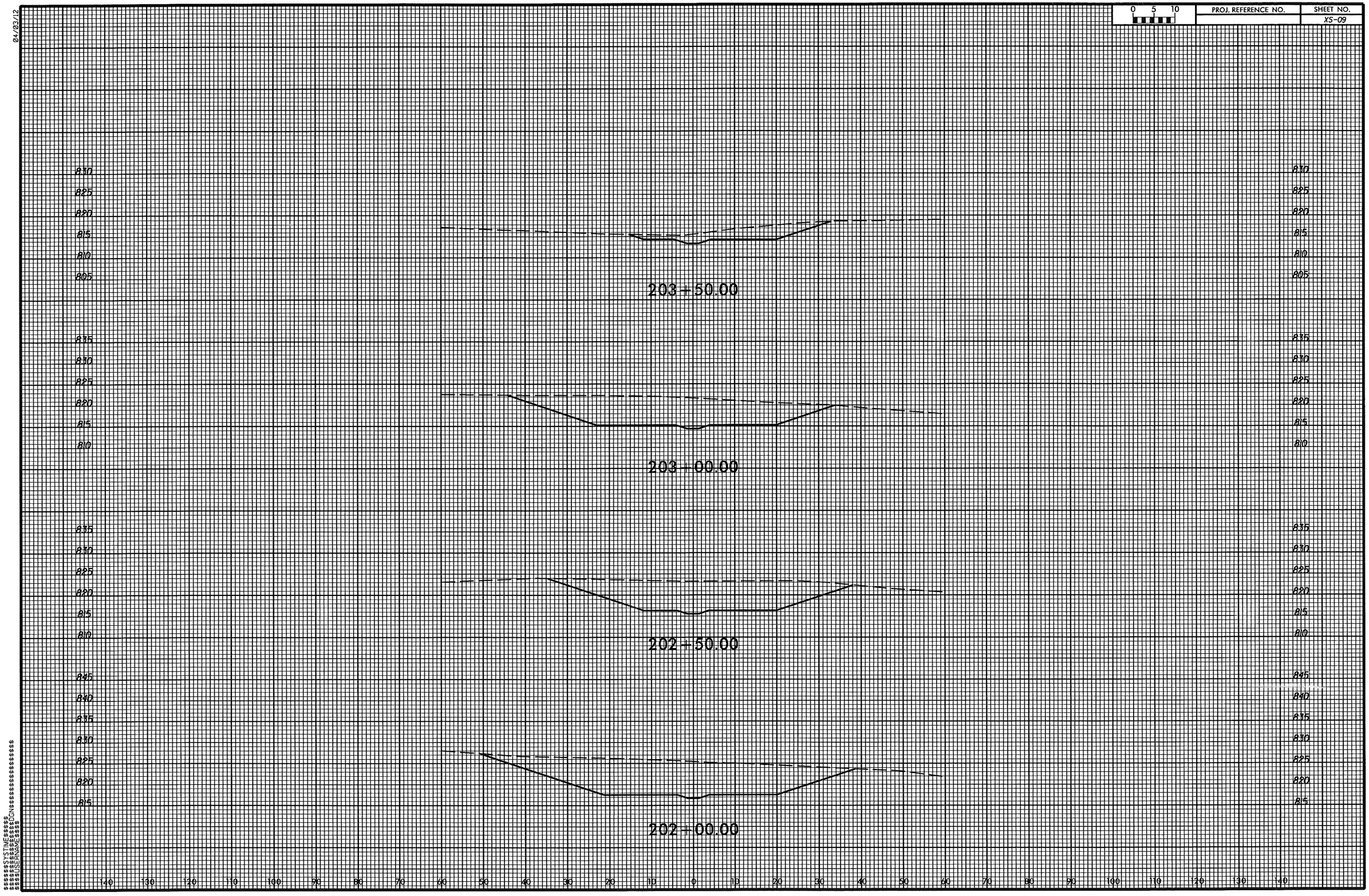
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-08

04/03/12

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

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-09

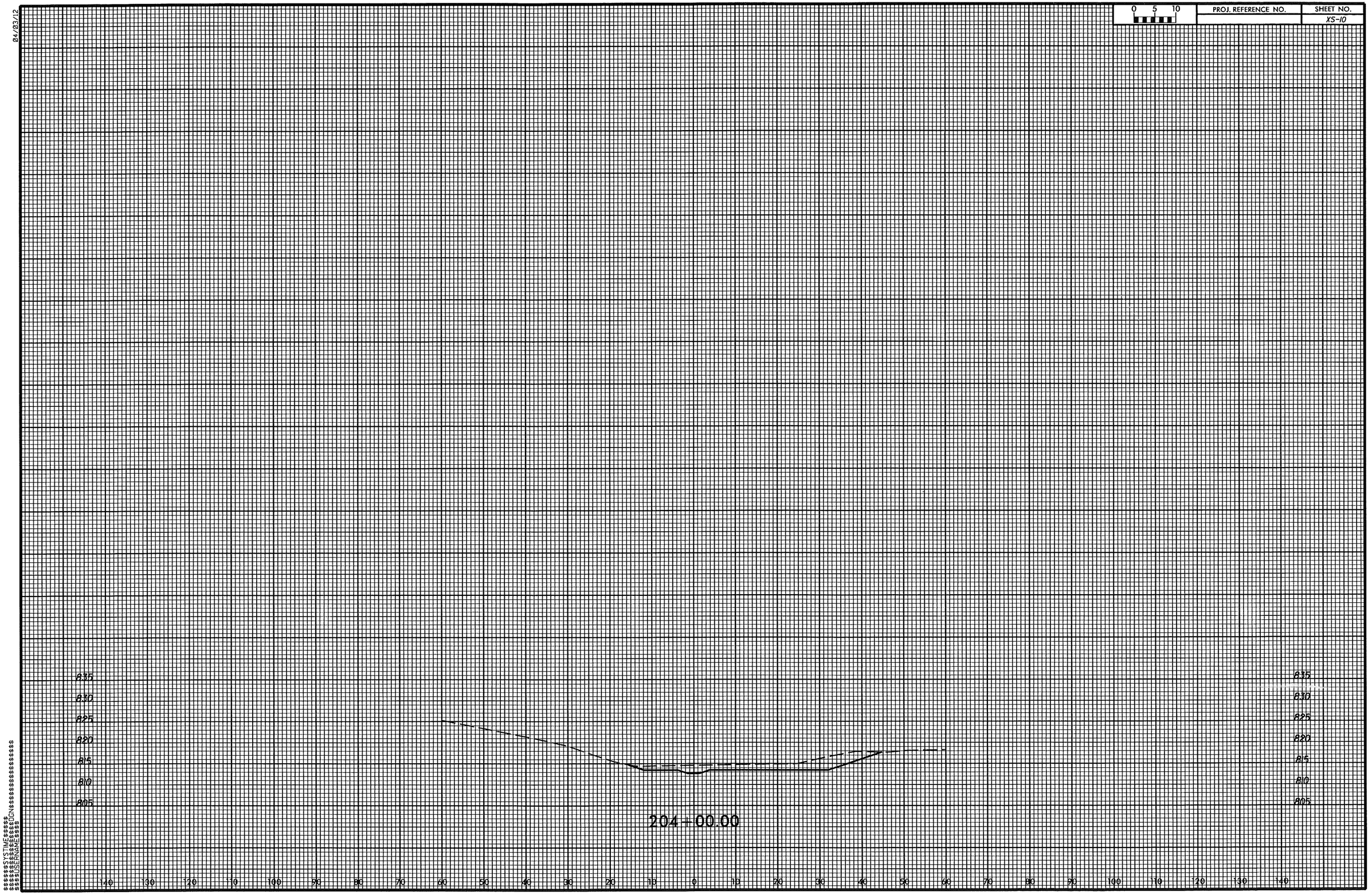


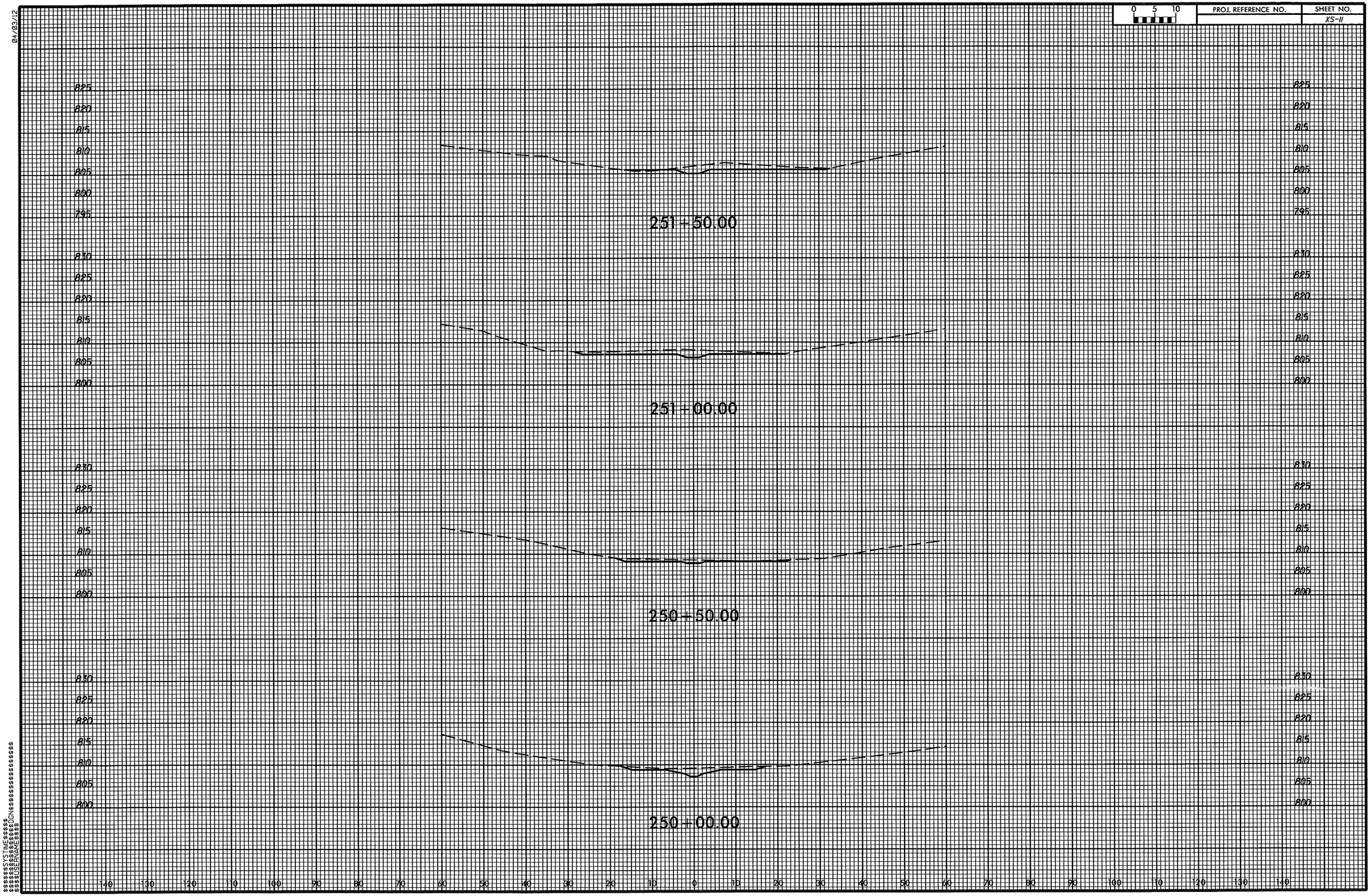
$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$DWG$$$$

04/03/12

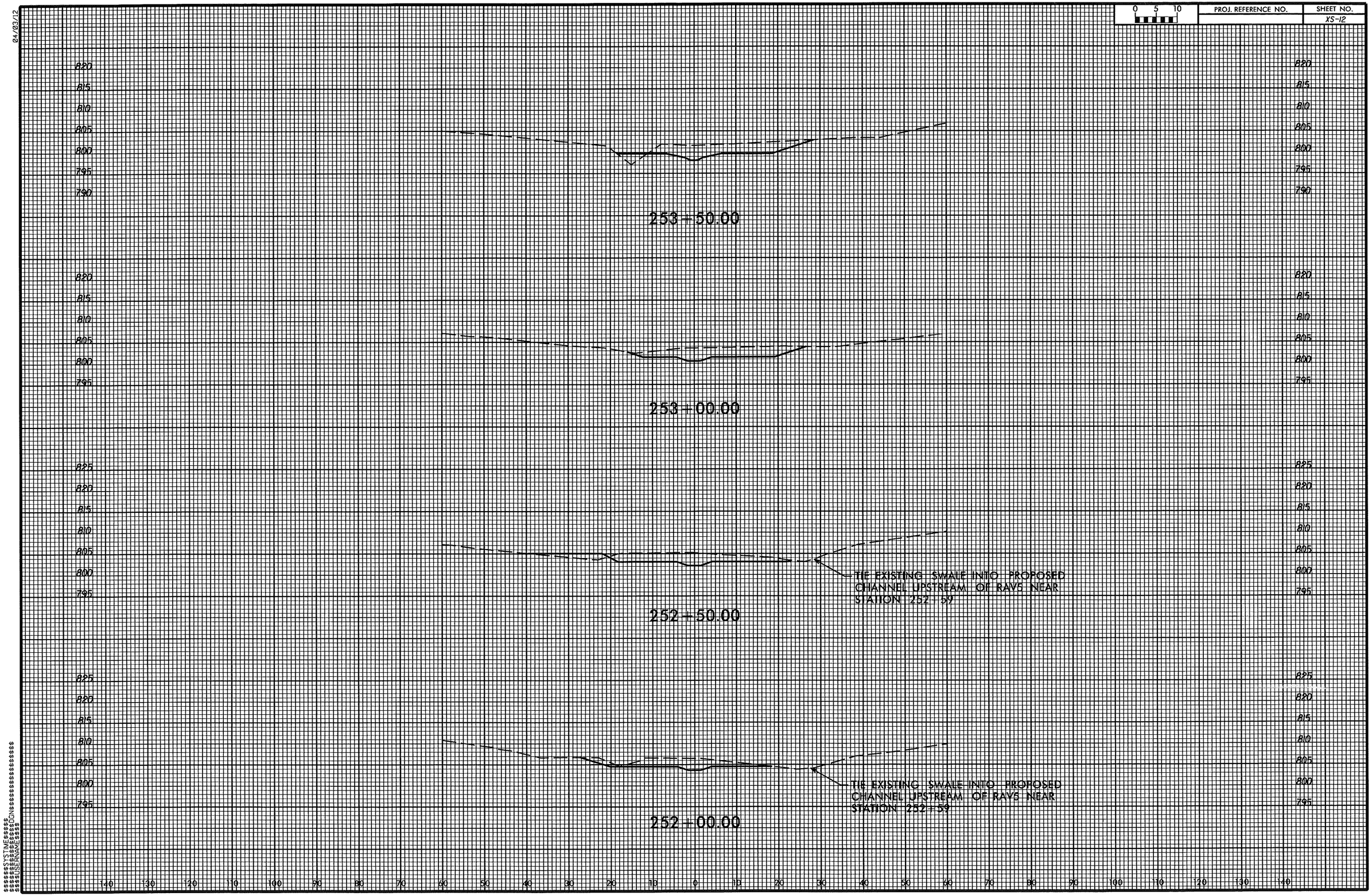
0 5 10

PROJ. REFERENCE NO.	SHEET NO.
	XS-10





0 5 10
PROJ. REFERENCE NO.
SHEET NO.
XS-11
04/03/12
825
820
815
810
805
800
795
251+50.00
830
825
820
815
810
805
800
251+00.00
830
825
820
815
810
805
800
250+50.00
830
825
820
815
810
805
800
250+00.00
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



0 5 10
PROJ. REFERENCE NO.
SHEET NO.
XS-12
04/03/12
820
815
810
805
800
795
790
253+50.00
253+00.00
825
TIE EXISTING SWALE INTO PROPOSED CHANNEL UPSTREAM OF RAV5 NEAR STATION 252+59
252+50.00
252+00.00
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

04/03/12

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

04/03/12

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

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-15

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

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-16

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

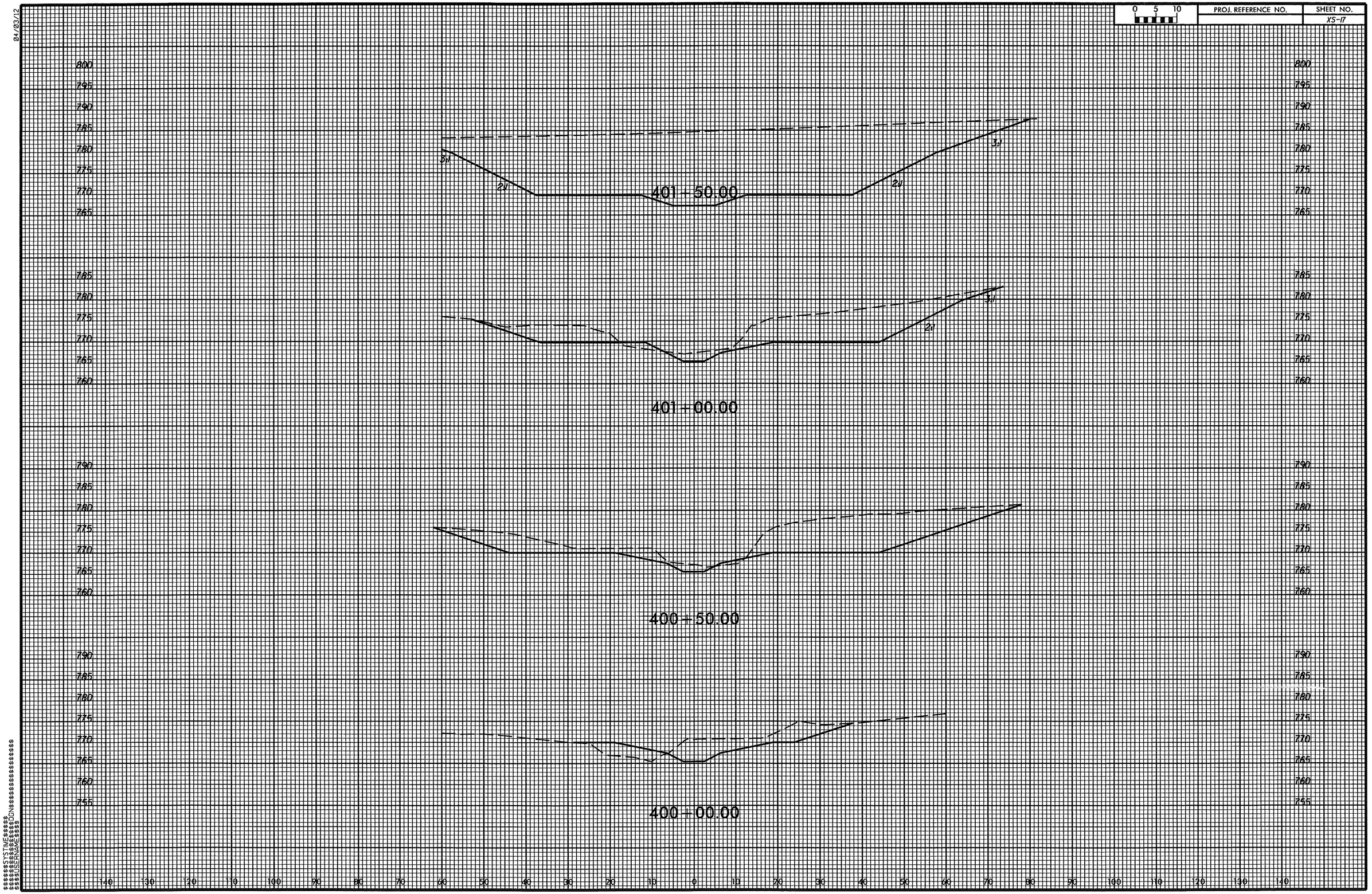
815
810
805
800
795
790
785

350+00.00

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

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-17



$$$$SYSTIME$$$$ $$$$DGNFILE$$$$

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-18

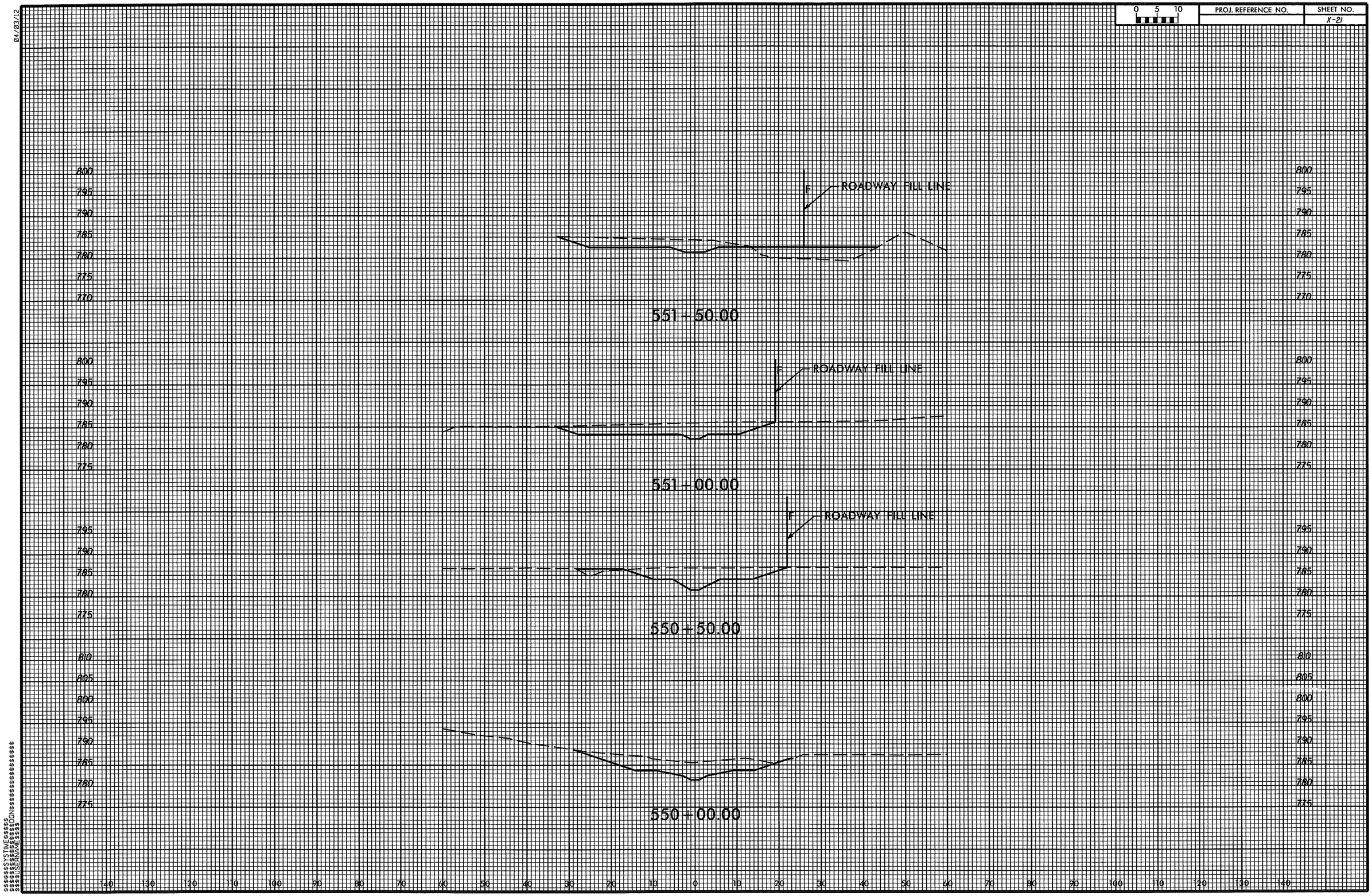
$$$$$SYSTIME$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$USERNAME$$$$$

04/03/12

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
		XS-19

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

04/03/12
0 5 10
PROJ. REFERENCE NO.
SHEET NO.
XS-20
810
805
800
795
790
785
780
503+50.00
503+00.00
502+50.00
502+00.00
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
$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



0 5 10
PROJ. REFERENCE NO.
SHEET NO.
X-21
04/03/12
ROADWAY FILL LINE
F
551+50.00
551+00.00
550+50.00
550+00.00
800
795
790
785
780
775
770
810
805
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

04/03/12

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

09/08/2011

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

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413A	1	

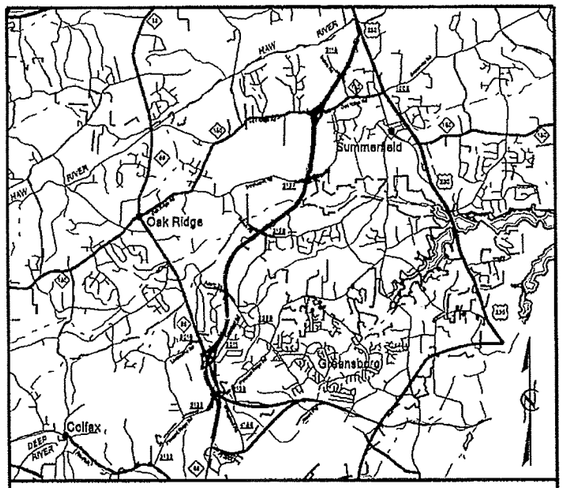
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34429.1.1		PE
34429.2.2		RW, UTIL

Permit Drawing Sheet 1 of 81

LOCATION: NC 68 CONNECTOR – FROM FOUR LANES AT SR 2011 (EDGEFIELD ROAD) TO SR 2127 (BROOKBANK ROAD)

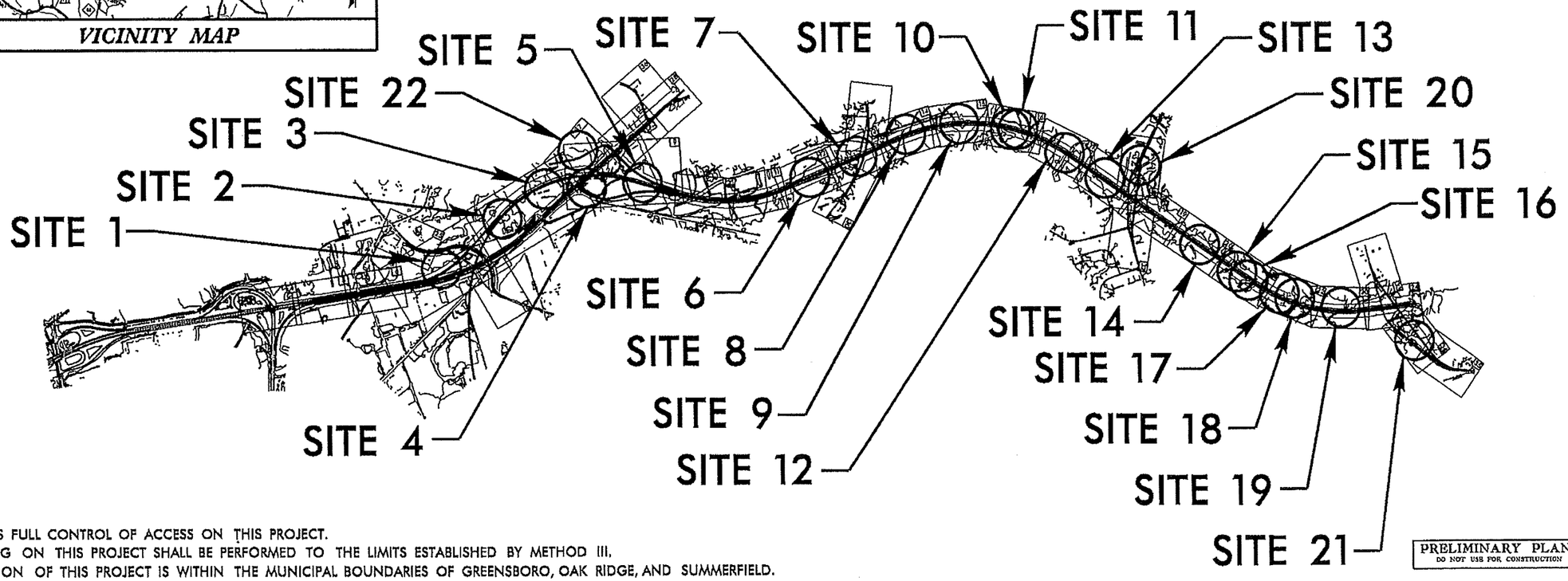
TYPE OF WORK: GRADING, PAVING, WIDENING, RESURFACING, DRAINAGE, STRUCTURES, SIGNING, SIGNALS, AND ITS

NAD 83/ NSRS 2007



VICINITY MAP

WETLAND & STREAM IMPACTS



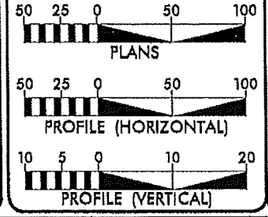
THERE IS FULL CONTROL OF ACCESS ON THIS PROJECT.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO, OAK RIDGE, AND SUMMERFIELD.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TIP PROJECT: R-2413A

CONTRACT:

GRAPHIC SCALES



DESIGN DATA

ADT 2012 = 23,000
ADT 2035 = 40,800
DHV = 11 %
D = 70 %
T = 15 % *
V = 70 MPH
* TTST 10% DUAL 5%
FUNC CLASS – INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2413A = 4.803 MILES

LENGTH STRUCTURE TIP PROJECT R-2413A = 0.150 MILES

TOTAL LENGTH TIP PROJECT R-2413A = 4.953 MILES

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NOVEMBER 18, 2011

LETTING DATE: APRIL 15, 2014

TONY HOUSER, PE
PROJECT ENGINEER

VACANT
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

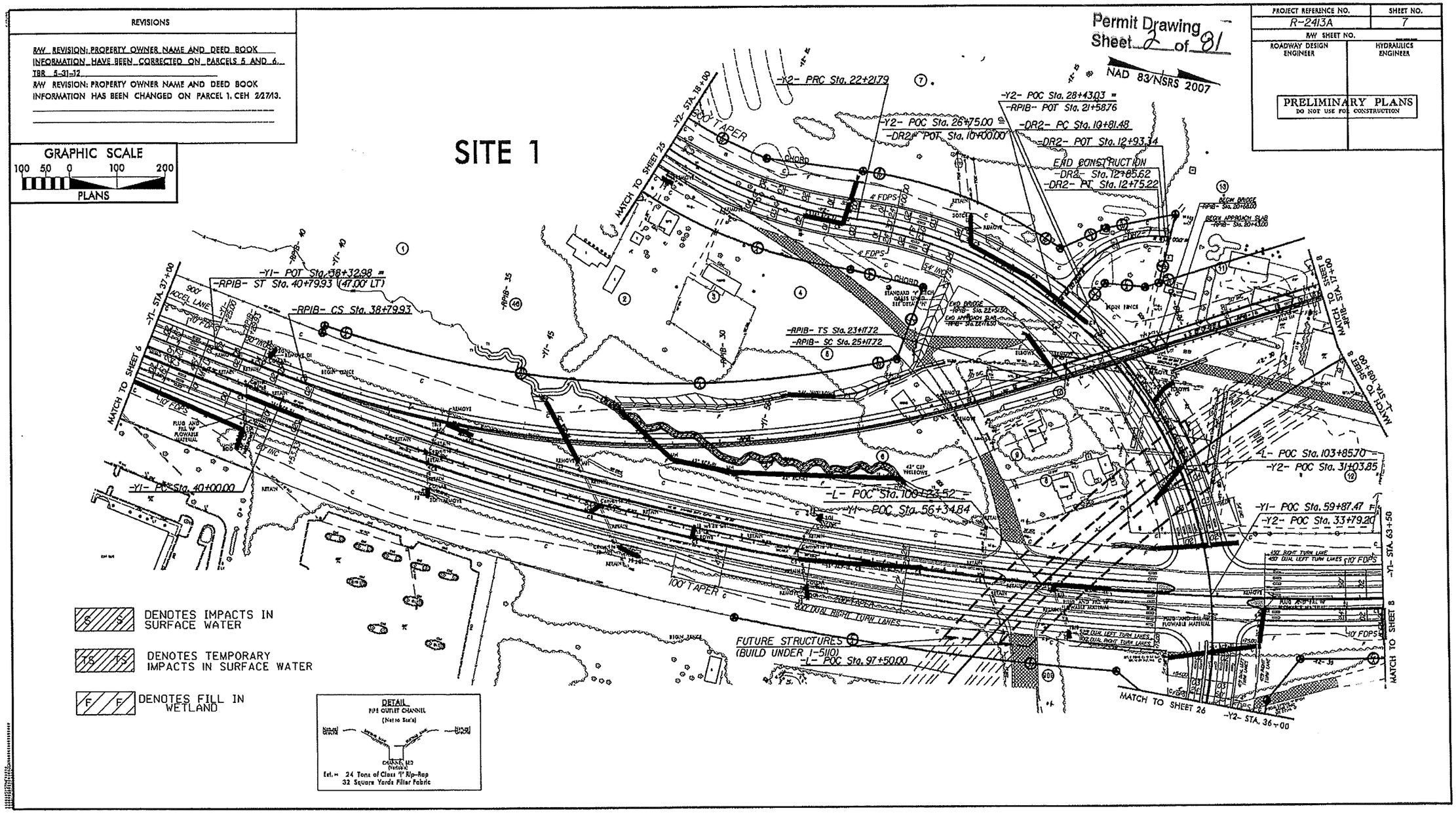
SIGNATURE:

ROADWAY DESIGN ENGINEER

SIGNATURE:

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER



REVISIONS
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAVE BEEN CORRECTED ON PARCELS 5 AND 6. TBR 5-31-12
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 1. CEH 2/27/13.
GRAPHIC SCALE
100 50 0 100 200
PLANS
SITE 1
Permit Drawing
Sheet 2 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
-Y2- PRC Sta. 22+21.79
-Y2- POC Sta. 26+75.00
-DR2- POT Sta. 10+00.00
-Y2- POC Sta. 28+43.03
-RPIB- POT Sta. 21+58.76
-DR2- PC Sta. 10+81.48
-DR2- POT Sta. 12+93.34
END CONSTRUCTION
-DR2- Sta. 12+85.62
-DR2- PT Sta. 12+75.22
-Y1- POT Sta. 38+32.98
-RPIB- ST Sta. 40+79.93 (47.00' LT)
-RPIB- CS Sta. 38+79.93
-RPIB- TS Sta. 23+17.72
-RPIB- SC Sta. 25+17.72
-Y1- POC Sta. 40+00.00
-L- POC Sta. 100+23.52
-Y1- POC Sta. 56+34.84
-L- POC Sta. 103+85.70
-Y2- POC Sta. 31+03.85
-Y1- POC Sta. 59+87.47
-Y2- POC Sta. 33+79.20
FUTURE STRUCTURES
(BUILD UNDER I-5110)
-L- POC Sta. 97+50.00
MATCH TO SHEET 6
MATCH TO SHEET 25
MATCH TO SHEET 26
MATCH TO SHEET 8
-Y1- STA. 37+00
-Y2- STA. 18+00
-Y2- STA. 36+00
-Y1- STA. 63+50
-Y1- STA. 17+00
-L- STA. 108+00
900' ACCEL LANE
100' TAPER
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)
Est. = 24 Tons of Class "I" Rip-Rap
32 Square Yards Filter Fabric

REVISIONS
R/W REVISION; PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAVE BEEN CORRECTED ON PARCELS 5 AND 6. TBR 5-31-12 R/W REVISION; PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 1. CEH 2/27/13.

GRAPHIC SCALE
100 50 0 100 200
PLANS

Permit Drawing
Sheet 3 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SITE 1

NAD 83/NSRS 2007

-Y2- PRC Sta. 22+21.79
-Y2- STA. 18+00
-Y2- POC Sta. 28+43.03
-RPIB- POT Sta. 21+58.76
-DR2- PC Sta. 10+81.48
-Y2- POC Sta. 26+75.00
-DR2- POT Sta. 10+00.00
-DR2- POT Sta. 12+93.34
END CONSTRUCTION
-DR2- Sta. 12+85.52
-DR2- PT Sta. 12+75.22
BEGIN BRIDGE -RPIB- Sta. 20+68.00
BEGIN APPROACH SLAB -RPIB- Sta. 20+43.00
END BRIDGE -RPIB- Sta. 22+52.00
END APPROACH SLAB -RPIB- Sta. 22+62.00
MATCH TO SHEET 8
-RPIB- STA. 17+00
-Y1- STA. 37+00
MATCH TO SHEET 6
-Y1- POT Sta. 38+32.98
-RPIB- ST Sta. 40+79.93 (47.00 LT)
-RPIB- GS Sta. 38+79.93
-Y1- POC Sta. 40+00.00
-RPIB- TS Sta. 23+11.72
-RPIB- SC Sta. 25+11.72
-L- POC Sta. 100+23.52
-Y1- POC Sta. 56+34.84
-L- POC Sta. 103+85.70
-Y2- POC Sta. 31+03.85
-Y1- POC Sta. 59+87.47
-Y2- POC Sta. 33+79.20
-Y1- STA. 63+50
MATCH TO SHEET 8
FUTURE STRUCTURES (BUILD UNDER SSIIO)
-L- POC Sta. 97+50.00
MATCH TO SHEET 26
-Y2- STA. 36+00

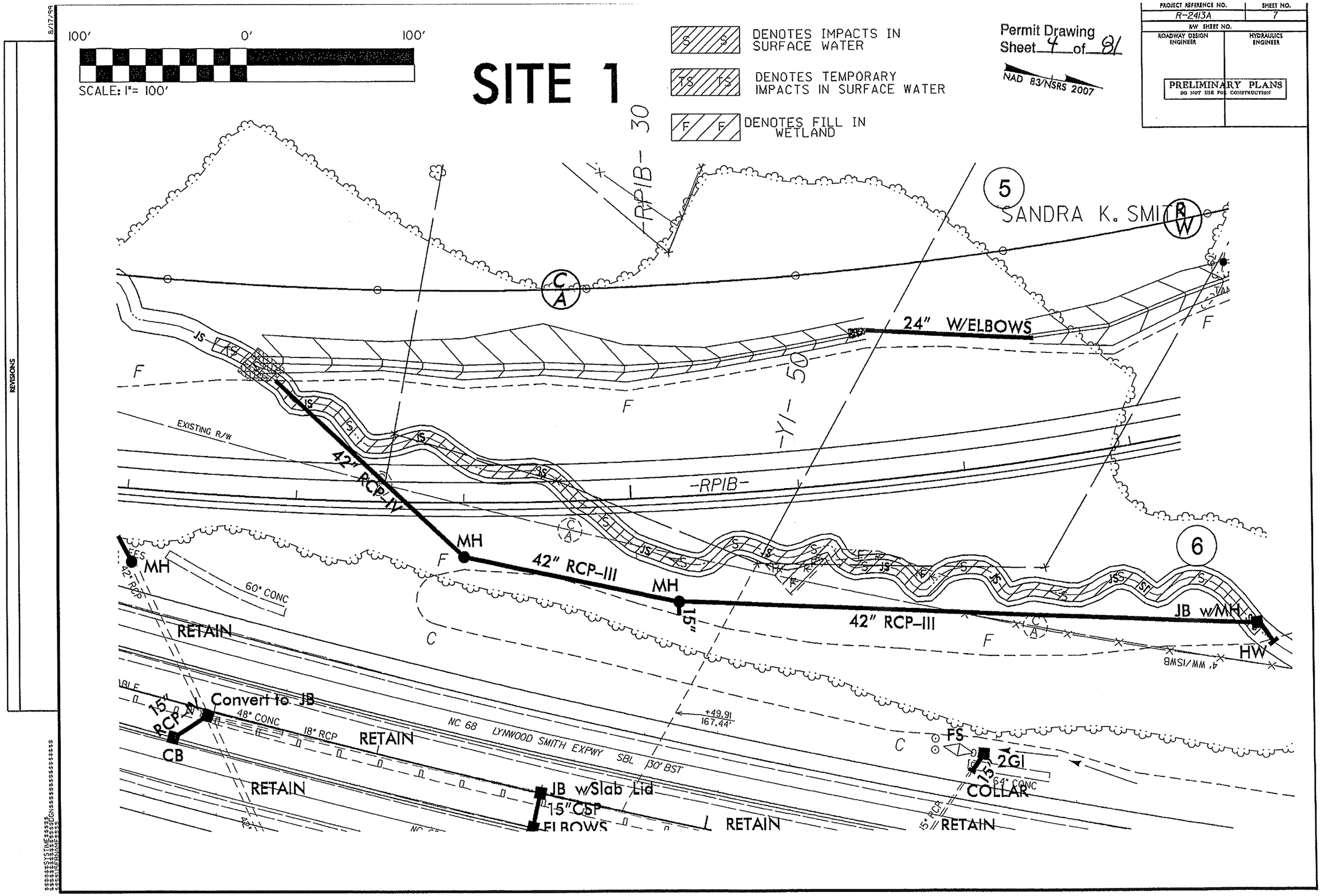
DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

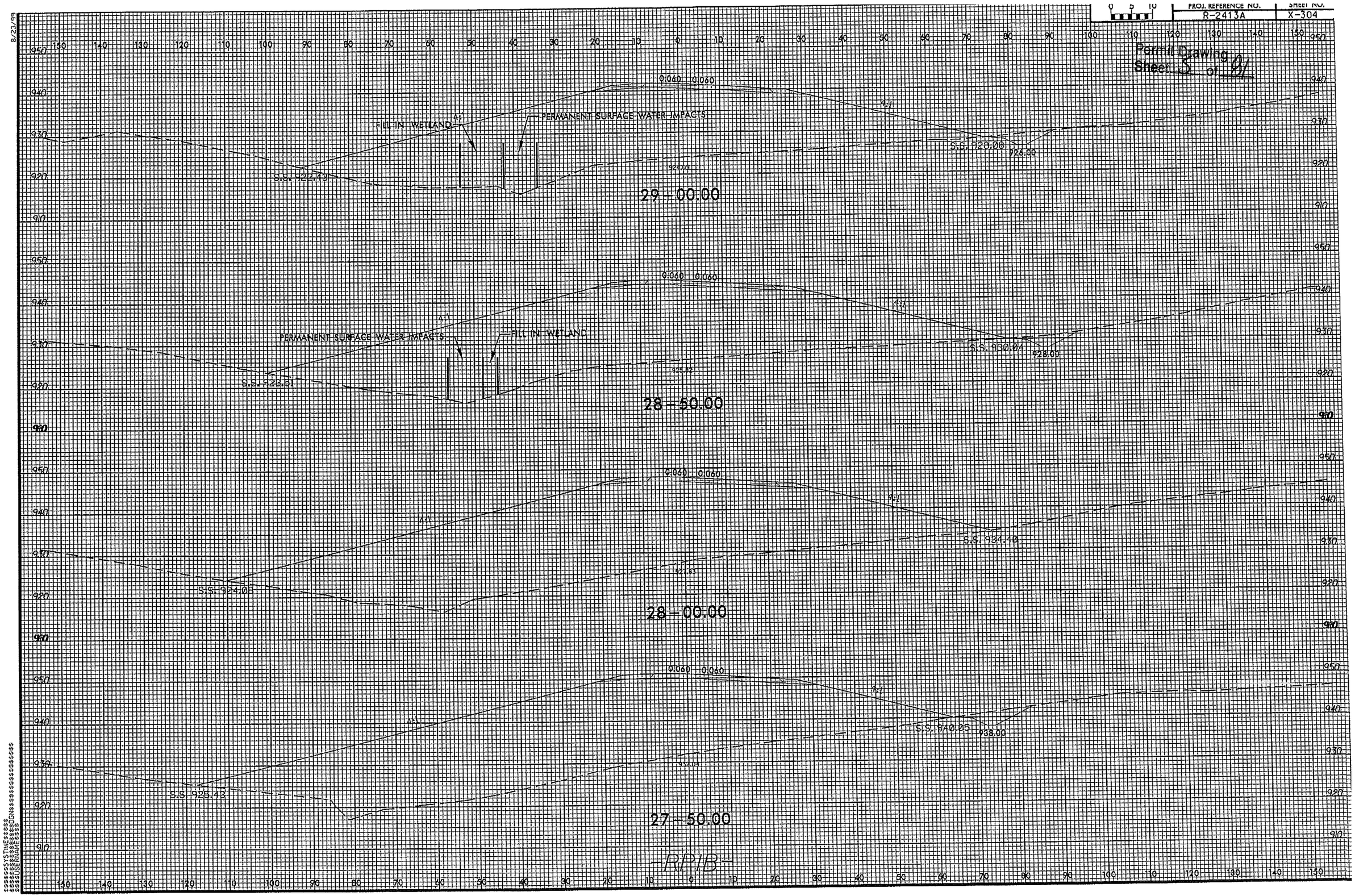
DENOTES FILL IN WETLAND

DETAIL
RIPE OUTLET CHANNEL
(Not to Scale)

Est.= 24 Tons of Class 'I' Rip-Rap
32 Square Yards Filter Fabric



SITE 1
SCALE: 1"= 100'
100' 0' 100'
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
Permit Drawing Sheet 4 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO. R-2413A
SHEET NO. 7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
REVISIONS
8/17/99
SANDRA K. SMITH
24" W/ELBOWS
42" RCP-IV
42" RCP-III
42" RCP-III
MH
MH
MH
15"
JB w/MH
HW
60" CONC
RETAIN
RETAIN
RETAIN
RETAIN
RETAIN
Convert to JB
15" RCP-IV
CB
48" CONC
18" RCP
NC 68 LYNWOOD SMITH EXPWY SBL 30' BST
+49.91
167.44'
JB w/Slab Lid
15" CSP
ELBOWS
FS
2GI
COLLAR
64" CONC
EXISTING R/W
-RPIB-
-RPIB-30
-YI-50


PROJ. REFERENCE NO.
R-2413A
SHEET NO.
X-304
Permit Drawing
Sheet 5 of 91
FILL IN WETLAND
PERMANENT SURFACE WATER IMPACTS
S.S. 922.73
S.S. 928.08
926.00
29-00.00
PERMANENT SURFACE WATER IMPACTS
FILL IN WETLAND
S.S. 928.61
S.S. 930.04
928.00
28-50.00
S.S. 924.08
S.S. 934.40
28-00.00
S.S. 925.43
S.S. 940.05
938.00
27-50.00
-RPIB-

Permit Drawing Sheet 6 of 81

GRAPHIC SCALE
100 50 0 100 200
PLANS

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)
Est.= 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)
Est.= 18 Tons of Class 'I' Rip-Rap
25 Square Yards Filter Fabric

SITE 2

SITE 3

(CONTINUED ON SHEET 37)

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	8
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- POC Sta. 115+00.00 =
-RPIB- POT Sta. 10+00.00 (59.00' LT)

2A
2B
2C

JAMES R. & DELORES P HIGGANS
PEARRIDGE, INC.
PUMP PIPE SALES & SERVICE, INC.
BAJ ELLISON PROPERTIES LLC
REGIONAL AIRLINE SERVICES INC.
JAMES WILLIAM SOPER
COLLEEN STAFFORD MCCUISTON
MCNOW (FORMERLY PEARL AND VICKI ROO)
RONALD GRAHAM HALL
FAMILY TRUST OF JOHNNY ODELL PITTS et al
GENEVA M. TUCKER, TRUSTEE
JOHNNY ODELL PITTS
MCNOW (FORMERLY JOSEPHINE COX SMITH)
WALTER T & BETTY P PARRISH
SMAAN 68 LLC
BLAIR & MARY ANN EVERETT
SACK FALLS PROPERTIES LLC
SMAAN ONE LLC

-Y1- PRC Sta. 77+43.73
-Y1- POC Sta. 77+75.00 =
-Y1A- POT Sta. 10+00.00
-Y1- PT Sta. 86+33.85
-Y1A- PC Sta. 10+66.37

-L- STA. 135+00

MATCH TO SHEET 7
-L- STA. 114+00
MATCH TO SHEET 7
-L- STA. 108+20
MATCH TO SHEET 7
-Y1- STA. 63+50
MATCH TO SHEET 9
-L- STA. 88+50
MATCH TO SHEET 9
-Y1- STA. 86+33.85

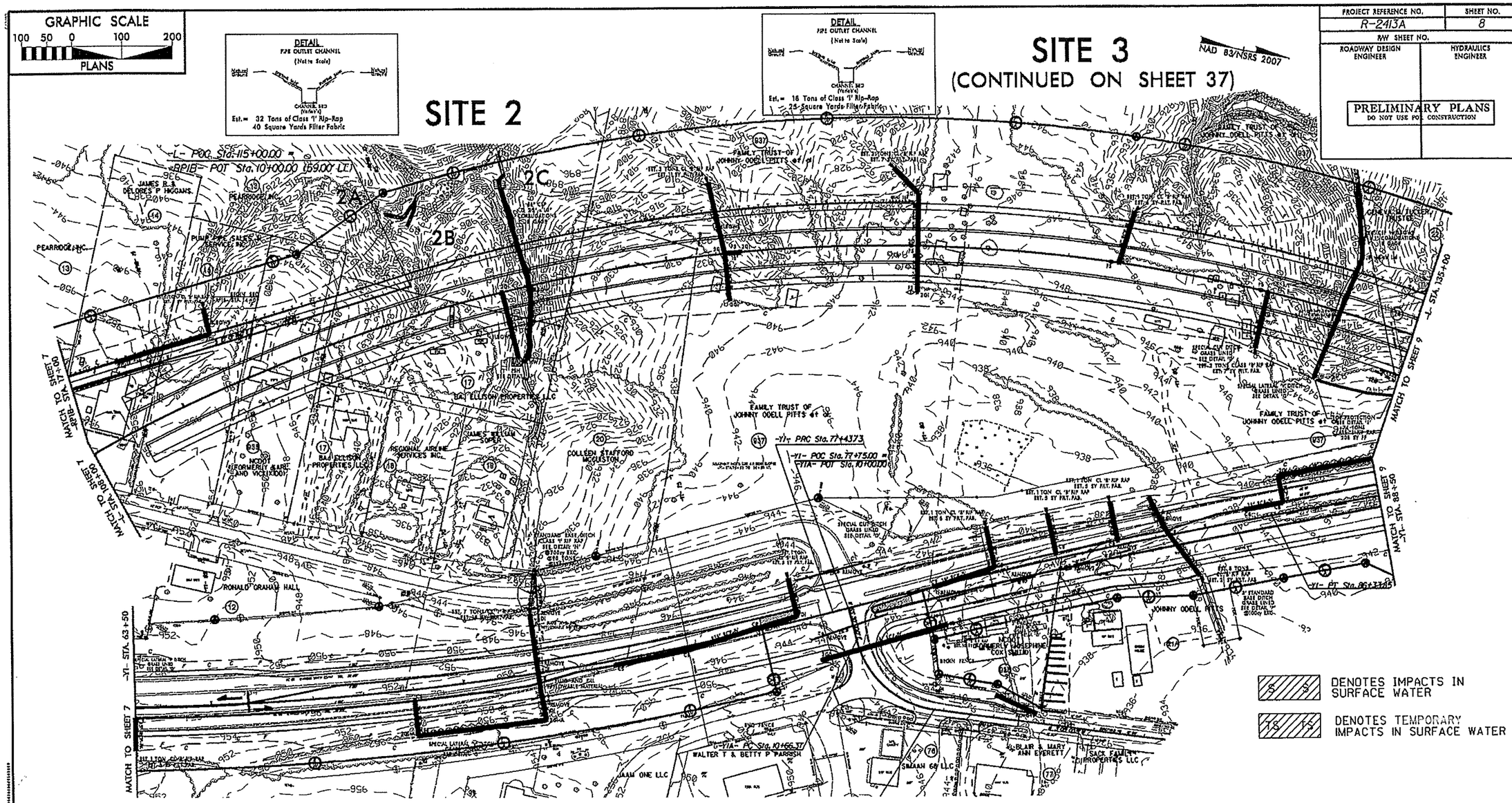
SS DENOTES IMPACTS IN SURFACE WATER

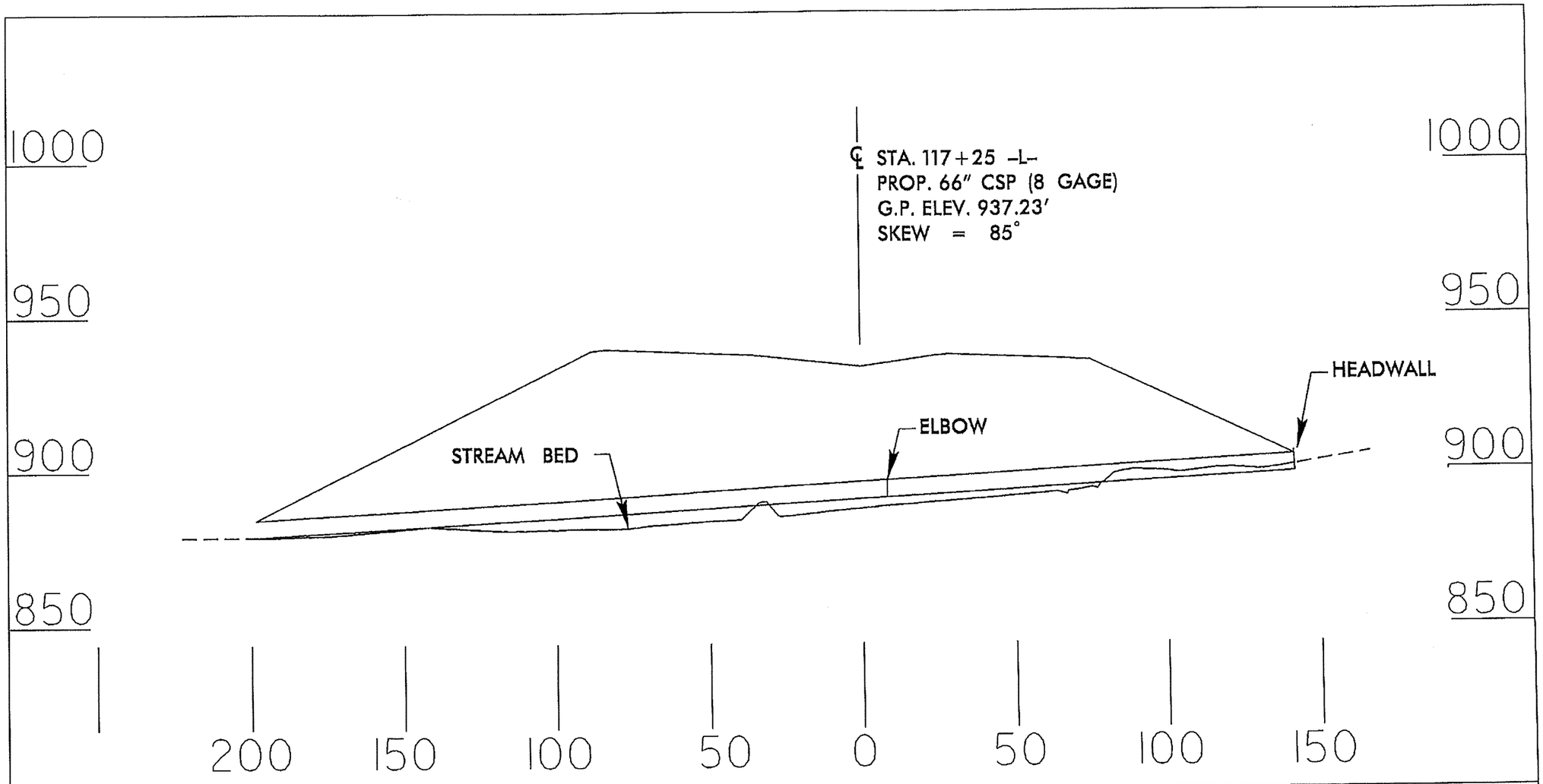
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

Permit Drawing
Sheet 7 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

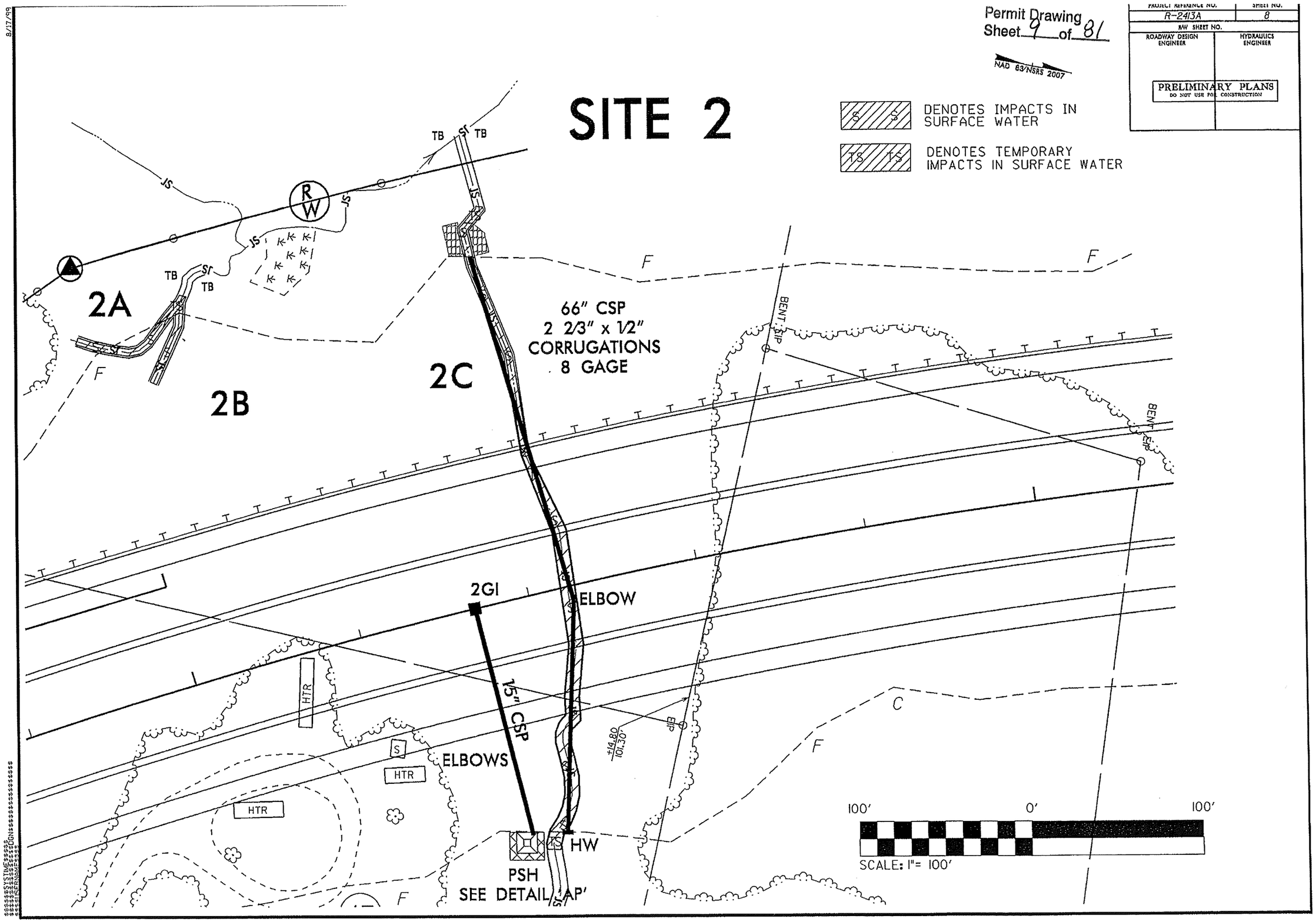




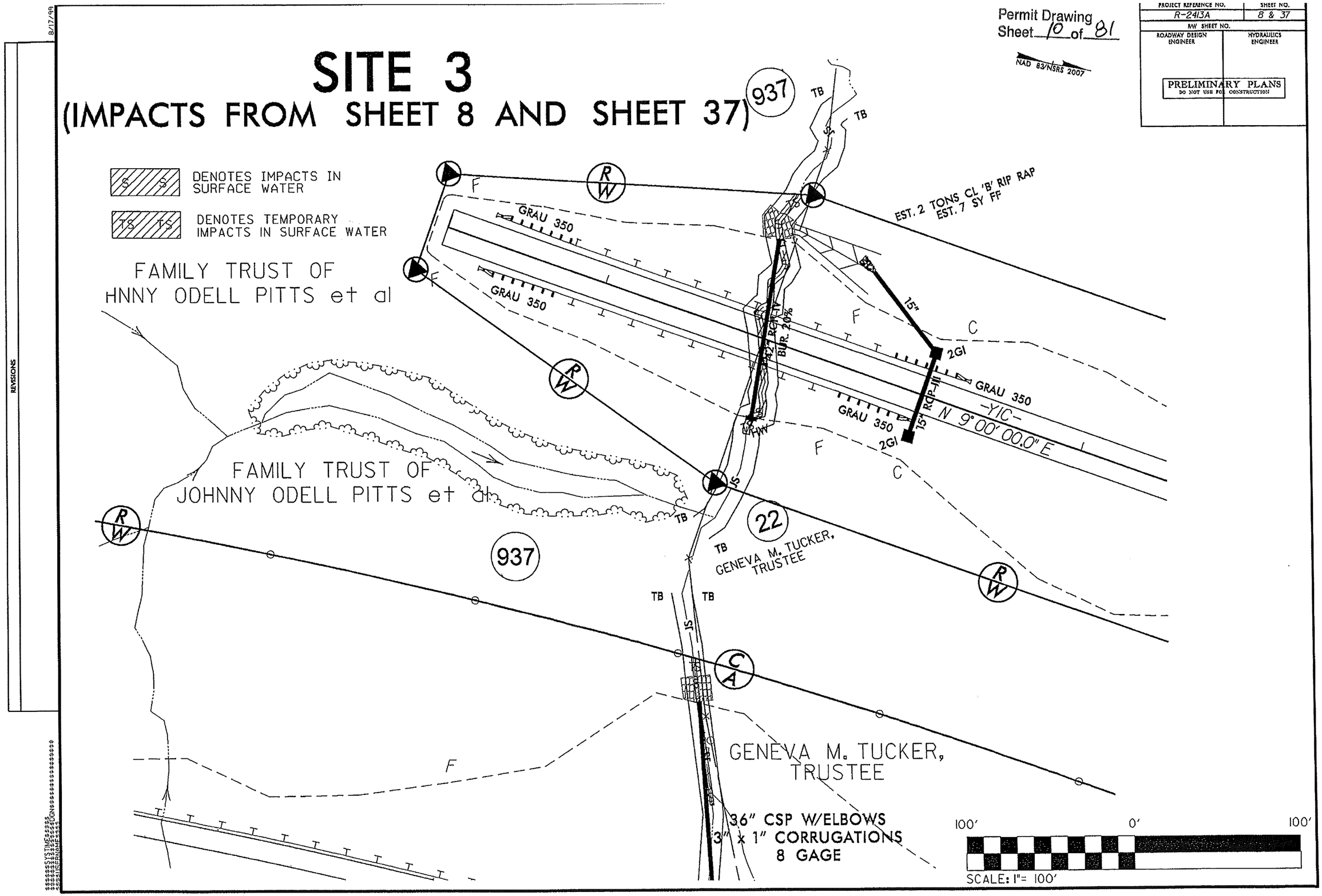
PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

SHEET OF 2/13/13



Permit Drawing
Sheet 9 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
8
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SITE 2
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
2A
2B
2C
66" CSP
2 2/3" x 1/2"
CORRUGATIONS
8 GAGE
2GI
ELBOW
15" CSP
ELBOWS
HTR
HW
PSH
SEE DETAIL 'AP'
BENT EIP
EIP
+14.80
101.30'
100'
0'
100'
SCALE: 1"= 100'



Permit Drawing
Sheet 10 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
8 & 37
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SITE 3
(IMPACTS FROM SHEET 8 AND SHEET 37)
937
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
FAMILY TRUST OF
HNNY ODELL PITTS et al
FAMILY TRUST OF
JOHNNY ODELL PITTS et al
GRAU 350
GRAU 350
GRAU 350
GRAU 350
EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FF
15"
2GI
2GI
15" RCP-III
42" RCP-IV
BUR. 20%
-Y/C-
N 9°00'00.0" E
22
937
GENEVA M. TUCKER, TRUSTEE
GENEVA M. TUCKER, TRUSTEE
36" CSP W/ELBOWS
3" x 1" CORRUGATIONS
8 GAGE
100'
0'
100'
SCALE: 1"= 100'
REVISIONS
8/17/99

Permit Drawing
Sheet 11 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	9
NW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/NSRS 2007

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.= 18 Tons of Class 'I' Rip-Rap
24 Square Yards Filter Fabric

SITE 4

(CONTINUED ON SHEET 37)

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.= 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric

SITE 5

MATCH TO SHEET 37 -L- STA. 92+00

MATCH TO SHEET 37 -L- STA. 104+50

MATCH TO SHEET 8 -L- STA. 135+00

MATCH TO SHEET 8 -L- STA. 88+50

MATCH TO SHEET 10 -L- STA. 164+00

GRAPHIC SCALE
100 50 0 100 200
PLANS

Permit Drawing
Sheet 12 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.= 18 Tons of Class 'I' Rip-Rap
24 Square Yards Filter Fabric

SITE 4

(CONTINUED ON SHEET 37)

NAD 83/NSRS 2007

MATCH TO SHEET 37 -L- STA. 97+00

MATCH TO SHEET 27 -YY- STA. 104+59

MATCH TO SHEET 8 -L- STA. 135+00

MATCH TO SHEET 8 -L- STA. 88+50

MATCH TO SHEET 10 -L- STA. 164+00

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.= 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric

SITE 5

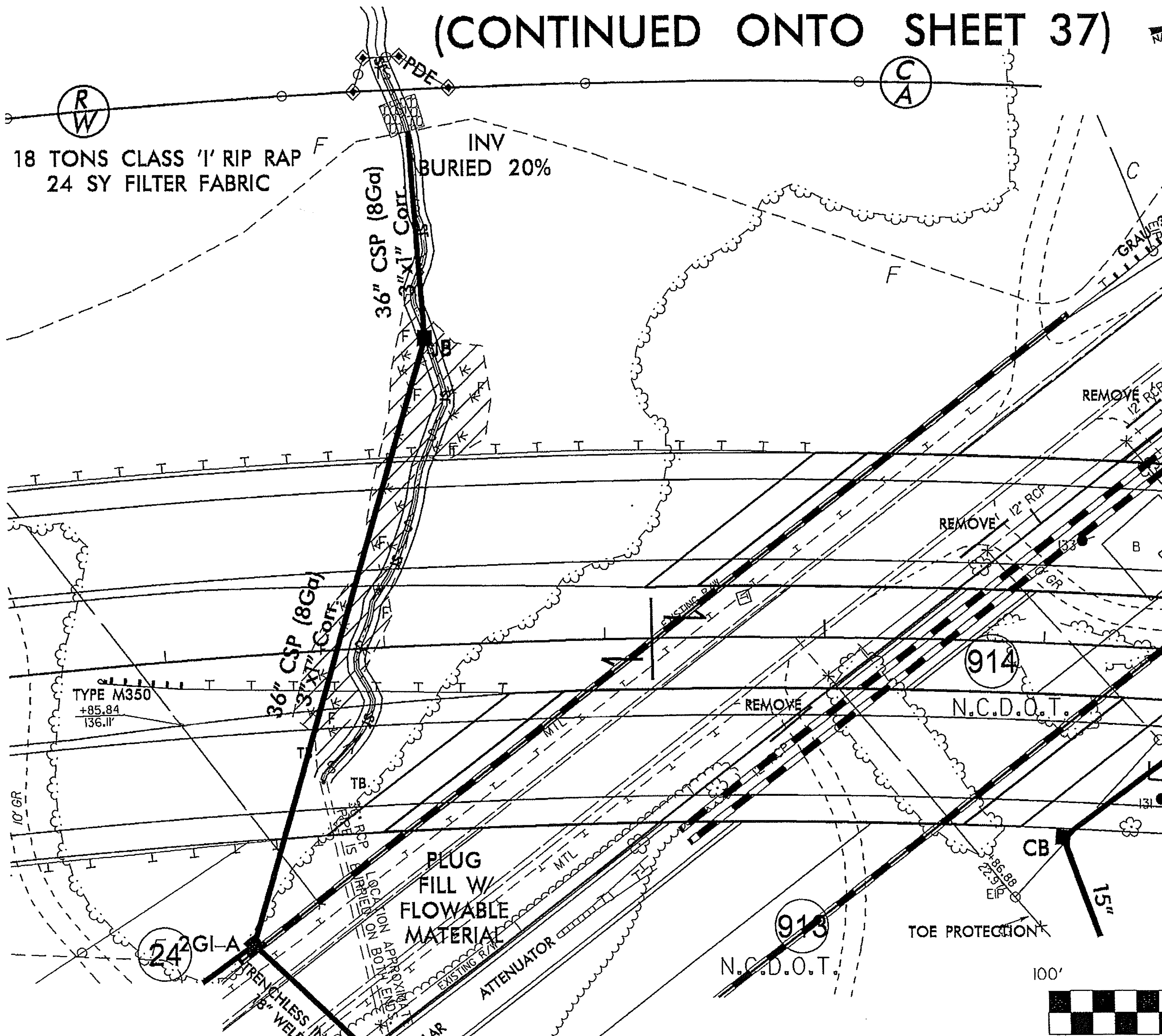
GRAPHIC SCALE
100 50 0 100 200
PLANS

SITE 4
(CONTINUED ONTO SHEET 37)

Permit Drawing
Sheet 13 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

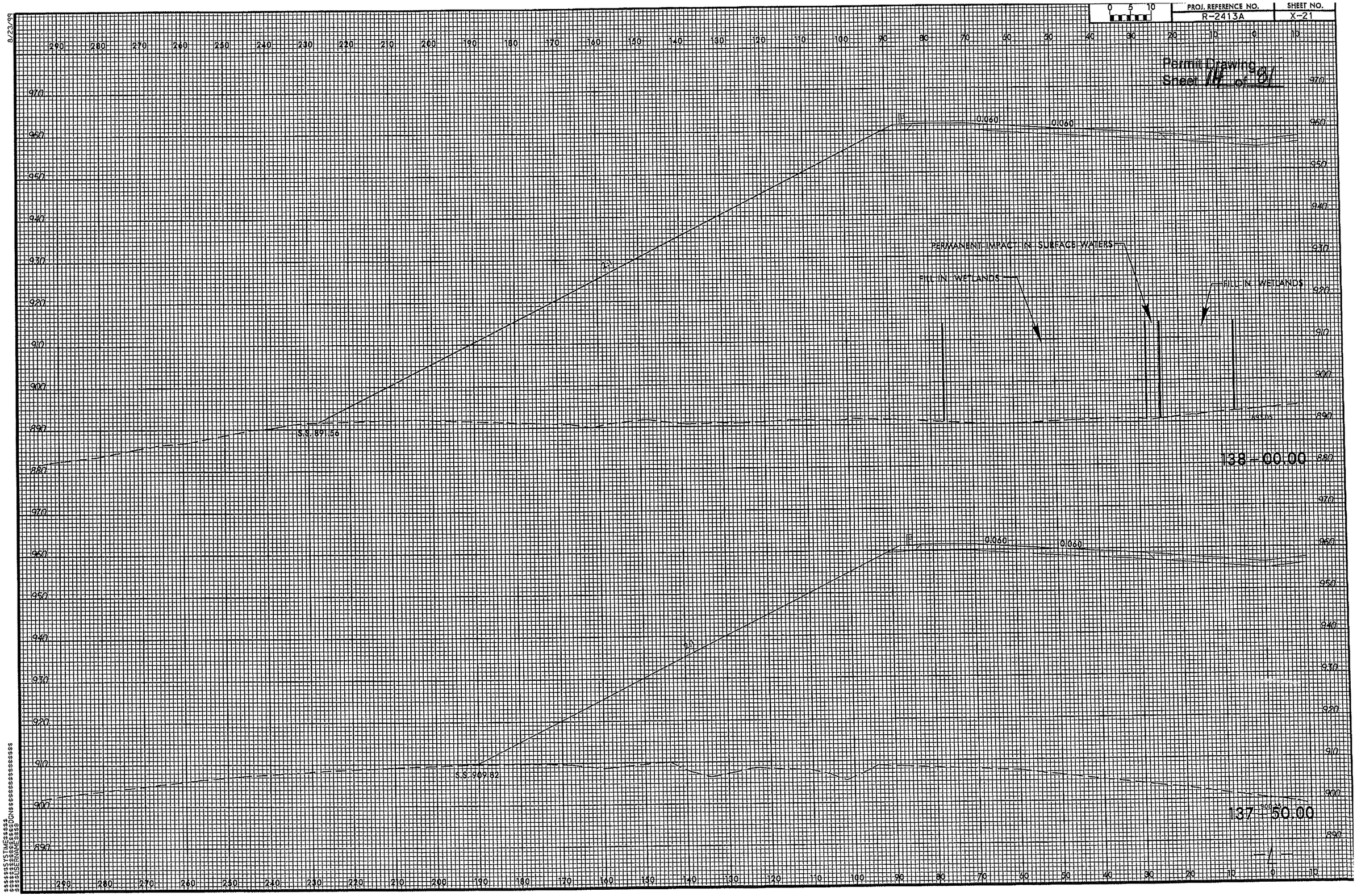
100' 0' 100'

SCALE: 1"= 100'

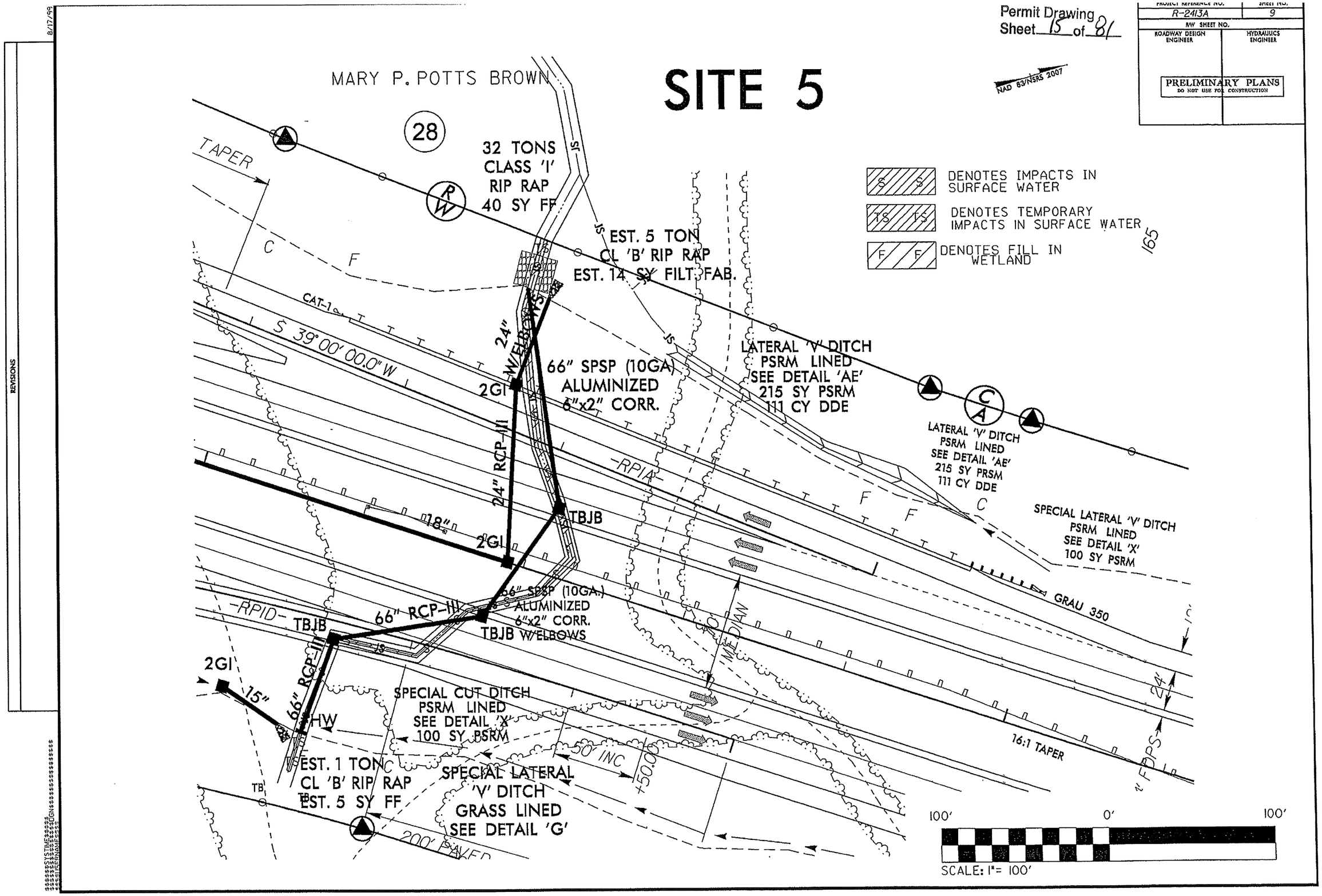
8/17/99

REVISIONS

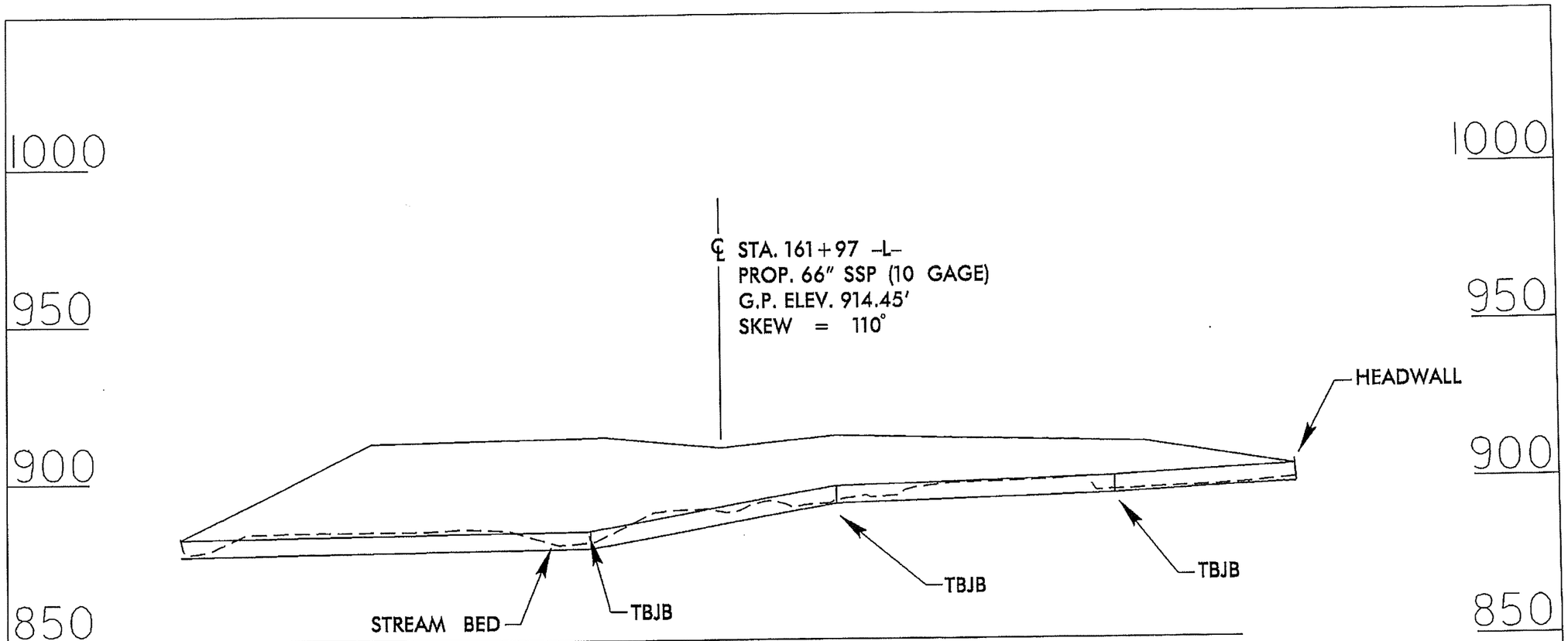
$$$$$$SYSTIME$$$$$ $$$$$$$$$$DGN$$$$$$$$$$$$$$ $$$$USERNAME$$$$



PROJ. REFERENCE NO.
R-2413A
SHEET NO.
X-21
Permit Drawing
Sheet 14 of 81
PERMANENT IMPACT IN SURFACE WATERS
FILL IN WETLANDS
FILL IN WETLANDS
0.060
0.060
S.S. 891.56
138+00.00
0.060
0.060
S.S. 909.82
137+50.00



Permit Drawing
Sheet 15 of 81
PROJECT REFERENCE NO. R-2413A
SHEET NO. 9
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83/NSRS 2007
SITE 5
MARY P. POTTS BROWN
28
TAPER
32 TONS
CLASS 'I'
RIP RAP
40 SY FF
EST. 5 TON
CL 'B' RIP RAP
EST. 14 SY FILT FAB.
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
165
CAT-1
S 39°00'00.0" W
24" W/ELBOWS
66" SPSP (10GA)
ALUMINIZED
6"x2" CORR.
2GI
24" RCP-III
LATERAL 'V' DITCH
PSRM LINED
SEE DETAIL 'AE'
215 SY PSRM
111 CY DDE
LATERAL 'V' DITCH
PSRM LINED
SEE DETAIL 'AE'
215 SY PRSM
111 CY DDE
SPECIAL LATERAL 'V' DITCH
PSRM LINED
SEE DETAIL 'X'
100 SY PSRM
-RPIA-
TBJB
18"
2GI
66" SPSP (10GA.)
ALUMINIZED
6"x2" CORR.
TBJB W/ELBOWS
66" RCP-III
-RPID-
TBJB
GRAU 350
MEDIAN
2GI
15"
66" RCP-III
HW
SPECIAL CUT DITCH
PSRM LINED
SEE DETAIL 'X'
100 SY PSRM
EST. 1 TON
CL 'B' RIP RAP
EST. 5 SY FF
SPECIAL LATERAL
'V' DITCH
GRASS LINED
SEE DETAIL 'G'
50' INC
+50.00
16:1 TAPER
24'
FDPS
200' PAVED
100'
0'
100'
SCALE: 1"= 100'
REVISIONS
8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R-2413A)

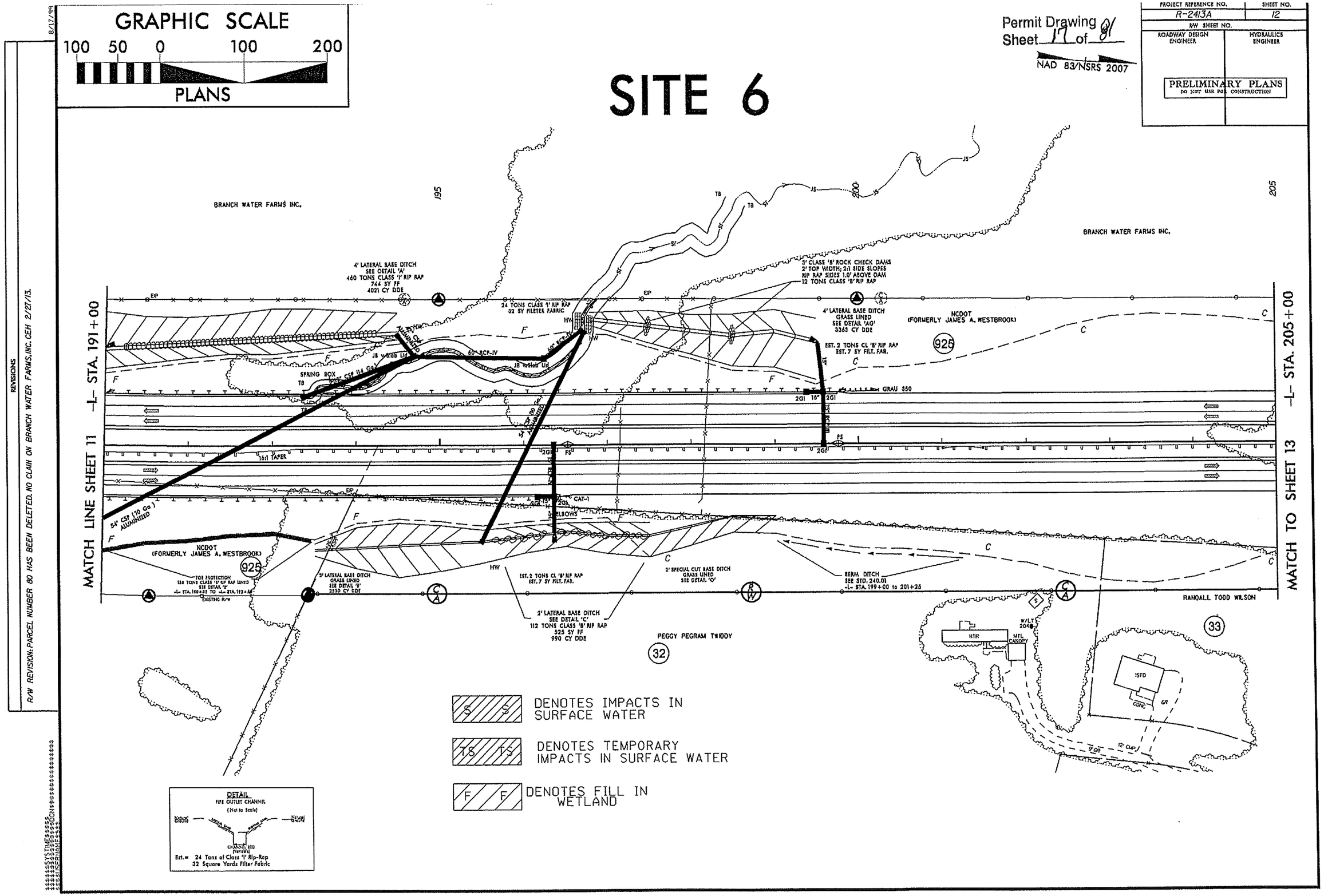
NC 68 CONNECTOR

FROM FOUR LANES AT

SR 2011 TO SR 2127

SHEET 16 OF 81

2/13/13


GRAPHIC SCALE
100 50 0 100 200
PLANS
Permit Drawing
Sheet 17 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SITE 6
BRANCH WATER FARMS INC.
MATCH LINE SHEET 11 -L- STA. 191+00
MATCH TO SHEET 13 -L- STA. 205+00
4' LATERAL BASE DITCH
SEE DETAIL 'A'
460 TONS CLASS 'I' RIP RAP
744 SY FF
4021 CY DDE
24 TONS CLASS 'I' RIP RAP
32 SY FILETER FABRIC
3' CLASS 'B' ROCK CHECK DAMS
2' TOP WIDTH; 2:1 SIDE SLOPES
RIP RAP SIDES 1.0' ABOVE DAM
12 TONS CLASS 'B' RIP RAP
4' LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'AG'
3363 CY DDE
EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FILT. FAB.
NCDOT
(FORMERLY JAMES A. WESTBROOK)
925
GRAU 350
SPRING BOX
16:1 TAPER
54" CSP (10 Ga.) ALUMINIZED
CAT-1
ELBOWS
TOE PROTECTION
2' LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'B'
2550 CY DDE
EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FILT. FAB.
2' SPECIAL CUT BASE DITCH
GRASS LINED
SEE DETAIL 'C'
BERM DITCH
SEE STD. 240.01
-L- STA. 199+00 to 201+25
2' LATERAL BASE DITCH
SEE DETAIL 'C'
112 TONS CLASS 'B' RIP RAP
525 SY FF
990 CY DDE
PEGGY PEGRAM TWIDDY
32
RANDALL TODD WILSON
33
HTR
MTL CANOPY
ISFD
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)
Est.= 24 Tons of Class 'I' Rip-Rap
32 Square Yards Filter Fabric
REVISIONS
R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIM ON BRANCH WATER FARMS, INC. CEH 2/27/13.
8/17/99

GRAPHIC SCALE

100 50 0 100 200

PLANS

Permit Drawing Sheet 18 of 81

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SITE 6

REVISIONS

8/17/99 R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIM ON BRANCH WATER FARMS, INC. CEH 2/27/15.

MATCH LINE SHEET 11 -L- STA. 191+00

-L- STA. 205+00 MATCH TO SHEET 13

BRANCH WATER FARMS INC.

4' LATERAL BASE DITCH SEE DETAIL 'A' 460 TONS CLASS 'I' RIP RAP 744 SY FF 402 CY DDE

24 TONS CLASS 'I' RIP RAP 32 SY FILTER FABRIC

3' CLASS 'I' ROCK CHECK DAMS 2' TOP WIDTH; 2:1 SIDE SLOPES RIP RAP SIDES 1.0' ABOVE DAM 12 TONS CLASS 'B' RIP-RAP

4' LATERAL BASE DITCH GRASS LINED SEE DETAIL 'AG' 3363 CY DDE

EST. 2 TONS CL 'B' RIP RAP EST. 7 SY FILT. FAB.

NCDOT (FORMERLY JAMES A. WESTBROOK)

925

16:1 TAPER

2GI 15" 2GI

FS

2GH

Y CATCH 20Y

SPRING BOX

16" CMP 110.60' ALUMINIZED

TOP PROTECTION 156 TONS CLASS 'I' RIP RAP LINED SEE DETAIL 'A' -L- STA. 190+33 TO -L- STA. 193+46

EXISTING R/W

4' LATERAL BASE DITCH GRASS LINED SEE DETAIL 'B' 2580 CY DDE

HW

EST. 2 TONS CL 'B' RIP RAP EST. 7 SY FILT. FAB.

3' LATERAL BASE DITCH SEE DETAIL 'C' 112 TONS CLASS 'B' RIP RAP 625 SY FF 390 CY DDE

3' SPECIAL CUT BASE DITCH GRASS LINED SEE DETAIL 'G'

BERM DITCH SEE STD. 240.01 -L- STA. 199+00 to 201+35

RANDALL TODD WILSON

PEGGY PEGRAM TWIDDY

32

33

W/L T 204

HTR

NTL CANOPY

ISFD

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

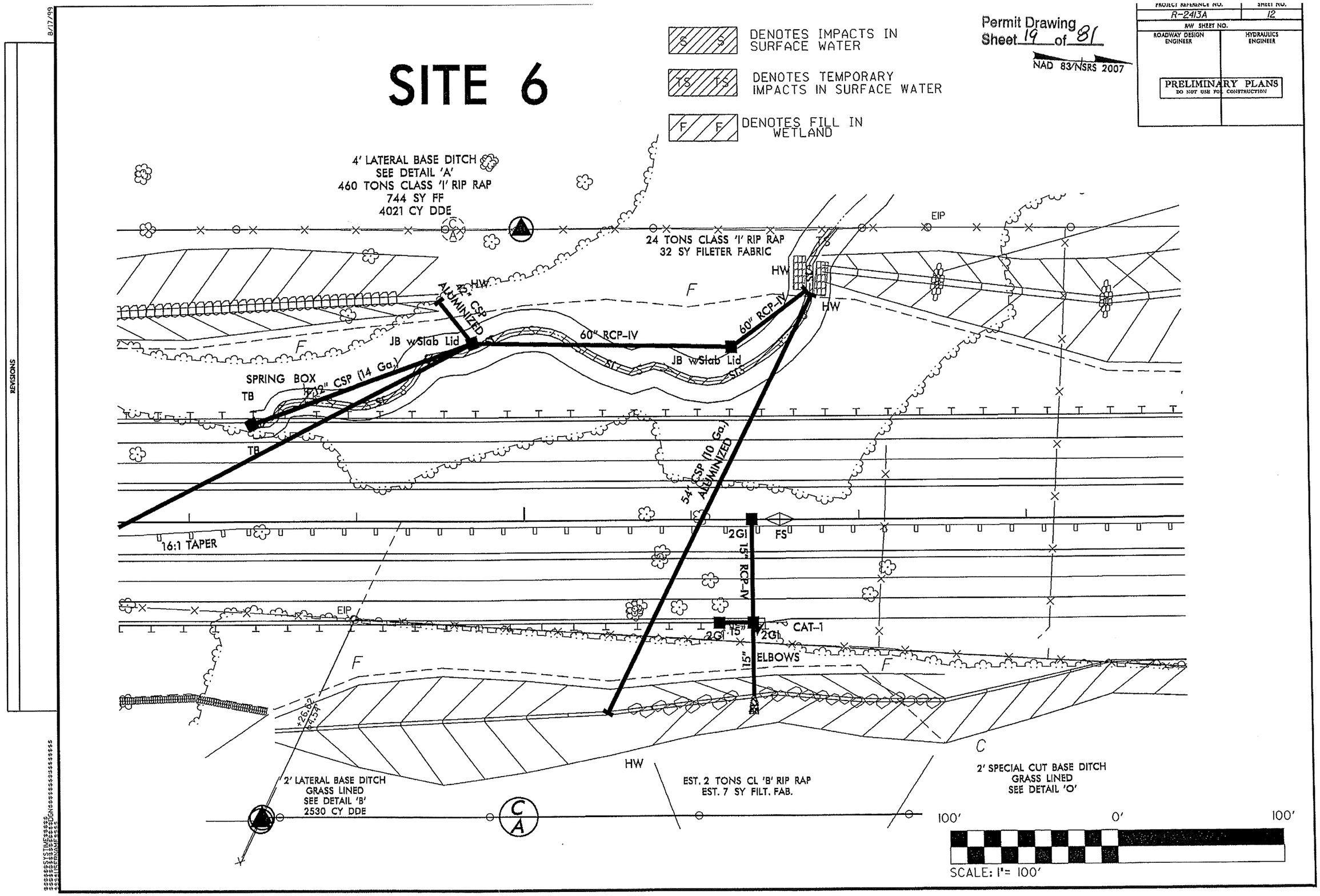
DENOTES FILL IN WETLAND

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

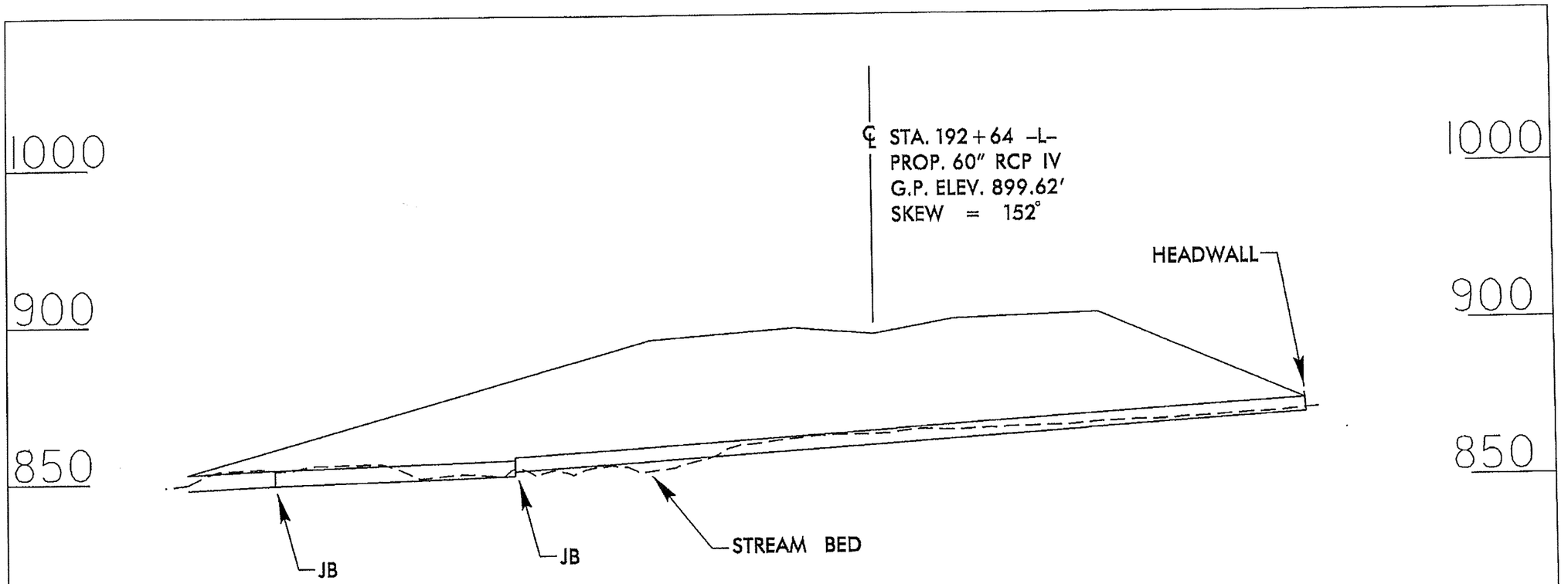
CHANNEL LINING (Variable)

Est. = 24 Tons of Class 'I' Rip-Rap
32 Square Yards Filter Fabric

$$SYSTIME$$
$$DGN$$



SITE 6
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
Permit Drawing
Sheet 19 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
4' LATERAL BASE DITCH
SEE DETAIL 'A'
460 TONS CLASS 'I' RIP RAP
744 SY FF
4021 CY DDE
24 TONS CLASS 'I' RIP RAP
32 SY FILETER FABRIC
EIP
HW
TS
F
12" CSP ALUMINIZED
JB w/Slab Lid
60" RCP-IV
SPRING BOX
TB
12" CSP (14 Ga.)
54" CSP (10 Ga.) ALUMINIZED
16:1 TAPER
2GI
FS
15" RCP-IV
CAT-1
15"
ELBOWS
+26.62
+4.54
C
2' LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'B'
2530 CY DDE
EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FILT. FAB.
2' SPECIAL CUT BASE DITCH
GRASS LINED
SEE DETAIL 'O'
100'
0'
100'
SCALE: 1"= 100'
REVISIONS
8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R-2413A)

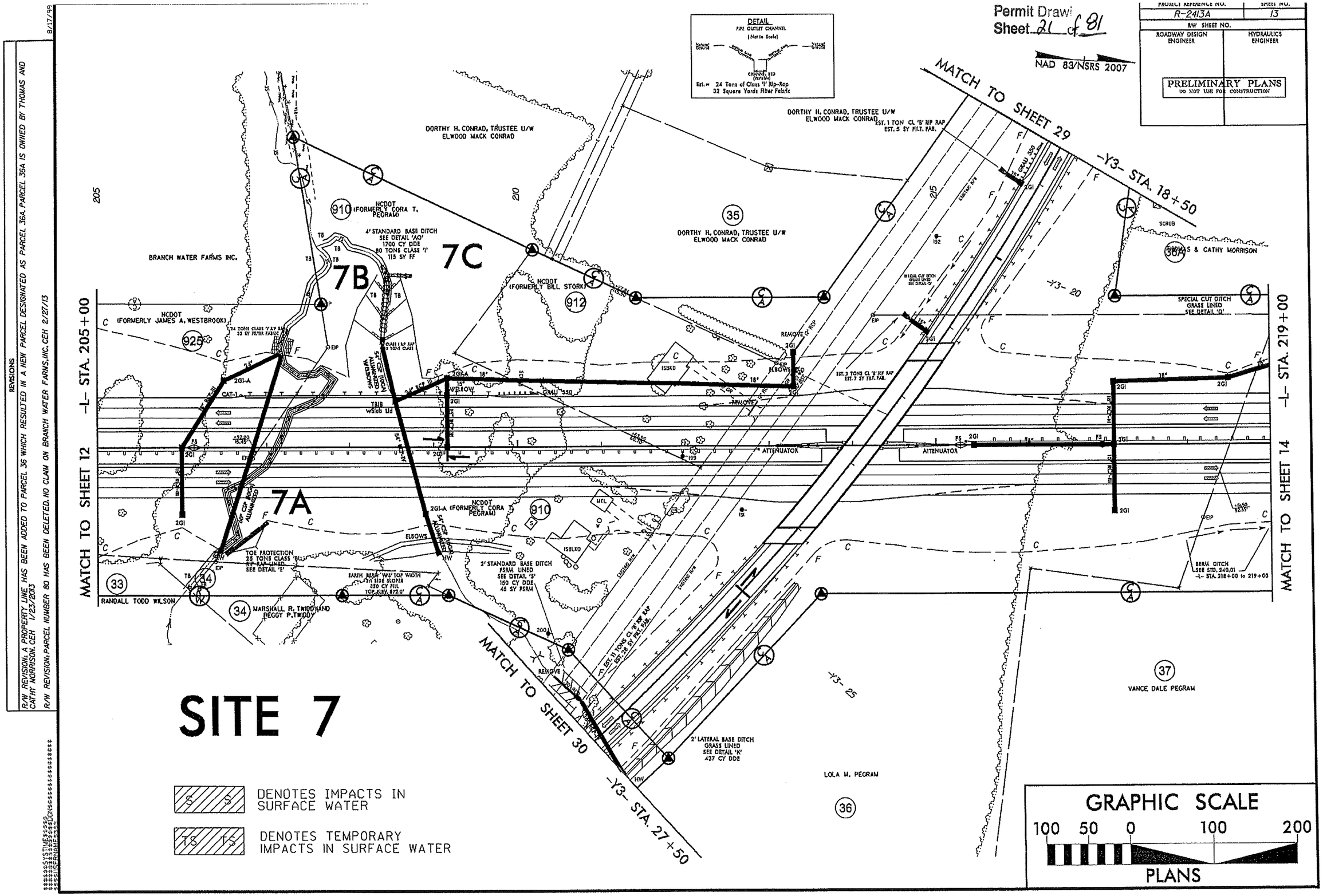
NC 68 CONNECTOR

FROM FOUR LANES AT

SR 2011 TO SR 2127

SHEET 20 OF 81

2/13/13



REVISIONS

R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN A NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIM ON BRANCH WATER FARMS, INC. CEH 2/27/13

8/17/99

Permit Drawing
Sheet 22 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN A NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIM ON BRANCH WATER FARMS, INC. CEH 2/27/13

8/17/99

SITE 7

DENOTES IMPACTS IN SURFACE WATER

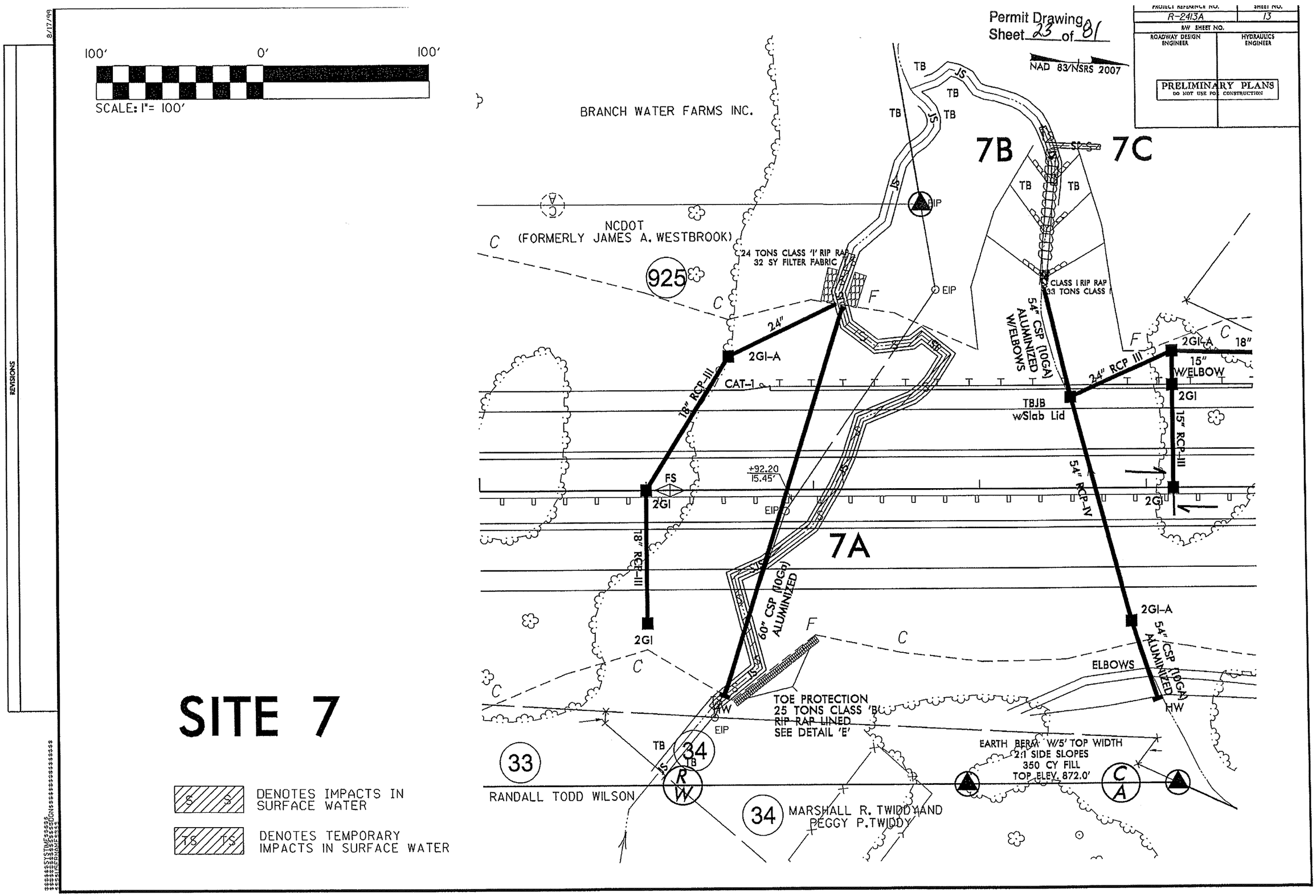
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

GRAPHIC SCALE

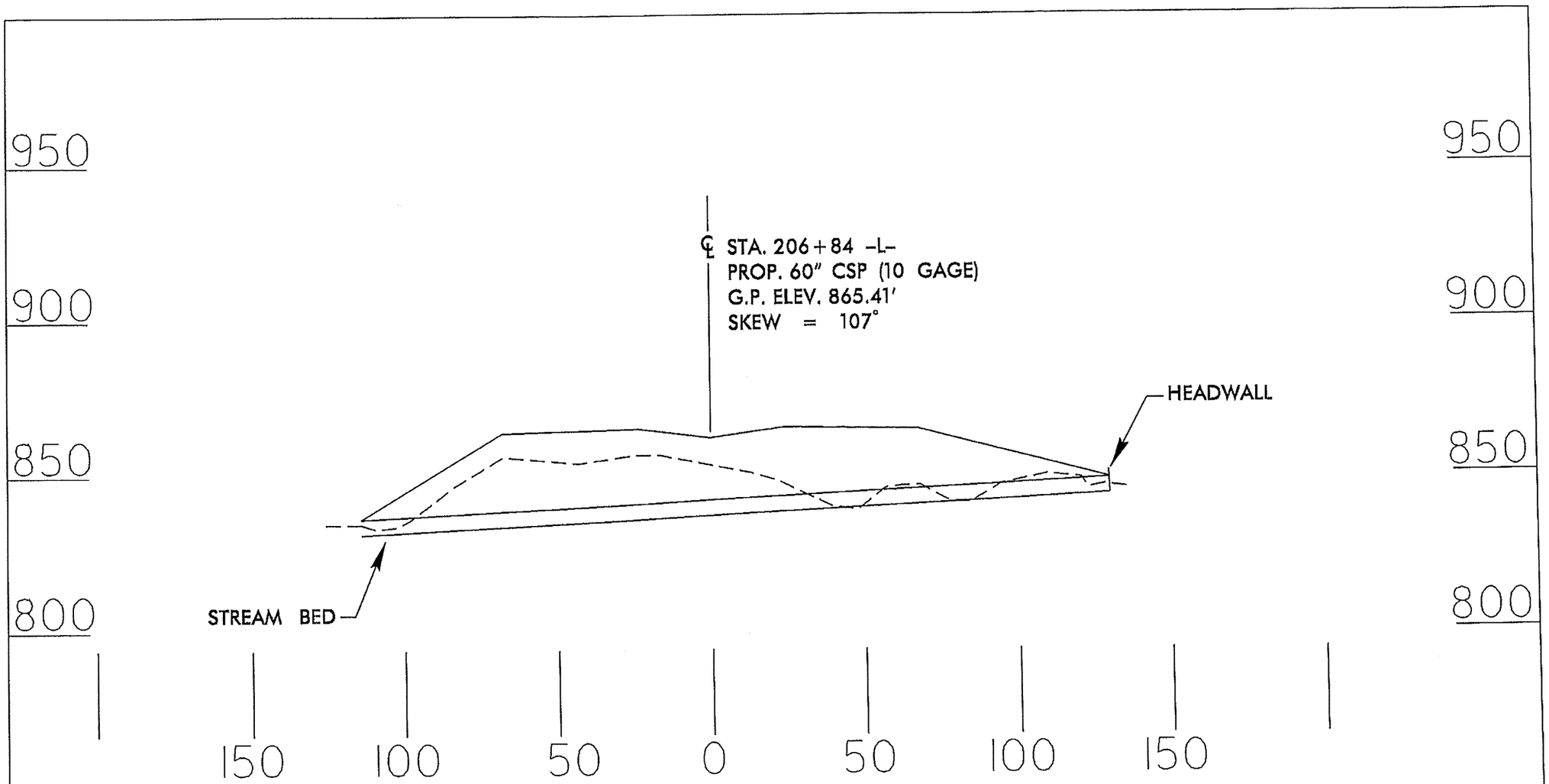
100 50 0 100 200

PLANS

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



Permit Drawing
Sheet 23 of 81
PROJECT REFERENCE NO. R-2413A
SHEET NO. 13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83/NSRS 2007
100' 0' 100'
SCALE: 1"= 100'
BRANCH WATER FARMS INC.
NCDOT
(FORMERLY JAMES A. WESTBROOK)
925
24 TONS CLASS 'I' RIP RAP
32 SY FILTER FABRIC
CLASS I RIP RAP
33 TONS CLASS I
54" CSP (10GA) ALUMINIZED W/ELBOWS
24" RCP III
18" RCP-III
15" W/ELBOW
15" RCP-III
54" RCP-IV
54" CSP (10GA) ALUMINIZED
60" CSP (10Ga) ALUMINIZED
TBJB w/Slab Lid
2GI-A
2GI
CAT-1
+92.20
15.45'
FS
EIP
HW
ELBOWS
7A
7B
7C
TOE PROTECTION
25 TONS CLASS 'B'
RIP RAP LINED
SEE DETAIL 'E'
EARTH BERM W/5' TOP WIDTH
2:1 SIDE SLOPES
350 CY FILL
TOP ELEV. 872.0'
33
34
RANDALL TODD WILSON
MARSHALL R. TWIDDY AND PEGGY P. TWIDDY
SITE 7
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REVISIONS
8/17/99



PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

SHEET 24 OF 84 2/13/13

REVISIONS

R/W REVISION: PARCEL 38 HAS BEEN SPLIT INTO THREE SEPARATE PARCELS. THE PROP. R/W LINE LOCATED RIGHT OF -L- BETWEEN STA.232+65.68 AND STA.235+30.83 HAS BEEN CHANGED TO AN EXIST. R/W LINE. CEH 11/21/2012

R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

8/17/99

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

Permit Drawing
Sheet 26 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

GRAPHIC SCALE
100 50 0 100 200
PLANS

S DENOTES IMPACTS IN SURFACE WATER

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

P DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

R/W REVISION: PARCEL 38 HAS BEEN SPLIT INTO THREE SEPARATE PARCELS. THE PROP. R/W LINE LOCATED RIGHT OF -L- BETWEEN STA.232+65.68 AND STA.235+30.83 HAS BEEN CHANGED TO AN EXIST. R/W LINE. CEH 11/21/2012

R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

8/17/99

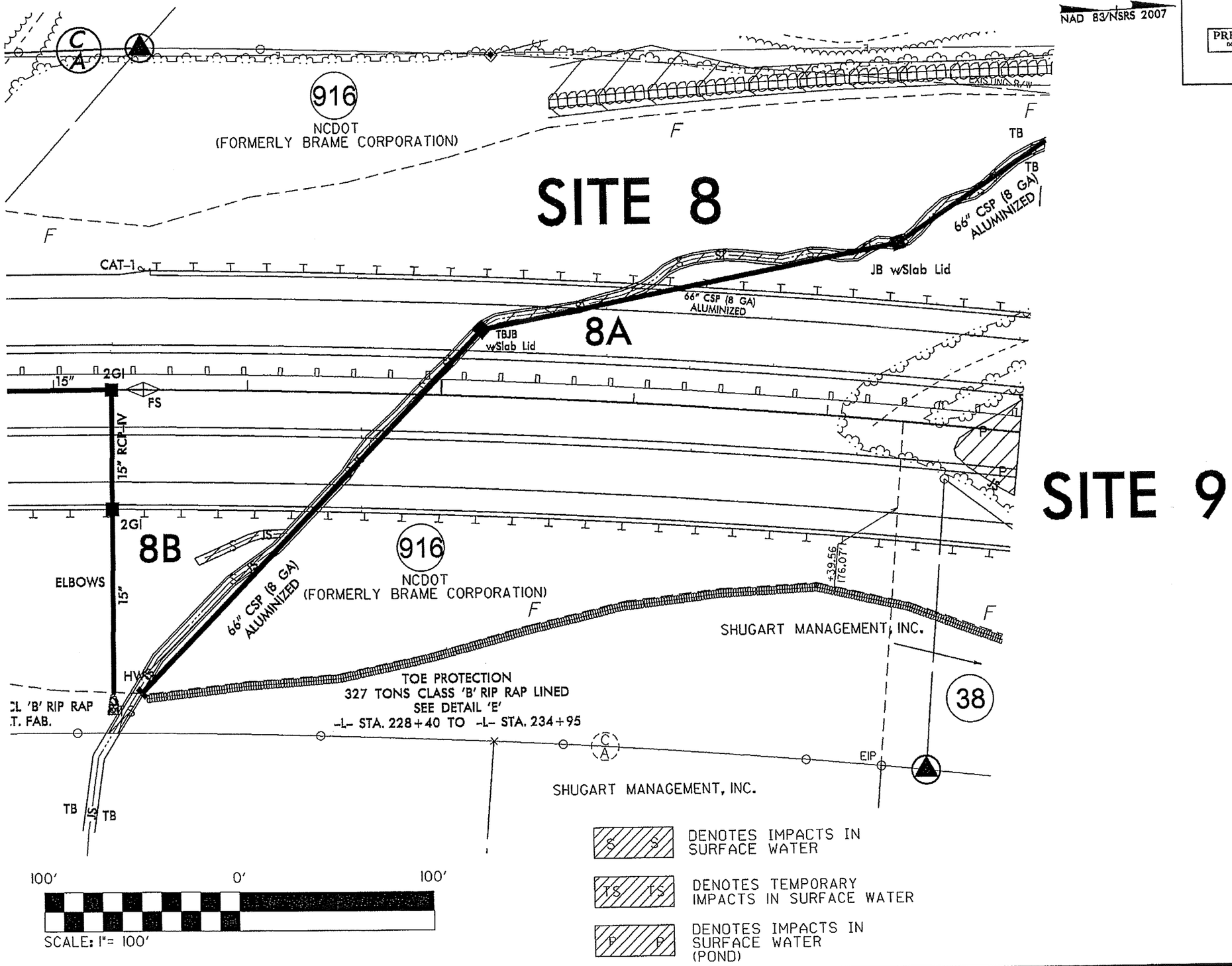
$$$$$$SYSTIME$$$$$ $$$$$$$$$$$DGN$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

Permit Drawing
Sheet 27 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

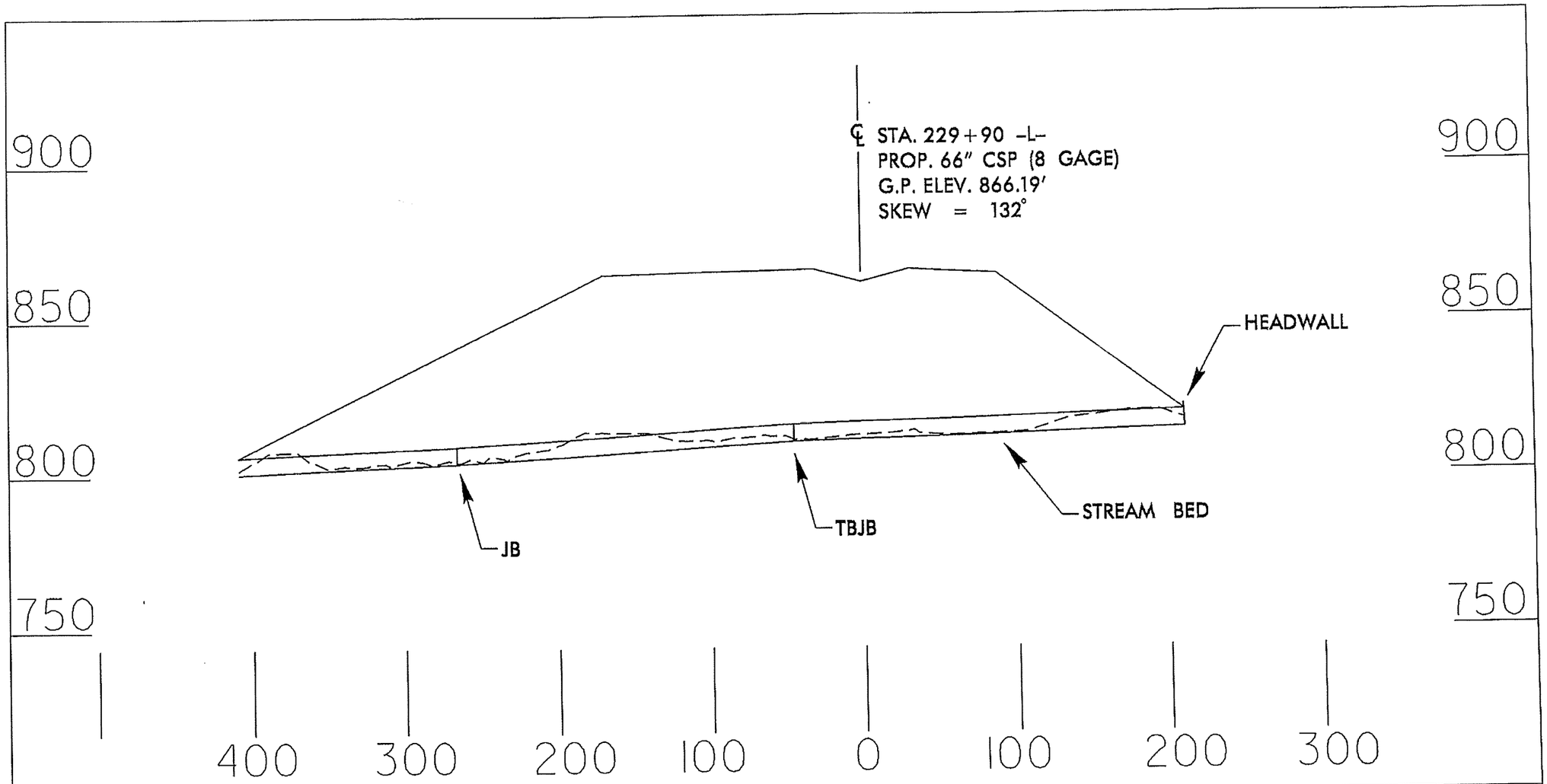
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007



REVISIONS

8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R-2413A)

NC 68 CONNECTOR

FROM FOUR LANES AT

SR 2011 TO SR 2127

SHEET 28 OF 81

2/13/13

Permit Drawing Sheet 29 of 81

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

R/W REVISION: PARCEL 38 HAS BEEN SPLIT INTO THREE SEPARATE PARCELS. THE PROP. R/W LINE LOCATED RIGHT OF -L- BETWEEN STA. 232+65.68 AND STA. 235+30.83 HAS BEEN CHANGED TO AN EXIST. R/W LINE. CEH 11/21/2012

SITE 8

DETAIL
RIPE OUTLET CHANNEL
(Not to Scale)

Est.= 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric

S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

8A

4' LATERAL BASE DITCH
SEE DETAIL 'A'
368 TONS CLASS 'I' RIP RAP
595 SY FF

EXISTING 66' DUKE POWER R/W DB 2743 PG 972

SCRUB

EIP 8.05' OFF LINE

916 NCDOT (FORMERLY BRAME CORPORATION)

32 TONS CLASS 'I' RIP RAP
40 SY FILTER FABRIC

EIP

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

917 NCDOT (FORMERLY BOBBY E. AND SHIRLEY SMITH)

2' STANDARD BASE DITCH
GRASS LINED
SEE DETAIL 'M'
250 CY EXCAVATION

EXISTING R/W

8C REMOVE

42" CMP W/ GALVANIZED STEEL FLARE END SECTIONS

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

GRAU 350

EST. 5 TONS CL 'B' RIP RAP
EST. 14 SY FILT. FAB.

TOE PROTECTION
58 TONS CLASS 'B' RIP RAP LINED
SEE DETAIL 'E'
-L- STA. 246+50 to 247+50

-L- STA. 233+00

-L- STA. 247+00

MATCH TO SHEET 14

ELBOWS

EST. 2 TON CL 'B' RIP RAP
EST. 7 SY FILT. FAB.

SHUGART MANAGEMENT, INC. (38)

TOE PROTECTION
345 TONS CLASS 'B' RIP RAP LINED
SEE DETAIL 'E'
-L- STA. 228+40 TO -L- STA. 235+30

DONEVAN SOUTH

TAINO A. ANDE

DAVID A. CRANMER AND LINDA A. CRANMER

SEPTIC EASEMENT FOR 60 POOL

SHUGART MANAGEMENT, INC.

PSH
SEE DETAIL 'AM'

10A

4' LATERAL BASE DITCH
SEE DETAIL 'AS'
58 TONS CLASS 'B' RIP RAP
185 SY FF
140 CY DDE

MATCH TO SHEET 16

10B

39 DONALD LINEBERRY

SITE 9

SITE 10

FOR -L- PROFILE, SEE SHEET NO. 41

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

$$$$$$$$SYSTIME$$$$$$$$
$$$$$$$$LEVEL$$$$$$$$

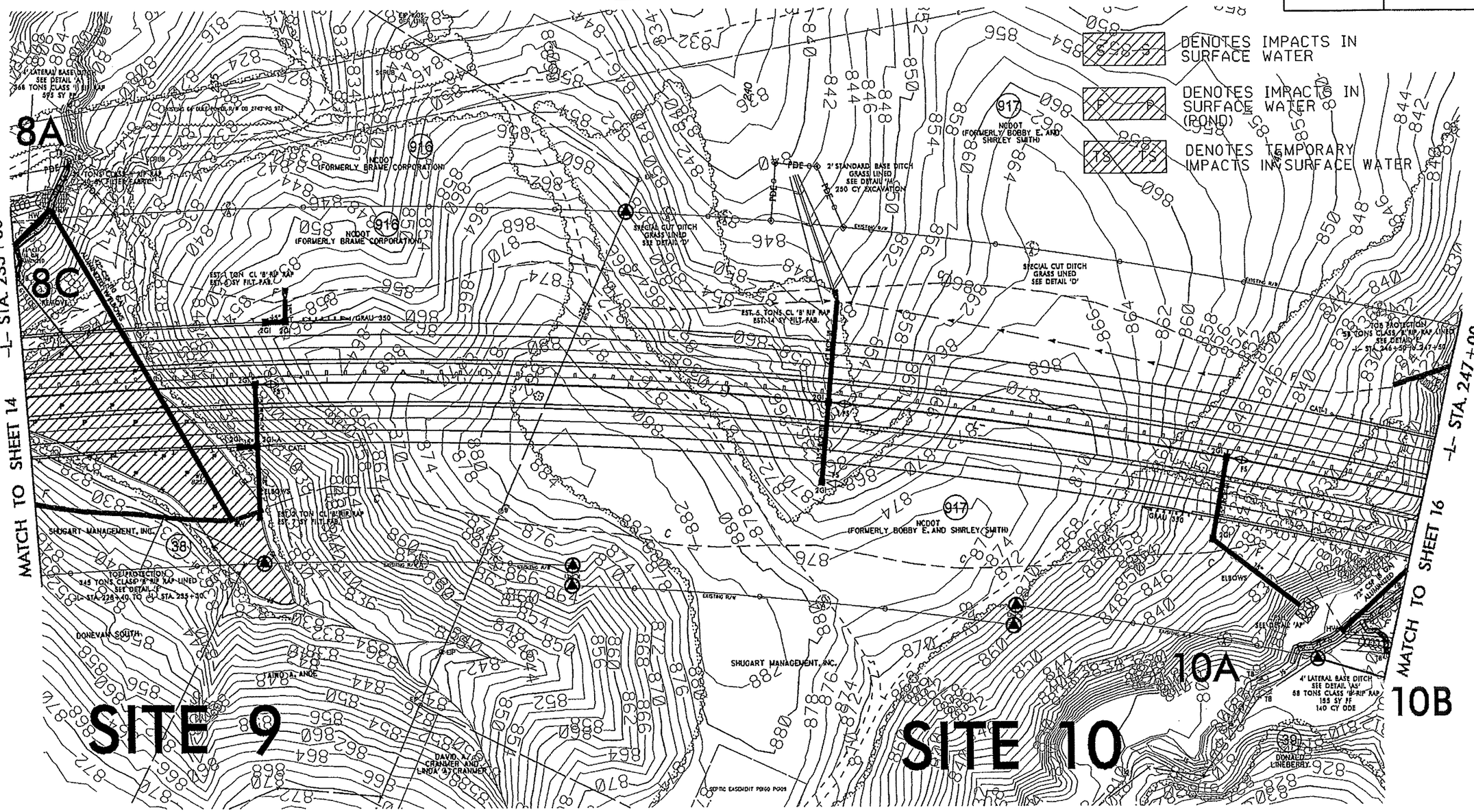
Permit Drawing
Sheet 30 of 81

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SITE 8



FOR -L- PROFILE, SEE SHEET NO. 41

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

REVISIONS

R/W REVISION: PARCEL 38 HAS BEEN SPLIT INTO THREE SEPARATE PARCELS. THE PROP. R/W LINE LOCATED RIGHT OF -L- BETWEEN STA.232+65.68 AND STA.235+30.83 HAS BEEN CHANGED TO AN EXIST. R/W LINE. CEH 11/21/2012

8/17/99

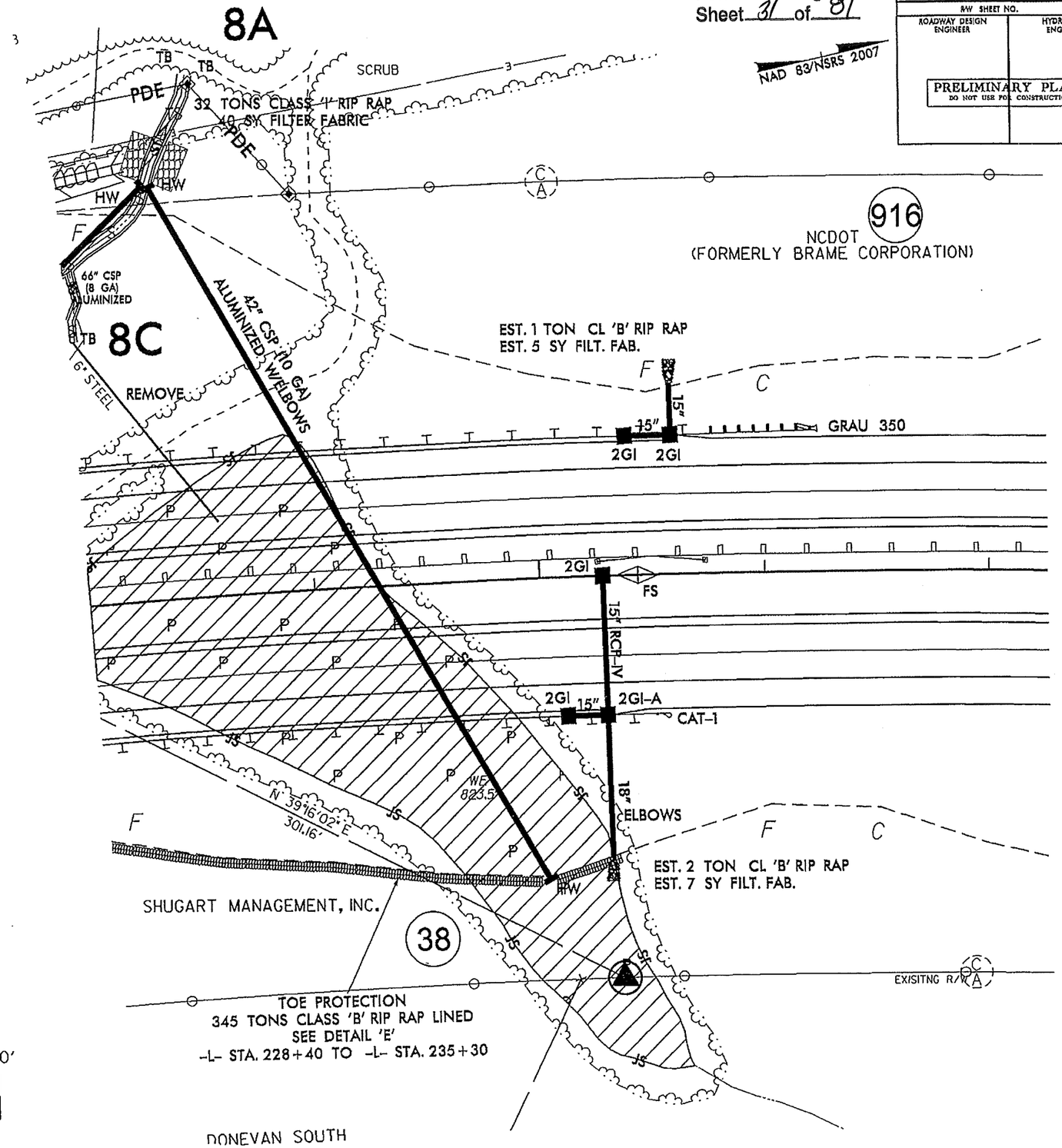
Permit Drawing
Sheet 31 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

SITE 8



S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

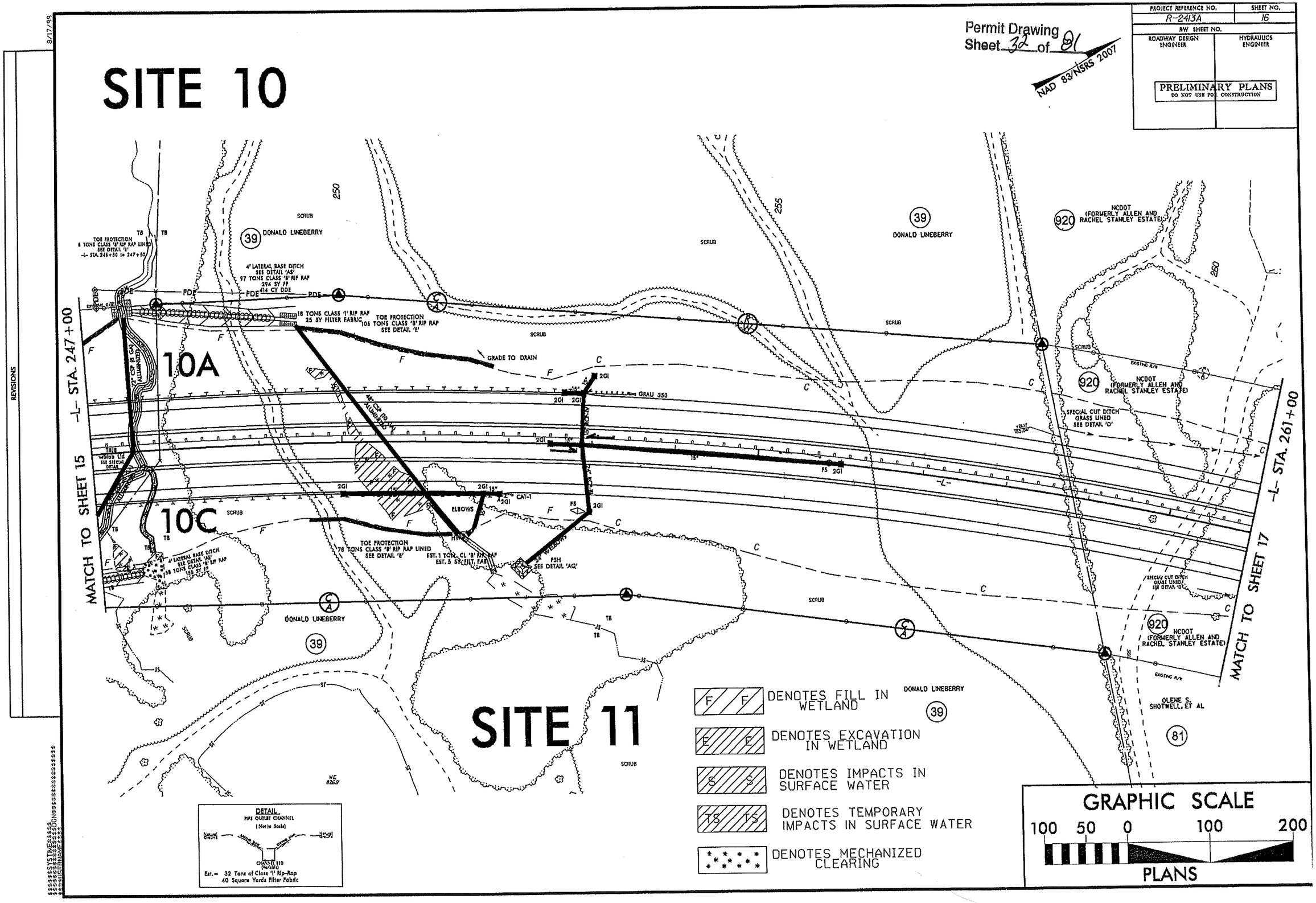
SITE 9

100' 0' 100'

SCALE: 1"= 100'

REVISIONS

8/17/99



PROJECT REFERENCE NO.
R-2413A
SHEET NO.
16
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 32 of 81
NAD 83/NSRS 2007
SITE 10
SITE 11
10A
10C
-L- STA. 247+00
-L- STA. 261+00
MATCH TO SHEET 15
MATCH TO SHEET 17
DONALD LINEBERRY
NCDOT (FORMERLY ALLEN AND RACHEL STANLEY ESTATE)
OLENE S. SHOTWELL, ET AL
SCRUB
GRADE TO DRAIN
GRAU 350
ELBOWS
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)
Est. = 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric
GRAPHIC SCALE
100 50 0 100 200
PLANS
REVISIONS
8/17/99

Permit Drawing Sheet 33 of 81

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SITE 10

SITE 11

10A

10C

-L- STA. 247+00

-L- STA. 261+00

MATCH TO SHEET 15

MATCH TO SHEET 17

DONALD LINEBERRY

NCDOT (FORMERLY ALLEN AND RACHEL STANLEY ESTATE)

SCRUB

DENOTES FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

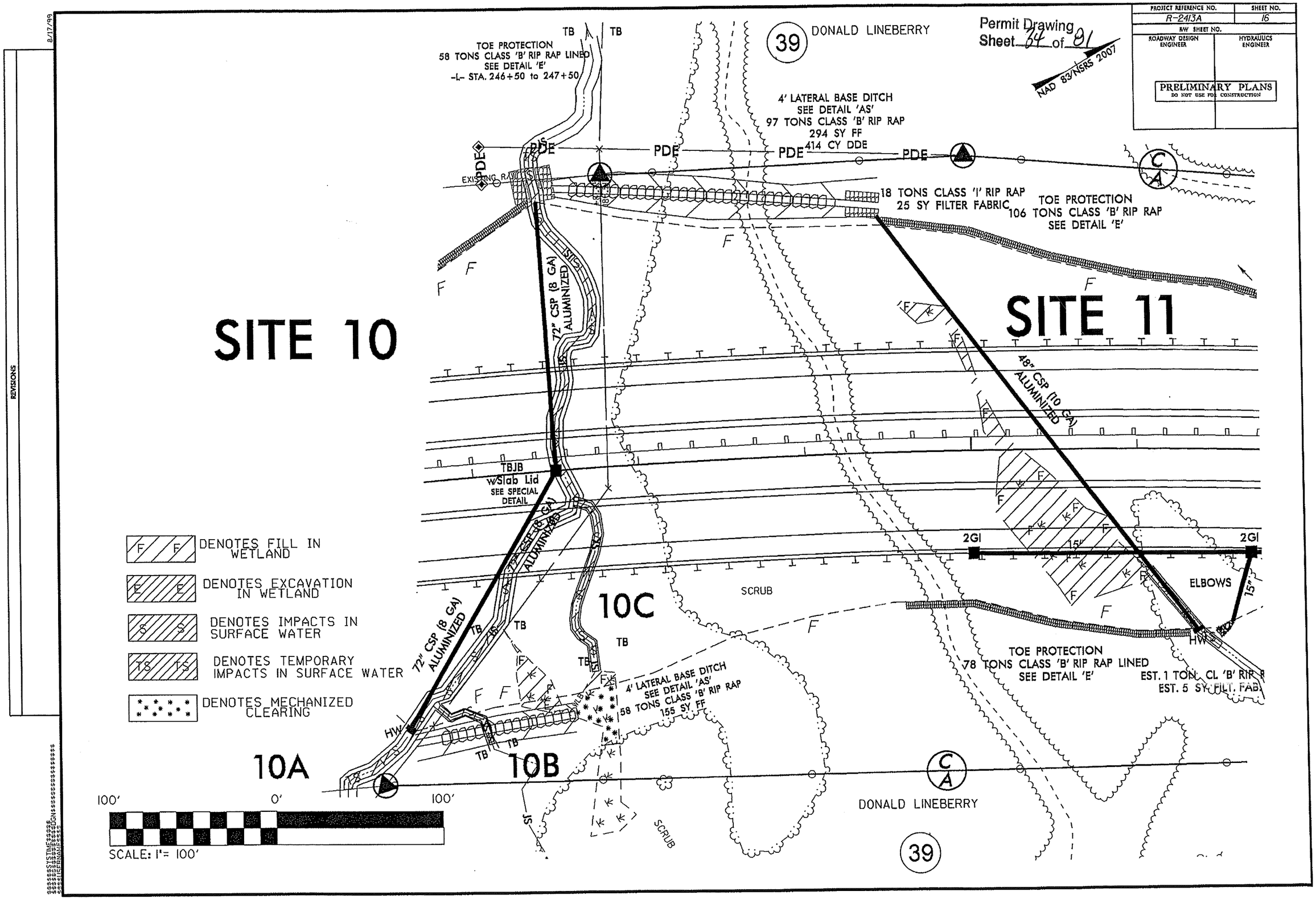
DENOTES MECHANIZED CLEARING

DETAIL
R/R OUTLET CHANNEL
(Not to Scale)

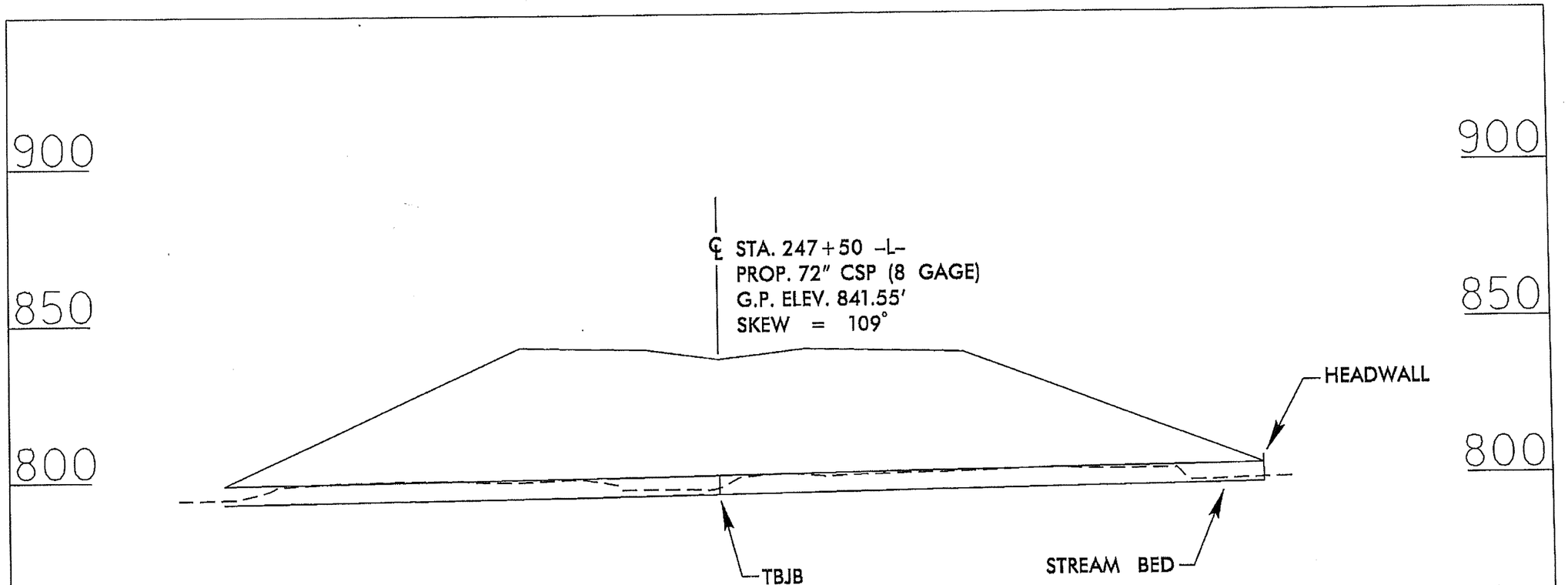
Est.= 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric

GRAPHIC SCALE
100 50 0 100 200
PLANS

REVISIONS 8/17/99



PROJECT REFERENCE NO.
R-2413A
SHEET NO.
16
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 34 of 81
NAD 83/NSRS 2007
39
DONALD LINEBERRY
TOE PROTECTION
58 TONS CLASS 'B' RIP RAP LINED
SEE DETAIL 'E'
-L- STA. 246+50 to 247+50
4' LATERAL BASE DITCH
SEE DETAIL 'AS'
97 TONS CLASS 'B' RIP RAP
294 SY FF
414 CY DDE
18 TONS CLASS 'I' RIP RAP
25 SY FILTER FABRIC
TOE PROTECTION
106 TONS CLASS 'B' RIP RAP
SEE DETAIL 'E'
SITE 10
SITE 11
72" CSP (8 GA) ALUMINIZED
48" CSP (10 GA) ALUMINIZED
TBJB
w/Slab Lid
SEE SPECIAL DETAIL
2GI
15"
ELBOWS
SCRUB
10C
10A
10B
TOE PROTECTION
78 TONS CLASS 'B' RIP RAP LINED
SEE DETAIL 'E'
EST. 1 TON CL 'B' RIP R
EST. 5 SY FILT. FAB.
4' LATERAL BASE DITCH
SEE DETAIL 'AS'
58 TONS CLASS 'B' RIP RAP
155 SY FF
DONALD LINEBERRY
39
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
100'
0'
100'
SCALE: 1"= 100'
REVISIONS
8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

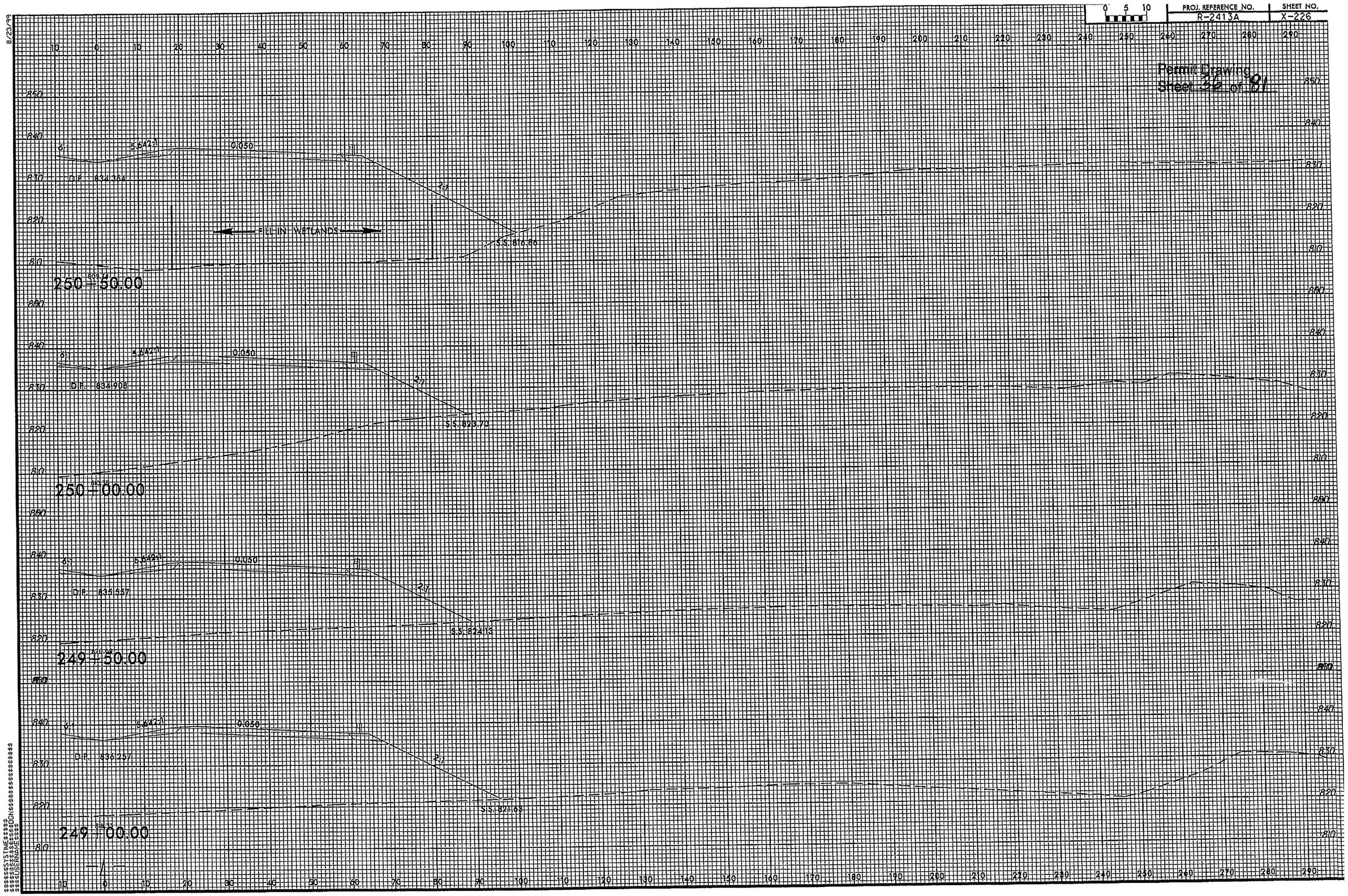
PROJECT: 34429.1.1 (R-2413A)

NC 68 CONNECTOR

FROM FOUR LANES AT

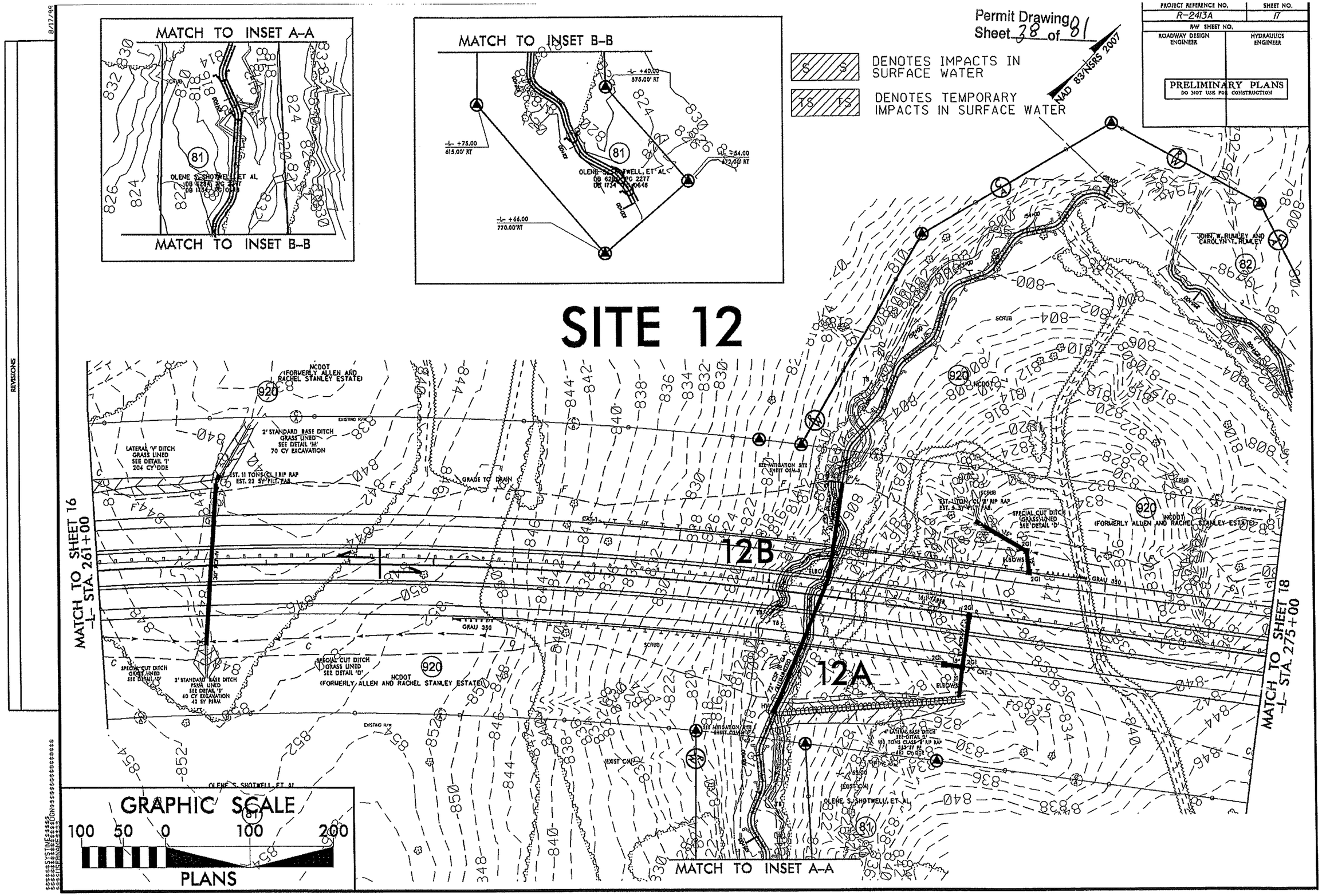
SR 2011 TO SR 2127

SHEET 35 OF 81 2/13/13

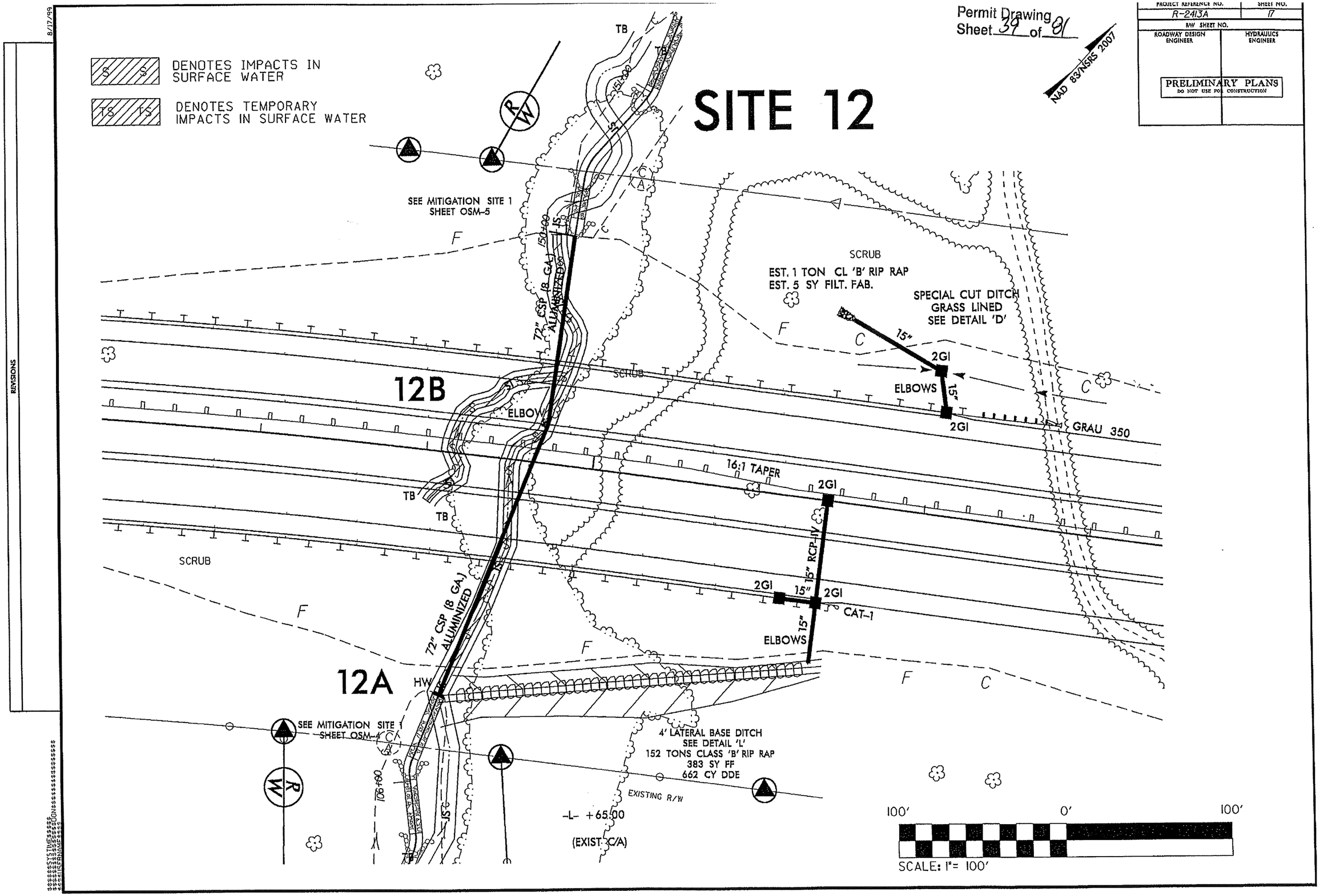


PROJ. REFERENCE NO.
R-2413A
SHEET NO.
X-226
Permit Drawing
Sheet 36 of 81
FILL IN WETLANDS
D.P. 834.364
S.S. 816.86
250+50.00
D.P. 834.908
S.S. 823.70
250+00.00
D.P. 835.557
S.S. 824.13
249+50.00
D.P. 836.257
S.S. 821.63
249+00.00

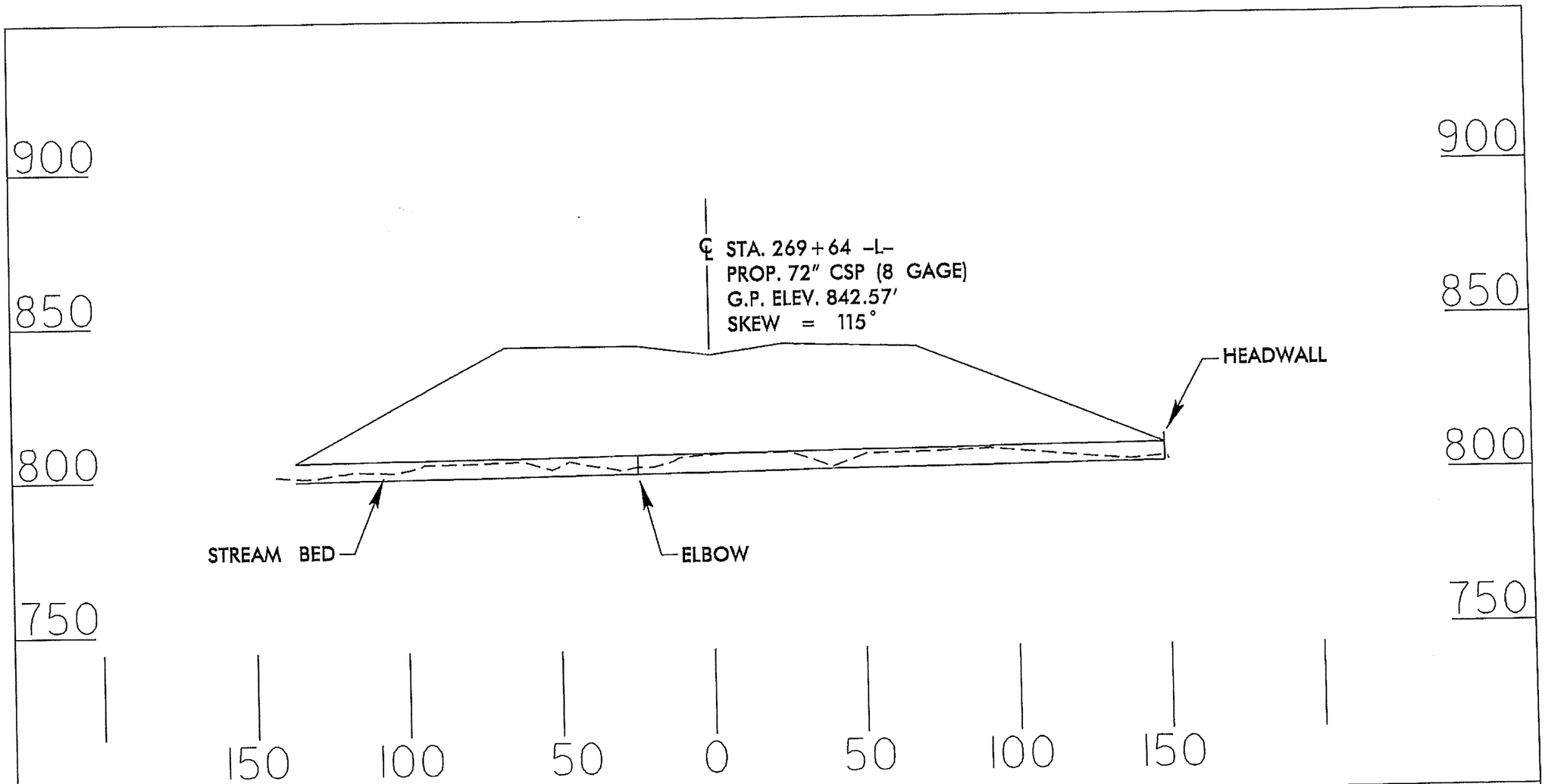
Permit Drawing
Sheet 37 of 81
PROJECT REFERENCE NO. R-2413A
SHEET NO. 17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
NAD 83/NSRS 2007
SITE 12
12A
12B
MATCH TO INSET A-A
MATCH TO INSET B-B
SCRUB
OLENE S. SHOTWELL, ET AL
DB 6284 PG 2277
DB 1734 PG 0648
-L- +75.00
615.00' RT
-L- +40.00
575.00' RT
-L- +54.00
672.00' RT
-L- +66.00
770.00' RT
JOHN W. RUMLEY AND CAROLYN T. RUMLEY
NCDOT
(FORMERLY ALLEN AND RACHEL STANLEY ESTATE)
LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'I'
204 CY DDE
2' STANDARD BASE DITCH
GRASS LINED
SEE DETAIL 'M'
70 CY EXCAVATION
EST. 11 TONS CL I RIP RAP
EST. 22 SY FILT. FAB.
GRADE TO DRAIN
SEE MITIGATION SITE 1
SHEET OSM-5
EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.
SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'
ELBOWS
GRAU 350
16:1 TAPER
CAT-1
72" CSP (8 GA) ALUMINIZED
SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'
2' STANDARD BASE DITCH
PSRM LINED
SEE DETAIL 'S'
60 CY EXCAVATION
40 SY PSRM
EXISTING R/W
(EXIST C/A)
4' LATERAL BASE DITCH
SEE DETAIL 'L'
152 TONS CLASS 'B' RIP RAP
345 SY FF
462 CY DDE
-L- +65.00
MATCH TO SHEET 16
-L- STA. 261+00
MATCH TO SHEET 18
-L- STA. 275+00
GRAPHIC SCALE
100 50 0 100 200
PLANS
REVISIONS
8/17/99



Permit Drawing
Sheet 38 of 81
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83/NSRS 2007
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
MATCH TO INSET A-A
MATCH TO INSET B-B
SITE 12
12A
12B
MATCH TO SHEET 16 -L- STA. 261+00
MATCH TO SHEET 18 -L- STA. 275+00
NCDOT (FORMERLY ALLEN AND RACHEL STANLEY ESTATE)
JOHN W. RUMLEY AND CAROLYN T. RUMLEY
OLENE S. SHOTWELL, ET AL
GRAPHIC SCALE
100 50 0 100 200
PLANS
REVISIONS
8/17/99



Permit Drawing
Sheet 39 of 81
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83/NSRS 2007
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
SITE 12
SEE MITIGATION SITE 1
SHEET OSM-5
SCRUB
EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.
SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'
15"
2GI
ELBOWS
GRAU 350
12B
ELBOW
16:1 TAPER
15" RCP-IV
CAT-1
72" CSP (8 GA.) ALUMINIZED
12A
HW
SEE MITIGATION SITE 1
SHEET OSM-4
4' LATERAL BASE DITCH
SEE DETAIL 'L'
152 TONS CLASS 'B' RIP RAP
383 SY FF
662 CY DDE
EXISTING R/W
-L- +65.00
(EXIST. C/A)
100'
0'
100'
SCALE: 1"= 100'
REVISIONS
8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

SHEET 40 OF 81 2/13/13

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

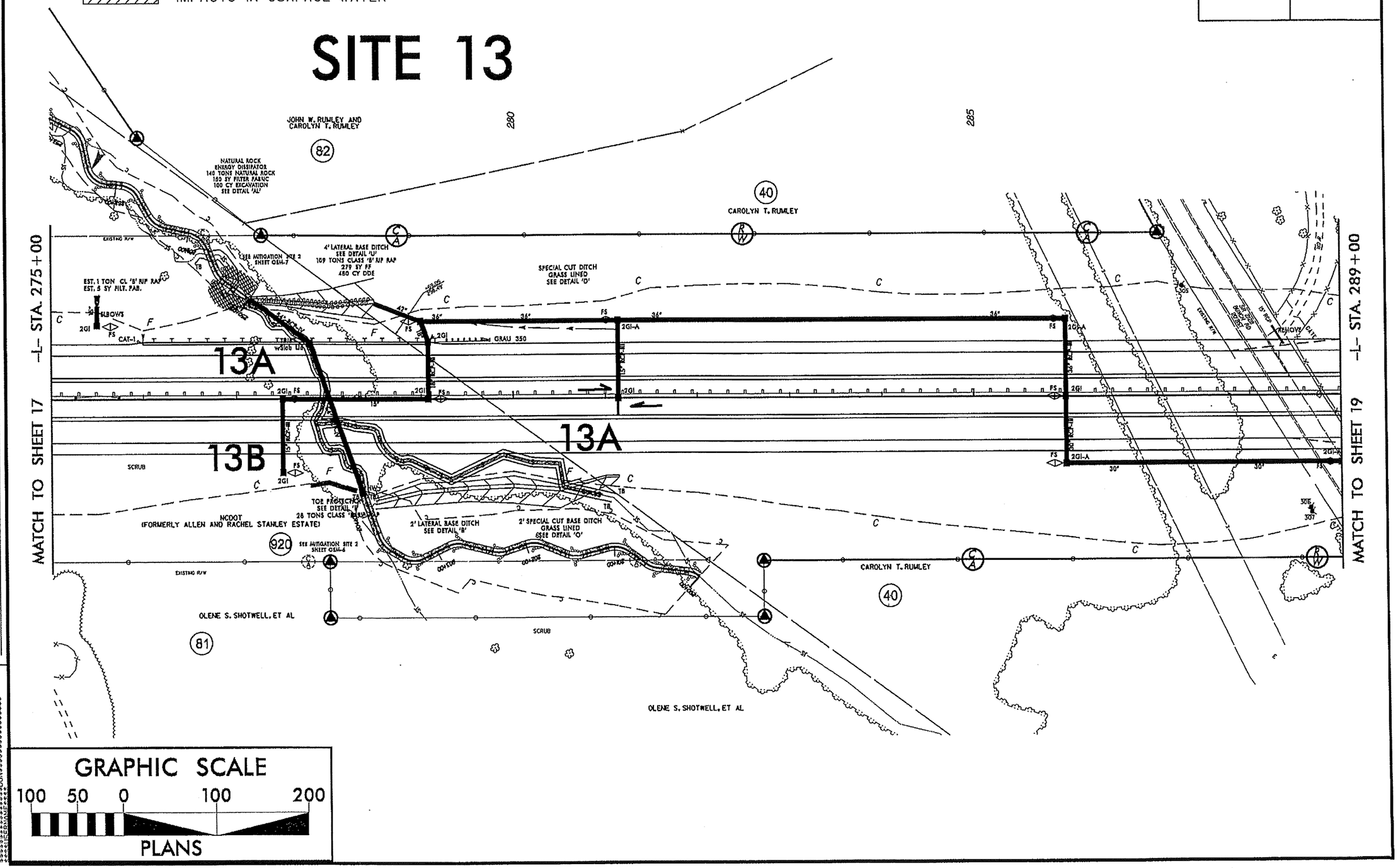
Permit Drawing
Sheet 41 of 81

NAD 83/NSRS 2007

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 13



REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

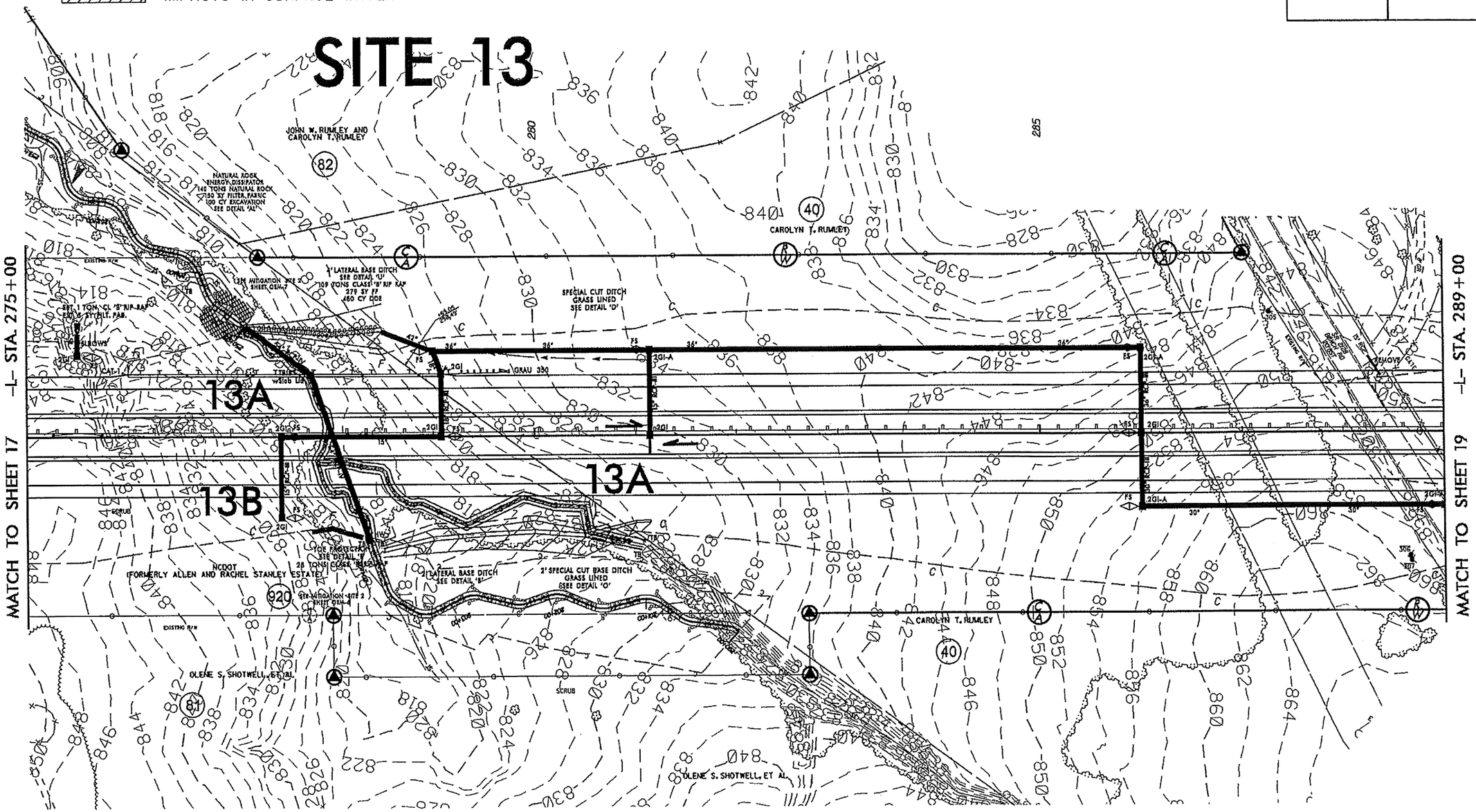
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 42 of 81

NAD 83/NSRS 2007

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



REVISIONS

8/17/99

R-2413A	18
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing Sheet 43 of 81

NAD 83/NSRS 2007

REVISIONS 8/17/99

SITE 13

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

EXISTING R/W

SEE MITIGATION SITE 2 SHEET OSM-7

4' LATERAL BASE DITCH
SEE DETAIL 'U'
109 TONS CLASS 'B' RIP RAP
279 SY FF
480 CY DDE

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

15" ELBOWS

2GI

FS

CAT-1

54" RCP-IV

TBJB w/Slab Lid

42"

+69.05
298.49'

36" 36" FS 36"

2GI-A

2GI

GRAU 350

18" RCP-III

15" RCP-III

13A

2GI FS 2GI FS 2GI

15"

54" RCP-IV

15" RCP-III

13B

SCRUB

NCDOT
(FORMERLY ALLEN AND RACHEL STANLEY ESTATE)

920

SEE MITIGATION SITE 2 SHEET OSM-6

TOE PROTECTION
SEE DETAIL 'E'
28 TONS CLASS 'B' RIP RAP

HW

TB

2' LATERAL BASE DITCH
SEE DETAIL 'B'

2' SPECIAL CUT BASE DITCH
GRASS LINED
SEE DETAIL 'O'

203+00 202+00 201+00

100' 0' 100'

SCALE: 1"= 100'

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

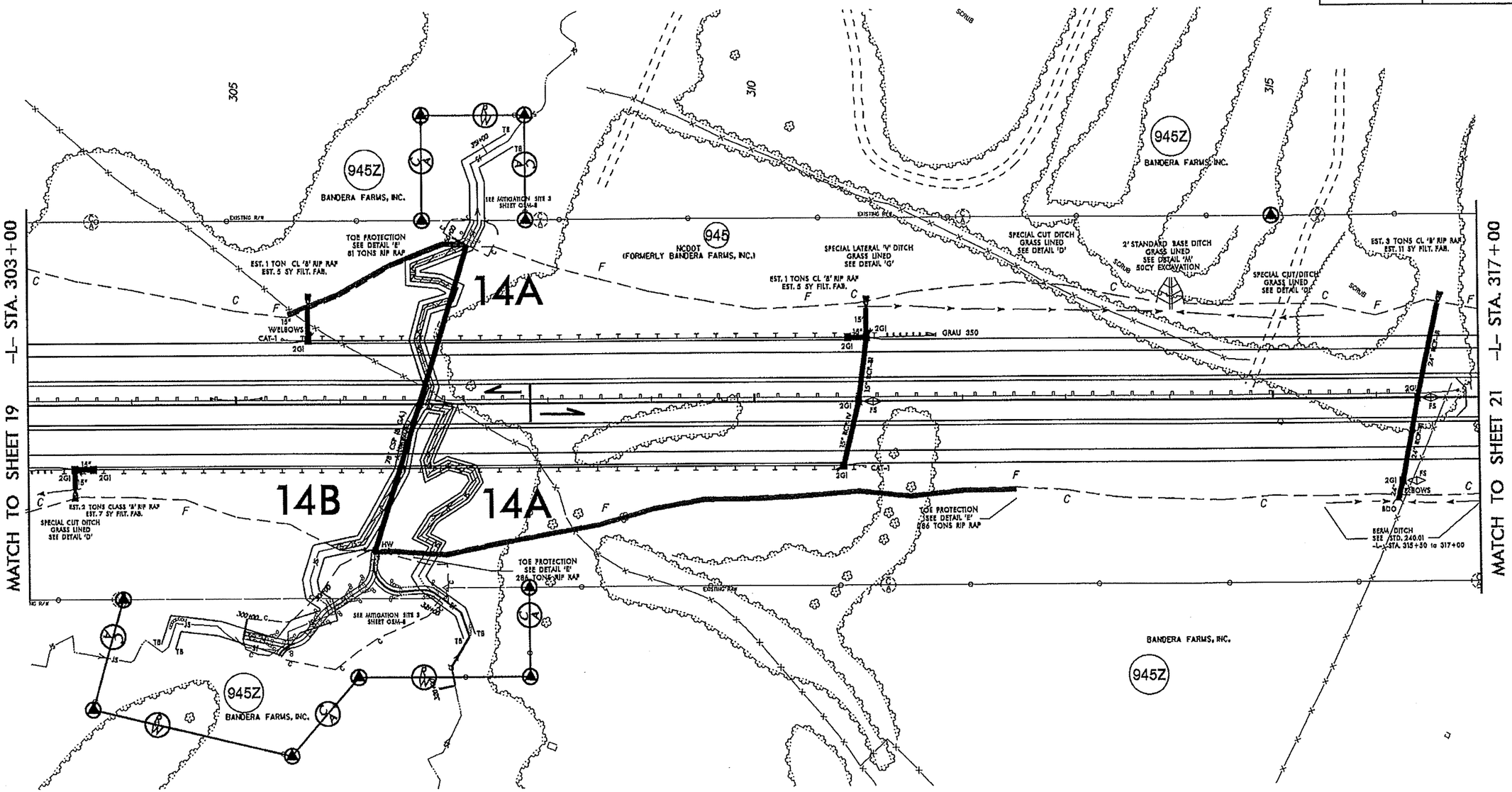
Permit Drawing
Sheet 44 of 81

NAD 83/NSRS 2007

SITE 14

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



GRAPHIC SCALE

100 50 0 100 200

PLANS

REVISIONS

8/17/99

Permit Drawing Sheet 45 of 81

NAD 83/NSRS 2007

R-2413A	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

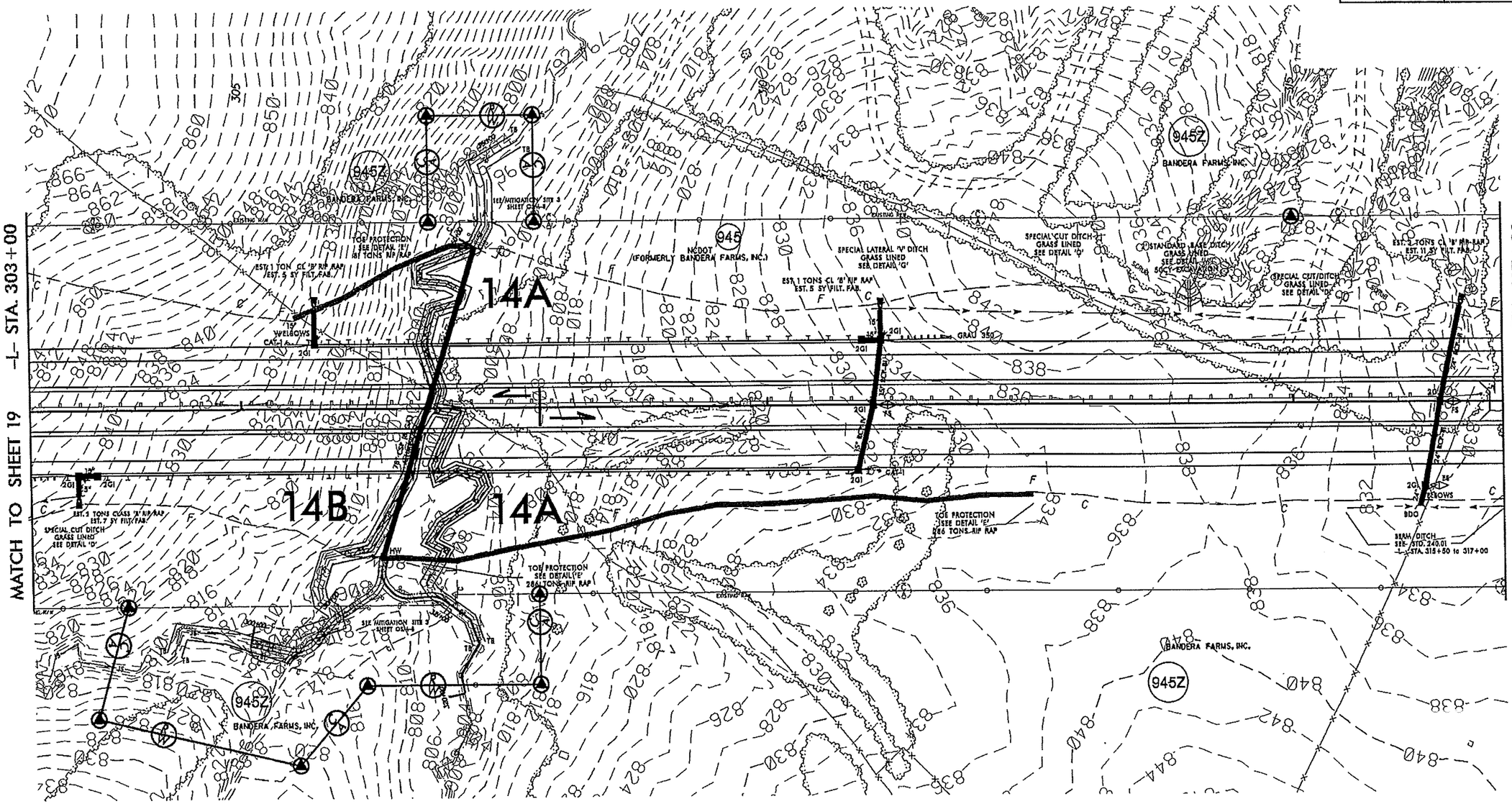
8/17/95

REVISIONS

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 14

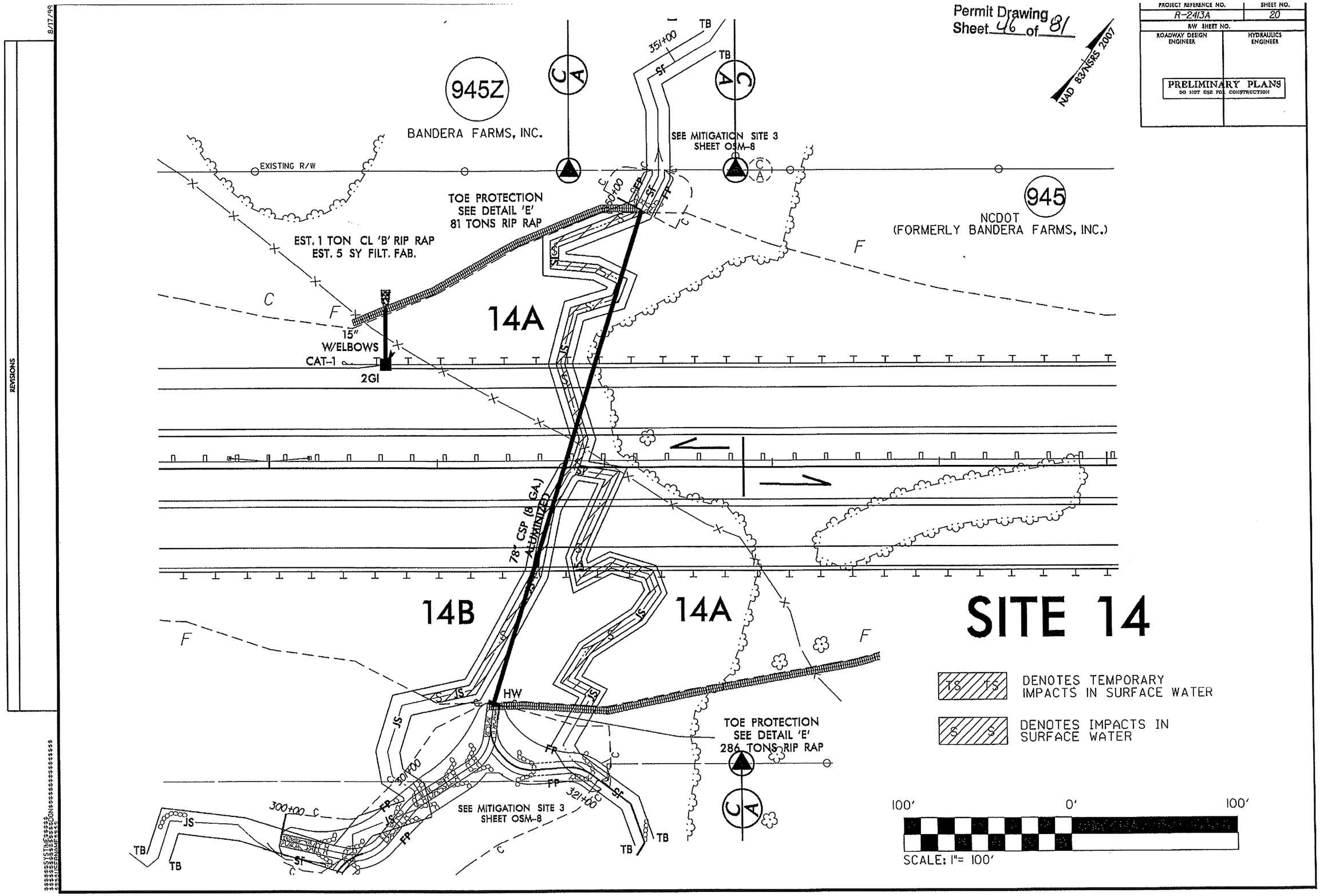


GRAPHIC SCALE

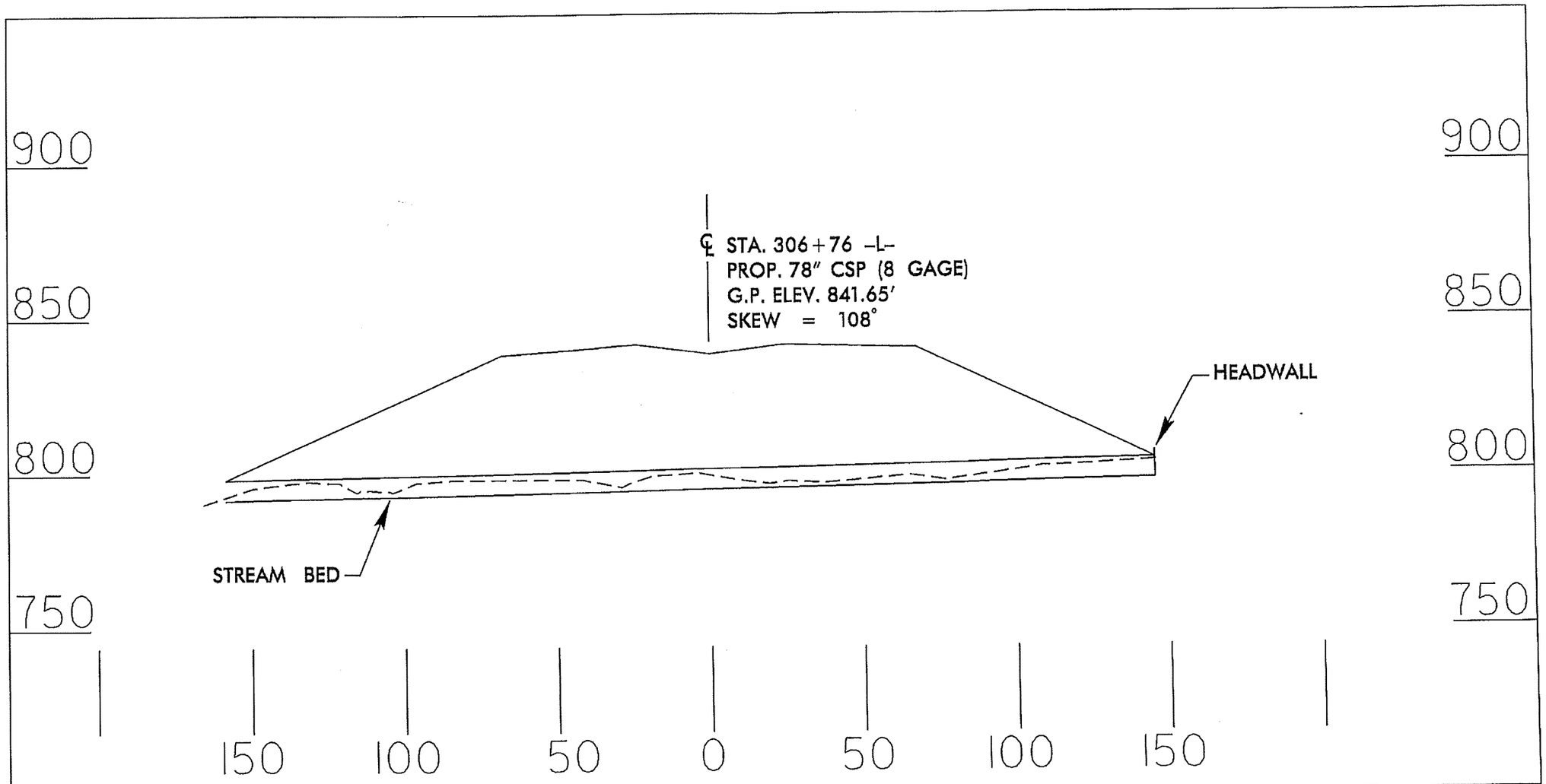
100 50 0 100 200

PLANS

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



Permit Drawing
Sheet 46 of 81
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
20
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83/NSRS 2007
945Z
BANDERA FARMS, INC.
945
NCDOT
(FORMERLY BANDERA FARMS, INC.)
EXISTING R/W
SEE MITIGATION SITE 3
SHEET OSM-8
TOE PROTECTION
SEE DETAIL 'E'
81 TONS RIP RAP
EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.
15"
W/ELBOWS
CAT-1
2GI
14A
14B
14A
78" CSP (8 GA.)
ALUMINIZED
HW
TOE PROTECTION
SEE DETAIL 'E'
286 TONS RIP RAP
SEE MITIGATION SITE 3
SHEET OSM-8
SITE 14
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
100'
0'
100'
SCALE: 1"= 100'
REVISIONS
8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

SHEET 47 OF 81 2/13/13

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	21
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 48 of 61

NAD 83/NSRS 2007

8/17/99

REVISIONS

SITE 15

SITE 16

CITY OF GREENSBORO

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.= 24 Tons of Class 'I' Rip-Rap
32 Square Yards Filter Fabric

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.= 32 Tons of Class 'I' Rip-Rap
40 Square Yards Filter Fabric

-L- STA. 317+00

-L- STA. 331+00

MATCH TO SHEET 20

MATCH TO SHEET 22

945Z
BANDERA FARMS, INC.

915A
NCDOT
(FORMERLY SESSOMS DEVELOPMENT, LLC)

915
NCDOT
(FORMERLY SESSOMS DEVELOPMENT, LLC)

44
ARTHUR M. BRRO AND ANN S. BRRO

DAVID L. BULLINS AND JEANNA L. BULLINS

RICHARD J. DISPENSA AND SUSAN DISPENSA

EDWARD B. WAYNICK AND DANA J. WAYNICK

15A

15B

16A

16B

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

24 TONS CLASS 'I' RIP RAP
32 SY FILTER FABRIC
SEE DETAIL 'AQ'

32 TONS CLASS 'I' RIP RAP
40 SY FILTER FABRIC

PSH
SEE DETAIL 'AP'

2'LATERAL BASE DITCH
PSSM LINED
SEE DETAIL 'A'
260 SY PSSM
715 CY DDE

3'LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'K'
1592 CY DDE

54" CSP (16 GA) ALUMINIZED

72" CSP (8 GA) ALUMINIZED

TSJB w/Slab Ltd
SEE SPECIAL DETAIL

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

GRAPHIC SCALE
100 50 0 100 200
PLANS

Permit Drawing
Sheet 49 of 81

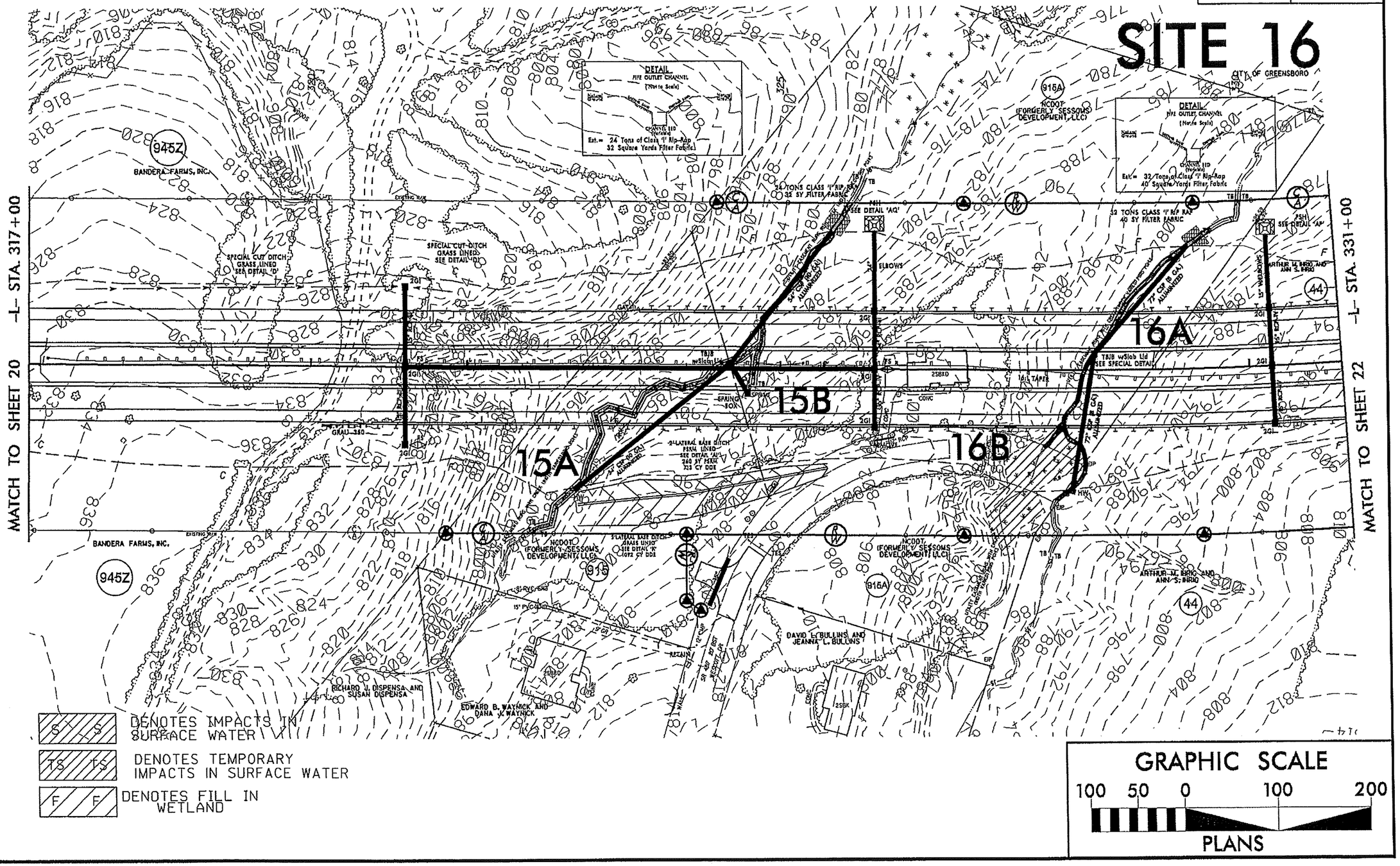
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

SITE 15

SITE 16



S S DENOTES IMPACTS IN SURFACE WATER

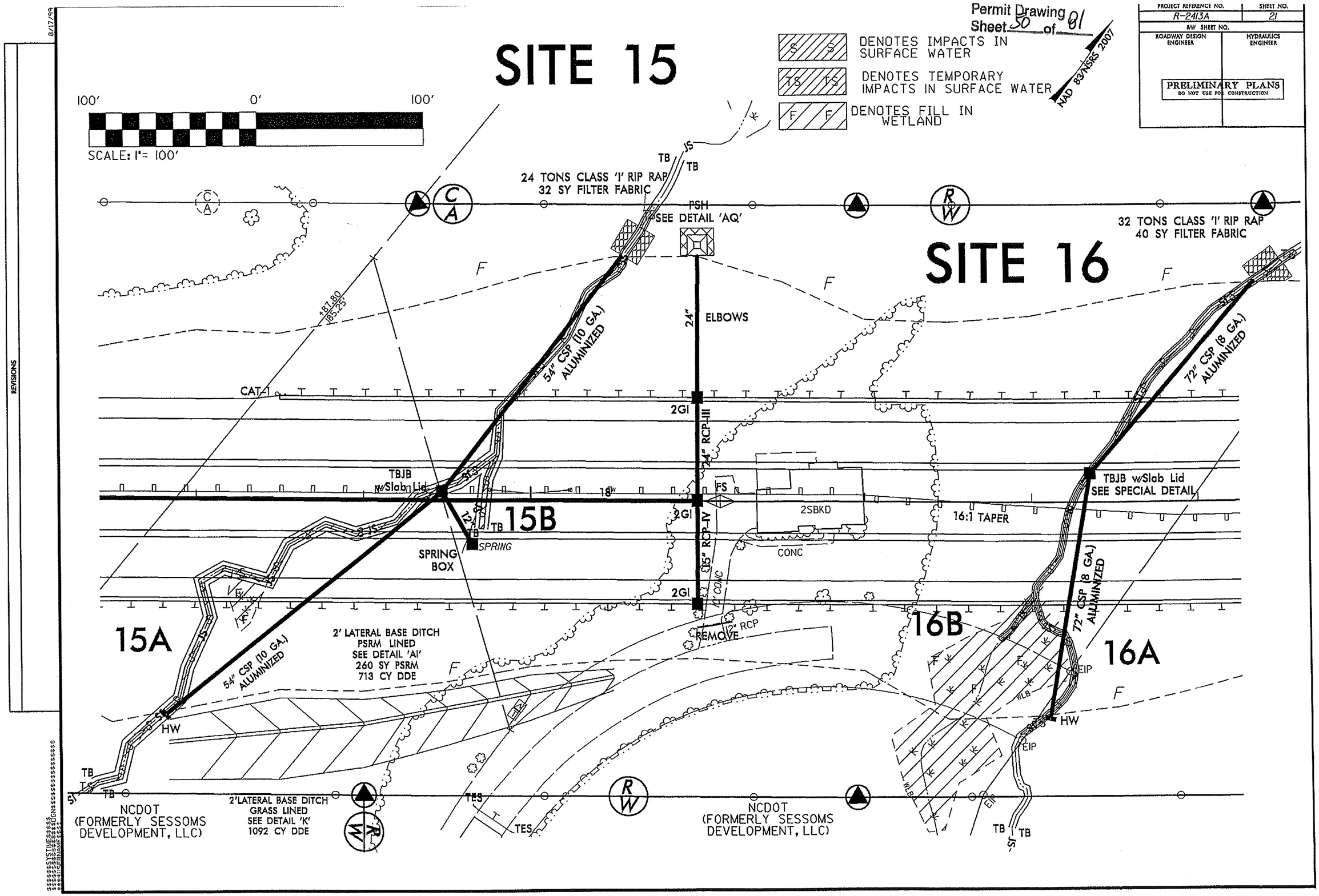
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

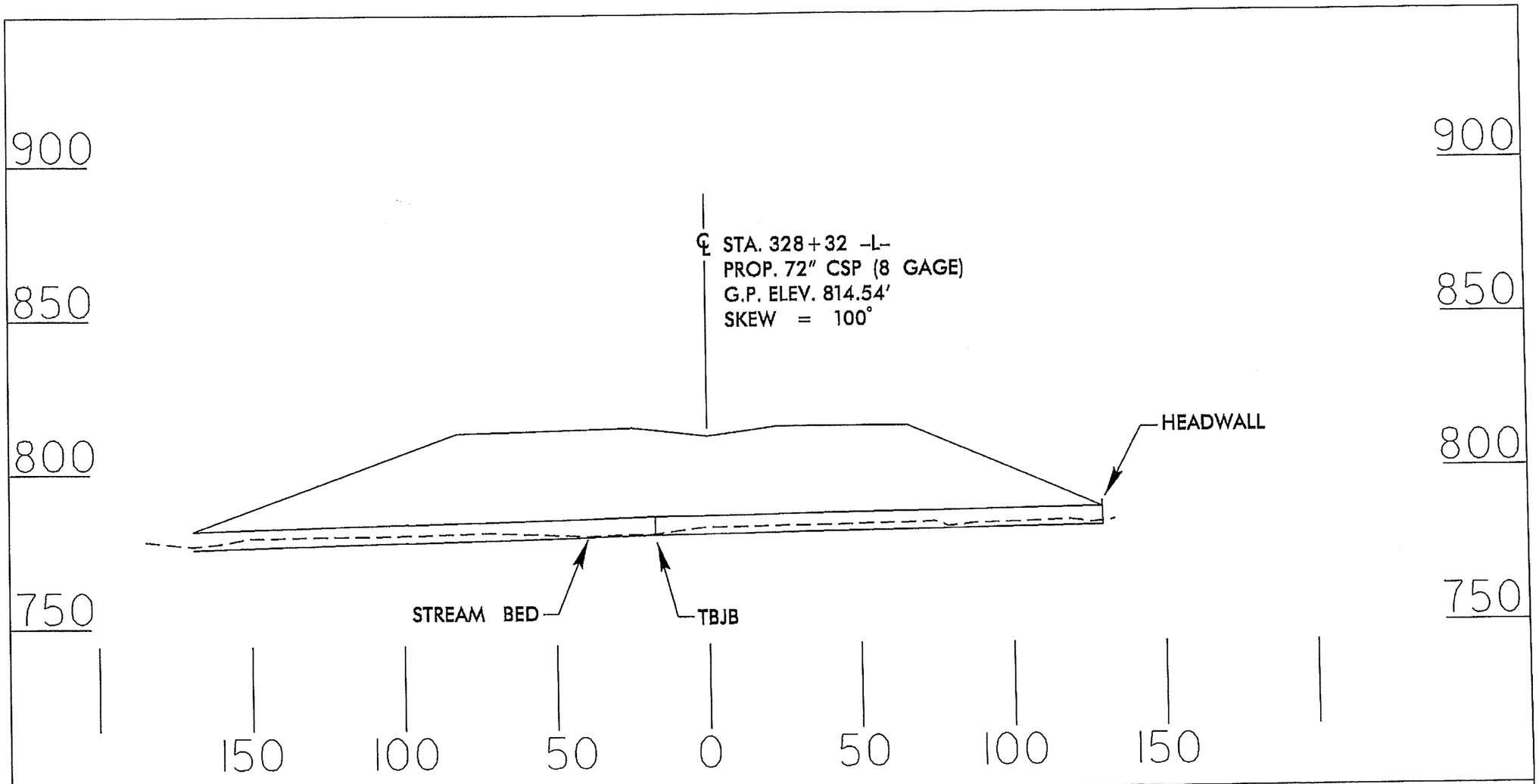
GRAPHIC SCALE
100 50 0 100 200
PLANS

REVISIONS

8/17/99



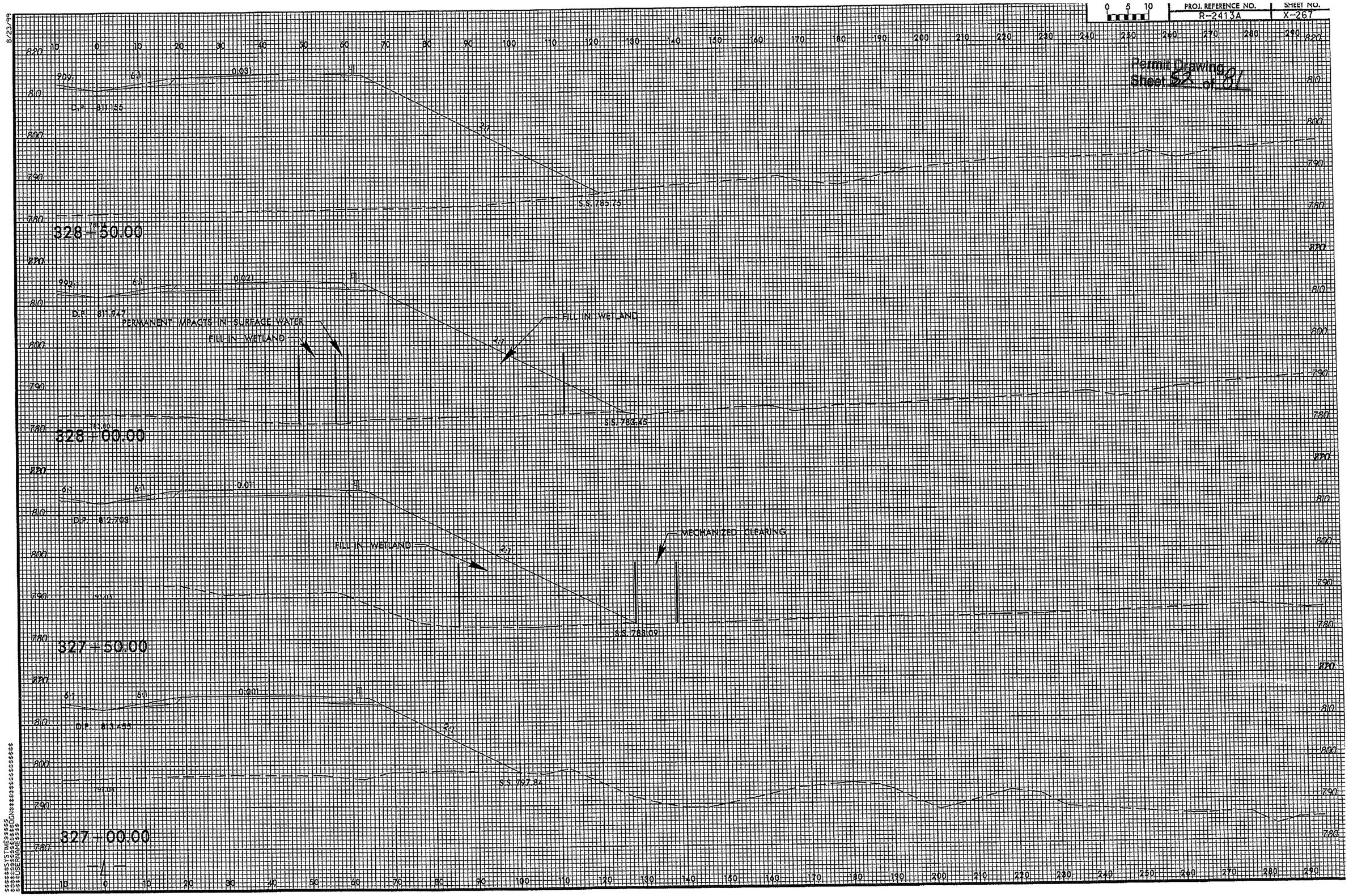
Permit Drawing
Sheet 50 of 81
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
21
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83/NSRS 2007
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
SITE 15
SITE 16
100'
0'
100'
SCALE: 1"= 100'
24 TONS CLASS 'I' RIP RAP
32 SY FILTER FABRIC
PSH
SEE DETAIL 'AQ'
32 TONS CLASS 'I' RIP RAP
40 SY FILTER FABRIC
+87.80
185.25'
54" CSP (10 GA.) ALUMINIZED
24" ELBOWS
72" CSP (8 GA.) ALUMINIZED
CAT-1
2GI
24" RCP-III
TBJB w/Slab Lid
18"
FS
2SBKD
16:1 TAPER
TBJB w/Slab Lid
SEE SPECIAL DETAIL
15B
SPRING BOX
SPRING
CONC
15" RCP-IV
12" CONC
12" RCP
REMOVE
15A
16B
16A
2' LATERAL BASE DITCH
PSRM LINED
SEE DETAIL 'AI'
260 SY PSRM
713 CY DDE
54" CSP (10 GA.) ALUMINIZED
72" CSP (8 GA.) ALUMINIZED
HW
EIP
WLB
NCDOT
(FORMERLY SESSOMS DEVELOPMENT, LLC)
2'LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'K'
1092 CY DDE
TES
NCDOT
(FORMERLY SESSOMS DEVELOPMENT, LLC)
REVISIONS
8/17/99



PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

SHEET 51 OF 81 2/13/13



PROJ. REFERENCE NO.
R-2413A
SHEET NO.
X-267
Permit Drawing
Sheet 52 of 81
328+50.00
D.P. 811.155
S.S. 785.75
328+00.00
D.P. 811.947
PERMANENT IMPACTS IN SURFACE WATER
FILL IN WETLAND
FILL IN WETLAND
S.S. 783.45
327+50.00
D.P. 812.703
FILL IN WETLAND
MECHANIZED CLEARING
S.S. 788.09
327+00.00
D.P. 813.455
S.S. 797.84

GRAPHIC SCALE
100 50 0 100 200
PLANS

Permit Drawing Sheet 53 of 81

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

R/W REVISION: PARCEL NUMBER 45 HAS BEEN CHANGED TO PARCEL NUMBER 47. CEH 2/27/13.

SITE 17

CITY OF GREENSBORO

ROY LEE HEDRICK AND BARBARA HEDRICK

OLLIE T. HARRELL AND RHUMELL M. HARRELL

HARRELL, OLLIE T AND RHUMELL M

ARTHUR M. BRIG AND ANN S. BRIG

PAUL R. MOUNCE

-L- STA. 331+00

-L- STA. 344+00

MATCH TO SHEET 21

MATCH TO SHEET 23

PSH SEE DETAIL 'AP'

ATTENUATOR

CLASS II RIP RAP (STRUCTURE PAY ITEM)

STANDARD BASE DITCH SEE DETAIL 'FY' 46 TONS CLASS 'B' RIP RAP 133 SY FF 40 CY DDE

3' LATERAL BASE DITCH SEE DETAIL 'AY' 92 TONS CLASS 'B' RIP RAP 265 SY FF

HC HC DENOTES HAND CLEARING

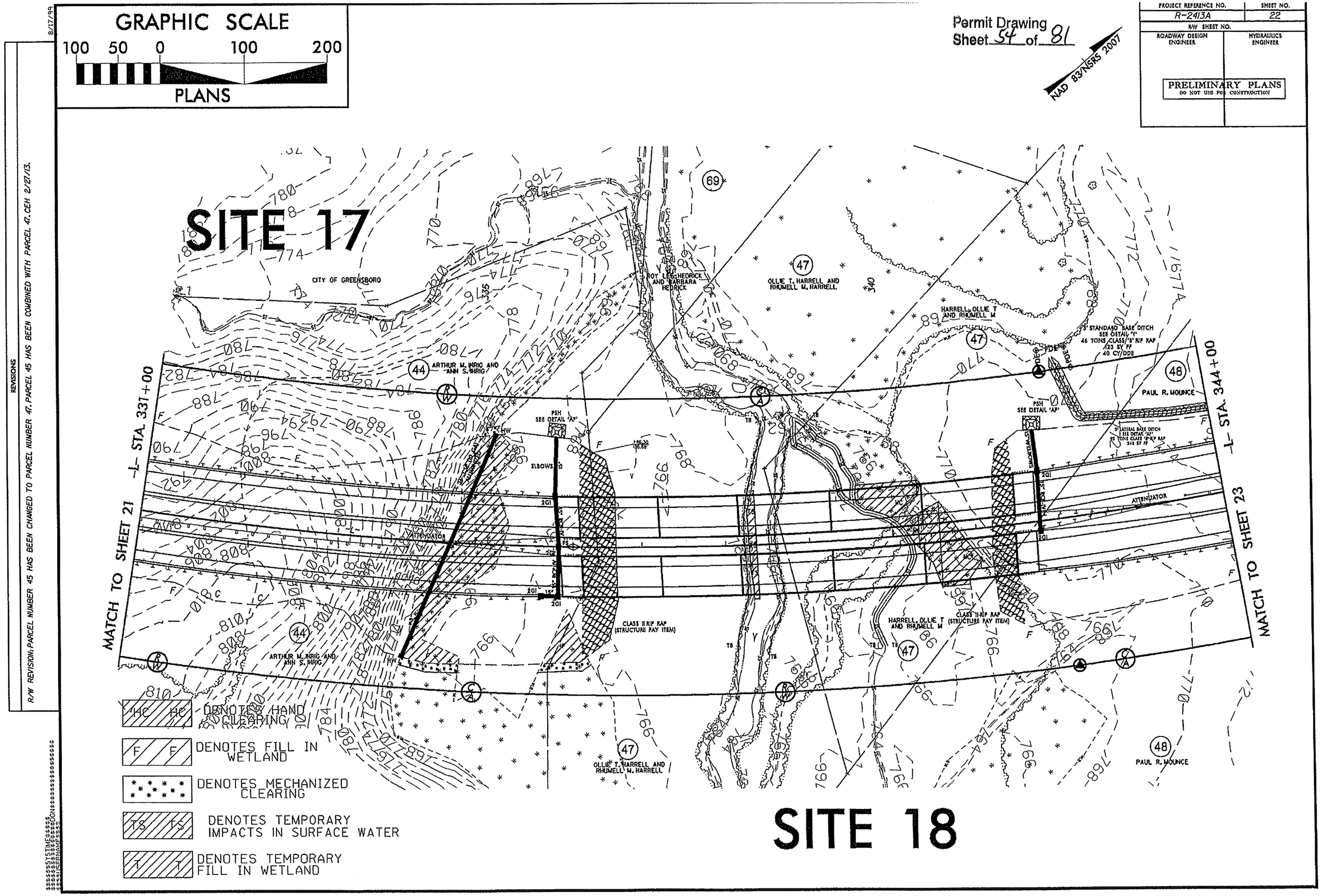
F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

T T DENOTES TEMPORARY FILL IN WETLAND

SITE 18


GRAPHIC SCALE
100 50 0 100 200
PLANS
Permit Drawing
Sheet 54 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
22
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SITE 17
SITE 18
CITY OF GREENSBORO
ROY LEE HEDRICK AND BARBARA HEDRICK
OLLIE T. HARRELL AND RHUMELL M. HARRELL
HARRELL, OLLIE T AND RHUMELL M
ARTHUR M. IHRIG AND ANN S. IHRIG
PAUL R. MOUNCE
MATCH TO SHEET 21 -L- STA. 331+00
MATCH TO SHEET 23 -L- STA. 344+00
PSH SEE DETAIL 'A'
ELBOWS
ATTENUATOR
CLASS II RIP RAP (STRUCTURE PAY ITEM)
DENOTES HAND CLEARING
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
REVISIONS
R/W REVISION: PARCEL NUMBER 45 HAS BEEN CHANGED TO PARCEL NUMBER 47. PARCEL 45 HAS BEEN COMBINED WITH PARCEL 47. CEH 2/27/13.
8/17/99

Permit Drawing Sheet 55 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	22
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

SITE 17

SITE 18

44 ARTHUR M. IHRIG AND ANN S. IHRIG

RW

CA

HC HC DENOTES HAND CLEARING

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

TS +46.30 38.88 TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

T T DENOTES TEMPORARY FILL IN WETLAND

PSH SEE DETAIL 'AP'

EIP

HW

36" CSP (10 GA) ALUMINIZED

ELBOWS 15"

15" RCP-IV

2GI

FS

ATTENUATOR

WLB

JS

ST

TB

CLASS II RIP RAP (STRUCTURE PAY ITEM)

HARRELL, OLLIE T (STRUCTURE AND RHUMELL M

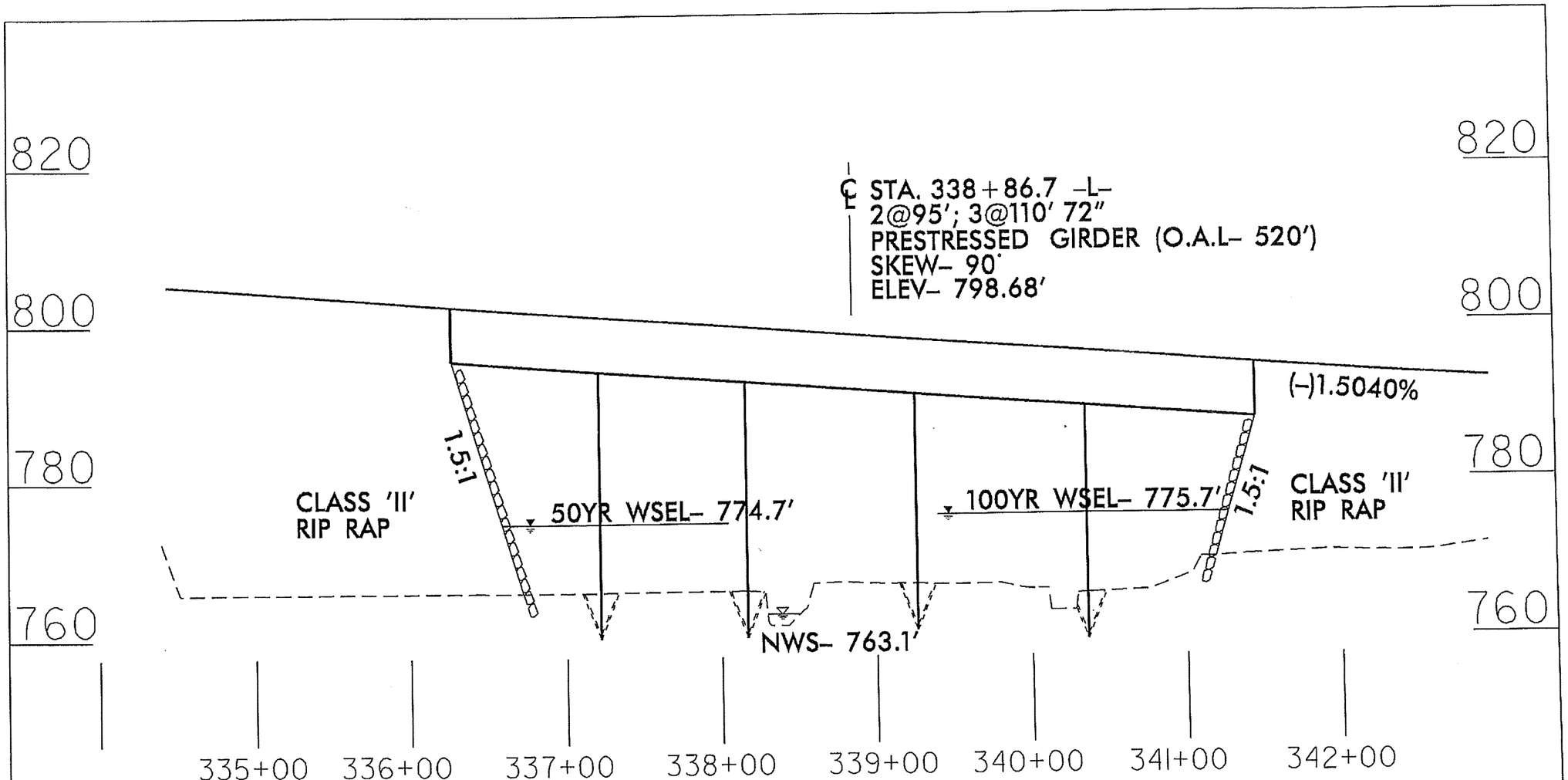
47

100' 0' 100'

SCALE: 1"= 100'.

REVISIONS

8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R-2413A)

NC 68 CONNECTOR

FROM FOUR LANES AT

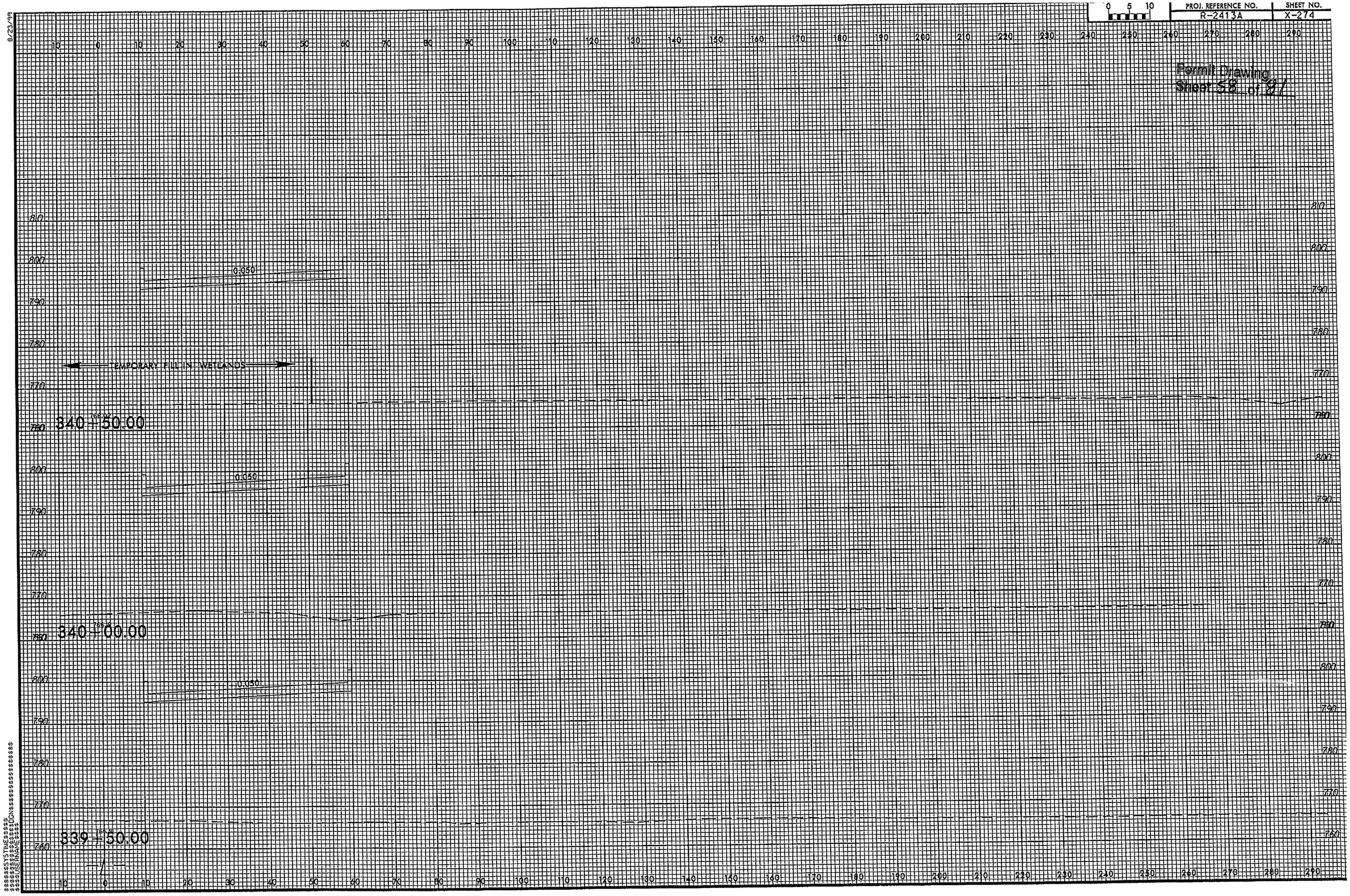
SR 2011 TO SR 2127

SHEET 56 OF 81 2/13/13

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-2413A	X-270

Permit Drawing
Sheet 57 of 81



PROJ. REFERENCE NO.
R-2413A
SHEET NO.
X-274
Permit Drawing
Sheet 58 of 81
0.050
TEMPORARY FILL IN WETLANDS
340+50.00
340+00.00
339+50.00

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 59 of 81

NAD 83/NSRS 2007

8/17/99

REVISIONS

SITE 19

HARRELL, OLLIE T AND RHUDELL M

47

TONY P. JOHNSON AND RHONDA R. JOHNSON

345

350

-L- STA. 344+00

MATCH TO SHEET 22

3' LATERAL BASE DITCH
SEE DETAIL 'A'
92 TONS CLASS 'B' RIP RAP
245 SY FF
231 CY DDE

EST. 2 TONS CLASS 'B' RIP RAP
EST. 7 SY FILT. FAB.

LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'I'
36 CY DDE

PAUL R. MOUNCE

48

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

EARTH BERM
5' TOP WIDTH
2:1 SIDE SLOPES
TOP ELEV.= 796.0'
@25 CY FILL

2' SPECIAL LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'F'

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE

49

-L- STA. 357+50

MATCH TO SHEET 24

GRAU 330

24" RCP-IV

2GI

15" WELDONS

16:1 TAPER

2GI-A

24" WELDONS

CAT-I

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

PAUL R. MOUNCE 48

4' LATERAL CHANNEL CHANGE
GRASS LINED
SEE DETAIL 'ZZ'
1939 CY DDE

24 TONS CLASS 'I' RIP RAP
32 SY FILTER FABRIC

EST. 3 TONS CL 'B' RIP RAP
EST. 14 SY FILT. FAB.

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE 49

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 'ZZ'
LATERAL CHANNEL CHANGE
(Not to Scale)

Natural Ground
2:1
D
2:1
b
T=4n.
Fill Slope
Min. D = 2 Ft.
b = 4 Ft.
h = 3 Ft.

FROM STA. 348+50 TO STA. 351+50 RT.

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Natural Ground
Natural Gas Pipeline
Natural Gas Pipeline
Natural Ground
CHANNEL BED (WIDTH)

Est.= 24 Tons of Class 'I' Rip-Rap
32 Square Yards Filter Fabric

GRAPHIC SCALE
100 50 0 100 200
PLANS

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

Permit Drawing Sheet 60 of 81

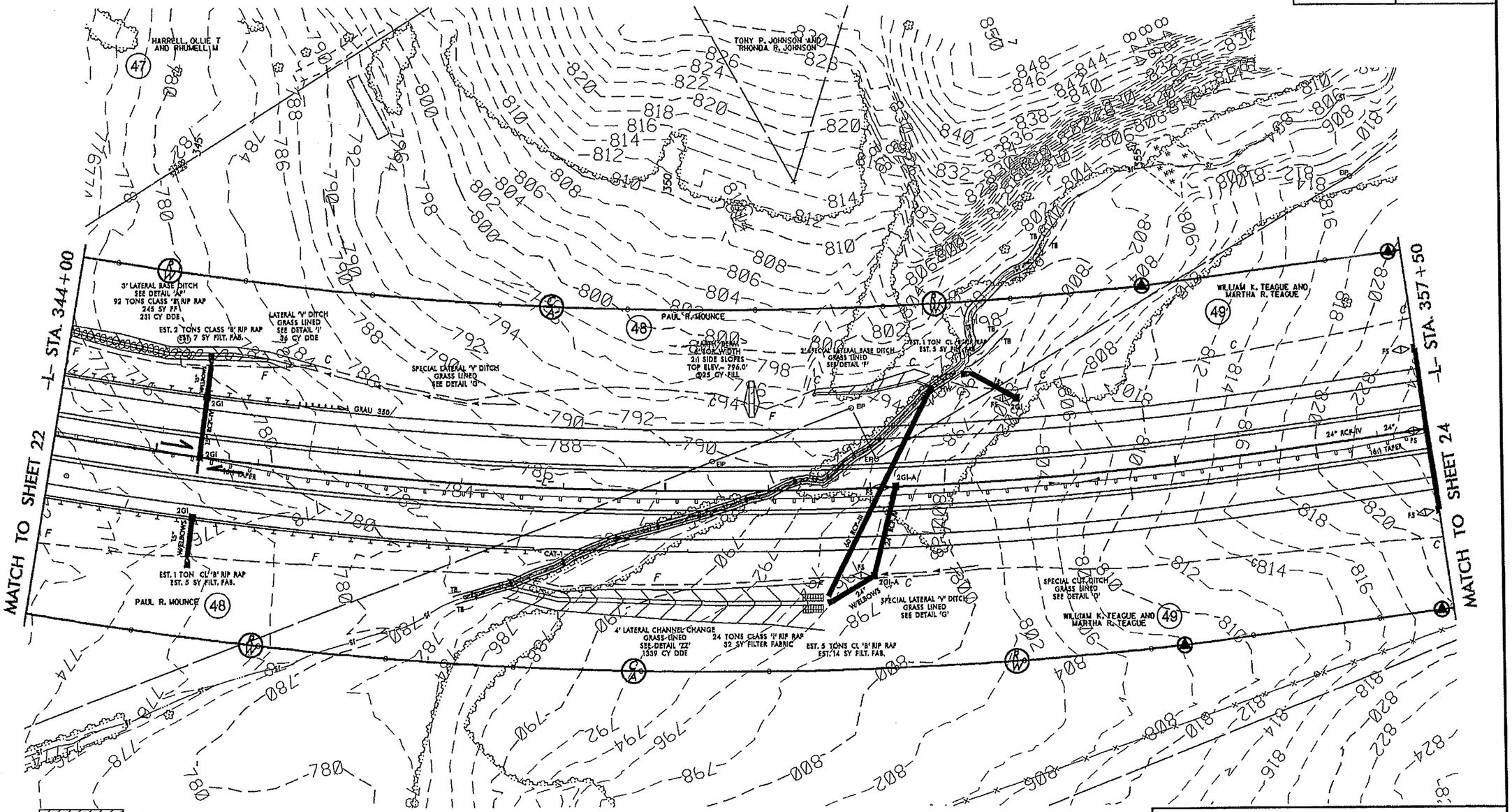
NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/99

SITE 19



DETAIL 'ZZ'
LATERAL CHANNEL CHANGE
(Not to Scale)

FROM STA. 348+50 TO STA. 351+50 RT.

DETAIL
PIPE OUTLET CHANNEL
(Not to Scale)

Est.- 24 Tons of Class 'I' Rip-Rap
32 Square Yards Filter Fabric

GRAPHIC SCALE
100 50 0 100 200
PLANS

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	23
MW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
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NAD 83/NSRS 2007

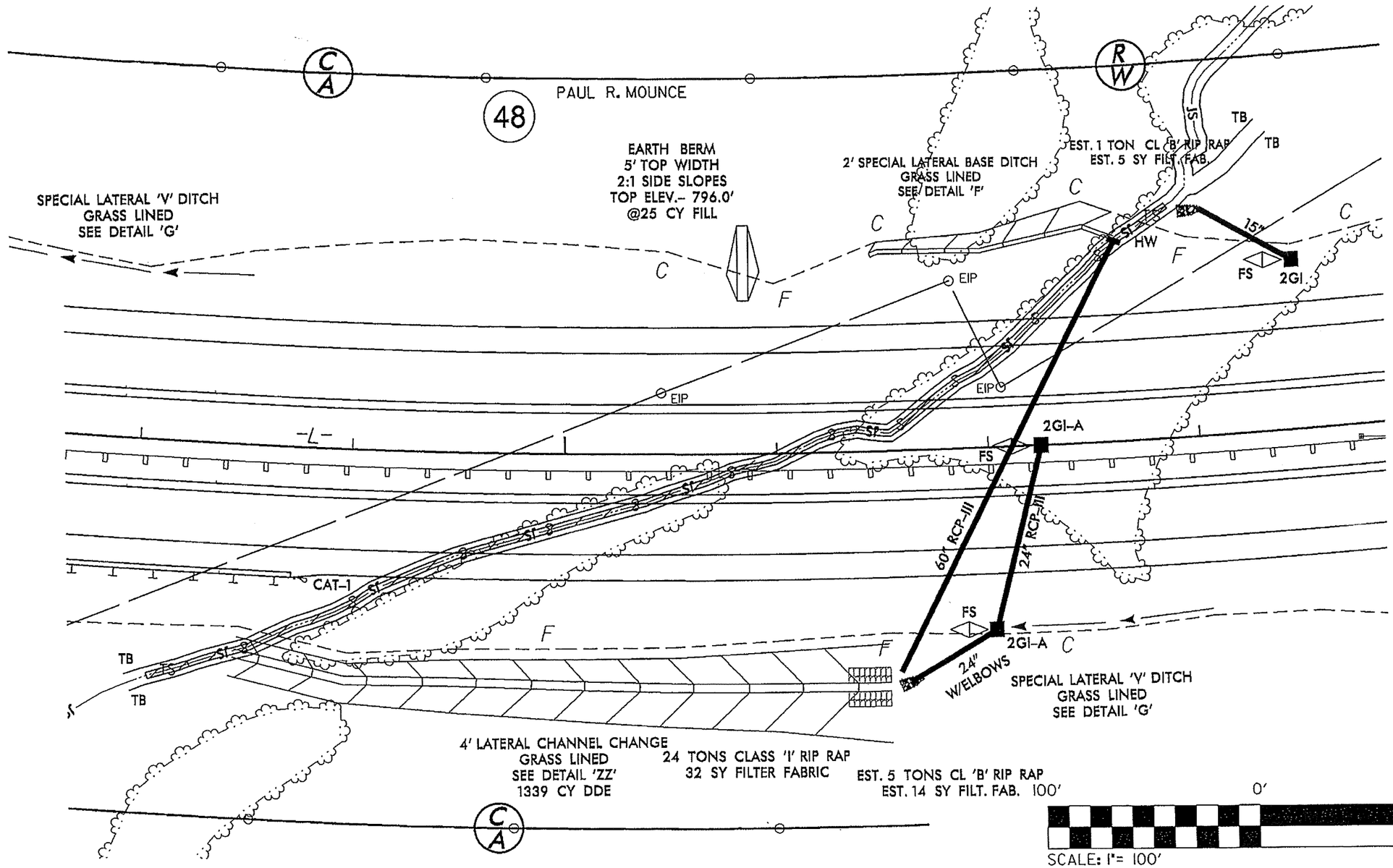
8/17/99

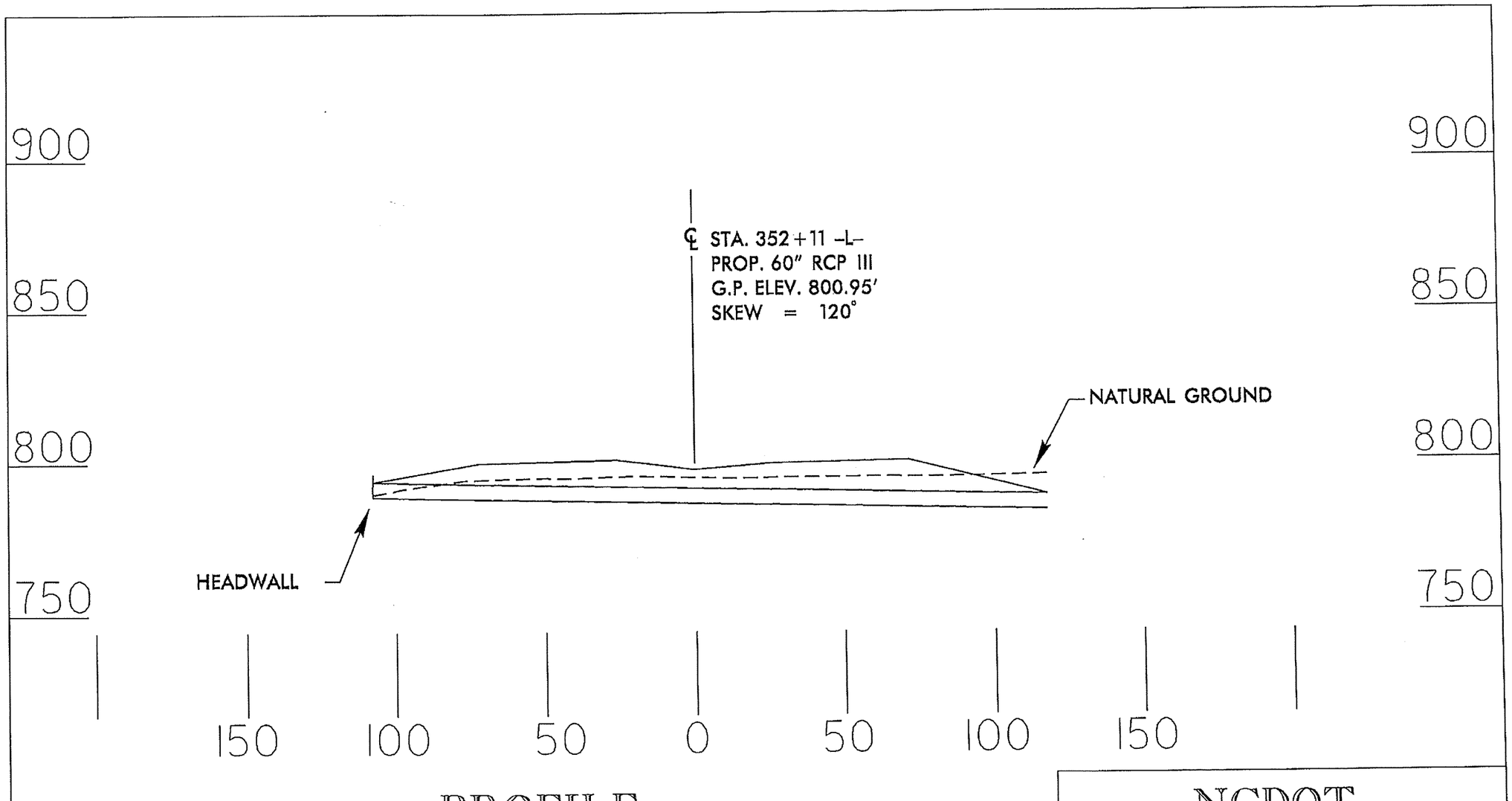
REVISIONS

SITE 19

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER





PROFILE

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R-2413A)
NC 68 CONNECTOR
FROM FOUR LANES AT
SR 2011 TO SR 2127

SHEET 62 OF 81 2/13/13

Permit Drawing
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R-2413A	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

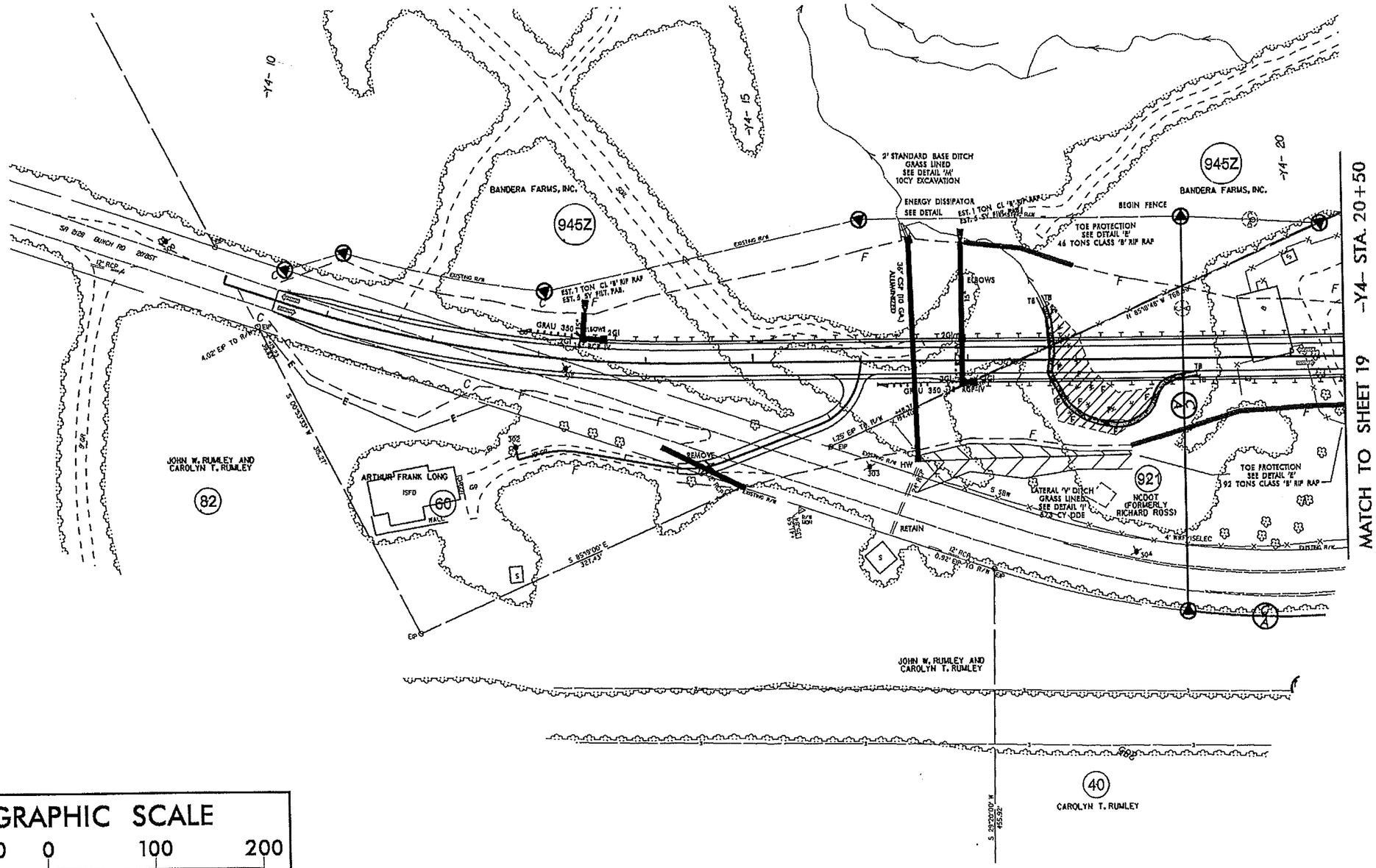
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

SITE 20

DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND



GRAPHIC SCALE
100 50 0 100 200
PLANS

REVISIONS

8/17/99

Permit Drawing Sheet 64 of 81

NAD 83/NSRS 2007

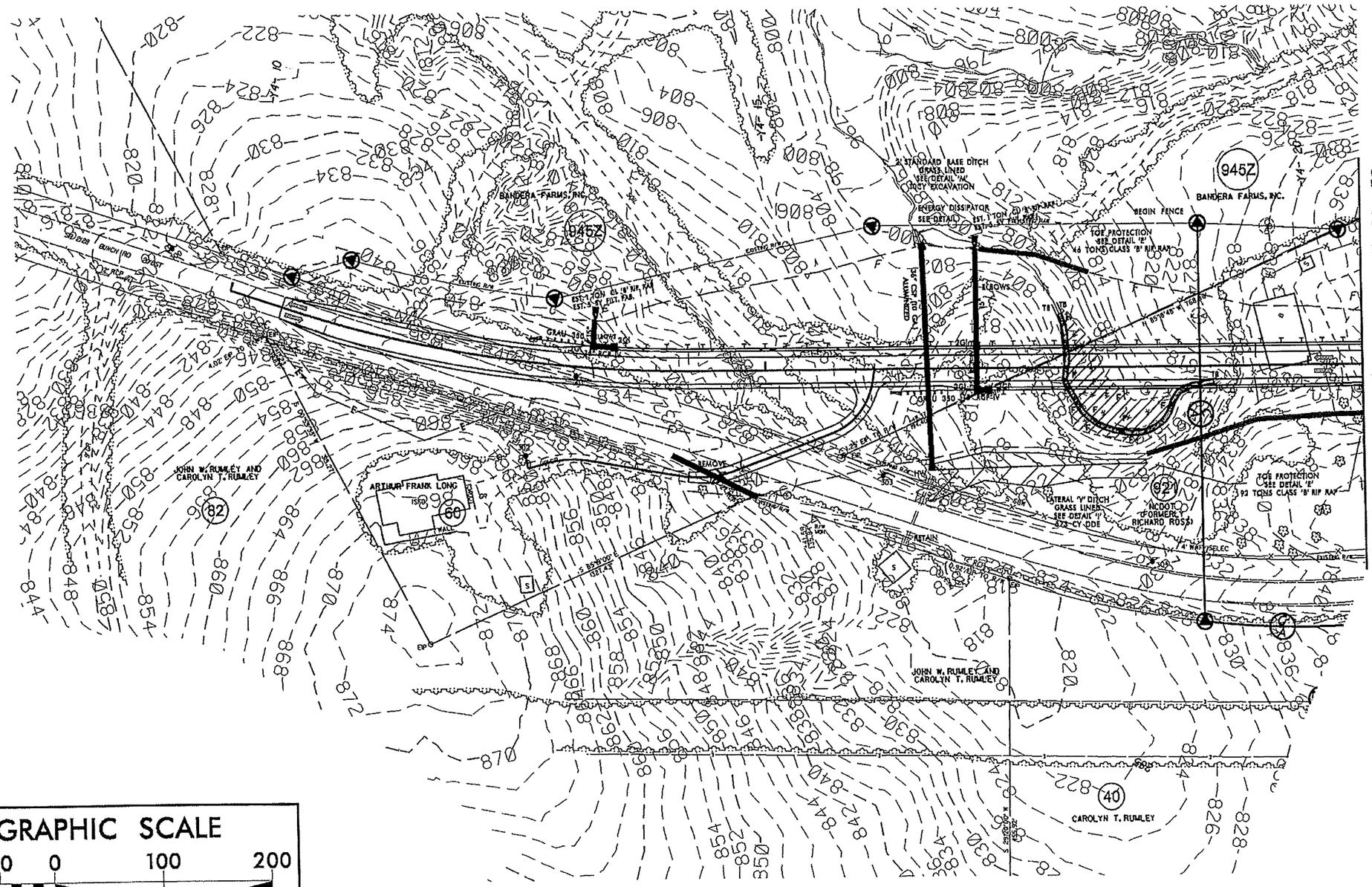
R-2413A	31
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

S/S DENOTES IMPACTS IN SURFACE WATER

F/F DENOTES FILL IN WETLAND

SITE 20



GRAPHIC SCALE

100 50 0 100 200

PLANS

REVISIONS 8/17/99

R-2413A	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
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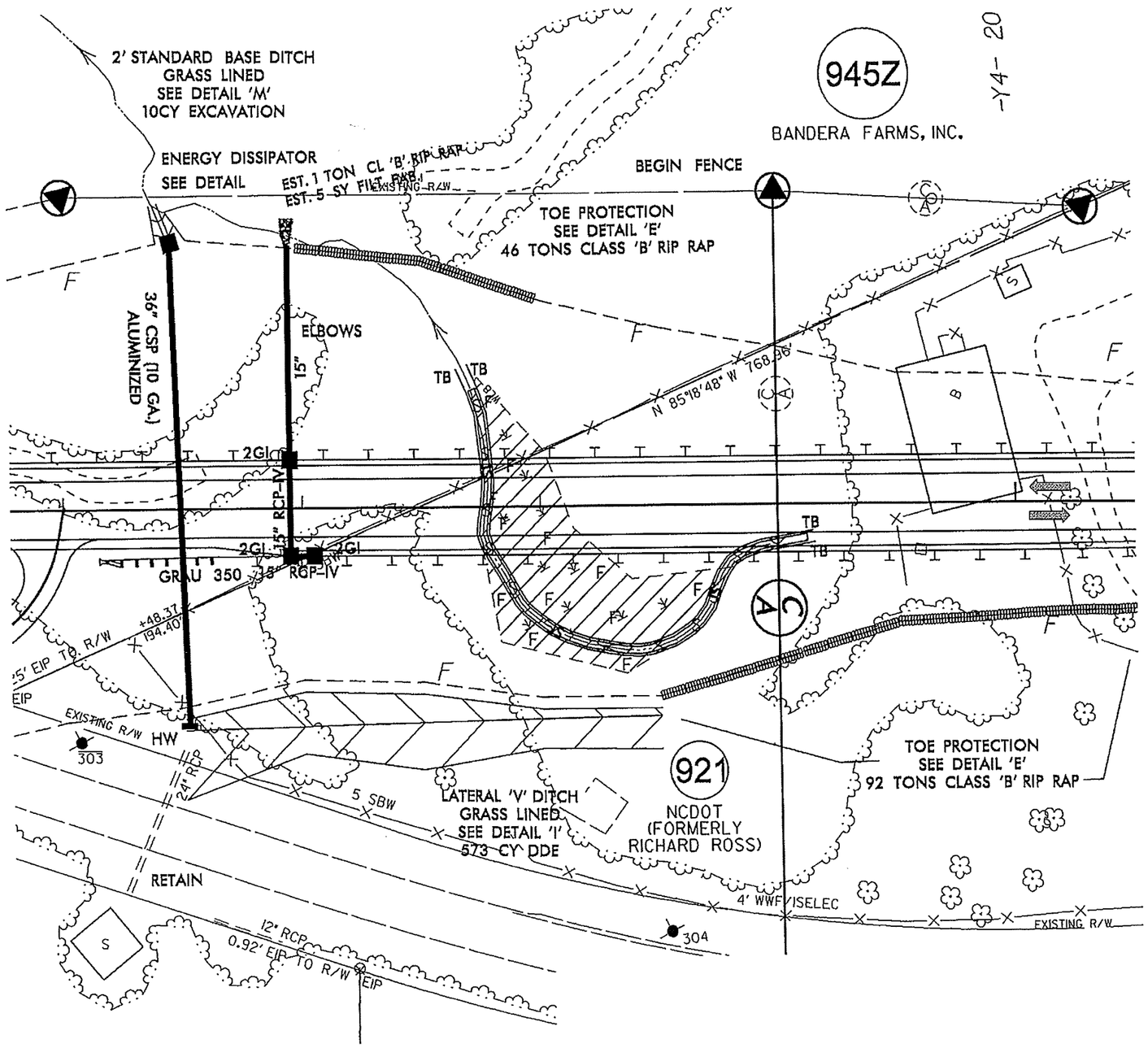
NAD 83/NSRS 2007

SITE 20



DENOTES IMPACTS IN SURFACE WATER

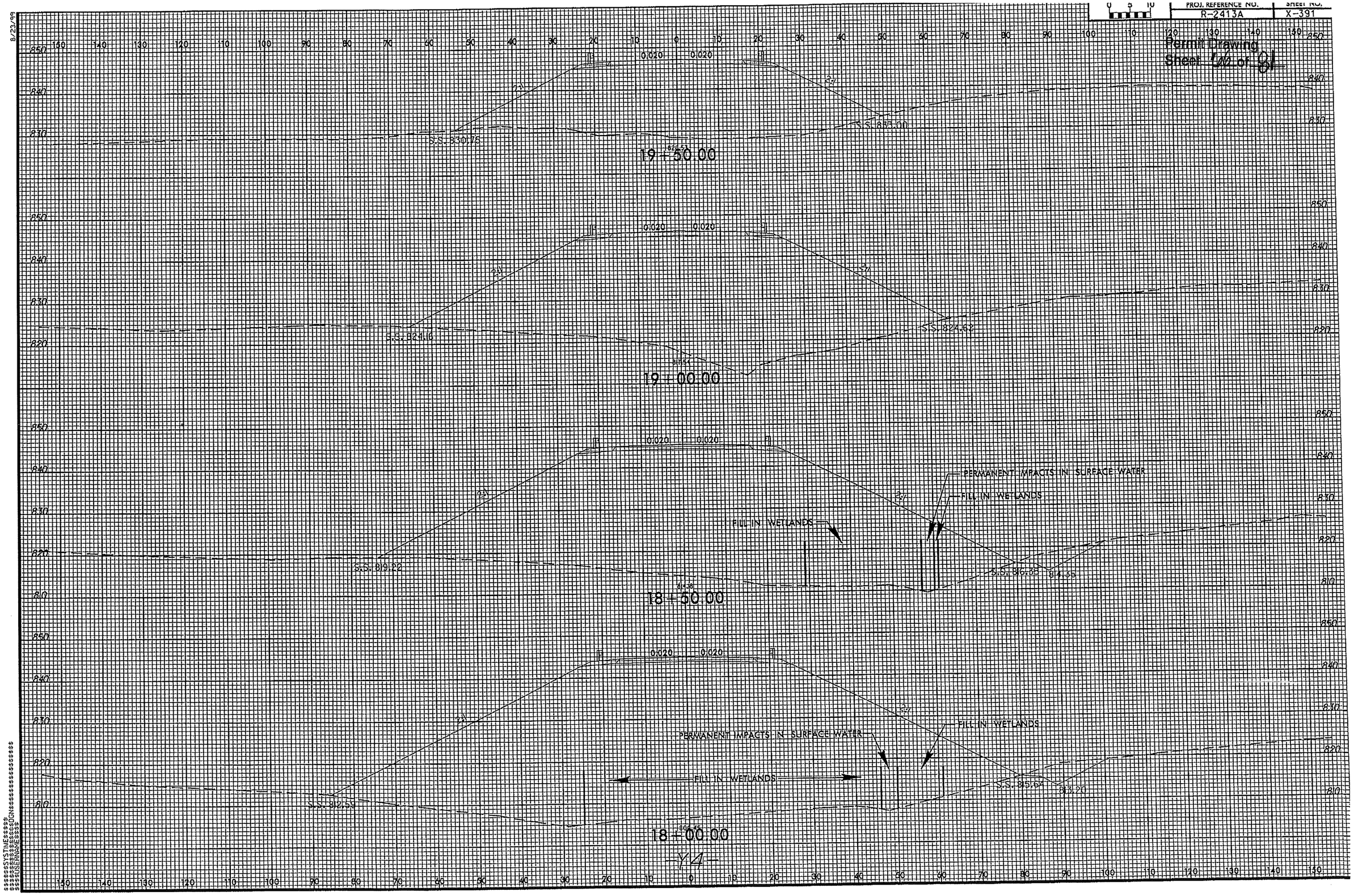
DENOTES FILL IN WETLAND

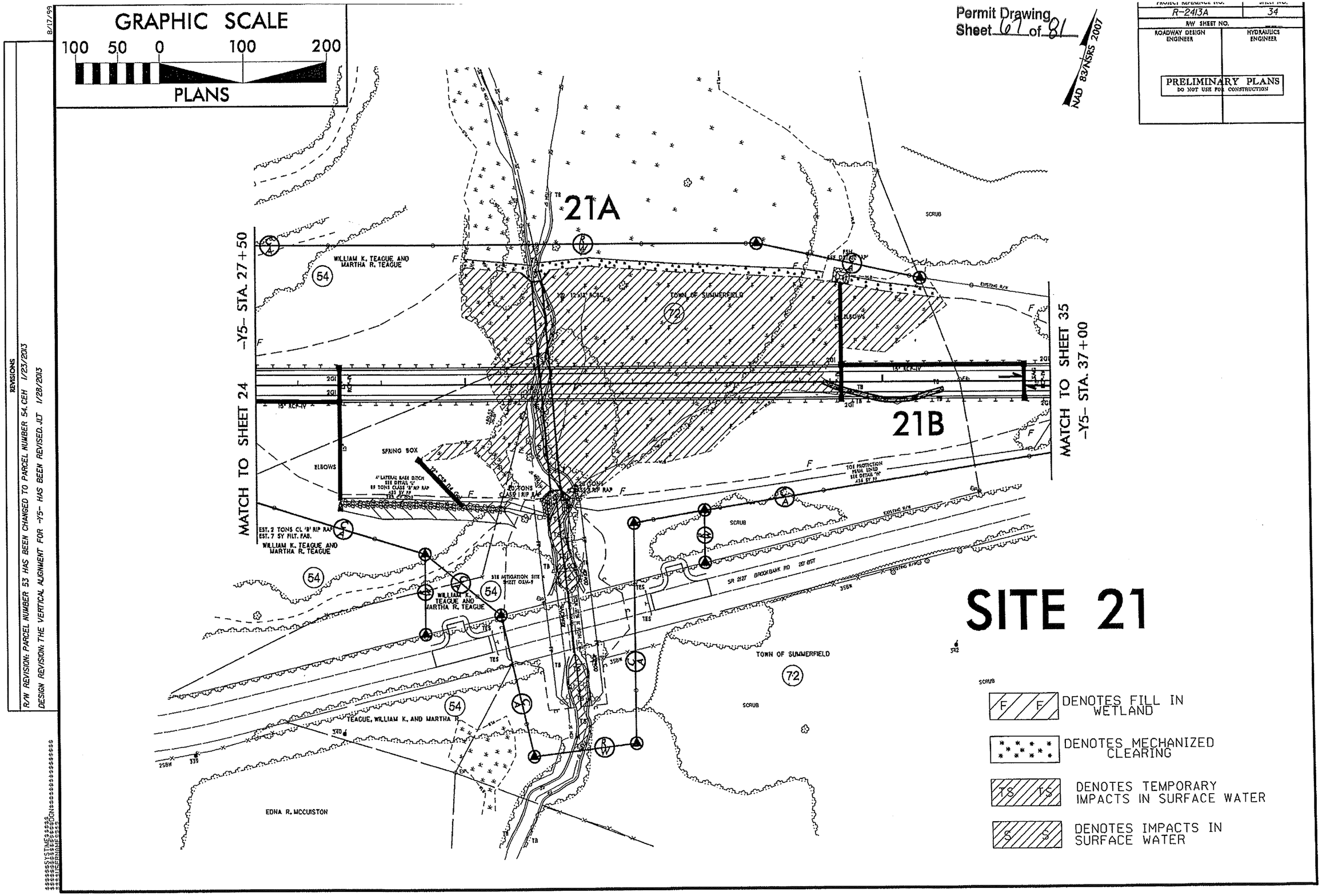
100' 0' 100'

SCALE: 1"= 100'

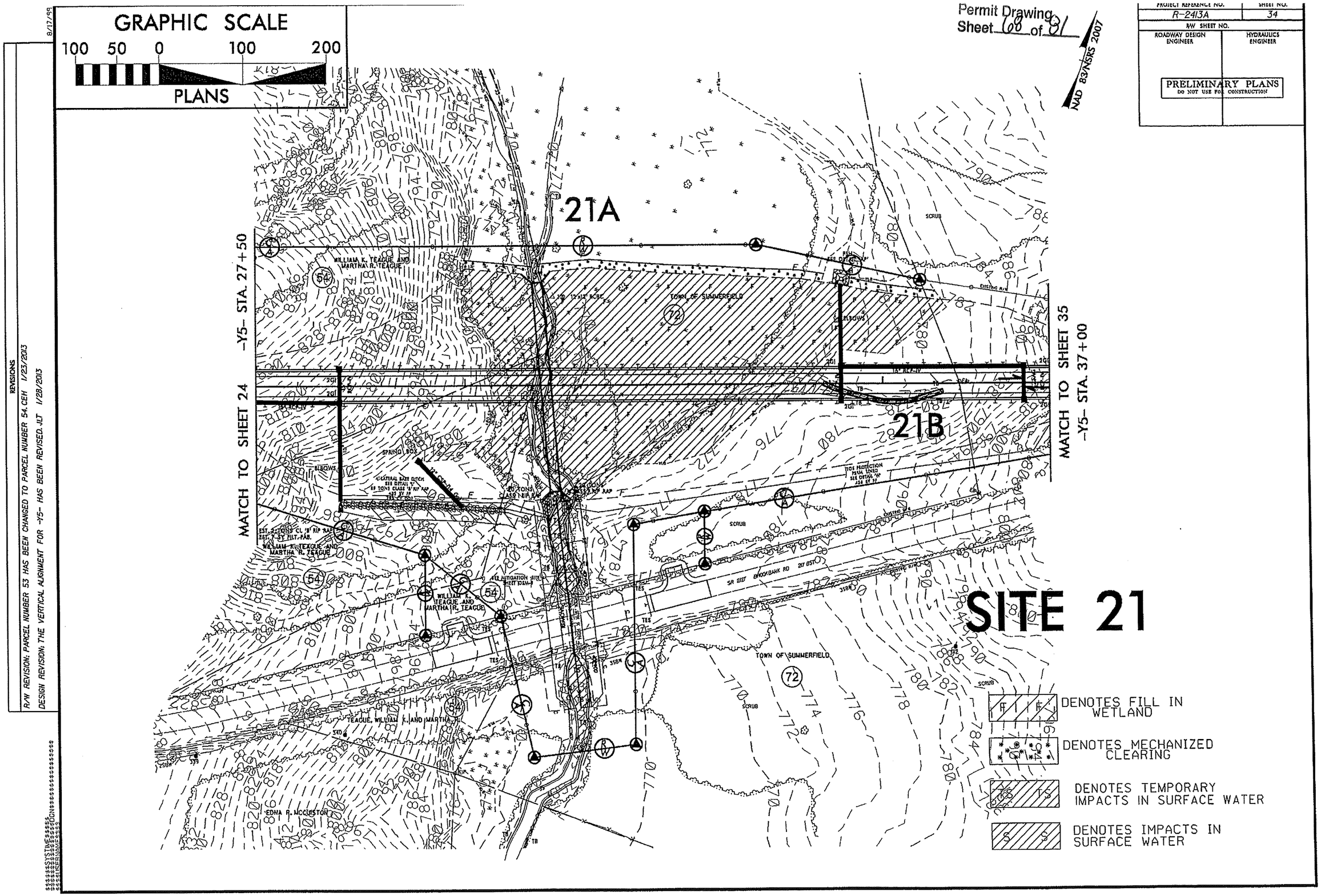
REVISIONS

8/17/99

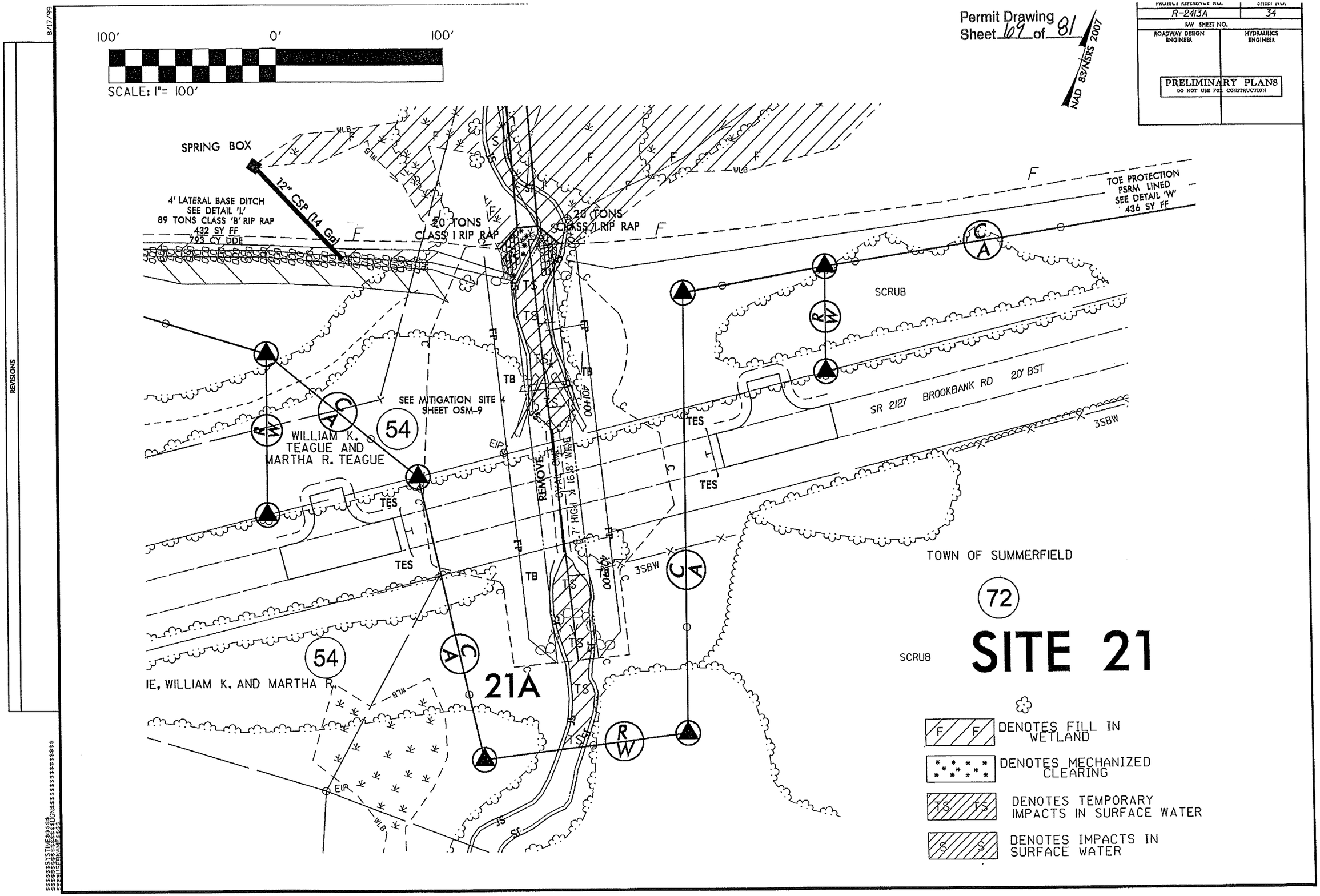

PROJ. REFERENCE NO.
R-2413A
SHEET NO.
X-391
Permit Drawing
Sheet 66 of 81
19+50.00
S.S. 830.78
S.S. 833.00
19+00.00
S.S. 824.16
S.S. 824.62
18+50.00
S.S. 819.22
S.S. 816.38
814.35
PERMANENT IMPACTS IN SURFACE WATER
FILL IN WETLANDS
18+00.00
S.S. 812.59
S.S. 815.64
813.20
-Y4-



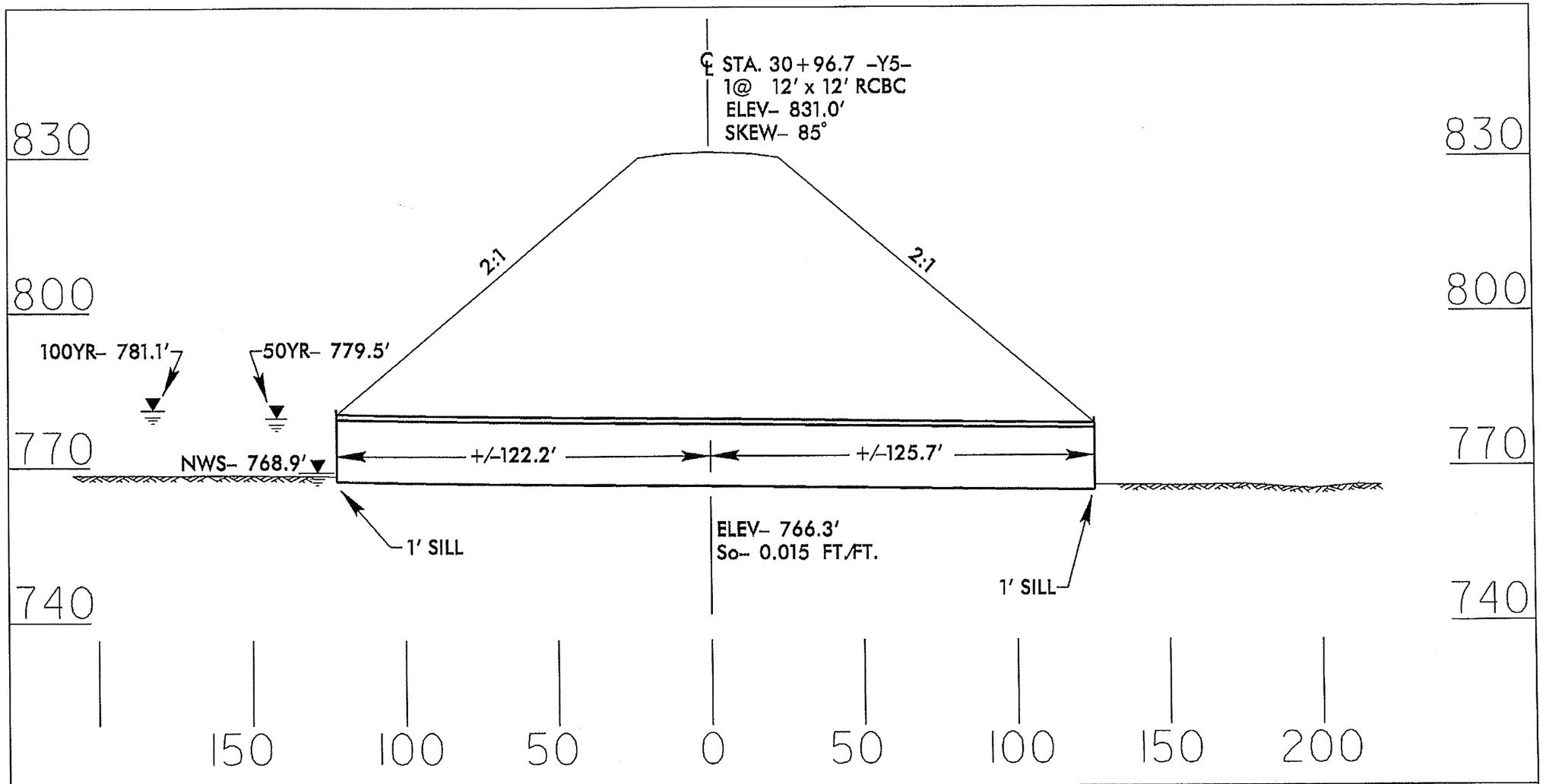
GRAPHIC SCALE
100 50 0 100 200
PLANS
Permit Drawing
Sheet 67 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
34
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
21A
21B
MATCH TO SHEET 24 -Y5- STA. 27+50
MATCH TO SHEET 35 -Y5- STA. 37+00
WILLIAM K. TEAGUE AND MARTHA R. TEAGUE
TOWN OF SUMMERFIELD
SPRING BOX
ELBOWS
SCRUB
EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FILT. FAB.
SITE MITIGATION SITE SHEET OSM-9
SR 2127 BROOKBANK RD 20' BST
TEAGUE, WILLIAM K. AND MARTHA R.
EDNA R. MCCUISTON
SITE 21
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
REVISIONS
R/W REVISION: PARCEL NUMBER 53 HAS BEEN CHANGED TO PARCEL NUMBER 54. CEH 1/23/2013
DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y5- HAS BEEN REVISED. JLT 1/28/2013
8/17/99



GRAPHIC SCALE
100 50 0 100 200
PLANS
Permit Drawing
Sheet 68 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
34
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
21A
21B
SITE 21
MATCH TO SHEET 24 -Y5- STA. 27+50
MATCH TO SHEET 35 -Y5- STA. 37+00
WILLIAM K. TEAGUE AND MARTHA R. TEAGUE
TOWN OF SUMMERFIELD
SCRUB
SPRING BOX
BROOKBANK RD
TEAGUE, WILLIAM K. AND MARTHA R.
EDNA R. MCCUISTON
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
REVISIONS
R/W REVISION: PARCEL NUMBER 53 HAS BEEN CHANGED TO PARCEL NUMBER 54. CEH 1/23/2013
DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y5- HAS BEEN REVISED. JLT 1/28/2013
8/17/99



Permit Drawing
Sheet 69 of 81
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413A
SHEET NO.
34
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
100'
0'
100'
SCALE: 1"= 100'
SPRING BOX
12" CSP (14 Ga)
4' LATERAL BASE DITCH
SEE DETAIL 'L'
89 TONS CLASS 'B' RIP RAP
432 SY FF
793 CY DDE
20 TONS
CLASS I RIP RAP
20 TONS
CLASS I RIP RAP
TOE PROTECTION
PSRM LINED
SEE DETAIL 'W'
436 SY FF
SCRUB
SR 2127 BROOKBANK RD 20' BST
3SBW
SEE MITIGATION SITE 4
SHEET OSM-9
54
WILLIAM K.
TEAGUE AND
MARTHA R. TEAGUE
TES
TB
TS
FP
EIP
REMOVE
401+00
402+00
TOWN OF SUMMERFIELD
72
SCRUB
SITE 21
54
IE, WILLIAM K. AND MARTHA R.
21A
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
REVISIONS
8/17/99



PROFILE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R-2413A)

NC 68 CONNECTOR

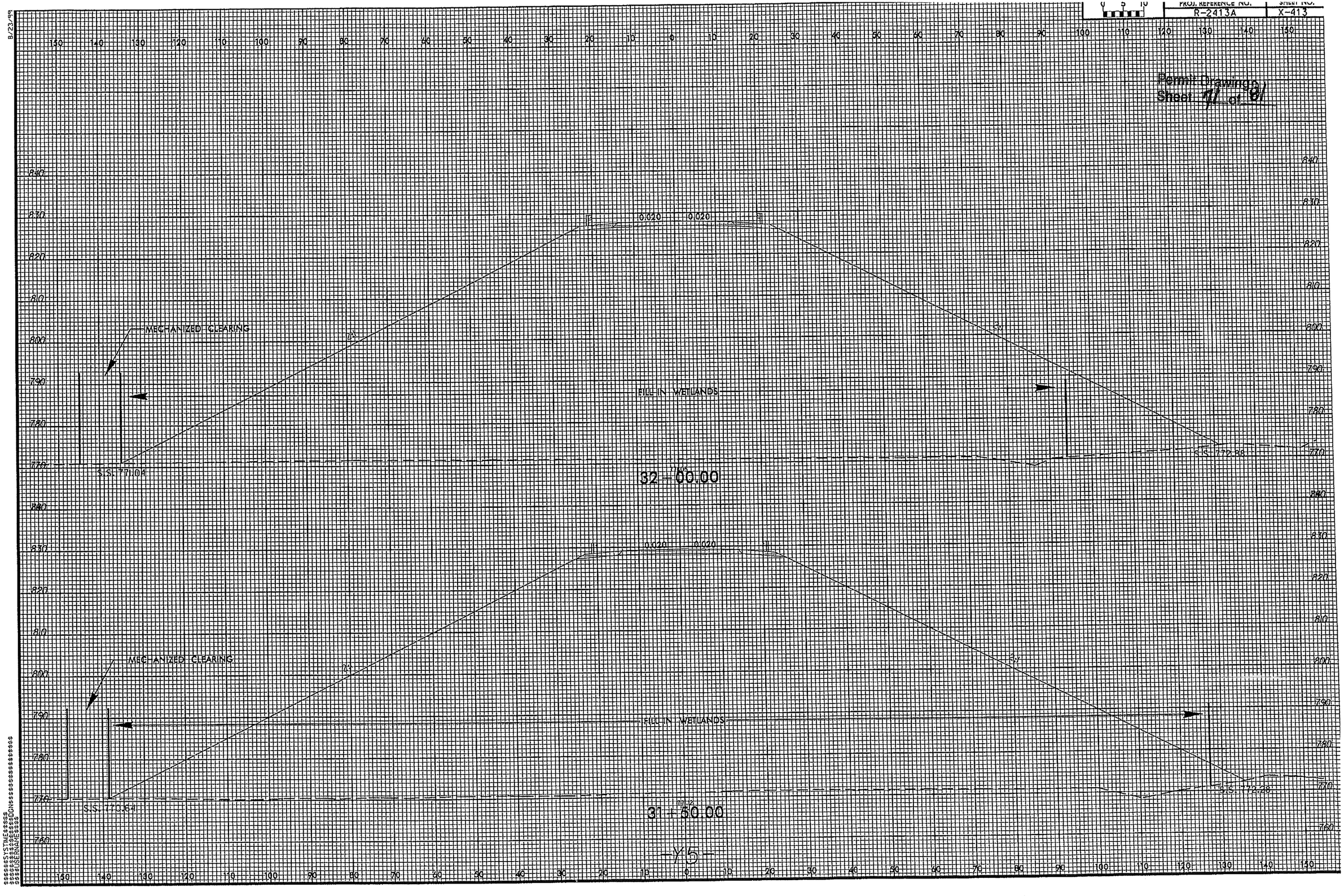
FROM FOUR LANES AT

SR 2011 TO SR 2127

SHEET 70 OF 81

2/13/13

Permit Drawings
Sheet 17 of 61



-Y5-

Permit Drawing
Sheet 72 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	37
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

DESIGN REVISION: THE HORIZONTAL DESIGN FOR -Y1C- HAS BEEN REVISED. THE LEFT TURN LANE ON -Y1C- HAS BEEN REMOVED AND THE CONCRETE ISLAND HAS BEEN REVISED TO RESTRICT LEFT TURNS OUT OF -Y1C-. JLT 1/28/2013
R/W REVISION: THE RIGHT OF WAY LABELS ON -Y1C- LOCATED ON PARCEL 26 HAVE BEEN REVISED BUT THE RIGHT OF WAY AREA HAS NOT CHANGED. CEH 2/7/13
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 25 AND 26. CEH 2/27/13.

8/17/99

GRAPHIC SCALE
100 50 0 100 200
PLANS

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

Permit Drawing
Sheet 73 of 81

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	37
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

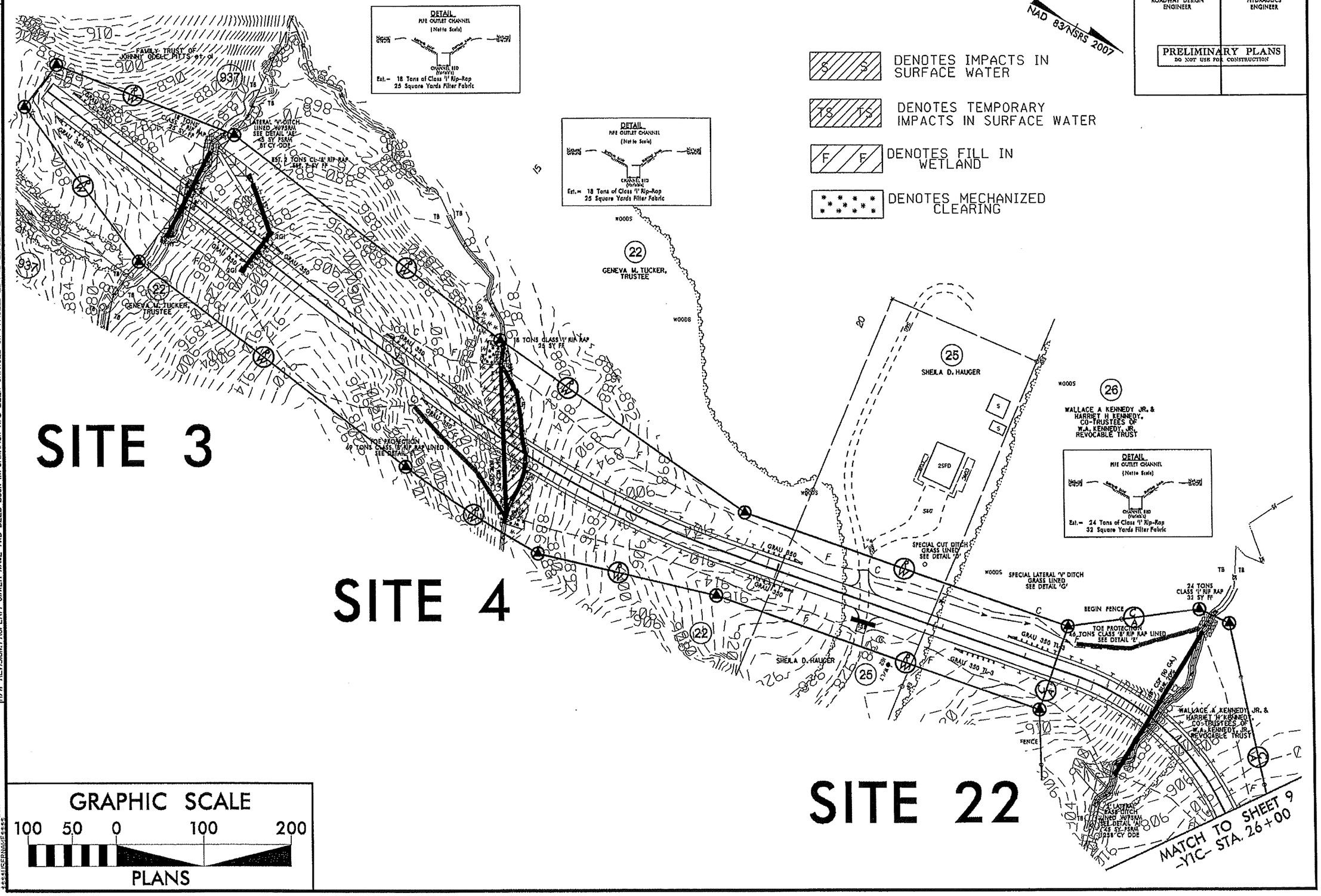
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

DESIGN REVISION: THE HORIZONTAL DESIGN FOR -Y1C- HAS BEEN REVISED. THE LEFT TURN LANE ON -Y1C- HAS BEEN REMOVED AND THE CONCRETE ISLAND HAS BEEN REVISED TO RESTRICT LEFT TURNS OUT OF -Y1C-. JLT 1/28/2013
R/W REVISION: THE RIGHT OF WAY LABELS ON -Y1C- LOCATED ON PARCEL 26 HAVE BEEN REVISED BUT THE RIGHT OF WAY AREA HAS NOT CHANGED. CEH 2/7/13
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 25 AND 26. CEH 2/27/13.

8/17/99



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	37
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
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NAD 83/NSRS 2007

SITE 3

SITE 4

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

N 86°23'53" E
213.66'

937

LATERAL 'V' DITCH LINED W/PSRM SEE DETAIL 'AE' 45 SY PSRM 81 CY DDE

EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FF

18 TONS CLASS 'I' RIP RAP 25 SY FF

3705 3703 3702 3704 3701 3706 3707

15" RCP-III

2GI

GRAU 350

36" RCP-IV BUR. 20%

18 TONS CLASS 'I' RIP RAP 25 SY FF

TOE PROTECTION 69 TONS CLASS 'B' RIP RAP LINED SEE DETAIL 'E'

22

GENEVA M. TUCKER, TRUSTEE

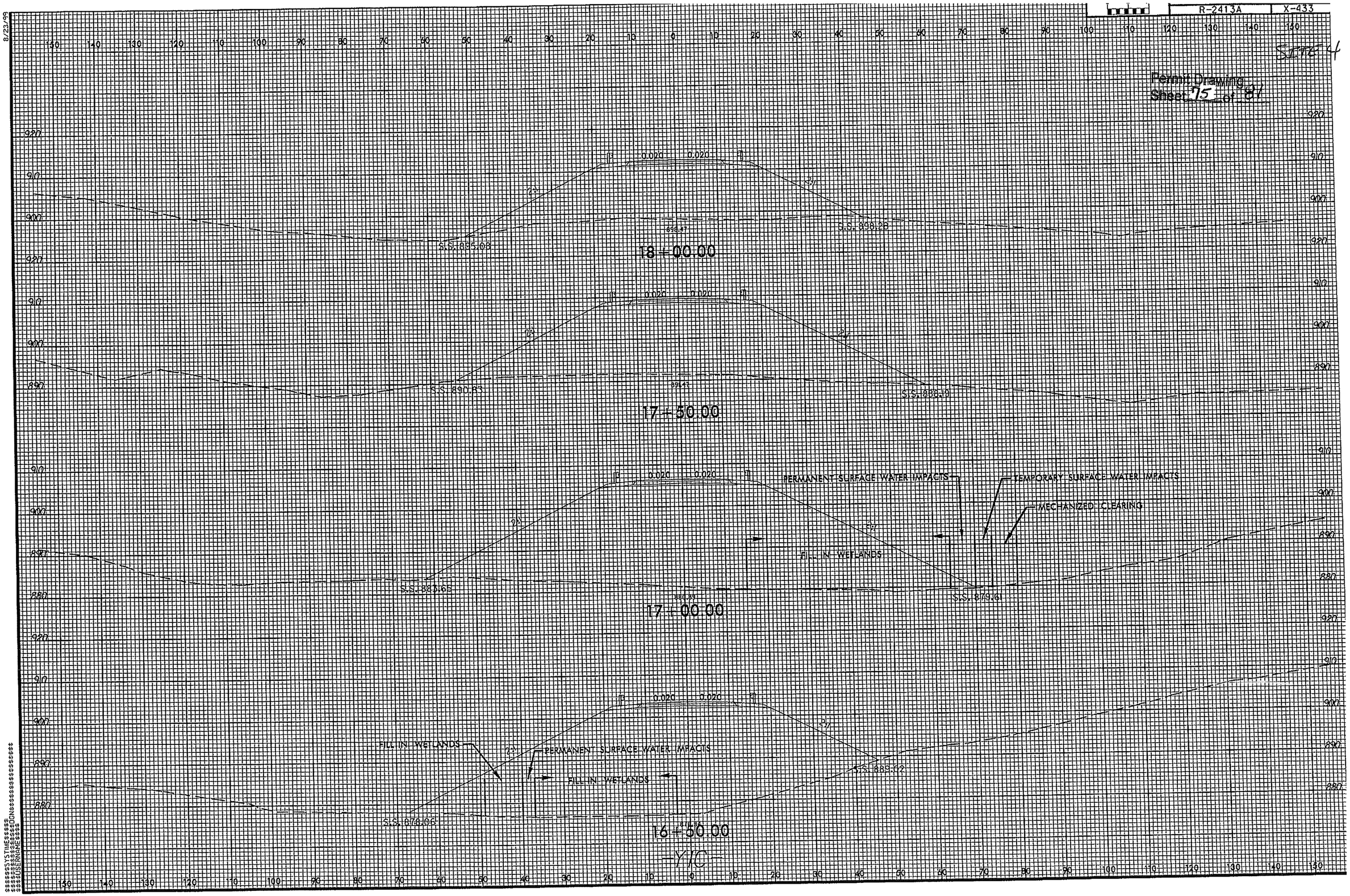
135

100' 0' 100'

SCALE: 1"= 100'

8/17/99

REVISIONS


R-2413A
X-433
SITE 4
Permit Drawing
Sheet 75 of 87
18+00.00
S.S. 895.08
S.S. 898.28
17+50.00
S.S. 890.83
S.S. 888.19
17+00.00
S.S. 883.65
S.S. 879.61
PERMANENT SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
MECHANIZED CLEARING
FILL IN WETLANDS
16+50.00
S.S. 878.06
S.S. 883.02
-Y/C-
0.020
2:1
8/23/99

Permit Drawing
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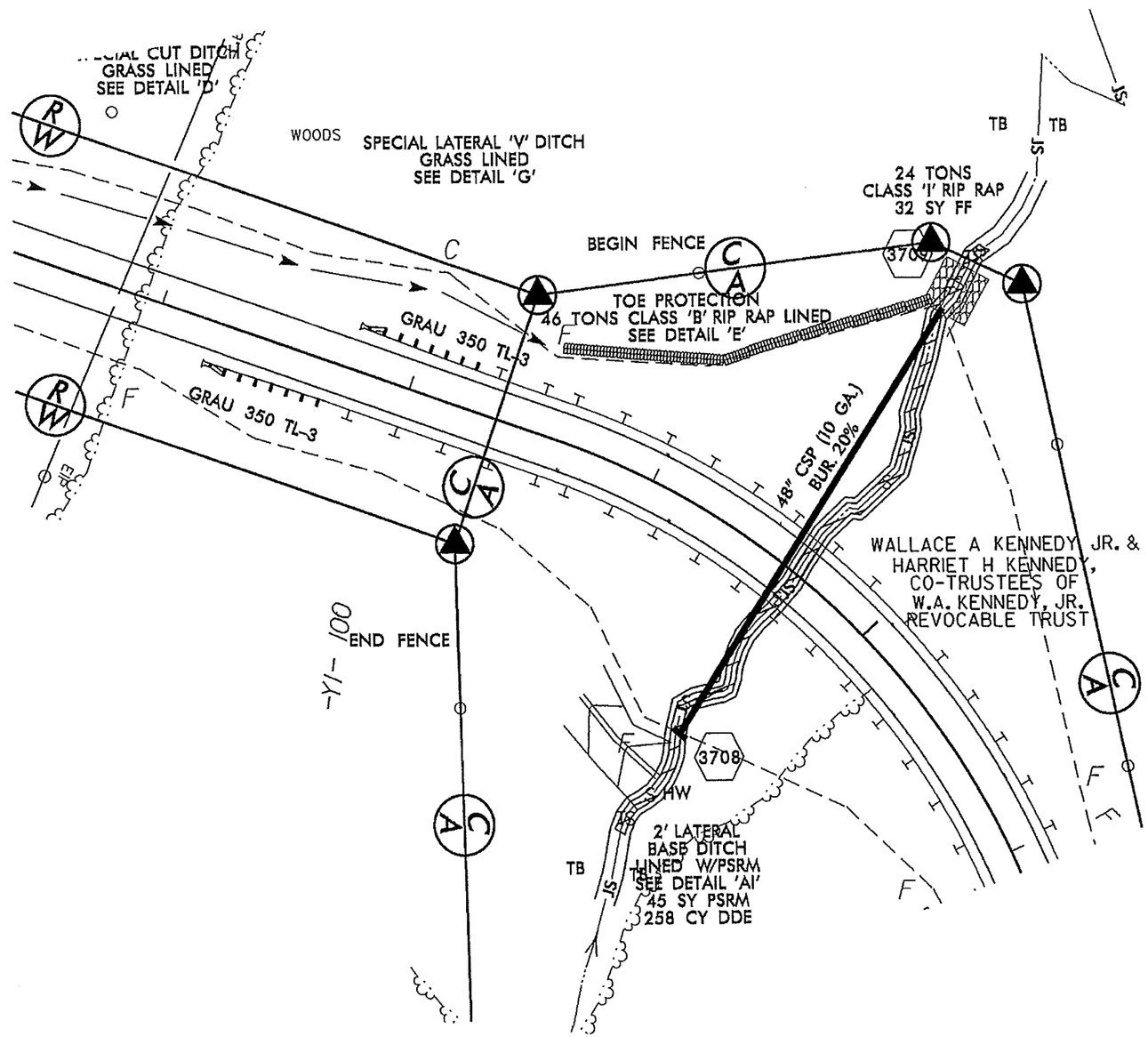
NAD 83/NSRS 2007

R-2413A	37
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/95



SITE 22

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100'

SCALE: 1"= 100'

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	WETLAND IMPACTS: Temp. Fill In Wetlands (ac)	WETLAND IMPACTS: Excavation in Wetlands (ac)	WETLAND IMPACTS: Mechanized Clearing in Wetlands (ac)	WETLAND IMPACTS: Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	SURFACE WATER IMPACTS: Temp. SW impacts (ac)	SURFACE WATER IMPACTS: Existing Channel Impacts Permanent (ft)	SURFACE WATER IMPACTS: Existing Channel Impacts Temp. (ft)	SURFACE WATER IMPACTS: Natural Stream Design (ft)
1	26+50 to 32+50 -RP1B-	42" RCP	0.01					0.13	<0.01	699	22	
		Bank Stabilization								20		
2	117+00 -L-	66" CSP										
2a.								<0.01	<0.01	60	18	
2b.		Road Fill						<0.01	<0.01	44	7	
2c.		Road Fill						0.05	<0.01	366	22	
		Bank Stabilization								20		
3	133+50 -L- &	36" CSP & 42" RCP						0.02	<0.01	212	36	
	12+00 -Y1C-	Bank Stabilization								32		
4	138+00 -L- &	2 @ 36" CSP	0.24			0.02		0.02	<0.01	523	42	
	16+00 to 17+00 -Y1C-	Bank Stabilization								30		
5	161+00 to 162+00 -L-	66" SPSP						0.03	<0.01	408	33	
		Bank Stabilization								20		
6	193+50 to 197+00 -L-	60" RCP & 54" CSP	<0.01					0.04	<0.01	409	21	
		Bank Stabilization								23		
SUBTOTALS:			0.26			0.02		0.29	0.08	2,866	201	

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A)

ATN Revised 3/31/05

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
7	206+50 to 208+50 -L-	60" CSP & 54" CSP										
7a.								0.03	<0.01	379	21	
		Bank Stabilization								45		
7b.								<0.01	<0.01	26	10	
7c.								<0.01		31		
8	228+00 to 233+50 -L-	66" CSP										
8a.								0.06	<0.01	654	50	
		Bank Stabilization								21		
8b.								<0.01		50		
8c.								<0.01		34		
9	232+50 to 235+50 -L-	42" CSP						0.60 (pond)				
10	247+50 -L-	72" CSP										
10a.			0.01		<0.01			0.05	<0.01	426	41	
		Bank Stabilization								20		
10b.								<0.01		49		
10c.			<0.01			0.01		0.01		116		
11	249+50 to 251+50 -L-	48" CSP	0.12					<0.01	<0.01	47	17	
SUBTOTALS:			0.14		<0.01	0.01		0.81	0.05	1,898	139	

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A)

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			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)
12	269+50 -L-	72" CSP										
12a.								0.03		299		1163*
12b.								0.01		131		
13	277+00 to 281+00 -L-	54" RCP										
13a.								0.04	<0.01	525	10	977*
13b.								0.01		106		
14	307+00 -L-	78" CSP										
14a.								0.07		486		342*
14b.								0.02		172		
15	322+50 to 326+00 -L-	54" CSP										
15a.			0.01					0.04	<0.01	513	41	
		Bank Stabilization								20		
15b.								<0.01		46		
16	327+50 to 329+50 -L-	72" CSP										
16a.			0.15					0.02	<0.01	342	29	
		Bank Stabilization								20		
16b.								<0.01		33		
SUBTOTALS:			0.16					0.21	0.03	2,693	80	2,482

* See Plan for On-Site Mitigation

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A)

SHEET 80 O 81 5/2/2013

ATN Revised 3/31/05

WETLAND PERMIT IMPACT SUMMARY

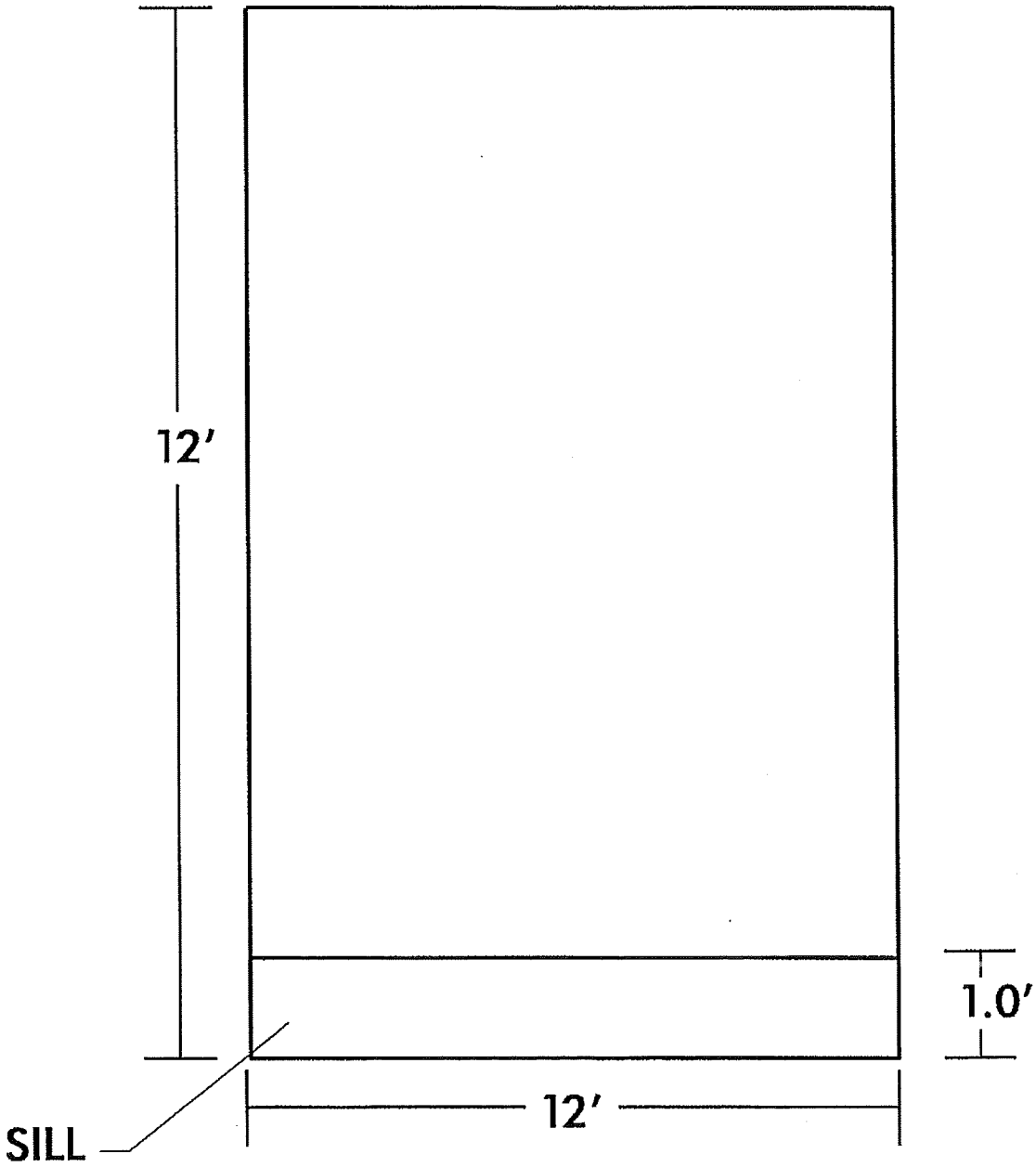
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
17	334+00 to 336+50 -L-	36" CSP	0.35			0.03						
18	338+00 to 340+50 -L-	Bridge		0.04			0.13		0.02		128	
19	348+00 to 353+00 -L-	60" RCP						0.03	<.01	507	34	
20	17+50 to 19+00 -Y4-	36" CSP	0.11					0.02		240		
21	29+00 to 36+00 -Y5-	1 @ 12' X 12' RCBC										
21a.			2.11			0.13		0.06	0.09	288	262	250*
21b.		Road Fill						0.01		149		
22	24+50 -Y1C-	48" CSP						0.02	<.01	256	22	
		Bank Stabilization								20		
SUBTOTALS:			2.57	0.04	<0.01	0.13	0.13	0.14	0.13	1,460	446	250
TOTALS:			3.13	0.04	<0.01	0.19	0.13	1.45	0.29	8,917	866	2,732

* See Plan for On-Site Mitigation

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GUILFORD
COUNTY
WBS - 34429.1.1 (R-2413A)

ATN Revised 3/31/05

SILL DETAIL



(PLACE SILL AT INLET AND OUTLET)

Permit Drawing
Sheet 71 of 81

09/08/99

TIP PROJECT: R-2413A

CONTRACT:

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

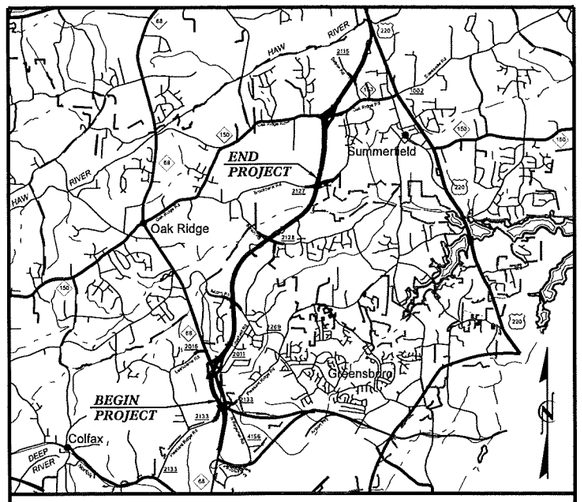
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413A	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34429.1.1		PE
34429.2.2		RW, UTIL

LOCATION: *NC 68 CONNECTOR – FROM FOUR LANES AT SR 2011 (EDGEFIELD ROAD) TO SR 2127 (BROOKBANK ROAD)*

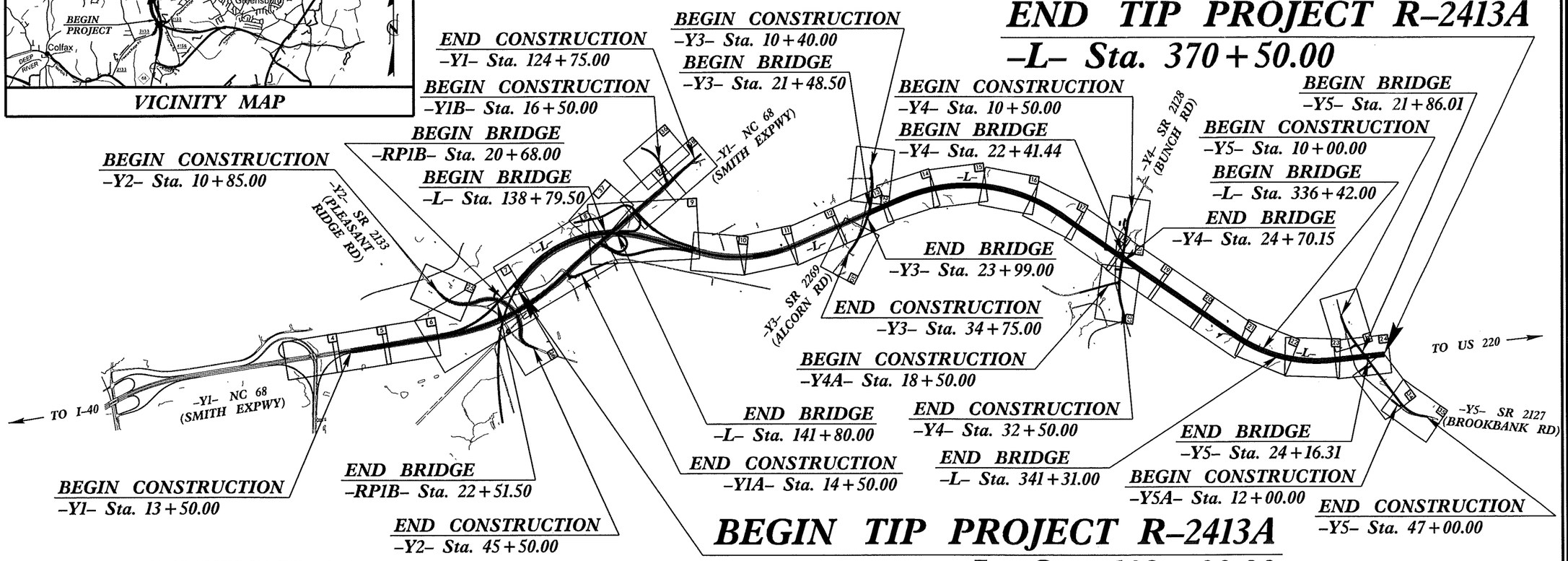
TYPE OF WORK: *GRADING, PAVING, WIDENING, RESURFACING, DRAINAGE, STRUCTURES, SIGNING, SIGNALS, AND ITS*

NAD 83/
NSRS 2007



VICINITY MAP

END TIP PROJECT R-2413A
-L- Sta. 370+50.00

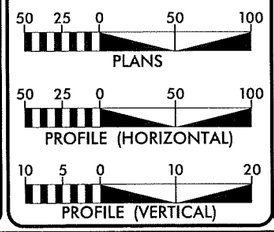


BEGIN TIP PROJECT R-2413A
-L- Sta. 109+00.00

THERE IS FULL CONTROL OF ACCESS ON THIS PROJECT.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO, OAK RIDGE, AND SUMMERFIELD.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2012	=	23,000
ADT 2035	=	40,800
DHV	=	11 %
D	=	70 %
T	=	15 % *
V	=	70 MPH

* TTST 10% DUAL 5%
FUNC CLASS – INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2413A = 4.803 MILES

LENGTH STRUCTURE TIP PROJECT R-2413A = 0.150 MILES

TOTAL LENGTH TIP PROJECT R-2413A = 4.953 MILES

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NOVEMBER 18, 2011

LETTING DATE: APRIL 15, 2014

TONY HOUSER, PE
PROJECT ENGINEER

JEFFREY L. TEAGUE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE:

ROADWAY DESIGN ENGINEER

SIGNATURE:

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER

23-APR-2013 12:28
R:\Roadway\Proj\R-2413A\r2413a_rdy_tsh.dgn
$$$$USERNAME$$$$

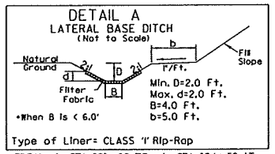
6/2/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	2-W

ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

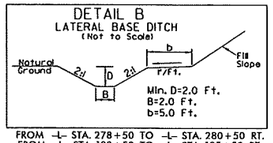
DETAIL A
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS 'I' Rip-Rap

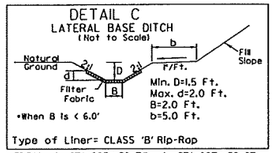
FROM –L– STA. 191+00 TO –L– STA. 194+50 LT.
FROM –L– STA. 230+50 TO –L– STA. 233+30 LT.

DETAIL B
LATERAL BASE DITCH
(Not to Scale)



FROM –L– STA. 278+50 TO –L– STA. 280+50 RT.
FROM –L– STA. 193+50 TO –L– STA. 195+50 RT.

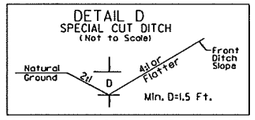
DETAIL C
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS 'B' Rip-Rap

FROM –L– STA. 195+50 TO –L– STA. 197+50 RT.
FROM –Y3– STA. 27+50 TO –Y3– STA. 29+50 LT.

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)



FROM –L– STA. 130+50 TO –L– STA. 131+50 RT.
FROM –L– STA. 154+50 TO –L– STA. 156+00 RT.
FROM –L– STA. 159+50 TO –L– STA. 160+50 RT.
FROM –L– STA. 164+00 TO –L– STA. 165+00 RT.
FROM –L– STA. 221+00 TO –L– STA. 225+00 RT.
FROM –L– STA. 260+50 TO –L– STA. 266+00 RT.
FROM –L– STA. 297+00 TO –L– STA. 303+50 RT.
FROM –L– STA. 353+50 TO –L– STA. 354+00 RT.
FROM –L– STA. 218+00 TO –L– STA. 218+50 LT.
FROM –L– STA. 220+50 TO –L– STA. 224+00 LT.
FROM –L– STA. 239+00 TO –L– STA. 245+00 LT.
FROM –L– STA. 258+50 TO –L– STA. 261+00 LT.
FROM –L– STA. 271+50 TO –L– STA. 273+00 LT.
FROM –L– STA. 279+00 TO –L– STA. 281+14 LT.
FROM –L– STA. 298+00 TO –L– STA. 302+00 LT.
FROM –L– STA. 311+50 TO –L– STA. 315+50 LT.
FROM –L– STA. 317+50 TO –L– STA. 321+50 LT.

FROM –RP1D– STA. 18+00 TO –RP1D– STA. 21+50 RT.

FROM –Y1– STA. 32+50 TO –Y1– STA. 33+50 RT.
FROM –Y1– STA. 101+00 TO –Y1– STA. 102+00 RT.
FROM –Y1– STA. 121+50 TO –Y1– STA. 123+50 RT.
FROM –Y1– STA. 35+50 TO –Y1– STA. 36+00 LT.
FROM –Y1– STA. 51+56 TO –Y1– STA. 52+50 LT.
FROM –Y1– STA. 77+50 TO –Y1– STA. 78+00 LT.
FROM –Y1– STA. 110+50 TO –Y1– STA. 111+27 LT.
FROM –Y1– STA. 119+50 TO –Y1– STA. 122+00 LT.

FROM –Y1B– STA. 17+50 TO –Y1B– STA. 18+50 LT.

FROM –Y1C– STA. 21+10 TO –Y1C– STA. 22+50 LT.

FROM –Y2– STA. 17+12 TO –Y2– STA. 18+00 RT.
FROM –Y2– STA. 25+00 TO –Y2– STA. 27+50 RT.
FROM –Y2– STA. 31+00 TO –Y2– STA. 32+50 RT.
FROM –Y2– STA. 38+00 TO –Y2– STA. 39+00 RT.
FROM –Y2– STA. 39+34 TO –Y2– STA. 42+50 RT.
FROM –Y2– STA. 15+50 TO –Y2– STA. 17+00 LT.
FROM –Y2– STA. 24+50 TO –Y2– STA. 28+00 LT.
FROM –Y2– STA. 31+50 TO –Y2– STA. 32+00 LT.
FROM –Y2– STA. 41+50 TO –Y2– STA. 43+57 LT.

FROM –Y3– STA. 20+00 TO –Y3– STA. 21+50 RT.
FROM –Y3– STA. 29+50 TO –Y3– STA. 30+00 LT.
FROM –Y3– STA. 33+50 TO –Y3– STA. 34+50 LT.

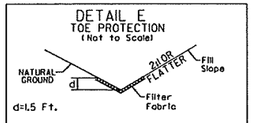
FROM –Y4– STA. 33+50 TO –Y4– STA. 37+00 RT.
FROM –Y4– STA. 35+50 TO –Y4– STA. 37+00 LT.

FROM –Y5– STA. 14+00 TO –Y5– STA. 14+50 RT.
FROM –Y5– STA. 18+00 TO –Y5– STA. 20+00 RT.
FROM –Y5– STA. 24+50 TO –Y5– STA. 25+83 RT.
FROM –Y5– STA. 42+50 TO –Y5– STA. 43+00 RT.
FROM –Y5– STA. 45+50 TO –Y5– STA. 46+50 RT.
FROM –Y5– STA. 13+50 TO –Y5– STA. 15+25 LT.
FROM –Y5– STA. 17+50 TO –Y5– STA. 21+00 LT.
FROM –Y5– STA. 24+50 TO –Y5– STA. 26+00 LT.
FROM –Y5– STA. 42+50 TO –Y5– STA. 43+00 LT.

FROM –Y5A– STA. 12+50 TO –Y5A– STA. 13+25 RT.

FROM –Y5B– STA. 10+22 TO –Y5B– STA. 11+00 LT. & RT.

DETAIL E
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS 'B' Rip-Rap

FROM –L– STA. 133+40 TO –L– STA. 135+00 RT.
FROM –L– STA. 190+35 TO –L– STA. 193+50 RT.
FROM –L– STA. 206+50 TO –L– STA. 207+00 RT.
FROM –L– STA. 228+50 TO –L– STA. 234+95 RT.
FROM –L– STA. 249+60 TO –L– STA. 251+30 RT.
FROM –L– STA. 277+80 TO –L– STA. 278+40 RT.
FROM –L– STA. 306+30 TO –L– STA. 312+50 RT.
FROM –L– STA. 246+50 TO –L– STA. 247+55 LT.
FROM –L– STA. 249+50 TO –L– STA. 251+80 LT.
FROM –L– STA. 305+50 TO –L– STA. 307+25 LT.

FROM –LP1A– STA. 14+35 TO –LP1A– STA. 17+50 LT.

FROM –LP1D– STA. 11+00 TO –LP1D– STA. 13+50 RT.

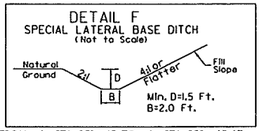
FROM –Y1– STA. 91+28 TO –Y1– STA. 92+60 RT.

FROM –Y1B– STA. 20+00 TO –Y1B– STA. 21+00 LT.

FROM –Y1C– STA. 15+50 TO –Y1C– STA. 17+00 RT.
FROM –Y1C– STA. 23+50 TO –Y1C– STA. 24+45 LT.

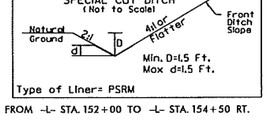
FROM –Y4– STA. 18+50 TO –Y4– STA. 21+90 RT.
FROM –Y4– STA. 17+00 TO –Y4– STA. 18+00 LT.

DETAIL F
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM –L– STA. 351+45 TO –L– STA. 352+65 LT.
FROM –Y1– STA. 57+00 TO –Y1– STA. 59+00 RT.

DETAIL G
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM –L– STA. 131+50 TO –L– STA. 133+35 RT.
FROM –L– STA. 144+00 TO –L– STA. 147+00 RT.
FROM –L– STA. 162+00 TO –L– STA. 164+00 RT.
FROM –L– STA. 352+00 TO –L– STA. 353+50 RT.
FROM –L– STA. 168+32 TO –L– STA. 169+05 LT.
FROM –L– STA. 311+00 TO –L– STA. 311+50 LT.
FROM –L– STA. 346+50 TO –L– STA. 348+50 LT.

FROM –LP1D– STA. 14+50 TO –LP1D– STA. 16+50 LT.

FROM –Y1– STA. 19+50 TO –Y1– STA. 20+50 RT.
FROM –Y1– STA. 31+50 TO –Y1– STA. 32+50 RT.
FROM –Y1– STA. 68+50 TO –Y1– STA. 71+50 RT.
FROM –Y1– STA. 99+83 TO –Y1– STA. 101+00 RT.
FROM –Y1– STA. 112+50 TO –Y1– STA. 114+35 RT.
FROM –Y1– STA. 120+55 TO –Y1– STA. 121+50 RT.
FROM –Y1– STA. 30+50 TO –Y1– STA. 32+50 LT.
FROM –Y1– STA. 34+80 TO –Y1– STA. 35+50 LT.
FROM –Y1– STA. 60+50 TO –Y1– STA. 64+00 LT.

FROM –Y1B– STA. 18+50 TO –Y1B– STA. 20+00 LT.

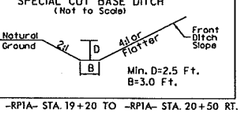
FROM –Y1C– STA. 22+50 TO –Y1C– STA. 23+50 LT.

FROM –Y2– STA. 35+15 TO –Y2– STA. 38+00 RT.
FROM –Y2– STA. 32+00 TO –Y2– STA. 32+85 LT.
FROM –Y2– STA. 34+75 TO –Y2– STA. 38+50 LT.
FROM –Y2– STA. 43+57 TO –Y2– STA. 45+00 LT.

FROM –Y4– STA. 34+50 TO –Y4– STA. 35+50 LT.

FROM –Y5– STA. 42+00 TO –Y5– STA. 42+50 RT.
FROM –Y5– STA. 41+60 TO –Y5– STA. 42+50 LT.

DETAIL H
STANDARD 'V' DITCH
(Not to Scale)



–L– STA. 219+00 RT.
–L– STA. 289+25 RT.

–LP1D– STA. 19+00 RT.

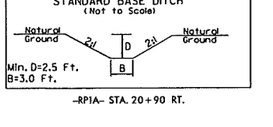
–Y2– STA. 24+50 RT.
–Y2– STA. 42+50 RT.

–Y3– STA. 30+00 RT.

–Y4– STA. 34+50 LT.

–Y5– STA. 42+00 RT.

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

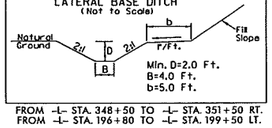


FROM –L– STA. 261+00 TO –L– STA. 262+40 LT.
FROM –L– STA. 345+65 TO –L– STA. 346+50 LT.

FROM –RP1B– STA. 25+00 TO –RP1B– STA. 25+50 RT.
FROM –RP1B– STA. 19+70 TO –RP1B– STA. 20+50 LT.

FROM –Y4– STA. 16+50 TO –Y4– STA. 18+50 RT.

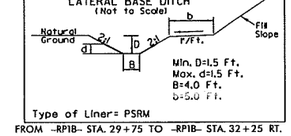
DETAIL J
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= PSRM

–Y2– STA. 32+60 RT.

DETAIL K
LATERAL BASE DITCH
(Not to Scale)

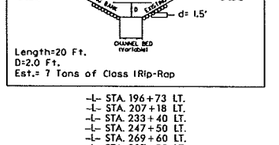


FROM –L– STA. 178+00 TO –L– STA. 180+50 RT.
FROM –L– STA. 322+82 TO –L– STA. 324+00 RT.

FROM –RP1B– STA. 25+50 TO –RP1B– STA. 27+50 RT.

FROM –Y3– STA. 24+50 TO –Y3– STA. 27+50 LT.

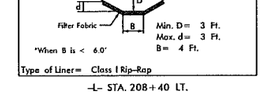
DETAIL L
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS 'B' Rip-Rap

FROM –L– STA. 269+30 TO –L– STA. 271+50 RT.
FROM –Y5– STA. 28+50 TO –Y5– STA. 30+98 RT.

DETAIL M
STANDARD BASE DITCH
(Not to Scale)



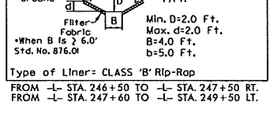
–L– STA. 241+00 LT.
–L– STA. 262+44 LT.
–L– STA. 314+00 LT.

–RP1D– STA. 19+00 RT.

–Y2– STA. 15+50 RT.

–Y4– STA. 16+50 LT.

DETAIL N
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

–RP1B– STA. 35+75 RT.

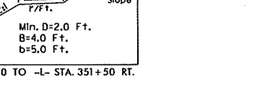
–Y1– STA. 71+50 LT.

DETAIL O
SPECIAL CUT DITCH
(Not to Scale)

FROM –L– STA. 197+50 TO –L– STA. 199+00 RT.
FROM –L– STA. 280+50 TO –L– STA. 281+14 RT.

FROM –Y1– STA. 78+50 TO –Y1– STA. 84+70 RT.

DETAIL P
STANDARD BASE DITCH
(Not to Scale)



–Y1– STA. 84+70 RT.

DETAIL Q
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

Type of Liner= CLASS 'B' Rip-Rap

FROM –LP1D– STA. 13+50 TO –LP1D– STA. 14+50 LT.

DETAIL S
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= PSRM

–L– STA. 262+25 RT.

–Y3– STA. 27+30 RT.

DETAIL U
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= CLASS 'B' Rip-Rap

FROM –L– STA. 277+10 TO –L– STA. 278+50 LT.

DETAIL V
STANDARD BASE DITCH
(Not to Scale)

–L– STA. 301+00 RT.

DETAIL W
TOE PROTECTION
(Not to Scale)

Type of Liner= PSRM

FROM –Y5– STA. 31+30 TO –Y5– STA. 39+00 RT.

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

Type of Liner= PSRM

FROM –L– STA. 161+05 TO –L– STA. 162+00 RT.
FROM –L– STA. 169+05 TO –L– STA. 170+00 LT.
FROM –L– STA. 164+50 TO –L– STA. 165+00 LT.
FROM –L– STA. 219+40 TO –L– STA. 220+50 LT.

FROM –Y5– STA. 17+00 TO –Y5– STA. 17+50 RT.
FROM –Y5– STA. 16+50 TO –Y5– STA. 17+50 LT.

DETAIL Y
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= CLASS 'B' Rip-Rap

–L– STA. 342+50 LT.

DETAIL AB
SPECIAL CUT DITCH
(Not to Scale)

Type of Liner= PSRM

FROM –L– STA. 152+00 TO –L– STA. 154+50 RT.

DETAIL AC
SPECIAL CUT BASE DITCH
(Not to Scale)

FROM –RP1A– STA. 19+20 TO –RP1A– STA. 20+50 RT.

DETAIL AD
STANDARD BASE DITCH
(Not to Scale)

–RP1A– STA. 20+90 RT.

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

Type of Liner= PSRM

FROM –L– STA. 162+50 TO –L– STA. 164+50 LT.
FROM –Y1C– STA. 11+95 TO –Y1C– STA. 12+50 LT.

DETAIL AF
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= CLASS 'B' Rip-Rap

FROM –L– STA. 342+50 TO –L– STA. 345+65 LT.

DETAIL AG
LATERAL BASE DITCH
(Not to Scale)

FROM –L– STA. 348+50 TO –L– STA. 351+50 RT.
FROM –L– STA. 196+80 TO –L– STA. 199+50 LT.

DETAIL AH
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= PSRM

FROM –RP1B– STA. 29+75 TO –RP1B– STA. 32+25 RT.

DETAIL AI
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= PSRM

FROM –L– STA. 324+00 TO –L– STA. 325+50 RT.

FROM –RP1B– STA. 28+50 TO –RP1B– STA. 29+75 RT.

FROM –Y1C– STA. 24+20 TO –Y1C– STA. 24+80 LT.

DETAIL AJ
PIPE OUTLET CHANNEL
(Not to Scale)

Length=20 Ft.
D=2.0 Ft.
Est.= 7 Tons of Class I Rip-Rap

–L– STA. 196+73 LT.
–L– STA. 207+18 LT.
–L– STA. 233+40 LT.
–L– STA. 247+50 LT.
–L– STA. 269+60 LT.
–L– STA. 307+23 LT.
–L– STA. 325+55 LT.
–L– STA. 351+55 RT.

DETAIL AO
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= Class I Rip-Rap

–L– STA. 208+40 LT.

DETAIL AR
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= CLASS 'B' Rip-Rap

–Y5– STA. 16+40 RT.

DETAIL AS
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= CLASS 'B' Rip-Rap

FROM –L– STA. 246+50 TO –L– STA. 247+50 RT.
FROM –L– STA. 247+60 TO –L– STA. 249+50 LT.

DETAIL ZZ
LATERAL CHANNEL CHANGE
(Not to Scale)

FROM –L– STA. 348+50 TO –L– STA. 351+50 RT.

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$$$$USERNAME$$$$

6/2/99

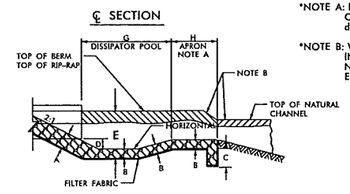
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	2-X
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

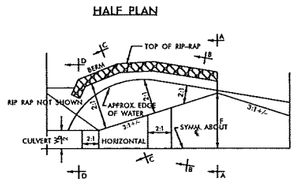
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DETAIL AK
-L- STA. 219+30 LT.
RIP-RAPPED ENERGY DISSIPATOR BASIN

*NOTE A: IF EXIT VELOCITY OF BASIN IS SPECIFIED, EXTEND BASIN AS REQUIRED TO OBTAIN SUFFICIENT CROSS SECTIONAL AREA AT SECTION A-A SUCH THAT Q des/CROSS SECTION AREA AT SEC. A-A) = SPECIFIED VELOCITY.

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

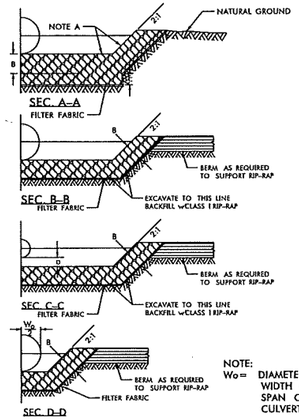




DIM	RIP RAP BASIN #							
	1	2	3	4	5	6	7	8
A	2.5							
B	2							
C	2							
D	2							
E	2							
F	10							
G	20							
H	10							

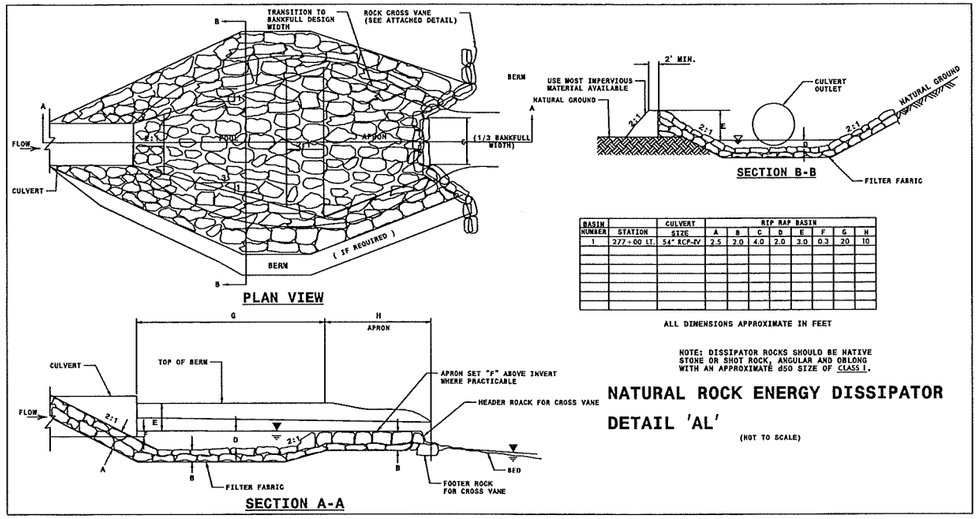
*ALL DIMENSIONS APPROXIMATE IN ℉

BASIN #	LOCATION (AT OUTLET)
1	-L- STA. 219+30 LT
2	
3	
4	
5	
6	
7	
8	



NOTE:
Wo = DIAMETER OF PIPE, WIDTH OF BOX OR SPAN OF PIPE-ARCH CULVERTS

5/05



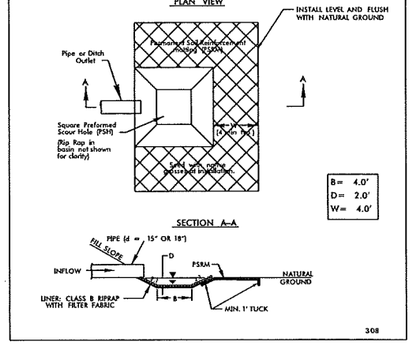
BASIN NUMBER	STATION	CULVERT SIZE	RIP RAP BASIN A	B	C	D	E	F	G	H
1	277+00 LT.	54" RCP-FV	2.5	2.0	4.0	2.0	3.0	0.3	20	10

ALL DIMENSIONS APPROXIMATE IN FEET

NOTE: DISSIPATOR ROCKS SHOULD BE NATIVE STONE OR SHOT ROCK, ANGULAR AND OBLONG WITH AN APPROXIMATE d50 SIZE OF CLASS I.

NATURAL ROCK ENERGY DISSIPATOR
DETAIL 'AL'
(NOT TO SCALE)

DETAIL AP
PREFORMED SCOUR HOLE
*NOT TO SCALE



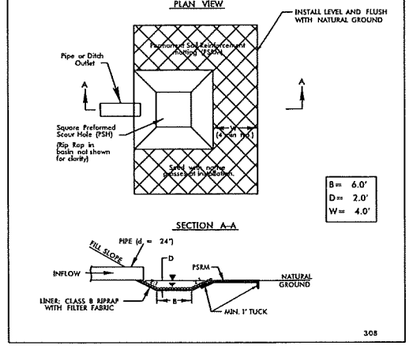
308

-L- STA. 116+70 RT.
-L- STA. 246+00 RT.
-L- STA. 330+25 LT.
-L- STA. 336+00 LT.
-L- STA. 341+85 LT.

-Y1- STA. 108+50 RT.

-Y5- STA. 34+50 LT.

DETAIL AQ
PREFORMED SCOUR HOLE
*NOT TO SCALE



308

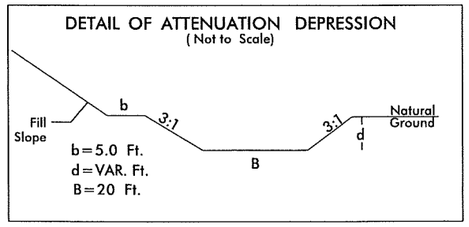
-L- STA. 252+25 RT.
-L- STA. 326+00 LT.

STATION	BOULDER DIMENSIONS (FT) HEIGHT	LENGTH	WIDTH
277+00 LT.	2.0	3.0	1.0

NOTES:
1) DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2) DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3) CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5) POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK CROSS VANE DETAIL
NOT TO SCALE

DETAIL OF ATTENUATION DEPRESSION
(Not to Scale)



-Y2- STA. 43+22 RT.

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

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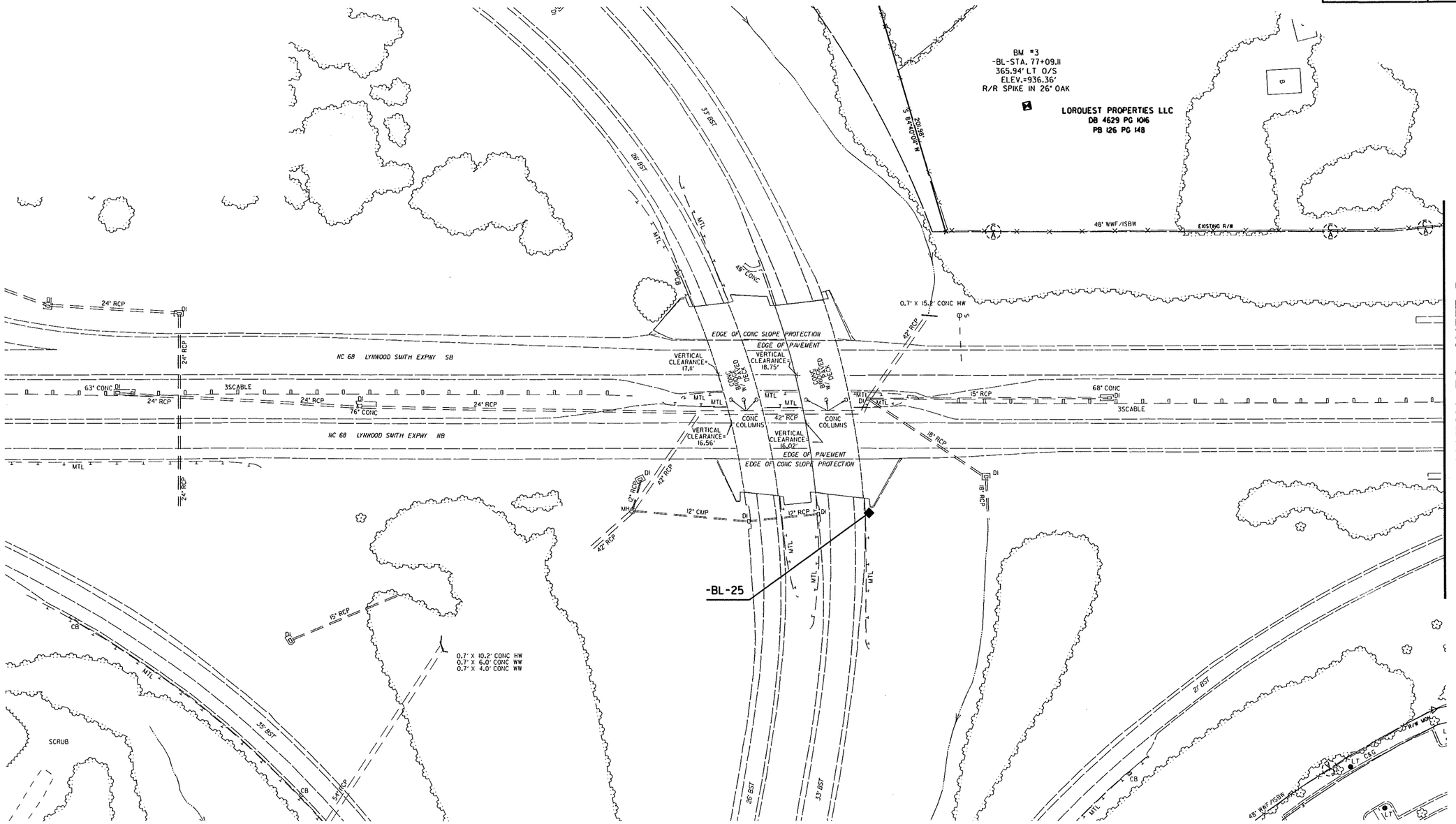

MATCH TO SHEET 5

REVISIONS
8/17/99

23-APR-2013 12:31
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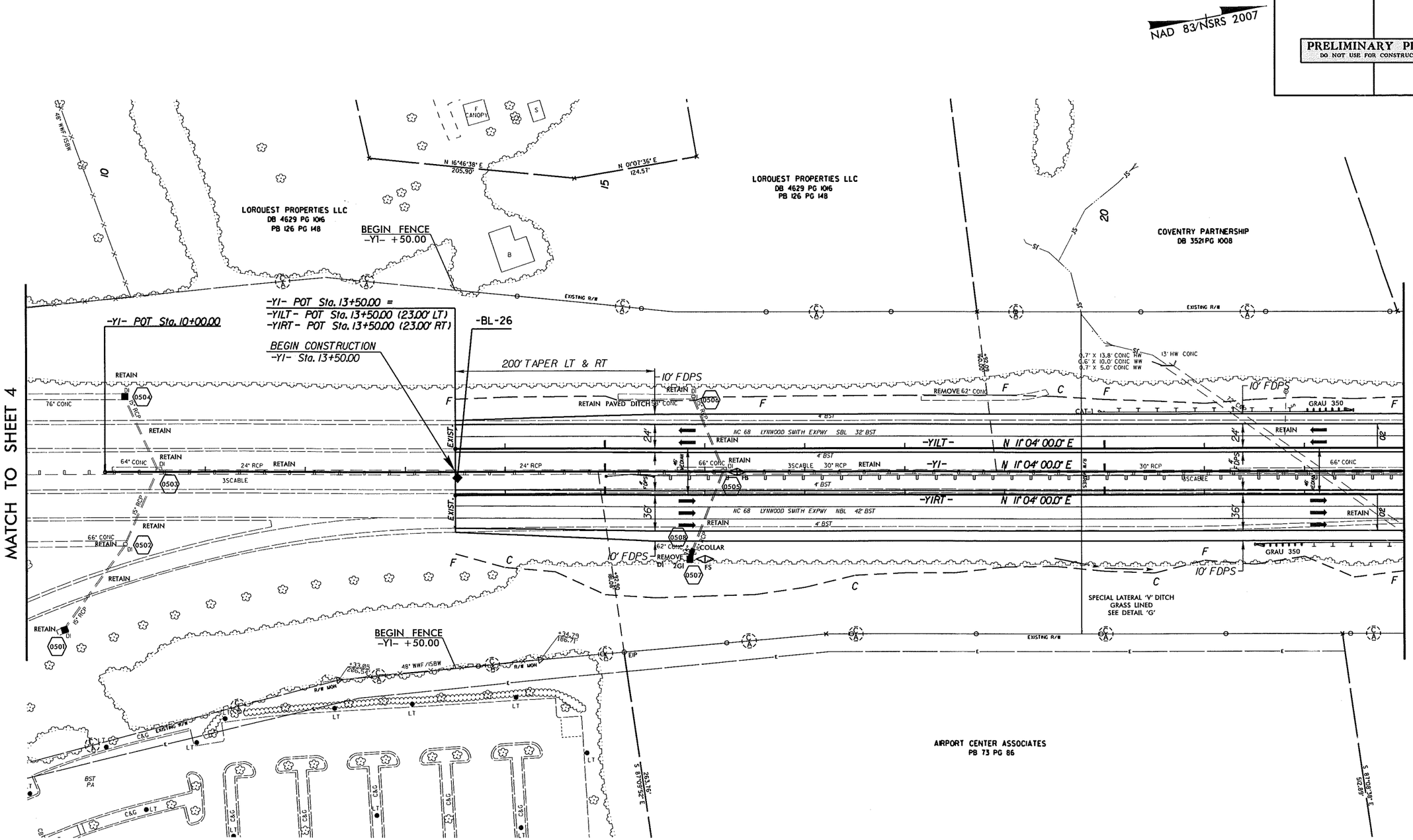
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



FOR -Y1LT- PROFILE, SEE SHEET NO. 51
FOR -Y1RT- PROFILE, SEE SHEET NO. 51
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

8/17/99 R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION LOCATED LEFT OF -Y1- STA.33+00 HAS BEEN CHANGED FROM CHARLES MILLS TO MIRACLE HOLDINGS,LLC. CEH 2/27/13.

BM #4
-BL-STA. 96+06.49 354.38' LT O/S
-Y1-STA. 24+55.52 (347.53' LT)
ELEV.=915.96'
R/R SPIKE IN 12" POPLAR

REX W. SIMMONS
DB 2996 PG 583

MIRACLE HOLDINGS, LLC
DB 5758 PG 2650

SCRUB

-Y1- 25

-Y1- 30

-Y1- 35

-Y1- STA. 23+00

-Y1- STA. 37+00

MATCH TO SHEET 5

MATCH TO SHEET 7

-BL-27

-BL-28

-Y1- POT Sta. 37+00.00 =
-Y1LT- POT Sta. 37+00.00 (23.00' LT)
-Y1RT- POT Sta. 37+00.00 (23.00' RT)

BEGIN 2'-9" C&G
-Y1- Sta. 36+50.00

END RETAINING WALL 1
-Y1- Sta. 24+50.00

BEGIN RETAINING WALL 1
-Y1- Sta. 23+00.00

300' TAPER

900' ACCELERATION LANE

SPECIAL MEDIAN GRADING
SEE XSC'S

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

10' FDPS

REMOVE 68' CONC

REMOVE 65' CONC

REMOVE 60' CONC

N 11° 04' 00.0" E -Y1LT-

N 11° 04' 00.0" E -Y1-

N 11° 04' 00.0" E -Y1RT-

NC 68 LYNWOOD SMITH EXPWY SBL 32' BST

NC 68 LYNWOOD SMITH EXPWY NBL 30' BST

3' BST

EXISTING R/W

8" VCP

8" DIP

8" VCP (PRIVATE)

42" CMP POND OVERFLOW

AIRPORT CENTER ASSOCIATES
PB 73 PG 86

CONCOURSE CENTER ASSOCIATES
DB 5699 PG 1482
PB 133 PG 34

WE 899.4

FOR -Y1LT- PROFILE, SEE SHEET NO. 52
FOR -Y1RT- PROFILE, SEE SHEET NO. 52
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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REVISIONS
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAVE BEEN CORRECTED ON PARCELS 5 AND 6. TBR 5-31-12
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 1. CEH 2/27/13.

GRAPHIC SCALE
100 50 0 100 200
PLANS

TRAFFIC DIAGRAM

PLEASANT RIDGE RD

NC 68: 22,750 / 40,100 — 3,700 / 6,300 — 4,450 / 5,900 — 17,450 / 32,500

PLEASANT RIDGE RD: 9,500 / 12,600 — 3,500 / 5,400 — 19,500 / 35,300

2012 ADT
2035 ADT

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-Y1- POT Sta. 38+32.98 = -RPIB- ST Sta. 40+79.93 (47.00' LT)
-RPIB- CS Sta. 38+79.93
-Y1- PC Sta. 40+00.00
-Y1- STA. 37+00
-Y1- STA. 39+00
-Y2- PRC Sta. 22+21.79
-Y2- STA. 18+00
-Y2- POC Sta. 26+75.00 = -DR2- POT Sta. 10+00.00
-Y2- POC Sta. 28+43.03 = -RPIB- POT Sta. 21+58.76
-DR2- PC Sta. 10+81.48
-DR2- POT Sta. 12+93.34
END CONSTRUCTION
-DR2- Sta. 12+85.62
-DR2- PT Sta. 12+75.22
-RPIB- Sta. 20+68.00
-RPIB- Sta. 20+43.00
-RPIB- Sta. 22+51.50
-RPIB- Sta. 23+17.50
-BYI-154
-RPIB- TS Sta. 23+17.72
-RPIB- SC Sta. 25+17.72
-L- POC Sta. 100+23.52 = -Y1- POC Sta. 56+34.84
-L- POC Sta. 103+85.70 = -Y2- POC Sta. 31+03.85
-Y1- POC Sta. 59+87.47 = -Y2- POC Sta. 33+79.20
-L- POC Sta. 97+50.00
FUTURE STRUCTURES (BUILD UNDER I-5110)
-BL-29
-BL-30
-Y1- STA. 63+50
-Y2- STA. 36+00
-L- STA. 108+00

DRIVE TO BE MAINTAINED BY PEARRIDGE, INC

1 MIRACLE HOLDINGS, LLC DB 5758 PG 2650
2 JOSEPHINE COX SMITH DB 5107 PG 881
3 NORMAN TODD CLINE AND DEBRA SUE CLINE DB 3901 PG 225 PB 77 PG 64
4 JOSEPHINE COX SMITH DB 5107 PG 881 PB 92 PG 149
5 SANDRA H. SMITH DB 3795 PG 161 PB 92 PG 149
6 GERALD T. TUCKER DB 3833 PG 262
7 CAROLINA GOLF CENTER DB 6086 PG 530
8 JOE SMITH DB 2549 PG 762 PB 39 PG 37
9 MARGARET ROBERTS DB 4790 PG 442 PB 39 PG 37
10 BILLY RAY SIMMONS DB 3290 PG 560 PB 136 PG 132
11 WALTER F. RUFFMAN DB 4536 PG 159 PB 126 PG 41
12 RONALD G. HALL DB 4358 PG 656 PB 39 PG 37
13 PEARRIDGE, INC. DB 4232 PG 2062
46 JOSEPHINE COX SMITH DB 2173 PG 123
CONCOURSE CENTER ASSOCIATES DB 5699 PG 482 PB 133 PG 34
REGIONAL ROAD VENTURE, LLC DB 5903 PG 662 PB 133 PG 34
DOROTHY H. WELKER DB 2654 PG 834, DB 4406 PG 728, DB 2928 PG 728, DB 5270 PG 622
CITY OF GREENSBORO DB 460 PG 439
NCDOT (FORMERLY DOROTHY WELKER)

MATCH TO SHEET 6
MATCH TO SHEET 25
MATCH TO SHEET 8
MATCH TO SHEET 26

APPROACH SLAB
PAVEMENT REMOVAL
MONO. CONCRETE ISLAND
PROPOSED TRAFFIC SIGNAL ★
FOR -Y1- PROFILE, SEE SHEET NO. 53
FOR -Y2- PROFILE, SEE SHEET NO. 57
FOR -DR2- PROFILE, SEE SHEET NO. 58
FOR -RP1B- PROFILE, SEE SHEET NO. 47
FOR BRIDGE SKETCH, SEE SHEET NO. 2-M
FOR INTERSECTION DETAIL, SEE SHEET NO. 2-S
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

-Y1- CURVE DATA
PI Sta 59+35.06
Δ = 35° 45' 00.0" (LT)
D = 0° 57' 17.7"
L = 3743.73'
T = 1935.06'
R = 6,000.00'
SE = 0.02
RO = 160'
INC = 80'

-RPIB- CURVE DATA
PIs Sta 24+51.06
θs = 2° 26' 17.2"
Ls = 200.00'
LT = 133.35'
ST = 66.68'

PI Sta 32+18.56
Δ = 33° 12' 44.6" (RT)
D = 2° 26' 17.2"
L = 1,362.21'
T = 700.84'
R = 2,350.00'
SE = 0.06

PIs Sta 39+46.61
θs = 2° 26' 17.2"
Ls = 200.00'
LT = 133.35'
ST = 66.68'

-L- CURVE DATA
PI Sta 129+66.67
Δ = 9° 14' 56.2" (RT)
D = 1° 47' 25.8"
L = 5,263.85'
T = 3,446.56'
R = 3,200.00'
SE = 0.06

-Y2- CURVE DATA
PI Sta 17+32.58
Δ = 68° 33' 40.7" (LT)
D = 6° 01' 52.1"
L = 1,136.79'
T = 647.58'
R = 950.00'
SE = 0.04
V = 50 MPH

PI Sta 36+15.73
Δ = 117° 15' 06.2" (RT)
D = 6° 44' 26.4"
L = 1,739.46'
T = 1,393.94'
R = 850.00'
SE = 0.04
V = 45 MPH

-DR2- CURVE DATA
PI Sta 11+86.71
Δ = 55° 30' 00.0" (RT)
D = 28° 38' 52.4"
L = 193.73'
T = 105.23'
R = 200.00'

R/W REVISION: THE RIGHT OF WAY IN THE NORTHEAST QUADRANT OF RAMP D (-RPID-) AND -Y1- HAS BEEN REVISED. CEH 2/7/13

R/W REVISION: PARCEL NUMBER 21 WEST OF EXIST. NC 68 HAS BEEN CHANGED TO PARCEL NUMBER 937. PROPERTY OWNER'S NAME ON PARCEL 937 HAS BEEN CHANGED FROM JOHNNY ODELL PITTS TO FAMILY TRUST OF JOHNNY ODELL PITTS ET AL. JLT 3-22-12

R/W REVISION: PROPERTY LINES HAVE BEEN CORRECTED ON PARCELS 13 AND 17. PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAVE BEEN CORRECTED ON PARCELS 17 AND 18. TBR 5-31-12

DESIGN REVISION: THE DASHED EDGE OF PAVEMENT LINES LOCATED RIGHT OF -L- HAVE BEEN CHANGED TO SOLID LINES TO REPRESENT PAVING. JLT 1/28/2013

GRAPHIC SCALE
100 50 0 100 200
PLANS

TRAFFIC DIAGRAM
NC 68 — 17,450 / 32,500 — 3,300 / 4,900 — 1,000 / 1,700 — 15,150 / 29,300 — NC 68
4,250 / 6,600
EDGEFIELD ROAD
2012 ADT
2035 ADT

-L- CURVE DATA
PI Sta 129+66.67
Δ = 94° 14' 56.2" (RT)
D = 1° 41' 25.8"
L = 5,263.85'
T = 3,446.58'
R = 3,200.00'
SE = 0.06

-Y1- CURVE DATA
PI Sta 59+35.06
Δ = 35° 45' 00.0" (LT)
D = 0° 57' 17.7"
L = 3,743.73'
T = 1935.06'
R = 6,000.00'
SE = 0.02

PI Sta 81+88.99
Δ = 4° 15' 00.0" (RT)
D = 0° 28' 38.9"
L = 890.12'
T = 445.26'
R = 12,000.00'
SE = 0.02

-Y1A- CURVE DATA
PI Sta 11+89.12
Δ = 68° 35' 00.5" (LT)
D = 31° 49' 51.6"
L = 215.46'
T = 122.75'
R = 180.00'
SE = 0.05
V = 40 MPH

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- POC Sta. 115+00.00 =
-RP1B- POT Sta. 10+00.00 (59.00' LT)

BEGIN TIP PROJECT R-2413A
-L- Sta. 109+00.00

-Y1- POC Sta. 77+75.00 =
-Y1A- POT Sta. 10+00.00

-Y1- PRC Sta. 77+43.73

-Y1A- PC Sta. 10+66.37

-Y1A- PT Sta. 12+81.83

-Y1- PT Sta. 86+33.85

END CONSTRUCTION
-Y1A- Sta. 14+50.00

MATCH TO SHEET 7
-Y1- STA. 63+50

MATCH TO SHEET 7
-L- STA. 108+00

MATCH TO SHEET 9
-L- STA. 135+00

MATCH TO SHEET 9
-Y1- STA. 88+50

FOUR SEASONS PROPERTY OF NC, LLC
DB 6664 PG 302

PEARRIDGE, INC.
DB 4232 PG 2062

PUMP PIPE SALES & SERVICE, INC.
DB 469 PG 1335
PB 10 PG 142

BAJ ELLISON PROPERTIES LLC
DB 6938 PG 1359

HCDOT
(FORMERLY) KARL AND VICKI KODI

REGIONAL AIRLINE SERVICES INC.
DB 5321 PG 743
PB 70 PG 90

JAMES WILLIAM SOPER
DB 4743 PG 1437
PB 70 PG 90

HEIRS OF PAT McCUISTON
WB 096 741

RONALD GRAHAM HALL
DB 375 PG 672

FAMILY TRUST OF JOHNNY ODELL PITTS et al
DB 208 PG 288
PB 84 PG 102

GENEVA M. TUCKER, TRUSTEE
DB 6052 PG 205

CINDY JONES
DB 6907 PG 539
PB 84 PG 302

HCDOT
(FORMERLY) JOSEPHINE COX SMITH
DB 7219 PG 2671

BLAIR & MARY ANN EVERETT
DB 4266 PG 2604
PB 65 PG 1

SACK FAMILY PROPERTIES LLC
DB 5718 PG 757
PB 94 PG 84

SWAAN 68 LLC
DB 4968 PG 65
PB 99 PG 159-61

WALTER T & BETTY P PARRISH
DB 6255 PG 192
PB 99 PG 139

JAAM ONE LLC
DB 495 PG 540
PB 140 PG 27

32 TONS CLASS 'I' RIP RAP
40 SY FILTER FABRIC

66" CSP
2 2/3" x 1/2" CORRUGATIONS
8 GAGE

18 TONS CLASS 'I' RIP RAP
25 SY FILTER FABRIC

36" CSP W/ELBOWS
1" CORRUGATIONS
8 GAGE

EST. 3 TONS CL 'B' RIP RAP
EST. 11 SY FILT. FAB.

EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FILT. FAB.

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

EST. 7 TONS CL 'I' RIP RAP
EST. 25 SY FILT. FAB.

4' STANDARD BASE DITCH
CLASS 'I' RIP RAP
SEE DETAIL 'AA'
@700cy EXC.
@90 TONS
@126cy FF

3' STANDARD BASE DITCH
GRASS LINED
SEE DETAIL 'F'
@100cy EXC

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

TOE PROTECTION
SEE DETAIL 'E'
74 TONS
CLASS 'B' RIP RAP
208 SY FF

BEGIN SPECIAL MEDIAN GRADING
-L- POC Sta. 134+28.68

-BL-31

-BL-32

-BL-
-BY4-
-GPS- R24/3-5

-Y1- +14.83
166.87'LT
(EXIST R/W)

-Y1- +48.66
169.15'LT
(EXIST R/W)

-Y1- +101.55
207.37'LT
(EXIST R/W)

-Y1- +72.62
233.16'LT
(EXIST R/W)

-Y1- +00.00
125.00'RT

-Y1- +33.85
125.00'RT

-Y1- +24.00
125.00'RT
225.00'RT

-Y1A- +20.63
ON PL
30.00'LT

-Y1A- +73.50
91.31'LT

-Y1A- +00.00
130.03'RT
45.00'RT

-Y1A- +63.24
100.00'RT
EXIST. R/W

-Y1- END 100.00
125.00'RT
END FEA

-RP1B- +00.00
125.00'RT

-RP1B- STA. 14+01

-L- +00.00
250.00'LT

450' RIGHT TURN LANE
200' TAPER
100' TAPER
375' RIGHT TURN LANE
600' LEFT TURN LANE
600' RIGHT TURN LANE
10' FDPS
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2GM6
2GI
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PAVEMENT REMOVAL
MONO. CONCRETE ISLAND
★ PROPOSED TRAFFIC SIGNAL
FOR -L- PROFILE, SEE SHEET NO. 37A
FOR -Y1- PROFILE, SEE SHEET NO. 54
FOR -Y1A- PROFILE, SEE SHEET NO. 56
FOR -RP1B- PROFILE, SEE SHEET NO. 46
FOR INTERSECTION DETAIL, SEE SHEET NO. 2-T
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X
SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 2 FOR SPECIAL MEDIAN GRADING

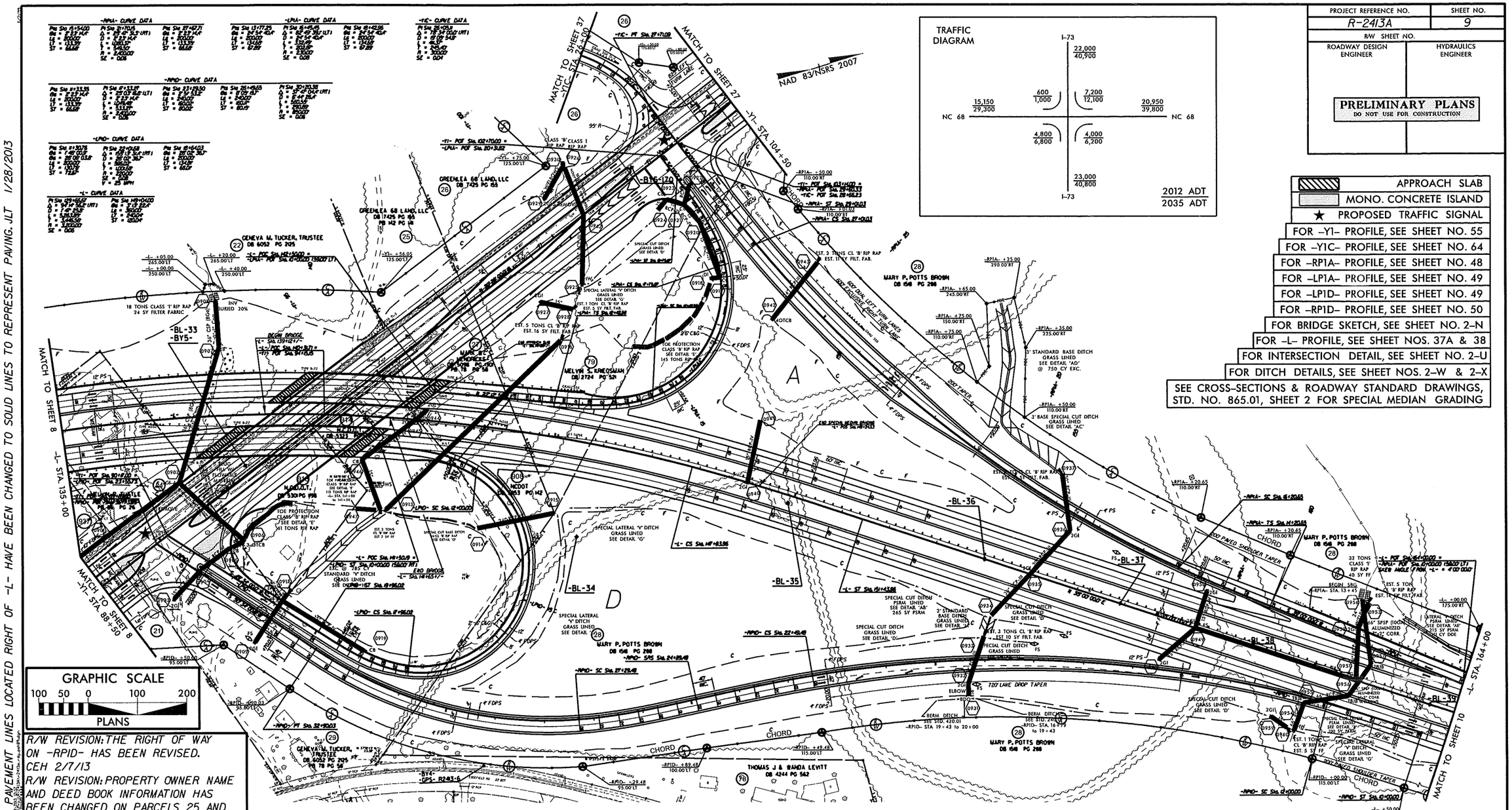
R/W REVISION: THE R/W AT THE CORNER OF -Y1- AND -RPID- HAS BEEN REVISED. CEH 2/7/13.

R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 14 AND 20. PARCEL 21 HAS BEEN CHANGED TO PARCEL 21A. CINDY JONES HAS BEEN ASSIGNED TO PARCEL 21A. CEH 2/27/13.

21-NPC-2013.DGN

R/W REVISION: PARCEL NUMBER 21 WEST OF EXIST. NC 68 HAS BEEN CHANGED TO PARCEL NUMBER 937, PROPERTY OWNER'S NAME ON PARCEL 937 HAS BEEN CHANGED FROM JOHNNY ODELL PITTS ET AL JLT 3-22-12

DESIGN REVISION: THE HORIZONTAL DESIGN FOR -YIC- HAS BEEN REVISED AND THE CONCRETE ISLAND HAS BEEN REVISED TO RESTRICT LEFT TURNS OUT OF -YIC-. A FREE-FLOW RIGHT TURN LANE OFF OF LOOP -LPID- RIGHT OF -L- OVER -YI- (NC 68) HAS BEEN REVISED AND IS NOW TO BE CONSTRUCTED UNDER R-2413A. THE HORIZONTAL DESIGN FOR -LPID- AND -RPID- HAVE BEEN REVISED. THE SPIRAL ON -LPID- HAS BEEN SHIFTED OFF THE MAINLINE BRIDGE LOCATED RIGHT OF -L-. THE DASHED EDGE OF PAVEMENT LINES LOCATED RIGHT OF -L- HAVE BEEN CHANGED TO SOLID LINES TO REPRESENT PAVING. JLT 1/28/2013



R/W REVISION: THE RIGHT OF WAY ON -RPID- HAS BEEN REVISED. CEH 2/7/13

R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 25 AND 26. CEH 2/27/13.

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

APPROACH SLAB
MONO. CONCRETE ISLAND
★ PROPOSED TRAFFIC SIGNAL

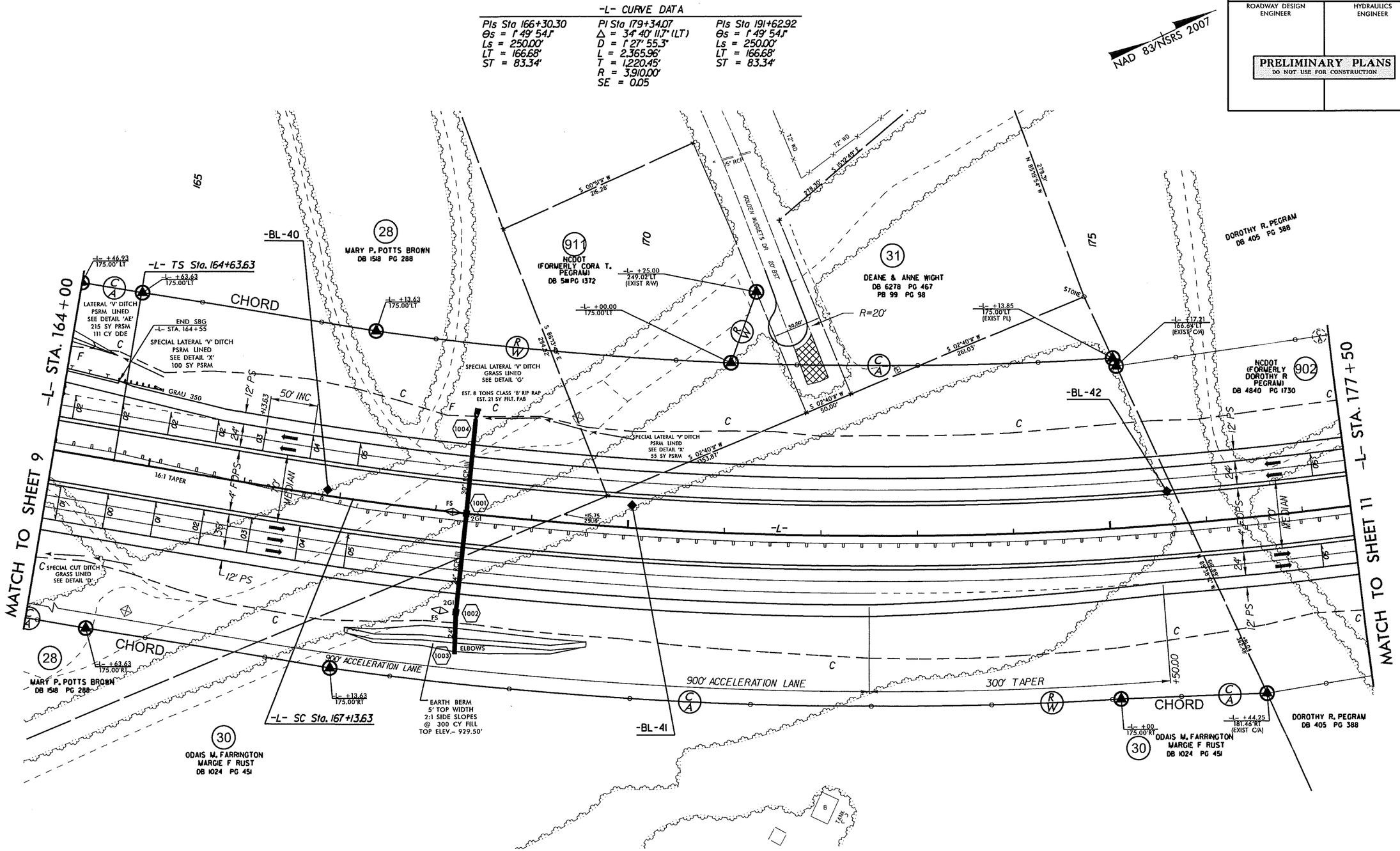
FOR –Y1– PROFILE, SEE SHEET NO. 55
FOR –Y1C– PROFILE, SEE SHEET NO. 64
FOR –RP1A– PROFILE, SEE SHEET NO. 48
FOR –LP1A– PROFILE, SEE SHEET NO. 49
FOR –LP1D– PROFILE, SEE SHEET NO. 49
FOR –RP1D– PROFILE, SEE SHEET NO. 50
FOR BRIDGE SKETCH, SEE SHEET NO. 2–N
FOR –L– PROFILE, SEE SHEET NOS. 37A & 38
FOR INTERSECTION DETAIL, SEE SHEET NO. 2–U
FOR DITCH DETAILS, SEE SHEET NOS. 2–W & 2–X
SEE CROSS–SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 2 FOR SPECIAL MEDIAN GRADING

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- CURVE DATA

PIs Sta 166+30.30	PI Sta 179+34.07	PIs Sta 191+62.92
Θs = 1° 49' 54.1"	Δ = 34° 40' 11.7" (LT)	Θs = 1° 49' 54.1"
Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 166.68'	L = 2,365.96'	LT = 166.68'
ST = 83.34'	T = 1,220.45'	ST = 83.34'
	R = 3,910.00'	
	SE = 0.05	



PAVEMENT REMOVAL
FOR -L- PROFILE, SEE SHEET NO. 39
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- CURVE DATA

PIs Sta 166+30.30	PI Sta 179+34.07	PIs Sta 191+62.92
Θs = 1° 49' 54.1"	Δ = 34° 40' 11.7" (LT)	Θs = 1° 49' 54.1"
Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 166.68'	L = 2,365.96'	LT = 166.68'
ST = 83.34'	T = 1,220.45'	ST = 83.34'
	R = 3,910.00'	
	SE = 0.05	

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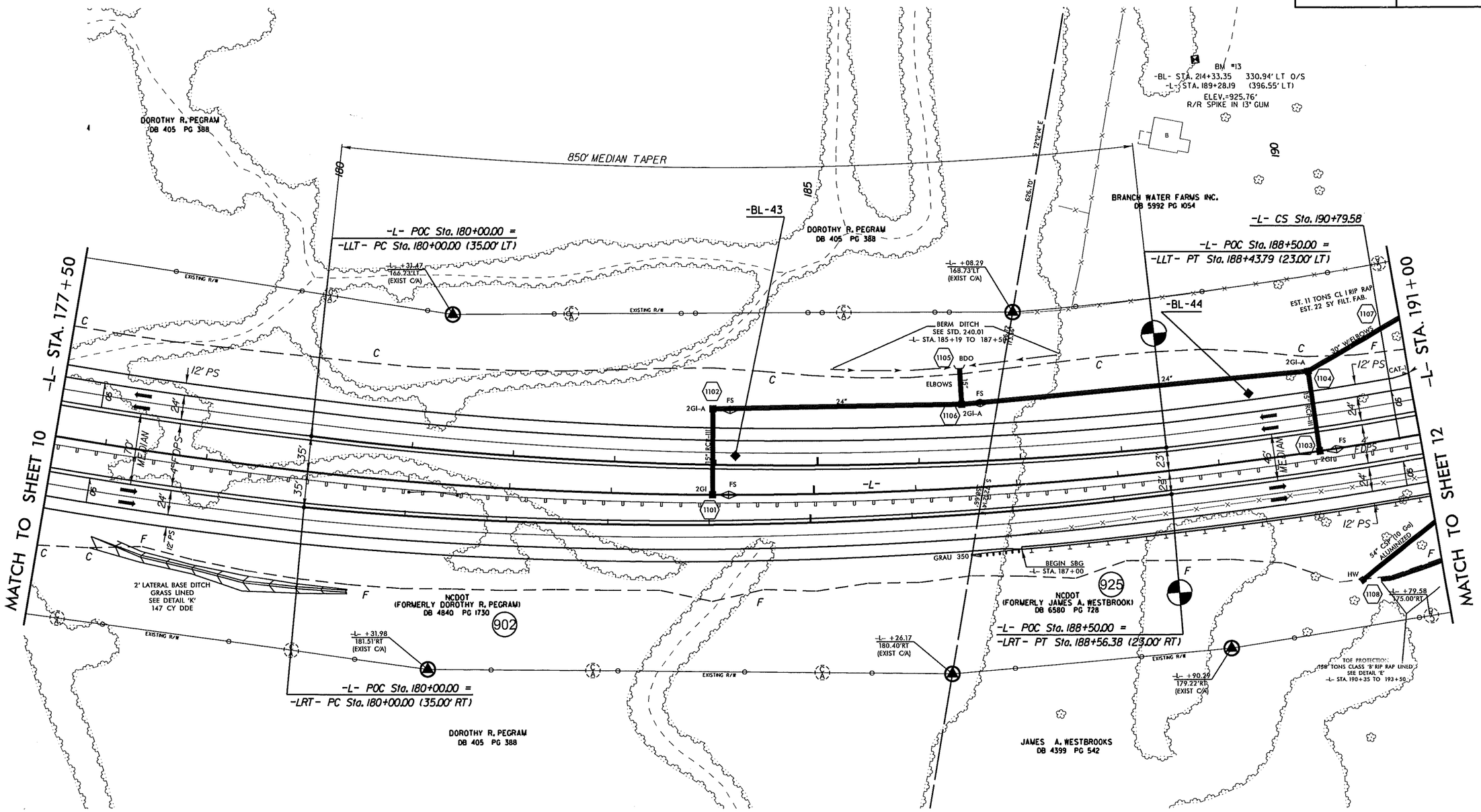

FOR -L- PROFILE, SEE SHEET NO. 39

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

REVISIONS

R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIM ON BRANCH WATER FARMS, INC. CEH 2/27/13.

8/17/99

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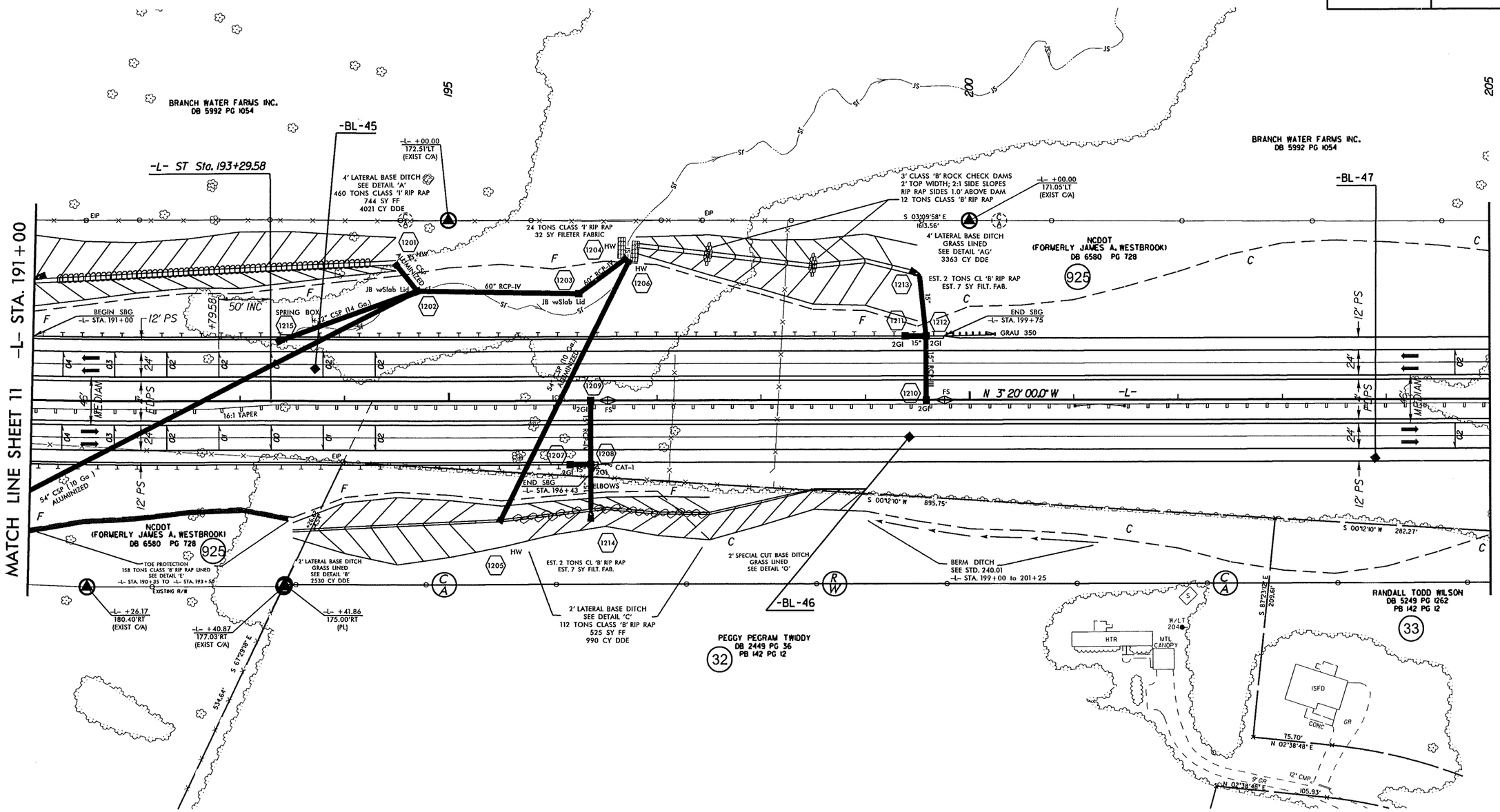
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-L- CURVE DATA

PIs Sta 166+30.30	PI Sta 179+34.07	PIs Sta 191+62.92
Θs = 1° 49' 54.1"	Δ = 34° 40' 11.7" (LT)	Θs = 1° 49' 54.1"
Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 166.68'	L = 2,365.96'	LT = 166.68'
ST = 83.34'	T = 1,220.45'	ST = 83.34'
	R = 3,910.00'	
	SE = 0.05	



FOR -L- PROFILE, SEE SHEET NO. 40
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

REVISIONS

R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIN ON BRANCH WATER FARMS, INC. CEH 2/27/13.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN A NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

R/W REVISION: PARCEL NUMBER 80 HAS BEEN DELETED. NO CLAIM ON BRANCH WATER FARMS, INC. CEH 2/27/13

8/17/99

-Y3- CURVE DATA
PI Sta 23+03.11
Δ = 46° 53' 16.5" (RT)
D = 1° 58' 32.6"
L = 2,373.21'
T = 1,257.58'
R = 2,900.00'

MATCH TO SHEET 29 -Y3- STA. 18+50

-L- STA. 205+00

-L- STA. 219+00

MATCH TO SHEET 12

MATCH TO SHEET 14

MATCH TO SHEET 30 -Y3- STA. 27+50

DORTHY H. CONRAD, TRUSTEE U/W
ELWOOD MACK CONRAD
DB 4569 PG 988
PB 103 PG 74

DORTHY H. CONRAD, TRUSTEE U/W
ELWOOD MACK CONRAD
DB 4569 PG 988
PB 103 PG 74
EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

BEGIN SBG
-Y3- STA. 19+10

NCDOT (FORMERLY CORA T. PEGRAM)
DB 5438 PG 684

4' STANDARD BASE DITCH
SEE DETAIL 'AO'
1700 CY DDE
80 TONS CLASS 'I'
115 SY FF

BRANCH WATER FARMS INC.
DB 5992 PG 1054

NCDOT (FORMERLY JAMES A. WESTBROOK)
DB 6580 PG 728

NCDOT (FORMERLY BILL STORK)
DB 5514 PG 2086

BEGIN SPECIAL MEDIAN GRADING
-L- POT Sta. 209+27.82

END SBG
-L- STA. 209+65

BEGIN SBG
-L- STA. 206+75

END SBG
-Y3- STA. 21+43.90

BEGIN APPROACH SLAB
-Y3- Sta. 21+23.50

BEGIN BRIDGE
-Y3- Sta. 21+48.50

END SPECIAL MEDIAN GRADING
-L- POT Sta. 218+95.72

THOMAS & CATHY MORRISON
DB 6741 PG 2365
PB 170 PG 10

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

RANDALL TODD WILSON
DB 5249 PG 1262
PB 142 PG 12

MARSHALL R. TWIDDY AND PEGGY P. TWIDDY
DB 4557 PG 1485
PB 121 PG 96

TOE PROTECTION
25 TONS CLASS 'BL' RIP RAP LINED
SEE DETAIL 'E'

EARTH BERM W/5' TOP WIDTH
2:1 SIDE SLOPES
350 CY FILL
TOP ELEV. 872.0'

2' STANDARD BASE DITCH
PSRM LINED
SEE DETAIL 'S'
150 CY DDE
45 SY PSRM

2' LATERAL BASE DITCH
GRASS LINED
SEE DETAIL 'K'
437 CY DDE

END C/A
-Y3- +98.13
99.57' RT
END FENCE

END C/A
-Y3- +00.00
75.00' LT
BEGIN FENCE

LOLA M. PEGRAM
DB 2132 PG 135
DB 2241 PG 554

VANCE DALE PEGRAM
DB 4060 PG 1590

M-XII BARRIER UNIT

ATTENUATOR TYPE B-77

ALCORN RD

END BRIDGE
-Y3- Sta. 23+99.00

END APPROACH SLAB
-Y3- Sta. 24+24.00

-L- POT Sta. 214+14.08=
-Y3- POC Sta. 22+73.33

BERM DITCH
SEE STD. 240.01
-L- STA. 218+00 to 219+00

-BL-48

-BL-49
-BY6-

-BL-50

APPROACH SLAB
PAVEMENT REMOVAL
FOR -L- PROFILE, SEE SHEET NO. 40
FOR BRIDGE SKETCH, SEE SHEET NO. 2-O
FOR -Y3- PROFILE, SEE SHEETS NO. 58 & 59
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X
SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

R/W REVISION: PARCEL 38 HAS BEEN SPLIT INTO THREE SEPARATE PARCELS. THE PROP. R/W LINE LOCATED RIGHT OF -L- BETWEEN STA.232+65.68 AND STA.235+30.83 HAS BEEN CHANGED TO AN EXIST. R/W LINE. CEH 11/21/2012

R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

8/17/99

-L- CURVE DATA

PIs Sta 224+06.88	PI Sta 248+65.16	PIs Sta 269+54.78
θs = 1° 33' 55.7"	Δ = 54° 52' 08.7" (RT)	θs = 1° 33' 55.7"
Ls = 250.00'	D = 1° 15' 08.5"	Ls = 250.00'
LT = 166.67'	L = 4,381.23'	LT = 166.67'
ST = 83.34'	T = 2,374.96'	ST = 83.34'
	R = 4,575.00'	
	SE = 0.05	

NAD 83/NSRS 2007

36A THOMAS & CATHY MORRISON
DB 6741 PG 2365
PB 170 PG 10

36 LOLA M. PEGRAM
DB 2132 PG 135
DB 2241 PG 554

37 VANCE DALE PEGRAM
DB 4060 PG 1590

916 NCDOT (FORMERLY BRAME CORPORATION)
DB 5537 PG 158

38 SHUGART MANAGEMENT, INC.
DB 6389 PG 2296
PB 169 PG 89

SHUGART MANAGEMENT, INC.
DB 6556 PG 804
PB 70 PG 55

DONEVAN SOUTH
DB 6957 PG 266
PB 179 PG 107

-L- STA. 219+00

MATCH TO SHEET 13

-L- STA. 233+00

MATCH TO SHEET 15

N 3° 20' 00.0" W -L-

CHORD

-L- TS Sta. 222+40.20

-L- SC Sta. 224+90.20

-BL-51

-BL-52

-BL-53

-BL-54

BEGIN SBG -L- STA. 224+85

BEGIN SBG -L- STA. 228+50

RIP RAP ENERGY DISSIPATOR BASIN
100 TONS CLASS I RIP RAP
110 SY FILTER FABRIC
100 CY EXCAVATION
SEE DETAIL 'AK'

SPECIAL LATERAL 'V' DITCH
PSRM LINED
SEE DETAIL 'X'
120 SY PSRM

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

EARTH BERM WITH
5' TOP WIDTH
2:1 SIDE SLOPES
TOP ELEV.=878.0'
40 CY FILL

BERM DITCH
SEE STD. 240.01
-L- STA. 221+00 TO 223+00

STANDARD 'V' DITCH
GRASS LINED
SEE DETAIL 'H'
60 CY EXCAVATION

4' LATERAL BASE DITCH
SEE DETAIL 'A'
368 TONS CLASS 'I' RIP RAP
595 SY FF
553 CY DDE

EST. 1 TON CL 'B' RIP RAP
EST. 6 SY FILT. FAB.

TOE PROTECTION
327 TONS CLASS 'B' RIP RAP LINED
SEE DETAIL 'E'
-L- STA. 228+40 TO -L- STA. 234+95

EXISTING 68' DUKE POWER R/W DB 2743 PG 972

SCRUB

BM #15
-BL- STA 257+24.88 367.09' LT
-L- STA 232+61.87 36.72' LT
ELEV=828.67'

TO WELL HOUSE

FOR -L- PROFILE, SEE SHEET NO. 41

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99

REVISIONS

R/W REVISION: PARCEL 38 HAS BEEN SPLIT INTO THREE SEPARATE PARCELS. THE PROP. R/W LINE LOCATED RIGHT OF -L- BETWEEN STA.232+65.68 AND STA.235+30.83 HAS BEEN CHANGED TO AN EXIST. R/W LINE. CEH 11/21/2012

-L- CURVE DATA

PIs Sta 224+06.88	PI Sta 248+65.16	PIs Sta 269+54.78
Θs = 1° 33' 55.7"	Δ = 54° 52' 08.7" (RT)	Θs = 1° 33' 55.7"
Ls = 250.00'	D = 1° 15' 08.5"	Ls = 250.00'
LT = 166.67'	L = 4,381.23'	LT = 166.67'
ST = 83.34'	T = 2,374.96'	ST = 83.34'
	R = 4,575.00'	
	SE = 0.05	

-L- STA. 233+00

MATCH TO SHEET 14

-L- STA. 247+00

MATCH TO SHEET 16

-L-

EIP 11.05' OFF LINE

S 44°45'23" W 618.87'

4' LATERAL BASE DITCH SEE DETAIL 'A' 368 TONS CLASS 'I' RIP RAP 595 SY FF

EXISTING 68' DUKE POWER R/W DB 2743 PG 972

SCRUB

-L- +60.00 225.00'LT

32 TONS CLASS 'I' RIP RAP 48 SY FILTER FABRIC

-L- +00.00 173.70'LT (EXIST C/A)

PDE

916 NCDOT (FORMERLY BRAME CORPORATION) DB 5537 PG 158

N 53°40'32" W 34.58'

EIP

-L- +20.32 173.17'RT (EXIST C/A)

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

-L- +30.00 230.00'LT 173.06'LT (EXIST C/A)

-L- +70.00 230.00'LT

2' STANDARD BASE DITCH GRASS LINED SEE DETAIL 'M' 250 CY EXCAVATION

-L- +00.00 173.02'LT (EXIST C/A)

917 NCDOT (FORMERLY BOBBY E. AND SHIRLEY SMITH) DB 5874 PG 2818

240

245

HW 1503

F 1501

66" CSP (16 GA) ALUMINIZED

6" STEEL

REMOVE

42" CSP (10 GA) ALUMINIZED W/ELBOWS

EST. 1 TON CL 'B' RIP RAP EST. 5 SY FILT. FAB.

1510

END SBG -L- STA. 235+62

1508

35°

15"

2GI 2GI 1509

GRAU 350

12" PS

24"

65

46' MEDIAN

EST. 5 TONS CL 'B' RIP RAP EST. 14 SY FILT. FAB.

1514

24" RCP III

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

EXISTING R/W

TOE PROTECTION 58 TONS CLASS 'B' RIP RAP LINED SEE DETAIL 'E' -L- STA. 246+50 to 247+50

BEGIN SBG -L- STA. 246+00

CAT-1

1504 FS 2GI

1513 FS 2GI

1512 FS 2GI

1515 FS 2GI

1505 2GI-A 15" CAT-1

1506 END SBG -L- STA. 235+30

1507 18" RCP III ELBOWS

N 16°02'E 30.16'

WS 823.3

F C

EST. 2 TON CL 'B' RIP RAP EST. 7 SY FILT. FAB.

SHUGART MANAGEMENT, INC. DB 6556 PG 804 PB 70 PG 55

38

TOE PROTECTION 345 TONS CLASS 'B' RIP RAP LINED SEE DETAIL 'E' -L- STA. 228+40 TO -L- STA. 235+30

-L- +30.83 176.46'RT (EXIST C/A)

DONEVAN SOUTH DB 6957 PG 2664 PB 171PG 107

-BL-55

0.80' EIP

N 53°40'32" W 320.39'

N 53°53'06" W 85.70'

N 53°53'06" W 55.31'

-L- +49.93 176.79'RT (EXIST C/A)

-L- +49.91 176.79'RT (EXIST C/A)

TAIWO A. ANDE DB 6928 PG 239 PB 171PG 107

S 37°52'07" E 156.55'

EIP

-BL-56

SHUGART MANAGEMENT, INC. DB 6200 PG 226 PB 160 PG 109

-BL-57

DAVID A. CRANWER AND LINDA A. CRANWER DB 416 PG 1698 DB 6353 PG 2397 PB 99 PG 126 PB 160 PG 109

S 37°42'01" E 136.41'

N 17°39'06" E 103.00'

N 38°56'06" E 287.25'

SEPTIC EASEMENT PB60 PG09

917 NCDOT (FORMERLY BOBBY E. AND SHIRLEY SMITH) DB 5874 PG 2815

GRAU 350

BEGIN SBG -L- STA. 244+75

1516

2GI

F

12" PS

ELBOWS

1517

72" CSP (8 GA) ALUMINIZED

PSH SEE DETAIL 'AP'

1518

HW

F

16.00' CHORD

-L- +11.45 197.10'RT (EXIST C/A)

-L- +11.46 177.09'RT (EXIST C/A)

-L- +28.46 177.18'RT (EXIST C/A)

T08 S 19°50'43" E 4' LATERAL BASE DITCH SEE DETAIL 'AS' 58 TONS CLASS 'B' RIP RAP 155 SY FF 140 CY DDE

-BL-58

95.28' S 40°45'56" E

S 21°49'46" W 55.04'

39 DONALD LINEBERRY DB 2548 PG 827

-BL-59

FOR -L- PROFILE, SEE SHEET NO. 41

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	16
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

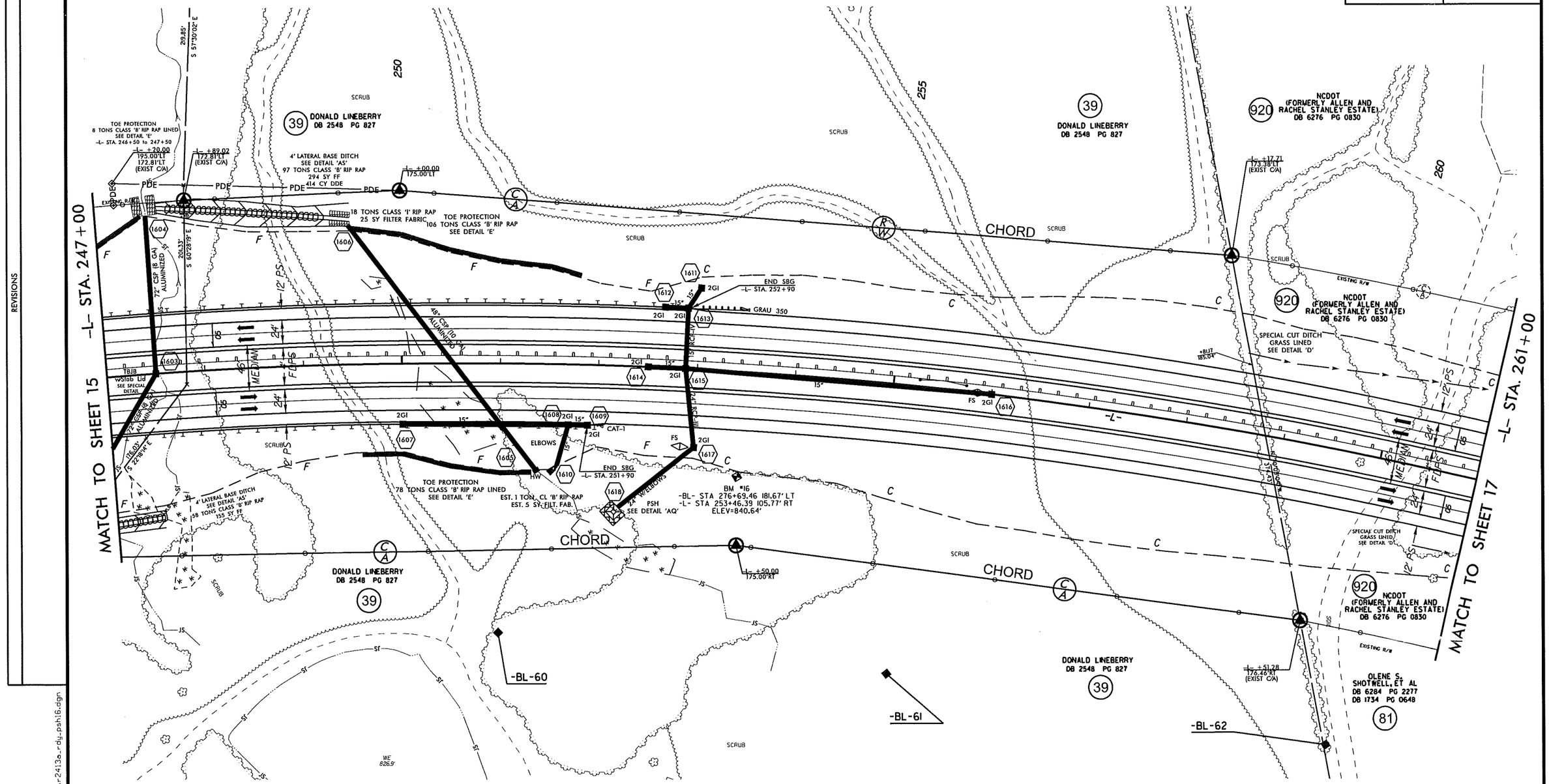
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99
REVISIONS

-L- CURVE DATA

PIs Sta 224+06.88	PI Sta 248+65.16	PIs Sta 269+54.78
Θs = 1° 33' 55.7"	Δ = 54° 52' 08.7" (RT)	Θs = 1° 33' 55.7"
Ls = 250.00'	D = 1° 15' 08.5"	Ls = 250.00'
LT = 166.67'	L = 4,381.23'	LT = 166.67'
ST = 83.34'	T = 2,374.96'	ST = 83.34'
	R = 4,575.00'	
	SE = 0.05	



FOR -L- PROFILE, SEE SHEET NO. 42
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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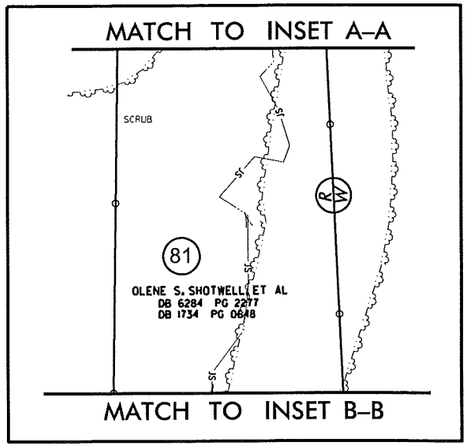
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

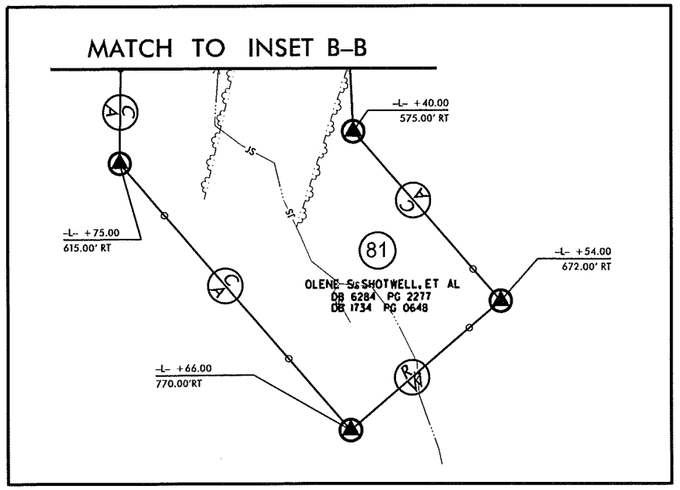
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

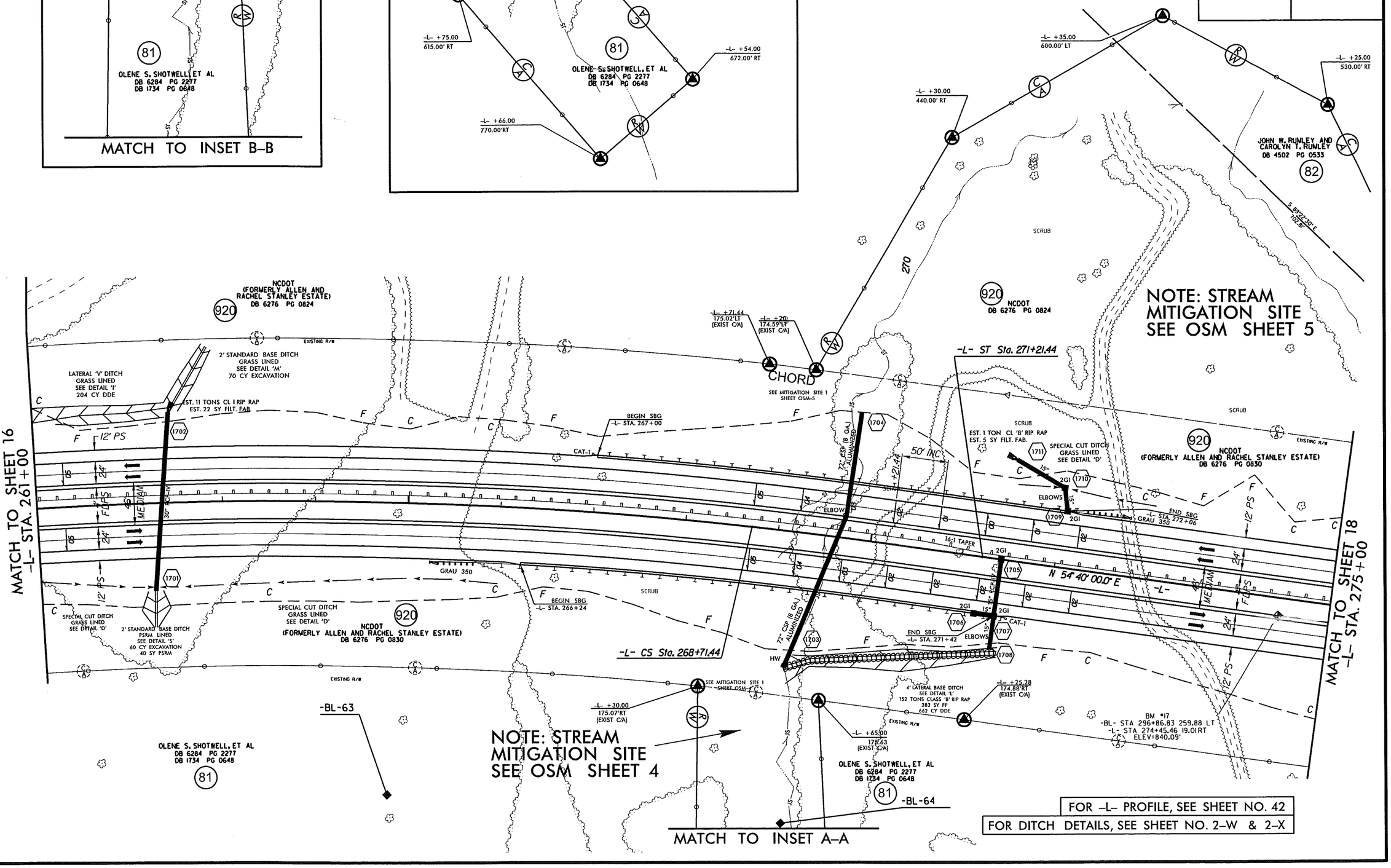
-L- CURVE DATA

PIs Sta 224+06.88	PI Sta 248+65.16	PIs Sta 269+54.78
Θs = 1° 33' 55.7"	Δ = 54° 52' 08.7" (RT)	Θs = 1° 33' 55.7"
Ls = 250.00'	D = 1° 15' 08.5"	Ls = 250.00'
LT = 166.67'	L = 4,381.23'	LT = 166.67'
ST = 83.34'	T = 2,374.96'	ST = 83.34'
	R = 4,575.00'	
	SE = 0.05	

NAD 83/NSRS 2007







FOR -L- PROFILE, SEE SHEET NO. 42

FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99 REVISIONS

-L- STA. 275+00

MATCH TO SHEET 17

-L- STA. 289+00

MATCH TO SHEET 19

NOTE: STREAM MITIGATION SITE SEE OSM SHEET 7

-L- +00.00
280.00' LT

JOHN W. RUMLEY AND CAROLYN T. RUMLEY
DB 4502 PG 0533
82

NATURAL ROCK ENERGY DISSIPATOR
140 TONS NATURAL ROCK
150 SY FILTER FABRIC
100 CY EXCAVATION
SEE DETAIL 'AL'

-L- +27.44
175.27'LT
(EXIST C/A)

S 82°22'22" E
22.07'

S 43°12'18" W
487.18'

280

285

40
CAROLYN T. RUMLEY
DB 545 PG 0103

EXISTING R/W

SEE MITIGATION SITE 2
SHEET OSM-7

4' LATERAL BASE DITCH
SEE DETAIL 'U'
109 TONS CLASS 'B' RIP RAP
279 SY FF
480 CY DDE

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

BM #18
-BL- STA 308+06.00 299.3' LT
-L- STA 285+65.55 87.56' LT
ELEV=840.86'

-L- +00.88
175.00'LT

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

BEGIN SBG
-L- STA. 276+00

END SBG
-L- STA. 279+08

42" RCP IV
36" RCP III
18" RCP III
15" RCP III
30" RCP III

12' PS
24' FLOS
40' MEDIAN
SCRUB

GRAU 350

N 54°40'00.0" E -L-

BEGIN SPECIAL MEDIAN GRADING
-L- POT Sta. 285+74.24

TOE PROTECTION
SEE DETAIL 'E'
28 TONS CLASS 'B' RIP RAP

2' LATERAL BASE DITCH
SEE DETAIL 'B'

2' SPECIAL CUT BASE DITCH
GRASS LINED
SEE DETAIL 'O'

NCDOT
(FORMERLY ALLEN AND RACHEL STANLEY ESTATE)
DB 6276 PG 0830
920

SEE MITIGATION SITE 2
SHEET OSM-6

NOTE: STREAM MITIGATION SITE SEE OSM SHEET 6

-L- +70.00
175.00'RT

CAROLYN T. RUMLEY
DB 545 PG 0103
40

-BL-67

-BL-68

OLENE S. SHOTWELL, ET AL
DB 6284 PG 2277
DB 1734 PG 0648
81

-L- +00.00
235.00' RT
174.71' RT
(EXIST C/A)

-L- +70.00
235.00' RT
174.64' RT
(EXIST C/A)

S 89°27'30" E
576.58'

-BL-66

OLENE S. SHOTWELL, ET AL
DB 6284 PG 2277
DB 1734 PG 0648

REMOVE GATE

PAVEMENT REMOVAL

FOR -L- PROFILE, SEE SHEET NO. 43

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

8/17/99 R/W REVISION: PARCEL NUMBER 41 HAS BEEN DELETED. NO CLAIM ON ROBERT L. WELCOMER, JR., CINDY WELCOMER AND KARIN M. SHAEFFER. CEH 2/27/13

MATCH TO SHEET 31 -Y4- STA. 20+50

BEGIN APPROACH SLAB -Y4- Sta. 22+16.44

BEGIN BRIDGE -Y4- Sta. 22+41.44

NOTE: DECK DRAINS NEEDED 12" SCUPPERS ON 12' CENTERS
STA. 22+30 RT. TO 22+70 RT. -Y4-
STA. 23+25 RT. TO 23+69 RT. -Y4-
STA. 24+50 RT. TO 24+68 RT. -Y4-

-L- POT Sta. 290+52.35 = -Y4- POT Sta. 23+52.74

END SBG -Y4- STA. 22+27.94

END SBG -Y4- STA. 22+10.30

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

921 NCDOT (FORMERLY RICHARD ROSS) DB 5229 PG 1065

922 NCDOT (FORMERLY ELLA SIDDLE) DB 6590 -RG 2884 (DB 3060 PG 6841) (DB 3053 PG 1501) (DB 2530 PG 231) (DB 2092 PG 3981) (DB2082 PG 2761) (DB 2081PG 1981)

945Z BANDERA FARMS, INC. DB 2797 PG 038

945 NCDOT (FORMERLY BANDERA FARMS, INC.) DB 7236 PG 3052

END SPECIAL MEDIAN GRADING -L- POT Sta. 295+34.27

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

-L- STA. 289+00

-L- STA. 303+00

M-XII BARRIER UNIT

TYPE B-77 ATTENUATOR

S 67°25'00" E 1500.00'

N 54°40'00" E

938 NCDOT (FORMERLY REGINA SIDDLE) DB 7220 PG 1936

-BL-69 -BY7-

STANDARD 'V' DITCH GRASS LINED SEE DETAIL 'H' 25 CY PDE

BEGIN SBG -Y4- STA. 25+03.44

END BRIDGE -Y4- Sta. 24+70.15

END APPROACH SLAB -Y4- Sta. 24+95.15

END SBG -Y4- STA. 26+30

END C/A -Y4- +50.00 75.00'LT

BEGIN FENCE -Y4- POT Sta. 26+86.00 = -DR4B- POT Sta. 11+70.00

ROBERT L. WELCOMER, JR. AND CINDY WELCOMER AND KARIN M. SHAEFFER DB 5198 PG 1340

S 67°25'00" E 1500.00'

N 26°15'00" E

-DR4B- +55.65 35.00'LT EXIST. R/W

-DR4B- +60.87 30.00'RT EXIST. R/W

REMOVE

RETAIN

-DR4B- POT Sta. 10+00.00

-Y4- STA. 27+50

BANDERA FARMS, INC. DB 2797 PG 038

-BL-70

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

EST. 5 TONS CL 'B' RIP RAP
EST. 14 SY FILT. FAB.

4' STANDARD BASE DITCH GRASS LINED SEE DETAIL 'V' 5200 CY EXCAVATION

MATCH TO SHEET 18

MATCH TO SHEET 32

MATCH TO SHEET 20

APPROACH SLAB

PAVEMENT REMOVAL

FOR -L- PROFILE, SEE SHEET NO. 43

FOR -DR4B- PROFILE, SEE SHEET NO. 60

FOR BRIDGE SKETCH, SEE SHEET NO. 2-P

FOR -Y4- PROFILE, SEE SHEET NOS. 59 & 60

FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	20
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99

REVISIONS

NOTE: STREAM MITIGATION SITE SEE OSM SHEET 8

-L- +80.00
275.00'LT
175.00'LT
(EXIST C/A)

BM #19
-BL- STA 328+46.53 338.81' LT
-L- STA 305+94.04 259.31' LT
ELEV=838.70'

945Z
BANDERA FARMS, INC.
DB 2797 PG 038

SEE MITIGATION SITE 3 SHEET OSM-8

945
NCDOT
(FORMERLY BANDERA FARMS, INC.)
DB 7236 PG 3052

-L- STA. 303+00

-L- STA. 317+00

MATCH TO SHEET 19

MATCH TO SHEET 21

EXISTING R/W

TOE PROTECTION
SEE DETAIL 'E'
81 TONS RIP RAP

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

BEGIN SBG
-L- STA. 305+70

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

END SBG
-L- STA. 311+08

EST. 1 TONS CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

2' STANDARD BASE DITCH
GRASS LINED
SEE DETAIL 'N'
50CY EXCAVATION

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

MEDIAN
CROSSOVER
SEE DETAIL 2-I

EST. 3 TONS CL 'B' RIP RAP
EST. 11 SY FILT. FAB.

-L- +00.00
175.00'LT
(EXIST C/A)

-L-
N 54° 40' 00.0" E

78" CMP (6) DAU UNMIXED

15" RCP III

24" RCP III

BEGIN SBG
-L- STA. 303+45

EST. 2 TONS CLASS 'B' RIP RAP
EST. 7 SY FILT. FAB.

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

END SBG
-L- STA. 310+85

TOE PROTECTION
SEE DETAIL 'E'
286 TONS RIP RAP

BERM DITCH
SEE STD. 240.01
-L- STA. 315+50 to 317+00

-BL-71

-BL-72

-BL-73

-BL-74

-L- +80
185.00' LT
(EXIST C/A)

-L- +80.00
260.00' LT
175.00' LT
(EXIST C/A)

-L- +15.00
260.00' LT

-L- +60.00
290.00' LT

-L- +50.00
335.00' LT

NOTE: STREAM MITIGATION SITE SEE OSM SHEET 8

FOR -L- PROFILE, SEE SHEET NO. 44

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	21
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-L- CURVE DATA

Pls Sta 328+62.22	Pl Sta 342+63.43	Pls Sta 355+71.14
θs = 1° 49' 54.1"	Δ = 37° 15' 11.7" (LT)	θs = 1° 49' 54.1"
Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 166.68'	L = 2,542.25'	LT = 166.68'
ST = 83.34'	T = 1,317.88'	ST = 83.34'
	R = 3,910.00'	
	SE = 0.05	

REVISIONS 8/17/99

MATCH TO SHEET 20

MATCH TO SHEET 22

-L- STA. 317+00

-L- STA. 331+00

BM #20
-BL- STA 347+16.86 298.20' LT
-L- STA 324+69.06 342.97' LT
ELEV=790.55'

-BL-75

-BL-76

-BL-77

-BL-78

-L- TS Sta. 326+95.55

-L- SC Sta. 329+45.55

BEGIN SBG
-L- STA. 320+65

BEGIN SBG
-L- STA. 323+50

BEGIN SPECIAL MEDIAN GRADING
-L- POC Sta. 330+59.68

945Z
BANDERA FARMS, INC.
DB 2797 PG 0338

915
NCDOT
(FORMERLY SESSOMS DEVELOPMENT, LLC)
DB 5409 PG 1784
PB 85 PG 143

915A
NCDOT
(FORMERLY SESSOMS DEVELOPMENT, LLC)
DB 5409 PG 1787

CITY OF GREENSBORO
DB 1480 PG 0488

RICHARD J. DISPENSA AND SUSAN DISPENSA
DB 6144 PG 2823
PB 85 PG 143

EDWARD B. WAYNICK AND DANA J. WAYNICK
DB 5085 PG 1090
PB 85 PG 143

DAVID L. BULLINS AND JEANNA L. BULLINS
DB 4379 PG 1420
PB 85 PG 143

ARTHUR M. IHRIG AND ANN S. IHRIG
DB 4988 PG 0438

44

MEDIAN CROSSOVER SEE DETAIL 2-F

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

24 TONS CLASS 'I' RIP RAP
32 SY FILTER FABRIC

PSH SEE DETAIL 'AQ'

PSH SEE DETAIL 'AP'

32 TONS CLASS 'I' RIP RAP
40 SY FILTER FABRIC

54" CSP (10 GA) ALUMINIZED

72" CSP (8 GA) ALUMINIZED

2' LATERAL BASE DITCH PSRM LINED SEE DETAIL 'A' 260 SY PSRM 713 CY DDE

2' LATERAL BASE DITCH GRASS LINED SEE DETAIL 'K' 1092 CY DDE

TBJB w/Slab Lid SEE SPECIAL DETAIL

SPRING BOX

GRAU 350

50' INC

16:1 TAPER

CHORD

-L- +32.41 175.00'LT (EXIST C/A)

-L- +43.19 175.00'RT (EXIST C/A)

-L- +95.55 175.00'LT

-L- +95.55 175.00'RT

-L- +45.55 175.00'LT

-L- +45.55 175.00'RT

-L- +00.00 175.00'RT

-L- +00.00 245.00'RT

-L- +15.00 255.04'RT (EXIST R/W)

-L- +07.80 255.00'RT

25' R

20' R

N 54°40'00" E

S 04°41'05" W 359.69'

S 04°41'05" W 358.20'

N 71°02'36" E 484.86'

S 70°55'21" W 301.54'

S 70°55'21" W 260.20'

S 17°05'08" E 147.00'

S 16°47'19" E 36.41'

N 15°55'57" W 154.82'

PAVEMENT REMOVAL

FOR -L- PROFILE, SEE SHEET NO. 44

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

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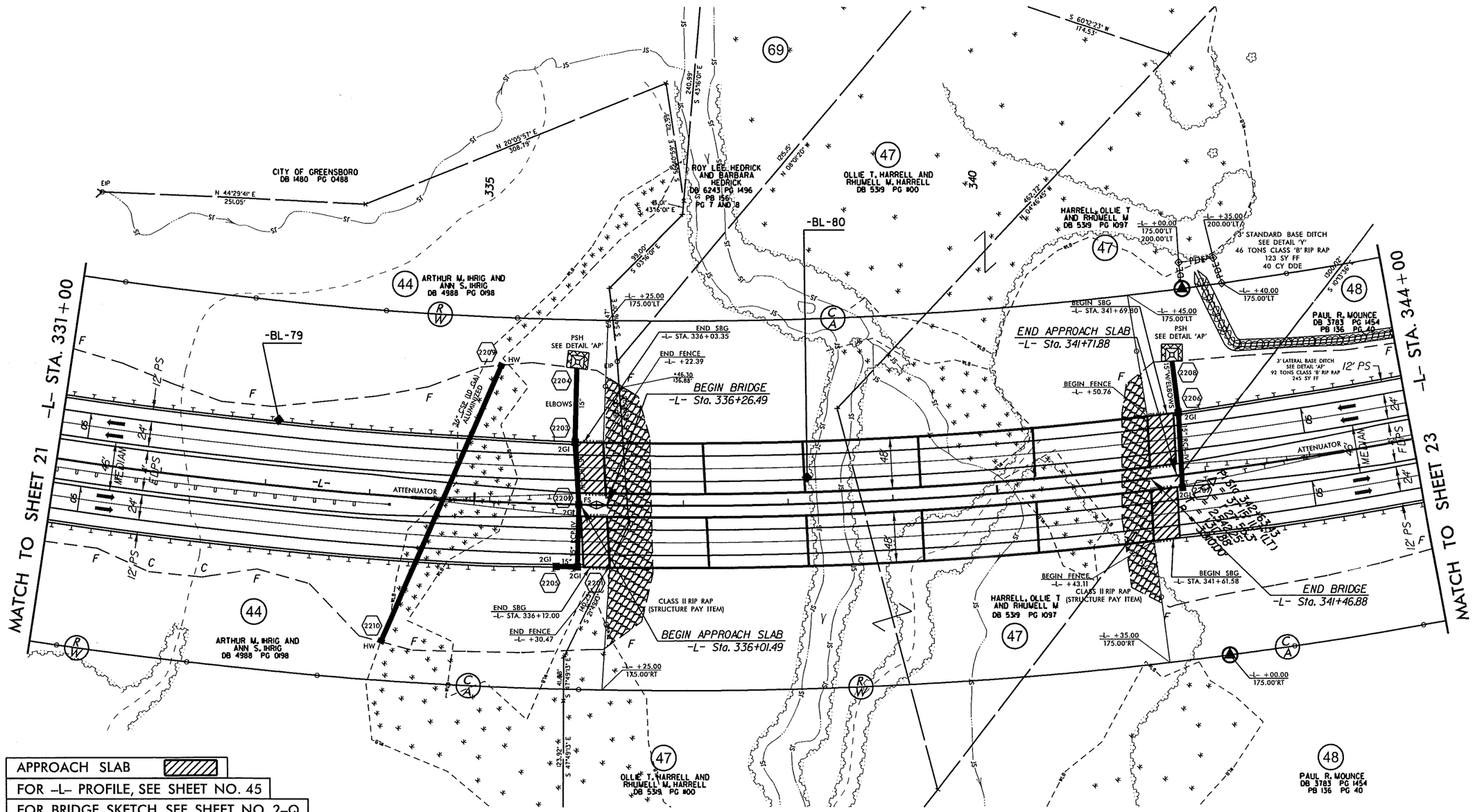
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- CURVE DATA

PIs Sta 328+62.22	PI Sta 342+63.43	PIs Sta 355+71.14
Θs = 1° 49' 54.1"	Δ = 37° 15' 11.7" (LT)	Θs = 1° 49' 54.1"
Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 166.68'	L = 2,542.25'	LT = 166.68'
ST = 83.34'	T = 1,317.88'	ST = 83.34'
	R = 3,910.00'	
	SE = 0.05	

NAD 83/NSRS 2007



APPROACH SLAB	
FOR -L- PROFILE, SEE SHEET NO. 45	
FOR BRIDGE SKETCH, SEE SHEET NO. 2-Q	
FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X	
SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING	

REVISIONS

R/W REVISION: PARCEL NUMBER 45 HAS BEEN CHANGED TO PARCEL NUMBER 47. PARCEL 45 HAS BEEN COMBINED WITH PARCEL 47. CEH 2/27/13.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99
REVISIONS

-L- CURVE DATA

Pls Sta 328+62.22	Pl Sta 342+63.43	Pls Sta 355+71.14
θs = 1° 49' 54.1"	Δ = 37° 15' 11.7" (LT)	θs = 1° 49' 54.1"
Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 166.68'	L = 2,542.25'	LT = 166.68'
ST = 83.34'	T = 1,317.88'	ST = 83.34'
	R = 3,910.00'	
	SE = 0.05	

HARRELL, OLLIE T AND RHUMELL W DB 5319 PG 1097 (47)

BM #21
-BL- STA 367+87.90 350.50' LT
-L- STA 345.+76.77 381.72' LT
ELEV=788.25'

TONY P. JOHNSON AND RHONDA R. JOHNSON DB 5694 PG 1854 PB 136 PG 40

S 50°22'05" E 285.85'

345

350

355

-BL-81

-BL-82

-BL-83

-L- STA. 344+00

-L- STA. 357+50

MATCH TO SHEET 22

MATCH TO SHEET 24

3' LATERAL BASE DITCH SEE DETAIL 'AF'
92 TONS CLASS 'B' RIP RAP
245 SY FF
231 CY DDE

EST. 2 TONS CLASS 'B' RIP RAP
EST. 7 SY FILT. FAB.

LATERAL 'V' DITCH GRASS LINED SEE DETAIL 'I' 36 CY DDE

END SBG -L- STA. 346+35

END SPECIAL MEDIAN GRADING -L- POC Sta. 347+13.64

SPECIAL LATERAL 'V' DITCH GRASS LINED SEE DETAIL 'G'

GRAU 350

12" PS

15" W/ELBOWS

24" RCP-III

16:1 TAPER

40' MEDIAN

F DPS

2GI

2302 2303 2304 2301 2310

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

PAUL R. MOUNCE DB 3783 PG 1454 PB 136 PG 40 (48)

S 01°01'03" W 958.75'

CAT-1

END SBG -L- STA. 348+73

4' LATERAL CHANNEL CHANGE GRASS LINED SEE DETAIL 'ZZ' 1339 CY DDE

24 TONS CLASS 'I' RIP RAP
32 SY FILTER FABRIC

EST. 5 TONS CL 'B' RIP RAP
EST. 14 SY FILT. FAB.

EARTH BERM
5' TOP WIDTH
2:1 SIDE SLOPES
TOP ELEV.- 796.0'
@25 CY FILL

2' SPECIAL LATERAL BASE DITCH GRASS LINED SEE DETAIL 'F'

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

2309 2308 2310 2311 2307 2305 2306

S 01°01'54" W 746.43'

60" RCP-III

24" RCP-III

2GI-A

SPECIAL LATERAL 'V' DITCH GRASS LINED SEE DETAIL 'G'

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

-L- CS Sta. 354+87.80

-L- ST Sta. 357+37.80

-L- +87.80 175.00'LT

-L- +37.80 175.00'LT

CHORD

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE DB 3851 PG 2185 DB 2063 PG 191 (49)

S 08°22'23" E 540.62'

50' INC +37.80

24" RCP-IV

-L- +87.80 175.00'RT

-L- +37.80 175.00'RT

FOR -L- PROFILE, SEE SHEET NO. 45

FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	24
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

8/17/99 R/W REVISION: THE R/W AND C/A LINE HAS BEEN CHANGED ON PARCEL 54 TO RUN DIRECTLY FROM THE MONUMENT AT -L- 361+82.04 (175.00' LT.) TO THE MONUMENT AT -Y5- 19+25.00 (75.00' RT.). THE R/W MONUMENT AT -Y5- STA.19+25.00 (189.40' RT.) HAS BEEN DELETED. PARCEL NUMBER 53 HAS BEEN CHANGED TO PARCEL NUMBER 54.

CEH 1/23/2013 DESIGN REVISION: THE VERTICAL ALIGNMENTS FOR -Y5-, -Y5B- AND -DR5A- HAVE BEEN REVISED. JLT 1/28/2013

MATCH TO SHEET 33 -Y5- STA. 18+00

-L- STA. 357+50

MATCH TO SHEET 23

-Y5- POT Sta. 18+80.00 = -DR5A- POT Sta. 12+15.00

BM #22
-BL- STA 387+42.37 370.55' LT
-L- STA 365+30.90 369.73' LT
ELEV=866.46'

END TIP PROJECT R-2413A -L- Sta. 370+50.00

BEGIN TIP PROJECT R-2413B -L- Sta. 370+50.00
TIE GUARDRAIL & MEDIAN GUIDERAIL TO TIP PROJECT R-2413B

BEGIN APPROACH SLAB
-Y5- Sta. 21+61.01

END SPECIAL MEDIAN GRADING
-L- POT Sta. 370+07.01

BEGIN CONSTRUCTION
-DR5A- POT Sta. 10+00.00

BEGIN BRIDGE
-Y5- Sta. 21+86.01
-L- POT Sta. 365+28.69 =
-Y5- POT Sta. 22+99.95

END BRIDGE
-Y5- Sta. 24+16.23

BEGIN SPECIAL MEDIAN GRADING
-L- POT Sta. 360+50.27

BEGIN CONSTRUCTION
-Y5B- Sta. 10+10.03

-Y5B- POT Sta. 10+00.00

-Y5B- POT Sta. 26+00.00
-Y5B- POT Sta. 14+20.83

-Y5B- PRC Sta. 12+31.89

-Y5B- PT Sta. 13+70.83

-Y5B- PC Sta. 10+95.12

BEGIN SBG
-Y5- STA. 24+49.27

END APPROACH SLAB
-Y5- Sta. 24+41.23

BEGIN SBG
-Y5- STA. 26+80

END C/A BREAK
-Y5- +25.00
100.00'RT
BEGIN FENCE

END C/A
-Y5- +25.00
85.00'LT
BEGIN FENCE
SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

END C/A
-Y5- +25.00
75.00'RT
END FENCE

BEGIN C/A BREAK
-Y5- +35.00
100.00'RT
END FENCE

-L- +82.04
175.00'LT
(EXIST R/W)

-L- +20.00
225.00'LT

-L- +50.00
225.00'LT

-L- +00.00
165.00'RT

-L- +00.00
175.00'RT

-Y5- +55.00
75.00'RT

-Y5- +52.02
160.00'RT

-Y5- +10.00
340.527' LT
EXIST R/W

-Y5- +58.00
450.00'LT
ON PL

-Y5B- +00.00
70.00'LT

-Y5B- +33.70
91.90'LT
ON PL

-Y5B- +32.02
55.00'RT

-Y5B- +00.00
35.00'RT

-Y5B- +55.00
45.00'RT

-Y5B- +50.00
65.00'LT

-Y5- +50.00
165.00'LT

-L- +50.00
175.00'RT

-Y5- +50.00
165.00'LT

-L- +50.00
225.00'LT

END FENCE
-L- +50.00

-BL-84
-BY9-

-BL-85

-BY9-181

N 13° 45' 00.0" E

N 73° 00' 00.0" W

N 17° 00' 00.0" W

N 15° 30' 00.0" W

N 24° 44' 40" W

N 01° 54' 08" E

N 00° 26' 20" E

S 88° 33' 40" E

S 05° 01' 34" E 325.12'

S 15° 55' 24" E 151.15'

N 50° 32' 20" E 709.00'

25' R

50' INC

12' PS

12' SS

24' FDPS

M-XII BARRIER UNIT

ATTENUATOR TYPE B-77

TYPE B-77

REMOVE

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB.

NOTE: DECK DRAINS NEEDED
6" SCUPPERS ON 5' CENTERS
STA 21+75 TO 22+15 RT -Y5-
STA 22+70 TO 23+10 RT -Y5-
STA 23+40 TO 24+10 RT -Y5-
STA 23+90 TO 24+30 LT -Y5-
STA 23+85 TO 24+25 LT -Y5-

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

GRAU 350

RETAIN

12" RCP

SR 2127 (BROOKPARK RD)

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE
DB 3851 PG 2185
DB 2063 PG 191

TEAGUE, WILLIAM K.
DB 2825 PG 787

TEAGUE, WILLIAM K. AND MARTHA R.
DB 3851 PG 2185
DB 2063 PG 191

LINDA MCCUISTON
DB 4778 PG 0643

EDNA R. MCCUISTON
DB 1021 PG 0526

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE
DB 1729 PG 122
DB 3851 PG 2185

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE
DB 2198 PG 029

APPROACH SLAB	
PAVEMENT REMOVAL	
FOR -L- PROFILE, SEE SHEET NO. 46	
FOR -Y5- PROFILE, SEE SHEET NO. 61	
FOR -DR5A- PROFILE, SEE SHEET NO. 63	
FOR -Y5B- PROFILE, SEE SHEET NO. 63	
DRIVEWAY RADII ARE 15', UNLESS NOTED	
FOR BRIDGE SKETCH, SEE SHEET NO. 2-R	
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X	
SEE CROSS-SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING	

-Y5B- CURVE DATA

PI Sta 11+65.26	PI Sta 13+03.21
Δ = 31° 20' 39.5" (RT)	Δ = 31° 50' 39.5" (LT)
D = 22° 55' 05.9"	D = 22° 55' 05.9"
L = 136.77'	L = 138.95'
T = 70.14'	T = 71.32'
R = 250.00'	R = 250.00'

MATCH TO SHEET 34 -Y5- STA. 27+50

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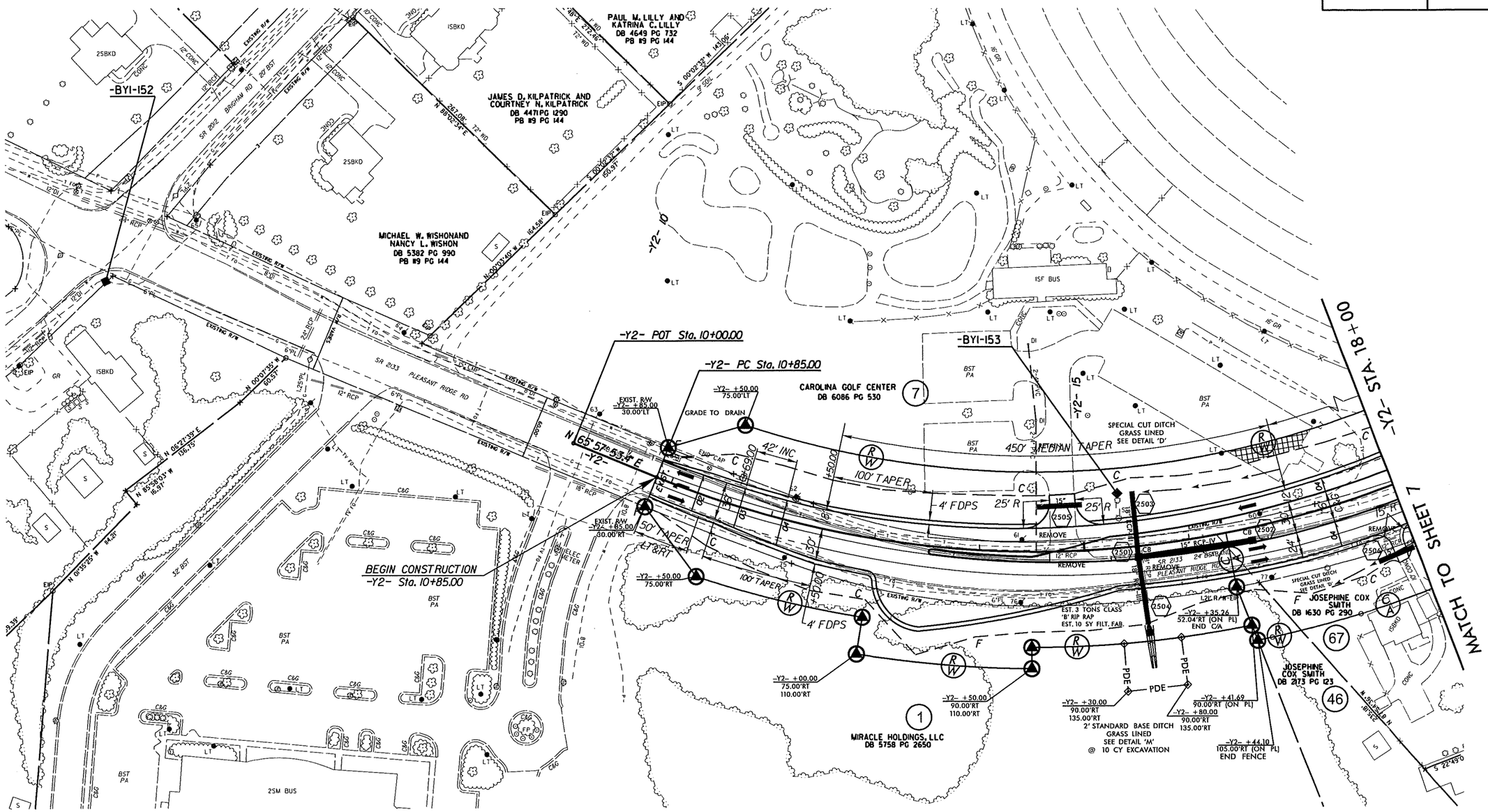
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y2- CURVE DATA
PI Sta 17+32.58
Δ = 68° 33' 40.7" (LT)
D = 6° 01' 52.1"
L = 1,136.79'
T = 647.58'
R = 950.00'
SE = 0.04
V = 50 MPH

NAD 83/NSRS 2007



PAVEMENT REMOVAL
MONO. CONCRETE ISLAND
FOR -Y2- PROFILE, SEE SHEET NO. 57
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

REVISIONS
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 1. CEH 2/27/13.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	26
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-Y2- CURVE DATA

PI Sta 36+15.73	PI Sta 42+19.21
Δ = 117° 15' 06.2" (RT)	Δ = 72° 46' 52.8" (LT)
D = 6° 44' 26.4"	D = 16° 22' 12.8"
L = 1,739.46'	L = 444.60'
T = 1,393.94'	T = 257.95'
R = 850.00'	R = 350.00'
SE = 0.04	SE = 0.04
V = 45 MPH	V = 30 MPH

REVISIONS

8/17/99

R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 75. CEH 2/27/13.

-Y2- STA. 36+00

MATCH TO SHEET 7

475' RIGHT TURN LANE & DUAL LEFT TURN LANES

200' TAPER

54' INC

-Y2- +61.25
125.00'LT

-Y2- +25.00
100.00'RT

-Y2- PRC Sta. 39+61.25

-Y2- +61.25
100.00'RT

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

EST. 2 TON CL 'B' RIP RAP EST. 7 SY FILT. FAB.

SPECIAL LATERAL 'V' DITCH GRASS LINED SEE DETAIL 'G'

-Y2- +50.00
46.15'LT
55.00'LT

-Y2- +05.85
55.00'LT

-Y2- +50.00
55.00'LT

END C/A -Y2- +00.00 75.00'LT BEGIN FENCE

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'D'

N 41° 52' 26.2" E -Y2-

-Y2- +50.00
30.00'RT
50.00'RT

-Y2- POT Sta. 46+90.85

END CONSTRUCTION
-Y2- Sta. 45+50.00

-Y2- +05.85
100.00'RT

-Y2- PT Sta. 44+05.85

NOTE: USE 4:1 SIDE SLOPES -Y2- 43+50 TO 44+50 RT.

20' BASE ATTENUATION DEPRESSION SEE DETAIL @ 25CY EXCAVATION

-BYI-156

STANDARD 'V' DITCH GRASS LINED SEE DETAIL 'H' 25 CY DDE

END C/A -Y2- +00.00 100.00'RT END FENCE

-Y2- +83.05
278.87'RT
EXIST. R/W

-Y2- +91.54
341.69'RT
EXIST. R/W

-BYI-155
-BY2-

350' MEDIAN TRANSITION

SUMMIT ALLERTON, LLC
DB 7340 PG 0384

PIEDMONT TRIAD AIRPORT
DB 5690 PG 549

NCDOT (FORMERLY DOROTHY WELKER)

NCDOT (FORMERLY LELAND A. BRAME)
DB 4727 PG 1797

PLEASANT RIDGE RD SR 2153

PAVEMENT REMOVAL

MONO. CONCRETE ISLAND

FOR -Y2- PROFILE, SEE SHEET NO. 58

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-Y1- CURVE DATA
PI Sta 113+55.16
Δ = 3° 12' 03.1" (LT)
D = 0° 29' 53.6"
L = 642.45'
T = 321.31'
R = 11,500.00'
SE = NC

REVISIONS

R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 26. CEH 2/27/13. 8/17/99

MATCH TO SHEET 9 -Y1- STA. 104+50

-Y1- STA. 114+00 MATCH TO SHEET 28

105 110

26
GREENLEA 68 LAND, LLC
DB 7425 PG 155

-Y1- PC Sta. 110+33.85

825' LEFT TURN LANE

1400' MEDIAN TAPER

100' TAPER

END C/A
-Y1- +33.85
125.00'LT

END FENCE
-Y1- +33.85

-Y1- +00.00
125.00'LT

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

REMOVE 12" RCP

REMOVE

NC 68 28' BST

+32.77
12.64'

N 20° 26' 00.0" W

GRAU 350

BEGIN SBG
-Y1- STA. 108+00

100' TAPER

900' LEFT TURN LANE

2GI

CAT-1
ELBOWS

END SBG
-Y1- STA. 110+50

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

EST. 1 TON CL 'B' RIP RAP
EST. 5 SY FILT. FAB

900' LEFT TURN LANE

END C/A
-Y1- +33.85
90.00'RT
END FENCE

-Y1- +33.85
125.00'RT

-Y1- +00.00
125.00'RT

ELBOWS

PDE

1.5:1 SLOPES USED:
-Y1- Sta. 109+50.00
to -Y1- Sta. 110+50.00

ISBKD

CONC

28
MARY P. POTTS BROWN
DB 1518 PG 288

PDE
PSH
SEE DETAIL 'AP'

-Y1- +75.00
125.00'RT
225.00'RT

-Y1- +25.00
125.00'RT
225.00'RT

JS

ST

MONO. CONCRETE ISLAND

FOR -Y1- PROFILE, SEE SHEET NO. 55

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

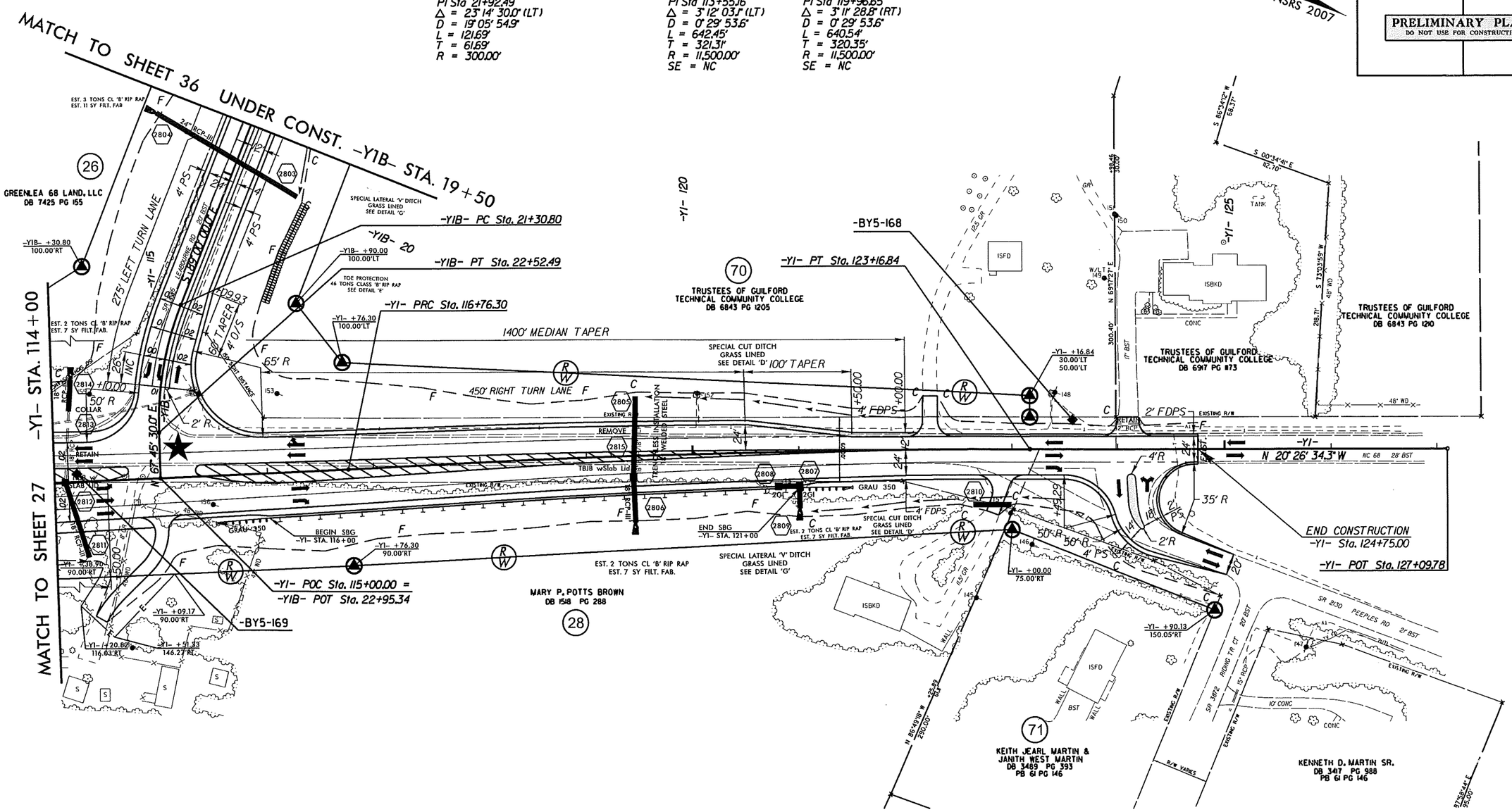
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

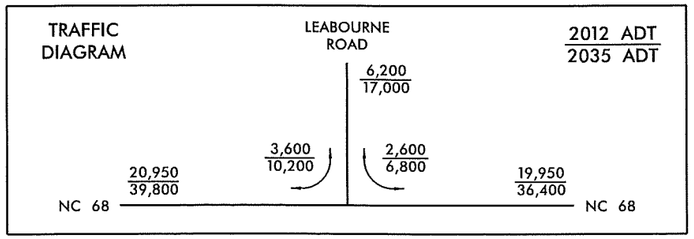
NAD 83/NSRS 2007

-Y1B- CURVE DATA
PI Sta 21+92.49
Δ = 23° 14' 30.0" (LT)
D = 19° 05' 54.9"
L = 121.69'
T = 61.69'
R = 300.00'

-Y1- CURVE DATA
PI Sta 113+55.16
Δ = 3° 12' 03.1" (LT)
D = 0° 29' 53.6"
L = 642.45'
T = 321.31'
R = 11,500.00'
SE = NC

PI Sta 119+96.65
Δ = 3° 11' 28.8" (RT)
D = 0° 29' 53.6"
L = 640.54'
T = 320.35'
R = 11,500.00'
SE = NC





	MONO. CONCRETE ISLAND
★	PROPOSED TRAFFIC SIGNAL
FOR -Y1- PROFILE, SEE SHEET NO. 56	
FOR -Y1B- PROFILE, SEE SHEET NO. 56	
DRIVEWAY RADII ARE 15', UNLESS NOTED	
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X	

REVISIONS

R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 26 AND 70. PROPERTY OWNER NAMES HARRY AND ANNE MORRISON, AND KEITH PEEPLES HAVE BEEN CHANGED TO TRUSTEES OF GUILFORD TECHNICAL COMMUNITY COLLEGE. CEH 2/27/13.

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	29
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

8/17/99 R/W REVISION: A PROPERTY LINE HAS BEEN ADDED TO PARCEL 36 WHICH RESULTED IN A NEW PARCEL DESIGNATED AS PARCEL 36A. PARCEL 36A IS OWNED BY THOMAS AND CATHY MORRISON. CEH 1/23/2013

-Y3- CURVE DATA
PI Sta 23+03.11
Δ = 46° 53' 16.5" (RT)
D = 1° 58' 32.6"
L = 2,373.21'
T = 1,257.58'
R = 2,900.00'
SE = 0.04

-BY6-172

-BY6-171

-Y3- PC Sta. 10+45.52

-Y3- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y3- POT Sta. 10+40.00

TIE DRIVEWAY IN AS DIRECTED BY THE ENGINEER

MATCH TO SHEET 13 -Y3- STA. 18+50

LINDA P. MORRISON
DB 2839 PG 164
73

37
VANCE DALE PEGRAM
DB 4060 PG 1590

36A
THOMAS & CATHY MORRISON
DB 6741PG 2365
PB 170 PG 10

JAMES A. MABE AND
CAROLYN B. MABE
DB 3475 PG 690
PB 83 PG 09
68

55
MELVIN C THORNE AND
BARBARA C. THORNE
DB 5970 PG 2636
PB 78 PG 146

57
GARY R. WILLIAMS AND
SHARON R. WILLIAMS
DB 3846 PG 168
PB 78 PG 146

ELWOOD MACK CONRAD
DORTHY H. CONRAD,
TRUSTEE U/W
DB 4569 PG 988
PB 103 PG 74

BETTY WOODS BARROW
DB 4021 PG 252
PB 89 PG 40

SR 2269 ALCORN RD
SR 2495 GOLDEN ACRES RD

PAVEMENT REMOVAL

FOR –Y3– PROFILE, SEE SHEET NO. 58

DRIVEWAY RADII ARE 15', UNLESS NOTED

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	30
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99

REVISIONS

-Y3- CURVE DATA

PI Sta 23+03.11
Δ = 46° 53' 16.5" (RT)
D = 1° 58' 32.6"
L = 2,373.21'
T = 1,257.58'
R = 2,900.00'
SE = 0.04

MATCH TO SHEET 13 -Y3- STA. 27+50

-BY6-173

LOLA M. PEGRAM
DB 2132 PG 135
DB 2241 PG 554
(36)

THOMAS W. NEEDHAM AND LAURA M. NEEDHAM
DB 5635 PG 2104
PB 59 PG 107
(56)

END CONSTRUCTION
-Y3- Sta. 34+75.00

MICHAEL J. HARDAWAY AND DEBORAH A. HARDAWAY
DB 5301 PG 562
PB 59 PG 107

MARSHALL R. TWIDDYAND PEGGY P. TWIDDY
DB 4837 PG 1485
PB 121 PG 86
(34)

PEGGY PEGRAM TWIDDY
DB 2449 PG 36
PB 142 PG 12
(32)

MARSHALL R. TWIDDY JR
DB 4557 PG 1485
PB 121 PG 86
(58)

EDWIN J. DASSO & LUANN C. DASSO
DB 5056 PG 715
(59)

HAROLD DARNELL MILLS AND JANICE L. MILLS
DB 4282 PG 168
PB 75 PG 45

RANDALL TODD WILSON
DB 5249 PG 1262
PB 142 PG 12

SR 2269 ALCORN RD

PAVEMENT REMOVAL

FOR –Y3– PROFILE, SEE SHEET NO. 59

DRIVEWAY RADII ARE 15', UNLESS NOTED

FOR DITCH DETAILS, SEE SHEET NO. 2–W & 2–X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NSRS 2007

8/17/99

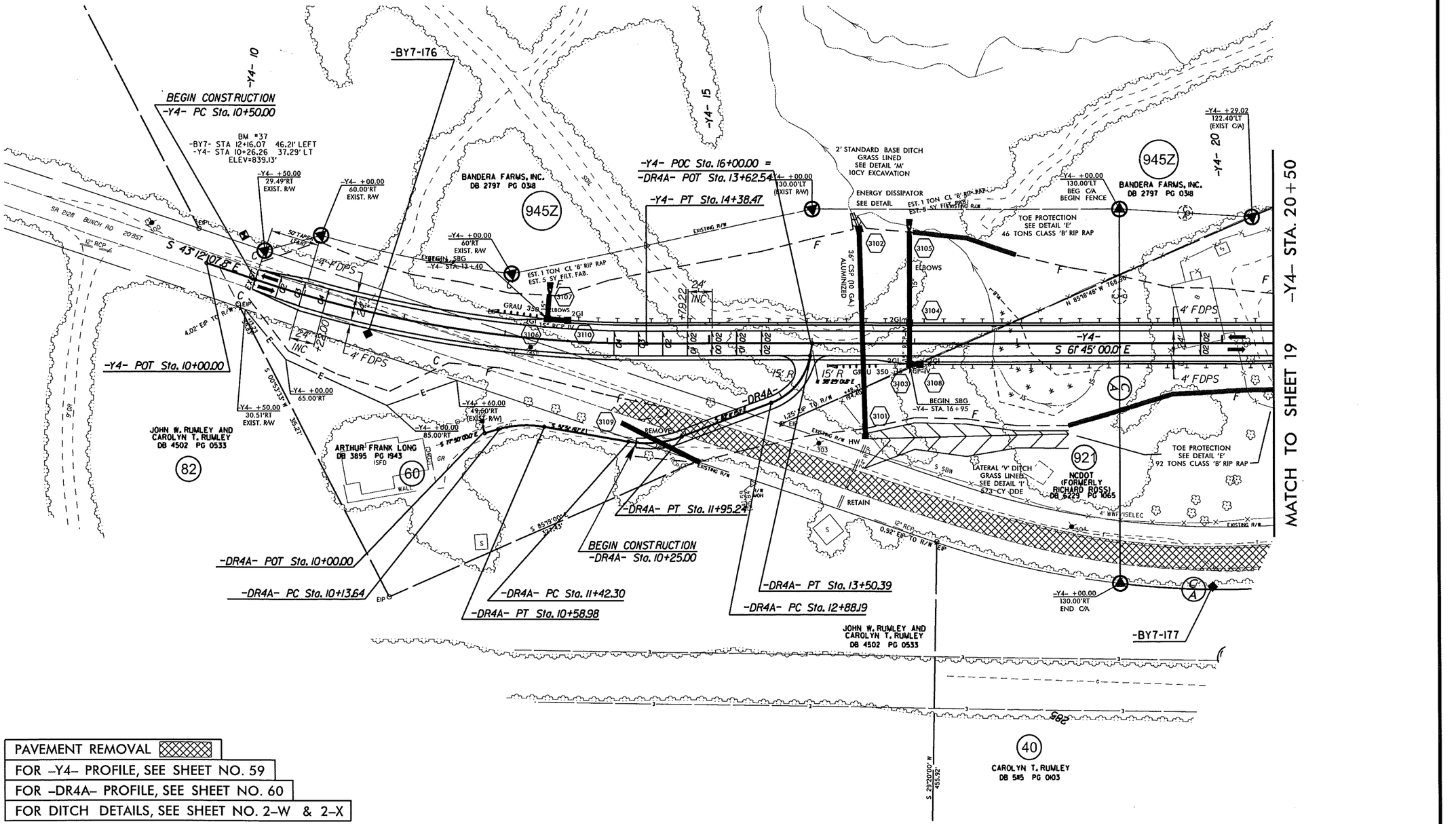
REVISIONS

-Y4- CURVE DATA

PI Sta 12+45.95
Δ = 18° 32' 52.2" (LT)
D = 4° 46' 28.7"
L = 388.47'
T = 195.95'
R = 1,200.00'
SE = 0.04
V = 50 MPH

-DR4A- CURVE DATA

PI Sta 10+36.71	PI Sta 11+69.40	PI Sta 13+22.41
Δ = 25° 58' 36.7" (RT)	Δ = 30° 19' 56.0" (LT)	Δ = 59° 23' 43.2" (LT)
D = 57° 17' 44.8"	D = 57° 17' 56.0"	D = 95° 29' 34.7"
L = 45.34'	L = 52.94'	L = 62.20'
T = 23.07'	T = 27.11'	T = 34.22'
R = 100.00'	R = 100.00'	R = 60.00'



PAVEMENT REMOVAL
FOR –Y4– PROFILE, SEE SHEET NO. 59
FOR –DR4A– PROFILE, SEE SHEET NO. 60
FOR DITCH DETAILS, SEE SHEET NO. 2–W & 2–X

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	32
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83 NSRS 2007

8/17/99

REVISIONS

R/W REVISION; PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCEL 61. CEH 2/27/13.

-Y4- CURVE DATA
PI Sta 32+83.16
Δ = 23° 12' 13.0" (LT)
D = 2° 51' 53.2"
L = 809.96'
T = 410.61'
R = 2,000.00'
SE = 0.04
V = 50 MPH

-Y4A- CURVE DATA
PI Sta 20+29.73
Δ = 17° 46' 43.3" (RT)
D = 19° 05' 54.9"
L = 93.09'
T = 46.92'
R = 300.00'

MATCH TO SHEET 19 -Y4- STA. 27+50

-Y4- PC Sta. 28+72.55
-Y4- POC Sta. 30+50.00 = -Y4A- POT Sta. 21+26.29
-Y4- PT Sta. 36+82.51
-Y4- POT Sta. 39+85.04
-Y4A- PT Sta. 20+75.90
-Y4A- PC Sta. 19+82.81
BEGIN CONSTRUCTION -Y4A- Sta. 18+50.00
END CONSTRUCTION -Y4- Sta. 37+50.00

-BY7-
-BY8-
-GPS- R2413-10

BM #38
-BY7- STA. 43+23.30
53.82' RIGHT
ELEV=890.74'

945Z BANDERA FARMS, INC. DB 2797 PG 0388
61 PICKETT BUNCH RESIDENTIAL LAND TRUST DB 7309 PG 2447 PB 136 PG 20
62 WALTER HEMPEL DB 6143 PG 1527 PB 122 PG 133
919 NCDOT (FORMERLY PICKETT & BAUGH REALTY, INC) DB 6053 PG 3096 PB 136 PG 20
85 DOUGLAS M. LENG AND VALERIE W. LENG DB 6365 PG 3031 PB 122 PG 133
MICHAEL DAVID MARSHALL AND BETH M.MARSHALL DB 5037 PG 1753 PB 122 PG 133
84 WILLIAM BENTON SMITH AND SUSAN K. SMITH DB 4737 PG 1994 PB 88 PG 21
H. ALLEN GIBBS AND CARLINE C. GIBBS DB 5398 PG 0858 PB 88 PG 21
BARNEY M. A. DAVIDSON AND ANN P. DAVIDSON DB 4868 PG 0964 PB 88 PG 21
SCOTT LANGKAMP AND CARMELA N. LANGKAMP DB 5545 PG 1825 PB 88 PG 21
83 STEPHEN P. ZDANOWSKI DB 6487 PG 2043 PB 89 PG 84
MARY K. GRIFFEN AND LYNN S. GRIFFEN DB 2693 PG 690 PB 89 PG 64
CHARLES ALAN ROSS AND JANET C. ROSS DB 5466 PG 0366 PB 89 PG 84
PETER J. OPACHAN AND REBECCA G. OPACHAN DB 4901 PG 2070 PB 89 PG 84
DARRYL KEITH JONES AND KIMBERLY RAYNOR JONES DB 5197 PG 0910 PB 89 PG 84
ROBERT L. WELCOMER, JR. AND CINDY WELCOMER AND KARIN M. SHAEFFER DB 598 PG 1540
PIEDMONT NATURAL GAS CO., INC. DB 3972 PG 1607
CARROLLAND CORPORATION DB 4765 PG 1846 PB 130 PG 123
BRIAN LAMONT JAMES DB 5058 PG 0473 PB 130 PG 123
PAMELA ELDRIDGE DB 5232 PG 0482 PB 89 PG 84

PAVEMENT REMOVAL
FOR -Y4- PROFILE, SEE SHEET NO. 60
FOR -Y4A- PROFILE, SEE SHEET NO. 60
DRIVEWAY RADII ARE 15', UNLESS NOTED
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

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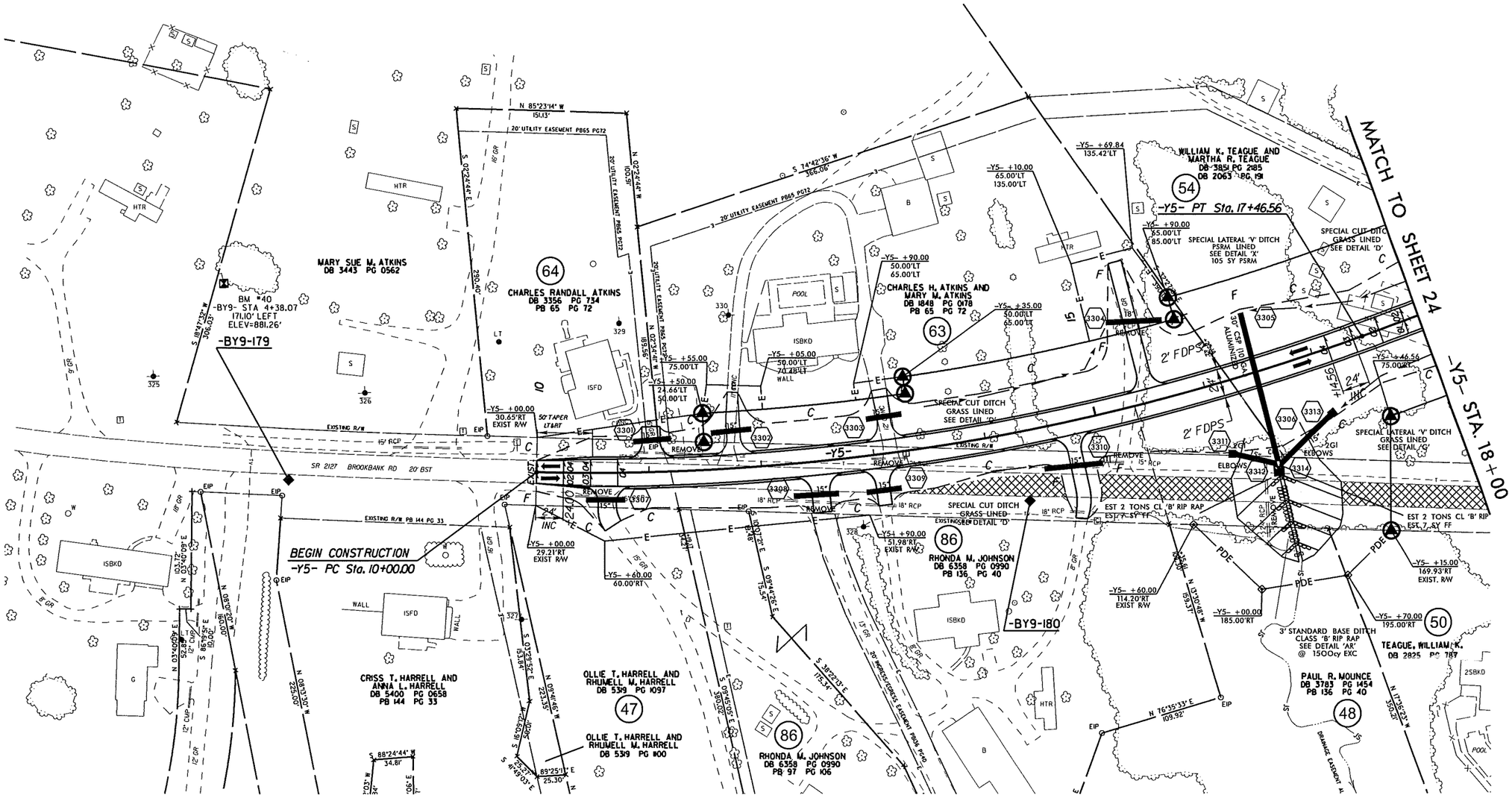
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-Y5- CURVE DATA
PI Sta 13+77.68
Δ = 21° 23' 14.5" (LT)
D = 2° 51' 53.2"
L = 746.56'
T = 377.68'
R = 2,000.00'
SE = 0.04
V = 50 MPH



PAVEMENT REMOVAL
FOR -Y5- PROFILE, SEE SHEET NO. 61
DRIVEWAY RADII ARE 15', UNLESS NOTED
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

REVISIONS

DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y5- HAS BEEN REVISED. JLT 1/28/2013
R/W REVISION: PARCEL NUMBER 87 HAS BEEN CHANGED TO PARCEL 86. PARCEL 87 HAS BEEN COMBINED WITH PARCEL 86. CEH 2/27/13.

8/17/99

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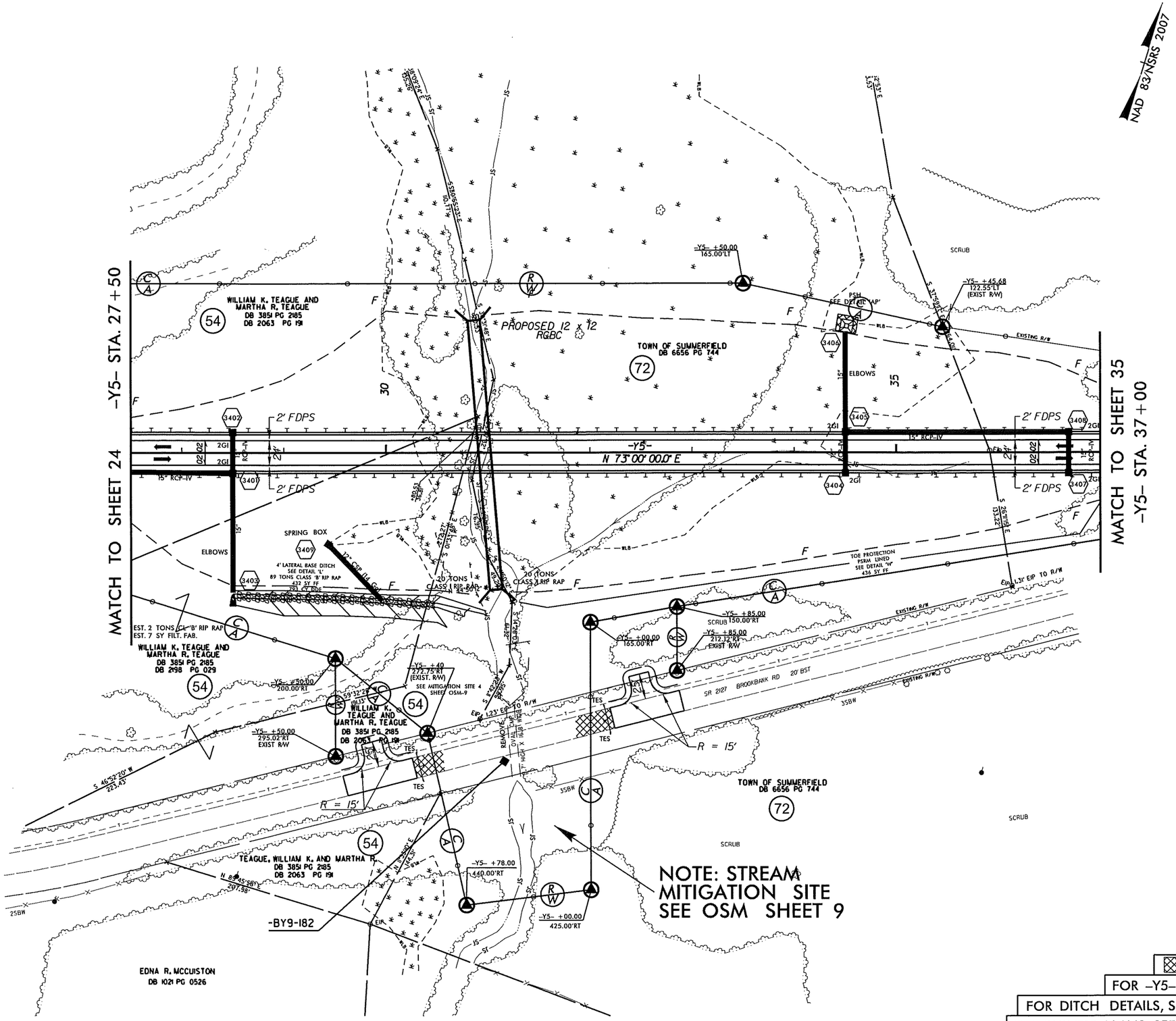
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	34
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PAVEMENT REMOVAL

FOR -Y5- PROFILE, SEE SHEET NO. 62

FOR DITCH DETAILS, SEE SHEET NOS. 2-W & 2-X

FOR CULVERT PLANS, SEE SHEET NO C-? THRU C-?

REVISIONS

R/W REVISION: PARCEL NUMBER 53 HAS BEEN CHANGED TO PARCEL NUMBER 54. CEH 1/23/2013

DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y5- HAS BEEN REVISED. JLT 1/28/2013

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	35
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS 8/17/99

-Y5A- CURVE DATA
PI Sta 12+85.41
Δ = 81° 18' 35.0" (LT)
D = 95° 29' 34.7"
L = 85.15'
T = 51.53'
R = 60.00'

-Y5- CURVE DATA
PI Sta 42+81.39
Δ = 45° 47' 30.0" (LT)
D = 5° 43' 46.5"
L = 799.22'
T = 422.33'
R = 1,000.00'
SE = 0.04
V = 50 MPH

MATCH TO SHEET 34
-Y5- STA. 37+00

SCRUB

-Y5- PC Sta. 38+59.06

-Y5- POC Sta. 39+50.00 =
-Y5A- POT Sta. 13+48.65

END SBG
-Y5- STA. 38+45

END C/A
-Y5- +59.06
65.00'LT
END FENCE

24' INC

GRAU 350

F END SBG
-Y5- STA. 38+00

TOE PROTECTION
FENCE LINED
SEE DETAIL 'W'

-Y5- +59.06
60.00'RT
END C/A
END FENCE

END FENCE
-Y5- +31.21
69.76'RT
EXIST. R/W

SR 2127 BROOKBANK RD
20' BST

-Y5A-
N 59° 08' 05.0" E

BM #41
-BY9- STA 36+24.32 44.05' LEFT
-Y5- STA 37+75.32 92.14' RIGHT
ELEV=814.95'

-Y5A- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y5A- Sta. 12+00.00

-BY9-183

-Y5A- PC Sta. 12+33.88

-Y5A- PT Sta. 13+19.03

SPECIAL LATERAL 'V' DITCH
GRASS LINED
SEE DETAIL 'G'

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

EST. 2 TONS CL 'B' RIP RAP
EST. 7 SY FILT. FAB.

15" RCP-IV

-Y5-

N 22° 12' 30.0" W

REMOVE

-Y5- +10.00
91.77'RT
EXIST. R/W

STANDARD 'V' DITCH
GRASS LINED
SEE DETAIL 'H'
@ 75cy EXC

-Y5- +55.00
87.37'RT
EXIST. R/W

-Y5- +65.00
100.00'RT

-Y5- +30.00
120.00'RT

SUMMERFIELD PROPERTIES, LLC
DB 5814 PG 0686
PB 162 PG 110

66

-Y5- PT Sta. 46+58.27

-Y5- POT Sta. 47+47.97

N 27° 12' 30.0" E

24" RCP
RETAIN

ISBKD

END CONSTRUCTION
-Y5- Sta. 47+00.00

50' TAPER
LT&RT

2' FDPS

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

SPECIAL LATERAL 'G' DITCH
GRASS LINED
SEE DETAIL 'G'

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'D'

BANNING RD
50' DY

TOWN OF SUMMERFIELD
DB 6656 PG 744

72

SUMMERFIELD PROPERTIES, LLC
DB 5814 PG 0686
PB 162 PG 110

66

PAVEMENT REMOVAL

FOR -Y5- PROFILE, SEE SHEET NO. 62

FOR -Y5A- PROFILE, SEE SHEET NO. 63

FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

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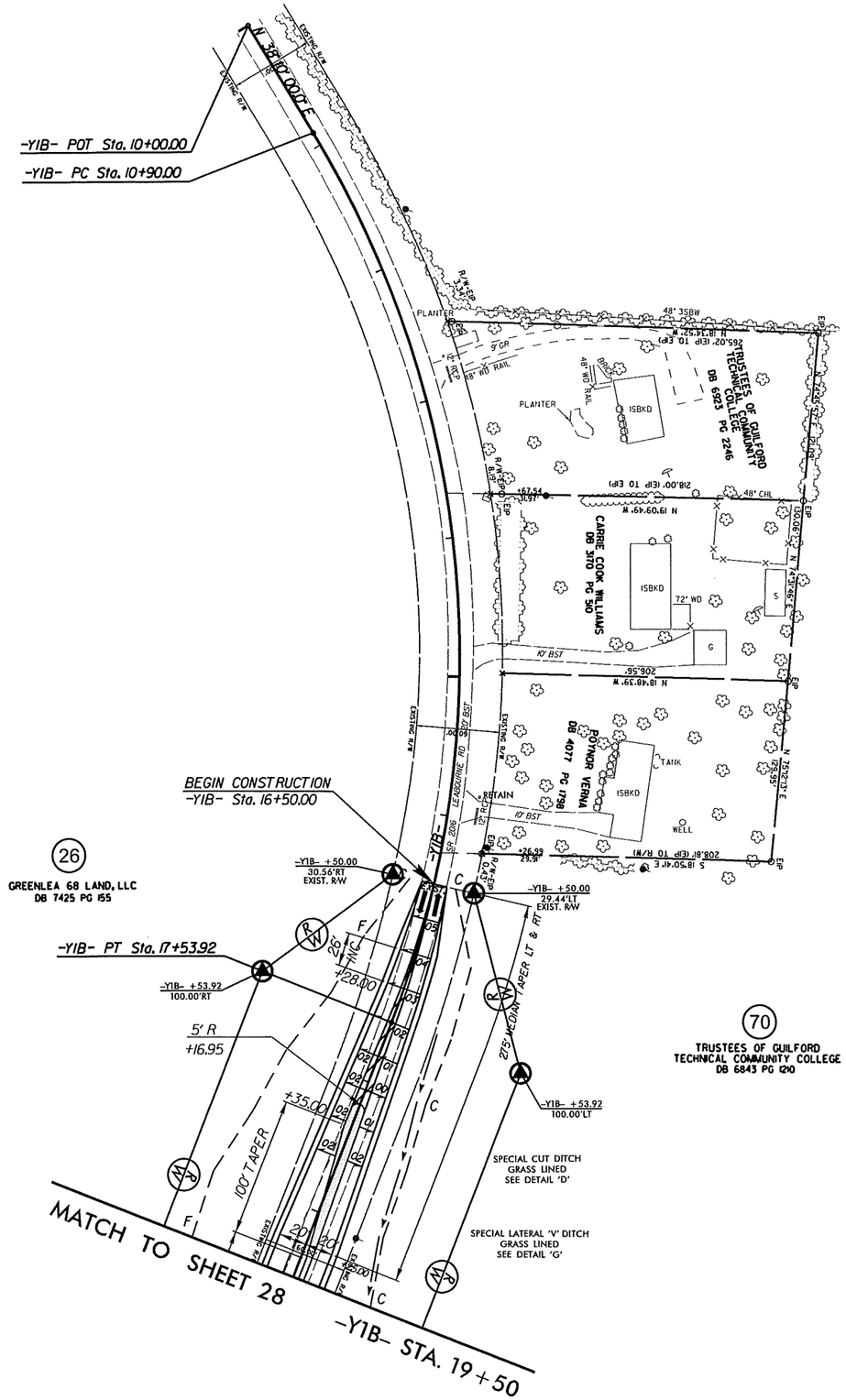
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	36
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-Y1B- CURVE DATA
PI Sta 14+47.67
Δ = 52° 50' 00.0" (RT)
D = 7° 57' 27.9"
L = 663.92'
T = 357.67'
R = 720.00'



FOR -Y1B- PROFILE, SEE SHEET NO. 56
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X

REVISIONS
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 26 AND 70. CEH 2/27/13.

8/17/99

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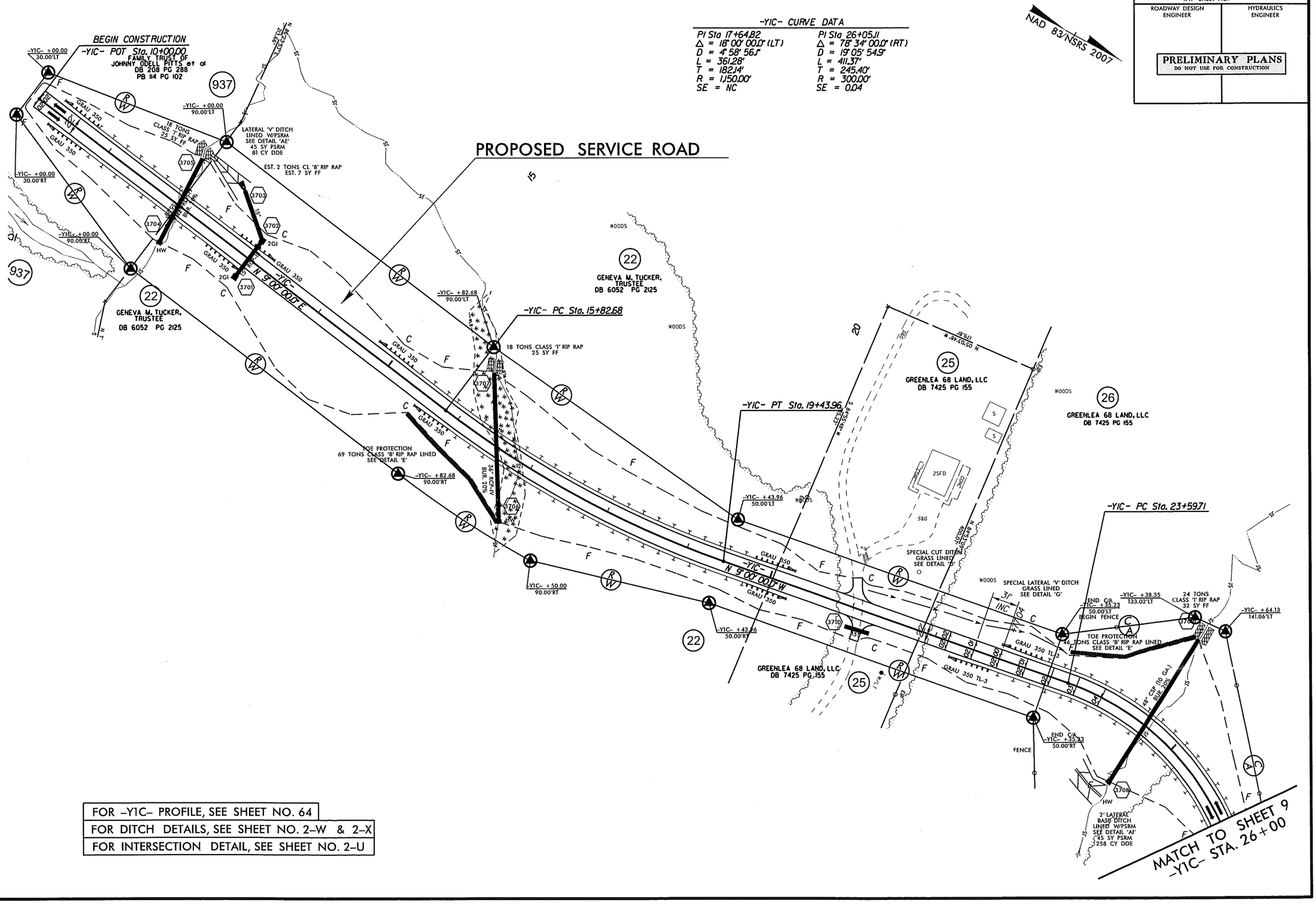
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	37
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y1C- CURVE DATA

PI Sta 17+64.82	PI Sta 26+05.11
Δ = 18° 00' 00.0" (LT)	Δ = 78° 34' 00.0" (RT)
D = 4° 58' 56.1"	D = 19° 05' 54.9"
L = 361.28'	L = 411.37'
T = 182.14'	T = 245.40'
R = 1,150.00'	R = 300.00'
SE = NC	SE = 0.04



FOR -Y1C- PROFILE, SEE SHEET NO. 64
FOR DITCH DETAILS, SEE SHEET NO. 2-W & 2-X
FOR INTERSECTION DETAIL, SEE SHEET NO. 2-U

REVISIONS

DESIGN REVISION: THE HORIZONTAL DESIGN FOR -Y1C- HAS BEEN REVISED. THE LEFT TURN LANE ON -Y1C- HAS BEEN REMOVED AND THE CONCRETE ISLAND HAS BEEN REVISED TO RESTRICT LEFT TURNS OUT OF -Y1C-. JLT 1/28/2013
R/W REVISION: THE RIGHT OF WAY LABELS ON -Y1C- LOCATED ON PARCEL 26 HAVE BEEN REVISED BUT THE RIGHT OF WAY AREA HAS NOT CHANGED. CEH 2/7/13
R/W REVISION: PROPERTY OWNER NAME AND DEED BOOK INFORMATION HAS BEEN CHANGED ON PARCELS 25 AND 26. CEH 2/27/13.

8/17/99

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	37A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

BEGIN GRADE
-L- Sta. 109+00.00
EL = 962.70'

PI = 120+00.00
EL = 926.95'
VC = 1,000'
K = 190

933.31'

(-)12.5000%

(+)2.0000%

66.1'

UNDERCUT

FOR -L- ALIGNMENT, SEE SHEET NO. 8

PIPE HYDRAULIC DATA
-L- STA. 117+25

DRAINAGE AREA	= 30	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 150	CFS
DESIGN HW ELEVATION	= 905.8	FT
100 YEAR DISCHARGE	= 180	CFS
100 YEAR HW ELEVATION	= 906.95	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= N/A	FT

-L-

PI = 120+00.00
EL = 926.95'
VC = 1,000'
K = 190

933.31'

(+)2.0000%

PI = 130+50.00
EL = 941.55

(-)10.3000%

PI = 131+50.00
EL = 941.55

(-)1.2891%

PI = 133+35.00
EL = 936.30

(+)2.0000%

967.86'

RIGHT DITCH - - - - - - -

FOR -L- ALIGNMENT, SEE SHEETS NO. 8 & 9

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BEGIN BRIDGE
-L- Sta. 138+79.50

END BRIDGE
-L- Sta. 141+80.00

(+)2.0000% (-)2.9000%

957.86

PI = 140+50.00
EL = 967.95'
VC = 1,400'
K = 286

-L- Sta. 140+18.52 =
-Y1- Sta. 94+15.15

946.40

(+)3.5000%

(-)1.5000%

PI = 144+00.00
EL = 936.90

PI = 146+00.00
EL = 937.50

PI = 147+00.00
EL = 933.00

BM #9
-BL-STA. 169+84.18
815.42' RT O/S
-L- STA 144+13.61
999.56' RT O/S
R/R SPIKE IN BASE
OF 24" PINE TREE
ELEV. = 940.04'
(NOT ON PLAN SHEET)

-L-

RIGHT DITCH - - - - - - -

FOR -L- ALIGNMENT, SEE SHEET NO. 9

136 137 138 139 140 141 142 143 144 145 146 147 148 149 150

940.40

BM #10
-BL-STA. 181+50.66
898.43' RT O/S
-L- STA 156+23.53
898.14' RT O/S
R/R SPIKE IN BASE
OF 14" PINE TREE
ELEV. = 947.36'
(NOT ON PLAN SHEET)

-L-

PI = 152+00.00
EL = 930.56

(-)5.2400%

(+)1.5067%

PI = 154+50.00
EL = 917.60

PI = 156+00.00
EL = 918.96

(-)2.9000%

PI = 159+50.00
EL = 906.21

(-)1.2200%

PI = 160+50.00
EL = 907.50

PI = 161+05.00
EL = 900.00

(+)6.4153%

PI = 162+00.00
EL = 905.60

PI = 162+50.00
EL = 886.70

(+)3.0000%

(+)10.1001%

PI = 163+50.00
EL = 900.40

PI = 163+65.00
EL = 900.85

PI = 164+00.00
EL = 900.00

915.53

LEFT DITCH — - - — -

RIGHT DITCH - - - - - - -

FOR -L- ALIGNMENT, SEE SHEET NO. 9

150 151 152 153 154 155 156 157 158 159 160 161 162 163 164

23-APR-2013 12:36
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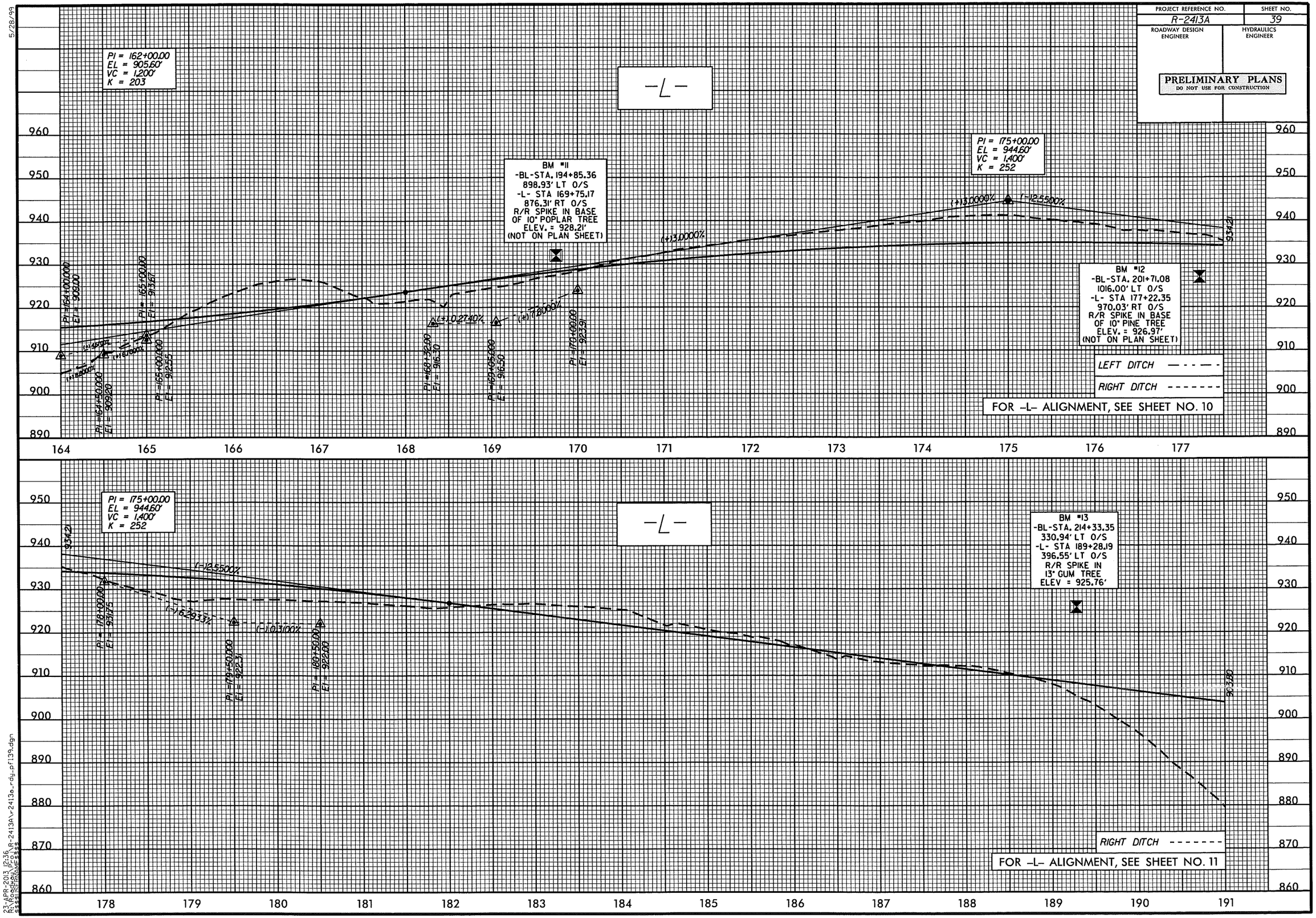
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	39
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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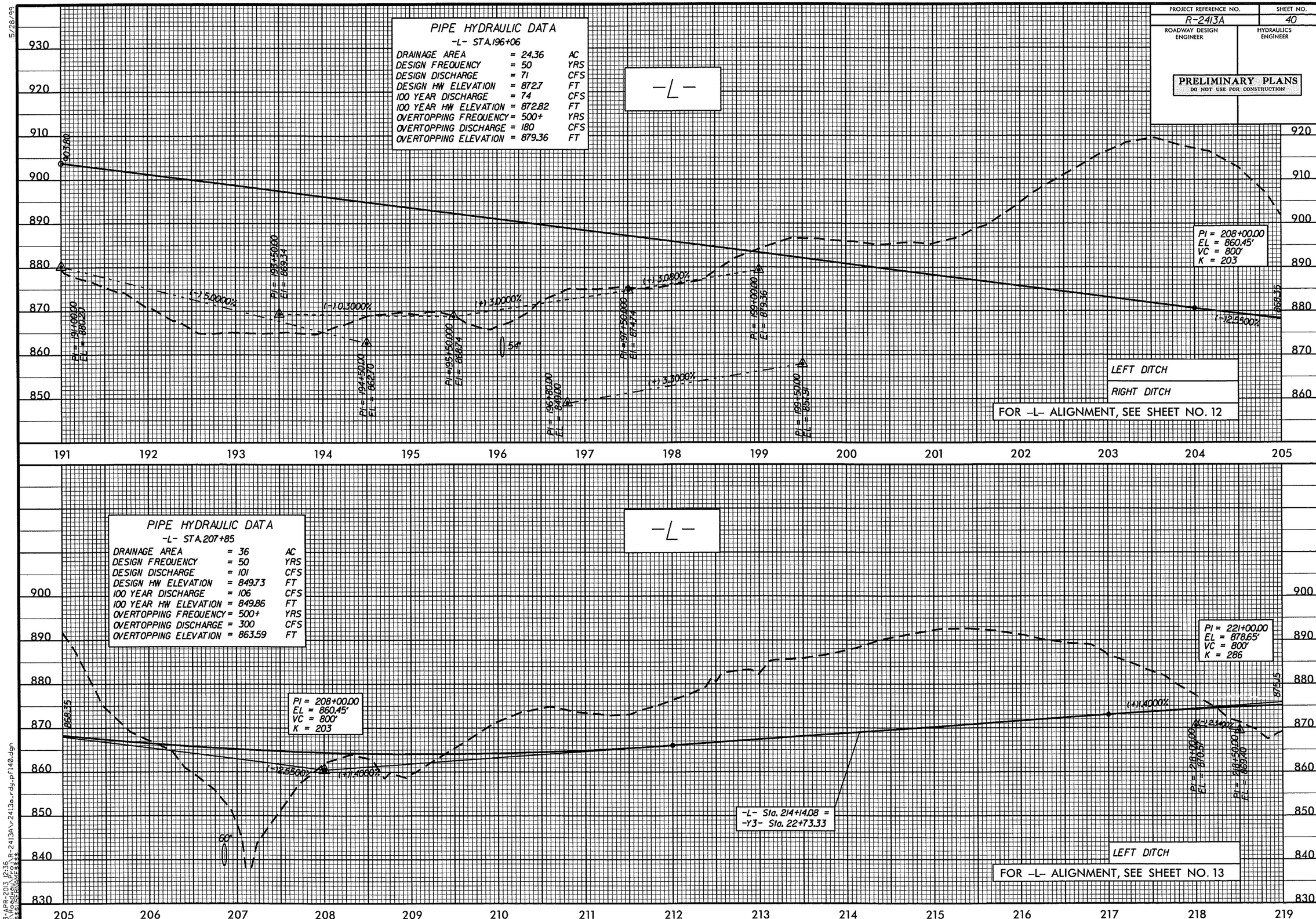
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	40
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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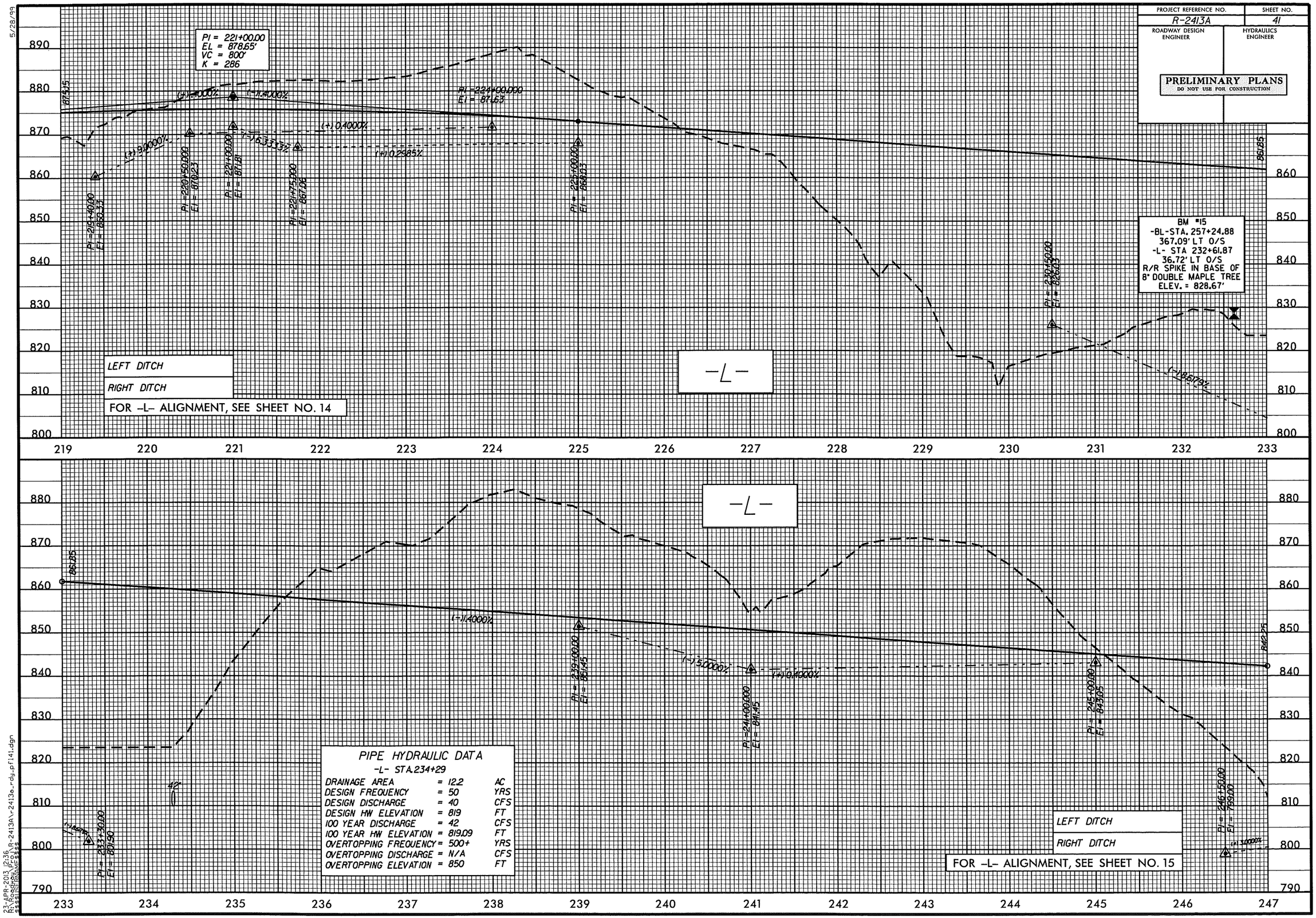
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	41
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
-L- STA.234+29

DRAINAGE AREA	= 12.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 40	CFS
DESIGN HW ELEVATION	= 819	FT
100 YEAR DISCHARGE	= 42	CFS
100 YEAR HW ELEVATION	= 819.09	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= 850	FT

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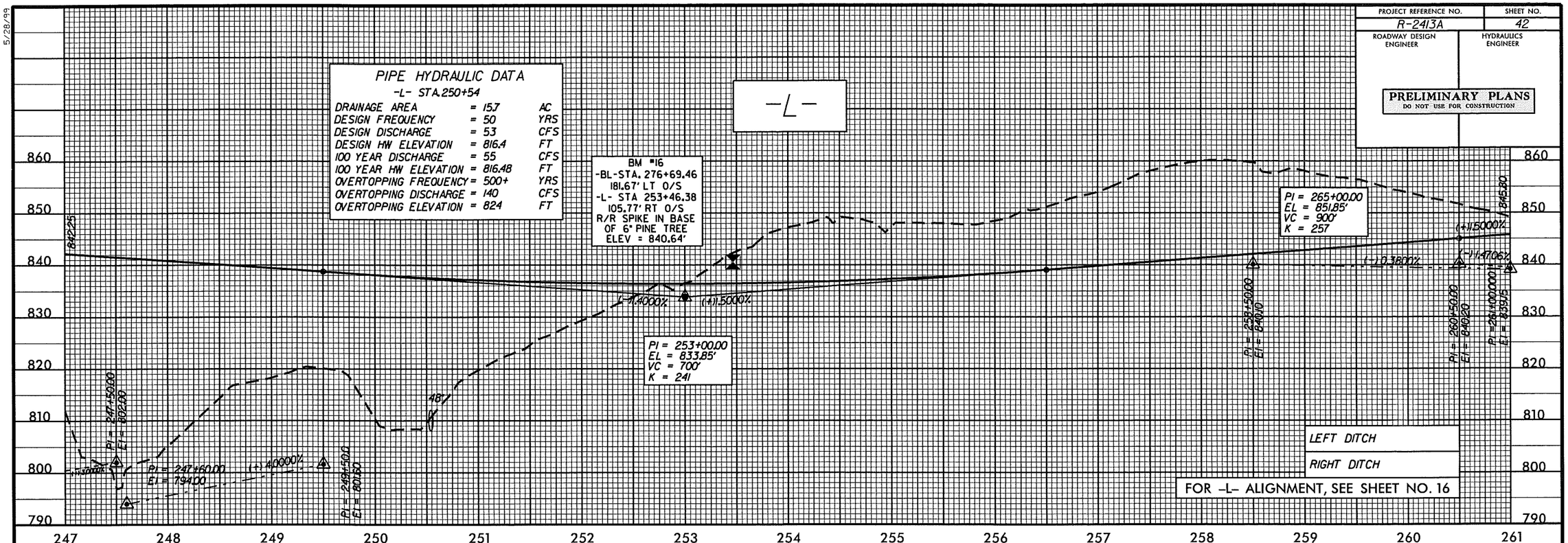
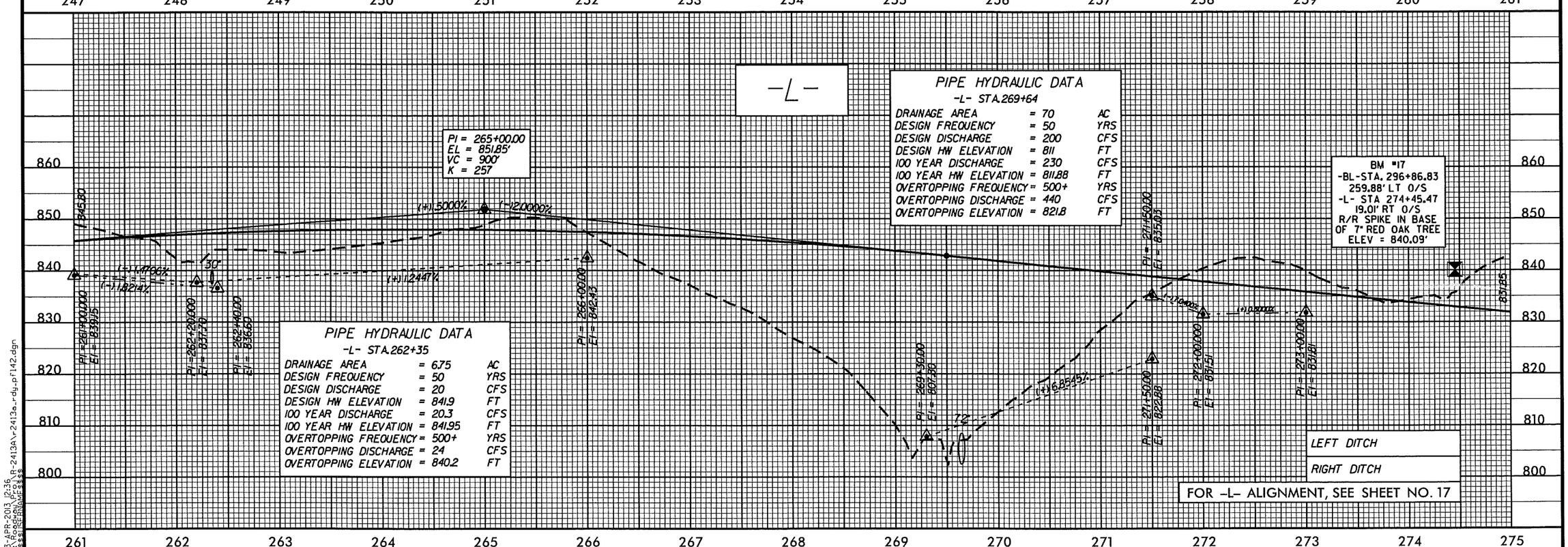
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	42
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





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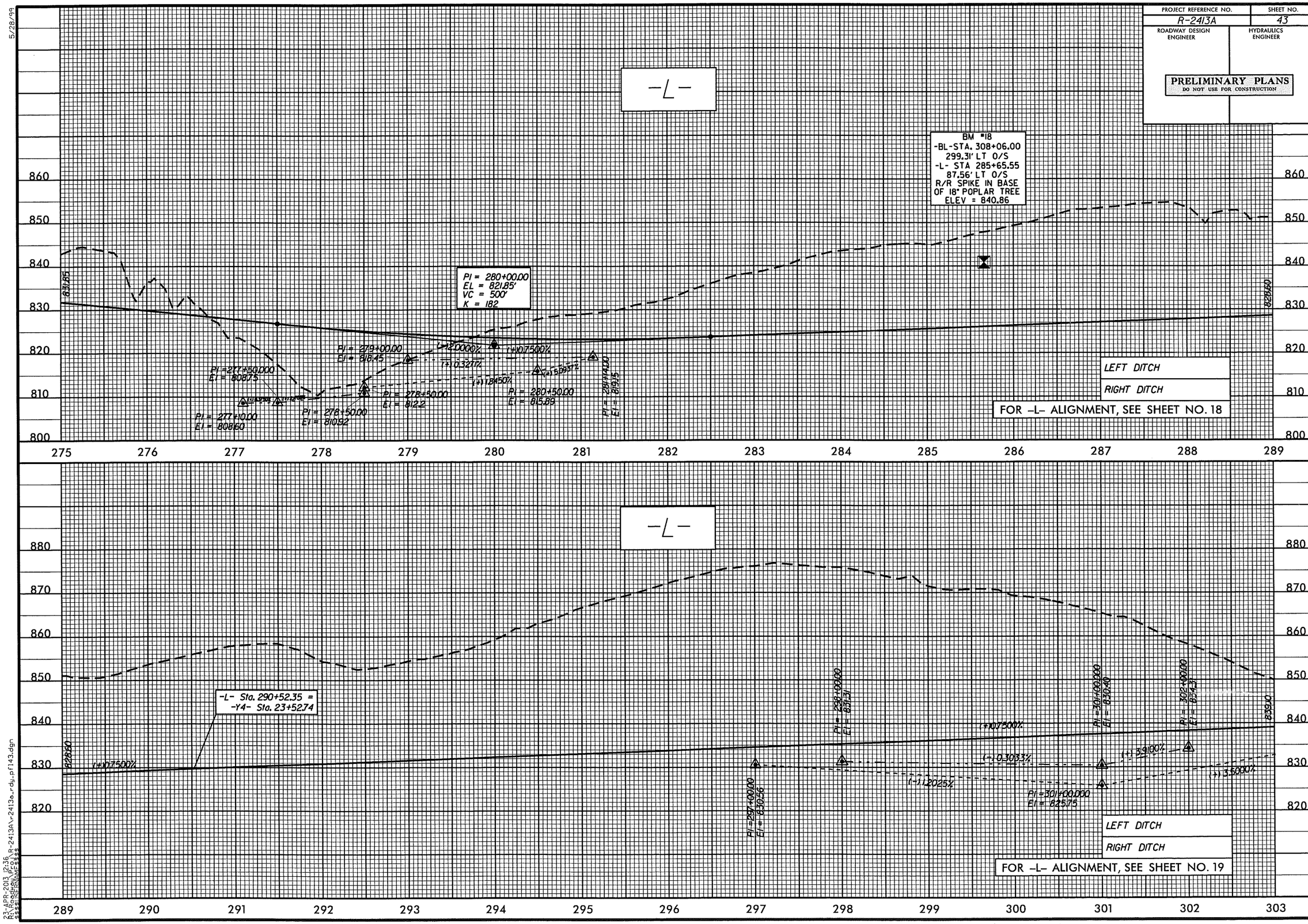
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	43
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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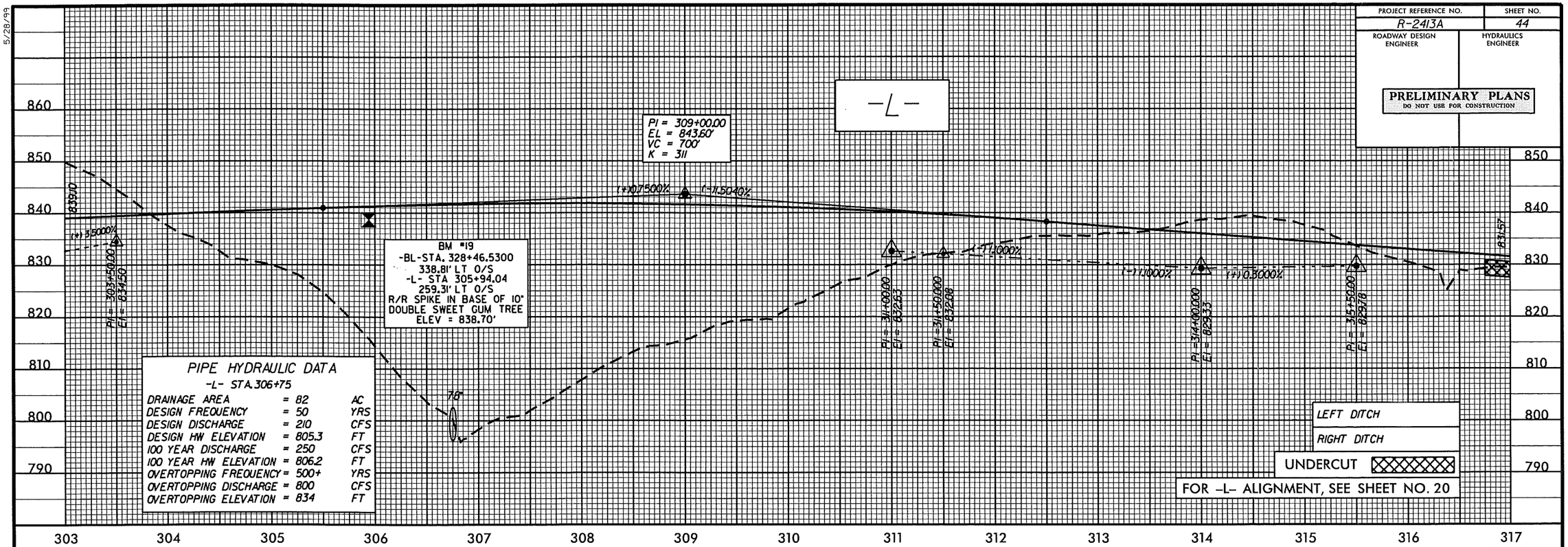
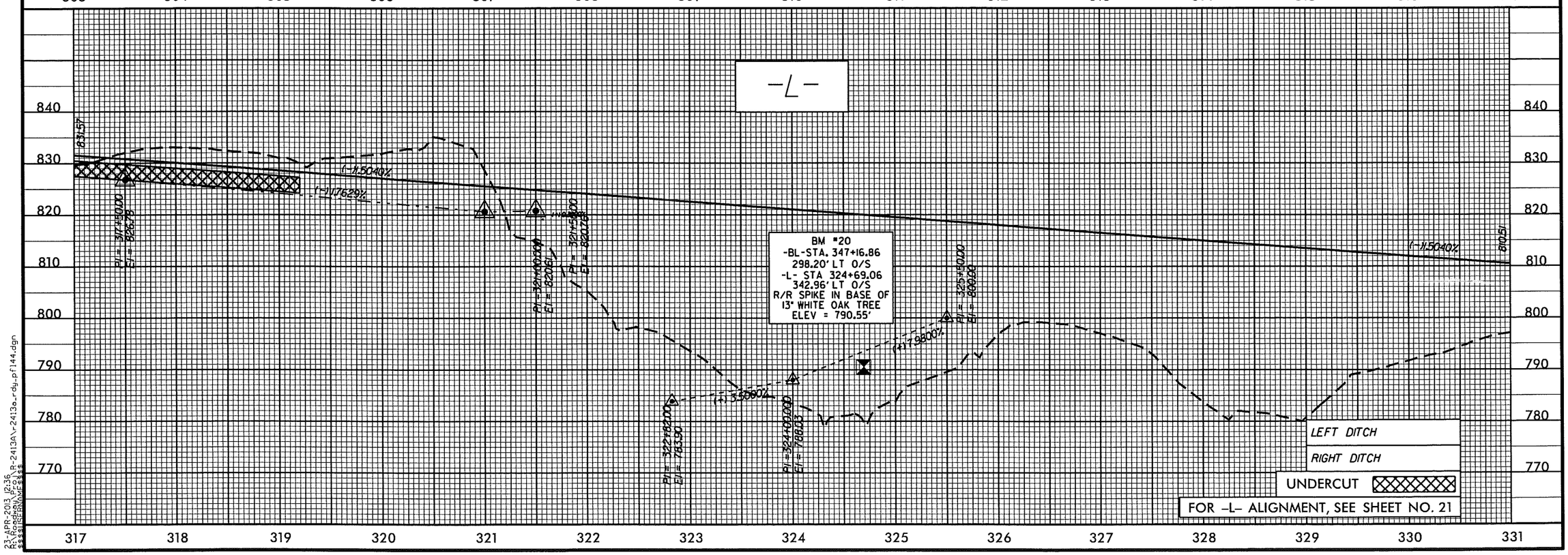
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	44
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
-L- STA.306+75

DRAINAGE AREA	= 82	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 210	CFS
DESIGN HW ELEVATION	= 805.3	FT
100 YEAR DISCHARGE	= 250	CFS
100 YEAR HW ELEVATION	= 806.2	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 800	CFS
OVERTOPPING ELEVATION	= 834	FT



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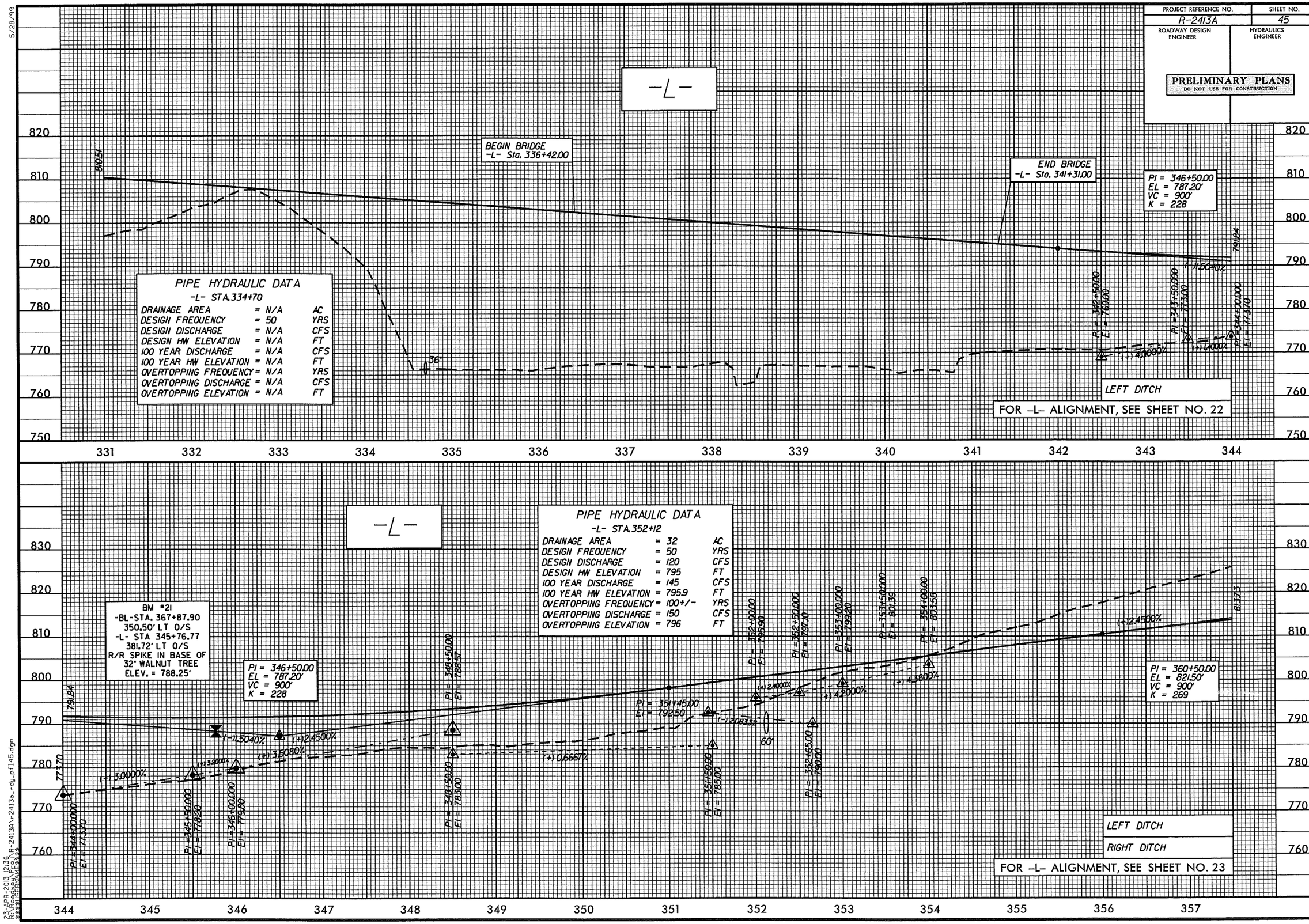
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	45
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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$$$$USERNAME$$$$

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	46
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

BM #22
-BL-STA. 387+42.37
370.55' LT O/S
-L- STA 365+30.90
369.73' LT O/S
R/R SPIKE IN BASE OF
17" MAPLE TREE
ELEV. = 866.46'

-L- Sta. 365+28.69 =
-Y5- Sta. 22+99.65

PI = 360+50.00
EL = 821.50'
VC = 900'
K = 269

(+)2.4500%

(-)0.9000%

821.23'

END GRADE
-L- Sta. 370+50.00
EL = 812.50'

FOR -L- ALIGNMENT, SEE SHEET NO. 24

-RPIB-

BEGIN GRADE
-RPIB- Sta. 10+00.00
EL = 944.64'

PI = 12+50.00
EL = 952.74'
VC = 450'
K = 592

(+)2.4000%

(+)4.0000%

959.77

FOR -RP1B- ALIGNMENT, SEE SHEET NO. 8

23-APR-2013 12:35
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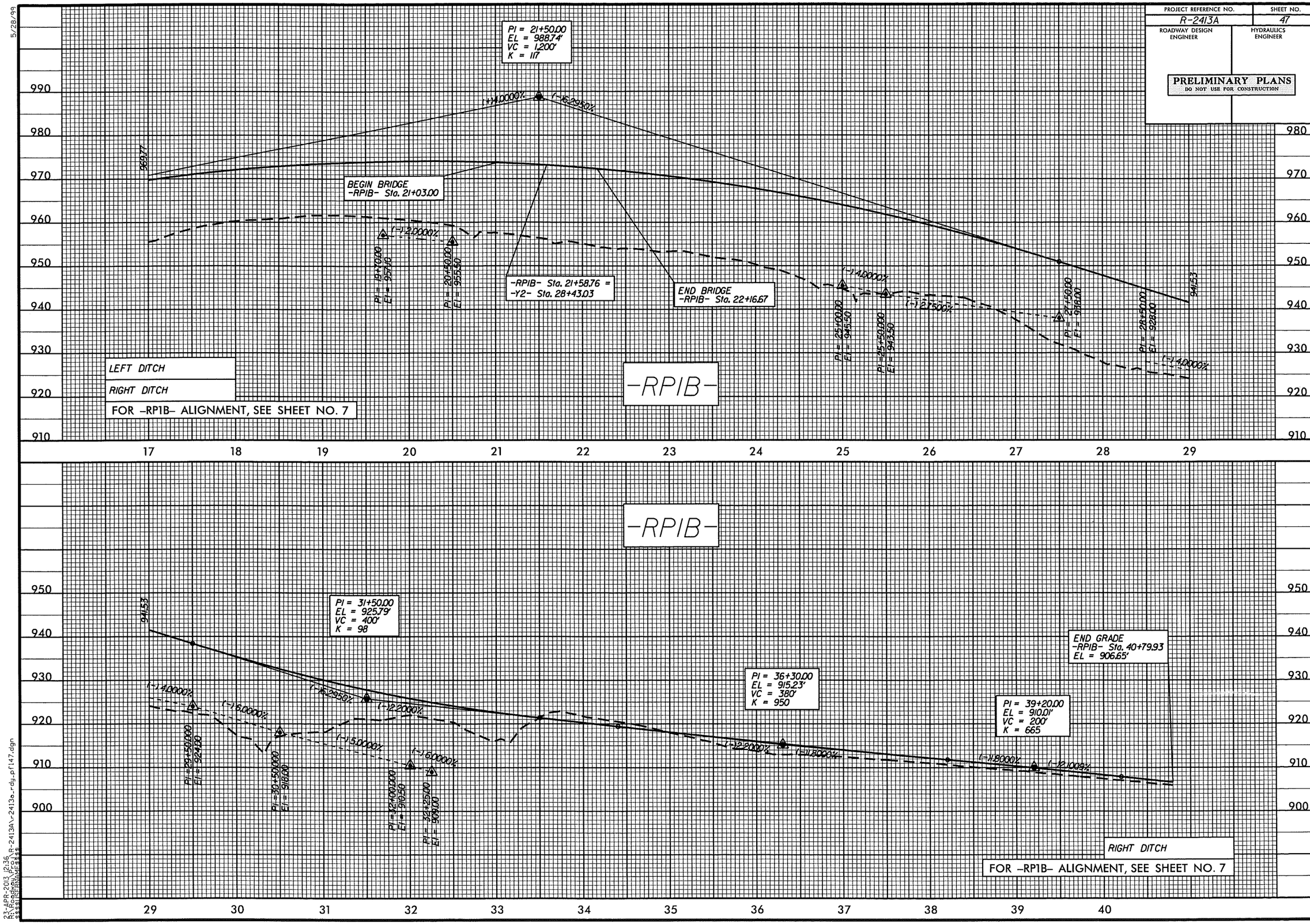
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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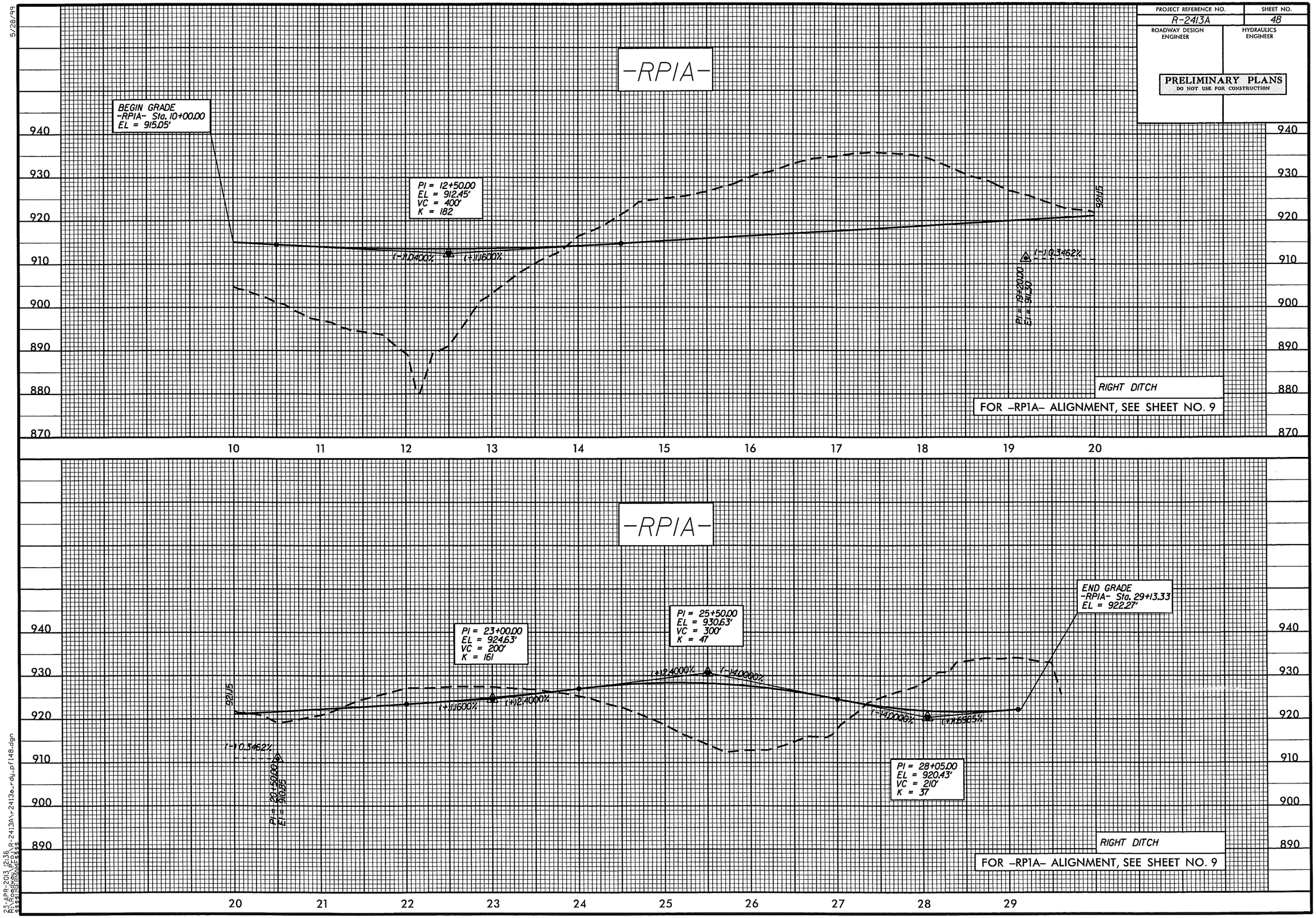
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	48
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	49
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/28/99

DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -LPID- HAS BEEN REVISED. JLT 1/28/2013

-LP1A-

BEGIN GRADE
-LP1A- Sta. 10+00.00
EL = 959.22'

PI = 12+30.00
EL = 956.46'
VC = 260'
K = 200

PI = 14+80.00
EL = 950.21'
VC = 200'
K = 36

PI = 18+50.00
EL = 920.61'
VC = 250'
K = 26

END GRADE
-LP1A- Sta. 19+84.82
EL = 922.66'

(-)11.2000%
(-)12.5000%
(-)12.5000%
(-)8.0000%
(-)8.0000%
(+)1.5205%

960 950 940 930 920 910

10 11 12 13 14 15 16 17 18 19 20

FOR -LP1A- ALIGNMENT, SEE SHEET NO. 9

-LP1D-

BEGIN GRADE
-LP1D- Sta. 10+00.00
EL = 957.31'

PI = 11+25.00
EL = 956.19'
VC = 190'
K = 67

PI = 16+20.00
EL = 937.62'
VC = 500'
K = 154

END GRADE
-LP1D- Sta. 23+05.72
EL = 934.17'

(-)0.9000%
(-)3.7500%
(-)3.7500%
(-)0.5035%
(+)0.3000%
(+)4.9000%

PI = 13+50.00
EL = 935.50

PI = 14+50.00
EL = 935.40

PI = 16+50.00
EL = 935.00

960 950 940 930 920 910

10 11 12 13 14 15 16 17 18 19 20 21 22 23

LEFT DITCH

FOR -LP1D- ALIGNMENT, SEE SHEET NO. 9

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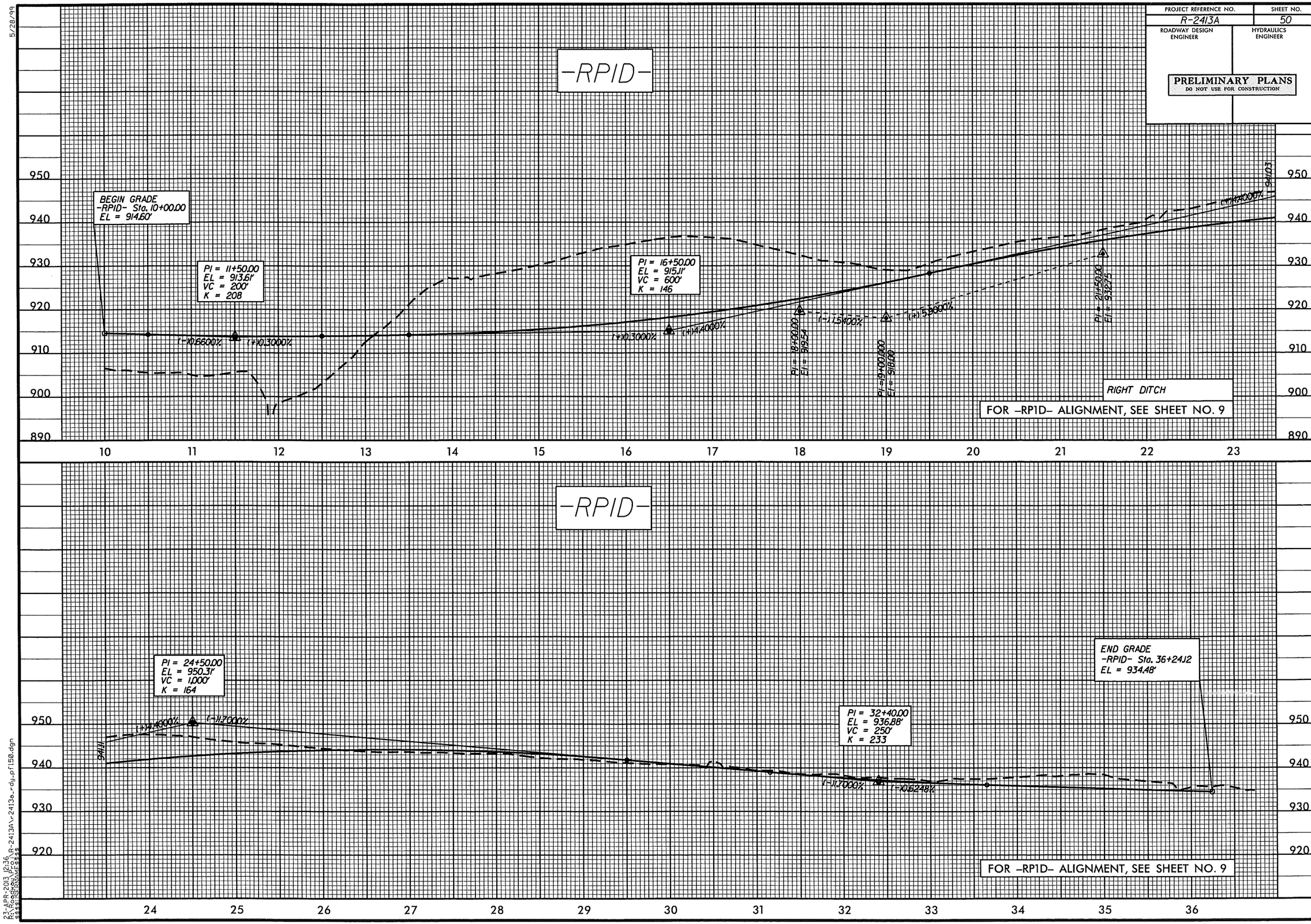
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	50
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -RPID- HAS BEEN REVISED. JLT 1/28/2013



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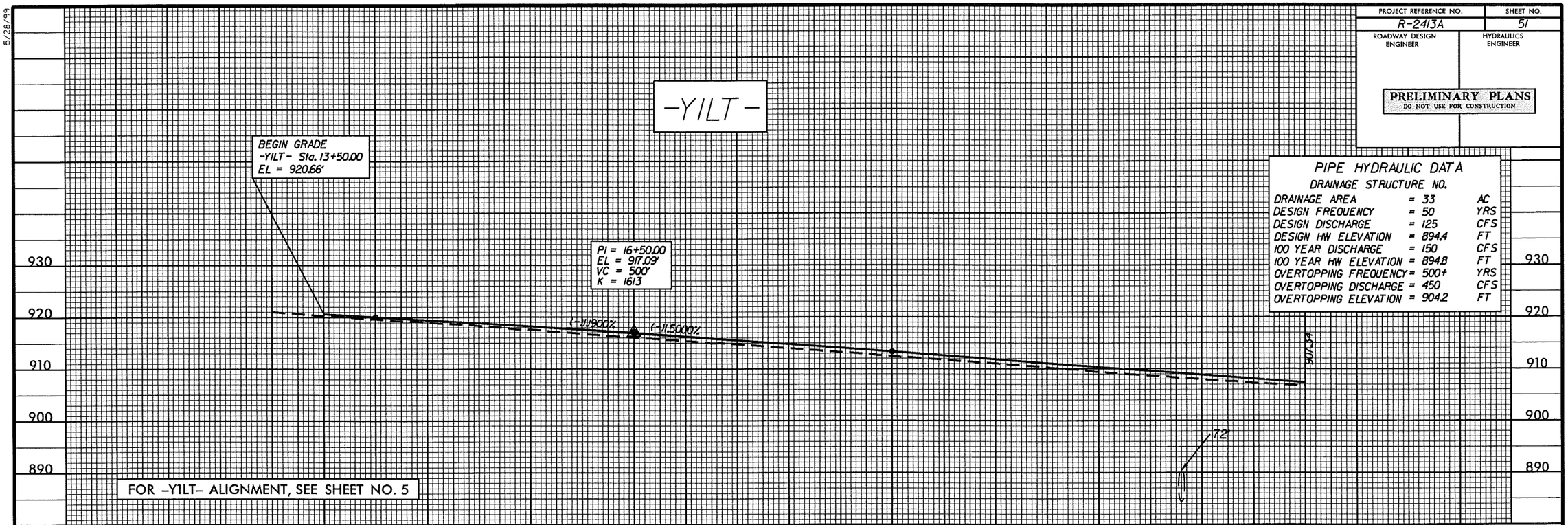
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	51
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

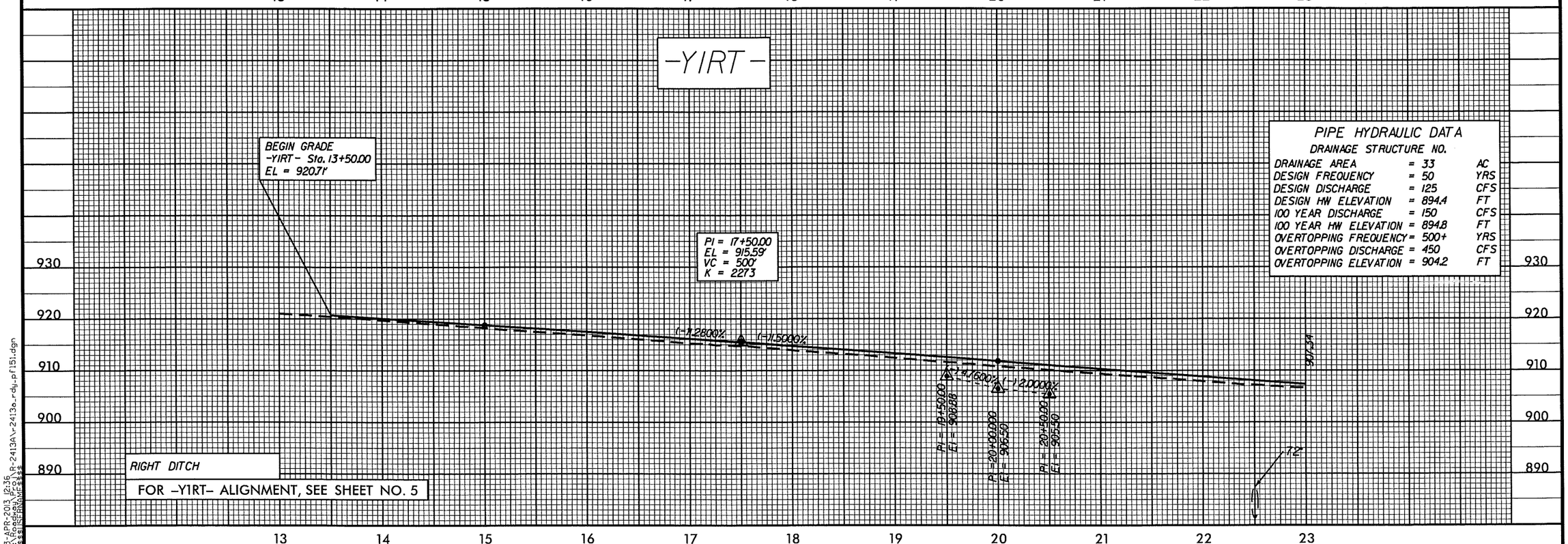
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 33	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 125	CFS
DESIGN HW ELEVATION	= 894.4	FT
100 YEAR DISCHARGE	= 150	CFS
100 YEAR HW ELEVATION	= 894.8	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 450	CFS
OVERTOPPING ELEVATION	= 904.2	FT

FOR -Y1LT- ALIGNMENT, SEE SHEET NO. 5



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 33	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 125	CFS
DESIGN HW ELEVATION	= 894.4	FT
100 YEAR DISCHARGE	= 150	CFS
100 YEAR HW ELEVATION	= 894.8	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 450	CFS
OVERTOPPING ELEVATION	= 904.2	FT

RIGHT DITCH

FOR -Y1RT- ALIGNMENT, SEE SHEET NO. 5

5/28/99

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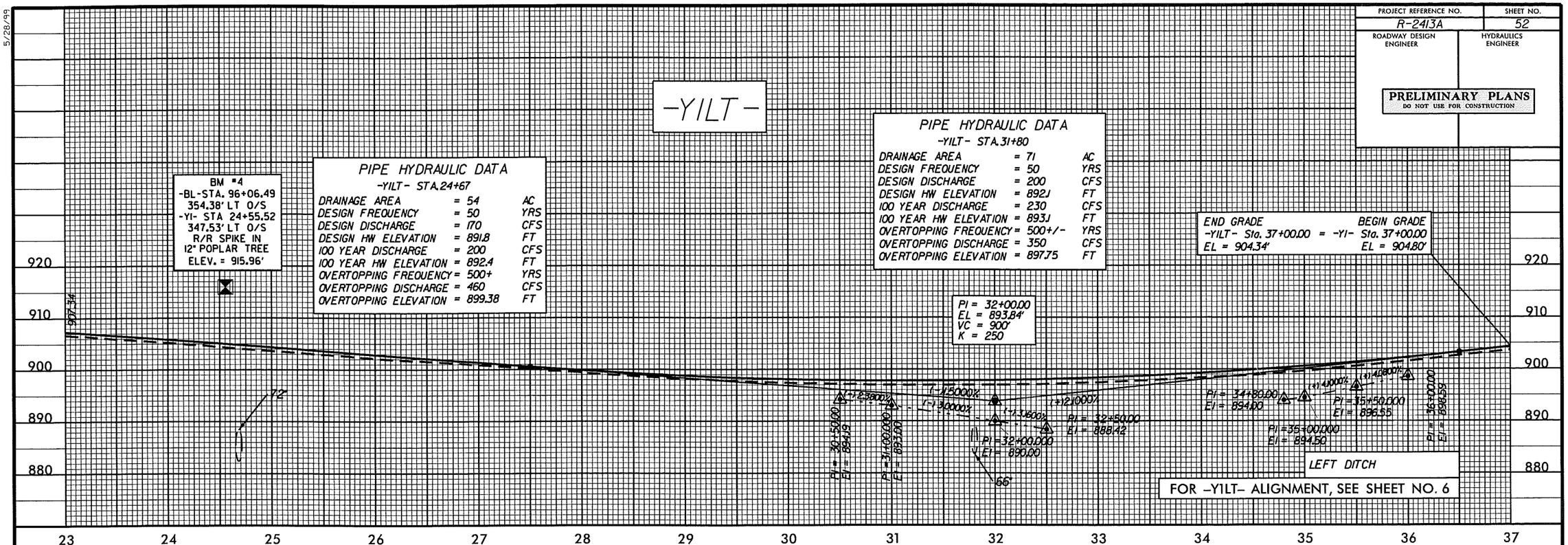
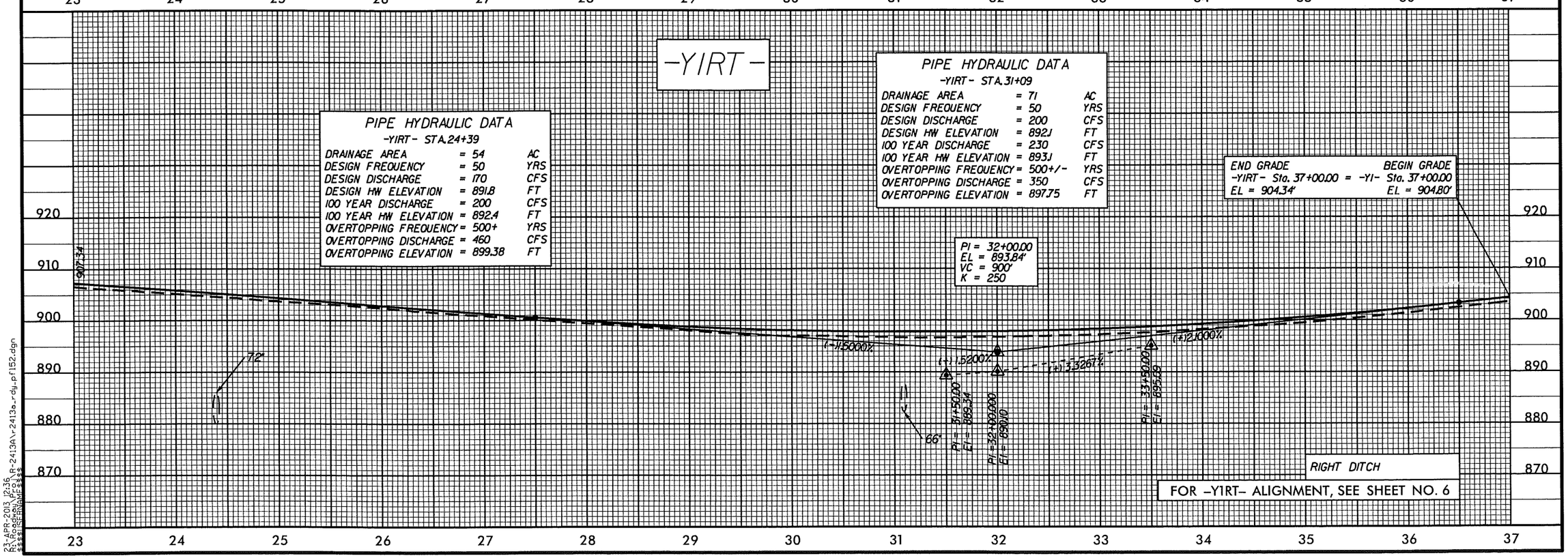
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	52
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	53

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y1-

BM #6
-BL- STA. 118+79.36
631.57' RT O/S
-Y1- STA. 47+55.55
620.03' RT O/S
ELEV. = 948.41'
R/R SPIKE IN 12" PINE TREE
(NOT ON PLAN SHEET)

BEGIN GRADE
-Y1- Sta. 37+00.00 = ----------
EL = 904.80'

END GRADE
-Y1LT- Sta. 37+00.00
EL = 904.34'

END GRADE
-Y1RT- Sta. 37+00.00
EL = 904.34'

(+)2.000%

932.06

950 940 930 920 910 890

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

FOR -Y1- ALIGNMENT, SEE SHEET NO. 7

-Y1-

-Y1- Sta. 59+87.47 =
-Y2- Sta. 33+79.20

PI = 63+00.00
EL = 959.40'
VC = 1,300'
K = 439

932.06

(+)2.000%

(+)10.860%

954.87

(+)1.000%

(+)2.000%

(+)2.000%

(+)1.000%

(+)1.000%

PI = 51+56.00
EL = 930.50

PI = 52+00.000
EL = 931.00

(+)1.360%

PI = 52+50.00
EL = 933.43

PI = 57+00.00
EL = 941.00

PI = 59+00.000
EL = 943.00

PI = 60+50.00
EL = 944.50

PI = 61+50.000
EL = 946.00

PI = 62+00.000
EL = 946.50

PI = 62+50.000
EL = 947.50

PI = 63+50.000
EL = 946.50

LEFT DITCH

RIGHT DITCH

FOR -Y1- ALIGNMENT, SEE SHEET NO. 7

950 940 930 920 910

50 51 52 53 54 55 56 57 58 59 60 61 62 63

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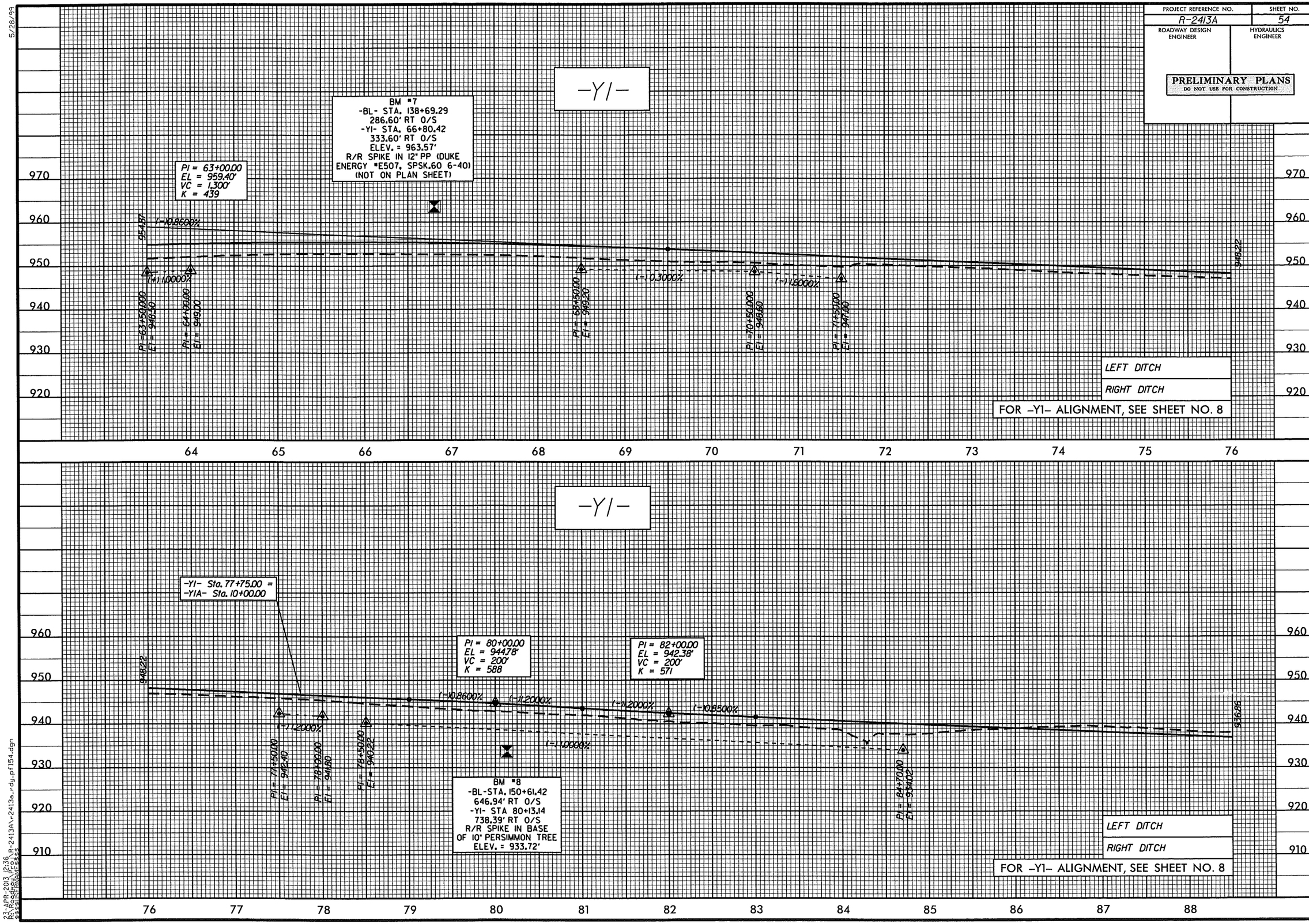
$$$$DGNFILE$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	54
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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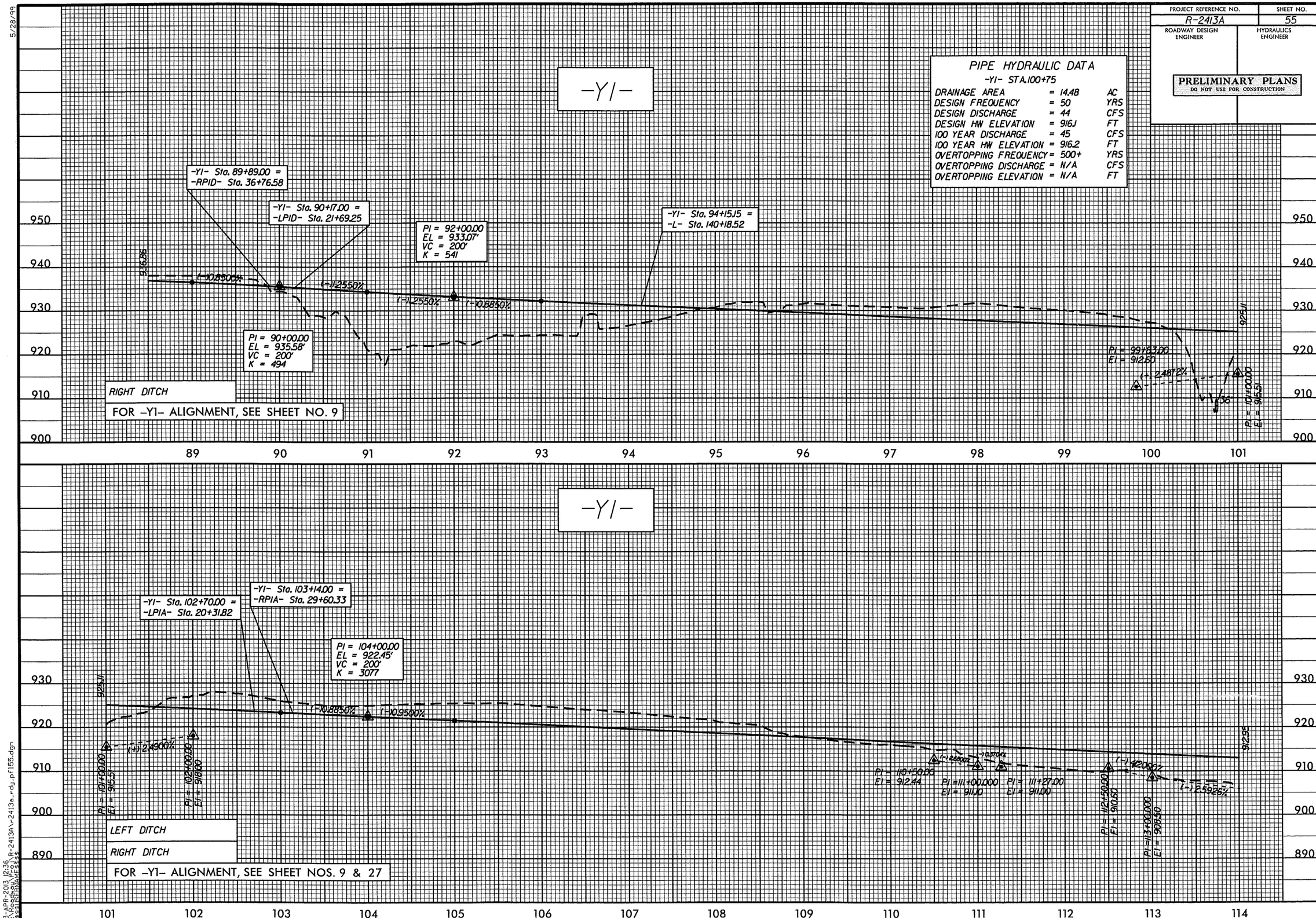
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	55
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
-Y1- STA.100+75

DRAINAGE AREA	= 14.48	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 44	CFS
DESIGN HW ELEVATION	= 916.1	FT
100 YEAR DISCHARGE	= 45	CFS
100 YEAR HW ELEVATION	= 916.2	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= N/A	FT

5/28/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A	56
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y1-

PIPE HYDRAULIC DATA
-Y1- STA.119+50

DRAINAGE AREA	= ?	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 3.4	CFS
DESIGN HW ELEVATION	= 903.6	FT
100 YEAR DISCHARGE	= 3.5	CFS
100 YEAR HW ELEVATION	= 903.6	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 14	CFS
OVERTOPPING ELEVATION	= 905.5	FT

-Y1- Sta. 115+00.00 =
-Y1B- Sta. 12+93.82

PI = 116+00.00
EL = 911.05'
VC = 200'
K = 1053

END GRADE
-Y1- Sta. 124+75.00
EL = 904.40'

9.26%

(-)0.9506%

(-)1.2592%

(-)0.2600%

(+)0.3000%

18"

(-)0.3288%

PI = 114+25.00
EL = 905.00

PI = 119+50.00
EL = 902.60

PI = 120+55.00
EL = 901.00

PI = 122+00.00
EL = 903.35

PI = 123+50.00
EL = 901.57

LEFT DITCH

RIGHT DITCH

FOR -Y1- ALIGNMENT, SEE SHEET NO. 28

-Y1A-

PI = 12+50.00
EL = 942.30'
VC = 300'
K = 1283

(-)2.0837%

(-)1.8500%

BEGIN GRADE
-Y1A- Sta. 10+47.00
EL = 946.53'

END GRADE
-Y1A- Sta. 14+50.00
EL = 938.60'

FOR -Y1A- ALIGNMENT, SEE SHEET NO. 8

-Y1B-

PIPE HYDRAULIC DATA
-Y1B- STA.19+88

DRAINAGE AREA	= 6.07	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 14	CFS
DESIGN HW ELEVATION	= 892.8	FT
100 YEAR DISCHARGE	= 16	CFS
100 YEAR HW ELEVATION	= 893	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 26	CFS
OVERTOPPING ELEVATION	= 894.39	FT

BEGIN GRADE
-Y1B- Sta. 16+50.00
EL = 894.63'

PI = 18+50.00
EL = 893.83'
VC = 300'
K = 56
V = 37 MPH

END GRADE
-Y1B- Sta. 22+59.84
EL = 911.29'

PI = 21+00.00
EL = 906.33'
VC = 200'
K = 105

(-)0.4000%

(-)0.3000%

(+)5.0000%

(+)5.0000%

(+)3.1031%

(-)1.2600%

(-)0.7676%

(-)0.4800%

24"

PI = 17+50.00
EL = 892.35

PI = 18+50.00
EL = 892.05

PI = 19+00.00
EL = 891.92

PI = 19+50.00
EL = 891.04

PI = 20+00.00
EL = 890.80

LEFT DITCH

FOR -Y1B- ALIGNMENT, SEE SHEET NO. 36

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114 115 116 117 118 119 120 121 122 123 124 125

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

950 940 930 920 910 900 890 880

5/26/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	57
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y2-

BEGIN GRADE
-Y2- Sta. 10+85.00
EL = 952.13'

PI = 13+50.00
EL = 954.95'
VC = 200'
K = 67
V = 46 MPH

PI = 16+00.00
EL = 950.20'
VC = 250'
K = 96

PI = 19+50.00
EL = 952.65'
VC = 200'
K = 154

(+)1.0642%
(-)1.9000%
(-)1.9360%
(+)0.7000%
(+)0.3333%
(-)4.5455%
(+)1.7000%
(-)0.6000%
950.55

PI = 15+50.00
EL = 946.30

PI = 17+00.00
EL = 947.39

PI = 17+41.00
EL = 946.66

PI = 18+00.00
EL = 950.00

LEFT DITCH
RIGHT DITCH

FOR -Y2- ALIGNMENT, SEE SHEETS NO. 25 & 7

-Y2-

PIPE HYDRAULIC DATA
-Y2- STA. 32+73

DRAINAGE AREA	= 5.03	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 16	CFS
DESIGN HW ELEVATION	= 946.2	FT
100 YEAR DISCHARGE	= 17	CFS
100 YEAR HW ELEVATION	= 946.4	FT
OVERTOPPING FREQUENCY	= 500+/-	YRS
OVERTOPPING DISCHARGE	= 28	CFS
OVERTOPPING ELEVATION	= 947.90	FT

PIPE HYDRAULIC DATA
-Y2- STA. 34+92

DRAINAGE AREA	= 5.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 11	CFS
DESIGN HW ELEVATION	= 948.2	FT
100 YEAR DISCHARGE	= 12	CFS
100 YEAR HW ELEVATION	= 948.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 35	CFS
OVERTOPPING ELEVATION	= 951.7	FT

-Y2- Sta. 31+03.85 =
-L- Sta. 103+85.70

-Y1- EOT INTERSECT
-Y2- Sta. 33+31.70
EL = 950.51'

-Y1- EOT INTERSECT
-Y2- Sta. 34+26.39
EL = 952.54'

PI = 24+50.00
EL = 944.22

PI = 25+00.000
EL = 947.85

PI = 25+00.00
EL = 945.50

PI = 27+50.00
EL = 945.75

PI = 28+00.00
EL = 948.76

PI = 31+00.00
EL = 945.75'
VC = 250'
K = 94
V = 49 MPH

PI = 31+50.00
EL = 946.39

PI = 32+00.000
EL = 946.50

PI = 32+00.00
EL = 942.30

PI = 32+50.00
EL = 941.50

PI = 32+85.00
EL = 944.00

PI = 34+76.00
EL = 946.40

PI = 35+00.000
EL = 946.50

PI = 35+45.00
EL = 943.00

PI = 36+00.00
EL = 946.00

950.55
955.72

(+)0.3033%
(+)0.4600%
(+)0.3000%
(-)0.6000%
(-)0.3100%
(+)1.9962%
(+)2.3533%
(+)1.8529%
(-)1.7647%
(-)1.2600%

-Y2- Sta. 28+43.03 =
-RPIB- Sta. 21+58.76

LEFT DITCH
RIGHT DITCH

FOR -Y2- ALIGNMENT, SEE SHEET NO. 7

23-APR-2013 12:36
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\\ssdsepnwmes\ss

R-2413A\r-2413a_rdy_pf157.dgn

5/26/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	58
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y2-

PI = 37+50.00
EL = 959.00'
VC = 450'
K = 100

PI = 42+50.00
EL = 946.50'
VC = 350'
K = 92
V = 48 MPH

PIPE HYDRAULIC DATA
-Y2- STA.43+47

DRAINAGE AREA	= 13.27	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 57	CFS
DESIGN HW ELEVATION	= 945.3	FT
100 YEAR DISCHARGE	= 59	CFS
100 YEAR HW ELEVATION	= 945.4	FT
OVERTOPPING FREQUENCY	= 500+/-	YRS
OVERTOPPING DISCHARGE	= 104	CFS
OVERTOPPING ELEVATION	= 948.16	FT

END GRADE
-Y2- Sta. 45+50.00
EL = 950.40'

BEGIN GRADE
-DR2- Sta. 10+39.00
EL = 949.86'

PI = 11+50.00
EL = 953.19'
VC = 200'
K = 116

END GRADE
-DR2- Sta. 12+85.62
EL = 954.93'

-DR2-

PI =36+00.000 EL = 946.00
PI =36+50.000 EL = 946.00
PI =37+00.000 EL = 950.50
PI =37+50.000 EL = 950.30
PI =37+50.000 EL = 950.50
PI =38+00.000 EL = 951.70
PI =38+50.000 EL = 951.00
PI =39+00.000 EL = 950.53
PI =39+34.001 EL = 950.50
PI =40+00.000 EL = 950.10
PI =41+00.000 EL = 947.60
PI =42+00.00 EL = 945.00
PI =42+50.00 EL = 944.00
PI =43+00.000 EL = 942.50
PI =43+50.000 EL = 943.50
PI =43+57.700 EL = 943.00
PI =44+00.000 EL = 944.00
PI =45+00.00 EL = 945.00

(+).9962% (-)12.5000% (+).3000% (-)27.392% (+)1.0000% (+)3.0000% (+)2.8536%

LEFT DITCH
RIGHT DITCH

FOR -Y2- ALIGNMENT, SEE SHEET NO. 26

FOR -DR2- ALIGNMENT, SEE SHEET NO. 7

-Y3-

PIPE HYDRAULIC DATA
-Y3- STA.17+60

DRAINAGE AREA	= 0.73	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 3.3	CFS
DESIGN HW ELEVATION	= 886.23	FT
100 YEAR DISCHARGE	= 3.6	CFS
100 YEAR HW ELEVATION	= 886.29	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 15	CFS
OVERTOPPING ELEVATION	= 888.76	FT

BEGIN GRADE
-Y3- Sta. 10+40.00
EL = 873.25'

PI = 11+50.00
EL = 877.14'
VC = 180'
K = 390

PI = 15+30.00
EL = 892.33'
VC = 560'
K = 151

PI = 21+00.00
EL = 889.55

(+)3.5564% (+)3.9983% (+)0.3006% (+)0.7000%

18" 18" 24"

89+40.0

RIGHT DITCH

FOR -Y3- ALIGNMENT, SEE SHEETS NO. 29 & 13

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	59
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y3-

BEGIN BRIDGE
-Y3- Sta. 21+50.00

END BRIDGE
-Y3- Sta. 24+00.00

-Y3- Sta. 22+73.33 =
-L- Sta. 214+14.08

PI = 25+40.00
EL = 895.37'
VC = 180'
K = 165

PI = 29+00.00
EL = 892.52'
VC = 190'
K = 137

PI = 31+35.00
EL = 893.92'
VC = 280'
K = 149
V = 59 MPH

PI = 33+90.00
EL = 890.65'
VC = 160'
K = 181

END GRADE
-Y3- Sta. 34+75.00
EL = 890.31'

PIPE HYDRAULIC DATA
-Y3- STA. 27+40

DRAINAGE AREA	= 17.2	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 46	CFS
DESIGN HW ELEVATION	= 883.45	FT
100 YEAR DISCHARGE	= 50	CFS
100 YEAR HW ELEVATION	= 883.69	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 130	CFS
OVERTOPPING ELEVATION	= 892.68	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 9.3	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 25	CFS
DESIGN HW ELEVATION	= 888.58	FT
100 YEAR DISCHARGE	= 27	CFS
100 YEAR HW ELEVATION	= 888.75	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 40	CFS
OVERTOPPING ELEVATION	= 890.35	FT

BM #36
-BY6-STA. 25+50.03
55.32' LT O/S
-Y3- STA 30+50.54
24.27' LT O/S
ELEV. = 897.17'
R/R SPIKE IN BASE
OF 16" PINE TREE

BM #14
-BL-STA. 231+03.75
261.32' RT O/S
-Y3- STA 32+24.81
333.13' RT O/S
R/R SPIKE IN
14" POPLAR TREE
ELEV. = 871.70'

LEFT DITCH
RIGHT DITCH

FOR -Y3- ALIGNMENT, SEE SHEET NOS. 13 & 30

-Y4-

BEGIN BRIDGE
-Y4- Sta. 22+41.44

-Y4- Sta. 23+52.74 =
-L- Sta. 290+52.35

PI = 18+50.00
EL = 845.15'
VC = 240'
K = 239

-Y4- Sta. 14+30.47 =
-DR4A- Sta. 11+45.74

PI = 11+75.00
EL = 838.43'
VC = 230'
K = 58

BM #37
-BY7-STA. 12+16.07
46.21' LT O/S
-Y4- STA 10+26.26
37.29' LT O/S
ELEV. = 839.13'
R/R SPIKE IN BASE
OF 17" PINE TREE

BEGIN GRADE
-Y4- Sta. 10+50.00
EL = 832.19'

PIPE HYDRAULIC DATA
-Y4- STA. 16+50

DRAINAGE AREA	= 10.27	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 27	CFS
DESIGN HW ELEVATION	= 812.60	FT
100 YEAR DISCHARGE	= 30	CFS
100 YEAR HW ELEVATION	= 812.88	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= 832.29	FT

RIGHT DITCH

FOR -Y4- ALIGNMENT, SEE SHEET NOS. 19 & 31

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413A	60
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y4-

END BRIDGE
-Y4- Sta. 24+70.15
856.15

-Y4- Sta. 26+86.00 =
-DR4B- Sta. 11+70.00

PI = 27+00.00
EL = 862.15'
VC = 300'
K = 96

(+)2.0000%
(+)5.1280%

PI = 32+00.00
EL = 887.79'
VC = 700'
K = 127

(+)5.1280%
(-)0.4000%

-Y4- Sta. 30+50.00 =
-Y4A- Sta. 21+26.29

PI = 33+50.00
EL = 882.89

PI = 34+50.00
EL = 877.60

PI = 35+50.00
EL = 879.20

PI = 36+50.00
EL = 885.99'
VC = 200'
K = 286

(-)0.4000%
(+)0.3486%
(+)1.4000%
(+)2.0133%
(+)0.4000%

END GRADE
-Y4- Sta. 37+50.00
EL = 886.29'

PI = 37+00.00
EL = 883.91

PI = 37+00.00
EL = 882.22

LEFT DITCH
RIGHT DITCH

FOR -Y4- ALIGNMENT, SEE SHEETS NO. 19 & 32

-Y4A-

PI = 19+50.00
EL = 888.29'
VC = 200'
K = 41

(-)0.7500%
(-)1.5254%

BEGIN GRADE
-Y4A- Sta. 18+50.00
EL = 889.04'

END GRADE
-Y4A- Sta. 21+14.29
EL = 879.00'

FOR -Y4A- ALIGNMENT, SEE SHEET NO. 32
FOR -DR4A- ALIGNMENT, SEE SHEET NO. 31
FOR -DR4B- ALIGNMENT, SEE SHEET NO. 19

-DR4A-

BEGIN GRADE
-DR4A- Sta. 11+50.00
EL = 834.95'

PI = 11+75.00
EL = 832.30'
VC = 50'
K = 3

PI = 12+50.00
EL = 836.01'
VC = 80'
K = 22

PI = 13+20.00
EL = 841.97'
VC = 50'
K = 7

(-)10.0000%
(+)4.5525%
(+)8.2500%
(+)14.2911%

END GRADE
-DR4A- Sta. 13+50.04
EL = 842.40'

-DR4B-

PI = 10+50.00
EL = 871.73'
VC = 60'
K = 8

PI = 11+10.00
EL = 863.90'
VC = 60'
K = 6

(-)5.2000%
(-)13.0548%
(-)12.7231%

BEGIN GRADE
-DR4B- Sta. 10+00.00
EL = 874.33'

END GRADE
-DR4B- Sta. 11+58.00
EL = 862.59'

23-APR-2013 12:36
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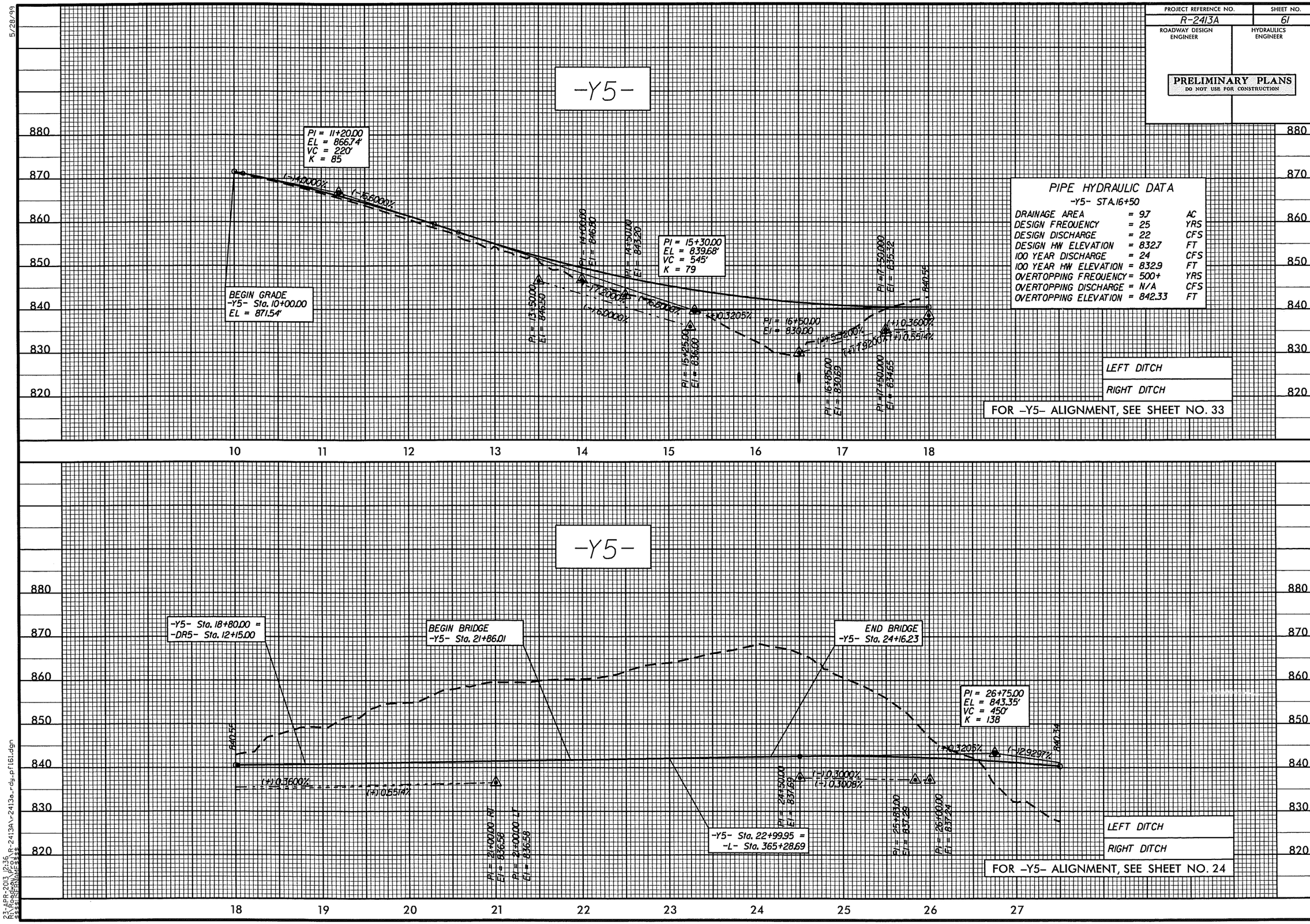
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	61
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
-Y5- STA.16+50

DRAINAGE AREA	= 9.7	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 22	CFS
DESIGN HW ELEVATION	= 832.7	FT
100 YEAR DISCHARGE	= 24	CFS
100 YEAR HW ELEVATION	= 832.9	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= 842.33	FT

LEFT DITCH
RIGHT DITCH

FOR -Y5- ALIGNMENT, SEE SHEET NO. 33

LEFT DITCH
RIGHT DITCH

FOR -Y5- ALIGNMENT, SEE SHEET NO. 24

DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y5- HAS BEEN REVISED. JLT 1/28/2013

5/28/99

23-APR-2013 12:36
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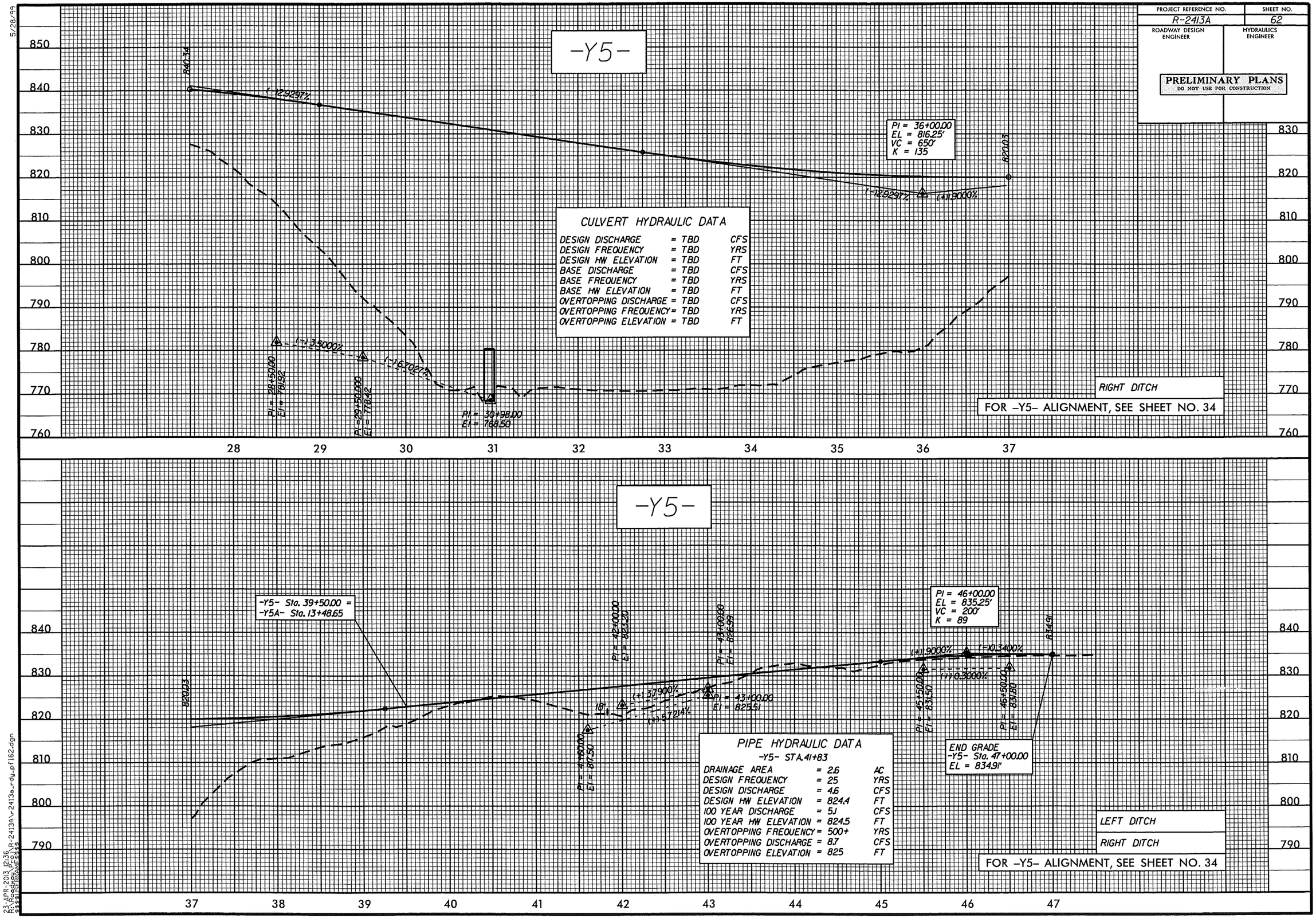
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	62
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= TBD	CFS
DESIGN FREQUENCY	= TBD	YRS
DESIGN HW ELEVATION	= TBD	FT
BASE DISCHARGE	= TBD	CFS
BASE FREQUENCY	= TBD	YRS
BASE HW ELEVATION	= TBD	FT
OVERTOPPING DISCHARGE	= TBD	CFS
OVERTOPPING FREQUENCY	= TBD	YRS
OVERTOPPING ELEVATION	= TBD	FT

RIGHT DITCH

FOR -Y5- ALIGNMENT, SEE SHEET NO. 34

PIPE HYDRAULIC DATA
-Y5- STA.41+83

DRAINAGE AREA	= 2.6	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4.6	CFS
DESIGN HW ELEVATION	= 824.4	FT
100 YEAR DISCHARGE	= 5.1	CFS
100 YEAR HW ELEVATION	= 824.5	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 8.7	CFS
OVERTOPPING ELEVATION	= 825	FT

LEFT DITCH

RIGHT DITCH

FOR -Y5- ALIGNMENT, SEE SHEET NO. 34

DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y5- HAS BEEN REVISED. JLT 1/28/2013

5/28/99

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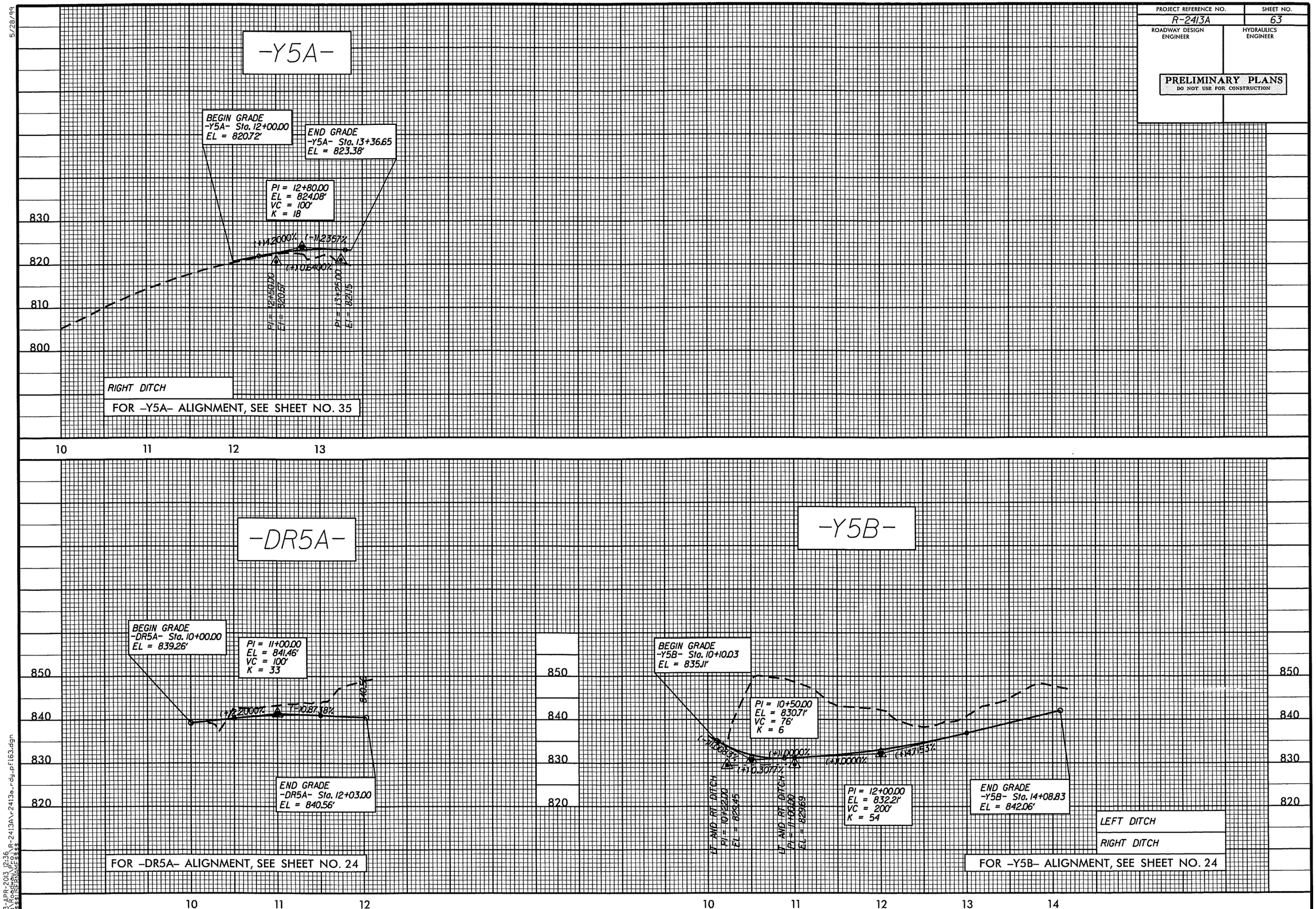
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	63
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DESIGN REVISION: THE VERTICAL ALIGNMENTS FOR -Y5B- AND -DR5A- HAVE BEEN REVISED. JLT 1/28/2013

5/28/99

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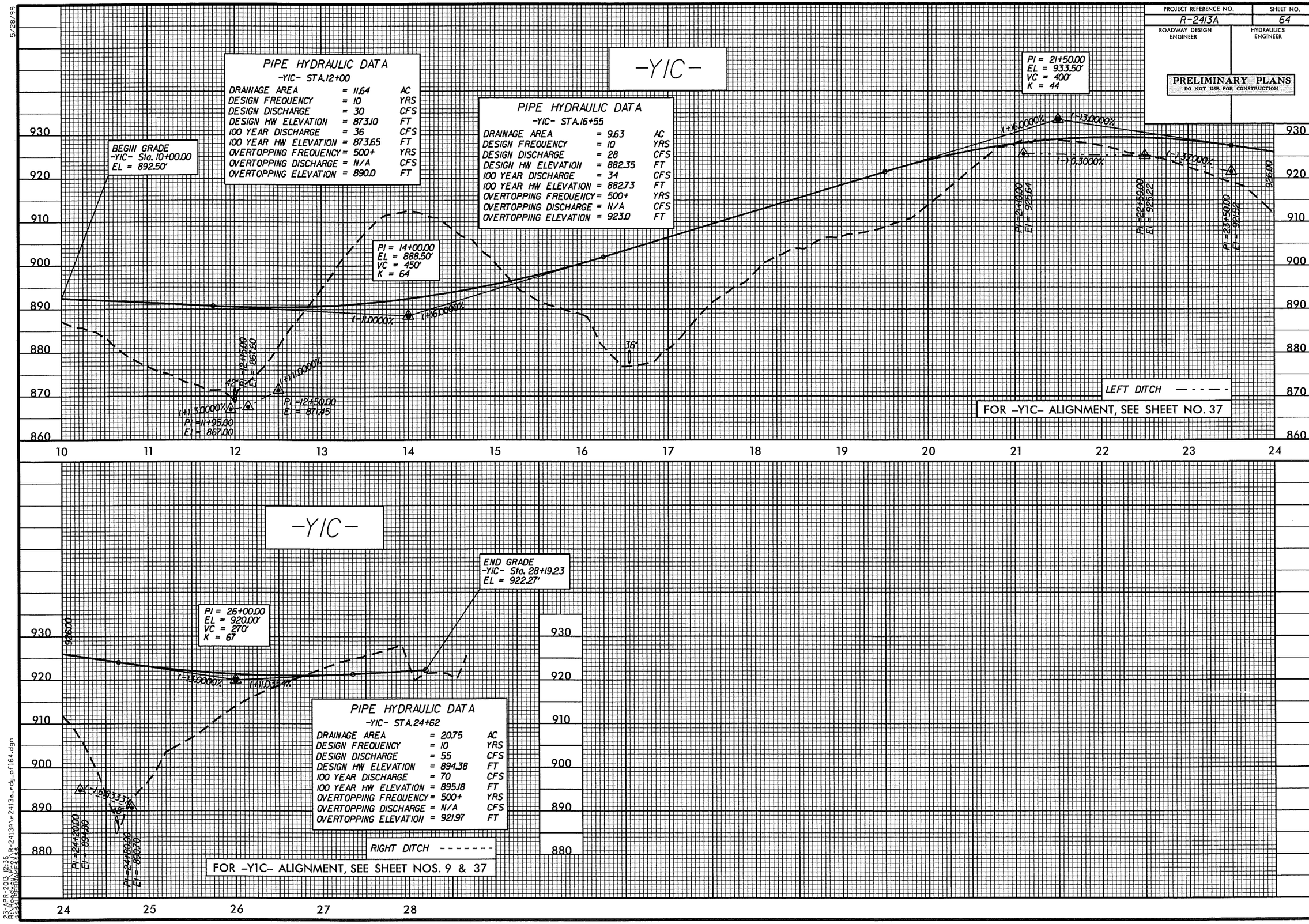
PROJECT REFERENCE NO.	SHEET NO.
R-2413A	64
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DESIGN REVISION: THE VERTICAL ALIGNMENT FOR -Y1C- HAS BEEN REVISED. JLT 1/28/2013

5/28/99

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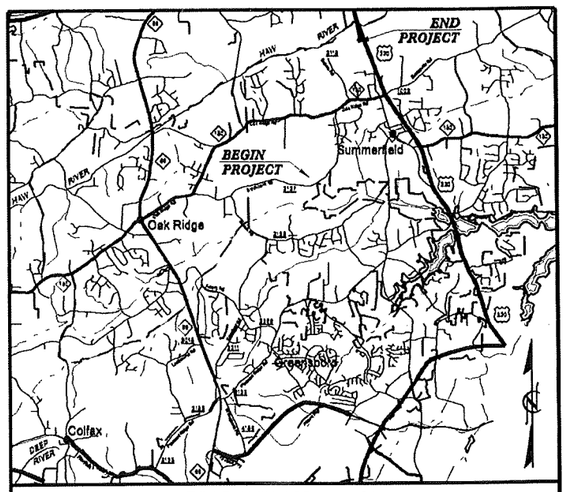
09/08/09

TIP PROJECT: R-2413B

~~See Sheet 1-A For Index of Sheets~~
See Sheet 1-B For Conventional Symbols
See Sheet 1-C thru 1-E For Survey Control Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413B	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34429.1.1		PE	
34429.2.3		R/W,UTL	

Permit Drawing
Sheet 1 of 31

LOCATION: NC 68 CONNECTOR – FROM SR 2127 (BROOKBANK ROAD) TO HAW RIVER

TYPE OF WORK: GRADING, PAVING, WIDENING, RESURFACING, DRAINAGE, STRUCTURES, SIGNING, GUARDRAIL, SIGNALS, AND ITS.

NAD 83/
NSRS 2007

WETLAND /SURFACE WATER PERMIT

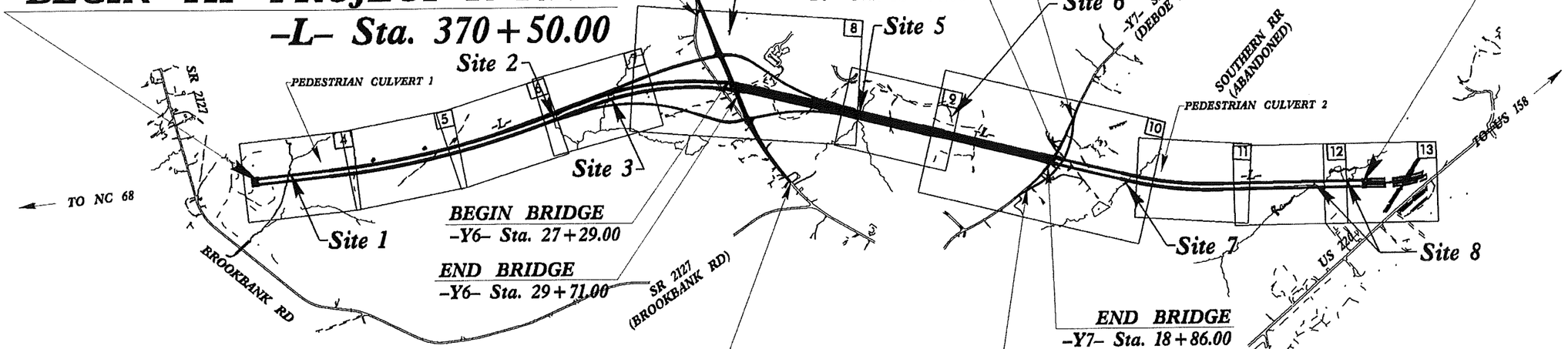
END TIP PROJECT R-2413B
–L– Sta. 520+00.00

BEGIN CONSTRUCTION
–Y6– Sta. 10+00.00

BEGIN CONSTRUCTION
–Y7– Sta. 11+75.00

BEGIN CONSTRUCTION
–Y6A– Sta. 12+00.00

BEGIN TIP PROJECT R-2413B
–L– Sta. 370+50.00



THERE IS FULL CONTROL OF ACCESS ON THIS PROJECT.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO, OAK RIDGE, AND SUMMERFIELD.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2012 = 23,000
ADT 2035 = 40,800
DHV = 11 %
D = 65 %
T = 15 % *
V = 70 MPH
* TTST 10% DUAL 5%
FUNC CLASS – INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2413B = 2.831 MILES

TOTAL LENGTH TIP PROJECT R-2413B = 2.831 MILES

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

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JANUARY 26, 2012

LETTING DATE: APRIL 15, 2014

TONY HOUSER, PE
PROJECT ENGINEER

JEFFREY TEAGUE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE:

ROADWAY DESIGN ENGINEER

SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER

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

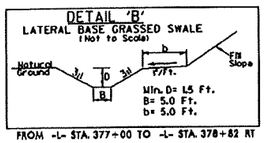
6/2/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	2-1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

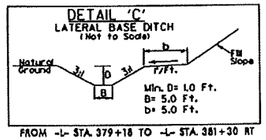
Permit Drawing
Sheet 2 of 31

DETAIL 'B'
LATERAL BASE GRASSED SWALE
(Not to Scale)



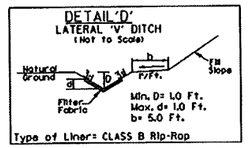
FROM -L- STA. 377+00 TO -L- STA. 378+82 RT

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



FROM -L- STA. 379+18 TO -L- STA. 381+30 RT

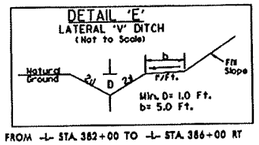
DETAIL 'D'
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

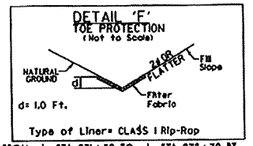
FROM -L- STA. 381+30 TO -L- STA. 382+00 RT

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



FROM -L- STA. 382+00 TO -L- STA. 386+00 RT

DETAIL 'F'
TOE PROTECTION
(Not to Scale)

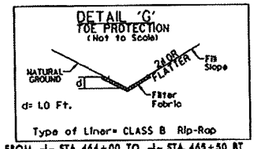


Type of Liner= CLASS I Rip-Rap

FROM -L- STA. 371+50 TO -L- STA. 372+70 RT
FROM -L- STA. 449+50 TO -L- STA. 451+50 RT
FROM -L- STA. 457+50 TO -L- STA. 459+00 RT
FROM -L- STA. 371+00 TO -L- STA. 373+90 LT
FROM -L- STA. 449+50 TO -L- STA. 453+10 LT

FROM -Y6- STA. 19+00 TO -Y6- STA. 21+50 LT

DETAIL 'G'
TOE PROTECTION
(Not to Scale)

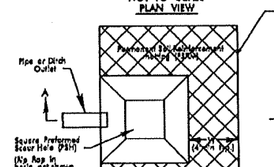


Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 464+00 TO -L- STA. 465+50 RT
FROM -L- STA. 488+50 TO -L- STA. 491+50 RT
FROM -L- STA. 491+77 TO -L- STA. 494+00 RT
FROM -L- STA. 505+50 TO -L- STA. 507+70 RT
FROM -L- STA. 373+90 TO -L- STA. 374+65 LT
FROM -L- STA. 465+00 TO -L- STA. 467+00 LT
FROM -L- STA. 519+00 TO -L- STA. 520+00 LT

FROM -Y6- STA. 33+30 TO -Y6- STA. 33+80 RT
FROM -RP6C- STA. 32+30 TO -RP6C- STA. 34+00 RT

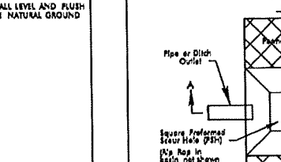
DETAIL 'I'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 410+50 TO -L- STA. 413+20 LT

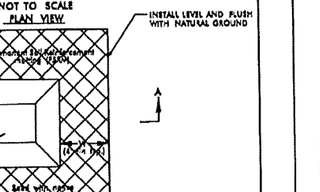
DETAIL 'J'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 458+05 TO -L- STA. 460+00 LT
FROM -Y6- STA. 19+50 TO -Y6- STA. 22+65 RT

DETAIL 'L'
PIPE OUTLET CHANNEL
(Not to Scale)

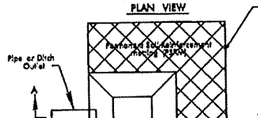


Type of Liner= CLASS I Rip-Rap

-L- STA. 410+78 RT
-L- STA. 453+14 LT

-Y6- STA. 21+68 LT

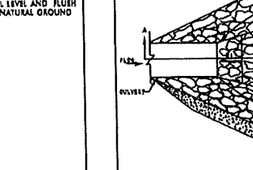
DETAIL 'N'
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

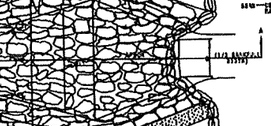
FROM -L- STA. 417+50 TO -L- STA. 420+50 LT

DETAIL 'O'
DRY DETENTION BASIN
END VIEW
(Not to Scale)



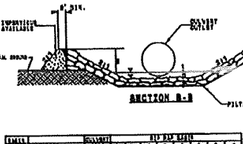
FROM -L- STA. 422+00 TO -L- STA. 425+00 RT

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



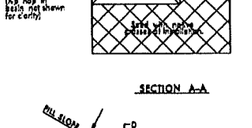
FROM -L- STA. 428+00 TO -L- STA. 429+00 RT
FROM -RP6D- STA. 16+70 TO -RP6D- STA. 19+50 LT

DETAIL 'Q'
BERM 'V' DITCH
(Not to Scale)



FROM -L- STA. 427+00 TO -L- STA. 428+00 RT
FROM -L- STA. 427+00 TO -L- STA. 430+00 LT
FROM -L- STA. 435+40 TO -L- STA. 437+50 LT

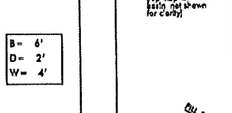
DETAIL 'R'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM -L- STA. 506+30 TO -L- STA. 507+80 LT

FROM -RP6C- STA. 31+50 TO -RP6C- STA. 33+50 LT
FROM -DR7B- STA. 10+50 TO -DR7B- STA. 11+50 LT

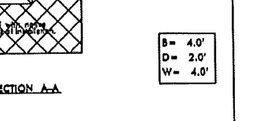
DETAIL 'S'
STANDARD 'V' DITCH
(Not to Scale)



-L- STA. 508+40 RT

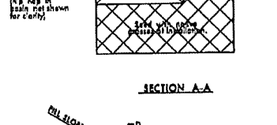
-RP6B- STA. 29+00 RT
-RP6B- STA. 27+50 LT

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



FROM -Y6- STA. 25+00 TO -Y6- STA. 26+00 RT
FROM -Y7- STA. 15+50 TO -Y7- STA. 16+50 RT

DETAIL 'U'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

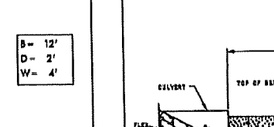


Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 475+85 TO -L- STA. 476+50 RT
FROM -L- STA. 517+00 TO -L- STA. 518+50 RT

FROM -Y6- STA. 25+15 TO -Y6- STA. 27+35 LT

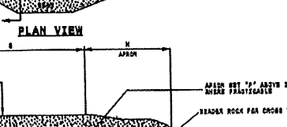
DETAIL 'V'
BERM BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -RP6D- STA. 19+50 TO -RP6D- STA. 20+50 LT

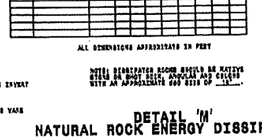
DETAIL 'X'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap ON BANKS

FROM STA. 452+00 TO STA. 453+00 -L- RT

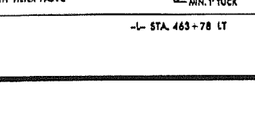
DETAIL 'Z'
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

-L- STA. 456+45 LT

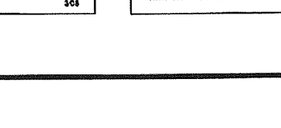
DETAIL 'AA'
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

-L- STA. 462+50 LT

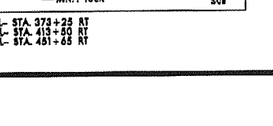
DETAIL 'AB'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

-L- STA. 464+88 LT

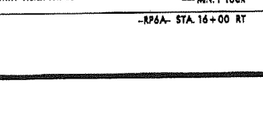
DETAIL 'AC'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

FROM -L- STA. 453+00 TO -L- STA. 454+50 RT
FROM -L- STA. 474+00 TO -L- STA. 475+50 LT
FROM -L- STA. 488+00 TO -L- STA. 490+30 LT

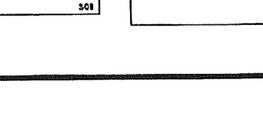
DETAIL 'AD'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

-L- STA. 475+83 RT

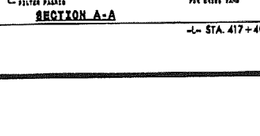
DETAIL 'AE'
BERM 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

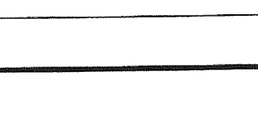
FROM -L- STA. 476+50 TO -L- STA. 477+50 RT

DETAIL 'AF'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM -Y7- STA. 19+23 TO -Y7- STA. 20+50 RT

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



Type of Liner= CLASS I Rip-Rap

-L- STA. 490+35 LT

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

Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 503+00 TO -L- STA. 506+30 LT

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

Type of Liner= CLASS I Rip-Rap

-L- STA. 508+20 RT
-L- STA. 475+55 LT

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

Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 511+00 TO -L- STA. 515+90 LT

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

Type of Liner= CLASS I Rip-Rap ON BANKS

FROM STA. 451+85 TO STA. 452+00 -L- RT
FROM STA. 453+00 TO STA. 453+32 -L- RT

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

Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 510+78 TO -L- STA. 517+00 RT

DETAIL 'AM'
BANK STABILIZATION
(Not to Scale)

Type of Liner= CLASS I Rip-Rap

-Y6- STA. 22+00 LT
-L- STA. 411+00 RT
-L- STA. 453+00 LT

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

Type of Liner= CLASS I Rip-Rap

FROM -L- STA. 417+57 TO -L- STA. 418+00 RT

DETAIL 'A'
PREFORMED SCOUR HOLE
*NOT TO SCALE

-L- STA. 463+78 LT

DETAIL 'K'
PREFORMED SCOUR HOLE
*NOT TO SCALE

-L- STA. 373+25 RT
-L- STA. 413+50 RT
-L- STA. 451+65 RT

DETAIL 'W'
PREFORMED SCOUR HOLE
*NOT TO SCALE

-RP6A- STA. 16+00 RT

DETAIL 'M'
NATURAL ROCK ENERGY DISSIPATOR
(NOT TO SCALE)

-L- STA. 417+40 RT

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

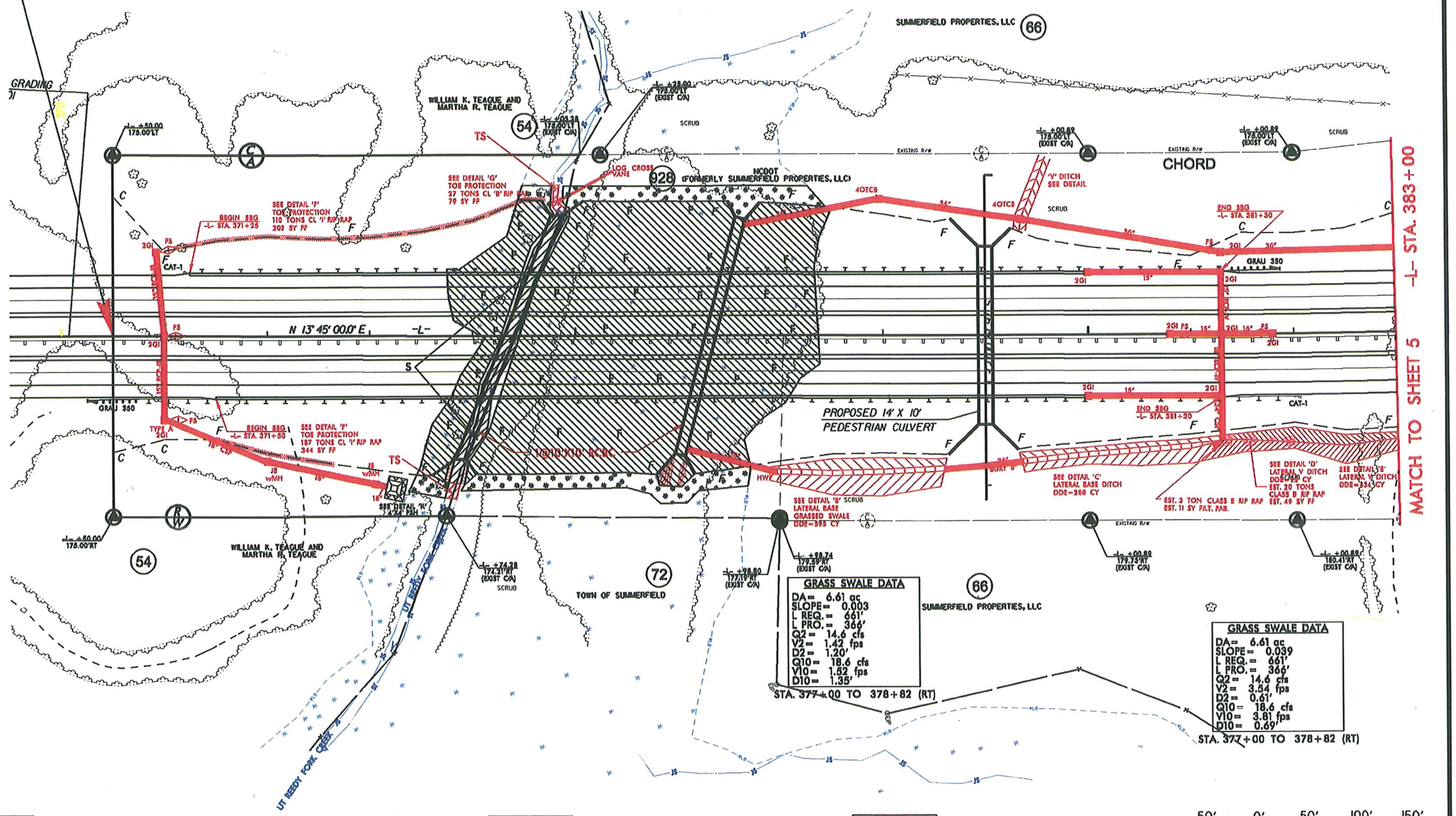
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 3 of 31

NAD 83/NSRS 2007

BEGIN TIP PROJECT R-2413B -L- Sta. 370+50.00
END TIP PROJECT R-2413A -L- Sta. 370+50.00
TIE GUARDRAIL & MEDIAN GUIDERAIL TO TIP PROJECT R-2413A

SITE 1



DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

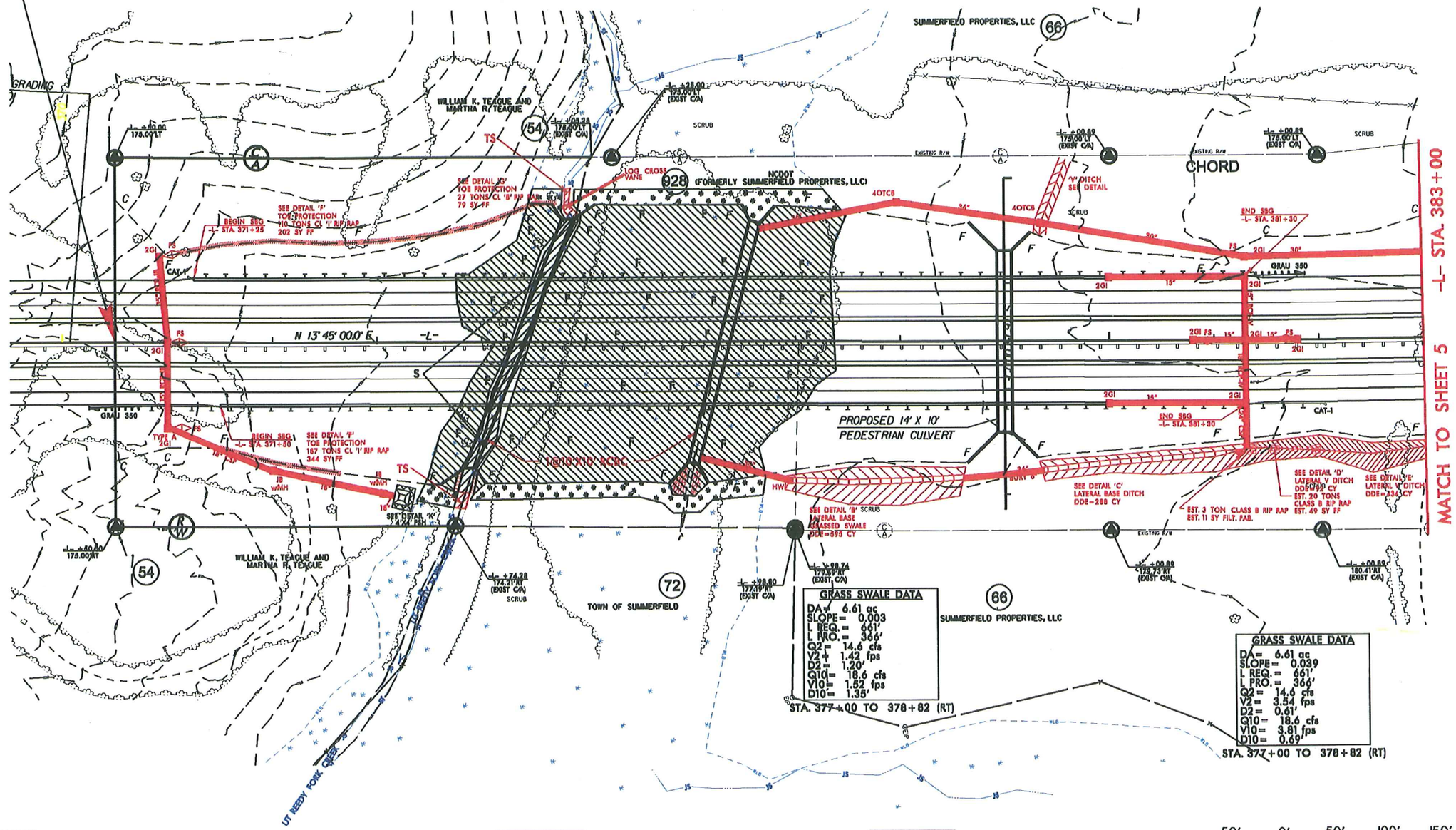
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 4 of 31

NAD 83/NSRS 2007

BEGIN TIP PROJECT R-2413B -L- Sta. 370+50.00
END TIP PROJECT R-2413A -L- Sta. 370+50.00
TIE GUARDRAIL & MEDIAN GUIDERAIL TO TIP PROJECT R-2413A

SITE 1



DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

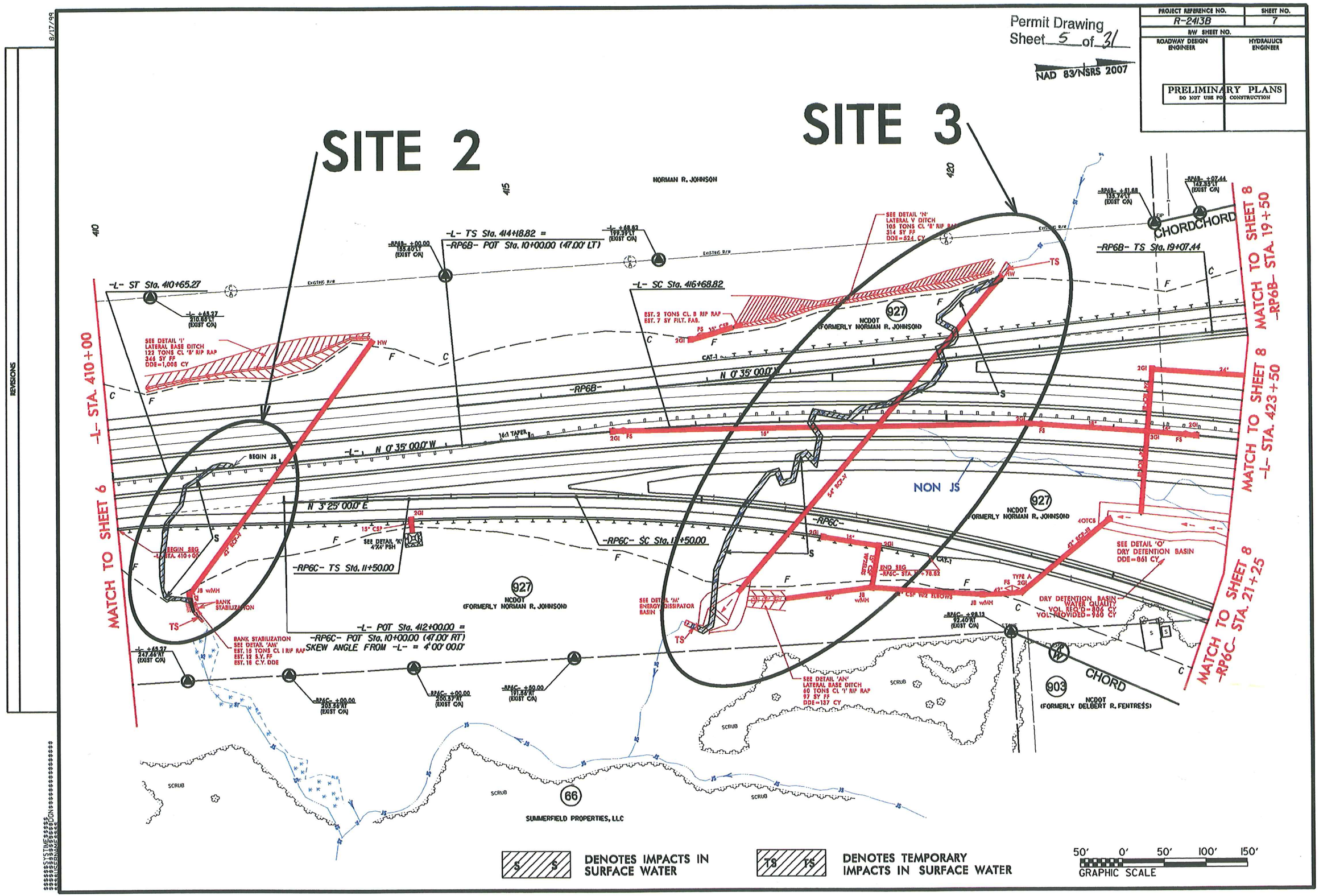
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

8/17/99



Permit Drawing
Sheet 5 of 31
NAD 83/NSRS 2007
PROJECT REFERENCE NO.
R-2413B
SHEET NO.
7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SITE 2
SITE 3
NORMAN R. JOHNSON
-L- ST Sta. 410+65.27
-L- TS Sta. 414+18.82 =
-RP6B- POT Sta. 10+00.00 (47.00' LT)
-L- SC Sta. 416+68.82
-RP6B- TS Sta. 19+07.44
CHORDCHORD
MATCH TO SHEET 8
-RP6B- STA. 19+50
MATCH TO SHEET 8
-L- STA. 423+50
MATCH TO SHEET 8
-RP6C- STA. 21+25
MATCH TO SHEET 6
-L- STA. 410+00
SEE DETAIL 'I'
LATERAL BASE DITCH
122 TONS CL 'B' RIP RAP
346 SY FF
DDE=1,008 CY
EST. 2 TONS CL. B RIP RAP
EST. 7 SY FILT. FAB.
SEE DETAIL 'N'
LATERAL V DITCH
105 TONS CL 'B' RIP RAP
314 SY FF
DDE=524 CY
N 0° 35' 00.0" W
-RP6B-
-L- N 0° 35' 00.0" W
16:1 TAPER
BEGIN JS
NON JS
N 3° 25' 00.0" E
-RP6C-
-RP6C- SC Sta. 11+50.00
-RP6C- TS Sta. 11+50.00
SEE DETAIL 'K'
4'X4' PSH
BEGIN SBG
-L- STA. 410+00
BANK STABILIZATION
SEE DETAIL 'M'
ENERGY DISSIPATOR BASIN
END SBG
-RP6C- STA. 11+78.82
SEE DETAIL 'O'
DRY DETENTION BASIN
DDE=861 CY
DRY DETENTION BASIN
WATER QUALITY
VOL. REQ'D=806 CY
VOL. PROVIDED=960 CY
-L- POT Sta. 412+00.00 =
-RP6C- POT Sta. 10+00.00 (47.00' RT)
SKEW ANGLE FROM -L- = 4° 00' 00.0"
BANK STABILIZATION
SEE DETAIL 'AM'
EST. 15 TONS CL I RIP RAP
EST. 12 S.Y. FF
EST. 18 C.Y. DDE
SEE DETAIL 'AN'
LATERAL BASE DITCH
60 TONS CL 'I' RIP RAP
97 SY FF
DDE=137 CY
CHORD
NCDOT
(FORMERLY NORMAN R. JOHNSON)
927
903
NCDOT
(FORMERLY DELBERT R. FENTRESS)
66
SUMMERFIELD PROPERTIES, LLC
SCRUB
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50' 100' 150'
GRAPHIC SCALE
REVISIONS
8/17/99

PROJECT REFERENCE NO. R-2413B
SHEET NO. 7
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 6 of 31
NAD 83/NSRS 2007
SITE 2
SITE 3
REVISIONS
8/17/99
NORMAN R. JOHNSON
-L- ST Sta. 410+65.27
-L- TS Sta. 414+18.82 =
-RP6B- POT Sta. 10+00.00 (47.00' LT)
-L- SC Sta. 416+68.82
-RP6B- TS Sta. 19+07.44
-RP6C- TS Sta. 11+50.00
-RP6C- SC Sta. 11+50.00
-L- POT Sta. 412+00.00 =
-RP6C- POT Sta. 10+00.00 (47.00' RT)
SKEW ANGLE FROM -L- = 4°00'00.0"
N 0°35'00.0" W
N 3°25'00.0" E
-RP6B-
-RP6C-
SEE DETAIL 'I'
LATERAL BASE DITCH
122 TONS CL 'B' RIP RAP
346 SY FF
DDE=1,008 CY
SEE DETAIL 'N'
LATERAL V DITCH
105 TONS CL 'B' RIP RAP
314 SY FF
DDE=824 CY
EST. 2 TONS CL. B RIP RAP
EST. 7 SY FILT. FAB.
BEGIN JS
BEGIN SBG
-L- STA. 410+00
BANK STABILIZATION
BANK STABILIZATION
SEE DETAIL 'AM'
EST. 15 TONS CL I RIP RAP
EST. 19 S.Y. FF
EST. 18 C.Y. DDE
SEE DETAIL 'K'
4'X4' PSH
SEE DETAIL 'M'
ENERGY DISSIPATOR BASIN
SEE DETAIL 'AN'
LATERAL BASE DITCH
65 TONS CL 'I' RIP RAP
97 SY FF
DDE=137 CY
END SBG
-RP6C- STA. 11+78.62
SEE DETAIL 'O'
DRY DETENTION BASIN
DDE=601 CY
DRY DETENTION BASIN
WATER QUALITY
VOL. REQ'D=806 CY
VOL. PROVIDED=960 CY
927
NCDOT
(FORMERLY NORMAN R. JOHNSON)
903
NCDOT
(FORMERLY DELBERT R. FENTRESS)
66
SUMMERFIELD PROPERTIES, LLC
NON JS
CHORD
SCRUB
16:1 TAPER
CAT-1
MATCH TO SHEET 6
-L- STA. 410+00
MATCH TO SHEET 8
-RP6B- STA. 19+50
MATCH TO SHEET 8
-L- STA. 423+50
MATCH TO SHEET 8
-RP6C- STA. 21+25
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50' 100' 150'
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 7 of 31

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

NAD 83/NSRS 2007

SITE 4

MATCH TO SHEET 14 -Y6A- STA. 11+00

MATCH TO SHEET 14 -Y6- STA. 19+00

MATCH TO SHEET 7 -R6B- STA. 19+50

MATCH TO SHEET 7 -L- STA. 423+50

MATCH TO SHEET 7 -R6C- STA. 21+25

MATCH TO SHEET 15 -Y6- STA. 35+00

MATCH TO SHEET 9 -L- STA. 451+00

DRY DETENTION BASIN
WATER QUALITY
VOL. REQ'D =
VOL. PROVIDED =

Dry Detention Basin With Draw Down Structure

Earth Berm/ Fence Crash

HENSON FOREST HOA, INC.

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.

SODLE, KENNETH D. AND ROSE M.

DAVID M. KAMORA AND JUDEY KAMORA

RICHARD G. CALASS AND BARBARA CALASS

RICHARD LEON BEESON AND JOAN T. BEESON

HENSON VILLAGE, LLC

NCDOT (FORMERLY MORGAN R. JOHNSON)

NCDOT (FORMERLY GREGORY L. OSBORNE)

NCDOT (FORMERLY DONALD L. HENSON)

NCDOT (FORMERLY IZULA Y. FENTRESS)

NCDOT (FORMERLY JOHN T. SPRUELL)

NCDOT (FORMERLY DELBERT R. FENTRESS)

BANK STABILIZATION

STAND. 6" DECK DRAIN @ 12' O.C. FROM STA. 29+05 TO STA. 29+50 END OF BRIDGE -Y6- RT

STAND. 6" DECK DRAIN @ 12' O.C. FROM STA. 29+43 TO STA. 29+87 END OF BRIDGE -Y6- LT

TOE PROTECTION 332 TONS CL 'I' RIP RAP 237 SY FF

SEE DETAIL 'I' TOE PROTECTION 29 TONS CL 'I' RIP RAP 237 SY FF

BEGIN SBG -R6D- STA. 13+25

N 33°40'00.0"E

S 12°50'20.0"E

N 10°20'20.0"E

S 10°24'00.0"W

N 5°24'00.0"E

S 32°28'30.0"W

CHORD

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 8 of 31

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

NAD 83/NSRS 2007

SITE 4

MATCH TO SHEET 14 -Y6A- STA. 11+00

MATCH TO SHEET 14 -Y6- STA. 19+00

MATCH TO SHEET 7 -R6B- STA. 19+50

MATCH TO SHEET 7 -L- STA. 423+50

MATCH TO SHEET 7 -R6C- STA. 21+25

MATCH TO SHEET 15 -Y6- STA. 35+00

MATCH TO SHEET 9 -L- STA. 451+00

DRY DETENTION BASIN
WATER QUALITY
VOL. REQ'D =
VOL. PROVIDED =

Dry Detention Basin
With Draw Down Structure

Earth Berm
From Cut

HENSON FOREST HOA, INC.

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.

HENSON VILLAGE, LLC

SODLE, KENNETH D. AND ROSE M.

NCDOT (FORMERLY NORMAN R. JOHNSON)

NCDOT (FORMERLY DONALD L. HENSON)

NCDOT (FORMERLY GREGORY L. OSBORNE)

NCDOT (FORMERLY JOHN T. SPRUILL)

NCDOT (FORMERLY ZULA V. PENTRESS)

NCDOT (FORMERLY DELBERT R. PENTRESS)

DAVID M. RAMORA AND JUDKEY RAMORA

RICHARD O. CALASS AND BARBARA CALASS

RICHARD LEON BIBSON AND JOAN Y. BIBSON

BANK STABILIZATION

STAND. 6" DECK DRAIN @ 12' O.C. FROM STA. 27+44 BEG. OF BRIDGE TO STA. 27+87 END OF BRIDGE -Y6- LT

STAND. 6" DECK DRAIN @ 12' O.C. FROM STA. 29+05 TO STA. 29+57 END OF BRIDGE -Y6- RT

STAND. 6" DECK DRAIN @ 12' O.C. FROM STA. 29+42 TO STA. 29+87 END OF BRIDGE -Y6- LT

TYPE A 2GI

TYPE D 2GI

TYPE FS 24" CSP

TYPE FS 18" CSP

15" CSP

15" RCP-FF

18" CSP WELDED WIRE

24" CSP W=315 LBS

CHORD

N 54°24'00"W

S 54°24'00"E

N 35°40'00"E

S 35°40'00"W

PROJECT REFERENCE NO. R-2413B
SHEET NO. 9
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 9 of 31
NAD 83/NSRS 2007
8/17/99
REVISIONS
SITE 5
SITE 5A
HENSON FOREST HOMEOWNERS ASSOCIATION, INC.
26
HENSON FOREST HOA, INC.
BANK STABILIZATION
SEE DETAIL 'AM'
EST. 15 TONS CLASS I RIP RAP
EST. 12 S.Y. F.F.
EST. 16 C.Y. DDE
BANK STABILIZATION DETAIL 'AM'
SEE DETAIL 'F'
TOE PROTECTION
232 TONS CL 'I' RIP RAP
427 SY FF
SEE DETAIL 'Z'
STANDARD V DITCH
17 TONS CL I RIP RAP
30 SY FF
DDE=20 CY
SEE DETAIL 'J'
LATERAL BASE DITCH
88 TONS CL B RIP RAP
248 SY FF
DDE=447 CY
NCDOT
(FORMERLY DONALD L. HENSON)
904
SEE DETAIL 'AA'
STANDARD V DITCH
49 TONS CL B RIP RAP
147 SY FF
DDE=150 CY
SEE DETAIL 'A'
6'X6' PSH
-L- STA. 451+00
-L- STA. 464+00
MATCH TO SHEET 8
MATCH TO SHEET 10
N 33°40' 00.0" E
-L-
SEE DETAIL 'F'
TOE PROTECTION
128 TONS CL 'I' RIP RAP
237 SY FF
SEE DETAIL 'K'
SEE DETAIL 'X'
LATERAL BASE DITCH
199 TONS CL I RIP RAP ON BANKS
450 SY FF
SEE DETAIL 'AK'
STAND. BASE DITCH
30 TONS CL I RIP RAP ON BANKS
6 SY FF
EST. DDE=40 CY
SEE DETAIL 'AK'
STANDARD BASE DITCH
63 TONS CL I RIP RAP ON BANKS
11 SY FF
EST. DDE=20 CY
SEE DETAIL 'AC'
LATERAL BASE DITCH
97 TONS CL I RIP RAP
178 SY FF
END SBG
-L- STA. 455+16
SEE DETAIL 'F'
TOE PROTECTION
97 TONS CL 'I' RIP RAP
178 SY FF
HENSON VILLAGE, LLC
30
PAUL G. MILAM AND VIRGINIA MILAM
-L- POT Sta. 451+92.79 =
-RP6D- ST Sta. 10+00.00 (47.00' RT)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50' 100' 150'
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 10 of 31

NAD 83/NSRS 2007

8/17/99

REVISIONS

SITE 5

SITE 5A

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

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

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 11 of 31

NAD 83/NSRS 2007

SITE 6

SITE 7

MATCH TO SHEET 9 — STA. 464+00

MATCH TO SHEET 11 — STA. 491+00

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.

KEVIN J. HILLIS

ROBERT E. ATKINSON AND MARIA E. ATKINSON

J. VAN FRIDDLE AND SARAH D. FRIDDLE

HENSON VILLAGE, LLC

PAUL G. MILAM AND VIRGINIA MILAM

MARY F. PARRISH

JAMES LEO FORREST AND SHIRLEY S. FORREST

JAMES LEO PARRISH AND SHIRLEY S. PARRISH

FRANCES B. ANGEL

JEFFREY W. REEH

STELLA COOK SMITH

NCDOT (FORMERLY DONALD L. HENSON)

SEE DETAIL 'AB' STAND. BASE DITCH EST. 93 TONS CL 'I' RIP RAP

SEE DETAIL 'G' TOE PROTECTION 70 TONS CL 'B' RIP RAP 210 SY FF

SEE DETAIL 'A' STANDARD BASE DITCH EST. 61 TONS CL 'I' RIP RAP

SEE DETAIL 'AC' LATERAL BASE DITCH 40 TONS CL I RIP RAP 74 SY FF DOD=1.0 CY

SEE DETAIL 'T' LATERAL V DITCH DOD=.47 CY

SEE DETAIL 'AB' STAND. BASE DITCH

SEE DETAIL 'D' SPECIAL LATERAL DITCH

SEE DETAIL 'AD' SPECIAL V DITCH

SEE DETAIL 'K' SPECIAL V DITCH

EST. 2 TONS CL B RIP-RAP EST. 7 SY FILT. FAB

SEE DETAIL 'AG' STAND. BASE DITCH 41 TONS CLASS I RIP RAP 46 SY FF DOD=.80CY CHORD

SEE DETAIL 'AC' LAT. BASE DITCH 203 TONS CLASS I RIP RAP 518 SY FF DOD=2.50 CY

EST. 6 TONS CLASS I RIP RAP, EST. 14 SY FILT. FAB

SEE DETAIL 'G' TOE PROTECTION 108 TONS CLASS I RIP RAP 79 SY FF

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 12 of 31

NAD 83/NSRS 2007

SITE 6

SITE 7

MATCH TO SHEET 9 -L- STA. 464+00

MATCH TO SHEET 11 -L- STA. 491+00

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.

J. VAN FRIDDLE AND SARAH D. FRIDDLE

STELLA COOK SMITH

MARY F. PARRISH

JAMES LEO FORREST AND SHIRLEY S. FORREST

JAMES LEO PARRISH AND SHIRLEY S. PARRISH

FRANCES B. ANGEL

JEFFREY W. REED

PAUL G. MILAM AND VIRGINIA MILAM

HENSON VILLAGE, LLC

(FORMERLY DONALD L. HENSON)

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

Permit Drawing
Sheet 13 of 31

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/99

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

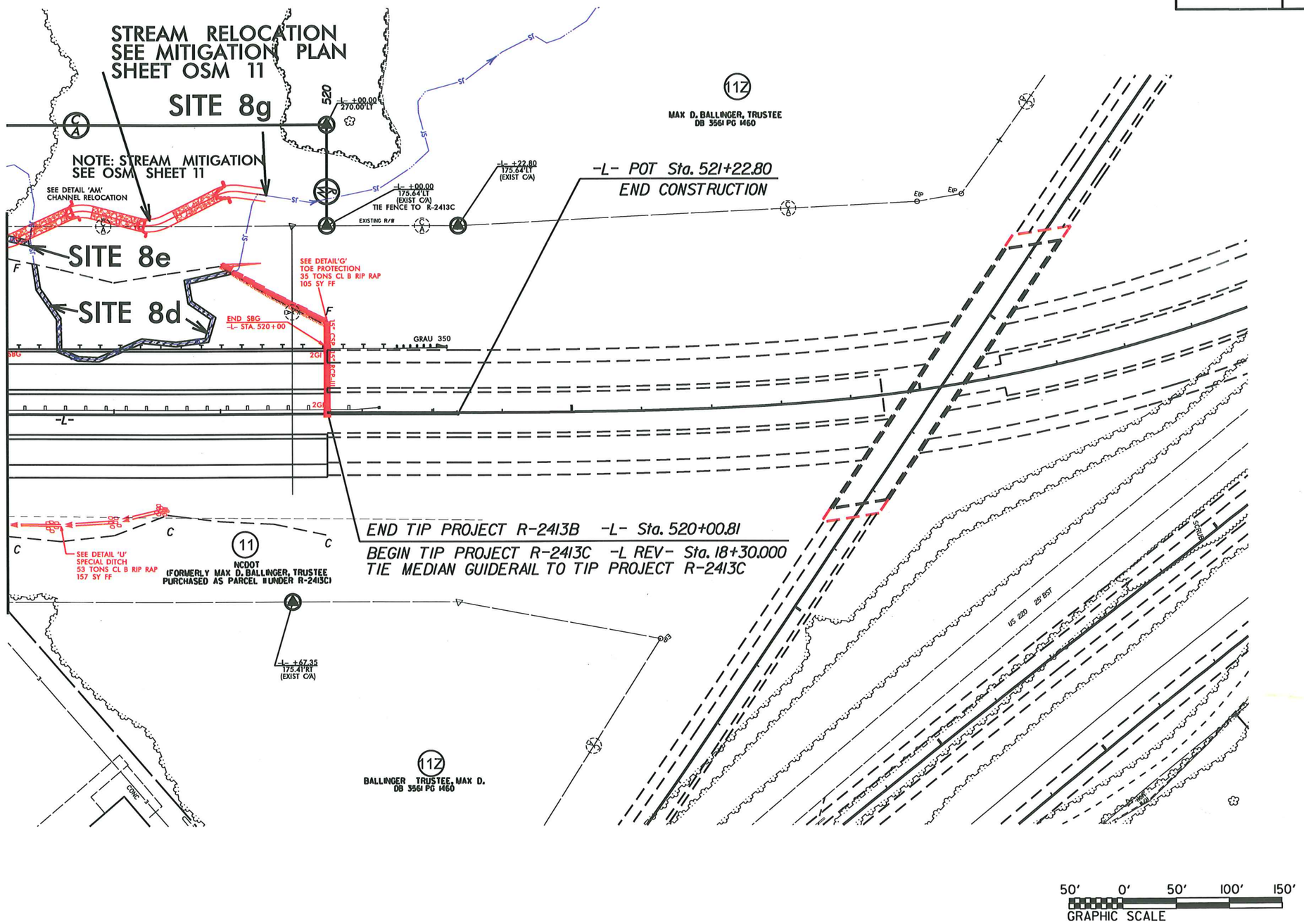
PROJECT REFERENCE NO. R-2413B
SHEET NO. 12
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 14 of 31
NAD 83/NSRS 2007
SITE 8
SITE 8a
SITE 8b
SITE 8c
SITE 8f
SITE 8g
STREAM RELOCATION
SEE MITIGATION PLAN
SHEET OSM 11
STREAM RESTORATION
SEE MITIGATION PLAN
SHEET OSM 10
FLOODPLAIN GRADING
SEE MITIGATION PLAN
UT TO HAW RIVER
TEMPORARY WETLAND EXCAVATION
REMOVE
MATCH TO SHEET 11 -L- STA. 504+00
MATCH TO SHEET 13 -L- STA. 517+00
SIMAAN 220, LLC
MAX D. BALLINGER, TRUSTEE
NCDOT
(FORMERLY MAX D. BALLINGER, TRUSTEE
PURCHASED AS PARCEL II UNDER R-2413C)
BATTIN, ROBERT D AND JOAN M
BATTIN ENTERPRISES LLC.
BATTIN REAL ESTATE LLC.
SEE DETAIL 'AH'
SPECIAL BASE DITCH
59 TONS CLASS B RIP RAP
165 SY FF
SEE DETAIL 'R'
SPECIAL V DITCH
SEE DETAIL 'G'
TOE PROTECTION
77 TONS CL 'B' RIP RAP
231 SY FF
SEE DETAIL 'AJ'
LAT. BASE DITCH
280 TONS CL. B RIP RAP
750 SY FF
DDE=1739 CY
SEE DETAIL 'AL'
LAT. BASE DITCH
380 TONS CL B RIP RAP
1013 SY FF
DDE=889 CY
SEE DETAIL 'AI'
STANDARD BASE DITCH
PROPOSED 1@10'X8' RCBC
W/ALTERNATE LOW FLOW SILLS
STREAM RESTORATION
SEE MITIGATION PLAN
BEGIN SBG -L- STA. 505+25
BEGIN SBG -L- STA. 510+75
END SBG -L- STA. 516+50
CL B RIP RAP
4OTCB W/MAN HOLE
20' UTILITY EASEMENT PB73 PG241
N 19°21'12.2" E
-L- +76.80 175.68' LT (EXIST C/A)
-L- +84.11 175.67' LT (EXIST C/A)
-L- +50.00 270.00' LT
-L- +50.00 175.65' LT (EXIST C/A)
-L- +30 175.00' RT
-L- +00.00 195.00' RT
-L- +25.00 175.00' RT
-L- +93.28 175.40' RT (EXIST R/W)
EXISTING R/W
SCRUB
GRAU 350
CAT-1
DENOTES TEMPORARY EXCAVATION IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
50' 0' 50' 100' 150'
GRAPHIC SCALE
REVISIONS
8/17/99

Permit Drawing
Sheet 15 of 31

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



8/17/99

8/17/99

Permit Drawing
Sheet 16 of 31

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

STREAM RELOCATION
SEE MITIGATION PLAN
SHEET OSM 11

SITE 8g

NOTE: STREAM MITIGATION
SEE OSM SHEET 11

SEE DETAIL 'AM'
CHANNEL RELOCATION

SITE 8e

SITE 8d

SEE DETAIL 'G'
TOE PROTECTION
35 TONS CL B RIP RAP
105 SY FF

RMD SBG
STA. 520+00

GRAU 350

SEE DETAIL 'U'
SPECIAL DITCH
53 TONS CL B RIP RAP
157 SY FF

11
NCDOT
(FORMERLY MAX D. BALLINGER, TRUSTEE
PURCHASED AS PARCEL 11 UNDER R-2413C)

11Z
BALLINGER TRUSTEE, MAX D.
DB 3561 PG 1460

11Z
MAX D. BALLINGER, TRUSTEE
DB 3561 PG 1460

-L- +00.00
270.00 LT

-L- +00.00
175.64 LT
(EXIST C/A)

TIE FENCE TO R-2413C

-EXISTING R/W

-L- +22.80
175.64 LT
(EXIST C/A)

-L- POT Sta. 521+22.80
END CONSTRUCTION

-L- +67.35
175.41 RT
(EXIST C/A)

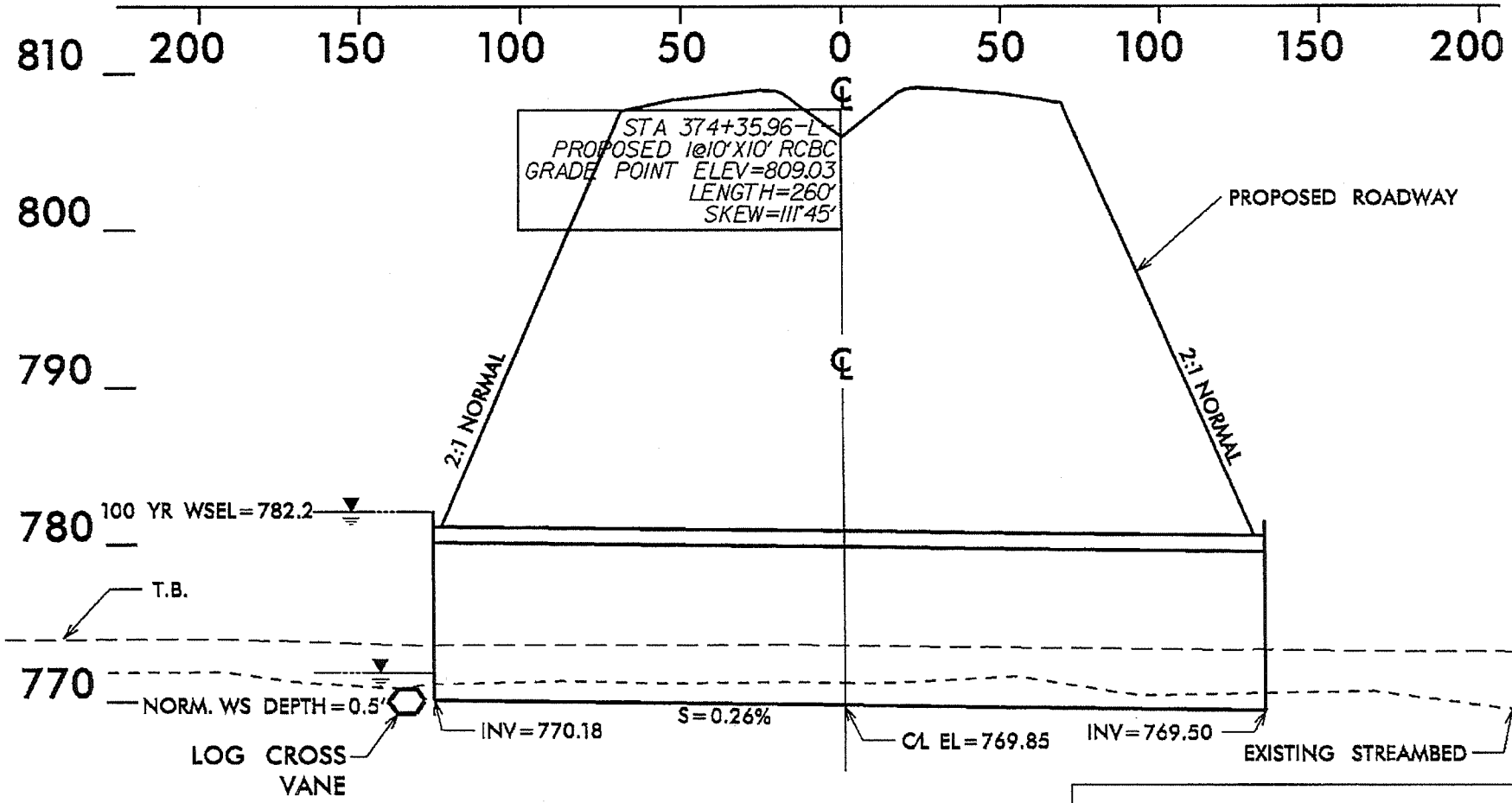
END TIP PROJECT R-2413B -L- Sta. 520+00.81

BEGIN TIP PROJECT R-2413C -L REV- Sta. 18+30.000
TIE MEDIAN GUIDERAIL TO TIP PROJECT R-2413C

US 220 25 EXIT

50' 0' 50' 100' 150'
GRAPHIC SCALE

$$$$SYSTIME$$$$
$$$$ICERNAME$$$$



PROFILE

SITE 1

(MAIN CHANNEL)

SCALE

1:50' HORIZONTAL

1:10' VERTICAL

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

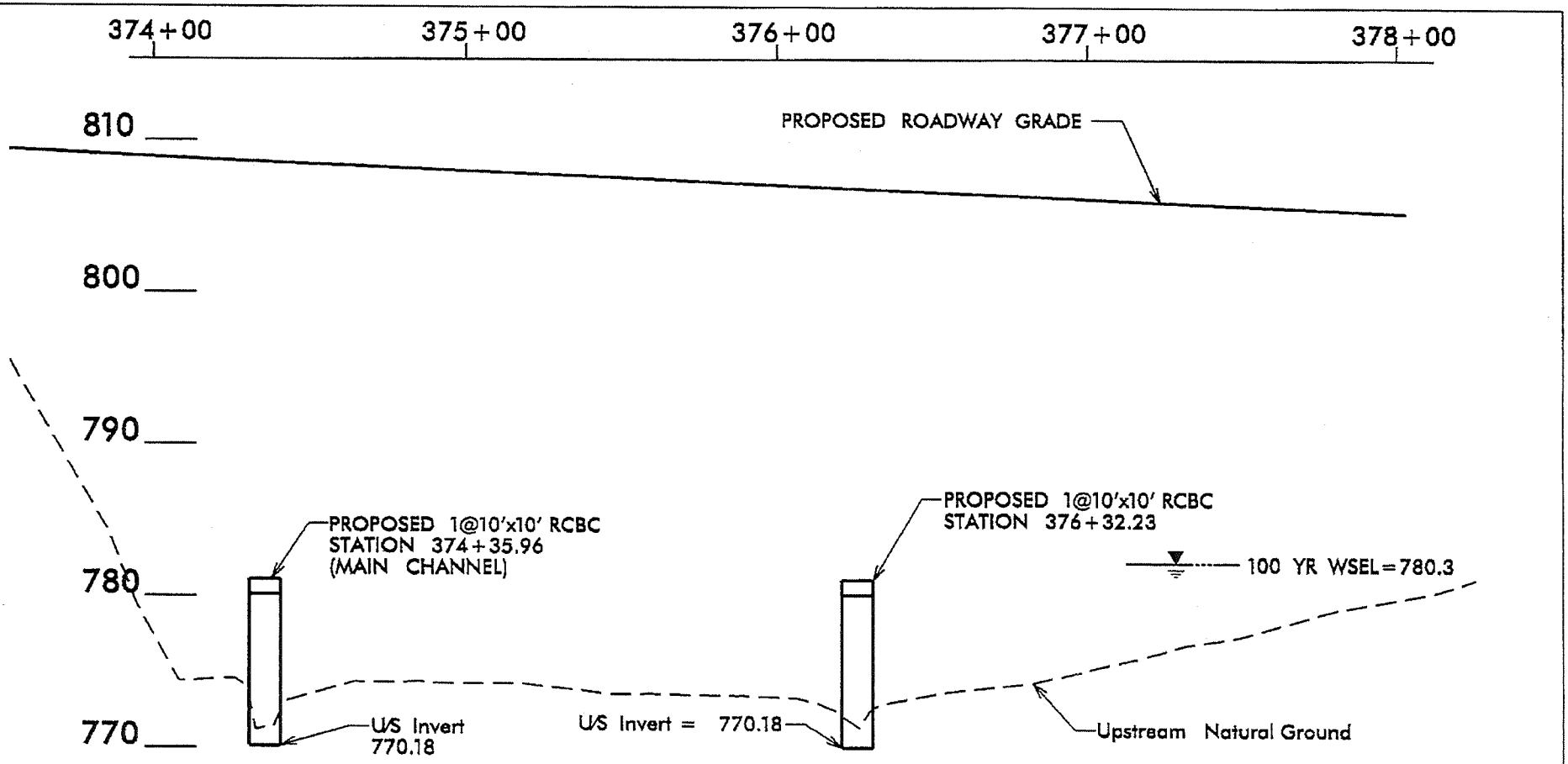
PROJECT: 34429.1.1 (R2413B)

NC 68 BETWEEN

SR 2127 (BROOKBANK ROAD)

AND NC 150

SHEET 17 OF 31 04/01/13



SECTION

SITE 1

SCALE

1:50' HORIZONTAL

1:10' VERTICAL

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R2413B)

NC 68 BETWEEN

SR 2127 (BROOKBANK ROAD)

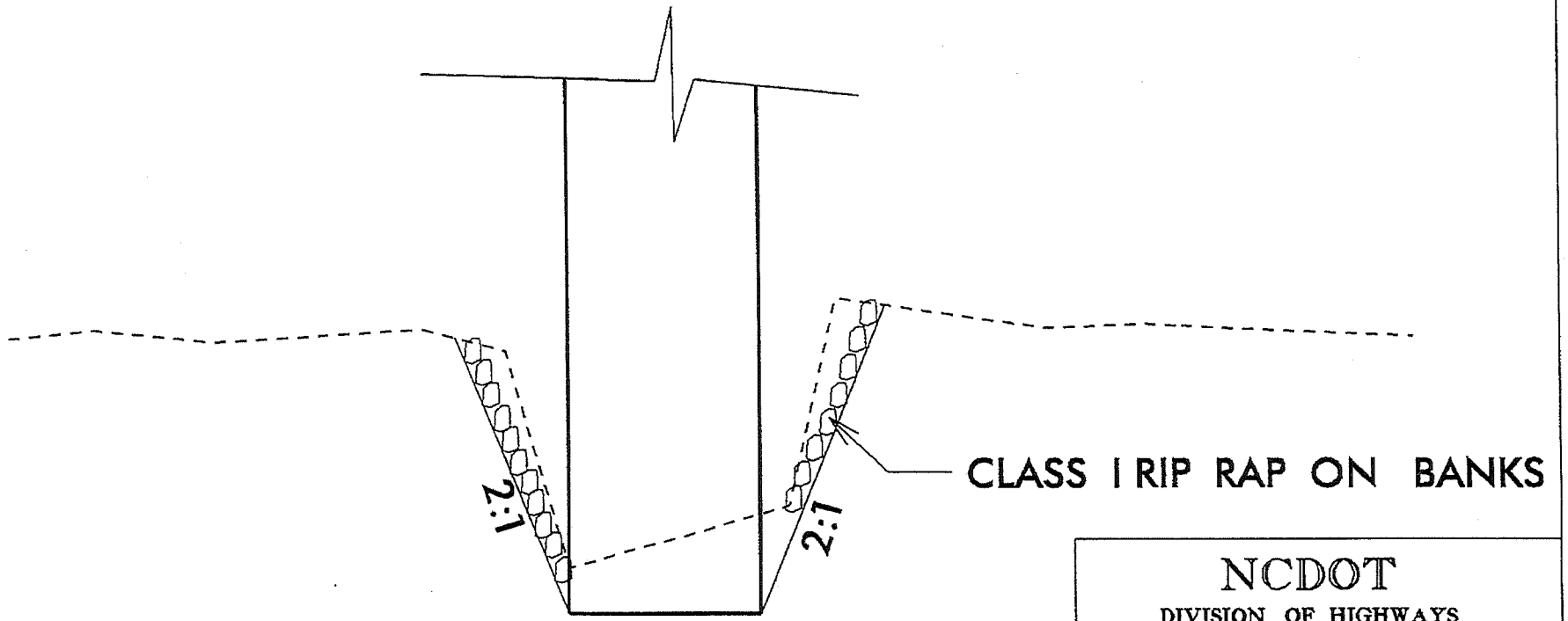
AND NC 150

SHEET 18 OF 31

04/01/13

DETAIL OF RIP RAP ON BANKS AT D/S FACE OF 1@10'X10' RCBC

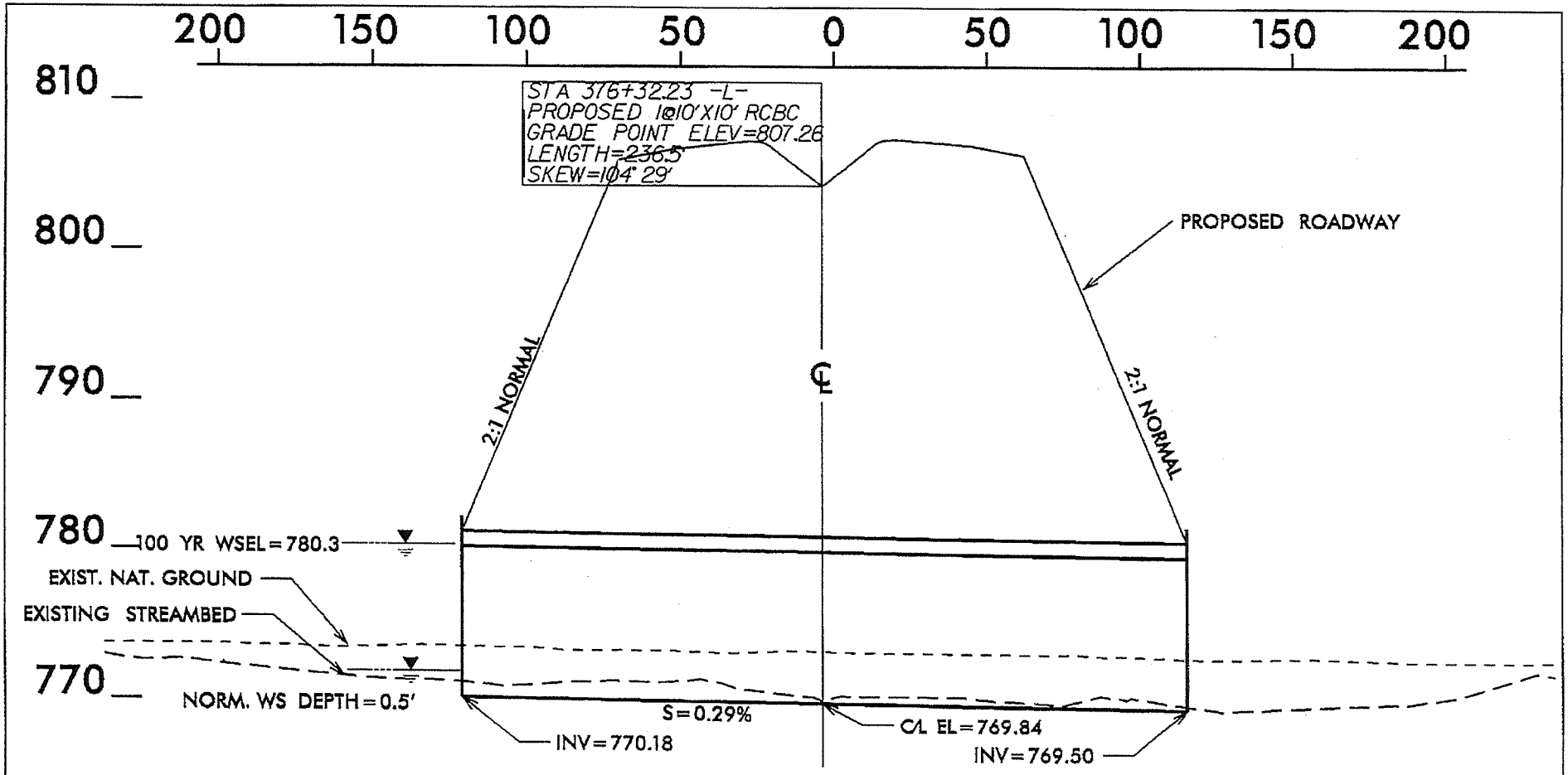
(N.T.S.)



SITE 1

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

SHEET 19 OF 31 04/01/13



PROFILE

SITE 1

SCALE

1:50' HORIZONTAL

1:10' VERTICAL

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

PROJECT: 34429.1.1 (R2413B)

NC 68 BETWEEN

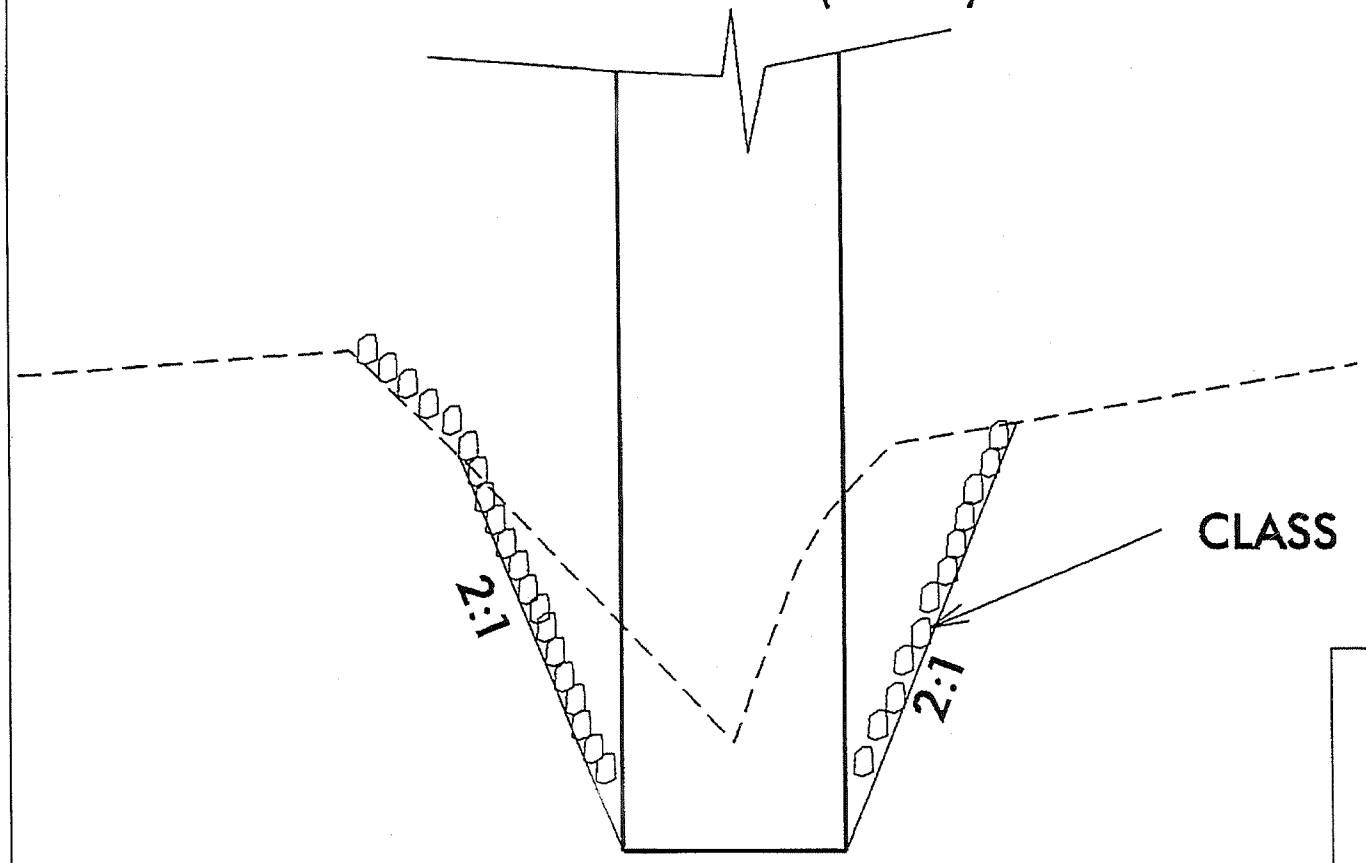
SR 2127 (BROOKBANK ROAD)

AND NC 150

SHEET 20 OF 31 04/01/13

DETAIL OF RIP RAP ON BANKS AT D/S FACE OF 1@10'X10' RCBC

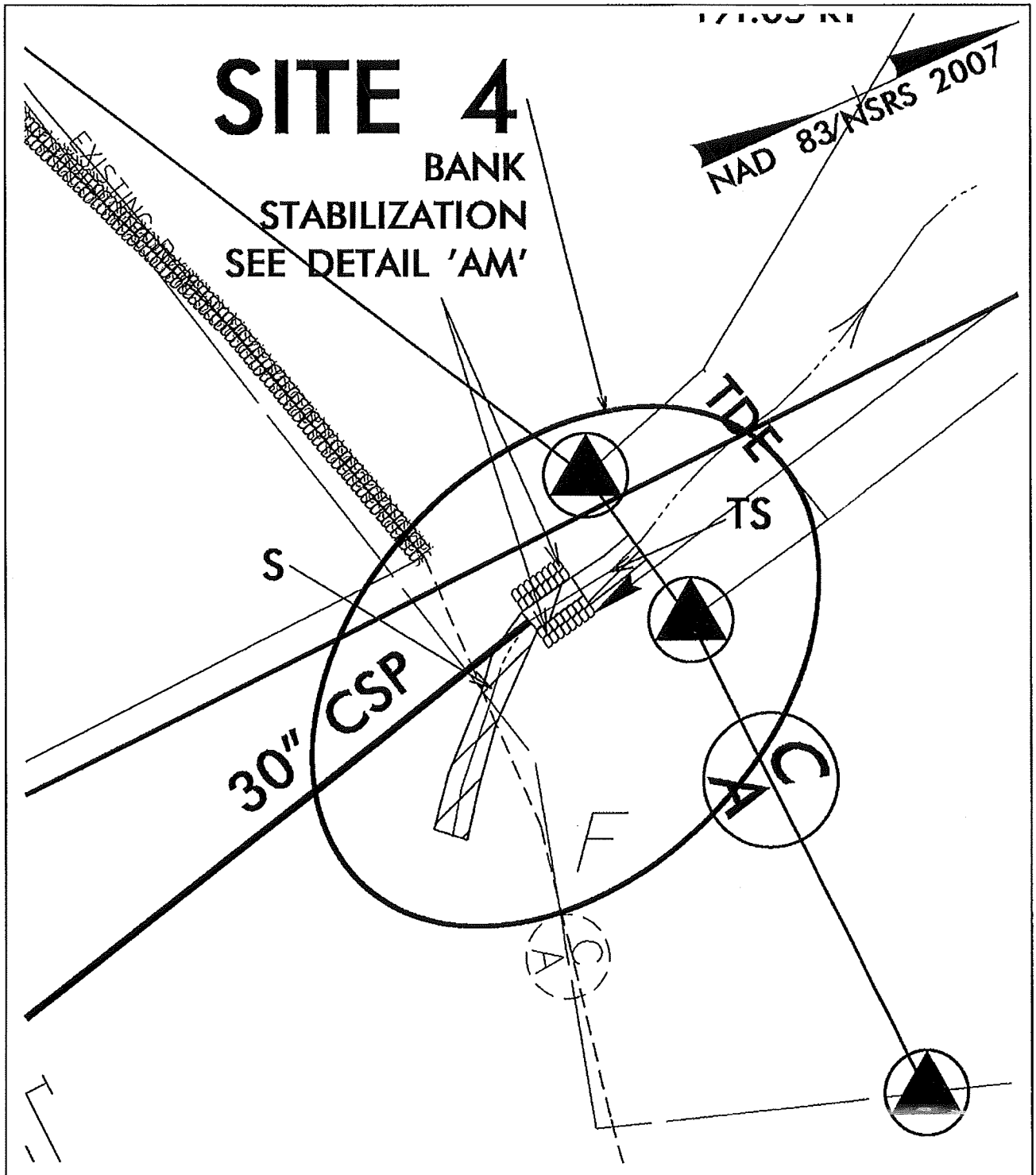
(N.T.S.)



SITE 1

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

SHEET 21 OF 31 04/01/13



IMPACT ENLARGEMENT

S / S — DENOTES IMPACTS IN SURFACE WATER

TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

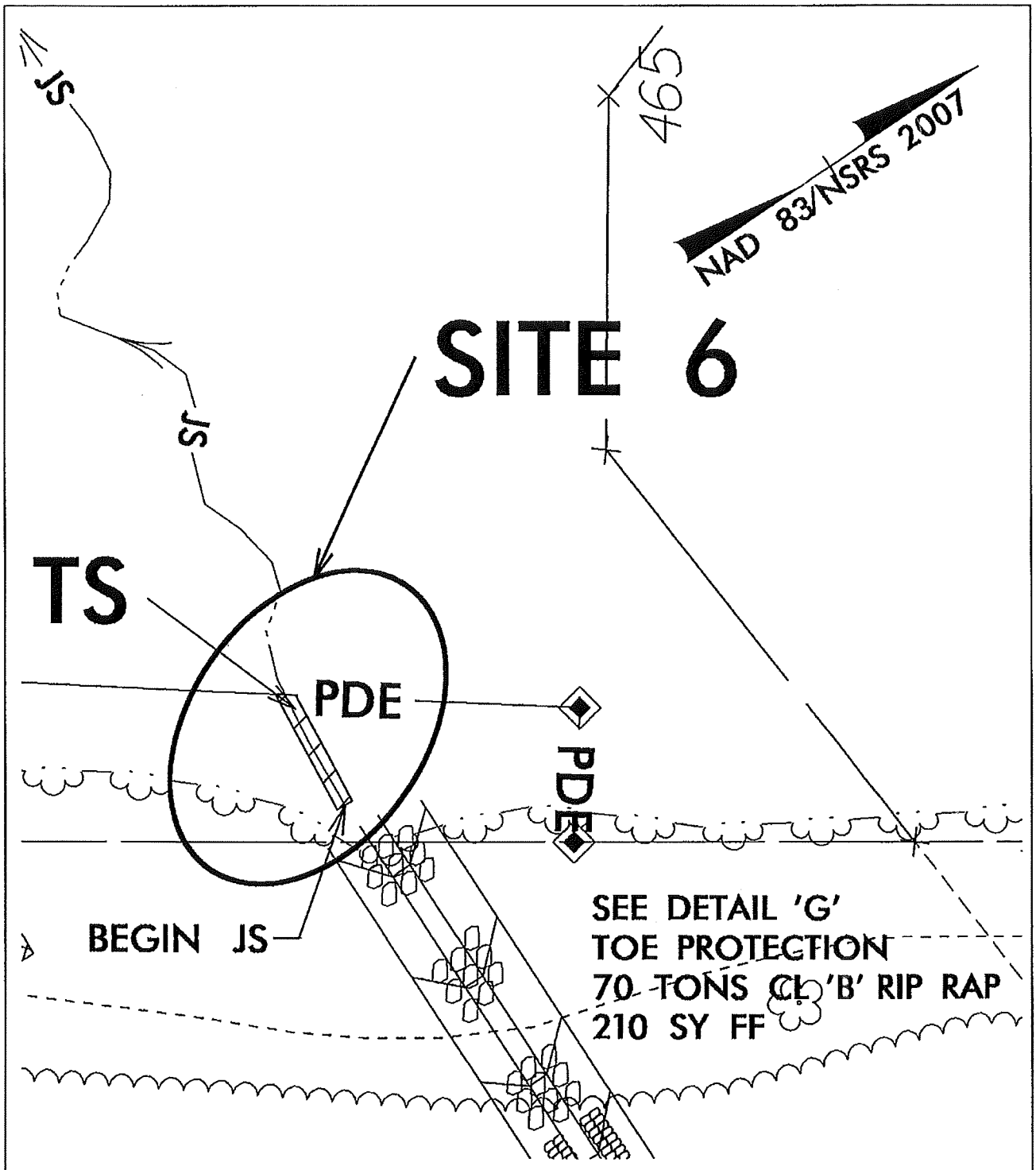
25' 0' 25'

GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS
GUILFORD COUNTRY
PROJECT: 34429.1.1 (R-2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

04/01/13



IMPACT ENLARGEMENT

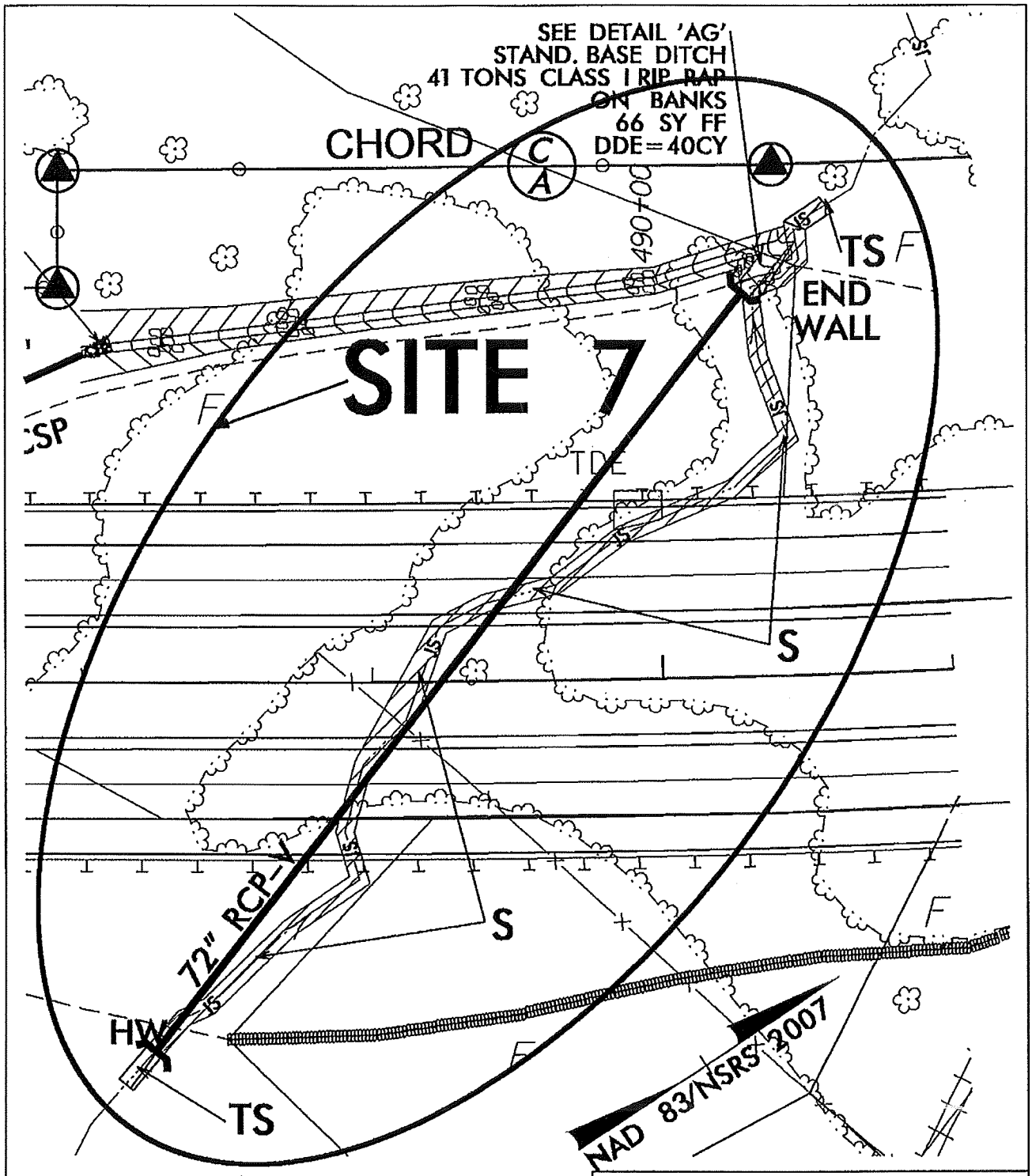
TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25' 0' 25'
GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS
GUILFORD COUNTRY
PROJECT: 34429.1.1 (R-2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

SHEET 23 OF 31 04/01/13



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50'

GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTRY

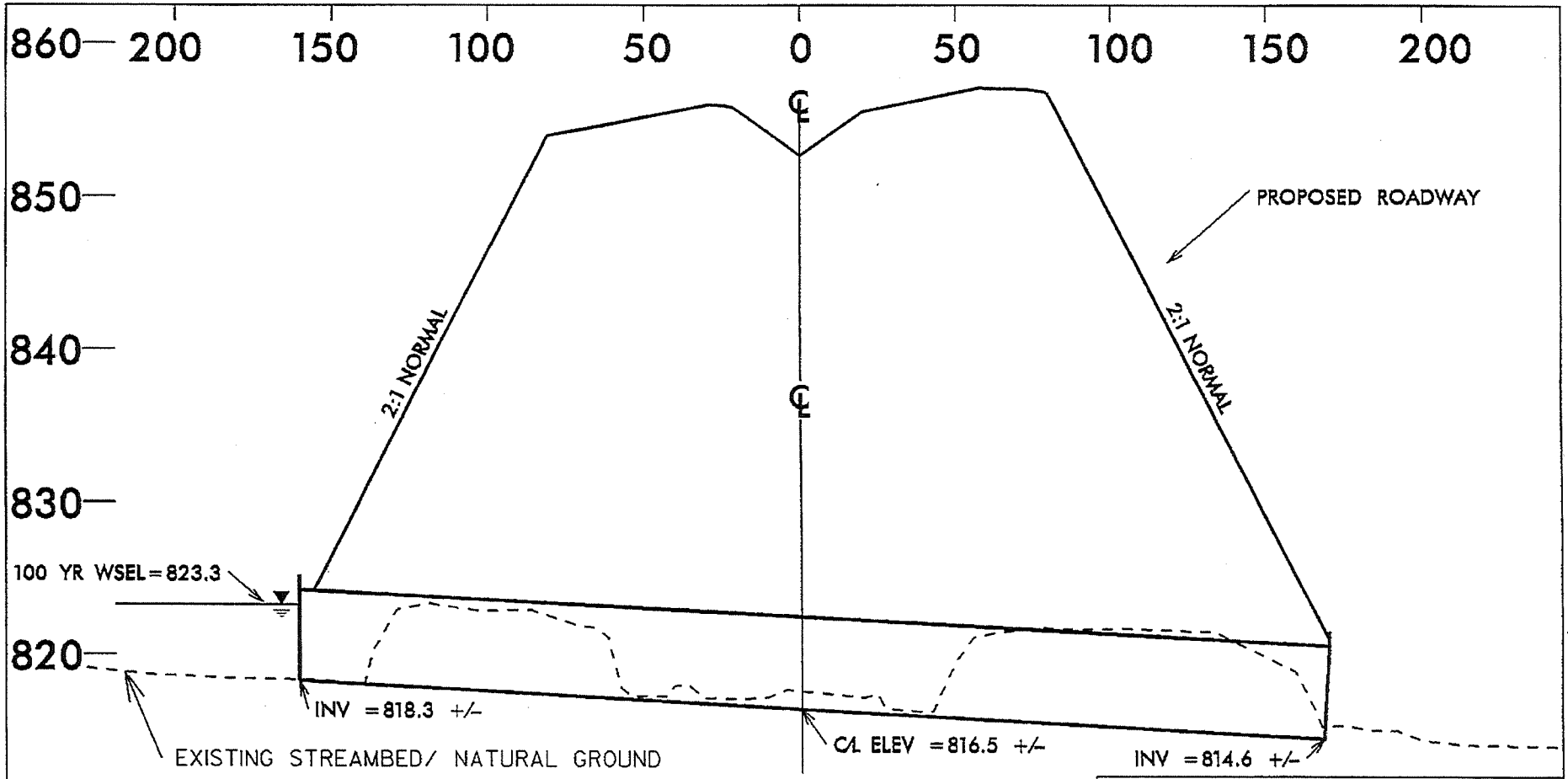
PROJECT: 34429.1.1 (R-2413B)

NC 68 BETWEEN

SR 2127 (BROOKBANK ROAD)

AND NC 150

SHEET 24 OF 31 04/01/13



PROFILE

SITE 7

SCALE

1:50' HORIZONTAL

1:10' VERTICAL

NCDOT

DIVISION OF HIGHWAYS

CABARRUS COUNTY

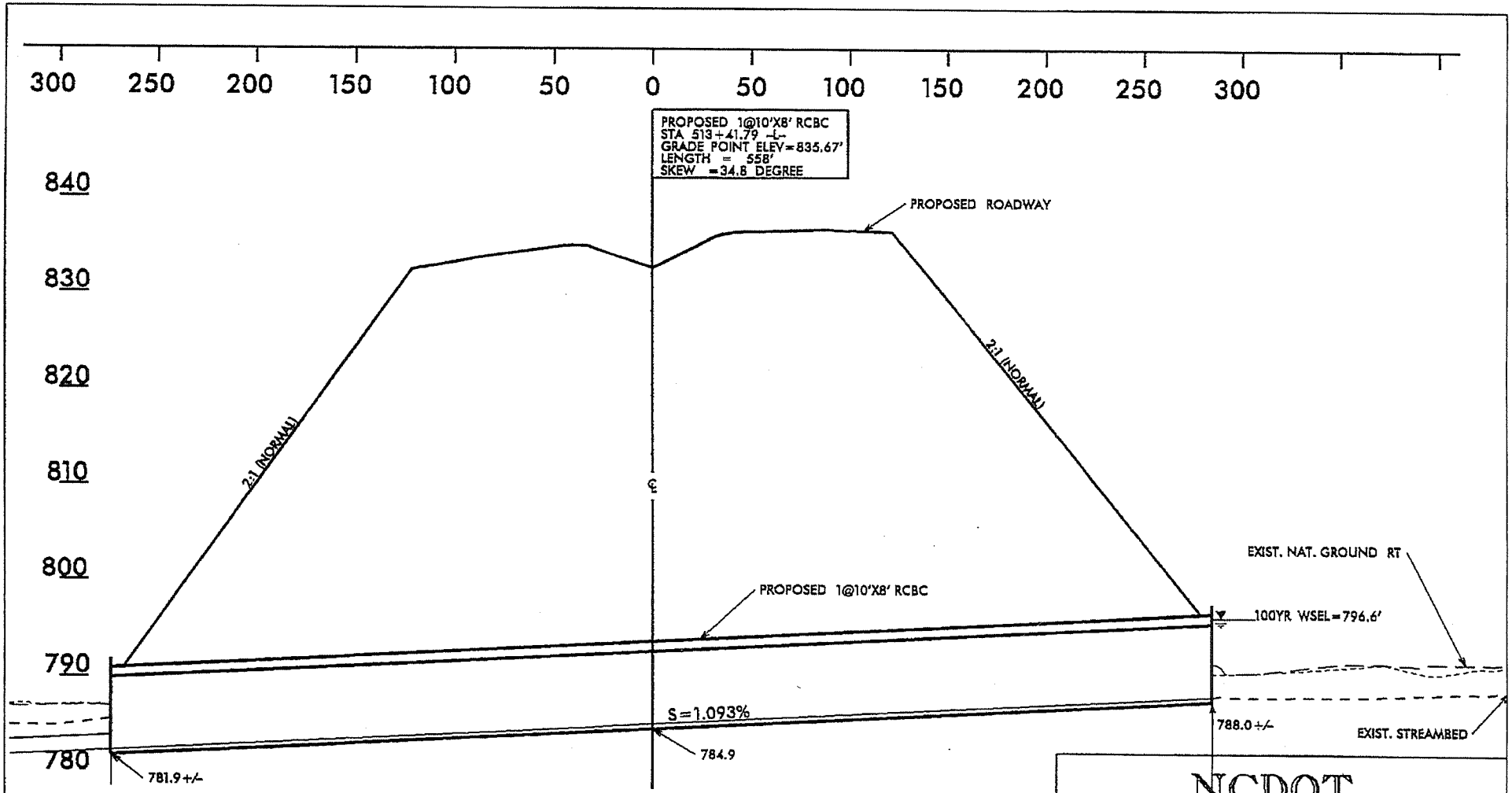
PROJECT: 34429.1.1 (R-2413B)

NC 68 BETWEEN

SR 2127 (BROOKBANK ROAD)

AND NC 150

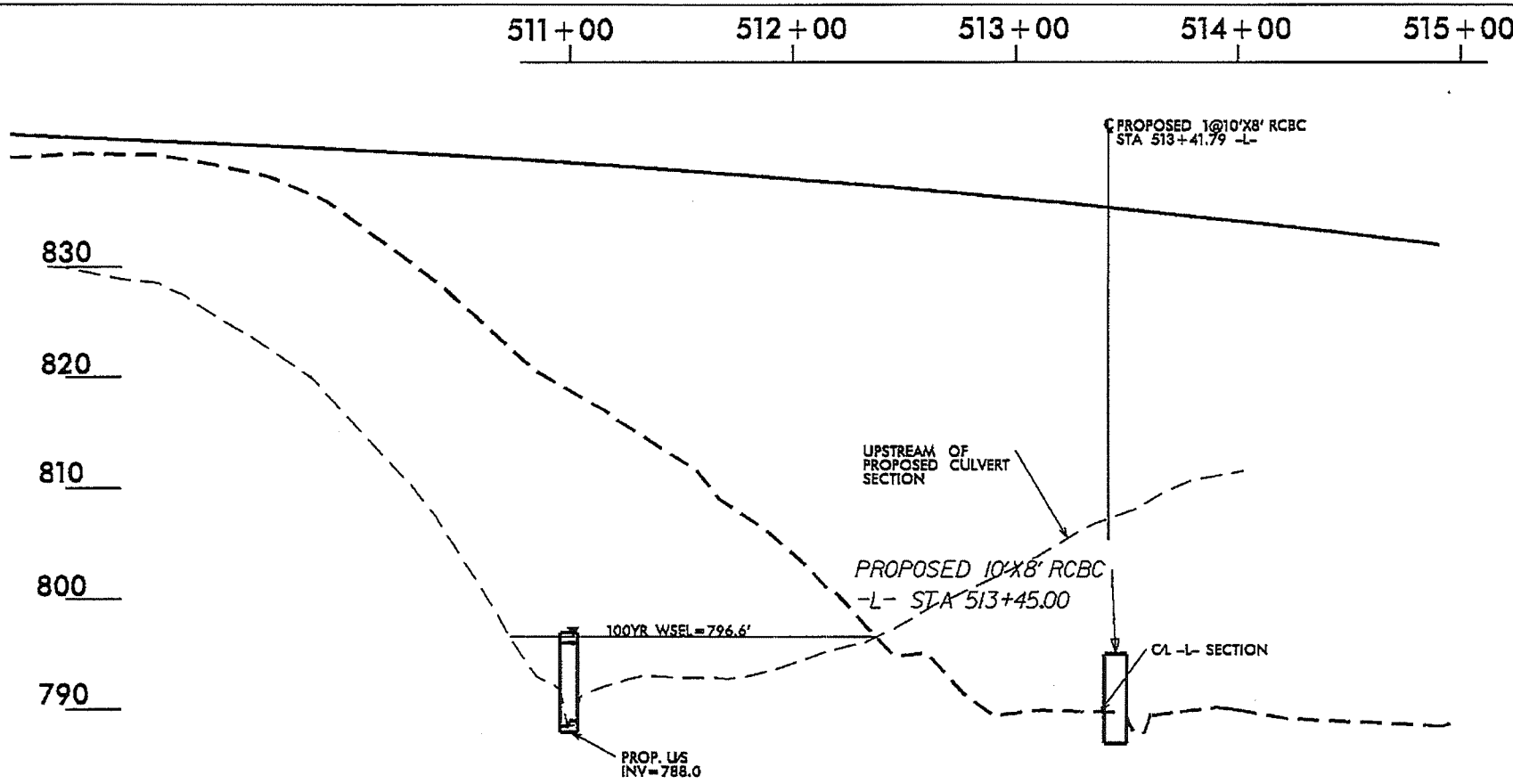
SHEET 25 OF 31 04/01/13



PROFILE
(N.T.S.)
SITE 8

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

SHEET 26 OF 31 04/01/13



SECTION

(N.T.S)

SITE 8

NCDOT

DIVISION OF HIGHWAYS

GUILFORD COUNTY

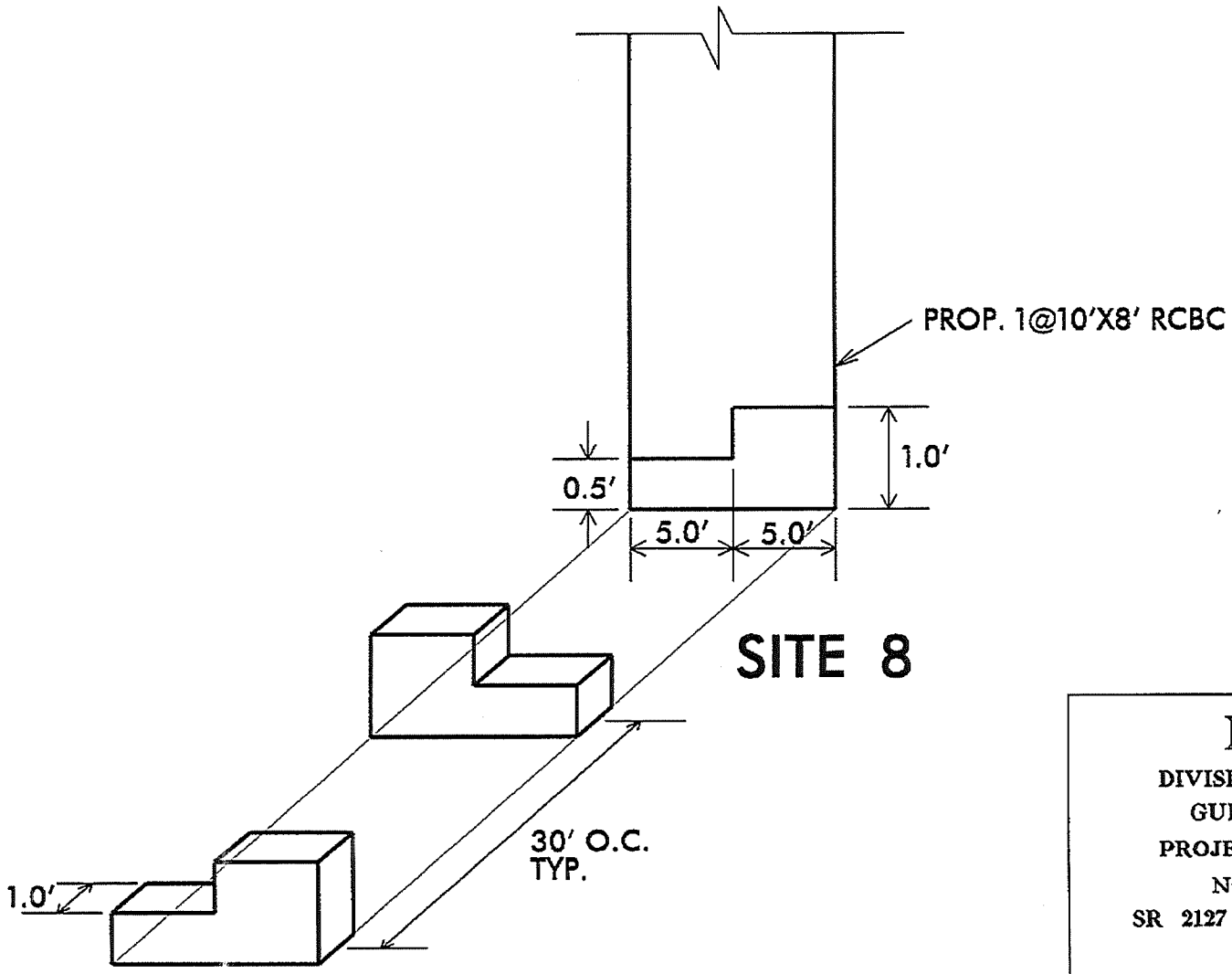
PROJECT: 34429.1.1 (R2413B)

NC 68 BETWEEN

SR 2127 (BROOKBANK ROAD)

AND NC 150

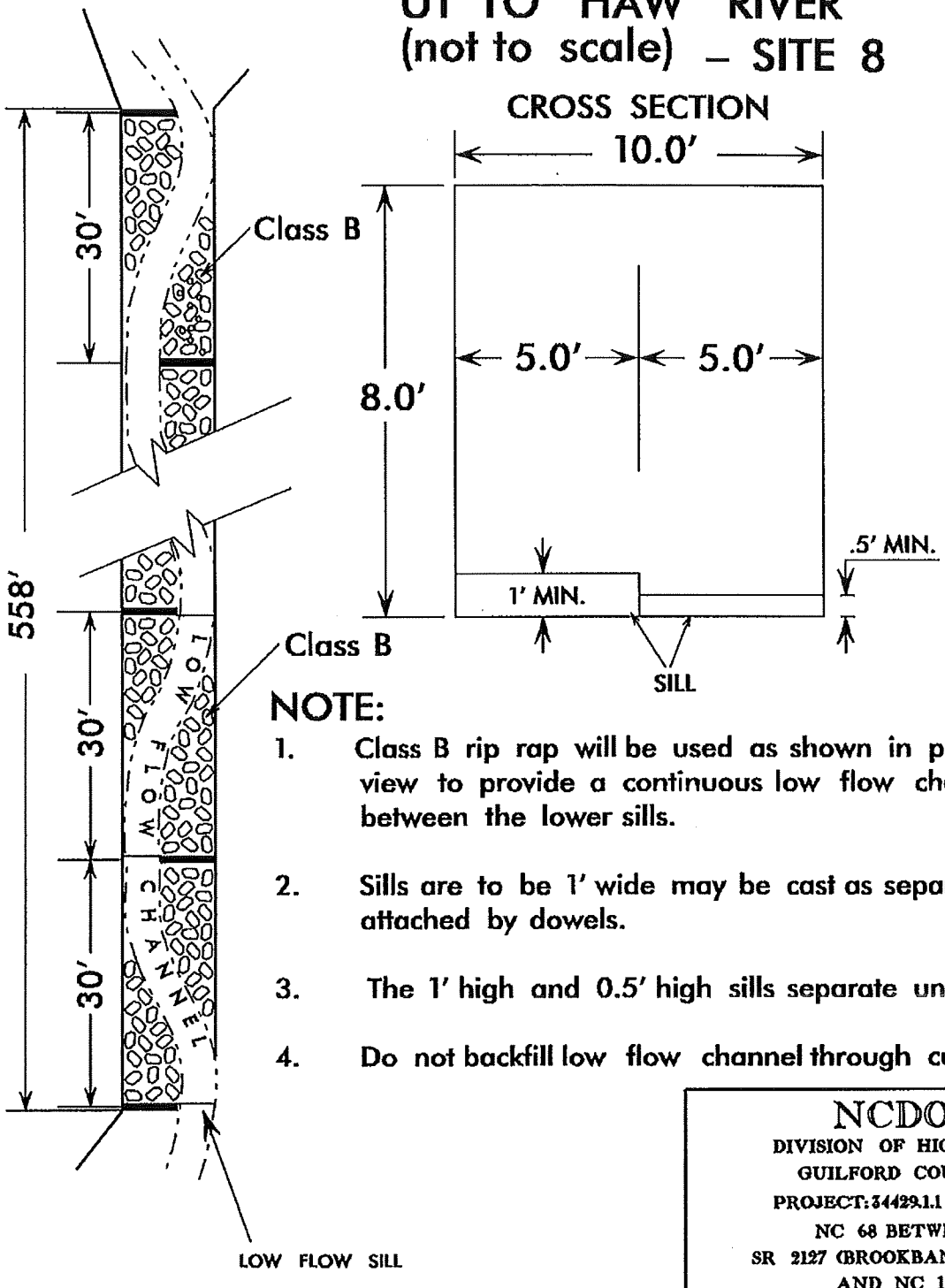
DETAIL OF ALTERNATING SILLS
(N.T.S.)



NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

SHEET 28 OF 31 04/01/13

DETAIL OF LOW FLOW CHANNEL AND SILLS –L– STA 513+41.79 PROPOSED 1 @ 10'X8' RCBC UT TO HAW RIVER (not to scale) – SITE 8



NOTE:

1. Class B rip rap will be used as shown in plan view to provide a continuous low flow channel between the lower sills.
2. Sills are to be 1' wide may be cast as separately and attached by dowels.
3. The 1' high and 0.5' high sills separate units.
4. Do not backfill low flow channel through culvert.

NCDOT
DIVISION OF HIGHWAYS
GUILFORD COUNTY
PROJECT: 34429.1.1 (R2413B)
NC 68 BETWEEN
SR 2127 (BROOKBANK ROAD)
AND NC 150

SHEET 29 OF 31 04/01/13

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Temp. 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	374+00 -L-	10' x10' RCBC						0.07	0.01	260	45	
	374+00 -L- Rt.	Bank Stabilization								24		
	376+00 -L-	10' x10' RCBC/ Roadway Fill	1.87			0.23						
2	410+50 -L-	42" RCP						0.02	<0.01	235	15	
		Bank Stabilization								11		
3	419+00 -L-	54" RCP						0.10	<0.01	726	30	
4	22+70 -Y6-	30" CSP						0.01	<0.01	39	15	
		Bank Stabilization								11		
5	452+50 -L-	60" RCP Roadway Fill						0.10	<0.01	554	24	
		Bank Stabilization								11		
5A		Roadway Fill						0.02	<0.01	146	17	
6	464+40 -L-	36" RCP							<0.01		21	
7	489+15 -L-	72" RCP						0.06	<0.01	411	30	
SUBTOTALS:			1.87			0.23		0.38	0.03	2428	197	

NOTES: Site 7 includes 30' of stream relocation.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GUILFORD COUNTY
WBS - 34429.1.1 (R-2413B)

5/2/2013

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Temp. 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)
8	513+00 -L-	10' X 8' RCBC						0.06		645		
8a		Roadway Fill	0.02									
8b		Roadway Fill	0.03									
8c		Flood Plain Exc.			0.01							
8f	508+20 to 511+00 -L- Rt.	Stream Restoration										373
8d	517+25 to 519+11 -L- Lt.	Roadway Fill						0.03		339		
8g	515+75 to 519+43 -L- Lt.	Stream Relocation										392
8e	516+94 to 517+23 -L- Rt.	Roadway Fill						<0.01		29		
SUBTOTALS:			0.05		0.01			0.09		1013		765
TOTALS:			1.92		0.01	0.23		0.47	0.03	3441	197	765

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

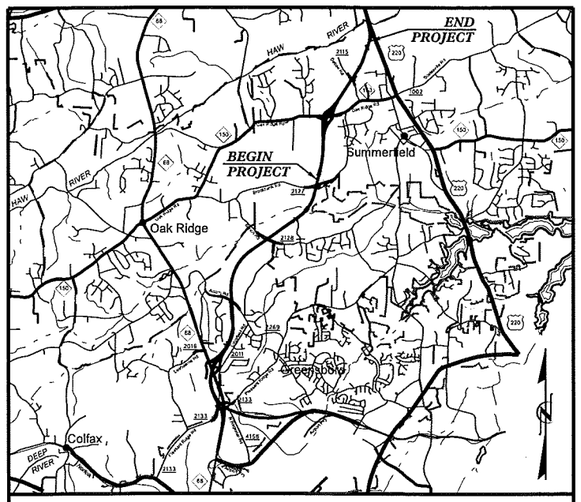
GUILFORD COUNTY
WBS - 34429.1.1 (R-2413B)

5/2/2013

09/08/99

TIP PROJECT: R-2413B

~~See Sheet 1-A For Index of Sheets~~
See Sheet 1-B For Conventional Symbols
See Sheet 1-C thru 1-E For Survey Control Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUILFORD COUNTY

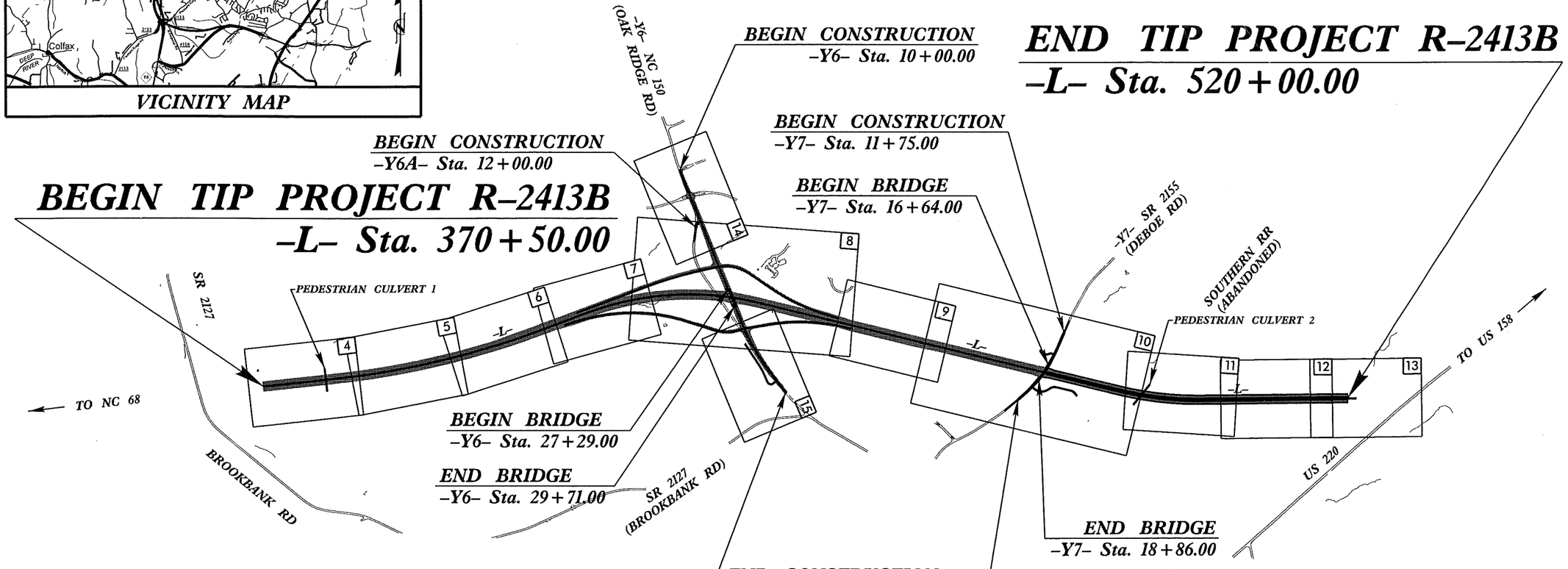
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413B	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34429.1.1		PE
34429.2.3		R/W,UTL

LOCATION: NC 68 CONNECTOR – FROM SR 2127 (BROOKBANK ROAD) TO HAW RIVER

TYPE OF WORK: GRADING, PAVING, WIDENING, RESURFACING, DRAINAGE, STRUCTURES, SIGNING, GUARDRAIL, SIGNALS, AND ITS.

NAD 83/ NSRS 2007



THERE IS FULL CONTROL OF ACCESS ON THIS PROJECT.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO, OAK RIDGE, AND SUMMERFIELD.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:

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 2012 = 23,000
ADT 2035 = 40,800
DHV = 11 %
D = 65 %
T = 15 % *
V = 70 MPH
* TTST 10% DUAL 5%
FUNC CLASS – INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R–2413B = 2.831 MILES

TOTAL LENGTH TIP PROJECT R–2413B = 2.831 MILES

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

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JANUARY 26, 2012

LETTING DATE: APRIL 15, 2014

TONY HOUSER, PE
PROJECT ENGINEER

JEFFREY L. TEAGUE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE:

ROADWAY DESIGN ENGINEER

SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER

23-APR-2013 12:40
R:\Roadway\Proj\R-2413B\r2413b_rdy_tsh.dgn
$$$$USERNAME$$$$

04/16/11

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	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 — EP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- 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
- Known Soil Contamination: Area or Site
- Potential Soil Contamination: Area or Site

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- 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 — flow
- 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
- Proposed Right of Way Line with Iron Pin and Cap Marker
- Proposed Right of Way Line with Concrete or Granite Marker
- Existing Control of Access — C A
- Proposed Control of Access — C A
- 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 Aerial Utility Easement — AUE
- 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 Curb Ramp — CR
- 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 WW

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 — W
- Designated U/G Water Line (S.U.E.*) — W
- 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:

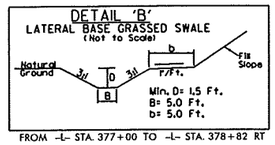
- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. — UST
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole (S.U.E.*)
- Abandoned According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

6/2/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	2-1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

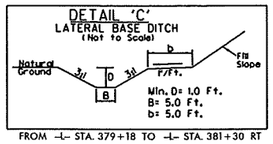
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DETAIL 'B'
LATERAL BASE GRASSED SWALE
(Not to Scale)



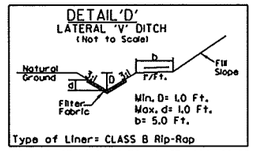
FROM -L- STA. 377+00 TO -L- STA. 378+82 RT

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



FROM -L- STA. 379+18 TO -L- STA. 381+30 RT

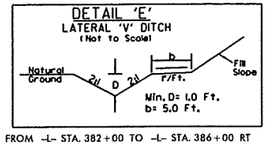
DETAIL 'D'
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

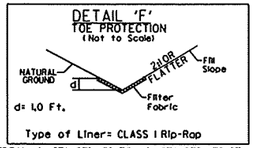
FROM -L- STA. 381+30 TO -L- STA. 382+00 RT

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



FROM -L- STA. 382+00 TO -L- STA. 386+00 RT

DETAIL 'F'
TOE PROTECTION
(Not to Scale)

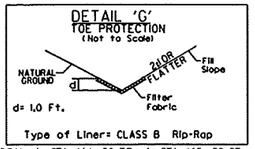


Type of Liner= CLASS I Rip-Rap

FROM -L- STA. 371+50 TO -L- STA. 372+70 RT
FROM -L- STA. 449+50 TO -L- STA. 451+50 RT
FROM -L- STA. 457+50 TO -L- STA. 459+00 RT
FROM -L- STA. 371+00 TO -L- STA. 373+90 LT
FROM -L- STA. 449+50 TO -L- STA. 453+10 LT

FROM -Y6- STA. 19+00 TO -Y6- STA. 21+50 LT

DETAIL 'G'
TOE PROTECTION
(Not to Scale)

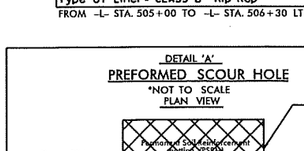


Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 464+00 TO -L- STA. 465+50 RT
FROM -L- STA. 488+50 TO -L- STA. 491+50 RT
FROM -L- STA. 491+77 TO -L- STA. 494+00 RT
FROM -L- STA. 505+50 TO -L- STA. 507+70 RT
FROM -L- STA. 373+90 TO -L- STA. 374+65 LT
FROM -L- STA. 465+00 TO -L- STA. 467+00 LT
FROM -L- STA. 519+00 TO -L- STA. 520+00 LT

FROM -Y6- STA. 33+30 TO -Y6- STA. 33+80 RT
FROM -RP6C- STA. 32+50 TO -RP6C- STA. 34+00 RT

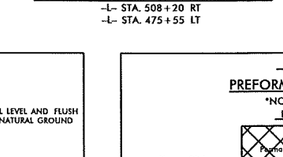
DETAIL 'I'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 410+50 TO -L- STA. 413+20 LT

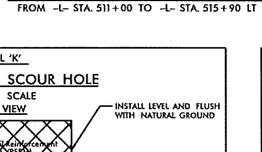
DETAIL 'J'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 458+05 TO -L- STA. 460+00 LT
FROM -Y6- STA. 19+50 TO -Y6- STA. 22+65 RT

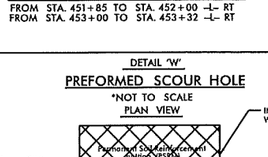
DETAIL 'L'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

-RP6A- STA. 16+00 RT

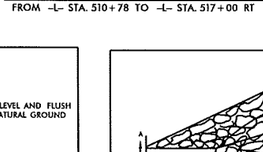
DETAIL 'N'
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

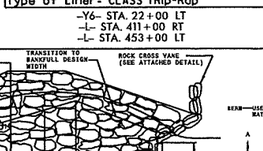
FROM -L- STA. 417+50 TO -L- STA. 420+50 LT

DETAIL 'O'
DRY DETENTION BASIN
END VIEW
(Not to Scale)



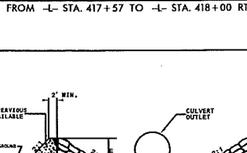
FROM -L- STA. 422+00 TO -L- STA. 425+00 RT

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



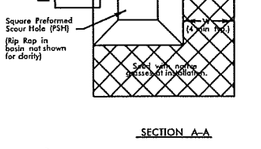
FROM -L- STA. 428+00 TO -L- STA. 429+00 RT
FROM -RP6D- STA. 16+70 TO -RP6D- STA. 19+50 LT

DETAIL 'Q'
BERM 'V' DITCH
(Not to Scale)



FROM -L- STA. 427+00 TO -L- STA. 428+00 RT
FROM -L- STA. 427+00 TO -L- STA. 430+00 LT
FROM -L- STA. 435+40 TO -L- STA. 437+50 LT

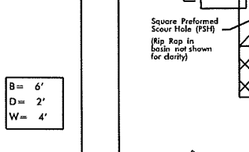
DETAIL 'R'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM -L- STA. 506+30 TO -L- STA. 507+50 LT

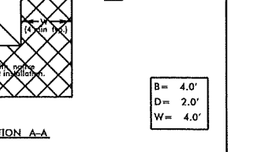
FROM -RP6C- STA. 31+50 TO -RP6C- STA. 33+50 LT
FROM -DR7B- STA. 10+50 TO -DR7B- STA. 11+50 LT

DETAIL 'S'
STANDARD 'V' DITCH
(Not to Scale)



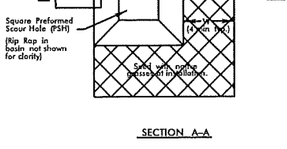
-L- STA. 379+50 LT
-RP6B- STA. 29+00 RT
-RP6B- STA. 27+50 LT

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



FROM -Y6- STA. 25+00 TO -Y6- STA. 26+00 RT
FROM -Y7- STA. 15+50 TO -Y7- STA. 16+50 RT

DETAIL 'U'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

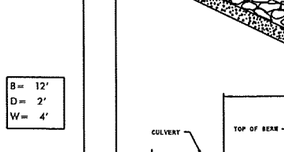


Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 475+85 TO -L- STA. 476+50 RT
FROM -L- STA. 517+00 TO -L- STA. 518+50 RT

FROM -Y6- STA. 25+15 TO -Y6- STA. 27+35 LT

DETAIL 'V'
BERM BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -RP6D- STA. 19+50 TO -RP6D- STA. 20+50 LT

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

Type of Liner= CLASS IRip-Rap ON BANKS

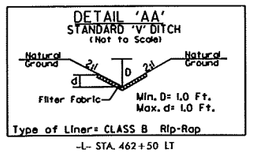
FROM STA. 452+00 TO STA. 453+00 -L- RT

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

Type of Liner= CLASS I Rip-Rap

-L- STA. 456+45 LT

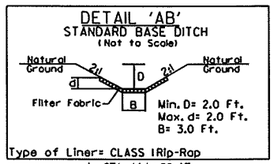
DETAIL 'AA'
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

-L- STA. 462+50 LT

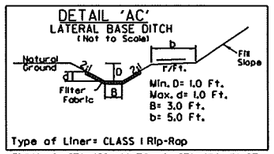
DETAIL 'AB'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS IRip-Rap

-L- STA. 464+88 LT

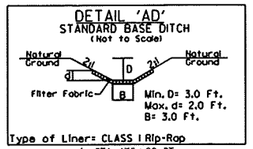
DETAIL 'AC'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

FROM -L- STA. 453+00 TO -L- STA. 454+50 RT
FROM -L- STA. 475+00 TO -L- STA. 475+50 LT
FROM -L- STA. 488+00 TO -L- STA. 490+30 LT

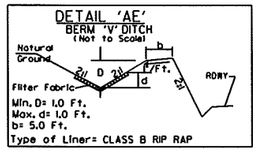
DETAIL 'AD'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

-L- STA. 475+83 RT

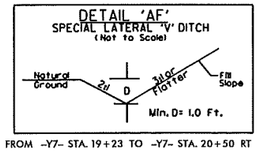
DETAIL 'AE'
BERM 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

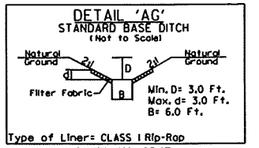
FROM -L- STA. 476+50 TO -L- STA. 477+50 RT

DETAIL 'AF'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM -Y7- STA. 19+23 TO -Y7- STA. 20+50 RT

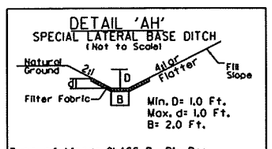
DETAIL 'AG'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

-L- STA. 490+35 LT

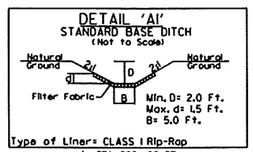
DETAIL 'AH'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 505+00 TO -L- STA. 506+30 LT

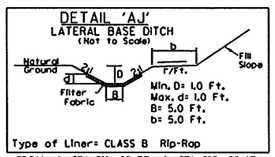
DETAIL 'AI'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

-L- STA. 508+20 RT
-L- STA. 475+55 LT

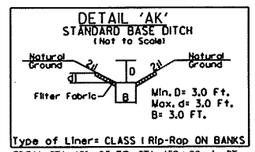
DETAIL 'AJ'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 511+00 TO -L- STA. 515+90 LT

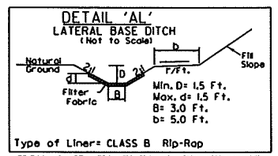
DETAIL 'AK'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I Rip-Rap ON BANKS

FROM STA. 451+85 TO STA. 452+00 -L- RT
FROM STA. 453+00 TO STA. 453+32 -L- RT

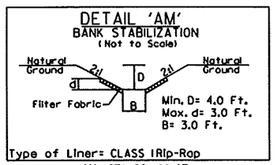
DETAIL 'AL'
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

FROM -L- STA. 510+78 TO -L- STA. 517+00 RT

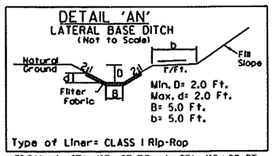
DETAIL 'AM'
BANK STABILIZATION
(Not to Scale)



Type of Liner= CLASS IRip-Rap

-Y6- STA. 22+00 LT
-L- STA. 411+00 RT
-L- STA. 453+00 LT

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

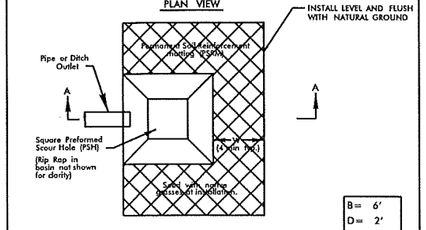


Type of Liner= CLASS I Rip-Rap

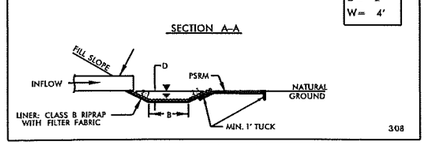
FROM -L- STA. 417+57 TO -L- STA. 418+00 RT

DETAIL 'A'
PREFORMED SCOUR HOLE
*NOT TO SCALE

PLAN VIEW



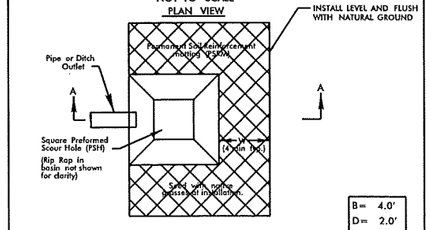
SECTION A-A



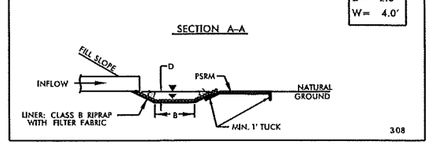
-L- STA. 463+78 LT

DETAIL 'K'
PREFORMED SCOUR HOLE
*NOT TO SCALE

PLAN VIEW



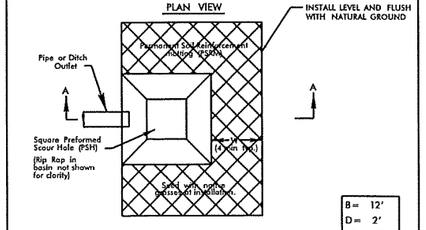
SECTION A-A



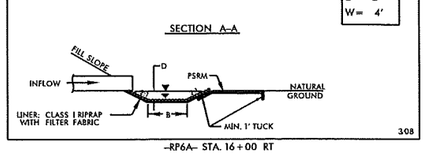
-L- STA. 373+25 RT
-L- STA. 413+50 RT
-L- STA. 451+65 RT

DETAIL 'W'
PREFORMED SCOUR HOLE
*NOT TO SCALE

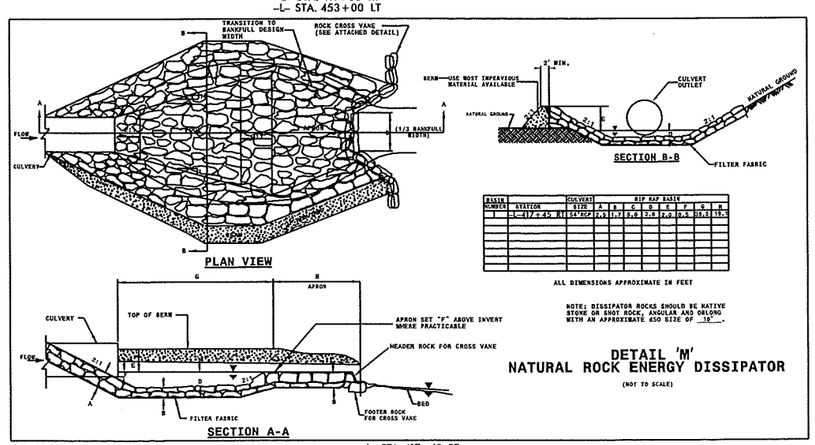
PLAN VIEW



SECTION A-A



-RP6A- STA. 16+00 RT



DETAIL 'M'
NATURAL ROCK ENERGY DISSIPATOR
(NOT TO SCALE)

-L- STA. 417+40 RT

APR-2013 12:41
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USER:ppeace

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-L- CURVE DATA

PIs Sta 381+34.23	PI Sta 395+39.13	PIs Sta 409+31.94
Θs = 0° 30' 01.4"	Δ = 13° 19' 57.1" (LT)	Θs = 0° 30' 01.4"
Ls = 200.00'	D = 0° 30' 01.4"	Ls = 200.00'
LT = 133.33'	L = 2,664.38'	LT = 133.33'
ST = 66.67'	T = 1,338.23'	ST = 66.67'
	R = 11,450.00'	
	SE = 0.02	

NOTE: A NON-STANDARD SUPERELEVATION TRANSITION WAS UTILIZED TO AVOID A POTENTIAL HYDROPLANING SITUATION.

BEGIN TIP PROJECT R-2413B -L- Sta. 370+50.00
END TIP PROJECT R-2413A -L- Sta. 370+50.00
TIE GUARDRAIL & MEDIAN GUIDERAIL TO TIP PROJECT R-2413A

SUMMERFIELD PROPERTIES, LLC
DB 5814 PG 0686
PB 162 PG 110
66

WILLIAM K. TEAGUE AND MARTHA R. TEAGUE
DB 3851 PG 2185
DB 2063 PG 191
54

NCDOT (FORMERLY SUMMERFIELD PROPERTIES, LLC)
928

BEGIN CONSTRUCTION
-CULVERT1- POT Sta. 10+00.00
-L- POT Sta. 379+00.00 (154.37' LT)

-L- TS Sta. 380+00.89
CHORD

-L- SC Sta. 382+00.89

-L- POT Sta. 379+00.00 =
-CULVERT1- POT Sta.11+54.37
Δ = 90° 00' 00.00"

PROPOSED 14' X 10'
PEDESTRIAN CULVERT

1@10'X10' RCBC

END CONSTRUCTION
-CULVERT1- POT Sta.13+14.43
-L- POT Sta. 379+00.00 (160.06' RT)

TOWN OF SUMMERFIELD
DB 6656 PG 744
72

BM #23
-BL- STA 401+10.81 336.96' RT
-L- STA 378+97.87 338.80' RT
ELEV=787.99'

-L- STA. 383+00

MATCH TO SHEET 5

FOR -L- PROFILE, SEE SHEET NO. 16
FOR DITCH DETAILS, SEE SHEET NO. 2-I
FOR CULVERT PLANS, SEE SHEET C? THRU C??

REVISIONS 8/17/99

23-APR-2013 12:41
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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

8/17/99

REVISIONS

-L- CURVE DATA

PIs Sta 381+34.23	PI Sta 395+39.13	PIs Sta 409+31.94
Θs = 0° 30' 01.4"	Δ = 13° 19' 57.1" (LT)	Θs = 0° 30' 01.4"
Ls = 200.00'	D = 0° 30' 01.4"	Ls = 200.00'
LT = 133.33'	L = 2,664.38'	LT = 133.33'
ST = 66.67'	T = 1,338.23'	ST = 66.67'
	R = 11,450.00'	
	SE = 0.02	

-L- STA. 383+00

MATCH TO SHEET 4

-L- STA. 397+00

MATCH TO SHEET 6

385 390 395

66 SUMMERFIELD PROPERTIES, LLC
DB 5814 PG 0686
PB 162 PG 110

-L- +00.00
225.28' LT
(EXIST C/A)

EXISTING R/W

SCRUB

-BL-87

-BL-88

BEGIN STANDARD BERM DITCH
FROM STA. 385+50 TO STA. 386+50 -L- LT

BEGIN STANDARD BERM DITCH
FROM STA. 388+20 TO STA. 389+00 -L- LT

BEGIN STANDARD BERM DITCH
FROM STA. 393+00 TO STA. 400+00 -L- LT

0508 BDO FS TYPE A 2GI 0506 15" CSP W/2ELBS

0505 BDO FS TYPE A 2GI 0504 15" CSP W/2ELBS

0509 BDO FS TYPE A 3GI 0501 15" CSP W/2ELBS

0507 FS 2GI

0502 FS 3GI

0503 FS 3GI

30" 24" 12' PS 15" RCP CL III

46' MEDIAN 24" FLUSH SHOULDER 12' PS 24" 8'

SEE DETAIL 'E'
LATERAL V DITCH
DDE=434 CY

928 NCDOT
(FORMERLY SUMMERFIELD PROPERTIES, LLC)

-L- +08.16
187.48' RT
(EXIST C/A)

SUMMERFIELD PROPERTIES, LLC
DB 5814 PG 0686
PB 162 PG 110
66

BM #24
-BL- STA 418+08.28 291.36' RT
-L- STA 396+05.10 287.38' RT
ELEV=845.56'

FOR -L- PROFILE, SEE SHEET NO. 16
FOR DITCH DETAILS, SEE SHEET NO. 2-I

23-APR-2013 12:41
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PROJECT REFERENCE NO.	SHEET NO.
R-2413B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

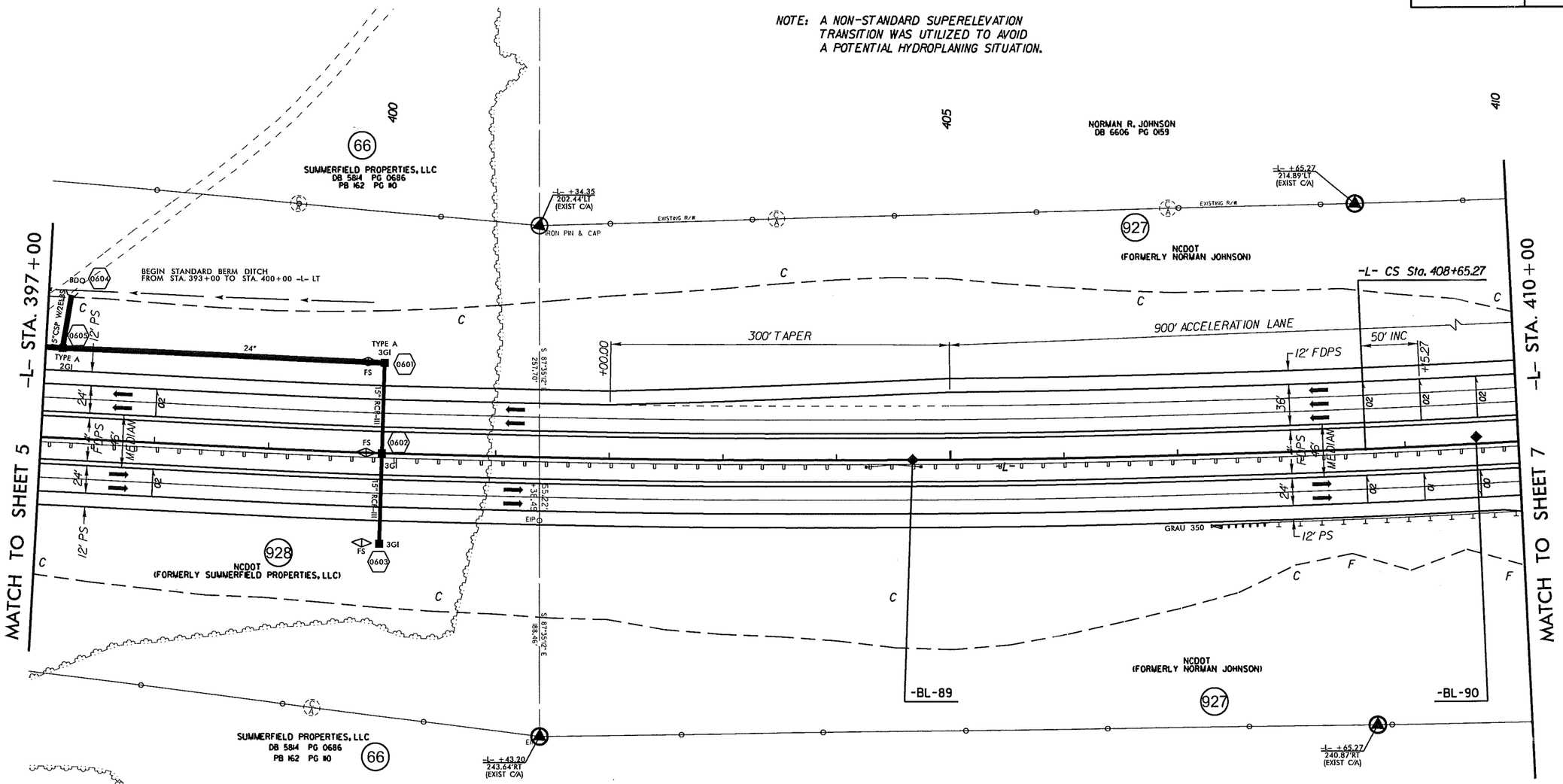
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-L- CURVE DATA

PIs Sta 381+34.23	PI Sta 395+39.13	PIs Sta 409+31.94
θs = 0° 30' 01.4"	Δ = 13° 19' 57.1" (LT)	θs = 0° 30' 01.4"
Ls = 200.00'	D = 0° 30' 01.4"	Ls = 200.00'
LT = 133.33'	L = 2,664.38'	LT = 133.33'
ST = 66.67'	T = 1,338.23'	ST = 66.67'
	R = 11,450.00'	
	SE = 0.02	

NOTE: A NON-STANDARD SUPERELEVATION TRANSITION WAS UTILIZED TO AVOID A POTENTIAL HYDROPLANING SITUATION.



FOR -L- PROFILE, SEE SHEET NO. 17

REVISIONS
8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2413B	7
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-RP6B- CURVE DATA

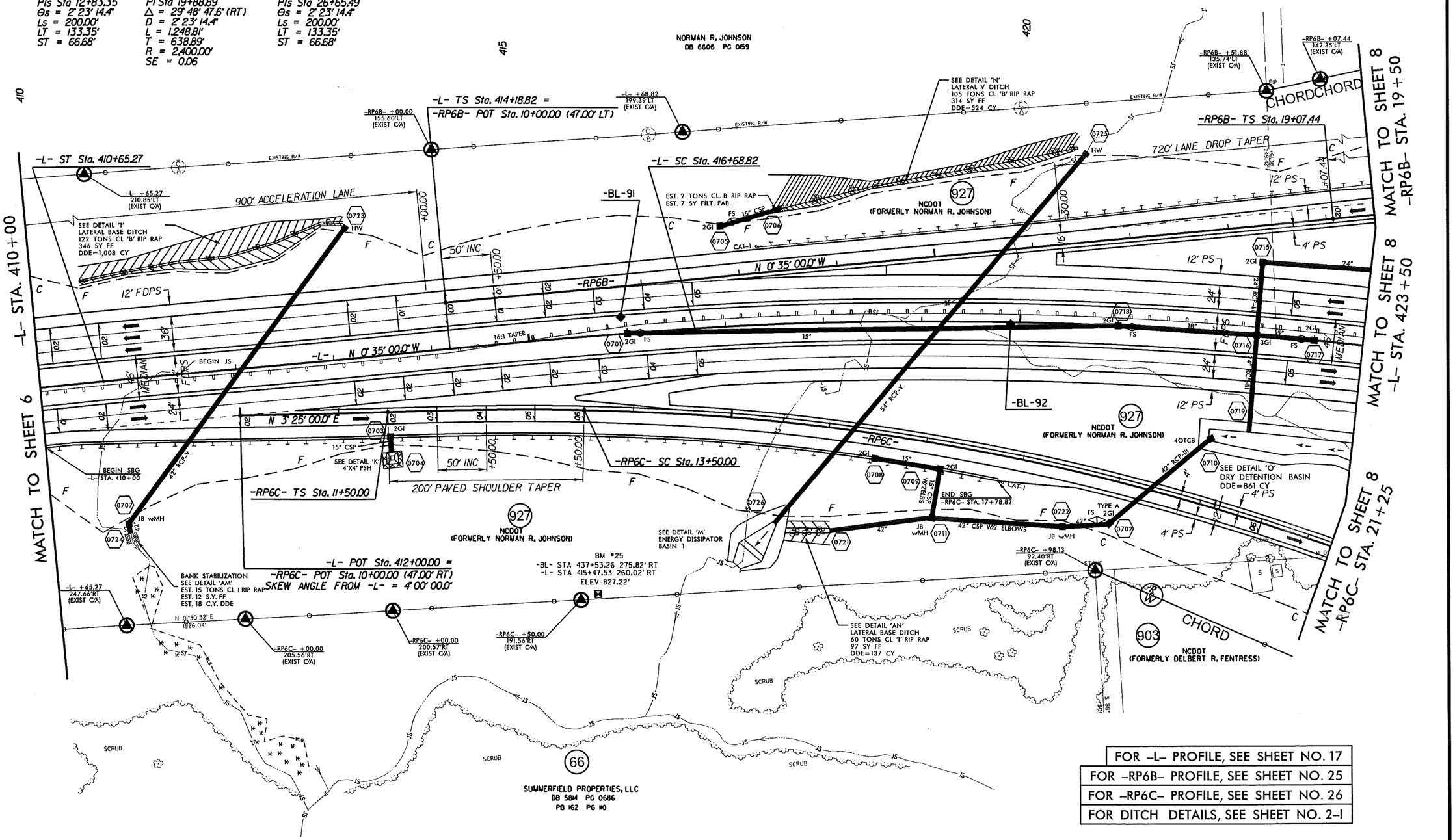
PIs Sta 20+40.77	PI Sta 23+75.27	PIs Sta 27+09.25
θs = 1° 08' 45.3"	Δ = 6° 07' 56.4" (RT)	θs = 1° 08' 45.3"
Ls = 200.00'	D = 1° 08' 45.3"	Ls = 200.00'
LT = 133.34'	L = 535.15'	LT = 133.34'
ST = 66.67'	T = 267.83'	ST = 66.67'
	R = 5,000.00'	
	SE = 0.04	

-L- CURVE DATA

PIs Sta 381+34.23	PI Sta 395+39.13	PIs Sta 409+31.94	PIs Sta 415+85.50	PI Sta 427+37.99	PIs Sta 438+39.47
θs = 0° 30' 01.4"	Δ = 13° 19' 57.1" (LT)	θs = 0° 30' 01.4"	θs = 1° 49' 54.1"	Δ = 30° 35' 11.7" (RT)	θs = 1° 49' 54.1"
Ls = 200.00'	D = 0° 30' 01.4"	Ls = 200.00'	Ls = 250.00'	D = 1° 27' 55.3"	Ls = 250.00'
LT = 133.33'	L = 2,664.38'	LT = 133.33'	LT = 166.68'	L = 2,087.30'	LT = 166.68'
ST = 66.67'	T = 1,338.23'	ST = 66.67'	ST = 83.34'	T = 1,069.16'	ST = 83.34'
	R = 11,450.00'			R = 3,910.00'	
	SE = 0.02			SE = 0.05	

-RP6C- CURVE DATA

PIs Sta 12+83.35	PI Sta 19+88.89	PIs Sta 26+65.49
θs = 2° 23' 14.4"	Δ = 29° 48' 47.6" (RT)	θs = 2° 23' 14.4"
Ls = 200.00'	D = 2° 23' 14.4"	Ls = 200.00'
LT = 133.35'	L = 1,248.81'	LT = 133.35'
ST = 66.68'	T = 638.89'	ST = 66.68'
	R = 2,400.00'	
	SE = 0.06	



FOR –L– PROFILE, SEE SHEET NO. 17
FOR –RP6B– PROFILE, SEE SHEET NO. 25
FOR –RP6C– PROFILE, SEE SHEET NO. 26
FOR DITCH DETAILS, SEE SHEET NO. 2-I

REVISIONS
8/17/99

23-APR-2013 12:41
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REVISIONS
RW REVISION: CHANGED TEMPORARY DRAINAGE EASEMENT AROUND STANDARD BASE DITCH ON –RP6A– TO A PERMANENT DRAINAGE EASEMENT. CEH 4/6/13.

SEE CROSS–SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

FOR STRUCTURE PLANS, SEE SHEET S? THRU S??

FOR INTERSECTION DETAIL, SEE SHEET NO. 2–E

FOR BRIDGE SKETCH, SEE SHEET NO. 2–G

FOR –RP6A– PROFILE, SEE SHEET NO. 24

FOR –RP6B– PROFILE, SEE SHEET NO. 25

FOR –RP6C– PROFILE, SEE SHEET NO. 26

FOR –RP6D– PROFILE, SEE SHEET NO. 27

FOR DITCH DETAILS, SEE SHEET NO. 2–I

FOR CURVE DATA, SEE SHEET NO. 8–A

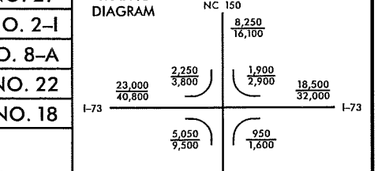
FOR –Y6– PROFILE, SEE SHEET NO. 22

FOR –L– PROFILE, SEE SHEET NO. 18

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	8
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRAFFIC DIAGRAM



2012 ADT
2035 ADT

NAD 83/NSRS 2007

MATCH TO SHEET 14 –Y6A– STA. 11+00

MATCH TO SHEET 14 –Y6– STA. 19+00

BM #45
–BYIO– STA 27+18.06 287.32' LT
–Y6– STA 20+05.35 131.56' LT
ELEV=883.26'

–Y6A– POT Sta. 10+00.00

–BYIO–189

–RP6B– ST. Sta. 28+42.58

–RP6B– CS Sta. 28+42.58

–RP6B– SC Sta. 21+07.44

–RP6A– TS Sta. 22+83.44

–Y6– POT Sta. 24+00.00 =
–RP6A– POT Sta. 27+85.08
–RP6B– POT Sta. 30+21.97

–RP6A– PT Sta. 27+46.77

–RP6A– SC Sta. 24+83.44

–RP6A– ST Sta. 20+83.44

–RP6A– CS Sta. 18+83.44

BEGIN APPROACH SLAB
–Y6– Sta. 27+04.00

BEGIN BRIDGE
–Y6– Sta. 27+29.00

END SPECIAL MEDIAN GRADING
–L– POT Sta. 440+25.37
–L– ST Sta. 440+06.13
–L– CS Sta. 437+56.13

END BRIDGE
–Y6– Sta. 29+71.00

END APPROACH SLAB
–Y6– Sta. 29+96.00

BEGIN SPECIAL MEDIAN GRADING
–L– POC Sta. 430+32.14

–L– POC Sta. 435+32.08 =
–Y6– POT Sta. 28+47.67

–RP6C– TS Sta. 29+99.04

–RP6C– PT Sta. 33+83.59

–RP6C– SC Sta. 31+99.04

–RP6C– ST Sta. 27+99.04

–RP6C– CS Sta. 25+99.04

–Y6– PC Sta. 32+10.46

–Y6– POC Sta. 33+00.00 =
–RP6C– POT Sta. 34+91.64
–RP6D– POT Sta. 24+48.97

–RP6D– CS Sta. 20+15.08

–RP6D– ST Sta. 22+15.08

–RP6D– SC Sta. 13+25

–RP6D– TS Sta. 11+45.00

–RP6D– SC Sta. 12+00.00

–RP6A– POT Sta. 10+00.00 (47.00' LT)
SKEW ANGLE FROM –L– = 0°00'00"

–L– POT Sta. 450+00.00 =
–RP6A– POT Sta. 10+00.00 (47.00' LT)
SKEW ANGLE FROM –L– = 0°00'00"

BM #26
–BL– STA 472+77.50 327.00' LT
–L– STA 450+52.74 327.64' LT
ELEV=872.69'

MATCH TO SHEET 7 –RP6B– STA. 19+50

MATCH TO SHEET 7 –L– STA. 423+50

MATCH TO SHEET 7 –RP6C– STA. 21+25

MATCH TO SHEET 9 –L– STA. 451+00

MATCH TO SHEET 15 –Y6– STA. 35+00

HENSON FOREST HOA, INC.

HENSON FOREST HOMEOWNERS ASSOCIATION, INC. DB 6053 PG 858 PB 82 PG 04

HENSON VILLAGE, LLC

NCDOT (FORMERLY DONALD L. HENSON) DB 5448 PG 0954

NCDOT (FORMERLY DELBERT R. FENTRESS) DB 4784 PG 0237 PB 87 PG 87

NCDOT (FORMERLY IZULA T. FENTRESS) DB 5029 PG 464 PB 87 PG 87

NCDOT (FORMERLY JOHN T. SPRUELL) DB 5645 PG 1776

NCDOT (FORMERLY NORMAN R. JOHNSON)

SIDDLE, KENNETH W. AND ROSE M. DB 2901 PG 180 PB 61 PG 125

DAVID M. RAMORA AND JUDEY RAMORA DB 6567 PG 1628

RICHARD LEON BEESON AND JOAN T. BEESON DB 1275 PG 233 DB 2591 PG 58 PB 63 PG 1

RICHARD & BARBARA CALLISS DB 6313 PG 2096 PB 82 PG 04

Dry Detention Basin With Draw Down Structure

GRAPHIC SCALE
100 50 0 100 200
PLANS

APPROACH SLAB
PAVEMENT REMOVAL
MONO. CONCRETE ISLAND
★ PROPOSED TRAFFIC SIGNAL

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS 8/17/99

-L- STA. 451+00

-L- STA. 464+00

MATCH TO SHEET 8

MATCH TO SHEET 10

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.
DB 6053 PG 1941
PB 152 PG 06

HENSON FOREST HOA, INC.

HENSON FOREST HOA, INC.

NCDOT
(FORMERLY DONALD L. HENSON)
DB 5481 PG 0954

NCDOT
(FORMERLY DONALD L. HENSON)
DB 5481 PG 0954

HENSON VILLAGE, LLC

HENSON VILLAGE, LLC

PAUL G. MILAM AND
VIRGINIA MILAM
DB 5412 PG 0530
PB 149 PG 94

-L- +46.11
206.43'LT
(EXIST C/A)

-L- +92.00
226.38'LT
(EXIST C/A)

-L- +57.00
226.38'LT
(EXIST C/A)

-L- +56.15
206.33'LT
(EXIST C/A)

-L- +46.10
171.46'LT
(EXIST C/A)

-L- +56.10
171.34'LT
(EXIST C/A)

-L- +46.00
200.00'LT
(EXIST C/A)

TDE

PDE

BANK STABILIZATION
SEE DETAIL 'AM'
EST. 15 TONS CLASS I RIP RAP
EST. 12 S.Y. F.F.
EST. 18 C.Y. DDE

SEE DETAIL 'F'
TOE PROTECTION
232 TONS CL 'I' RIP RAP
427 SY FF

SEE DETAIL 'F'
TOE PROTECTION
128 TONS CL 'I' RIP RAP
237 SY FF

SEE DETAIL 'K'
4X4 PSH

SEE DETAIL 'A'
6'X6' PSH

SEE DETAIL '2'
STANDARD V DITCH
17 TONS CL I RIP RAP
30 SY FF
DDE=20 CY

SEE DETAIL 'J'
LATERAL BASE DITCH
88 TONS CL B RIP RAP
248 SY FF
DDE=447 CY

SEE DETAIL 'AA'
STANDARD V DITCH
49 TONS CL B RIP RAP
147 SY FF
DDE=150 CY

SEE DETAIL 'AC'
LATERAL BASE DITCH
97 TONS CL I RIP RAP
178 SY FF

SEE DETAIL 'AK'
STANDARD BASE DITCH
63 TONS CL I RIP RAP ON BANKS
11 SY FF
EST. DDE=20 CY

SEE DETAIL 'X'
LATERAL BASE DITCH
199 TONS CL I RIP RAP ON BANKS
450 SY FF

SEE DETAIL 'AK'
STAND. BASE DITCH
30 TONS CL I RIP RAP ON BANKS
6 SY FF
EST. DDE=40 CY

SEE DETAIL 'F'
TOE PROTECTION
97 TONS CL 'I' RIP RAP
178 SY FF

-L- +10.00
203.59'RT
(EXIST C/A)

-L- +00.00
225.00'RT

-L- +50.00
225.00'RT

-L- +50.00
178.74'RT
(EXIST C/A)

-L- +12.26
178.76'RT
(EXIST C/A)

END SBG
-L- STA. 455+18

-BL-100

-BL-101

-L- POT Sta. 451+92.79 =
-RP6D- ST Sta. 10+00.00 (47.00' RT)

N 33° 40' 00.0" E -L-

N 33° 40' 00.0" E

12' PS

200' PS TAPER

900' ACCELERATION LANE

300' TAPER

60' (LRFD)

24' FLUSH MEDIAN

36' FLUSH MEDIAN

15" CSP

30" RCP III

18" RCP III

JB wMH

HW

SCRUB

EXISTING R/W

33' SOIL

FOR –L– PROFILE, SEE SHEET NO. 19
FOR –RP6D– PROFILE, SEE SHEET NO. 27
FOR DITCH DETAILS, SEE SHEET NO. 2–I

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REVISIONS
R/W REVISION: THE TEMPORARY CONSTRUCTION EASEMENT (TCE) AROUND -DR7B- HAS BEEN CHANGED TO RIGHT OF WAY. THE PROPERTY OWNER NAME HAS BEEN CORRECTED ON PARCEL 10. CEH 4/9/2013

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-L- CURVE DATA

Pt1 Sta 489+58.79	Pt2 Sta 494+80.57	Pt3 Sta 499+99.51
Δ = 1°35' 29.6"	Δ = 1°01' 46.6" (LT)	Δ = 1°35' 29.6"
Ls = 250.00'	D = 1°16' 23.7"	Ls = 250.00'
LT = 166.67'	L = 87.46'	LT = 166.67'
ST = 83.34'	T = 43.75'	ST = 83.34'
	R = 4500.00'	
	SE = 0.05	

-Y7- CURVE DATA

Pt1 Sta 18+37.54
Δ = 27°00' 28.8" (RT)
D = 3°17' 59.2"
L = 648.46'
T = 332.27'
R = 1800.00'
SE = 0.04

-Y7DET- CURVE DATA

Pt1 Sta 11+50.47	Pt2 Sta 17+86.43	Pt3 Sta 24+79.31
Δ = 15°59' 00.0" (LT)	Δ = 56°57' 32.8" (RT)	Δ = 47°58' 04.0" (LT)
D = 6°21' 58.3"	D = 6°21' 58.3"	D = 6°21' 58.3"
L = 296.19'	L = 894.17'	L = 172.28'
T = 150.47'	T = 488.54'	T = 96.40'
R = 900.00'	R = 900.00'	R = 900.00'

-DR7A- CURVE DATA

Pt1 Sta 10+95.84	Pt2 Sta 11+70.85
Δ = 93°14' 54.5" (LT)	Δ = 51°59' 54.8" (RT)
D = 63°39' 43.1"	D = 114°35' 29.6"
L = 146.47'	L = 45.39'
T = 96.24'	T = 24.39'
R = 90.00'	R = 50.00'

-DR7B- CURVE DATA

Pt1 Sta 11+50.00	Pt2 Sta 13+22.11	Pt3 Sta 15+96.49
Δ = 75°00' 00.0" (LT)	Δ = 45°01' 05.0" (RT)	Δ = 36°35' 00.0" (RT)
D = 38°11' 49.9"	D = 57°17' 44.8"	D = 57°17' 44.8"
L = 196.35'	L = 78.57'	L = 63.85'
T = 115.47'	T = 41.44'	T = 33.06'
R = 150.00'	R = 100.00'	R = 100.00'

BEGIN CONSTRUCTION
-Y7- Sta. 11+75.00

-Y7- POT Sta. 10+00.00 =
-Y7DET- PC Sta. 10+00.00

-BY12-197

-Y7- PC Sta. 14+05.26
-Y7- POC Sta. 15+00.00 =
-DR7A- POT Sta. 12+21.84
N 47° 00' 00.0" E
-DR7A- PT Sta. 11+91.84
-DR7A- PRC Sta. 11+46.47

-Y7DET- PRC Sta. 12+98.19

BEGIN CONSTRUCTION
-DR7A- PC Sta. 10+00.00

BM #27
-BL- STA 492+74.70 346.85' LT
-L- STA 470+61.06 345.39' LT
ELEV=877.38'

BM #28
-BL- STA 504+83.45 343.23' LT
-L- STA 482+85.48 322.07' LT
ELEV=866.66'

-L- SC Sta. 490+42.11

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.
DB 663 PG 007
PB 156 PG 21

KEVIN J. HILLIS
DB 6409 PG 2952
PB 72 PG 85

ROBERT E. ATKINSON AND MARIA E. ATKINSON
DB 3260 PG 65
PB 72 PG 85

J. VAN FRODLE AND SARAH D. FRODLE
DB 3221 PG 887

SEE DETAIL 'AB'
STAND. BASE DITCH
EST. 93 TONS CL 'I' RIP RAP
DDE=45 CY
F.F.=160 SY
SLOPE=8.11%

SEE DETAIL 'G'
TOE PROTECTION
70 TONS CL 'B' RIP RAP
210 SY FF

SEE DETAIL 'AI'
STANDARD BASE DITCH
EST. 61 TONS CL 'I' RIP RAP
DDE=37 CY
F.F.=67 SY
SLOPE=3.44%

SEE DETAIL 'AC'
LATERAL BASE DITCH
45 TONS CL I RIP RAP
76 SY FF
DDE=14 CY

SEE DETAIL 'I'
LATERAL V DITCH
DDE=47 CY

BEGIN APPROACH SLAB
-Y7- Sta. 16+49.00

BEGIN BRIDGE
-Y7- Sta. 16+64.00
-L- POT Sta. 478+60.62 =
-Y7- POC Sta. 17+73.70

END SPECIAL MEDIAN GRADING
-L- POT Sta. 483+35.51

-L- POT Sta. 479+83.02 =
-Y7DET- POC Sta. 17+64.11

EST. 5 TONS CLASS I RIP RAP
EST. 14 SY FILT. FAB

SEE DETAIL 'AC'
LAT. BASE DITCH
203 TONS CLASS I RIP RAP
349 SY FF
DDE=250 CY

SEE DETAIL 'AG'
STAND. BASE DITCH
41 TONS CLASS I RIP RAP
ON BANKS
66 SY FF
DDE=40CY
CHORD

SEE DETAIL 'G'
TOE PROTECTION
105 TONS CL 'B' RIP RAP
79 SY FF

SEE DETAIL 'AD'
STAND. BASE DITCH
DDE=90 CY
F.F.= 70 SY
SLOPE=4.29%

SEE DETAIL 'AE'
REAR YARD DITCH
33 TONS CLASS B RIP RAP
50 SY FF
DDE=111 CY

SEE DETAIL 'K'
SPECIAL V DITCH

SEE DETAIL 'Q'
SPECIAL LATERAL DITCH
DDE=20 CY
F.F.=32 SY
SLOPE=11.55%

SEE DETAIL 'AF'
SPECIAL 'V' DITCH

BEGIN SPECIAL MEDIAN GRADING
-L- POT Sta. 473+80.72

END BRIDGE
-Y7- Sta. 18+86.00

END APPROACH SLAB
-Y7- Sta. 19+01.00

END CONSTRUCTION
-Y7- Sta. 22+75.00

-Y7- POC Sta. 20+25.00 =
-DR7B- POT Sta. 10+00.00
-Y7- PT Sta. 22+53.74

-BY12-198

-Y7- POT Sta. 25+18.85

-Y7- POT Sta. 25+00.00 =
-Y7DET- PT Sta. 25+65.18

-Y7DET- PC Sta. 23+92.90

-DR7B- PC Sta. 10+34.90
-Y7DET- PT Sta. 21+92.90

-DR7B- PT Sta. 12+31.25

-DR7B- PC Sta. 15+63.44
-DR7B- PT Sta. 15+85.24

-DR7B- PC Sta. 12+80.67

-DR7B- POT Sta. 16+81.20

END CONSTRUCTION
-DR7B- Sta. 16+50.00

-DR7B- PT Sta. 15+27.29

-BL-102
-BL-103
-BL-104
-BY12-
-BL-105
-BL-106

-L- TS Sta. 487+92.11

-L- STA. 464+00
MATCH TO SHEET 9
-L- STA. 491+00
MATCH TO SHEET 11

HENSON VILLAGE, LLC
PAUL G. MILAM AND VIRGINIA MILAM
DB 5412 PG 0530
PB 149 PG 94
NCDOT (FORMERLY DONALD L. HENSON)
DB 548 PG 0954
FRANCES B. ANGEL
DB 1048 PG 0640
PB 87 PG 98
JEFFREY B. REEN
DB 5359 PG 0459
PB 69 PG 88
STECLA / COOK SMITH
DB 5769 PG 0625
PB 9 PG 87
MARY F. PARRISH
DB 2578 PG 87
PB 70 PG 8
JAMES L. PARRISH AND SHIRLEY S. PARRISH AND MALIA A. JAMES
DB 7335 PG 2372

APPROACH SLAB
FOR –Y7– PROFILE, SEE SHEET NO. 28
FOR –DR7A– PROFILE, SEE SHEET NO. 29
FOR –DR7B– PROFILE, SEE SHEET NO. 29
FOR –Y7DET– PROFILE, SEE SHEET NO. 28
FOR –Y7DET– DETAIL, SEE SHEET NO. 2–F
DRIVEWAY RADII ARE 15', UNLESS NOTED
FOR DITCH DETAILS, SEE SHEET NO. 2–I
FOR BRIDGE SKETCH, SEE SHEET NO. 2–H
FOR –L– PROFILE, SEE SHEETS NO. 19 & 20
FOR STRUCTURE PLANS, SEE SHEET S? THRU S??
SEE CROSS–SECTIONS & ROADWAY STANDARD DRAWINGS, STD. NO. 865.01, SHEET 1 FOR SPECIAL MEDIAN GRADING

GRAPHIC SCALE
100 50 0 100 200
PLANS

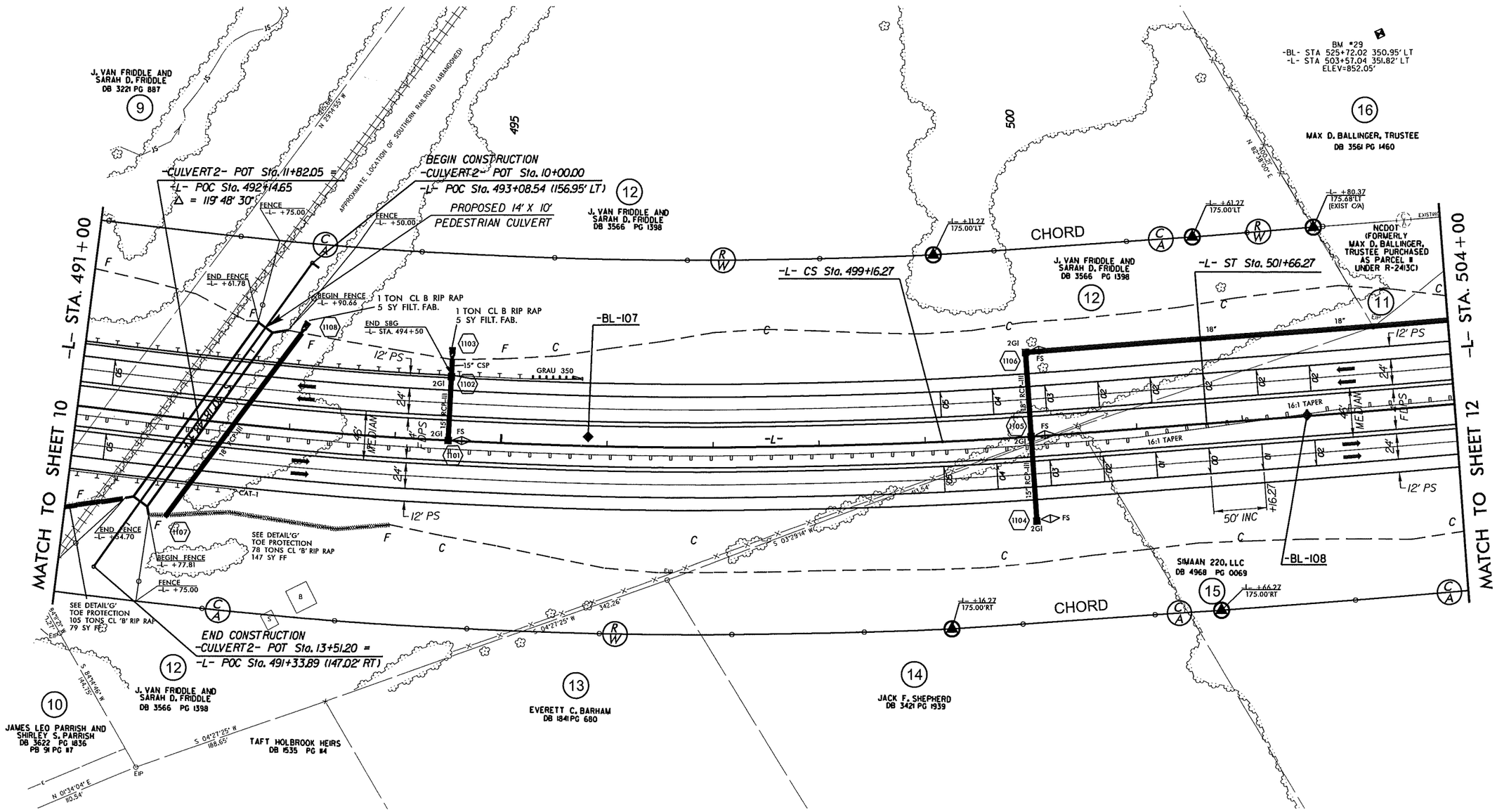
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

-L- CURVE DATA

PIs Sta 489+58.78	PI Sta 494+80.57	PIs Sta 499+99.61
Θs = 1° 35' 29.6"	Δ = 11° 07' 48.6" (LT)	Θs = 1° 35' 29.6"
Ls = 250.00'	D = 1° 16' 23.7"	Ls = 250.00'
LT = 166.67'	L = 874.16'	LT = 166.67'
ST = 83.34'	T = 438.46'	ST = 83.34'
	R = 4,500.00'	
	SE = 0.05	



FOR -L- PROFILE, SEE SHEET NO. 20
FOR DITCH DETAILS, SEE SHEET NO. 2-1
FOR CULVERT PLANS, SEE SHEET C? THRU C??

REVISIONS

8/17/99

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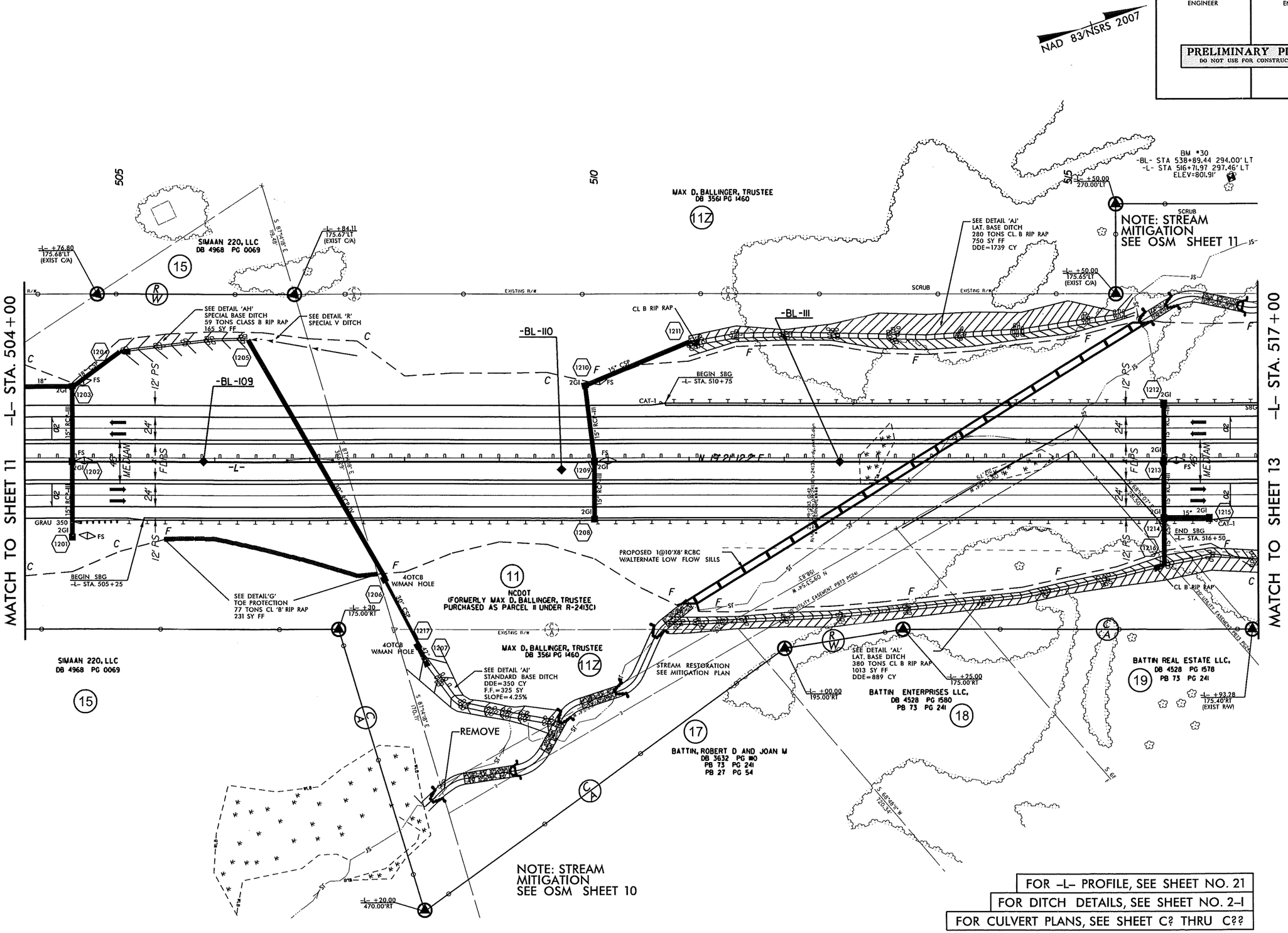
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



FOR -L- PROFILE, SEE SHEET NO. 21
FOR DITCH DETAILS, SEE SHEET NO. 2-1
FOR CULVERT PLANS, SEE SHEET C? THRU C??

REVISIONS

8/17/99

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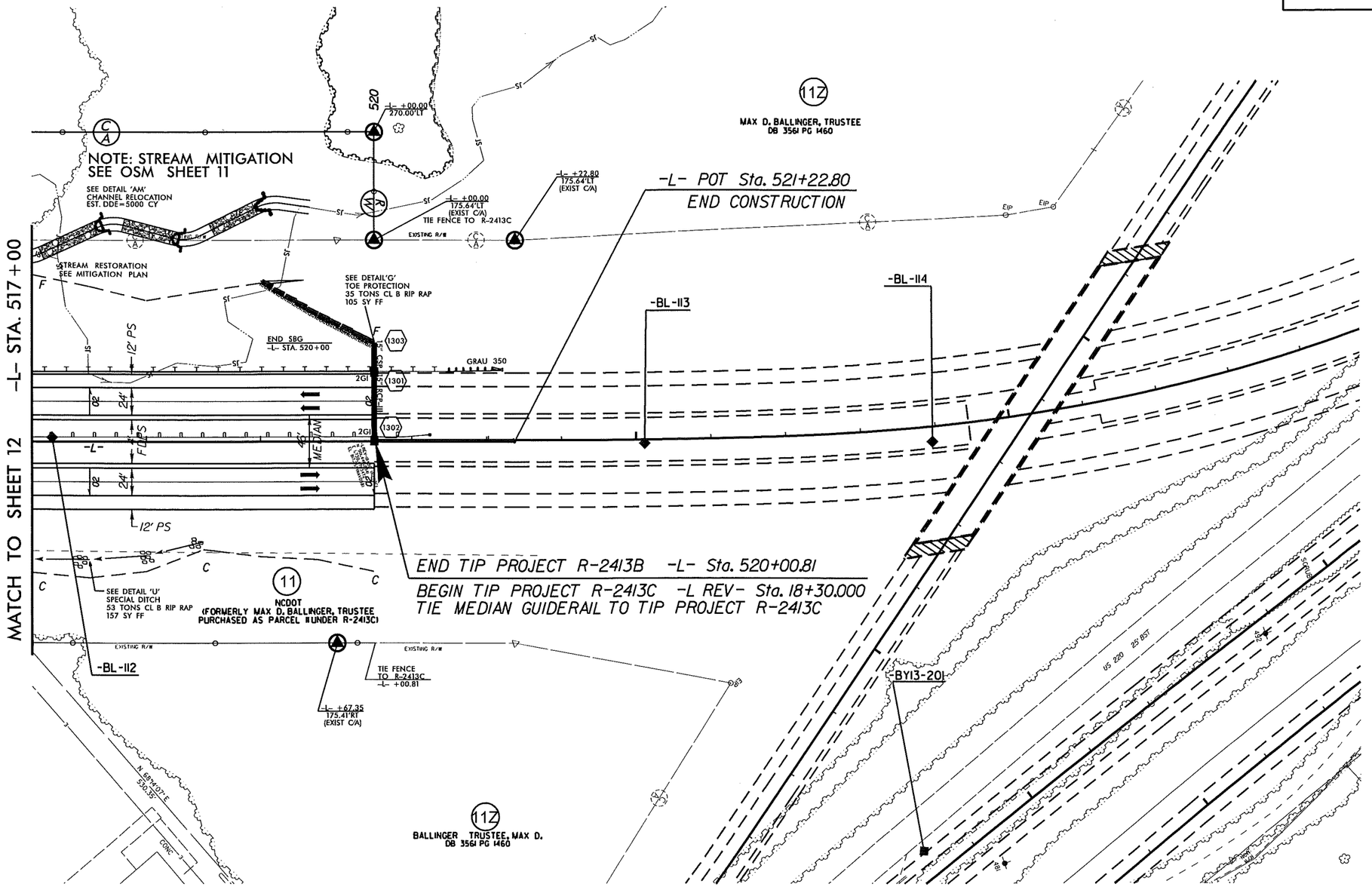
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS 8/17/99



FOR -L- PROFILE, SEE SHEET NO. 21
FOR DITCH DETAILS, SEE SHEET NO. 2-I

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PROJECT REFERENCE NO.	SHEET NO.
R-2413B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

REVISIONS

8/17/99

R/W REVISION. THE PROPERTY LINES ON PARCELS 21 AND 26 THAT PARALLEL -Y6- HAVE BEEN CHANGED TO EXISTING RIGHT OF WAY LINES. THE PROPERTY LINES ON PARCEL 26 THAT CHANGED ARE LOCATED LEFT OF -Y6- FROM STA.12+92.13 TO 14+86.83. CEH 4/9/2013

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-BY10-187 PINC 21+52.83
-Y6- STA. 13+19.05 (21.96' LT)

BEGIN CONSTRUCTION
-Y6- POT Sta. 10+00.00

12" CONCRETE EXPRESSWAY GUTTER
VARIABLE BERM (TIE TO EXISTING SLOPE)
DO NOT DISTURB FENCE OR TREES

DO NOT DISTURB WALL

-Y6- POT Sta. 17+50.00 =
-Y6A- POT Sta. 13+08.24

-BY10-186 PINC 18+37.09
-Y6- STA. 10+05.99 (19.15' RT)

-BY10-188 PINC 25+31.62
-Y6- STA. 16+95.99 (15.43' RT)

-Y6A- PT Sta. 12+78.53

-Y6A- PC Sta. 12+14.71

BEGIN CONSTRUCTION
-Y6A- Sta. 12+00.00

BM #44
-BY10- STA 24+81.29 368.86' LT
-Y6- STA 16+42.50 360.55' RT
ELEV=904.16'

BM #43
-BY10- STA 22+80.14 470.14' RT
-Y6- STA 13+99.33 458.45' RT
ELEV=913.52'

HENSON FOREST HOA, INC.

HENSON FOREST HOMEOWNERS ASSOCIATION, INC.
DB 5955 PG 2724
PB 154 / PG 3

HENSON FOREST DEVELOP.
DB 5519 PG 1865
PB 154 PG 03

MICHAEL R. BURKITT AND ANNE COPLEY BURKITT
DB 6397 PG 1869
PB 154 PG 3

SHAWN V. POOLE
DB 6654 PG 0247
PB 152 PG 04

LEONARD CUSTOM HOMES, INC.
DB 6377 PG 0591
PB 152 PG 04

BLUE RIDGE BUILDERS OF SUMMERFIELD, INC.
DB 5942 PG 3031
PB 149 PG 95

ALEXANDER M. LOZADA AND LORENE LOZADA.
DB 4707 PG 1276
PB 83 PG 13

STEVEN V. SHIPMAN AND JULIA E. M. SHIPMAN
DB 5946 PG 2744
PB 83 PG 13

CAROLYN SUE WHITE MARSH
DB 2897 PG 0630
PB 60 PG 18

CAROLYN SUE VAUGHN AND KENNETH RAY WHITE
DB 6655 PG 0178
PB 60 PG 18

ARMFIELD HOMEOWNERS ASSOC, INC.
DB 6023 PG 0775
PB 153 PG 56

JOHNSON, NORMAN R
DB 6606 PG 0159

-Y6- +89.37 31.58'LT EXIST. R/W
-Y6- +45.00 60.00'LT
-Y6- +35.40 64.23'LT EXIST R/W
-Y6- +95.92 63.37'LT EXIST R/W
-Y6- +94.47 76.33'LT END C/A BEGIN FENCE
-Y6- +00.00 55.00'RT
-Y6- +27.50 29.60'RT EXIST. R/W
-Y6- +36.42 55.00'RT EXIST. R/W
-Y6- +92.82 90.00'RT END C/A END FENCE

100' LEFT TURN LANE
100' TAPER
50' TAPER
300' MEDIAN TAPER (LT & RT)
500' MEDIAN TAPER
GRADE TO DRAIN
RT SIDE ONLY

MATCH TO SHEET 8
-Y6- STA. 19+00

MATCH TO SHEET 8
-Y6A- STA. 11+00

PAVEMENT REMOVAL
FOR -Y6- PROFILE, SEE SHEET NO. 22
FOR -Y6A- PROFILE, SEE SHEET NO. 23

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

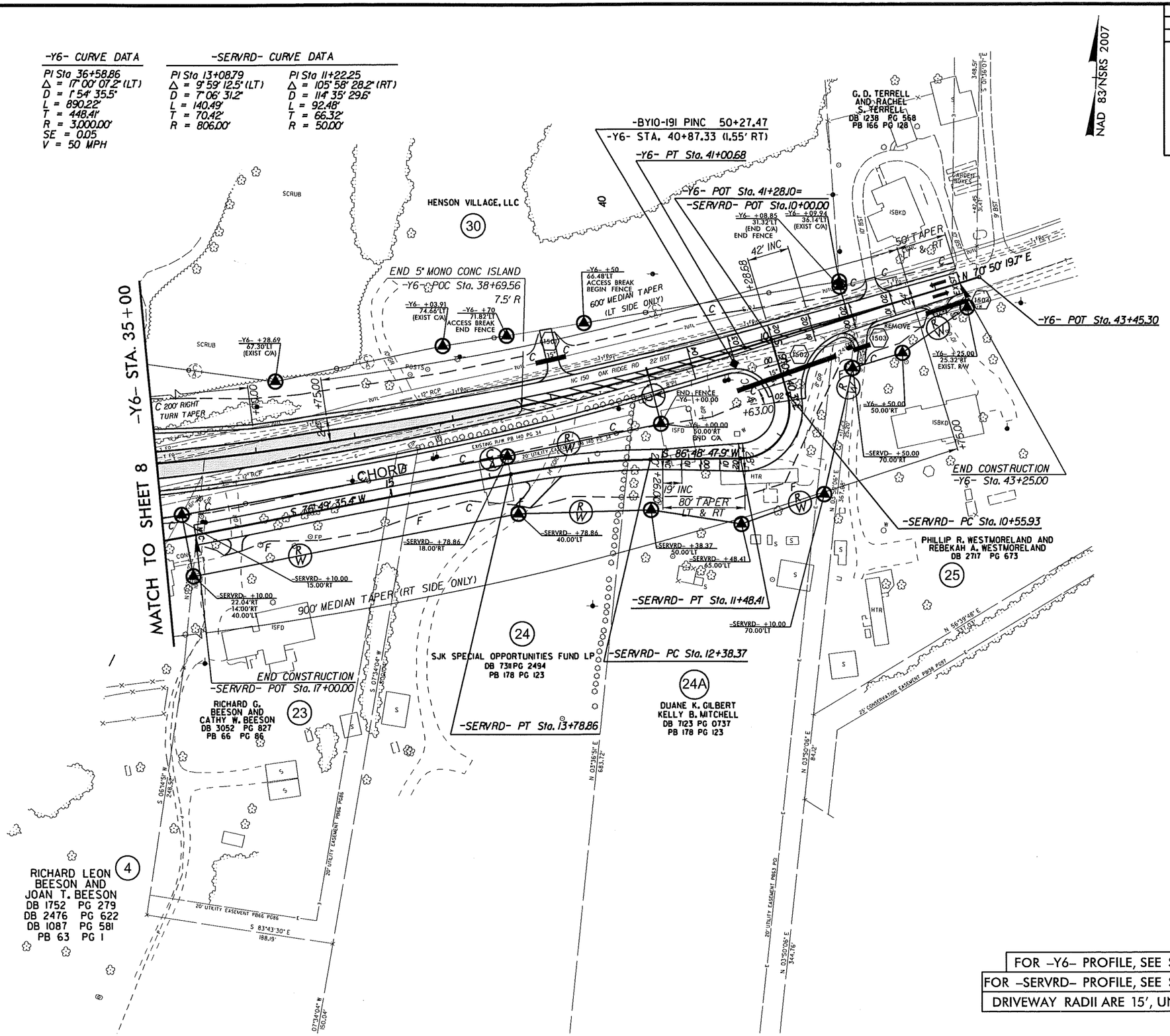
-Y6- CURVE DATA

PI Sta 36+58.86
Δ = 17° 00' 07.2" (LT)
D = 1° 54' 35.5"
L = 890.22'
T = 448.41'
R = 3,000.00'
SE = 0.05
V = 50 MPH

-SERVRD- CURVE DATA

PI Sta 13+08.79
Δ = 9° 59' 12.5" (LT)
D = 7° 06' 31.2"
L = 140.49'
T = 70.42'
R = 806.00'

PI Sta 11+22.25
Δ = 105° 58' 28.2" (RT)
D = 114° 35' 29.6"
L = 92.48'
T = 66.32'
R = 50.00'



FOR -Y6- PROFILE, SEE SHEET NO. 23
FOR -SERVRD- PROFILE, SEE SHEET NO. 23
DRIVEWAY RADII ARE 15', UNLESS NOTED

REVISIONS

R/W REVISION: THE PROPERTY OWNER NAME ON PARCEL 24 HAS BEEN CHANGED FROM KEVAN R.COMBS TO SJK SPECIAL OPPORTUNITIES FUND,LP. PARCEL 24 HAS BEEN SPILT INTO TWO SEPARATE PARCELS SJK SPECIAL OPPORTUNITIES FUND,LP (PARCEL NO.24) AND DUANE K.GILBERT AND KELLY B.MITCHELL (PARCEL 24A). CEH 4/9/2013

8/17/99

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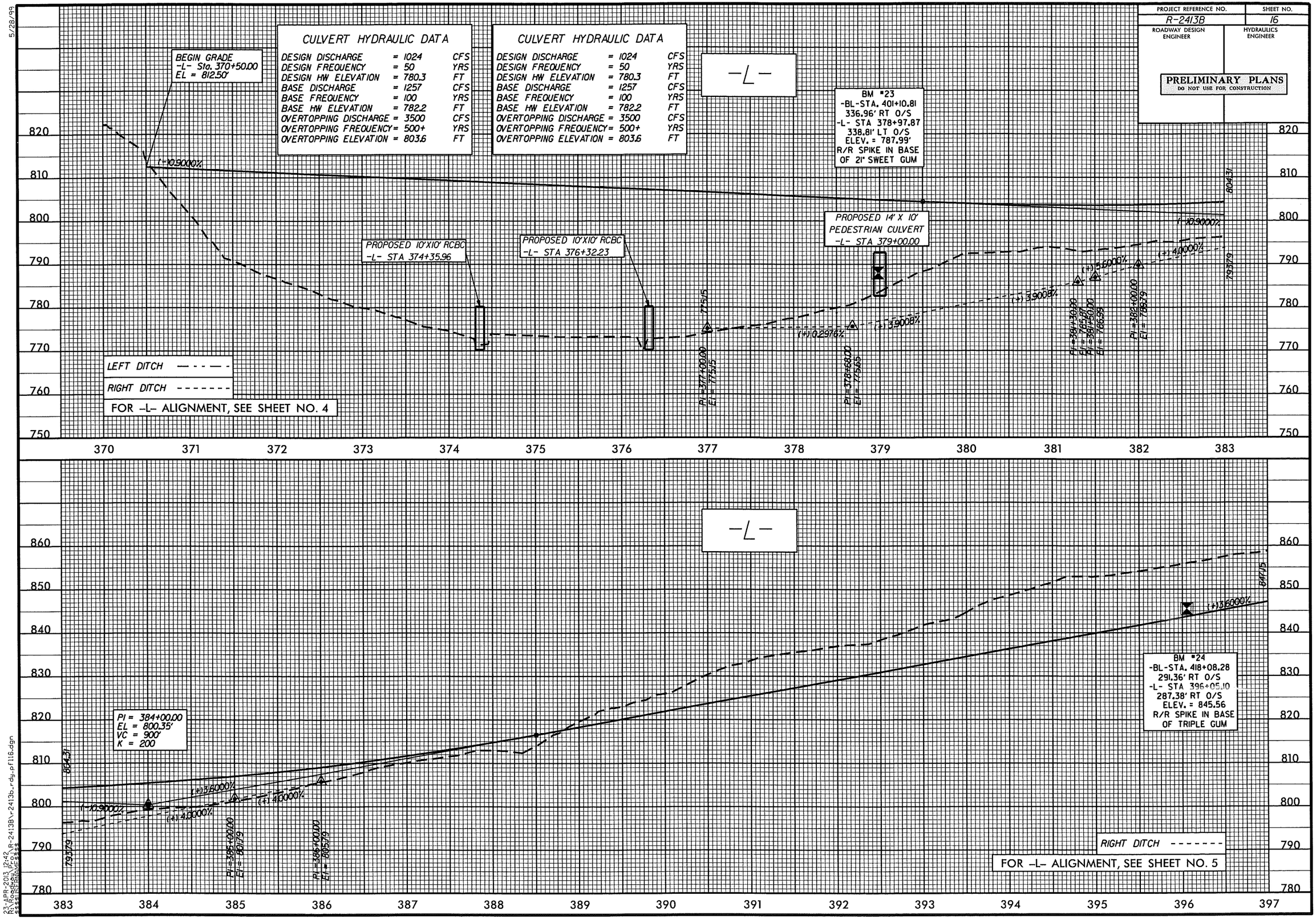
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/28/99

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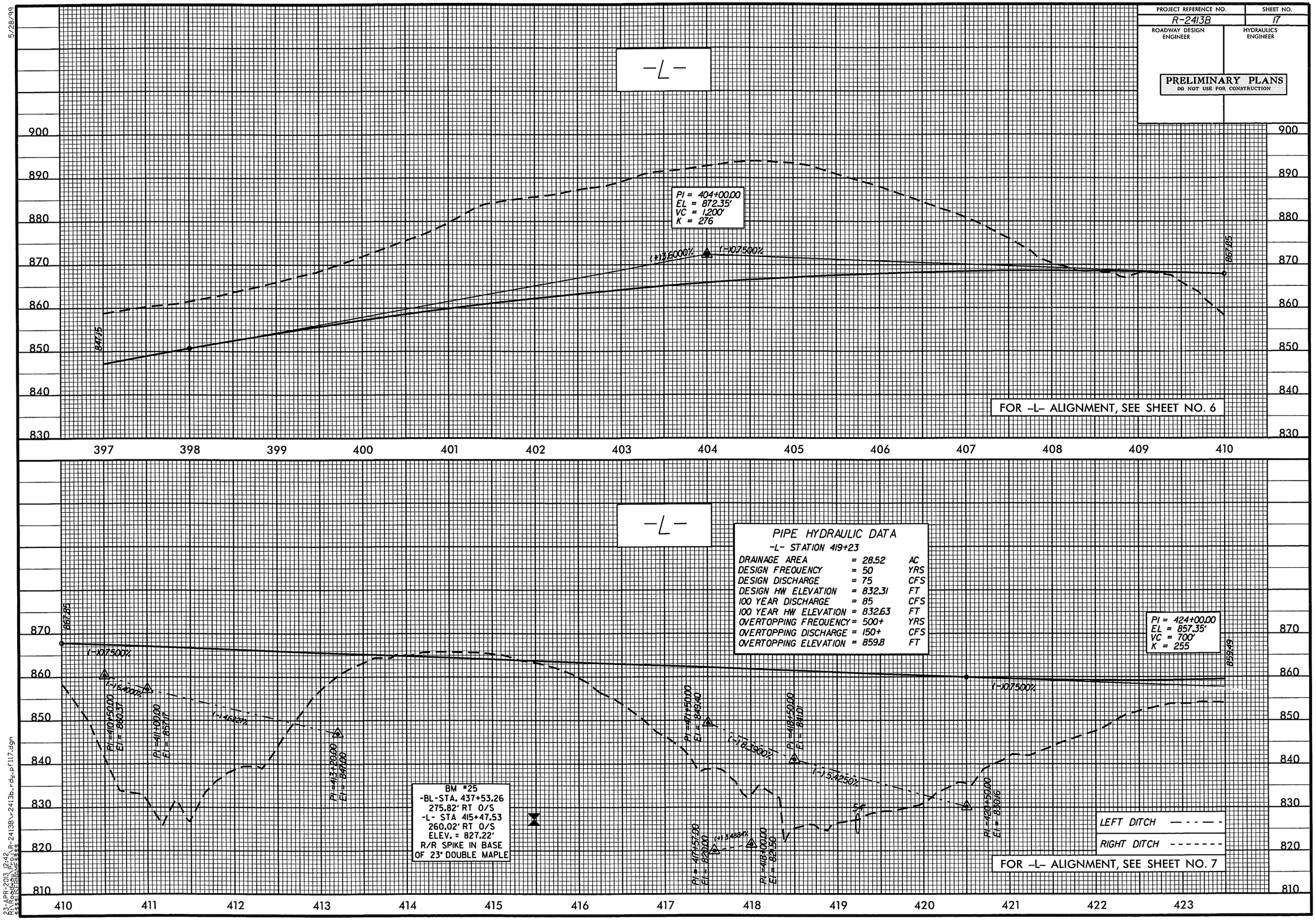
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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23-APR-2013 12:42
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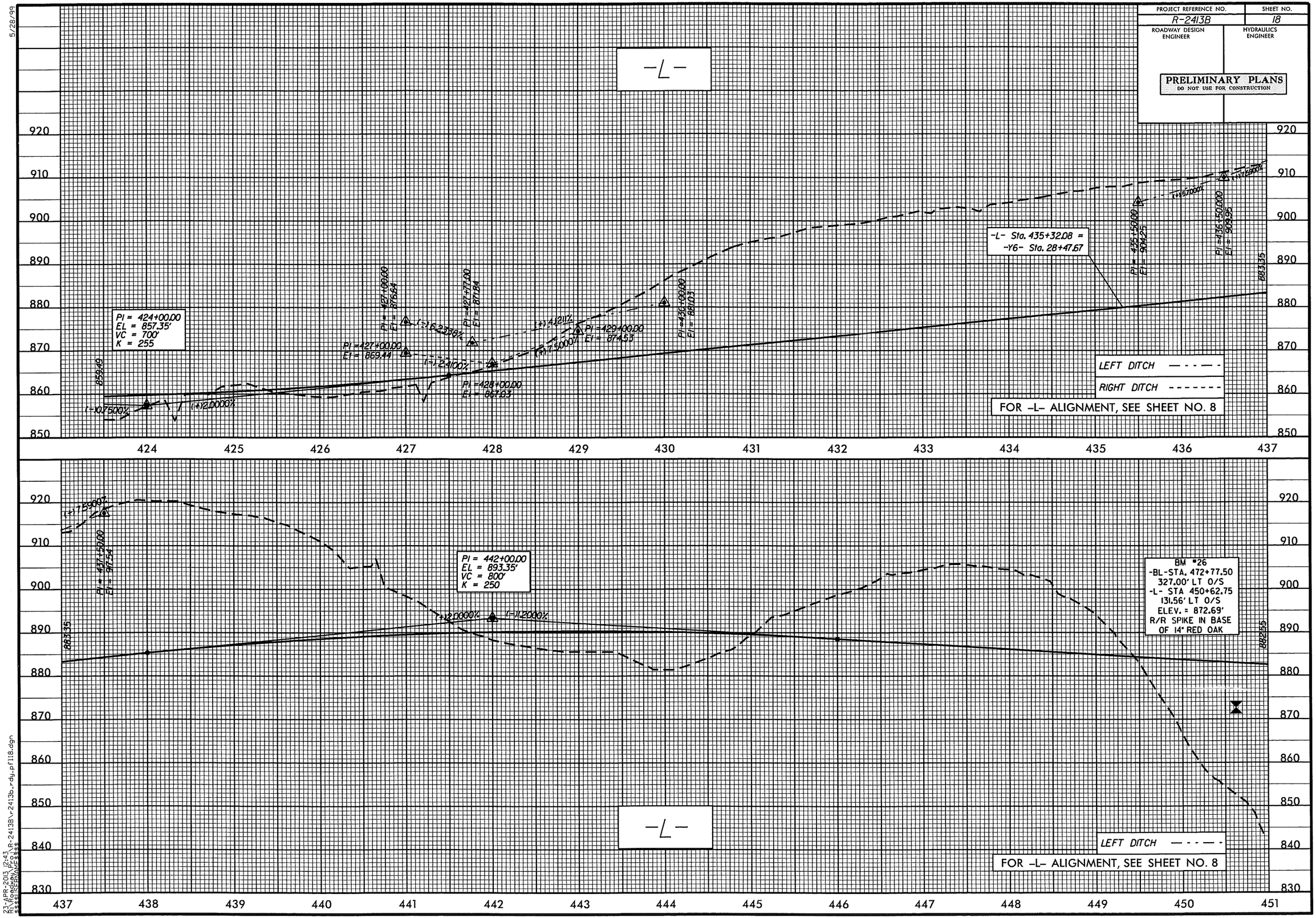
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/28/99

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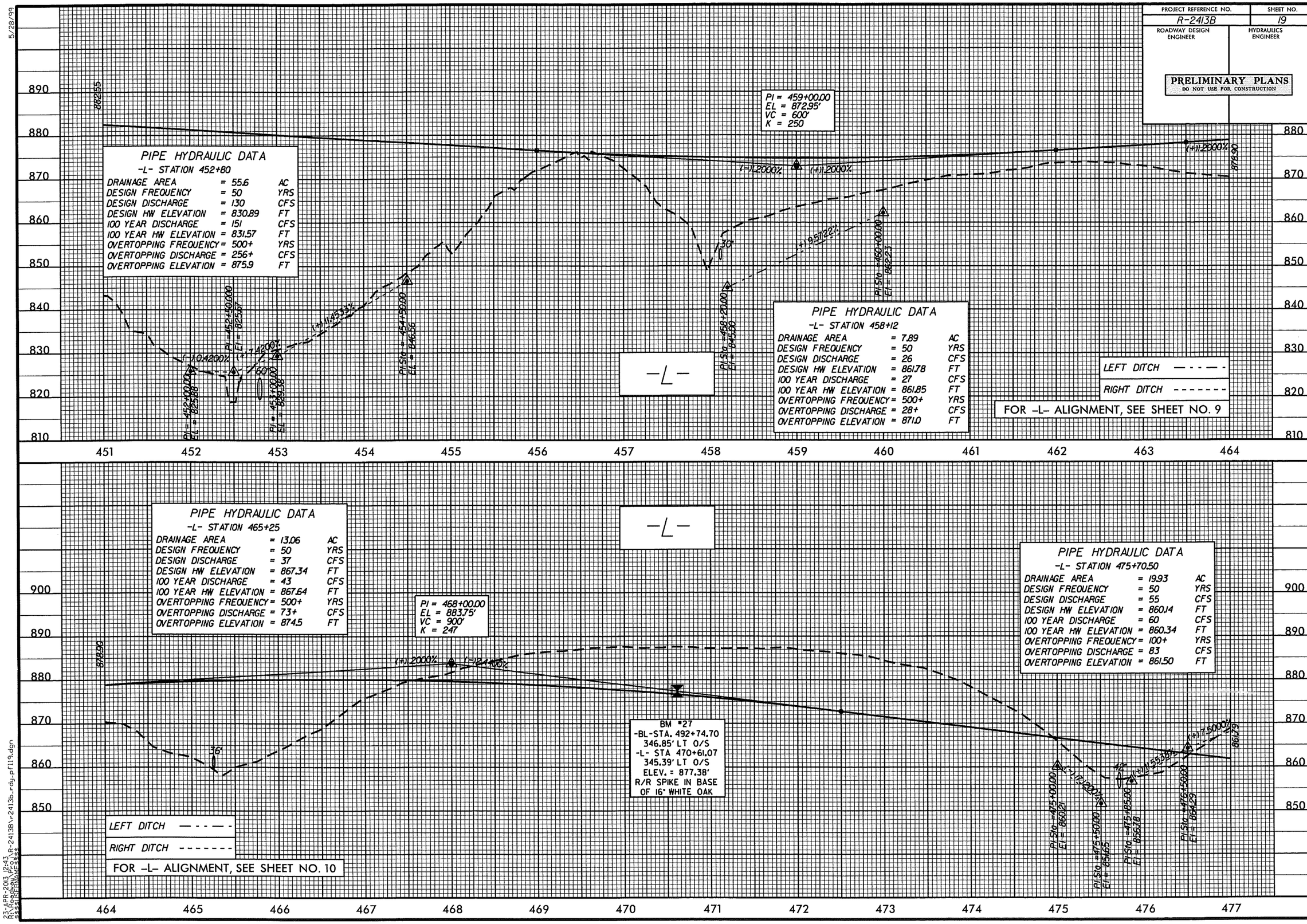
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/28/99

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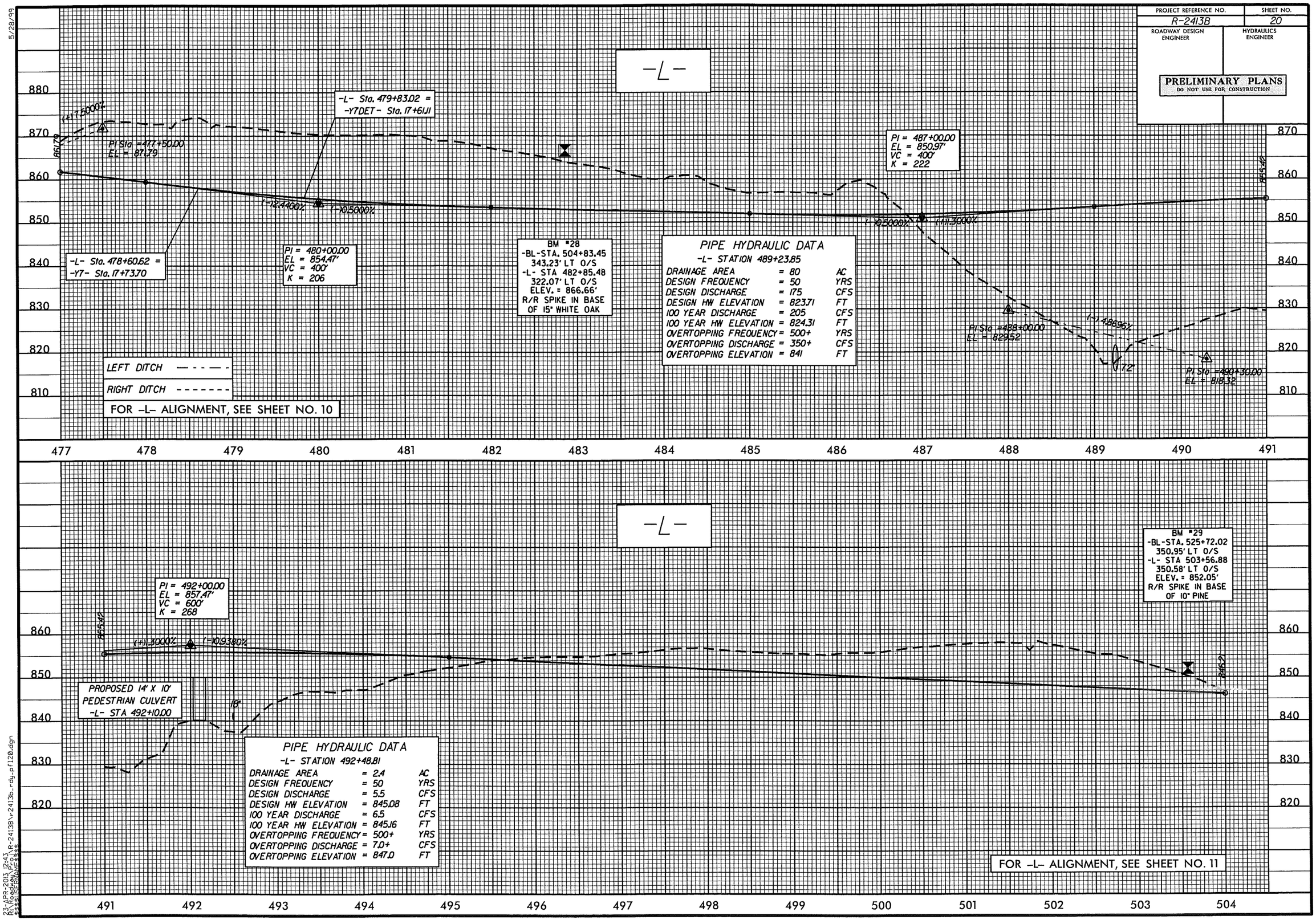
5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PI = 513+19.04
EL = 837.59'
VC = 700'
K = 342

(-)0.9380%
(-)2.9839%
(-)4.0000%
(+)3.5000%
(-)10.0000%
(-)0.9474%
(-)1.5200%
(+)3.3869%
(+)3.2768%
(+)8.4869%
(-)3.0952%
(-)8.2200%
(-)3.1500%
(-)0.8140%

PROPOSED 10'X8' RCBC
-L- STA 513+45.00

PI =505+00.00
EL = 831.10

PI =506+35.00
EL = 825.70

PI =507+50.00
EL = 829.75

PI =510+75.00
EL = 798.60

PI =511+00.00
EL = 812.00

PI =511+60.00
EL = 806.00

PI =512+50.00
EL = 792.00

PI =513+50.00
EL = 804.20

PI =514+50.00
EL = 799.00

PI =514+60.00
EL = 796.50

PI =515+50.00
EL = 789.00

PI =515+59.00
EL = 809.14

PI =516+00.00
EL = 800.06

PI =516+90.00
EL = 787.50

PI =517+00.00
EL = 814.65

826.23

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= TBD	CFS
DESIGN FREQUENCY	= TBD	YRS
DESIGN HW ELEVATION	= TBD	FT
BASE DISCHARGE	= TBD	CFS
BASE FREQUENCY	= TBD	YRS
BASE HW ELEVATION	= TBD	FT
OVERTOPPING DISCHARGE	= TBD	CFS
OVERTOPPING FREQUENCY	= TBD	YRS
OVERTOPPING ELEVATION	= TBD	FT

BM #30
-BL-STA. 538+89.44
294.00' LT O/S
-L- STA 516+71.82
296.22' LT O/S
ELEV. = 801.91'
R/R SPIKE IN BASE
OF 23" SWEET GUM

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

FOR -L- ALIGNMENT, SEE SHEET NO. 12

504 505 506 507 508 509 510 511 512 513 514 515 516 517

840 830 820 810 800 790 780

-L-

END GRADE
-L- Sta. 520+00.81
EL = 817.25'

826.23

(-)12.9839%
(+)11.0000%

PI =517+00.00
EL = 814.65

PI =518+50.00
EL = 816.35

RIGHT DITCH - - - - - - -

FOR -L- ALIGNMENT, SEE SHEET NO. 13

517 518 519 520 521

840 830 820 810 800 790

23-APR-2013 12:43
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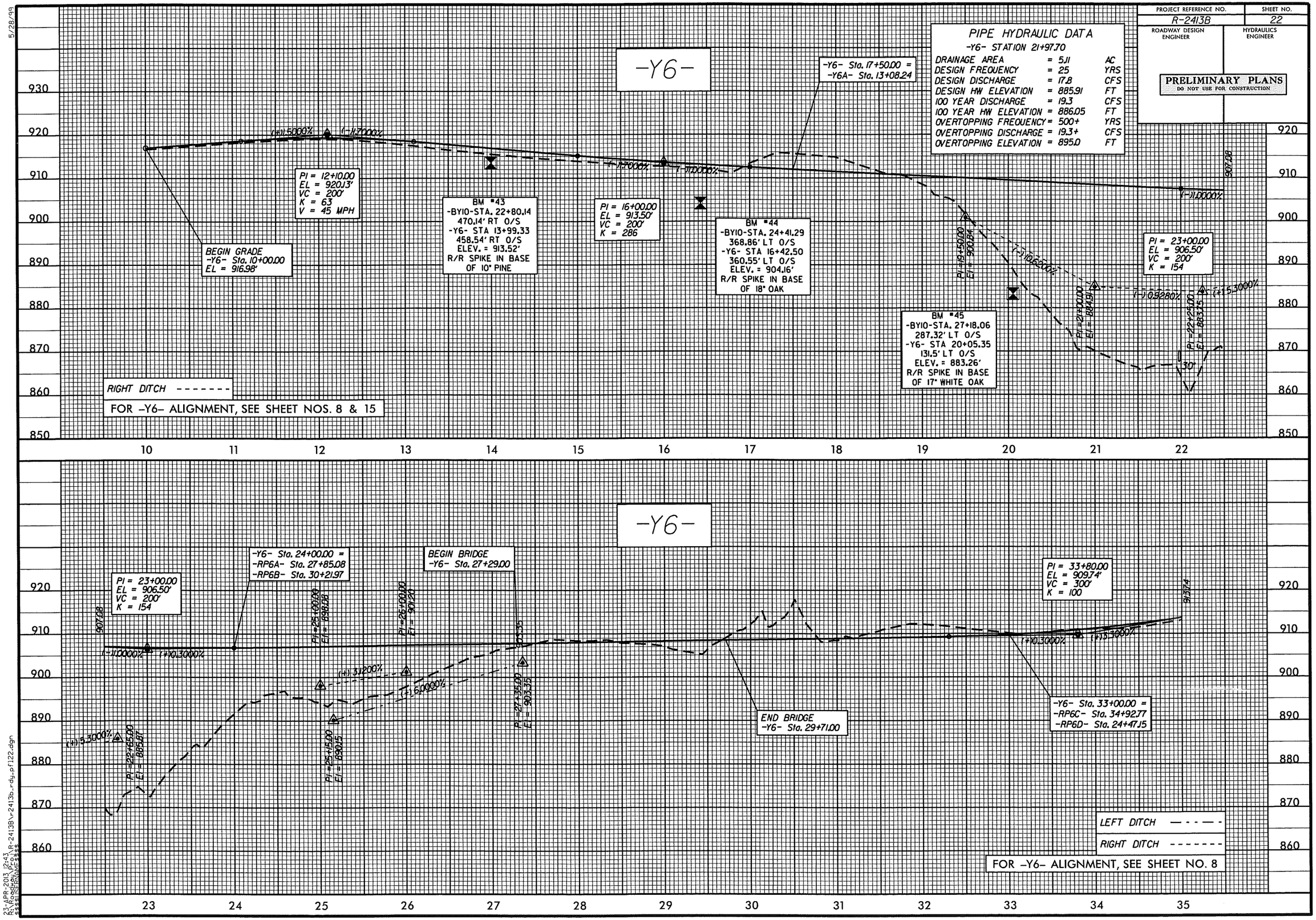
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

-Y6- STATION 21+97.70

DRAINAGE AREA	= 5.11	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 17.8	CFS
DESIGN HW ELEVATION	= 885.91	FT
100 YEAR DISCHARGE	= 19.3	CFS
100 YEAR HW ELEVATION	= 886.05	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 19.3+	CFS
OVERTOPPING ELEVATION	= 895.0	FT



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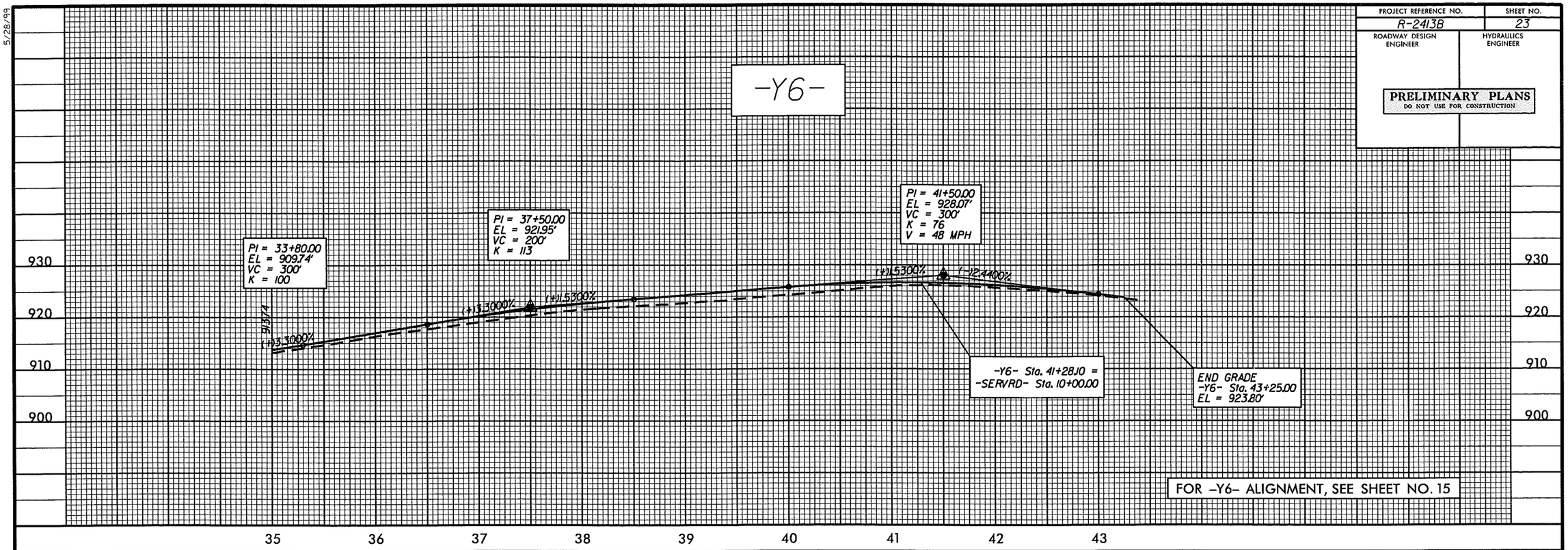
$$$$USERNAME$$$$

5/28/99

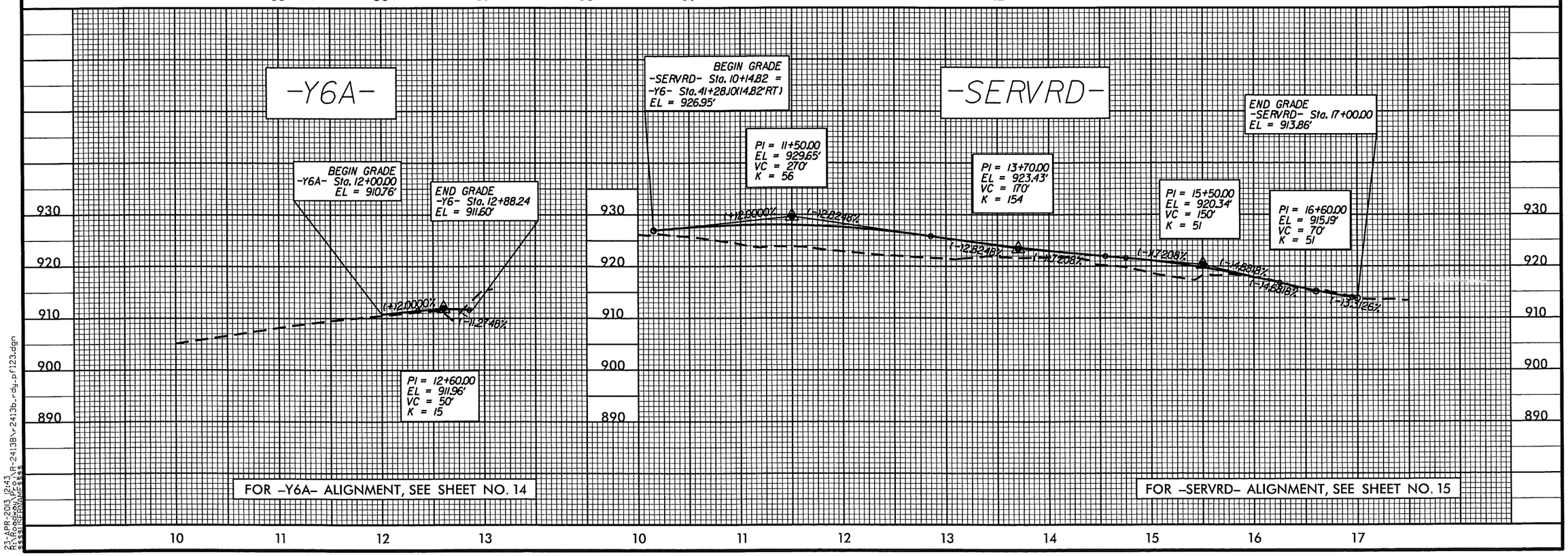
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y6-



-Y6A-



-SERVRD-

23-APR-2013 12:43
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$$$$USERNAME$$$$

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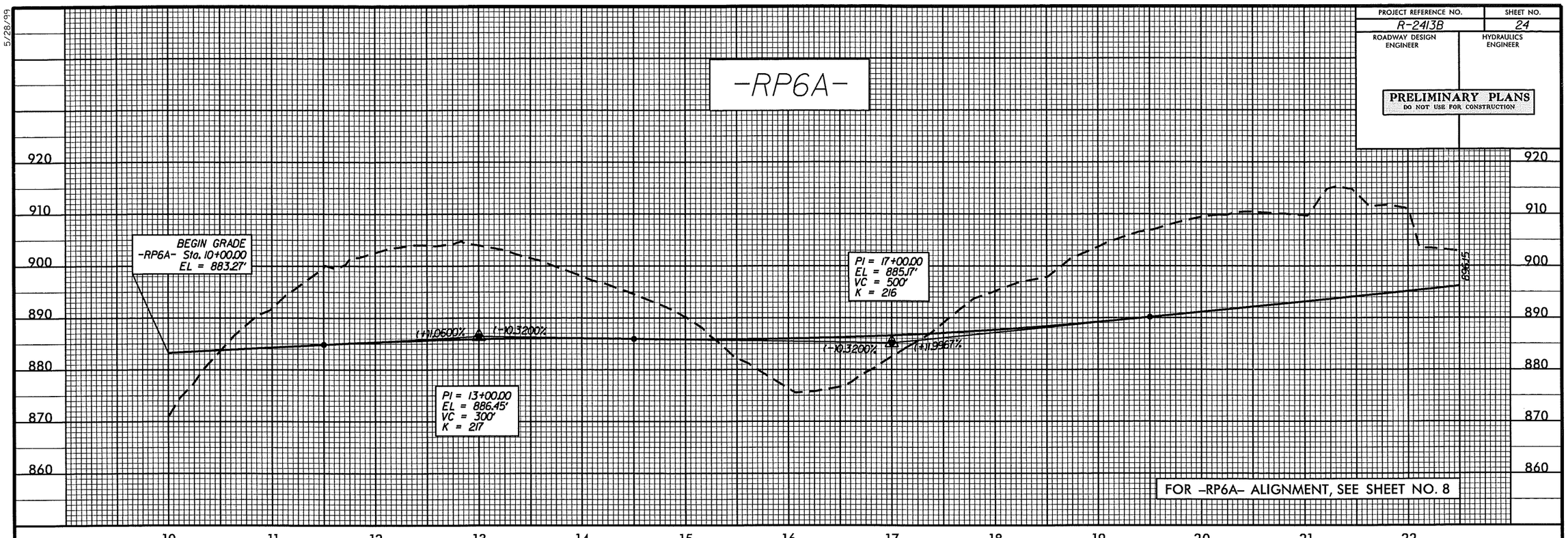
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

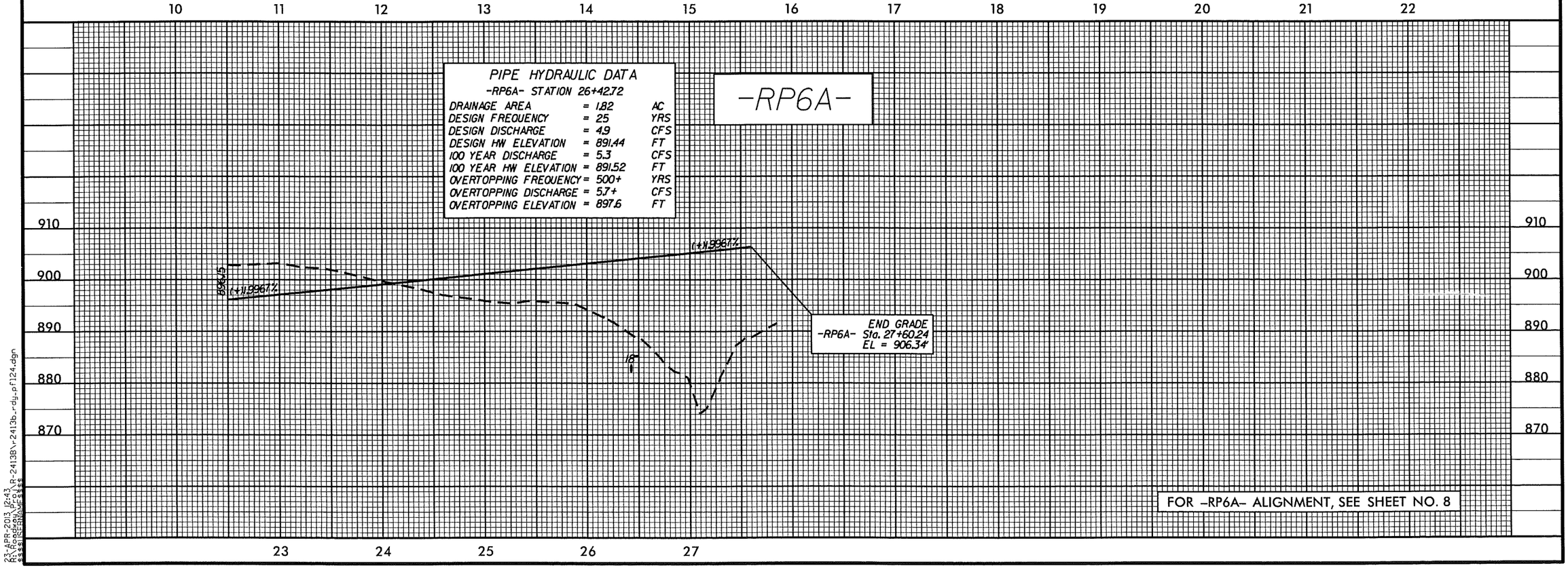
-RP6A-



PIPE HYDRAULIC DATA
-RP6A- STATION 26+42.72

DRAINAGE AREA	= 1.82	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4.9	CFS
DESIGN HW ELEVATION	= 891.44	FT
100 YEAR DISCHARGE	= 5.3	CFS
100 YEAR HW ELEVATION	= 891.52	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 5.7+	CFS
OVERTOPPING ELEVATION	= 897.6	FT

-RP6A-



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$$$$$USERNAME$$$$

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-RP6B-

PIPE HYDRAULIC DATA
-RP6B- STATION 15+71.98

DRAINAGE AREA	= 28.52	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 75	CFS
DESIGN HW ELEVATION	= 832.31	FT
100 YEAR DISCHARGE	= 85	CFS
100 YEAR HW ELEVATION	= 832.63	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 150+	CFS
OVERTOPPING ELEVATION	= 859.8	FT

PI = 14+00.00
EL = 863.51'
VC = 300'
K = 612

(-)0.3000%

(-)0.7900%

(-)0.7900%

864.19

BEGIN GRADE
-RP6B- Sta. 10+00.00
EL = 864.71'

PI = 20+00.00
EL = 858.77'
VC = 900'
K = 150

54"

FOR -RP6B- ALIGNMENT, SEE SHEET NO. 7

10 11 12 13 14 15 16 17 18 19

870 860 850 840 830 820

-RP6B-

PIPE HYDRAULIC DATA
-RP6B- STATION 28+82

DRAINAGE AREA	= 1.45	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4.7	CFS
DESIGN HW ELEVATION	= 896.62	FT
100 YEAR DISCHARGE	= 5.1	CFS
100 YEAR HW ELEVATION	= 896.68	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 5.4+	CFS
OVERTOPPING ELEVATION	= 897.00	FT

PI = 28+50.00
EL = 902.97'
VC = 200'
K = 68
V = 46 MPH

(+)2.7795%

(+)5.2000%

(+)5.2000%

(-)0.7900%

864.19

PI = 20+00.00
EL = 858.77'
VC = 900'
K = 150

18"

END GRADE
-RP6B- Sta. 29+91.51
EL = 906.19'

FOR -RP6B- ALIGNMENT, SEE SHEET NO. 8

20 21 22 23 24 25 26 27 28 29 30

910 900 890 880 870 860

23-APR-2013 12:43
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$$$$USERNAME$$$$

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413B	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-RP6C-

BEGIN GRADE
-RP6C- Sta. 10+00.00
EL = 865.87'

PI = 13+00.00
EL = 863.20'
VC = 300'
K = 283

(-)10.8900%

(-)11.9500%

PI = 19+00.00
EL = 851.50'
VC = 900'
K = 137

(-)11.9500%

(+)4.6000%

863.59'

54"

PIPE HYDRAULIC DATA
-RPY6C- STATION 16+24.13

DRAINAGE AREA	= 28.52	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 75	CFS
DESIGN HW ELEVATION	= 832.31	FT
100 YEAR DISCHARGE	= 85	CFS
100 YEAR HW ELEVATION	= 832.63	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 150+	CFS
OVERTOPPING ELEVATION	= 859.8	FT

FOR -RP6C- ALIGNMENT, SEE SHEET NO. 7

PI = 19+00.00
EL = 851.50'
VC = 900'
K = 137

862.95'

(+)4.6000%

PI = 32+50.00
EL = 913.60'
VC = 400'
K = 68
V = 46 MPH

(+)4.6000%

(-)1.2781%

PI Sta. =31+50.00
EL = 902.85

(+)0.9150%

PI Sta. =33+50.00
EL = 904.68

END GRADE
-RP6C- Sta. 34+61.25
EL = 910.90'

-RP6C-

LEFT DITCH — - - — -

FOR -RP6C- ALIGNMENT, SEE SHEET NO. 8

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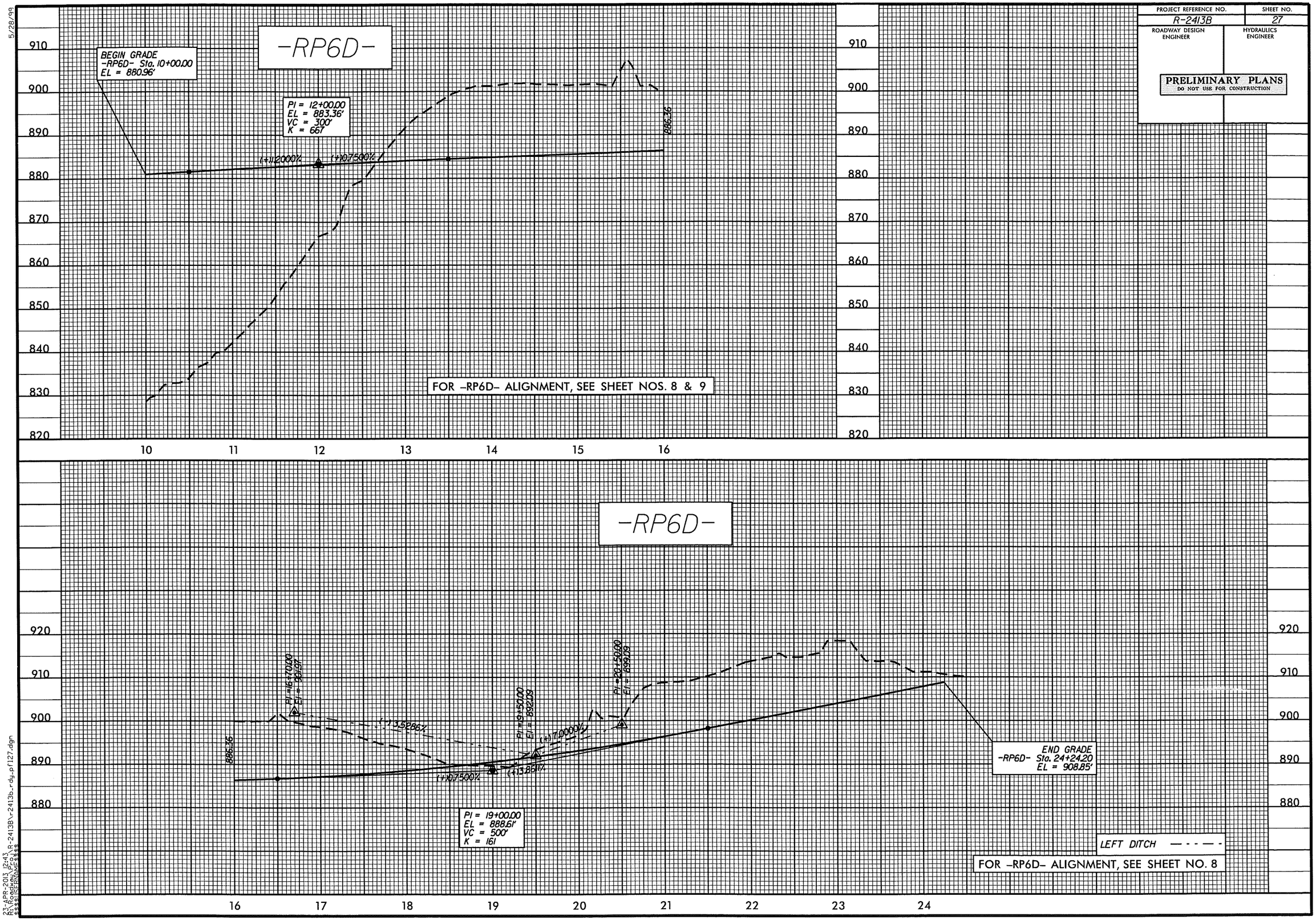
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
R-2413B	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y7-

BEGIN GRADE
-Y7- Sta. 11+75.00
EL = 869.32'

PI = 14+00.00
EL = 872.44'
VC = 300'
K = 132
V = 59 MPH

BEGIN BRIDGE
-Y7- Sta. 16+69.00

PI = 17+50.00
EL = 885.25'
VC = 310'
K = 67
V = 46 MPH

END BRIDGE
-Y7- Sta. 18+80.00

PI = 21+00.00
EL = 881.75'
VC = 350'
K = 80
V = 45 MPH

(+)3.6600%
(-)11.0000%
(-)3.3867%
(+)3.6600%
(-)10.0000%
(+)12.4000%
(-)1.0000%
(+)1.4000%
(+)3.3829%

PI =15+50.00
El = 869.88

PI =16+00.00
El = 869.33

PI =16+50.00
El = 871.05

PI =19+20.00
El = 873.25

PI =20+50.00
El = 878.35

BM #28
-BL-STA. 504+83.45
343.23' LT O/S
-Y7- STA 13+78.57
323.15' LT O/S
R/R SPIKE IN BASE
OF 15" WHITE OAK
ELEV. = 866.66'

END GRADE
-Y7- Sta. 22+75.00
EL = 887.67'

RIGHT DITCH - - - - - - -

FOR -Y7- ALIGNMENT, SEE SHEET NO. 10

-Y7DET-

BEGIN GRADE
-Y7DET- Sta. 11+36.72
EL = 868.12'

PI = 19+90.00
EL = 872.43'
VC = 800'
K = 222

(+)0.5051%
(+)4.0009%

END GRADE
-Y7DET- Sta. 24+29.17
EL = 890.44'

FOR -Y7DET- ALIGNMENT, SEE SHEET NO. 2-F

23-APR-2013 12:43
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$$$$USERNAME$$$$

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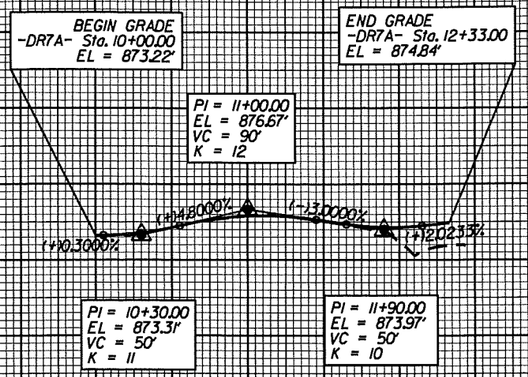
PROJECT REFERENCE NO.	SHEET NO.
R-2413B	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

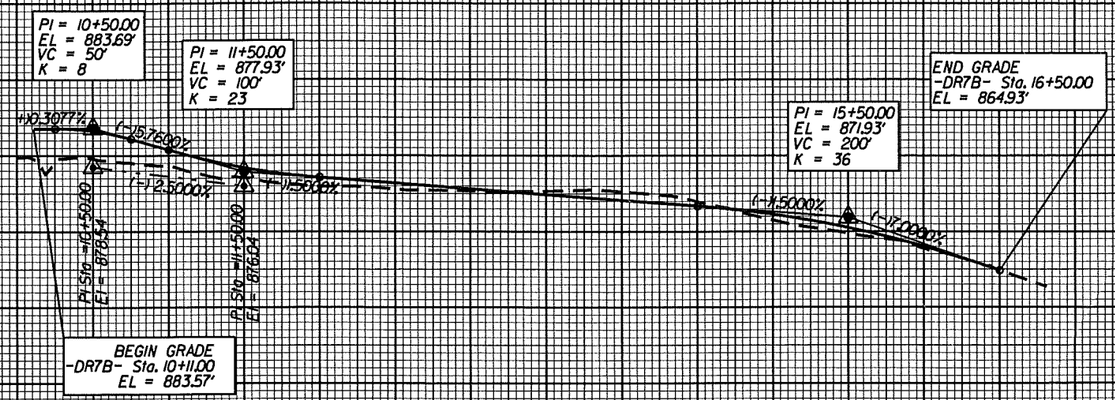
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-DR7A-



FOR -DR7A- ALIGNMENT, SEE SHEET NO. 10

-DR7B-

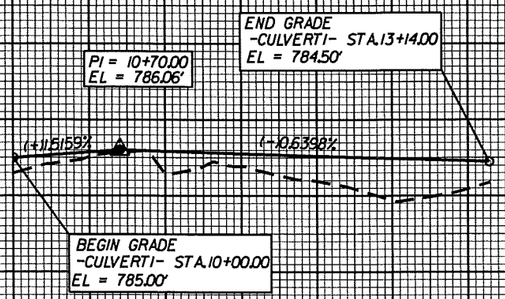


LEFT DITCH — - - — -

FOR -DR7B- ALIGNMENT, SEE SHEET NO. 10

-CULVERT1-

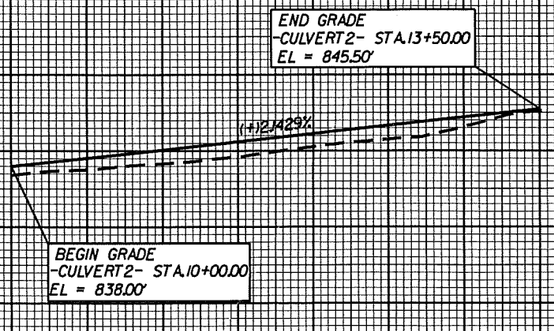
(PEDESTRIAN CULVERT)



FOR -CULVERT1- ALIGNMENT, SEE SHEET NO. 4

-CULVERT2-

(PEDESTRIAN CULVERT)



FOR -CULVERT2- ALIGNMENT, SEE SHEET NO. 11

27-APR-2013 12:43
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