



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT L. MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

May 21, 2014

Wilmington Regulatory Field Office
US Army Corp. of Engineers
69 Darlington Avenue
Wilmington, NC 28403

N.C. Dept. of Environment & Natural Resources
Division of Coastal Management
400 Commerce Avenue
Morehead City, NC 28557

ATTN: Brad Shaver
NCDOT Coordinator

ATTN: Stephen Lane
NCDOT Coordinator

Dear Sirs':

Subject: **Modification Request for Section 404 Nationwide Permit 23, Section 10 Permit, CAMA Major Development Permit, and Section 401 Water Quality Certification** for proposed widening of the US 17-74-76/NC 133 from the NC 133/SR 1472 Interchange to the US 421/NC 133 Interchange, Brunswick County. Federal Aid Project No. NHS-0017(68); TIP No. R-3601.

Debit \$240.00 from WBS Element 38868.1.1

References: R-3601 404/401/CAMA permit application dated April 26, 2013
R-3601 Nationwide Permit 23 and 5, issued August 19, 2013 (SAW-2007-03461-010)
R-3601 Major CAMA permit, issued August 2, 2013 (#89-13)
R-3601 401 Water Quality Certification, issued May 16, 2013 (DWR# 13-0472)

The purpose of this letter is to request modification of the issued permits on this project to account for design changes and approved moratorium in-water work methods. Please find enclosed revised permit drawings, sturgeon concurrence letter from the National Marine Fisheries Service, and agency correspondence regarding construction methods for the above referenced project. Please replace permit drawings from the original submittal with the full set included with this modification request.

As you are aware, the North Carolina Department of Transportation (NCDOT) proposes to widen US 17-74-76/NC 133 from the NC 133/SR 1472 Interchange to the US 421/NC 133 Interchange by adding one auxiliary lane in each direction. This project involves the

replacement of two bridges over the Brunswick River with one bridge carrying both travel directions. Additionally, the northbound bridge over Alligator Creek will be replaced and the southbound structure will be widened. To further alleviate congestion problems, a second auxiliary lane in the northbound direction will be added.

There will be 0.41 acre of permanent impacts to riparian wetlands resulting from fill, excavation, and mechanized clearing resulting from project construction, of which 0.03 acre are impacts to CAMA wetlands. This is a decrease from the previous permit which allowed for 0.44 acre of permanent impacts to wetlands of which 0.04 were impacts to CAMA wetlands. A total of 105 linear feet of permanent stream impacts are also anticipated; this is a decrease from the 185 linear feet that were previously permitted. A revised EEP acceptance letter showing the decrease in impacts will be forwarded to you upon receipt.

The permanent impact area due to bridge bents will be 0.03 acre which is a 0.01 acre increase from the previous permit. The design bridges will have fewer columns than previously permitted however the diameter is greater. This change was necessary in order to construct the structures and comply with the in-water work moratorium. Temporary work bridges will also be necessary to construct and improve bridges on this project. The existing clearances will be maintained on both the Alligator and Brunswick Rivers.

A primary nursery area in-water work moratorium will be observed from January 1 to June 30 for Alligator Creek and from January 1 to September 30 for the Brunswick River. Limited in-water construction methods to be used during the in-water moratorium include working inside of casings, static pile extraction, spudding associated with barges, removal of piles using a vibratory hammer, and installation of casings using the screwing in method (see attached memo and correspondence).

Regulatory Approvals

CAMA: NCDOT requests that the Coastal Area Management Act (CAMA) Major Development permit (#89-13) issued on August 2, 2013 be modified to account for a decrease in impacts and change in approved in-water work methods during the moratorium as noted above.

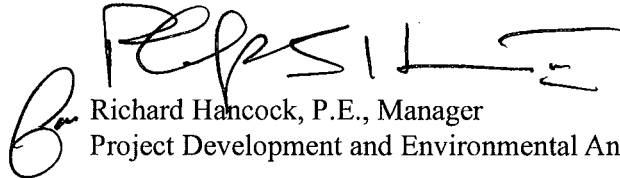
Section 404 Permit: All aspects of this project are being processed by the Federal Highway Administration as a "Categorical Exclusion" in accordance with 23 CFR 771.115(b). The NCDOT requests that these activities be re-issued under the existing Nationwide Permit 23 (refer to NWP 23 issued on August 19, 2013 SAW-2007-03641-010).

Section 401 Permit: We anticipate 401 General Certification number 3891 will apply to this project as it was previously permitted (refer to 401 Water Quality Certification issued on May 16, 2013 DWQ#: 13-0472). All general conditions of the Water Quality Certification will continue to be met. NCDOT is providing this application to the NCDWR for their review and approval.

A copy of this permit modification request will be posted on the NCDOT Website at:
<https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx> under Quick Links >
Permit Applications

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Amy James at aejames2@ncdot.gov or (919) 707-6129.

Sincerely,


Richard Hancock, P.E., Manager
Project Development and Environmental Analysis Unit

cc: NCDOT Permit Application Standard Distribution List

To: Amy James

From: Melissa Ruiz

NCDOT, Natural Environment Section

801 Jones Franklin Rd.
Raleigh, NC 27606

File:

Date: March 7, 2014

Reference: NCDOT R-3601 Brunswick River and Alligator Creek Bridge Replacements and Widening Construction Methods

This memo is to follow-up on the construction methods discussion that took place during the Environmental Pre-construction meeting on March 3, 2014. Constructability of the project has been an issue especially considering the in-water work moratorium in place on Alligator Creek (1/1 – 6/30) and the Brunswick River (1/1 – 9/30). In an effort to improve constructability, and protect the environment around these project sites, our team is requesting permission to use certain construction methods for in-water work that are currently prohibited during in-water work moratorium periods. The use of some of these methods during moratoriums have already been approved and included in permits (Item 2 on permit #89-13 from DENR/CRC) or the Environmental Scope of Work from NCDOT (Items 1-3) while others were discussed during our meeting on March 3. So that we may facilitate the permit application approval process in April/May 2014, we are presenting a comprehensive list of the construction methods in order of importance that our team would like to utilize for in-water work during the moratorium periods:

1. Working inside of casings year round – Use of this method is considered an exception from the moratorium according to the Design-Build contract with NCDOT.
2. Static pile extraction – Use of this method was considered an exception from the moratorium according to the Design-Build contract with NCDOT. This method of extraction is useful for some activities such as spudding. However, due to the characteristics of the substrate and sediment located in the waterways, using this method to remove existing piles and temporary work bridges will likely lead to pile fractures as they are pulled.
3. Spudding associated with barges – Use of this method was considered an exception from the moratorium according to the Design-Build contract with NCDOT.
4. Removal of piles using vibratory hammer – According to the NMFS concurrence letter (received by NCDOT 11/6/2013 and provided as an attachment to this memo) in the Project Effects section, the extraction of existing piles by vibratory hammer shall be considered an exception to the in-water moratorium.
5. Installation of casings using the screwing in method – Specific information regarding this method was provided to regulatory agencies. In response to the information, NMFS indicated “route of potential adverse effects from the design modification (i.e., the augering) proposed to be implemented during the in-water moratorium period” (communication with Eric Hawk, NMFS, 2/19/2014 and provided as an attachment to this memo).
6. Installation of piles using vibratory hammer – According to the NMFS concurrence letter (received by NCDOT 11/6/2013 and provided as an attachment to this memo), “vibratory driving of piles or bridge

Reference: NCDOT R-3601 Brunswick River and Alligator Creek Bridge Replacements and Widening Construction Methods

support structures, or removal of old bridge structures, generates a continuous but low-level noise and is unlikely to cause more than noninjurious, insignificant behavioral effects to sturgeon.”

7. Installation of casings using vibratory hammer – This method is very similar to Item 6 with the exception that it will take slightly more time as the casings for the bridges must penetrate into the PeeDee substrate while piles for temporary work bridges may not be installed to the same depth.

One of the principal objectives of the bridge designs adopted by our Team for this project has been to minimize the amount of all in-water work. Results of our efforts have led to a reduction in the total number of pier columns that will be in the water. Project R-3601 was permitted under the Department’s design with 45 columns in water at Brunswick River and 28 columns in water at Alligator Creek. Under our design, we propose to place 26 columns at Brunswick River and 18 columns at Alligator Creek within the banks of these waterways, yielding a total net reduction of 29 columns that will be constructed in the water.

Our Team would also like to share that the actual time of casing and pile construction in the water will represent a fraction of the time that the contractor’s forces will be at work on placement of these bridge foundation elements. While this is an approximate percentage, we estimate 25% of the total time the contractor is installing casings and piles will actually involve vibrating or screwing these structures into place. The majority of the time required to perform this work will be devoted to moving equipment, splicing casings and pile segments, and setting up for each installation.

As a final benefit to the environment, the ability to use some or all of these construction methods during moratorium periods should serve to decrease the length of time that the temporary bridges will remain in place during the course of the project.

With low levels of noise and vibration, minimal disturbance of bed materials, and no pile driving or casing installations with impact hammers at any time while in the water, our Team believes that the flexibility offered through the use of these construction methods described in this memorandum will enable construction work for bridge foundations in the least amount of time. We appreciate having this opportunity to describe our proposed construction procedures in greater detail. If you or any one of the individual agencies would like to bring specific questions to us, please do not hesitate to contact me.

STANTEC CONSULTING SERVICES INC.



Melissa Ruiz
Senior Environmental Scientist
Phone: (919) 865-7529
Fax: (919) 851-7024
melissa.ruiz@stantec.com

Attachment: NMFS Concurrence Letter

Ruiz, Melissa

From: Baker, Jessi E <jessi.baker@ncdenr.gov>
Sent: Friday, March 28, 2014 4:06 PM
To: Wilson, Travis W.; James, Amy E; brad.e.shaver@usace.army.mil; Herndon, Mason; Lane, Stephen
Cc: Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M
Subject: RE: R-3601 proposed modifications to in-water work during moratorium

I concur with WRC that I do not support installation using vibratory hammer during the moratorium.

Jessi Baker, Fisheries Resource Specialist
NC Division of Coastal Management
400 Commerce Avenue
Morehead City, NC 28557
(252) 808-2808 ext. 213
jessi.baker@ncdenr.gov

Please visit www.nccoastalmanagement.net to subscribe to Coastal Management's quarterly newsletter, the CAMAgram.

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Wilson, Travis W.
Sent: Friday, March 28, 2014 3:47 PM
To: James, Amy E; brad.e.shaver@usace.army.mil; Herndon, Mason; Lane, Stephen
Cc: Baker, Jessi E; Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M
Subject: RE: R-3601 proposed modifications to in-water work during moratorium

WRC does not support pile or casing installation by vibratory hammer during the moratorium. WRC was not supportive of allowing vibratory extraction, but we were amenable due to concerns raised regarding the safety and ability to static pull. Being sympathetic to the need for some relief on the time restrictions we felt like that was a reasonable compromise. Also, we have agreed to allow casings to be installed during the moratorium by screwing them in, under an assumption that the effects will be minimal because they should be similar to what occurs inside the casing. Although this is not an unreasonable assumption, it does constitute in water work of which the affects on fish migration have not been studied. This was the second concession to the in water work moratorium. Allowing the additional in water work would further undermine the remaining conservation measures in place to protect fish migration through this area. Without reasonable justification I cannot agree to the use of vibratory installation during the in water work moratorium.

NOTE: NEW PHONE NUMBER AND MAILING ADDRESS

Travis W. Wilson
Eastern Region Highway Project Coordinator
Habitat Conservation Program
NC Wildlife Resources Commission
1718 Hwy 56 West
Creedmoor, NC 27522

Phone: 919-707-0370
Fax: 919-528-2524
Travis.Wilson@ncwildlife.org

From: James, Amy E
Sent: Friday, March 28, 2014 10:20 AM
To: Wilson, Travis W.; brad.e.shaver@usace.army.mil; Herndon, Mason; Lane, Stephen
Cc: Baker, Jessi E; Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M
Subject: RE: R-3601 proposed modifications to in-water work during moratorium

Hi all,

I'm forwarding the memo from our design-build contractor that I sent out about two weeks ago discussing proposed in-water work allowed during the moratorium since I've only heard from Travis since then. I really need your input before the contractor commits to certain construction methods/timelines—the main takeaways from this memo are thus:

- The first four proposed exceptions to work in-water during the moratorium were informally agreed upon during the design-build bid/concurrence process (work inside casings, static and vibratory pile extraction, and spudding);
- The fifth proposal (casing 'screw-in') has been discussed recently and was approved by some (but not all) parties, pending other issues (acoustic monitoring);
- The sixth proposal (pile installation by vibratory hammer) has not really been discussed before now (and hence, is not approved) and is mainly an issue for installing piles for temporary workbridges;
- The seventh proposal (casing installation by vibratory hammer) has also not been proposed before now, though I'm not sure whether the casings will have been 'screwed in' beforehand.

I know the last two proposals are for activities that generally do not receive moratorium exceptions, but I am doing due diligence and forwarding the requests to you for review. If I can go back to the contractor with some concrete feedback, I think it will help them in formulating their permit application/modification that is slated to be submitted towards the end of April.

Please 'reply all' since I will be out of the office all of next week. Thank you for your help and patience during this process.
Amy

From: Wilson, Travis W.
Sent: Thursday, March 20, 2014 3:40 PM
To: James, Amy E; brad.e.shaver@usace.army.mil; Herndon, Mason; Lane, Stephen
Cc: Baker, Jessi E; Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M
Subject: RE: R-3601 proposed modifications to in-water work during moratorium

I do not recall WRC agreeing to pile installation during the moratorium by use of vibratory hammer.

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Travis W. Wilson
Eastern Region Highway Project Coordinator
Habitat Conservation Program
NC Wildlife Resources Commission
1718 Hwy 56 West
Creedmoor, NC 27522
Phone: 919-707-0370

Fax: 919-528-2524
Travis.Wilson@ncwildlife.org

From: James, Amy E
Sent: Thursday, March 13, 2014 2:07 PM
To: brad.e.shaver@usace.army.mil; Herndon, Mason; Lane, Stephen
Cc: Wilson, Travis W.; Baker, Jessi E; Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M
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Hi All,

Attached to this email is a memo from our contractor, Stantec, that outlines in-water construction methods it would like to use during the sturgeon and/or PNA moratoriums. One of these is already explicitly stated in the CAMA permit (static pull), some have only been informally approved by resource agencies (spudding, vibratory pull, etc.) and at least two (#6 and #7) have been discussed in theory and are only proposals by the contractor at this point. This memo is an effort to reduce any 'surprises' in the permit modification process, so your comments and feedback are needed. Please let me know if you have any questions and I'll do my best to answer them.

Thanks,
Amy

Amy James
Biologist, Project Management
NCDOT, Natural Environment Section
Direct 919.707-6129
aejames@ncdot.gov

Email correspondence to and from this sender is subject to the N.C. Public Records Law and may be disclosed to third parties.

Ruiz, Melissa

From: Lane, Stephen <stephen.lane@ncdenr.gov>
Sent: Friday, March 28, 2014 4:48 PM
To: James, Amy E; Wilson, Travis W.; brad.e.shaver@usace.army.mil; Herndon, Mason
Cc: Baker, Jessi E; Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M; Sollod, Steve
Subject: RE: R-3601 proposed modifications to in-water work during moratorium

Hi Amy,

Thanks for sending your email summarizing the contractor's proposal. The DCM has reviewed the draft proposal, and after consultation with our fisheries resource agencies and much internal discussion, we have concluded that we could agree to the first five proposed exceptions to the moratoria if officially requested in a permit modification request. DCM has also concluded that the six and seventh proposed exceptions do not appear to be appropriate for this project and would likely not receive permit approval. I hope you find this guidance helpful in formulating your anticipated permit modification request. If I may be of any further assistance, please let me know.

Sincerely,

Stephen Lane
Coastal Management Representative

From: James, Amy E
Sent: Friday, March 28, 2014 10:20 AM
To: Wilson, Travis W.; brad.e.shaver@usace.army.mil; Herndon, Mason; Lane, Stephen
Cc: Baker, Jessi E; Eric Hawk - NOAA Federal (eric.hawk@noaa.gov); Rivenbark, Chris; Mccauley, Karen M
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Thanks,

Amy

Amy James

Biologist, Project Management

NCDOT, Natural Environment Section

Direct 919.707-6129

aejames@ncdot.gov



UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office

263 13th Avenue South

St. Petersburg, Florida 33701-5505

<http://sero.nmfs.noaa.gov>

NOV 06 2013

F/SER3: EGH
SER-2013-10713

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

Ref.: Federal Aid Project NHS-0017(68) – Brunswick River and Alligator Creek Bridge
Replacements and Widening, U.S. Highway 17-74-76, Leland-Wilmington Area,
Brunswick County, North Carolina

Dear Dr. Thorpe:

This responds to your letter dated February 25, 2013, submitted to National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA). You requested concurrence from NMFS with NCDOT's findings that the proposed project may affect but is not likely to adversely affect the federally-listed shortnose and Atlantic sturgeons. We requested additional information by e-mail on March 28, April 12, 17, 18, 29, and 30, 2013. Responses were received on March 28, April 12, 18, and 30, 2013. A conference call with the interested parties was held on May 23, 2013. NMFS requested additional information on June 5, 2013, and a response was received on July 10, 2013, at which time informal consultation was initiated. Our findings regarding the effects of the proposed action are based on the description of the action in the present informal consultation. Any changes to the proposed action may negate the findings of this consultation and may require reinitiating of consultation with NMFS. This consultation is being conducted with NCDOT as the nonfederal representative designated by the Federal Highway Administration (FHWA), North Carolina Division (letter dated April 8, 2003), pursuant to 50 CFR 402.08.

Project Location

The midpoint positions of the two bridges to be replaced or widened between the neighboring cities of Leland and Wilmington are as follows: 34.234086°N, 77.985969°W, U.S. Highway 17-74-76 bridge crossing over the Brunswick River (a tributary of the Cape Fear River); 34.234272°N, 77.979400°W, bridge crossing over Alligator Creek (a small creek off the Brunswick River) (North American Datum 1983). These bridges are approximately 30 miles upriver from the opening to the Atlantic Ocean (Figures 1-3). The U.S. Highway 17-74-76 (US 17-74-76) bridges over the Brunswick River are located at river kilometer 46.4.

Figure 1 shows the project location in relation to the Cape Fear River and its distance from the Atlantic Ocean. Figure 2 shows the east-west highway (US 17-74-76) leading through the



project area, surrounding rivers, and urban development to the east and west of the project site. Figure 3 is a close-up view of the project site.

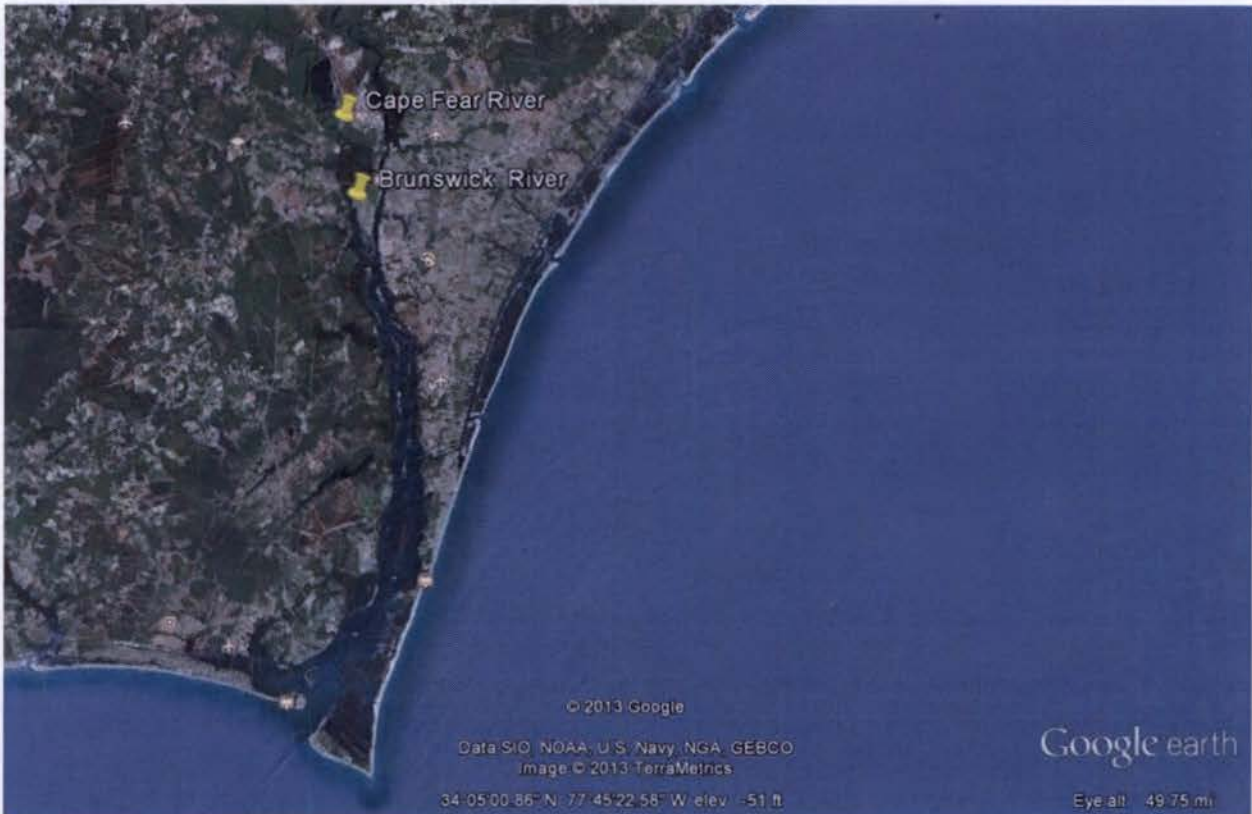


Figure 1. High-altitude overview of the Brunswick River project location. The Brunswick River is a tributary of the Cape Fear River.

Proposed Action

NCDOT proposes to replace the two-span bridge over the Brunswick River with a single-span structure carrying both travel directions, and the northbound bridge over Alligator Creek will also be replaced. The southbound bridge over Alligator Creek will be widened. Three temporary work bridges will be required to remove the existing bridge over the Brunswick River, although only one will be in place at any time. One temporary work bridge will be needed to widen the bridge over Alligator Creek. For both bridge projects, the temporary work bridges will be built using piles driven by impact hammer. The dual bridges on US 17-74-76 over Brunswick River consist of 13 spans of 60 ft with a concrete monolithic deck and a substructure of reinforced caps on piles. The new structure will carry both travel directions and consists of eight spans of 100-ft length with a 4.5-ft pre-stressed girder superstructure and a substructure of end bents on piles and reinforced caps on 4-ft drilled shafts. The final structure will be supported by seven bents consisting of seven 4-ft shafts per bent. The bridge on US 17-74-76 over Alligator Creek will consist of five spans of 50 ft with a concrete monolithic deck and a substructure of reinforced caps on piles. The new structure will consist of three 40-ft, one 45-ft, and three 40-ft with a 36-in pre-stressed girder superstructure and a substructure of integral end bents on piles and reinforced caps on 4-ft drilled shafts. The final structure will consist of six bents of six 4-ft shafts per bent. Work will be done from barges and work bridges, not causeways that would block off parts of the channel, so the river/creek area left available for

sturgeon passage during construction should not differ much from normal (A. James, NCDOT, pers. comm. to E. Hawk, NMFS, April 18, 2013). The riverine/wetland impacts for the Brunswick River structure will be 0.02 ac for all permanent bents, and 0.1 ac for all temporary bents. For the Alligator Creek work, there will be 0.01 ac of impacts for all permanent bents, and 0.02 ac for all temporary bents. In-water construction activities will include spudding (i.e., anchoring barges hydraulically), removing existing piles using a vibratory hammer and/or statically (i.e., without the use of a vibratory hammer), drilling new piers using a vibratory hammer, and augering out material from hollow, driven piles. Any material removed during the augering-out process will be contained and not allowed to enter the surrounding environment. No explosives will be used. Cofferdams will not be built. Some existing pilings may be manually cut in place by divers using a diamond-cable cutting device. Bridge construction will take approximately three years. NCDOT has estimated that the duration of the vibratory driving/removing of piles will be approximately 32-48 hours per phase, spread over three phases, where one phase equates to roughly one year of work (A. James, NCDOT, pers. comm. to E. Hawk, May 30, 2013).

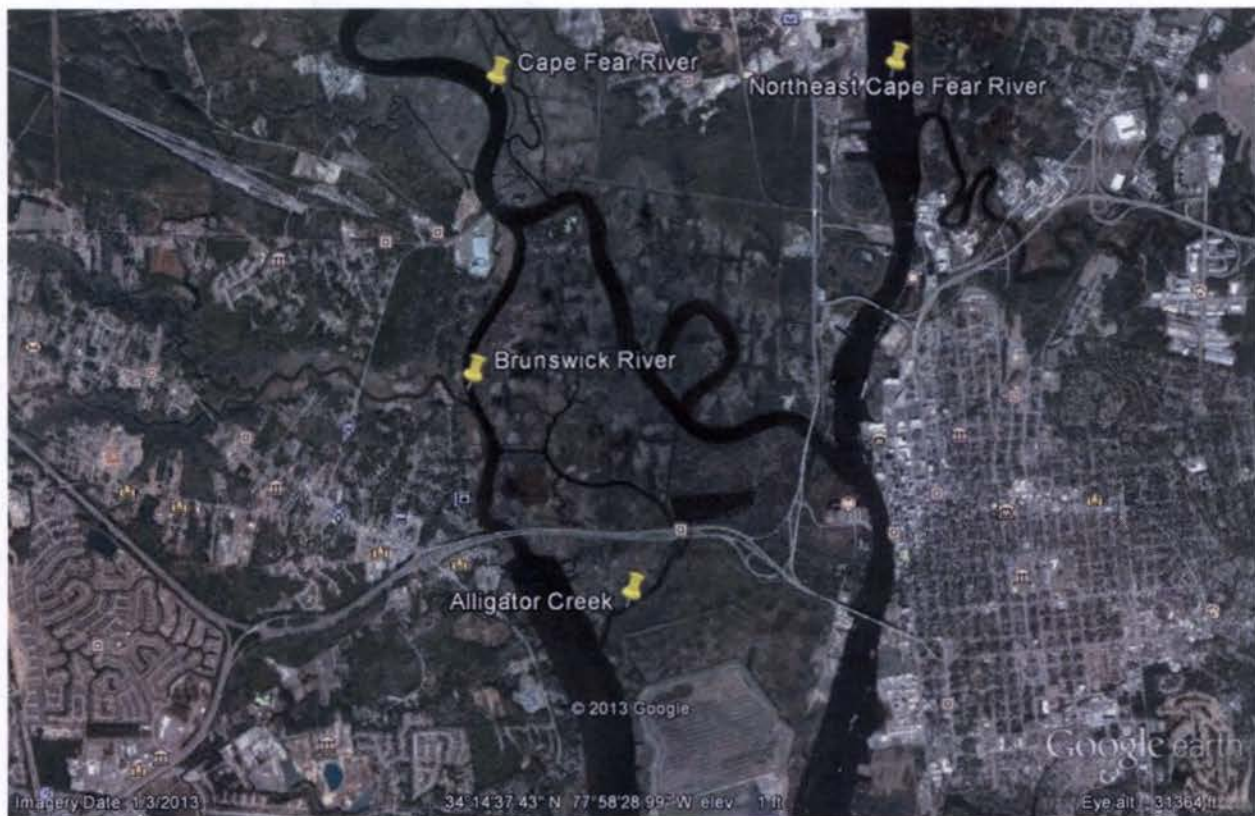


Figure 2. Aerial view of area rivers and tributaries, showing the east-west portion of the US 17-74-76 highway between Leland and Wilmington. The western bridge ("Brunswick River bridge") crosses the Brunswick River just north of where it widens; the eastern bridge ("Alligator Creek bridge") crosses Alligator Creek, a small tributary of the Brunswick River, just west of where US 17-74-76 splits to the north and southeast.

To protect potentially spawning Atlantic and shortnose sturgeon and other anadromous species that may be moving upriver or downriver past the site during construction, NCDOT will adhere to an in-water-work moratorium from January 1 through May 31 in the Brunswick River and

Alligator Creek sites, as well as wetlands with an active connection to these two water bodies (A. James, NCDOT, pers. comm. to E. Hawk, NMFS, July 10, 2013). NCDOT initially proposed an in-water moratorium commencing February 15, but after consultation with NMFS, moved back the moratorium startup date to accommodate NMFS's concerns over potential spawning sturgeon presence at the site in February and late January. NCDOT may extend the moratorium beyond May 31, if requested by North Carolina Wildlife Resources Division (NCWRC) and the North Carolina Division of Marine Fisheries (NCDMF) to protect primary nursery areas and downstream migration of alosine¹ juveniles.

If it becomes necessary during construction due to unexpected setbacks or delays, NCDOT will negotiate with NCWRC and NCDMF for possible exceptions to conduct unexpected, necessary work during the moratorium, such as removal of existing piles and installation of casings. In past NCDOT bridge construction projects over anadromous rivers and streams, NCDOT has negotiated on a project by project basis with NCWRC and NCDMF to complete certain types of in-water work during these moratoriums. In past North Carolina bridge construction projects with in-water moratoria, limited exceptions have been granted to the in-water-work moratorium, to allow extracting existing piles by vibratory hammer, drilling within *pre-installed* casings (i.e., casings installed outside the in-water work moratorium), spudding of work barges, and excavating causeway to natural ground (A. James, NCDOT, pers. comm. to E. Hawk, NMFS, April 18, 2013). As per an agreement with NMFS, in-water work may occur during the month of January under the exception discussed above only if bubble curtains are used (to dampen underwater noise transmission), pending reinitiation of ESA consultation and approval by NMFS of the proposed in-water work method (A. James, NCDOT, pers. comm. to E. Hawk, NMFS, September 4, 2013). However, NCDOT may install and use bubble curtains at any time during construction, i.e., year-round, without need for additional consultation or approval from NMFS (E. Hawk, pers. comm. to A. James, October 31, 2013).

According to NCDOT, the original design of the project called for a temporary detour bridge to be built, and a two-span, dual bridge design (as currently exists over Alligator Creek) over the Brunswick River. The temporary detour bridge alternative was eliminated, however, to accommodate moratorium constructability concerns, and a single-span (two travel lanes in opposite directions) bridge design was adopted. These measures will effectively reduce the construction schedule by one season, and by extension, reduce potential disruption to sturgeon habitat. Use of NCDOT's best management practices for the protection of surface waters² will also help minimize project effects. Floating turbidity curtains may be used around the work site if determined practicable.

¹ *Alosa* species: shad, herring, and alewife.

² NCDOT implemented a sediment and erosion control program for construction activities in 1970. This program requires preparing erosion control plans, implementing and maintaining standard specifications and project-special provisions, and monitoring active work sites for compliance with North Carolina's Sedimentation Pollution Control Law. Through the Post-Construction Runoff Control Program, NCDOT is implementing the Best Management Plan "toolbox" and the BMP Inspection and Maintenance programs to protect water quality and minimize post-construction impacts. The Highway Stormwater Program, established in 1998, is an NCDOT-wide initiative to protect and improve water quality while fulfilling NCDOT's mission of providing and supporting a safe and integrated transportation system that enhances the state.

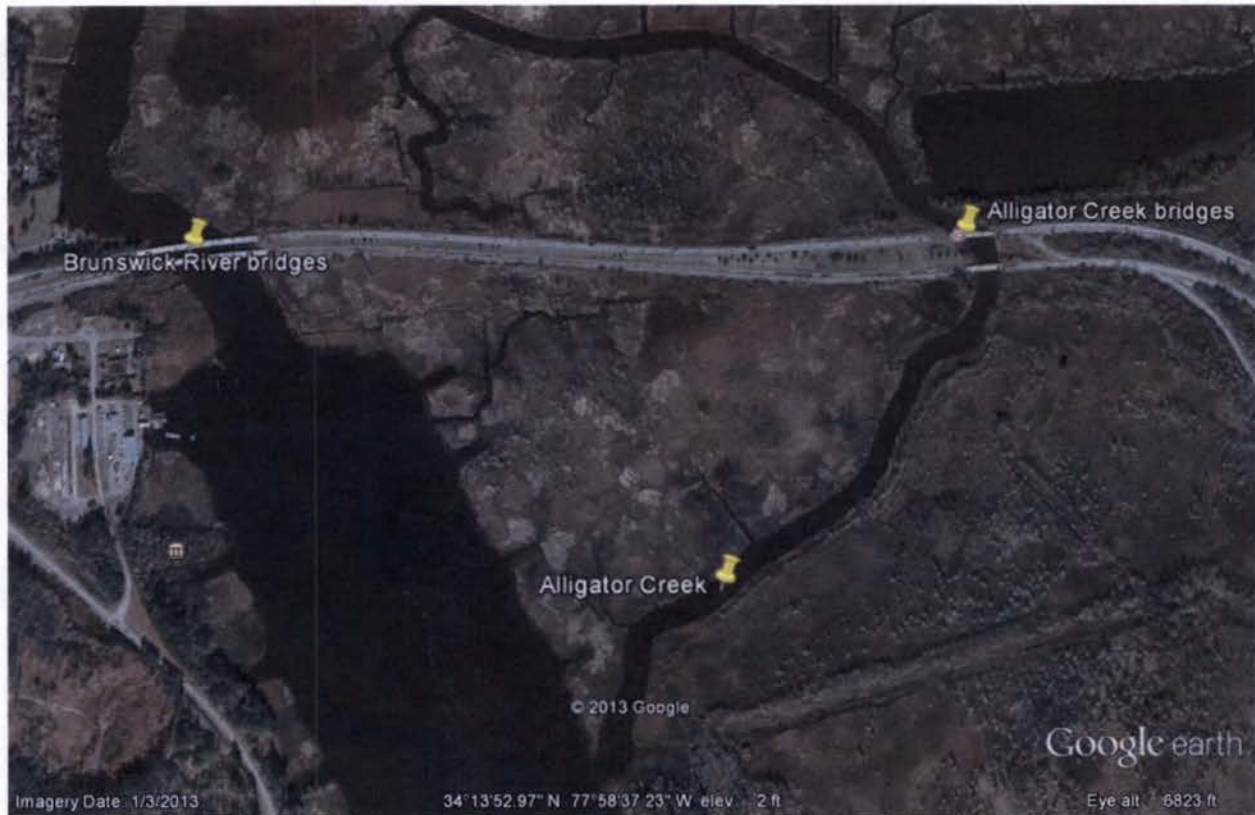


Figure 3. Close-up of project site showing the existing US 17-74-76 bridges over the Brunswick River and its Alligator Creek tributary.

Species Affected and Life History Requirements

The only federally-listed species under NMFS's jurisdiction that may occur in the project area are shortnose sturgeon, *Acipenser brevirostrum*, and the South Atlantic distinct population segment (DPS) of Atlantic sturgeon, *Acipenser oxyrinchus oxyrinchus*.³ Sea turtles are not expected at the project site because of its distance from the open ocean (approximately 30 river miles). Although the river is tidally influenced at the project site, there have not been any documented (by NCDMF for NMFS) sea turtle sightings that far upriver (F. Rohde, NMFS, pers. comm. to E. Hawk, NMFS, March 28, 2013). Therefore, we believe the project will have no effect on sea turtles. There is no NMFS-designated critical habitat in the project area.

Shortnose and Atlantic sturgeon inhabit large rivers and coastal and marine habitats along the Atlantic coast and are likely present at the project site during certain times of the year. Young sturgeon primarily inhabit freshwater regions of rivers and eat a wide variety of plant and animal materials. As they get older, their tolerance to salinity increases. Juveniles rear in their natal river and estuary for several years before moving progressively seaward.

The Brunswick River and Alligator Creek are tributaries of the Cape Fear River and shortnose sturgeon are known to inhabit the Cape Fear River and its tributary, the Northeast Cape Fear River. Spring (upstream) spawning migrations are believed to be triggered when water temperatures warm above 8°C; from the late winter/early spring (southern rivers) to mid-to-late

³ *Acipenser* is Latin for sturgeon, *brevirostrum* means "short beak" and *oxyrinchus* means "sharp nose."

spring (northern rivers), specifically occurring in the Cape Fear River between January–March.⁴ Although there are few data describing the distribution and population of shortnose sturgeon within the Cape Fear River, researchers concur that a self-recruiting population of shortnose inhabits the river.^{5,6}

Atlantic sturgeon are known to occur in the Brunswick River, as detailed below. As adults, they migrate seasonally between freshwater and mesohaline⁷ areas within the river, based on water temperature and salinity cues, and up the major Atlantic coast rivers to spawn. Juvenile and adult Atlantic sturgeon reside in upper estuarine habitat where they frequently congregate around the saltwater-freshwater interface. In general, residency time of young Atlantic sturgeon in estuarine areas varies from 1-6 years, before emigrating along the coast and onto the continental shelf where they grow to maturity.⁸

Seasonality of Sturgeon Presence in the Action Area

Moser et al. [p. 33, Figures 14 and 15; p. 36; p. 40] documented shortnose sturgeon presence at or near the Brunswick River project area in February–March and May–June, and documented the capture of two gravid shortnose sturgeon females at or within 10 kilometers of the project area (one in early January 1990, the other in early February 1991). The study showed greatest shortnose sturgeon gross travel rates occur during January–March, presumably participating in spawning migrations. Moser et al. also captured 100 Atlantic sturgeon, with Brunswick River having the highest CPUE of three areas sampled by gillnet (the other two areas were Wilmington Harbor and the upper Cape Fear River); CPUE's were highest during summer and early fall (June–September). These fish were generally captured over shoals (less than 7 m), even though the nets extended into deeper channel areas.

Overall, however, shortnose and Atlantic sturgeon presence is thought to be rare in the Brunswick River and project area, with shortnose being considerably rarer than Atlantics. Recently, local North Carolina Department of Environment and Natural Resources (NCDENR) Division of Marine Fisheries (DMF) biologists permitted by NMFS conducted gillnet sampling in the Brunswick River and put acoustic transmitters on Atlantic and shortnose sturgeon captured there. In spite of intensive netting effort in 2012, only two shortnose sturgeon were captured from January to June 2012, a total of 26 Atlantic sturgeon and two shortnose sturgeon were captured during 27 targeted gillnet sets ranging from 1-4 hours per set. The largest Atlantic sturgeon (1.75 m) captured and tagged was in pre-spawning condition, a running-ripe male on February 22. The largest shortnose sturgeon captured/tagged (0.87 m) was a ripe female with mature oocytes visible at the incision site, on January 6. From mid-September to December

⁴ Moser, M.L. and S.W. Ross. 1993. Distribution and movements of shortnose sturgeon (*Acipenser brevirostrum*) and other anadromous fishes of the lower Cape Fear River, North Carolina. Final Report to the U.S. Army Corps of Engineers, Wilmington, North Carolina.

⁵ Ross, S.W., F.C. Rohde, and D.G. Lindquist. 1988. Endangered, threatened, and rare fauna of North Carolina. Part II. A re-evaluation of the marine and estuarine fishes. Occasional Papers of the North Carolina Biological Survey 1988. 20 pp.

⁶ Moser, M.L. and S.W. Ross. 1995. Habitat use and movements of shortnose and Atlantic sturgeons in the lower Cape Fear River, North Carolina. Transactions of the American Fisheries Society. 124: 225-234.

⁷ Referring to estuarine water with salinity ranging 5-18 parts per thousand (i.e., moderately "brackish" water).

⁸ Smith, T.I.J. 1985. The fishery, biology, and management of Atlantic sturgeon, *Acipenser oxyrinchus*, in North America. Environmental Biology of Fishes Vol. 14, No.1, pp. 61-72.

2012, seven juvenile Atlantic sturgeon were captured, ranging from 0.63-1.06 m fork length (mean: 0.86 m), during 23 gillnetting events of 1-4 hour duration each.⁹

Neither Atlantic nor shortnose sturgeon likely spawn at the project site, but rather spawn significantly further towards the fall line. Their historic spawning area is thought to be around Fayetteville, over 100 miles upstream. NCDENR is unaware of any observed reports of sturgeon spawning on the Cape Fear or Northeast Cape Fear Rivers (see Figure 2 for the spatial relationship of these rivers to the Brunswick River and Alligator Creek). Shortnose sturgeon spawning season in the Brunswick River is unknown at the current time, since so few have been caught. It is assumed to be in the spring, as in other Southeastern rivers, but recent research indicates that it may occur in the fall, or in both seasons, and current work that NCDENR DMF is doing should answer that question for Atlantic sturgeon (F. Rohde, NMFS, pers. comm. to E. Hawk, NMFS, March 28, 2013). NCDENR DMF has captured juvenile Atlantics under 0.3 m in the river and many subadults, so they believe there is sturgeon production in the river system (C. Collier, NCDENR DMF, pers. comm. to E. Hawk, NMFS, April 29, 2013).

Project Effects

We have analyzed the proposed action to determine the potential routes of adverse effects to shortnose and Atlantic sturgeon. Adult sturgeon en route to spawning areas upriver of the project site, and post-spawning adults and other life stages moving or returning downriver to the estuary and sea, could be affected by bridge construction by being struck by construction equipment (piles, work barges), construction-associated noise and turbidity, temporary or permanent loss of spawning/foraging/sheltering habitat, and temporary disruption of spawning/migratory behaviors. We believe shortnose sturgeon and Atlantic sturgeon are unlikely to be adversely affected by any aspects of the proposed action, and that all project effects will be discountable and/or insignificant, for the following reasons:

1. The in-water work moratorium proposed by NCDOT (January 1-May 31 of any year) prohibits in-water work when these species are most likely to be present in the project area, based on previous scientific surveys. That, coupled with their infrequent occurrence in the project areas, render the risk (that spawning sturgeon will be in the project area during construction and be affected) discountable. If necessary to conduct in-water work outside of cofferdams or caissons or drilled casings between January 1 and May 31, exceptions from the moratorium shall be limited to allowing extraction of existing piles by vibratory hammer, drilling within *pre-installed* casings (i.e., casings installed outside the in-water work moratorium), spudding of work barges, and excavating causeway to natural ground. If other activities are subsequently proposed during the in-water work moratorium, NCDOT shall reinitiate ESA consultation with NMFS on additional conservation measures that may be implemented if additional in-water activities are required. NCDOT may install and use bubble curtains (to reduce underwater noise transmission) at any time of the year without need for approval from NMFS; as bubble

⁹ Performance Reports to NMFS by South Carolina Department of Natural Resources (SCDNR) for January 1-June 30 and July 1-December 31, 2012. Research and Management of Endangered and Threatened Species in the Southeast: Riverine Movements of Shortnose and Atlantic Sturgeon. William Post, Tanya Darden, Douglas Peterson, Joe Hightower, Mike Loeffler, and Chip Collier, Investigators.

- curtains have only beneficial effects. In-water work may occur during the month of January under the exception discussed above only if bubble curtains are used.
2. The bridges being demolished and the replacement bridges will occupy essentially the same previously-disturbed footprint, so “additional” effects to potential refuge and foraging habitat will be insignificant.
 3. Operating construction machinery can physically strike and harm sturgeon. The possibility of this occurring is discountable given the species’ mobility, expected avoidance behavior, and the in-water work moratorium that only allows in-water work to take place when the species are least likely to be present. Therefore, the risk of direct construction impacts (i.e., sturgeon being struck by machinery or materials) is discountable.
 4. In the unlikely event they are present when unfettered in-water construction is allowed (June 1-December 31), they are likely to avoid construction noise and activity (noise effects are discussed below).
 5. Construction noise could disrupt spawning or injure sturgeon. As suggested by the Moser et al. study and the aforementioned 2012 SCDNR capture/tagging/acoustic tracking research, gravid sturgeon or juveniles could be present during a period when in-water construction is authorized before the moratorium starts on January 1 (from mid-September to December 2012, seven Atlantic sturgeon were captured by NCDMF; and one gravid sturgeon was captured on January 6). Nonetheless, we believe the risk to these sturgeon, and especially to gravid sturgeon, during this pre-moratorium time frame from noise effects that could injure them or cause them to abort their spawning runs will be discountable because (a) of their rarity (intensive sampling in 2012 by Moser et al. and NCDENR has yielded infrequent captures of sturgeon in the Brunswick River despite intensive sampling, and the earliest recorded capture of a gravid female (a shortnose sturgeon) occurred on January 6, (b) there are alternate pathways off the Cape Fear River (tributaries and creeks) that upriver-migrating spawning sturgeon could use to circumvent the construction areas during construction (see Figure 2), and (c) vibratory driving of new piles or bridge support structures, or removal of old bridge structures, generates a continuous but low-level noise and is unlikely to cause more than noninjurious, insignificant, behavioral effects to sturgeon. The same likely holds true for underwater cutting implements (e.g., diamond cable) wielded by divers; noise levels are expected to be low and cause insignificant and discountable effects to any sturgeon that may be present nearby.
 6. Impact pile driving necessary to build the temporary work bridges is likely to cause only noninjurious insignificant effects because (a) of the piling composition and substrate, (b) it will be temporary, of short duration (not more than 8 hours per day), and noncontinuous (there will be periods of quiet between periods of noise), and (c) it is unlikely to ensonify the whole river channel available to migrating or emigrating sturgeon. Additionally, there are alternate migration routes available to them. Therefore, the noise effects of impact pile driving will be insignificant.
 7. Construction, particularly vibrating in bridge supports and pile driving for temporary work bridges, could negatively affect spawning sites by sedimentation effects. Sediments disturbed and turbidity generated during in-water construction will not affect sturgeon spawning habitat because there are no known spawning sites near the project site.

8. Turbidity generated during in-water construction, embankment grading, work bridge construction, etc. will have discountable effects on sturgeon foraging because of the low likelihood that they will be present due to their low densities, the in-water moratorium, and because turbidity controls (part of NCDOT's best management practices) will be used to contain disturbed sediments; therefore, this effect will be insignificant and discountable.
9. Sturgeon passage upriver and downriver could be partially blocked during construction by in-water construction, pilings, work bridges, etc. However, neither the construction process nor the completed bridges will appreciably block the river or creek nor impede or alter sturgeon passage or water flow in Brunswick River or Alligator Creek. Construction will not occur at both locations simultaneously, ensuring that there are alternate pathways available to them (Figures 2-3). Therefore, this effect will be insignificant.
10. Loud levels of intermittent or continuous construction noise from pile driving and bridge span support installation could harm sturgeon if they were close to the noise source for prolonged periods, or forced to move away from foraging habitat. However, NCDOT has estimated that the duration of the vibratory driving/removing of piles will only be approximately 32-48 hours per phase, spread over three phases, where one phase equates to roughly one year of work (A. James, NCDOT, pers. comm. to E. Hawk, May 30, 2013). In addition, in 2003, during construction of the Wilmington Bypass Northeast Cape Fear River Bridge, NCDOT conducted a study to monitor construction noise propagation into adjacent wetlands. A vibratory driver/extractor and an impact driver were tested. According to NCDOT's study, using ambient (baseline background) levels to determine a distance that this or similar construction equipment would be safe to use, the distance was found to be approximately 36 meters from the source for both the vibratory driver and impact hammer. Both the river and the creek are greater than 36 meters wide at the construction site. As well, the moratorium limits in-water construction to when sturgeon are most likely not present, sturgeon have the ability to avoid the construction area if disturbed by the noise, and there is alternate similar habitat available to them nearby (see Figure 2). Based on the above, we believe noise effects will be discountable and insignificant.
11. The project will impact only a very small portion of the available foraging habitat for shortnose and Atlantic sturgeon, and these effects will be temporary, aside from the actual area of river bottom displaced by the bridge support structures (see Figures 2-3). The riverine/wetland impacts for the Brunswick River structure will be 0.02 ac for all permanent bents, and 0.1 ac for all temporary bents. For the Alligator Creek work, there will be 0.01 ac of impacts for all permanent bents, and 0.02 ac for all temporary bents. Sturgeon will still be able to forage underneath the bridges post-construction. A review of aerial images of the adjacent riverine areas using Google Earth Pro by the NMFS project biologist showed that there are miles of alternate, similar, undisturbed habitat nearby, up and downstream of the project site, where sturgeon could move to and their potential foraging would be unaffected by project activities (see Figures 2 and 3). The in-water area affected by construction is small by comparison. Therefore, project effects on foraging habitat will be insignificant.

12. Spudding of work barges outside of the moratorium will have insignificant effects on sturgeon that may be present because of their ability to move away and expected avoidance behavior if disturbed.

Based on the above, NMFS believes that all effects of the proposed action are discountable or insignificant, and thus the proposed action is not likely to adversely affect any life stages of shortnose sturgeon or the South Atlantic DPS of Atlantic sturgeon. Nevertheless, we recommend that bubble curtains be installed around impact pile driving operations, to the extent practicable, as this technology is known to reduce sound transmission through the water.

This concludes your consultation responsibilities under the ESA for species under NMFS's purview. A new consultation must be initiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

We have enclosed additional relevant information for your review. If you have any questions, please contact Eric Hawk, consultation biologist, at (727) 551-5773 or by e-mail at Eric.Hawk@noaa.gov. Thank you for your continued cooperation in the conservation of ESA-listed species.

Sincerely,



for

Roy E. Crabtree, Ph.D.
Regional Administrator

Enc.: 1. *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Revised March 23, 2006)
2. *PCTS Access and Additional Considerations for ESA Section 7 Consultations*
(Revised June 11, 2013)

File: 1514-22.L.1.NCDOT

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

- a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.
- b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.
- c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.
- d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.
- e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.
- f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.
- g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 6-11-2013)

Public Consultation Tracking System (PCTS) Guidance: PCTS is a Web-based query system at <https://pcts.nmfs.noaa.gov/> that allows all federal agencies (e.g., U.S. Army Corps of Engineers - USACE), project managers, permit applicants, consultants, and the general public to find the current status of NMFS's Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations which are being conducted (or have been completed) pursuant to ESA Section 7 and the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) Sections 305(b)(2) and 305(b)(4). Basic information including access to documents is available to all.

The PCTS Home Page is shown below. For USACE-permitted projects, the easiest and quickest way to look up a project's status, or review completed ESA/EFH consultations, is to click on either the "Corps Permit Query" link (top left); or, below it, click the "Find the status of a consultation based on the Corps Permit number" link in the golden "I Want To..." window.

The screenshot shows the NOAA PCTS Public Consultation Tracking System homepage. The header includes the NOAA logo and the text "NOAA PCTS PUBLIC CONSULTATION TRACKING SYSTEM" and "NATIONAL MARINE FISHERIES SERVICE". Below the header is a navigation bar with links: home, reports, user guide, glossary. The main content area is divided into three columns. The left column, titled "I Want To...", contains a list of links: "Corps Permit Query", "Federal Agency Login", "NMFS Login", "Reset a Password", "Run a Report", "Reset the User Guide", "Find Consultations", "Find the status of a consultation based on a Corps Permit number", and "Get New Account". The middle column, titled "Quick Search", contains a search form with fields for "Enter PCTS Tracking Number", "OR", "Select REGION", "Enter YEAR", "OR", "Enter KEY WORD(S)", and a "Search" button. The right column, titled "About PCTS", contains a brief description of the system. The footer includes a "Footer" section with links: "About PCTS", "User Guide", "Privacy Policy", "Disclaimer", "Feedback", "Search", "About Us", and "Contact Us".

Then, from the "Corps District Office" list pick the appropriate USACE district. In the "Corps Permit #" box, type in the 9-digit USACE permit number identifier, with no hyphens or letters. Simply enter the year and the permit number, joined together, using preceding zeros if necessary after the year to obtain the necessary 9-digit (no more, no less) number. For example, the USACE Jacksonville District's issued permit number SAJ-2013-0235 (LP-CMW) must be typed in as 201300235 for PCTS to run a proper search and provide complete and accurate results. For querying permit applications submitted for ESA/EFH consultation by other USACE districts, the procedure is the same. For example, an inquiry on Mobile District's permit MVN201301412 is entered as 201301412 after selecting the Mobile District from the "Corps District Office" list. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov or (727) 551-5773.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to Section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA Section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA Section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.



North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released September 2011)

Project/TIP No.: R-3601

County(ies): Brunswick New Hanover

Page 1 of 1

General Project Information

Project No.:	R-3601	Project Type:	Roadway Widening	Date:	5/9/2014
NCDOT Contact:	Karen McCauley, PE	Contractor / Designer:	Joseph Kelvington, PE		
Address:	Transportation Program - Mngt Unit, NCDOT 1020 Birch Ridge Drive Raleigh, NC 27610	Address:	R-3601 Project Design Manager 801 Jones Franklin Rd. Suite 300 Raleigh, NC 27606		
	Phone:		919-707-6611	Phone:	919-865-7390
	Email:		kmccauley@ncdot.gov	Email:	joseph.kelvington@stantec.com
City/Town:	Belville and Leland	County(ies):	Brunswick	New Hanover	
River Basin(s):	Cape Fear	CAMA County?	Yes	Yes	
Primary Receiving Water:	Brunswick River	NCDWQ Stream Index No.:	18-77		
NCDWQ Surface Water Classification for Primary Receiving Water	Primary:	Class SC			
	Supplemental:	None			
Other Stream Classification:	None				
303(d) Impairments:	dissolved oxygen (DO)	pH			
Buffer Rules in Effect	N/A				

Project Description

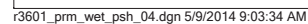
Project Length (lin. Miles or feet):	1.67 Mi.	Surrounding Land Use:	rural, tidally influenced coastal		
	Proposed Project		Existing Site		
Project Built-Upon Area (ac.)	ac.		ac.		
Typical Cross Section Description:	6 lane divided highway, 10 ft paved shoulders lt/rt, 6 ft paved shoulders median; grassed median, varying width		4 lane divided highway, approximately 10 ft paved shoulders rt/lt, 3 ft paved shoulders median; grassed median varying width		
Average Daily Traffic (veh/hr/day):	Design/Future:	ADT 2035=107,000	Existing:	ADT 2009=63,000	

General Project Narrative: Minimizing use of shoulder berm gutter and maintaining grass shoulder sheet flow along the causeway to the maximum extent practical. Eliminating deck drains on Bridge 103 over the Brunswick River and Bridge 107 over Alligator Creek. At Bridge 108 there will be no direct discharge into the surface waters from deck drains. Utilizing grass ditches, shoulders, and slopes to aid in treatment of runoff.

References

CONTRACT: C 203359

N.T.S



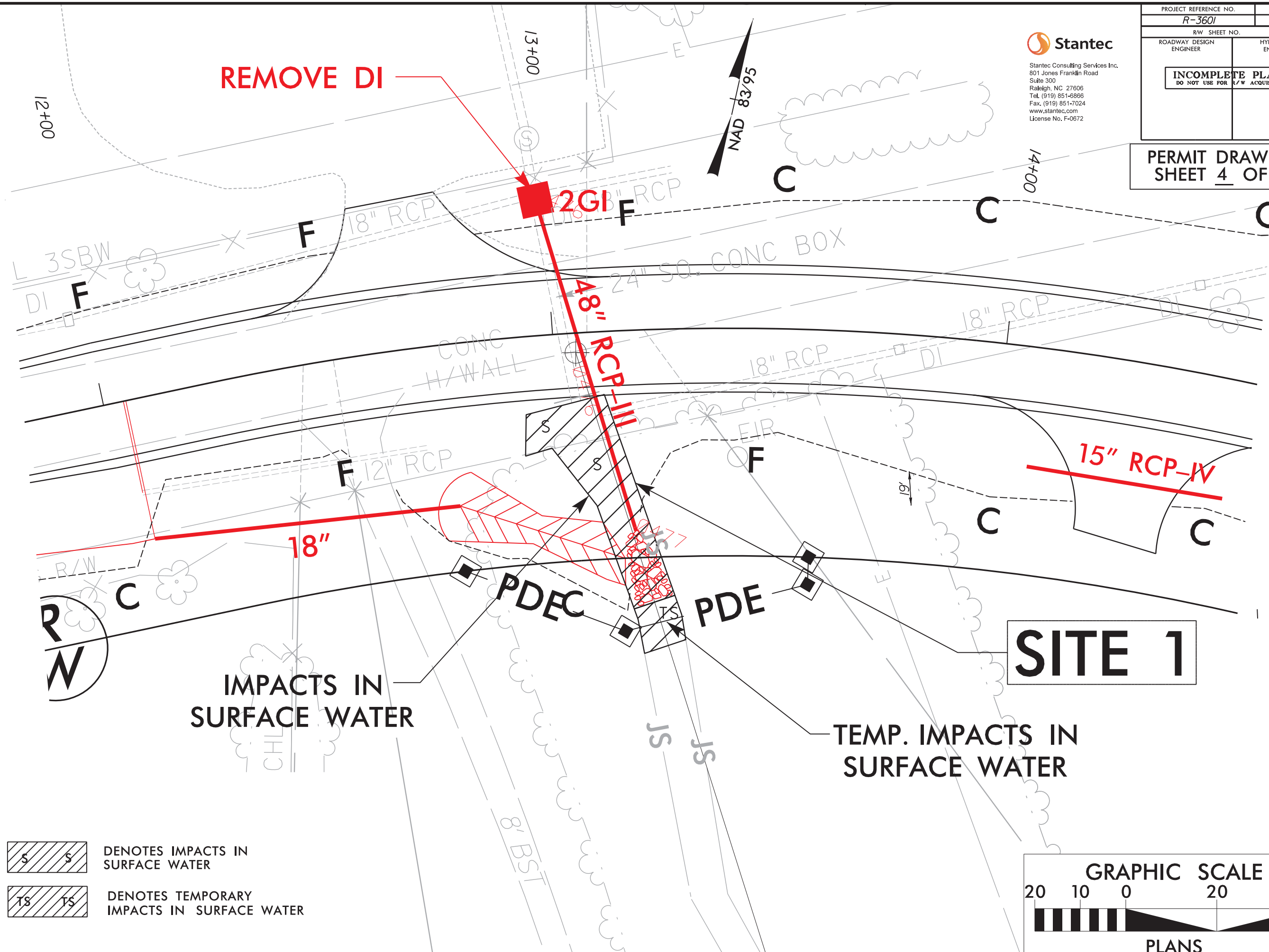
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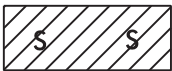
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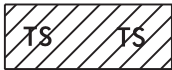
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801 Jones Franklin Road
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Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
R-3601	4A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	

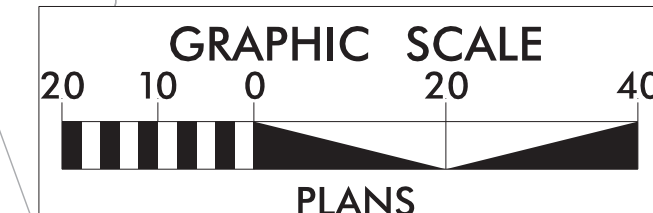
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SHEET 4 OF 44



 DENOTES IMPACTS IN SURFACE WATER

 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

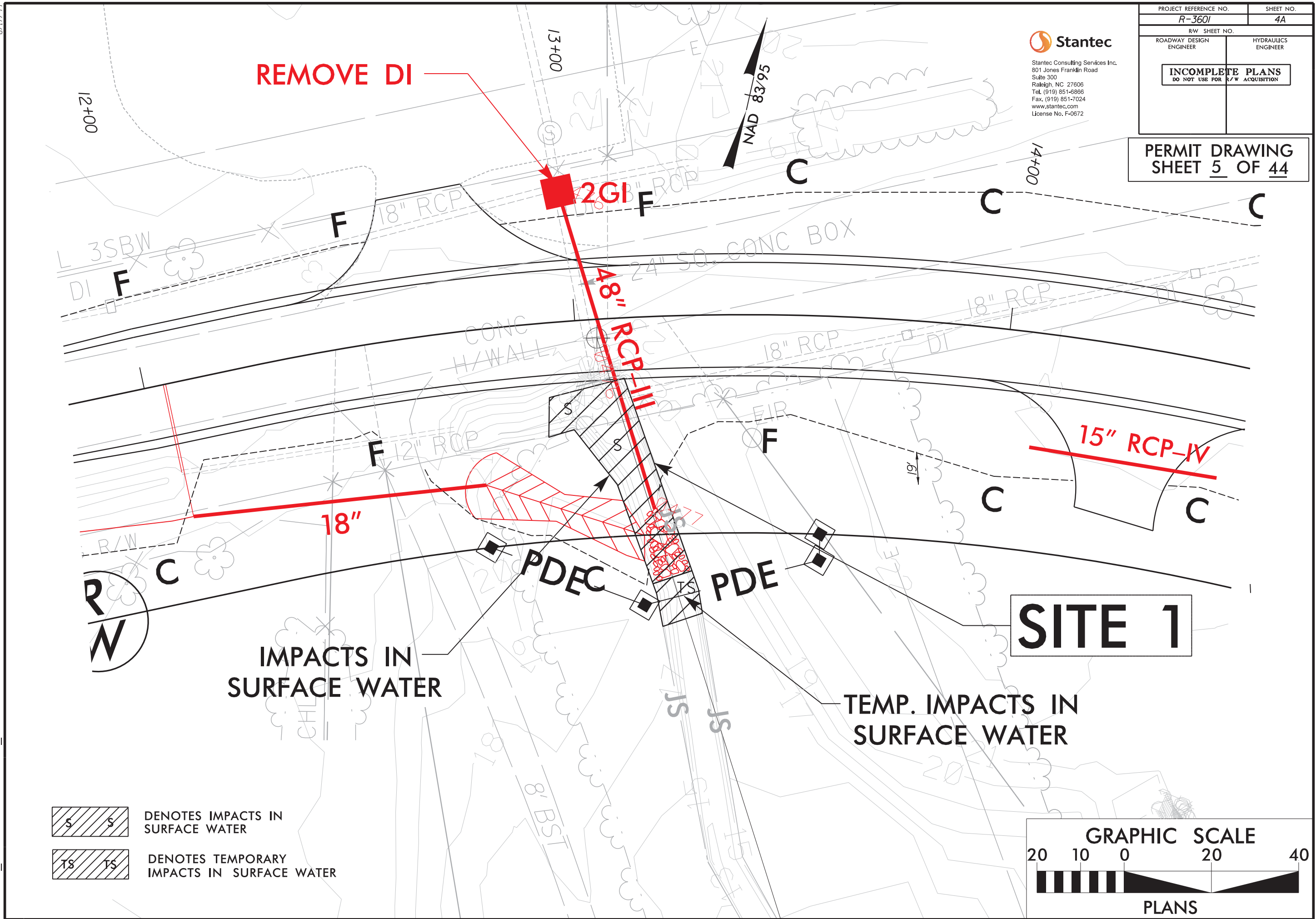
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PROJECT REFERENCE NO.		SHEET NO.	
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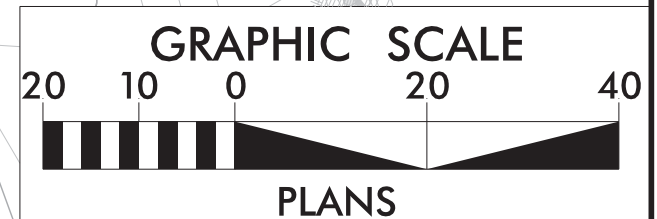
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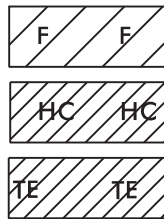


DENOTES IMPACTS IN
SURFACE WATER



DENOTES TEMPORARY
IMPACTS IN SURFACE WATER



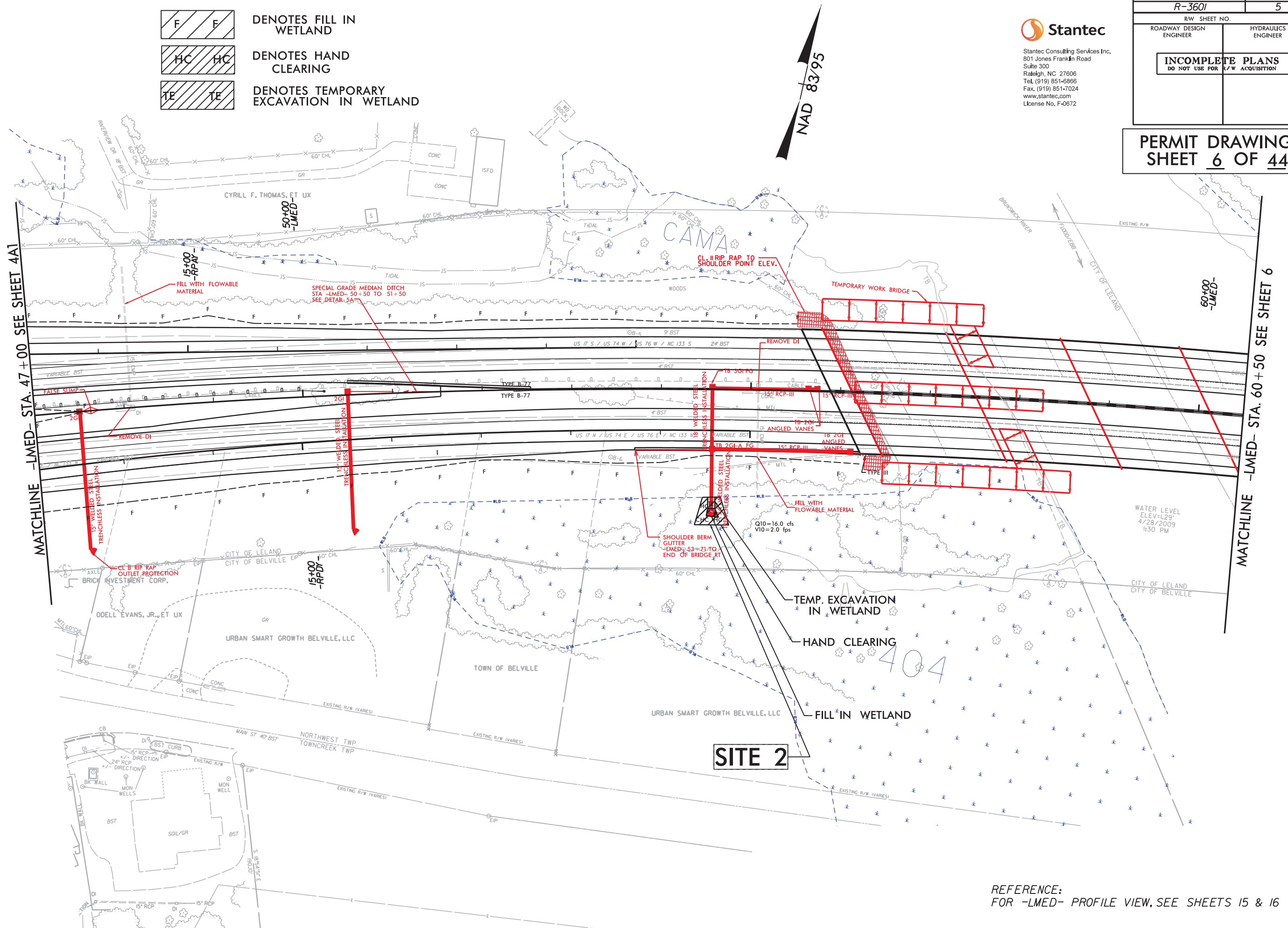


F F DENOTES FILL IN WETLAND
HC HC DENOTES HAND CLEARING
TE TE DENOTES TEMPORARY EXCAVATION IN WETLAND

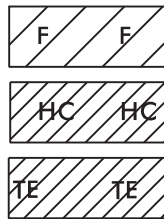
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R-3601		5	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		DO NOT USE FOR E/W ACQUISITION	

PERMIT DRAWING
SHEET 6 OF 44



REFERENCE:
FOR -LMED- PROFILE VIEW, SEE SHEETS 15 & 16



F F
DENOTES FILL IN
WETLAND

HC HC
DENOTES HAND
CLEARING

TE TE
DENOTES TEMPORARY
EXCAVATION IN WETLAND

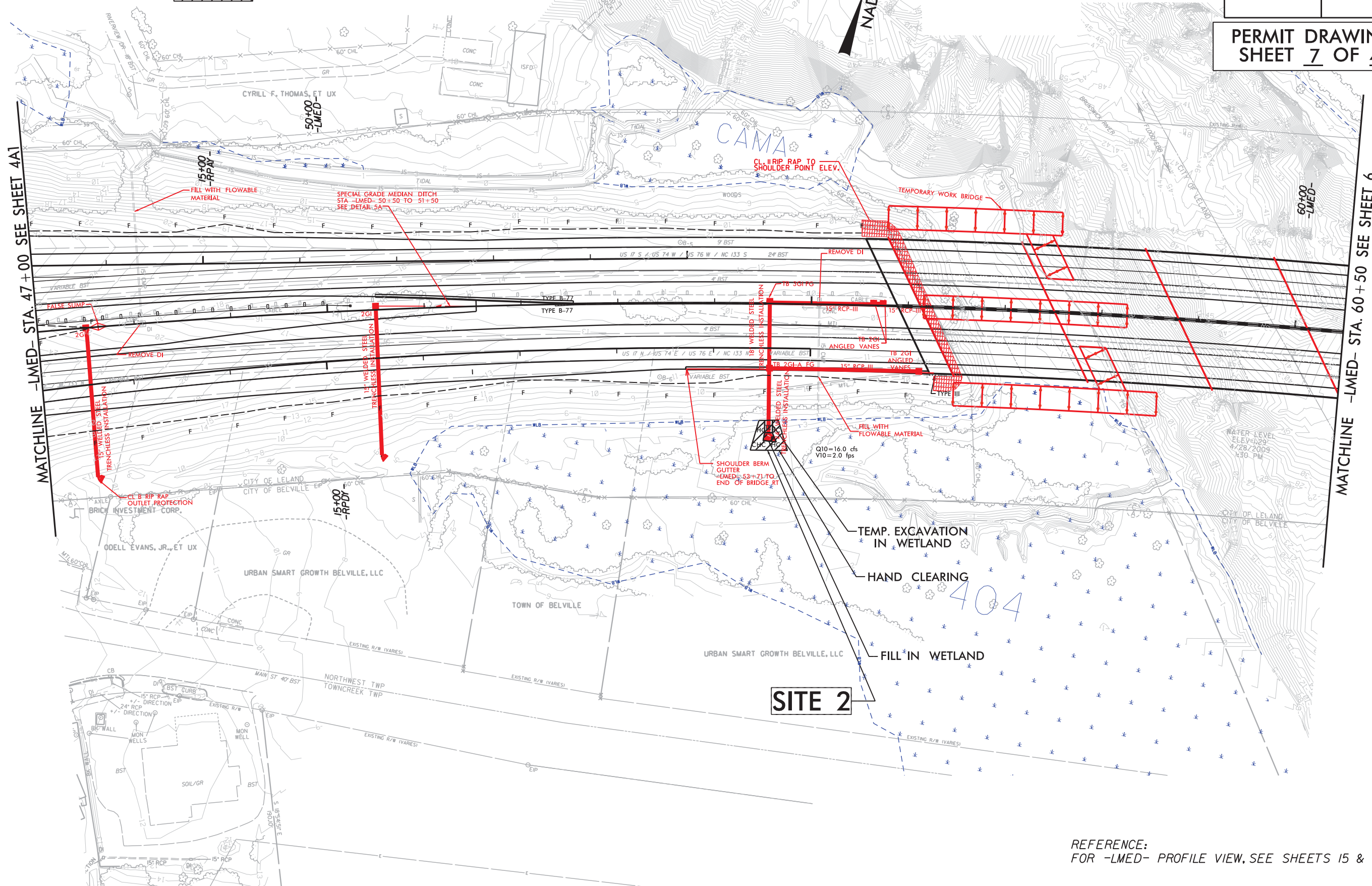
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www.stantec.com
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PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>5</i>	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			

**PERMIT DRAWING
SHEET 7 OF 44**

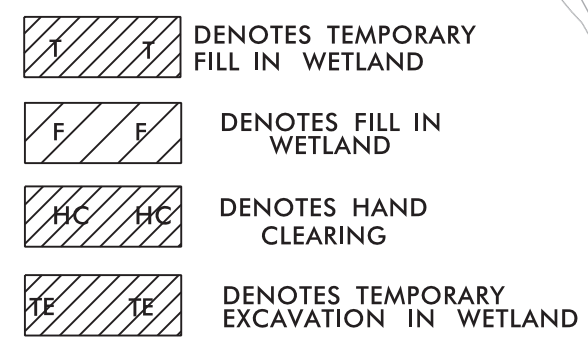
MATCHLINE -LMED- STA. 47+00 SEE SHEET 4A1

MATCHLINE -LMED- STA. 60+50 SEE SHEET 6



REFERENCE:
FOR -LMED- PROFILE VIEW, SEE SHEETS 15 & 16

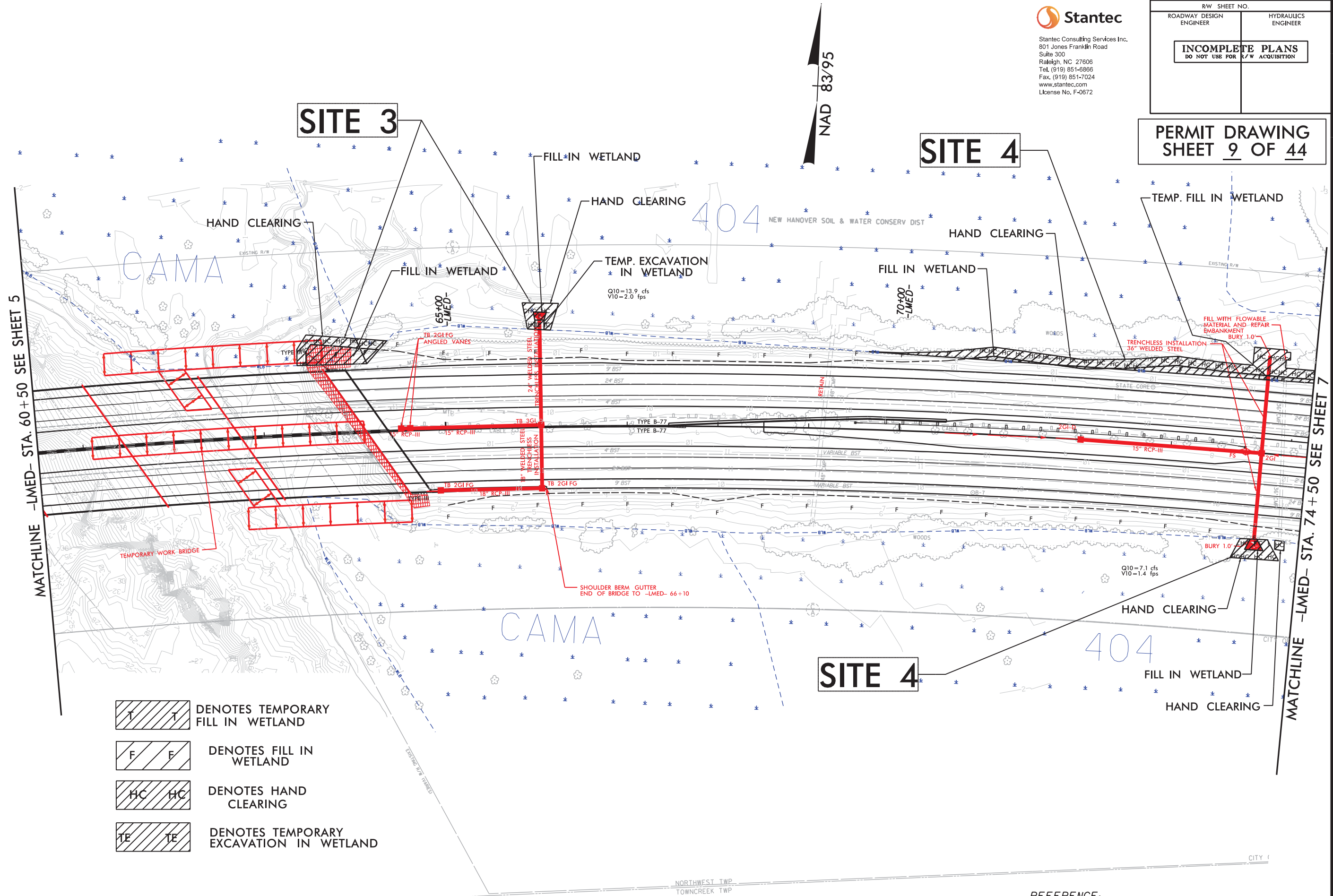
TEMP. FILL IN WETLAND



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PROJECT REFERENCE NO.	SHEET NO.
R-3601	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR E/W ACQUISITION	

PERMIT DRAWING
SHEET 9 OF 44



REFERENCE:
FOR -LMED- PROFILE VIEW, SEE SHEETS 15 & 16

5/28/99

PERMIT DRAWING
SHEET 10 OF 44

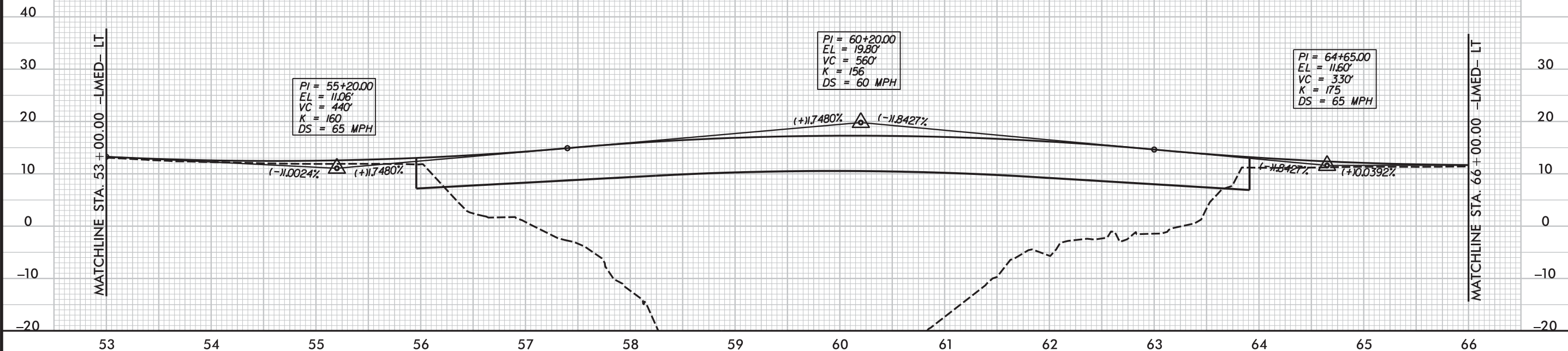
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ROADWAY DESIGN
ENGINEER

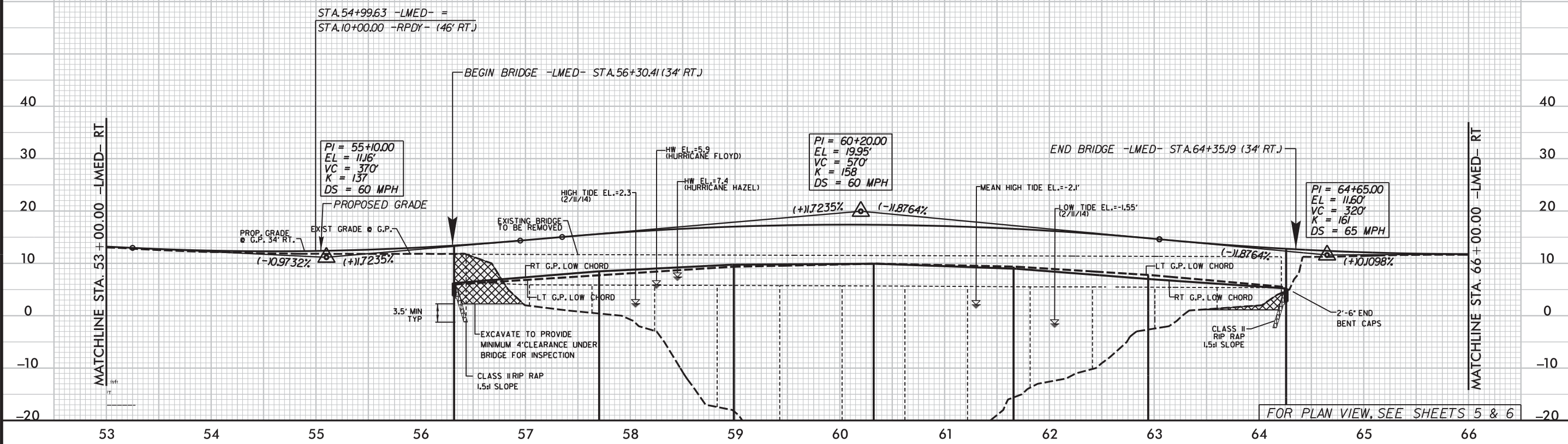
HYDRAULICS
ENGINEER

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

-LMED- LT



-LMED- RT



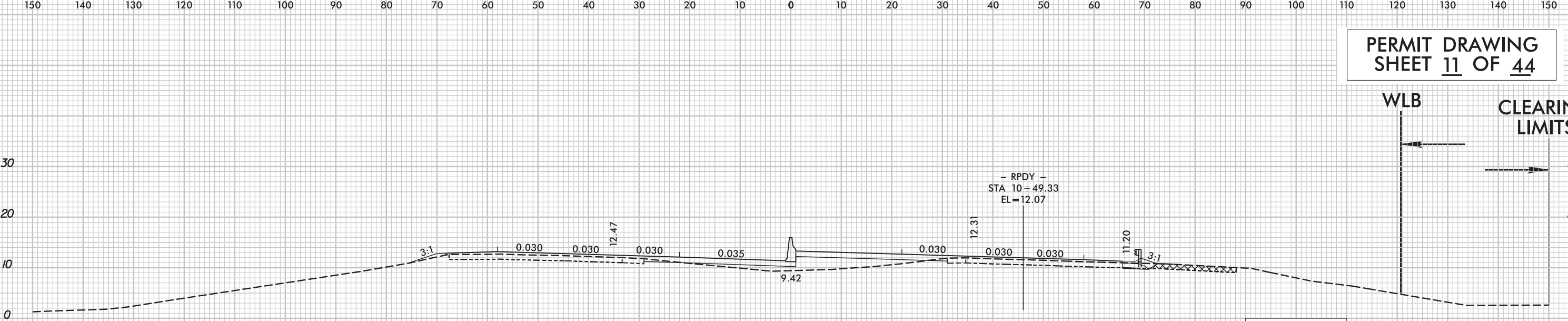
FOR PLAN VIEW, SEE SHEETS 5 & 6

8/23/99

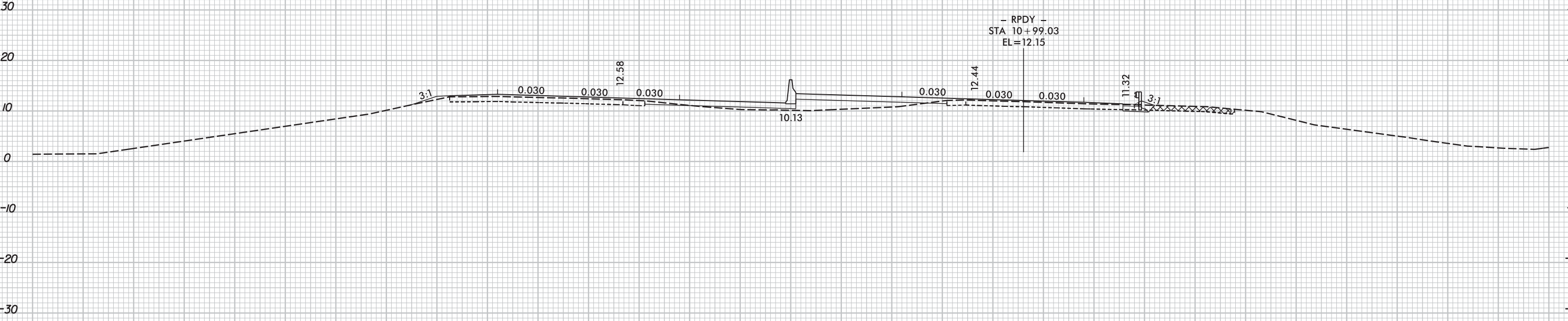


PROJ. REFERENCE NO.	SHEET NO.
R-3601	X-11

PERMIT DRAWING
SHEET 11 OF 44



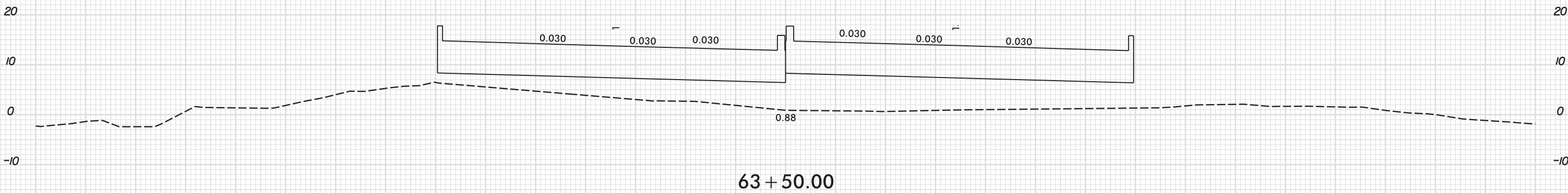
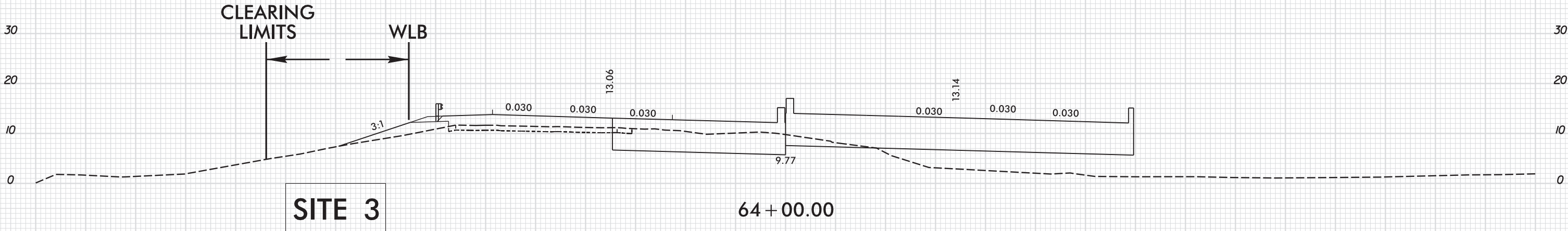
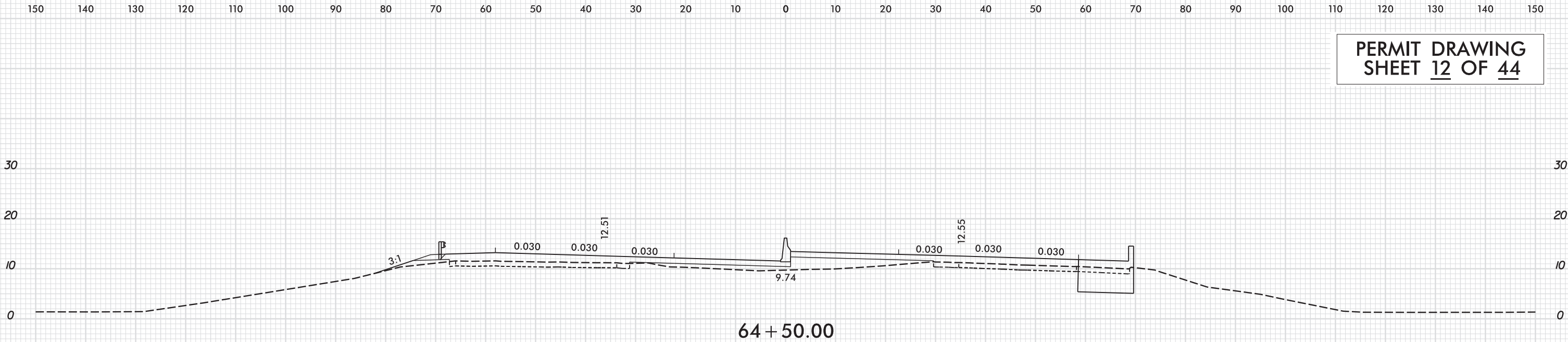
54 + 50.00



54 + 00.00

-LMED-

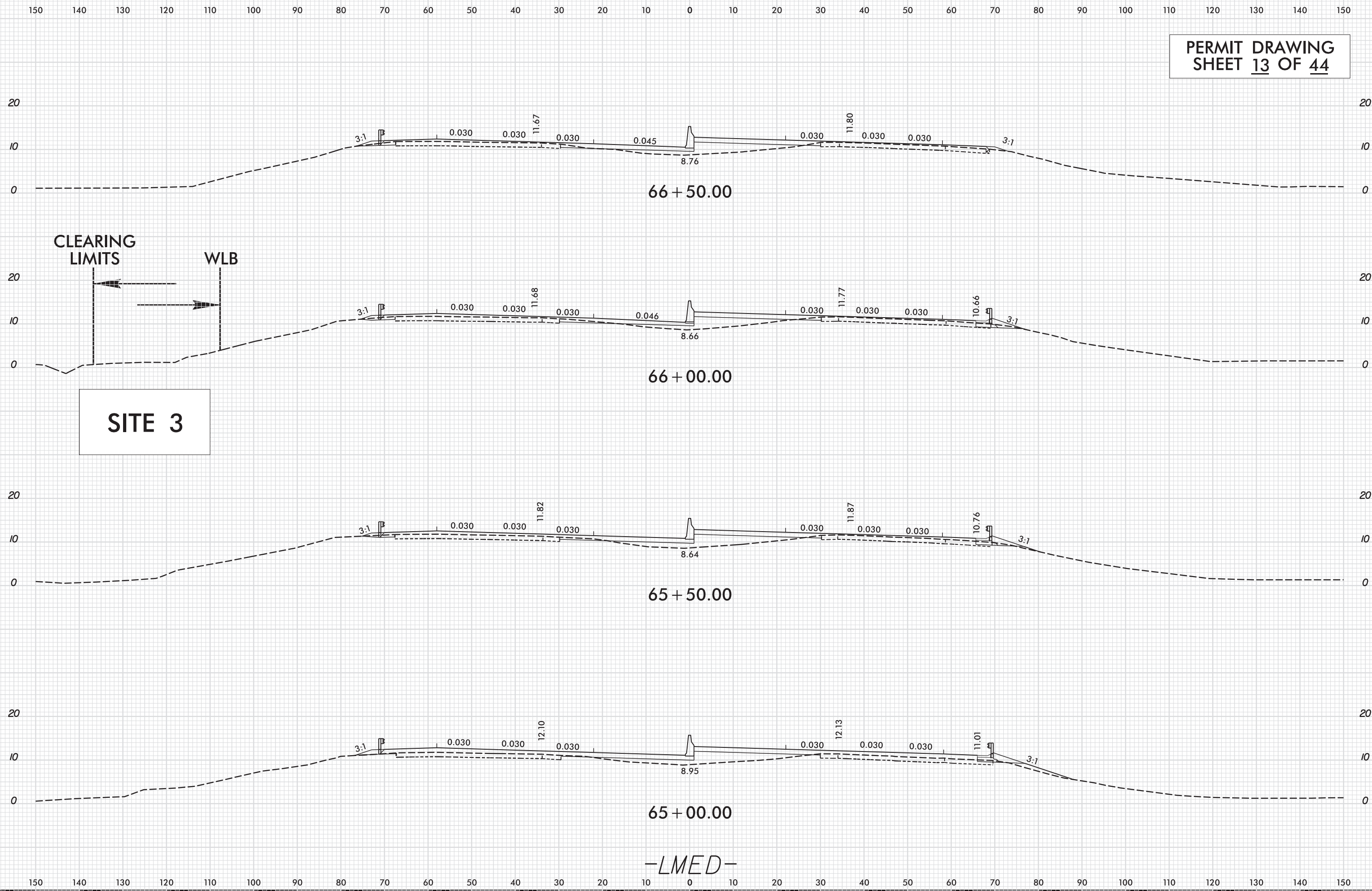
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SHEET 12 OF 44



-LMED-

8/23/99

PERMIT DRAWING
SHEET 13 OF 44

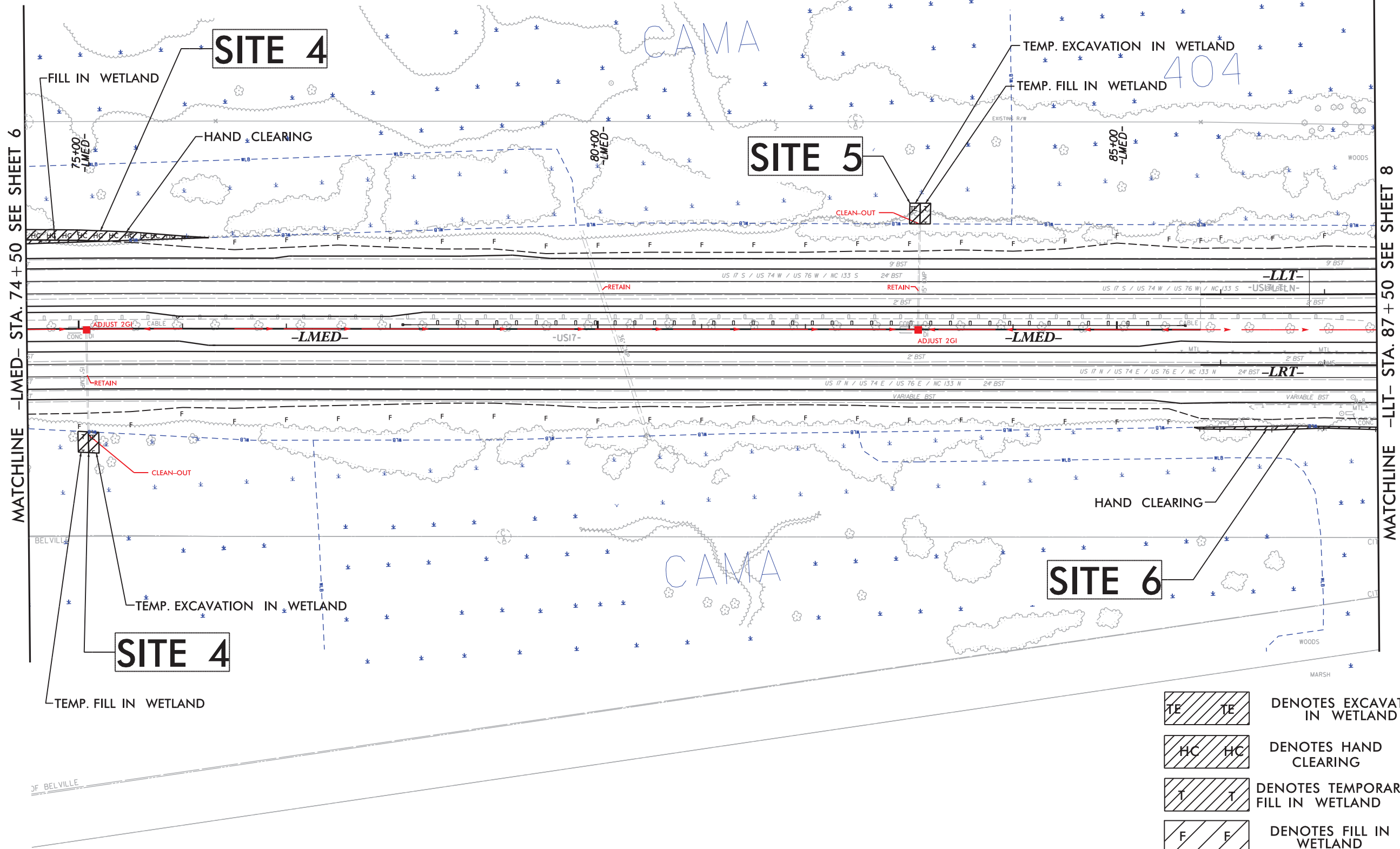


-LMED-

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PROJECT REFERENCE NO.		SHEET NO.	
R-3601		7	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			

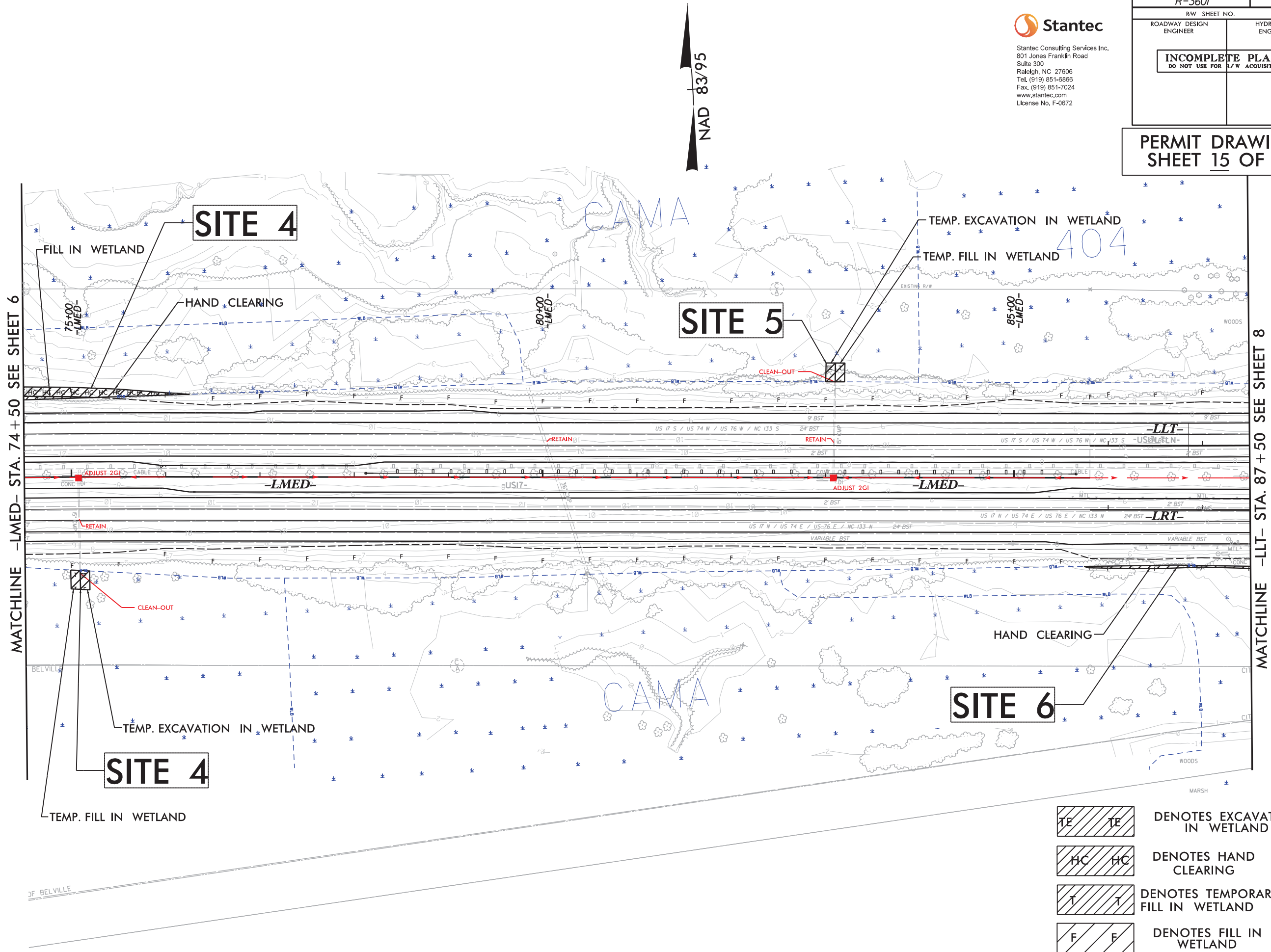
PERMIT DRAWING
SHEET 14 OF 44

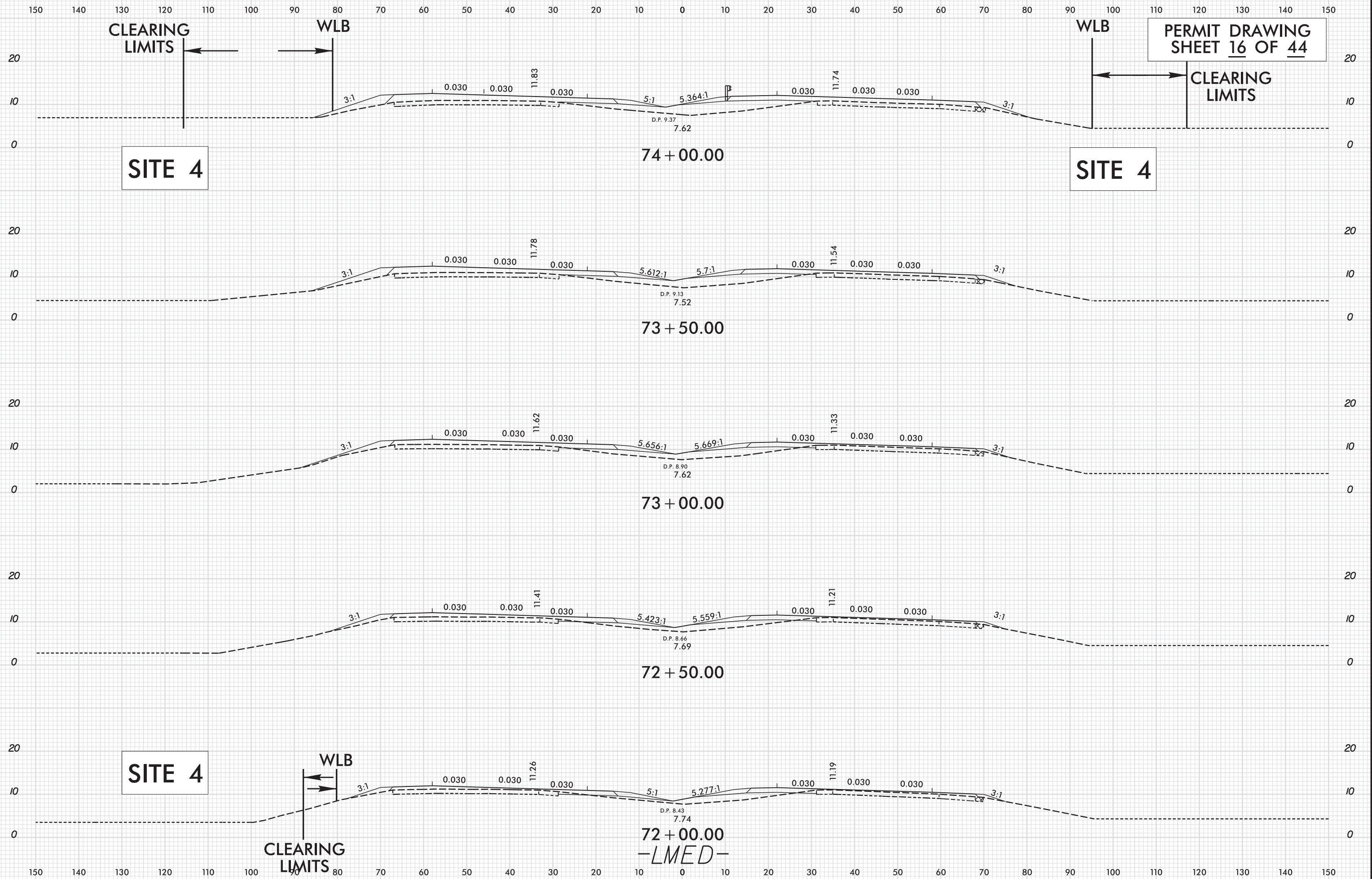


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PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>7</i>	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			

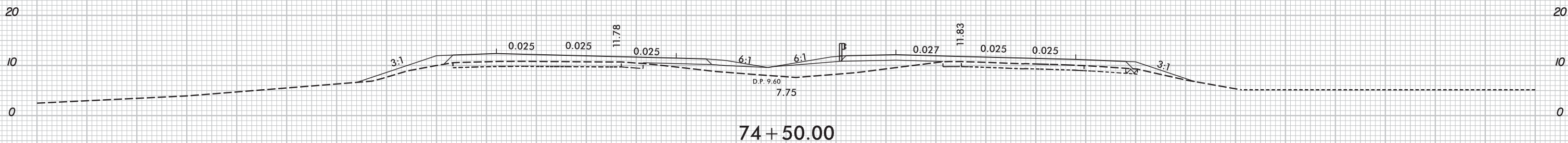
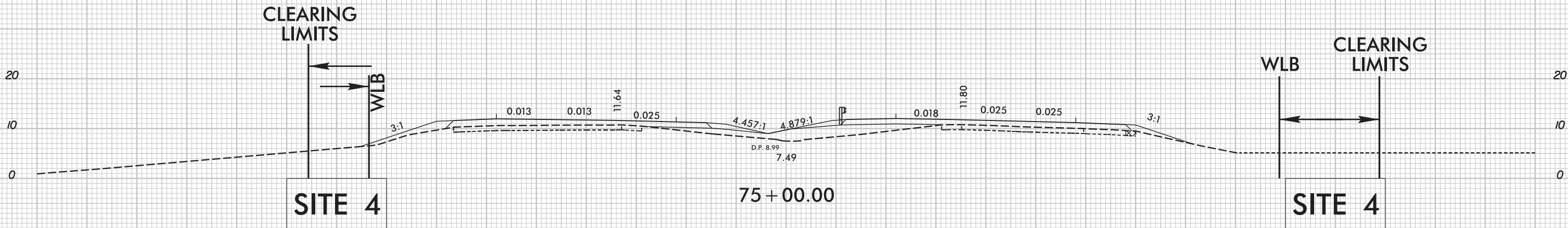
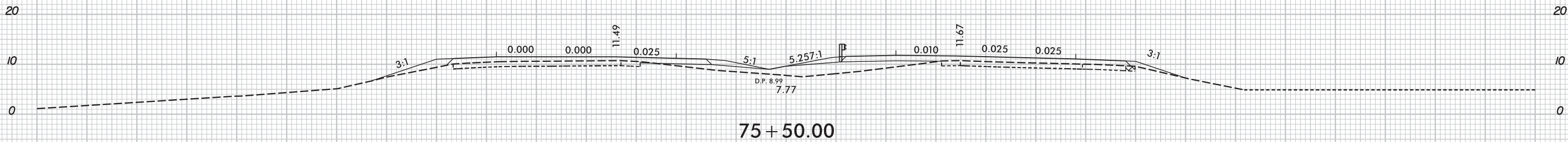
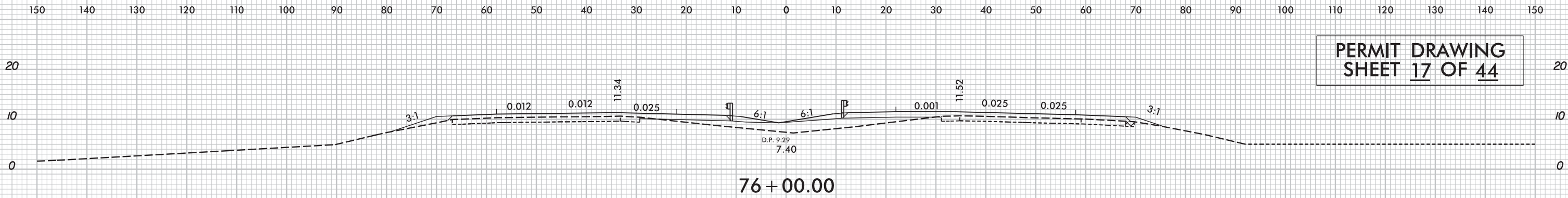
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SHEET 15 OF 44





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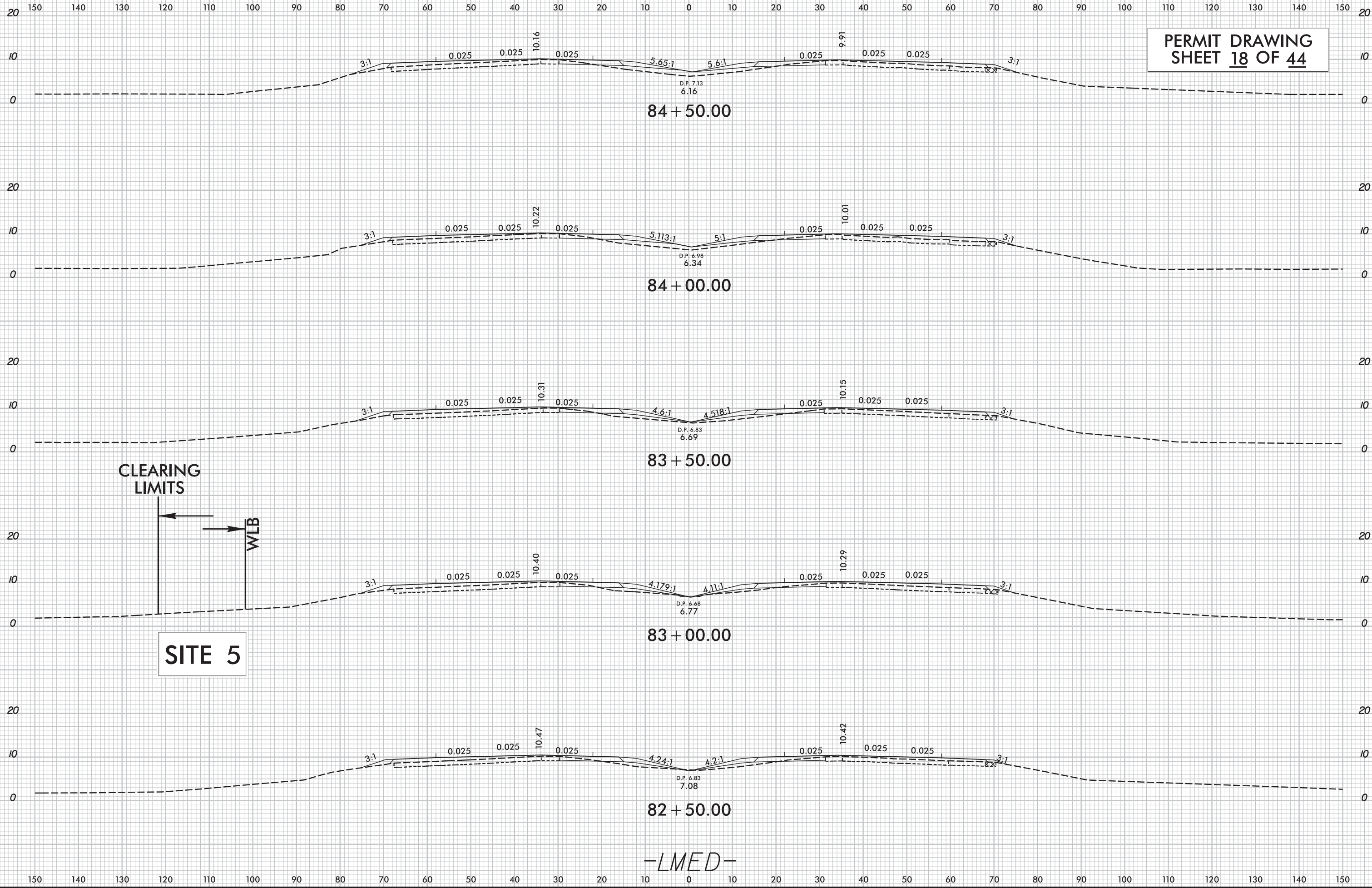
PERMIT DRAWING
SHEET 17 OF 44



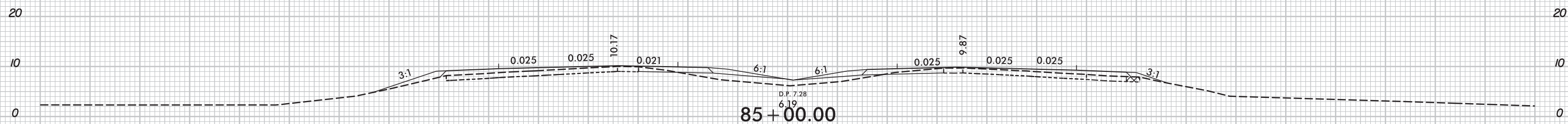
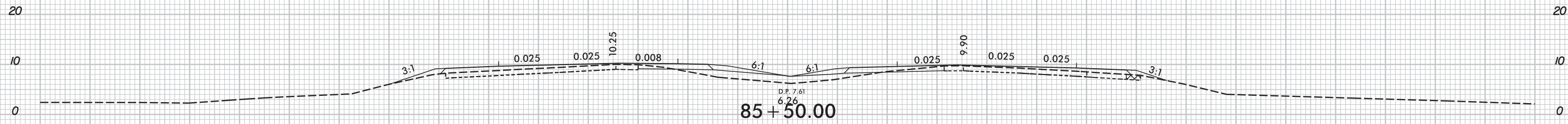
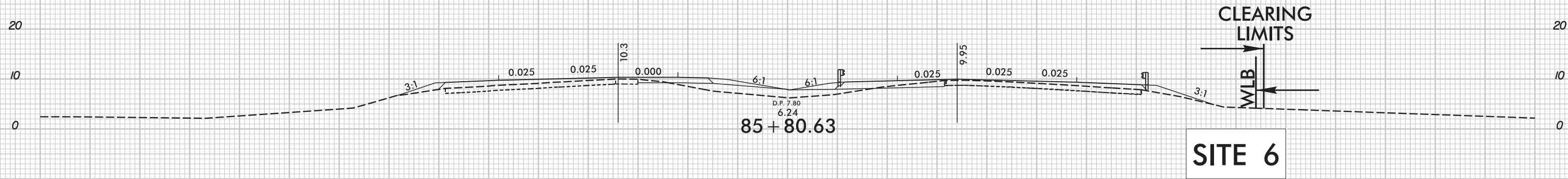
-LMED-

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PERMIT DRAWING
SHEET 18 OF 44



PERMIT DRAWING
SHEET 19 OF 44

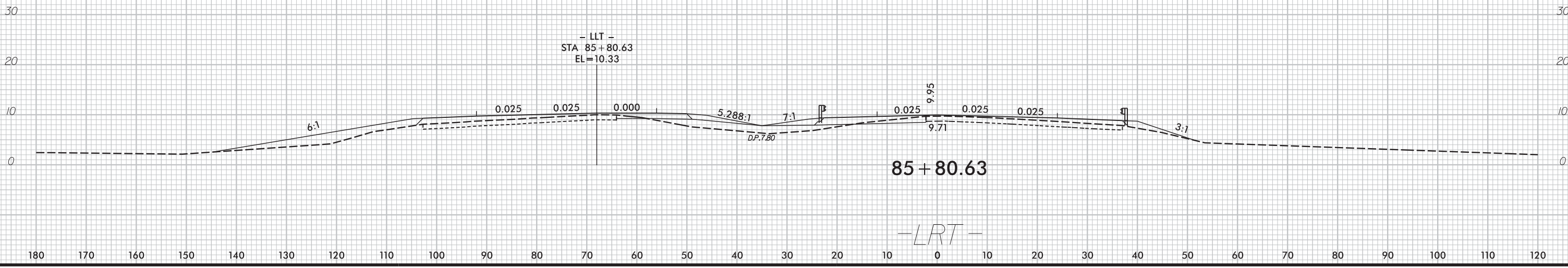
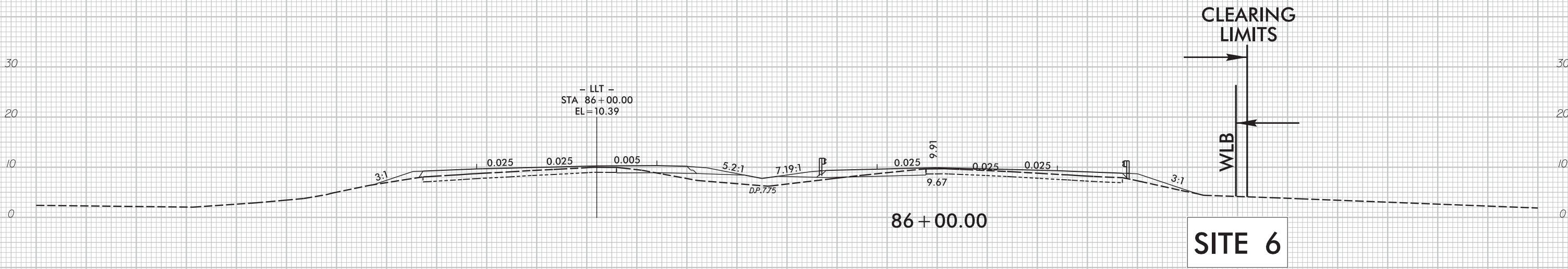
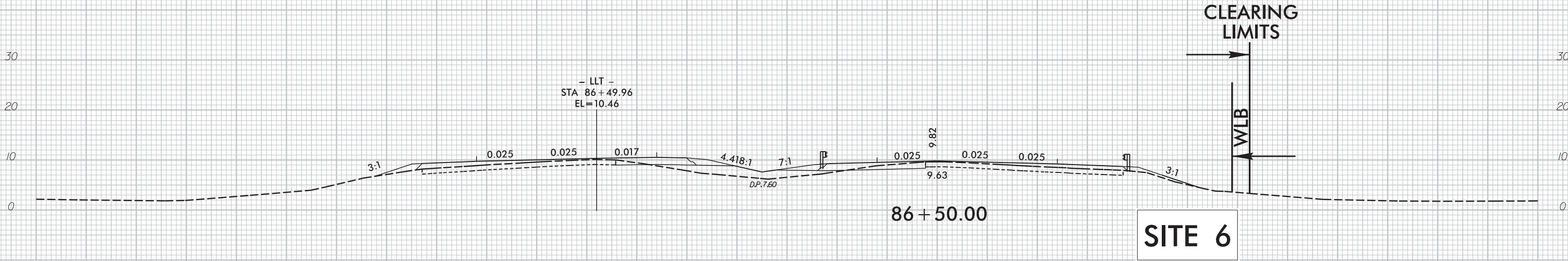


-LMED-

8/23/99

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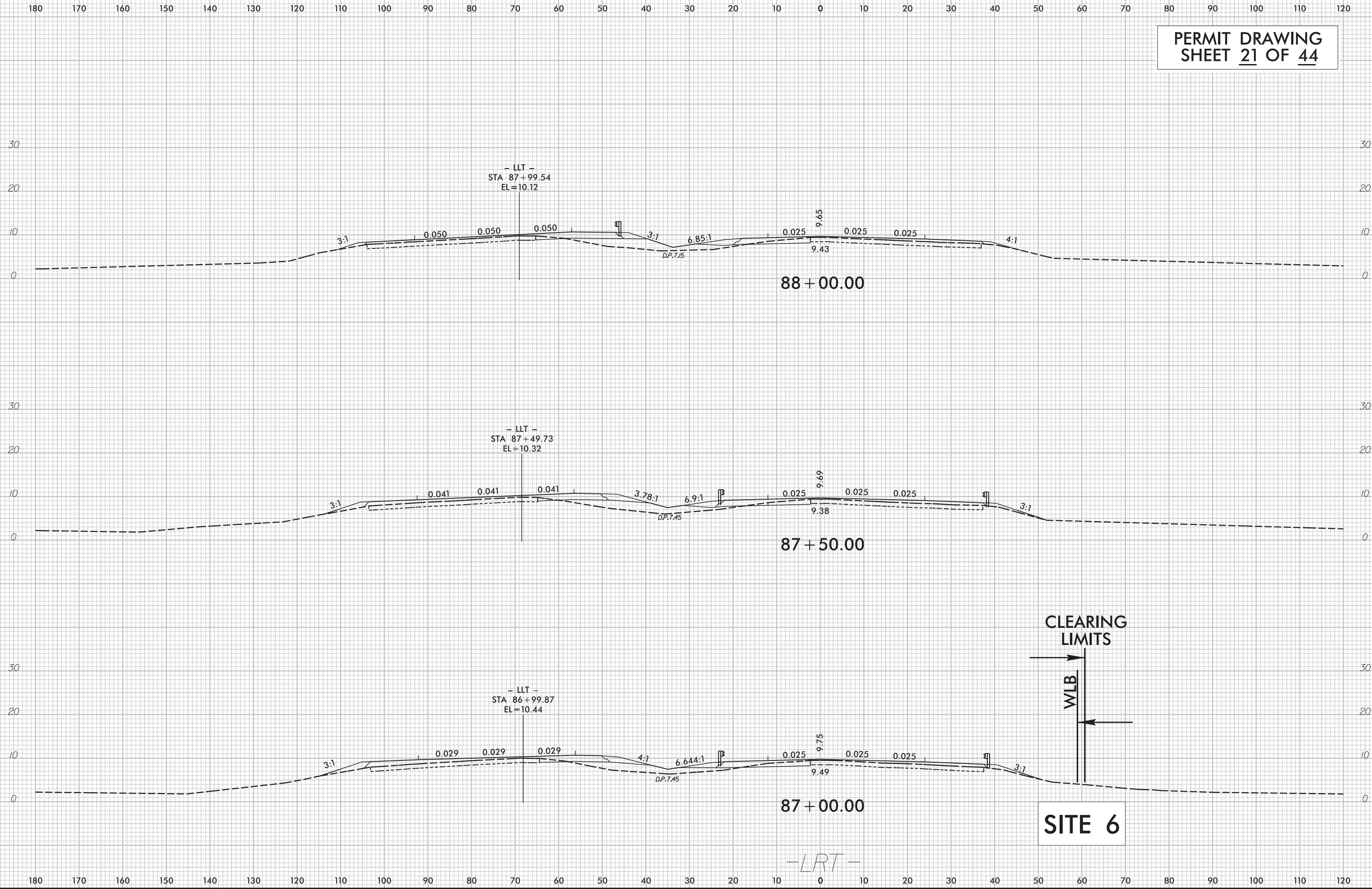
PERMIT DRAWING
SHEET 20 OF 44

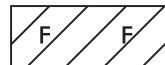
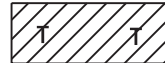


8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-3601	X-32

PERMIT DRAWING
SHEET 21 OF 44

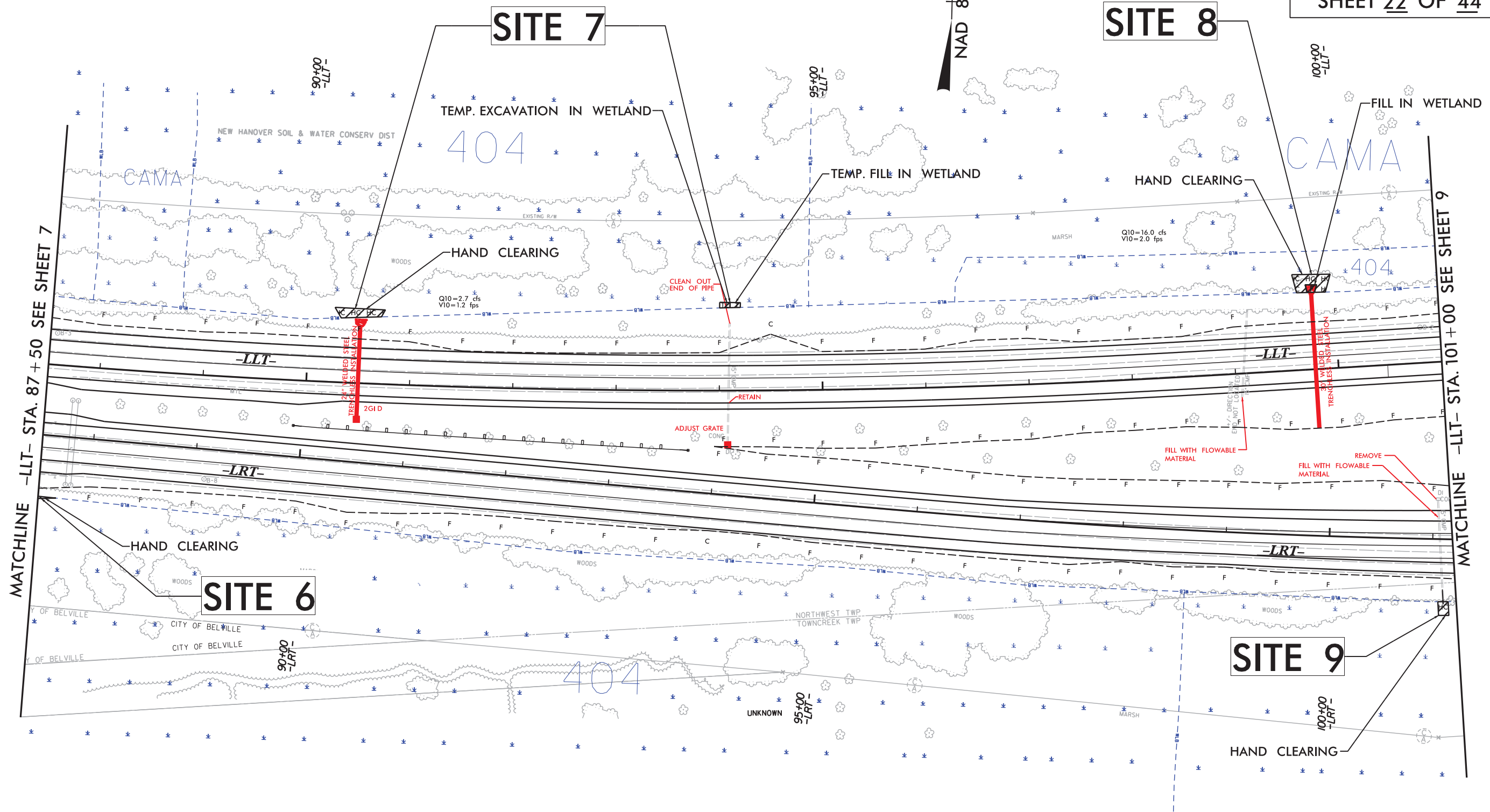


-  DENOTES FILL IN WETLAND
-  DENOTES TEMPORARY FILL IN WETLAND
-  DENOTES HAND CLEARING
-  DENOTES TEMPORARY EXCAVATION IN WETLAND

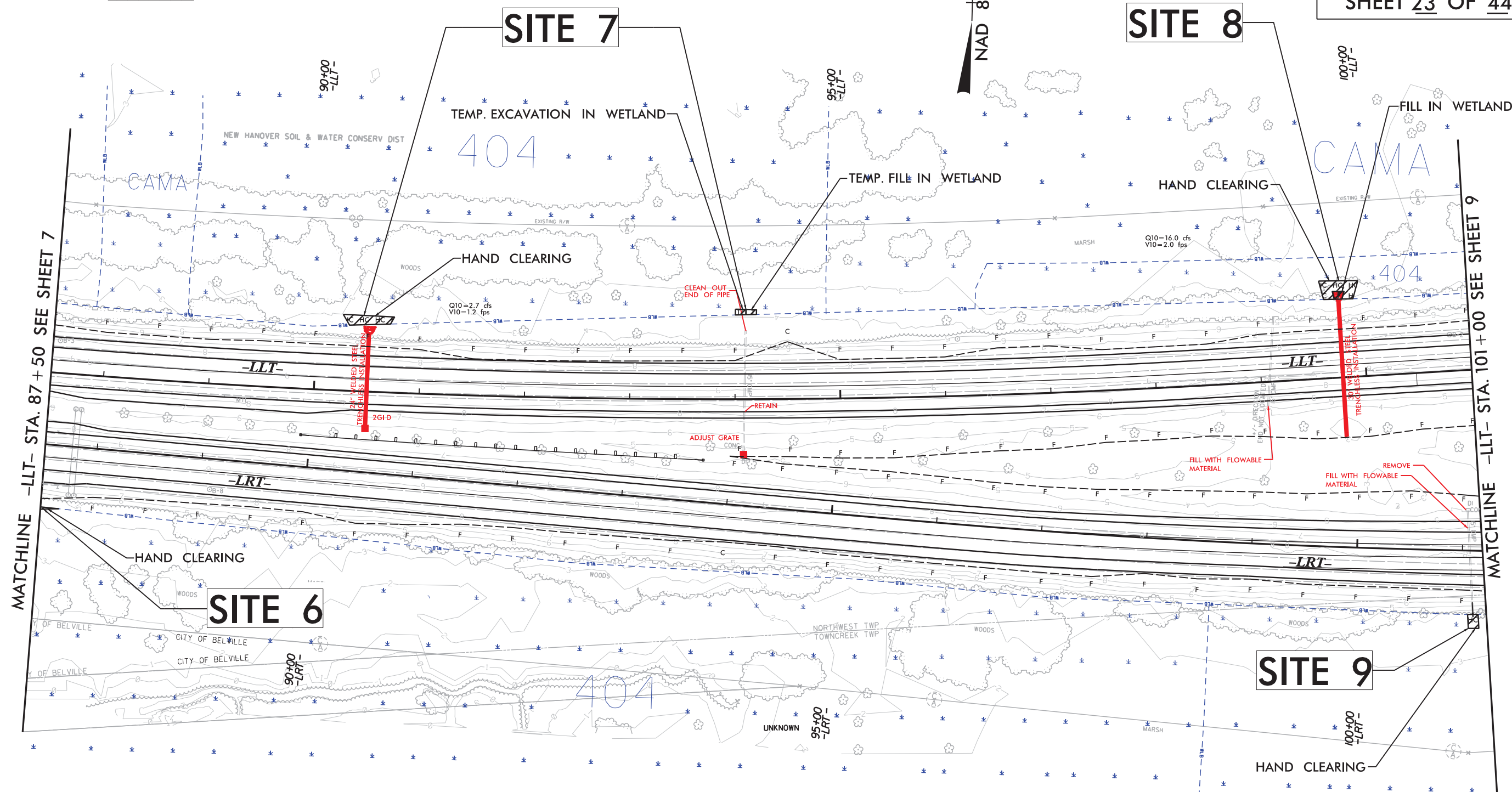
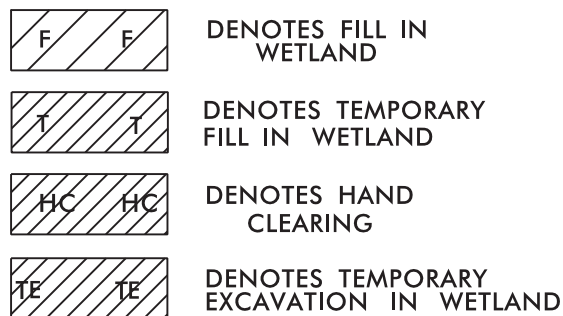
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PROJECT REFERENCE NO. R-3601		SHEET NO. 8	
RW SHEET NO.		HYDRAULICS ENGINEER	
ROADWAY DESIGN ENGINEER		DO NOT USE FOR E/W ACQUISITION	

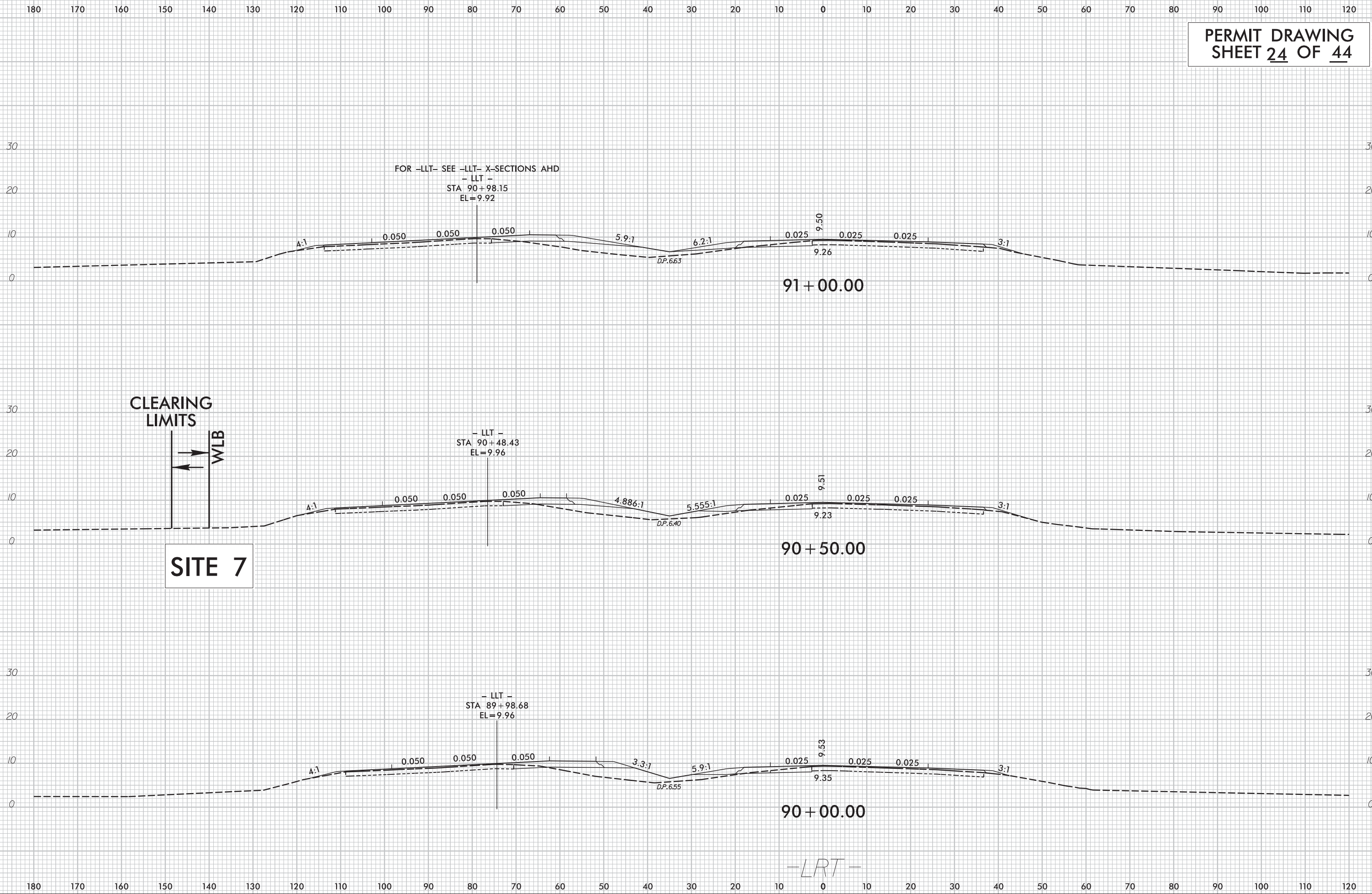
**PERMIT DRAWING
SHEET 22 OF 44**



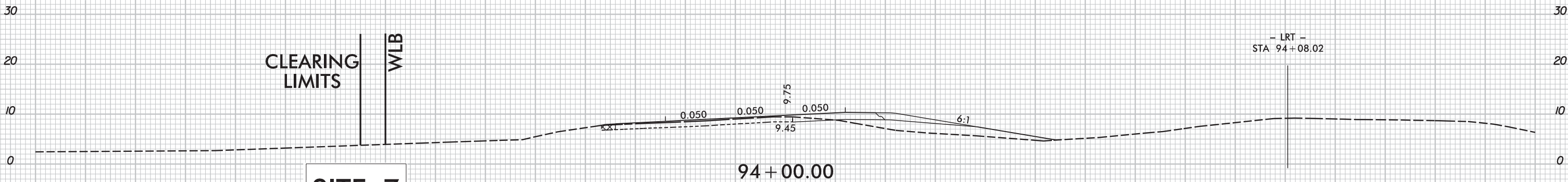
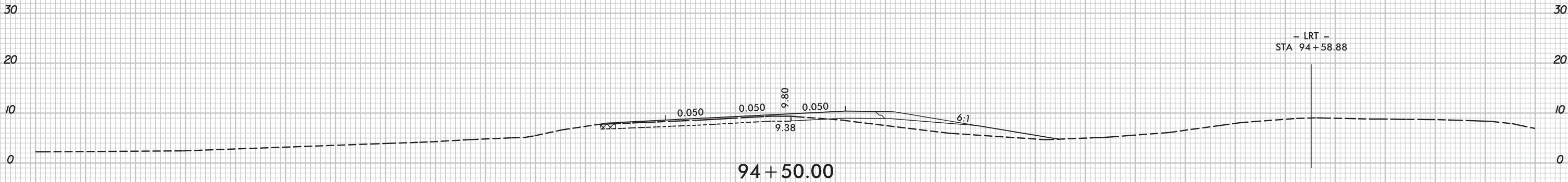
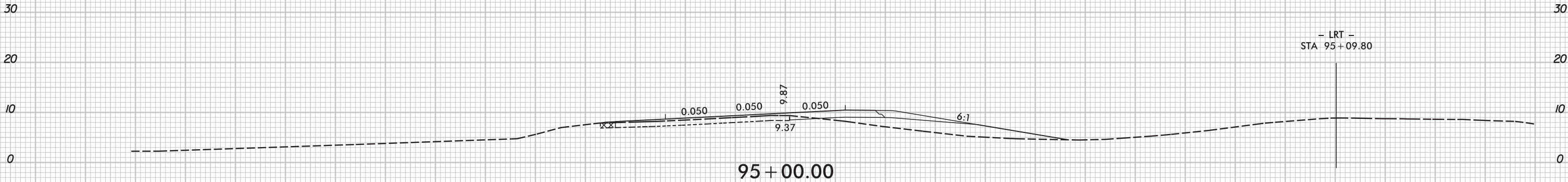
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SHEET 23 OF 44



PERMIT DRAWING
SHEET 24 OF 44



PERMIT DRAWING
SHEET 25 OF 44



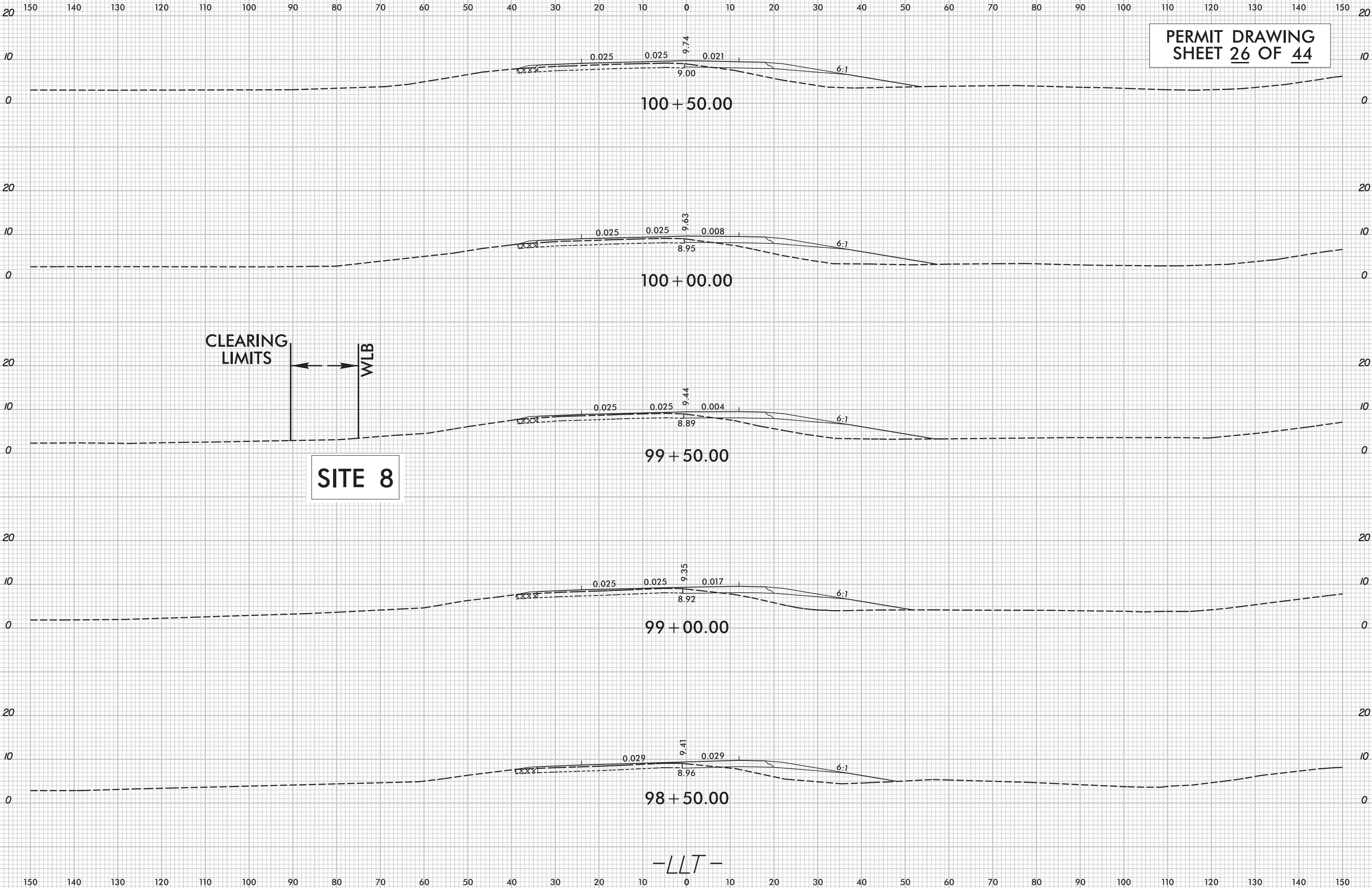
CLEARING
LIMITS

WLB

SITE 7

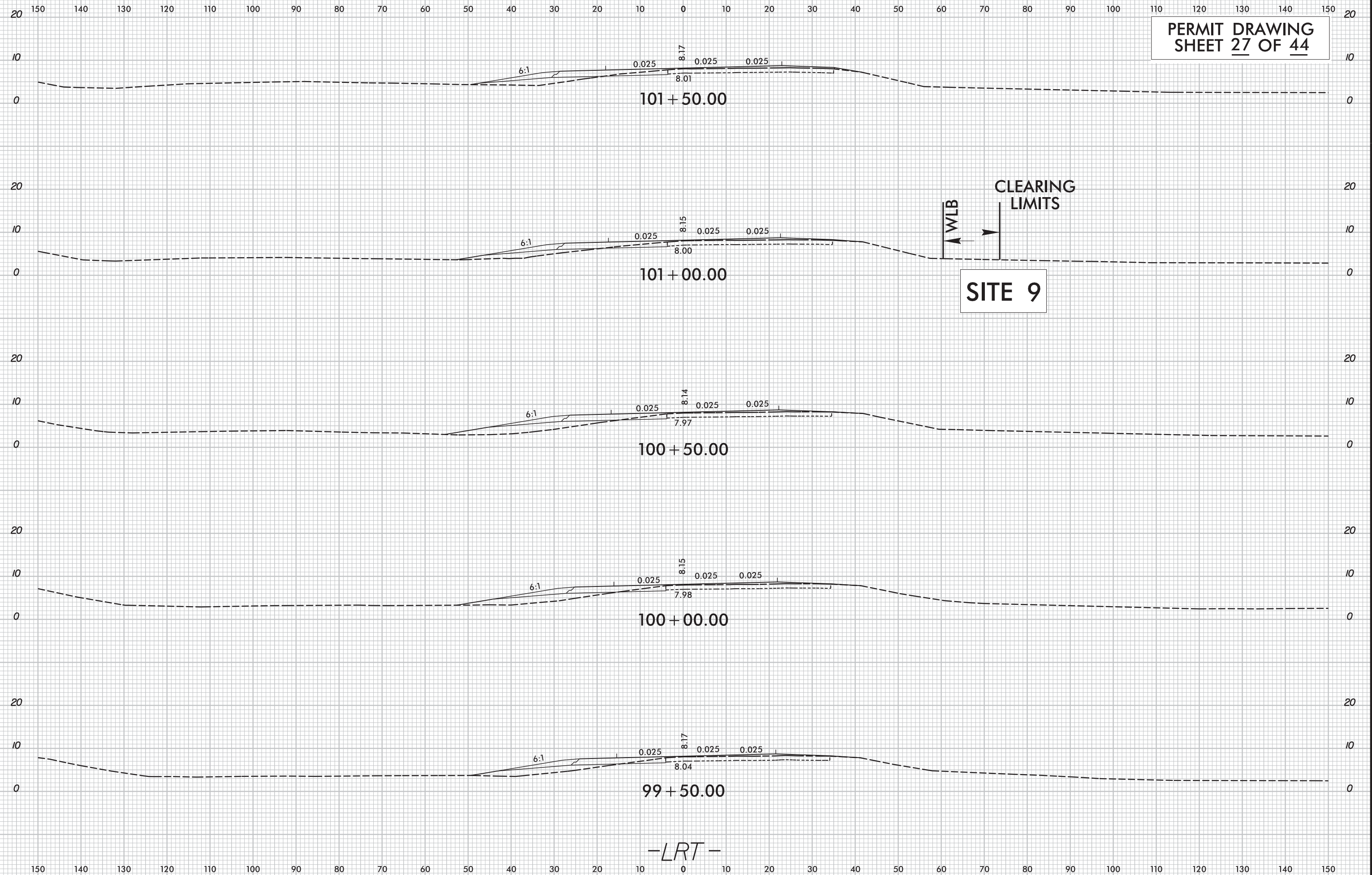
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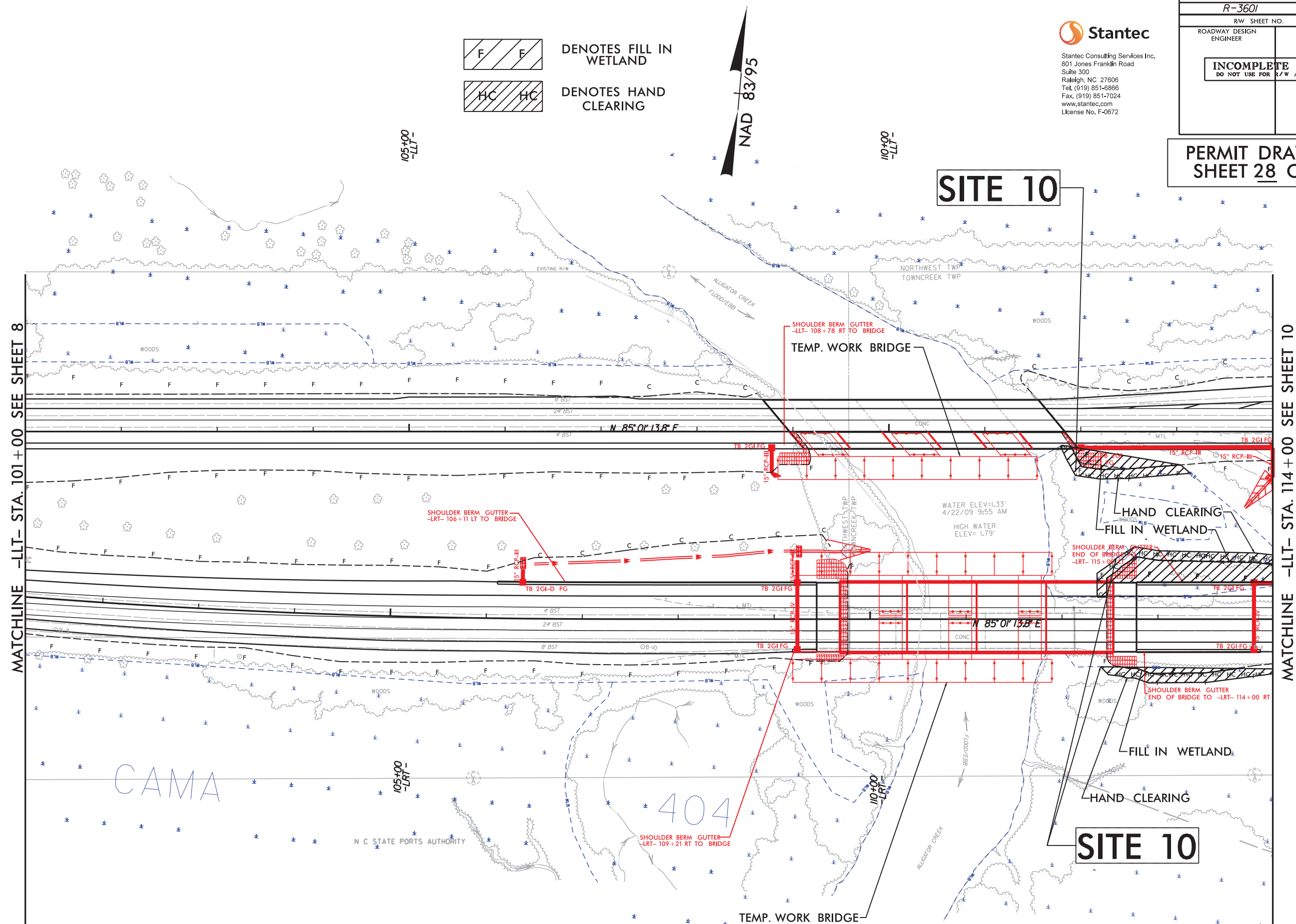
PERMIT DRAWING
SHEET 26 OF 44



8/23/99

PERMIT DRAWING
SHEET 27 OF 44



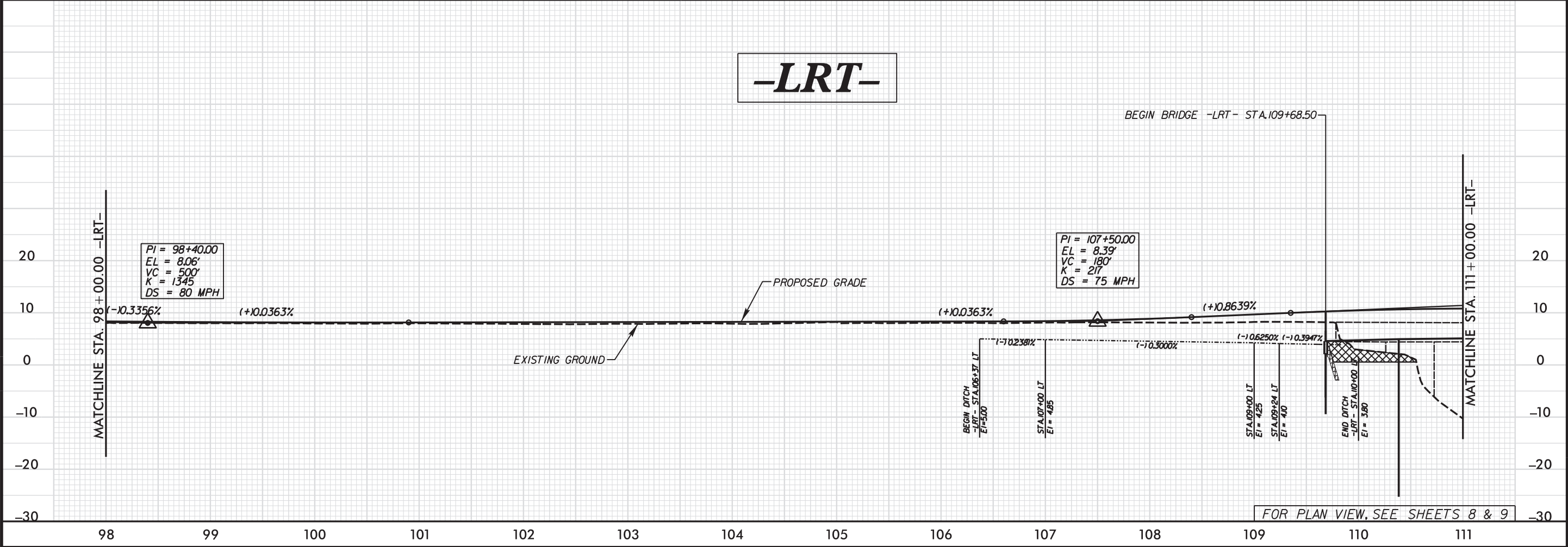
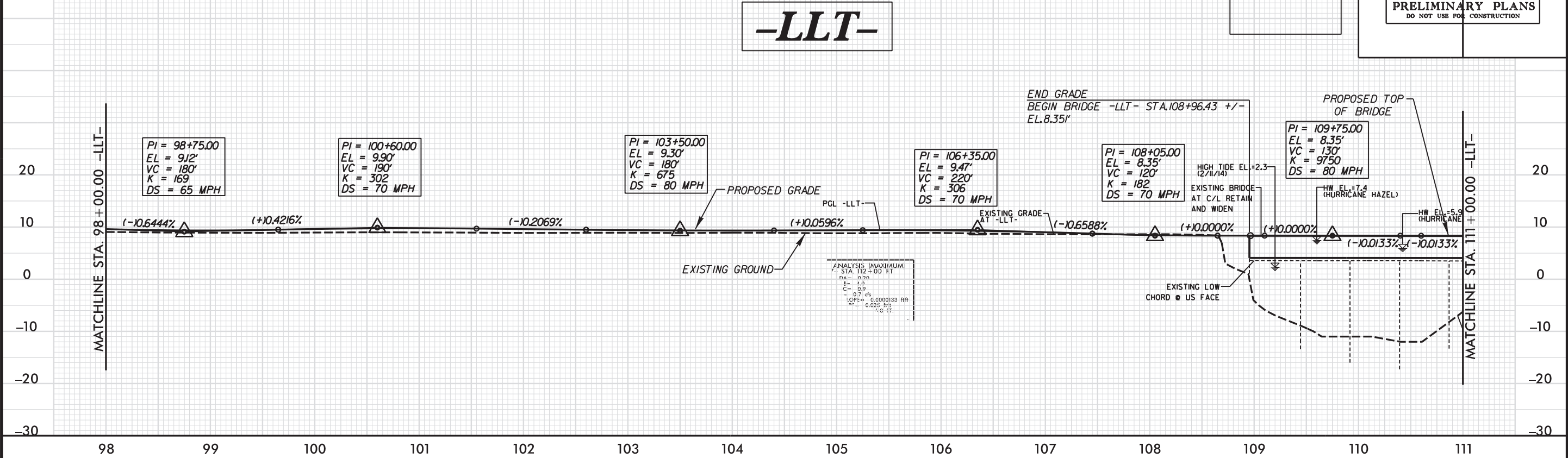


REFERENCE:
FOR -LLT- & -LRT- PROFILE VIEW, SEE SHEETS 19-20

5/28/99

PERMIT DRAWING
SHEET 30 OF 44

PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>19</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



5/28/99

PERMIT DRAWING
SHEET 31 OF 44

PROJECT REFERENCE NO.
R-3601

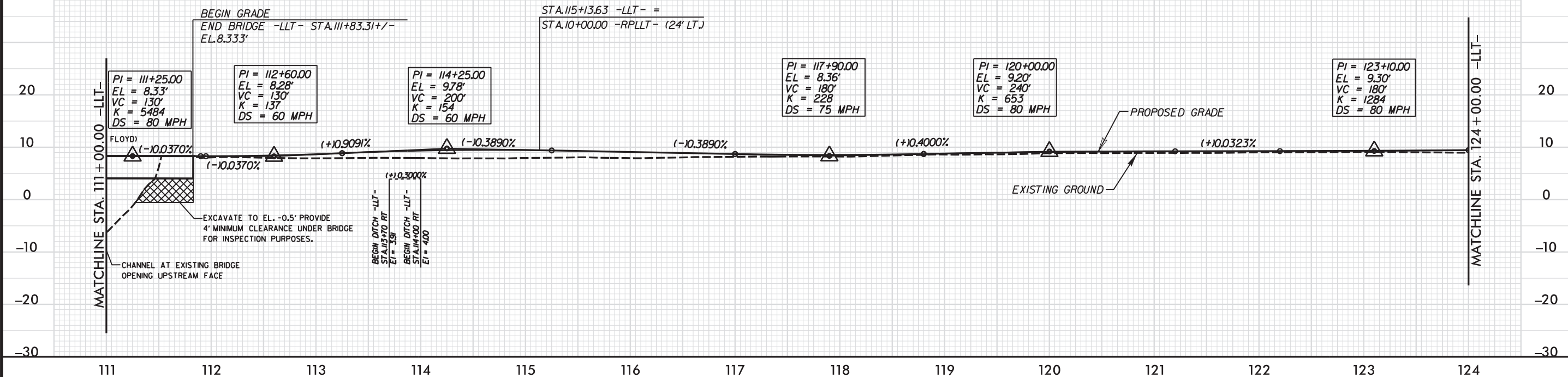
SHEET NO.
20

ROADWAY DESIGN
ENGINEER

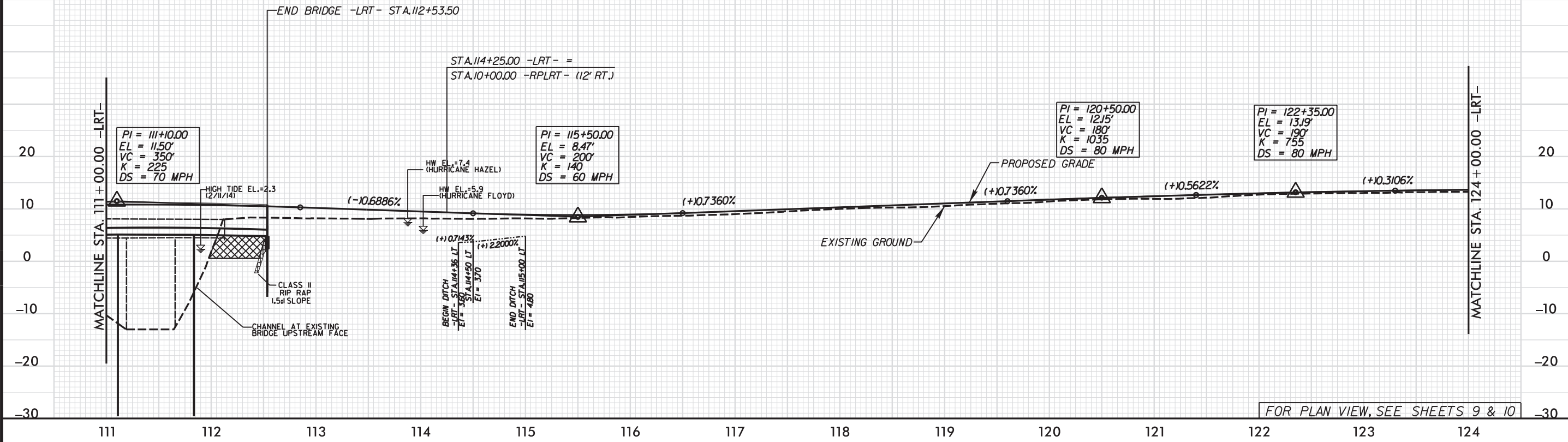
HYDRAULICS
ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-LLT-

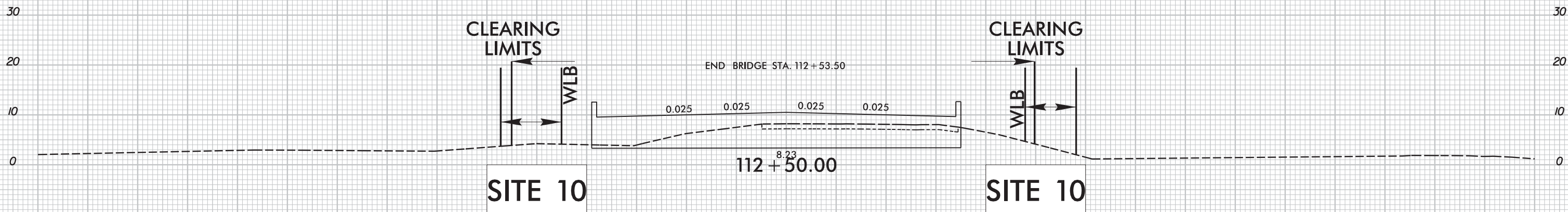
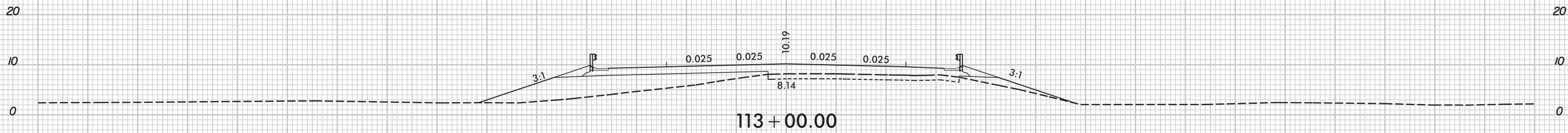
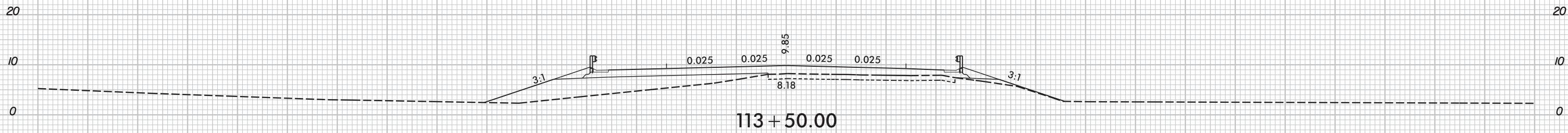
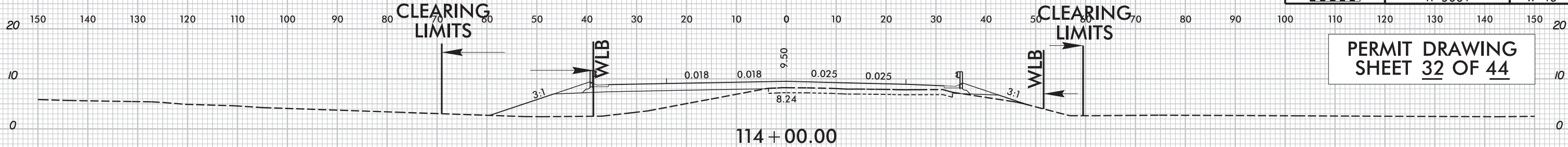


-LRT-



FOR PLAN VIEW, SEE SHEETS 9 & 10

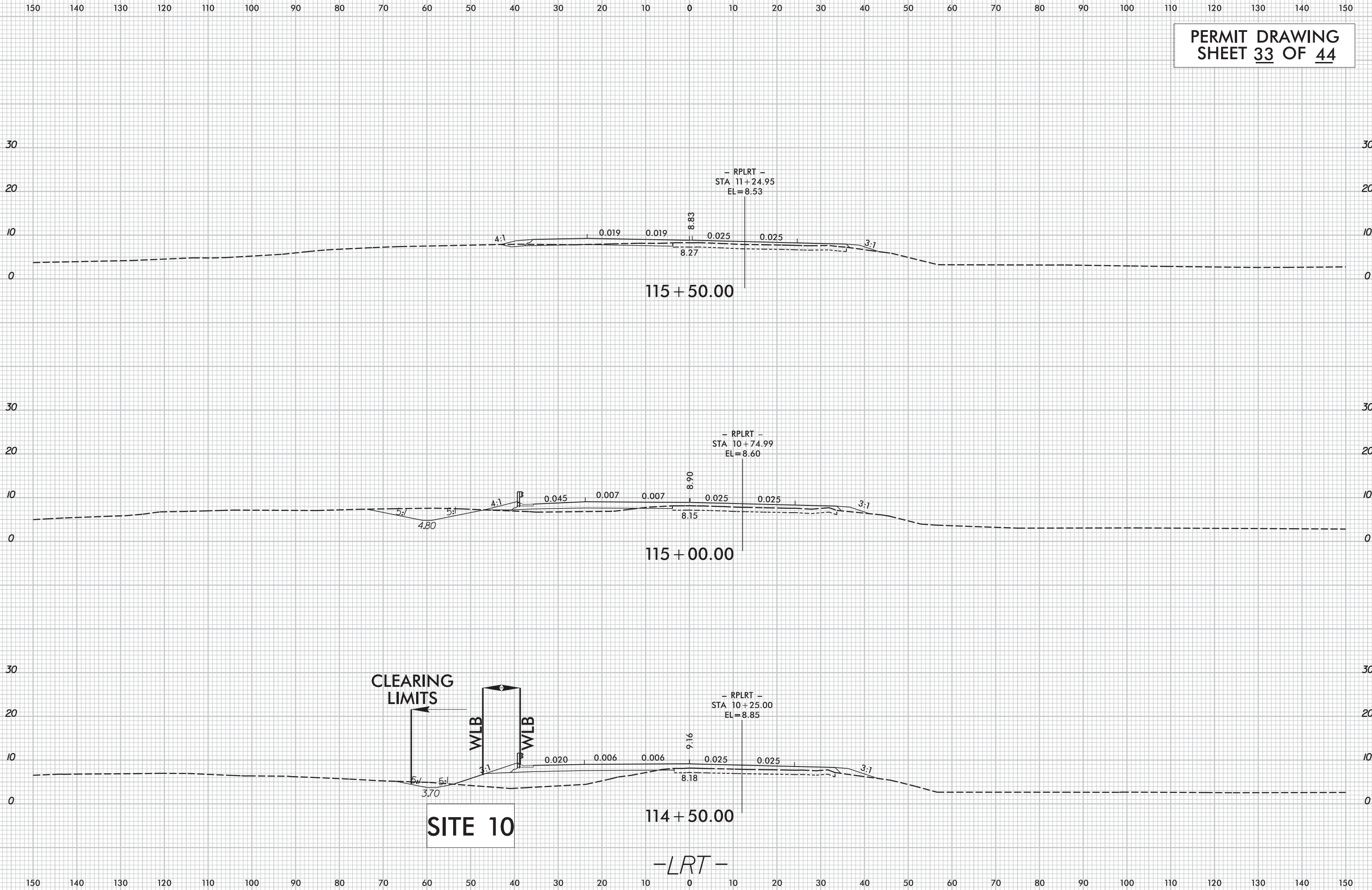
PERMIT DRAWING
SHEET 32 OF 44



-LRT-

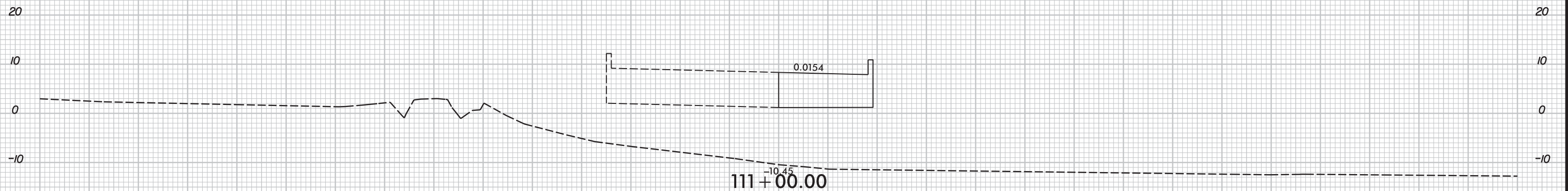
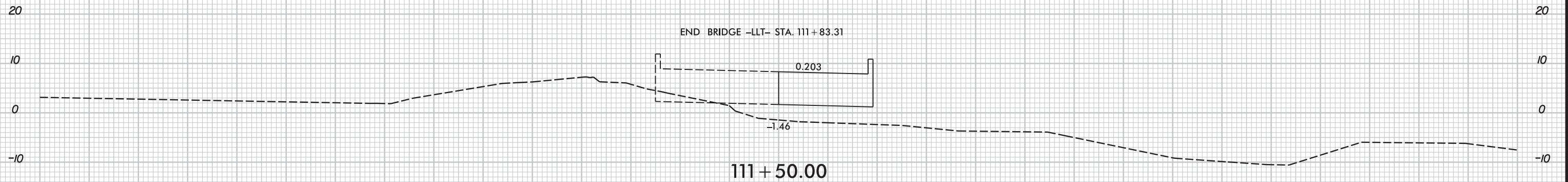
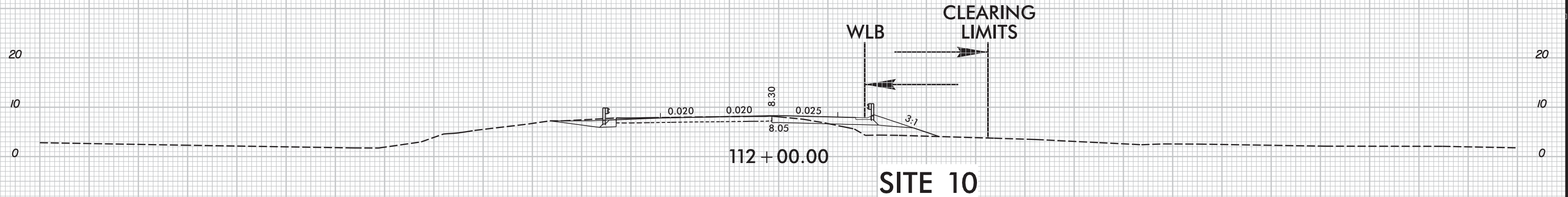
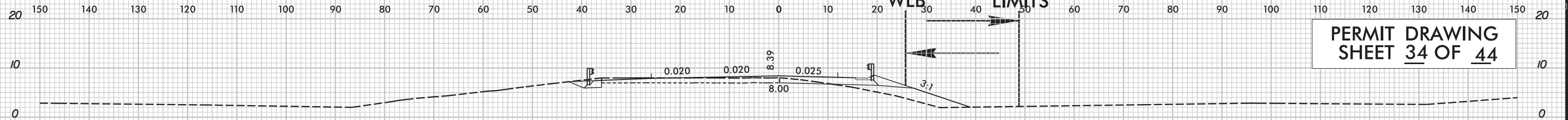
8/23/99

PERMIT DRAWING
SHEET 33 OF 44



8/23/99

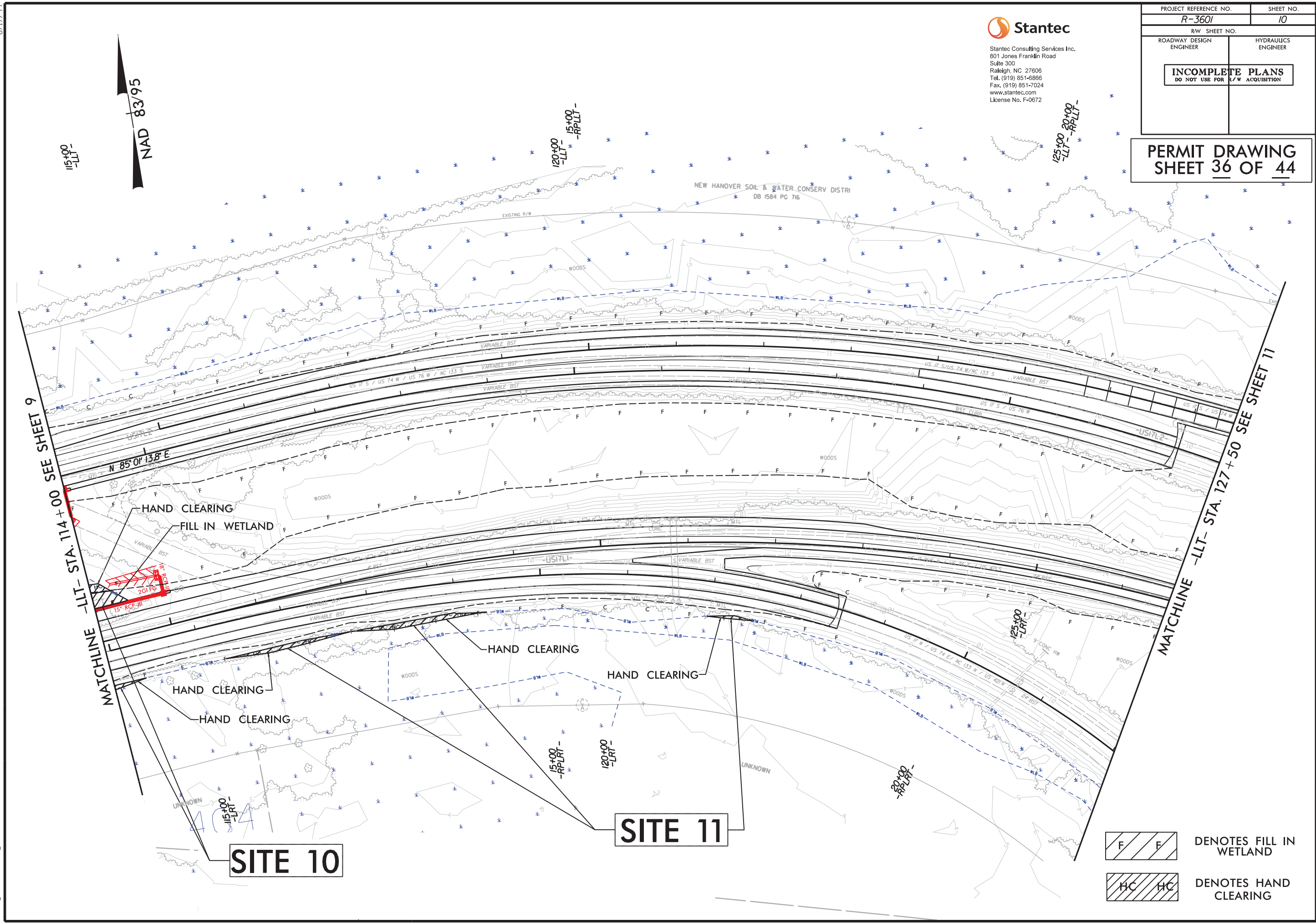
PERMIT DRAWING
SHEET 34 OF 44



-LLT-

8/17/99

582014
R-3601-1 PERMIT PACKAGE_20140508.DWG
R-3601-1 PERMIT PACKAGE_20140508.DWG



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PROJECT REFERENCE NO.	SHEET NO.
R-3601	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR E/W ACQUISITION	

**PERMIT DRAWING
SHEET 36 OF 44**

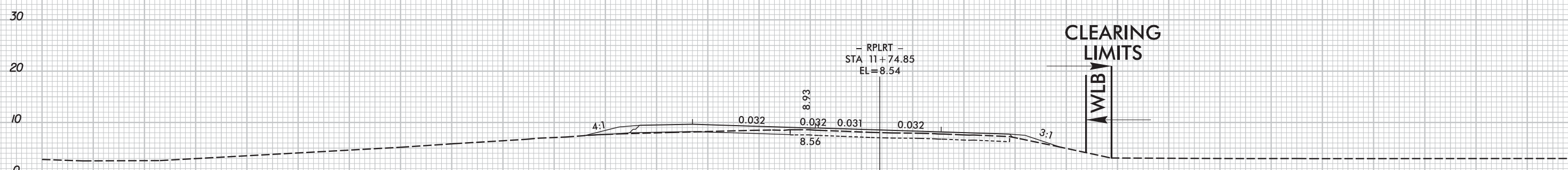
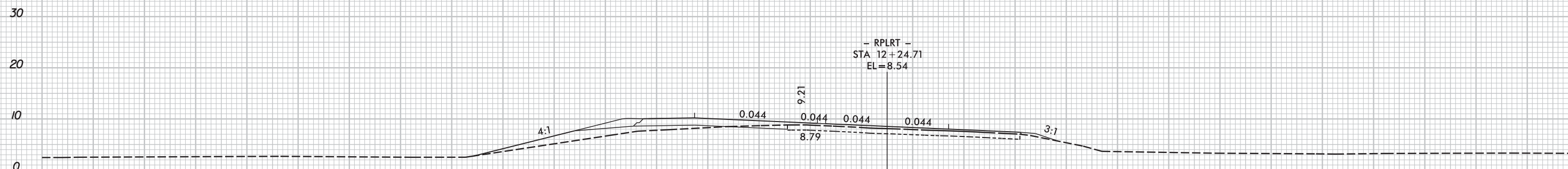
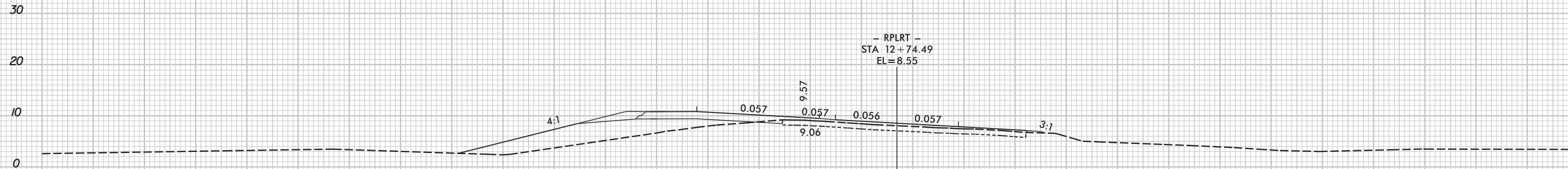
DENOTES FILL IN WETLAND

DENOTES HAND CLEARING

8/23/99

PERMIT DRAWING
SHEET 37 OF 44

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



CLEARING
LIMITS

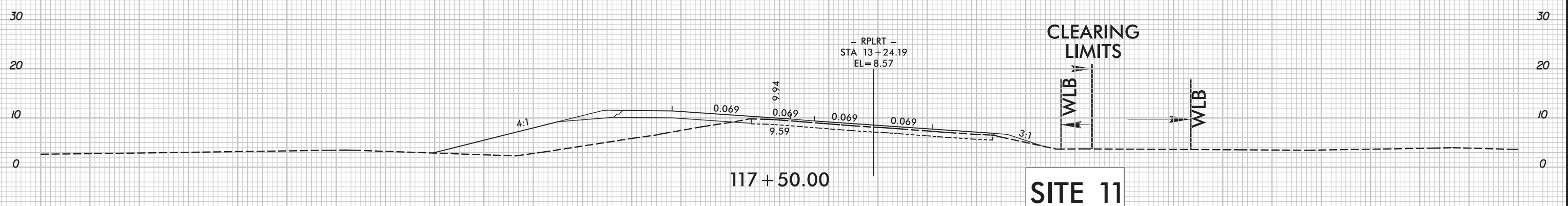
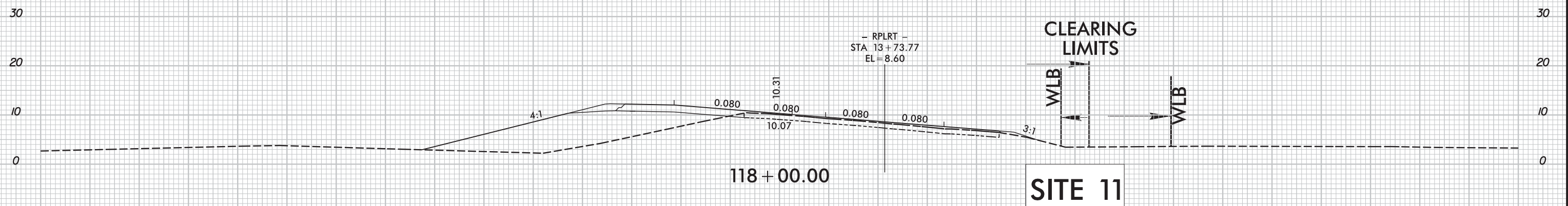
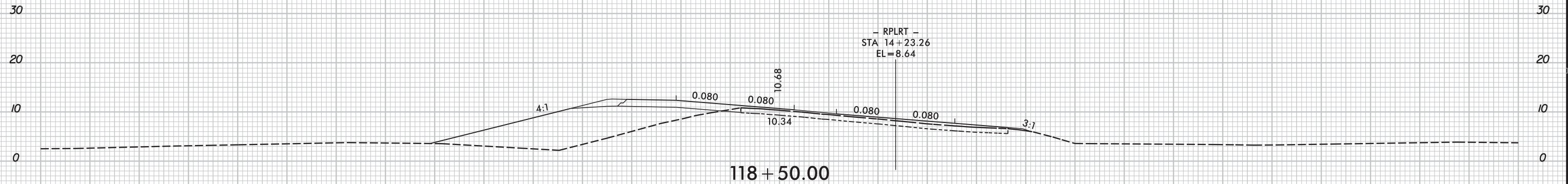
WLB

SITE 11

-LRT-

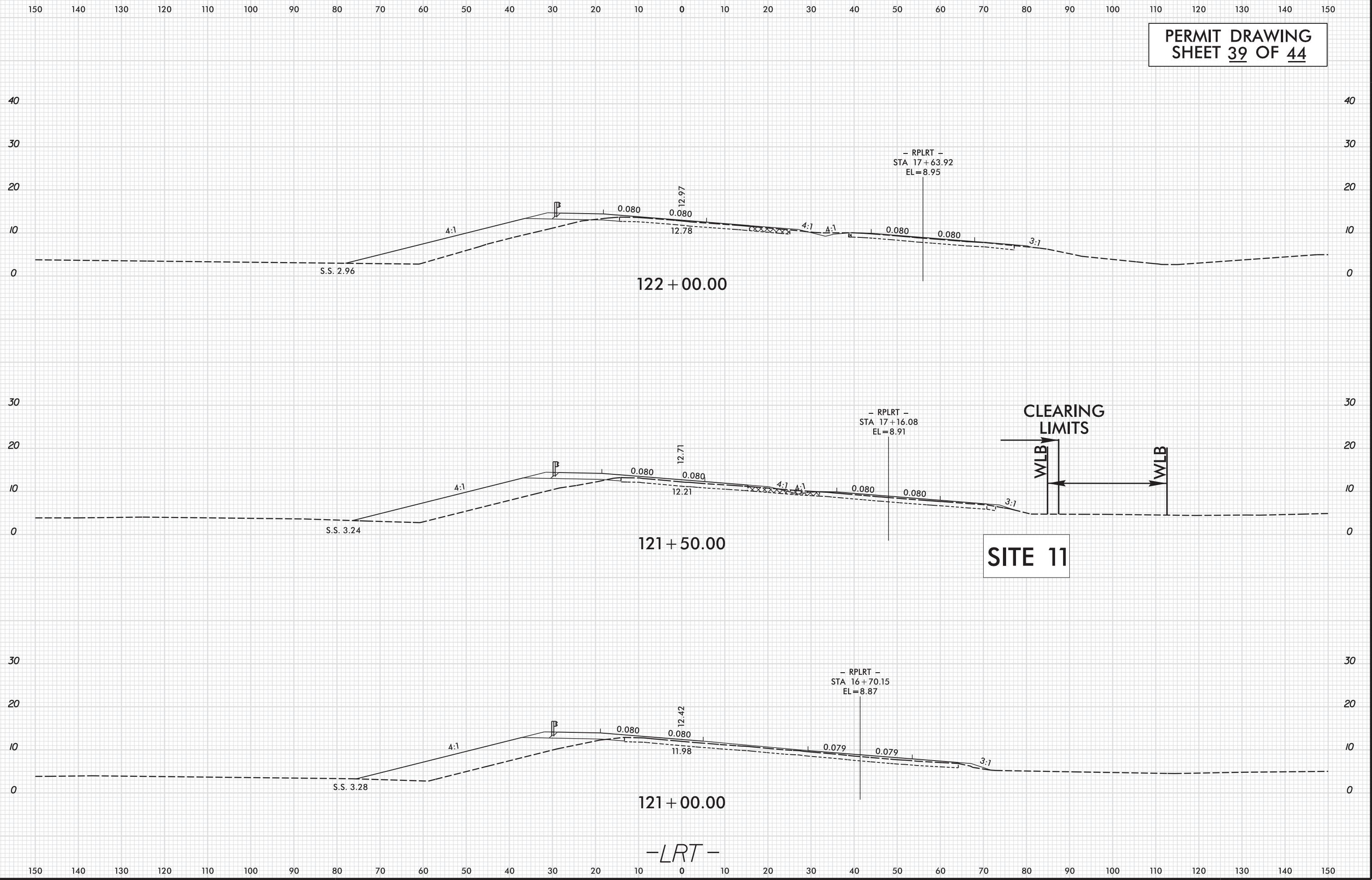
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PERMIT DRAWING
SHEET 38 OF 44



-LRT-

PERMIT DRAWING
SHEET 39 OF 44

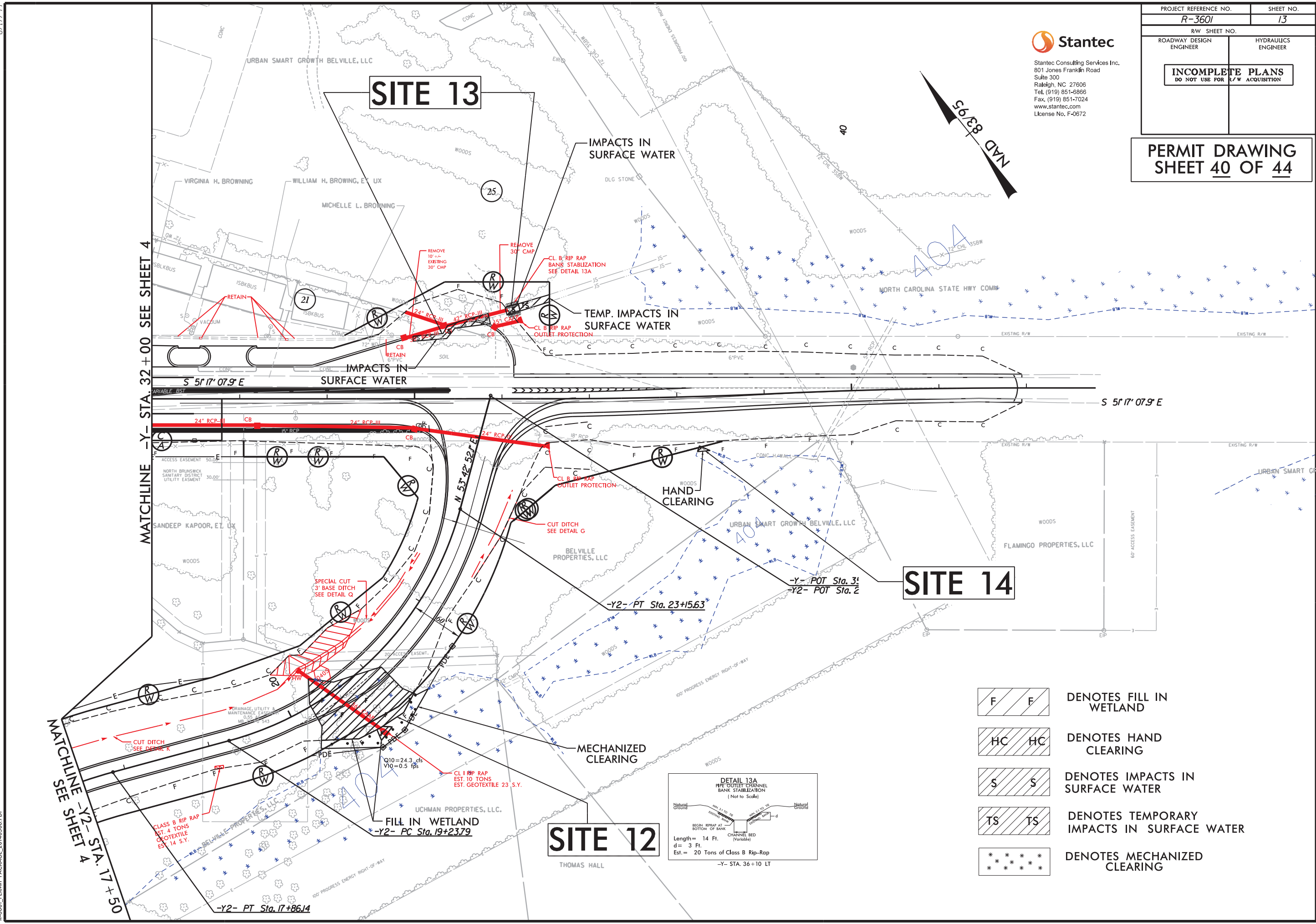


8/17/99

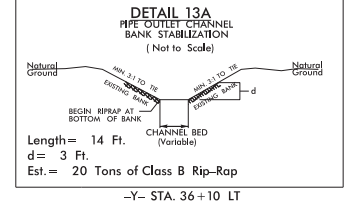
PROJECT REFERENCE NO.	SHEET NO.
R-3601	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR E/W ACQUISITION	

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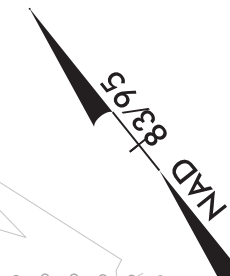
PERMIT DRAWING
SHEET 40 OF 44



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

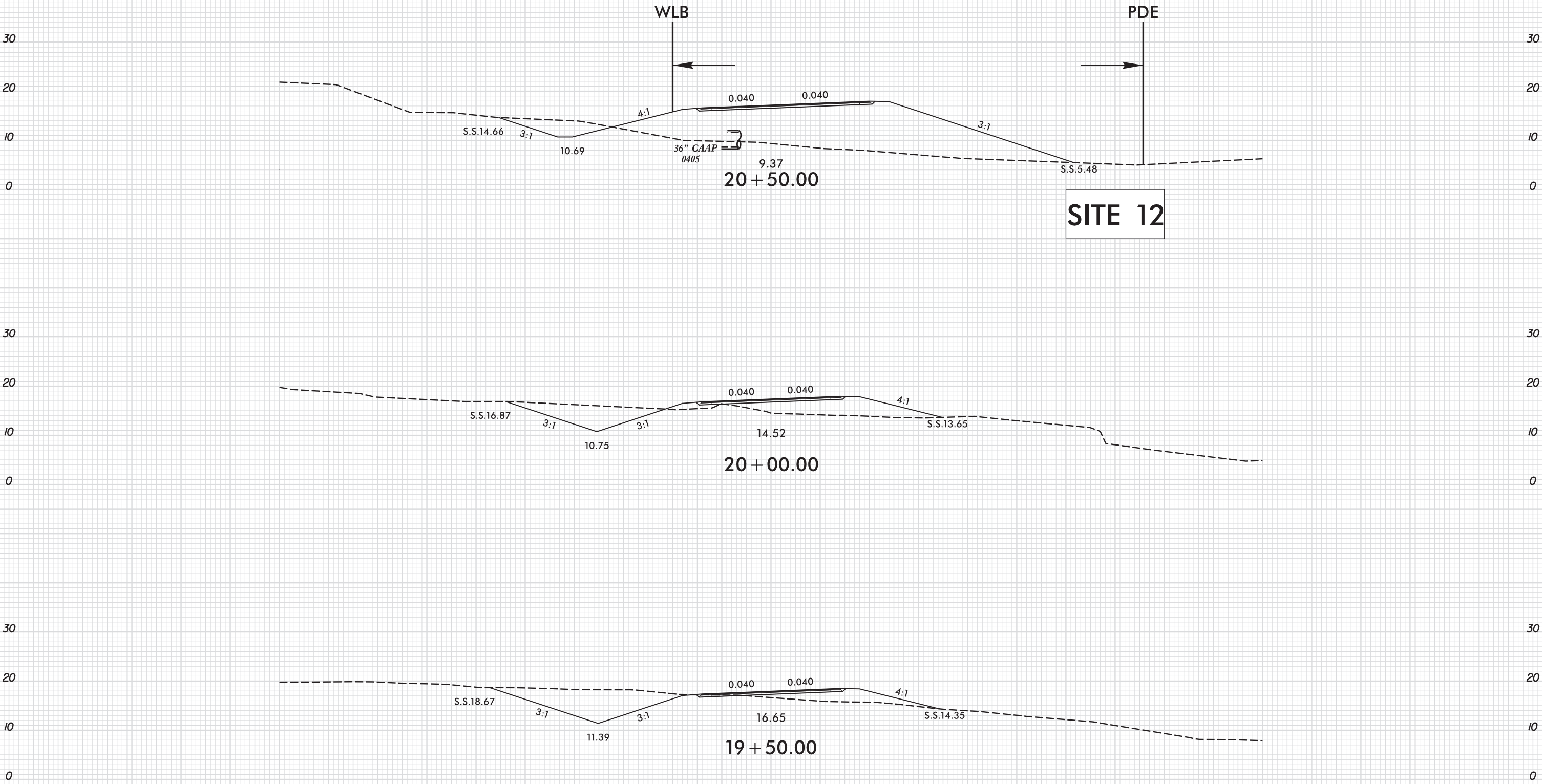


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STANTEC
R-3601 PERMIT PACKAGE 20140508.DGN



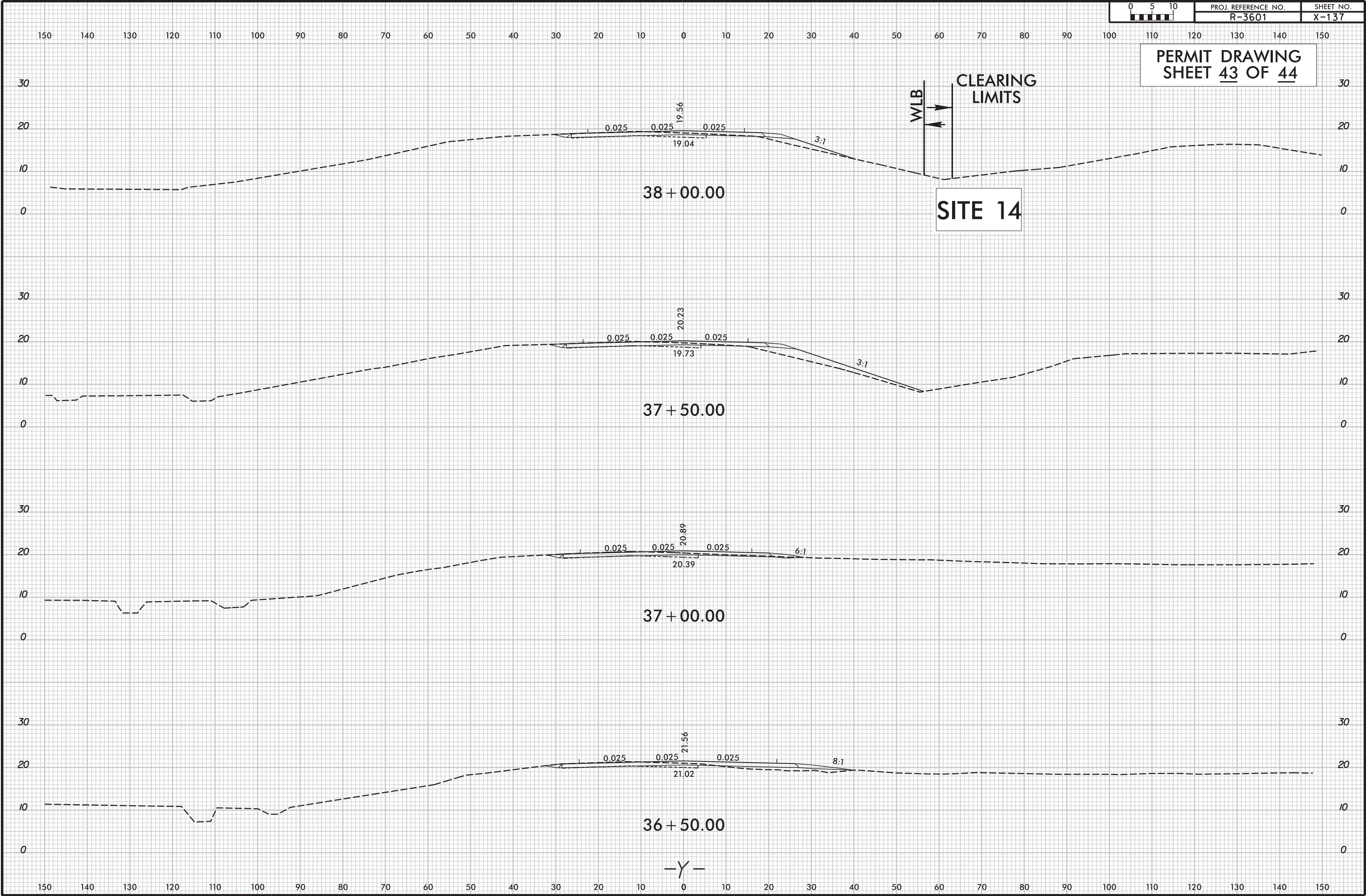
8/23/99

PERMIT DRAWING
SHEET 42 OF 44



-Y2-

PERMIT DRAWING
SHEET 43 OF 44



WETLAND PERMIT IMPACT SUMMARY														
			WETLAND IMPACTS							SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	CAMA Permanent Fill in Wetlands (ac)	404 Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Temp Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-Y2- 13+05	48" DRAINAGE PIPE								0.01	< 0.01	47	10	
2	-LMED- 54+37 TO 54+75 RT	24" DRAINAGE PIPE		< 0.01			< 0.01		0.02					
3	64+43 LT & 'LMED- 65+92 TO 66+26 LT	BRIDGE 24" DRAINAGE PIPE	0.03	< 0.01			< 0.01		0.04					
4	76+31 LT & -LMED- 74+99 TO 75+19 RT	ROADWAY FILL/36" DRAINAGE PIPE		0.04	< 0.01		< 0.01		0.16					
5	-LMED- 83+00 TO 83+21 RT	EXISTING DRAINAGE PIPE			< 0.01		< 0.01							
6	-LRT- 85+81 TO 87+69 RT	ROADWAY							0.01					
7	-LLT- 90+25 TO 90+74 LT & -LLT- 94+00 TO 94+21 LT	ROADWAY			< 0.01		< 0.01		< 0.01					
8	-LLT- 99+60 TO 99+97 LT	30" DRAINAGE PIPE		< 0.01					0.01					
9	-LRT- 101+06 TO 101+17 RT	EXISTING DRAINAGE PIPE							< 0.01					
10	-LLT- 111+79 TO 113+14 RT & -LRT- 112+37 TO 114+59	BRIDGE 108 & BRIDGE 107		0.14					0.12					
11	-LRT- 115+52 TO 118+61 RT & -LRT- 121+21 TO 121+77 RT	ROADWAY							0.03					
12	' -Y2- 20+65	ROADWAY/36" DRAINAGE PIPE		0.16				0.04						
13	-Y- 34+98 TO 36+55 LT	42" DRAINAGE PIPE								0.02	< 0.01	44	37	
13	-Y- 36+10 LT	BANK STABILIZATION								< 0.01		14		
14	-Y- 38+30 RT	ROADWAY							< 0.01					
TOTALS*:			0.03	0.34	0.01		0.02	0.04	0.41	0.03	< 0.01	105	47	0.00

*Rounded totals are sum of actual impacts

NOTES:

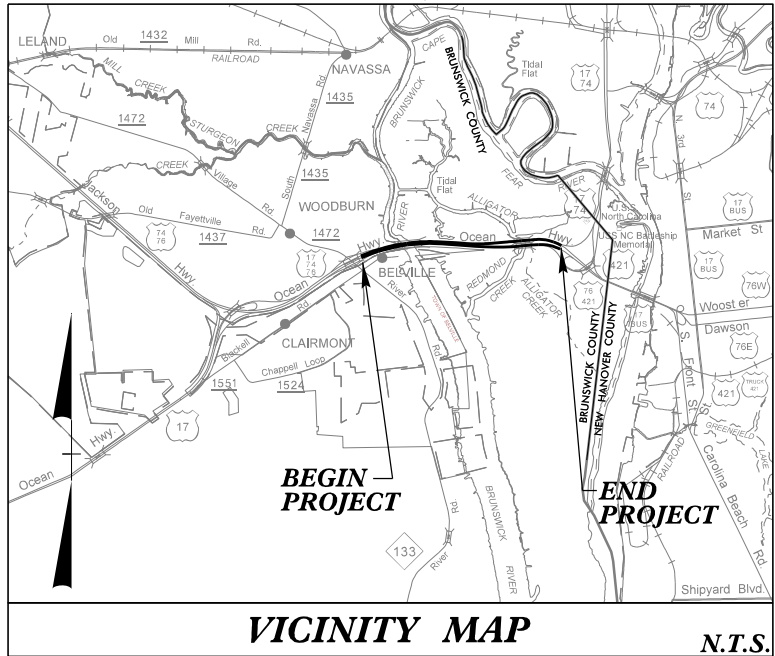
1. Permanent bridge pier surface water impacts = 0.04 acres
2. Temporary bridge pier surface water impacts = 0.02 acres
3. There will be 0.41 acre of hand clearing on this project. Additionally, there will be 0.04 acre of temporary fill in wetlands for erosion control measures in hand clearing areas. There will also be a <0.01 acre (165 sq. ft.) of temporary fill in CAMA wetlands for erosion control measures in hand clearing areas.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
R-3601 5/9/2014
BRUNSWICK AND NEW HANOVER COUNTY
US 17-74-76 FROM NC 133/SR 1472 INTERCHANGE
TO US 421 / NC 133 INTERCHANGE
SHEET 44 OF 44

TIP PROJECT: R-3601

CONTRACT: C 203359

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



VICINITY MAP

N.T.S.

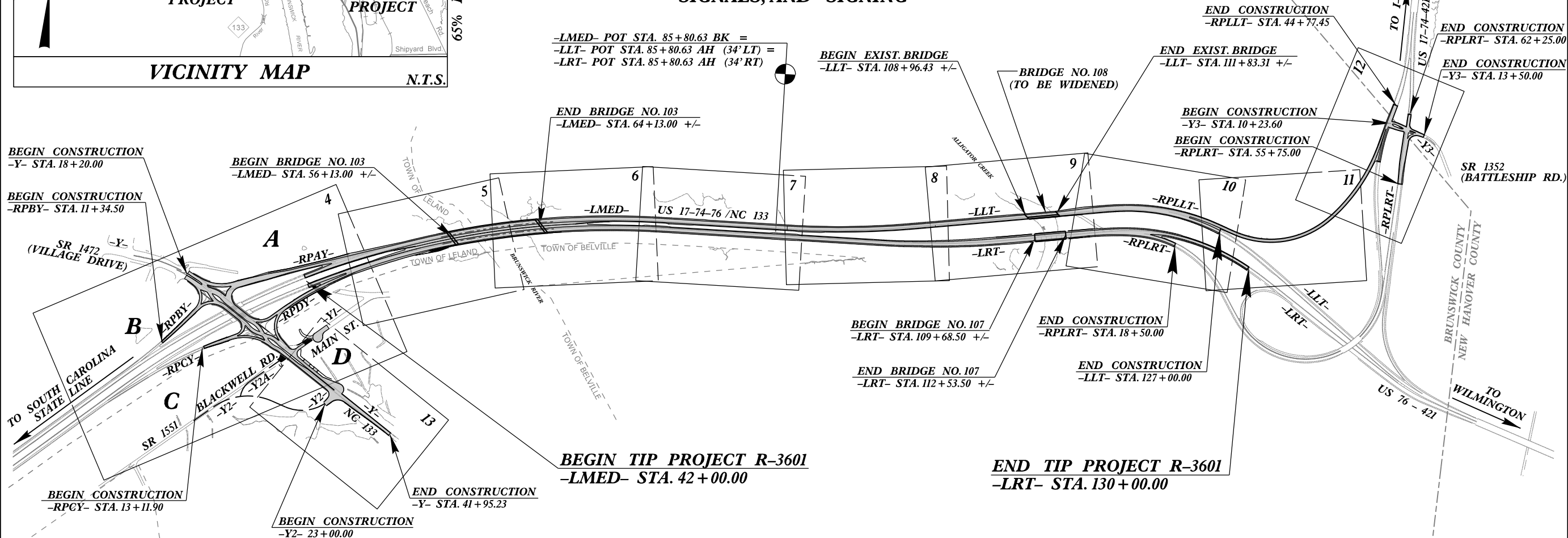
65% PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BRUNSWICK AND
NEW HANOVER COUNTIES

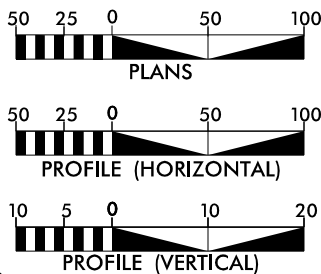
LOCATION: US 17-74-76 FROM THE NC 133 / SR 1472 INTERCHANGE
TO THE US 421/NC 133 INTERCHANGE

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



- A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF LELAND AND BELVILLE.
- CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
- THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

GRAPHIC SCALES



DESIGN DATA

ADT 2014 = 79,625
ADT 2035 = 107,000
DHV = 11 %
D = 55 %
T = 6 % *
V = 60 MPH
* (TTST = 3% + DUAL 3%)
FUNC. CLASSIFICATION
FREEWAY

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3601 = 1.462 MI.
LENGTH STRUCTURE TIP PROJECT R-3601 = 0.205 MI.
TOTAL LENGTH TIP PROJECT R-3601 = 1.667 MI.
NOTE: -LMED- & -LRT- USED FOR PROJECT LENGTH.

NCDOT CONTACT: K. ZAK HAMIDI, PE
PROJECT ENGINEER - DESIGN BUILD GROUP

Prepared in the Office of:
STANTEC CONSULTING
801 Jones Franklin Road, Suite 300 Raleigh NC 27606
Tel. (919) 851-6866 Fax. (919) 851-7024 www.Stantec.com
License No. F-0672

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 24, 2014
JOSEPH T. KELVINGTON, P.E.
PROJECT ENGINEER

LETTING DATE: DECEMBER 17, 2013
JASON T. GADDY
PROJECT DESIGN ENGINEER



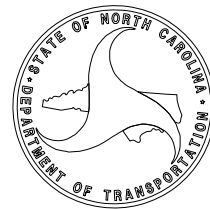
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HYDRAULICS ENGINEER

SIGNATURE: P.E.

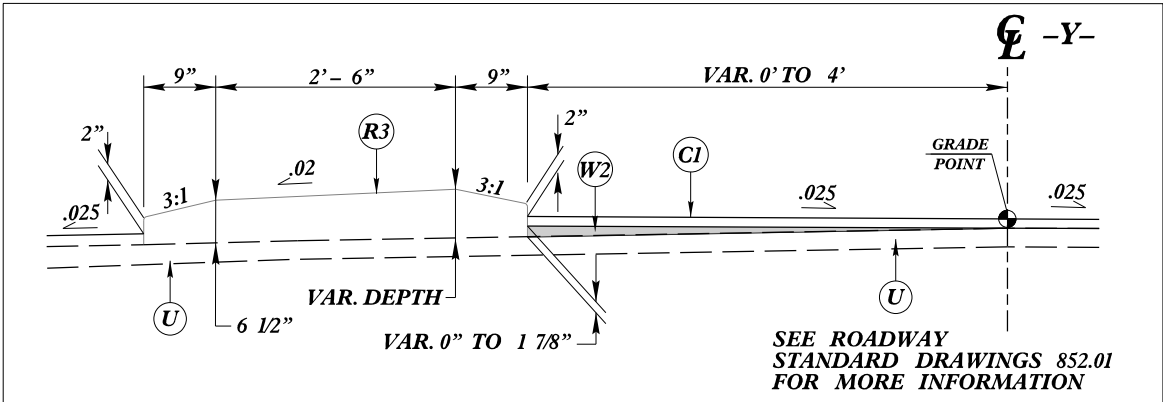
ROADWAY DESIGN
ENGINEER

SIGNATURE: P.E.



PRELIMINARY PAVEMENT SCHEDULE			
C1	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	E5	PROP. APPROX. 7" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	E6	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5 1/2" IN DEPTH.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 1 1/2" IN DEPTH OR GREATER THAN 2" IN DEPTH.	J1	8" AGREGATE BASE COURSE
C4	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	R1	1'-6" CONC. CURB AND GUTTER.
C5	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	R2	2'-6" CONC. CURB AND GUTTER.
C6	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 1 1/2" IN DEPTH OR GREATER THAN 2" IN DEPTH.	R3	MODIFIED 5" MONOLITHIC CONC. ISLAND (KEYED IN).
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	R4	9" X 18" CONC. CURB.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2 1/2" IN DEPTH OR GREATER THAN 4" IN DEPTH.	R5	CAST IN PLACE DOUBLE FACED CONC. BARRIER. STD. 854.02
D3	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	R6	2'-6" X 1'-0" CONCRETE PARAPET WALL WITH HANDRAIL
D4	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2 1/2" IN DEPTH OR GREATER THAN 4" IN DEPTH.	S	4" CONC. SIDEWALK.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	T	EARTH MATERIAL.
E2	PROP. APPROX. 4 1/2" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5 1/2" IN DEPTH.	W1	VARIABLE DEPTH ASPHALT PAVEMENT (SEE DETAIL 2: METHOD OF WEDGING NO. 1).
E4	PROP. APPROX. 3" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	W2	VARIABLE DEPTH ASPHALT PAVEMENT (SEE DETAIL 2: METHOD OF WEDGING NO. 2).

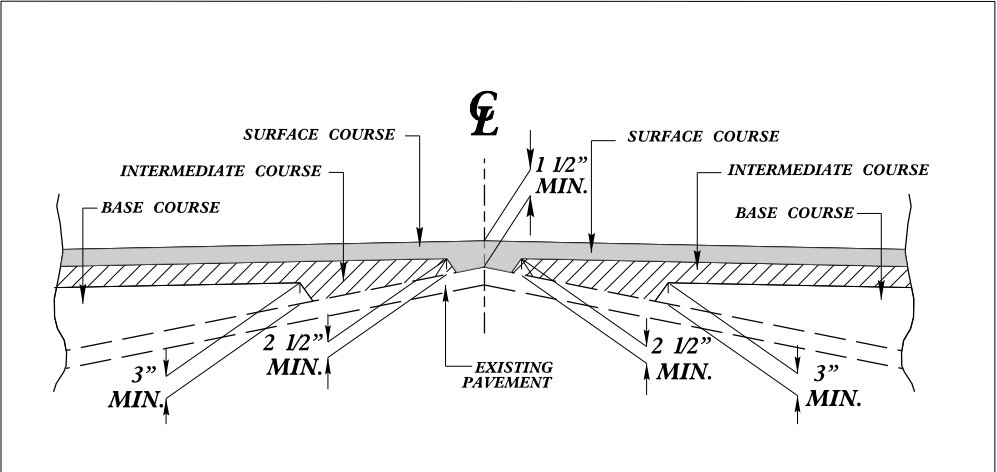
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



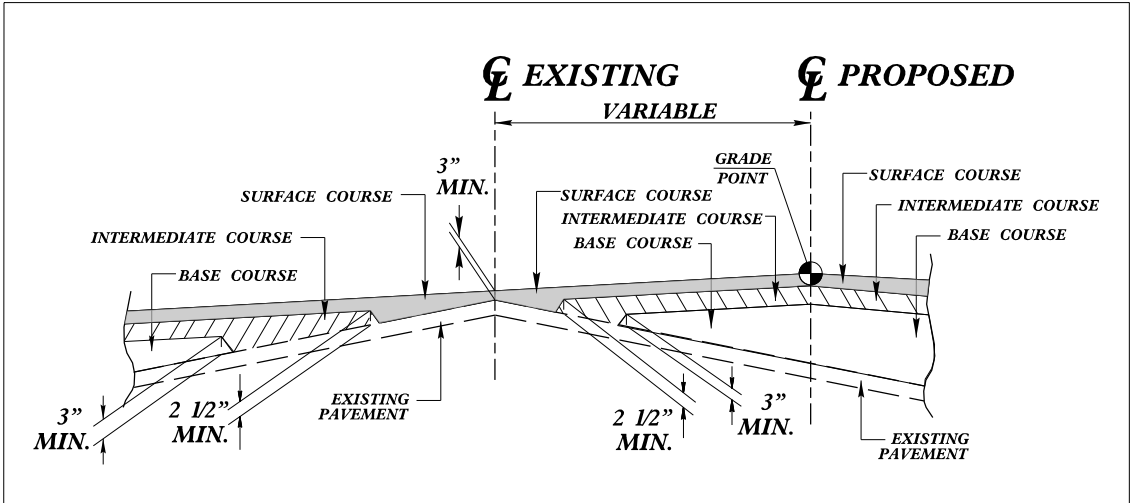
DETAIL SHOWING MODIFIED 5" MONOLITHIC CONC. ISLAND
*USE IN CONJUNCTION WITH TYPICAL SECTION NO. 11



PROJECT REFERENCE NO.		SHEET NO.
R-3601		2
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



DETAIL 1: METHOD OF WEDGING NO. 1



DETAIL 2: METHOD OF WEDGING NO. 2

PREL. PAVEMENT SCHEDULE

C1	1½" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
C4	1½" S9.5C
C5	3" S9.5C
C6	VAR. DEPTH S9.5C
D1	4" I19.0B
D2	VAR. DEPTH I19.0B
D3	3" I19.0C
D4	VAR. DEPTH I19.0C
E1	4" B25.0B
E2	4½" B25.0B
E3	VAR. DEPTH B25.0B
E4	3" B25.0C
E5	7" B25.0C
E6	VAR. DEPTH B25.0C
J1	8" AGGREGATE BASE COURSE
R1	1'-6" CONC. CURB AND GUTTER
R2	2'-6" CONC. CURB AND GUTTER
R3	MOD. 5" MONOLITHIC ISLAND (KEYED IN)
R4	9" X 18" CONC. CURB
R5	CAST IN PLACE DOUBLE FACED CONE BARRIER, STD. 854.02
R6	2'-6" X 1'-0" CONC. PARAPET WALL W/HANDRAIL
S	4" CONC. SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 1)
W2	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 2)

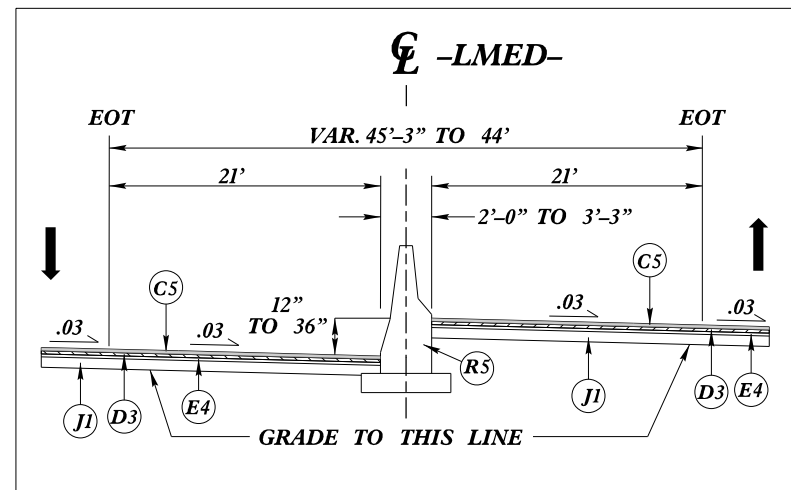
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

NOTE:

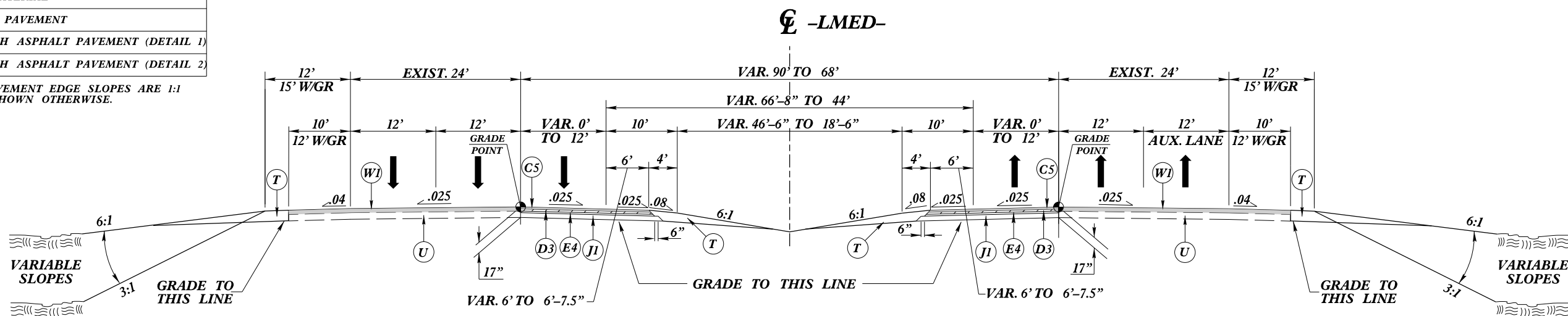
1. GRADE POINT TRANSITIONS FROM -LMED- STA. 42+00.00 (45' OFFSET) TO -LMED- STA. 53+00.00 (34' OFFSET) LT. AND RT.
2. EXISTING MEDIAN PAVED SHOULDERS TO BE REMOVED
3. ALL PAVED SHOULDERS ARE FULL DEPTH (UNLESS OTHERWISE SPECIFIED)
4. FOR NARROW WIDENING 4" OF B25.0B MAY BE USED IN LIEU OF ABC.



PROJECT REFERENCE NO.	SHEET NO.
R-3601	2-A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

**MEDIAN BARRIER DETAIL**

-LMED- STA. 52+54.00 TO STA. 55+89.12 (BEGIN APPROACH SLAB)
 -LMED- STA. 64+36.81 (END APPROACH SLAB) TO STA. 67+45.69

**TYPICAL SECTION NO. 1**

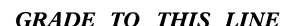
-LMED LT- STA. 42+00.00 TO STA. 55+95.76 (34' LT.) +/- (BEGIN BRIDGE)
 -LMED LT- STA. 63+91.03 (34' LT.) +/- (END BRIDGE) TO STA. 85+80.63
 -LMED RT- STA. 42+00.00 TO STA. 56+30.41 (34' RT.) +/- (BEGIN BRIDGE)
 -LMED RT- STA. 64+35.19 (34' RT.) +/- (END BRIDGE) TO STA. 85+80.63

17.2	
------	--

UNLESS SHOWN OTHERWISE.



**** 3:1 SLOPE USED IN AREAS OF WETLANDS**



GRADE
THIS LI



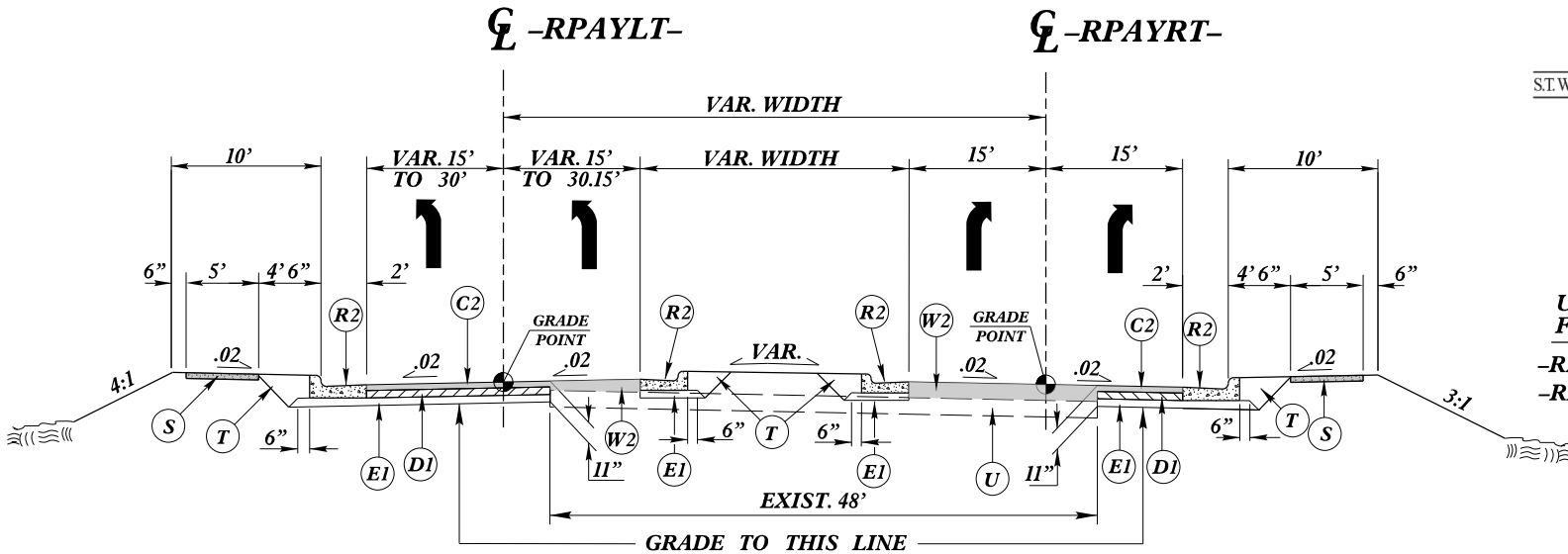
* ~~BPLIT~~ STA 10+00.00 TO STA 42+50.00



-RPLRT- STA. 55+75.00 TO STA. 62+25.00

PREL. PAVEMENT SCHEDULE	
C1	1½" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
C4	1½" S9.5C
C5	3" S9.5C
C6	VAR. DEPTH S9.5C
D1	4" I19.0B
D2	VAR. DEPTH I19.0B
D3	3" I19.0C
D4	VAR. DEPTH I19.0C
E1	4" B25.0B
E2	4½" B25.0B
E3	VAR. DEPTH B25.0B
E4	3" B25.0C
E5	7" B25.0C
E6	VAR. DEPTH B25.0C
J1	8" AGGREGATE BASE COURSE
R1	1'-6" CONC. CURB AND GUTTER
R2	2'-6" CONC. CURB AND GUTTER
R3	MOD. 5" MONOLITHIC ISLAND (KEYED IN)
R4	9" X 18" CONC. CURB
R5	CAST IN PLACE DOUBLE FACED CONE BARRIER, STD. 854.02
R6	2'-6" X 1'-0" CONC. PARAPET WALL W/HANDRAIL
S	4" CONC. SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 1)
W2	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 2)

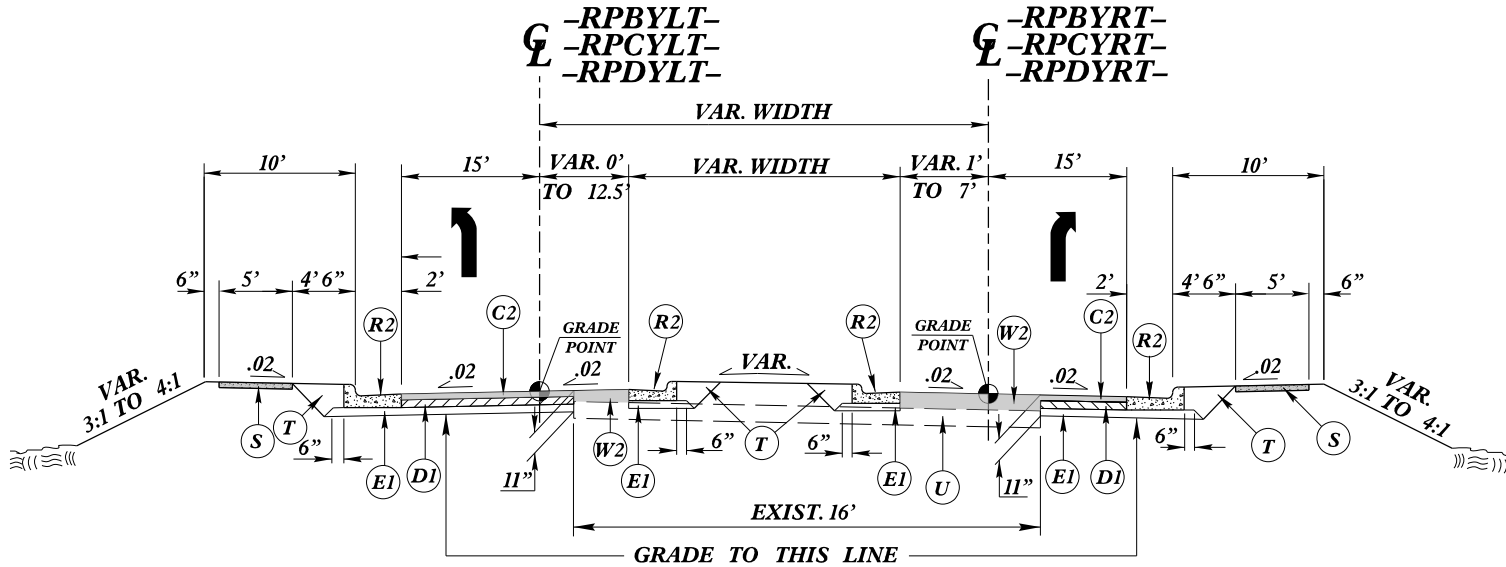
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



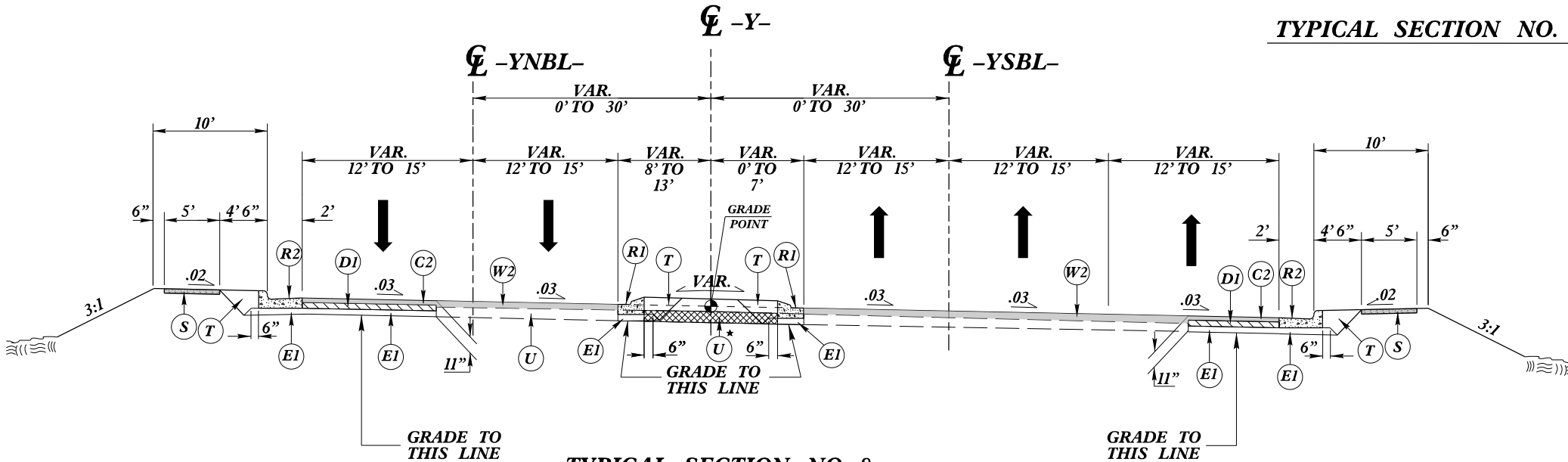
TYPICAL SECTION NO. 6

USE TYPICAL SECTION NO. 7 AT THE FOLLOWING LOCATION:

-RPBYLT- STA. 10+00.00 TO STA. 11+96.59
-RPBYRT- STA. 10+00.00 TO STA. 11+81.11
-RPCYLT- STA. 10+00.00 TO STA. 11+92.74
-RPCYRT- STA. 10+00.00 TO STA. 13+31.56
-RPDYLT- STA. 10+00.00 TO STA. 13+23.43
-RPDYRT- STA. 10+00.00 TO STA. 12+90.35



TYPICAL SECTION NO. 7



TYPICAL SECTION NO. 8

USE TYPICAL SECTION NO. 8 AT THE FOLLOWING LOCATION:

-Y- STA. 18+20.00 TO STA. 21+14.42

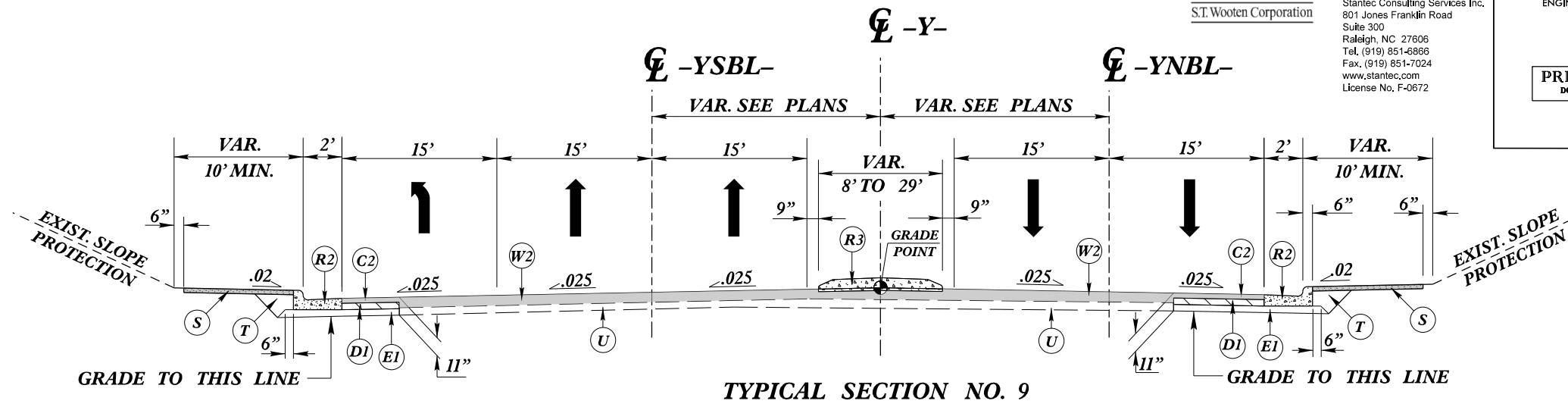


PROJECT REFERENCE NO.	SHEET NO.
R-3601	2-C
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PREL. PAVEMENT SCHEDULE

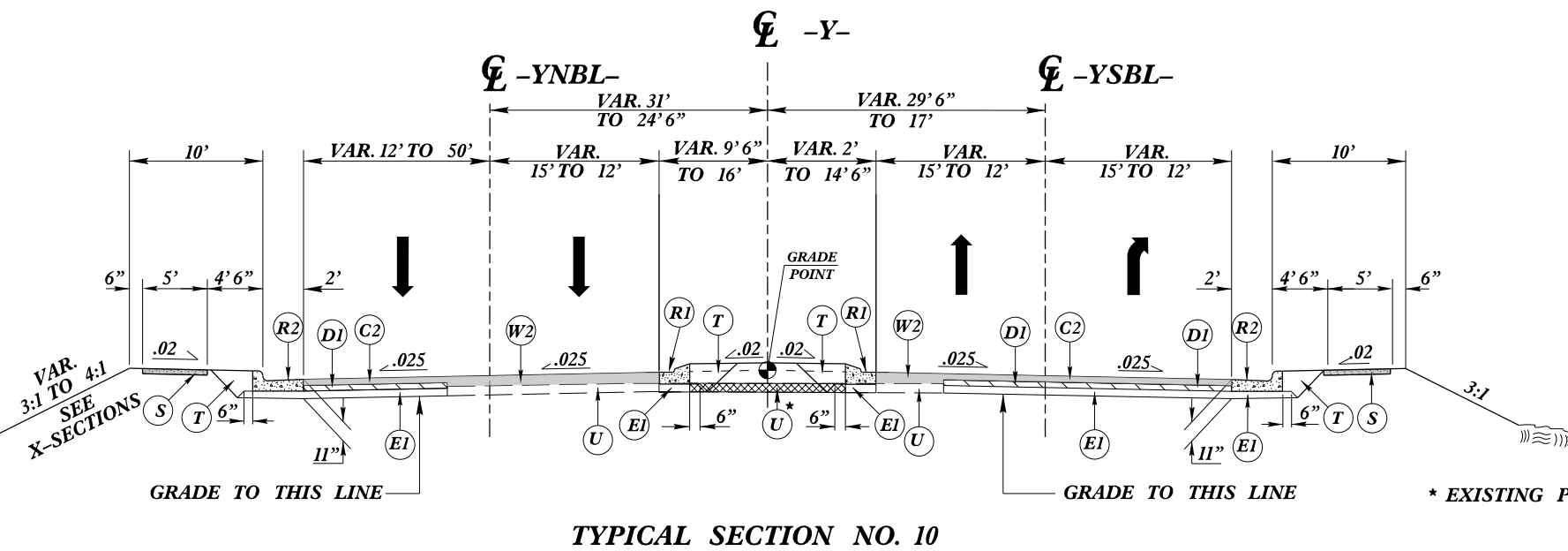
C1	1½" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
C4	1½" S9.5C
C5	3" S9.5C
C6	VAR. DEPTH S9.5C
D1	4" I19.0B
D2	VAR. DEPTH I19.0B
D3	3" I19.0C
D4	VAR. DEPTH I19.0C
E1	4" B25.0B
E2	4½" B25.0B
E3	VAR. DEPTH B25.0B
E4	3" B25.0C
E5	7" B25.0C
E6	VAR. DEPTH B25.0C
J1	8" AGGREGATE BASE COURSE
R1	1'-6" CONC. CURB AND GUTTER
R2	2'-6" CONC. CURB AND GUTTER
R3	MOD. 5" MONOLITHIC ISLAND (KEYED IN)
R4	9" X 18" CONC. CURB
R5	CAST IN PLACE DOUBLE FACED CONE BARRIER, STD. 854.02
R6	2'-6" X 1'-0" CONC. PARAPET WALL W/HANDRAIL
S	4" CONC. SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 1)
W2	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 2)

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



USE TYPICAL SECTION NO. 9 AT THE FOLLOWING LOCATION:

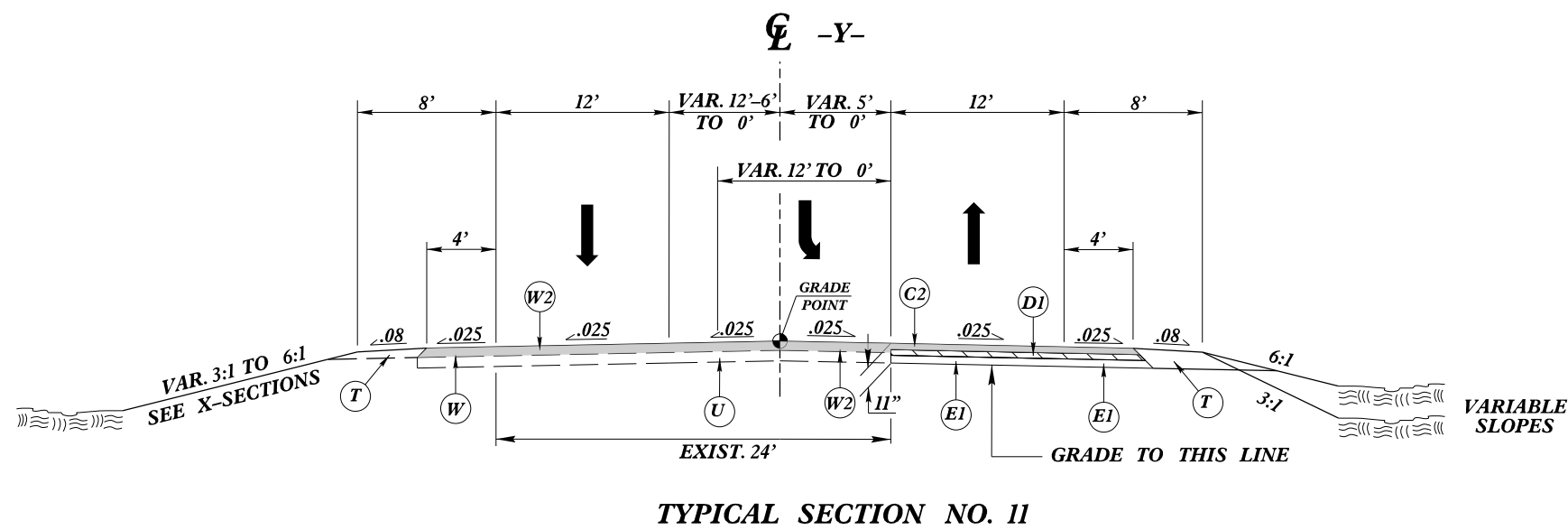
-Y- STA. 21+14.42 TO STA. 26+64.62



USE TYPICAL SECTION NO. 10 AT THE FOLLOWING LOCATION:

-Y- STA. 26+64.62 TO STA. 36+14.00

* EXISTING PAVEMENT TO BE REMOVED

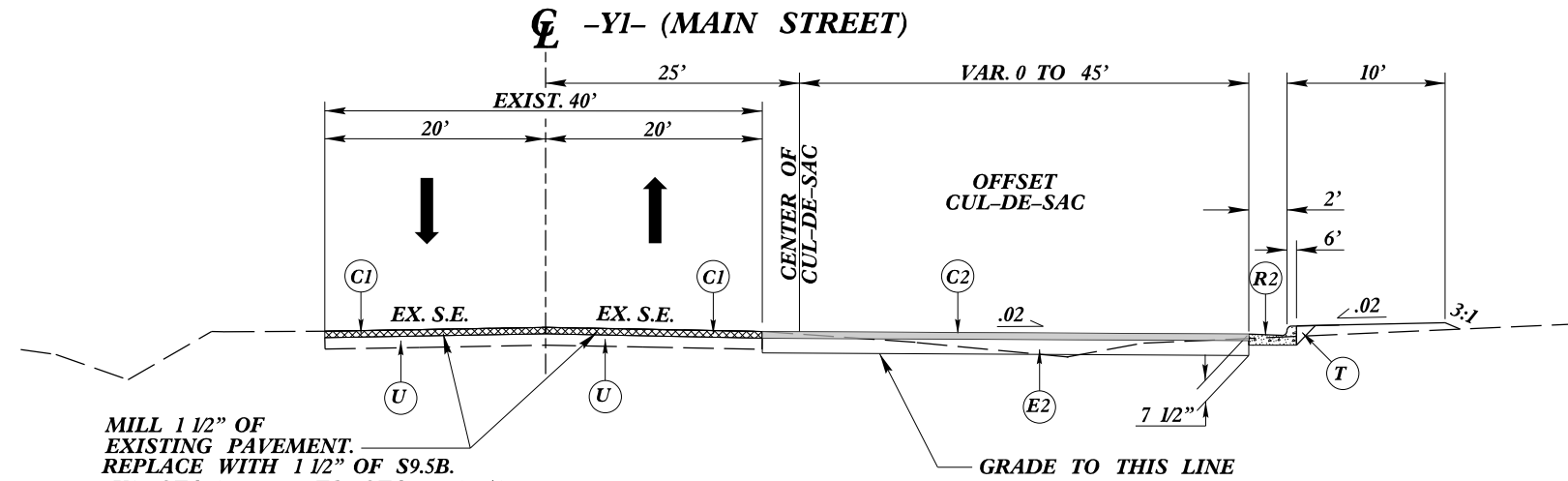


USE TYPICAL SECTION NO. 11 AT THE FOLLOWING LOCATION:

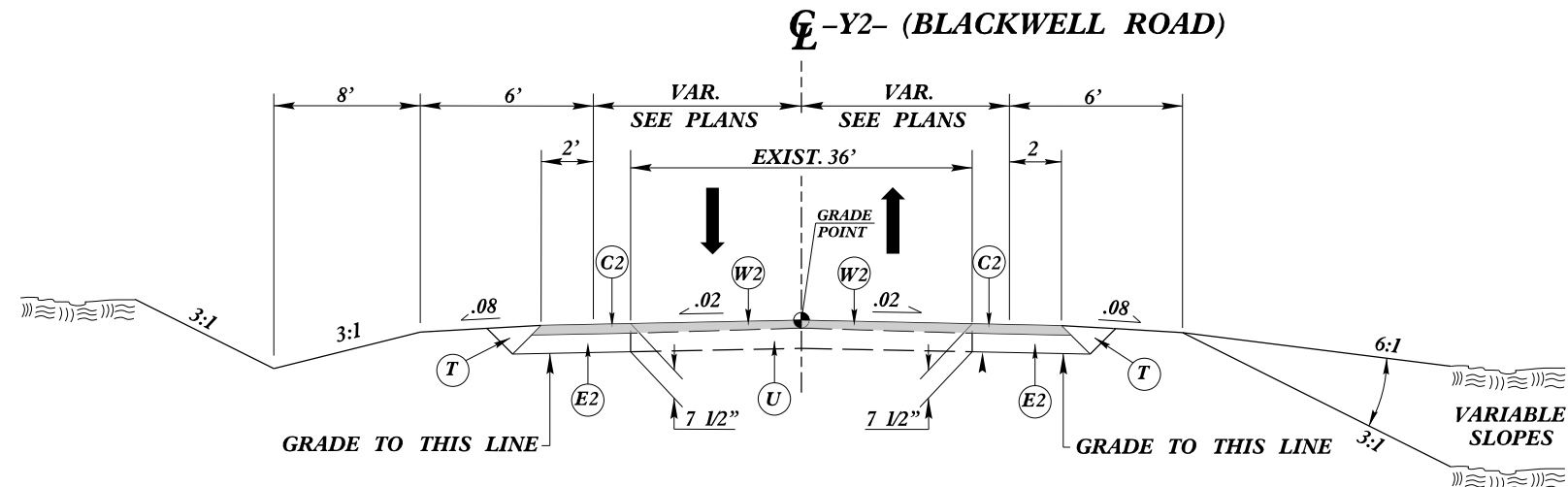
-Y- STA. 36+14.00 TO STA. 41+95.23

PREL. PAVEMENT SCHEDULE	
C1	1½" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
C4	1½" S9.5C
C5	3" S9.5C
C6	VAR. DEPTH S9.5C
D1	4" I19.0B
D2	VAR. DEPTH I19.0B
D3	3" I19.0C
D4	VAR. DEPTH I19.0C
E1	4" B25.0B
E2	4½" B25.0B
E3	VAR. DEPTH B25.0B
E4	3" B25.0C
E5	7" B25.0C
E6	VAR. DEPTH B25.0C
J1	8" AGGREGATE BASE COURSE
R1	1'-6" CONC. CURB AND GUTTER
R2	2'-6" CONC. CURB AND GUTTER
R3	MOD. 5" MONOLITHIC ISLAND (KEYED IN)
R4	9" X 18" CONC. CURB
R5	CAST IN PLACE DOUBLE FACED CONE BARRIER, STD. 854.02
R6	2'-6" X 1'-0" CONC. PARAPET WALL W/HANDRAIL
S	4" CONC. SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 1)
W2	VAR. DEPTH ASPHALT PAVEMENT (DETAIL 2)

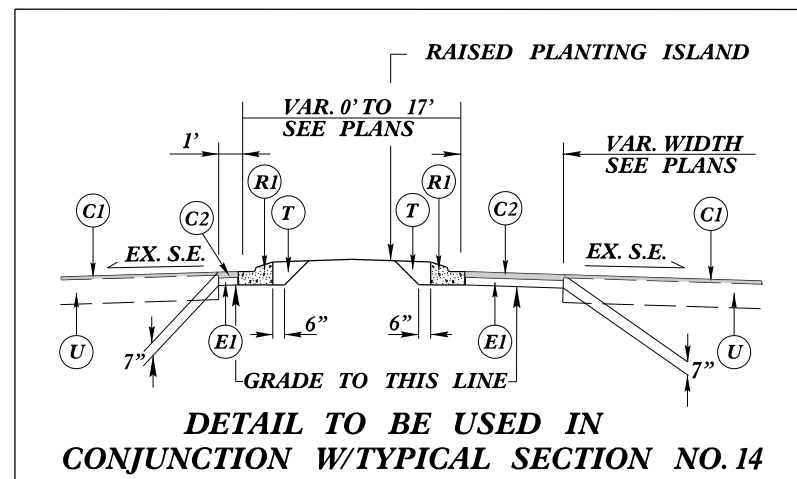
**NOTE: PAVEMENT EDGE SLOPES ARE 1:1
UNLESS SHOWN OTHERWISE.**



TYPICAL SECTION NO. 12

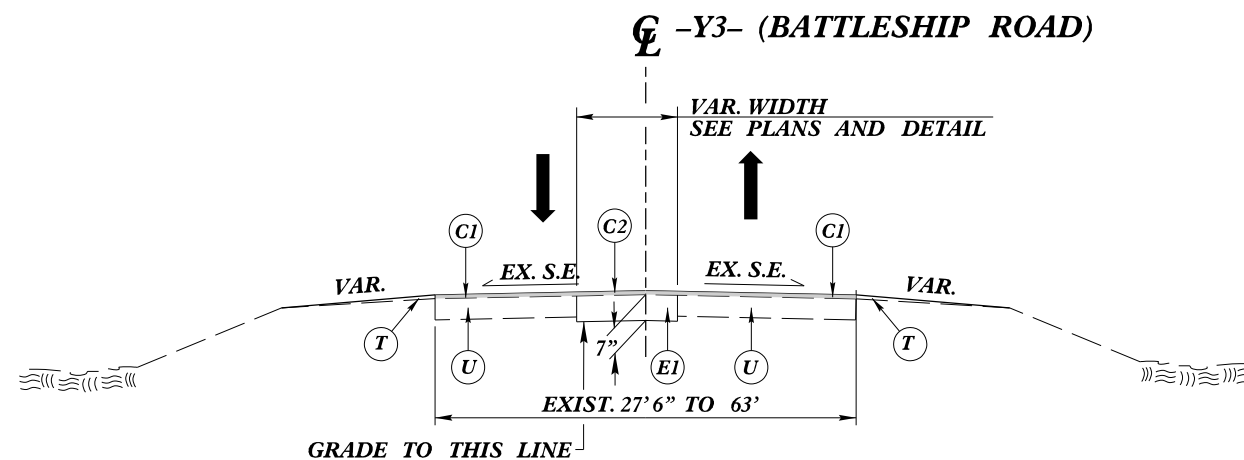


TYPICAL SECTION NO. 13



**DETAIL TO BE USED IN
CONJUNCTION W/TYPICAL SECTION NO.14**

-Y3- STA. 12+65.00 TO STA. 12+12.00
-Y3- STA. 11+00.00 TO STA. 11+38.00



TYPICAL SECTION NO. 14

USE TYPICAL SECTION NO. 14 AT THE FOLLOWING LOCATION:

-Y3- STA. 10+23.60 TO STA. 13+50.00

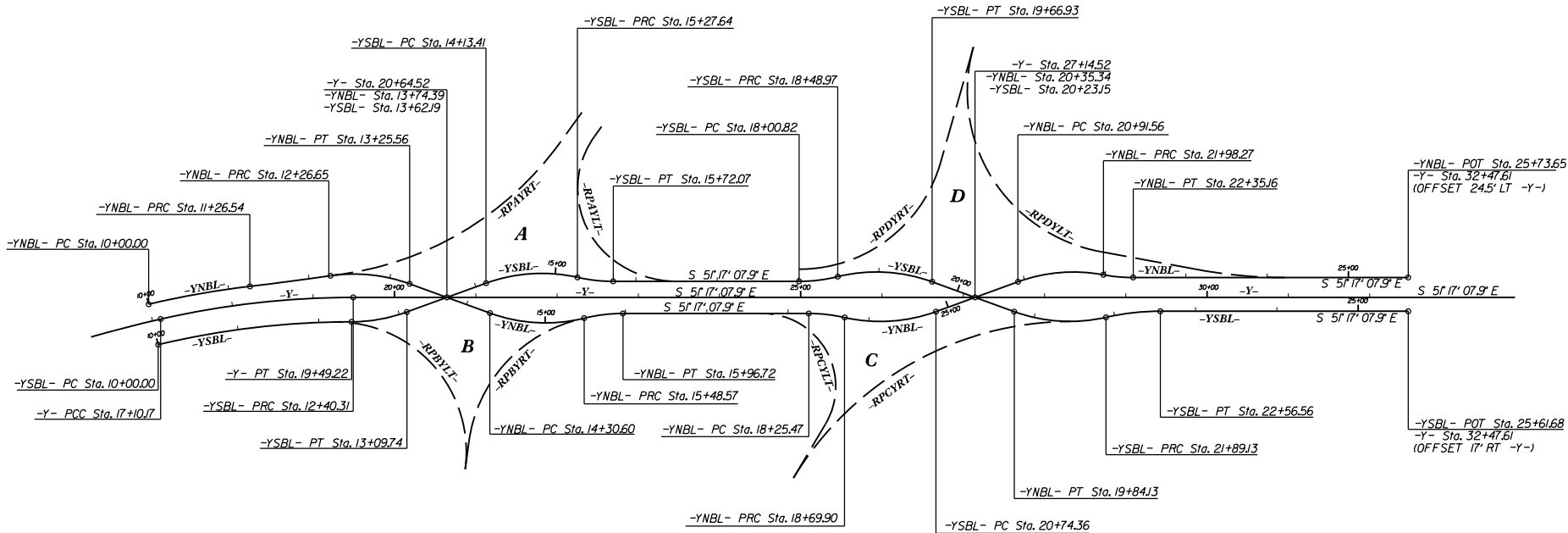
PROJECT REFERENCE NO.	SHEET NO.
<i>R-3601</i>	<i>2-E</i>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>2-F</i>	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

CURVE DATA FOR SHEET 4

RPAYLT		-YNBL-			-YSBL-			-RPAY-		-RPBY-			
PI Sta 12+28.79 Δ = 36° 52' 11.2" (LT) D = 44° 04' 25.2" L = 83.65' T = 43.33' R = 130.00' SE = 0.02 DS = <15 MPH	PI Sta 11+22.68 Δ = 88° 58' 43.5" (LT) D = 52° 05' 13.5" L = 170.83' T = 108.06' R = 110.00' SE = 0.02 DS = <15 MPH	PI Sta 10+63.34 Δ = 6° 38' 44.5" (RT) D = 5° 15' 06.0" L = 126.54' T = 63.34' R = 1,091.00' SE = N/A DS = N/A	PI Sta 11+76.60 Δ = 1° 38' 19.5" (LT) D = 1° 38' 13.3" L = 100.11' T = 50.06' R = 3,500.00' SE = N/A DS = N/A	PI Sta 12+77.14 Δ = 28° 20' 06.8" (RT) D = 28° 38' 52.4" L = 98.91' T = 50.49' R = 200.00' SE = N/A DS = N/A	PI Sta 11+20.69 Δ = 13° 14' 21.1" (RT) D = 5° 30' 33.2" L = 240.31' T = 120.69' R = 1,040.00' SE = N/A DS = N/A	PI Sta 12+75.38 Δ = 19° 53' 22.5" (LT) D = 28° 38' 52.4" L = 69.43' T = 35.07' R = 200.00' SE = N/A DS = N/A	PI Sta 14+72.13 Δ = 32° 43' 35.8" (RT) D = 28° 38' 52.4" L = 114.24' T = 58.72' R = 200.00' SE = N/A DS = N/A	PI Sta 26+40.47 Δ = 2° 03' 11.9" (LT) D = 0° 57' 17.7" L = 215.02' T = 107.52' R = 6,000.00' SE = EXIST DS = EXIST	PI Sta 12+81.08 Δ = 3° 21' 30.0" (LT) D = 1° 08' 45.3" L = 293.07' T = 146.58' R = 5,000.00' SE = EXIST DS = EXIST				
	RPAYRT	-YNBL-			-YSBL-			-RPCY-		-RPDY-			
	PI Sta 12+21.47 Δ = 47° 22' 21.2" (RT) D = 14° 19' 26.2" L = 330.72' T = 175.47' R = 400.00' SE = 0.02 DS = <15 MPH	PI Sta 14+91.36 Δ = 33° 47' 40.3" (LT) D = 28° 38' 52.4" L = 117.97' T = 60.75' R = 200.00' SE = N/A DS = N/A	PI Sta 15+72.76 Δ = 13° 47' 40.3" (RT) D = 28° 38' 52.4" L = 48.15' T = 24.19' R = 200.00' SE = N/A DS = N/A	PI Sta 18+47.77 Δ = 12° 43' 35.8" (RT) D = 28° 38' 52.4" L = 44.42' T = 22.30' R = 200.00' SE = N/A DS = N/A	PI Sta 15+49.95 Δ = 12° 43' 35.8" (LT) D = 28° 38' 52.4" L = 44.42' T = 22.30' R = 200.00' SE = N/A DS = N/A	PI Sta 18+25.01 Δ = 13° 47' 40.3" (LT) D = 28° 38' 52.4" L = 48.15' T = 24.19' R = 200.00' SE = N/A DS = N/A	PI Sta 19+09.72 Δ = 33° 47' 40.3" (RT) D = 28° 38' 52.4" L = 117.97' T = 60.75' R = 200.00' SE = N/A DS = N/A	PI Sta 12+24.65 Δ = 7° 12' 15.9" (RT) D = 1° 36' 20.2" L = 448.70' T = 224.65' R = 3,568.49' SE = EXIST DS = EXIST	PI Sta 23+67.97 Δ = 9° 41' 13.2" (LT) D = 2° 23' 14.4" L = 405.77' T = 203.37' R = 2,400.00' SE = EXIST DS = EXIST				
RPBYLT	RPBYRT	-YNBL-			-YSBL-			-Y-					
PI Sta 11+86.96 Δ = 98° 53' 05.5" (LT) D = 35° 48' 35.5" L = 276.14' T = 186.96' R = 160.00' SE = 0.03 DS = <15 MPH	PI Sta 11+58.41 Δ = 69° 41' 28.8" (RT) D = 31° 49' 51.6" L = 218.94' T = 125.32' R = 180.00' SE = 0.02 DS = <15 MPH	PI Sta 19+28.62 Δ = 32° 43' 35.8" (LT) D = 28° 38' 52.4" L = 114.24' T = 58.72' R = 200.00' SE = N/A DS = N/A	PI Sta 21+46.21 Δ = 30° 34' 11.4" (RT) D = 28° 38' 52.4" L = 106.71' T = 54.66' R = 200.00' SE = N/A DS = N/A	PI Sta 22+16.77 Δ = 10° 34' 11.4" (LT) D = 28° 38' 52.4" L = 36.90' T = 18.50' R = 200.00' SE = N/A DS = N/A	PI Sta 21+33.37 Δ = 32° 52' 41.7" (LT) D = 28° 38' 52.4" L = 114.77' T = 59.01' R = 200.00' SE = N/A DS = N/A	PI Sta 22+22.98 Δ = 12° 52' 41.7" (RT) D = 19° 05' 54.9" L = 67.43' T = 33.86' R = 300.00' SE = N/A DS = N/A	PI Sta 15+21.77 Δ = 14° 31' 20.5" (RT) D = 3° 50' 00.0" L = 378.84' T = 190.44' R = 1,494.67' SE = N/A DS = N/A					PI Sta 18+30.19 Δ = 12° 48' 01.2" (RT) D = 5° 21' 17.1" L = 239.05' T = 120.02' R = 1,070.00' SE = N/A DS = N/A	
RPCYLT	RPCYRT	-RPDYLT-			-RPDYRT-								
PI Sta 12+35.31 Δ = 120° 40' 59.0" (LT) D = 63° 39' 43.1" L = 189.57' T = 158.05' R = 90.00' SE = 0.02 DS = <15 MPH	PI Sta 12+24.36 Δ = 58° 34' 35.1" (RT) D = 14° 19' 26.2" L = 408.94' T = 224.36' R = 400.00' SE = 0.03 DS = 25 MPH	PI Sta 12+19.82 Δ = 95° 24' 23.3" (LT) D = 28° 38' 52.4" L = 333.03' T = 219.82' R = 200.00' SE = 0.04 DS = 30 MPH	PI Sta 15+07.78 Δ = 10° 31' 34.5" (LT) D = 9° 32' 57.5" L = 110.23' T = 55.27' R = 600.00' SE = 0.025 DS = <15 MPH	PI Sta 13+65.79 Δ = 9° 56' 15.4" (RT) D = 30° 58' 14.5" L = 32.09' T = 16.08' R = 185.00' SE = 0.025 DS = <15 MPH	PI Sta 12+61.00 Δ = 64° 07' 46.7" (RT) D = 31° 49' 51.6" L = 201.47' T = 112.76' R = 180.00' SE = 0.03 DS = 15 MPH								

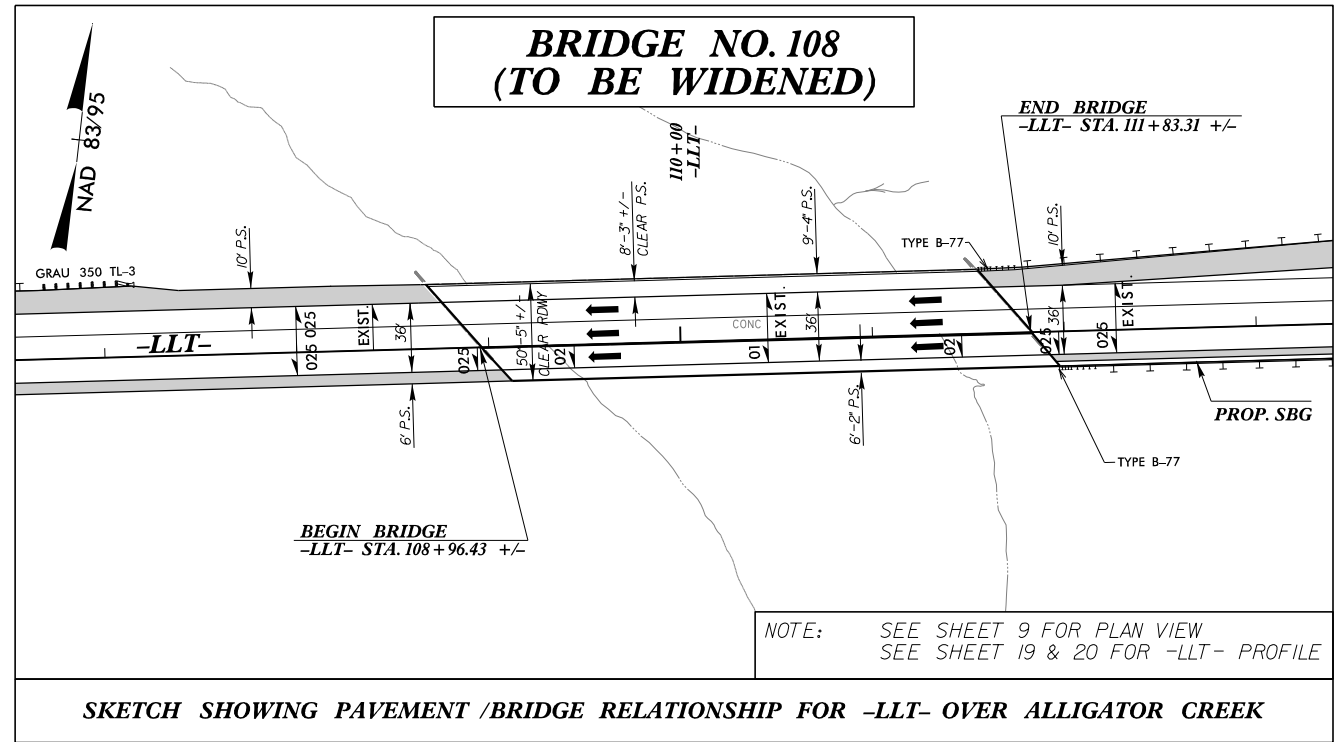
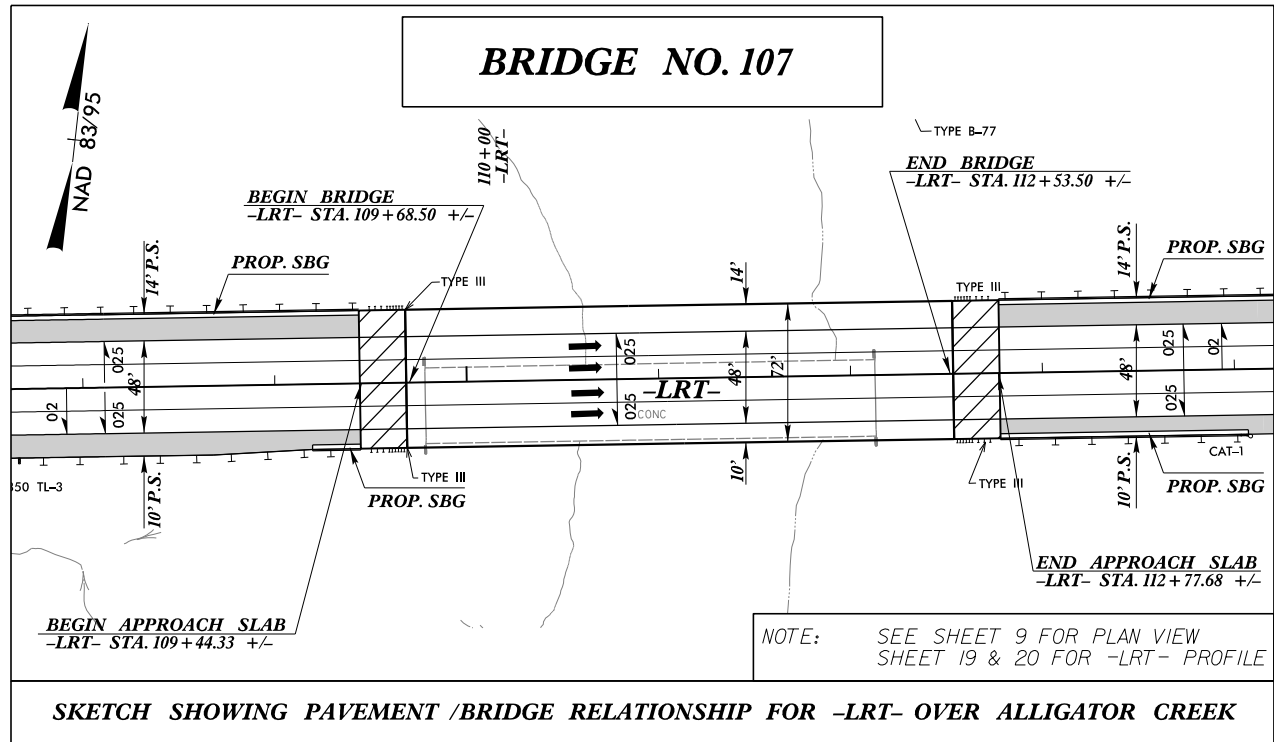
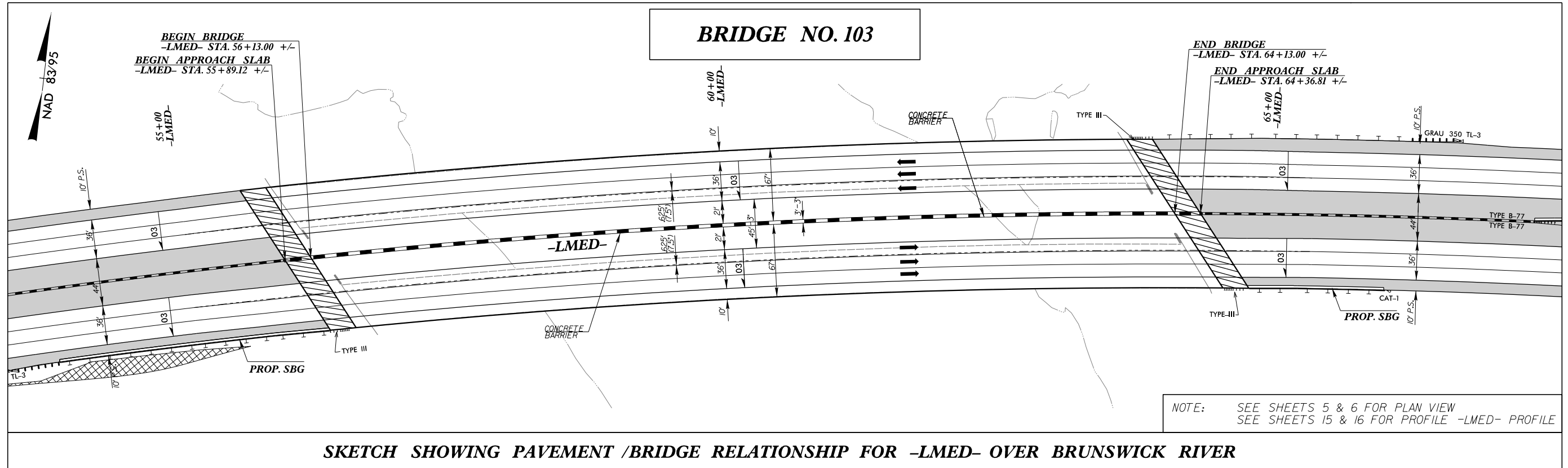


DIVERGING DIAMOND INTERCHANGE ALIGNMENT DETAIL

SKETCH SHOWING PAVEMENT WIDTH TO BRIDGE WIDTH RELATIONSHIP



PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>2-G</i>	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

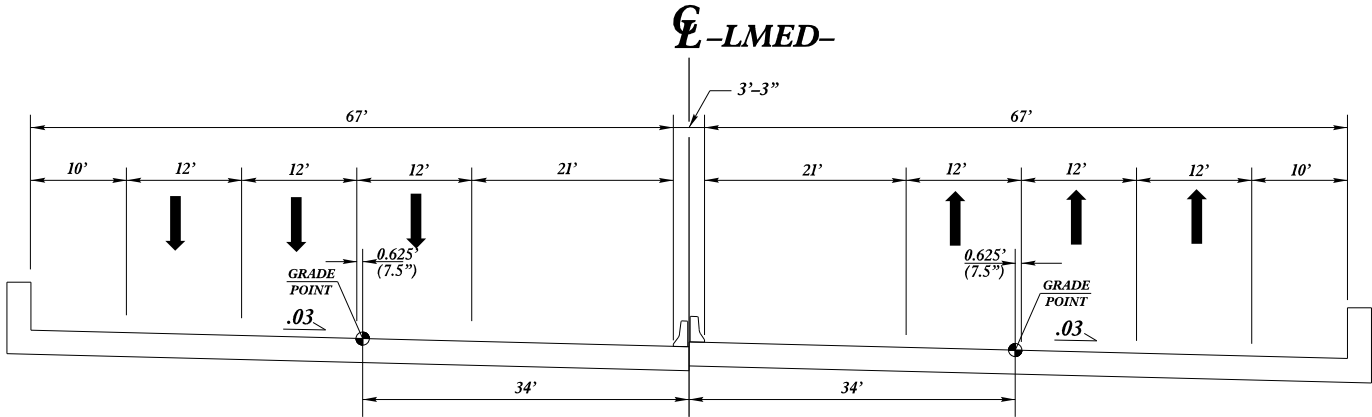




PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>2-H</i>	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

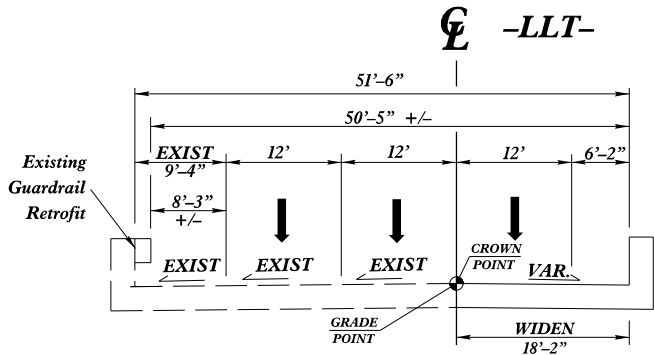
STRUCTURE TYPICAL SECTIONS

-LMED- STRUCTURE -LMED- US 17-74-76 OVER BRUNSWICK RIVER



STRUCTURE TYPICAL SECTION NO. 1
BRIDGE NO. 103
(MINIMUM DIMENSIONS)

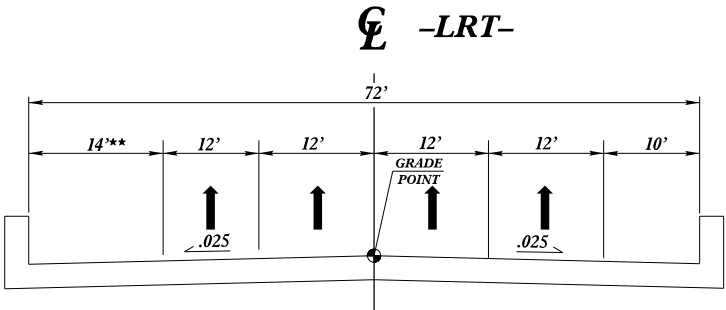
-LLT- STRUCTURE -LLT- US 17-74-76 OVER ALLIGATOR CREEK



STRUCTURE TYPICAL SECTION NO. 2
BRIDGE NO. 108
(MINIMUM DIMENSIONS)

-LRT- STRUCTURE -LRT- US 17-74-76 OVER ALLIGATOR CREEK

**ADDITIONAL BRIDGE OFFSET WIDTH
REQUIRED FOR STAGE CONSTRUCTION



STRUCTURE TYPICAL SECTION NO. 3
BRIDGE NO. 107
(MINIMUM DIMENSIONS)

NOTE:
STAGE CONSTRUCTION
(MAINTAIN TRAFFIC ON-SITE
WHILE REPLACING BRIDGE NO. 107)

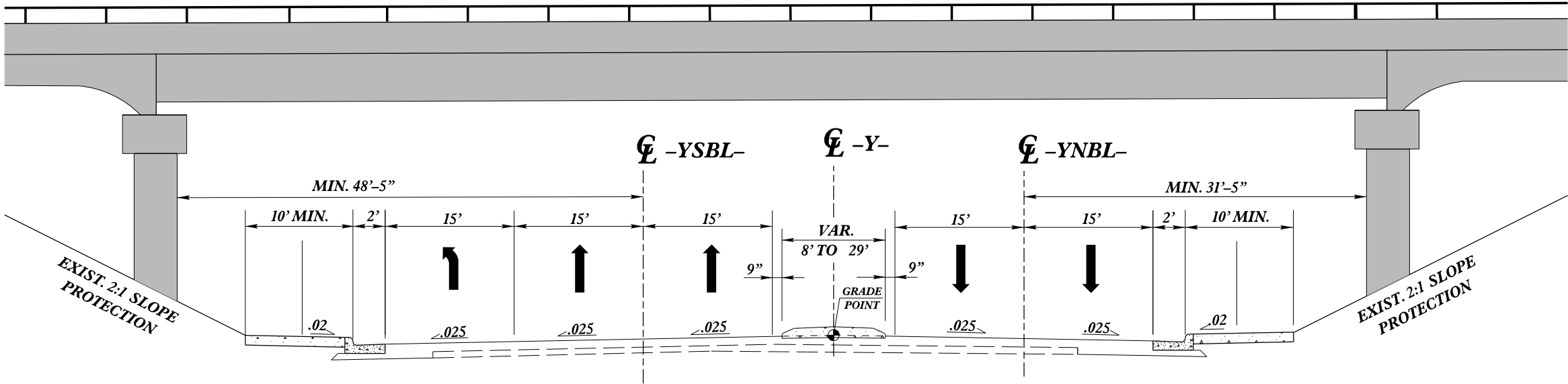
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PROJECT REFERENCE NO.		SHEET NO.
R-3601		2-1
RW SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

ROADWAY TYPICAL SECTION

-LMED- STRUCTURES *EXIST. -LMED- US 17-74-76 OVER PROP. NC 133 RIVER (RIVER ROAD)*



DETAIL OF -Y- UNDER US 17 BRIDGES
(MINIMUM DIMENSIONS)

REVISIONS

5/9/2014
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locole


PROPOSED SIGNAL LOCATIONS

GRAPHIC SCALE

30 15 0 30 60

PLANS

MATCHLINE -Y- STA. 24+50.00 SEE SHEET 2-K



S.T. Wooten Corporation

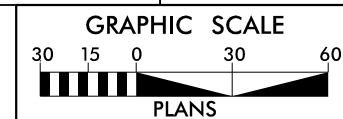


Stantec

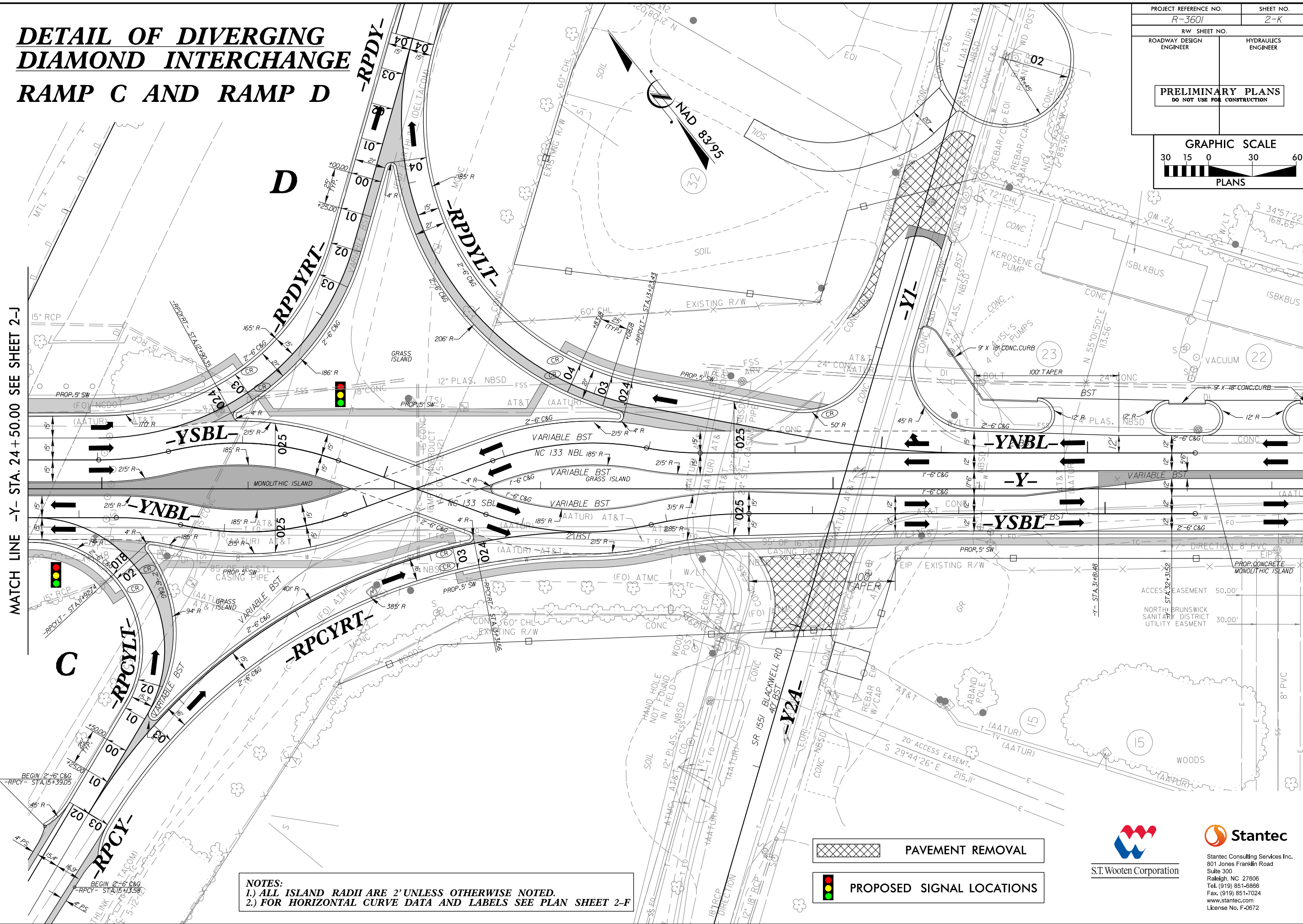
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DETAIL OF DIVERGING DIAMOND INTERCHANGE RAMP C AND RAMP D

PROJECT REFERENCE NO.	SHEET NO.
R-3601	2-K
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



MATCH LINE -Y- STA. 24+50.00 SEE SHEET 2-J

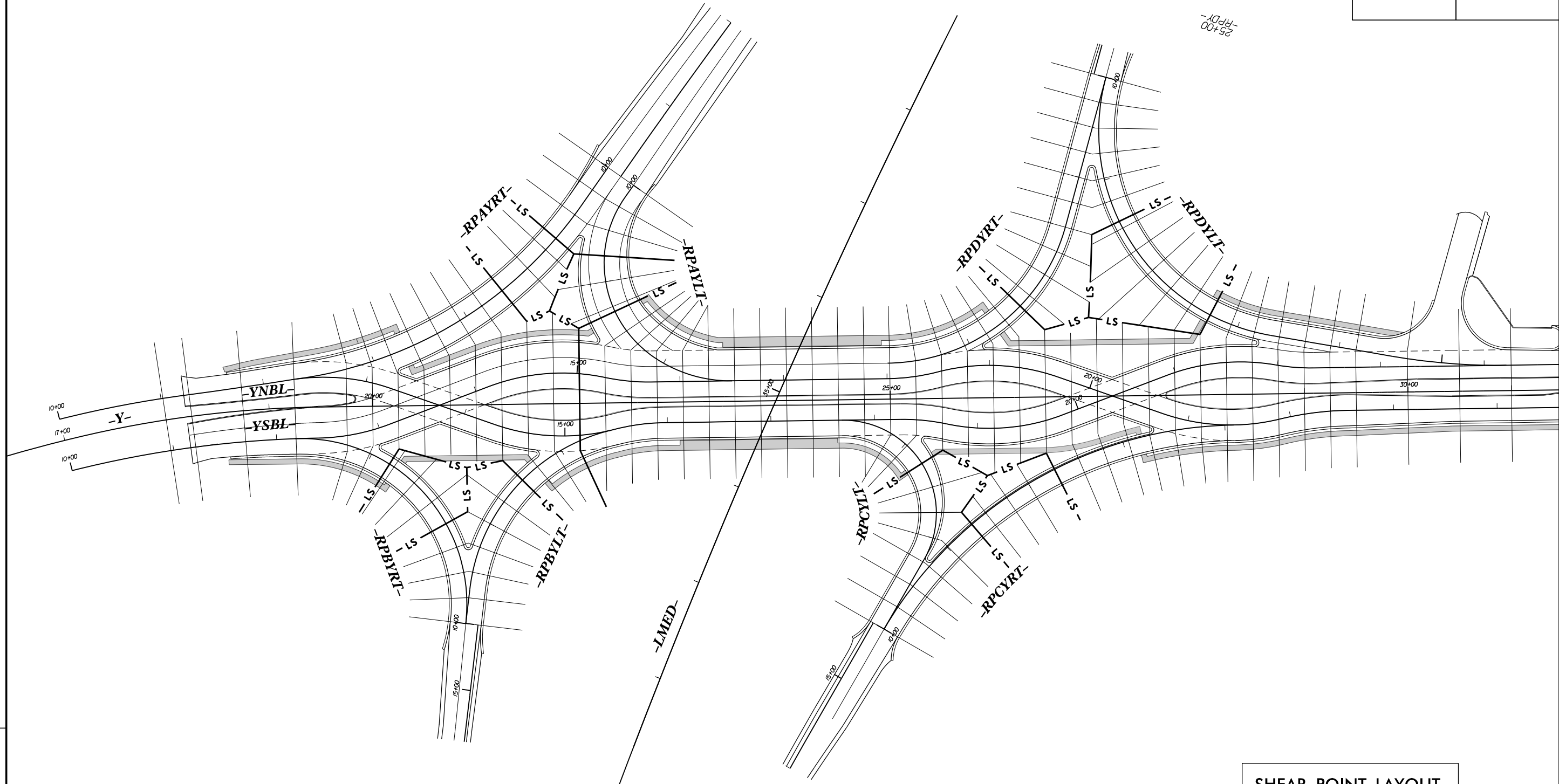


SHEAR POINT LAYOUT



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PROJECT REFERENCE NO.		SHEET NO.	
R-3601		2-L	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

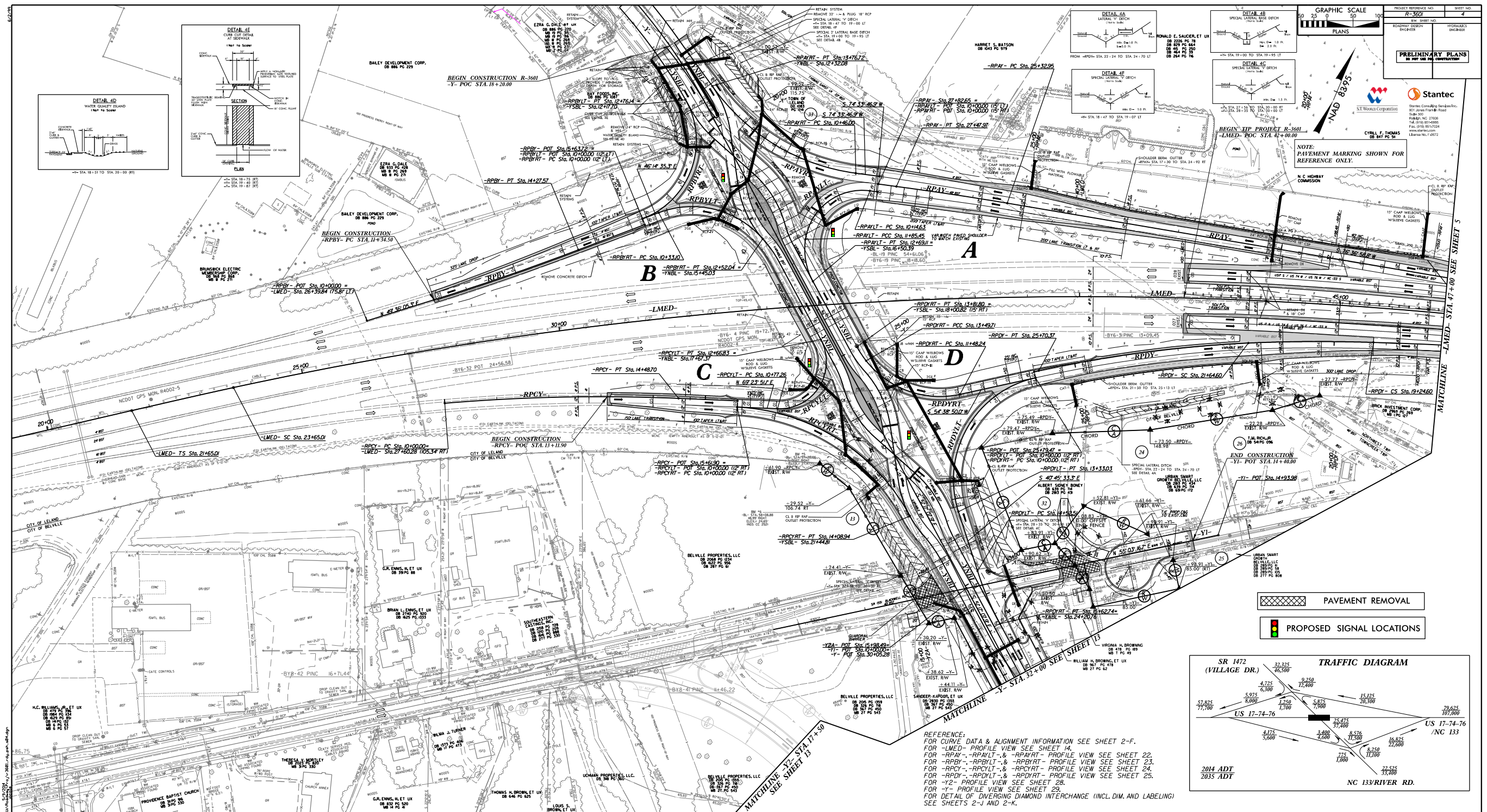


SHEAR POINT LAYOUT
US 17-74-76 / NC 133
RIVER ROAD
INTERCHANGE

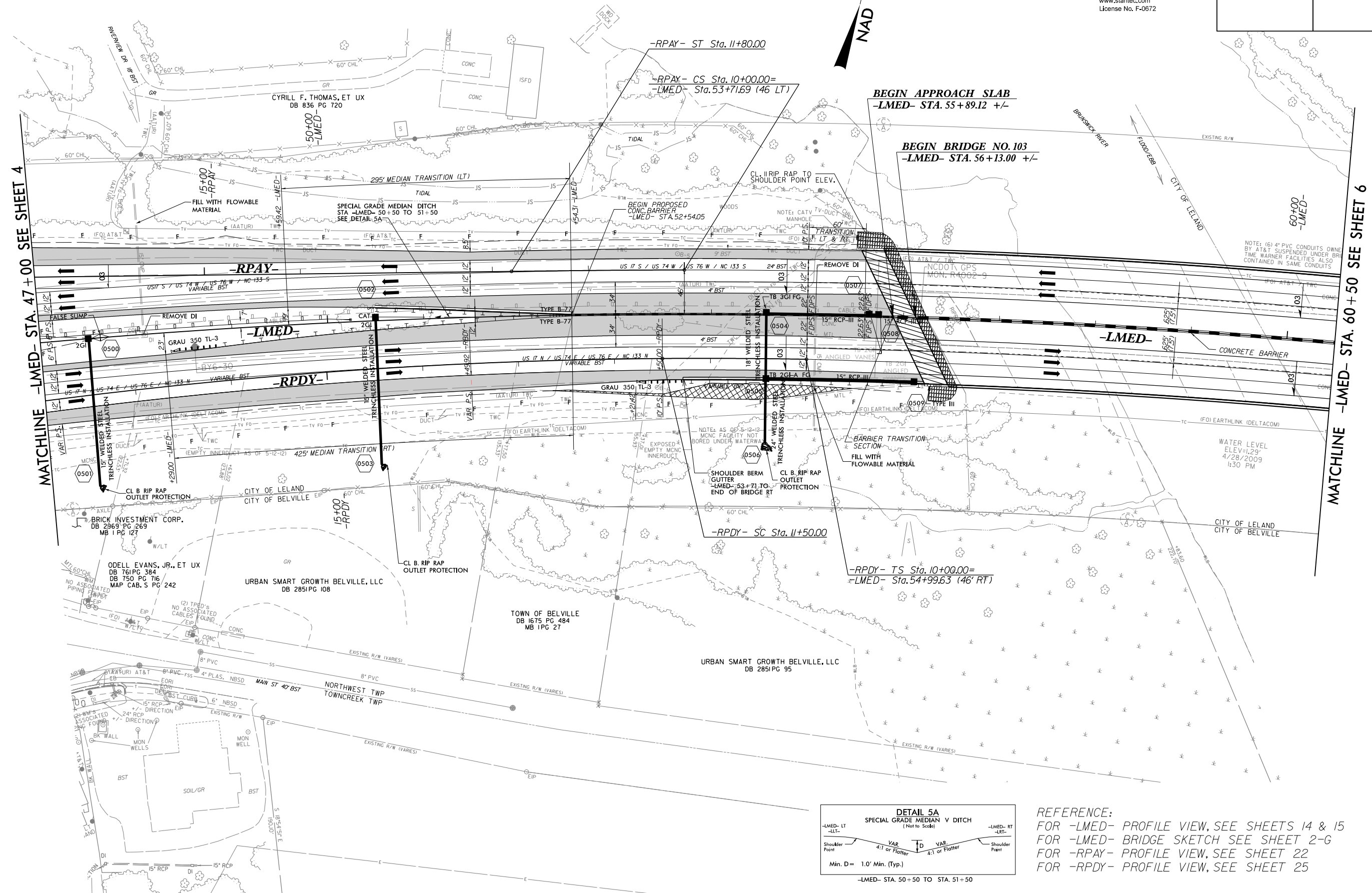
REVISIONS

5/3/2014
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locote

8/17/99



-LMED- <i>PI Sta 49+95.48</i> <i>$\Delta = 38^{\circ}00'00.0''$ (RT)</i> <i>$D = 0^{\circ}45'00.0''$</i> <i>$L = 5,066.67'$</i> <i>$T = 2,630.47'$</i> <i>$R = 7,639.44'$</i> <i>$SE = 0.03$</i> <i>$DS = 70$ MPH</i>



DETAIL 5A
SPECIAL GRADE MEDIAN V DITCH
 (Not to Scale)

The diagram shows a cross-section of a median ditch. The ditch is V-shaped with a vertical depth labeled 'D'. The ditch is flanked by two slopes, each labeled 'VAR. 4:1 or Flatter'. The ditch is bounded by 'Shoulder Point' on both sides. The ditch is labeled 'LIMED- LT' on the left and 'LIMED- RT' on the right. The ditch is also labeled 'LIMED- STA. 50+50 TO STA. 51+50' at the bottom.

Min. D = 1.0' Min. (Typ.)

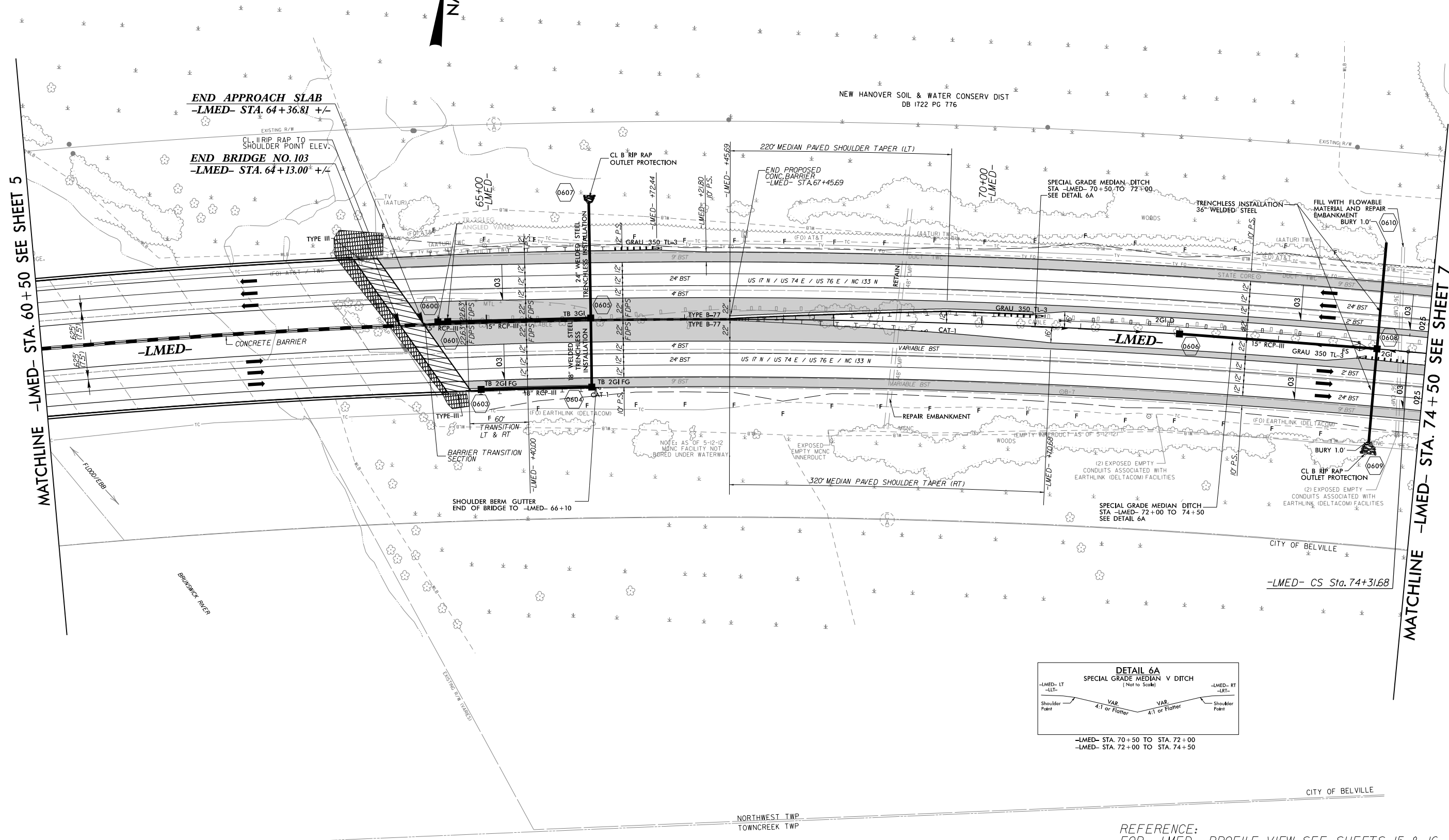
REFERENCE:
FOR -LMED- PROFILE VIEW, SEE SHEETS 14 & 15
FOR -LMED- BRIDGE SKETCH SEE SHEET 2-G
FOR -RPAY- PROFILE VIEW, SEE SHEET 22
FOR -RPDY- PROFILE VIEW, SEE SHEET 25

8/17/99

REVISIONS

5/3/2014
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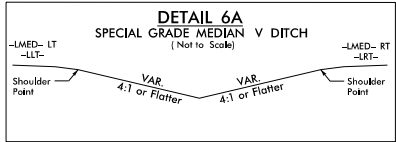
MATCHLINE -LMED- STA. 60+50 SEE SHEET 5



-LMED-	
PI Sta 49+95.48	PIs Sta 74+98.35
$\Delta = 38^{\circ}00'00.0''$ (RT)	$\Theta s = 0^{\circ}45'00.0''$
$D = 0^{\circ}45'00.0''$	$Ls = 200.00'$
$L = 5,066.67'$	$LT = 133.33'$
$T = 2,630.47'$	$ST = 66.67'$
$R = 7,639.44'$	
$SE = 0.03$	
$DS = 70$ MPH	



PROJECT REFERENCE NO.		SHEET NO.
R-3601		6
R/W SHEET NO.		
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

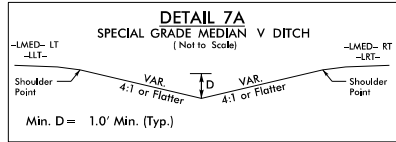


REFERENCE:
FOR -LMED- PROFILE VIEW, SEE SHEETS 15 & 16
FOR -LMED- BRIDGE SKETCH SEE SHEET 2-G

MATCHLINE -LMED- STA. 74+50 SEE SHEET 7

-LMED-
Pls Sta 74+98.35
 $\theta_s = 0^\circ 45' 00.0''$
Ls = 200.00'
LT = 133.33'
ST = 66.67'

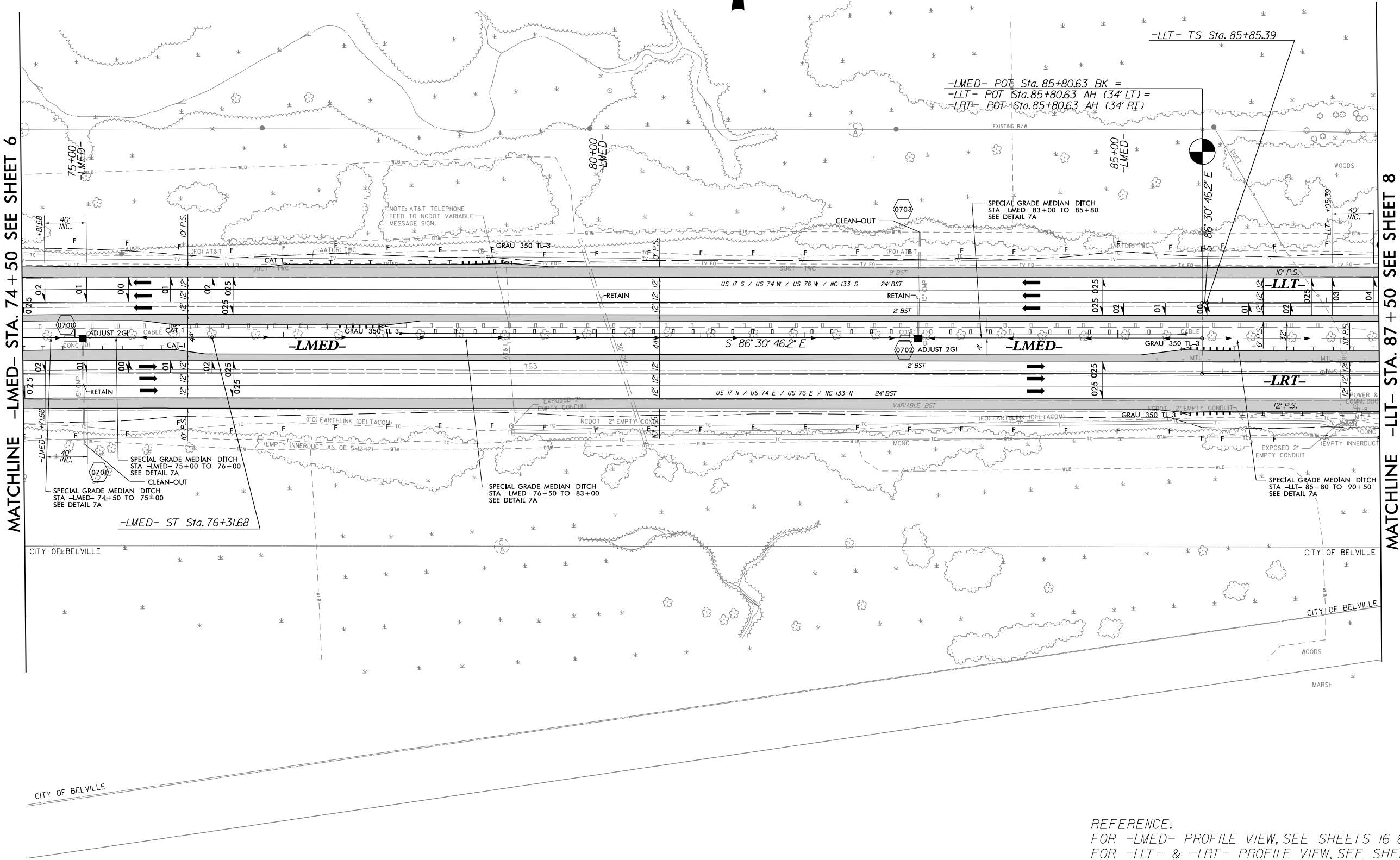
-LLT-
Pls Sta 87+13.96
 $\theta_s = 0^\circ 42' 37.7''$
Ls = 200.00'
LT = 133.33'
ST = 66.67'



-LMED- STA. 74+50 TO STA. 75+00
-LMED- STA. 75+00 TO STA. 76+00
-LMED- STA. 76+50 TO STA. 83+00
-LMED- STA. 83+00 TO STA. 85+80
-LLT- STA. 85+80 TO STA. 90+50



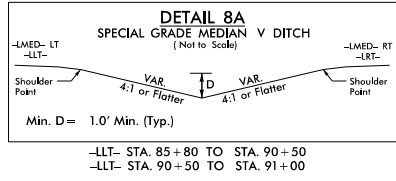
PROJECT REFERENCE NO. <i>R-3601</i>		SHEET NO. <i>7</i>	
R/W SHEET NO.			
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			



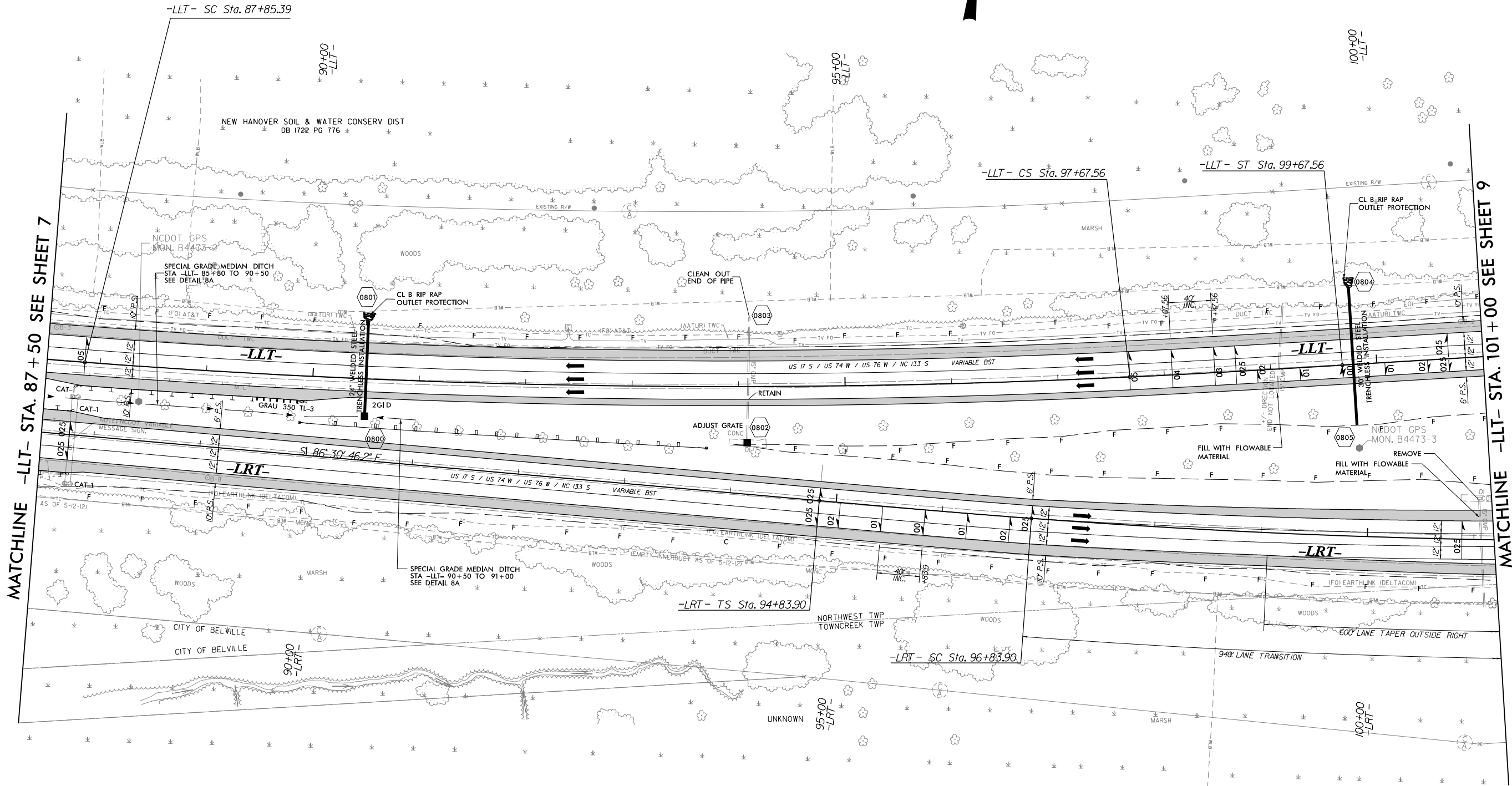
REFERENCE:
FOR -LMED- PROFILE VIEW, SEE SHEETS 16 & 17
FOR -LLT- & -LRT- PROFILE VIEW, SEE SHEET 18

-LLT-		
Pls Sta 87+18.73	Pls Sta 92+77.10	Pls Sta 98+34.23
$\Theta_s = 0^\circ 42' 58.3''$	$\Delta = 7^\circ 02' 03.4''$ (LT)	$\Theta_s = 0^\circ 42' 58.3''$
$L_s = 200.00'$	$D = 0^\circ 42' 58.3''$	$L_s = 200.00'$
$LT = 133.33'$	$L = 982.17'$	$LT = 133.33'$
$ST = 66.67'$	$T = 491.70'$	$ST = 66.67'$
	$R = 8,000.00'$	
	$SE = 0.05$	
	$DS = 80+ MPH$	

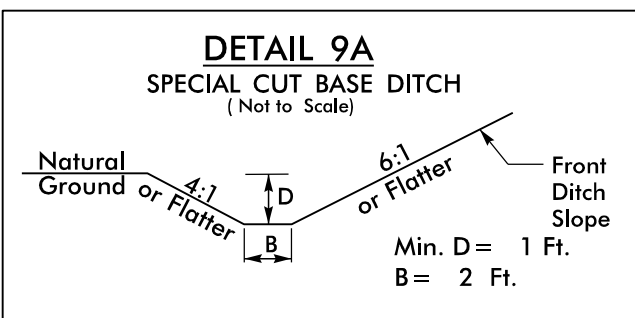
-LRT-	
Pls Sta 96+17.23	Pls Sta 101+48.22
$\Theta_s = 0^\circ 45' 03.3''$	$\Delta = 6^\circ 57' 53.3''$ (LT)
$L_s = 200.00'$	$D = 0^\circ 45' 03.3''$
$LT = 133.33'$	$L = 927.49'$
$ST = 66.67'$	$T = 464.32'$
	$R = 7,630.00'$
	$SE = 0.025$
	$DS = 60 MPH$



PROJECT REFERENCE NO.		SHEET NO.
R-3601		8
RW SHEET NO.		
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



REVISIONS



-LRT-

PI Sta 101+48.22	PIs Sta 106+78.06
$\Delta = 6^{\circ}57'53.3"$ (LT)	$\Theta_s = 0^{\circ}45'03.3"$
$D = 0^{\circ}45'03.3"$	$L_s = 200.00'$
$L = 927.49'$	$LT = 133.33'$
$T = 464.32'$	$ST = 66.67'$
$R = 7,630.00'$	
$SE = 0.025$	
$DS = 60$ MPH	

-LRT- STA. 106+37 TO STA. 110+00 (LT)

NAD 83/95



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PROJECT REFERENCE NO.

R-3601

SHEET NO.

9

R/W SHEET NO.

ROADWAY DESIGN
ENGINEER

HYDRAULICS
ENGINEER

THIS DOCUMENT
ORIGINALLY
SIGNED AND
SEALED BY

MICHAEL D. LINDGREN
P.E.# 025513
JUNE 27, 2014

THIS DOCUMENT
ORIGINALLY
SIGNED AND
SEALED BY

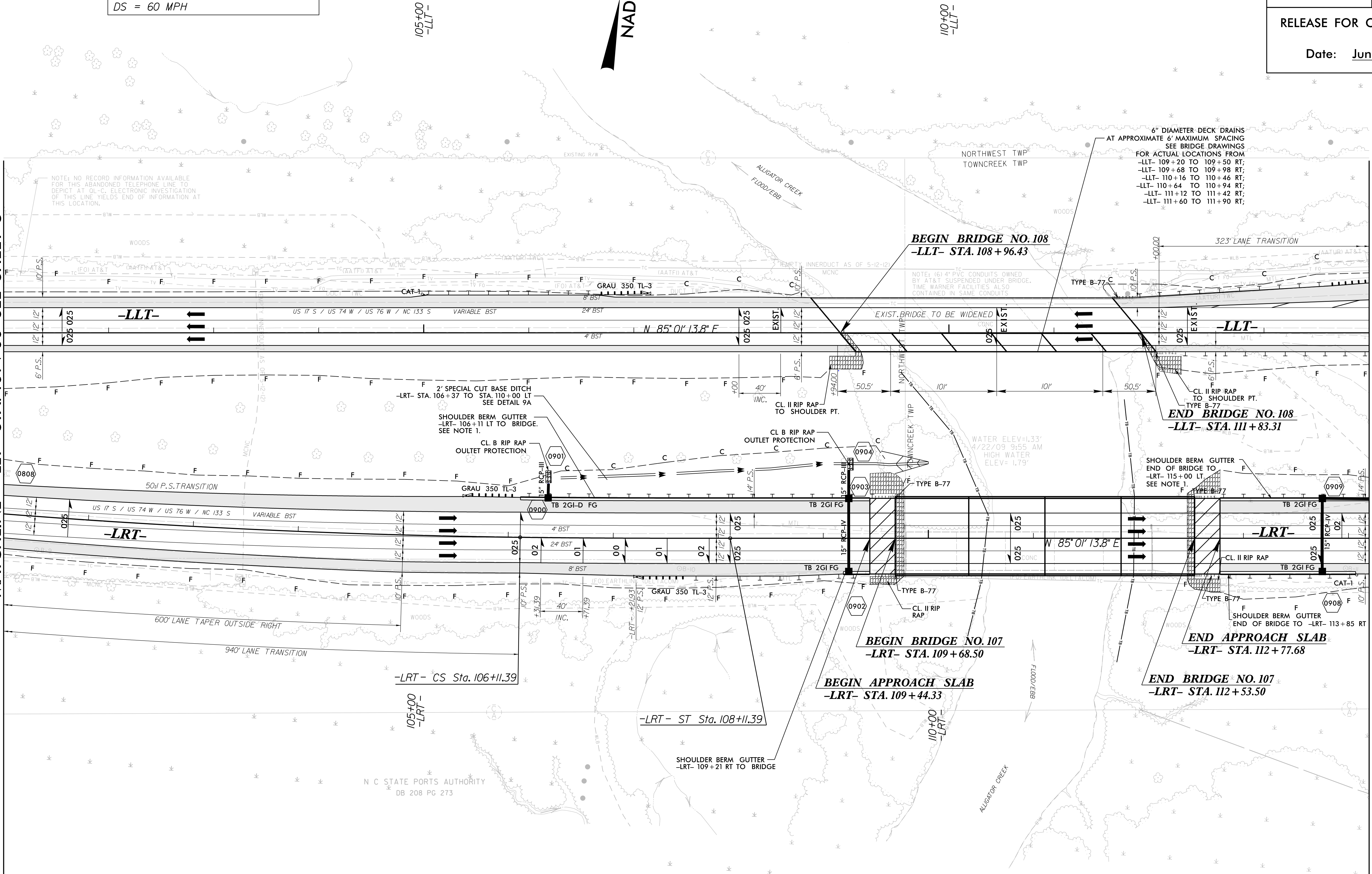
STEVEN M. BONDOR
P.E.# 12786
JUNE 27, 2014

RELEASE FOR CONSTRUCTION

Date: June 27, 2014

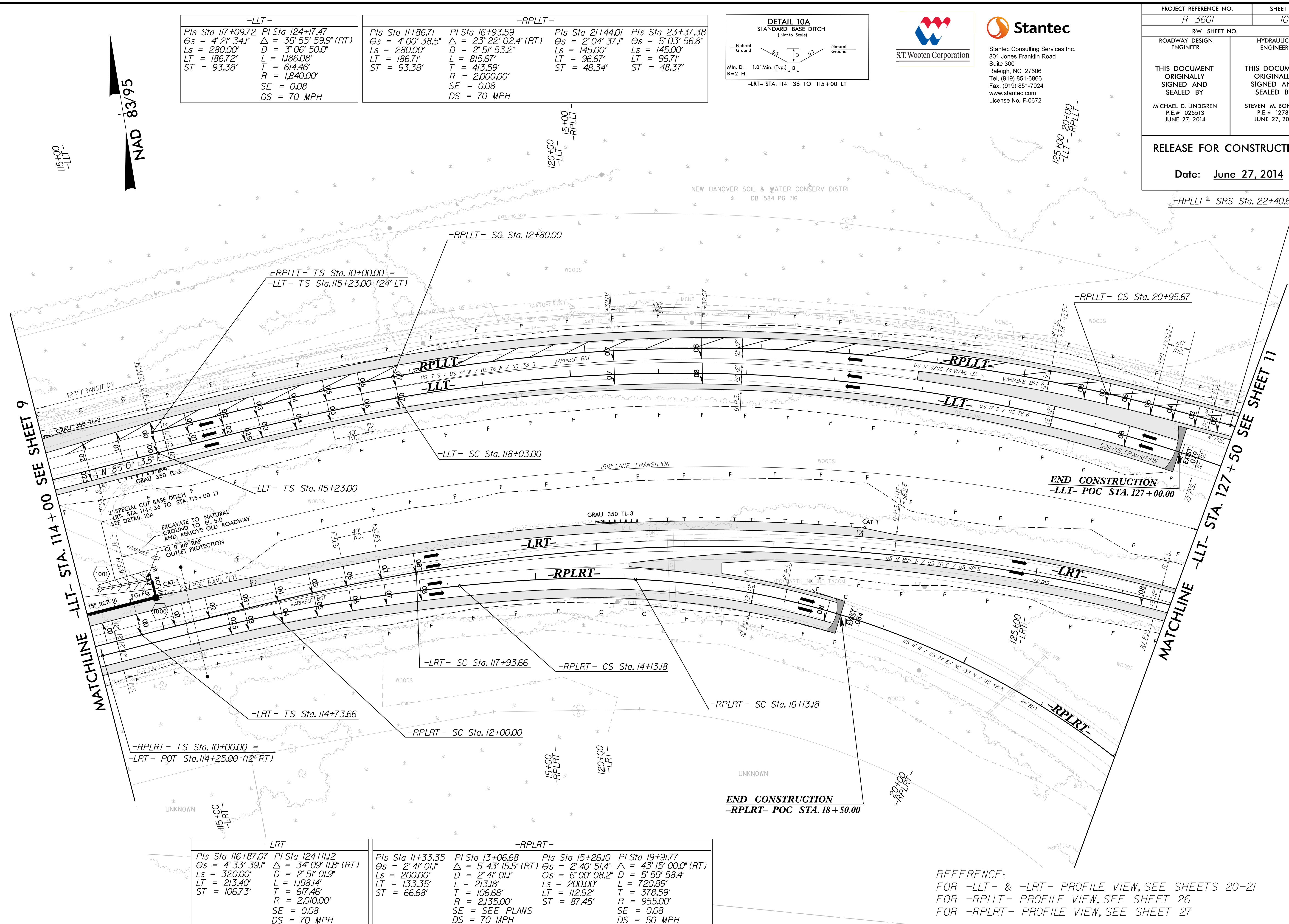
MATCHLINE -LLT- STA. 101+00 SEE SHEET 8

MATCHLINE -LLT- STA. 114+00 SEE SHEET 10



NOTE 1: LEAVE 10' GAP IN BACK OF CURB ALONG APPROACH SLABS ON LEFT SIDE OF -LRT- DURING PHASE II CONSTRUCTION TO ALLOW DRAINAGE FROM BRIDGE 107 TO DISCHARGE TO FILL SLOPE. COMPLETE BACK OF CURB CONSTRUCTION DURING FINAL TRAFFIC PATTERN.

REFERENCE:
FOR -LLT- & -LRT- PROFILE VIEW, SEE SHEETS 19-20
FOR -LLT- & -LRT- BRIDGE SKETCH SEE SHEET 2-H



REFERENCE:
FOR -LLT- & -LRT- PROFILE VIEW, SEE SHEETS 20-21
FOR -RPLLT- PROFILE VIEW, SEE SHEET 26
FOR -RPLRT- PROFILE VIEW, SEE SHEET 27

8/17/99

REVISIONS

5/3/2014
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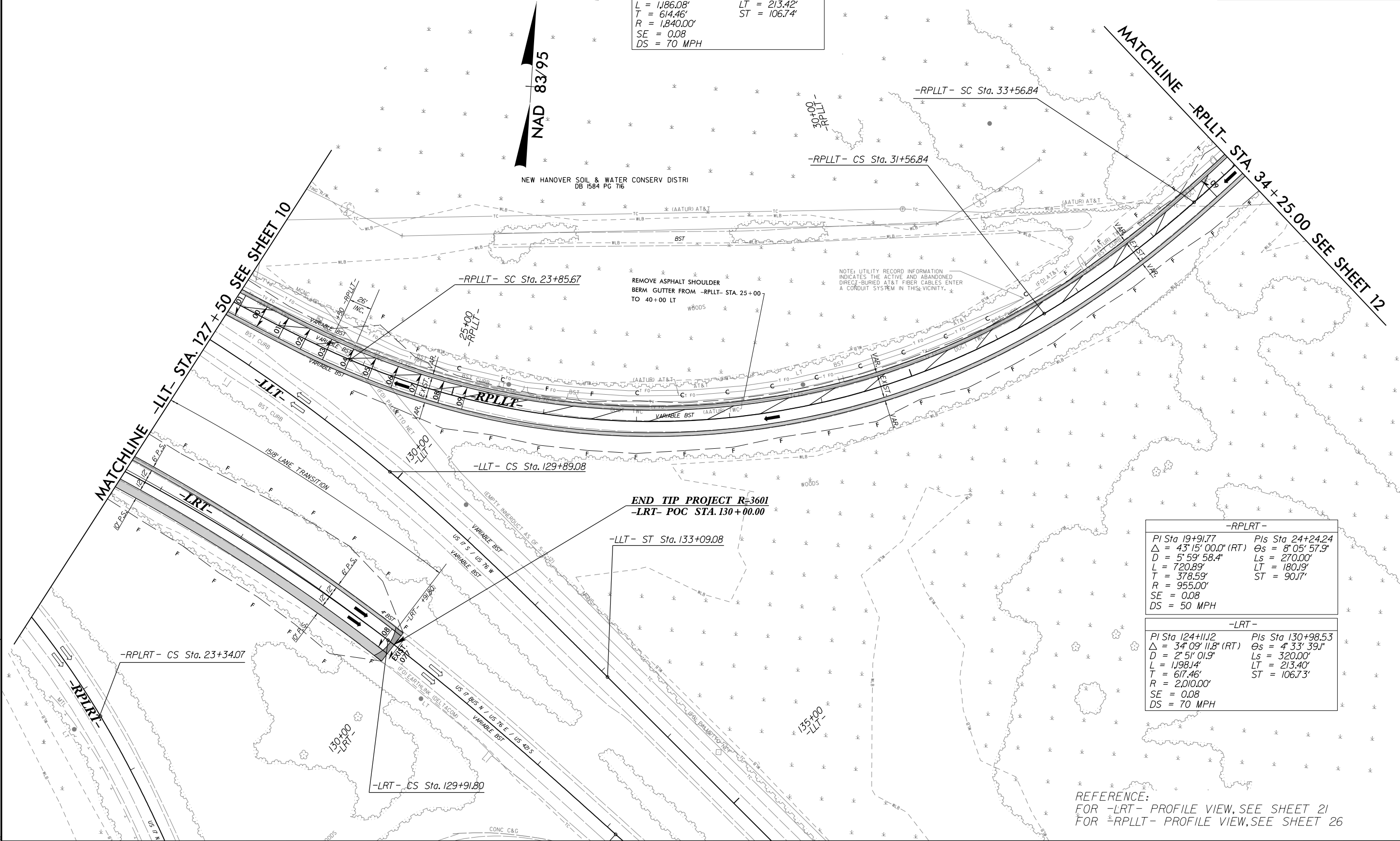
-RPLLT-			
Pls Sta 23+37.38 $\Delta s = 5^{\circ} 03' 56.8''$ $L s = 145.00'$ $L T = 96.71'$ $S T = 48.37'$	Pls Sta 28+02.44 $\Delta = 53^{\circ} 53' 01.0''$ (LT) $D = 6^{\circ} 59' 14.2''$ $L = 771.7'$ $T = 416.76'$ $R = 820.00'$ $S E = 0.08$ $D S = 50$ MPH	Pls Sta 32+46.00 $\Delta s = 3^{\circ} 29' 21.5''$ $\Delta s = 6^{\circ} 59' 29.8''$ $L s = 200.00'$ $L T = 111.39'$ $S T = 89.16'$	Pls Sta 36+57.46 $\Delta = 20^{\circ} 46' 27.8''$ (LT) $D = 3^{\circ} 29' 37.1''$ $L = 594.63'$ $T = 300.62'$ $R = 1,640.00'$ $S E = EXISTING$ $D S = 65$ MPH

-LLT-	
Pls Sta 124+17.47 $\Delta = 36^{\circ} 55' 59.9''$ (RT) $D = 3^{\circ} 06' 50.0''$ $L = 1,186.08'$ $T = 614.46'$ $R = 1,840.00'$ $S E = 0.08$ $D S = 70$ MPH	Pls Sta 130+95.82 $\Delta s = 4^{\circ} 58' 56.1''$ $L s = 320.00'$ $L T = 213.42'$ $S T = 106.74'$



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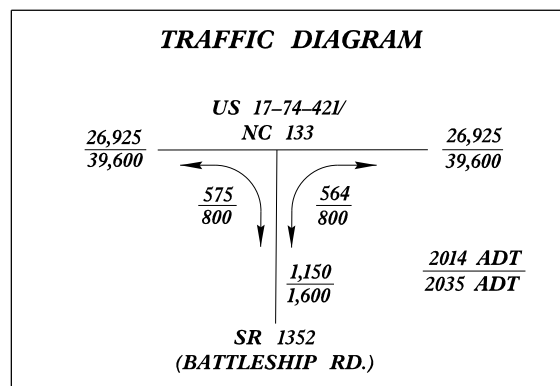
PROJECT REFERENCE NO.		SHEET NO.
R-3601		11
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



-RPLRT-	
Pls Sta 19+91.77 $\Delta = 43^{\circ} 15' 00.0''$ (RT) $D = 5^{\circ} 59' 58.4''$ $L = 720.89'$ $T = 378.59'$ $R = 955.00'$ $S E = 0.08$ $D S = 50$ MPH	Pls Sta 24+24.24 $\Delta s = 8^{\circ} 05' 57.9''$ $L s = 270.00'$ $L T = 180.19'$ $S T = 90.17'$

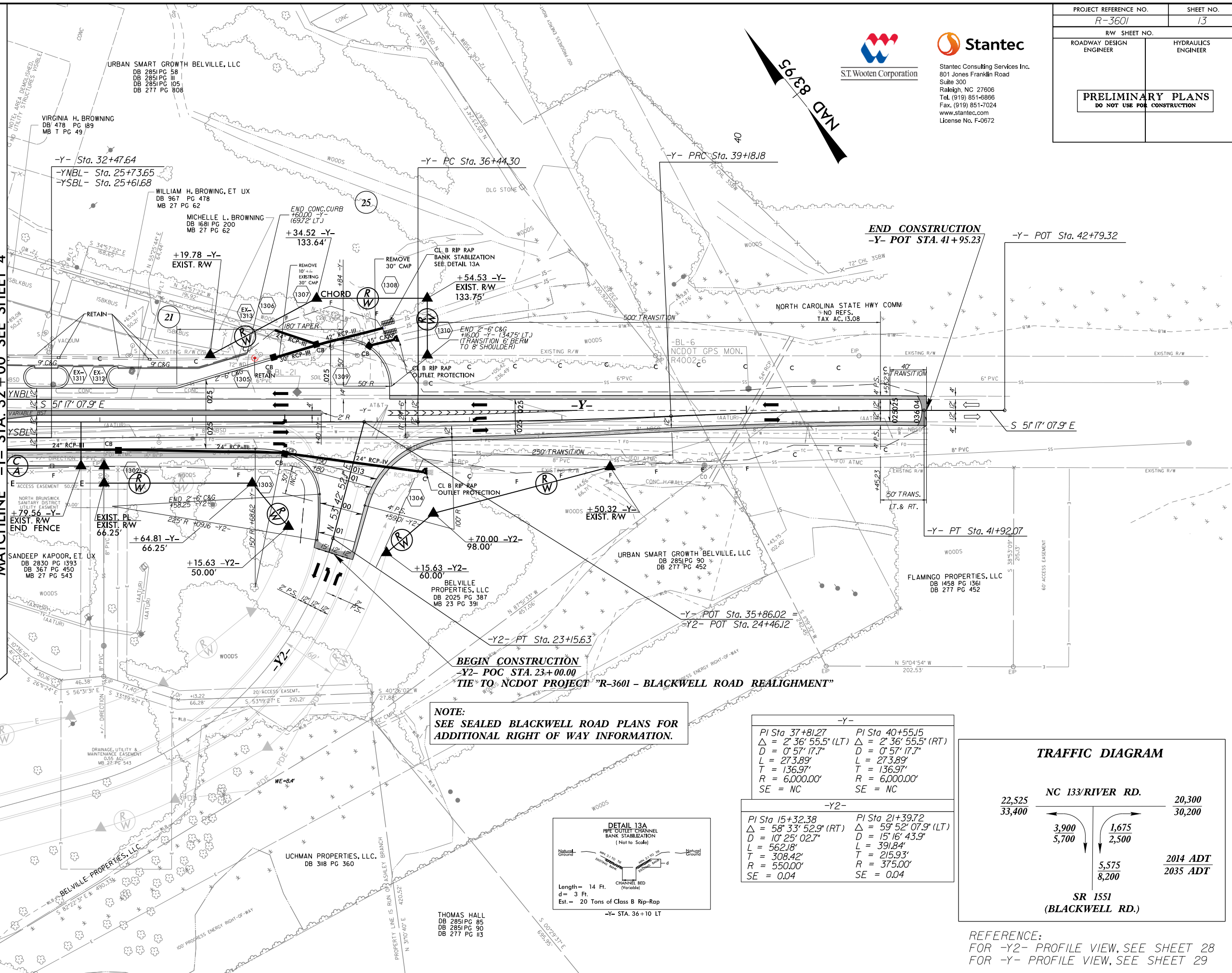
-LRT-	
Pls Sta 124+11.12 $\Delta = 34^{\circ} 09' 11.8''$ (RT) $D = 2^{\circ} 51' 01.9''$ $L = 1,198.14'$ $T = 617.46'$ $R = 2,010.00'$ $S E = 0.08$ $D S = 70$ MPH	Pls Sta 130+98.53 $\Delta s = 4^{\circ} 33' 39.1''$ $L s = 320.00'$ $L T = 213.40'$ $S T = 106.73'$

REFERENCE:
FOR -LRT- PROFILE VIEW, SEE SHEET 21
FOR -RPLLT- PROFILE VIEW, SEE SHEET 26



MATCHLINE -Y2- STA. 17+50
SEE SHEET 4

MATCHLINE -Y- STA. 32+00 SEE SHEET 4



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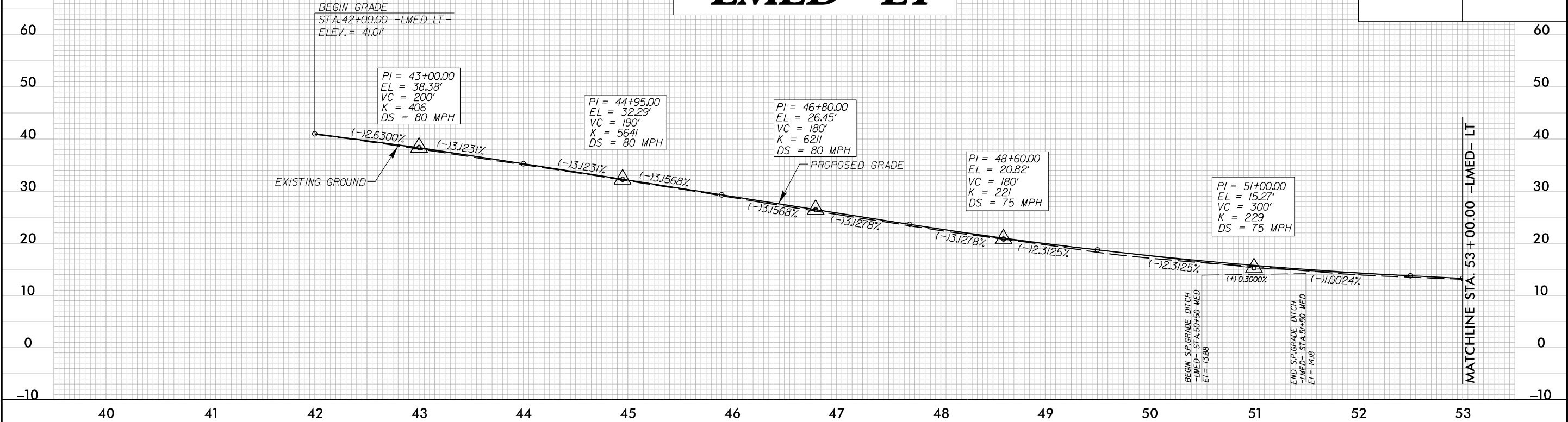


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PROJECT REFERENCE NO.		SHEET NO.
R-3601		14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

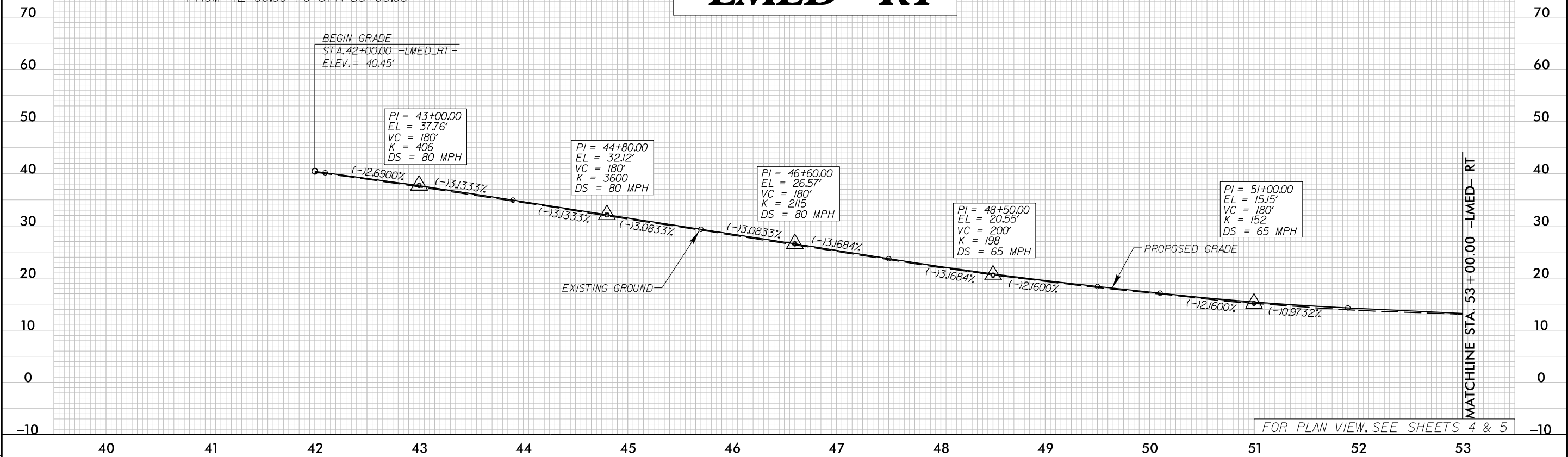
NOTE: VERTICAL ALIGNMENT BASED ON A
VARIABLE HORIZONTAL OFFSET FROM -LMED-
FROM 42+00.00 TO STA 53+00.00

-LMED- LT



NOTE: VERTICAL ALIGNMENT BASED ON A
VARIABLE HORIZONTAL OFFSET FROM -LMED-
FROM 42+00.00 TO STA 53+00.00

-LMED- RT



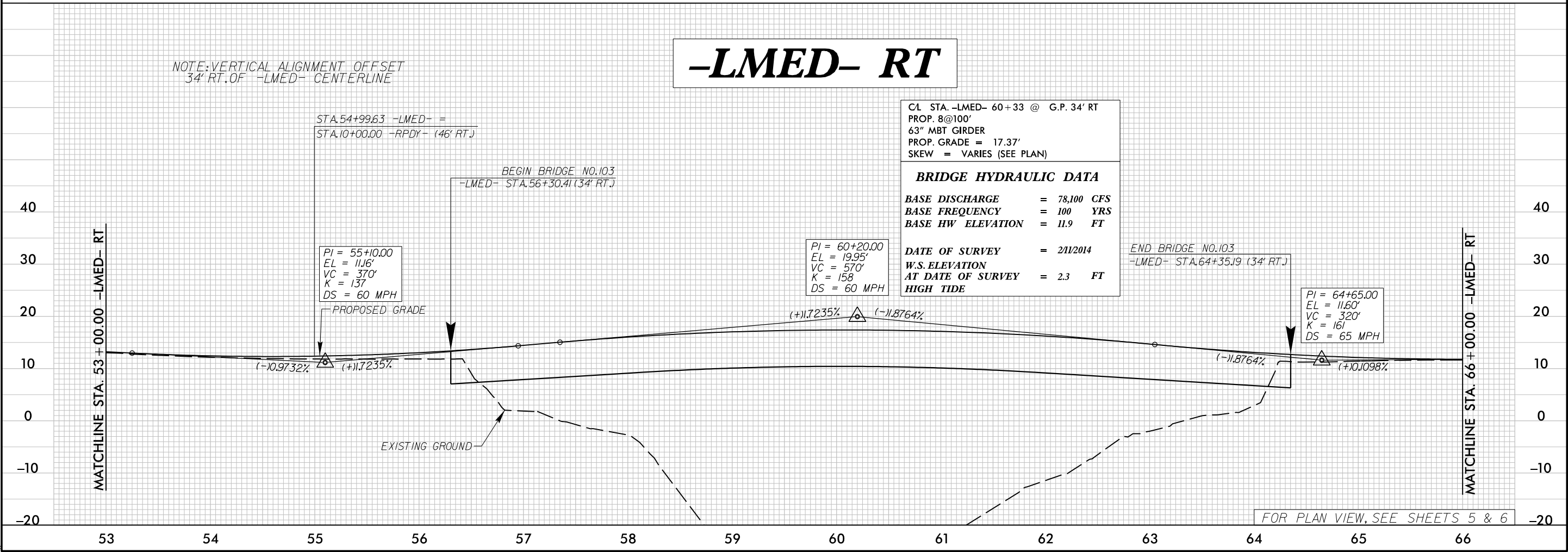
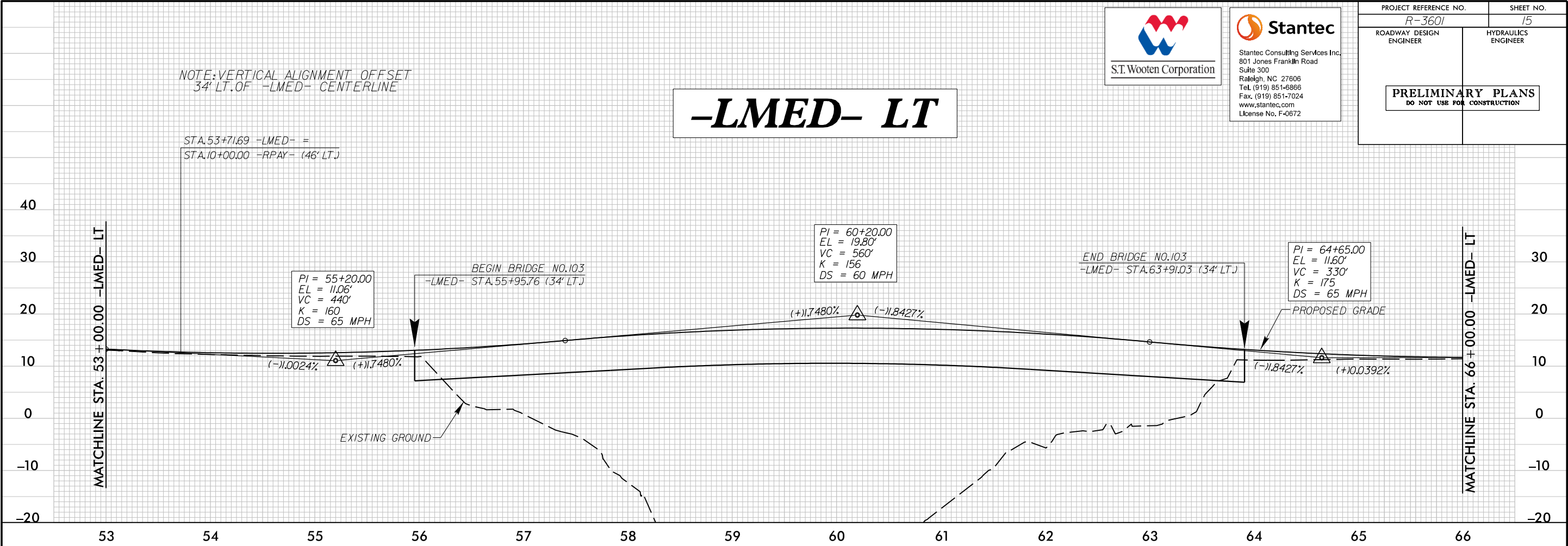
FOR PLAN VIEW, SEE SHEETS 4 & 5

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PROJECT REFERENCE NO.		SHEET NO.
R-3601		15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



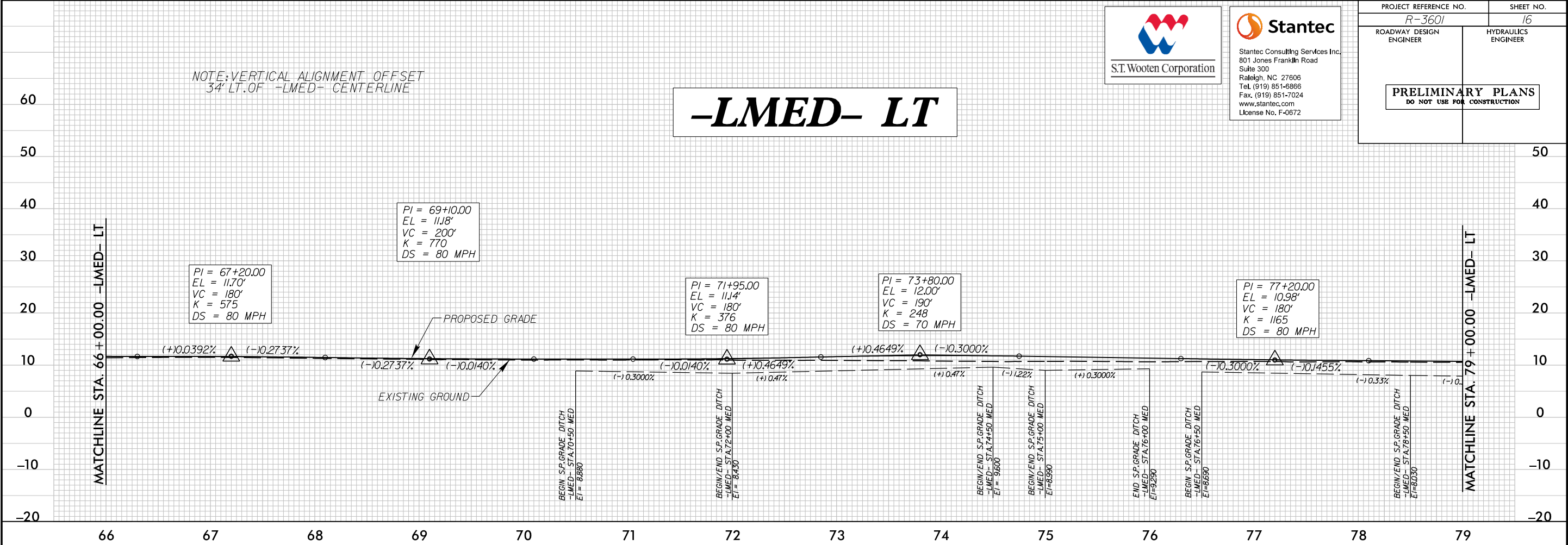
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PROJECT REFERENCE NO.		SHEET NO.
R-3601		16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

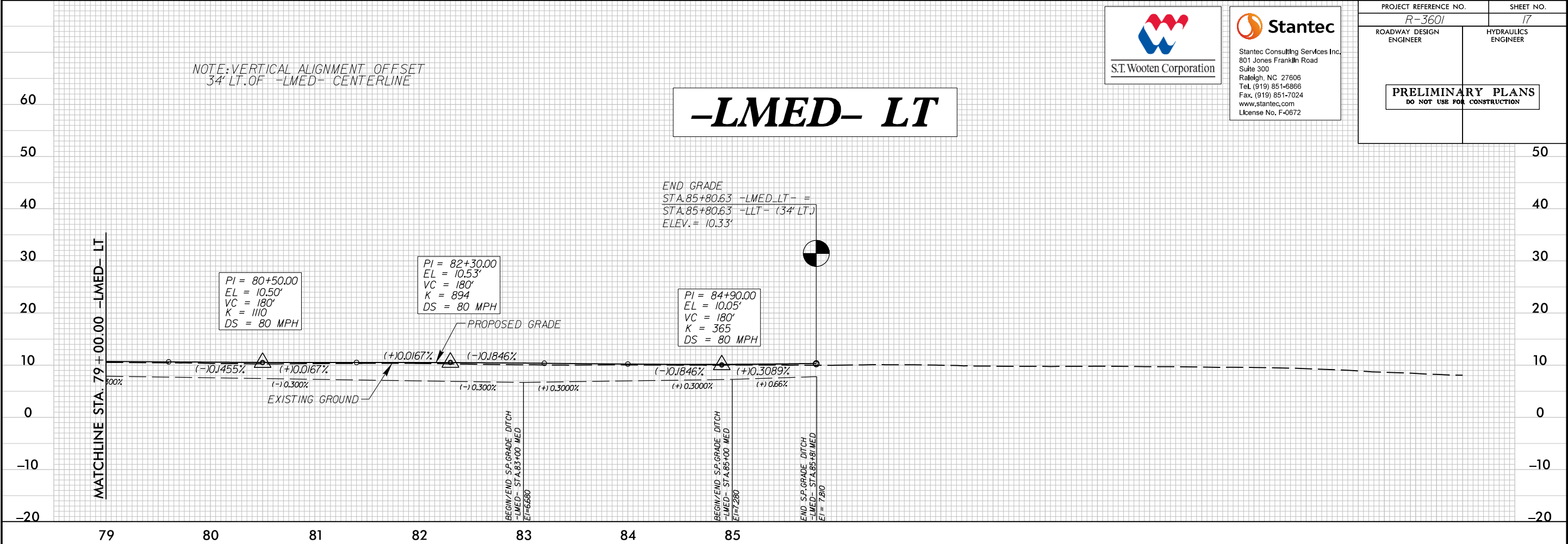


5/28/99

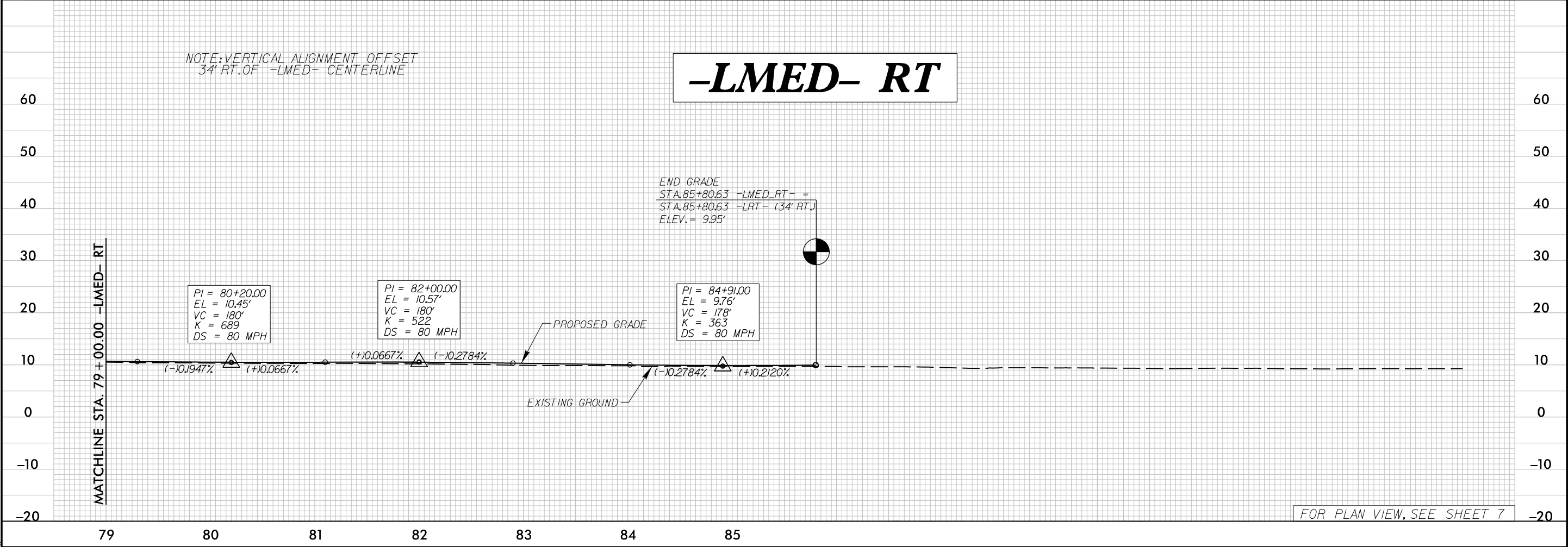


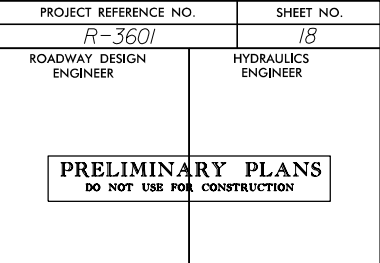
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PROJECT REFERENCE NO.		SHEET NO.
R-3601		17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



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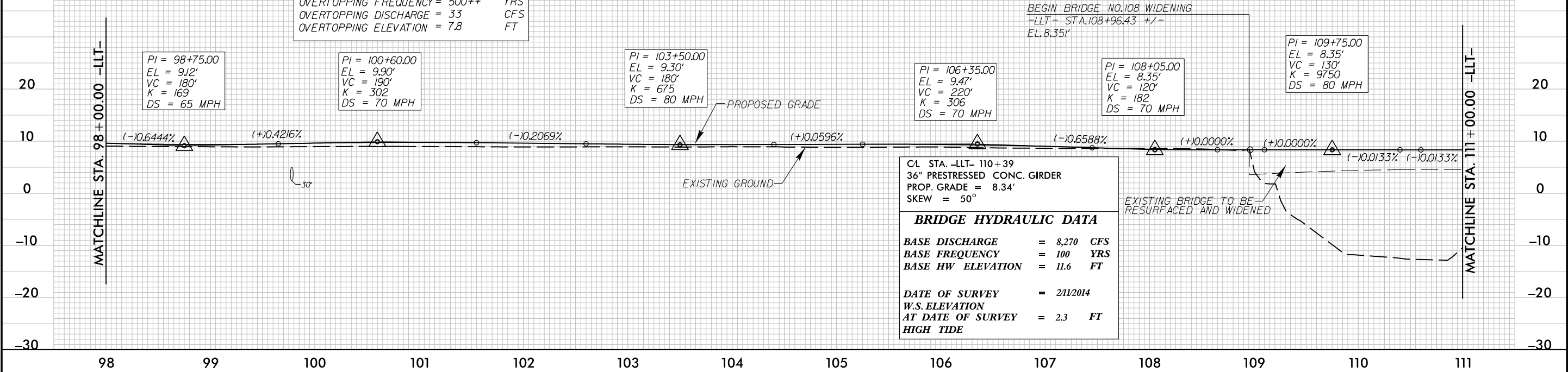


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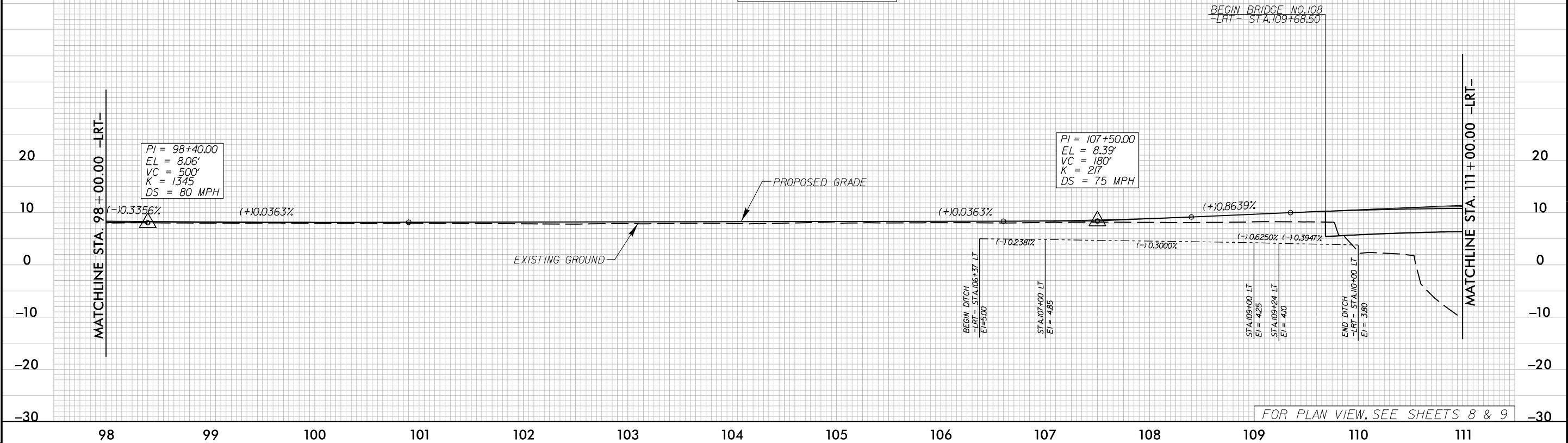
PROJECT REFERENCE NO.		SHEET NO.
R-3601		19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

PIPE HYDRAULIC DATA		
-LLT- Sta. 99+78		
DRAINAGE AREA	= 3.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 19	CFS
DESIGN HW ELEVATION	= 5.2	FT
100 YEAR DISCHARGE	= 21	CFS
100 YEAR HW ELEVATION	= 5.5	FT
OVERTOPPING FREQUENCY	= 500++	YRS
OVERTOPPING DISCHARGE	= 33	CFS
OVERTOPPING ELEVATION	= 7.8	FT

-LLT-



-LRT-

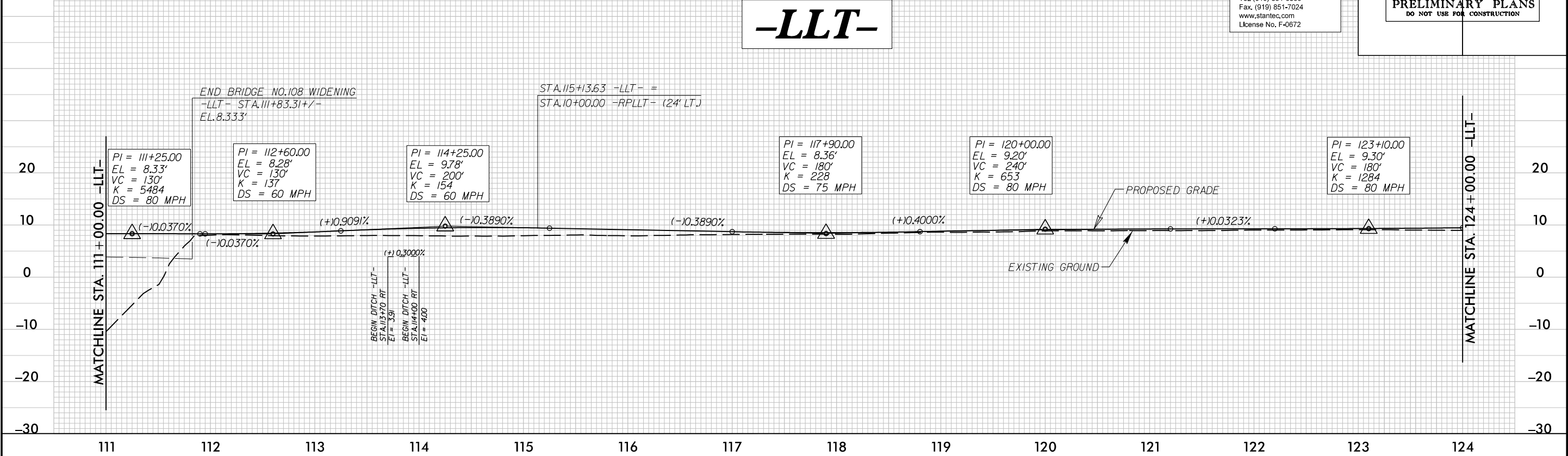


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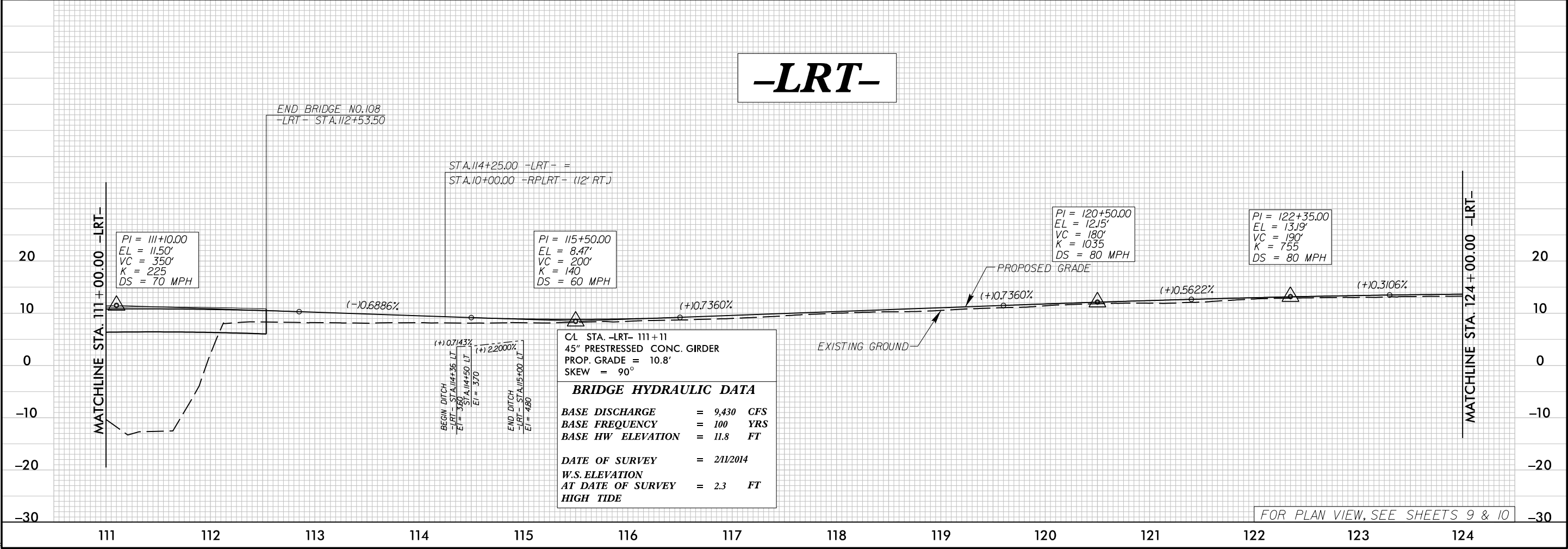


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PROJECT REFERENCE NO.		SHEET NO.
R-3601		20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



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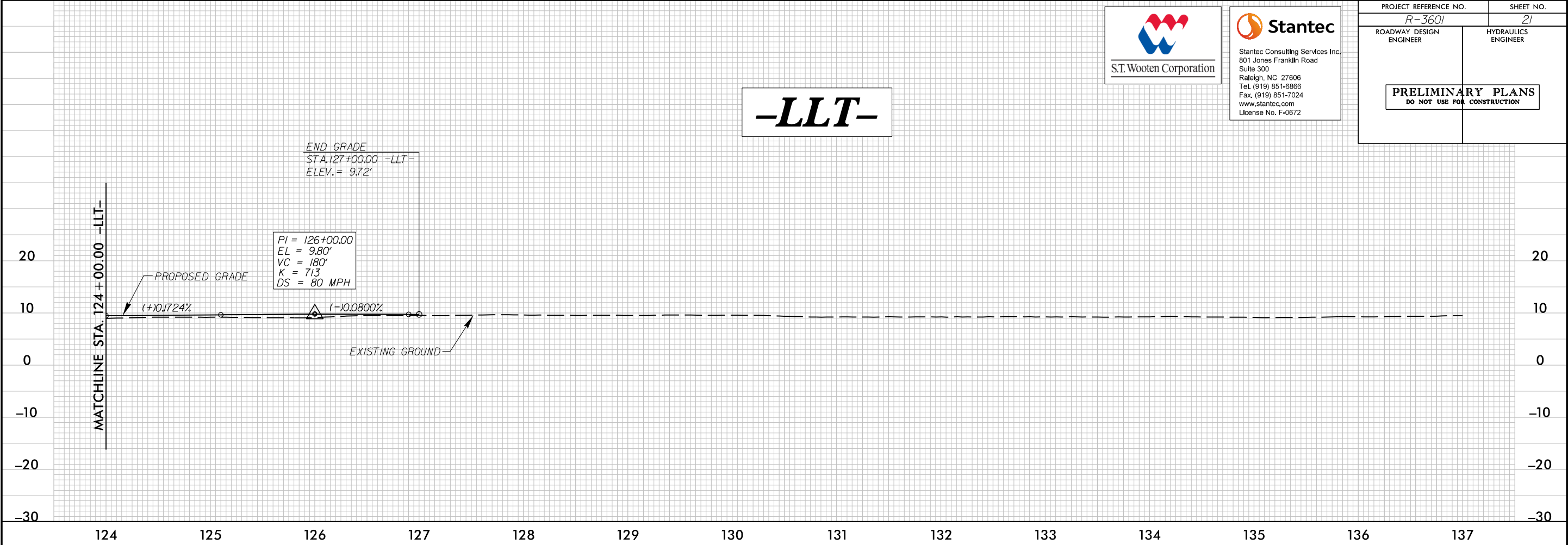
FOR PLAN VIEW, SEE SHEETS 9 & 10

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PROJECT REFERENCE NO.		SHEET NO.
R-3601		21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		



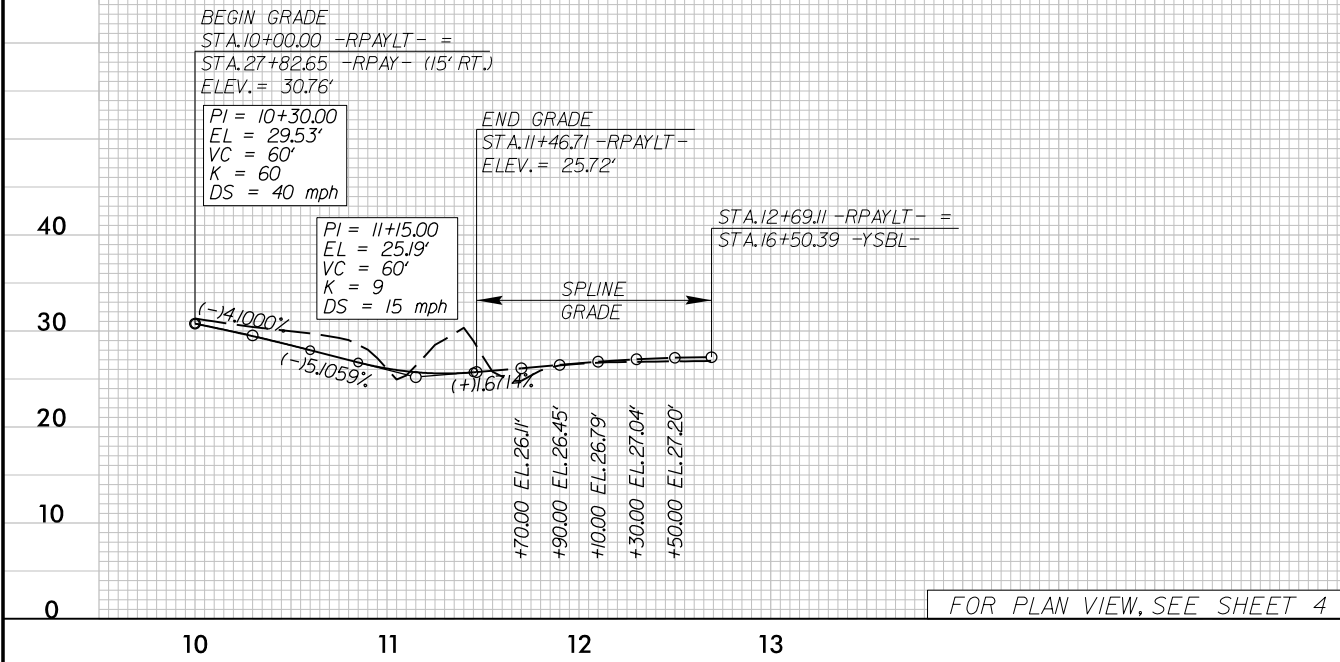
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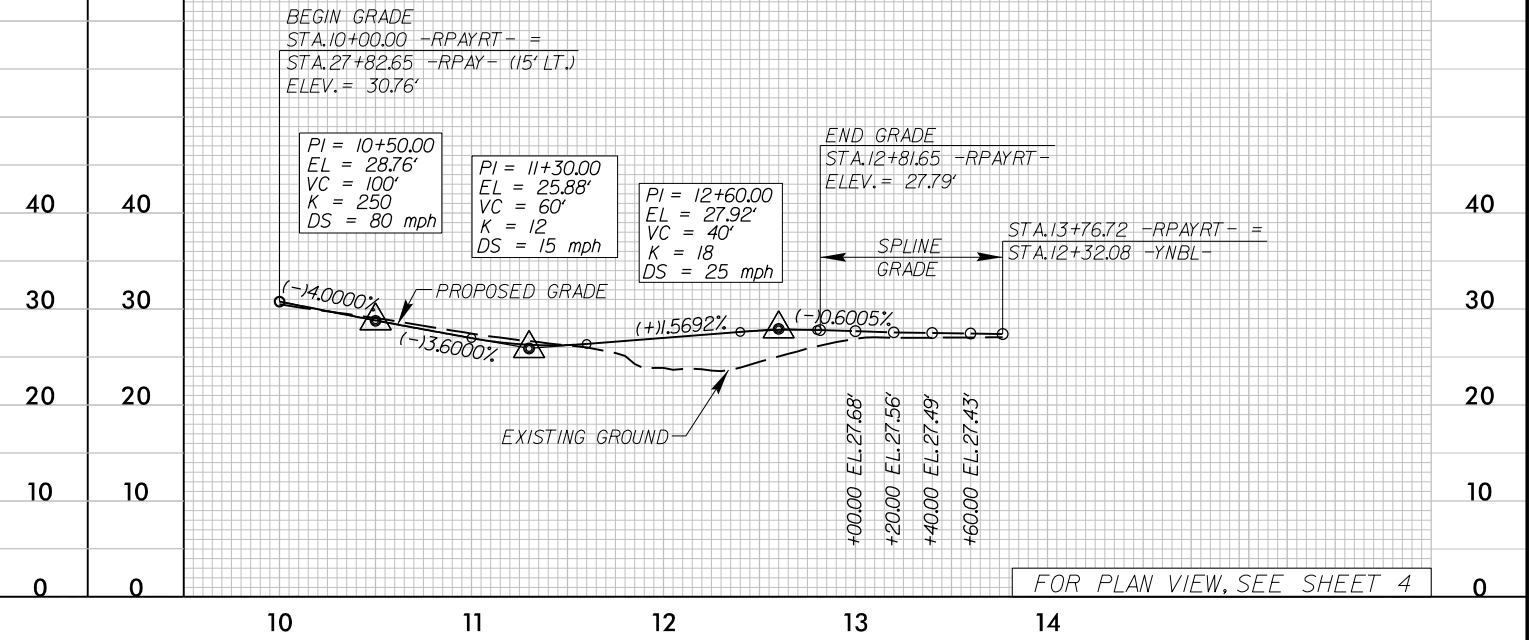
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PROJECT REFERENCE NO.		SHEET NO.
R-3601		22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

-RPAYLT-

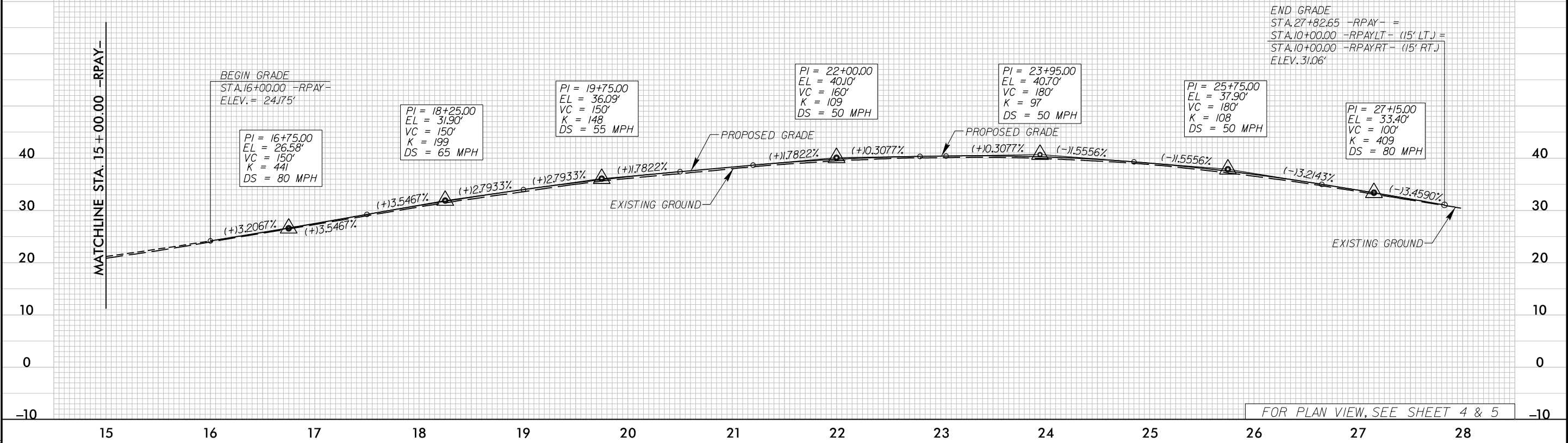


-RPAYRT-



NOTE: -RPAY- STA.10+00.00 TO -RPAY- STA.16+00.00
TO BE CONSTRUCTED BASED ON -LMED- GRADE.

-RPAY-



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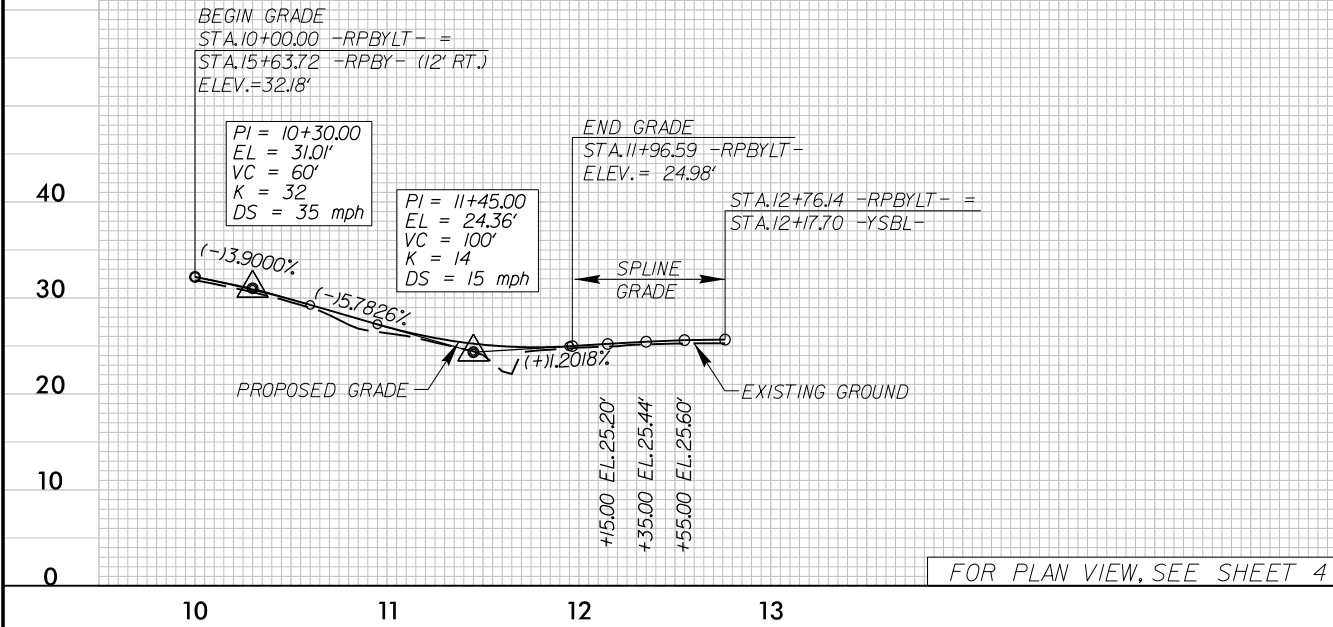
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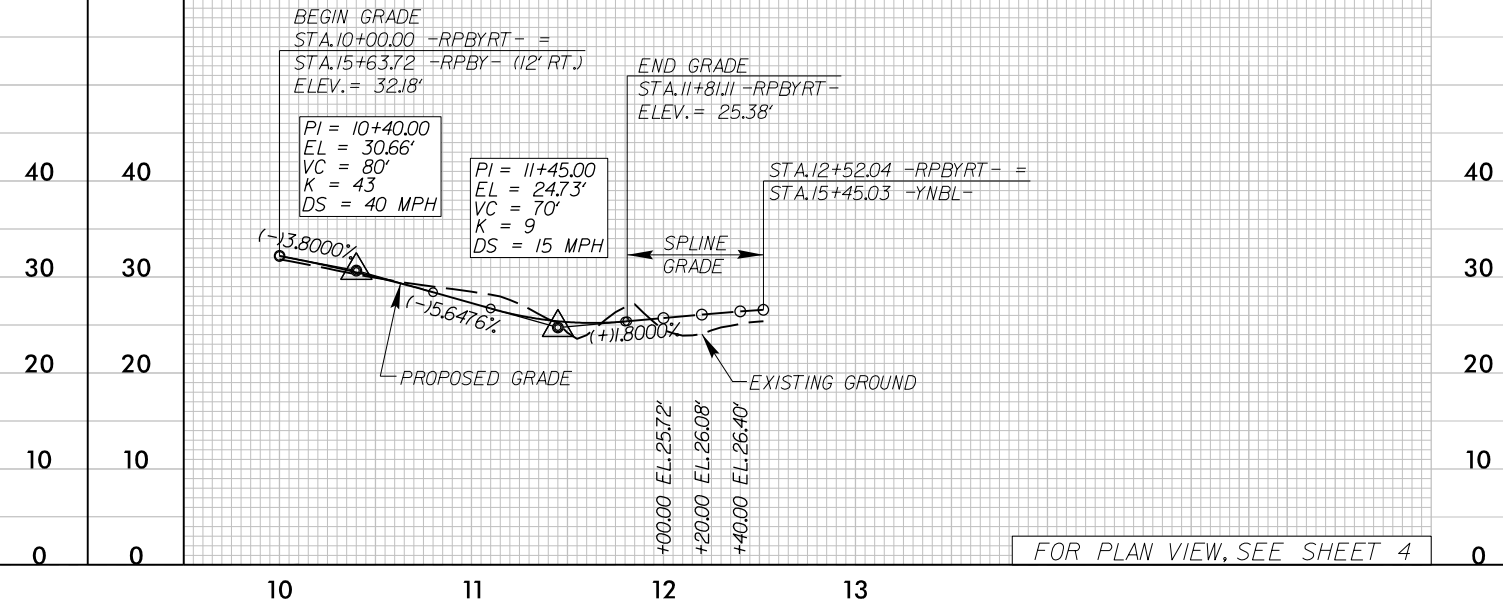
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PROJECT REFERENCE NO.		SHEET NO.
R-3601		23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

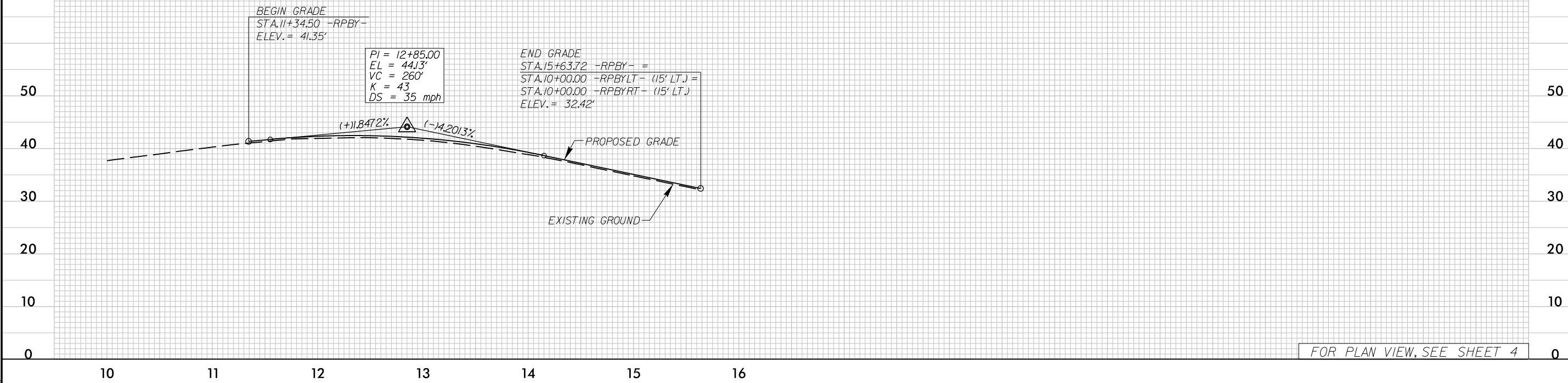
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-RPBYRT-



-RPBY-



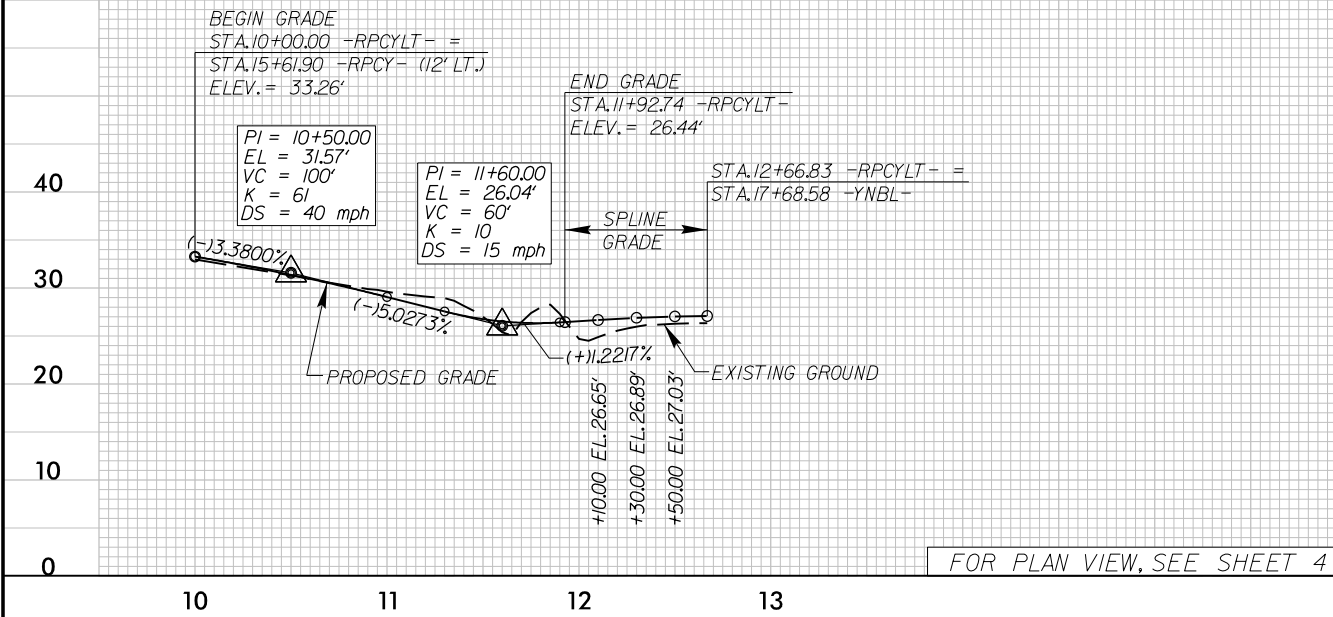
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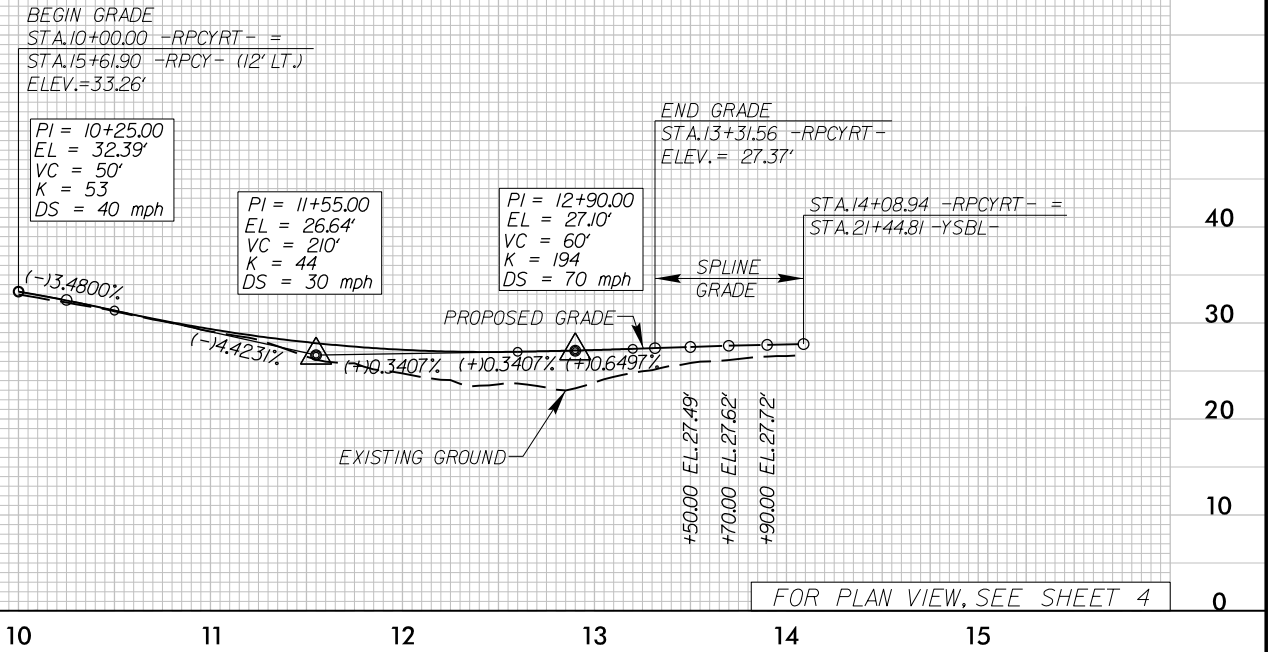
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PROJECT REFERENCE NO.		SHEET NO.
R-3601		24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		

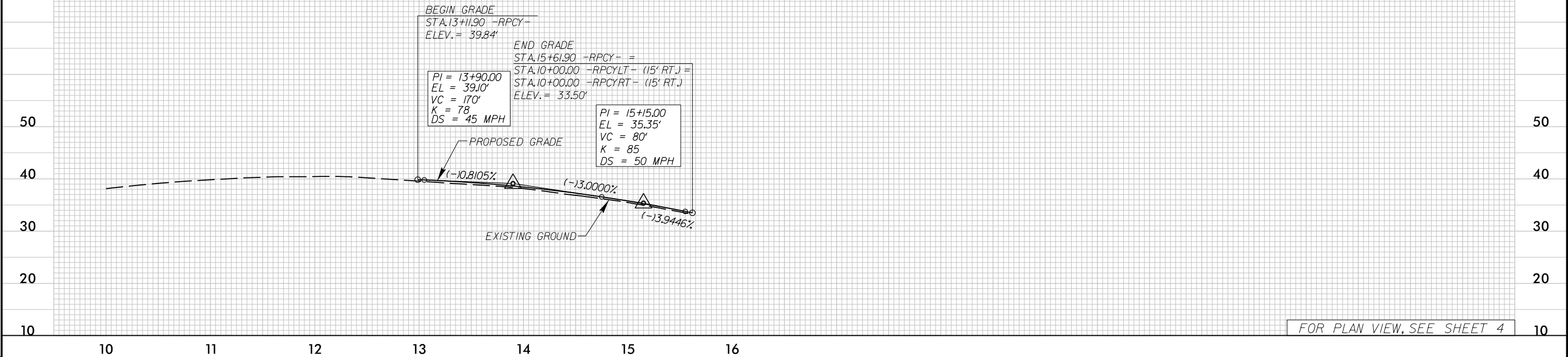
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-RPCYRT-



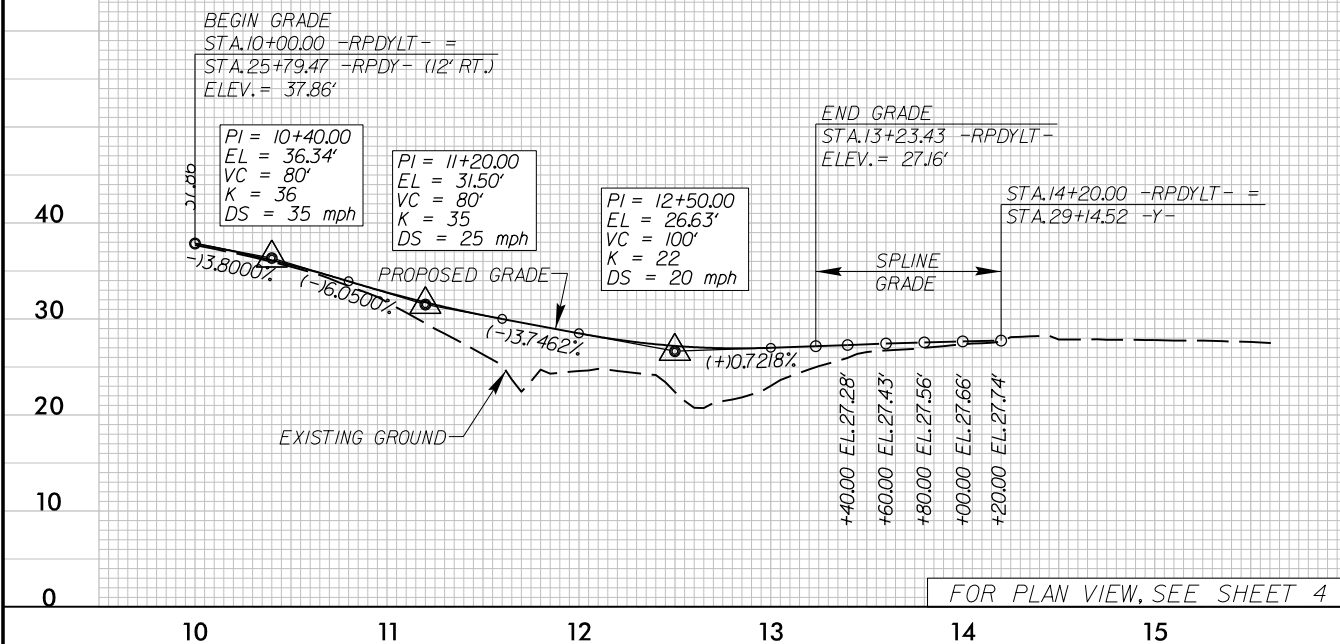
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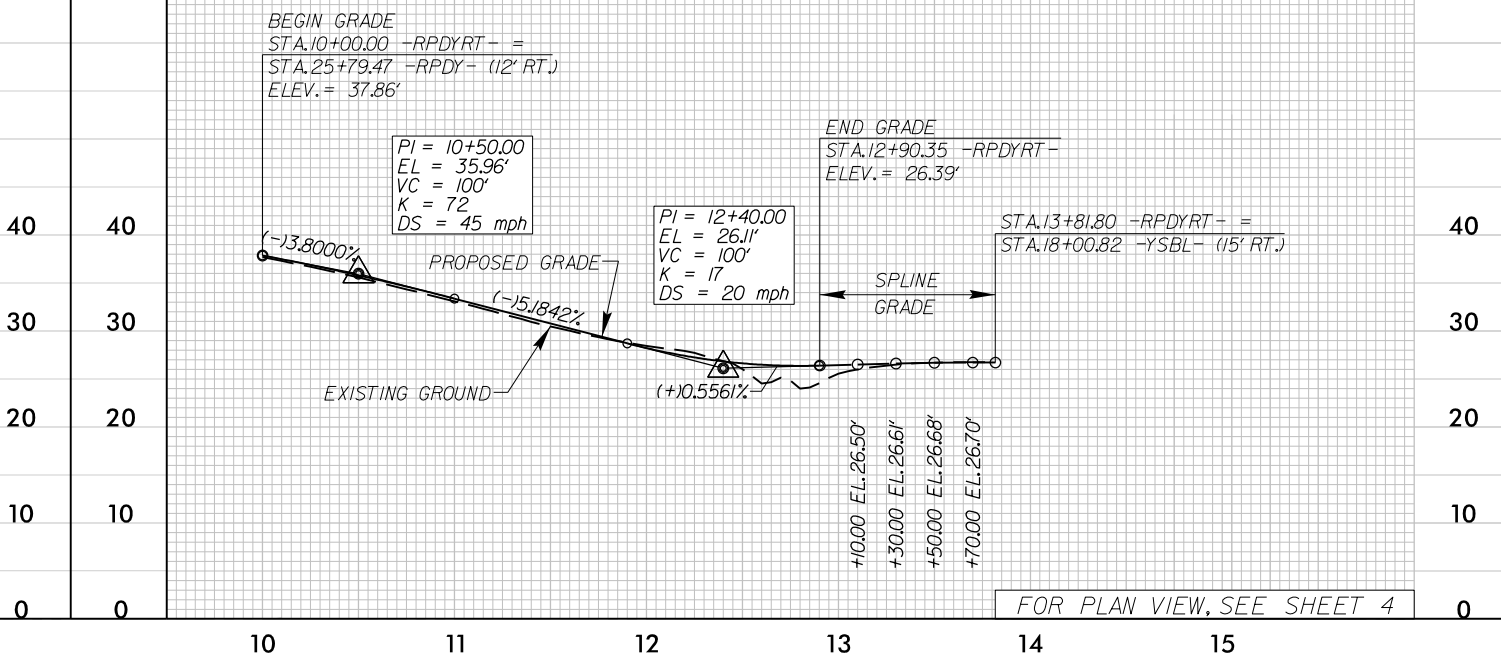
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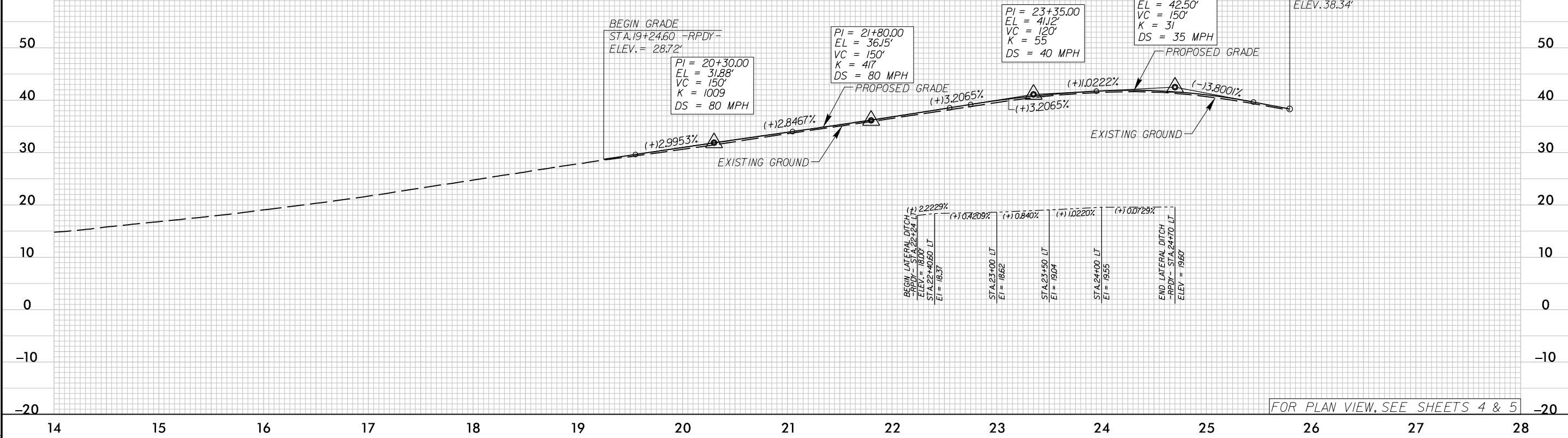
PROJECT REFERENCE NO.		SHEET NO.	
R-3601		25	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

-RPDYRT-

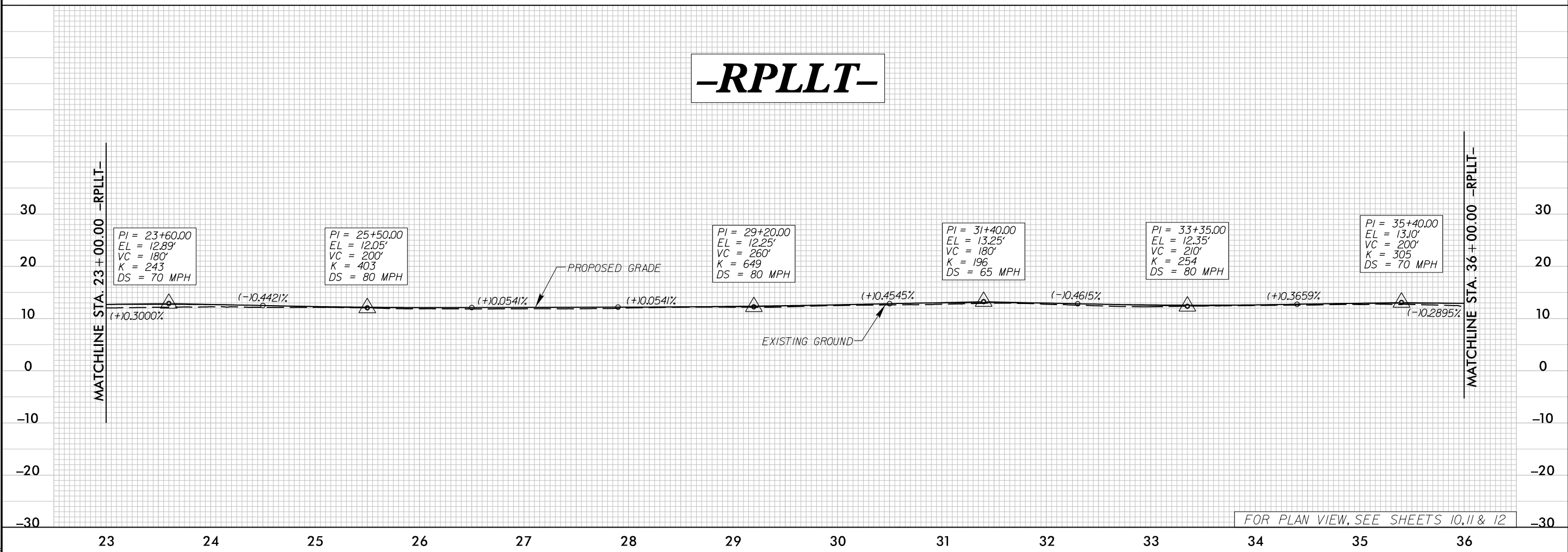
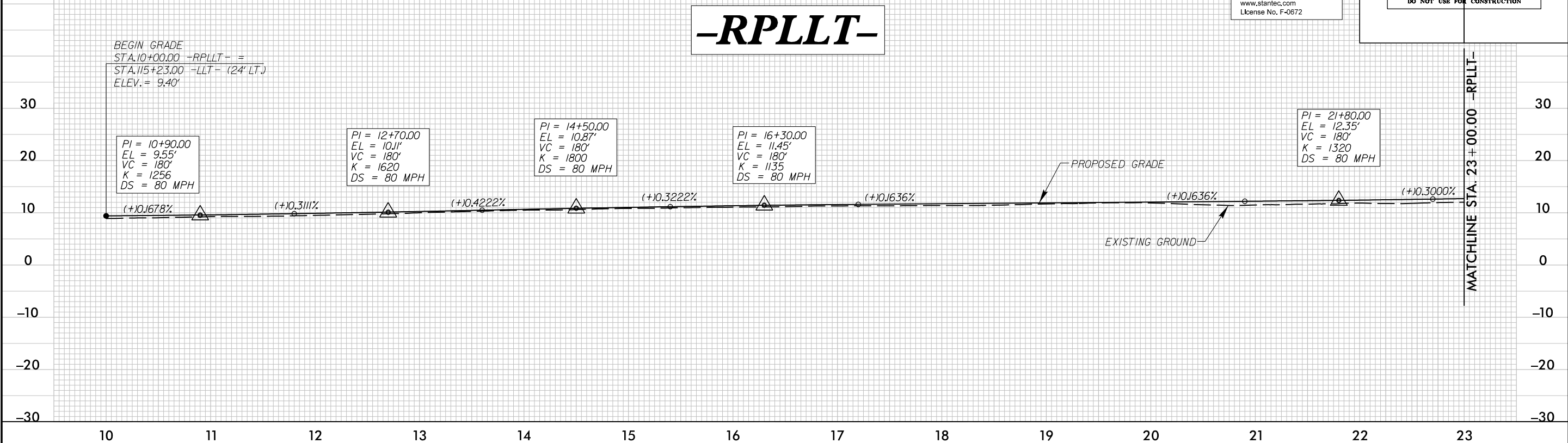


NOTE: -RPDY- STA.10+00.00 TO -RPDY- STA.19+24.60 TO BE CONSTRUCTED BASED ON -LMED- GRADE.

-RPDY-



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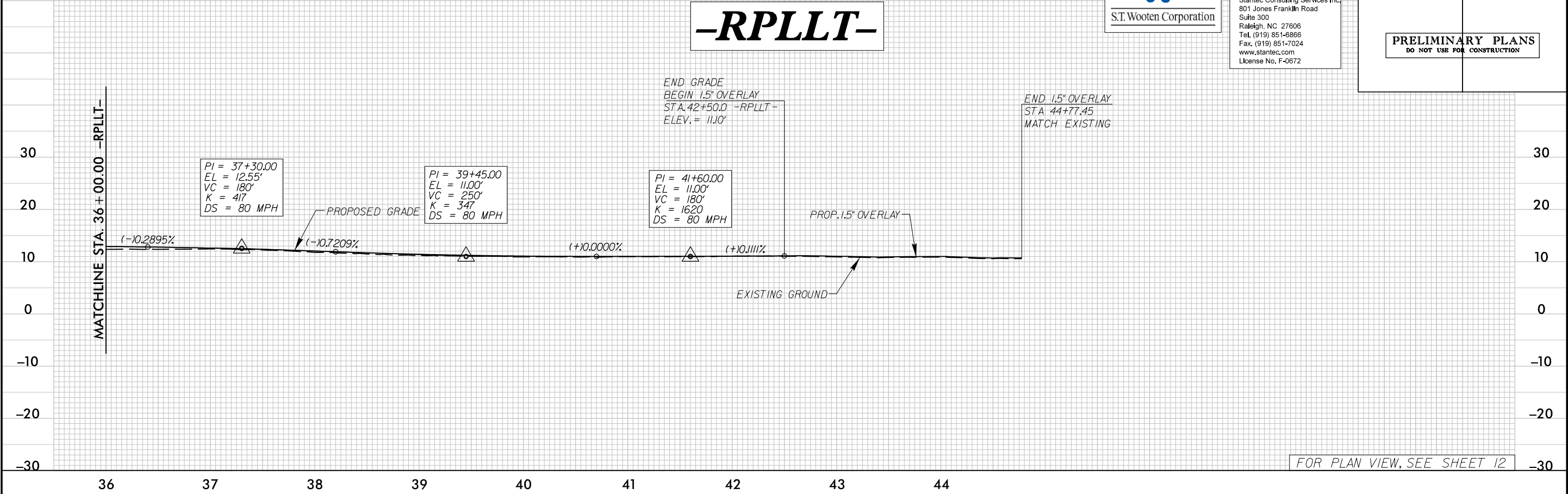


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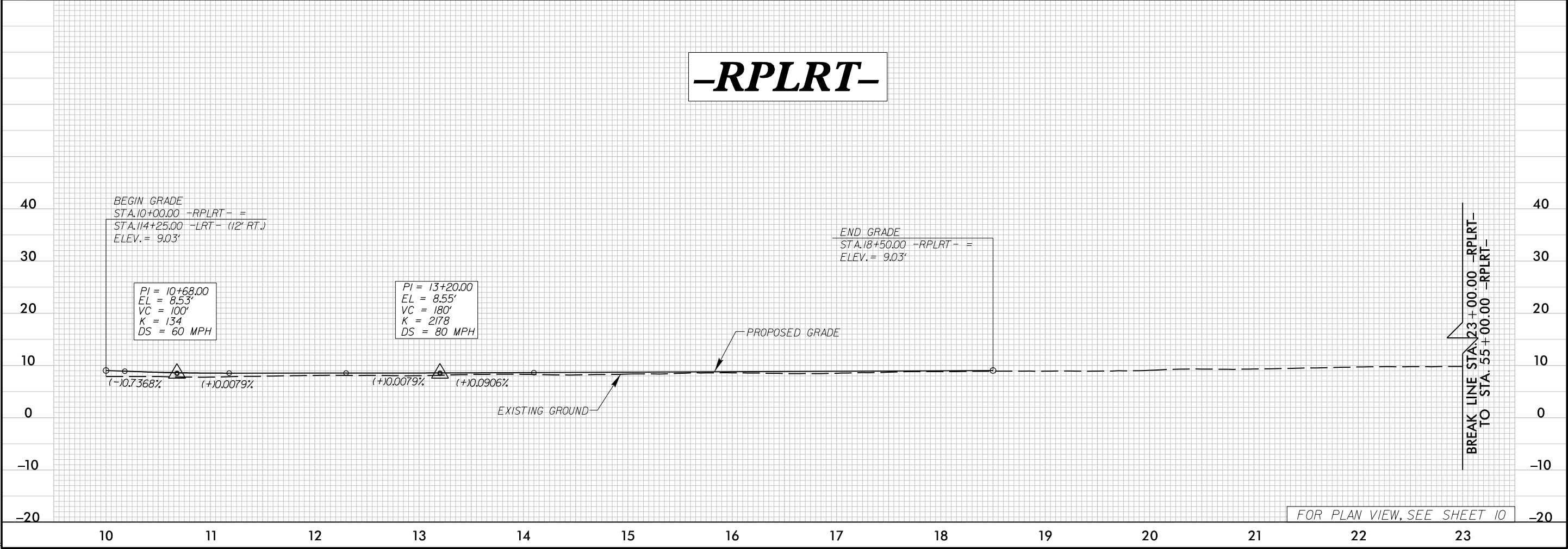


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PROJECT REFERENCE NO.		SHEET NO.
R-3601		27
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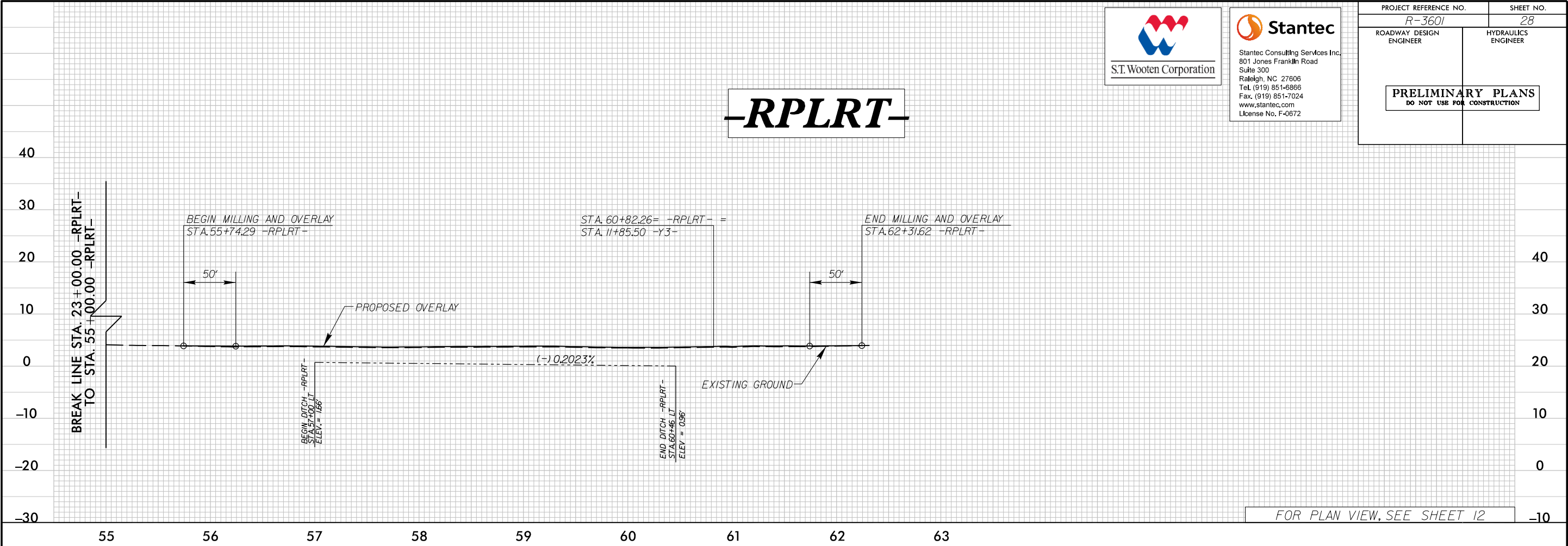


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PROJECT REFERENCE NO.		SHEET NO.
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