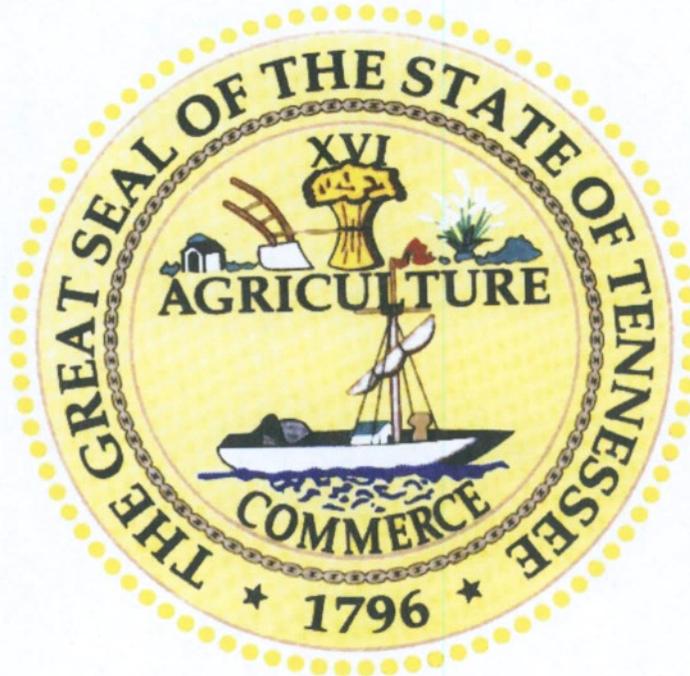


# TRANSPORTATION PLANNING REPORT

*Special Bridge Replacement Program*  
LOCAL ROUTE 00928 – NORTH CUTT COVE RD.  
BRIDGE OVER HAYES CREEK at L.M. 5.18  
WARREN COUNTY  
PIN: 010876.00



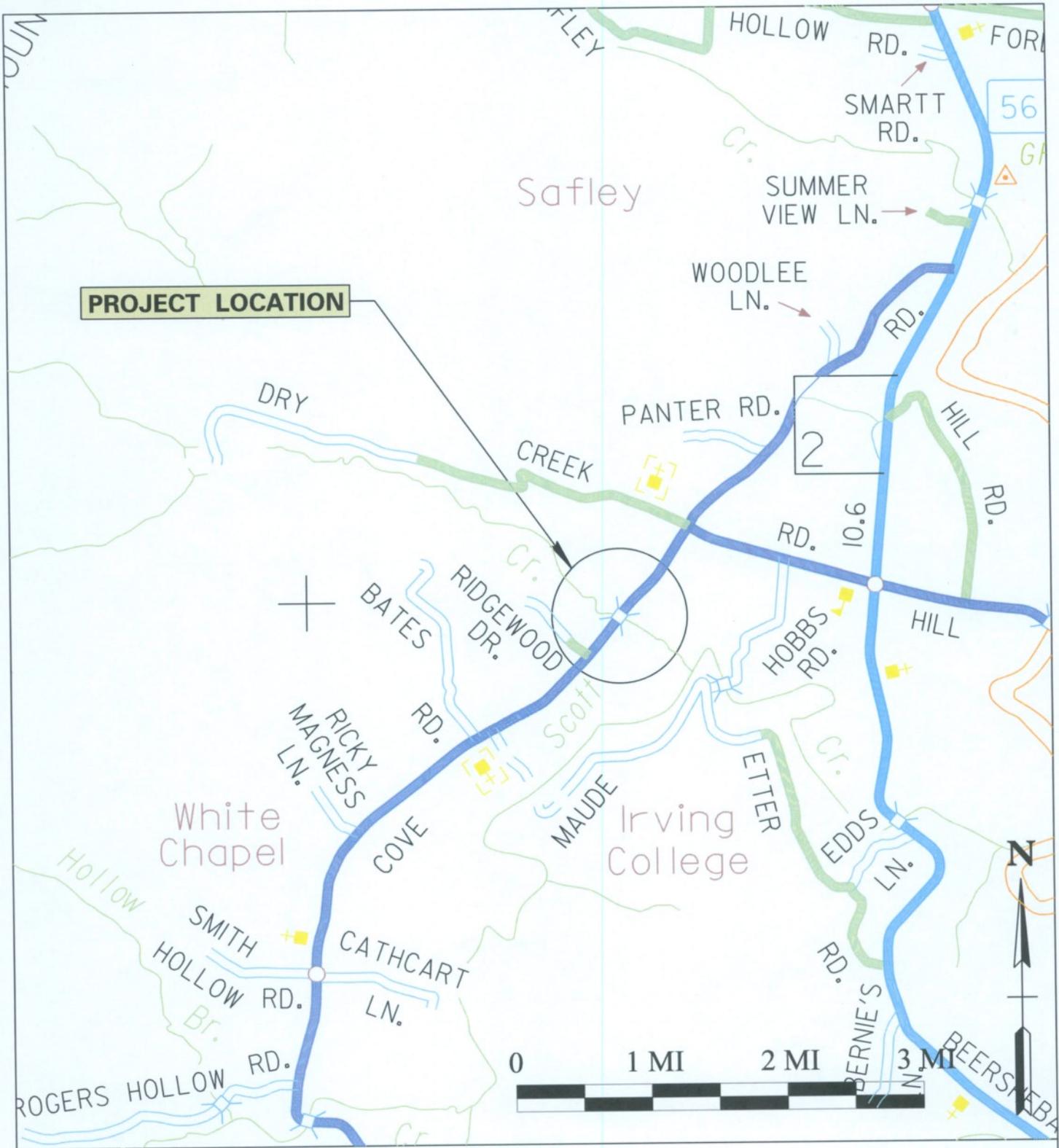
PREPARED BY  
TENNESSEE DEPARTMENT OF TRANSPORTATION  
PROJECT PLANNING DIVISION

Approved by [Signature] Date 7/16/13  
Chief of Environment and Planning

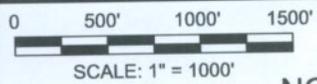
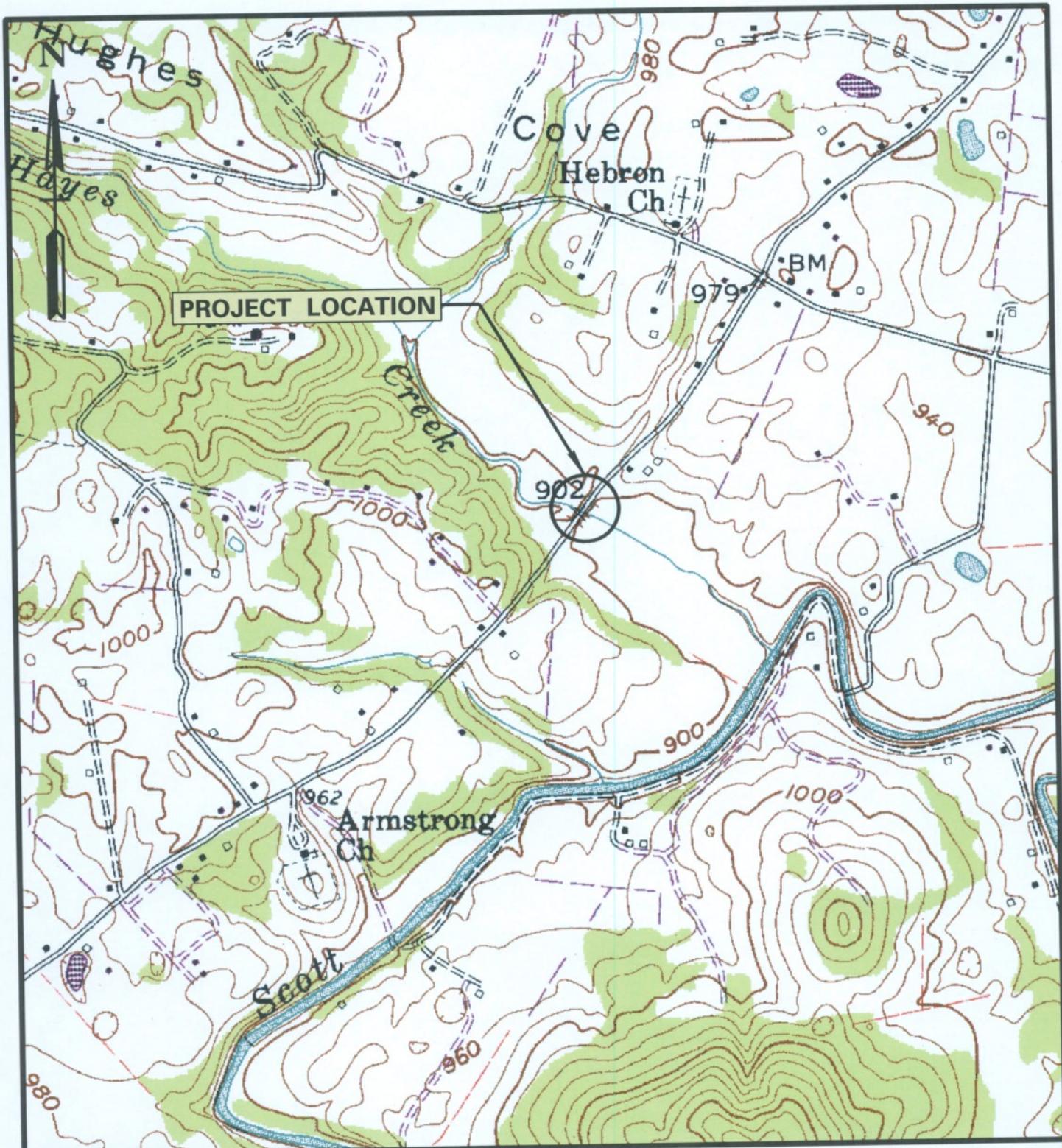
Approved by [Signature] Date 7/19/13  
Deputy Commissioner and Chief Engineer

Approved by:	Signature	DATE
Transportation Director Project Planning Division	<u>[Signature]</u>	6-24-13
Engineering Director Design Division	<u>[Signature]</u>	6-25-13
Engineering Director Structures Division	<u>[Signature]</u>	7-1-13

*This document is covered by 23 USC § 409 and its production pursuant to fulfilling public planning requirements does not waive the provisions of § 409.*



**AREA MAP**  
 NORTHCUTT COVE RD. (00928) WARREN COUNTY  
 BRIDGE OVER BIG HAYES CREEK @ L.M. 5.18  
 BRIDGE ID 89S43980005



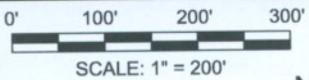
**PROJECT MAP**

**NORTHUTT COVE RD. (00928)    WARREN COUNTY**  
**BRIDGE OVER HAYES CREEK @ L.M. 5.18**  
**BRIDGE ID 89S43980005**



PROJECT LOCATION

NORTHCUTT COVE RD.



AERIAL MAP

NORTHCUTT COVE RD. (00928) WARREN COUNTY  
BRIDGE OVER HAYES CREEK @ L.M. 5.18  
BRIDGE ID 89S43980005

**TRANSPORTATION PLANNING WORKSHEET  
BRIDGE REPLACEMENT ANALYSIS, NEEDS, AND COSTS**

County: Warren Route: Local Route 00928 Log Mile: 5.18  
 Feature Crossed: Hayes Creek System: Local  
 Functional Class: Rural Minor Collector Bridge ID: 89S43980005

**EXISTING CONDITIONS**

2017 AADT: 360 App. Cross Section: 20' / 20' / 60' No. Lanes: 2  
 Approach Alignment: Tangent Year Built: 1950 Load Limit: H10  
 Width (out to out): 20.0 Sidewalks: Right -- Left -- Length: 61  
 No. Spans: Approach: -- Main: 4  
 Substructure: Concrete Abutments / Piers Vertical Clearance: 7.0' Sufficiency Rating: 46.4  
 Other: \_\_\_\_\_

**PROPOSED IMPROVEMENTS**

STANDARDS FROM RD01-TS- 2 (Table 1) Type of Work: Replace  
 Design Year: 2037 Design AADT: 430 Terrain Rolling ADL (F): -- (R): --  
 Project Length: 728' Bridge Length: 78 ft Approach Length: 2 @ 325'  
 Design Speed (MPH): 40 Posted Speed (MPH): 35  
 Approach Width:\* 22' / 28' / As Req'd Bridge Width (O to O): 31.5\* ft No. Lanes: 2  
 Right-of-Way Required: 0.3 acres Tract(s) 3 Structure Type: Prestressed Conc.  
 \* Remarks Proposed structure width is wider than standard in order to phase construct the bridge.

**MAINTENANCE OF TRAFFIC**

Temporary Detour:  Temporary Runaround:  Stage Construct:   
 Alternate Route: None

Remarks: Construction of the proposed structure will be built in phases with one 9 foot lane to remain open and traffic flow will be regulated by a temporary signal on each approach.

**ESTIMATED COST**

Right-of-Way: \$15,000 Approaches: \$175,800 Structure: \$276,300  
 Preliminary Engineering: \$67,700 Utilities: \$43,500 Misc./Cont.: \$136,600  
 Mobilization: \$29,300 Total: \$744,200

Remarks: Lane width's to become 11 ft and shoulders to be increased to 3 ft on the approaches with the centerline to remain the same. The current elevation of the roadway is to be increased by 2.4 ft in order to improve the vertical clearance. The structure will be built 1.5 ft wider in order to phase construct the proposed structure.

Field Investigation by: Robert Hamilton Jr. (Reg. 2 Survey), Barry McClendon (Reg. 2 Survey), Gary Chapman (Reg. 2 Survey), Landon Castelberry (Reg. 2 Traffic), Alan Wolfe (Reg. 2 Traffic), Levie Glenn (Warren County Hwy. Dept.) Lori Krauss (Center Hill / Dale Hollow RPO), David D. Duncan (TDOT Planning), Mike Gilbert (TDOT Planning)

Route:	Northcutt Cove Rd. (00928)
Description:	Bridge over Hayes Creek (89S43980005)
	L.M. 5.18
County:	WARREN
Length:	717 Feet
Date:	July 8, 2013

<u>DESCRIPTION</u>	<u>LOCAL</u>	<u>STATE</u>	<u>FEDERAL</u>	<u>TOTAL</u>
Right-of-Way	\$ 3,000	\$ -	\$ 12,000	\$ 15,000
Clearing and Grubbing	\$ 1,000	\$ -	\$ 4,000	\$ 5,000
Earthwork	\$ 1,800	\$ -	\$ 7,200	\$ 9,000
Railroad Crossing or Separation	\$ -	\$ -	\$ -	\$ -
Drainage	\$ 980	\$ -	\$ 3,920	\$ 4,900
Utilities	\$ 8,700	\$ -	\$ 34,800	\$ 43,500
Structures	\$ 55,300	\$ -	\$ 221,000	\$ 276,300
Pavement Removal	\$ 1,800	\$ -	\$ 7,300	\$ 9,100
Paving	\$ 13,500	\$ -	\$ 54,100	\$ 67,600
Roadway and Pavement Appurtenances	\$ -	\$ -	\$ -	\$ -
Retaining Walls	\$ -	\$ -	\$ -	\$ -
Topsoil	\$ -	\$ -	\$ -	\$ -
Seeding	\$ 50	\$ -	\$ 150	\$ 200
Sodding	\$ 640	\$ -	\$ 2,560	\$ 3,200
Rip-Rap or Slope Protection	\$ 2,100	\$ -	\$ 8,400	\$ 10,500
Fencing	\$ -	\$ -	\$ -	\$ -
Signing	\$ -	\$ -	\$ -	\$ -
Pavement Markings	\$ 200	\$ -	\$ 700	\$ 900
Lighting	\$ -	\$ -	\$ -	\$ -
Signalization	\$ 7,200	\$ -	\$ 28,800	\$ 36,000
Guardrail	\$ 3,900	\$ -	\$ 15,500	\$ 19,400
Pay Item Quantity Adjustment (15%) <sup>1</sup>	\$ 15,000	\$ -	\$ 60,100	\$ 75,100
Maintenance of Traffic	\$ 2,000	\$ -	\$ 8,000	\$ 10,000
Mobilization (5%)	\$ 5,800	\$ -	\$ 23,400	\$ 29,300
<b>CONSTRUCTION COST (rounded)</b>	<b>\$ 123,000</b>	<b>\$ -</b>	<b>\$ 492,000</b>	<b>\$ 615,000</b>
Engineering and Contingency (10%)	\$ 12,300	\$ -	\$ 49,200	\$ 61,500
<b>TOTAL CONSTRUCTION COST (rounded)</b>	<b>\$ 135,300</b>	<b>\$ -</b>	<b>\$ 541,200</b>	<b>\$ 676,500</b>
Preliminary Engineering (10%)	\$ 13,500	\$ -	\$ 54,200	\$ 67,700
<b>PROJECT COST <sup>2</sup>(rounded)</b>	<b>\$148,800</b>	<b>\$ -</b>	<b>\$ 595,400</b>	<b>\$ 744,200</b>

<sup>1</sup> For estimating purposes pay items are adjusted for fluxuation of cost based on quantity.

<sup>2</sup> For estimating future project costs, a compounded inflation rate of 7 % should be applied from the date of this estimate.

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
-	Right-of-Way	LS	LS	\$ 15,000.00	\$ 15,000
<b>RIGHT-OF-WAY TOTAL (ROUNDED)</b>					<b>\$ 15,000</b>
201-01	Clearing and Grubbing	LS	LS	\$ 5,000.00	\$ 5,000
<b>CLEAR AND GRUBBING TOTAL (ROUNDED)</b>					<b>\$ 5,000</b>
203-03	Borrow Excavation (Unclassified)	CY	600	\$ 15.00	\$ 9,000
<b>EARTHWORK TOTAL (ROUNDED)</b>					<b>\$ 9,000</b>
202-03.01	Removal of Asphalt Pavement	SY	1,600	\$ 5.00	\$ 8,000
415-01.02	Cold Planning Bituminous Pavement	SY	300	\$ 3.50	\$ 1,050
<b>PAVEMENT REMOVAL TOTAL (ROUNDED)</b>					<b>\$ 9,100</b>
209-08.02	Temporary Silt Fence (w/ backing)		1500	\$ 3.25	\$ 4,875
<b>DRAINAGE TOTAL (ROUNDED)</b>					<b>\$ 4,900</b>
	Above Ground Utilities	LF	2850	\$ 10.00	\$ 28,500
770-18.10	35FT Wood Pole	EA	3	\$ 5,000.00	\$ 15,000
<b>UTILITIES TOTAL (ROUNDED)</b>					<b>\$ 43,500</b>
	Removal of Existing Bridge	SF	1220	\$ 15.00	\$ 18,300
	78 ft Prestressed Concrete Bridge	SF	2,457	\$ 105.00	\$ 257,985
<b>STRUCTURES TOTAL (ROUNDED)</b>					<b>\$ 276,300</b>
<b>Asphalt</b>					
411-03.10	ACS Mix (PG76-22) Grading D	TON	114.8	\$ 91.03	\$ 10,453
403-01	Bituminous Material for Tack Coat (TC)	TON	1.3	\$ 571.21	\$ 750
411-01.07	ACS Mix (PG64-22) Grading E Shoulder	TON	69.9	\$ 82.94	\$ 5,795
402-01	Bituminous Material for Prime Coat (PC)	TON	2.6	\$ 508.44	\$ 1,323
402-02	Aggregate for Cover Material	TON	9.4	\$ 23.27	\$ 218
307-02.08	Asphalt Conc. Mix (PG70-22) Grading B-M2	TON	122	\$ 77.65	\$ 9,506
307-02.01	Asphalt Conc. Mix (PG70-22) Grading A	TON	332.2	\$ 72.81	\$ 24,189
303-01	Mineral Aggregate, TY A Base, Grading D	TON	847.1	\$ 18.08	\$ 15,315
<b>PAVING TOTAL (ROUNDED)</b>					<b>\$ 67,600</b>
<b>RETAINING WALLS TOTAL (ROUNDED)</b>					<b>\$ -</b>
712-01	Traffic Control	LS		\$ 10,000.00	\$ 10,000
<b>MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)</b>					<b>\$ 10,000</b>
203-07	Furnishing & Spreading Topsoil	CY	0	\$ 10.00	\$ -
<b>TOPSOIL TOTAL (ROUNDED)</b>					<b>\$ -</b>
801-03	Water	MG	15	\$ 7.00	\$ 105
<b>SEEDING TOTAL (ROUNDED)</b>					<b>\$ 200</b>
803-01	Sodding (New Sod)	SY	800	\$ 4.00	\$ 3,200
<b>SODDING TOTAL (ROUNDED)</b>					<b>\$ 3,200</b>
<b>SIGNING TOTAL (ROUNDED)</b>					<b>\$ -</b>
716-11.01	Spray Thermo Pvmr Mrkng (4" Line)	LM	0.85	\$ 1,100.00	\$ 935
<b>PAVEMENT MARKINGS TOTAL (ROUNDED)</b>					<b>\$ 900</b>
730-40	Temporary Traffic Signal System	EACH	2	\$ 18,000.00	\$ 36,000
<b>SIGNALIZATION TOTAL (ROUNDED)</b>					<b>\$ 36,000</b>
705-02.02	Single Guardrail (Type 2)	LF	200	\$ 15.55	\$ 3,110
705-04.07	Type 38 End Terminal	EACH	4	\$ 2,500.00	\$ 10,000
705-01.01	Guardrail at Bridge Ends	LF	110	\$ 56.85	\$ 6,254
<b>GUARDRAIL TOTAL (ROUNDED)</b>					<b>\$ 19,400</b>
709-05.06	Machined Rip-Rap (Class A-1)	TON	350	\$ 30.00	\$ 10,500
<b>RIP-RAP OR SLOPE PROTECTION TOTAL (ROUNDED)</b>					<b>\$ 10,500</b>



STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
NASHVILLE, TENNESSEE 37243-0350

**MEMORANDUM**

**TO:** Project Planning Office

**FROM:** Mike Gilbert, Roadway Specialist Supervisor I  
Conceptual Planning Office

**DATE:** July 8, 2013

**SUBJECT:** TPR Field Review (Special Bridge Replacement Program)  
Northcutt Cove Rd. (928) over Hayes Creek  
Log Mile 5.18  
Warren County  
Pin #: 010876.00

A field review was held for the above-mentioned project on August 1, 2012.

The existing bridge consists of a two (2) span, steel I-beam structure with an out-to-out width of twenty (20) feet. The overall bridge length is sixty-one (61) feet and the sufficiency rating for this bridge is 46.4. The 10-year and 100-year discharges and depths of flow for the drainage basin were determined using the appropriate regression equations. It was determined that the 100-year flow depth is 10.5 feet and the 10-year flow depth is 7.8 feet.

The proposed alignment is to remain the same and the grade for this structure is to be increased 2.4 feet. The increase in grade will raise the clearance from seven (7) feet to 7.7 feet. In order for the existing centerline to remain the same, the proposed structure will be constructed approximately 1.5 feet wider than what Road Design Standard RD01-TS-2 calls for. This will be required to achieve the proper width in order to maintain one (1) nine (9) foot travel lane during construction of the proposed bridge. Constructing a larger structure appears more feasible than shifting the centerline. Right-of-way costs, environmental impacts, and earthwork requirements will be less by keeping the centerline the same as well. Traffic flow during the lane closure will be regulated by two (2) temporary signals. Approximately 0.3 acres of right-of-way, involving three (3) tracts, will be acquired due to the additional lane widths, shoulder widths, and the increase in grade. There is no evidence of underground utilities or any utilities attached to the existing structure; however, some overhead utilities will require relocation.

The route has a base year (2017) AADT of 360 and a design year (2037) AADT of 430. The bridge over Hayes Creek will be designed to meet Road Design Standard RD01-TS-2 (See Table 1). Northcutt Cove Road is a local route; however, it's functional classification is listed as a Rural Minor Collector. The structure is to consist of a two (2) span prestressed concrete structure with each span measuring 33.5 feet. The total length of the structure will be seventy-eight (78) feet. The structure is also to contain two (2) eleven (11) foot lanes with two (2) 3.75 foot shoulders in order to maintain one (1) nine (9) foot lane during construction for a total out-to-out width of thirty-one (31.5) feet. The approaches to the structure will contain two (2) eleven (11) foot lanes with three (3) foot shoulders.

The required approach work, utility relocations, estimated replacement cost, and preliminary engineering for this bridge are approximately \$744,200. Local match required is approximately \$148,800.

MG

cc: file

### CHECK LIST OF DETERMINANTS FOR LOCATION STUDY

If any of the following facilities or ESE categories are located within the project area or corridor, place an "x" in the blank opposite the item. Where more than one alternate is to be considered, place its letter designation in the blank.

- |   |   |   |
|---|---|---|
| 1. Agricultural land usage                          |   | X |
| 2. Airport (existing or proposed)                   |   |   |
| 3. Commercial area, shopping center                 |   |   |
| 4. Floodplains                                      |   | X |
| 5. Forested land                                    |   |   |
| 6. Historical, cultural, or natural landmark        |   |   |
| 7. Industrial park, factory                         |   |   |
| 8. Institutional usages                             |   |   |
| a. School or other educational institution          |   |   |
| b. Church or other religious institution (Cemetery) |   |   |
| c. Hospital or other medical facility               |   |   |
| d. Public building, e.g., fire station              |   |   |
| e. Defense installation                             |   |   |
| 9. Recreation usages                                |   |   |
| a. Park or recreational area                        |   |   |
| b. Game preserve or wildlife area                   |   |   |
| 10. Residential establishment                       |   |   |
| 11. Urban area, town, city, or community            |   |   |
| 12. Waterway, lake, pond, river, stream, spring     |   | X |
| Permit required:                                    |   |   |
| Coast Guard   |   |   |
| Section 404   | X |   |
| TVA Section 26a review                              |   |   |
| NPDES   | X |   |
| Aquatic Resource Alteration                         | X |   |
| 13. Other   |   |   |
| 14. Location coordinated with local officials       |   | X |
| 15. Railroad crossings                              |   |   |
| 16. Hazardous materials site                        |   |   |

**TENNESSEE DEPARTMENT OF TRANSPORTATION  
PROJECT PLANNING DIVISION**

PROJECT NO.: \_\_\_\_\_ ROUTE: Northcutt Cove Rd. (00928)  
 COUNTY: Warren CITY: McMinnville  
 PROJECT PIN NUMBER: 010876.00  
 PROJECT DESCRIPTION: Special Bridge Replacement Program  
Bridge over Hayes Creek  
L.M. 5.18

**DIVISION REQUESTING:**

MAINTENANCE  PAVEMENT DESIGN   
 PLANNING  STRUCTURES   
 PROG. DEVELOPMENT & ADM.  SURVEY & DESIGN   
 PUBLIC TRANS. & AERO.  TRAFFIC SIGNAL DESIGN   
 OTHER \_\_\_\_\_   
 YEAR PROJECT PROGRAMMED FOR CONSTRUCTION: \_\_\_\_\_  
 PROJECTED LETTING DATE: \_\_\_\_\_

**TRAFFIC ASSIGNMENT:**

BASE YEAR		DESIGN YEAR					DESIGN ROADWAY % TRUCKS		DESIGN AVERAGE DAILY LOADS	
AADT	YEAR	AADT	DHV	%	YEAR	DIR.DIST.	DHV	AADT	FLEX	RIGID
360	2017	430	52	12	2037	65-35	2	3		

REQUESTED BY: NAME Michael Gilbert DATE 4/12/12  
 DIVISION Planning  
 ADDRESS 10<sup>th</sup> Floor  
J.K. Polk Bldg

REVIEWED BY: TONY ARMSTRONG Tony Armstrong DATE 4-20-12  
 TRANSPORTATION MANAGER 1  
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: DUDLEY DANIEL Dudley Daniel DATE 20 Apr 20  
 TRANSPORTATION MANAGER 2  
 SUITE 1000, JAMES K. POLK BUILDING

**COMMENTS:**

This Traffic Based on 2011 Cycle Count. The Future Traffic is based on Growth Rate from the ADAM Computer Program.

**DHV'S ARE NOT REQUIRED FOR SIDE ROADS LESS THAN 1000 AADT.**

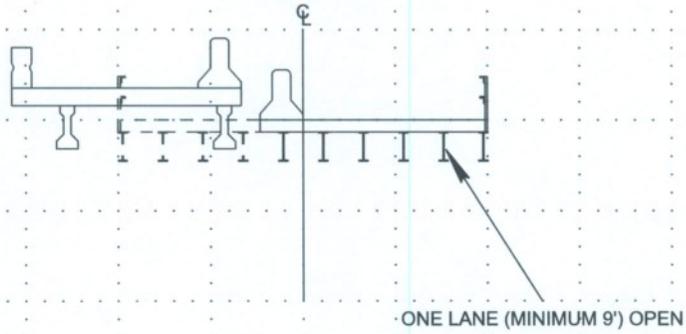
NOTE: FOR BRIDGE REPLACEMENT PROJECTS, ADLs ARE NOT REQUIRED FOR ADTs OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS.

SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS.

(REV. 4/10/12)

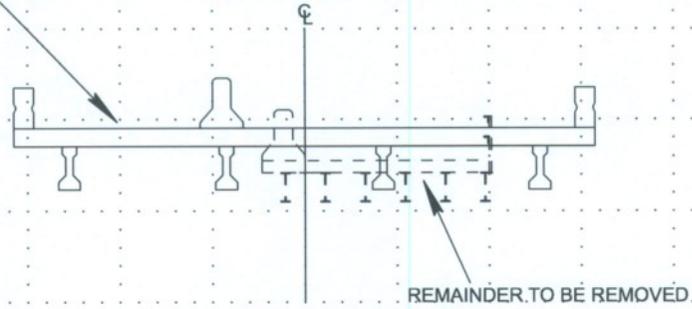


PHASE ONE

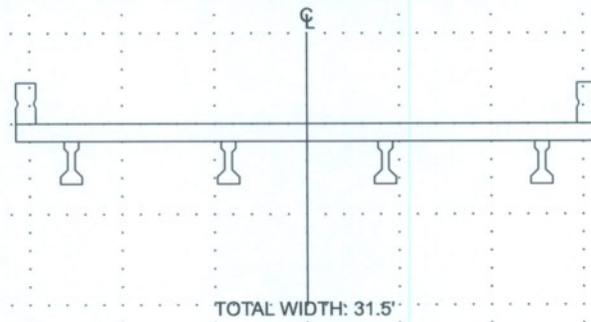


ONE LANE (MINIMUM 9') OPEN

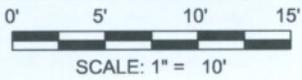
PHASE TWO



COMPLETED PROPOSED STRUCTURE



TOTAL WIDTH: 31.5'



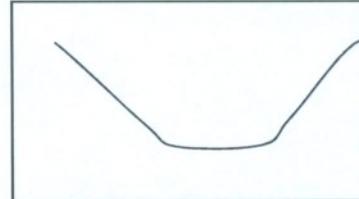
STAGE CONSTRUCTION DETAIL  
NORTHCUTT COVE RD. (00928) WARREN COUNTY  
BRIDGE OVER HAYES CREEK @ L.M. 5.18  
BRIDGE ID 89S43980005

## SITE INSPECTION

INSPECTION MADE BY: Mike Gilbert BRIDGE ID: 89S43980005 COUNTY: Warren  
 Date: 6/26/11 Route Name: Local Route 00928 Stream Name: Hayes Creek @ L.M. 5.18

### CHANNEL

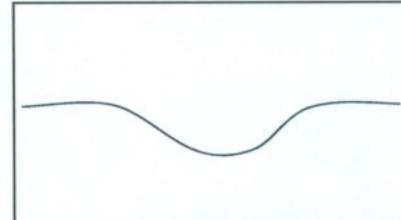
Approx depth and width of channel: Horizontal: 25' Vertical: 1'  
 Depth of normal flow: 1' In Reservoir:  Yes  No  
 Depth of Ordinary High Water: N/A  
 Type of material in stream bed: Stony, Cobbles  
 Type of vegetation on banks: Light Brush / Trees  
 "N" factor of the channel: 0.035  
 Are channel banks stable:  Yes  No  
 If the streambed is gravel: D<sub>30</sub> = -- D<sub>85</sub> = --  
 Skew of the channel with the roadway: 90°



Channel Shape Sketch

### FLOODPLAIN

Is the skew same as the channel?  Yes  No  
 Is it symmetrical about the channel?  Yes  No  
 Type of vegetation in the floodplain and "N" factors  
 Left U.S.: Farmland (0.035) Right U.S.: Light Brush (0.050)  
 Left D.S.: Light Brush (0.050) Right D.S.: Light Brush (0.050)  
 Are roadway approaches lower than the structure?  Yes  No  
 Are there any buildings in the floodplain?  Yes  No  
 Approx. floor elevations: --  
 Flood information from local residents:  
 (elevations & dates) --



Floodplain Sketch

### EXISTING STRUCTURE

Length: 61 No. of spans: 2 Structure type: Steel I-Beam No. of lanes: 2 Skew: 90°  
 Width (out to out): 20.0' Width (curb to curb): 19.0' Approach:  paved  graveled  
 Sidewalks on Structure:  Yes  No Bridgerail type: Metal Railing Bridgerail height = 2.5'  
 Superstructure depth: 4.2' Finished Grade to low girder = 1.7' Girder depth = 1'  
 Are any substructures in the channel?  Yes  No Vertical Clearance = 7.0 ft  
 Indications of overtopping: None  
 High water marks: Low Chord  
 Local scour:  Yes, None  No  
 Any signs of stream  aggradation or  degradation? None  
 Any drift or drift potential?  Yes, None  No  
 Any obstructions (pipes, stock fences, etc.)? None

### PROPOSED STRUCTURE

Replacement  Rehabilitate  Widening  New Location  
 Bridge length: 78 ft Bridge type: Prestressed Conc. Span arrangement: 2 @ 33.5 ft Skew: 90°  
 Bridge width: 31.5 ft Sidewalks: No Design Speed (MPH): 40 ADT ( 2037 ) = 430  
 Proposed grade: Increase 2.4 ft Proposed alignment: Maintain Existing  
 Method of maintaining traffic:  Stage construction  On site detour  Close road  Shift Centerline  
 Cost of proposed Structure: \$105 per ft<sup>2</sup> X 78 / 31.5 length (ft) / width (ft) Cost = \$258,000  
 Cost of bridge removal: \$15 per ft<sup>2</sup> X 61 / 20.0 length (ft) / width (ft) Cost = \$18,300  
 Detour structure: Type and size = N/A Cost = \$0  
**Total Structure Cost = \$276,300**

**Bridge TPR Flow Calculations  
For Hydrologic Area 2  
Area > 300 Acres**

County: Warren  
 Bridge ID: 89S43980005  
 Route: Local Route 928  
 Feature Crossed: Hayes Creek  
 Log Mile: 5.18

By: MG  
 Date: 6/22/12  
 PIN: 010876.00

**DRAINAGE BASIN**

Measurement from quad = 4,429 acres  
 Contributing Drainage Area, CDA = acres/640 = 6.92 sq. mi.

**USGS REGRESSION EQUATIONS FOR FLOW**

$Q_2 = 207(CDA)^{0.725} = 841$  cfs  
 $Q_5 = 344(CDA)^{0.715} = 1,372$  cfs  
 $Q_{10} = 444(CDA)^{0.711} = 1,757$  cfs  
 $Q_{25} = 578(CDA)^{0.708} = 2,274$  cfs  
 $Q_{50} = 682(CDA)^{0.706} = 2,672$  cfs  
 $Q_{100} = 788(CDA)^{0.705} = 3,082$  cfs

**DEPTH OF FLOW EQUATIONS**

10-Year Flood Depth =  $5.33(CDA)^{0.197} = 7.8$  ft  
 100-Year Flood Depth =  $7.43(CDA)^{0.181} = 10.5$  ft

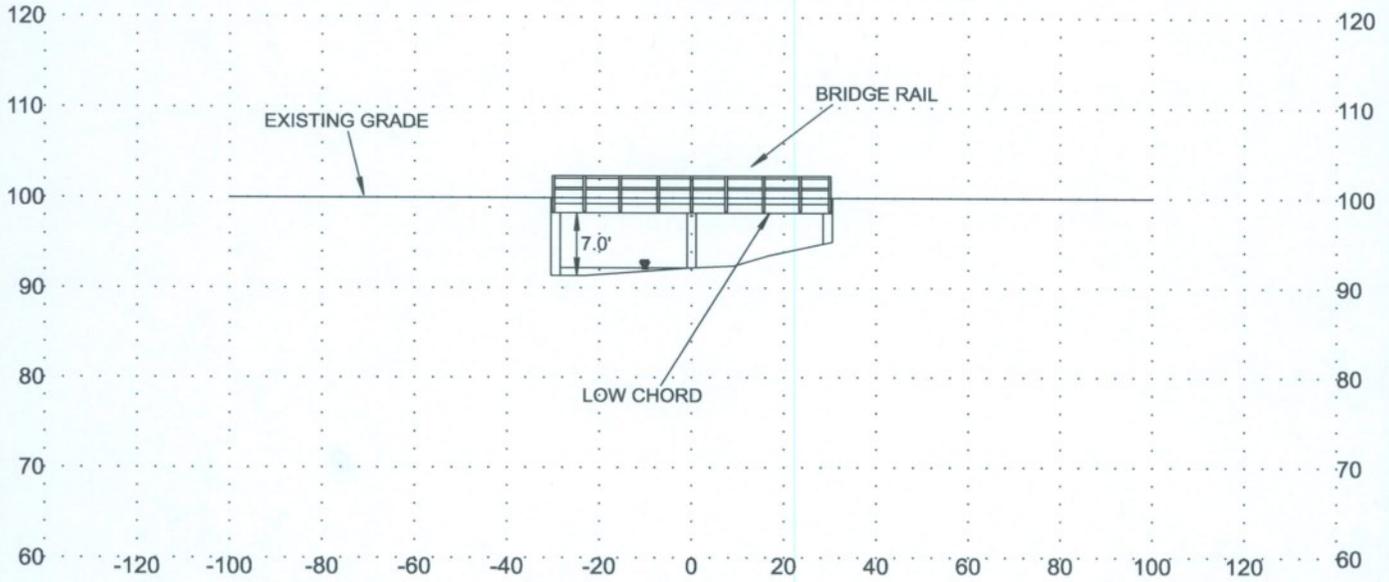
**AREAS**

Existing Area Below Low Chord = 566 ft<sup>2</sup>  
 Proposed Area Below Low Chord = 570 ft<sup>2</sup>  
 Proposed 10-Year Flood Area,  $A_{10} = 183$  ft<sup>2</sup>  
 Proposed 100-Year Flood Area,  $A_{100} = 303$  ft<sup>2</sup>

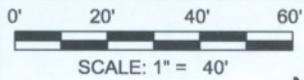
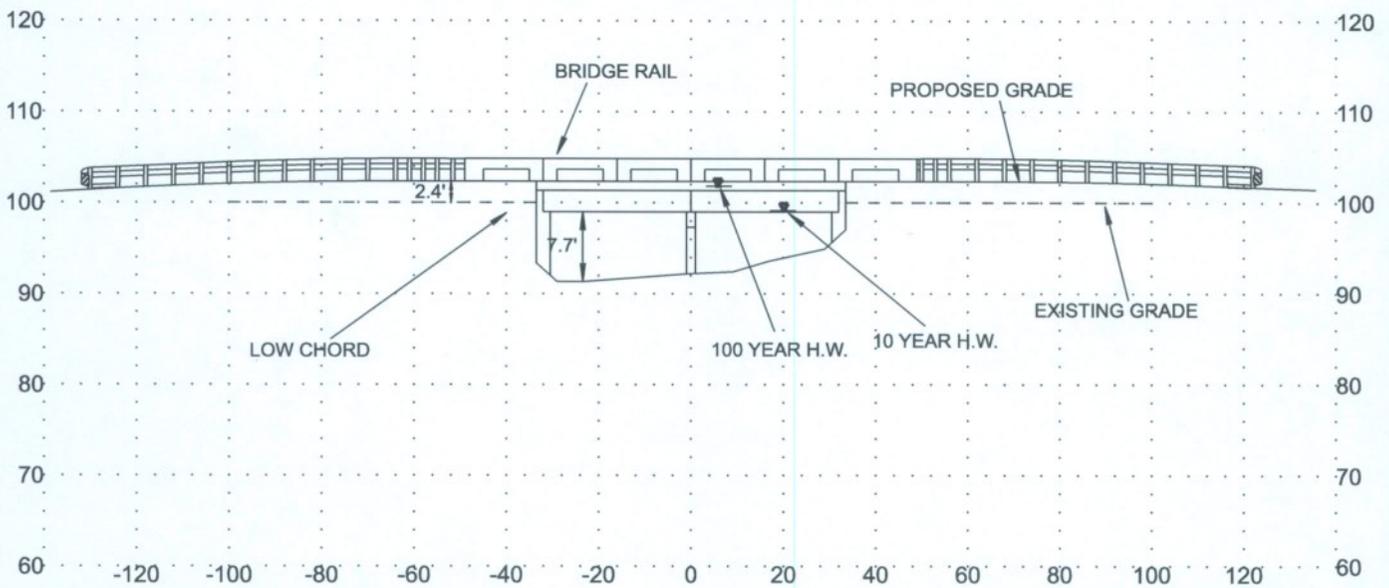
**VELOCITIES**

Proposed 10-Year Flood Velocity,  $V_{10} = Q_{10}/A_{10} = 9.6$  fps  
 Proposed 100-Year Flood Velocity,  $V_{100} = Q_{100}/A_{100} = 10.2$  fps

### EXISTING STRUCTURE (INLET)



### PROPOSED STRUCTURE (INLET)



**BRIDGE SECTIONS**  
NORTHCUTT COVE RD. (00928) WARREN COUNTY  
BRIDGE OVER HAYES CREEK  
BRIDGE ID 89S43980005

Bridge ID: 89S43980005  
Warren County



**View of Structure**



**Bridge Number**

Bridge ID: 89S43980005  
Warren County



**Northbound Bridge Approach on Northcutt Cove Rd.**



**Southbound Bridge Approach on Northcutt Cove Rd.**

Bridge ID: 89S43980005  
Warren County



**Bridge Looking North on Northcutt Cove Rd.**



**Bridge Looking South on Northcutt Cove Rd.**

Bridge ID: 89S43980005  
Warren County



**Bridge Rail**



**Structure**

Bridge ID: 89S43980005  
Warren County



**Superstructure**



**Substructure**

Bridge ID: 89S43980005  
Warren County



**Beam Corrosion**



**Posted Weight Limit**

Bridge ID: 89S43980005  
Warren County



**Inlet**



**Outlet**

Bridge ID: 89S43980005  
Warren County



**Upstream**



**Upstream Right**

Bridge ID: 89S43980005  
Warren County



**Upstream Left**



**Downstream**

Bridge ID: 89S43980005  
Warren County



**Downstream Right**

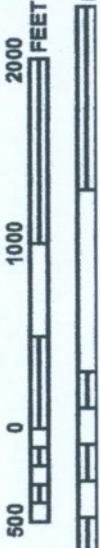


**Downstream Left**

## **Appendix**

- FEMA Flood Map (Page 1)
- USGS Tennessee StreamStats data. (Pages 2-3)

MAP SCALE 1" = 1000'



**NFIP**  
**NATIONAL FLOOD INSURANCE PROGRAM**

PANEL 0255D

**FIRM**  
FLOOD INSURANCE RATE MAP  
WARREN COUNTY,  
TENNESSEE  
AND INCORPORATED AREAS

PANEL 255 OF 300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:  
COMMUNITY NUMBER 470983  
WARREN COUNTY PANEL SUFFIX 0255 D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

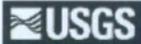


MAP NUMBER  
47177C0255D  
MAP REVISED  
SEPTEMBER 26, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



*Tennessee StreamStats*

## Basin Characteristics Report

Date: Wed Mar 27 2013 10:48:22 Mountain Daylight Time

NAD27 Latitude: 35.5824 (35 34 57)

NAD27 Longitude: -85.7295 (-85 43 46)

NAD83 Latitude: 35.5825 (35 34 57)

NAD83 Longitude: -85.7295 (-85 43 46)

Parameter	Value
Tennessee climate factor, 2-year interval	2.339
Streamflow-recession index, in days per log cycle of decrease in discharge	50
Total drainage area in square miles	6.92
Average soil permeability - in/hr	1.831
Percent of area within Hydrologic Area 3	0
Percent of area within Hydrologic Area 4	0
Percent area underlain by soil permeability of at least 2 in/hr	70
Percent of area within Hydrologic Area 1	0
Area that contributes flow to a point on a stream, in square miles	6.92
Stream Slope 10 and 85 method in feet per mile	110.40
Percent of area within Hydrologic Area 2	100

