STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

October 10, 2017

U. S. Army Corps of Engineers
Regulatory Field Office
207 West 5th Street
Washington, NC 27889-1000

ATTN: Mr. Tom Steffens
NCDOT Coordinator

Subject: **Application for Modification to the Section 404 Individual Permit and Section 401 Water Quality Certification** for Section B of the proposed SR 1923 (Booker Dairy Road) Extension from US 70 Business to US 301 in Johnston County, Federal Aid Project No. STP-1923(2), State Project No. 8.3212101, TIP No. U-3334B. Debit $570 from WBS Number 34929.1.3

Reference: USACE Individual 404 Permit Action ID SAW-2008-02482, issued March 17, 2009, a Permit Modification issued August 25, 2009 and a Permit Renewal issued January 8, 2015.

NCDWR Project No. 20081106 Certification and Neuse Riparian Buffer Authorization, issued November 4, 2008, a Permit Modification issued July 22, 2009 and a Permit Renewal issued January 8, 2015.

Dear Sir:

The purpose of this letter is to request a modification to the United States Army Corps of Engineers (USACE) Section 404 Individual Permit and North Carolina Division of Water Resources Section 401 Certification and Neuse Buffer Authorization for Section B for the above referenced project. The original permit application (submitted July 10, 2008) presented final impacts for U-3334A and preliminary impacts for U-3334B. This modification presents the final design impacts for U-3334B.

Please see the enclosed, North Carolina Division of Mitigation Services (DMS) mitigation acceptance letter, Hydraulic Review Concurrence meeting minutes (4B and 4C), stormwater management plan (SMP), permit drawings, and roadway plan sheets for the U-3334B section.

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

Telephone: (919) 707-6000
Fax: (919) 212-5785
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
1020 BIRCH RIDGE DRIVE
RALEIGH, NC 27699

Table 1– Description of Project Sections for U-3334

Section	Approximate Section Limits	Approximate Length	Construction Letting
U-3334 A	West of SR 1003 (Buffalo Road) to US 70 Business	2.27 miles	January 2009
U-3334 B	West of SR 1003 (Buffalo Road) to US 301	2.12 miles	January 2018
	TOTAL	4.39 miles	

Summary of U-3334B Jurisdictional Impacts:
The preliminary design impacts projected from the original permit application for U-3334B were 176 linear feet of permanent stream impacts, 20,378 square feet of Zone 1 buffers, 7,040 square feet of Zone 2 buffers, and 5.3 acres of permanent impacts to wetlands. Final design impacts for U-3334B are 430 linear feet of permanent impacts to streams, 96 linear feet of bank stabilization, and 54 linear feet of temporary stream impacts, 32,274 square feet of Zone 1 buffers, 12,089 square feet of Zone 2 buffers, and 4.10 acres of permanent impacts to wetlands. The increase in stream impacts from preliminary to final design are due to the preliminary cross section being designed for a two-lane 26-foot roadway with 8-foot shoulders and the final cross section being designed for two 12-foot travels lanes in each direction from Buffalo Road to US301 (Brightleaf Boulevard) with 4-foot paved and 4-foot grassed shoulders and extending project area on White Oak Drive picking up another stream.

Totals of the proposed impacts to individual water resources by each section can be found in Tables 2, 3, and 4.

Table 2. Summary of Wetland Impacts for U-3334

Section	Design Stage	Wetland Impact Type	Wetland Impact Area (ac)	Wetland Impacts Requiring Mitigation (ac)
U-3334A	Final	Permanent Wetland Fill	1.96	2.39
		Excavation in Wetlands	0.02	
		Mechanized Clearing in Wetlands	0.41	
		Hand Clearing in Wetlands	7.02	
		Temp. Clearing in Wetlands	0.21	
U-3334B	Final	Permanent Wetland Fill	3.57	4.11
		Mechanized Clearing in Wetlands	0.54	
			Total	**6.50**

Table 3. Summary of Stream Impacts for U-3334

Section	Design Stage	Stream Impact Type	Impact Length (lf)	Stream Impacts Requiring Mitigation (lf)
U-3334A	Final	Permanent Fill	78	78
		Bank Stabilization	0	
		Temporary	0	
U-3334B	Final	Permanent Fill	430	430
		Bank Stabilization	96	
		Temporary	54	
Total			**658**	**508**

Table 4. Summary of Buffer Impacts for U-3334

Section	Zone 1 Buffer Impacts (sq. ft)	Zone 2 Buffer Impacts (sq. ft)
U-3334A	48,895	20,378
U-3334B	32,274	12,089
Total	**81,169**	**32,467**

IMPACTS TO WATERS OF THE U.S.

Tables 5, 6, and 7 summarize the proposed impacts to jurisdictional water resources for the final design of U-3334B. Site numbers correspond with the permit drawings included in this application. The project is located in the Neuse River Basin HUC 03020201. There is one wetland and three streams located with the project area. All three streams are unnamed tributaries (UTs) to Buffalo Creek. Buffalo Creek carries a North Carolina Division of Water Resources (NCDWR) stream classification of C; NSW and a stream index number of 27-42.

Wetlands

Proposed final permanent impacts are 4.10 acres (Table 5).

Table 5. U-3334B Wetland Impacts

Site	Wetland Number	Riparian or Non-Riparian	Permanent Fill in Wetlands (ac)	Mechanized Clearing (ac)
1	BDB-BZ	Non-Riparian	3.57	0.54
Total Impacts			**4.11**	

Utility impacts

There will be no wetland impacts due to utility relocations or installations. The Town of Smithfield completed the installation of a waterline within the project limits under a Nationwide 12 permit. The installation of the waterline was not due to the transportation project, but due to the Town improving the waterline within the project limits of U-3334B.

Surface Waters

Final permanent stream impacts for U-3334B are 526 linear feet. Temporary stream impacts are 54 linear feet. Table 6 lists the site number, stream name, stream classification, amount of impacts, and amount of mitigation required.

Table 6. U-3334B Stream Impacts

Site	Stream Name	Intermittent/ Perennial	Impact Type	Impact Length (linear feet)
2	UT to Buffalo Creek (SA)	P	Perm. Fill	315
			Bank Stabilization*	32
			Temp Fill	20
3	UT to Buffalo Creek (SB)	P	Perm. Fill	100
			Bank Stabilization*	64
			Temp Fill	24
4	UT to Buffalo Creek (SC)	I	Perm. Fill	15
			Temp Fill	10
			Total Temporary Impacts:	**54**
			Total Permanent Impacts:	**526**
			Permanent Impacts Requiring NCDWR Mitigation[1]:	**315**
			Permanent Impacts Requiring USACE Mitigation:	**430**

[1]Mitigation requirement for permanent impacts for DWR at a 1:1 ratio will be met under the USACE mitigation requirement ratio of 2:1.
*Bank stabilization does not require mitigation.

Utility impacts

There will be no impacts to jurisdictional streams due to utility relocations or installations.

RIPARIAN BUFFER IMPACTS

U-3334B is subject to the Neuse River Basin Buffer Rules. Impacts for each zone are detailed in Table 7.

Table 7. U-3334B Riparian Buffer Impacts

Mitigation requirements (sq. ft.)	Allowable with mitigation*	Allowable with mitigation**	Allowable**	**Total Impacts**	**Impacts Requiring Mitigation**
Zone 1 Impact	8,621	16,523	7,130	**32,274**	**25,144**
Zone 2 Impact	1,639	8,056	2,394	**12,089**	**9,695**

***** Impacts other than Road Crossing ** Road Crossing

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 phase and minimization measures were incorporated as part of the project design. Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts.

Avoidance and Minimization

Impacts to jurisdictional streams and wetlands could not be avoided. Minimization efforts have taken place continually through the planning and design process and are listed below.

- Design Standards in Sensitive Watersheds will be implemented.
- Runoff from impervious surfaces has been diverted away from surface waters or has been treated using grass swales prior to entering jurisdictional waters.
- Equalizer pipes are used to maintain existing flow patterns through the wetland.
- Riprap pads are utilized at Site 2 outlets for energy dissipation.
- 3:1 slopes in jurisdictional areas where practicable.

Compensatory Mitigation

Compensatory mitigation requirements for the proposed U-3334B are summarized in Table 8 below. Mitigation of impacts jurisdictional streams, wetlands, and buffers will be provided by DMS.

Table 8. Jurisdictional Impacts Requiring Mitigation

Non-riparian Wetland (ac.)		Streams (ft.)	Buffers Zone 1 (sq. ft.)	Buffers Zone 2 (sq. ft.)
4.11 ac. @ 2:1 ratio		430 ft. @ 2:1 ratio	25,144@x3	9,695@x1.5
Totals	**8.22**	**860**	**75,432**	**14,543**

FEDERALLY PROTECTED SPECIES

As of July 13, 2017, the USFWS lists four federally protected species for Johnston County (Table 9).

Table 9. Federally Protected Species Listed for Johnston County

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Alasmadonta heterodon	Dwarf wedgemussel	E	No	No Effect
Elliptio steinstansana	Tar River spinymussel	E	No	No Effect
Picoides borealis	Red-cockaded woodpecker	E	No	No Effect
Rhus michauxii	Michaux's sumac	E	Yes	No Effect

E= Endangered

Surveys were last conducted for Michaux's sumac on May 15, 2017. Habitat is present, but no Michaux's sumac were located during the survey. The biological conclusion is No Effect. Habitat was not found in the study area for dwarf wedgemussel, Tar River spinymussel, and red-cockaded woodpecker. The biological conclusion for these three species is No Effect.

The USFWS has developed a programmatic biological opinion (PBO) in conjunction with the Federal Highway Administration (FHWA), the US Army Corps of Engineers (USACE), and NCDOT for the northern long-eared bat (NLEB) (in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1-8, including all NCDOT projects and activities. The programmatic determination for NLEB for the NCDOT program is "May Affect, Likely to Adversely Affect." The PBO provides incidental take coverage for NLEB and will ensure compliance with Section 7 of the Endangered Species Act for five years for all NCDOT projects with a federal nexus in Divisions 1-8, which includes Johnston County, where U-3334B is located.

Bald and Golden Eagle Protection Act (BGPA): In the July 9, 2007 Federal Register (72:37346-37372), the bald eagle was declared recovered, and removed (de-listed) from the Federal List of Threatened and Endangered wildlife. This delisting took effect August 8, 2007. After delisting, the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668-668d) became the primary law protecting bald eagles. Nesting and foraging habitat are not present in the project area, nor have bald eagle nests or individuals have been seen within a 660-foot radius of the project area.

REGULATORY APPROVALS

Application is hereby made for a modification to the Department of the Army Section 404 Individual Permit as required for the above-described activities for the proposed TIP project U-3334B.

We are also hereby requesting a modification of the Individual Section 401 Water Quality Certification and Neuse Riparian Buffer Authorization from the Division of Water Resources. In compliance with Section 143-215.3D (e) of the NCAC, we will provide $570 to act as payment for processing the Section 401 permit modification.

A copy of this modification request will be posted on the NCDOT website at https://connect.ncdot.gov/resources/Environmental/. If you have any questions or need additional information, please contact Deanna Riffey at driffey@ncdot.gov or (919) 707-6151.

Sincerely,

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

cc: NCDOT Permit Application Standard Distribution List

Environmental Quality

ROY COOPER
Governor

October 6, 2017

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

Dear Mr. Harris:

Subject: EEP Mitigation Acceptance Letter:

U-3334B, Smithfield – SR 1923 (Booker Dairy Road) from Buffalo Road to US 301 (Brightleaf Boulevard, Johnston County

The purpose of this letter is to notify you that the Division of Mitigation Services (DMS) will provide the stream, wetland and buffer mitigation for the subject project. Based on the information supplied by you on October 6, 2017, the stream, wetland and buffer impacts are located in CU 03020201 of the Neuse River basin in the Northern Inner Coastal Plain (NICP) Eco-Region, and are as follows:

Stream and Wetlands	River Basin	CU Location	Eco-Region	Stream			Wetlands		
				Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh
Impacts	Neuse	03020201	NICP	0	0	430.0	0	4.11	0

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

All buffer mitigation requests and approvals are administrated through the Riparian Restoration Buffer Fund. The NCDOT will be responsible to ensure that appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWR's Buffer Authorization Certification, DMS will transfer funds from the NCDOT 2984 Fund into the Riparian Restoration Buffer Fund. Upon completion of transfer payment, NCDOT will have completed its riparian buffer mitigation responsibility for TIP Number U-3334B. Subsequently, DMS will conduct a review of current NCDOT ILF Program mitigation projects in the river basin to determine if available buffer mitigation credits exist. If there are buffer mitigation credits available, then the Riparian Restoration Buffer Fund will purchase the appropriate amount of buffer mitigation credits from NCDOT ILF Program.

Buffer	River Basin	CU	Eco-Region	Buffer Impacts		
				Zone 1	Zone 2	TOTAL
Impacts	Neuse	03020201	NICP	25,144.0	9,695.0	34,839.0

The impacts and associated mitigation needs were under projected by the NCDOT in the 2017 impact data. DMS commits to implement sufficient compensatory stream, wetland and buffer 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. Tom Steffens, USACE – Washington Regulatory Field Office
Ms. Amy Chapman, NC Division of Water Resources
File: U-3334B

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

July 11, 2014

To:
Rob Ridings
Thomas Steffens
Gary Jordan
Travis Wilson
Cynthia Van Der Wiele
Ron Lucas
Cory Bosquet
Wendi Johnson
Brenda Moore
Chris Rivenbark
David Harris
Emily Murray
Jay McInnis

From: Paul Atkinson, PE
Project Manager – TIP East

Subject: **FINAL Minutes of the Interagency Hydraulic Design Review "4B" Meeting for U-3334B**: SR 1923 Extension (Booker Dairy Road) from SR 1003 (Buffalo Road) to US 301 (Brightleaf Boulevard)

The "4B" Meeting for U-3334B was held on June 18, 2014 at 10:00 AM in the NCDOT Hydraulic Design Conference Room, at the Century Center Complex in Raleigh, NC. The following were in attendance:

Participants:

Team Members

Paul Atkinson, NCDOT Hydraulics (Present)
Thomas Steffens, USACE (Present)
Gary Jordan, USFWS (Present)
Travis Wilson, NCWRC (Present)
Cynthia Van Der Wiele, EPA (Absent)
Ron Lucas, FHWA (Present)
Rob Ridings, NCDWR (Present)

Support Staff

Wendi Johnson, Division 4 (Present)
Brenda Moore, Roadway Design (Absent)
Chris Rivenbark, NCDOT-NES (Present)
David Harris, NCDOT-REU (Absent)
Emily Murray, Structures (Present)
Jay McInnis, NCDOT-PDEA (Absent)
Corey Bosquet, Utilities (Absent)

Other Attendees

Mark Staley, NCDOT-REU (Present)
Amy James, NCDOT-NES (Present)
Katrina Washington, Roadway Design (Present)
Brook Anderson, NCDOT Hydraulics (Present)
Craig Freeman, NCDOT Hydraulics (Present)
Erik Seiler, NCDOT Hydraulics (Present)

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH NC 27699-1590

TELEPHONE: 919-707-6700
FAX: 919-250-4108

WEBSITE: WWW.NCDOT.ORG/DOH/

LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC

The 4B meeting began with Paul Atkinson (NCDOT) giving a brief overview of the project and stating he would go through the project sheet by sheet.

Sheets 4 & 5:

No wetlands or jurisdictional streams. No comments.

Sheets 6 & 7:

Paul Atkinson identified wetlands and three proposed equalizer pipes to maintain connectivity between wetlands. No comments.

Sheets 8 & 9:

No wetlands or jurisdictional streams. No comments.

Sheet 10:

Paul Atkinson identified the jurisdictional stream, which currently is piped across the existing road at 90^{o} and ties to a straightened channel between the existing road and a Walmart parking lot. The proposed design is a double barrel box culvert buried 1' and at a skew due to the proposed roadway alignment. Paul indicated there will also be some stream realignment to tie to the proposed culvert. Tom Steffens asked Paul to elaborate on the future culvert. Paul stated that the future plans consist of adding a median and two additional travel lanes which will require the currently proposed culvert to be extended. It was agreed that impacts for channel relocation will be permitted as part of this project, and the future culvert extension will be part of another project and will not be permitted as part of U-3334B. Tom asked how deep the normal flow is in the stream. Brook Anderson said 0.5' to 1'. Rob Ridings asked if this project's main storm water treatment strategy consists of grassed-lined ditches. Paul said, yes. Tom asked if there would be rip rap at the outlet of the culvert, and how the existing channel that is to be filled will be stabilized and flow directed to the proposed channel. Paul replied that yes, there will be rip rap added at the culvert outlet to protect the outlet channel and bank, and also across the proposed fill in existing channel that will form the new channel bank where the channel realignment begins. Tom requested the rip rap locations be shown on the plans.

After the meeting, an analysis of outlet velocities showed that rip rap would be required in the bed of the channel at the outlet of the 60" pipe, due to high outlet velocities from the 60" pipe that ties to the channel at the box culvert outlet.

Sheet 11:

No additional impacts. No comments.

Transportation

PAT McCRORY
Governor

NICHOLAS J. TENNYSON
Secretary

November 7, 2016

To:

Ron Lucas	Gary Lovering
Thomas Steffens	Wendi Johnson
Gary Jordan	Chris Rivenbark
Travis Wilson	Mark Staley
Cynthia Van Der Wiele	Kevin Fischer
Rob Riding	Jay McInnis
	David Harris

From: Paul Atkinson, PE
Project Manager – TIP East

Subject: **FINAL Minutes of the Interagency Hydraulic Design Review "4C" Meeting for U-3334B**: SR 1923 Extension (Booker Dairy Road) from SR 1003 (Buffalo Road) to US 301 (Brightleaf Boulevard)

The "4C" Meeting for U-3334B was held on October 19, 2016 at 9:00 AM in the NCDOT Hydraulics Conference Room, at the Century Center Complex in Raleigh, NC. The following were in attendance:

Participants:

Team Members
Rob Ridings, NCDWR (Present)
Ron Lucas, FHWA (Absent)
Thomas Steffens, USACE (Present)
Gary Jordan, USFWS (Absent)
Travis Wilson, NCWRC (Absent)
Cynthia Van Der Wiele, EPA (Absent)

Support Staff
Paul Atkinson, NCDOT Hydraulics
Wendi Johnson, NCDOT Division 4
Chris Rivenbark, NCDOT-NES
Mark Staley, NCDOT REU (Phone)

Other Attendees
Deanna Riffey, NCDOT-NES
Tatia White, NCDOT Roadway Design
Piotr Stojda, NCDOT Roadway Design
Larry M. James, NCDOT Utilities
Brook Anderson, NCDOT Hydraulics
Michelle Berry, NCDOT Hydraulics
Erik Seiler, NCDOT Hydraulics

The 4C meeting began with Brook Anderson (NCDOT) giving a brief overview of the project and stating she would go through the Wetland and Surface Water Impacts Permit then Buffer Impacts Permit.

Wetland Impacts Permit

Sheets 3& 4:

No Comments.

Sheet 5:

No Comments.

Sheets 6 & 7:

Tom Steffens asked if there will be a separation between the existing ditch at the inlet side of the 24"RCP that runs from south to north and the proposed base ditch that runs east to west, to insure the wetlands will not be drained. Brook Anderson confirmed that there is an existing drive that separates the ditches and the separation will be maintained in the proposed design.

Brook Anderson stated that the red fill slope line shown going across the existing road should be black and the Hydraulics Unit will update the drawings.

Rob Ridings asked if the equalizer pipes will not be buried. Brook Anderson stated the pipes will not be buried.

Wendi Johnson asked if more equalizer pipes could be put in. Wendi Johnson stated in the past they have had issues with large wetlands. Brook Anderson responded that the Hydraulics Unit is okay with additional equalizer pipes being installed, if needed, during construction. Rob Ridings and Tom Steffens were also in agreement.

Sheets 8&9:

Brook Anderson gave an overview of the culvert replacement and stream realignment and indicated rip rap in the stream bed at the outlet of the 3@6'X6' RCBC and 60" RCP was required due to the 60" RCP outlet velocities.

Rob Ridings requested at Site 3 that the rip rap on the right bank of the outlet end of the 7'X6' RCBC be extended past where the proposed ditch ties into the channel to match the left bank. Rob Ridings stated that with increased urbanization erosion could be an issue in the future. Brook Anderson stated that the Hydraulics Unit will look into extending the rip rap.

Sheet 10:

Tom Steffens asked if there will be rip rap on the right bank at the outlet of the 3@6'X6' RCBC and 60" RCP. Brook Anderson stated that there is bank stabilization.

Rob Ridings pointed out the two pipes discharging into sides of the 3@6'X6' RCBC and asked if treatment options were looked at prior to this design. Brook Anderson responded that other options had been looked at but due to other constraints, discharging directly into the culvert was the only option. Rob Ridings stated if this was the only design that would work and other scenarios were looked at, then that should be documented in the SMP. Brook Anderson stated that the Hydraulics Unit will update the SMP.

Paul Atkinson asked NES if the portion of the side channel (coming into the east side of the main channel at the inlet of the 3@6'X6' RCBC) that is currently hatched as surface waters impacts, should be removed from the tabulation if it is not jurisdictional. Chris Rivenbark responded that they will check to see if it is a jurisdictional and will follow up with the Hydraulics Unit if hatching is needed.

After the meeting, Deanna Riffey contacted the Hydraulics Unit and stated NES checked the portion of the side channel at the 3@6'x6' RCBC that is currently hatched as surface waters impacts. The side channel is not a jurisdictional feature and the hatching should be removed to the edge of the main channel.

Sheet 11:

No Comments.

Sheets 12&13:

No Comments.

Sheets 14&15:

No Comments.

Sheet 16:

No Comments.

Buffer Impacts Permit

Sheets 3& 4:

Brook Anderson stated the Hydraulics Unit will update the sheet legend. It should read Mitigable Impacts not Allowable Impacts.

Sheets 5& 6:

No Comments.

Sheets 7& 8:

No Comments.

Sheet 9:

Rob Ridings stated that the Allowable Impacts for the Site 2 relocation of the existing ditch on the Buffer Impact Summary Sheet should be moved to Mitigable because they are parallel impacts.

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.07; Released October 2016)

WBS Element:	34929.1.3	TIP No.:	U-3334B	County(ies):	Johnston	Page	1	of	2

General Project Information

WBS Element:	34929.1.3	**TIP Number:**	U-3334B	**Project Type:**	Roadway Relocation	**Date:**	3/1/2017
NCDOT Contact:	Paul Atkinson, PE			**Contractor / Designer:**	Brook Anderson		
	Address: NCDOT Hydraulics Unit 1590 Mail Service Center Raleigh, NC 27699			**Address:**	NCDOT Hydraulics Unit 1590 Mail Service Center Raleigh, NC 27699		
	Phone: (919) 707-6707			**Phone:**	(919) 707-6706		
	Email: patkinson@ncdot.gov			**Email:**	beanderson@ncdot.gov		
City/Town:	Smithfield			**County(ies):**	Johnston		
River Basin(s):	Neuse			**CAMA County?**	No		
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	2.124 MI	**Surrounding Land Use:**	residential, agricultural, and commercial

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	ac.	ac.
Typical Cross Section Description:	From Buffalo Rd to White Oakdrive: 2, 12' travel lanes in each direction divided by conc. median with curb and gutter. From White Oak Drive to US 301 (Brightleaf Boulevard): 2, 12' travel lanesin each direction with 4' paved and 4' grassed shoulders	2, 12' travel lanes and total pavement width approximately 24'.
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 16785 Year: 2038	Existing: 10637 Year: 2018

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

The proposed project will upgrade SR 1923 to an urban collector extending SR 1923 (Booker Dairy Road) from SR 1003 (Buffalo Road) to US 301 (Brightleaf Boulevard). Approximately 0.25 miles will be on a new location with the remainder following existing roads.

Two culverts will be replaced. The first existing culvert, at Ava Gardner drive, is a 95" x 67" CMAP that will be replaced with 3 @ 6' x 6' RCBC. The proposed culvert uses sills and a flood plain bench to maintain existing flow depths and to retain bed material in the culvert. The second existing culvert, located at the Walmart drive, is a 128" x 83" CMAP, which will be replaced with 2 @ 7' x 8' RCBC. Both proposed culverts are buried appropriately. This project has storm drain systems that collect road and off-site discharge, Rip Rap pads are utilized at the system outlets for energy dissipation. Existing pipes will be up-sized to meet future development. Equalizer pipes are used to maintain existing flow patterns through wetlands.

Two pipes enter each of the proposed culverts. The two pipes that enter the proposed 3@ 6' x 6' RCBC were routed to enter the culvert due to the low fill height, topography, and culvert orientation preventing the flow from being ditched to the stream.The east pipe entering the 2 @ 7' x 8' RCBC is due to the constraints caused by the proposed fill covering the existing outlet ditch and the nearby 10" steel gas line that prevents the outlet pipe from outletting into the proposed ditch. The west pipe is outfalled into the culvert to prevent having to impact the private property near the westtern bank of the channel.

Waterbody Information

Surface Water Body (1):	Buffalo Creek (UT BC 1)		**NCDWR Stream Index No.:**	27-42	
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C		
		Supplemental Classification:	Nutrient Sensitive Waters (NSW)		
Other Stream Classification:	None				
Impairments:	None				
Aquatic T&E Species?	No	Comments:			
NRTR Stream ID:	UT BC 1			**Buffer Rules in Effect:**	Neuse
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A
Deck Drains Discharge Over Water Body?	No	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.07; Released October 2016)

WBS Element: 34929.1.3 **TIP No.:** U-3334B **County(ies):** Johnston

Swales

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
12	-L- 123+46 Lt 35.522588/ -78.307118	(1)Buffalo Creek (UT	6.0	3.0	3.0	3.4	341	229	4.00%	13.1	3.6	17.0	3.9	No	No
12	-L- 123+08 RT 35.522423 / -78.307893	(1)Buffalo Creek (UT	6.0	3.0	3.0	5.4	541	297	1.34%	18.7	2.8	28.8	3.1	No	No
12	-L- 120+34 RT 35.523268 / -78.307808	(1)Buffalo Creek (UT	0.0	3.0	3.0	0.3	33	242	0.30%	1.0	0.6	1.3	1.0	No	No

Additional Comments

Swale ending at -L- 122+88 LT: Total Existing DA: 3.56 ac, Total Proposed DA: 3.71ac. Area is primarily comprised of off-site drainage (2.1 ac Impervious /1.6 ac. Pervious) Proposed project decreases impervious area from 2.6 ac impervious to 2.0 ac impervious by removal of existing businesses/ parking lots in proposed R/W.

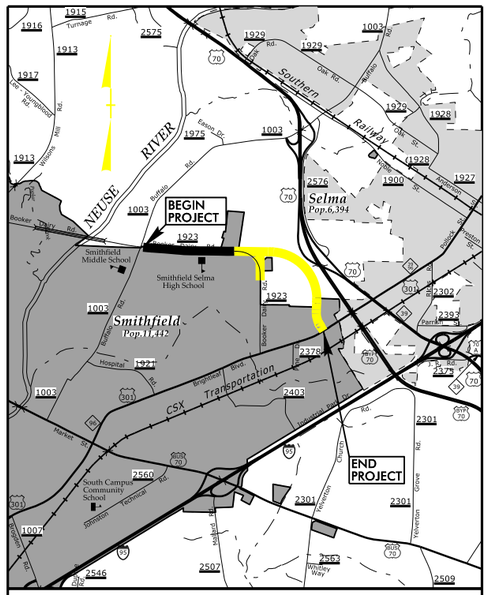
Swale ending at -L- 123+08 RT: Total DA: 5.4 ac (3.3 ac Impervious/ 2.1 ac Pervious), includes 3.7 ac from swale ending @ -L- 122+88 RT and 1.7 ac (0.69ac off-site) additional area. The on-site imp. DA decreased from 1.34ac to 1.02 ac. The swale provides 69' of additional treatment prior to entering BZ2 and an additional 54' +/- through the buffers before discharging into channel.

09/06/99

TIP PROJECT: U-3334B

CONTRACT:

See Sheet 1-B for Conventional Symbols
See Sheets 1-C thru 1-D for Survey Control Sheets



VICINITY MAP

ROW PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

JOHNSTON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3334B	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34929.1.3	STP-1923(12)	P.E.
34929.2.5	STP-1923(12)	R/W
34929.2.6		UTIL.

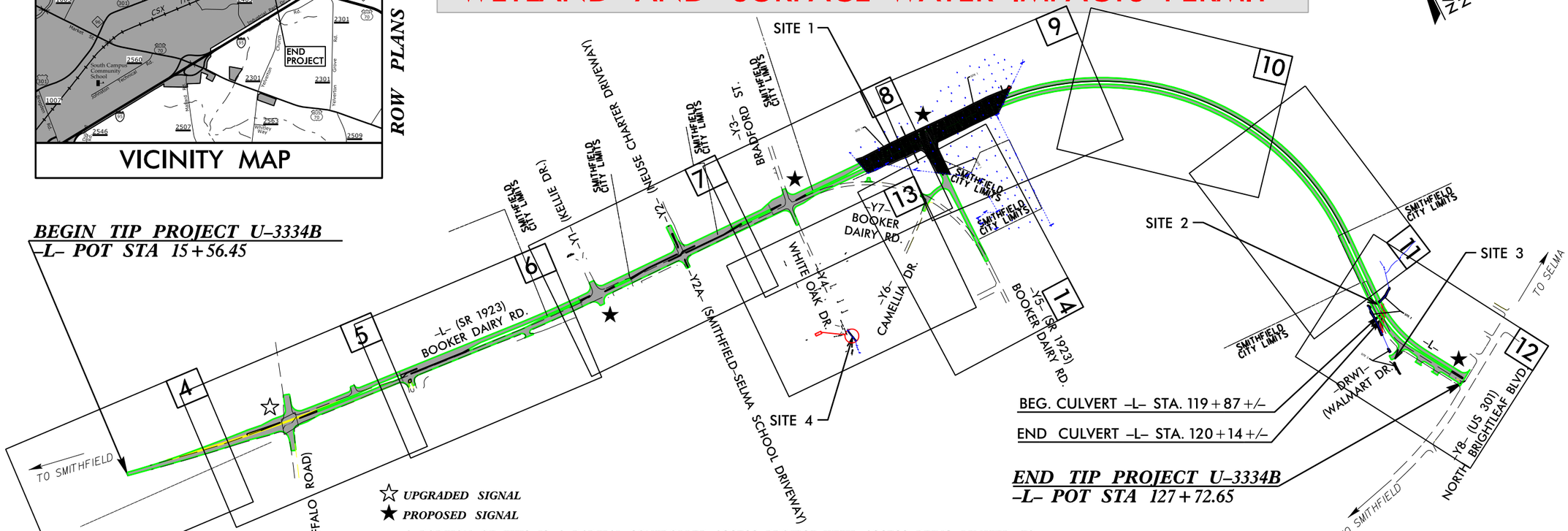
PERMIT DRAWING SHEET 1 OF 16

LOCATION: *SR 1923 EXTENSION (BOOKER DAIRY ROAD) FROM SR 1003 (BUFFALO ROAD) TO US 301 (BRIGHTLEAF BOULEVARD)*

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERT, AND SIGNALS

WETLAND AND SURFACE WATER IMPACTS PERMIT

NSRS 2007 / 38 DAD



☆ *UPGRADED SIGNAL*
★ *PROPOSED SIGNAL*

BEG. CULVERT -L- STA. 119+87 +/-
END CULVERT -L- STA. 120+14 +/-

BEGIN TIP PROJECT U-3334B
-L- POT STA 15+56.45

END TIP PROJECT U-3334B
-L- POT STA 127+72.65

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

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF SMITHFIELD.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2018 = 10,637
ADT 2038 = 16,785
K = 9 %
D = 55 %
T = 3 % *
V = 50 MPH
* (1% TTST + 2% DUALS)
FUNC CLASS = URBAN COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-3334B = 2.123 MILES

LENGTH OF STRUCTURE TIP PROJECT U-3334B = 0.001 MILES

TOTAL LENGTH OF TIP PROJECT U-3334B = 2.124 MILES

Prepared In the Office of:

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Raleigh, NC 27606
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for the North Carolina Department of Transportation

2012 STANDARD SPECIFICATIONS	*STANTEC CONTACT*
RIGHT OF WAY DATE: JUNE 10, 2016	STEVE SMALLWOOD, P.E. *PROJECT ENGINEER*
LETTING DATE: JANUARY 16, 2018	*NCDOT CONTACT:* REKHA PATEL, P.E.

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

1/5/2017
mgberry
R:\Hydraulics\PERMITS_Environmental\Drawings\WETLANDS\U3334B_Hyd_prm_wet_tsh.dgn

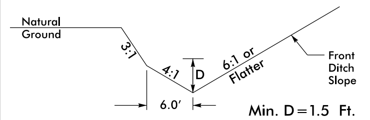
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULIC DESIGN ENGINEER

PERMIT DRAWING SHEET 2 OF 16

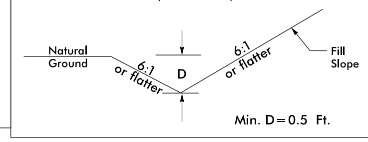
DRAINAGE DETAILS

DETAIL A
SPECIAL CUT DITCH w/HINGE (Not to Scale)



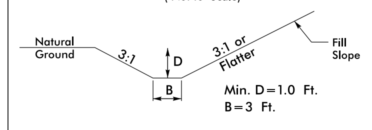
-L- STA. 20+00 TO STA. 25+00 (LT)

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



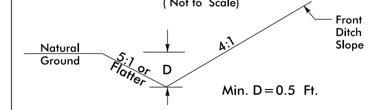
-L- STA. 29+00 TO STA. 31+05 (RT)

DETAIL C
SPECIAL LATERAL BASE DITCH (Not to Scale)



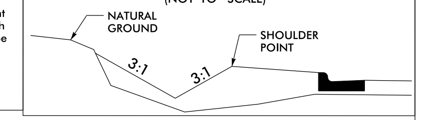
-Y- STA. 21+26 TO STA. 21+65 (RT)
-L- STA. 26+50 TO STA. 27+21 (RT)

DETAIL D
SPECIAL CUT DITCH (Not to Scale)



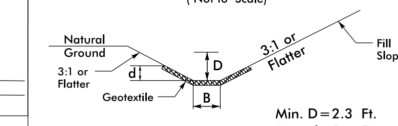
-L- STA. 31+65 TO STA. 32+50 (RT)

DETAIL E
SPECIAL BACK OF CURB LATERAL DITCH (NOT TO SCALE)



-L- STA. 29+50 TO STA. 32+50 (LT)

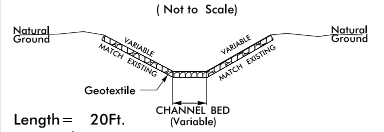
DETAIL F
SPECIAL LATERAL BASE DITCH (Not to Scale)



Geotextile=55sy
Est.= 36 Tons of Class I Rip-Rap

-L- STA. 32+71 TO STA. 32+94 (RT)

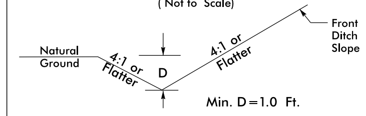
DETAIL G
PIPE OUTLET CHANNEL (Not to Scale)



Length= 20Ft.
Geotextile= 45sy
Est.= 32 Tons of Class I Rip-Rap

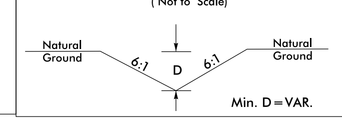
-L- STA.32+59 TO STA.32+76 (RT)

DETAIL H
SPECIAL CUT DITCH (Not to Scale)



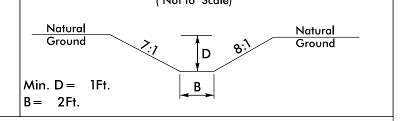
-Y- STA. 20+90 TO STA. 22+15 (LT)
-L- STA. 68+22 TO STA. 71+50 (LT)
-L- STA. 67+65 TO STA. 71+50 (RT)

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



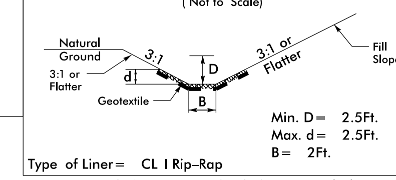
-L- STA. 52+15 (RT)

DETAIL J
STANDARD BASE DITCH (Not to Scale)



-L- STA. 66+71 (LT)

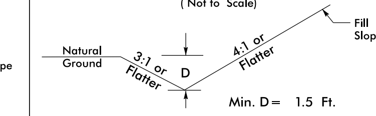
DETAIL K
SPECIAL LATERAL BASE DITCH (Not to Scale)



Type of Liner= CL I Rip-Rap

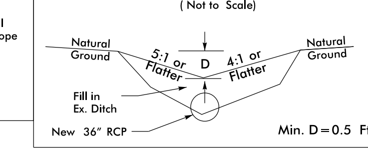
-Y4- STA. 10+93 TO STA. 11+50 (LT)

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



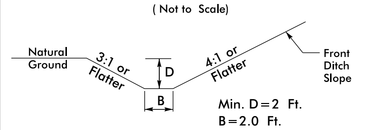
-Y4- STA. 11+50 TO STA. 12+00 (RT)
-L- STA. 86+00 TO STA. 90+82 (LT)
-L- STA. 99+50 TO STA. 102+50 (LT)
-L- STA. 95+50 TO STA. 107+00 (RT)

DETAIL M
FILL IN EX. DITCH (Not to Scale)



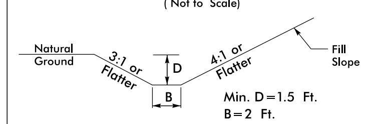
-Y4- STA. 12+41 TO STA. 13+25 (LT)

DETAIL N
SPECIAL LATERAL BASE DITCH (Not to Scale)



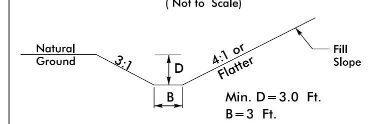
-L- STA. 84+35 TO STA. 91+49 (RT)
-L- STA. 91+50 TO STA. 95+50 (RT)

DETAIL O
SPECIAL LATERAL BASE DITCH (Not to Scale)



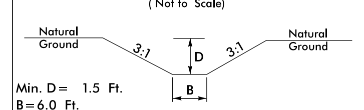
-L- STA. 90+82 TO STA. 96+00 (LT)
-L- STA. 102+50 TO STA. 116+50 (LT)
-L- STA. 107+00 TO STA. 115+74 (RT)

DETAIL P
SPECIAL LATERAL BASE DITCH (Not to Scale)



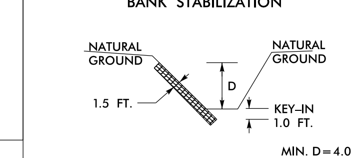
-L- STA. 116+45 TO STA. 117+89 (RT)

DETAIL R
STANDARD BASE DITCH (Not to Scale)



-L- STA. 123+46 (LT)
-L- STA. 123+48 (RT)

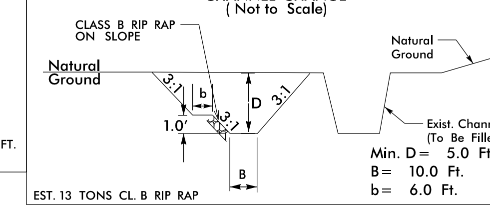
DETAIL S
BANK STABILIZATION



Type of Liner= CL I Rip-Rap

-L- STA. 118+71 (75' LT) TO
-L- STA. 119+17 (62' LT)
-L- STA. 122+82 (180' RT) TO
-L- STA. 123+54 (193' RT)

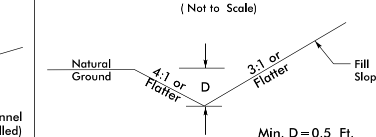
DETAIL T
CHANNEL CHANGE (Not to Scale)



EST. 13 TONS CL. B RIP RAP

-L- STA. 118+56 TO STA. 119+58 LT

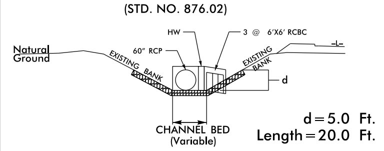
DETAIL V
SPECIAL LATERAL 'V' DITCH (Not to Scale)



-Y5- STA. 18+62 TO STA. 21+00 (RT)

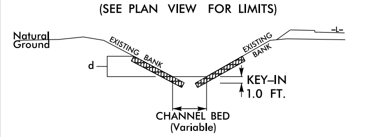
DETAIL W
RIP RAP AT OUTLET (Not to Scale)

RIP RAP AT PIPE OUTLET (STD. NO. 876.02)



d=5.0 Ft.
Length=20.0 Ft.

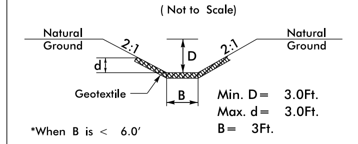
ADDITIONAL BANK STABILIZATION (SEE PLAN VIEW FOR LIMITS)



Est.= 140 Tons of Class I Rip-Rap

-L- STA. 120+52 TO STA. 121+00 (RT)

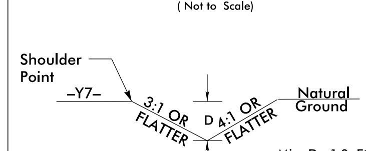
DETAIL X
STANDARD BASE DITCH (Not to Scale)



Type of Liner= CL I Rip-Rap

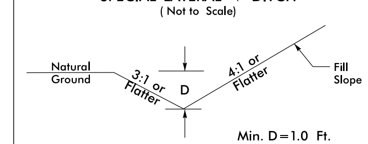
-Y4- STA. 20+24 TO STA. 20+81 (LT)

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



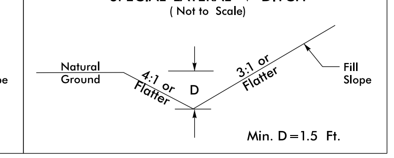
-Y7- STA. 15+00 TO STA. 16+08 (LT)

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



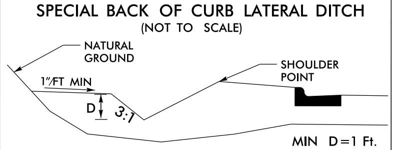
-Y5- STA. 14+25 TO STA. 15+50 (RT)
-Y5- STA. 14+50 TO STA. 18+00 (LT)
-Y6- STA. 10+40 TO STA. 11+50 (LT)
-L- STA. 96+00 TO STA. 98+50 (LT)

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



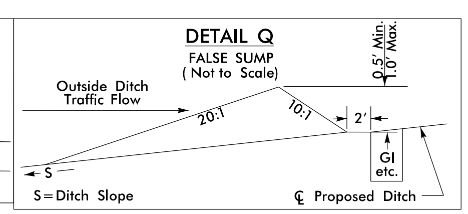
-Y5- STA. 18+00 TO STA. 20+50 (LT)

DETAIL BB
SPECIAL BACK OF CURB LATERAL DITCH (NOT TO SCALE)



-L- STA. 118+59 TO STA. 120+50 (RT)

DETAIL Q
FALSE SUMP (Not to Scale)



-L- STA. 14+40 (RT)
-L- STA. 19+33 (RT)
-L- STA. 21+33 (RT)
-L- STA. 24+55 (RT)
-L- STA. 26+33 (RT)

DETAIL U
(NOT TO SCALE)

SKEWED MULTI-BARREL CULVERT LOW FLOW CHANNEL SILLS

*NOTES:

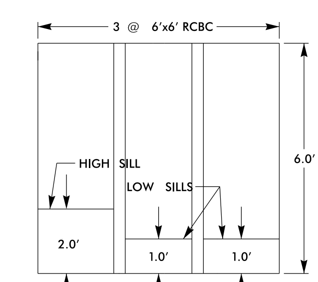
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE 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.

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

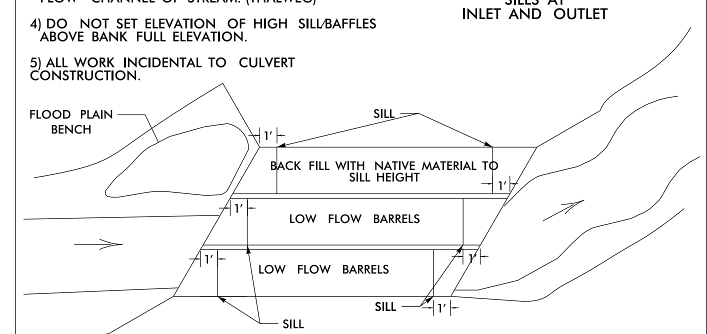
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL ELEVATION.

5) ALL WORK INCIDENTAL TO CULVERT CONSTRUCTION.



SILLS AT INLET AND OUTLET



PLAN VIEW

WETLAND AND SURFACE WATER IMPACTS PERMIT

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Stantec Consulting Services Inc.
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Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 3 OF 16

REVISIONS

8/17/99

11/30/2206 - R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 11,14,15 AND 17 THROUGH 21; UPDATED PROPERTY OWNER NAMES AND/OR DEED REFERENCES ON PARCELS 11,14 AND 23. - SS

LEGEND

- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING

NAD 83/NSRS 2007

SITE 1

MECHANIZED CLEARING

FILL IN WETLANDS

ENGLISH

GRAPHIC SCALE 100' 0' 100'

MATCHLINE -L- 63+50 SEE SHEET 7

MATCHLINE -L- 77+00 SEE SHEET 9

MATCHLINE -Y4- 15+00 SEE SHEET 13

MATCHLINE -Y7- 15+00 SEE SHEET 14

MECHANIZED CLEARING

TIMOTHY W. & NETA J. KETTERMAN

GRACE COMMUNITY ASSEMBLY OF GOD, INC.

BRG AH S 3°05'03.1" W

ISBK FIRST ASSEMBLY OF GOD CHURCH

JIMMY E. NORRIS

BARBARA NELLE ADAMS

JACKIE SUTTON THORNTON

BOBBY C. WHITFIELD

E & F PROPERTIES INC.

VENTURE CAPITAL PARTNERS

JOE LEIGH PARNELL

GEORGE W. CREECH JR. & DIANNE B. CREECH

JOHN ALAN JONES

JAMES CLINTON PARRISH

LEIGH WILLIFORD PITTMAN

JULIAN EDMUND BAKER JR.

WAYNE R. REGISTER

JESSIE HOUSTON WILLIFORD
CLARENCE THOMAS WILLIFORD

GEORGE C. MCLAMB PROPERTIES

ANTHONY VINCENT CRIMALDI

LMR RENTALS

JO LEIGH PARNELL

S 89°03'18.2" E

S 8°27'23.1" W

S 6°32'53.0" E

S 5°08'41.6" W

CITY LIMITS

SR 1923 BOOKER DAIRY RD 22' BST

STANDARD 2' BASE DITCH SEE DETAIL J (SHEET 2D-1) SLOPE = 5.180% EST. DDE = 65 CY

CB SEE SPECIAL DETAIL

SPECIAL CUT DITCH SEE DETAIL H (SHEET 2D-1)

SEE SPEC. DET. SHEET 2C-1

SPECIAL LATERAL 'V' DITCH SEE DETAIL L (SHEET 2D-1)

SP. LATERAL 2' BASE DITCH SEE DETAIL K (SHEET 2D-1) CL I RIP RAP EST. 70 TONS EST. 116 SY GF

FILL IN EX. DITCH SEE DETAIL M (SHEET 2D-1)

CL RIP RAP EST. 7 TONS EST. 7 SY GF

2GI-A W/OUT APRON

RETAIN PIPE

REMOVE EX. SYSTEM

RETAIN EX. DITCH

FILL EX. DITCH

10' DRAINAGE & UTILITY EASEMENT

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

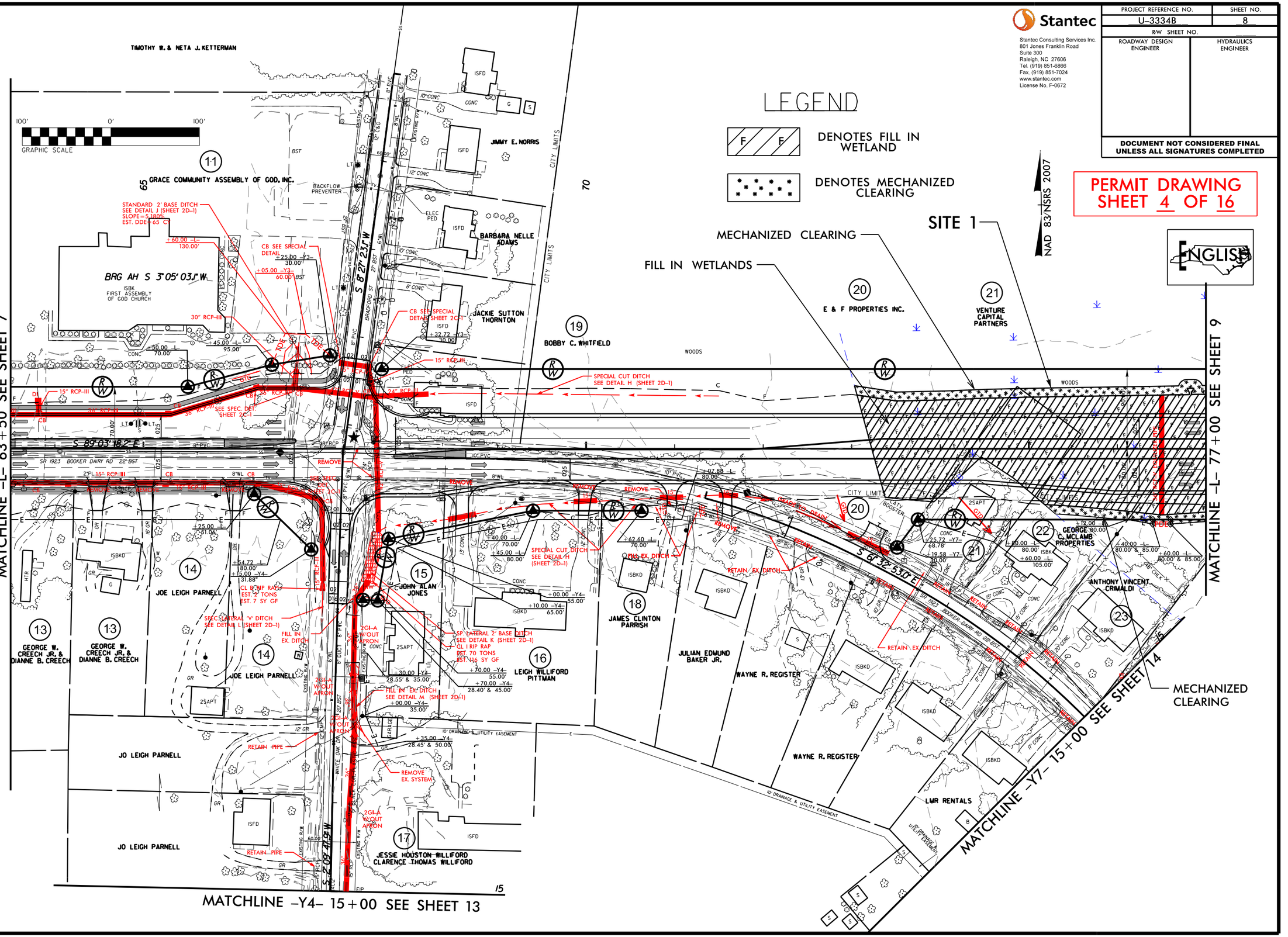
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 4 OF 16

ENGLISH

REVISIONS
8/17/99
11/30/2016 — R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 11,14,15 AND 17 THROUGH 21; UPDATED PROPERTY OWNER NAMES AND/OR DEED REFERENCES ON PARCELS 11,14 AND 23. - SS

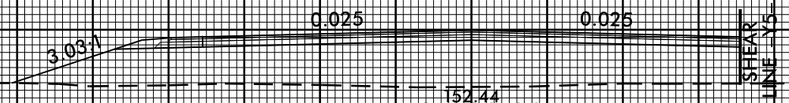


6/23/16

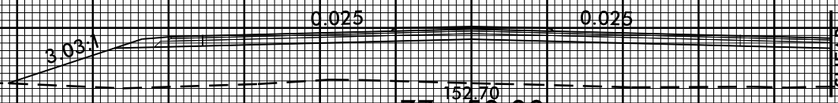
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-3334B	X-34

PERMIT DRAWING
SHEET 5 OF 16

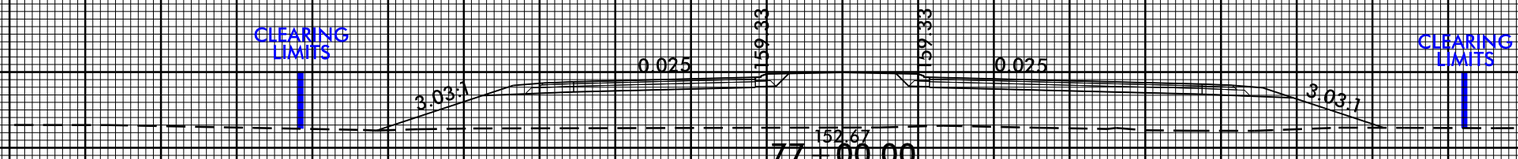
78+00.00



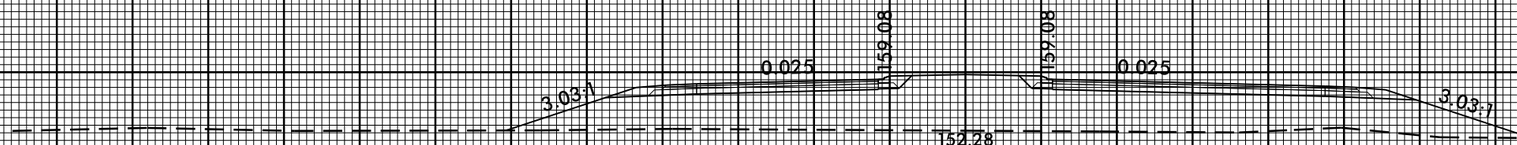
77+50.00



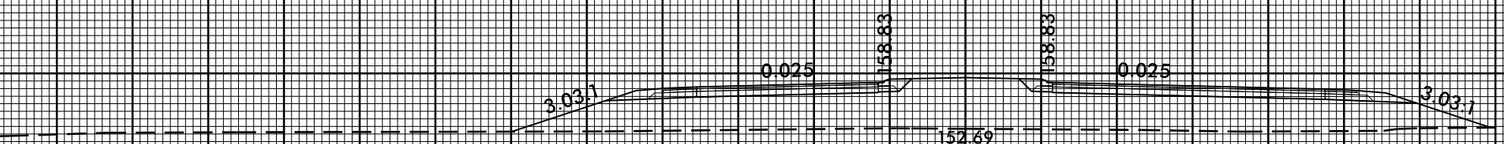
77+00.00



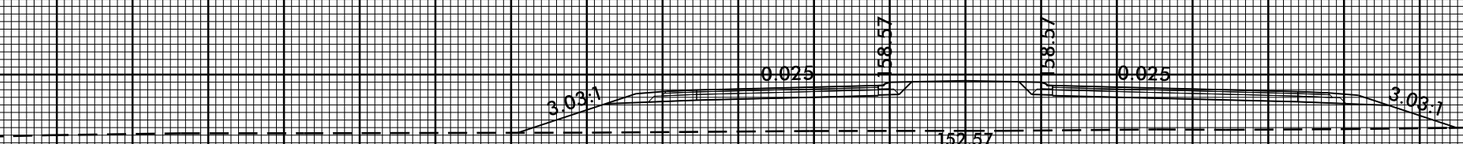
76+50.00



76+00.00



75+50.00



-4-

9/15/2017
beanderson
R:\Hydraulics\PERMITS Environmental\Drawings\WETLANDS\U3334B Hyd prm XPL-21 .dgn

WETLAND AND SURFACE WATER IMPACTS PERMIT

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

REVISIONS
9/18/2017 - R/W REVISION: CREATED PARCEL 23Z; ADDED TCE ON PARCEL 23Z.- SS

8/17/99

10/4/2017
mgberry
R:\Hydraulics\PERMITS_Environmental\Drawings\WETLANDS\U3334B_Hyd_prm_wet_psh9.dgn

LEGEND

⁘	DENOTES MECHANIZED CLEARING
▨ F	DENOTES FILL IN WETLAND

(24)
NELL M. HOWELL
REVOCABLE TRUST

-L-

PI Sta 102+71.66
Δ = 90° 31' 41.4" (RT)
D = 2° 56' 17.7"
L = 3,081.03'
T = 1,968.06'
R = 1,950.00'
Se = .03
RUNOFF = 108'

100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING
SHEET 6 OF 16

WETLAND AND SURFACE WATER IMPACTS PERMIT

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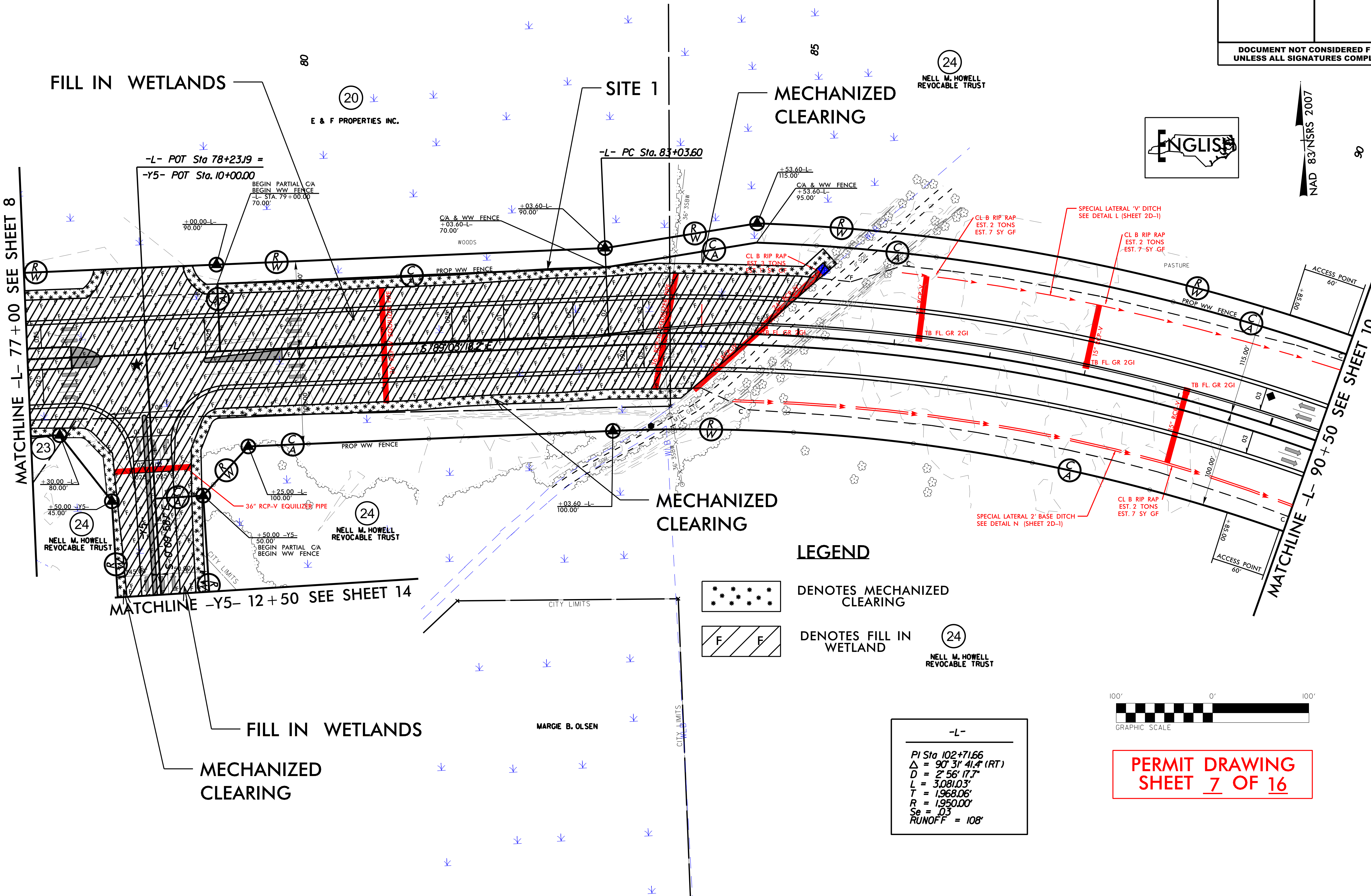
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	9
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

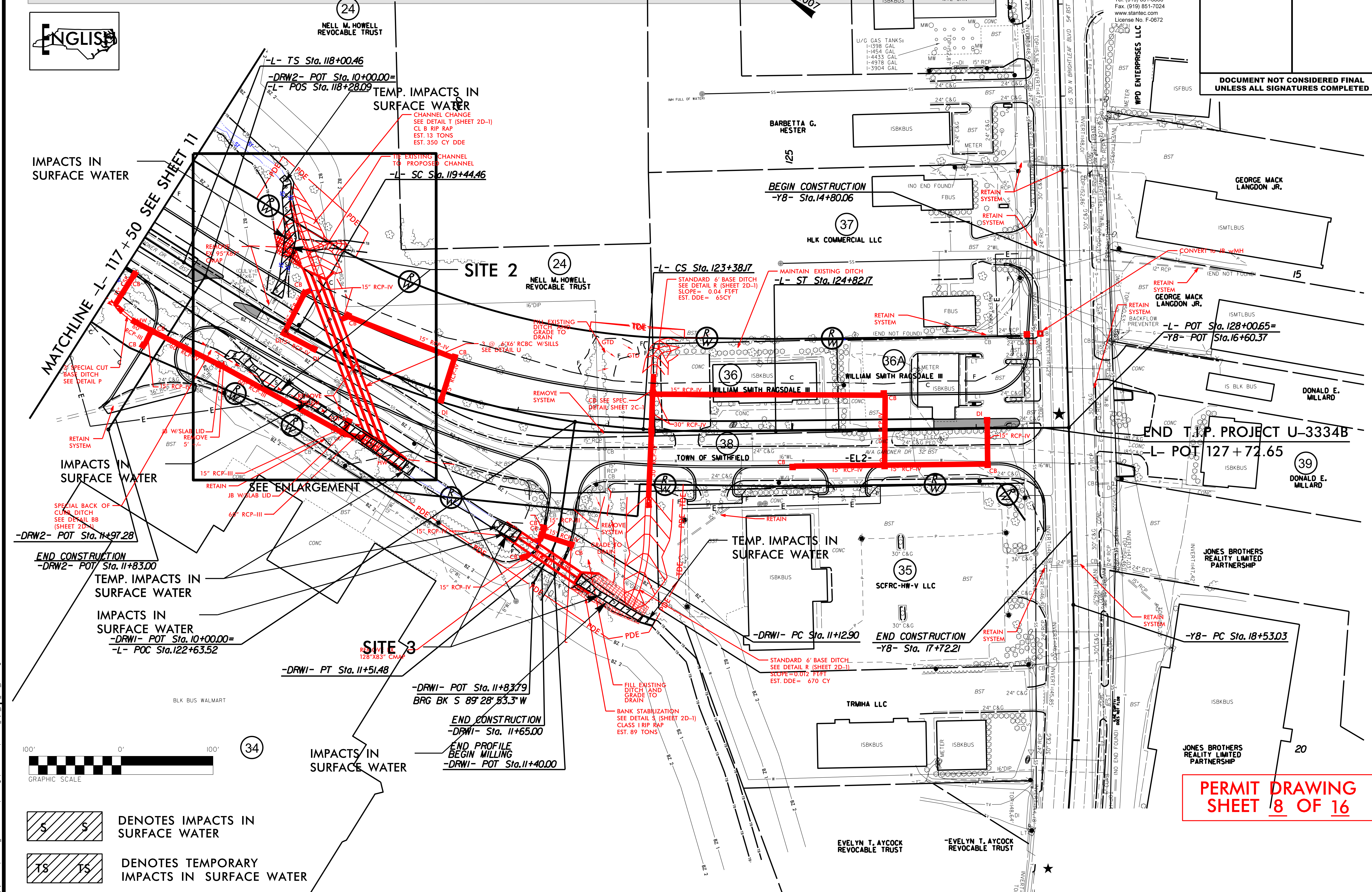
9/18/2017 - R/W REVISION: CREATED PARCEL 23Z; ADDED TCE ON PARCEL 23Z. - SS


FILL IN WETLANDS
SITE 1
MECHANIZED CLEARING
E & F PROPERTIES INC.
NELL M. HOWELL REVOCABLE TRUST
MARGIE B. OLSEN
-L- POT Sta 78+23.19 =
-Y5- POT Sta 10+00.00
-L- PC Sta. 83+03.60
S 89°05'18.2" E
MATCHLINE -L- 77+00 SEE SHEET 8
MATCHLINE -L- 90+50 SEE SHEET 10
MATCHLINE -Y5- 12+50 SEE SHEET 14
36" RCP-V EQUILIZER PIPE
CL B RIP RAP EST. 2 TONS EST. 7 SY GF
SPECIAL LATERAL 'V' DITCH SEE DETAIL L (SHEET 2D-1)
SPECIAL LATERAL 2' BASE DITCH SEE DETAIL N (SHEET 2D-1)
TB FL. GR 2GI
PROP WW FENCE
ACCESS POINT
PASTURE
WOODS
CITY LIMITS
NAD 83/NSRS 2007
ENGLISH
LEGEND
DENOTES MECHANIZED CLEARING
DENOTES FILL IN WETLAND
GRAPHIC SCALE
100' 0' 100'

-L-
PI Sta 102+71.66
Δ = 90° 31' 41.4" (RT)
D = 2° 56' 17.7"
L = 3,081.03'
T = 1,968.06'
R = 1,950.00'
Se = .03
RUNOFF = 108'

PERMIT DRAWING SHEET 7 OF 16

WETLAND AND SURFACE WATER IMPACTS PERMIT



ENGLISH
NAD 83/NSRS 2007
SITE 2
SITE 3
SEE ENLARGEMENT
MATCHLINE -L- 117+50 SEE SHEET 11
IMPACTS IN SURFACE WATER
TEMP. IMPACTS IN SURFACE WATER
-L- TS Sta. 118+00.46
-DRW2- POT Sta. 10+00.00=
-L- POS Sta. 118+28.09
-L- SC Sta. 119+44.46
-L- CS Sta. 123+38.17
-L- ST Sta. 124+82.17
BEGIN CONSTRUCTION
-Y8- Sta. 14+80.06
-L- POT Sta. 128+00.65=
-Y8- POT Sta. 16+60.37
END T.I.P. PROJECT U-3334B
-L- POT 127+72.65
-DRW2- POT Sta. 11+97.28
END CONSTRUCTION
-DRW2- POT Sta. 11+83.00
-DRW1- POT Sta. 10+00.00=
-L- POC Sta. 122+63.52
-DRW1- PT Sta. 11+51.48
-DRW1- POT Sta. 11+83.79
BRG BK S 89°28'53.3" W
END CONSTRUCTION
-DRW1- Sta. 11+65.00
END PROFILE
BEGIN MILLING
-DRW1- POT Sta. 11+40.00
-DRW1- PC Sta. 11+12.90
END CONSTRUCTION
-Y8- Sta. 17+72.21
-Y8- PC Sta. 18+53.03
CHANNEL CHANGE
SEE DETAIL T (SHEET 2D-1)
CL B RIP RAP
EST. 13 TONS
EST. 350 CY DDE
TIE EXISTING CHANNEL TO PROPOSED CHANNEL
STANDARD 6' BASE DITCH
SEE DETAIL R (SHEET 2D-1)
SLOPE= 0.04 FT/FT
EST. DDE= 65CY
MAINTAIN EXISTING DITCH
FILL EXISTING DITCH AND GRADE TO DRAIN
3 @ 6'X6' RCBC W/SILLS
SEE DETAIL U
3' SPECIAL CUT BASE DITCH
SEE DETAIL P
SPECIAL BACK OF CURB DITCH
SEE DETAIL BB
(SHEET 2D-1)
STANDARD 6' BASE DITCH
SEE DETAIL R (SHEET 2D-1)
SLOPE=0.012 FT/FT
EST. DDE= 670 CY
FILL EXISTING DITCH AND GRADE TO DRAIN
BANK STABILIZATION
SEE DETAIL S (SHEET 2D-1)
CLASS I RIP RAP
EST. 89 TONS
RETAIN SYSTEM
REMOVE SYSTEM
CONVERT TO JB w/MH
NELL M. HOWELL REVOCABLE TRUST
BARBETTA G. HESTER
HLK COMMERCIAL LLC
GEORGE MACK LANGDON JR.
WILLIAM SMITH RAGSDALE III
TOWN OF SMITHFIELD
SCFRC-HW-V LLC
DONALD E. MILLARD
JONES BROTHERS REALITY LIMITED PARTNERSHIP
TRMIHA LLC
EVELYN T. AYCOCK REVOCABLE TRUST
WPD ENTERPRISES LLC
BLK BUS WALMART
GRAPHIC SCALE
100' 0' 100'

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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www.stantec.com
License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

11/30/2016 - R/W REVISIONS: ADDED PARCEL 36A; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCEL 35, 36A, 37 AND 39;
UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 35. - SS
3/14/2017 - R/W REVISION: ADDED TDE TO PARCELS 24 & 37 AND REVISED PDE ON PARCELS 34 & 35. - SS

8/17/99

8/7/2017
mgberry
R:\Hydraulics\PERMITS_Environmental\Drawings\WETLANDS\U3334B_Hyd_prm_wet_psh12.dgn

PERMIT DRAWING
SHEET 8 OF 16

WETLAND AND SURFACE WATER IMPACTS PERMIT

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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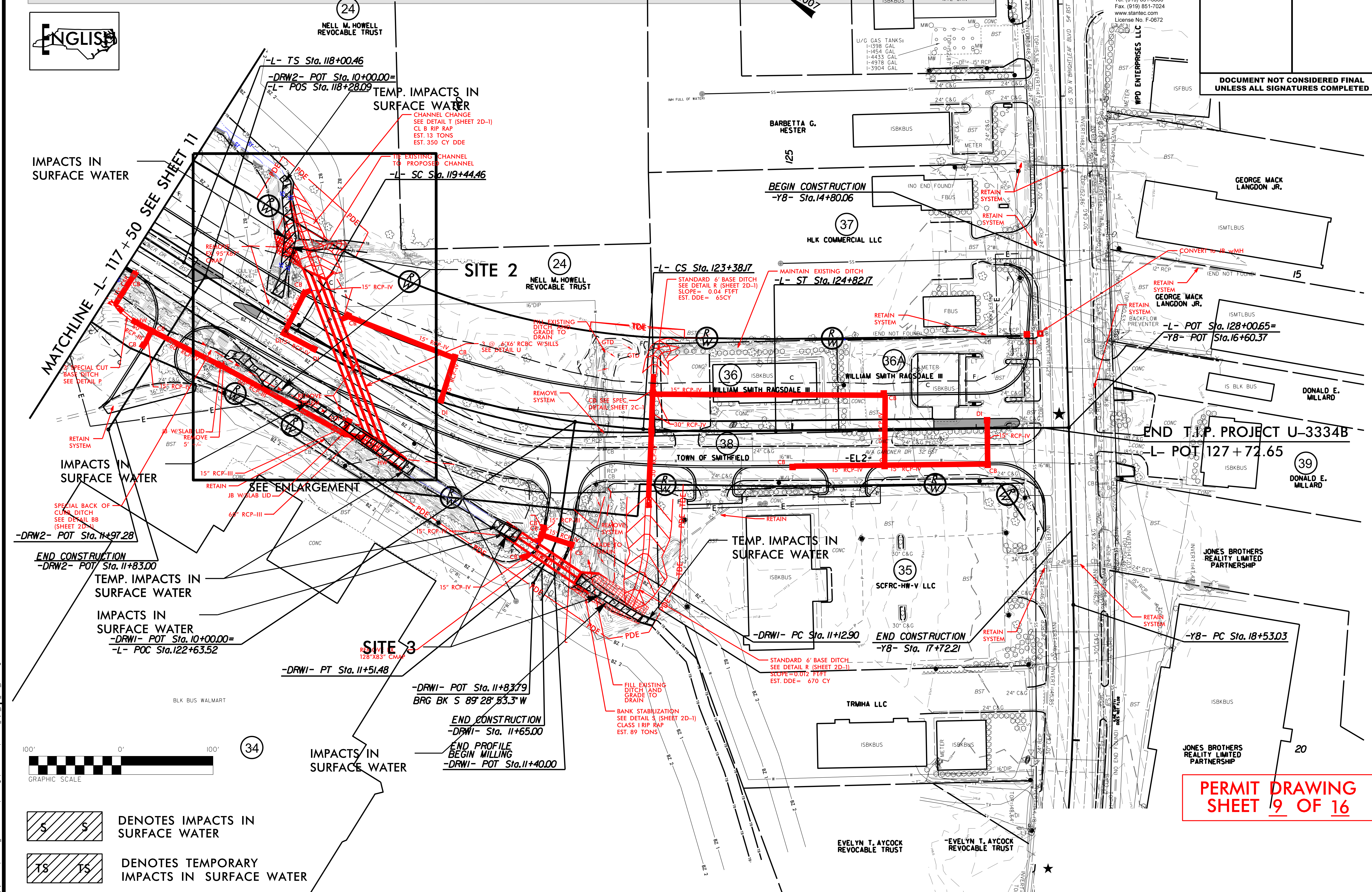
License No. F-0672

REVISIONS

11/30/2016 - R/W REVISIONS: ADDED PARCEL 36A; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCEL 35, 36A, 37 AND 39; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 35. - SS
3/14/2017 - R/W REVISION: ADDED TDE TO PARCELS 24 & 37 AND REVISED PDE ON PARCELS 34 & 35. - SS

ENGLISH



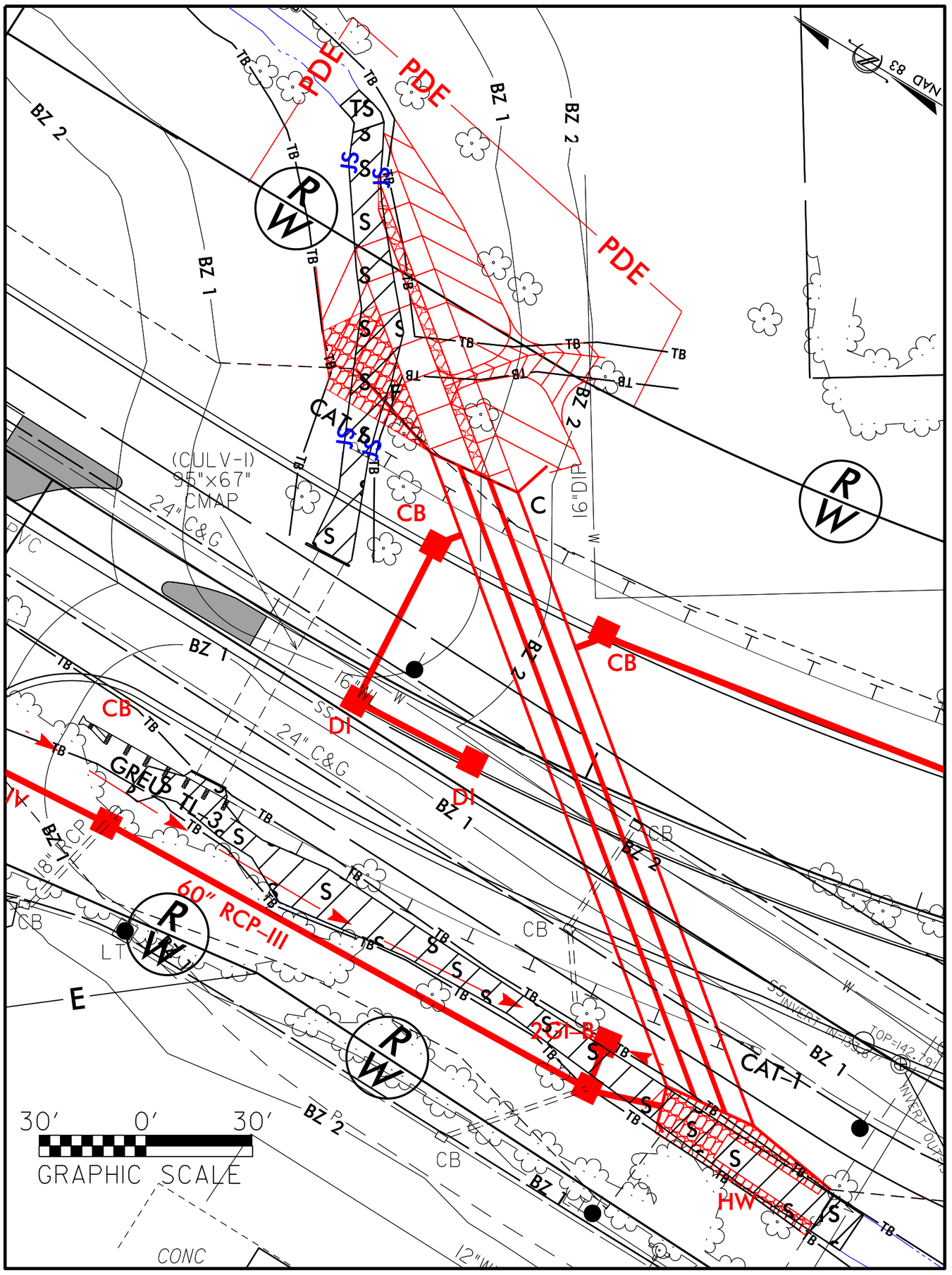
NAD 83/NSRS 2007
MATCHLINE -L- 117+50 SEE SHEET 11
SITE 2
SITE 3
SEE ENLARGEMENT
-L- TS Sta. 118+00.46
-DRW2- POT Sta. 10+00.00= -L- POS Sta. 118+28.09
TEMP. IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
-L- SC Sta. 119+44.46
-L- CS Sta. 123+38.17
-L- ST Sta. 124+82.17
BEGIN CONSTRUCTION -Y8- Sta. 14+80.06
-L- POT Sta. 128+00.65= -Y8- POT Sta. 16+60.37
END T.I.P. PROJECT U-3334B -L- POT 127+72.65
-DRW2- POT Sta. 11+97.28
END CONSTRUCTION -DRW2- POT Sta. 11+83.00
-DRW1- POT Sta. 10+00.00= -L- POC Sta. 122+63.52
-DRW1- PT Sta. 11+51.48
-DRW1- POT Sta. 11+83.79
BRG BK S 89°28'53.3" W
END CONSTRUCTION -DRW1- Sta. 11+65.00
END PROFILE BEGIN MILLING -DRW1- POT Sta. 11+40.00
-DRW1- PC Sta. 11+12.90
END CONSTRUCTION -Y8- Sta. 17+72.21
-Y8- PC Sta. 18+53.03
NELL M. HOWELL REVOCABLE TRUST
BARBETTA G. HESTER
HLK COMMERCIAL LLC
GEORGE MACK LANGDON JR.
WILLIAM SMITH RAGSDALE III
TOWN OF SMITHFIELD
DONALD E. MILLARD
JONES BROTHERS REALITY LIMITED PARTNERSHIP
SCFRC-HW-V LLC
TRMIHA LLC
EVELYN T. AYCOCK REVOCABLE TRUST
WPD ENTERPRISES LLC
CHANNEL CHANGE SEE DETAIL T (SHEET 2D-1) CL B RIP RAP EST. 13 TONS EST. 350 CY DDE
STANDARD 6' BASE DITCH SEE DETAIL R (SHEET 2D-1) SLOPE= 0.04 FT/FT EST. DDE= 65CY
STANDARD 6' BASE DITCH SEE DETAIL R (SHEET 2D-1) SLOPE=0.012 FT/FT EST. DDE= 670 CY
BANK STABILIZATION SEE DETAIL S (SHEET 2D-1) CLASS I RIP RAP EST. 89 TONS
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PERMIT DRAWING SHEET 9 OF 16

8/17/99
8/7/2017 mgberry R:\Hydraulics\PERMITS_Environmental\Drawings\WETLANDS\U3334B_Hyd_prm_wet_psh12.dgn



ENGLISH

SITE 2
ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

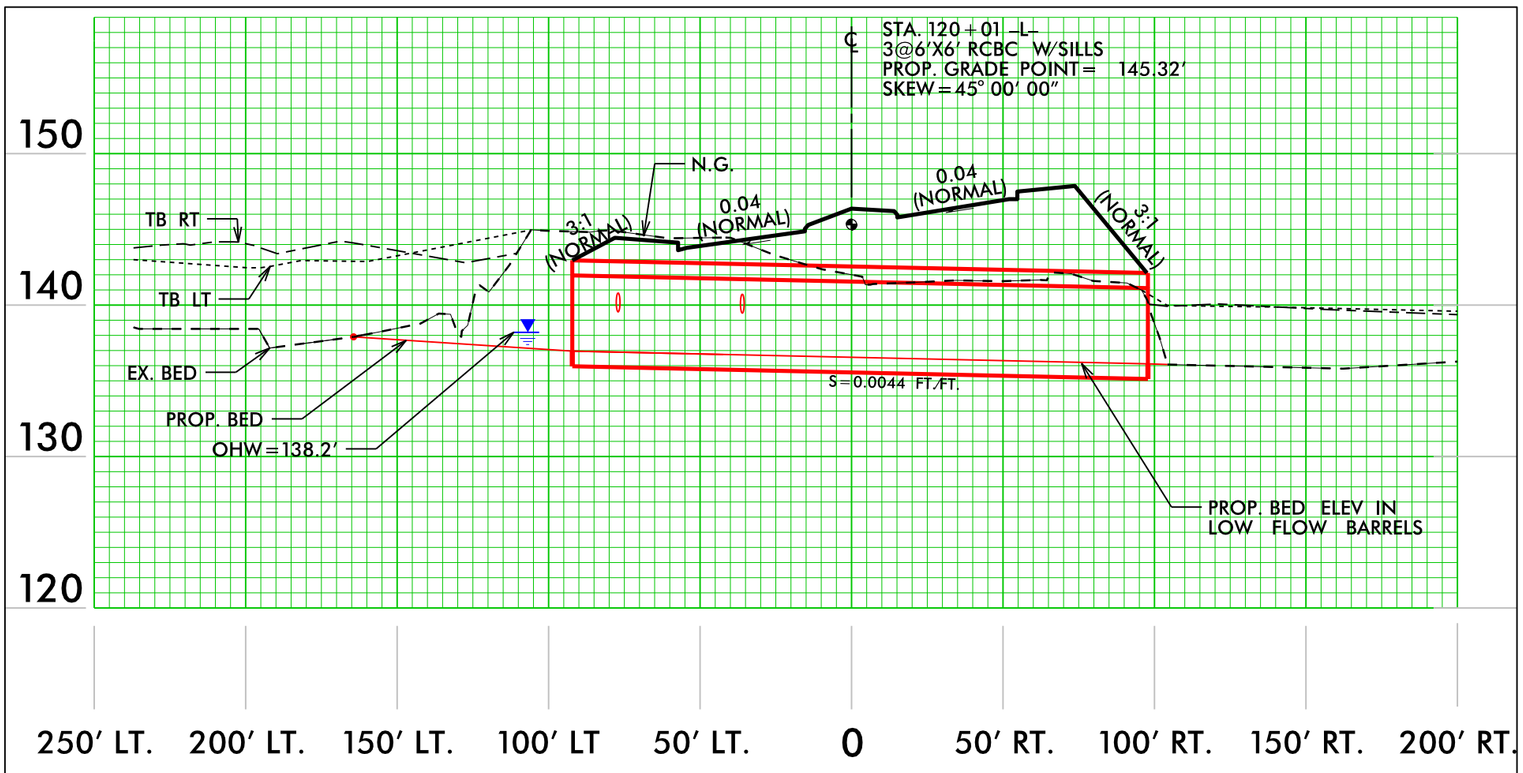
NCDOT

DIVISION OF HIGHWAYS
JOHNSTON COUNTY

PROJECT: 34929.1.3 (U-3334B)

SR1923 EXTENSION (BOOKER DAIRY RD) FROM SR1003 (BUFFALO RD) TO US 301 (BRIGHTLEAF BLVD)

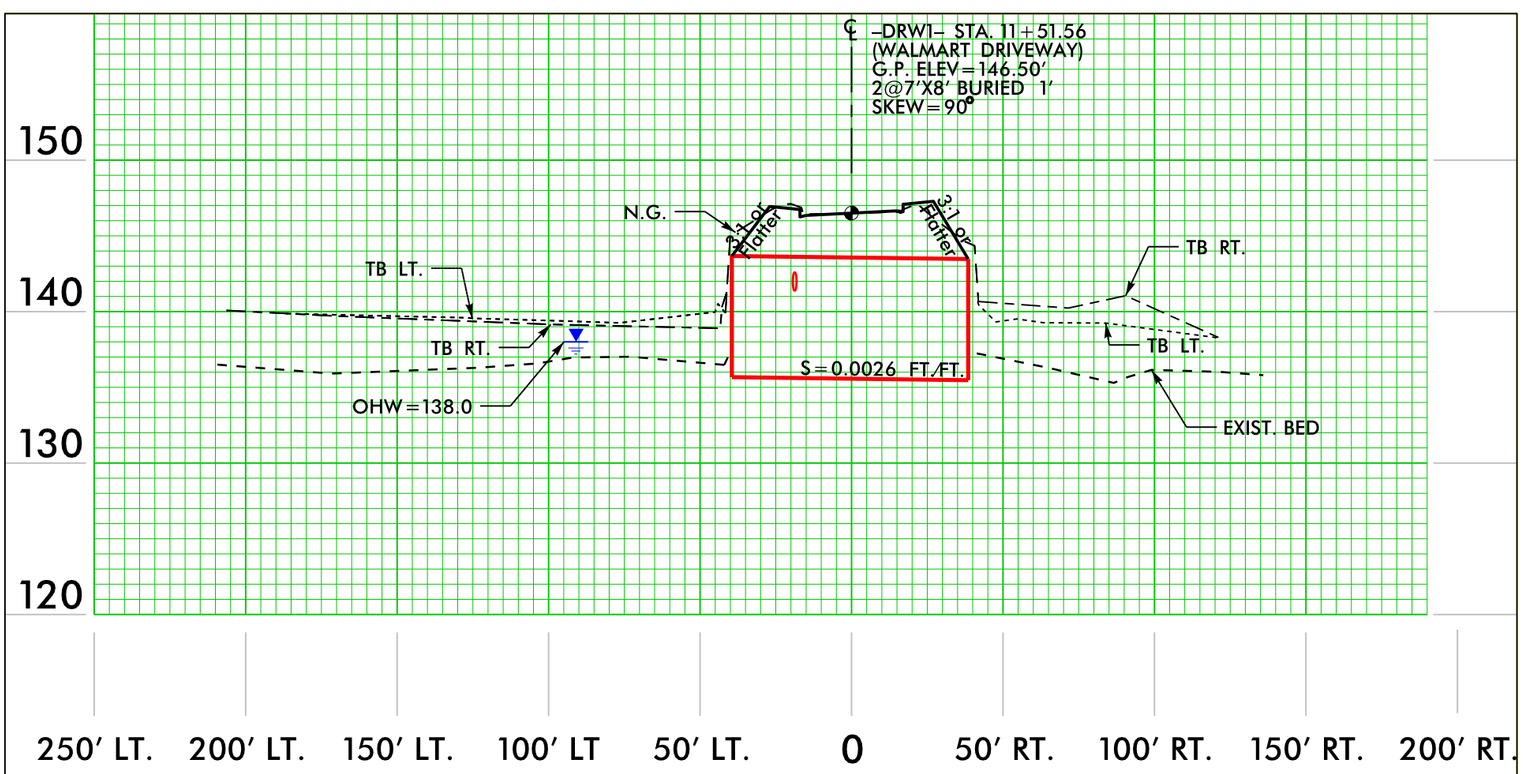
08 / 07 / 2017



SCALE
HORIZ: 1" = 50'
VERT: 1" = 10'

SITE 2
-L- CULVERT PROFILE

NCDOT
DIVISION OF HIGHWAYS
JOHNSTON COUNTY
PROJECT: 34929.1.3 (U-3334B)
SR 1923 EXTENSION (BOOKER DAIRY RD) FROM SR 1003 (BUFFALE RD) TO US 301 (BRIGHTLEAF BLVD)



SCALE
HORIZ: 1" = 50'
VERT: 1" = 10'

SITE 3
-DRW1- WALMART
CULVERT PROFILE

NCDOT
DIVISION OF HIGHWAYS
JOHNSTON COUNTY
PROJECT: 34929.1.3 (U-3334B)
SR 1923 EXTENSION (BOOKER DAIRY RD) FROM SR 1003 (BUFFALE RD) TO US 301 (BRIGHTLEAF BLVD)

WETLAND AND SURFACE WATER IMPACTS PERMIT

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 12 OF 16

NAD 83/NSRS 2007

ENGLISH

REVISIONS

11/30/2016 - R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 31 AND 40; SUBDIVIDED PARCEL 32 INTO PARCELS 32 AND 40; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 32 - SS

8/17/99

MATCHLINE -Y4- 15+00 SEE SHEET 8

-Y4-	-Y4-
PI Sta 16+22.02	PI Sta 21+40.95
Δ = 0° 47' 49.0" (RT)	Δ = 46° 36' 26.9" (RT)
D = 0° 34' 22.6"	D = 42° 26' 28.7"
L = 139.09'	L = 109.82'
T = 69.55'	T = 58.15'
R = 10,000.00'	R = 135.00'
Se = EXISTING	Se = EXISTING

PC Sta. 15+52.47

PT Sta. 16+91.56

PC Sta. 20+82.80

PT Sta. 21+92.61
BRG AH S 49° 34' 03.9" W

POT Sta. 22+08.59

END CONSTRUCTION
-Y4- Sta. 21+10.00

SITE 4

JO LEIGH PARNELL

ROBERT C. & JOYCE V. MARR

CARLTON G. PERNELL

THOMAS O. & TERESA BARBOUR LIFE ESTATE

ROBERT N. REPASS

WILLIAM OTIS DAUGHTRY

MICHAEL L. NEWSOME

SHARON PROCTOR STALLS

OPERATION HOMEFRONT INC.

DAVID P. JR & JEAN GRAHAM

GAIL J. GELLENTHIN

UNKNOWN
PB 17 PG 101

REMOVE EX. SYSTEM

REMOVE TO EX. DITCH

STANDARD 3' BASE DITCH
SEE DETAIL X
SLOPE = 0.300%
EST. DOT = 175 CY
EST. = 80 TONS OF CLASS I RIP RAP

EXTEND RIP RAP 20' (+/-) FOR EROSION CONTROL
EST. = 15 TONS OF CLASS I RIP RAP

3X ENLARGEMENT

IMPACTS IN SURFACE WATER

TEMP. IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

100' 0' 100'
GRAPHIC SCALE

NOTES:

SEE SHEET 21 FOR -Y4- PROFILE.

1/3/2017
mgberry
K:\Projects\PERMITS_Environmental\Drawings\WETLANDS\U3334B_Wetland_work_mxd13.dgn

WETLAND AND SURFACE WATER IMPACTS PERMIT

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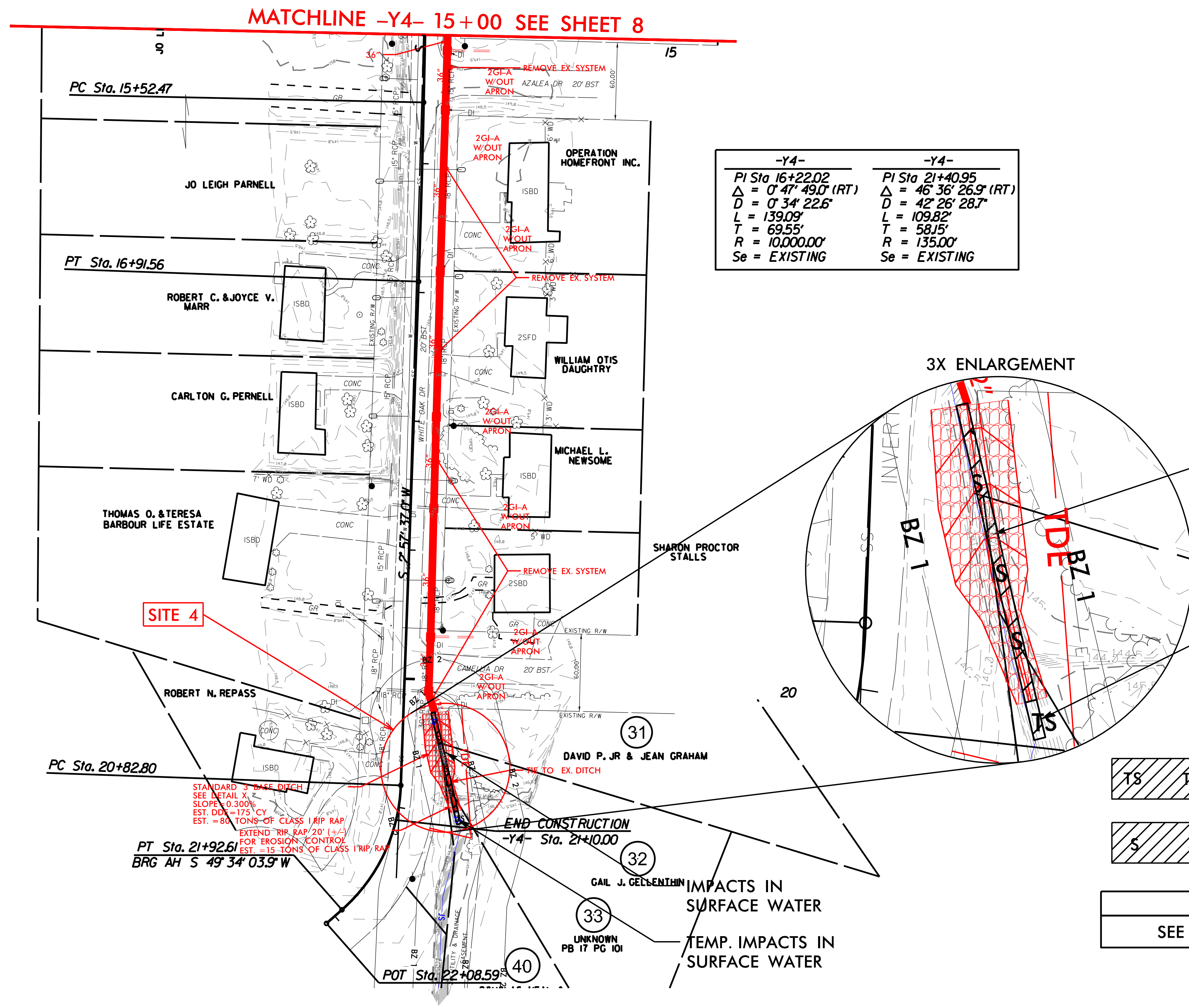
License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	13
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 13 OF 16

REVISIONS
11/30/2016 - R/W REVISIONS: ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 31 AND 40; SUBDIVIDED PARCEL 32 INTO PARCELS 32 AND 40; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 32.- SS



-Y4-	-Y4-
PI Sta 16+22.02	PI Sta 21+40.95
Δ = 0° 47' 49.0" (RT)	Δ = 46° 36' 26.9" (RT)
D = 0° 34' 22.6"	D = 42° 26' 28.7"
L = 139.09'	L = 109.82'
T = 69.55'	T = 58.15'
R = 10,000.00'	R = 135.00'
Se = EXISTING	Se = EXISTING

TS / TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S / S — DENOTES IMPACTS IN SURFACE WATER

NOTES:
SEE SHEET 21 FOR -Y4- PROFILE.

WETLAND AND SURFACE WATER IMPACTS PERMIT

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Fax. (919) 851-7024
www.stantec.com
License No. F-0672

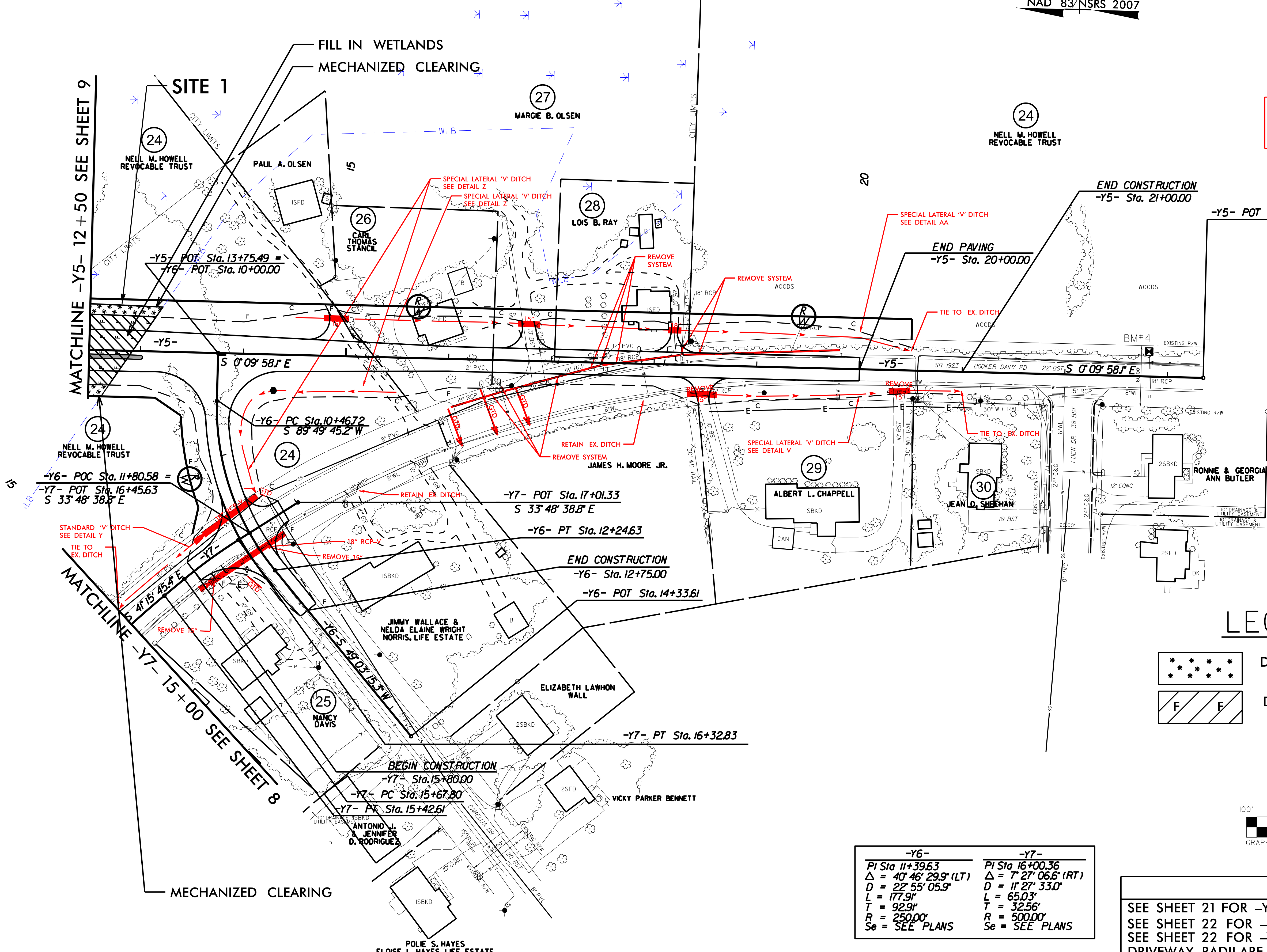
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	14
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 14 OF 16

NAD 83/NSRS 2007


FILL IN WETLANDS
MECHANIZED CLEARING
SITE 1
MATCHLINE -Y5- 12+50 SEE SHEET 9
MATCHLINE -Y7- 15+00 SEE SHEET 8
24
NELL M. HOWELL REVOCABLE TRUST
PAUL A. OLSEN
27
MARGIE B. OLSEN
26
CARL THOMAS STANCIL
28
LOIS B. RAY
-Y5- POT Sta. 13+75.49 =
-Y6- POT Sta. 10+00.00
-Y5-
S 0°09' 58.1" E
SPECIAL LATERAL 'V' DITCH SEE DETAIL Z
REMOVE SYSTEM
SPECIAL LATERAL 'V' DITCH SEE DETAIL AA
END CONSTRUCTION
-Y5- Sta. 21+00.00
-Y5- POT Sta. 23+34.69
END PAVING
-Y5- Sta. 20+00.00
TIE TO EX. DITCH
WOODS
BM#4
SR 1923 BOOKER DAIRY RD
-Y6- PC Sta. 10+46.72
S 89°49' 45.2" W
RETAIN EX. DITCH
JAMES H. MOORE JR.
SPECIAL LATERAL 'V' DITCH SEE DETAIL V
29
ALBERT L. CHAPPELL
30
JEAN O. SHEEHAN
RONNIE & GEORGIA ANN BUTLER
-Y6- POC Sta. 11+80.58 =
-Y7- POT Sta. 16+45.63
S 33°48' 38.8" E
-Y7- POT Sta. 17+01.33
S 33°48' 38.8" E
-Y6- PT Sta. 12+24.63
STANDARD 'V' DITCH SEE DETAIL Y
TIE TO EX. DITCH
END CONSTRUCTION
-Y6- Sta. 12+75.00
-Y6- POT Sta. 14+33.61
41°15' 45.4" E
REMOVE 15"
JIMMY WALLACE & NELDA ELAINE WRIGHT NORRIS, LIFE ESTATE
-Y6- S 49°03' 15.3" W
ELIZABETH LAWHON WALL
25
NANCY DAVIS
-Y7- PT Sta. 16+32.83
BEGIN CONSTRUCTION
-Y7- Sta. 15+80.00
-Y7- PC Sta. 15+67.80
-Y7- PT Sta. 15+42.61
ANTONIO J. & JENNIFER D. RODRIGUEZ
VICKY PARKER BENNETT
POLIE S. HAYES
ELOISE L. HAYES LIFE ESTATE
MECHANIZED CLEARING
GRAPHIC SCALE
100'
0'
100'

-Y6-	-Y7-
PI Sta 11+39.63	PI Sta 16+00.36
Δ = 40° 46' 29.9" (LT)	Δ = 7° 27' 06.6" (RT)
D = 22° 55' 05.9"	D = 11° 27' 33.0"
L = 177.91'	L = 65.03'
T = 92.91'	T = 32.56'
R = 250.00'	R = 500.00'
Se = SEE PLANS	Se = SEE PLANS

LEGEND

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

NOTES:

SEE SHEET 21 FOR -Y5- PROFILE.
SEE SHEET 22 FOR -Y6- PROFILE.
SEE SHEET 22 FOR -Y7- PROFILE.
DRIVEWAY RADII ARE 20' UNLESS NOTED OTHERWISE

WETLAND AND SURFACE WATER IMPACTS PERMIT

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	14

RW SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

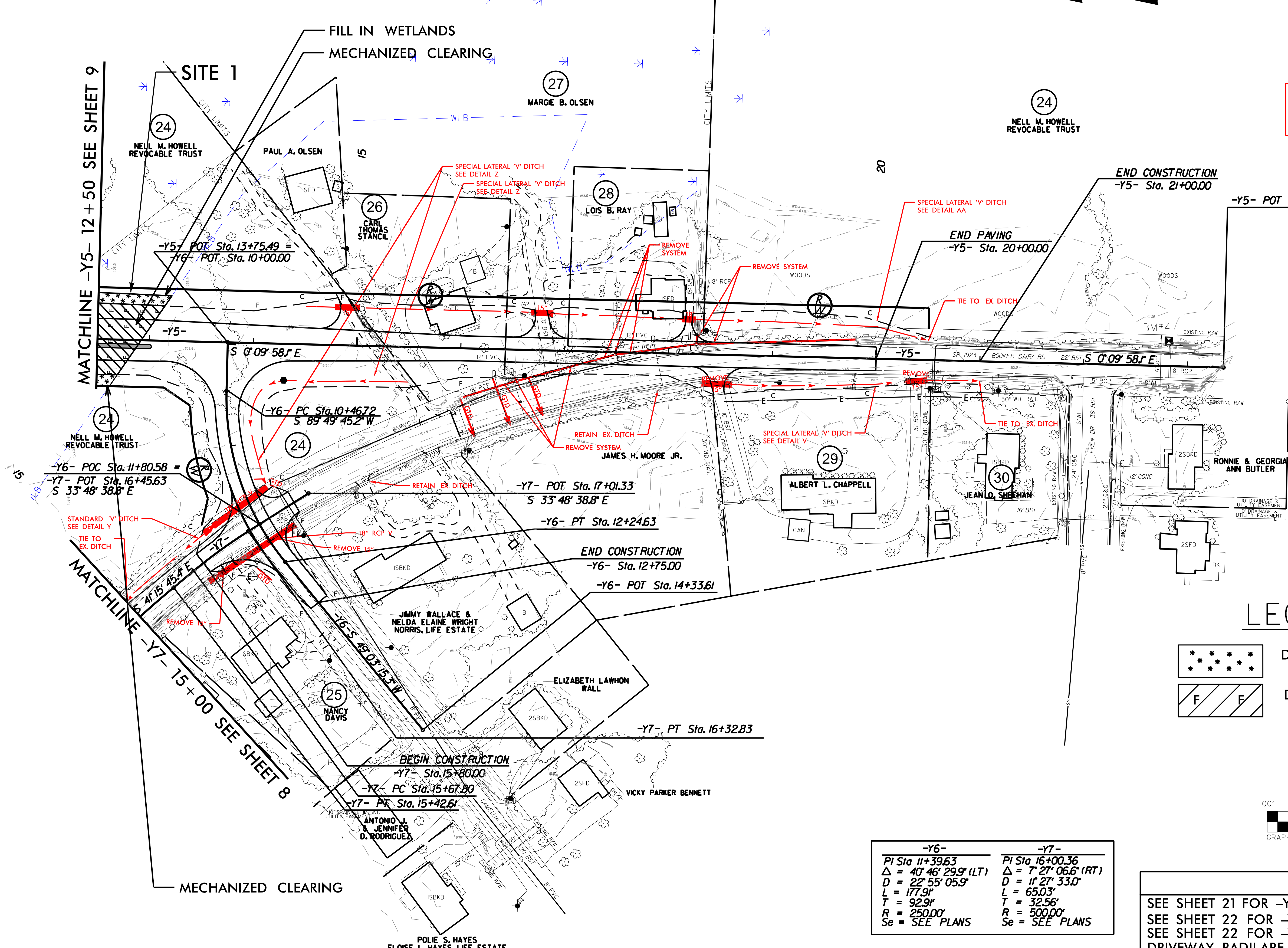
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 15 OF 16

ENGLISH

NAD 83/NSRS 2007


FILL IN WETLANDS
MECHANIZED CLEARING
SITE 1
MATCHLINE -Y5- 12+50 SEE SHEET 9
MATCHLINE -Y7- 15+00 SEE SHEET 8
MARGIE B. OLSEN
NELL M. HOWELL REVOCABLE TRUST
PAUL A. OLSEN
CARL THOMAS STANCIL
LOIS B. RAY
JAMES H. MOORE JR.
ALBERT L. CHAPPELL
JEAN O. SHEEHAN
RONNIE & GEORGIA ANN BUTLER
JIMMY WALLACE & NELDA ELAINE WRIGHT NORRIS, LIFE ESTATE
ELIZABETH LAWHON WALL
NANCY DAVIS
VICKY PARKER BENNETT
ANTONIO J. & JENNIFER D. RODRIGUEZ
POLIE S. HAYES
ELOISE L. HAYES LIFE ESTATE
-Y5- POT Sta. 13+75.49 = -Y6- POT Sta. 10+00.00
S 0°09' 58.1" E
-Y6- PC Sta. 10+46.72
S 89°49' 45.2" W
-Y6- POC Sta. 11+80.58 = -Y7- POT Sta. 16+45.63
S 33°48' 38.8" E
-Y7- POT Sta. 17+01.33
S 33°48' 38.8" E
-Y6- PT Sta. 12+24.63
END CONSTRUCTION -Y6- Sta. 12+75.00
-Y6- POT Sta. 14+33.61
-Y6- S 49°03' 15.3" W
41°15' 45.4" E
-Y7- PT Sta. 16+32.83
BEGIN CONSTRUCTION -Y7- Sta. 15+80.00
-Y7- PC Sta. 15+67.80
-Y7- PT Sta. 15+42.61
END CONSTRUCTION -Y5- Sta. 21+00.00
-Y5- POT Sta. 23+34.69
END PAVING -Y5- Sta. 20+00.00
SPECIAL LATERAL 'V' DITCH SEE DETAIL Z
SPECIAL LATERAL 'V' DITCH SEE DETAIL AA
SPECIAL LATERAL 'V' DITCH SEE DETAIL V
STANDARD 'V' DITCH SEE DETAIL Y
REMOVE SYSTEM
TIE TO EX. DITCH
RETAIN EX. DITCH
SR 1923 BOOKER DAIRY RD
BM#4
WOODS

LEGEND

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

100' 0' 100'
GRAPHIC SCALE

-Y6-	-Y7-
PI Sta 11+39.63	PI Sta 16+00.36
Δ = 40°46' 29.9" (LT)	Δ = 7°27' 06.6" (RT)
D = 22°55' 05.9"	D = 11°27' 33.0"
L = 177.91'	L = 65.03'
T = 92.91'	T = 32.56'
R = 250.00'	R = 500.00'
Se = SEE PLANS	Se = SEE PLANS

NOTES:

SEE SHEET 21 FOR -Y5- PROFILE.
SEE SHEET 22 FOR -Y6- PROFILE.
SEE SHEET 22 FOR -Y7- PROFILE.
DRIVEWAY RADII ARE 20' UNLESS NOTED OTHERWISE

REVISIONS

8/17/99

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	-L- 73+01 to -L- 85+33	Roadway Embankment	3.57			0.54						
2	-L- 118+24 to 121+50	3 @ 6'x6' RCBC						0.07	< 0.01	315	20	
2		Bank Stabilization						< 0.01		32		
3	-DRW1- 11+51.48	2 @ 7'X8' RCBC						< 0.01	< 0.01	100	24	
3		Bank Stabilizaion						0.01		64		
4	-Y4- 20+25 to 20+97 LT	42'' RCP						< 0.01	< 0.01	15	10	
TOTALS*:			3.57			0.54		0.10	< 0.01	526	54	0

*Rounded totals are sum of actual impacts

NOTES:

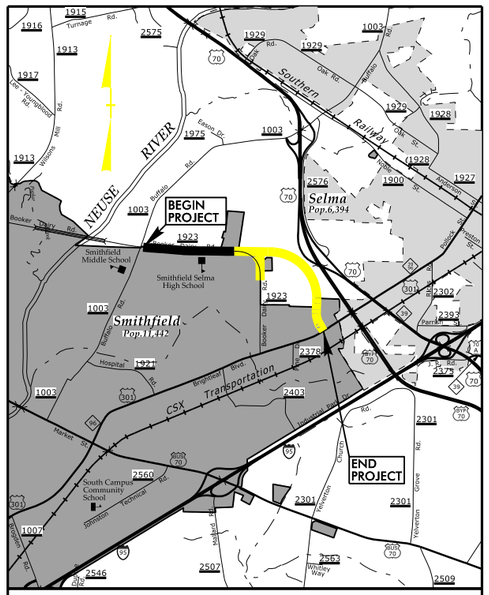
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
10/04/17
Johnston County
U-3334B
34929.1.3
SHEET 16 OF 16

Revised 2013 10 24

09/26/99

TIP PROJECT: U-3334B

See Sheet 1-B for Conventional Symbols
See Sheets 1-C thru 1-D for Survey Control Sheets



VICINITY MAP

REVISED 65% PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

JOHNSTON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3334B	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34929.1.3	STP-1923(12)	P.E.
34929.2.5	STP-1923(12)	R/W
34929.2.6		UTIL.

BUFFER DRAWING SHEET 1 OF 6

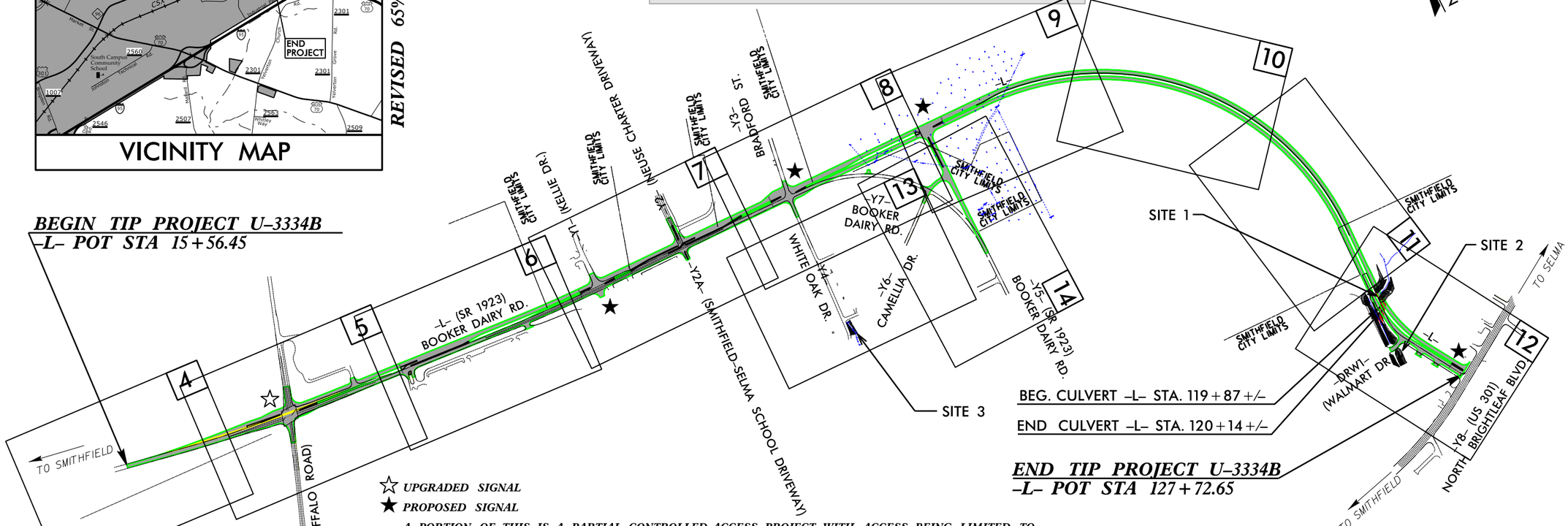
LOCATION: *SR 1923 EXTENSION (BOOKER DAIRY ROAD) FROM SR 1003 (BUFFALO ROAD) TO US 301 (BRIGHTLEAF BOULEVARD)*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE, CULVERT, AND SIGNALS*

BUFFER IMPACTS PERMIT

NSRS 2007 38 NAD

BEGIN TIP PROJECT U-3334B
-L- POT STA 15+56.45



☆ *UPGRADED SIGNAL*
★ *PROPOSED SIGNAL*

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

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF SMITHFIELD.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

BEG. CULVERT -L- STA. 119+87 +/-
END CULVERT -L- STA. 120+14 +/-

END TIP PROJECT U-3334B
-L- POT STA 127+72.65

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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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 2018 = 10,637
ADT 2038 = 16,785
K = 9 %
D = 55 %
T = 3 % *
V = 50 MPH
* (1% TTST + 2% DUALS)
FUNC CLASS = URBAN COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-3334B = 2.123 MILES

LENGTH OF STRUCTURE TIP PROJECT U-3334B = 0.001 MILES

TOTAL LENGTH OF TIP PROJECT U-3334B = 2.124 MILES

Prepared In the Office of:

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road Suite 300
Raleigh, NC 27606
Tel. (919) 851-6666 Fax. (919) 851-7024 www.stantec.com License No. F-0672

for the North Carolina Department of Transportation

2012 STANDARD SPECIFICATIONS	*STANTEC CONTACT*
RIGHT OF WAY DATE: JUNE 10, 2016	STEVE SMALLWOOD, P.E. *PROJECT ENGINEER*
LETTING DATE: JANUARY 16, 2018	*NCDOT CONTACT:* REKHA PATEL, P.E.

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

4/2017
mgberry
R:\Hydraulics\PERMITS_Environmental\Drawings\BUFFERS\U3334B_hyd_prm_buf_tsh.dgn

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2D-1

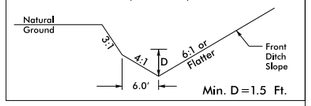
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULIC DESIGN ENGINEER

DRAINAGE DETAILS

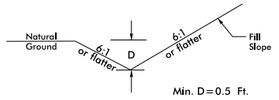
BUFFER DRAWING SHEET 2 OF 6

DETAIL A
SPECIAL CUT DITCH w/HINGE
(Not to Scale)



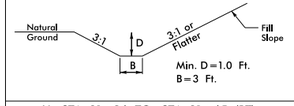
–L– STA. 20+00 TO STA. 25+00 (LT)

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



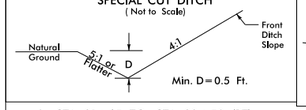
–L– STA. 29+00 TO STA. 31+05 (RT)

DETAIL C
SPECIAL LATERAL BASE DITCH
(Not to Scale)



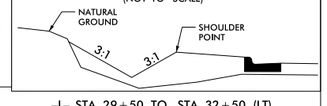
–Y– STA. 21+26 TO STA. 21+65 (RT)
–L– STA. 26+50 TO STA. 27+21 (RT)

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)



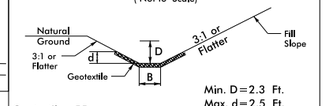
–L– STA. 31+65 TO STA. 32+50 (RT)

DETAIL E
SPECIAL BACK OF CURB LATERAL DITCH
(NOT TO SCALE)



–L– STA. 29+50 TO STA. 32+50 (LT)

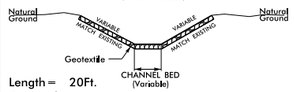
DETAIL F
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Geotextile=55sy
Est.= 36 Tons of Class I Rip–Rap

–L– STA. 32+71 TO STA. 32+94 (RT)

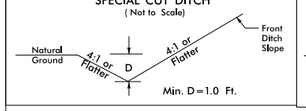
DETAIL G
PIPE OUTLET CHANNEL
(Not to Scale)



Length= 20Ft.
Geotextile= 45sy
Est.= 32 Tons of Class I Rip–Rap

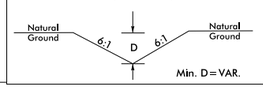
–L– STA.32+59 TO STA.32+76 (RT)

DETAIL H
SPECIAL CUT DITCH
(Not to Scale)



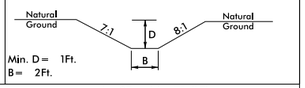
–Y– STA. 20+90 TO STA. 22+15 (LT)
–L– STA. 68+22 TO STA. 71+50 (LT)
–L– STA. 67+65 TO STA. 71+50 (RT)

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



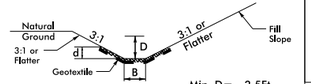
–L– STA. 52+15 (RT)

DETAIL J
STANDARD BASE DITCH
(Not to Scale)



–L– STA. 66+71 (LT)

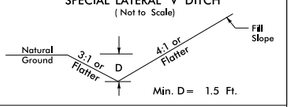
DETAIL K
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CL I Rip–Rap

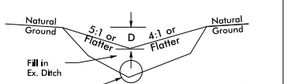
–Y4– STA. 10+93 TO STA. 11+50 (LT)

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



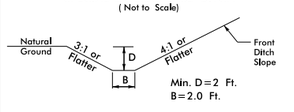
–Y4– STA. 11+50 TO STA. 12+00 (RT)
–L– STA. 86+00 TO STA. 90+82 (LT)
–L– STA. 99+50 TO STA. 102+50 (LT)
–L– STA. 95+50 TO STA. 107+00 (RT)

DETAIL M
FILL IN EX. DITCH
(Not to Scale)



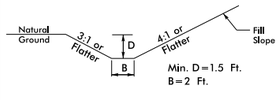
–Y4– STA. 12+41 TO STA. 13+25 (LT)

DETAIL N
SPECIAL LATERAL BASE DITCH
(Not to Scale)



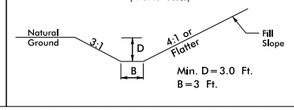
–L– STA. 84+35 TO STA. 91+49 (RT)
–L– STA. 91+50 TO STA. 95+50 (RT)

DETAIL O
SPECIAL LATERAL BASE DITCH
(Not to Scale)



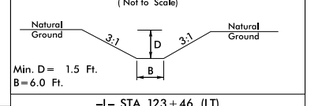
–L– STA. 90+82 TO STA. 96+00 (LT)
–L– STA. 102+50 TO STA. 116+50 (LT)
–L– STA. 107+00 TO STA. 115+74 (RT)

DETAIL P
SPECIAL LATERAL BASE DITCH
(Not to Scale)



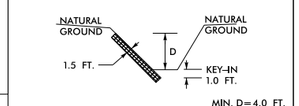
–L– STA. 116+45 TO STA. 117+89 (RT)

DETAIL R
STANDARD BASE DITCH
(Not to Scale)



–L– STA. 123+46 (LT)
–L– STA. 123+48 (RT)

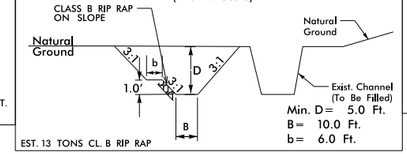
DETAIL S
BANK STABILIZATION



Type of Liner= CL I Rip–Rap

–L– STA. 118+71 (75' LT) TO
–L– STA. 119+17 (62' LT)
–L– STA. 122+82 (180' RT) TO
–L– STA. 123+54 (193' RT)

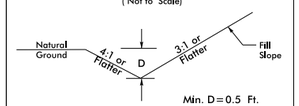
DETAIL T
CHANNEL CHANGE
(Not to Scale)



EST. 13 TONS CL. B RIP RAP

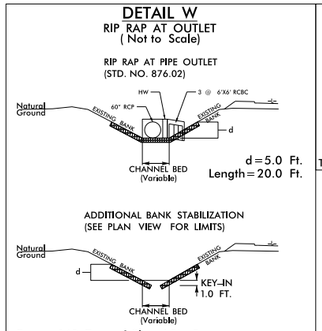
–L– STA. 118+56 TO STA. 119+58 LT

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



–Y5– STA. 18+62 TO STA. 21+00 (RT)

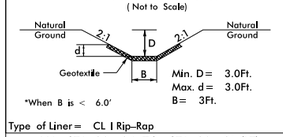
DETAIL W
RIP RAP AT OUTLET
(Not to Scale)



Est.= 140 Tons of Class I Rip–Rap

–L– STA. 120+52 TO STA. 121+00 (RT)

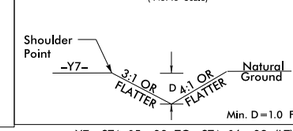
DETAIL X
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CL I Rip–Rap

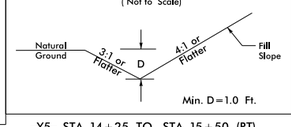
–Y4– STA. 20+24 TO STA. 20+81 (LT)

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



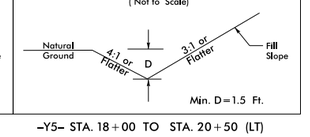
–Y7– STA. 15+00 TO STA. 16+08 (LT)

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



–Y5– STA. 14+25 TO STA. 15+50 (RT)
–Y5– STA. 14+50 TO STA. 18+00 (LT)
–Y6– STA. 10+40 TO STA. 11+50 (LT)
–L– STA. 96+00 TO STA. 98+50 (LT)

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



–Y5– STA. 18+00 TO STA. 20+50 (LT)

DETAIL U
(NOT TO SCALE)

SKEWED MULTI–BARREL CULVERT LOW FLOW CHANNEL SILLS

*NOTES:

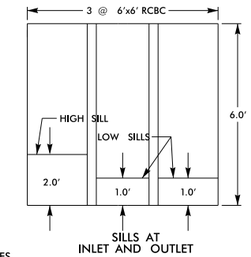
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE 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.

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

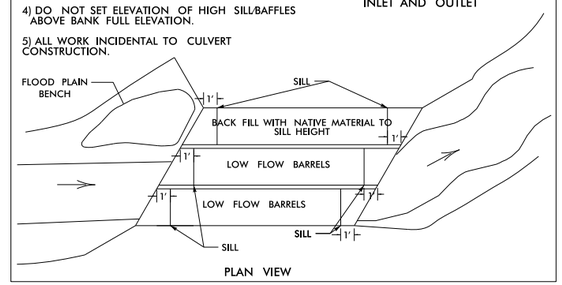
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL ELEVATION.

5) ALL WORK INCIDENTAL TO CULVERT CONSTRUCTION.

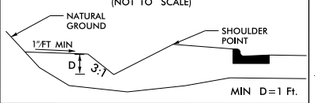


SILLS AT INLET AND OUTLET



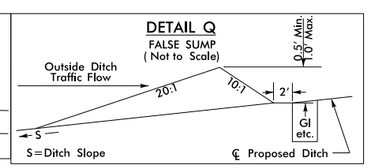
PLAN VIEW

DETAIL BB
SPECIAL BACK OF CURB LATERAL DITCH
(NOT TO SCALE)



–L– STA. 118+59 TO STA. 120+50 (RT)

DETAIL Q
FALSE SUMP
(Not to Scale)



–L– STA. 14+40 (RT)
–L– STA. 19+33 (RT)
–L– STA. 21+33 (RT)
–L– STA. 24+55 (RT)
–L– STA. 26+33 (RT)

BUFFER IMPACTS PERMIT

8/7/2017
mgentry
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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 3 OF 6

NAD 83/NSRS 2007

105 110 115

24 NELL M. HOWELL REVOCABLE TRUST

CITY LIMITS

-L- PT Sta. 113+84.63

SPECIAL LATERAL 2' BASE DITCH SEE DETAIL O

PROP WW FENCE

TB FL GR 2GI

15" RCP-IV

CL B RIP RAP EST. 2 TONS EST. 7 SY GF

SPECIAL LATERAL 'V' DITCH SEE DETAIL L

SPECIAL LATERAL 2' BASE DITCH SEE DETAIL O

15" RCP-III

CULTIVATED

-L-1 S 1°28'23.2" W

CITY LIMITS

SITE 1

10' SOIL

CL B RIP RAP EST. 3 TONS EST. 10 SY GF

SPECIAL LAT. 3' BASE DITCH SEE DETAIL P

MATCHLINE -L- 104+00 SEE SHEET 10

MATCHLINE -L- 117+50 SEE SHEET 12

48" WW

24 NELL M. HOWELL REVOCABLE TRUST

34

CITY LIMITS

100' 0' 100'
GRAPHIC SCALE

MITIGABLE IMPACTS ZONE 2

-L-
PI Sta 102+71.66
Δ = 90° 31' 41.4" (RT)
D = 2° 56' 17.7"
L = 3,081.03'
T = 1,968.06'
R = 1,950.00'
Se = .03
RUNOFF = 108'

ENGLISH

NOTES:
SEE SHEET 18 FOR -L- PROFILE.
DRIVEWAY RADII ARE 20' UNLESS NOTED OTHERWISE

REVISIONS 8/17/99

4/6/2017
mmoore
R:\Hydraulics\PERMITS_Environmental\Drawings\BUFFERS\U3334B_Hyd_prm_buf_gsh11.dgn

REVISIONS

11/30/2016 - R/W REVISIONS: ADDED PARCEL 36A; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCEL 35,36A,37 AND 39; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 35. - SS
3/14/2017 - R/W REVISION: ADDED TDE TO PARCELS 24 & 37 AND REVISED PDE ON PARCELS 34 & 35. - SS
8/16/2017 - R/W REVISION: CONVERTED A TEMPORARY DRIVEWAY TO PERMANENT DRIVEWAY AND ADDED A LEFT TURN LANE AT -L- STA. 118+30+/-. - SS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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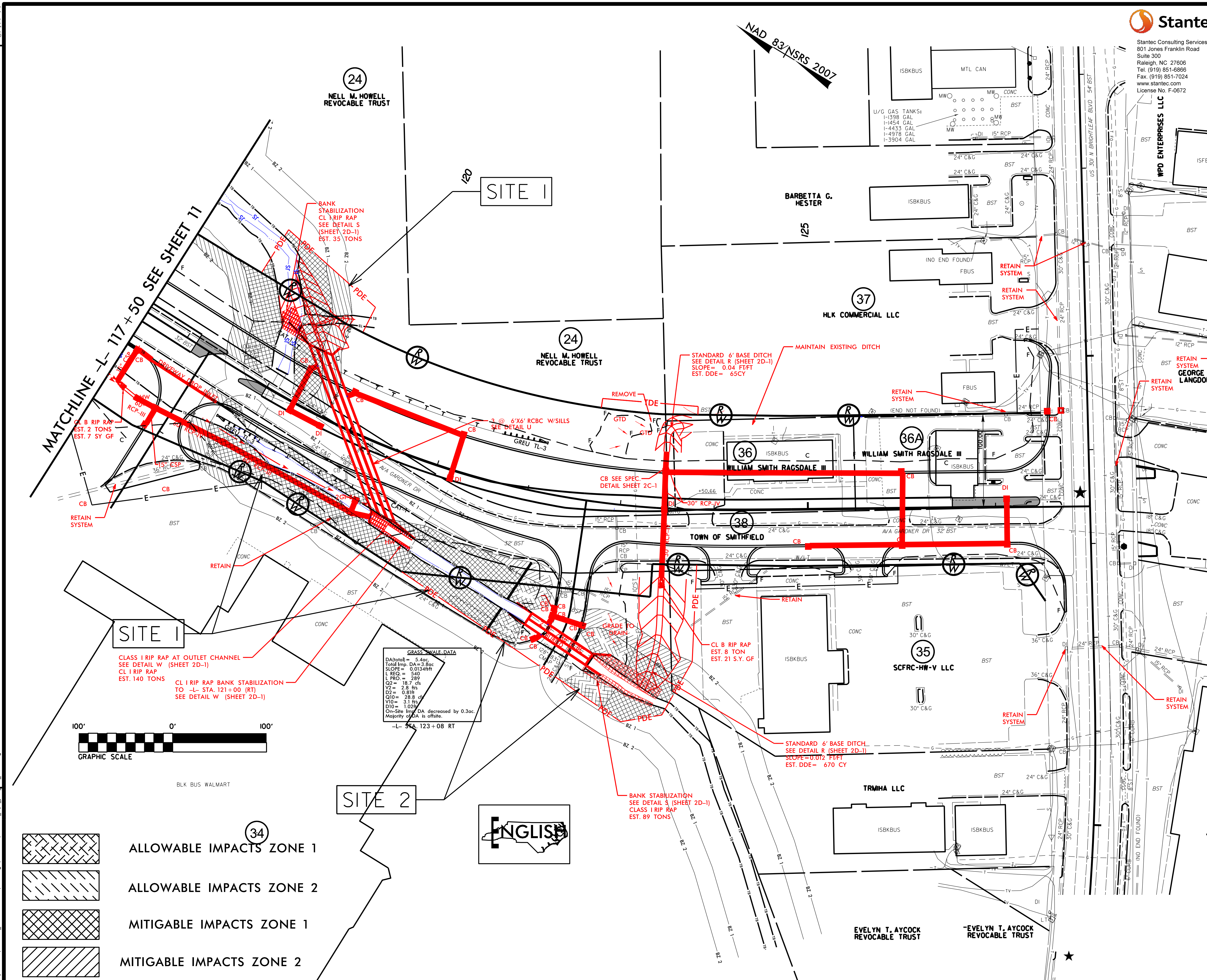
BUFFER DRAWING SHEET 4 OF 6



NAD 83/NSRS 2007
MATCHLINE -L- 117+50 SEE SHEET 11
SITE 1
SITE 2
NELL M. HOWELL REVOCABLE TRUST
BARBETTA G. HESTER
HLK COMMERCIAL LLC
WILLIAM SMITH RAGSDALE III
TOWN OF SMITHFIELD
SCFRC-HW-V LLC
TRMIHA LLC
EVELYN T. AYCOCK REVOCABLE TRUST
GEORGE MACK LANGDON JR.
DONALD E. MILLARD
JONES BROTHERS REALITY LIMITED PARTNERSHIP
WPD ENTERPRISES LLC
US 301 N BRIGHTLEAF BLVD
AVA GARDNER DR
BANK STABILIZATION CL I RIP RAP SEE DETAIL S (SHEET 2D-1) EST. 35 TONS
STANDARD 6' BASE DITCH SEE DETAIL R (SHEET 2D-1) SLOPE= 0.04 FT/FT EST. DDE= 65CY
MAINTAIN EXISTING DITCH
3 @ 6'X6' RCBC W/SILLS SEE DETAIL U
CB SEE SPEC. DETAIL SHEET 2C-1
CL B RIP RAP EST. 2 TONS EST. 7 SY GF
RETAIN SYSTEM
CLASS I RIP RAP AT OUTLET CHANNEL SEE DETAIL W (SHEET 2D-1) CL I RIP RAP EST. 140 TONS
CL I RIP RAP BANK STABILIZATION TO -L- STA. 121+00 (RT) SEE DETAIL W (SHEET 2D-1)
CL B RIP RAP EST. 8 TON EST. 21 S.Y. GF
STANDARD 6' BASE DITCH SEE DETAIL R (SHEET 2D-1) SLOPE=0.012 FT/FT EST. DDE= 670 CY
BANK STABILIZATION SEE DETAIL S (SHEET 2D-1) CLASS I RIP RAP EST. 89 TONS
GRASS SWALE DATA
DA(total)= 5.4ac, Total Imp. DA=3.8ac, SLOPE= 0.0134ft/ft, L REQ.= 540, L PROV.= 289, Q2= 18.7 cfs, V2= 2.8 ft/s, D2= 0.8ft, Q10= 28.8 cfs, V10= 3.1 ft/s, D10= 1.02ft, On-Site Imp. DA decreased by 0.3ac. Majority of DA is offsite.
-L- STA. 123+08 RT
GRAPHIC SCALE 100' 0' 100'
ENGLISH
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

9/28/2017
mgberry
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BUFFER IMPACTS PERMIT

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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BUFFER DRAWING SHEET 5 OF 6

ENGLISH

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

100' 0' 100'
GRAPHIC SCALE

NAD 83/NSRS 2007

MATCHLINE –Y4– 15+00 SEE SHEET 8

–Y4–	–Y4–
PI Sta 16+22.02	PI Sta 21+40.95
Δ = 0° 47' 49.0" (RT)	Δ = 46° 36' 26.9" (RT)
D = 0° 34' 22.6"	D = 42° 26' 28.7"
L = 139.09'	L = 109.82'
T = 69.55'	T = 58.15'
R = 10,000.00'	R = 135.00'
Se = EXISTING	Se = EXISTING

SITE 3
3X ENLARGEMENT

NOTES:
SEE SHEET 21 FOR –Y4– PROFILE.

REVISIONS
11/30/2016 - R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 31 AND 40; SUBDIVIDED PARCEL 32 INTO PARCELS 32 AND 40; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 32 - SS

8/17/99

4/6/2017
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BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	3 @ 6'x6' RCBC w/ Sills (2@ Buried 1', 1@ Buried 2')	-L- 118+24 LT to	x						16523	8056	24579		
		-L- 121+08 RT											
1	3 @ 6'x6' RCBC w/ Sills (2@ Buried 1', 1@ Buried 2')	-L- 121+08 RT to			x				5636	399	6035		
		-L- 122+02 RT											
2	2 @ 7'x8' RCBC, Buried 1'	-L- 122+02 RT to	x			4650	1784	6434					
		-L- 123+20 RT											
2	Relocation of Existing Ditch	-DRW1- 11+21 LT to			x				2985	1240	4225		
		-DRW1- 11+84 LT											
3	42" RCP	-Y4- 20+17 LT to			x	2480	610	3091					
		-Y4- 21+10 LT											
TOTAL:						7130	2394	9525	25144	9695	34839		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

JONHSTON COUNTY
PROJECT: 34929.1.3 (U-3334B)

9/28/2017
SHEET 6 OF 6

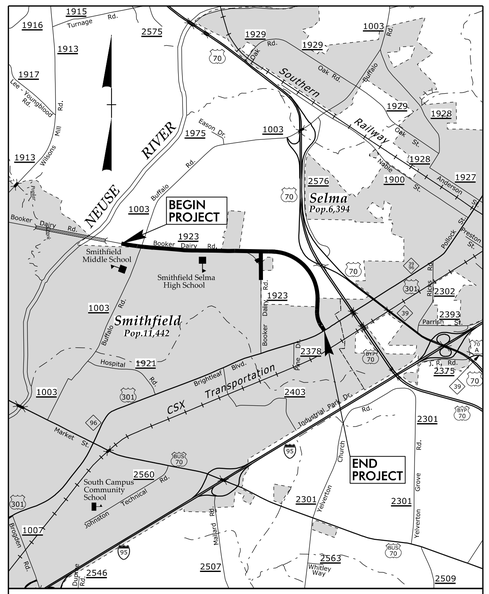
Rev. May 2006

09/08/99

TIP PROJECT: U-3334B

CONTRACT:

See Sheet 1B for Conventional Symbols
See Sheets 1C-1 thru 1C-4 for Survey Control Sheets



VICINITY MAP

PLFI PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

JOHNSTON COUNTY

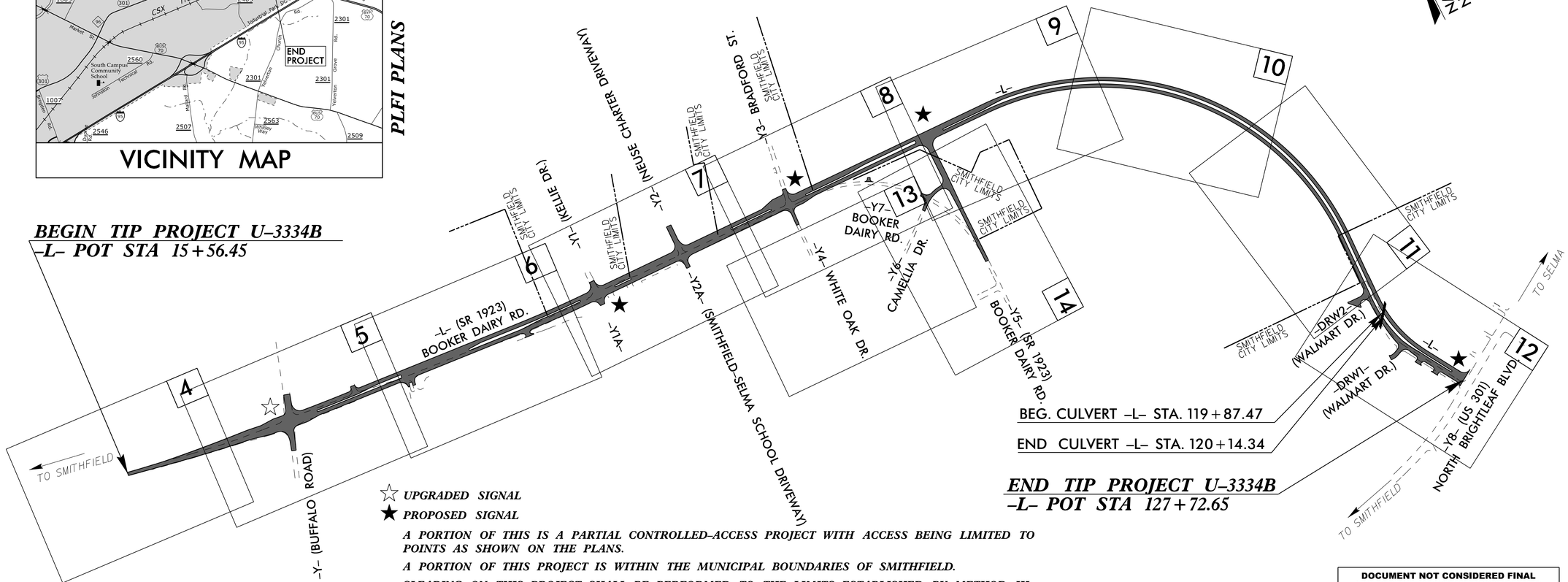
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3334B	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34929.1.3	STP-1923(12)	P.E.
34929.2.5		R/W
34929.2.6		UTIL.
34929.3.3		CONSTR.

LOCATION: *SR 1923 EXTENSION (BOOKER DAIRY ROAD) FROM SR 1003 (BUFFALO ROAD) TO US 301 (BRIGHTLEAF BOULEVARD)*

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERT, AND SIGNALS

NAD 1983 2007 NSRS



BEG. CULVERT -L- STA. 119+87.47

END CULVERT -L- STA. 120+14.34

BEGIN TIP PROJECT U-3334B
-L- POT STA 15+56.45

END TIP PROJECT U-3334B
-L- POT STA 127+72.65

☆ *UPGRADED SIGNAL*
★ *PROPOSED SIGNAL*

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

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF SMITHFIELD.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

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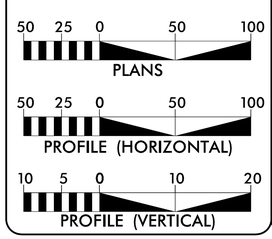
GRAPHIC SCALES



DESIGN DATA

ADT 2018 = 10,637
ADT 2038 = 16,785
K = 9 %
D = 55 %
T = 3 % *
V = 50 MPH
* (1% TTST + 2% DUALS)
FUNC CLASS = URBAN COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-3334B = 2.119 MILES

LENGTH OF STRUCTURE TIP PROJECT U-3334B = 0.005 MILES

TOTAL LENGTH OF TIP PROJECT U-3334B = 2.124 MILES

Prepared in the Office of:

Stantec

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for the North Carolina Department of Transportation

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JUNE 10, 2016

LETTING DATE: JANUARY 16, 2018

STANTEC CONTACT

STEVE SMALLWOOD, P.E.
PROJECT ENGINEER

NCDOT CONTACT:

TATIA L. WHITE, P.E., PLS

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

7/26/2017
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cmozingo

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	1B

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
- Computed 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 — S
- Potential Contamination Area: Soil — S
- Known Contamination Area: Water — W
- Potential Contamination Area: Water — W
- 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 & PROJECT CONTROL:

- Secondary Horiz and Vert Control Point
- Primary Horiz Control Point
- Primary Horiz and Vert Control Point
- Exist Permanent Easment Pin and Cap
- New Permanent Easement Pin and Cap
- Vertical Benchmark
- Existing Right of Way Marker
- Existing Right of Way Line
- New Right of Way Line — RW
- New Right of Way Line with Pin and Cap — RW
- New Right of Way Line with Concrete or Granite R/W Marker — RW
- New Control of Access Line with Concrete C/A Marker — CA
- Existing Control of Access — CA
- New Control of Access — CA
- Existing Easement Line — E
- New Temporary Construction Easement — E
- New Temporary Drainage Easement — TDE
- New Permanent Drainage Easement — PDE
- New Permanent Drainage / Utility Easement — DUE
- New Permanent Utility Easement — PUE
- New Temporary Utility Easement — TUE
- New Aerial Utility Easement — AUE

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 — HH
- 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

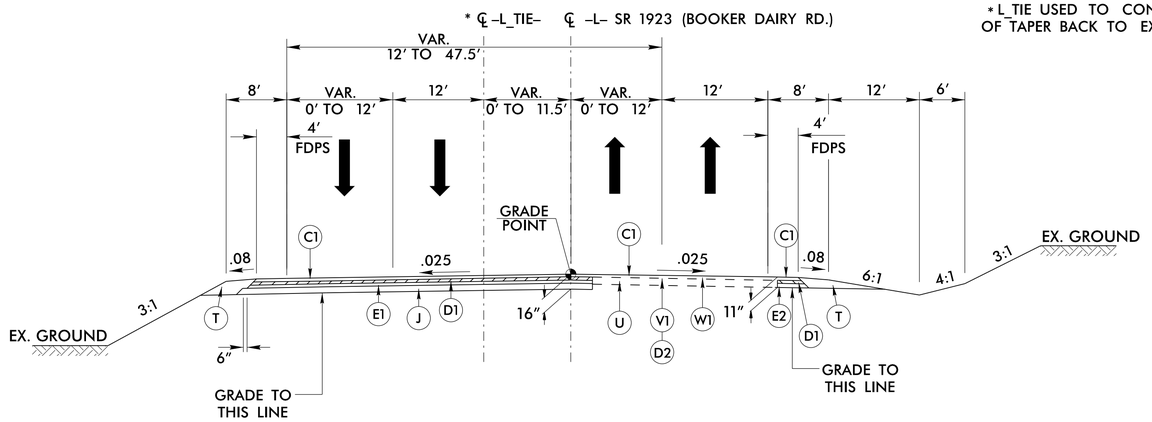
SANITARY SEWER:

- 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.

6/2/99



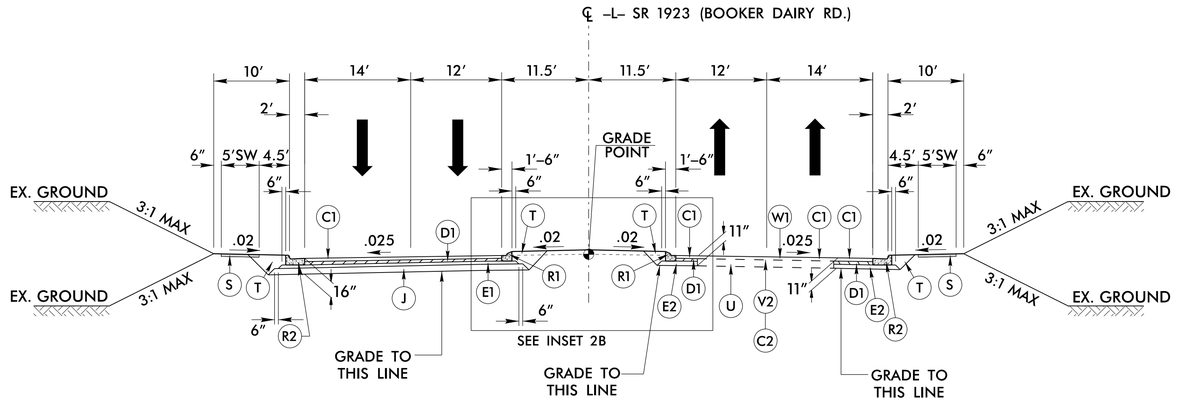
* L_TIE USED TO CONTROL WIDTH OF TAPER BACK TO EXISTING WIDTH

TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1 AT THE FOLLOWING LOCATION:

–L– STA. 15+56.45 TO –L– STA. 27+89.21

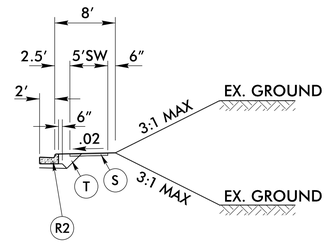
TRANSITION FROM EXISTING TWO–LANE TO TYPICAL SECTION NO. 1



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2 AT THE FOLLOWING LOCATION:

–L– STA. 27+89.21 TO –L– STA. 67+26.98

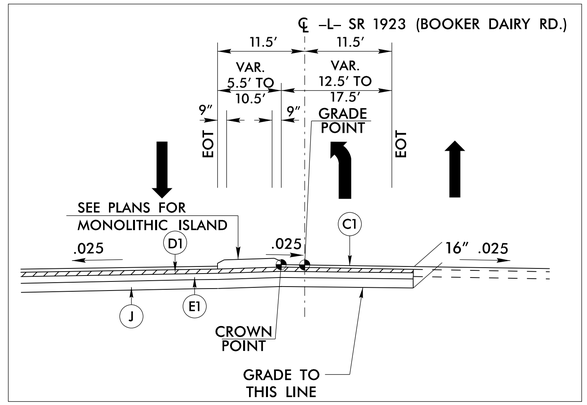


INSET NO. 2A

USE WITH TYPICAL SECTION NO. 2

USE INSET NO. 2A AT THE FOLLOWING LOCATION:

–L– STA. 37+33.00 RT TO –L– STA. 46+00.00 RT
–L– STA. 52+15.00 RT TO –L– STA. 58+56.00 RT



INSET NO. 2B

USE INSET NO. 2B AT THE FOLLOWING LOCATIONS:

–L– STA. 24+70.00 TO –L– STA. 27+20.00
–L– STA. 28+65.03 TO –L– STA. 29+98.44
–L– STA. 36+56.78 TO –L– STA. 41+83.51
–L– STA. 50+61.42 TO –L– STA. 51+40.00
–L– STA. 52+55.00 TO –L– STA. 53+34.03
–L– STA. 54+61.52 TO –L– STA. 63+55.00
–L– STA. 65+91.42 TO –L– STA. 66+70.00
–L– STA. 67+85.00 TO –L– STA. 68+64.03
–L– STA. 77+45.00 TO –L– STA. 77+67.59
–L– STA. 78+85.00 TO –L– STA. 79+64.03
–L– STA. 126+53.99 TO –L– STA. 127+42.57

FINAL PAVEMENT SCHEDULE

C1	3″ S9.5B	N	GEOTEXTILE FOR SOIL STABILIZATION
C2	1½″ S9.5B	R1	1′-6″ C & G
C3	VAR. S9.5B	R2	2′-6″ C & G
D1	4″ I19.0B	R3	2′-9″ C & G
D2	3″ I19.0B	S	CONCRETE SIDEWALK
D3	VAR. I19.0B	T	EARTH MATERIAL
E1	3″ B25.0B	U	EXISTING PAVEMENT
E2	4″ B25.0B	V1	3″ MILLING EXISTING PAVEMENT
E3	VAR. B25.0B	V2	1½″ MILLING EXISTING PAVEMENT
J	6″ ABC	W1	WEDGING (SEE DETAIL ON SHT. 2A-1)
L	CLASS IV SUBGRADE STABILIZATION	W2	WEDGING (SEE DETAIL ON SHT. 2A-1)

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

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License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2A-2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

6/19/2017
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mmorton

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2A-3
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

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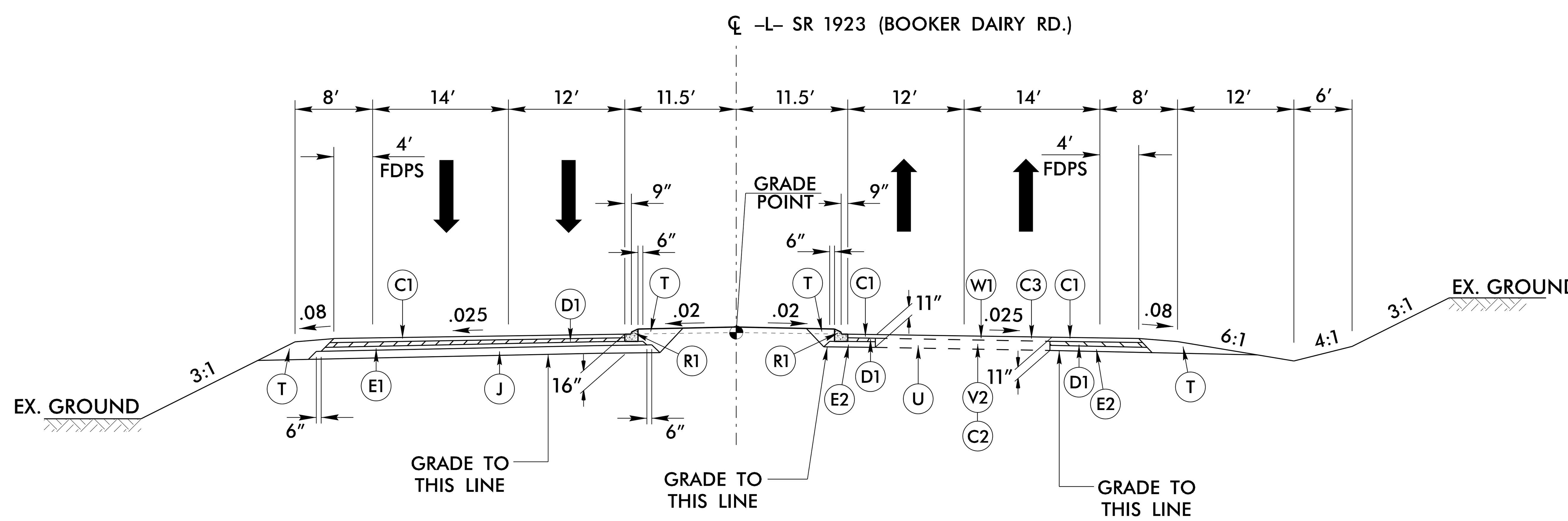
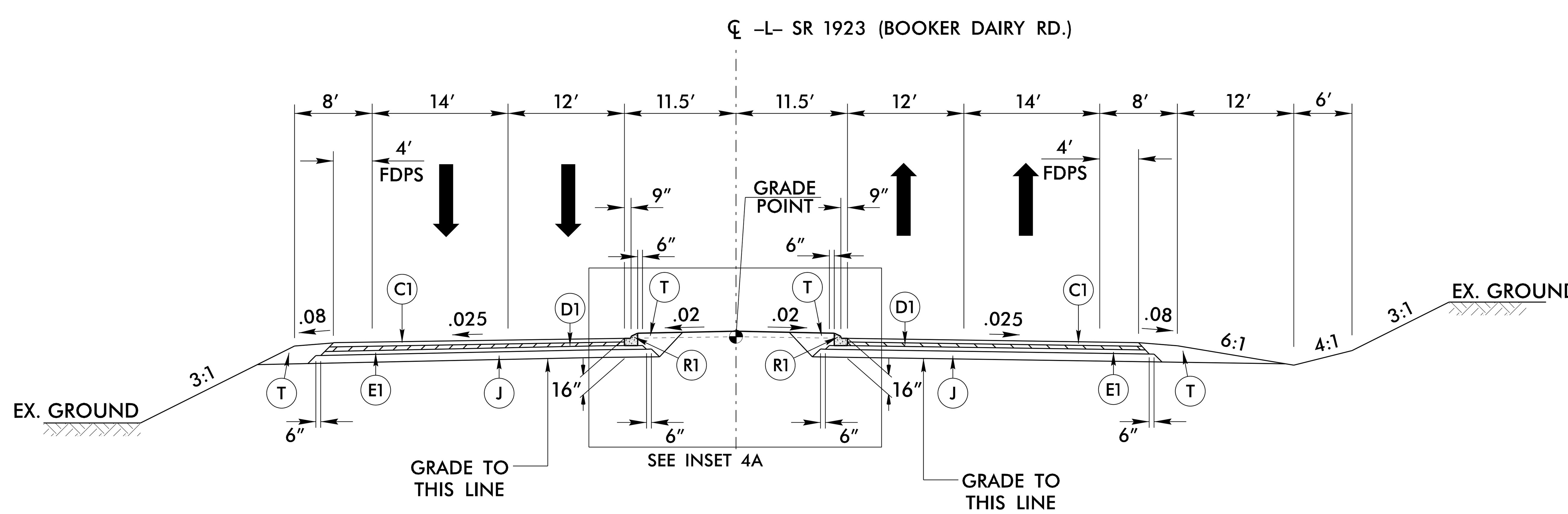


TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 3 AT THE FOLLOWING LOCATION:
-L- STA. 67+26.98 TO -L- STA. 71+00.00



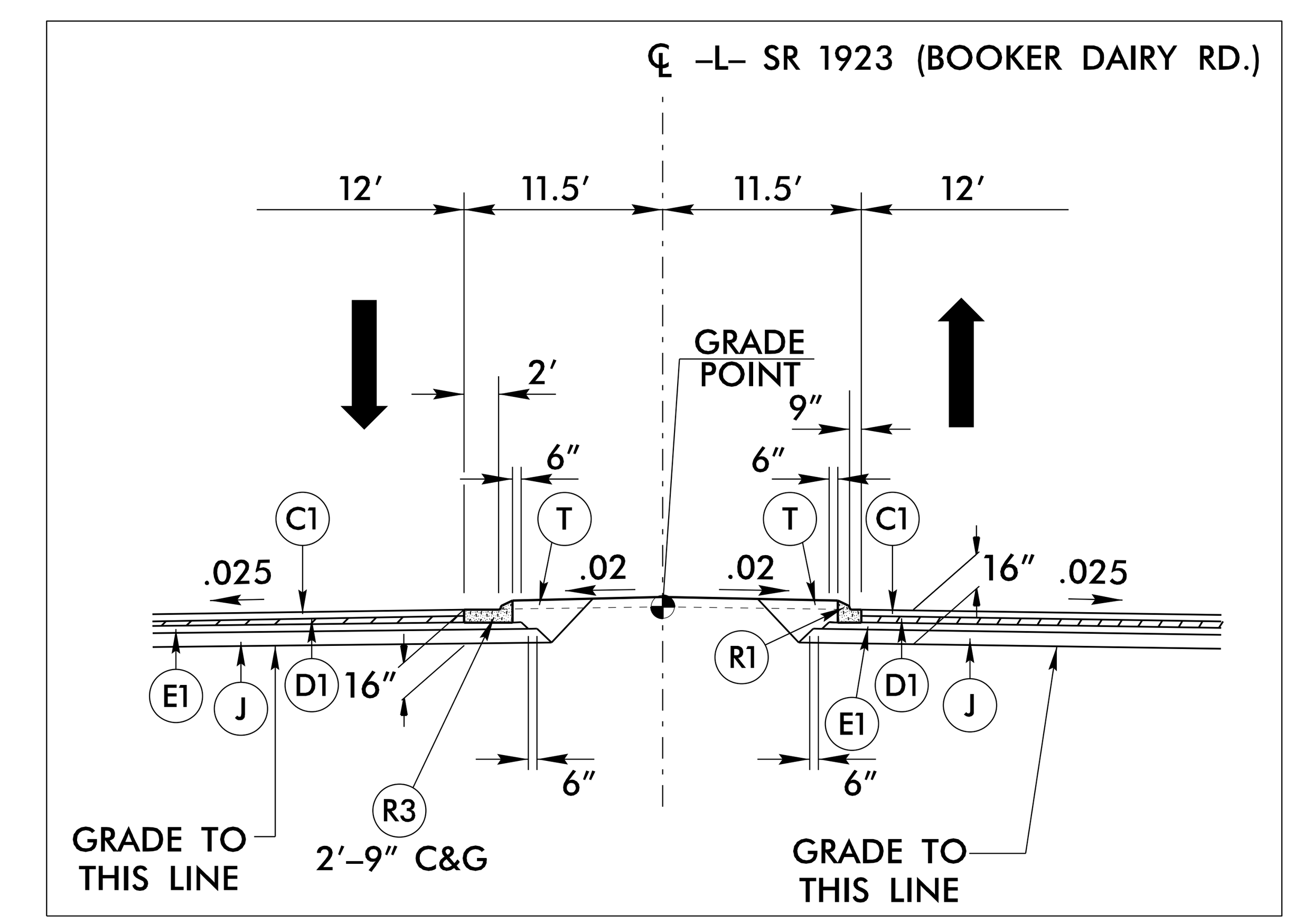
TYPICAL SECTION NO. 4

USE TYPICAL SECTION NO. 4 AT THE FOLLOWING LOCATION:
-L- STA. 71+00.00 TO -L- STA. 117+00.00

FINAL PAVEMENT SCHEDULE

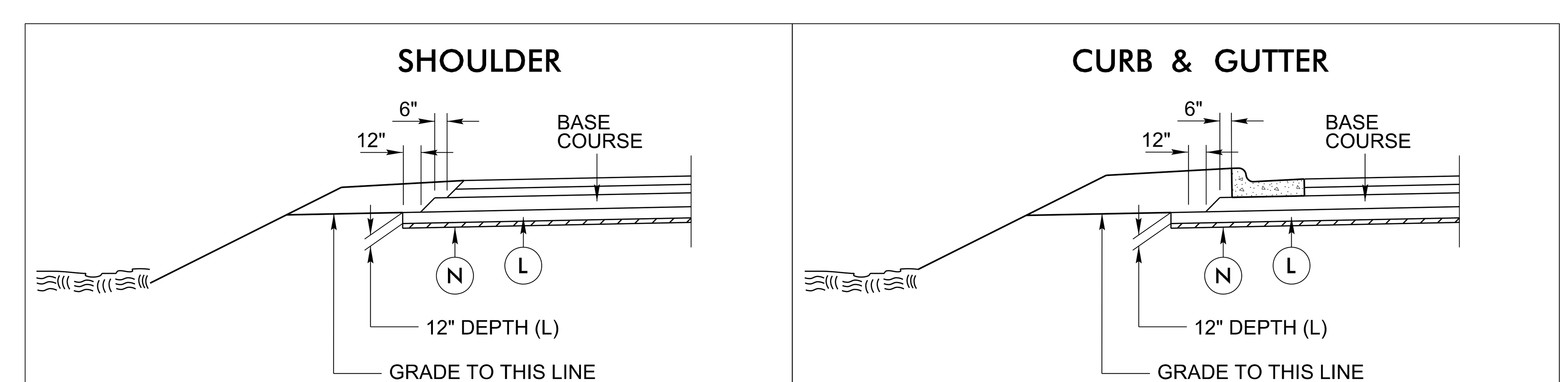
C1	3" S9.5B	N	GEOTEXTILE FOR SOIL STABILIZATION
C2	1½" S9.5B	R1	1'-6" C & G
C3	VAR. S9.5B	R2	2'-6" C & G
D1	4" I19.0B	R3	2'-9" C & G
D2	3" I19.0B	S	CONCRETE SIDEWALK
D3	VAR. I19.0B	T	EARTH MATERIAL
E1	3" B25.0B	U	EXISTING PAVEMENT
E2	4" B25.0B	V1	3" MILLING EXISTING PAVEMENT
E3	VAR. B25.0B	V2	1½" MILLING EXISTING PAVEMENT
J	6" ABC	W1	WEDGING (SEE DETAIL ON SHT. 2A-1)
L	CLASS IV SUBGRADE STABILIZATION	W2	WEDGING (SEE DETAIL ON SHT. 2A-1)

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



INSET NO. 4A

USE WITH TYPICAL SECTION NO. 4
USE INSET NO. 4A AT THE FOLLOWING LOCATIONS:
-L- STA. 82+56.60 TO -L- STA. 114+31.32



GEOTEXTILE FOR SOIL STABILIZATION

-L- STA. 75+00+/- TO -L- STA. 84+50+/-

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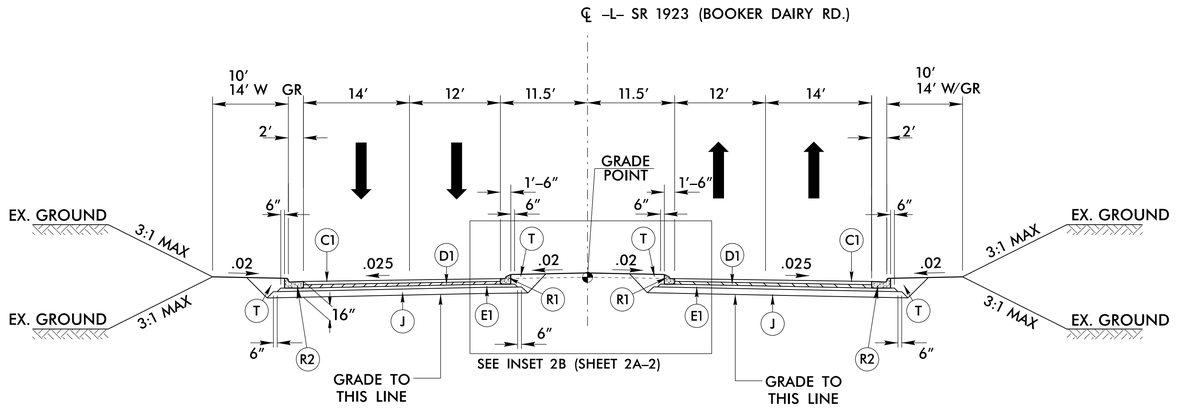
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2A-4
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



TYPICAL SECTION NO. 5

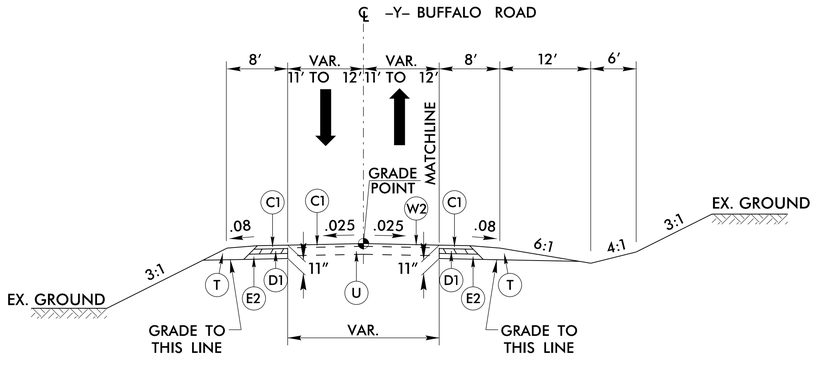
USE TYPICAL SECTION NO. 5 AT THE FOLLOWING LOCATION:

–L– STA. 117+00.00 TO –L– STA. 127+72.65

FINAL PAVEMENT SCHEDULE

C1	3″ S9.5B	N	GEOTEXTILE FOR SOIL STABILIZATION
C2	1½″ S9.5B	R1	1′-6″ C & G
C3	VAR. S9.5B	R2	2′-6″ C & G
D1	4″ I19.0B	R3	2′-9″ C & G
D2	3″ I19.0B	S	CONCRETE SIDEWALK
D3	VAR. I19.0B	T	EARTH MATERIAL
E1	3″ B25.0B	U	EXISTING PAVEMENT
E2	4″ B25.0B	V1	3″ MILLING EXISTING PAVEMENT
E3	VAR. B25.0B	V2	1½″ MILLING EXISTING PAVEMENT
J	6″ ABC	W1	WEDGING (SEE DETAIL ON SHT. 2A-1)
L	CLASS IV SUBGRADE STABILIZATION	W2	WEDGING (SEE DETAIL ON SHT. 2A-1)

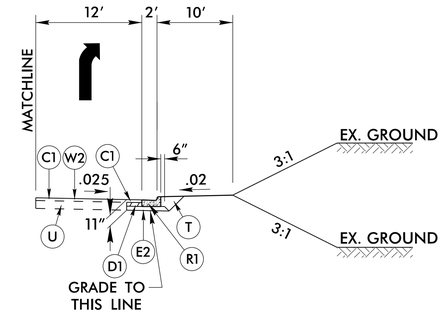
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 6

USE TYPICAL SECTION NO. 6 AT THE FOLLOWING LOCATIONS:

–Y– STA. 18+07.09 TO –Y– STA. 22+14.82



INSET NO. 6A

USE WITH TYPICAL SECTION NO. 6

USE INSET NO. 6A AT THE FOLLOWING LOCATION:

–Y– STA. 18+07.09 LT TO –Y– STA. 19+57.59 LT

6/2/99

6/19/2017
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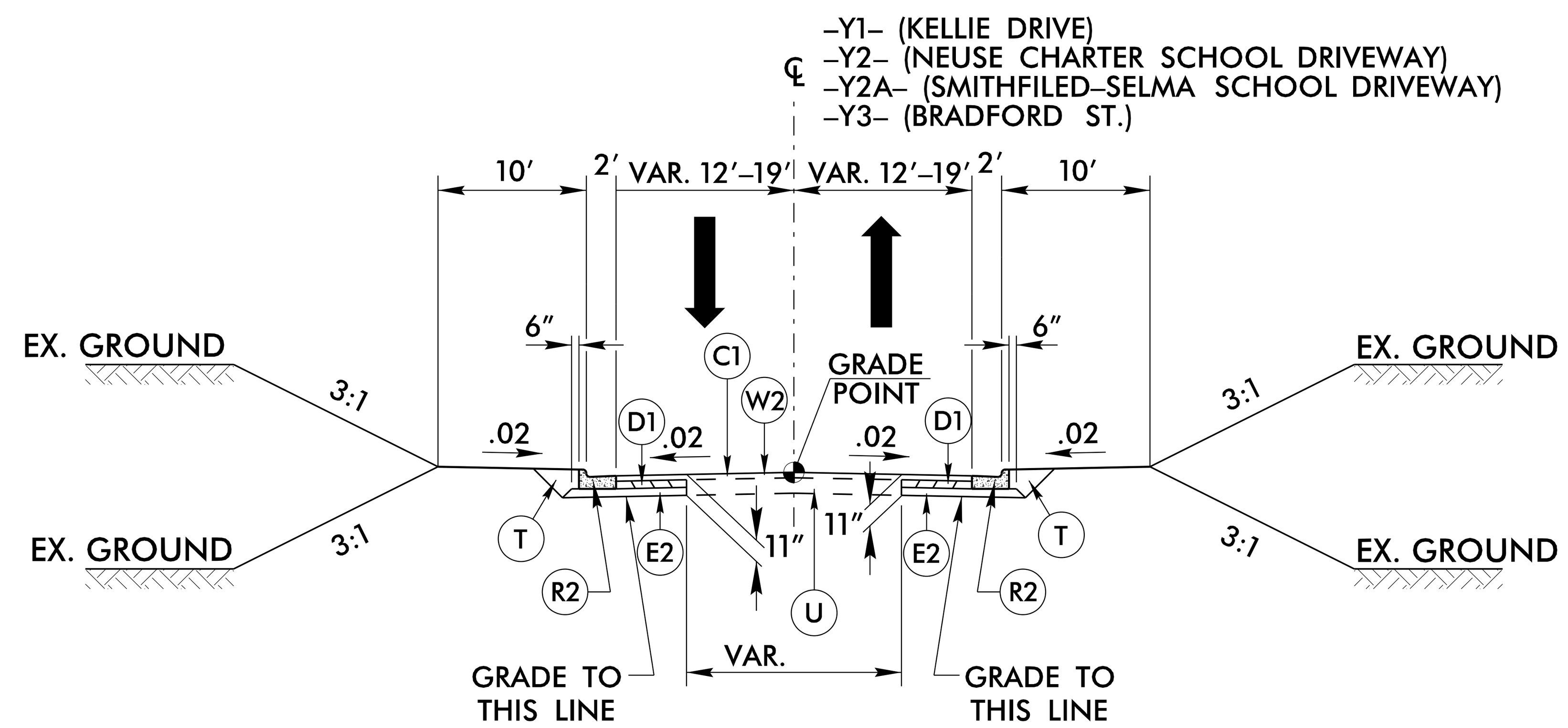
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2A-5
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

FINAL PAVEMENT SCHEDULE

C1	3" S9.5B	N	GEOTEXTILE FOR SOIL STABILIZATION
C2	1½" S9.5B	R1	1'-6" C & G
C3	VAR. S9.5B	R2	2'-6" C & G
D1	4" I19.0B	R3	2'-9" C & G
D2	3" I19.0B	S	CONCRETE SIDEWALK
D3	VAR. I19.0B	T	EARTH MATERIAL
E1	3" B25.0B	U	EXISTING PAVEMENT
E2	4" B25.0B	V1	3" MILLING EXISTING PAVEMENT
E3	VAR. B25.0B	V2	1½" MILLING EXISTING PAVEMENT
J	6" ABC	W1	WEDGING (SEE DETAIL ON SHT. 2A-1)
L	CLASS IV SUBGRADE STABILIZATION	W2	WEDGING (SEE DETAIL ON SHT. 2A-1)

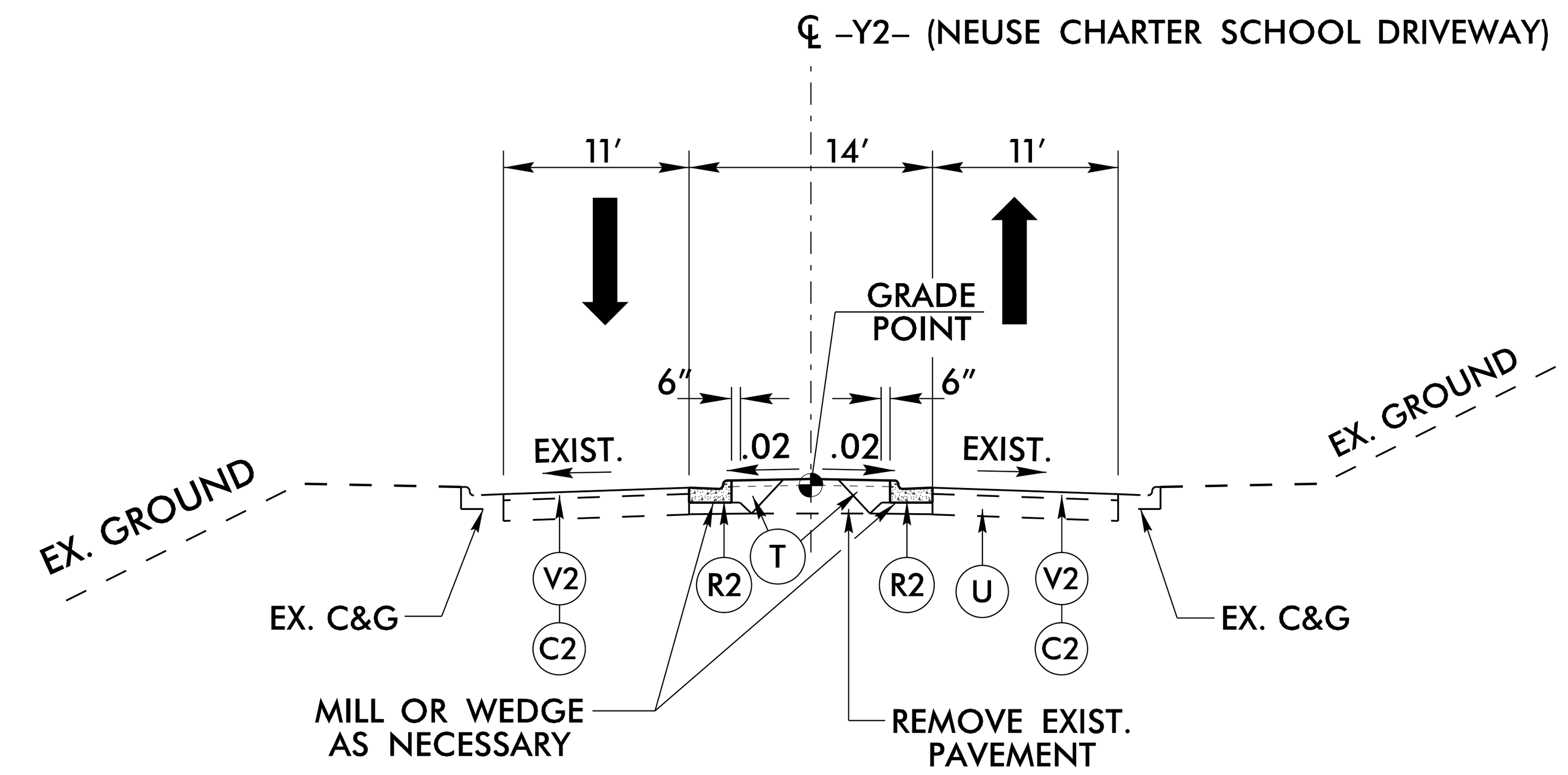
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7 AT THE FOLLOWING LOCATIONS:

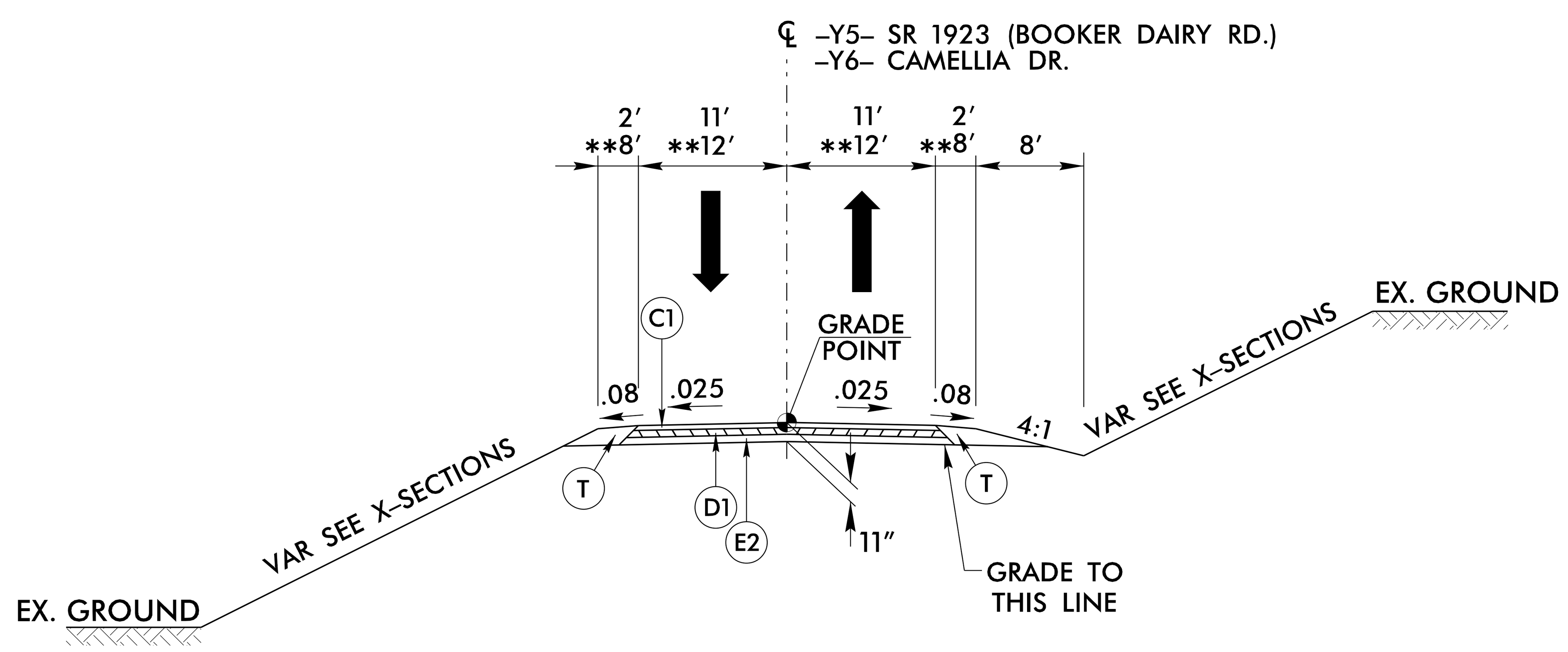
-Y1- STA. 10+75.00 TO -Y1- STA. 11+34.46
-Y2- STA. 10+20.00 TO -Y2- STA. 11+02.15
-Y2A- STA. 10+37.50 TO -Y2A- STA. 11+13.00
-Y3- STA. 13+25.00 TO -Y3- STA. 13+91.65



TYPICAL SECTION NO. 7A

USE TYPICAL SECTION NO. 7A AT THE FOLLOWING LOCATIONS:

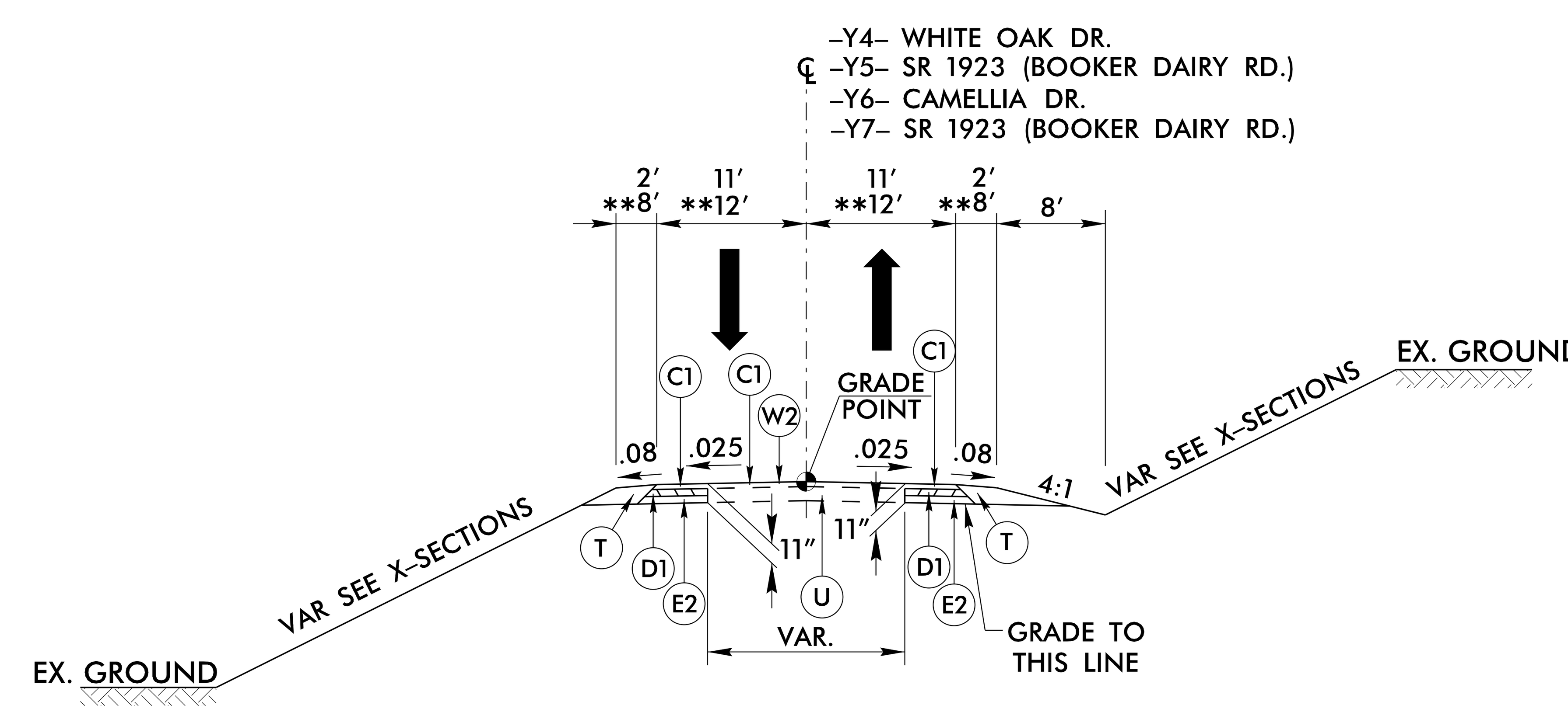
-Y2- STA. 9+20.00 TO -Y2- STA. 10+20.00



TYPICAL SECTION NO. 8

USE TYPICAL SECTION NO. 8 AT THE FOLLOWING LOCATION:

**-Y5- STA. 10+35.51 TO -Y5- STA. 17+54.14
-Y6- STA. 10+16.21 TO -Y6- STA. 11+68.63



TYPICAL SECTION NO. 9

USE TYPICAL SECTION NO. 9 AT THE FOLLOWING LOCATIONS:

-Y4- STA. 10+37.53 TO -Y4- STA. 11+75.00
**-Y5- STA. 17+54.14 TO -Y5- STA. 20+00.00
-Y6- STA. 11+68.63 TO -Y6- STA. 12+75.00
-Y7- STA. 15+80.00 TO -Y7- STA. 16+34.61

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2A-6
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

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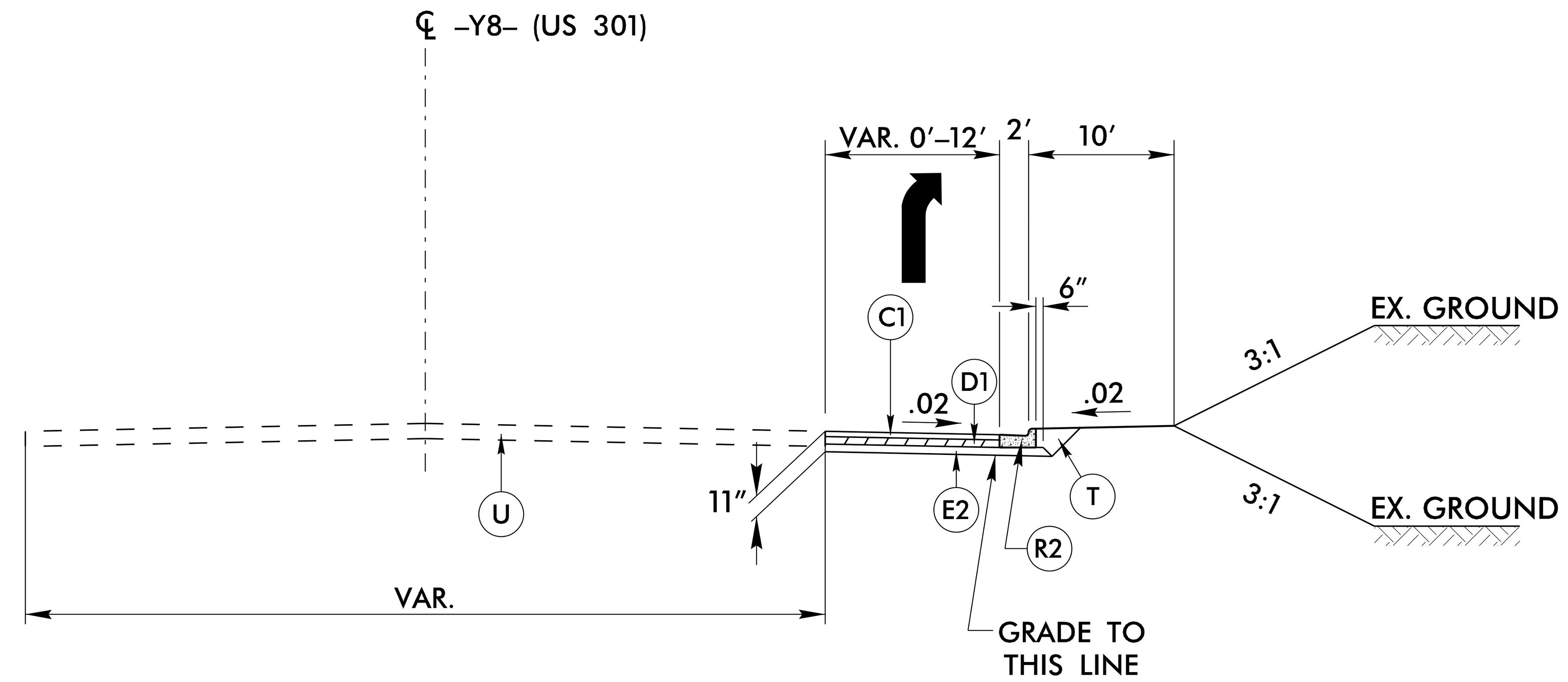
FINAL PAVEMENT SCHEDULE

C1	3" S9.5B	N	GEOTEXTILE FOR SOIL STABILIZATION
C2	1½" S9.5B	R1	1'-6" C & G
C3	VAR. S9.5B	R2	2'-6" C & G
D1	4" I19.0B	R3	2'-9" C & G
D2	3" I19.0B	S	CONCRETE SIDEWALK
D3	VAR. I19.0B	T	EARTH MATERIAL
E1	3" B25.0B	U	EXISTING PAVEMENT
E2	4" B25.0B	V1	3" MILLING EXISTING PAVEMENT
E3	VAR. B25.0B	V2	1½" MILLING EXISTING PAVEMENT
J	6" ABC	W1	WEDGING (SEE DETAIL ON SHT. 2A-1)
L	CLASS IV SUBGRADE STABILIZATION	W2	WEDGING (SEE DETAIL ON SHT. 2A-1)

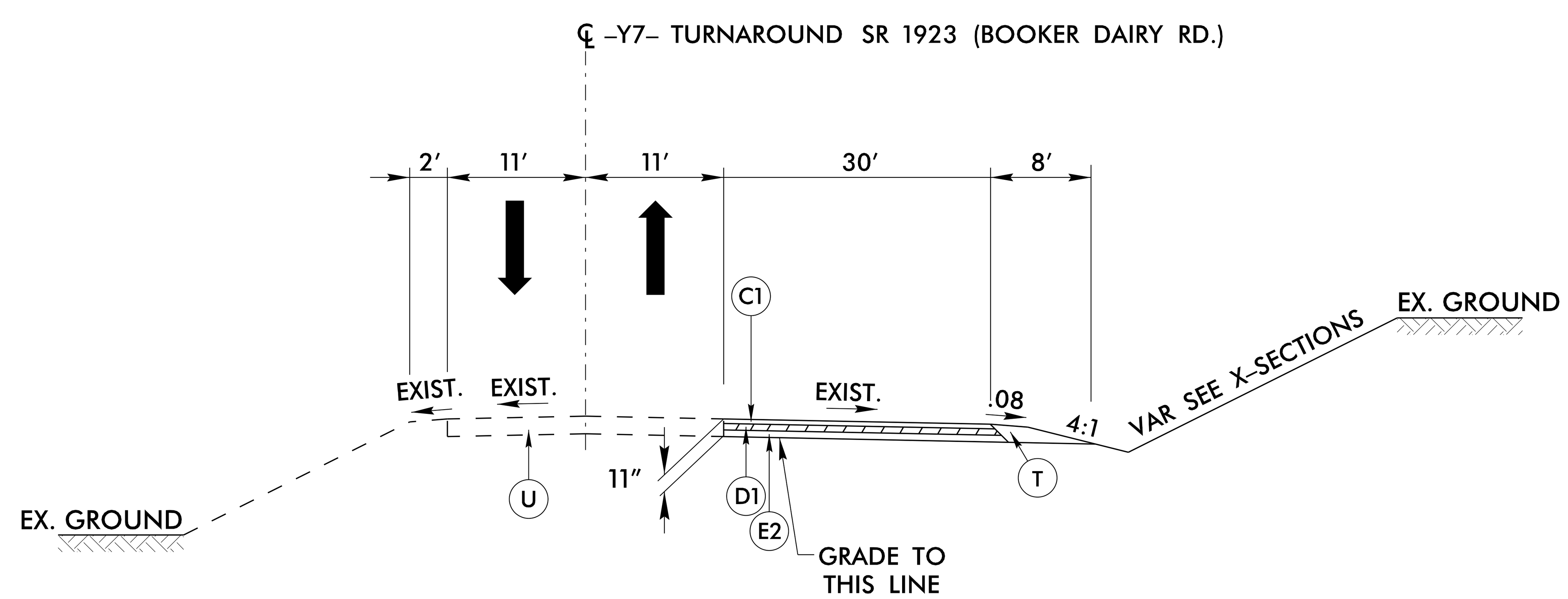
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 10

USE TYPICAL SECTION NO. 10 AT THE FOLLOWING LOCATIONS:

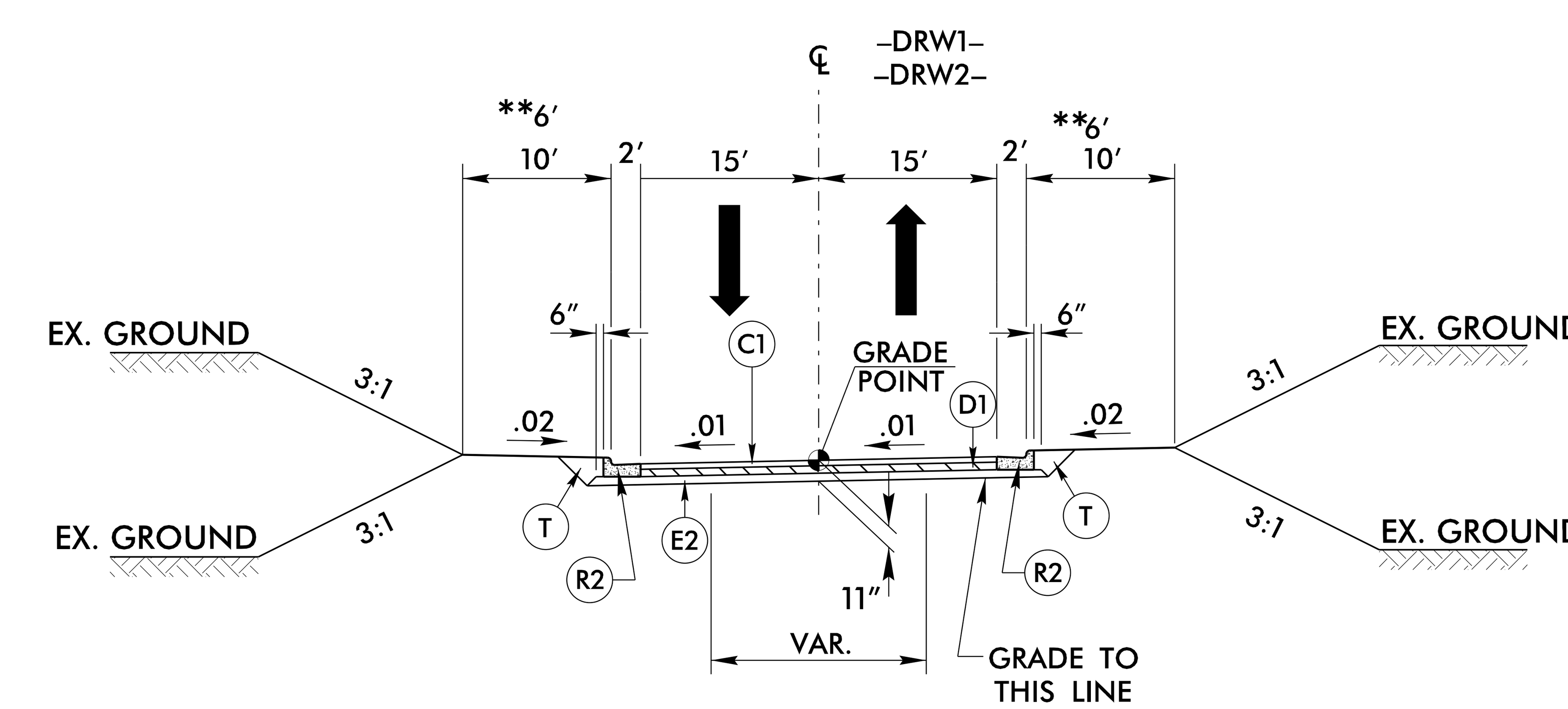
-Y8- STA. 14+80.06 TO -Y8- STA. 16+21.59



TYPICAL SECTION NO. 11

USE TYPICAL SECTION NO. 11 AT THE FOLLOWING LOCATIONS:

-Y7- TURNAROUND



TYPICAL SECTION NO. 12

USE TYPICAL SECTION NO. 12 AT THE FOLLOWING LOCATIONS:

-DRW1- STA. 10+48.26 TO -DRW1- STA. 11+40.00
**-DRW2- STA. 10+37.50 TO -DRW2- STA. 11+72.77

NOTE: MILL & REPLACE WITH 1 1/2" S9.5B
-DRW1- STA. 11+40.00 TO -DRW1- STA. 11+65.00

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
U–3334B	2B–1

ROADWAY DESIGN ENGINEER

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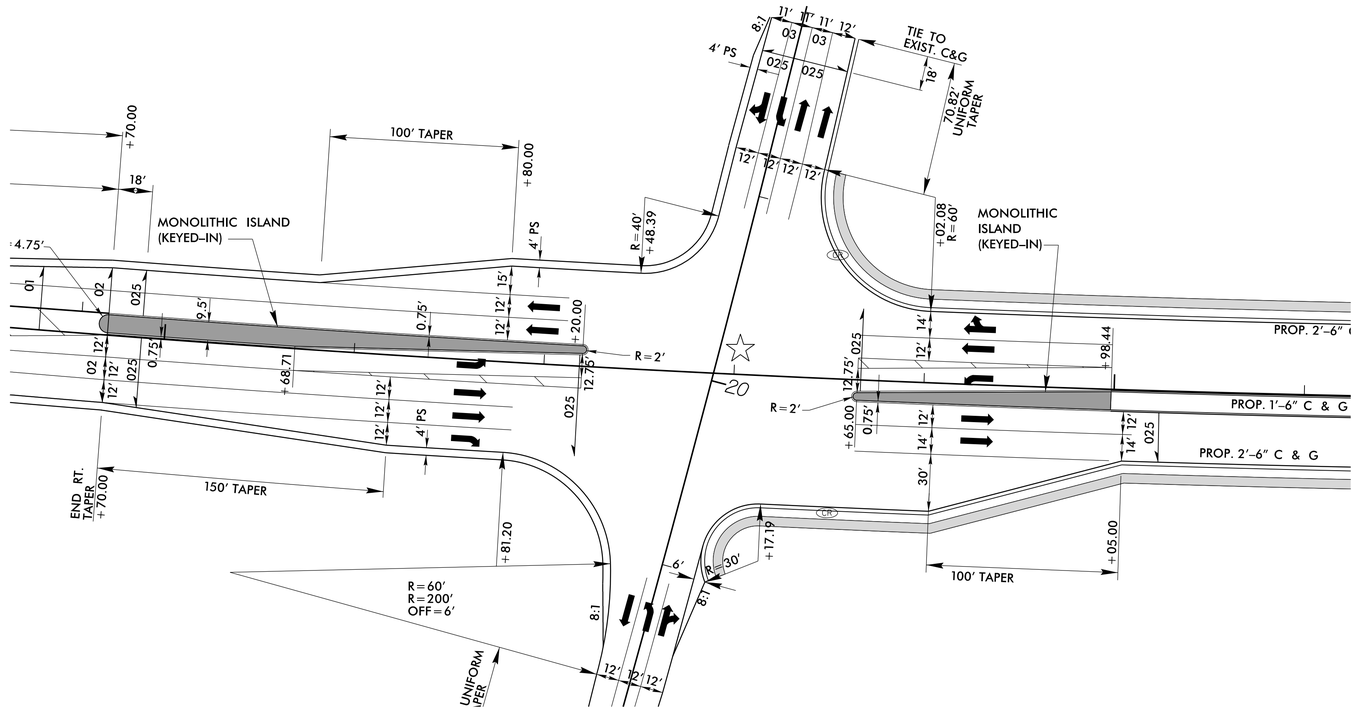
NAD 83/NSRS 2007

INTERSECTION DETAIL @ –L– (BOOKER DIARY ROAD) –Y– (BUFFALO ROAD)

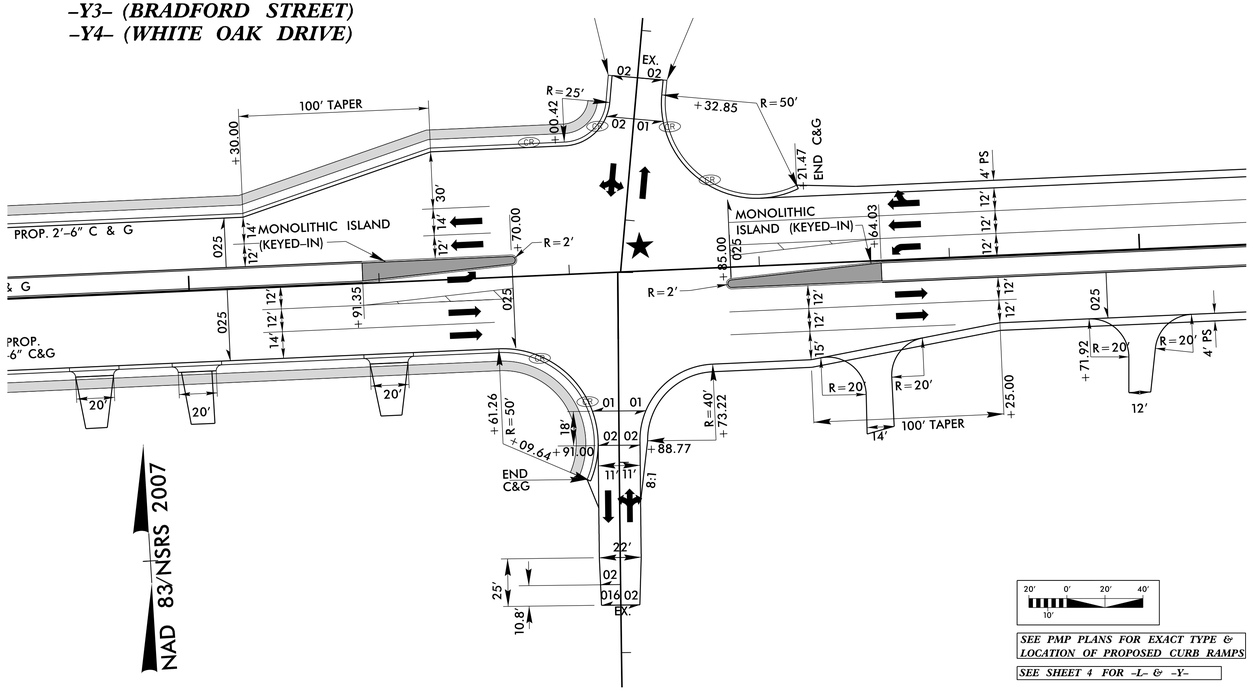


SEE PMP PLANS FOR EXACT TYPE & LOCATION OF PROPOSED CURB RAMPS

SEE SHEET 4 FOR –L– & –Y–

UPGRADE EXISTING SIGNAL

INTERSECTION DETAIL @ –L– (BOOKER DIARY ROAD) –Y3– (BRADFORD STREET) –Y4– (WHITE OAK DRIVE)

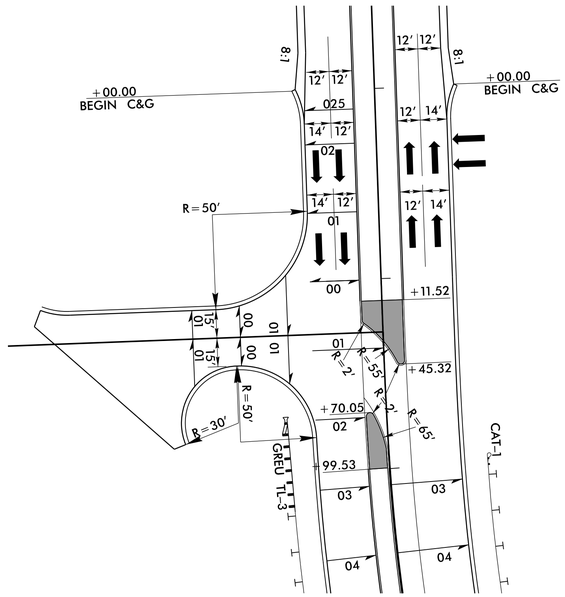


NAD 83/NSRS 2007

SEE PMP PLANS FOR EXACT TYPE & LOCATION OF PROPOSED CURB RAMPS

SEE SHEET 4 FOR –L– & –Y–

INTERSECTION DETAIL @ –L– (BOOKER DIARY ROAD) –DRW2– (WALMART TRUCK ENTRANCE)



NAD 83/NSRS 2007

SEE SHEET 12 FOR –L– & –DRW2–

7/26/2017
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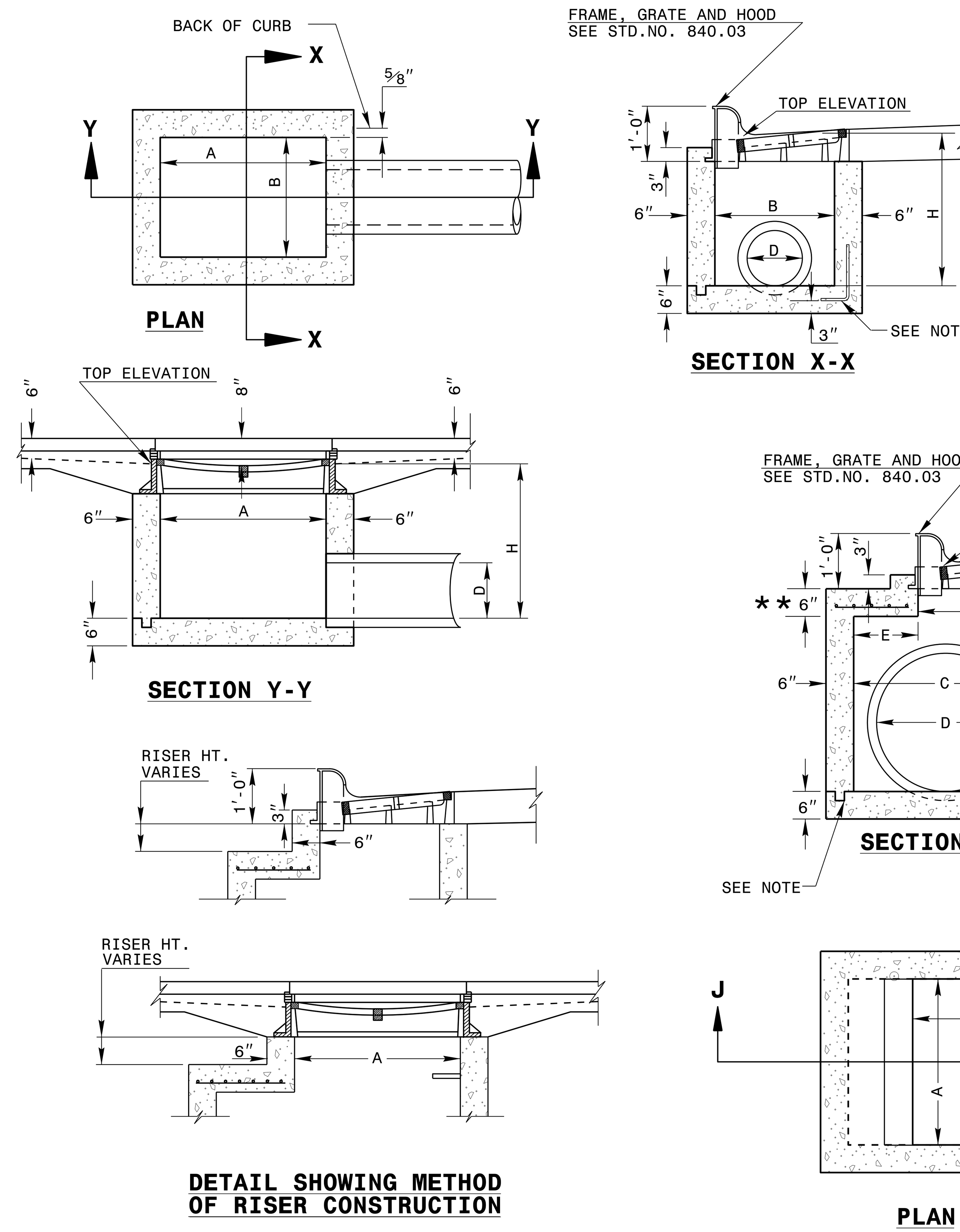
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
MINIMUM DEPTH
CONCRETE CATCH BASIN
12" THRU 84" PIPE

SHEET 1 OF 2
840D02



GENERAL NOTES:

USE CLASS "B" CONCRETE THROUGHOUT.

PROVIDE ALL CATCH BASINS OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.

OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.

USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.

IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, ADD TO SLAB AS SHOWN ON STD. NO. 840.00.

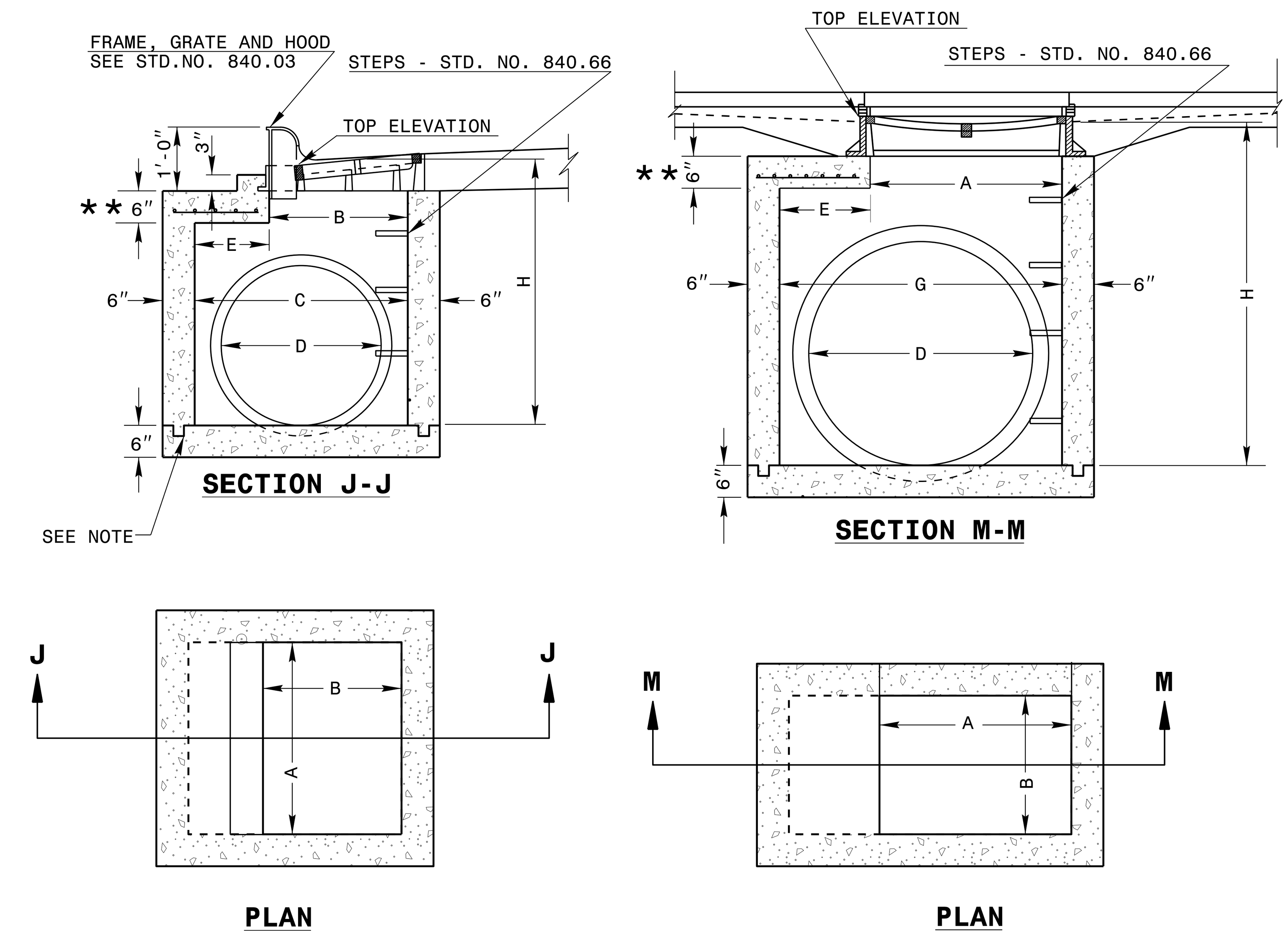
USE TYPE "E", "F" AND "G" GRATES UNLESS OTHERWISE INDICATED.

FOR 8'-0" IN HEIGHT OR LESS USE 6" WALLS AND BOTTOM SLAB. OVER 8'-0" TO 16'-0" IN HEIGHT USE 8" WALLS AND BOTTOM SLAB. ADJUST QUANTITIES ACCORDINGLY.

CONSTRUCT WITH PIPE CROWNS MATCHING.

CHAMFER ALL EXPOSED CORNERS 1".

** FOR STRUCTURES WITH PIPE LARGER THAN 54", MAKE THE TOP SLAB 8" THICK.



STATE OF
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RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
MINIMUM DEPTH
CONCRETE CATCH BASIN
12" THRU 84" PIPE

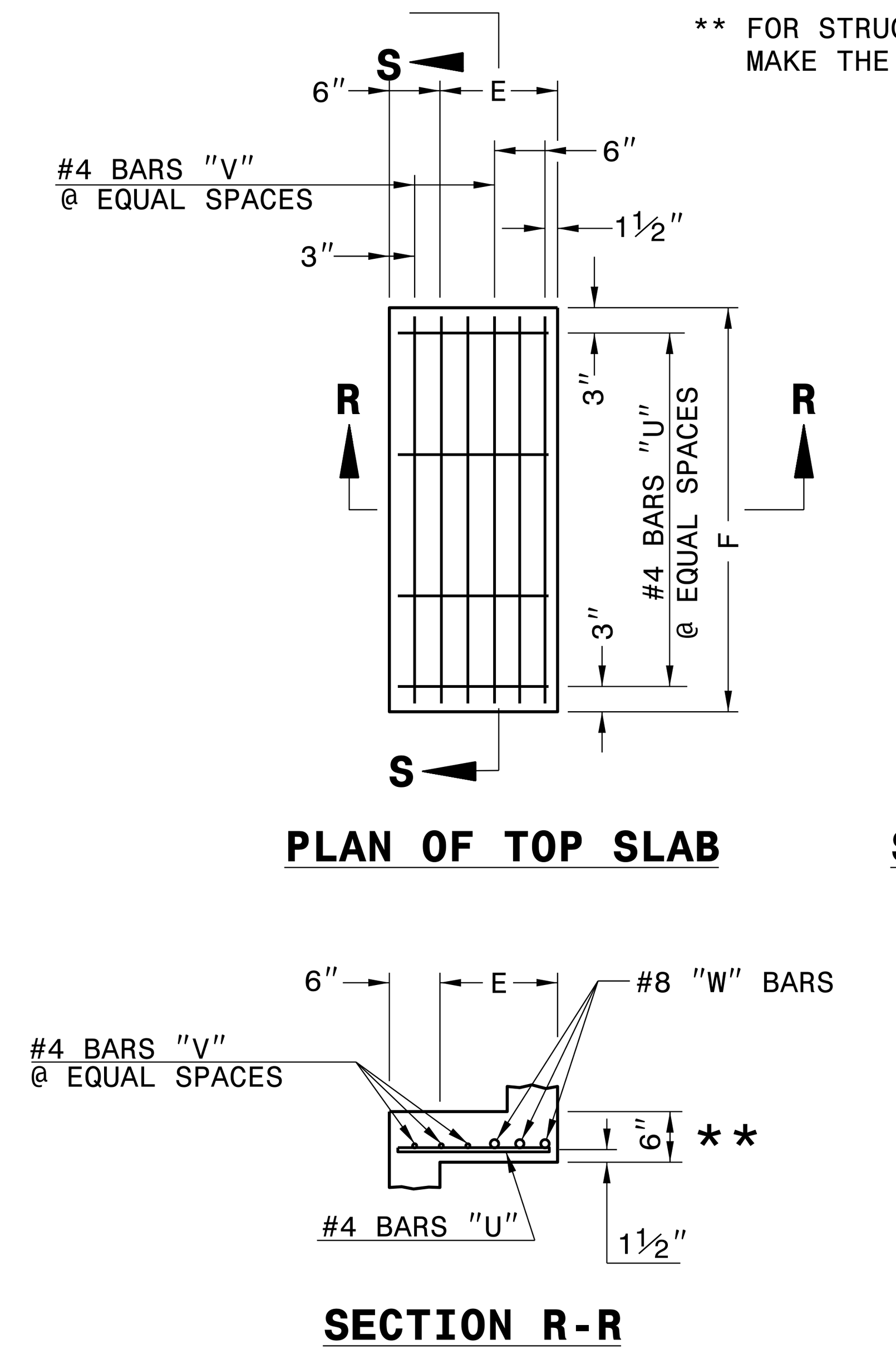
SHEET 1 OF 2
840D02

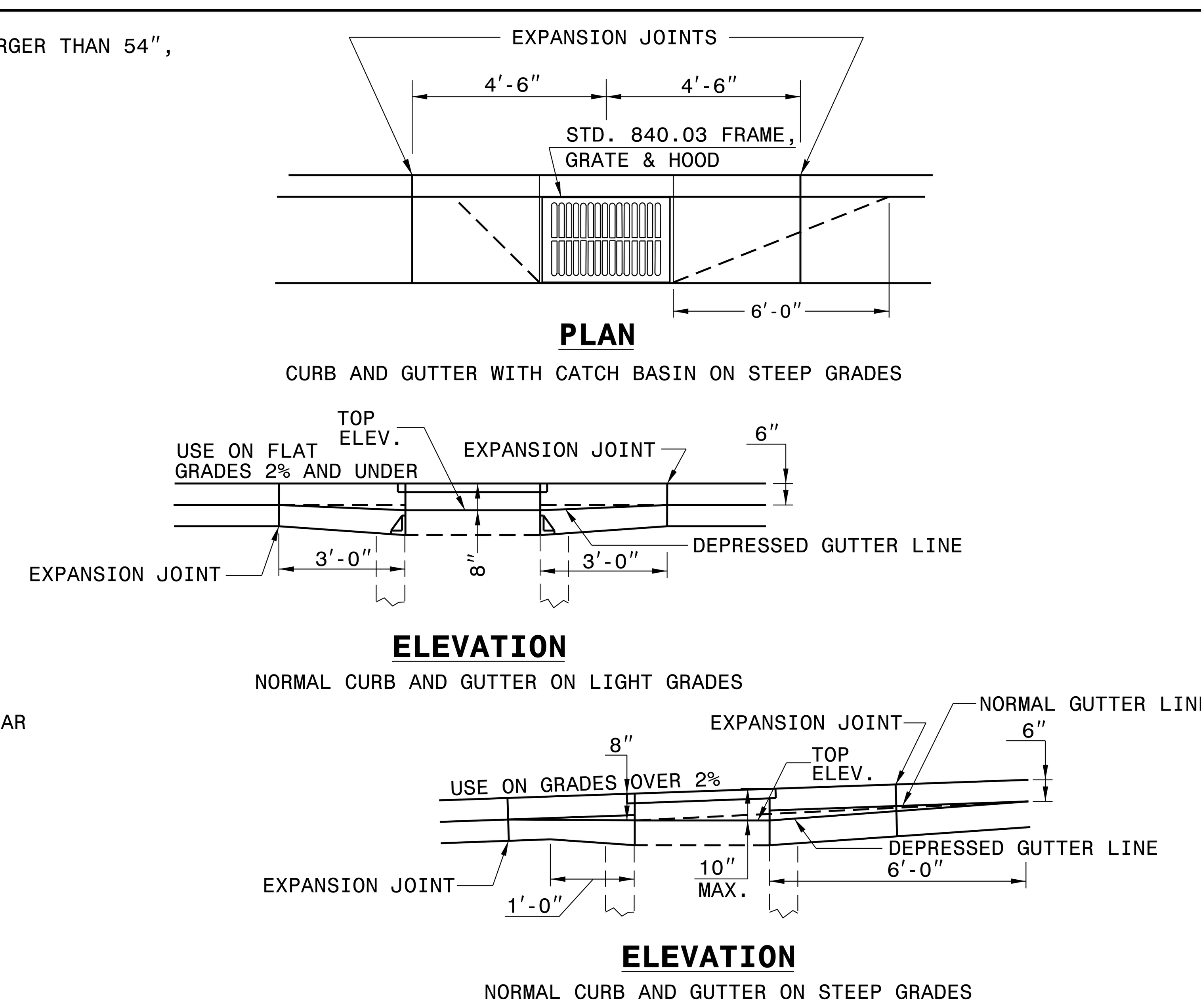
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
MINIMUM DEPTH
CONCRETE CATCH BASIN
12" THRU 84" PIPE

SHEET 2 OF 2
840D02

** FOR STRUCTURES WITH PIPE LARGER THAN 54", MAKE THE TOP SLAB 8" THICK.





* RISER HAS .228 CUBIC YARDS OF CONCRETE PER FOOT HEIGHT

MINIMUM DIMENSIONS AND QUANTITIES FOR CONCRETE CATCH BASIN(BASED ON MIN. HEIGHT, H, WITH NO RISER) *

DIMENSIONS OF BOX AND PIPE						COVER DIMENSION		BARS-U		BARS-V		BARS-W		TOTAL LBS.	CU.YDS. CONC. IN BOX			DEDUCTIONS ONE PIPE	
PIPE	SPAN	WIDTH	WIDTH	SPAN	MIN. HEIGHT										TOP SLAB	BOTTOM SLAB	TOT. CONC. FOR MINIMUM HEIGHT, H		
D	A	B	C	G	H	E	F	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH					C.M.	R.C.
12"	3'-0"	2'-2"	--	--	2'-0"	--	--	--	--	--	--	--	--	--	--	0.235	0.772	0.015	0.026
15"	3'-0"	2'-2"			2'-3"											0.235	0.829	0.023	0.036
18"	3'-0"	2'-2"			2'-6"											0.235	0.887	0.033	0.049
24"	3'-0"	2'-2"			3'-1"											0.235	1.001	0.059	0.085
30"	3'-0"	2'-2"	3'-4"	3'-4"	3'-10"	1'-2"	4'-4"	4	1'-5"	2	4'-1"	3	4'-1"	39	0.123	0.347	1.433	0.092	0.127
36"	3'-0"	2'-2"	3'-10"	3'-10"	4'-6"	1'-8"	4'-10"	4	1'-11"	3	4'-7"	3	4'-7"	43	0.161	0.432	1.714	0.132	0.178
42"	3'-0"	2'-2"	4'-5"	4'-5"	4'-11"	2'-2"	5'-5"	5	2'-5"	4	5'-2"	3	5'-2"	47	0.200	0.543	1.738	0.180	0.243
48"	3'-0"	2'-2"	5'-0"	5'-0"	5'-6"	2'-10"	6'-0"	5	3'-1"	4	5'-9"	3	5'-9"	51	0.235	0.667	2.052	0.235	0.317
54"	3'-0"	2'-2"	5'-7"	5'-7"	6'-0"	3'-5"	6'-7"	6	3'-8"	5	6'-4"	3	6'-4"	56	0.289	0.802	2.387	0.297	0.401
60"	3'-0"	2'-2"	6'-3"	6'-3"	6'-6"	4'-1"	7'-3"	6	4'-4"	5	7'-0"	3	7'-0"	61	0.340	0.973	2.722	0.363	0.546
66"	3'-0"	2'-2"	6'-11"	6'-11"	7'-0"	4'-9"	7'-11"	7	5'-0"	6	7'-8"	3	7'-8"	66	0.391	1.160	3.057	0.440	0.655
72"	3'-0"	2'-2"	7'-6"	7'-6"	7'-6"	5'-3"	8'-6"	7	5'-6"	6	8'-3"	3	8'-3"	72	0.442	1.340	3.392	0.524	0.774
78"	3'-0"	2'-2"	8'-1"	8'-1"	8'-0"	5'-11"	9'-1"	8	6'-2"	7	8'-10"	3	8'-10"	78	0.493	1.530	3.727	0.615	0.893
84"	3'-0"	2'-2"	8'-9"	8'-9"	8'-6"	6'-7"	9'-9"	8	6'-10"	7	9'-6"	3	9'-6"	84	0.544	1.760	4.062	0.713	1.010

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
MINIMUM DEPTH
CONCRETE CATCH BASIN
12" THRU 84" PIPE

SHEET 2 OF 2
840D02

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: 2002 Std.840.01 DATE:
MODIFIED BY: E.E. WARD DATE: 3-1-02
CHECKED BY: DATE:
FILE SPEC.: s:Special Details/jhowerton/840d02.dgn

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2C-2

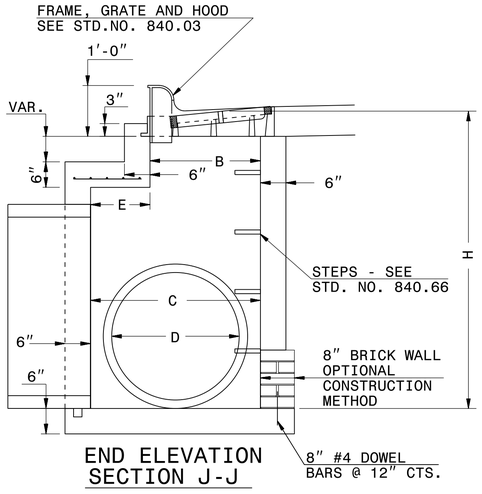
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR

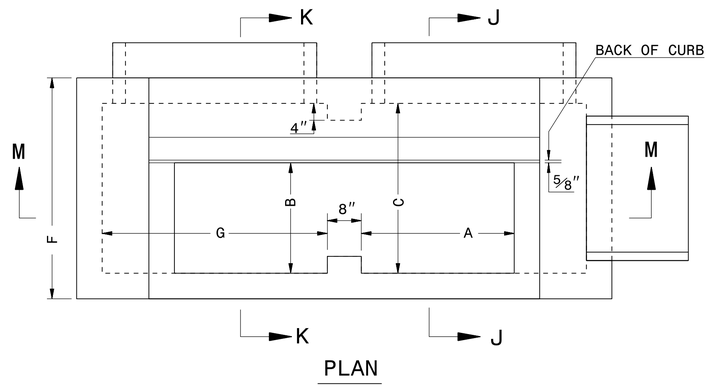
SIDE BY SIDE HOODED CATCH BASIN WITH DOUBLE SIZE BOX

SHEET 1 OF 1

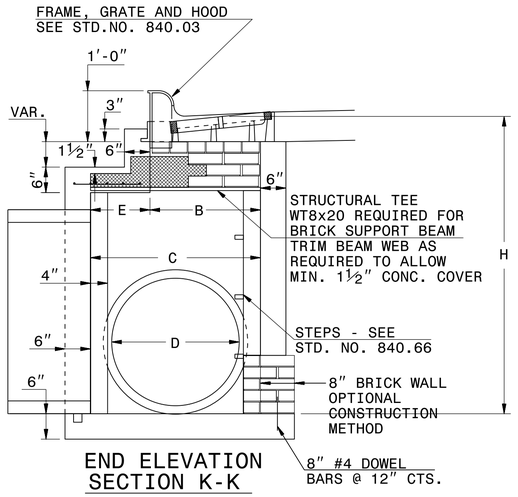
84002dbl



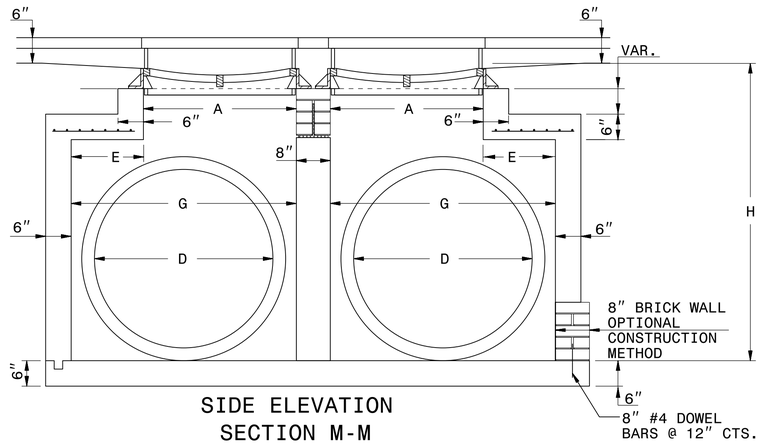
END ELEVATION
SECTION J-J



PLAN



END ELEVATION
SECTION K-K



SIDE ELEVATION
SECTION M-M

GENERAL NOTES:

CLASS "B" CONCRETE TO BE USED THROUGHOUT.

ALL CATCH BASINS OVER 3'-6" IN DEPTH WILL BE PROVIDED WITH STEPS ON 12" CENTERS. SEE STD. DWG. NO. 840.66.

OPTIONAL CONSTRUCTION - MONOLITHIC POUR
2" KEY WAY OR #4 BAR DOWELS AT 12" CENTERS
AND AS DIRECTED BY THE ENGINEER.

FORMS WILL BE USED IN THE CONSTRUCTION OF THE BOTTOM SLAB.

IF THE PIPE IS SET IN THE BASE SLAB OF THE BOX ADD TO THE BASE AS SHOWN ON STD DWG. NO. 840.00. USE TYPE "E", "F" AND "G" GRATES UNLESS OTHERWISE INDICATED.

WHEN BOX DEPTH IS 8' OR LESS USE 6" WALLS AND BOTTOM SLAB. WHEN DEPTH IS 8' TO 16' USE 8" WALLS AND BOTTOM SLAB. QUANTITIES SHALL BE ADJUSTED ACCORDINGLY.

SEE SHEET 2 OF STD. DWG. NO. 840.02 FOR DIMENSIONS.

SEE STD. DWG. NO. 840.01 FOR BRICK MASONRY CONSTRUCTION INFORMATION.

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR

SIDE BY SIDE HOODED CATCH BASIN
WITH DOUBLE SIZE BOX

SHEET 1 OF 1

84002dbl

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Keith S. Howerton

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: L.E.Robinson DATE: May 1993
MODIFIED BY: E.E. Ward DATE: Oct. 2004
CHECKED BY: DATE:
FILE SPEC'S: usr/details/stand/840d02 Double CB.dgn

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

8/17/99

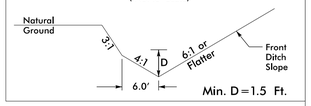
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	2D-1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULIC DESIGN ENGINEER

DRAINAGE DETAILS

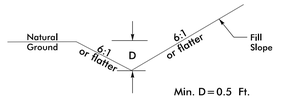
DETAIL A
SPECIAL CUT DITCH w/HINGE
(Not to Scale)



Min. D=1.5 Ft.

–L– STA. 20+00 TO STA. 25+00 (LT)

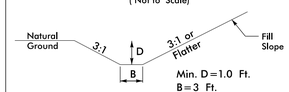
DETAIL B
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=0.5 Ft.

–L– STA. 29+00 TO STA. 31+05 (RT)

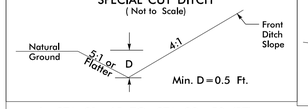
DETAIL C
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D=1.0 Ft.
B=3 Ft.

–Y– STA. 21+26 TO STA. 21+65 (RT)
–L– STA. 26+50 TO STA. 27+21 (RT)

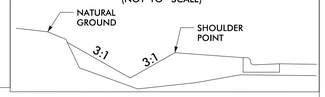
DETAIL D
SPECIAL CUT DITCH
(Not to Scale)



Min. D=0.5 Ft.

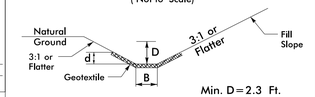
–L– STA. 31+65 TO STA. 32+50 (RT)

DETAIL E
SPECIAL BACK OF CURB LATERAL DITCH
(NOT TO SCALE)



–L– STA. 29+50 TO STA. 32+50 (LT)

DETAIL F
SPECIAL LATERAL BASE DITCH
(Not to Scale)

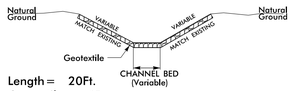


Min. D=2.3 Ft.
Max. d=2.5 Ft.
B=3.5Ft.

Geotextile=55sy
Est.= 36 Tons of Class I Rip–Rap

–L– STA. 32+71 TO STA. 32+94 (RT)

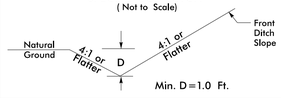
DETAIL G
PIPE OUTLET CHANNEL
(Not to Scale)



Length= 20Ft.
Geotextile= 45sy
Est.= 32 Tons of Class I Rip–Rap

–L– STA.32+59 TO STA.32+76 (RT)

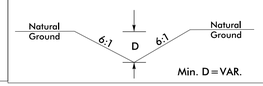
DETAIL H
SPECIAL CUT DITCH
(Not to Scale)



Min. D=1.0 Ft.

–Y– STA. 20+90 TO STA. 22+15 (LT)
–L– STA. 68+22 TO STA. 71+50 (LT)
–L– STA. 67+65 TO STA. 71+50 (RT)

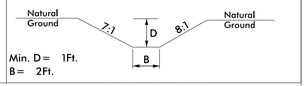
DETAIL I
STANDARD 'V' DITCH
(Not to Scale)



Min. D=VAR.

–L– STA. 52+15 (RT)

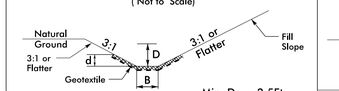
DETAIL J
STANDARD BASE DITCH
(Not to Scale)



Min. D= 1Ft.
B= 2Ft.

–L– STA. 66+71 (LT)

DETAIL K
SPECIAL LATERAL BASE DITCH
(Not to Scale)

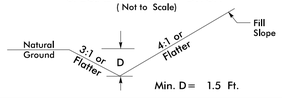


Min. D= 2.5Ft.
Max. d= 2.5Ft.
B= 2Ft.

Type of Liner= CL I Rip–Rap

–Y4– STA. 10+93 TO STA. 11+50 (LT)

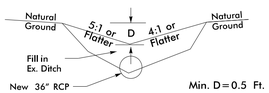
DETAIL L
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D= 1.5 Ft.

–Y4– STA. 11+50 TO STA. 12+00 (RT)
–L– STA. 86+00 TO STA. 90+82 (LT)
–L– STA. 99+50 TO STA. 102+50 (LT)
–L– STA. 95+50 TO STA. 107+00 (RT)

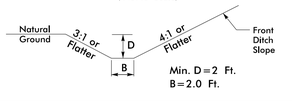
DETAIL M
FILL IN EX. DITCH
(Not to Scale)



Min. D=0.5 Ft.

–Y4– STA. 12+41 TO STA. 13+25 (LT)

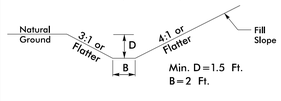
DETAIL N
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D=2 Ft.
B=2.0 Ft.

–L– STA. 84+35 TO STA. 91+49 (RT)
–L– STA. 91+50 TO STA. 95+50 (RT)

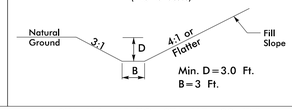
DETAIL O
SPECIAL LATERAL BASE DITCH
(Not to Scale)



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

–L– STA. 90+82 TO STA. 96+00 (LT)
–L– STA. 102+50 TO STA. 116+50 (LT)
–L– STA. 107+00 TO STA. 115+74 (RT)

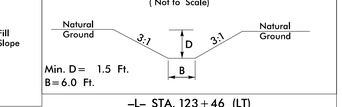
DETAIL P
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D=3.0 Ft.
B=3 Ft.

–L– STA. 116+45 TO STA. 117+89 (RT)

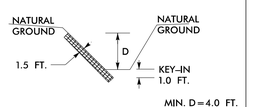
DETAIL R
STANDARD BASE DITCH
(Not to Scale)



Min. D= 1.5 Ft.
B=6.0 Ft.

–L– STA. 123+46 (LT)
–L– STA. 123+48 (RT)

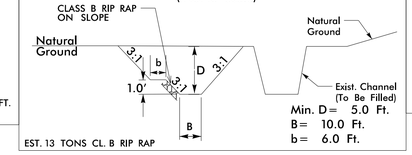
DETAIL S
BANK STABILIZATION



Type of Liner= CL I Rip–Rap

–L– STA. 118+71 (75' LT) TO
–L– STA. 119+17 (62' LT)
–L– STA. 122+82 (180' RT) TO
–L– STA. 123+54 (193' RT)

DETAIL T
CHANNEL CHANGE
(Not to Scale)

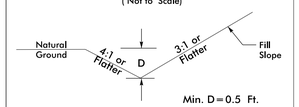


Min. D= 5.0 Ft.
B= 10.0 Ft.
b= 6.0 Ft.

EST. 13 TONS CL. B RIP RAP

–L– STA. 118+56 TO STA. 119+58 LT

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

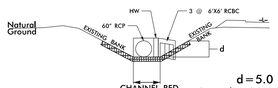


Min. D=0.5 Ft.

–Y5– STA. 18+62 TO STA. 21+00 (RT)

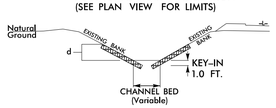
DETAIL W
RIP RAP AT OUTLET
(Not to Scale)

RIP RAP AT PIPE OUTLET
(STD. NO. 876.02)



d=5.0 Ft.
Length=20.0 Ft.

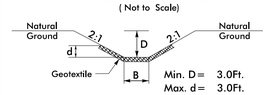
ADDITIONAL BANK STABILIZATION
(SEE PLAN VIEW FOR LIMITS)



Est.= 140 Tons of Class I Rip–Rap

–L– STA. 120+52 TO STA. 121+00 (RT)

DETAIL X
STANDARD BASE DITCH
(Not to Scale)



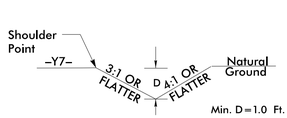
Min. D= 3.0Ft.
Max. d= 3.0Ft.
B= 3Ft.

*When B is < 6.0'

Type of Liner= CL I Rip–Rap

–Y4– STA. 20+24 TO STA. 20+81 (LT)

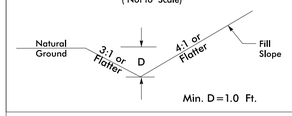
DETAIL Y
STANDARD 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.

–Y7– STA. 15+00 TO STA. 16+08 (LT)

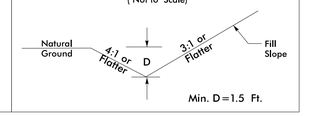
DETAIL Z
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.

–Y5– STA. 14+25 TO STA. 15+50 (RT)
–Y5– STA. 14+50 TO STA. 18+00 (LT)
–Y6– STA. 10+40 TO STA. 11+50 (LT)
–L– STA. 96+00 TO STA. 98+50 (LT)

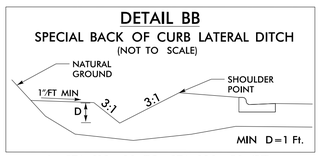
DETAIL AA
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.5 Ft.

–Y5– STA. 18+00 TO STA. 20+50 (LT)

DETAIL BB
SPECIAL BACK OF CURB LATERAL DITCH
(NOT TO SCALE)



–L– STA. 118+00 TO STA. 120+50 (RT)

DETAIL U
(NOT TO SCALE)

SKEWED MULTI–BARREL CULVERT LOW FLOW CHANNEL SILLS

*NOTES:

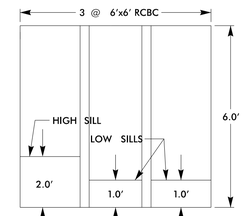
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE 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.

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

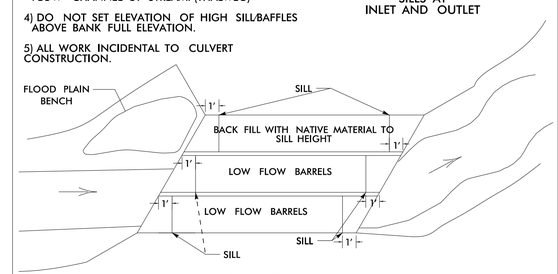
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL ELEVATION.

5) ALL WORK INCIDENTAL TO CULVERT CONSTRUCTION.



SILLS AT INLET AND OUTLET



PLAN VIEW

6/9/2017
U:\Drainage\U3334B_Hyd_ditch_detail_2D-1.dgn
smeadows

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	4
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

BEGIN T.I.P. PROJECT U-3334B
-L_TIE- PC Sta. 10+00.00 =
-L- POT Sta. 15+56.45 19.20' RT

POT Sta. 10+00.00

BEGIN CONSTRUCTION
-L- POT Sta. 13+94.65

-L- PC Sta. 18+59.45

-L_TIE- PRC Sta. 16+47.87

JOHN W. TWISDALE
DB 1867 PG 707

10 (L_TIE)

15 (L_TIE)

20

S 79°15'15.0" E

GRADE TO DRAIN

-L-

-L_TIE-

EXISTING R/W

SPECIAL CUT DITCH W/HINGE
SEE DETAIL A (SHEET 2D-1)

630' TAPER
LANE DROP

200.00'

0401 FS 2GI-A 24" RCP-III 0402

BEG. RT TAPER +56.45

24" RCP-III 15" RCP

0403 FS 2GI-A 24" RCP-III

SR 1923 BOOKER DAIRY RD 32' BST

0404 FS 2GI-A 15" RCP

RIPRAP

REMOVE EXIST. SYSTEM

EXISTING R/W 48" WW

PAINT STRIPING
(SEE PAVEMENT MARKING PLANS)

MATCHLINE -L- 22+50 SEE SHEET 5

S 87°25'50" E
1660.00'

CITY LIMITS

-BL- 100

NO CLAIM
(1)
JOHN TWISDALE
DB 795 PG 258

N 68°22'...

-L-	-L_TIE-	-L_TIE-
PI Sta 25+21.18	PI Sta 13+24.14	PI Sta 17+81.02
△ = 6° 18' 45.6" (LT)	△ = 4° 56' 57.6" (LT)	△ = 2° 02' 03.4" (RT)
D = 0° 28' 38.9"	D = 0° 45' 50.2"	D = 0° 45' 50.2"
L = 1,322.12'	L = 647.87'	L = 266.28'
T = 661.73'	T = 324.14'	T = 133.16'
R = 12,000.00'	R = 7,500.00'	R = 7,500.00'
Se = NC	Se = N/A	Se = N/A

NOTES:

SEE SHEET 15 FOR -L- PROFILE

6/18/2017
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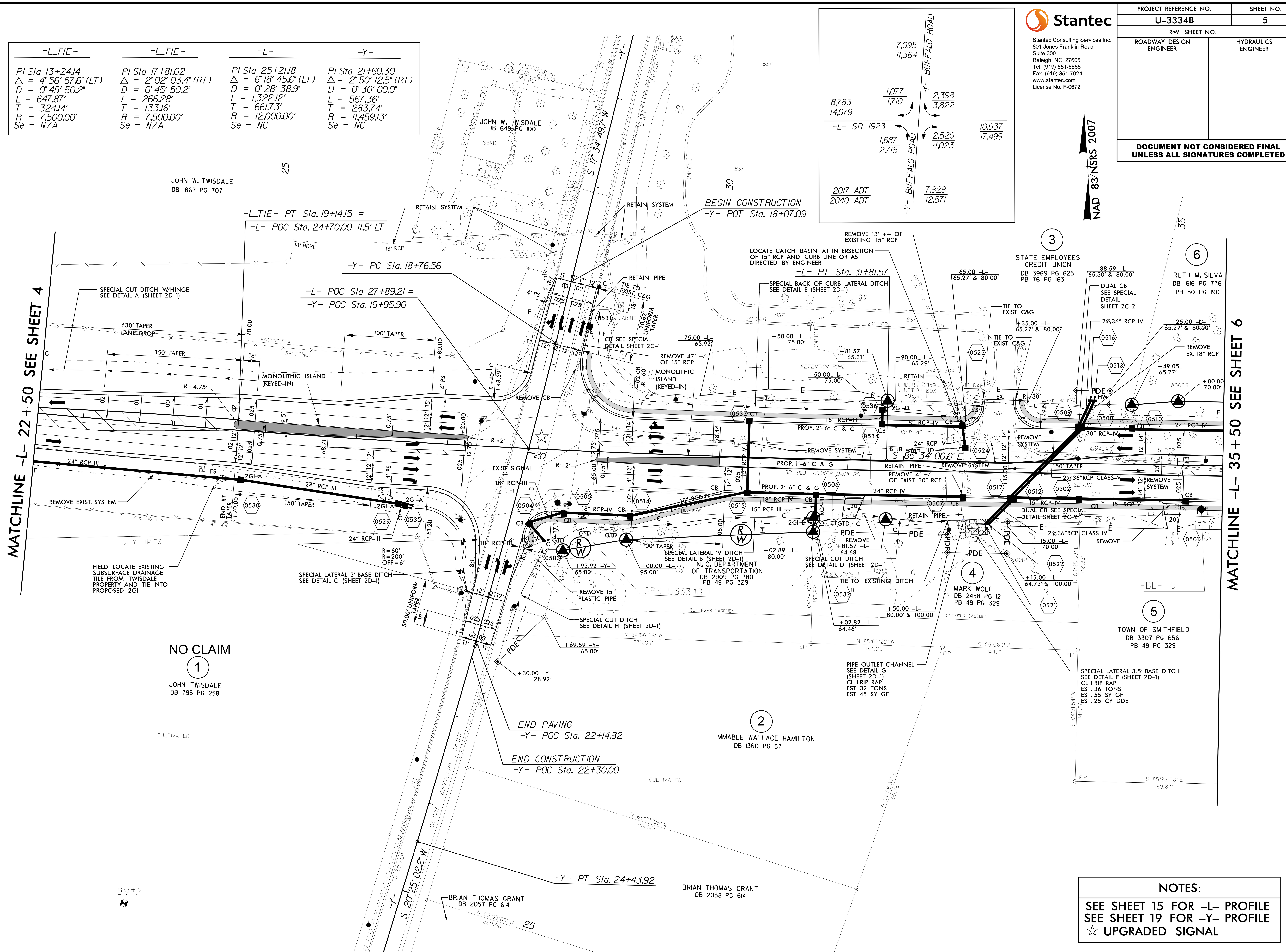
cmoz1000

-L_TIE-	-L_TIE-	-L-	-Y-
PI Sta 13+24.14	PI Sta 17+81.02	PI Sta 25+21.18	PI Sta 21+60.30
Δ = 4° 56' 57.6" (LT)	Δ = 2° 02' 03.4" (RT)	Δ = 6° 18' 45.6" (LT)	Δ = 2° 50' 12.5" (RT)
D = 0° 45' 50.2"	D = 0° 45' 50.2"	D = 0° 28' 38.9"	D = 0° 30' 00.0"
L = 647.87'	L = 266.28'	L = 1,322.12'	L = 567.36'
T = 324.14'	T = 133.16'	T = 661.73'	T = 283.74'
R = 7,500.00'	R = 7,500.00'	R = 12,000.00'	R = 11,459.13'
Se = N/A	Se = N/A	Se = NC	Se = NC



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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

11/30/2016 - R/W REVISIONS: ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 1 THROUGH 4 AND 6. - SS
1/26/2017 - R/W REVISION: REMOVED PDE FROM PARCEL 1 - SS

NOTES:

SEE SHEET 15 FOR -L- PROFILE
SEE SHEET 19 FOR -Y- PROFILE
☆ UPGRADED SIGNAL

6/19/2017
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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS
11/30/2016 - R/W REVISIONS; ADJUSTED STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKINGS ON PARCELS 5 AND 9.- SS
8/17/99

NAD 83/NSRS 2007

MATCHLINE -L- 35+50 SEE SHEET 5

MATCHLINE -L- 49+50 SEE SHEET 7

6 RUTH M. SILVA DB 1616 PG 776 PB 50 PG 190

6 RUTH M. SILVA DB 1616 PG 776 PB 50 PG 190

N. C. DEPARTMENT OF TRANSPORTATION DB 2496 PG 22 PB 62 PG 404

7 WAYNE L. BAREFOOT DB 1616 PG 404 PB 50 PG 190

TETRA BLISS PROPERTIES, LLC DB 3640 PG 290 PB 73 PG 237

8 WOLFPACK INVESTORS, LLC DB 3829 PG 363 PB 73, PG 237

5 TOWN OF SMITHFIELD DB 3307 PG 656 PB 49 PG 329

5 TOWN OF SMITHFIELD DB 1347 PG 522

5 TOWN OF SMITHFIELD DB 3463 PG 808

5 TOWN OF SMITHFIELD DB 3559 PG 993

9 JOHNSTON COUNTY BOARD OF EDUCATION DB 649 PG 59

2SBK SMITHFIELD RECREATION & AQTICS

-L- PC Sta. 45+81.12

-BL- 102

SR 1923 BOOKER DAIRY RD

S 85°34'00.6" E

CULTIVATED

4' MONOLITHIC ISLAND (KEYED-IN)

CB SEE SPECIAL DETAIL SHEET 2C-1

TIE TO EXIST. C&G

RETAIN EX. SYSTEM

DO NOT DISTURB EXISTING SIDEWALK & PLANTING

DO NOT DISTURB GUARDRAIL

DO NOT DISTURB EXISTING BRICK COLUMNS

SEAL ABANDONED WELL

SEE SPECIAL SHEET

-L-
PI Sta 48+24.72
Δ = 3° 29' 17.6" (LT)
D = 0° 42' 58.3"
L = 487.05'
T = 243.60'
R = 8,000.00'
Se = NC

NOTES:
SEE SHEET 16 FOR -L- PROFILE

6/19/2017
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smcclung

8/17/99

REVISIONS

11/30/2016 – R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 8 AND 9.
UPDATED PROPERTY OWNER NAME ON PARCEL 11.– SS

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NAD 83/NSRS 2007

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE –L– 49+50 SEE SHEET 6

MATCHLINE –L– 63+50 SEE SHEET 8

TETRA BLISS PROPERTIES, LLC
DB 3640 PG 290
PB 73 PG 237

WOLFPACK INVESTORS, LLC
DB 3829 PG 363
PB 73 PG 237

NEUSE CHARTER SCHOOL
DB 4351 PG 405

GRACE COMMUNITY ASSEMBLY OF GOD, INC.
DB 1015 PG 498
PB 75 PG 360

JOHNSTON COUNTY BOARD OF EDUCATION
DB 649 PG 59

JOHNSTON COUNTY BOARD OF EDUCATION
DB 1468 PG 166

DAN UNDERWOOD HEIRS
DB 1010 PG 167
PB 43 PG 323

-L- PT Sta. 50+68.17

-Y1- POT Sta. 10+00.00
BRG AH S 0° 57' 27.2" W

BEGIN CONSTRUCTION
-Y1- Sta. 10+75.00

-Y2- POT Sta. 9+00.00
BRG AH S 1° 00' 56.3" W

BEGIN CONSTRUCTION
-Y2- Sta. 9+20.00

END MILLING BEGIN GRADE
-Y2- Sta. 10+20.00

-Y1A_REV- PC Sta. 10+63.02

~~END CONSTRUCTION~~
~~-Y1A- POT Sta 10+87.51~~

END CONSTRUCTION
-Y1A_REV- POC Sta 10+85.22

~~-Y1A- POT Sta. 11+71.96~~
~~BRG BK S 0° 57' 27.2" W~~

-L- POT Sta 51+96.52 =
-Y1- POT Sta. 11+71.96 =
~~-Y1A- POT Sta. 10+00.00~~
-Y1A_REV- POT Sta. 10+00.00

-Y1A_REV- PT Sta. 12+19.30

-L- POT Sta 58+72.10=
-Y2- POT Sta. 11+39.65
-Y2A- POT Sta. 10+00.00
BRG AH S 0° 47' 26.3" W

END CONSTRUCTION
-Y2A- POT Sta 11+13.00

-Y2A- POT Sta. 11+17.65

S 89°03' 18.2" E –L–

-Y1A_REV-
PI Sta 11+69.31
Δ = 99° 29' 11.0" (LT)
D = 63° 39' 43.1"
L = 156.27'
T = 106.29'
R = 90.00'

-L-
PI Sta 48+24.72
Δ = 3° 29' 17.6" (LT)
D = 0° 42' 58.3"
L = 487.05'
T = 243.60'
R = 8,000.00'
Se = NC

NOTES:

SEE SHEET 16 FOR –L– PROFILE.
SEE SHEET 20 FOR –Y1–, –Y2– & –Y2A– PROFILES.
★ PROPOSED SIGNAL.

PROJECT REFERENCE NO.	SHEET NO.
U-3334B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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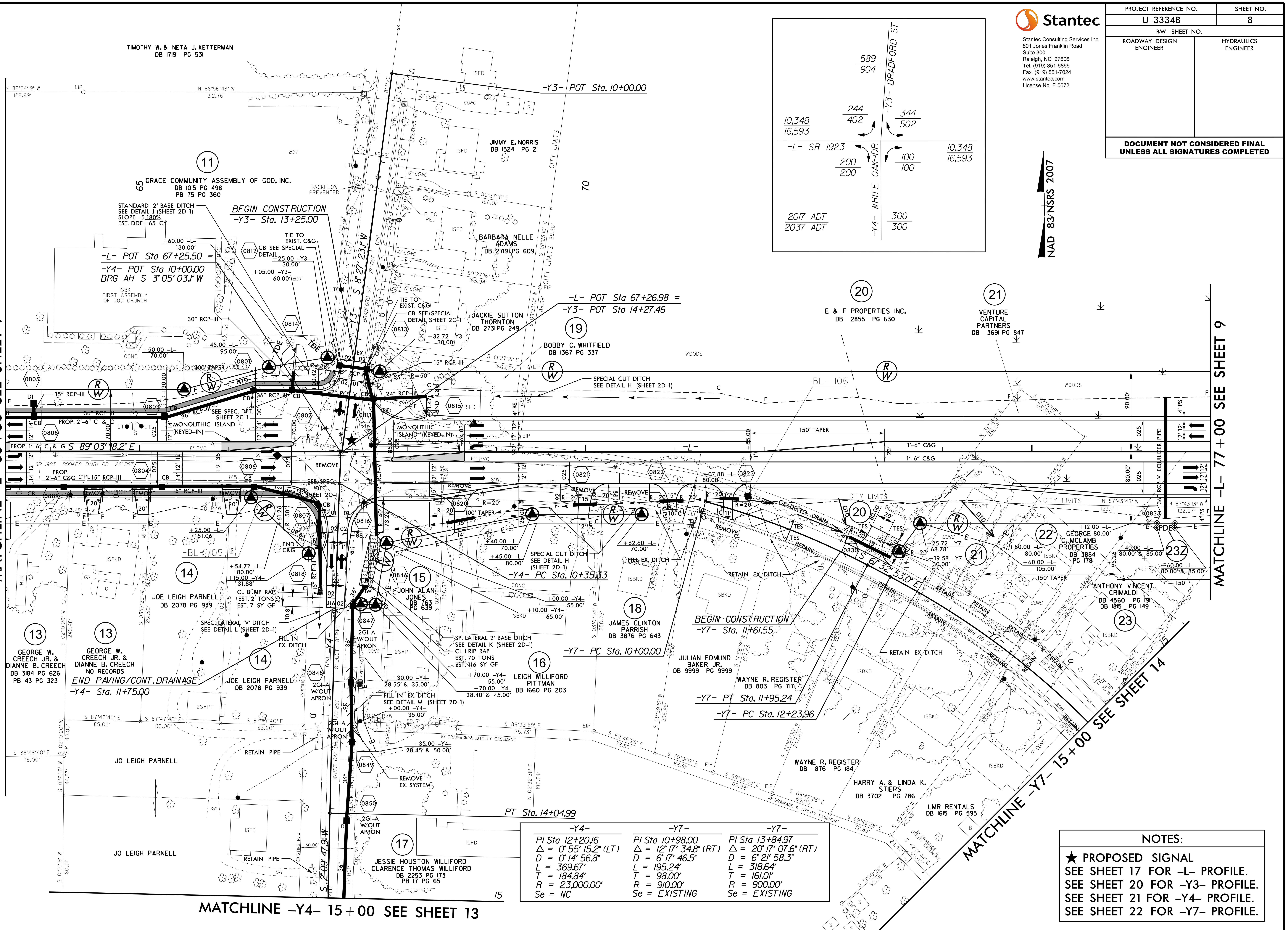
REVISIONS

11/30/2016 - R/W REVISIONS: ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 11,14,15 AND 17 THROUGH 21; UPDATED PROPERTY OWNER NAMES AND/OR DEED REFERENCES ON PARCELS 11,14 AND 23. - SS
9/18/2017 - R/W REVISIONS: CREATED PARCEL 23Z; ADDED PDE AND TCE ON PARCEL 23Z. - SS



MATCHLINE -L- 63+50 SEE SHEET 7

MATCHLINE -L- 77+00 SEE SHEET 9

MATCHLINE -Y4- 15+00 SEE SHEET 13

MATCHLINE -Y7- 15+00 SEE SHEET 14

-Y4-	-Y7-	-Y7-
PI Sta 12+20.16	PI Sta 10+98.00	PI Sta 13+84.97
Δ = 0°55'15.2" (LT)	Δ = 12°17'34.8" (RT)	Δ = 20°17'07.6" (RT)
D = 0°14'56.8"	D = 6°17'46.5"	D = 6°21'58.3"
L = 369.67'	L = 195.24'	L = 318.64'
T = 184.84'	T = 98.00'	T = 161.01'
R = 23,000.00'	R = 910.00'	R = 900.00'
Se = NC	Se = EXISTING	Se = EXISTING

NOTES:

★ PROPOSED SIGNAL
SEE SHEET 17 FOR -L- PROFILE.
SEE SHEET 20 FOR -Y3- PROFILE.
SEE SHEET 21 FOR -Y4- PROFILE.
SEE SHEET 22 FOR -Y7- PROFILE.

8/17/99

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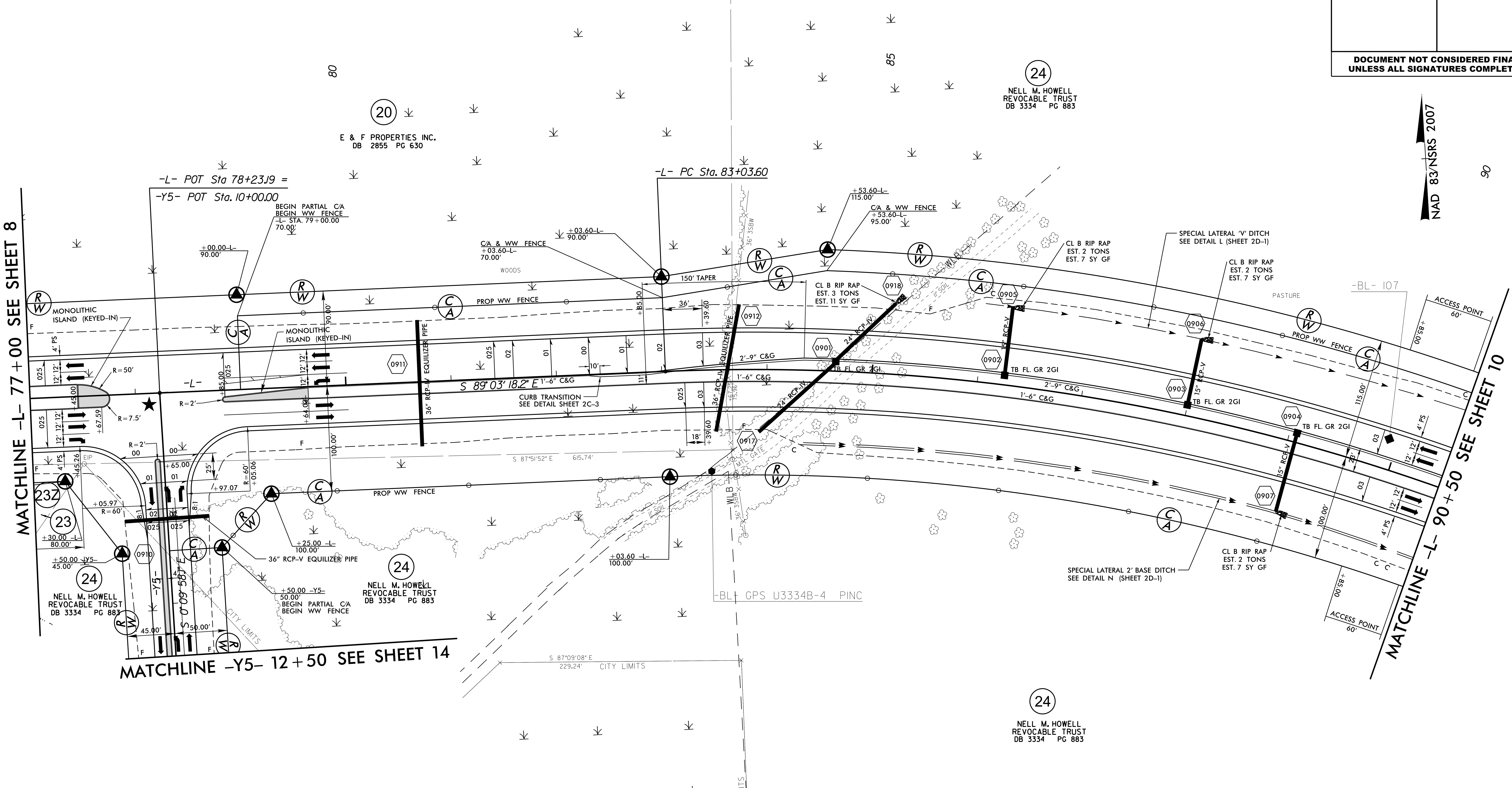
PROJECT REFERENCE NO.	SHEET NO.
U-3334B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

9/18/2017 - R/W REVISION: CREATED PARCEL 23Z, ADDED TCE ON PARCEL 23Z. - SS

8/17/99



NAD 83/NSRS 2007
MATCHLINE -L- 77+00 SEE SHEET 8
MATCHLINE -L- 90+50 SEE SHEET 10
MATCHLINE -Y5- 12+50 SEE SHEET 14
-L- POT Sta 78+23.19 =
-Y5- POT Sta. 10+00.00
-L- PC Sta. 83+03.60
S 89°03' 18.2" E
S 0°09' 58.1" E
20
E & F PROPERTIES INC.
DB 2855 PG 630
24
NELL M. HOWELL
REVOCABLE TRUST
DB 3334 PG 883
23
23Z
MARGIE B. OLSEN
DB 929 PG 45
MONOLITHIC ISLAND (KEYED-IN)
BEGIN PARTIAL C/A
BEGIN WW FENCE
-L- STA. 79+00.00
70.00'
C/A & WW FENCE
PROP WW FENCE
WOODS
150' TAPER
36" RCP-IV EQUILIZER PIPE
36" RCP-V EQUILIZER PIPE
CURB TRANSITION
SEE DETAIL SHEET 2C-3
2'-9" C&G
1'-6" C&G
CL B RIP RAP
EST. 3 TONS
EST. 11 SY GF
CL B RIP RAP
EST. 2 TONS
EST. 7 SY GF
SPECIAL LATERAL 'V' DITCH
SEE DETAIL L (SHEET 2D-1)
SPECIAL LATERAL 2' BASE DITCH
SEE DETAIL N (SHEET 2D-1)
TB FL. GR 2GI
PASTURE
-BL- 107
ACCESS POINT
-BL- GPS U3334B-4 PINC
CITY LIMITS
S 87°09'08" E
229.24'
S 87°51'52" E
615.74'

2018 ADT 2038 ADT	-L- SR 1923	3,509 7,055
10,348 16,593	6,941 9,945	256 98
	7,197 10,042	
	-Y5- EXIST. SR 1923	

-L-

PI Sta 102+71.66
Δ = 90° 31' 41.4" (RT)
D = 2° 56' 17.7"
L = 3,081.03'
T = 1,968.06'
R = 1,950.00'
Se = .03
RUNOFF = 108'

NOTES:

SEE SHEET 17 FOR -L- PROFILE.
SEE SHEET 21 FOR -Y5- PROFILE.

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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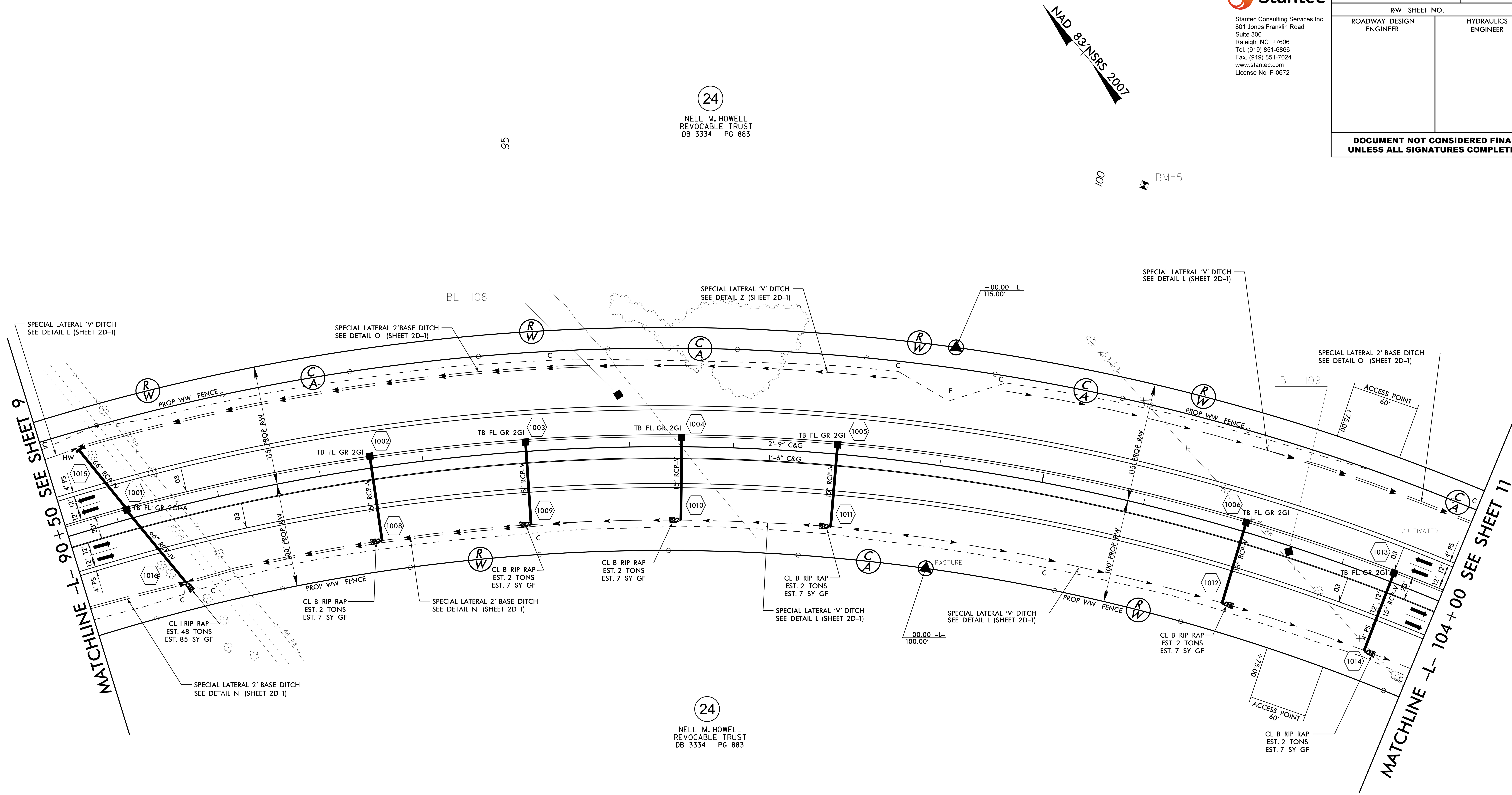
REVISIONS



NAD 83/NSRS 2007
24
NELL M. HOWELL
REVOCABLE TRUST
DB 3334 PG 883
BM#5
-BL- 108
-BL- 109
SPECIAL LATERAL 'V' DITCH SEE DETAIL L (SHEET 2D-1)
SPECIAL LATERAL 2'BASE DITCH SEE DETAIL O (SHEET 2D-1)
SPECIAL LATERAL 'V' DITCH SEE DETAIL Z (SHEET 2D-1)
SPECIAL LATERAL 2' BASE DITCH SEE DETAIL O (SHEET 2D-1)
SPECIAL LATERAL 2' BASE DITCH SEE DETAIL N (SHEET 2D-1)
SPECIAL LATERAL 'V' DITCH SEE DETAIL L (SHEET 2D-1)
+00.00 -L- 115.00'
+00.00 -L- 100.00'
PROP WW FENCE
115' PROP R/W
100' PROP R/W
TB FL. GR 2GI
TB FL. GR 2GI-A
15" RCP-IV
66" RCP-IV
2'-9" C&G
1'-6" C&G
CL B RIP RAP EST. 2 TONS EST. 7 SY GF
CL I RIP RAP EST. 48 TONS EST. 85 SY GF
ACCESS POINT 60'
PASTURE
CULTIVATED
HW
1001 1002 1003 1004 1005 1006 1008 1009 1010 1011 1012 1013 1014 1015 1016
MATCHLINE -L- 90+50 SEE SHEET 9
MATCHLINE -L- 104+00 SEE SHEET 11

-L-
PI Sta 102+71.66
Δ = 90° 31' 41.4" (RT)
D = 2° 56' 17.7"
L = 3,081.03'
T = 1,968.06'
R = 1,950.00'
Se = .03
RUNOFF = 108'

NOTES:

SEE SHEET 18 FOR -L- PROFILE.

8/17/99

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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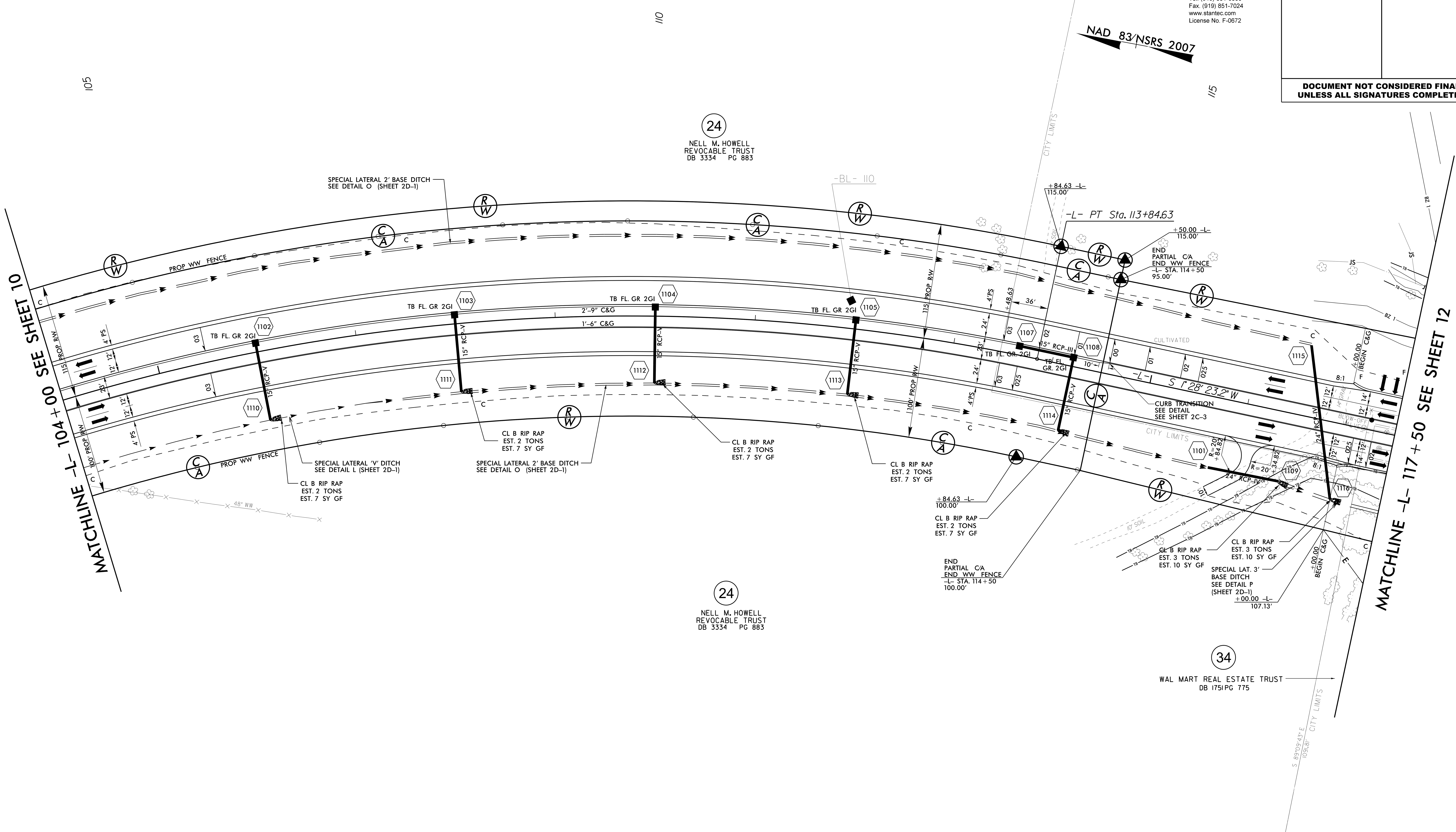
NAD 83/NSRS 2007
105
110
115
24
NELL M. HOWELL
REVOCABLE TRUST
DB 3334 PG 883
MATCHLINE -L- 104+00 SEE SHEET 10
MATCHLINE -L- 117+50 SEE SHEET 12
SPECIAL LATERAL 2' BASE DITCH
SEE DETAIL O (SHEET 2D-1)
PROP WW FENCE
-BL- 110
CITY LIMITS
+84.63 -L-
115.00'
-L- PT Sta. 113+84.63
+50.00 -L-
115.00'
END
PARTIAL C/A
END WW FENCE
-L- STA. 114+50
95.00'
TB FL GR 2GI
1102
1103
1104
1105
1107
1108
1110
1111
1112
1113
1114
1115
1116
1101
1109
2'-9" C&G
1'-6" C&G
15" RCP-V
15" RCP-III
24" RCP-IV
TB FL GR 2GI
-L- S 1°28' 23.2" W
CURB TRANSITION
SEE DETAIL
SEE SHEET 2C-3
CULTIVATED
115' PROP R/W
100' PROP R/W
SPECIAL LATERAL 'V' DITCH
SEE DETAIL L (SHEET 2D-1)
CL B RIP RAP
EST. 2 TONS
EST. 7 SY GF
+84.63 -L-
100.00'
END
PARTIAL C/A
END WW FENCE
-L- STA. 114+50
100.00'
CL B RIP RAP
EST. 3 TONS
EST. 10 SY GF
SPECIAL LAT. 3'
BASE DITCH
SEE DETAIL P
(SHEET 2D-1)
+00.00 -L-
107.13'
+00.00
BEGIN C&G
34
WAL MART REAL ESTATE TRUST
DB 1751 PG 775

-L-
PI Sta 102+71.66
Δ = 90° 31' 41.4" (RT)
D = 2° 56' 17.7"
L = 3,081.03'
T = 1,968.06'
R = 1,950.00'
Se = .03
RUNOFF = 108'

NOTES:

SEE SHEET 18 FOR -L- PROFILE.

6/19/2017
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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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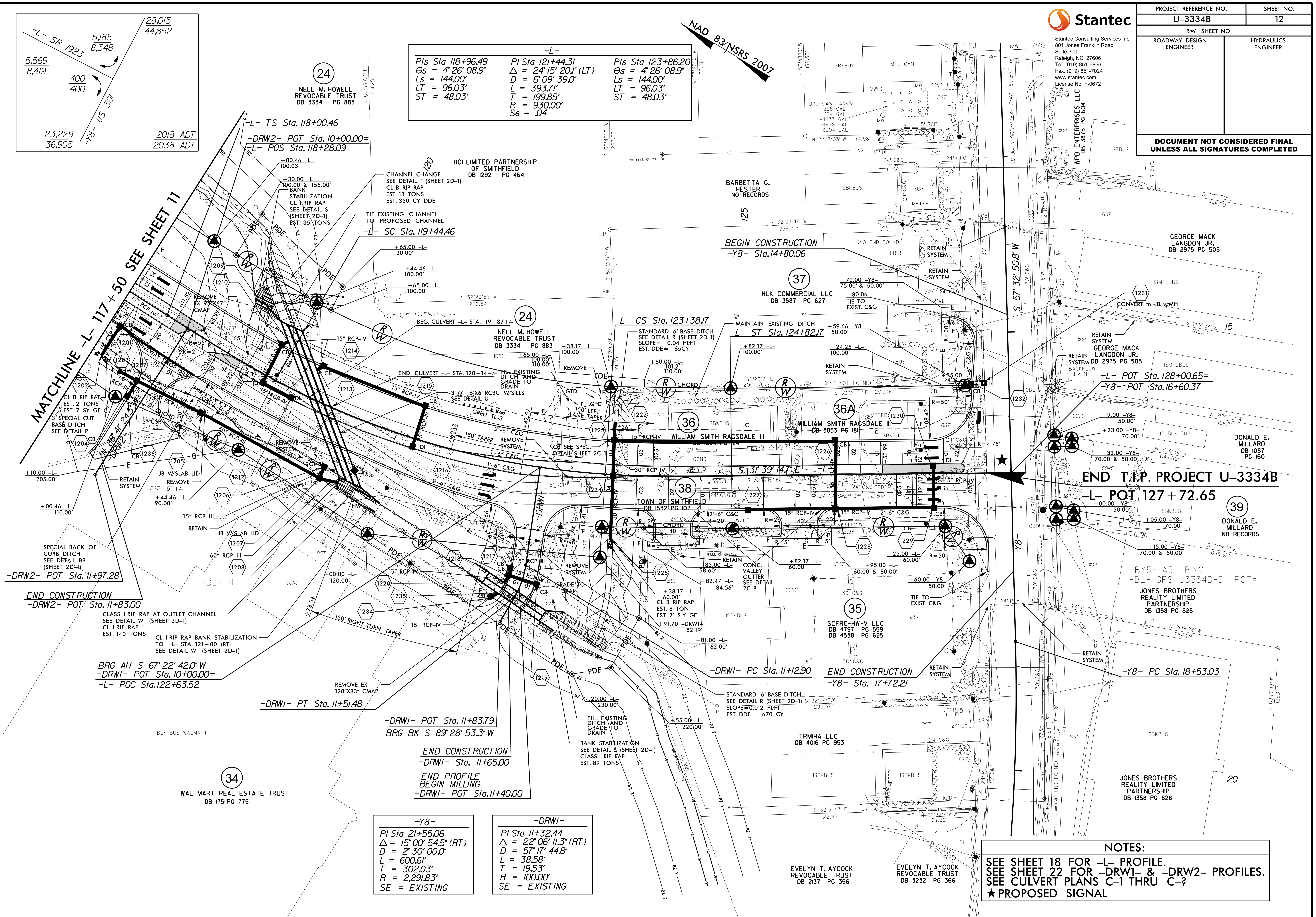
REVISIONS

11/30/2016 - R/W REVISIONS: ADDED PARCEL 364; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCEL 35,364,37 AND 39;
UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 35,- SS
3/14/2017 - R/W REVISION: ADDED TDE TO PARCELS 24 & 37 AND REVISED PDE ON PARCELS 34 & 35.- SS
8/16/2017 - R/W REVISION: CONVERTED A TEMPORARY DRIVEWAY TO PERMANENT DRIVEWAY AND ADDED A LEFT TURN LANE AT -L- STA. 118+30+/-. SS

-L-		
PIs Sta 118+96.49	PI Sta 121+44.31	PIs Sta 123+86.20
Θs = 4° 26′ 08.9″	Δ = 24° 15′ 20.1″ (LT)	Θs = 4° 26′ 08.9″
Ls = 144.00′	D = 6° 09′ 39.0″	Ls = 144.00′
LT = 96.03′	L = 393.71′	LT = 96.03′
ST = 48.03′	T = 199.85′	ST = 48.03′
	R = 930.00′	
	Se = .04	


NAD 83/NSRS 2007
MATCHLINE -L- 117+50 SEE SHEET 11
-L- TS Sta. 118+00.46
-DRW2- POT Sta. 10+00.00=
-L- POS Sta. 118+28.09
-L- SC Sta. 119+44.46
-L- CS Sta. 123+38.17
-L- ST Sta. 124+82.17
BEGIN CONSTRUCTION -Y8- Sta. 14+80.06
END T.I.P. PROJECT U-3334B
-L- POT 127+72.65
-L- POT Sta. 128+00.65= -Y8- POT Sta. 16+60.37
-DRW2- POT Sta. 11+97.28
END CONSTRUCTION -DRW2- POT Sta. 11+83.00
BRG AH S 67° 22′ 42.0″ W
-DRW1- POT Sta. 10+00.00=
-L- POC Sta. 122+63.52
-DRW1- PT Sta. 11+51.48
-DRW1- POT Sta. 11+83.79
BRG BK S 89° 28′ 53.3″ W
END CONSTRUCTION -DRW1- Sta. 11+65.00
END PROFILE BEGIN MILLING -DRW1- POT Sta. 11+40.00
-DRW1- PC Sta. 11+12.90
END CONSTRUCTION -Y8- Sta. 17+72.21
-Y8- PC Sta. 18+53.03
NELL M. HOWELL REVOCABLE TRUST DB 3334 PG 883
HOI LIMITED PARTNERSHIP OF SMITHFIELD DB 1292 PG 464
BARBETTA G. HESTER NO RECORDS
HLK COMMERCIAL LLC DB 3587 PG 627
WILLIAM SMITH RAGSDALE III DB 3853 PG 181
TOWN OF SMITHFIELD DB 1532 PG 107
SCFRC-HW-V LLC DB 4797 PG 559 DB 4538 PG 625
WAL MART REAL ESTATE TRUST DB 1751 PG 775
TRMIHA LLC DB 4016 PG 953
EVELYN T. AYCOCK REVOCABLE TRUST DB 2137 PG 356
EVELYN T. AYCOCK REVOCABLE TRUST DB 3232 PG 366
GEORGE MACK LANGDON JR. DB 2975 PG 505
DONALD E. MILLARD DB 1087 PG 160
DONALD E. MILLARD NO RECORDS
JONES BROTHERS REALITY LIMITED PARTNERSHIP DB 1358 PG 828
WPD ENTERPRISES LLC DB 3875 PG 604
US 301 N BRIGHTLEAF BLVD
AVA GARDNER DR
2018 ADT
2038 ADT

-Y8-
PI Sta 21+55.06
Δ = 15° 00′ 54.5″ (RT)
D = 2° 30′ 00.0″
L = 600.61′
T = 302.03′
R = 2,291.83′
SE = EXISTING

-DRW1-
PI Sta 11+32.44
Δ = 22° 06′ 11.3″ (RT)
D = 57° 17′ 44.8″
L = 38.58′
T = 19.53′
R = 100.00′
SE = EXISTING

NOTES:

SEE SHEET 18 FOR -L- PROFILE.
SEE SHEET 22 FOR -DRW1- & -DRW2- PROFILES.
SEE CULVERT PLANS C-1 THRU C-?
★ PROPOSED SIGNAL

16-AUG-2017 09:08
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$$$$USERNAME$$$$

8/17/99

REVISIONS

11/30/2016 - R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 31 AND 40; SUBDIVIDED PARCEL 32 INTO PARCELS 32 AND 40; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 32. - SS

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83/NSRS 2007

MATCHLINE -Y4- 15+00 SEE SHEET 8

-Y4-	-Y4-
PI Sta 16+22.02	PI Sta 21+40.95
Δ = 0° 47' 49.0" (RT)	Δ = 46° 36' 26.9" (RT)
D = 0° 34' 22.6"	D = 42° 26' 28.7"
L = 139.09'	L = 109.82'
T = 69.55'	T = 58.15'
R = 10,000.00'	R = 135.00'
Se = EXISTING	Se = EXISTING

NOTES:
SEE SHEET 21 FOR -Y4- PROFILE.

6/8/2017
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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83/NSRS 2007

REVISIONS

11/30/2016 - R/W REVISIONS; ADJUSTED THE STATIONS AND/OR OFFSETS BASED ON THE FIELD STAKING ON PARCELS 24,25,29,AND 30; UPDATED PROPERTY OWNER NAME AND DEED REFERENCE ON PARCEL 25. - SS

8/17/99

MATCHLINE -Y5- 12+50 SEE SHEET 9

MATCHLINE -Y7- 15+00 SEE SHEET 8

-Y6- PC Sta. 10+46.72
S 89° 49' 45.2" W

-Y5- POT Sta. 13+75.49 =
-Y6- POT Sta. 10+00.00

-Y5- S 0° 09' 58.1" E

-Y6- POC Sta. 11+80.58 =
-Y7- POT Sta. 16+45.63
S 33° 48' 38.8" E

END CONSTRUCTION
-Y7- Sta. 16+84.89

-Y7- POT Sta. 17+01.33
BRG BK S 33° 48' 38.8" E

-Y6- PT Sta. 12+24.63

END CONSTRUCTION
-Y6- Sta. 12+75.00

-Y6- POT Sta. 14+33.61

-Y6- S 49° 03' 15.3" W

-Y7- PT Sta. 16+32.83

BEGIN CONSTRUCTION
-Y7- Sta. 15+80.00

-Y7- PC Sta. 15+67.80

-Y7- PT Sta. 15+42.61

END CONSTRUCTION
-Y5- Sta. 21+00.00

-Y5- POT Sta. 23+34.69

END PAVING
-Y5- Sta. 20+00.00

-Y6-	-Y7-
PI Sta 11+39.63	PI Sta 16+00.36
Δ = 40° 46' 29.9" (LT)	Δ = 7° 27' 06.6" (RT)
D = 22° 55' 05.9"	D = 11° 27' 33.0"
L = 177.91'	L = 65.03'
T = 92.91'	T = 32.56'
R = 250.00'	R = 500.00'
Se = SEE PLANS	Se = SEE PLANS

NOTES:
SEE SHEET 21 FOR -Y5- PROFILE.
SEE SHEET 22 FOR -Y6- PROFILE.
SEE SHEET 22 FOR -Y7- PROFILE.

6/9/2017
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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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–L–

LEFT DITCH GRADE
RIGHT DITCH GRADE

BEGIN –L– GRADE
STA. 15+56.45
ELEV. 137.30'

PI = 17+00.00
EL = 138.06'
VC = 100'
K = 1435
DS > 70 MPH

PI = 19+70.00
EL = 139.68'
VC = 150'
K = 9722
DS > 70 MPH

(+)0.5300%
(+)0.5997%
(+)0.5843%
(+) 0.3340%

BEGIN DITCH LT
–L– STA.20+00
ELEV.=137.93'

–L–

–L– STA. 27+89.21 =
–Y– STA. 19+95.90

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.508 & 509 Sta.33+54

DRAINAGE AREA	= 91	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 120	CFS
DESIGN HW ELEVATION	= 141.78	FT
100 YEAR DISCHARGE	= 132	CFS
100 YEAR HW ELEVATION	= 142.4	FT
OVERTOPPING FREQUENCY	= 50(+/-)	YRS
OVERTOPPING DISCHARGE	= 120	CFS
OVERTOPPING ELEVATION	= 141.79	FT

PI = 24+15.00
EL = 142.28'
VC = 110'
K = 703
DS > 70 MPH

PI = 28+70.00
EL = 145.65'
VC = 230'
K = 122
DS = 55 MPH

PI = 30+75.00
EL = 143.31'
VC = 110'
K = 184
DS = 70 MPH

PI = 34+00.00
EL = 141.54'
VC = 170'
K = 144
DS = 60 MPH

(+)0.5843%
(+) 0.3340%
(+)0.7407%
(+)0.5634%
(+)0.6504%
(–)1.1415%
(–)1.3366%
(–)0.5446%
(–) 1.7858%
(–) 3.0059%
(+)0.4210%
(+)0.6385%

BEGIN DITCH RT
–L– STA.26+50 ELEV.=140.40'

END DITCH LT
–L– STA.25+00 ELEV.=139.60'

END DITCH RT
–L– STA. 27+21 ELEV.=140.80'

BEGIN DITCH RT
–L– STA.29+00 ELEV.=142.89'

BEGIN DITCH LT
–L– STA.29+50 ELEV.=142.13'

END DITCH RT
–L– STA.31+05 ELEV.=140.15'

BEGIN DITCH RT
–L– STA.31+65 ELEV.=139.57'

36" RCP-V
–L– STA. 33+54 ELEV.=135.8'

DITCH LT
–L– STA.31+76
ELEV.=140.66

END DITCH RT
–L– STA.32+50 ELEV.=136.93'

36" RCP-V
–L– STA. 33+58 ELEV.=135.8'

END DITCH LT
–L– STA.32+50 ELEV.=141.98'

END DITCH RT
–L– STA.32+94.00 ELEV.=135.44'

BEGIN DITCH RT
–L– STA.32+71.00 ELEV.=135.34'

SEE SHEETS 4 & 5 FOR –L– PLAN

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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–L–

LEFT DITCH GRADE
RIGHT DITCH GRADE

PI = 36+60.00
EL = 143.20'
VC = 200'
K = 177
DS = 65 MPH

(+)1.7714%

PI = 43+25.00
EL = 154.98'
VC = 150'
K = 217
DS = 65 MPH

(+)1.0800%

PI = 45+00.00
EL = 156.87'
VC = 150'
K = 280
DS = 70 MPH

(+)0.5448%

PI = 47+90.00
EL = 158.45'
VC = 210'
K = 215
DS = 65 MPH

(–)0.4533%

160 150 140 130 120

36 37 38 39 40 41 42 43 44 45 46 47 48 49

BM#3 ELEVATION = 156.44'
N 648725 E 2201770
L STATION 59+74 60' RIGHT
RR SPIKE BASE OF 18" OAK

–L–

PI = 50+00.00
EL = 157.54'
VC = 200'
K = 273
DS > 70 MPH

(+)0.3000%

–L– STA. 51+96.52 =
–Y1– STA. 11+71.96

PI = 55+40.00
EL = 159.16'
VC = 410'
K = 617
DS > 70 MPH

(–)0.3650%

–L– STA. 58+72.10 =
–Y2– STA. 11+39.65

SEE SHEETS 6 & 7 FOR –L– PLAN

160 150 140 130 120

50 51 52 53 54 55 56 57 58 59 60 61 62 63

9/7/2017
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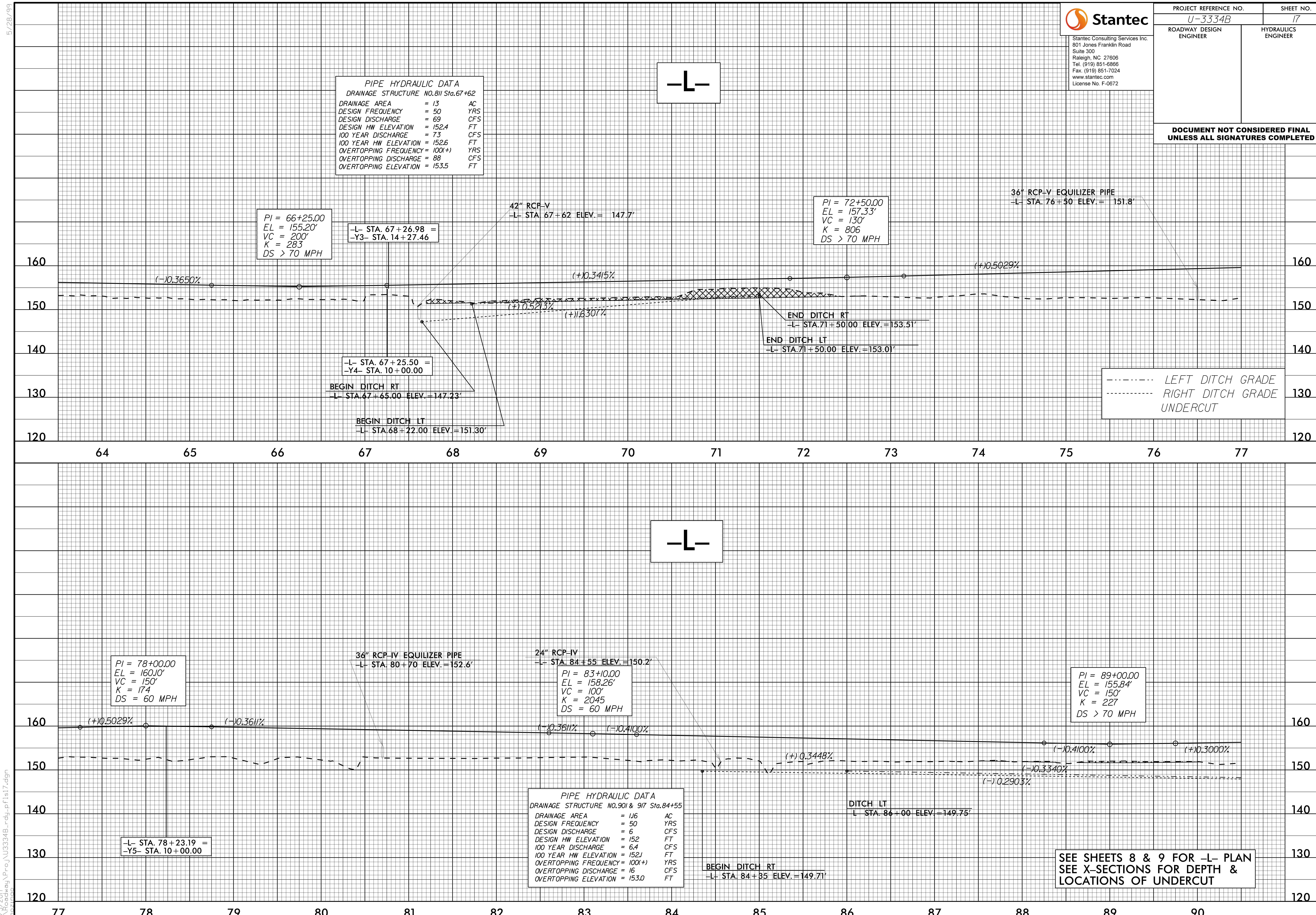
smpatrick



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PROJECT REFERENCE NO.
U-3334B
SHEET NO.
17
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
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-L-
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.811 Sta.67+62
DRAINAGE AREA = 13 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 69 CFS
DESIGN HW ELEVATION = 152.4 FT
100 YEAR DISCHARGE = 73 CFS
100 YEAR HW ELEVATION = 152.6 FT
OVERTOPPING FREQUENCY = 100(+) YRS
OVERTOPPING DISCHARGE = 88 CFS
OVERTOPPING ELEVATION = 153.5 FT
PI = 66+25.00
EL = 155.20'
VC = 200'
K = 283
DS > 70 MPH
-L- STA. 67+26.98 =
-Y3- STA. 14+27.46
42" RCP-V
-L- STA 67+62 ELEV. = 147.7'
PI = 72+50.00
EL = 157.33'
VC = 130'
K = 806
DS > 70 MPH
36" RCP-V EQUILIZER PIPE
-L- STA. 76+50 ELEV. = 151.8'
(-)0.3650%
(+)0.3415%
(+)0.5029%
(+)0.5213%
(+)1.6307%
END DITCH RT
-L- STA.71+50.00 ELEV.=153.51'
END DITCH LT
-L- STA.71+50.00 ELEV.=153.01'
-L- STA. 67+25.50 =
-Y4- STA. 10+00.00
BEGIN DITCH RT
-L- STA.67+65.00 ELEV.=147.23'
BEGIN DITCH LT
-L- STA.68+22.00 ELEV.=151.30'
LEFT DITCH GRADE
RIGHT DITCH GRADE
UNDERCUT
160
150
140
130
120
64
65
66
67
68
69
70
71
72
73
74
75
76
77
-L-
PI = 78+00.00
EL = 160.10'
VC = 150'
K = 174
DS = 60 MPH
36" RCP-IV EQUILIZER PIPE
-L- STA. 80+70 ELEV.=152.6'
24" RCP-IV
-L- STA. 84+55 ELEV.=150.2'
PI = 83+10.00
EL = 158.26'
VC = 100'
K = 2045
DS = 60 MPH
PI = 89+00.00
EL = 155.84'
VC = 150'
K = 227
DS > 70 MPH
(+)0.5029%
(-)0.3611%
(-)0.3611%
(-)0.4100%
(+) 0.3448%
(-)0.4100%
(+)0.3000%
(-)0.3340%
(-) 0.2903%
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.901 & 917 Sta.84+55
DRAINAGE AREA = 1.16 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 6 CFS
DESIGN HW ELEVATION = 152 FT
100 YEAR DISCHARGE = 6.4 CFS
100 YEAR HW ELEVATION = 152.1 FT
OVERTOPPING FREQUENCY = 100(+) YRS
OVERTOPPING DISCHARGE = 16 CFS
OVERTOPPING ELEVATION = 153.0 FT
DITCH LT
-L- STA. 86+00 ELEV.=149.75'
BEGIN DITCH RT
-L- STA. 84+35 ELEV.=149.71'
-L- STA. 78+23.19 =
-Y5- STA. 10+00.00
SEE SHEETS 8 & 9 FOR -L- PLAN
SEE X-SECTIONS FOR DEPTH & LOCATIONS OF UNDERCUT
160
150
140
130
120
77
78
79
80
81
82
83
84
85
86
87
88
89
90
10/3/2017

5/28/99

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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BM#5 ELEVATION = 153.00'
N 648186 E 2205838
L STATION 100+37 300' LEFT
RR SPIKE IN BASE OF 15" PINE

–L–

LEFT DITCH GRADE
RIGHT DITCH GRADE

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.101 & 1015 Sta.91+15

DRAINAGE AREA	= 56.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 79	CFS
DESIGN HW ELEVATION	= 152.6	FT
100 YEAR DISCHARGE	= 129	CFS
100 YEAR HW ELEVATION	= 153.3	FT
OVERTOPPING FREQUENCY	= 100(+/–)	YRS
OVERTOPPING DISCHARGE	= 120	CFS
OVERTOPPING ELEVATION	= 153.0	FT

66" RCP-IV
–L– STA. 91+15 ELEV.=148.0'

PI = 100+00.00
EL = 159.14'
VC = 150'
K = 198
DS = 65 MPH

(+)0.3203%
(+)0.3000%
(+)0.3000%
(–)0.4579%
(–)0.3000%
(–)0.4000%

BEGIN DITCH RT
–L– STA. 91+50 ELEV.=148.25'

END DITCH RT
–L– STA. 91+49 ELEV.=147.64'

DITCH LT
–L– STA. 90+82 EL=148.14'

END DITCH LT
–L– STA. 98+50 EL=150.60'

BEGIN DITCH LT
–L– STA. 99+50 EL=150.35'

DITCH RT
–L– STA.99+00 ELEV.=150.50'

160 150 140 130 120

91 92 93 94 95 96 97 98 99 100 101 102 103 104

–L–

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.1115 Sta.116+72

DRAINAGE AREA	= 5.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 22	CFS
DESIGN HW ELEVATION	= 145.53	FT
100 YEAR DISCHARGE	= 20	CFS
100 YEAR HW ELEVATION	= 145.65	FT
OVERTOPPING FREQUENCY	= 100(+/–)	YRS
OVERTOPPING DISCHARGE	= 21	CFS
OVERTOPPING ELEVATION	= 145.7	FT

24" RCP-IV
–L– STA. 116+74 ELEV.=140.01'

PI = 114+50.00
EL = 152.50'
VC = 250'
K = 207
DS = 65 MPH

(–)0.4579%
(–)0.3000%
(–)0.4000%
(–)0.3000%
(–)12.0000%
(–)11.4000%
(–)11.6632%
(–)11.1357%

DITCH RT
–L– STA. 114+00 EL=146.00'

DITCH LT
–L– STA. 114+00 ELEV.=144.55'

END DITCH RT
–L– STA. 115+74 EL=142.52'

END DITCH LT
–L– STA. 116+50 EL=141.05'

BEGIN DITCH RT
–L– STA. 116+45 EL=139.56'

SEE SHEETS 10 & 11 FOR –L– PLAN
SEE X–SECTIONS FOR DEPTH & LOCATIONS OF UNDERCUT

160 150 140 130 120 110

104 105 106 107 108 109 110 111 112 113 114 115 116 117

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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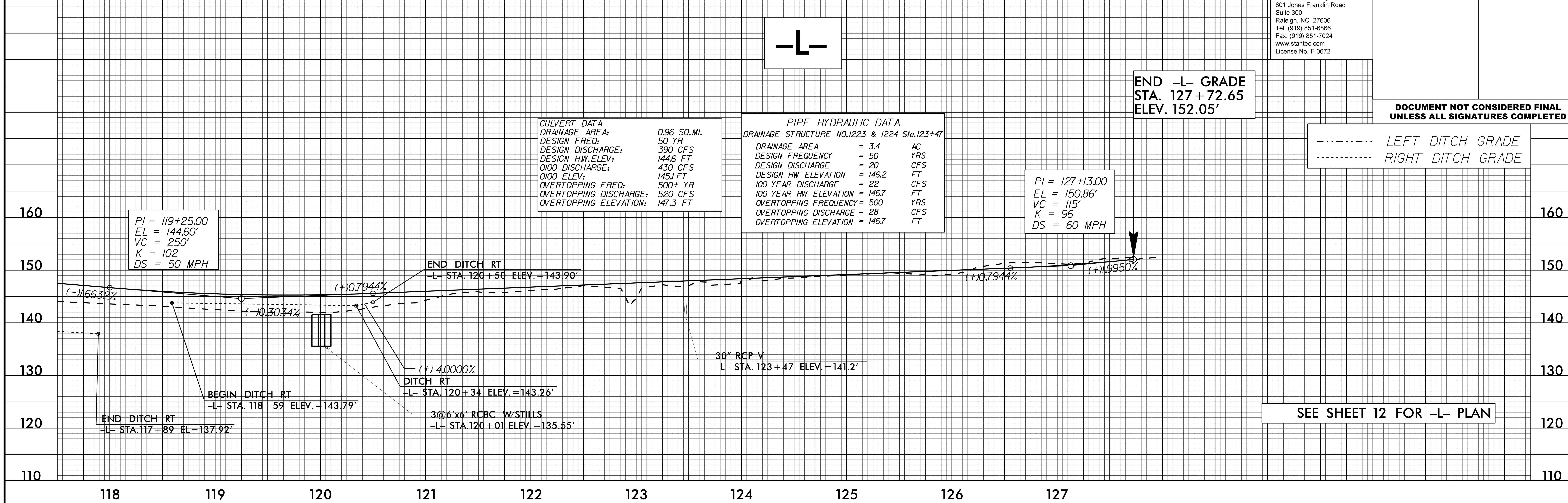
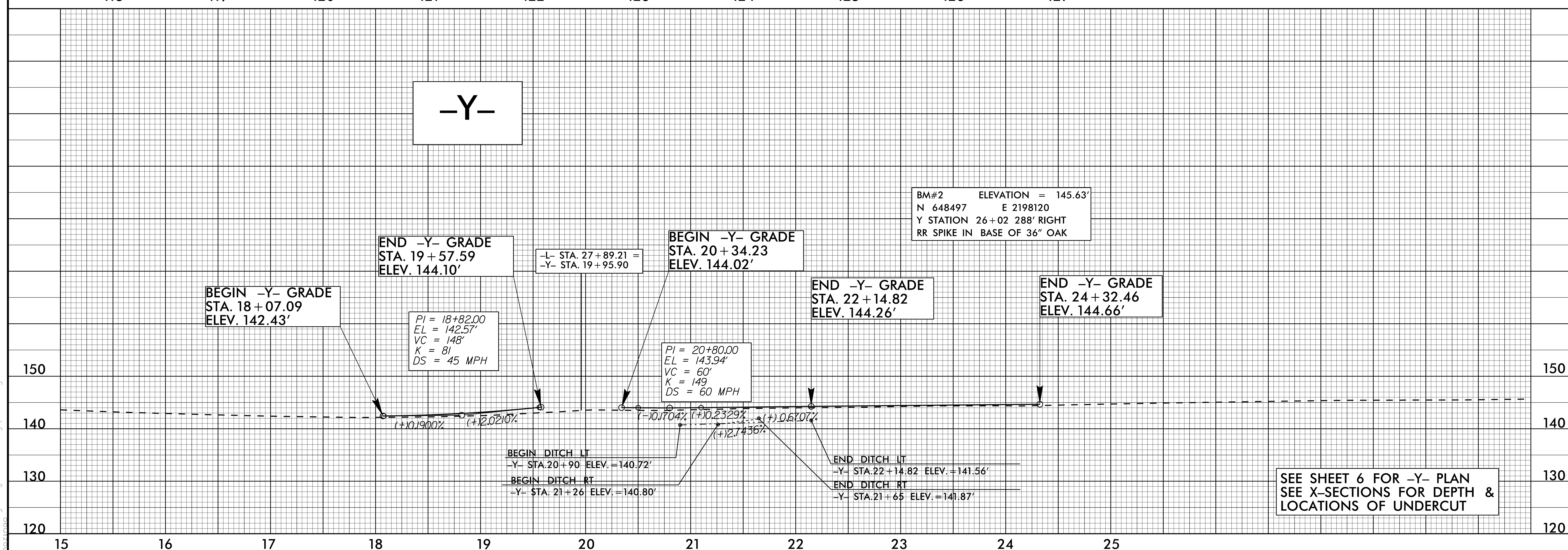

-L-
END -L- GRADE
STA. 127+72.65
ELEV. 152.05'
LEFT DITCH GRADE
RIGHT DITCH GRADE
PI = 119+25.00
EL = 144.60'
VC = 250'
K = 102
DS = 50 MPH
PI = 127+13.00
EL = 150.86'
VC = 115'
K = 96
DS = 60 MPH
(-)1.6632%
(-)0.3034%
(+)0.7944%
(+)0.7944%
(+)1.9950%
END DITCH RT
-L- STA. 120+50 ELEV.=143.90'
(+) 4.0000%
DITCH RT
-L- STA. 120+34 ELEV.=143.26'
BEGIN DITCH RT
-L- STA. 118+59 ELEV.=143.79'
END DITCH RT
-L- STA.117+89 EL=137.92'
3@6'x6' RCBC W/STILLS
-L- STA.120+01 ELEV.=135.55'
30" RCP-V
-L- STA. 123+47 ELEV.=141.2'
SEE SHEET 12 FOR -L- PLAN
160
150
140
130
120
110
118
119
120
121
122
123
124
125
126
127

CULVERT DATA	
DRAINAGE AREA:	0.96 SQ.MI.
DESIGN FREQ:	50 YR
DESIGN DISCHARGE:	390 CFS
DESIGN H.W.ELEV:	144.6 FT
Q100 DISCHARGE:	430 CFS
Q100 ELEV:	145.1 FT
OVERTOPPING FREQ:	500+ YR
OVERTOPPING DISCHARGE:	520 CFS
OVERTOPPING ELEVATION:	147.3 FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.1223 & 1224 Sta.123+47

DRAINAGE AREA	=	3.4	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	20	CFS
DESIGN HW ELEVATION	=	146.2	FT
100 YEAR DISCHARGE	=	22	CFS
100 YEAR HW ELEVATION	=	146.7	FT
OVERTOPPING FREQUENCY	=	500	YRS
OVERTOPPING DISCHARGE	=	28	CFS
OVERTOPPING ELEVATION	=	146.7	FT


-Y-
BM#2 ELEVATION = 145.63'
N 648497 E 2198120
Y STATION 26+02 288' RIGHT
RR SPIKE IN BASE OF 36" OAK
END -Y- GRADE
STA. 19+57.59
ELEV. 144.10'
-L- STA. 27+89.21 =
-Y- STA. 19+95.90
BEGIN -Y- GRADE
STA. 20+34.23
ELEV. 144.02'
BEGIN -Y- GRADE
STA. 18+07.09
ELEV. 142.43'
END -Y- GRADE
STA. 22+14.82
ELEV. 144.26'
END -Y- GRADE
STA. 24+32.46
ELEV. 144.66'
PI = 18+82.00
EL = 142.57'
VC = 148'
K = 81
DS = 45 MPH
PI = 20+80.00
EL = 143.94'
VC = 60'
K = 149
DS = 60 MPH
(+)0.1900%
(+)2.0210%
(-)0.1704%
(+)0.2329%
(+)2.7436%
(+) 0.6707%
BEGIN DITCH LT
-Y- STA.20+90 ELEV.=140.72'
BEGIN DITCH RT
-Y- STA. 21+26 ELEV.=140.80'
END DITCH LT
-Y- STA.22+14.82 ELEV.=141.56'
END DITCH RT
-Y- STA.21+65 ELEV.=141.87'
SEE SHEET 6 FOR -Y- PLAN
SEE X-SECTIONS FOR DEPTH &
LOCATIONS OF UNDERCUT
150
140
130
120
15
16
17
18
19
20
21
22
23
24
25

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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–Y1–

BEGIN –Y1– GRADE
STA. 10+75.00
ELEV. 156.16'

PI = 11+05.00
EL = 155.95'
VC = 10'
K = 12
DS = 15 MPH

END –Y1– GRADE
STA. 11+34.46
ELEV. 157.18'

(–)0.7100%
(+)4.9826%

SEE SHEET 7 FOR –Y1– PLAN

–Y1A_REV–

BEGIN –Y1A_REV– GRADE
STA. 10+37.50
ELEV. 157.19'

END –Y1A_REV– GRADE
STA. 10+85.22
ELEV. 155.56'

(–)3.4075%

SEE SHEET 7 FOR –Y1A_REV– PLAN

–Y2–

LEFT DITCH GRADE
RIGHT DITCH GRADE

PI = 10+70.00
EL = 156.75'
VC = 50'
K = 40
DS = 30 MPH

BEGIN –Y2– GRADE
STA. 10+20.00
ELEV. 156.98'

END –Y2– GRADE
STA. 11+02.15
ELEV. 157.01'

(–)0.4594%
(+)0.8078%

SEE SHEET 7 FOR –Y2– PLAN

–Y2A–

BEGIN –Y2A– GRADE
STA. 10+37.50
ELEV. 157.01'

PI = 10+80.00
EL = 155.52'
VC = 50'
K = 33
DS = 40 MPH

END –Y2A– GRADE
STA. 11+13.00
ELEV. 154.77'

(–)3.4955%
(–)2.2861%

SEE SHEET 7 FOR –Y2A– PLAN

–Y3–

BEGIN –Y3– GRADE
STA. 13+25.00
ELEV. 153.47'

PI = 13+50.00
EL = 153.34'
VC = 50'
K = 13
DS = 15 MPH

END –Y3– GRADE
STA. 13+89.63
ELEV. 154.63'

(–)0.5100%
(+)3.2425%

SEE SHEET 8 FOR –Y3– PLAN

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LEFT DITCH GRADE
RIGHT DITCH GRADE

–Y4–

BEGIN –Y4– GRADE
STA. 10+37.53
ELEV. 154.60'

END –Y4– GRADE
STA. 11+75.00
ELEV. 151.91'

BEGIN DITCH RT
STA. 11+50 EL=150.24

PI = 11+49.00
EL = 152.01'
VC = 50'
K = 26
DS = 25 MPH

END DITCH RT
STA. 12+00 EL=149.90

BEGIN DITCH LT
–Y4– STA.12+41 ELEV.=149.81'

(–)2.3235%
(–)0.3846%
(–)0.2982%
(–)0.6800%
(–)0.3095%

END DITCH LT
–Y4– STA.11+50 ELEV.=147.06'

END DITCH LT
Y4 STA.13+25 ELEV.=149.55'

BEGIN DITCH LT
–Y4– STA.10+93 ELEV.=147.23'

SEE SHEETS 8 & 13 FOR –Y4– PLAN

–Y5–

BM#4 ELEVATION = 152.54'
N 647474 E 2203648
Y5 STATION 22+81 24' LEFT
RR SPIKE IN BASE OF 15" OAK

BEGIN –Y5– GRADE
STA. 10+35.51
ELEV. 158.76'

END –Y5– GRADE
STA. 20+00.00
ELEV. 154.20'

36" RCP–IV EQUILIZER PIPE
–Y5– STA. 11+29.11 ELEV.= 152.25'

PI = 11+99.00
EL = 156.14'
VC = 250'
K = 132
DS = 55 MPH

PI = 16+50.00
EL = 157.51'
VC = 150'
K = 115
DS = 55 MPH

PI = 19+50.00
EL = 154.51'
VC = 100'
K = 264
DS > 70 MPH

(–)1.6040%
(+)0.3033%
(+)0.2985%
(–)0.9994%
(–)0.3000%
(–)0.3000%
(–)0.6200%
(–)0.3151%

BEGIN DITCH RT
STA. 14+16 EL=152.38

BEGIN DITCH LT
STA. 14+50 EL=152.40

END DITCH RT
STA. 15+50 EL=152.78

STA. 18+00
EL=151.35

BEGIN DITCH RT
STA. 18+62 EL=151.72

END DITCH LT
STA. 20+50 EL=150.60

END DITCH RT
STA. 21+00 EL=150.97

SEE SHEETS 8 FOR –Y5– PLAN

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PROJECT REFERENCE NO.	SHEET NO.
U-3334B	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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SEE SHEET 14 FOR –Y6– PLAN

–Y6–

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.1406 Sta.11+55

DRAINAGE AREA	= 0.34	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 1.6184	CFS
DESIGN HW ELEVATION	= 152.8	FT
100 YEAR DISCHARGE	= 2	CFS
100 YEAR HW ELEVATION	= 152.9	FT
OVERTOPPING FREQUENCY	= 100(+)	YRS
OVERTOPPING DISCHARGE	= 7.4	CFS
OVERTOPPING ELEVATION	= 154.5	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.1408 Sta.12+00

DRAINAGE AREA	= 1	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4.76	CFS
DESIGN HW ELEVATION	= 152.3	FT
100 YEAR DISCHARGE	= 6	CFS
100 YEAR HW ELEVATION	= 152.6	FT
OVERTOPPING FREQUENCY	= 100(+)	YRS
OVERTOPPING DISCHARGE	= 5.9	CFS
OVERTOPPING ELEVATION	= 152.8	FT

BEGIN –Y6– GRADE
STA. 10+17.99
ELEV. 156.22'

END –Y6– GRADE
STA. 12+75.00
ELEV. 153.38'

PI = 10+40.00
EL = 155.88'
VC = 40'
K = 32
DS= 25 MPH

PI = 11+55.00
EL = 155.54'
VC = 80'
K = 36
DS = 35 MPH

PI = 12+35.00
EL = 153.54'
VC = 80'
K = 38
DS = 30 MPH

(–)11.5482%
(–)0.3000%
(–)0.3000%
(–)2.4990%
(–)0.4000%

BEGIN DITCH LT
STA. 10+40 EL=152.38

END DITCH LT
STA. 11+50 EL=152.05

18" RCP-V
–Y6– STA. 11+55 ELEV.= 151.99'

18" RCP-V
–Y6– STA. 12+00 ELEV.= 150.79'

–Y7–

BEGIN –Y7– GRADE
STA. 15+80.00
ELEV. 154.35'

PI = 15+95.00
EL = 154.45'
VC = 30'
K = 21
DS = 20 MPH

END DITCH LT
STA. 16+08 EL=151.

END –Y7– GRADE
STA. 16+34.61
ELEV. 155.30'

BEGIN DITCH LT
STA. 15+00 EL=151.54

(+)0.6780%
(+)0.3148%
(+)2.1416%

SEE SHEETS 8 & 14 FOR –Y7– PLAN

LEFT DITCH GRADE
RIGHT DITCH GRADE

–DRW1–

CULVERT DATA

DRAINAGE AREA:	1.2 SQ.MI.
DESIGN FREQ:	10 YR
DESIGN DISCHARGE:	330 CFS
DESIGN H.W.ELEV:	142.6 FT
Q100 DISCHARGE:	500 CFS
Q100 ELEV:	143.8 FT
OVERTOPPING FREQ:	500+ YR
OVERTOPPING DISCHARGE:	600+ CFS
OVERTOPPING ELEVATION:	146.8 FT

BEGIN –DRW1– GRADE
STA. 10+49.50
ELEV. 149.27

END –DRW1– GRADE
STA. 11+40.00
ELEV. 146.21'

END MILL
& REPLACE
STA. 11+65.00

PI = 10+65.00
EL = 149.11'
VC = 30'
K = 7
DS < 15 MPH

PI = 11+25.00
EL = 145.75'
VC = 30'
K = 4
DS < 15 MPH

(–)1.0000%
(–)5.6027%
(+)3.0179%
(–)4.0000%

END DITCH LT
STA. 11+45 EL=140.41

BEGIN DITCH LT
STA. 10+80 EL=143.01

2@7'x8' RCBC
–DRW1– STA.11+51.56 ELEV.=135.57'

SEE SHEET 12 FOR —DRW1– PLAN

–DRW2–

BEGIN –DRW2– GRADE
STA. 10+37.50
ELEV. 146.55'

PI = 11+11.00
EL = 147.44'
VC = 60'
K = 53
DS = 30 MPH

END –DRW2– GRADE
STA. 11+47.50
ELEV. 148.29'

(+)1.2045%
(+)2.3462%

SEE SHEET 12 FOR —DRW2– PLAN

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