STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

February 24, 2017

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

ATTN: Mr. Steve Kichefski
NCDOT Coordinator

Subject: **Application for Section 404 Regional General Permit No. 198200031, and 401 Water Quality Certification** for the proposed widening of NC 16 from SR 1801 (Claremont Road) to SR 1895 (Tower Road) in Catawba County, Federal Aid Project No. STP-0016(53), Division 12, TIP No. R-3100 A & B, Debit $570 from WBS 34522.1.4. Reference Corps ID: SAW-2009-0902

Reference: Individual Permit Application dated October 12, 2016
Request to Rescind Individual 404 and 401 Water Quality Certification, dated December 8, 2016.

Dear Sir:

Pursuant to informal guidance and conversations regarding the project impact(s) and permit applicability, NCDOT rescinded the request for an Individual 404 and 401 Permit Application on December 8, 2016, and provides the following application for a Regional General Permit No. 198200031 (GP31).

The information from the October 12, 2016 Individual Permit, pertinent to a GP 31 has been re-provided below for purposes of a stand-alone permit application.

The North Carolina Department of Transportation (NCDOT) proposes to widen NC 16 from the current 4 lane section east of Conover at 1801 (Claremont Road) to the current 4 lane section west of Denver near SR 1895 (Tower Road) Catawba County. The project is approximately 8.2 miles in length.

The project has been divided into A and B sections for design purposes, but was recently combined into one project for bid and construction purposes. Previously dividing the project resulted in separate roadway and hydraulic design files for each section.

Please see the enclosed PCN, Division of Mitigation Services (DMS) mitigation acceptance letters, permit drawing review minutes (4B and 4C), State Stormwater Management Plan (SMP), permit drawings, and design plans for the above referenced project.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
NATURAL ENVIRONMENT SECTION
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

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

Location:
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

MERGER INFORMATION

In compliance with the NEPA/404 Merger Process, the following Concurrence Points were reached for this project:

R-3100 A:	4B: June 19, 2013	4C: March 19, 2014.
R-3100 B:	4B: June 19, 2013	4C: July 22, 2015.

PROJECT SCHEDULE

The project is currently scheduled to let to construction on April 18, 2017, with a review date of February 28, 2017.

RESOURCE STATUS

303(d) Impaired Waters:
Maiden Creek is currently listed on the North Carolina 2014 Final 303(d) list of impaired waters for having impaired ecological/biological integrity for benthos.

IMPACTS TO WATERS OF THE U.S.

Tables 1 and 2 summarize the impacts to jurisdictional water resources for R-3100. Site numbers correspond with the permit (hydraulic) drawings included in this application. The stream and wetland numbers correspond to the NRTR. A brief description of each impact site will follow the tables.

As previously mentioned, project R-3100 was divided for design purposes, and was just recently merged as one project.

As the project is viewed from west to east (left to right) the B section is the western (left) section, and the A section is the eastern (right) section. Therefore, the impacts below are described in order from Section B to A. Otherwise, R-3100A Site 1 would begin in the middle of the project.

R-3100 B			→			R-3100 A
Site 1	→	Site 7	|	Site 1	→	Site 10

Table 1 – R-3100 Wetland Impacts*

Site	Wetland Number	Wetland Size (ac)	Permanent Fill in Wetlands (ac)	Excavation (ac)	Mechanized Clearing (ac)	Impacts Requiring Mitigation (ac)
R-3100 B – No wetland impacts						
R-3100 A - Site 6	W4	0.06**	0.06	--	--	0.06
R-3100 A - Site 7	W5	0.10**	0.10	--	--	0.10
R-3100 A - Site 8	W6	0.04**	--	0.02	0.02	0.04
		Total Impacts	**0.16**	**0.02**	**0.02**	**0.20**

*** All wetlands impacted are riparian ** Total take of wetland**

Table 2 – R-3100 Stream Impacts.

Permit Site	Stream Name/ NRTR ID	Status/ Class	Permanent		Temporary Channel Impacts (ac/lf)	ACOE Required Mitigation (lf)	DWR Required Mitigation (lf)
			Channel Impacts (lf/ac)	Bank Stabilization (lf/ac)			
R-3100 B Site 1	UT to Smyre Creek S3a & S3b	Perennial C	99 (0.01)	48 (<0.01)	<0.01 (55)	99	0
R-3100 B Site 2	UT to Smyre Creek S2a, S4a, S4b	Perennial C	465 (0.05)	39 (<0.01)	0.01 (43)	465	504
R-3100 B Site 2A	UT to Smyre Creek S5c	Perennial C	177 (0.02)	--	<0.01 (33)	177	177
R-3100 B Site 3 (west)	UT to Smyre Creek S6c	Perennial C	--	22 (<0.01)	<0.01 (27)	0	0
R-3100 B Site 3 (central)	UT to Smyre Creek S6b	Perennial C	55 (<0.01)	33 (<0.01)	<0.01 (16)	55	0
R-3100 B Site 3 (east)	UT to Smyre Creek S6a	Perennial C	--	17 (<0.01)	<0.01 (45)	0	0
R-3100 B Site 4	UT to Maiden Creek S9a, S9b, S9c	Perennial WS-II, HQW	172 (0.01)	20 (<0.01)	<0.01 (43)	172	192
R-3100 B Site 5	UT to Maiden Creek S10a, S10b	Perennial WS-II, HQW	92 (<0.01)	66 (<0.01)	<0.01 (16)	92	158
R-3100 B Site 6	UT to Smyre Creek S6a	Perennial C	--	40 (<0.01)	<0.01 (14)	0	0
R-3100 B Site 7	UT to Smyre Creek S6e	Perennial C	--	84 (0.01)	<0.01 (19)	0	0
Total Stream Impacts for R-3100 B:			**1,060**	**369**	**0.03 (311)**	**1,060**	**1,031**
			1,429				
R-3100 A Site 1	Bee Branch S12 A	Perennial WS-II, HQW	163 (0.02)	77	<0.01 (51)	163	240
HUC Line ↑ 03050102 ↓ 03050101							
R-3100 A Site 2	UT South Fork Creek S13	Perennial WS-IV	74 (0.04)	82	0.01 (38)	74	156
R-3100 A Site 3	UT South Fork Creek S14	Perennial WS-IV	76 (0.03)	104	<0.01 (24)	76	180
R-3100 A Site 4	UT South Fork Creek S20	Intermittent WS-IV	35 (<0.01)	10	<0.01 (20)	35	0
R-3100 A Site 5	UT South Fork Creek S21A	Intermittent WS-IV	43 (0.01)	6	<0.01 (20)	43	0
R-3100 A Sites 6-7	*Wetland Impacts Only*		--	--	--	--	--
R-3100 A Site 8	UT South Fork Creek S22	Intermittent WS-IV	42 (<0.01)	--	--	42	0
R-3100 A Site 9	UT South Fork Creek S24 A&B	Perennial WS-IV	220 (0.04)	25	<0.01 (51)	220	245
R-3100 A Site 10	UT South Fork Creek Not in NRTR	Perennial WS-IV	--	--	<0.01 (22)	0	0
Total Stream Impacts for R-3100 A:			**653**	**304**	**0.06 (226)**	**653**	**821**
			957				
Total Stream Impacts for R-3100:			**1,713**	**673**	**0.09 (537)**	**1,713**	**1,852**
			2,386				

R-3100 B Permit Site 1: The wider roadway slopes will require the removal of the existing 6' x 6' box culvert, and replacement with a 6' x 7' culvert.
This replacement will result in 99 linear feet (0.01 acre) of permanent stream impact, and
48 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and
55 linear feet (<0.01 acre) of temporary stream impact.

R-3100 B Permit Site 2: The wider roadway slopes will require the removal of the existing 6' x 6' box culvert, and replacement with a 10' x 10' culvert with 3' alternating baffles. It will also result in the relocation of a parallel stream to NC 16.
The culvert replacement will result in 52 linear feet (<0.01 acre) of permanent stream impact,
39 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and
11 linear feet (<0.01 acre) of temporary stream impact.

The channel re-alignment will result in 413 linear feet (0.05 acre) of permanent stream impact, and
32 linear feet (<0.01 acre) of temporary impact.

Avoidance: A 300' retaining wall will be installed on the south side of the road to avoid permanent loss of water impact to the stream. This was added pursuant to agency discussion at both the 4B and 4C meetings to keep jurisdictional resource impacts limited to one side of the road.

Minimization: The culvert will contain 3' alternating baffles to maintain the "natural" stream width of 7' through the culvert.

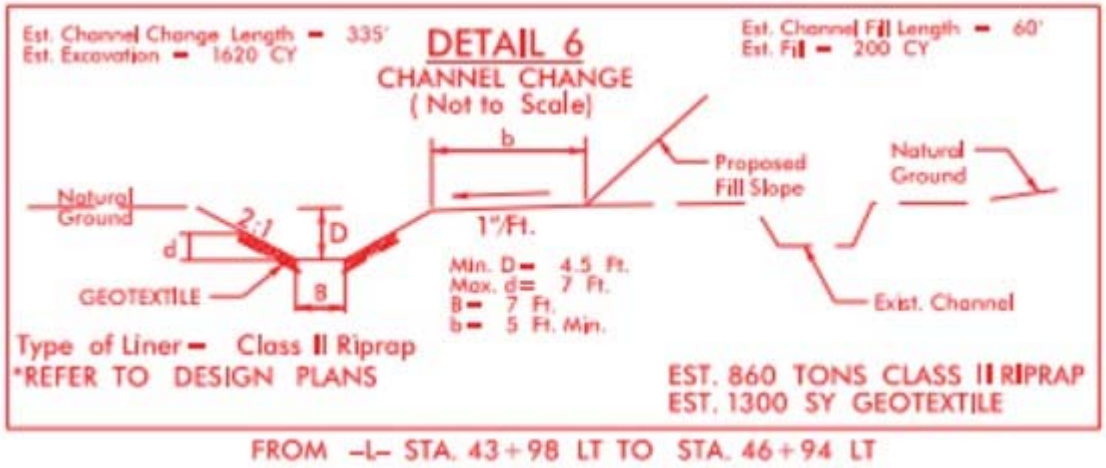
Site 2A was created to separate the impacts with an adjoining tributary for permitting purposes. It was evaluated in the 4B and 4C Concurrence Meetings with Site 2.
The confluence of this tributary with Site 2 will result in
177 linear feet (0.02 acre) of permanent stream impact, and
33 linear feet (<0.01 acre) of temporary stream impact.

Additional Information pursuant to Regional General Permit No. 198200031, Section r, which states:
r. Stream relocation(s) associated with projects may be authorized under this RGP. As stated above, mitigation will be required for all relocation projects. If the stream relocation is conducted in accordance with the requirements stated below in 1-5, the relocated segment of stream may be considered toward reducing the amount of compensatory mitigation required. A relocation plan must be submitted with the PCN that addresses all factors required within the current Wilmington District, Corps of Engineers Stream Mitigation Guidelines, which can include, but may not be limited to:*

(1) The relocated stream has pattern, profile, and dimension based on natural channel design. If natural channel design construction is not possible due to site constraints, the relocated stream must have pattern, profile, and dimension similar to, or better than, the existing stream. Note that site constraints do not include those situations where NCDOT chooses not to acquire additional adjacent property that is available for purchase.

The current stream dimension is an incised system with approximately 5' bank height, and bed width ranging from 3-7 feet. The banks of the system are steep with Kudzu as the dominant vegetation.

In the revised stream profile, the banks will be placed at a 2:1 slope. The bed width will remain approximately the same, and the bank vegetation will be planted as noted in the planting plan described in later sections. For stabilization purposes, riprap on geotextile fabric will line the banks.



(2) The new stream meets the current buffer requirements as stated in current District stream mitigation guidance. If the required buffer widths cannot be obtained, a project by-project decision will be completed to determine if additional compensatory mitigation is required.

Site 2: Stream buffer enhancements/ improvements:
Roadside Environmental treated this as a full stream restoration, and applied the planting plan as if that was the case. This will provide the system a buffer, which currently does not exist (or exists in the form of Kudzu).
Note that Roadside Environmental has placed plantings inside the 25' sewer easement. Those plantings are subject to the maintenance of the buffer, and may be mowed periodically, outside of NCDOT control.

Stormwater
Currently, stormwater runs off of the roadway untreated into the stream area.
Stormwater in the new study area will be captured and discharged on the opposite side of the roadway (and downstream) into a pre-formed scour hole. Therefore, the relocated system will not receive roadway stormwater.

(3) The new location allows the relocated stream to remain stable (e.g., in a 6 valley vs. on a slope, no bends that will impact stability, etc.).

There at two main bends in the relocated stream system. The first is in the transition from the current to the new channel. The current profile (as noted above) includes Class II Riprap to ensure stability.
The second bend is located at the culvert entrance. This area will also contain Class II Riprap to the transition to the new culvert for stability.

(4) There is no loss of channel for any reason (e.g., old channel is 200' and new channel is 150' =50' channel loss; part of the new channel is put in a culvert; the new channel (sides and bottom) is hardened with concrete, rip rap, etc.).

Measurements:
The existing channel at Site 2 is 413 linear feet.
The future, shifted channel at Site 2 will be 335 linear feet.

(5) The Corps will determine if monitoring and reporting will be required for a specific project and the parameters of any required monitoring and reporting. If monitoring is required, a monitoring plan must be included with the PCN and meet current requirements.

NCDOT does not propose monitoring for stream relocation at Site 2.

R-3100 B Permit Site 3: Site 3 has three impacts.
The first (most westerly) is bank stabilization to attenuate stormwater/ prevent stream bank erosion to the receiving stream from stormwater drainage. This impact will result in
22 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and
27 linear feet (<0.01 acre) of temporary stream impact.

The second (center, intersecting road crossing) is the replacement of a 48" corrugated metal pipe, with a 54" reinforced concrete pipe to accommodate for a grade change and intersection tie-in to NC 16.

Pursuant to agency concerns at the November 1, 2016 field review of the drop structures at Sites 3 and 4, the sites were re-designed using alternate energy dissipation methods. This impact will result in:

Revised Design with Splash Pool	***Previous Design with drop structure***
55 linear feet (<0.01 acre) of permanent stream impact, 33 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and 16 linear feet (<0.01 acre) of temporary steam impact.	*66 linear feet (<0.01 acre) of permanent stream impact,* *10 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and* *16 linear feet (<0.01 acre) of temporary steam impact.* *NCDOT requests a burial exemption for this 54" RCP structure.*

The third (most eastern) is bank stabilization to attenuate stormwater/ prevent stream bank erosion to the receiving stream from stormwater drainage. This impact will result in
17 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and
45 linear feet (<0.01 acre) of temporary stream impact.

R-3100 B Permit Site 4:

The wider roadway slopes will require the removal of the existing 5' x 5' box culvert, and replacement with a 60" reinforced concrete pipe.

Site history:
At the 4C meeting, there was a request to use a corrugated pipe in anticipation the corrugation may prevent water acceleration in the pipe.

Even after designing the corrugated pipe, there were still stream velocity/ scour concerns. The Division also expressed long term maintenance concerns with a 60"corrugated steel pipe. (Corrugated steel pipes tend to rust out over time and replacement under a major highway becomes problematic in the future.)

To ensure long-term stability of the stream, and considering the current structure does not allow for aquatic passage, a drop box was added to the pipe structure (similar to Site 3).

However, pursuant to agency concerns at the November 1, 2016 field review of the drop structures at Sites 3 and 4, the sites were re-designed using alternate energy dissipation methods. This impact will result in:

Revised Design with Splash Pool	***Previous Design with drop structure***
172 linear feet (0.01 acre) of permanent stream impact, 20 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and 43 linear feet (<0.01 acre) of temporary stream impact.	*172 linear feet (0.01 acre) of permanent stream impact,* *10 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and* *43 linear feet (<0.01 acre) of temporary stream impact.*

R-3100 B Permit Site 5: The wider roadway slopes will require the removal of the existing 7' x 6' box culvert, and replacement with a 7' x 8' box culvert. This impact will result in
92 linear feet (0.02 acre) of permanent stream impact,
66 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and
16 linear feet (<0.01 acre) of temporary stream impact.

R-3100 B Permit Site 6: Increased stormwater flow and concerns that increased erosive velocities could result in erosion to the receiving stream resulted in the addition of Site 6 between Concurrence Point 4B and 4C.

At the Concurrence Point 4C meeting, agencies agreed the stream impacts were warranted, but encouraged a re-evaluation of the drainage ditch.

Instead of a continuous rip-rap lined ditch to the stream, the ditch gradient was reduced, and a 30" corrugated steel pipe was added to carry the stream down the steepest reach of the system. The pipe will outlet into a rip rap lined pad to attenuate velocity. This riprap will continue to the streambank and result in
40 linear feet (<0.01 acre) of permanent stream impact by way of bank stabilization, and
14 linear feet (<0.01 acre) of temporary stream impact.

R-3100 B Permit Site 7: Site 7 was added after the Concurrence Point 4C meeting resulting from concerns the 300 foot retaining wall, added to avoid/minimize impacts to UT to Smyre Creek, may require protection from erosion during high flow events. This riprap protection will result in
84 linear feet (0.01 acre) of permanent stream impact by way of bank stabilization, and
19 linear feet (<0.01 acre) of temporary stream impact.

R-3100 A:

R-3100 A Permit Site 1: The wider roadway slopes will require the removal of the existing 7' x 7' box culvert, and replacement with a 7' x 8' culvert.
This replacement will result in 163 linear feet (0.02 acre) of permanent stream impact,
77 linear feet of permanent stream impact by way of bank stabilization, and
51 linear feet (<0.01 acre) of temporary stream impact.

Minimization: The existing 7' x 7' box culvert is perched. The new structure will be buried 1' and will reestablish the potential for aquatic passage.

R-3100 A Permit Site 2: The wider roadway slopes will require the removal of the existing double barrel 9' x 8' box culvert, and replacement with a double barrel 9' x 9' culvert.
This replacement will result in 74 linear feet (0.04 acre) of permanent stream impact,
82 linear feet of permanent stream impact by way of bank stabilization, and
38 linear feet of (0.01 acre) temporary stream impact.

Minimization: The culvert will have a floodplain bench and high sill to direct low flows to one barrel to maintain continuity of stream width through the culvert to prevent over-widening and to allow for aquatic passage.

Minimization: The existing 9' x 8' box culvert is perched. The new structure will be buried 1' and will reestablish the potential for aquatic passage.

R-3100 A Permit Site 3: The wider roadway slopes will require the removal of the existing double barrel 9' x 8' box culvert, and replacement with a double barrel 9' x 9' culvert.
This replacement will result in 76 linear feet (0.03 acre) of permanent stream impact,
104 linear feet of permanent stream impact by way of bank stabilization, and
24 linear feet (<0.01 acre) of temporary stream impact.

Minimization: The culvert will have a floodplain bench and high sill to direct low flows to one barrel to maintain continuity of stream width through the culvert to prevent over-widening and to allow for aquatic passage.

R-3100 A Permit Site 4: The wider roadway slopes will require the removal of the existing 30" corrugated metal pipe, and replacement with a 30" reinforced concrete pipe. Jurisdiction of the intermittent stream (UT to S. Fork Creek) begins at the outlet of the existing 30" pipe.
This replacement will result in 35 linear feet (<0.01 acre) of permanent stream impact,
10 linear feet of permanent stream impact by way of bank stabilization, and
20 linear feet (<0.01 acre) of temporary stream impact.

R-3100 A Permit Site 5: The wider roadway slopes will require the removal of the existing 18" reinforced concrete pipe, and replacement with a longer 18" reinforced concrete pipe. Jurisdiction of the intermittent stream (UT to S. Fork Creek) begins at the outlet of the existing 18" pipe.
This replacement will result in 43 linear feet (0.01 acre) of permanent stream impact,
6 linear feet of permanent stream impact by way of bank stabilization, and
20 linear feet (<0.01 acre) of temporary stream impact.

R-3100 A Permit Site 6: The wider roadway slopes and drainage features will impact (by way of fill) Wetland W4. This impact will result in permanent fill to 0.06 acre of wetland (the entire wetland).

R-3100 A Permit Site 7: The wider roadway slopes will impact (by way of fill) Wetland W5. This impact will result in permanent fill to 0.10 acre of wetland (the entire wetland).

R-3100 A Permit Site 8: The wider roadway slopes and drainage features will impact (by way of fill) Wetland W6. This impact will result in permanent excavation and mechanized clearing of 0.04 acre of wetland (the entire wetland).
A stream that exits this wetland will also be impacted. This impact will result in 42 linear feet (<0.01 acre) of permanent stream impact.

R-3100 A Permit Site 9: The wider roadway slopes will require the removal of the existing 7' x 7' box culvert, and replacement with a 7' x 8' box culvert.
This replacement will result in 220 linear feet (0.04 acre) of permanent stream impact,
25 linear feet of permanent stream impact by way of bank stabilization, and
51 linear feet (<0.01 acre) of temporary stream impact.

Minimization: Sills will be placed at the entrance, exit, and every 50 feet to help attenuate stream flow in the culvert.

R-3100 A Permit Site 10: The wider roadway fill and new stormwater drainage system will result in the removal of the existing 24" reinforced concrete pipe, and replacement with a 42" concrete pipe.
This will result in 22 feet (<0.01 acre) of temporary stream impact.

MITIGATION OPTIONS

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning and NEPA compliance stages; minimization measures were incorporated as part of the project design.

Avoidance and Minimization:
NCDOT has avoided impacting many wetlands and streams and reduced impacts to wetlands and streams to the greatest extent practicable. Wetland impacts have been kept to a minimum by avoiding ditching and channelization through wetlands. Existing drainage patterns to the wetlands have been kept to maintain the hydrology feeding the wetlands. Other specific examples of avoidance and minimization measures include:

- NCDOT avoided impacts to S1 a and b and W1 (reference S1 in NRTR, Figure 3a).

- NCDOT avoided impacts to S13 a and b by widening to the north at this location (reference S13 in NRTR, Figure 3i).

- Drainage system outlets utilize energy dissipation devices such as pre-formed scour holes and rip rap pads as well as grassed channels and swales.

- The project crosses Bee Branch and several ditches outlet to swales located in the Bee Branch drainage, which has a classification of WS-II, HQW. Grass swales meeting DWR criteria to maximum extent practicable are proposed on the three quadrants that drain directly into the Bee Branch crossing to treat roadway drainage. Other ditches within the Bee Branch drainage area have been designed with 3:1 side slopes to the maximum extent practicable and longitudinal slopes a flat as practicable. In addition, preformed scour holes have been used at cross pipe outlets to provide diffuse flow in overland areas.

- The project area located within the South Fork Mountain Creek drainage area has a classification of WS-IV. Grass swales meeting DWR criteria to the maximum extent practicable have been designed at all points of discharge into the streams as identified in the NRTR. In addition, preformed scour holes have been used at cross pipe outlets to provide diffuse flow in overland areas. Further, two rip-rap energy dissipator basins have been designed to provide diffuse flow in one overland area and reduce flows to non-erosive velocities in another.

Site Specific Avoidance and Minimization Measures (May be repeated from Impact Descriptions):

- **R-3100 B Permit Site 2: Avoidance:** A 300' retaining wall will be installed on the south side of the road to avoid permanent loss of water impacts to the stream. This was added pursuant to agency discussion at both the 4B and 4C meetings to keep jurisdictional resource impacts limited to one side of the road.
  Minimization: The culvert will contain 3' alternating baffles to maintain the "natural" stream with of 7' through the culvert.

- **R-3100 A Permit Site 1: Minimization**: The existing 7' x 7' box culvert is perched. The new structure will be buried 1' and will reestablish the potential for aquatic passage.

- **R-3100 A Permit Site 2: Minimization**: The culvert will have a floodplain bench and high sill to direct low flows to one barrel to continue continuity of stream width through the culvert to prevent over-widening and to allow for aquatic passage.

Minimization: The existing 9' x 8' box culvert is perched. The new structure will be buried 1' and will reestablish the potential for aquatic passage.

- **R-3100 A Permit Site 3:** **Minimization**: The culvert will have a floodplain bench and high sill to direct low flows to one barrel to continue continuity of stream width through the culvert to prevent over-widening and to allow for aquatic passage.

- **R-3100 A Permit Site 9:** **Minimization**: Sills will be placed at the entrance, exit, and every 50 feet to help attenuate stream flow in the culvert.

Compensation:
The NCDOT has avoided and minimized impacts to jurisdictional resources to the greatest extent practicable as described above. Tables 1 and 2 summarize the wetland and stream impacts for each section, and Table 4 below summarizes the mitigation requirements for the project.

Table 4 – R-3100 Mitigation Summary

HUC	Project Section	ACOE Required Mitigation (lf)	DWR Required Mitigation (lf)	Wetland Mitigation (ac)
03050102	R-3100 B (All Sites) R-3100 A Site 1 Only	1,223	1,271	--
03050101	R-3100 A Sites 2-10	490	581	0.20
R-3100 Total Mitigation Liability:		**1,713**	**1,852**	**0.20**

REGULATORY APPROVALS

Section 404: Application is hereby made for a Regional General Permit No. 198200031 as required for the above-described activities.

Section 401: We are hereby requesting a 401 Water Quality Certification from the N. C. Division of Water Resources. In compliance with Section 143 215.3D(e) of the NCAC, we will provide $570.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line).

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Michael Turchy at maturchy@ncdot.gov or (919) 707-6157. A copy of this application and distribution list will also be posted on the NCDOT website at:
http://connect.ncdot.gov/resources/Environmental/Pages.

Sincerely,

for Philip S. Harris III, P.E., C.P.M.
Natural Environment Section Head

cc: NCDOT Permit Application Standard Distribution List

Office Use Only:
Corps action ID no. _____
DWQ project no. _____
Form Version 1.3 Dec 10 2008

Pre-Construction Notification (PCN) Form

A. Applicant Information

1. Processing

1a. Type(s) of approval sought from the Corps:	☒ **Section 404 Permit**	☐ Section 10 Permit
1b. Specify Nationwide Permit (NWP) number:	or General Permit (GP) number: **31**	
1c. Has the NWP or GP number been verified by the Corps?	☒ **Yes**	☐ No
1d. Type(s) of approval sought from the DWQ (check all that apply):	☒ 401 Water Quality Certification – Regular ☐ 401 Water Quality Certification – Express	☐ Non-404 Jurisdictional General Permit ☐ Riparian Buffer Authorization
1e. Is this notification solely for the record because written approval is not required?	For the record only for DWQ 401 Certification: ☐ Yes ☒ **No**	For the record only for Corps Permit: ☐ Yes ☒ **No**
1f. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts? If so, attach the acceptance letter from mitigation bank or in-lieu fee program.	☒ **Yes**	☐ No
1g. Is the project located in any of NC's twenty coastal counties. If yes, answer 1h below.	☐ Yes	☒ **No**
1h. Is the project located within a NC DCM Area of Environmental Concern (AEC)?	☐ Yes	☒ **No**

2. Project Information

2a. Name of project:	**Widening of NC 16 from the current 4 lane sections at SR 1801 (Clarement Rd) to SR 1895 (Tower Rd).**
2b. County:	**Catawba**
2c. Nearest municipality / town:	**Newton**
2d. Subdivision name:	*not applicable*
2e. NCDOT only, T.I.P. or state project no:	**R-3100 A & B**

3. Owner Information

3a. Name(s) on Recorded Deed:	**North Carolina Department of Transportation**
3b. Deed Book and Page No.	*not applicable*
3c. Responsible Party (for LLC if applicable):	*not applicable*
3d. Street address:	**1598 Mail Service Center**
3e. City, state, zip:	**Raleigh, NC 27699-1598**
3f. Telephone no.:	**(919) 707-6157**
3g. Fax no.:	**(919) 212-5785**
3h. Email address:	**maturchy@ncdot.gov**

4. Applicant Information (if different from owner)	
4a. Applicant is:	☐ Agent ☐ Other, specify:
4b. Name:	*not applicable*
4c. Business name (if applicable):	
4d. Street address:	
4e. City, state, zip:	
4f. Telephone no.:	
4g. Fax no.:	
4h. Email address:	
5. Agent/Consultant Information (if applicable)	
5a. Name:	*not applicable*
5b. Business name (if applicable):	
5c. Street address:	
5d. City, state, zip:	
5e. Telephone no.:	
5f. Fax no.:	
5g. Email address:	

B. Project Information and Prior Project History	
1. Property Identification	
1a. Property identification no. (tax PIN or parcel ID):	*not applicable*
1b. Site coordinates (in decimal degrees):	Latitude: (DD.DDDDDD) **35.618385** Longitude: (-DD.DDDDDD) **-81.133195**
1c. Property size:	
2. Surface Waters	
2a. Name of nearest body of water (stream, river, etc.) to proposed project:	**Smyre Creek, Bee Branch, Maiden Creek and South Fork Creek**
2b. Water Quality Classification of nearest receiving water:	**See Cover Letter, Table 2 for Classifications of each resource.**
2c. River basin:	**Catawba**
3. Project Description	
3a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: **The land use within the vicinity of the project consists of about 50% developed or disturbed lands (roadsides and residential areas), and 50% forested land).**	
3b. List the total estimated acreage of all existing wetlands on the property: **0.6 acre**	
3c. List the total estimated linear feet of all existing streams (intermittent and perennial) on the property: **11,954**	
3d. Explain the purpose of the proposed project: **The purpose of the project is to upgrade the existing roadway to a multi-lane facility to improve traffic flow, increase safety, and reduce travel times and provide more efficient vehicle operations. NC 16 is a major north-south route in the western piedmont of North Carolina. This portion of NC 16 serves as a radial route between Charlotte and Newton. NC 16 is also heavily used to access Interstate 40.** **Existing NC 16 is operating at Level of Service D from north of Tower Road (SR 1895) to Caleb Setzer Road (SR 1800), and Level of Service C for the remaining portion of the project. The proposed improvements to NC 16 will improve the level of traffic service to Level of Service B from north of Tower Road to Bethany Church Road, and Level of Service C or better for the remainder of the project.**	
3e. Describe the overall project in detail, including the type of equipment to be used: **The North Carolina Department of Transportation (NCDOT) proposes to widen NC 16 from the current 4 lane section east of Conover at SR 1801 (Claremont Rd) to the current 4 lane section west Denver near SR 1895 (Tower Road) Catawba County. The project is approximately 8.2 miles in length. Standard road building equipment, including dozers, cranes, grading equipment, hauling and paving equipment will be used.**	
4. Jurisdictional Determinations	
4a. Have jurisdictional wetland or stream determinations by the Corps or State been requested or obtained for this property / project (including all prior phases) in the past? Comments:	☒ **Yes** ☐ No ☐ Unknown
4b. If the Corps made the jurisdictional determination, what type of determination was made?	☐ Preliminary ☒ **Final**
4c. If yes, who delineated the jurisdictional areas? Name (if known):	Agency/Consultant Company: Other: **ESI**
4d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation. **March 10, 2009**	

5. Project History	
5a. Have permits or certifications been **requested** or obtained for this project (including all prior phases) in the past?	☒ **Yes** ☐ No ☐ Unknown
5b. If yes, explain in detail according to "help file" instructions.	**Individual Application, 10/12/16, Rescinded 12/8/16.**
6. Future Project Plans	
6a. Is this a phased project?	☐ Yes ☒ **No**
6b. If yes, explain.	

C. Proposed Impacts Inventory

1. Impacts Summary

1a. Which sections were completed below for your project (check all that apply):

☒ **Wetlands** ☒ **Streams - tributaries** ☐ Buffers

☐ Open Waters ☐ Pond Construction

2. Wetland Impacts

If there are wetland impacts proposed on the site, then complete this question for each wetland area impacted.

2a. Wetland impact number – Permanent (P) or Temporary (T)	2b. Type of impact	2c. Type of wetland (if known)	2d. Forested	2e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	2f. Area of impact (acres)
See Table 1 in Cover Letter			☐ Yes ☐ No	☐ Corps ☐ DWQ	
				2g. **Total wetland impacts**	

2h. Comments:

3. Stream Impacts

If there are perennial or intermittent stream impacts (including temporary impacts) proposed on the site, then complete this question for all stream sites impacted.

3a. Stream impact number - Permanent (P) or Temporary (T)	3b. Type of impact	3c. Stream name	3d. Perennial (PER) or intermittent (INT)?	3e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	3f. Average stream width (feet)	3g. Impact length (linear feet)
See Table 2 in Cover Letter			☐ PER ☐ INT	☐ Corps ☐ DWQ		
					3h. **Total stream and tributary impacts**	

3i. Comments:

4. Open Water Impacts

If there are proposed impacts to lakes, ponds, estuaries, tributaries, sounds, the Atlantic Ocean, or any other open water of the U.S. then individually list all open water impacts below.

4a. Open water impact number – Permanent (P) or Temporary (T)	4b. Name of waterbody (if applicable)	4c. Type of impact	4d. Waterbody type	4e. Area of impact (acres)
O1 ☐ P ☐ T				
O2 ☐ P ☐ T				
O3 ☐ P ☐ T				
O4 ☐ P ☐ T				
			4f. Total open water impacts	0 Permanent 0 Temporary
4g. Comments:				

5. Pond or Lake Construction

If pond or lake construction proposed, then complete the chart below.

5a. Pond ID number	5b. Proposed use or purpose of pond	5c. Wetland Impacts (acres)			5d. Stream Impacts (feet)			5e. Upland (acres)
		Flooded	Filled	Excavated	Flooded	Filled	Exca vated	Flooded
P1								
P2								
	5f. Total							
5g. Comments:								

5h. Is a dam high hazard permit required?	☐ Yes ☐ No If yes, permit ID no:
5i. Expected pond surface area (acres):	
5j. Size of pond watershed (acres):	
5k. Method of construction:	

6. Buffer Impacts (for DWQ)

If project will impact a protected riparian buffer, then complete the chart below. If yes, then individually list all buffer impacts below. If any impacts require mitigation, then you **MUST** fill out Section D of this form.

6a. Project is in which protected basin?	☐ Neuse ☐ Tar-Pamlico ☐ Other: ☐ Catawba ☐ Randleman

6b. Buffer impact number – Permanent (P) or Temporary (T)	6c. Reason for impact	6d. Stream name	6e. Buffer mitigation required?	6f. Zone 1 impact (square feet)	6g. Zone 2 impact (square feet)
B1 ☐ P ☐ T			☐ Yes ☐ No		
			6h. **Total buffer impacts**		
6i. Comments: **This project is not located within a protected buffer area.**					

D. Impact Justification and Mitigation		
1. Avoidance and Minimization		
1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing project. **See Avoidance and Minimization Section in cover letter.**		
1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques. **See Avoidance and Minimization Section in cover letter.**		
2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State		
2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?	☒ **Yes** ☐ No If no, explain:	
2b. If yes, mitigation is required by (check all that apply):	☐ DWQ ☒ **Corps**	
2c. If yes, which mitigation option will be used for this project?	☐ Mitigation bank ☒ **Payment to in-lieu fee program** ☐ Permittee Responsible Mitigation	
3. Complete if Using a Mitigation Bank		
3a. Name of Mitigation Bank: not applicable		
3b. Credits Purchased (attach receipt and letter)	Type	Quantity
3c. Comments:		
4. Complete if Making a Payment to In-lieu Fee Program		
4a. Approval letter from in-lieu fee program is attached.	☒ **Yes**	
4b. Stream mitigation requested:	1,852 linear feet	
4c. If using stream mitigation, stream temperature:	☒ **warm** ☐ cool ☐cold	
4d. Buffer mitigation requested (DWQ only):	0 square feet	
4e. Riparian wetland mitigation requested:	0.20 acre	
4f. Non-riparian wetland mitigation requested:	0 acres	
4g. Coastal (tidal) wetland mitigation requested:	0 acres	
4h. Comments:		
Complete if Using a Permittee Responsible Mitigation Plan		
5a. If using a permittee responsible mitigation plan, provide a description of the proposed mitigation plan.		

6. Buffer Mitigation (State Regulated Riparian Buffer Rules) – required by DWQ				
6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation?				☐ Yes ☒ No
6b. If yes, then identify the square feet of impact to each zone of the riparian buffer that requires mitigation. Calculate the amount of mitigation required.				
Zone	6c. Reason for impact	6d. Total impact (square feet)	Multiplier	6e. Required mitigation (square feet)
Zone 1			3 (2 for Catawba)	
Zone 2			1.5	
	6f. **Total buffer mitigation required:**			
6g. If buffer mitigation is required, discuss what type of mitigation is proposed (e.g., payment to private mitigation bank, permittee responsible riparian buffer restoration, payment into an approved in-lieu fee fund).				
6h. Comments:				

E. Stormwater Management and Diffuse Flow Plan (required by DWQ)	
1. Diffuse Flow Plan	
1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?	☐ Yes ☒ **No**
1b. If yes, then is a diffuse flow plan included? If not, explain why. Comments: If required from 1a, see attached buffer permit drawings.	☐ Yes ☐ No
2. Stormwater Management Plan	
2a. What is the overall percent imperviousness of this project?	**N/A**
2b. Does this project require a Stormwater Management Plan?	☒ **Yes** ☐ No
2c. If this project DOES NOT require a Stormwater Management Plan, explain why:	
2d. If this project DOES require a Stormwater Management Plan, then provide a brief, narrative description of the plan: **See attached permit drawings.**	
2e. Who will be responsible for the review of the Stormwater Management Plan?	☐ Certified Local Government ☐ DWQ Stormwater Program ☒ **DWQ 401 Unit**
3. Certified Local Government Stormwater Review	
3a. In which local government's jurisdiction is this project?	**not applicable**
3b. Which of the following locally-implemented stormwater management programs apply (check all that apply):	☐ Phase II ☐ NSW ☐ USMP ☐ Water Supply Watershed ☐ Other:
3c. Has the approved Stormwater Management Plan with proof of approval been attached?	☐ Yes ☐ No
4. DWQ Stormwater Program Review	
4a. Which of the following state-implemented stormwater management programs apply (check all that apply):	☐ Coastal counties ☐ HQW ☐ ORW ☐ Session Law 2006-246 ☐ Other:
4b. Has the approved Stormwater Management Plan with proof of approval been attached?	☐ Yes ☐ No **N/A**
5. DWQ 401 Unit Stormwater Review	
5a. Does the Stormwater Management Plan meet the appropriate requirements?	☐ Yes ☐ No **N/A**
5b. Have all of the 401 Unit submittal requirements been met?	☐ Yes ☐ No **N/A**

F. Supplementary Information	
1. Environmental Documentation (DWQ Requirement)	
1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land?	☒ **Yes** ☐ No
1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)?	☒ **Yes** ☐ No
1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) Comments: **See attached cover letter.**	☒ **Yes** ☐ No
2. Violations (DWQ Requirement)	
2a. Is the site in violation of DWQ Wetland Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 2B .0200)?	☐ Yes ☒ **No**
2b. Is this an after-the-fact permit application?	☐ Yes ☒ **No**
2c. If you answered "yes" to one or both of the above questions, provide an explanation of the violation(s):	
3. Cumulative Impacts (DWQ Requirement)	
3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality?	☐ Yes ☒ **No**
3b. If you answered "yes" to the above, submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent DWQ policy. If you answered "no," provide a short narrative description. **Implementation of the proposed Build Alternative would not contribute, in conjunction with past, present, or future projects, to substantial adverse cumulative effects on resources in the study areas.** **See pages 45 & 46 of the Categorical Exclusion for the full Indirect and Cumulative Effect section.**	
4. Sewage Disposal (DWQ Requirement)	
4a. Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility. **not applicable**	

5. Endangered Species and Designated Critical Habitat (Corps Requirement)	
5a. Will this project occur in or near an area with federally protected species or habitat?	☒ **Yes** ☐ No
5b. Have you checked with the USFWS concerning Endangered Species Act impacts?	☒ **Yes** ☐ No
5c. If yes, indicate the USFWS Field Office you have contacted.	☐ Raleigh ☒ **Asheville**
5d. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat? **USFWS website:** **Schweinitz's sunflower- No Effect, habitat present, last survey: 10/22/2015** **Dwarf-flowered heartleaf – No Effect, habitat present, last survey: 4/4/2013** **Northern long-eared bat: NCDOT has determined that the proposed action does not require separate consultation on the grounds that the proposed action is consistent with the final Section 4(d) rule, codified at 50 C.F.R. § 17.40(o) and effective February 16, 2016. NCDOT may presume its determination is informed by best available information and consider Section 7 responsibilities fulfilled for NLEB.** **Per protocol, the 4(d) consistency determination was sent to the UFWS on 6/15/2016, with acknowledgement of receipt. No comments were received.**	
6. Essential Fish Habitat (Corps Requirement)	
6a. Will this project occur in or near an area designated as essential fish habitat?	☐ Yes ☒ **No**
6b. What data sources did you use to determine whether your site would impact Essential Fish Habitat? NMFS County Index	
7. Historic or Prehistoric Cultural Resources (Corps Requirement)	
7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)?	☐ Yes ☒ **No**
7b. What data sources did you use to determine whether your site would impact historic or archeological resources? **NEPA Documentation**	
8. Flood Zone Designation (Corps Requirement)	
8a. Will this project occur in a FEMA-designated 100-year floodplain?	☒ **Yes** ☐ No
8b. If yes, explain how project meets FEMA requirements: **NCDOT Hydraulics Unit coordination with FEMA**	
8c. What source(s) did you use to make the floodplain determination? **FEMA Maps**	

for Philip S. Harris, III, P.E. Applicant/Agent's Printed Name	Applicant/Agent's Signature (Agent's signature is valid only if an authorization letter from the applicant is provided.)	02-24-2017 Date

To Be Replaced with Revised Request (for 10' more (1,852) of stream impact).

Environmental Quality

PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

October 11, 2016

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

Dear Mr. Harris:

Subject: DMS Mitigation Acceptance Letter: **R-3100,** NC 16 from SR 1895 (Tower Road) to SR 1800 (Caleb Setzer Rd), Catawba County

The purpose of this letter is to notify you that the Division of Mitigation Services (DMS) will provide the stream and wetland mitigation for the subject project. Based on the information supplied by you on October 11, 2016, the stream and wetland impacts are located in CU 03050101 and 03050102 of the Catawba River basin in the Central Piedmont (CP) Eco-Region, and are as follows:

Stream & Wetlands	River Basin	CU Location	Eco-Region	Stream			Wetlands		
				Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh
Impacts	Catawba	03050101	CP	0	0	581.0	0.20	0	0
Impacts	Catawba	03050102	CP	0	0	1261.0	0	0	0

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

These impacts and associated mitigation needs were *not* projected by the NCDOT in the 2016 impact data. DMS will commit to implement sufficient compensatory stream and riparian wetland mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies using the delivery timeline listed in Section F.3.c.iii of the In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from DMS.

If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-707-8420.

Sincerely,

James B. Stanfill
DMS Credit Management Supervisor

Cc: Mr. Steve Kichefski, USACE – Asheville Regulatory Field Office
Ms. Amy Chapman, NC Division of Water Resources – Raleigh
File: R-3100

Subject: Meeting Minutes from 4B Preliminary Drainage Design Review held on June 19, 2013 for R-3100A in Catawba County

Team Members:

Loretta Beckwith-USACE	(present)
Marella Buncick-USFWS	(present)
Marla Chambers-NCWRC	(present)
Felix Davila-FHWA	(absent)
Chris Militscher-EPA	(absent)
Mason Herndon-NCDWQ	(absent)
Davidian Byrd-Roadway	(present)
Reuben Chandler-Division 12	(present)
Zahid Baloch-PDEA	(present)
Charles Hunt-Structures	(present)
Michael Turchy-NES	(present)

Participants:
Marshall Clawson, NCDOT Hydraulics
Vincent Rivers, NCDOT Hydraulics
Zahid Baloch, NCDOT PDEA
Monroe Brown, NCDOT Utilities
Charles Hunt, NCDOT Structure Design
Davidian Byrd, NCDOT Roadway Design
Janaki Patel, NCDOT Utilities
James Swinson, NCDOT Utilities
Brad Chilton, NCDOT NES
Mark Staley, NCDOT REU
Michael Turchy, NCDOT NES
Reuben Chandler, NCDOT Division 12
Kathryn Espinoza, McKim and Creed
Rick Moore, McKim and Creed

Introductions were initiated by Marshall Clawson. Introductions were made by all in attendance. Rick Moore proceeded with the review.

General

- Project falls within the Catawba River Basin in which riparian buffer rules are not applicable.
- The project has four (4) major structures all of which are culverts.

Plan Sheet 6 (Stream S12a and S12b)

- Impacts to surface waters from proposed 1 @ 7'x8' RCBC and roadway fill. Existing 7'x7' RCBC to be removed.
- The box will be buried one (1) foot below natural ground.
- USFWS discussed moving Structure 617 being relocated to the other side of the road however the same ditch is required in either location. Therefore 617 will remain as is.

- NCWRC voiced concern of erosion at the ditch end based upon alignment. The small amount of water is not anticipated to be erosive therefore the ditches will remain as currently shown.
- Bee Branch (S12a and S12b) is classified as a High Quality Water (HQW). Treatment of stormwater drainage will be obtained from proposed roadway swales and the proposed lateral swales using maximum slopes of 1% and 3:1 side slopes.

Plan Sheet 14 (Stream S13a)

- The drainage redlines show an open ditch section from Structure 1404 to the proposed energy dissipator at the upstream end of the JS. The dissiaptor is proposed to stop just short of the JS avoiding any impacts. It was asked if a stream design could be incorporated into this ditch section. However based upon Division comments and the fact that this section is currently piped, plan revisions will be made to pipe this ditch section all of the way to the energy dissipator.

Plan Sheet 15 (Stream S13c and S13d)

- Impacts to surface waters from proposed 2 @ 9'x9' RCBC and roadway fill. Existing 9'x8' RCBC to be removed.
- Both boxes will be buried one (1) foot and one (1) box will also have 1' sills constructed on the upstream and downstream end to force normal low flows through one (1) side. A bench will be constructed at the upstream and downstream end to assist in forcing the low flows through one (1) side.

Plan Sheet 15 (Stream S14b and S14c)

- Impacts to surface waters from proposed 2 @ 9'x9' RCBC and roadway fill. Existing 9'x8' RCBC to be removed.
- Both boxes will be buried one (1) foot and one (1) box will also have 1' sills constructed on the upstream and downstream end to force normal low flows through one (1) side. A bench will be constructed at the upstream and downstream end to assist in forcing the low flows through one (1) side.

Plan Sheet 18 (Stream S21a, Stream S21b and Wetland W3)

- Even though roadway water is flowing through private property, existing drainage patterns were maintained to ensure hydrology was not impacted to minimize potential for impact to these streams and this wetland.

Plan Sheet 18 (Wetland W4 and W5)

- Impacts to wetlands from proposed roadway fill and ditch excavation

Plan Sheet 19 (Wetland W5 and W6)

- Impacts to wetlands from proposed roadway fill and ditch excavation
- The lateral base ditch/grass swale shown from Sta 217+80 -L- LT to 220+10 -L- LT will be revised to show a piped system since this section is currently piped. Location and Surveys to provide additional information in this area to pick up the existing

system. The pipe system will terminate at the existing outlet so as not to impact the JS (Stream S23a).

Plan Sheet 20 (Stream S24a and S24b)

- Impacts to surface waters from proposed 1 @ 7'x8' RCBC and roadway fill. Existing 7'x7' RCBC to be removed.
- The box will be buried one (1) foot below natural ground.
- The 36" cross pipe on Sheet 19 at approximate Sta 228+95 will be modified to tie into the proposed 7' x 8' RCBC to eliminate the riprap lined tail ditch and its 28.6% slope tying in to the existing JS. A box will be added on the downstream (-L- LT) end of this cross pipe where the 36" pipe will turn and tie into the downstream (-L- LT) end of the proposed 7' x 8' RCBC.

Plan Sheet 21 (Stream S25 and Wetland W7)

- Structures 2108 and 2109 both discharge into an existing riprap lined ditch contained within an existing permanent drainage easement. Therefore there are no impacts at this site.

Meeting Adjourned.

Subject: Final Meeting Minutes from 4C Preliminary Drainage Design Review held on March 19, 2014 for R-3100A in Catawba County

Team Members:

Loretta Beckwith, USACE (present)
Marella Buncick, USFWS (present)
Marla Chambers, NCWRC (present)
Michael Turchy, NCDOT NES (present)
Mitch Batuzich, FHWA (present)
Alan Johnson NCDWR (absent)
Cynthia Van Der Wiele EPA (absent)
Reuben Chandler, NCDOT Division 12 (absent)

Participants:
Vincent Rivers, NCDOT Hydraulics
Kanchana Noland, NCDOT Roadway
Douglas Kretchman, NCDOT Roadway
Laura Sutton, NCDOT Structures
Rick Moore, McKim and Creed

Introductions were initiated by Vincent Rivers. Introductions were made by all in attendance. Rick Moore proceeded with the review.

General

- Baffles were discussed at length on all four (4) stream crossings. Each stream crossing was discussed in detail during the 4B meeting and Marshall Clawson determined that baffles would not be used for any of the crossings. Each crossing was designed to the maximum extent practicable to have a span similar to the width of the streams at their normal flow depth and to maintain the stream slope through the culvert. They are all also buried 1 foot, have 1' sills in the overflow culvert (as applicable at the multi-barrel locations) and the culvert at Sta 230+73 has sills at 50' intervals.
- The term "channel excavation" that was used at the four (4) RCBC locations in the permit drawings refers to slope work being performed to tie the channel slopes into natural ground, not excavation within the channel themselves.
- There was a lot of discussion on the methodologies and policies for NRTR field work as related to bankfull and stream width determination.

- There was discussion about limiting riprap at the pipe outlets by transitioning to coir fabric and natural plantings. This will be a Division decision in the field.
- If riprap size was changed at any of the four (4) culvert crossings, their CSR should be revised to reflect this. All four (4) CSR's will be revised to show Class II riprap at their outlet.

Site 1

- In the 4B meeting, USFWS discussed moving Structure 617 to the other side of the road however the same ditch is required in either location. Therefore, as discussed in the 4B meeting minutes, Structure 617 will remain as originally designed.
- In the 4B meeting, NCWRC voiced concern of erosion at the ditch ends based upon their alignment. As discussed in the 4B meeting minutes, the small amount of water (in both flow and velocity) is not anticipated to be erosive therefore the ditches will remain as currently shown.
- Is riprap planned in the bottom of the ditches? No, the plans call for Streambank Stabilization which per the NCDOT details does not call for riprap in the bottom of the ditches.

Site 2

- There was discussion on the layout of the proposed roadway drainage system - primarily that the system will be constructed over the proposed RCBC crossing and outlet in the floodplain areas in preformed scour holes.
- Clarification over the linetype showing shoulder berm gutter was provided.

Site 3

- Can we adjust the ditch angle at the outlet near 168+20-L- LT? No, the angle of the ditch is designed to minimize impacts to the existing residence.

Site 4

- There was general discussion that the proposed roadway drainage system is designed to maintain existing drainage patterns.
- There was discussion on the exact starting point of the JS - based upon the Final Survey provided by NCDOT, the JS begins at the outlet of the existing pipe.
- No comments on the impacts as they are shown.

Site 5

- No comments on the impacts as they are shown.

Site 6

- There is a small wedge of wetlands outside the proposed R/W not included in the impacts. This should be revised to show it as a total take.

Site 7

- No comments on the impacts as they are shown.

Site 8

- No comments on the impacts as they are shown.

Site 9

- The CSR should be revised to show the drainage tying into the proposed 7’x8’ RCBC in both plan and profile. The CSR will be revised.
- Structures may need more PDE on the downstream end.

Meeting Adjourned.

Minutes from the Interagency 4B Hydraulic Design Review Meeting
State Project 34522.1.4 (R-3100B) in Catawba County
F.A. Project: STP-0016(53)
June 19, 2013

Team Members:
Loretta Beckwith, USACE
Marella Buncick, USFWS
Marla Chambers, NCWRC
Brad Chilton, NCDOT-NES
Michael Turchy, NCDOT-NES
Mark Staley, NCDOT-REU
Zahid Baloch, NCDOT-PDEA

Participants:
Charles Smith, NCDOT Hydraulics
Reuben Chandler, NCDOT Div. 12
Davidian Byrd, NCDOT Roadway
Marshall Clawson, NCDOT
Monroe Brown, NCDOT
Claudia Lee, URS
Dennis Hoyle, URS
Meme Diaz, URS

Minutes:
Introductions were made by all in attendance.

Meme Diaz proceeded through the Hydraulic Redline Plans dated May 2013:

Sheet 4:
- Discussed tie-in to project to the west, and the overview of this project. No comments

Sheet 5:
- Proposed culvert design at Sta. 28+48 -L- and Sta. 43+58 -L- conflicts with existing utilities. Utilities are to be relocated.
- It was requested to have utilities moved from under the roadway fill when relocating.

Sheet 6:
- Reviewed photos of stream relocation site.
- Concern regarding stream relocation and the resulting stream stability was expressed by USACE and USFWS representatives. Option of stream relocation or piping was discussed. Stream relocation was the chosen option, but design should focus on stream stability.
- Stream stability takes precedence over achieving natural stream conditions.
- Baffles will be used within culvert to be used to promote a natural stream bed through the culvert when the culvert slope is greater than 2%.
- Proposed culvert design at Sta. 28+48 -L- and Sta. 43+58 -L- conflicts with existing utilities.Utilities are to be relocated.
- It was requested to have utilities moved from under the roadway fill when relocating.
- Concern regarding stream relocation and the resulting stream stability was expressed by USACE and USFWS representatives. Option of stream relocation or piping was

discussed. Stream relocation was the chosen option, but design should focus on stream stability.

- Stream stability takes precedence over achieving natural stream conditions.
- Baffles within culvert to be used to promote a natural stream bed within the culvert when the culvert slope is greater than 2%.
- There needs to be a 5' separation berm between the top of the relocated stream banks and the toe of the fill between Sta. 44+00 -L- to 47+50 -L-

Sheet 7:

- It was confirmed that the pipe beneath -Y4- will be buried one foot. No further comments.

Sheet 17:

- The layout of the two culverts was discussed. It was verified that the stream banks would be protected along the outlet ends.
- The length of pipe at Sta. 190+00 -L- was discussed, but there were no comments.

No further comments.

Meeting adjuourned.

Minutes from the Interagency 4C Hydraulic Design Review Meeting
State Project 34522.1.4 (R-3100B) in Catawba County
F.A. Project: STP-0016(53)
July 22, 2015

Team Members:
Steve Kichefski, USACE (Phone)
Marella Buncick, USFWS
Marla Chambers, NCWRC
Amy Chapman, NCDWR
Donna Hood, NCDWR
Carla Dagnino, NCDOT-NES
Michael Turchy, NCDOT-NES
Mark Staley, NCDOT-REU
Zahid Baloch, NCDOT-PDEA
Cynthia Van Der Wiele-USEPA
Mitch Batuzich - FHWA

Participants:
Bill Zerman, NCDOT Hydraulics
Charles Smith, NCDOT Hydraulics
Larry Carpenter, NCDOT Div. 12 (Phone)
Kanchana Noland, NCDOT Roadway
James Swinson, NCDOT Utilities
Laura Sutton, NCDOT SMU
Claudia Lee, AECOM
Bill Stephens, AECOM

Minutes:
Introductions were made by all in attendance.

Bill Stephens and Claudia Lee proceeded through the permit drawings:

General:
- Request was made to separate out stream impacts from culvert impacts on the impact summary sheet for all sites.

Sheet 5:
- It was noted that temporary easements and additional stream impacts are needed on the inlet end of the proposed 6 ft. x 7 ft. RCBC due to construction phasing. Permits will be revised.
- The width of the existing stream compared to the width of the proposed box culvert was questioned. It was determined from the field visit notes that the stream width up and downstream are approximately the same as the width of the box culvert.

Sheet 6:
- It was recommended that baffles be placed in the proposed 9 ft. x 10 ft. RCBC to reduce the low flow width to that of the existing stream width.
- It was questioned if a natural stream design was considered for the channel change on the upstream side of the proposed culvert. Notes from the 4B meeting indicated that stream stability would take precedence over achieving natural stream conditions. The existing sanitary sewer line located along the north side of the channel change would also limit a natural stream design.

- Marla Chambers indicated she may conduct a field visit to Site 6 to observe the existing conditions.

Sheet 7:

- Pipe size across -Y4- is mislabeled. Should be a 60-in. CMP. Profile will be included for this pipe in the revised permits.
- Detail 33 Rip Rap at Embankment: Cl B rip rap will be revised to Cl I rip rap.

Sheet 8:

- The stability of the proposed outfall ditch to Site 6 was questioned due to steep natural ground slope along a portion of the ditch. NCDOT/AECOM will investigate options to stabilize the ditch in the steep segment of the ditch.

Sheet 17:

- It was suggested to consider a different type drainage structure at Site 4 to retain stream bed material instead of the proposed 60-in. reinforced concrete pipe. NCDOT/AECOM will investigate options and need for an alternate structure.
- The single barrel proposed box culvert at Site 5 appears to be a 2-barrel culvert due to the centerline shown in the drawing. The centerline will be removed.

No further comments.

Meeting adjourned.

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-3100B **County(ies):** Catawba

General Project Information

Project No.:	R-3100B	**Project Type:**	Roadway Widening	**Date:**	9/28/2016
NCDOT Contact:	Bill Zerman, PE	**Contractor / Designer:**	URS Corporation - North Carolina; Dennis Hoyle, PE, PLS		
Address:	1590 Mail Service Center Raleigh, NC 27699-1590	**Address:**	701 Corporate Center Dr., Suite 475 Raleigh, NC 27607		
Phone:	919-707-6755	**Phone:**	919-854-6200		
Email:	bzerman@ncdot.gov	**Email:**	dennis.hoyle@aecom.com		
City/Town:	Newton, NC	**County(ies):**	Catawba		
River Basin(s):	Catawba	**CAMA County?**	No		
Primary Receiving Water:	Smyre Creek; Maiden Creek	**NCDWQ Stream Index No.:**	11-129-5-4-1, 11-129-5-7-2-(1)		
NCDWQ Surface Water Classification for Primary Receiving Water	**Primary:**	Class C	Water Supply V (WS-V)		
	Supplemental:	None	None		
Other Stream Classification:	None	S4a/S4b	C		
303(d) Impairments:	biological impairment				
Buffer Rules in Effect	N/A				

Project Description

Project Length (lin. Miles or feet):	3.46 miles	**Surrounding Land Use:**	Low-Density residential (R-30)

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	28.55 ac.	15.03 ac.
Typical Cross Section Description:	Divided median highway with two lanes in each direction and bulb turnouts for limited access. 12' lane widths.	Two lane highway with intersection. 11' lane widths
Average Daily Traffic (veh/hr/day):	Design/Future: 20,200 VPD	Existing: 13,050 VPD

General Project Narrative:

East of Newton, NC in the Catawba River Basin, 3.46 miles of NC16, existing 2-lane highway alignment between Claremont Road and east of Balls Creek Road, will be replaced with a 4-lane divided highway section with raised median and superstreet intersection design. The new alignment will follow the existing path of NC 16.

The roadway drainage system will consist of curb and gutter draining roadway runoff to median and curb inlets with outlets disconnected from surface waters. Drainage system outlets utilize energy dissipation devices such as pre-formed scour holes and rip rap pads as well as grassed channels and swales. Where channels flow into jurisdictional streams, riprap will be used to stabilize the banks.

Two named streams or their tributaries are affected by the proposed project:
Smyre Creek - Index # 11-129-5-4-1; Stream Classification C
Maiden Creek - Index # 11-129-5-7-2-(1); Stream Classification WS-V; 303(d) Parameter of Interest: Benthos Fair (Nar, AL, FW)

There are five jurisdictional stream crossings. Two crossings require culverts equal to a 60" diameter each. Two crossings utilize box culverts. Pipes and culverts within jurisdicational streams are designed with a buried depth of 20% of the diameter for pipe sizes up to and including 48" and a buried depth of one foot for box culverts and pipes over 48".

A tributary to Smyre Creek will undergo approximately 300 feet of realignment.

References

NCDENR - Surface Water Classification Web Mapping (http://portal.ncdenr.org/web/wq/ps/csu/maps); NCDENR Draft 2014 303d List

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-3100B **County(ies):** Catawba

Project Environmental Summary

Surface Water Impacts

Sheet No.	Station (From / To)	Feature Impacted	Water / Wetland / Buffer Type	Receiving Surface Water Name	NRTR Map ID	NCDWQ Stream Index	NCDWQ Surface Water Classification	303(d) Impairments	Type of Impact	Existing SCM	Proposed SCM
5	28+68 -L- 29+16 -L-	Stream	Perennial	Smyre Creek	S3a/S3b	11-129-5-4-1	C	None	Culvert	N/A	
6	42+85 -L- 47+76 -L-	Stream	Perennial	Smyre Creek	S4a/S4b	11-129-5-4-1	C	None	Culvert	N/A	
6	45+65 -L- RT 46+59 -L- RT	Stream	Perennial	Smyre Creek	S4a/S4b	11-129-5-4-1	C	None	Stabilization	N/A	
7	11+82 -Y4- 12+18 -Y4-	Stream	Perennial	Smyre Creek	S4a/S4b	11-129-5-4-1	C	None	Culvert	N/A	
7	50+07 -L- RT 50+26 -L- RT	Stream	Perennial	Smyre Creek	S4a/S4b	11-129-5-4-1	C	None	Stabilization	N/A	
7	56+70 -L- RT 57+16 -L- RT	Stream	Perennial	Symre Creek	S4a/S4b	11-129-5-4-1	C	None	Stabilization	N/A	
8	65+72 -L- RT 66+14 -L- RT	Stream	Perennial	Smyre Creek	S4a/S4b	11-129-5-4-1	C	None	Stabilization	N/A	
17	189+11 -L- 191+53 -L-	Stream	Perennial	Maiden Creek	S10a/S10b	11-129-5-7-2-(1)	WS-V	biological impairment	Culvert	N/A	
17	192+75 -L- 193+30 -L-	Stream	Perennial	Maiden Creek	S10a/S10b	11-129-5-7-2-(1)	WS-V	biological impairment	Culvert	N/A	

* List all stream and surface water impact locations regardless of jurisdiction or size.
Equalizer Pipes to be noted as a minimization of impacts.
All proposed SCMs listed must also be listed under Swales, Preformed Sour Holes and other Energy Dissipators, or Other Stormwater Control Measures.

Description of Minimization of Impacts or Mitigation

Pipes and culverts within jurisdicational streams are designed with a buried depth of 20% of the diameter for pipe sizes up to and including 48" and a buried depth of one foot for box culverts and pipes over 48".

References

TIP PROJECT: R-3100B

CONTRACT: C203800

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA COUNTY

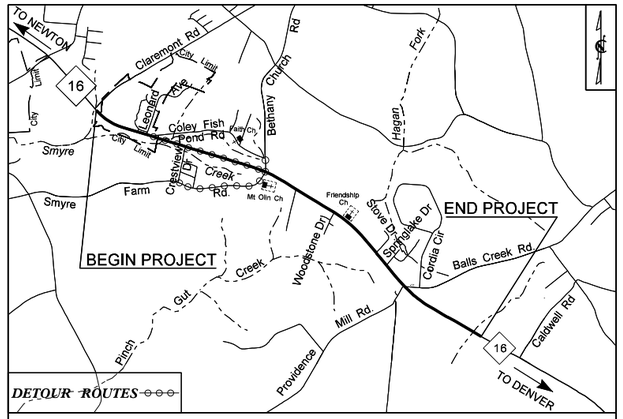
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3100B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34522.1.4	STP-0016(53)	PE
34522.2.FR4	STP-0016(53)	ROW
34522.2.FRU4	STP-0016(53)	UTIL.
34522.3.5	STP-0016(52)	CONST.

PART 2 OF 2
PERMIT DRAWING
SHEET 1 OF 22

LOCATION: NC 16 FROM NORTH OF SR 1801 (CLAREMONT RD) TO NORTH OF SR 1814 (CALDWELL RD)

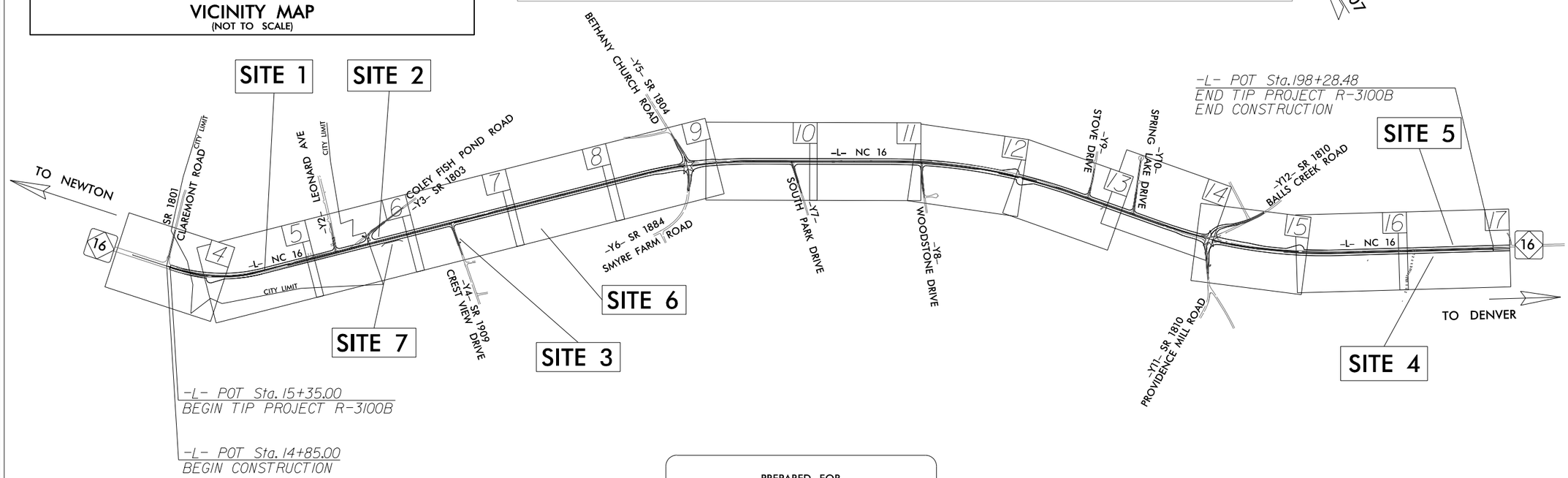
TYPE OF WORK: GRADING, DRAINAGE, RETAINING WALL, CULVERTS, PAVING & SIGNALS



VICINITY MAP
(NOT TO SCALE)

NAD 83/ NSRS 2007

WETLAND AND STREAM IMPACTS



PROPOSED SIGNAL

PREPARED FOR
DEPARTMENT OF TRANSPORTATION
RALEIGH, NC

NCDOT CONTACT: GARY LOVERING, PE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS PROJECT IS PARTIAL CONTROL-ACCESS, WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2017 = 13,408
ADT 2037 = 20,558
K = 10 %
D = 65 %
T = 9 % *
V = 50 MPH
*(TTST 4% + DUAL 5%)
FUNC CL = RURAL ARTERIAL

REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3100B = 3.465 Miles

TOTAL LENGTH TIP PROJECT R-3100B = 3.465 Miles

Prepared In the Office of:
URS Corporation - North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JANUARY 30, 2015

LETTING DATE:
APRIL 18, 2017

EDWARD G. EDENS, PE
PROJECT ENGINEER

KEVIN J. VAN METRE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

8/17/99

REVISIONS

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

8/17/99

REVISIONS

$$$$$SYSTIME$$$$$
$$$$$DGN$$$$$
$$$$$ULENAME$$$$$

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Morrisville, North Carolina 27560
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NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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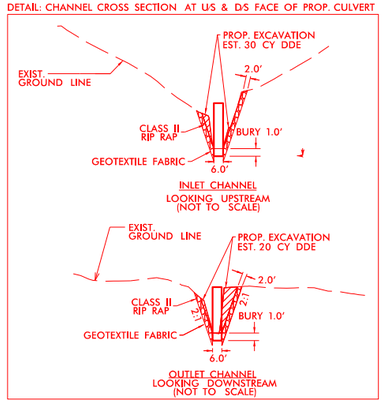
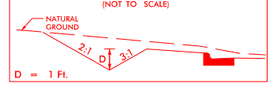
PERMIT DRAWING
SHEET 3 OF 22

NAD 83 /NSRS 2007

DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT

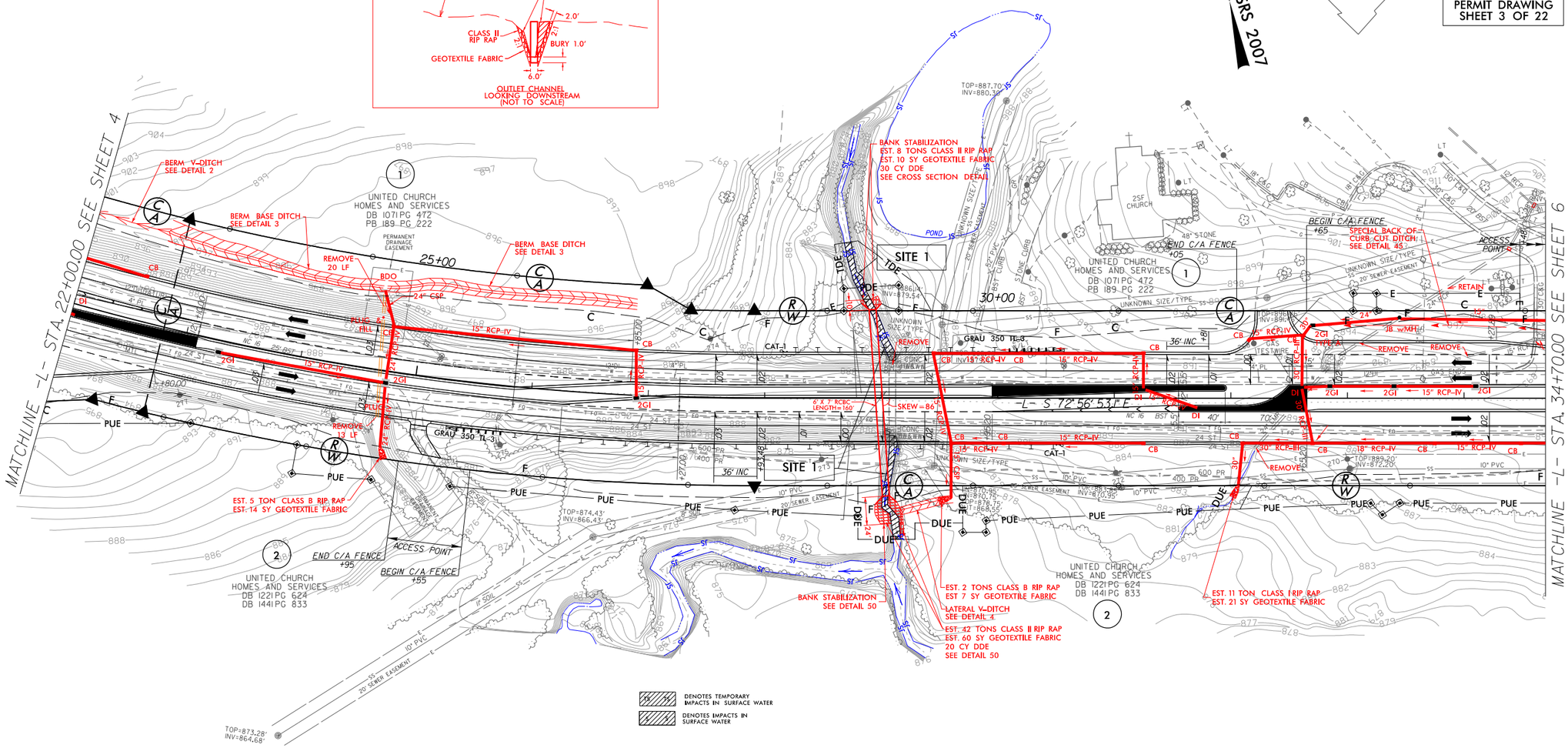


DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)

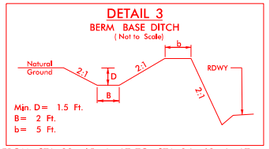


D = 1 Ft.

FROM -L- STA. 32+70 LT TO -L- STA. 37+75 LT



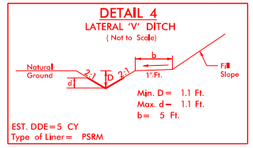
DETAIL 3
BERM BASE DITCH
(Not to Scale)



Min. D= 1.5 Ft.
B= 2 Ft.
b= 5 Ft.

FROM STA. 22+65 -L- LT TO STA. 24+63 -L- LT
FROM STA. 24+63 -L- LT TO STA. 26+87 -L- LT

DETAIL 4
LATERAL "V" DITCH
(Not to Scale)



Min. D= 1.1 Ft.
Max. d= 1.1 Ft.
b= 5 Ft.

EST. DDE=5 CY
Type of Liner= PSRM

FROM STA. 29+16 -L- RT TO STA. 29+60 -L- RT

DETAIL 50
PIPE OUTLET CHANNEL
BANK STABILIZATION
(Not to Scale)

Length= 24 Ft.

FROM STA. -L- 28+95 RT TO STA. -L- 29+18 RT

FOR -L- PROFILE SEE SHEET 18

100' 0' 100'
SCALE

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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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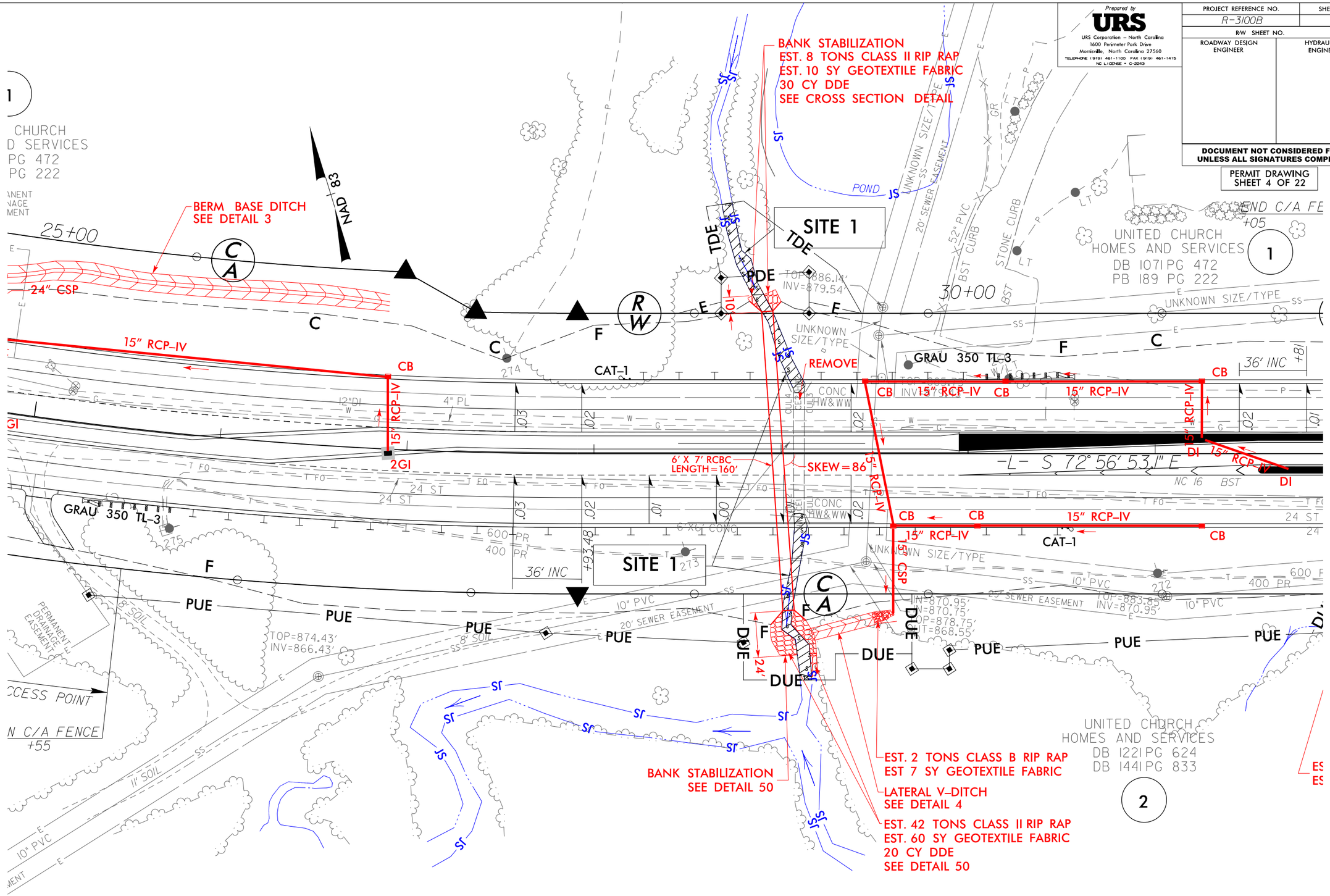
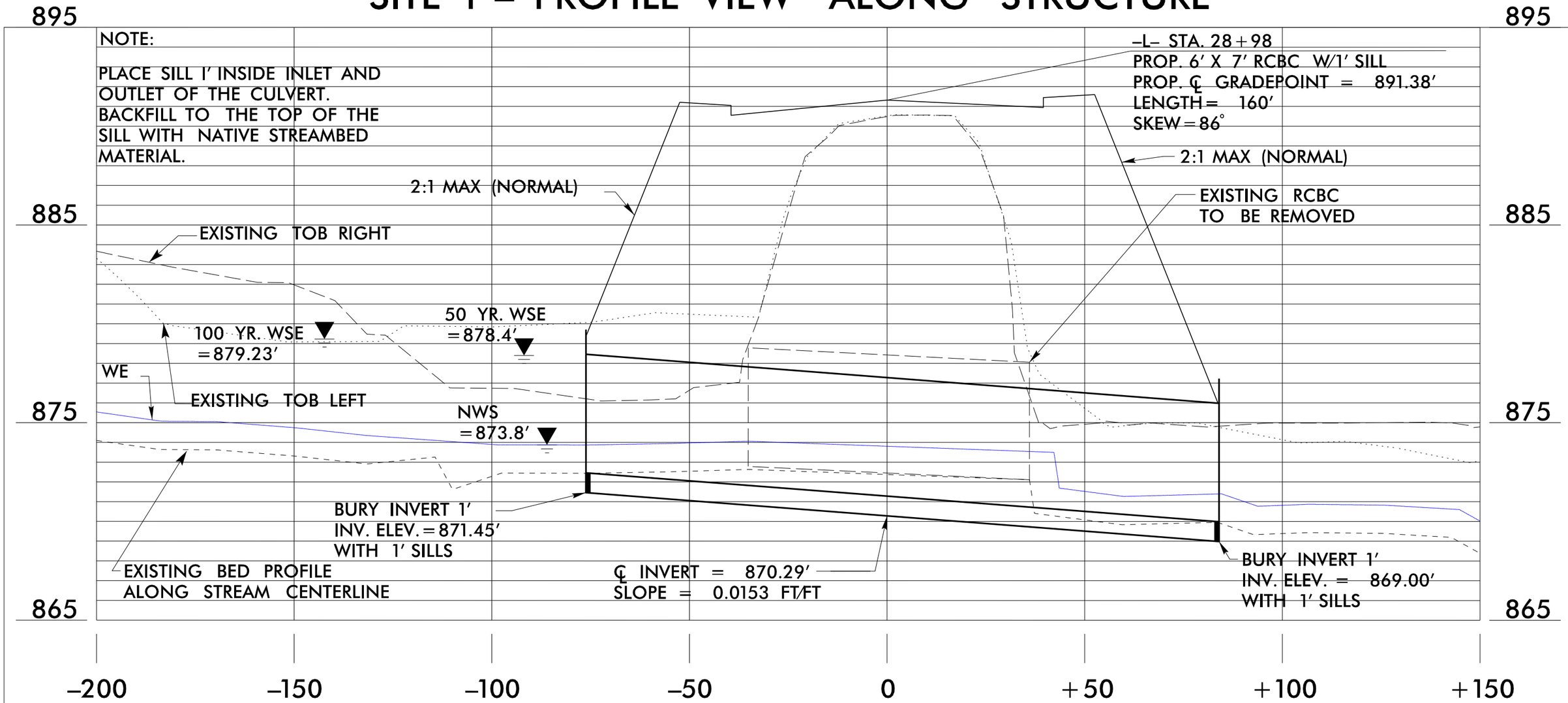
PERMIT DRAWING
SHEET 4 OF 22



REVISIONS

8/17/99

SITE 1 – PROFILE VIEW ALONG STRUCTURE



PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	250	CFS
DESIGN FREQUENCY =	50	YRS
DESIGN WS ELEVATION =	878.4	FT
BASE DISCHARGE =	300	CFS
BASE FREQUENCY =	100	YRS
BASE WS ELEVATION =	879.23	FT
OT DISCHARGE =	900	CFS
OT FREQUENCY =	>500	YRS
OT WS ELEVATION* =	891.5	FT

*ROADWAY LOW POINT

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

NC 16 NORTH OF SR 1801 (CLAREMONT RD) AND NORTH OF SR 1814 (CALDWELL RD)

SITE 1

PERMIT DRAWING

SHEET 5 OF 22

02/20/17

PERMIT DRAWING
SHEET 6 OF 22

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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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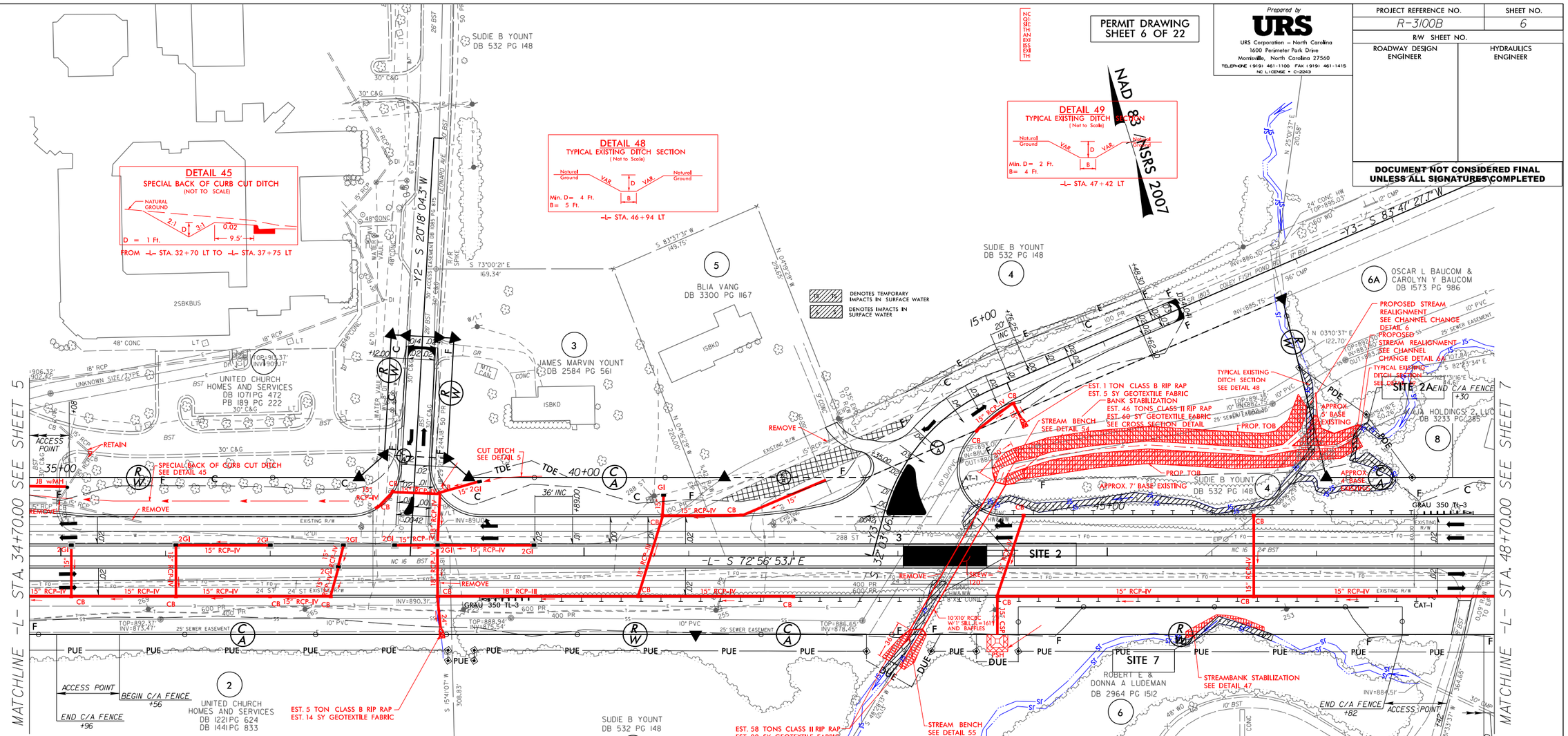
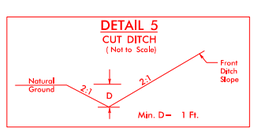
NC DOT SEC TH AN EXI ISS EXI TH

NAD 83/NSRS 2007

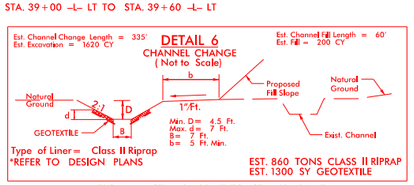
REVISIONS 8/17/99



FOR -L- PROFILE SEE SHEET 19
FOR -Y2- PROFILE SEE SHEET 25
FOR -Y3- PROFILE SEE SHEET 25



FROM STA. 39+00 -L- LT TO STA. 39+60 -L- LT



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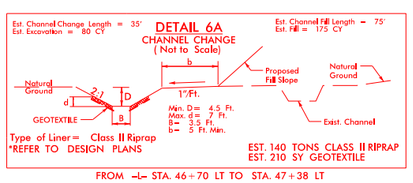
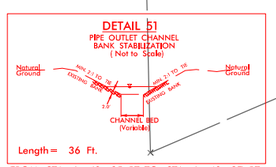
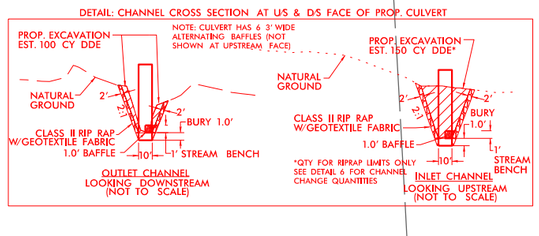
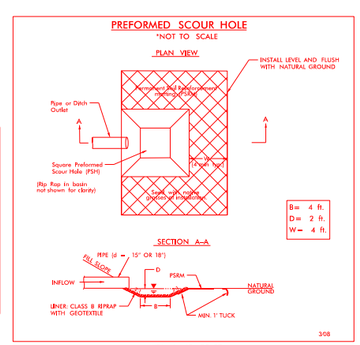


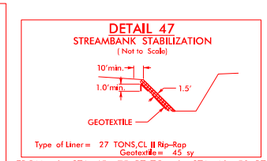
FROM -L- STA. 46+70 LT TO STA. 47+38 LT



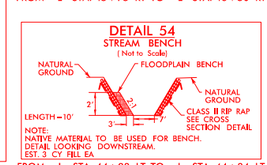
FROM STA. -L- 42+85 RT TO STA. -L- 43+27 RT



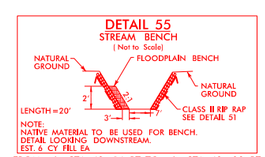




FROM -L- STA. 45+75 RT TO -L- STA. 46+50 RT



FROM -L- STA. 44+00 LT TO -L- STA. 44+04 LT



FROM -L- STA. 43+14 RT TO -L- STA. 43+23 RT

$$$$USERNAME$$$$ $$$$SYSTIME$$$$

PERMIT DRAWING
SHEET 7 OF 22

NOTE:
Q10 AND Q25 WSE ON THE UPSTREAM SIDE OF THE CULVERT IS GREATER FOR THE PROPOSED CONDITION BY 0.2 FT. AND 0.1 FT. RESPECTIVELY. THIS IS NOT EXPECTED TO RESULT IN ANY FLOODING ISSUES AS THE ROADWAY AND SURROUNDING EXISTING STRUCTURES ARE WELL ABOVE THE PROPOSED CONDITION WSE.

Prepared by
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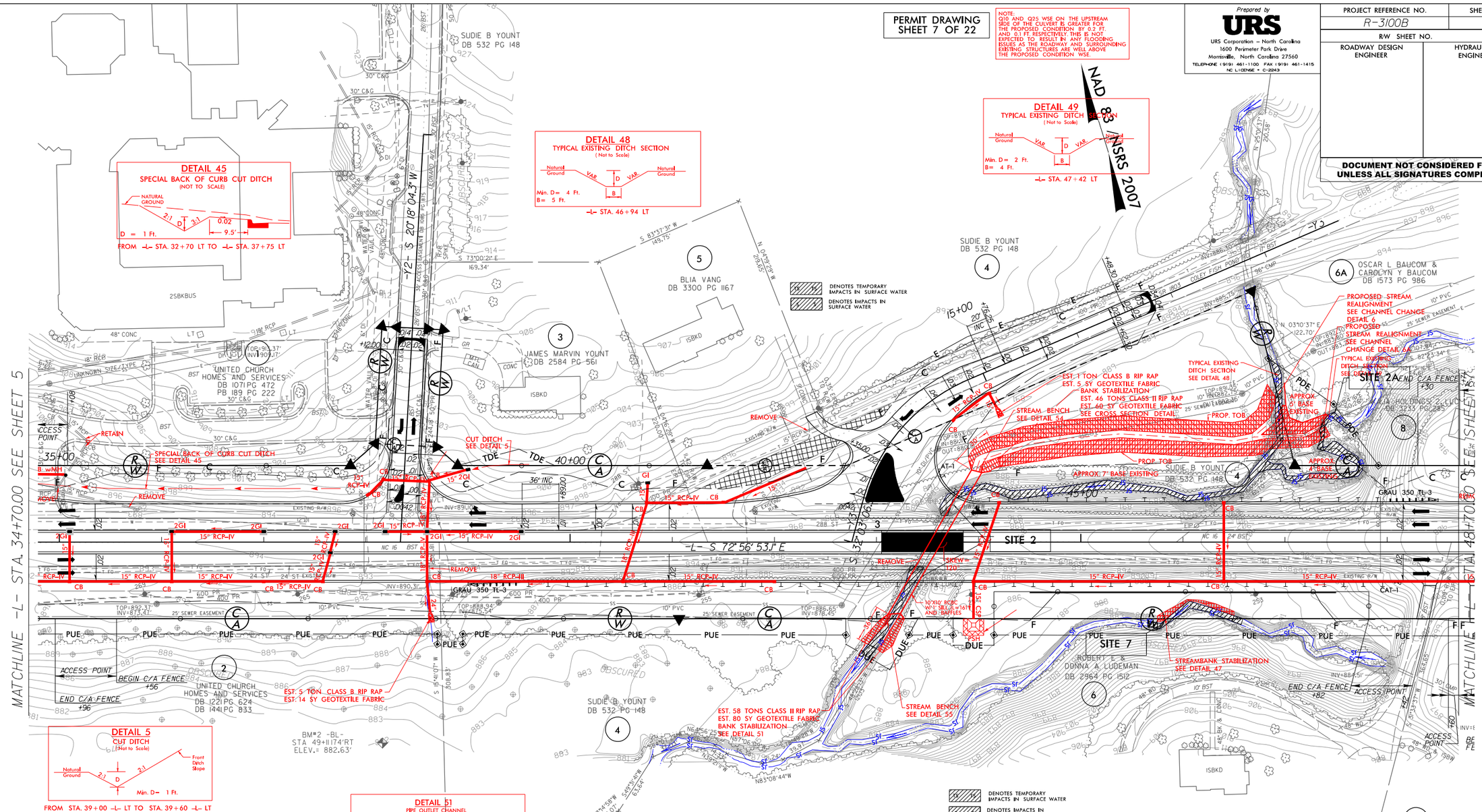
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



FOR -L- PROFILE SEE SHEET 19
FOR -Y2- PROFILE SEE SHEET 25
FOR -Y3- PROFILE SEE SHEET 25

DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)
D = 1 Ft.
FROM -L- STA. 32+70 LT TO -L- STA. 37+75 LT

DETAIL 48
TYPICAL EXISTING DITCH SECTION
(Not to Scale)
Min. D= 4 Ft.
B= 5 Ft.
-L- STA. 46+94 LT

DETAIL 49
TYPICAL EXISTING DITCH SECTION
(Not to Scale)
Min. D= 2 Ft.
B= 4 Ft.
-L- STA. 47+42 LT

DETAIL 5
CUT DITCH
(Not to Scale)
Min. D= 1 Ft.
FROM STA. 39+00 -L- LT TO STA. 39+60 -L- LT

DETAIL 6
CHANNEL CHANGE
(Not to Scale)
Est. Channel Change Length = 335'
Est. Excavation = 1620 CY
Est. Channel Fill Length = 60'
Est. Fill = 200 CY
Min. D= 4.5 Ft.
Max. d= 7 Ft.
B= 7 Ft.
b= 5 Ft. Min.
Type of Liner= Class II Riprap
*REFER TO DESIGN PLANS
EST. 860 TONS CLASS II RIPRAP
EST. 1300 SY GEOTEXTILE
FROM -L- STA. 43+98 LT TO STA. 46+94 LT

DETAIL 6A
CHANNEL CHANGE
(Not to Scale)
Est. Channel Change Length = 35'
Est. Excavation = 80 CY
Est. Channel Fill Length = 75'
Est. Fill = 175 CY
Min. D= 4.5 Ft.
Max. d= 7 Ft.
B= 3.5 Ft.
b= 5 Ft. Min.
Type of Liner= Class II Riprap
*REFER TO DESIGN PLANS
EST. 140 TONS CLASS II RIPRAP
EST. 210 SY GEOTEXTILE
FROM -L- STA. 46+70 LT TO STA. 47+38 LT

DETAIL 51
PIPE OUTLET CHANNEL BANK STABILIZATION
(Not to Scale)
Length= 36 Ft.
FROM STA. -L- 42+85 RT TO STA. -L- 43+27 RT

DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT

NOTE: CULVERT HAS 6 3' WIDE ALTERNATING BAFFLES (NOT SHOWN AT UPSTREAM FACE)

PROP. EXCAVATION
EST. 100 CY DDE
NATURAL GROUND
CLASS II RIP RAP W/GEOTEXTILE FABRIC
1.0' BAFFLE
BURY 1.0'
1' STREAM BENCH
OUTLET CHANNEL LOOKING DOWNSTREAM (NOT TO SCALE)

PROP. EXCAVATION
EST. 150 CY DDE*
NATURAL GROUND
CLASS II RIP RAP W/GEOTEXTILE FABRIC
1.0' BAFFLE
BURY 1.0'
1' STREAM BENCH
*QTY FOR RIPRAP LIMITS ONLY SEE DETAIL 6 FOR CHANNEL CHANGE QUANTITIES
INLET CHANNEL LOOKING UPSTREAM (NOT TO SCALE)

PREFORMED SCOUR HOLE
*NOT TO SCALE
PLAN VIEW
INSTALL LEVEL AND FLUSH WITH NATURAL GROUND
Pipe or Ditch Outlet
Square Preformed Scour Hole (PSH)
(Rip Rap in basin not shown for clarity)
SECTION A-A
INFLOW
UNDER CLASS II RIPRAP WITH GEOTEXTILE
MIN. 1' TUCK
B= 4 ft.
D= 2 ft.
W= 4 ft.
STA. -L- 43+95 RT

DETAIL 47
STREAMBANK STABILIZATION
(Not to Scale)
Type of Liner= 27 TONS,CL II Rip-Rap
Geotextile = 45 sy
FROM -L- STA. 45+75 RT TO -L- STA. 46+50 RT

DETAIL 55
STREAM BENCH
(Not to Scale)
LENGTH=20'
NOTE:
NATIVE MATERIAL TO BE USED FOR BENCH.
DETAIL LOOKING DOWNSTREAM.
EST. 6 CY FILL EA
FROM -L- STA. 43+14 RT TO -L- STA. 43+23 RT

DETAIL 54
STREAM BENCH
(Not to Scale)
LENGTH=10'
NOTE:
NATIVE MATERIAL TO BE USED FOR BENCH.
DETAIL LOOKING DOWNSTREAM.
EST. 3 CY FILL EA
FROM -L- STA. 44+00 LT TO -L- STA. 44+04 LT

REVISIONS

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$$$$SYSTIME$$$$
$$$$USERNAME$$$$

PERMIT DRAWING
SHEET 8 OF 22

Prepared by
URS
URS Corporation – North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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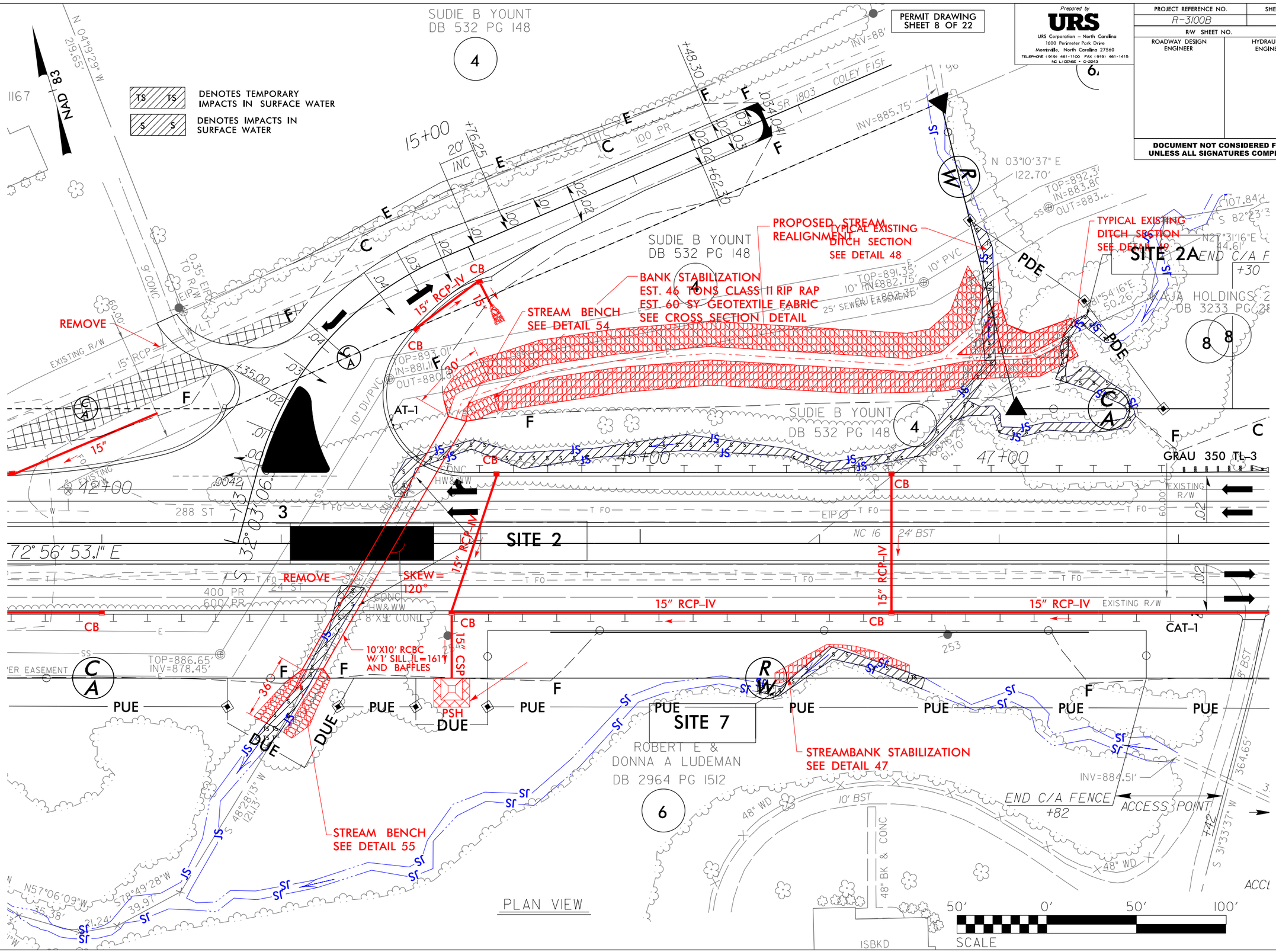

REVISIONS

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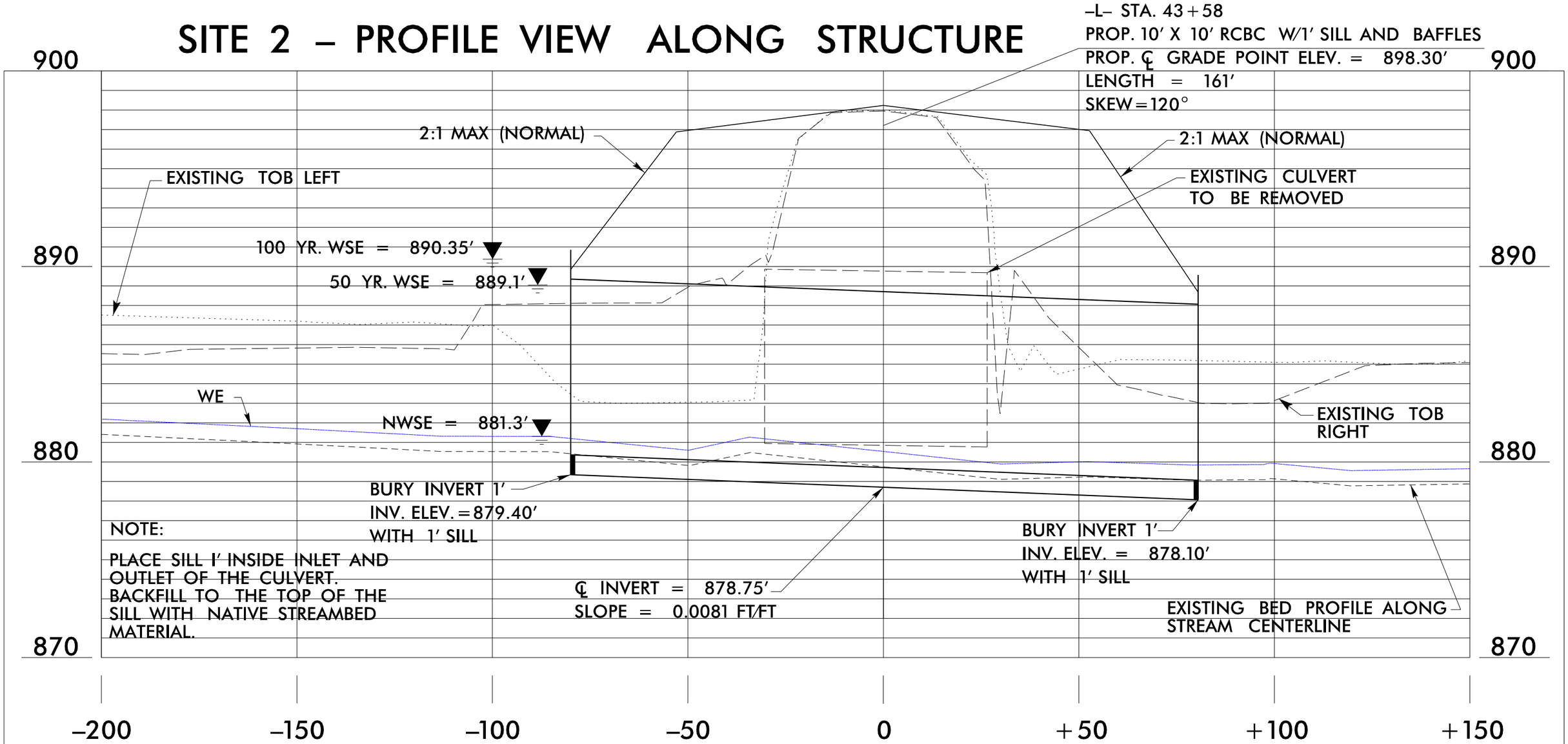
SITE 2 – PROFILE VIEW ALONG STRUCTURE



NOTE:

PLACE SILL 1' INSIDE INLET AND OUTLET OF THE CULVERT. BACKFILL TO THE TOP OF THE SILL WITH NATIVE STREAMBED MATERIAL.

PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	650	CFS
DESIGN FREQUENCY =	50	YR.
DEISGN WS ELEVATION =	889.1	FT.
BASE DISCHARGE =	800	CFS
BASE FREQUENCY =	100	YR.
BASE WS ELEVATION =	890.35	FT.
OT DISCHARGE =	1500	CFS
OT FREQUENCY =	>500	YR.
OT WS ELEVATION =	897.4	FT.

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

NC 16 NORTH OF SR 1801 (CLAREMONT RD) AND NORTH OF SR 1814 (CALDWELL RD)

SITE 2

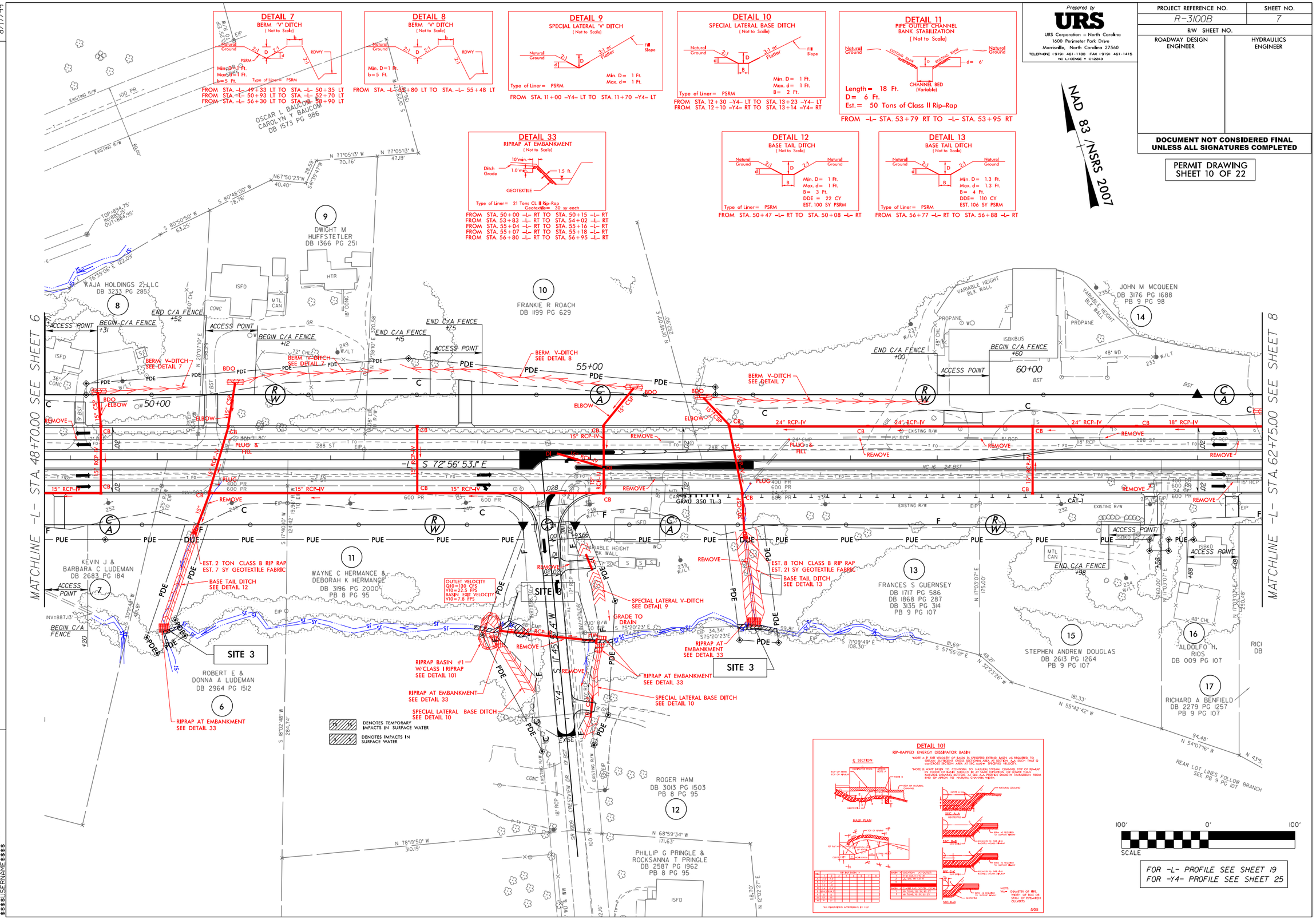
PERMIT DRAWING

SHEET 9 OF 22

02/20/17

8/17/99

REVISIONS



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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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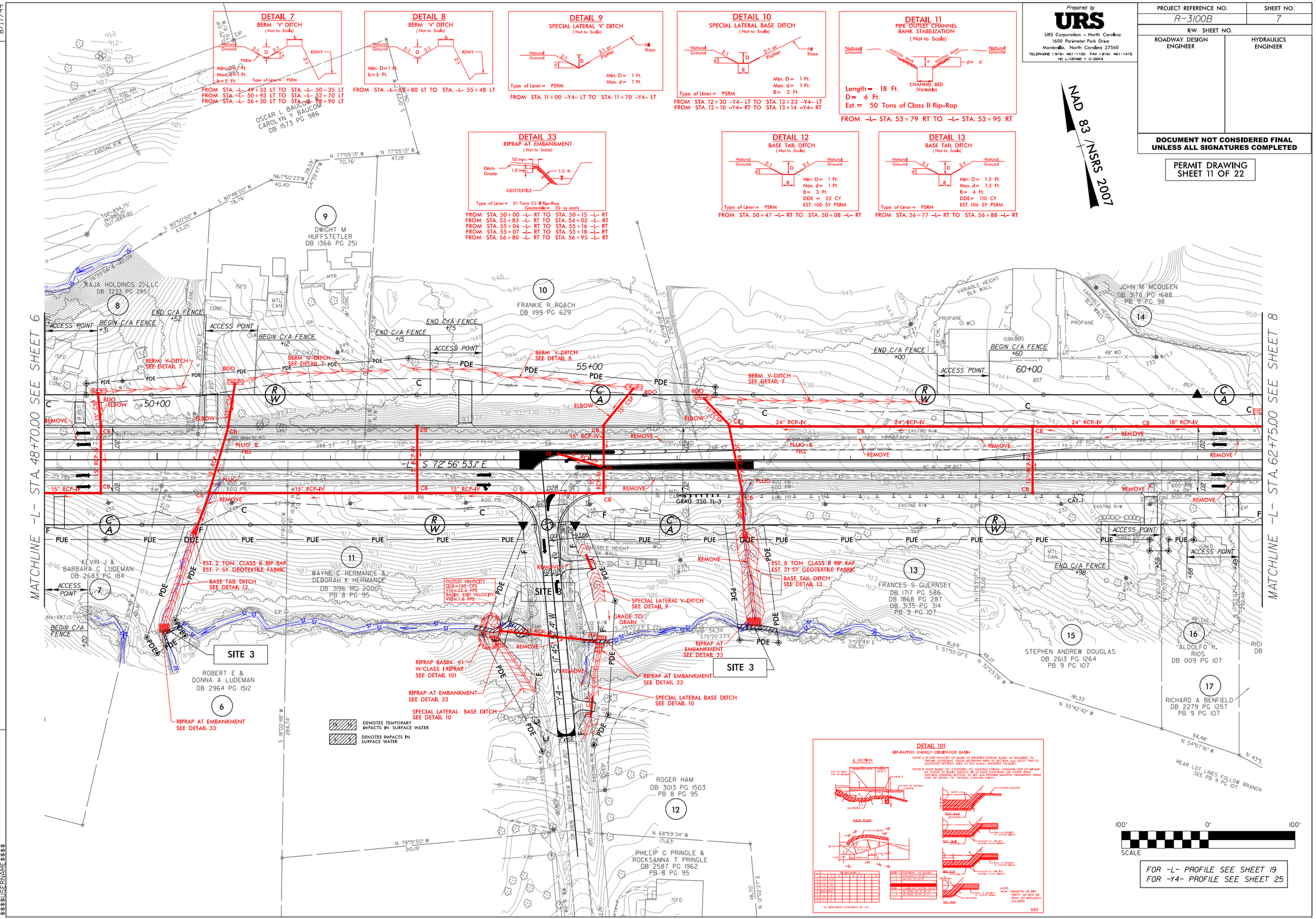
PERMIT DRAWING
SHEET 10 OF 22

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

8/17/99

REVISIONS



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R-3100B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING
SHEET 11 OF 22

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PERMIT DRAWING
SHEET 12 OF 22

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R-3100B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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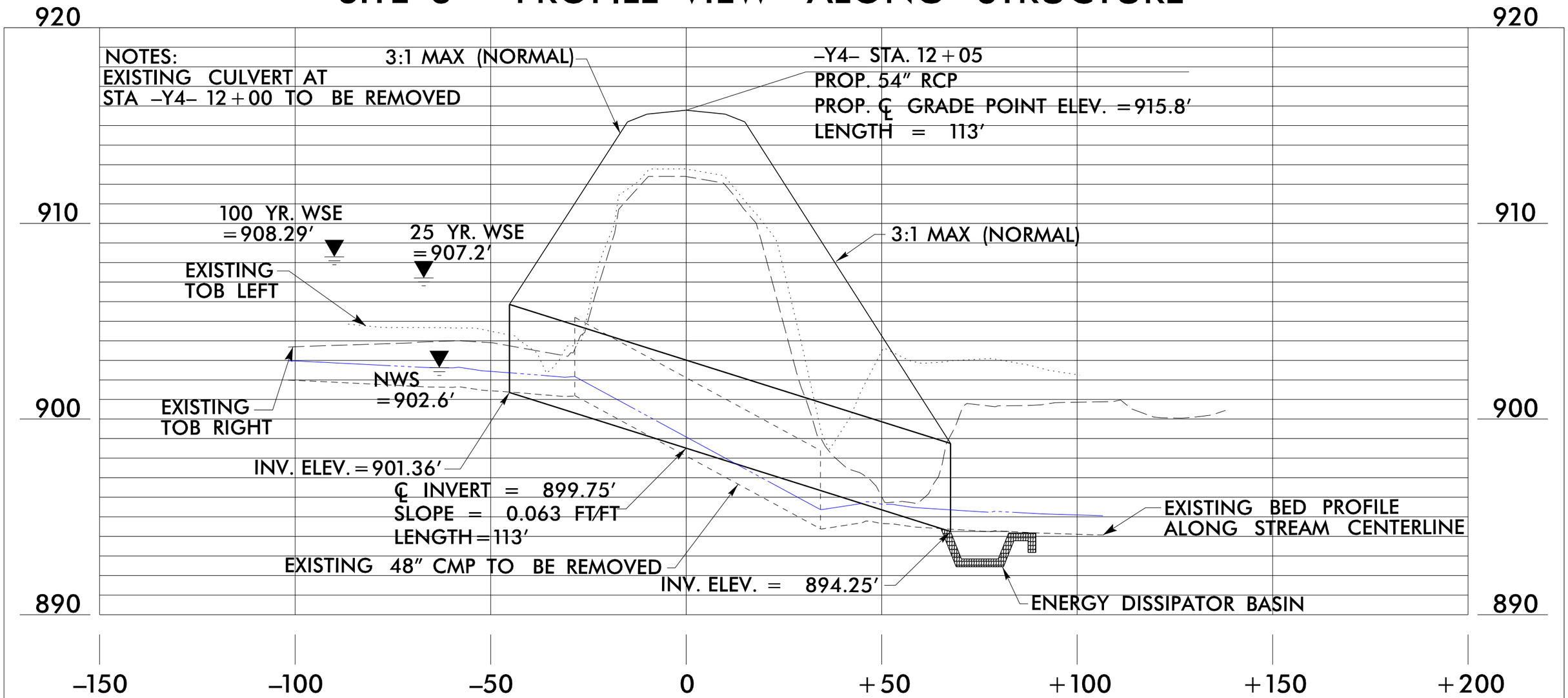
REVISIONS

BERM V-DITCH SEE DETAIL 7
BERM V-DITCH SEE DETAIL 7
BERM V-DITCH SEE DETAIL 8
ACCESS POINT
50+00
55+00
BDO
ELBOW
15" CSP
CB
PLUG & FILL
15" RCP-IV
REMOVE
PLUG
24" RCP
30" RCP-V
30" CSP
15" RCP-III
DI
-L- S 72° 56' 53.1" E
288 ST
24 ST
GRAU 350 TL-3
EST. 2 TON CLASS B RIP RAP
EST. 7 SY GEOTEXTILE FABRIC
BASE TAIL DITCH SEE DETAIL 12
WAYNE C HERMANCE & DEBORAH K HERMANCE
DB 3196 PG 2000
PB 8 PG 95
OUTLET VELOCITY
Q10=130 CFS
V10=22.5 FPS
BASIN EXIT VELOCITY
V10=7.8 FPS
SITE 3
SITE 6
SITE 3
SITE 3
SPECIAL LATERAL V-DITCH SEE DETAIL 9
GRADE TO DRAIN
54" RCP
HW
RIPRAP AT EMBANKMENT SEE DETAIL 33
RIPRAP BASIN #1 W/CLASS I RIPRAP SEE DETAIL 101
RIPRAP AT EMBANKMENT SEE DETAIL 33
SPECIAL LATERAL BASE DITCH SEE DETAIL 10
SPECIAL LATERAL BASE DITCH SEE DETAIL 10
RIPRAP AT EMBANKMENT SEE DETAIL 33
ROBERT E & DONNA A LUDEMAN
DB 2964 PG 1512
RIPRAP AT EMBANKMENT SEE DETAIL 33
EST. 8 TO
EST. 21 SY
BASE SEE
VARIABLE HEIGHT BK WALL
S 11° 45' 57.4" W
-Y4-
S 18°02'48" W
284.74'
NAD 83
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
S S DENOTES IMPACTS IN SURFACE WATER
50' 0' 50' 100'
SCALE

SITE 3 – PROFILE VIEW ALONG STRUCTURE



PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	150	CFS
DESIGN FREQUENCY =	25	YR.
DESIGN WS ELEVATION =	907.2	FT.
BASE DISCHARGE =	180	CFS
BASE FREQUENCY =	100	YR.
BASE WS ELEVATION =	908.29	FT.
OT DISCHARGE =	264	CFS
OT FREQUENCY =	200+	YR.
OT WS ELEVATION =	912.5	FT.

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

NC 16 NORTH OF SR 1801 (CLAREMONT RD)

AND NORTH OF SR 1814 (CALDWELL RD)

SITE 3

PERMIT DRAWING

SHEET 13 OF 22

02/20/17

8/17/99

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NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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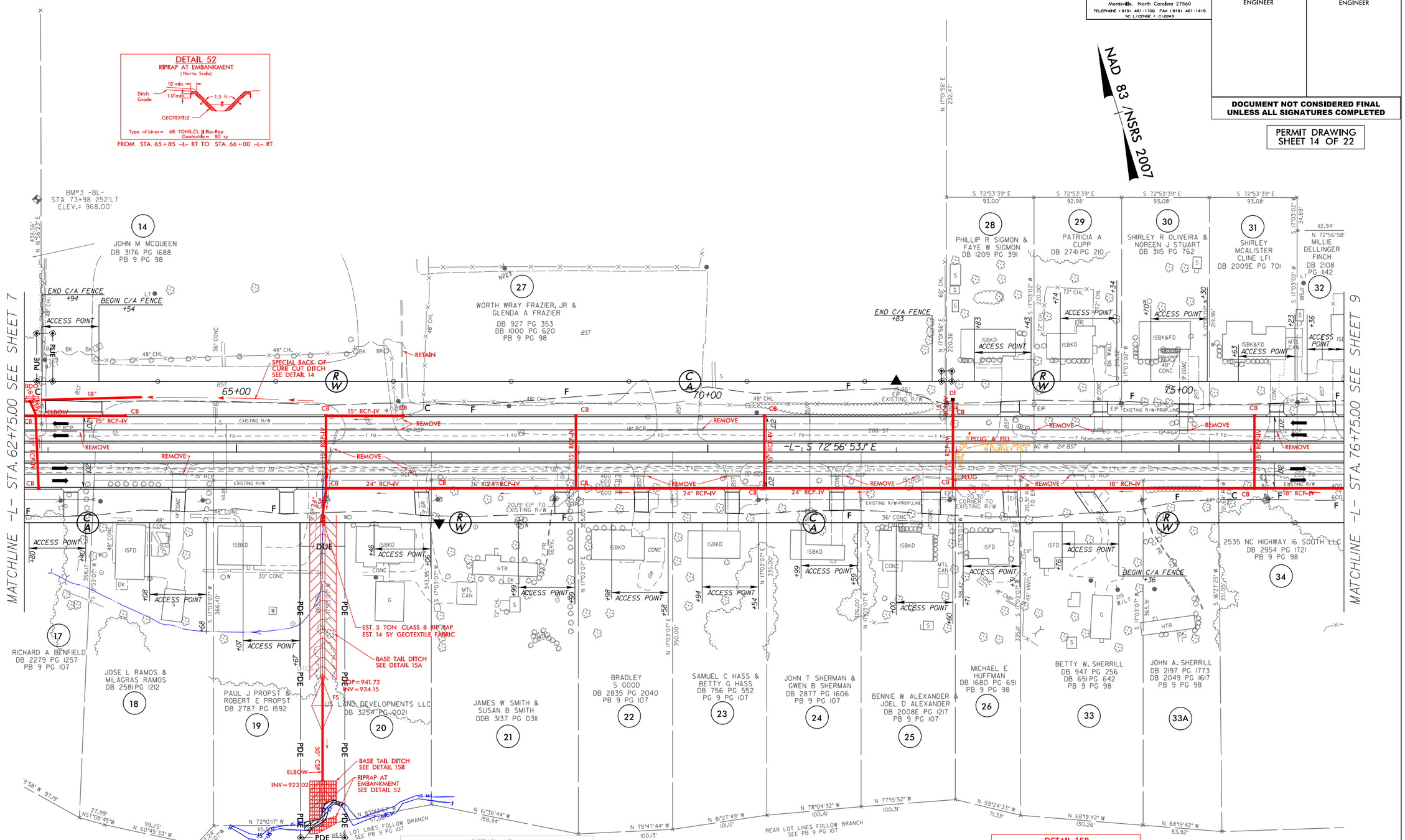
PERMIT DRAWING
SHEET 14 OF 22

NAD 83 /NSRS 2007



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

8/17/99

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$$$$SYSTIME$$$$
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R-3100B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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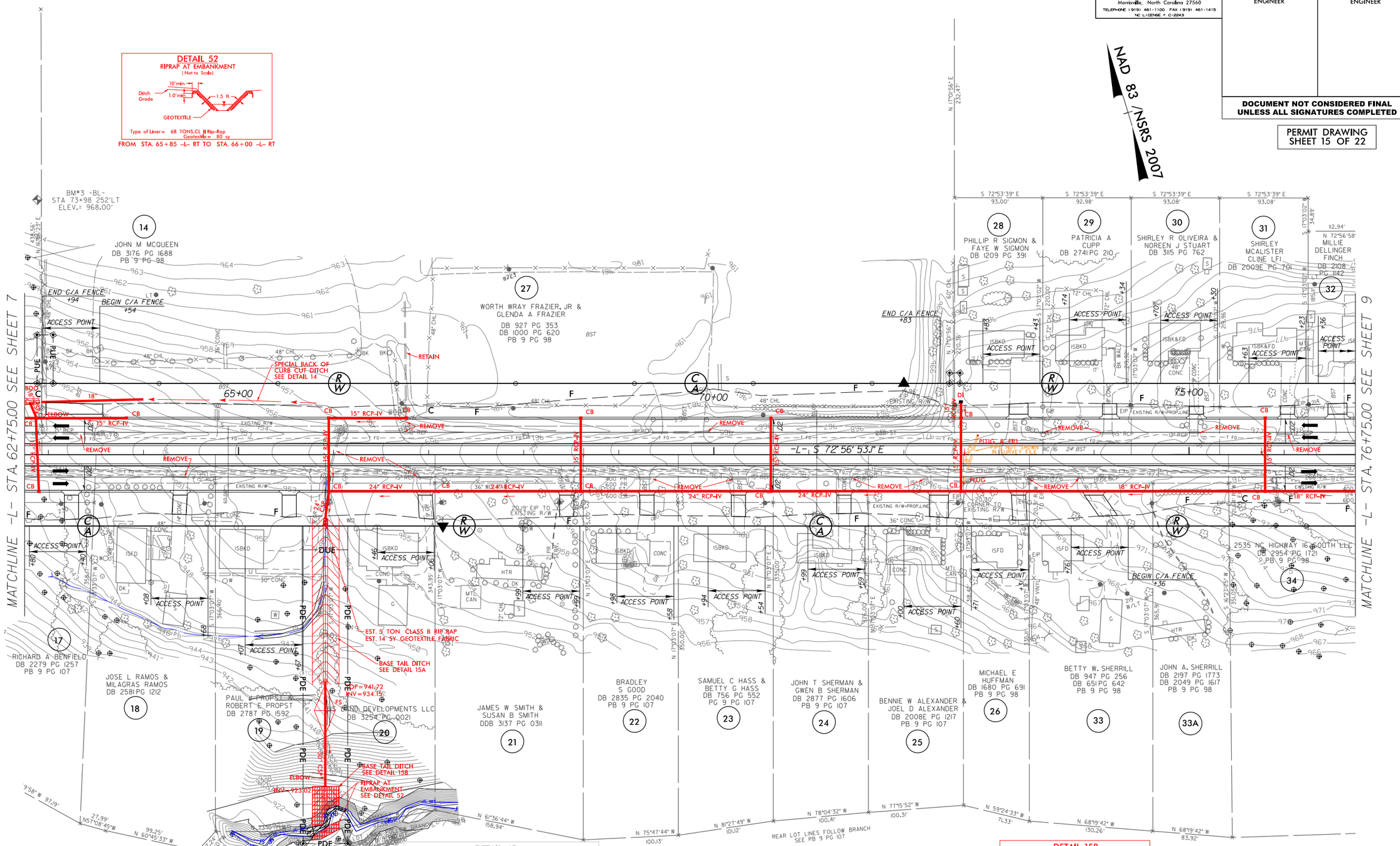
PERMIT DRAWING
SHEET 15 OF 22

NAD 83 /NSRS 2007



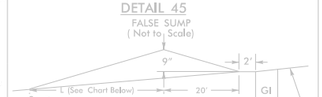
FOR -L- PROFILE SEE SHEET 20

DETAIL 52
RIPRAP AT EMBANKMENT
(Not to Scale)

Type of Liner= 68 TONS,CL II Rip-Rap
Geotextile= 80 sy

FROM STA. 65+85 -L- RT TO STA. 66+00 -L- RT

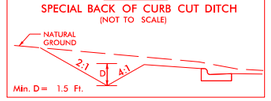
DETAIL 45
FALSE SUMP
(Not to Scale)



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

FROM STA. 65+91 -L- RT

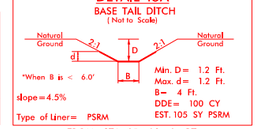
DETAIL 14
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)



Min. D= 1.5 Ft.

FROM STA. 62+90 -L- LT TO STA. 65+82 -L- LT

DETAIL 15A
BASE TAIL DITCH
(Not to Scale)

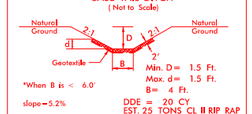


Min. D= 1.2 Ft.
Max. d= 1.2 Ft.
B= 4 Ft.
DDE= 100 CY
EST. 105 SY PSRM

Type of Liner= PSRM

FROM STA. 65+92 -L- RT

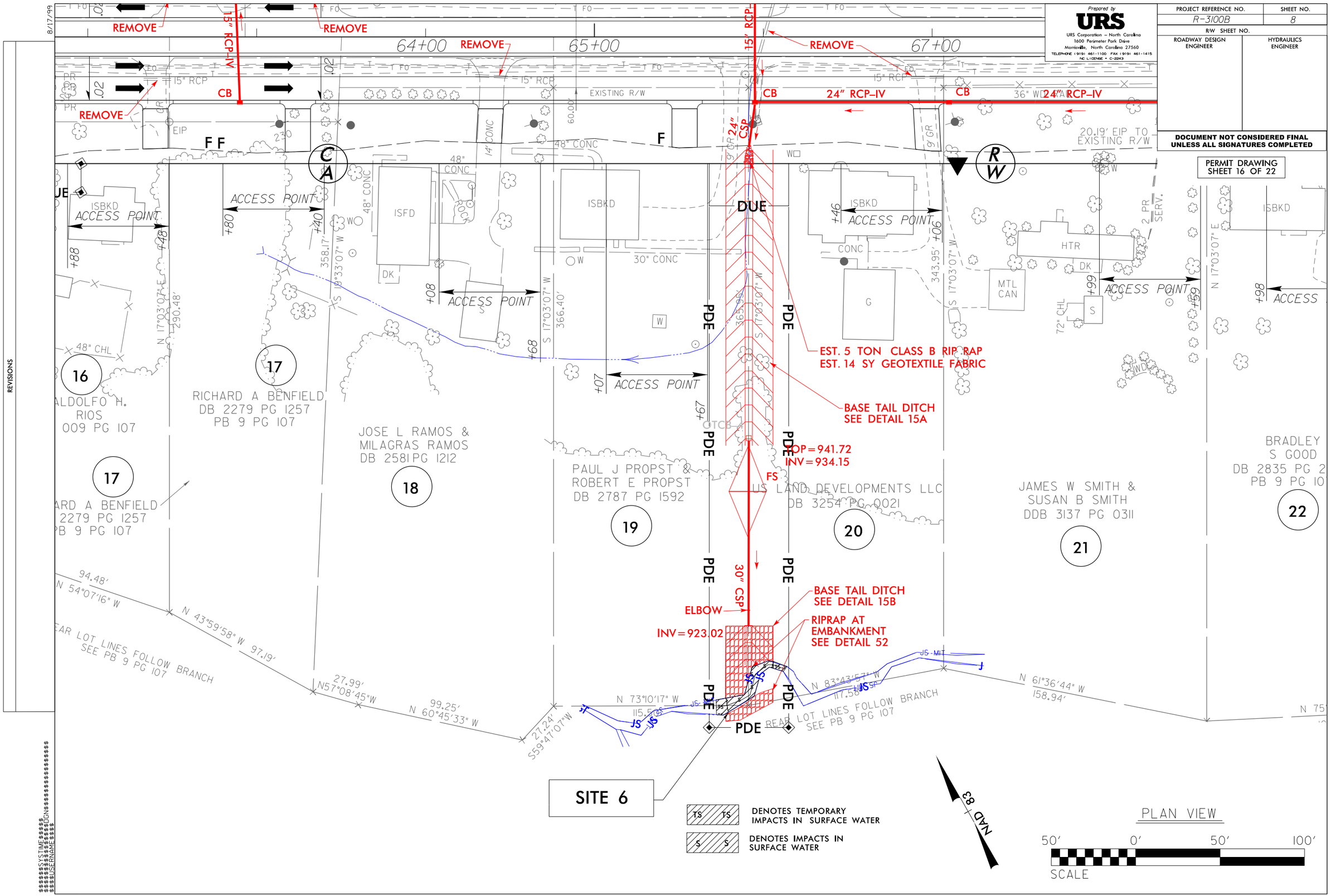
DETAIL 15B
BASE TAIL DITCH
(Not to Scale)



Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 4 Ft.
DDE = 20 CY
EST. 25 TONS CL II RIP RAP

Type of Liner= Class II Rip-Rap

FROM STA. 65+92 -L- RT (DOWNSTREAM OF PIPE)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Morrisville, North Carolina 27560
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NC LICENSE # C-2243
PROJECT REFERENCE NO.
R-3100B
SHEET NO.
8
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 16 OF 22
REMOVE
15" RCP-IV
CB
15" RCP
64+00
65+00
67+00
EXISTING R/W
24" RCP-IV
36" WD
20.19' EIP TO EXISTING R/W
ISBKD
ACCESS POINT
ISFD
DK
48" CONC
30" CONC
14" CONC
DUE
PDE
24" CSP
CONC
G
HTR
MTL CAN
72" CHL
S
48" CHL
EST. 5 TON CLASS B RIP RAP
EST. 14 SY GEOTEXTILE FABRIC
BASE TAIL DITCH
SEE DETAIL 15A
TOP=941.72
INV=934.15
FS
30" CSP
ELBOW
INV=923.02
BASE TAIL DITCH
SEE DETAIL 15B
RIPRAP AT
EMBANKMENT
SEE DETAIL 52
16
17
18
19
20
21
22
ALDOLFO H. RIOS
009 PG 107
RICHARD A BENFIELD
DB 2279 PG 1257
PB 9 PG 107
JOSE L RAMOS &
MILAGRAS RAMOS
DB 2581 PG 1212
PAUL J PROPST &
ROBERT E PROPST
DB 2787 PG 1592
US LAND DEVELOPMENTS LLC
DB 3254 PG 0021
JAMES W SMITH &
SUSAN B SMITH
DDB 3137 PG 0311
BRADLEY
S GOOD
DB 2835 PG 2
PB 9 PG 10
REAR LOT LINES FOLLOW BRANCH
SEE PB 9 PG 107
SITE 6
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
S S DENOTES IMPACTS IN SURFACE WATER
NAD 83
PLAN VIEW
50' 0' 50' 100'
SCALE
REVISIONS
8/17/99

TIP PROJECT: R-3100B

CONTRACT: C203800

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA COUNTY

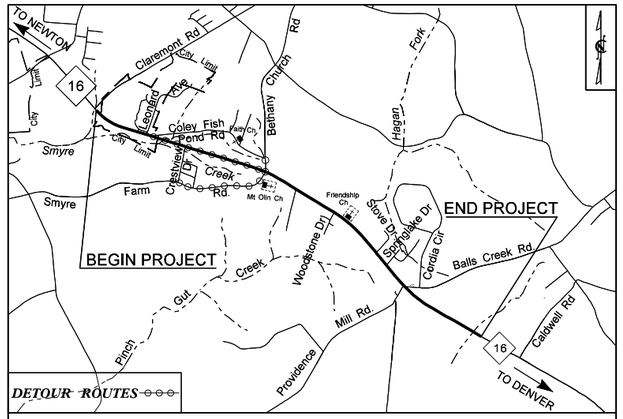
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3100B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34522.1.4	STP-0016(53)	PE
34522.2.FR4	STP-0016(53)	ROW
34522.2.FRU4	STP-0016(53)	UTIL.
34522.3.5	STP-0016(52)	CONST.

PART 2 OF 2
PERMIT DRAWING
SHEET 1 OF 22

LOCATION: NC 16 FROM NORTH OF SR 1801 (CLAREMONT RD) TO NORTH OF SR 1814 (CALDWELL RD)

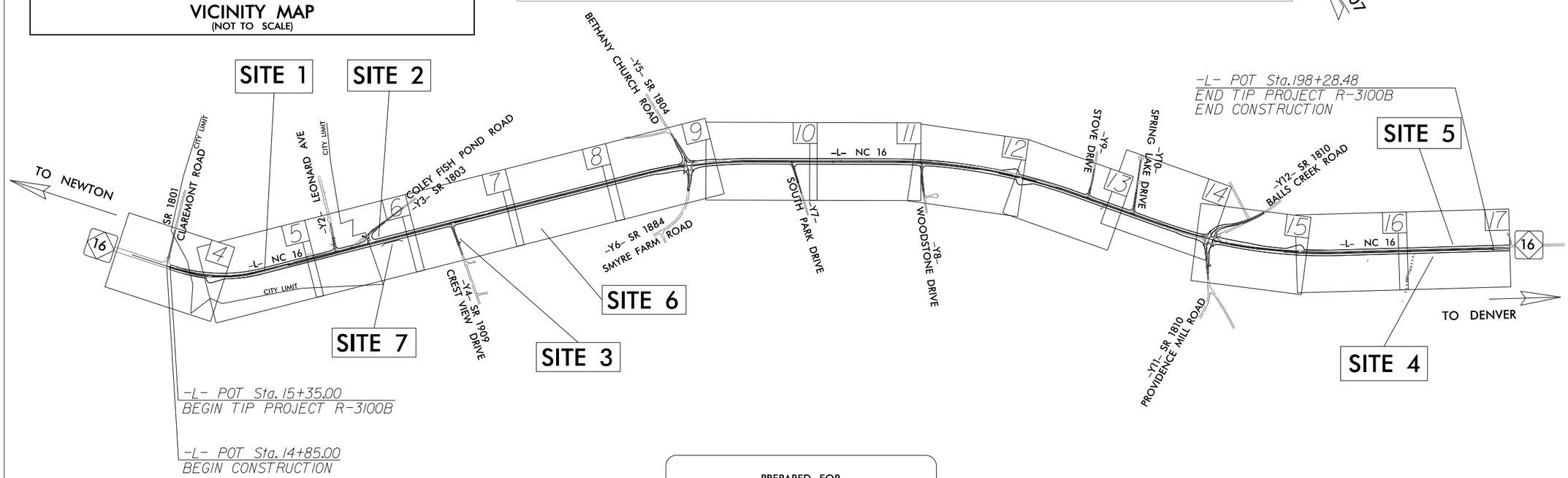
TYPE OF WORK: GRADING, DRAINAGE, RETAINING WALL, CULVERTS, PAVING & SIGNALS



VICINITY MAP
(NOT TO SCALE)

NAD 83/ NSRS 2007

WETLAND AND STREAM IMPACTS



PROPOSED SIGNAL

PREPARED FOR
DEPARTMENT OF TRANSPORTATION
RALEIGH, NC

NCDOT CONTACT: GARY LOVERING, PE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS PROJECT IS PARTIAL CONTROL-ACCESS, WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2017 = 13,408
ADT 2037 = 20,558
K = 10 %
D = 65 %
T = 9 % *
V = 50 MPH
*(TTST 4% + DUAL 5%)
FUNC CL = RURAL ARTERIAL

REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3100B = 3.465 Miles

TOTAL LENGTH TIP PROJECT R-3100B = 3.465 Miles

Prepared In the Office of:
URS Corporation - North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JANUARY 30, 2015

LETTING DATE:
APRIL 18, 2017

EDWARD G. EDENS, PE
PROJECT ENGINEER

KEVIN J. VAN METRE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

8/17/99

REVISIONS

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

8/17/99

REVISIONS

$$$$$SYSTIME$$$$$
$$$$$DGN$$$$$
$$$$$ULENAME$$$$$

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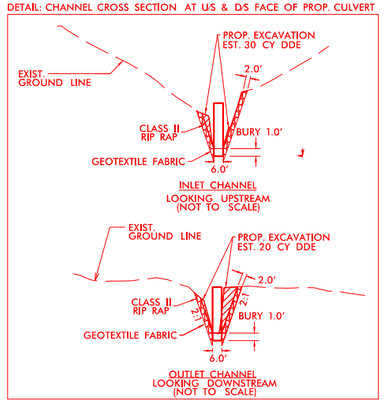
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

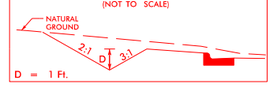
PERMIT DRAWING
SHEET 3 OF 22

NAD 83 /NSRS 2007

DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT

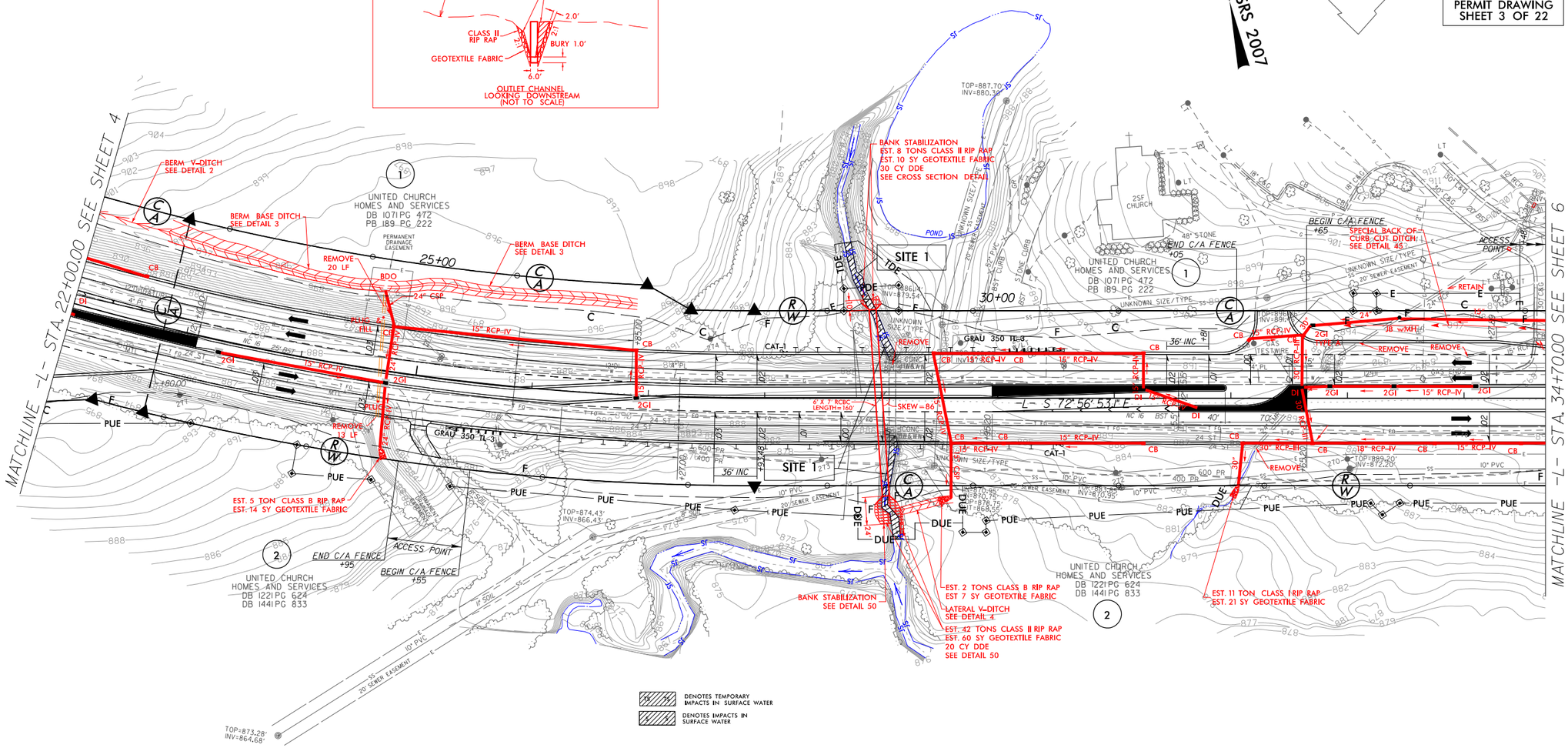


DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)

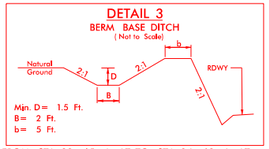


D = 1 Ft.

FROM -L- STA. 32+70 LT TO -L- STA. 37+75 LT



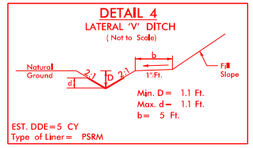
DETAIL 3
BERM BASE DITCH
(Not to Scale)



Min. D= 1.5 Ft.
B= 2 Ft.
b= 5 Ft.

FROM STA. 22+65 -L- LT TO STA. 24+63 -L- LT
FROM STA. 24+63 -L- LT TO STA. 26+87 -L- LT

DETAIL 4
LATERAL "V" DITCH
(Not to Scale)



Min. D= 1.1 Ft.
Max. d= 1.1 Ft.
b= 5 Ft.

EST. DDE=5 CY
Type of Liner= PSRM

FROM STA. 29+16 -L- RT TO STA. 29+60 -L- RT

DETAIL 50
PIPE OUTLET CHANNEL
BANK STABILIZATION
(Not to Scale)

Length= 24 Ft.

FROM STA. -L- 28+95 RT TO STA. -L- 29+18 RT

FOR -L- PROFILE SEE SHEET 18

100' 0' 100'
SCALE

Prepared by
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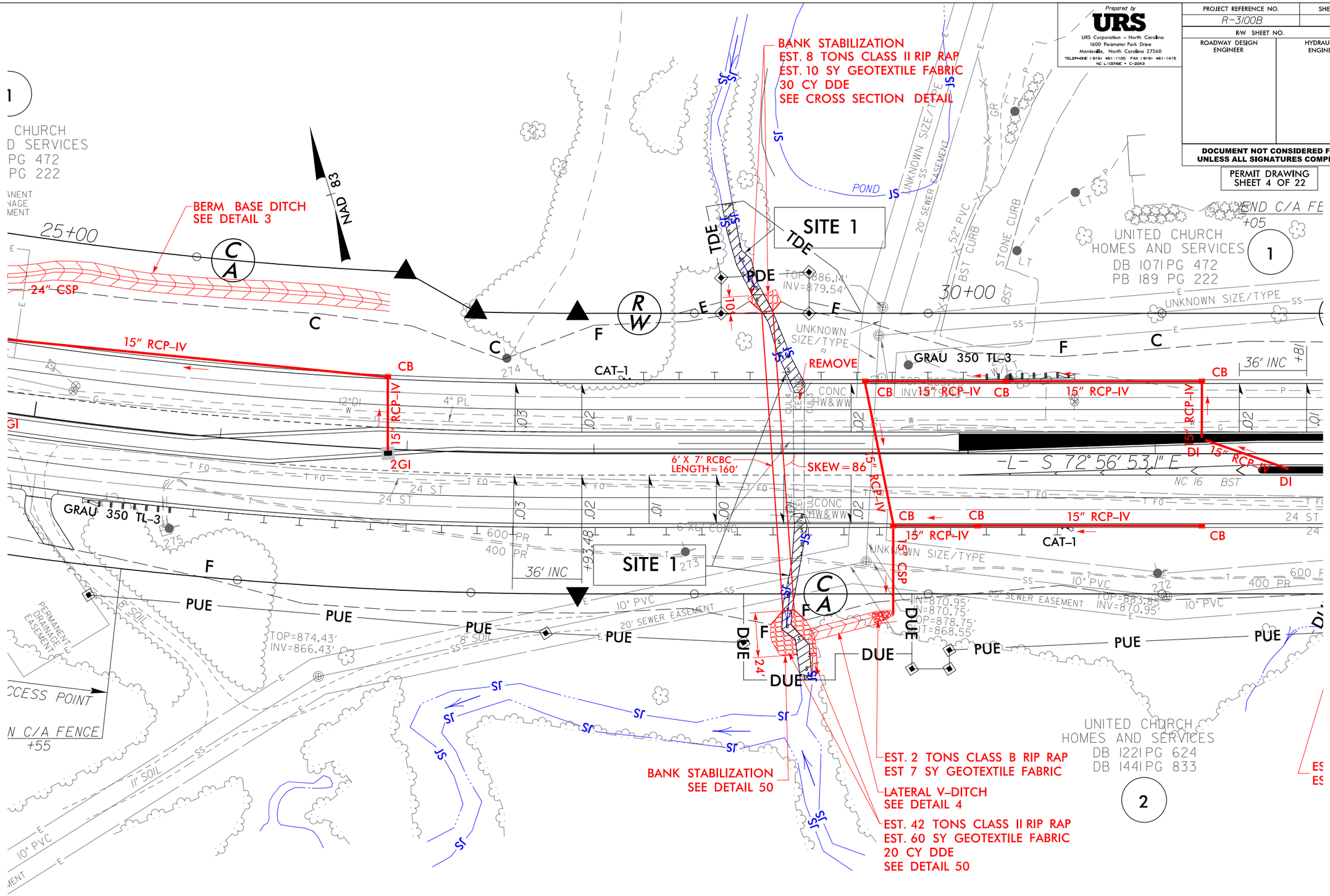
NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

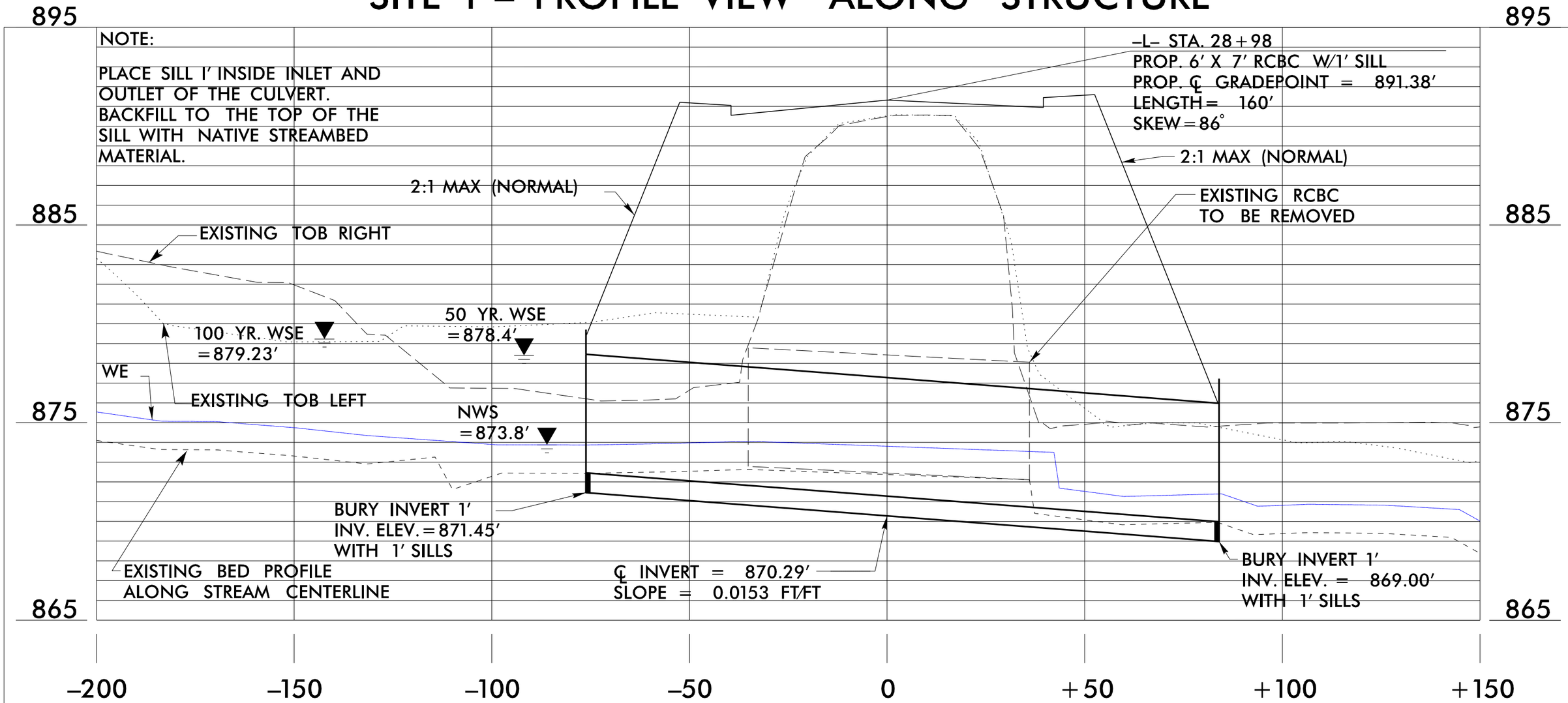
PERMIT DRAWING
SHEET 4 OF 22



REVISIONS

8/17/99

SITE 1 – PROFILE VIEW ALONG STRUCTURE



PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	250	CFS
DESIGN FREQUENCY =	50	YRS
DESIGN WS ELEVATION =	878.4	FT
BASE DISCHARGE =	300	CFS
BASE FREQUENCY =	100	YRS
BASE WS ELEVATION =	879.23	FT
OT DISCHARGE =	900	CFS
OT FREQUENCY =	>500	YRS
OT WS ELEVATION* =	891.5	FT

*ROADWAY LOW POINT

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

NC 16 NORTH OF SR 1801 (CLAREMONT RD) AND NORTH OF SR 1814 (CALDWELL RD)

SITE 1

PERMIT DRAWING

SHEET 5 OF 22

02/20/17

PERMIT DRAWING
SHEET 6 OF 22

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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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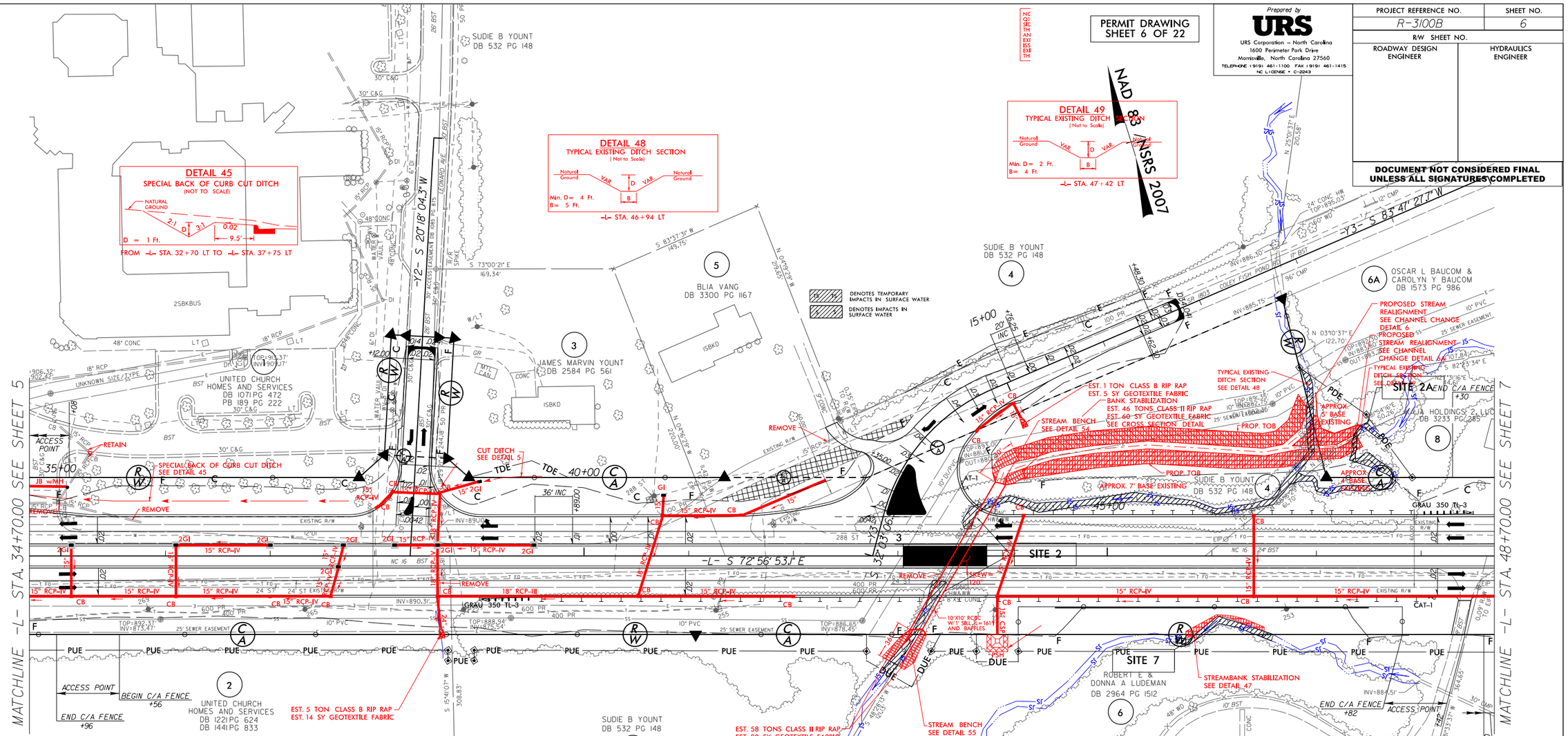
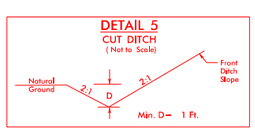
NC DOT SEC TH AN EXI ISS EXI TH

NAD 83/NSRS 2007

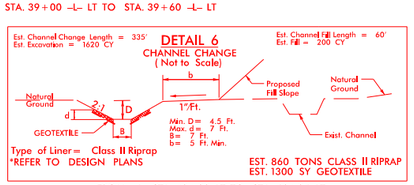
REVISIONS 8/17/99



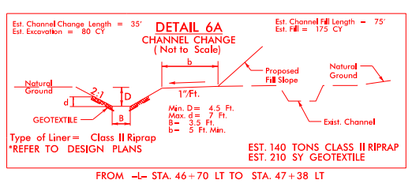
FOR -L- PROFILE SEE SHEET 19
FOR -Y2- PROFILE SEE SHEET 25
FOR -Y3- PROFILE SEE SHEET 25



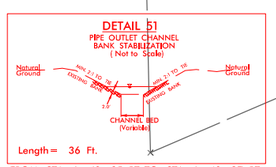
FROM STA. 39+00 -L- LT TO STA. 39+60 -L- LT



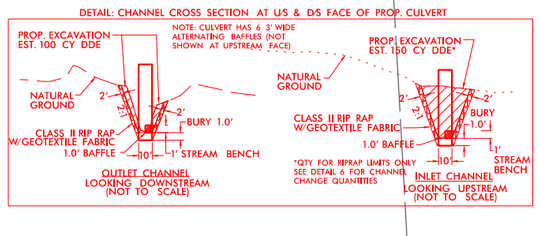
FROM -L- STA. 43+98 LT TO STA. 46+94 LT

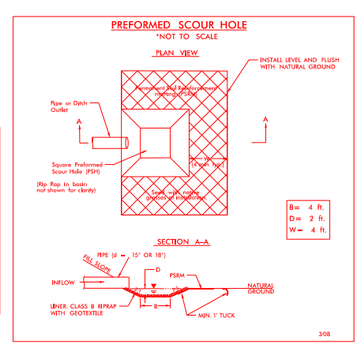


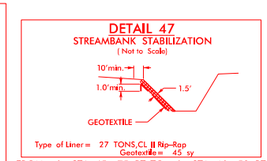
FROM -L- STA. 46+70 LT TO STA. 47+38 LT



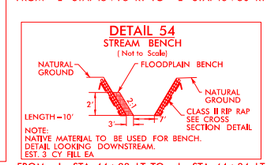
FROM STA. -L- 42+85 RT TO STA. -L- 43+27 RT



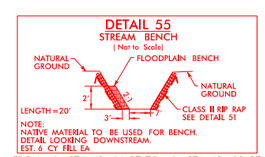




FROM -L- STA. 45+75 RT TO -L- STA. 46+50 RT



FROM -L- STA. 44+00 LT TO -L- STA. 44+04 LT



FROM -L- STA. 43+14 RT TO -L- STA. 43+23 RT

$$$$USERNAME$$$$ $$$$SYSTIME$$$$

PERMIT DRAWING
SHEET 7 OF 22

NOTE:
Q10 AND Q25 WSE ON THE UPSTREAM SIDE OF THE CULVERT IS GREATER FOR THE PROPOSED CONDITION BY 0.2 FT. AND 0.1 FT. RESPECTIVELY. THIS IS NOT EXPECTED TO RESULT IN ANY FLOODING ISSUES AS THE ROADWAY AND SURROUNDING EXISTING STRUCTURES ARE WELL ABOVE THE PROPOSED CONDITION WSE.

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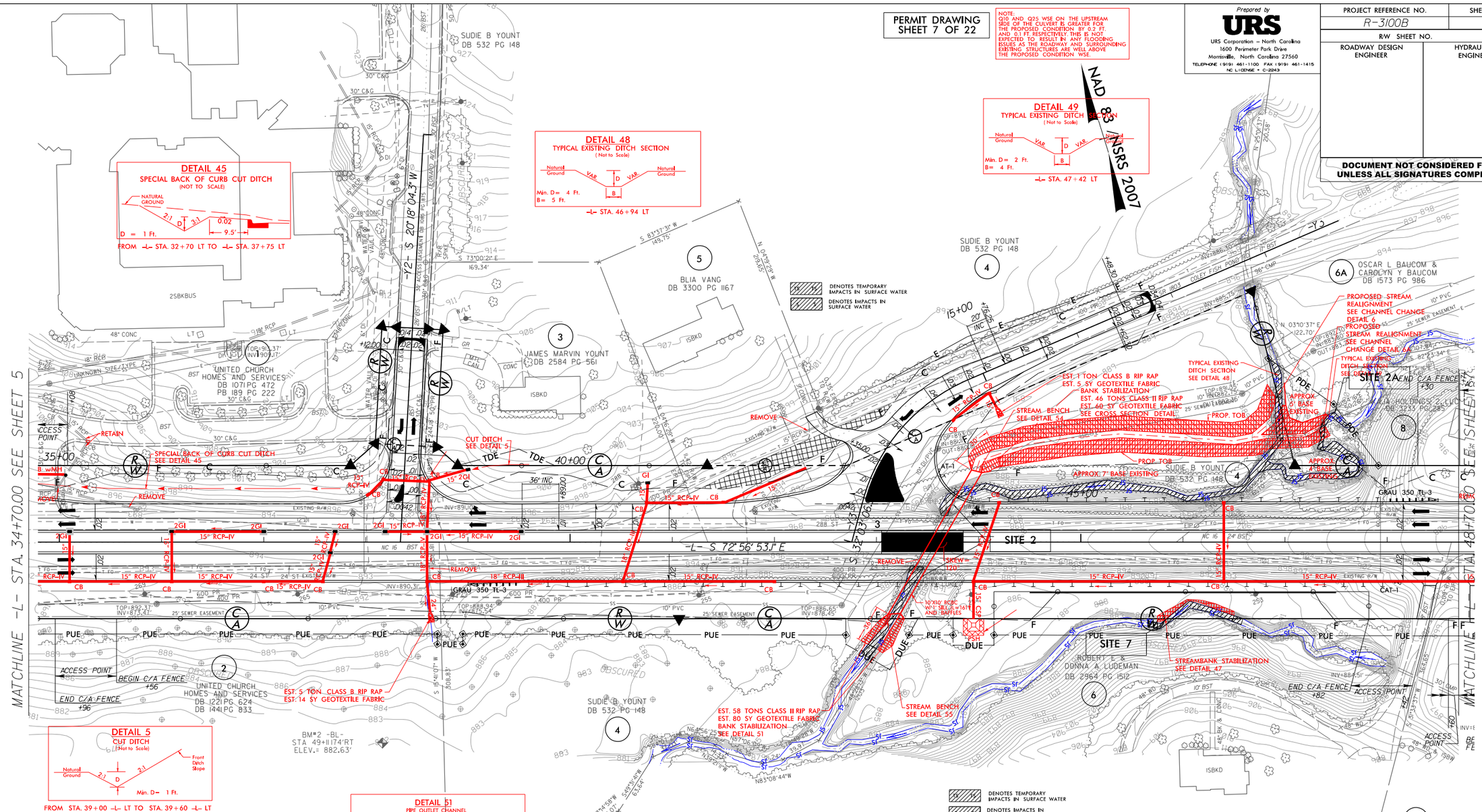
NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



FOR -L- PROFILE SEE SHEET 19
FOR -Y2- PROFILE SEE SHEET 25
FOR -Y3- PROFILE SEE SHEET 25

DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)
D = 1 Ft.
FROM -L- STA. 32+70 LT TO -L- STA. 37+75 LT

DETAIL 48
TYPICAL EXISTING DITCH SECTION
(Not to Scale)
Min. D= 4 Ft.
B= 5 Ft.
-L- STA. 46+94 LT

DETAIL 49
TYPICAL EXISTING DITCH SECTION
(Not to Scale)
Min. D= 2 Ft.
B= 4 Ft.
-L- STA. 47+42 LT

DETAIL 5
CUT DITCH
(Not to Scale)
Min. D= 1 Ft.
FROM STA. 39+00 -L- LT TO STA. 39+60 -L- LT

DETAIL 6
CHANNEL CHANGE
(Not to Scale)
Est. Channel Change Length = 335'
Est. Excavation = 1620 CY
Est. Channel Fill Length = 60'
Est. Fill = 200 CY
Min. D= 4.5 Ft.
Max. d= 7 Ft.
B= 7 Ft.
b= 5 Ft. Min.
Type of Liner= Class II Riprap
*REFER TO DESIGN PLANS
EST. 860 TONS CLASS II RIPRAP
EST. 1300 SY GEOTEXTILE
FROM -L- STA. 43+98 LT TO STA. 46+94 LT

DETAIL 6A
CHANNEL CHANGE
(Not to Scale)
Est. Channel Change Length = 35'
Est. Excavation = 80 CY
Est. Channel Fill Length = 75'
Est. Fill = 175 CY
Min. D= 4.5 Ft.
Max. d= 7 Ft.
B= 3.5 Ft.
b= 5 Ft. Min.
Type of Liner= Class II Riprap
*REFER TO DESIGN PLANS
EST. 140 TONS CLASS II RIPRAP
EST. 210 SY GEOTEXTILE
FROM -L- STA. 46+70 LT TO STA. 47+38 LT

DETAIL 51
PIPE OUTLET CHANNEL BANK STABILIZATION
(Not to Scale)
Length= 36 Ft.
FROM STA. -L- 42+85 RT TO STA. -L- 43+27 RT

DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT

NOTE: CULVERT HAS 6 3' WIDE ALTERNATING BAFFLES (NOT SHOWN AT UPSTREAM FACE)

PROP. EXCAVATION
EST. 100 CY DDE
NATURAL GROUND
CLASS II RIP RAP W/GEOTEXTILE FABRIC
1.0' BAFFLE
BURY 1.0'
1' STREAM BENCH
OUTLET CHANNEL LOOKING DOWNSTREAM (NOT TO SCALE)

PROP. EXCAVATION
EST. 150 CY DDE*
NATURAL GROUND
CLASS II RIP RAP W/GEOTEXTILE FABRIC
1.0' BAFFLE
BURY 1.0'
1' STREAM BENCH
*QTY FOR RIPRAP LIMITS ONLY SEE DETAIL 6 FOR CHANNEL CHANGE QUANTITIES
INLET CHANNEL LOOKING UPSTREAM (NOT TO SCALE)

PREFORMED SCOUR HOLE
*NOT TO SCALE
PLAN VIEW
INSTALL LEVEL AND FLUSH WITH NATURAL GROUND
Pipe or Ditch Outlet
Square Preformed Scour Hole (PSH)
(Rip Rap in basin not shown for clarity)
SECTION A-A
INFLOW
UNDER CLASS II RIPRAP WITH GEOTEXTILE
MIN. 1' TUCK
B= 4 ft.
D= 2 ft.
W= 4 ft.
STA. -L- 43+95 RT

DETAIL 47
STREAMBANK STABILIZATION
(Not to Scale)
Type of Liner= 27 TONS,CL II Rip-Rap
Geotextile = 45 sy
FROM -L- STA. 45+75 RT TO -L- STA. 46+50 RT

DETAIL 55
STREAM BENCH
(Not to Scale)
LENGTH=20'
NOTE:
NATIVE MATERIAL TO BE USED FOR BENCH.
DETAIL LOOKING DOWNSTREAM.
EST. 6 CY FILL EA
FROM -L- STA. 43+14 RT TO -L- STA. 43+23 RT

DETAIL 54
STREAM BENCH
(Not to Scale)
LENGTH=10'
NOTE:
NATIVE MATERIAL TO BE USED FOR BENCH.
DETAIL LOOKING DOWNSTREAM.
EST. 3 CY FILL EA
FROM -L- STA. 44+00 LT TO -L- STA. 44+04 LT

REVISIONS

8/17/99

$$$$SYSTIME$$$$
$$$$USERNAME$$$$

PERMIT DRAWING
SHEET 8 OF 22

Prepared by
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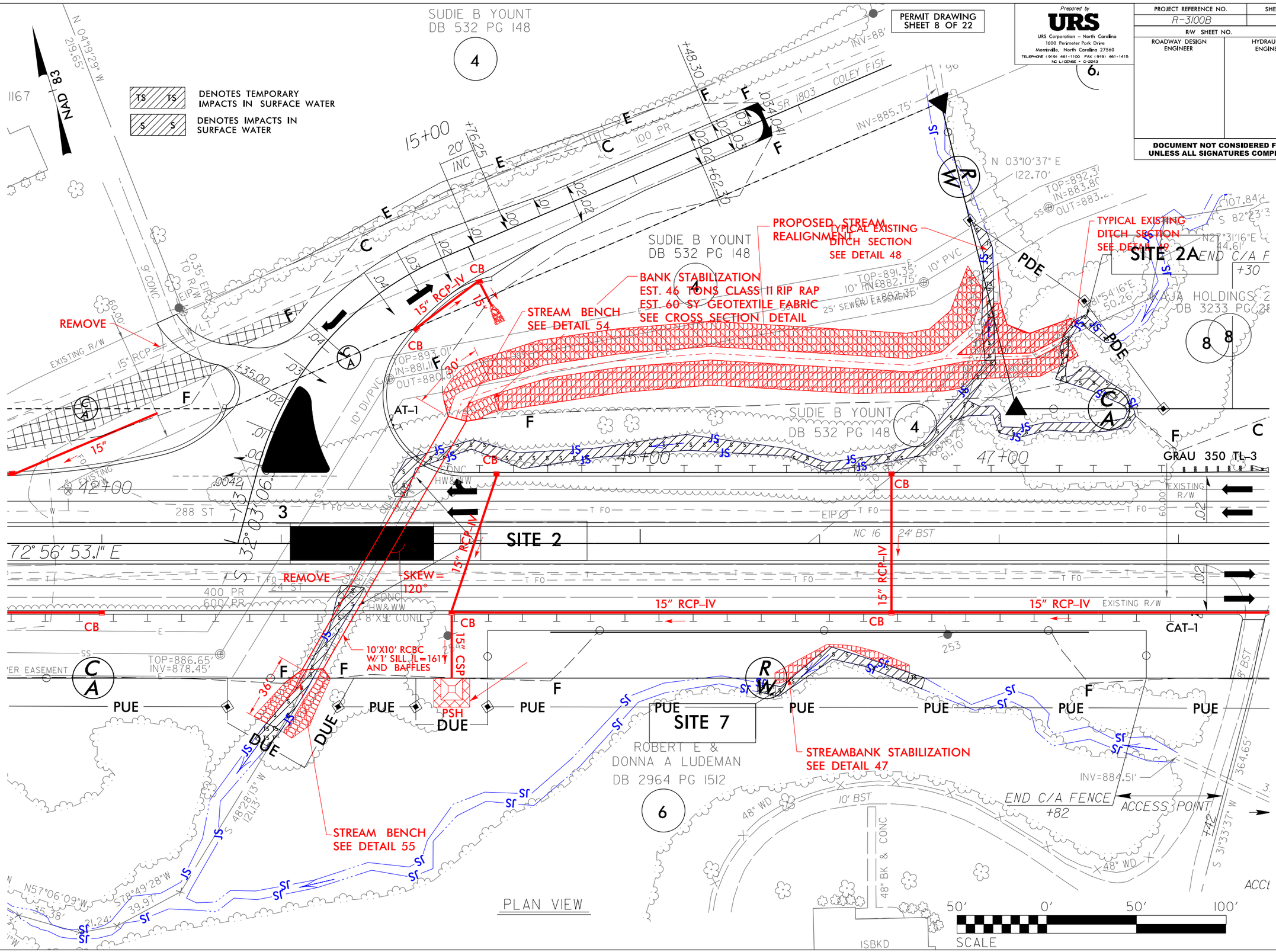
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

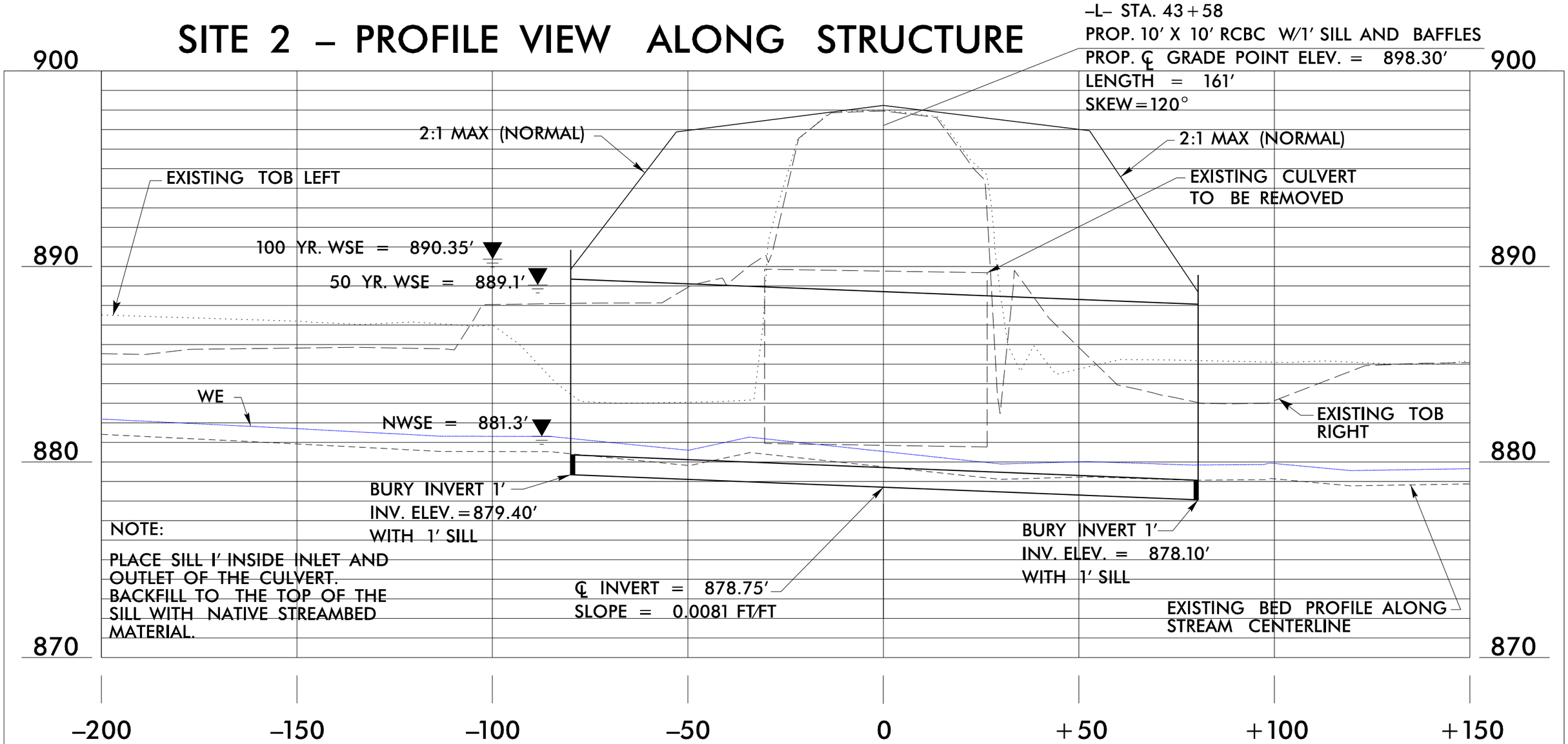
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

8/17/99

SITE 2 – PROFILE VIEW ALONG STRUCTURE



NOTE:

PLACE SILL 1' INSIDE INLET AND OUTLET OF THE CULVERT. BACKFILL TO THE TOP OF THE SILL WITH NATIVE STREAMBED MATERIAL.

PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	650	CFS
DESIGN FREQUENCY =	50	YR.
DEISGN WS ELEVATION =	889.1	FT.
BASE DISCHARGE =	800	CFS
BASE FREQUENCY =	100	YR.
BASE WS ELEVATION =	890.35	FT.
OT DISCHARGE =	1500	CFS
OT FREQUENCY =	>500	YR.
OT WS ELEVATION =	897.4	FT.

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

NC 16 NORTH OF SR 1801 (CLAREMONT RD) AND NORTH OF SR 1814 (CALDWELL RD)

SITE 2

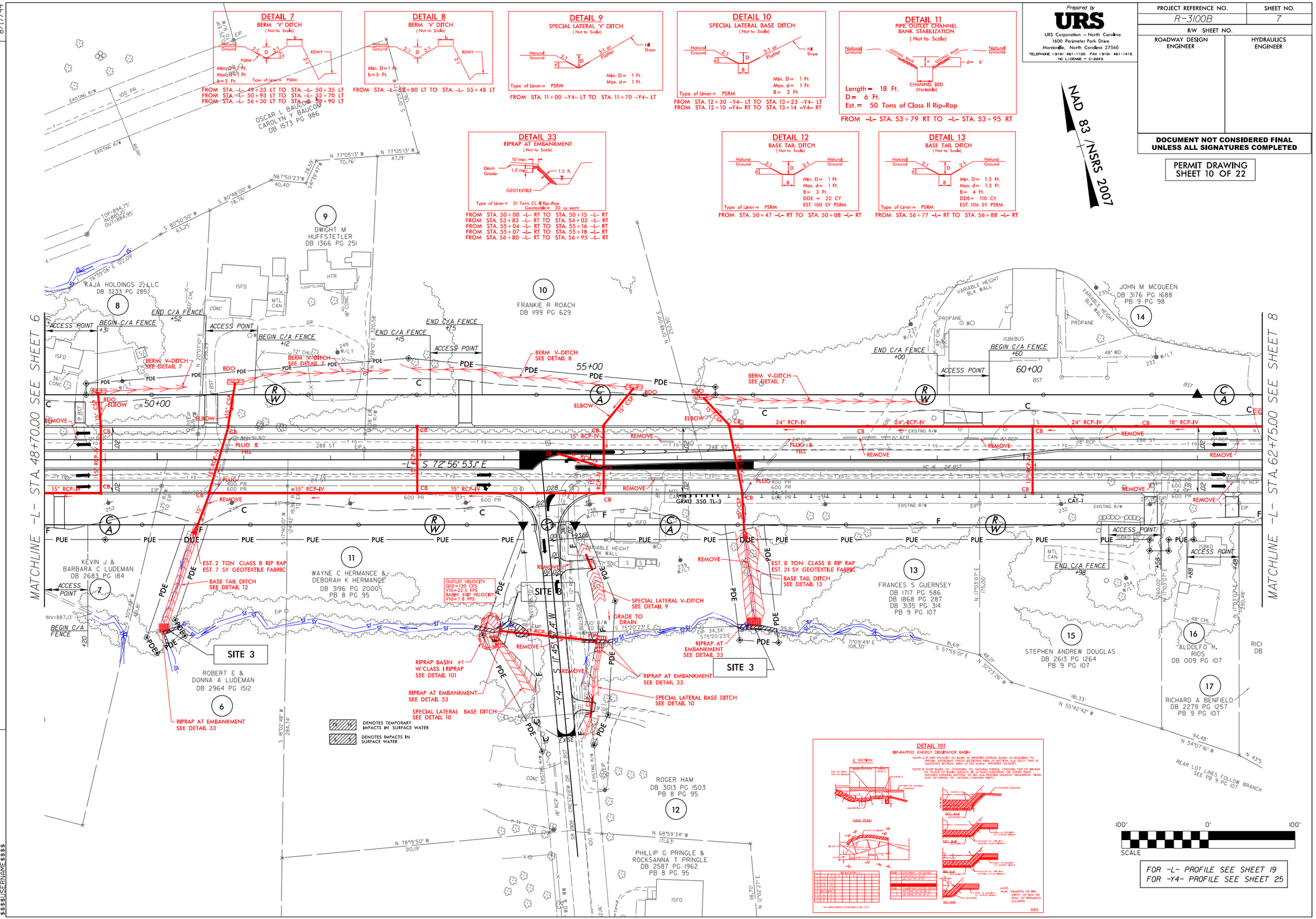
PERMIT DRAWING

SHEET 9 OF 22

02/20/17

8/17/99

REVISIONS



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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

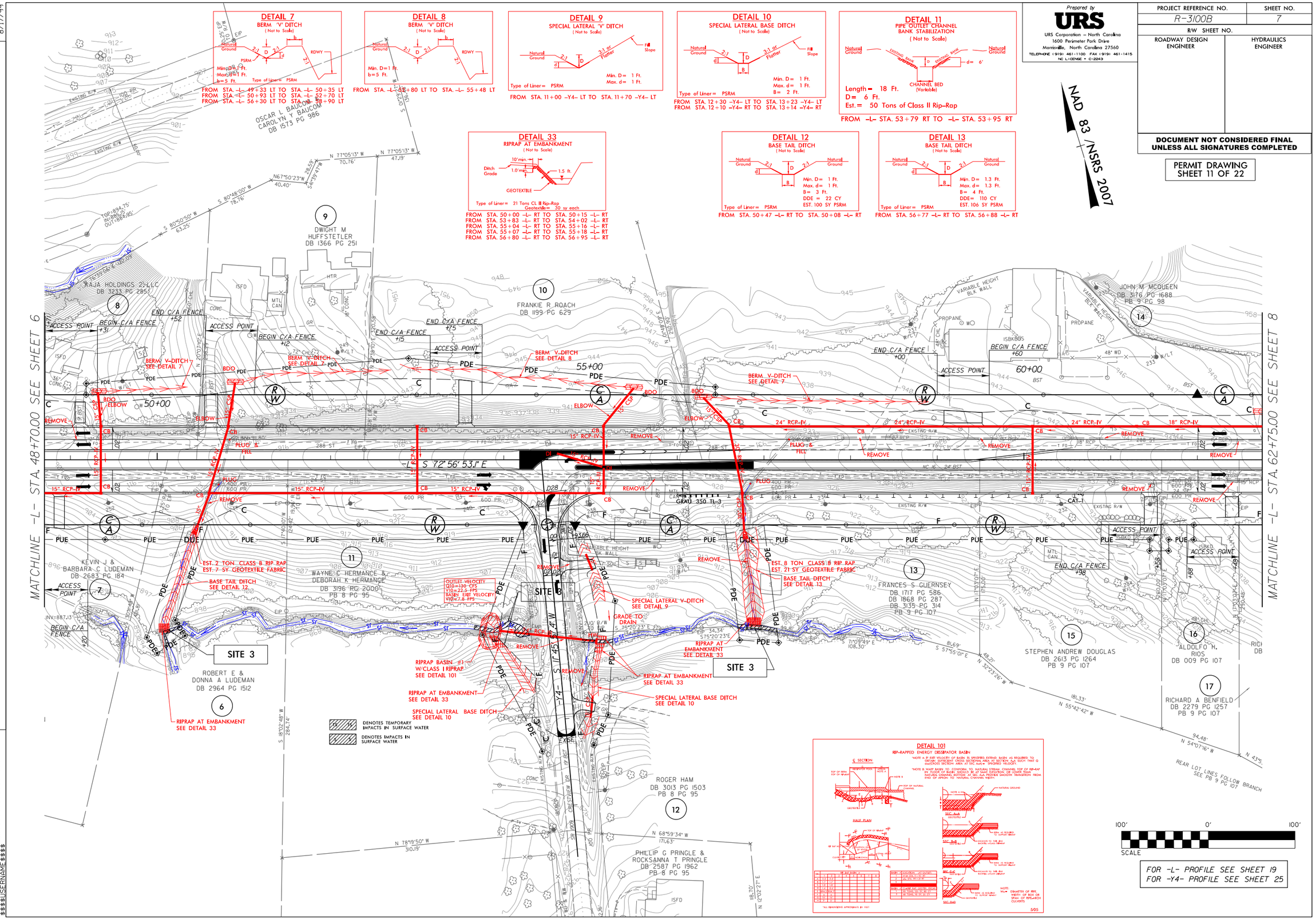
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 10 OF 22

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

8/17/99

REVISIONS



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PERMIT DRAWING
SHEET 11 OF 22

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

PERMIT DRAWING
SHEET 12 OF 22

Prepared by
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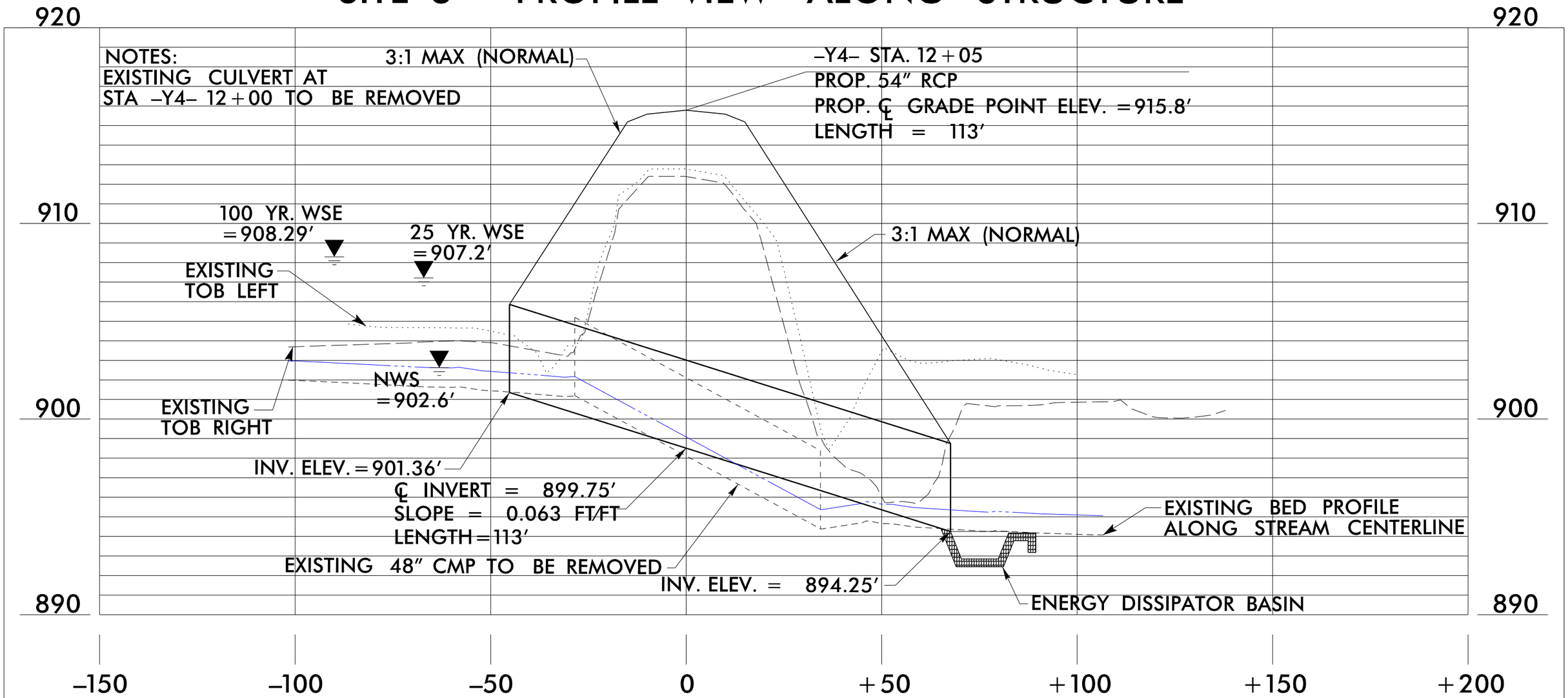
8/17/99

REVISIONS

BERM V-DITCH SEE DETAIL 7
BERM V-DITCH SEE DETAIL 7
BERM V-DITCH SEE DETAIL 8
ACCESS POINT
50+00
55+00
BDO
ELBOW
15" CSP
CB
PLUG & FILL
15" RCP-IV
REMOVE
PLUG
24" RCP
30" RCP-V
30" CSP
15" RCP-III
DI
-L- S 72° 56' 53.1" E
288 ST
24 ST
GRAU 350 TL-3
EST. 2 TON CLASS B RIP RAP
EST. 7 SY GEOTEXTILE FABRIC
BASE TAIL DITCH SEE DETAIL 12
WAYNE C HERMANCE & DEBORAH K HERMANCE
DB 3196 PG 2000
PB 8 PG 95
OUTLET VELOCITY
Q10=130 CFS
V10=22.5 FPS
BASIN EXIT VELOCITY
V10=7.8 FPS
SITE 3
SITE 6
SITE 3
SITE 3
SPECIAL LATERAL V-DITCH SEE DETAIL 9
GRADE TO DRAIN
54" RCP
HW
RIPRAP AT EMBANKMENT SEE DETAIL 33
RIPRAP BASIN #1 W/CLASS I RIPRAP SEE DETAIL 101
RIPRAP AT EMBANKMENT SEE DETAIL 33
SPECIAL LATERAL BASE DITCH SEE DETAIL 10
SPECIAL LATERAL BASE DITCH SEE DETAIL 10
RIPRAP AT EMBANKMENT SEE DETAIL 33
ROBERT E & DONNA A LUDEMAN
DB 2964 PG 1512
RIPRAP AT EMBANKMENT SEE DETAIL 33
EST. 8 TO
EST. 21 SY
BASE SEE
VARIABLE HEIGHT BK WALL
S 11° 45' 57.4" W
-Y4-
S 18°02'48" W
284.74'
NAD 83
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
S S DENOTES IMPACTS IN SURFACE WATER
50' 0' 50' 100'
SCALE

SITE 3 – PROFILE VIEW ALONG STRUCTURE



PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	150	CFS
DESIGN FREQUENCY =	25	YR.
DESIGN WS ELEVATION =	907.2	FT.
BASE DISCHARGE =	180	CFS
BASE FREQUENCY =	100	YR.
BASE WS ELEVATION =	908.29	FT.
OT DISCHARGE =	264	CFS
OT FREQUENCY =	200+	YR.
OT WS ELEVATION =	912.5	FT.

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

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DIVISION OF HIGHWAYS

CATAWBA COUNTY

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NC 16 NORTH OF SR 1801 (CLAREMONT RD)

AND NORTH OF SR 1814 (CALDWELL RD)

SITE 3

PERMIT DRAWING

SHEET 13 OF 22

02/20/17

8/17/99

REVISIONS

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URS
URS Corporation – North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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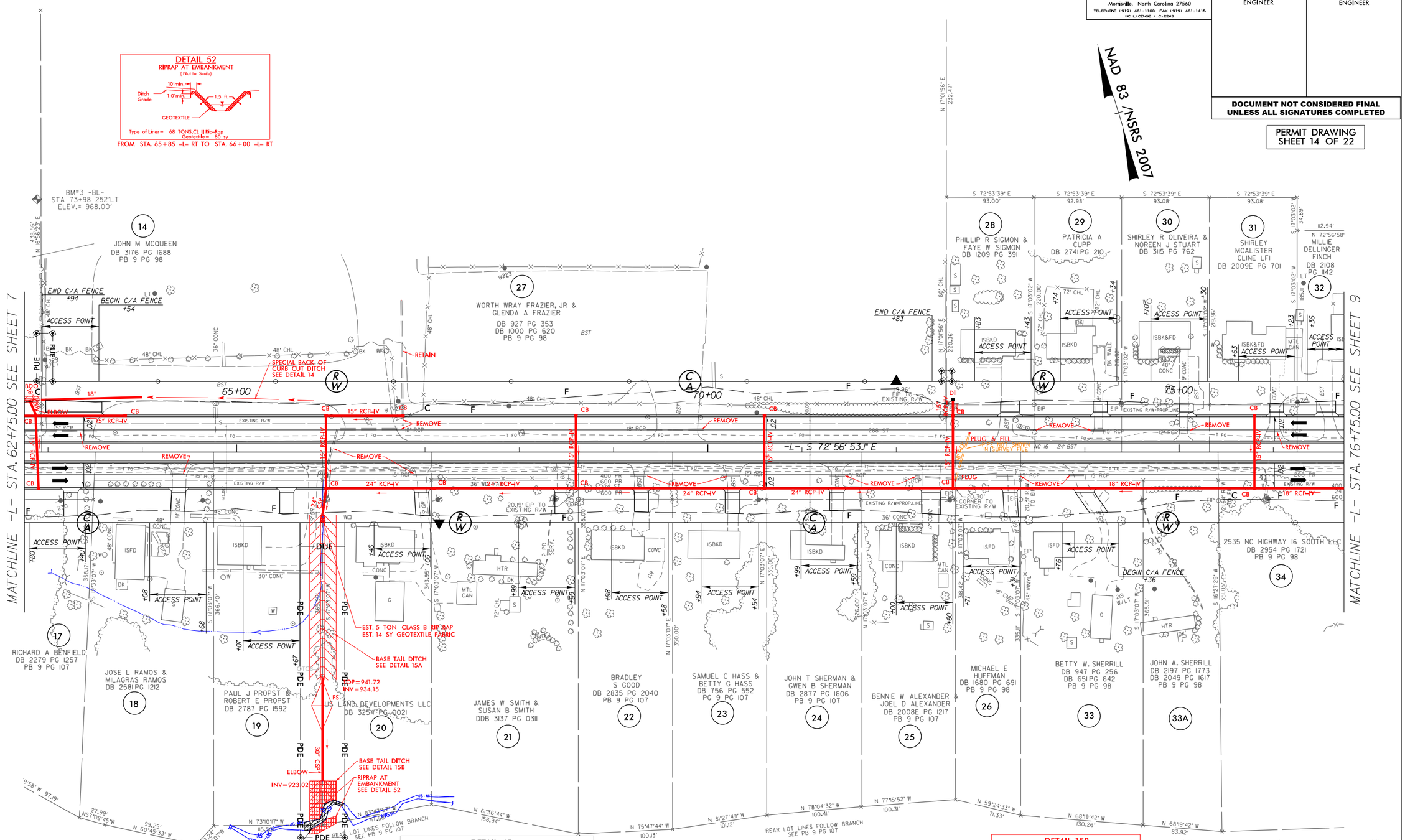
SHEET 14 OF 22

NAD 83 /NSRS 2007



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

8/17/99

REVISIONS

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$$$$USERNAME$$$$

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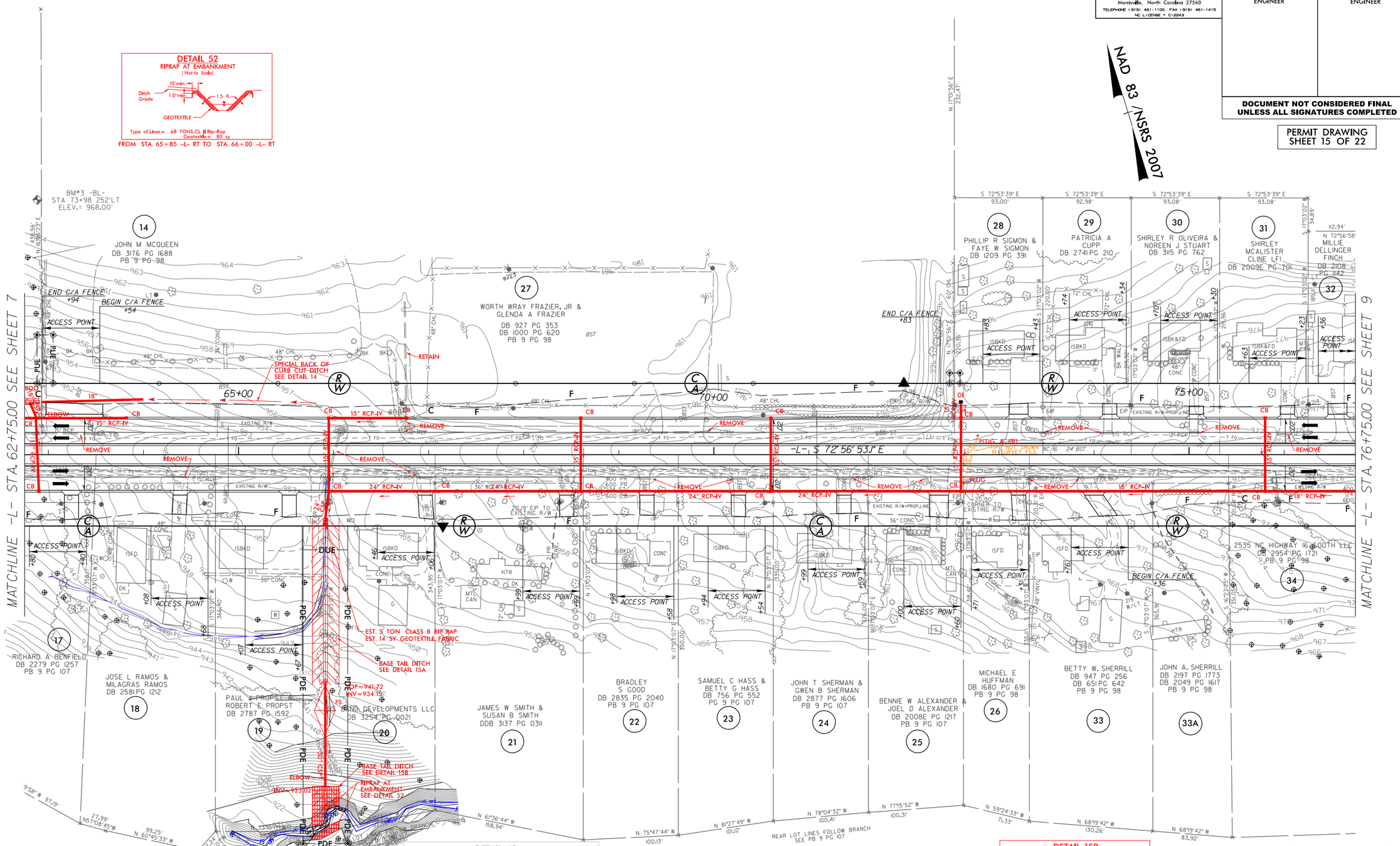
SHEET 15 OF 22

NAD 83 /NSRS 2007



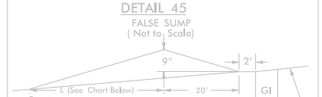
FOR -L- PROFILE SEE SHEET 20

DETAIL 52
RIPRAP AT EMBANKMENT
(Not to Scale)

Type of Liner= 68 TONS,CL II Rip-Rap
Geotextile= 80 sy

FROM STA. 65+85 -L- RT TO STA. 66+00 -L- RT

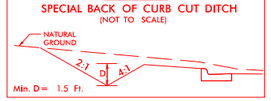
DETAIL 45
FALSE SUMP
(Not to Scale)



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

FROM STA. 65+91 -L- RT

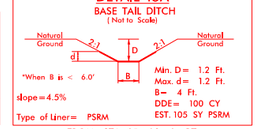
DETAIL 14
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)



Min. D= 1.5 Ft.

FROM STA. 62+90 -L- LT TO STA. 65+82 -L- LT

DETAIL 15A
BASE TAIL DITCH
(Not to Scale)

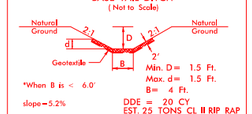


Min. D= 1.2 Ft.
Max. d= 1.2 Ft.
B= 4 Ft.
DDE= 100 CY
EST. 105 SY PSRM

Type of Liner= PSRM

FROM STA. 65+92 -L- RT

DETAIL 15B
BASE TAIL DITCH
(Not to Scale)



Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 4 Ft.
DDE = 20 CY
EST. 25 TONS CL II RIP RAP

Type of Liner= Class II Rip-Rap

FROM STA. 65+92 -L- RT (DOWNSTREAM OF PIPE)

8/17/99

REVISIONS

$$$$$SYSTIME$$$$
$$$$$DGN$$$$$

8/17/99

REVISIONS

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PERMIT DRAWING
SHEET 18 OF 22

NAD 83 /NSRS 2007

DETAIL 41
PIPE CHANNEL BANK STABILIZATION
(Not to Scale)

Natural Ground — Existing Bank — d — 2.0' — Existing Bank — Natural Ground — CHANNEL BED (Variable)

Length= VARIABLE
CLASS II RIP RAP
D= 5 Ft.

FROM STA. 189+19 -L- LT TO STA. 189+38 -L- LT
FROM STA. 191+28 -L- RT TO STA. 191+43 -L- RT
FROM STA. 192+68 -L- RT TO STA. 192+97 -L- RT
FROM STA. 193+10 -L- LT TO STA. 193+27 -L- LT

DETAIL 42
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

Natural Ground — 2:1 — d — D — 2:1 or Flatter — Fill Slope

Type of Liner= PSRM
Min. D= 1 Ft.
Max. d= 1 Ft.

FROM STA. 192+97 -L- RT TO STA. 195+00 -L- RT

DETAIL 43
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Natural Ground — 2:1 — d — D — B — 2:1 or Flatter — Fill Slope

Type of Liner= PSRM
Min. D= 1.4 Ft.
Max. d= 1 Ft.
B= 4 Ft.

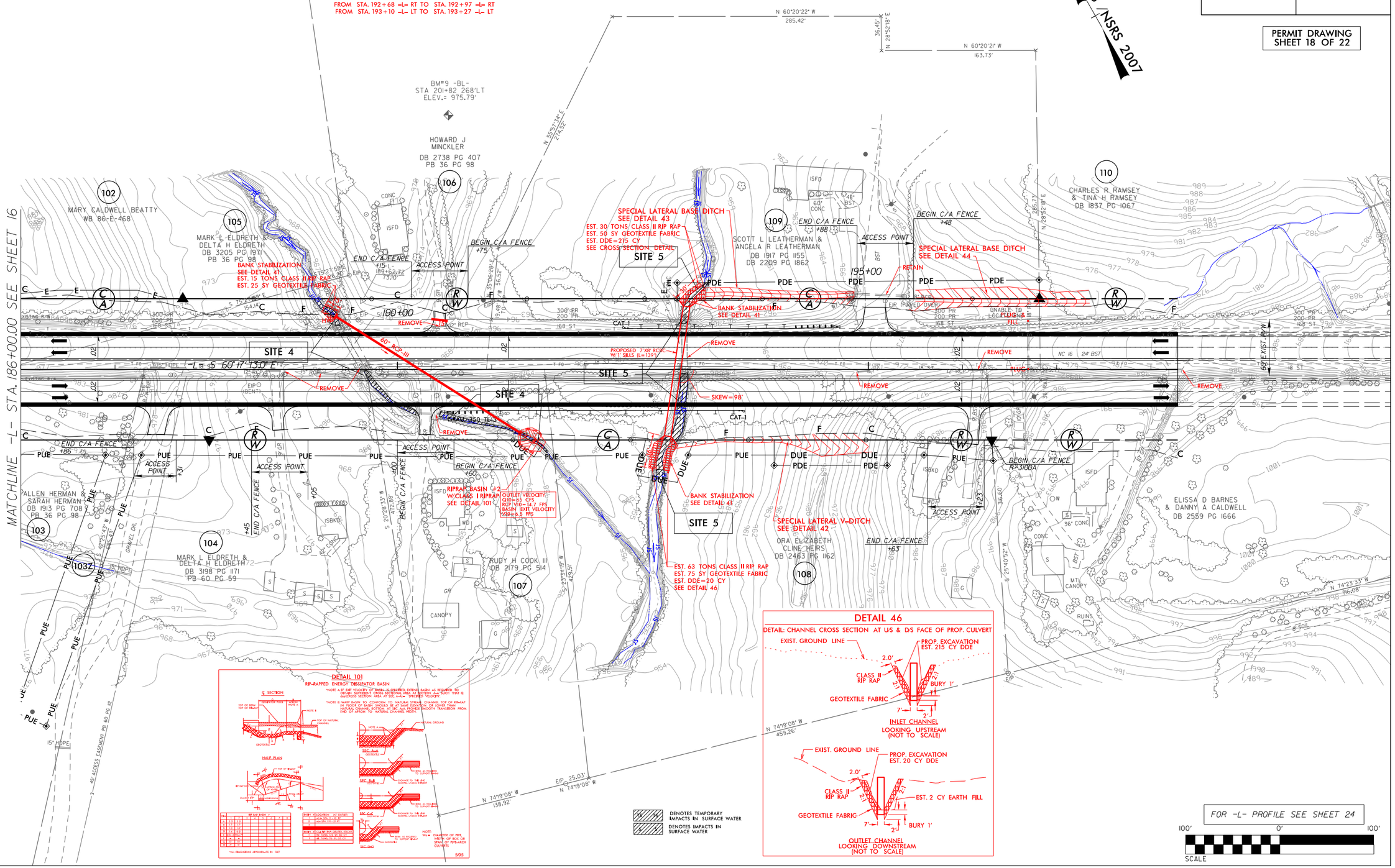
FROM STA. 193+26 -L- LT TO STA. 194+85 -L- LT

DETAIL 44
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Natural Ground — 2:1 — d — D — B — 4:1 — Fill Slope

Type of Liner= PSRM
Min. D= 1.4 Ft.
Max. d= 1 Ft.
B= 5 Ft.

FROM STA. 195+37 -L- LT TO STA. 197+43 -L- LT



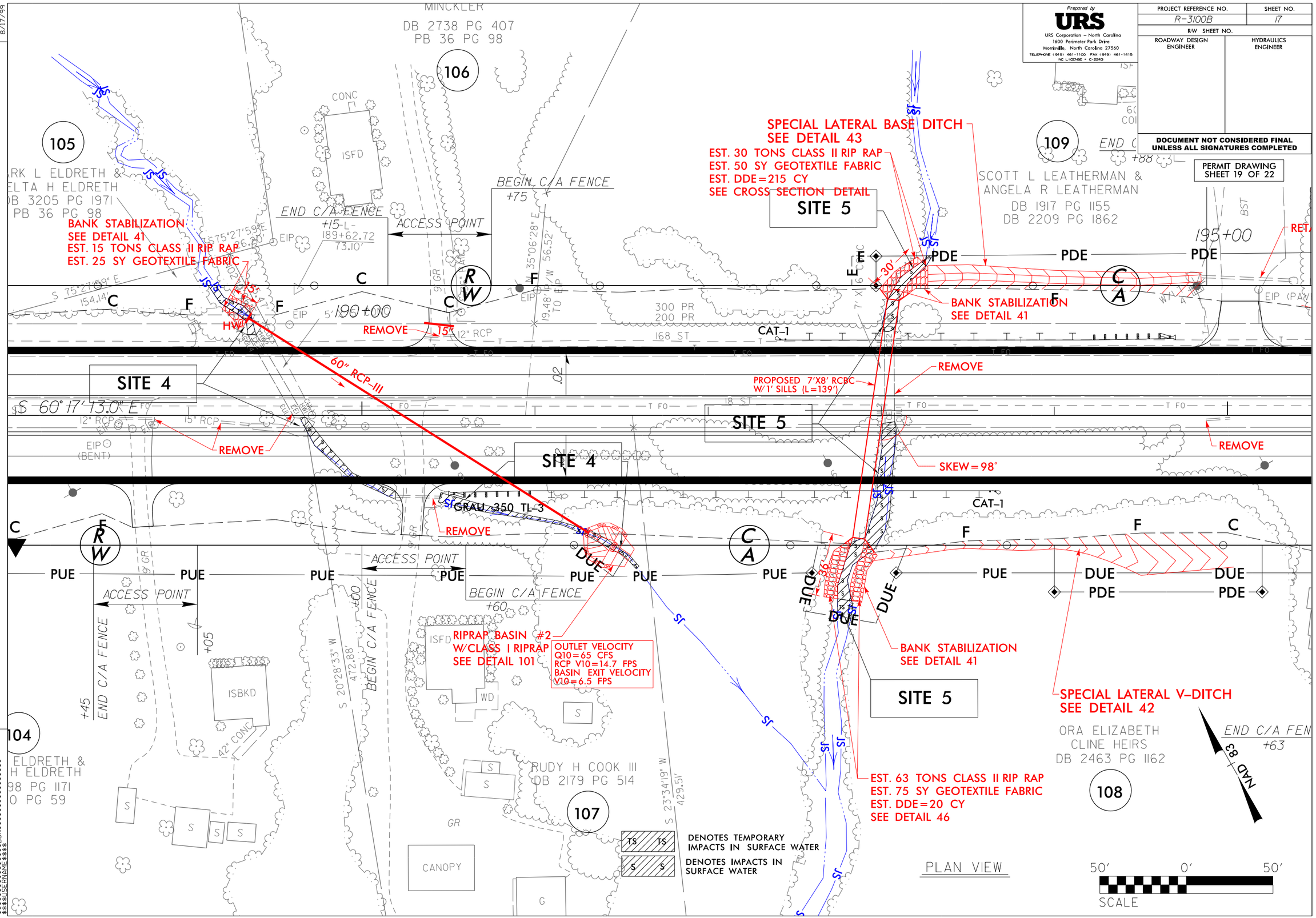
DETAIL 101
RIP-RAPPED ENERGY DISSIPATOR BASIN

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

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

DETAIL 46
DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT

$$$$$SYSTIME$$$$$
$$$$$DGNNAME$$$$$
$$$$$USERNAME$$$$$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HYDRAULICS ENGINEER
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PERMIT DRAWING SHEET 19 OF 22
8/17/99
REVISIONS
MINCKLER
DB 2738 PG 407
PB 36 PG 98
106
105
ARK L ELDRETH &
ELTA H ELDRETH
DB 3205 PG 1971
PB 36 PG 98
CONC
ISFD
BEGIN C/A FENCE
+75
END C/A FENCE
+15-L-
189+62.72
73.10'
ACCESS POINT
BANK STABILIZATION
SEE DETAIL 41
EST. 15 TONS CLASS II RIP RAP
EST. 25 SY GEOTEXTILE FABRIC
S 75°27'59" E
154.14'
190+00
REMOVE
15"
12" RCP
HW
60" RCP-III
SITE 4
S 60°17'13.0" E
15" RCP
REMOVE
EIP (BENT)
GRAU 350 TL-3
REMOVE
ACCESS POINT
BEGIN C/A FENCE
+60
RIPRAP BASIN #2
W/CLASS I RIPRAP
SEE DETAIL 101
OUTLET VELOCITY
Q10=65 CFS
RCP V10=14.7 FPS
BASIN EXIT VELOCITY
V10=6.5 FPS
ISFD
WD
ISBKD
42" CONC
END C/A FENCE
+45
ACCESS POINT
+05
S 20°28'33" W
472.88'
BEGIN C/A FENCE
+00
104
ELDRETH &
H ELDRETH
98 PG 1171
0 PG 59
RUDY H COOK III
DB 2179 PG 514
107
CANOPY
GR
S 23°34'19" W
429.51'
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
SPECIAL LATERAL BASE DITCH
SEE DETAIL 43
EST. 30 TONS CLASS II RIP RAP
EST. 50 SY GEOTEXTILE FABRIC
EST. DDE=215 CY
SEE CROSS SECTION DETAIL
SITE 5
109
END C/A
+88
SCOTT L LEATHERMAN &
ANGELA R LEATHERMAN
DB 1917 PG 1155
DB 2209 PG 1862
195+00
RET
300 PR
200 PR
168 ST
CAT-1
30'
BANK STABILIZATION
SEE DETAIL 41
REMOVE
PROPOSED 7'X8' RCBC
W/1' SILLS (L=139')
SKEW=98°
REMOVE
REMOVE
CAT-1
BANK STABILIZATION
SEE DETAIL 41
SITE 5
SPECIAL LATERAL V-DITCH
SEE DETAIL 42
ORA ELIZABETH
CLINE HEIRS
DB 2463 PG 1162
108
END C/A FEN
+63
EST. 63 TONS CLASS II RIP RAP
EST. 75 SY GEOTEXTILE FABRIC
EST. DDE=20 CY
SEE DETAIL 46
NAD 83
PLAN VIEW
50' 0' 50'
SCALE

8/17/99

REVISIONS

$$$$$SYSTIME$$$$
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8/17/99

REVISIONS

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PERMIT DRAWING
SHEET 18 OF 22

NAD 83 /NSRS 2007

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PIPE CHANNEL BANK STABILIZATION
(Not to Scale)

Natural Ground — Existing Bank — d — 2.0' — Existing Bank — Natural Ground — CHANNEL BED (Variable)

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FROM STA. 189+19 -L- LT TO STA. 189+38 -L- LT
FROM STA. 191+28 -L- RT TO STA. 191+43 -L- RT
FROM STA. 192+68 -L- RT TO STA. 192+97 -L- RT
FROM STA. 193+10 -L- LT TO STA. 193+27 -L- LT

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Natural Ground — 2:1 — d — D — 2:1 or Flatter — Fill Slope

Type of Liner= PSRM
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Max. d= 1 Ft.

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(Not to Scale)

Natural Ground — 2:1 — d — D — B — 2:1 or Flatter — Fill Slope

Type of Liner= PSRM
Min. D= 1.4 Ft.
Max. d= 1 Ft.
B= 4 Ft.

FROM STA. 193+26 -L- LT TO STA. 194+85 -L- LT

DETAIL 44
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Natural Ground — 2:1 — d — D — B — 4:1 — Fill Slope

Type of Liner= PSRM
Min. D= 1.4 Ft.
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B= 5 Ft.

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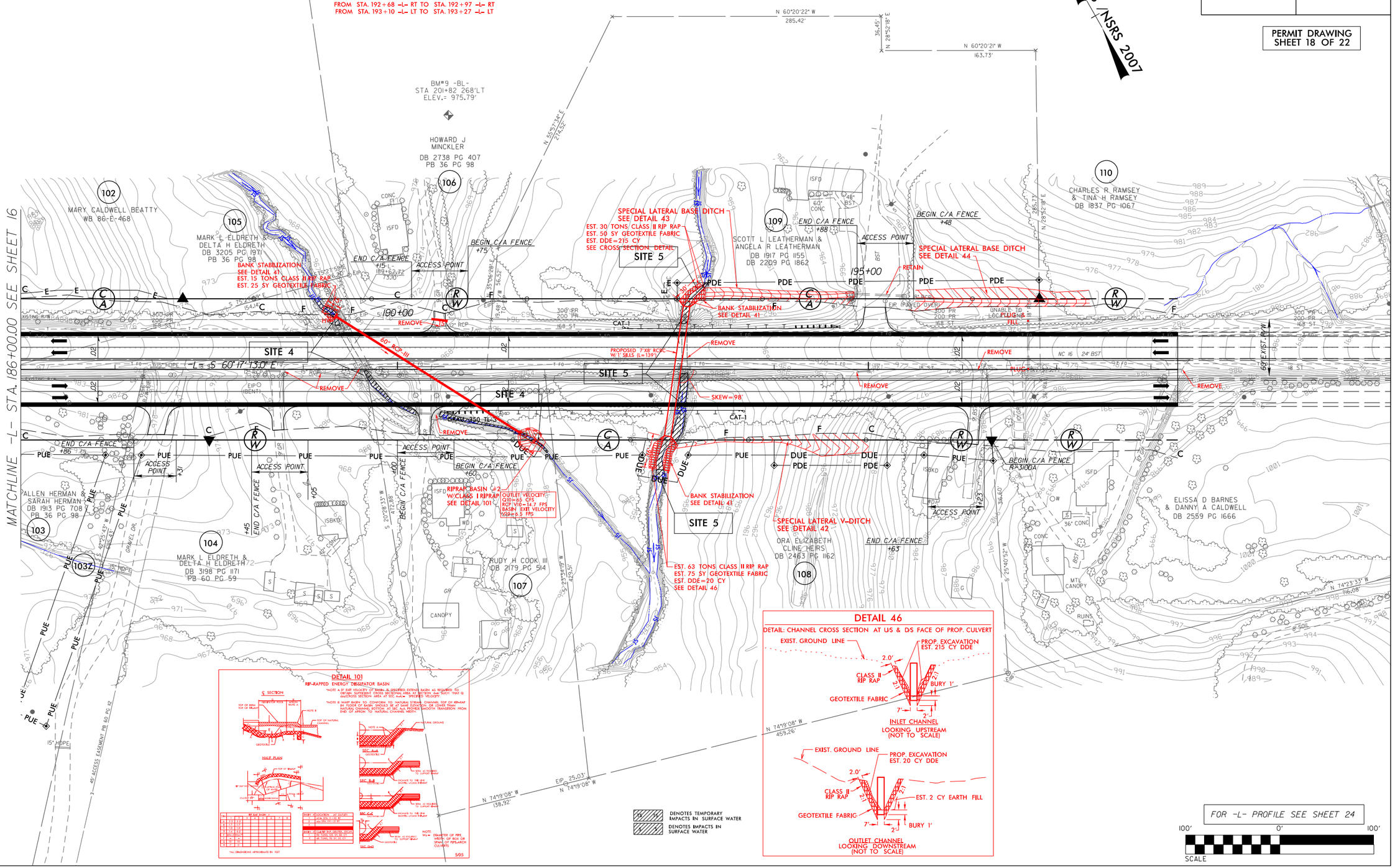

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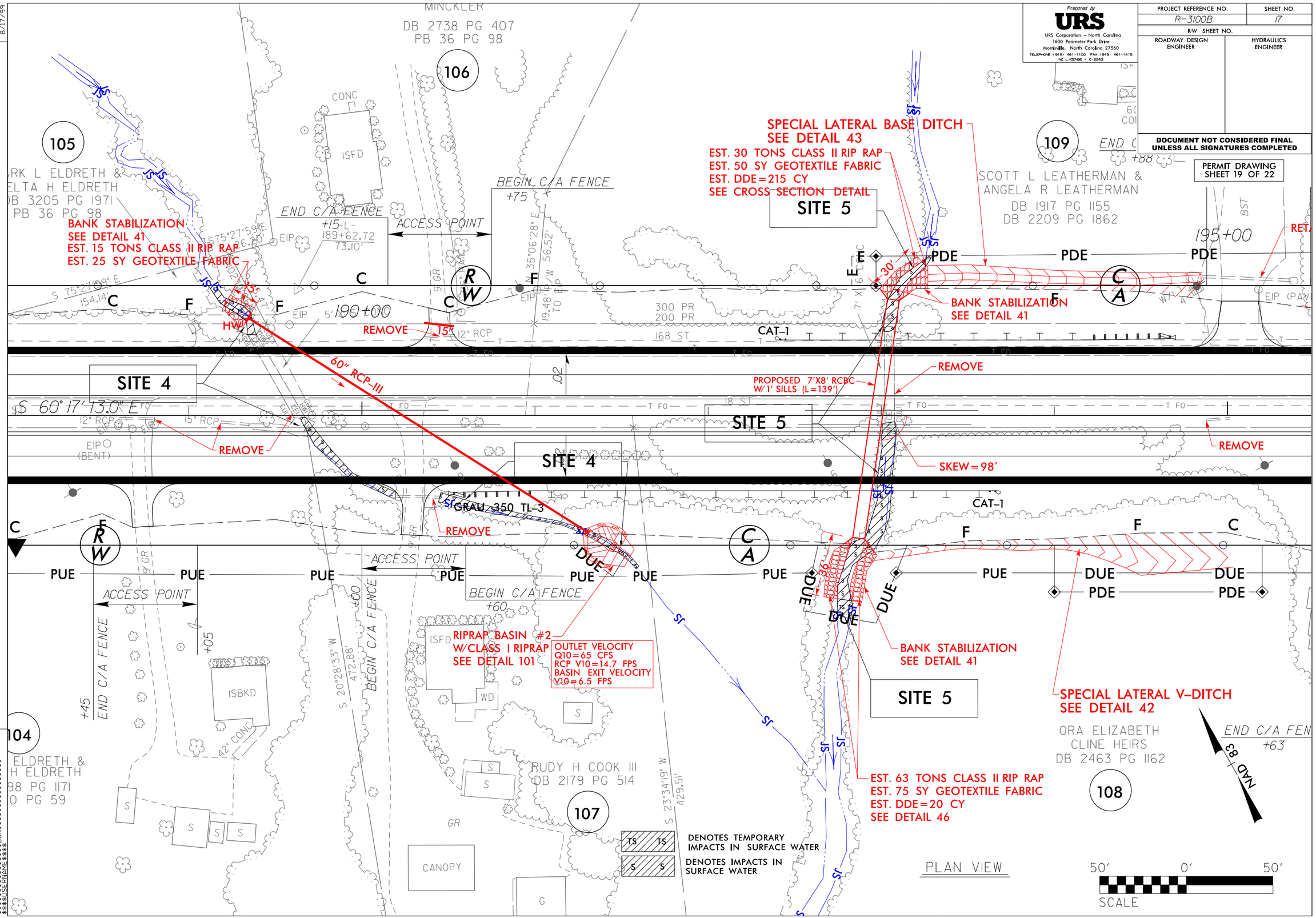
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BEGIN C/A FENCE
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END C/A FENCE
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S 75°27'59" E
154.14'
190+00
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15"
12" RCP
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60" RCP-III
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S 60°17'13.0" E
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WD
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PROPOSED 7'X8' RCBC
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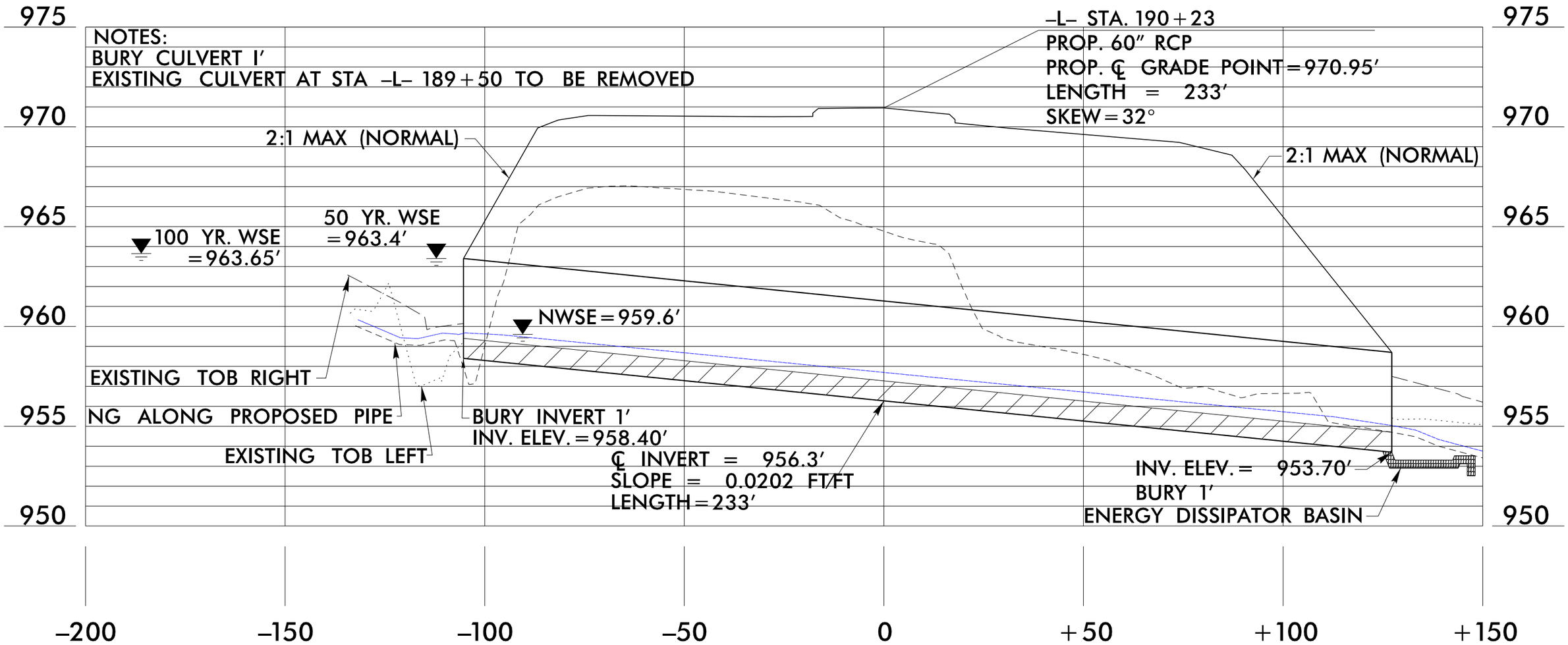
EST. 63 TONS CLASS II RIP RAP
EST. 75 SY GEOTEXTILE FABRIC
EST. DDE=20 CY
SEE DETAIL 46
NAD 83
PLAN VIEW
50' 0' 50'
SCALE

SITE 4 – PROFILE VIEW ALONG STRUCTURE



PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	80	CFS
DESIGN FREQUENCY =	50	YR.
DESIGN WS ELEVATION =	963.4	FT.
BASE DISCHARGE =	85	CFS
BASE FREQUENCY =	100	YR.
BASE WS ELEVATION =	963.65	FT.
OT DISCHARGE =	368	CFS
OT FREQUENCY =	500+	YR.
OT WS ELEVATION =	970.1	FT.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

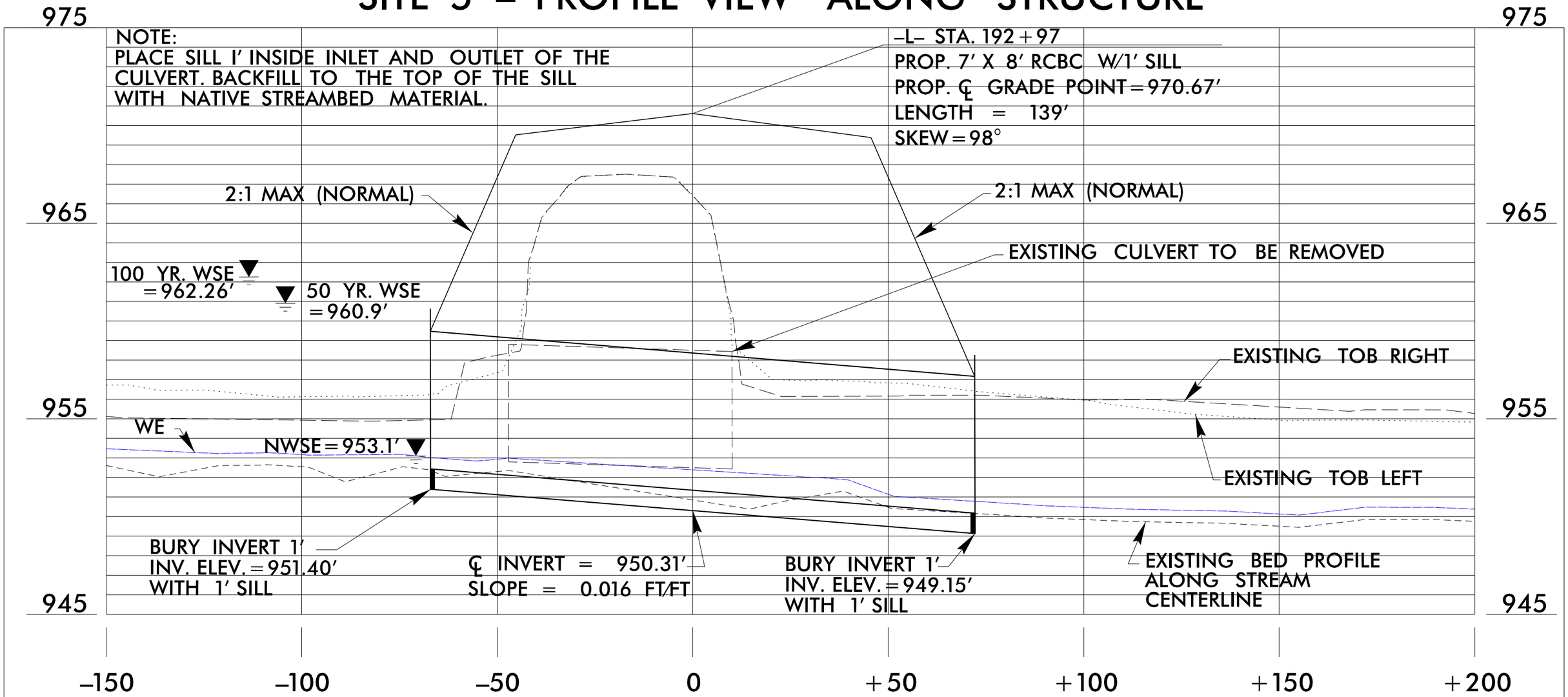
NC 16 NORTH OF SR 1801 (CLAREMONT RD)
AND NORTH OF SR 1814 (CALDWELL RD)

SITE 4

PERMIT DRAWING
SHEET 20 OF 22

02/20/17

SITE 5 – PROFILE VIEW ALONG STRUCTURE



PROFILE

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE =	480	CFS
DESIGN FREQUENCY =	50	YR.
DEISGN WS ELEVATION =	960.9	FT.
BASE DISCHARGE =	580	CFS
BASE FREQUENCY =	100	YR.
BASE WS ELEVATION =	962.26	FT.
OT DISCHARGE =	1100	CFS
OT FREQUENCY =	>500	YR.
OT WS ELEVATION =	970.5	FT.

Native Material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow culvert barrel. Rip rap may be used to supplement the Native Material in the high flow culvert barrel(s). If rip rap is used to line the high flow culvert barrel(s), Native Material should be placed on top to fill voids and provide a flat surface for animal passage. Native Material is subject to approval by the engineer and may be subject to permit conditions.

NCDOT

DIVISION OF HIGHWAYS

CATAWBA COUNTY

PROJECT: 34522.1.4 (R-3100B)

NC 16 NORTH OF SR 1801 (CLAREMONT RD) AND NORTH OF SR 1814 (CALDWELL RD)

SITE 5

PERMIT DRAWING

SHEET 21 OF 22

02/20/17

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	28+68 to 29+16 -L-	6'x7' RCBC (Culvert)						0.01		99		
1	28+68 to 29+16 -L-	6'x7' RCBC (Stream)							< 0.01		52	
1	28+68 to 29+16 -L-	Bank Stabilization						< 0.01	< 0.01	48	3	
2	42+85 to 46+98 -L-	10'x10' RCBC (Culvert)						< 0.01		52		
2	42+85 to 46+98 -L-	Fill/Channel Relocation						0.05	< 0.01	413	32	
2	42+85 to 46+98 -L-	Bank Stabilization						< 0.01	< 0.01	39	11	
2A	46+79 to 47+76 -L-	Fill/Channel Relocation						0.02	< 0.01	177	33	
3 Center	11+82 to 12+18 -Y4-	54" RCP (Culvert)						< 0.01		55		
3	11+82 to 12+18 -Y4-	Bank Stabilization						< 0.01	< 0.01	33	16	
3 West	50+07 to 50+26 -L-	Bank Stabilization						< 0.01	< 0.01	22	27	
3 East	56+70 to 57+16 -L-	Bank Stabilization						< 0.01	< 0.01	17	45	
4	189+11 to 191+53 -L-	60" RCP (Culvert)						0.01		172		
4	189+11 to 191+53 -L-	60" RCP (Stream)							< 0.01		28	
4	189+11 to 191+53 -L-	Bank Stabilization						< 0.01	< 0.01	20	15	
5	192+75 to 193+30 -L-	7'x8' RCBC (Culvert)						0.02		92		
5	192+75 to 193+30 -L-	Bank Stabilization						< 0.01	< 0.01	66	16	
6	65+72 to 66+14 -L-	Bank Stabilization						< 0.01	< 0.01	40	14	
7	45+65 to 46+59 -L-	Bank Stabilization						0.01	< 0.01	84	19	
TOTALS*:								0.18	0.03	1429	311	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
02/20/2017
Catawba County
R-3100B
34522.1.4

Revised 2013 10 24

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3100A	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34522.1.3	STP-0016(52)	P.E.
34522.2.3	STP-0016(52)	R/W, UTIL.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA COUNTY

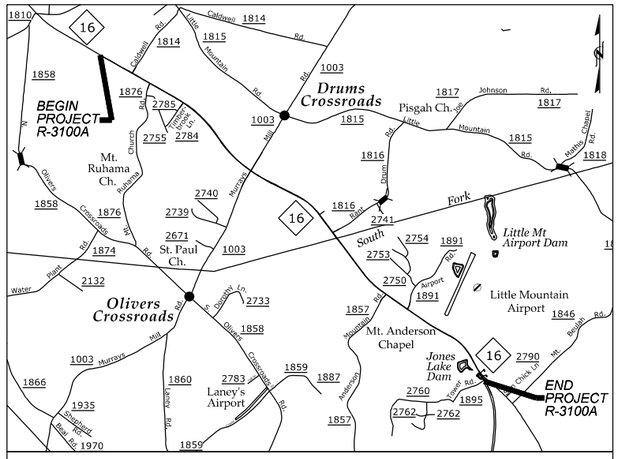
LOCATION: NC 16 FROM NORTH OF SR 1814 (CALDWELL ROAD) TO SR 1895 (TOWER ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND CULVERTS

PERMIT DRAWING
SHEET 2 OF 32

TIP PROJECT: R-3100A

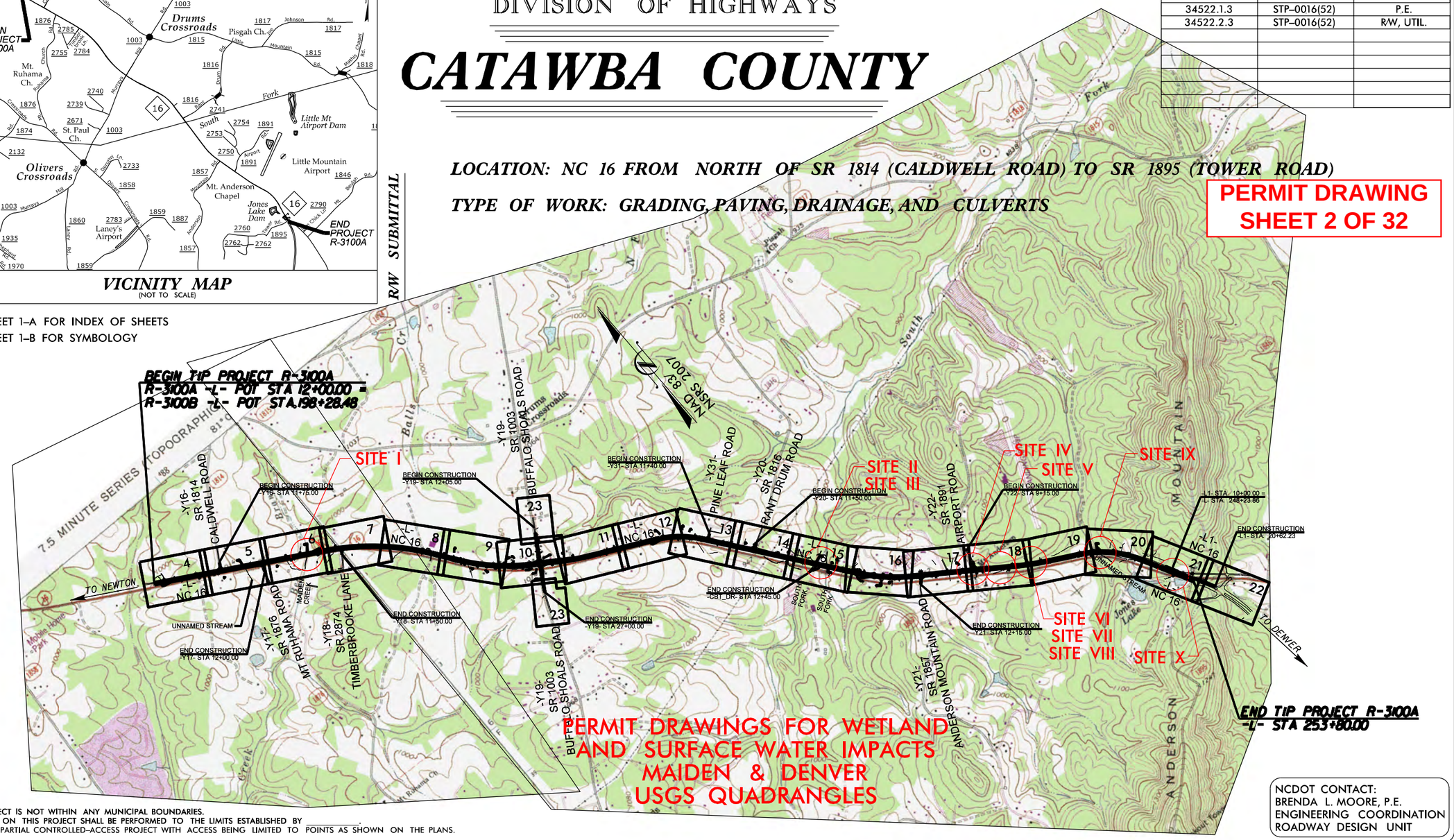
CONTRACT:



VICINITY MAP
(NOT TO SCALE)

R/W SUBMITTAL

SEE SHEET 1-A FOR INDEX OF SHEETS
SEE SHEET 1-B FOR SYMBOLOGY



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY _____.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

NCDOT CONTACT:
BRENDA L. MOORE, P.E.
ENGINEERING COORDINATION
ROADWAY DESIGN UNIT

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2014 = 10,100
ADT 2034 = 18,700
DHV = 10 %
D = 60 %
T = 9 % *
V = 60 MPH
* TTST 4% DUAL 5%
FUNC CLASS =
RURAL ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3100A = 4.781 MILES
TOTAL LENGTH OF TIP PROJECT R-3100A = 4.781 MILES

Prepared In the Office of:

PO Box 700
Fuquay-Varina, NC 27526
(919) 552-2253
(919) 552-2254 (Fax)
www.hatchmott.com
LICENSE NO. F-0669

Hatch Mott MacDonald

McKIM & CREED
NC LICENSE #F-0202
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL. (910) 343-1048 FAX. (910) 790-6282

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
AUGUST 30, 2013

LETTING DATE:
AUGUST 18, 2015

TIM JORDAN, PE
PROJECT ENGINEER

RICK MOORE, PE
HYDRAULICS PROJECT ENGINEER

ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SIGNATURE: P.E.

HYDRAULICS ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE HIGHWAY DESIGN ENGINEER

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

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD NC, P.L.L.C. LICENSE NO. F-0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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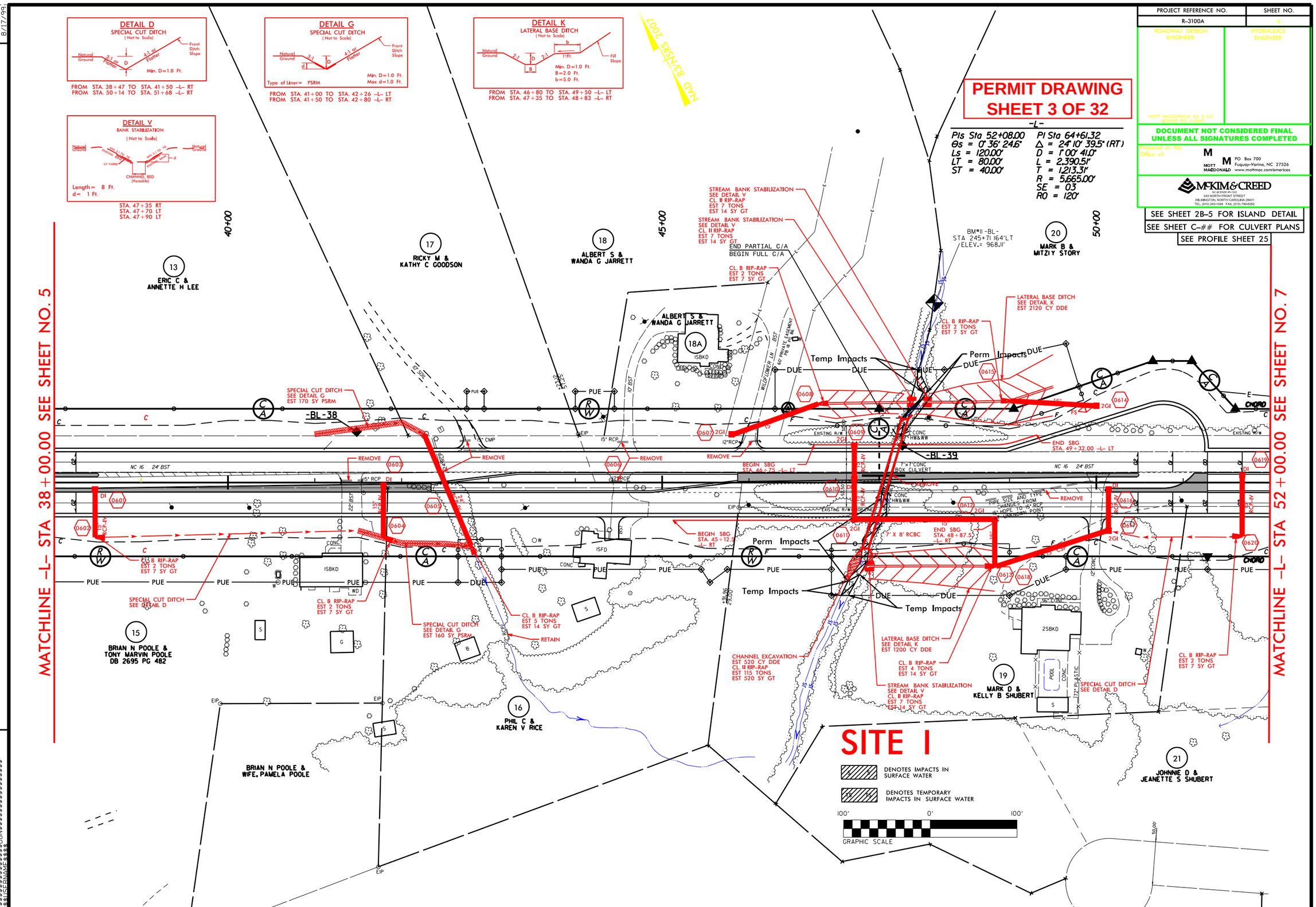
NC LICENSE #P-1122
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1948 FAX: (910) 790-0592

SEE SHEET 2B-5 FOR ISLAND DETAIL

SEE SHEET C-## FOR CULVERT PLANS

SEE PROFILE SHEET 25

PERMIT DRAWING SHEET 3 OF 32



REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	6

ROADWAY DESIGN

HYDRAULICS ENGINEER

MOTT MACDONALD NC, P.L.L.C. LICENSE NO. F-0669

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www.mottmac.com/americas

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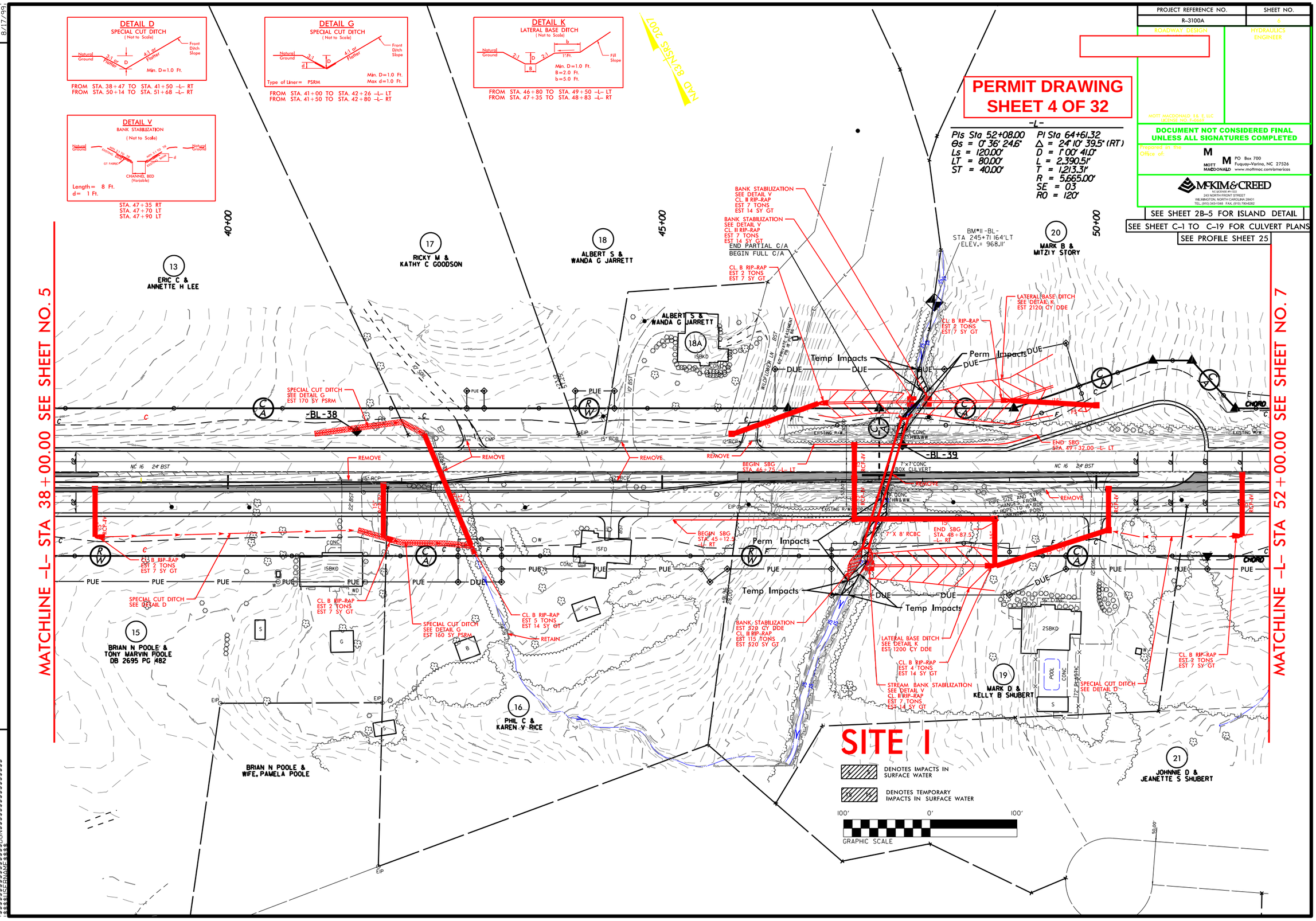
NC LICENSE #F-1312
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1948 FAX: (910) 763-6392

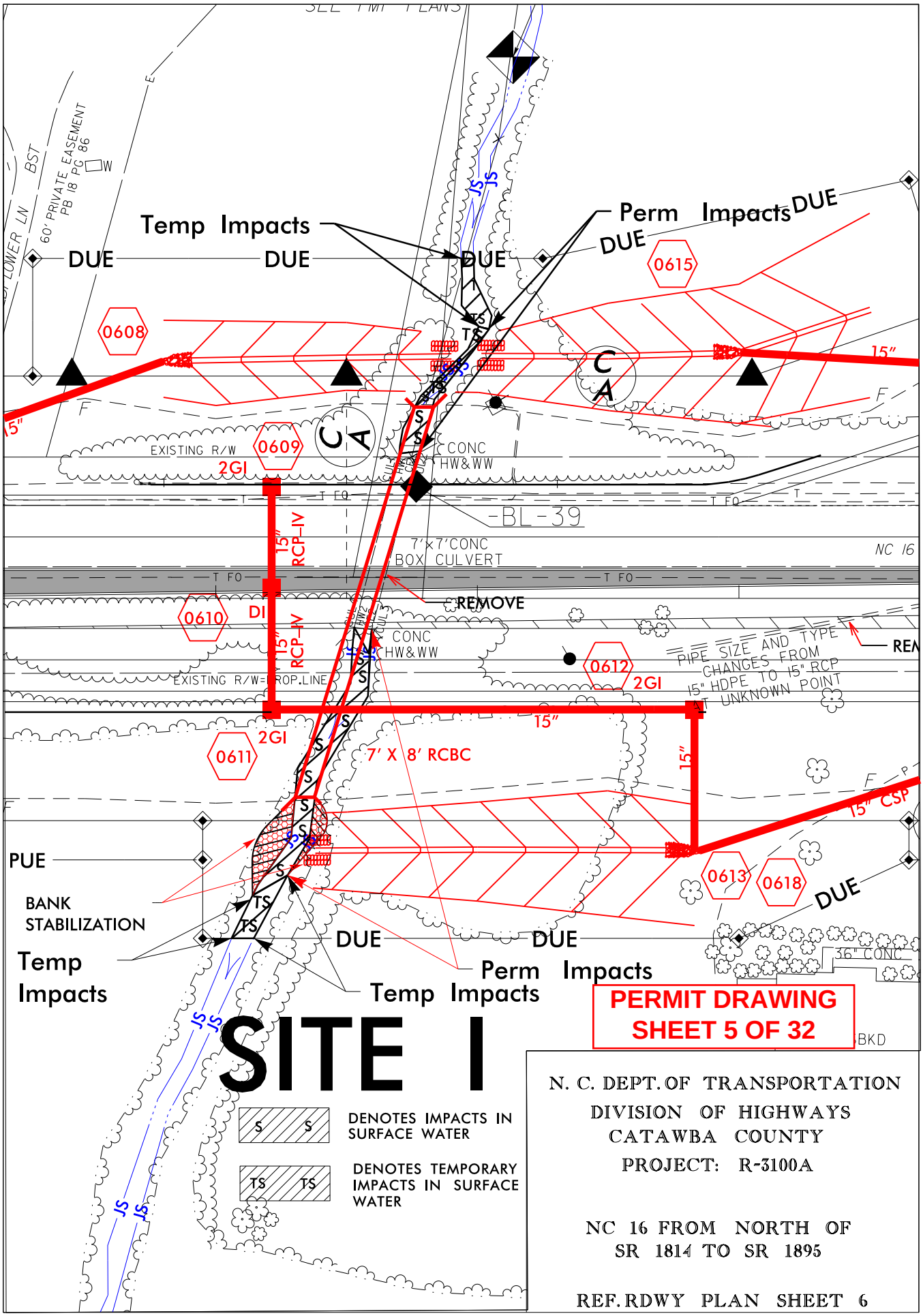
PERMIT DRAWING SHEET 4 OF 32

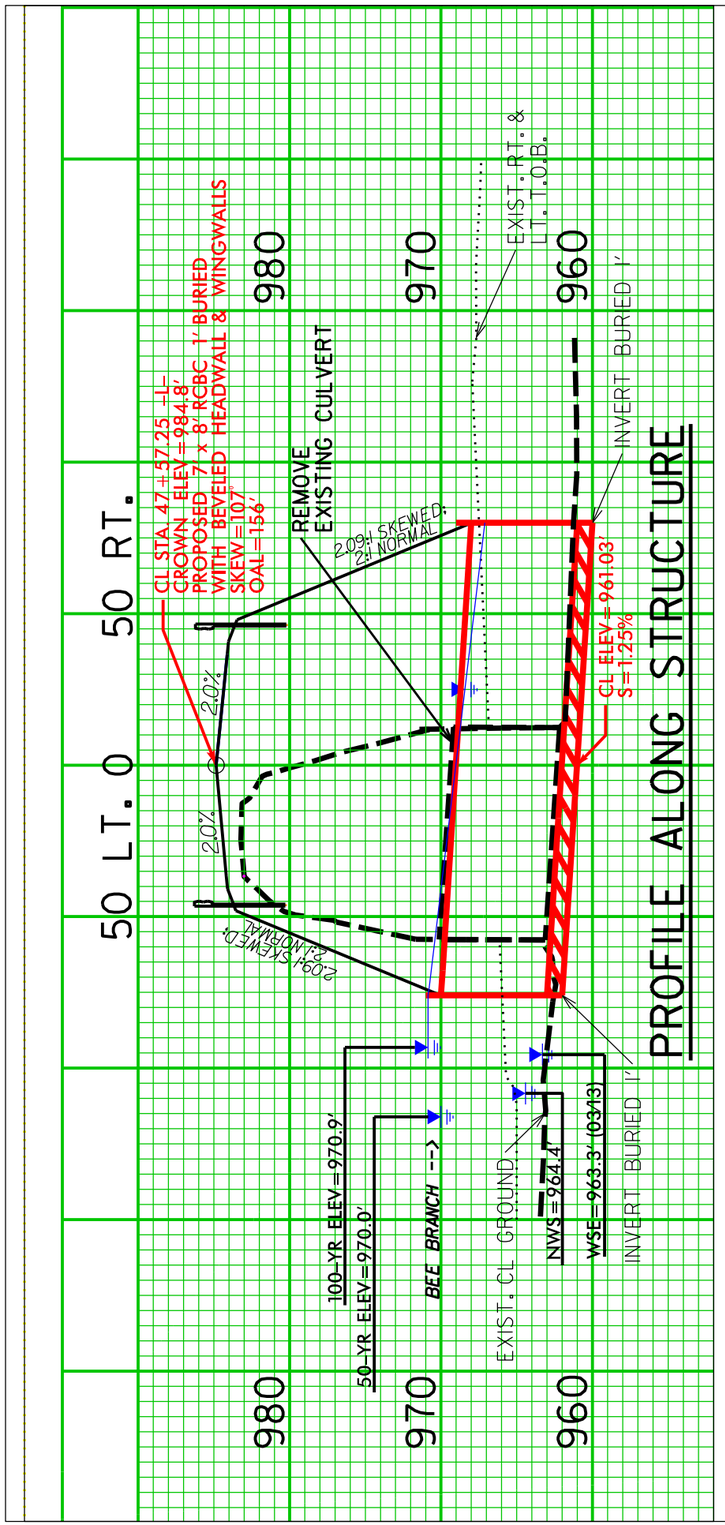
SEE SHEET 2B-5 FOR ISLAND DETAIL

SEE SHEET C-1 TO C-19 FOR CULVERT PLANS

SEE PROFILE SHEET 25




Temp Impacts
DUE
DUE
DUE
Perm Impacts
DUE
DUE
0608
0609
0610
0611
0612
0613
0615
0618
2GI
2GI
2GI
DI
15"
RCP-IV
15"
RCP-IV
15"
15"
15"
15" CSP
7' X 8' RCBC
EXISTING R/W
CONC
HW&WW
BL-39
7'x7'CONC
BOX CULVERT
NC 16
REMOVE
PIPE SIZE AND TYPE
CHANGES FROM
15" HDPE TO 15" RCP
AT UNKNOWN POINT
EXISTING R/W=PROP.LINE
60' PRIVATE EASEMENT
PB 18 PG 86
LOWER LN
BST
PUE
BANK
STABILIZATION
Temp
Impacts
DUE
DUE
Perm Impacts
Temp Impacts
DUE
36" CONC
PERMIT DRAWING
SHEET 5 OF 32
SITE I
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A
NC 16 FROM NORTH OF
SR 1814 TO SR 1895
REF. RDWY PLAN SHEET 6



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

SITE I

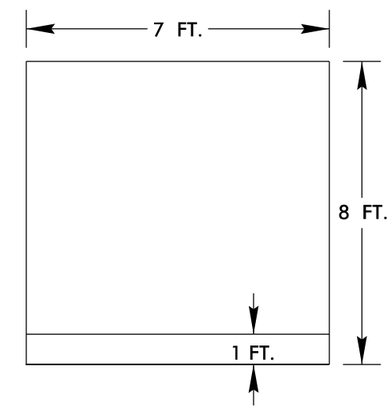
DETAIL 1

(NOT TO SCALE)

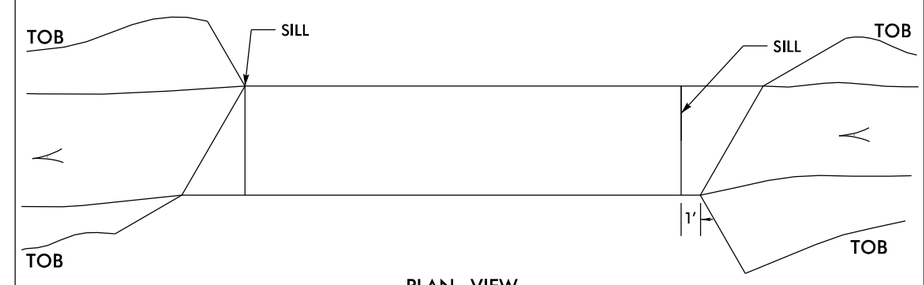
SKEWED LOW FLOW CHANNEL AND SILLS

*NOTES:

1) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.
2) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)
3) DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FULL.
4) NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SILLS AT
INLET AND OUTLET



PLAN VIEW

PERMIT DRAWING
SHEET 6 OF 32

2/12

SITE I

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD, P.A. & LLC
LICENSE NO. F-0665

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McKIM & CREED
NC LICENSE #F-1122
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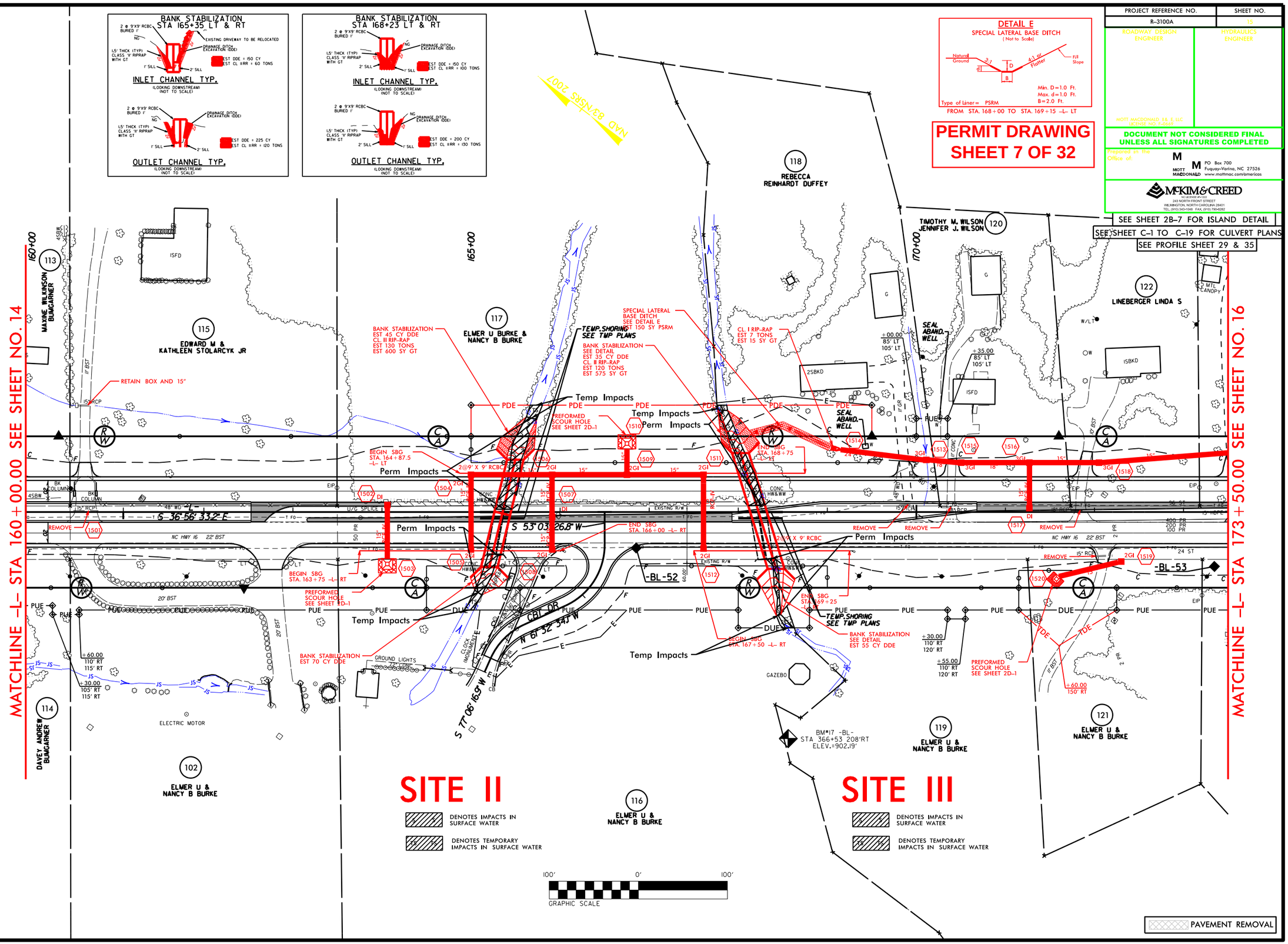
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1348 FAX: (910) 763-6392

PERMIT DRAWING
SHEET 7 OF 32

SEE SHEET 2B-7 FOR ISLAND DETAIL

SEE SHEET C-1 TO C-19 FOR CULVERT PLANS

SEE PROFILE SHEET 29 & 35



REVISIONS

8/17/99

SYSTIME$$$$
SYSDATE$$$$
CFNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD 18, 5, LLC
LICENSE NO. F-0669

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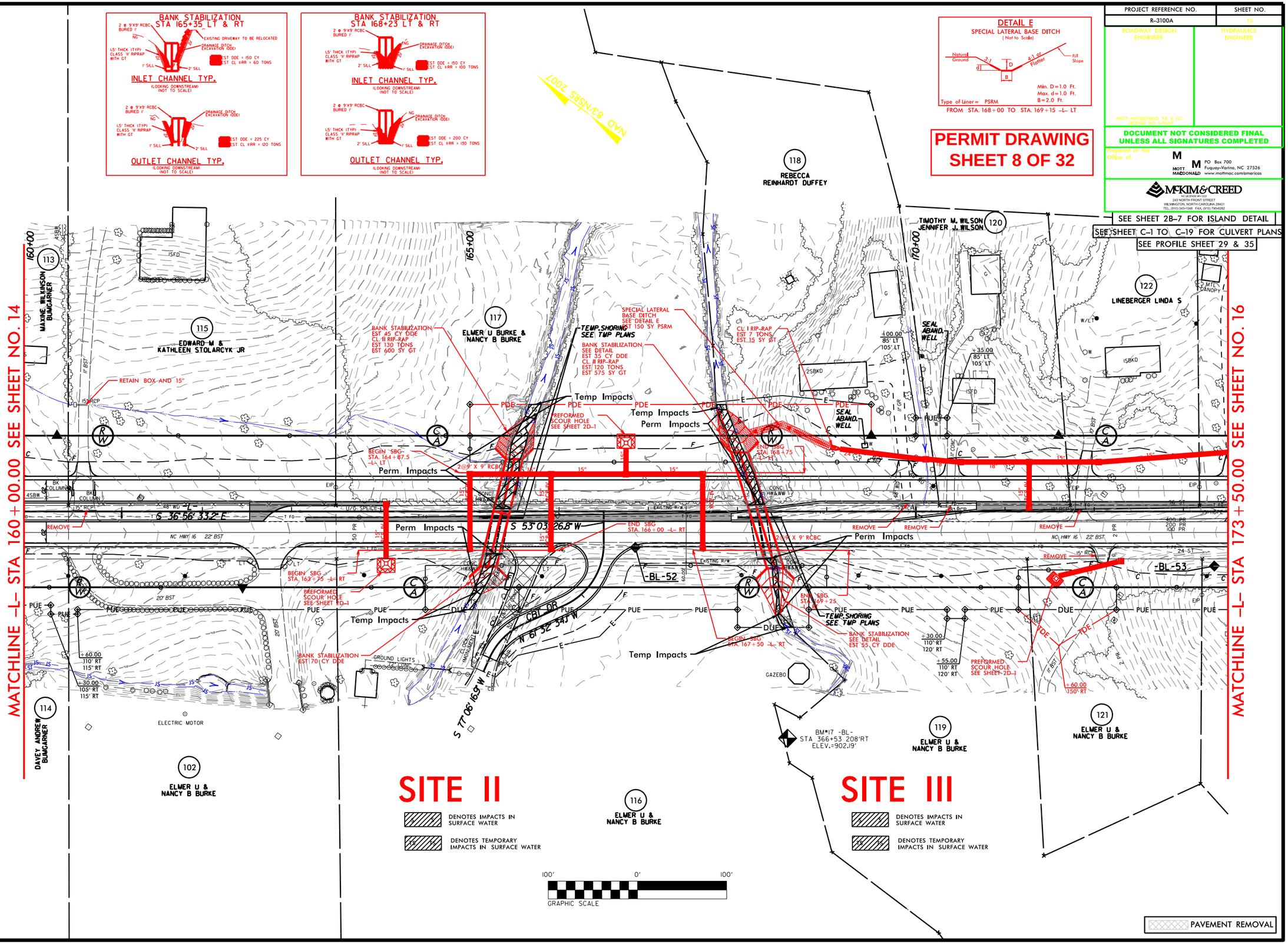
McKIM&CREED
NC LICENSE NO. C-1733
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1568 FAX: (910) 763-6392

PERMIT DRAWING
SHEET 8 OF 32

SEE SHEET 2B-7 FOR ISLAND DETAIL

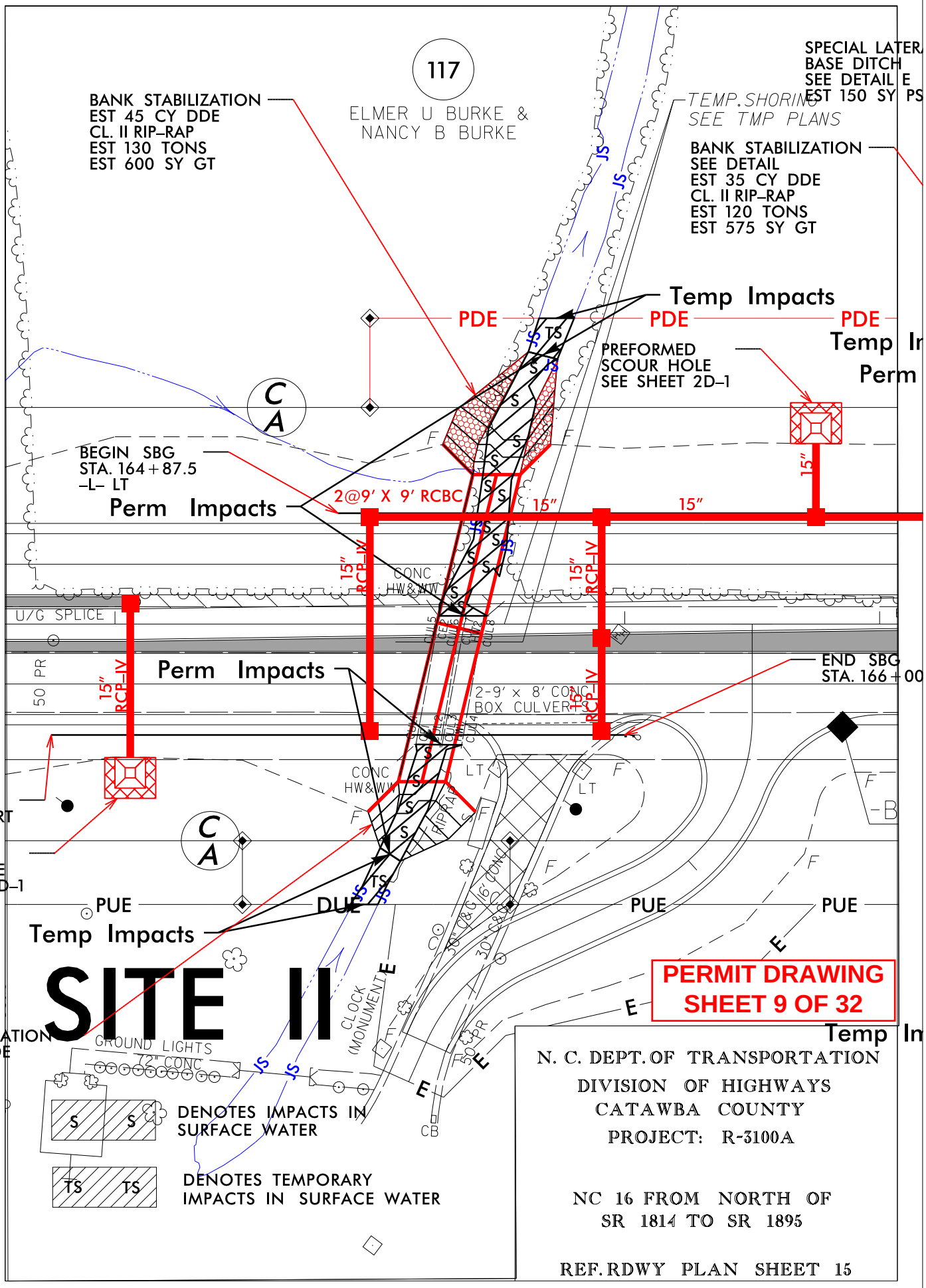
SEE SHEET C-1 TO C-19 FOR CULVERT PLANS

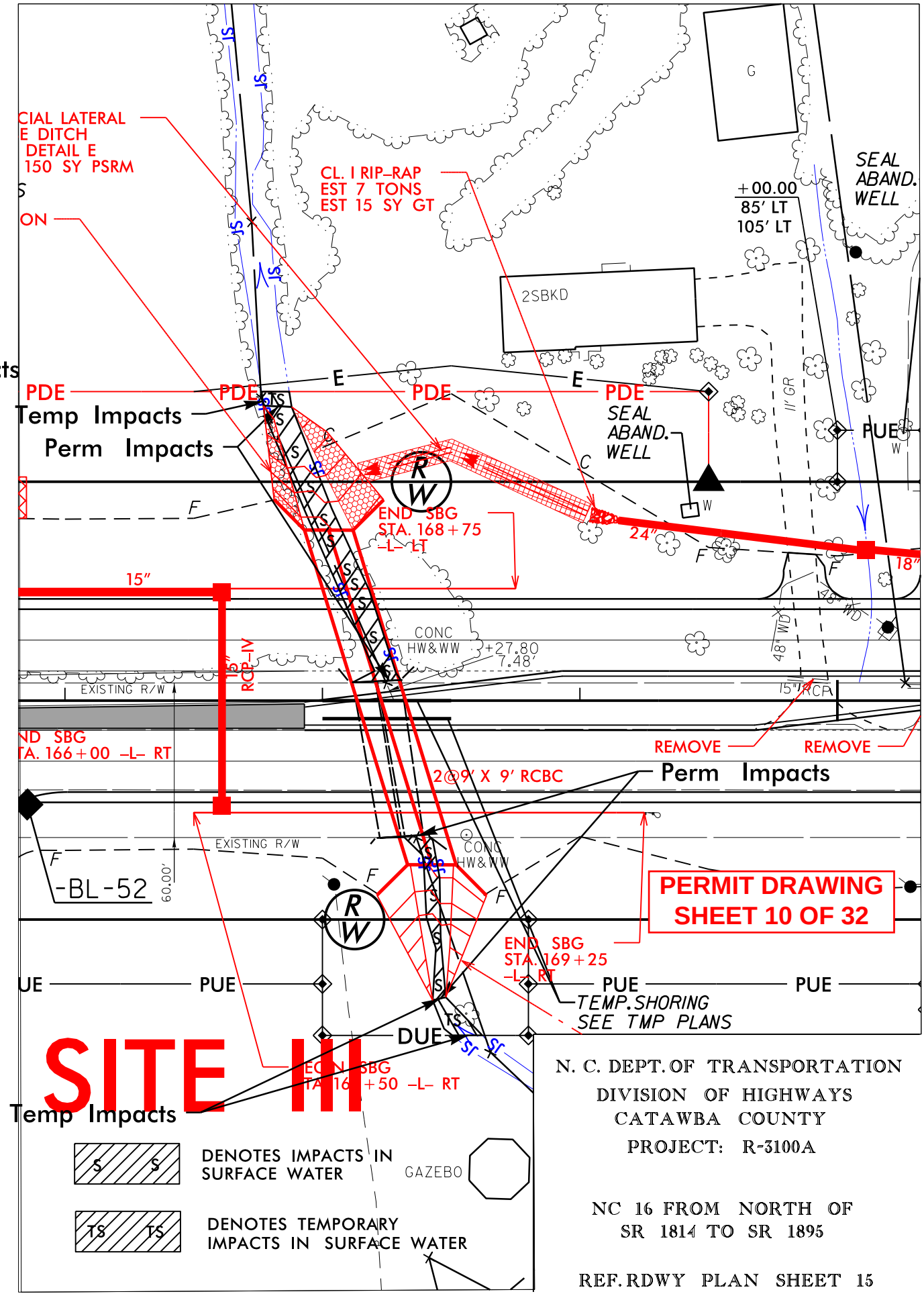
SEE PROFILE SHEET 29 & 35



REVISIONS

8/17/99

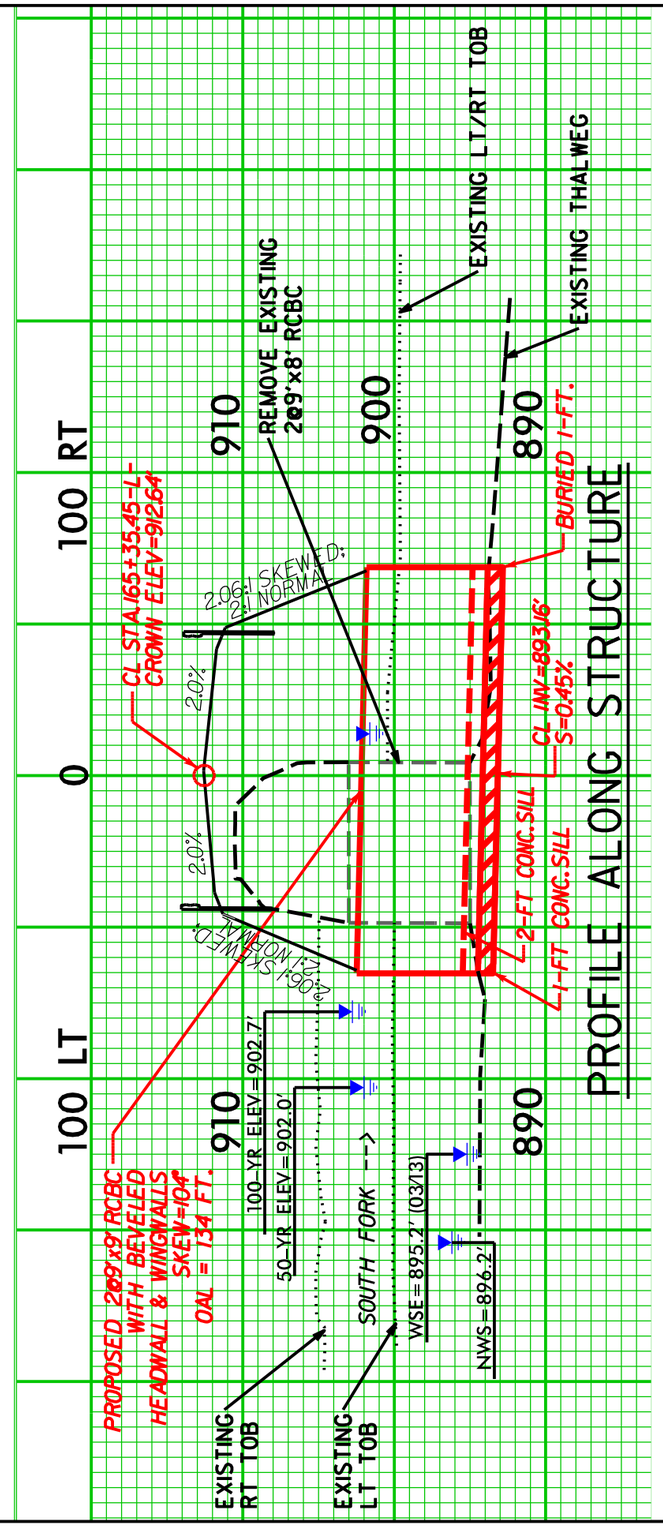

117
ELMER U BURKE &
NANCY B BURKE
BANK STABILIZATION
EST 45 CY DDE
CL. II RIP-RAP
EST 130 TONS
EST 600 SY GT
TEMP. SHORING
SEE TMP PLANS
SPECIAL LATER
BASE DITCH
SEE DETAIL E
EST 150 SY PS
BANK STABILIZATION
SEE DETAIL
EST 35 CY DDE
CL. II RIP-RAP
EST 120 TONS
EST 575 SY GT
Temp Impacts
PDE
PDE
PDE
Temp In
Perm
PREFORMED
SCOUR HOLE
SEE SHEET 2D-1
C
A
BEGIN SBG
STA. 164+87.5
-L- LT
Perm Impacts
2@9' X 9' RCBC
15"
15"
15"
15" RCP-IV
15" RCP-IV
15" RCP-IV
CONC
HW&WW
U/G SPLICE
50 PR
Perm Impacts
END SBG
STA. 166+00
2-9' x 8' CONC
BOX CULVERTS
CONC
HW&WW
LT
LT
SBG
3+75 -L- RT
REFORMED
COUR HOLE
EE SHEET 2D-1
C
A
PUE
DUE
PUE
PUE
Temp Impacts
SITE II
PERMIT DRAWING
SHEET 9 OF 32
Temp In
NK STABILIZATION
T 70 CY DDE
GROUND LIGHTS
72" CONC
CLOCK
MONUMENT
CB
DENOTES IMPACTS IN
SURFACE WATER
DENOTES TEMPORARY
IMPACTS IN SURFACE WATER
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A
NC 16 FROM NORTH OF
SR 1814 TO SR 1895
REF. RDWY PLAN SHEET 15



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. RDWY PLAN SHEET 15



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

SITE II

DETAIL 1

(NOT TO SCALE)

SKEWED MULTI–BARREL LOW FLOW CHANNEL, SILLS AND FLOOD PLAIN

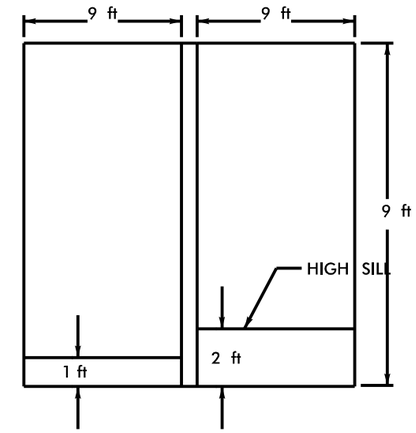
*NOTES:

1) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

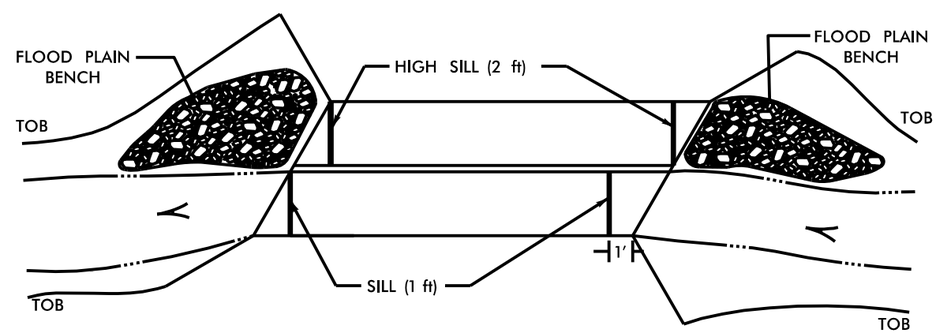
2) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

3) DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FULL.

4) NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SILLS AT INLET AND OUTLET



PLAN VIEW

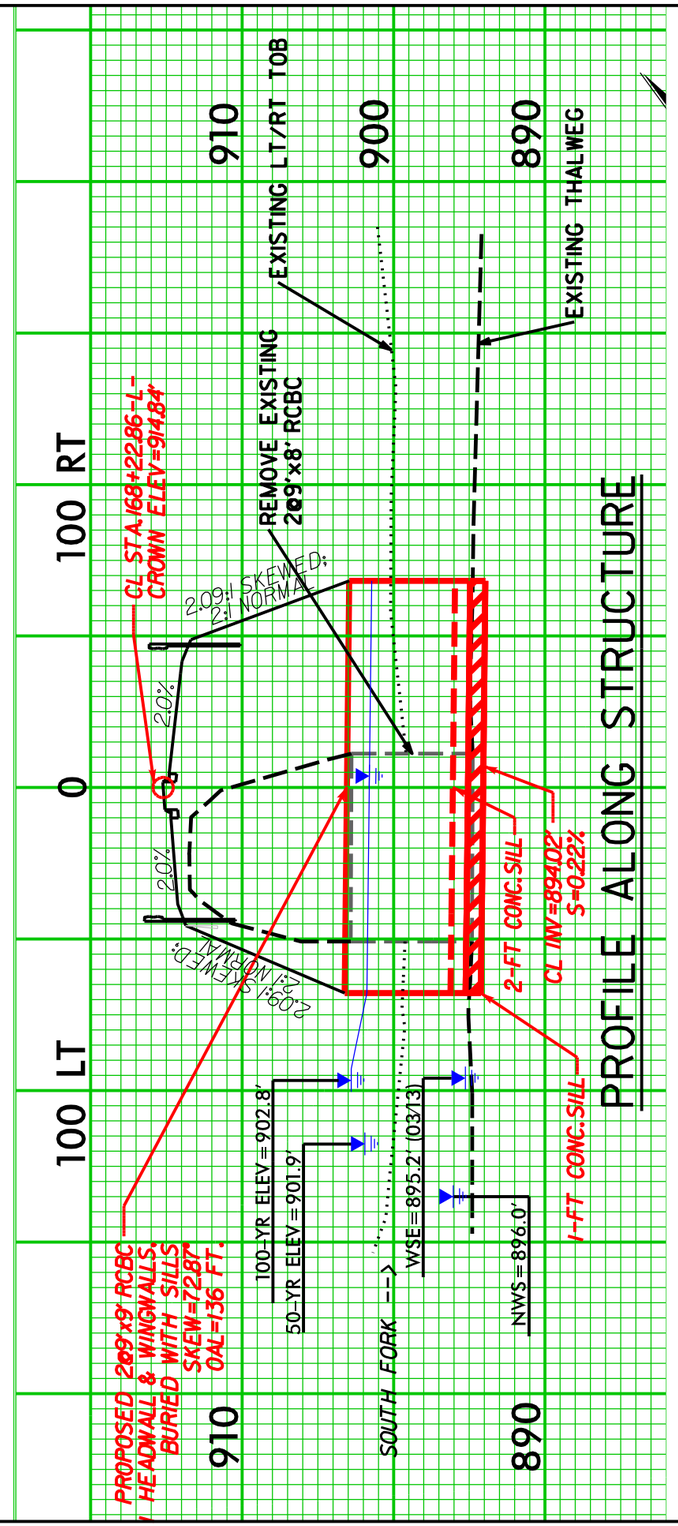
PERMIT DRAWING
SHEET 11 OF 32

SITE II

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

SITE III

DETAIL 1

(NOT TO SCALE)

SKEWED MULTI–BARREL LOW FLOW CHANNEL, SILLS AND FLOOD PLAIN

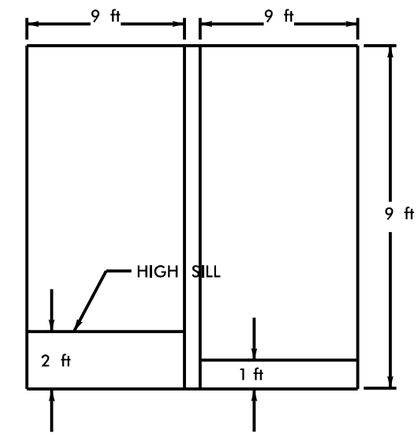
*NOTES:

1) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

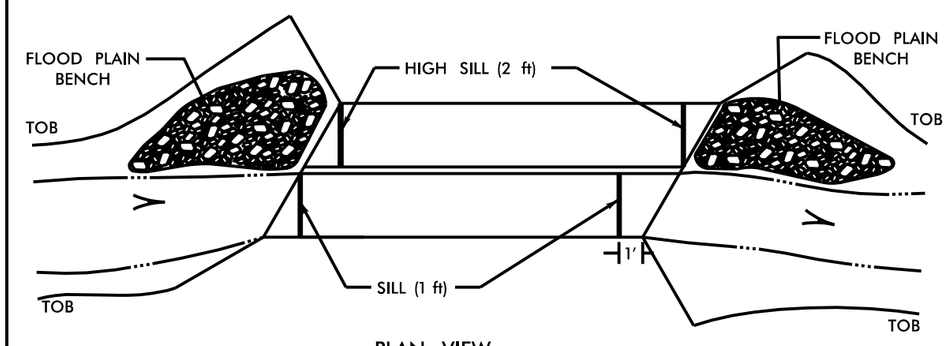
2) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

3) DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FULL.

4) NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SILLS AT
INLET AND OUTLET



PLAN VIEW

PERMIT DRAWING
SHEET 12 OF 32

SITE III

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD 18, S. LLC
LICENSE NO. F-0669

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Prepared in the Office of:

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PO Box 700
Fuquay-Varina, NC 27526
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McKIM&CREED
NC LICENSE #C-1733
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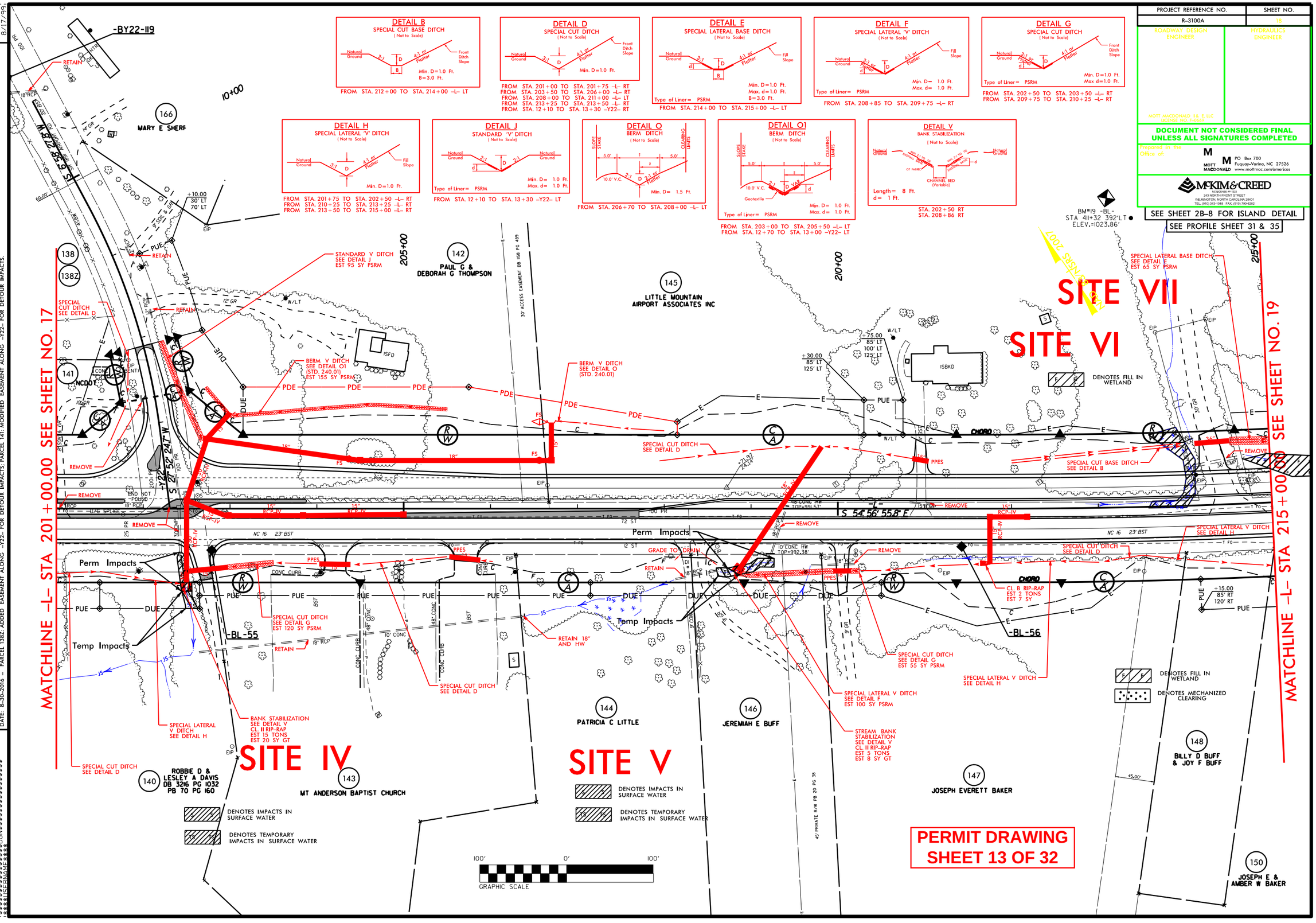
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1348 FAX: (910) 7304382

SEE SHEET 2B-8 FOR ISLAND DETAIL

SEE PROFILE SHEET 31 & 35



REVISIONS

DATE: 4-6-2015 – PARCEL 140, REVISED EXISTING RIGHT OF WAY TO MATCH EXISTING RECORDED PLAT, APPROX. 50 FT FROM THE EXISTING CENTERLINE.
DATE: 5-7-2015 – R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 2-19-2015 FOR PARCEL 146
PARCEL 146; CHANGED PROPERTY OWNER NAME TO JEREMIAH E BUFF.
R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 3-5-2015 FOR PARCEL 140
DATE: 6-16-2015 – R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 4-21-2015 FOR PARCEL 143, 146 & 148
R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 4-10-2015 FOR PARCEL 146 & 148
DATE: 8-30-2016 – PARCEL 138Z; ADDED EASEMENT ALONG -Y22- FOR DETOUR IMPACTS.
PARCEL 141; MODIFIED EASEMENT ALONG -Y22- FOR DETOUR IMPACTS.

8/17/99

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$
$$$$$$DGNNAME$$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD, P.A. & LLC
LICENSE NO. F-0669

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Fuquay-Varina, NC 27526
www.mottmac.com/americas

McKIM & CREED
NC LICENSE #C-1733
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1348 FAX: (910) 763-6382

SEE SHEET 2B-8 FOR ISLAND DETAIL

SEE PROFILE SHEET 31 & 35

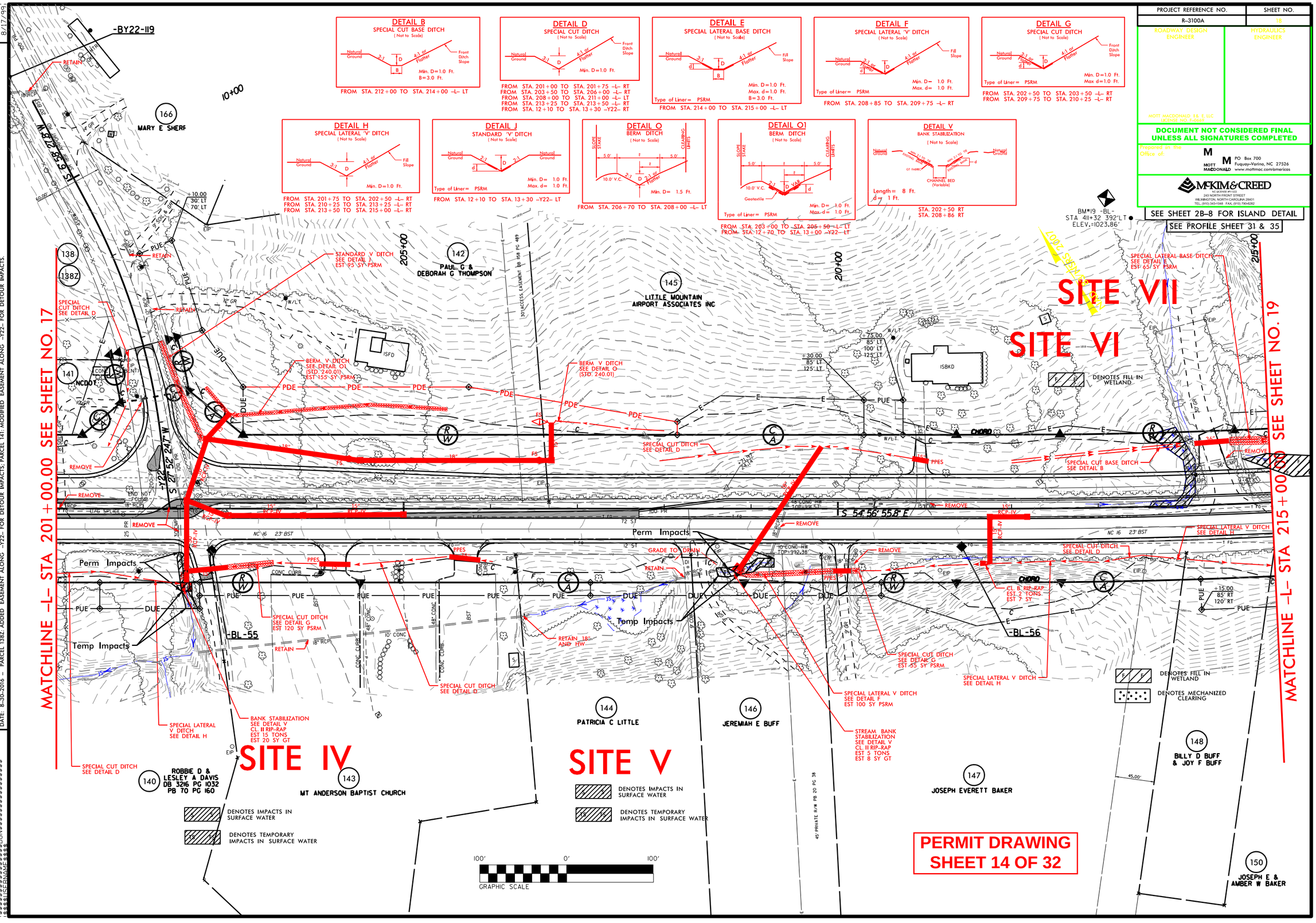
REVISIONS

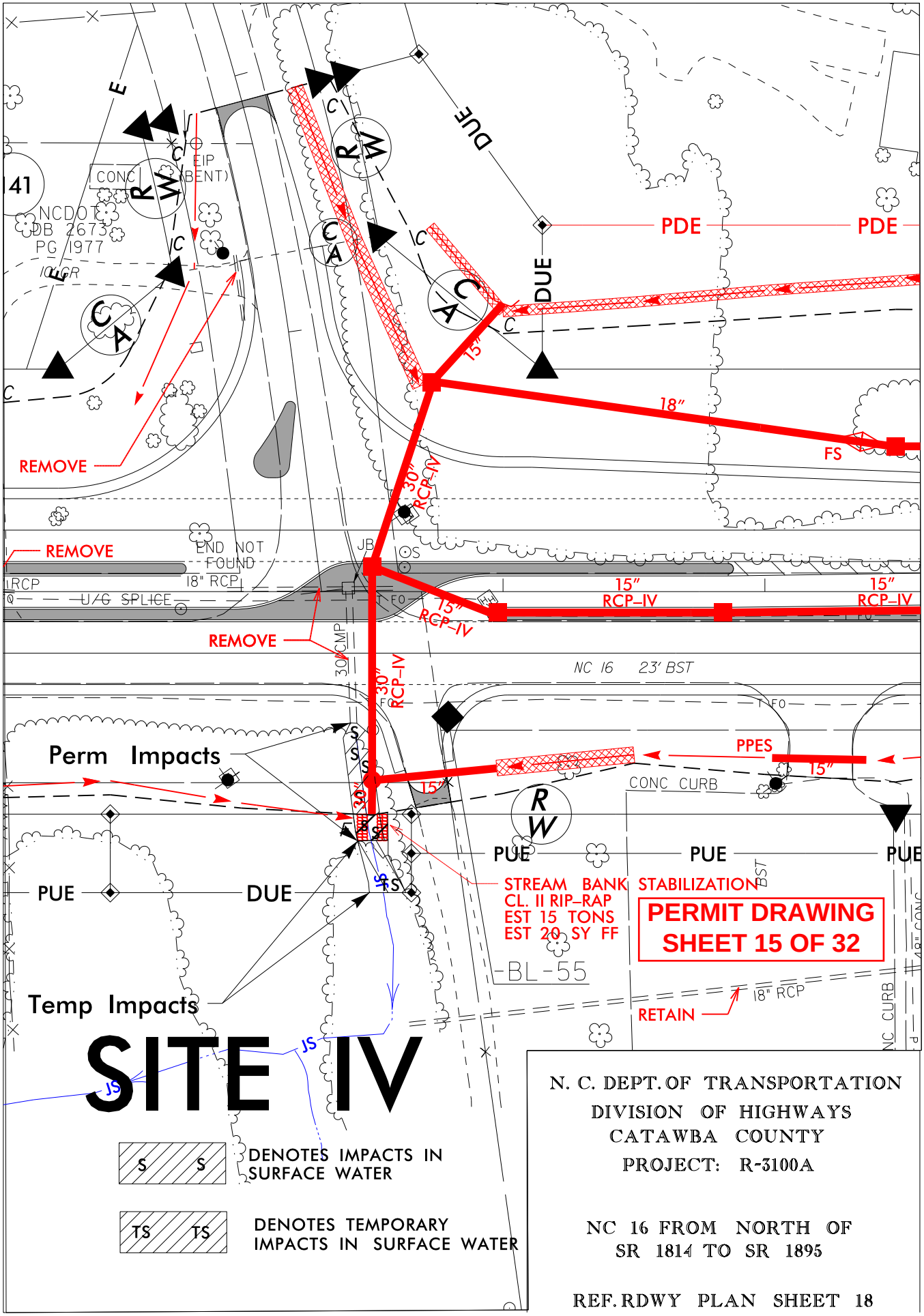
DATE: 4-6-2015 – PARCEL 140; REVISED EXISTING RIGHT OF WAY TO MATCH EXISTING RECORDED PLAT, APPROX. 50 FT FROM THE EXISTING CENTERLINE. PARCEL 146; CHANGED PROPERTY OWNER NAME TO JEREMIAH E BUFF

DATE: 5-7-2015 – R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 2-19-2015 FOR PARCEL 146
R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 3-5-2015 FOR PARCEL 140

DATE: 6-16-2015 – R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 4-21-2015 FOR PARCEL 143, 146 & 148
R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 4-10-2015 FOR PARCEL 146 & 148

DATE: 8-30-2016 – PARCEL 138Z; ADDED EASEMENT ALONG –Y22– FOR DETOUR IMPACTS; PARCEL 141; MODIFIED EASEMENT ALONG –Y22– FOR DETOUR IMPACTS.

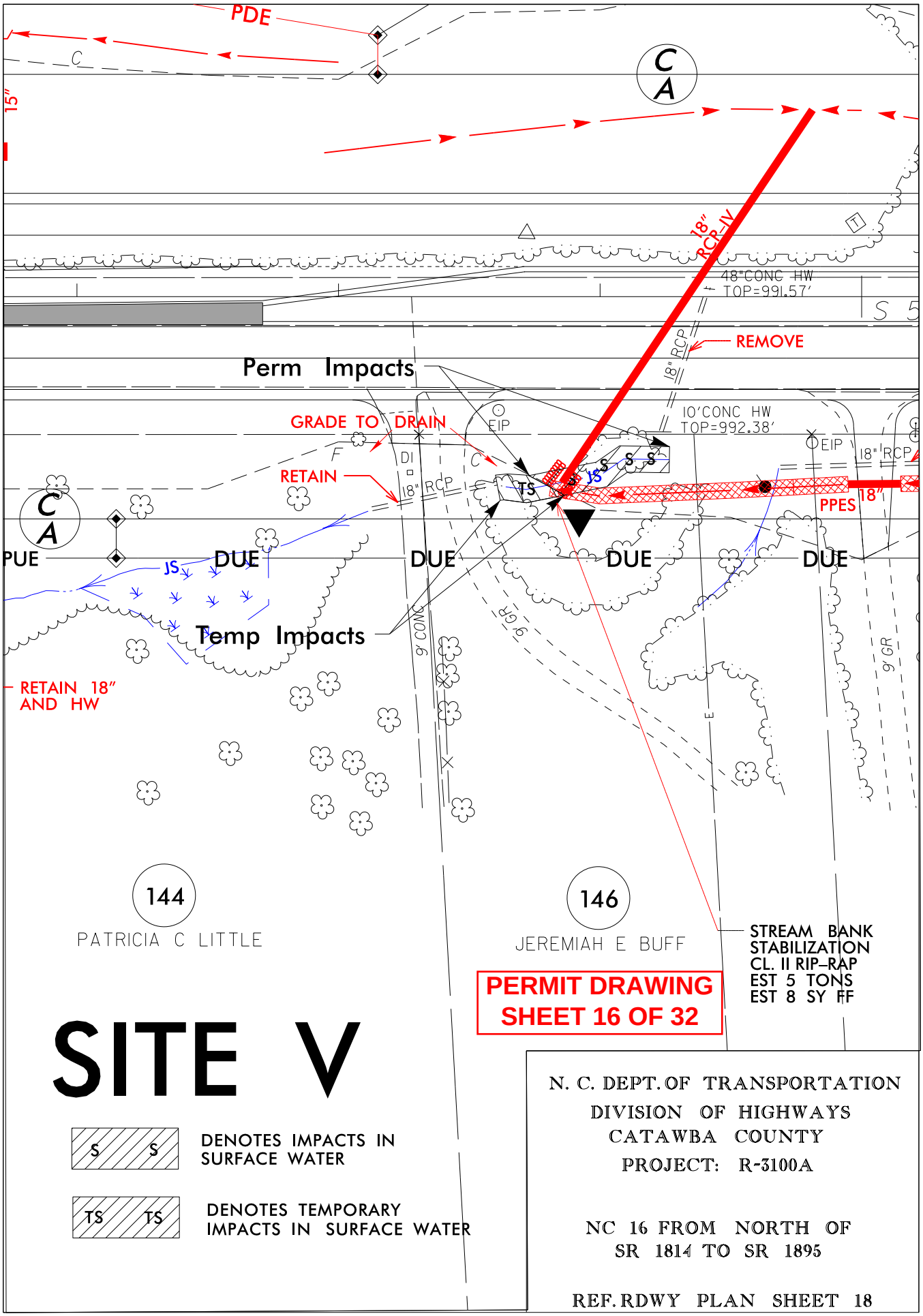


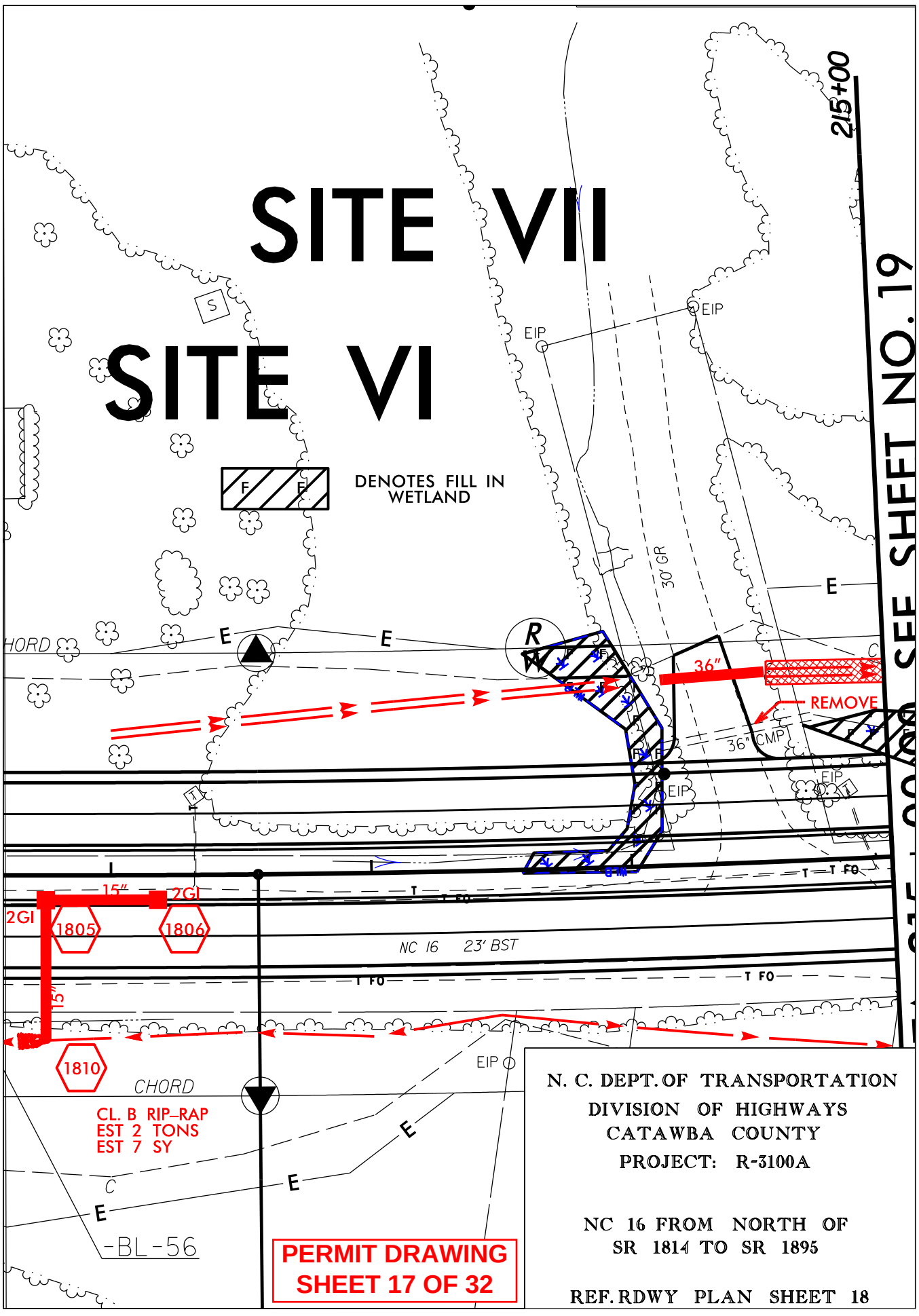


N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. RDWY PLAN SHEET 18


PDE
15"
C
A
18" RCP-IV
48"CONC HW
TOP=991.57'
REMOVE
18" RCP
Perm Impacts
GRADE TO DRAIN
EIP
10'CONC HW
TOP=992.38'
EIP
18" RCP
RETAIN
DI
18" RCP
TS
JS
S
PPES
18"
PUE
DUE
DUE
DUE
DUE
JS
Temp Impacts
9' CONC
9' GR
9' GR
RETAIN 18"
AND HW
144
PATRICIA C LITTLE
146
JEREMIAH E BUFF
STREAM BANK
STABILIZATION
CL. II RIP-RAP
EST 5 TONS
EST 8 SY FF
PERMIT DRAWING
SHEET 16 OF 32
SITE V
S S
DENOTES IMPACTS IN
SURFACE WATER
TS TS
DENOTES TEMPORARY
IMPACTS IN SURFACE WATER
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A
NC 16 FROM NORTH OF
SR 1814 TO SR 1895
REF. RDWY PLAN SHEET 18

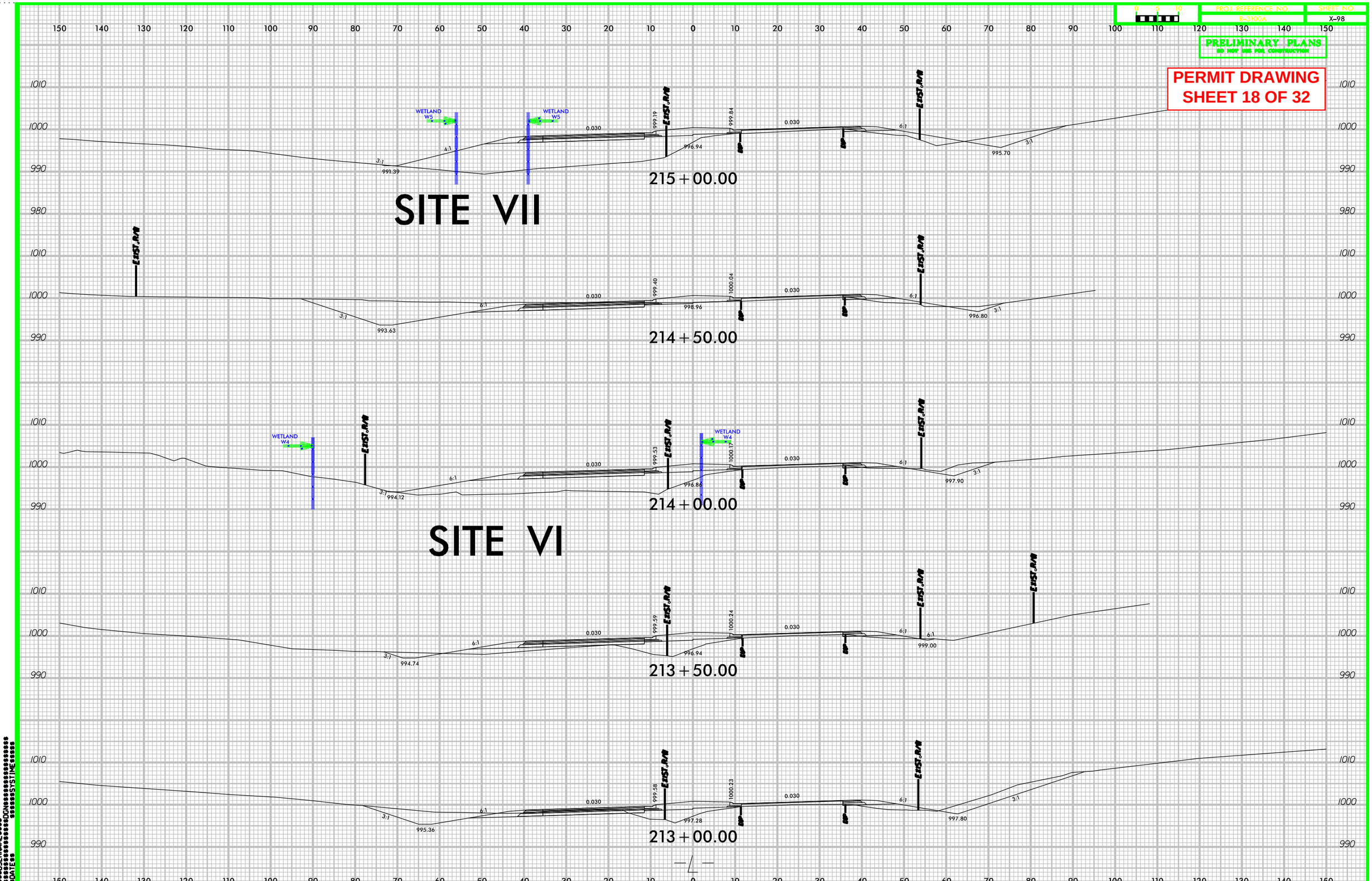

SITE VII
SITE VI
DENOTES FILL IN WETLAND
215+00
SEE SHEET NO. 19
EIP
30' GR
E
HORD
R
36"
REMOVE
36" CMP
T FO
15"
2GI
1805
1806
NC 16 23' BST
1810
CHORD
CL. B RIP-RAP
EST 2 TONS
EST 7 SY
C
-BL-56
PERMIT DRAWING
SHEET 17 OF 32
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A
NC 16 FROM NORTH OF
SR 1814 TO SR 1895
REF. RDWY PLAN SHEET 18

PROJ. REFERENCE NO. B-3100A

SHEET NO. X-98

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 18 OF 32



PERMIT DRAWING
SHEET 19 OF 32

PROJECT REFERENCE	SHEET NO.
R-3100A	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

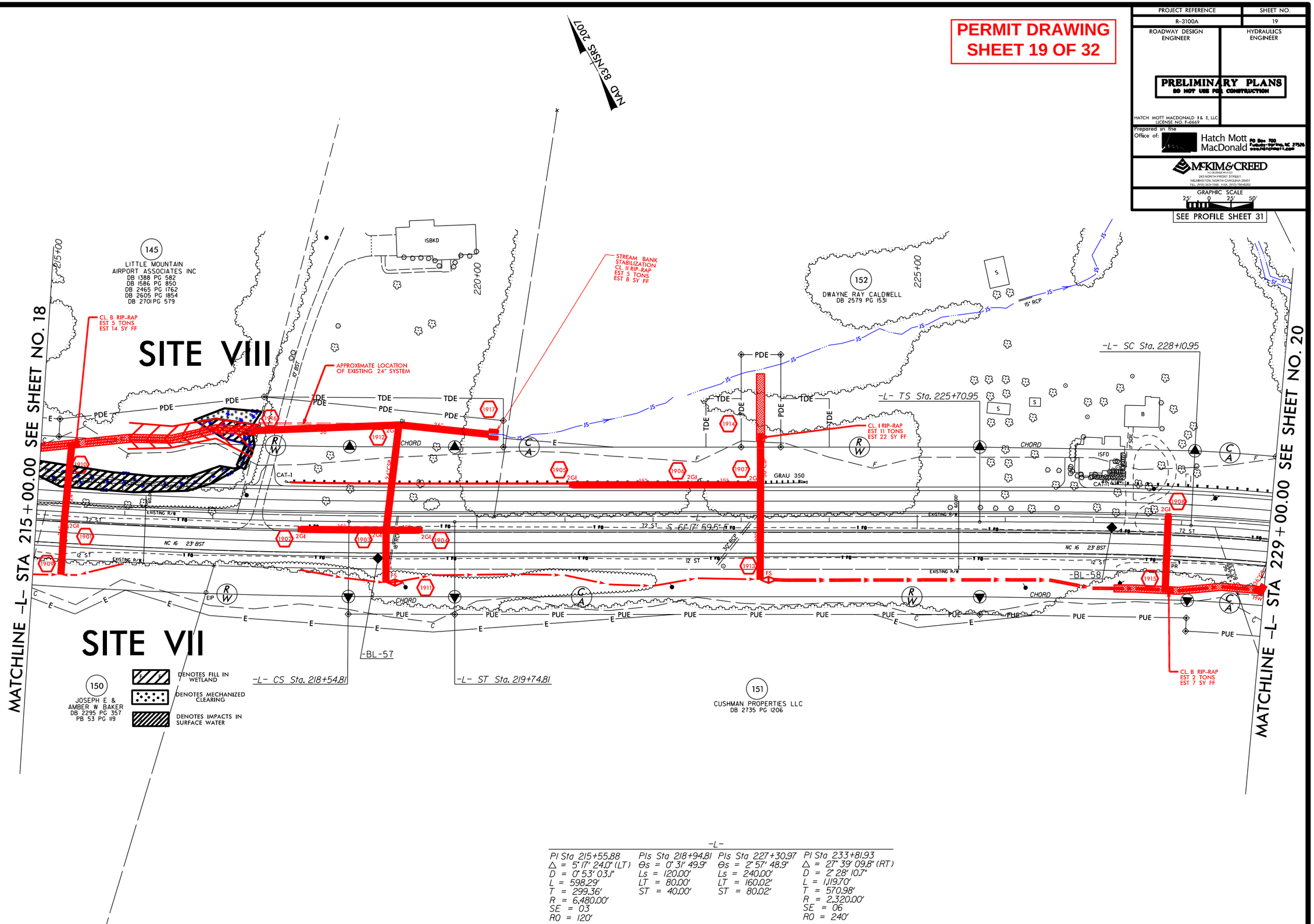
HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald PO Box 700 Fuquay-Varina, NC 27526 www.hatchmottmacdonald.com

McKIM&CREED
NC LICENSE #F-0207
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1568 FAX: (910) 790-4282

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 31



-L-

PI Sta 215+55.88	PIs Sta 218+94.81	PIs Sta 227+30.97	PI Sta 233+81.93
Δ = 5° 17' 24.0" (LT)	Θs = 0° 31' 49.9"	Θs = 2° 57' 48.9"	Δ = 27° 39' 09.8" (RT)
D = 0° 53' 03.1"	Ls = 120.00'	Ls = 240.00'	D = 2° 28' 10.7"
L = 598.29'	LT = 80.00'	LT = 160.02'	L = 1,119.70'
T = 299.36'	ST = 40.00'	ST = 80.02'	T = 570.98'
R = 6,480.00'			R = 2,320.00'
SE = 03			SE = 06
RO = 120'			RO = 240'

PROJECT REFERENCE	SHEET NO.
R-3100A	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

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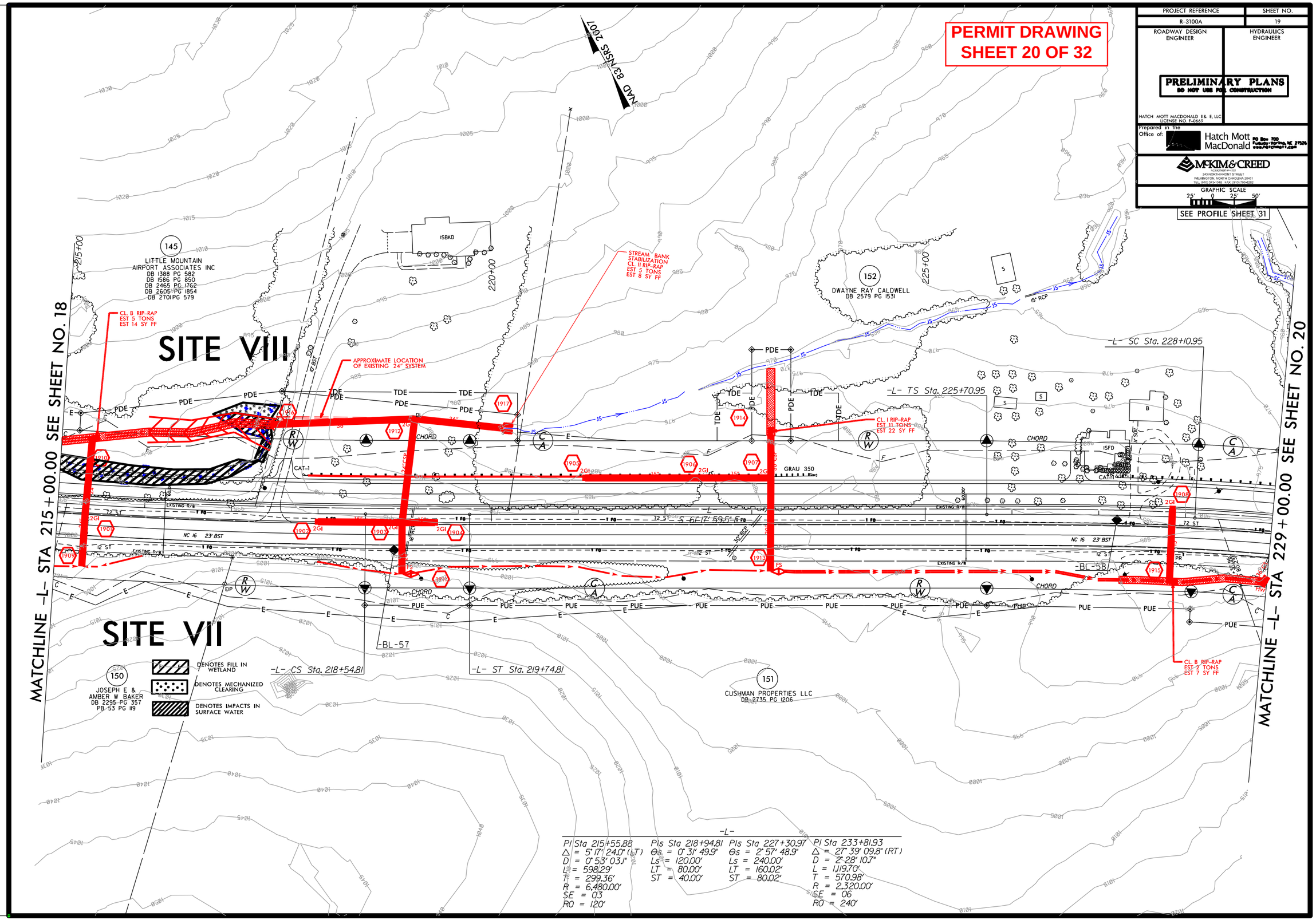
McKIM&CREED
NC LICENSE #F-0107
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1568 FAX: (910) 790-4282

GRAPHIC SCALE
25' 0 25' 50'

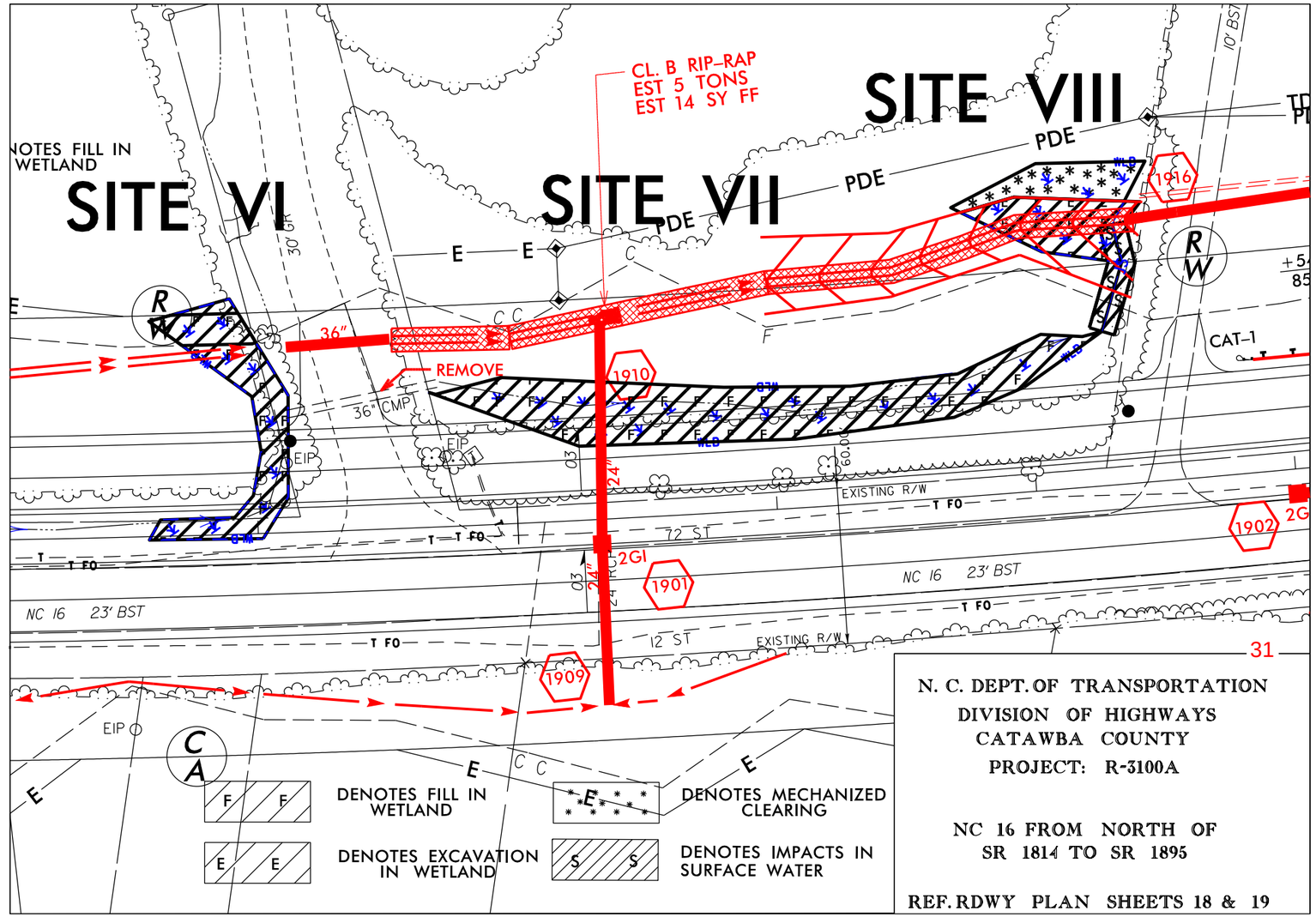
SEE PROFILE SHEET 31

PERMIT DRAWING
SHEET 20 OF 32



-L-

PI Sta 215+55.88	PIs Sta 218+94.81	PIs Sta 227+30.97	PI Sta 233+81.93
Δ = 5° 17' 24.0" (LT)	Θs = 0° 31' 49.9"	Θs = 2° 57' 48.9"	Δ = 27° 39' 09.8" (RT)
D = 0° 53' 03.1"	Ls = 120.00'	Ls = 240.00'	D = 2° 28' 10.7"
Ls = 598.29'	LT = 80.00'	LT = 160.02'	L = 1,119.70'
T = 299.36'	ST = 40.00'	ST = 80.02'	T = 570.98'
R = 6,480.00'			R = 2,320.00'
SE = 03			SE = 06
RO = 120'			RO = 240'



31

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

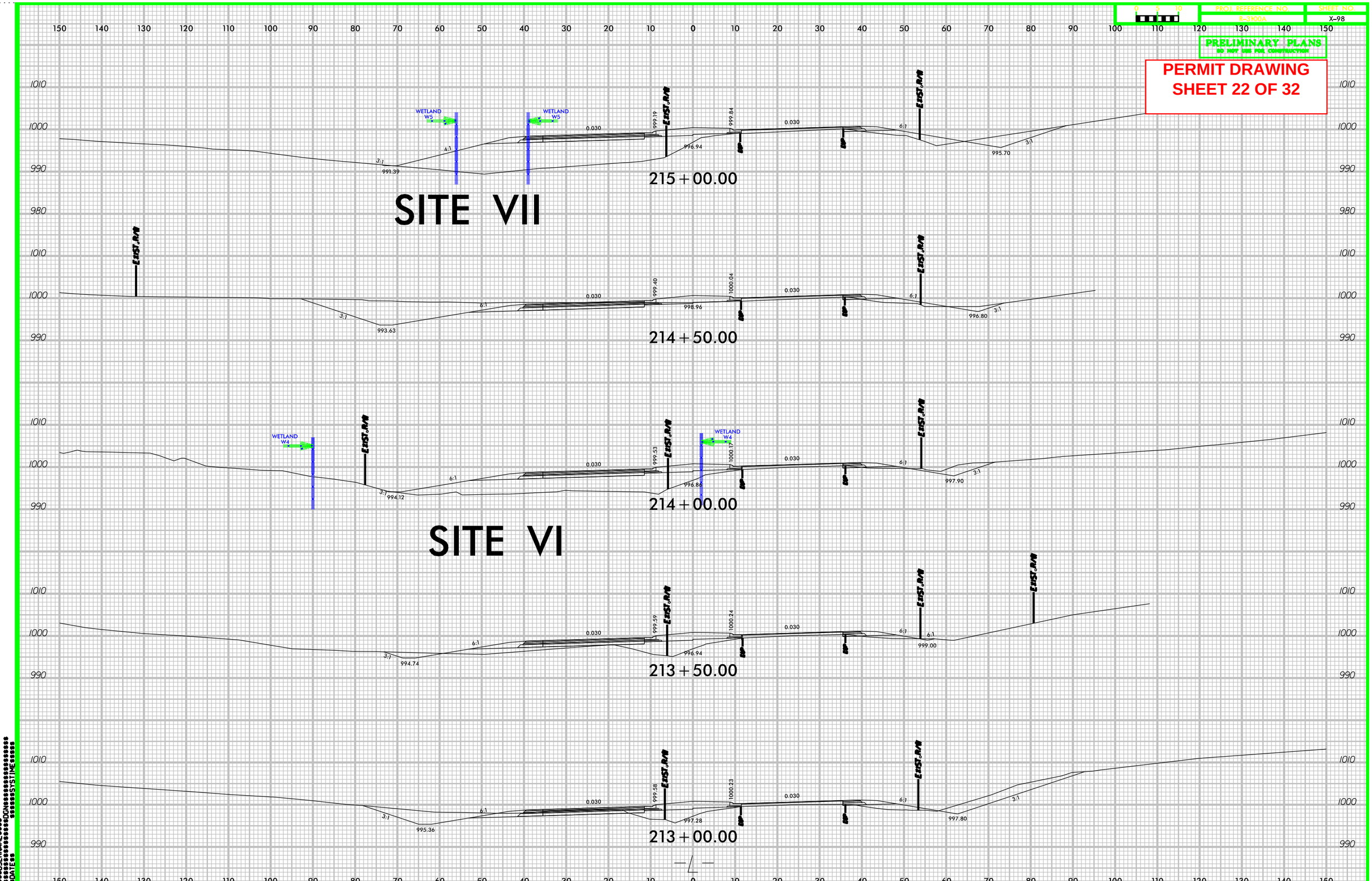
REF. RDWY PLAN SHEETS 18 & 19

PROJ. REFERENCE NO. B-3100A

SHEET NO. X-98

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 22 OF 32



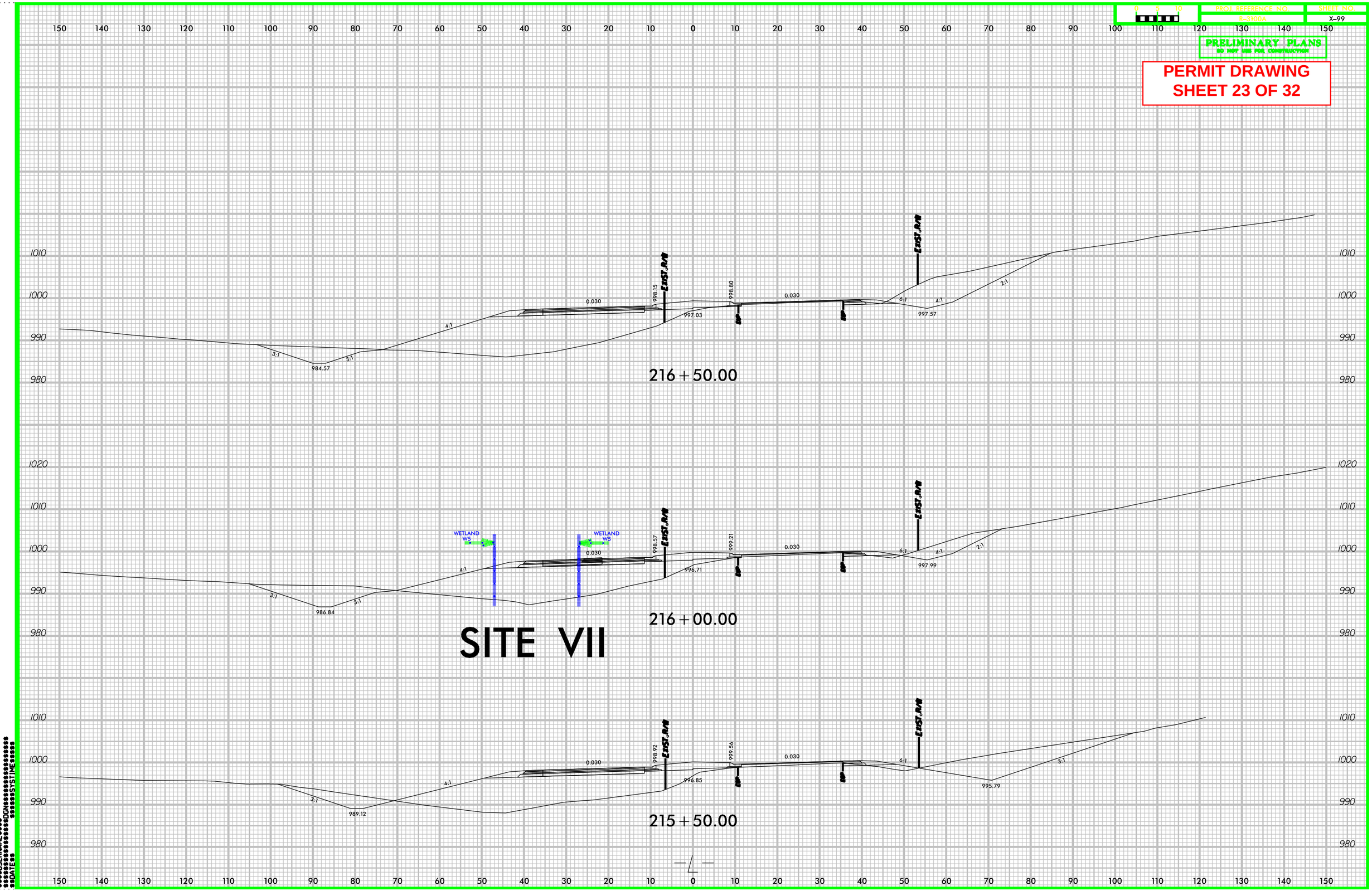
$$USERNAME$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$DATE$$ $$$$$$SYSTIME$$$$$

PROJ. REFERENCE NO. B-3100A

SHEET NO. X-99

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 23 OF 32



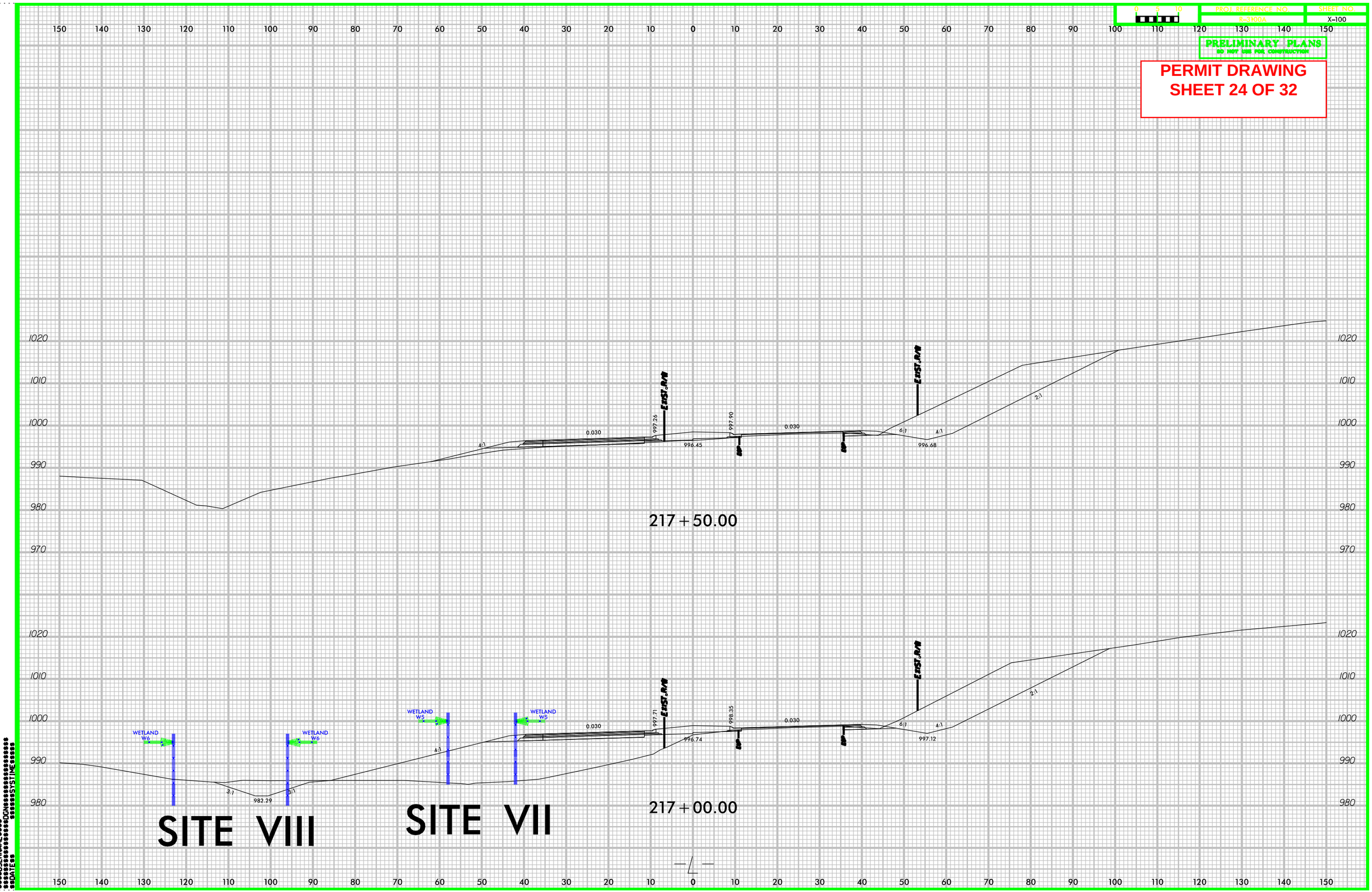
$$USERNAME$$
$$DGN$$
$$SYSTIME$$
$$DATE$$

PROJ. REFERENCE NO.
R-3100A

SHEET NO.
X-100

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 24 OF 32



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

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD, P.A. & LLC
LICENSE NO. F-0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:
MOTT MACDONALD
PO Box 700
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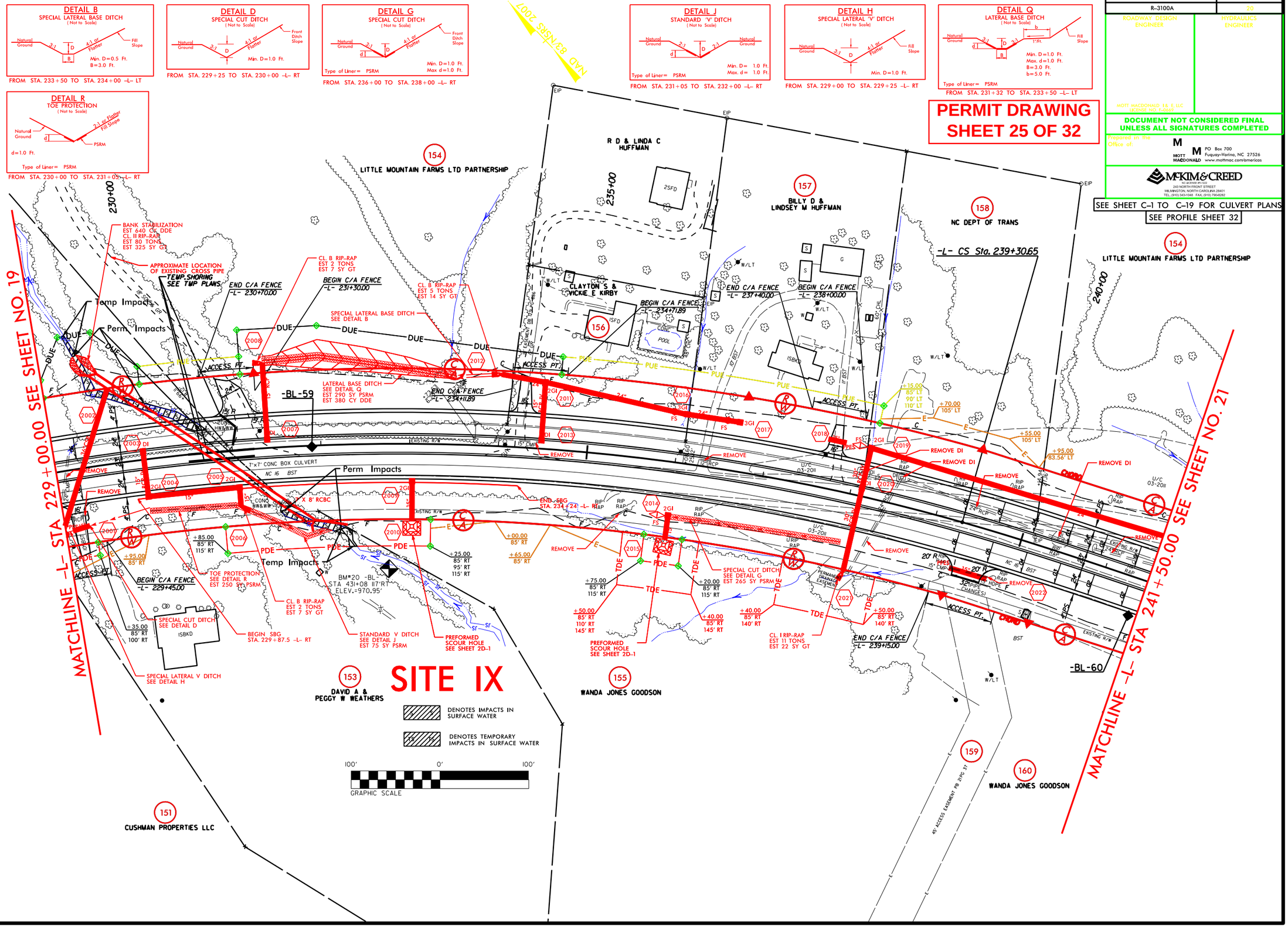
www.mottmac.com/americas

McKIM & CREED
NC LICENSE #F-1102
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1348 FAX: (910) 763-6392

PERMIT DRAWING
SHEET 25 OF 32

SEE SHEET C-1 TO C-19 FOR CULVERT PLANS

SEE PROFILE SHEET 32



REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD J.V. 5, LLC
LICENSE NO. F-0669

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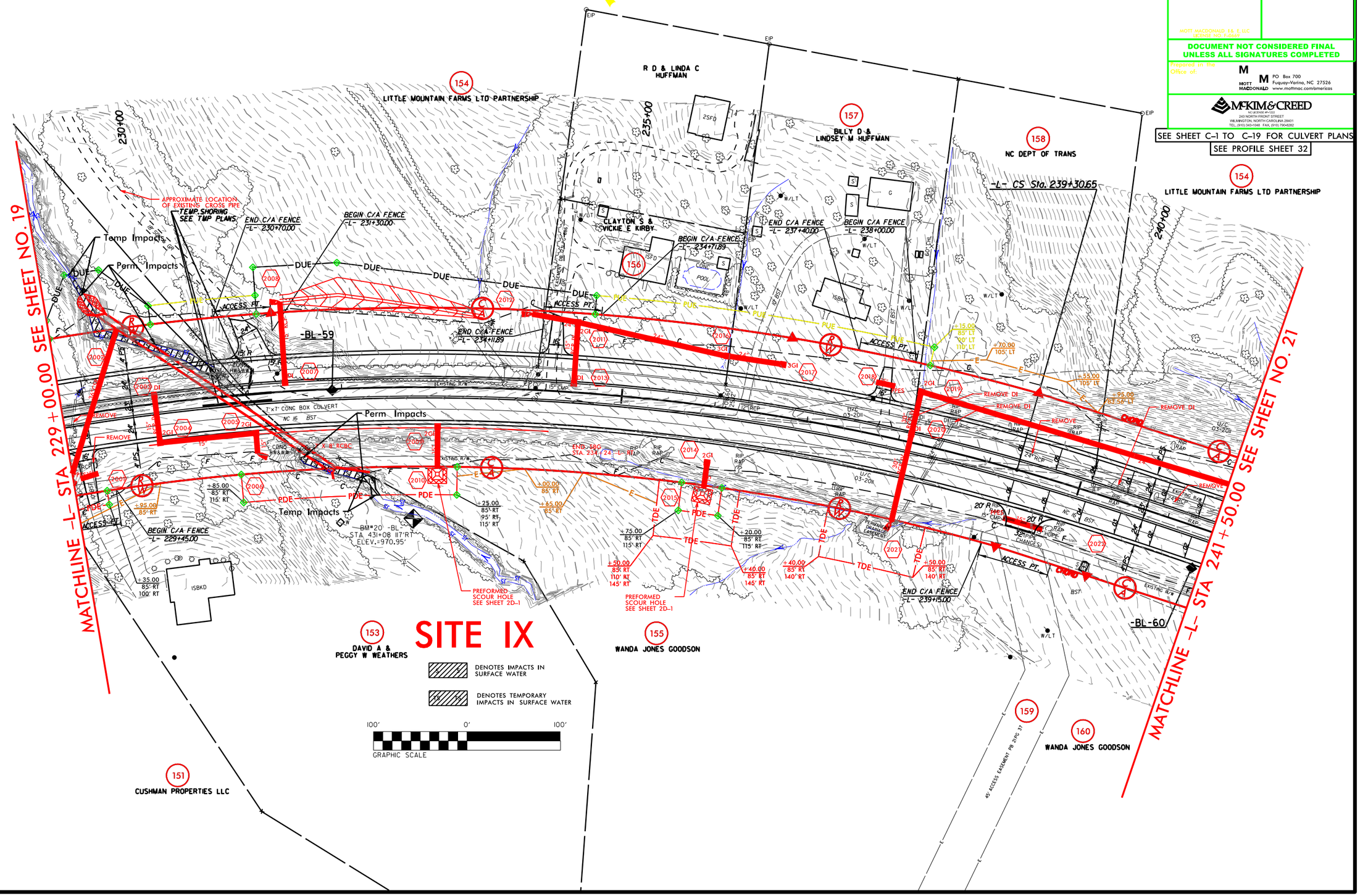
www.mottmac.com/americas

McKIM & CREED
NC LICENSE #F-1102
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1481 FAX: (910) 763-6392

SEE SHEET C-1 TO C-19 FOR CULVERT PLANS

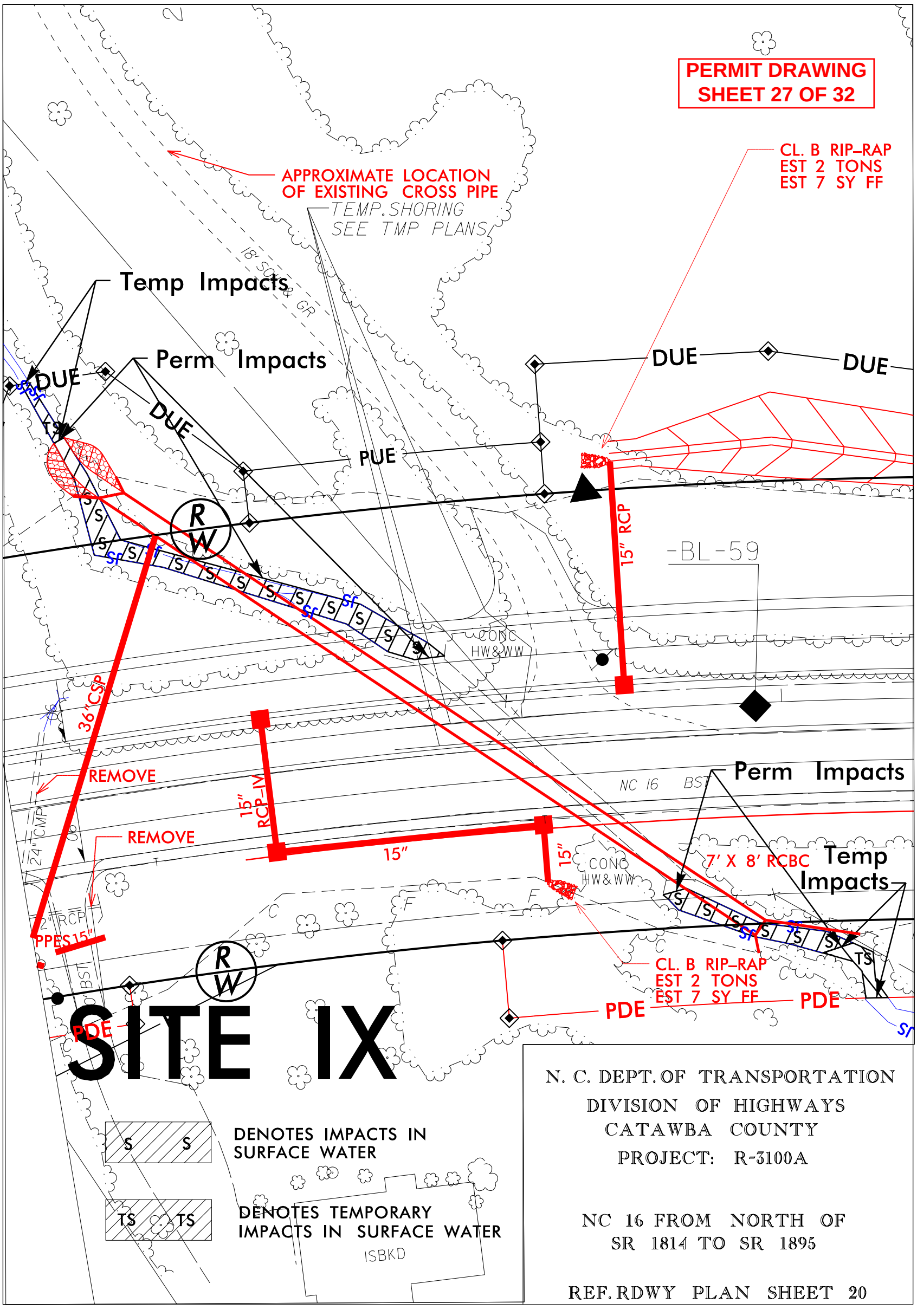
SEE PROFILE SHEET 32

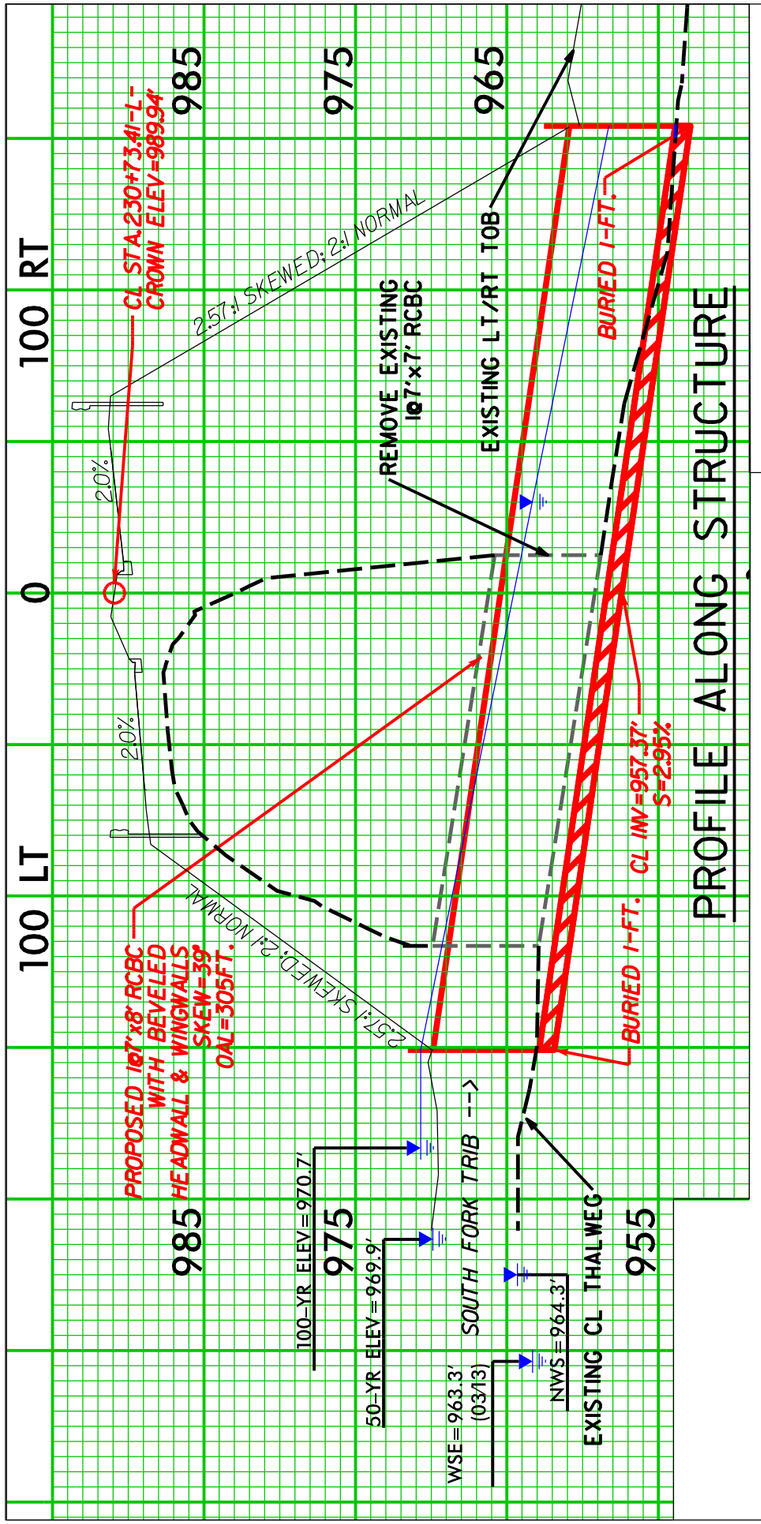
PERMIT DRAWING
SHEET 26 OF 32



REVISIONS

8/17/99


PERMIT DRAWING
SHEET 27 OF 32
APPROXIMATE LOCATION
OF EXISTING CROSS PIPE
TEMP. SHORING
SEE TMP PLANS
CL. B RIP-RAP
EST 2 TONS
EST 7 SY FF
Temp Impacts
Perm Impacts
DUE
DUE
DUE
DUE
PUE
R
W
15" RCP
-BL-59
CONC
HW&WW
36" CSP
REMOVE
REMOVE
15" RCP-IV
15"
15"
NC 16 BST
Perm Impacts
7' X 8' RCBC
Temp
Impacts
24" CMP
12" RCP
PPES15"
CONC
HW&WW
CL. B RIP-RAP
EST 2 TONS
EST 7 SY FF
PDE
PDE
PDE
SITE IX
DENOTES IMPACTS IN
SURFACE WATER
DENOTES TEMPORARY
IMPACTS IN SURFACE WATER
ISBKD
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A
NC 16 FROM NORTH OF
SR 1814 TO SR 1895
REF. RDWY PLAN SHEET 20



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

SITE IX

DETAIL 1

(NOT TO SCALE)

SKEWED LOW FLOW CHANNEL AND SILLS

*NOTES:

1) THE BED MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE EQUIVALENT TO THAT OF CLASS B RIP RAP. STONES LARGER THAN 12 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIALS SUBJECT TO APPROVAL BY THE ENGINEER.

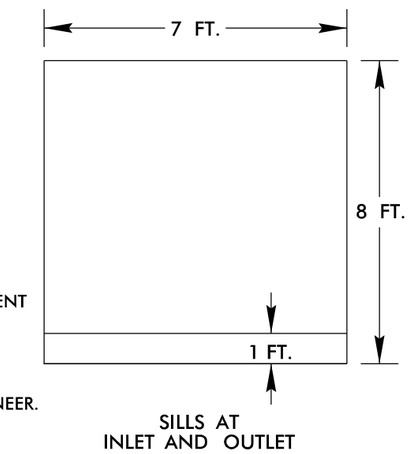
2) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

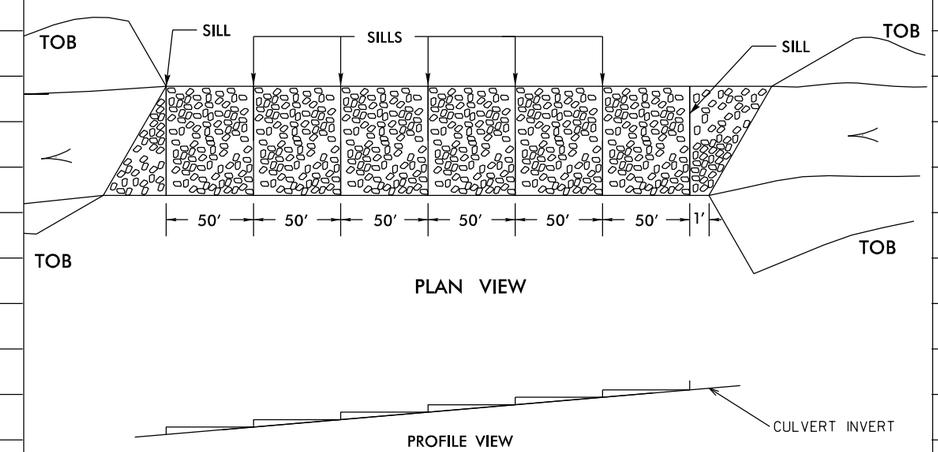
3) TOP OF SILL SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) CLASS B RIP RAP MAY BE USED TO SUPPLEMENT NATURAL BED MATERIAL.

5) DO NOT SET ELEVATION OF HIGH SILL ABOVE BANK FULL.

6) NUMBER OF SILLS DETERMINED BY THE ENGINEER.





2/12

PERMIT DRAWING
SHEET 28 OF 32

SITE IX

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. CSR

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of: Hatch Mott MacDonald PO Box 700 Fuquay-Varina, NC 27526 www.hatchmott.com

McKIM & CREED
ENGINEERS
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1481 FAX: (910) 790-4282

SEE PROFILE SHEET 32 & 33

PERMIT DRAWING
SHEET 29 OF 32

DATE: 6-16-2015 - R/W REVISION REQUEST FOR PLAN CHANGES DURING THE INITIAL CONTACTS SUBMITTED ON 4-21-2015 FOR PARCEL 154 & 161

8/17/99

NAD 83/NSRS 2007

MATCHLINE -L- STA 241+50.00 SEE SHEET NO. 20

MATCHLINE -L1- STA 17+50.00 SEE SHEET NO. 22

154
LITTLE MOUNTAIN FARMS LTD PARTNERSHIP
DB 3058 PG 572

DAVID C & TERESA T LYNN
DB 1945 PG 507
PB 32 PG 114

GILBERT H SR & SYLVIA G CALDWELL
DB 1987 PG 1278
PB 32 PG 148

S 42°38'50" E
400.02'

-L1- ST Sta. 10+00.00
-L- POT Sta. 248+23.86

-L1- CS Sta. 12+98.89

-L1- SC Sta. 11+60.00

-L1- SRS Sta. 14+58.89

-L1- SC Sta. 16+58.89

-L- ST Sta. 241+70.65

245+00

250+00

15+00

BM#21-BL-
STA 451+71.183'LT
ELEV.=1072.17'

-BL-62

BEGIN EXP. GUTTER
-L1- Sta.11+20.00

ABANDON EXISTING ROW

END C/A FENCE
-L- 252+00.00

+11.54 -L-
85' LT
95' LT
120' LT

+55.00 -L-
EX. R/W
120' LT

+60.00 -L-
65' LT

+85.00 -L-
EX. R/W

+00.00 -L-
100' LT

+70.65
85' LT

+17.15
90' LT

RETAIN

REMOVE

REMOVE DI

2GI

FS

CAT-1

PDE

200' R

20' R

GRAU-350

TES

-L1-

-L-

S 27°43'11.9" E

END EXP. GUTTER
-L1- Sta.14+05.00

APPROXIMATE LOCATION OF EXISTING SYSTEM

RAISE TO PROPOSED GRADE AND CONVERT TO A JUNCTION BOX WITH MANHOLE RING AND COVER

-BL-61

ACCESS PT.

CL. II RIP-RAP
EST 3 TONS
EST 7 SY FF

END C/A FENCE
-L- 248+65.00

STREAM BANK STABILIZATION
CL. II RIP-RAP
EST 15 TONS
EST 20 SY FF

BEGIN C/A FENCE
-L- 249+25.00

APPROXIMATE LOCATION OF EXISTING 15"RCP DRIVE PIPE. REMOVE AND REPLACE WITH 24"RCP

+85.00
85' RT

+55.00
95' RT

+38.62
85' RT

+81.61
95' RT

END C/A FENCE
-L- 253+38.62

END TIP PROJECT R-3100A
-L- STA 253+80.00

+70.65
85' RT

BEGIN C/A FENCE
-L- 242+36.00

160
WANDA JONES GOODSON
DB 2239 PG 980
DB 1443 PG 907

162
EDDIE DWAYNE LAIL
DB 2973 PG 1918

ANTHONY L & KAREN O DRUM
DB 968 PG 165

CLIFF-BLAKE REALTY ASSOCIATES
DB 1936 PG 1335

ELIJAH L. MOSLEY
DB 2340 PG 205
PB 6 PG 97

TOWER RD (ABAND)

S 23°19'10" E
272.13'

N 28°19'22" W
270.58'

SITE X

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

-L1-

Pls Sta 11+06.67	Pl Sta 12+29.45	Pls Sta 13+52.22	Pls Sta 15+92.23	Pl Sta 18+60.76
Θs = 1° 10' 41.9"	Δ = 2° 02' 44.5" (LT)	Θs = 1° 10' 41.9"	Θs = 1° 32' 02.5"	Δ = 6° 11' 14.5" (RT)
Ls = 160.00'	D = 1° 28' 22.4"	Ls = 160.00'	Ls = 200.00'	D = 1° 32' 02.5"
LT = 106.67'	L = 138.89'	LT = 106.67'	LT = 133.34'	L = 403.34'
ST = 53.34'	T = 69.45'	ST = 53.34'	ST = 66.67'	T = 201.87'
	R = 3,890.00'			R = 3,735.00'
	SE = 04			SE = 05
	RO = 160'			RO = 200'

-L-

Pl Sta 233+81.93	Pls Sta 240+10.67
Δ = 27° 39' 09.8" (RT)	Θs = 2° 57' 48.9"
D = 2° 28' 10.7"	Ls = 240.00'
L = 1,119.70'	LT = 160.02'
T = 570.98'	ST = 80.02'
R = 2,320.00'	
SE = 06	
RO = 240'	

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

MOTT MACDONALD NC, P.L.L.C. LICENSE NO. F-0669

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of:

MOTT MACDONALD
PO Box 700
Fuquay-Varina, NC 27526
www.mottmac.com/americas

McKIM & CREED
NC LICENSE #F-1312
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1348 FAX: (910) 790-0592

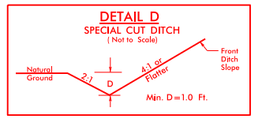
PERMIT DRAWING
SHEET 30 OF 32

NAD 83/NSRS 2007

8/17/99

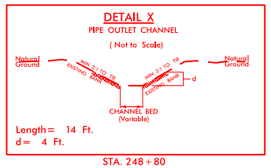
REVISIONS

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)



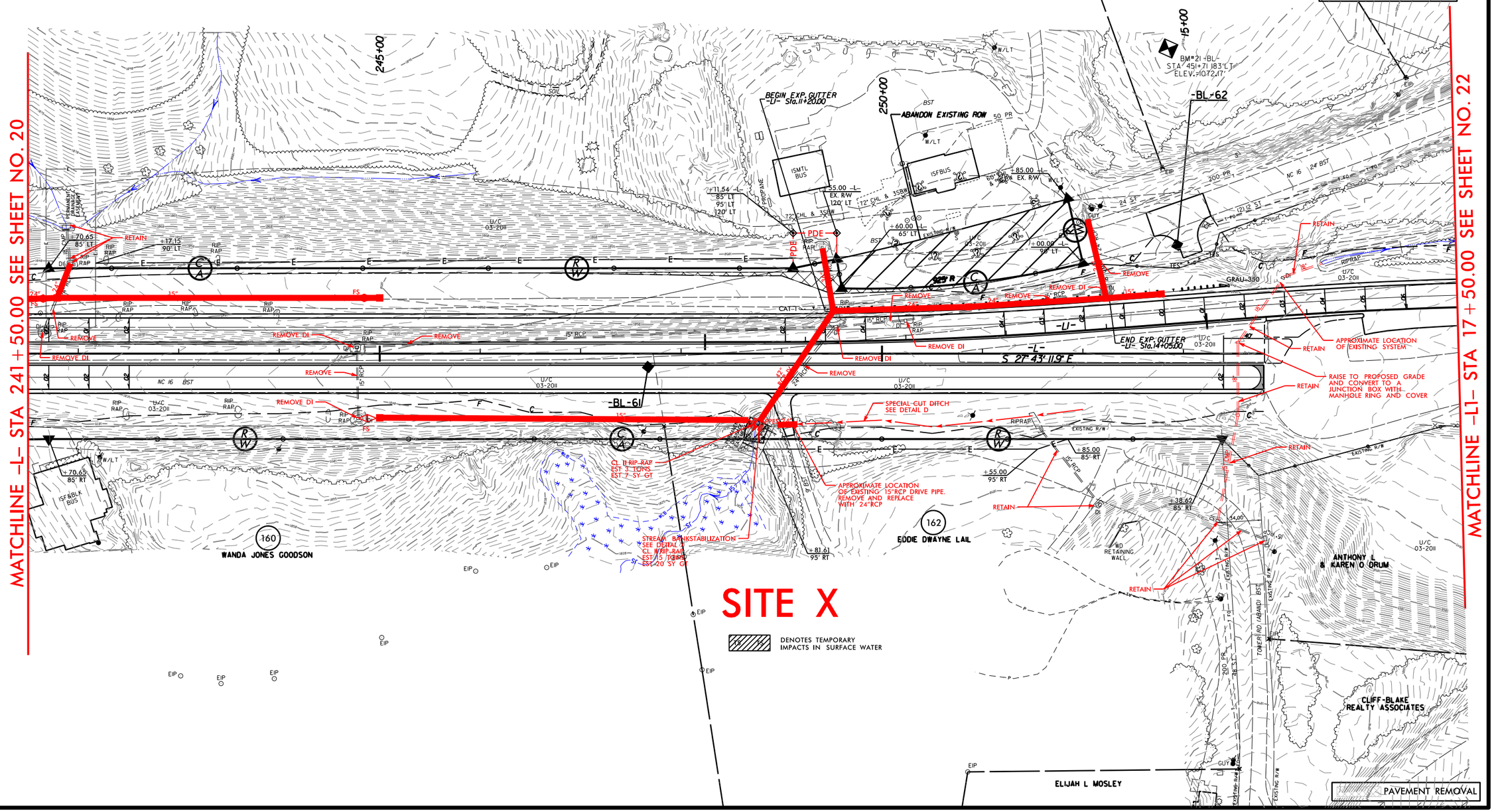
FROM STA. 249+00 TO STA. 252+00 –L– RT

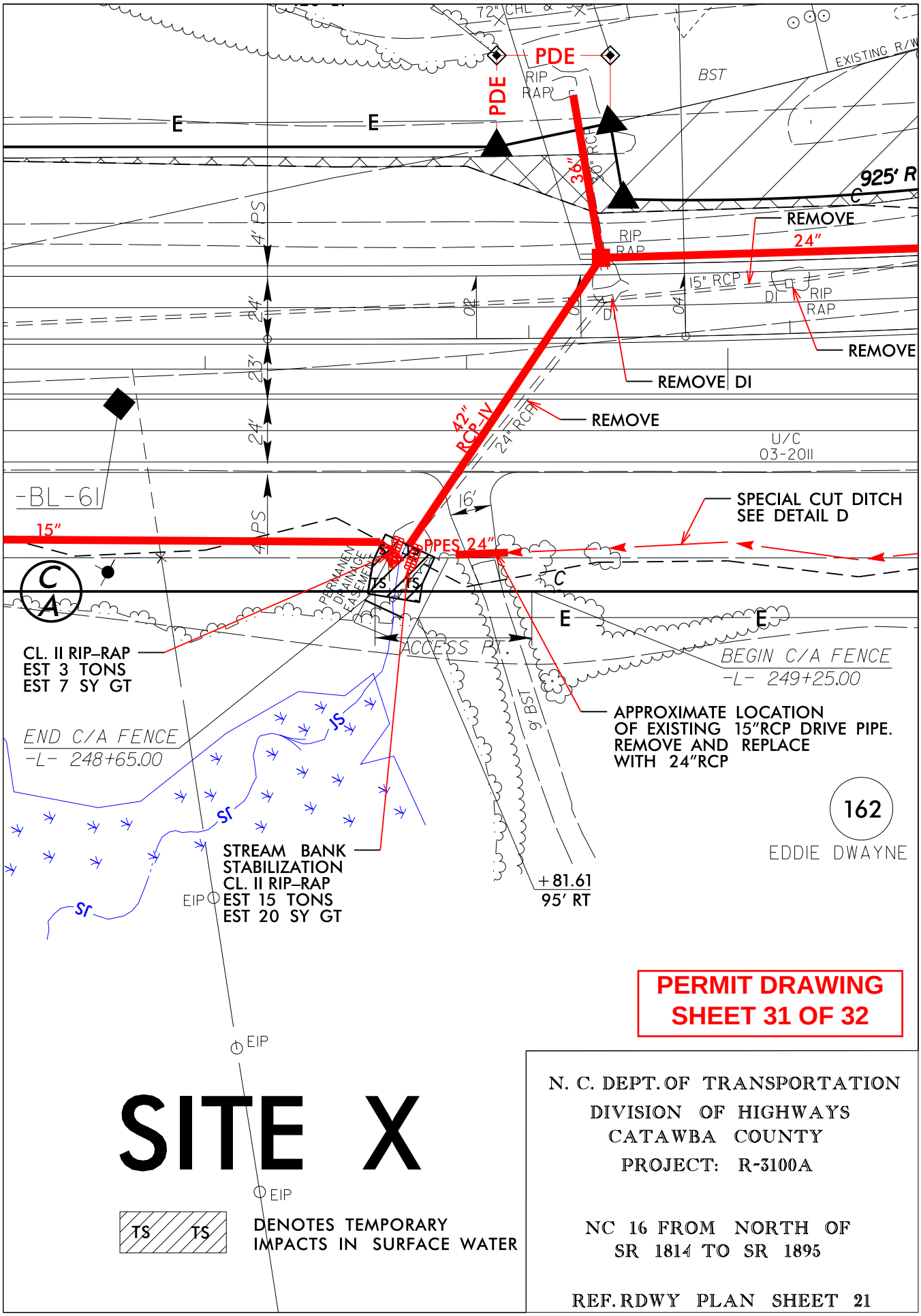
DETAIL X
PIPE OUTLET CHANNEL
(Not to Scale)



Length= 14 Ft.
d= 4 Ft.

STA. 248+80





PERMIT DRAWING
SHEET 31 OF 32

SITE X

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

REF. RDWY PLAN SHEET 21

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
I	47+58 -L- LT & RT	7'X8' RCBC						0.02	< 0.01	163	51	
		BANK STABIL.								77		
II	165+35 -L- LT & RT	2 @ 9'X9' RCBC						0.04	0.01	74	38	
		BANK STABIL.								82		
III	168+23 LT & RT	2 @ 9'X9' RCBC						0.03	< 0.01	76	24	
		BANK STABIL.								104		
IV	201+53 -L- RT	30" RCP						< 0.01	< 0.01	35	20	
		BANK STABIL.								10		
V	208+80 -L- RT	18" RCP						0.01	< 0.01	43	20	
		BANK STABIL.								6		
VI	213+60 -L- LT	BASE DITCH	0.04									
	214+12-L- LT	RDWY FILL	0.02									
VII	214+70 -L- LT											
	217+30-L- LT	RDWY FILL	0.10									
VIII	216+68 -L- LT	BASE DITCH			0.02	0.02						
	217+45 -L- LT	RDWY FILL						< 0.01		42		
IX	230+72 LT & RT	7'X8' RCBC						0.04	< 0.01	220	51	
		BANK STABIL.								25		
X	248+78 -L- RT	42" RCP							< 0.01		22	
TOTALS:			0.16		0.02	0.02		0.14	0.06	957	226	

PERMIT DRAWING
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NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

CATAWBA COUNTY
WBS - 34522.1.3 (R-3100A)

ATN Revised 3/31/05

SHEET 10/6/2016