



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

PAT L. MCCRORY  
GOVERNOR

ANTHONY J. TATA  
SECRETARY

November 24, 2014

U.S. Army Corps of Engineers  
Regulatory Field Office  
3331 Heritage Trade Drive, Suite 105  
Wake Forest, NC 27587

ATTN: Mr. David Bailey  
NCDOT Coordinator

SUBJECT: **Application for Section 404 Nationwide Permit 14, Section 401 Water Quality Certification, and Jordan Lake Riparian Buffer Authorization** for the new location I-73 Connector, from NC 68 to West of Greensboro Western Loop, Greensboro, Guilford County. Division 7. Federal-Aid Project No. NHF-0073(25). TIP No. I-5110.

Debit \$570.00 from WBS 42345.1.1

Dear Mr. Bailey:

The North Carolina Department of Transportation (NCDOT) proposes to construct the I-73 Connector (I-5110) to complete a missing link in the I-73 corridor by joining the existing and future portion of I-73 in the Greensboro area. The proposed project will enhance north-south mobility and interstate connectivity through North Carolina and the Piedmont Triad region.

Please see enclosed copies of the Pre-Construction Notification (PCN), the North Carolina Ecosystem Enhancement Program (NCEEP) Mitigation Acceptance letter, Indirect and Cumulative Effects Screening Report, Stormwater Management Plan, permit drawings, buffer drawings, and roadway design plan sheets.

This project had a Design Build let date of March 31, 2014. Construction of this project is projected to commence in February of 2015 or sooner, contingent on issuance of permits.

A copy of this permit application and its distribution list will be posted on the NCDOT Website at: <https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx> under *Quick Links > Permit Applications*. A copy of the Finding of No Significant Impact (FONSI) is also available at the above website address under *Quick Links > Environmental Documents*.

MAILING ADDRESS:  
NC DEPARTMENT OF TRANSPORTATION  
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS  
NATURAL ENVIRONMENT SECTION  
1598 MAIL SERVICE CENTER  
RALEIGH NC 27699-1598

TELEPHONE: 919-707-6100

FAX: 919-212-5785

WEBSITE: [WWW.NCDOT.ORG](http://WWW.NCDOT.ORG)

PHYSICAL ADDRESS:  
Century Center - Building B  
1020 Birch Ridge Dr  
Raleigh, NC 27610-4328

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Ms. Deanna Riffey at either [driffey@ncdot.gov](mailto:driffey@ncdot.gov) or (919) 707-6151.

Sincerely,



for

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

cc: NCDOT Permit Application Standard Distribution List.



Office Use Only:  
 Corps action ID no. \_\_\_\_\_  
 DWQ project no. \_\_\_\_\_  
 Form Version 1.4 January 2009

## Pre-Construction Notification (PCN) Form

### A. Applicant Information

#### 1. Processing

1a. Type(s) of approval sought from the Corps:	<input checked="" type="checkbox"/> Section 404 Permit	<input type="checkbox"/> Section 10 Permit
1b. Specify Nationwide Permit (NWP) number: 14 or General Permit (GP) number:		
1c. Has the NWP or GP number been verified by the Corps?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
1d. Type(s) of approval sought from the DWQ (check all that apply):		
<input checked="" type="checkbox"/> 401 Water Quality Certification – Regular <span style="margin-left: 100px;"><input type="checkbox"/> Non-404 Jurisdictional General Permit</span> <input type="checkbox"/> 401 Water Quality Certification – Express <span style="margin-left: 100px;"><input checked="" type="checkbox"/> Riparian Buffer Authorization</span>		
1e. Is this notification solely for the record because written approval is not required?	For the record only for DWQ 401 Certification: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	For the record only for Corps Permit: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
1f. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts? If so, attach the acceptance letter from mitigation bank or in-lieu fee program.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
1g. Is the project located in any of NC's twenty coastal counties. If yes, answer 1h below.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1h. Is the project located within a NC DCM Area of Environmental Concern (AEC)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

#### 2. Project Information

2a. Name of project:	I-73 Connector
2b. County:	Guilford
2c. Nearest municipality / town:	Greensboro
2d. Subdivision name:	<i>not applicable</i>
2e. NCDOT only, T.I.P. or state project no.:	T.I.P. No. I-5110

#### 3. Owner Information

3a. Name(s) on Recorded Deed:	North Carolina Department of Transportation
3b. Deed Book and Page No.	<i>not applicable</i>
3c. Responsible Party (for LLC if applicable):	<i>not applicable</i>
3d. Street address:	1598 Mail Service Center
3e. City, state, zip:	Raleigh, NC 27699-1598
3f. Telephone no.:	(919) 707-6151
3g. Fax no.:	(919) 212-2785
3h. Email address:	driffey@ncdot.gov

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

<b>B. Project Information and Prior Project History</b>	
<b>1. Property Identification</b>	
1a. Property identification no. (tax PIN or parcel ID):	<i>not applicable</i>
1b. Site coordinates (in decimal degrees):	Latitude: 36.122482 (DD.DDDDDD) Longitude: - 79.95231 (-DD.DDDDDD)
1c. Property size:	Approximately 220 acres
<b>2. Surface Waters</b>	
2a. Name of nearest body of water (stream, river, etc.) to proposed project:	Brush Creek
2b. Water Quality Classification of nearest receiving water:	WS-III, NSW
2c. River basin:	Cape Fear
<b>3. Project Description</b>	
3a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: A four-lane divided controlled access roadway. Airport infrastructure and commercial developments dominate the project vicinity.	
3b. List the total estimated acreage of all existing wetlands on the property: Approximately 0.13	
3c. List the total estimated linear feet of all existing streams (intermittent and perennial) on the property: 3,918	
3d. Explain the purpose of the proposed project: The purpose of this project is to complete a missing link in the I-73 corridor by joining the existing and future portions of I-73 in the Greensboro area. This will enhance north-south mobility and interstate connectivity through North Carolina and the Piedmont Triad region.	
3e. Describe the overall project in detail, including the type of equipment to be used: The I-73 Connector proposes to connect NC 68 and Bryan Boulevard, west of the Greensboro Western Loop (Future I-840/I-73), with a new 1.6 mile, four-lane, median-divided freeway. It will be a fully controlled access facility with two, 12-foot lanes in both directions and a depressed grass median that varies from 70' at the southern end to 46' at the northern end. It will begin at the existing Bryan Boulevard / Airport Parkway interchange (Station 25+00) and extend on new location to just west of existing NC 68 where it ties to R-2413A (Station 109+00). A partial interchange will be provided with NC 68. In addition, Pleasant Ridge Road will be realigned where it crosses NC 68. Standard road building equipment, such as trucks, dozers, and cranes will be used.	
<b>4. Jurisdictional Determinations</b>	
4a. Have jurisdictional wetland or stream determinations by the Corps or State been requested or obtained for this property / project (including all prior phases) in the past? Comments: Site visit done 9/7/2011; JD not issued.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
4b. If the Corps made the jurisdictional determination, what type of determination was made?	<input type="checkbox"/> Preliminary <input type="checkbox"/> Final
4c. If yes, who delineated the jurisdictional areas? Name (if known): Scott G. Davis	Agency/Consultant Company: Other:
4d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation. September 7, 2011 - Site visit by Andy Williams.	
<b>5. Project History</b>	
5a. Have permits or certifications been requested or obtained for this project (including all prior phases) in the past?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown
5b. If yes, explain in detail according to "help file" instructions.	

**6. Future Project Plans**

6a. Is this a phased project?

Yes

No

6b. If yes, explain.

### C. Proposed Impacts Inventory

#### 1. Impacts Summary

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

- Wetlands                       Streams - tributaries                       Buffers  
 Open Waters                       Pond Construction

#### 2. Wetland Impacts

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

2a. Wetland impact number – Permanent (P) or Temporary (T)	2b. Type of impact	2c. Type of wetland (if known)	2d. Forested	2e. Type of jurisdiction	2f. Area of impact (acres)
Site 1 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Corps <input type="checkbox"/> DWQ	
Site 2 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Fill	Headwater Wetland	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	<0.01
Site 3 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Corps <input type="checkbox"/> DWQ	
Site 4 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Corps <input type="checkbox"/> DWQ	
Site 5 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Corps <input type="checkbox"/> DWQ	
Site 6 <input type="checkbox"/> P <input type="checkbox"/> T			<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Corps <input type="checkbox"/> DWQ	
<b>2g. Total wetland impacts</b>					<0.01 Permanent

2h. Comments:

#### 3. Stream Impacts

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

3a. Stream impact number - Permanent (P) or Temporary (T)	3b. Type of impact	3c. Stream name	3d. Perennial (PER) or intermittent (INT)?	3e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	3f. Average stream width (feet)	3g. Impact length (linear feet)
Site 1 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Fill	UT Brush Creek (SD)	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	3-5	130
Site 1 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Fill	UT Brush Creek (SD)	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	3-5	10
Site 1 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Stabilization	UT Brush Creek (SD)	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	3-5	10
Site 2 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Fill	UT Brush Creek (SC)	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	3-8	334
Site 2 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Fill	UT Brush Creek (SC)	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	3-8	20
Site 2 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Stabilization	UT Brush Creek (SC)	<input type="checkbox"/> PER <input checked="" type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	3-8	20
Site 3 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Stabilization	UT Brush Creek (S73)	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	4-10	18

Site 3 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Stabilization	UT Brush Creek (S73)	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	4-10	24		
Site 4 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Fill	UT Brush Creek (S77)	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	4-10	51		
Site 4 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	Fill	UT Brush Creek (S77)	<input checked="" type="checkbox"/> PER <input type="checkbox"/> INT	<input checked="" type="checkbox"/> Corps <input type="checkbox"/> DWQ	4-10	8		
<b>3h. Total stream and tributary impacts</b>						563 Perm 62 Temp		
3i. Comments: For Site 1 (SD) and Site 2 (SC), 1:1 mitigation was determined by onsite visit on 9/7/11 with A. Williams (USACE). Mitigation based on low stream quality and diminished biological function. USACE waved the NWP threshold for stream SC.								
<b>4. Open Water Impacts</b>								
If there are proposed impacts to lakes, ponds, estuaries, tributaries, sounds, the Atlantic Ocean, or any other open water of the U.S. then individually list all open water impacts below.								
4a. Open water impact number – Permanent (P) or Temporary (T)	4b. Name of waterbody (if applicable)	4c. Type of impact		4d. Waterbody type	4e. Area of impact (acres)			
O1 <input type="checkbox"/> P <input checked="" type="checkbox"/> T	N/A	Fill		Pond	0.43			
O2 <input type="checkbox"/> P <input type="checkbox"/> T								
O3 <input type="checkbox"/> P <input type="checkbox"/> T								
O4 <input type="checkbox"/> P <input type="checkbox"/> T								
<b>4f. Total open water impacts</b>						0.43 Temporary		
4g. Comments:								
<b>5. Pond or Lake Construction</b>								
If pond or lake construction proposed, then complete the chart below.								
5a. Pond ID number	5b. Proposed use or purpose of pond	5c. Wetland Impacts (acres)			5d. Stream Impacts (feet)			5e. Upland (acres)
		Flooded	Filled	Excavated	Flooded	Filled	Excavated	Flooded
P1								
P2								
<b>5f. Total</b>								
5g. Comments:								
5h. Is a dam high hazard permit required?			<input type="checkbox"/> Yes		<input type="checkbox"/> No		If yes, permit ID no:	
5i. Expected pond surface area (acres):								
5j. Size of pond watershed (acres):								
5k. Method of construction:								

**6. Buffer Impacts (for DWQ)**

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

6a. Project is in which protected basin?	<input type="checkbox"/> Neuse <input type="checkbox"/> Catawba	<input type="checkbox"/> Tar-Pamlico <input type="checkbox"/> Randleman	<input checked="" type="checkbox"/> Other: Jordan Lake
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6b. Buffer impact number – Permanent (P) or Temporary (T)	6c. Reason for impact	6d. Stream name	6e. Buffer mitigation required?	6f. Zone 1 impact (square feet)	6g. Zone 2 impact (square feet)
B2 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Road Crossing	UT Brush Creek (SC)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	21,955	14,027
B3 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Road Crossing	UT Brush Creek (S73)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	21,551	14,243
B4 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Road Crossing	UT Brush Creek (S77)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	2,986	1,720
B4 <input checked="" type="checkbox"/> P <input type="checkbox"/> T	Utility	UT Brush Creek (S77)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	942	1,158
<b>6h. Total buffer impacts</b>				47,434	31,148

6i. Comments: 1) Did not deduct wetlands from buffers due to no mitigation sought for wetlands. 2) Zone 1 Utility Impacts were not counted toward mitigable impacts. Zone 1 in the utility area of impact is a maintained utility corridor and is already disturbed through routine maintenance for access to sanitary sewer.

<b>D. Impact Justification and Mitigation</b>		
<b>1. Avoidance and Minimization</b>		
1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing project. The redesign of Section I-5110 allowed the redesign of a portion of Project R-2413A, which resulted in minimizing stream impacts by 156 ft. The drainage pipe for Pond P6 (Site 3) was angled to avoid impacting wetlands along stream S73. Additional measures are listed in the Stormwater Management Plan and NEPA Documents		
1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques. Will follow NCDOT construction guidelines and BMPs, including no staging of construction equipment or storage of construction supplies in jurisdictional areas; Installation of temporary sediment control fences, earth berms, and temporary ground cover during construction; 2:1 fill slopes utilized in wetland and stream areas where possible. Due to the project being within both the Jordan Lake watershed, Design Standards in Sensitive Watersheds will be employed.		
<b>2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State</b>		
2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, explain: Streams will require mitigation. Not proposing wetland mitigation due to wetland being low quality and impacts are minimal.	
2b. If yes, mitigation is required by (check all that apply):	<input checked="" type="checkbox"/> DWQ <input checked="" type="checkbox"/> Corps	
2c. If yes, which mitigation option will be used for this project?	<input type="checkbox"/> Mitigation bank <input checked="" type="checkbox"/> Payment to in-lieu fee program <input type="checkbox"/> Permittee Responsible Mitigation	
<b>3. Complete if Using a Mitigation Bank</b>		
3a. Name of Mitigation Bank: not applicable		
3b. Credits Purchased (attach receipt and letter)	Type	Quantity
3c. Comments:		
<b>4. Complete if Making a Payment to In-lieu Fee Program</b>		
4a. Approval letter from in-lieu fee program is attached.	<input checked="" type="checkbox"/> Yes	
4b. Stream mitigation requested:	464 ft @ 1:1 and 51 ft @ 2:1 linear feet	
4c. If using stream mitigation, stream temperature:	<input checked="" type="checkbox"/> warm <input type="checkbox"/> cool <input type="checkbox"/> cold	
4d. Buffer mitigation requested (DWQ only):	172,923 square feet	
4e. Riparian wetland mitigation requested:	0 acres	
4f. Non-riparian wetland mitigation requested:	0 acres	
4g. Coastal (tidal) wetland mitigation requested:	0 acres	
4h. Comments:		
<b>5. Complete if Using a Permittee Responsible Mitigation Plan</b>		
5a. If using a permittee responsible mitigation plan, provide a description of the proposed mitigation plan.		

**6. Buffer Mitigation (State Regulated Riparian Buffer Rules) – required by DWQ**

6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation?

Yes       No

6b. If yes, then identify the square feet of impact to each zone of the riparian buffer that requires mitigation. Calculate the amount of mitigation required.

Zone	6c. Reason for impact	6d. Total impact (square feet)	Multiplier	6e. Required mitigation (square feet)
Zone 1	Road Crossing	43,506	3 (2 for Catawba)	130,518
Zone 2	Road Crossing	28,270	1.5	42,405
<b>6f. Total buffer mitigation required:</b>				<b>172,923</b>

6g. If buffer mitigation is required, discuss what type of mitigation is proposed (e.g., payment to private mitigation bank, permittee responsible riparian buffer restoration, payment into an approved in-lieu fee fund).

Payment into an approved in-lieu fee fund (EEP)

6h. Comments:

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

<b>F. Supplementary Information</b>	
<b>1. Environmental Documentation (DWQ Requirement)</b>	
1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.)  Comments: Documentation will be provided upon request.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>2. Violations (DWQ Requirement)</b>	
2a. Is the site in violation of DWQ Wetland Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 2B .0200)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2b. Is this an after-the-fact permit application?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2c. If you answered "yes" to one or both of the above questions, provide an explanation of the violation(s):	
<b>3. Cumulative Impacts (DWQ Requirement)</b>	
3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
3b. If you answered "yes" to the above, submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent DWQ policy. If you answered "no," provide a short narrative description.  ICE Report included.	
<b>4. Sewage Disposal (DWQ Requirement)</b>	
4a. Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.  not applicable	

<b>5. Endangered Species and Designated Critical Habitat (Corps Requirement)</b>		
5a. Will this project occur in or near an area with federally protected species or habitat?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
5b. Have you checked with the USFWS concerning Endangered Species Act impacts?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
5c. If yes, indicate the USFWS Field Office you have contacted.	<input checked="" type="checkbox"/> Raleigh <input type="checkbox"/> Asheville	
5d. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat? NCNHP, USFWS, NCDOT, Field Surveys		
<b>6. Essential Fish Habitat (Corps Requirement)</b>		
6a. Will this project occur in or near an area designated as essential fish habitat?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
6b. What data sources did you use to determine whether your site would impact Essential Fish Habitat? NMFS County Index		
<b>7. Historic or Prehistoric Cultural Resources (Corps Requirement)</b>		
7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
7b. What data sources did you use to determine whether your site would impact historic or archeological resources? Consulted with SHPO		
<b>8. Flood Zone Designation (Corps Requirement)</b>		
8a. Will this project occur in a FEMA-designated 100-year floodplain?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
8b. If yes, explain how project meets FEMA requirements: Coordination with FEMA requirements is documented and will be supplied upon request.		
8c. What source(s) did you use to make the floodplain determination? FEMA Maps		
Ar Richard W. Hancock, P.E. Applicant/Agent's Printed Name	 Applicant/Agent's Signature (Agent's signature is valid only if an authorization letter from the applicant is provided.)	11-25-2014 Date



North Carolina Department of Environment and Natural Resources

Pat McCrory  
Governor

Michael Ellison, Director  
Ecosystem Enhancement Program

John E. Skvarla, III  
Secretary

October 28, 2014

Mr. Richard W. Hancock, P.E.  
Project Development and Environmental Analysis Unit  
North Carolina Department of Transportation  
1548 Mail Service Center  
Raleigh, North Carolina 27699-1598

Dear Mr. Hancock:

Subject: EEP Mitigation Acceptance Letter:

**I-5110**, Proposed I-73 from NC 68 to Greensboro Western Loop, Guilford County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the stream mitigation and buffer mitigation for the subject project. Based on the information supplied by you on October 27, 2014, the impacts are located in CU 03030002 of the Cape Fear River in the Central Piedmont (CP) 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	Cape Fear	03030002	CP	0	0	515.0	0	0	0

\*Some of the stream 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 NCDWQ's Buffer Authorization Certification, EEP 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 I-5110. Subsequently, EEP 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.

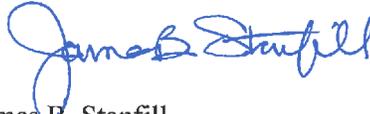
Buffer	River Basin	CU	Eco-Region	Buffer Impacts		
				Zone 1	Zone 2	TOTAL
Impacts	Cape Fear	03030002 (Haw Arm)	CP	43,506.0	28,270.0	71,776.0

Mr. Richard Hancock  
October 28, 2014  
TIP I-5110  
Page Two

**This mitigation acceptance letter replaces the mitigation acceptance letter issued on December 13, 2013 and October 14, 2014.** EEP commits to implement sufficient compensatory stream mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies in accordance with the N.C. Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument dated July 28, 2010. EEP commits to implement sufficient buffer mitigation to offset the buffer impacts associated with this project. 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 EEP.

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

Sincerely,



James-B. Stanfill  
EEP Asset Management Supervisor

Cc: Mr. David Bailey, USACE – Raleigh Regulatory Field Office  
Mr. Dave Wanucha, NC Division of Water Resources – Winston-Salem  
File: I-5110 Revised

# Indirect and Cumulative Effects Screening Report

**North Carolina Department of Transportation**  
Proposed I-73 Connector from NC 68 to Bryan Boulevard,  
West of the Greensboro Western Loop  
Greensboro, Guilford County  
TIP No. I-5110, WBS No. 42345.1.1



Prepared by:



**Florence & Hutcheson, Inc.**

CONSULTING ENGINEERS

**April 1, 2011**

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## INDIRECT AND CUMULATIVE EFFECTS SCREENING REPORT

**North Carolina Department of Transportation**  
Proposed I-73 Connector from NC 68 to Bryan Boulevard,  
West of the Greensboro Western Loop  
Greensboro, Guilford County  
TIP No. I-5110, WBS No. 42345.1.1

April 1, 2011

### **I. Executive Summary**

The North Carolina Department of Transportation proposes a new location freeway to connect NC 68 (near the proposed US 220/ NC 68 Connector – TIP Project R-2413) with Bryan Boulevard (SR 2176) at the Piedmont Triad International Airport (PTI). This project is approximately 1.5 miles long. The project is included in the current NCDOT 10-Year Work Program. Right of way acquisition is scheduled for Fiscal Year 2013 and construction is scheduled for Fiscal Year 2015.

Interstate 73 is a National Highway System corridor that extends from Sault Ste. Marie, Michigan to near Myrtle Beach, South Carolina. In the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the US Congress established the I-73/74 North-South Corridor as “Congressional High Priority Corridor 5.” Roads identified on the National Highway System are recognized as being important to the nation’s economy, defense, and mobility. High priority corridors are designated to integrate regions, link major population centers of the country, provide opportunities for increased economic growth, and serve the travel and commerce needs of the nation. The North Carolina portion of I-73 generally follows US 220 and I-74. In the Triad area, I-73 runs concurrently with US 220 from south of Greensboro to I-85 and along I-840 (Greensboro Western Loop) to Bryan Boulevard. I-73 is proposed to follow the US 220/ NC 68 Connector (TIP Project R-2413) and join US 220 northwest of Greensboro. There is no freeway in place to link the existing and future portions of I-73 in this area.

The purpose of this project is to complete a missing link in the I-73 corridor by joining the existing and future portions of I-73 in the Greensboro area. This will enhance north-south mobility and interstate connectivity through North Carolina and the Piedmont Triad region.

The time horizon for this analysis is through the year 2030. This time frame is consistent with locally adopted transportation and land use plans, PTI’s airport master plan, and population projections from the North Carolina Office of State Budget and Management.

The Piedmont Triad International airport (PTI) has had the most influence on recent development in the project area. The airport along with the proximity to major transportation corridors has attracted shipping, distributing, and other transportation related industries. In addition to industrial development, there are a number of office and commercial buildings. The recent addition of a FedEx hub at PTI increased the amount of industrial and commercial development. According to



local planning documents, future land use maps, and information from local officials, the current development trends are expected to continue through the year 2030. As PTI continues to grow and the interstate network (I-73 and I-840) is completed, the area around the airport and along Market Street will continue to see industrial and commercial development.

No indirect effects are expected from the proposed I-73 Connector alone. The I-73 Connector will be designed as a short (1.5 mile), freeway to freeway connection with fully controlled access. It alone will not give new exposure to properties along its alignment. Local officials expect this area to develop according to their future land use plans if the I-73 corridor is completed and PTI expands as expected. The need for this project is to provide a connection between an existing freeway (Bryan Boulevard has been constructed to interstate standards) and the proposed US 220/ NC 68 Connector. Once completed, I-73 will extend to northern Guilford County. The *combination* of these transportation projects may have some effect on the rate and type of development, but this project *alone* should not result in considerable indirect effects.

It is reasonable to assume past actions (the new FedEx hub at PTI, the Bryan Boulevard relocation, and industrial development) have had some cumulative effect on environmental resources. Indirect effects to land use change and cumulative effects to the environment resulting from the proposed I-73 Connector have a moderate potential of impacting water quality in the FLUSA.

The I-73 Connector, combined with other transportation projects will improve mobility through Guilford County. This improved mobility will expand the commute shed for Greensboro, Winston-Salem, and High Point which will in turn increase the amount of through traffic in the area. These factors could make the area more attractive for highway-oriented uses such as gas stations, restaurants, and hotels.

Local officials anticipate additional industrial development to occur in the future as a result of the construction of the new I-73 interstate corridor and the expansion of PTI. Likely locations for this development are along NC 68 between the airport and the proposed interchange with the US 220/ NC 68 Connector, as well as surrounding proposed interchange locations along the corridor.



## **II. Indirect and Cumulative Effects Introduction**

This report documents the information used to assess any future land use changes that could occur as a result of this project. The predicted changes, if any, require action from a non-NCDOT party to occur. The majority of the measures taken to avoid, minimize, and decrease the impact of future land use changes in the project area would be coordinated with these groups.

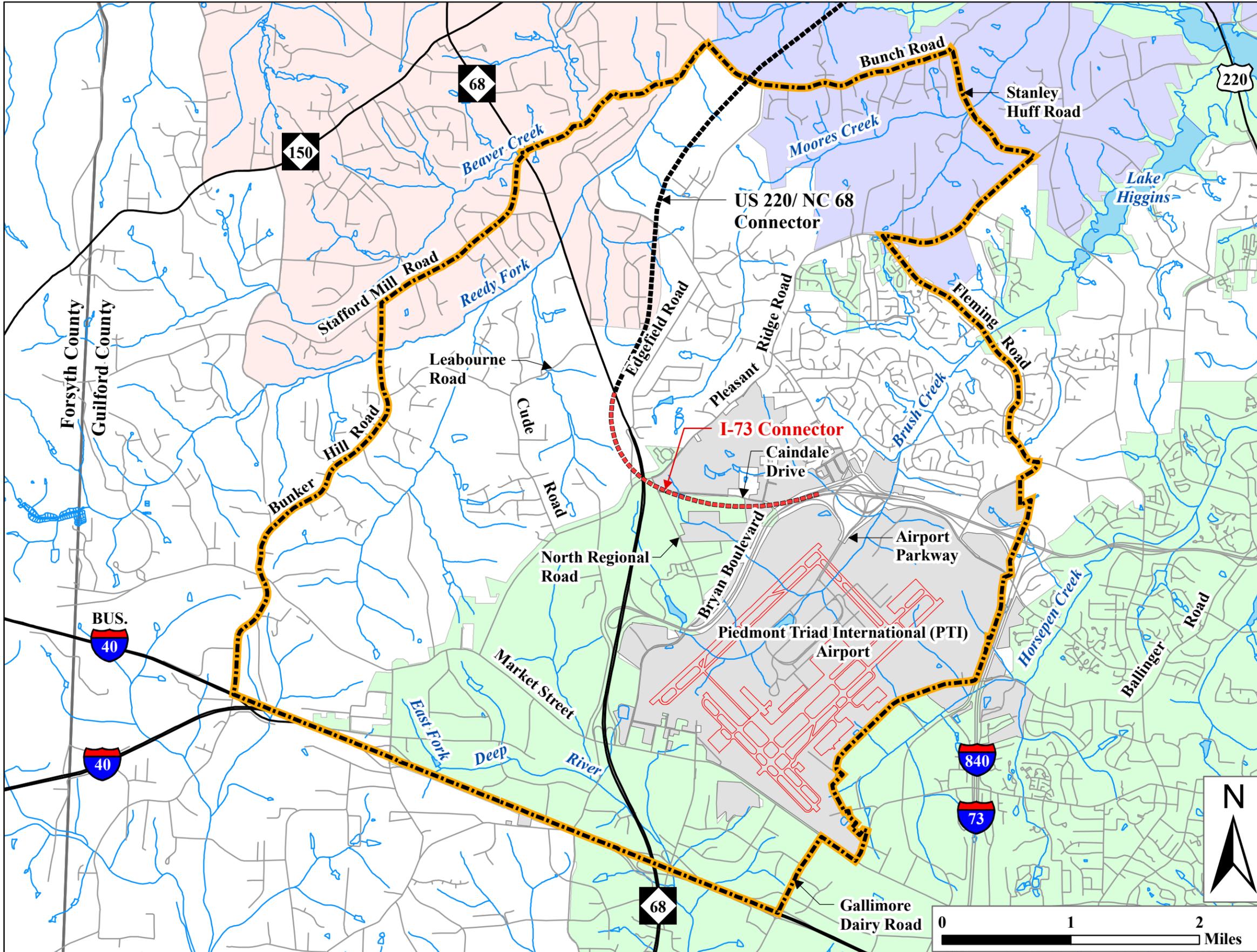
## **III. Project Overview**

The North Carolina Department of Transportation (NCDOT) proposes to connect NC 68 and Bryan Boulevard, west of the Greensboro Western Loop, with a new location freeway. The I-73 Connector [State Transportation Improvement Plan (TIP) Project I-5110] is a proposed one and a half mile long new location freeway between NC 68 (near the proposed US 220/ NC 68 Connector – TIP Project R-2413) and Bryan Boulevard at the Piedmont-Triad International Airport (PTI) (see Figure 1). Right of way acquisition is scheduled for 2013, and construction in 2015.

Interstate 73 is a National Highway System corridor that extends from Sault Ste. Marie, Michigan to near Myrtle Beach, South Carolina. In the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the US Congress established the I-73/74 North-South Corridor as “Congressional High Priority Corridor 5.” Roads identified on the National Highway System are recognized as being important to the nation’s economy, defense, and mobility. High priority corridors are designated to integrate regions, link major population centers of the country, provide opportunities for increased economic growth, and serve the travel and commerce needs of the nation. The North Carolina portion of I-73 generally follows US 220 and I-74. In the Triad area, I-73 runs concurrently with US 220 from south of Greensboro to I-85 and along I-840 (Greensboro Western Loop) to Bryan Boulevard. I-73 is proposed to follow the US 220/ NC 68 Connector (TIP Project R-2413) and join US 220 northwest of Greensboro. There is no freeway in place to link the existing and future portions of I-73 in this area.

The purpose of this project is to complete a missing link in the I-73 corridor by joining the existing and future portions of I-73 in the Greensboro area. This will enhance north-south mobility and interstate connectivity through North Carolina and the Piedmont Triad region.

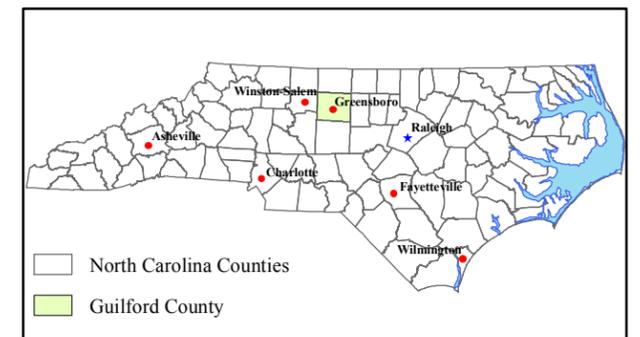
The I-73 Connector will be built to interstate standards. It is proposed as a fully controlled access facility with a typical section consisting of a multi-lane divided freeway with a 70-foot median, four-foot paved median shoulders, and 12-foot paved outside shoulders. The right of way width is expected to be at least 350 feet, and the posted speed limit is proposed to be 70 mph. According to information from a 2008 NCDOT feasibility study (FS-0507A) for this project, the current (2007) Annual Average Daily Traffic (AADT) estimates for the US 220/ NC 68 Connector and Bryan Boulevard (assuming the I-73 Connector is in place) are 52,400 and 57,000 vehicles per day (vpd), respectively. The design year (2035) forecasted AADT estimates are 68,000 vpd for the US 220/ NC 68 Connector and 78,000 vpd for Bryan Boulevard.



**Figure 1 - Project Location & Future Land Use Study Area**

- - - - - I-73 Connector (I-5110)
- US 220/ NC 68 Connector (R-2413)
- Major Roads
- Roads
- — — — — Streams & Creeks
- Waterbodies
- Future Land Use Study Area (FLUSA)
- Piedmont Triad International Property
- Greensboro
- Oak Ridge
- Summerfield

Map Sources:  
Greensboro GIS  
Guilford County GIS  
North Carolina Department of Transportation  
Florence & Hutcheson





Upon completion of the I-73 Connector, the western end of Bryan Boulevard would remain in place between NC 68 and North Regional Road for property access. The portion of Bryan Boulevard between North Regional Road and Airport Parkway would be removed.

The proposed I-73 Connector is not expected to affect economic development in the area or serve a specific development. It is not in response to PTI's Airport Master Plan.

At the time of this document, it is expected the proposed project will require an Environmental Assessment (EA). However, depending on the level of potential impacts and input from the various environmental agencies, a Categorical Exclusion (CE) may be sufficient. According to Federal Highway Administration (FHWA) guidance, "the degree to which indirect and cumulative impacts need to be addressed in an EA depends on the potential for the impacts to be significant and will vary by resource, project type, geographic location, and other factors." Detailed indirect and cumulative impacts are generally not conducted for a CE.

#### **IV. Future Land Use Study Area**

The Future Land Use Study Area (FLUSA) is the area surrounding a project that could be indirectly affected as a result of the proposed project and other actions. This study area encompasses all of the areas examined for potential increases in development pressure as a result of project construction. Although it is the focus for data collection and analysis contained within this report, it is not meant to infer that land use effects will be felt throughout the FLUSA. The area outlined in orange and black on Figure 1 is the FLUSA for the proposed I-73 Connector.

The FLUSA is generally bounded by: Bunch Road to the north; Beaver Creek, Stafford Mill Road, Bunker Hill Road in the west; I-40 to the south; and, PTI property, Fleming Road, Pleasant Ridge Road, and Stanley Huff Road to the east. The FLUSA includes five jurisdictions – Greensboro, Piedmont Triad Airport (PTI), Oak Ridge, Summerfield, and Guilford County – and one unincorporated community – Colfax.

The FLUSA has been defined based on the following reasons:

- The potential for land use changes with respect to the I-73 Connector is low. It is a short (1.5 miles), controlled access, freeway-to-freeway connection that will be built to interstate standards. Induced development from these types of projects is generally expected to occur at interchanges. This project does not have any proposed interchanges, but it will connect to one being designed as part of the adjacent US 220/NC 68 Connector (R-2413) (north of Pleasant Ridge Road at NC 68). The interchange was included in the Indirect and Cumulative Effects (ICE) document for R-2413 (see Section VI, Other Transportation and Infrastructure Projects for further discussion of related projects). It is more likely there will be cumulative impacts associated with I-5110 than indirect land use impacts.
- With other transportation projects proposed in the area (R-2413, US 220/NC 68 Connector and U-2524, Greensboro Western Loop, Interstate 840), the I-73 Connector will not influence future land uses to the degree the other projects will. Potential land use changes associated



with other projects will be taken into account as cumulative impacts, but potential land use changes are much more likely to take place as a result of other projects.

- More than half of the I-73 Connector project area falls within PTI's future boundary as defined in the airport's recent master plan (see Figure 2). The planned airport expansion will drive development in the area more so than this project. According to airport authorities, they are not planning future expansion because of this project.
- I-40 will act as a barrier for development to the south.
- The area south and east of the existing airport property is already developed with little to no developable land for miles.
- Fleming, Pleasant Ridge, Stanley Huff, and Bunch Roads were conservatively chosen as FLUSA boundaries because indirect development pressure from the proposed project is not expected to extend past, or even to these limits.
- While there is some developable land east of Fleming Road, the area to the west (inside the FLUSA) is built-out with residential development. It is unlikely development as a result of the proposed project will cross over this residential area.

## **V. Time Horizon**

The time horizon for this analysis is through the year 2030. This time frame is consistent with locally adopted transportation and land use plans, PTI's airport master plan, and population projections from the North Carolina Office of State Budget and Management.

## **VI. Other Transportation and Infrastructure Projects**

The following are lists of other notable projects underway or foreseeable in the area (see Figure 2).

### **NCDOT's 2009-2015 State Transportation Improvement Program Projects**

- U-2524 (Greensboro Western Loop) – new location freeway from north of I-85 southwest of Greensboro to east of US 220 north of the city; construction is complete from I-85 to Bryan Boulevard; the remaining portion is scheduled for construction sometime after 2015.
- R-2413 (US 220/ NC 68 Connector) – four-lane divided roadway partially on new location and partially widening existing US 220 from US 220 northwest of Greensboro to NC 68 near PTI. The project will be built to interstate standards. Right of way acquisition and construction are scheduled to begin in fiscal year (FY) 2012.
- R-2309 – widening of existing two-lane US 220 to a multi-lane facility with curb and gutter from south of proposed I-840 (U-2524) to the northern end of the US 220/ NC 68 Connector (R-2413). Right of way acquisition is in progress and construction is expected to begin in FY 2012.
- R-2611 – widening of Market Street to multi-lanes from the unincorporated community of Colfax west of PTI to NC 68. Right of way acquisition is in progress and construction is expected to begin in FY 2011.

There are no other transportation projects with funding or a clear funding source.

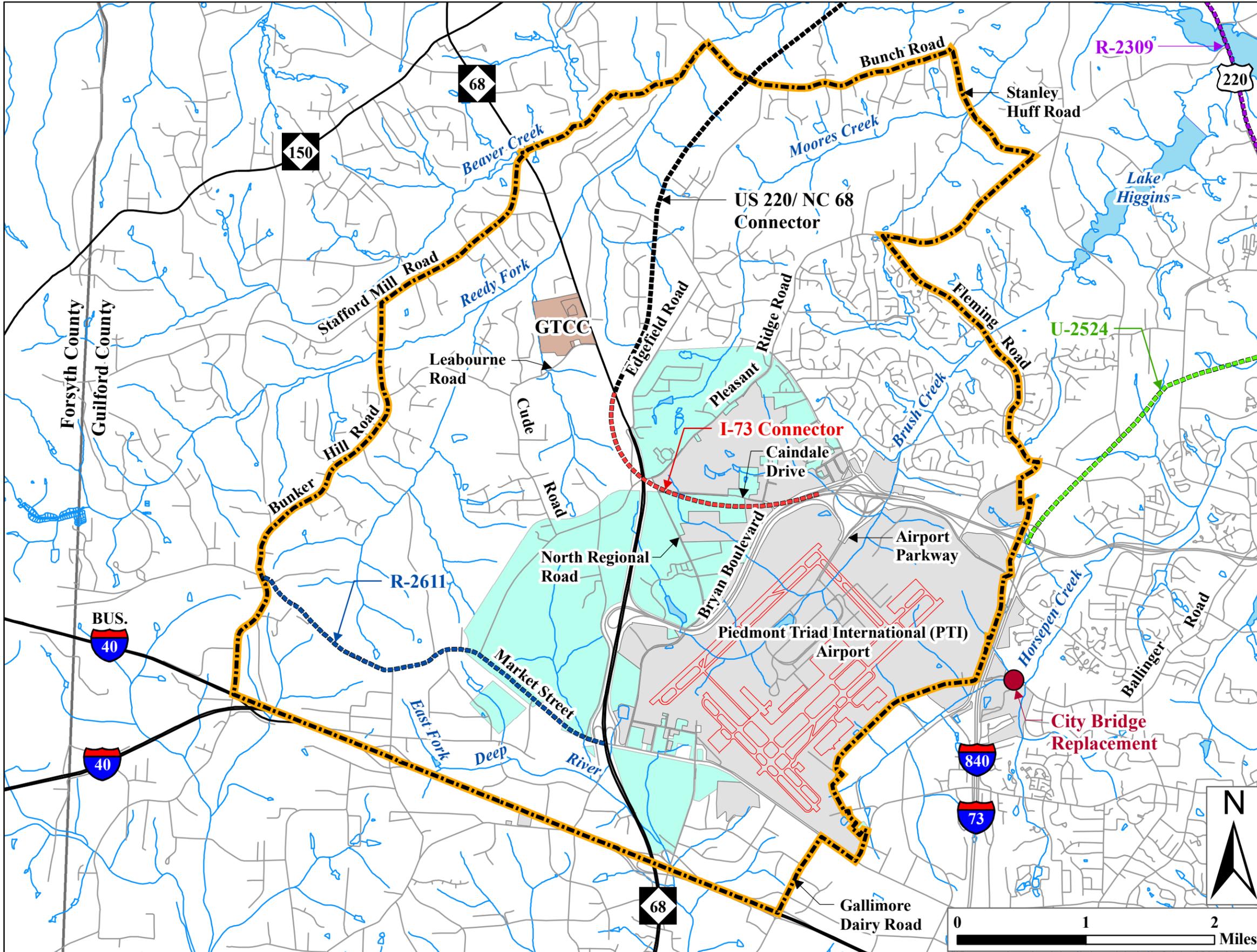
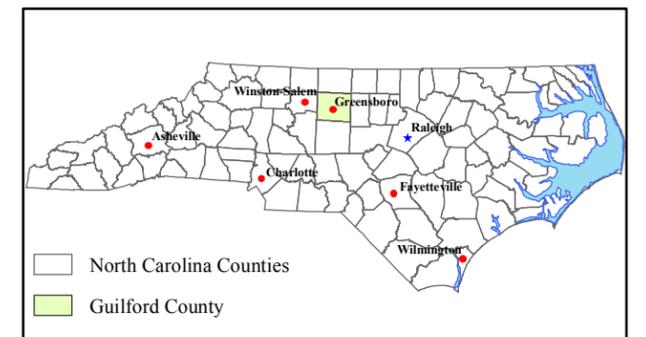
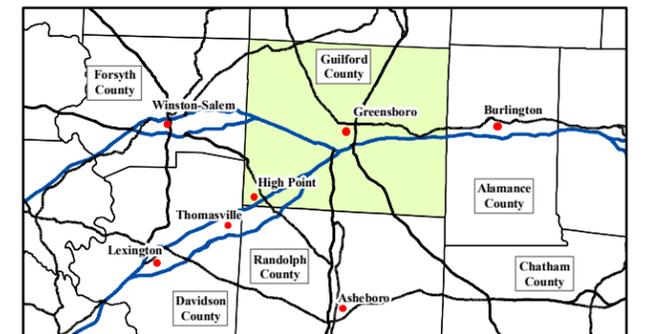


Figure 2 - Other Projects

- I-73 Connector (I-5110)
- US 220/ NC 68 Connector (R-2413)
- R-2309 (US 220 Widening)
- R-2611 (Market Street Widening)
- U-2524 (Greensboro Wester Loop)
- Future Land Use Study Area (FLUSA)
- Piedmont Triad International Property
- PTI Planned Expansion
- New GTCC Campus
- Greensboro Bridge Replacement

Map Sources:  
Greensboro GIS  
Guilford County GIS  
North Carolina Department of Transportation  
Florence & Hutcheson





## Infrastructure Projects

- Greensboro Technical Community College has recently begun construction of the school's fourth campus on the northwest corner of NC 68 and Leabourne Road. The new campus will include three buildings (with a total of about 250,000 square feet of floor space) and a three-level parking garage. Construction is expected to be completed in the Spring of 2013.
- The City of Greensboro's Engineering and Inspections and Water Resources Departments plan to extend water and sewer services to the new GTCC campus in 2011. As part of this project, water and sewer infrastructure is planned for the area bounded by NC 68, Leabourne Road, Cude Road, and Pleasant Ridge Road.
- The City of Greensboro plans to replace the bridge on Ballinger Road over Horsepen Creek east of I-73/ I-840 and outside of the FLUSA. Construction is scheduled to begin in 2011.

## VII. Transportation Impact Causing Activities

### Travel Time Savings

Travel times are unlikely to change considerably. Motorists traveling between Bryan Boulevard/Airport Parkway and NC 68 north of Edgefield Road currently travel along Bryan Boulevard to its interchange with NC 68 and then north on NC 68. This route is approximately 3.5 miles long. The posted speed limit along both roadways is 55 miles per hour (mph). Taking the distance and speed into account, it takes motorists about four minutes to complete the trip. Using the proposed I-73 Connector to make the same trip would take motorists about two minutes, assuming a 70 mph speed limit on the Connector and 35 mph on loops or ramps. Travel time savings are considered to be negligible at two minutes or less.

### Property Access

The I-73 Connector could result in minor access changes to some properties. The roadway network will generally remain undisturbed. A cul-de-sac could potentially be provided on Bryan Boulevard east of North Regional Road to maintain access between NC 68 and properties along North Regional Road. In this case, Bryan Boulevard would be abandoned between the cul-de-sac and the proposed southern terminus of the I-73 Connector. Access to one or two properties west of the proposed NC 68 interchange may be altered slightly. In the event these properties would otherwise become landlocked with the construction of this project, a new connection will be provided. Another potential location for a cul-de-sac is along North Regional Road south of Caindale Drive. Access to properties will be maintained from the southern end of North Regional Road via the remaining part of Bryan Boulevard.

The I-73 Connector is proposed as a fully controlled access freeway on new location, and therefore, will not provide any new access to properties.



## Travel Patterns

The I-73 Connector is unlikely to change travel patterns considerably. The main entrance to the airport will remain at its current location (Bryan Boulevard and Airport Parkway). People wanting to go to the airport from the south and east via Bryan Boulevard and I-73/ I-840 will still travel the same way as they do today. People going to the airport from the south and west currently get there via NC 68 and Bryan Boulevard. Since part of Bryan Boulevard west of Airport Parkway will most likely be abandoned, travelers from the south and west will be required to drive 1.8 miles further along NC 68 to the I-73 Connector to reach Airport Parkway. Those going to the airport from the north via NC 68 will no longer drive as far south on NC 68 to get to Bryan Boulevard. Instead, they will use the proposed I-73 Connector.

The local routes people use to travel to their homes, work, or to go shopping could be minimally affected once the proposed project is completed. Other than the part of Bryan Boulevard that may be abandoned and the potential to make North Regional Road a dead end, all other routes should remain unchanged. Employees at North Regional Road businesses who get to work via westbound Bryan Boulevard will have to instead use the I-73 Connector, NC 68, the remaining part of Bryan Boulevard, and North Regional Road. Likewise, those arriving from the north on NC 68 will no longer be able to turn left onto Pleasant Ridge Road to get to North Regional Road due to a cul-de-sac on North Regional Road. They will be required to continue southbound on NC 68 to the remaining part of Bryan Boulevard.

Some routes may be temporarily impacted during construction. In these cases, traffic will be maintained by providing alternative access.

## Property Exposure

The I-73 Connector is likely to increase the exposure of some properties in the area surrounding the proposed interchange with NC 68. There are undeveloped and agricultural tracts of land adjacent to the interchange and some that are farther removed to the north, west, and northeast. Properties immediately adjacent to the interchange may become more attractive for highway commercial development that would benefit from passing traffic (gas stations, fast food restaurants, etc.). However, it should be noted that Guilford Technical Community College (GTCC) owns a large tract of land at the northwest corner of NC 68 and Leabourne Road and will soon be breaking ground on a new facility. The presence of GTCC and water and sewer infrastructure in this area could also increase property exposure. According to local planning officials, there has been some interest by a developer(s) to build an apartment complex nearby that may be targeted for student housing.

Properties farther removed from the proposed interchange could become attractive for residential development. People may be more interested in moving to the area to take advantage of access to several major transportation corridors.



## Land Use and Transportation Nodes

The proposed project may somewhat alter land use patterns near the planned interchange. However, local planning officials indicate land uses will continue to be influenced by PTI rather than the I-73 Connector. Greensboro's future land use map dated February 19, 2010 shows the trend of industrial and office building development will continue through the year 2025 (*Greensboro Connections 2025 Comprehensive Plan*). This type of development may occur sooner as a result of the I-73 Connector along with the adjacent proposed US 220/ NC 68 Connector (R-2413).

This project along with the US 220/ NC 68 Connector will extend the I-73 corridor into the northern parts of Guilford County. It is likely the combination of these two projects along with the proximity to PTI and direct access to I-840 and NC 68 will enhance the transportation node that already exists.

## VIII. Population Trends and Projections

According to the US Census Bureau, Guilford County's population increased by about 21% between 1990 and 2000, or 2% annually. Based on county projections from the North Carolina Office of State Budget and Management, the population of Guilford County is expected to have increased by about 1.5% per year between 2000 and 2010. From there it is projected to continue rising 1.5% per year through the year 2020. The rate of growth will drop slightly to about 1.3% per year between 2020 and 2030.

Population growth trends within the FLUSA can be expected to be similar to those projected for Guilford County up to the time horizon of this study.

## VIX. Job Trends and Projections

According to data from the Employment Security Commission of North Carolina (ESCNC), the number of Guilford County jobs increased by 14,802 between 1997 and 2007, a 0.6% annual growth rate. The FLUSA is part of the Greensboro/ High Point/ Guilford Workforce Development Board (WDB). The ESCNC's projections for this WDB between 2006 and 2016 show the number of jobs increasing by 66,180, or 1.2% annually.

Annual job growth rates for the FLUSA were estimated using the WDB employment projections and population percentages from the 2000 US Census data. The WDB total projected employment growth (66,180 jobs) was distributed to Greensboro, High Point, and Guilford County (minus Greensboro and High Point) based upon their percentage share of the total County population in 2000. Greensboro and High Point comprised approximately 53% and 20%, respectively, of the total 2000 population in Guilford County. The remaining part of Guilford County accounted for 27%. The projected employment for Greensboro and Guilford County was then distributed within the FLUSA based on the percentage of area of each in the FLUSA and professional judgment. The projected employment for High Point was not included since no part of High Point is within the FLUSA. This distribution assumed that the FLUSA contained approximately 5% of Greensboro's employment base and 3% of Guilford County's employment base.



Based on the methodology described above, it is estimated that the FLUSA will experience an annual job increase of 2% between 2006 and 2016. Job projections past the year 2016 were not available at the time of this assessment.

## **X. Municipal Utilities**

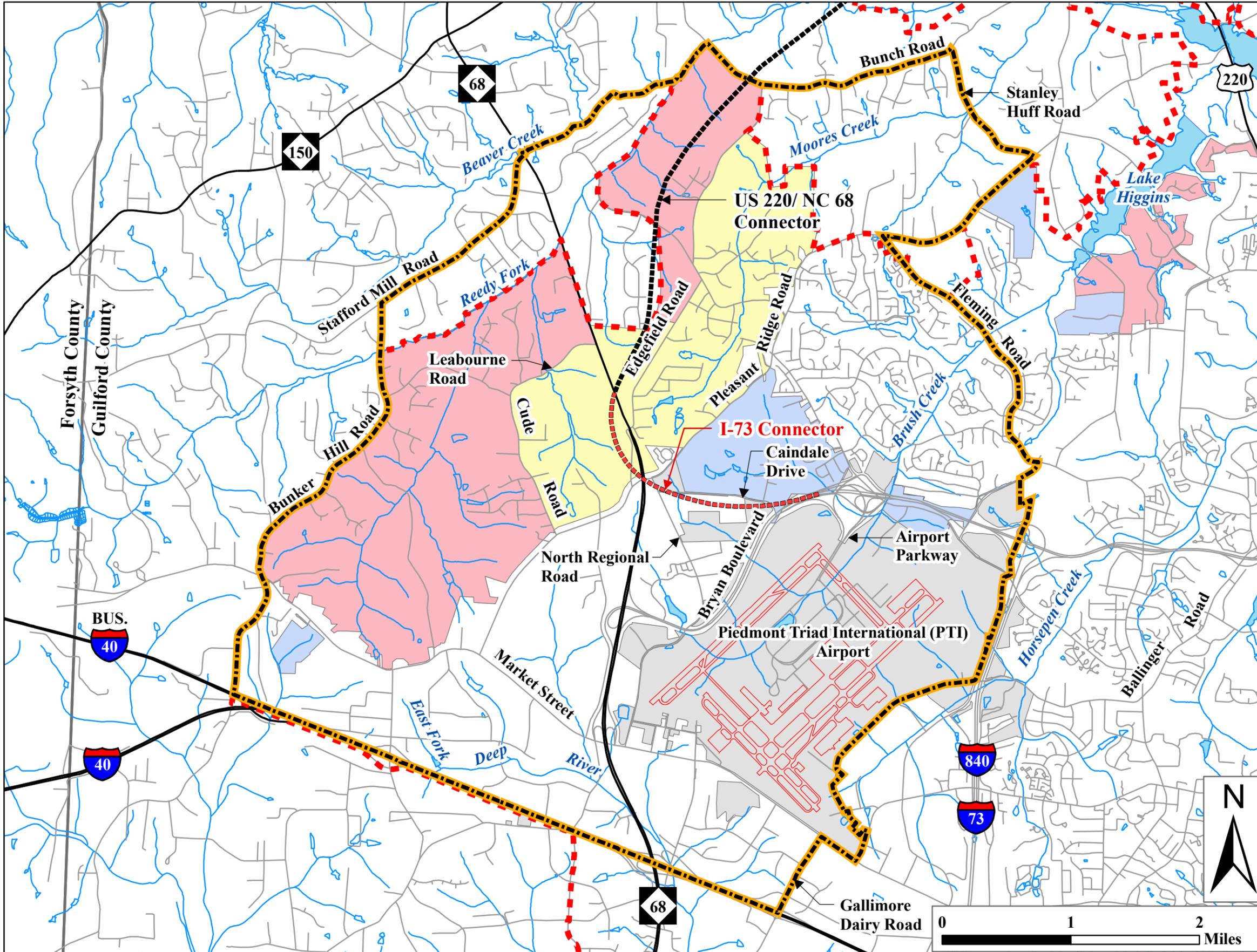
Guilford County, Oak Ridge, and Summerfield do not currently provide water and sewer services. Except for those areas, the FLUSA is within Greensboro's water and sewer service boundary. Not all areas in the water and sewer service boundary currently have service. The areas that do not are included in the service boundary because City officials have determined that water and sewer services could be extended to these areas in the future. The likelihood of extension falls into categories A, B, and C, with A being the most likely and C the least (see Figure 3). According to a Greensboro official, water and sewer services could be "readily provided" in areas categorized as A. One or the other, but not both, of the services could be readily provided to areas in category B, and C indicates areas where neither service is likely to be provided in the near future. According to the official, the time frame for extending water and sewer services will be driven by development pressure. An example of this is the current project to extend services to the new GTCC campus. Though the future campus is shown as being within Category C on Figure 3, the planned project prompted the extension of services to the area.<sup>1</sup> Once completed, areas along NC 68 up to the campus and properties along Lebourne Road, Cude Road, and part of Pleasant Ridge Road will have access to City water and sewer services.

Generally, there are existing water and sewer services within the FLUSA east of Pleasant Ridge Road and south of Market Street. A municipal water storage is located on the west side of North Regional Road across from Caindale Drive. The proposed designs will consider all reasonable options to avoid relocating the tower, if possible.

Greensboro's water supply comes from four sources – Lake Higgins, Lake Townsend, Lake Brandt, and the recently added Randleman Lake – to produce a finished (after treatment) water capacity of nearly 38 million gallons of water per day (mgd). In addition, the City of Greensboro has contracted with Burlington and Reidsville for an extra five mgd from each on an as-needed basis. Randleman Lake will be able to produce another 19 mgd in the future, which allows Greensboro to match its production needs to demands as development increases. According to Greensboro's Water Supply Master Plan (December 31, 2009), the additional 19 mgd will meet the City's needs over the next 30-40 years. Three water treatment plants (at Lake Brandt, Lake Townsend, and Randleman Lake) currently pump water to businesses and residents. The plants at Lake Brandt and Lake Townsend each have a capacity of 30 mgd. The plant at Randleman Lake has a capacity of 12 mgd, half of which is designated for Greensboro.

Based on information from the Master Plan, current water demand is 31 to 35 mgd, leaving a remaining capacity of three to seven mgd (not including the supplemental amount of 10 mgd available from Burlington and Reidsville).

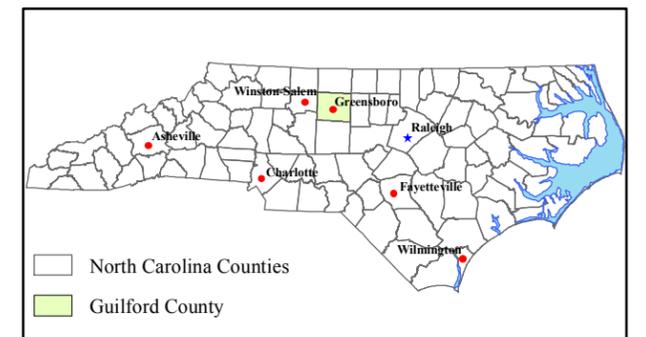
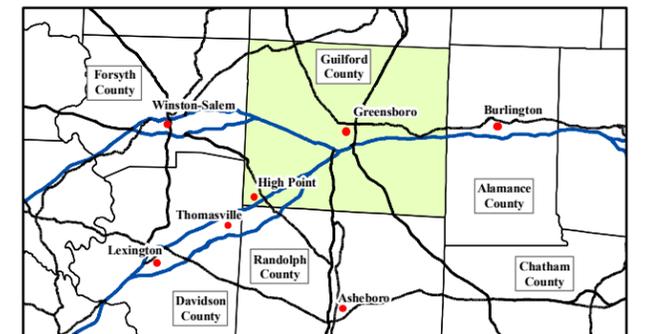
<sup>1</sup> The water sewer service areas information was created prior to knowledge of GTCC's future campus. Therefore, the site of the planned GTCC campus is shown as being within Category C (not likely to have water or sewer services in the future) on Figure 3.



**Figure 3 - Water & Sewer**

- I-73 Connector (I-5110)
- US 220/ NC 68 Connector (R-2413)
- Roads
- Future Land Use Study Area (FLUSA)
- Piedmont Triad International Property
- Water & Sewer Service Boundary
- Category A - Extension Most Likely
- Category B - Ext. Somewhat Likely
- Category C - Extension Least Likely

Map Sources:  
Greensboro GIS  
Guilford County GIS  
North Carolina Department of Transportation  
Florence & Hutcheson





Greensboro has two wastewater treatment facilities which can process a total of 56 mgd of wastewater. The facilities currently treat an average of 29 mgd. There are no immediate future plans for additional wastewater treatment facilities.

## **XI. Notable Features**

### **Human Environmental Features**

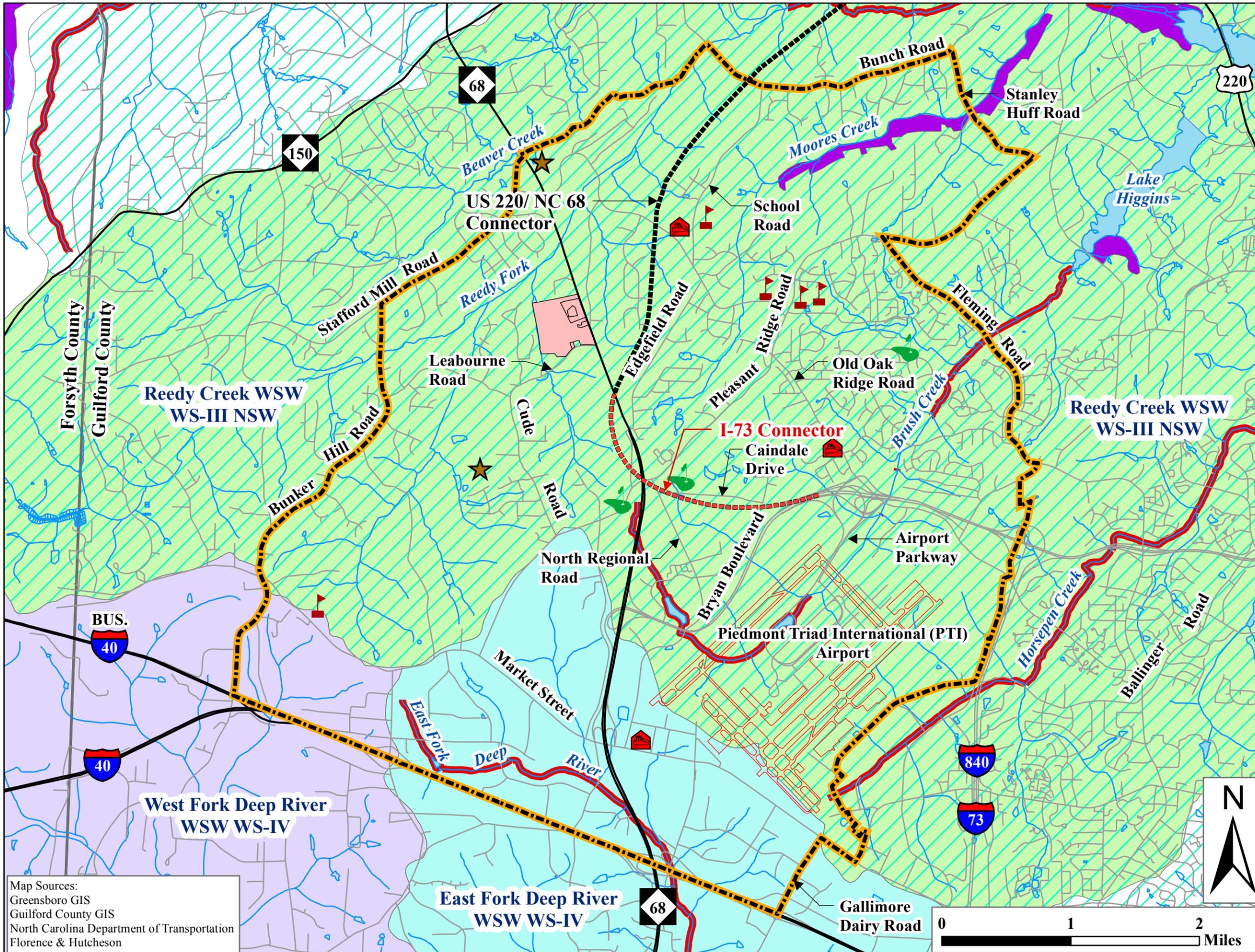
Notable human environmental features include (see Figure 4):

- Northwest Middle and High Schools along School Road
- Colfax Elementary School along Market Street
- E.P. Pearce Elementary School along Pleasant Ridge Road
- New Garden Friends School across from E.P. Pearce Elementary School – a private school based on Quaker beliefs
- National Register of Historic Places: Old Mill of Guilford along NC 68 and the Shaw-Cude House off of Cude Road
- A future Guilford Technical Community College campus along NC 68
- Piedmont Triad International (PTI) airport including: passenger services, a FedEx hub, GTCC Aviation Center, commercial carrier and private aircraft maintenance facilities, fire and rescue services, and the world headquarters for Honda Aircraft Company, Inc.
- Greensboro Fire Department Stations 17 (Old Oak Ridge Road) and 20 (Market Street)
- Oak Ridge Fire Department Station 51 off School Road
- Pleasant Ridge Golf Course along Pleasant Ridge Road east of NC 68
- Rick Murphy Golf Academy (offers golf instructions, shop and driving range) along Pleasant Ridge Road west of NC 68
- Cardinal Golf and Country Club off Fleming Road

### **Natural Environmental Features**

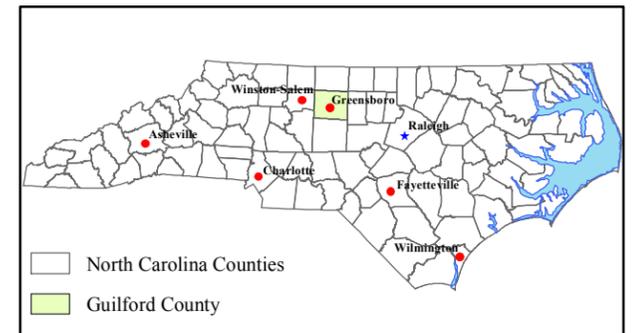
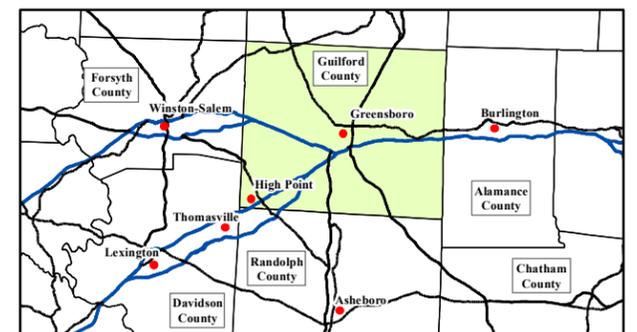
Notable natural environmental features include (see Figure 4):

- Based on the most recently updated (September 22, 2010 – accessed March 9, 2011) county-by-county database of federally listed species in North Carolina as posted by the US Fish and Wildlife Service (USFWS), two federally protected species are listed for Guilford County: the Bald eagle and Small whorled pogonia. The Bald eagle is protected by the Bald and Golden Eagle Protection Act. The Small whorled pogonia is considered a threatened species. A preliminary environmental screening (November 16, 2010) found there is no potential habitat for the Bald eagle in the area. It was determined that there are potential habitat areas for the Small whorled pogonia. According to a representative from USFWS, there should be no critical habitats or species under the Endangered Species Act within the project area. In addition, a biological conclusion of “no effect” for the Small whorled pogonia was reported in the Natural Resources Technical Report Addendum for the US 220/ NC 68



**Figure 4 - Notable Features**

- - - - - I-73 Connector (I-5110)
- 303(d) Impaired Waters
- ★ National Register Historic Places
- 🏠 Fire Stations
- 🏫 Schools
- 🌳 Golf Courses
- Future Land Use Study Area (FLUSA)
- New GTCC Campus
- Significant Natural Heritage Areas
- Water Supply Watersheds
- East Fork Deep River WSW WS-IV
- Reedy Fork WSW WS-III NSW
- West Fork Deep River WSW WS-IV
- Jordan Lake Watershed



Map Sources:  
Greensboro GIS  
Guilford County GIS  
North Carolina Department of Transportation  
Florence & Hutcheson





Connector (July 2010). Based on the information outlined above, this species is unlikely to be found within one mile of the I-73 Connector project area.

- An area along Moores Creek in the northern part of the FLUSA is designated as a significant Natural Heritage area. This designation identifies the area as having particular biodiversity significance due to the presence of rare species, rare or high quality natural communities, or other important ecological features.
- All streams in the FLUSA are in the Cape Fear River Basin. Reedy Fork, Moores Creek, and Brush Creek have been assigned a best use classification of WS-III by the North Carolina Division of Water Quality (NCDWQ). The classification WS-III indicates freshwaters used as sources of water supply for drinking, culinary or food processing purposes where a WS-I or WS-II classification is not feasible. These waters are protected for Class C uses. In addition, these waters are classified as Nutrient Sensitive Waters (NSW) by the NCDWQ. This supplemental classification is intended for waters needing additional nutrient management due to the potential for excessive growth of microscopic or macroscopic vegetation.
- The East Fork Deep River has been assigned a best use classification of WS-IV by NCDWQ. The classification WS-IV indicates freshwaters used as sources of water supply for drinking, culinary, or food processing purposes where a WS-I, II or III classification is not feasible. These waters are also protected for Class C uses. WS-IV waters are generally in moderately to highly developed watersheds or protected areas.
- The following streams in the FLUSA are listed as 303(d) streams on NCDWQ's 2010 final 303(d) list of impaired waters:
  - Brush Creek is listed for ecological/ biological integrity for benthos and fish communities
  - East Fork Deep River is listed for fecal coliform and turbidity

## **XII. Development Regulations<sup>2</sup>**

### **State and Federal Regulations**

According to the North Carolina Division of Water Quality (NCDWQ), as a result of storm water rules enacted by the Environmental Protection Agency (EPA) in 1999, construction or land development activities that disturb one acre or more are required to obtain a National Pollutant Discharge Elimination System (NPDES) storm water permit and site plan. An erosion and sediment control plan must also be developed for these sites under the state's Sedimentation Pollution Control Act (SPCA) administered by the NC Division of Land Resources. Local governments may review and enforce the erosion and sediment control plan within their jurisdiction, but the program has to be as strict as the Division of Land Resources program. Site disturbances of less than one acre require the use of NCDOT's Best Management Practices (BMPs), but a site plan is not required.

According to the March 1997 NCDOT Best Management Practices for Protection of Surface Waters report, BMPs include activities, practices, and procedures undertaken to prevent or reduce water pollution, such as: on-site detention areas, vegetative buffers, culverts, inspections and enforcement,

<sup>2</sup> Parts of this section were taken from NCDOT's R-2413 *Qualitative Indirect and Cumulative Effects* report dated September 30, 2005. The information was verified for accuracy for the purposes of this document.



and erosion control. Site disturbances greater than one acre require both the application of BMPs as well as a site plan.

In 1972, the National Pollutant Discharge Elimination System (NPDES) program was established under the authority of the Clean Water Act. Phase I of the NPDES stormwater program was established in 1990. It requires NPDES permit coverage for large or medium municipalities with populations of 100,000 or more. The Phase II program extends permit coverage to smaller (< 100,000 pop.) communities and public entities that own or operate a municipal separate storm sewer system (MS4) by requiring them to apply for and obtain an NPDES permit for storm water discharges.

Guilford County has been automatically designated by the EPA as a Phase II permittee. Consequently, as required by the Federal regulations, Guilford County must, at a minimum, develop, implement, and enforce a storm water program designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable using the six minimum control measures of the Phase II program. Each of the six minimum controls requires the use of Best Management Practices (BMPs) and measurable goals (i.e., narrative or numeric standards used to gauge program effectiveness). Among other things, the developed storm water program will provide regulatory controls for future developments using post construction storm water management techniques such as planning and growth controls, site-based local controls (e.g., impervious surface limits), as well as miscellaneous storage, vegetative, and infiltration practices. The County does implement Watershed Protection and Storm Water Management Plans. Potential impacts to water quality throughout the project area should be minimized due to the presence of state and local water supply watershed protection regulations, the creation and implementation of Guilford County's Phase II storm water plan, and land use plans/zoning regulations enforced by the various municipalities throughout the FLUSA (including riparian buffers and the preservation of open space/natural land).

#### Basins and Water Supply Watershed Regulations

The I-73 Connector FLUSA falls within the Cape Fear River Basin. The NCDWQ prepared a Cape Fear River Basin-wide Water Quality Plan in 2005 in an effort to create long-term water quality management strategies for local and state officials. The Plan recommends that all agencies and groups interested in development and water quality in Greensboro work together to plan growth of the city in such a way that water quality and quantity are protected.

As mentioned previously in this report, the FLUSA is within the Reedy Fork, Moores Creek, and Brush Creek Water Supply Watersheds (Class III), and the East Fork Deep River Water Supply Watersheds (Class IV).

Development in the protected area of Class III water supply watersheds is limited to two dwelling units per acre or 24% built-upon area under the low-density option. Under the high-density option, 24-50% built-upon area is permitted.

Development in the protected area of Class IV water supply watersheds has density limits. For projects without curb and gutter street systems under the low-density option development is limited



to two dwelling units per acre (or 24% built-upon area) or three dwelling units per acre (or 36% built-upon area). Under the high-density option, 24-70% built-upon area is allowed if developers control runoff from the first inch of rainfall.

The 10/70 provision is allowed in the protected area of Class III and Class IV water supply watersheds. This provision allows local governments to use 10% of the non-critical area of each watershed within its jurisdiction for new development or expansion up to 70% built-upon area (without storm water control), provided that the low-density option is used in the remainder of the watershed.

A part of the FLUSA is within the Jordan Lake Watershed boundary and is subject to the Jordan Lake Nutrient Management Strategy Rules (see Figure 4). Jordan Lake is located in Chatham County at the confluence of the Haw River and the Deep River. It serves as a water supply for several communities, as well as a recreational area. The Jordan Nutrient Strategy is a set of rules designed to reduce nutrient over-enrichment in the lake and restore it to full use. The rules are in place to reduce pollution from wastewater discharges, stormwater runoff from development, agricultural activities, and fertilizer application.

#### Local Development Regulations

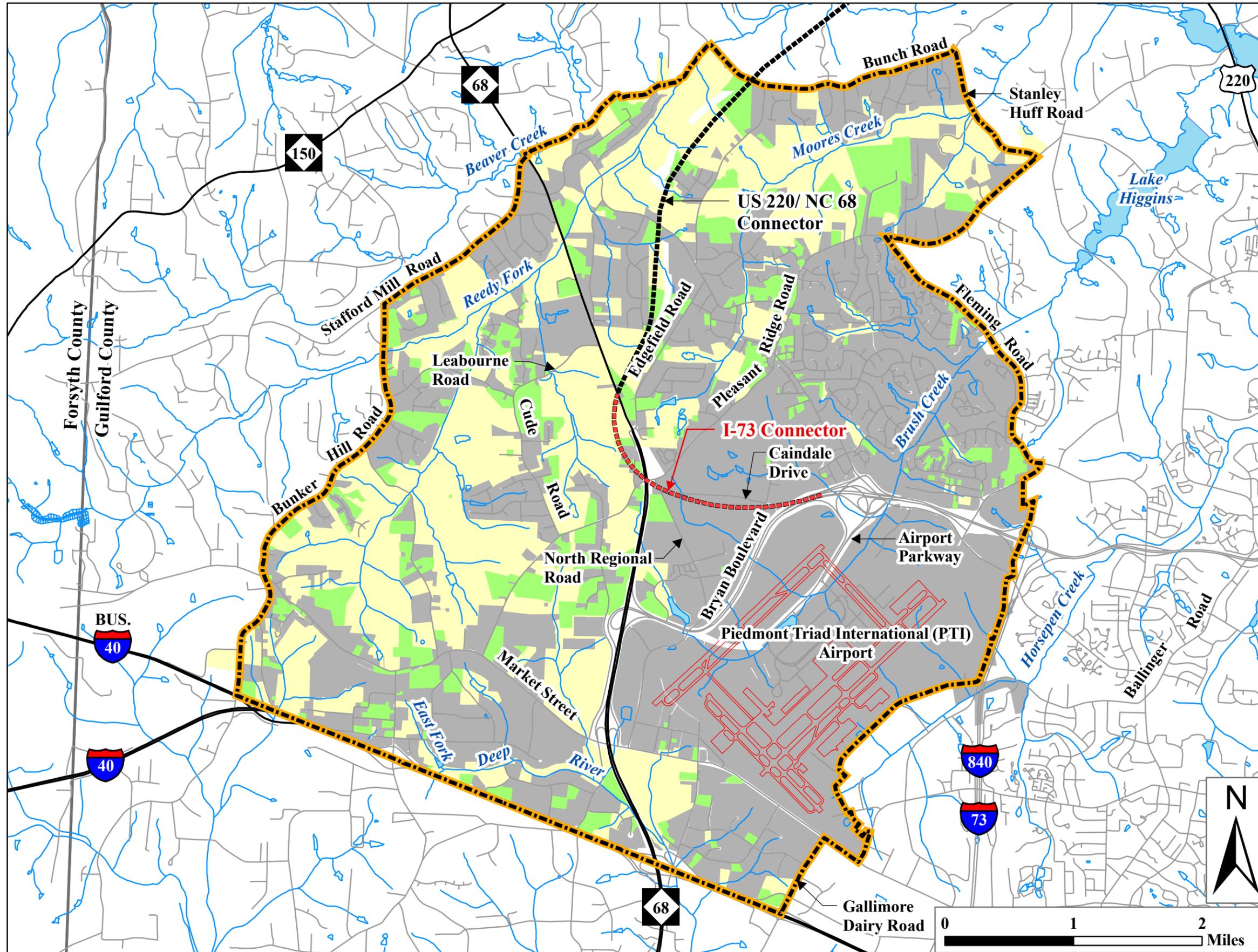
The City of Greensboro's Adopted Land Development Ordinance includes development regulations based on the state and federal requirements discussed previously. Similar environmental regulations are included in the ordinances for Oak Ridge and Summerfield.

Greensboro's Airport Overlay District requires developers proposing any structure over 50 feet to get written documentation from the airport authority that it will not interfere with airport operations. No permit or plan approval will be granted without compliance. Additionally, residential uses are prohibited inside the federally approved airport noise cone with the exception of single-family detached dwellings on lots that are at least 40,000 square feet in area.

### **XIII. Available Land**

To determine the potential market for future development, land within the FLUSA was identified as "developed," "undeveloped/constrained," or "undeveloped/unconstrained." Categorizing available land was completed using tax data, GIS data, and aerial photography. Small parcels with a structure, subdivided lots that have been platted but not built on, industrial sites, PTI property, Greensboro Technical Community College (GTCC) property, and road right of way were considered developed. Next, constraints on development were overlaid on the map, including water bodies, streams identified by NCDWQ, and National Wetland Inventory (NWI) wetlands. Finally, the undeveloped land was identified as either undeveloped/constrained (if it was covered by one or more of these overlays) or undeveloped/unconstrained.

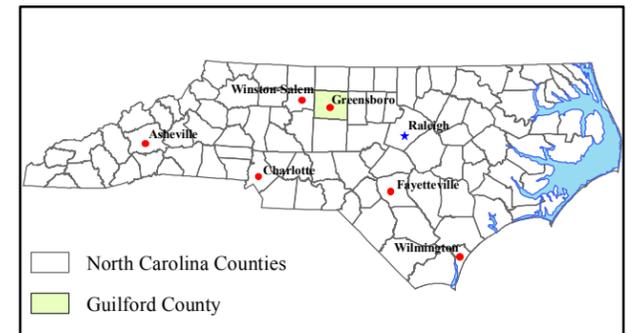
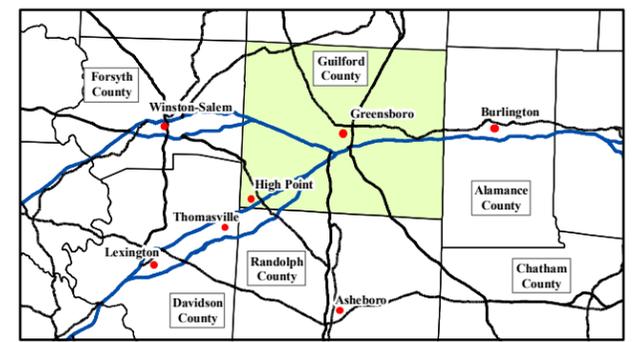
There are approximately 15,350 acres of land in the FLUSA. Of this, approximately 9,640 acres (63%) is currently developed (see Figure 5). Of the 5,710 acres of undeveloped area, approximately 4,400 acres (29% of the total) is considered constrained – protected by streams, wetlands, ponds, and



**Figure 5 - Available Land**

- - - - - I-73 Connector (I-5110)
- US 220/ NC 68 Connector (R-2413)
- Major Roads
- Roads
- Streams & Creeks
- Waterbodies
- Future Land Use Study Area (FLUSA)
- Undeveloped/ Unconstrained Land
- Undeveloped/ Constrained Land
- Developed Land

Map Sources:  
Greensboro GIS  
Guilford County GIS  
North Carolina Department of Transportation  
Florence & Hutcheson





stream buffers. The remaining 1,310 acres (8% of the total) of land is classified as undeveloped/ unconstrained, which includes active farmland, forested areas, open space, and large parcels with single structures. Undeveloped/unconstrained areas generally represent land within the FLUSA that could be developed in the future.

#### **XIV. Market for Development**

##### Current Development Pressures

As stated before in this report, the Piedmont Triad International airport (PTI) has had the most influence on recent development in much of the FLUSA. The airport, along with the proximity to major transportation corridors, has attracted shipping, distributing, and other transportation related industries. In addition to industrial development, there are a number of office and commercial buildings. The recent addition of a FedEx hub at PTI increased the amount of industrial and commercial development. The area north of PTI has been mostly developed as residential areas. However, tax data from Guilford County indicates about 80% of the homes in the FLUSA were built prior to 2000. Those that have been built in the last 10 years have generally been distributed evenly over the study area with no large developments. This indicates there has not been much residential development pressure.

##### Development Market Assumptions

According to local planning documents, future land use maps, and information from local officials, the current development trends are expected to continue through the year 2030. As PTI continues to grow and the interstate network (I-73 and I-840) is completed, the area around the airport and along Market Street will continue to see industrial and commercial development. Local officials expect these types of land uses on the west side of NC 68 and north. In addition, the planned GTCC campus and accompanying water and sewer service extension is likely to attract supporting development (commercial, multi-family residential, etc.). Recent development in the FLUSA has been steady, but local officials anticipate the area to be mostly built out by 2030 (assuming the proposed transportation projects will be built and PTI grows as officials there expect).

According to their Airport Master Plan Update and Strategic Long-Range Visioning Plan (September, 2010), PTI officials anticipate the recently completed third runway will attract new tenants and encourage existing tenants to expand their operations. Six of the largest airport tenants and their development plans are listed below:

- FedEx – this hub operation will ultimately require 250 acres of airport land (it currently occupies about 165 acres).
- TIMCO Aviation Services, Inc. – this maintenance and repair operation currently leases approximately 30 acres with a lease option for an additional 10 acres; TIMCO has plans to expand their facilities with additional maintenance shops, hangar, ramp, ramp access, and parking space.
- Cessna Citation Service Center – this facility leases four acres and has plans to double the size of the current building.



- Comair Maintenance Facility – this maintenance facility currently occupies about four acres and has no immediate plans for expansion.
- Honda Aircraft Headquarters – this aircraft maker occupies approximately 70 acres with a lease option for an additional 30 acres.
- T.H. Davis Aviation Center – this 120,000 square-foot training facility is operated by GTCC and could expand further to accommodate worker training for additional airport tenants.

In addition to these development plans at the airport, PTI has plans to expand their facilities over the next 10 years. These expansions include: a passenger terminal, terminal support area, airport and rental car remote parking, aviation-related developments, and general aviation areas. The majority of this development will occur on existing airport property; however, the airport plans to acquire approximately 240 additional acres to accommodate future plans. Beyond 10 years, PTI expects airport-related development pressure will require approximately 2,030 more acres.

**XV. Indirect Screening Matrix Methodology and Matrix**

The categories listed on the Indirect Screening Matrix (see Table 1) have been shown to influence land development decisions in numerous areas statewide and nationally. The measures used to rate the impacts from a high concern for indirect effects potential to less concern for indirect effects potential are supported by documentation sections. Each characteristic is assessed individually and the results of the table are looked at comprehensively to determine the indirect effects potential of the proposed project. The scope of the project, change in accessibility, public policy, and notable environmental features categories are given extra weight to determine if future growth in the area is related to the project modifications.

**Table 1 – Indirect Land Use Effects Screening Tool**

Rating	Scope of Project	Change in Accessibility	Forecasted Population Growth	Forecasted Employment Growth	Available Land	Water/ Sewer Availability	Market for Development	Public Policy	Notable Environmental Features	Result
More Concern	Major New Location	> 10 Minute Travel Time Savings	> 3% Annual Population Growth	Substantial Number of New Jobs	5,000+ Acres of Land	All Services Existing/ Available	Development Activity Abundant	Less Stringent, No Growth Management	Targeted or Threatened Resources	
↑										
↑				X		X	X			
↔	X		X						X	Possible Indirect Scenario Assessment
↓		X			X			X		
↓										
Less Concern	Very Limited Scope	No Travel Time Savings	No Population Growth or Decline	No New Jobs or Job Losses	Limited Land Available	No Service Available Now or In the Future	Development Activity Lacking	More Stringent Growth Management	Features Incorporated in Local Protection	



## **XVI. Screening Matrix Results**

The indirect land use effects screening tool indicates the proposed I-73 Connector may cause indirect effects and an Indirect Scenario Assessment could possibly be required.

With regards to indirect land use effects, this new location I-73 Connector project is a neutral concern. Its short length (about 1.5 miles), fully controlled access, and connection between existing or planned interchanges limit its indirect effects on land use.

As discussed in Section VII. Transportation Impact Causing Activities, the travel time saving will be low at approximately two minutes.

The forecasted population growth is expected to follow the same trend as the County at about 1.5% per year through 2020 and dropping slightly to 1.3% per year between 2020 and 2030.

The expected forecasted employment growth could be a slight concern. As described in Section VIII. Job Trends and Projections, the FLUSA is expected to experience an annual job increase of about 2% compared to the ESCNC's prediction of 1.2% annually.

There are approximately 5,710 acres of undeveloped land in the FLUSA. However, 4,400 acres of it (77%) are constrained by streams, wetlands, ponds, and stream buffers. Only 1,310 acres are considered undeveloped and unconstrained. Additionally, PTI plans to acquire about 900 acres over the next 20-30 years and as much as 1,500 acres more later. For these reasons, the amount of developable land in the FLUSA was rated lower.

About half of the FLUSA currently has access to water and sewer services, but it is in areas that are mostly already developed. The City plans to extend services along NC 68 to the new GTCC campus. Greensboro has a water and sewer service policy in place that will extend services to those areas of its jurisdiction that do not currently have it as development demands it. The majority of the FLUSA falls within the City's water and sewer service boundary.

Recent development activity has been influenced by the expansion of PTI. Industrial and commercial development has been attracted to the area since the new FedEx hub was built.

Jurisdictions in the FLUSA follow state and federal development regulations to protect water quality. Again, the presence of PTI also has an influence on development around it. In addition to height restrictions, there are development limitations for areas within its noise cone.

There are notable environmental features in the FLUSA. These will be protected by best management practices and state and federal regulations.



## **XVII. Indirect Effects Summary**

No indirect effects are expected from the proposed I-73 Connector alone. The major factors contributing to this result are the limited scope of the project, the existing and planned interstate network in the area, and the influence of Piedmont Triad International airport on development in much of the FLUSA.

The I-73 Connector will be designed as a short (1.5 mile), freeway to freeway connection with fully controlled access. It alone will not give new exposure to properties along its alignment. Properties in the immediate vicinity of the proposed interchange with NC 68 may become more attractive for commercial development, but this project has been taken into account in local land use plans. Local officials expect this area to develop according to their future land use plans if the I-73 corridor is completed and PTI expands as expected.

The need for this project is to provide a connection between an existing freeway (Bryan Boulevard) and the proposed US 220/ NC 68 Connector. Once completed, I-73 will extend to northern Guilford County. The *combination* of these transportation projects may have some effect on the rate and type of development, but this project alone should not result in considerable indirect effects.

## **XVIII. Cumulative Effects Summary**

It is reasonable to assume past actions (the new FedEx hub at PTI, the Bryan Boulevard relocation, and industrial development) have had some cumulative effect on environmental resources. Future airport and GTCC development, infrastructure development, and planned transportation projects could continue to cumulatively affect on environmental resources (see *Section XIV. Market for Development* for a more detailed discussion of future development). Notable features include a significant Natural Heritage area and 303(d) impaired waters. Another item to note is part of the FLUSA is within the Jordan Lake Watershed boundary and subject to the Jordan Lake Nutrient Management Strategy Rules (see Figure 4). A more detailed cumulative effects analysis will be conducted in the future, and the results will be documented in a Land Use Scenario Assessment.

None of the preliminary alternatives for the I-73 Connector will notably contribute to cumulative impacts on impaired and protected notable environmental resources. The 303(d) impaired waters, as shown on Figure 4, are in areas that are already developed and are unlikely to be affected by cumulative effects. The proposed project, in conjunction with other past and future actions, should not cause land use changes in these areas. Small undeveloped areas along the impaired section of Brush Creek south of the project are expected to develop with or without the I-73 Connector. Local officials and PTI representatives anticipate development in these areas will be influenced by the airport's future plans for expansion. Direct environmental impacts from NCDOT projects are addressed by avoidance, minimization, and/or mitigation consistent with programmatic agreements with the natural resource agencies during the Merger and permitting processes.

The I-73 Connector FLUSA is within the study area defined in the *Qualitative Indirect and Cumulative Effects* document for the adjacent proposed US 220/ NC 68 Connector (R-2413). Though that document does not account for this project, it does consider the other transportation



projects listed earlier in this document as well as the recently constructed Bryan Boulevard relocation. Since the scope of this project is minor in comparison to the US 220/ NC 68 Connector and the FLUSA is within its ICE study area, it is reasonable to rely somewhat on the cumulative effects conclusions for R-2413.

The potential effects of a transportation improvement project could increase when considered along with other public or private development-related activities. The I-73 Connector, combined with other transportation projects will improve mobility through Guilford County. This improved mobility will expand the commute shed for Greensboro, Winston-Salem, and High Point which will in turn increase the amount of through traffic in the area. These factors could make the area more attractive for highway-oriented uses such as gas stations, restaurants, and hotels.

Local officials anticipate additional industrial development to occur in the future as a result of the construction of the new I-73 interstate corridor and the expansion of PTI. Likely locations for this development are along NC 68 between the airport and the proposed interchange with the US 220/ NC 68 Connector, as well as surrounding proposed interchange locations along the corridor.

Based on the findings and conclusions of this report and those from the *Qualitative Indirect and Cumulative Effects* document for R-2413, any indirect effects to land use change and cumulative effects to the environment resulting from the proposed I-73 Connector have a moderate potential of impacting water quality in the FLUSA.



## **XIX. Sources**

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City of Greensboro, Connections 2025 Comprehensive Plan, May 2003 (amended January 2009)

City of Greensboro, Land Development Ordinance, June 2010

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GUAMPO, Long Range Transportation Plan 2035, January 2009

GUAMPO, Greensboro Urban Area Thoroughfare Plan, July 2005

Guilford County, Airport Area Plan, May 2008

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Town of Summerfield, Comprehensive Plan: Our Town, Our Plan, May 2010

Town of Summerfield, Development Ordinance

US Census Bureau, 1990 and 2000 Census



North Carolina Department of Transportation  
 Highway Stormwater Program  
**STORMWATER MANAGEMENT PLAN**  
 FOR LINEAR ROADWAY PROJECTS



(Version 1.2; Released September 2011)

**Project/TIP No.:** I-5110      **County(ies):** Guilford      **Page** 1 **of** 5

**General Project Information**

<b>Project No.:</b>	I-5110	<b>Project Type:</b>	New Location	<b>Date:</b>	10/23/2014
<b>NCDOT Contact:</b>	Stephen Morgan, P.E.	<b>Contractor / Designer:</b>	Flatiron, Blythe / RK&K: Matthew L. Cook		
<b>Address:</b>	1590 Mail Service Center Raleigh, NC 27699	<b>Address:</b>	900 Ridgefield Drive, Suite 350 Raleigh, NC 27609		
	<b>Phone:</b> 919-707-6739		<b>Phone:</b> 919-878-9560		
	<b>Email:</b> smorgan@ncdot.gov		<b>Email:</b> mcook@rkk.com		
<b>City/Town:</b>	Greensboro	<b>County(ies):</b>	Guilford		
<b>River Basin(s):</b>	Cape Fear	<b>CAMA County?</b>	No		
<b>Primary Receiving Water:</b>	Brush Creek	<b>NCDWQ Stream Index No.:</b>	16-11-4-(1)		
<b>NCDWQ Surface Water Classification for Primary Receiving Water</b>	<b>Primary:</b>	Water Supply III (WS-III)			
	<b>Supplemental:</b>	Nutrient Sensitive Waters (NSW)			
<b>Other Stream Classification:</b>					
<b>303(d) Impairments:</b>	None				
<b>Buffer Rules in Effect</b>	Other				

**Project Description**

<b>Project Length (lin. Miles or feet):</b>	1.625 Miles	<b>Surrounding Land Use:</b>	Commercial		
	<b>Proposed Project</b>		<b>Existing Site</b>		
<b>Project Built-Upon Area (ac.)</b>	38.21 ac.		38.63 ac.		
<b>Typical Cross Section Description:</b>	A four-lane divided controlled access roadway.				
<b>Average Daily Traffic (veh/hr/day):</b>	<b>Design/Future:</b> 42200	<b>Existing:</b>	0		

**General Project Narrative:** The I-73 Connector proposes to connect NC 68 and Bryan Boulevard, west of the Greensboro Western Loop (Future I-840/I-73), with a new 1.6 mile, four lane, median-divided freeway. It will be a fully controlled access facility with two, 12-foot lanes in both directions and a depressed grass median that varies from 70' at the southern end to 46' at the northern end. It will begin at the existing Bryan Boulevard / Airport Parkway interchange (Station 25+00) and extend on new location to just west of existing NC 68 where it ties to R-2413A (Station 109+00). A partial interchange will be provided with NC 68. In addition, Pleasant Ridge Road will be realigned where it crosses NC 68. Standard road building equipment, such as trucks, dozers, and cranes will be used.

**References**





GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA
DA= 0.82ac SLOPE= 1.72% L REQ.= 82' L PRO.= 150' Q2= 2.59cfs V2= 1.71ft/s D2= 0.50' Q10= 3.35cfs V10= 1.99ft/s D10= 0.53'	DA= 0.47ac SLOPE= 0.3% L REQ.= 47' L PRO.= 250' Q2= 1.58cfs V2= 1.32ft/s D2= 0.90' Q10= 2.05cfs V10= 1.40ft/s D10= 0.99'	DA= 1.19ac SLOPE= 0.3% L REQ.= 119' L PRO.= 500' Q2= 4.04cfs V2= 1.87ft/s D2= 1.20' Q10= 5.23cfs V10= 1.99ft/s D10= 1.32'	DA= 1.39ac SLOPE= 0.3% L REQ.= 139' L PRO.= 400' Q2= 4.40cfs V2= 1.87ft/s D2= 1.21' Q10= 5.65cfs V10= 2.00ft/s D10= 1.37'	DA= 1.31ac SLOPE= 0.3% L REQ.= 131' L PRO.= 350' Q2= 3.86cfs V2= 1.85ft/s D2= 1.18' Q10= 5.00cfs V10= 1.97ft/s D10= 1.30'	DA= 1.16ac SLOPE= 0.3% L REQ.= 116' L PRO.= 300' Q2= 3.42cfs V2= 1.79ft/s D2= 1.13' Q10= 4.43cfs V10= 1.70ft/s D10= 1.32'	DA= 1.41ac SLOPE= 0.3% L REQ.= 141' L PRO.= 350' Q2= 3.81cfs V2= 1.84ft/s D2= 1.18' Q10= 4.94cfs V10= 1.96ft/s D10= 1.29'
BUFFER CHECK -L- STA. 27+50 TO 29+00 RT PSH 4	SPECIAL CUT DITCH CQ -L- STA. 29+00 TO 31+50 RT PSH 4-5	SPECIAL CUT DITCH CQ -L- STA. 31+50 TO 36+50 RT PSH 5	SPECIAL CUT DITCH CQ -L- STA. 36+50 TO 40+50 RT PSH 5	SPECIAL CUT DITCH CQ -L- STA. 40+50 TO 44+00 RT PSH 5	SPECIAL CUT DITCH CQ -L- STA. 44+00 TO 47+00 RT PSH 6	SPECIAL CUT DITCH CQ -L- STA. 47+00 TO 50+50 RT PSH 6

GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA
DA= 1.40ac SLOPE= 0.30% L REQ.= 140' L PRO.= 166' Q2= 4.11cfs V2= 1.01ft/s D2= 0.71' Q10= 5.32cfs V10= 1.08ft/s D10= 0.78'	DA= 1.50ac SLOPE= 0.3% L REQ.= 150' L PRO.= 150' Q2= 4.40cfs V2= 1.11ft/s D2= 0.81' Q10= 5.69cfs V10= 1.18ft/s D10= 0.90'	DA= 0.33ac SLOPE= 0.30% L REQ.= 33' L PRO.= 134' Q2= 0.98cfs V2= 0.65ft/s D2= 0.43' Q10= 1.27cfs V10= 0.69ft/s D10= 0.47'	DA= 1.14ac SLOPE= 0.3% L REQ.= 114' L PRO.= 150' Q2= 3.33cfs V2= 0.90ft/s D2= 0.59' Q10= 4.31cfs V10= 0.96ft/s D10= 0.65'	DA= 1.55ac SLOPE= 0.3% L REQ.= 155' L PRO.= 200' Q2= 4.55cfs V2= 1.12ft/s D2= 0.82' Q10= 5.89cfs V10= 1.19ft/s D10= 0.91'	DA= 0.128ac SLOPE= 0.3% L REQ.= 13' L PRO.= 50' Q2= 0.38cfs V2= 0.55ft/s D2= 0.34' Q10= 0.49cfs V10= 0.59ft/s D10= 0.37'	DA= 1.17ac SLOPE= 1.4% L REQ.= 117' L PRO.= 125' Q2= 3.44cfs V2= 1.86ft/s D2= 0.56' Q10= 4.46cfs V10= 1.98ft/s D10= 0.61'
ROADWAY DITCH -L- STA. 49+00 TO 50+66 CL PSH 6	ROADWAY DITCH -L- STA. 50+50 TO 52+00 RT PSH 6	ROADWAY DITCH -L- STA. 50+66 TO 52+00 CL PSH 6	ROADWAY DITCH -L- STA. 52+00 TO 53+50 CL PSH 6	ROADWAY DITCH -L- STA. 54+00 TO 56+00 RT PSH 6	MEDIAN V DITCH CG -L- STA. 61+50 TO 62+00 CL PSH 7	MEDIAN V DITCH CG -L- STA. 62+00 TO 63+25 CL PSH 7

GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA
DA= 1.53ac SLOPE= 0.31% L REQ.= 153' L PRO.= 75' Q2= 3.81cfs V2= 1.08ft/s D2= 0.77' Q10= 4.93cfs V10= 1.15ft/s D10= 0.85'	DA= 1.60ac SLOPE= 1.10% L REQ.= 160' L PRO.= 175' Q2= 4.69cfs V2= 1.83ft/s D2= 0.65' Q10= 6.07cfs V10= 1.96ft/s D10= 0.72'	DA= 1.06ac SLOPE= 1.44% L REQ.= 106' L PRO.= 125' Q2= 3.34cfs V2= 1.86ft/s D2= 0.55' Q10= 4.33cfs V10= 1.99ft/s D10= 0.60'	DA= 1.31ac SLOPE= 1.20% L REQ.= 131' L PRO.= 150' Q2= 4.14cfs V2= 1.84ft/s D2= 0.61' Q10= 5.36cfs V10= 1.96ft/s D10= 0.68'	DA= 1.17ac SLOPE= 1.3% L REQ.= 117' L PRO.= 125' Q2= 3.71cfs V2= 1.84ft/s D2= 0.58' Q10= 4.81cfs V10= 1.97ft/s D10= 0.64'	DA= 1.09ac SLOPE= 1.40% L REQ.= 109' L PRO.= 125' Q2= 3.43cfs V2= 1.86ft/s D2= 0.56' Q10= 4.45cfs V10= 1.98ft/s D10= 0.61'	DA= 0.37ac SLOPE= 2.08% L REQ.= 37' L PRO.= 50' Q2= 3.87cfs V2= 1.78ft/s D2= 0.27' Q10= 5.01cfs V10= 1.94ft/s D10= 0.31'
SPECIAL CUT W/ HINGE DITCH CB -L- STA. 62+00 TO 62+75 RT PSH 7	SPECIAL CUT W/ HINGE DITCH CB -L- STA. 62+75 TO 64+50 RT PSH 7	MEDIAN V DITCH CG -L- STA. 67+00 TO 68+25 CL PSH 7	SPECIAL CUT W/ HINGE DITCH CB -L- STA. 67+00 TO 68+50 RT PSH 7	MEDIAN V DITCH CG -L- STA. 71+50 TO 72+75 CL PSH 8	SPECIAL CUT W/ HINGE DITCH CB -L- STA. 71+50 TO 72+75 RT PSH 8	LATERAL BASE DITCH CC -L- STA. 86+00 TO 87+25 LT PSH 9

GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA
DA= 1.24ac SLOPE= 0.48% L REQ.= 124' L PRO.= 125' Q2= 18.02cfs V2= 1.86ft/s D2= 0.88' Q10= 23.33cfs V10= 2.00ft/s D10= 1.00'	DA= 1.13ac SLOPE= 2.96% L REQ.= 113' L PRO.= 125' Q2= 2.81cfs V2= 1.80ft/s D2= 0.20' Q10= 3.64cfs V10= 1.96ft/s D10= 0.24'	DA= 0.30ac SLOPE= 1.0% L REQ.= 30' L PRO.= 150' Q2= 0.95cfs V2= 1.09ft/s D2= 0.38' Q10= 1.23cfs V10= 1.16ft/s D10= 0.42'	DA= 1.26ac SLOPE= 1.2% L REQ.= 126' L PRO.= 150' Q2= 3.13cfs V2= 1.87ft/s D2= 0.63' Q10= 4.05cfs V10= 2.00ft/s D10= 0.70'	DA= 0.66ac SLOPE= 2.0% L REQ.= 66' L PRO.= 150' Q2= 2.08cfs V2= 1.71ft/s D2= 0.45' Q10= 2.69cfs V10= 1.83ft/s D10= 0.50'	DA= 0.31ac SLOPE= 2.75% L REQ.= 31' L PRO.= 92' Q2= 1.26cfs V2= 1.87ft/s D2= 0.41' Q10= 1.63cfs V10= 2.00ft/s D10= 0.45'	DA= 0.42ac SLOPE= 1.75% L REQ.= 42' L PRO.= 50' Q2= 1.70cfs V2= 1.70ft/s D2= 0.50' Q10= 2.21cfs V10= 1.99ft/s D10= 0.53'
LATERAL BASE DITCH CC -L- STA. 87+25 TO 89+00 LT PSH 9	LATERAL BASE DITCH CC -L- STA. 87+25 TO 88+50 RT PSH 9	MEDIAN V DITCH CG -L- STA. 88+50 TO 90+00 LT PSH 9	MEDIAN V DITCH CG -L- STA. 90+00 TO 91+50 CL PSH 9	SPECIAL CUT W/ HINGE DITCH CB -L- STA. 90+00 TO 91+50 LT PSH 9	MEDIAN V DITCH CG -L- STA. 95+08 TO 96+00 CL PSH 10	MEDIAN V DITCH CG -L- STA. 96+50 TO 97+00 CL PSH 10

GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA
DA= 3.30ac SLOPE= 0.85% L REQ.= 240' L PRO.= 250' Q2= 5.39cfs V2= 1.86ft/s D2= 0.52' Q10= 6.97cfs V10= 2.00ft/s D10= 0.60'	DA= 0.21ac SLOPE= 0.30% L REQ.= 21' L PRO.= 97' Q2= 0.85cfs V2= 0.81ft/s D2= 0.51' Q10= 1.11cfs V10= 1.86ft/s D10= 0.57'	DA= 1.63ac SLOPE= 1.50% L REQ.= 163' L PRO.= 365' Q2= 3.10cfs V2= 1.75ft/s D2= 0.35' Q10= 4.01cfs V10= 1.90ft/s D10= 0.40'	DA= 3.70ac SLOPE= 0.63% L REQ.= 370' L PRO.= 400' Q2= 10.87cfs V2= 1.76ft/s D2= 0.63' Q10= 13.96cfs V10= 1.90ft/s D10= 0.72'	DA= 0.55ac SLOPE= 3.50% L REQ.= 55' L PRO.= 65' Q2= 1.19cfs V2= 1.68ft/s D2= 0.16' Q10= 1.54cfs V10= 1.84ft/s D10= 0.18'	DA= 2.54ac SLOPE= 0.90% L REQ.= 254' L PRO.= 300' Q2= 4.13cfs V2= 1.61ft/s D2= 0.48' Q10= 5.35cfs V10= 1.89ft/s D10= 0.51'	DA= 1.68ac SLOPE= 1.74% L REQ.= 168' L PRO.= 200' Q2= 2.51cfs V2= 1.72ft/s D2= 0.30' Q10= 3.24cfs V10= 1.87ft/s D10= 0.34'
LATERAL BASE DITCH CC -L- STA. 96+50 TO 99+00 RT PSH 10	MEDIAN V DITCH CG -L- STA. 98+00 TO 98+97.29 CL PSH 10	LATERAL BASE DITCH CC -L- STA. 103+35 TO 107+00 RT PSH 10-11	LATERAL BASE DITCH CC -FLY- STA. 23+00 TO 27+00 LT PSH 9	STANDARD BASE DITCH CD -FLY- STA. 37+40 RT PSH 12	LATERAL BASE DITCH CC -FLY- STA. 42+00 TO 45+00 RT PSH 12	SPECIAL CUT BASE DITCH CK -FLY- STA. 61+00 TO 63+00 RT PSH 14

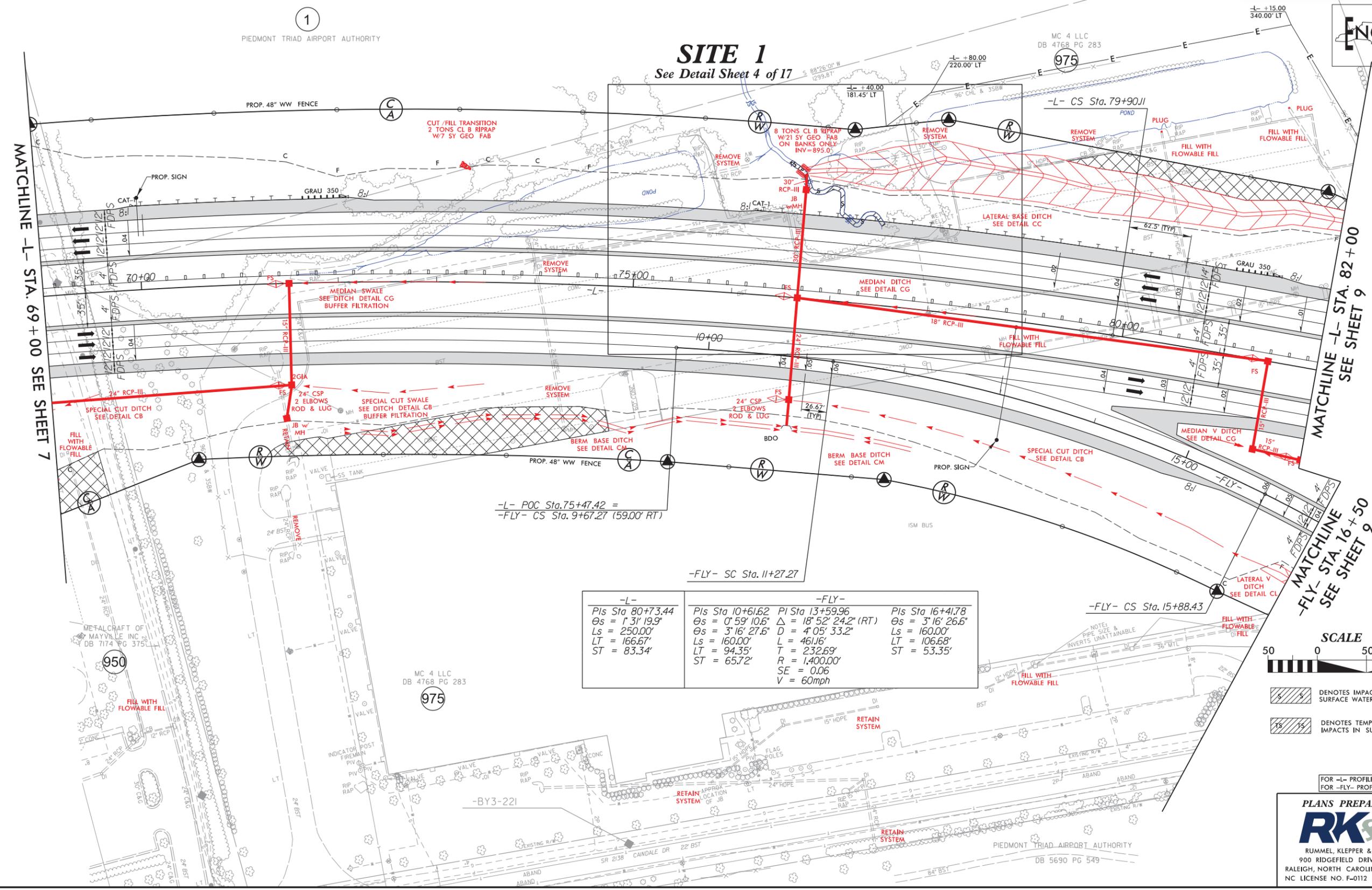
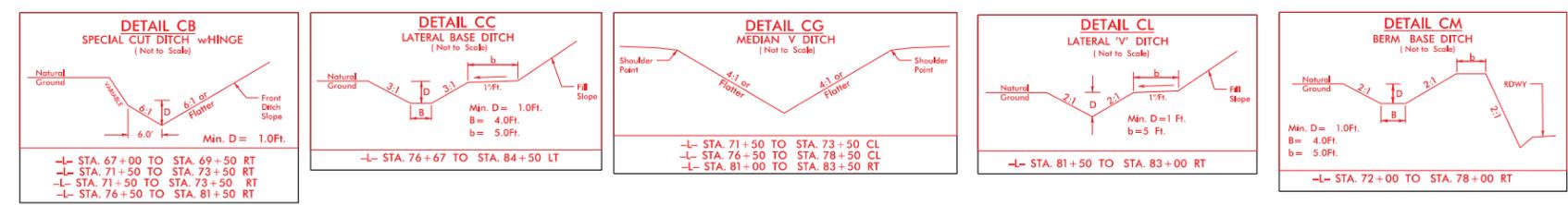
GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA	GRASS SWALE DATA
DA= 0.30ac SLOPE= 0.90% L REQ.= 30' L PRO.= 189' Q2= 0.74cfs V2= 0.98ft/s D2= 0.35' Q10= 0.95cfs V10= 1.05ft/s D10= 0.39'	DA= 1.26ac SLOPE= 1.70% L REQ.= 126' L PRO.= 151' Q2= 1.88cfs V2= 1.55ft/s D2= 0.25' Q10= 2.43cfs V10= 1.69ft/s D10= 0.30'	DA= 2.88ac SLOPE= 1.33% L REQ.= 288' L PRO.= 300' Q2= 6.52cfs V2= 1.81ft/s D2= 0.41' Q10= 8.44cfs V10= 1.96ft/s D10= 0.48'	DA= 1.30ac SLOPE= 1.50% L REQ.= 130' L PRO.= 150' Q2= 3.22cfs V2= 1.88ft/s D2= 0.54' Q10= 4.17cfs V10= 2.00ft/s D10= 0.59'	DA= 0.87ac SLOPE= 1.15% L REQ.= 87' L PRO.= 109' Q2= 2.09cfs V2= 1.40ft/s D2= 0.50' Q10= 2.78cfs V10= 1.64ft/s D10= 0.53'	DA= 0.94ac SLOPE= 1.00% L REQ.= 94' L PRO.= 100' Q2= 2.54cfs V2= 1.52ft/s D2= 0.53' Q10= 3.29cfs V10= 1.62ft/s D10= 0.58'	DA= 0.69ac SLOPE= 2.34% L REQ.= 69' L PRO.= 100' Q2= 2.01cfs V2= 1.80ft/s D2= 0.43' Q10= 2.60cfs V10= 1.92ft/s D10= 0.48'
BUFFER FILTRATION CHECK -FLY- STA. 63+00 TO 64+89.15 RT PSH 14	SPECIAL CUT BASE DITCH CK -FLY- STA. 66+41.84 TO 67+92.80 RT PSH 14	SPECIAL CUT BASE DITCH CT -RPIC- STA. 16+00 TO 19+00 RT PSH 9, 12	SPECIAL CUT BASE DITCH CB -RPIC- STA. 25+50 TO 27+00 LT PSH 12	SPECIAL CUT DITCH CB -RPIC- STA. 29+58.25 TO 30+63.01 LT PSH 13	SPECIAL CUT DITCH CB -RPIC- STA. 32+65.87 TO 33+66.11 LT PSH 13	SPECIAL CUT DITCH CB -YI- STA. 35+50 TO 36+50 LT PSH 13

INCOMPLETE PLANS  
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DO NOT USE FOR CONSTRUCTION

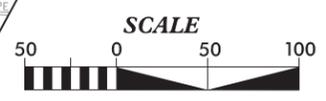
PLANS PREPARED BY :

**RK&K**RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
NC LICENSE NO. F-0112 • (919) 878-9560





-L-	-FLY-	-FLY-	-FLY-
PIs Sta 80+73.44	PIs Sta 10+61.62	PI Sta 13+59.96	PIs Sta 16+41.78
$\Theta_s = 1^\circ 31' 19.9''$	$\Theta_s = 0^\circ 59' 10.6''$	$\Delta = 18^\circ 52' 24.2''$ (RT)	$\Theta_s = 3^\circ 16' 26.6''$
Ls = 250.00'	$\Theta_s = 3^\circ 16' 27.6''$	D = 4' 05' 33.2"	Ls = 160.00'
LT = 166.67'	Ls = 160.00'	L = 461.16'	LT = 106.68'
ST = 83.34'	LT = 94.35'	T = 232.69'	ST = 53.35'
	ST = 65.72'	R = 1,400.00'	
		SE = 0.06	
		V = 60mph	



- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER

FOR -L- PROFILE SEE SHTS. 21 & 22  
 FOR -FLY- PROFILE SEE SHT. 23

PLANS PREPARED BY :

RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
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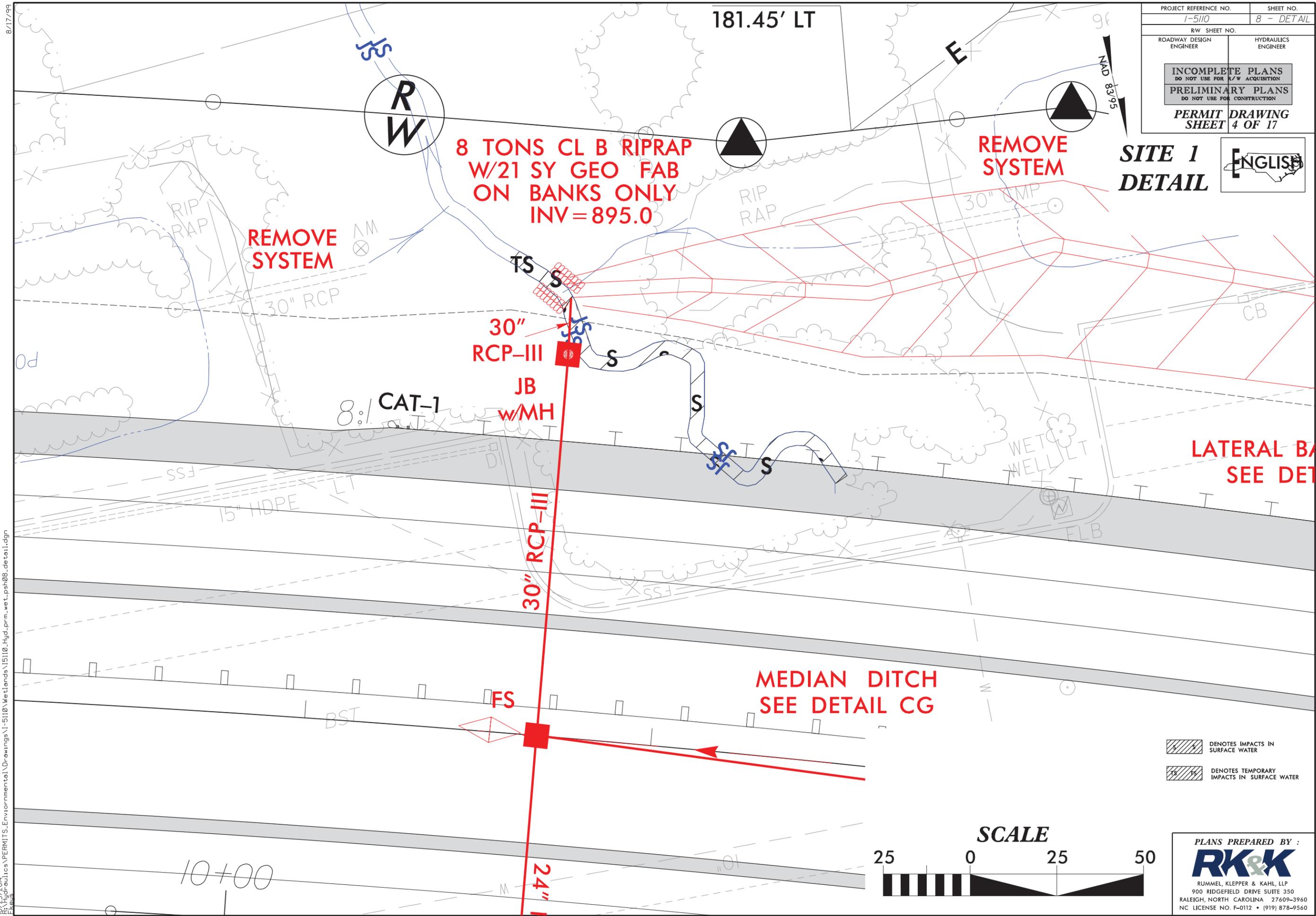


8/17/99

PROJECT REFERENCE NO. 1-5110	SHEET NO. 8 - DETAIL
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>PERMIT DRAWING</b> SHEET 4 OF 17	

**SITE 1  
DETAIL**

ENGLISH



**8 TONS CL B RIPRAP  
W/21 SY GEO FAB  
ON BANKS ONLY  
INV = 895.0**

**REMOVE  
SYSTEM**

**REMOVE  
SYSTEM**

**30\"/>**

**MEDIAN DITCH  
SEE DETAIL CG**

**LATERAL BA  
SEE DET**

- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER



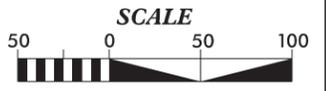
PLANS PREPARED BY :

**RK&K**

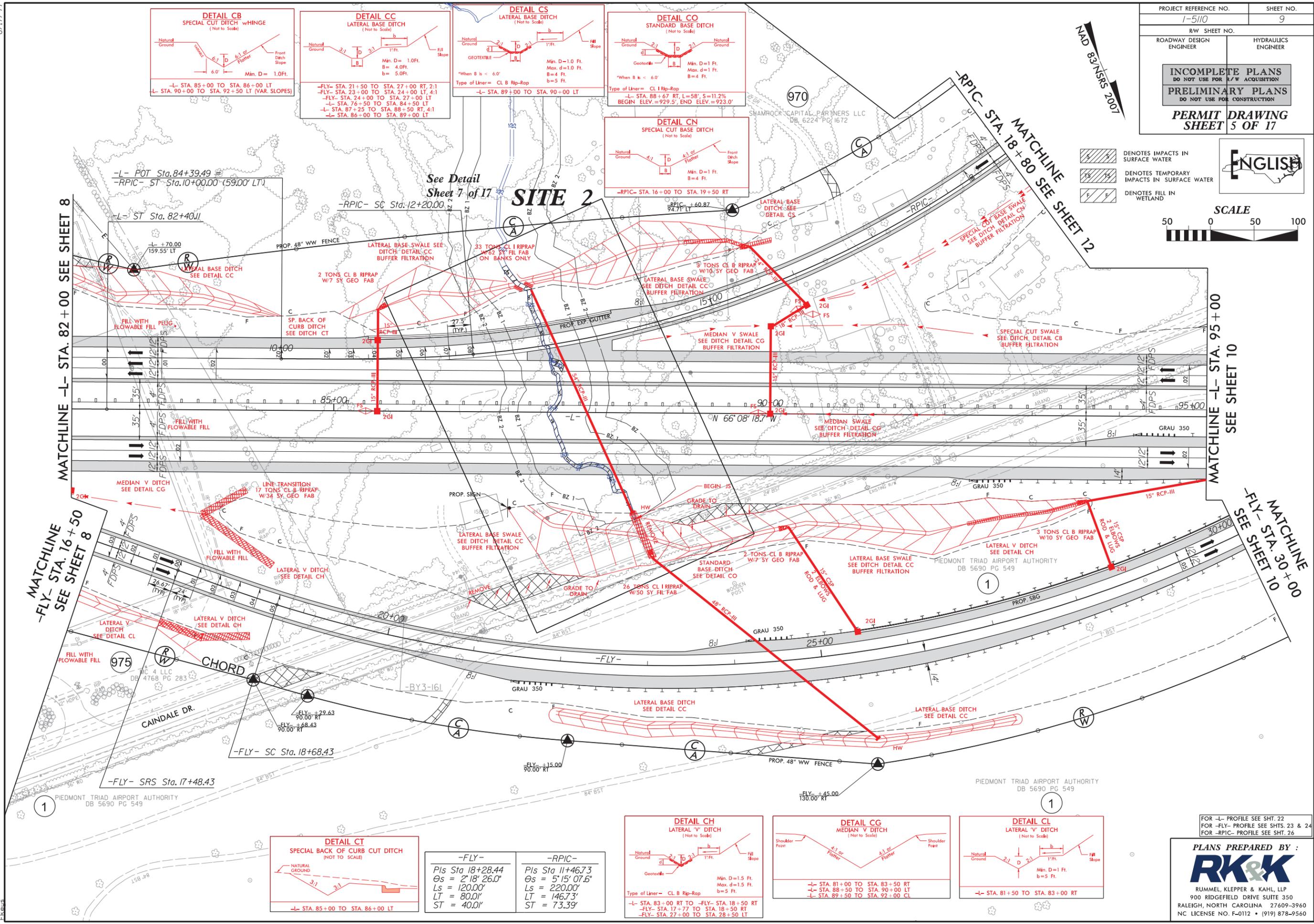
RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
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 K&K

NAD 82/NSRS 2007



- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND

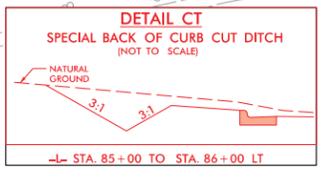
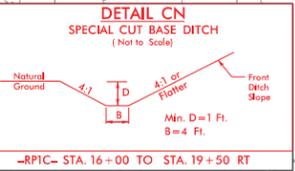
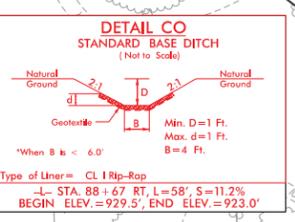
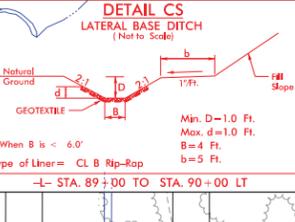
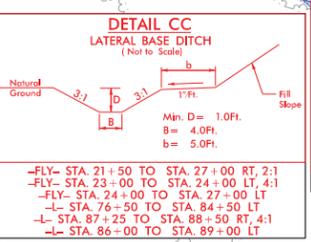
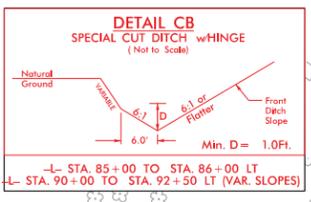


MATCHLINE -L- STA. 82+00 SEE SHEET 8

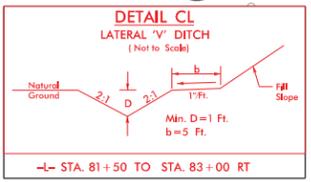
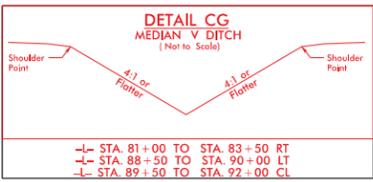
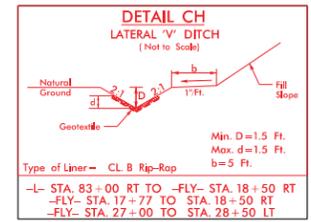
MATCHLINE -FLY- STA. 16+50 SEE SHEET 8

MATCHLINE -L- STA. 95+00 SEE SHEET 10

MATCHLINE -FLY- STA. 30+00 SEE SHEET 10



-FLY-	-RPIC-
Pls Sta 18+28.44	Pls Sta 11+46.73
Os = 2' 18" 26.0"	Os = 5' 15" 07.6"
Ls = 120.00'	Ls = 220.00'
LT = 80.01'	LT = 146.73'
ST = 40.01'	ST = 73.39'



FOR -L- PROFILE SEE SHT. 22  
FOR -FLY- PROFILE SEE SHTS. 23 & 24  
FOR -RPIC- PROFILE SEE SHT. 26

PLANS PREPARED BY :

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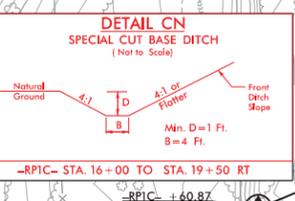
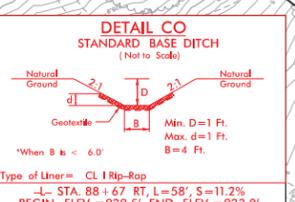
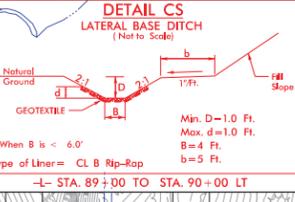
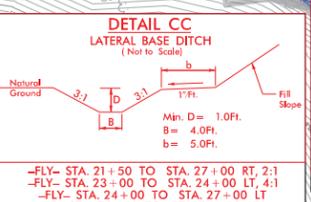
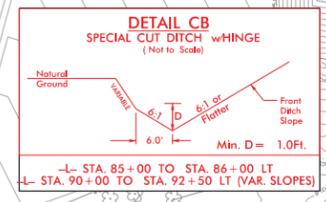
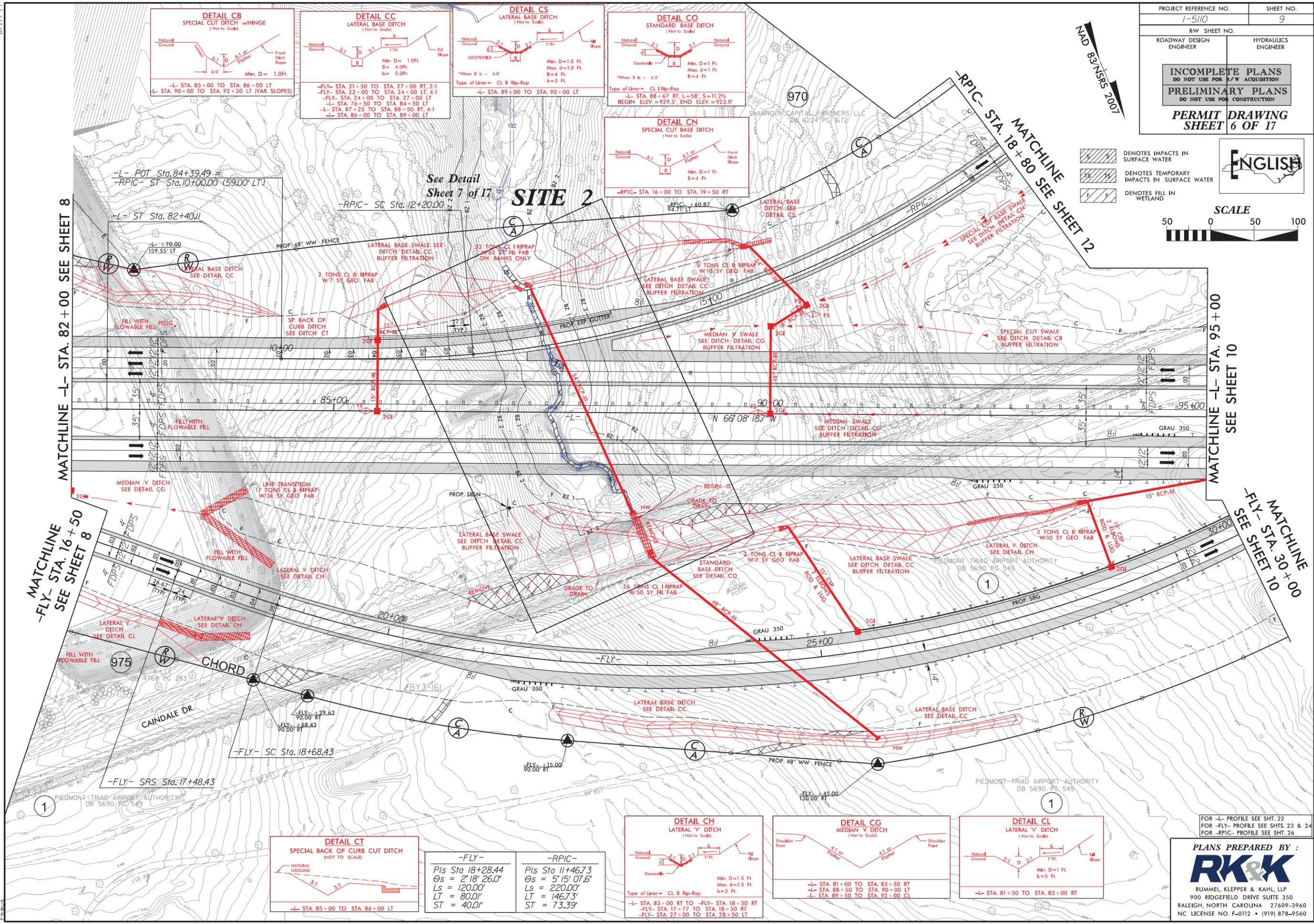
PROJECT REFERENCE NO. 1-5110	SHEET NO. 9
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>PERMIT DRAWING SHEET 6 OF 17</b>	

NAD 82 NGS 2007  
 82° NS 8' 20" W

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

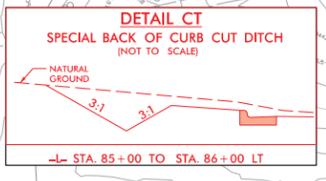
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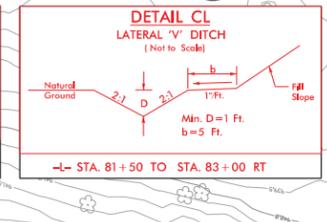
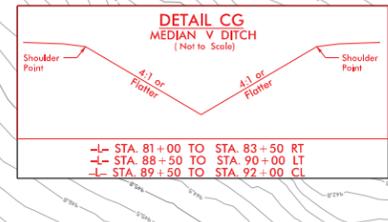
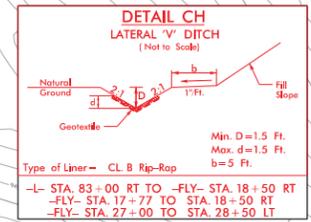
MATCHLINE -L- STA. 16+50  
 SEE SHEET 8  
 -FLY- STA. 16+50  
 SEE SHEET 8

MATCHLINE -L- STA. 95+00  
 SEE SHEET 10  
 -FLY- STA. 30+00  
 SEE SHEET 10



-FLY-  
 Pls Sta 18+28.44  
 Os = 2' 18" 26.0"  
 Ls = 120.00'  
 LT = 80.0'  
 ST = 40.0'

-RPIC-  
 Pls Sta 11+46.73  
 Os = 5' 15" 07.6"  
 Ls = 220.00'  
 LT = 146.73'  
 ST = 73.39'

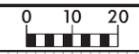


FOR -L- PROFILE SEE SHT. 22  
 FOR -FLY- PROFILE SEE SHTS. 23 & 24  
 FOR -RPIC- PROFILE SEE SHT. 26

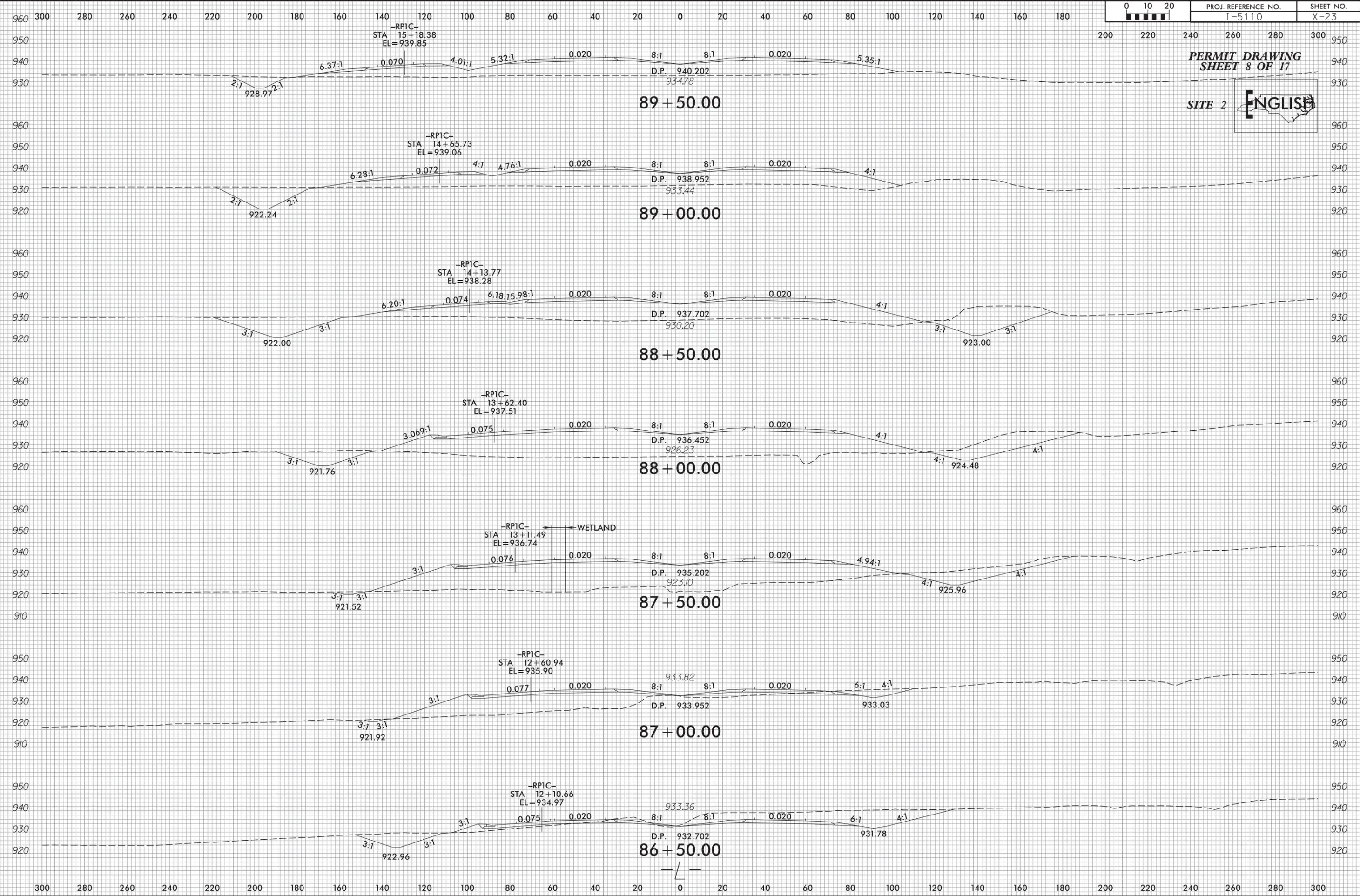
**PLANS PREPARED BY :**  
**RK&K**  
 RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560



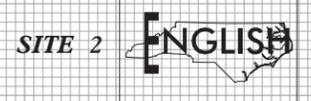
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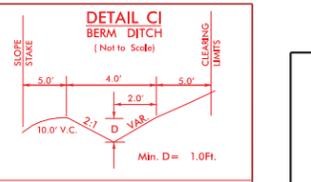
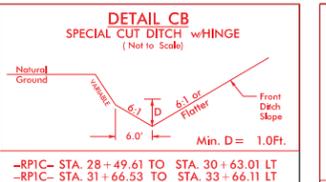
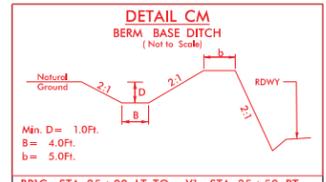
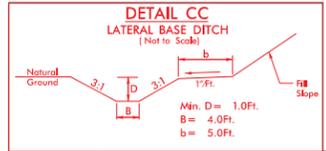
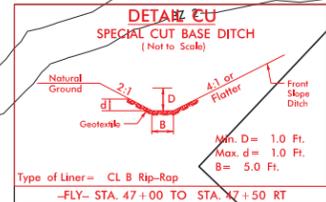
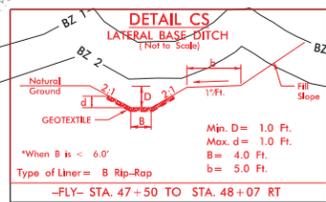
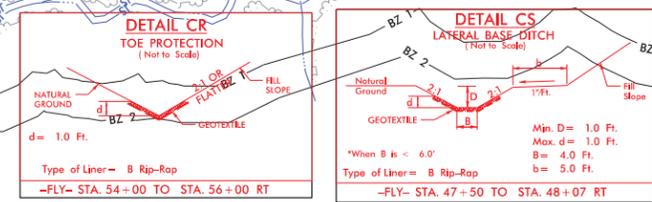
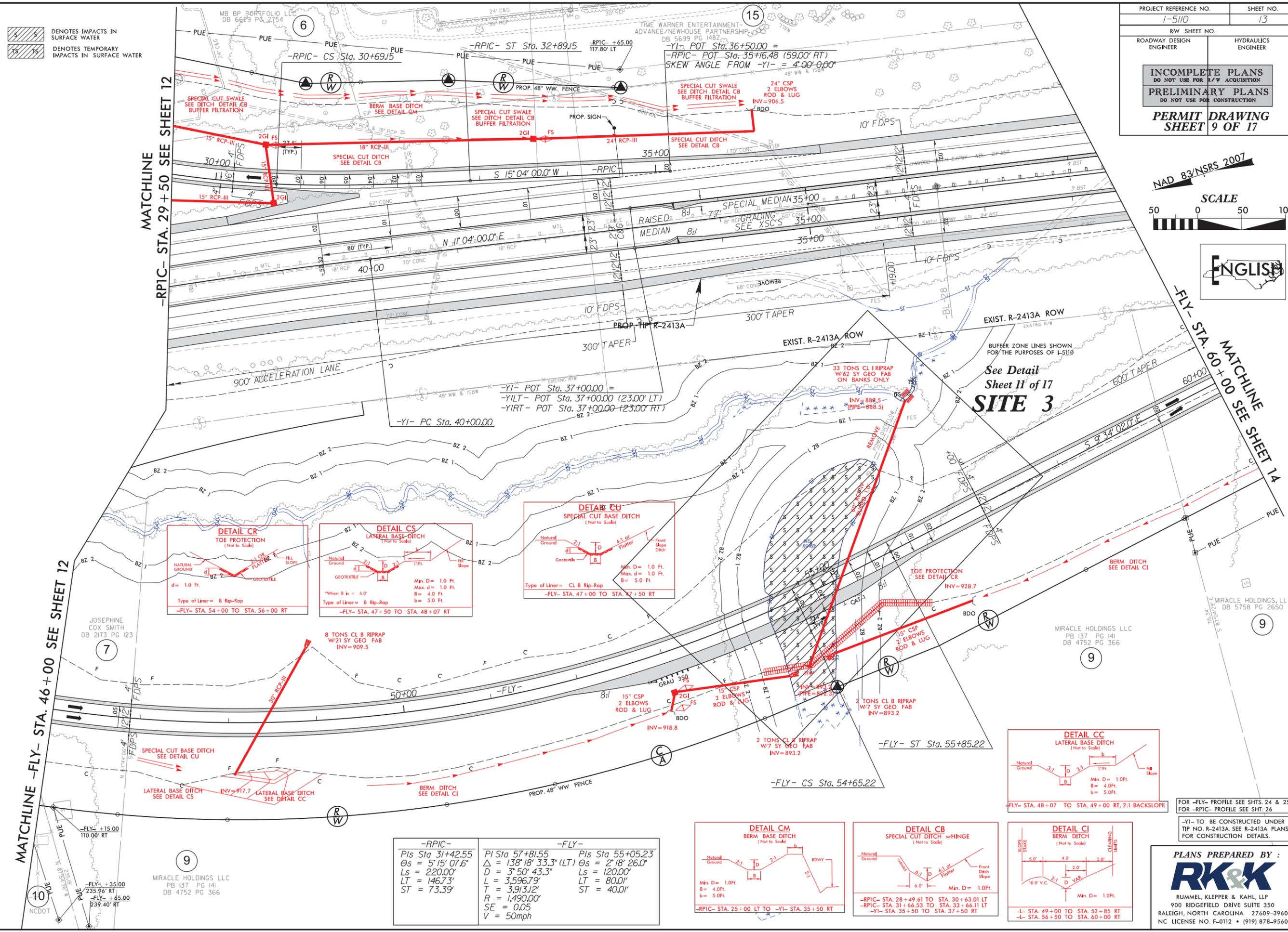
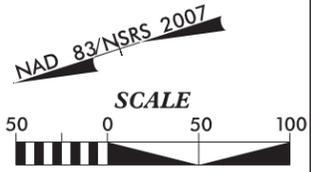
PROJ. REFERENCE NO.	SHEET NO.
I-5110	X-23



PERMIT DRAWING  
SHEET 8 OF 17



10/23/2014  
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-RPIC-	-FLY-
Pls Sta 31+42.55 $\Delta s = 5' 15'' 07.6''$ $Ls = 220.00'$ $LT = 146.73'$ $ST = 73.39'$	Pls Sta 57+81.55 $\Delta = 138' 18'' 33.3''$ (LT) $\Delta s = 2' 18'' 26.0''$ $Ls = 120.00'$ $T = 3,596.79'$ $L = 3,913.12'$ $R = 1,490.00'$ $SE = 0.05$ $V = 50\text{mph}$

-RPIC- STA. 25+00 LT TO -YI- STA. 35+50 RT  
 -RPIC- STA. 28+49.61 TO STA. 30+63.01 LT  
 -RPIC- STA. 31+66.53 TO STA. 33+66.11 LT  
 -YI- STA. 35+50 TO STA. 37+50 RT

- STA. 49+00 TO STA. 52+85 RT  
 - STA. 56+50 TO STA. 60+00 RT

FOR -FLY- PROFILE SEE SHTS. 24 & 25  
 FOR -RPIC- PROFILE SEE SHT. 26  
 -YI- TO BE CONSTRUCTED UNDER  
 TIP NO. R-2413A. SEE R-2413A PLANS  
 FOR CONSTRUCTION DETAILS.

**PLANS PREPARED BY :**  
  
 RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560

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 10/23/2014



8/17/99

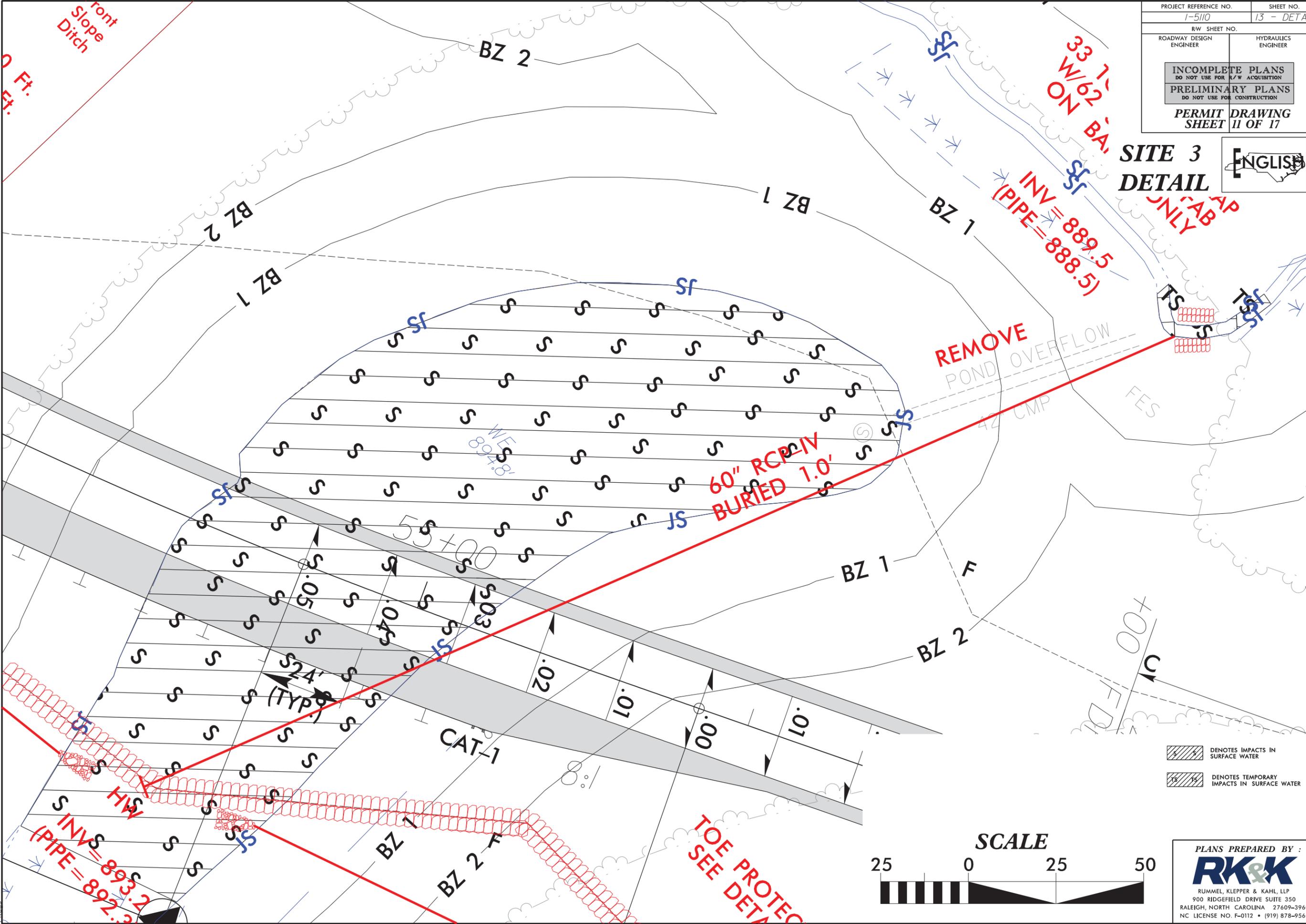
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rk

PROJECT REFERENCE NO. 1-5110	SHEET NO. 13 - DETAIL
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
PERMIT SHEET	DRAWING SHEET II OF 17

**SITE 3  
DETAIL**

ONLY BY AP

ENGLISH



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



PLANS PREPARED BY :

**RK&K**

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900 RIDGEFIELD DRIVE SUITE 350  
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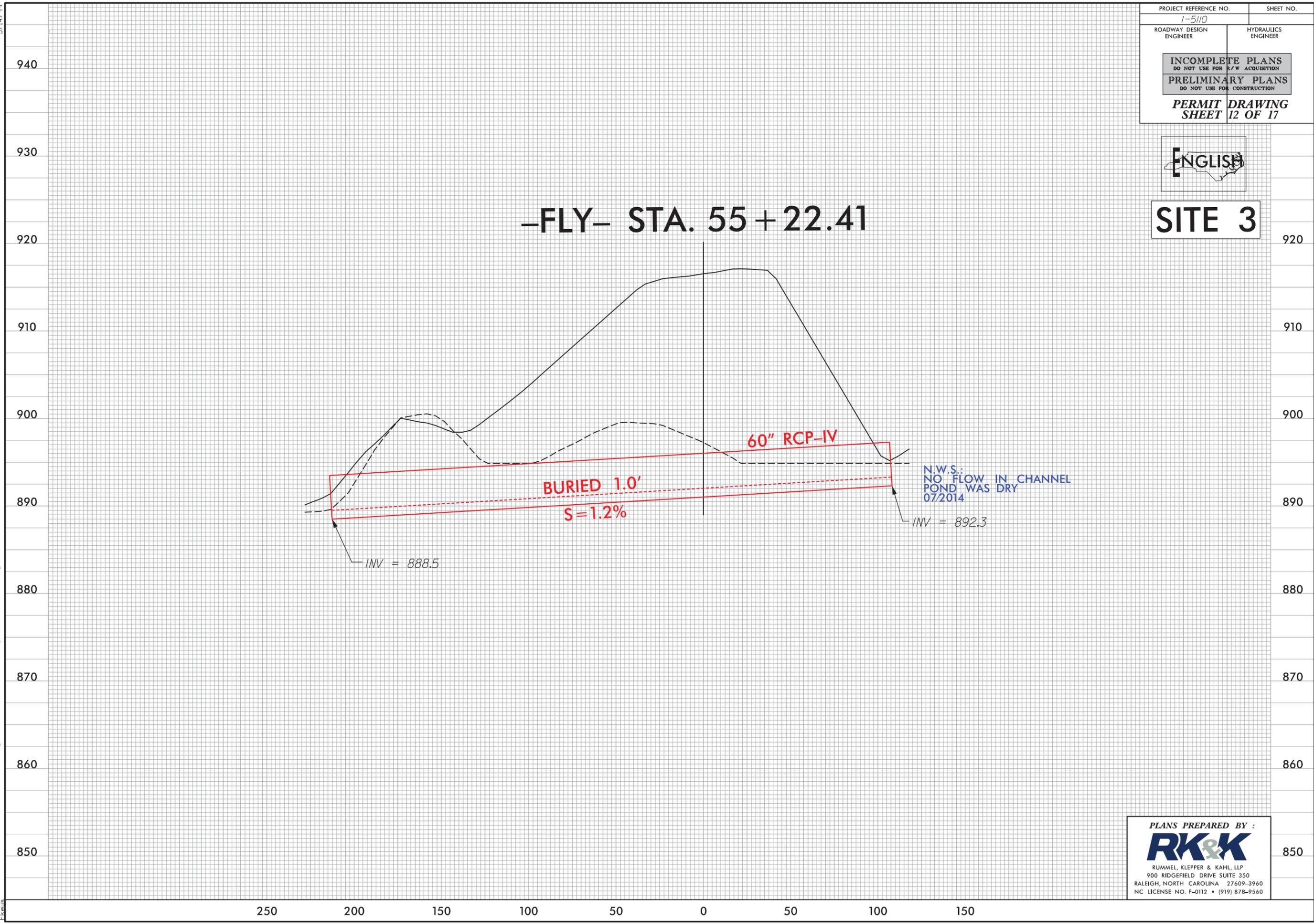
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10/23/2014  
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PROJECT REFERENCE NO. 1-5110	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
PERMIT SHEET	DRAWING 12 OF 17



**SITE 3**

# -FLY- STA. 55 + 22.41

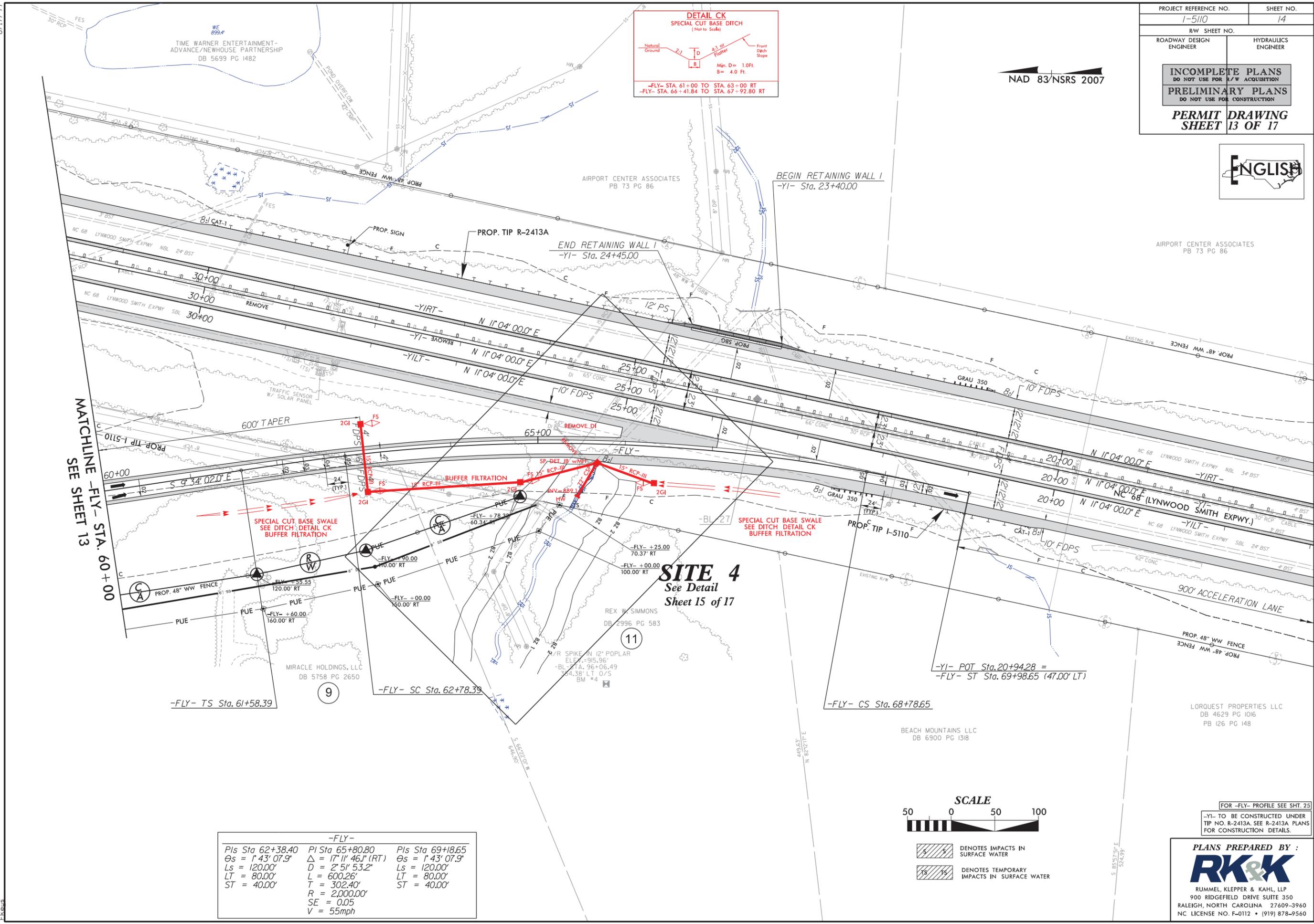
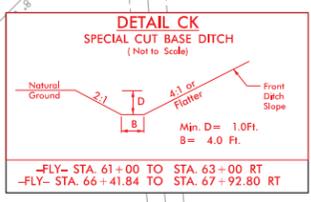


PLANS PREPARED BY :

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900 RIDGEFIELD DRIVE SUITE 350  
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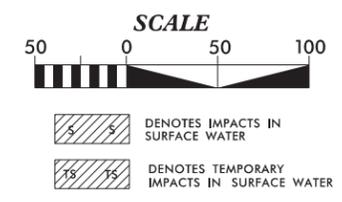


NAD 83/NSRS 2007



MATCHLINE -FLY- STA. 60+00 SEE SHEET 13

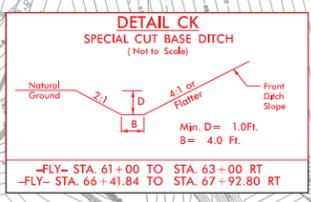
-FLY-		
PIs Sta 62+38.40	PI Sta 65+80.80	PIs Sta 69+18.65
$\Theta_s = 1^\circ 43' 07.9''$	$\Delta = 17^\circ 11' 46.1'' (RT)$	$\Theta_s = 1^\circ 43' 07.9''$
$L_s = 120.00'$	$D = 2^\circ 51' 53.2''$	$L_s = 120.00'$
$LT = 80.00'$	$L = 600.26'$	$LT = 80.00'$
$ST = 40.00'$	$T = 302.40'$	$ST = 40.00'$
	$R = 2,000.00'$	
	$SE = 0.05$	
	$V = 55mph$	



FOR -FLY- PROFILE SEE SHT. 25  
 -YI- TO BE CONSTRUCTED UNDER TIP NO. R-2413A. SEE R-2413A PLANS FOR CONSTRUCTION DETAILS.

**PLANS PREPARED BY :**  
**RK&K**  
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 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560

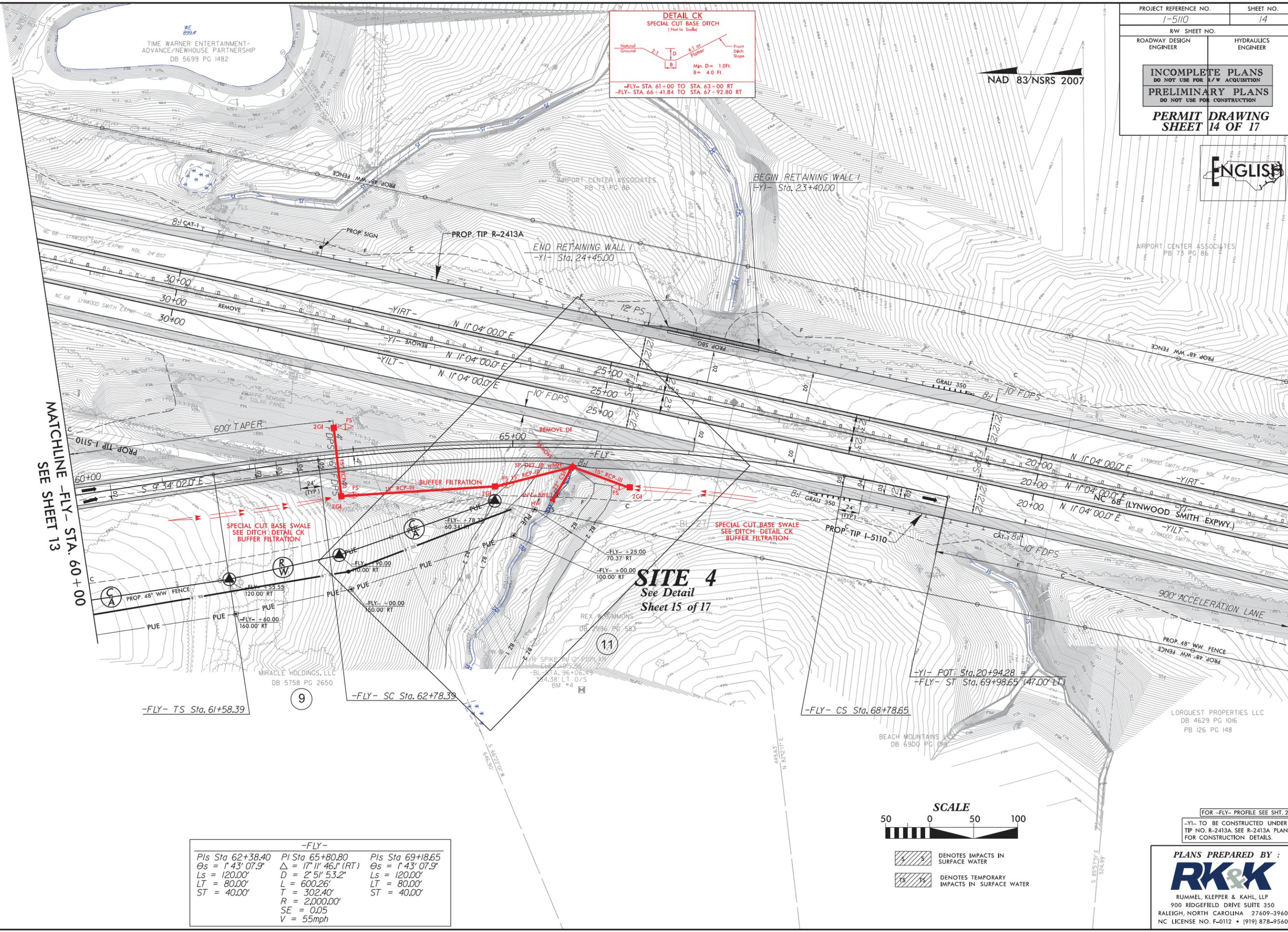
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 8/24/2014



NAD 83/NSRS 2007

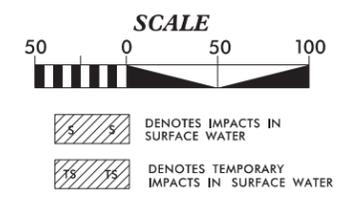
MATCHLINE -FLY- STA. 60+00  
SEE SHEET 13

8/17/99  
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**SITE 4**  
See Detail  
Sheet 15 of 17

-FLY-		
PIs Sta 62+38.40	PI Sta 65+80.80	PIs Sta 69+18.65
$\Theta_s = 1^\circ 43' 07.9''$	$\Delta = 17^\circ 11' 46.1''$ (RT)	$\Theta_s = 1^\circ 43' 07.9''$
$L_s = 120.00'$	$D = 2^\circ 51' 53.2''$	$L_s = 120.00'$
$LT = 80.00'$	$L = 600.26'$	$LT = 80.00'$
$ST = 40.00'$	$T = 302.40'$	$ST = 40.00'$
	$R = 2,000.00'$	
	$SE = 0.05$	
	$V = 55\text{mph}$	



FOR -FLY- PROFILE SEE SHT. 25  
-Y1- TO BE CONSTRUCTED UNDER TIP NO. R-2413A. SEE R-2413A PLANS FOR CONSTRUCTION DETAILS.

**PLANS PREPARED BY :**  
**RK&K**  
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PROJECT REFERENCE NO. I-5110	SHEET NO. 14 - DETAIL
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>PERMIT DRAWING</b> <b>SHEET 15 OF 17</b>	

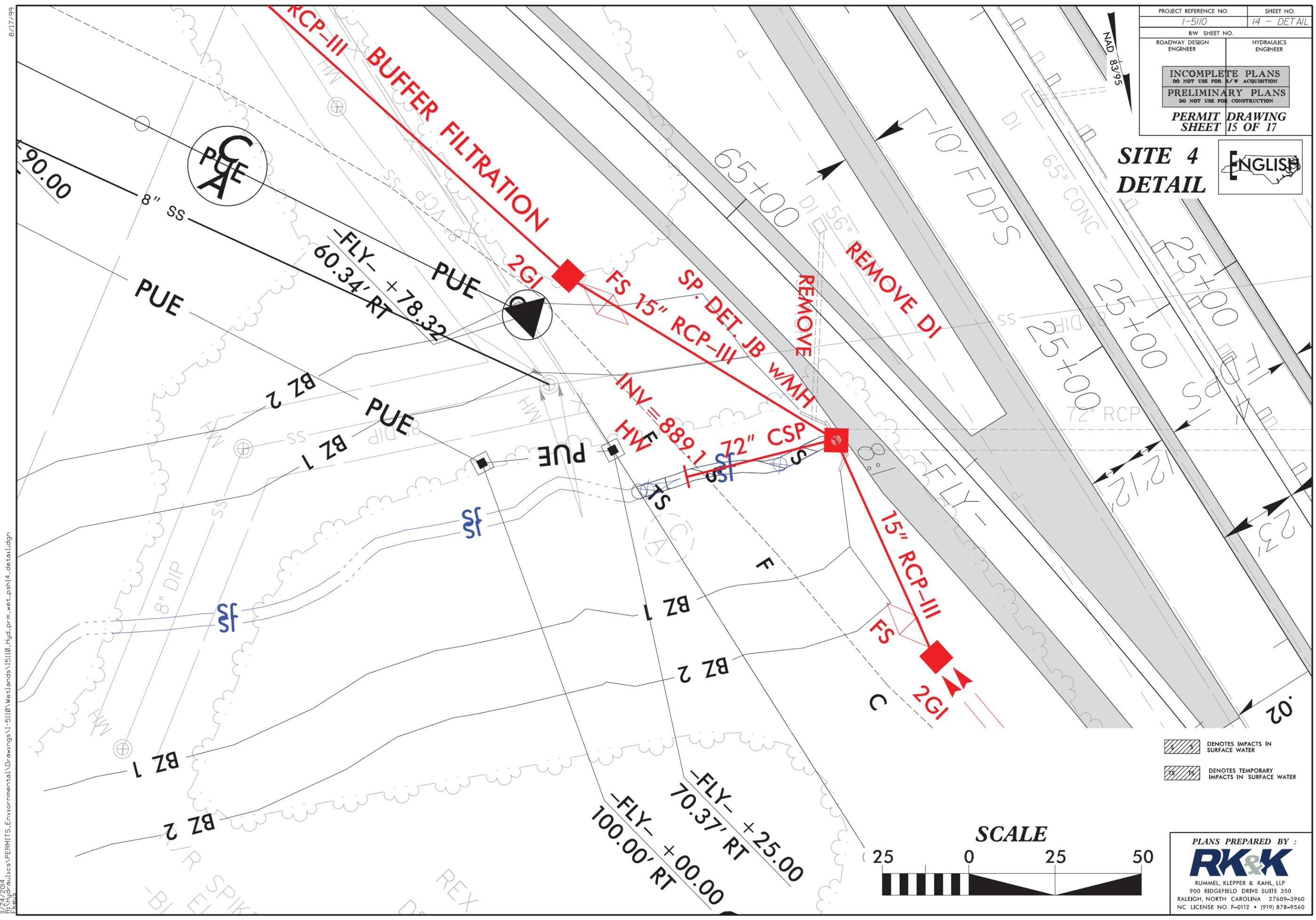
**SITE 4  
DETAIL**



- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER



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 11/24/2014  
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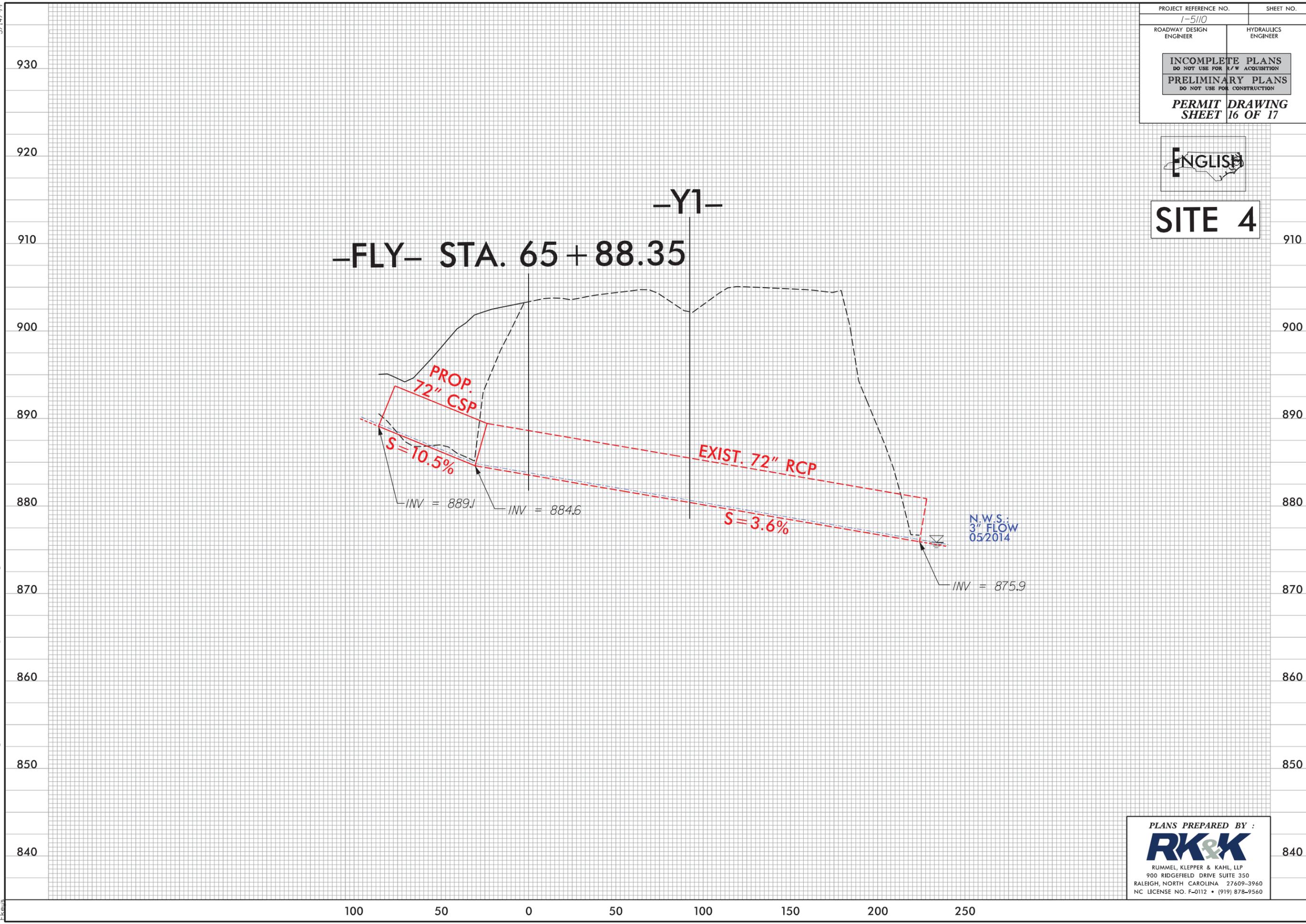
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PROJECT REFERENCE NO. 1-5110	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> <small>DO NOT USE FOR R/W ACQUISITION</small>	
<b>PRELIMINARY PLANS</b> <small>DO NOT USE FOR CONSTRUCTION</small>	
<b>PERMIT SHEET</b>	
<b>DRAWING 16 OF 17</b>	



**SITE 4**

-Y1-  
-FLY- STA. 65 + 88.35



PLANS PREPARED BY :

**RK&K**

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10/23/2014  
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 Files

**WETLAND PERMIT IMPACT SUMMARY**

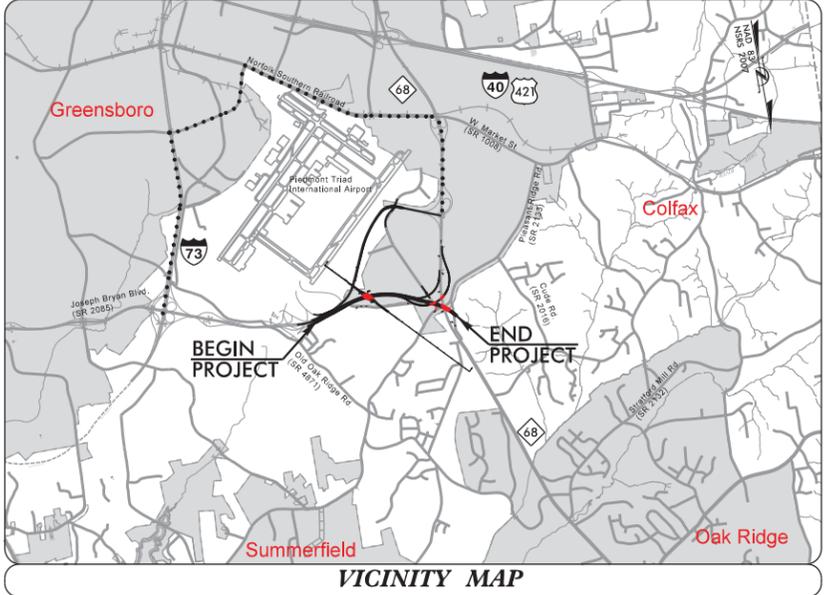
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-L- 76+49-77+49 LT	30" RCP						0.01	<0.01	130	10	
		Bank Stabilization						<0.01		10		
2	-L- 86+95-88+47	54" RCP	<0.01					0.03	<0.01	334	20	
		Bank Stabilization						<0.01		20		
3	-FLY- 54+20-57+01 RT	Bank Stabilization						<0.01	<0.01	18	24	
		Open Water Impact						0.43				
4	-FLY- 35+38-65+70 RT	72" CSP						<0.01	<0.01	51	8	
<b>TOTALS:</b>			<0.01					0.48	0.01	563	62	

NC DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
  
 GUILFORD COUNTY  
 34429.3.S8 (I-5110)  
  
 PERMIT DRAWING SHEET 17 OF 17

ATN Revised 3/31/05

09/28/99

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



VICINITY MAP

OFFSITE DETOUR ROUTE - - - - -

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED IN METHOD III. IN AREAS WITH PERMANENT UTILITY EASEMENTS, CLEARING SHALL EXTEND TO THE RIGHT OF WAY LIMITS. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**GUILFORD COUNTY**

LOCATION: FUTURE I-73 FROM EAST OF SR 217  
(BROOKBANK ROAD) TO HAW RIVER  
TYPE OF WORK: WETLAND AND STREAM IMPACTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5110	1	
WBS NO.	F.A. PROJ. NO.	DESCRIPTION	
42345.3.FS1	NHF-0073(25)	PE	

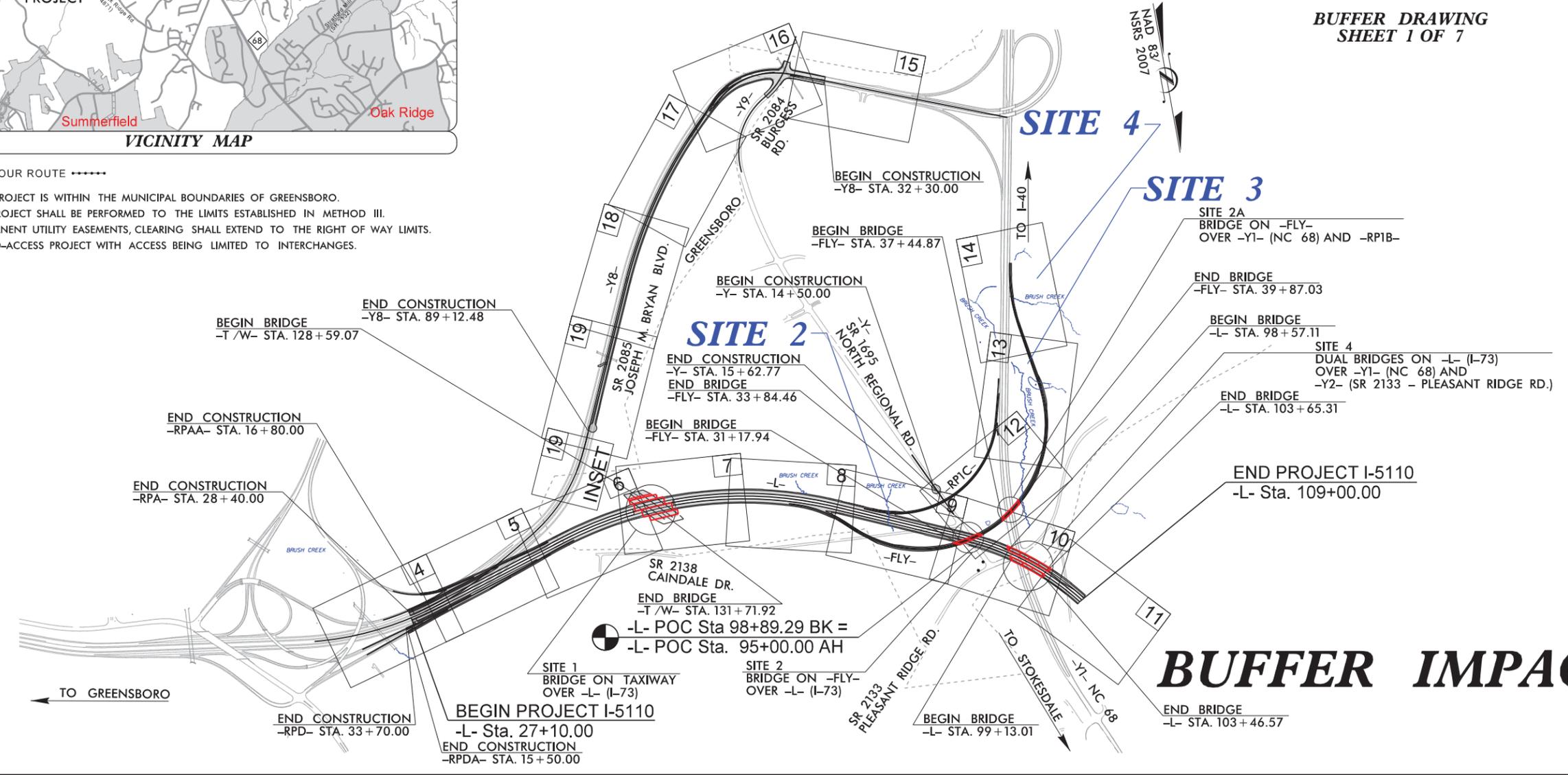


INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION  
PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION

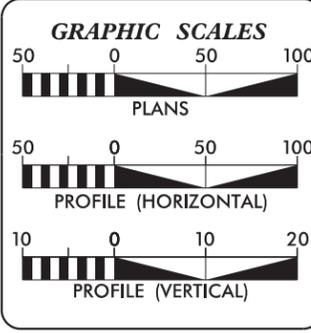
BUFFER DRAWING  
SHEET 1 OF 7

TIP PROJECT: I-5110

CONTRACT: C203433



**BUFFER IMPACTS**



**DESIGN DATA**

ADT 2014	= 24,500
ADT 2035	= 42,200
DHV	= 11%
D	= 65%
*T	= 15%
v	= 70 mph

(\*TTST 10% + DUALS 5%)  
FUNC. CLASS = INTERSTATE

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT I-5110	1.528 mi
LENGTH STRUCTURES TIP PROJECT I-5110	0.097 mi
TOTAL LENGTH TIP PROJECT I-5110	1.625 mi

**NCDOT CONTACT**

**K. Zak Hamidi, P.E.**  
PROJECT ENGINEER - DESIGN BUILD GROUP

**PLANS PREPARED BY:**

**RK&K** RUMMEL KLEPPER & KAHL LLP  
900 RIDGEFORD DRIVE, SUITE 350  
RALEIGH, NORTH CAROLINA 27609  
NC LICENSE NO. P-0112

**FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**

2012 STANDARD SPECIFICATIONS

**LETTING DATE:**  
APRIL 2014

**FLATIRON** a joint venture

**J.T. Peacock, Jr., P.E.**  
PROJECT ENGINEER

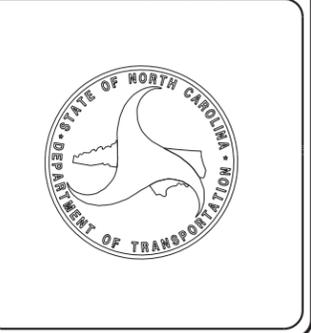
**Brandon J. McInnis, P.E.**  
PROJECT DESIGN ENGINEER

**HYDRAULICS ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.

**ROADWAY DESIGN ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.



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PROJECT REFERENCE NO.	SHEET NO.
I-5110	BUFFER DATA
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

**BUFFER DRAWING SHEET 2 OF 7**



<b>GRASS SWALE DATA</b> DA= 0.82ac SLOPE= 1.72% L REQ.= 82' L PRO.= 150' Q2= 2.59cfs V2= 1.71ft/s D2= 0.50' Q10= 3.35cfs V10= 1.99ft/s D10= 0.53' <b>BUFFER CHECK</b> -L- STA. 27+50 TO 29+00 RT PSH 4	<b>GRASS SWALE DATA</b> DA= 0.47ac SLOPE= 0.3% L REQ.= 47' L PRO.= 250' Q2= 1.58cfs V2= 1.32ft/s D2= 0.90' Q10= 5.65cfs V10= 1.40ft/s D10= 0.99' <b>SPECIAL CUT DITCH CQ</b> -L- STA. 29+00 TO 31+50 RT PSH 4-5	<b>GRASS SWALE DATA</b> DA= 1.19ac SLOPE= 0.3% L REQ.= 119' L PRO.= 500' Q2= 4.04cfs V2= 1.87ft/s D2= 1.20' Q10= 5.23cfs V10= 1.99ft/s D10= 1.32' <b>SPECIAL CUT DITCH CQ</b> -L- STA. 31+50 TO 36+50 RT PSH 5	<b>GRASS SWALE DATA</b> DA= 1.39ac SLOPE= 0.3% L REQ.= 139' L PRO.= 400' Q2= 4.40cfs V2= 1.87ft/s D2= 1.21' Q10= 5.65cfs V10= 2.00ft/s D10= 1.37' <b>SPECIAL CUT DITCH CQ</b> -L- STA. 36+50 TO 40+50 RT PSH 5	<b>GRASS SWALE DATA</b> DA= 1.31ac SLOPE= 0.3% L REQ.= 131' L PRO.= 350' Q2= 3.86cfs V2= 1.85ft/s D2= 1.18' Q10= 5.00cfs V10= 1.97ft/s D10= 1.30' <b>SPECIAL CUT DITCH CQ</b> -L- STA. 40+50 TO 44+00 RT PSH 5	<b>GRASS SWALE DATA</b> DA= 1.16ac SLOPE= 0.3% L REQ.= 116' L PRO.= 300' Q2= 3.42cfs V2= 1.79ft/s D2= 1.13' Q10= 4.43cfs V10= 1.70ft/s D10= 1.32' <b>SPECIAL CUT DITCH CQ</b> -L- STA. 44+00 TO 47+00 RT PSH 6	<b>GRASS SWALE DATA</b> DA= 1.41ac SLOPE= 0.3% L REQ.= 141' L PRO.= 350' Q2= 3.81cfs V2= 1.84ft/s D2= 1.18' Q10= 4.94cfs V10= 1.96ft/s D10= 1.29' <b>SPECIAL CUT DITCH CQ</b> -L- STA. 47+00 TO 50+50 RT PSH 6	<b>GRASS SWALE DATA</b> DA= 1.40ac SLOPE= 0.30% L REQ.= 140' L PRO.= 166' Q2= 4.11cfs V2= 1.01ft/s D2= 0.71' Q10= 5.32cfs V10= 1.08ft/s D10= 0.78' <b>ROADWAY DITCH</b> -L- STA. 49+00 TO 50+66 CL PSH 6	<b>GRASS SWALE DATA</b> DA= 1.50ac SLOPE= 0.3% L REQ.= 150' L PRO.= 150' Q2= 4.40cfs V2= 1.11ft/s D2= 0.81' Q10= 5.69cfs V10= 1.18ft/s D10= 0.90' <b>ROADWAY DITCH</b> -L- STA. 50+50 TO 52+00 RT PSH 6
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<b>GRASS SWALE DATA</b> DA= 0.33ac SLOPE= 0.30% L REQ.= 33' L PRO.= 134' Q2= 0.98cfs V2= 0.65ft/s D2= 0.43' Q10= 1.27cfs V10= 0.69ft/s D10= 0.47' <b>ROADWAY DITCH</b> -L- STA. 50+66 TO 52+00 CL PSH 6	<b>GRASS SWALE DATA</b> DA= 1.14ac SLOPE= 0.3% L REQ.= 114' L PRO.= 150' Q2= 3.33cfs V2= 0.90ft/s D2= 0.59' Q10= 4.31cfs V10= 0.96ft/s D10= 0.65' <b>ROADWAY DITCH</b> -L- STA. 52+00 TO 53+50 CL PSH 6	<b>GRASS SWALE DATA</b> DA= 1.55ac SLOPE= 0.3% L REQ.= 155' L PRO.= 200' Q2= 4.55cfs V2= 1.12ft/s D2= 0.82' Q10= 5.89cfs V10= 1.19ft/s D10= 0.91' <b>ROADWAY DITCH</b> -L- STA. 54+00 TO 56+00 RT PSH 6	<b>GRASS SWALE DATA</b> DA= 0.128ac SLOPE= 0.3% L REQ.= 13' L PRO.= 150' Q2= 0.38cfs V2= 0.55ft/s D2= 0.34' Q10= 0.49cfs V10= 0.59ft/s D10= 0.37' <b>MEDIAN V DITCH CG</b> -L- STA. 61+50 TO 62+00 CL PSH 7	<b>GRASS SWALE DATA</b> DA= 1.17ac SLOPE= 1.4% L REQ.= 117' L PRO.= 200' Q2= 3.44cfs V2= 1.86ft/s D2= 0.56' Q10= 4.46cfs V10= 1.98ft/s D10= 0.61' <b>MEDIAN V DITCH CG</b> -L- STA. 62+00 TO 63+25 CL PSH 7	<b>GRASS SWALE DATA</b> DA= 1.53ac SLOPE= 0.31% L REQ.= 46' L PRO.= 75' Q2= 3.81cfs V2= 1.08ft/s D2= 0.77' Q10= 4.93cfs V10= 1.15ft/s D10= 0.85' <b>SPECIAL CUT W/ HINGE DITCH CB</b> -L- STA. 62+00 TO 62+75 RT PSH 7	<b>GRASS SWALE DATA</b> DA= 1.60ac SLOPE= 1.10% L REQ.= 160' L PRO.= 125' Q2= 4.69cfs V2= 1.83ft/s D2= 0.65' Q10= 6.07cfs V10= 1.96ft/s D10= 0.72' <b>SPECIAL CUT W/ HINGE DITCH CB</b> -L- STA. 62+75 TO 64+50 RT PSH 7	<b>GRASS SWALE DATA</b> DA= 1.06ac SLOPE= 1.44% L REQ.= 106' L PRO.= 125' Q2= 3.34cfs V2= 1.86ft/s D2= 0.55' Q10= 4.33cfs V10= 1.99ft/s D10= 0.60' <b>MEDIAN V DITCH CG</b> -L- STA. 67+00 TO 68+25 CL PSH 7	<b>GRASS SWALE DATA</b> DA= 1.31ac SLOPE= 1.20% L REQ.= 131' L PRO.= 150' Q2= 4.14cfs V2= 1.84ft/s D2= 0.61' Q10= 5.36cfs V10= 1.96ft/s D10= 0.68' <b>SPECIAL CUT W/ HINGE DITCH CB</b> -L- STA. 67+00 TO 68+50 RT PSH 7	<b>GRASS SWALE DATA</b> DA= 1.17ac SLOPE= 1.3% L REQ.= 117' L PRO.= 125' Q2= 3.71cfs V2= 1.84ft/s D2= 0.58' Q10= 4.81cfs V10= 1.97ft/s D10= 0.64' <b>MEDIAN V DITCH CG</b> -L- STA. 71+50 TO 72+75 CL PSH 8
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<b>GRASS SWALE DATA</b> DA= 1.09ac SLOPE= 1.40% L REQ.= 109' L PRO.= 125' Q2= 3.43cfs V2= 1.86ft/s D2= 0.56' Q10= 4.45cfs V10= 1.98ft/s D10= 0.61' <b>SPECIAL CUT W/ HINGE DITCH CB</b> -L- STA. 71+50 TO 72+75 RT PSH 8	<b>GRASS SWALE DATA</b> DA= 0.37ac SLOPE= 2.08% L REQ.= 37' L PRO.= 50' Q2= 3.87cfs V2= 1.78ft/s D2= 0.27' Q10= 5.01cfs V10= 1.94ft/s D10= 0.31' <b>LATERAL BASE DITCH CC</b> -L- STA. 86+00 TO 87+25 LT PSH 9	<b>GRASS SWALE DATA</b> DA= 1.24ac SLOPE= 0.48% L REQ.= 124' L PRO.= 125' Q2= 18.02cfs V2= 1.86ft/s D2= 0.88' Q10= 23.33cfs V10= 1.94ft/s D10= 1.00' <b>LATERAL BASE DITCH CC</b> -L- STA. 87+25 TO 89+00 LT PSH 9	<b>GRASS SWALE DATA</b> DA= 1.13ac SLOPE= 2.96% L REQ.= 113' L PRO.= 125' Q2= 2.81cfs V2= 1.80ft/s D2= 0.20' Q10= 3.64cfs V10= 1.96ft/s D10= 0.24' <b>LATERAL BASE DITCH CC</b> -L- STA. 87+25 TO 88+50 RT PSH 9	<b>GRASS SWALE DATA</b> DA= 0.30ac SLOPE= 1.0% L REQ.= 30' L PRO.= 150' Q2= 0.95cfs V2= 1.09ft/s D2= 0.38' Q10= 1.23cfs V10= 1.16ft/s D10= 0.42' <b>MEDIAN V DITCH CG</b> -L- STA. 88+50 TO 90+00 LT PSH 9	<b>GRASS SWALE DATA</b> DA= 1.26ac SLOPE= 1.2% L REQ.= 126' L PRO.= 150' Q2= 3.13cfs V2= 1.87ft/s D2= 0.63' Q10= 4.05cfs V10= 2.00ft/s D10= 0.70' <b>MEDIAN V DITCH CG</b> -L- STA. 90+00 TO 91+50 CL PSH 9	<b>GRASS SWALE DATA</b> DA= 0.66ac SLOPE= 2.0% L REQ.= 66' L PRO.= 150' Q2= 2.08cfs V2= 1.71ft/s D2= 0.45' Q10= 2.69cfs V10= 1.83ft/s D10= 0.50' <b>SPECIAL CUT W/ HINGE DITCH CB</b> -L- STA. 90+00 TO 91+50 LT PSH 9	<b>GRASS SWALE DATA</b> DA= 0.31ac SLOPE= 2.75% L REQ.= 31' L PRO.= 92' Q2= 1.26cfs V2= 1.87ft/s D2= 0.41' Q10= 1.63cfs V10= 2.00ft/s D10= 0.45' <b>MEDIAN V DITCH CG</b> -L- STA. 95+08 TO 96+00 CL PSH 10	<b>GRASS SWALE DATA</b> DA= 0.42ac SLOPE= 1.75% L REQ.= 42' L PRO.= 50' Q2= 1.70cfs V2= 1.70ft/s D2= 0.50' Q10= 2.21cfs V10= 1.99ft/s D10= 0.53' <b>MEDIAN V DITCH CG</b> -L- STA. 96+50 TO 97+00 CL PSH 10	<b>GRASS SWALE DATA</b> DA= 3.30ac SLOPE= 0.85% L REQ.= 240' L PRO.= 250' Q2= 5.39cfs V2= 1.86ft/s D2= 0.52' Q10= 6.97cfs V10= 2.00ft/s D10= 0.60' <b>LATERAL BASE DITCH CC</b> -L- STA. 96+50 TO 99+00 RT PSH 10
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<b>GRASS SWALE DATA</b> DA= 0.21ac SLOPE= 0.30% L REQ.= 21' L PRO.= 97' Q2= 0.85cfs V2= 0.81ft/s D2= 0.51' Q10= 1.11cfs V10= 0.86ft/s D10= 0.57' <b>MEDIAN V DITCH CG</b> -L- STA. 98+00 TO 98+97.29 CL PSH 10	<b>GRASS SWALE DATA</b> DA= 1.63ac SLOPE= 1.50% L REQ.= 163' L PRO.= 365' Q2= 3.10cfs V2= 1.75ft/s D2= 0.35' Q10= 4.01cfs V10= 1.90ft/s D10= 0.40' <b>LATERAL BASE DITCH CC</b> -L- STA. 103+35 TO 107+00 RT PSH 10-11	<b>GRASS SWALE DATA</b> DA= 3.70ac SLOPE= 0.63% L REQ.= 370' L PRO.= 400' Q2= 10.87cfs V2= 1.76ft/s D2= 0.63' Q10= 13.96cfs V10= 1.90ft/s D10= 0.72' <b>LATERAL BASE DITCH CC</b> -FLY- STA. 23+00 TO 27+00 LT PSH 9	<b>GRASS SWALE DATA</b> DA= 0.55ac SLOPE= 3.50% L REQ.= 55' L PRO.= 65' Q2= 1.19cfs V2= 1.68ft/s D2= 0.48' Q10= 1.54cfs V10= 1.84ft/s D10= 0.18' <b>STANDARD BASE DITCH CD</b> -FLY- STA. 37+40 RT PSH 12	<b>GRASS SWALE DATA</b> DA= 2.54ac SLOPE= 0.90% L REQ.= 254' L PRO.= 300' Q2= 4.13cfs V2= 1.61ft/s D2= 0.48' Q10= 5.35cfs V10= 1.89ft/s D10= 0.51' <b>LATERAL BASE DITCH CC</b> -FLY- STA. 42+00 TO 45+00 RT PSH 12	<b>GRASS SWALE DATA</b> DA= 1.68ac SLOPE= 1.74% L REQ.= 168' L PRO.= 200' Q2= 2.51cfs V2= 1.72ft/s D2= 0.30' Q10= 3.24cfs V10= 1.87ft/s D10= 0.34' <b>SPECIAL CUT BASE DITCH CK</b> -FLY- STA. 61+00 TO 63+00 RT PSH 14	<b>GRASS SWALE DATA</b> DA= 0.30ac SLOPE= 0.90% L REQ.= 30' L PRO.= 189' Q2= 0.74cfs V2= 0.98ft/s D2= 0.35' Q10= 0.95cfs V10= 1.05ft/s D10= 0.39' <b>BUFFER FILTRATION CHECK</b> -FLY- STA. 63+00 TO 64+89.15 RT PSH 14	<b>GRASS SWALE DATA</b> DA= 1.26ac SLOPE= 1.70% L REQ.= 126' L PRO.= 151' Q2= 1.88cfs V2= 1.55ft/s D2= 0.25' Q10= 2.43cfs V10= 1.69ft/s D10= 0.30' <b>SPECIAL CUT BASE DITCH CK</b> -FLY- STA. 66+41.84 TO 67+92.80 RT PSH 14	<b>GRASS SWALE DATA</b> DA= 2.88ac SLOPE= 1.33% L REQ.= 288' L PRO.= 300' Q2= 6.52cfs V2= 1.81ft/s D2= 0.41' Q10= 8.44cfs V10= 1.96ft/s D10= 0.48' <b>SPECIAL CUT BASE DITCH CT</b> -RPIC- STA. 16+00 TO 19+00 RT PSH 9, 12	<b>GRASS SWALE DATA</b> DA= 1.30ac SLOPE= 1.50% L REQ.= 130' L PRO.= 150' Q2= 3.22cfs V2= 1.88ft/s D2= 0.54' Q10= 4.17cfs V10= 2.00ft/s D10= 0.59' <b>SPECIAL CUT BASE DITCH CB</b> -RPIC- STA. 25+50 TO 27+00 LT PSH 12
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<b>GRASS SWALE DATA</b> DA= 0.87ac SLOPE= 1.15% L REQ.= 87' L PRO.= 109' Q2= 2.09cfs V2= 1.40ft/s D2= 0.50' Q10= 2.78cfs V10= 1.64ft/s D10= 0.53' <b>SPECIAL CUT DITCH CB</b> -RPIC- STA. 29+58.25 TO 30+63.01 LT PSH 13	<b>GRASS SWALE DATA</b> DA= 0.94ac SLOPE= 1.00% L REQ.= 94' L PRO.= 100' Q2= 2.54cfs V2= 1.52ft/s D2= 0.53' Q10= 3.29cfs V10= 1.62ft/s D10= 0.58' <b>SPECIAL CUT DITCH CB</b> -RPIC- STA. 32+65.87 TO 33+66.11 LT PSH 13	<b>GRASS SWALE DATA</b> DA= 0.69ac SLOPE= 2.34% L REQ.= 69' L PRO.= 100' Q2= 2.01cfs V2= 1.80ft/s D2= 0.43' Q10= 2.60cfs V10= 1.92ft/s D10= 0.48' <b>SPECIAL CUT DITCH CB</b> -YI- STA. 35+50 TO 36+50 LT PSH 13
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**PLANS PREPARED BY :**

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 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
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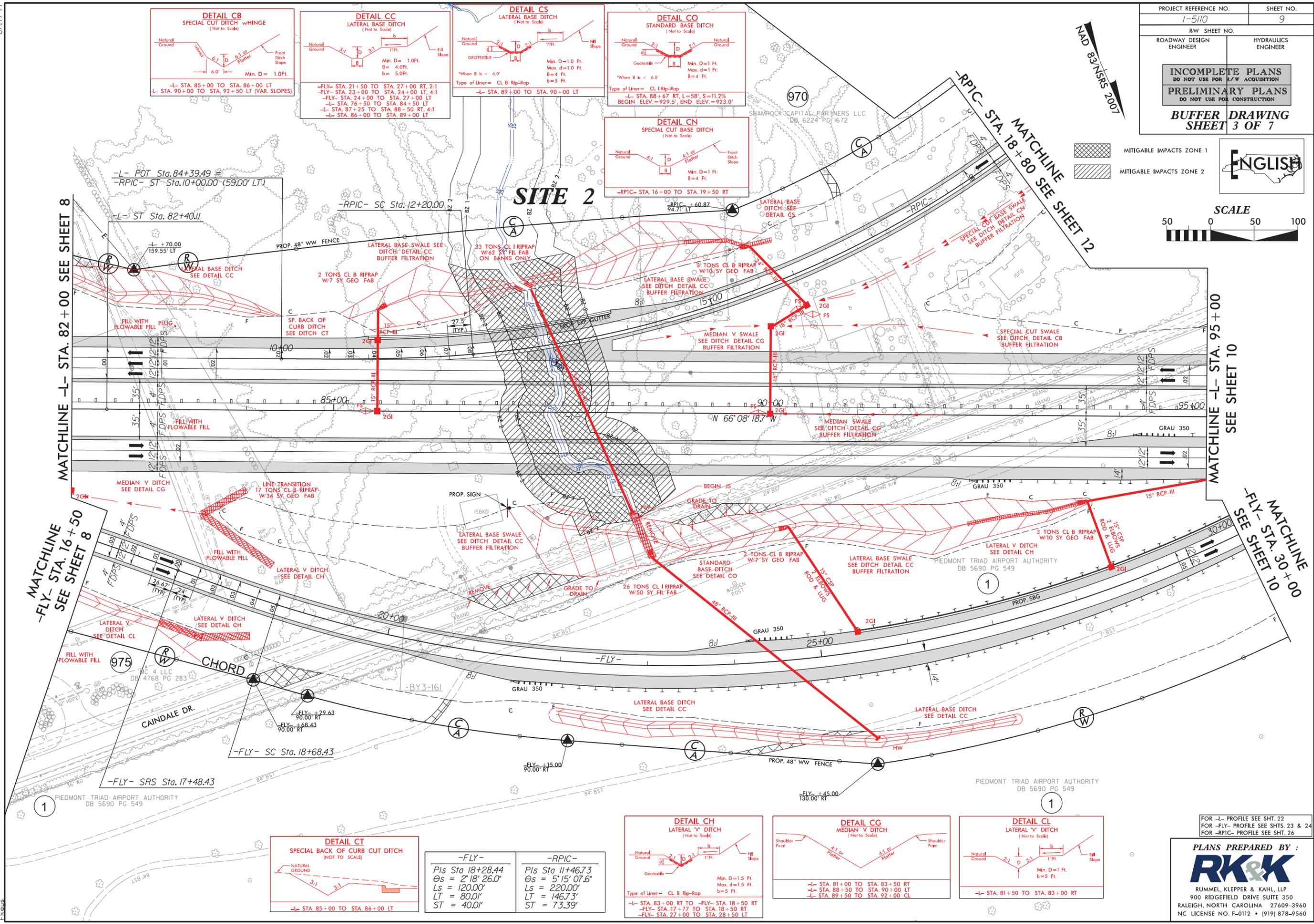


MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

SCALE

ENGLISH

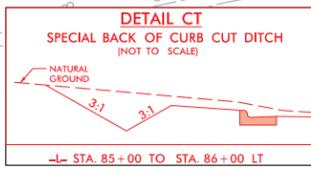
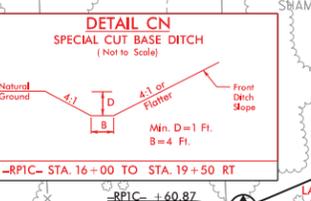
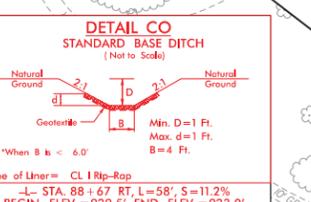
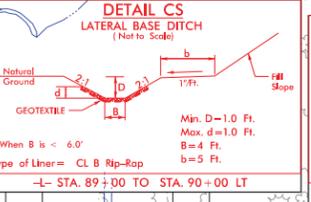
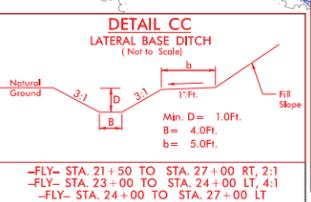
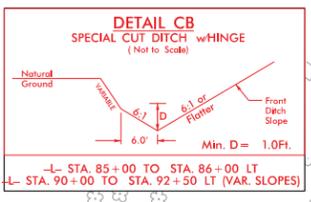


MATCHLINE -L- STA. 82+00 SEE SHEET 8

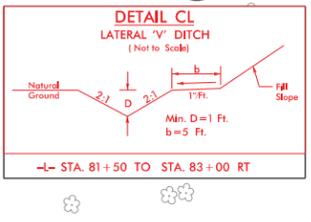
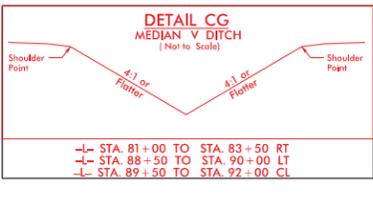
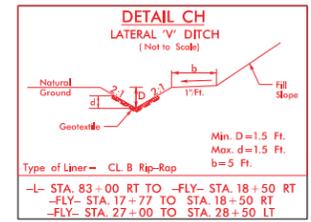
MATCHLINE -L- STA. 95+00 SEE SHEET 10

MATCHLINE -FLY- STA. 16+50 SEE SHEET 8

MATCHLINE -FLY- STA. 30+00 SEE SHEET 10



-FLY-	-RPIC-
Pls Sta 18+28.44	Pls Sta 11+46.73
Os = 2' 18" 26.0"	Os = 5' 15" 07.6"
Ls = 120.00'	Ls = 220.00'
LT = 80.01'	LT = 146.73'
ST = 40.01'	ST = 73.39'



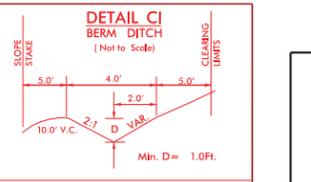
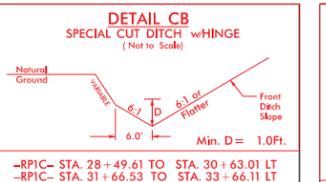
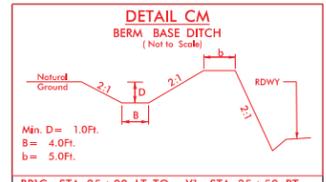
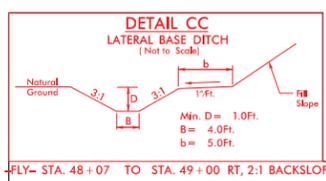
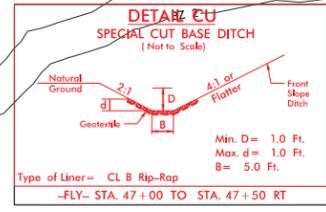
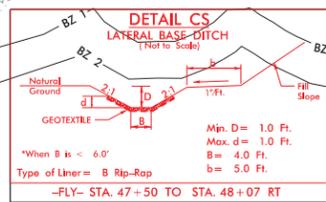
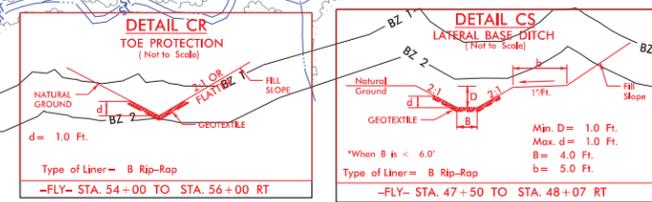
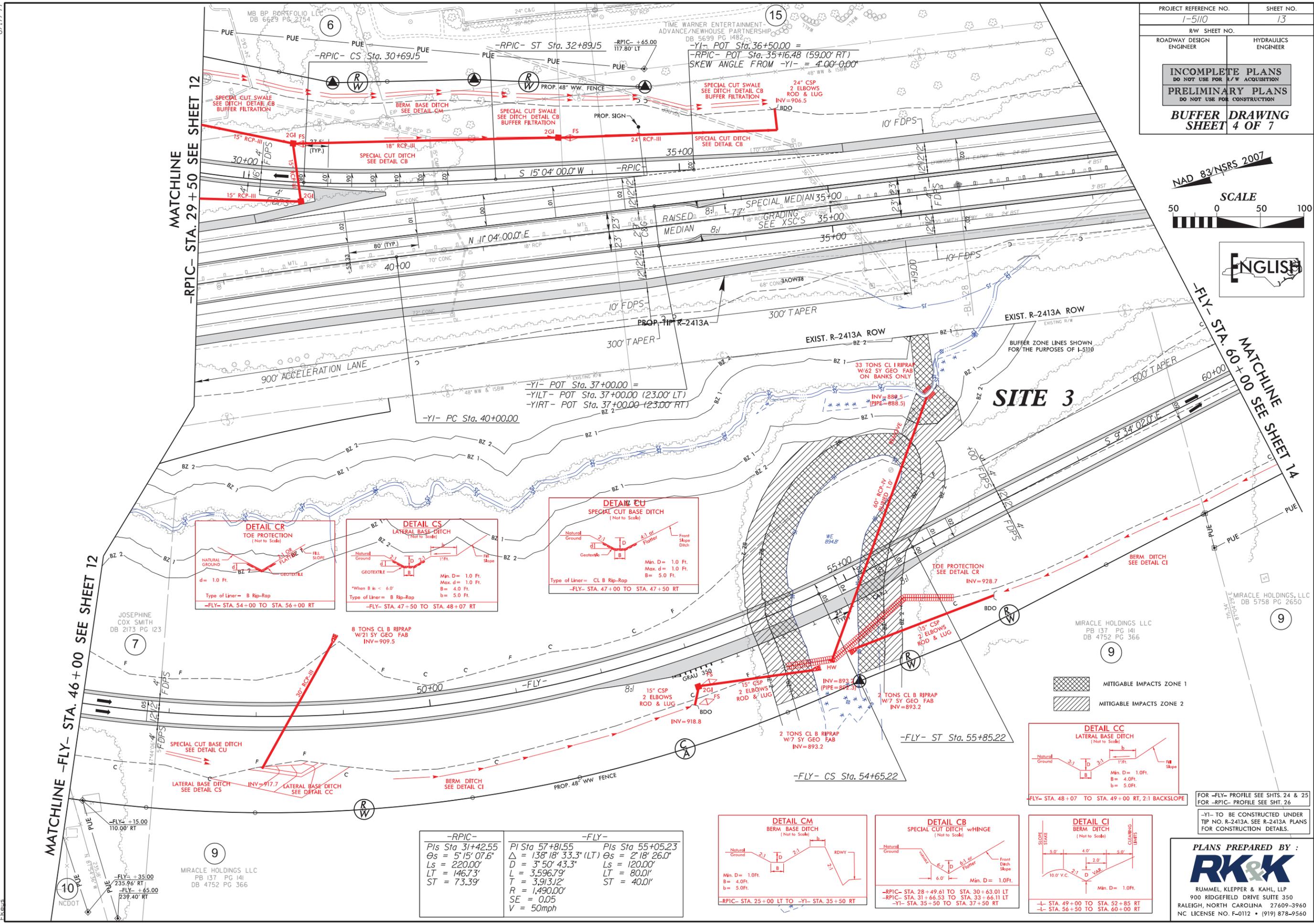
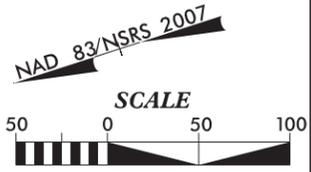
FOR -L- PROFILE SEE SHT. 22  
FOR -FLY- PROFILE SEE SHTS. 23 & 24  
FOR -RPIC- PROFILE SEE SHT. 26

PLANS PREPARED BY :

**RK&K**

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8/17/99  
10/23/2014  
R:\Projects\PERMITS\_Environmental\Drawings\1-5110\Buffers\15110\_Hyd\_prm\_buf\_psh09.dgn



-RPIC-	-FLY-
Pls Sta 31+42.55	Pls Sta 57+81.55
Δs = 5'15" 07.6"	Δs = 2'18" 26.0"
Ls = 220.00'	Ls = 120.00'
LT = 146.73'	LT = 80.0'
ST = 73.39'	ST = 40.0'
R = 1,490.00'	
SE = 0.05	
V = 50mph	

FOR -FLY- PROFILE SEE SHTS. 24 & 25  
FOR -RPIC- PROFILE SEE SHT. 26

-YI- TO BE CONSTRUCTED UNDER  
TIP NO. R-2413A. SEE R-2413A PLANS  
FOR CONSTRUCTION DETAILS.

**PLANS PREPARED BY :**

**RK&K**

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8/17/99  
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10/23/2014



### BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT									BUFFER REPLACEMENT		
			TYPE			ALLOWABLE			MITIGABLE			ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )	
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )	TOTAL (ft <sup>2</sup> )	ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )	TOTAL (ft <sup>2</sup> )			
2	54" RCP	-L- 86+36-88+92	X							21955	14027	35982		
3	60" RCP	-FLY- 53+80-57+06	X							21551	14243	35794		
4	72" CSP	-FLY- 64+74-66+14 RT	X			2986	1720	4706						
4	UTILITY SS	-FLY- 64+45-65+25 RT			X	942	1158	2100						
<b>TOTAL:</b>						3928	2878	6806	43506	28270	71776			

N.C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
  
 GUILFORD COUNTY  
 PROJECT: 34429.3.S8 (I-5110)  
  
 BUFFER DRAWING SHEET 6 OF 7

**BUFFER IMPACTS SUMMARY**

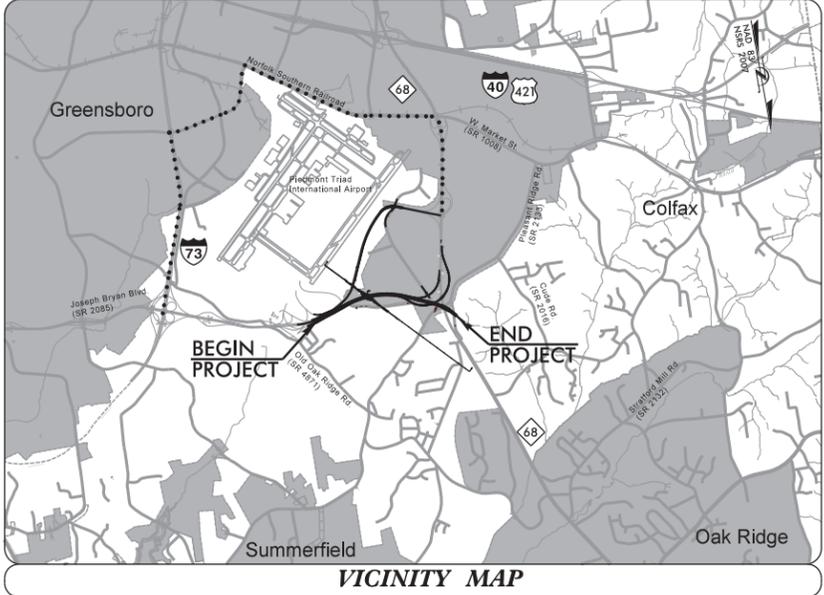
Site	Station	WETLANDS IN BUFFER	
		ZONE 1 (ft <sup>2</sup> )	ZONE 2 (ft <sup>2</sup> )
2	-L- 87+54-87+64 LT	70	
<b>TOTALS:</b>		<b>70</b>	<b>0</b>

N.C. DEPT. OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
  
 GUILFORD COUNTY  
 PROJECT: 34429.3.S8 (I-5110)  
  
 BUFFER DRAWING 7 OF 7

R:\Hydraulics\CALCULATIONS\Permits\5110 wetland in Buffer Summary Sheet.xls

09/28/14

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



VICINITY MAP

OFFSITE DETOUR ROUTE - - - - -

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF GREENSBORO. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED IN METHOD III. IN AREAS WITH PERMANENT UTILITY EASEMENTS, CLEARING SHALL EXTEND TO THE RIGHT OF WAY LIMITS. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**GUILFORD COUNTY**

LOCATION: FUTURE I-73 FROM EAST OF SR 2127 (BROOKBANK ROAD) TO HAW RIVER

TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING, RESURFACING, STRUCTURES, SIGNALS, SIGNING, LIGHTING, & ITS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5110	1	
WBS NO.	F.A. PROJ. NO.	DESCRIPTION	
42345.3.FS1	NHF-0073(25)	PE	

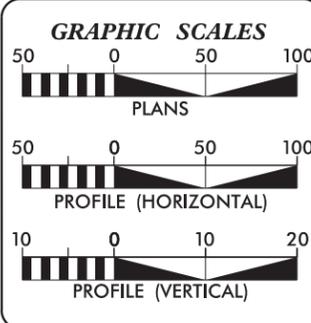
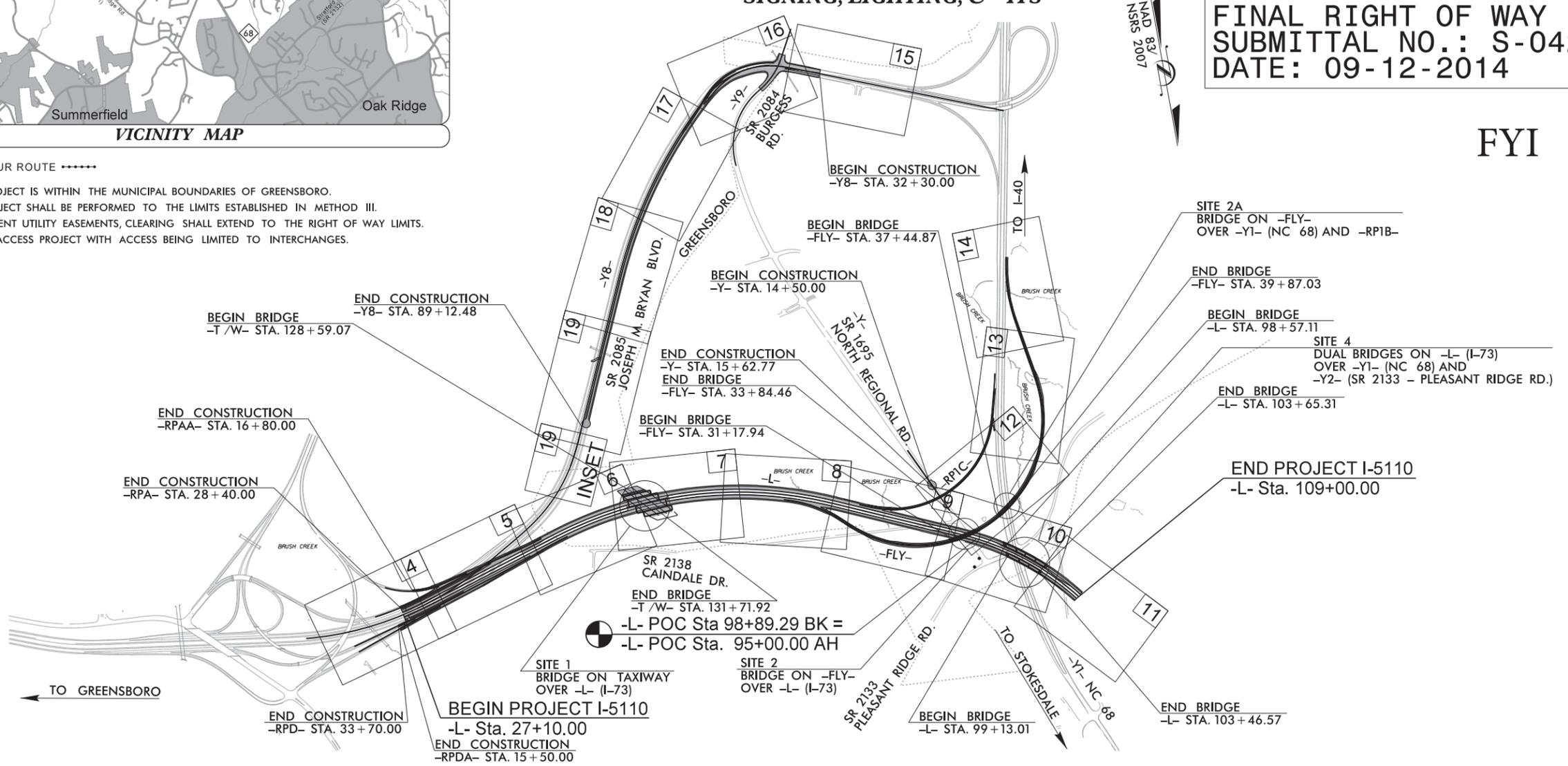
PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION

FINAL RIGHT OF WAY PLANS  
SUBMITTAL NO.: S-042R1  
DATE: 09-12-2014

FYI

TIP PROJECT: I-5110

CONTRACT: C203433



**DESIGN DATA**

ADT 2014 =	24,500
ADT 2035 =	42,200
DHV =	11%
D =	65%
*T =	15%
V =	70 mph

(\*TTST 10% + DUALS 5%)  
FUNC. CLASS = INTERSTATE

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT I-5110.....	1.528 mi
LENGTH STRUCTURES TIP PROJECT I-5110.....	0.097 mi
TOTAL LENGTH TIP PROJECT I-5110.....	1.625 mi

**NCDOT CONTACT**

**K. Zak Hamidi, P.E.**  
PROJECT ENGINEER - DESIGN BUILD GROUP

**PLANS PREPARED BY:**

**RK&K** RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE, SUITE 350  
RALEIGH, NORTH CAROLINA 27609  
NC LICENSE NO. F-0112

**FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**

2012 STANDARD SPECIFICATIONS

**LETTING DATE:**  
APRIL 2014

**FLATIRON** **Wight**  
a joint venture

**J.T. Peacock, Jr., P.E.**  
PROJECT ENGINEER

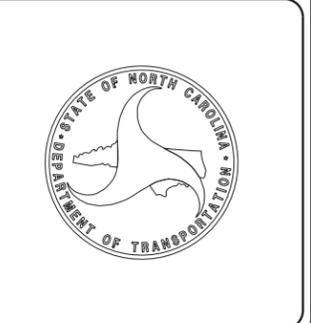
**Brandon J. McInnis, P.E.**  
PROJECT DESIGN ENGINEER

**HYDRAULICS ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.

**ROADWAY DESIGN ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.



10/22/2014 R:\Roadway\Proj\N5110\_Rdy\_t.sh.dgn Fkeys

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# CONVENTIONAL PLAN SHEET SYMBOLS

*Note: Not to Scale*

\*S.U.E. = *Subsurface Utility Engineering*

12/05/11

**BOUNDARIES AND PROPERTY:**

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EP
Property Corner	✕
Property Monument	□ ECM
Parcel/Sequence Number	⑫③
Existing Fence Line	-x-x-x-
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-
Known Soil Contamination: Area or Site	☠ ☠
Potential Soil Contamination: Area or Site	☠ ?

**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	→
False Sump	▽

**RAILROADS:**

Standard Gauge	-----
RR Signal Milepost	○
Switch	□
RR Abandoned	-----
RR Dismantled	-----

**RIGHT OF WAY:**

Baseline Control Point	◆
Existing Right of Way Marker	△
Existing Right of Way Line	-----
Proposed Right of Way Line	-----
Proposed Right of Way Line with Iron Pin and Cap Marker	○
Proposed Right of Way Line with Concrete or Granite RW Marker	▲
Proposed Control of Access Line with Concrete C/A Marker	○
Existing Control of Access	○
Proposed Control of Access	○
Existing Easement Line	-----
Proposed Temporary Construction Easement	-----
Proposed Temporary Drainage Easement	-----
Proposed Permanent Drainage Easement	-----
Proposed Permanent Drainage / Utility Easement	-----
Proposed Permanent Utility Easement	-----
Proposed Temporary Utility Easement	-----
Proposed Aerial Utility Easement	-----
Proposed Permanent Easement with Iron Pin and Cap Marker	◆

**ROADS AND RELATED FEATURES:**

Existing Edge of Pavement	-----
Existing Curb	-----
Proposed Slope Stakes Cut	-C-
Proposed Slope Stakes Fill	-F-
Proposed Curb Ramp	○ CR
Existing Metal Guardrail	-----
Proposed Guardrail	-----
Existing Cable Guiderail	-----
Proposed Cable Guiderail	-----
Equality Symbol	⊕
Pavement Removal	⊗
VEGETATION:	
Single Tree	☼
Single Shrub	☼
Hedge	-----
Woods Line	-----

Orchard	☼ ☼ ☼ ☼
Vineyard	□

**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	○
Storm Sewer	-----

**UTILITIES:**

POWER:	
Existing Power Pole	●
Proposed Power Pole	○
Existing Joint Use Pole	●
Proposed Joint Use Pole	○
Power Manhole	⊕
Power Line Tower	⊗
Power Transformer	⊗
U/G Power Cable Hand Hole	□
H-Frame Pole	●
Recorded U/G Power Line	-----
Designated U/G Power Line (S.U.E.*)	-----

**TELEPHONE:**

Existing Telephone Pole	●
Proposed Telephone Pole	○
Telephone Manhole	⊕
Telephone Booth	□
Telephone Pedestal	⊕
Telephone Cell Tower	⊕
U/G Telephone Cable Hand Hole	□
Recorded U/G Telephone Cable	-----
Designated U/G Telephone Cable (S.U.E.*)	-----
Recorded U/G Telephone Conduit	-----
Designated U/G Telephone Conduit (S.U.E.*)	-----
Recorded U/G Fiber Optics Cable	-----
Designated U/G Fiber Optics Cable (S.U.E.*)	-----

**WATER:**

Water Manhole	⊕
Water Meter	○
Water Valve	⊗
Water Hydrant	⊕
Recorded U/G Water Line	-----
Designated U/G Water Line (S.U.E.*)	-----
Above Ground Water Line	-----

**TV:**

TV Satellite Dish	☼
TV Pedestal	⊕
TV Tower	⊗
U/G TV Cable Hand Hole	□
Recorded U/G TV Cable	-----
Designated U/G TV Cable (S.U.E.*)	-----
Recorded U/G Fiber Optic Cable	-----
Designated U/G Fiber Optic Cable (S.U.E.*)	-----

**GAS:**

Gas Valve	◇
Gas Meter	⊕
Recorded U/G Gas Line	-----
Designated U/G Gas Line (S.U.E.*)	-----
Above Ground Gas Line	-----

**SANITARY SEWER:**

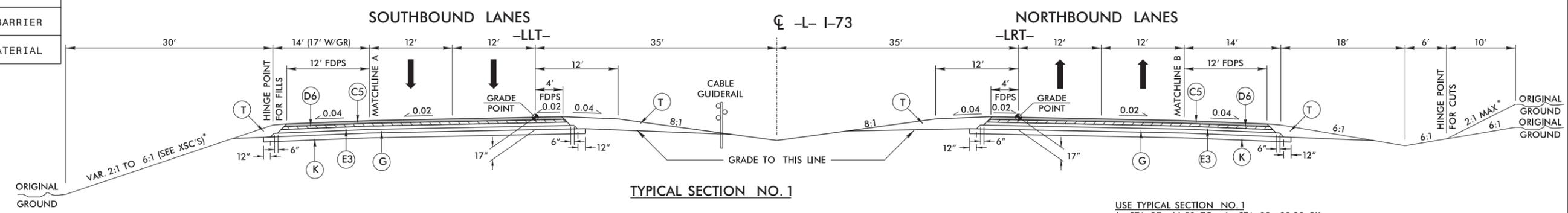
Sanitary Sewer Manhole	⊕
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	-----
Above Ground Sanitary Sewer	-----
Recorded SS Forced Main Line	-----
Designated SS Forced Main Line (S.U.E.*)	-----

**MISCELLANEOUS:**

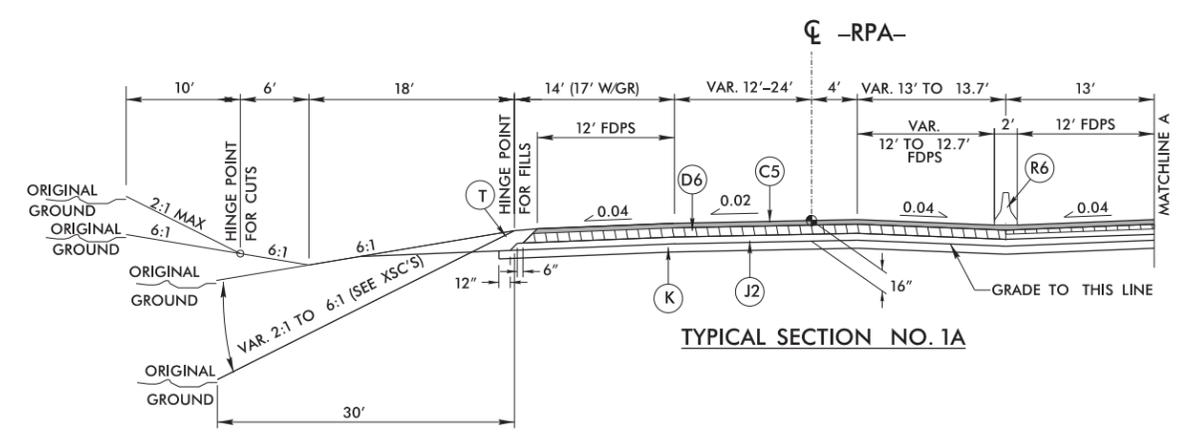
Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	⊕
Utility Unknown U/G Line	-----
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	⊕
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole (S.U.E.*)	⊕
Abandoned According to Utility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

PAVEMENT SCHEDULE	
C5	3" TYPE S9.5C
D6	3" TYPE I19.0C
E3	3" TYPE B25.0C
G	PROP. 8" CTABC
J2	10" ABC
K	STABILIZED SUB.
R7	TYPE T BARRIER
T	EARTH MATERIAL

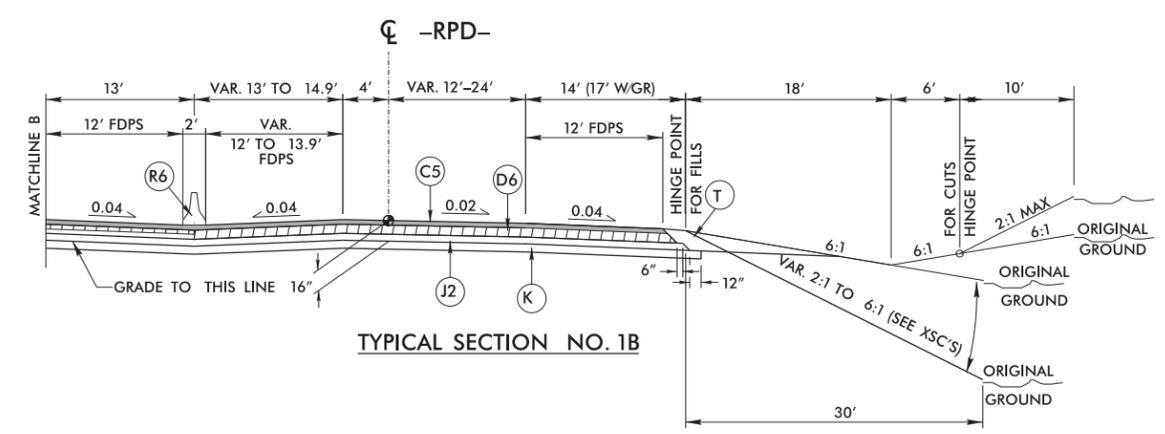
PROJECT REFERENCE NO. I-5110	SHEET NO. 2A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



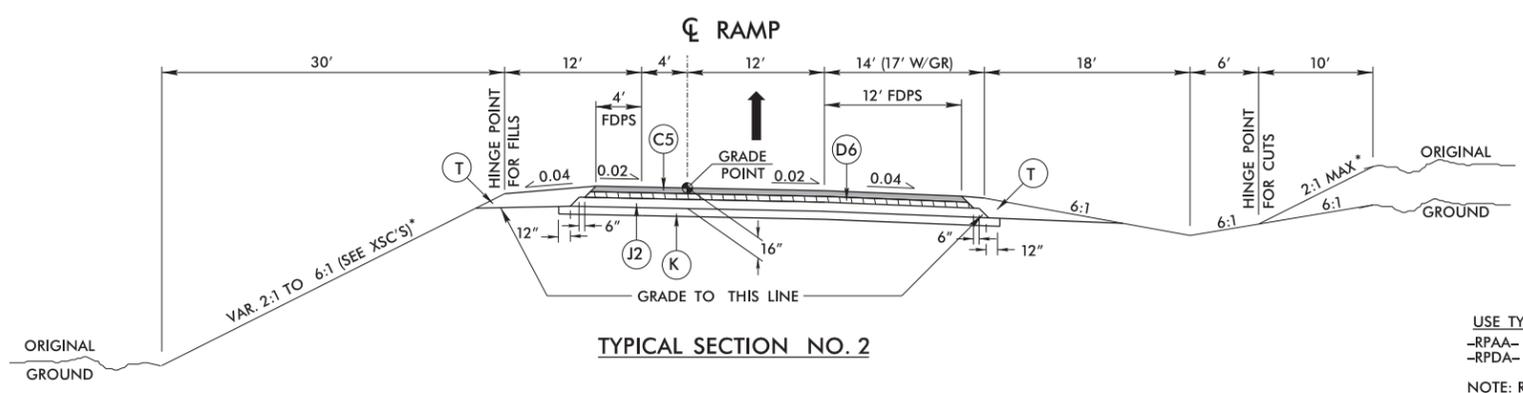
USE TYPICAL SECTION NO. 1  
 -L- STA. 27+66.53 TO -L- STA. 98+89.29 BK  
 -L- STA. 95+00.00 AH TO -L- STA. 98+57.11 (BEGIN BRIDGE LT)  
 -L- STA. 103+65.31 (END BRIDGE LT) TO -L- STA. 109+00.00  
 NOTE: USE PROFILES -LLT- AND -LRT- FROM -L- STA. 27+66.53 TO -L- STA. 51+25.00  
 NOTE: TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 1 AT THE FOLLOWING LOCATIONS -L STA. 27+16.53 TO -L STA. 27+66.53 (RT.+LT.)



USE TYPICAL SECTION NO. 1A  
 -RPA- STA. 10+00.00 TO -RPA- STA. 27+90.00  
 NOTE: USE -L- PAVEMENT DESIGN AT THE FOLLOWING LOCATIONS:  
 -RPA- STA. 10+00.00 TO -RPA- STA. 17+87.10  
 NOTE: TRANSITION FROM TYPICAL SECTION NO. 1A TO EXISTING AT THE FOLLOWING LOCATIONS:  
 -RPA- STA. 27+90.00 TO -RPA- STA. 28+40.00



USE TYPICAL SECTION NO. 1B  
 -RPD- STA. 10+98.43 TO -RPD- STA. 33+20.00  
 NOTE: USE -L- PAVEMENT DESIGN AT THE FOLLOWING LOCATIONS:  
 -RPD- STA. 10+98.43 TO -RPD- STA. 24+94.45  
 NOTE: TRANSITION FROM TYPICAL SECTION NO. 1B TO EXISTING AT THE FOLLOWING LOCATIONS:  
 -RPD- STA. 33+20.00 TO -RPD- STA. 33+70.00



USE TYPICAL SECTION NO. 2  
 -RPAA- STA. 10+00.00 TO -RPAA- STA. 16+30.00  
 -RPDA- STA. 10+00.00 TO -RPDA- STA. 15+00.00  
 NOTE: REVERSE TYPICAL SECTION FOR -RPDA-  
 NOTE: TRANSITION FROM TYPICAL SECTION NO. 2 TO EXISTING AT THE FOLLOWING LOCATIONS:  
 -RPAA- STA. 16+30.00 TO -RPAA- STA. 16+80.00  
 -RPDA- STA. 15+00.00 TO -RPDA- STA. 15+50.00

NOTES:  
 SEE PLANS FOR LOCATION OF CONCRETE ISLANDS, AUXILIARY LANES, AND TAPERS.  
 \* 4:1 MAX INSIDE INTERCHANGE

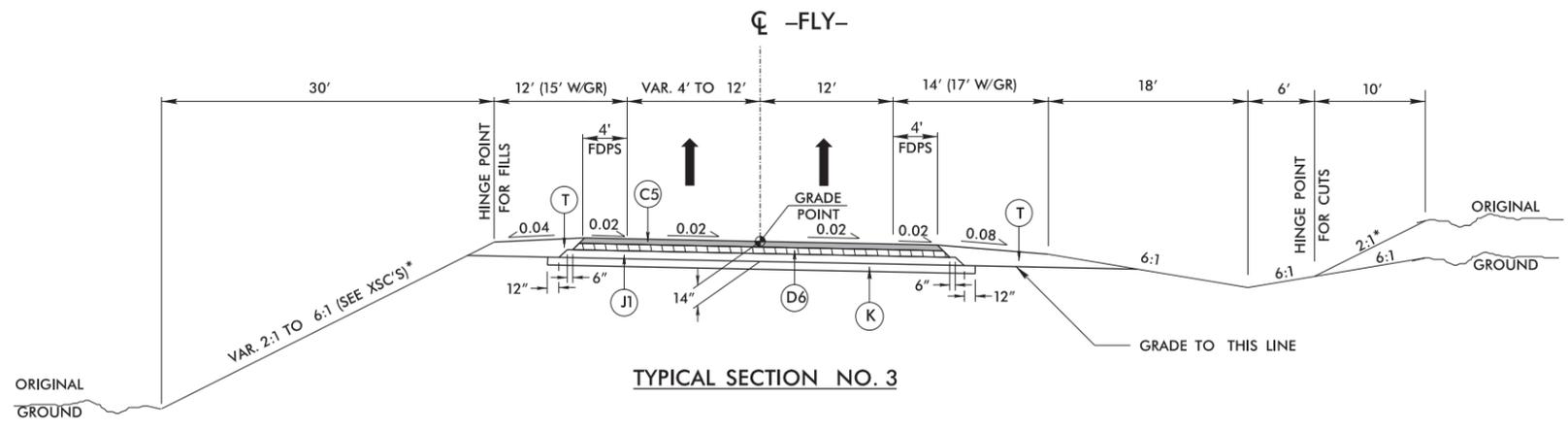
PLANS PREPARED BY :

RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560

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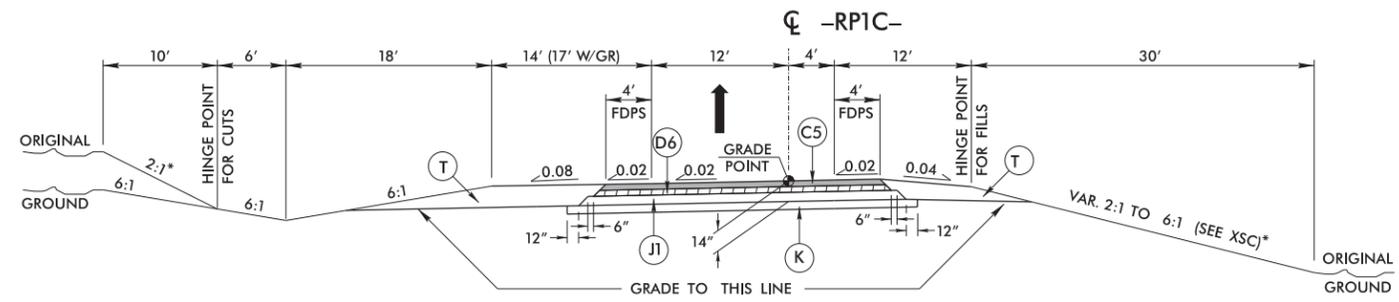
PAVEMENT SCHEDULE	
C1	1.5" TYPE S9.5B
C2	2" TYPE S9.5B
C3	3" TYPE S9.5B
C4	VAR. TYPE S9.5B
C5	3" TYPE S9.5C
D6	3" TYPE I19.0C
E1	4" TYPE B25.0B
J1	8" ABC
K	STABILIZED SUB.
P	PRIME COAT
R2	2'-6" C&G
T	EARTH MATERIAL
U	EXISTING PAVE.
W	WEDGING

PROJECT REFERENCE NO. I-5110	SHEET NO. 2B
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



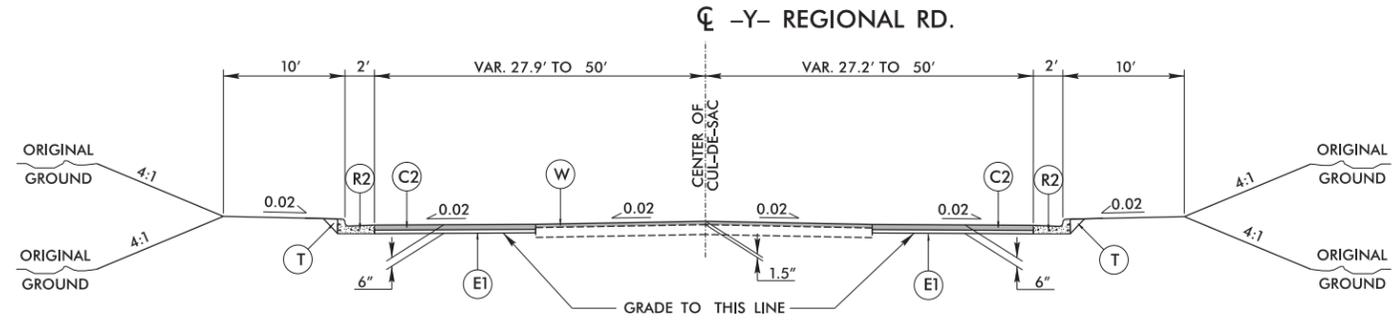
USE TYPICAL SECTION NO. 3  
 -FLY- STA. 9+67.27 TO -FLY- STA. 31+17.94 (BEGIN BRIDGE)  
 -FLY- STA. 33+84.46 (END BRIDGE) TO -FLY- STA. 37+44.87 (BEGIN BRIDGE)  
 -FLY- STA. 39+87.03 (END BRIDGE) TO -FLY- STA. 69+98.65

NOTE: USE -L- PAVEMENT DESIGN AT THE FOLLOWING LOCATION:  
 -FLY- STA. 10+00.00 TO -FLY- STA. 15+06.21  
 USE -YI- PAVEMENT DESIGN AT THE FOLLOWING LOCATION:  
 -FLY- STA. 65+94.24 TO -FLY- STA. 69+98.65

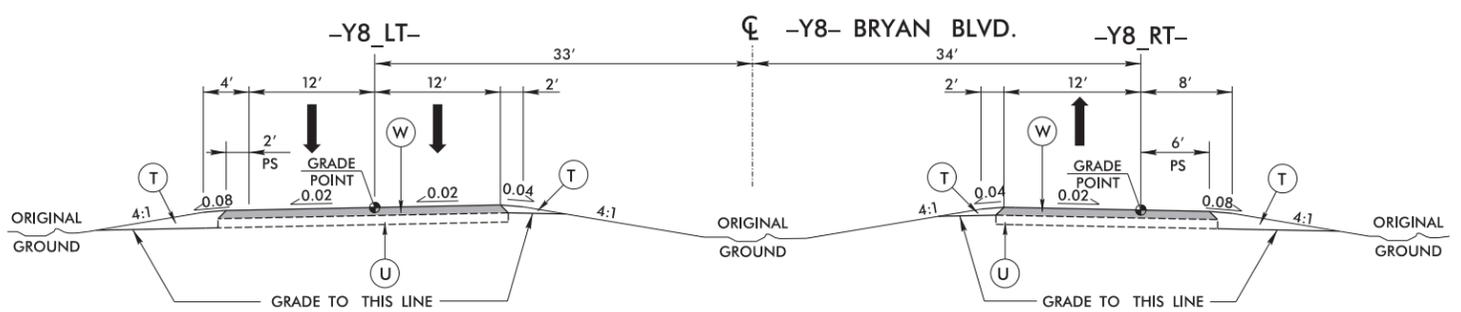


USE TYPICAL SECTION NO. 4  
 -RPIC- STA. 10+00.00 TO -RPIC- STA. 35+16.48

NOTE: USE -L- PAVEMENT DESIGN AT THE FOLLOWING LOCATION:  
 -RPIC- STA. 10+00.00 TO -RPIC- STA. 13+79.43  
 USE -YI- PAVEMENT DESIGN AT THE FOLLOWING LOCATION:  
 -RPIC- STA. 30+81.01 TO -RPIC- STA. 35+16.48



USE TYPICAL SECTION NO. 5  
 -Y- STA. 14+45.00 TO -Y- STA. 15+57.77



USE TYPICAL SECTION NO. 6  
 -Y8- STA. 32+30.00 TO -Y8- STA. 36+50.00

NOTE: TRANSITION FROM TYPICAL SECTION NO. 1 TO TYPICAL SECTION NO. 2 FROM -Y8- STA. 36+50.00 TO -Y8- STA. 37+50.00

NOTES:  
 SEE PLANS FOR LOCATION OF CONCRETE ISLANDS, AUXILIARY LANES, AND TAPERS.  
 \* 4:1 MAX INSIDE INTERCHANGE

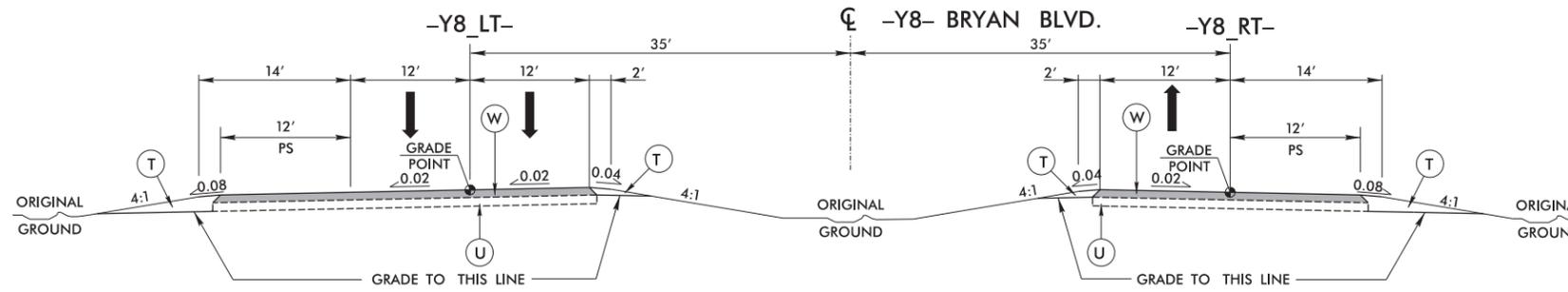
PLANS PREPARED BY :  
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 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560

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PAVEMENT SCHEDULE	
C1	1 1/2" TYPE S9.5B
C3	3" TYPE S9.5B
J1	8" ABC
P	PRIME COAT
T	EARTH MATERIAL
U	EXISTING PAVE.
W	WEDGING

PROJECT REFERENCE NO.	SHEET NO.
1-5110	2C
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

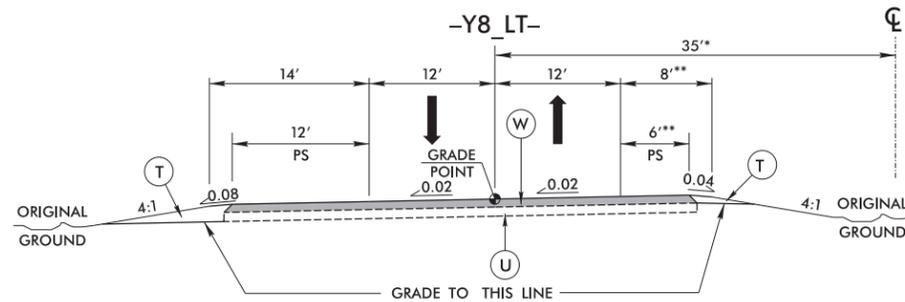
**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7  
-Y8- STA. 37+50.00 TO -Y8- STA. 42+52.22

NOTE: TRANSITION FROM TYPICAL SECTION NO. 1 TO TYPICAL SECTION NO. 2 FROM -Y8- STA. 36+50.00 TO -Y8- STA. 37+50.00



TYPICAL SECTION NO. 8

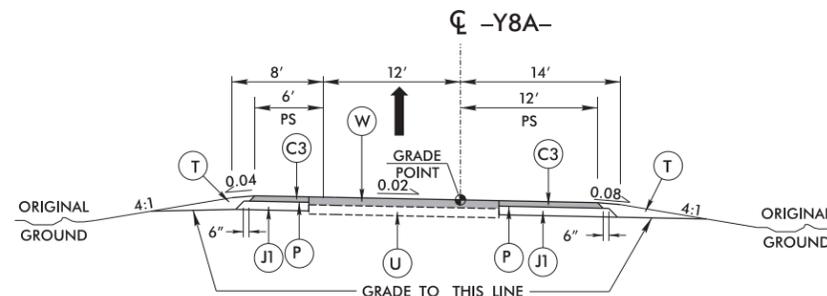
USE TYPICAL SECTION NO. 8  
-Y8- STA. 42+52.22 TO -Y8- STA. 87+84.02

\*NOTES: DISTANCE FROM CENTERLINE TO GRADE POINT TRANSITIONS LINEARLY FROM 35' TO 40' FROM -Y8- STA. 84+00.00 TO -Y8- STA. 86+50.00.

USE 40' DISTANCE FROM CENTERLINE TO GRADE POINT AT THE FOLLOWING LOCATION: -Y8- STA. 86+50.00 TO -Y8- STA. 87+84.02.

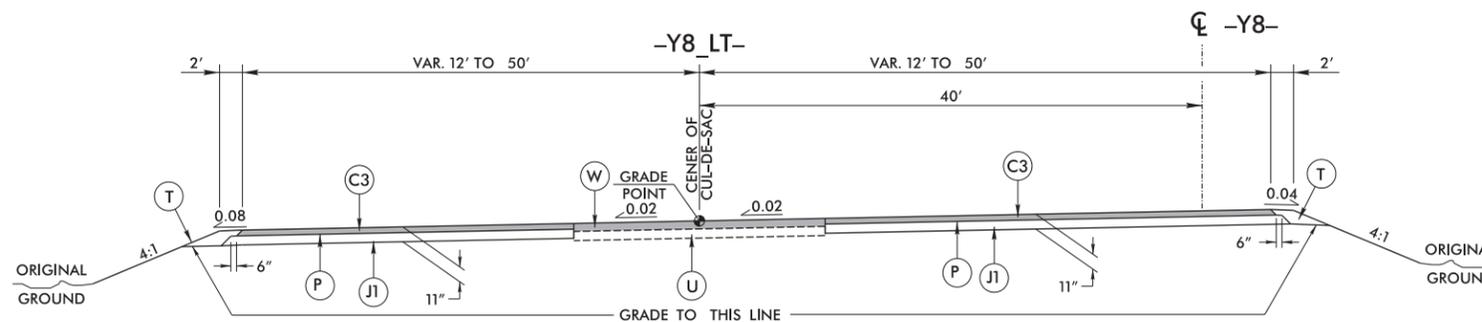
\*\*NOTES: PAVED SHOULDER WIDTH TRANSITIONS FROM 6' TO 12' FROM -Y8- STA. 84+00.00 TO -Y8- STA. 86+50.00.

USE 12' PAVED SHOULDER AT THE FOLLOWING LOCATION: -Y8- STA. 86+50.00 TO -Y8- STA. 87+84.02.



TYPICAL SECTION NO. 9

USE TYPICAL SECTION NO. 9  
-Y8A- STA. 14+87.15 TO -Y8A- STA. 24+20.00



TYPICAL SECTION NO. 10

USE TYPICAL SECTION NO. 10  
-Y8- STA. 87+84.02 TO -Y8- STA. 89+12.48

NOTES:  
SEE PLANS FOR LOCATION OF CONCRETE ISLANDS, AUXILIARY LANES, AND TAPERS.

PLANS PREPARED BY :

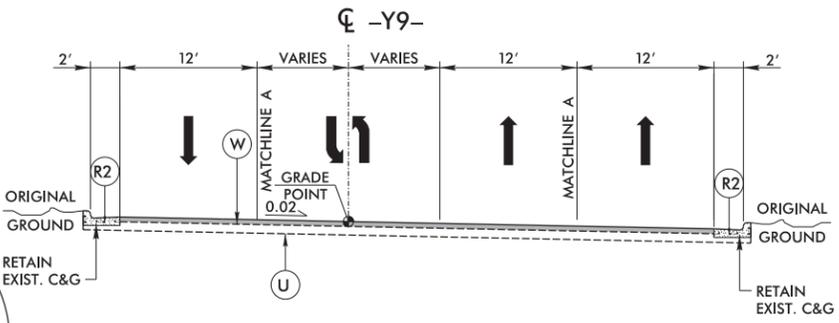
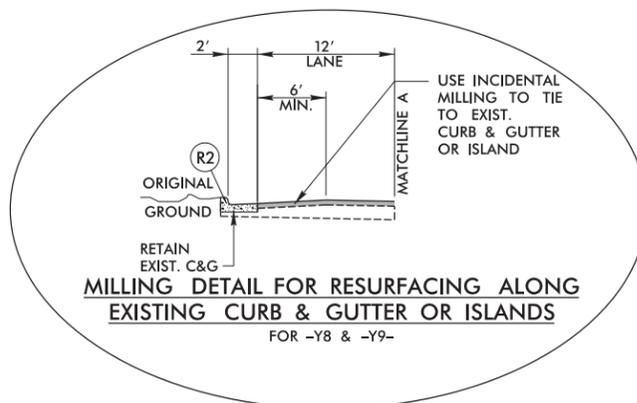
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900 RIDGEFIELD DRIVE SUITE 350  
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PAVEMENT SCHEDULE	
C5	3" TYPE S9.5C
C7	1 1/2" TYPE S9.5C
D6	3" TYPE I19.0C
E3	3" TYPE B25.0C
E4	4" TYPE B25.0C
G	PROP. 8" CTABC
J1	8" ABC
J5	6" ABC
K	STABILIZED SUB.
N	GEOTEXTILE PAVEMENT STABILIZATION
P	PRIME COAT
R2	2'-6" C&G
S	SPLIT SEAL
T	EARTH MATERIAL
U	EXISTING PAVE.
W	WEDGING

PROJECT REFERENCE NO.	SHEET NO.
1-5110	2D
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

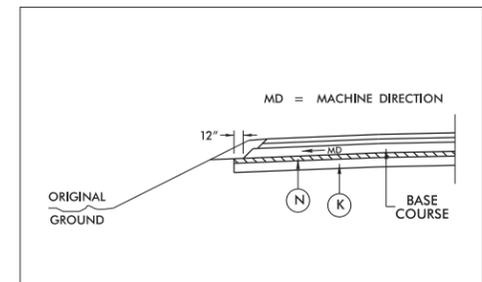
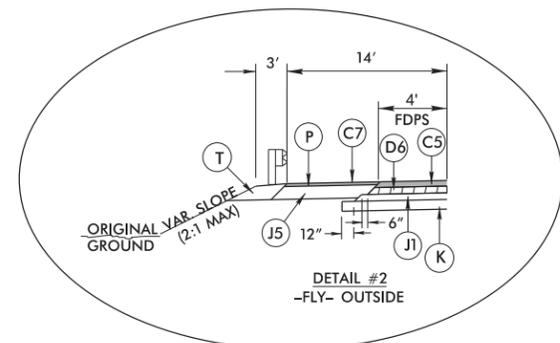
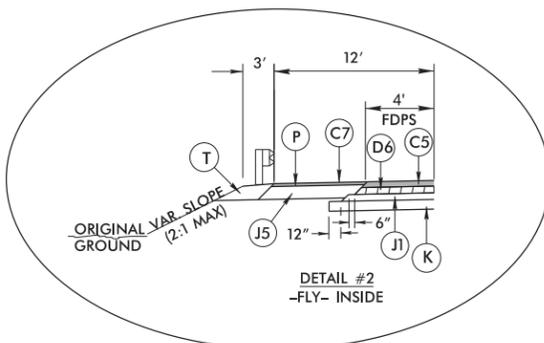
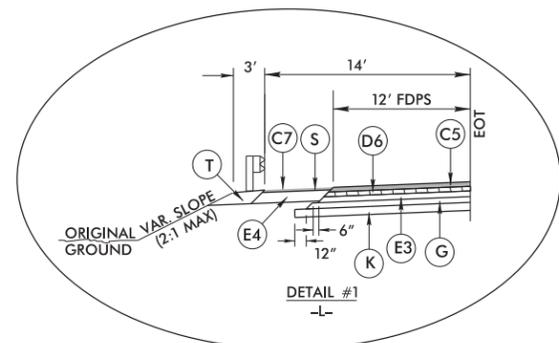
**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION NO. 10

USE TYPICAL SECTION NO. 10  
-Y9- STA. 13+20.00 TO -Y9- STA. 18+10.00

**GUARDRAIL WIDENING DETAILS**



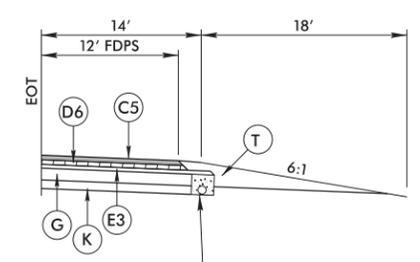
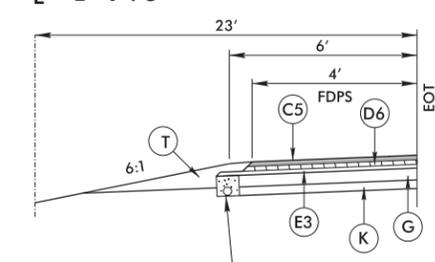
DETAIL SHOWING GEOTEXTILE FOR PAVEMENT STABILIZATION

INVESTIGATE THE USE OF GEOTEXTILE FOR PAVEMENT STABILIZATION FOR THE FOLLOWING:

- L- STA 97+50.00 TO -L- STA 98+89.29 BK (LT)
- L- STA 95+00.00 AH TO -L- STA 98+17.39 (LT)
- L- STA 103+95.00 TO -L- STA 109+00.00 (LT)
- L- STA 103+73.00 TO -L- STA 106+50.00 (RT)
- FLY- STA 22+25.00 TO -FLY- STA 31+17.94 (BEGIN BRIDGE)
- FLY- STA 33+84.46 (END BRIDGE) TO -FLY- STA 37+44.87 (BEGIN BRIDGE)
- FLY- STA 39+87.03 (END BRIDGE) TO -FLY- STA 45+50.00
- FLY- STA 53+25.00 TO -FLY- STA 56+25.00

NOTES:  
SEE PLANS FOR LOCATION OF CONCRETE ISLANDS, AUXILIARY LANES, AND TAPERS.

**SHOULDER DRAIN DETAILS**



**DETAIL FOR SHOULDER DRAINS**

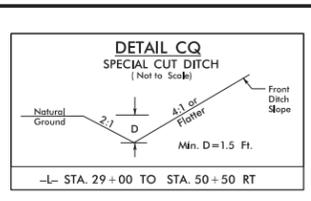
LINE	STATION TO	STATION	LOCATION	OUTLET	STATION
-RPA-	10+00	14+00	RT	N/A	N/A
-RPD-	10+98.43	21+80	LT	N/A	N/A
-L-	48+25	65+75	MED. LT	0608	50+70
				0607	52+00
				0707	62+00
-L-	48+25	65+75	RT	0604	50+50
				0602	54+00
				0705	62+50
-L-	69+40	71+75	MED. LT	0801	71+50
-L-	69+40	75+47.42	RT	0803	71+50
-FLY-	12+05	13+55	RT	N/A	N/A

PLANS PREPARED BY :  
**RK&K**  
RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
NC LICENSE NO. F-0112 • (919) 878-9560

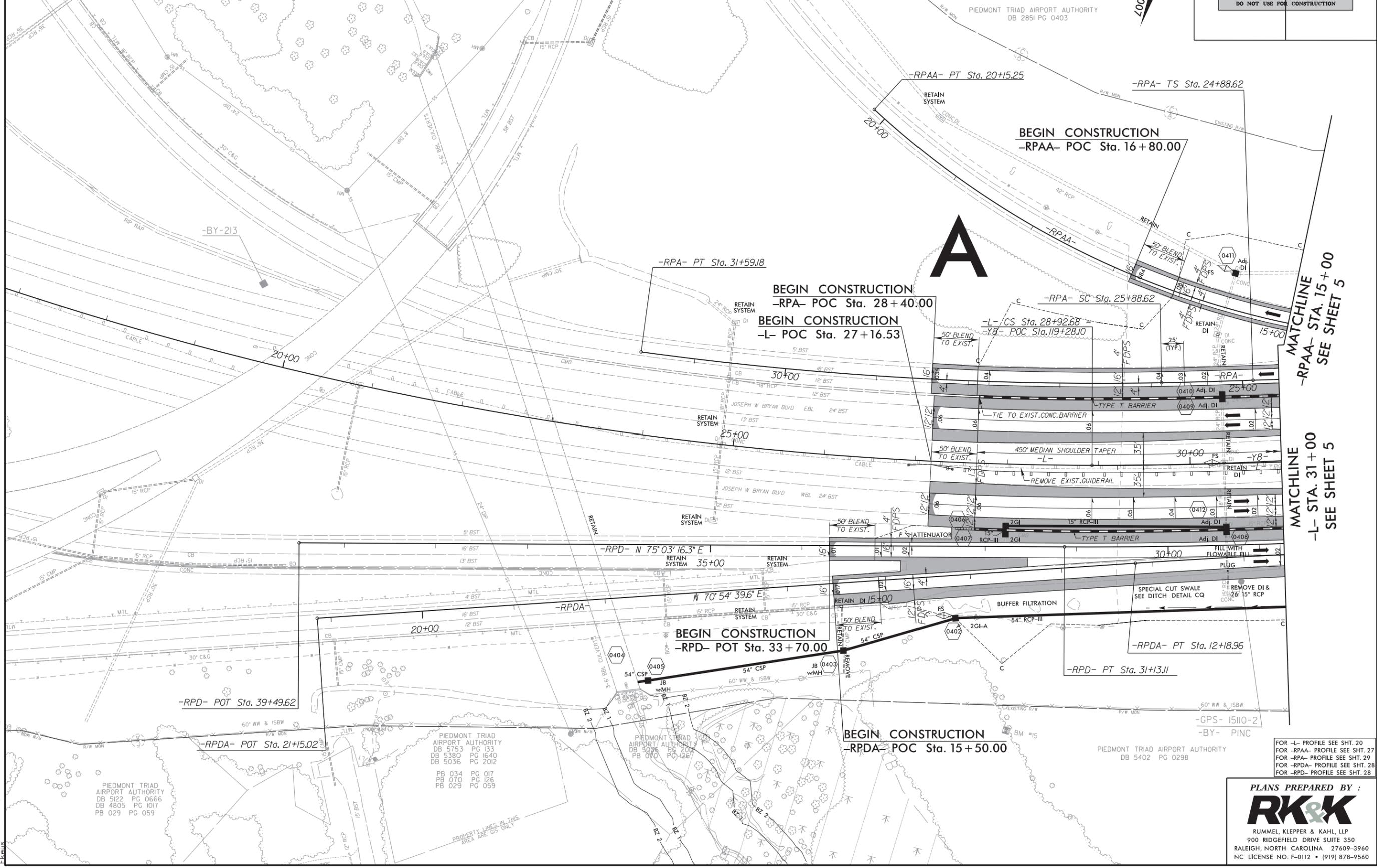
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RLE

8/17/99  
 10/22/2014  
 R:\Roadway\Proj\15110\_Rdy\_psh04.dgn  
 E:\Users

-L-	-RPA-	-RPA-	-RPA-	-RPA-	-RPA-	-RPA-	-RPA-
PI Sta 22+14.63	PIs Sta 25+55.55	PIs Sta 25+55.55	PI Sta 28+74.73	PI Sta 17+34.60	PI Sta 29+83.76	PI Sta 11+09.49	PI Sta 122+41.53
$\Delta = 20^\circ 33' 49.1''$ (LT)	$\Theta_s = 2^\circ 01' 29.5''$	$\Theta_s = 0^\circ 46' 34.9''$	$\Delta = 8^\circ 51' 33.4''$ (RT)	$\Delta = 3^\circ 47' 06.6''$ (RT)	$\Delta = 2^\circ 28' 14.9''$ (RT)	$\Delta = 1^\circ 40' 21.7''$ (LT)	$\Delta = 32^\circ 38' 14.2''$ (RT)
$D = 1^\circ 29' 59.6''$	$L_s = 270.00'$	$L_s = 100.00'$	$D = 1^\circ 33' 09.8''$	$D = 5^\circ 59' 58.4''$	$D = 0^\circ 57' 17.7''$	$D = 0^\circ 45' 50.2''$	$D = 1^\circ 29' 59.6''$
$L = 1,371.01'$	$LT = 180.01'$	$LT = 66.67'$	$L = 570.56'$	$L = 579.80'$	$L = 258.74'$	$L = 218.96'$	$L = 2,175.98'$
$T = 692.96'$	$ST = 90.01'$	$ST = 33.33'$	$T = 285.85'$	$T = 299.14'$	$T = 129.39'$	$T = 109.49'$	$T = 1,118.40'$
$R = 3,820.00'$			$R = 3,690.00'$	$R = 955.00'$	$R = 6,000.00'$	$R = 7,500.00'$	$R = 3,820.00'$
$SE = 0.06$			$SE = 0.04$	$SE = 0.08$	$SE = 0.02$	$SE = 0.02$	
$V = 75\text{mph}$			$V = 55\text{mph}$	$V = 50\text{mph}$	$V = 50\text{mph}$	$V = 55\text{mph}$	



PROJECT REFERENCE NO. 1-5110	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



10/22/2014  
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 E:\Users

PIEDMONT TRIAD  
 AIRPORT AUTHORITY  
 DB 5122 PG 0666  
 DB 4805 PG 1017  
 PB 029 PG 059

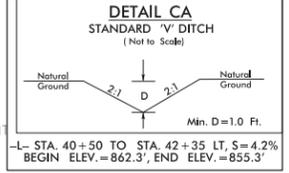
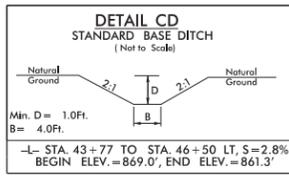
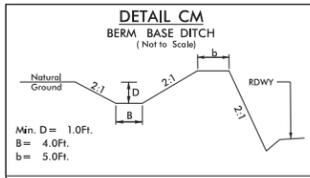
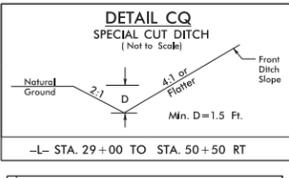
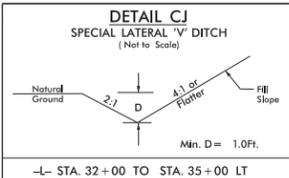
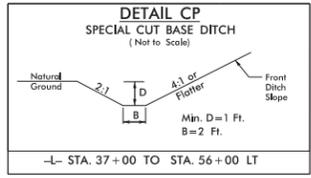
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 AIRPORT AUTHORITY  
 DB 5753 PG 133  
 DB 5380 PG 1640  
 DB 5036 PG 2012  
 PB 034 PG 017  
 PB 070 PG 126  
 PB 029 PG 059

PIEDMONT TRIAD  
 AIRPORT AUTHORITY  
 DB 5076 PG 2012  
 PB 070 PG 126

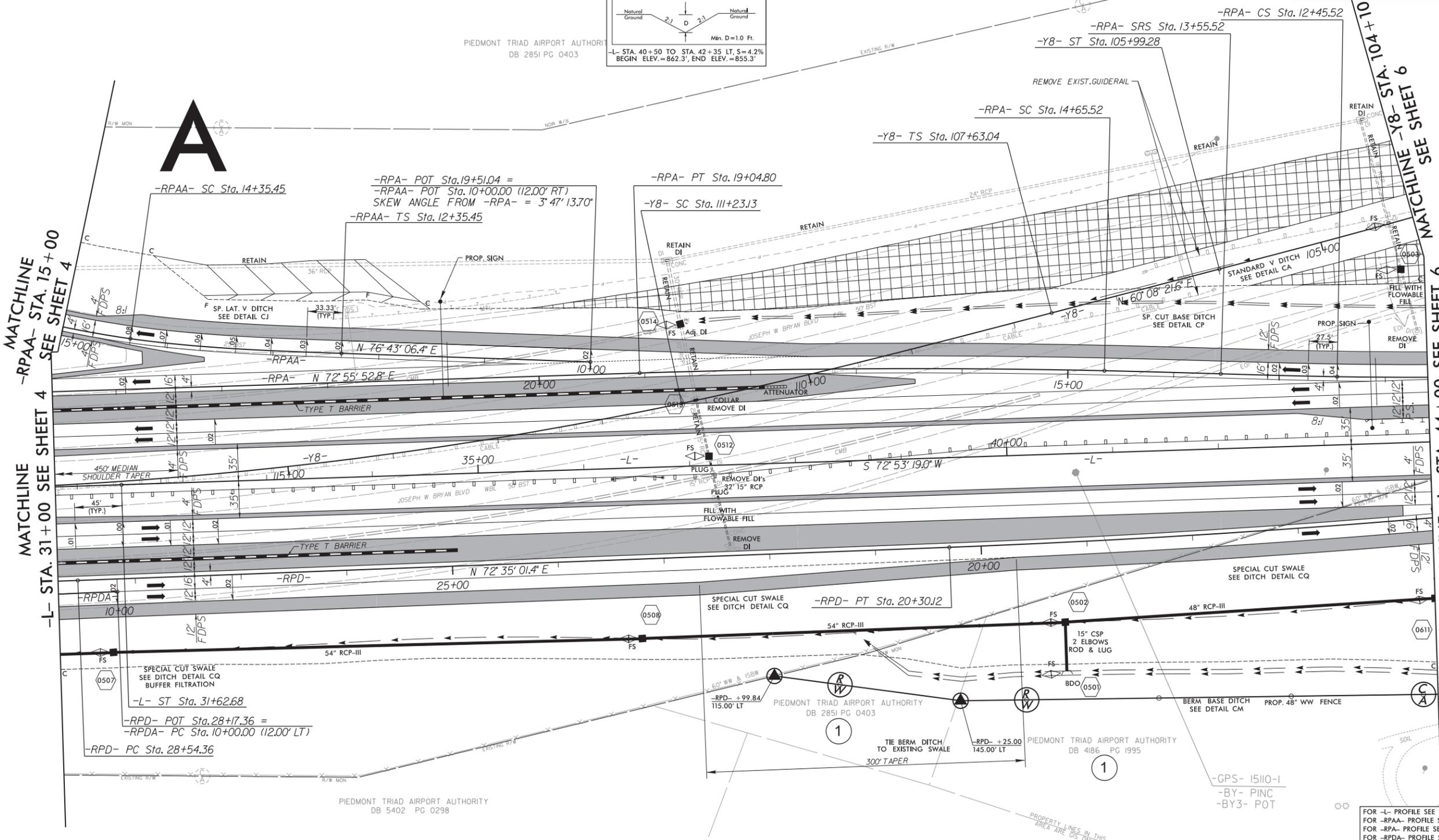
PIEDMONT TRIAD AIRPORT AUTHORITY  
 DB 5402 PG 0298

FOR -L- PROFILE SEE SHT. 20  
 FOR -RPA- PROFILE SEE SHT. 27  
 FOR -RPDA- PROFILE SEE SHT. 28  
 FOR -RPD- PROFILE SEE SHT. 28

**PLANS PREPARED BY :**  
  
 RUMMEL, KLEPPER & KAHL, LLP  
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 NC LICENSE NO. F-0112 • (919) 878-9560



NAD 83 NSRS 2007



MATCHLINE -RPA- STA. 15+00 SEE SHEET 4

MATCHLINE -L- STA. 31+00 SEE SHEET 4

MATCHLINE -Y8- STA. 104+10 SEE SHEET 6

MATCHLINE -L- STA. 44+00 SEE SHEET 6

12/22/2014 R:\Roadway\Proj\15110\_Rdy\_psh05.dgn

<p><b>-Y8-</b></p> <p>PI Sta 110+03.13  <math>\Delta s = 2^\circ 42' 01.7''</math>  <math>Ls = 360.09'</math>  <math>L = 160.74'</math>  <math>T = 80.38'</math>  <math>R = 4,410.00'</math>  <math>SE = 0.04</math>  <math>V = 60\text{mph}</math></p>	<p><b>-RPA-</b></p> <p>PI Sta 11+65.16  <math>\Delta = 2^\circ 05' 18.4''</math> (RT)  <math>D = 1' 17' 57.2''</math>  <math>L = 160.74'</math>  <math>T = 80.38'</math>  <math>R = 4,410.00'</math>  <math>SE = 0.04</math>  <math>V = 60\text{mph}</math></p>	<p>PI Sta 12+82.19  <math>\Delta s = 0^\circ 42' 52.5''</math>  <math>Ls = 110.00'</math>  <math>L = 73.33'</math>  <math>T = 36.67'</math>  <math>ST = 36.67'</math></p>	<p>PI Sta 14+28.86  <math>\Delta s = 0^\circ 23' 12.0''</math>  <math>Ls = 110.00'</math>  <math>L = 73.33'</math>  <math>T = 36.67'</math>  <math>ST = 36.67'</math></p>	<p>PI Sta 16+85.22  <math>\Delta = 3^\circ 05' 17.6''</math> (LT)  <math>D = 0^\circ 42' 10.9''</math>  <math>L = 439.28'</math>  <math>T = 219.69'</math>  <math>R = 8,150.00'</math>  <math>SE = NC</math>  <math>V = 50\text{mph}</math></p>	<p><b>-RPA-</b></p> <p>PI Sta 17+81.45  <math>\Delta s = 5^\circ 59' 58.4''</math>  <math>Ls = 200.00'</math>  <math>L = 133.41'</math>  <math>T = 66.74'</math>  <math>ST = 66.74'</math></p>	<p><b>-RPD-</b></p> <p>PI Sta 17+81.45  <math>\Delta = 2^\circ 51' 00.2''</math> (RT)  <math>D = 0^\circ 34' 22.6''</math>  <math>L = 497.43'</math>  <math>T = 248.77'</math>  <math>R = 10,000.00'</math>  <math>SE = NC</math>  <math>V = 55\text{mph}</math></p>
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FOR -L- PROFILE SEE SHT. 20  
 FOR -RPA- PROFILE SEE SHT. 27  
 FOR -RPA- PROFILE SEE SHT. 29  
 FOR -RPDA- PROFILE SEE SHT. 28  
 FOR -RPD- PROFILE SEE SHTS. 27 & 28

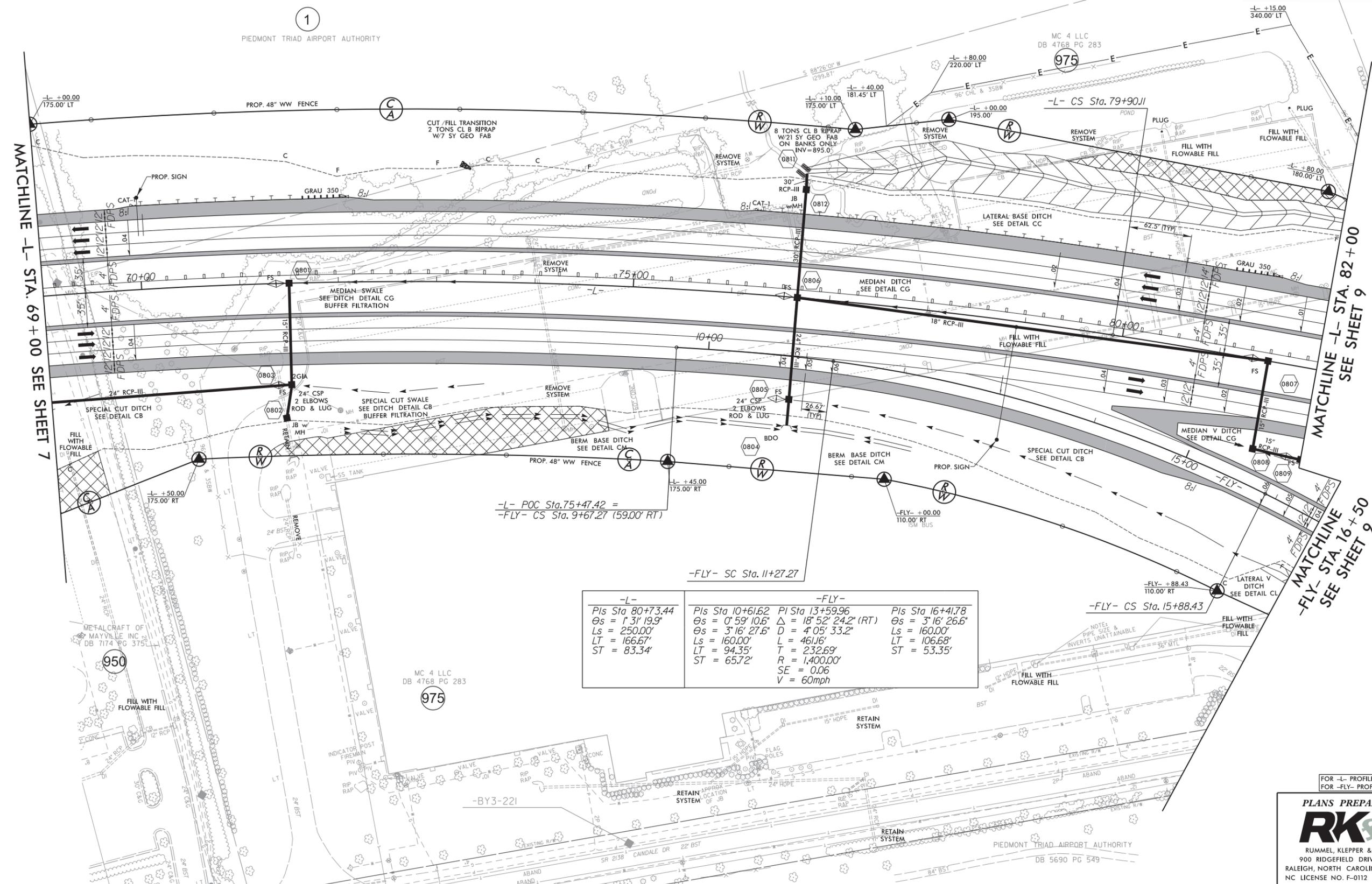
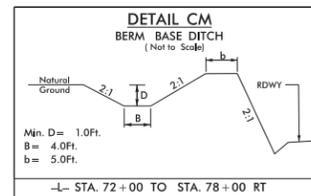
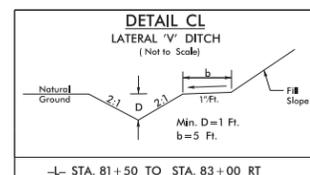
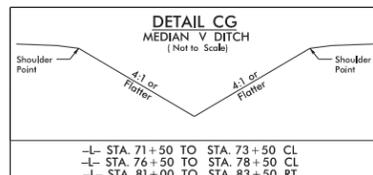
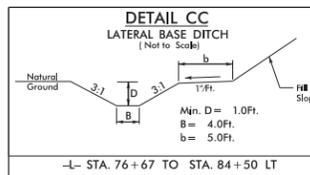
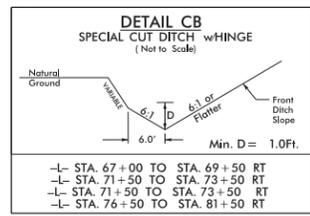
**PLANS PREPARED BY :**

**RK&K**

RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560







-L-	-FLY-	-FLY-	-FLY-
PIs Sta 80+73.44	PIs Sta 10+61.62	PI Sta 13+59.96	PIs Sta 16+41.78
$\Theta_s = 1^\circ 31' 19.9''$	$\Theta_s = 0^\circ 59' 10.6''$	$\Delta = 18^\circ 52' 24.2''$ (RT)	$\Theta_s = 3^\circ 16' 26.6''$
$L_s = 250.00'$	$\Theta_s = 3^\circ 16' 27.6''$	$D = 4^\circ 05' 33.2''$	$L_s = 160.00'$
$LT = 166.67'$	$L_s = 160.00'$	$L = 461.16'$	$LT = 106.68'$
$ST = 83.34'$	$LT = 94.35'$	$T = 232.69'$	$ST = 53.35'$
	$ST = 65.72'$	$R = 1,400.00'$	
		$SE = 0.06$	
		$V = 60\text{mph}$	

NOTE:  
PIPE SIZE &  
INVERTS UNATTAINABLE

FOR -L- PROFILE SEE SHTS. 21 & 22  
 FOR -FLY- PROFILE SEE SHT. 23

**PLANS PREPARED BY :**  
**RK&K**  
 RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560

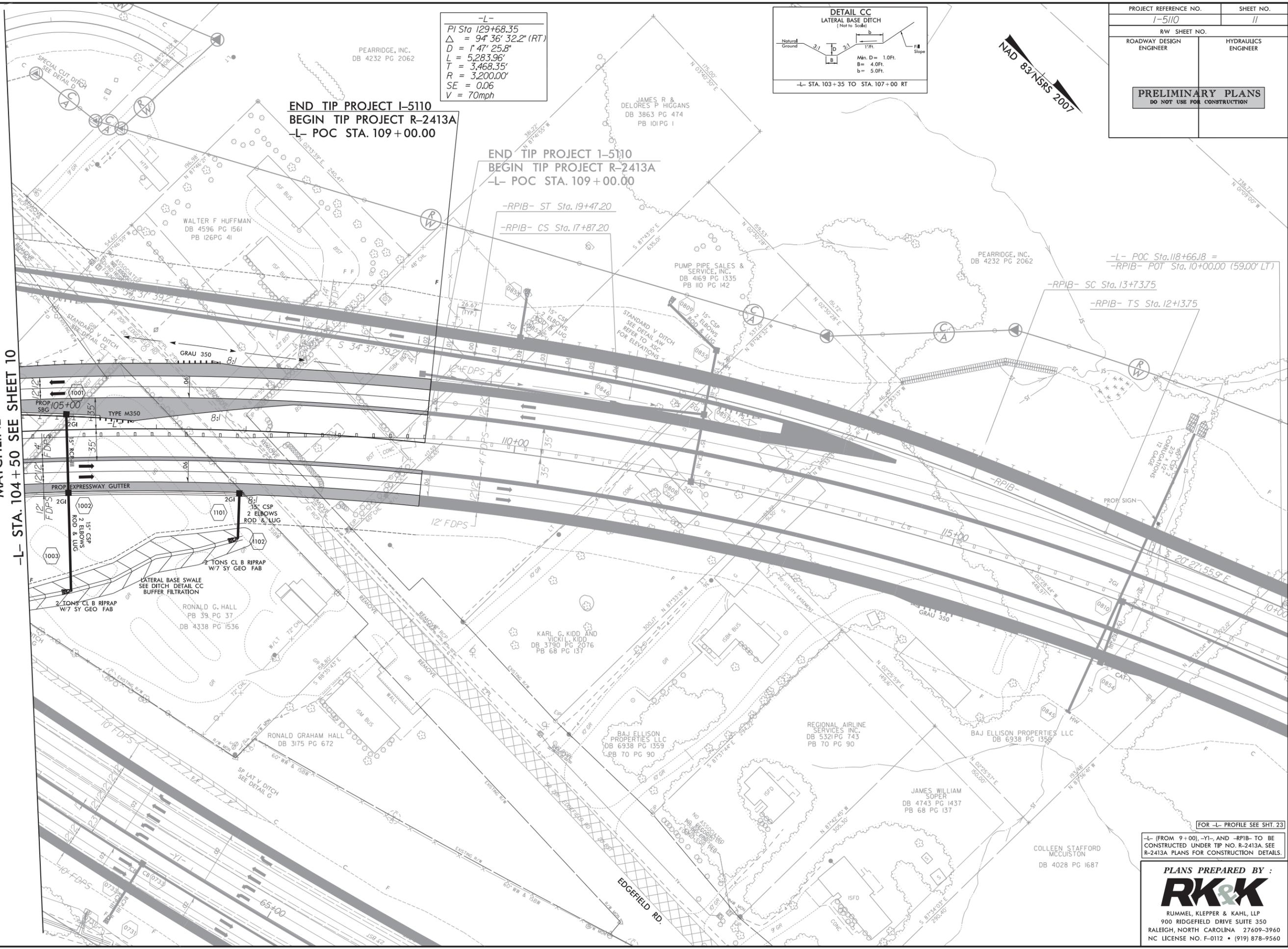
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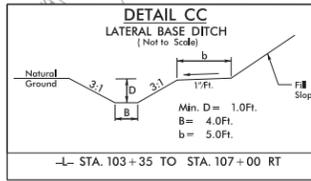


8/17/99  
10/22/2014  
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MATCHLINE  
-L- STA. 104+50 SEE SHEET 10



-L-  
PI Sta 129+68.35  
 $\Delta = 94' 36'' 32.2'' (RT)$   
 $D = 1' 47'' 25.8''$   
 $L = 5,283.96'$   
 $T = 3,468.35'$   
 $R = 3,200.00'$   
 $SE = 0.06$   
 $V = 70mph$



PROJECT REFERENCE NO. I-5110	SHEET NO. 11
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

NAD 83/NRS 2007

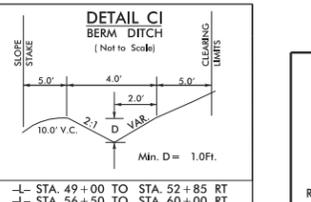
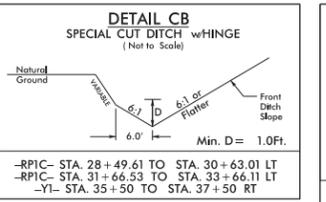
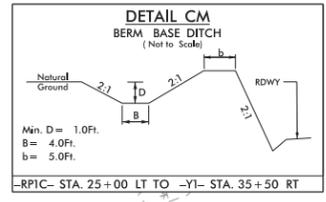
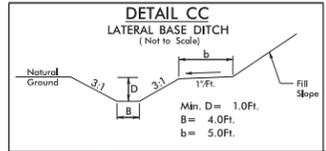
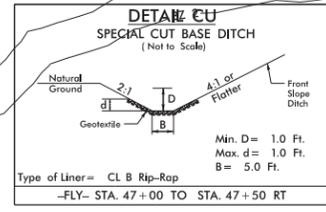
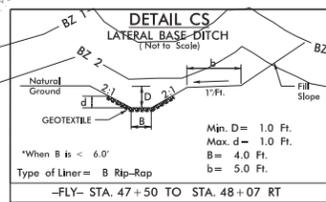
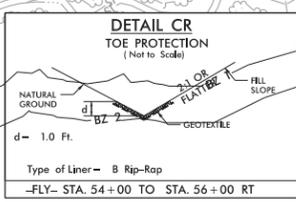
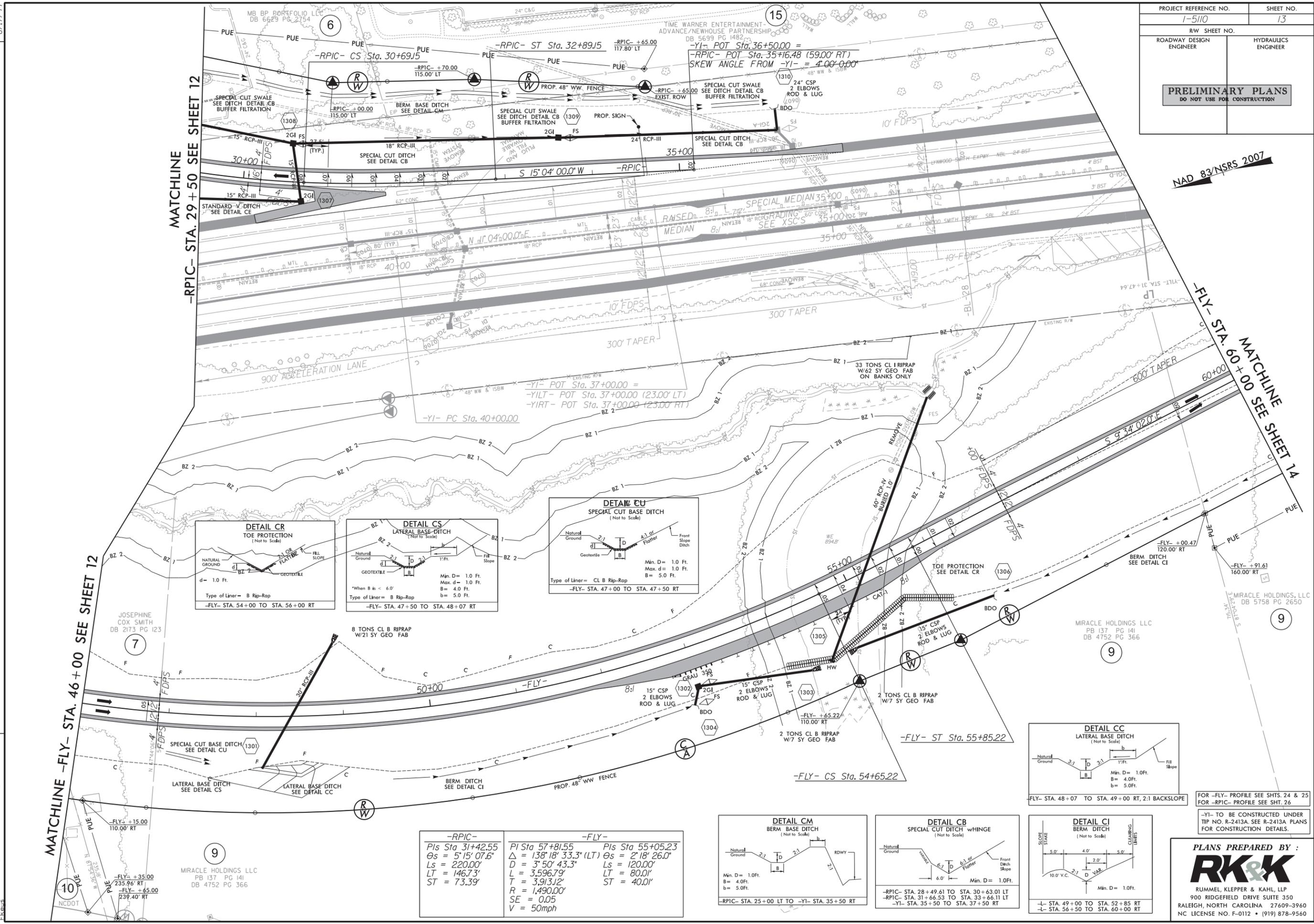
FOR -L- PROFILE SEE SHT. 23

-L- (FROM 9+00), -YI-, AND -RPIB- TO BE CONSTRUCTED UNDER TIP NO. R-2413A. SEE R-2413A PLANS FOR CONSTRUCTION DETAILS.

PLANS PREPARED BY :  
**RK&K**  
RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
NC LICENSE NO. F-0112 • (919) 878-9560



NAD 83/NSRS 2007



-RPIC-	-FLY-
PI Sta 31+42.55 Δs = 5'15" 07.6" Ls = 220.00' LT = 146.73' ST = 73.39'	PI Sta 57+81.55 Δ = 138'18" 33.3" (LT) D = 3'50" 43.3" Ls = 120.00' T = 3.91312' R = 1,490.00' SE = 0.05 V = 50mph
	PI Sta 55+05.23 Δs = 2'18" 26.0" Ls = 120.00' LT = 80.01' ST = 40.01'

-RPIC- STA. 25+00 LT TO -YI- STA. 35+50 RT  
-RPIC- STA. 28+49.61 TO STA. 30+63.01 LT  
-RPIC- STA. 31+66.53 TO STA. 33+66.11 LT  
-YI- STA. 35+50 TO STA. 37+50 RT

-L- STA. 49+00 TO STA. 52+85 RT  
-L- STA. 56+50 TO STA. 60+00 RT

FOR -FLY- PROFILE SEE SHTS. 24 & 25  
FOR -RPIC- PROFILE SEE SHT. 26  
-YI- TO BE CONSTRUCTED UNDER  
TIP NO. R-2413A. SEE R-2413A PLANS  
FOR CONSTRUCTION DETAILS.

**PLANS PREPARED BY :**  
**RK&K**  
RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
NC LICENSE NO. F-0112 • (919) 878-9560

REVISIONS  
ROW REVISION - 10/20/14 - REVISED PUE -RPIC- STA. 29+50 TO 34+65 LT

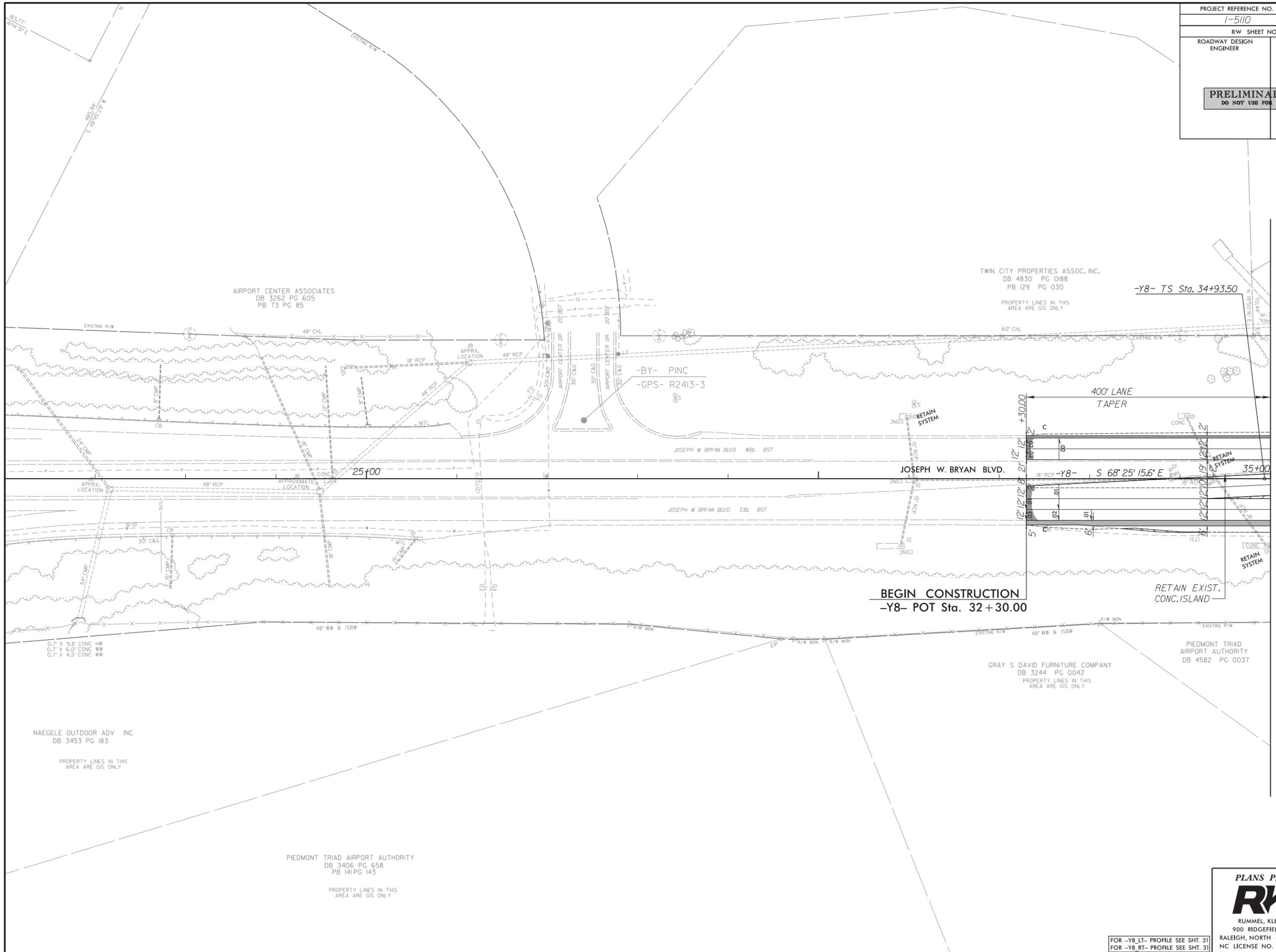
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PROJECT REFERENCE NO.	SHEET NO.
1-5110	15
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

MAD 8/15/RS 2017

MATCHLINE -Y8- STA. 35 + 00  
SEE SHEET 16



0.7' X 9.8' CONC HW  
0.7' X 6.0' CONC WW  
0.7' X 4.5' CONC WW

NAEGELE OUTDOOR ADV INC  
DB 3453 PG 183

PROPERTY LINES IN THIS  
AREA ARE GIS ONLY

PIEDMONT TRIAD AIRPORT AUTHORITY  
DB 3406 PG 658  
PB 141 PG 143

PROPERTY LINES IN THIS  
AREA ARE GIS ONLY

GRAY S DAVID FURNITURE COMPANY  
DB 3244 PG 0042  
PROPERTY LINES IN THIS  
AREA ARE GIS ONLY

PIEDMONT TRIAD  
AIRPORT AUTHORITY  
DB 4582 PG 0037

TWIN CITY PROPERTIES ASSOC. INC.  
DB 4830 PG 0188  
PB 129 PG 030

PROPERTY LINES IN THIS  
AREA ARE GIS ONLY

AIRPORT CENTER ASSOCIATES  
DB 3262 PG 605  
PB 73 PG 85

-Y8- TS Sta. 34+93.50

**BEGIN CONSTRUCTION**  
-Y8- POT Sta. 32 + 30.00

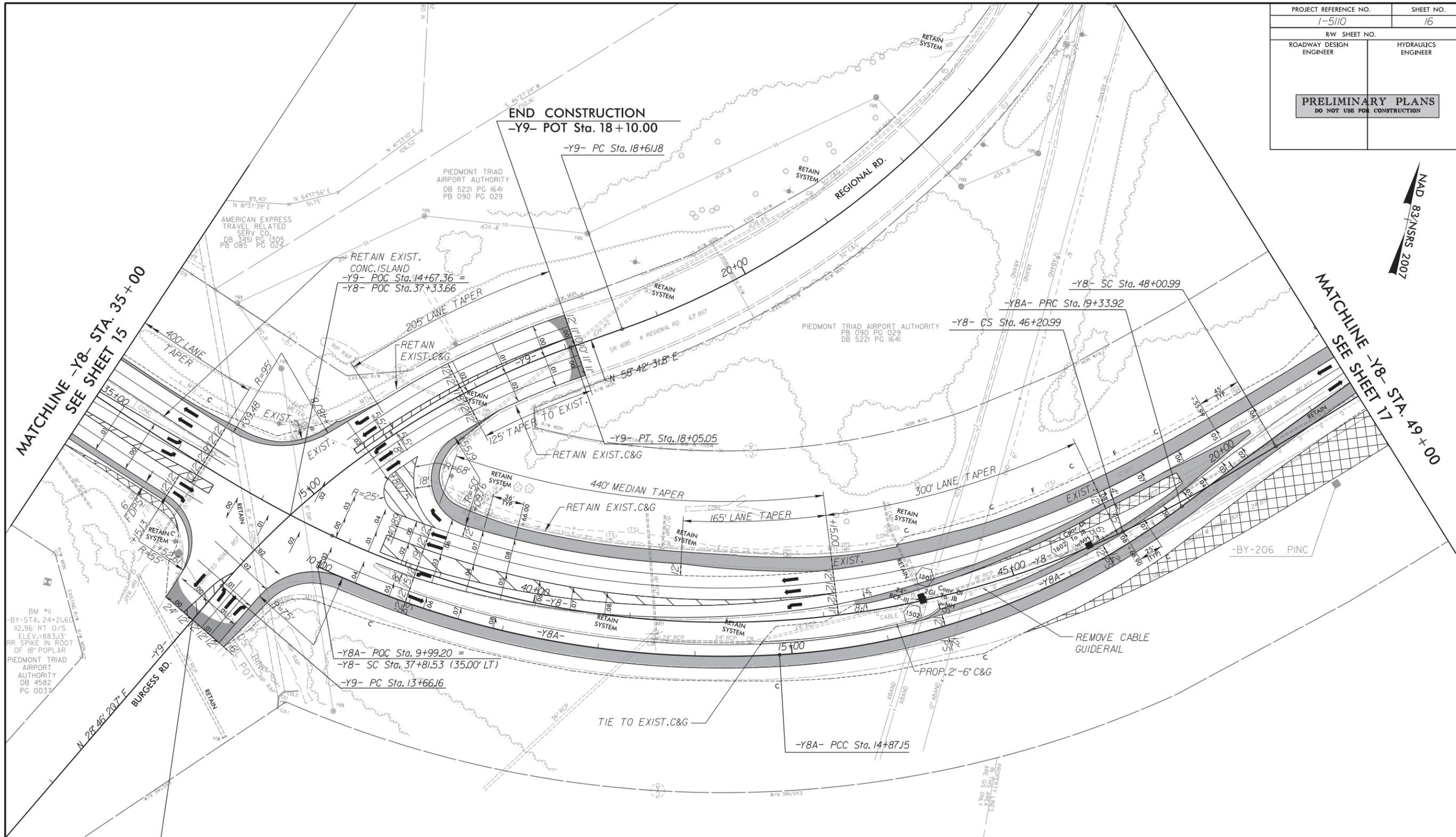
RETAIN EXIST.  
CONC. ISLAND

FOR -Y8\_LT- PROFILE SEE SHT. 31  
FOR -Y8\_RT- PROFILE SEE SHT. 31

PLANS PREPARED BY :

**RK&K**

RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
NC LICENSE NO. F-0112 • (919) 878-9560



BM #11  
BY-STA. 24+21.60  
112.96' RT O/S  
ELEV.=883.13'  
RR SPIKE IN FOOT  
OF 18" POPLAR  
PIEDMONT TRIAD  
AIRPORT  
AUTHORITY  
DB 4582  
PG 0037

**BEGIN CONSTRUCTION**  
-Y9- POT Sta. 13+20.00

PIEDMONT TRIAD AIRPORT AUTHORITY  
DB 4582 PG 0037  
PROPERTY LINES IN THIS  
AREA ARE GIS ONLY

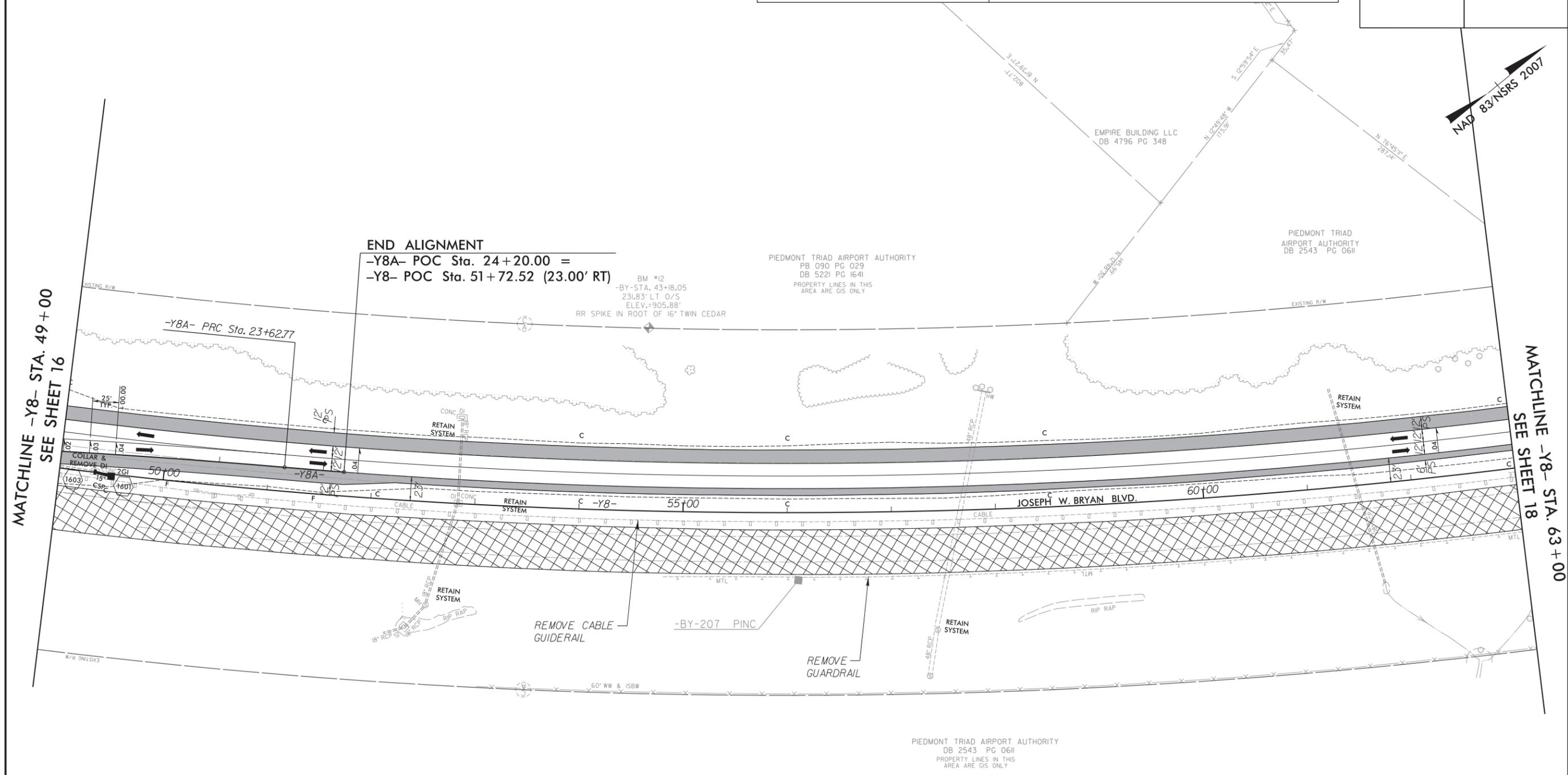
-Y8-		-Y8A-		-Y9-	
PI Sta 36+85.75	PI Sta 42+30.56	PI Sta 12+48.24	PI Sta 17+17.19	PI Sta 15+90.74	PI Sta 24+00.96
$\Delta = 8^{\circ} 38' 27.2"$	$\Delta = 50^{\circ} 22' 03.4" (LT)$	$\Delta = 28^{\circ} 14' 29.4" (LT)$	$\Delta = 33^{\circ} 40' 53.8" (LT)$	$\Delta = 29^{\circ} 56' 11.1" (RT)$	$\Delta = 64^{\circ} 42' 42.2" (LT)$
Ls = 288.03'	D = 6' 00' 00.0"	D = 5' 47' 16.3"	D = 7' 32' 20.1"	D = 6' 49' 15.3"	D = 6' 43' 29.5"
LT = 192.25'	L = 839.46'	L = 487.94'	L = 446.77'	L = 438.89'	L = 962.28'
ST = 96.22'	T = 449.03'	T = 249.03'	T = 230.05'	T = 224.58'	T = 539.78'
	R = 954.93'	R = 989.93'	R = 760.00'	R = 840.00'	R = 852.00'
	SE = 0.08	SE = 0.08	SE = 0.08	SE = 0.02	
	V = 50mph	V = 55mph	V = 50mph	V = 15mph (Stop.Cond.)	

FOR -Y8 LT- PROFILE SEE SHTS. 31 & 32  
FOR -Y8 RT- PROFILE SEE SHT. 31  
FOR -Y8A- PROFILE SEE SHT. 33  
FOR -Y9- PROFILE SEE SHT. 34

**PLANS PREPARED BY :**  
**RK&K**  
RUMMEL, KLEPPER & KAHL, LLP  
900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO. 1-5110	SHEET NO. 17
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

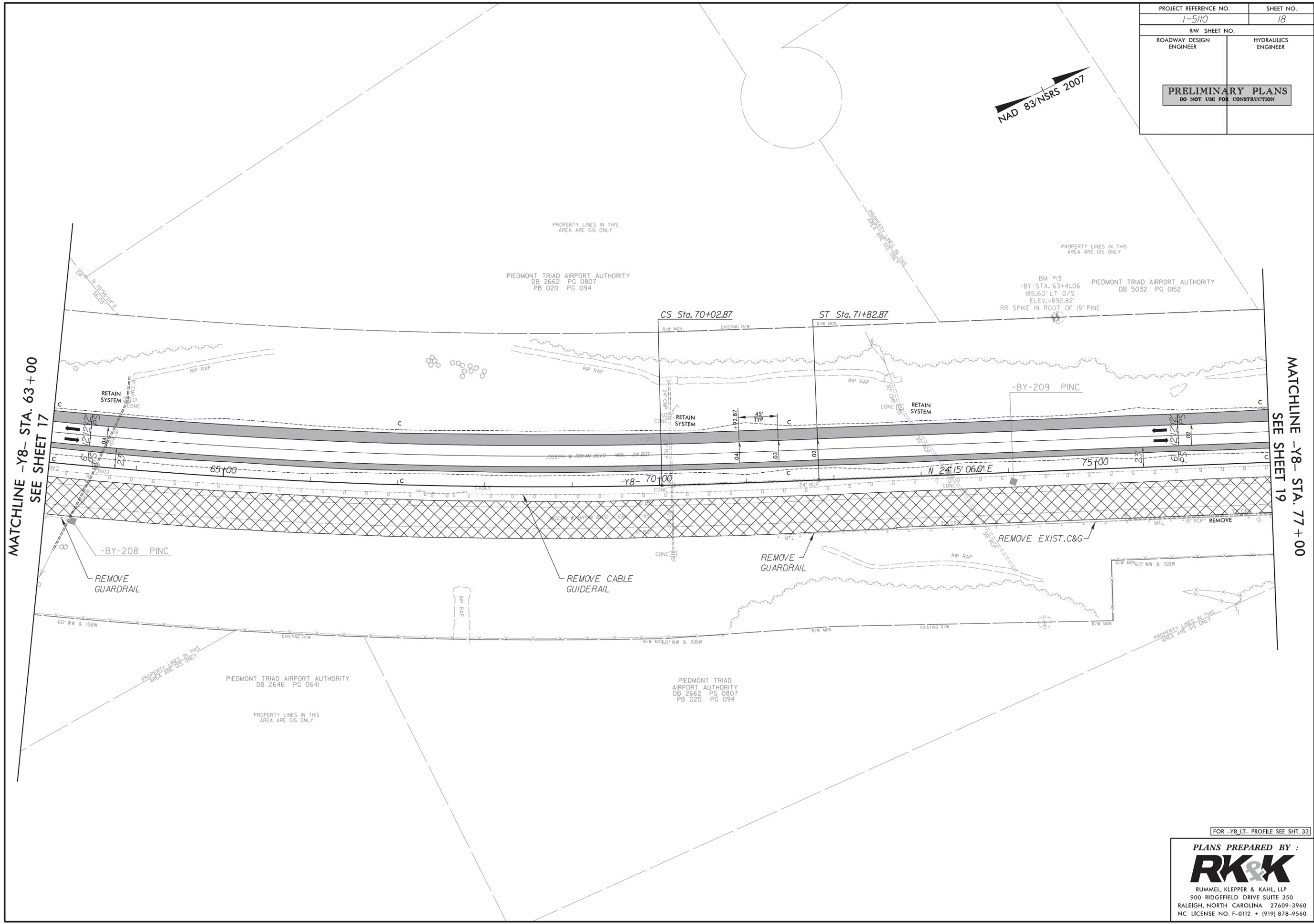
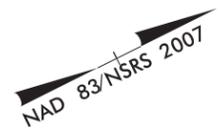
-Y8A-		-Y8-		
PI Sta 21+48.39	PI Sta 24+59.95	PIs Sta 46+81.04	PI Sta 59+15.68	PIs Sta 70+62.88
$\Delta = 3^{\circ}00'53.6"$ (RT)	$\Delta = 1^{\circ}57'05.1"$ (LT)	$\Theta_s = 5^{\circ}24'00.0"$	$\Delta = 22^{\circ}01'07.8"$ (LT)	$\Theta_s = 0^{\circ}54'00.0"$
D = 0'42'10.9"	D = 1'00'14.5"	Ls = 180.00'	D = 1'00'00.0"	Ls = 180.00'
L = 428.85'	L = 194.36'	LT = 120.06'	L = 2,201.88'	LT = 120.00'
T = 214.47'	T = 97.19'	ST = 60.05'	T = 1,114.69'	ST = 60.00'
R = 8,150.00'	R = 5,706.58'		R = 5,729.58'	
SE = NC	SE = 0.04		SE = 0.04	
V = 50mph	V = 70mph		V = 75mph	



FOR -Y8 LT- PROFILE SEE SHTS. 32 & 33

PLANS PREPARED BY :  
**RK&K**  
 RUMMEL, KLEPPER & KAHL, LLP  
 900 RIDGEFIELD DRIVE SUITE 350  
 RALEIGH, NORTH CAROLINA 27609-3960  
 NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
1-5110	18
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

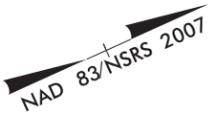


FOR -Y8 LT- PROFILE SEE SHT. 33

PLANS PREPARED BY :

**RK&K**

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900 RIDGEFIELD DRIVE SUITE 350  
RALEIGH, NORTH CAROLINA 27609-3960  
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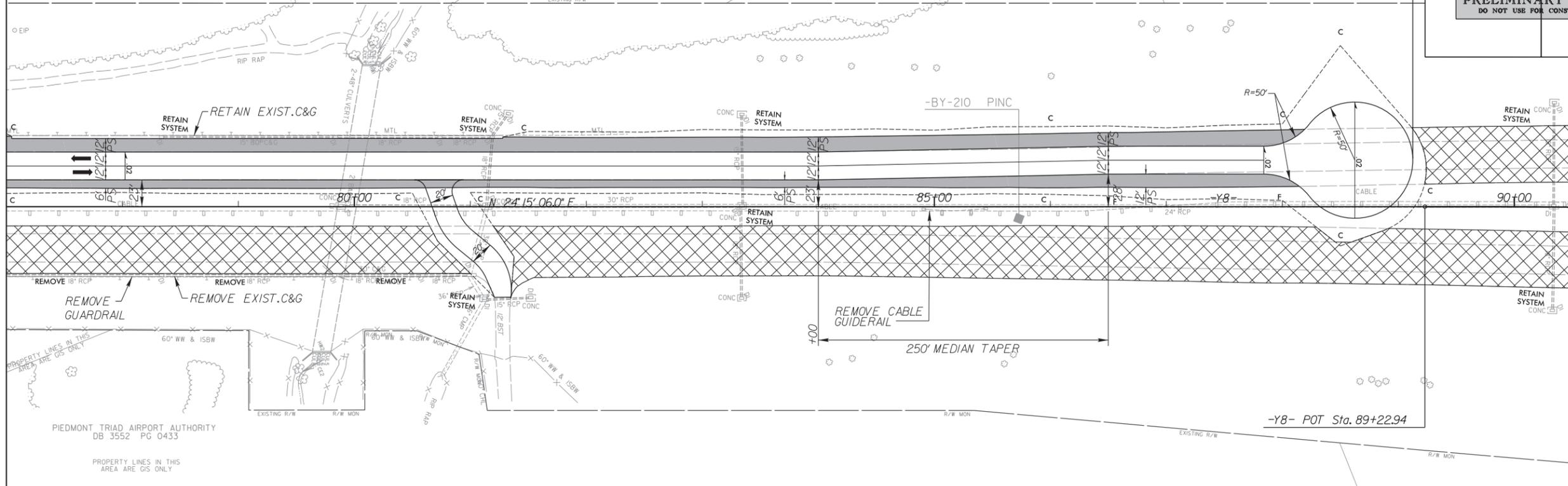
-Y8-  
 Pts Sta 92+43.20  
 $\theta_s = 7^\circ 11' 58.1''$   
 $L_s = 480.00'$   
 $LT = 320.27'$   
 $ST = 160.24'$

PIEDMONT TRIAD AIRPORT AUTHORITY  
 DB 3552 PG 0433

PROJECT REFERENCE NO. 1-5110	SHEET NO. 19
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

**END CONSTRUCTION**  
 -Y8- POT Sta. 89+12.48

MATCHLINE -Y8- STA. 77+00  
SEE SHEET 18

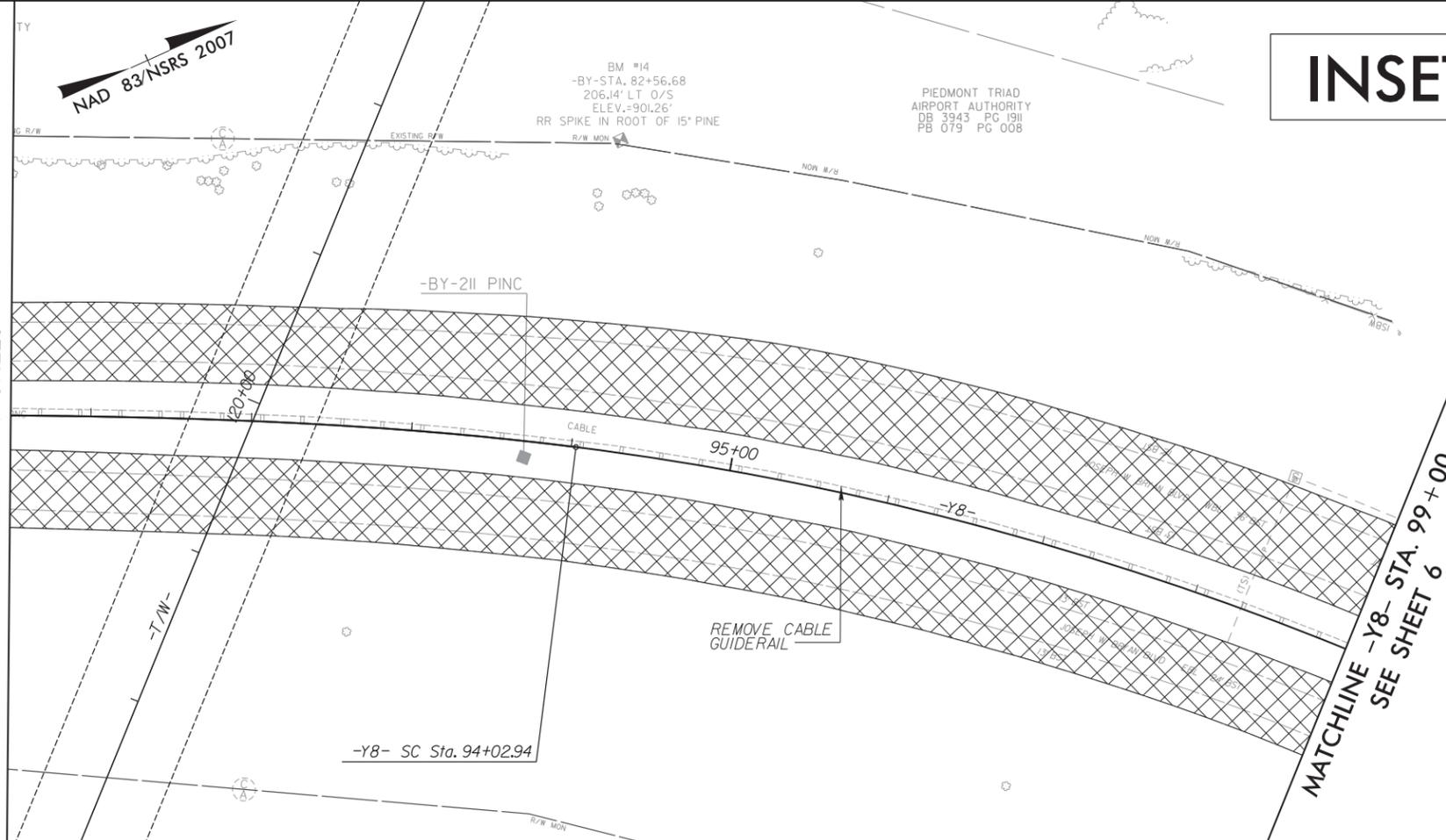


MATCHLINE -Y8- STA. 90+50  
SEE THIS SHEET



**INSET**

MATCHLINE -Y8- STA. 90+50  
SEE THIS SHEET



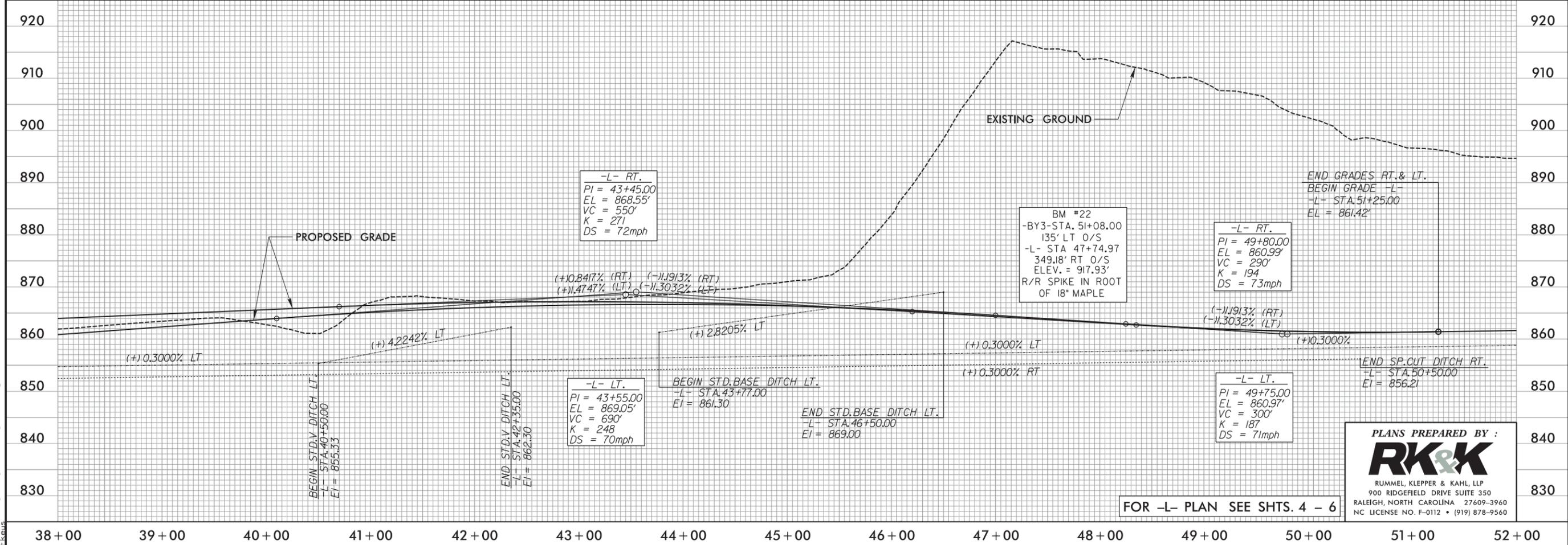
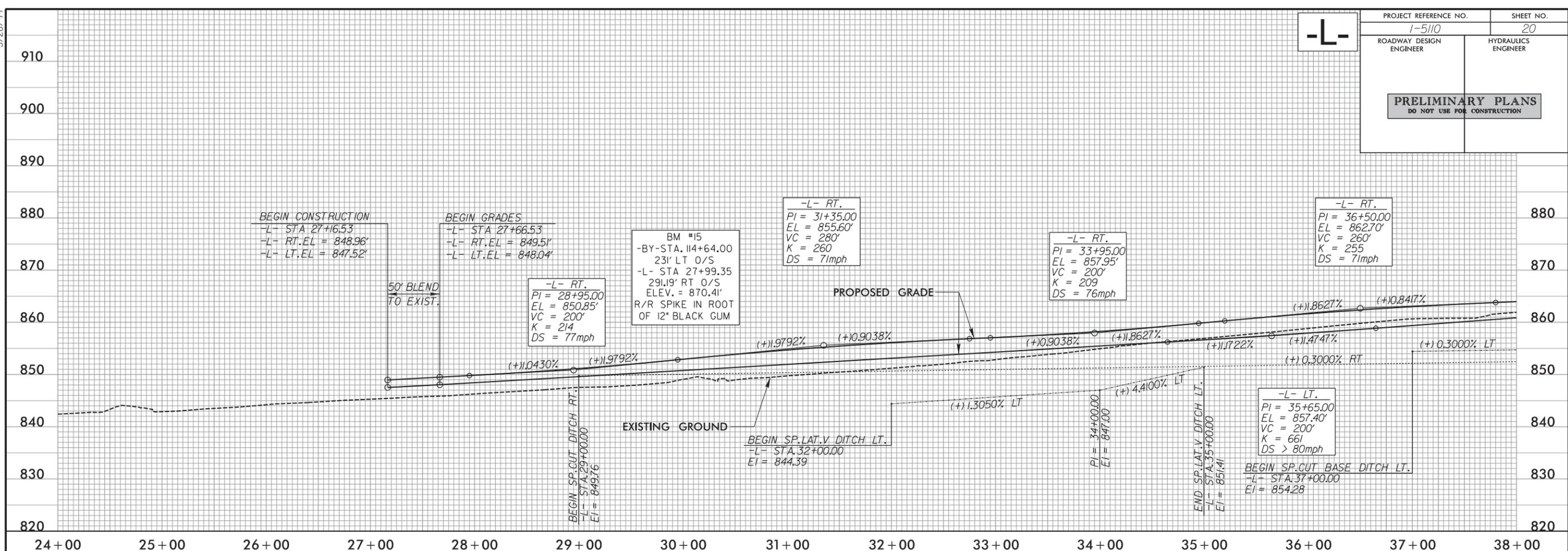
MATCHLINE -Y8- STA. 99+00  
SEE SHEET 6

PLANS PREPARED BY :  
**RK&K**  
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FOR -Y8 LT- PROFILE SEE SHT. 33

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PROJECT REFERENCE NO. 1-5110	SHEET NO. 20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



FOR -L- PLAN SEE SHTS. 4 - 6

**PLANS PREPARED BY :**

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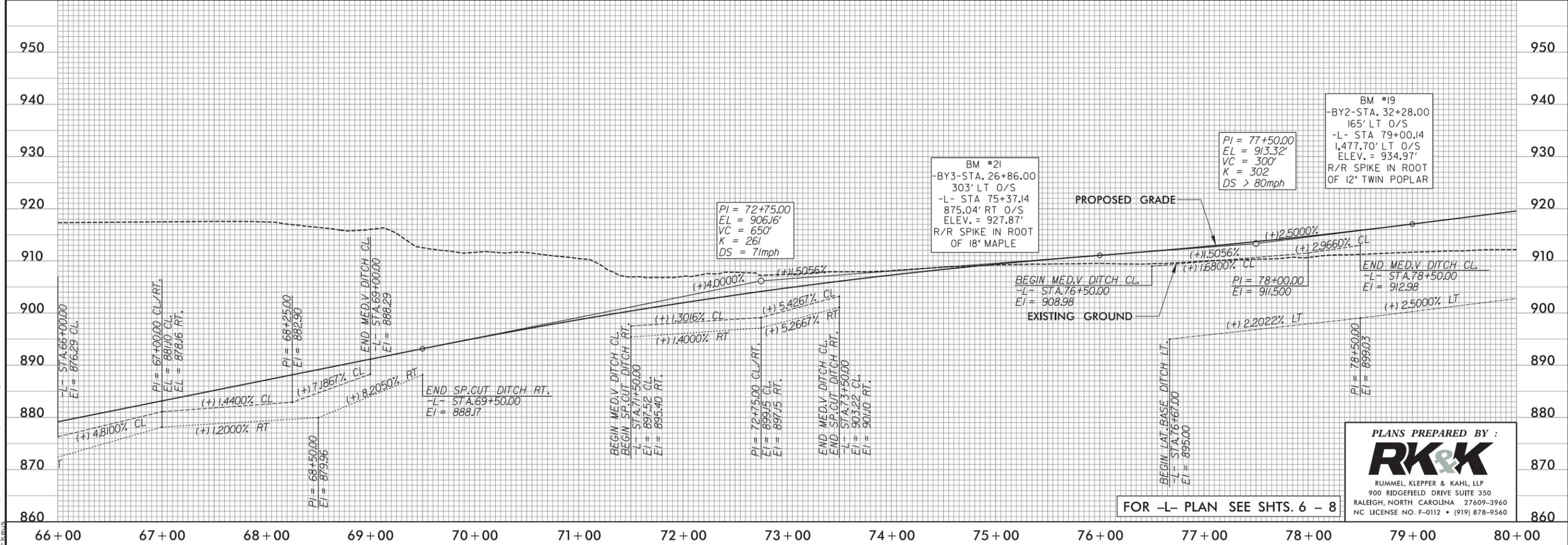
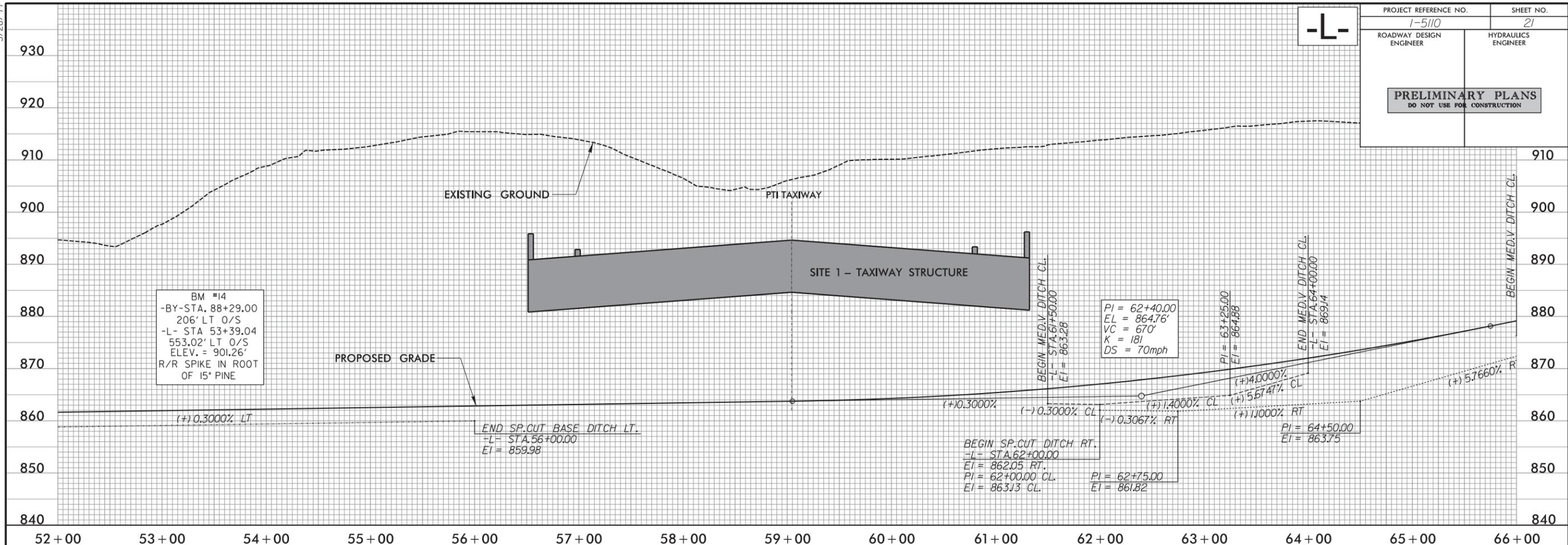
RUMMEL, KLEPPER & KAHL, LLP  
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Elev

5/28/99

-L-

PROJECT REFERENCE NO. 1-5110	SHEET NO. 21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



BM #19  
-BY2-STA. 32+28.00  
165' LT O/S  
-L- STA 79+00.14  
1,477.70' LT O/S  
ELEV. = 934.97'  
R/R SPIKE IN ROOT  
OF 12' TWIN POPLAR

BM #21  
-BY3-STA. 26+86.00  
303' LT O/S  
-L- STA 75+37.14  
875.04' RT O/S  
ELEV. = 927.87'  
R/R SPIKE IN ROOT  
OF 18' MAPLE

**PLANS PREPARED BY :**  
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FOR -L- PLAN SEE SHTS. 6 - 8

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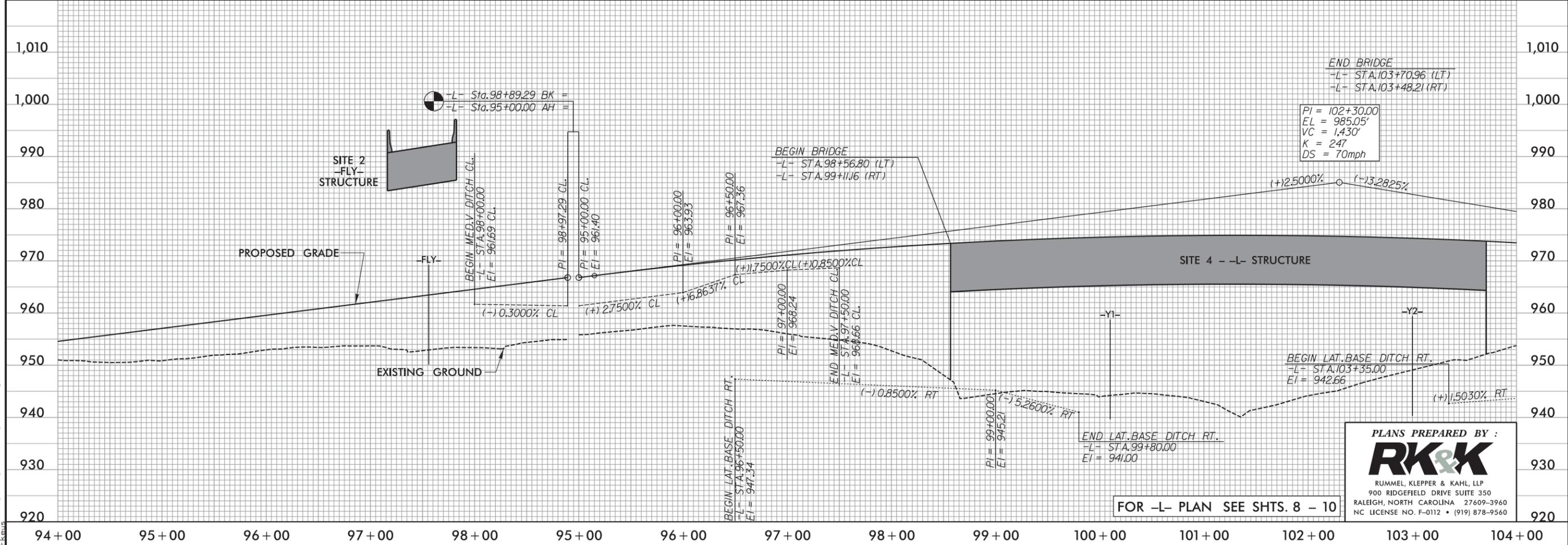
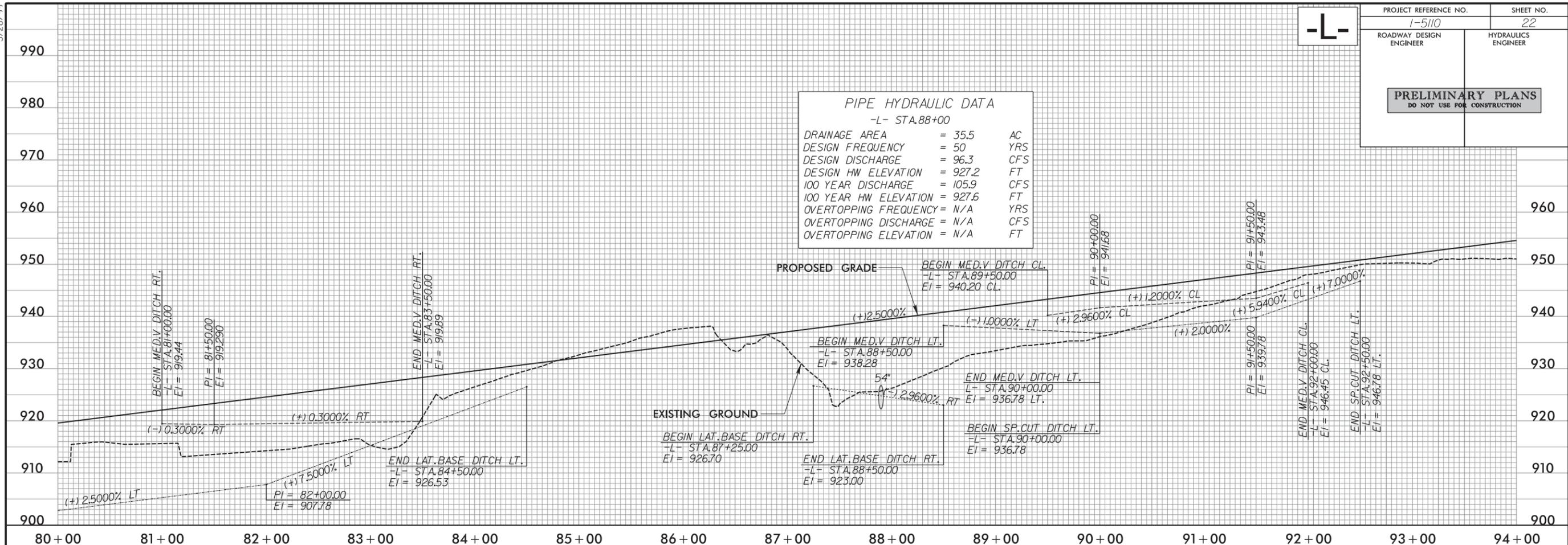
5/28/99

-L-

PROJECT REFERENCE NO. 1-5110	SHEET NO. 22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

**PIPE HYDRAULIC DATA**  
-L- STA.88+00

DRAINAGE AREA	= 35.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 96.3	CFS
DESIGN HW ELEVATION	= 927.2	FT
100 YEAR DISCHARGE	= 105.9	CFS
100 YEAR HW ELEVATION	= 927.6	FT
OVERTOPPING FREQUENCY	= N/A	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= N/A	FT



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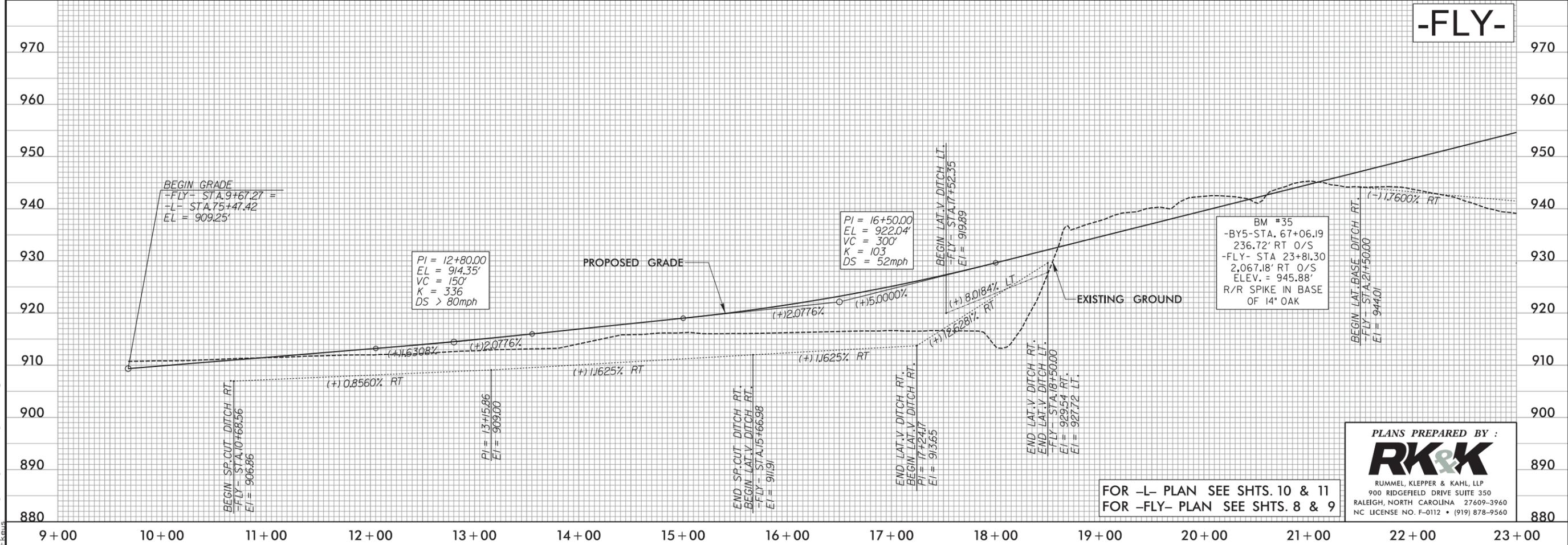
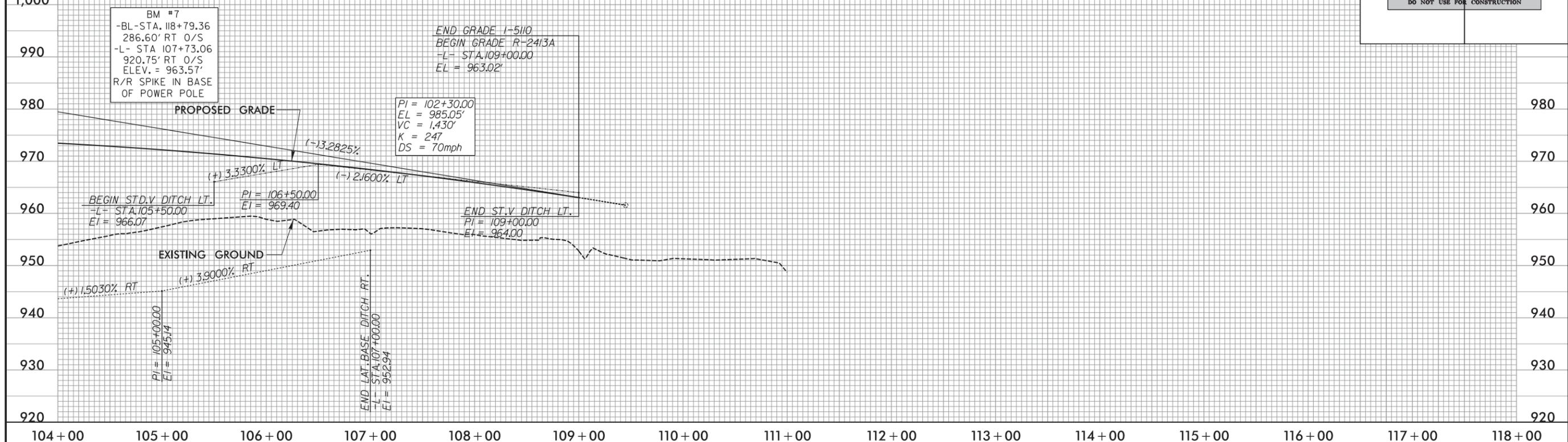
FOR -L- PLAN SEE SHTS. 8 - 10

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-L-

PROJECT REFERENCE NO. 1-5110	SHEET NO. 23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



-FLY-

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FOR -L- PLAN SEE SHTS. 10 & 11  
 FOR -FLY- PLAN SEE SHTS. 8 & 9

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 5/28/2014  
 R. Kennedy

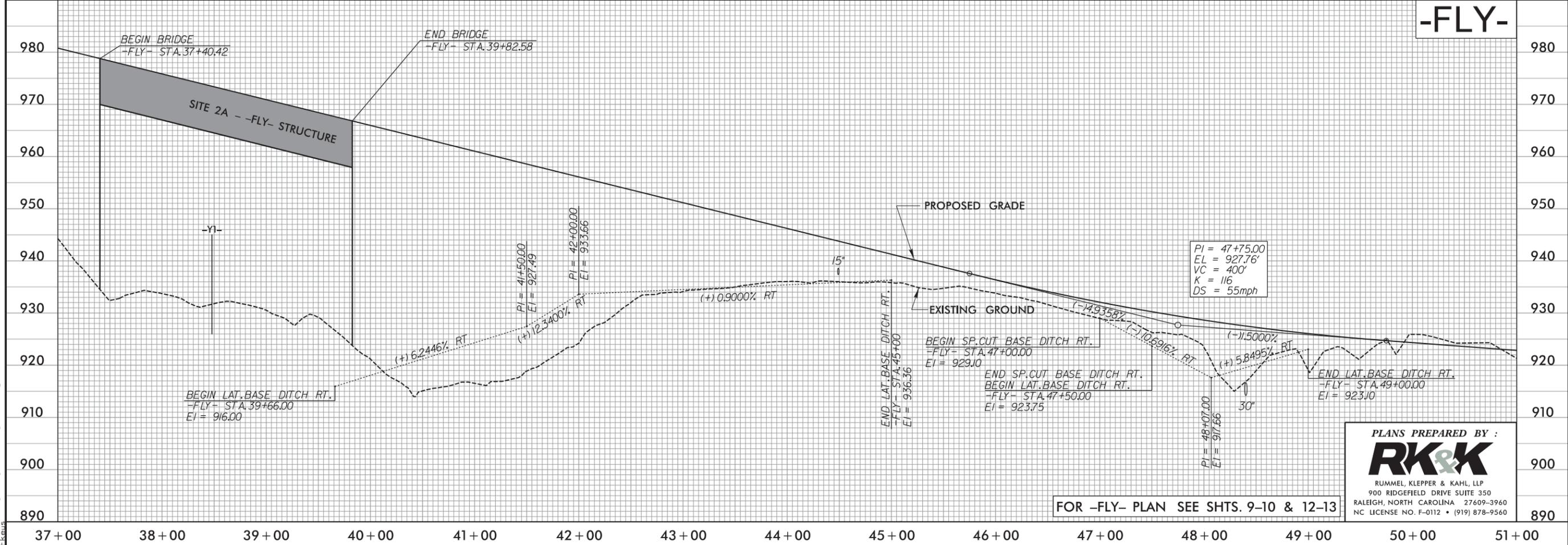
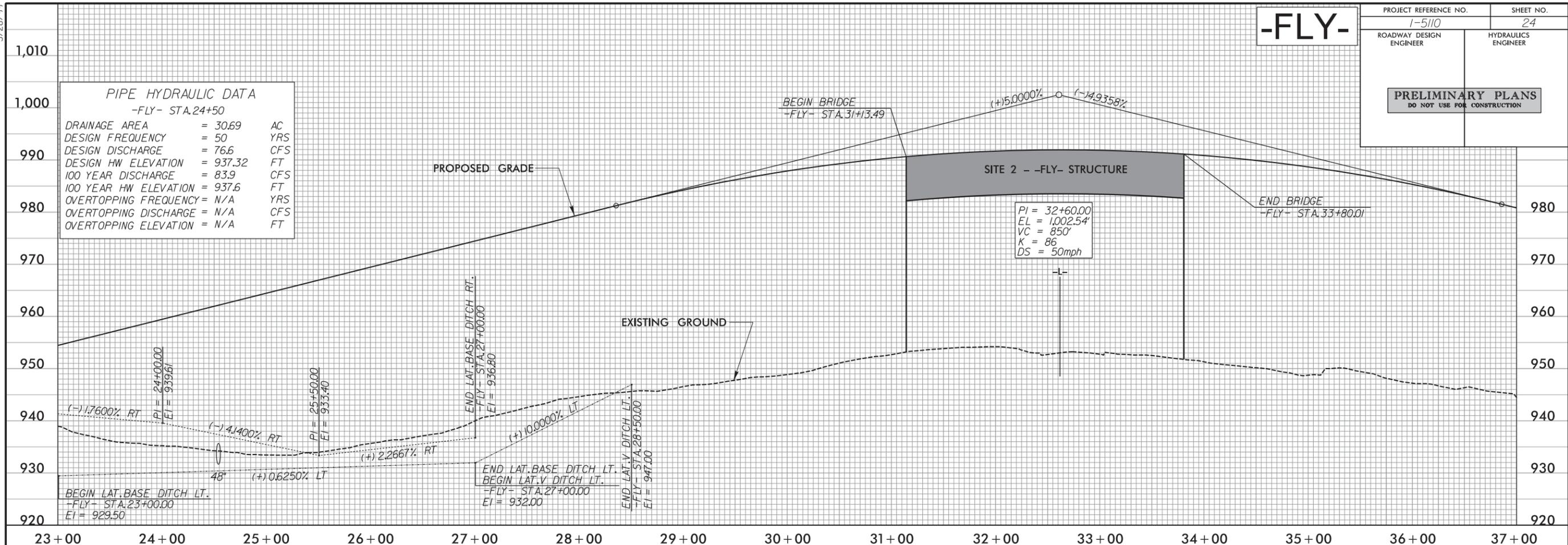
5/28/99

**-FLY-**

PROJECT REFERENCE NO. 1-5110	SHEET NO. 24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

**PIPE HYDRAULIC DATA**  
-FLY- STA.24+50

DRAINAGE AREA	= 30.69	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 76.6	CFS
DESIGN HW ELEVATION	= 937.32	FT
100 YEAR DISCHARGE	= 83.9	CFS
100 YEAR HW ELEVATION	= 937.6	FT
OVERTOPPING FREQUENCY	= N/A	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= N/A	FT



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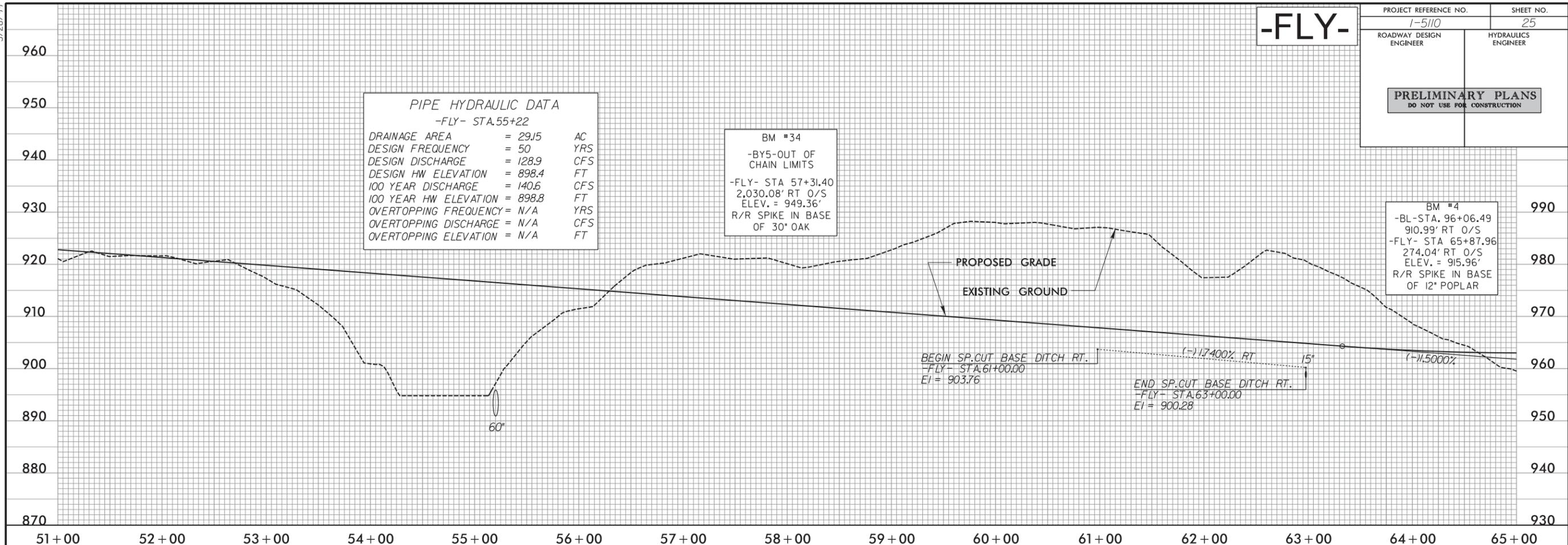
FOR -FLY- PLAN SEE SHTS. 9-10 & 12-13

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**-FLY-**

PROJECT REFERENCE NO. 1-5110	SHEET NO. 25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



**PIPE HYDRAULIC DATA**  
-FLY- STA.55+22

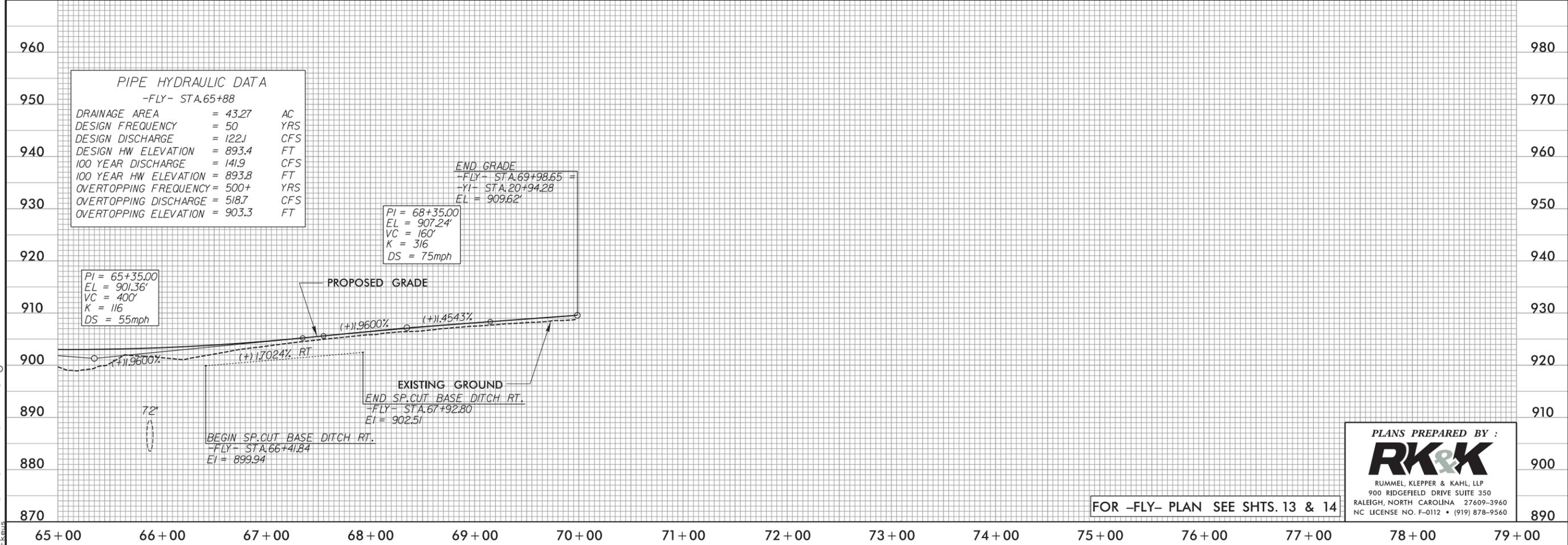
DRAINAGE AREA	= 29.15	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 128.9	CFS
DESIGN HW ELEVATION	= 898.4	FT
100 YEAR DISCHARGE	= 140.6	CFS
100 YEAR HW ELEVATION	= 898.8	FT
OVERTOPPING FREQUENCY	= N/A	YRS
OVERTOPPING DISCHARGE	= N/A	CFS
OVERTOPPING ELEVATION	= N/A	FT

**BM #34**  
-BY5-OUT OF CHAIN LIMITS  
-FLY- STA 57+31.40  
2,030.08' RT O/S  
ELEV. = 949.36'  
R/R SPIKE IN BASE OF 30" OAK

**BM #4**  
-BL-STA. 96+06.49  
910.99' RT O/S  
-FLY- STA 65+87.96  
274.04' RT O/S  
ELEV. = 915.96'  
R/R SPIKE IN BASE OF 12" POPLAR

BEGIN SP.CUT BASE DITCH RT.  
-FLY- STA.61+00.00  
EI = 903.76

END SP.CUT BASE DITCH RT.  
-FLY- STA.63+00.00  
EI = 900.28



**PIPE HYDRAULIC DATA**  
-FLY- STA.65+88

DRAINAGE AREA	= 43.27	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 122.1	CFS
DESIGN HW ELEVATION	= 893.4	FT
100 YEAR DISCHARGE	= 141.9	CFS
100 YEAR HW ELEVATION	= 893.8	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 518.7	CFS
OVERTOPPING ELEVATION	= 903.3	FT

**PI = 68+35.00**  
EL = 907.24'  
VC = 160'  
K = 316  
DS = 75mph

**PI = 65+35.00**  
EL = 901.36'  
VC = 400'  
K = 116  
DS = 55mph

**END GRADE**  
-FLY- STA.69+98.65 =  
-YI- STA.20+94.28  
EL = 909.62'

BEGIN SP.CUT BASE DITCH RT.  
-FLY- STA.66+41.84  
EI = 899.94

END SP.CUT BASE DITCH RT.  
-FLY- STA.67+92.80  
EI = 902.51

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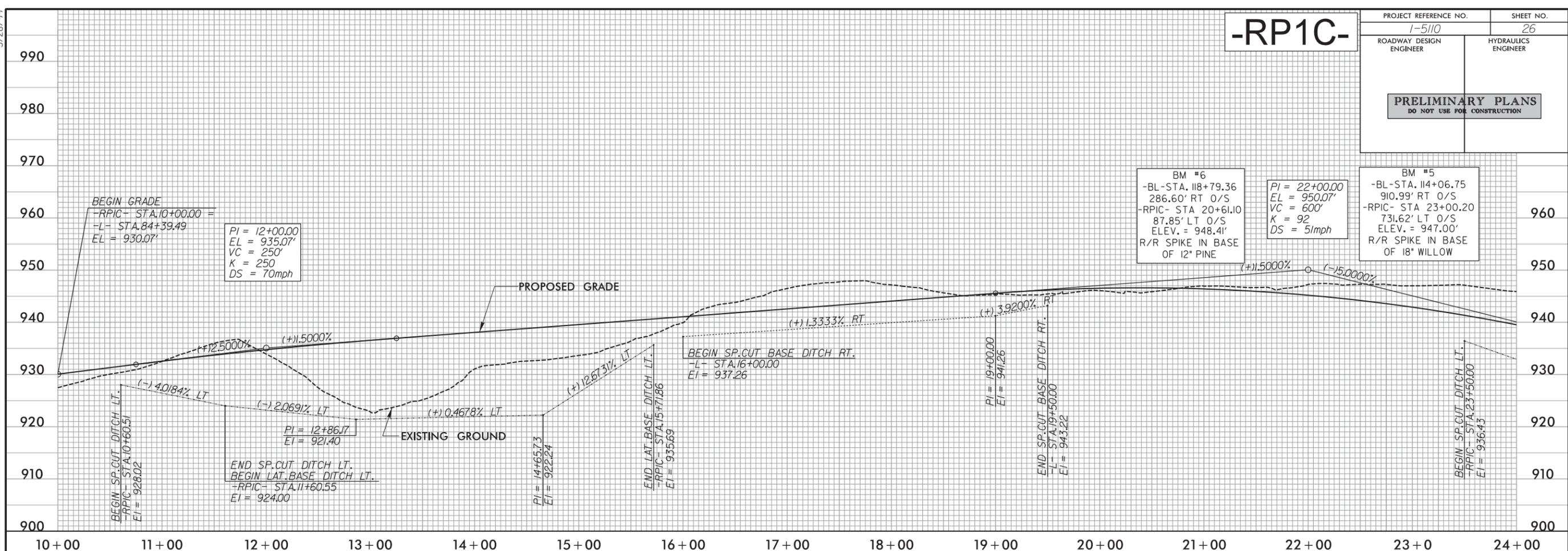
FOR -FLY- PLAN SEE SHTS. 13 & 14

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# -RP1C-

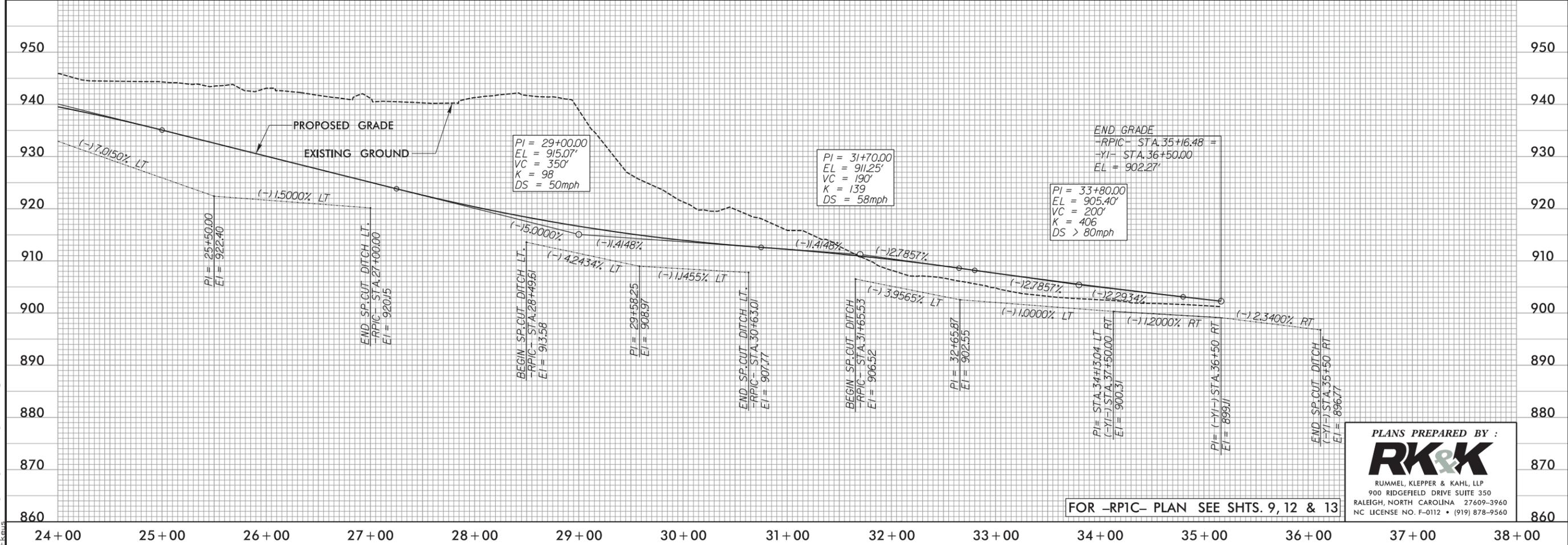
PROJECT REFERENCE NO. I-5110	SHEET NO. 26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



BM #6  
-BL-STA. 118+79.36  
286.60' RT O/S  
-RPIC- STA 20+61.10  
87.85' LT O/S  
ELEV. = 948.41'  
R/R SPIKE IN BASE  
OF 12" PINE

PI = 22+00.00  
EL = 950.07'  
VC = 600'  
K = 92  
DS = 51mph

BM #5  
-BL-STA. 114+06.75  
910.99' RT O/S  
-RPIC- STA 23+00.20  
731.62' LT O/S  
ELEV. = 947.00'  
R/R SPIKE IN BASE  
OF 18" WILLOW



END GRADE  
-RPIC- STA. 35+16.48 =  
-YI- STA. 36+50.00  
EL = 902.27'

PI = 33+80.00  
EL = 905.40'  
VC = 200'  
K = 406  
DS > 80mph

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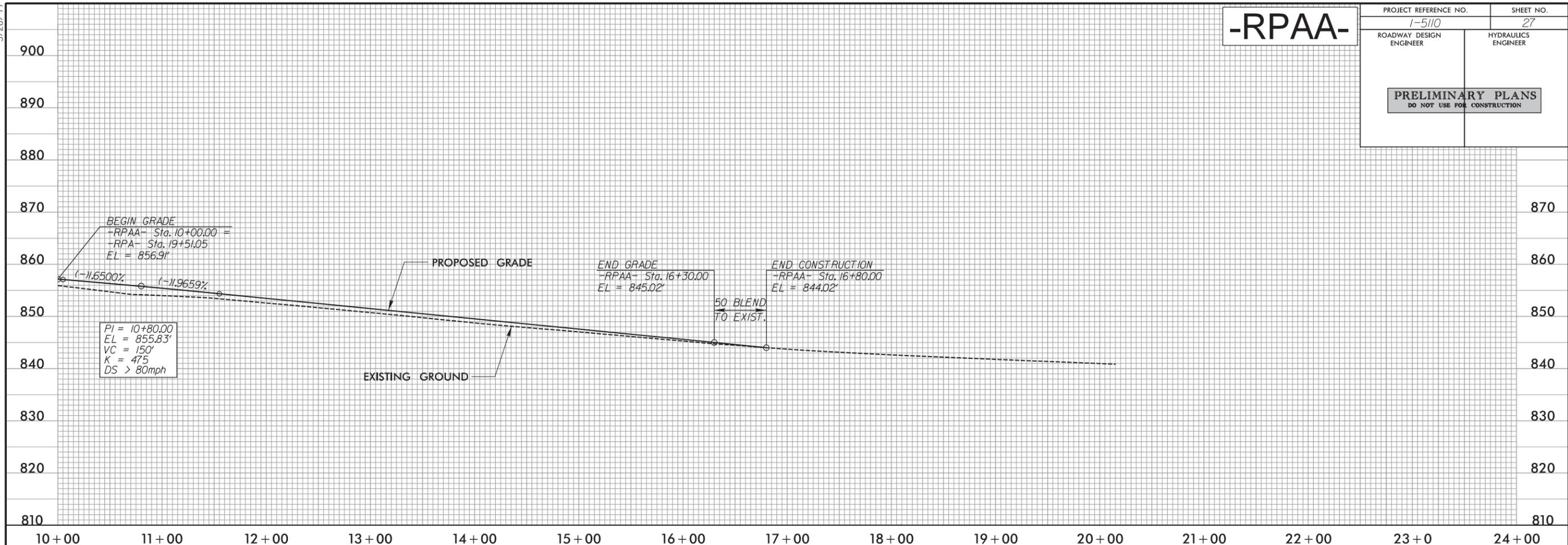
FOR -RPIC- PLAN SEE SHTS. 9, 12 & 13

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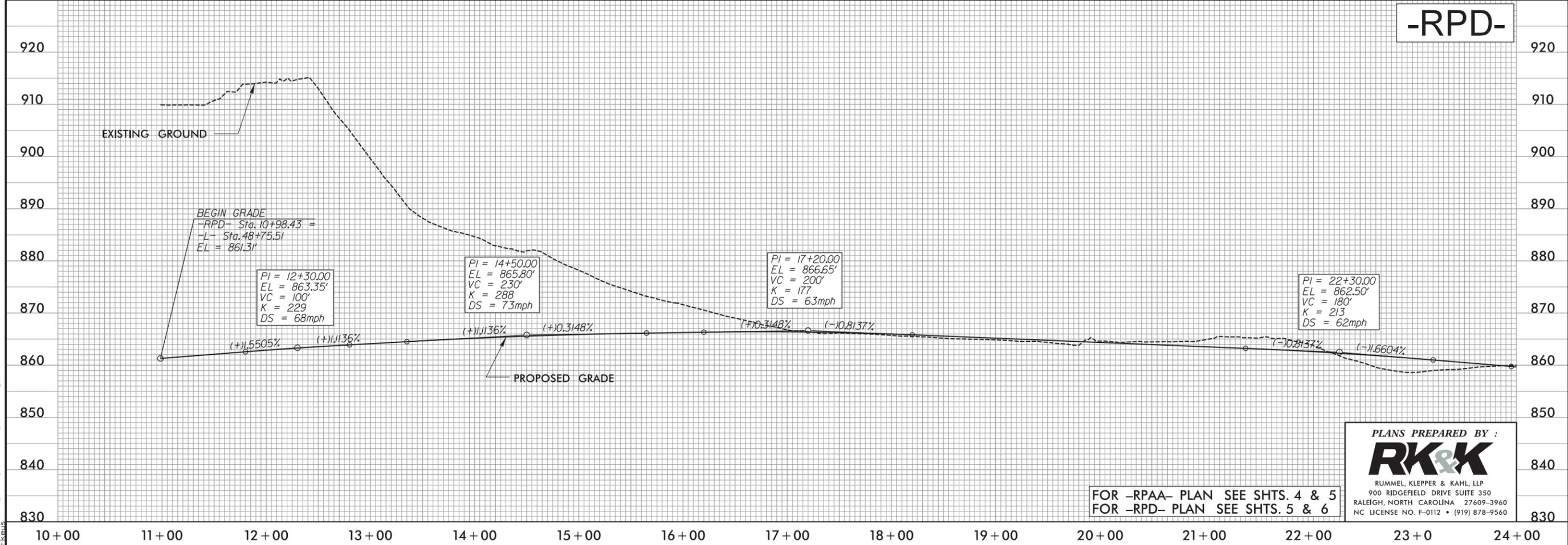
5/28/99

# -RPAA-

PROJECT REFERENCE NO. 1-5110	SHEET NO. 27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



# -RPD-



FOR -RPAA- PLAN SEE SHTS. 4 & 5  
 FOR -RPD- PLAN SEE SHTS. 5 & 6

PLANS PREPARED BY :

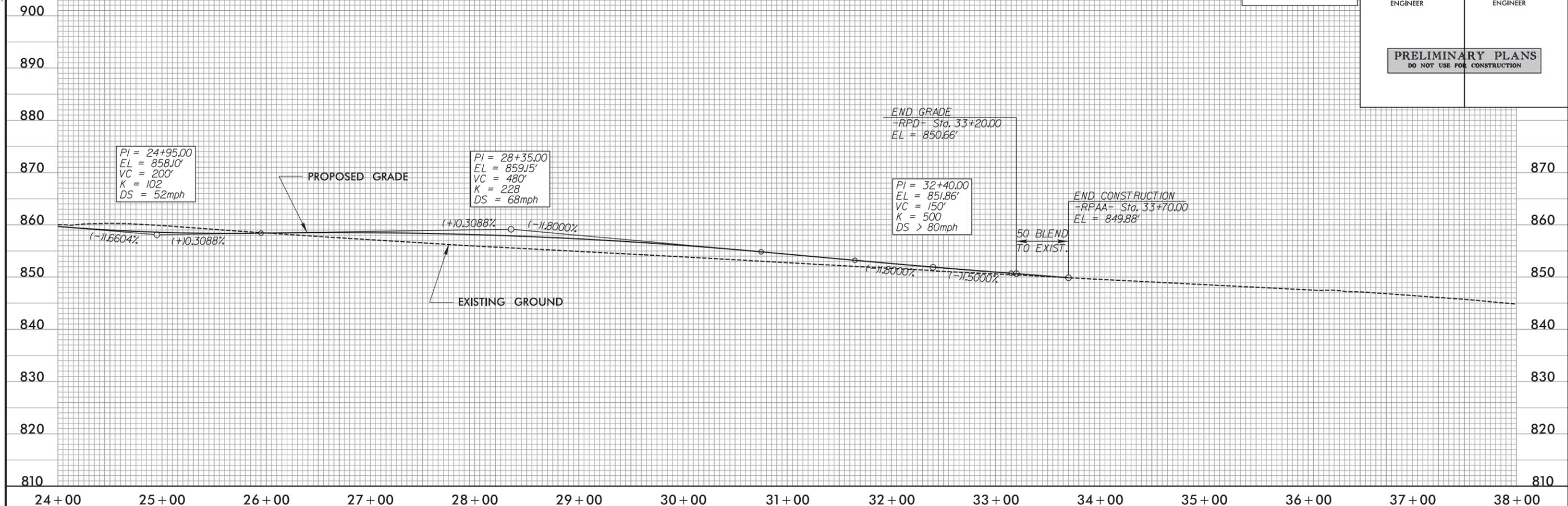
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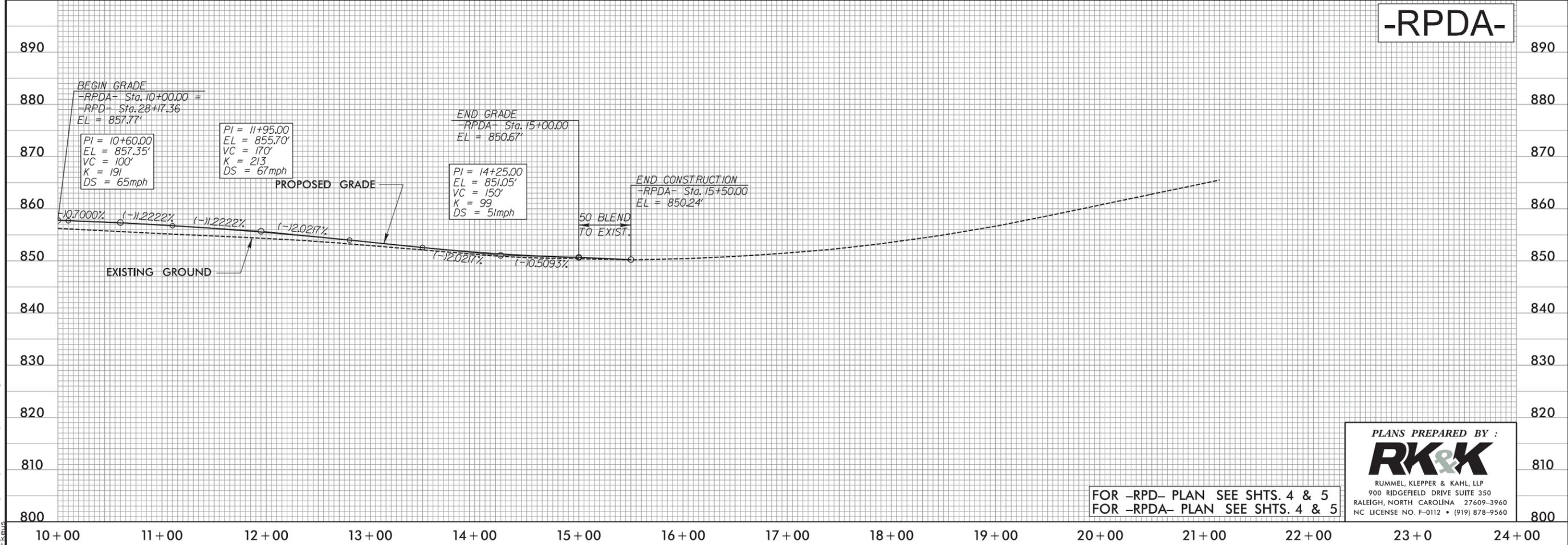
5/28/99

**-RPD-**

PROJECT REFERENCE NO. 1-5110	SHEET NO. 28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



**-RPDA-**



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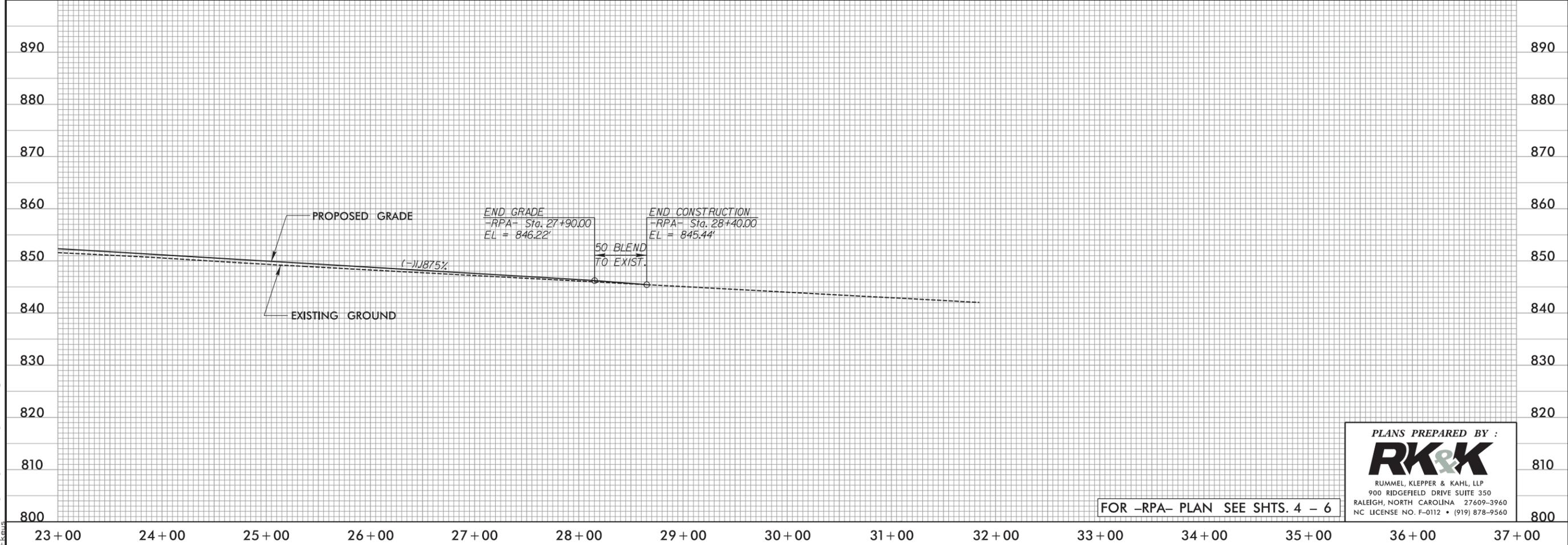
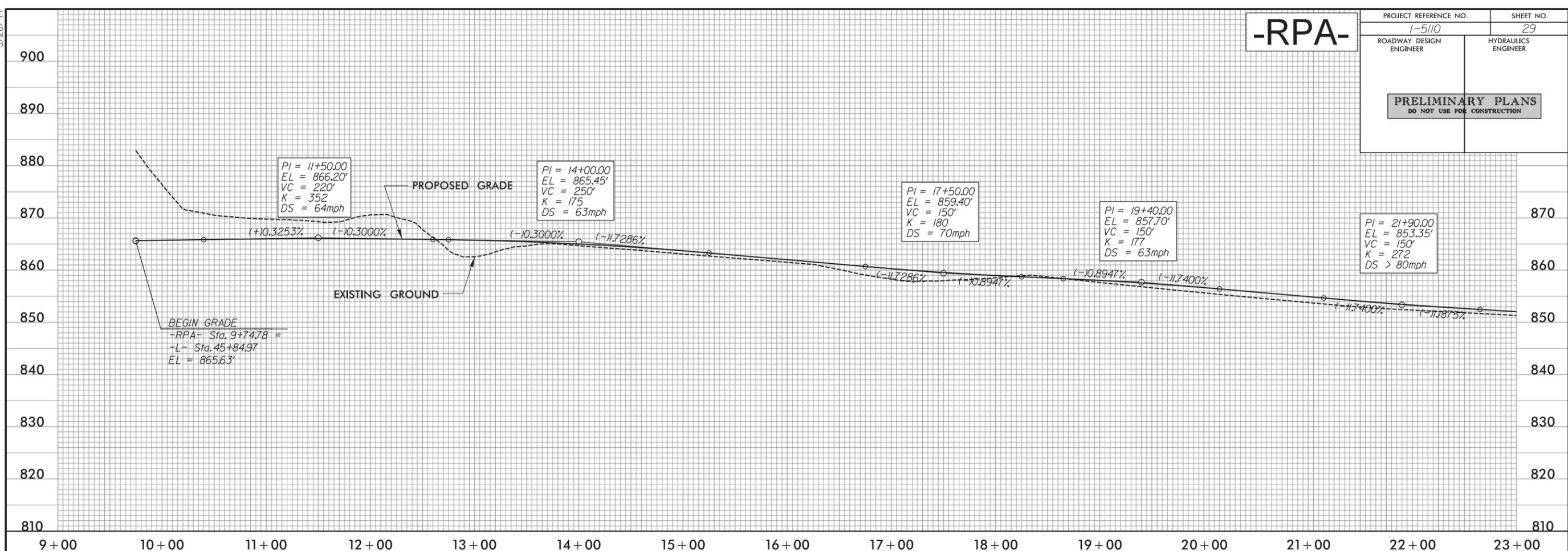
FOR -RPD- PLAN SEE SHTS. 4 & 5  
FOR -RPDA- PLAN SEE SHTS. 4 & 5

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**-RPA-**

PROJECT REFERENCE NO. 1-5110	SHEET NO. 29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



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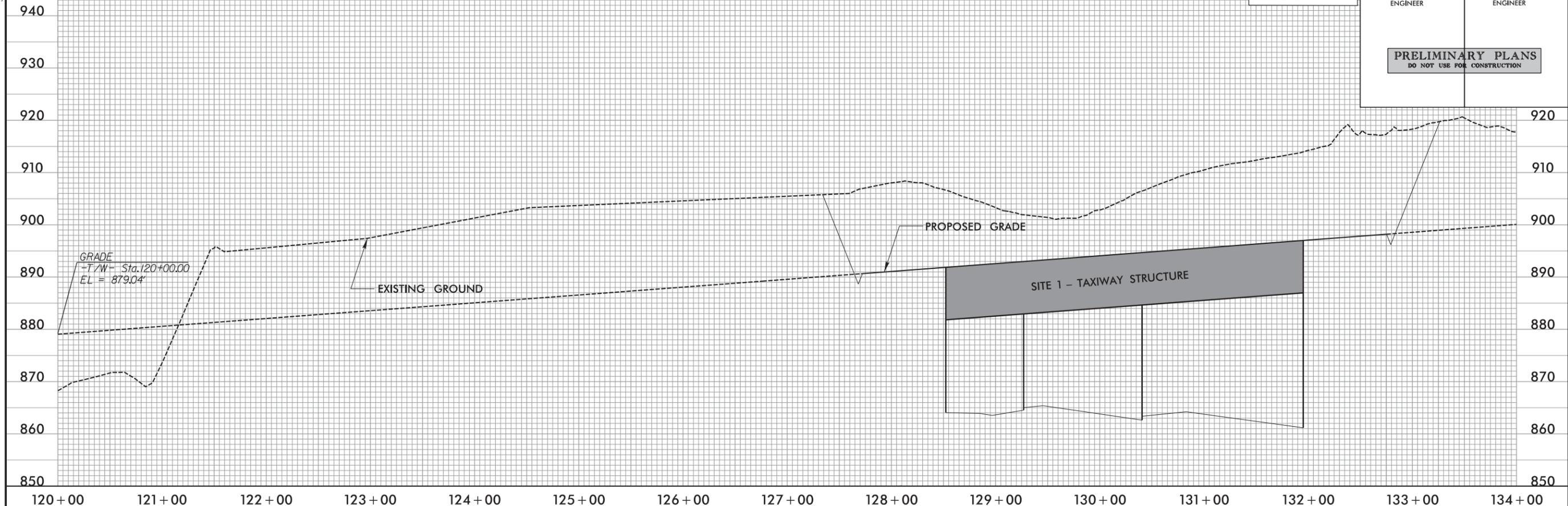
FOR -RPA- PLAN SEE SHTS. 4 - 6

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Elevs

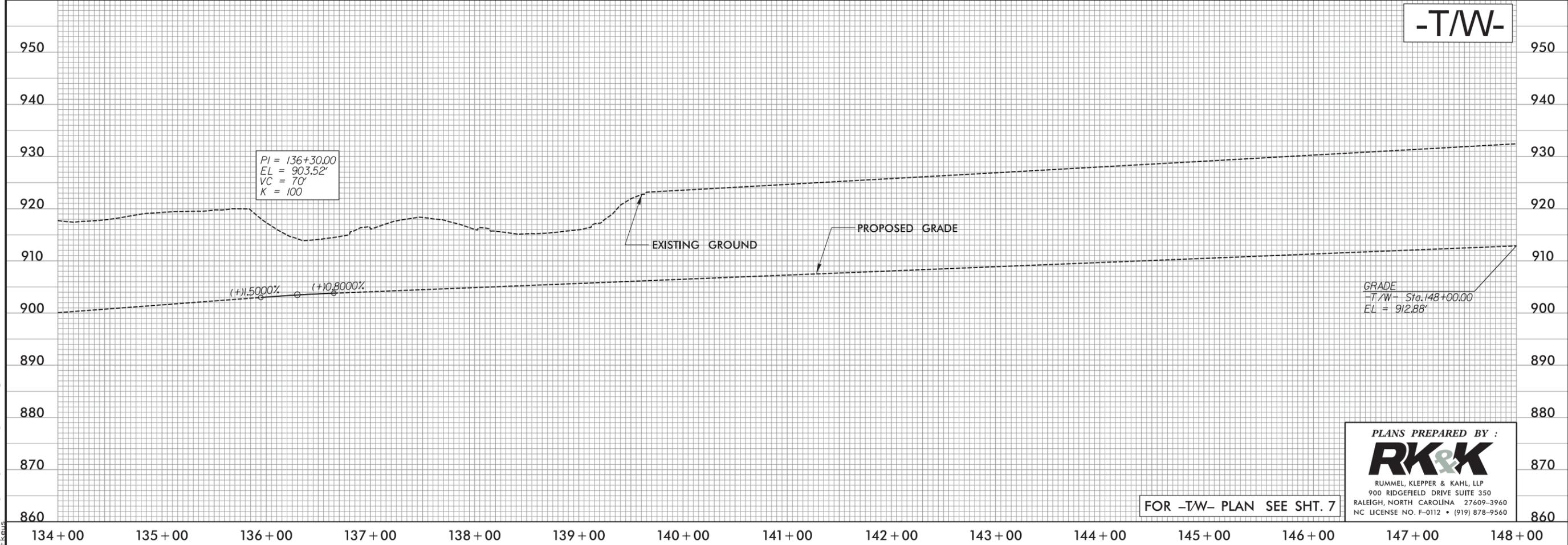
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**-T/W-**

PROJECT REFERENCE NO. 1-5110	SHEET NO. 30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



**-T/W-**



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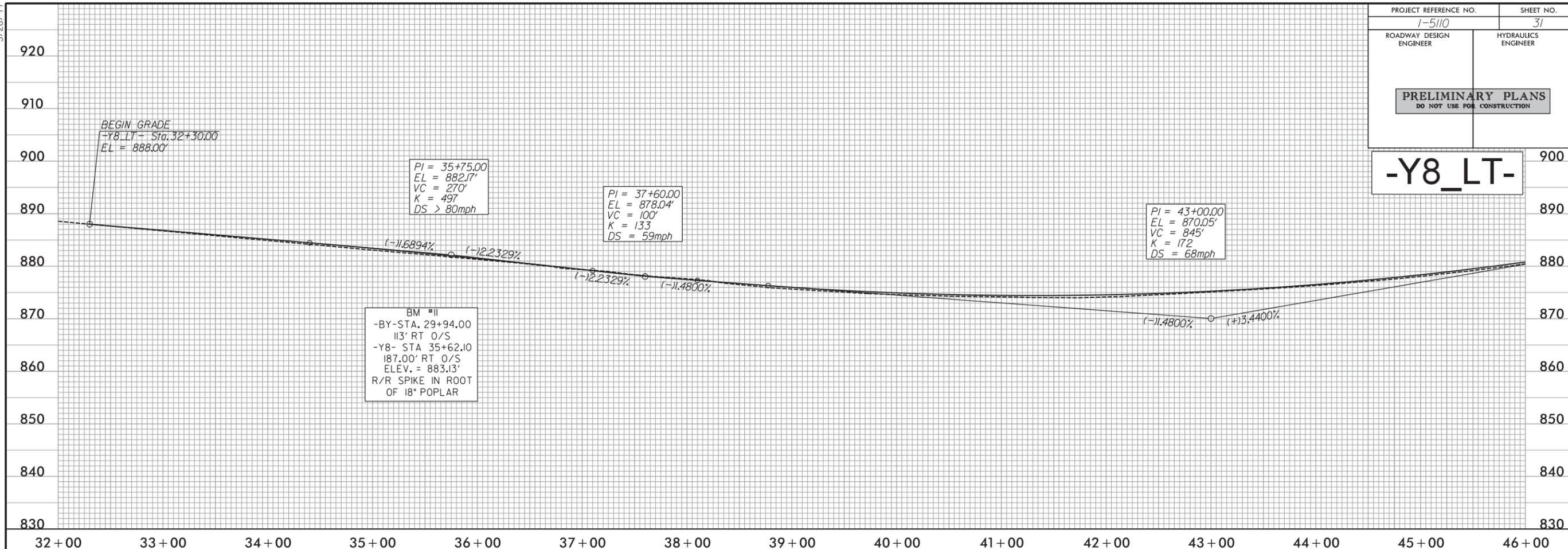
FOR -T/W- PLAN SEE SHT. 7

10/22/2014  
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Elev

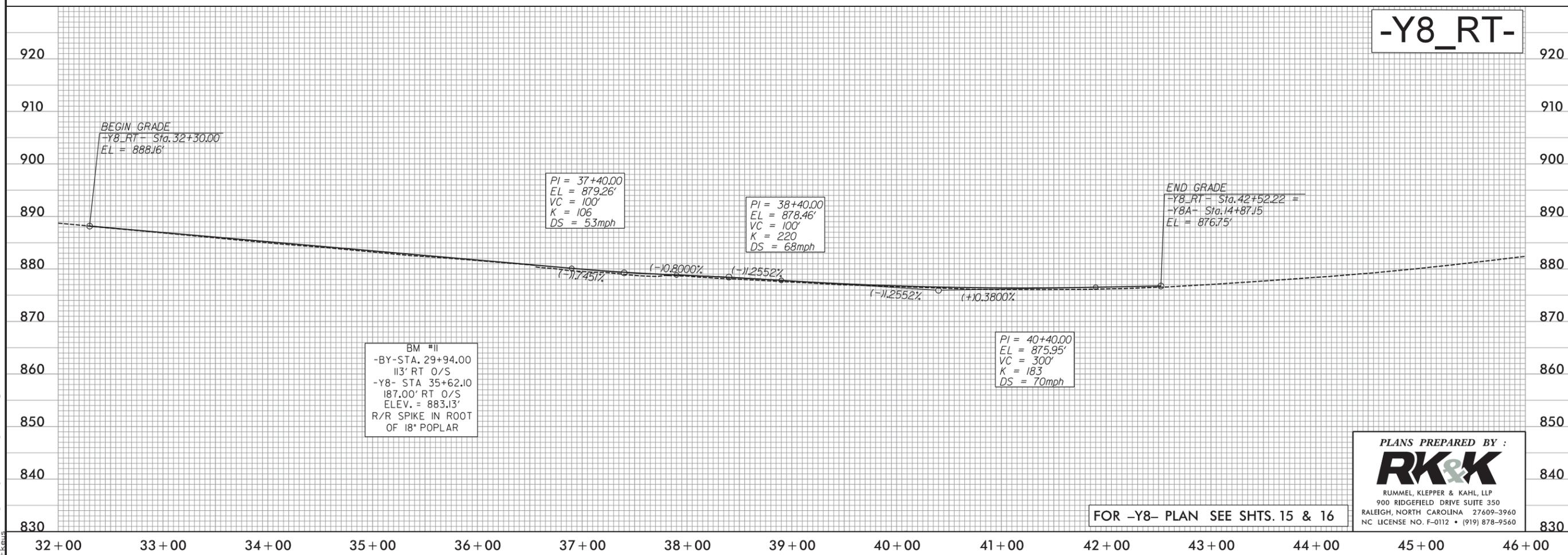
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PROJECT REFERENCE NO. I-5110	SHEET NO. 31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

# -Y8\_LT-



# -Y8\_RT-



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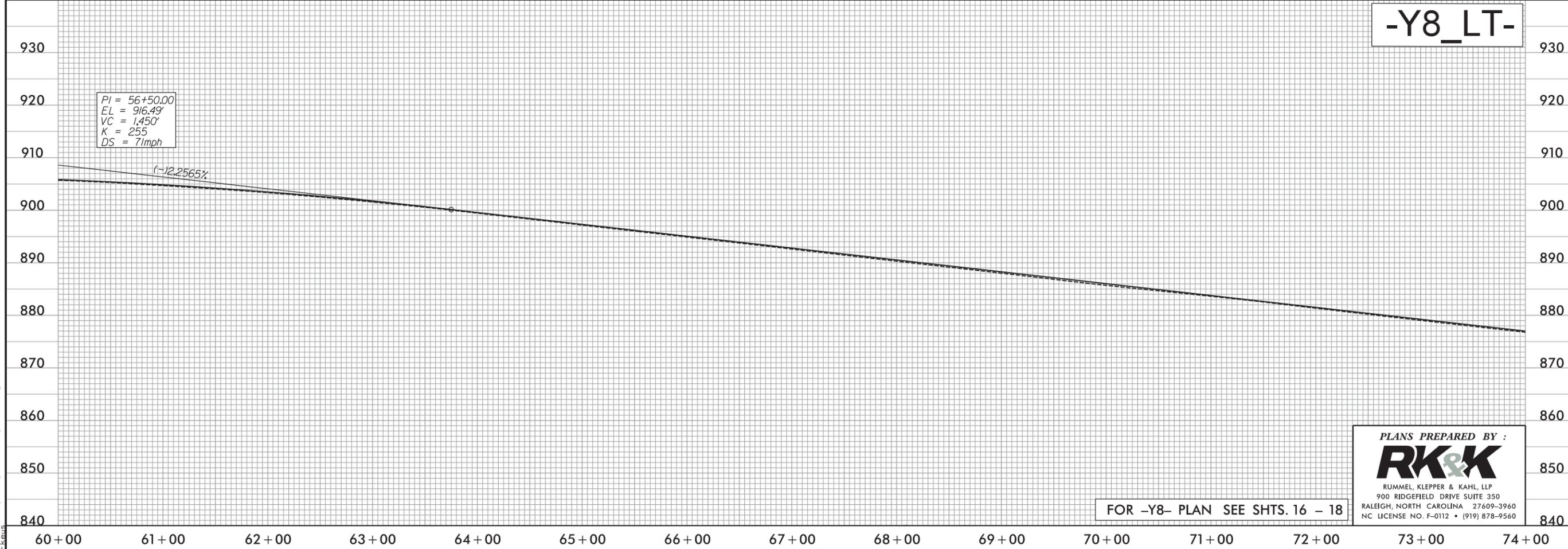
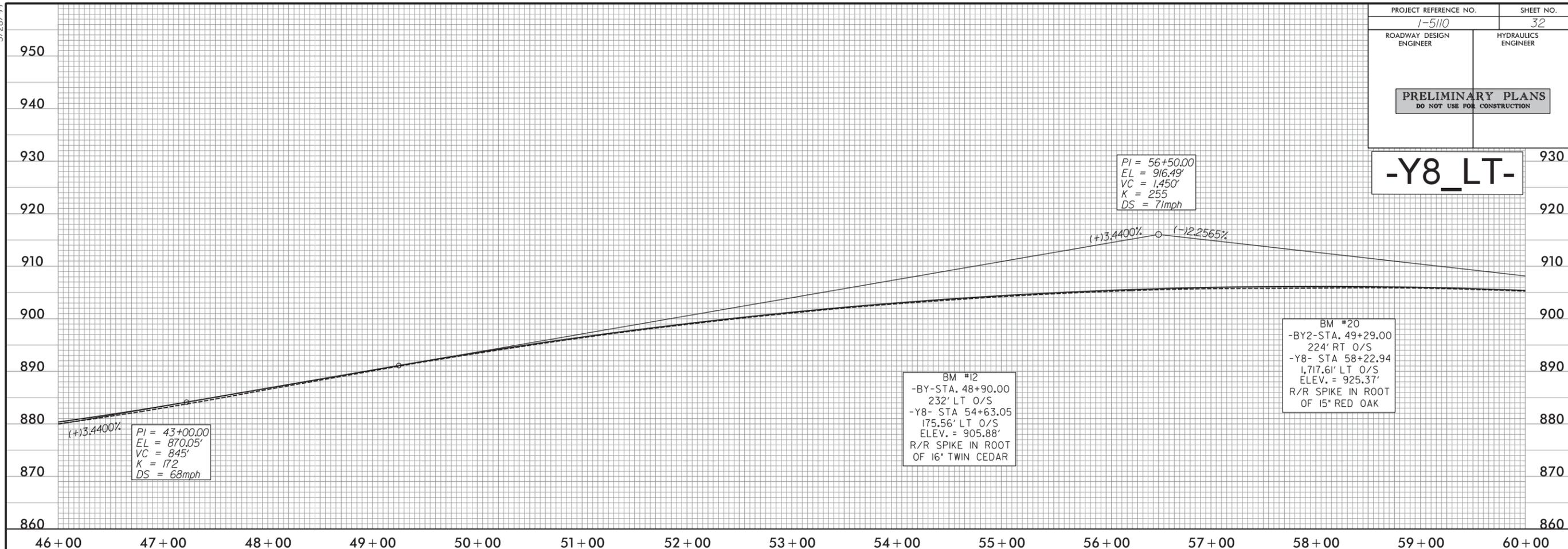
FOR -Y8- PLAN SEE SHTS. 15 & 16

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PROJECT REFERENCE NO. 1-5110	SHEET NO. 32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-Y8\_LT-



-Y8\_LT-

PLANS PREPARED BY :

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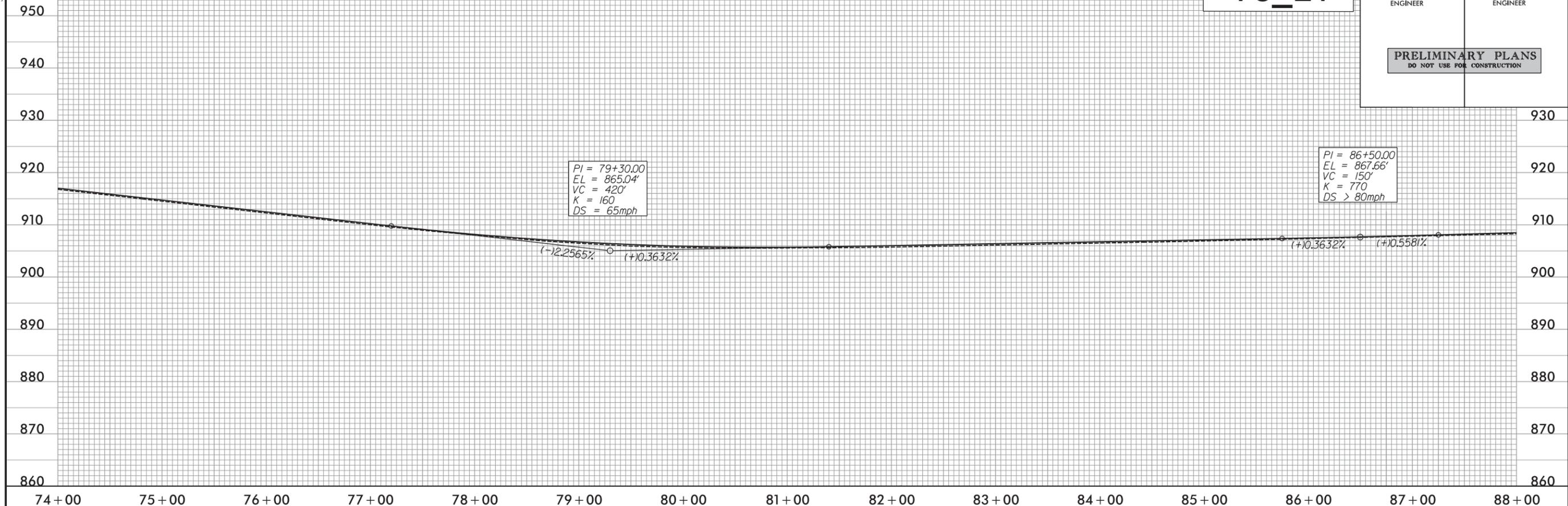
FOR -Y8- PLAN SEE SHTS. 16 - 18

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Elevs

5/28/99

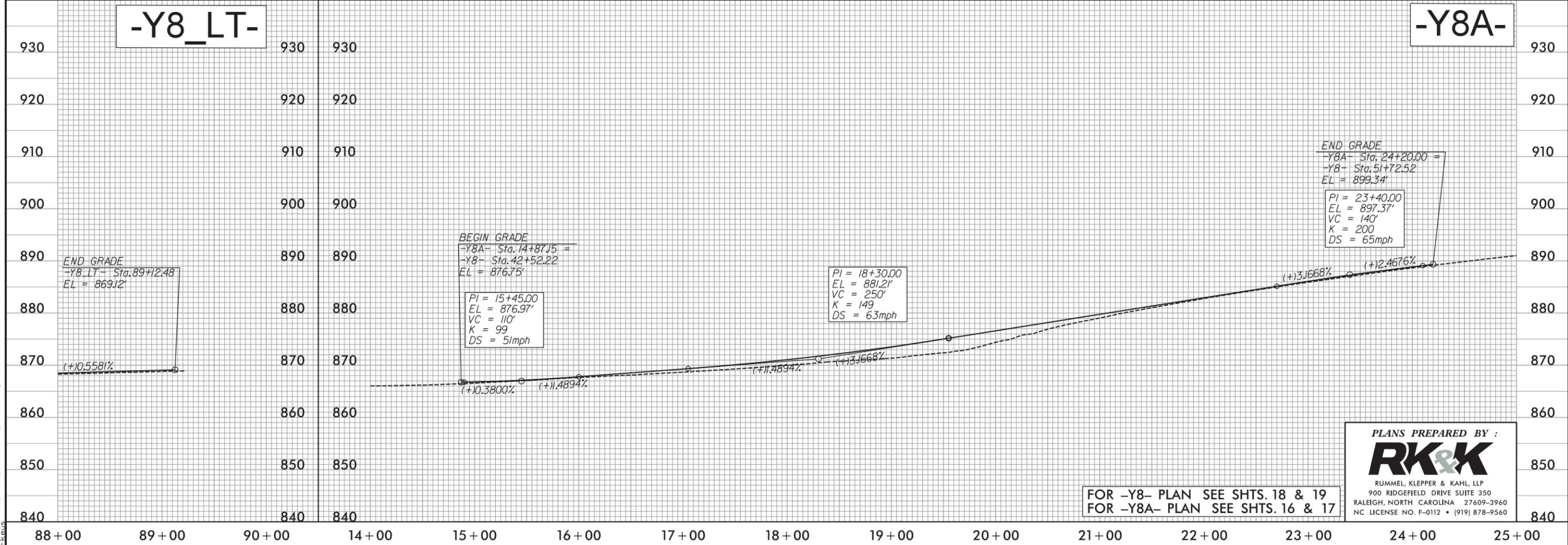
# -Y8\_LT-

PROJECT REFERENCE NO. 1-5110	SHEET NO. 33
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



# -Y8\_LT-

# -Y8A-



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FOR -Y8- PLAN SEE SHTS. 18 & 19  
FOR -Y8A- PLAN SEE SHTS. 16 & 17

PLANS PREPARED BY :

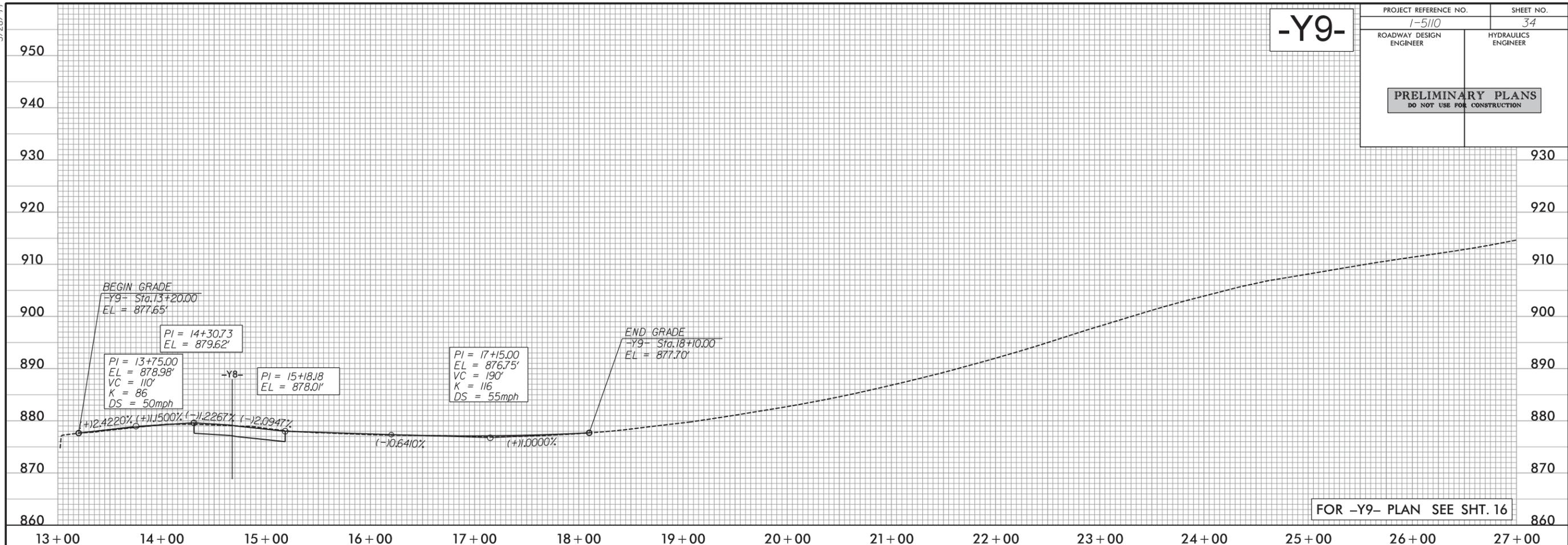


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-Y9-

PROJECT REFERENCE NO. 1-5110	SHEET NO. 34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



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PLANS PREPARED BY :

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