



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

March 8, 2010

Ms. Kimberly Garvey
U.S. Army Corps of Engineers
Wilmington Regulatory Field Office
Post Office Box 1890
Wilmington, NC 28402-1890

Dear Madam:

Subject: **Revised permit application** for the replacement of Bridge 46 over the Cape Fear River on US 401/NC 211 in Harnett County. Federal Aid Project Number BRSTP-401(146), TIP No. B-4138, WBS 33490.1.1.

Reference: NW application dated December 14, 2009

Please find enclosed: Revised Draft Construction Consultation and cover letter, Revised Permit Drawings, Revised Roadway Plans, Stormwater Management Plan, Revised Mitigation Request Form, Revised JD Request Form, cover letter and updated wetland mapping (for the Jurisdictional Determination) for this proposed bridge replacement project.

Proposed impacts to jurisdictional streams and wetlands have increased as a result of recent field verification with the USACE. This and additional information mentioned above is being provided at the request of Kimberly Garvey (USACE) and to complete informational needs for this project.

If you have any questions or need additional information, please contact Mr. John S. Merritt at 919-431-6749 or jsmerritt@ncdot.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregory J. Thorpe".

Gregory J. Thorpe, Ph.D. Environmental Management Director
Project Development and Environmental Analysis Branch

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

TELEPHONE: 919-431-2000
FAX: 919-431-2002

WEBSITE: WWW.NCDOT.ORG

LOCATION:
4701 ATLANTIC AVENUE
SUITE 116
RALEIGH NC 27604

w/attachment

Mr. Brian Wrenn, NCDWQ (4 copies)

Mr. Ken Averitte, NCDWQ

w/o attachment (see website for attachments)

Dr. David Chang, P.E., Hydraulics

Mr. Greg Perfetti, P.E., Structure Design

Mr. Victor Barbour, P.E., Project Services Unit

Mr. Mark Staley, Roadside Environmental

Mr. Greg Burns, P.E, Division 6 Engineer

Mr. Jim Rerko, Division 6 Environmental Officer

Mr. Jay Bennett, P.E., Roadway Design

Mr. Majed Alghandour, P. E., Programming and TIP

Mr. Art McMillan, P.E., Highway Design

Mr. Scott McLendon, USACE, Wilmington

Mr. Travis Wilson, NCWRC

Mr. Gary Jordan, USFWS

Ms. Anne Deaton, NCDMF

Mr. Ron Sechler, NMFS

Ms. Natalie Lockhart, PDEA

Ms. Beth Harmon, EEP

Mr. Phillip Ayscue, NCDOT External Audit Branch

Ms. LeiLani Paugh, NEU

Mr. Randy Griffin, NEU

DRAFT

North Carolina Department of Transportation
PROJECT ENVIRONMENTAL CONSULTATION FORM
I. D. No. B-4138

I. GENERAL INFORMATION

- a. Consultation Phase: Construction Consultation
- b. Project Description: Replacement of Bridge No. 46 over the Cape Fear River on US 401/NC 210 in Harnett County
- c. WBS Project No. 33490.1.1
State Project: 8.1451901
Federal Project: BRSTP-401(146)
- d. Document Type: Categorical Exclusion 7/29/2008

II. ACTION PROPOSED IN CATEGORICAL EXCLUSION

Bridge No. 46 will be replaced with a new bridge of approximately 640 feet in length on a new alignment. Improvements to the approach roadways will be required for a distance of approximately 1565 feet to the south and 1420 feet to the north of the existing structure. The bridge will provide for two 12-foot lanes with 4-foot paved shoulders on the southeast side of the bridge and curb and gutter with 5'-6" sidewalk on the northwest side. Traffic will be maintained on the existing structure.

This conclusion was reached after evaluation of multiple alternatives. One alternative studied was to replace on the existing location while detour traffic offsite US 401 is a four lane facility carrying in excess of 17,000 vehicles per day (VPD). There are no four lane detour routes available and the two lane roads would be overloaded by adding the current 17,000 vehicles per day carried by US 401. This is not considered feasible.

Another scenario to replace on the existing location was studied whereby the bridge to be replaced would be shut down and all traffic would be shifted to the remaining bridge. A good test model occurred in 2008 when repairs to the railroad just a few hundred feet from the bridge reduced traffic to two-lane two-ways. The delay was in excess of 20 minutes. This was verified by a number of citizens who complained of this delay when the option was presented at a Citizen's Informational Workshop and brought up the example of the railroad closure. We also have concerns raised from the Town of Lillington, from the Fire Chief, and from Harnett County Commissioners who all oppose the two-lane two-way scenario based on both emergency response and economic impact. Their correspondence is attached.

DRAFT

III. CONCLUSIONS

The Categorical Exclusion has been reevaluated as required by 23 CFR 771. The current proposed action is essentially the same as the action proposed in the Categorical Exclusion. Proposed changes, if any, are noted below in Section IV. It has been determined that anticipated social, economic, and environmental impacts were accurately described in the Categorical Exclusion unless noted otherwise herein. Therefore, the previous Administration Action remains valid.

IV. CHANGES IN PROPOSED ACTION AND ENVIRONMENTAL CONSEQUENCES

There are no changes in the proposed action.

Neither permanent nor temporary bicycle or pedestrian accommodations are required for this project.

The project study area contains approximately 289 linear feet of the Cape Fear River and approximately 1,770 linear feet of three unnamed tributaries of the Cape Fear River. The proposed alternate will permanently impact 897 ft of the streams located in the project area. There are 287 ft of temporary stream impacts in the project area. There are six jurisdictional wetlands in the area that will be impacted by the proposed project as well. Approximately 0.41 acres of wetlands will be impacted by this project. Onsite natural stream design will provide 608 ft due to stream relocation.

NCDOT is relocating a 255' of the 12" sewer line owned by Harnett County. The current location of the sewer line is in conflict with the proposed stream relocation. The sewer relocation will consist of 242' of 12" pipe along a new location outside of the stream relocation, 75' of which is in wetlands not impacted by other project activities. The current alignment is not suitable for reuse because of terrain changes in the stream relocation.

Progress Energy will be relocating their pole line north of the stream relocation because of conflicts with the relocation of the southbound lanes. The line will pass 282' on a new location in the wetlands before rejoining the current path of the line. One pole will be located in the wetlands. Progress Energy will handclear brush within 15' of the power lines in areas not cleared by other DOT activity.

No species have been added to the listings for Harnett County since the time of the document. All other species and the biological conclusions included within the Programmatic Categorical Exclusion remain accurate.

The bald eagle was removed from the Federal List of Threatened and Endangered wildlife effective August 8, 2007 and no longer requires a biological conclusion. Nesting and foraging habitat in the project area, no bald eagle nests or individuals have been seen within a 660 foot radius of the project area.

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No changes have occurred between the current NCDWQ water usage classification and the water resource classification listed within the Programmatic Categorical Exclusion.

V. LIST OF PROJECT COMMITMENTS

Please see attached green sheet.

VI. COORDINATION

Project Development and Environmental Analysis Branch personnel have discussed current project proposals with others as follows:

Bryan Key Roadway Design	<u>1-2010</u> Date
John Merritt Natural Environment Unit	<u>1-2010</u> Date

VII. NCDOT CONCURRENCE

_____ Project Planning Engineer Project Development & Environmental Analysis Branch	_____ Date
_____ Bridge Project Development Unit Head Project Development & Environmental Analysis Branch	_____ Date

VIII. FHWA CONCURRENCE

_____ John F. Sullivan, III, PE, Division Administrator Federal Highway Administration	_____ Date
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

March 8, 2010

Ms. Kimberly Garvey
NCDOT Coordinator
USACE-SAW-RG
69 Darlington Avenue
Wilmington, NC 28403

SUBJECT: Request for Revised Preliminary Jurisdictional Determination of
the proposed replacement of Bridge 46 over the Cape Fear River on
I-40/NC210 in Harnett County, TIP B-4138

Dear Ms. Garvey:

The North Carolina Department of Transportation (NCDOT) Natural Environment Unit (NEU) has completed the delineation of "Waters of the United States," for the above referenced project. NEU is requesting a revised preliminary jurisdictional determination for this project. The wetland revised was WA-1 (Wetland 3 in NRTR) corresponding to the original Wetland Determination Data Form.

Please see the attached supporting documents:

- 1) Preliminary Jurisdictional Determination Form
- 2) Map of Unverified Wetlands

If you have any questions or require additional information, please contact me at (919) 431-6749 or jsmerritt@ncdot.gov.

Sincerely,

John Merritt,
Senior Environmental Specialist, NCDOT – NEU

Enclosures (5)

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

TELEPHONE: 919-431-2000

FAX: 919-431-2001

WEBSITE: WWW.NCDOT.ORG

LOCATION:
4701 Atlantic Ave.,
Suite 116
Raleigh, NC 27604

ATTACHMENT

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

John Merritt
NCDOT
4701 Atlantic Ave. Suite 116
Raleigh, NC 27604

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: CE-SAW-RG-L

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:

B-4214

(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: North Carolina County/parish/borough: Harnett City: Lillington

Center coordinates of site (lat/long in degree decimal format):

Lat. 35.406961° N, Long. -78.813128 ° **W**.

Universal Transverse Mercator:

Name of nearest waterbody: Cape Fear River

Identify (estimate) amount of waters in the review area:

Non-wetland waters: 400 linear feet: 300 width (ft) and/or acres.

Cowardin Class: Riverine

Stream Flow: Perennial

Wetlands: 1.02 acres.

Cowardin Class: PF01

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal:

Non-Tidal:

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: 12/17/09

Field Determination. Date(s): 7/23/09

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to

request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there "may be" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for preliminary JD (check all that apply

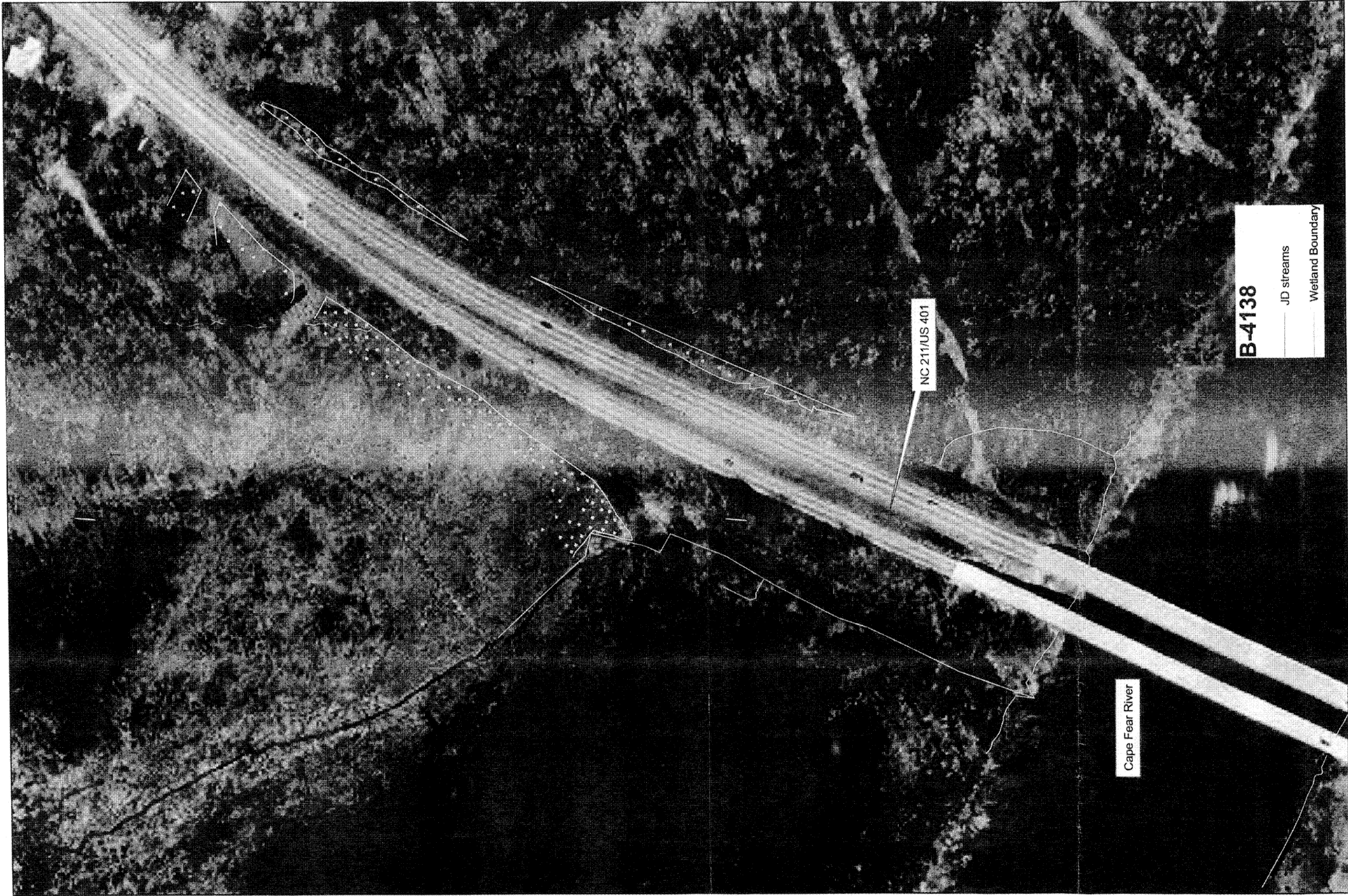
- checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps: .
- Corps navigable waters' study: .
- U.S. Geological Survey Hydrologic Atlas: .
 - USGS NHD data.
 - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: Lillington 1:24,000.
- USDA Natural Resources Conservation Service Soil Survey. Citation:
- National wetlands inventory map(s). Cite name: SAW shapefile
- State/Local wetland inventory map(s): .
- FEMA/FIRM maps: .
- 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): .
or Other (Name & Date): .
- Previous determination(s). File no. and date of response letter: USACE (Action ID: 2003300357) and expired on April 8, 2008.
- Other information (please specify): .

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Signature and date of
Regulatory Project Manager
(REQUIRED)

Signature and date of
person requesting preliminary JD
(REQUIRED, unless obtaining
the signature is impracticable)



Cape Fear River

NC 211/US 401

B-4138
— JD streams
— Wetland Boundary

STORMWATER MANAGEMENT PLAN

Project: 33490.1.1 (B-4138)
Harnett County

Project Description:

Replace Bridge #46 over the Cape Fear River on US 401. Includes structure replacement and roadway approach work. Bridge will be relocated approximately 85' upstream of existing bridge. The Cape Fear River is classified as WS-IV at this location. It is downstream of the Town of Lillington intake and approximately 9 miles upstream from the Town of Erwin intake.

Roadway Description:

The typical section will remain as a four-lane highway with divided grass median. The median width will vary from 40' to 110'. The length of roadway approach work will be approximately 0.60 miles. It is proposed to use curb and gutter on the West side of the project and grassed shoulder on the East side.

Bridge Structure:

Bridge #46 is one of two bridges at this crossing on US 401 that span the Cape Fear River. Existing Bridge #46 is the southbound bridge and is 16 spans, 803' in length, built in 1958. Proposed Bridge #46 will be a 6 span, 605' bridge. This will reduce the number of piers in the river from 9 piers to 5 piers. There will be no deck drains over the river but they will be provided in the overbank areas. Rip rap swales will be provided along the overbank, under the deck drains.

BMP's:

Most drainage along the project will go into grassed ditches/swales. The typical ditch section has a 6:1 front slope with a 3:1 to 6:1 back slope. Storm drain systems will outlet into either rip rap lined ditches/embankment or will outlet to drop box structures prior to entering a river/stream. The rip rap lined ditches and drop structures will reduce velocities at confluence with river/stream. Culverts located in streams (Sta 20+00 –SBL-RT) will be buried up to 1' and placed at a minimum slope of 0.3%.

Avoidance and Minimization:

There is a stream and wetland system located at the beginning of the project along the West side of US 401. The fill slopes were steepened and shoulder section narrowed to minimize impacts to the wetland and to avoid impact to the stream.

Stream Relocation:

In the Northwest quadrant of the Cape Fear River crossing an existing stream will be impacted. The stream presently runs just parallel to the existing US 401 road fill. The realigned bridge and roadway will cover the stream so it will be relocated just outside the proposed roadway fill. The relocated stream will provide an improved section. The existing stream has predominantly vertical, eroding banks with the bankfull discharge having little to no access to the floodplain. The relocated section will be increased in

area with the bankfull flow having access to a wider floodplain bench. The design used stream morphology analysis.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

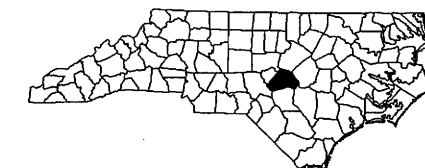
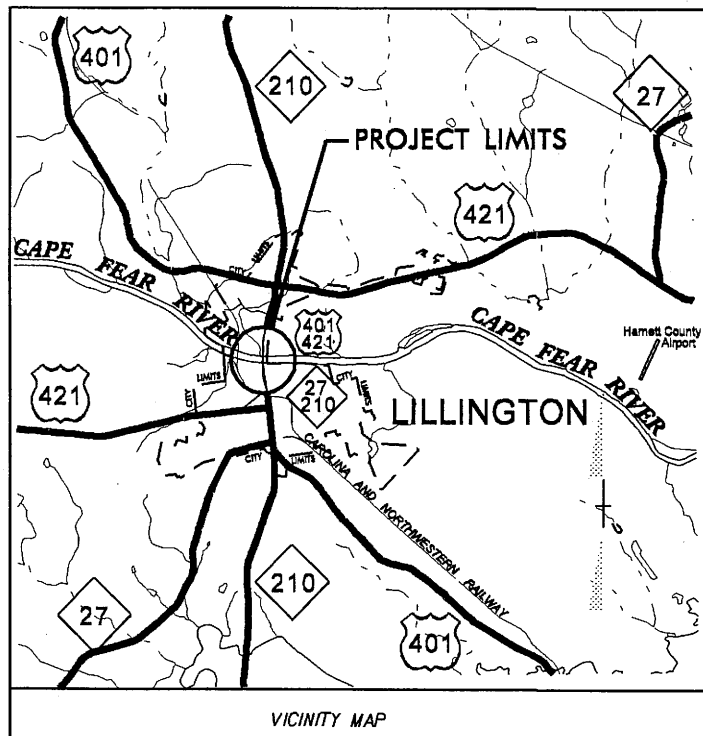
HARNETT COUNTY

LOCATION: BRIDGE 46 OVER CAPE FEAR RIVER
ON US 401

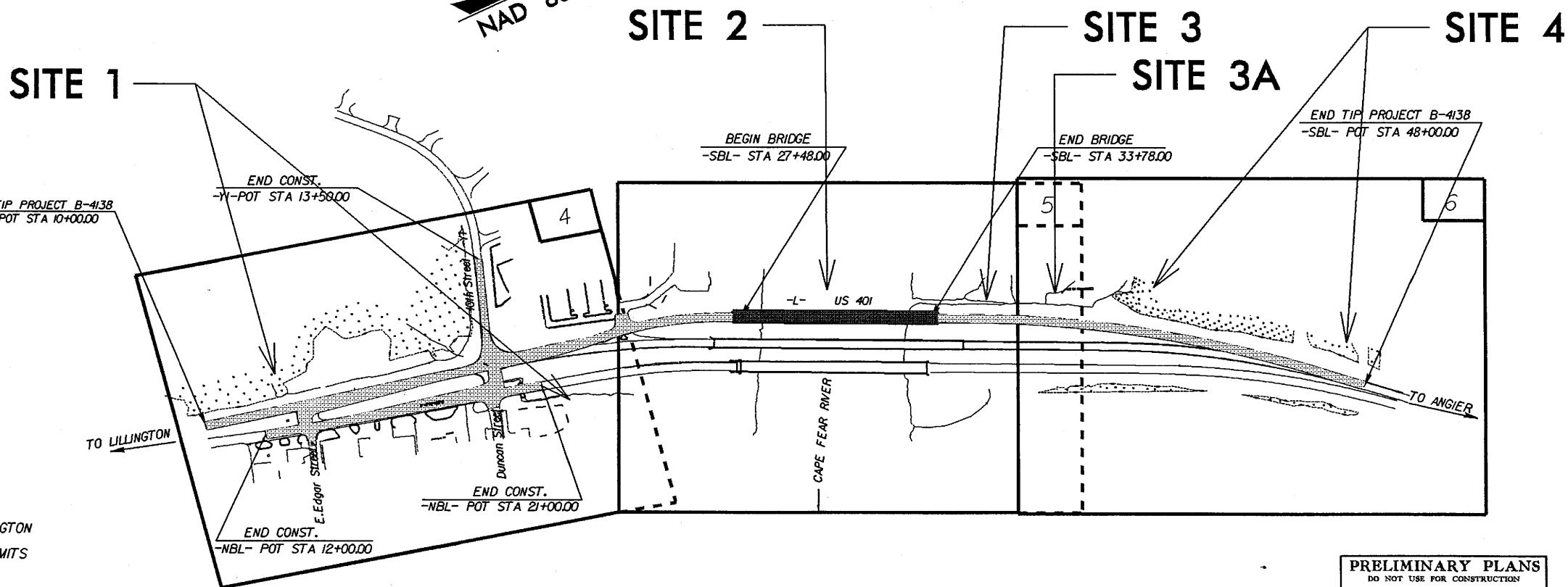
TYPE OF WORK: GRADING, DRAINAGE, PAVING, PAVEMENT MARKINGS,
STRUCTURES, SIGNING, AND WIDENING

revised 3/4/10
Permit Drawing
Sheet 1 of 16

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4138	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33490.1.1	BRSTP-401(146)	PE	
33490.2.1	BRSTP-0401(146)	RW /UTIL.	



WETLAND /STREAM PERMIT

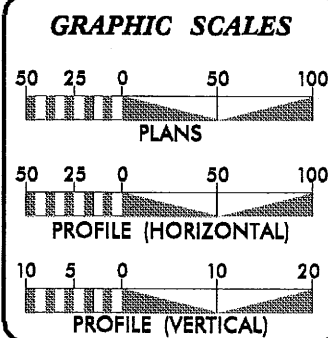


Notes:
THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF LILLINGTON
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS
ESTABLISHED BY METHOD III
SEE SHEET 7 FOR DETOUR

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TIP PROJECT: B-4138

CONTRACT:



DESIGN DATA

ADT 2009 =	28500
ADT 2035 =	52600
DHV =	10 %
D =	55 %
T =	8 % *
V =	50 MPH
* TTST 4	DUAL 4

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4138 =	0.601 MILES
LENGTH STRUCTURE TIP PROJECT B-4138 =	0.119 MILES
TOTAL LENGTH OF TIP PROJECT B-4138 =	0.720 MILES

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MARCH 20, 2009	JASON MOORE, P. E. PROJECT ENGINEER
LETTING DATE: MARCH 16, 2010	BRYAN KEY, P. E. PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

**DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA**

STATE HIGHWAY DESIGN ENGINEER P.E.

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	12+00 -SBL- LT 20+50 -SBL- RT	ROAD FILL	<0.01			0.05	0.06	0.02	<0.01	112	67		
	18+50 -SBL- LT & 20+80 -NBL- RT	Bank Stabil						<0.01		23			
2	28+50 -SBL- RT&RRT 32+85 -SBL- RT&RRT 33+10 -SBL- LLT	EMBANKMENT RIP RAP						0.03		8 8 53			
	28+35 TO 30+50 -SBL- LT.	PHASE I TEMP CAUSEWAY							0.41		100		
	30+70 TO 33+10 -SBL- LT.	PHASE II TEMP CAUSEWAY							0.40		100		
3	33+10 TO 39+62 -SBL- LT.	ROAD FILL/ RELOC STREAM						0.08	<0.01	613	20	608	
3A	37+45 -SBL- LT	RELOC STREAM						0.01		80			
4	38+70 TO 47+60 -SBL- LT.	ROAD FILL	0.20			0.16	0.38						
TOTALS:			0.20			0.21	0.44	0.14	0.81	897	287	608	

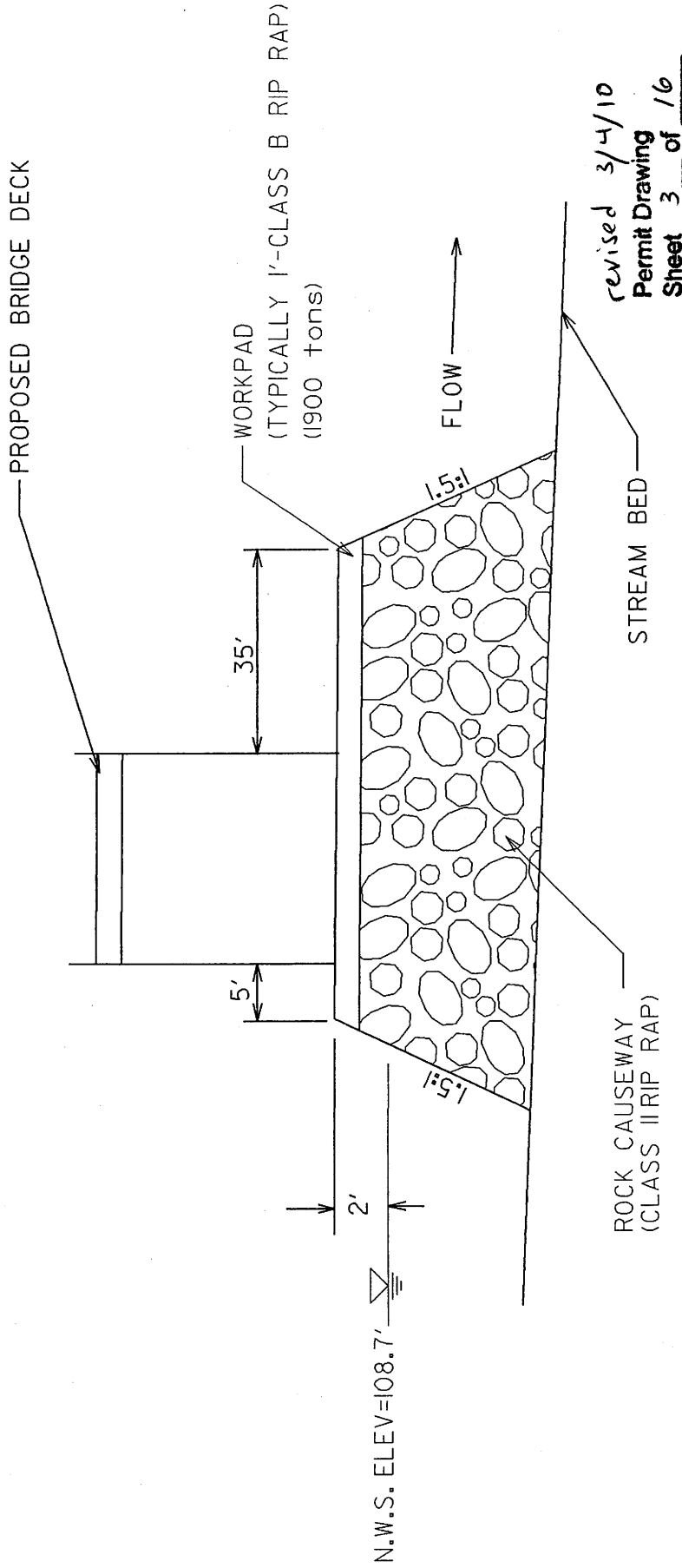
Impacts due to piers = 196 sq ft

Site 4: Fill Impact for Power Pole relocation Sta 40+55 -SBL- LLT = 2 sq ft;
 Fill Impact due to Sewer Relocation/Installation = 0.01 ac
 Hand Clearing Impact due to access for Utilities = 0.09 ac

revised 3/14/10
Permit Drawing
Sheet 2 of 16

NC DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 HARNETT COUNTY
 WBS - 33490.1.1 (B-4138)

WORKPAD DETAIL (NOT TO SCALE)



NC DOT

DIVISION OF HIGHWAYS
HARNETT COUNTY

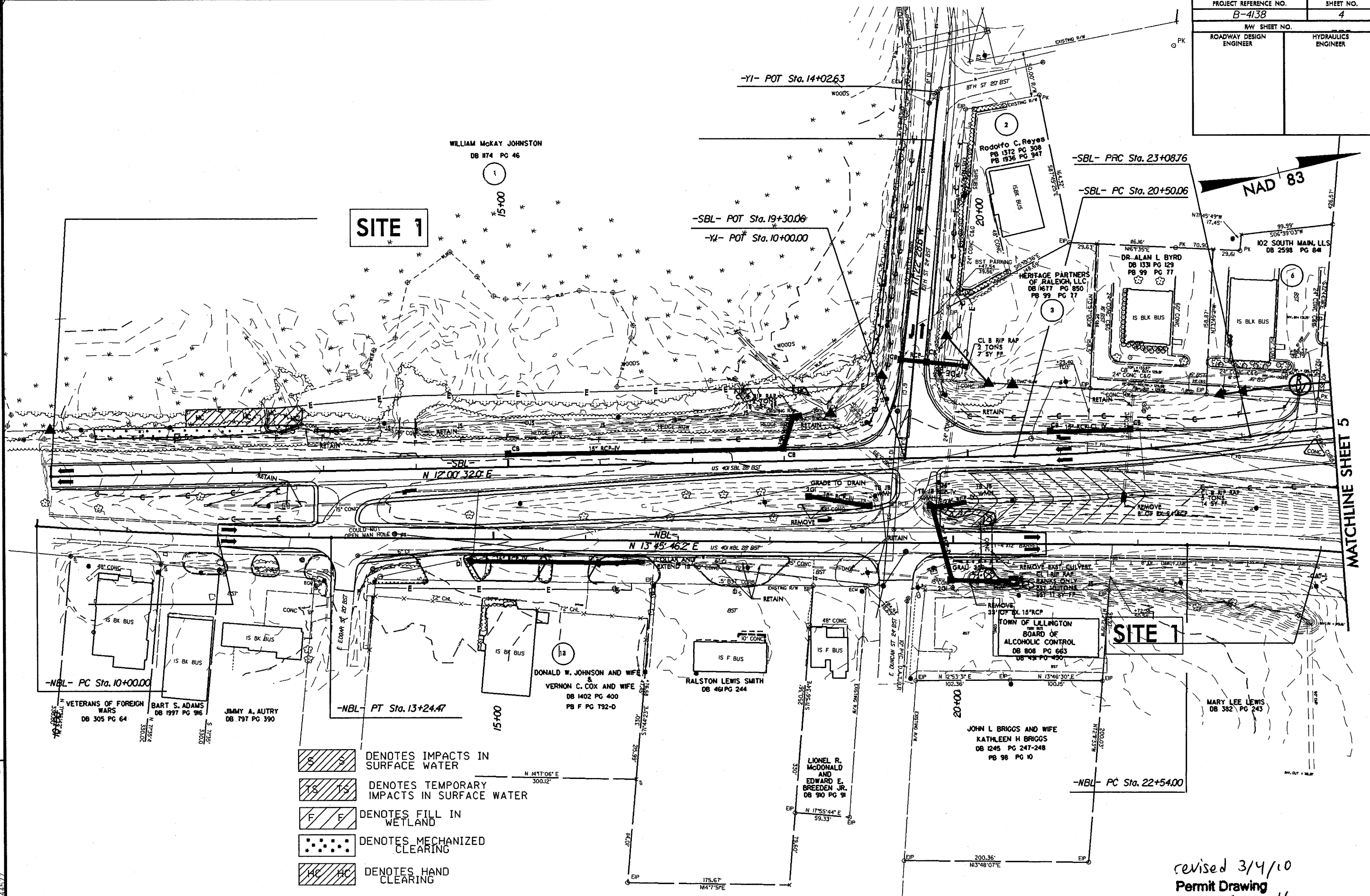
PROJECT: 33490.11 (B-4138)


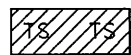
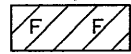

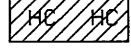
LILLINGTON
BRG. #46 OVER CAPE FEAR RIVER
ON US 401

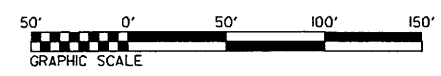
QUANTITIES OF ESTIMATES

VOLUME OF CLASS II RIP RAP= 8500 cy
AREA OF CLASS II RIP RAP= 0.81 ac
ESTIMATE 14400 TONS CLASS II RIP RAP

03-MAR-2010 05:58:11 S:\Environmental\Drawings\B-4138_Bud\para\site4.dwg
 8/17/99
 REVISIONS



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

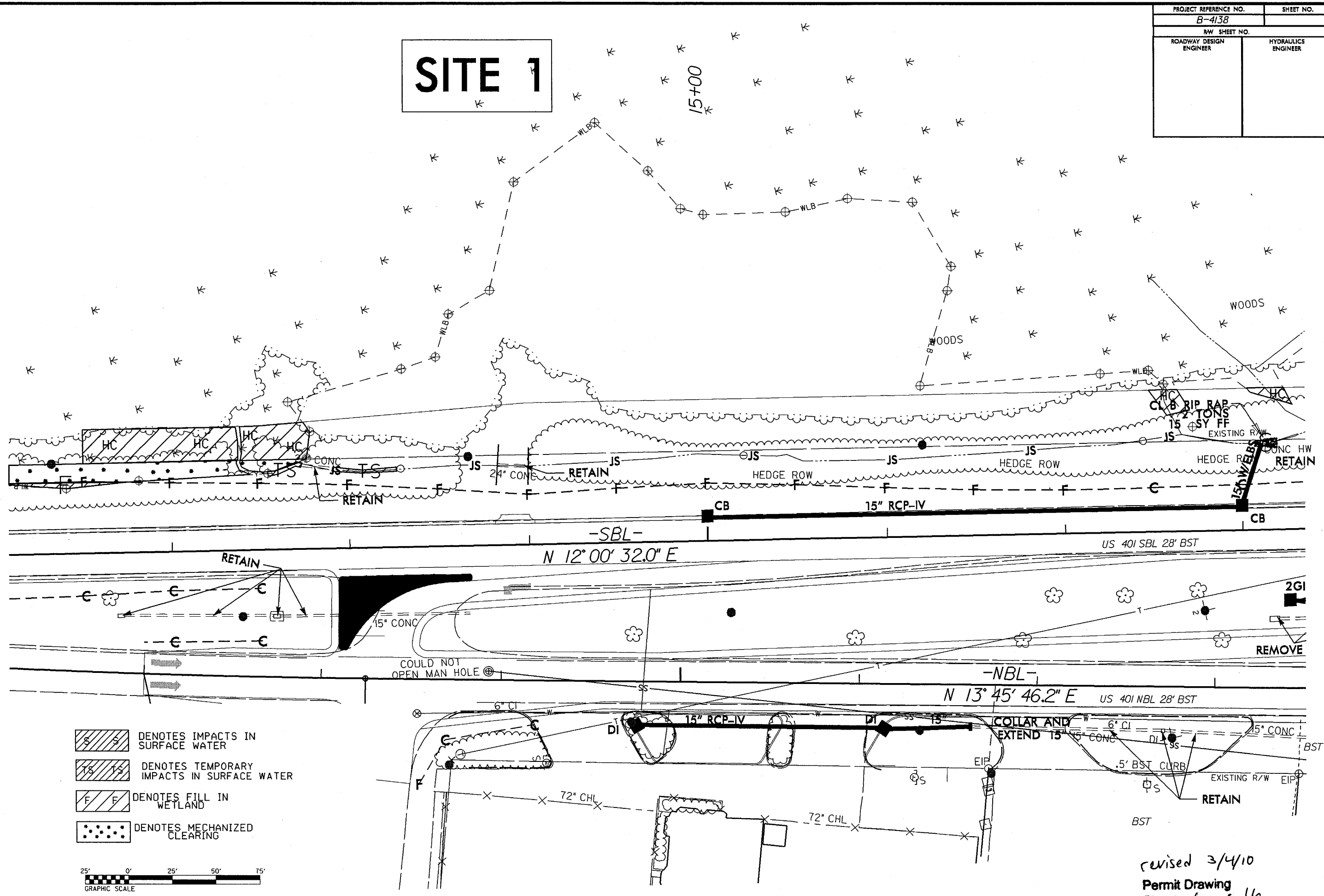


revised 3/4/10
 Permit Drawing
 Sheet 5 of 16

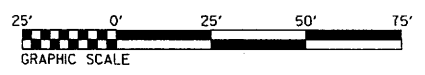
MATCHLINE SHEET 5

PROJECT REFERENCE NO. B-4138	SHEET NO.
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

SITE 1



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



revised 3/4/10
Permit Drawing
Sheet 6 of 16

5/14/99
03-MAR-2010 06:41 C:\p1\Drawings\4138_hyd.prm_wet.psh4.dgn

PROJECT REFERENCE NO. B-4138	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

SITE 3

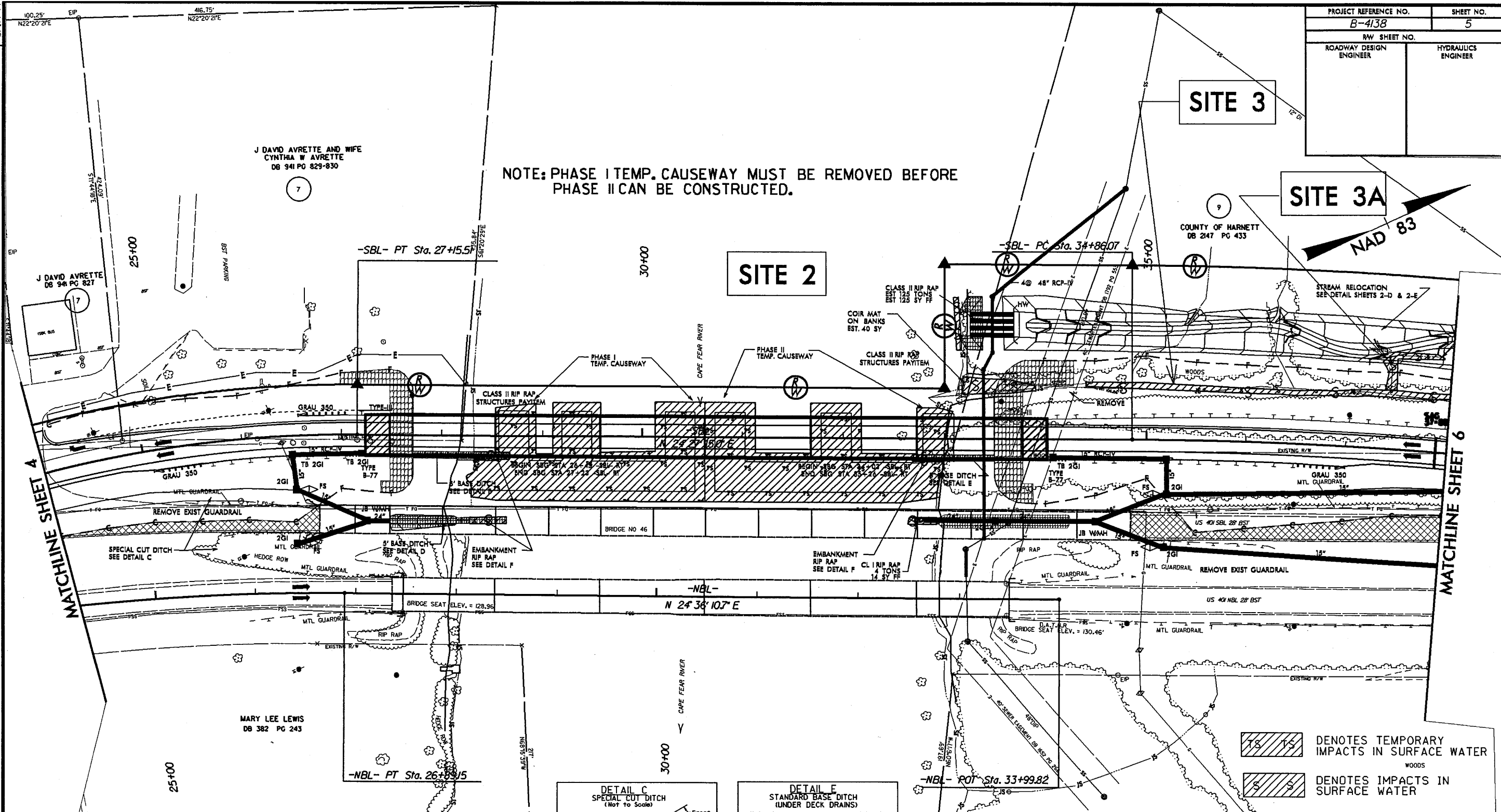
SITE 3A

NOTE: PHASE I TEMP. CAUSEWAY MUST BE REMOVED BEFORE PHASE II CAN BE CONSTRUCTED.

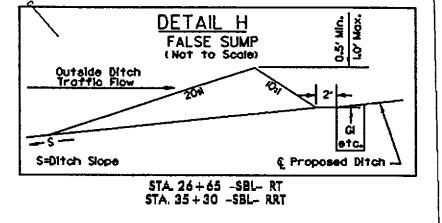
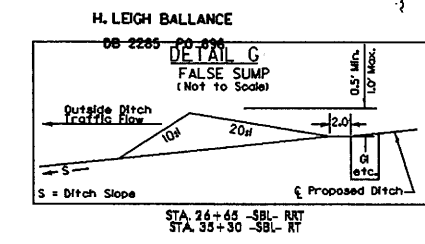
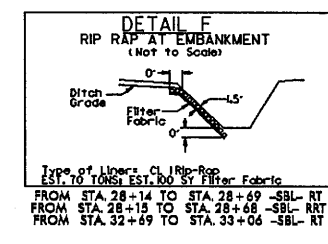
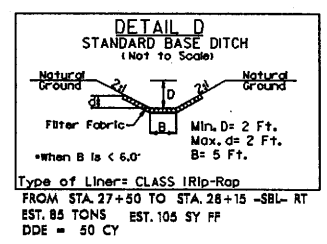
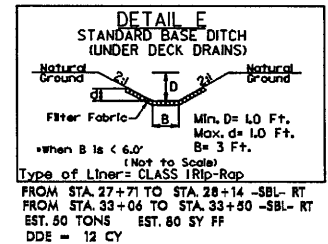
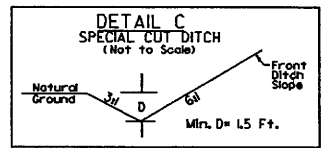
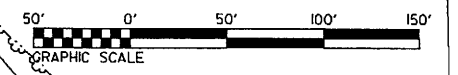
SITE 2

COUNTY OF HARNETT
DB 247 PG 433

NAD 83



DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER



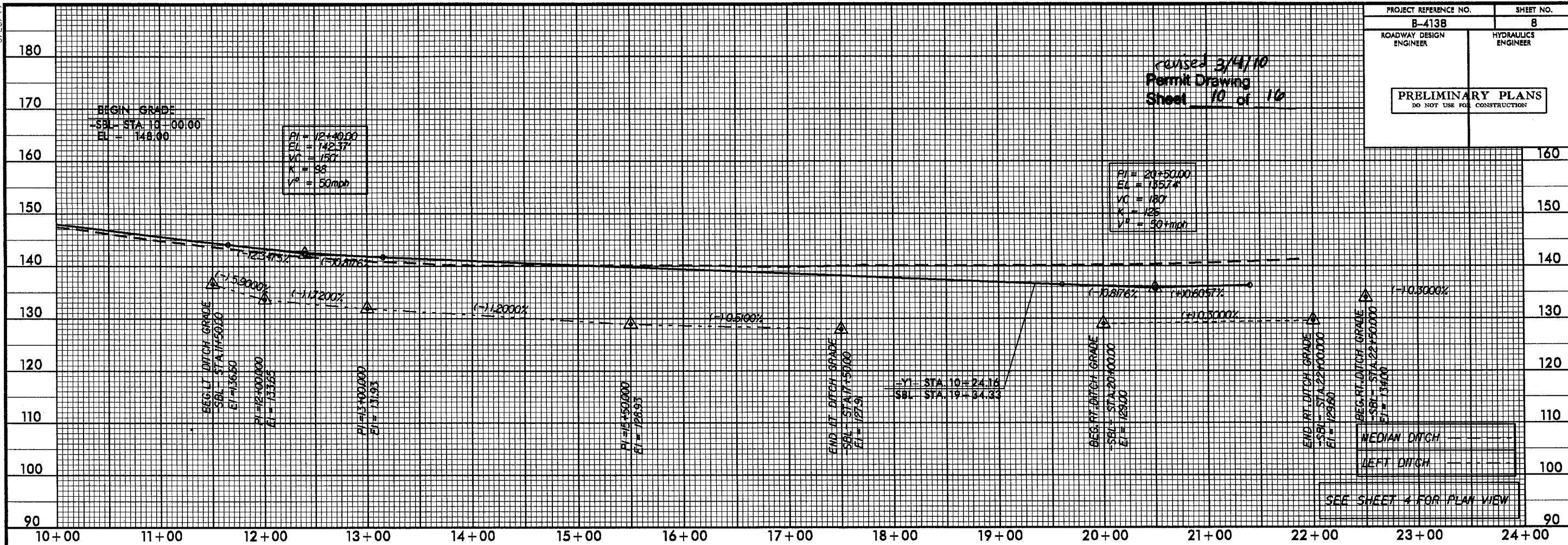
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Permit Drawing
Sheet 8 of 16

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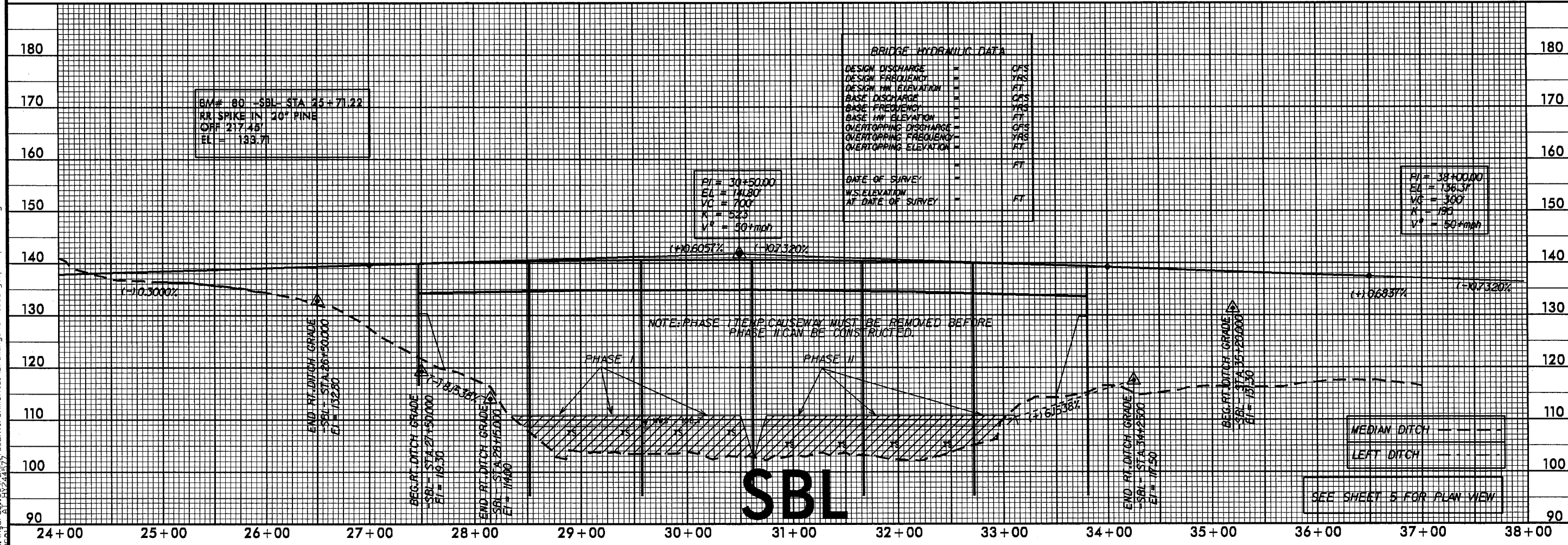
5/28/99

PROJECT REFERENCE NO. B-413B	SHEET NO. 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

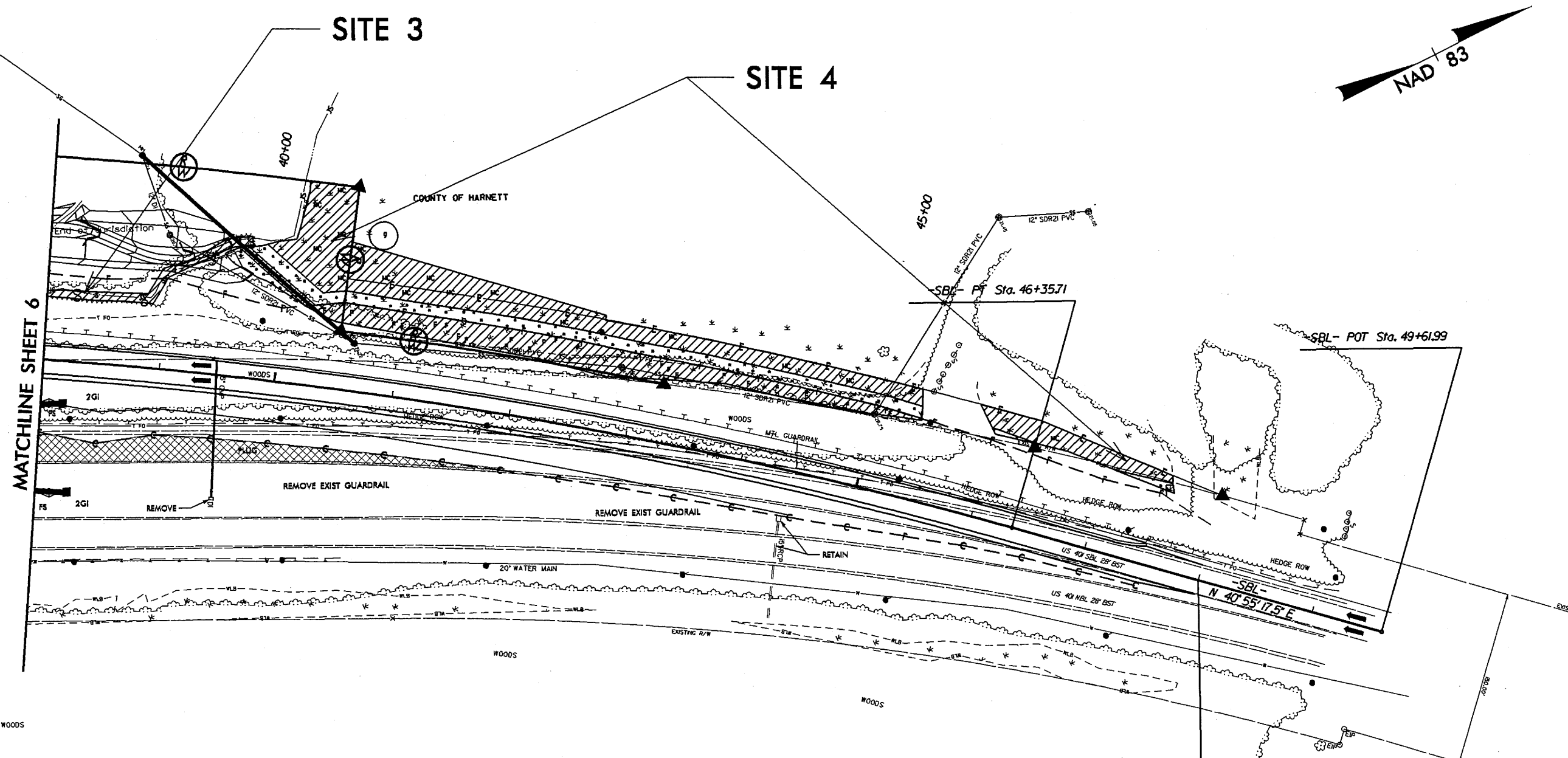
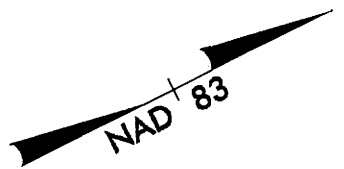
revised 3/4/10
Permit Drawing
Sheet 10 of 10

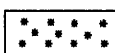
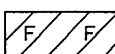
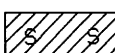
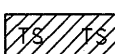


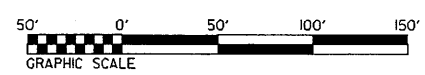
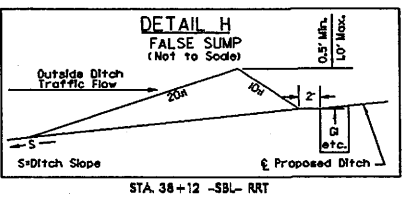
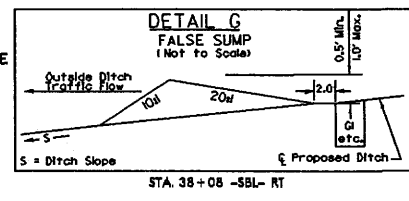
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PROJECT REFERENCE NO. B-4138	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



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

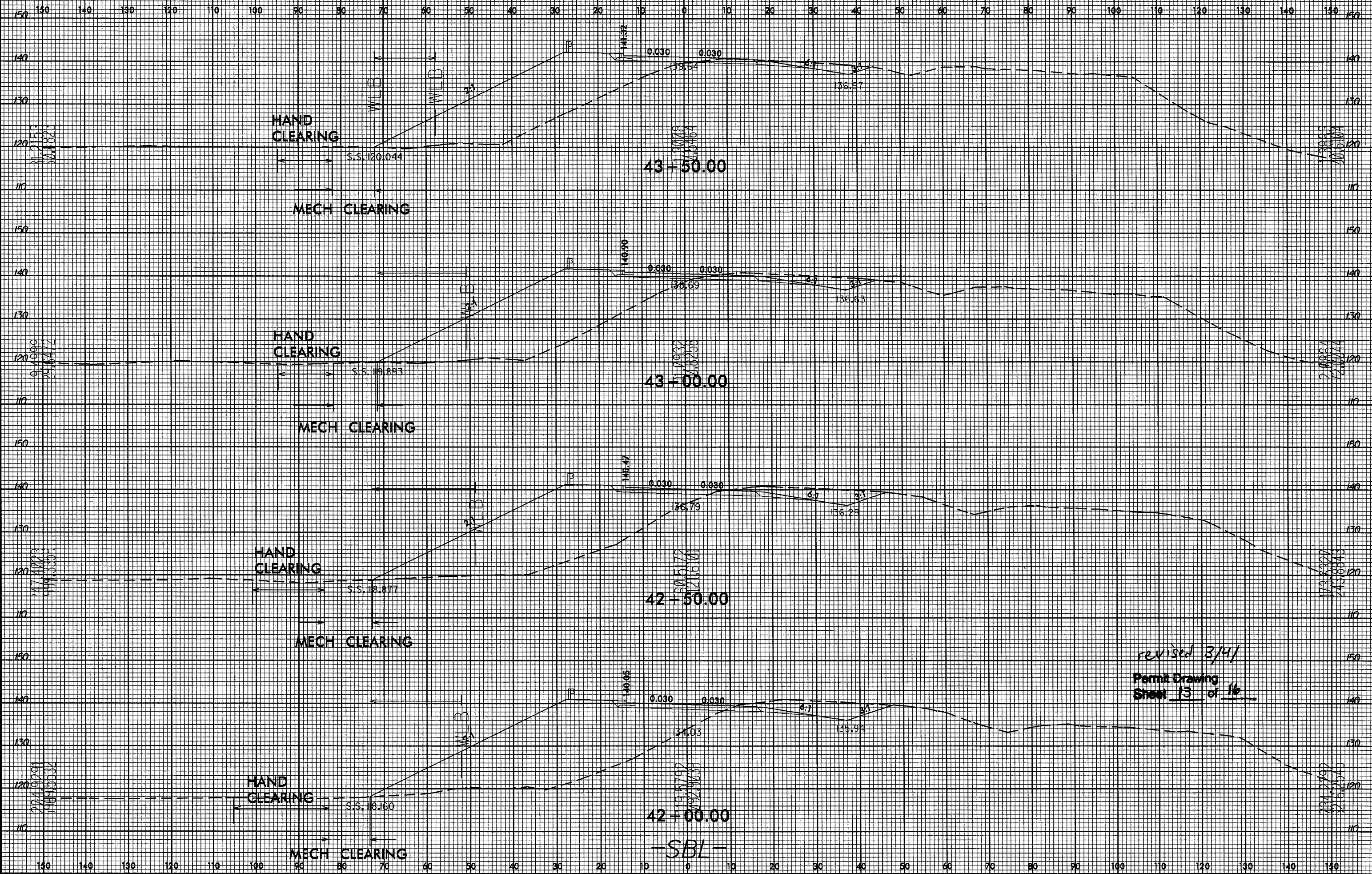


revised 3/4/10
Permit Drawing
Sheet 11 of 16

REVISIONS

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 8/17/99

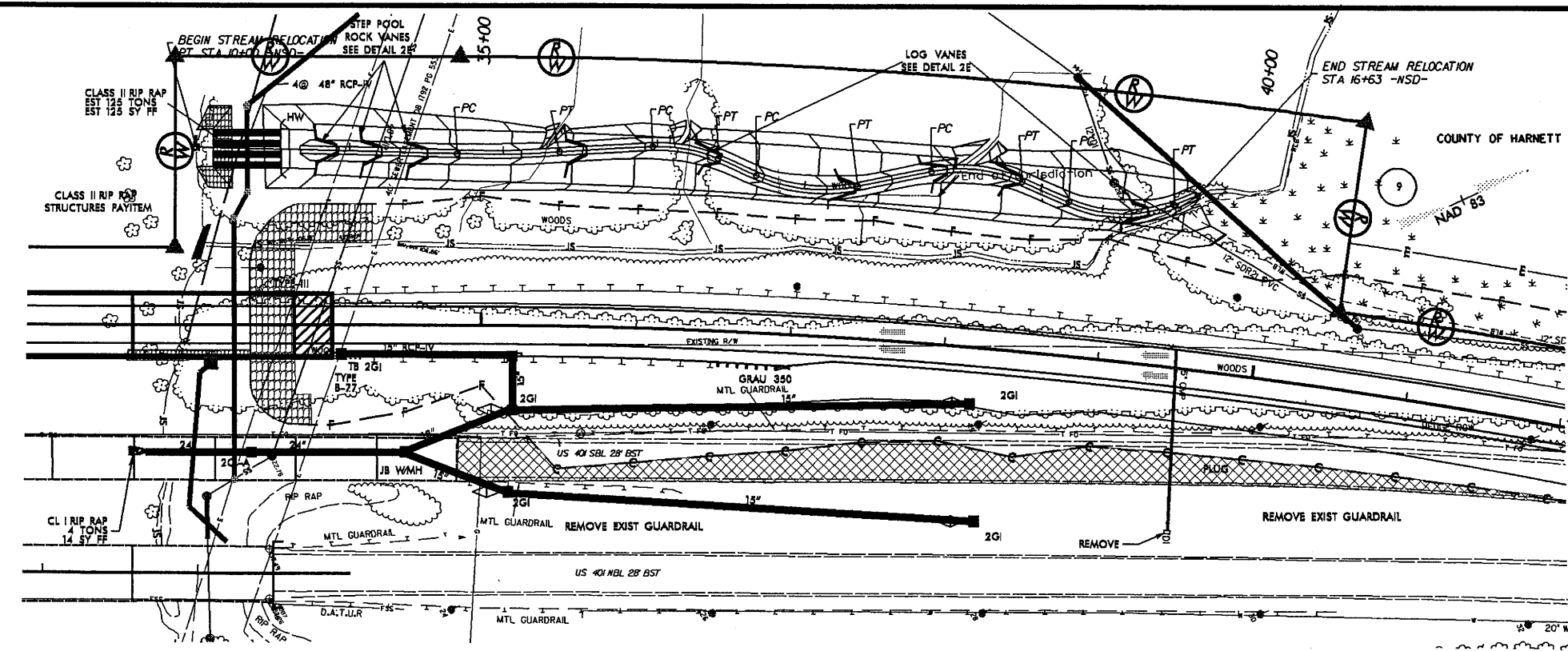
8/23/94



revised 3/4/1
Permit Drawing
Sheet 13 of 16

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Geol. A1 R244977

revised 3/4/10
 Permit Drawing
 Sheet 15 of 16



STREAM RELOCATION
 STA 10+00 -NSD- (STA 33+15 -SBL- LT)
 TO
 STA 16+63 -NSD- (STA 39+52 -SBL- LT)

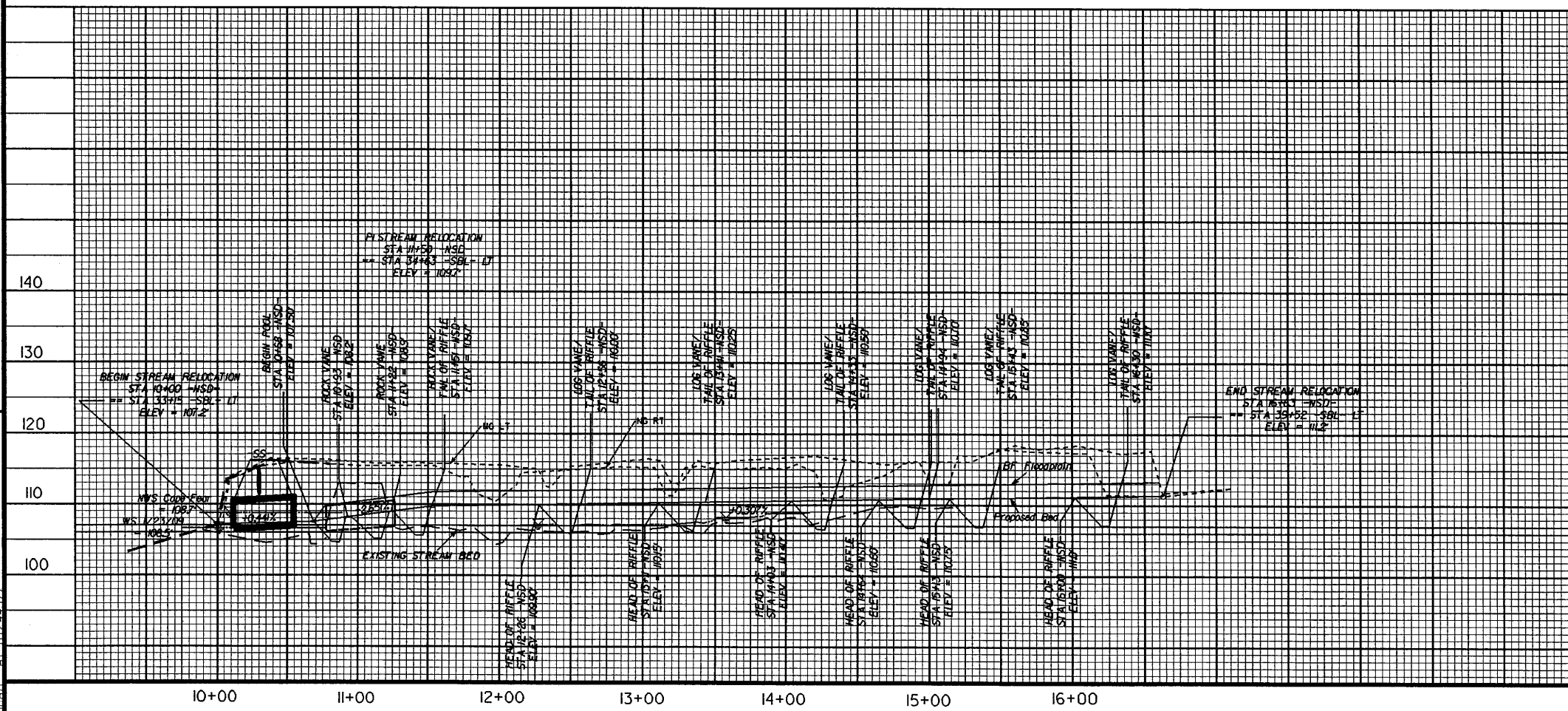
Quantities:

- Boulders/Header/Footer Rock = 80 Tons
- Log Vanes = 40 Logs ; 12 Roofwads
- #57 Stone = 170 Tons
- Filter Fabric = 390 SY
- Excavation = 4400 CY

REVISIONS

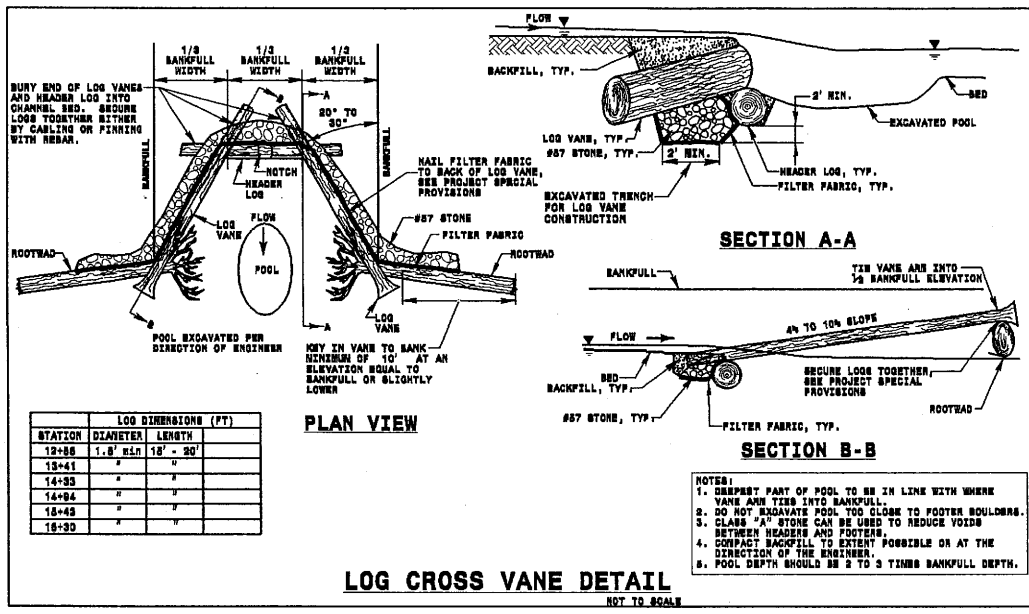
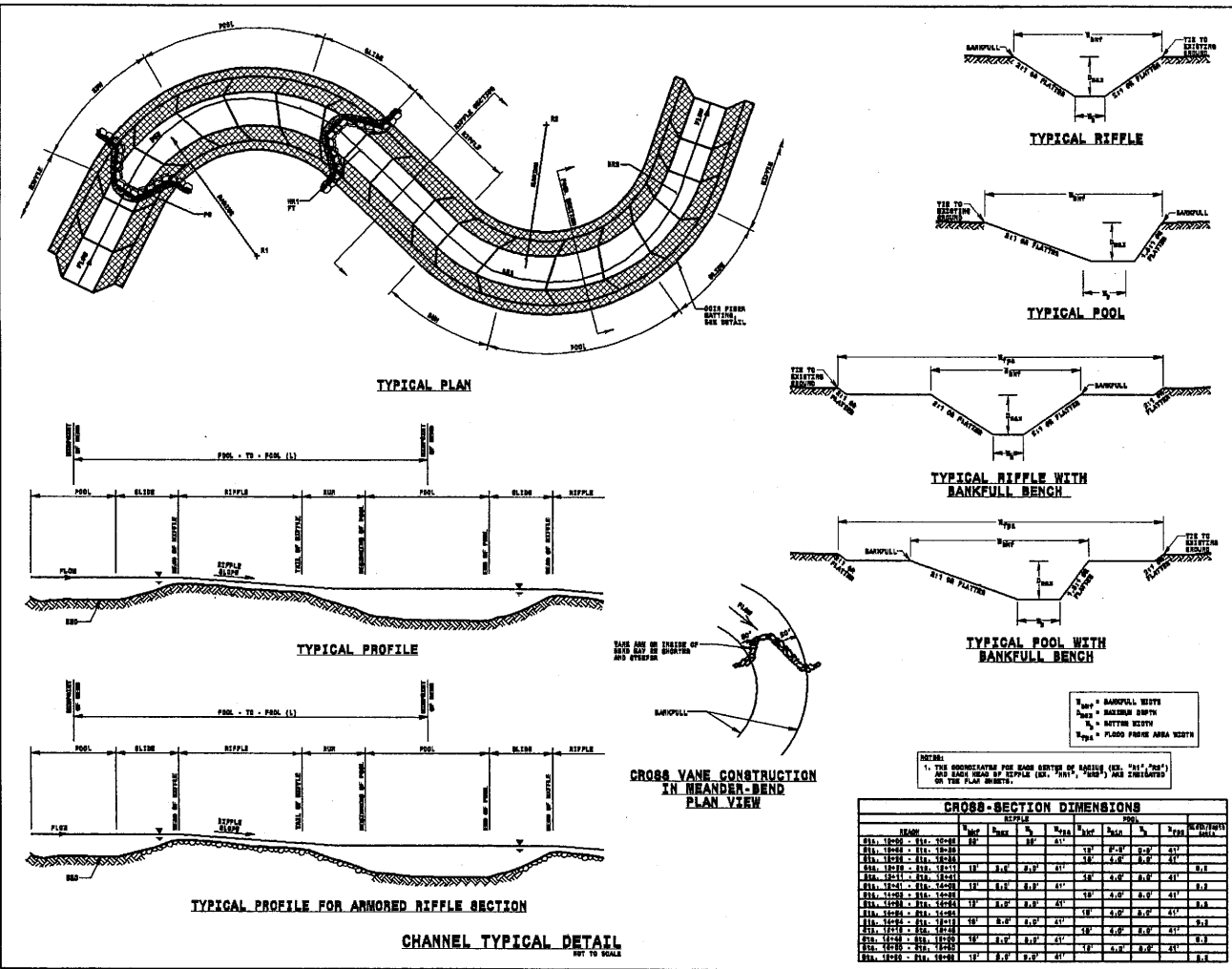
CURVE DATA

PT Sta 10+00 N 25° 44' 22.5" E	PI Sta 12+03.67 Δ = 4° 28' 51.5" (LT) D = 6' 4" 26.6" L = 66.48' T = 33.26' R = 850.00'
PC Sta 11+70.41 PT Sta 12+36.89	
N 21° 15' 31.0" E	PI Sta 13+18.90 Δ = 26° 30' 03.6" (RT) D = 6' 36" 30.1" L = 43.02' T = 21.90' R = 93.00'
PC Sta 12+97.00 PT Sta 13+40.02	
N 47° 45' 34.6" E	PI Sta 14+02.09 Δ = 3° 38' 10.3" (LT) D = 5' 09" 25.0" L = 67.71' T = 34.92' R = 112.00'
PC Sta 13+67.17 PT Sta 14+34.88	
N 13° 07' 23.8" E	PI Sta 15+14.60 Δ = 3° 57' 28.3" (RT) D = 5' 52" 28.3" L = 60.23' T = 31.08' R = 99.00'
PC Sta 14+83.52 PT Sta 15+43.75	
N 47° 58' 48.6" E	PI Sta 16+13.24 Δ = 4° 22' 34.3" (LT) D = 6' 22" 38.2" L = 68.93' T = 36.30' R = 89.00'
PC Sta 15+76.94 PT Sta 16+45.87	
N 3° 36' 14.6" E	



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HYDRAULICS ENGINEER

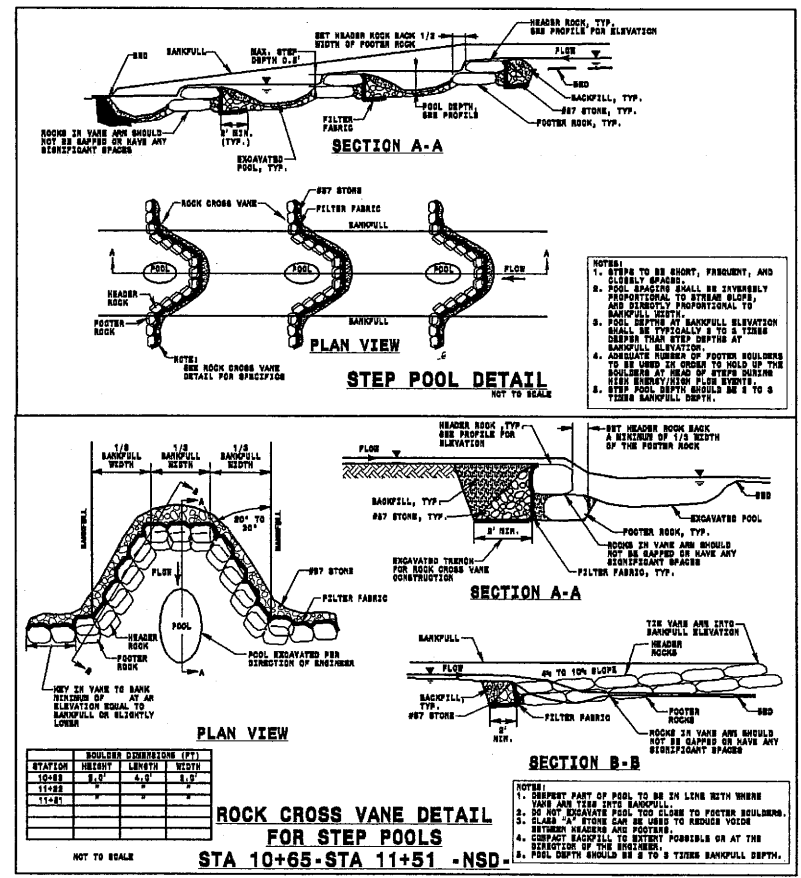


revised 3/4/10
Permit Drawing
Sheet 16 of 16

MORPHOLOGICAL MEASUREMENTS TABLE

UT to Cape Fear River — Harnett County — B-4138
-UT to Cape Fear River- Sta. In+nn.nn to Sta. nn+nn.nn

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach
1. Stream type	Trib to Cape Fear - G6	Trib to Cape Fear - G6		Muddy Creek - E5/C5
2. Drainage area	0.7 sq mi (450 ac)	0.7 sq mi (450 ac)		0.85 sq mi (545 ac)
3. Bankfull width (ft)	Mean: 9 Range: 9-10	Mean: 13 Range: 13-14		Mean: 11.2 Range: 11-12
4. Bankfull mean depth (ft)	Mean: 2.2 Range: 2.5-3.2	Mean: 1.4 Range: 1.4-1.5		Mean: 1.0 Range: 1.0-1.1
5. Width/depth ratio	Mean: 3.5 Range: 3.2-4.0	Mean: 9.3 Range: 9.3-10.0		Mean: 10.8 Range: 10.8-11.5
6. Bankfull cross-sectional area (sq ft)	Mean: 19.3 Range: 17.9-20.3	Mean: 18 Range: 18-19		Mean: 11.5 Range: 11.5-12.5
7. Bankfull mean velocity (ft/s)	Mean: 4.1 Range: 2.8 - 5.9	Mean: 3.4 Range: 3.2 - 3.5		Mean: 1.0 Range: 1.0-1.1
8. Bankfull discharge (cfs)	Mean: 69 Range: 69-70	Mean: 69 Range: 69-70		Mean: 11.0 Range: 11.0-11.5
9. Bankfull max depth (ft)	Mean: 2.8 Range: 2.5-3.2	Mean: 2.0 Range: 2.0-2.1		Mean: 1.7 Range: 1.7-1.8
10. Width of floodprone area (ft)	Mean: 11.7 Range: 12-21	Mean: 41 Range: 41-42		Mean: 245 Range: 245-250
11. Entrenchment ratio	Mean: 8.0 Range: 8.0-8.5	Mean: 29.3 Range: 29.3-30.0		Mean: 22.0 Range: 22.0-22.5
12. Meander length (ft)	Mean: N/A Range: N/A	Mean: 115 Range: 155 - 195		Mean: 76 Range: 55 - 97
13. Ratio of meander length to bankfull width	Mean: N/A Range: N/A	Mean: 13.5 Range: 11.9 - 15		Mean: 6.8 Range: 4.9 - 8.7
14. Radius of curvature (ft)	Mean: N/A Range: N/A	Mean: 100 Range: 100-105		Mean: 6.2 Range: 10.4 - 21.9
15. Ratio of radius of curvature to bankfull width	Mean: N/A Range: N/A	Mean: 7.7 Range: 7.7-8.0		Mean: 1.4 Range: 0.9 - 2.0
16. Belt width (ft)	Mean: N/A Range: N/A	Mean: 33 Range: 33-34		Mean: 39.5 Range: 39.5-40.0
17. Meander width ratio	Mean: N/A Range: N/A	Mean: 2.5 Range: 2.5-2.6		Mean: 3.5 Range: 2.7 - 4.4
18. Sinuosity (stream length/valley length)	Mean: 1.00 Range: 1.00-1.05	Mean: 1.02 Range: 1.02-1.05		Mean: 1.1 Range: 1.1-1.15
19. Valley slope (%)	Mean: 0.003 Range: 0.003-0.004	Mean: 0.003 Range: 0.003-0.004		Mean: 0.0047 Range: 0.0047-0.005
20. Average slope (%)	Mean: 0.005 Range: 0.003-0.012	Mean: 0.003 Range: 0.003-0.004		Mean: 0.002 Range: 0.002-0.003
21. Pool slope (%)	Mean: 0.005 Range: 0.005-0.006	Mean: 0.003 Range: 0.003-0.004		Mean: 0.0019 Range: 0.0019-0.002
22. Ratio of pool slope to average slope	Mean: 0.1 Range: 0.1-0.12	Mean: 1.0 Range: 1.0-1.1		Mean: 1.0 Range: 1.0-1.1
23. Maximum pool depth (ft)	Mean: 2.8 Range: 2.8-3.0	Mean: 4.0 Range: 4.0-4.5		Mean: 1.8 Range: 1.8-2.0
24. Ratio of pool depth to average bankfull depth	Mean: 1.0 Range: 1.0-1.1	Mean: 2.9 Range: 2.9-3.0		Mean: 1.7 Range: 1.7-1.8
25. Pool width (ft)	Mean: 7 Range: 6-8	Mean: 15 Range: 15-16		Mean: 17.2 Range: 17.2-18.0
26. Ratio of pool width to bankfull width	Mean: 0.8 Range: 0.8-0.9	Mean: 1.2 Range: 1.2-1.3		Mean: 1.5 Range: 1.5-1.6
27. Pool to pool spacing (ft)	Mean: 73 Range: 66-78	Mean: 95 Range: 90 - 100		Mean: 37 Range: 18 - 68
28. Ratio of pool to pool spacing to bankfull width	Mean: 7.2 Range: 7.2-7.5	Mean: 7.3 Range: 6.9 - 7.7		Mean: 3.3 Range: 1.5 - 6.1
29. Ratio of lowest bank height to bankfull height (or max bankfull depth)	Mean: 1.4 Range: 1.4-1.5	Mean: 1.0 Range: 1.0-1.1		Mean: 37 Range: 18 - 68



REVISIONS

8/17/99
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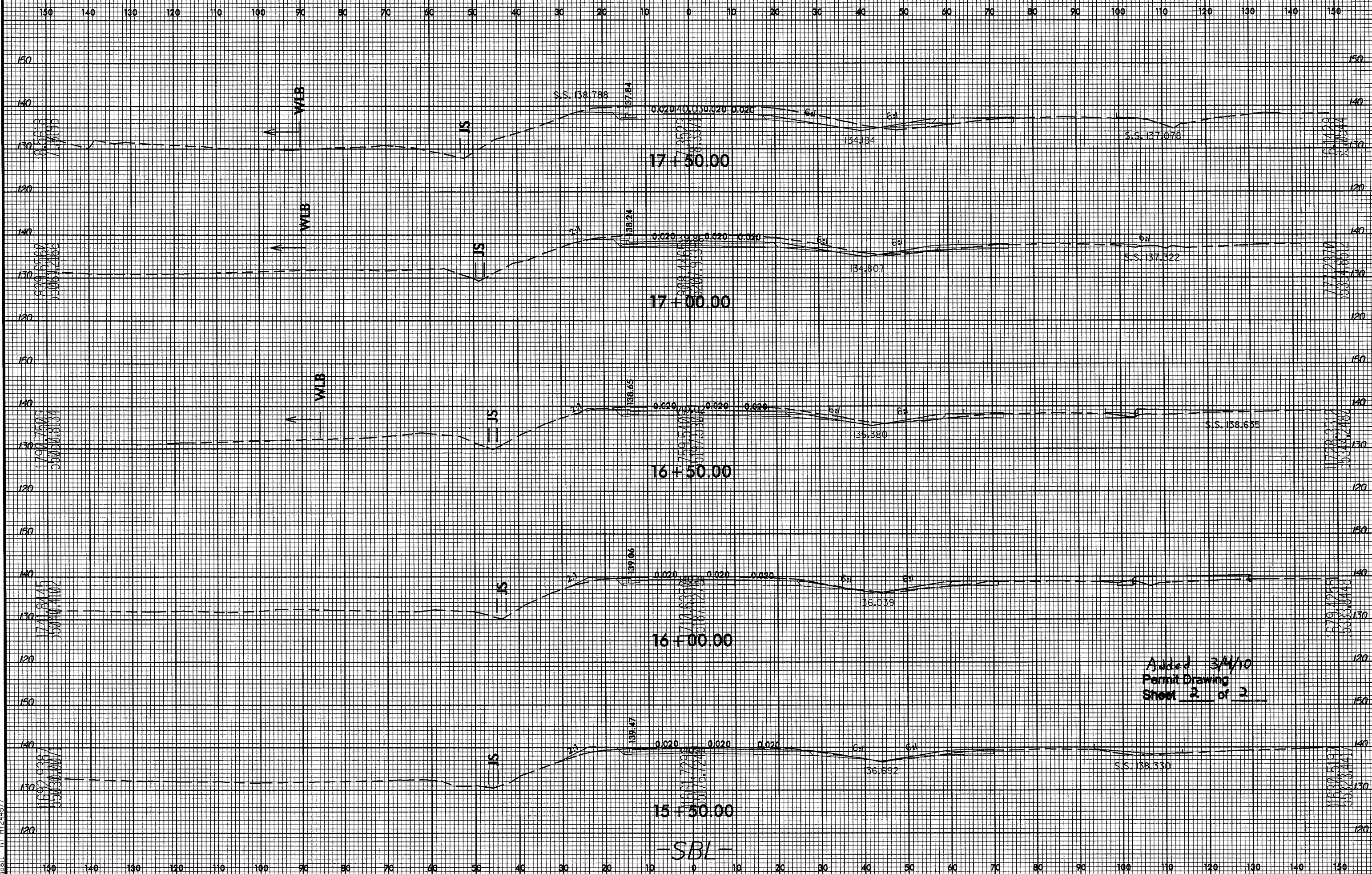
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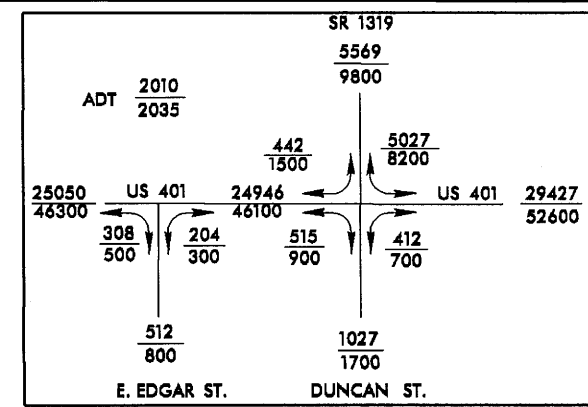
NAMES AND ADDRESSES

PARCEL	SITE	NAMES	ADDRESSES
1	1	WILLIAM MCKAY JOHNSTON	224 DEVONBROOK LN CARY, NC 27511
	1	NCDOT	
	2		CAPE FEAR RIVER
9	3, 3A, 4	COUNTY OF HARNETT	308 WEST DUNCAN ST LILLINGTON, NC 27546

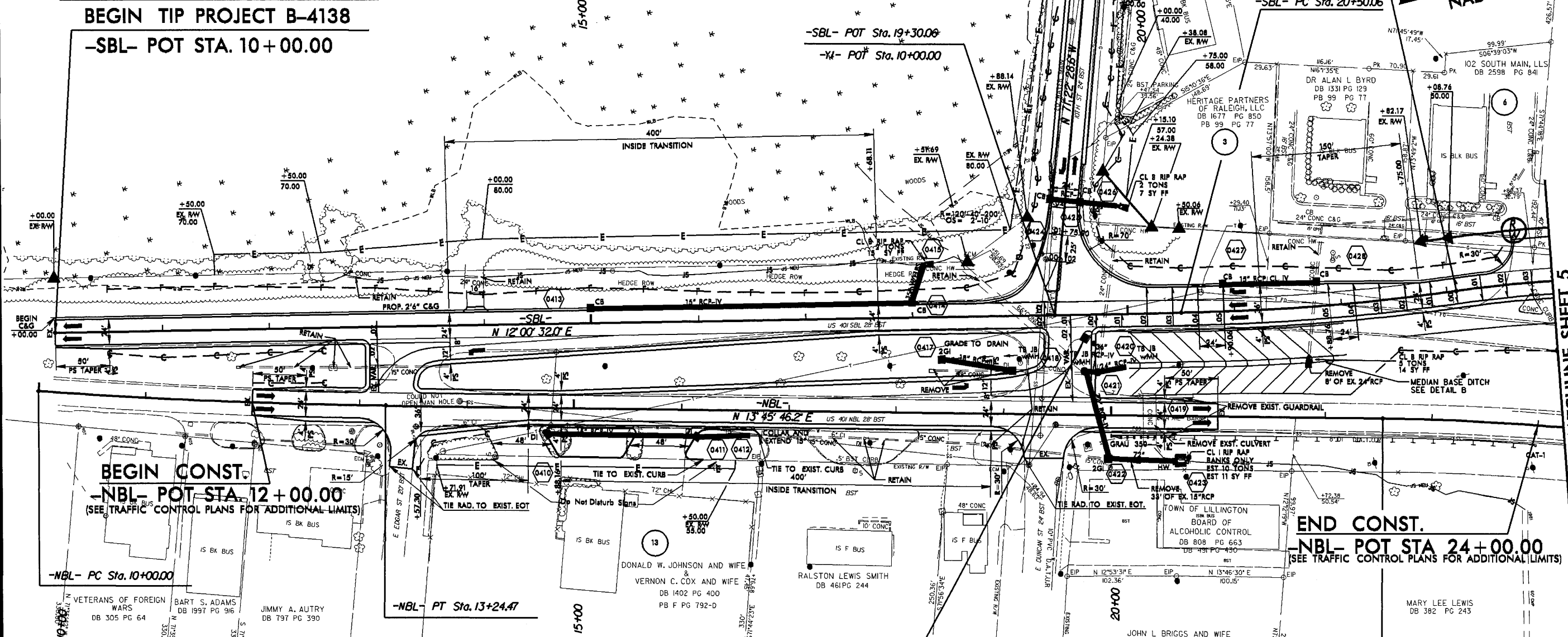
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Permit Drawing
Sheet 1 of 2

NCDOT
DIVISION OF HIGHWAYS
HARNETT COUNTY
PROJECT: 33490.1.1 (B-4138)
LILLINGTON
BRG. #46 OVER CAPE FEAR RIVER
ON US 401





BEGIN TIP PROJECT B-4138
-SBL- POT STA. 10+00.00

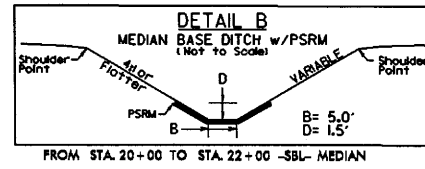
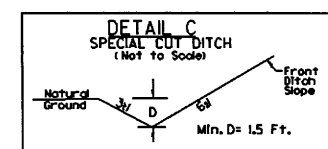


-SBL-

PI Sta 21+79.57	PI Sta 25+14.11
$\Delta = 6^{\circ} 58' 31.3" (LT)$	$\Delta = 19^{\circ} 25' 14.3" (RT)$
$D = 2^{\circ} 41' 46.6"$	$D = 4^{\circ} 46' 28.7"$
$L = 258.70'$	$L = 406.74'$
$T = 129.51'$	$T = 205.34'$
$R = 2125.00'$	$R = 1200.00'$
$SE = .05$	$SE = .07$
$V_0 = 50\text{mph}$	$V_0 = 50\text{mph}$

-NBL-

PI Sta 11+62.28	PI Sta 24+72.23
$\Delta = 3^{\circ} 24' 49.0" (LT)$	$\Delta = 10^{\circ} 50' 24.5" (RT)$
$D = 1^{\circ} 03' 07.5"$	$D = 2^{\circ} 29' 28.0"$
$L = 324.47'$	$L = 435.15'$
$T = 162.28'$	$T = 218.23'$
$R = 5,446.00'$	$R = 2,300.00'$
$SE = EXIST.$	$SE = EXIST.$



-BL- 1 POT 5+00.00
-BY- 8 POT 15+50.00
-SBL- POT Sta. 19+59.40
Offset 22.25' (RT)

END CONST.
-NBL- POT STA. 24+00.00
(SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL LIMITS)

SEE SHEET 7 FOR -DET-
SEE SHEET 8 FOR -SBL- PROFILE
SEE SHEET 11 FOR -YI- PROFILE

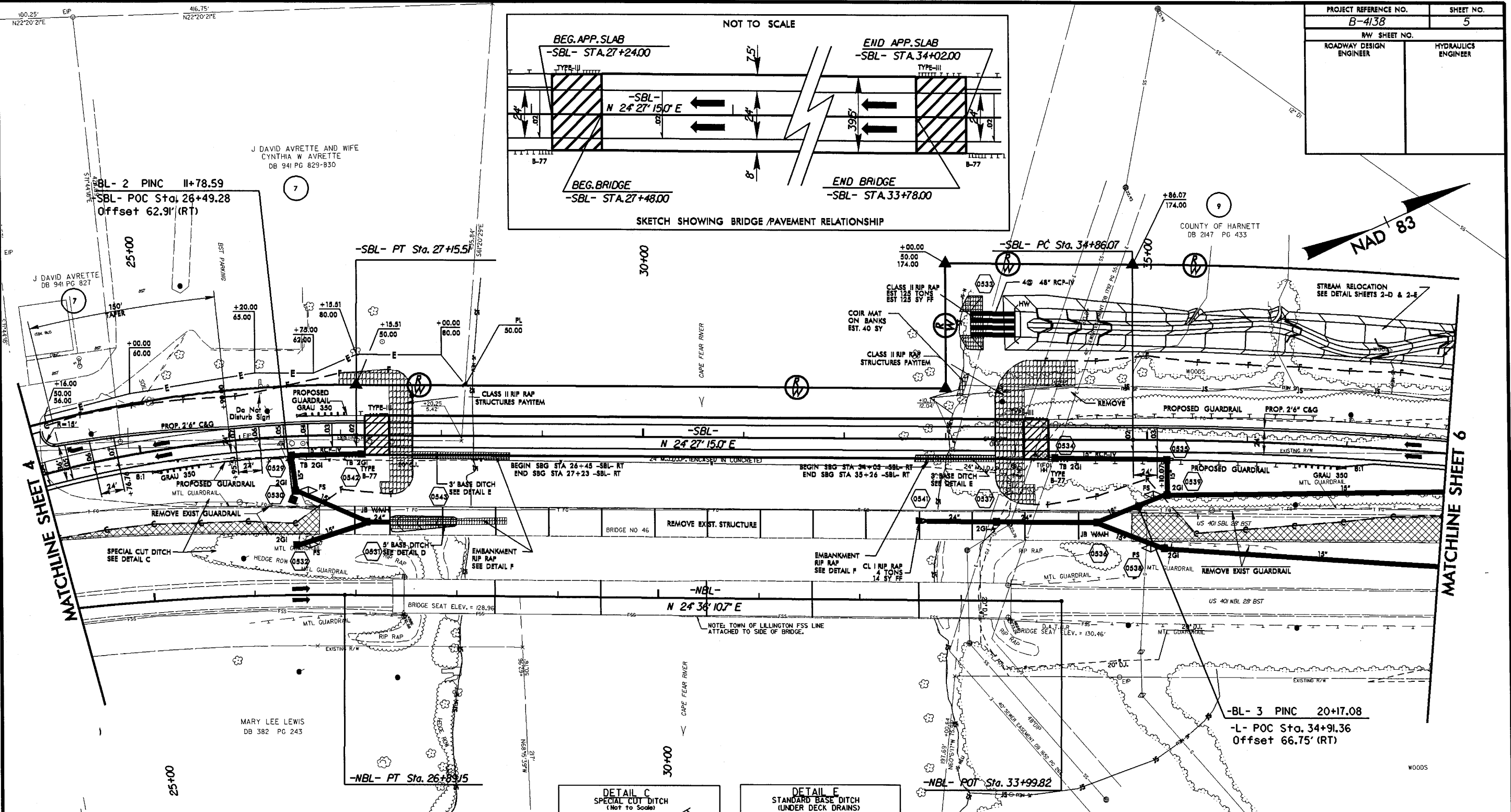
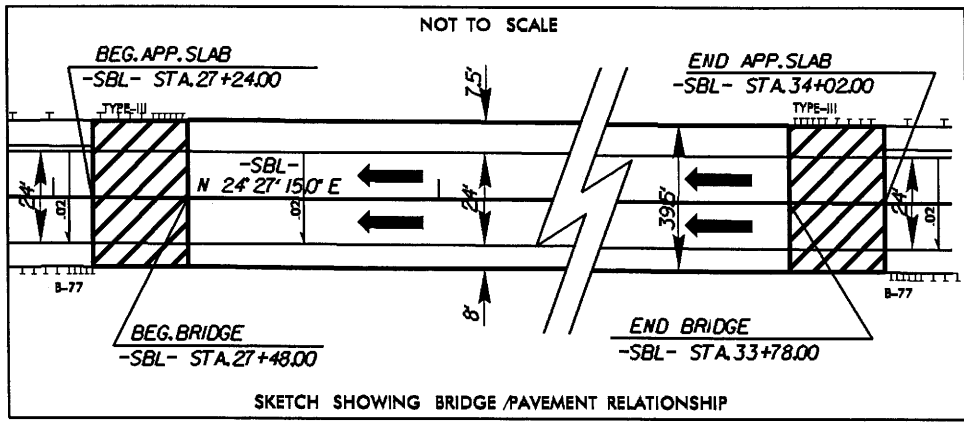
PROP. MONOLITHIC ISLAND
SEE SHEET 2-D FOR DIRECTIONAL CROSSOVER DETAIL

Revised

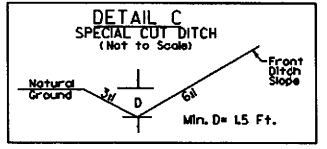
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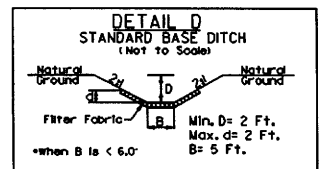
PROJECT REFERENCE NO. B-4138	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



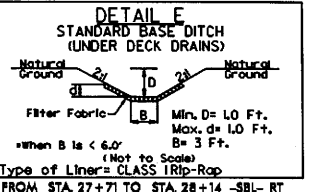
-SBL-	
PI Sta 25+14.11 $\Delta = 19' 25'' 14.3''$ (RT) $D = 4' 46'' 28.7''$ $L = 406.74'$ $T = 205.34'$ $R = 1,200.00'$ $SE = .07$ $V_0 = 50\text{mph}$	PI Sta 40+64.88 $\Delta = 16' 28'' 02.4''$ (RT) $D = 1' 25'' 56.6''$ $L = 1,149.64'$ $T = 578.81'$ $R = 4,000.00'$ $SE = .03$ $V_0 = 50\text{mph}$
-NBL-	
PI Sta 24+72.23 $\Delta = 10' 50'' 24.5''$ (RT) $D = 2' 29'' 28.0''$ $L = 435.15'$ $T = 218.23'$ $R = 2,300.00'$ $SE = \text{EXIST.}$	



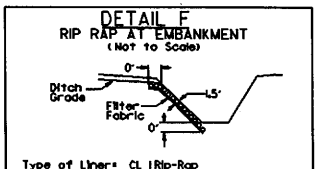
FROM STA. 22+00 TO STA. 26+30 -SBL- RT
 FROM STA. 24+30 TO STA. 26+30 -NBL- LT
 FROM STA. 33+20 TO STA. 45+00 -SBL- RT
 FROM STA. 35+00 TO STA. 39+30 -NBL- LT



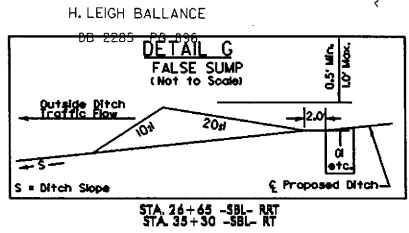
When B is < 6.0'
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 FROM STA. 27+50 TO STA. 28+15 -SBL- RT
 EST. 85 TONS EST. 105 SY FF
 DDE = 50 CY



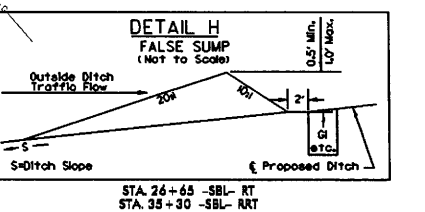
When B is < 6.0'
 (Not to Scale)
 Type of Liner: CLASS I Rip-Rap
 FROM STA. 27+71 TO STA. 28+14 -SBL- RT
 FROM STA. 33+06 TO STA. 33+50 -SBL- RT
 EST. 50 TONS EST. 80 SY FF
 DDE = 12 CY



Type of Liner: CLASS I Rip-Rap
 FROM STA. 28+14 TO STA. 28+69 -SBL- RT
 FROM STA. 28+15 TO STA. 28+68 -SBL- RT
 FROM STA. 32+69 TO STA. 33+06 -SBL- RT



H. LEIGH BALLANCE
 DB 2285 PG 228
 STA. 26+65 -SBL- RT
 STA. 35+30 -SBL- RT

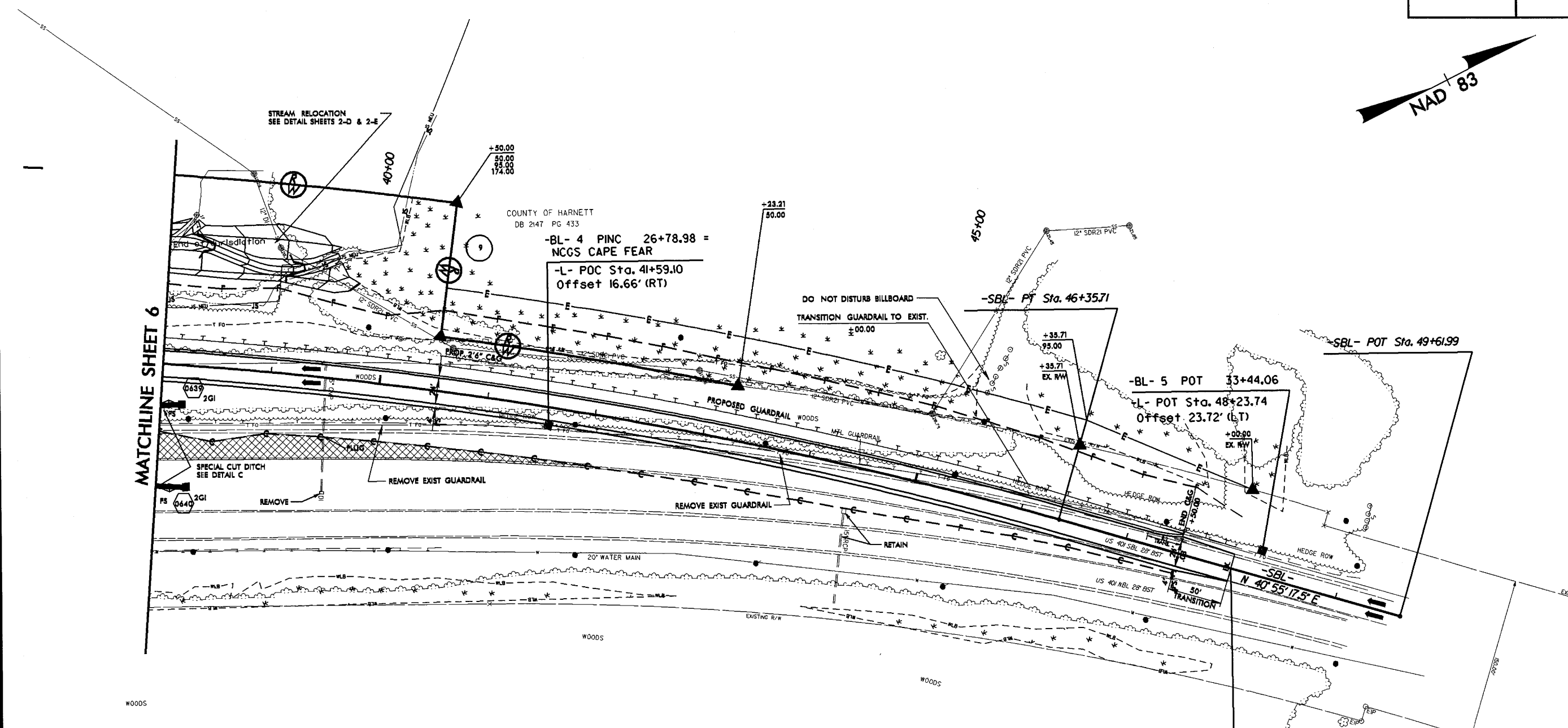
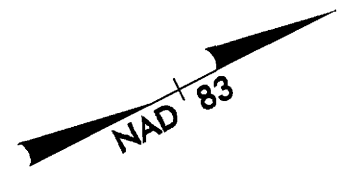


STA. 26+65 -SBL- RT
 STA. 35+30 -SBL- RT

SEE SHEET 2-H FOR HEADWALL DETAIL
 SEE SHEETS 2-D THRU 2-E FOR STREAM RELOCATION
 SEE SHEET S-1 THRU S-58 FOR STRUCTURES PLANS
 PAVEMENT REMOVAL [Hatched Pattern]
 SEE SHEET 8 FOR -SBL- PROFILE

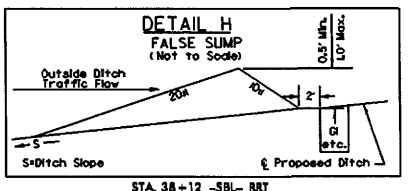
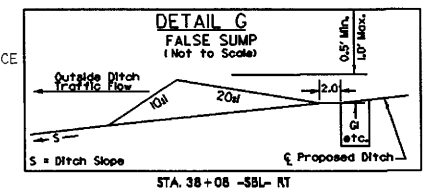
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PROJECT REFERENCE NO. B-4138	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



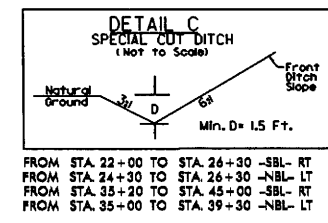
REVISIONS

H. LEIGH BALLANCE
DB 2285 PG 896



END TIP PROJECT B-4138
-SBL- POT 48+00.00
 (SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL LIMITS)

-SBL-
 PI Sta 40+64.88
 $\Delta = 16' 28'' 02.4''$ (RT)
 $D = 1' 25'' 56.6''$
 $L = 1149.64'$
 $T = 578.81'$
 $R = 4,000.00'$
 $SE = .03$
 $V_b = 50\text{mph}$



FROM STA. 22+00 TO STA. 26+30 -SBL- RT
 FROM STA. 24+30 TO STA. 26+30 -NBL- LT
 FROM STA. 33+20 TO STA. 45+00 -SBL- RT
 FROM STA. 35+00 TO STA. 39+30 -NBL- LT

SEE SHEETS 2-D THRU 2-E FOR STREAM RELOCATION
 PAVEMENT REMOVAL
 SEE SHEET 9 FOR -SBL- PROFILE

Revised
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