Transportation

PAT McCRORY
Governor

NICHOLAS J. TENNYSON
Secretary

October 12, 2016

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 Individual Permit and Section 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

Dear Sir:

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 ENG 4345, 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.

Purpose and Need:
The purpose of this project is to upgrade the existing roadway to a multi-lane facility to improve traffic flow, increase safety, reduce travel times and provide more efficient vehicle operation. 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.

Summary of Jurisdictional Impacts:
Impacts for the overall project include approximately 0.20 acre of permanent wetland impacts, 2,364 linear feet of permanent stream impacts (1,724 linear feet of fill and 640 linear feet of bank stabilization), and 0.09 acre of temporary stream impacts (see Tables 2 and 3 for a breakdown of impacts).

Summary of Utility Impacts:
Utilities will be replaced in the road shoulder and are thus accounted for in the project impacts. There will be no additional impacts associated with utility relocations for this project.

Summary of Mitigation:
The project has been designed to avoid and minimize impacts to jurisdictional areas throughout the National Environmental Policy Act (NEPA) and design processes. However, project impacts will necessitate compensatory mitigation for the unavoidable impacts. NC Division of Mitigation Services (DMS) will provide all required mitigation for this project. See Tables 1 and 2 for a summary of impacts and Table 4 for a summary of proposed mitigation. These mitigable impacts include 1,724 linear feet of permanent stream impact and 0.2 acre of permanent wetland impact. It has been determined that onsite mitigation is not an option for this project.

NEPA DOCUMENT STATUS

An Environmental Assessment (EA) was completed for this project in January 1998.
A Finding of No Significant Impact (FONSI) was completed in December 1998.
In addition, a Re-evaluation of the EA & FONSI was completed in July 2012.
A Federal Highways (FHWA) for a Right of Way Consultation was completed in April 2013.
A second FHWA for a Right of Way Consultation was completed in October 2014.
A FHWA Construction Consultation will be completed in October 2016.
Copies of the above documents are available upon request.

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.

INDEPENDENT UTILITY

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

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

RESOURCE STATUS

Waters within the project area are located in the Catawba River Basin (HUC 03050101 and 03050102, within subbasins 03-08-32 and 03-08-35). Bee Branch, Unnamed Tributaries to Bee Branch, and Unnamed Tributaries to Maiden Creek are High Quality Waters and Water Supply II Waters located within the project area.

Wetland and stream determinations within R-3100 were conducted using the field delineation method outlined in the 1987 Corps of Engineers Wetland Delineation Manual. Mr. Steve Lund of the U.S. Army Corps of Engineers (USACE) and Polly Lespinasse of the North Carolina Division of Water Quality (DWR) field verified the wetlands and surface waters on March 10, 2009. This Section 404 Individual Permit application includes a request for a reverification by way of a Preliminary Jurisdictional Determination of the resources included in the R-3100 project area.

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	66 (<0.01)	10 (<0.01)	<0.01 (16)	66	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)	10 (<0.01)	<0.01 (43)	172	182
R-3100 B Site 5	UT to Maiden Creek S10a, S10b	Perennial WS-II, HQW	92 (0.02)	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:			**1,071**	**336**	**0.03 (311)**	**1,071**	**1,021**
			1,407				
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:			**1,724**	**640**	**0.09 (537)**	**1,724**	**1,842**
			2,364				

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.

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.

This site was re-evaluated after concurrence point 4C meeting due to stream velocity/ scour concerns with the steep grade on the existing, and replacement structure.

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. This allows for the energy dissipation to occur inside the structure.

The previous design had a 1.9% slope and a V10 = 9.0 fps. The revised design with a drop structure allows the pipes to be placed at a 0.3% grade and an outlet velocity of V10= 7.5 fps.

This impact will result in
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. This impact will result in
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.

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).

NCDOT also requests a burial exemption for this 60" RCP structure.

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:

<u>R-3100 A Permit Site 1</u>: 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.

<u>R-3100 A Permit Site 2:</u> 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.

<u>R-3100 A Permit Site 3:</u> 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.

<u>R-3100 A Permit Site 4:</u> 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.

<u>R-3100 A Permit Site 5:</u> 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.

<u>R-3100 A Permit Site 6:</u> 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.

FEDERALLY PROTECTED SPECIES

Plants and animals with Federal classification of Endangered (E) or Threatened (T) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of April 2, 2015, the USFWS lists three federally protected species for Catawba County (Table 3).

Summary of Species with Habitat:

Dwarf-flowered heartleaf: Walking visual surveys of all areas of potential habitat were conducted in April 2013. No individuals of this species have been identified within the project and there are no known occurrences within 1.0 mile of the project.

Schweinitz's sunflower: Walking visual surveys of all areas of potential habitat were conducted in September 2013, and October 2015. No individuals of this species have been identified within the project and there are no known occurrences within 1.0 mile of the project.

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

Table 3 – Federally protected species listed for Catawba County

Scientific Name	Common Name	Federal Status*	Habitat Present	Biological Conclusion
Myotis septentrionalis	Northern long-eared bat	T	Yes	*
Hexastylis naniflora	Dwarf-flowered heartleaf	T	Yes	No Effect
Helianthus schweinitzii	Schweinitz's sunflower	E	Yes	No Effect

*May Affect – NLEB is exempt due to consistency with the 4(d) rule.

INDIRECT CUMULATIVE IMPACT ANALYSIS

Existing rules for the 401 Water Quality Certification Program (15A NCAC 2H .0506(b)(4) require that the DWR determine that a project "does not result in cumulative impacts, based on past or reasonably anticipated future impacts, that cause or will cause a violation of downstream water quality standards."

An Indirect and Cumulative Effects Screening Report was completed for this project in 2014. Copies of this report are available upon request. This report concluded the following:

The project is not expected to notably reduce travel times as a result of added capacity. The addition of a center median may alter the way some properties are accessed, but access will not be removed from any parcels and the project is not expected to alter regional travel patterns. The project will not create any new land use nodes. The timing of development activities in the FLUSA is not necessarily dependent upon construction of the project, but rather upon the availability of public utilities, as well as market conditions. Based on the information analyzed, the indirect land use effects screening tool indicates a lower level of concern for indirect and cumulative effects potential as a result of the project, and suggests that further examination of indirect and cumulative effects is not likely to be warranted.

CULTURAL RESOURCES

In a letter dated September 13, 1995, the SHPO recommended that no archaeological investigation be conducted for the proposed project.

Pursuant to 36 CFR Part 800.4, the North Carolina State Historic Preservation Office (SHPO) was consulted and recommended an architectural historian survey the area of potential effect (see letter dated September 13, 1995 in Appendix C of the 2008 FONSI).

NCDOT investigated the area of potential effect and found no properties either listed or eligible for listing in the National Register of Historic Places. Therefore, no further compliance with either Section 106 of the National Register Act of 1966 or with the Section 4(f) of the Department of Transportation Act of 1966 is required.

FEMA COMPLIANCE

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

WILD AND SCENIC RIVER SYSTEM

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

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.

<u>Avoidance and Minimization:</u>
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 of this project. This project will permanently impact 0.20 acre of wetlands, 2,364 linear feet of streams (1,724 linear feet of permanent fill and 640 linear feet of bank stabilization), and temporarily impact 0.09 acre of streams. Table 4 below, and the attached mitigation acceptance letter from DMS summarizes the mitigation requirements for this 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	1,234	1,261	--
03050101	R-3100 A Sites 2-10	490	581	0.20
R-3100 Total Mitigation Liability:		**1,724**	**1,842**	**0.20**

REGULATORY APPROVALS

Section 404: Application is hereby made for a USACE Individual 404 Permit 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,

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

cc: NCDOT Permit Application Standard Distribution List

U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

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

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

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PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME
First - Phillip Middle - S Last - Harris
Company - NCDOT
E-mail Address - pharris@ncdot.gov / maturchy@ncdot.gov

8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Middle - Last -
Company -
E-mail Address -

6. APPLICANT'S ADDRESS:
Address- 1548 Mail Service Center
City - Raleigh State - NC Zip - 27699 Country - US

9. AGENT'S ADDRESS:
Address-
City - State - Zip - Country -

7. APPLICANT'S PHONE NOs. w/AREA CODE
a. Residence n/a b. Business 919-707-6157 c. Fax 919-212-5785

10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ SIGNATURE OF APPLICANT _____ DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
R-3100: The widening of NC 16 from the current 4 lane sections at SR 1801 (Claremont Rd) to SR 1895 (Tower Road).

13. NAME OF WATERBODY, IF KNOWN (if applicable)
Smyre Creek, Bee Branch, Maiden Creek, South Fork Creek

14. PROJECT STREET ADDRESS (if applicable)
Address not applicable
City - State- Zip-

15. LOCATION OF PROJECT
Latitude: °N 35.618385 Longitude: °W 81.133195

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

17. DIRECTIONS TO THE SITE

From Interstate 40, Use Exit 132 (NC 16). Travel south on NC 16 until the road becomes two lanes. Project begins at two lane section.

18. Nature of Activity (Description of project, include all features)

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) the current 4 lane section west of 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.

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

The purpose of this 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 operation. 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.

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

20. Reason(s) for Discharge

Impacts to Jurisdictional Resources will result from widening the roadway, shoulders, lengthening and/or replacing hydraulic conveyance structures. Further impact descriptions are found in the attached cover letter.

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

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
See attached cover letter.		

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

Acres See attached cover letter.

or

Linear Feet See attached cover letter.

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

See attached cover letter.

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

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

a. Address- See attached permit drawings and landowner label list.

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
see attached agency	coordination.				

* Would include but is not restricted to zoning, building, and flood plain permits

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

SIGNATURE OF APPLICANT — DATE 10/12/2016 — SIGNATURE OF AGENT — DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

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: C203829

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	

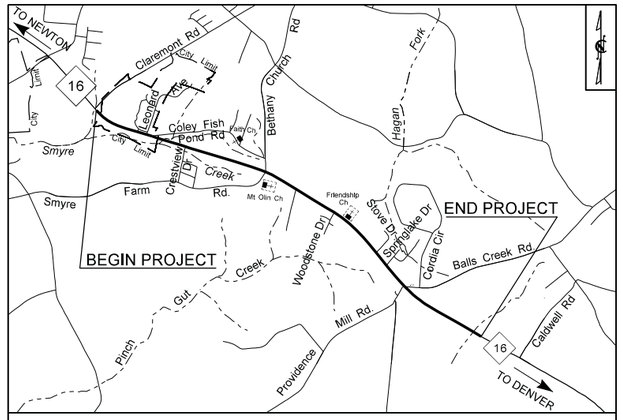
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34522.1.4	STP-0016(53)	PE
34522.2.FR4	STP-0016(53)	ROW
34522.2.FRU4	STP-0016(53)	UTIL.
34522.3.FR4	STP-0016(53)	CONST.

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)

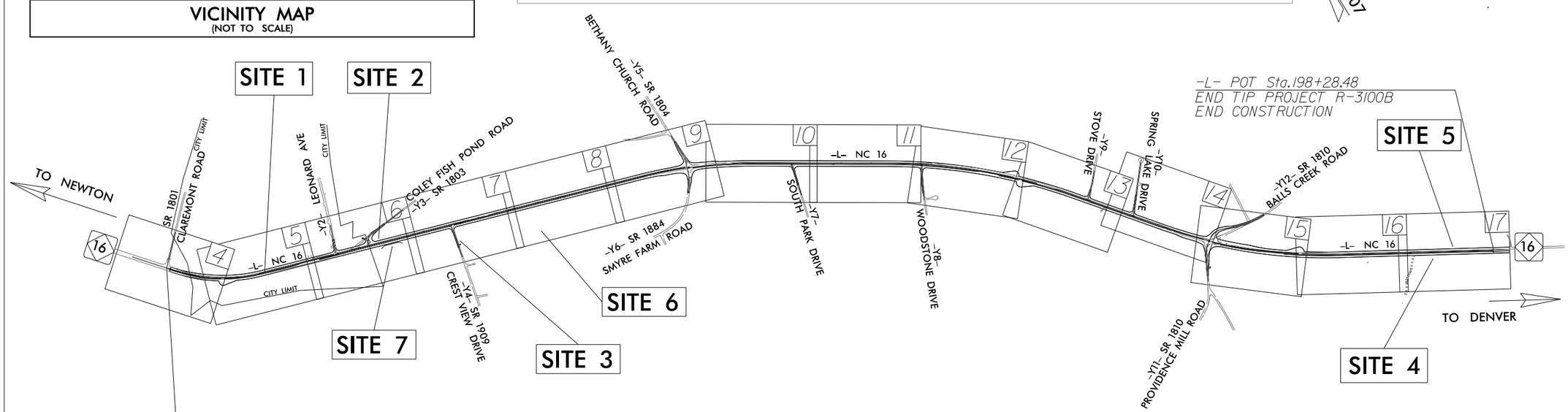
TYPE OF WORK: GRADING, DRAINAGE, RETAINING WALL, CULVERTS, PAVING & SIGNALS



VICINITY MAP
(NOT TO SCALE)

NAD 83/
NSRS 2007

WETLAND AND STREAM IMPACTS



PREPARED FOR
DEPARTMENT OF TRANSPORTATION
RALEIGH, NC

NCDOT CONTACT: BRENDA MOORE, PE, CPM

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 2016 = 13,050
ADT 2036 = 20,200
DHV = 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 = 3.474 Miles

TOTAL LENGTH TIP PROJECT R-3100B = 3.474 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:
JANUARY 17, 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

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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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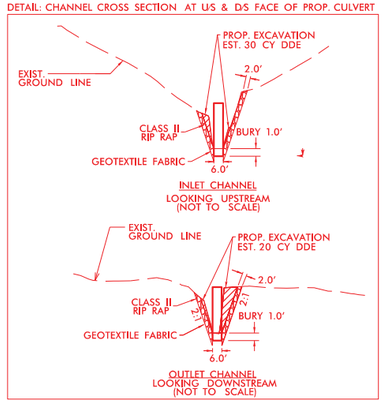
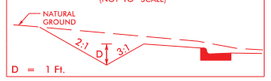
PERMIT DRAWING
SHEET 2 OF 22

NAD 83 /NSRS 2007

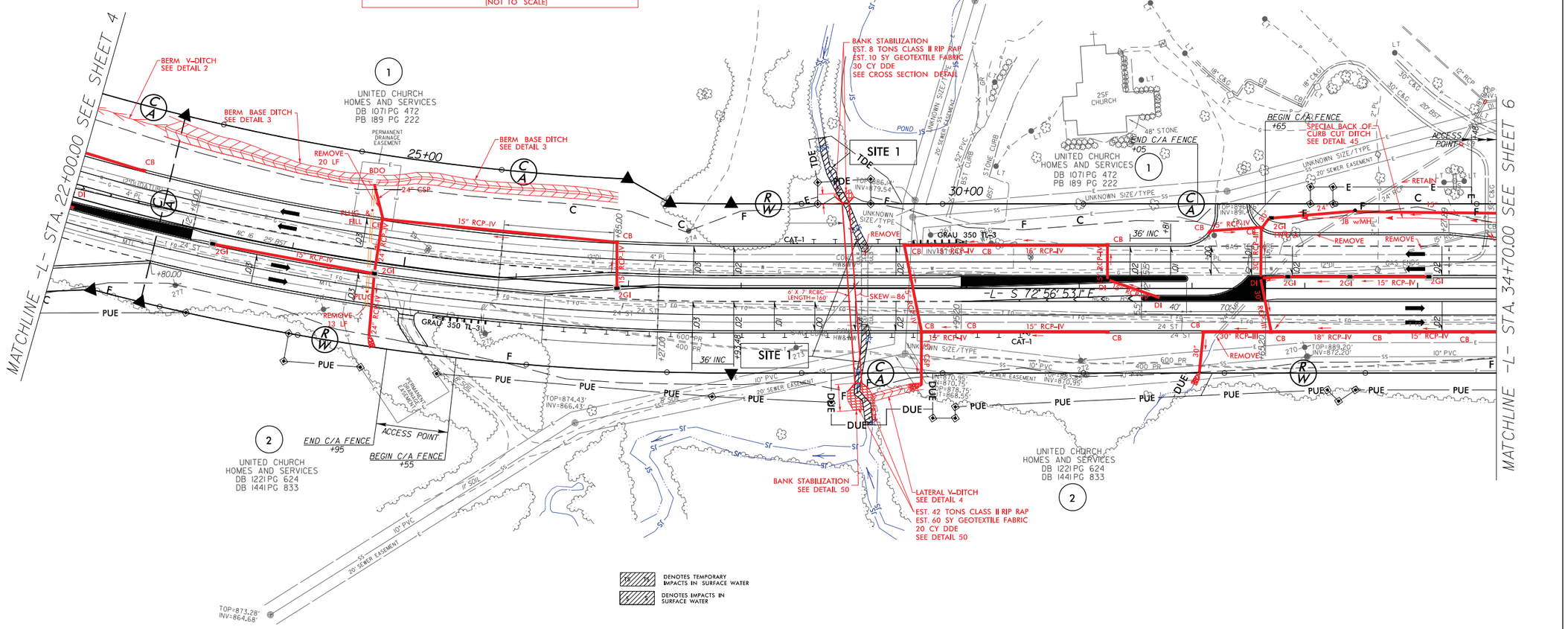
DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT



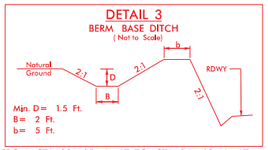
DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)



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



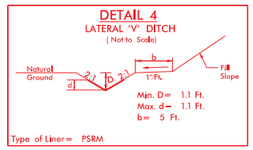
DETAIL 3
BERM BASE DITCH
(Not to Scale)



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)

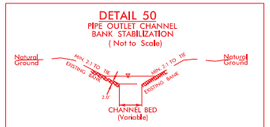


Min. D= 1.1 Ft.
Max. d= 1.1 Ft.
b= 5 Ft.

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

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$ULFNAME$$$$

8/17/99

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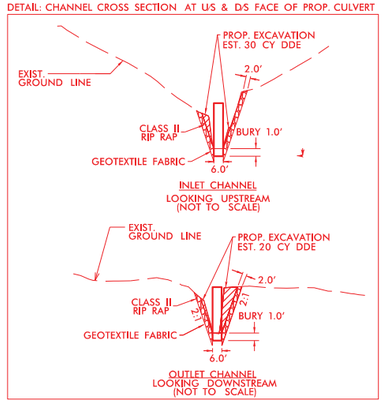
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 3 OF 22

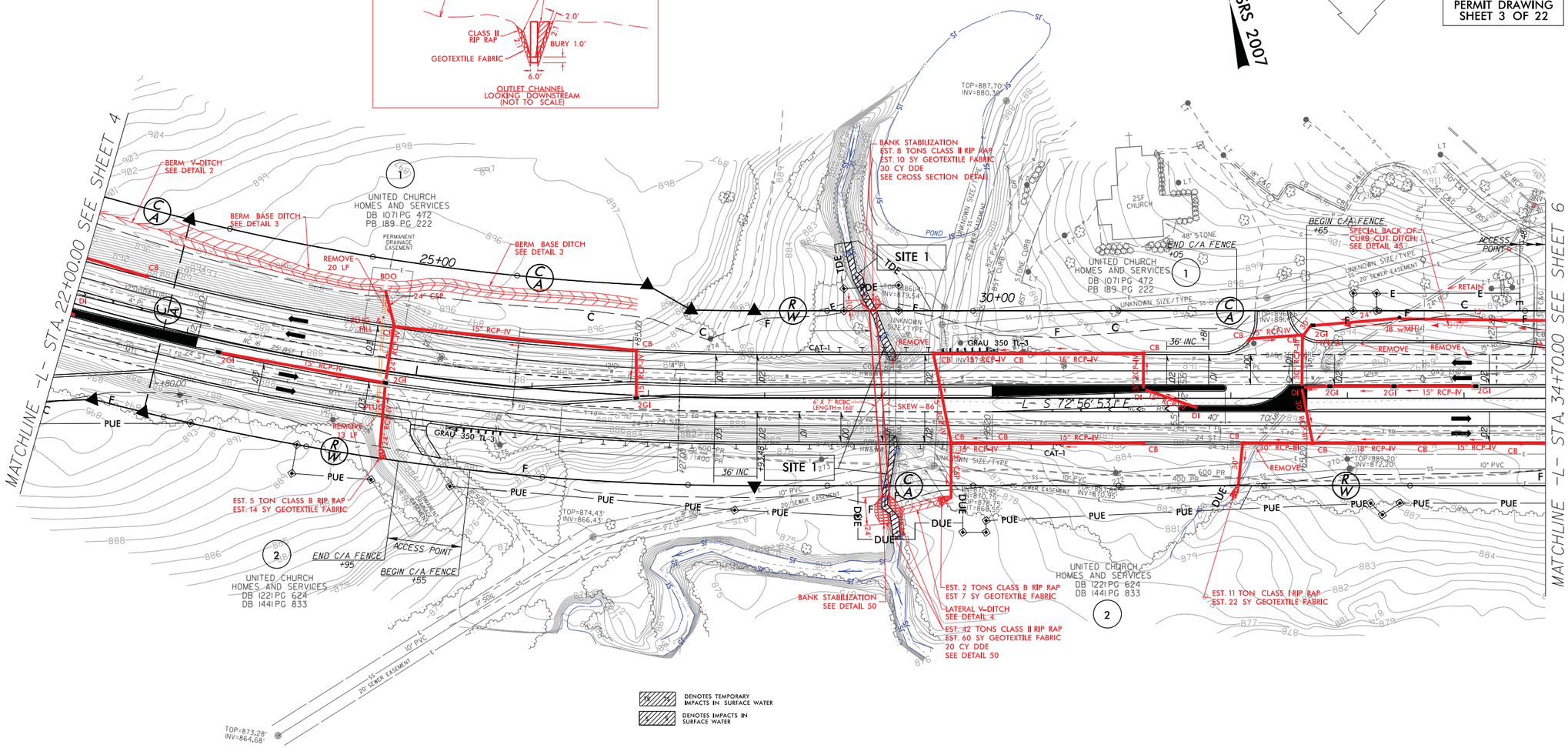
NAD 83 /NSRS 2007

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

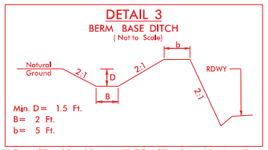


DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)

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



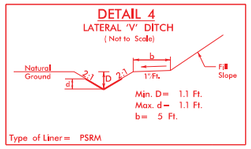
DETAIL 3
BERM BASE DITCH
(Not to Scale)



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)

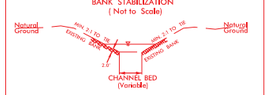


Min. D = 1.1 Ft.
Max. d = 1.1 Ft.
b = 5 Ft.

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)



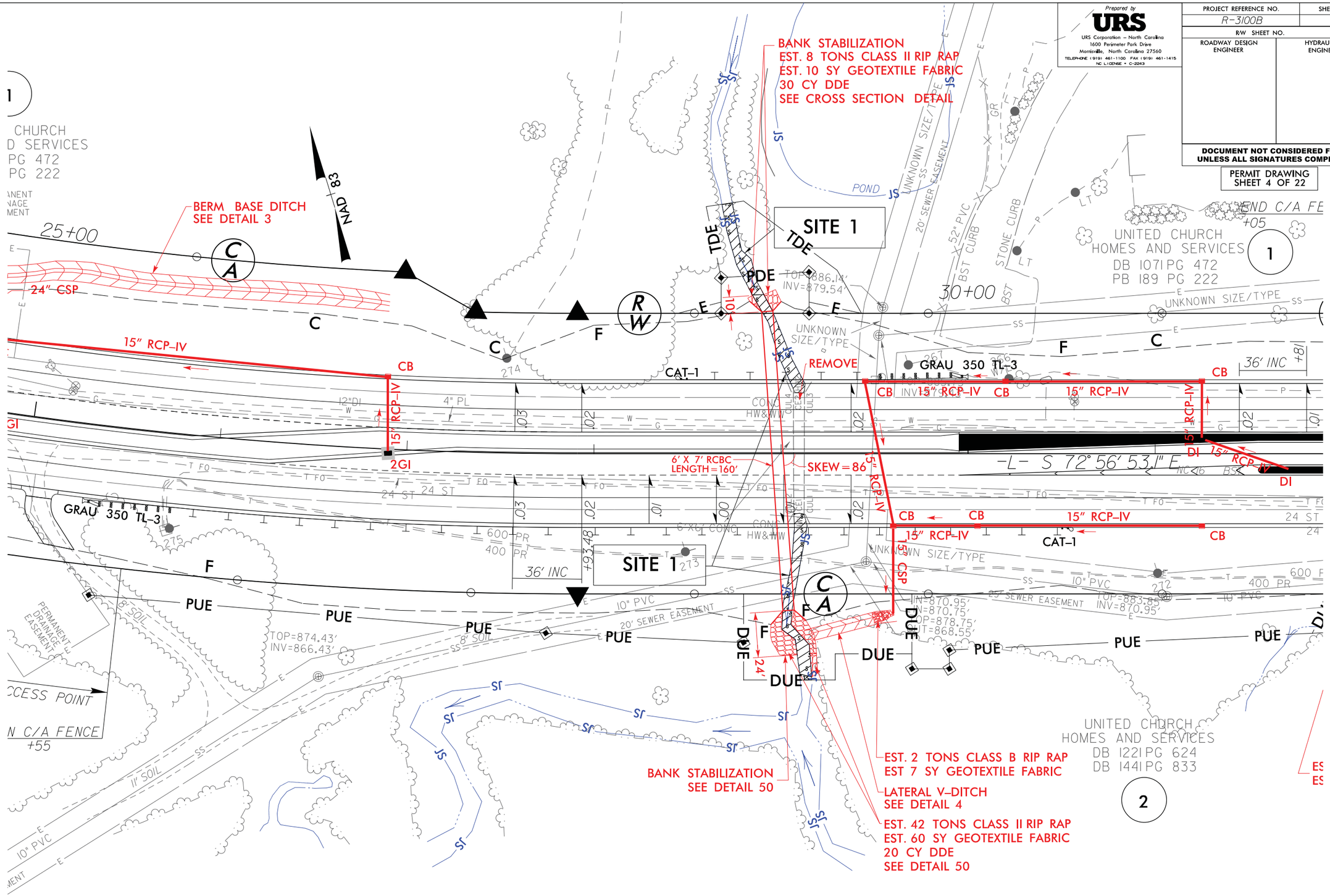
Length = 24 Ft.

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

FOR -L- PROFILE SEE SHEET 18

100' 0' 100'
SCALE

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



TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

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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

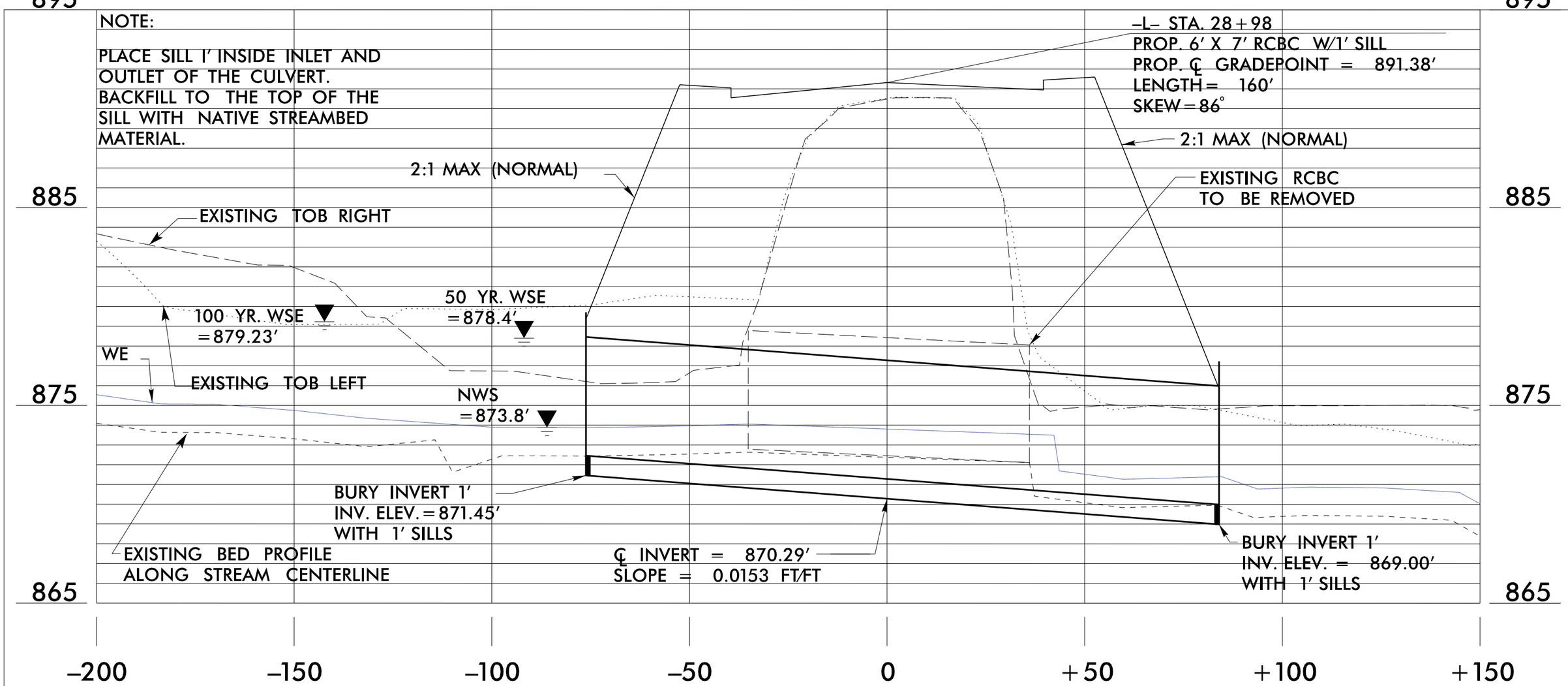
PERMIT DRAWING
SHEET 4 OF 22

REVISIONS

8/17/99

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

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

09/30/16

PERMIT DRAWING
SHEET 6 OF 22

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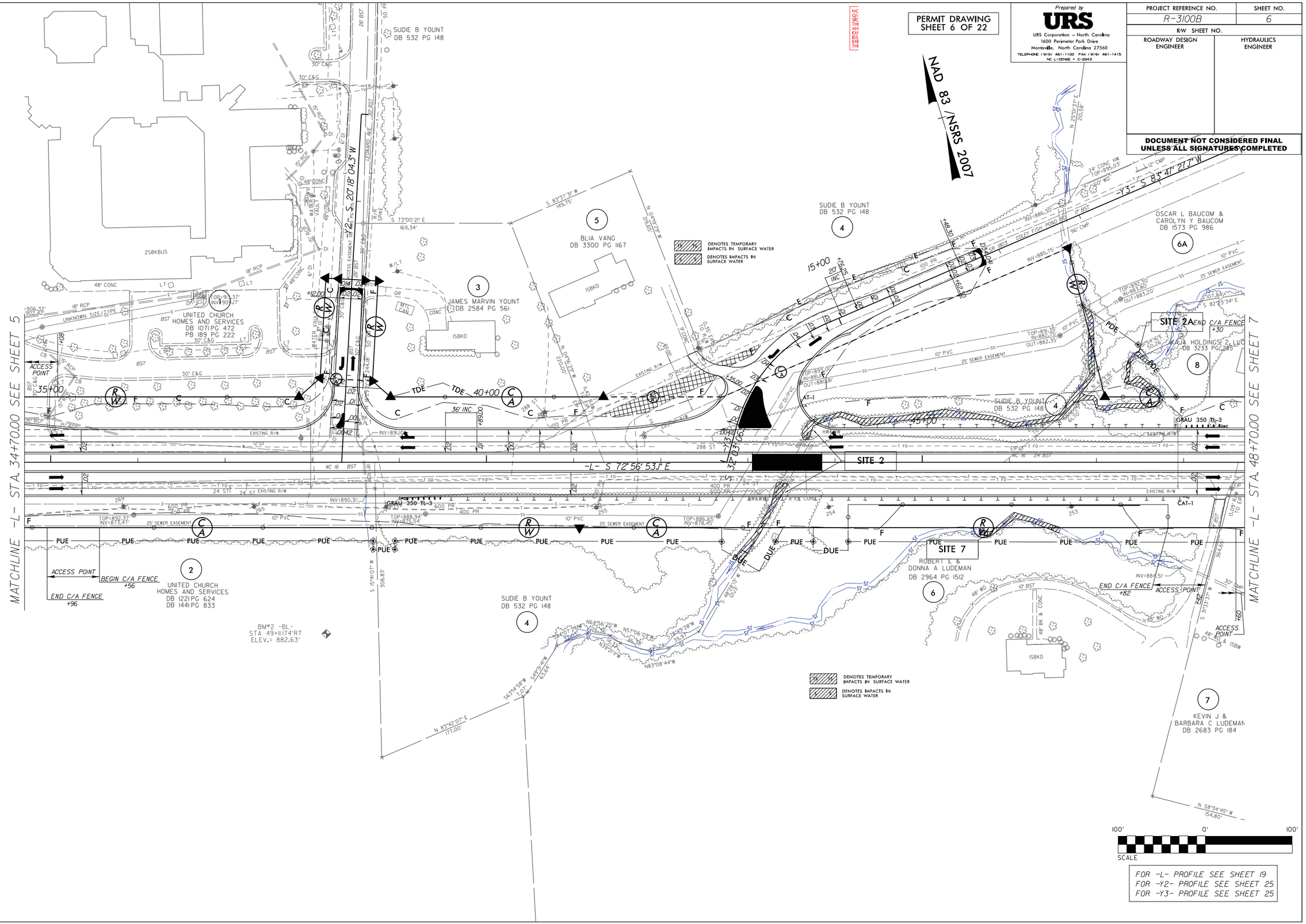
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

REVISIONS

8/17/99

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

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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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

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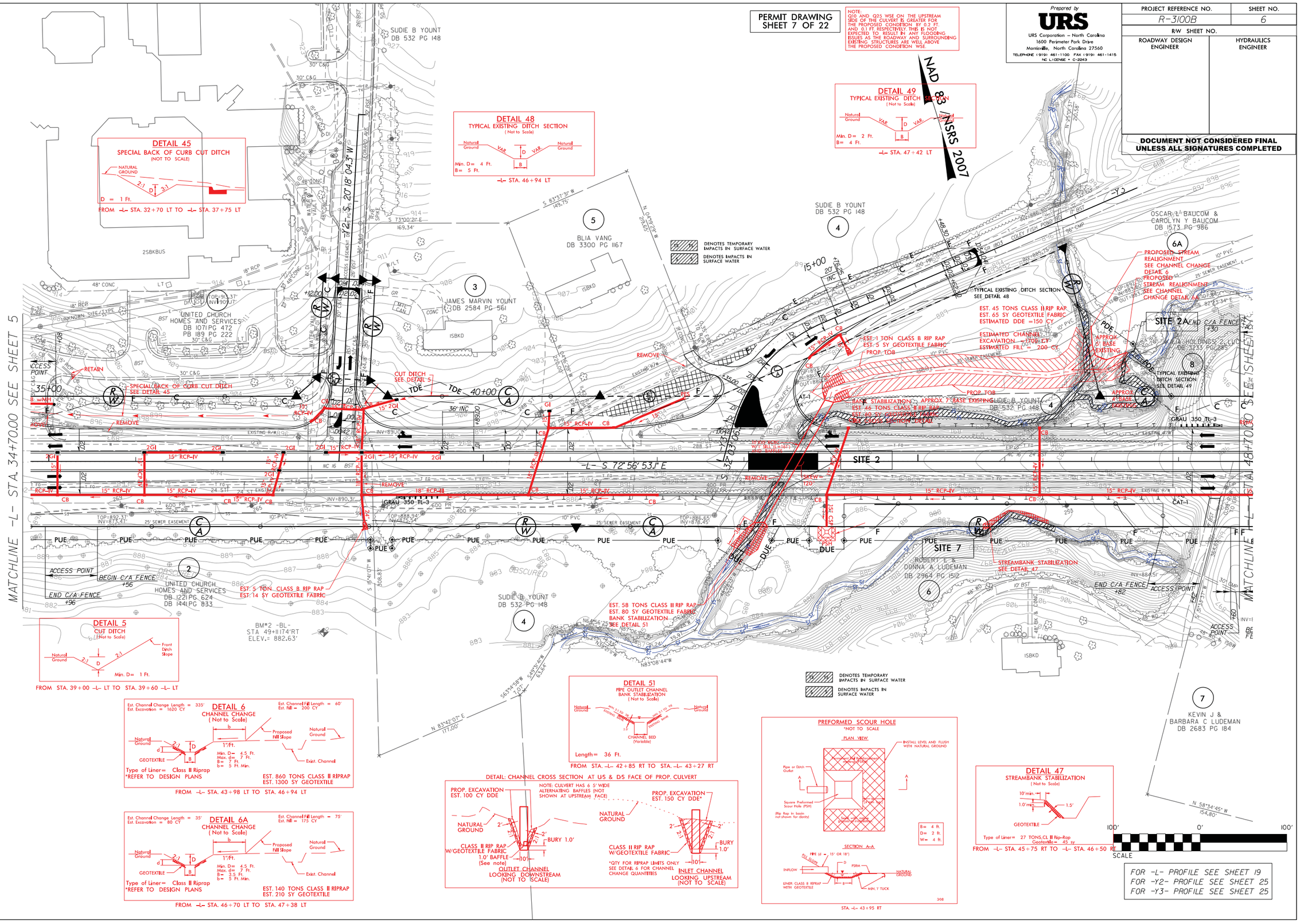
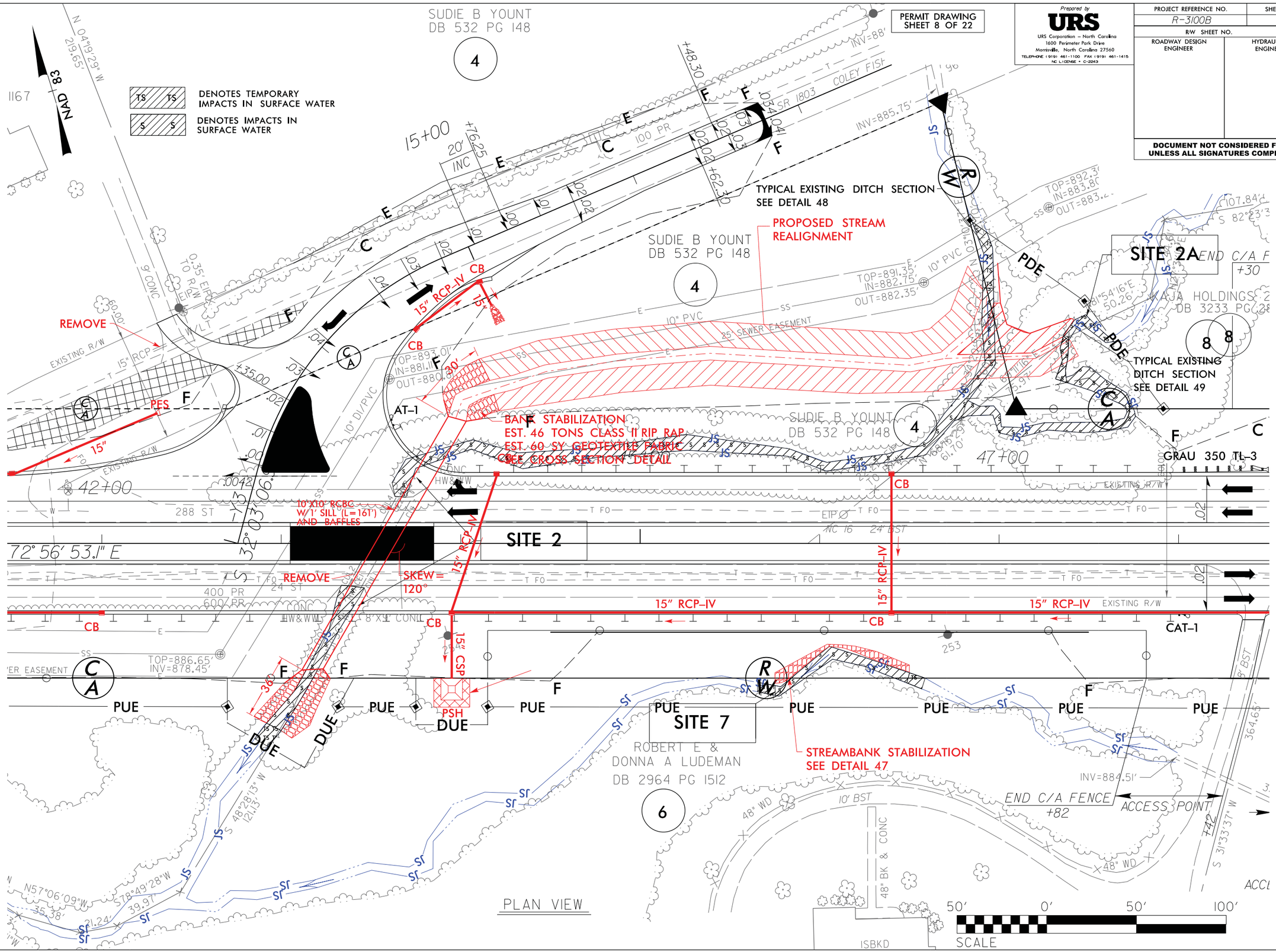
$$$$SYSTIME$$$$
$$$$USERNAME$$$$





REVISIONS

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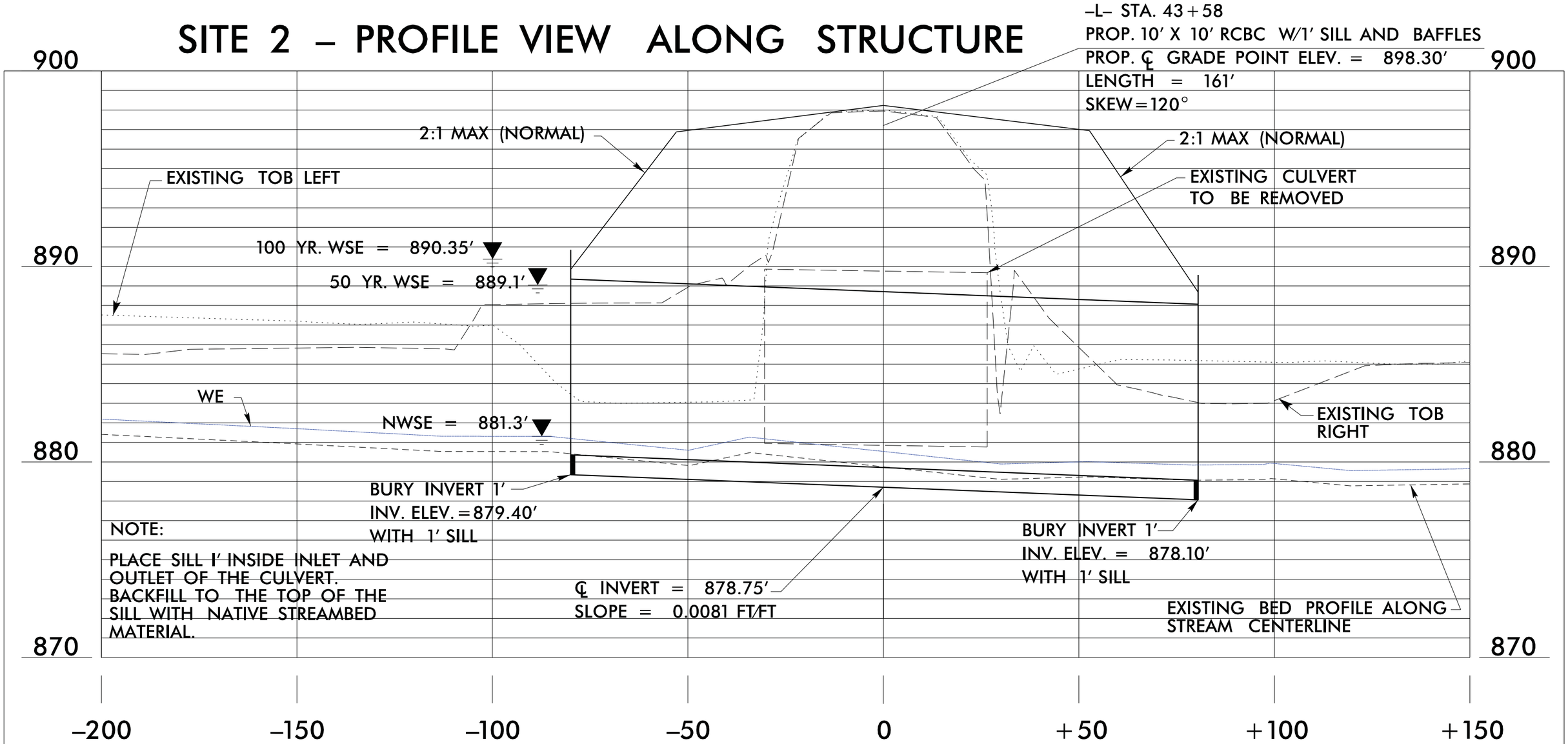
$$$$$$$$SYSTIME$$$$$$$$
$$$$$$$$USERNAME$$$$$$$$

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

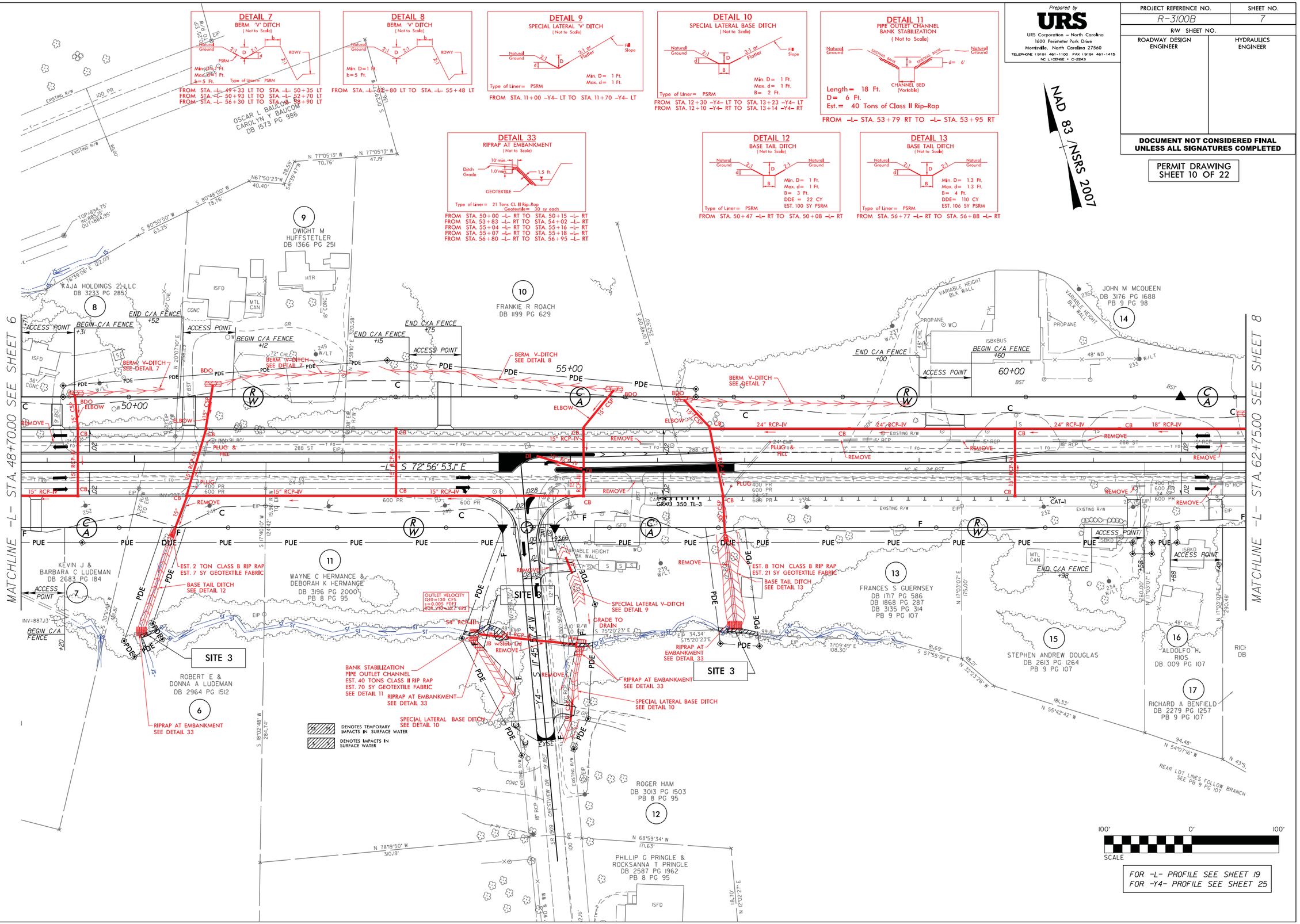
SHEET 9 OF 22

09/30/16

8/17/99

REVISIONS

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



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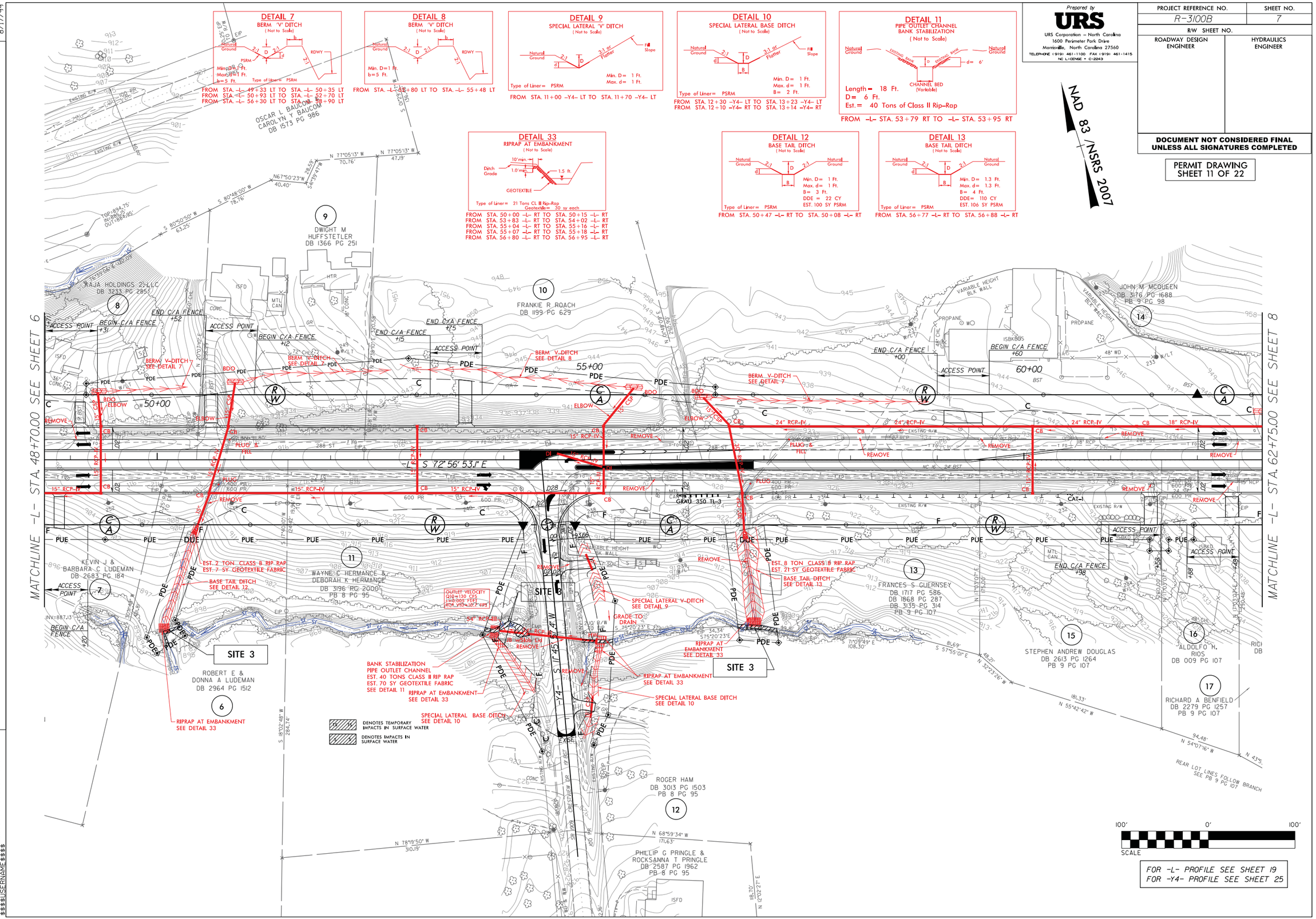
REVISIONS



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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 11 OF 22

$$$$SYSTIME$$$$
$$$$DGNNAME$$$$

PERMIT DRAWING
SHEET 12 OF 22

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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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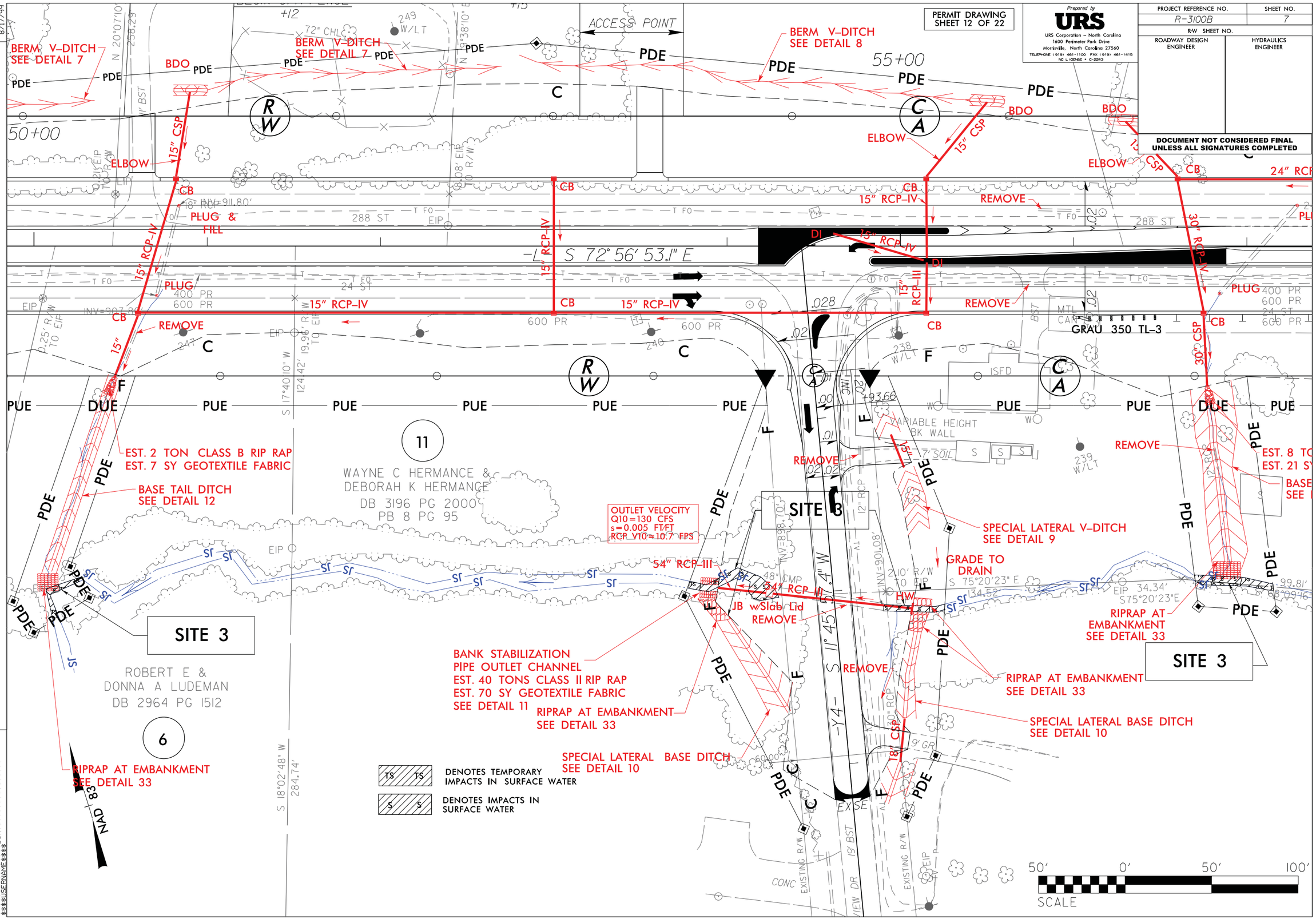
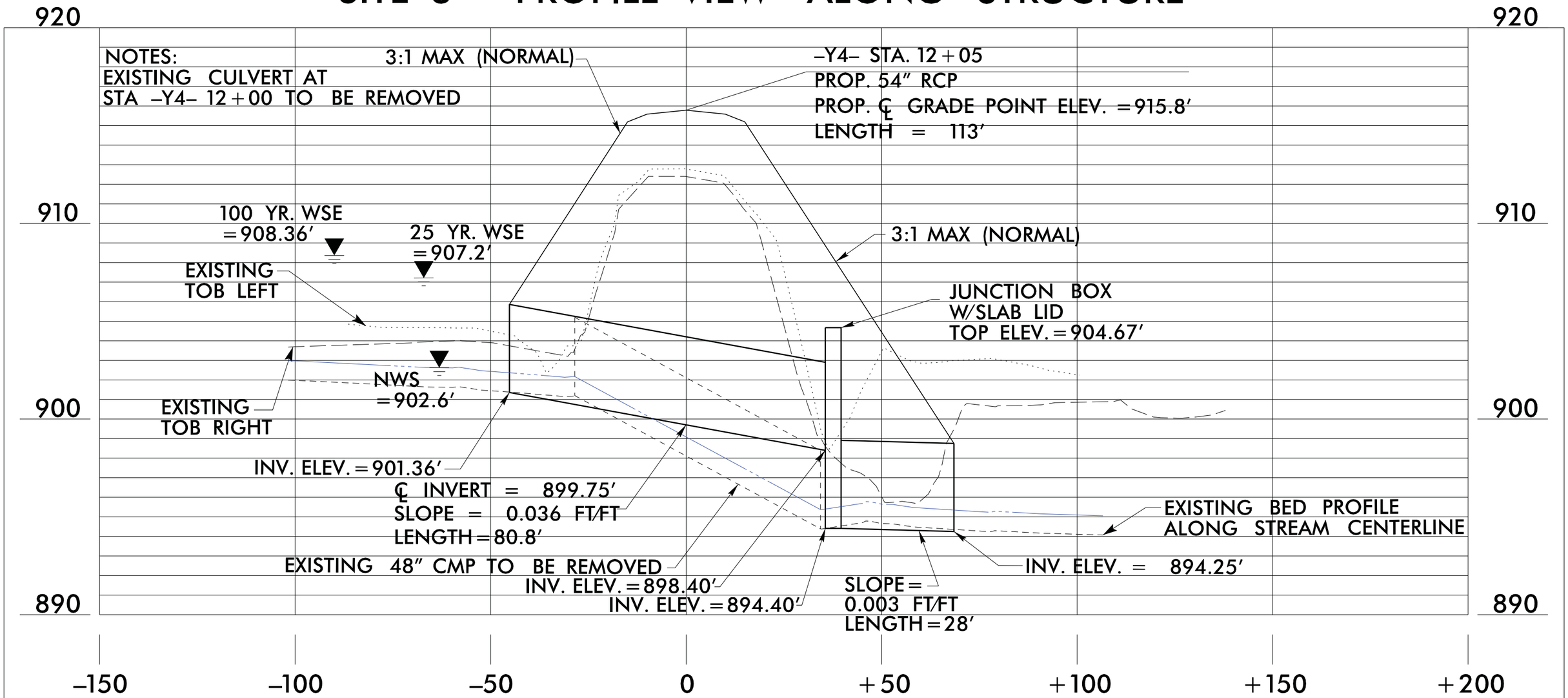


REVISIONS

8/17/99

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 =	908.36	FT.
OT DISCHARGE =	263	CFS
OT FREQUENCY =	200+	YR.
OT WS ELEVATION =	912.5	FT.

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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

09/30/16

8/17/99

REVISIONS

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

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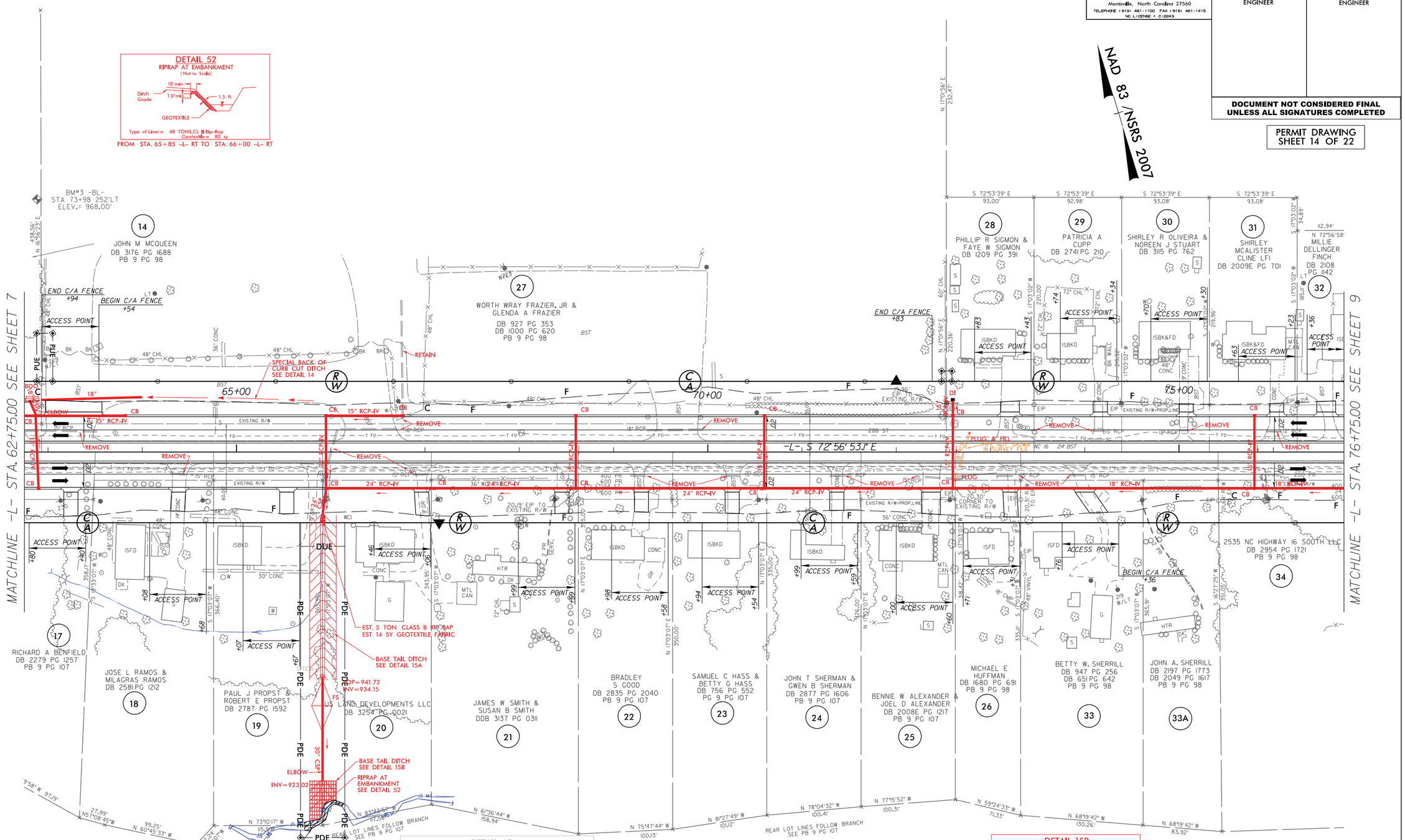
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 14 OF 22

NAD 83 /NSRS 2007



FOR -L- PROFILE SEE SHEET 20

DETAIL 52
RIPRAP AT EMBANKMENT
(Not to Scale)

Ditch Grade — 10' min. — 1.0' min. — 1.5 ft. — GEOTEXTILE

Type of Liner= 48 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)

9" — 2' — L (See Chart Below) — 20' — GI etc.

S=Ditch Slope — ℄ Proposed Ditch

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)

NATURAL GROUND — 2:1 — D — 2:1

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)

Natural Ground — 2:1 — d — D — 2:1 — Natural Ground — B

*When B is < 6.0'

slope=4.5%

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)

Natural Ground — 2:1 — d — D — 2:1 — Natural Ground — Geotextile — B — 2'

*When B is < 6.0'

slope=5.2%

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

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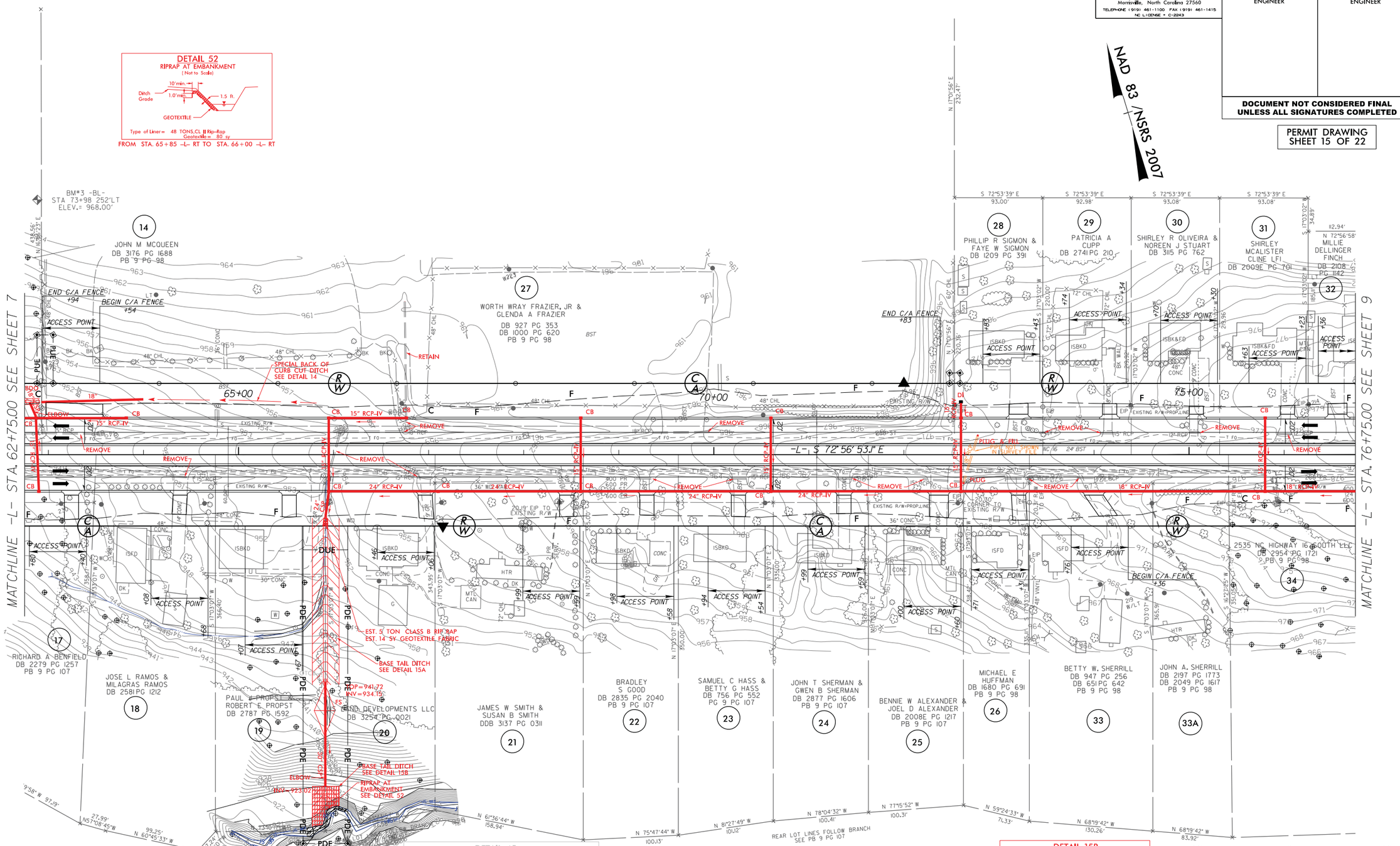
NC LICENSE # C-2243

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 15 OF 22

NAD 83 /NSRS 2007



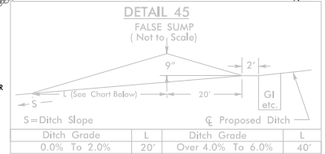
FOR -L- PROFILE SEE SHEET 20

DETAIL 52
RIPRAP AT EMBANKMENT
(Not to Scale)

Type of Liner= 48 TONS,CL II Rip-Rap
Geotextile= 80 sy

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

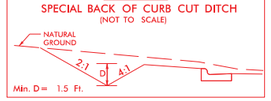
DETAIL 45
FALSE SUMP
(Not to Scale)



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

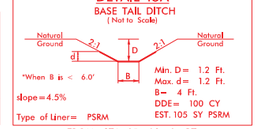
DETAIL 14
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)



Min. D= 1.5 Ft.

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

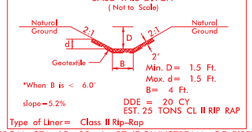
DETAIL 15A
BASE TAIL DITCH
(Not to Scale)



*When B is < 6.0'
slope=4.5%
Min. D= 1.2 Ft.
Max. d= 1.2 Ft.
B= 4 Ft.
DDE= 100 CY
EST. 105 SY PSRM
Type of Liner= PSRM

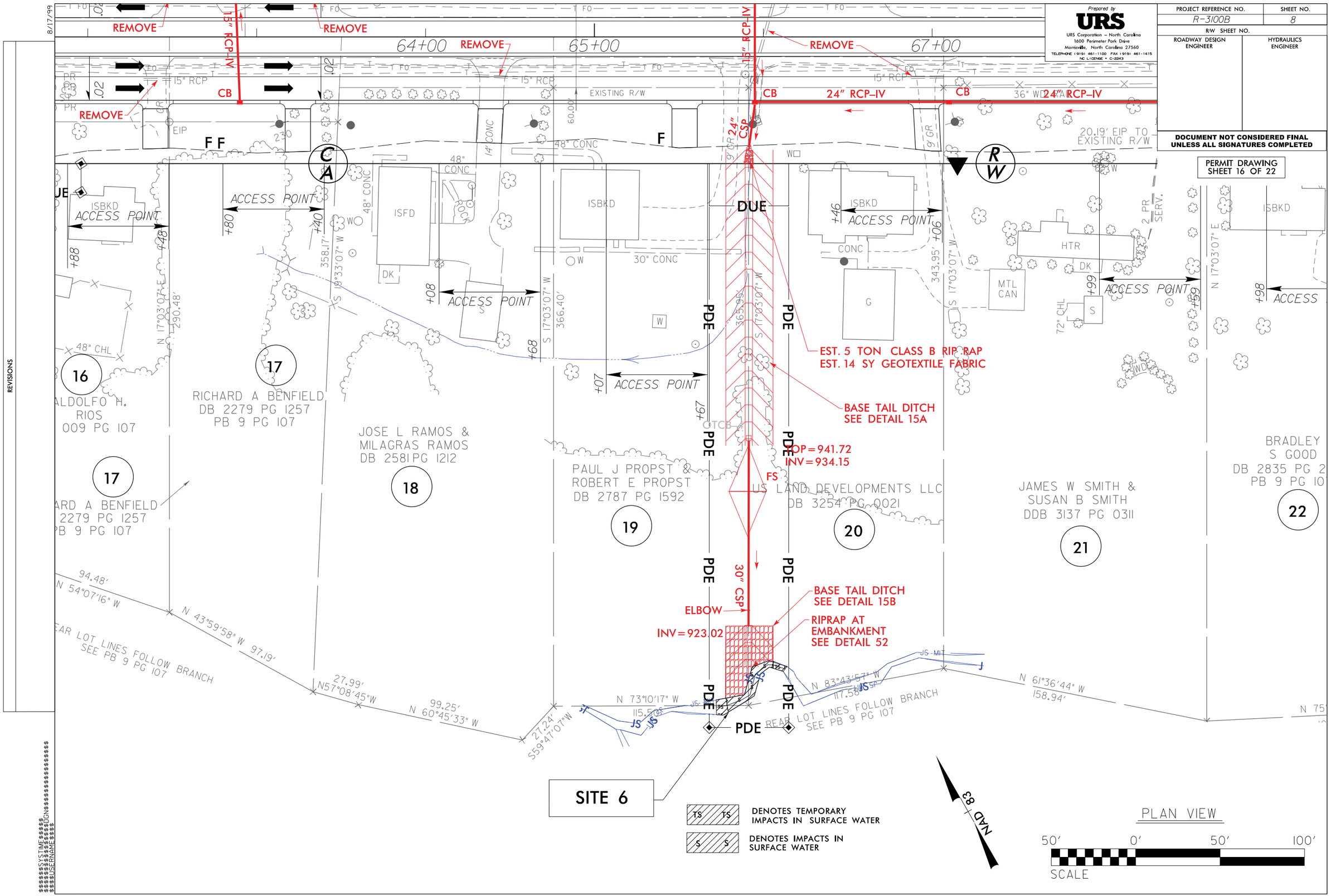
FROM STA. 65+92 -L- RT

DETAIL 15B
BASE TAIL DITCH
(Not to Scale)



*When B is < 6.0'
slope=5.2%
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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URS
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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
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PERMIT DRAWING
SHEET 16 OF 22
REVISIONS
8/17/99
REMOVE
15" RCP-IV
CB
24" RCP-IV
36" WD
64+00
65+00
67+00
15" RCP
EXISTING R/W
EIP
F F
F
C A
R W
48" CONC
14" CONC
9' GR
24" CSP
20.19' EIP TO EXISTING R/W
ISBKD
ACCESS POINT
ISFD
DK
DUE
PDE
CONC
G
HTR
MTL CAN
S
72" CHL
48" CHL
30" CONC
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
N 54°07'16" W
N 43°59'58" W 97.19'
N 57°08'45" W
N 60°45'33" W
S 59°47'07" W
N 73°10'17" W
N 83°43'57" W
N 61°36'44" W
158.94'
N 17°03'07" E
S 17°03'07" W
S 19°33'07" W
290.48'
358.17'
366.40'
365.99'
343.95'
JS-MIT
SITE 6
TS
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
S
DENOTES IMPACTS IN SURFACE WATER
NAD 83
PLAN VIEW
50'
0'
50'
100'
SCALE

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	17
R/W SHEET NO.	
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SHEET 17 OF 22

NAD 83 /NSRS 2007

DETAIL 41
PIPE OUTLET CHANNEL BANK STABILIZATION
(Not to Scale)

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

Length= VARIABLE
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

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

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

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

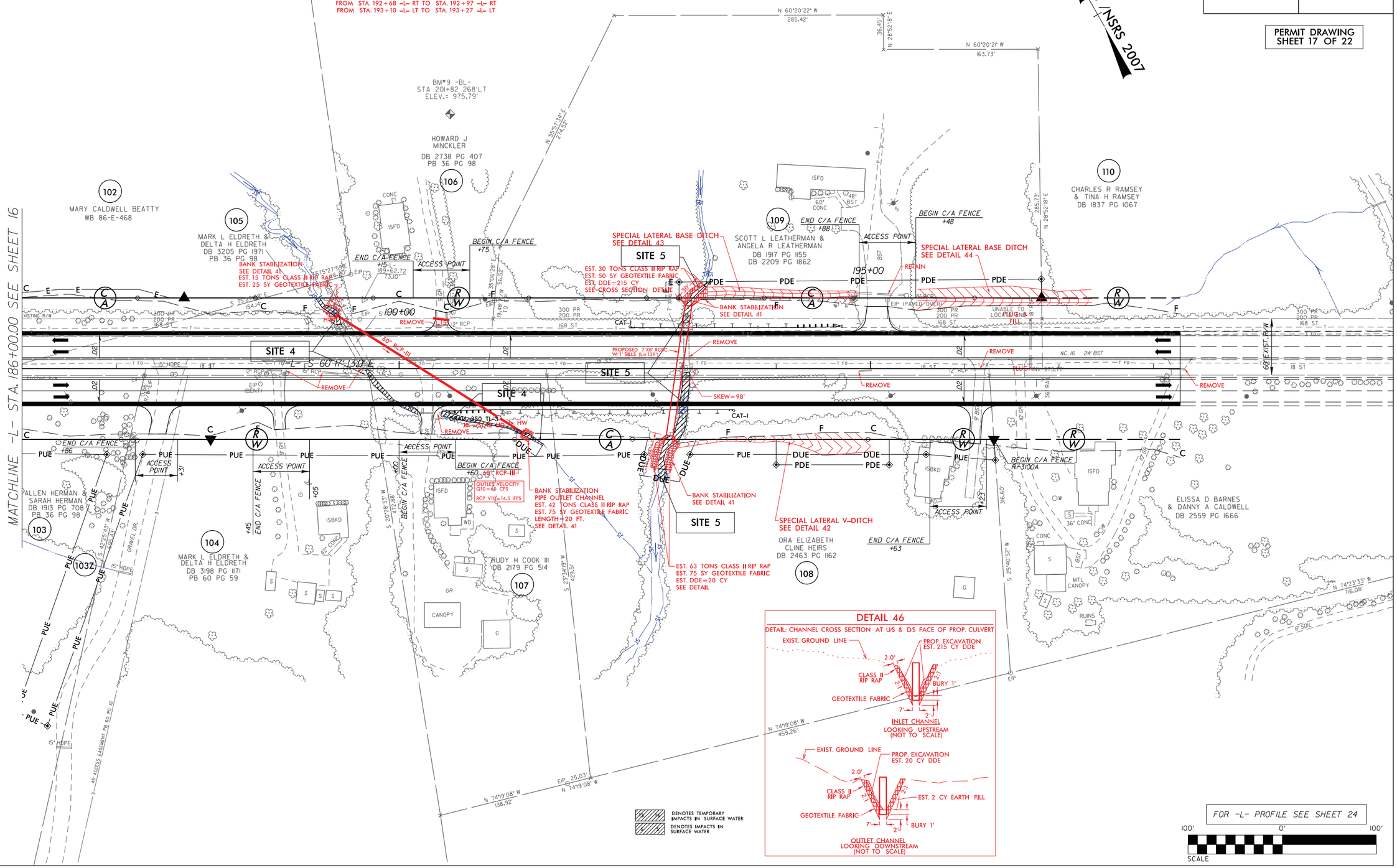
FROM STA. 193+26 -L- LT TO STA. 194+85 -L- LT

DETAIL 44
SPECIAL LATERAL BASE DITCH
(Not to Scale)

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

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

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



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

EXIST. GROUND LINE — PROP. EXCAVATION EST. 215 CY DDE — 2.0' — CLASS II RIP RAP — GEOTEXTILE FABRIC — BURY 1' — 7' — 2'

INLET CHANNEL
LOOKING UPSTREAM
(NOT TO SCALE)

EXIST. GROUND LINE — PROP. EXCAVATION EST. 20 CY DDE — 2.0' — CLASS II RIP RAP — EST. 2 CY EARTH FILL — GEOTEXTILE FABRIC — BURY 1' — 7' — 2'

OUTLET CHANNEL
LOOKING DOWNSTREAM
(NOT TO SCALE)

$$$$$SYSTIME$$$$$
$$$$$DGN$$$$$
$$$$$ULERNAME$$$$$

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R-3100B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 18 OF 22

NAD 83 /NSRS 2007

DETAIL 41
PIPE OUTLET CHANNEL BANK STABILIZATION
(Not to Scale)

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

Length= VARIABLE
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

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

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

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

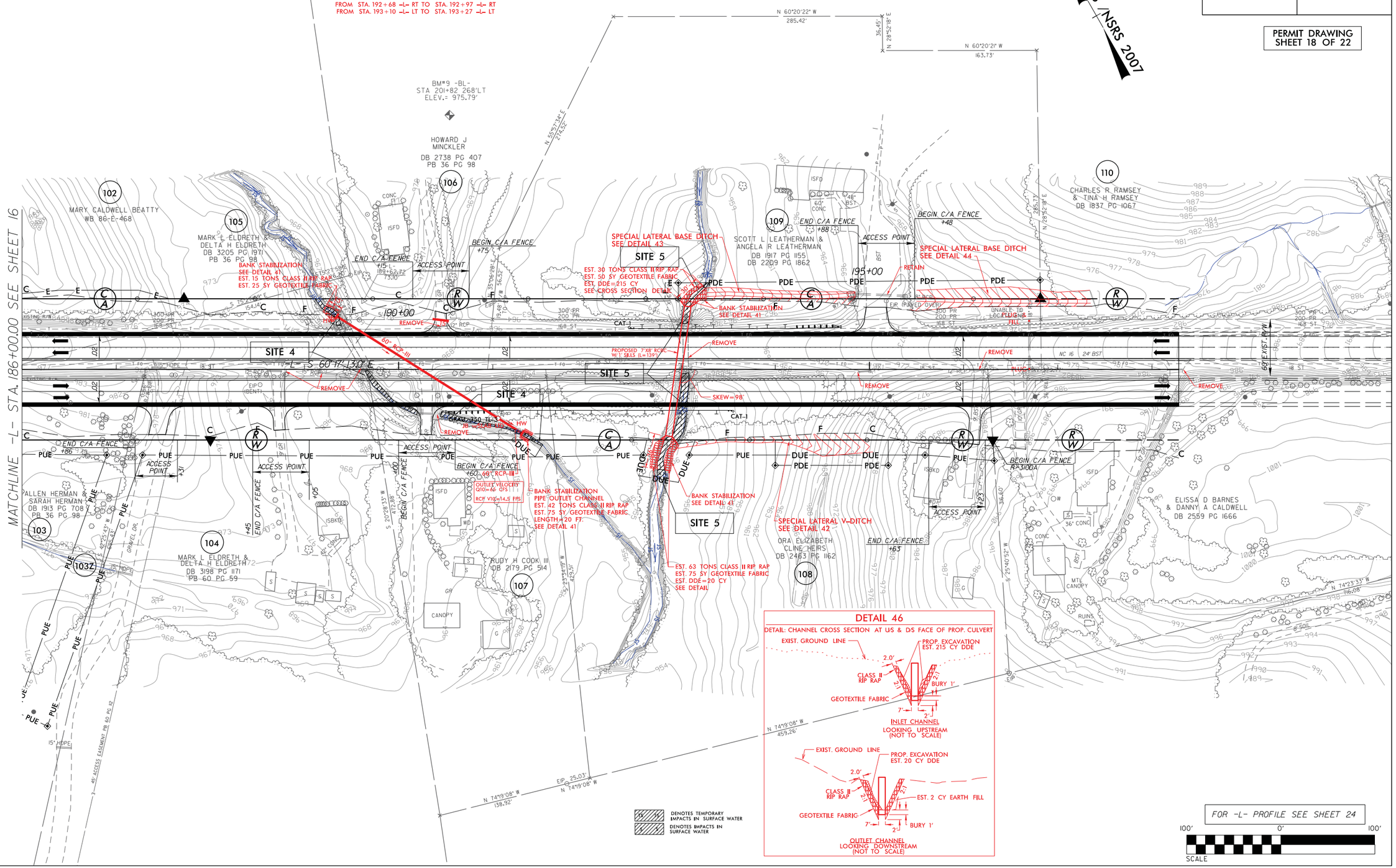
FROM STA. 193+26 -L- LT TO STA. 194+85 -L- LT

DETAIL 44
SPECIAL LATERAL BASE DITCH
(Not to Scale)

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

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

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



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

EXIST. GROUND LINE — PROP. EXCAVATION EST. 215 CY DDE — 2.0' — CLASS II RIP RAP — 2:1 — 2:1 — BURY 1' — GEOTEXTILE FABRIC — 7' — 2'

INLET CHANNEL
LOOKING UPSTREAM
(NOT TO SCALE)

EXIST. GROUND LINE — PROP. EXCAVATION EST. 20 CY DDE — 2.0' — CLASS II RIP RAP — 2:1 — 2:1 — EST. 2 CY EARTH FILL — GEOTEXTILE FABRIC — 7' — 2' — BURY 1'

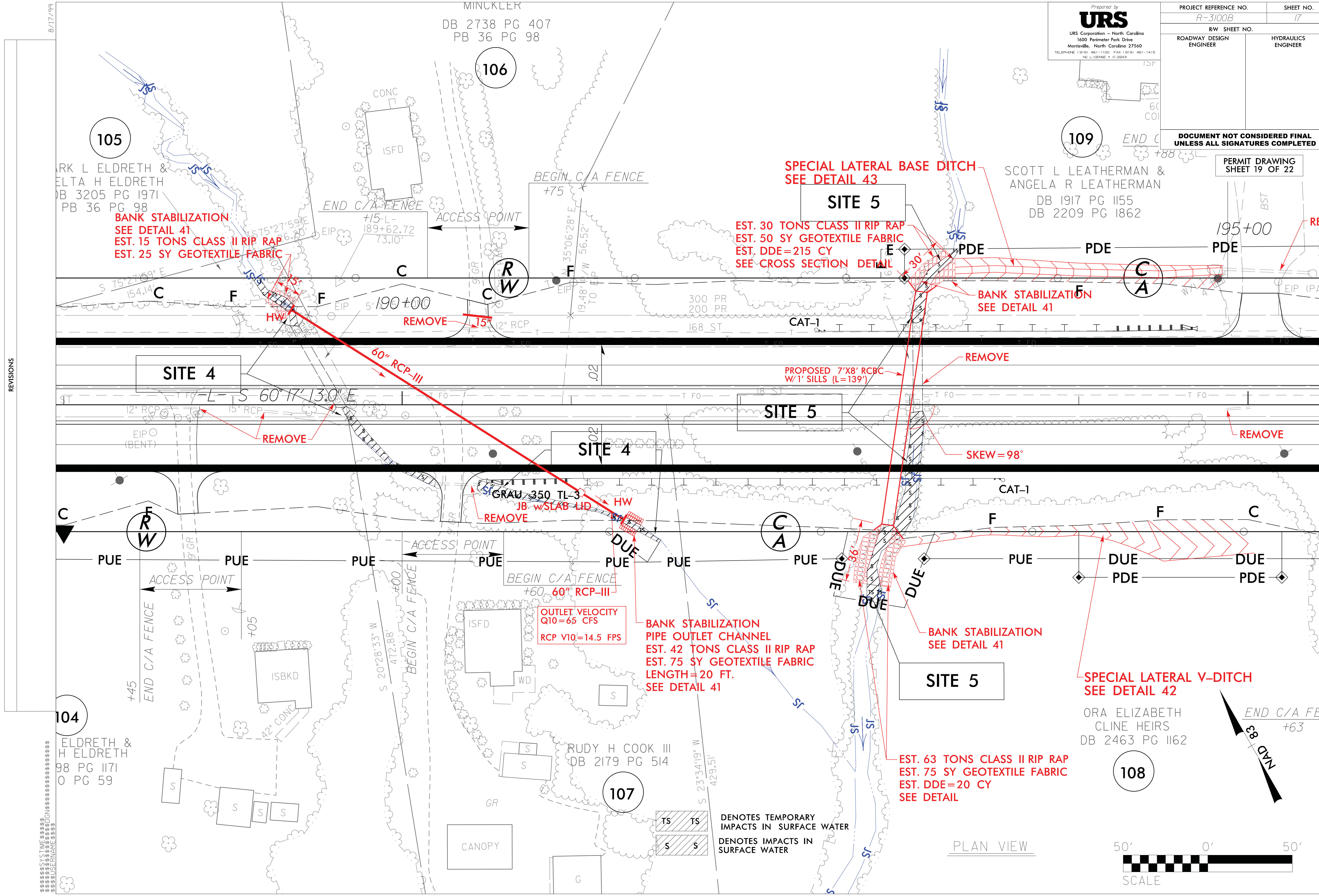
OUTLET CHANNEL
LOOKING DOWNSTREAM
(NOT TO SCALE)

DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER

FOR -L- PROFILE SEE SHEET 24

100' 0' 100'
SCALE

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



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SHEET NO.
17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
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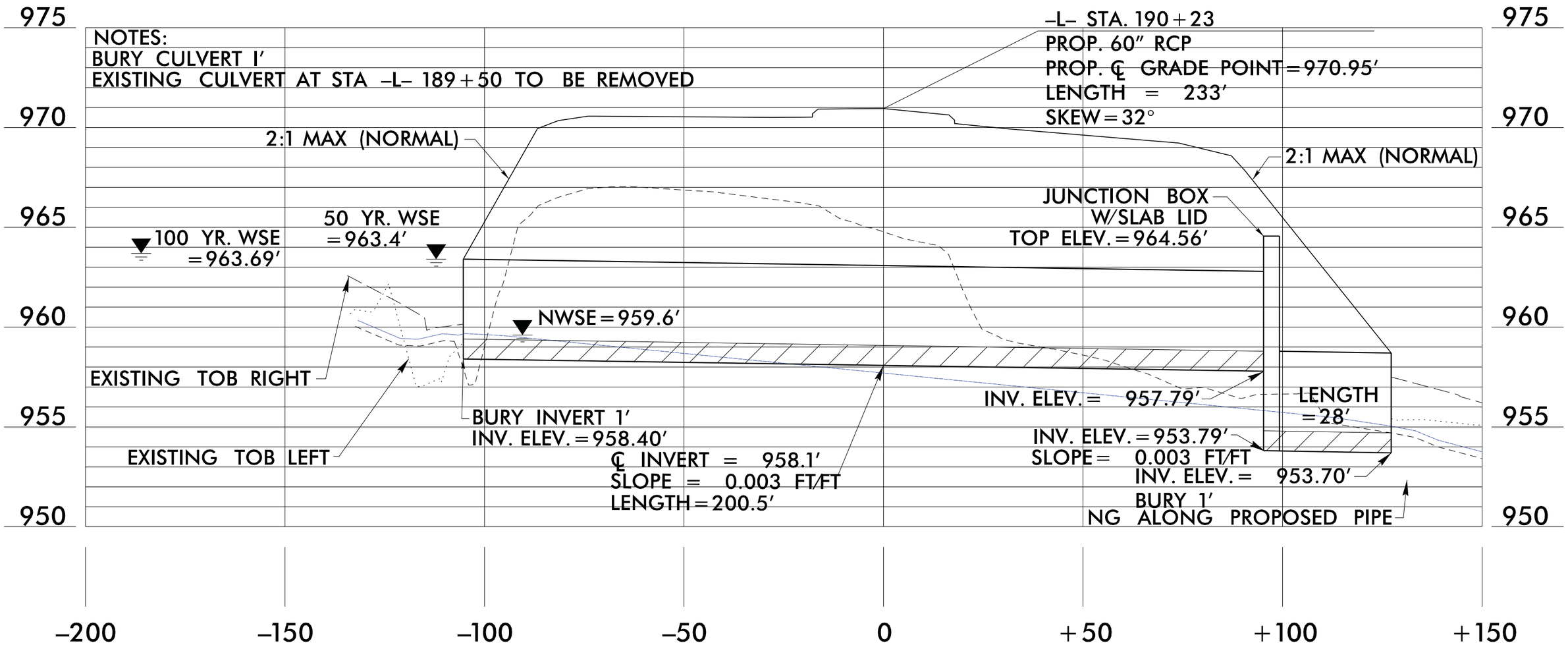
8/17/99
REVISIONS
MINCKLER
DB 2738 PG 407
PB 36 PG 98
106
105
ARK L ELDRETH &
ELTA H ELDRETH
DB 3205 PG 1971
PB 36 PG 98
BANK STABILIZATION
SEE DETAIL 41
EST. 15 TONS CLASS II RIP RAP
EST. 25 SY GEOTEXTILE FABRIC
15'
HW
60" RCP-III
SITE 4
-L- S 60°17'13.0" E
12" RCP
15" RCP
REMOVE
EIP (BENT)
CONC
ISFD
END C/A FENCE
+15 -L- 189+62.72 73.10'
ACCESS POINT
BEGIN C/A FENCE
+75
190+00
REMOVE
15"
12" RCP
300 PR
200 PR
168 ST
CAT-1
SPECIAL LATERAL BASE DITCH
SEE DETAIL 43
SITE 5
EST. 30 TONS CLASS II RIP RAP
EST. 50 SY GEOTEXTILE FABRIC
EST. DDE=215 CY
SEE CROSS SECTION DETAIL
30'
PDE
BANK STABILIZATION
SEE DETAIL 41
PROPOSED 7'X8' RCBC
W/1' SILLS (L=139')
REMOVE
SKEW=98°
109
SCOTT L LEATHERMAN &
ANGELA R LEATHERMAN
DB 1917 PG 1155
DB 2209 PG 1862
195+00
REMOVE
GRAU 350 TL-3
JB w/SLAB LID
HW
REMOVE
PUE
DUE
ACCESS POINT
END C/A FENCE
+45
+05
BEGIN C/A FENCE
+60 60" RCP-III
OUTLET VELOCITY
Q10=65 CFS
RCP V10=14.5 FPS
BANK STABILIZATION
PIPE OUTLET CHANNEL
EST. 42 TONS CLASS II RIP RAP
EST. 75 SY GEOTEXTILE FABRIC
LENGTH=20 FT.
SEE DETAIL 41
36'
SITE 5
BANK STABILIZATION
SEE DETAIL 41
EST. 63 TONS CLASS II RIP RAP
EST. 75 SY GEOTEXTILE FABRIC
EST. DDE=20 CY
SEE DETAIL
SPECIAL LATERAL V-DITCH
SEE DETAIL 42
104
ELDRETH &
H ELDRETH
98 PG 1171
O PG 59
ISBKD
ISFD
RUDY H COOK III
DB 2179 PG 514
107
CANOPY
ORA ELIZABETH
CLINE HEIRS
DB 2463 PG 1162
108
END C/A FENCE
+63
NAD 83
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
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 =	963.69	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)

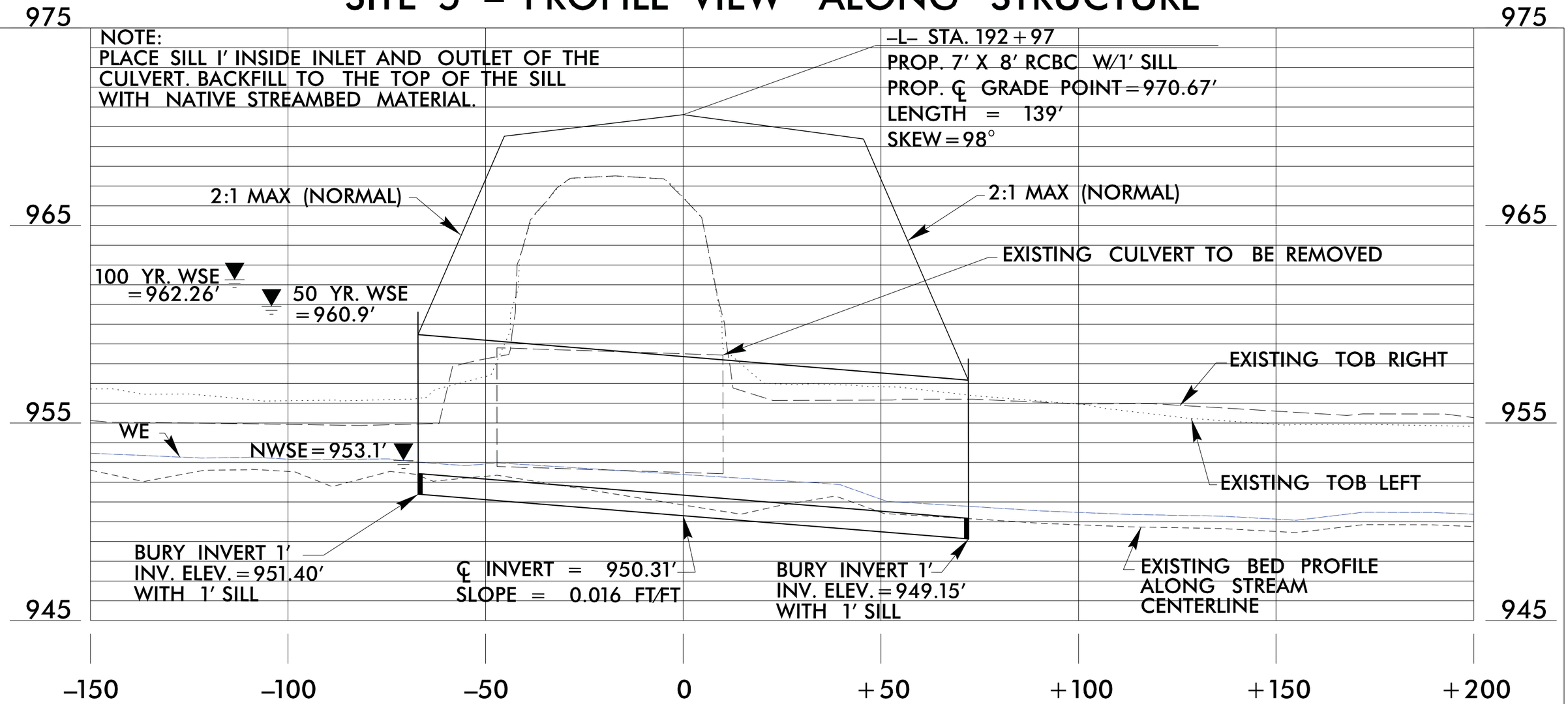
NC 16 NORTH OF SR 1801 (CLAREMONT RD)
AND NORTH OF SR 1814 (CALDWELL RD)

SITE 4

PERMIT DRAWING
SHEET 20 OF 22

09/30/16

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

09/30/16

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	11+82 to 12+18 -Y4-	60" CSP (Culvert)						< 0.01	< 0.01	66	7	
3 Center	11+82 to 12+18 -Y4-	Bank Stabilization						< 0.01	< 0.01	10	9	
3 East	50+07 to 50+26 -L-	Bank Stabilization						< 0.01	< 0.01	22	27	
3 West	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	10	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	1407	311	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
09/30/2016
Catawba County
R-3100B
34522.1.4

Revised 2013 10 24

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

General Project Information

Project No.:	R-3100A	**Project Type:**	Roadway Widening	**Date:**	12/18/2013
NCDOT Contact:	Jay Twisdale	**Contractor / Designer:**	Richard A. Moore, PE, McKim and Creed		
Address:	NCDOT - Hydraulic Design Unit 1020 Birch Ridge Road / 1590 Mail Service Center Raleigh, NC 27610 / Raleigh, NC 27699-1590	**Address:**	243 North Front Street Wilmington, NC 28401		
Phone:	919-707-6700	**Phone:**	910-343-1048		
Email:	jtwisdale@ncdot.gov	**Email:**	ramoore@mckimcreed.com		
City/Town:	Newton, NC	**County(ies):**	Catawba		
River Basin(s):	Catawba	**CAMA County?**	No		
Primary Receiving Water:	Bee Branch, UT to South Fork Mountain Creek	**NCDWQ Stream Index No.:**	Multiple		
NCDWQ Surface Water Classification for Primary Receiving Water	**Primary:**	Water Supply IV (WS-IV)	Water Supply II (WS-II)		
	Supplemental:	None	High Quality Waters (HQW)		
Other Stream Classification:	None				
303(d) Impairments:	None				
Buffer Rules in Effect	Catawba				

Project Description

Project Length (lin. Miles or feet):	4.78	**Surrounding Land Use:**	Residential, Agricultural, Commercial, Undeveloped

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	48.14 ac.	17.75 ac.
Typical Cross Section Description:	4-lane divided highway with 23' raised median with 1'6" curb and gutter and 8' shoulders. 2'9" curb and gutter installation in superelevation. Superstreet intersections.	2-lane shoulder section
Average Daily Traffic (veh/hr/day):	Design/Future: 18,700 (2040)	Existing: 10,100 (2015)

General Project Narrative:

This project is located to the southeast of Newton, NC and is in the Catawba River Basin. The project consists of widening an existing, primarily 2-lane shoulder section roadway with a 4-lane divided section with superstreet intersections. The total project length is 4.78 miles all on existing location. The projects drainage system consists of primarily ditches, cross pipes, storm drainage systems and box culverts. There is one named tributary that crosses under the proposed roadway and 24 other stream segments within the project corridor (as identified in the Natural Resources Technical Report (NRTR)). The 2 named streams or their tributaries impacted by this project are:

- Bee Branch SIN 11-129-5-7-2-2 Stream Classification WS-II; HQW
- South Fork Mountain Creek SIN 11-98-(0.5) Stream Classification WS-IV

Approximately 1.73 miles of the beginning of the project is located within the Bee Branch drainage area which has a classification of WS-II; HQW. The project crosses Bee Branch and several ditches outlet to swales located within the Bee Branch drainage area. Grass swales meeting DWQ criteria to the maximum extent practicable are proposed on the three (3) 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 as flat as practicable. In addition, preformed scour holes have been used at cross pipe outlets to provide diffuse flow in overland areas.

The remainder of the project is located within the South Fork Mountain Creek drainage area which has a classification of WS-IV. Grass swales meeting DWQ 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 (2) 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.

Box culverts in jurisdictional streams will be buried 1'. There are no cross pipes located in jurisdictional streams.

References

NCDOT PDEA Natural Resources Technical Report, May 2009

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-3100A **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
6	47+06 -L- RT 48+05 -L- LT	Stream	Perennial	Bee Branch	S12a, S12b	11-129-5-7-2-2	WS-II; HQW		Culvert	N/A	
15	164+93 -L- RT 165+80 -L- LT	Stream	Perennial	UT to South Fork Mountain Creek	S13c, S13d	11-98-(5) (closest)	WS-IV		Culvert	N/A	
15	167+77 -L- LT 168+63 -L- RT	Stream	Perennial	UT to South Fork Mountain Creek	S13c, S13d	11-98-(5) (closest)	WS-IV		Culvert	N/A	
18	201+53 -L- RT 201+53 -L- RT	Stream	Intermittent	UT to South Fork Mountain Creek	S20	11-98-(5) (closest)	WS-IV		Fill	N/A	
18	208+63 -L- RT 209+27 -L- RT	Stream	Intermittent	UT to South Fork Mountain Creek	S21a	11-98-(5) (closest)	WS-IV		Fill	N/A	
18	213+60 -L- LT 214+12 -L- LT	Wetland	Headwater Wetland	UT to South Fork Mountain Creek	W4	11-98-(5) (closest)	WS-IV		Excavation	N/A	
18	214+70 -L- LT 217+30 -L- LT	Wetland	Headwater Wetland	UT to South Fork Mountain Creek	W5	11-98-(5) (closest)	WS-IV		Fill	N/A	
19	216+68 -L- LT 217+45 -L- LT	Wetland	Headwater Wetland	UT to South Fork Mountain Creek	W6	11-98-(5) (closest)	WS-IV		Fill	N/A	
20	229+35 -L- LT 232+38 -L- RT	Stream	Perennial	UT to South Fork Mountain Creek	S24a, S24b	11-98-(5) (closest)	WS-IV		Culvert	N/A	
21	248+78 -L- RT 248+78 -L- RT	Stream	Intermittent	UT to South Fork Mountain Creek	S25	11-98-(5) (closest)	WS-IV		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

References

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

Swales

Sheet No.	Station (From / To)	Stream Crossing Station	Base Width (ft)	Front Slope (H:V)	Back Slope (H:V)	Drainage Area (ac)	Recommended Treatment Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used
6	46+80 LT 47+80 LT	47+80 LT	2.0	2	2	2.82	282	100	0.90%	3.5	2.0	4.8	2.1	No
6	48+00 LT 49+50 LT	48+00 LT	2.0	2	2	1.32	132	150	1.00%	3.0	2.0	3.7	2.1	No
6	47+35 RT 48+83 RT	47+35 RT	2.0	2	2	1.89	189	148	0.75%	4.7	2.0	6.2	2.2	No
15	168+00 LT 169+15 LT	168+00 LT	2.0	4	3	11.10	1110	115	14.20%	10.6	7.1	15.3	7.8	No
19	223+22 LT 223+22 LT	223+22 LT	3.0	2	2	4.64	464	85	10.50%	7.2	5.8	9.6	6.4	No
20	231+05 RT 232+00 RT	232+00 RT	V	2	2	1.06	106	100	8.00%	2.2	4.4	3.0	4.7	No
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☐ YES ☐ NO

Have minimum design criteria, as presented in the NCDOT Best Management Practices Toolbox, Version 1 (March 2008), been met and verified? If No, provide further explanantion of why design criteria was not met.

Additional Comments

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

Preformed Scour Holes and Energy Dissipators

Sheet No.	Station	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)	V10 (fps)
14	153+20 RT	Riprap Energy Dissipator Basin	Class II	64.29	Pipe	60	114.4	
15	164+06 RT	PFSH	Class 'B'	0.02	Pipe	15	0.1	
15	166+75 LT	PFSH	Class 'B'	0.99	Pipe	15	4.6	
15	171+60 RT	PFSH	Class 'B'	0.42	Pipe	15	1.7	
18	202+48 RT	Riprap Apron / Pad	Class II	16.16	Pipe	30	27.4	
18	208+85 RT	Riprap Apron / Pad	Class II	11.26	Pipe	18	23.6	
19	220+12 LT	Riprap Apron / Pad	Class II	6.62	Pipe	36	46.7	
20	233+03 RT	PFSH	Class 'B'	0.27	Pipe	15	1.3	
21	248+78 RT	Riprap Apron / Pad	Class II	29.21	Pipe	15 & 42	48.9	
☐ YES ☐ NO								

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

Additional Comments

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

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

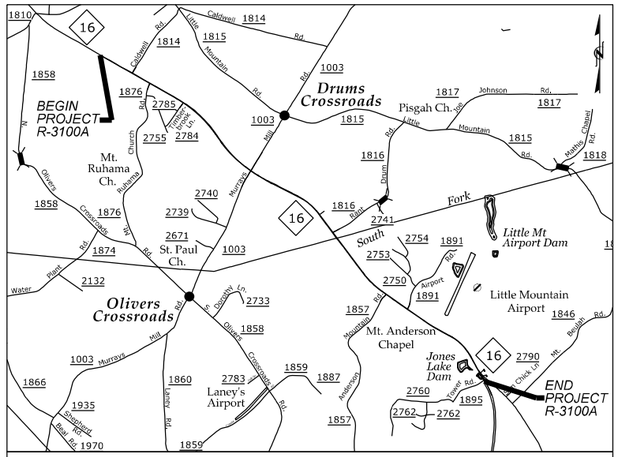
CATAWBA COUNTY

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 1 OF 32

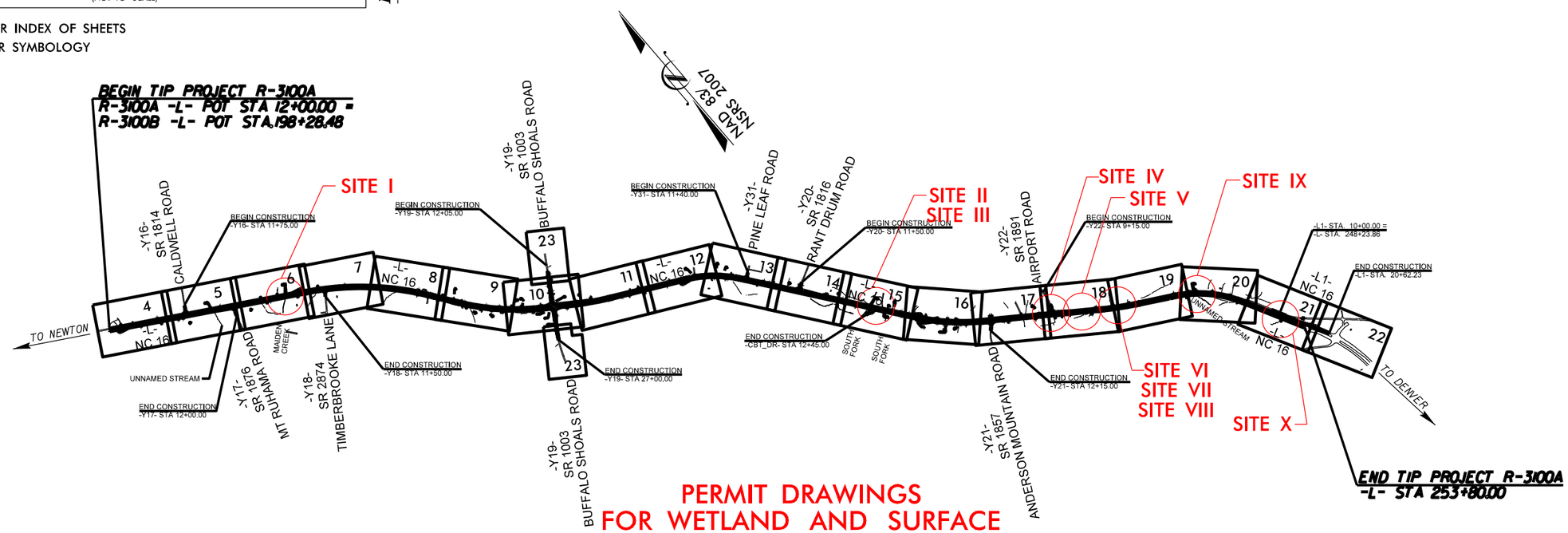
TIP PROJECT: R-3100A



VICINITY MAP
(NOT TO SCALE)

R/W SUBMITTAL

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



PERMIT DRAWINGS FOR WETLAND AND SURFACE WATER IMPACTS

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

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.

CONTRACT:

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

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:

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(919) 552-2254 (Fax)
www.hatchmott.com
LICENSE NO. F-0669

Hatch Mott MacDonald

McKIM & CREED
NC LICENSE #F-1232
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

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

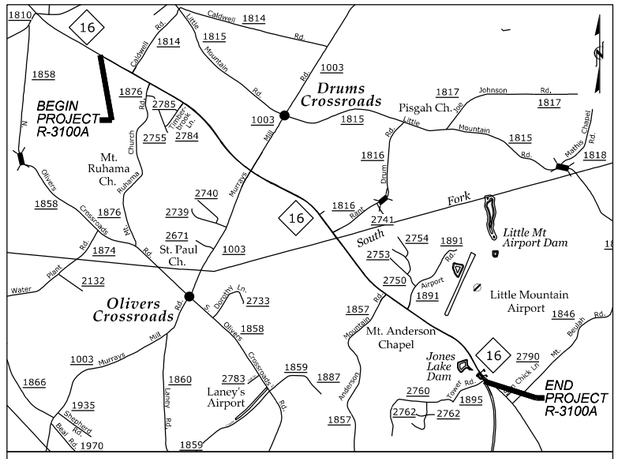
LOCATION: NC 16 FROM NORTH OF SR 1814 (CALDWELL ROAD) TO SR 1895 (TOWER ROAD)

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

PERMIT DRAWING SHEET 2 OF 32

TIP PROJECT: R-3100A

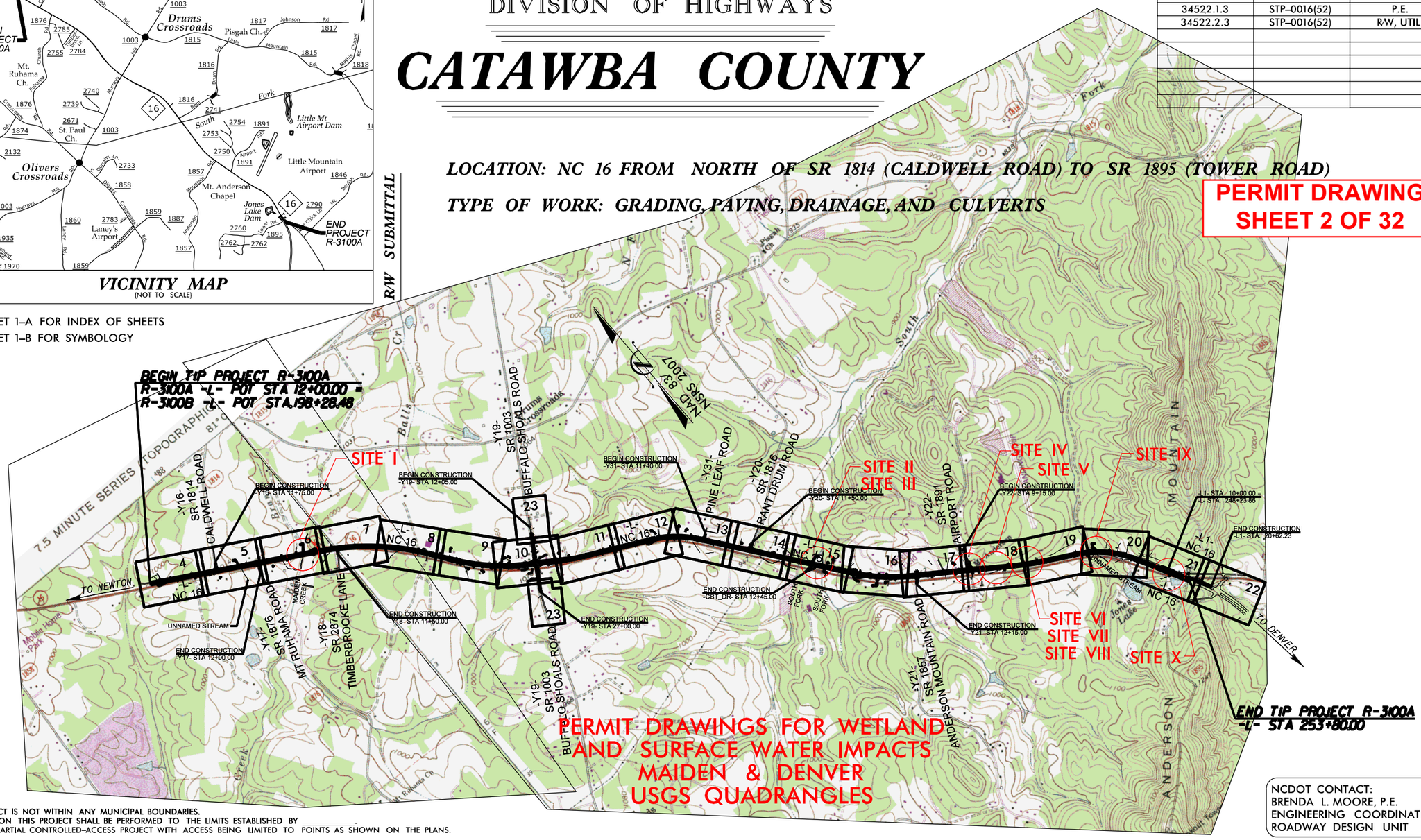
CONTRACT:



VICINITY MAP
(NOT TO SCALE)

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

R/W SUBMITTAL



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

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.

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

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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

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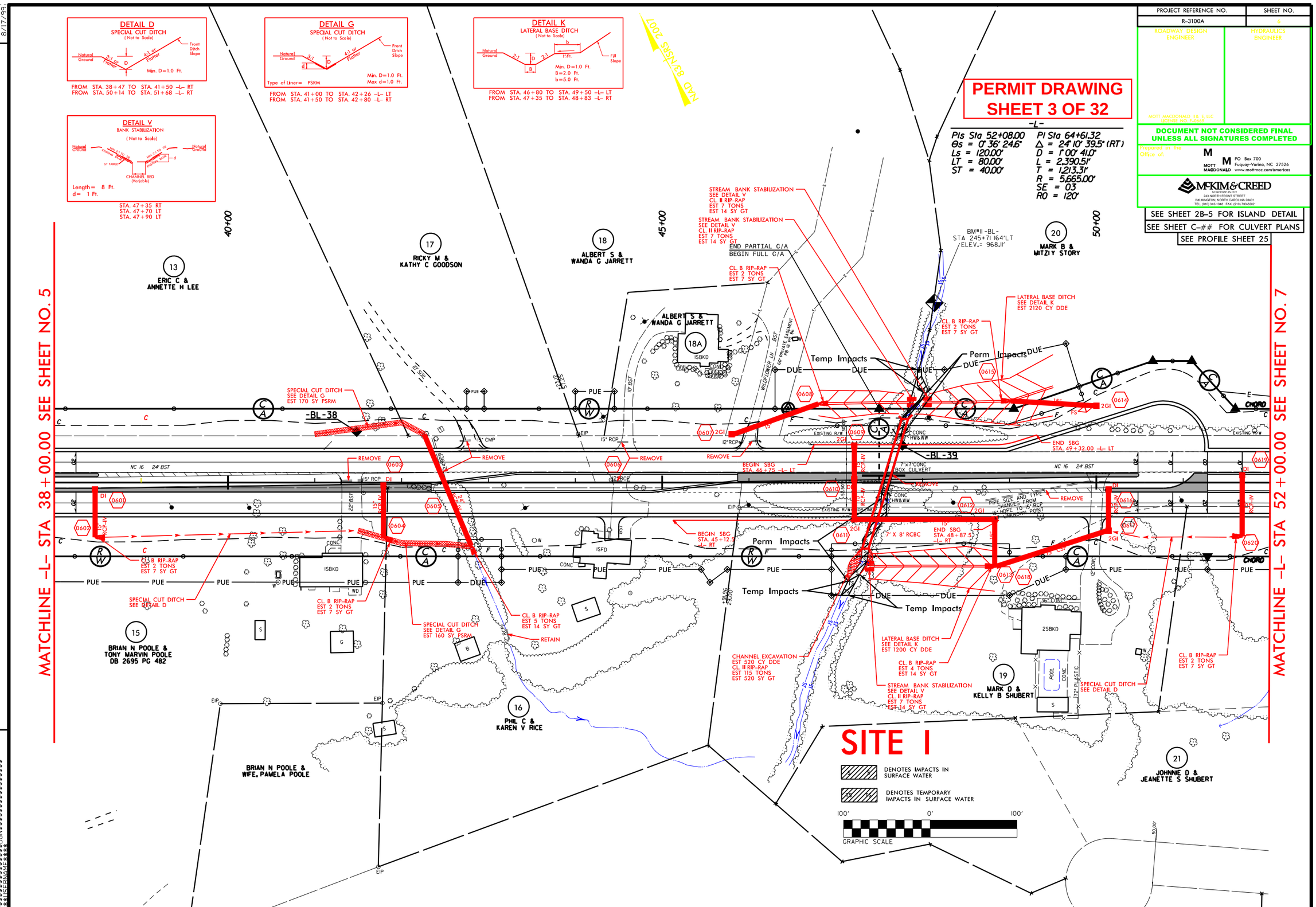
SEE SHEET 2B-5 FOR ISLAND DETAIL

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

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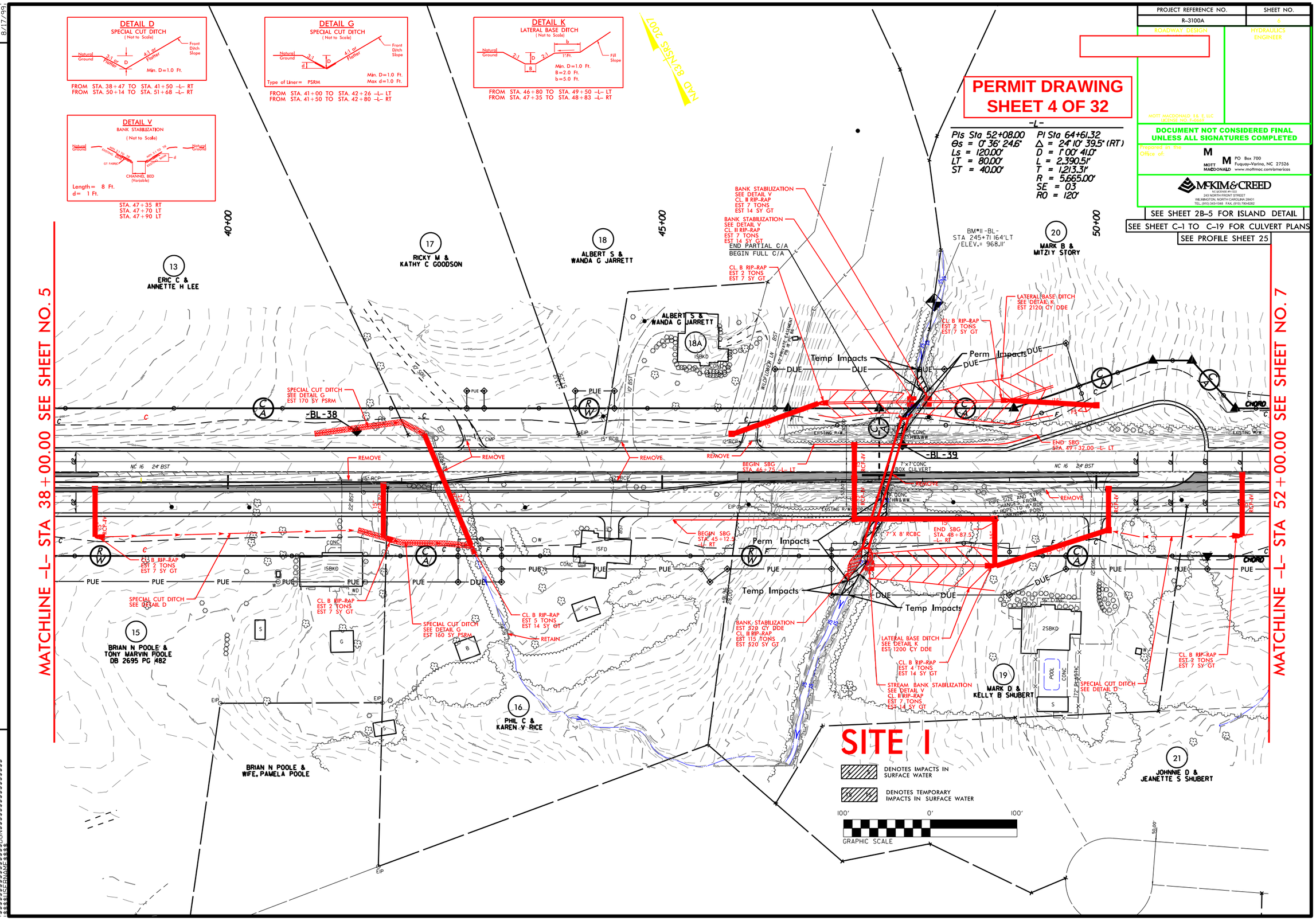
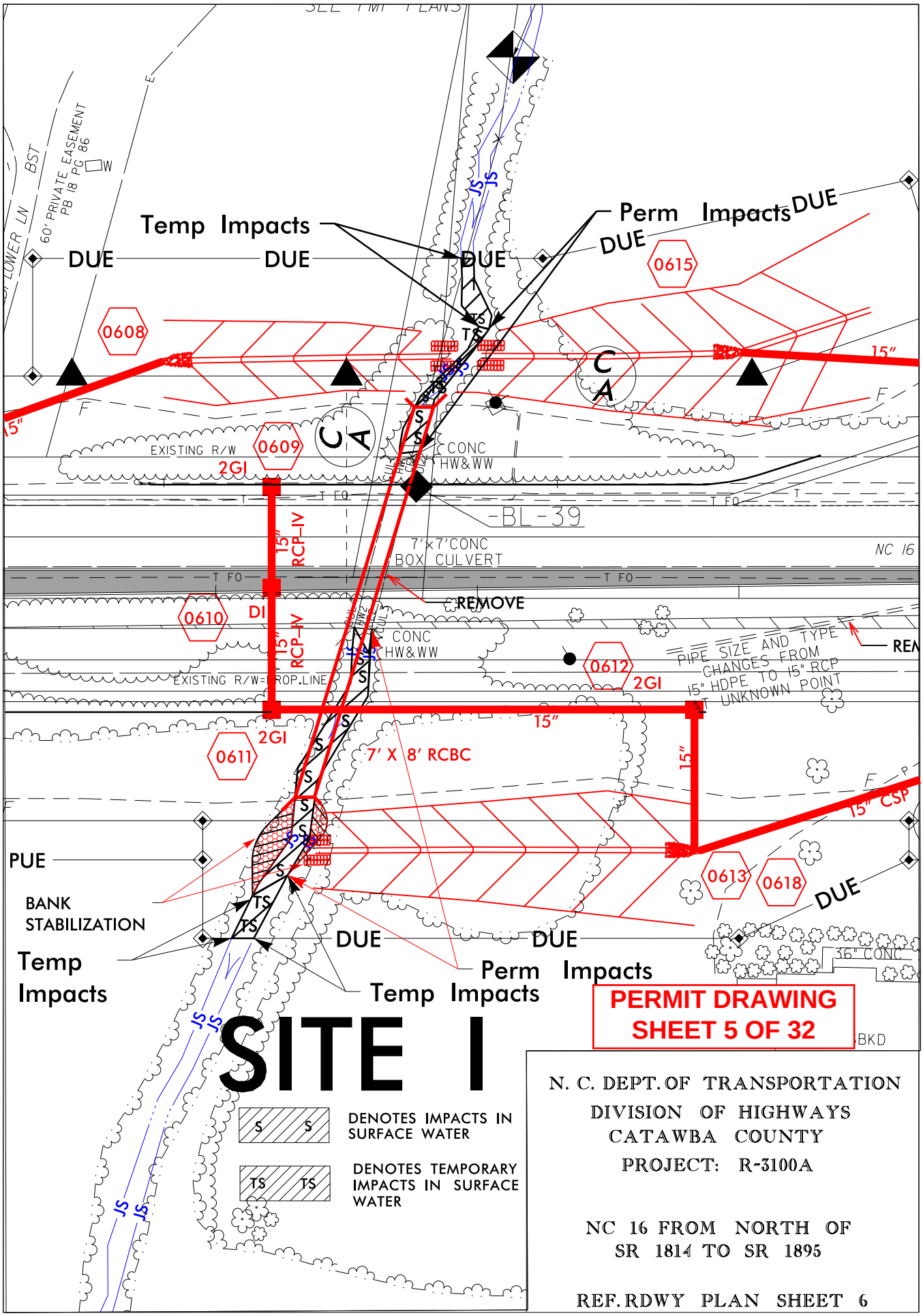
PERMIT DRAWING SHEET 4 OF 32

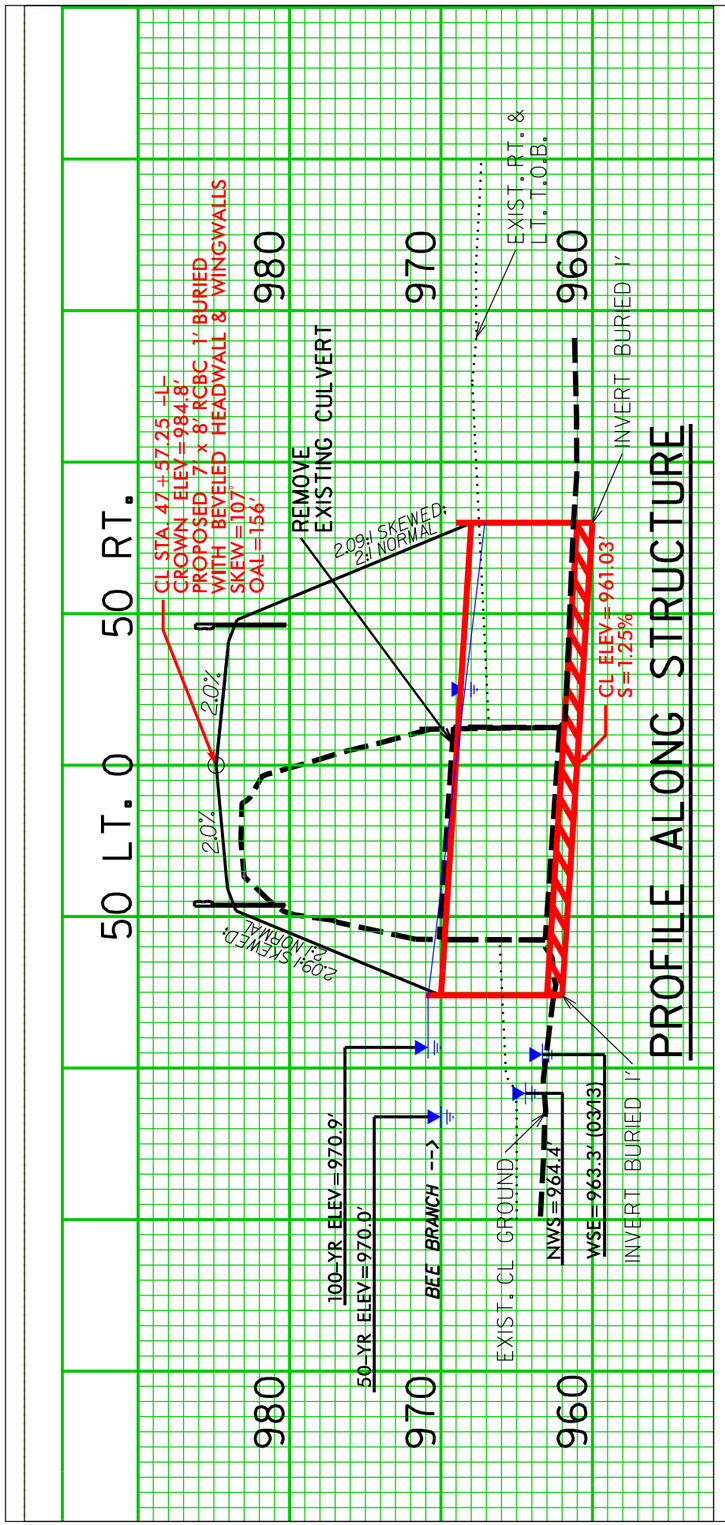
SEE SHEET 2B-5 FOR ISLAND DETAIL

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

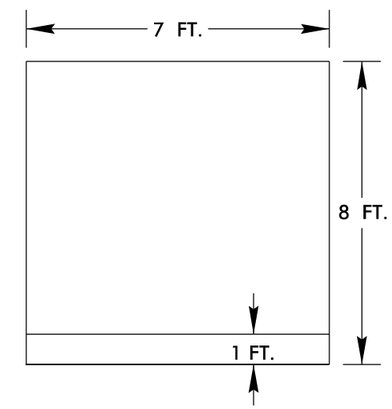
DETAIL 1

(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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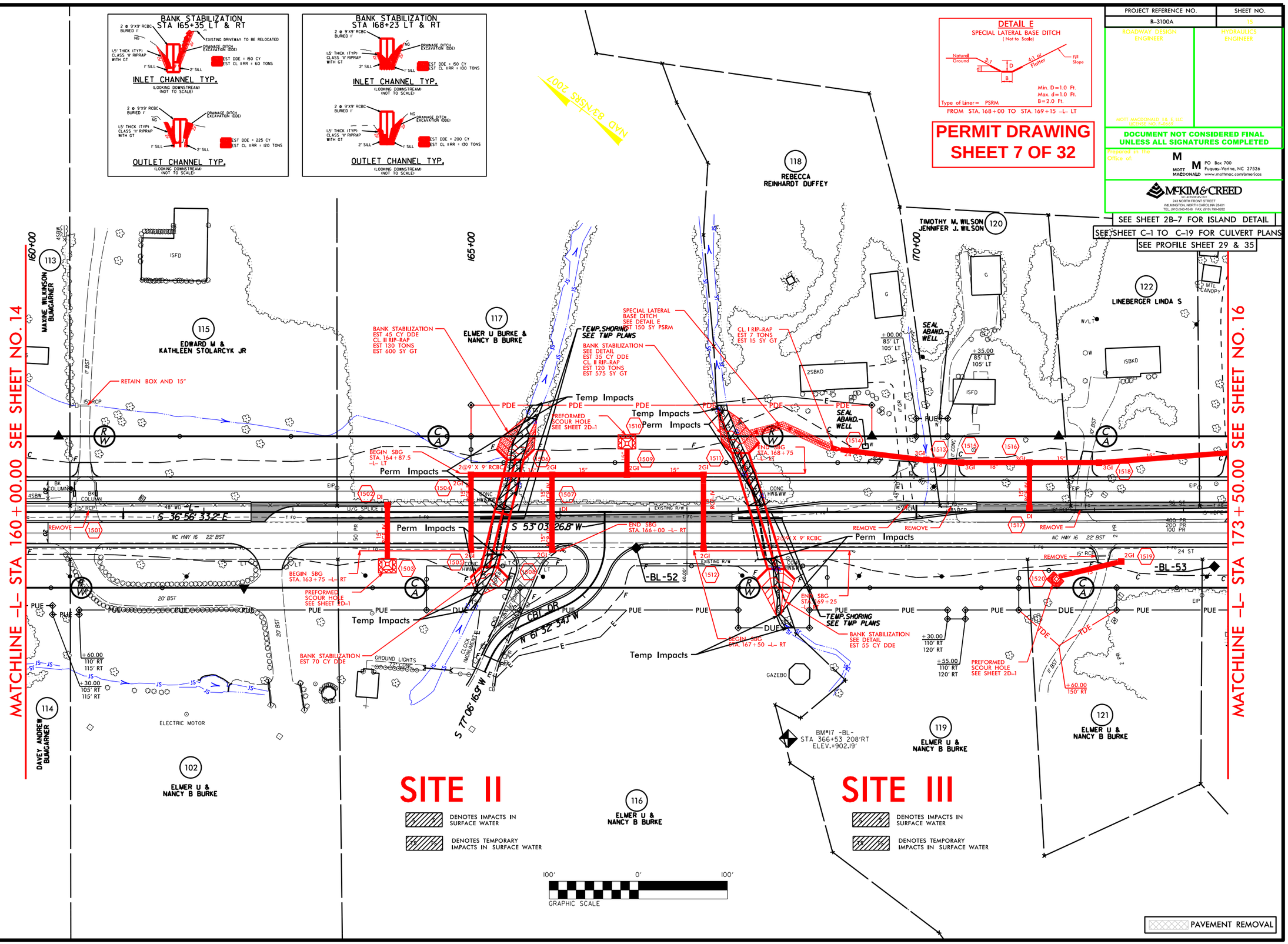
PERMIT DRAWING
SHEET 7 OF 32

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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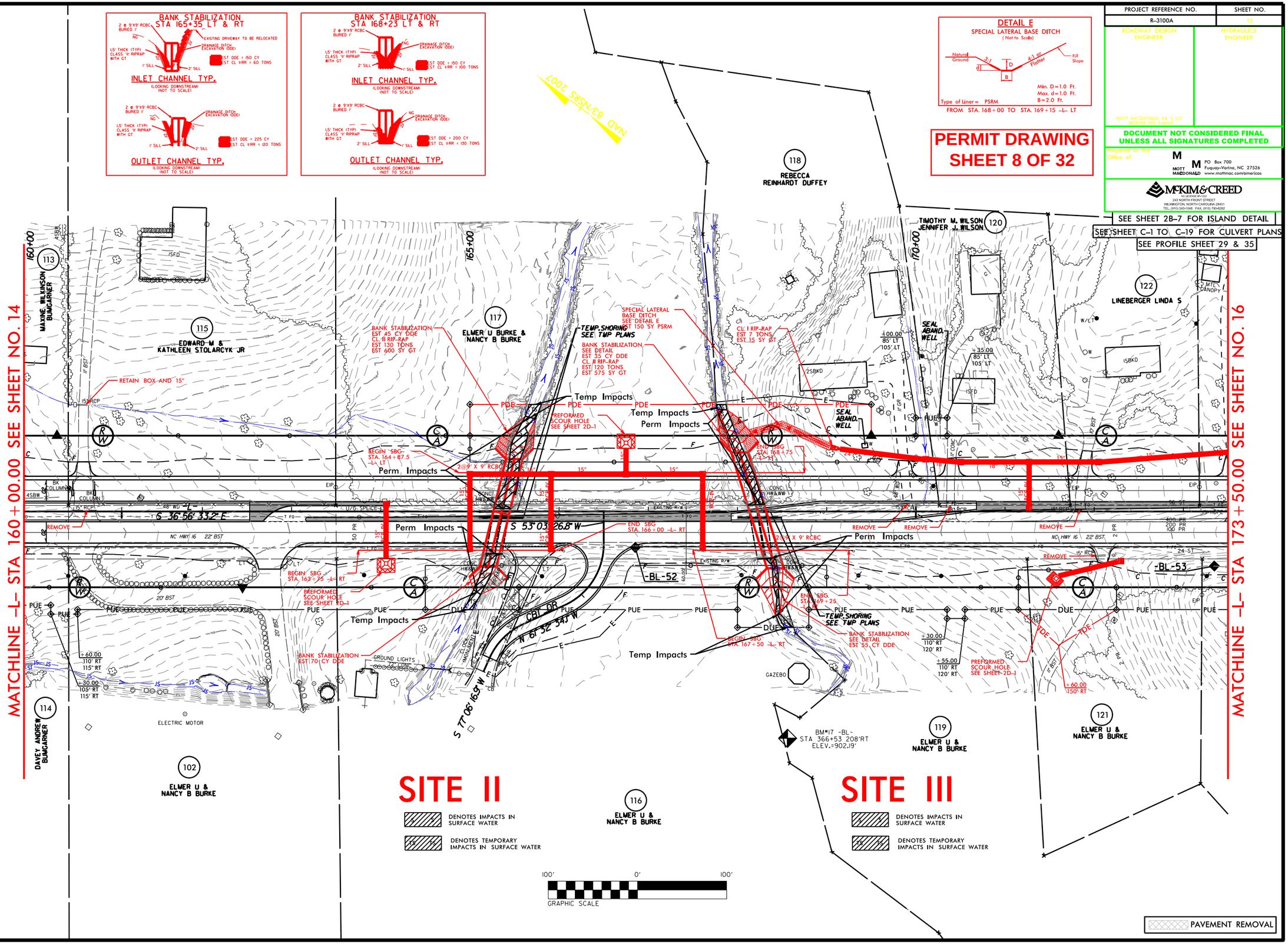
PERMIT DRAWING
SHEET 8 OF 32

SEE SHEET 2B-7 FOR ISLAND DETAIL

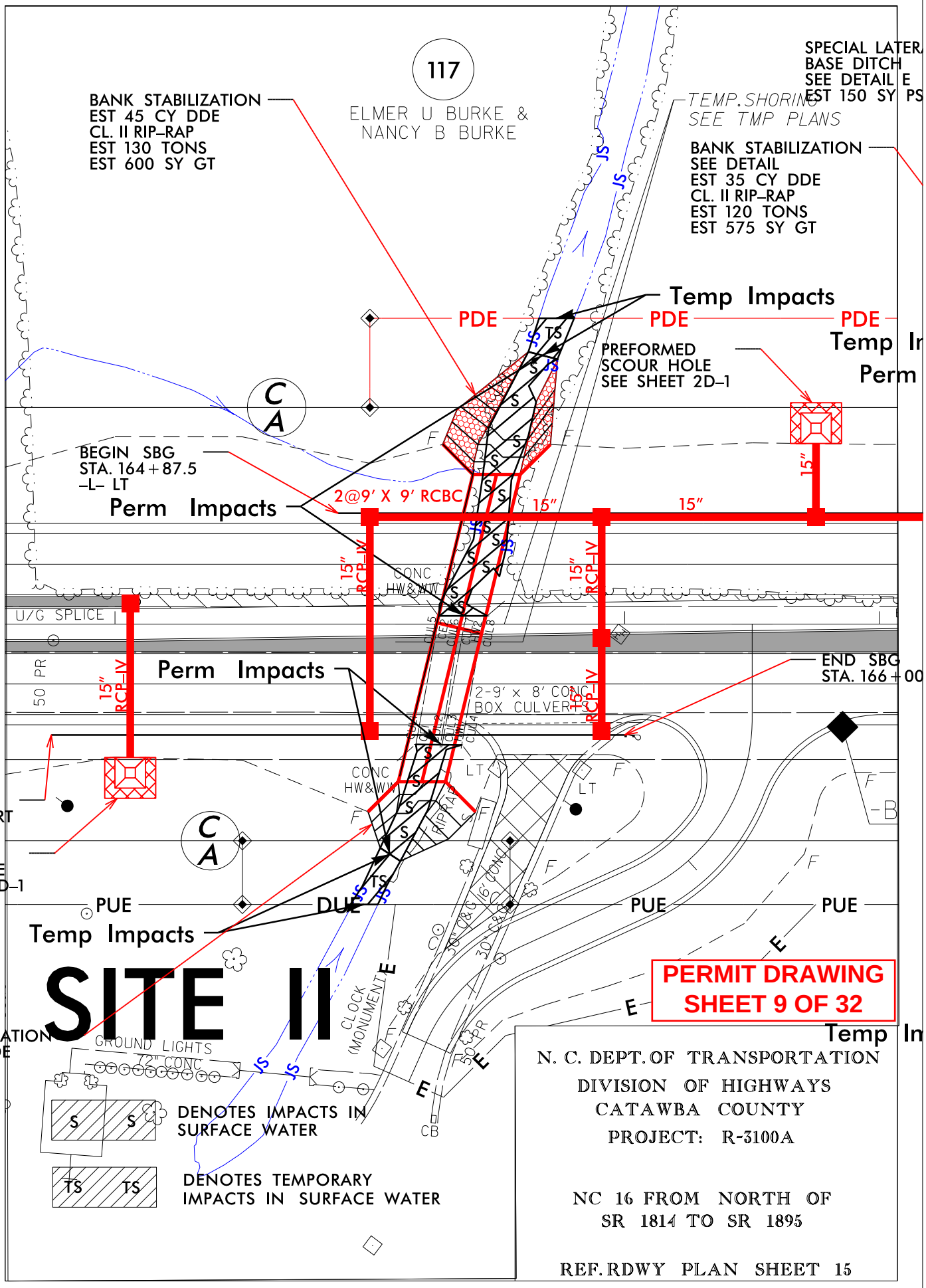
SEE SHEET C-1 TO C-19 FOR CULVERT PLANS

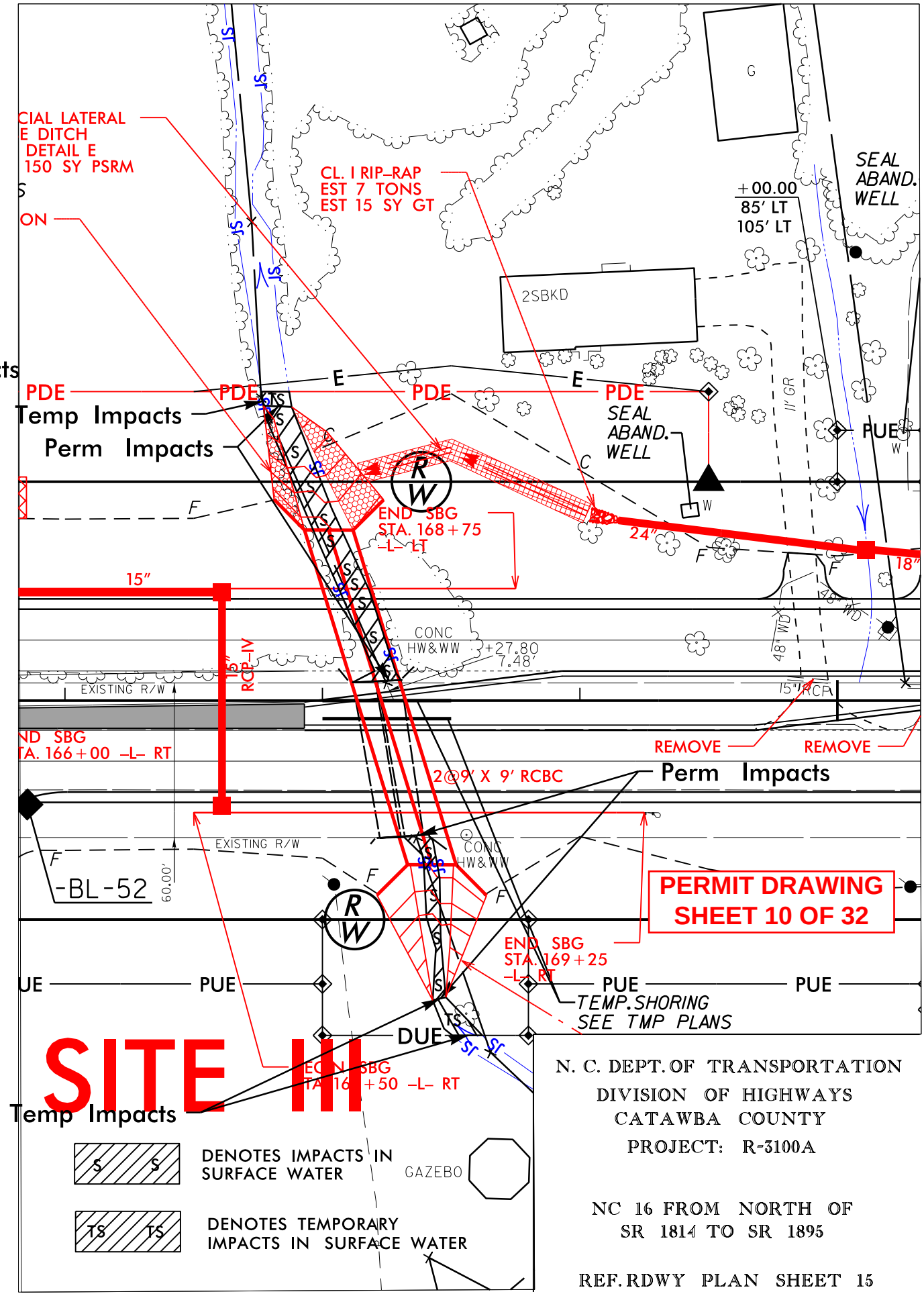
SEE PROFILE SHEET 29 & 35



REVISIONS

8/17/99

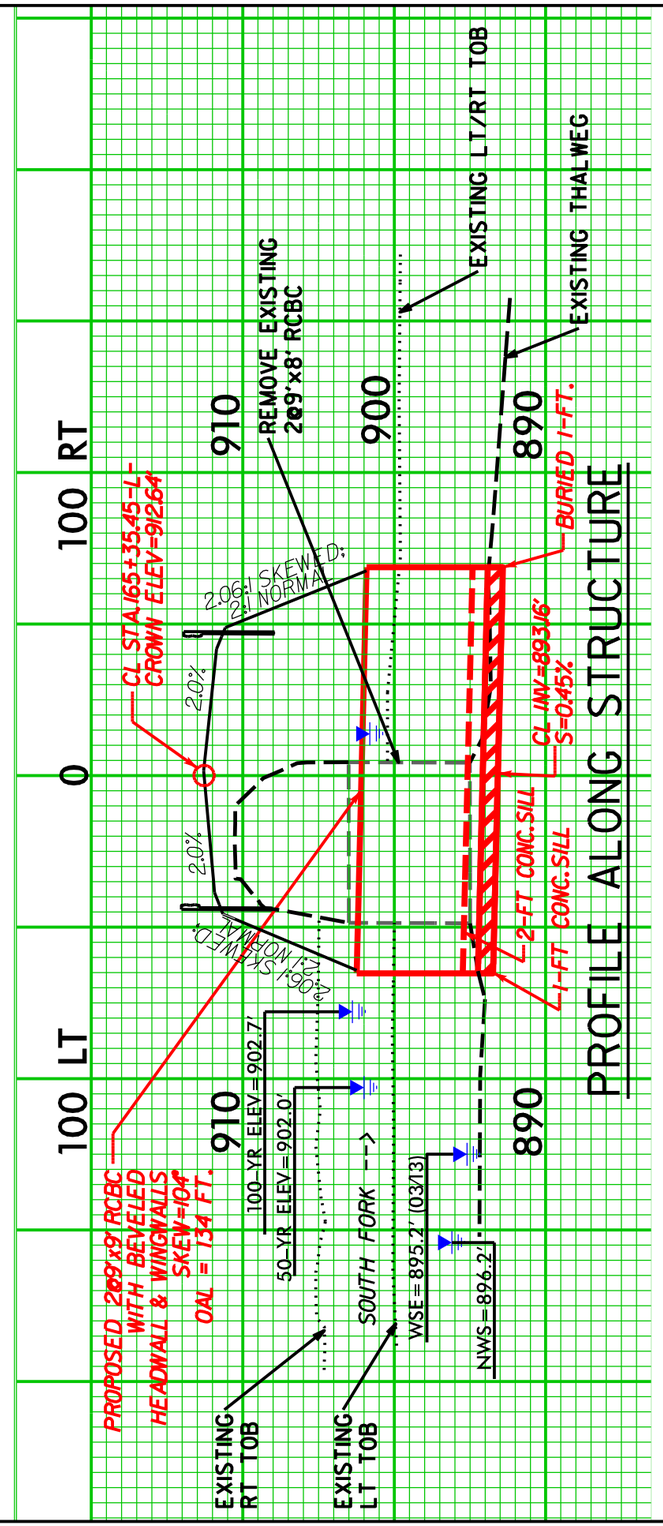

117
ELMER U BURKE &
NANCY B BURKE
BANK STABILIZATION
EST 45 CY DDE
CL. II RIP-RAP
EST 130 TONS
EST 600 SY GT
TEMP. SHORING
SEE TMP PLANS
SPECIAL LATER
BASE DITCH
SEE DETAIL E
EST 150 SY PS
BANK STABILIZATION
SEE DETAIL
EST 35 CY DDE
CL. II RIP-RAP
EST 120 TONS
EST 575 SY GT
Temp Impacts
PDE
PDE
PDE
Temp 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

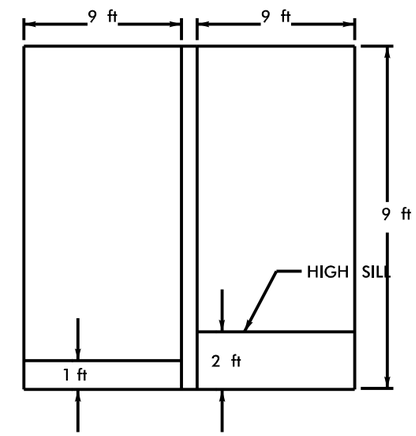
*NOTES:

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

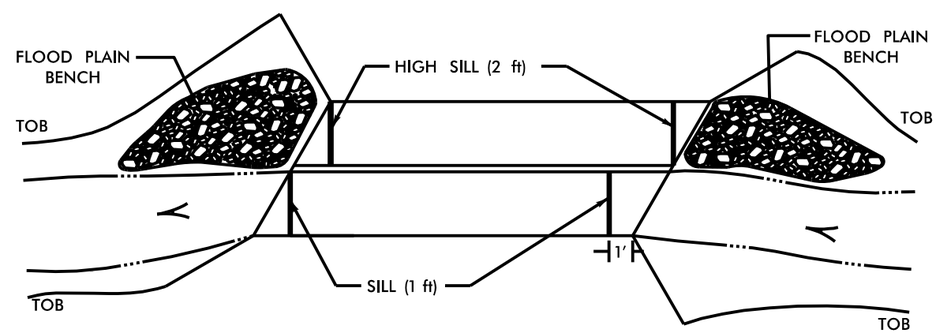
2) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

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

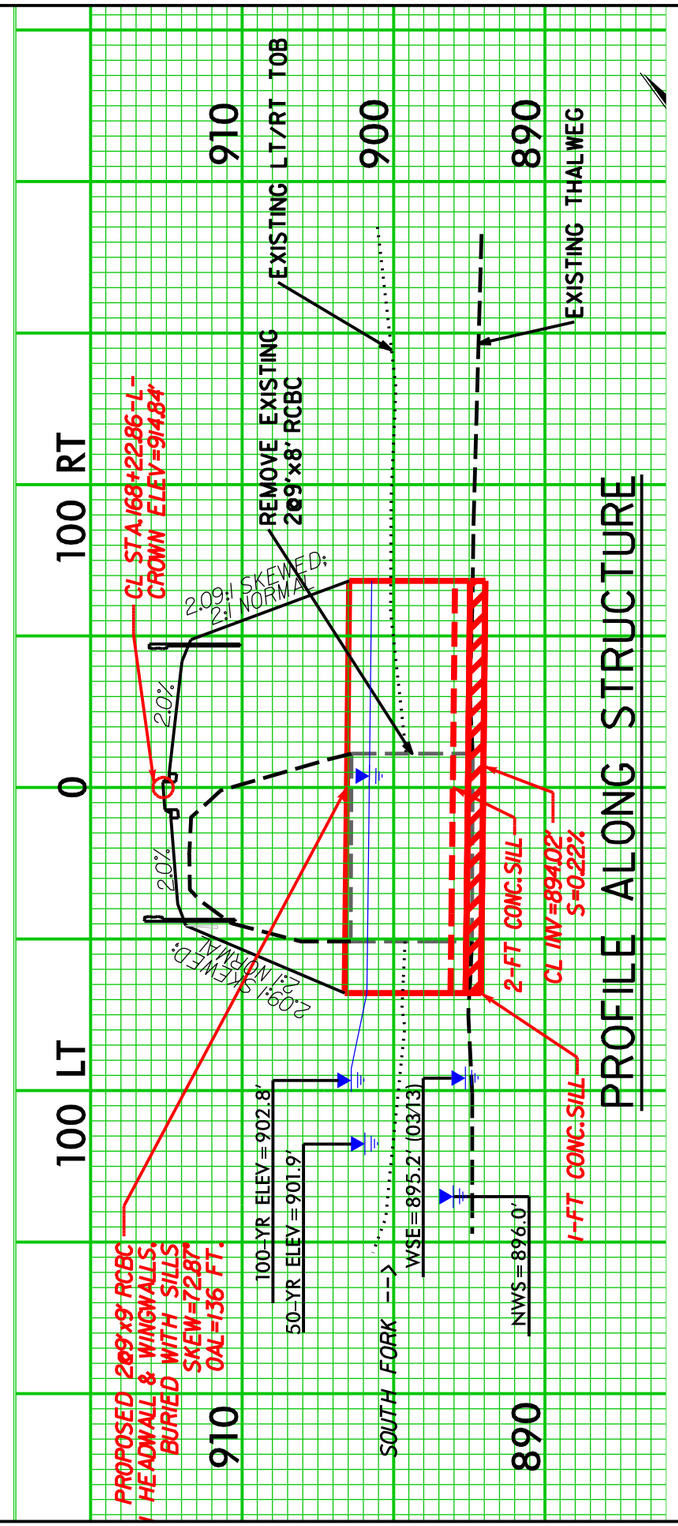
PERMIT DRAWING
SHEET 11 OF 32

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

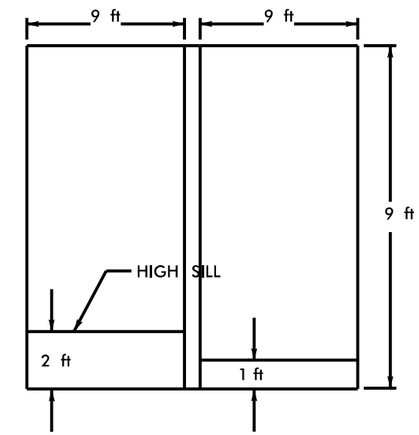
*NOTES:

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

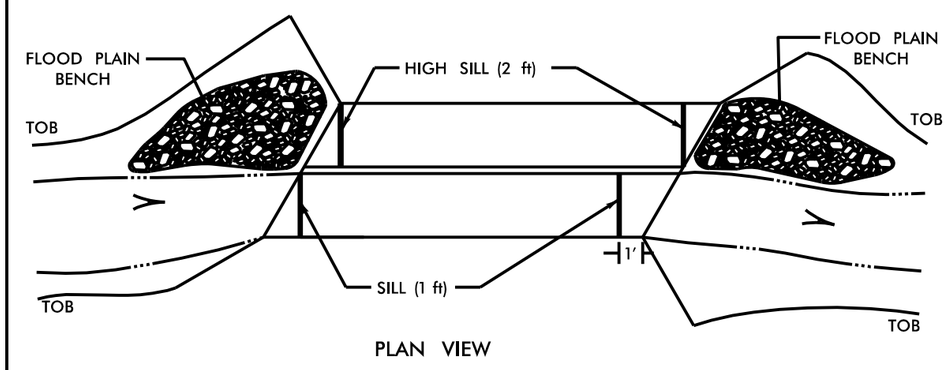
2) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

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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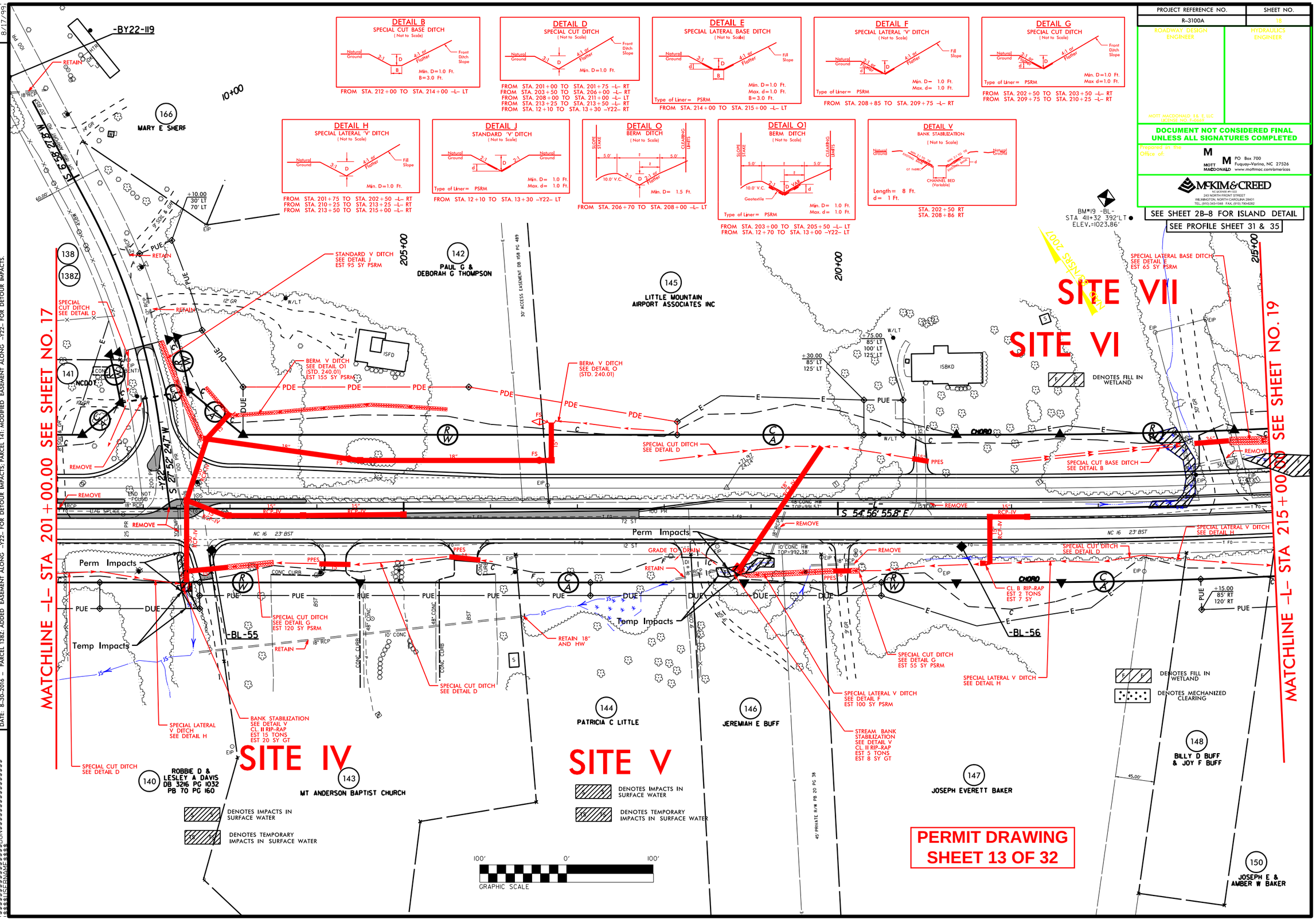
Prepared in the Office of:

MOTT MACDONALD
PO Box 700
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) 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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PO Box 700
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

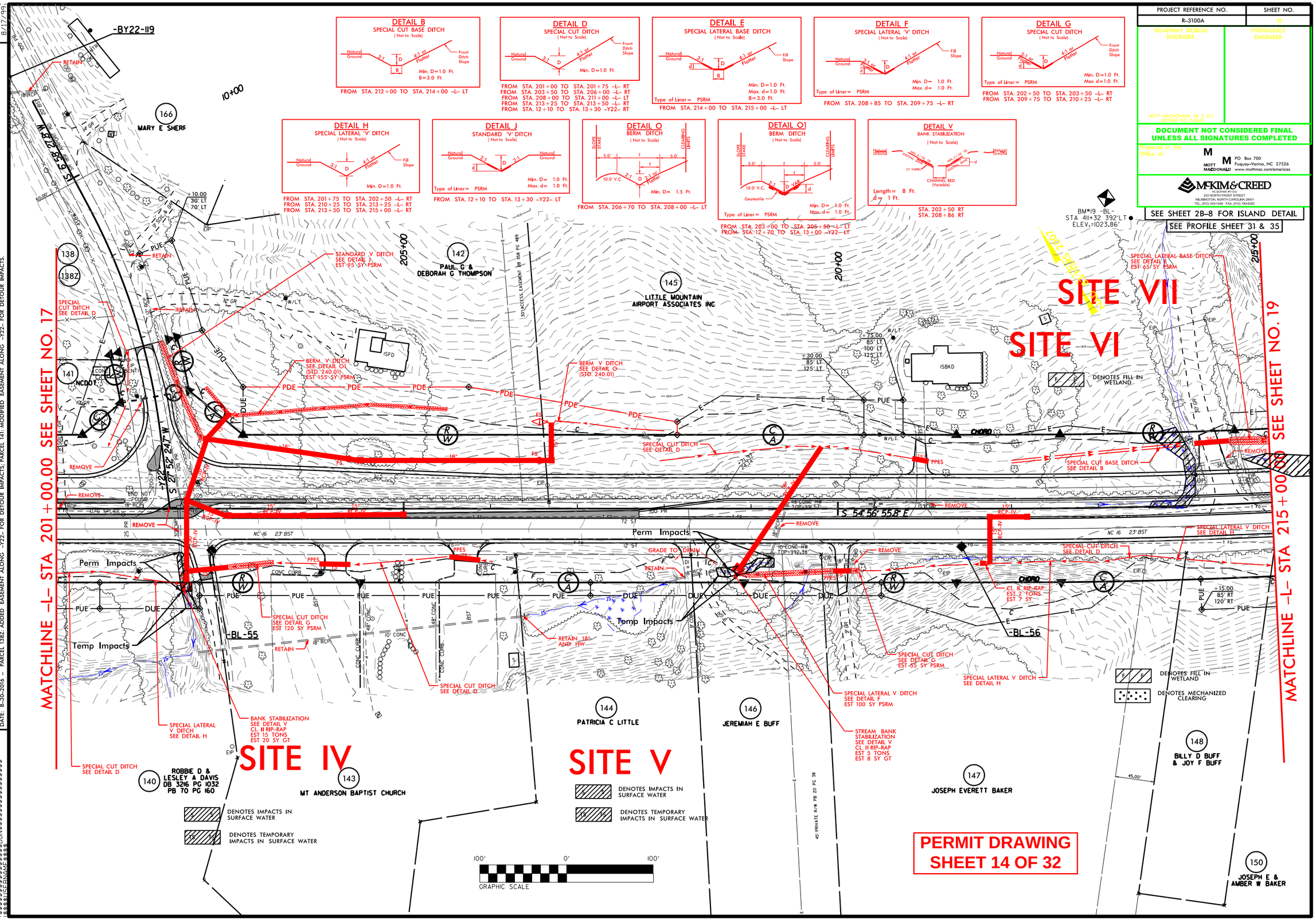
REVISIONS

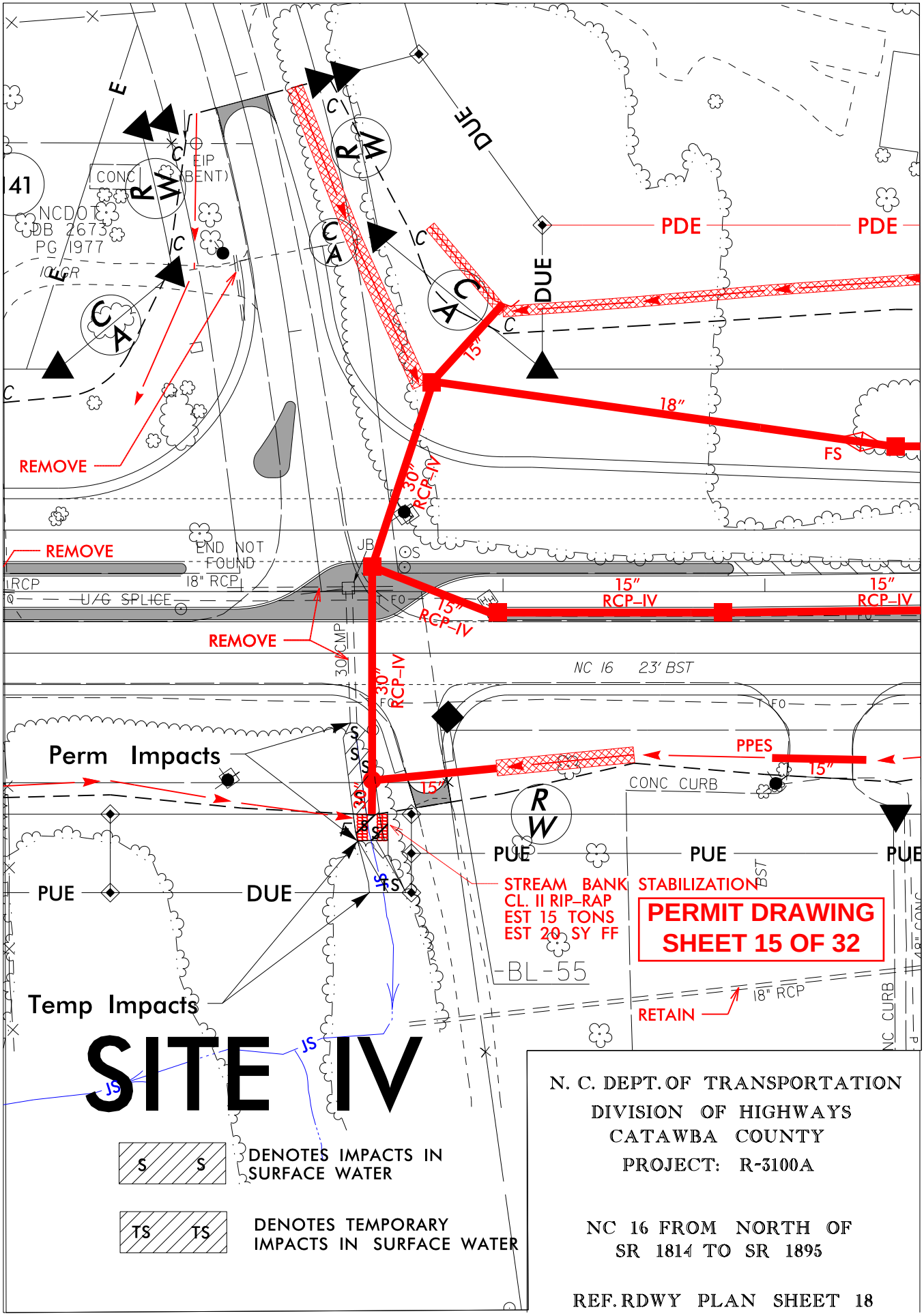
DATE: 4-6-2015 – PARCEL 140; REVISED EXISTING RIGHT OF WAY TO MATCH EXISTING RECORDED PLAT, APPROX. 50 FT FROM THE EXISTING CENTERLINE. PARCEL 146; CHANGED PROPERTY OWNER NAME TO JEREMIAH E BUFF

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.

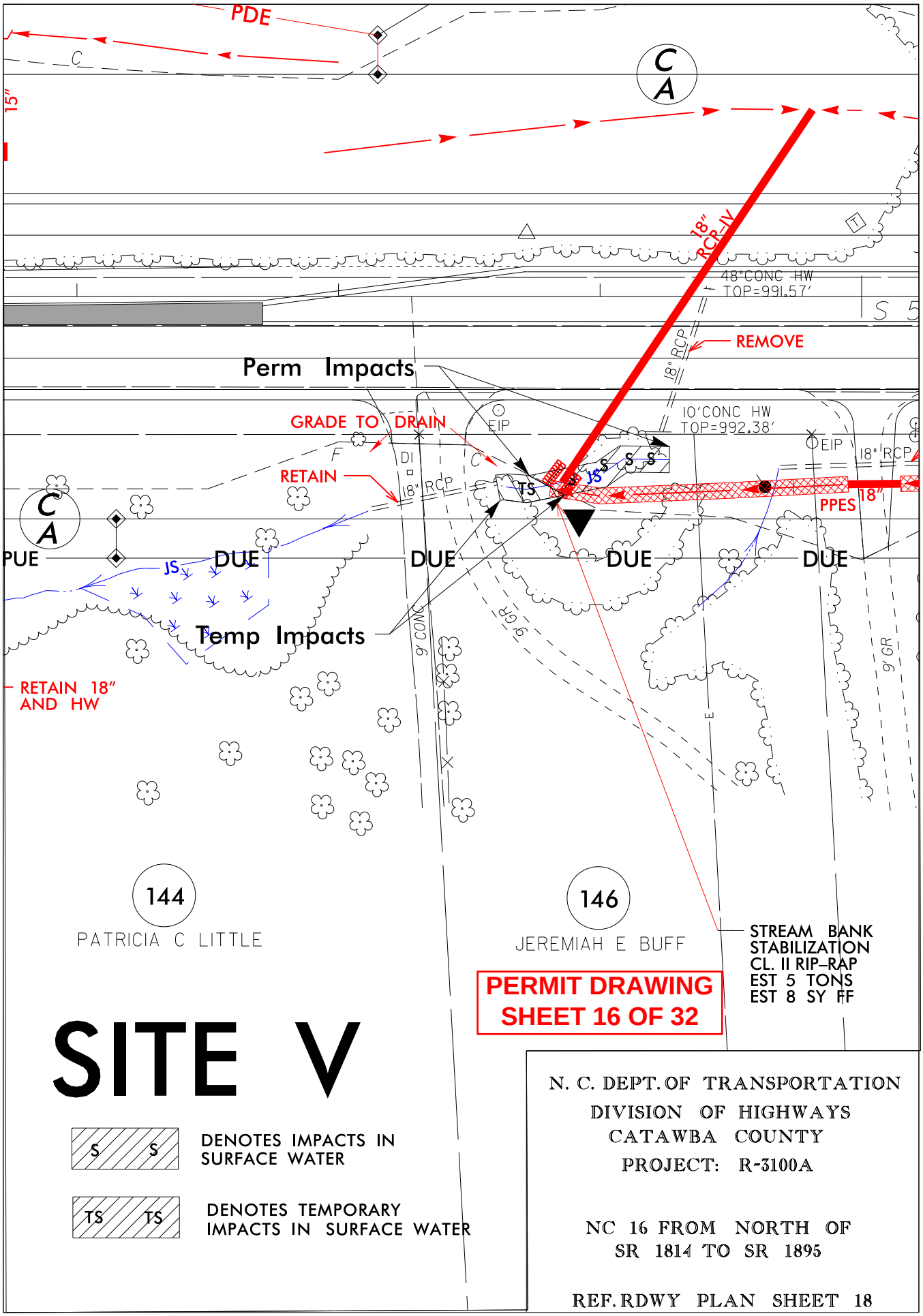


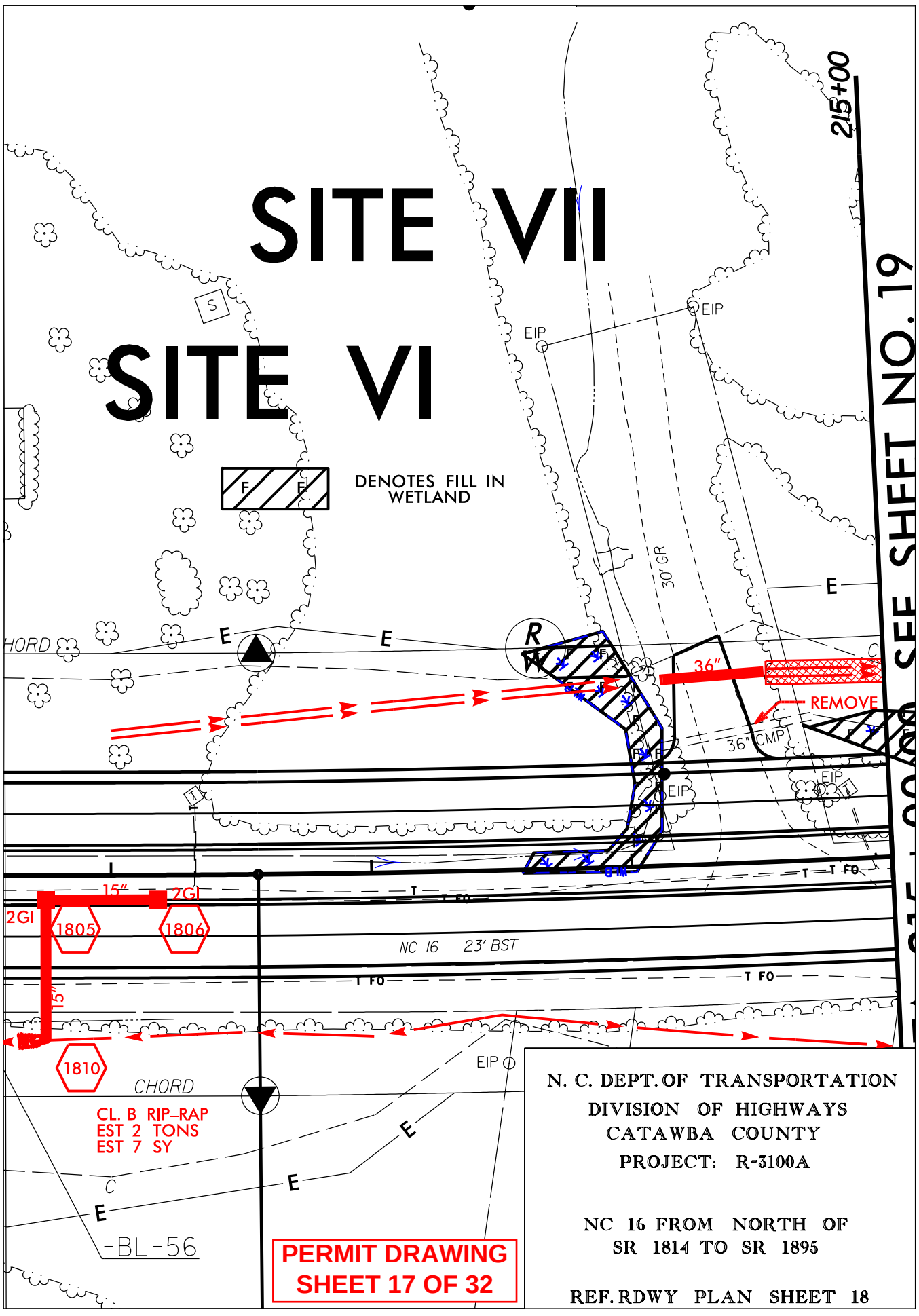


N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A

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

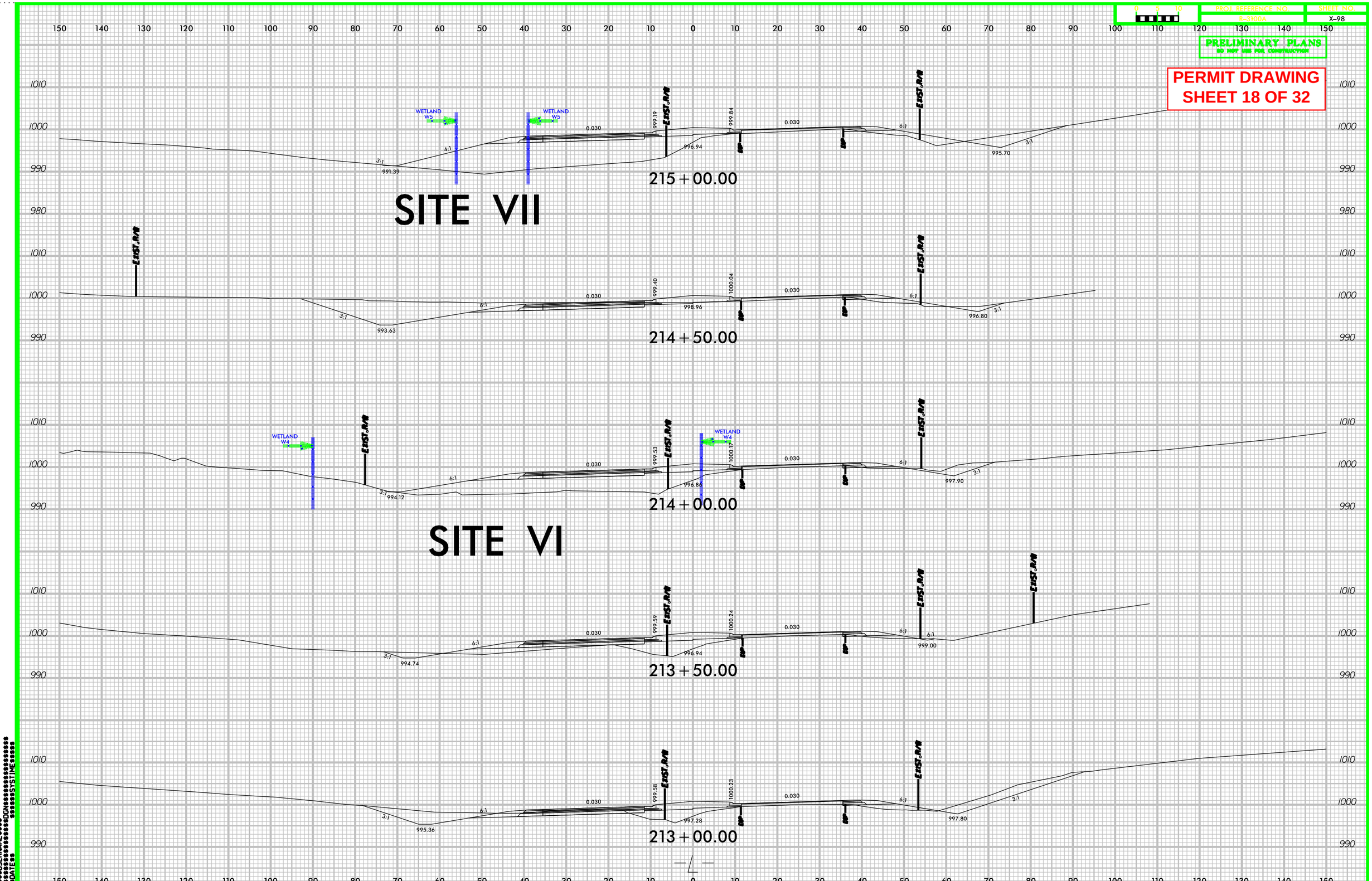

SITE VII
SITE VI
DENOTES FILL IN WETLAND
215+00
SEE SHEET NO. 19
EIP
30' GR
E
HORD
R
36"
REMOVE
36" CMP
T FO
15"
2GI
1805
1806
NC 16 23' BST
1810
CHORD
CL. B RIP-RAP
EST 2 TONS
EST 7 SY
C
-BL-56
PERMIT DRAWING
SHEET 17 OF 32
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
CATAWBA COUNTY
PROJECT: R-3100A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



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

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

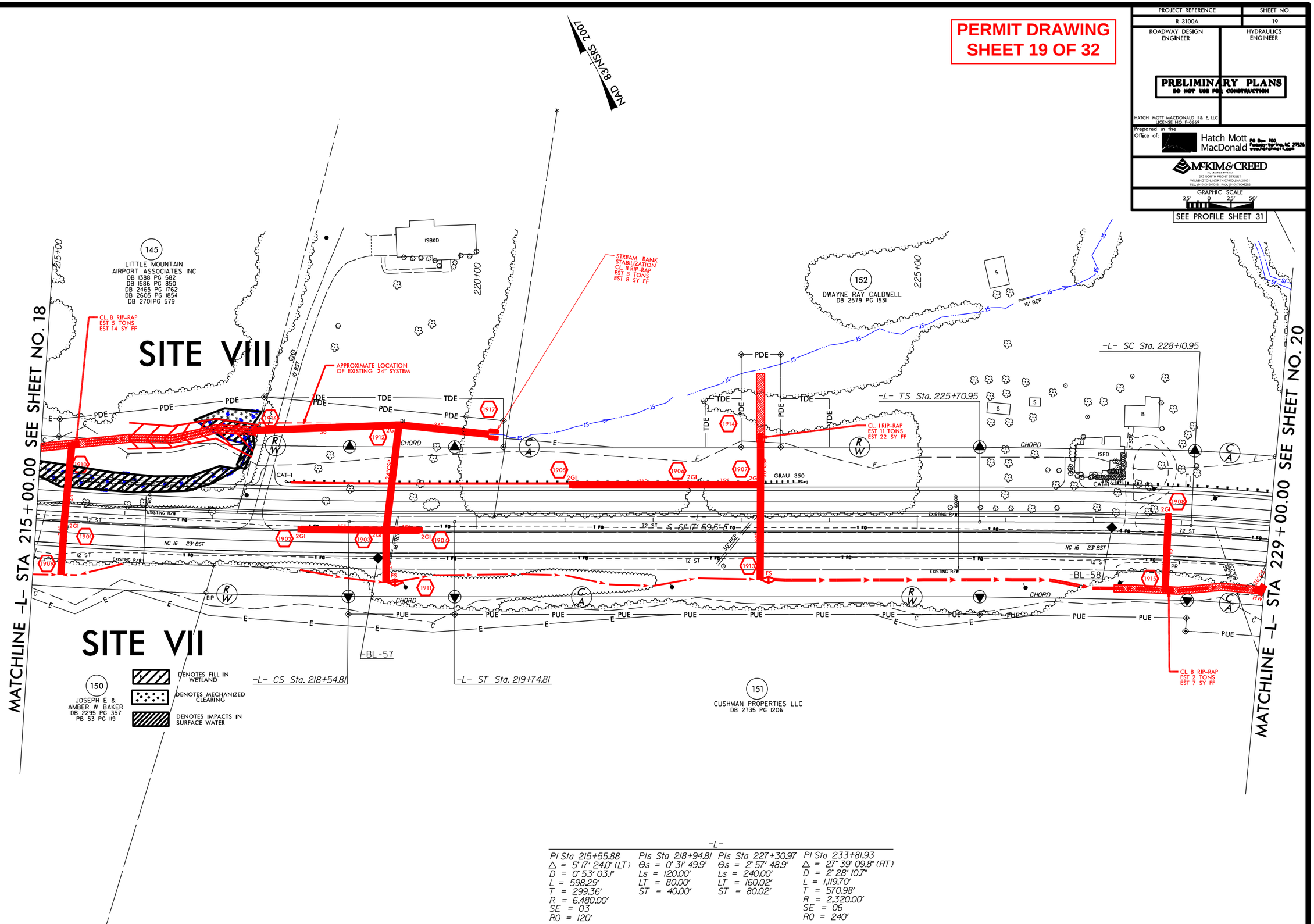
HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

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

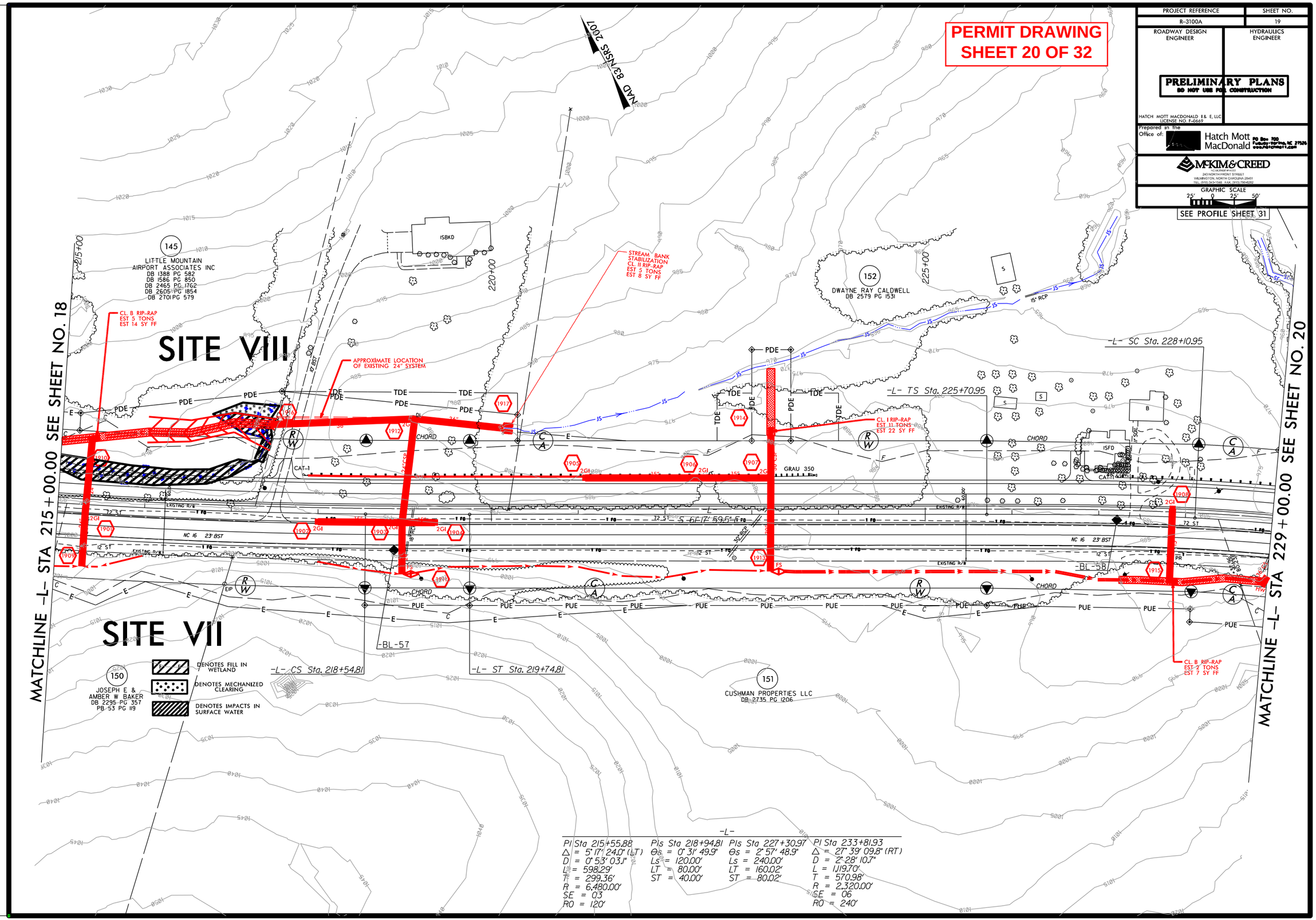
HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

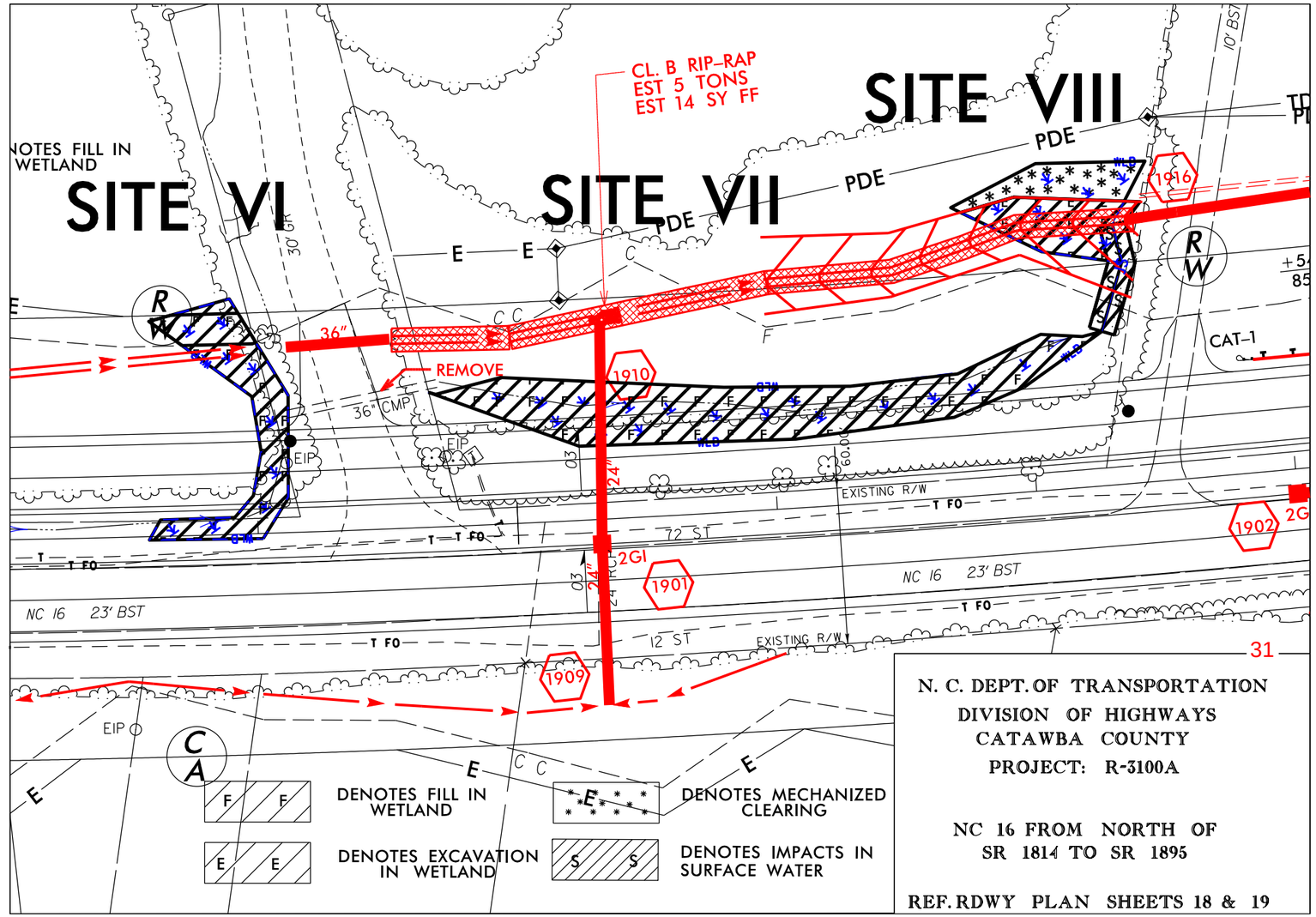
Prepared in the Office of: Hatch Mott MacDonald PO Box 700 Fuquay-Varina, NC 27526 www.hatchmottmacdonald.com

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'

PERMIT DRAWING
SHEET 20 OF 32





31

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

NC 16 FROM NORTH OF
SR 1814 TO SR 1895

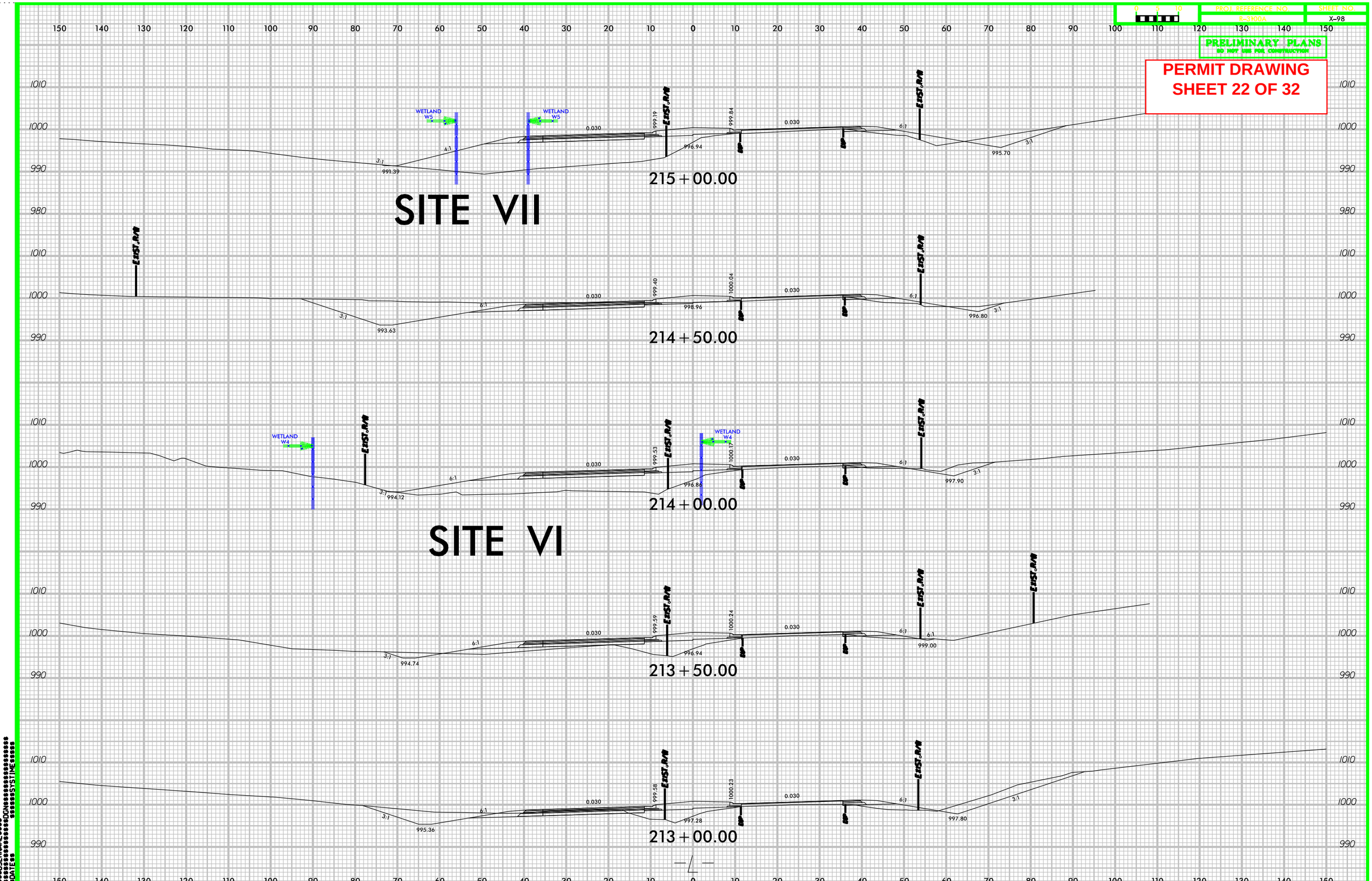
REF. RDWY PLAN SHEETS 18 & 19

PROJ. REFERENCE NO. B-3100A

SHEET NO. X-98

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 22 OF 32

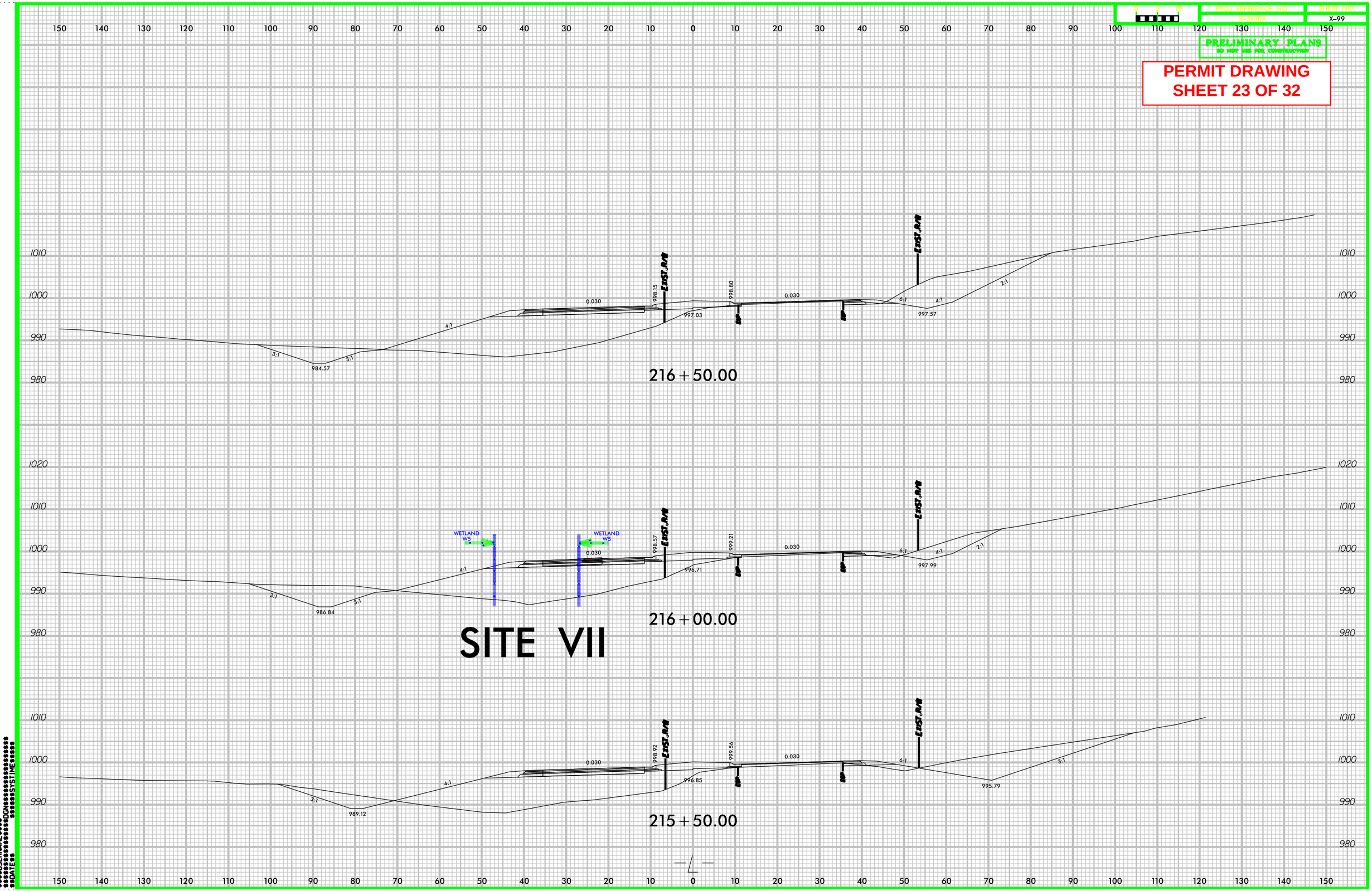


$$USERNAME$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$DATE$$ $$$$$$SYSTIME$$$$$

PROJ. REFERENCE NO.	SHEET NO.
B-3100A	X-99

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 23 OF 32



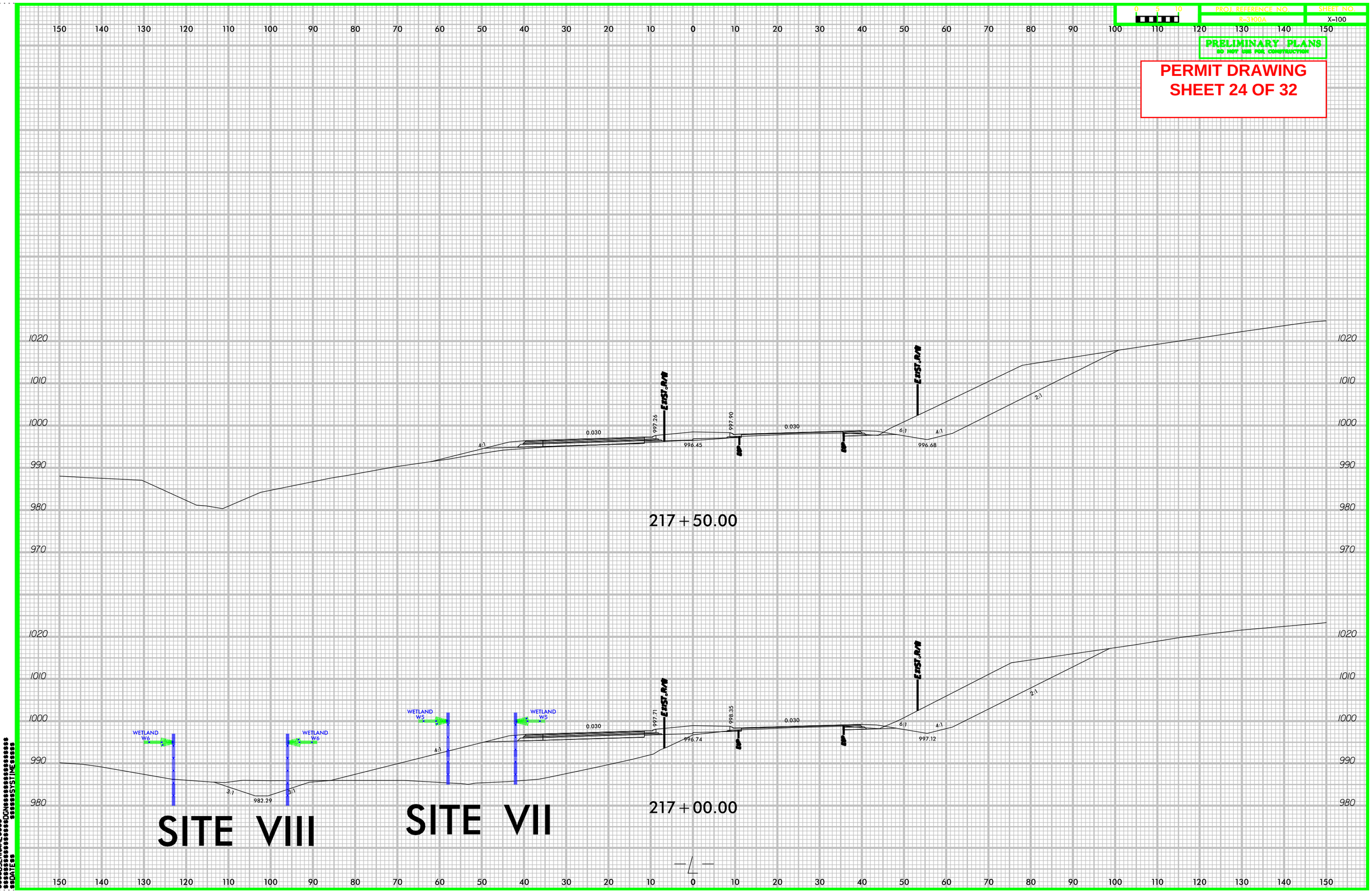
$$USERNAME$$
$$DGN$$
$$SYSTIME$$
$$DATE$$

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

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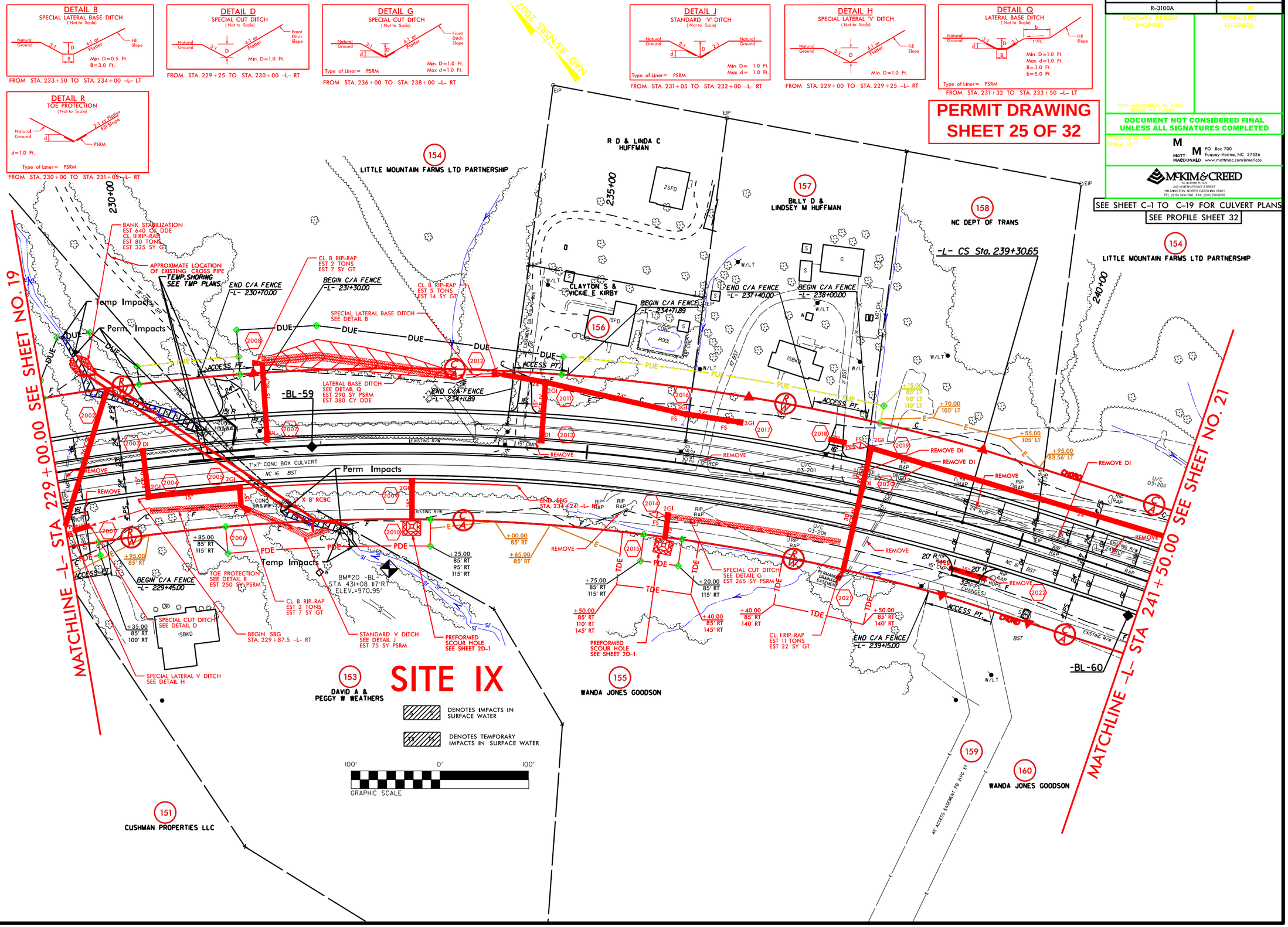
Fuquay-Varina, NC 27526
www.mottmac.com/americas

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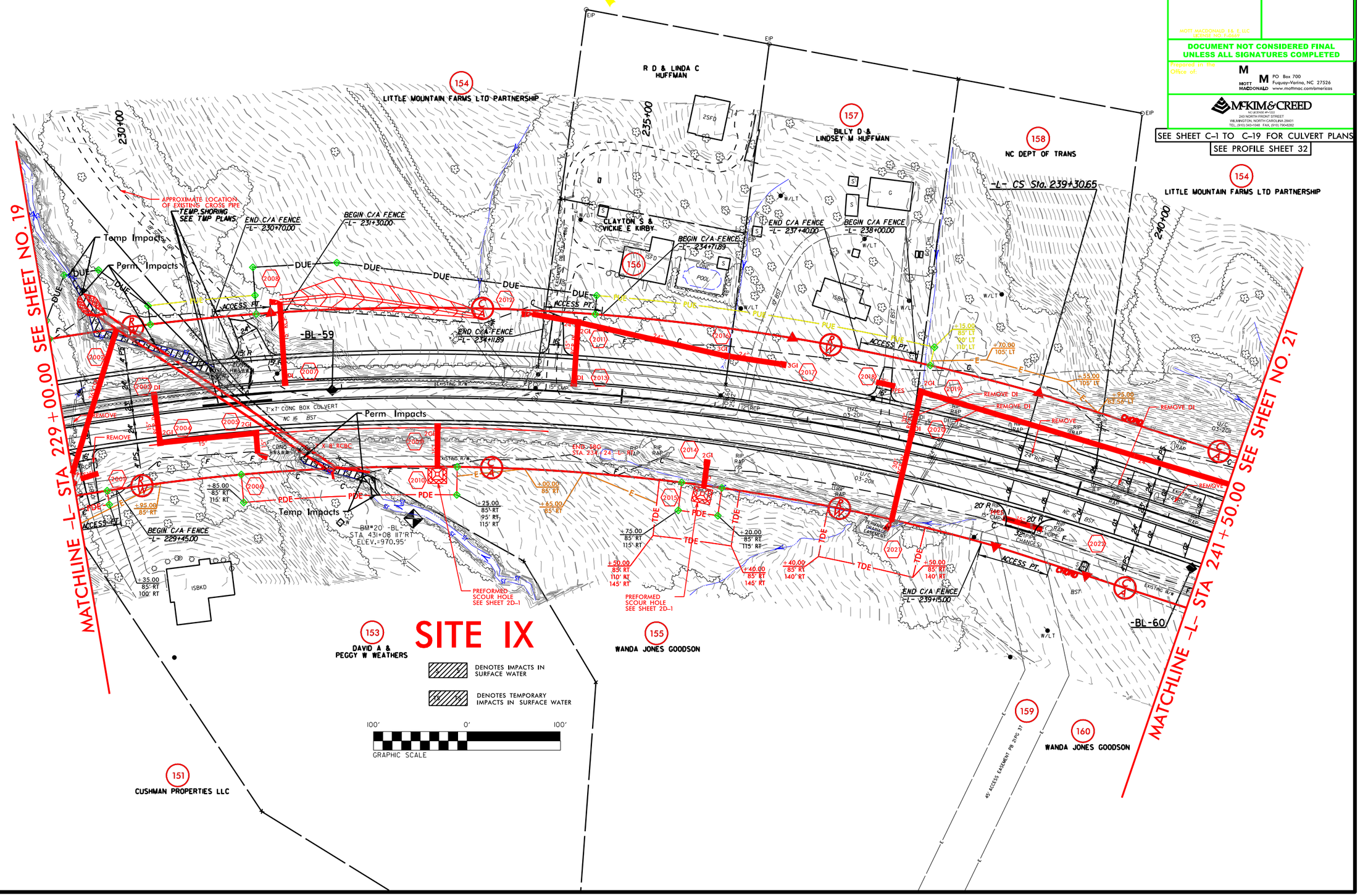
McKIM & CREED
NC LICENSE #F-1102
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1481 FAX: (910) 763-6392

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

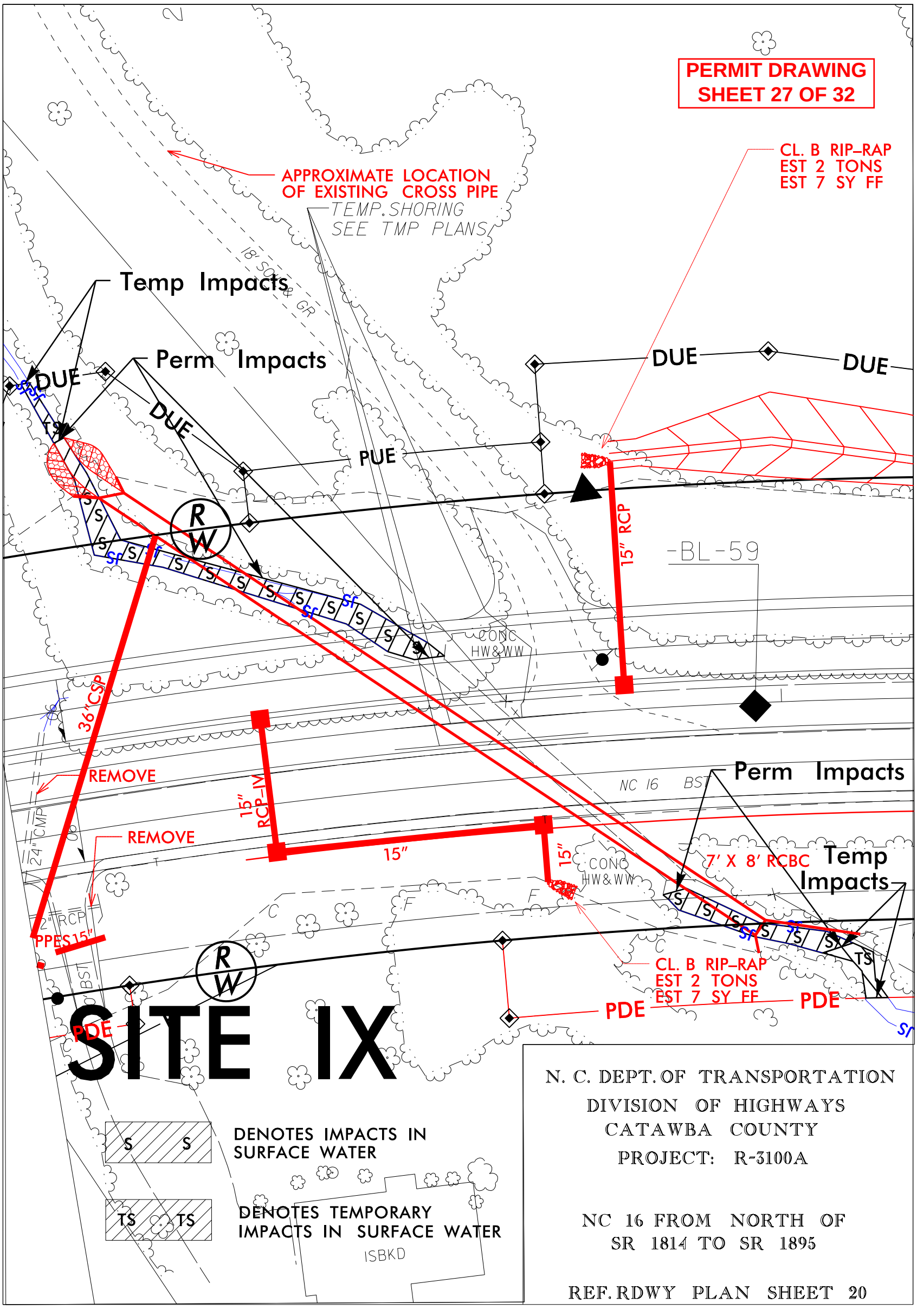
SEE PROFILE SHEET 32

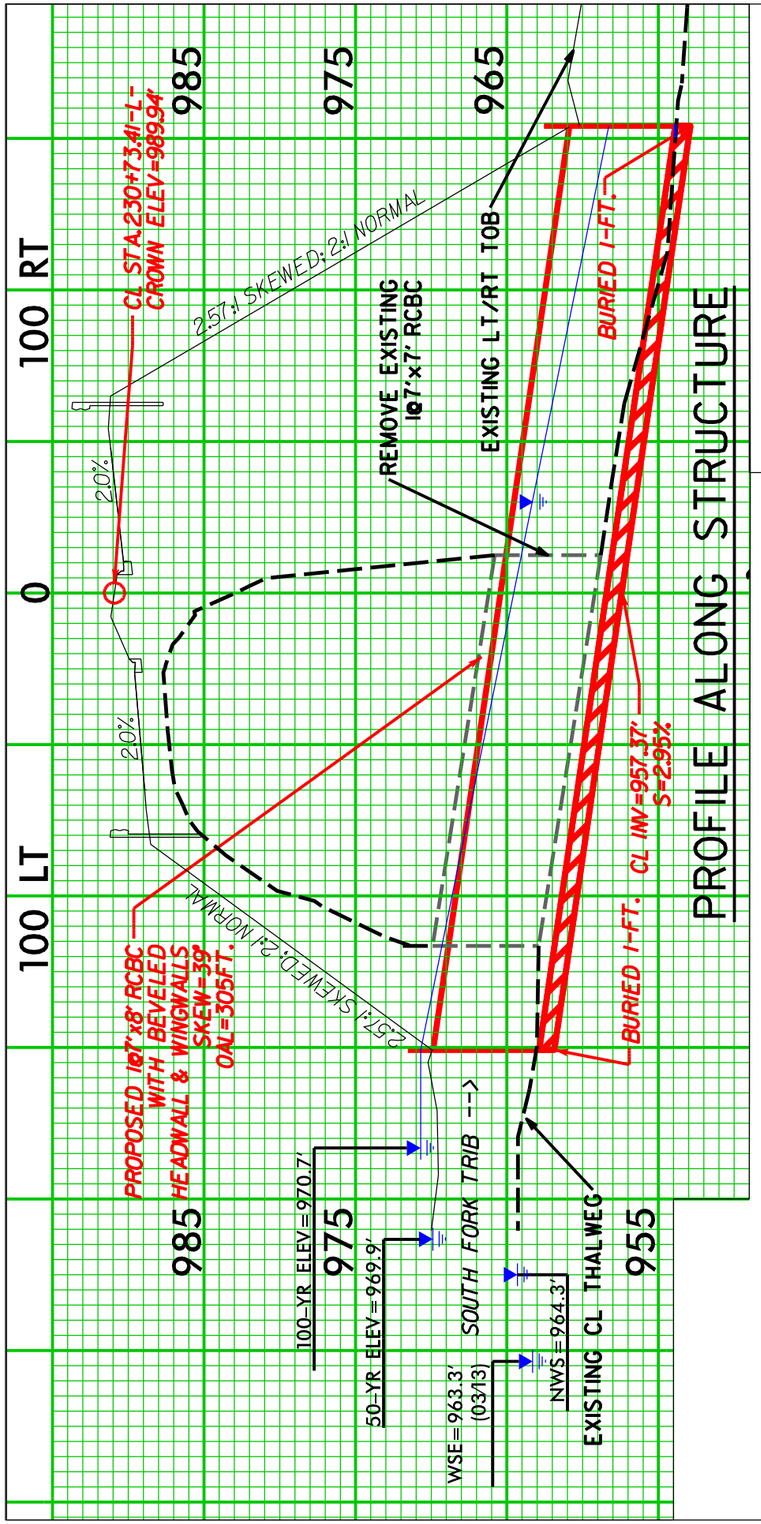
PERMIT DRAWING
SHEET 26 OF 32



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



PROFILE ALONG STRUCTURE

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.

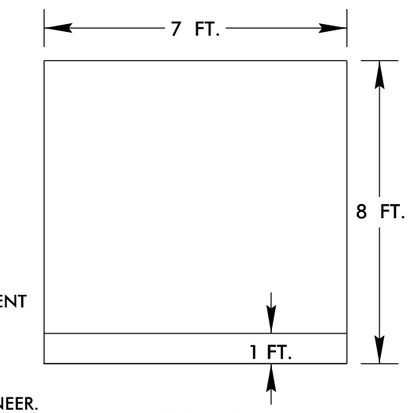
2) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

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

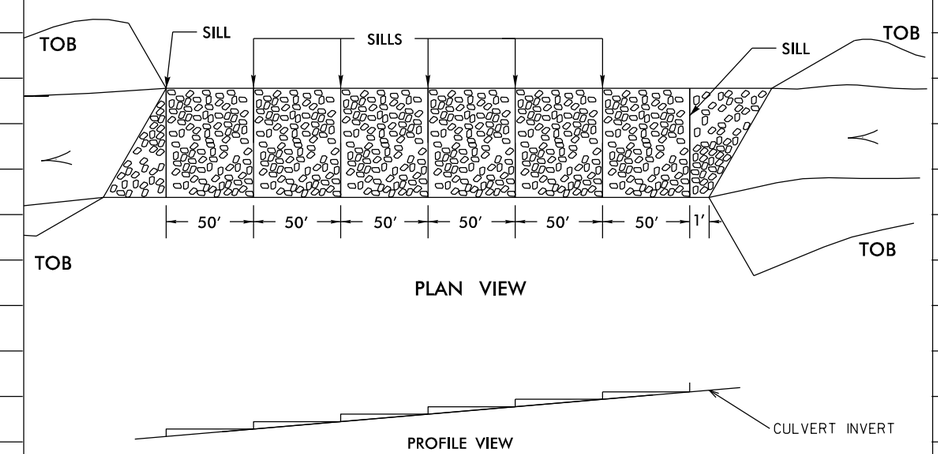
4) CLASS B RIP RAP MAY BE USED TO SUPPLEMENT NATURAL BED MATERIAL.

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

6) NUMBER OF SILLS DETERMINED BY THE ENGINEER.



SILLS AT
INLET AND OUTLET



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

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

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

NAD 83/NSRS 2007

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

-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

BEGIN EXP. GUTTER -L1- Sta. 11+20.00
ABANDON EXISTING ROW
END C/A FENCE -L- 252+00.00
END EXP. GUTTER -L1- Sta. 14+05.00
BEGIN C/A FENCE -L- 242+36.00
END C/A FENCE -L- 248+65.00
BEGIN C/A FENCE -L- 249+25.00
END C/A FENCE -L- 253+38.62
END TIP PROJECT R-3100A -L- STA 253+80.00

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

CL. II RIP-RAP EST 3 TONS EST 7 SY FF
STREAM BANK STABILIZATION CL. II RIP-RAP EST 15 TONS EST 20 SY FF
APPROXIMATE LOCATION OF EXISTING 15"RCP DRIVE PIPE. REMOVE AND REPLACE WITH 24"RCP
APPROXIMATE LOCATION OF EXISTING SYSTEM
RAISE TO PROPOSED GRADE AND CONVERT TO A JUNCTION BOX WITH MANHOLE RING AND COVER

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

SITE X

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

-L1-

PIs Sta 11+06.67	PI Sta 12+29.45	PIs Sta 13+52.22	PIs Sta 15+92.23	PI Sta 18+60.76
Θs = 1° 10' 41.9"	Δ = 2° 02' 44.5" (LT)	Θs = 1° 10' 41.9"	Θs = 1° 10' 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-

PI Sta 233+81.93	PIs 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

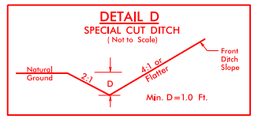
PERMIT DRAWING
SHEET 30 OF 32

NAD 83/NSRS 2007

8/17/99

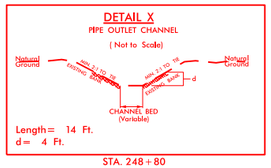
REVISIONS

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)



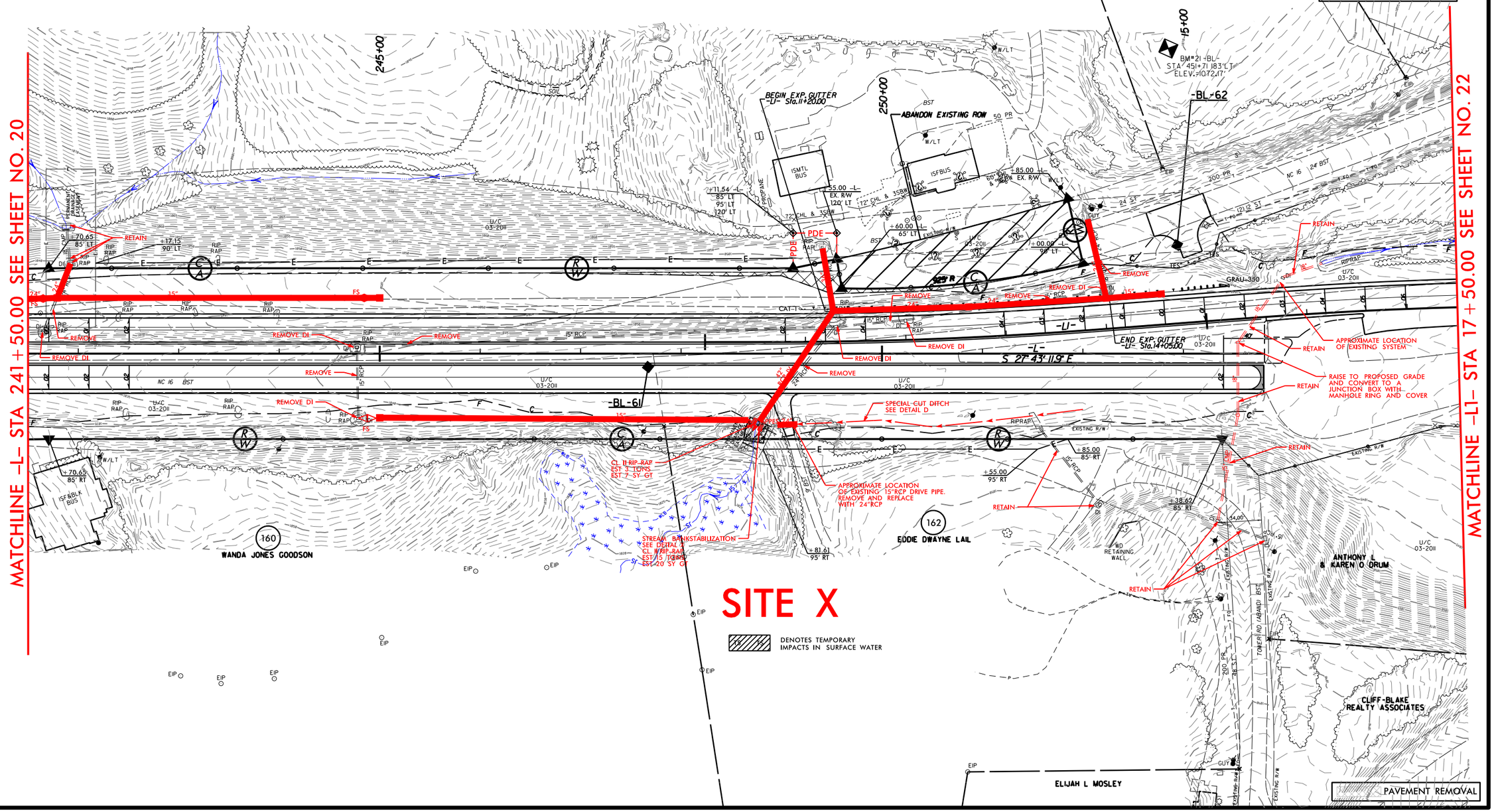
FROM STA. 249+00 TO STA. 252+00 –L– RT

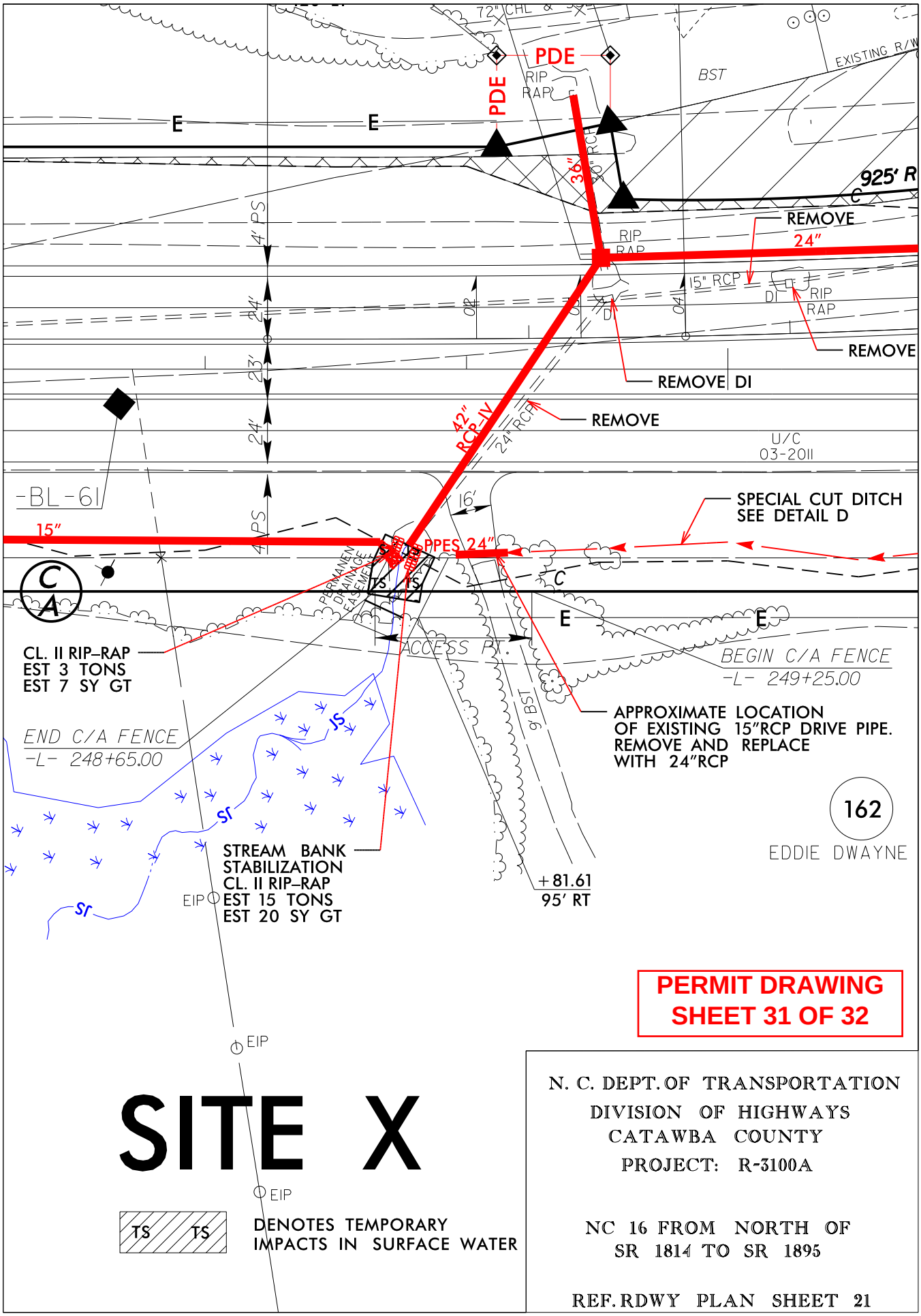
DETAIL X
PIPE OUTLET CHANNEL
(Not to Scale)



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
SHEET 32 OF 32

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

CATAWBA COUNTY
WBS - 34522.1.3 (R-3100A)

ATN Revised 3/31/05

SHEET 10/6/2016

TIP PROJECT: R-3100B

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

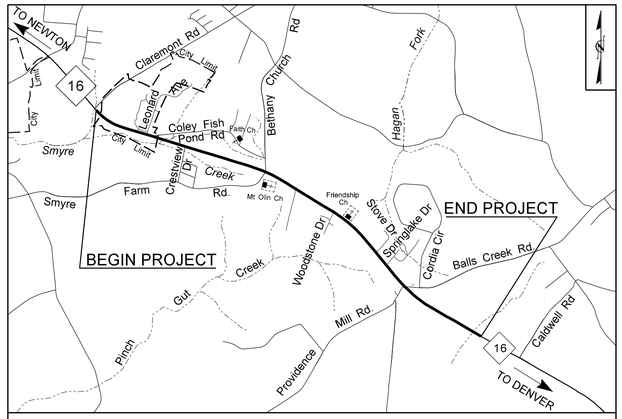
CATAWBA COUNTY

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,CONST.
34522.2.FRU4	STP-0016(53)	UTIL.

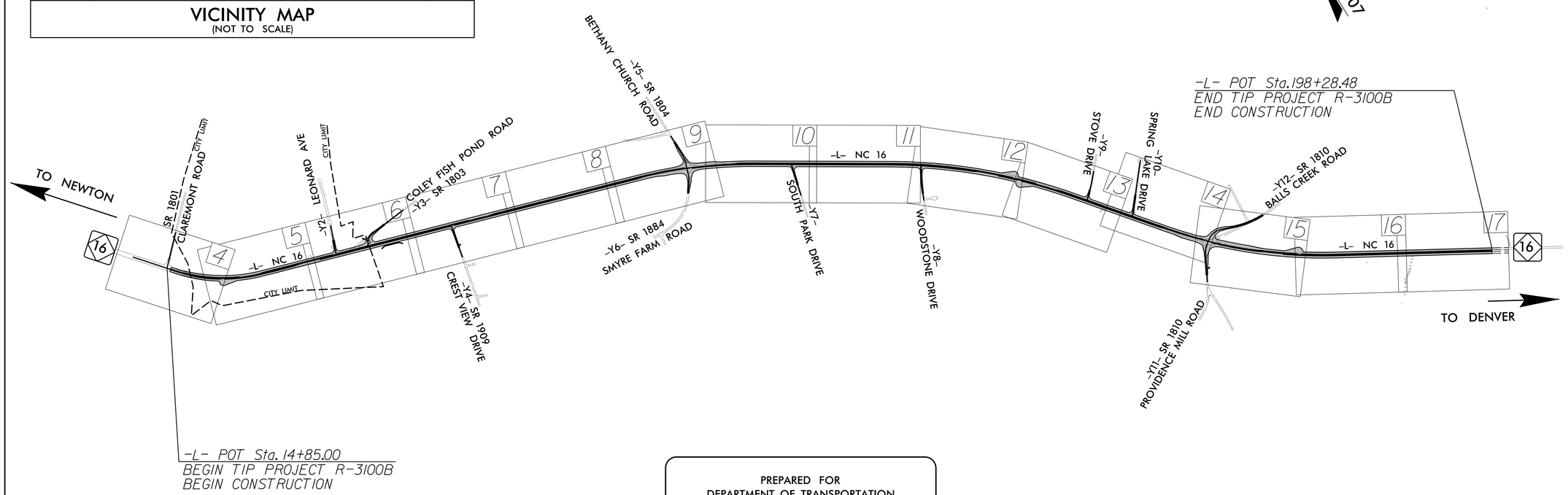
LOCATION: NC 16 FROM NORTH OF SR 1801 (CLAREMONT RD) TO NORTH OF SR 1814 (CALDWELL RD)

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



VICINITY MAP
(NOT TO SCALE)

NAD 83/ NSRS 2007



PREPARED FOR
DEPARTMENT OF TRANSPORTATION
RALEIGH, NC

NCDOT CONTACT: KANCHANA V. NOLAND

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CONTRACT:

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2016 = 13,050
ADT 2036 = 20,200
DHV = 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 = 3.474 Miles

TOTAL LENGTH TIP PROJECT R-3100B = 3.474 Miles

URS

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:
JANUARY 17, 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

04/06/15

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	1-B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale **S.U.E. = Subsurface Utility Engineering*

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Existing Historic Property Boundary — HPB
- Known Contamination Area: Soil
- Potential Contamination Area: Soil
- Known Contamination Area: Water
- Potential Contamination Area: Water
- Contaminated Site: Known or Potential

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

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

RIGHT OF WAY:

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H-Frame Pole
- U/G Power Line LOS B (S.U.E.*) — P
- U/G Power Line LOS C (S.U.E.*) — P
- U/G Power Line LOS D (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole
- U/G Telephone Cable LOS B (S.U.E.*) — T
- U/G Telephone Cable LOS C (S.U.E.*) — T
- U/G Telephone Cable LOS D (S.U.E.*) — T
- U/G Telephone Conduit LOS B (S.U.E.*) — TC
- U/G Telephone Conduit LOS C (S.U.E.*) — TC
- U/G Telephone Conduit LOS D (S.U.E.*) — TC
- U/G Fiber Optics Cable LOS B (S.U.E.*) — T FO
- U/G Fiber Optics Cable LOS C (S.U.E.*) — T FO
- U/G Fiber Optics Cable LOS D (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line LOS B (S.U.E*) — W
- U/G Water Line LOS C (S.U.E*) — W
- U/G Water Line LOS D (S.U.E*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- U/G TV Cable LOS B (S.U.E.*) — TV
- U/G TV Cable LOS C (S.U.E.*) — TV
- U/G TV Cable LOS D (S.U.E.*) — TV
- U/G Fiber Optic Cable LOS B (S.U.E.*) — TV FO
- U/G Fiber Optic Cable LOS C (S.U.E.*) — TV FO
- U/G Fiber Optic Cable LOS D (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- U/G Gas Line LOS B (S.U.E.*) — G
- U/G Gas Line LOS C (S.U.E.*) — G
- U/G Gas Line LOS D (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- SS Forced Main Line LOS B (S.U.E.*) — FSS
- SS Forced Main Line LOS C (S.U.E.*) — FSS
- SS Forced Main Line LOS D (S.U.E.*) — FSS

MISCELLANEOUS:

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

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	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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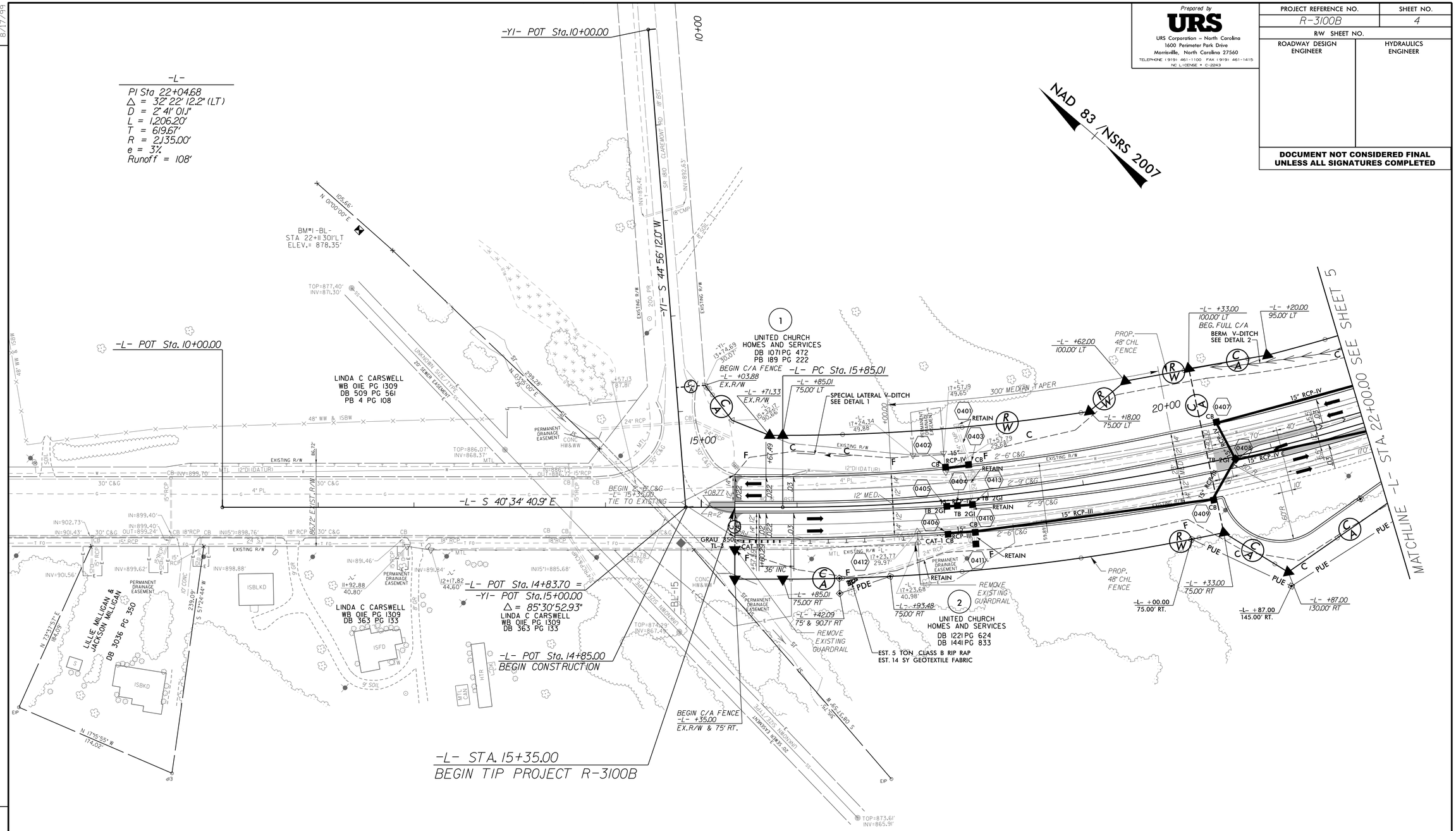
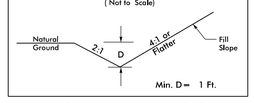
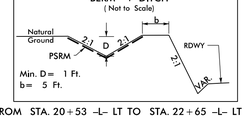


DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 16+00 -L- LT TO STA. 16+60 -L- LT

DETAIL 2
BERM 'V' DITCH
(Not to Scale)



FROM STA. 20+53 -L- LT TO STA. 22+65 -L- LT

FOR -L- PROFILE SEE SHEET 18

REVISIONS

DATE: 08/30/2016 - ADJUSTED R/W AND PUE ON PARCELS 1 AND 2

8/17/99

8/26/2016
R:\Roadway\Proj\r3100b_rdy_PSH04.dgn

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

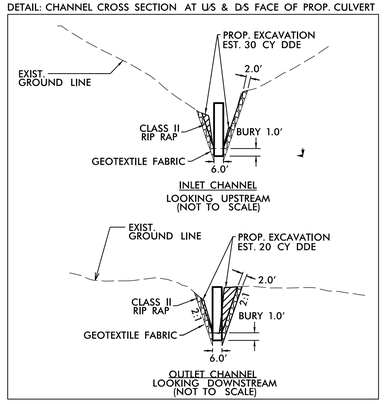
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

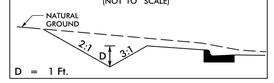
NAD 83 /NSRS 2007

-L-
PI Sta 22+04.68
Δ = 32° 22' 12.2" (LT)
D = 2° 41' 01.1"
L = 1,206.20'
T = 619.67'
R = 2,135.00'
e = 3%
Runoff = 108'

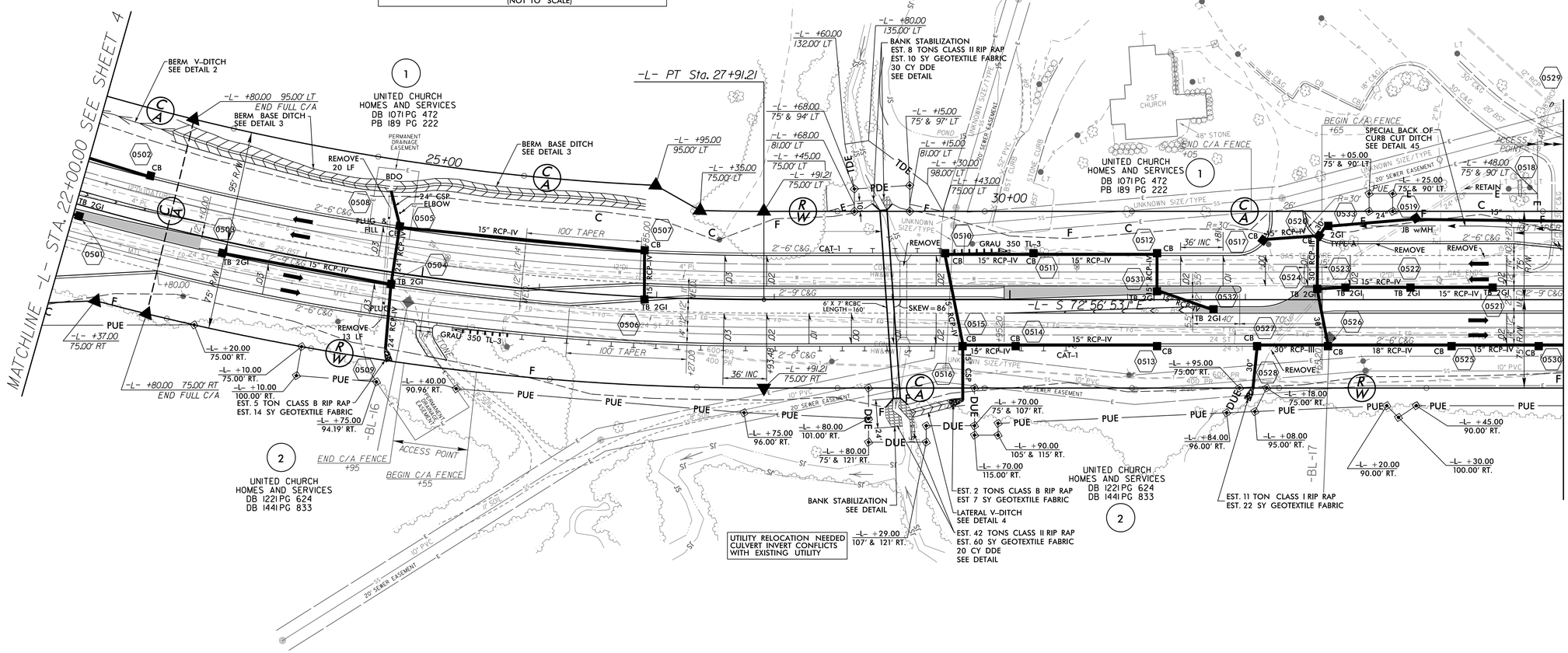
DETAIL: CHANNEL CROSS SECTION AT US & DS FACE OF PROP. CULVERT



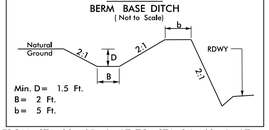
DETAIL 45
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)



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



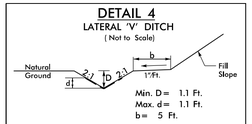
DETAIL 3
BERM BASE DITCH
(Not to Scale)



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)

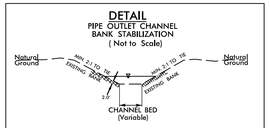


Min. D = 1.1 Ft.
Max. d = 1.1 Ft.
b = 5 Ft.

Type of Liner = PSRM

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

DETAIL
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

REVISIONS
DATE: 06/09/2016 – ADDED TCE ONTO PACEL 1 FOR SLOPE CONTRUCTION STA 33+25 TO STA 34+48
DATE: 08/30/2016 – ADJUSTED R/W AND PUE ON PARCELS 1 AND 2

8/17/99

8/26/2016
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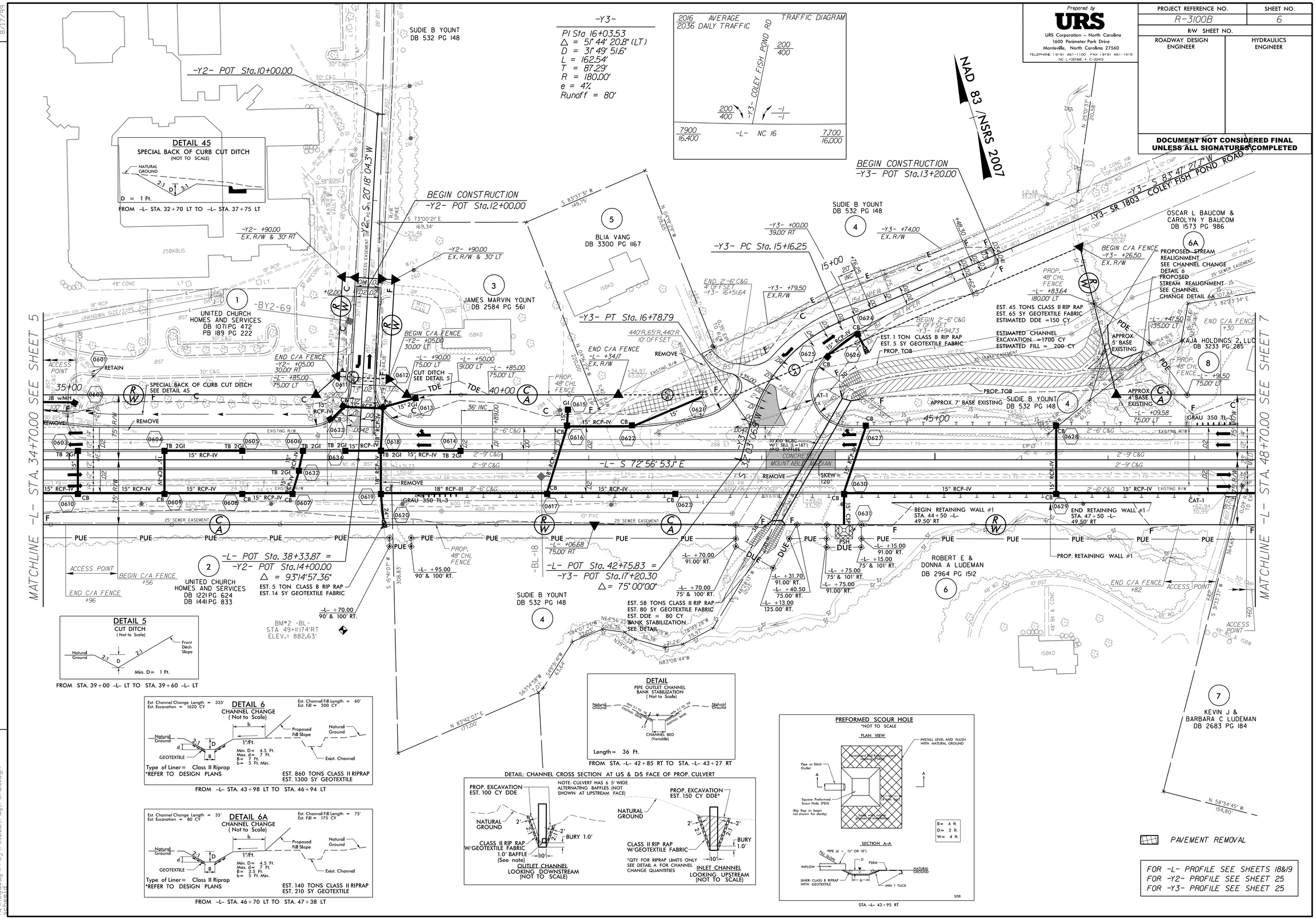
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URS
URS Corporation – North Carolina
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TELEPHONE (919) 461-1100 FAX (919) 461-1415
NC LICENSE # C-2243
PROJECT REFERENCE NO.
R-3100B
SHEET NO.
6
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
NAD 83 /NSRS 2007
-Y3- PI Sta 16+03.53
Δ = 51° 44' 20.8" (LT)
D = 31° 49' 51.6"
L = 162.54'
T = 87.29'
R = 180.00'
e = 4%
Runoff = 80'
2016 AVERAGE 2036 DAILY TRAFFIC
TRAFFIC DIAGRAM
-Y3- COLEY FISH POND RD
-L- NC 16
-Y2- POT Sta.10+00.00
BEGIN CONSTRUCTION -Y2- POT Sta.12+00.00
BEGIN CONSTRUCTION -Y3- POT Sta.13+20.00
-Y3- PC Sta. 15+16.25
-Y3- PT Sta. 16+78.79
-Y3- SR 1803 COLEY FISH POND ROAD
-L- S 72°56'53.1" E
MATCHLINE -L- STA. 34+70.00 SEE SHEET 5
MATCHLINE -L- STA. 48+70.00 SEE SHEET 7
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
SUDIE B YOUNT DB 532 PG 148
BLIA VANG DB 3300 PG 1167
JAMES MARVIN YOUNT DB 2584 PG 561
UNITED CHURCH HOMES AND SERVICES DB 1071 PG 472 PB 189 PG 222
UNITED CHURCH HOMES AND SERVICES DB 1221 PG 624 DB 1441 PG 833
OSCAR L BAUCOM & CAROLYN Y BAUCOM DB 1573 PG 986
KAJA HOLDINGS 2, LLC DB 3233 PG 285
ROBERT E & DONNA A LUDEMAN DB 2964 PG 1512
KEVIN J & BARBARA C LUDEMAN DB 2683 PG 184
-L- POT Sta. 38+33.87 = -Y2- POT Sta.14+00.00 Δ = 93°14'57.36"
-L- POT Sta. 42+75.83 = -Y3- POT Sta.17+20.30 Δ = 75°00'00"
EST. 5 TON CLASS B RIP RAP
EST. 14 SY GEOTEXTILE FABRIC
EST. 58 TONS CLASS II RIP RAP
EST. 80 SY GEOTEXTILE FABRIC
EST. DDE = 80 CY
BANK STABILIZATION SEE DETAIL
EST. 45 TONS CLASS II RIP RAP
EST. 65 SY GEOTEXTILE FABRIC
ESTIMATED DDE =150 CY
ESTIMATED CHANNEL EXCAVATION =1700 CY
ESTIMATED FILL = 200 CY
EST. 1 TON CLASS B RIP RAP
EST. 5 SY GEOTEXTILE FABRIC
BM#2 -BL- STA 49+11.74'RT ELEV.= 882.63'
DETAIL 5
CUT DITCH
(Not to Scale)
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
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
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
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 U/S & D/S FACE OF PROP. CULVERT
NOTE: CULVERT HAS 6 5' 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 (See note)
BURY 1.0'
OUTLET CHANNEL LOOKING DOWNSTREAM (NOT TO SCALE)
PROP. EXCAVATION EST. 150 CY DDE*
CLASS II RIP RAP W/GEOTEXTILE FABRIC
*QTY FOR RIPRAP LIMITS ONLY SEE DETAIL A FOR CHANNEL CHANGE QUANTITIES
INLET CHANNEL LOOKING UPSTREAM (NOT TO SCALE)
PREFORMED SCOUR HOLE
*NOT TO SCALE
PLAN VIEW
SECTION A-A
B= 4 ft.
D= 2 ft.
W= 4 ft.
STA. -L- 43+95 RT
PAVEMENT REMOVAL
FOR -L- PROFILE SEE SHEETS 18&19
FOR -Y2- PROFILE SEE SHEET 25
FOR -Y3- PROFILE SEE SHEET 25
REVISIONS
DATE: 06/09/2016 - REMOVED EXTRA TCE ON PARCEL 1 STA 35+50 TO STA 36+40
DATE: 08/30/2016 - ADJUSTED R/W AND PUE ON PARCELS 1 AND 2
8/17/99
8/26/2016
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8/17/99

REVISIONS

DATE: 01/26/2016 - REVISED ACCESS LOCATION ON PARCEL 14.

FROM STA. –L– 49+33 LT TO STA. –L– 50+35 LT
FROM STA. –L– 50+93 LT TO STA. –L– 52+70 LT
FROM STA. –L– 56+30 LT TO STA. –L– 58+90 LT

FROM STA. –L– 52+80 LT TO STA. –L– 55+48 LT

FROM STA. 11+00 –Y4– LT TO STA. 11+70 –Y4– LT

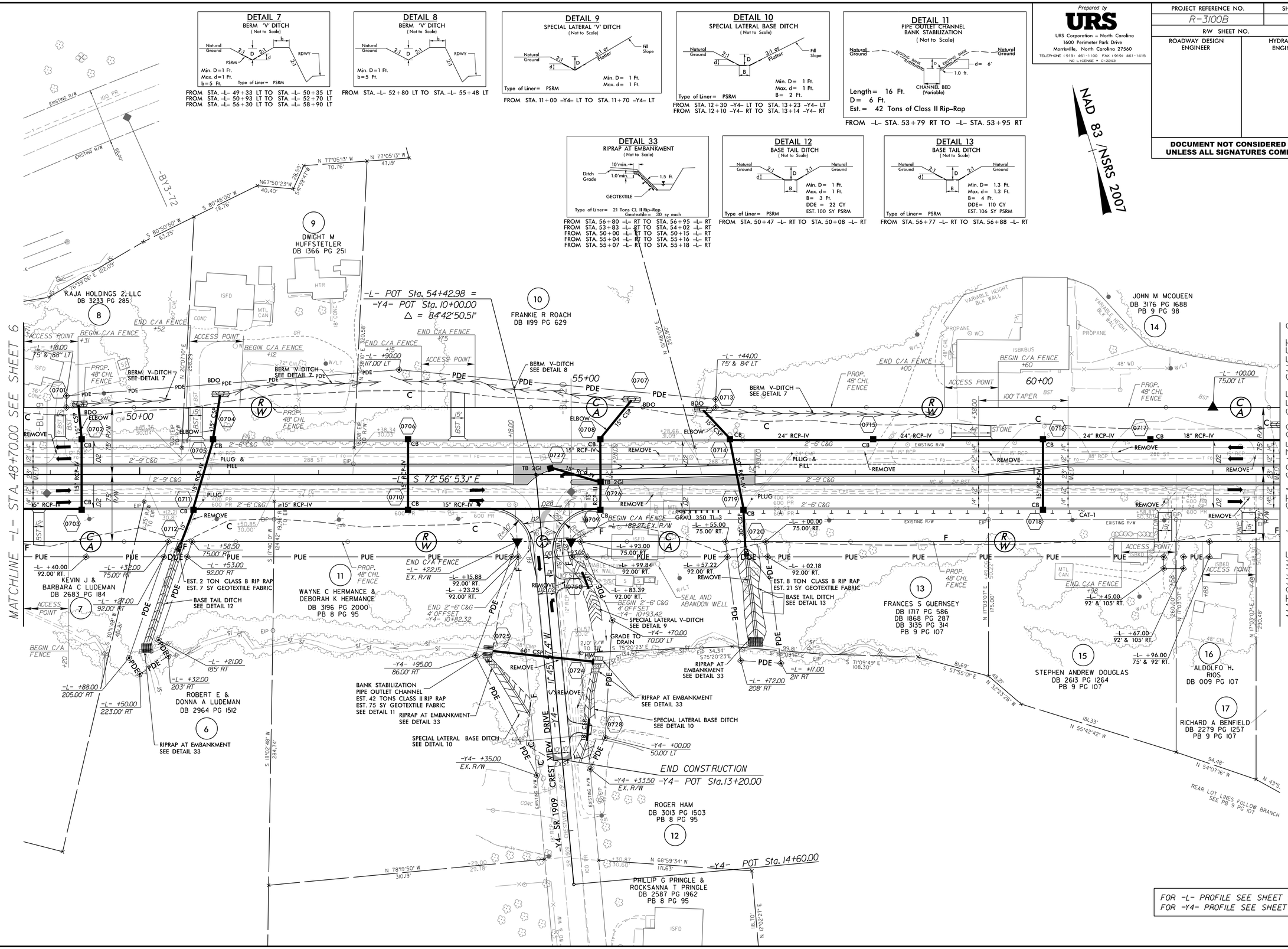
FROM STA. 12+30 –Y4– LT TO STA. 13+23 –Y4– LT
FROM STA. 12+10 –Y4– RT TO STA. 13+14 –Y4– RT

FROM –L– STA. 53+79 RT TO –L– STA. 53+95 RT

FROM STA. 56+80 –L– RT TO STA. 56+95 –L– RT
FROM STA. 53+83 –L– RT TO STA. 54+02 –L– RT
FROM STA. 50+00 –L– RT TO STA. 50+15 –L– RT
FROM STA. 55+04 –L– RT TO STA. 55+16 –L– RT
FROM STA. 55+07 –L– RT TO STA. 55+18 –L– RT

FROM STA. 50+47 –L– RT TO STA. 50+08 –L– RT

FROM STA. 56+77 –L– RT TO STA. 56+88 –L– RT



FOR -L- PROFILE SEE SHEET 19
FOR -Y4- PROFILE SEE SHEET 25

8/23/2016
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scheid

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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

NAD 83 /NSRS 2007

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

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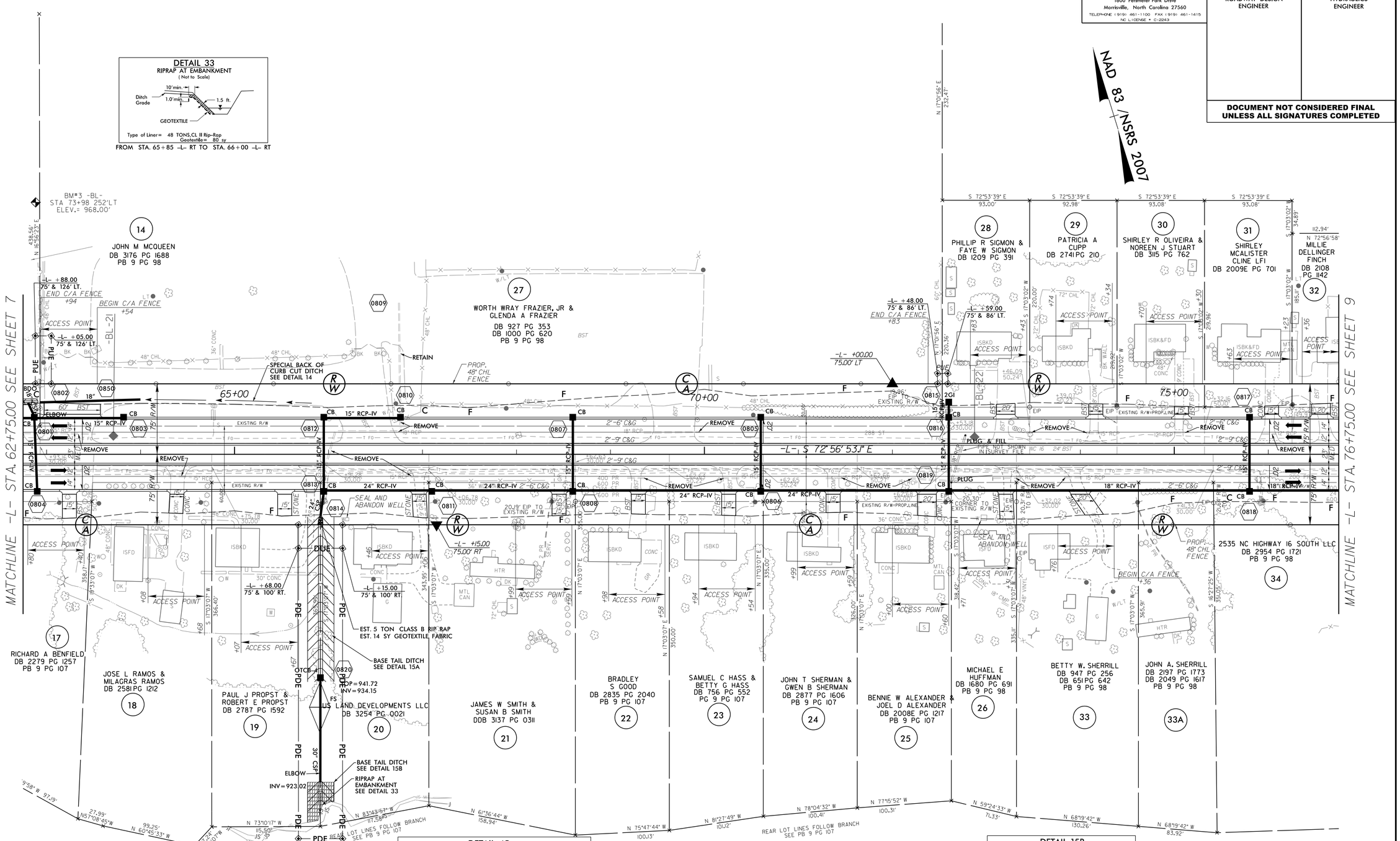
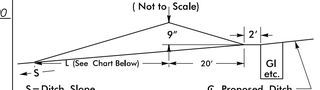


DETAIL 33
RIPRAP AT EMBANKMENT
(Not to Scale)

Type of Liner= 48 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)

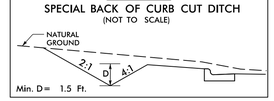


S=Ditch Slope ℄ Proposed Ditch

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'

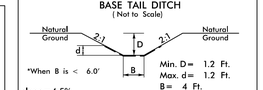
FROM STA. 65+91 -L- RT

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



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

DETAIL 15A
BASE TAIL DITCH
(Not to Scale)

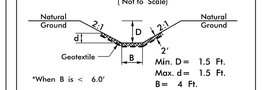


Min. D= 1.2 Ft.
Max. d= 1.2 Ft.
B= 4 Ft.
DDE= 100 CY
EST. 105 SY PSRM

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)

FOR -L- PROFILE SEE SHEETS 19&20

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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83 /NSRS 2007

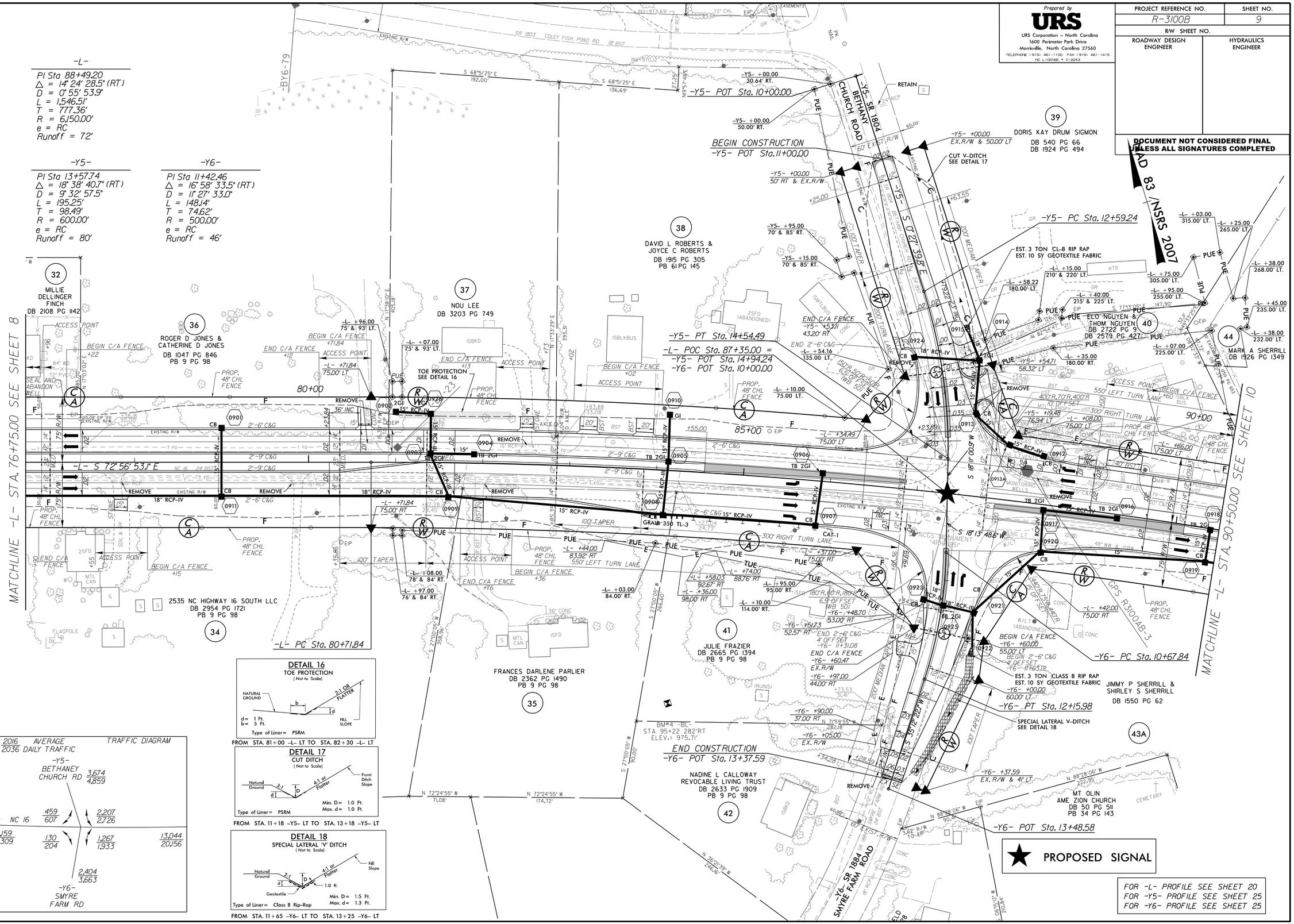
REVISIONS

8/17/99

-L-
PI Sta 88+49.20
△ = 14° 24' 28.5" (RT)
D = 0° 55' 53.9"
L = 1,546.51'
T = 777.36'
R = 6,150.00'
e = RC
Runoff = 72'

-Y5-
PI Sta 13+57.74
△ = 18° 38' 40.7" (RT)
D = 9° 32' 57.5"
L = 195.25'
T = 98.49'
R = 600.00'
e = RC
Runoff = 80'

-Y6-
PI Sta 11+42.46
△ = 16° 58' 33.5" (RT)
D = 11° 27' 33.0"
L = 148.14'
T = 74.62'
R = 500.00'
e = RC
Runoff = 46'



FROM STA. 81+00 -L- LT TO STA. 82+30 -L- LT

FROM STA. 11+18 -Y5- LT TO STA. 13+18 -Y5- LT

FROM STA. 11+65 -Y6- LT TO STA. 13+25 -Y6- LT

8/23/2016
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sheet2

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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DETAIL 19
SPECIAL DITCH
(Not to Scale)

Type of Liner= PSRM

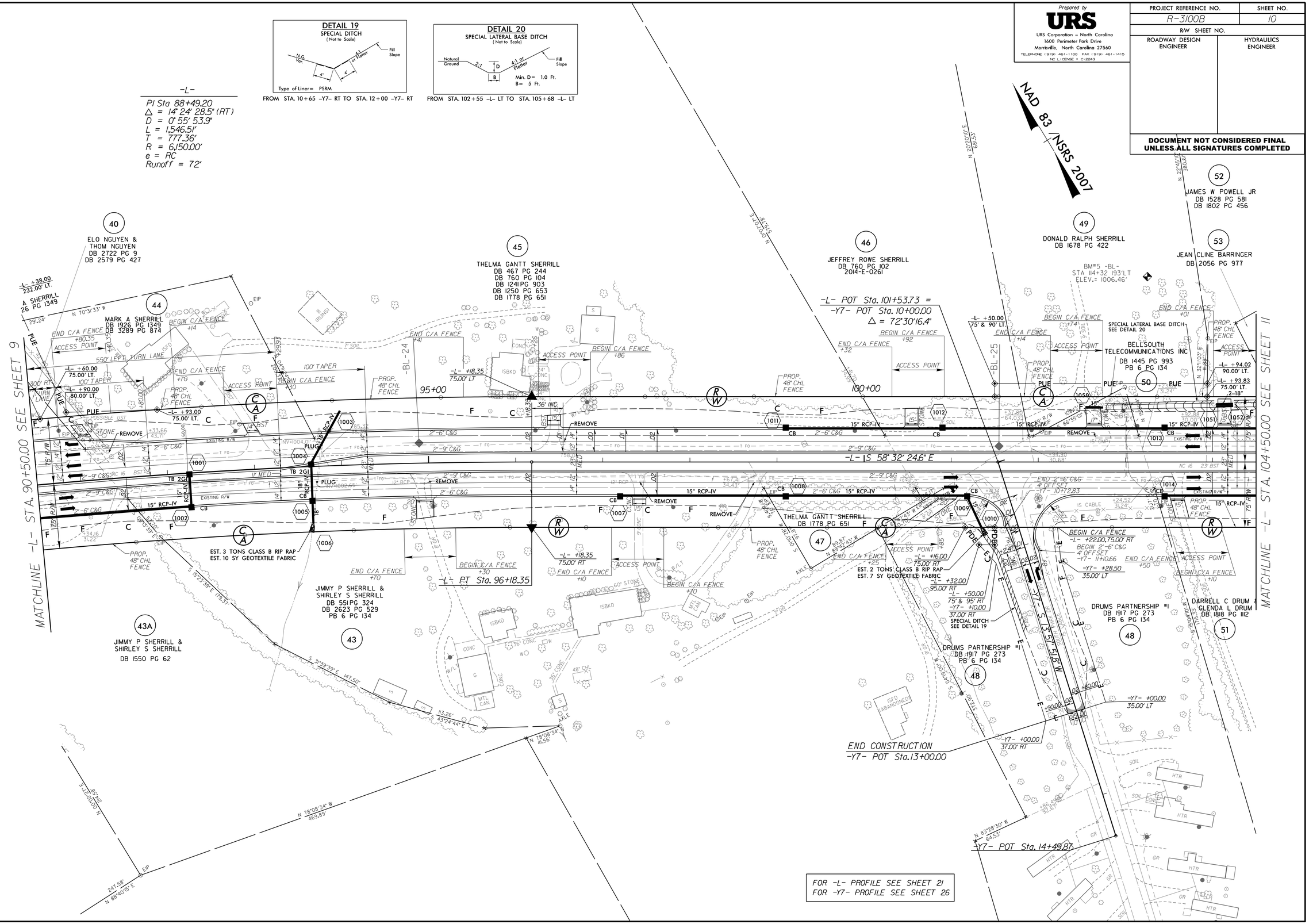
FROM STA. 10+65 -Y7- RT TO STA. 12+00 -Y7- RT

DETAIL 20
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Min. D= 1.0 Ft.
B= 5 Ft.

FROM STA. 102+55 -L- LT TO STA. 105+68 -L- LT

-L-
PI Sta 88+49.20
△ = 14° 24' 28.5" (RT)
D = 0° 55' 53.9"
L = 1,546.51'
T = 777.36'
R = 6,150.00'
e = RC
Runoff = 72'



REVISIONS

DATE: 06/22/2015 – INCREASED PERMANENT UTILITY EASEMENT ON PARCEL 46 AND ADDED PERMANENT UTILITY EASEMENT ON PARCEL 49.
DATE: 08/14/2015 – ADDED PARCEL NUMBER 43A-ADDED PROPERTY LINE BETWEEN PARCEL 43 & 43A-CHANGED PROPERTY OWNER NAME ON PARCEL 46.
DATE: 12/15/2015 – ADDED ACCESS POINT ON PARCEL 44 AND MOVED PREVIOUSLY PROPOSED ACCESS POINT ON PARCEL 44.
DATE: 04/20/2016 – ADDING A4 ACCESS POINT AND DRIVE FROM -L- STA.94+70 RT TO 95+30 RT ON PARCEL 43.

8/17/99

8/23/2016
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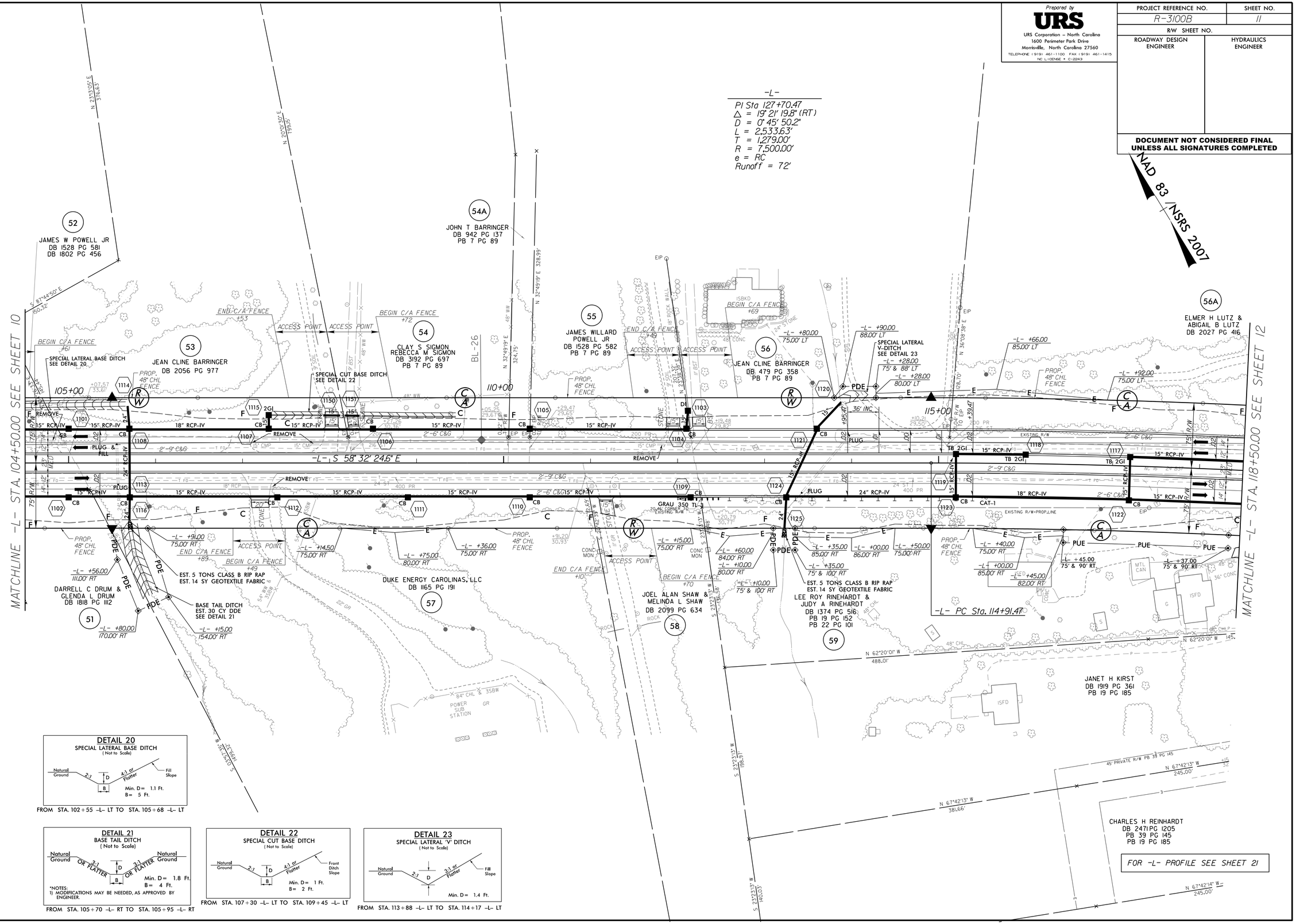
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83 /NSRS 2007

-L-
PI Sta 127+70.47
△ = 19° 21' 19.8" (RT)
D = 0° 45' 50.2"
L = 2,533.63'
T = 1,279.00'
R = 7,500.00'
e = RC
Runoff = 72'



DETAIL 20
SPECIAL LATERAL BASE DITCH
(Not to Scale)
Natural Ground, 2:1, D, B, 4:1 or Flatter, Fill Slope
Min. D = 1.1 Ft.
B = 5 Ft.
FROM STA. 102+55 -L- LT TO STA. 105+68 -L- LT

DETAIL 21
BASE TAIL DITCH
(Not to Scale)
Natural Ground, 3:1 OR FLATTER, D, B, 3:1 OR FLATTER, Natural Ground
Min. D = 1.8 Ft.
B = 4 Ft.
*NOTES:
1) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.
FROM STA. 105+70 -L- RT TO STA. 105+95 -L- RT

DETAIL 22
SPECIAL CUT BASE DITCH
(Not to Scale)
Natural Ground, 2:1, D, B, 4:1 or Flatter, Front Ditch Slope
Min. D = 1 Ft.
B = 2 Ft.
FROM STA. 107+30 -L- LT TO STA. 109+45 -L- LT

DETAIL 23
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground, 2:1, D, 3:1 or Flatter, Fill Slope
Min. D = 1.4 Ft.
FROM STA. 113+88 -L- LT TO STA. 114+17 -L- LT

REVISIONS

8/17/99

8/23/2016
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NC LICENSE # C-2243

PROJECT REFERENCE NO.	SHEET NO.
R-3100B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

8/17/99

-L-
PI Sta 127+70.47
△ = 19° 21' 19.8" (RT)
D = 0° 45' 50.2"
L = 2,533.63'
T = 1,279.00'
R = 7,500.00'
e = RC
Runoff = 72'

-Y8-
PI Sta 12+47.94
△ = 8° 30' 06.4" (LT)
D = 2° 36' 15.7"
L = 326.44'
T = 163.52'
R = 2,200.00'
e = RC
Runoff = 40'

NAD 83 / NSRS 2007

-L- POC Sta. 119+17.46 =
-Y8- POT Sta. 10+00.00
△ = 86° 9' 25"

-Y8- PC Sta. 10+84.42

-Y8- POT Sta. 14+84.11

END CONSTRUCTION
-Y8- POC Sta. 13+84.00
-Y8- PT Sta. 14+10.86

MATCHLINE -L- STA. 118+50.00 SEE SHEET 11

MATCHLINE -L- STA. 132+50.00 SEE SHEET 13

56A ELMER H LUTZ & ABIGAIL B LUTZ DB 2027 PG 416

68 FRIENDSHIP UNITED METHODIST CHURCH DB 1699 PG 285 DB 2131 PG 1888 PB 21 PG 245 PB 7 PG 89

69 LARRY N MORETZ & DONNA T MORETZ DB 1875 PG 214

72 WILLARD WILSON HUFFMAN WB 89-E-53

59 LEE ROY & JUDY A RINEHARDT DB 1374 PG 516 PB 19 PG 152 PB 22 PG 101

60 JANET H KIRST DB 1919 PG 361 PB 19 PG 185

61 GARY D PRESNELL & SANDRA R PRESNELL DB 1590 PG 112 PB 19 PG 185

62 ROBERT D & ANN K COX DB 1790 PG 1208 PB 19 PG 102

63 BARBARA R BURTON DB 1426 PG 233 PB 19 PG 102

64 EDWARD L STERNE DB 1962 PG 481 PB 19 PG 102

65 JAMES LEE MCCLEAVE DB 1915 PG 1491 PB 19 PG 102

66 HOWARD T DRUM DB 2134 PG 117 DB 3165 PG 072 PB 19 PG 102

67 TIMOTHY JOE HELMS DB 3122 PG 7967 PB 19 PG 102

70 LEON RIVERS DB 1813 PG 1262 PB 19 PG 185

71 CARROL M OWENBY & MELLONEE B OWENBY DB 2287 PG 1043

RONNIE D HART & BETTY S HART DB 2212 PG 1048 PB 19 PG 185

J D CALDWELL JR & ROBIN DUNCAN DB 2420 PG 551 PB 19 PG 185

BARRY A ROBINSON & KAREN E ROBINSON DB 2094 PG 1320 PG 19 PG 185

LORI B FRISBEE DB 2709 PG 1441 PB 19 PG 185

EST. 5 TONS CLASS B RIP RAP
EST. 14 SY GEOTEXTILE FABRIC

EST. 5 TONS CL-B RIP RAP
EST. 14 SY GEOTEXTILE FABRIC

SPECIAL BACK OF CURB CUT DITCH SEE DETAIL 27

SPECIAL LATERAL V-DITCH SEE DETAIL 28

BERM V-DITCH SEE DETAIL 24

BERM BASE DITCH SEE DETAIL 25

BERM V-DITCH SEE DETAIL 26

DETAIL 24
BERM 'V' DITCH
(Not to Scale)
Min. D = 1 Ft.
b = 5 Ft.
FROM STA. 125+81 -L- RT TO STA. 127+50 -L- RT
FROM STA. 127+61 -L- RT TO STA. 128+55 -L- RT
FROM STA. 128+65 -L- RT TO STA. 129+25 -L- RT

DETAIL 25
BERM BASE DITCH
(Not to Scale)
Min. D = 1 Ft.
B = 2 Ft.
b = 5 Ft.
FROM STA. 119+55 -L- RT TO STA. 122+00 -L- RT
FROM STA. -L- 122+65 RT TO STA. -L- 124+30 RT

DETAIL 26
BERM 'V' DITCH
(Not to Scale)
Min. D = 1.5 Ft.
b = 5 Ft.
FROM STA. -L- 124+35 RT TO STA. -L- 125+70 RT

DETAIL 27
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)
Min. D = 1.1 Ft.
FROM STA. 129+25 -L- RT TO STA. 130+60 -L- RT

DETAIL 28
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Min. D = 1.2 Ft.
FROM STA. 130+60 -L- RT TO STA. 131+88 -L- RT

FOR -L- PROFILE SEE SHEET 22
FOR -Y8- PROFILE SEE SHEET 26

8/23/2016
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sstesel

8/17/99

REVISIONS

-L-	-Y9-
PI Sta 127+70.47	PI Sta 11+74.52
△ = 19° 21' 19.8" (RT)	△ = 5° 38' 01.4" (RT)
D = 0° 45' 50.2"	D = 4° 58' 56.1"
L = 2,533.63'	L = 113.08'
T = 1,279.00'	T = 56.58'
R = 7,500.00'	R = 1,150.00'
e = RC	
Runoff = 72'	

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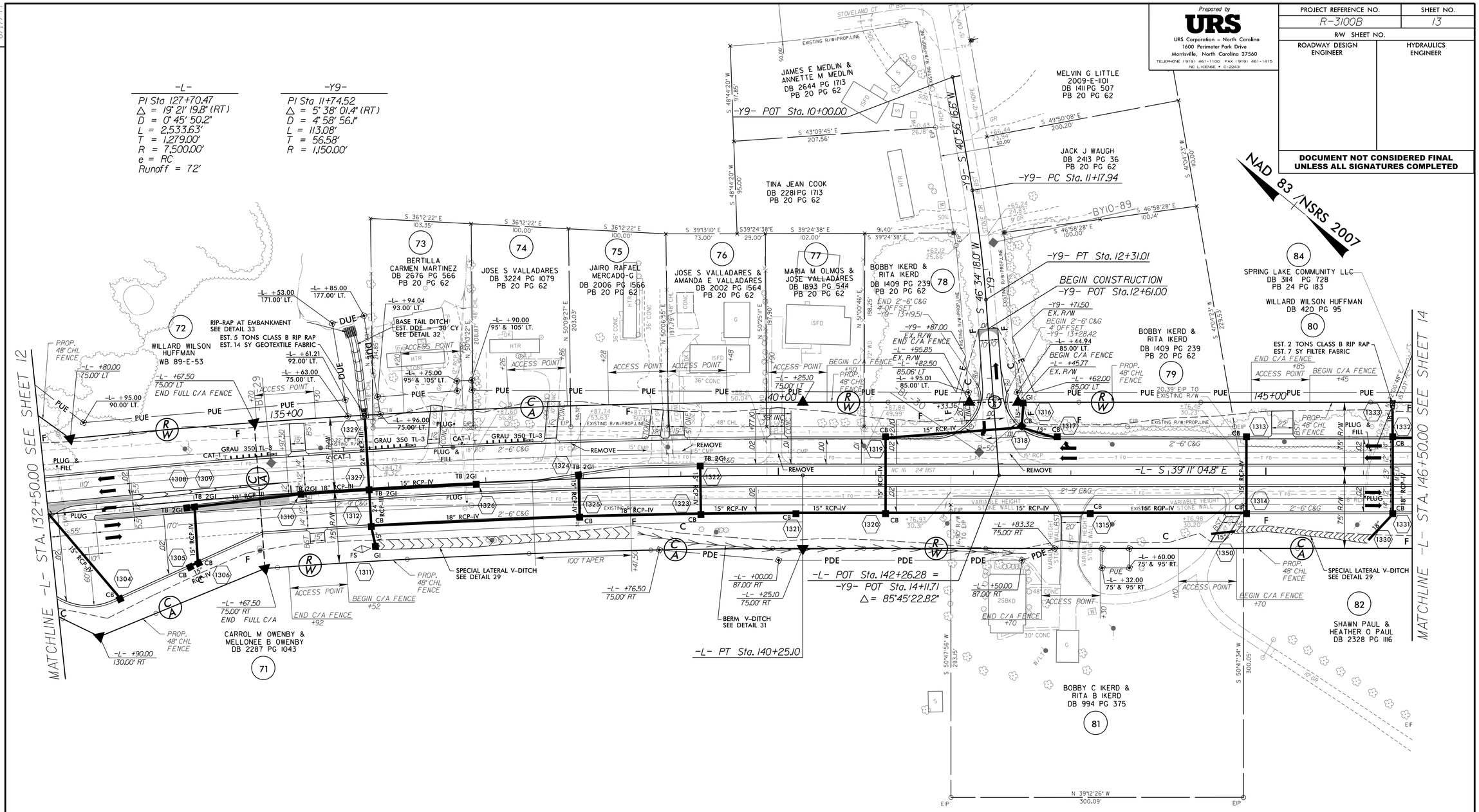
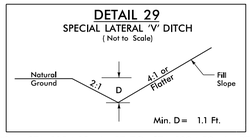
PROJECT REFERENCE NO.	SHEET NO.
R-3100B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

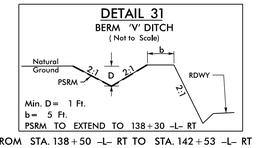


DETAIL 29
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



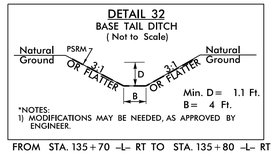
FROM STA. 135+83 -L- RT TO STA. 138+50 -L- RT
FROM STA. 144+68 -L- RT TO STA. 146+05 -L- RT

DETAIL 31
BERM 'V' DITCH
(Not to Scale)



FROM STA. 138+50 -L- RT TO STA. 142+53 -L- RT

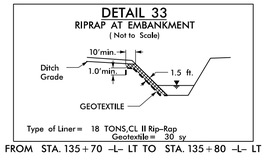
DETAIL 32
BASE TAIL DITCH
(Not to Scale)



*NOTES:
1) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

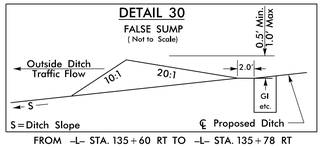
FROM STA. 135+70 -L- RT TO STA. 135+80 -L- RT

DETAIL 33
RIPRAP AT EMBANKMENT
(Not to Scale)



FROM STA. 135+70 -L- LT TO STA. 135+80 -L- LT

DETAIL 30
FALSE SUMP
(Not to Scale)



FROM -L- STA. 135+60 RT TO -L- STA. 135+78 RT

FOR -L- PROFILE SEE SHEET 22
FOR -Y9- PROFILE SEE SHEET 26

8/23/2016
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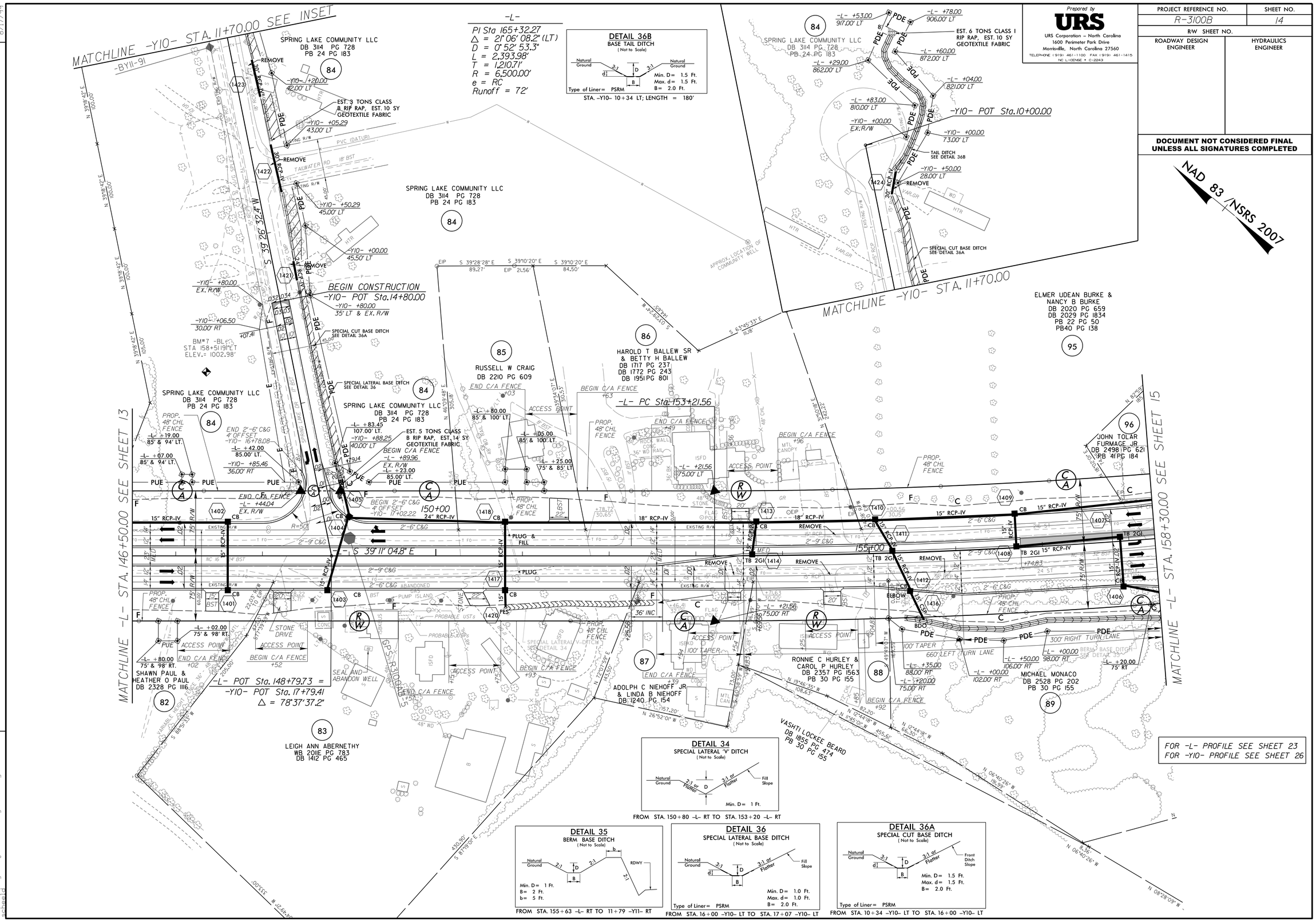
sdeal



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	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83 /NSRS 2007

REVISIONS

DATE: 06/22/2015 - INCREASED PERMANENT UTILITY EASEMENT ON PARCEL 89; EXPANDED PERMANENT DRAINAGE EASEMENT ON PARCEL 84; REVISED EXISTING RIGHT OF WAY ON PARCEL 84.

DATE: 08/14/2015 - CHANGED PROPERTY OWNER ON PARCEL 83.

DATE: 04/20/2016 - ADDING AN ACCESS POINT AND STONE DRIVE FROM -L- STA 147+92 RT TO 148+52 RT ON PARCEL 83.

8/17/99

8/23/2016
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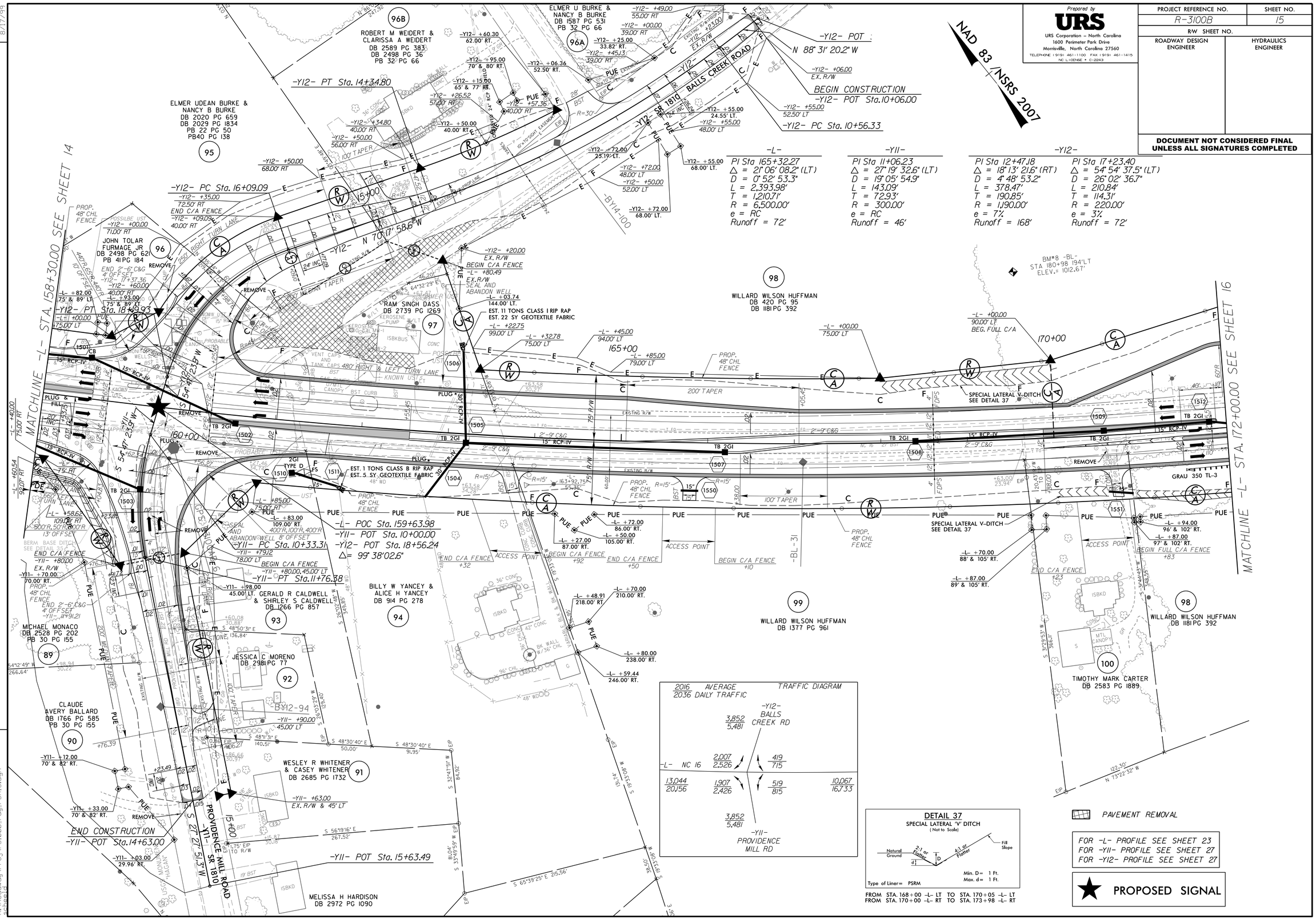

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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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REVISIONS

8/17/99

8/23/2016
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PROJECT REFERENCE NO.	SHEET NO.
R-3100B	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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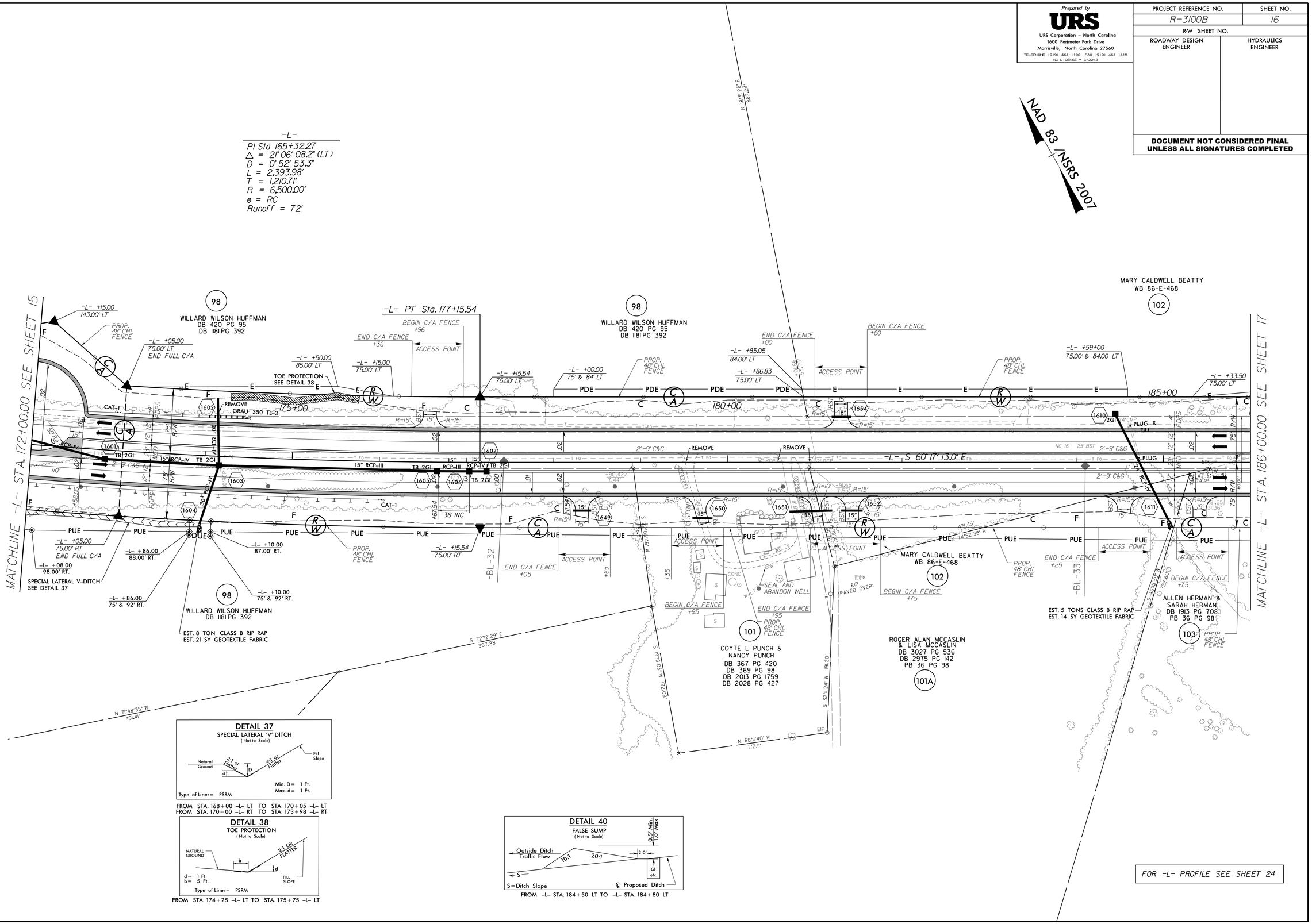
REVISIONS

DATE: 06/22/2015 – REVISED THE PROPERTY LINE ON PARCEL 101.
DATE: 08/14/2015 – RELOCATED ACCESS POINT AND DRIVEWAY ON PARCEL 101A
DATE: 05/17/2016 – ADDED ACCESS POINT AND DRIVE TO PARCEL 101A –L– STA 184+55 RT
SHIFTED ACCESS POINT AND DRIVE ON PARCEL 102 TO –L– STA 181+30 LT
CHANGED PDE TO TCE ON PARCEL 102.



FROM STA. 168+00 –L– LT TO STA. 170+05 –L– LT
FROM STA. 170+00 –L– RT TO STA. 173+98 –L– RT

FROM STA. 174+25 –L– LT TO STA. 175+75 –L– LT

FROM –L– STA. 184+50 LT TO –L– STA. 184+80 LT

FOR –L– PROFILE SEE SHEET 24

8/17/99

8/23/2016
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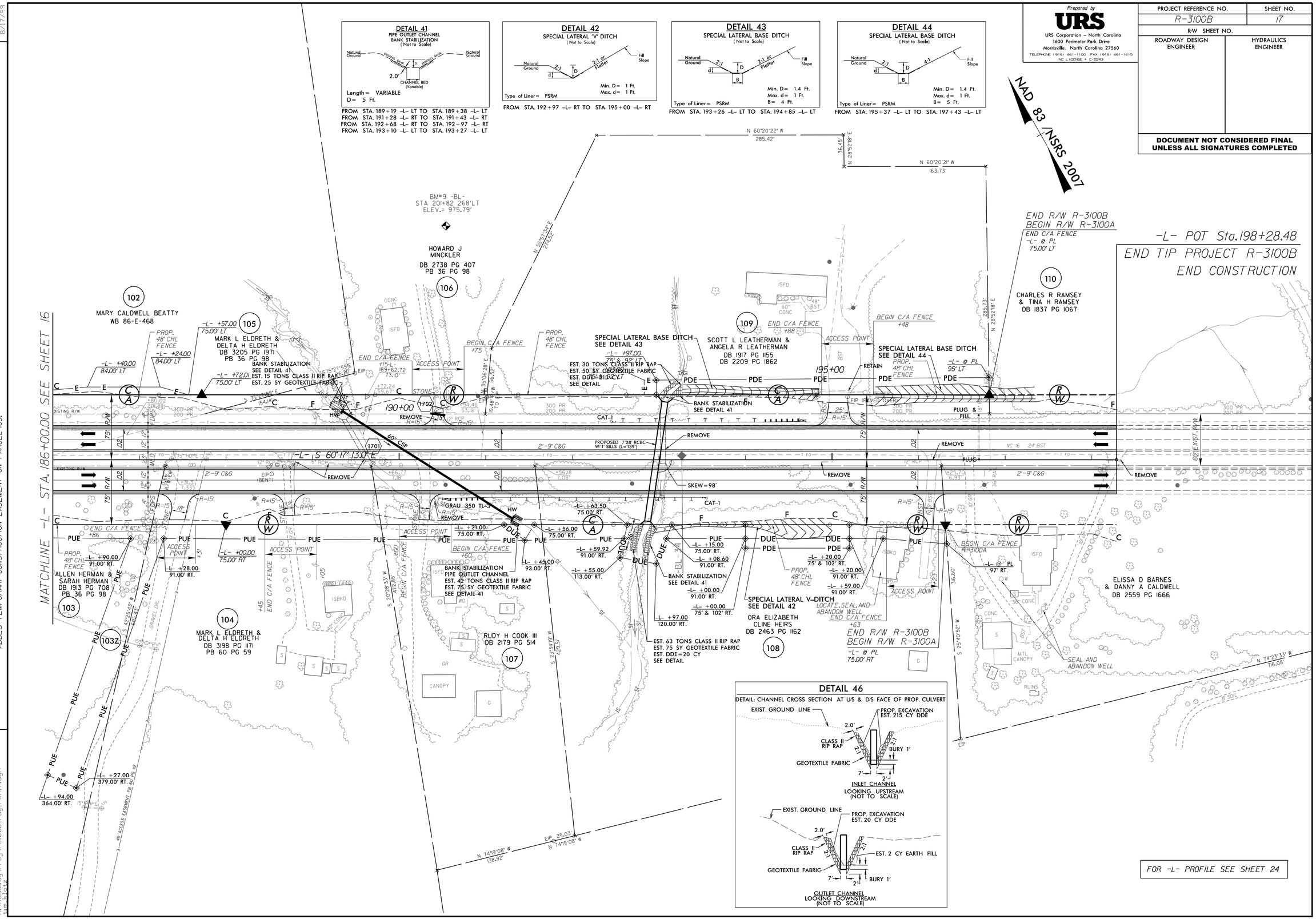

8/17/99

8/30/2016
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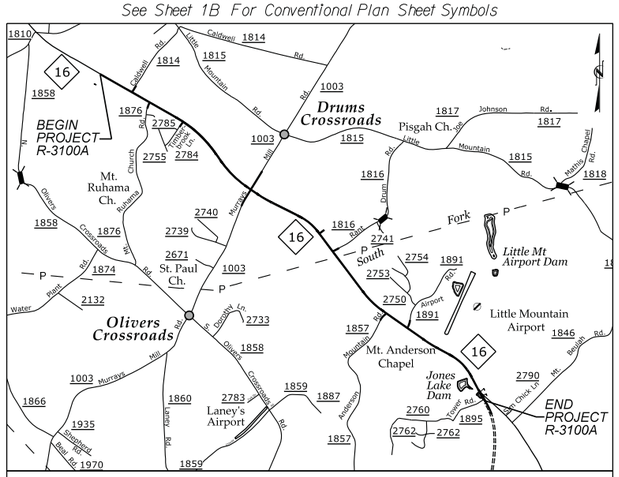
tmbeck

09/08/99

TIP PROJECT: R-3100A

CONTRACT:

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



VICINITY MAP
(NOT TO SCALE)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA COUNTY

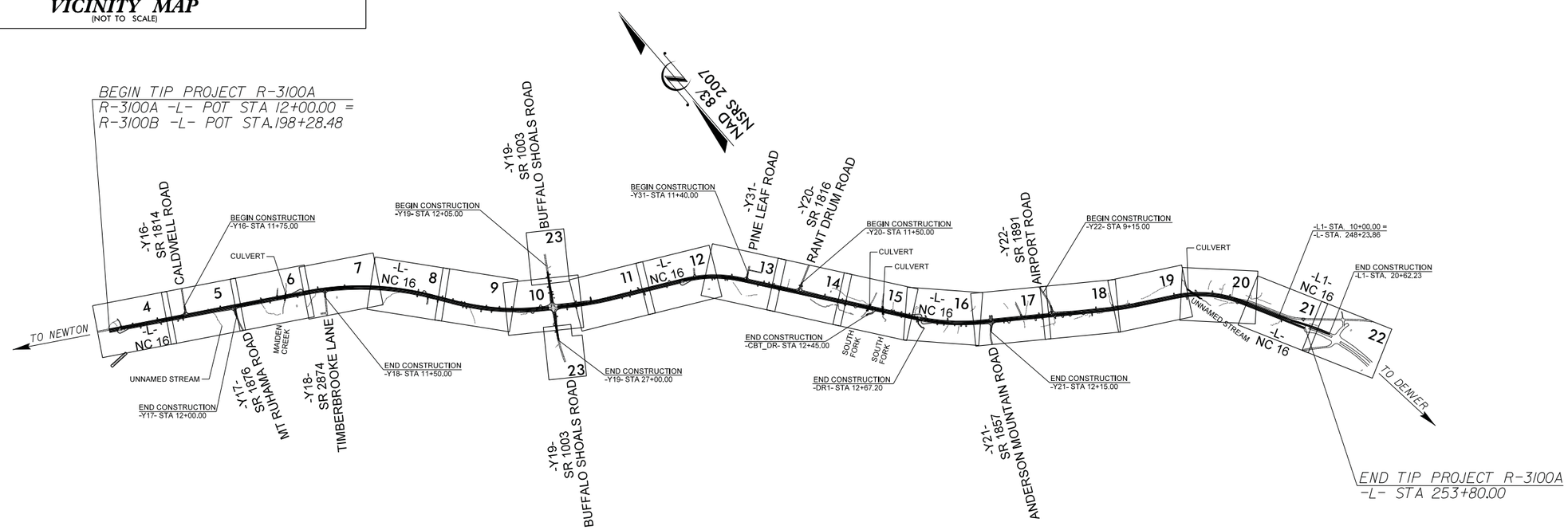
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3100A	1	

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.
34522.3.FR3	STP-0016(52)	CONST.

PART 1 OF 2

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

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



THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

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GRAPHIC SCALES

PLANS: 0 50 100
PROFILE (HORIZONTAL): 0 50 100
PROFILE (VERTICAL): 0 10 20

DESIGN DATA

ADT 2016 = 10,960
ADT 2034 = 18,700
K = 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

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Fuquay-Varina, NC 27526
www.mottmac.com/americas
LICENSE NO. F-0669

McKIM&CREED
(C) LICENSE #F-0122
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL. (910) 343-1048 FAX. (910) 790-6282

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 26, 2014

LETTING DATE:
JANUARY 17, 2017

TIM JORDAN, PE
PROJECT ENGINEER

RICK MOORE, P.E.
HYDRAULICS PROJECT ENGINEER

GARY LOVING, P.E.
NCDOT CONTACT

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
SIGNATURE: P.E.

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE
SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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jor66165

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	4

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

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

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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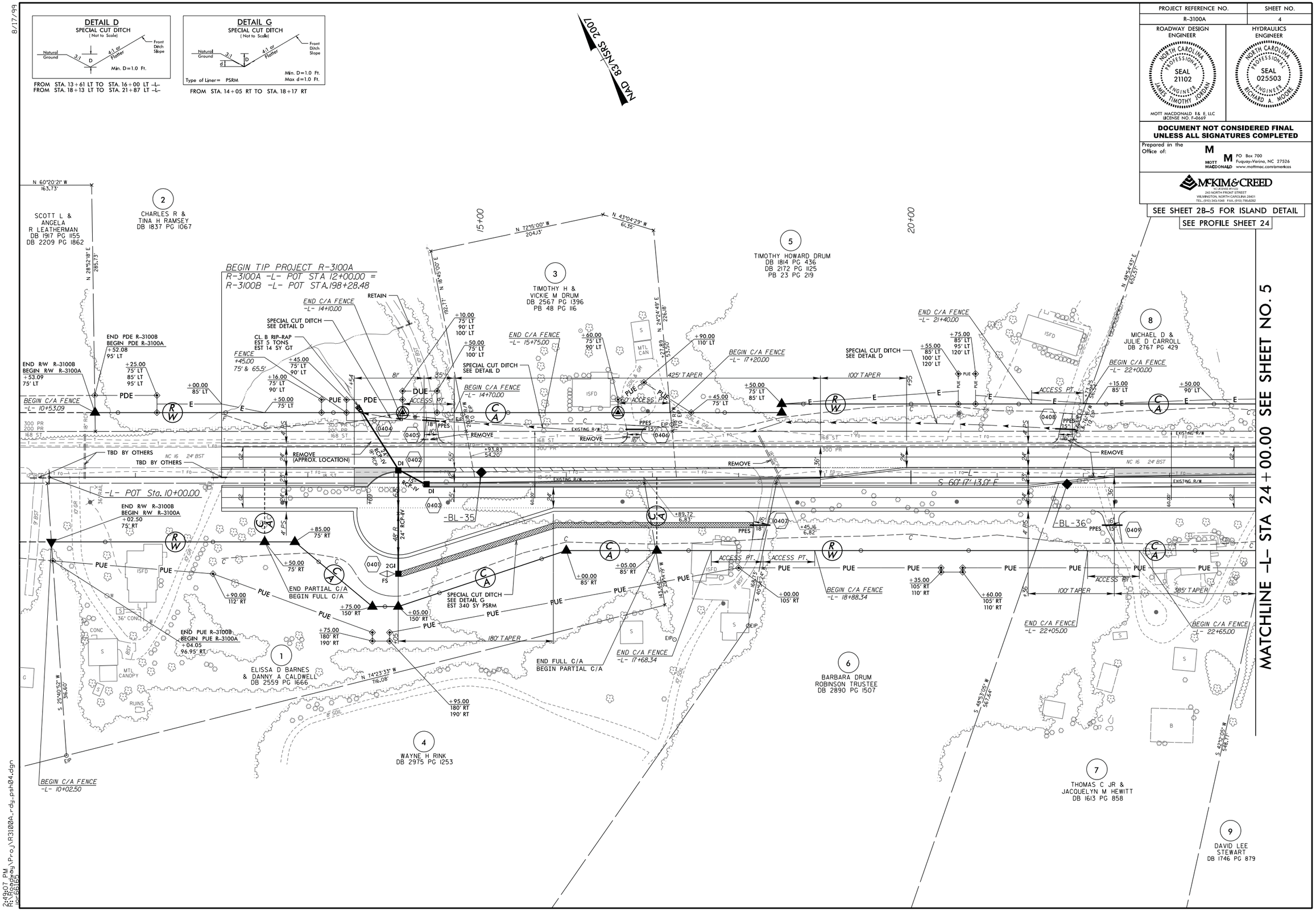
WILMINGTON, NORTH CAROLINA 28401
TEL. (910) 343-1346 FAX. (910) 790-4282

SEE SHEET 2B-5 FOR ISLAND DETAIL

SEE PROFILE SHEET 24



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jor06165

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PROJECT REFERENCE NO.	SHEET NO.
R-3100A	5

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

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

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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WILMINGTON, NORTH CAROLINA 28401
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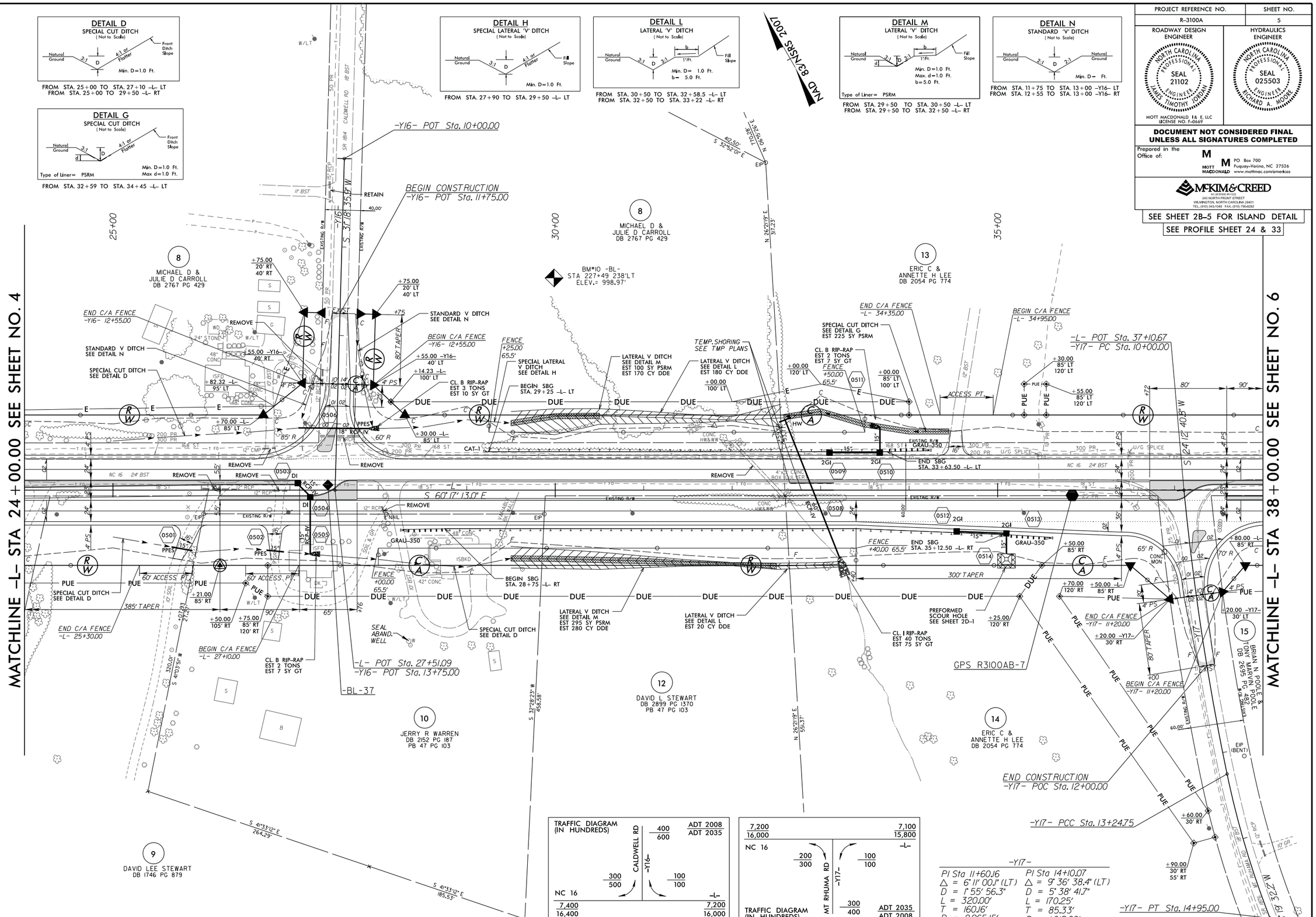
SEE SHEET 2B-5 FOR ISLAND DETAIL

SEE PROFILE SHEET 24 & 33



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8/17/99

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

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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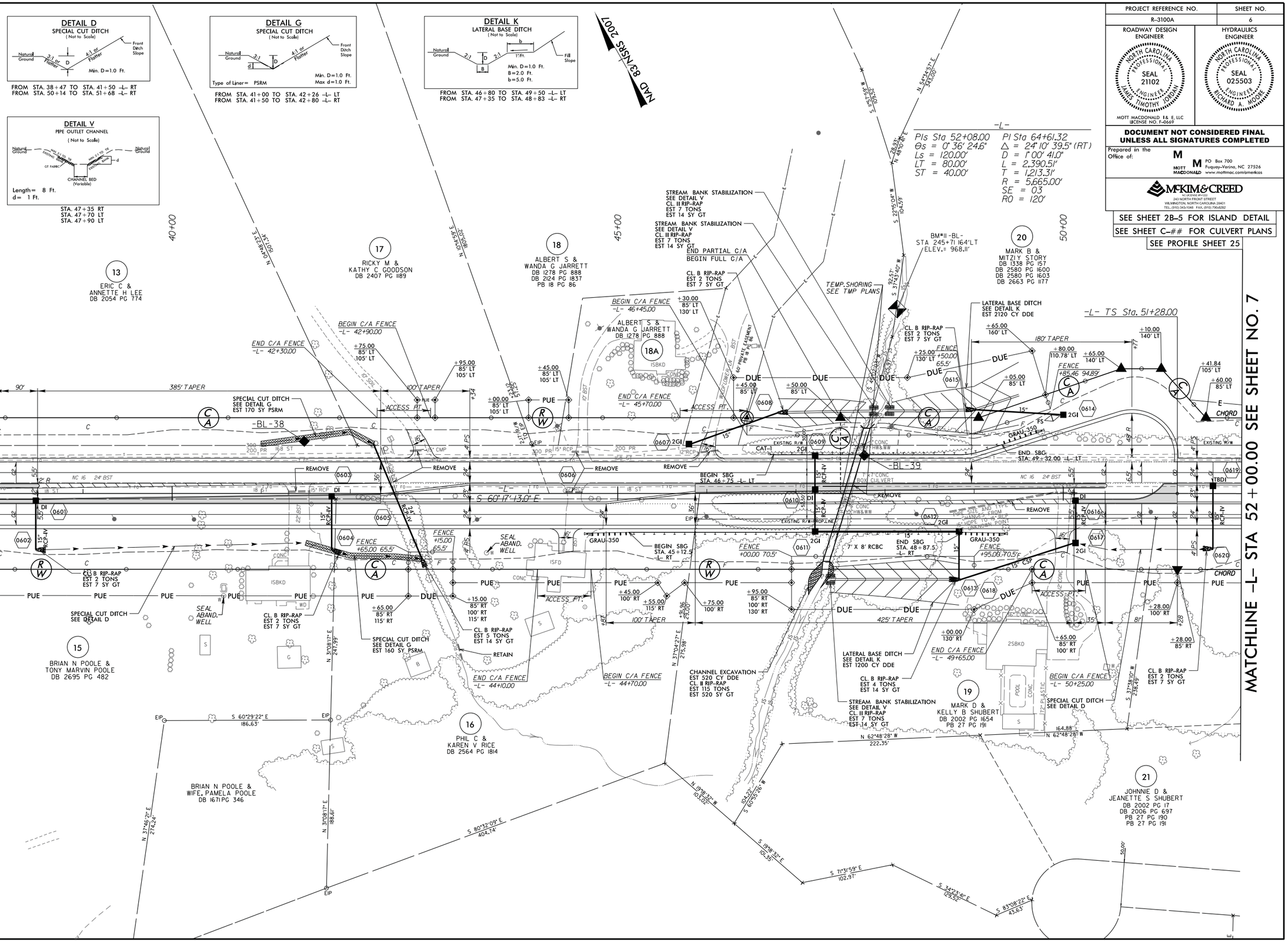
SEE SHEET 2B-5 FOR ISLAND DETAIL

SEE SHEET C-## FOR CULVERT PLANS

SEE PROFILE SHEET 25



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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	7

ROADWAY DESIGN ENGINEER

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

HYDRAULICS ENGINEER

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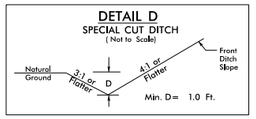
SEE SHEET 2B-6 FOR ISLAND DETAIL

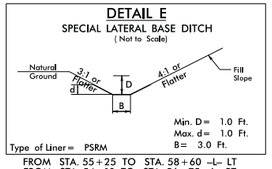
SEE PROFILE SHEET 25 & 33

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)



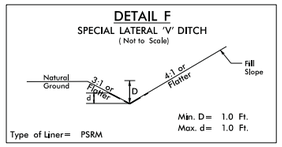
FROM STA. 65+25 TO STA. 65+50 -L- RT

DETAIL E
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 55+25 TO STA. 58+60 -L- LT
FROM STA. 54+10 TO STA. 56+75 -L- RT

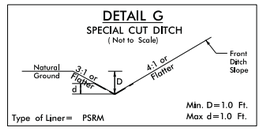
DETAIL F
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 61+25 TO STA. 62+50 -L- RT

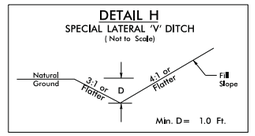
NAD 83/NSRS 2007

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)



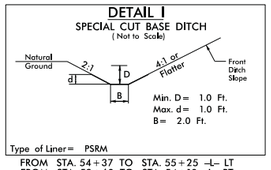
FROM STA. 58+60 TO STA. 59+00 -L- LT
FROM STA. 58+00 TO STA. 61+25 -L- RT

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

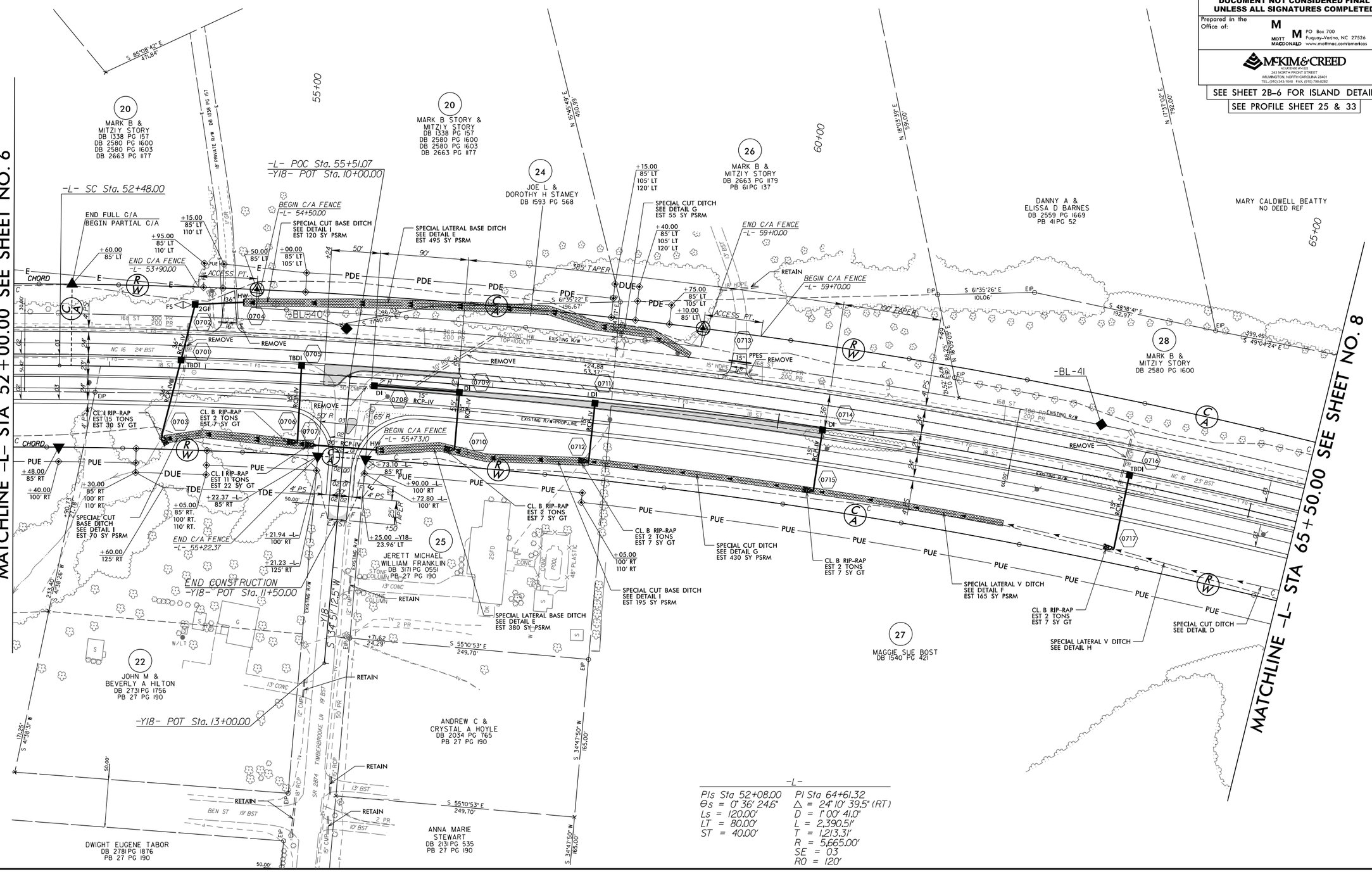


FROM STA. 62+50 TO STA. 65+25 -L- RT

DETAIL I
SPECIAL CUT BASE DITCH
(Not to Scale)



FROM STA. 54+37 TO STA. 55+25 -L- LT
FROM STA. 53+60 TO STA. 54+10 -L- RT
FROM STA. 56+75 TO STA. 58+00 -L- RT



-L-

PIs Sta 52+08.00	PI Sta 64+61.32
Θs = 0° 36' 24.6"	Δ = 24° 10' 39.5" (RT)
Ls = 120.00'	D = 1° 00' 41.0"
LT = 80.00'	L = 2,390.51'
ST = 40.00'	T = 1,213.31'
	R = 5,665.00'
	SE = 0.3
	RO = 120'

2:49:23 PM
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jordanmoore

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	8

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
MOTT MACDONALD R & E, LLC
LICENSE NO. F-0669

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD L. MOORE

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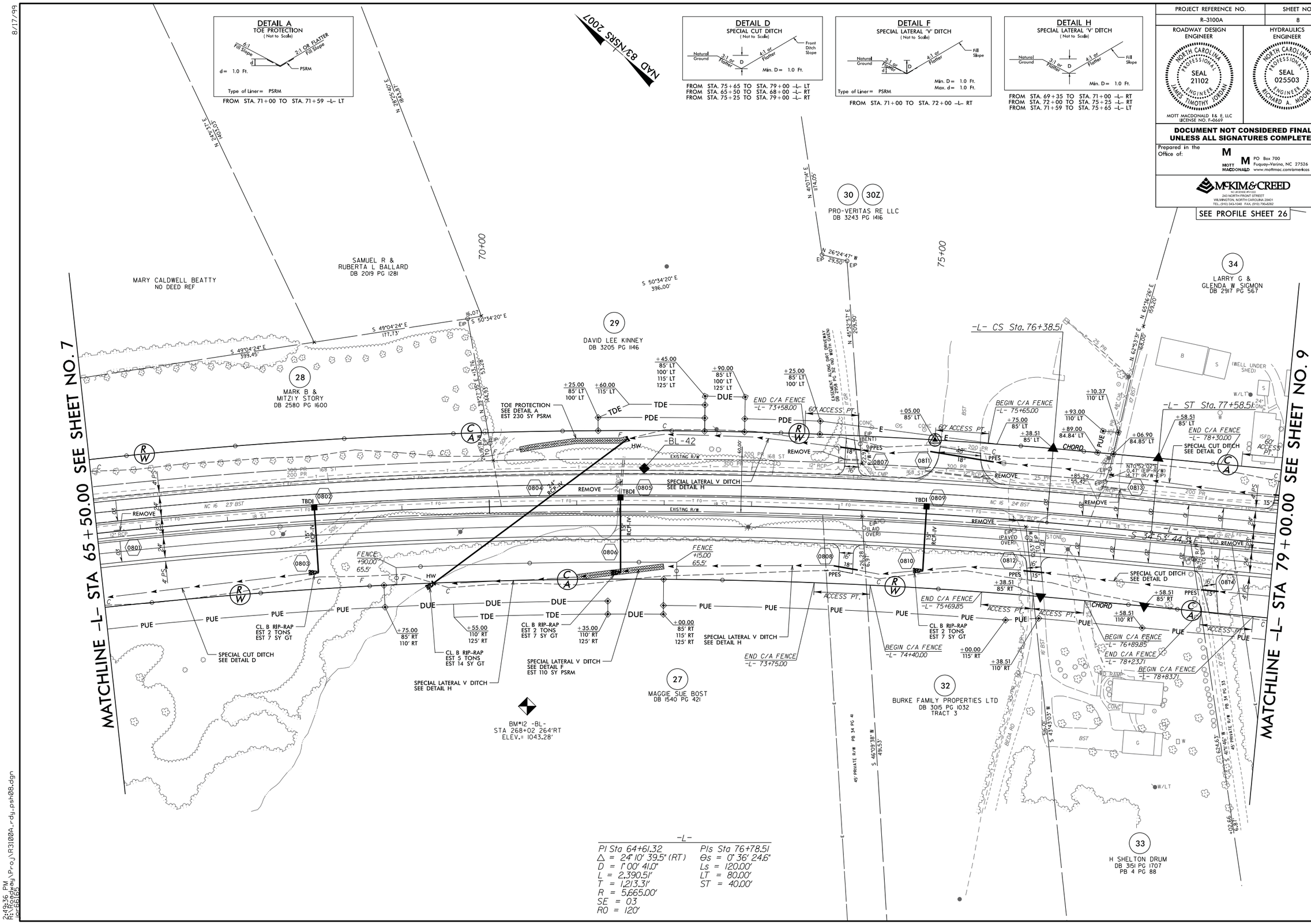
SEE PROFILE SHEET 26



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jordanbrian

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	9

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

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HYDRAULICS ENGINEER

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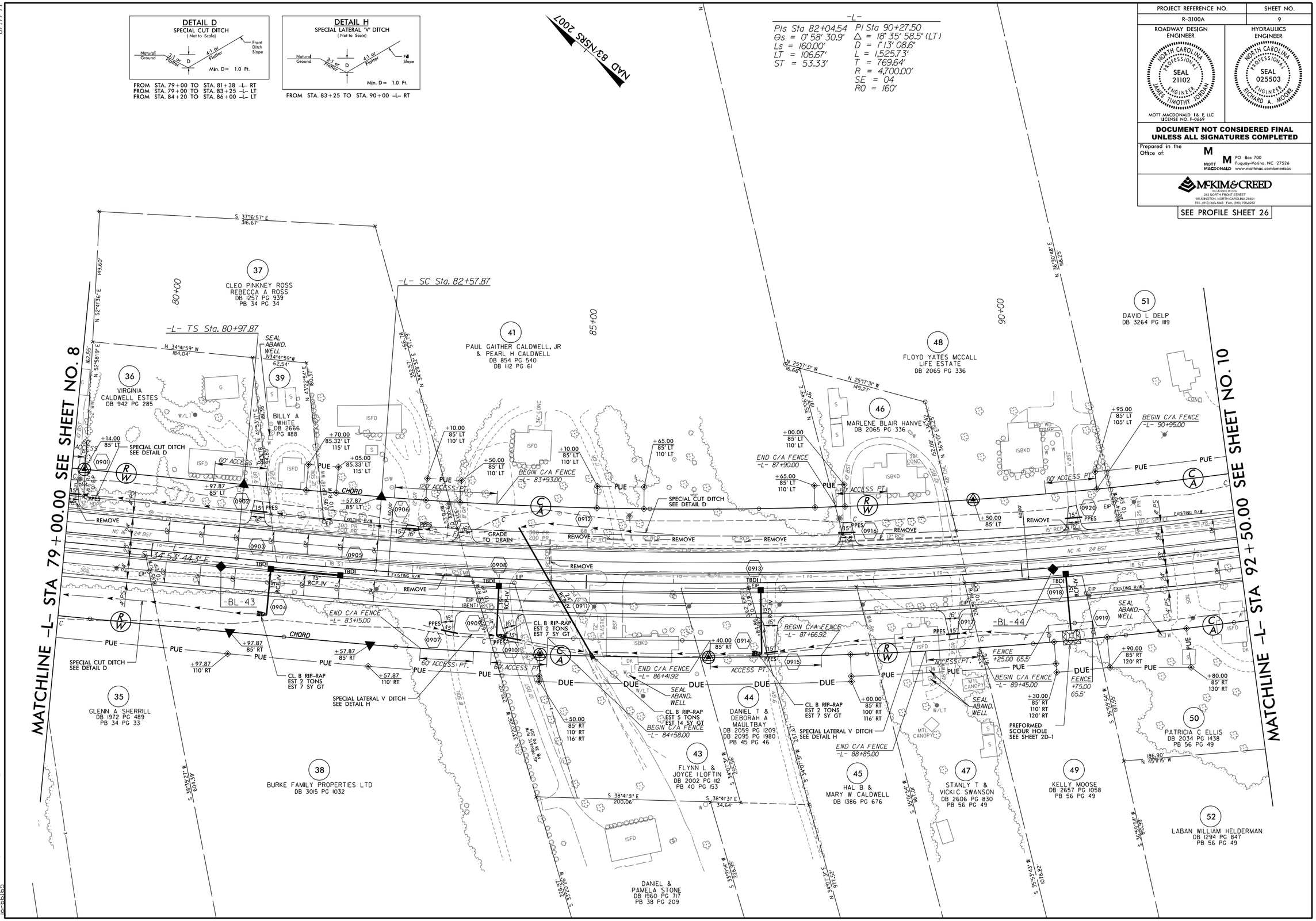
SEE PROFILE SHEET 26



8/17/99

TRAFFIC DIAGRAM (IN HUNDREDS)		ADT 2008 / ADT 2035
BUFFALO SHOALS RD		4,000 / 6,800
800 / 1,500		1,100 / 2,200
NC 16		–L–
7,100 / 15,800	900 / 1,800	1,100 / 2,100
–Y19–		7,600 / 16,800
		4,100 / 7,000

–L–

PI Sta 90+27.50
△ = 18° 35' 58.5" (LT)
D = 1° 13' 08.6"
L = 1,525.73'
T = 769.64'
R = 4,700.00'
SE = 04
RO = 160'

PIs Sta 98+36.93
Θs = 0° 58' 30.9"
Ls = 160.00'
LT = 106.67'
ST = 53.33'

PIs Sta 105+53.70
Θs = 0° 38' 03.4"
Ls = 120.00'
LT = 80.00'
ST = 40.00'

PI Sta 109+04.95
△ = 6° 34' 23.5" (LT)
D = 1° 03' 25.6"
L = 621.80'
T = 311.24'
R = 5,420.00'
SE = 03
RO = 120'

–Y19–

PI Sta 18+77.72
△ = 1° 36' 13.7" (LT)
D = 1° 00' 18.7"
L = 159.55'
T = 79.78'
R = 5,700.00'

NAD 83/NSRS 2007

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	10

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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

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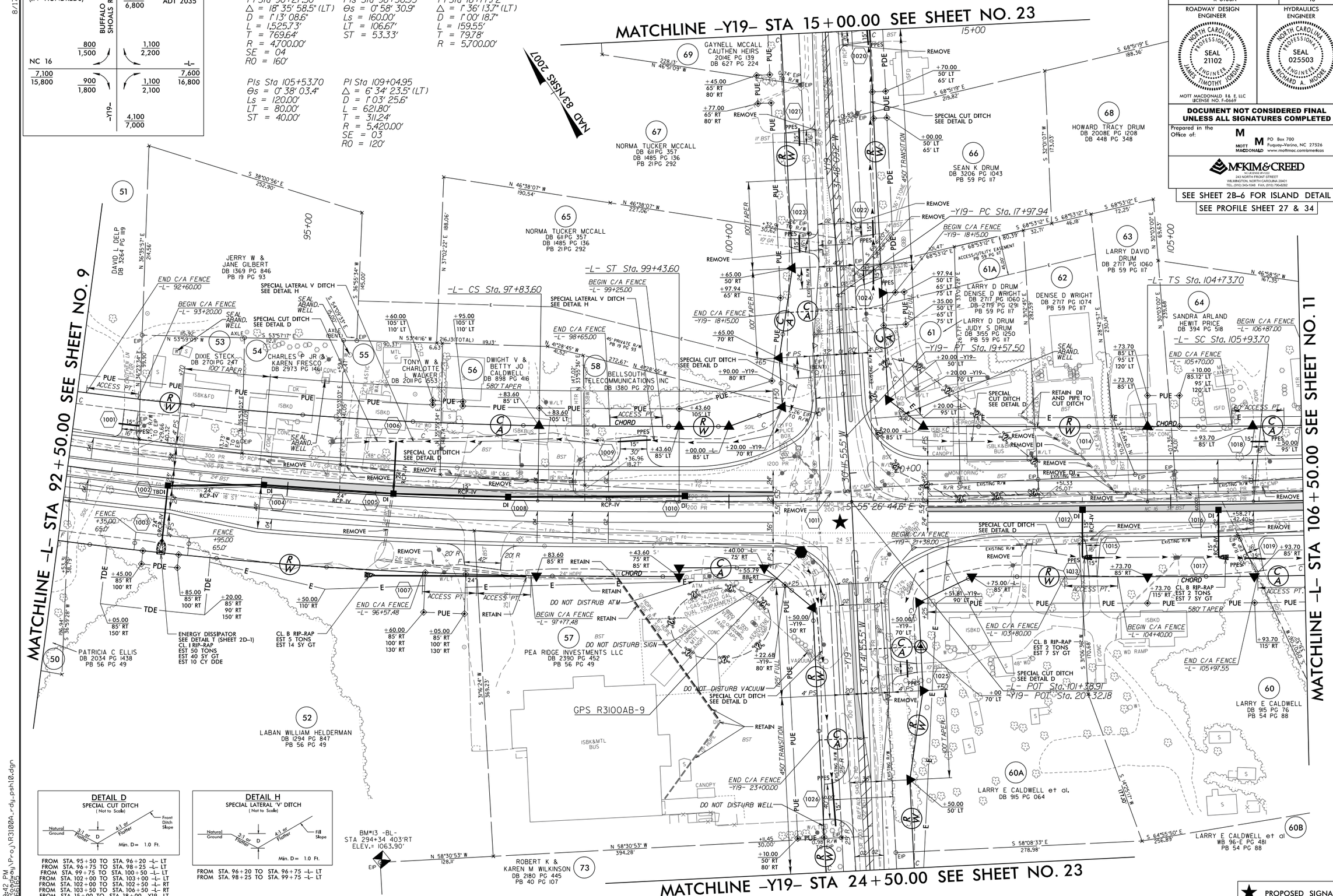
MCKIM & CREED
INCORPORATED
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL. (910) 343-1546 FAX. (910) 790-4282

SEE SHEET 2B–6 FOR ISLAND DETAIL
SEE PROFILE SHEET 27 & 34



DETAIL D
SPECIAL CUT DITCH
(Not to Scale)

FROM STA. 95+50 TO STA. 96+20 –L– LT
FROM STA. 96+75 TO STA. 98+25 –L– LT
FROM STA. 99+75 TO STA. 100+50 –L– LT
FROM STA. 102+00 TO STA. 103+00 –L– LT
FROM STA. 102+00 TO STA. 102+50 –L– RT
FROM STA. 103+50 TO STA. 106+50 –L– RT
FROM STA. 15+00 TO STA. 18+00 –Y19– LT
FROM STA. 21+00 TO STA. 22+15 –Y19– RT

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

FROM STA. 96+20 TO STA. 96+75 –L– LT
FROM STA. 98+25 TO STA. 99+75 –L– LT

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10/6/2015

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	11

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
MOTT MACDONALD F & E, LLC
LICENSE NO. F-0669

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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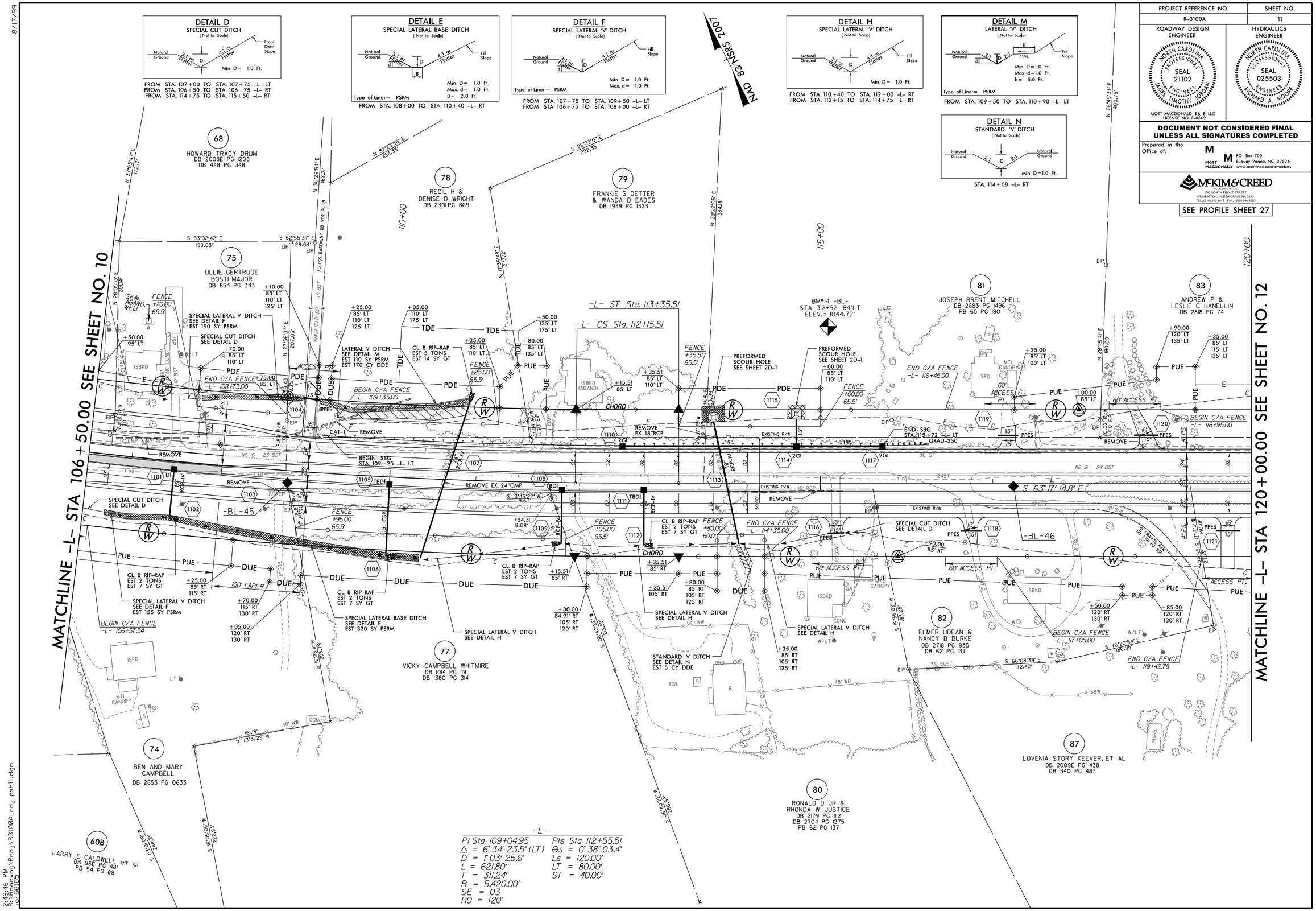
SEE PROFILE SHEET 27



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jor06165

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	12

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
MOTT MACDONALD F& E, LLC
LICENSE NO. F-0669

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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SEE SHEET 2B-6 FOR ISLAND DETAIL

SEE PROFILE SHEET 28

DETAIL E
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Min. D= 1.0 Ft.
Max. d= 1.0 Ft.
B= 2.0 Ft.
Type of Liner= PSRM

FROM STA. 129+52 TO STA. 133+50 -L- RT

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

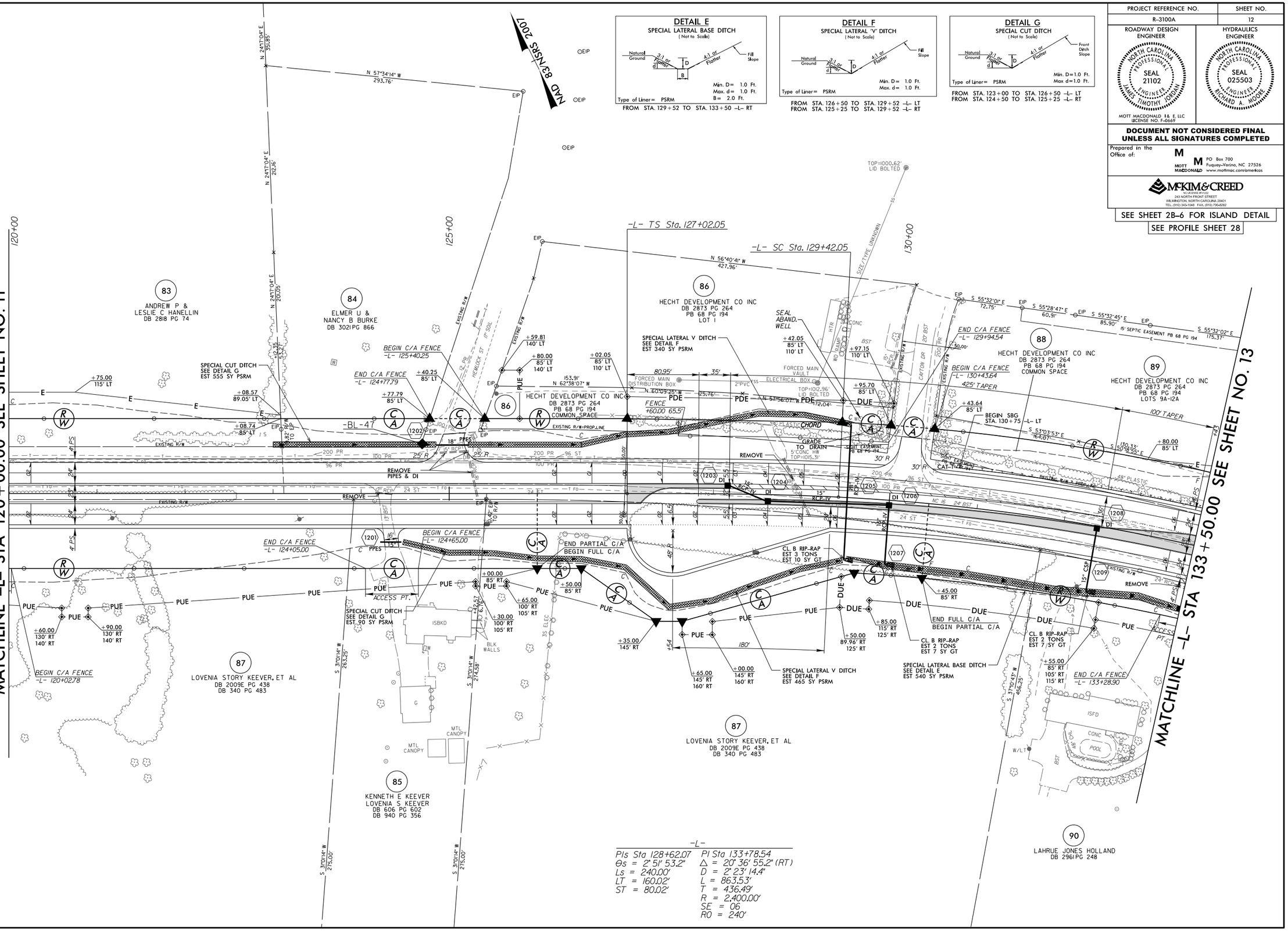
Min. D= 1.0 Ft.
Max. d= 1.0 Ft.
Type of Liner= PSRM

FROM STA. 126+50 TO STA. 129+52 -L- LT
FROM STA. 125+25 TO STA. 129+52 -L- RT

DETAIL G
SPECIAL CUT DITCH
(Not to Scale)

Min. D=1.0 Ft.
Max d=1.0 Ft.
Type of Liner= PSRM

FROM STA. 123+00 TO STA. 126+50 -L- LT
FROM STA. 124+50 TO STA. 125+25 -L- RT



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jo: 68169

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PROJECT REFERENCE NO.	SHEET NO.
R-3100A	13

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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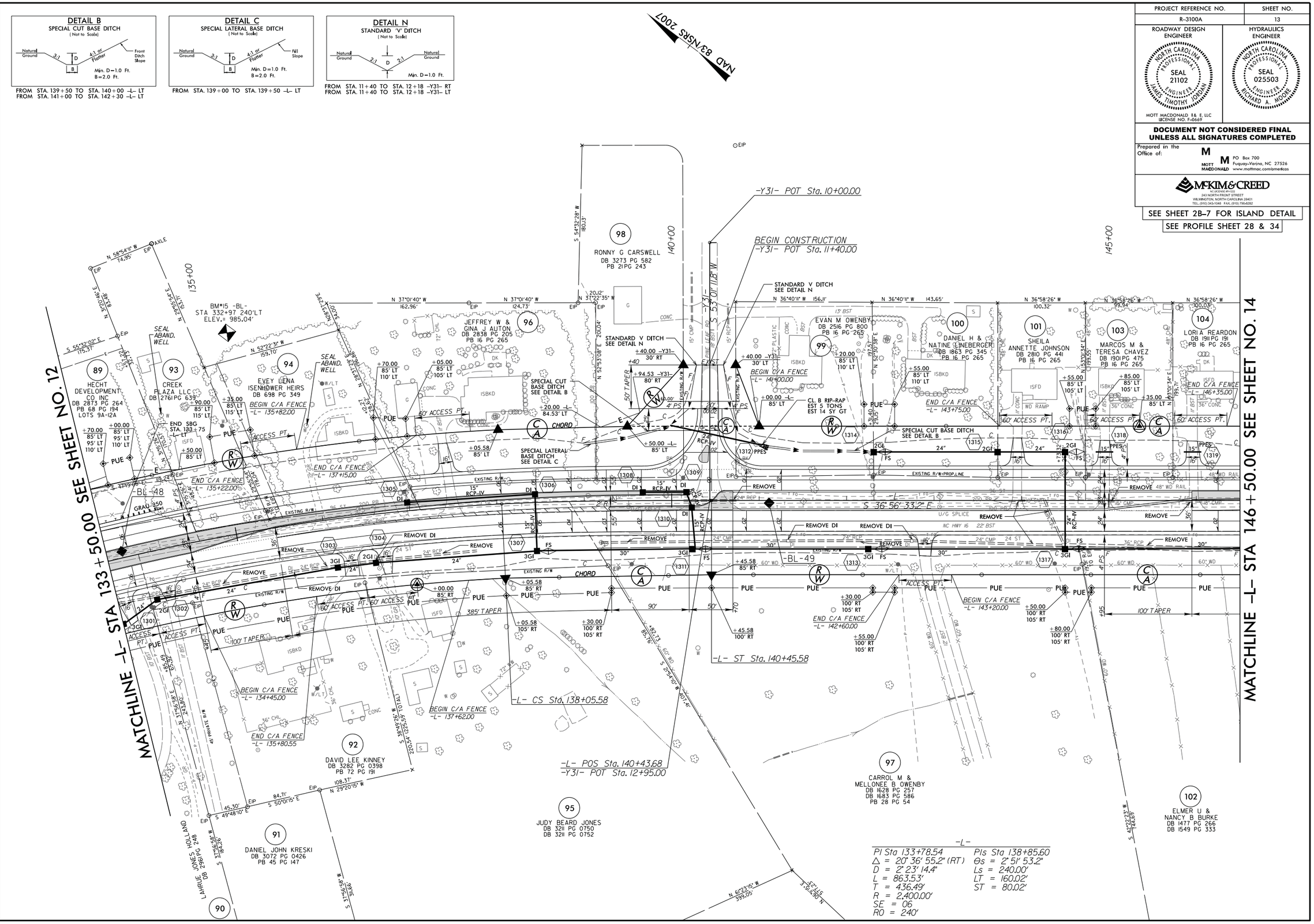
SEE SHEET 2B-7 FOR ISLAND DETAIL

SEE PROFILE SHEET 28 & 34



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jordanbrian

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	14

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
MOTT MACDONALD F& E, LLC
LICENSE NO. F-0669

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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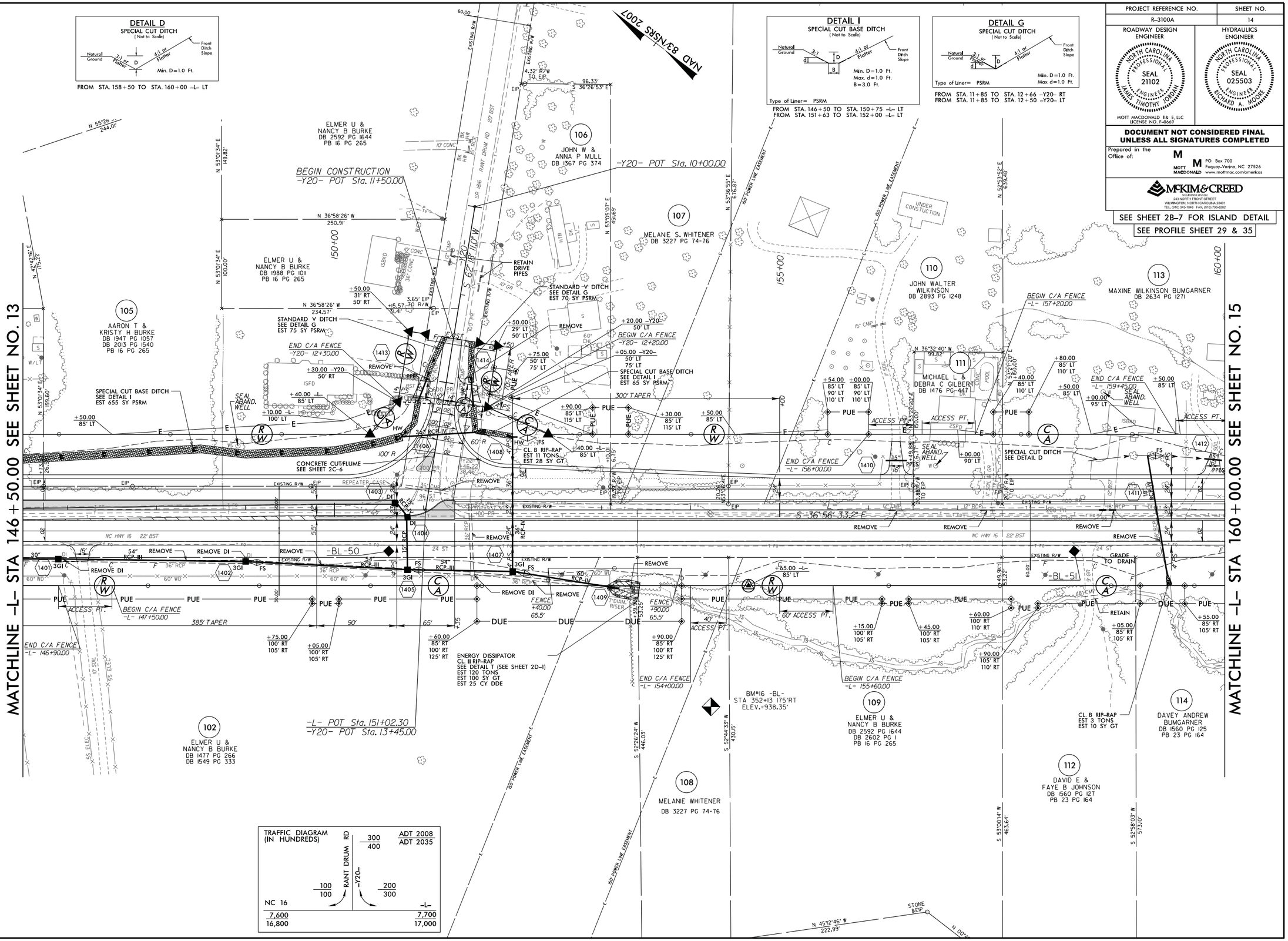
TEL. (910) 343-1348 FAX. (910) 790-6282

SEE SHEET 2B-7 FOR ISLAND DETAIL

SEE PROFILE SHEET 29 & 35



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PROJECT REFERENCE NO.	SHEET NO.
R-3100A	15

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

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

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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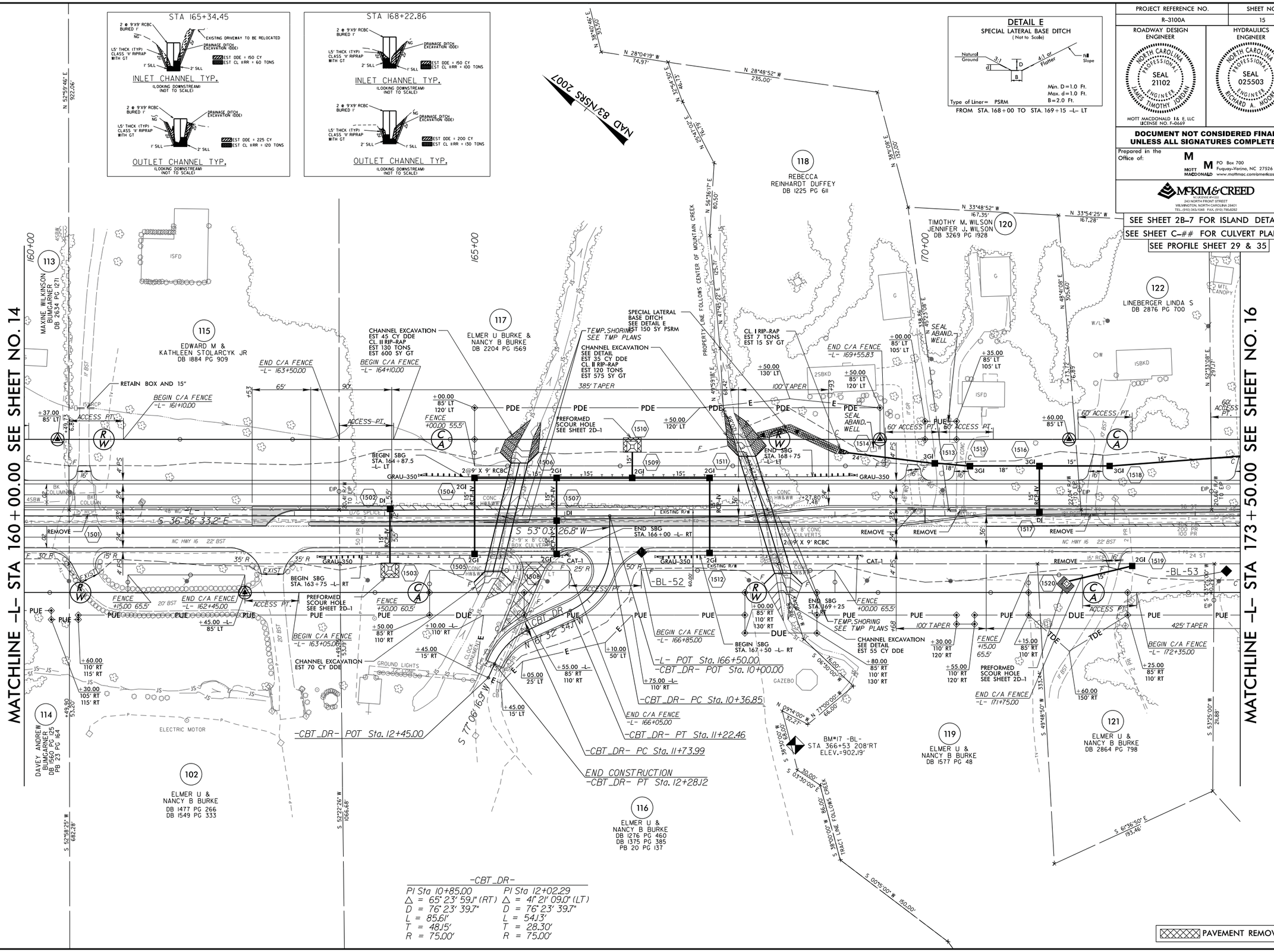
TEL: (910) 343-1346 FAX: (910) 790-6202

SEE SHEET 2B-7 FOR ISLAND DETAIL

SEE SHEET C-## FOR CULVERT PLANS

SEE PROFILE SHEET 29 & 35



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jcr66165

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	16

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN — MOTT MACDONALD I & E, LLC LICENSE NO. F-0669

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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SEE SHEET 2B-7 FOR ISLAND DETAIL

SEE PROFILE SHEET 30 & 36

DETAIL D
SPECIAL CUT DITCH (Not to Scale)

Natural Ground; 3:1; D; 4:1 or Flatter; Front Ditch Slope; Min. D=1.0 Ft.

FROM STA. 174+00 TO STA. 175+50 -L- RT
FROM STA. 180+75 TO STA. 182+50 -L- RT
FROM STA. 186+50 TO STA. 187+50 -L- LT

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

Natural Ground; 3:1; D; 4:1 or Flatter; Fill Slope; Min. D=1.0 Ft.

FROM STA. 187+00 TO STA. 187+50 -L- RT

DETAIL O
BERM DITCH (Not to Scale)

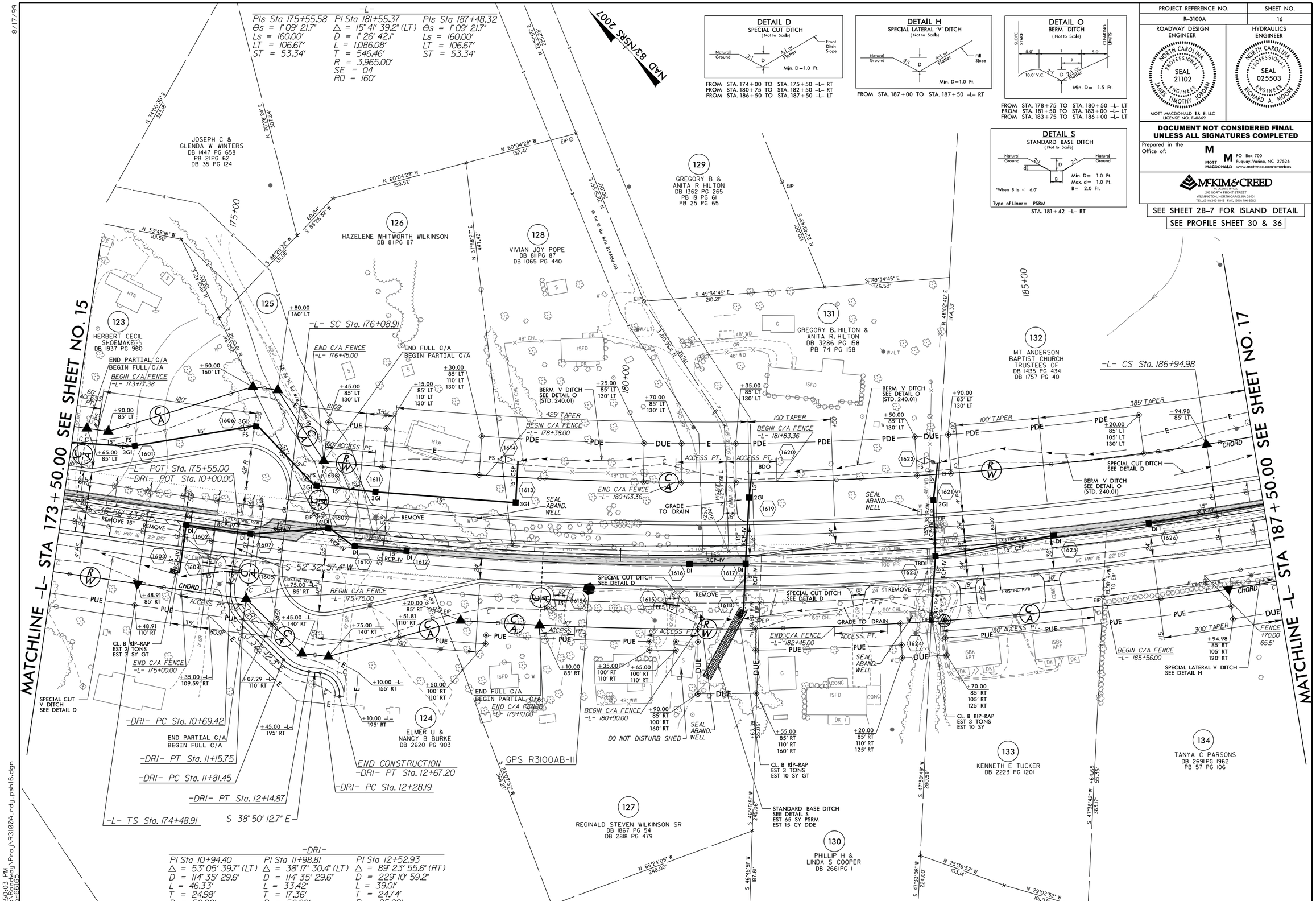
SLOPE STAKE; 5.0'; 8'; 5.0'; CLEARING LIMITS; 10.0' V.C.; 2:1; D; 2:1 or Flatter; Min. D= 1.5 Ft.

FROM STA. 178+75 TO STA. 180+50 -L- LT
FROM STA. 181+50 TO STA. 183+00 -L- LT
FROM STA. 183+75 TO STA. 186+00 -L- LT

DETAIL S
STANDARD BASE DITCH (Not to Scale)

Natural Ground; 2:1; d; D; 2:1; B; Natural Ground; Min. D= 1.0 Ft.; Max. d= 1.0 Ft.; B= 2.0 Ft.; *When B is < 6.0'; Type of Liner= PSRM

STA. 181+42 -L- RT



-DRI-

PI Sta 10+94.40	PI Sta 11+98.81	PI Sta 12+52.93
Δ = 53° 05' 39.7" (LT)	Δ = 38° 17' 30.4" (LT)	Δ = 89° 23' 55.6" (RT)
D = 114° 35' 29.6"	D = 114° 35' 29.6"	D = 229° 10' 59.2"
L = 46.33'	L = 33.42'	L = 39.01'
T = 24.98'	T = 17.36'	T = 24.74'
R = 50.00'	R = 50.00'	R = 25.00'

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pc6165

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	17

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN — MOTT MACDONALD I & E, LLC LICENSE NO. F-0669

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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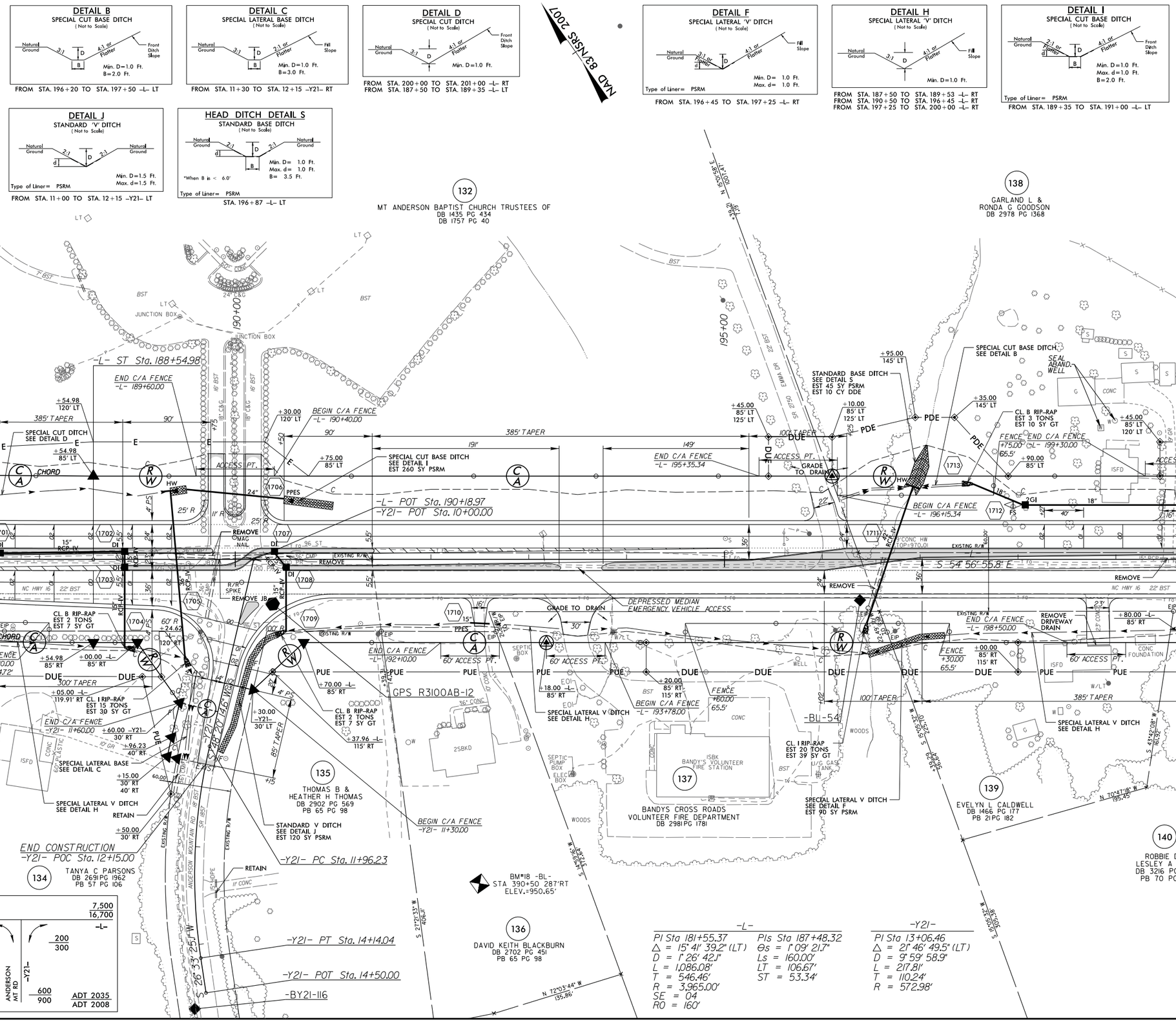
SEE SHEET 2B-8 FOR ISLAND DETAIL

SEE PROFILE SHEET 30 & 35



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PROJECT REFERENCE NO.	SHEET NO.
R-3100A	18

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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

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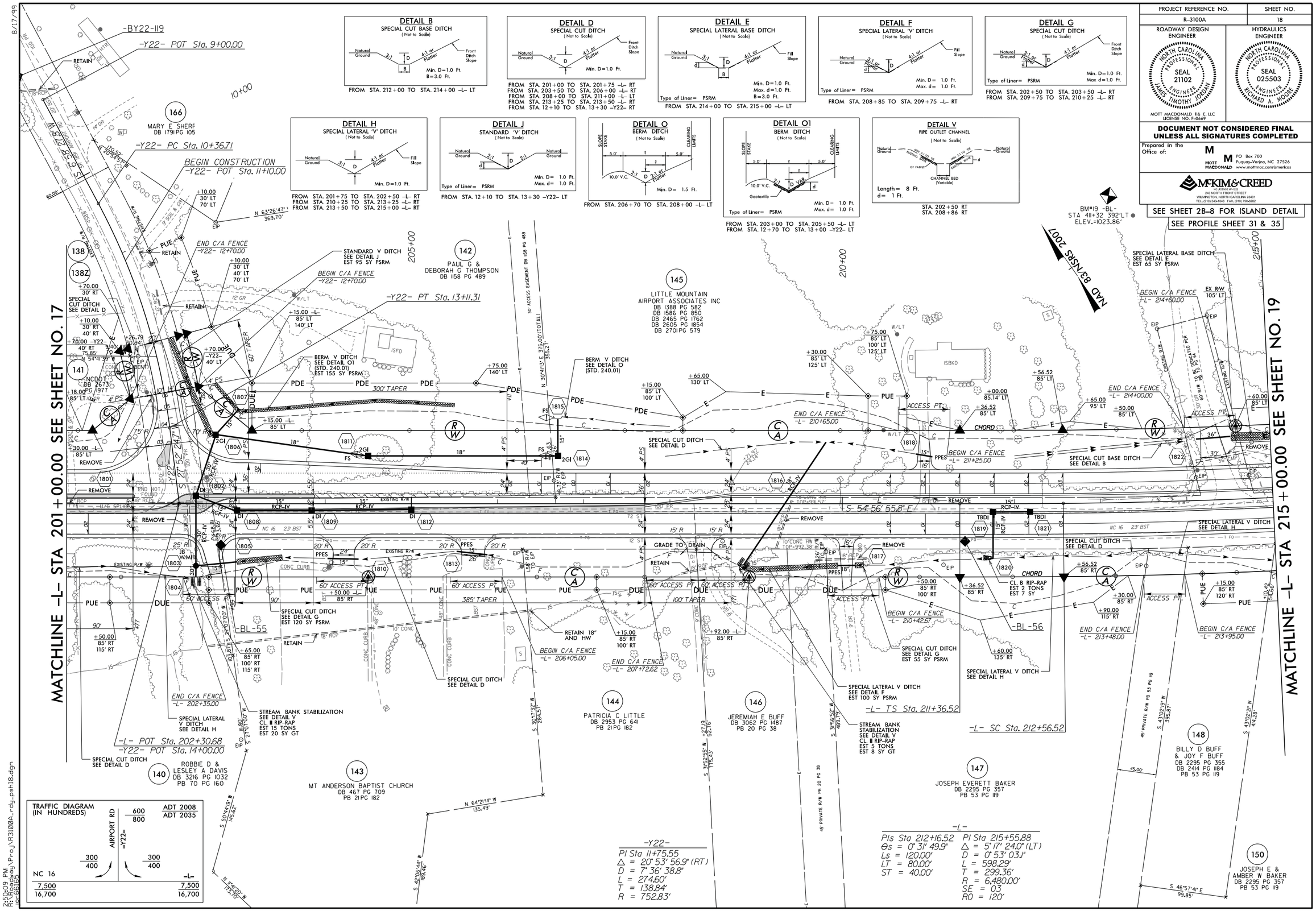
WILMINGTON, NORTH CAROLINA 28401
TEL. (910) 343-1346 FAX. (910) 790-6202

SEE SHEET 2B-8 FOR ISLAND DETAIL

SEE PROFILE SHEET 31 & 35



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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	19

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

MOTT MACDONALD I & E, LLC
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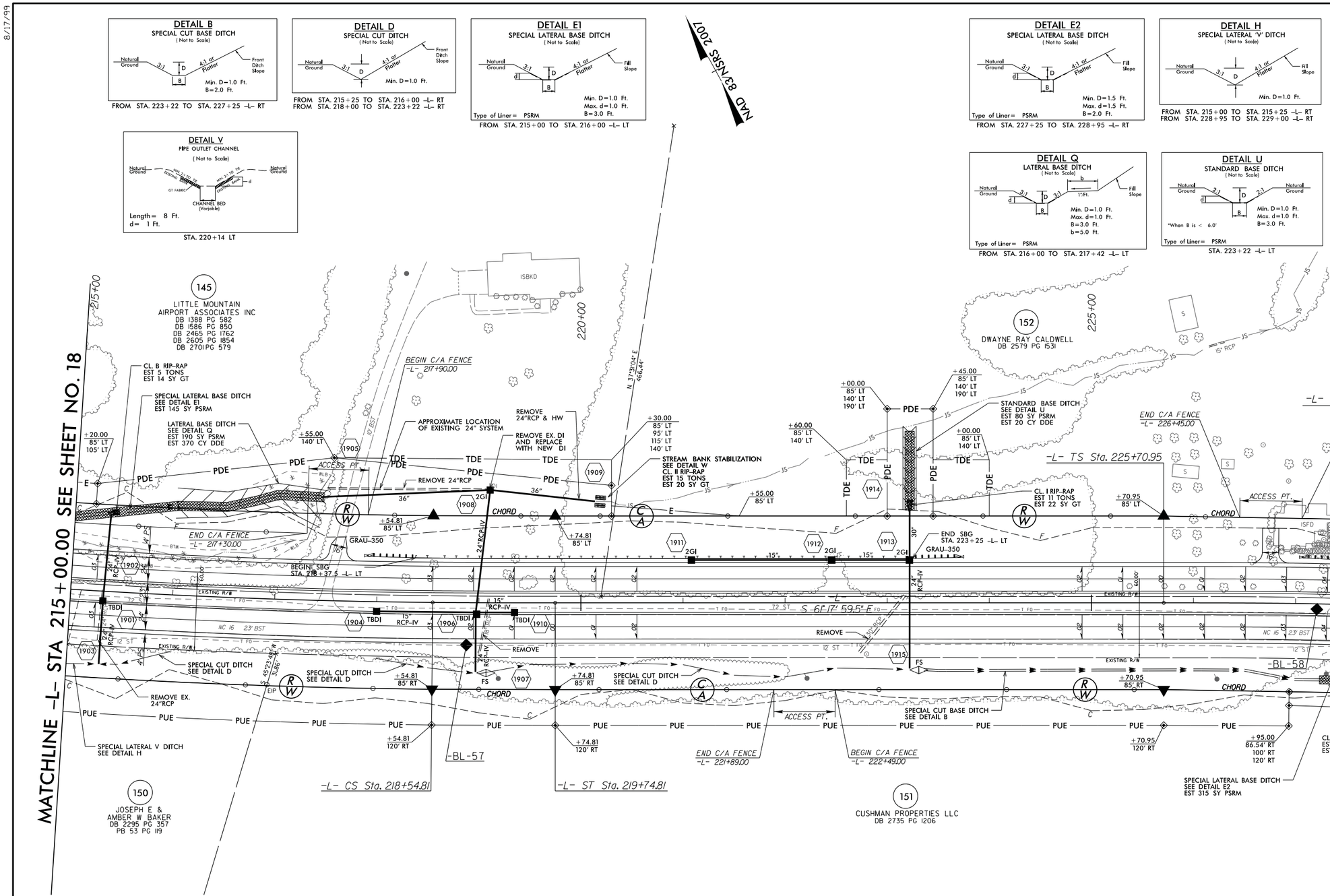
SEE PROFILE SHEET 31



-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'

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pr06165

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	20

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

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

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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WILMINGTON, NORTH CAROLINA 28401
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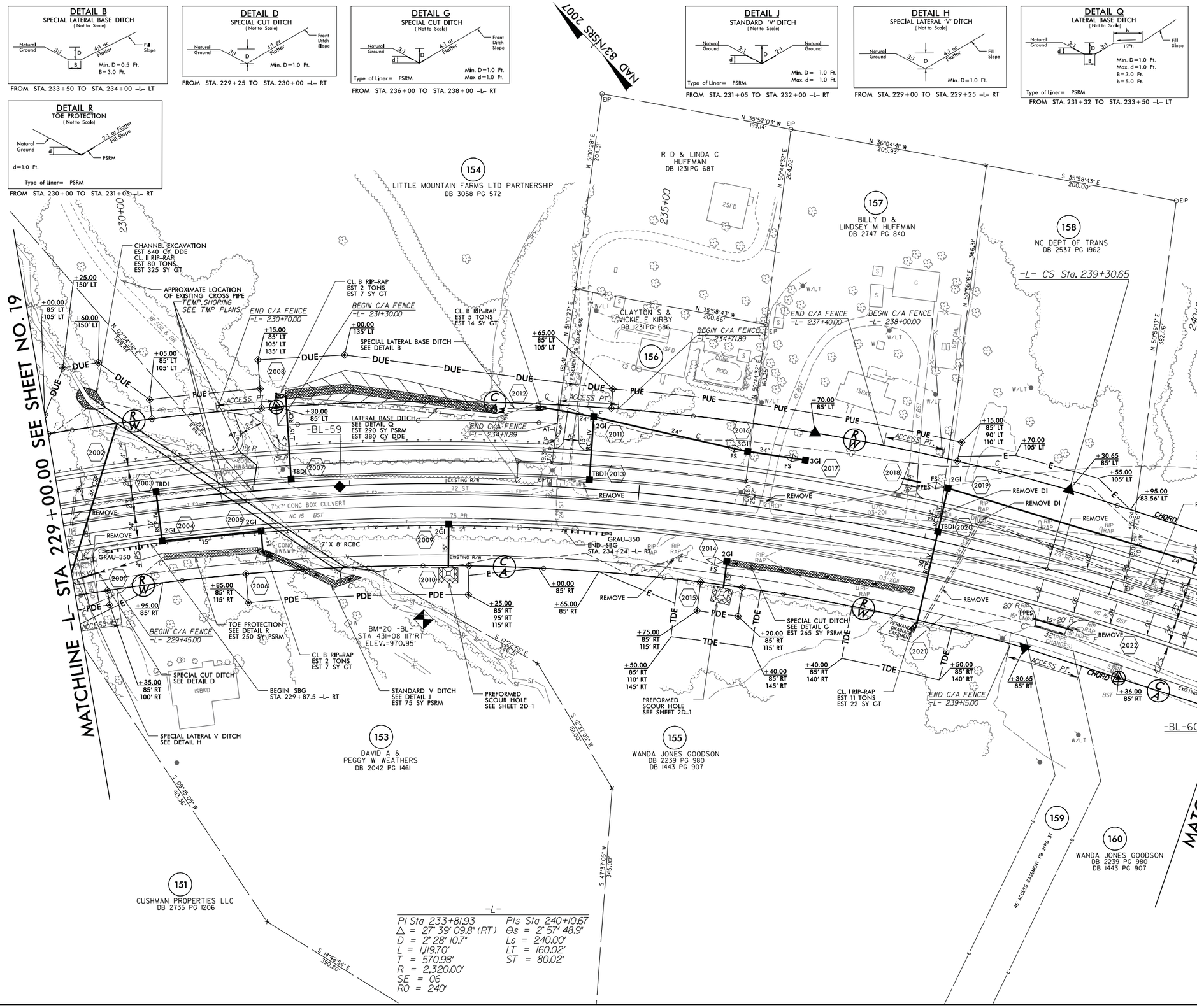
SEE SHEET C-## FOR CULVERT PLANS

SEE PROFILE SHEET 32



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jor 06/16

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	21

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 025503 ENGINEER RICHARD A. MOORE

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SEE PROFILE SHEET 32 & 33

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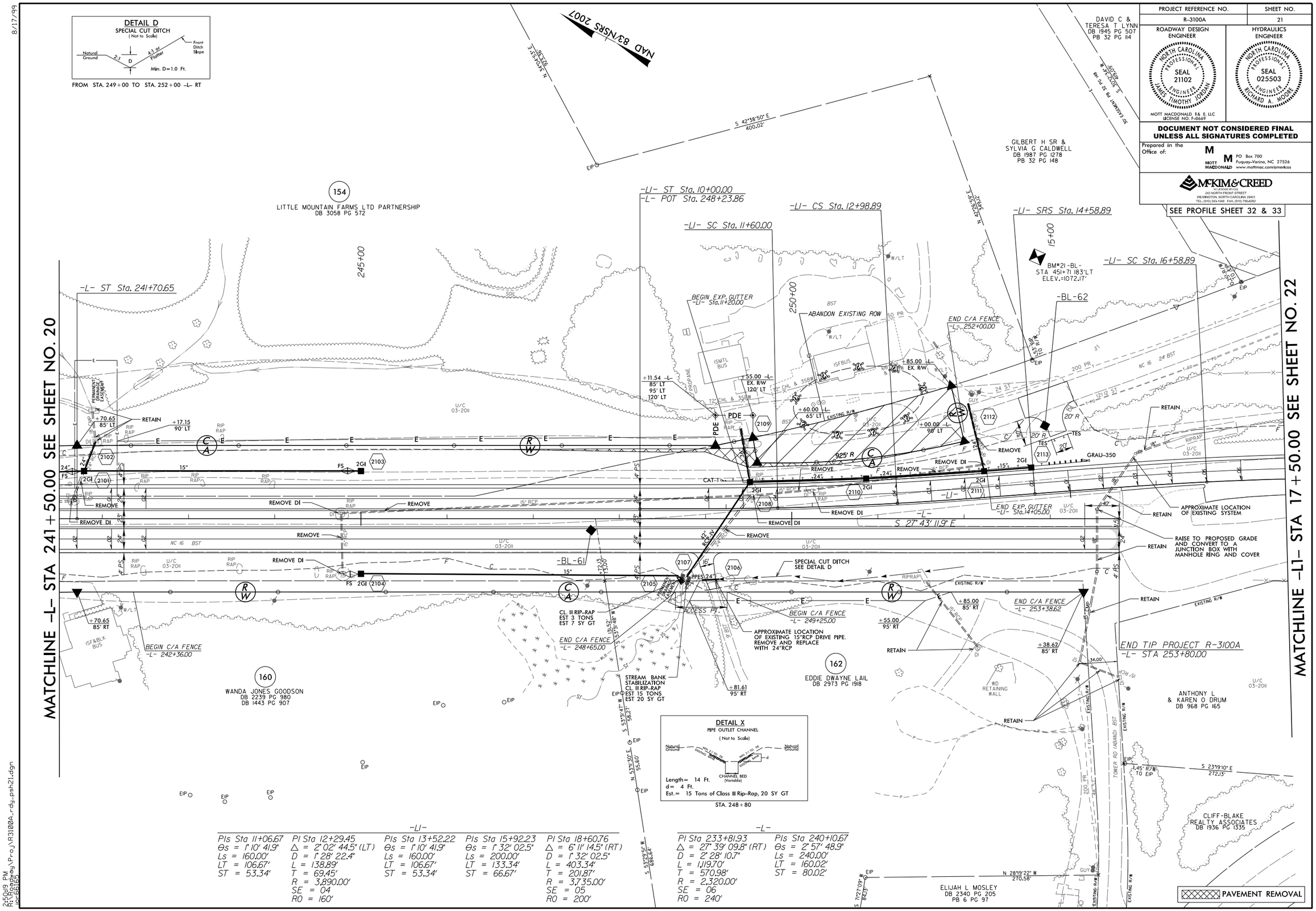

-L1-

PIs Sta 11+06.67	PI Sta 12+29.45	PIs Sta 13+52.22	PIs Sta 15+92.23	PI 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-

PI Sta 233+81.93	PIs 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'	

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10/6/2025

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	22

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER JAMES TIMOTHY JORDAN
MOTT MACDONALD E & E, LLC
LICENSE NO. F-0669

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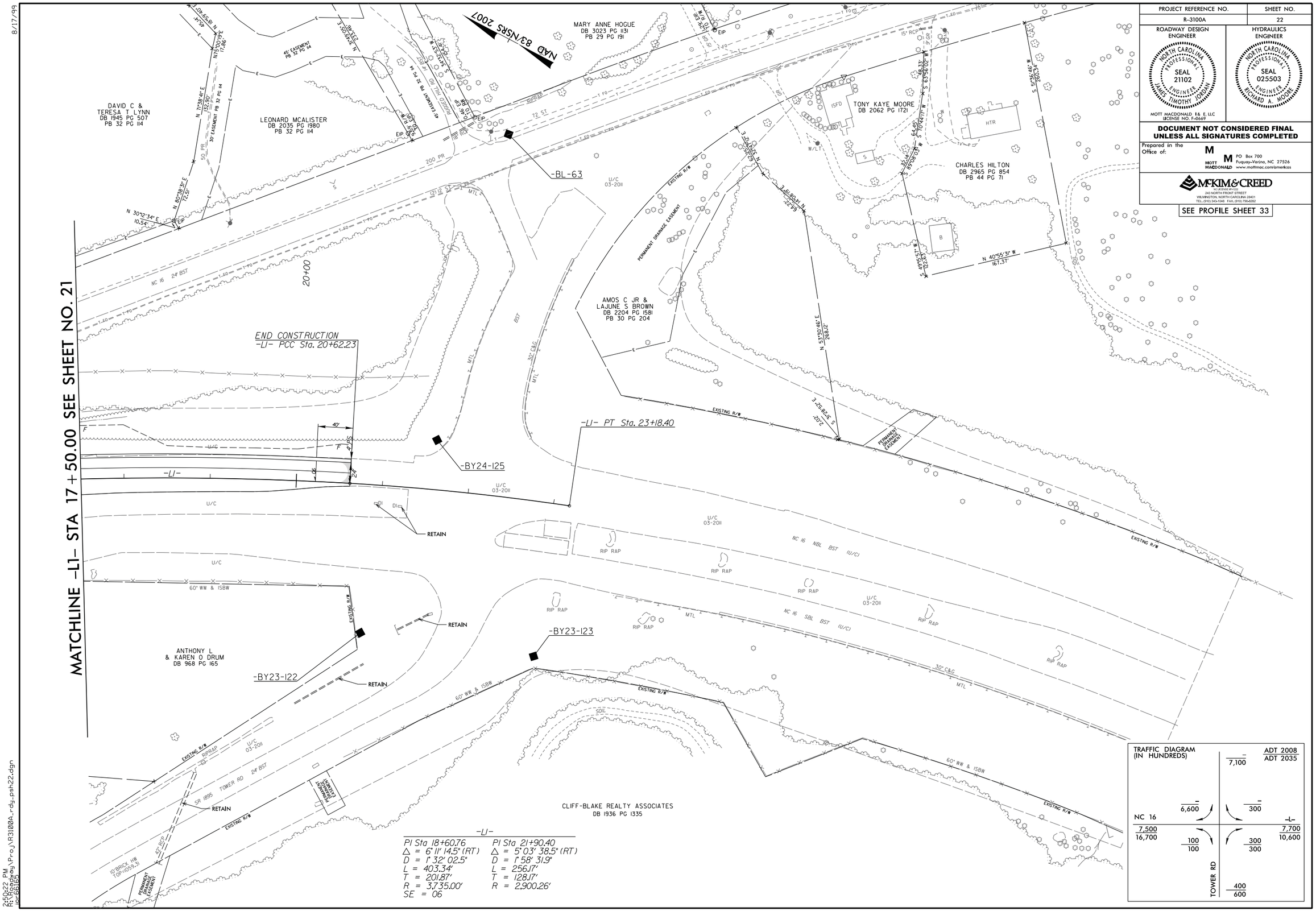
SEE PROFILE SHEET 33



8/17/99

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jordan

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	23

ROADWAY DESIGN ENGINEER
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MOTT MACDONALD I & E, LLC
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SEE PROFILE SHEET 34

MATCHLINE –Y19– STA 24+50.00 SEE SHEET NO. 10

–Y19–
PI Sta 27+54.52
△ = 9°04' 21.6" (LT)
D = 2°22' 55.8"
L = 380.86'
T = 190.83'
R = 2,405.21'

NAD 83/NSRS 2007

–Y19– PC Sta. 25+63.69

25+00

SPECIAL CUT DITCH SEE DETAIL D

60B
LARRY E CALDWELL et al
DB 96E PG 481
PB 54 PG 88

+35.00 50' RT 70' RT
+63.69 50' RT 70' RT
+63.69 50' RT
+63.69 50' LT
SPECIAL CUT DITCH SEE DETAIL D
SPECIAL LATERAL V DITCH SEE DETAIL H
REMOVE
S 3° 41' 55.5" W
450' TRANSITION
PDE
N 74°23'03" W 386.34'
73
ROBERT K & KAREN M WILKINSON
DB 2180 PG 445
PB 40 PG 107
SPECIAL LATERAL V DITCH SEE DETAIL H
+00
+00.00 30' RT 50' RT 70' RT
+00.00 30' LT 50' LT
SPECIAL CUT DITCH SEE DETAIL D
END CONSTRUCTION
–Y19– POT Sta. 27+00.00
RETAIN
164
ROLAND E & RUTH M EDWARDS
DB 1992 PG 1458
PB 40 PG 107
0.34' EIP TO R/W 21.34' 30.33'
AXLE
S 73°02'40" E 408.48'
N 22°52'39" E 1217.63'
CRAIG WATSON SR & LINDA C GRIGG
DB 939 PG 611
+52.01 30.08'
N 69°15'11" W 338.14'
BUFFALO SHOALS RD
SR 1003
EXISTING R/W
60.00'
–Y19– PT Sta. 29+44.55
RETAIN
S 73°00'34" E 410.38'
S 22° 37' 33.8" W
36" WD RAIL
10" GR
36" WD RAIL
LARRY E & LINDA C CALDWELL
DB 390 PG 509
DB 915 PG 64
DB 915 PG 76
PB 54 PG 88
GERALDINE MCCALL NEWTON
DB 665 PG 65
PB 40 PG 107
–BY19–112
S 74°09'07" E 383.30'
N 69°15'11" W 252.53'

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground — 3:1 or Flatter — D — 4:1 or Flatter — Front Ditch Slope
Min. D= 1.0 Ft.

FROM STA. 25+00 TO STA. 25+75 –Y19– LT
FROM STA. 26+75 TO STA. 27+00 –Y19– LT
FROM STA. 25+00 TO STA. 25+75 –Y19– RT

DETAIL H
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground — 3:1 or Flatter — D — 4:1 or Flatter — Fill Slope
Min. D= 1.0 Ft.

FROM STA. 25+75 TO STA. 26+75 –Y19– LT
FROM STA. 25+75 TO STA. 27+00 –Y19– RT

SEE PROFILE SHEET 34

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground — 3:1 or Flatter — D — 4:1 or Flatter — Front Ditch Slope
Min. D= 1.0 Ft.

FROM STA. 12+47 TO STA. 15+00 –Y19– LT

DETAIL N
STANDARD 'V' DITCH
(Not to Scale)
Natural Ground — 2:1 — D — 2:1 — Natural Ground
Min. D= 1.0 Ft.

STA. 12+47 –Y19– LT

NAD 83/NSRS 2007

EIP

GPS R3100AB-10

–Y19– POT Sta. 10+00.00

N 46°51'09" W 23.05'
+55.15 30.60'
6.22' EIP TO R/W
200' PR
200' PR
N 3°28'51" E 170.13'
165
J D JR & JANICE M GOODSON
DB 1030 PG 133
60.00'
163
MAGGIE SUE WILLIAMS BOST
DB 2011E PG 189
DB 430 PG 59
S 80°59'56" E 644.82'
EXISTING R/W
BUFFALO SHOALS RD
SR 1003
22' BST
BEGIN CONSTRUCTION
–Y19– POT Sta. 12+05.00
STANDARD V DITCH SEE DETAIL N EST 5 CY DDE
+05.00 30' LT 80' LT
+54.50 32.51'
+60.00 65' LT 80' LT
+95.00 30' RT 50' RT
N 46°51'09" W 228.00'
2.08' R/W TO EIP
EIP
230
PDE
RETAIN 18"
RETAIN 15"
PUE
15" RCP
S 3° 48' 00.2" W
–Y19–
BEGIN GRADE
–Y19– POT Sta. 13+15.00
8" SOIL
REMOVE
PPES
+15.00 30' LT 50' LT
N 3°28'51" E 170.01'
72
BRENDA CAUTHEN HILDEBRAN
DB 1330 PG 400
71
JUANITA BOGLE REINHARDT
DB 2868 PG 1420
+15
+15.00 30' RT 50' RT 65' RT
REMOVE
N 46°51'09" W 228.00'
+34.50 30.60'
2 PR
2302
12" LWP
450' TRANSITION
N 3°28'51" E 169.20'
69
GAYNELL MCCALL CAUTHEN HEIRS
2014E PG 139
DB 627 PG 224
11" BST
2303
30' ACCESS EASEMENT DB 2868 PG 1420
S 68°47'53" E 407.26'
68
HOWARD TRACY DRUM
DB 2008E PG 1208
DB 448 PG 348
15+00

MATCHLINE –Y19– STA 15+00.00 SEE SHEET NO. 10

8/17/99

2:50:25 PM
R:\Roadway\Proj\R3100A_rdy_psh23.dgn
pr8665