



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

September 8, 2005

Stormwater Section
Division of Water Quality
943 Washington Square Mall
Washington, NC 27889

Attention: Mr. Bill Moore

Dear Sir:

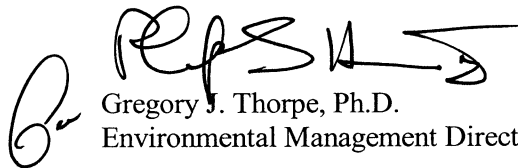
Subject: **Stormwater Permit Request** for the proposed replacement of Bridge No. 16 over Merchants Millpond on SR 1400, in Gates County. Federal Aid Project No. BRZ-1400(4), State Project No. 8.2060201, TIP No. B-3640; Debit WBS 33394.1.1 \$420.

The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 16 on SR 1400 over Merchants Millpond in Gates County. Gates County falls under the jurisdiction of the Coastal Area Management Act (CAMA). The NCDOT is applying for a Clean Water Act (CWA) §404 Department of Army Permit, and a North Carolina CWA §401 Water Quality Certification.

A Stormwater Application Form, the Project Scope Narrative, Proposed Bridge Survey Report, and the project plans are provided with this request. Please review this project for authorization by your division.

Thank you for your time and consideration. Please contact Mr. Galen Cail, P.E. at (919) 250-4100 if you have any questions or concerns with the stormwater design. If you need any additional information from our staff, contact Tyler Stanton at tstanton@dot.state.nc.us or (919) 715-1439.

Sincerely,



Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

Cc: w/out attachments:
Mr. Bill Biddlecome, USACE
Ms. Lynn Mathis, NCDOT
Ms. Stacy Baldwin, P.E., PDEA
File B-3640

Enclosures (4)

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

OFFICE USE ONLY		
Date Received	Fee Paid	Permit Number

**State of North Carolina
Department of Environment and Natural Resources
Division of Water Quality**

**STORMWATER MANAGEMENT PERMIT APPLICATION FORM
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
LINEAR ROADWAY PROJECT**

This form may be photocopied for use as an original.

DWO Stormwater Management Plan Review:

A complete stormwater management plan submittal includes this application form, a supplement form for each BMP proposed (see Section V), design calculations, and plans and specifications showing all road and BMP details.

I. PROJECT INFORMATION

NCDOT Project Number: 33188.1.1 (B-3640) County: Gates

Project Name: Replace Bridge #16 over Merchants Mill Pond on SR 1400

Project Location: Northeast of Gatesville; South of Easons Crossroads

Contact Person: Marshall Clawson/Galen Cail Phone: (919) 250-4100 Fax: (919) 250-4108

Receiving Stream Name: Pond / Bennetts Crk River Basin: Chowan River Basin Class: C-NSW

Proposed linear feet of project: Total Roadway = 335' ; Total Bridge Length = 135' (3 @ 45' Cored Slab)

Proposed Structural BMP and Road Station (*attach a list of station and BMP type if more room is needed*):

Minimized concentrating stormwater; No deck drains proposed

Type of proposed project: (*check all that apply*):

- New
 Widening
 2 lane*
 4 lane*
 Curb and Gutter
 Bridge Replacement
 Other (*Describe*) _____

**2 lane and 4 lane imply that roadside ditches are used unless Curb and Gutter is also checked.*

II. REQUIRED ITEMS CHECKLIST

Initial in the space provided below to indicate the following design requirements have been met and supporting documentation is attached. Supporting documentation shall, at a minimum, consist of a brief narrative description including (1) the scope of the project, (2) how the items below are met, (3) how the proposed best management practices minimize water quality impacts, and (4) any significant constraints and/or justification for not meeting a, b, c and d to the maximum extent practicable.

Designer's Initials

- a. The amount of impervious surface has been minimized as much as possible.
 b. The runoff from the impervious areas has been diverted away from surface waters as much as possible.
 c. Best Management Practices are employed which minimize water quality impacts.
 d. Vegetated roadside ditches are 3:1 slope or flatter.

III. OPERATION AND MAINTENANCE AGREEMENT

I acknowledge and agree by my initials below that the North Carolina Department of Transportation is responsible for the implementation of the four maintenance items listed. I agree to notify DWQ of any operational problems with the BMP's that would impact water quality or prior to making any changes to the system or responsible party.

Maintenance Engineer's Initials

- SDB a. BMP's shall be inspected and maintained in good working order.
- SDB b. Eroded areas shall be repaired and reseeded as needed.
- SDB c. Stormwater collection systems, including piping, inlets, and outlets, shall be maintained to insure proper functioning.

Maintenance Engineer's Name: STERLING BAKER
Title: DIVISION MAINTENANCE ENGINEER

IV. APPLICATION CERTIFICATION

I, (print or type name) Philip S. Harris III of PDEA Branch, certify that the information included on this permit application form is, to the best of my knowledge, correct and that the project will be constructed in conformance with the approved plans and that the proposed project complies with the requirements of 15A NCAC 2H .1000.

Title: PDEA Natural Environment Unit Head
Address: Raleigh, NC
Signature: [Signature] Date: 9/7/05

V. SUPPLEMENT FORMS

The applicable state stormwater management permit supplement form(s) listed below must be submitted for each BMP specified for this project. Contact the Stormwater and General Permits Unit at (919) 733-5083 for the status and availability of these forms.

- Form SWU-102 Wet Detention Basin Supplement
- Form SWU-103 Infiltration Basin Supplement
- Form SWU-104 Low Density Supplement
- Form SWU-105 Curb Outlet System Supplement
- Form SWU-106 Off-Site System Supplement
- Form SWU-107 Underground Infiltration Trench Supplement
- Form SWU-108 Neuse River Basin Supplement
- Form SWU-109 Innovative Best Management Practice Supplement
- Form SWU-110 Extended Dry Detention Basin Supplement

STORMWATER MANAGEMENT PLAN

WBS: 33188.1.1 (B-3640)
Gates County

Date: 8/05

PROJECT DESCRIPTION

The project involves the bridge replacement of Bridge #16 over Merchants Mill Pond on SR 1400. The overall length of the bridge is 135' and the total project length is 335'. The existing bridge length is 106'. The existing two lane road will be widened from 9' lanes to 11' lanes. The existing bridge will be widened from 29' to 45' to accommodate 5' 9" sidewalks on each side of the proposed bridge. The crossing is within the Chowan River Basin and is part of the Merchants Millpond State Park.

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES

Best Management Practices (BMPs) and measures used on the project to reduce the stormwater impacts include the following:

- Approach work was minimized to approximately 100' on each side of the bridge.
- No deck drains proposed for new bridge.
- Concentrated flow minimized to one proposed inlet on west side of crossing. Otherwise allowed sheet flow over grassed shoulders.

09/08/05

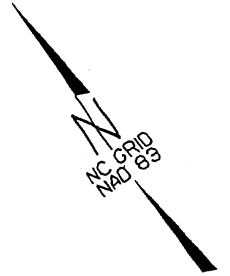
See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GATES COUNTY

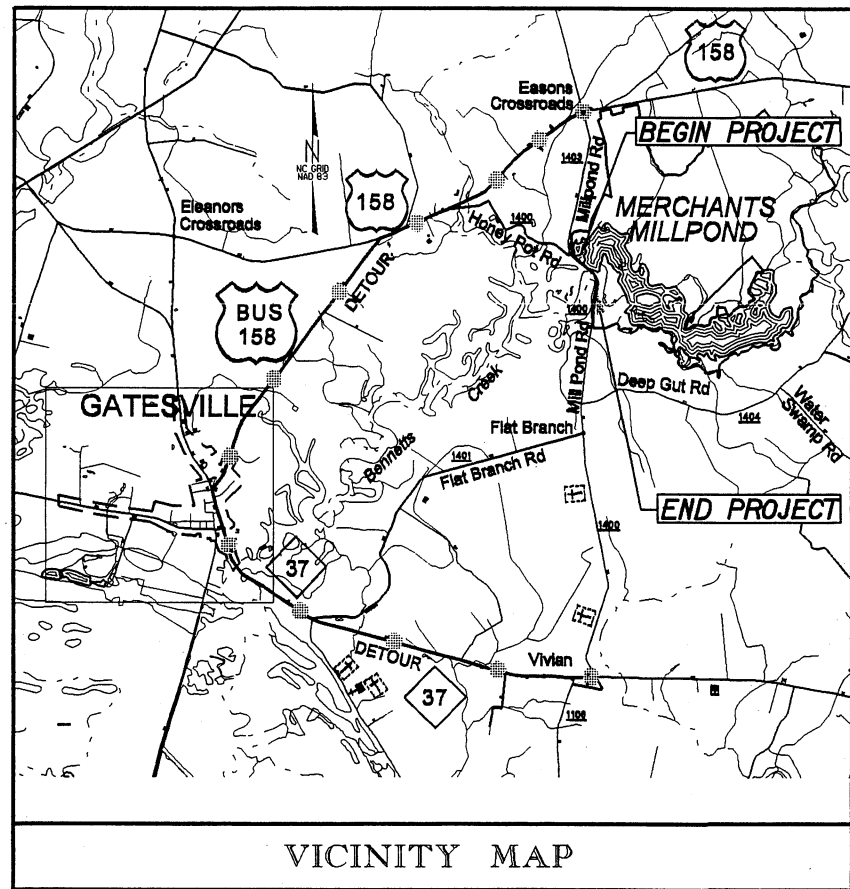
LOCATION: BRIDGE NO. 16 OVER MERCHANTS MILLPOND ON SR 1400
TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3640	1	
WBS NO.	F.A. PROJ. NO.	DESCRIPTION	
33188.1.1	BRZ-1400(4)	P.E.	
33188.2.1	BRZ-1400(4)	R/W	



TIP: B-3640

PROJECT: 33188.1.1

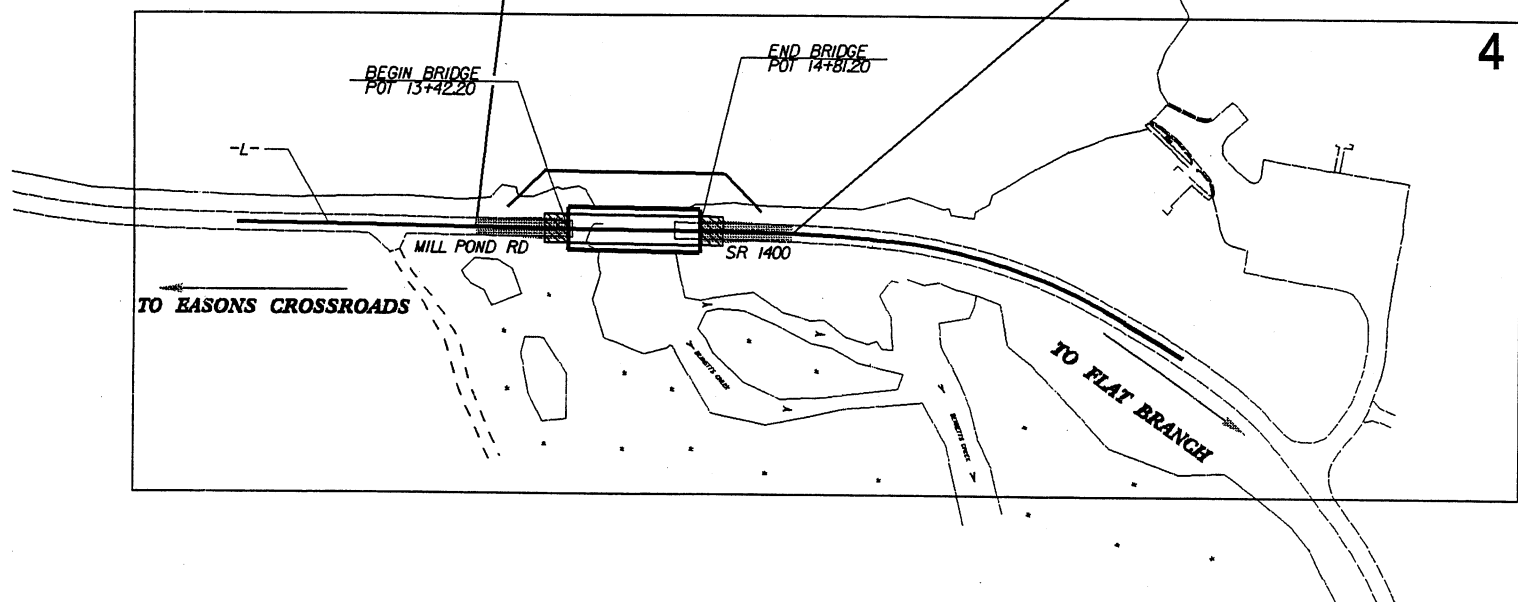


VICINITY MAP

LEGEND: DETOUR

STA. 12+45.00 -L- BEGIN TIP PROJECT B-3640

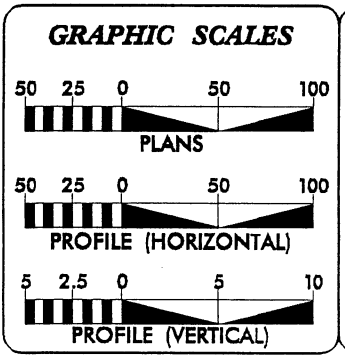
STA. 15+80.00 -L- END TIP PROJECT B-3640



NOTES:
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD _____
THIS PROJECT IS NOT LOCATED WITHIN THE BOUNDARIES OF ANY MUNICIPALITY.

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

NCDOT CONTACT: CATHY HOUSER, P.E. - PROJECT ENGINEER - ROADWAY DESIGN - ENGINEERING COORDINATION



DESIGN DATA

ADT 2005 = 1000
ADT 2025 = 1600
DHV = 10 %
D = 55 %
T = 4 % *
V = 50 MPH
* TTST 1% DUAL 3%

PROJECT LENGTH

LENGTH ROADWAY	TIP PROJECT B-3640 =	0.037 MILES
LENGTH STRUCTURE	TIP PROJECT B-3640 =	0.026 MILES
TOTAL LENGTH OF TIP PROJECT B-3640 = 0.063 MILES		

Prepared in the Office of:
WILBUR SMITH ASSOCIATES
P.O. BOX 2478 RALEIGH, NC 27602-2478 PHONE (919) 755-0583

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 30, 2005

LETTING DATE:
MARCH 21, 2006

THOMAS E. TALLMAN, P.E.
PROJECT ENGINEER

R.D. ODELL, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.

**DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA**

STATE DESIGN ENGINEER _____ P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED _____ P.E.
DIVISION ADMINISTRATOR

DATE _____

DATE PLOTTED: 09/08/05

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

*S.U.E = SUBSURFACE UTILITY ENGINEER

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

Edge of Pavement	-----
Curb	-----
Prop. Slope Stakes Cut	----- C
Prop. Slope Stakes Fill	----- F
Prop. Woven Wire Fence	----- ○ ○
Prop. Chain Link Fence	----- □ □
Prop. Barbed Wire Fence	----- ◇ ◇
Prop. Wheelchair Ramp	----- WCR
Curb Cut for Future Wheelchair Ramp	----- CCFR
Exist. Guardrail	-----
Prop. Guardrail	-----
Equality Symbol	----- ⊕
Pavement Removal	----- XXXX

RIGHT OF WAY

Baseline Control Point	----- ◆
Existing Right of Way Marker	----- △
Exist. Right of Way Line w/Marker	----- △
Prop. Right of Way Line with Proposed RW Marker (Iron Pin & Cap)	----- ▲
Prop. Right of Way Line with Proposed (Concrete or Granite) RW Marker	----- ●
Exist. Control of Access Line	----- ○ A
Prop. Control of Access Line	----- ○ A
Exist. Easement Line	----- E
Prop. Temp. Construction Easement Line	----- E
Prop. Temp. Drainage Easement Line	----- TDE
Prop. Perm. Drainage Easement Line	----- PDE

HYDROLOGY

Stream or Body of Water	-----
River Basin Buffer	----- RBB
Flow Arrow	----- →
Disappearing Stream	----- Y
Spring	----- ○
Swamp Marsh	----- ↓
Shoreline	-----
Falls, Rapids	----- +
Prop Lateral, Tail, Head Ditches	----- FLM

STRUCTURES

MAJOR	
Bridge, Tunnel, or Box Culvert	----- CONC
Bridge Wing Wall, Head Wall and End Wall	-----) CONC WW (

MINOR	
Head & End Wall	----- CONC HW
Pipe Culvert	----- = = = =
Footbridge	----- >-----<
Drainage Boxes	----- □ CB
Paved Ditch Gutter	-----

UTILITIES

Exist. Pole	----- ●
Exist. Power Pole	----- ○
Prop. Power Pole	----- ○
Exist. Telephone Pole	----- ●
Prop. Telephone Pole	----- ○
Exist. Joint Use Pole	----- +
Prop. Joint Use Pole	----- +
Telephone Pedestal	----- □
UG Telephone Cable Hand Hold	----- □
Cable TV Pedestal	----- □
UG TV Cable Hand Hold	----- □
UG Power Cable Hand Hold	----- □
Hydrant	----- ◇
Satellite Dish	----- ∩
Exist. Water Valve	----- ⊗
Sewer Clean Out	----- ⊕
Power Manhole	----- ⊕
Telephone Booth	----- □
Cellular Telephone Tower	----- ●
Water Manhole	----- ⊕
Light Pole	----- ○
H-Frame Pole	----- ⊗
Power Line Tower	----- ⊗
Pole with Base	----- □
Gas Valve	----- ◇
Gas Meter	----- ⊕
Telephone Manhole	----- ⊕
Power Transformer	----- ⊕
Sanitary Sewer Manhole	----- ⊕
Storm Sewer Manhole	----- ⊕
Tank; Water, Gas, Oil	----- ○
Water Tank With Legs	----- ○
Traffic Signal Junction Box	----- □
Fiber Optic Splice Box	----- □
Television or Radio Tower	----- ⊗
Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement	----- TS TS

Recorded Water Line	----- W W
Designated Water Line (S.U.E.*)	----- W W
Sanitary Sewer	----- SS SS
Recorded Sanitary Sewer Force Main	----- FSS FSS
Designated Sanitary Sewer Force Main(S.U.E.*)	----- FSS FSS
Recorded Gas Line	----- G G
Designated Gas Line (S.U.E.*)	----- G G
Storm Sewer	----- S S
Recorded Power Line	----- P P
Designated Power Line (S.U.E.*)	----- P P
Recorded Telephone Cable	----- T T
Designated Telephone Cable (S.U.E.*)	----- T T
Recorded U/G Telephone Conduit	----- TC TC
Designated U/G Telephone Conduit (S.U.E.*)	----- TC TC
Unknown Utility (S.U.E.*)	----- ?UTL ?UTL
Recorded Television Cable	----- TV TV
Designated Television Cable (S.U.E.*)	----- TV TV
Recorded Fiber Optics Cable	----- FO FO
Designated Fiber Optics Cable (S.U.E.*)	----- FO FO
Exist. Water Meter	----- ○
UG Test Hole (S.U.E.*)	----- ⊕
Abandoned According to U/G Record	----- AATUR
End of Information	----- E.O.I.

BOUNDARIES & PROPERTIES

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Property Line Symbol	----- PL
Exist. Iron Pin	----- EP
Property Corner	----- +
Property Monument	----- ECM
Property Number	----- 123
Parcel Number	----- 6
Fence Line	----- X X
Existing Wetland Boundaries	----- WW & ISBW
High Quality Wetland Boundary	----- HLB
Medium Quality Wetland Boundaries	----- MQ WLB
Low Quality Wetland Boundaries	----- LQ WLB
Proposed Wetland Boundaries	----- WLB
Existing Endangered Animal Boundaries	----- EAB
Existing Endangered Plant Boundaries	----- EPB

BUILDINGS & OTHER CULTURE

Buildings	----- □
Foundations	----- □
Area Outline	----- □
Gate	----- ↗
Gas Pump Vent or U/G Tank Cap	----- ○
Church	----- +
School	----- □
Park	----- □
Cemetery	----- □
Dam	----- □
Sign	----- S
Well	----- W
Small Mine	----- X
Swimming Pool	----- ▨

TOPOGRAPHY

Loose Surface	-----
Hard Surface	-----
Change in Road Surface	-----
Curb	-----
Right of Way Symbol	----- R/W
Guard Post	----- GP
Paved Walk	-----
Bridge	-----
Box Culvert or Tunnel	-----
Ferry	-----
Culvert	-----
Footbridge	-----
Trail, Footpath	-----
Light House	----- ★

VEGETATION

Single Tree	----- ○
Single Shrub	----- ○
Hedge	----- ~
Woods Line	----- ~
Orchard	----- ○
Vineyard	----- VINEYARD

RAILROADS

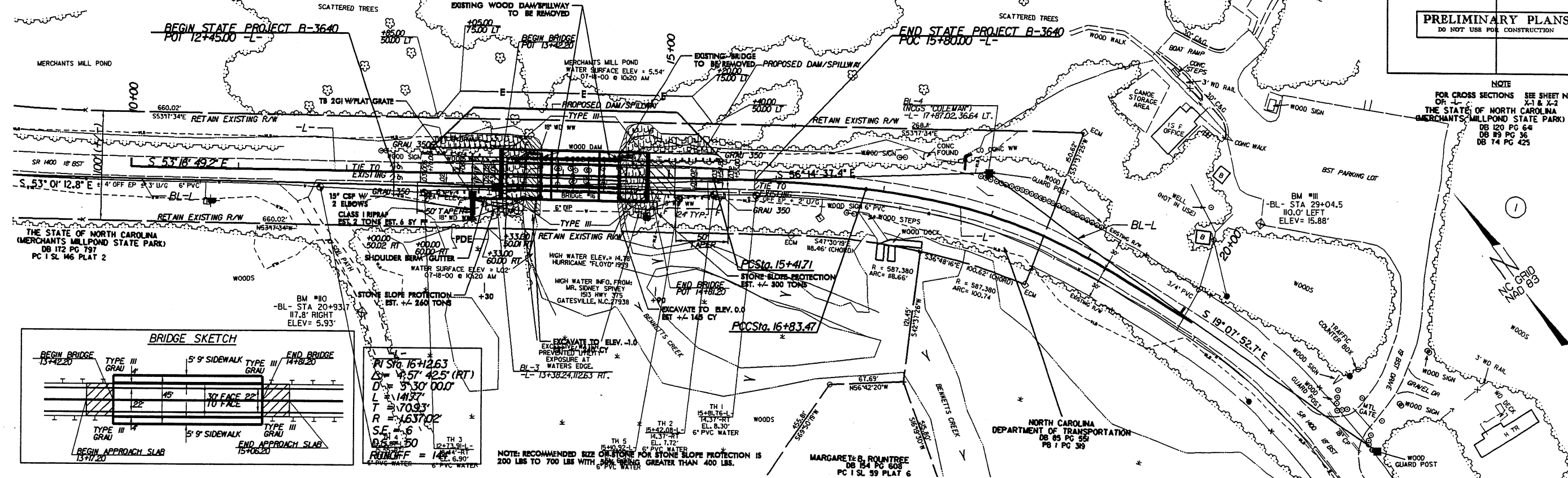
Standard Gauge	----- CSX TRANSPORTATION
RR Signal Milepost	----- MILEPOST 35
Switch	----- SWITCH

5/28/99
STATE & COUNTY

8/17/99

THE STATE OF NORTH CAROLINA
 (MERCHANTS MILL POND STATE PARK)
 DB 120 PG 64
 DB 13 PG 36
 DB 14 PG 425

PROJECT REFERENCE NO.	SHEET NO.
B-3640	4
NW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS	
DO NOT USE FOR CONSTRUCTION	



NOTE
 FOR CROSS SECTIONS SEE SHEET NO. X-1 & X-2
 OF THE STATE OF NORTH CAROLINA
 (MERCHANTS MILL POND STATE PARK)
 DB 120 PG 64
 DB 13 PG 36
 DB 14 PG 425

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "COLEMAN" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 983820.668071 EASTING: 267080.630711 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS 1.000084 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "COLEMAN" TO STATION 11+5000 IS N 54° 15' 28.85" W, 644.86' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

STRUCTURE HYDRAULIC DATA

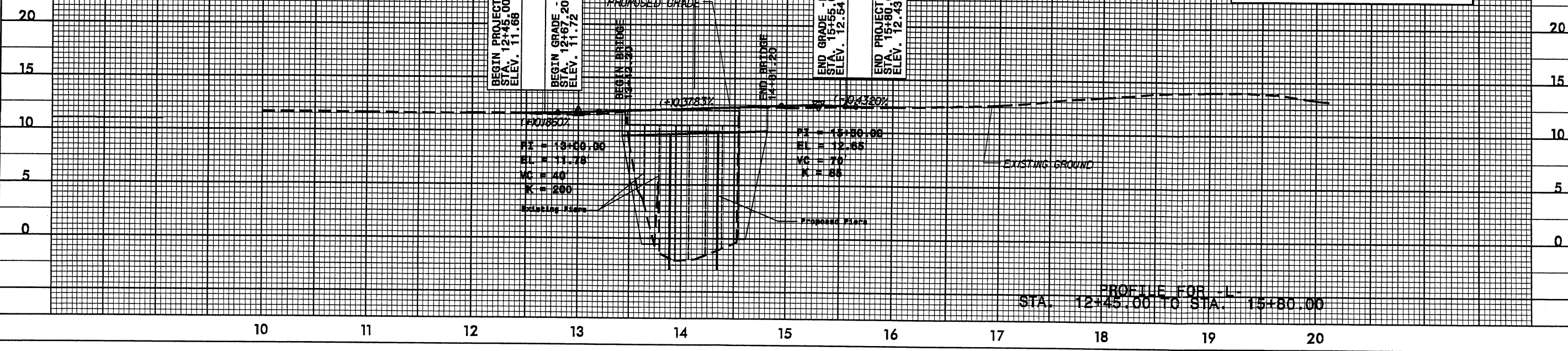
DESIGN DISCHARGE	=	CFS
DESIGN FREQUENCY	=	YRS
DESIGN HW ELEVATION	=	FT
BASE DISCHARGE	=	CFS
BASE FREQUENCY	=	YRS
BASE HW ELEVATION	=	FT
OVERTOPPING DISCHARGE	=	CFS
OVERTOPPING FREQUENCY	=	YRS
OVERTOPPING ELEVATION	=	FT

BM #10
 -L- STA. 12+17.33, 129.88 (RT.)
 ELEV. 5.93'
 BRIDGE NAIL IN 8" SWEETGUM, +/- 1" OFF THE GROUND.

BM #11
 -L- STA. 16+83.47, 366.99 (LT.)
 ELEV. 15.88'
 PK NAIL SET IN BST PARKING LOT, IN THE NORTHERN CORNER OF CANOE ACCESS AREA.

FEATHER TO EXIST
 BEGIN PROJECT STA. 12+45.00 ELEV. 11.68
 BEGIN GRADE -L- STA. 12+67.20 ELEV. 11.72

FEATHER TO EXIST
 END GRADE -L- STA. 15+55.00 ELEV. 12.84
 END PROJECT STA. 15+80.00 ELEV. 12.43



DATE: 8/17/99
 DRAWN BY: [Name]
 CHECKED BY: [Name]

K
M

INFORMATION TO BE SHOWN ON PLANS

Design: Discharge 9492 c.f.s. Frequency 25 YR Elev. 10.62
Base Flood: Discharge 13822 c.f.s. Frequency 100 YR Elev. 12.77
Overtopping: Discharge 12300 c.f.s. Frequency +/-50 YR Elev. 11.60

ADDITIONAL INFORMATION AND COMPUTATIONS

HYDROLOGY: (FROM HEC-1) CHOWAN RIVER BASIN

Table with columns: YR, Q(INFLOW), Q(OUTFLOW), POND WS ELEV., Q(OUTFLOW), POND WS ELEV. Rows for 5, 10, 25, 50, 100, 200 years.

SCOUR ANALYSIS - OVERTOPPING IS +/-50 YR

CONTRACTION

Ys = Y1 [(Qbc / Qnc)^0.7 - 1] Y1 = AREA APP/TOP WIDTH = 1154/106 = 10.9
= 10.9 [(11844/10622)^0.7 - 1] = 1.1 Qbc = 11844 Qnc = 10622

LOCAL

PEIR #1

Ys = Y1 [2(K1)(K2)(K3)(K4)(sigma Y1)^0.65 (Fr)^0.43] Y1 = 9.84 (-0.9) = 10.74
Fr = V1 / (g Y1)^0.5 V1 = 12.78 g = 32.2 Fr = .69
Ys = 10.74 [2(1)(1)(1.1)(1)(2.5/10.74)^0.65 (.69)^0.43] = 7.8

PEIR #2

Ys = 7.2 Y1 = 9.84 (-1.30) = 11.14
V1 = 13.02 g = 32.2 Fr = .69

SITE DATA

Drainage Area 82.5 SQ. MI. Source USGS QUAD Character RURAL
Stream Classification (Such as Trout, High Quality Water, etc.) C-NSW
Data on Existing Structure 1 @ 16', 1 @ 14', 1 @ 16', 1 @ 13', 1 @ 16', 1 @ 15', 1 @ 16' TIMBER DECK
WITH VERTICAL ABUTMENTS & PIERS Waterway Opening 893 FT^2

Data on Structures Up and Down Stream UPSTREAM: 3 @ 8' x 10' RCBC ON NC 32; BRIDGE NO. 21 ON
NC 158 3 @ 45'

DOWNSTREAM: BRIDGE NO. 13 ON NC 37 3 @ 45.1' CORED SLAB

Gage Station No. NA Period of Records NA

Max. Discharge NA c.f.s. Date NA Frequency NA

Historical Flood Information:

Date '99 Elev. 14.72 Est. Freq. FLOYD OVER BRIDGE Source VANESA TRUMAN - RESIDENT Period of Knowledge 15 YRS
Date '99 Elev. 14.72 Est. Freq. FLOYD OVER BRIDGE Source ROUNDTREE - RESIDENT Period of Knowledge 85 YRS
Date Elev. Est. Freq. Source Period of Knowledge

Historical Scour Info.: General NONE Contraction NONE Local NONE

Channel Slope 0.0009 F/FT Source USGS Normal Water Surface Elev. 4.09

Manning's n: Left 0.B. 0.12 Channel 0.05 Right 0.B. 0.12 Source FIELD

Flood Study / Status 100YR FLOOD HAZARD ZONE / NO DETAIL STUDY Floodway Established? NO

Flood Study 100 yr. Discharge NA c.f.s.; W.S. Elev.: With Floodway NA Without Floodway NA

DESIGN DATA

Hydrological Method SCS 24-HOUR TYPE III RAINFALL DISTRIBUTION; HEC-1

Hydraulic Design Method HEC-RAS 3.1.1

Table with columns: Floods Evaluation: Freq., Q, Elev., Backwater, Bridge Opening Velocity. Rows for 10, 25, 100, 200 years.

Waterway Opening Provided 1226 FT^2 * WS ELEV. FROM HEC-1 HEC-RAS SECTION 2070

Average Channel Velocity (Design) 8.08 FTS Average Overbank Velocity (Design) 3.77 FTS

Computed Scour: General Contraction 1.1' Local 7.8/7.9'

Is a Floodway Revision Required? NO

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
HYDRAULICS UNIT
RALEIGH, N. C.

MC

I.D. No. B-3640 Project No. 8.2060201 Proj. Station 14+11.5 -L-

County GATES Bridge Over MERCHANTS MILLPOND / BENNETTS CREEK Bridge Inv. No. 16

On Highway SR 1400 Between SR 1403 and SR 1404

Recommended Structure 3 @ 45' 21" CORED SLAB BRIDGE

Recommended Width of Roadway 40' SH. PT. SH. PT. Skew 90°

Location is (Up, At) Down Stream from Existing Crossing AT EXISTING CROSSING

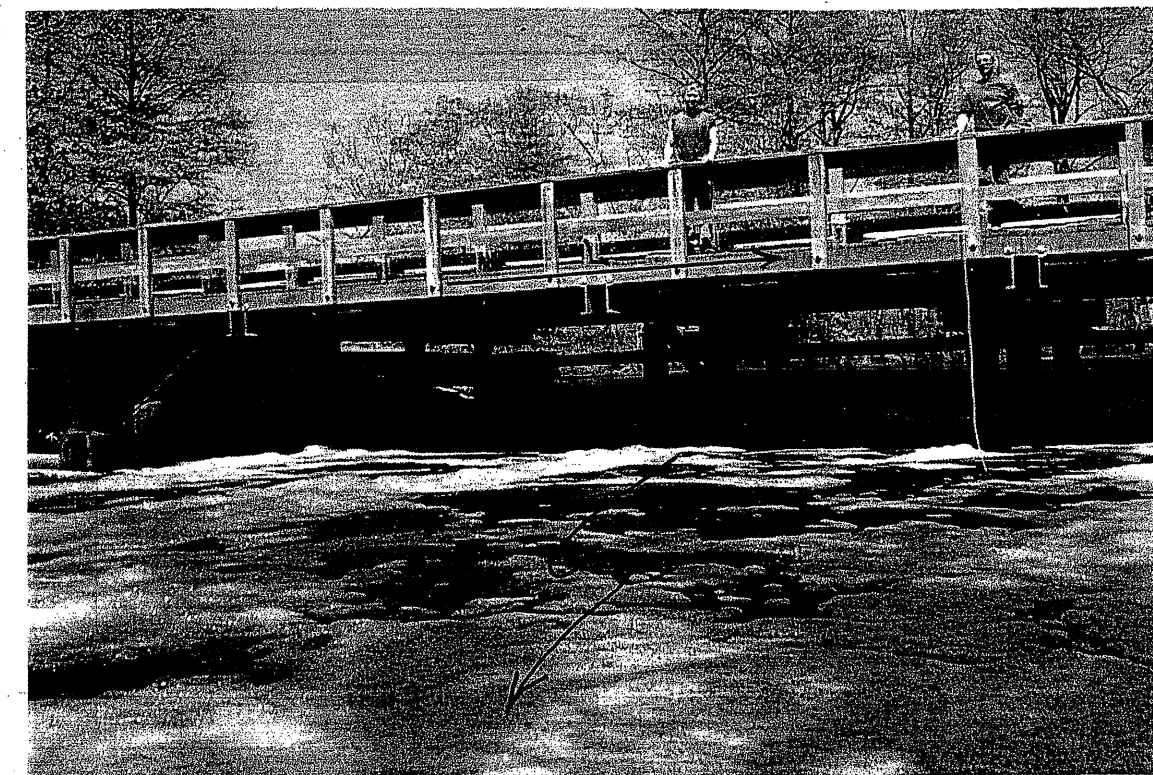
Nearest Shipping Point COFIELD on CSR R.R., 16.0 Miles From Bridge

Bench Mark is BM NO. 110: STA 12+17.33 -L- 129.88' RT; BRIDGE NAIL IN 8" SWEETGUM

Elev. 5.93 ft Datum: NGVD 29

Temporary Crossing IS NOT REQUIRED; OFFSITE DETOUR

MERCHANTS MILLPOND
BENNETTS CREEK
Stream
I.D. No. B-3640
Project No. 8.2060201
Bridge Inv. No. 16



Designed by: SUNGATE DESIGN GROUP, P.A.

Assisted by: WMH, RHK, TSG

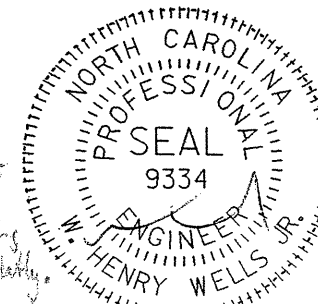
Project Engineer: W. HENRY WELLS, JR PE

Reviewed & Approved by: MWC

- Rev 2/7/05

Per booklet, use 2' side slopes. Will use prop tangent and existing existing bridge opening.

Date 11/17/03



MERCHANTS MILLPOND

10 11 12 13 14 15 16

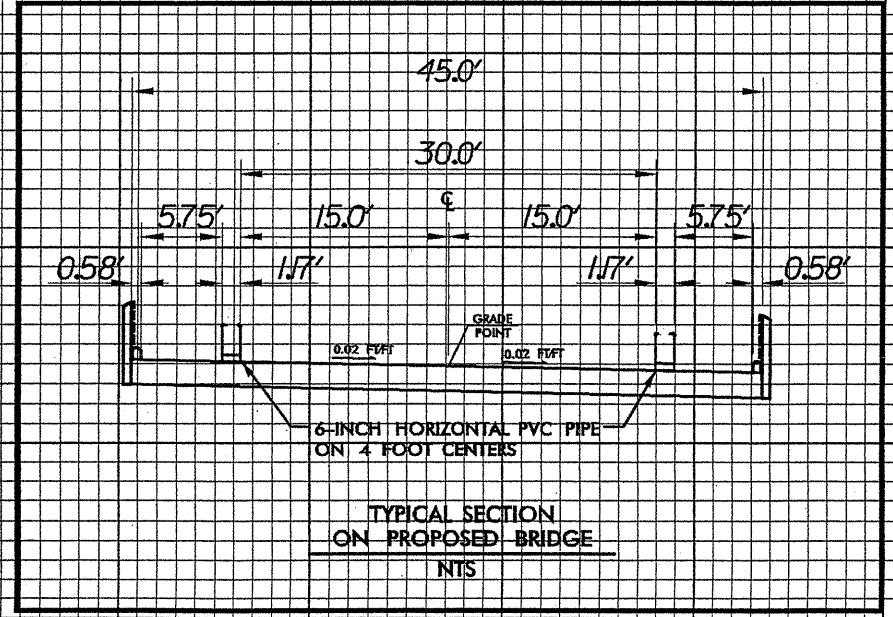
CENTERLINE STA 14+11.5 -L-
 3 @ 45' 21" CORED SLAB
 ELEV. = 12.34
 SKEW = 90°

EXISTING 100YR WS EL 14.68
 PROPOSED 100YR WS EL 12.77
 EXISTING 25YR WS EL 13.21
 PROPOSED 25YR WS EL 10.62

PI = 12+50.00
 EL = 11.86'
 VC = 80'
 K = 400

PI = 15+50.00
 EL = 12.76'
 VC = 100'
 K = 202

PI = 16+50.00
 EL = 12.00'
 VC = 100'
 K = 112



NOTE: NO DECK DRAINS ON BRIDGE

THE STATE OF NORTH CAROLINA
 (MERCHANTS MILLPOND STATE PARK)

MERCHANTS MILL POND
 POND WS ELEV 7.48
 41503

EXIST WOOD DAM (SPILLWAY) EL 6.0
 (REMOVE)

PROPOSED SPILLWAY
 ELEV 6.0

EXIST. BRIDGE TO BE REMOVED

S 53°16'49.2" E

THE STATE OF NORTH CAROLINA
 (MERCHANTS MILLPOND STATE PARK)

SHOULDER BERM GUTTER

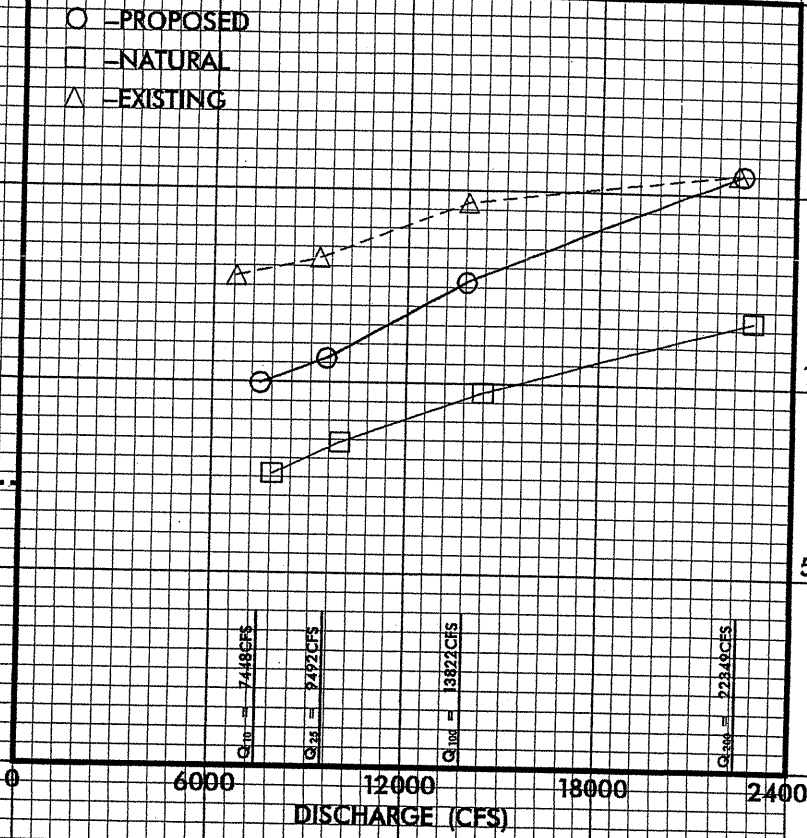
STONE SLOPE PROTECTION
 EST. +/- 260 TONS

EXCAVATE TO ELEV. -1.0
 EST. +/- 240 CY

EXCAVATE TO ELEV. 0.0
 EST. +/- 145 CY

PCC Sta. 16+

PERFORMANCE CURVE



EXISTING ROAD FILL TO BE REMOVED (-)0.1950%

PROPOSED GRADE (+)0.3000%

(REMOVE) EXISTING WALL

(DOWNSTREAM OF SPILLWAY) WSE ELEV 4.09 41503

1.5:1 NORMAL STONE SLOPE PROTECTIO
 RECOMMENDED SIZE OF
 200lbs TO 700lbs WITH
 GREATER THAN 400lbs

OVERTOPPING SCOUR
 (+)450 YR

TO TOP OF BERM ONE
 6" BEING

MERCHANTS MILL POND

PROPOSED DAM

EXISTING R/W

BL-4 (NGGS "COLEMAN")
 PNC 26+71.21

BL-1 (NGGS "COLEMAN")
 +1-11+81.02.3664 LT.

BENNETTS CREEK
 PCC Sta. 15+

STONE SLOPE PROTECTIO
 EST. +/- 300 TONS

PCC Sta. 16+