STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

August 8, 2019

MEMORANDUM TO: Mr. Brandon H. Jones, P.E.
Division 8 Engineer

FROM: for Philip S. Harris, III, P.E., C.P.M.,Unit Head
Environmental Analysis Unit

SUBJECT: Richmond County; US 74 Bypass West of Rockingham at SR 1109 (Zion Church Rd.) to Southwest of SR 1304 (Harrington Rd.); Federal Aid Project No. NHF-0220(4); WBS 34542.1.1; **TIP R-3421 A & B**

Attached are the U.S. Army Corps of Engineers Individual Permit Modification and N.C. Division of Water Resources (NCDWR) Water Quality Certification. All environmental permits have been received for the construction of this project.

A copy of this permit package will be posted on the NCDOT website at:
https://connect.ncdot.gov/resources/Environmental/Pages/Permits-and-Mitigation.aspx
Quick Links>Permit Documents> Issued Permits.

cc: w/o attachment (see website for attachments)

Mr. Ron Davenport, P.E. Contracts Management
Mr. Art King, Division 8 Environmental Officer
Dr. Majed Al-Ghandour, P.E., Programming and TIP
Mr. Carl Barclay, P.E., Utilities Unit
Mr. Stephen Morgan, P.E., Hydraulics
Mr. Brian Hanks, P.E., Structure Design
Mr. Mark Staley, Roadside Environmental
Mr. Lamar Sylvester, P.E., State Roadway Construction Engineer

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

Telephone: (919) 707-6000
Fax: (919) 212-5785
Customer Service: 1-877-368-4968
Website: www.ncdot.gov

Location:
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

PROJECT COMMITMENTS

Richmond County
US 74 Bypass West of Rockingham at SR 1109 (Zion Church Rd.)
to Southwest of SR 1304 (Harrington Rd.)
Federal Aid Project No. NHF-220(4)
WBS No. 34542.1.FR3
TIP Nos. R-3421A, R-3421B

COMMITMENTS FROM PROJECT DEVELOPMENT AND DESIGN

All standard commitments identified during the project development and design phase have been incorporated into the design. Original commitments developed during project development or permitting appear in standard font. Status changes or additions to the project commitments developed through consultation on Section C of the project or as a result of environmental permitting are printed in *italics or* ***Bold Italics.*** Further updates completed for this construction consultation are preceded by the title ***Update*** and are also written in ***Bold Italics.***

Roadway Design / Roadside Environmental Unit / Hydraulics / Division 8 Construction

- "High Quality Waters (HQW) Erosion Control Guidelines" will be adhered to throughout construction.

These guidelines are currently referred to as "Design Standards in Sensitive Watersheds". A "No Effect" conclusion for the shortnose sturgeon was issued by the National Marine Fisheries Service based on NCDOT adhering to this set of guidelines.

Update: ***The Erosion Control Plans completed for Sections A and B of the R-3421 project adhere to "Design Standards in Sensitive Watersheds."***

- NCDOT's "Stream Crossing Guidelines for Anadromous Fish Passage" will be adhered to for this project.

A "No Effect" conclusion for the shortnose sturgeon was issued by the National Marine Fisheries Service based on NCDOT adhering to this set of guidelines.

Update: ***The Stream Crossing Guidelines for Anadromous Fish Passage generally consist of qualifications, dimensional recommendations, moratoria guidance, and construction recommendations such that migration of anadromous fish will not be impeded by projects in the Coastal Plain region of North Carolina. The guidance was issued over a decade ago, and the specific terms are routinely negotiated as part of the NEPA/Section 404 Merger process or the permitting process dependent upon specific fauna in the project study area. Concurrence Point 4B meetings for Sections A and B of the project were conducted in Spring of 2005. Due to funding, these sections of the project were delayed for several years and Concurrence Point 4C meetings were eventually held for Sections A and B of the project in the Summer of 2015.***

The hydraulic design of drainage structures for all jurisdictional streams on Section A and B of the R-3421 project consist of culverts that are buried for 20% of their diameter up to 1-foot for each jurisdictional stream crossing. On Section B of the project, the proposed box culvert at the tributary to Cartledge Creek will have buried inverts, two (2) barrels for low-flow fish passage, and one (1) high-flow barrel with inlet and outlet sills and interior baffles. These specifications are consistent with the Stream Crossing Guidelines for Anadromous Fish Passage and the merger Concurrence Point 4B and 4C discussions for Sections A and B of the R-3421 project.

Structures Management Unit / *Division 8 Construction*

- NCDOT's "Guidelines for Best Management Practices for Bridge Demolition and Removal" will be adhered to throughout construction.

A "No Effect" conclusion for the shortnose sturgeon was issued by the National Marine Fisheries Service based on NCDOT adhering to this set of guidelines.

Update: ***No bridges will be demolished or removed as part of Sections A or B of the R-3421 project.***

Division 8 Construction

- No in-stream construction in any Pee Dee tributaries will be carried out during the months of January, February, March or April. This schedule will provide spawning shortnose sturgeon (*Acipenser brevirostrum)* adequate time to migrate upstream and return.

A "No Effect" conclusion for the shortnose sturgeon was issued by the National Marine Fisheries Service based on NCDOT adhering to this moratorium.

Note: Hitchcock Creek and Cartledge Creek will not be impacted by the proposed project. No moratorium is necessary.

Update: ***The above note concerning Hitchcock Creek and Cartledge Creek was added during consideration of constructing Section C of the project, which did not impact either creek. As well, documented e-mails with the National Marine Fisheries Service in Summer and Fall of 2010 clarified that the moratorium applies only to Hitchcock and Cartledge Creeks and not to the smaller tributaries of the Pee Dee River. Neither Section A nor Section B of the project impacts the mainstems of Hitchcock Creek or Cartledge Creek, therefore the construction moratorium originally committed to in the FONSI does not apply.***

Environmental Analysis Unit / Division 8 Construction

- According to archaeological investigations, two prehistoric sites eligible for listing in the National Register of Historic Places (site numbers 31RH418 and 31RH420) may be affected by the proposed project. Prior to right-of-way acquisition, NCDOT commits to resolve any adverse affects to these prehistoric properties in consultation with the North Carolina State Historic Preservation Office (SHPO) and any other consulting party(s) that may be identified. The Advisory Council for Historic Preservation will be provided an opportunity to comment on the undertaking.

*Site 31RH420/420** is outside of the proposed right of way area for project R-3421C and will not be disturbed. Site 31RH418 is within the proposed right of way area of R-3421C; however, the property owner, a timber company, clear-cut all of their property in 2005. Clear-cutting the forest around the site and bulldozing the approximate site location to create a level loading area for the logging trucks appears to have destroyed the site. Gary Glover, Ph.D., North Carolina Department of Transportation Archaeological Section, furnished this information to the Office of State Archaeology in 2005.*

Note: The most recent design plans show that Site 31RH420/420** is outside of the proposed right of way area of project R-3421C and will not be disturbed. The October 12, 2010 letter from the North Carolina State Historic Preservation office attached to this consultation acknowledged the information concerning Site 31RH418 stated in the above commitment response.

***Update:* The two sites identified above were the only sites that were eligible for listing in the National Register from its inception and through subsequent updates. Both sites were located in the Section C project area and would not be affected by Sections A or B of the R-3421 project. None of the other sites assessed and subsequently re-examined in the vicinity of Sections A or B of the R-3421 project are eligible for listing in the National Register.**

- On February 27, 2001, the Carolina heelsplitter (*Lasmigona decorata*) was added as a Federally listed endangered mussel species in Richmond County. NCDOT performed intensive surveys for this species September through December 2001. While no species were located during this survey, its presence cannot be totally ruled out due to previous occurrences. Thus a finding of "not likely to adversely affect" was given. The USFWS concurred with this finding in a letter dated January 22, 2002. Should additional information become available relative to the referenced species, NCDOT commits to provide additional surveys for the protected Carolina heelsplitter.

The PDEA Natural Environmental Unit is currently coordinating with Gary Jordan, US Fish and Wildlife Service, to request concurrence on changing the "Not Likely to Adversely Affect" Biological Conclusion to a "No Effect" Biological Conclusion for the Carolina heelsplitter.

Note: The Carolina heelsplitter has been removed from the USFWS list of threatened and endangered species for Richmond County; therefore, no further coordination is necessary.

***Update:* The Schweinitz's sunflower (Helianthus schweinitzii) was added as a Federally listed endangered plant in Richmond County on June 27, 2018. As such, surveys for this plant within Sections A and B of the R-3421 project have not yet been initiated. The survey window for Schweinitz's sunflower typically begins in late August and extends through October.**

The NCDOT Environmental Analysis Unit will initiate surveys for Schweinitz's sunflower within the study area for Sections A and B of the R-3421 project in late August 2019.

Construction for Sections A or B of the R-3421 project cannot commence until the Schweinitz's sunflower surveys have been completed and any subsequent compliance with Section 7 of the Endangered Species Act has been completed.

COMMITMENTS FROM PERMITTING

Division 8 / Hydraulics Unit / Environmental Analysis Unit

- 404 Special Condition #7: The permit plans for R-3421 A and B are currently in the preliminary plan state and accordingly, R-3421A and B are not authorized for construction at this time. Construction may commence on Sections A and B only after all appropriate and practicable avoidance and minimization measures have been employed, final design has been completed and plans have been approved by the District Commander. A modification request must be submitted to the District Commander prior to construction.

Note: This commitment covers projects R-3421A and R-3421B, not R-3421C.

Update: Since the 404/401 permitting was initiated, merger concurrence through points 4B and 4C has continued for both Sections A and B of the R-3421 project. Further avoidance and minimization measures were discussed for both sections of the project and have been incorporated into the latest design plans. Permit modifications for the Individual Section 404 Permit and Section 401 Water Quality Certification specific to Sections A and B of the R-3421 project have been obtained.

- 401 Project Specific Condition #9: When final design plans are completed for R-3421 Sections A and B, a modification to the 401 Water Quality Certification shall be submitted with five copies and fees to the NC Division of Water Quality. Final designs shall reflect all appropriate avoidance, minimization, and mitigation for impacts to wetlands, streams, and other surface waters. No construction activities that impact any wetlands, streams, or surface waters located in R-3421 Sections A or B shall begin until after the permittee applies for, and receives a written modification of the 401 Water Quality Certification from the NC Division of Water Quality.

Note: This commitment covers projects R-3421A and R-3421B, not R-3421C.

Update: Since the 404/401 permitting was initiated, merger concurrence through points 4B and 4C has continued for both Sections A and B of the R-3421 project. Further avoidance and minimization measures were discussed for both sections of the project and have been incorporated into the latest design plans. Permit modifications for the Individual Section 404 Permit and Section 401 Water Quality Certification specific to Sections A and B of the R-3421 project have been obtained.

Hydraulics Unit

- 404 Special Condition #8: In order to ensure that all impacts associated with R-3421 Section A and B are avoided and minimized, a Concurrence Point 4C meeting shall be held prior to construction in these sections.

Update: Concurrence Point 4C meetings were held for both Sections A and B of the proposed R-3421 project in the Summer of 2015 to discuss further avoidance and minimization measures. Items discussed at the meetings have been included in the plans as agreed to in the meetings.

Environmental Analysis Unit

- 404 Special Condition #10: The applicant shall submit a compensatory mitigation plan for impacts associated with Sections A and B of the R-3421 along with the final plans for R-3421A and B and the permit modification request(s).

Update: ***Permit modifications for the Individual Section 404 Permit and Section 401 Water Quality Certification specific to Sections A and B of the R-3421 project have been obtained. A compensatory mitigation plan was included as part of the permit modification request.***

Division 8 Construction, Roadside Environmental Unit

- 404 Special Condition #22: In order to ensure that the project is not likely to adversely affect the endangered shortnose sturgeon, the permittee shall adhere to the following conditions:
    a. "High Quality Waters Erosion Control Guidelines: shall be adhered to throughout the entire project.
    b. NCDOT's "Stream Crossing Guidelines for Anadromous Fish Passage" shall be adhered to for all streams identified in the project area.
    c. The "Guidelines for Best Management Practices for Bridge Demolition and Removal" shall be adhered to for all streams identified in the project area.

Update: ***Potential impacts to the shortnose sturgeon related to constructing Sections A and B of the proposed R-3421 project have been minimized to the extent practicable through implementation of the referenced guidelines where applicable and as amended by discussion with NOAA Fisheries related specifically to elements of the Stream Crossing Guidelines for Anadromous Fish Passage. High Quality Waters Erosion Control Guidelines, now identified as Design Standards in Sensitive Watersheds, have been incorporated into the design plans. Neither Section A nor Section B of the project requires bridge demolition or removal.***

- 401 Modification Condition #2: Geotextile fabric shall be placed within and along the banks of 27 linear feet of stream channel to be temporarily impacted at Site 13A to ease removal of fill material from the temporary detour.
- 401 Modification Condition #3: Grubbing within the 50 foot riparian area of the stream should be avoided to the maximum extent practicable at Site 13A.
- 401 Modification Condition #4: The impacted stream, banks, and riparian area at Site 13A shall be restored as closely as possible to its pre-impacted condition during removal of the temporary detour. If any trees are removed within the riparian area, appropriate, native tree species shall be planted to replace any removed to construct the detour.

Update: ***The three 401 Modification Conditions (#2, #3, #4) are related specifically to Section C of the project, which has already been constructed.***

No additional special conditions were added from the August 2019 permit modifications for Sections A and B of the R-3421 project.

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

August 6, 2019

Regulatory Division

Action ID No. SAW-1996-03023

Mr. Philip S. Harris III, P.E., C.P.M
Natural Environment Section Head
NC Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Harris:

Reference the Department of the Army (DA) permit issued on August 7, 2012, to Mr. Gregory J. Thorpe, of the North Carolina Department of Transportation for impacts associated with the widening and new lane construction project identified as R-3421A, B and C. The widening portion of the proposed project is located along US 220 from the US 220 Ellerbe Bypass to SR 1304 (Harrington Road), between Ellerbe and Rockingham, North Carolina. The new location portion of this project is located from SR 1304 (Harrington Road) to the US 74 Bypass, west of Rockingham, North Carolina. The site contains tributaries and adjacent wetlands that are within the Yadkin River basin.

Impacts authorized by the original permit include: 1) The placement of fill material into 13,569 linear feet of jurisdictional stream channel, 14.54 acres of wetlands and 2.58 acres of open water ponds. At time of permit issuance, R-3421 C consisted of final designs; whereas, R-3421 sections A and B were in preliminary plan state. Compensatory mitigation was implemented for the unavoidable impacts to R-3421 C by payment into the North Carolina Division of Mitigation Services Program.

On October 17, 2012, the Corps issued a modification to this permit to include a temporary discharge of fill material within 27 linear feet of jurisdictional stream channel, associated with the construction of a temporary detour. The permit was also modified by request dated April 20, 2016, for the proposed permanent impacts to 0.13 acre of adjacent wetlands and temporary impacts to 10 linear feet of stream associated with the mechanized clearing of a 30 foot maintenance corridor for the relocation of an existing Piedmont Natural Gas (PNG) 4-inch gas line.

Please reference your modification request dated December 1, 2017, for a permit expiration date extension for an additional five (5) years. Also reference your July 18, 2019, modification request to authorize construction on the A & B sections since plans for these sections have progressed to final design. The Corps has completed the evaluation of your requests and determined that both are appropriate and reasonable, and no public notice is required for these modifications. Therefore, the permit is modified to extend the expiration date for an additional five (5) years to December 31, 2022, and to authorize construction for sections A & B. The authorized construction must be constructed as indicated in the modification plans submitted with your July 18, 2019 request, and the revisions dated July 25, 2019 and July 30, 2019. In addition, this modification approval includes the following special conditions:

> **August 2019 revision, SC #1**. In order to compensate for impacts associated with this modification, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.
>
> **August 2019 revision, SC #2**. All surveys discussed within the July 18, 2019 modification request will be completed as proposed.

All other conditions of the permit remain in effect as written. Should you have questions, contact Mr. Andrew Williams, Raleigh Regulatory Field Office at telephone (919) 554-4884, Extension 26.

FOR THE COMMANDER

Robert J. Clark
Colonel, U.S. Army
District Commander

Enclosure

Copy Furnished (w/o enclosure):

Ms. April Norton
DEQ- Water Quality Department of Environmental Quality
1617 Mail Service Center
Raleigh, NC 27699

Mr. Brandon H. Jones, PE
Division Engineer
NCDOT Division 8
902 N Sandhills Blvd.
Aberdeen, NC 28315

Mr. Art King
Division Environmental Officer
NCDOT Division 8
902 N Sandhills Blvd.
Aberdeen, NC 28315

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

U.S. ARMY CORPS OF ENGINEERS
Wilmington District
Compensatory Mitigation Responsibility Transfer Form

Permittee: NCDOT, Phil Harris, Natural Environment Section Head **Action ID:** SAW-1996-03023
Project Name: R-3421 A&B **County:** Richmond

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Division of Mitigation Services (NCDMS), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements (credits) shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the bank ledger and provide a copy of the signed form and the updated bank ledger to the Permittee, the USACE Project Manager, and the Wilmington District Mitigation Office (see contact information on page 2). The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements:

Permitted Impacts Requiring Mitigation* **8-digit HUC and Basin:** 03040201, Yadkin River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
7,577	0	0	4.48	0	0	0

*If more than one mitigation sponsor will be used for the permit, only include impacts to be mitigated by this sponsor.

Compensatory Mitigation Requirements: **8-digit HUC and Basin:** 03040201, Yadkin River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
15,154	0	0	8.96	0	0	0

Mitigation Site Debited: NCDMS
(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCDMS, list NCDMS. If the NCDMS acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCDMS), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name:_____

Name of Sponsor's Authorized Representative:_____

_____ _____
Signature of Sponsor's Authorized Representative **Date of Signature**

USACE Wilmington District
Compensatory Mitigation Responsibility Transfer Form, Page 2

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions: None

This reflects impacts and required mitigation for Sections A and B only. Section C has been previously constructed and mitigated.

This form is not valid unless signed below by the USACE Project Manager and by the Mitigation Sponsor on Page 1. ***Once signed, the Sponsor should provide copies of this form along with an updated bank ledger to: 1) the Permittee, 2) the USACE Project Manager at the address below, and 3) the Wilmington District Mitigation Office, Attn: Todd Tugwell, 11405 Falls of Neuse Road, Wake Forest, NC 27587 (email: todd.tugwell@usace.army.mil)***. Questions regarding this form or any of the permit conditions may be directed to the USACE Project Manager below.

USACE Project Manager: Andy Williams
USACE Field Office: Raleigh Regulatory Field Office
US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587
Email: Andrew.e.williams2@usace.army.mil

	August 5, 2019
USACE Project Manager Signature	**Date of Signature**

U.S. ARMY CORPS OF ENGINEERS

Wilmington District

Current Wilmington District mitigation guidance, including information on mitigation ratios, functional assessments, and mitigation bank location and availability, and credit classifications (including stream temperature and wetland groupings) is available at http://ribits.usace.army.mil.

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director

NORTH CAROLINA
Environmental Quality

August 5, 2019

Mr. Philip S. Harris, III, P.E., CPM
Natural Environment Section Head
Project Development and Environmental Analysis
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina, 27699-1598

Subject: Modification to 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS for the proposed widening and new lane construction from US 74 (Rockingham/Hamlet Bypass) to US 220 (Ellerbe Bypass) in Richmond County, Federal Aid Project No. NHF-0220(4), State Project No. 8.1580802, TIP R-3421AB. NCDWR Project No. 20120142 V.5; Certification No. 3916.

Dear Mr. Harris:

Attached hereto is a modification of Certification No. 3916 issued to The North Carolina Department of Transportation (NCDOT) originally dated March 10, 2012 with subsequent modifications on the following dates: September 28, 2012, September 25, 2014 (in-field modification; Section C) and May 12, 2016. This modification will be Version 5.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

DocuSigned by:
Amy Chapman
9C9886312DCD474...

Linda Culpepper
Director
Division of Water Resources

Electronic copy only distribution:
Andrew Williams, US Army Corps of Engineers, Raleigh Field Office
Chris Rivenbark, NC Department of Transportation, Environmental Analysis Unit
Jason Dilday, NC Department of Transportation, Raleigh
Art King, Division 8 Environmental Officer
Rex Badgett, Division 8 DEO Assistant
Gary Jordan, US Fish and Wildlife Service
Travis Wilson, NC Wildlife Resources Commission
Beth Harmon, Division of Mitigation Services
April Norton, NC Division of Water Resources
File Copy

Modification to the 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with Modification to the 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500. This certification authorizes the NCDOT to impact 0.68 acres (Section A) and 3.8 acres (Section B) of jurisdictional wetlands; and, 4,221 linear feet (Section A) and 3,970 linear feet (Section B) of jurisdictional streams; in Richmond County. The project shall be constructed pursuant to the application modification dated and received July 18, 2019, with subsequent information on August 2, 2019. The authorized impacts are as described below:

Stream Impacts in the Yadkin-Pee Dee River Basin

Site	Temporary Fill in Perennial Stream (linear ft.)	Permanent Fill in Perennial Stream (linear ft.)		Temporary Fill in Intermittent Stream (linear ft.)	Permanent Fill in Intermittent Stream (linear ft.)	Total Stream Impact (linear ft.)	Stream Impacts Requiring Mitigation (linear ft.)
R-3421A							
1	10	411		---	----	421	411
2	50	1,011		---	---	1,061	1,011
3	106	475		---	---	581	475
3A	---	81		---	---	81	---
3B	10	61		---	---	71	---
4	---	---		12	205	217	---
5*	25	327		---	---	352	327
5A*	10	118		---	---	128	---
6	---	---		---	---	---	---
7A*	10	127		---	---	137	---
7 South*	10	828		---	---	838	828
7 North*	12	175		---	---	187	---
8	---	---		---	147	147	---
8A	---	---		---	---	---	---
Total:	**243**	**3,614**		**12**	**352**	**4,221**	**3,052**
R-3421B							
1	---	---		10	33	43	---
2	20	201		---	---	221	---
2A	36	---		---	---	36	---
3	21	578		---	---	599	578
4	22	397		---	---	419	397
5	23	669		---	---	692	669
6	---	---		---	---		---
7	---	---		34	610	644	---
8	161	703		---	---	864	703
9	---	---		---	---		---
10	11	339		---	---	350	339
11	---	---		21	81	102	---
12	---	---		---	---	---	---
Total:	**294**	**2,887**		**65**	**724**	**3,970**	**2,686**

Note: *R – 3421A streams SI and SK at sites 5 and 7 are identified as intermittent by NCDWR.

Total Stream Impacts for Project: 8,191 linear feet.

Wetland Impacts in the Yadkin-Pee Dee River Basin

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impacts (ac)	Wetland Impacts Requiring Mitigation (ac)
R-3421A							**---**
2	0.48	---	---	---	---	0.48	---
6	---	---	---	<0.01	---	<0.01	---
7 South	---	---	0.15	0.02	---	0.17	---
8A	<0.01	---	---	0.02	---	0.03	---
Total:	**0.48**		**0.15**	**0.05**		**0.68**	**---**
R-3421B							
1	0.23	---	---	0.01	---	0.24	---
3	0.03	---	---	---	---	0.03	---
4	0.06	---	---	<0.01	---	0.07	---
6	0.09	---	---	<0.01	---	0.10	---
9	0.10	---	---	0.02	---	0.12	---
10	0.75	---	0.03	0.09	---	0.84	---
12	2.24	---	---	0.14	---	2.38	2.24
Total:	**3.50**	**---**	**0.03**	**0.27**	**---**	**3.8**	**2.24**

Total Wetland Impacts for Project: 4.48 ac

The application provides adequate assurance that the discharge of fill material into the waters of the Yadkin-Pee Dee Basin in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application modification request dated and received July 18, 2019 with subsequent information on July 29, 2019. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated March 10, 2012 and subsequent modifications on September 28, 2012, September 25, 2014 (in-field modification; Section C) and May 12, 2016 still apply except where superseded by this certification. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 300 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

Conditions of Certification:

1. Compensatory mitigation for R-3421A is required for 3,052 linear feet of impact to streams. Compensatory mitigation for R-3421B is required for 2,686 linear feet of impacts to streams and 2.24 acres of riparian wetlands. We understand that you have chosen to perform compensatory mitigation for impacts to streams through the North Carolina Division of Mitigation Service (DMS) (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. The DMS has indicated in letters dated July 12, 2019 and August 2, 2019 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the DMS Mitigation Banking Instrument signed July 28, 2010.

2. This modification is applicable only to the additional proposed activities. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated March 10, 2012 and subsequent modification still apply except where superseded by this certification.

3. Unless otherwise approved in this certification, placement of culverts and other structures in open waters and streams, shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and downstream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by the NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NCDWR for guidance on how to proceed and to determine if a permit modification will be required. [15A NCAC 02H.0506(b)(2)]

4. For sites where multiple pipes or barrels will be utilized, they shall be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage. [15A NCAC 02H.0506(b)(2)]

5. Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed. [15A NCAC 02H.0506(b)(2)]

6. For segments of streams being impacted due to site dewatering activities, the site shall be graded to its preconstruction contours and revegetated with appropriate native species. [15A NCAC 02H.0506(b)(2)]

7. The stream channel shall be excavated no deeper than the natural bed material of the stream, to the maximum extent practicable. Efforts must be made to minimize impacts to the stream banks, as well as to vegetation responsible for maintaining the stream bank stability. Any riparian impacts for access to the stream channel shall be temporary and be revegetated with native riparian species. [15A NCAC 02H.0506(b)(2)]

8. NCDOT shall comply with NPDES Permit NCS000250 issued to the NCDOT, including the applicable requirements of General Permit for Construction Activities - NCG010000. Please note the extra protections for sensitive watersheds where applicable.

General Conditions

1. As a condition of this 401 Water Quality Certification, if bridge demolition occurs now or in the future, the bridge demolition must be accomplished in strict compliance with the most recent version of NCDOT's Best Management Practices for Construction and Maintenance Activities. [15A NCAC 02H .0507(d)(2) and 15A NCAC 02H .0506(b)(5)]

2. Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed. [15A NCAC 02H.0506(b)(2)]

3. The stream channel shall be excavated no deeper than the natural bed material of the stream, to the maximum extent practicable. Efforts must be made to minimize impacts to the stream banks, as well as to vegetation responsible for maintaining the stream bank stability. Any applicable riparian buffer impact for access to stream channel shall be temporary and be revegetated with native riparian species. [15A NCAC 02H.0506(b)(2)]

4. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills. [15A NCAC 02B.0200]

5. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S. or protected riparian buffers. [15A NCAC 02H.0506(b)(2)]

6. The dimension, pattern and profile of the stream above and below the crossing shall not be modified. Disturbed floodplains and streams shall be restored to natural geomorphic conditions. [15A NCAC 02H.0506(b)(2)]

7. The use of riprap above the Normal High-Water Mark shall be minimized. Any riprap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage. [15A NCAC 02H.0506(b)(2)]

8. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval. [15A NCAC 02H .0507 (c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

9. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water. [15A NCAC 02H.0506(b)(3) and (c)(3)]

10. Heavy equipment shall be operated from the banks rather than in the stream channel to minimize sedimentation and reduce the introduction of other pollutants into the stream. [15A NCAC 02H.0506(b)(3)]

11. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials. [15A NCAC 02H.0506(b)(3)]
12. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification. [15A NCAC 02H.0506(b)(3)]

13. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited. [15A NCAC 02H.0506(b)(3)]

14. The Permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If the NCDWR determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification. [15A NCAC 02B.0200]

15. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification. [15A NCAC 02H.0506(b)(2)]

16. A copy of this Water Quality Certification shall be maintained on the construction site always. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

17. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization, including all non-commercial borrow and waste sites associated with the project, shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification. [15A NCAC 02H.0501 and .0502]

18. The issuance of this certification does not exempt the Permittee from complying with all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.

19. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery. [15A NCAC 02B.0506(b)(2)]

20. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer (or whomever is the authorized agent if a non-NCDOT project) shall complete and return the enclosed "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0502(f)]

21. Native riparian vegetation (i.e., trees and shrubs native to your geographic region) must be reestablished in the riparian areas within the construction limits of the project by the end of the growing season following completion of construction. [15A NCAC 02B.0506(b)(2)]

22. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities. [15A NCAC 02H.0506(b)(3) and (c)(3)]

23. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices to protect surface waters standards [15A NCAC 02H.0506(b)(3) and (c)(3)]

    a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*.

    b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.

    c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.

    d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.

24. Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved by this Certification. [15A NCAC 02H.0506(b)(3) and (c)(3)]

25. All sediment and erosion control devices shall be removed, and the natural grade restored within two (2) months of the date that the Division of Energy, Mining and Land Resources (DEMLR) or locally delegated program has released the specific area within the project. [15A NCAC 02H.0506(b)(3) and (c)(3)]

If you wish to contest any statement in the attached Certification you must file a petition for an administrative hearing. You may obtain the petition form from the office of Administrative hearings. You must file the petition with the office of Administrative Hearings within sixty (60) days of receipt of this notice. A petition is considered filed when it is received in the office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00am and 5:00pm, except for official state holidays. The original and one (1) copy of the petition must be filed with the Office of Administrative Hearings.

The petition may be faxed, providing the original and one copy of the document is received by the Office of Administrative Hearings within five (5) business days following the faxed transmission.
The mailing address for the Office of Administrative Hearings is:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Telephone: (919) 431-3000, Facsimile: (919) 431-3100

A copy of the petition must also be served on DEQ as follows:

Mr. Bill F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center

This letter completes the review of the Division of Water Resources under Section 401 of the Clean Water Act. If you have any questions, please contact April Norton at 919-707-9111 or April.Norton@ncdenr.gov.

This 5th day of August 2019
DIVISION OF WATER RESOURCES

DocuSigned by:
Amy Chapman
Certificate ...

Linda Culpepper, Director

WQC No. 3916

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director

NORTH CAROLINA
Environmental Quality

NCDWR Project No.: _____ **County:** _____
Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion
Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the 401 Transportation Permitting Unit, North Carolina Division of Water Resources, 1617 Mail Service Center, Raleigh, NC, 27699-1617. This form may be returned to NCDWR by the applicant, the applicant's authorized agent, **or** the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date:_____

Engineer's Certification

_____ Partial _____ Final

I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____
Date _____

Revised 7/30/19

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element:	34542.1.FR4	**TIP No.:**	R-3421A	**County(ies):**	Richmond	**Page** 1	**of** 3

General Project Information

WBS Element:	34542.1.FR4	**TIP Number:**	R-3421A	**Project Type:**	New Location	**Date:**	7/30/2019
NCDOT Contact:	Mr. Stephen R. Morgan, PE			**Contractor / Designer:**			
Address:	1000 Birch Ridge Drive Raleigh, NC			**Address:**			
Phone:	919-707-6739			**Phone:**			
Email:	smorgan@ncdot.gov			**Email:**			
City/Town:				**County(ies):**	Richmond		
River Basin(s):	Yadkin-Pee Dee			**CAMA County?**	No		
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	1.78	**Surrounding Land Use:**	Agricultural, Rural, Residential

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	54.4 ac.	ac.
Typical Cross Section Description:	46' Grass median, 2@12' paved inside shoulers, 2@12' lanes each direction, 12' paved outside shoulder, grass roadway ditches.	
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: Year:	Existing: Year: 2019

General Project Narrative: (Description of Minimization of Water Quality Impacts)

CSR 1 & 2 on Loop B & I73; CSR 3 Loop C; CSR 4 Ramp C; CSR 5 on L2/L2Rev (extension).

R-3421A is an interchange and bypass project (US220 Bypass From US74 Bypass West Of Rockingham at SR1109 Interchange) which will include a 46' grass median with 2@12' travel lanes in each direction. The project also includes grass lined roadway ditches. The proposed project includes 4 major drainage structures (3Culverts & extension of 2 culverts) located in the interchange, which will convey Un-named Tribs to the Pee Dee River. The culverts will include sills and utilize Low Flow Benches as well as a stream relocation between 2 culverts to maintain the low flow in one barrel of the culvert. A Rip Rapped Energy Dissipator will be utilized at the outlet of 2 60" pipes to dissipate the energy and prevent erosion to the receiving stream. There are some minor channel improvements at the inlet and outlet of a few of the culverts. Direct dischages into jurisdictional features were avoided to the maximum extent practicable. Where possible, drainage systems were released away from jurisdictional features. However, in some locations direct discahge was unavoidable due to extreme topographic constraints as well as proposed roadway profiles. In these locations no practical alternatives were present.

Waterbody Information

Surface Water Body (1):	Un-named Trib to Pee Dee River	**NCDWR Stream Index No.:**	UT to 13 - (34)		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C		
		Supplemental Classification:			
Other Stream Classification:	None				
Impairments:	None				
Aquatic T&E Species?	No	Comments:			
NRTR Stream ID:				**Buffer Rules in Effect:**	N/A
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element: 34542.1.FR4 **TIP No.:** R-3421A **County(ies):** Richmond

Revised 7/30/19

Swales

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
	See Comments Below														

Additional Comments

The design for R-3421A includes typical grassed cut ditches within the roadway footprint. These ditches are collecting runoff from the impervious roadway surfaces and transporting the runoff to inlets and pipes. The geometry of the typical cut ditches contain side slopes ranging from 4:1 to 8:1 and having mostly mild longitudinal slopes. However, no grassed swale treatment was claimed nor reqired for this portion of the project even though many aspects of the grassed swale criteria was incorporated into the design.

Revised 7/30/19

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element: 34542.1.FR4 **TIP No.:** R-3421A **County(ies):** Richmond

Preformed Scour Holes and Energy Dissipators

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)	V10 (fps)	BMP Associated w/ Buffer Rules?
10	-RPD- 10+32.66 (73.4' LT) 34.9524103,-79.8468202	(1)Un-named Trib to Pee	Riprap Energy Dissipator Basin	Class I			2 - 60" RCP and 1 - 36" RCP			N/A

Additional Comments

* Refer to the NCDOT Best Management Practices Toolbox (2014), NCDOT Standards, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

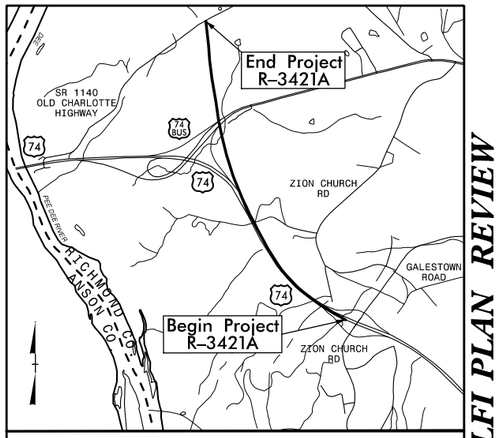
Revised 7/25/2019

09/08/99

TIP PROJECT: R-3421A

CONTRACT:

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



VICINITY MAP

PLFI PLAN REVIEW

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RICHMOND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3421A	1	

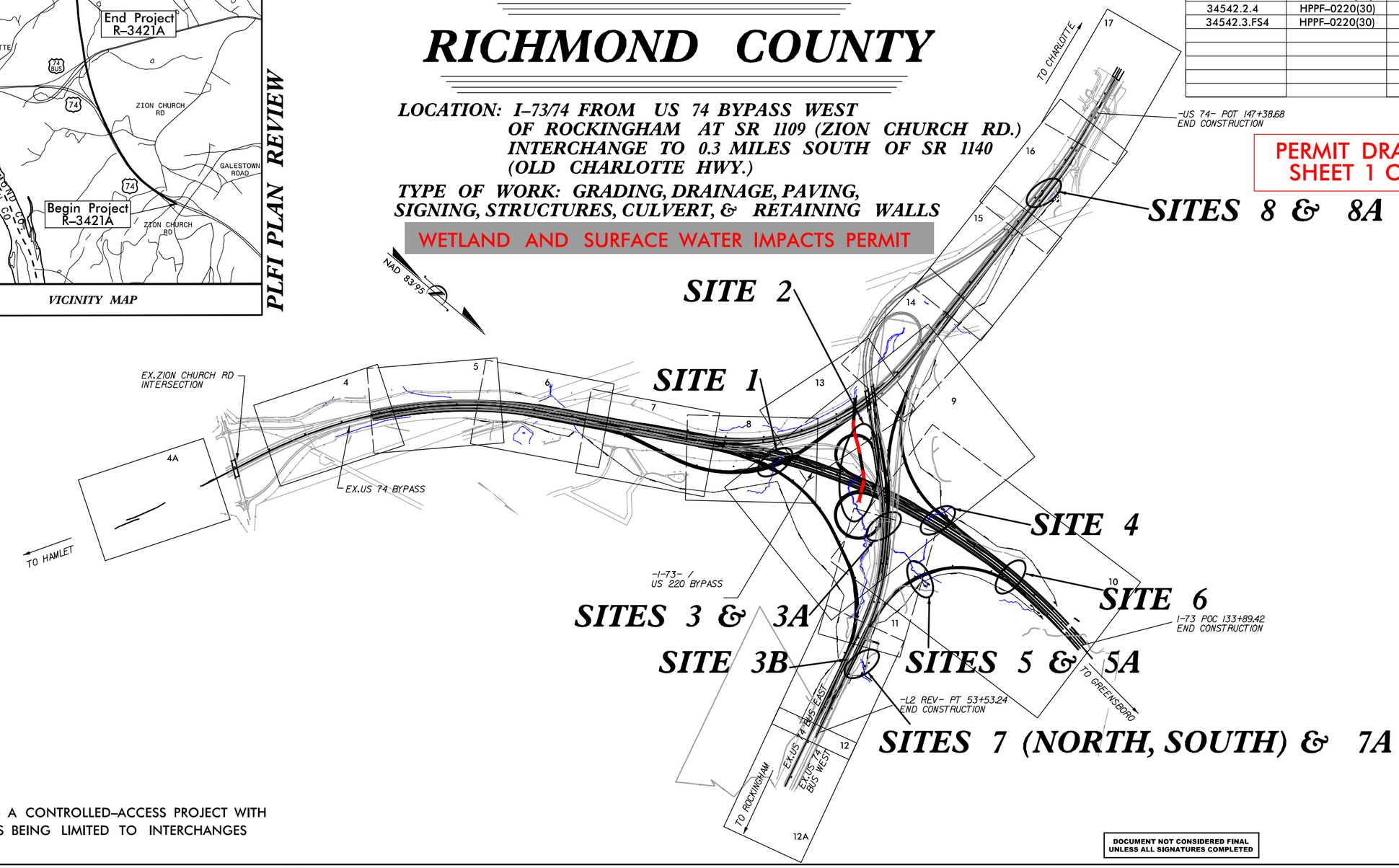
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34542.1.FR4	HPPF-0220(75)	P.E.
34542.2.4	HPPF-0220(30)	R/W, UTIL.
34542.3.FS4	HPPF-0220(30)	P.E.

LOCATION: I-73/74 FROM US 74 BYPASS WEST OF ROCKINGHAM AT SR 1109 (ZION CHURCH RD.) INTERCHANGE TO 0.3 MILES SOUTH OF SR 1140 (OLD CHARLOTTE HWY.)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING, STRUCTURES, CULVERT, & RETAINING WALLS

WETLAND AND SURFACE WATER IMPACTS PERMIT

PERMIT DRAWING
SHEET 1 OF 37



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 (2016) = 9,330-12,800
ADT (2036) = 19,900-23,800
K = 10%
D = 60%
T = 26% *
V = 70 mph
FUNC. CLASS. = INTERSTATE

* (TTST 9% + DUAL 17%)

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3421A = 1.707 miles
LENGTH STRUCTURES TIP PROJECT R-3421A = 0.073 miles
TOTAL LENGTH OF TIP PROJECT R-3421A = 1.782 miles

(SB LANES WERE USED FOR LENGTH OF PROJECT)

Prepared In the Office of:
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE, SUITE 350
RALEIGH, NORTH CAROLINA 27609
NC LICENSE NO: F-0112
FOR NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 20, 2008

LETTING DATE:
OCTOBER, 2019

MICHAEL T. MERRITT, PE
PROJECT ENGINEER
RK&K, LLP

SCOTT BLEVINS, P.E.
PROJECT DESIGN ENGINEER
RK&K, LLP

NCDOT CONTACT: GREGORY S. DAVIS, P.E.
DIVISION 8 PROJECT ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

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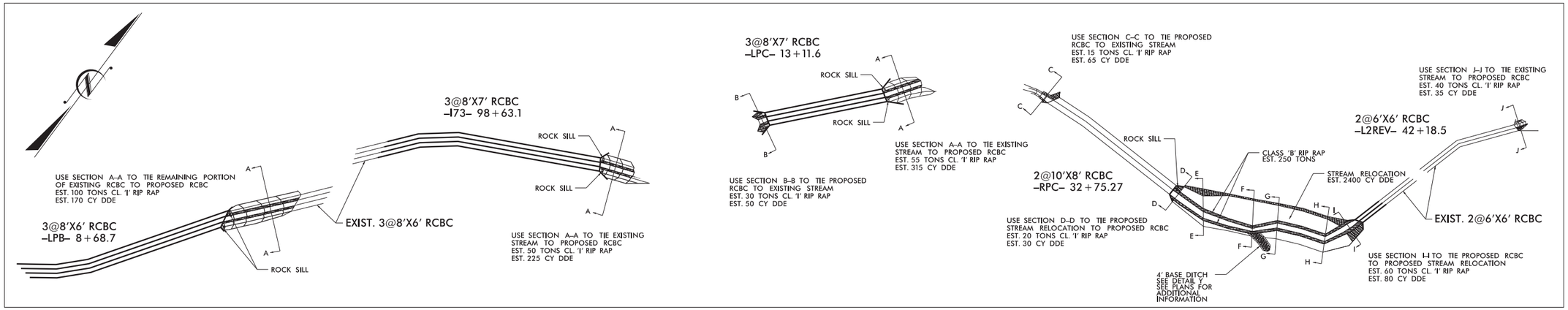
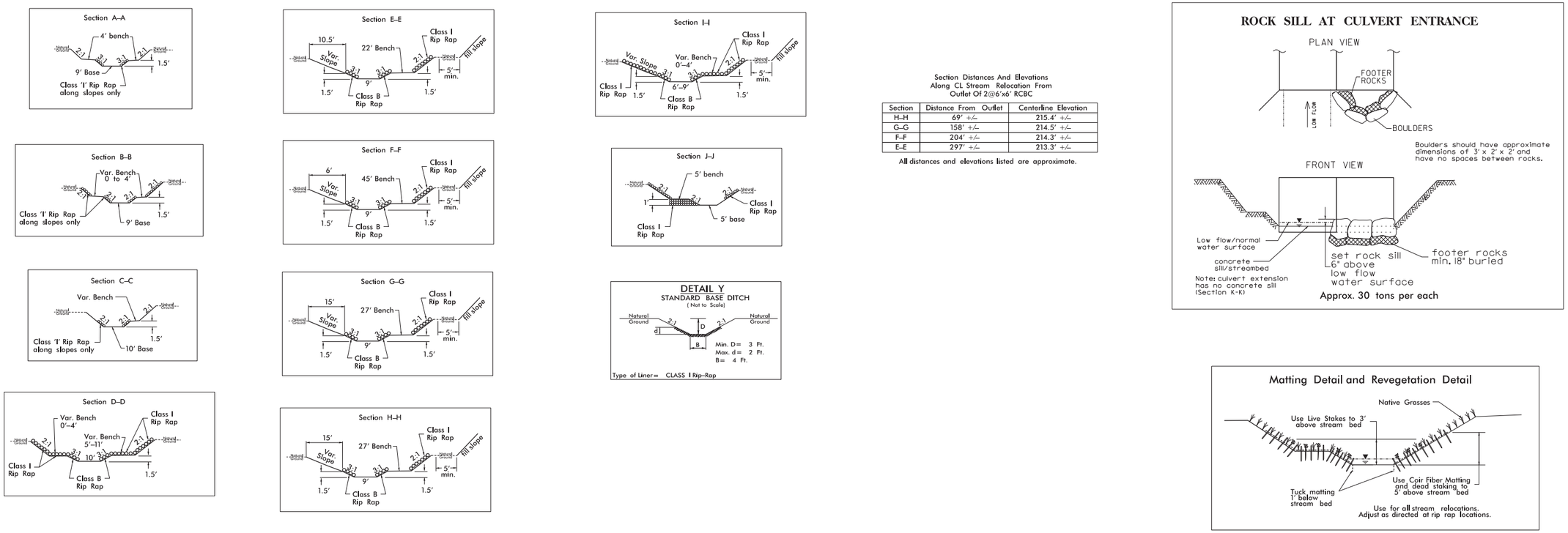
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	2D-1
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STREAM RELOCATION DETAILS

PERMIT DRAWING
SHEET 1A OF 37





Section Distances And Elevations
Along CL Stream Relocation From
Outlet Of 2@6'x6' RCBC

Section	Distance From Outlet	Centerline Elevation
H–H	69' +/–	215.4' +/–
G–G	158' +/–	214.5' +/–
F–F	204' +/–	214.3' +/–
E–E	297' +/–	213.3' +/–

All distances and elevations listed are approximate.

NOTES:
THE TYPICAL BANKFULL DEPTH FOR THE RELOCATED STREAM IS 1.5'.
BENCH WIDTHS MAY VARY FROM DIMENSIONS SHOWN DEPENDING ON FIELD CONDITIONS, THE INTENT IS TO PROVIDE FLOODPLAIN TO THE MAXIMUM EXTENT POSSIBLE BETWEEN SECTIONS D–D AND I–I.
OTHER DIMENSIONS, ELEVATIONS AND GEOMETRY MAY VARY DEPENDING ON FIELD CONDITIONS AND WITH THE ENGINEER'S APPROVAL.
ADDITIONAL INFORMATION MAY BE SHOWN ON THE PLAN SHEETS.

REVISIONS

Revised 7/25/2019

6/03/98

7/19/2019
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dgnsu1t

Revised 7/25/2019

8/17/99

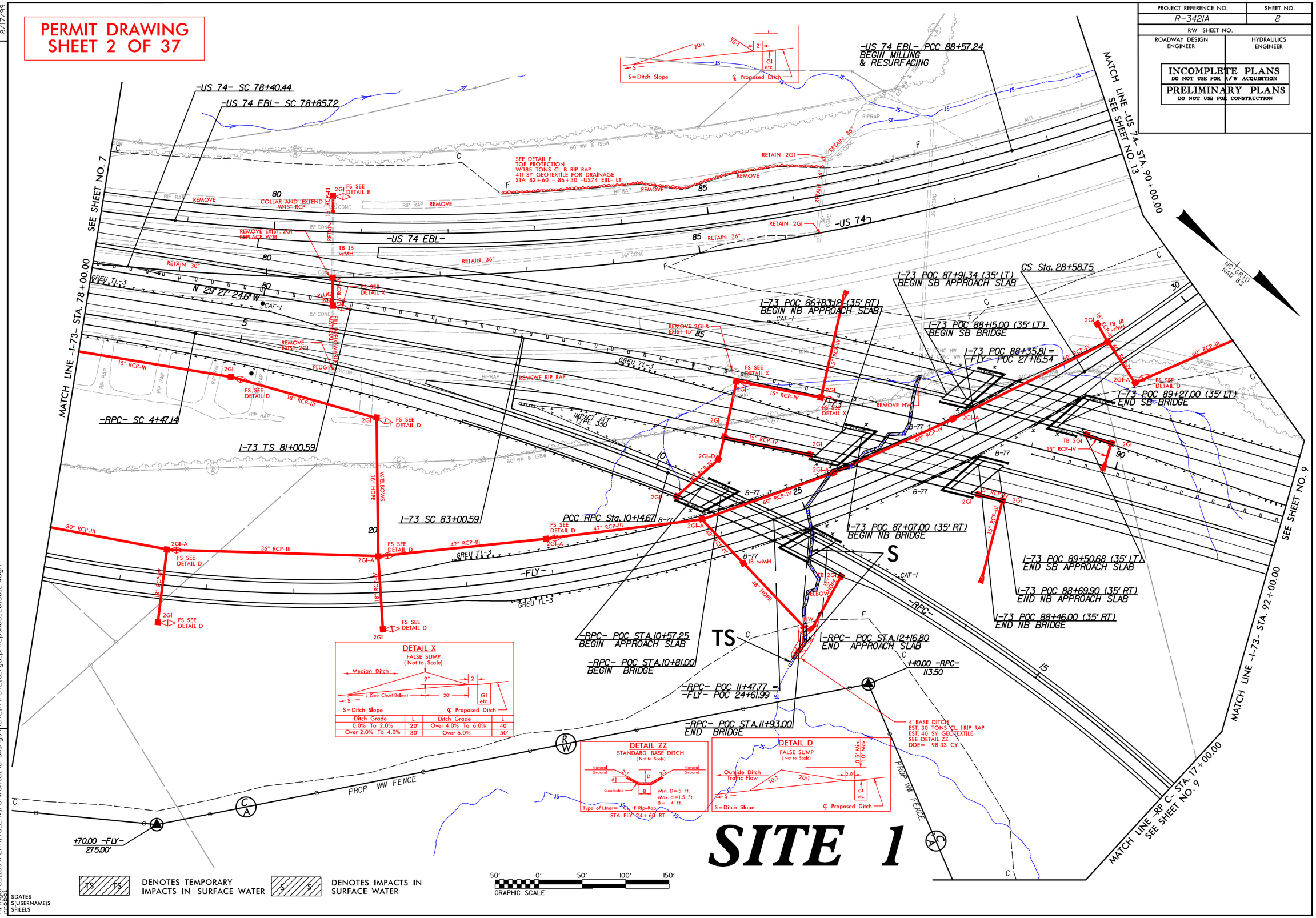
REVISIONS

PERMIT DRAWING
SHEET 2 OF 37

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	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



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Revised 7/25/2019

8/17/99

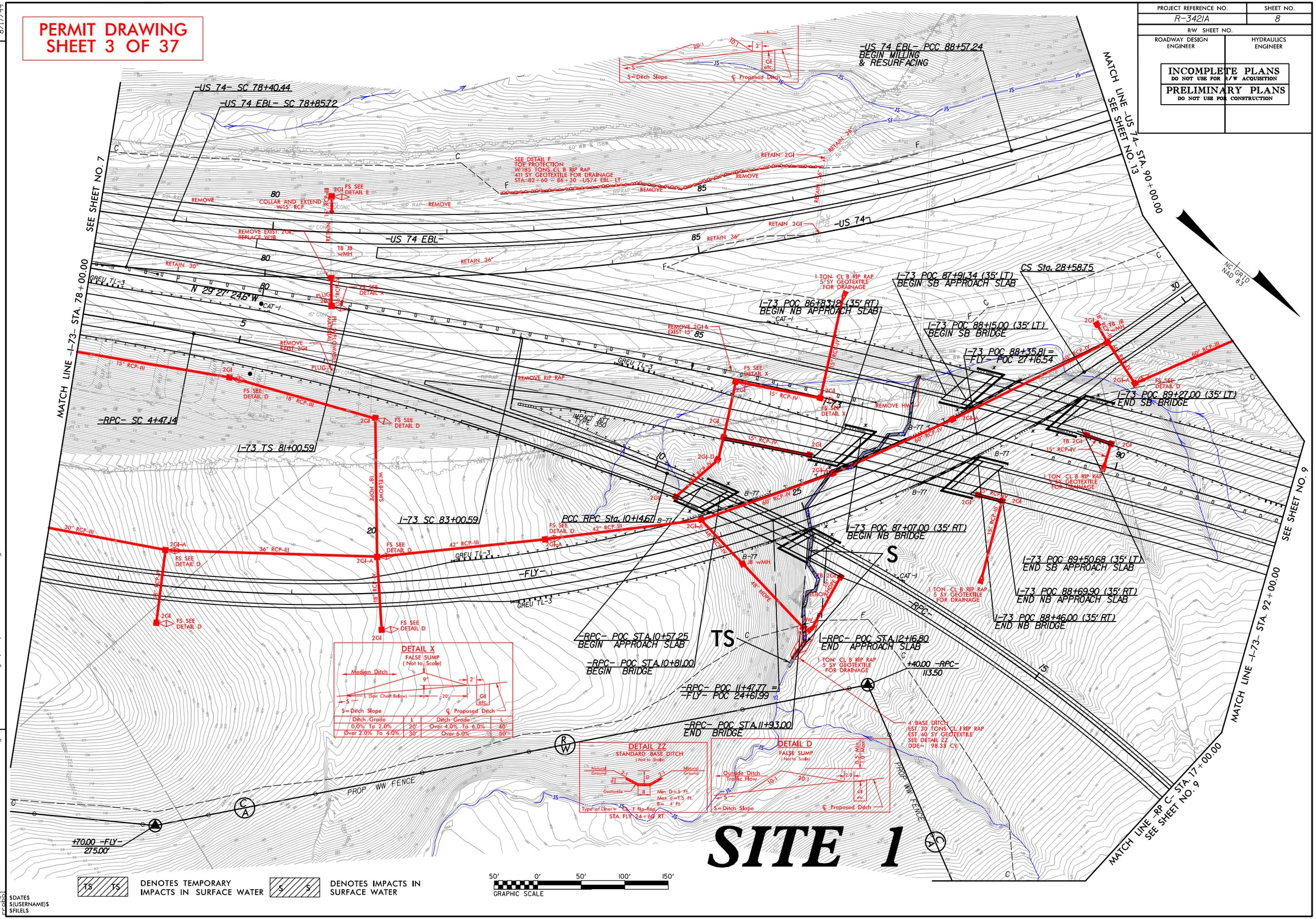
REVISIONS

PERMIT DRAWING
SHEET 3 OF 37

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	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



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$FILELS

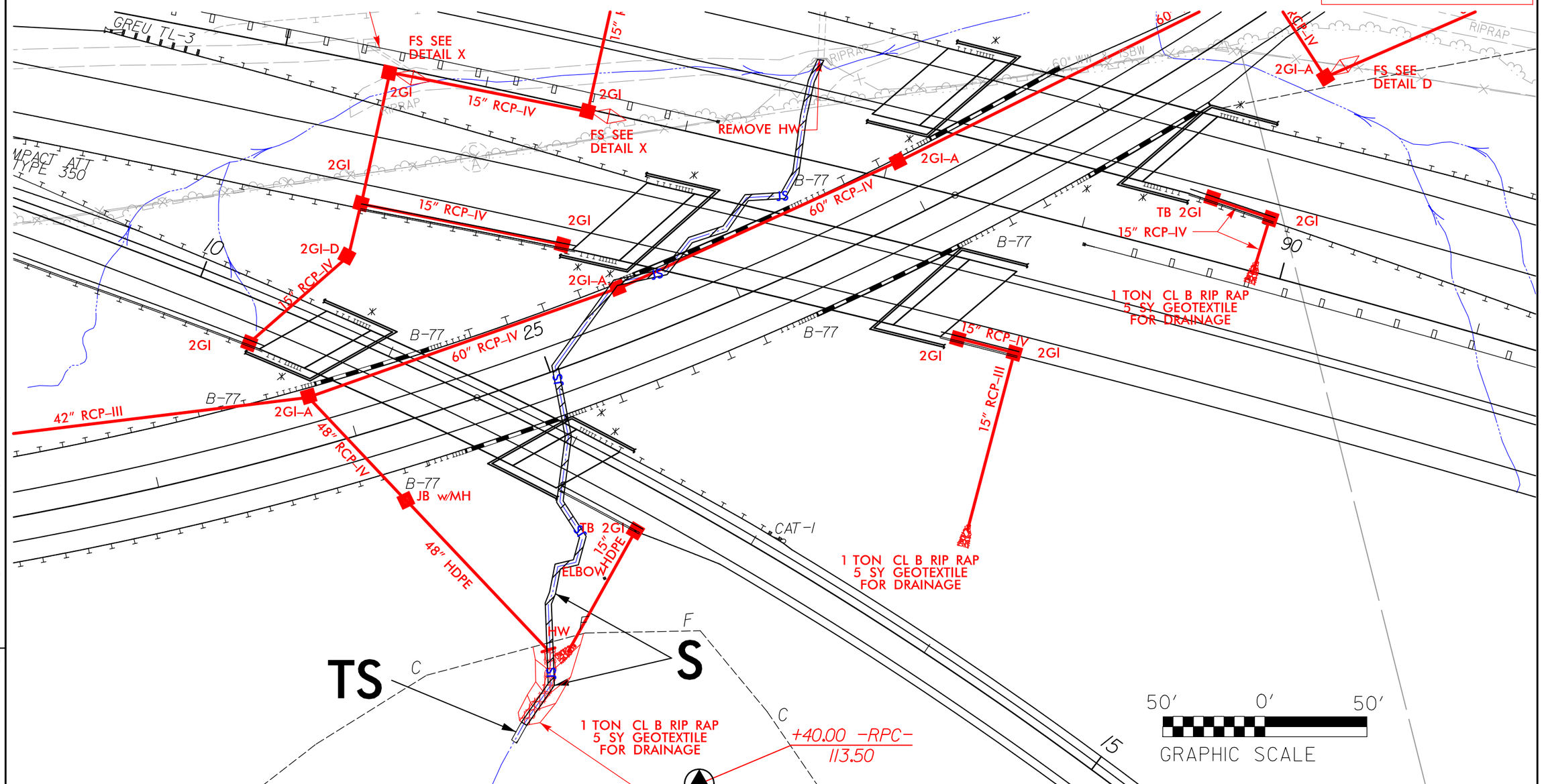
SITE 1 ENLARGEMENT

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	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 4 OF 37



S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

$DATE$
$(USERNAME)$
$FILEL$

8/17/99

REVISIONS

Revised 7/25/2019

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SITE 1 ENLARGEMENT

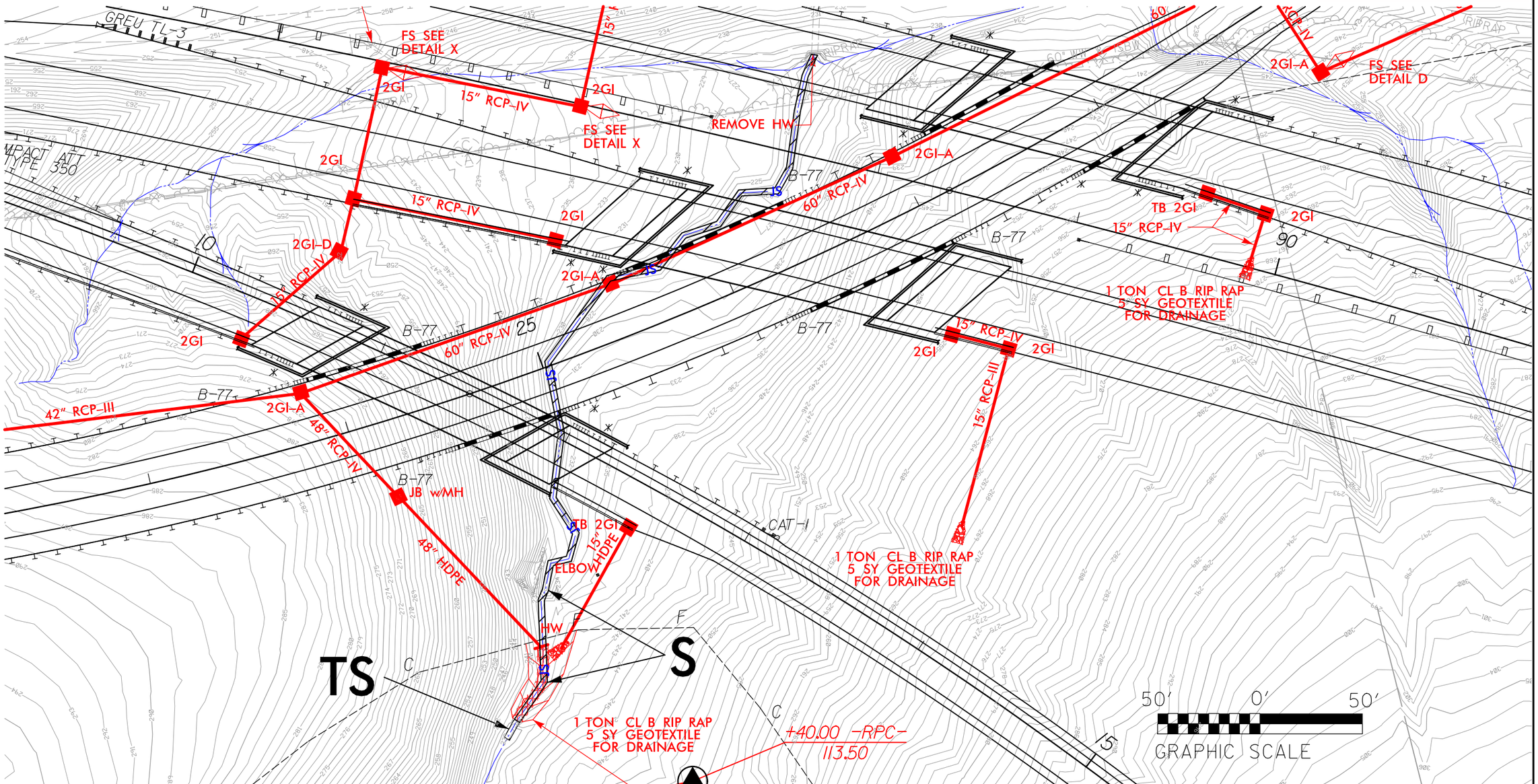
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 5 OF 37

NC GRID NAD 83



S DENOTES IMPACTS IN SURFACE WATER

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

Revised 7/25/2019

$DATE$
$(USERNAME)$
$FILEL$

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8/17/99

REVISIONS

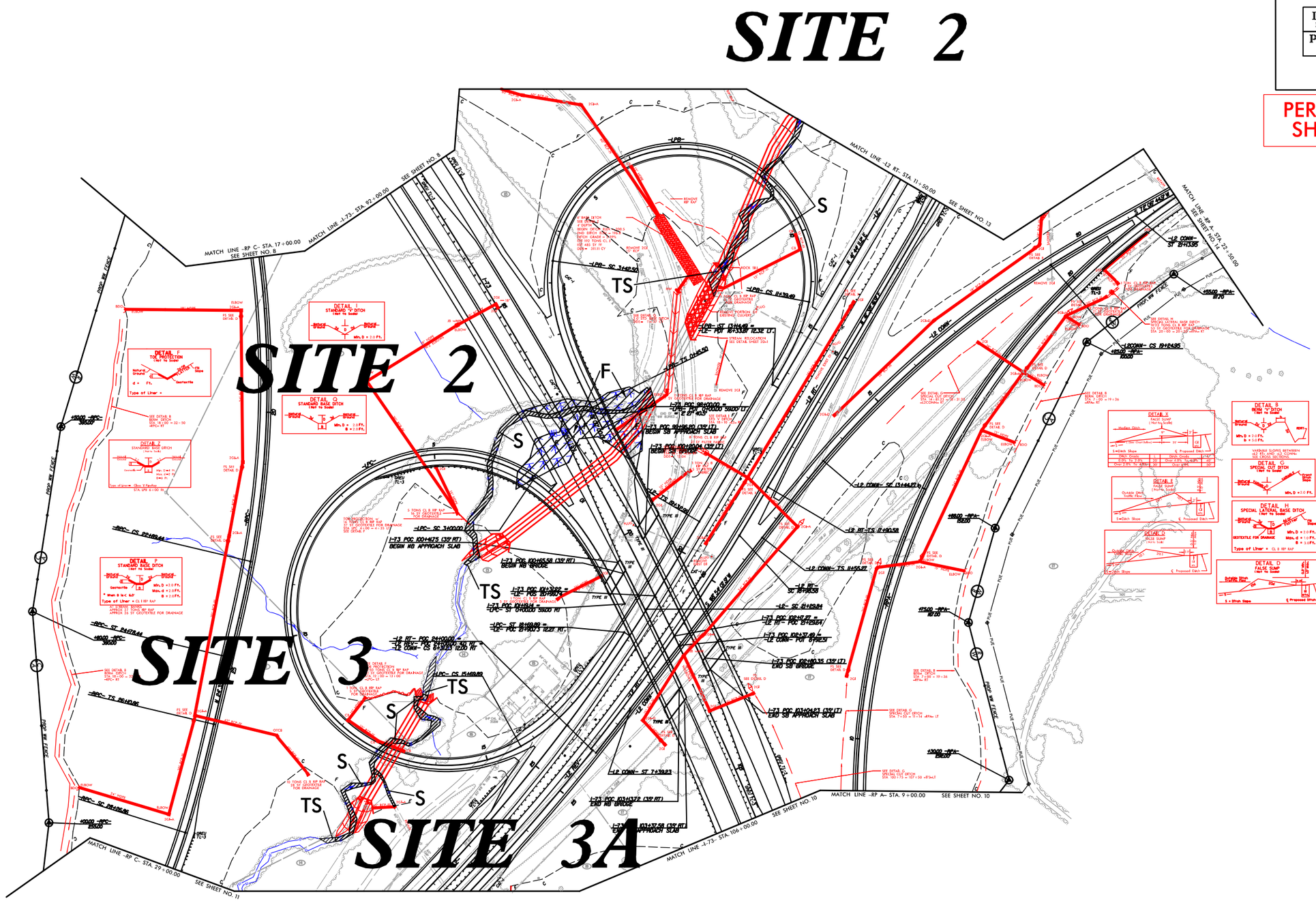
Revised 7/25/2019

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	9
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 6 OF 37

SITE 2



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

▨ S S	DENOTES IMPACTS IN SURFACE WATER
▨ TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
▨ F F	DENOTES FILL IN WETLAND

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rrobol
$DATE$
$(USERNAME)$
$FILEL$

Revised 7/25/2019

REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	9

R/W SHEET NO.

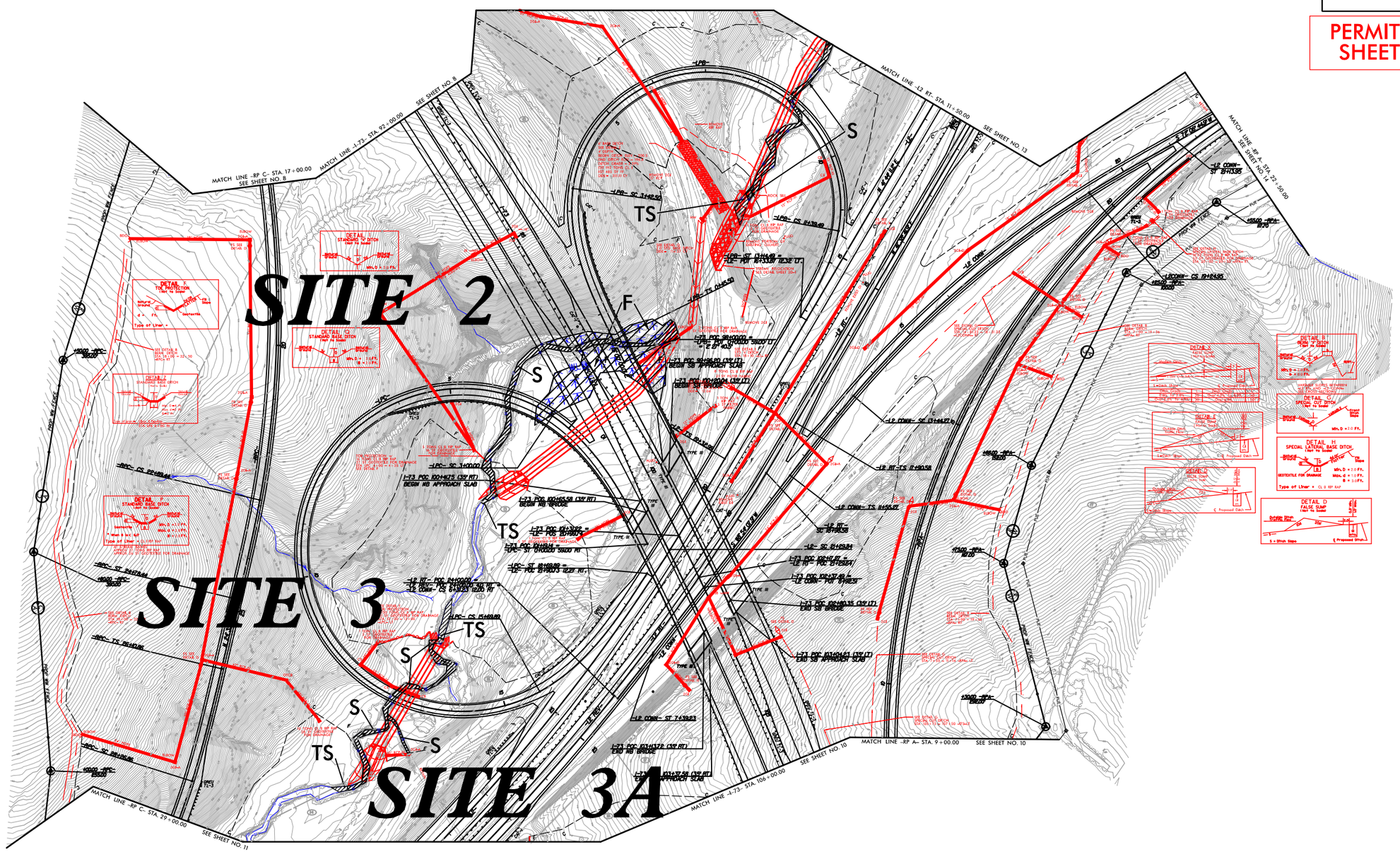
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 7 OF 37

SITE 2



100′ 0′ 100′ 200′ 300′
GRAPHIC SCALE

▨ S S	DENOTES IMPACTS IN SURFACE WATER
▨ TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
▨ F F	DENOTES FILL IN WETLAND

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rrobol

$DATE$
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$FILEL$

Revised 7/25/2019

REVISIONS

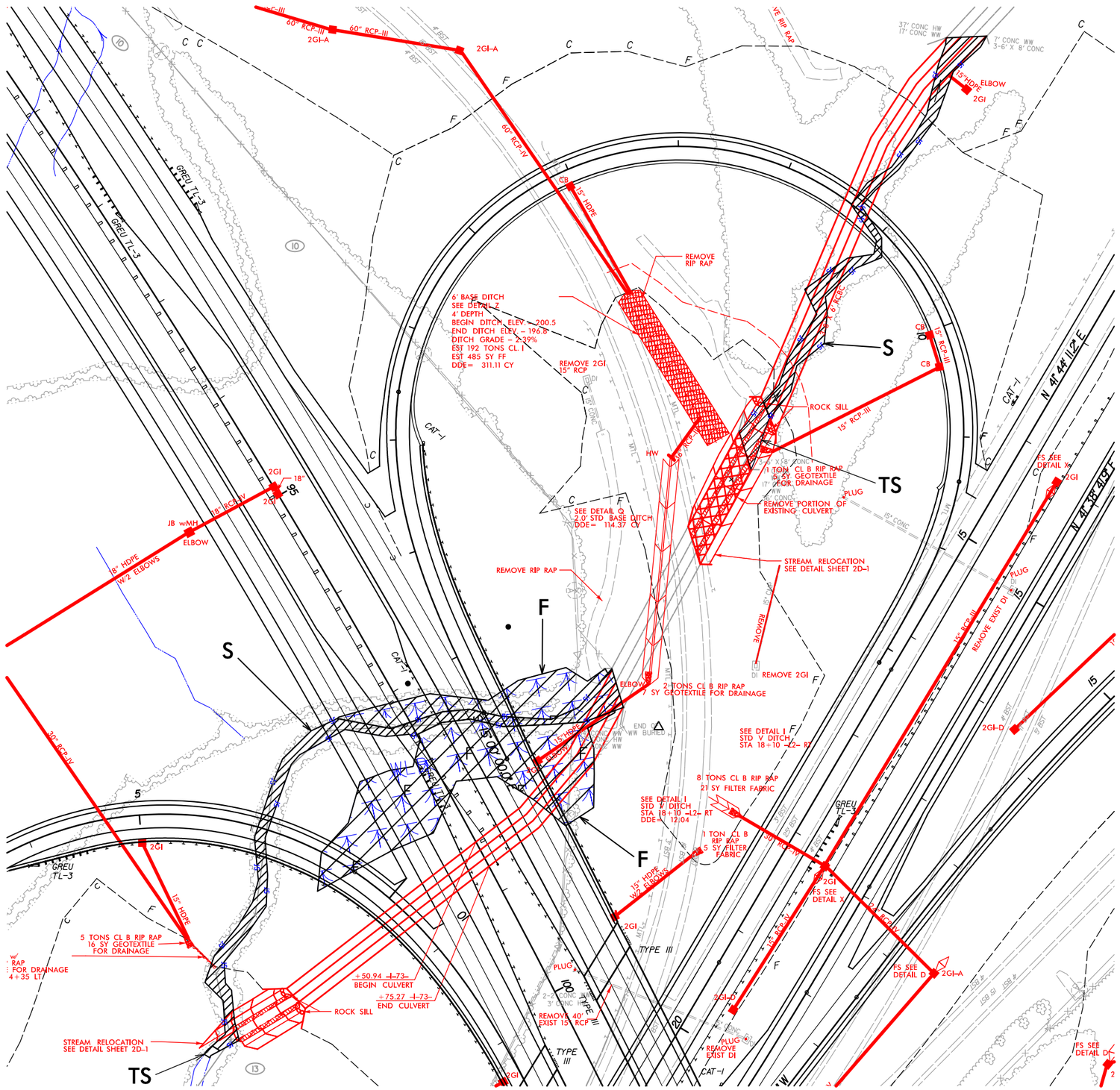
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	9
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 37



SITE 2 ENLARGEMENT

50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

$DATE$
$(USERNAME)$
$FILEL$

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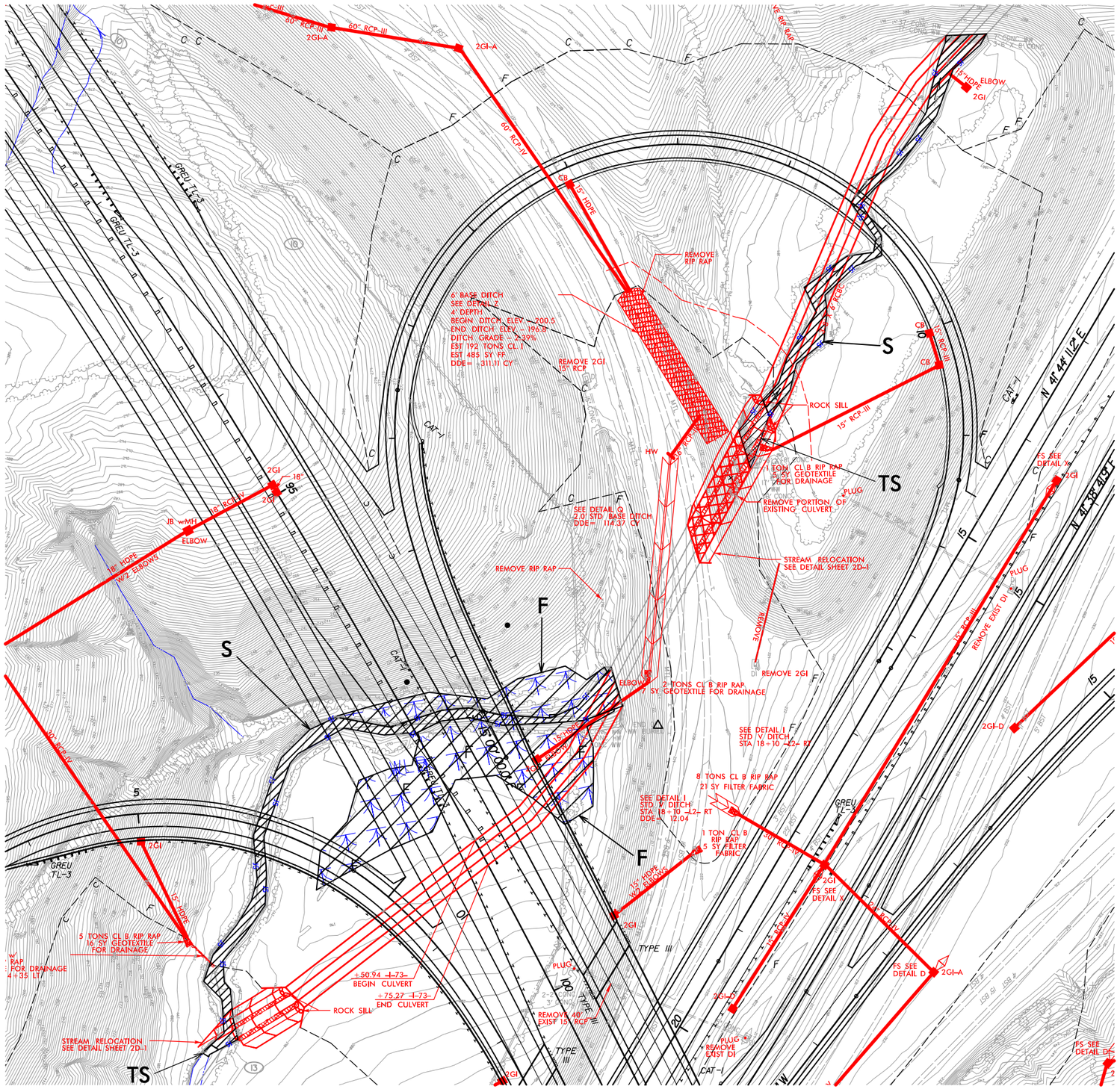
Revised 7/25/2019

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	9
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 9 OF 37



SITE 2 ENLARGEMENT

NC GRID NAD 83

50' 0' 50'
GRAPHIC SCALE

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F — DENOTES FILL IN WETLAND

REVISIONS

8/17/99

$DATE$
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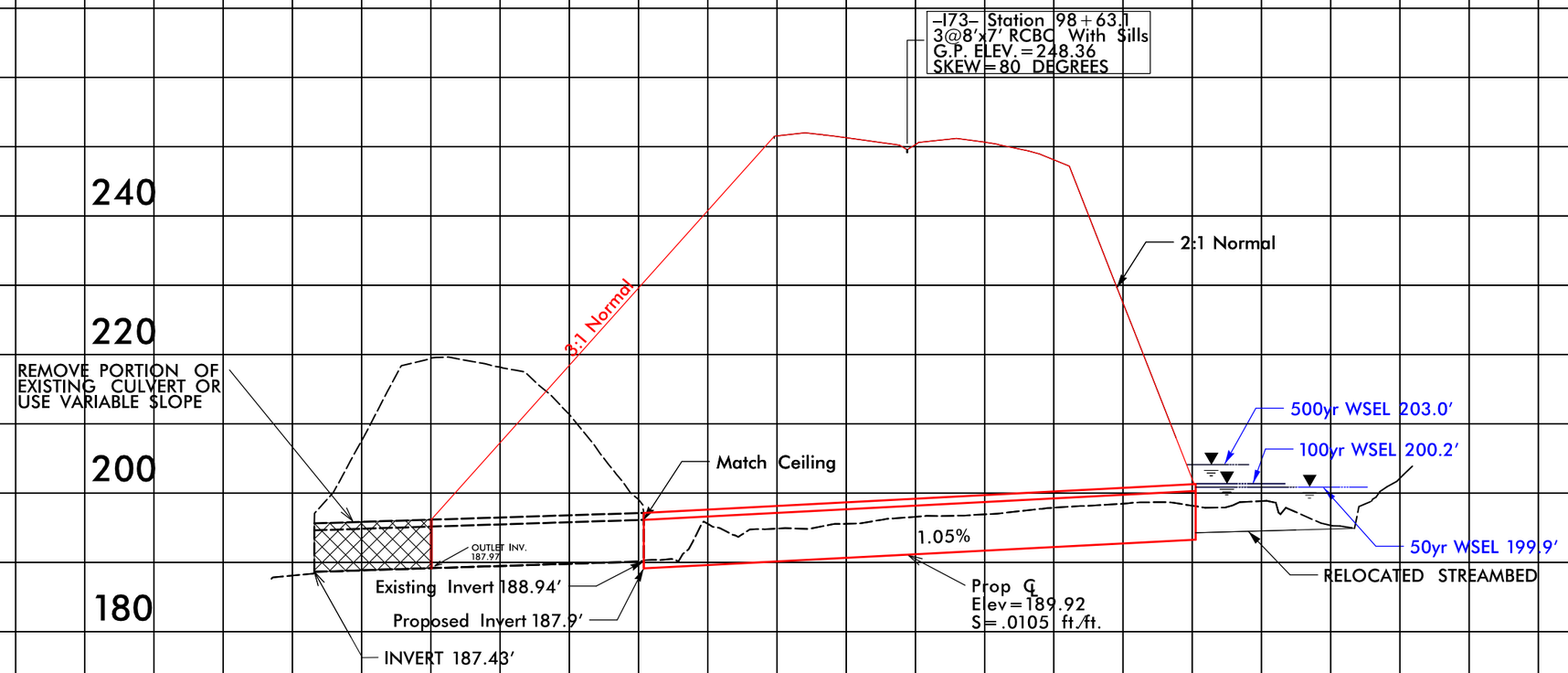
Revised 7/25/2019

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 10 OF 37

SITE 2



5/14/99

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$FILELS

Revised 7/25/2019

5/14/99

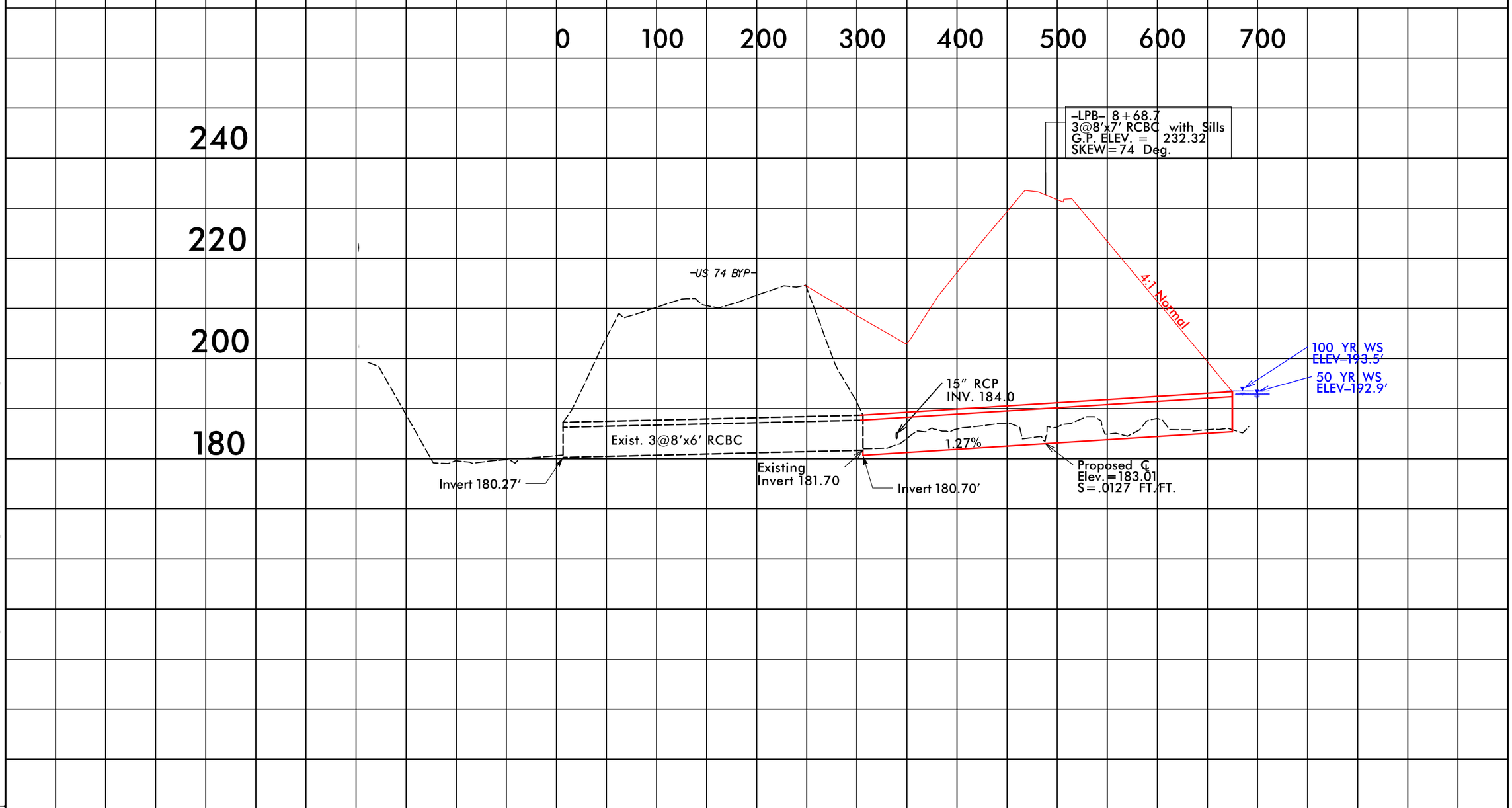
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 11 OF 37

SITE 2



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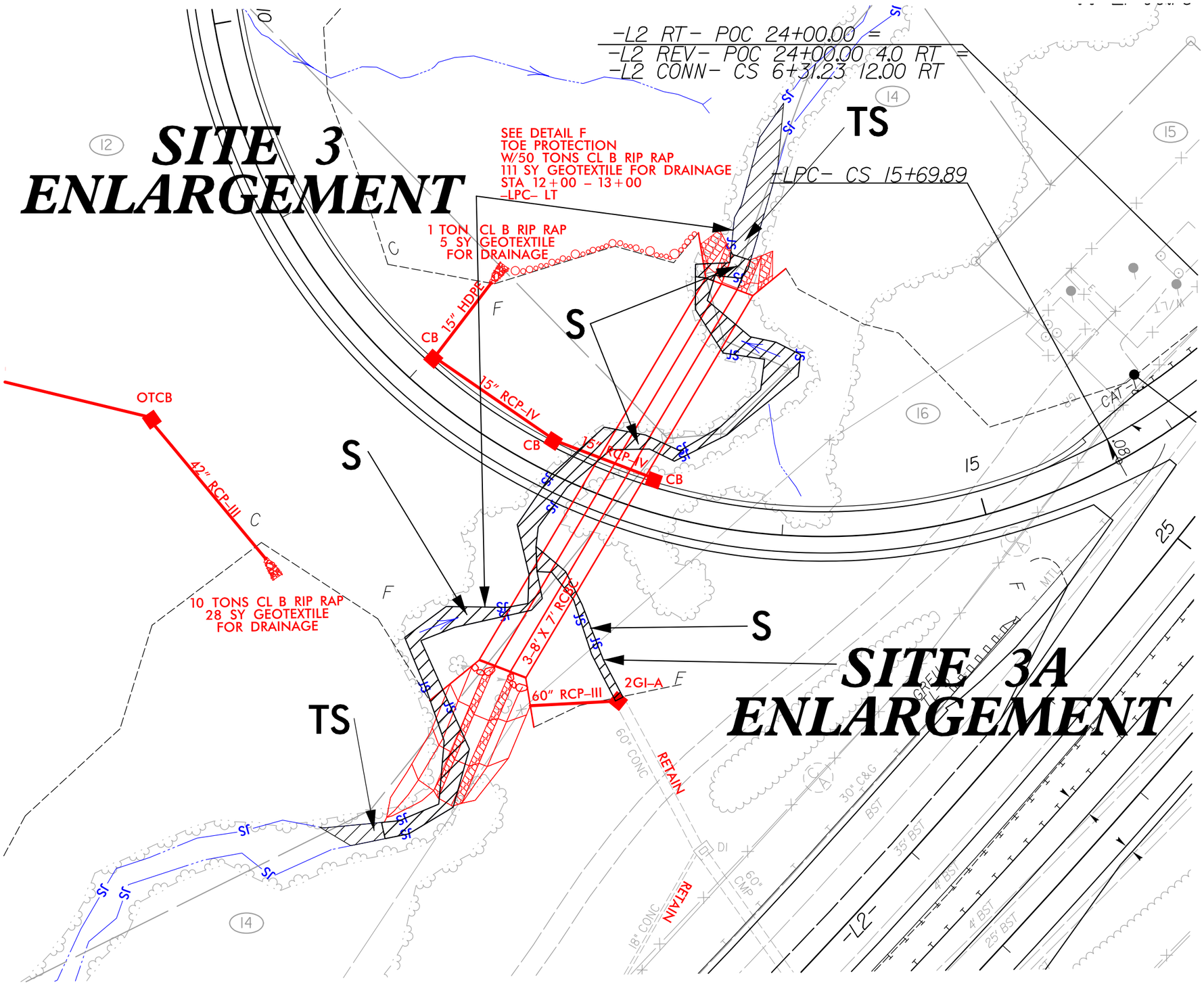
Revised 7/25/2019

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	9
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 12 OF 37



S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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Revised 7/25/2019

REVISIONS

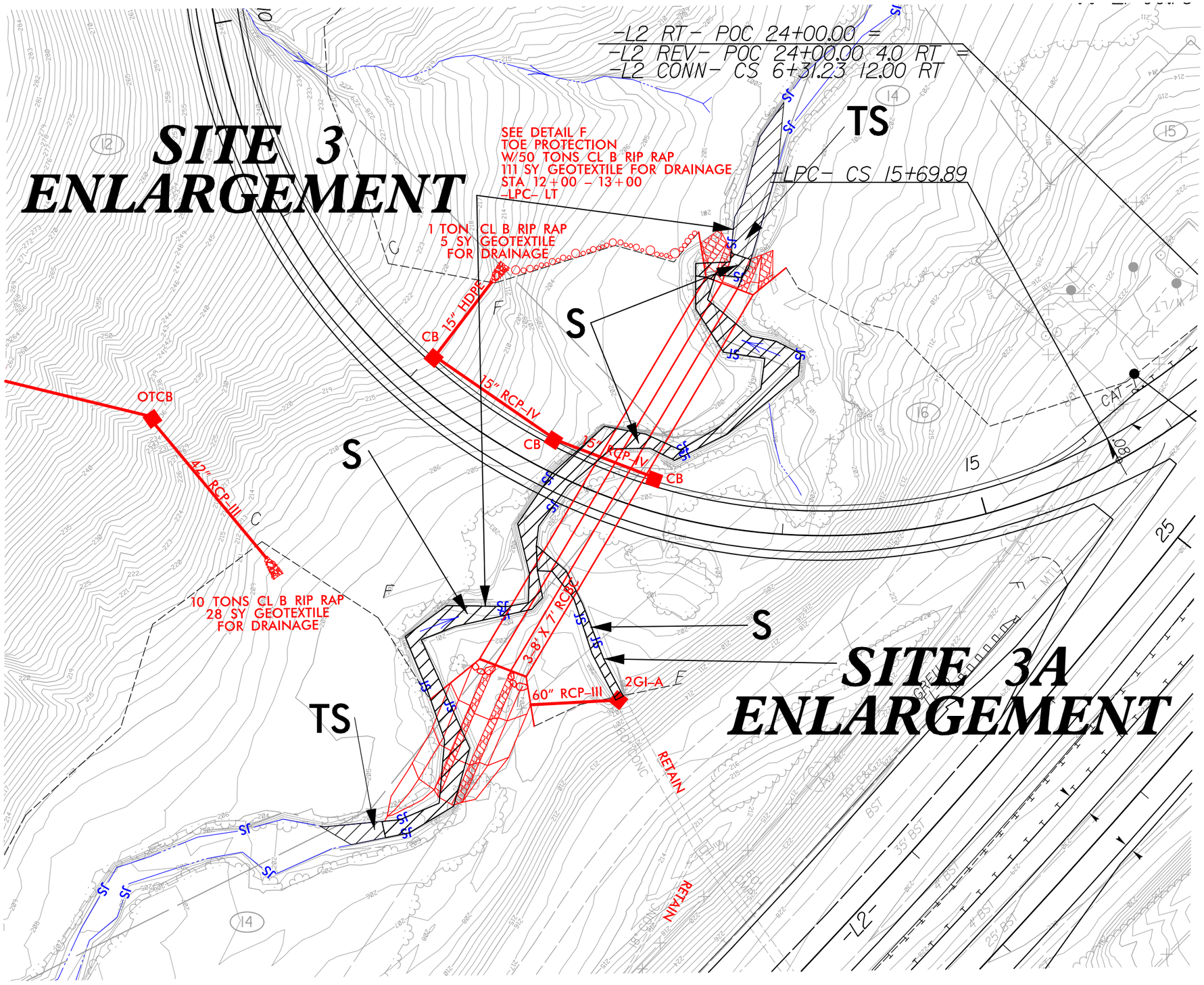
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	9
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 13 OF 37



NC 68 TD
NAD 83

50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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Revised 7/25/2019

5/14/99

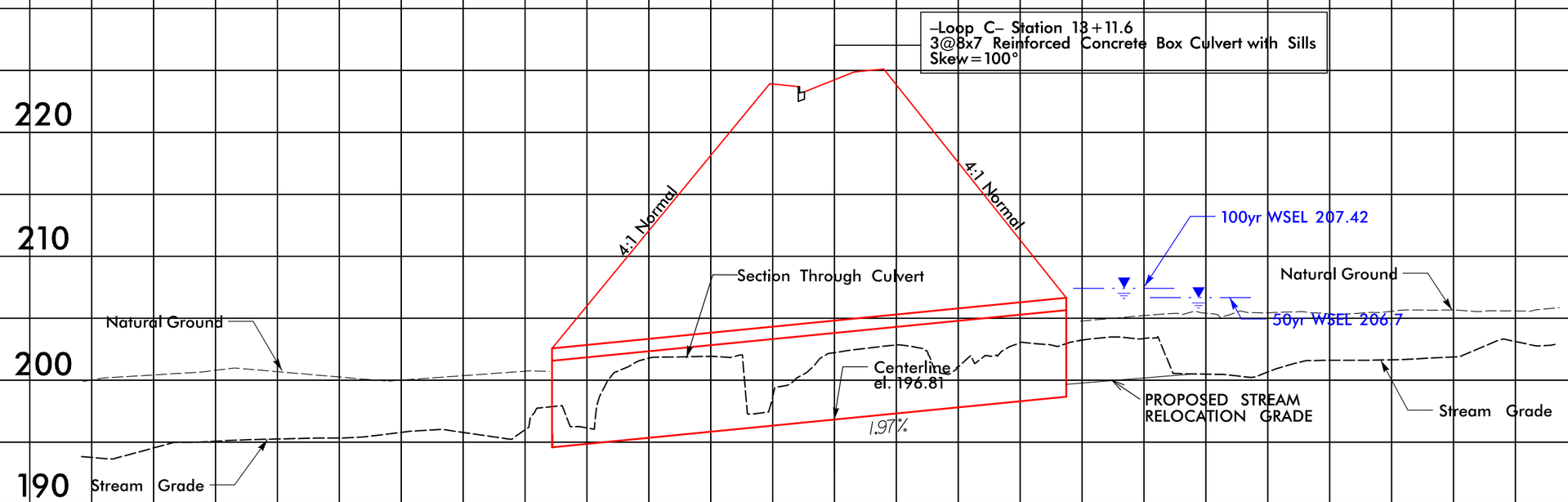
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 14 OF 37

SITE 3



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PROJECT REFERENCE NO.	SHEET NO.
R-3421A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

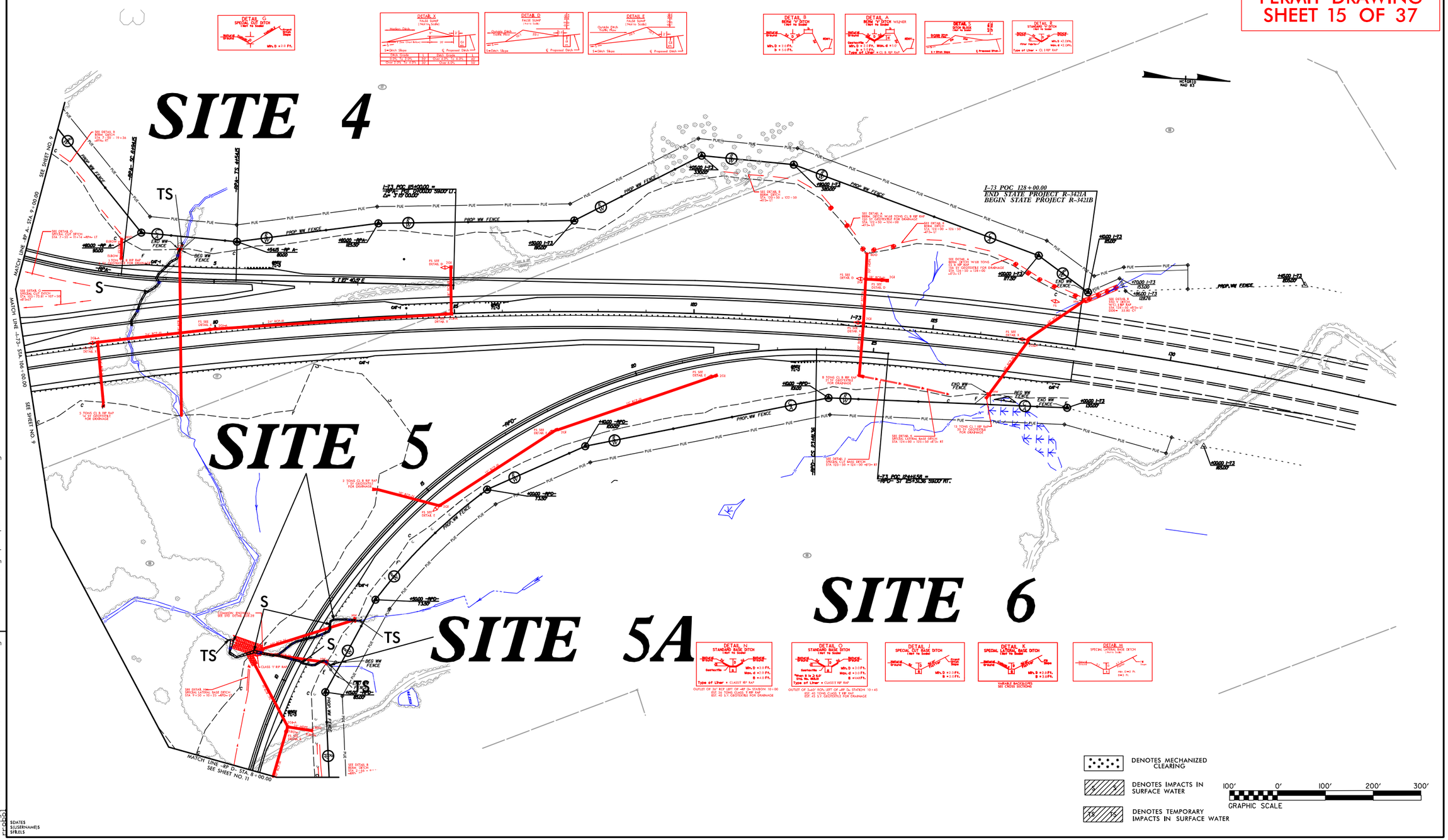
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 15 OF 37

Revised 7/25/2019

REVISIONS

8/17/99



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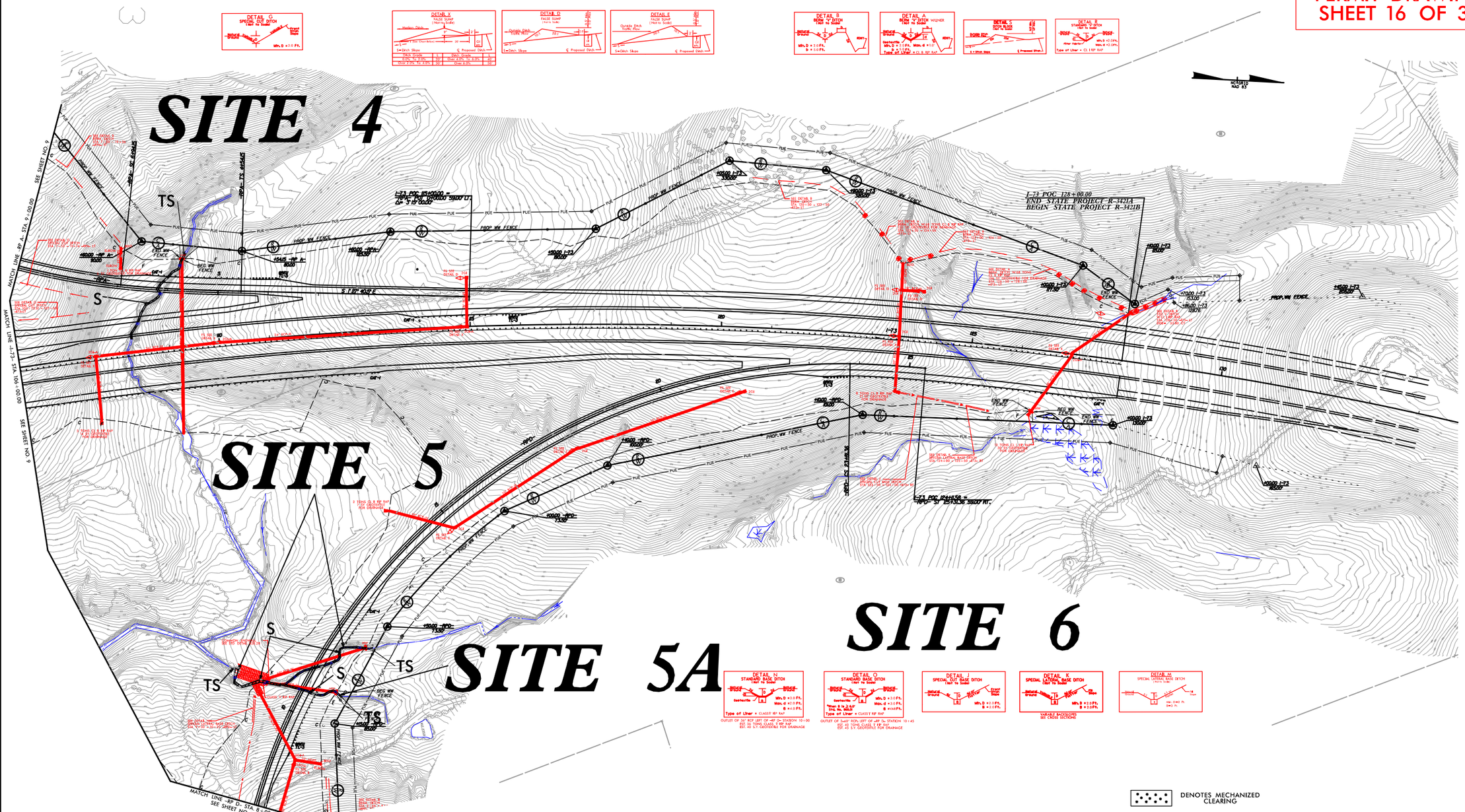
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 16 OF 37



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REVISIONS

8/17/99

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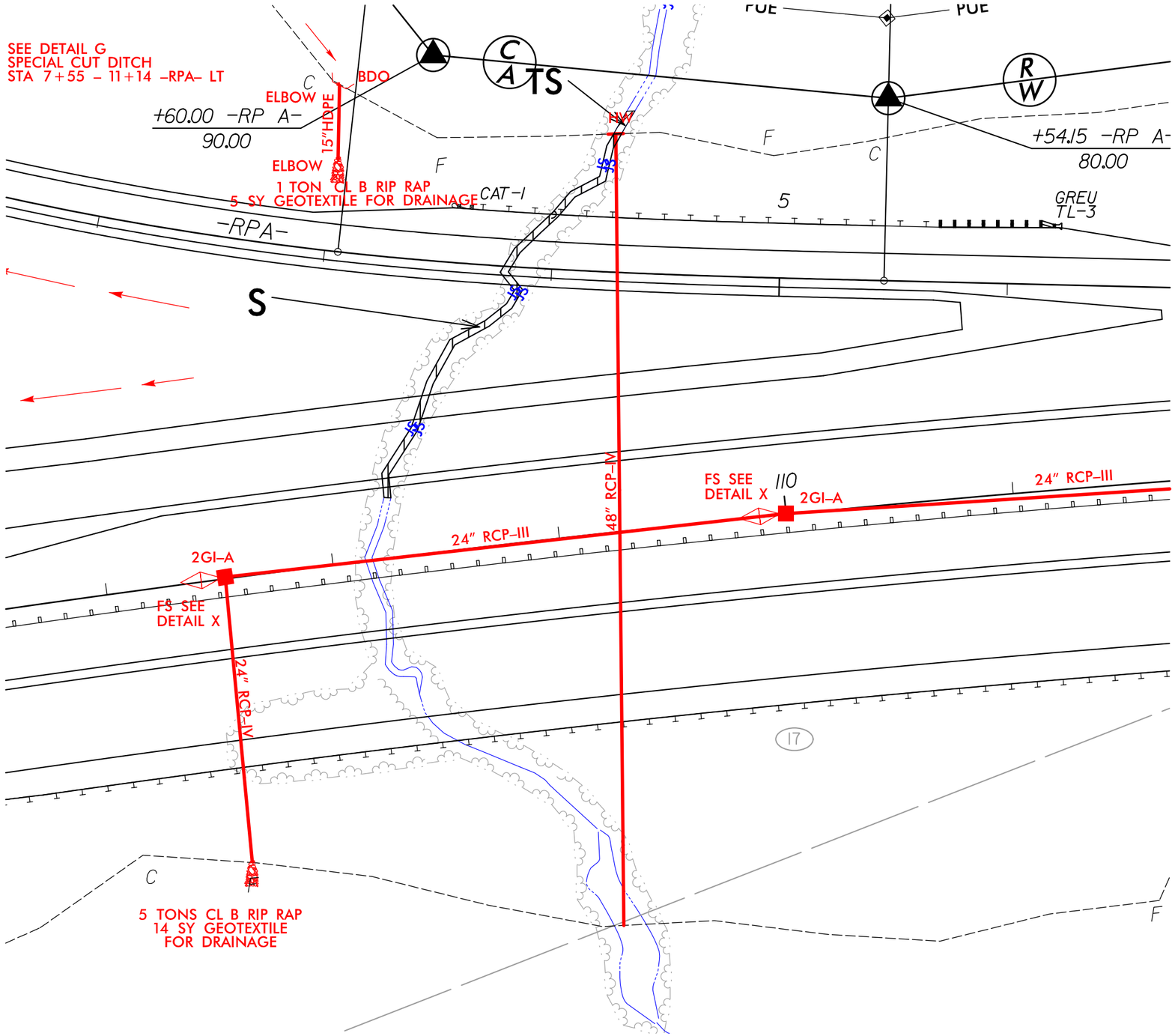
Revised 7/25/2019

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 17 OF 37



NC GRID
NAD 83

SITE 4 ENLARGEMENT

50′ 0′ 50′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

$DATE$
$(USERNAME)$
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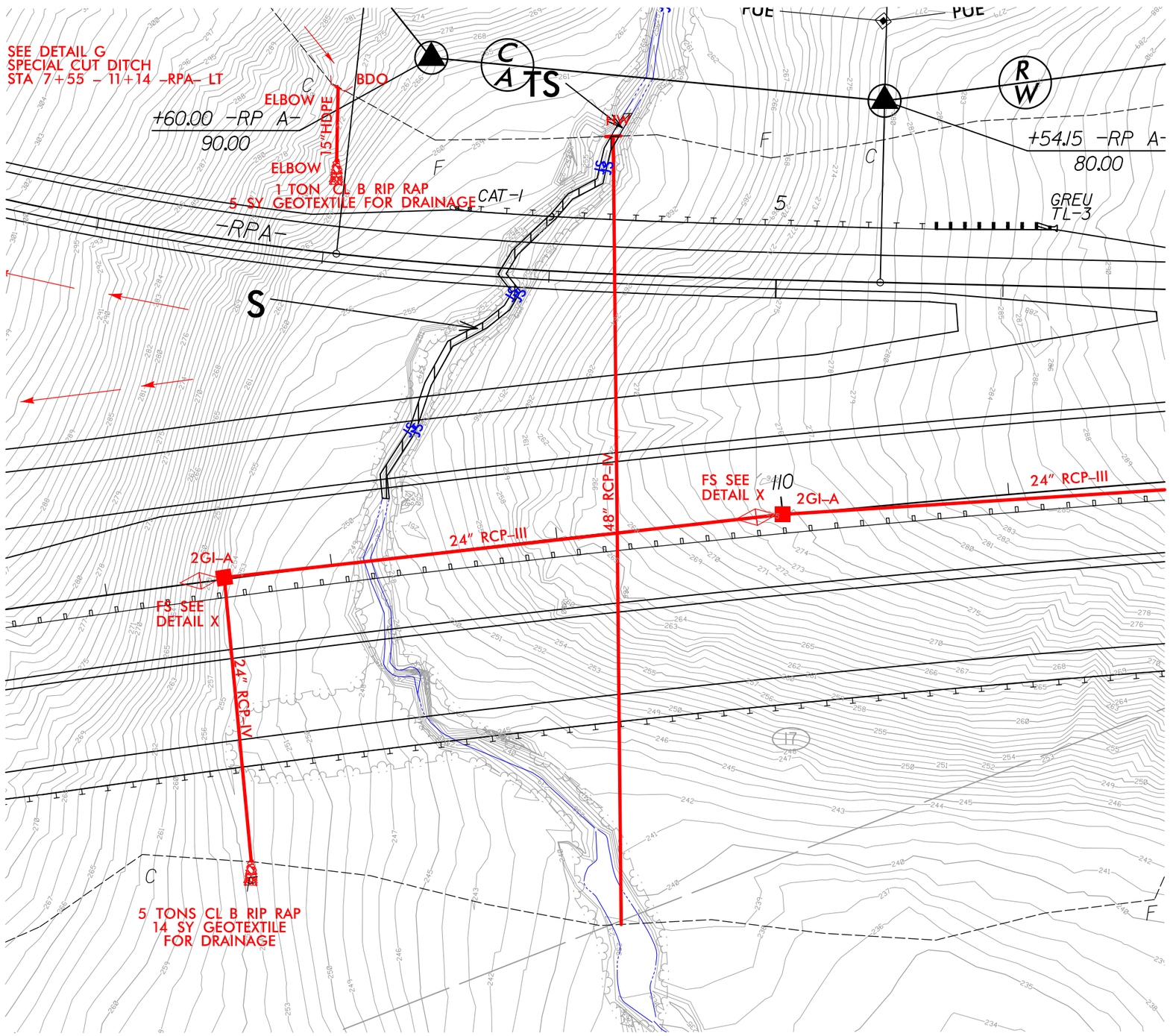
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 18 OF 37



SITE 4 ENLARGEMENT

NC GRID NAD 83

50′ 0′ 50′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

Revised 7/25/2019

REVISIONS

8/17/99

$DATE$
$(USERNAME)$
$FILEL$

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REVISIONS

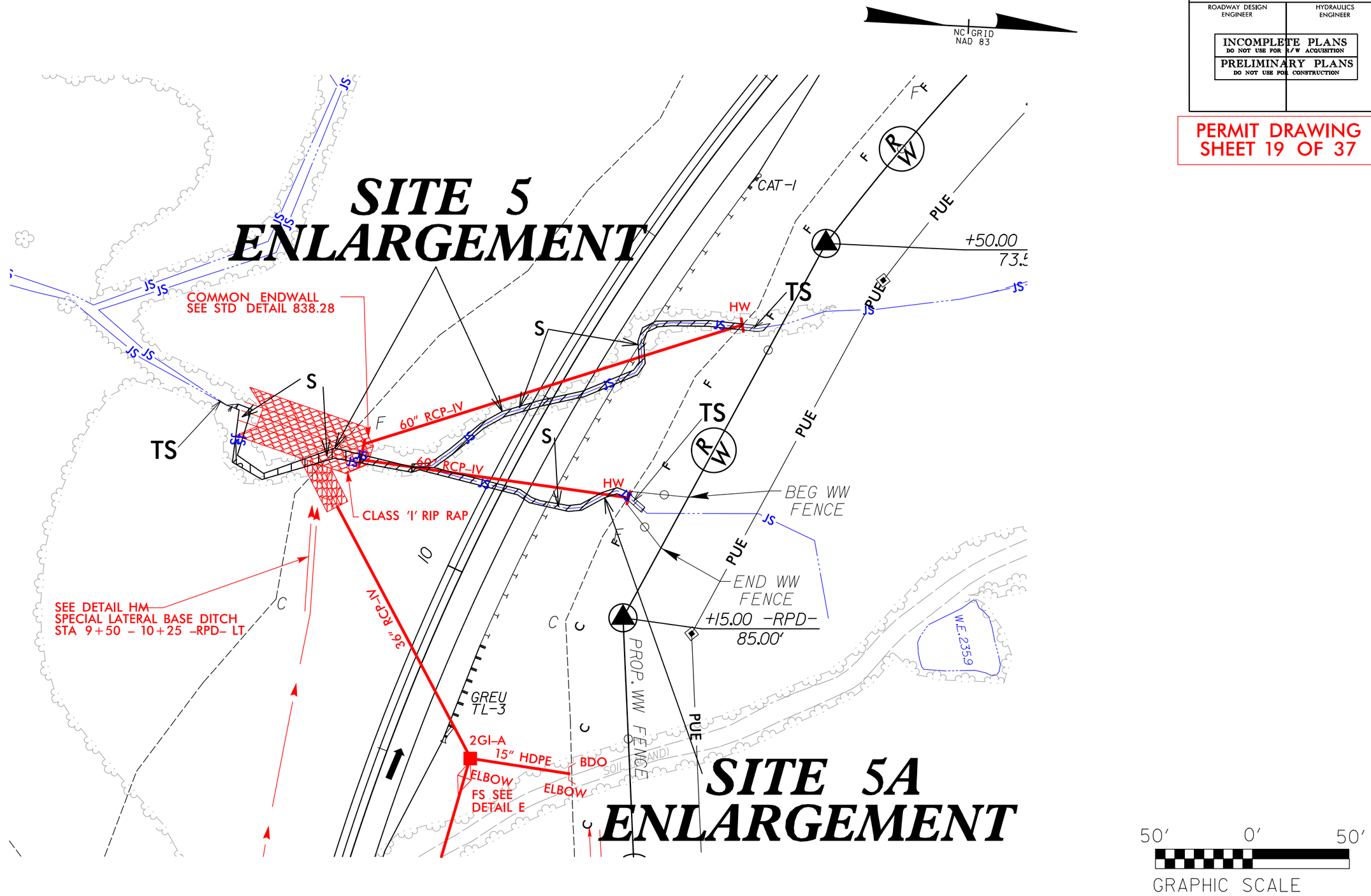
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 19 OF 37



S DENOTES IMPACTS IN SURFACE WATER

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

$DATE$
$(USERNAME)$
$FILEL$

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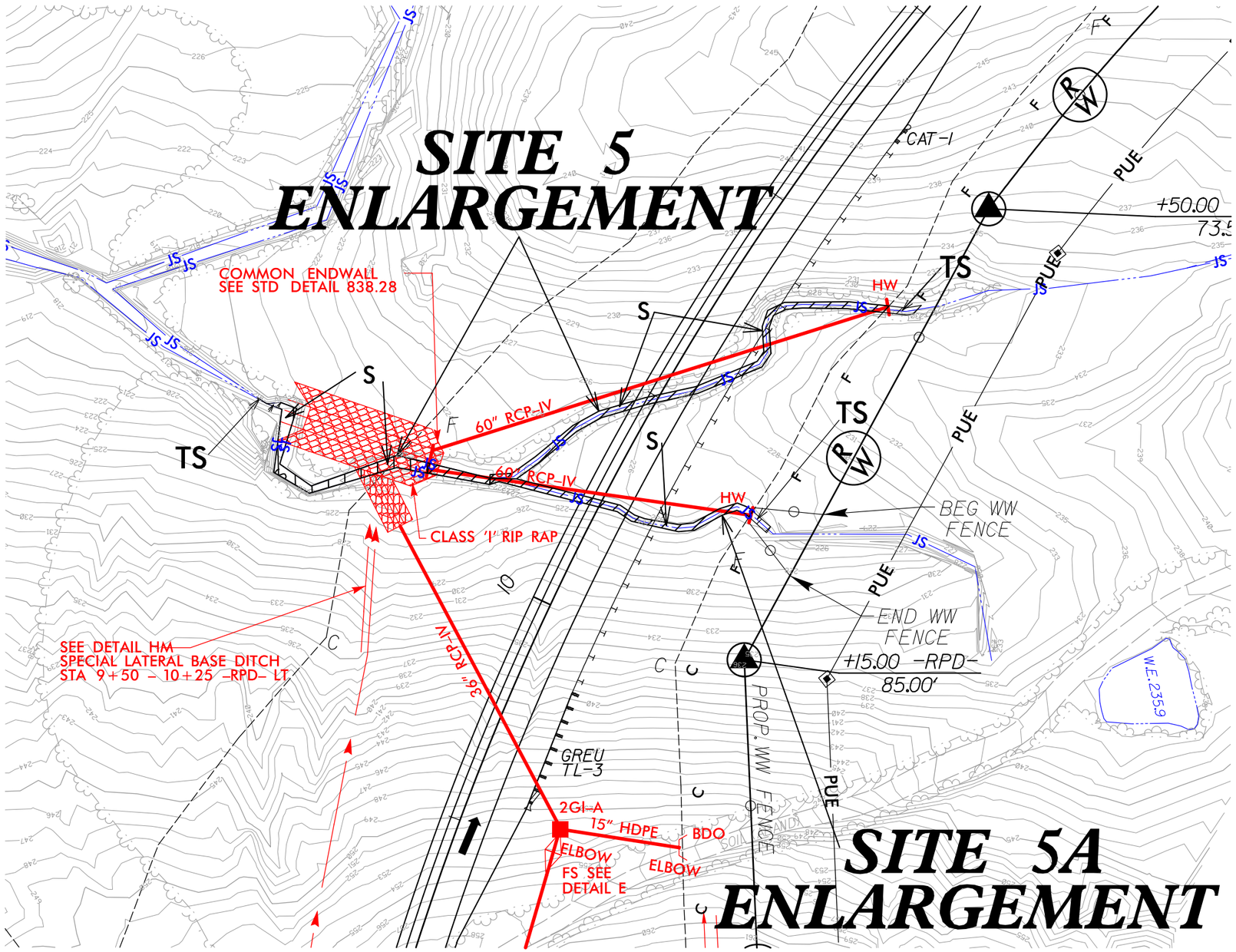
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 20 OF 37

NC GRID
NAD 83



50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

$DATE$
$(USERNAME)$
$FILEL$

Revised 7/25/2019

REVISIONS

8/17/99

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Revised 7/25/2019

REVISIONS

8/17/99

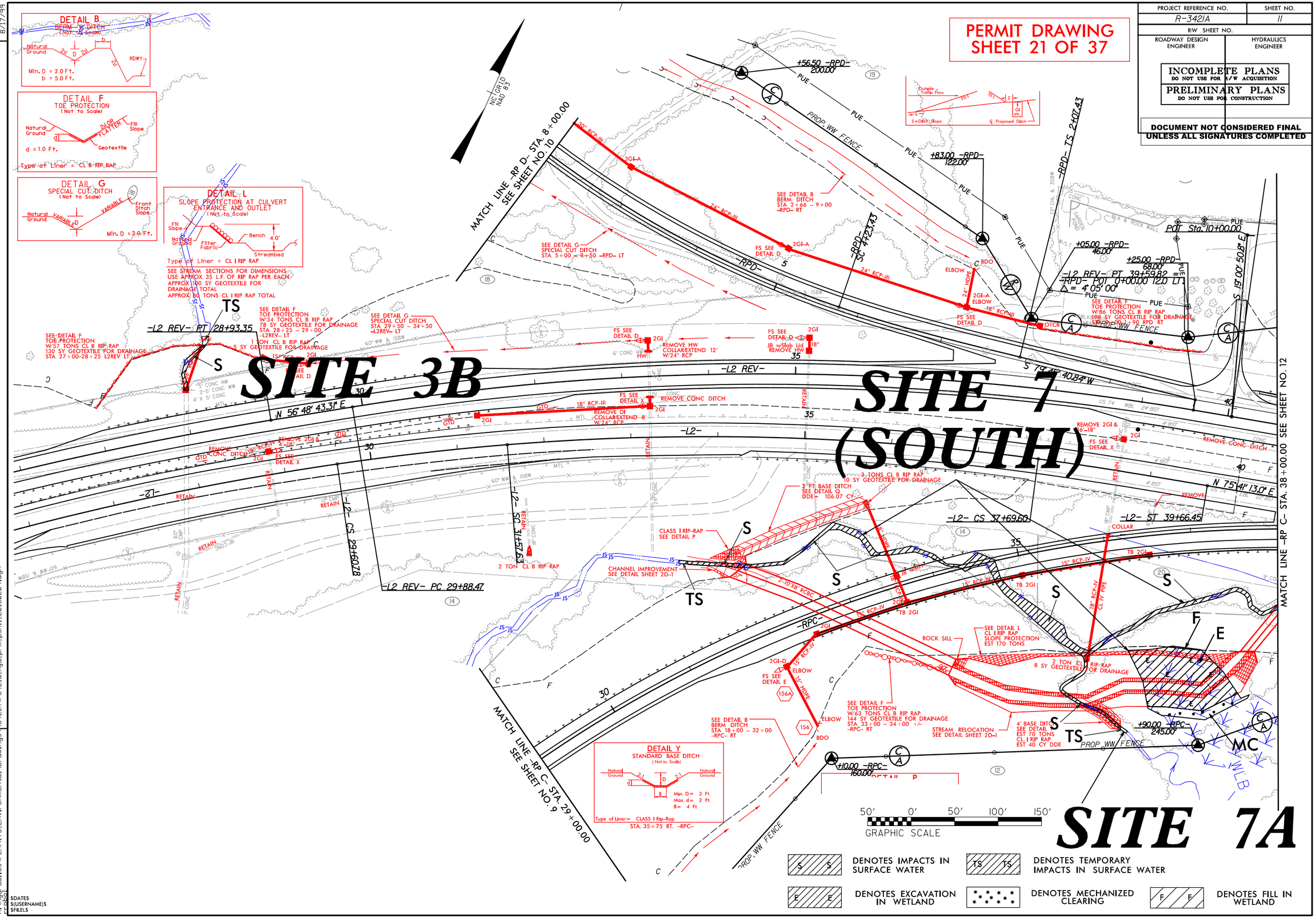
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 21 OF 37



S S	DENOTES IMPACTS IN SURFACE WATER	TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
E E	DENOTES EXCAVATION IN WETLAND		DENOTES MECHANIZED CLEARING
F F	DENOTES FILL IN WETLAND		

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Revised 7/25/2019

REVISIONS

8/17/99

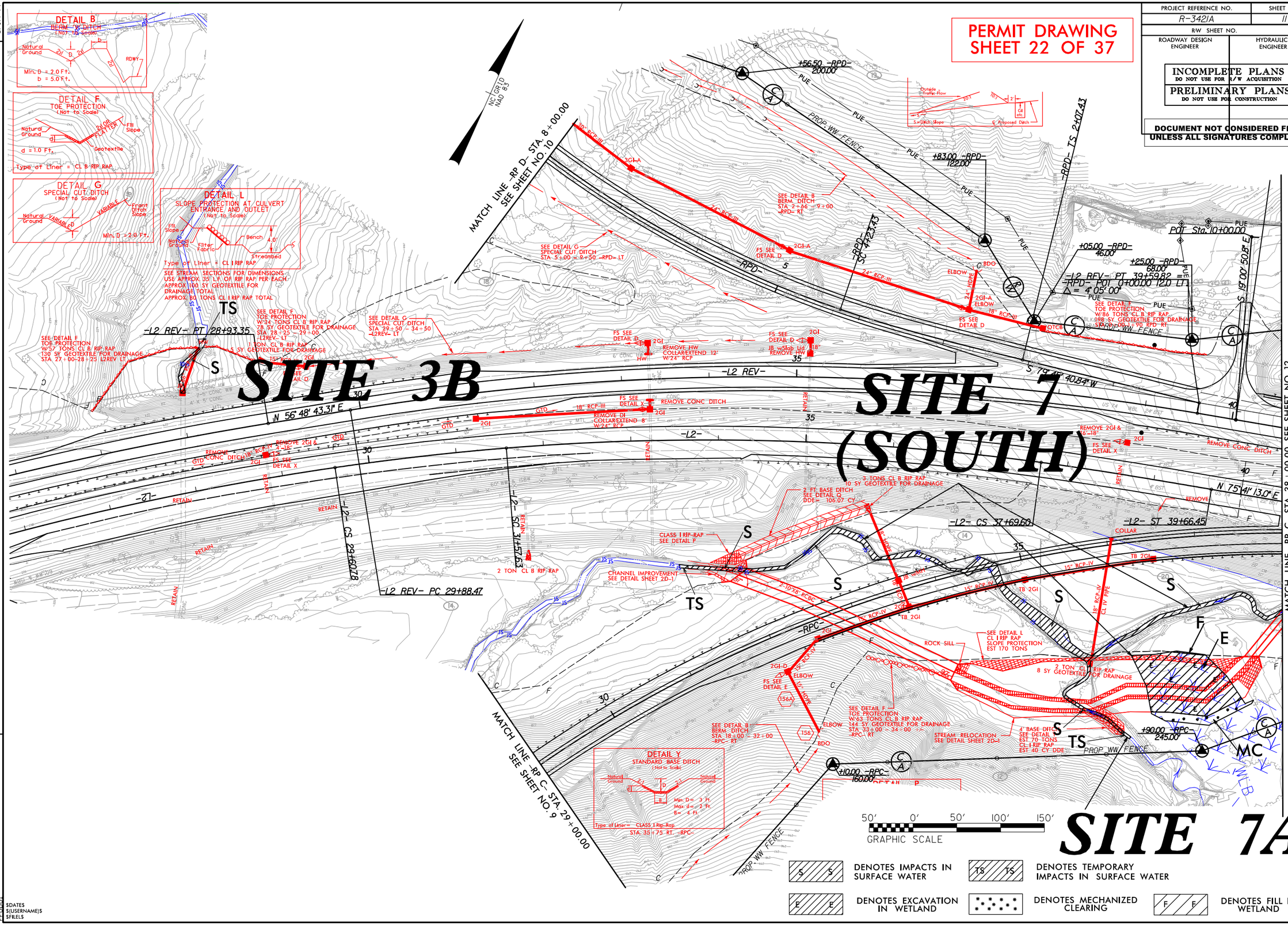
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 22 OF 37



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$DATES
$(USERNAME)$
$FILEL$

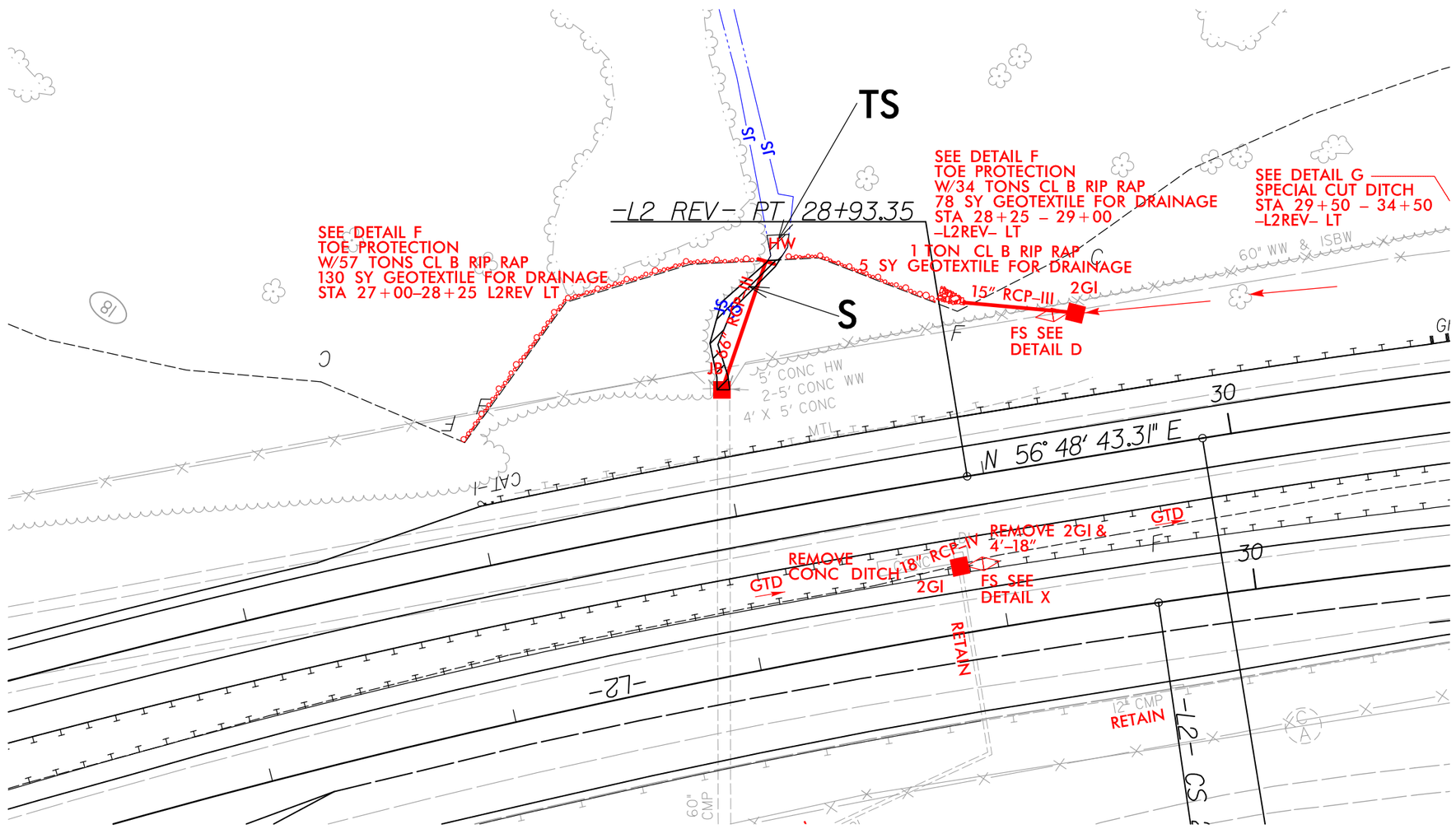
SITE 3B ENLARGEMENT

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 23 OF 37

NC GRID NAD 83



S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

$DATE$
$(USERNAME)$
$FILEL$

8/17/99

REVISIONS

Revised 7/25/2019

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PROJECT REFERENCE NO.	SHEET NO.
R-3421A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

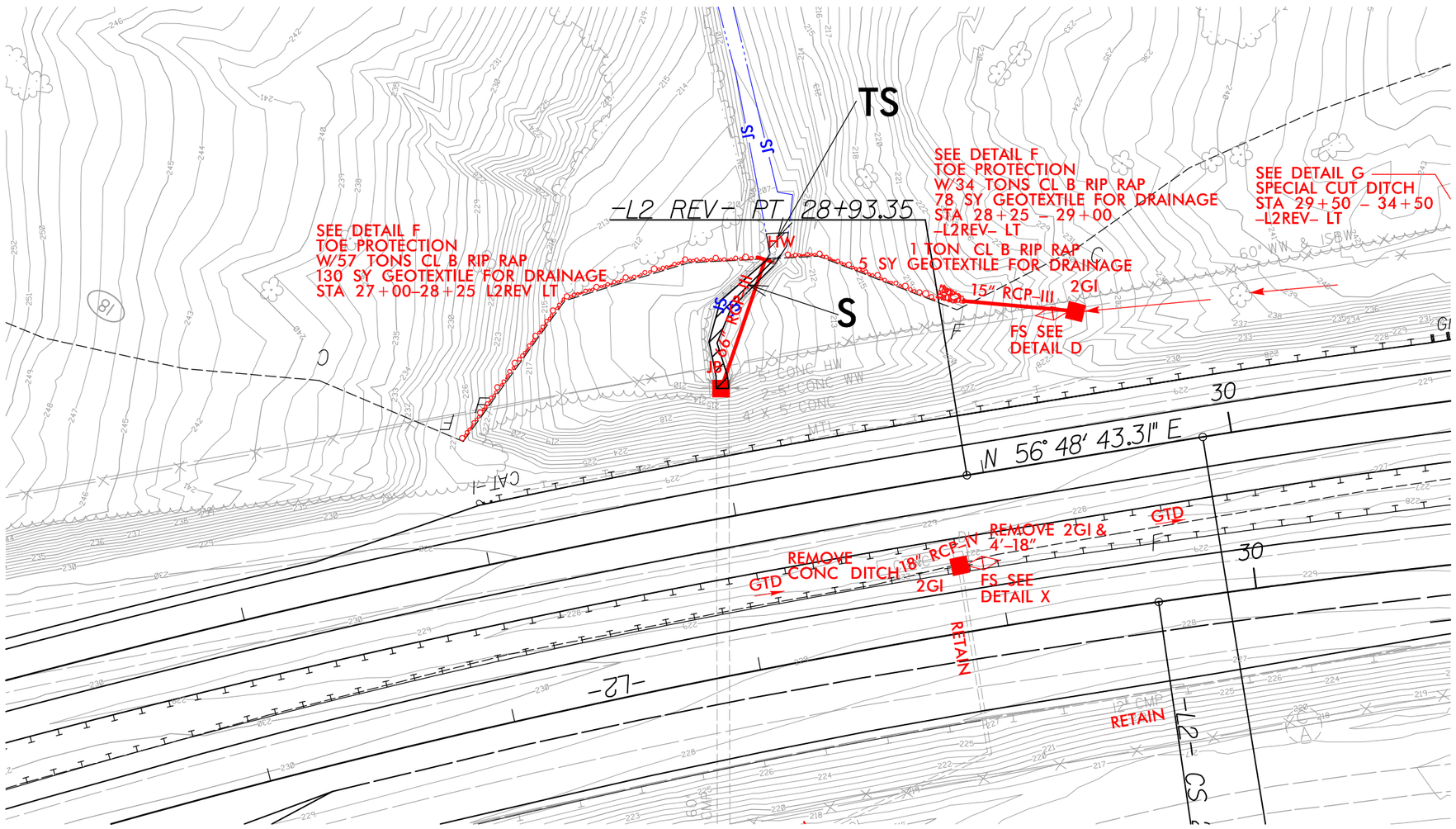
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 24 OF 37

SITE 3B ENLARGEMENT

NC GRID NAD 83



50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

Revised 7/25/2019

REVISIONS

8/17/99

$DATE$
$(USERNAME)$
$FILEL$

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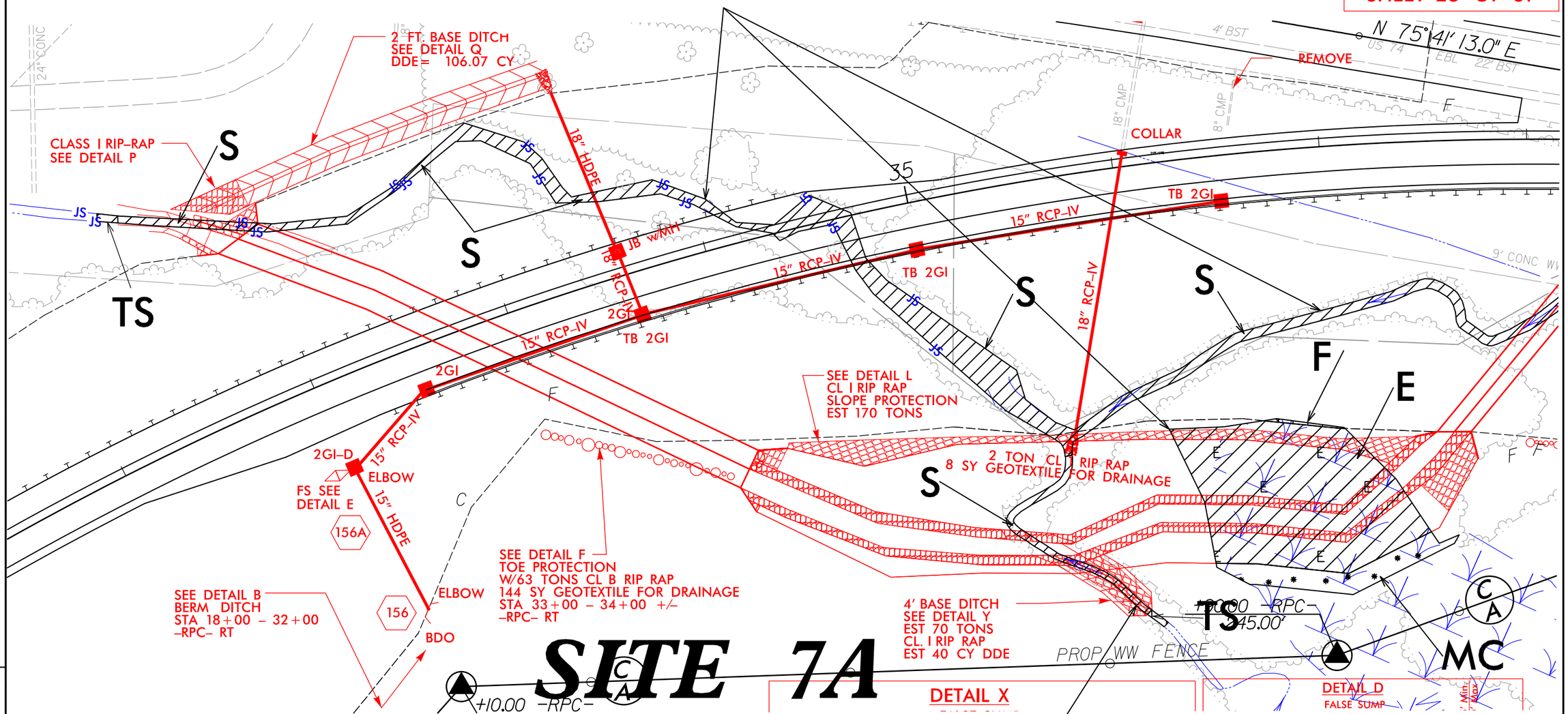
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 25 OF 37

SITE 7 (SOUTH) ENLARGEMENT



SITE 7A ENLARGEMENT

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

50' 0' 50'
GRAPHIC SCALE

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$(USERNAME)$
$FILEL$

8/17/99

REVISIONS

Revised 7/25/2019

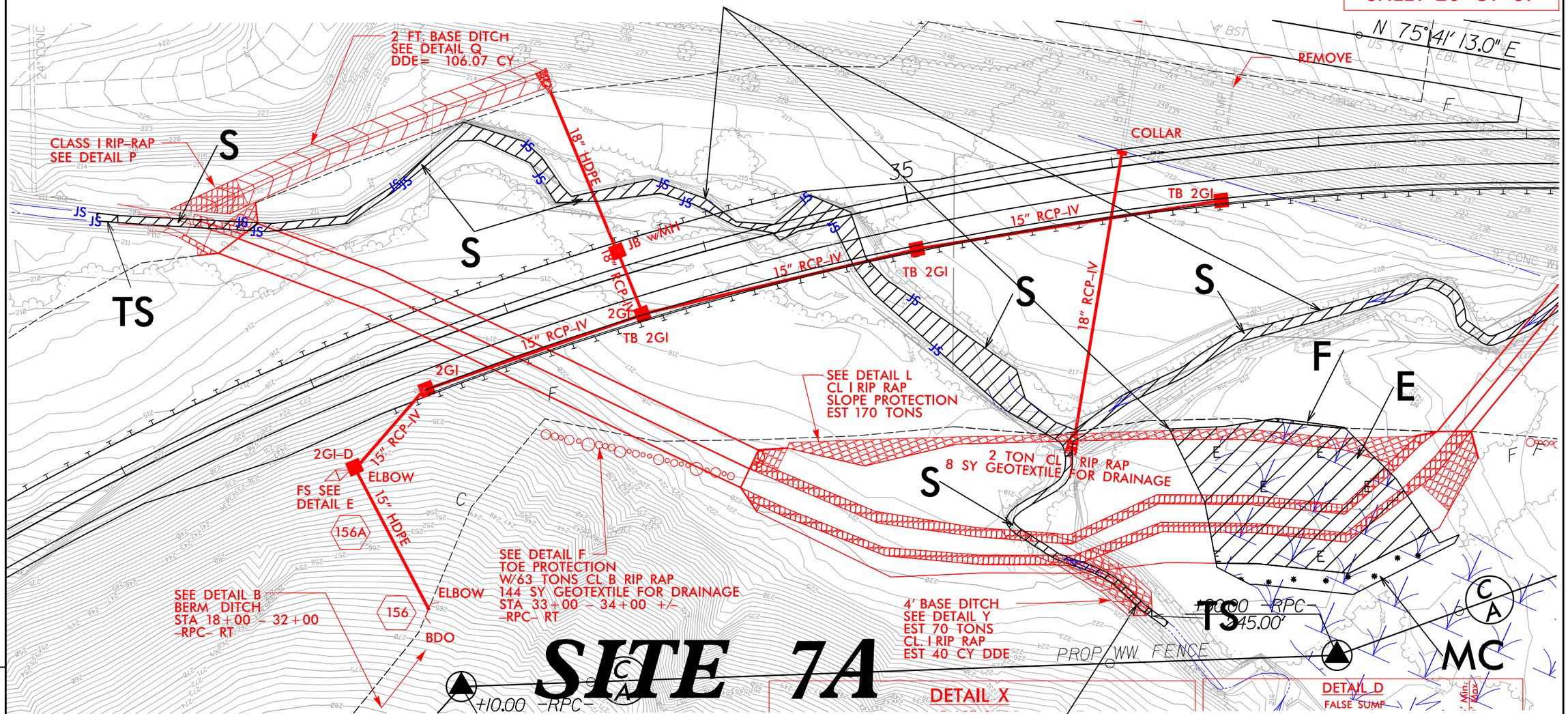
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 26 OF 37

SITE 7 (SOUTH) ENLARGEMENT



SITE 7A ENLARGEMENT

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

50' 0' 50'
GRAPHIC SCALE

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$FILEL$

Revised 7/25/2019

REVISIONS

8/17/99

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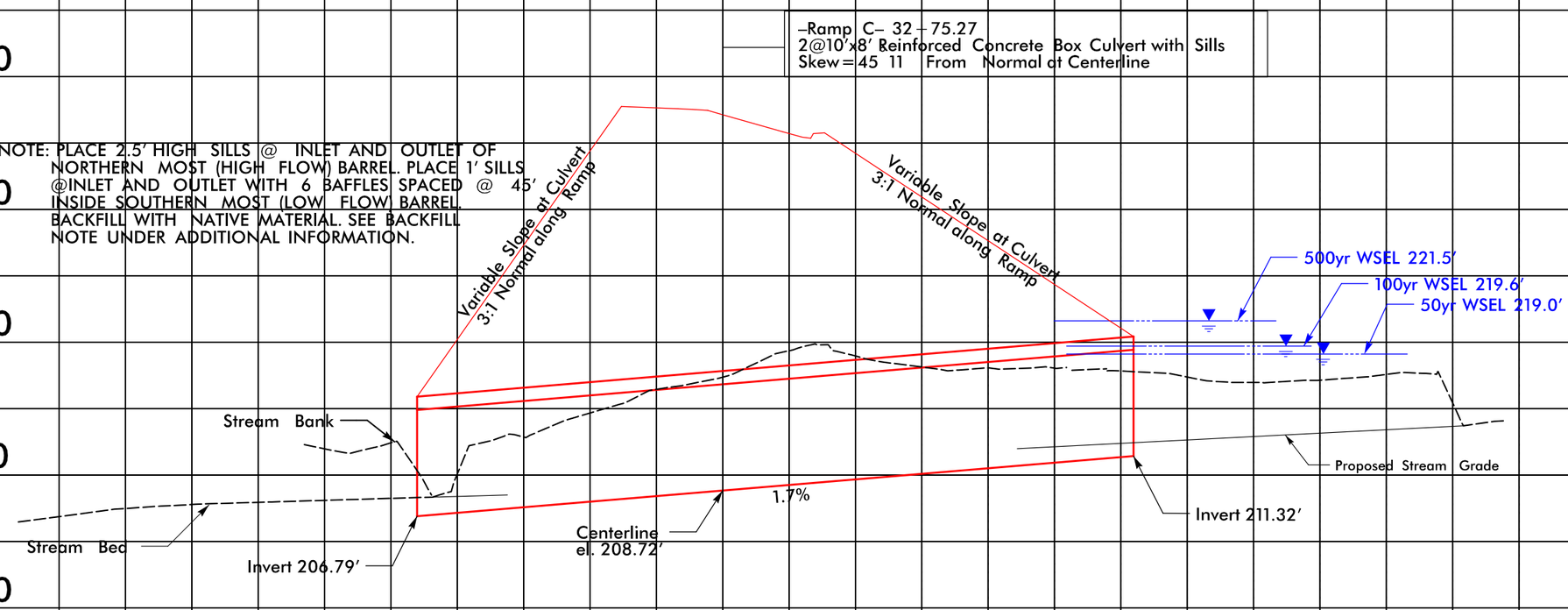
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 27 OF 37

SITE 7



Revised 7/25/2019

5/14/99

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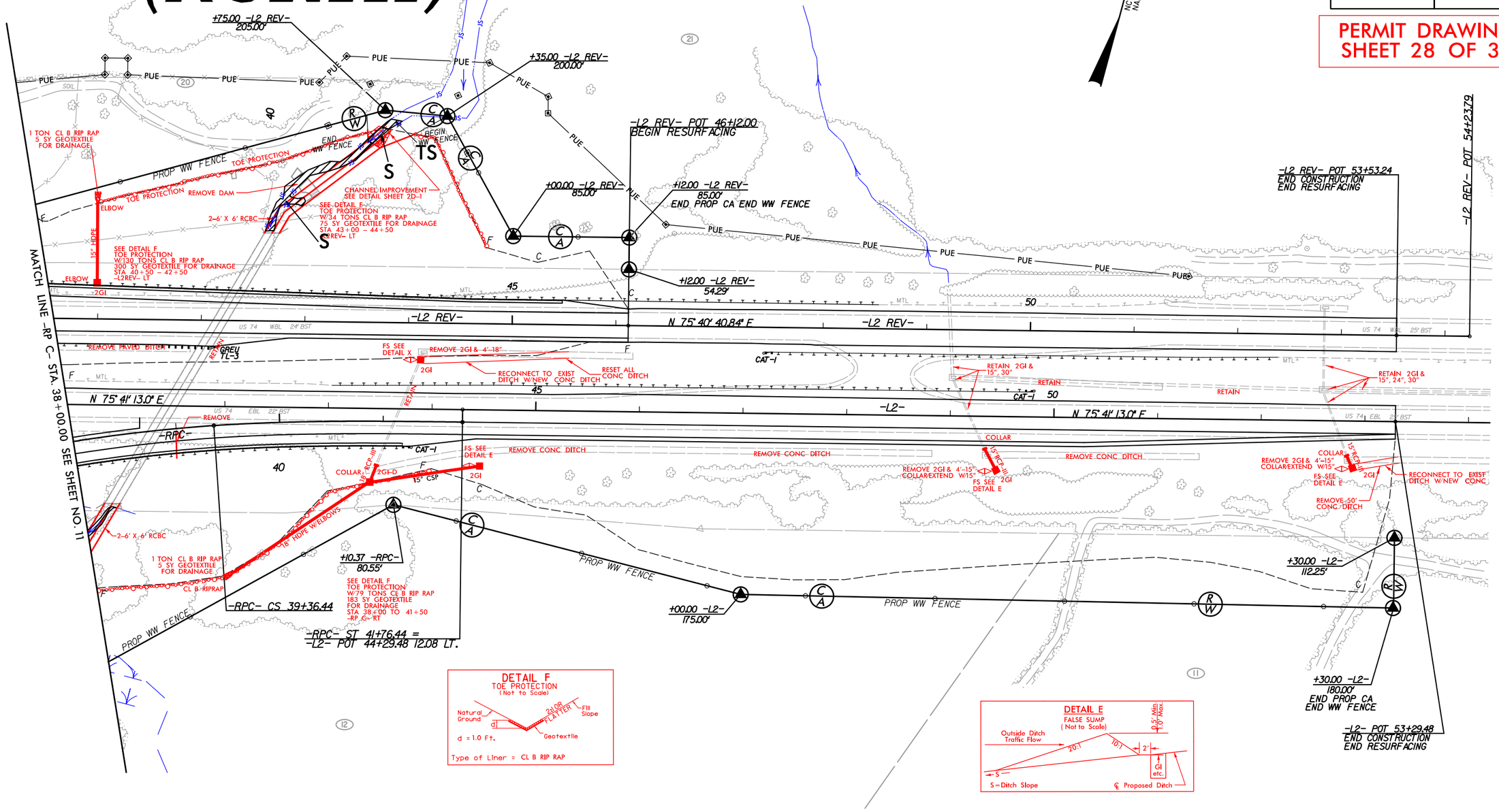
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 28 OF 37

SITE 7 (NORTH)



REVISIONS

8/17/99

Revised 7/25/2019

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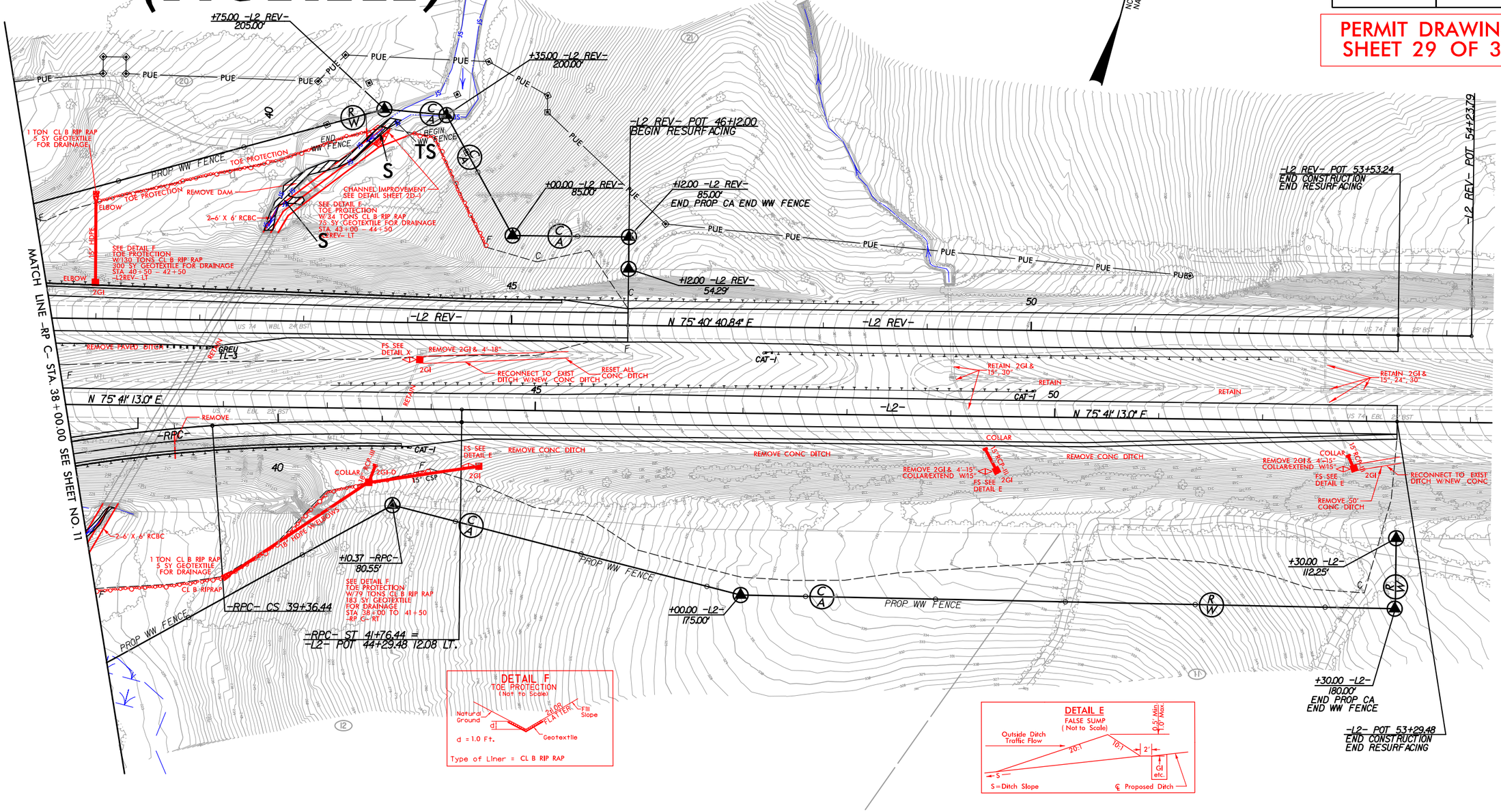
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 29 OF 37

SITE 7 (NORTH)



S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

Revised 7/25/2019

REVISIONS

8/17/99

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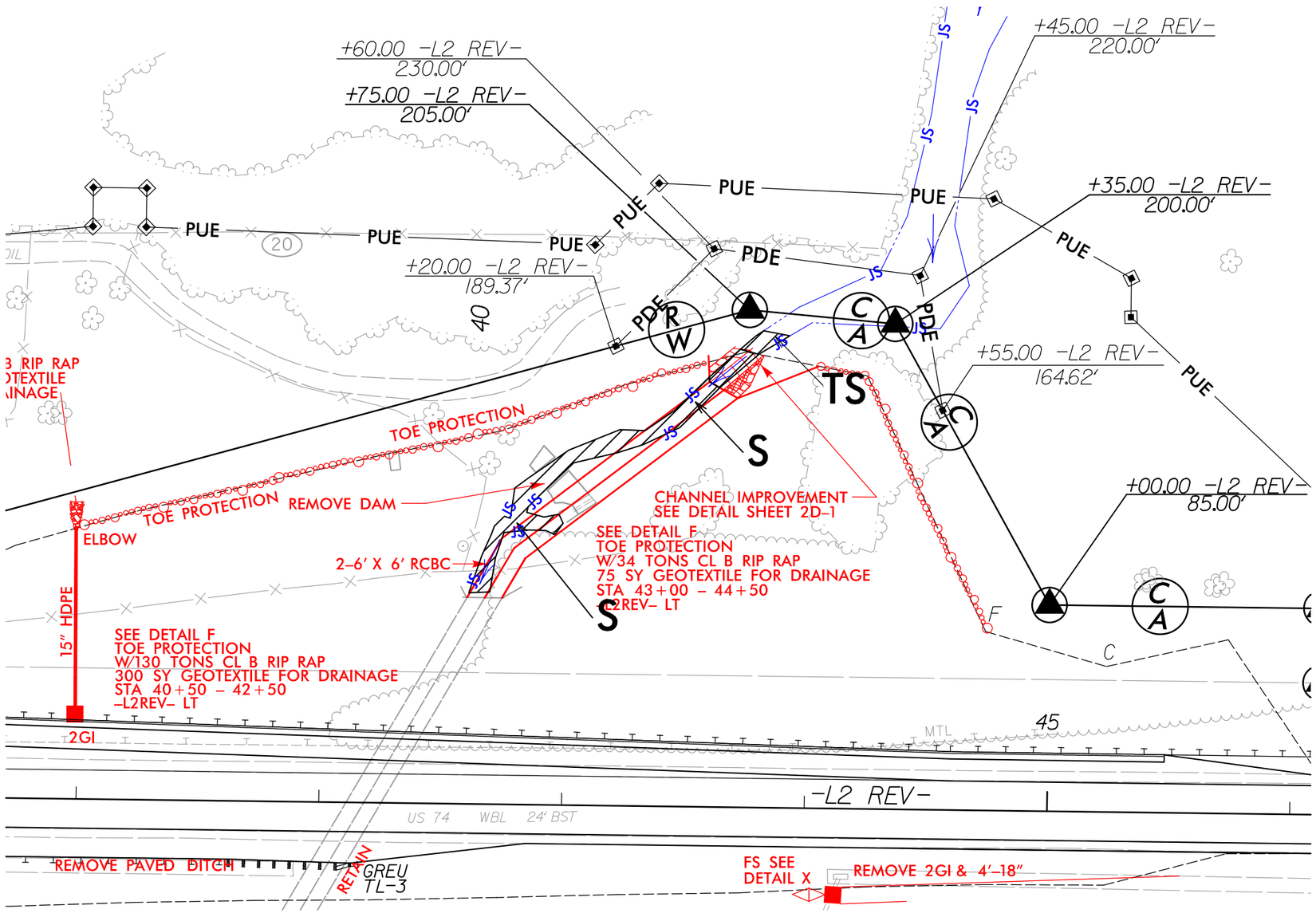
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 30 OF 37

SITE 7 (NORTH) ENLARGEMENT



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S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

Revised 7/25/2019

REVISIONS

8/17/99

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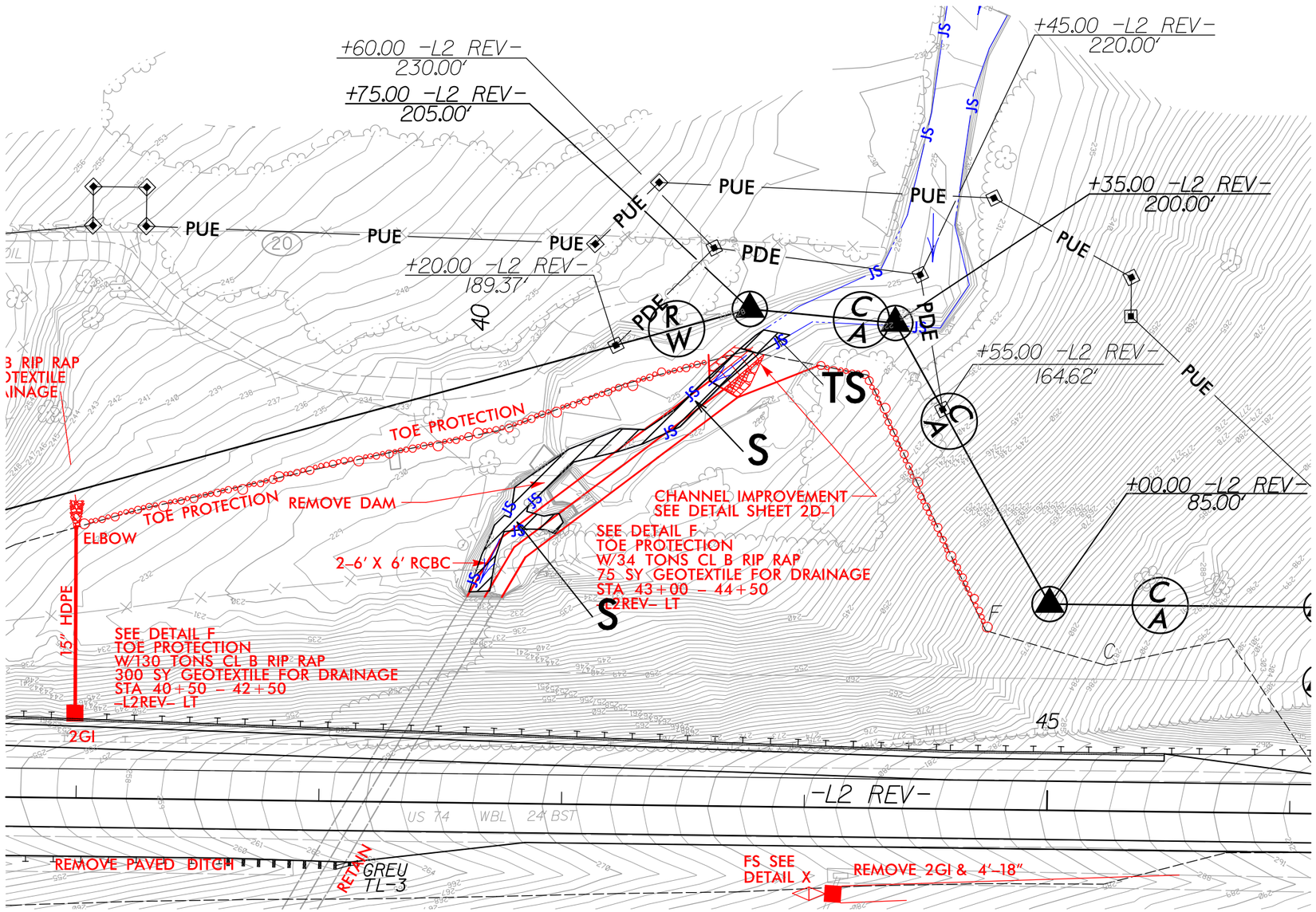
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 31 OF 37

SITE 7 (NORTH) ENLARGEMENT



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S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

Revised 7/25/2019

REVISIONS

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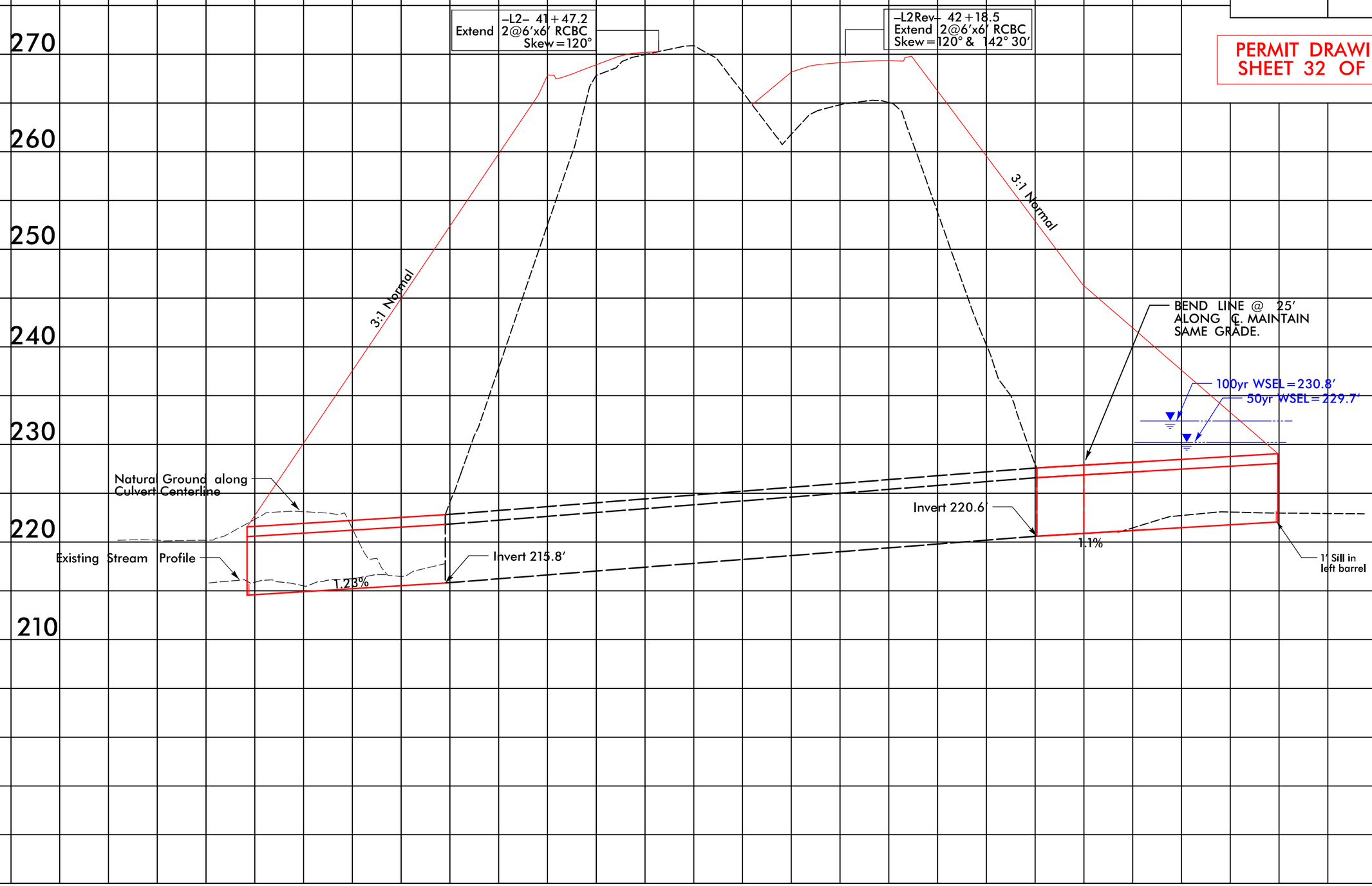
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 32 OF 37

SITE 7



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Revised 7/25/2019

REVISIONS

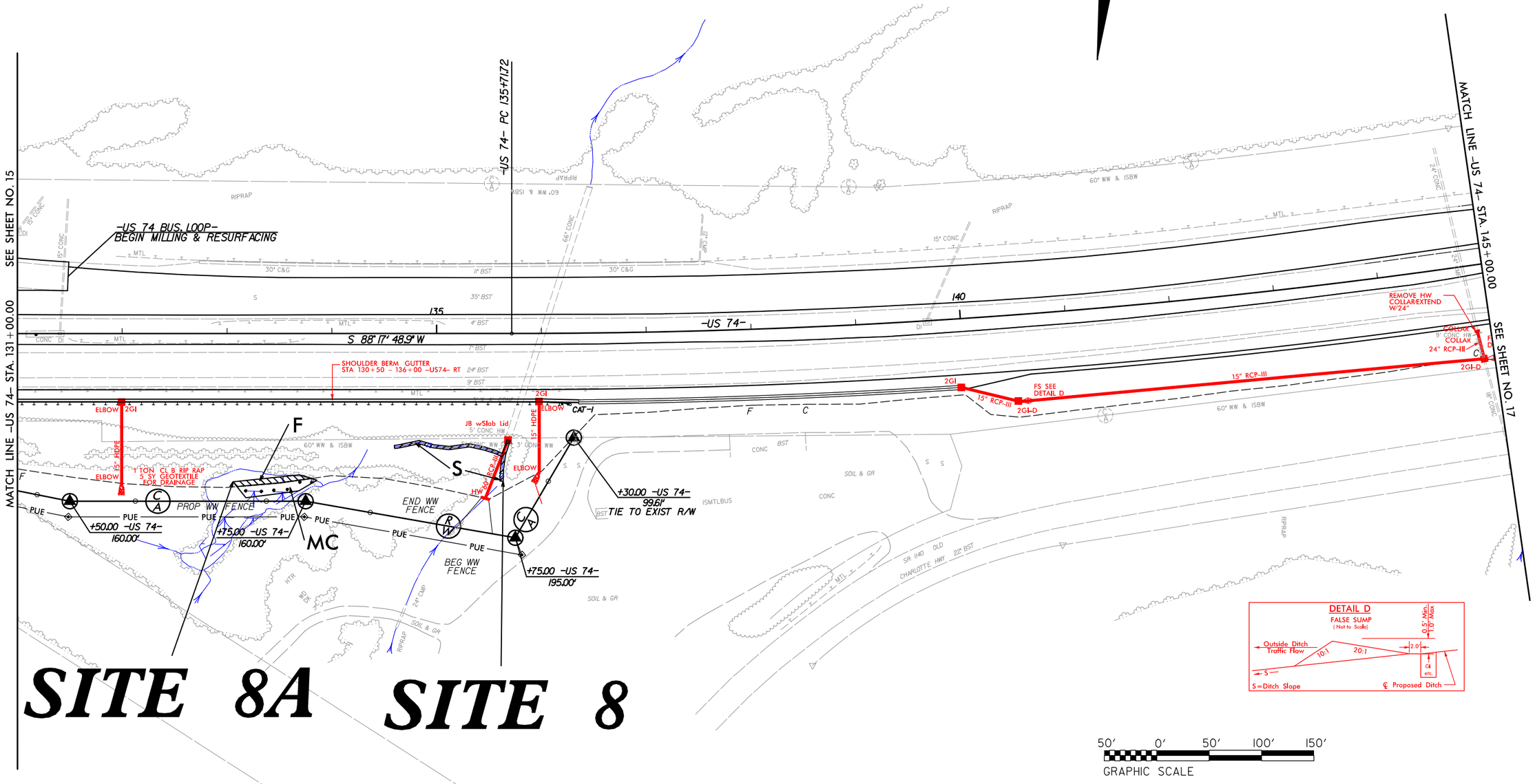
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	16
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 33 OF 37



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Revised 7/25/2019

REVISIONS

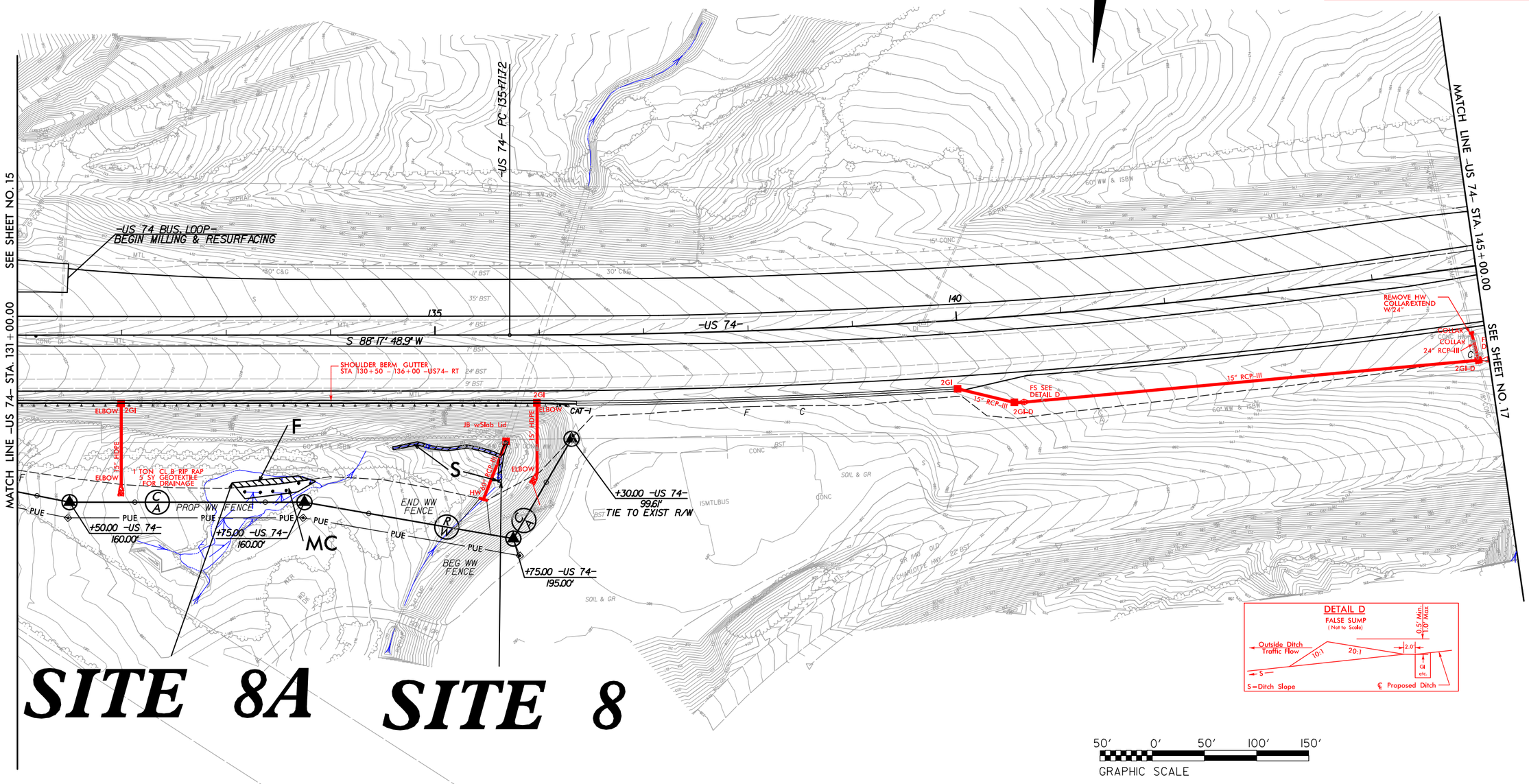
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421A	16
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 34 OF 37



DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

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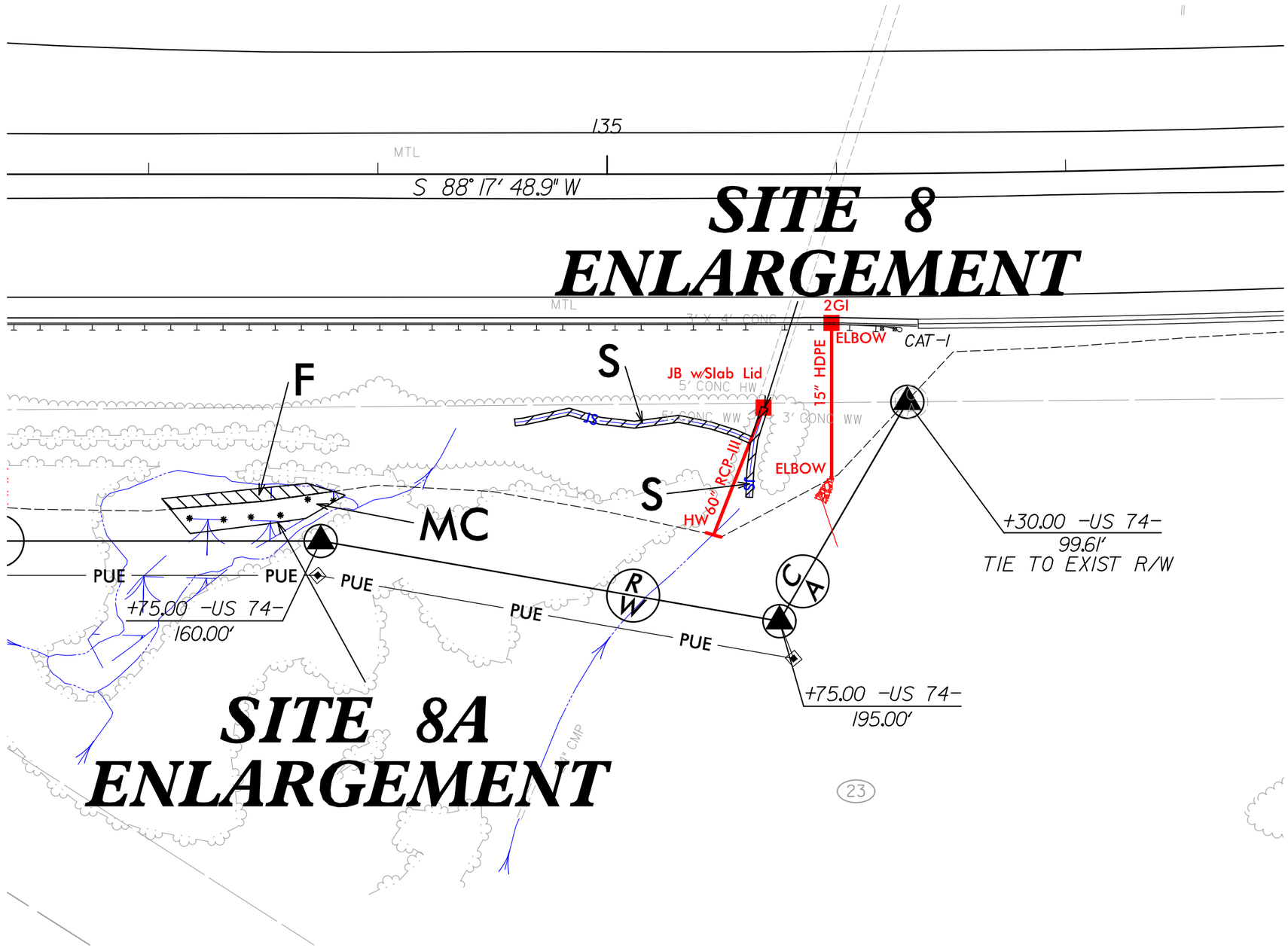
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 35 OF 37



NC GRID
NAD 83

50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

$DATE$
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8/17/99

REVISIONS

Revised 7/25/2019

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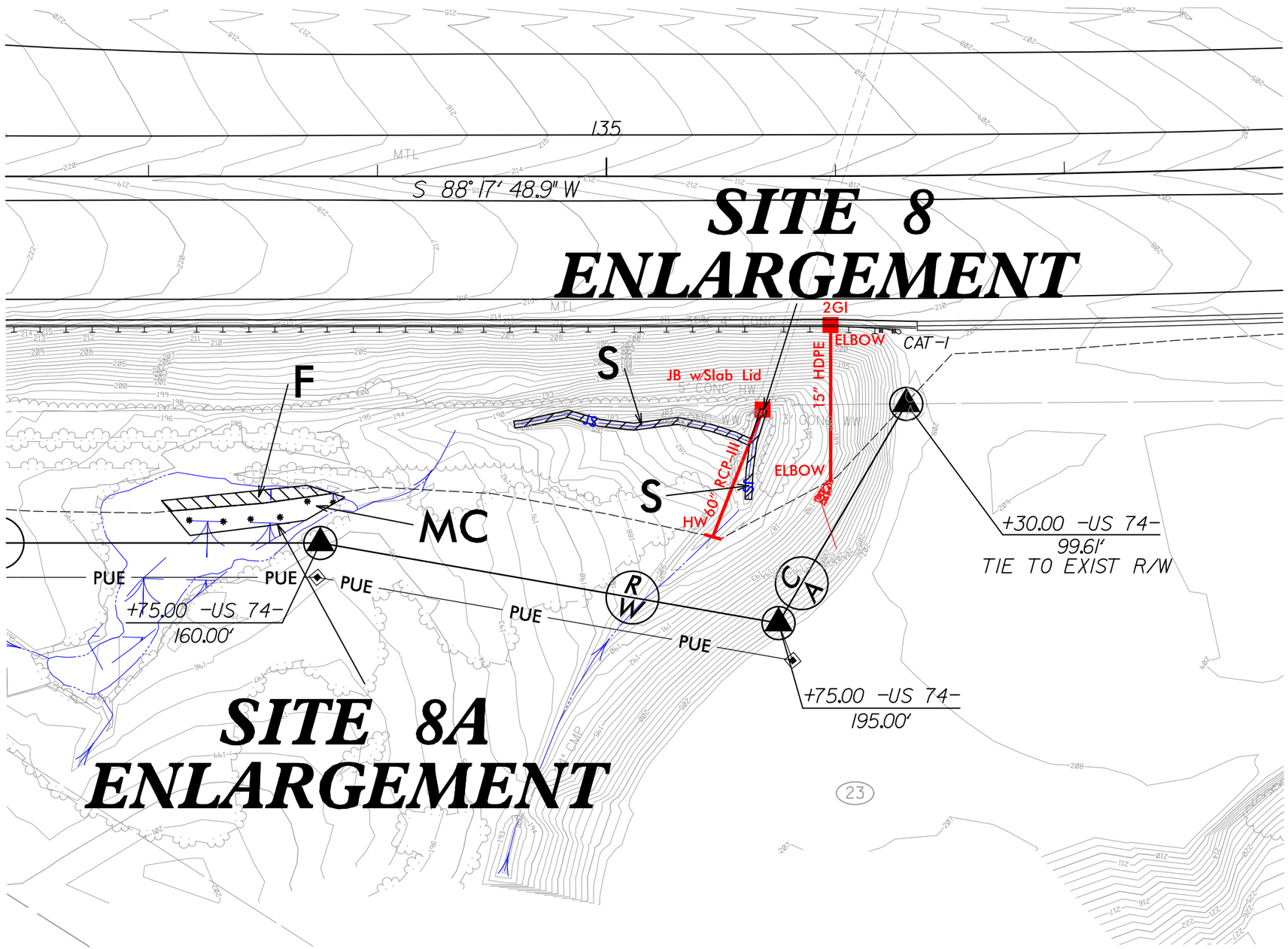
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 36 OF 37



S S DENOTES IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

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8/17/99

REVISIONS

Revised 7/25/2019

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Revised 7/25/2019

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	24+53 / 26+88 -FLY-	PROP PIPE SYSTEM						0.03	< 0.01	411	10	
2	94+76 / 98+53 -I-73-	TRIPLE BARREL	0.48					0.25	0.02	1011	50	
		CULVERT EXTENSIONS										
3	12+62 / 14+03 -LPC-	PROP 3-BARREL CULVERTS						0.09	0.02	475	106	
3A	12+90 / 13+44 -LPC-RT	60" RCP EXTENSION						< 0.01		81		
		PROP 3-BARREL CULVERTS										
3B	28+02 / 28+38 -L2REV-	PROP 66" RCP						< 0.01	< 0.01	61	10	
4	108+56 / 109+94 -I-73-	PROP 48" RCP						0.01	< 0.01	205	12	
5	10+00 / 11+96 -RPD-	PROP 60" RCP						0.02	< 0.01	327	25	
5A	10+34 / 10+71 -RPD-	PROP 60" RCP						< 0.01	< 0.01	118	10	
6	126+44 / 126+91 -I-73-	CLEARING FOR ROADWAY FILL				< 0.01						
7A	35+17 / 35+87 -RPC-	PROP CULVERTS						< 0.01	< 0.01	127	10	
7 SOUTH	31+62 / 38+32 -RPC-	PROP CULVERTS, 18"RCP,			0.15	0.02		0.11	< 0.01	828	10	
		STREAM REALIGN										
7 NORTH	42+60 / 43+90	CULVERTS EXTENSIONS,						0.03	< 0.01	175	12	
	-L2REV-	PROP CULVERT &										
8	134+60 / 135+70 -US 74-	60" RCP EXTENSION						0.01		147		
8A	133+06 / 133+86 -US 74-	ROADWAY FILL	< 0.01			0.02						
TOTALS*:			0.48		0.15	0.05		0.58	0.05	3966	255	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
5/28/2019
RICHMOND COUNTY
R-3421A
WBS 34542.1.1

Revised 2013 10 24

Revised 7/30/19

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element:	34542.1.FR3	**TIP No.:**	R-3421B	**County(ies):**	Richmond	**Page**	1	**of**	3

General Project Information

WBS Element:	34542.1.FR3	**TIP Number:**	R-3421B	**Project Type:**	New Location	**Date:**	7/30/2019
NCDOT Contact:	Mr. Galen Cail, PE	**Contractor / Designer:**					
Address:	1000 Birch Ridge Drive Raleigh, NC	**Address:**					
Phone:	919-707-6711	**Phone:**					
Email:	gcail@ncdot.gov	**Email:**					
City/Town:		**County(ies):**	Richmond				
River Basin(s):	Yadkin-Pee Dee	**CAMA County?**	No				
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	4.30	**Surrounding Land Use:**	Agricultural, Rural, Residential
	Proposed Project		**Existing Site**
Project Built-Upon Area (ac.)	52.1 ac.		N/A ac.
Typical Cross Section Description:	46' Grass median, 2@12' paved inside shoulers, 2@12' lanes each direction, 12' paved outside shoulder, grass roadway ditches.		N/A
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 19,980	Year: 2036	Existing: N/A Year: N/A
General Project Narrative: (Description of Minimization of Water Quality Impacts)	R-3421B is an interchange and bypass project (US220 Bypass, I-73/I-74) which will include a 46' grass median with 2@12' travel lanes in each direction. The project also includes grass lined roadway ditches. The proposed project includes 1 major drainage structure (3 barrel RCBC), which will convey an unnamed tributary to Cartledge Creek. The culvert will include sills and utilize Low Flow Benches to maintain low flow in two barrels. Rip Rapped Energy Dissipators will be utilized at the outlets of a 30" pipe and a 36" pipe to prevent erosion at the outlets.		

Waterbody Information

Surface Water Body (1):	Un-named Trib to Cartledge Creek	**NCDWR Stream Index No.:**	UT to 13 - 35		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C		
		Supplemental Classification:			
Other Stream Classification:	None				
Impairments:	None				
Aquatic T&E Species?	No	Comments:			
NRTR Stream ID:			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element: 34542.1.FR3 **TIP No.:** R-3421B **County(ies):** Richmond

Revised 7/30/19

Swales

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?

Additional Comments

The design for R-3421B includes typical grassed cut ditches within the roadway footprint. These ditches are collecting runoff from the impervious roadway surfaces and transporting to inlets and pipes. The geometry of the typical cut ditches contain side slopes ranging from 2:1 to 8:1 and mild longitudinal slopes. Although no grassed swale treatment credit is claimed for this project or required many reaches of the grassed ditches/swales will meet the criteria for grassed swale treatment.

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element: 34542.1.FR3 **TIP No.:** R-3421B **County(ies):** Richmond

Preformed Scour Holes and Energy Dissipators

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)	V10 (fps)	BMP Associated w/ Buffer Rules?
17	-L- 322+50 RT 34.9854605, -79.7994557	(1)Un-named Trib to	Riprap Energy Dissipator Basin	Class I	9.7	Pipe	30" RCP	27.5	1.1	N/A
19	-L- 347+26 LT 34.9897885, -79.7930204	(1)Un-named Trib to	Riprap Energy Dissipator Basin	Class I	13.2	Pipe	36" RCP	32.4	1.2	N/A

Additional Comments

* Refer to the NCDOT Best Management Practices Toolbox (2014), NCDOT Standards, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

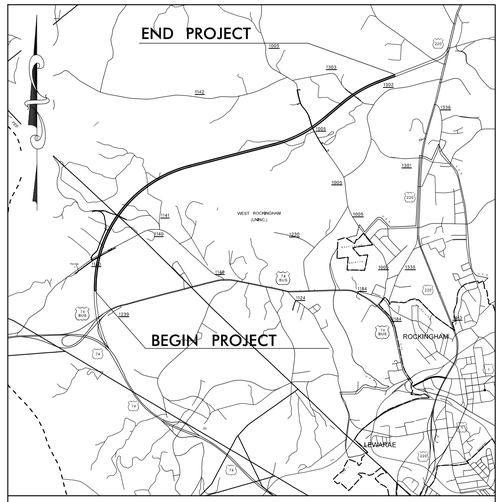
Revised 7/30/19

09/08/09

TIP PROJECT: R-3421B

CONTRACT:

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RICHMOND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3421B	1	

WBS NO.	F.A. PROJ. NO.	DESCRIPTION
34542.1.FR3	NHF-0220(76)	P.E.
34542.2.3	NHF-0220(43)	R /W & UTIL.

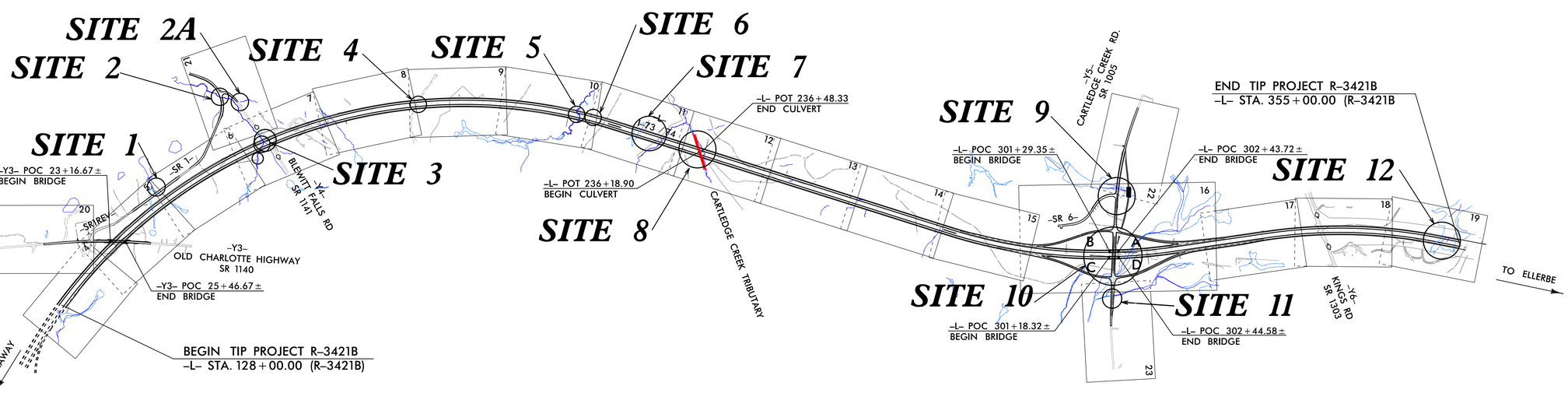
PERMIT DRAWING
SHEET 1 OF 71

LOCATION: I-73/74 FROM 0.3 MILES SOUTH OF SR 1140 (OLD CHARLOTTE HIGHWAY) TO 0.2 MILES SOUTHWEST OF SR 1304 (HARRINGTON ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERTS, STRUCTURES, MSE RETAINING WALLS, AND SIGNING

WETLAND AND SURFACE WATER IMPACTS PERMIT

NC GRID NAD 83/95



NOTE:
THIS PROJECT IS A CONTROLLED ACCESS PROJECT WITH ACCESS LIMITED TO THE INTERCHANGE.

MULKEY
ENGINEERS & CONSULTANTS
PO Box 33127
Raleigh, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM

GRAPHIC SCALES

25′ 0 50′
PLANS

25′ 0 50′
PROFILE (HORIZONTAL)

5′ 0 10′
PROFILE (VERTICAL)

DESIGN DATA

ADT 2016 = 10,400
ADT 2036 = 19,980

K = 10%
D = 60%
T = 26% *
V = 70 mph

* (Duals = 9% + TTST = 17%)

Functional Class.: Interstate statewide ties

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3421B = 4.270 MILES

LENGTH STRUCTURES TIP PROJECT R-3421B = 0.029 MILES

TOTAL LENGTH TIP PROJECT R-3421B = 4.299 MILES

-L- LINE USED FOR PROJECT LENGTH

Prepared in the Office of:
Mulkey Engineers & Consultants
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 23, 2009

LETTING DATE:
FEB 16, 2016
(PRODUCTION)

JOHNNY BANKS
MULKEY E & C
PROJECT MANAGER

STEVE BROWDE, PE
MULKEY E & C
PROJECT DESIGN ENGINEER

NCDOT CONTACT: REKHA PATEL, PE
ROADWAY DESIGN - PROJECT ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

P.E.
STATE HIGHWAY DESIGN ENGINEER

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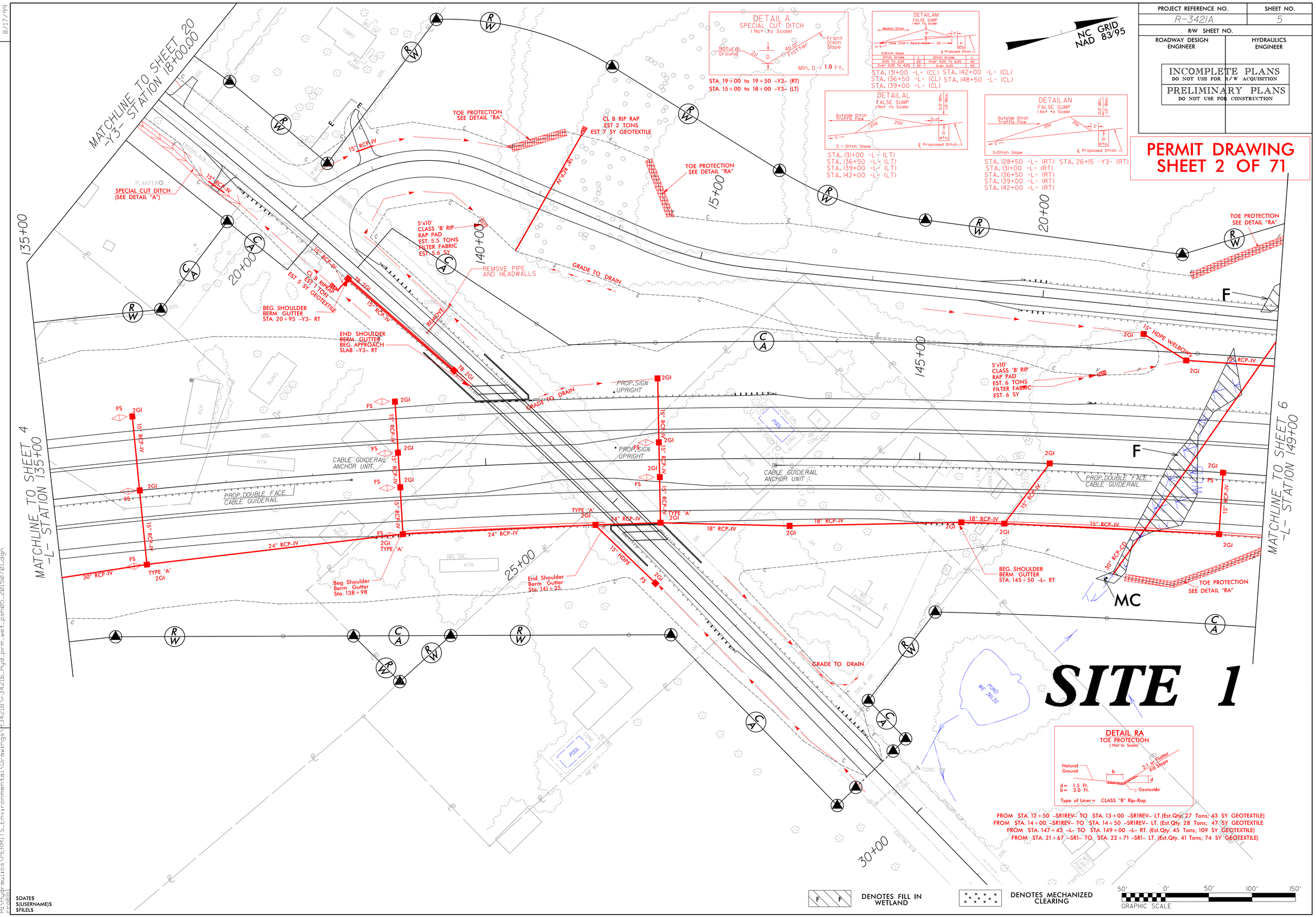
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 2 OF 71

NC GRID
NAD 83/95



REVISIONS

8/17/99

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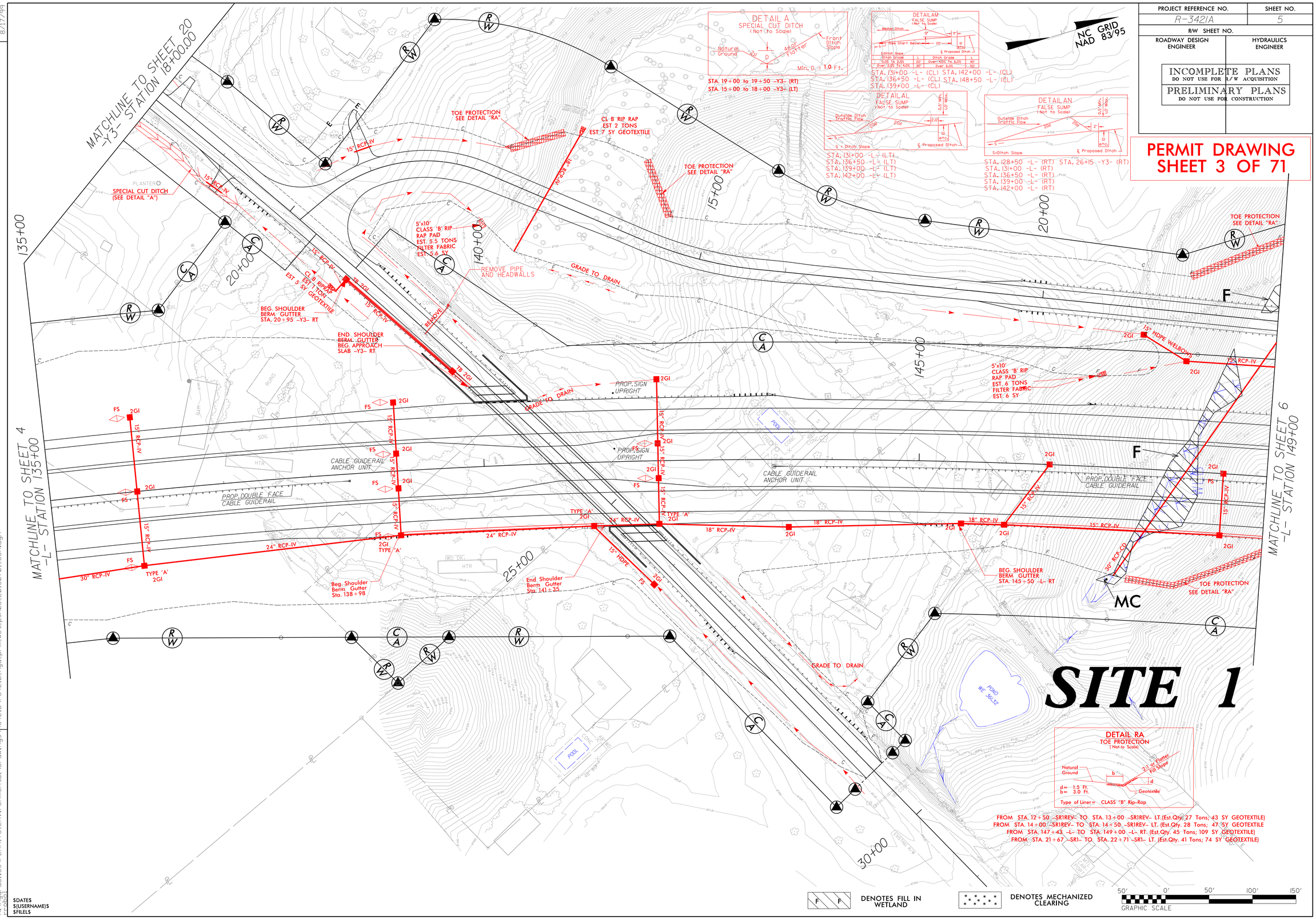
PROJECT REFERENCE NO.	SHEET NO.
R-3421A	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 3 OF 71

NC GRID NAD 83/95



REVISIONS

8/17/99

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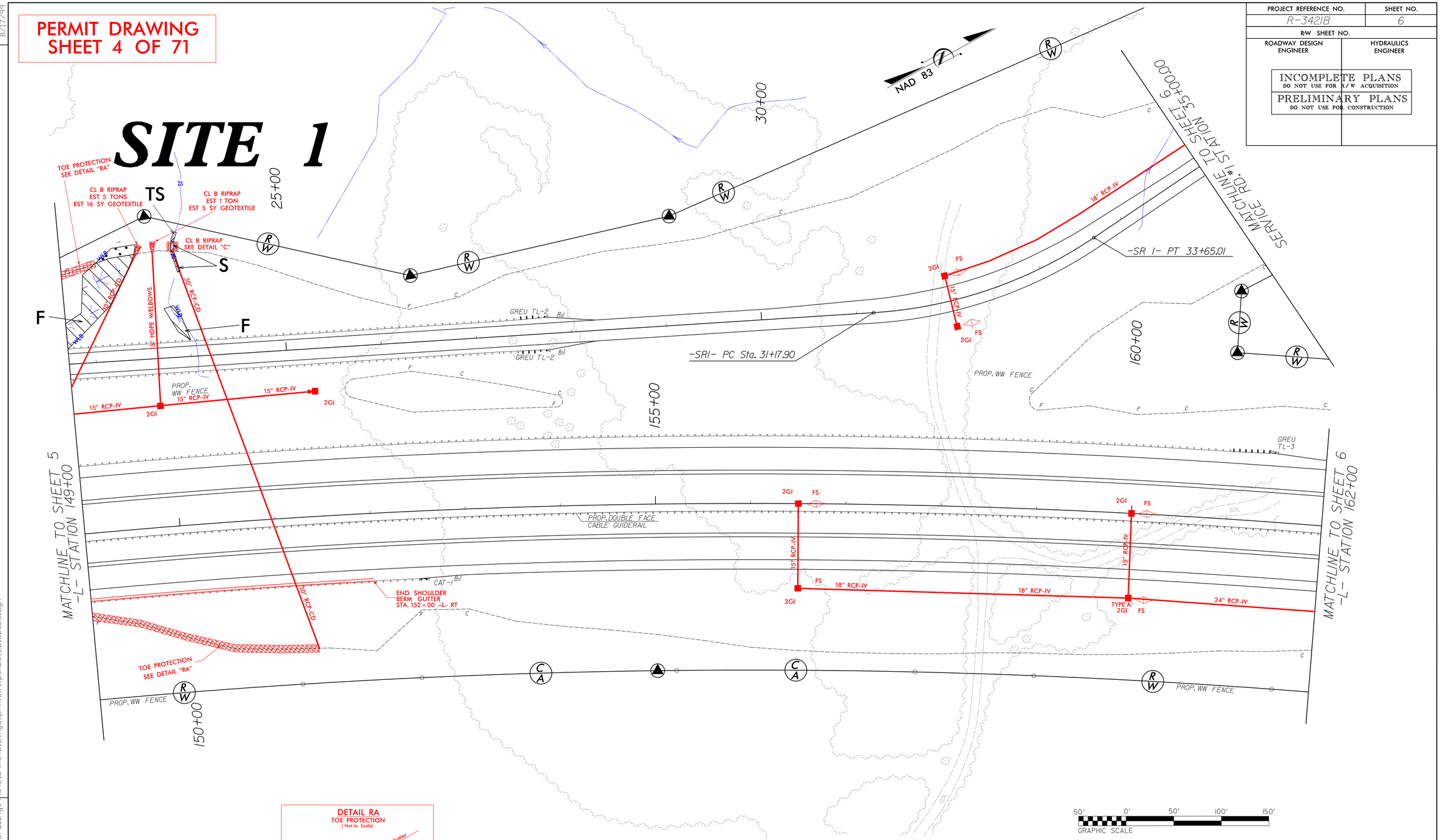
PERMIT DRAWING
SHEET 4 OF 71

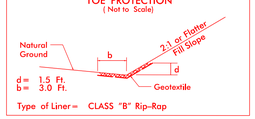
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



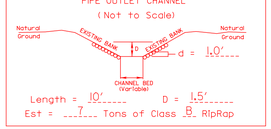
DETAIL RA
TOE PROTECTION
(Not to Scale)



d = 1.5 Ft.
b = 3.0 Ft.
Type of Liner = CLASS "B" Rip-Rap

FROM STA. 149+00 -L- TO STA. 151+35 -L- RT.
(Est.Qty. 70 Tons; 161 SY GEOTEXTILE)
FROM STA. 22+71 -SR1- TO STA. 23+05 -SR1- LT.
(Est.Qty. 41 Tons; 24 SY GEOTEXTILE)

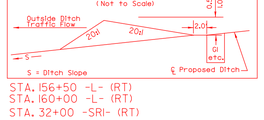
DETAIL C
PIPE OUTLET CHANNEL
(Not to Scale)



Length = 10'
D = 1.5'
Est = 7 Tons of Class B RipRap

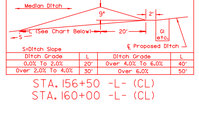
STA. 150+95.58 -L- (LT)

DETAIL AL
FALSE SUMP
(Not to Scale)



STA. 156+50 -L- (RT)
STA. 160+00 -L- (RT)
STA. 32+00 -SR1- (RT)

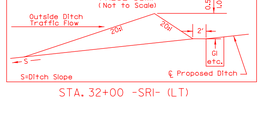
DETAIL AM
FALSE SUMP
(Not To Scale)



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

STA. 156+50 -L- (CL)
STA. 160+00 -L- (CL)

DETAIL AN
FALSE SUMP
(Not to Scale)



STA. 32+00 -SR1- (LT)

50' 0' 50' 100' 150'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

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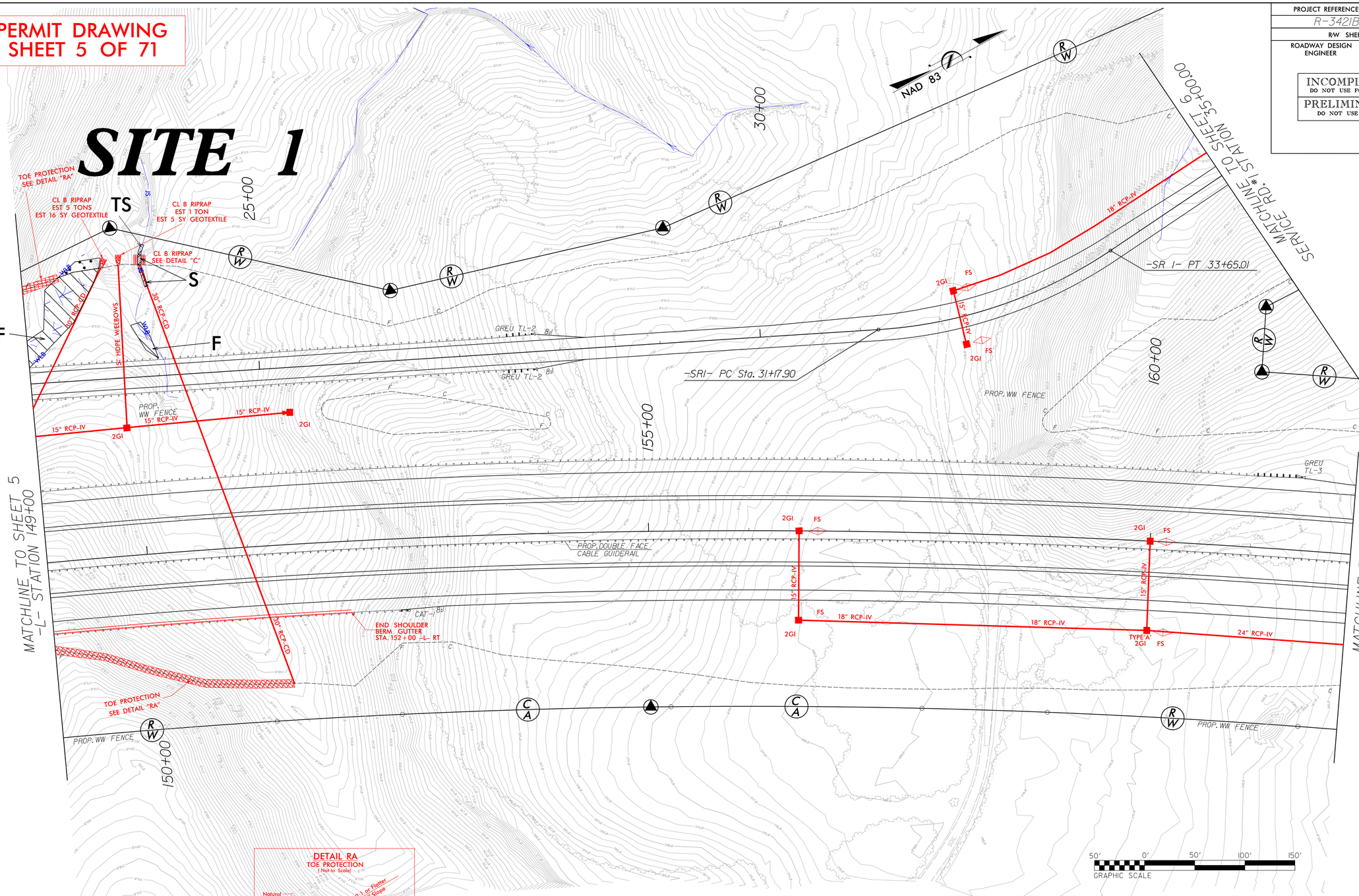
PERMIT DRAWING
SHEET 5 OF 71

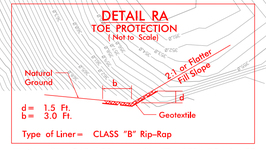
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DETAIL RA
TOE PROTECTION
(Not to Scale)

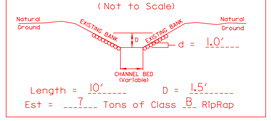


d = 1.5 Ft.
b = 3.0 Ft.

Type of Liner = CLASS "B" Rip-Rap

FROM STA. 149+00 -L- TO STA. 151+35 -L- RT.
(Est.Qty. 70 Tons; 161 SY GEOTEXTILE)
FROM STA. 22+71 -SR1- TO STA. 23+05 -SR1- LT.
(Est.Qty. 41 Tons; 24 SY GEOTEXTILE)

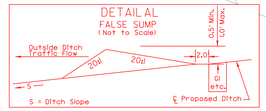
DETAIL C
PIPE OUTLET CHANNEL
(Not to Scale)



Length = 10'
D = 1.5'
Est = 7 Tons of Class B RipRap

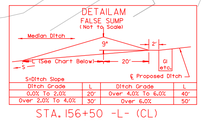
STA. 150+95.58 -L- (LT)

DETAIL AL
FALSE SUMP
(Not to Scale)



STA. 156+50 -L- (RT)
STA. 160+00 -L- (RT)
STA. 32+00 -SRI- (RT)

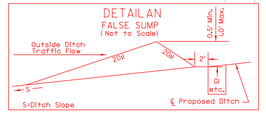
DETAIL AM
FALSE SUMP
(Not to Scale)



S=Ditch Slope		Ditch Grade	L
Ditch Grade	L	Over 4.00 To 6.00	40'
0.00 To 2.00	20'	Over 6.00	50'
Over 2.00 To 4.00	30'		

STA. 156+50 -L- (CL)
STA. 160+00 -L- (CL)

DETAIL AN
FALSE SUMP
(Not to Scale)



STA. 32+00 -SRI- (LT)

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

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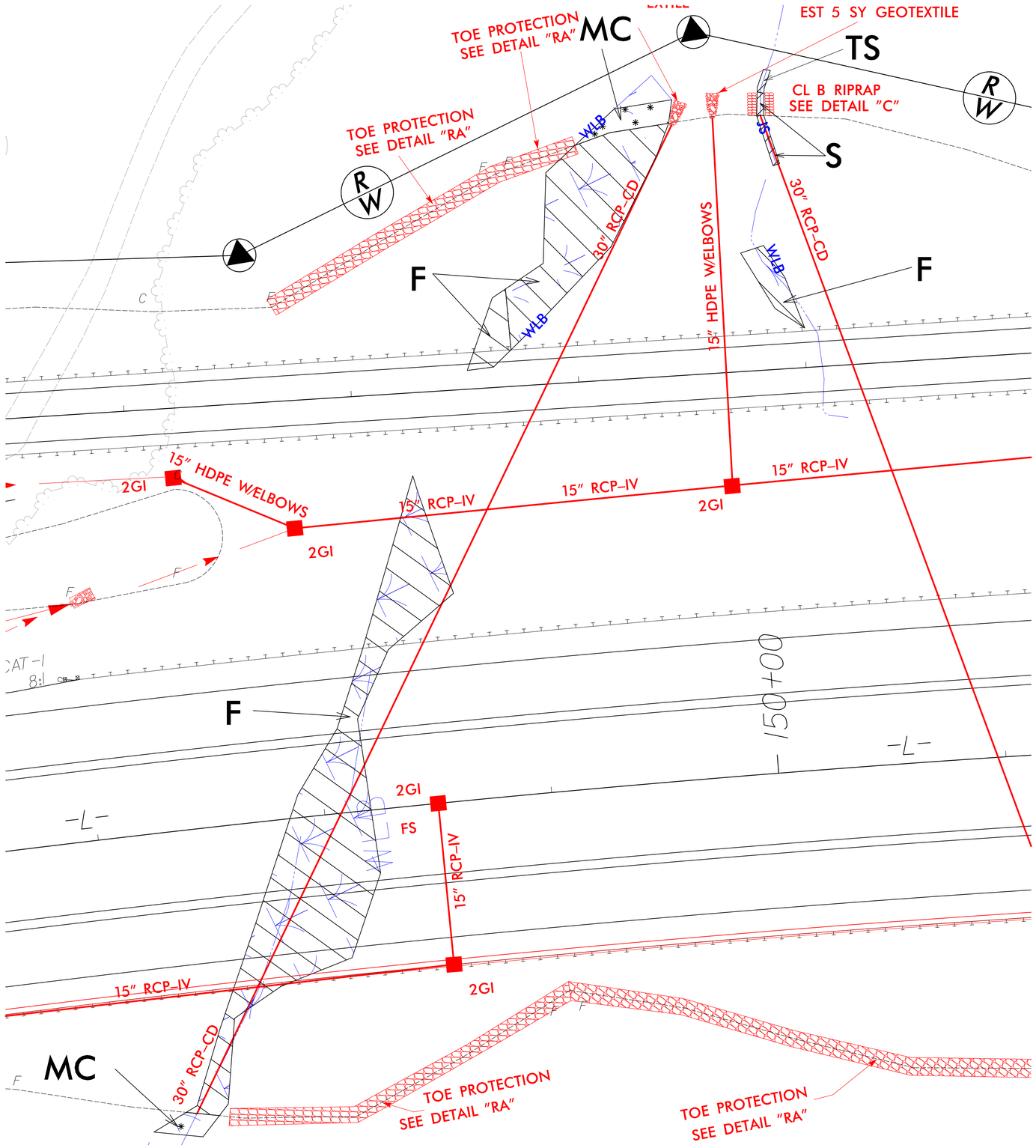
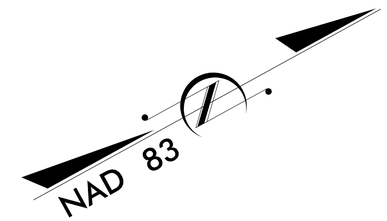
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 6 OF 71





SITE 1 ENLARGEMENT

50' 0' 50'
GRAPHIC SCALE

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F — DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

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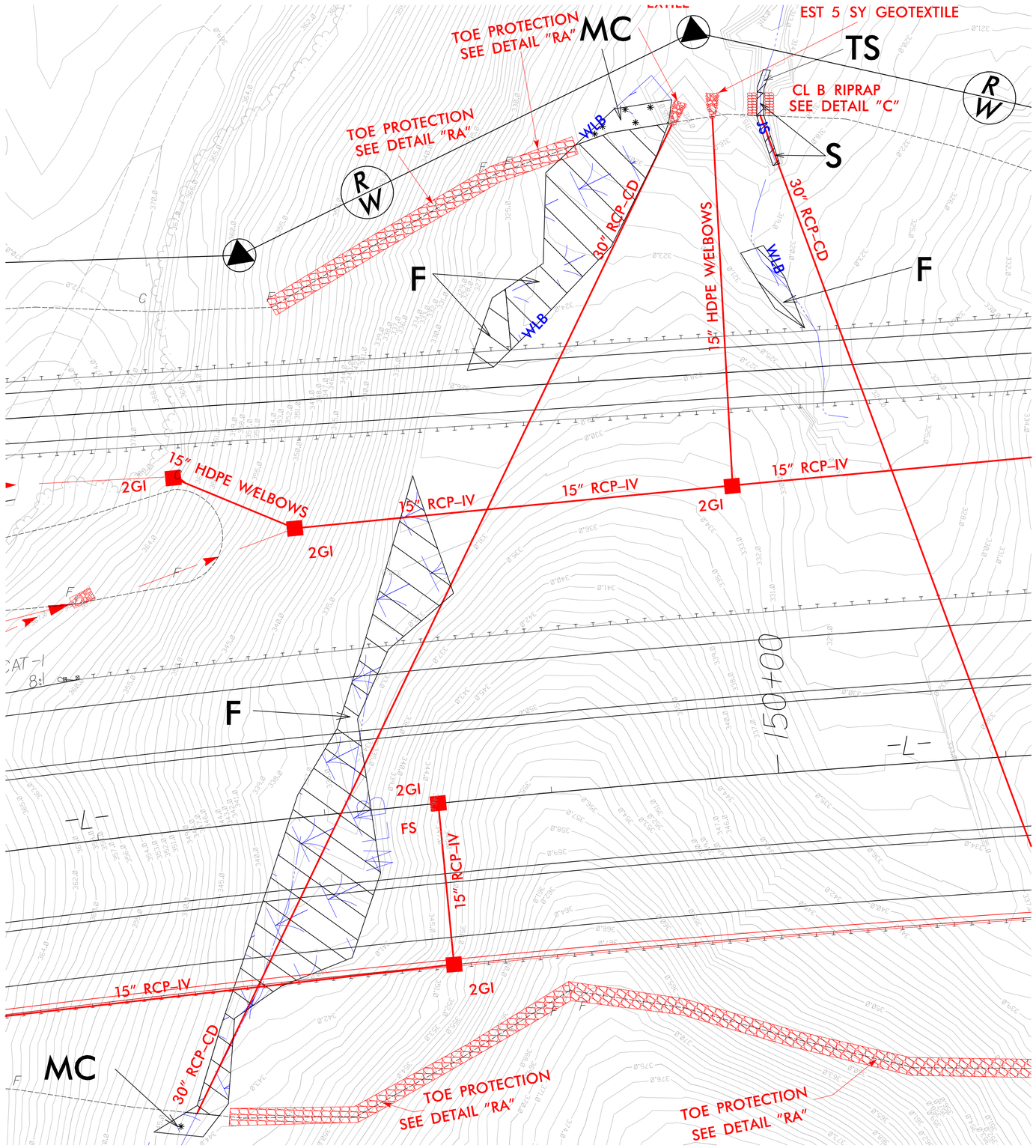
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 7 OF 71



NAD 83

SITE 1 ENLARGEMENT

50' 0' 50'
GRAPHIC SCALE

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F — DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

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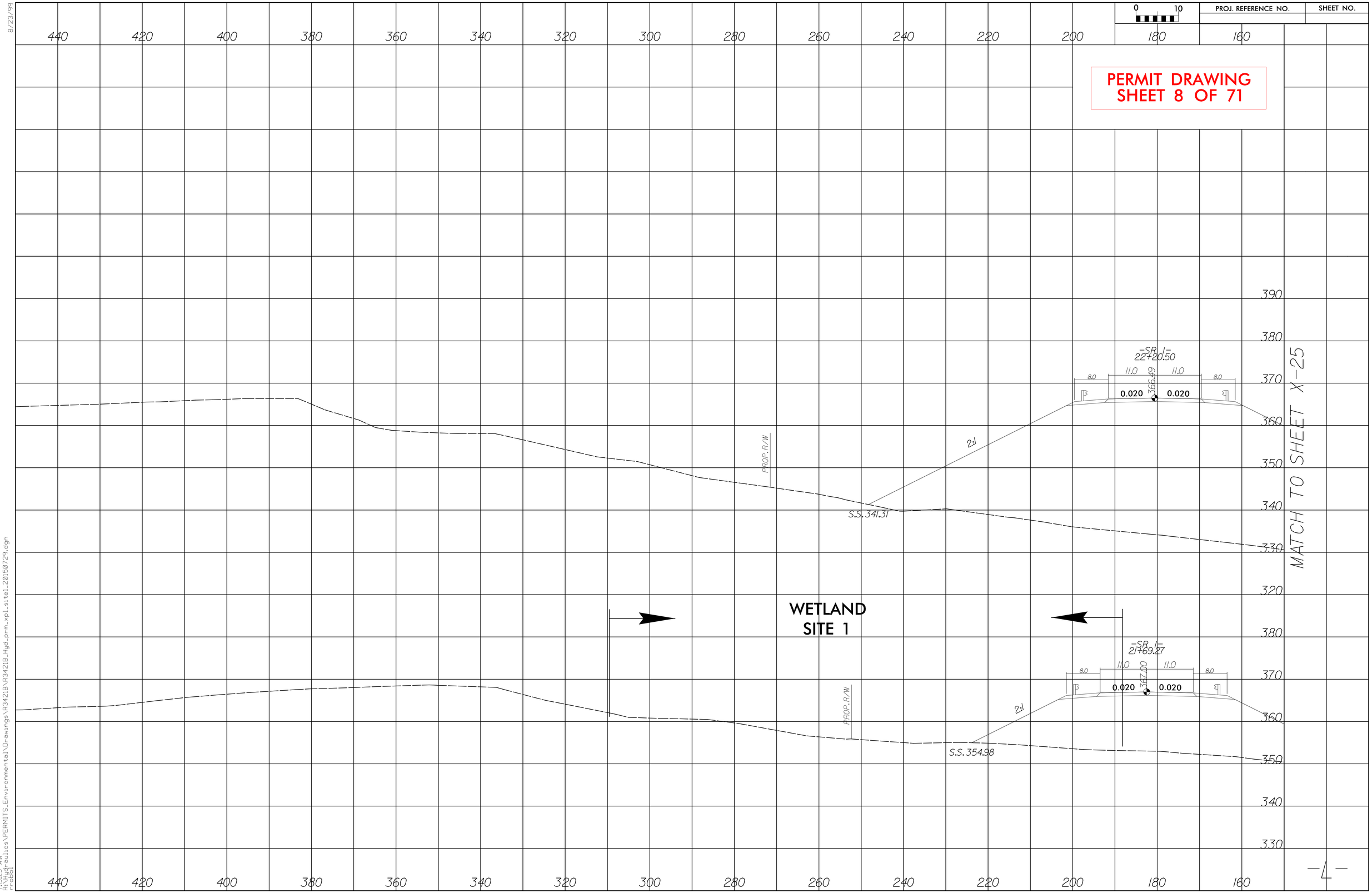

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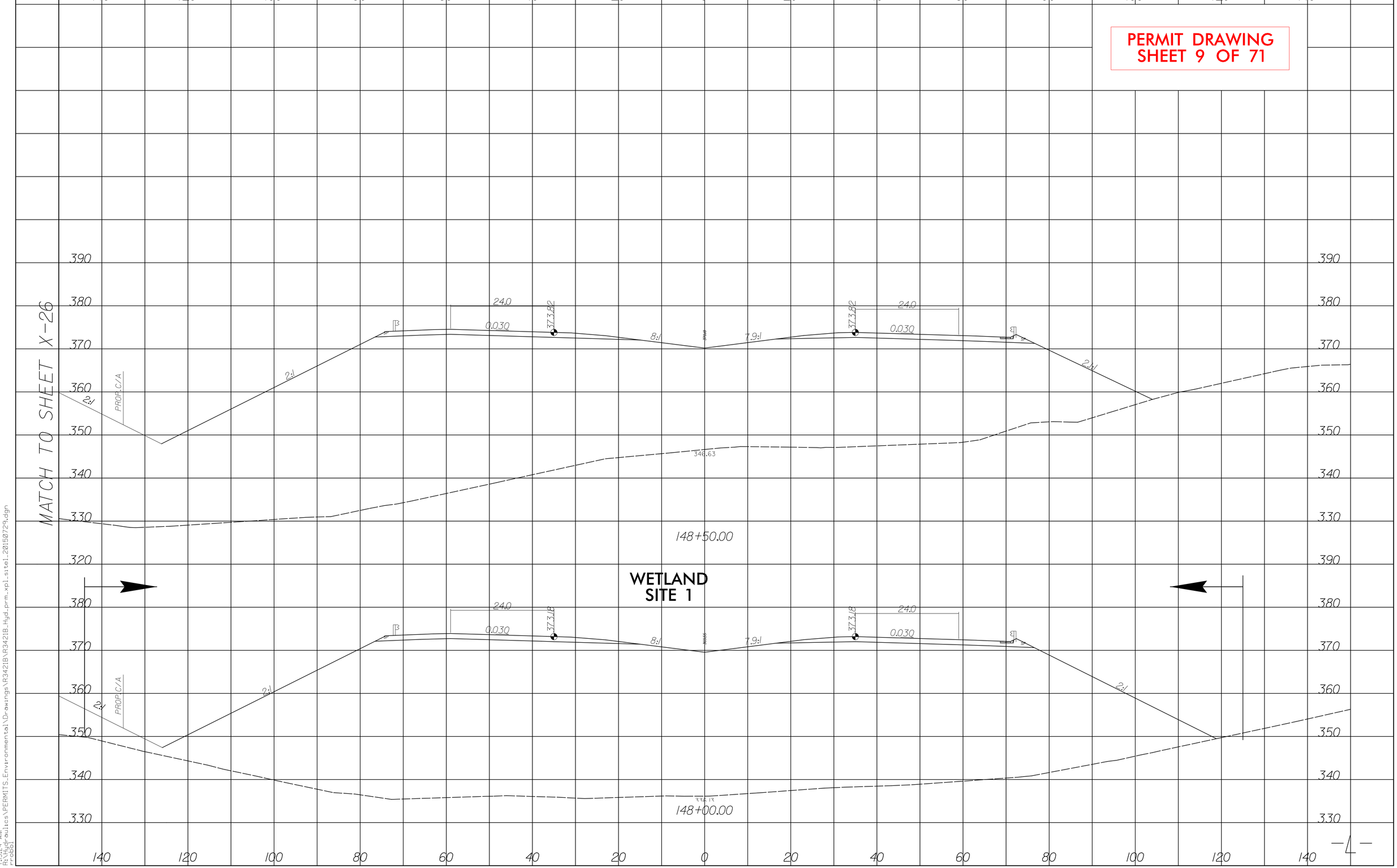
PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-25

PERMIT DRAWING
SHEET 9 OF 71



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Revised 8/6/19

REVISIONS

8/17/99

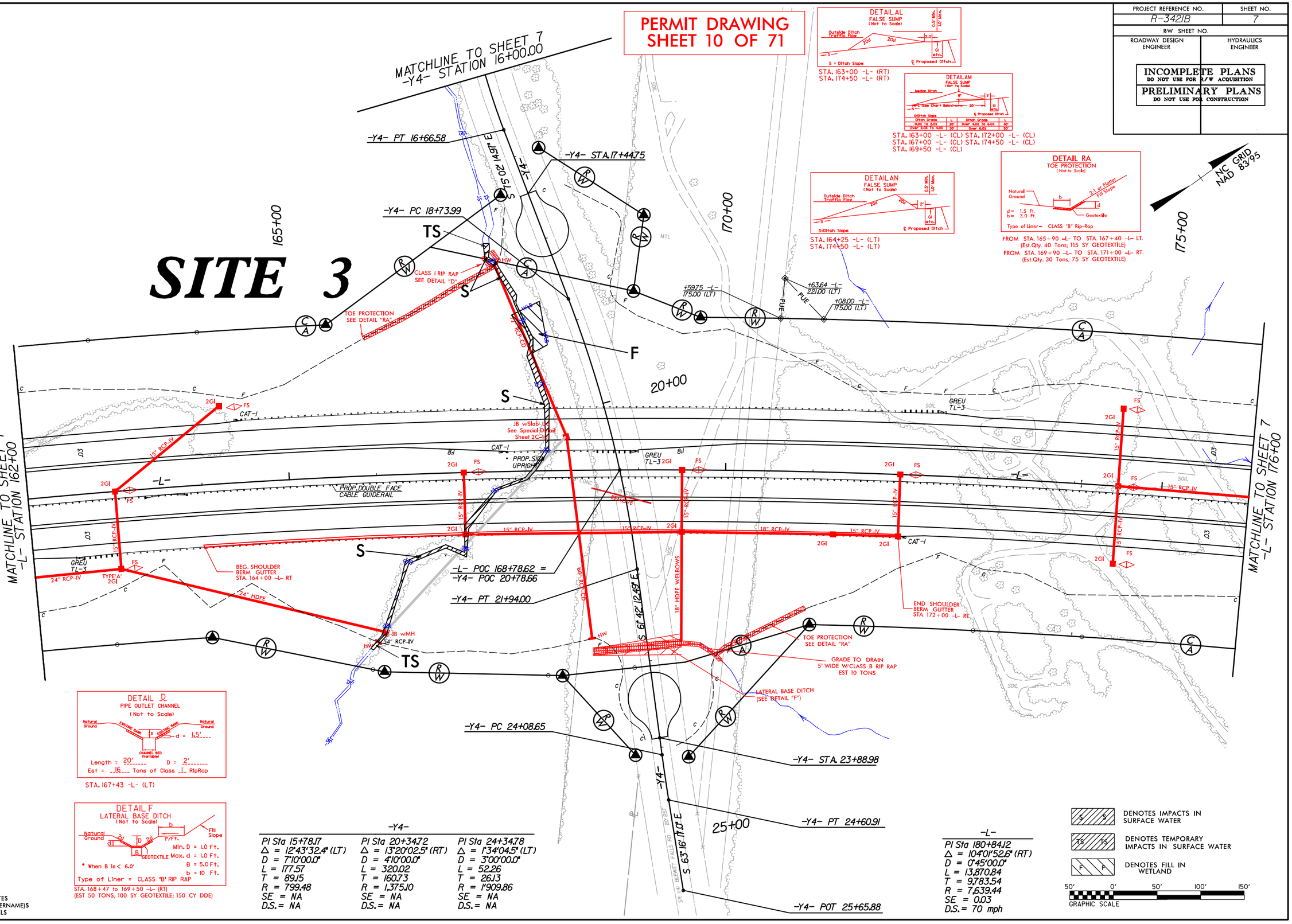
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 10 OF 71

SITE 3



DETAIL AL
FALSE SUMP
(Not to Scale)

Outside Ditch Traffic Flow; 20ft; 20ft; 2.0'; 0.5' Min.; 1.0' Max.; 6' Min.; S = Ditch Slope; ℄ Proposed Ditch

STA. 163+00 -L- (RT)
STA. 174+50 -L- (RT)

DETAIL AM
FALSE SUMP
(Not to Scale)

Median Ditch; 9'; 2'; 20'; 6' Min.; See Chart Below; ℄ Proposed Ditch

S=Ditch Slope

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

STA. 163+00 -L- (CL) STA. 172+00 -L- (CL)
STA. 167+00 -L- (CL) STA. 174+50 -L- (CL)
STA. 169+50 -L- (CL)

DETAIL AN
FALSE SUMP
(Not to Scale)

Outside Ditch Traffic Flow; 20ft; 20ft; 2'; 0.5' Min.; 1.0' Max.; 6' Min.; S=Ditch Slope; ℄ Proposed Ditch

STA. 164+25 -L- (LT)
STA. 174+50 -L- (LT)

DETAIL RA
TOE PROTECTION
(Not to Scale)

Natural Ground; b; d; 2:1 or Flatter Fill Slope; Geotextile

d= 1.5 Ft.
b= 3.0 Ft.

Type of Liner- CLASS "B" Rip-Rap

FROM STA. 165+90 -L- TO STA. 167+40 -L- LT.
(Est.Qty. 40 Tons; 115 SY GEOTEXTILE)
FROM STA. 169+90 -L- TO STA. 171+00 -L- RT.
(Est.Qty. 30 Tons; 75 SY GEOTEXTILE)

DETAIL D
PIPE OUTLET CHANNEL
(Not to Scale)

Natural Ground; EXISTING BANK; D; d = 1.5'; CHANNEL BED (Variable)

Length = 20' D = 2'
Est = 16 Tons of Class I RipRap

STA. 167+43 -L- (LT)

DETAIL F
LATERAL BASE DITCH
(Not to Scale)

Natural Ground; 2%; d; D; 2%; B; GEOTEXTILE; b; 1'/Ft.; Fill Slope

Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
B = 5.0 Ft.
b = 10 Ft.

* When B is < 6.0'

Type of Liner = CLASS "B" RIP RAP

STA. 168+47 to 169+50 -L- (RT)
(EST 50 TONS; 100 SY GEOTEXTILE; 150 CY DDE)

-Y4-

PI Sta 15+78.17	PI Sta 20+34.72	PI Sta 24+34.78
Δ = 12°43'32.4" (LT)	Δ = 13°20'02.5" (RT)	Δ = 1°34'04.5" (LT)
D = 7°10'00.0"	D = 4°10'00.0"	D = 3°00'00.0"
L = 177.57	L = 320.02	L = 52.26
T = 89.15	T = 160.73	T = 26.13
R = 799.48	R = 1,375.10	R = 1'909.86
SE = NA	SE = NA	SE = NA
D.S. = NA	D.S. = NA	D.S. = NA

-L-

PI Sta 180+84.12
Δ = 104°01'52.6" (RT)
D = 0°45'00.0"
L = 13,870.84
T = 9,783.54
R = 7,639.44
SE = 0.03
D.S. = 70 mph

S S — DENOTES IMPACTS IN SURFACE WATER
TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER
F F — DENOTES FILL IN WETLAND

50' 0' 50' 100' 150'
GRAPHIC SCALE

$DATES
$(USERNAME)$
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sg jones

Revised 8/6/19

REVISIONS

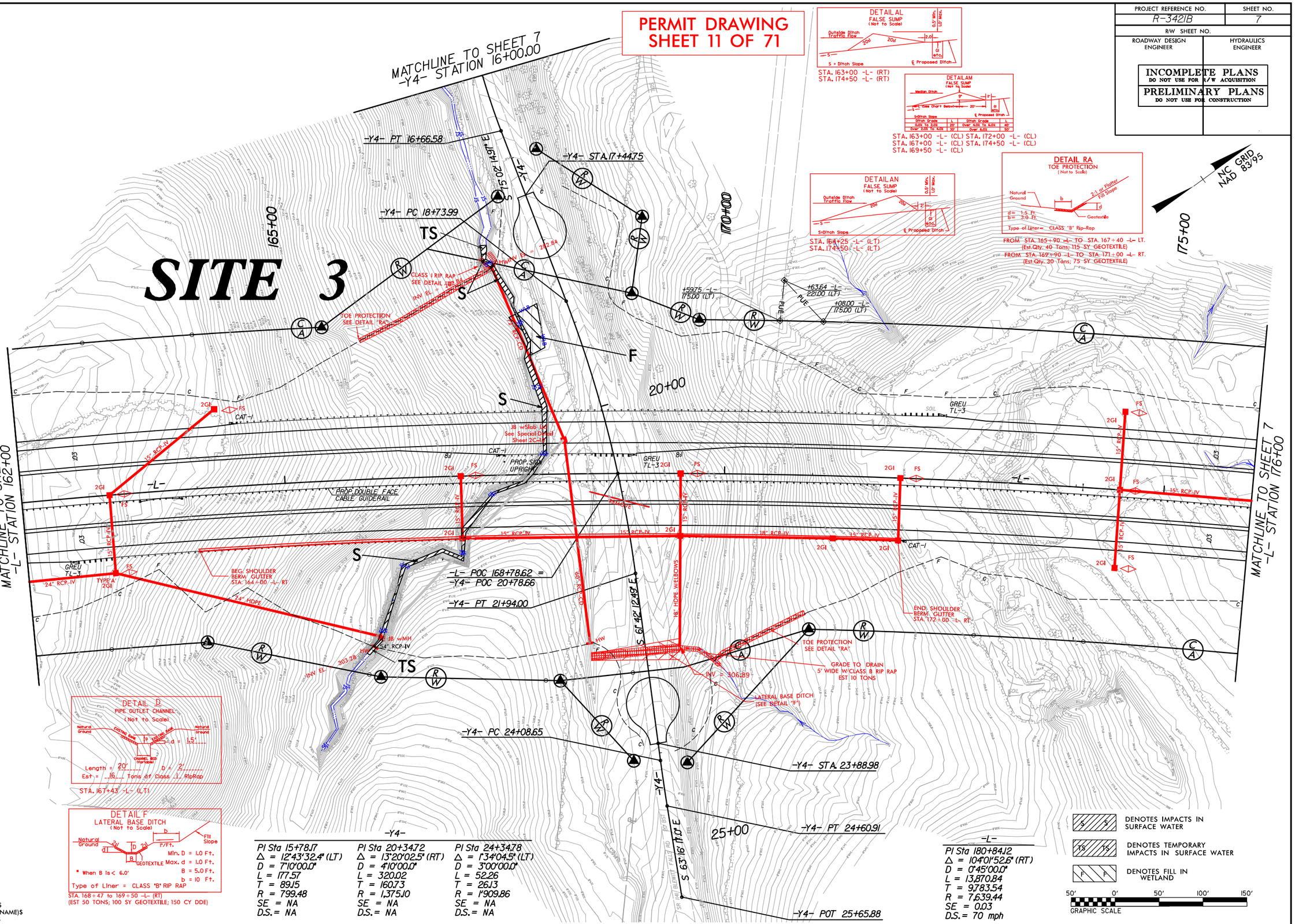
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	7
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 11 OF 71



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Revised 8/6/19

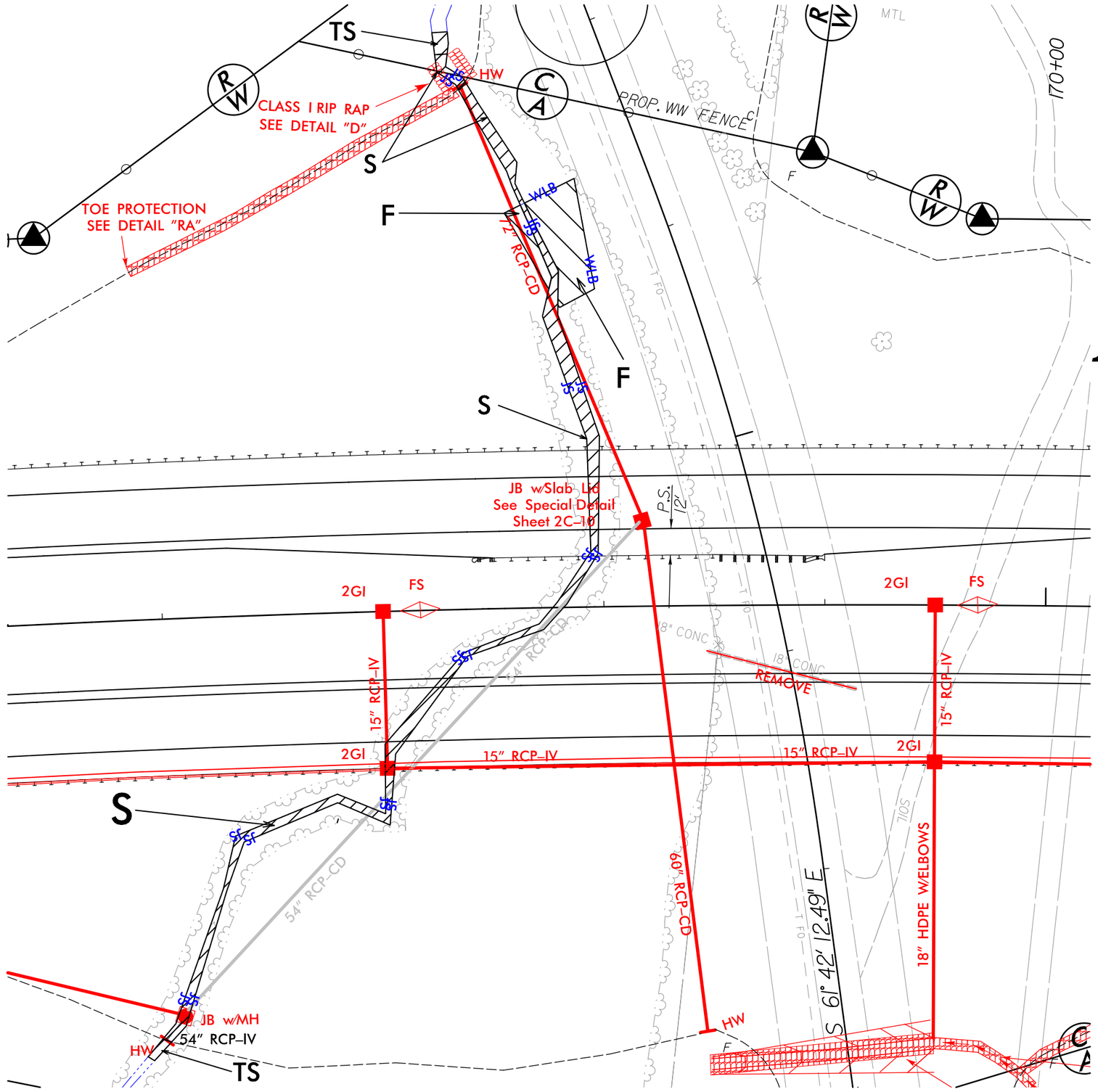
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 12 OF 71

SITE 3 ENLARGEMENT



REVISIONS

8/17/99

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Revised 8/6/19

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

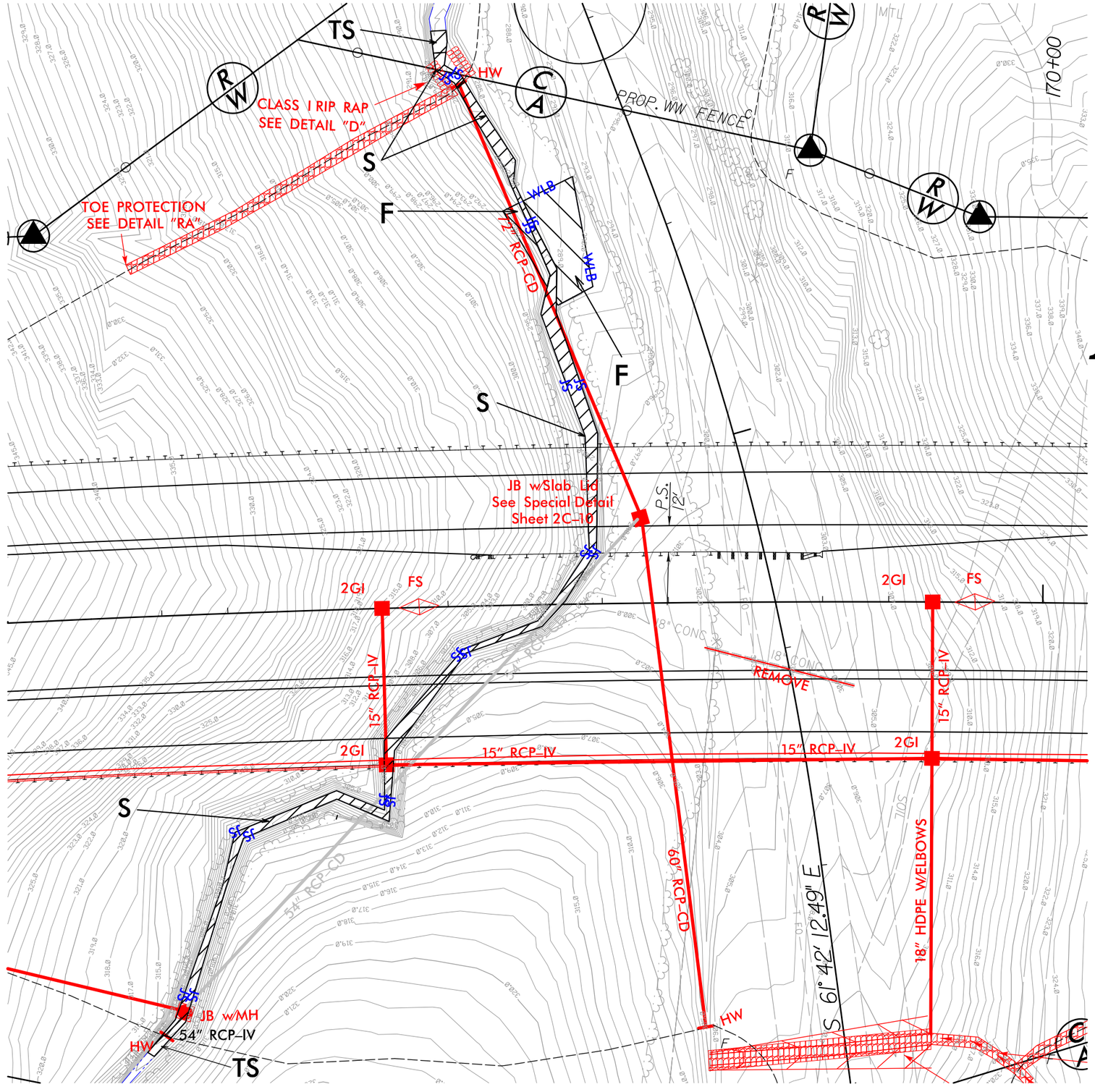
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 13 OF 71

NAD 83

SITE 3 ENLARGEMENT



50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F F DENOTES FILL IN WETLAND

REVISIONS

8/17/99

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sg jones

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8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-63

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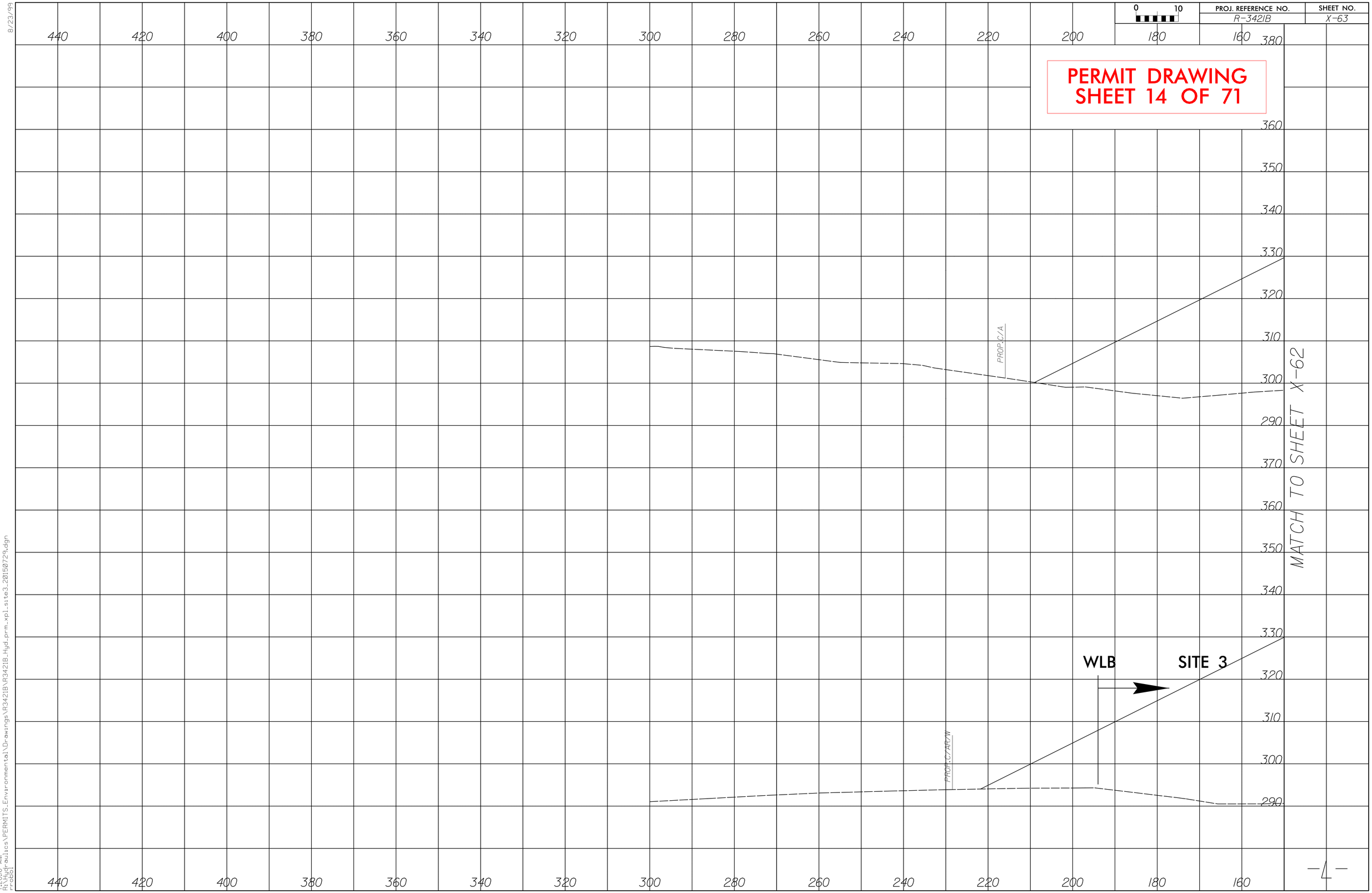
PERMIT DRAWING
SHEET 14 OF 71



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rrobel

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-62

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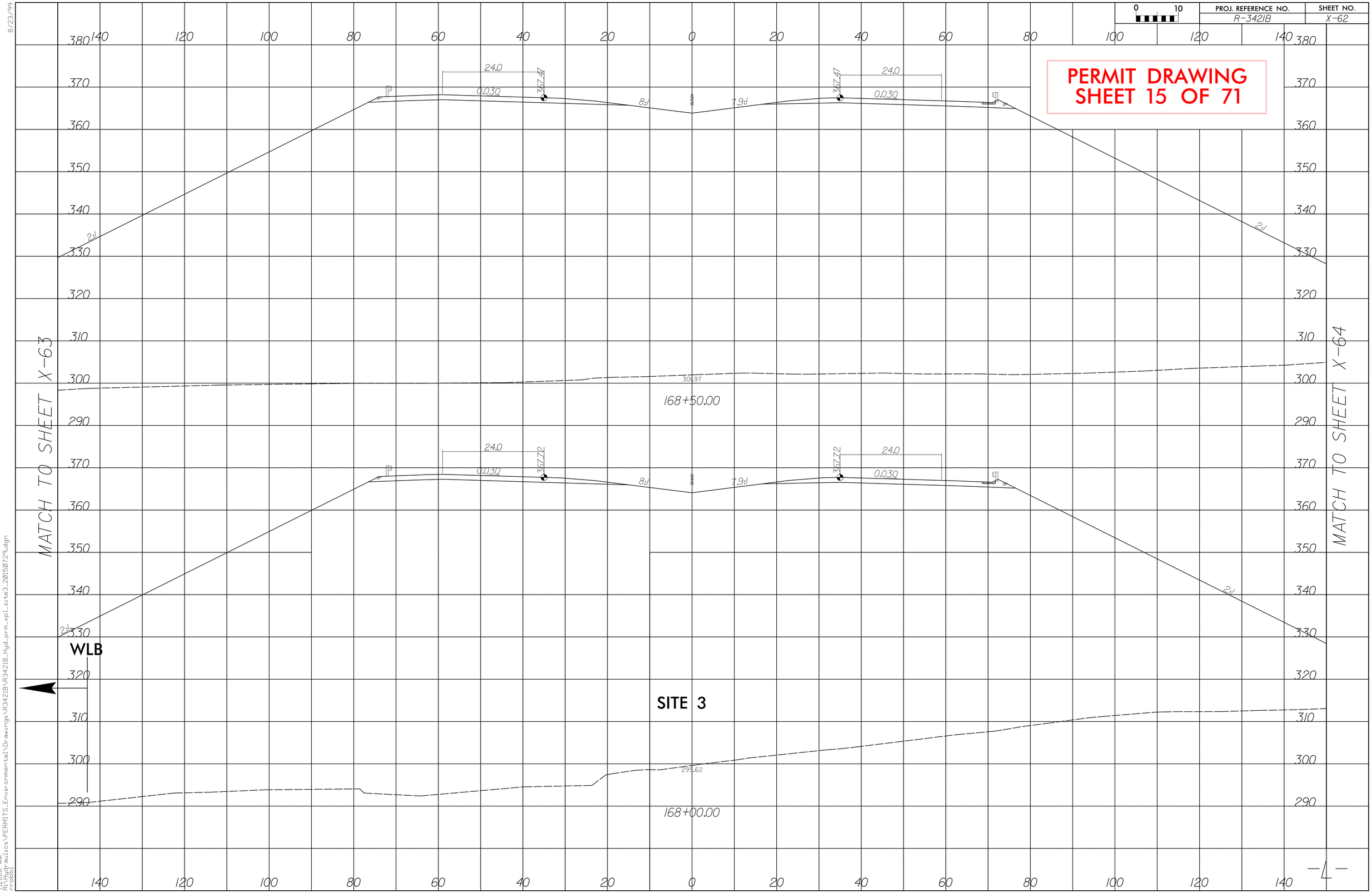
PERMIT DRAWING
SHEET 15 OF 71



PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-64

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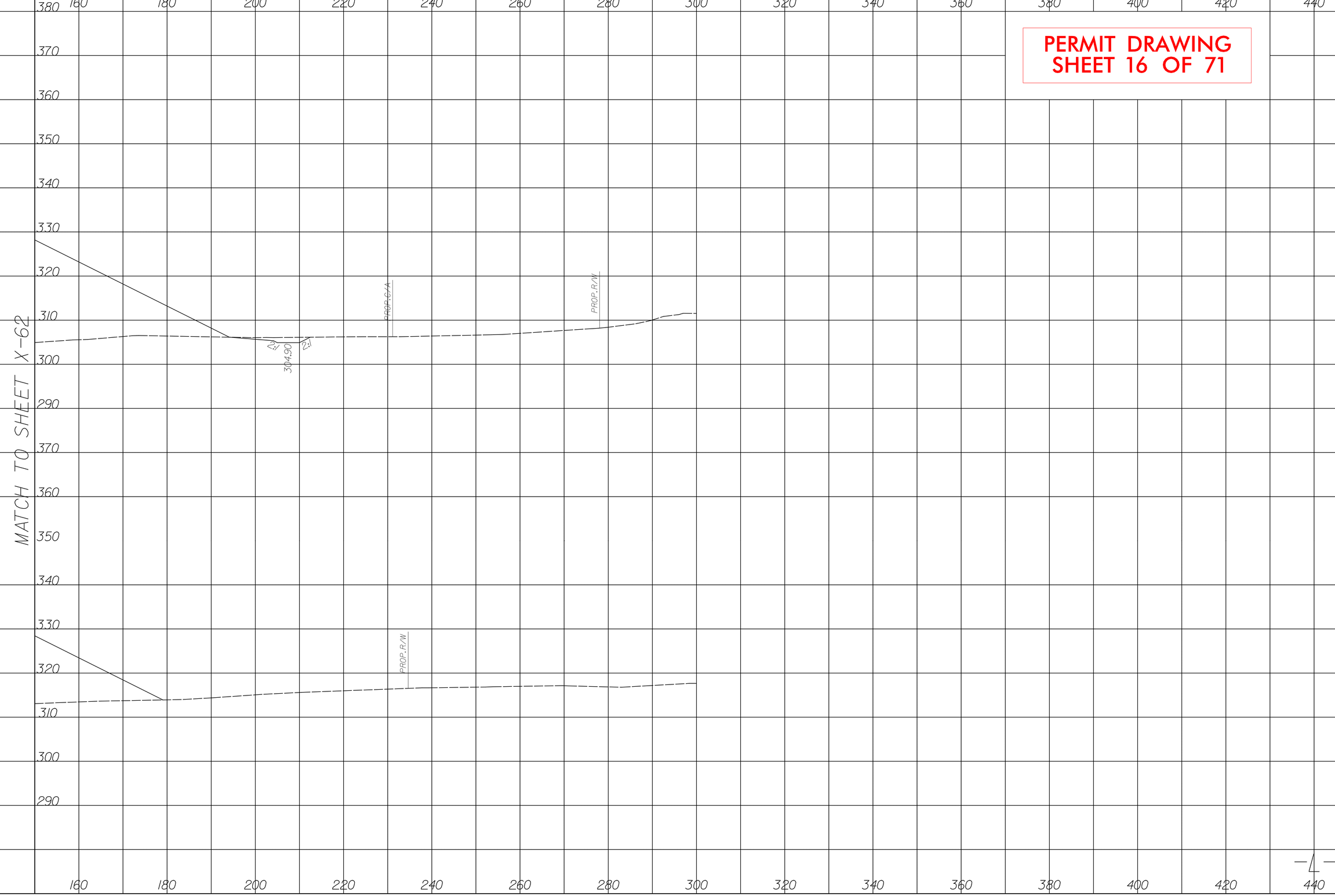
PERMIT DRAWING
SHEET 16 OF 71



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rrebel

Revised 8/6/19

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

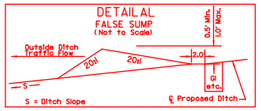
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 17 OF 71

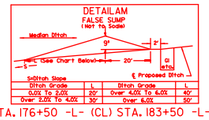
NC GRID NAD 83/95

DETAIL AL
FALSE SUMP
(Not to Scale)



STA. 176+50 -L- (RT) STA. 190+00 -L- (RT)
STA. 183+50 -L- (RT)
STA. 187+00 -L- (RT)

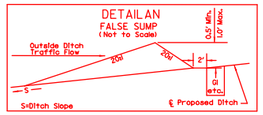
DETAIL AM
FALSE SUMP
(Not To Scale)



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

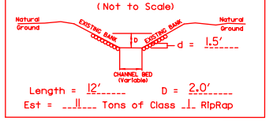
STA. 176+50 -L- (CL) STA. 183+50 -L- (CL)
STA. 179+00 -L- (CL) STA. 187+00 -L- (CL)
STA. 181+00 -L- (CL) STA. 190+00 -L- (CL)

DETAIL AN
FALSE SUMP
(Not to Scale)



STA. 176+50 -L- (LT) STA. 190+00 -L- (LT)
STA. 183+50 -L- (LT)
STA. 187+00 -L- (LT)

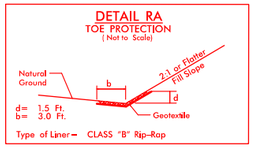
DETAIL G
PIPE OUTLET CHANNEL
(Not to Scale)



Length = 12'
D = 2.0'
Est = 11 Tons of Class I RipRap

STA. 178+71.06 -L- (LT)
STA. 179+59 -L- (RT) -(25' long)

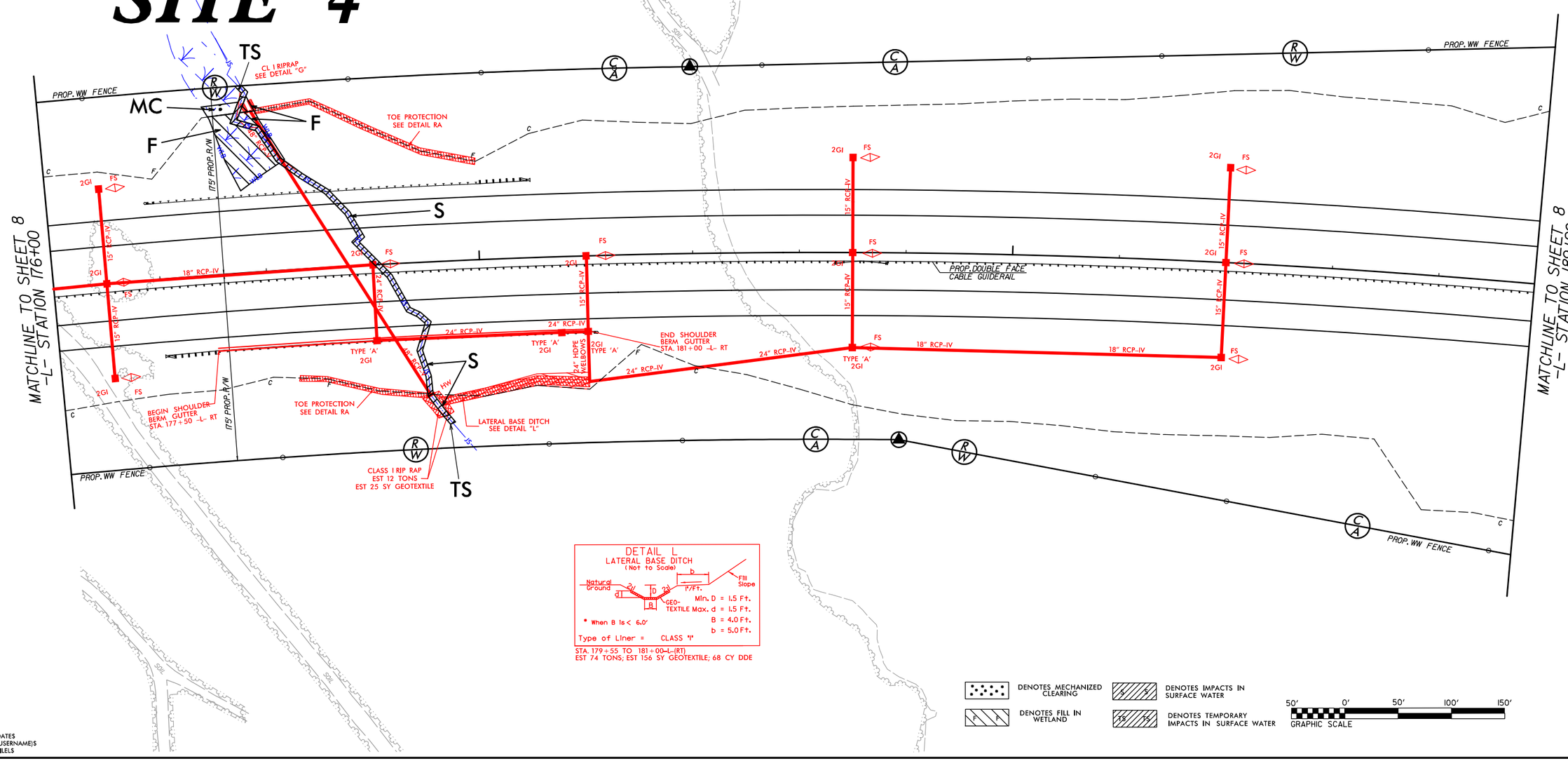
DETAIL RA
TOE PROTECTION
(Not to Scale)



d= 1.5 Ft.
b= 3.0 Ft.
Type of Liner- CLASS "B" Rip-Rap

FROM STA. 178+00 -L- TO STA. 180+00 -L- LT.
(Est.Qty. 70 Tons; 147 SY GEOTEXTILE)
FROM STA. 178+25 -L- TO STA. 179+45 -L- RT.
(Est.Qty. 30 Tons; 84 SY GEOTEXTILE)

SITE 4



DETAIL L
LATERAL BASE DITCH
(Not to Scale)

Min. D = 1.5 Ft.
Max. d = 1.5 Ft.
B = 4.0 Ft.
b = 5.0 Ft.

* When B is < 6.0'

Type of Liner = CLASS "I"

STA. 179+55 TO 181+00-L-(RT)
EST 74 TONS; EST 156 SY GEOTEXTILE; 68 CY DDE

DENOTES MECHANIZED CLEARING
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

9:19:36 AM
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$(USERNAME)$
$FILELS

Revised 8/6/19

REVISIONS

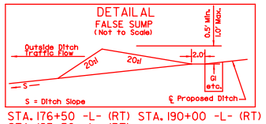
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

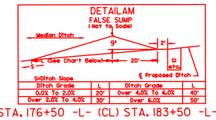
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

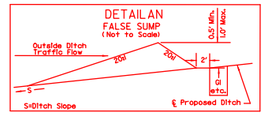
PERMIT DRAWING
SHEET 18 OF 71



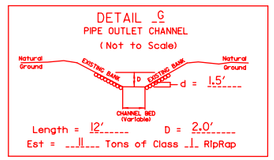
STA. 176+50 -L- (RT) STA. 190+00 -L- (RT)
STA. 183+50 -L- (RT)
STA. 187+00 -L- (RT)



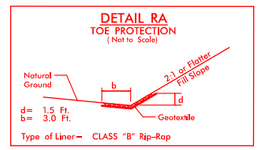
STA. 176+50 -L- (CL) STA. 183+50 -L- (CL)
STA. 179+00 -L- (CL) STA. 187+00 -L- (CL)
STA. 181+00 -L- (CL) STA. 190+00 -L- (CL)



STA. 176+50 -L- (LT) STA. 190+00 -L- (LT)
STA. 183+50 -L- (LT)
STA. 187+00 -L- (LT)



STA. 178+71.06 -L- (LT)
STA. 179+59 -L- (RT) -(25' long)



FROM STA. 178+00 -L- TO STA. 180+00 -L- LT.
(Est.Qty. 70 Tons; 147 SY GEOTEXTILE)
FROM STA. 178+25 -L- TO STA. 179+45 -L- RT.
(Est.Qty. 30 Tons; 84 SY GEOTEXTILE)

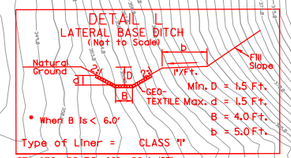
NC GRID NAD 83/95

SITE 4

180+00

185+00

TS
CL I RIPRAP SEE DETAIL "G"
MC
F
TOE PROTECTION SEE DETAIL RA
PROP. WW FENCE
175' PROP. R/W
S
2GI
FS
15" RCP-IV
18" RCP-IV
24" RCP-IV
24" HDPE
TYPE 'A' 2GI
PROP. DOUBLE FACE CABLE GUIDERAIL
END SHOULDER BERM GUTTER STA. 181+00 -L- RT
BEGIN SHOULDER BERM GUTTER STA. 177+50 -L- RT
LATERAL BASE DITCH SEE DETAIL "L"
CLASS I RIP RAP EST 12 TONS EST 25 SY GEOTEXTILE
MATCHLINE TO SHEET 8 -L- STATION 176+00
MATCHLINE TO SHEET 8 -L- STATION 189+90



STA. 179+55 TO 181+00-L-(RT)
EST 74 TONS; EST 156 SY GEOTEXTILE; 68 CY DDE

DENOTES MECHANIZED CLEARING
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

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SITE 4 ENLARGEMENT

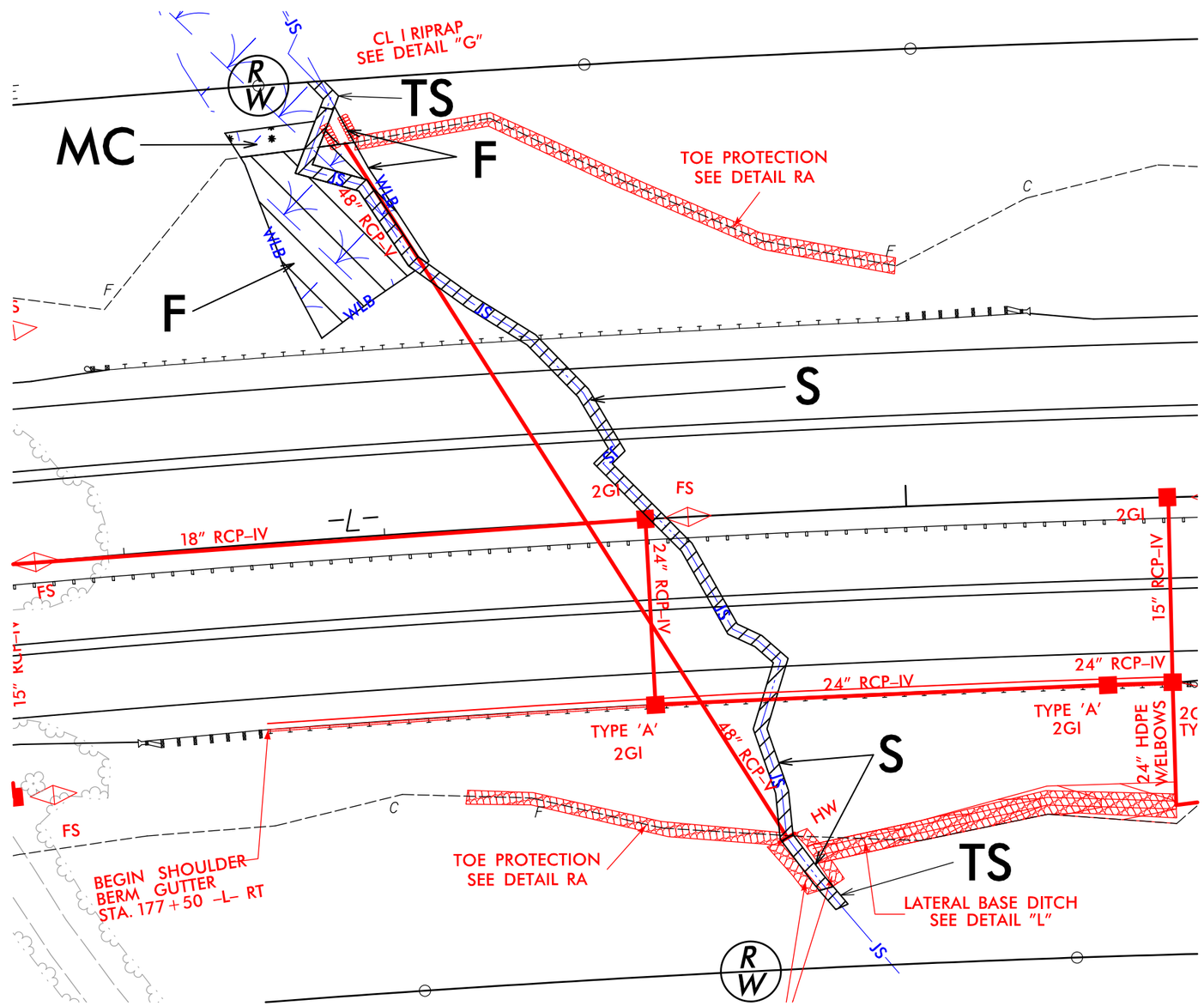
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 19 OF 71

NC GRID NAD 83/95



50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

F F DENOTES FILL IN WETLAND

Revised 8/6/19

REVISIONS

8/17/99

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SITE 4 ENLARGEMENT

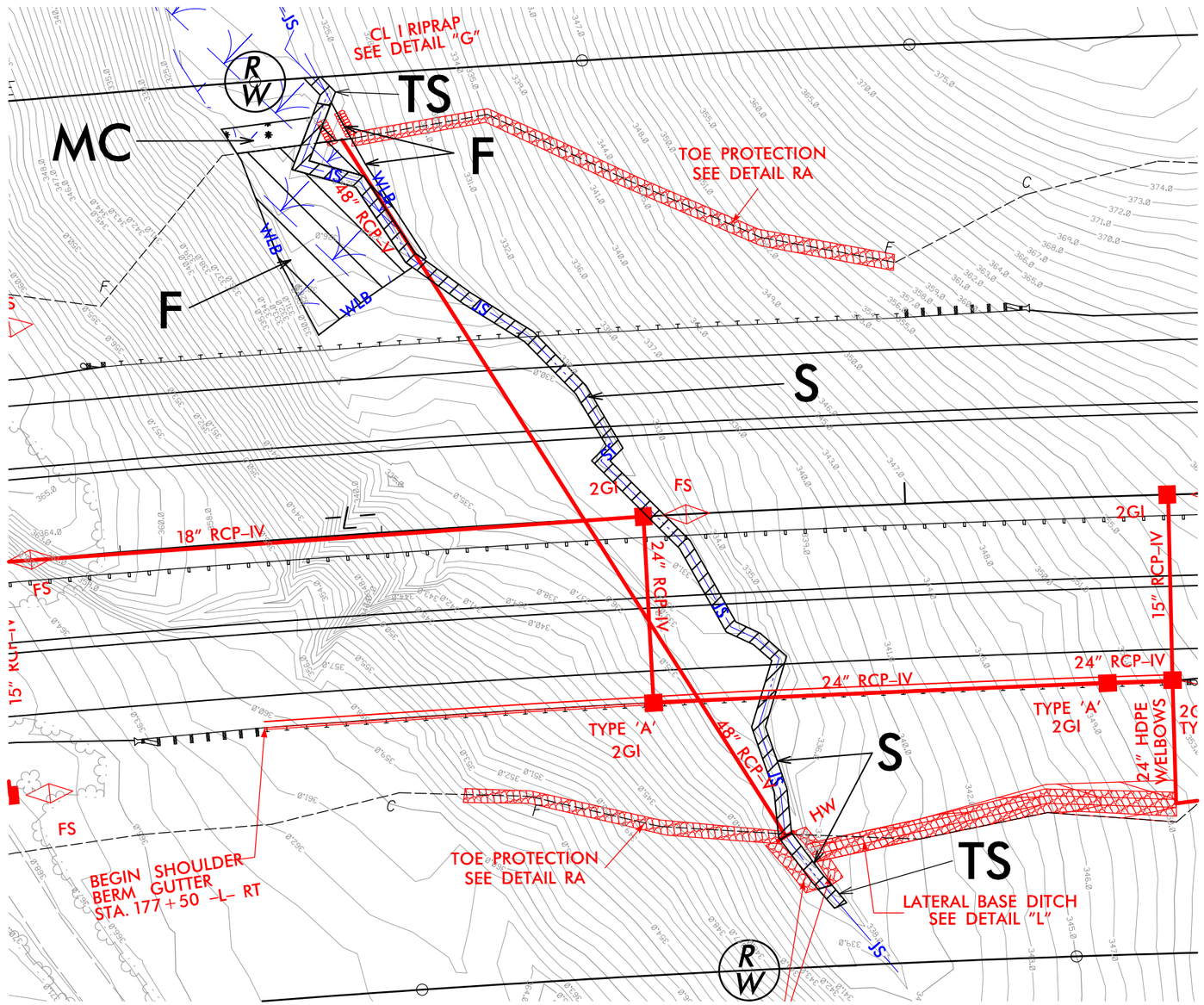
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 20 OF 71

NC GRID NAD 83/95



50' 0' 50'
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

Revised 8/6/19

REVISIONS

8/17/99

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PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-73

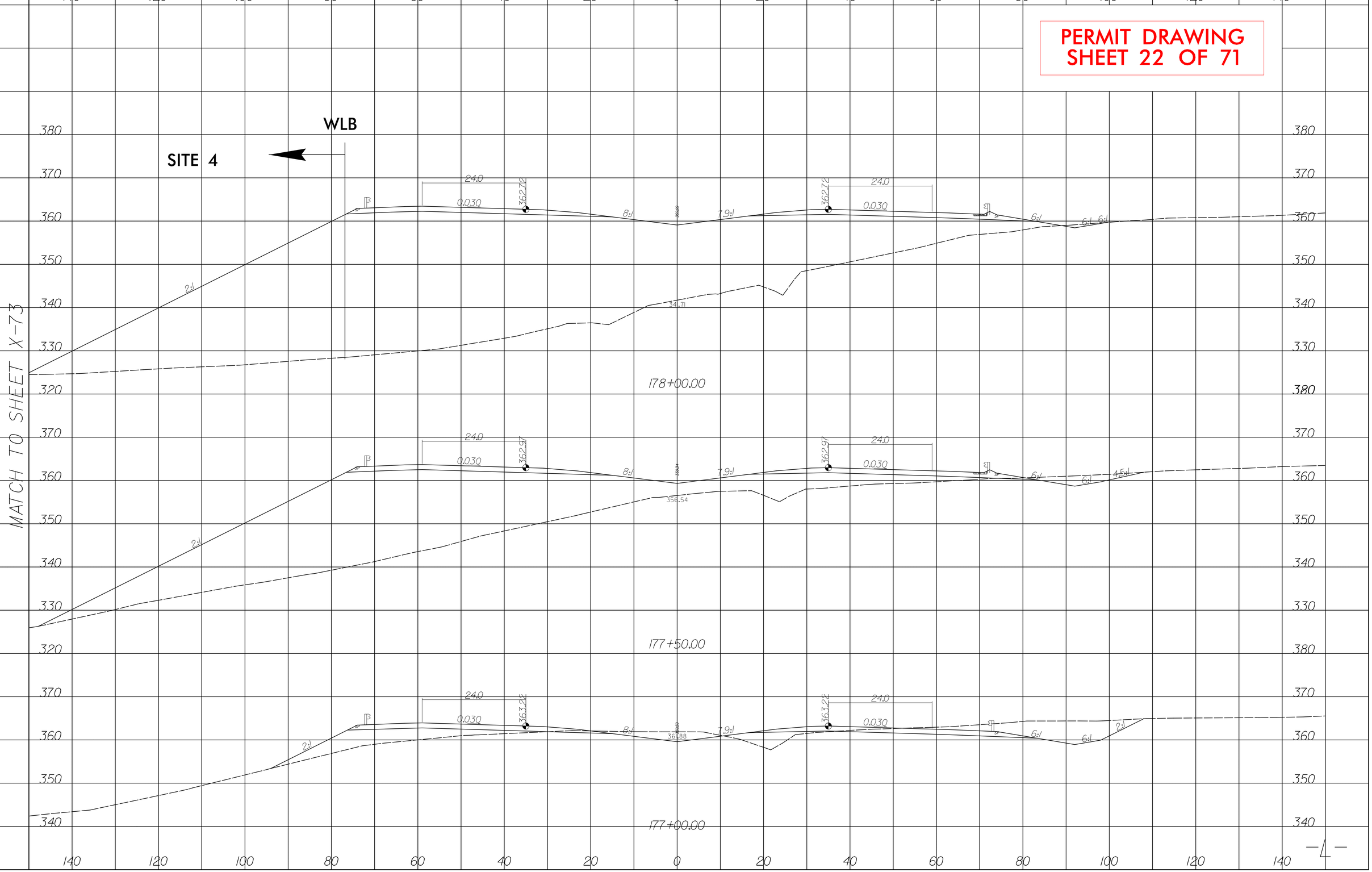
0 10

PERMIT DRAWING
SHEET 21 OF 71

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-72

0 10

PERMIT DRAWING
SHEET 22 OF 71

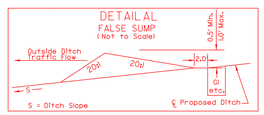


PROJECT REFERENCE NO.	SHEET NO.
R-3421B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

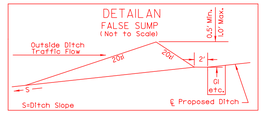
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

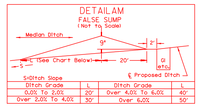
PERMIT DRAWING
SHEET 23 OF 71



STA. 205+00 -L- (RT)
STA. 211+50 -L- (RT)

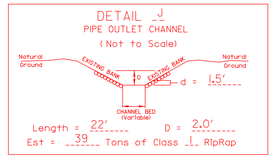


STA. 205+00-L- (LT)
STA. 211+50 -L- (LT)

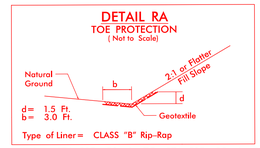


S=Ditch Slope		Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

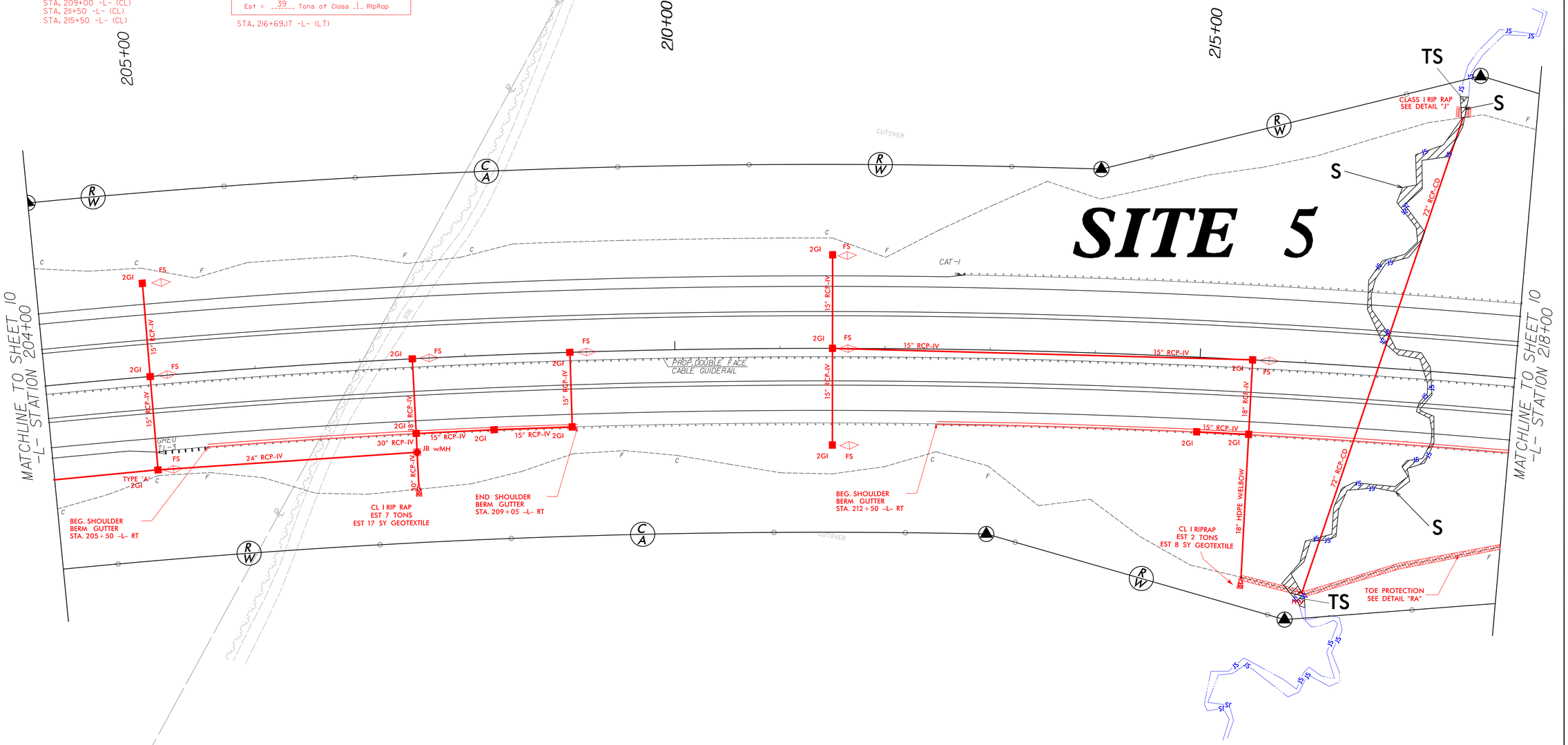
STA. 205+00 -L- (CL)
STA. 209+00 -L- (CL)
STA. 211+50 -L- (CL)
STA. 215+50 -L- (CL)



STA. 216+69.17 -L- (LT)



FROM STA. 215+50 -L- TO STA. 218+00 -L- RT.
(Est.Qty. 70 Tons; 170 SY GEOTEXTILE)



S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

8/17/99

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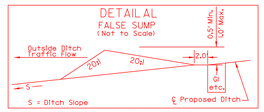
rrobb

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

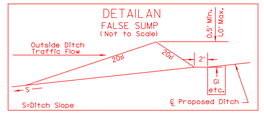
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

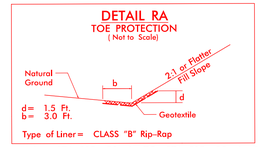
PERMIT DRAWING
SHEET 24 OF 71



STA. 205+00 -L- (RT)
STA. 211+50 -L- (RT)

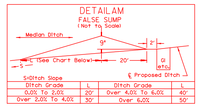


STA. 205+00-L- (LT)
STA. 211+50 -L- (LT)



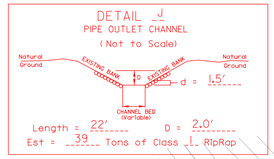
Type of Liner= CLASS "B" Rip-Rap

FROM STA. 215+50 -L- TO STA. 218+00 -L- RT.
(Est.Qty. 70 Tons; 170 SY GEOTEXTILE)



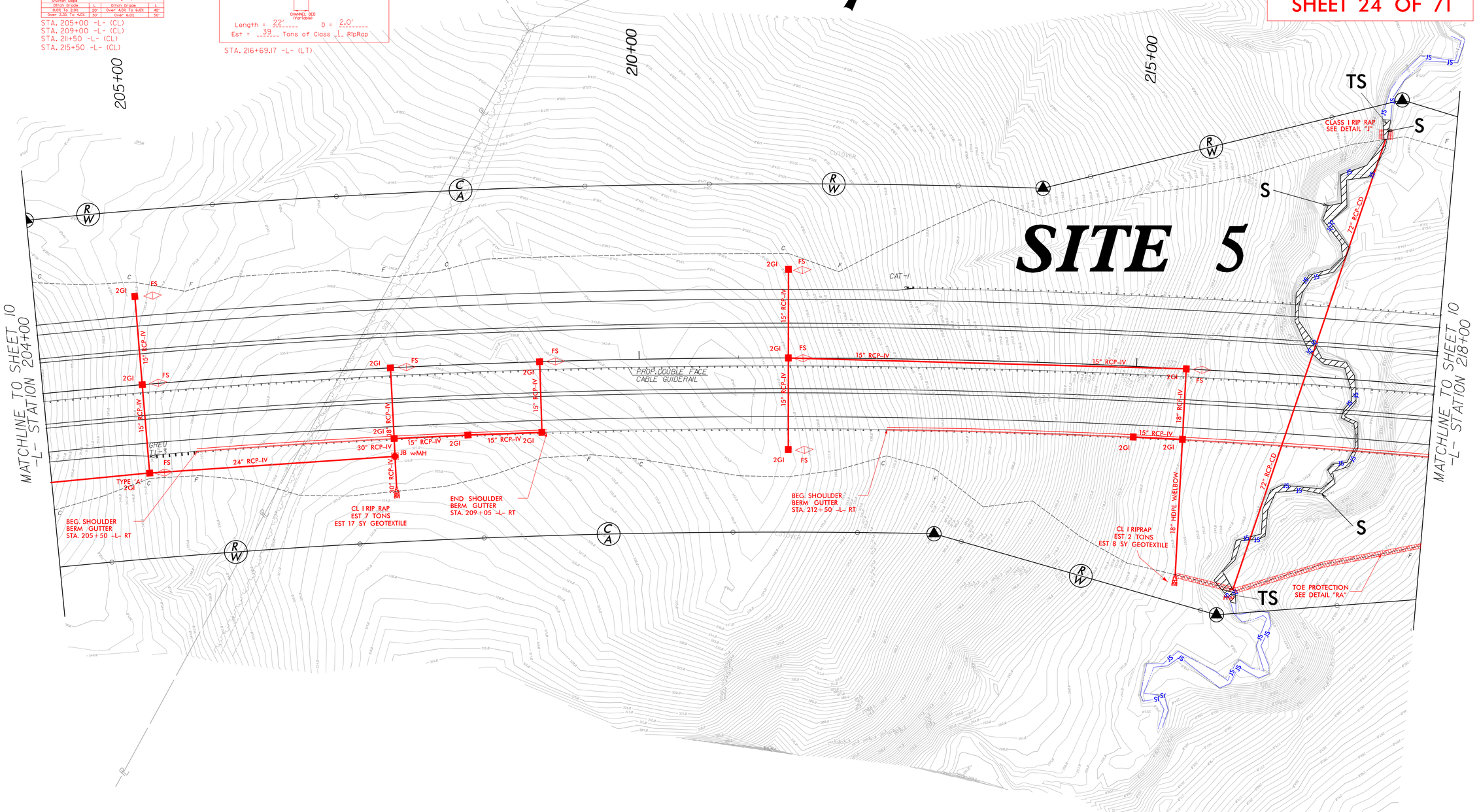
Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 205+00 -L- (CL)
STA. 209+00 -L- (CL)
STA. 211+50 -L- (CL)
STA. 215+50 -L- (CL)



Length = 22' D = 2.0'
Est = 39 Tons of Class I RipRap

STA. 216+69.17 -L- (LT)



S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 100' 150'
GRAPHIC SCALE

REVISIONS

8/17/99

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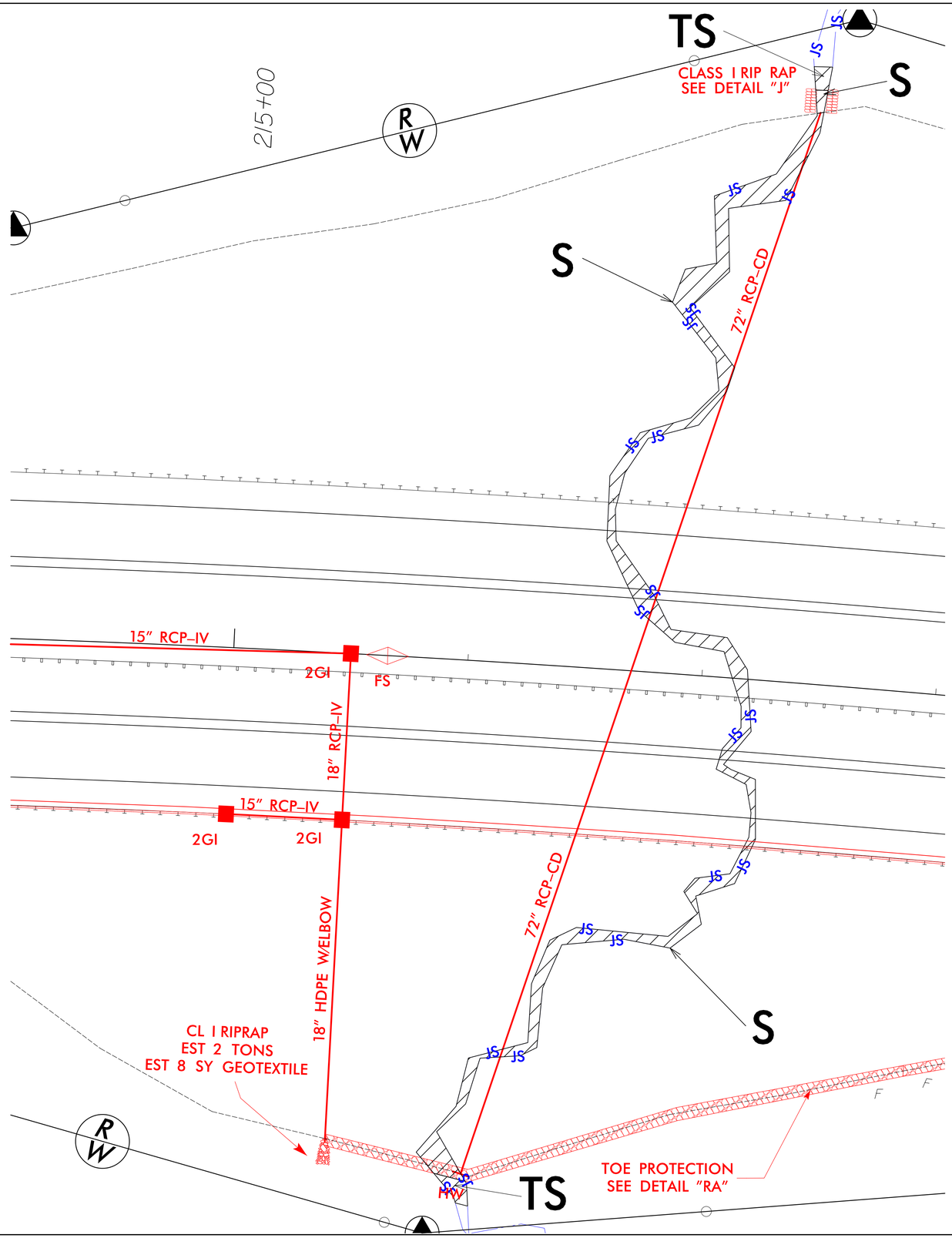
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 25 OF 71

SITE 5 ENLARGEMENT



NC GRID NAD 83/95

50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-3421B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

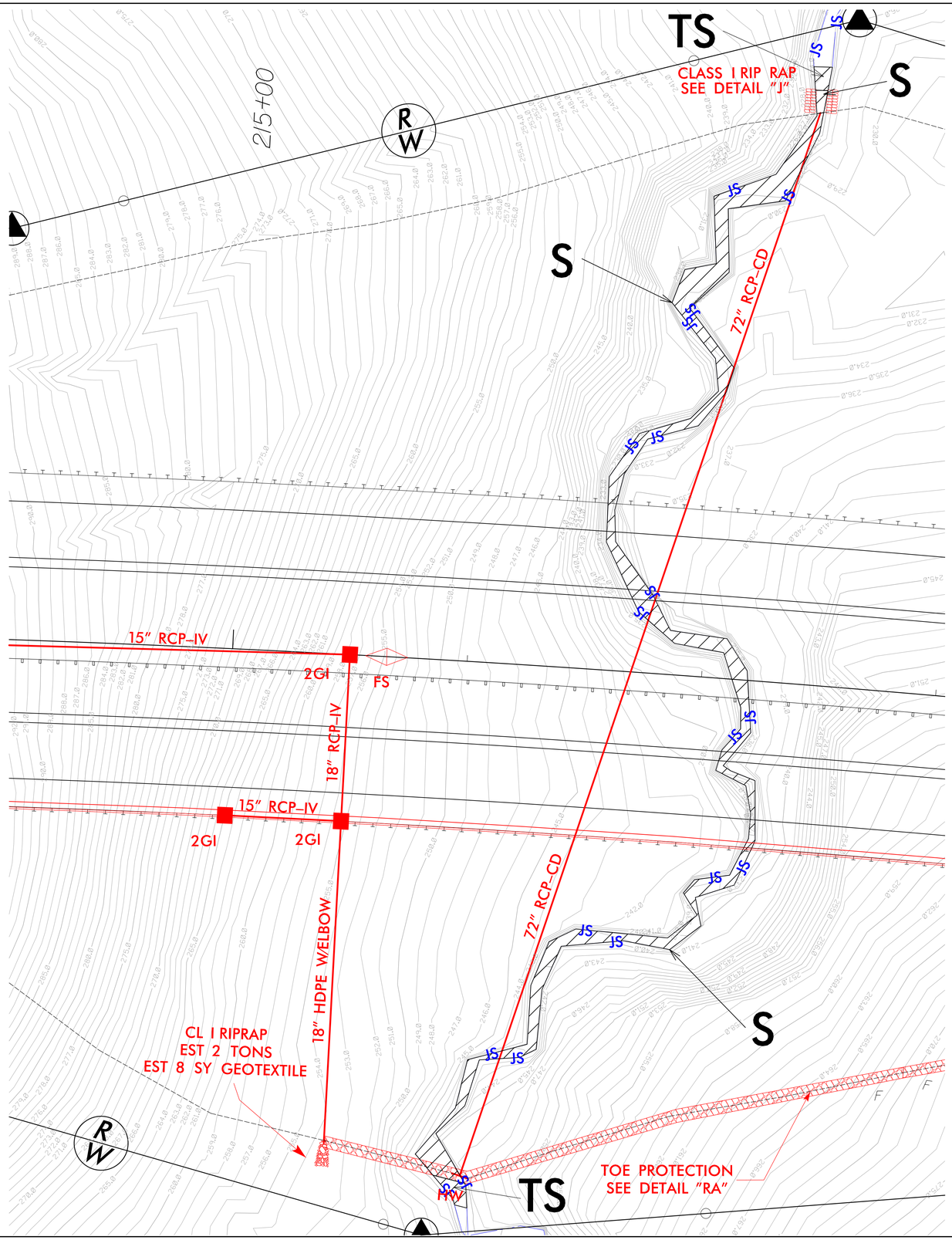
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 26 OF 71

NC GRID NAD 83/95

SITE 5 ENLARGEMENT



50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

$DATE$
$(USERNAME)$
$FILEL$

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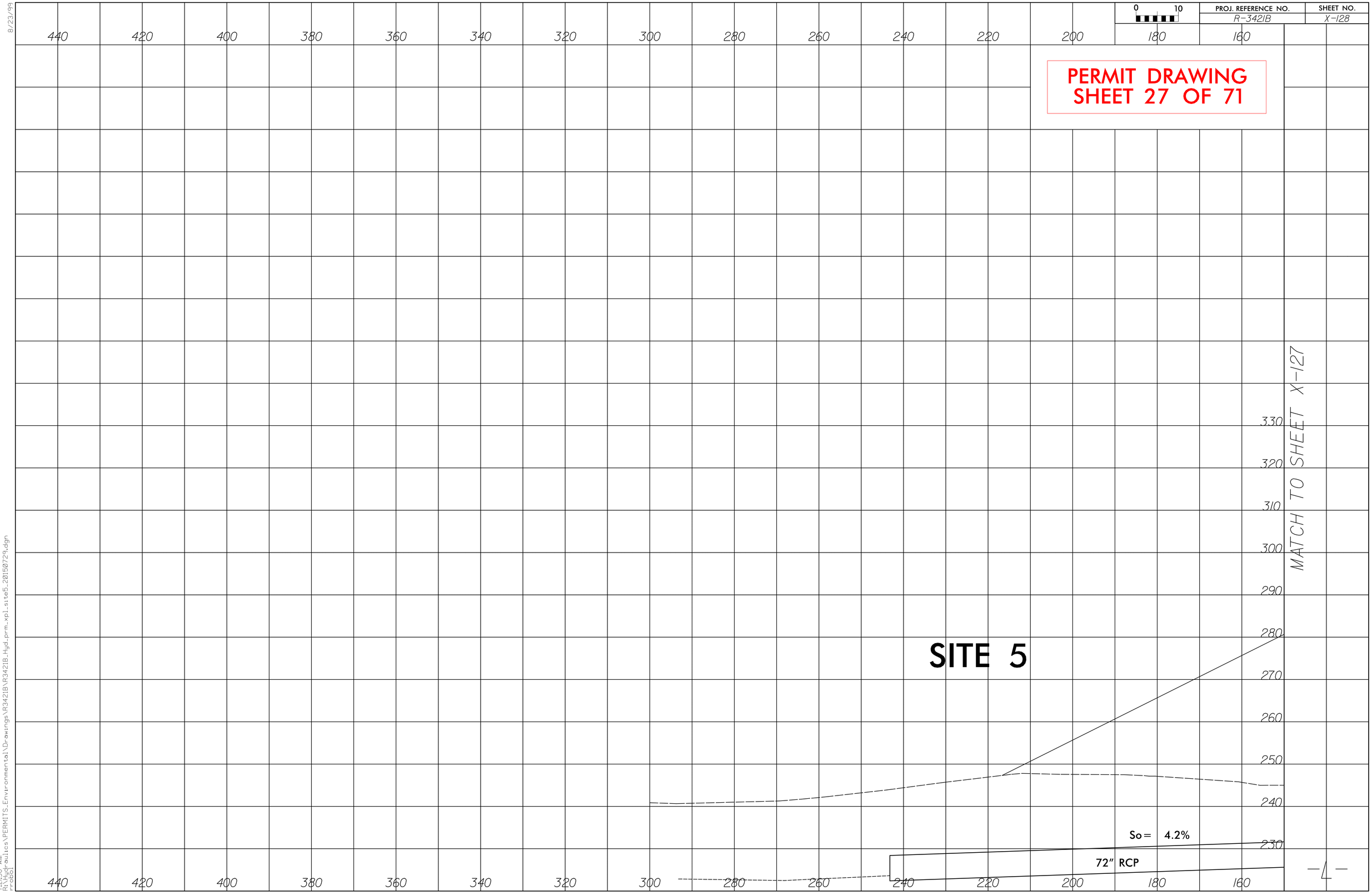

8/23/99

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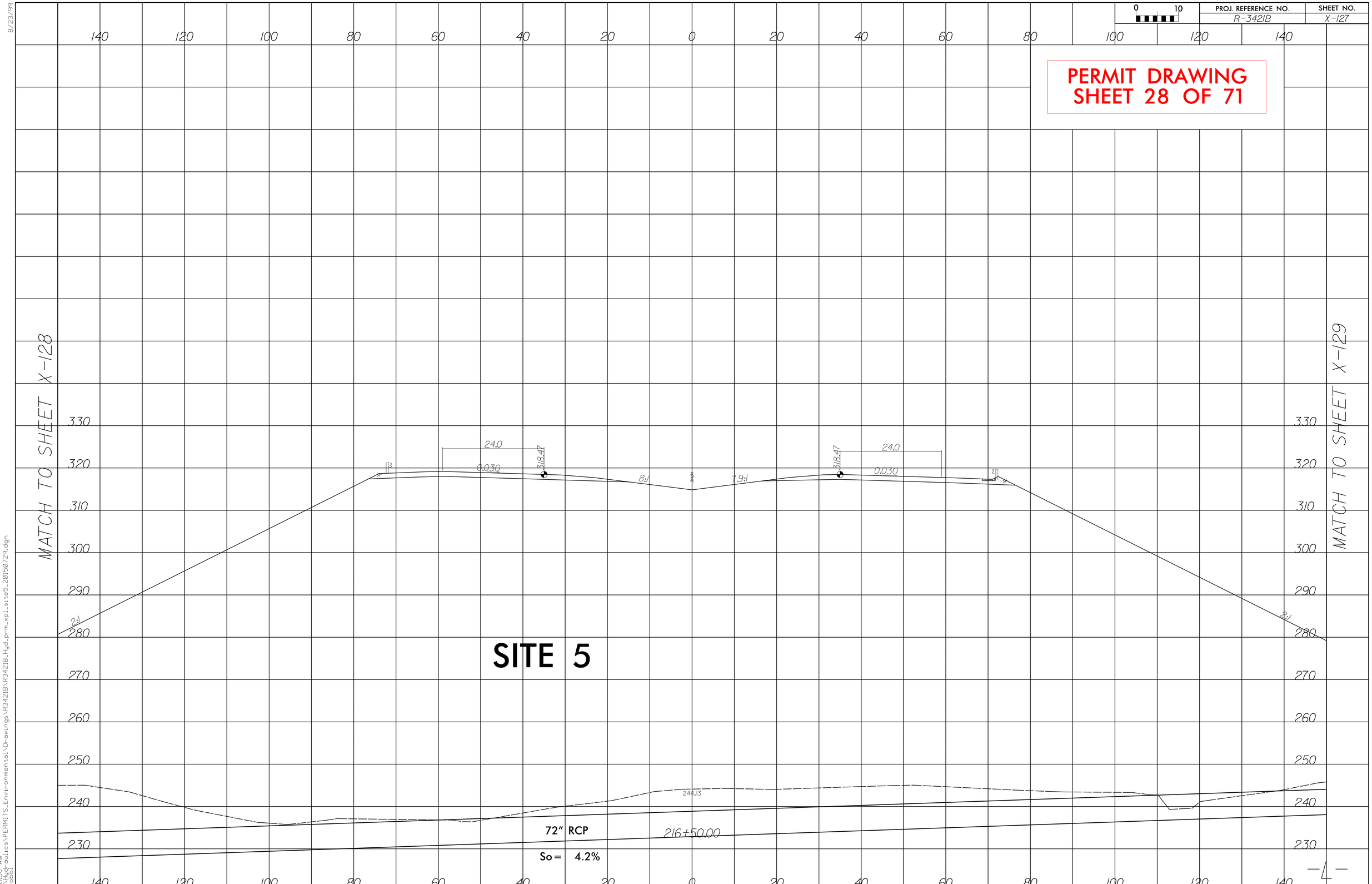
rrobol

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-127

0 10

PERMIT DRAWING
SHEET 28 OF 71



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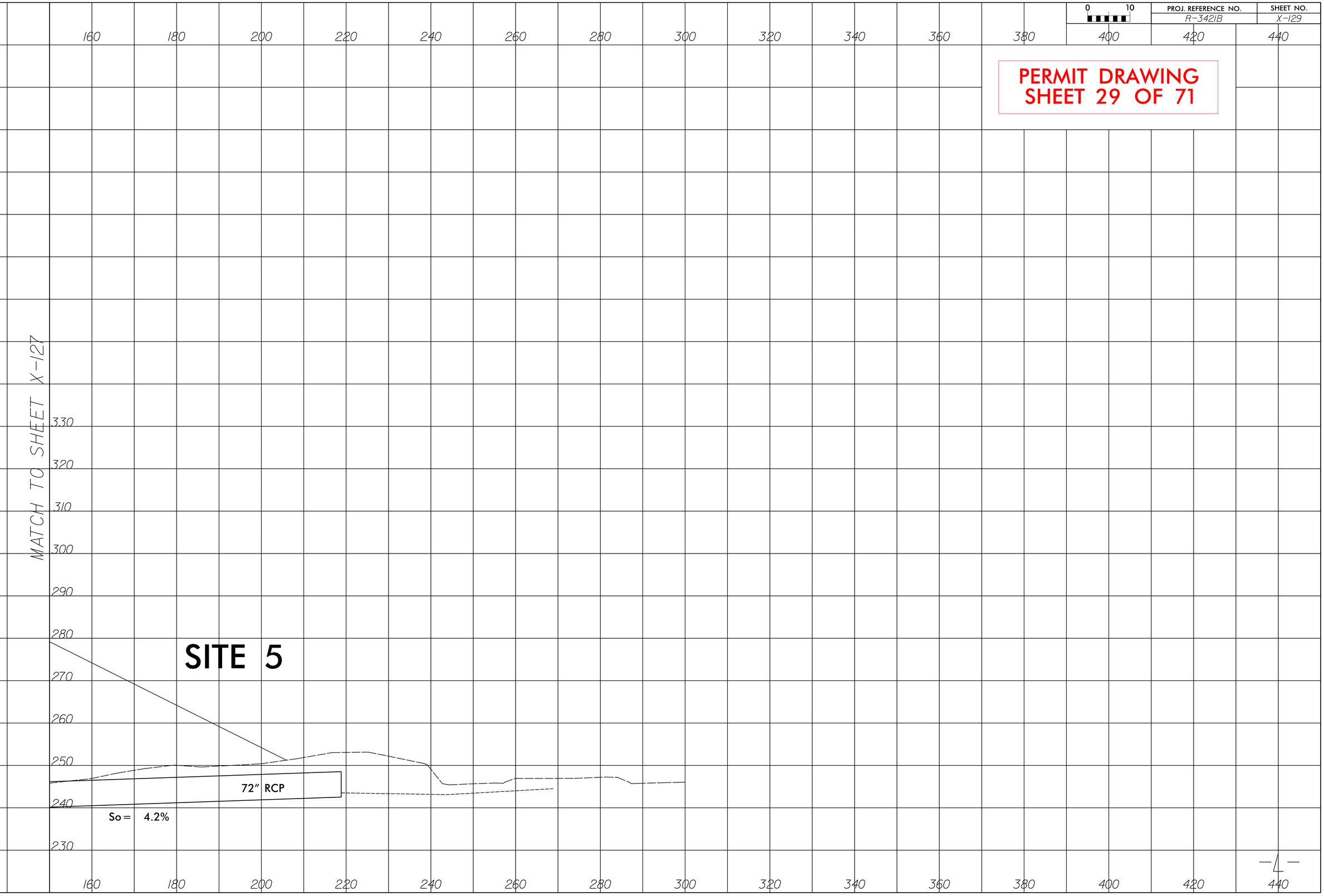
rrobbi

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-129

PERMIT DRAWING
SHEET 29 OF 71

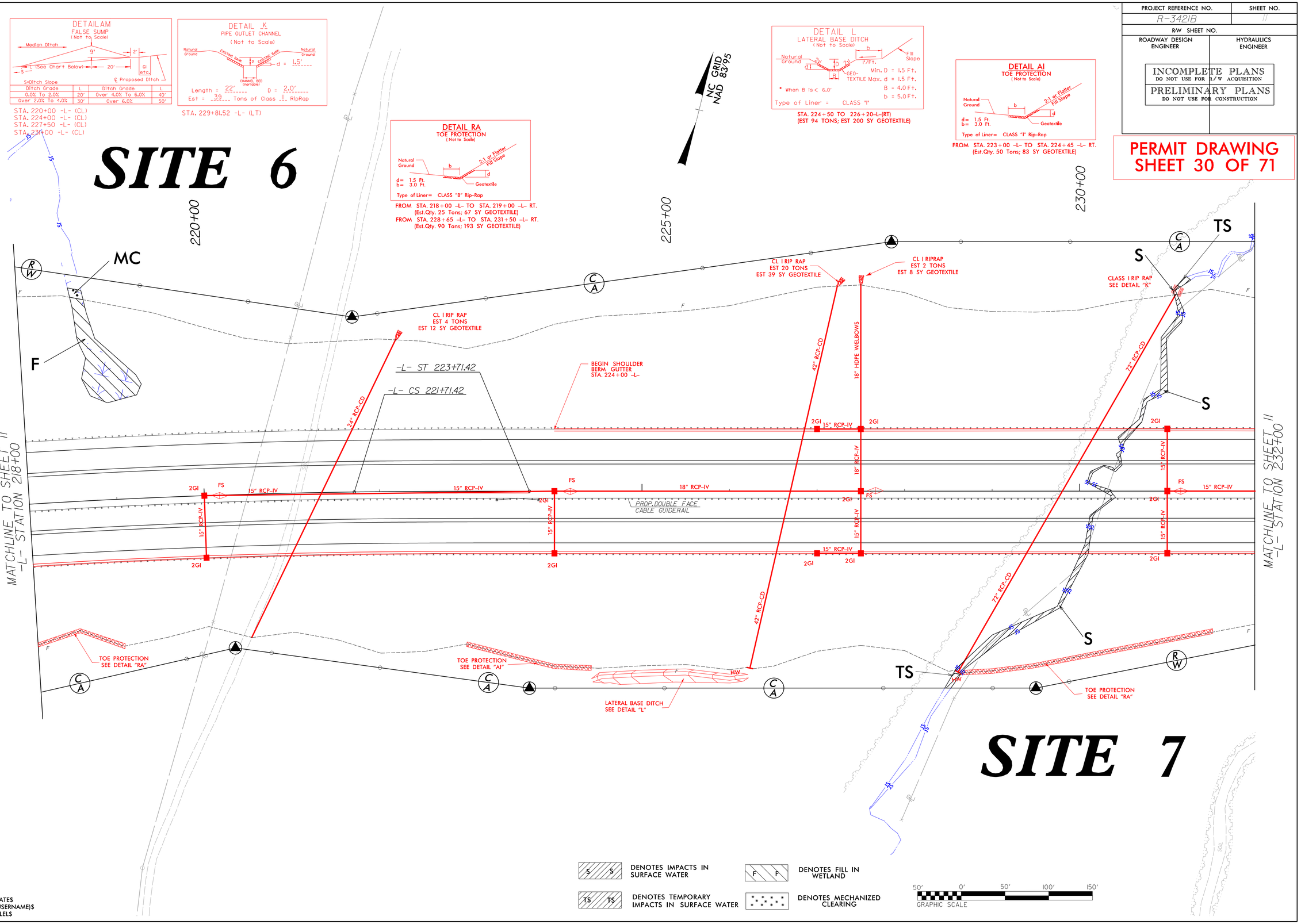


PROJECT REFERENCE NO.	SHEET NO.
R-3421B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 30 OF 71



REVISIONS

8/17/99

$DATE$
$(USERNAME)$
$FILEL$

7:21:42 AM
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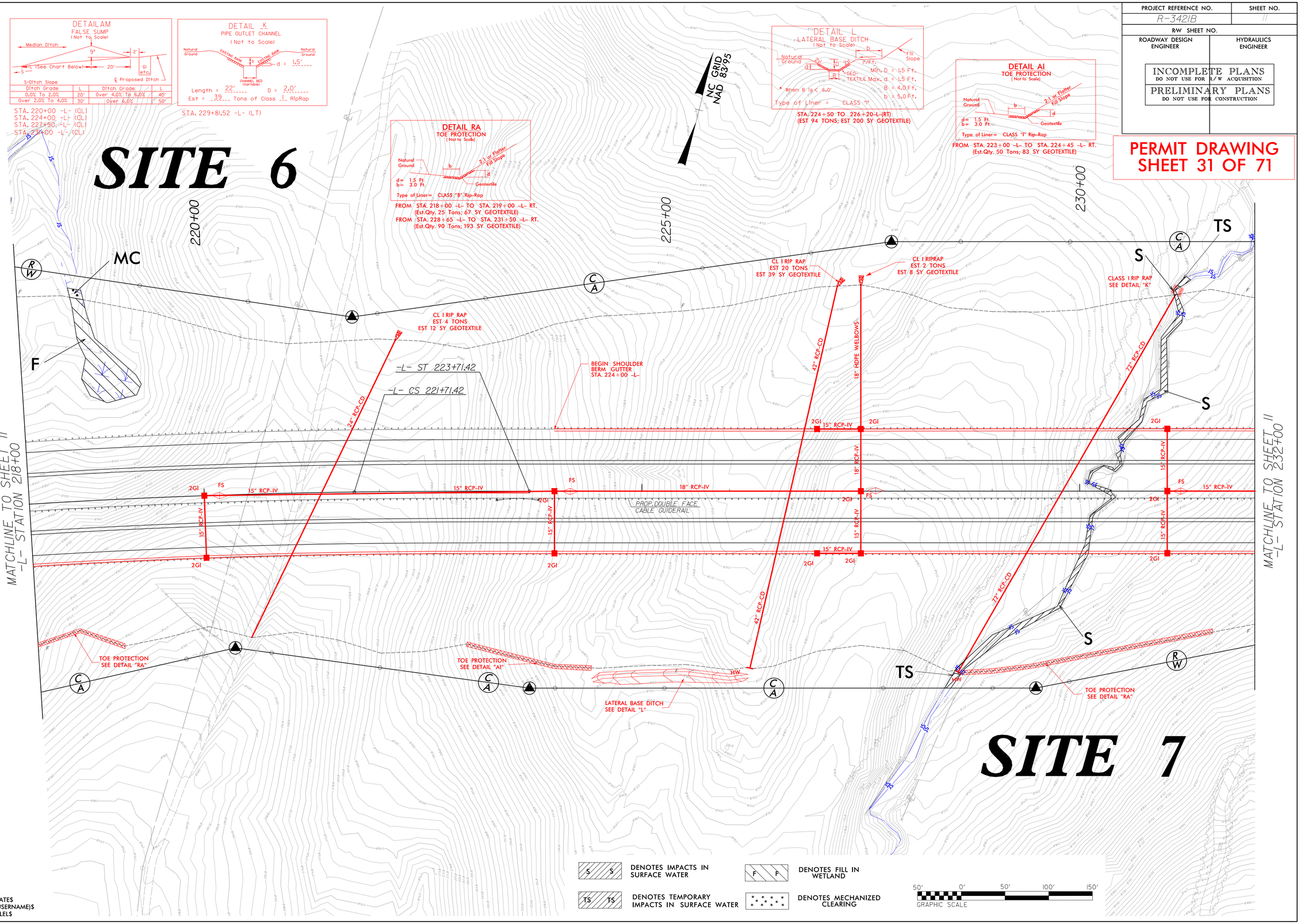
rrcobb

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 31 OF 71



REVISIONS

8/17/99

$DATE$
$(USERNAME)$
$FILEL$

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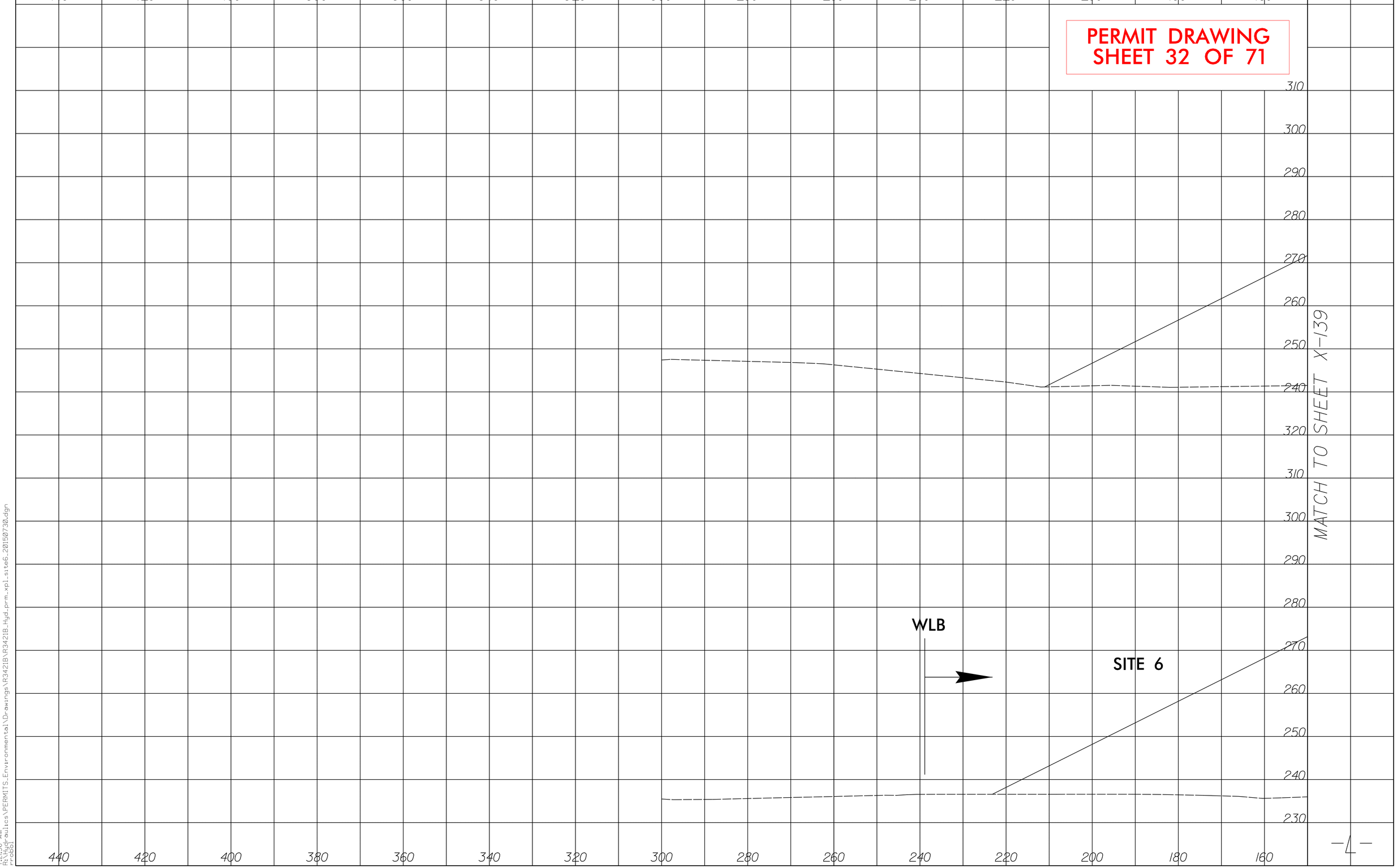
r-proj

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-140

0 10

PERMIT DRAWING
SHEET 32 OF 71



8/23/99

SDATE
SUSER
SNAME$
SFILES

7:21:56 AM
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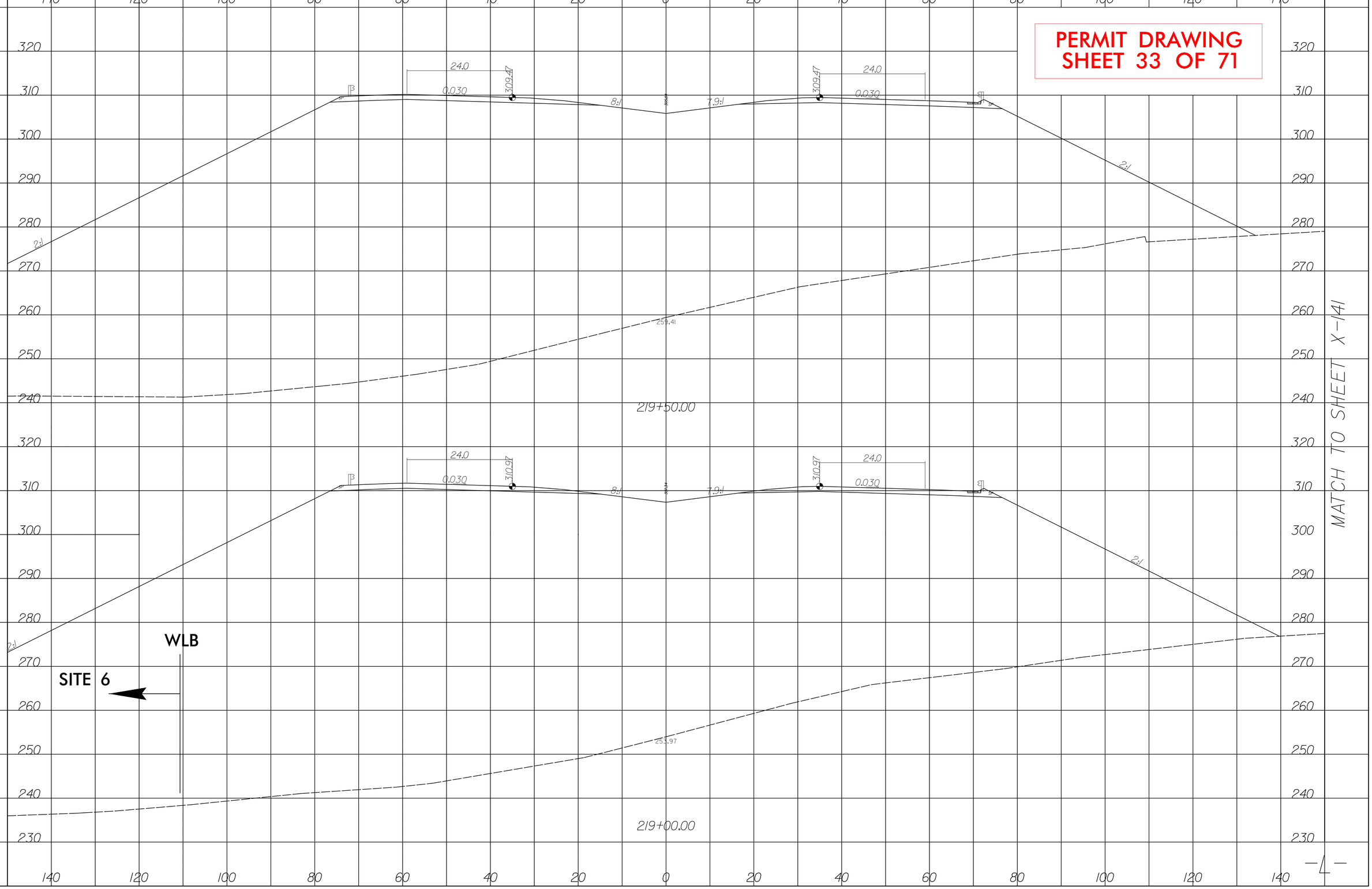
rrobol

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-139

0 10

PERMIT DRAWING
SHEET 33 OF 71



PROJECT REFERENCE NO.	SHEET NO.
R-3421B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

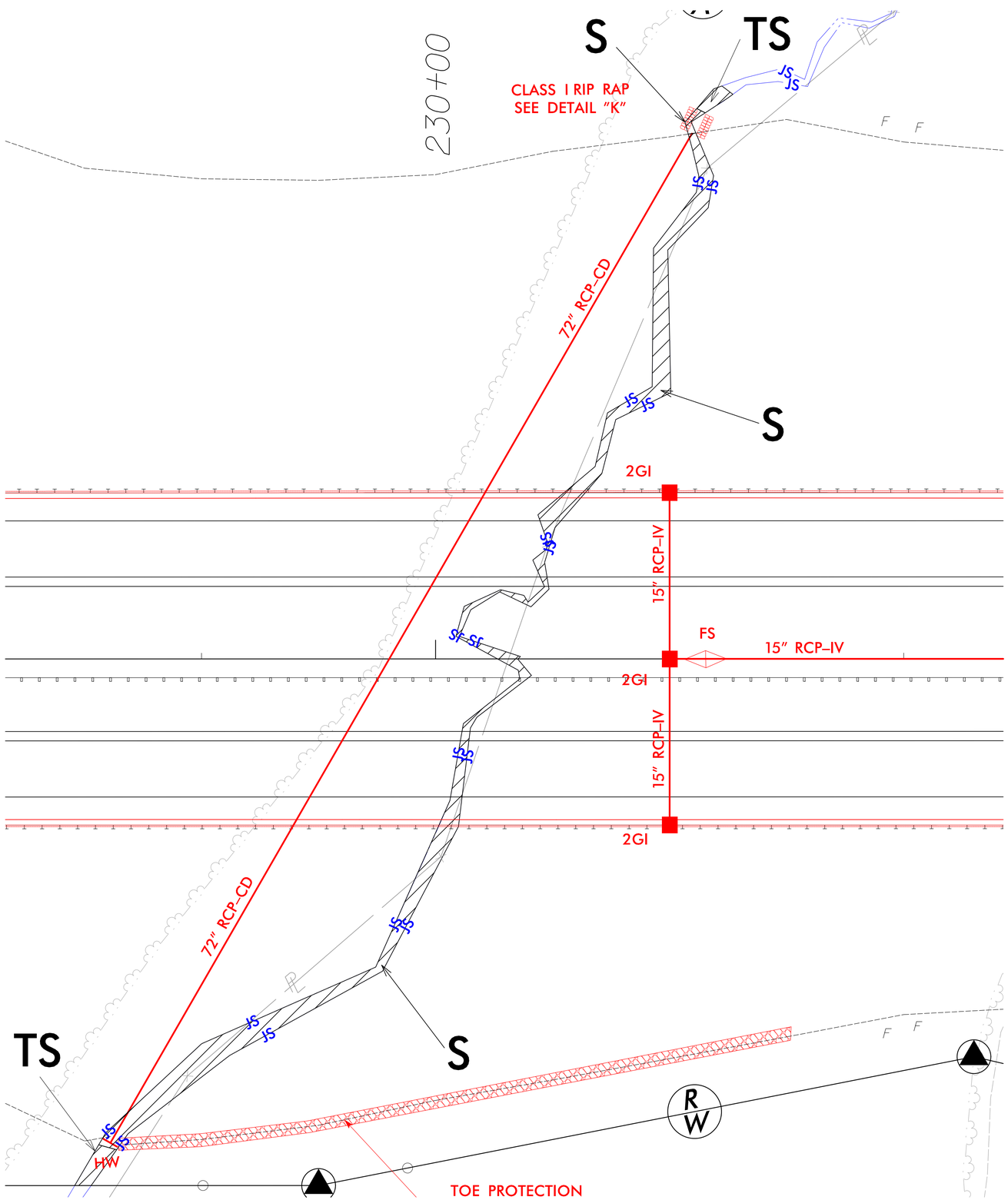
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 34 OF 71

NC GRID NAD 83/95

SITE 7 ENLARGEMENT



50' 0' 50'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

7:22:03 AM
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PROJECT REFERENCE NO.	SHEET NO.
R-3421B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

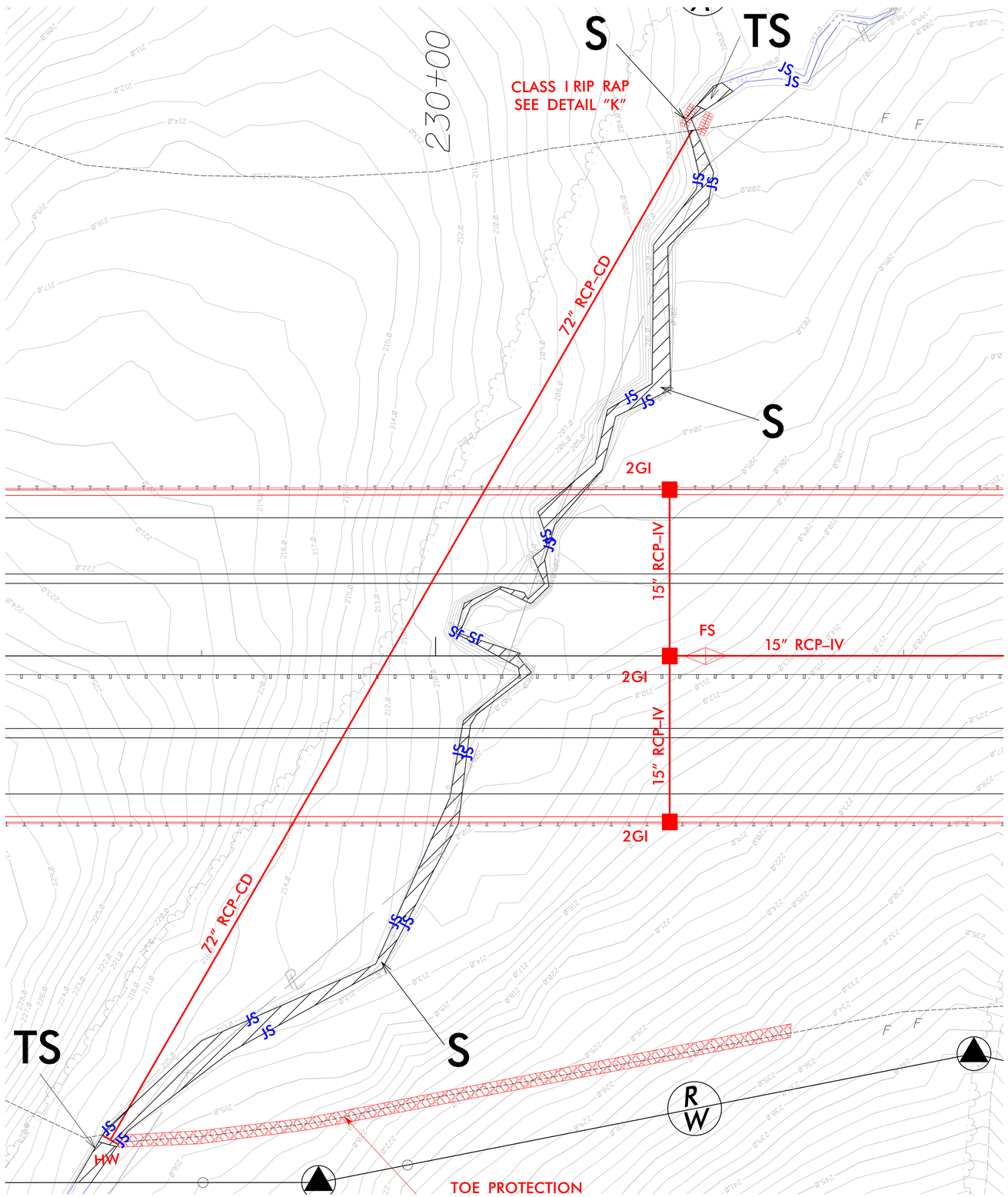
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 35 OF 71

NC GRID NAD 83/95

SITE 7 ENLARGEMENT



50′ 0′ 50′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

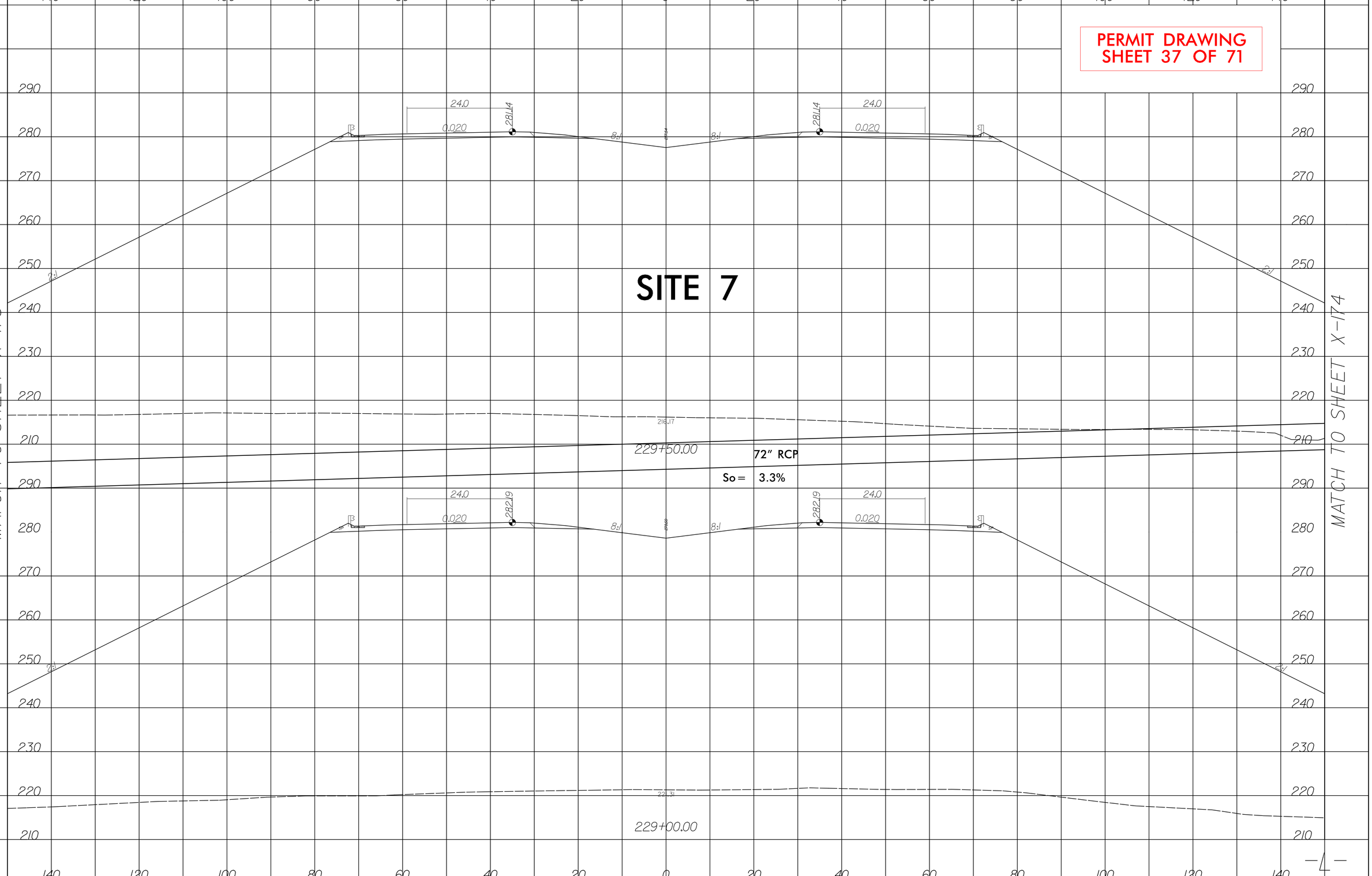
8/17/99

7:22:07 AM
R:\Hydraulics\PERMITS_Environmental\Drawings\R3421B\R3421B_Hyd_prm_wet_psh11_enlarge site7_20150720_con.dgn

PERMIT DRAWING
SHEET 36 OF 71

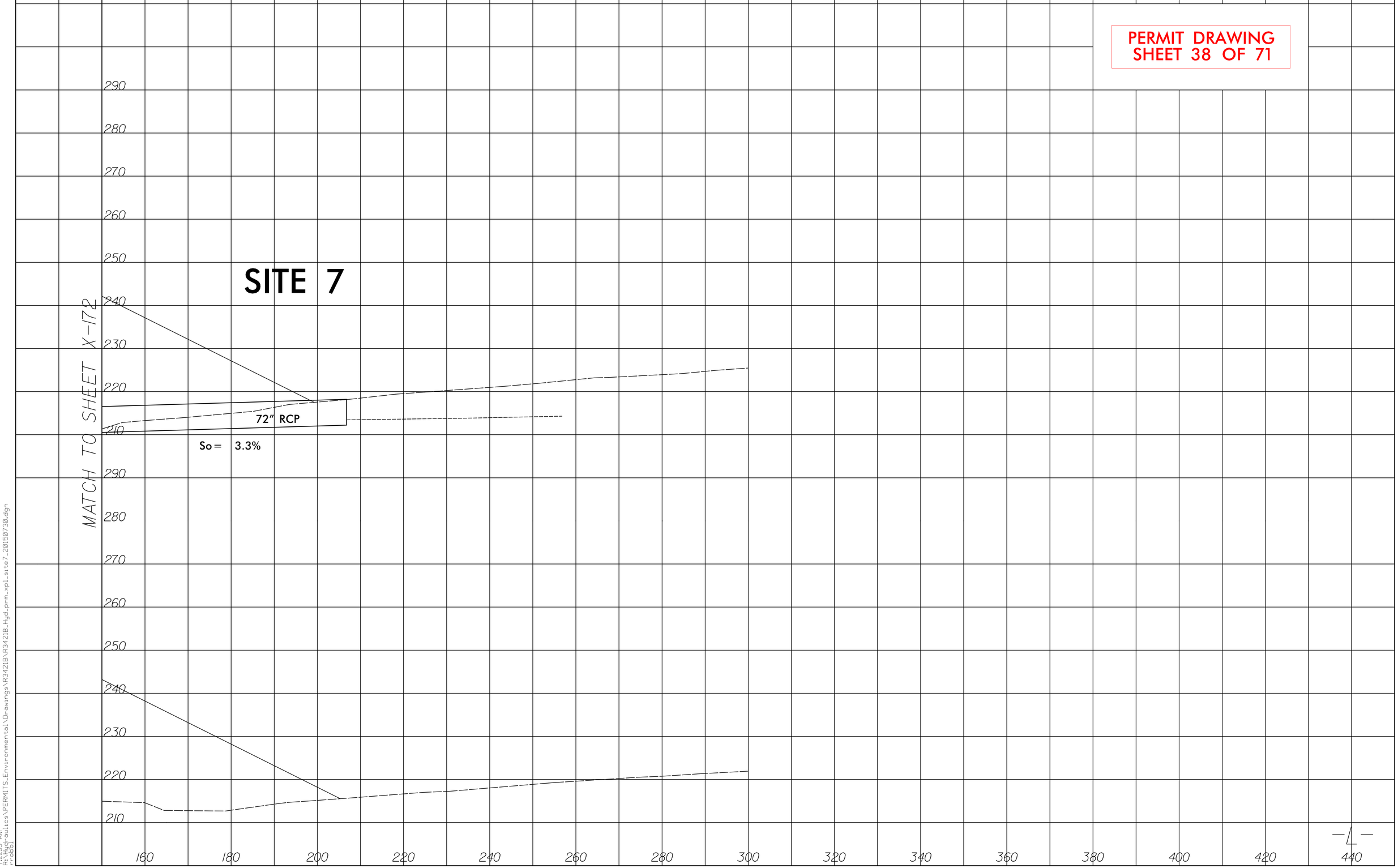
PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-172

PERMIT DRAWING
SHEET 37 OF 71



PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-174

PERMIT DRAWING
SHEET 38 OF 71



Revised 8/6/19

REVISIONS

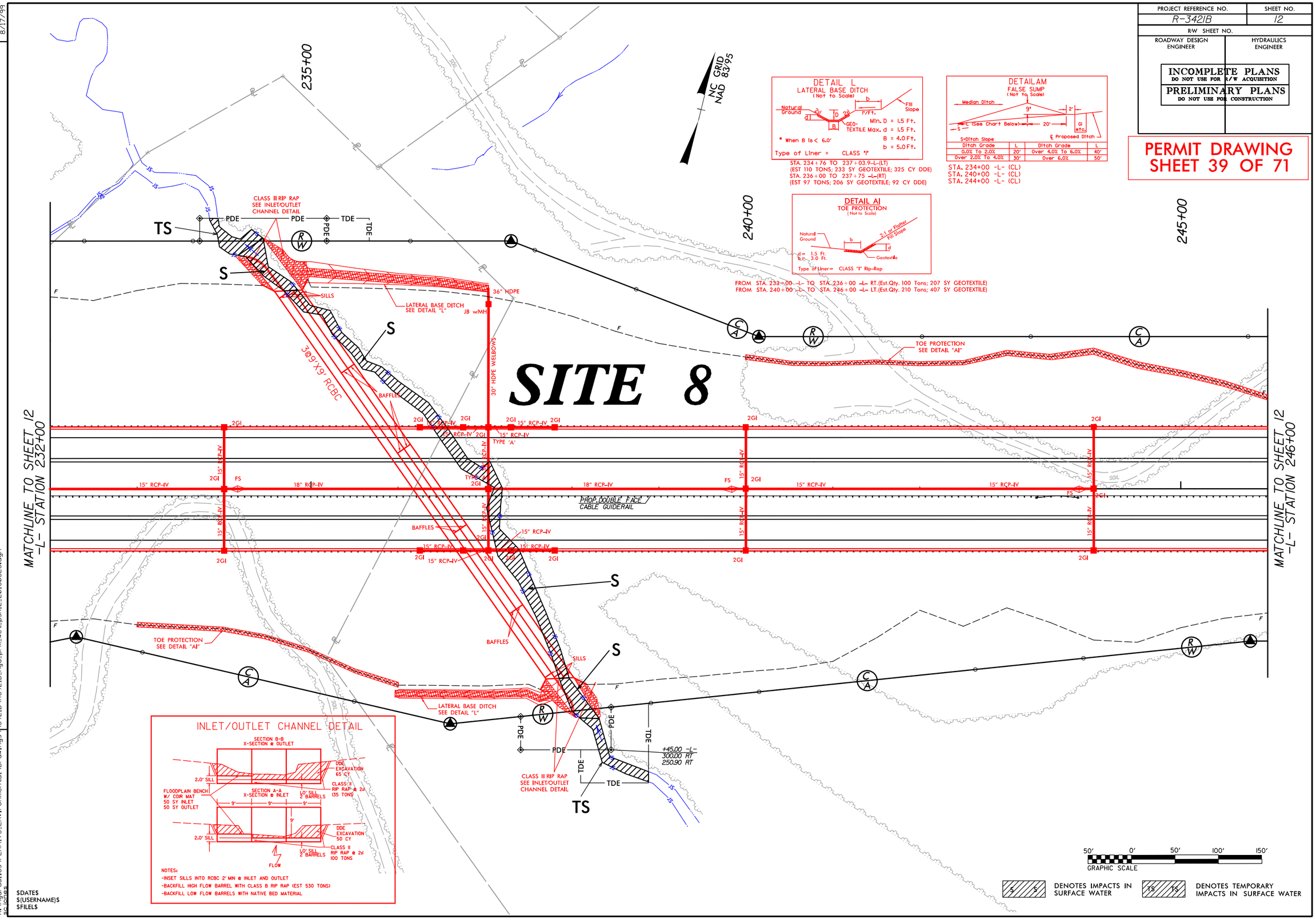
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	12
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 39 OF 71



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$DATE$
$(USERNAME)$
$FILE$

Revised 8/6/19

REVISIONS

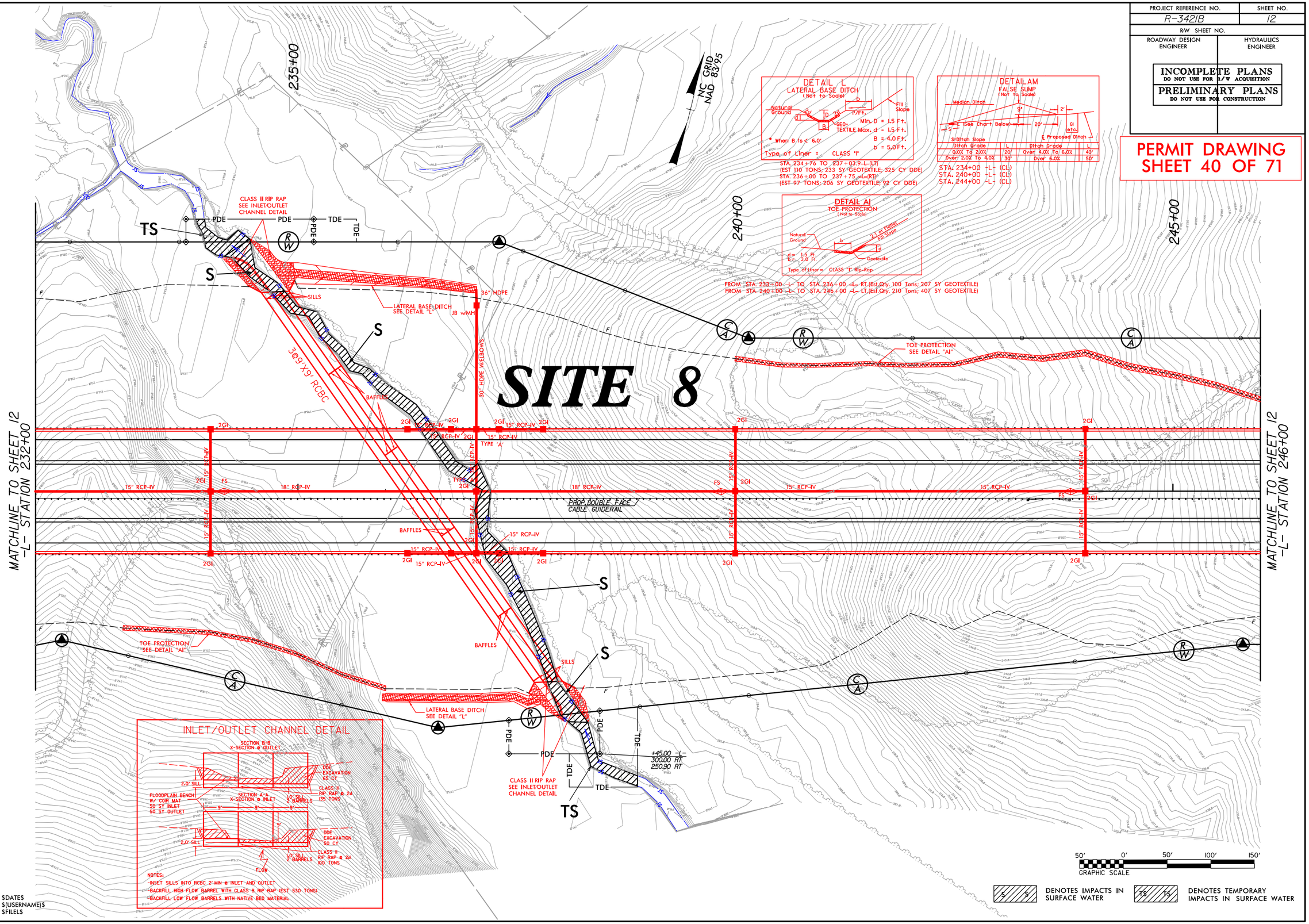
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	12
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 40 OF 71



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$(USERNAME)$
$FILE1$

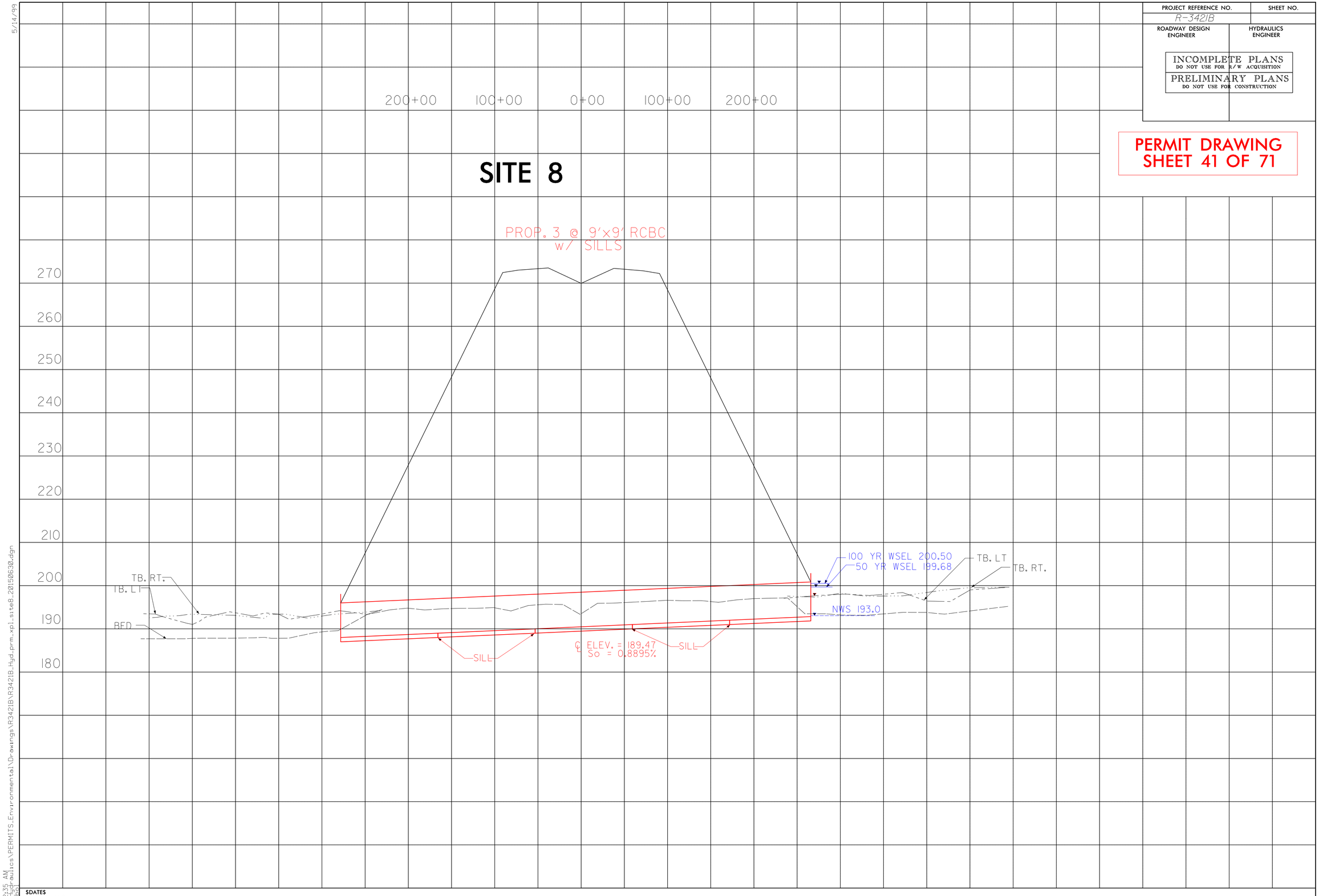
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 41 OF 71

SITE 8



5/14/99

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$DATE$
$(USERNAME)$
$FILEL$

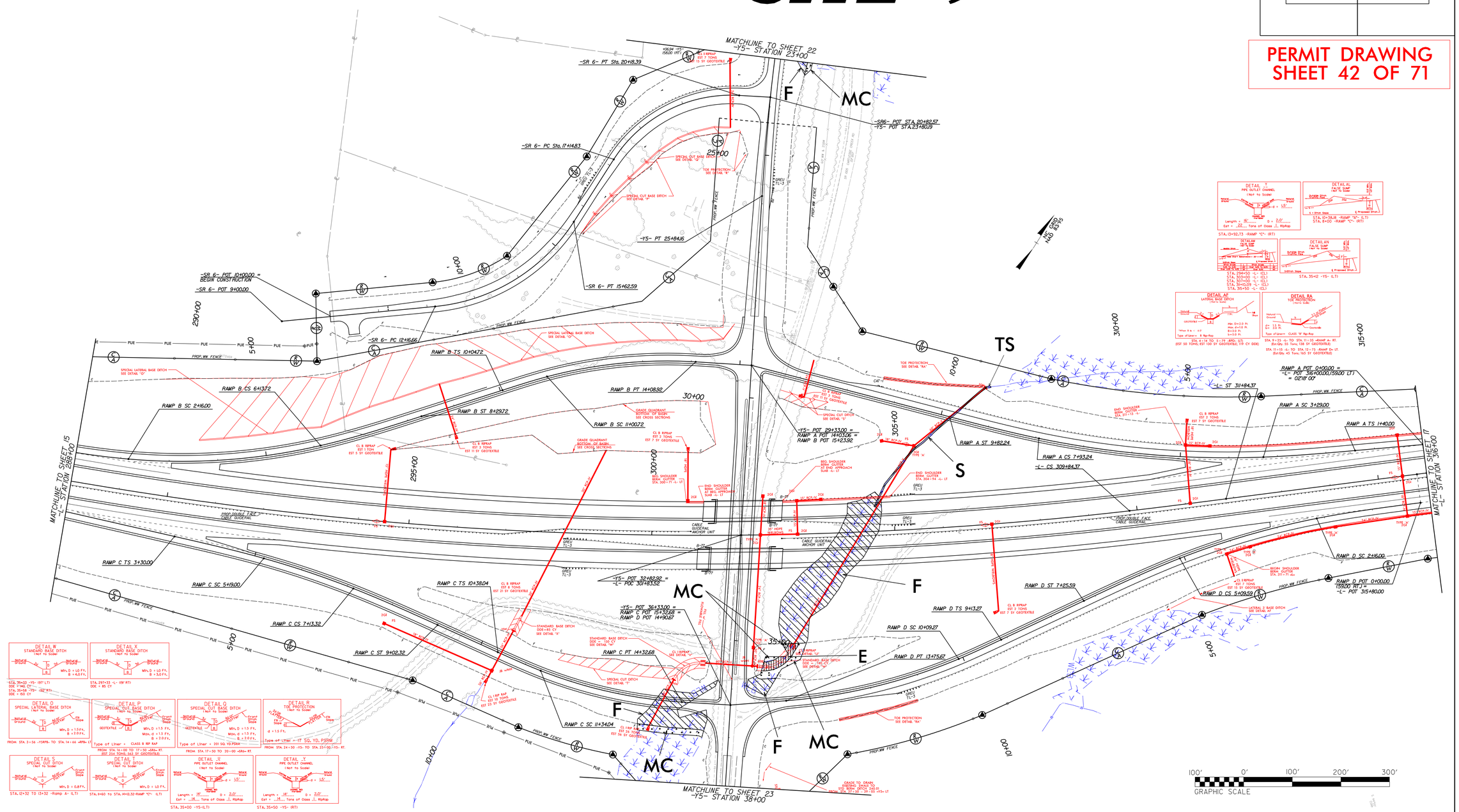
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 42 OF 71

SITE 9



SITE 10

S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
E E	DENOTES EXCAVATION IN WETLAND

REVISIONS

8/17/99

7:22:49 AM
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(rcobb)

$DATES
$(USERNAME)$
$FILEL$

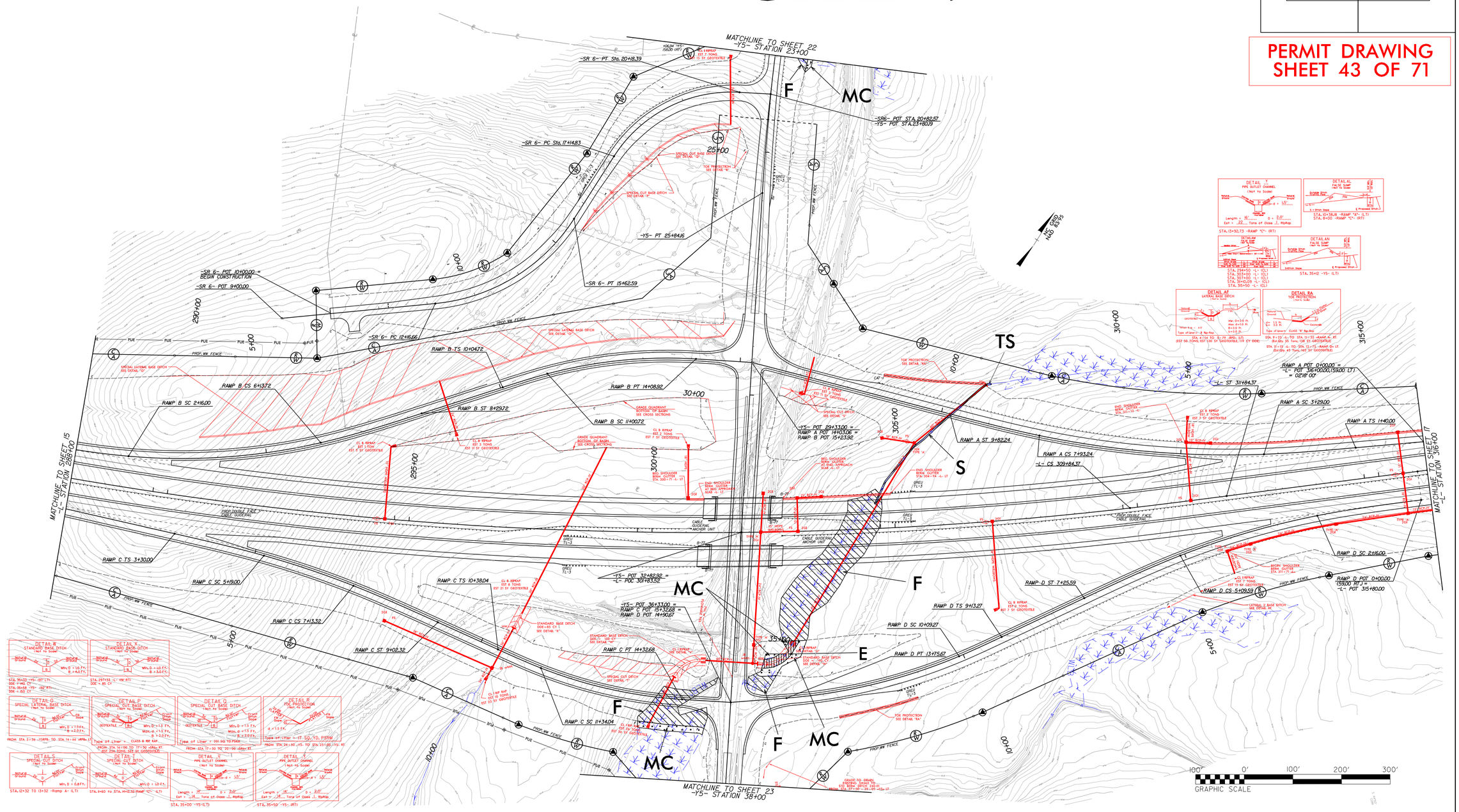
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 43 OF 71

SITE 9



SITE 10

S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
E E	DENOTES EXCAVATION IN WETLAND

REVISIONS

8/17/99

7:22:55 AM
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rcobb

$DATE$
$(USERNAME)$
$FILEL$

SITE 9 ENLARGEMENT

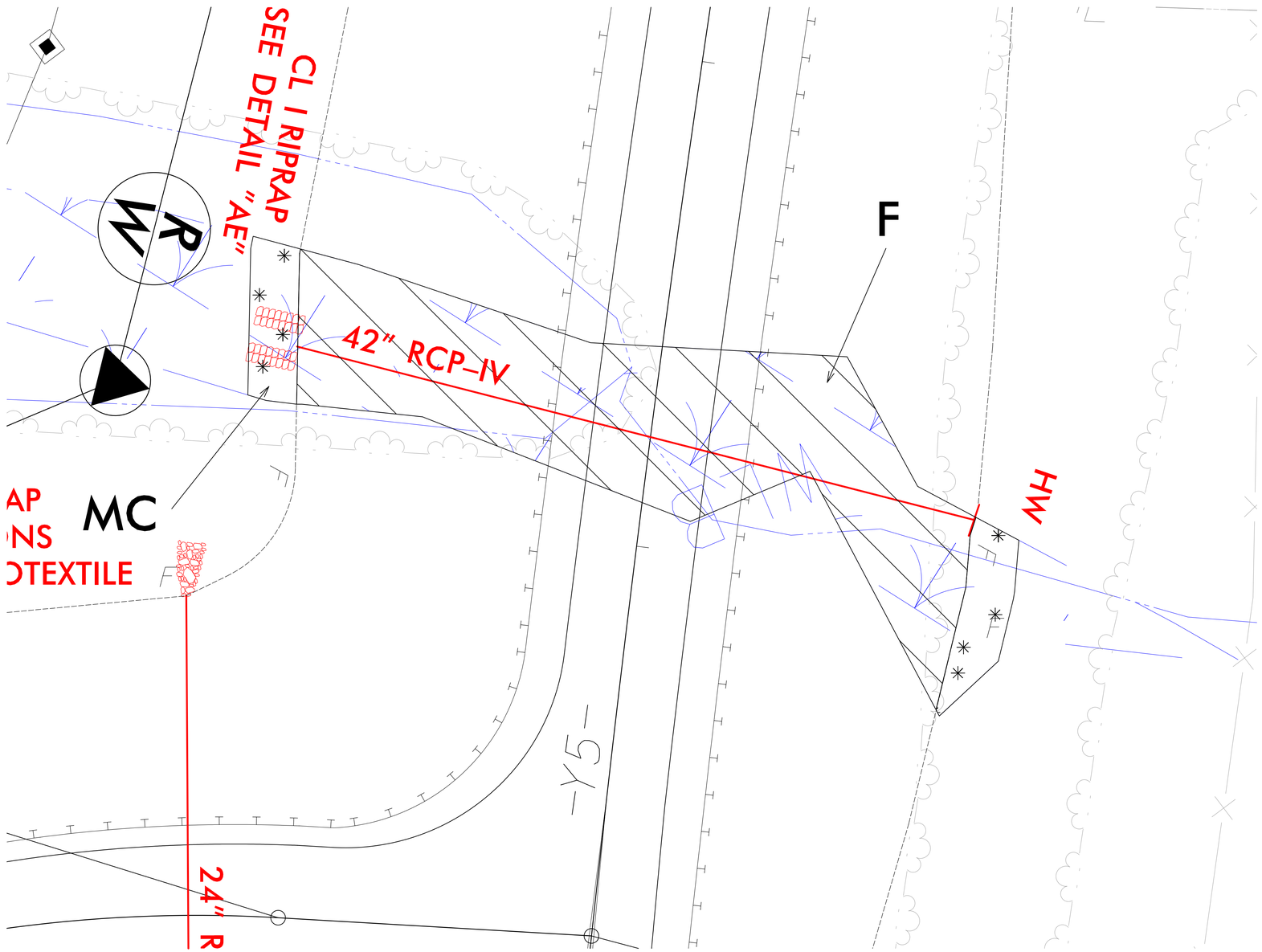
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 44 OF 71

NC GRID
NAD 83/95



25′ 0′ 25′
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

$DATE$
$(USERNAME)$
$FILEL$

REVISIONS

8/17/99

7:23:00 AM
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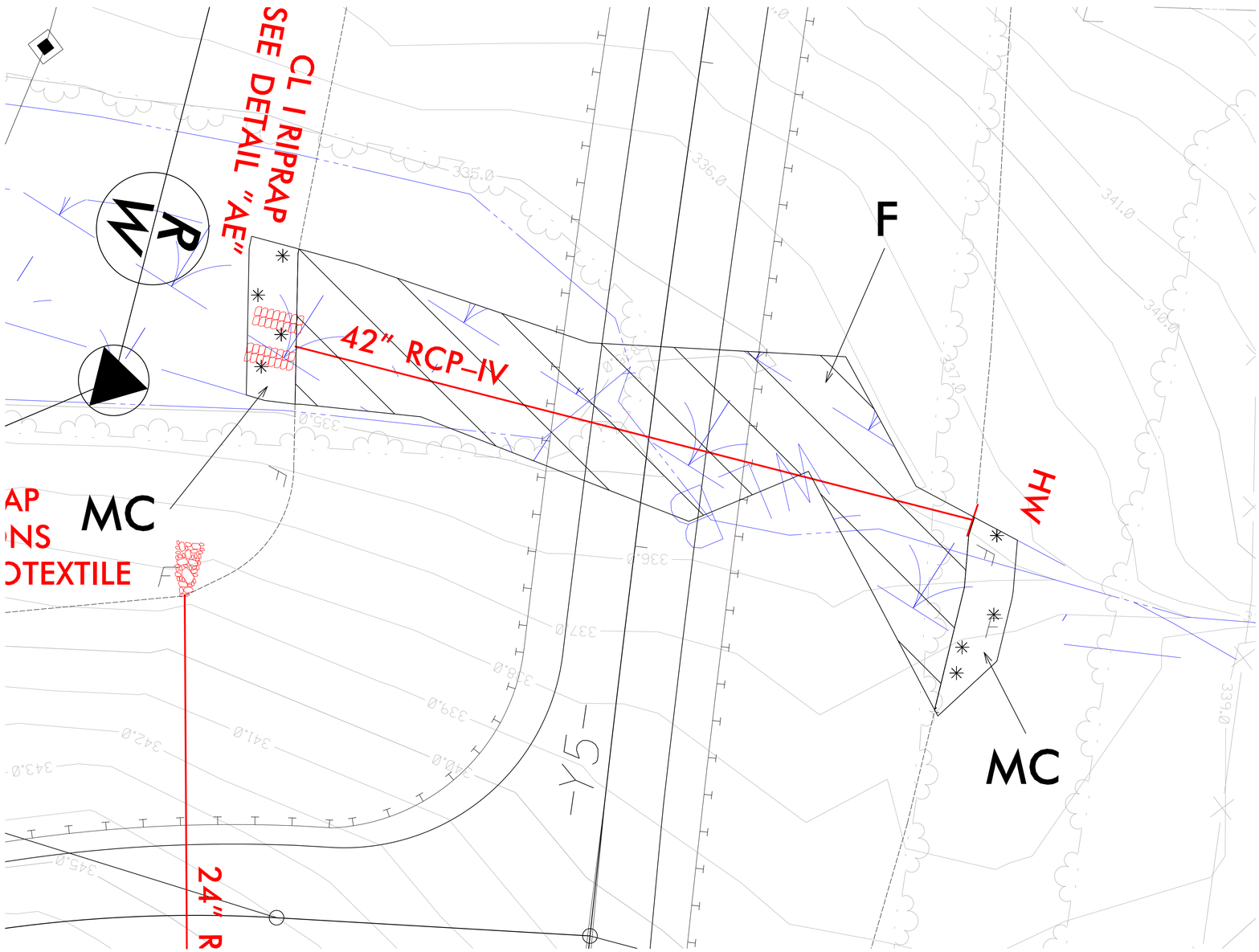
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 45 OF 71

SITE 9 ENLARGEMENT



F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

7:23:05 AM
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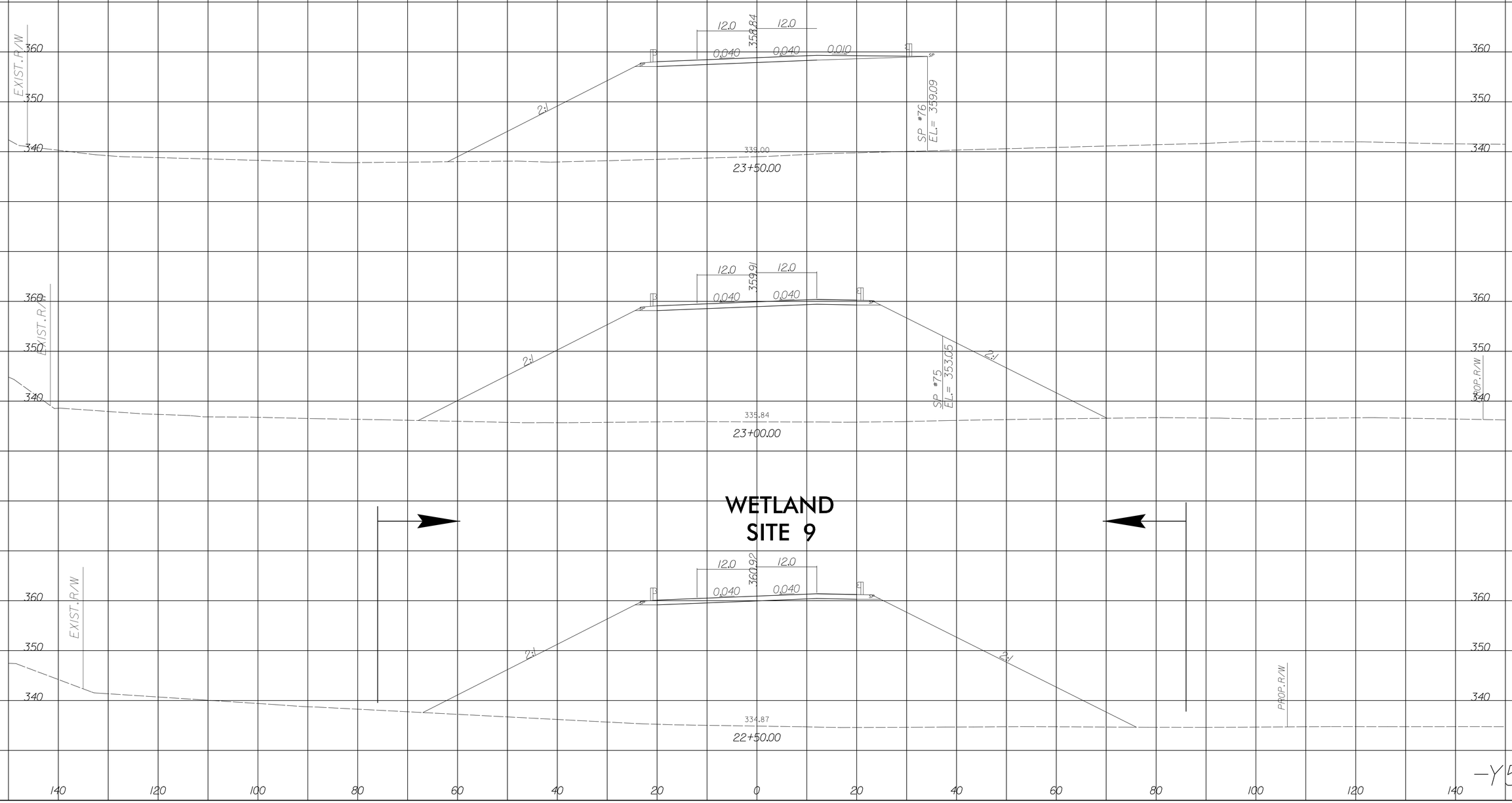
$DATE$
$(USERNAME)$
$FILEL$

PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-422

PERMIT DRAWING
SHEET 46 OF 71



-Y5-

8/23/99

$DATES
$USERNAME$
$FILE$

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rrobol

SITE 10 ENLARGEMENT

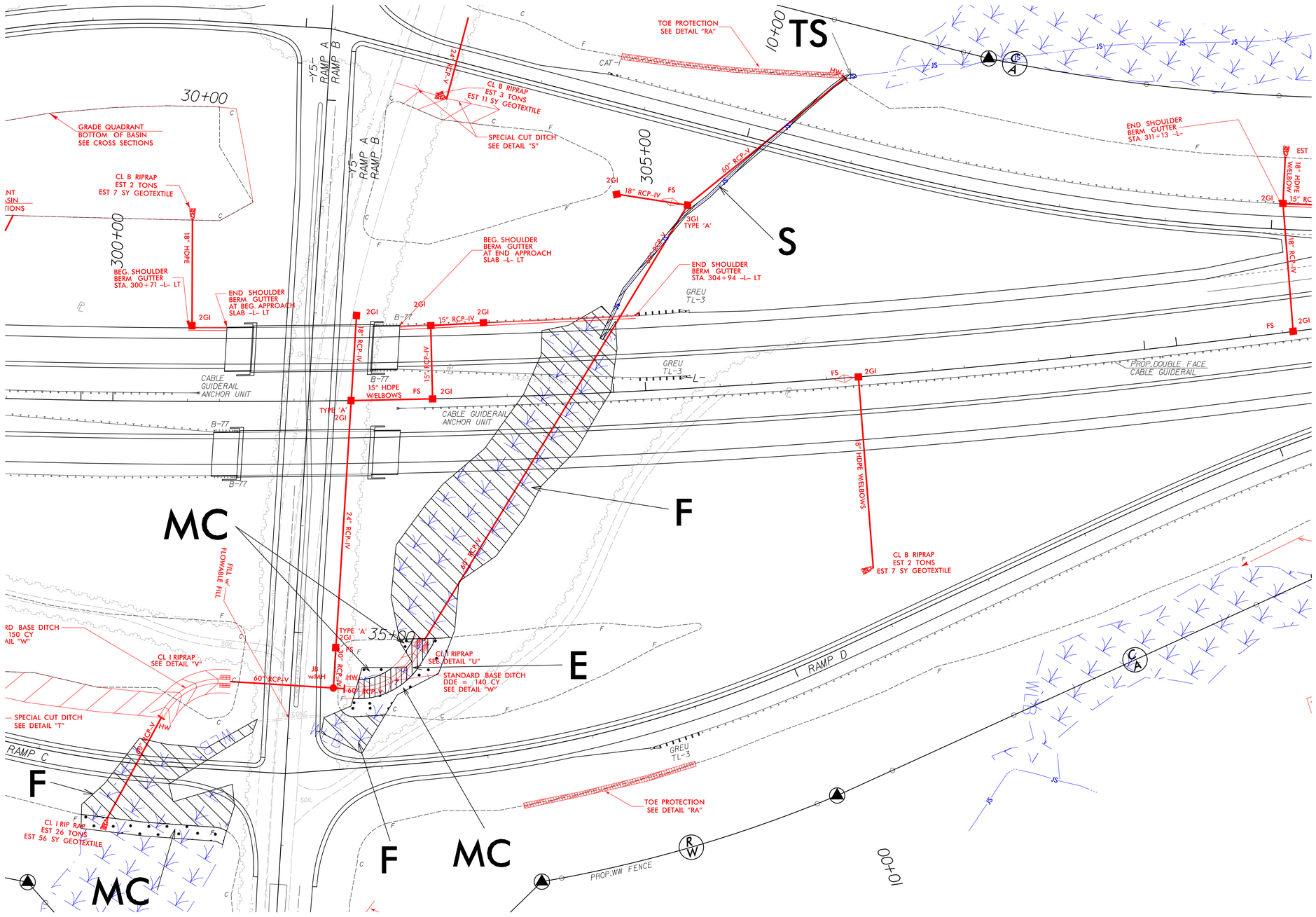
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING SHEET 47 OF 71

NC GRID NAD 83/95



S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
E E	DENOTES EXCAVATION IN WETLAND

100' 0' 100'
GRAPHIC SCALE

REVISIONS

8/17/99

$DATES
$(USERNAME)$
$FILEL$

7:23:21 AM
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SITE 10 ENLARGEMENT

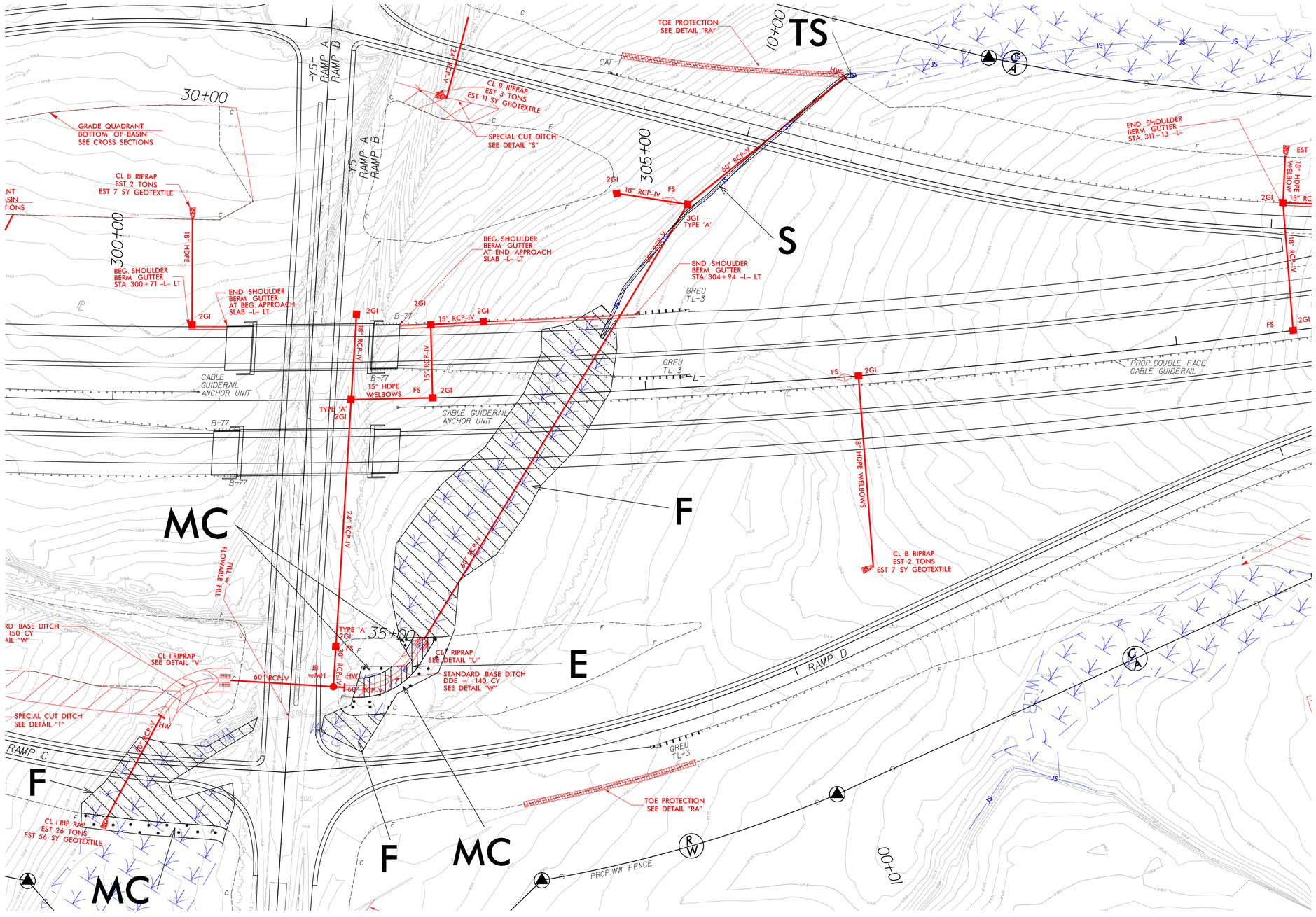
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING SHEET 48 OF 71

NC GRID NAD 83/95



S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER
F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
E E	DENOTES EXCAVATION IN WETLAND

100' 0' 100'
GRAPHIC SCALE

REVISIONS

8/17/99

$DATES
$(USERNAME)$
$FILEL$

7:23:26 AM
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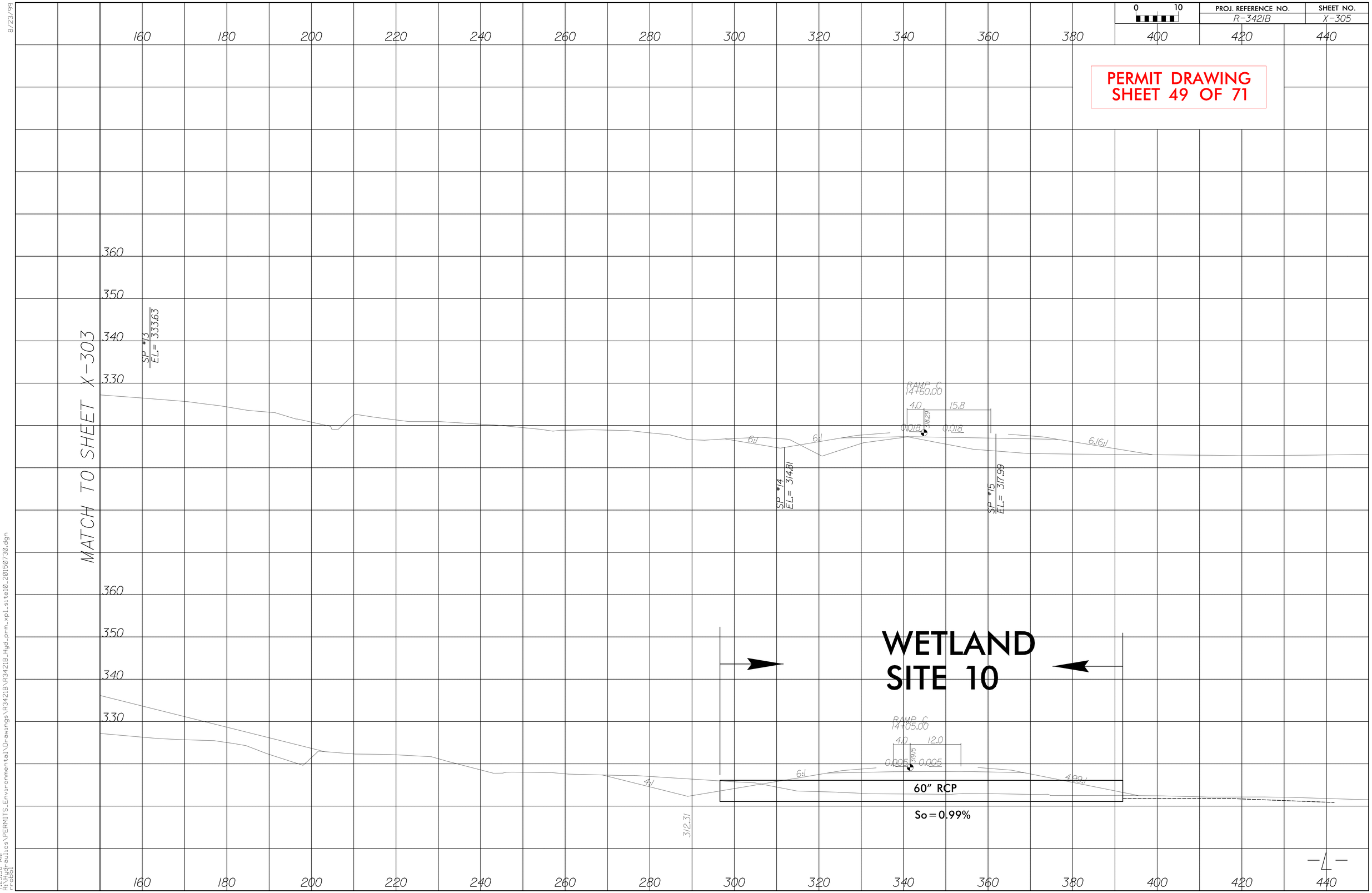
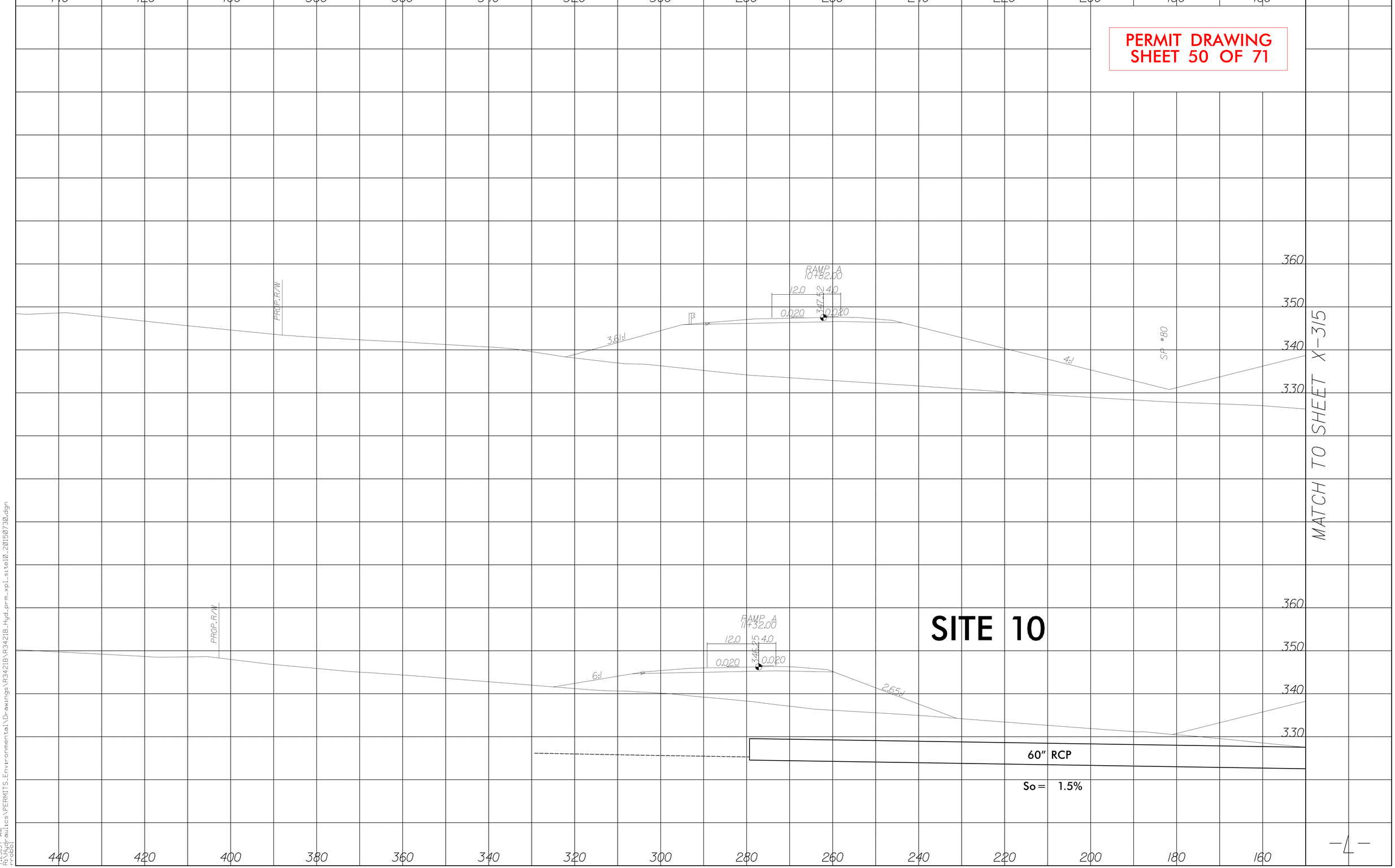
PERMIT DRAWING
SHEET 49 OF 71



PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-316

0 10

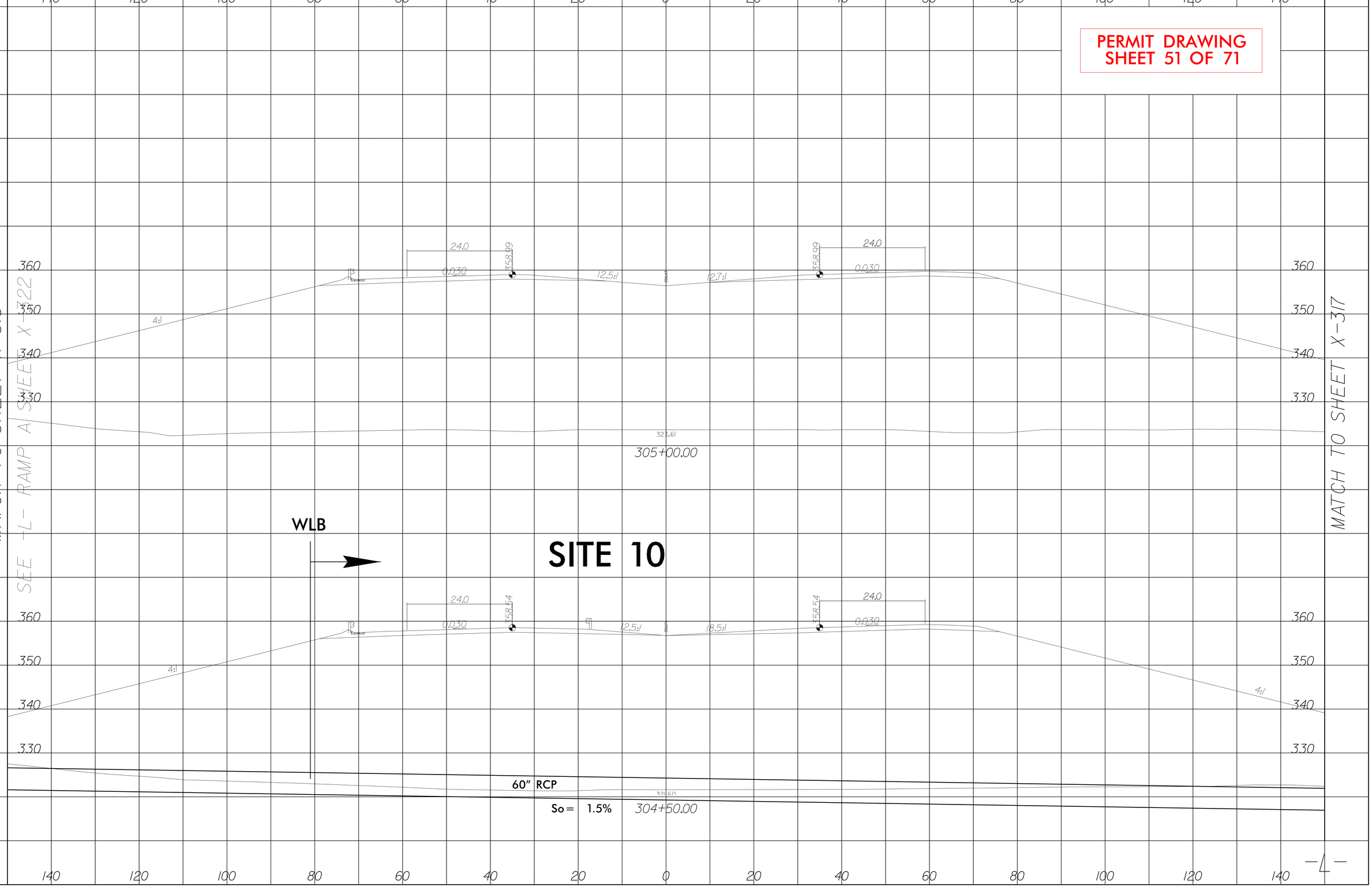
PERMIT DRAWING
SHEET 50 OF 71



PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-315

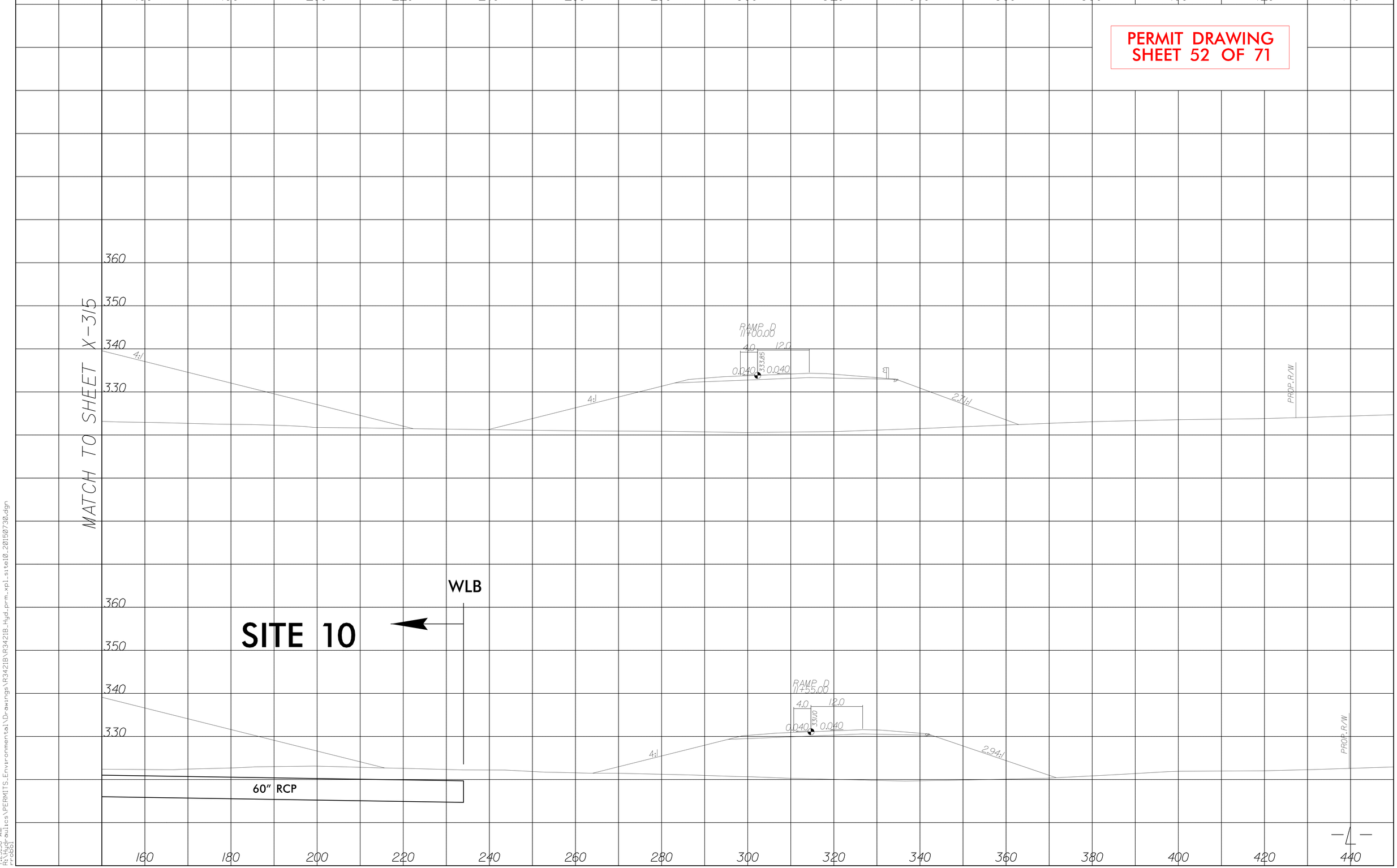
0 10

PERMIT DRAWING
SHEET 51 OF 71



PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-317

PERMIT DRAWING
SHEET 52 OF 71



8/23/99

$DATE$
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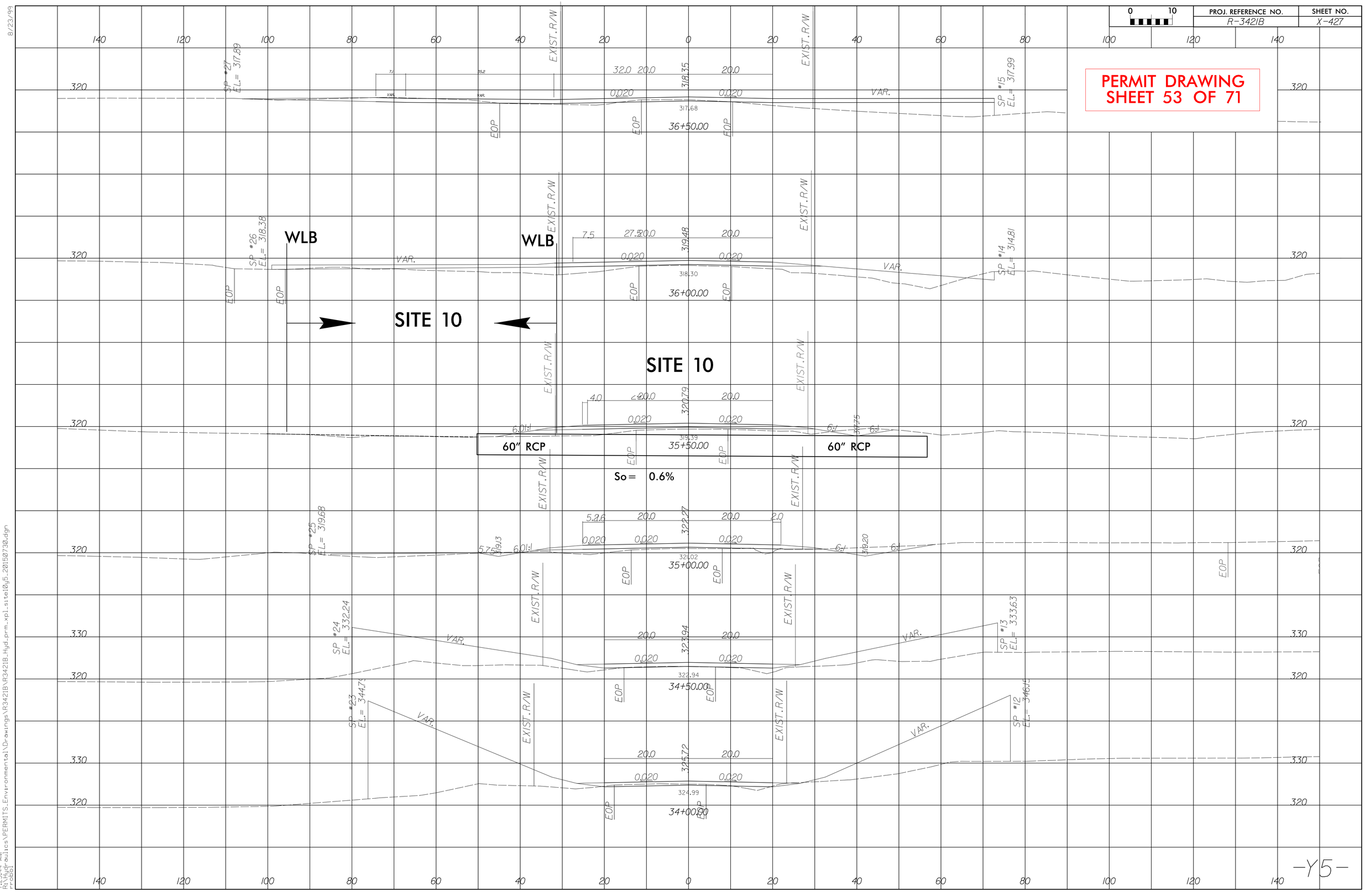
rrobbi

PERMIT DRAWING
SHEET 53 OF 71



-Y5-

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

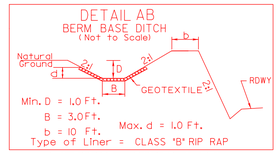
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

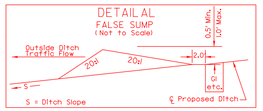
PERMIT DRAWING
SHEET 54 OF 71

SITE 12

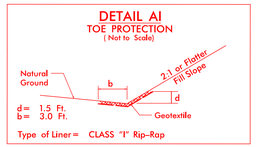
NC GRID NAD 83/95



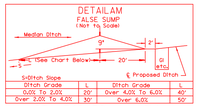
STA. 344+25 to 346+50 -L- (RT.)
(EST 77 TONS; 172 SY GEOTEXTILE; 200 CY DDE)



STA. 346+50 -L- (RT)
STA. 349+50 -L- (RT)

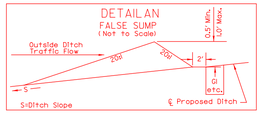


FROM STA. 350+68 -L- TO STA. 354+65 -L- RT.(Est.Qty. 130 Tons; 267 SY GEOTEXTILE)
FROM STA. 352+30 -L- TO STA. 355+90 -L- LT.(Est.Qty. 125 Tons; 245 SY GEOTEXTILE)

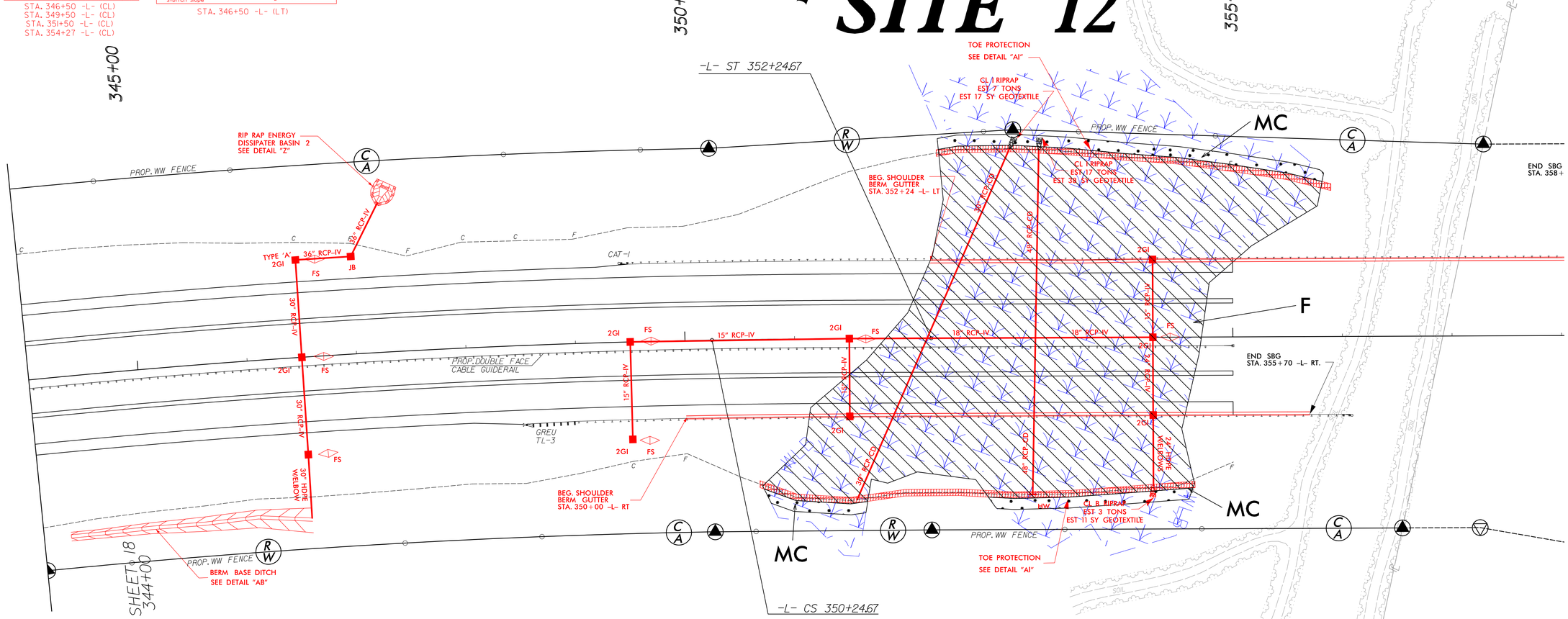


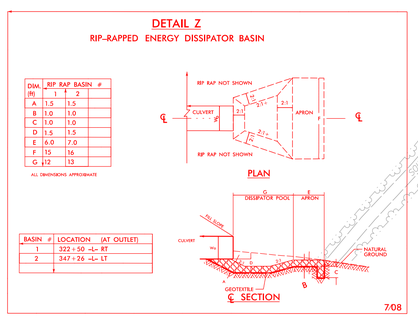
S=Ditch Slope			
Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 346+50 -L- (CL)
STA. 349+50 -L- (CL)
STA. 351+50 -L- (CL)
STA. 354+27 -L- (CL)



STA. 346+50 -L- (LT)





DIM. (ft)	RIP RAP BASIN # 1	2	
A	1.5	1.5	
B	1.0	1.0	
C	1.0	1.0	
D	1.5	1.5	
E	6.0	7.0	
F	15	16	
G	12	13	

ALL DIMENSIONS APPROXIMATE

BASIN #	LOCATION (AT OUTLET)
1	322+50 -L- RT
2	347+26 -L- LT

STA. 347+26 -L- RT
(EST 15 TONS CLASS I RIP RAP; 27 SY GEOTEXTILE; 23 CY DDE)

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

7:23:56 AM
R:\Hydraulics\PERMITS_Environmental\Drawings\R3421B\R3421B_Hyd_prm_wet_psh19_20150327.dgn
rrsebo1

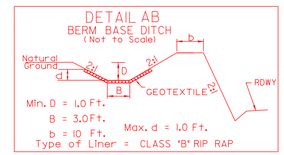
$DATES
$(USERNAME)$
$FILEL$

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

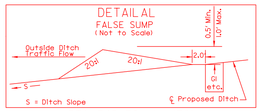
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

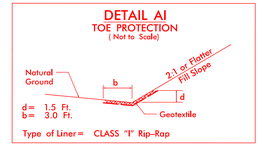
PERMIT DRAWING
SHEET 55 OF 71



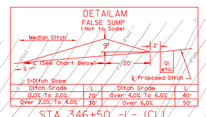
STA. 344+25 to 346+50 -L- (RT.)
(EST 77 TONS; 172 SY GEOTEXTILE; 200 CY DDE)



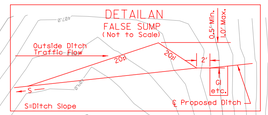
STA. 346+50 -L- (RT)
STA. 349+50 -L- (RT)



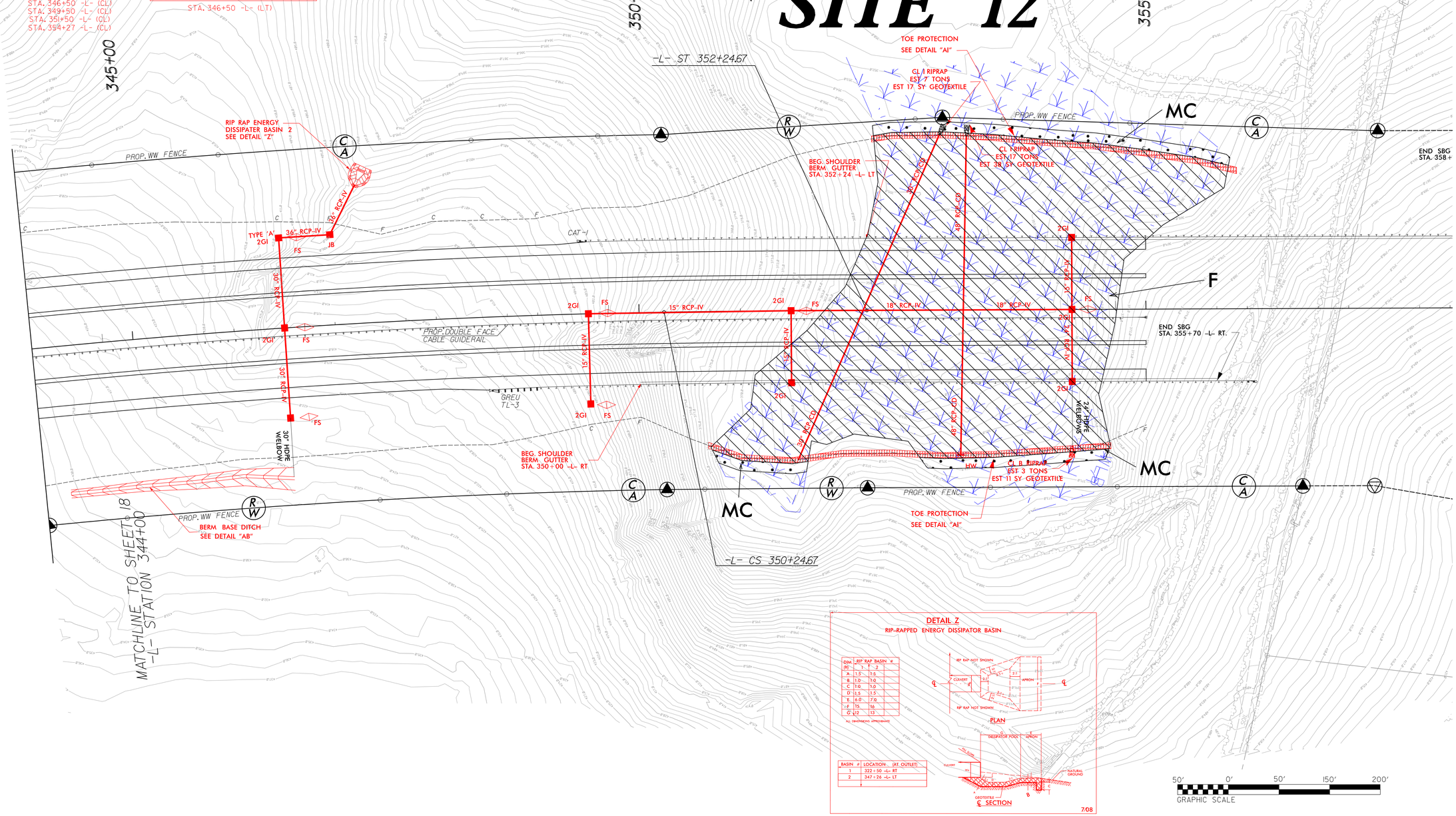
FROM STA. 350+68 -L- TO STA. 354+65 -L- RT.(Est.Qty. 130 Tons; 267 SY GEOTEXTILE)
FROM STA. 352+30 -L- TO STA. 355+90 -L- LT.(Est.Qty. 125 Tons; 245 SY GEOTEXTILE)



STA. 346+50 -L- (CL)
STA. 349+50 -L- (CL)
STA. 351+50 -L- (CL)
STA. 354+27 -L- (CL)



STA. 346+50 -L- (LT)



DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

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rrsebo1

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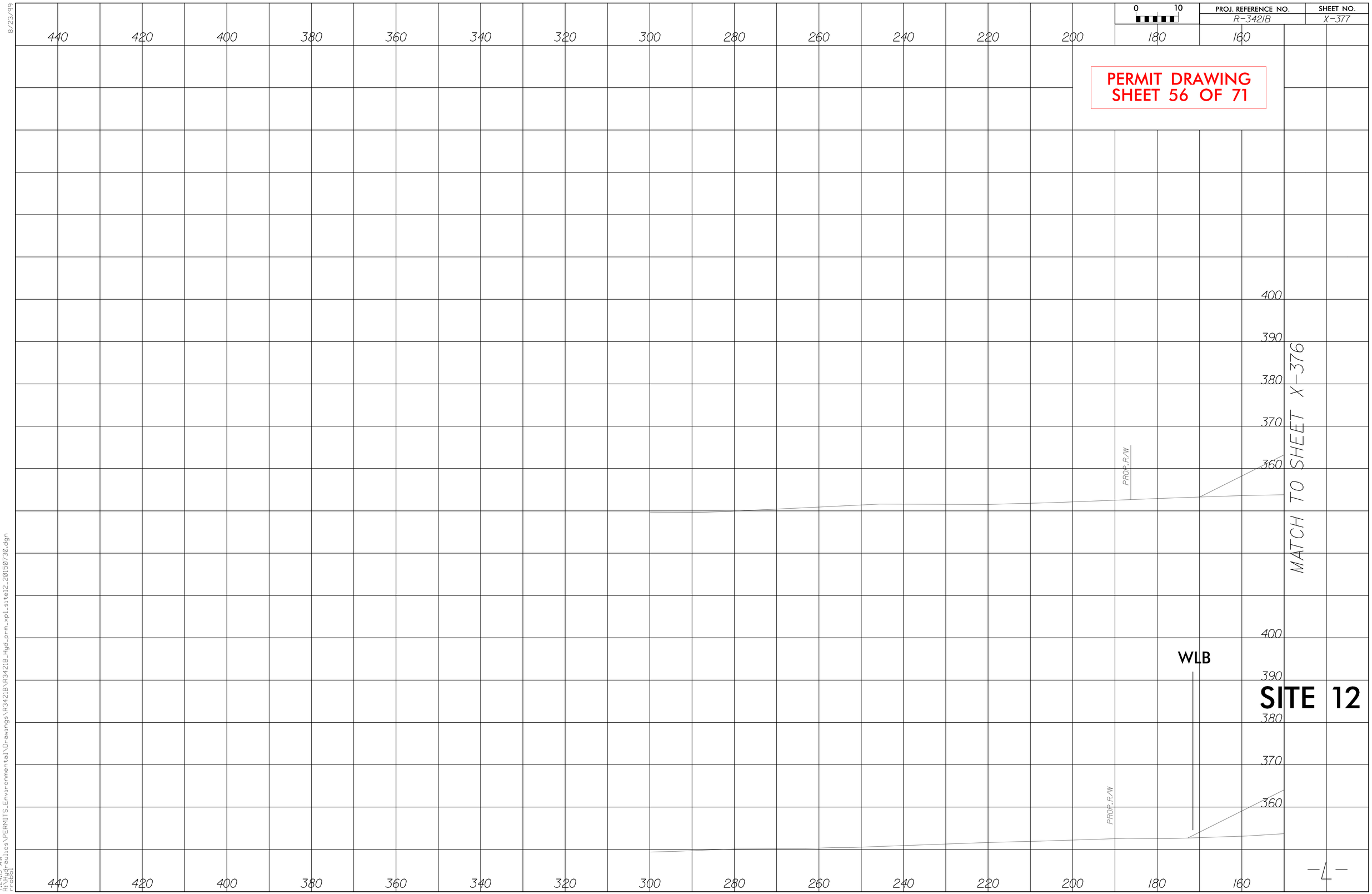
PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-377

0 10

PERMIT DRAWING
SHEET 56 OF 71



PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-376

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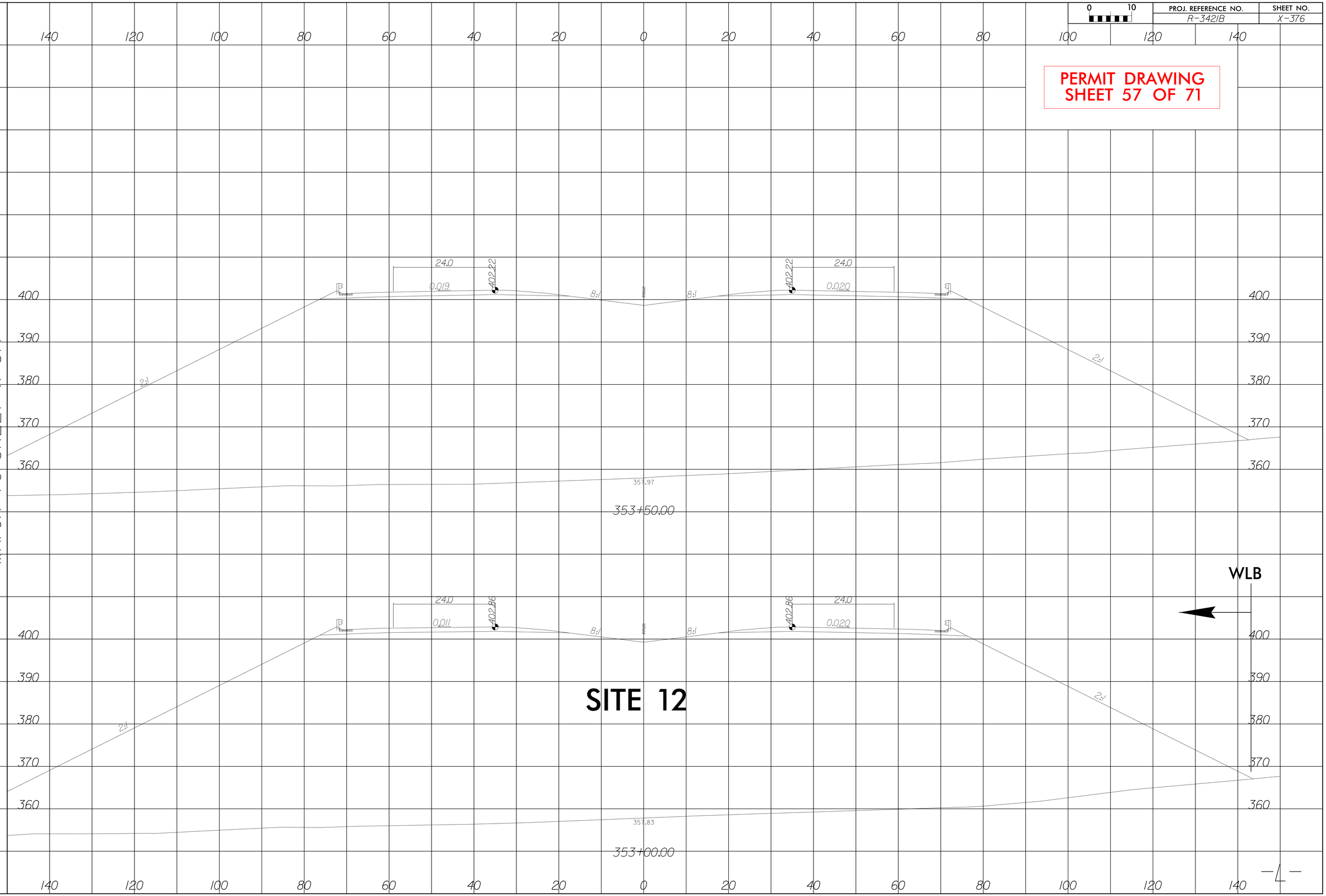
PERMIT DRAWING
SHEET 57 OF 71

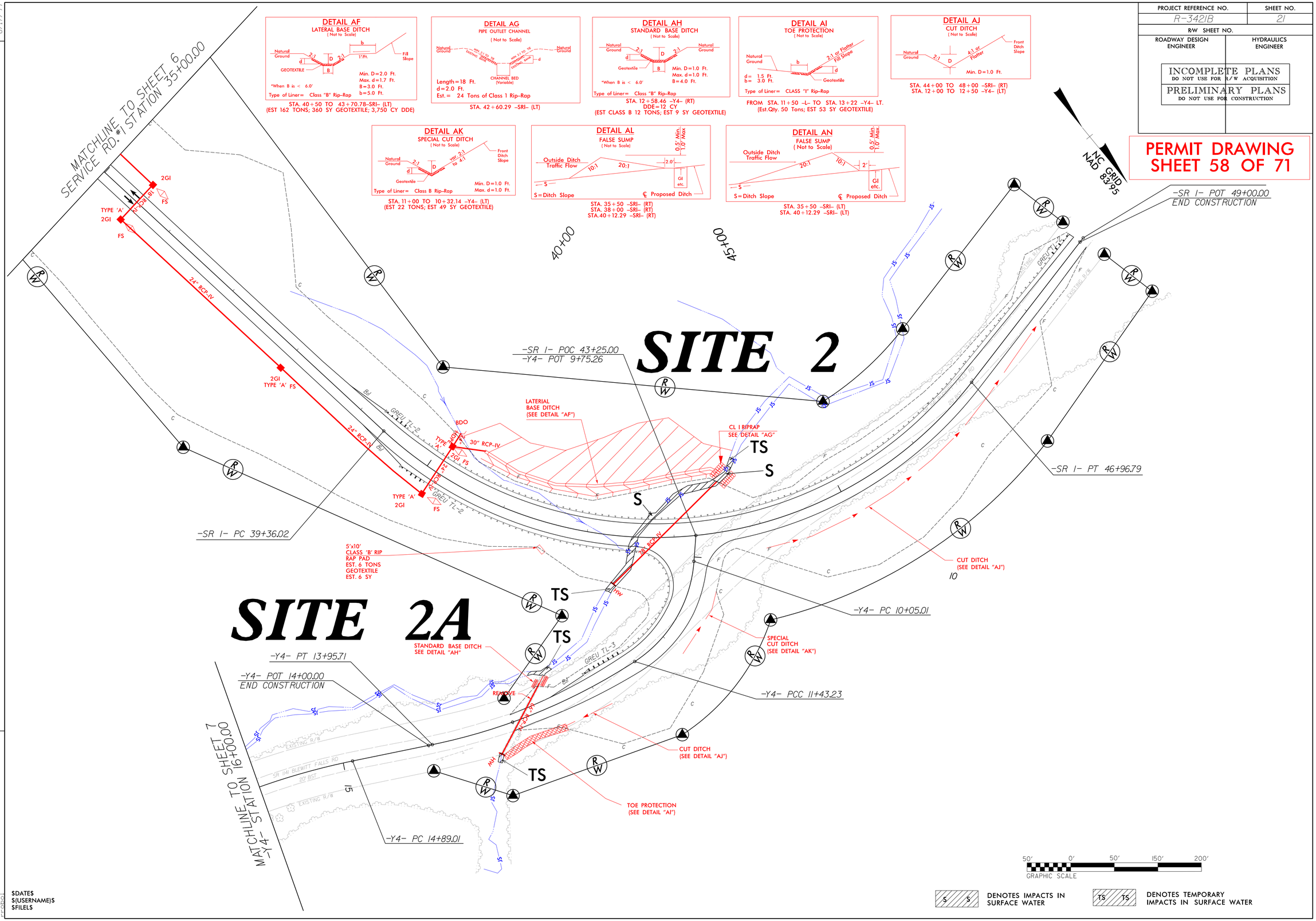


PROJECT REFERENCE NO.	SHEET NO.
R-3421B	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 58 OF 71



REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-3421B	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

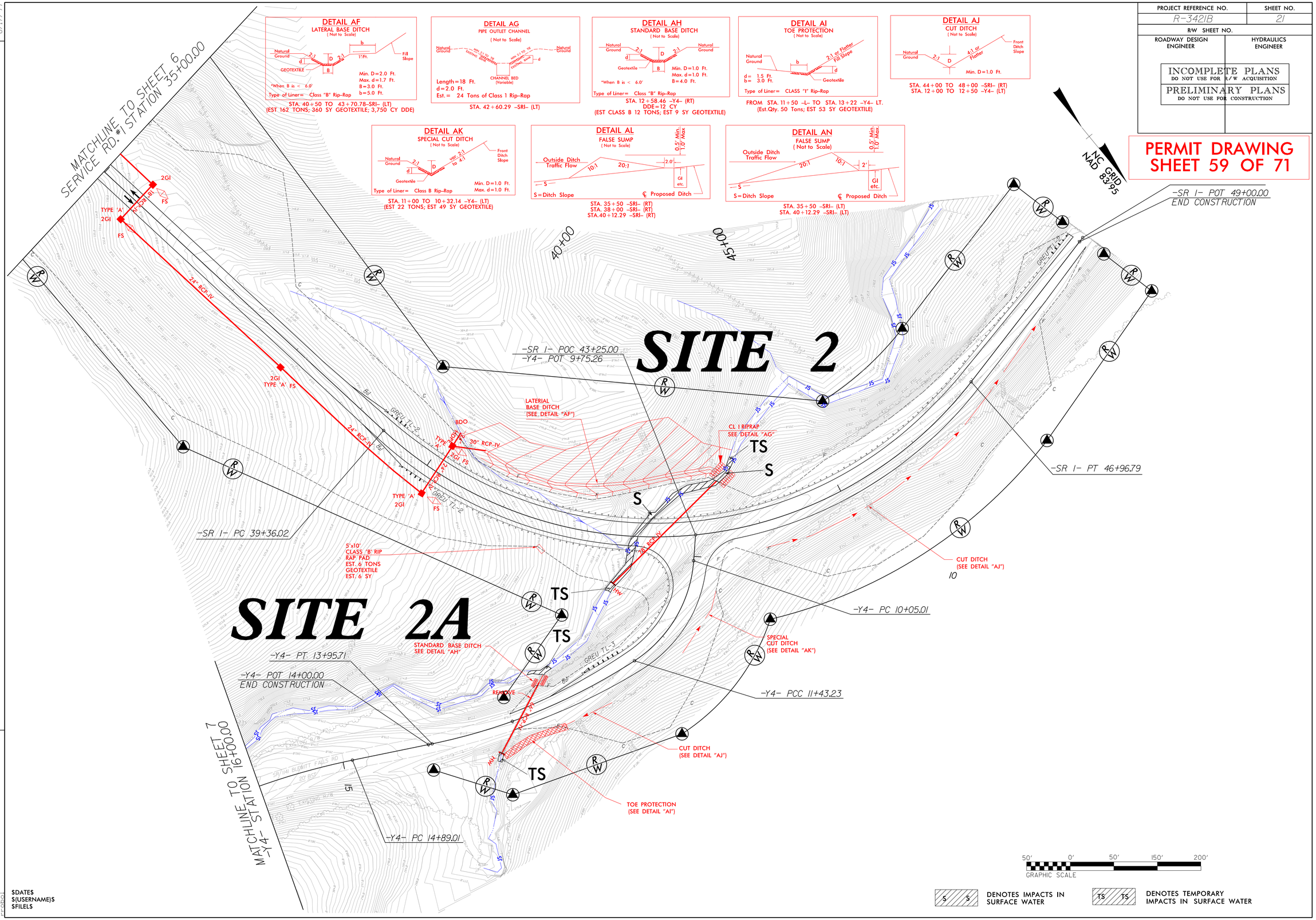
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 59 OF 71

REVISIONS

8/17/99



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$FILEL$

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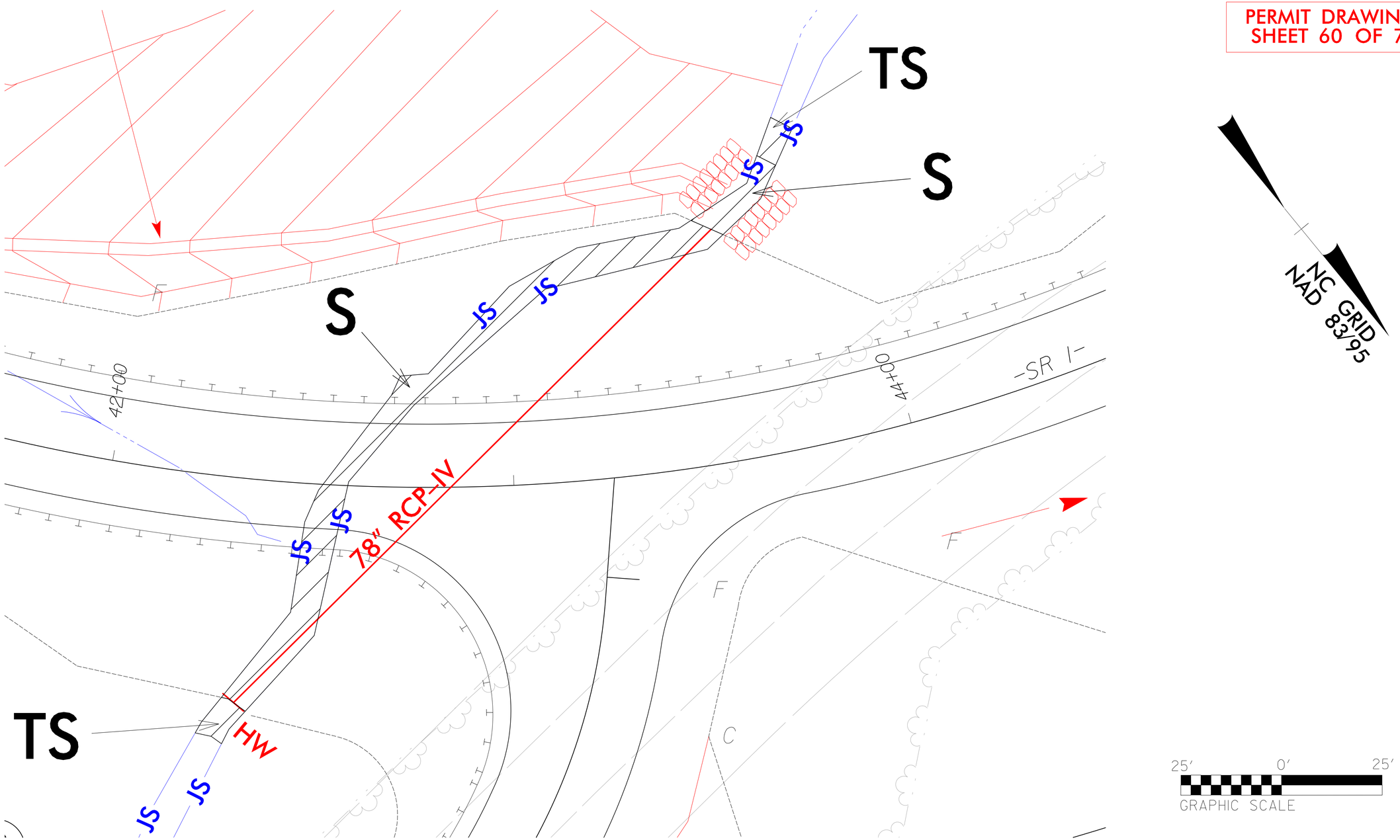
SITE 2 ENLARGEMENT

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	21
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 60 OF 71



$DATE$
$(USERNAME)$
$FILEL$

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

7:24:30 AM
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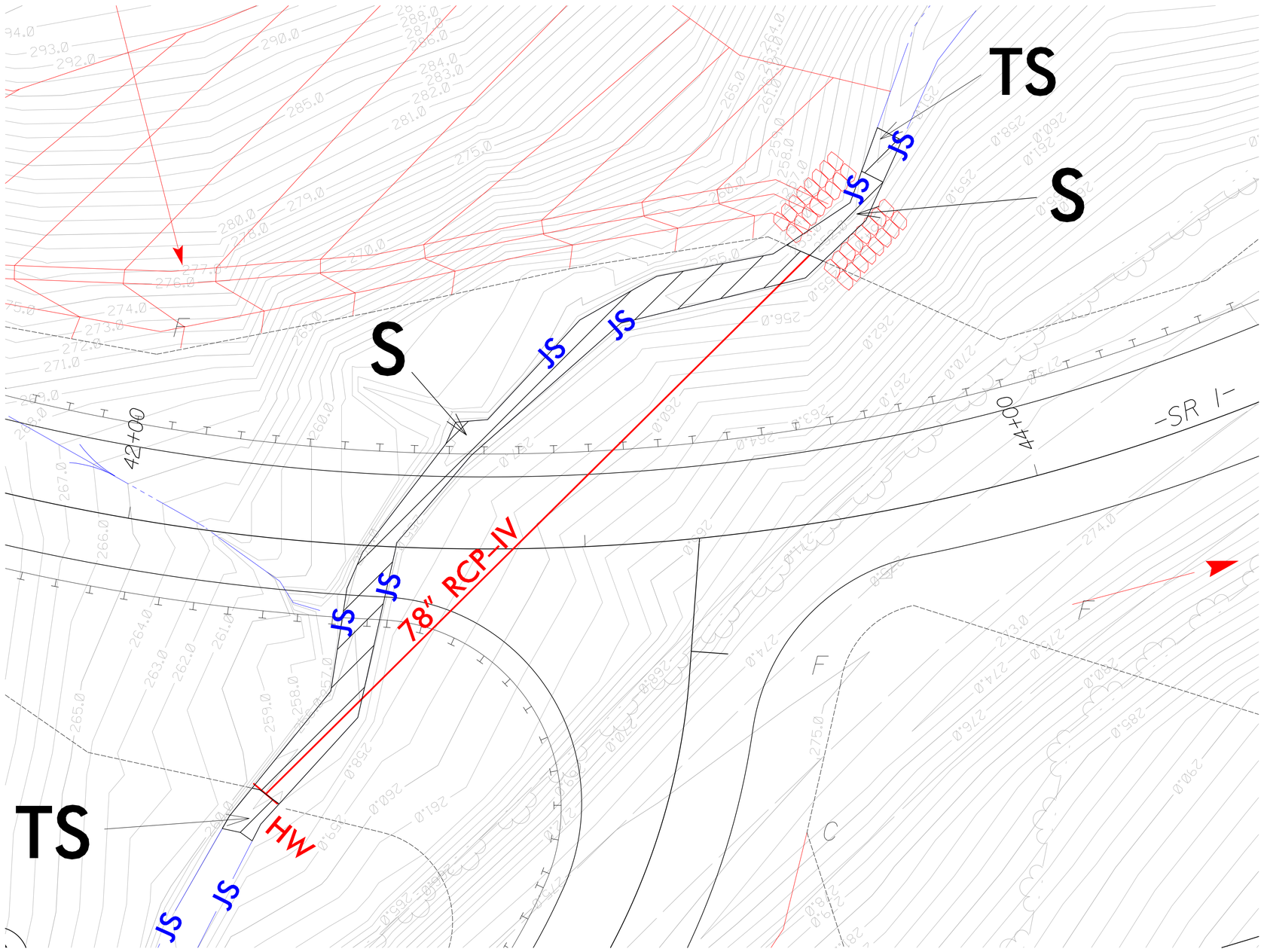
SITE 2 ENLARGEMENT

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	21
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 61 OF 71



NC GRID
NAD 83/95

25' 0' 25'
GRAPHIC SCALE

$DATE$
$(USERNAME)$
$FILEL$

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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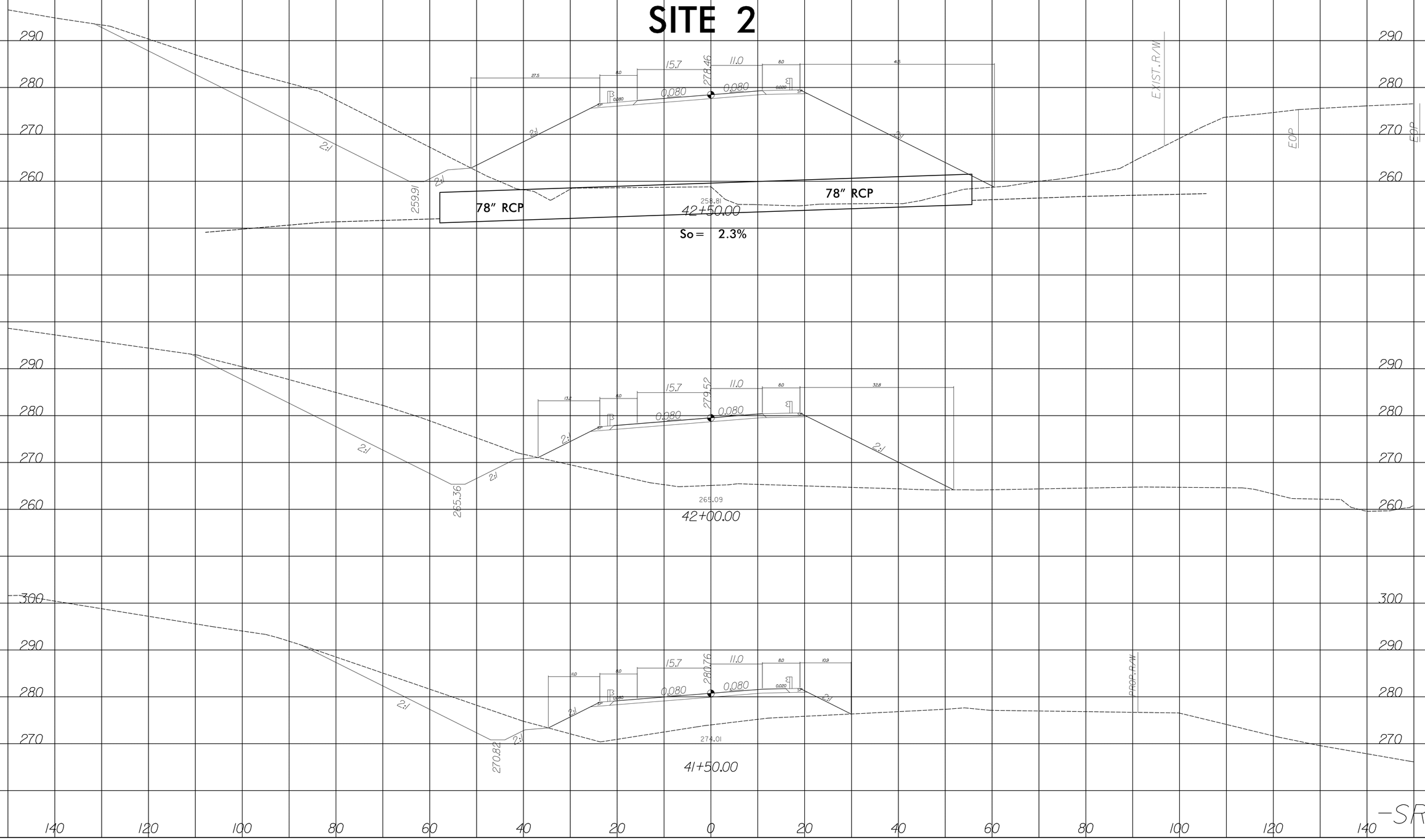
PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-399

PERMIT DRAWING
SHEET 62 OF 71

SITE 2



-SR1-

8/23/99

$DATES
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rrobbi

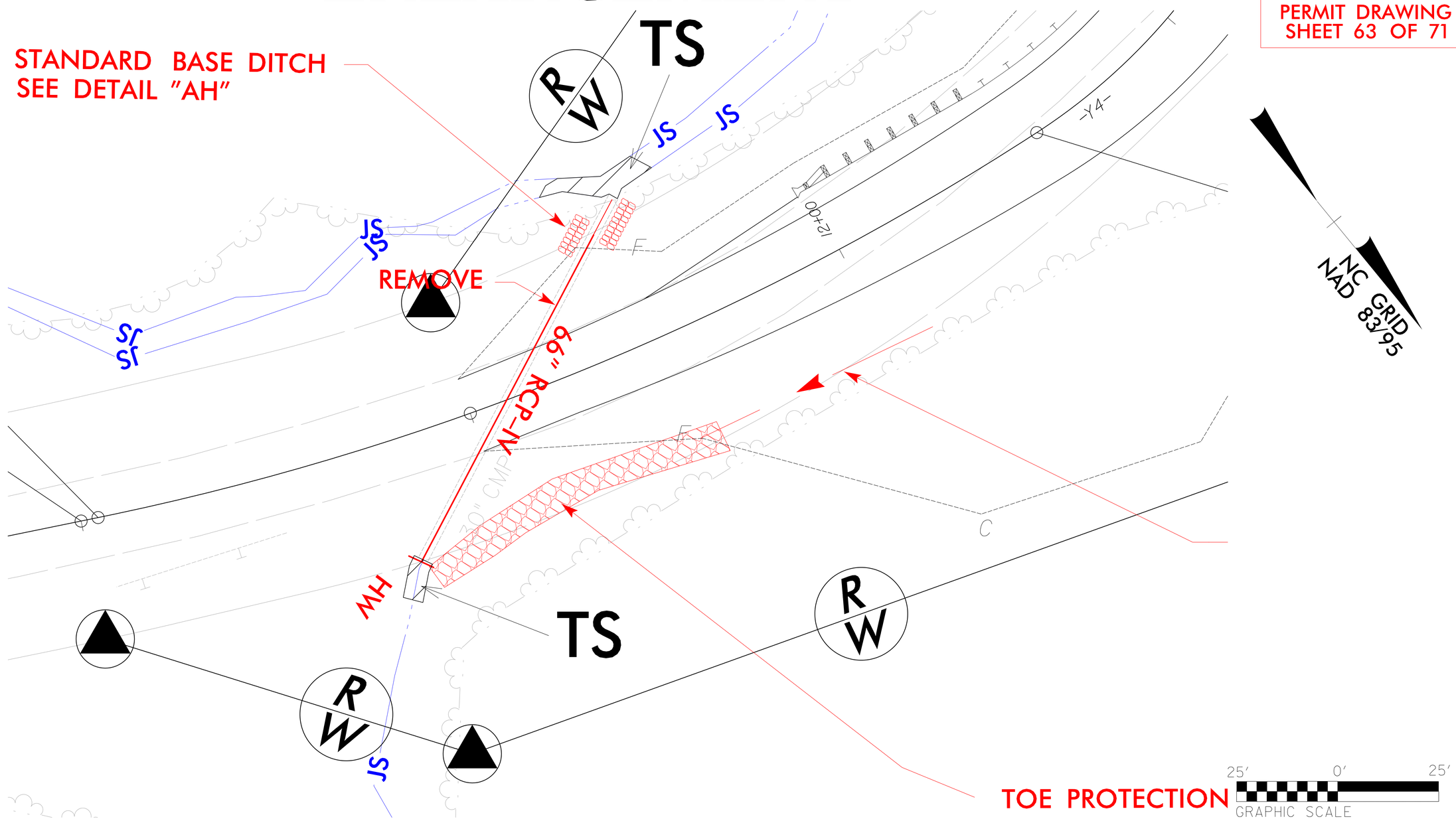
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 63 OF 71

SITE 2A ENLARGEMENT



TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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$FILEL$

REVISIONS

8/17/99

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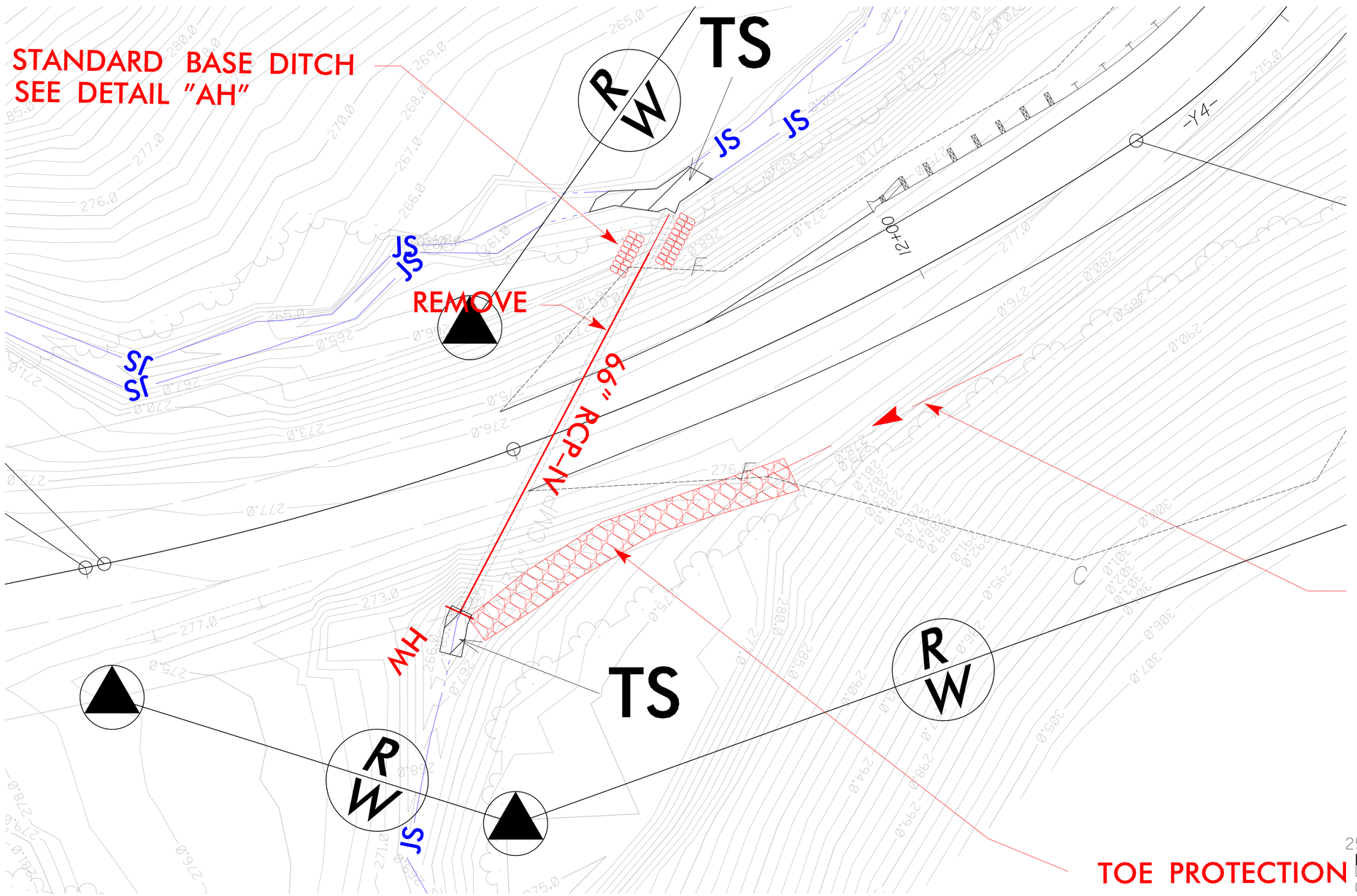
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 64 OF 71

SITE 2A ENLARGEMENT



TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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8/17/99

REVISIONS

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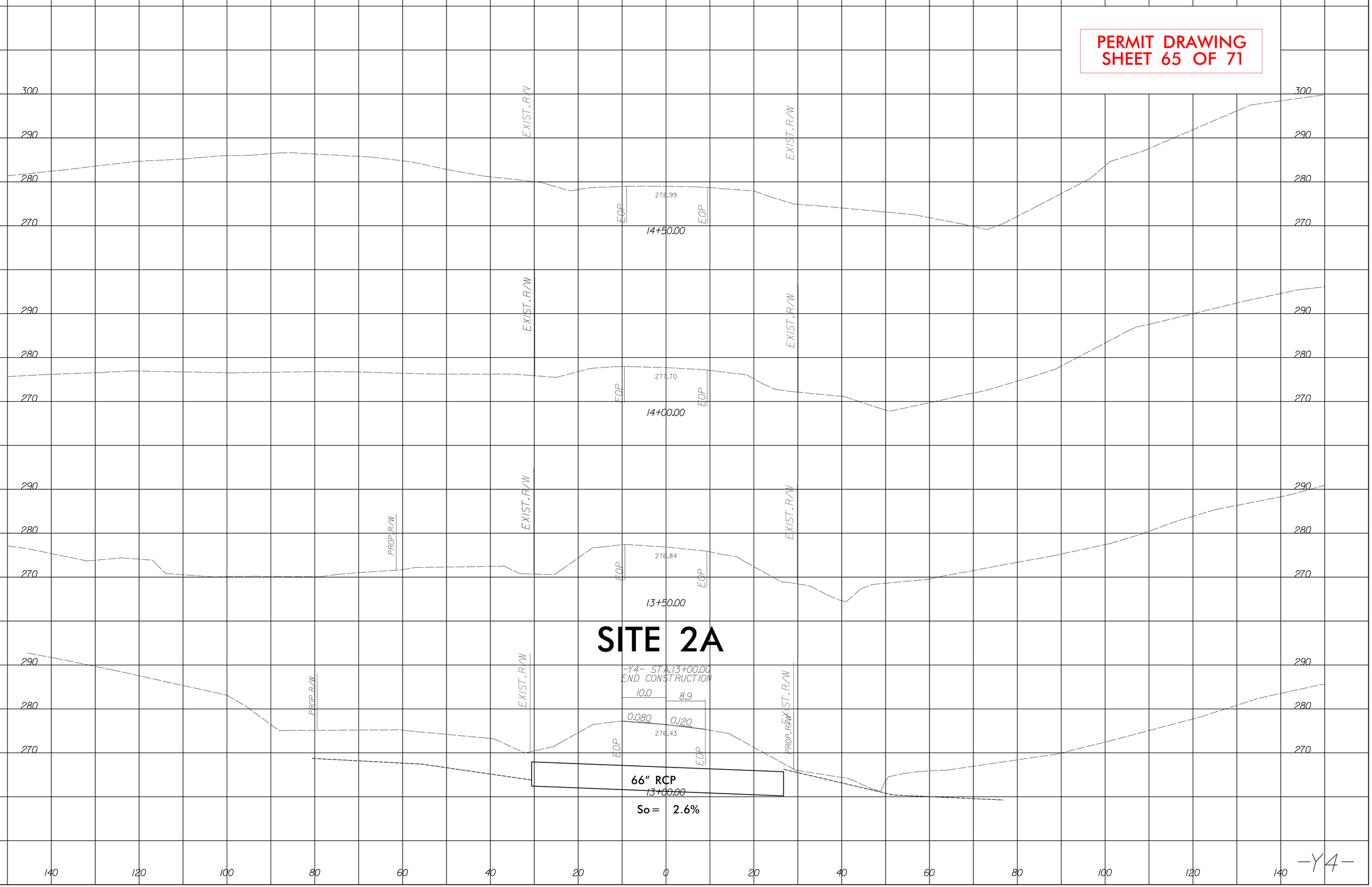
PROJ. REFERENCE NO.	SHEET NO.
R-3421B	X-408

0 10

PERMIT DRAWING
SHEET 65 OF 71



PROJECT REFERENCE NO.	SHEET NO.
R-3421B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MULKEY ENGINEERS & CONSULTANTS
PO Box 33127
Raleigh, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM

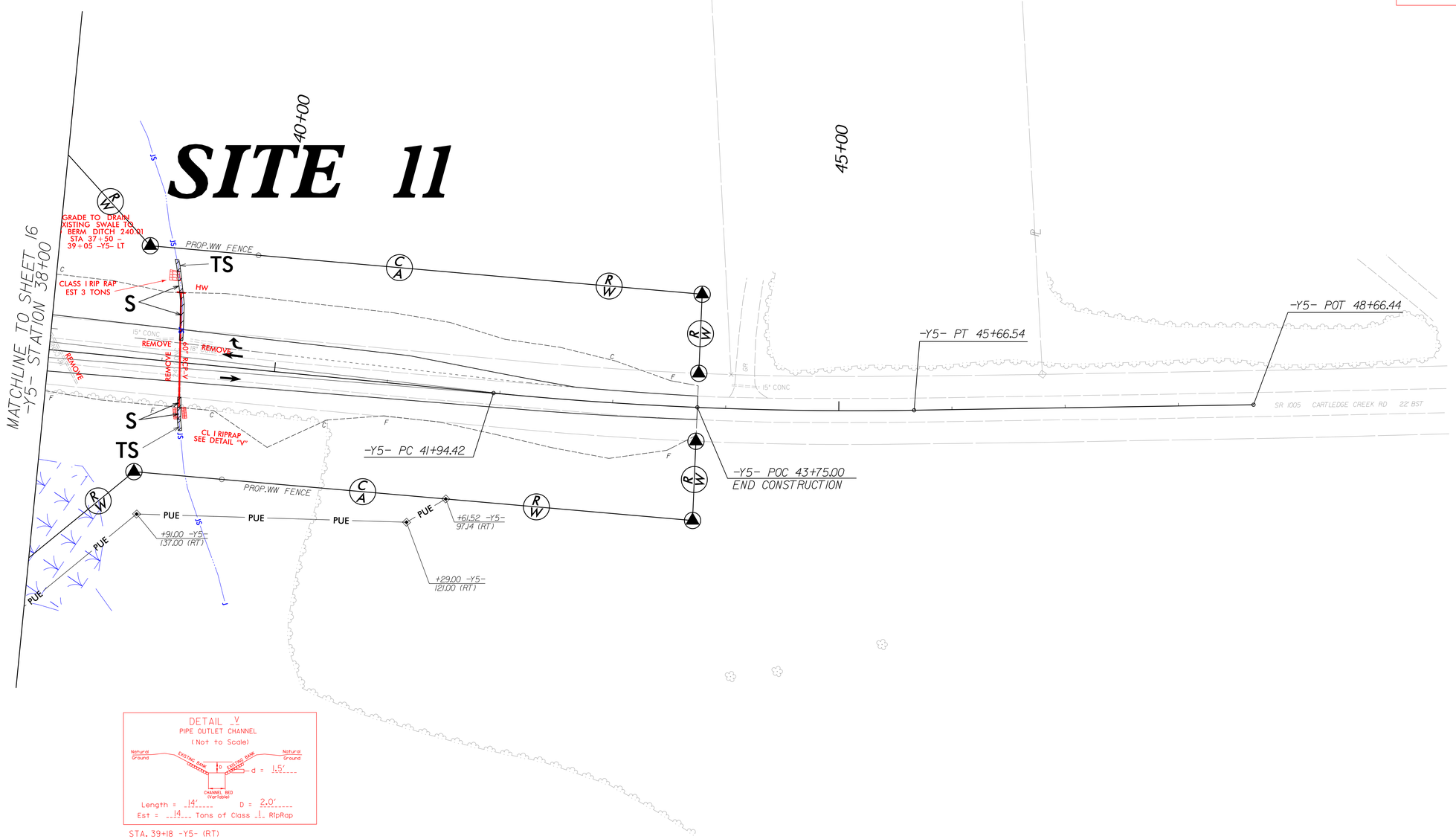
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 66 OF 71

NC GRID
NAD 83/95

SITE 11



S DENOTES IMPACTS IN SURFACE WATER

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50' 150' 200'
GRAPHIC SCALE

REVISIONS

8/17/99

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[rrobb]

$DATE$
$(USERNAME)$
$FILEL$

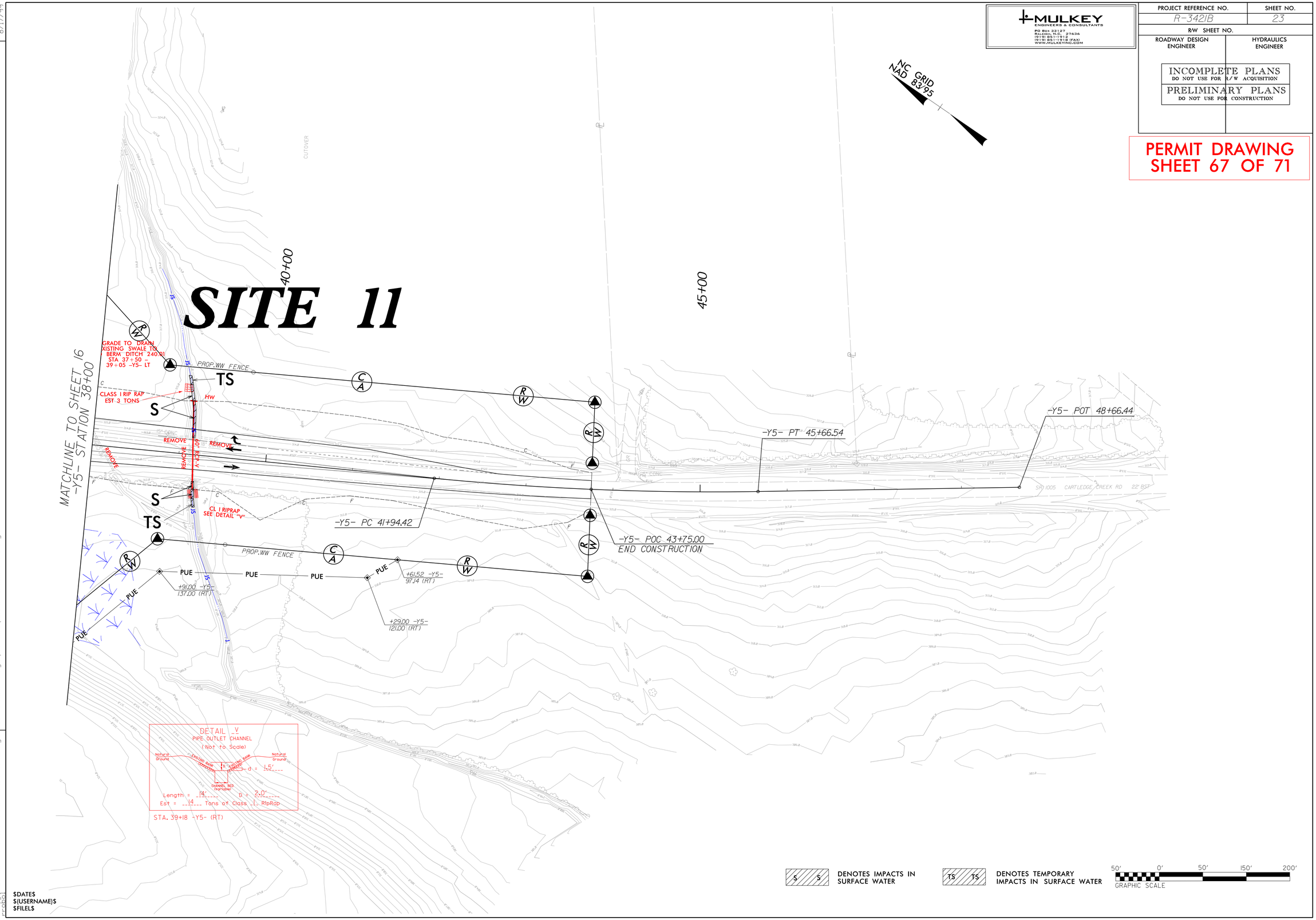
MULKEY ENGINEERS & CONSULTANTS
PO Box 33127
Raleigh, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	23
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 67 OF 71



REVISIONS

8/17/99

$DATE$
$(USERNAME)$
$FILEL$

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proj61

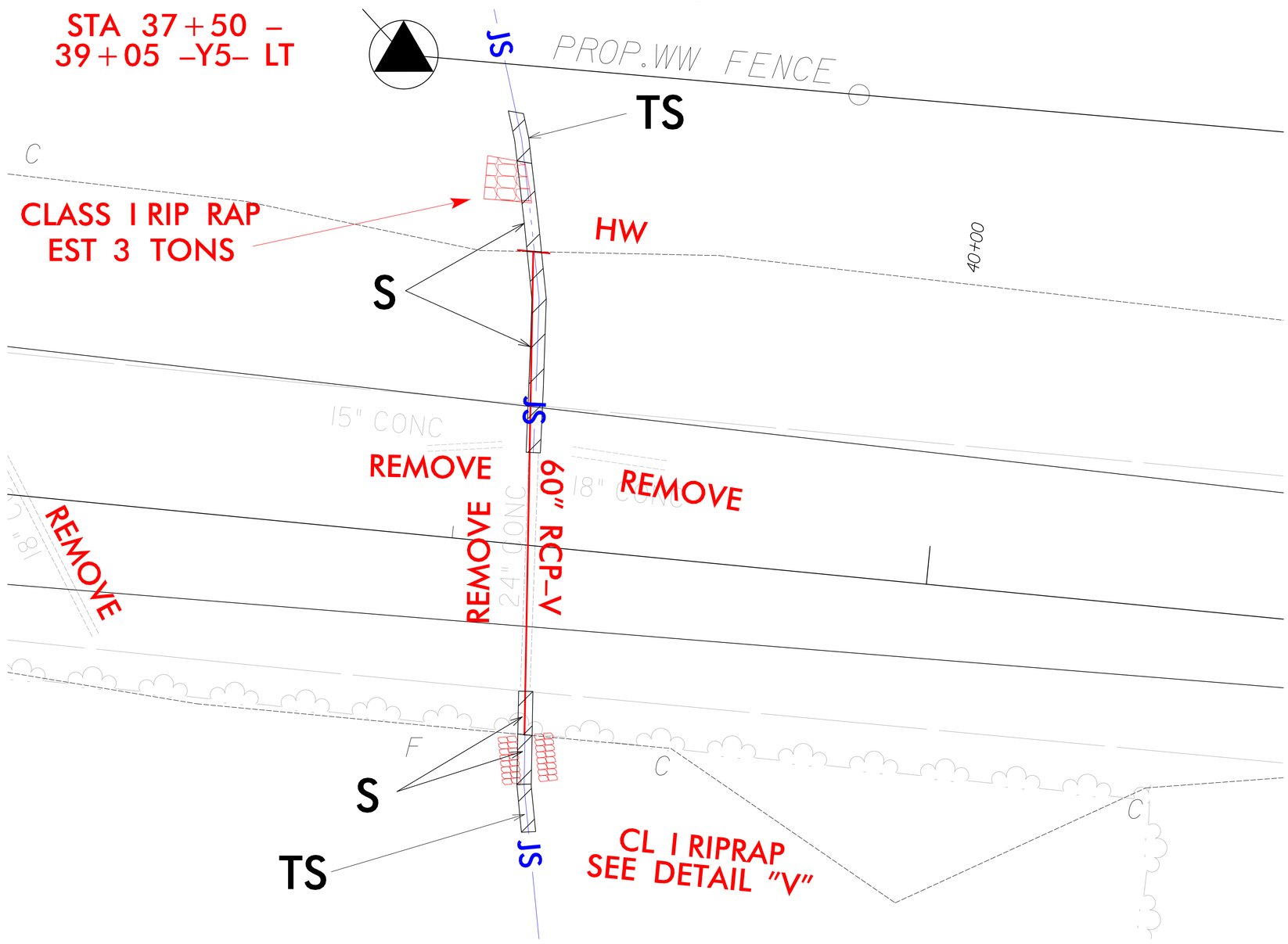
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 68 OF 71

SITE 11 ENLARGEMENT



25′ 0′ 25′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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(rcbb)

$DATE$
$(USERNAME)$
$FILEL$

SITE 11 ENLARGEMENT

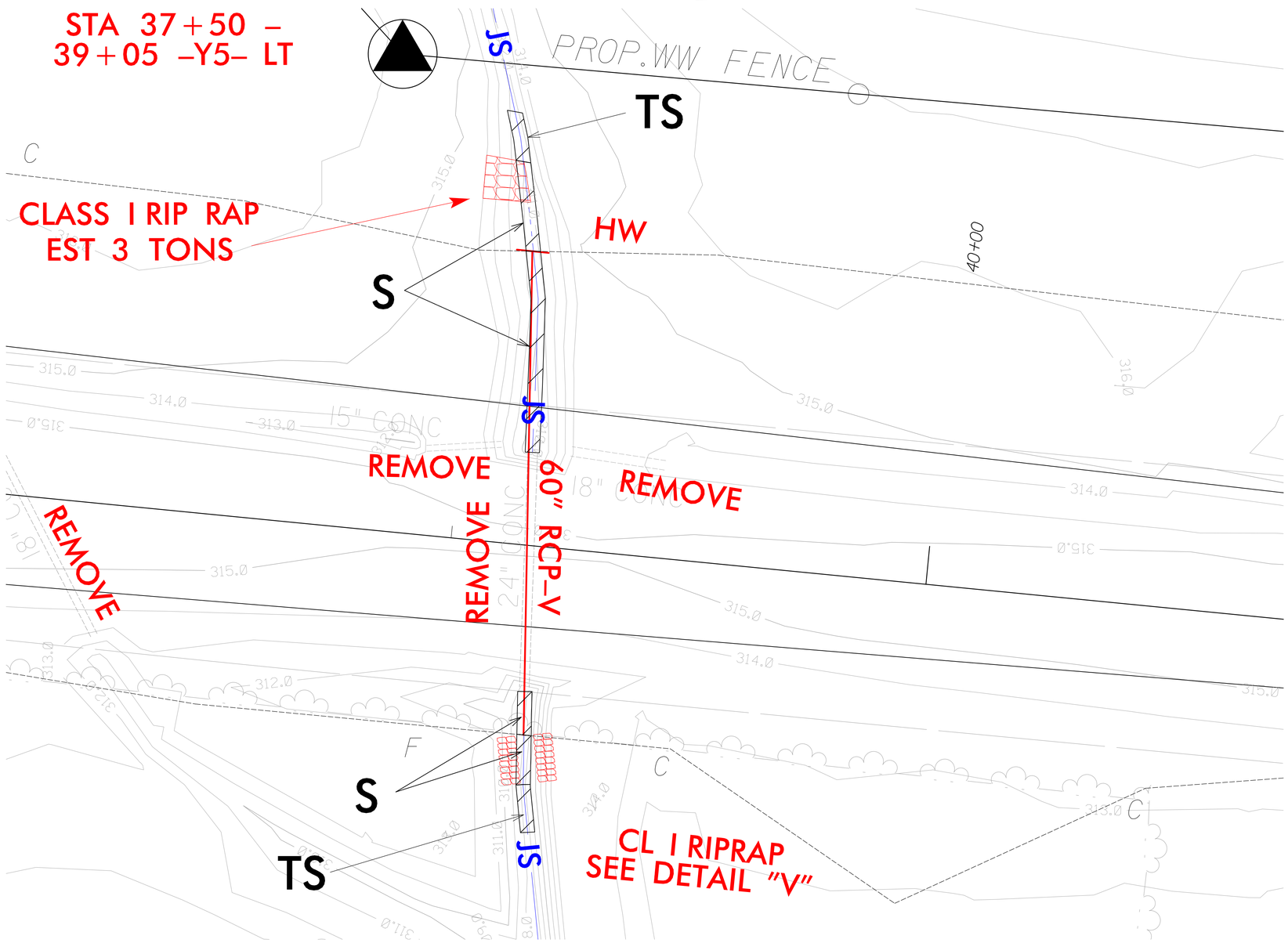
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 69 OF 71

NC GRID
NAD 83/95



25′ 0′ 25′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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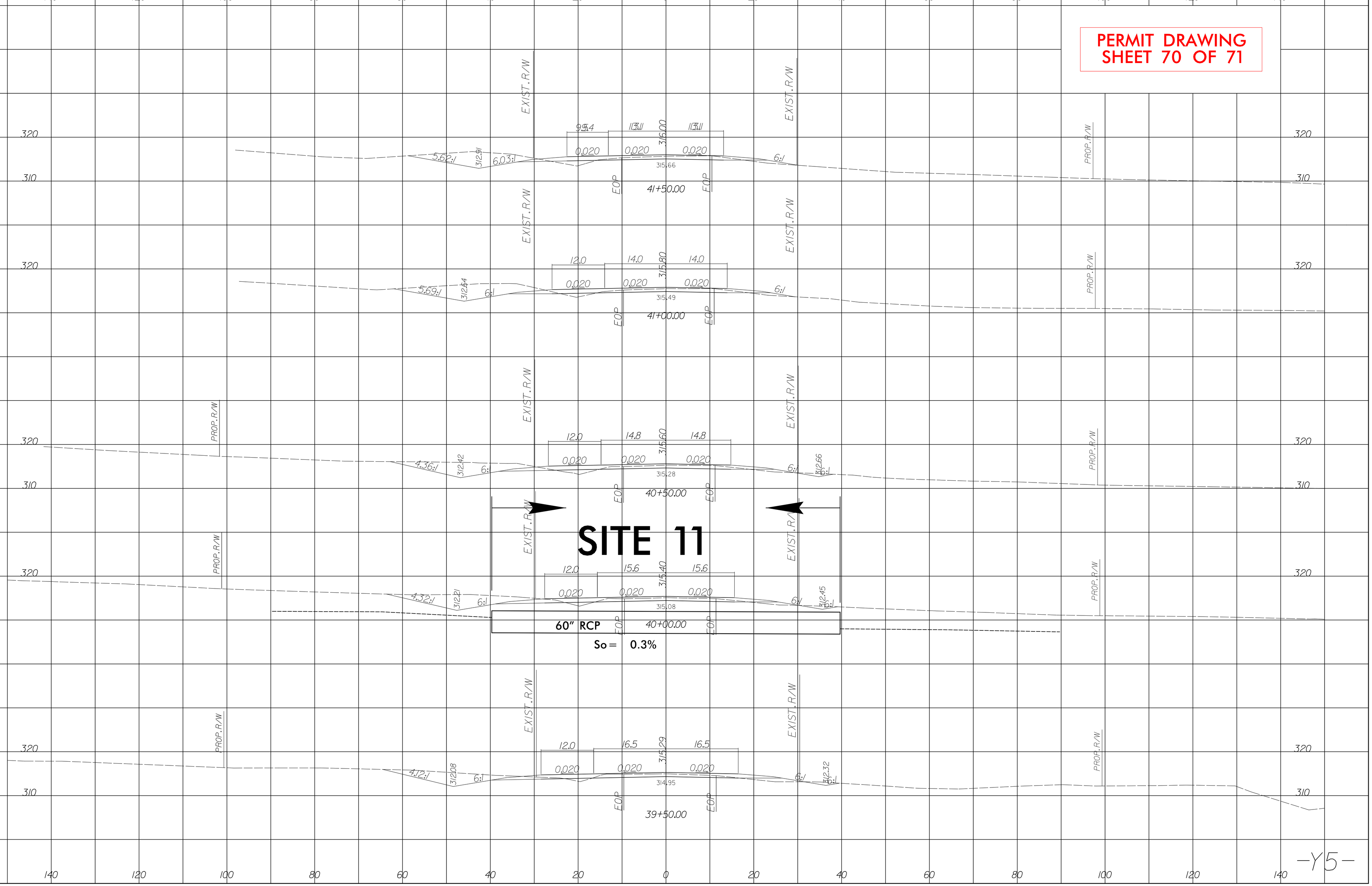
$FILEL$

PERMIT DRAWING
SHEET 70 OF 71



Revised 8/6/19

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	147+09 / 150+26 -L-	PROP 30" RCP	0.23			0.01		< 0.01	< 0.01	23	10	
	150+12 / 150+21 -L-	BANK STABILIZATION						< 0.01		10		
2	42+28 / 43+89 -SR1-	PROP 78" RCP						0.03	< 0.01	178	20	
	43+54 / 43+81 -SR1-	BANK STABILIZATION						< 0.01		23		
2A	12+29 / 13+29 -Y4-	PROP 66" RCP							< 0.01		36	
3	165+85 / 167+99 -L-	PROP PIPE SYSTEM	0.03					0.05	< 0.01	560	21	
	167+30 / 167+43 -L-	BANK STABILIZATION						< 0.01		18		
4	177+50 / 179+71 -L-	PROP 48" RCP	0.06			< 0.01		0.04	< 0.01	372	22	
	179+46 / 179+65 -L-	BANK STABILIZATION						< 0.01		25		
5	215+90 / 217+35 -L-	PROP 72" RCP						0.08	< 0.01	659	23	
	217+29 / 217+34 -L-	BANK STABILIZATION						< 0.01		10		
6	218+57 / 219+34 -L-	ROADWAY FILL	0.09			< 0.01						
7	228+51 / 231+25 -L-	PROP 72" RCP						0.07	< 0.01	598	34	
	231+07 / 231+15 -L-	BANK STABILIZATION						< 0.01		12		
8	233+83 / 238+88 -L-	PROP 3@9'X9' RCBC						0.17	0.05	578	161	
	234+16 / 238+31 -L-	BANK STABILIZATION						0.05		125		
9	22+48 / 23+27 -Y5-	PROP 42" RCP	0.10			0.01						
10	299+77 / 310+33 -L-	PROP PIPE SYSTEM	0.76		0.03	0.08		0.02	< 0.01	339	11	
11	39+03 / 39+23 -Y5-	PROP 60" RCP						< 0.01	< 0.01	51	21	
	39+05 / 39+22 -Y5-	BANK STABILIZATION						< 0.01		30		
12	350+69 / 355+83 -L-	ROADWAY FILL & RIP RAP PADS	2.25			0.14						
TOTALS*:			3.51		0.03	0.26		0.53	0.07	3611	359	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/30/2019
RICHMOND COUNTY
R-3421B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

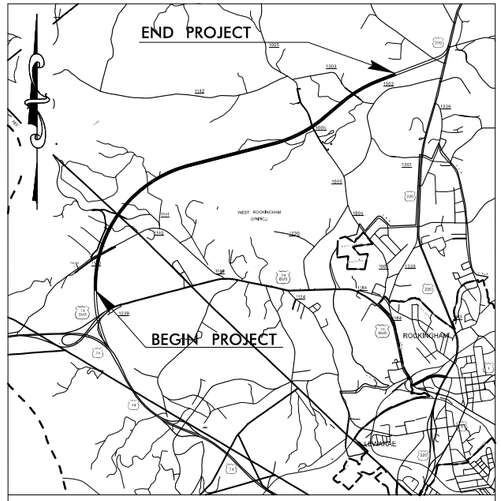
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3421B	1	5

WBS NO.	F.A. PROJ. NO.	DESCRIPTION
34542.1.FR3	NHF-0220(76)	P.E.
34542.2.3	NHF-0220(43)	R /W & UTIL.
34542.3.7	NHF-0220(43)	CONST.

RICHMOND COUNTY

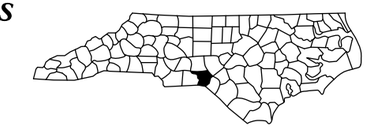
LOCATION: I-73/74 FROM 0.3 MILES SOUTH OF SR 1140 (OLD CHARLOTTE HIGHWAY) TO 0.2 MILES SOUTHWEST OF SR 1304 (HARRINGTON ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERTS & STRUCTURES

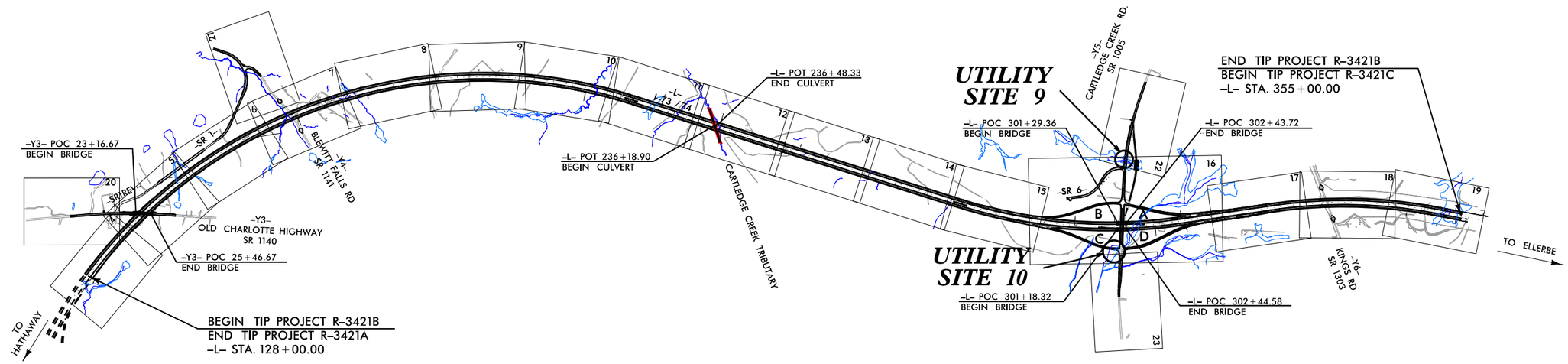


VICINITY MAP

WETLAND AND SURFACE WATER UTILITY IMPACTS PERMIT



NC GRID NAD 83/95



NOTE:
THIS PROJECT IS A CONTROLLED ACCESS PROJECT WITH ACCESS LIMITED TO THE INTERCHANGE.

TIP PROJECT: R-3421B

CONTRACT: C204368

09/08/99

3:32:33 PM
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arender

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 2019 = 11,850
ADT 2040 = 21,900
K = 10 %
D = 60 %
T = 26 % *
V = 70 MPH
* 17% TTST + 9% DUAL
FUNC CLASS = INTERSTATE
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3421B	=	4.270 MILES
LENGTH STRUCTURES TIP PROJECT R-3421B	=	0.029 MILES
TOTAL LENGTH TIP PROJECT R-3421B	=	4.299 MILES

Prepared in the Office of:
CALYX ENGINEERS + CONSULTANTS
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 23, 2009

LETTING DATE:
OCTOBER 2019

JOHNNY BANKS
CALYX E & C PROJECT MANAGER

STEPHEN C. BROWDE, PE
CALYX E & C PROJECT DESIGN ENGINEER

NCDOT CONTACT: GREGORY S. DAVIS, PE
PROJECT MANAGER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

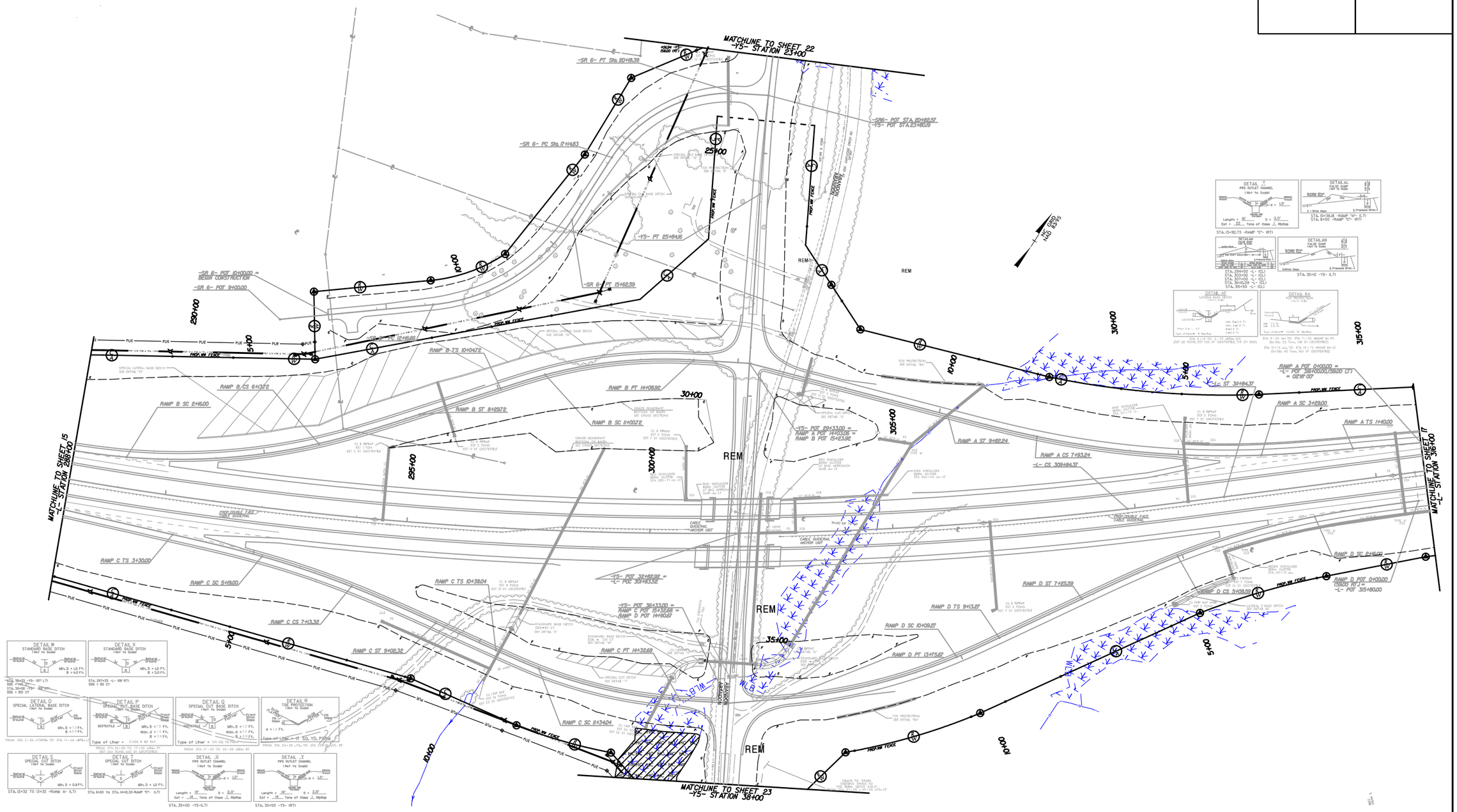
ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT REFERENCE NO.	SHEET NO.
R-3421B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

WETLAND AND SURFACE WATER UTILITY IMPACTS
SHEET 2 OF 5



SITE 10

SEE PSH 23 FOR CONTINUATION OF SITE 10

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$(USERNAME)$
$FILE1$

HC HC DENOTES HAND CLEARING

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-3421B	22
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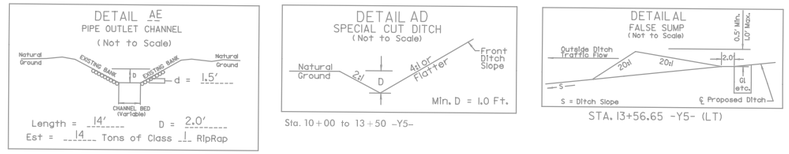
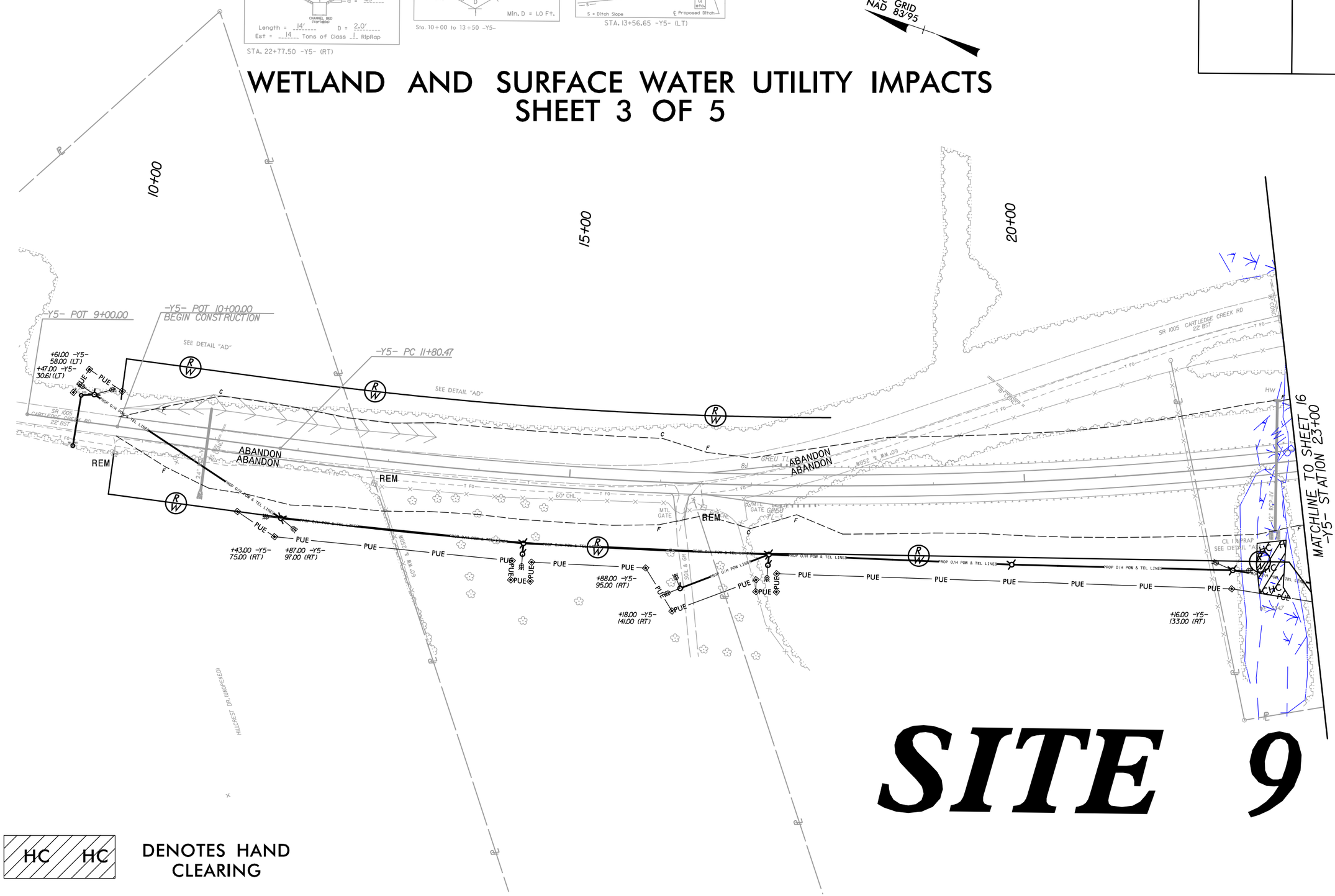
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



WETLAND AND SURFACE WATER UTILITY IMPACTS
SHEET 3 OF 5



HC HC DENOTES HAND CLEARING

REVISIONS

8/17/99

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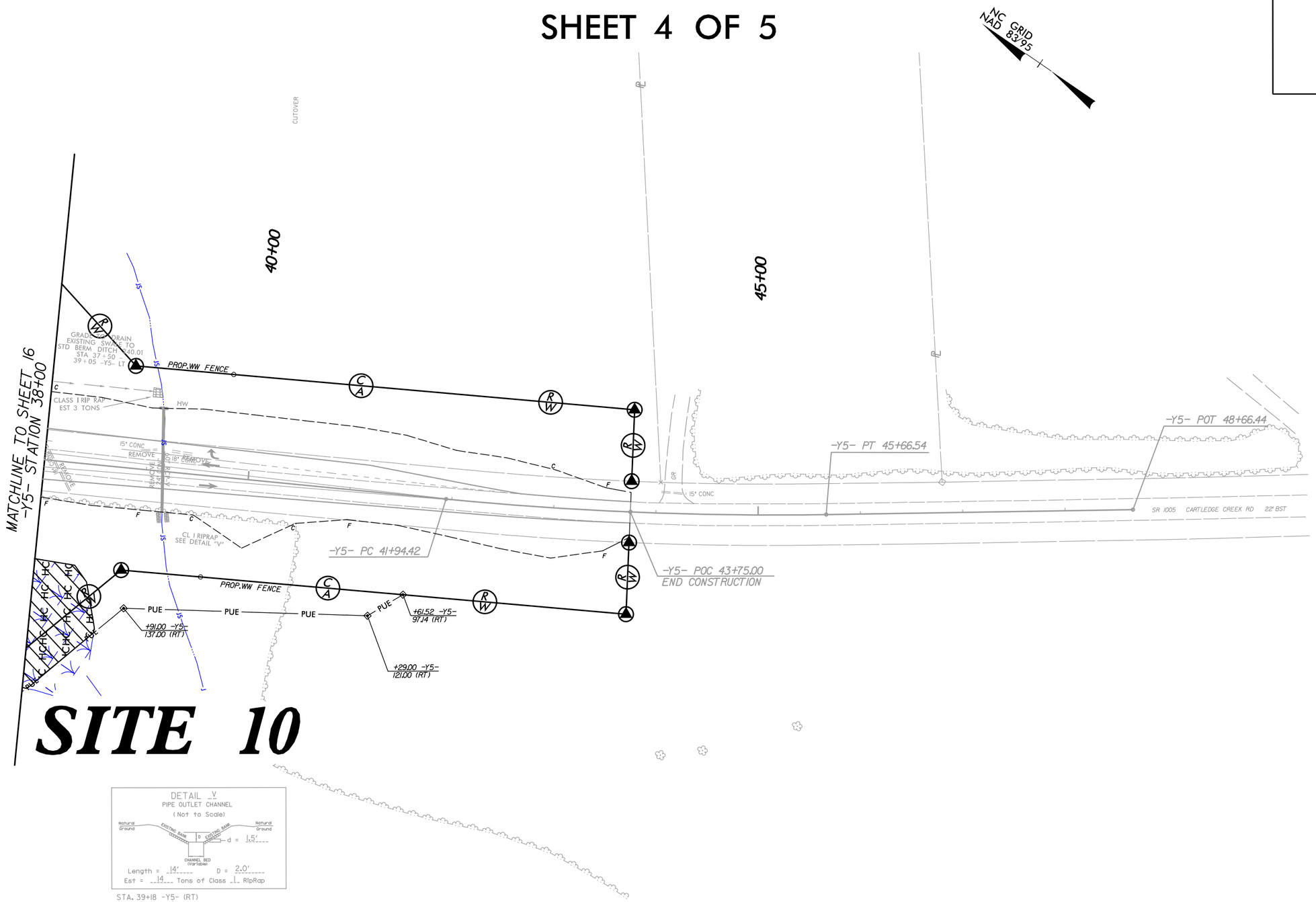
PROJECT REFERENCE NO.	SHEET NO.
R-3421B	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

WETLAND AND SURFACE WATER UTILITY IMPACTS
SHEET 4 OF 5



HC HC DENOTES HAND CLEARING

REVISIONS

8/17/99

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WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
9	22+48/22+79 -Y5-						0.04					
10	299+40/301+03 -L-						0.44					
TOTALS*:							0.48			0	0	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/16/2019
RICHMOND
R-3421B
34542.2.3
SHEET 5 OF 5

Revised 2018 Feb