

TRANSPORTATION PLANNING REPORT

Special Bridge Replacement Program

State Route 196

Bridge over Shaw Creek L.M. 6.80

Bridge over Overflow L.M. 7.11

Fayette County

PIN 101895.00



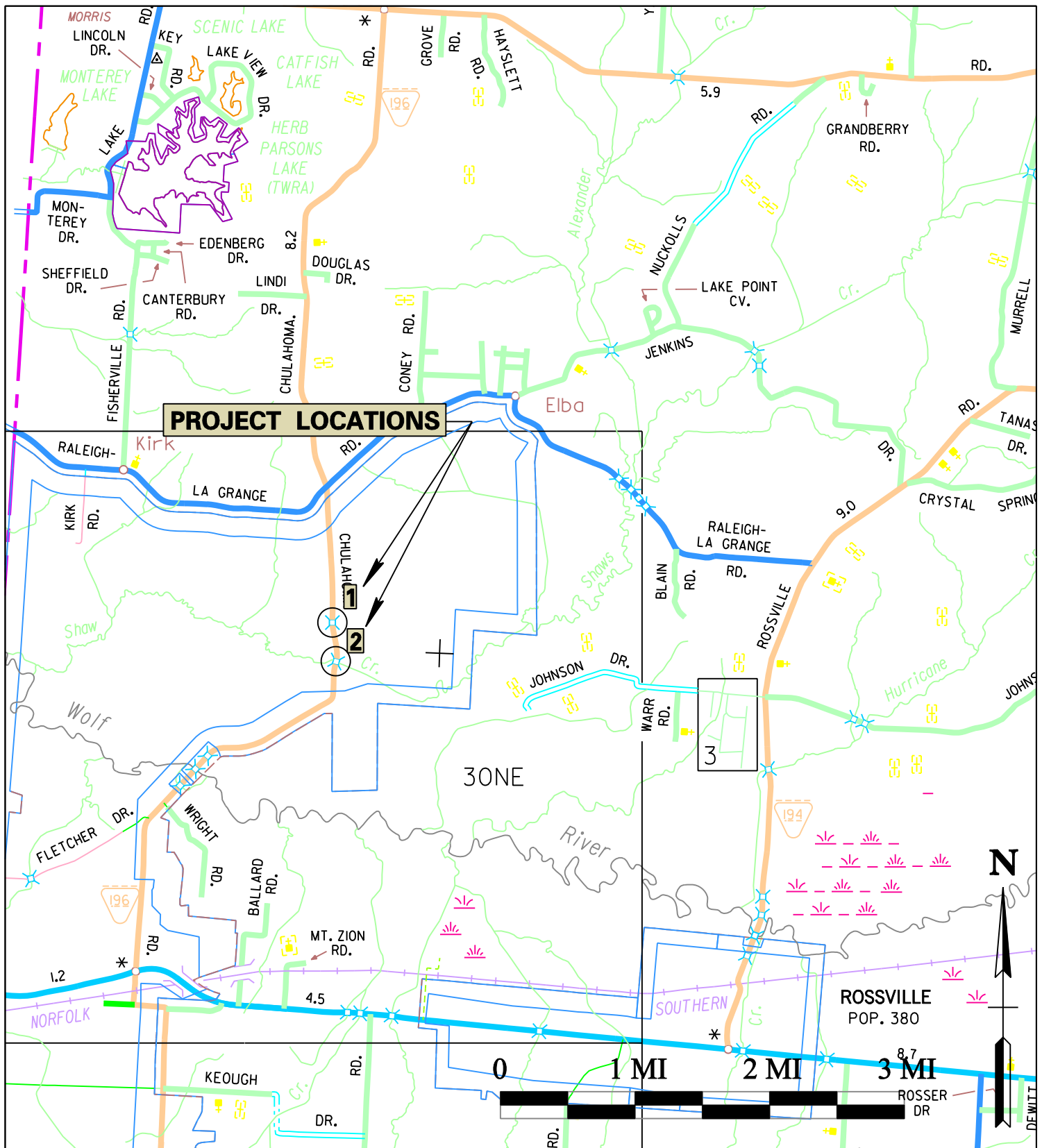
PREPARED BY
TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION

Approved by [Signature] Date 4/25/13
Chief of Environment and Planning

Approved by [Signature] Date 5/13/13
Deputy Commissioner and Chief Engineer

Approved by:	Signature	DATE
Transportation Director Project Planning Division	<u>[Signature]</u>	<u>4-11-13</u>
Engineering Director Design Division	<u>[Signature]</u>	<u>4-18-13</u>
Engineering Director Structures Division	<u>[Signature]</u>	<u>4-22-13</u>

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

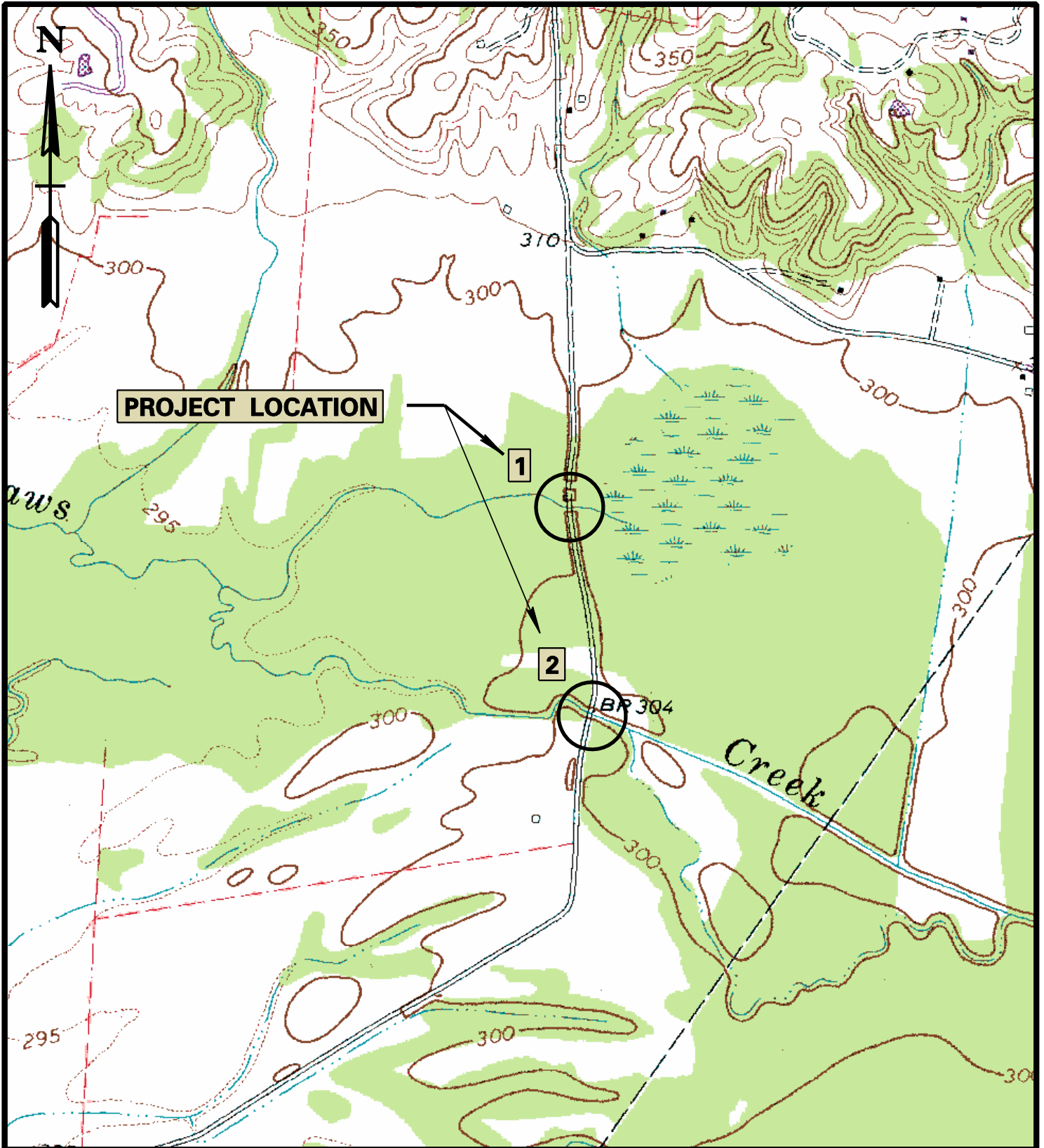


AREA MAP

STATE ROUTE 196 (SR196) FAYETTE COUNTY

1 - BRIDGE OVER OVERFLOW @ L.M. 7.11 ID: 24S81090003

2 - BRIDGE OVER SHAW CREEK @ L.M. 6.80 ID: 24S81090043



PROJECT MAP

STATE ROUTE 196 (SR196) FAYETTE COUNTY

1- BRIDGE OVER OVERFLOW @ L.M. 7.11 ID: 24S81090003

2 - BRIDGE OVER SHAW CREEK @ L.M. 6.80 ID: 24S81090043

Route:	SR 196
Description:	Bridge over Shaw Creek (24S81090043) @ L.M. 6.80
	Bridge over Overflow (24S81090003) @ L.M. 7.11
County:	Fayette
Length:	0.5 miles
Date:	September 27, 2012

<u>DESCRIPTION</u>	<u>LOCAL</u>	<u>STATE</u>	<u>FEDERAL</u>	<u>TOTAL</u>
Right-of-Way	\$ -	\$ 8,000	\$ 32,000	\$ 40,000
Clearing and Grubbing	\$ -	\$ 6,000	\$ 24,000	\$ 30,000
Earthwork	\$ -	\$ -	\$ -	\$ -
Railroad Crossing or Separation	\$ -	\$ -	\$ -	\$ -
Drainage	\$ -	\$ 1,040	\$ 4,160	\$ 5,200
Utilities	\$ -	\$ 41,400	\$ 165,600	\$ 207,000
Structure (Bridge @ L.M. 6.80)	\$ -	\$ 113,100	\$ 452,400	\$ 565,500
Structure (Bridge @ L.M. 7.11)	\$ -	\$ 159,500	\$ 638,000	\$ 797,500
Pavement Removal	\$ -	\$ 7,300	\$ 29,000	\$ 36,300
Paving	\$ -	\$ 90,000	\$ 359,800	\$ 449,800
Roadway and Pavement Appurtenances	\$ -	\$ -	\$ -	\$ -
Retaining Walls	\$ -	\$ -	\$ -	\$ -
Topsoil	\$ -	\$ -	\$ -	\$ -
Seeding	\$ -	\$ 40	\$ 160	\$ 200
Sodding	\$ -	\$ 13,900	\$ 55,500	\$ 69,400
Rip-Rap or Slope Protection	\$ -	\$ 1,200	\$ 4,800	\$ 6,000
Fencing	\$ -	\$ -	\$ -	\$ -
Signing	\$ -	\$ -	\$ -	\$ -
Pavement Markings	\$ -	\$ 2,400	\$ 9,800	\$ 12,200
Lighting	\$ -	\$ -	\$ -	\$ -
Signalization	\$ -	\$ 7,200	\$ 28,800	\$ 36,000
Guardrail	\$ -	\$ 6,100	\$ 24,500	\$ 30,600
Other Construction Items (15%)	\$ -	\$ 68,600	\$ 274,300	\$ 342,900
Maintenance of Traffic	\$ -	\$ 10,000	\$ 40,000	\$ 50,000
Mobilization (5%)	\$ -	\$ 26,800	\$ 107,100	\$ 133,900
CONSTRUCTION COST (rounded)	\$ -	\$ 562,600	\$ 2,249,900	\$ 2,812,500
Engineering and Contingency (10%)	\$ -	\$ 56,300	\$ 225,000	\$ 281,300
TOTAL CONSTRUCTION COST (rounded)	\$ -	\$ 618,900	\$ 2,474,900	\$ 3,093,800
Preliminary Engineering (10%)	\$ -	\$ 61,900	\$ 247,500	\$ 309,400
PROJECT COST¹ (rounded)	\$ -	\$ 680,800	\$ 2,722,400	\$ 3,403,200

¹ For estimating future project costs, a compounded inflation rate of 10 % should be applied from the date of this estimate.

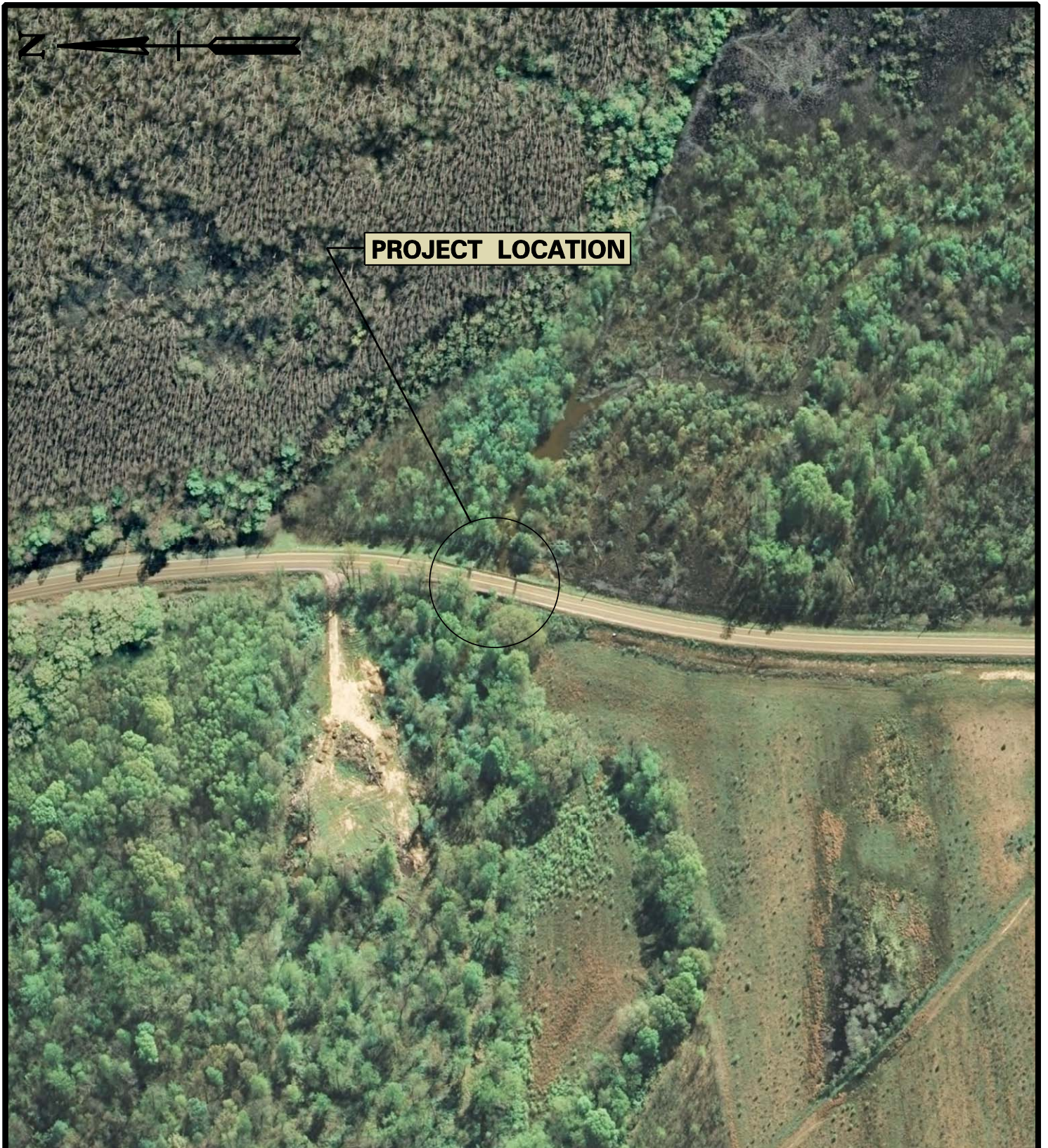
TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
-	Right-of-Way	LS	LS	\$ 40,000.00	\$ 40,000
RIGHT-OF-WAY TOTAL (ROUNDED)					\$ 40,000
201-01	Clearing and Grubbing	LS	LS	\$ 30,000.00	\$ 30,000
CLEAR AND GRUBBING TOTAL (ROUNDED)					\$ 30,000
203-03	Borrow Excavation (Unclassified)	LS	LS	\$ 54,500.00	\$ 54,500
EARTHWORK TOTAL (ROUNDED)					\$ 54,500
202-03.01	Removal of Asphalt Pavement	SY	7,055	\$ 5.00	\$ 35,275
415-01.02	Cold Planing Bituminous Pavement	SY	289	\$ 3.50	\$ 1,012
PAVEMENT REMOVAL TOTAL (ROUNDED)					\$ 36,300
209-08.02	Temporary Silt Fence (w/ backing)	LF	1600	\$ 3.25	\$ 5,200
DRAINAGE TOTAL (ROUNDED)					\$ 5,200
	Above Ground Utilities	LF	12700	\$ 10.00	\$ 127,000
770-18.10	35FT Wood Pole	EA	16	\$ 5,000.00	\$ 80,000
UTILITIES TOTAL (ROUNDED)					\$ 207,000
	Removal of Existing Bridge	SF	3859.2	\$ 20.00	\$ 77,184
	4 span prestress box beam bridge	SF	5,762	\$ 125.00	\$ 720,250
STRUCTURE @ L.M. 7.11 TOTAL (ROUNDED)					\$ 797,500
	Removal of Existing Bridge	SF	2,149	\$ 20.00	\$ 42,980
	3 span prestress box beam bridge	SF	3,870	\$ 135.00	\$ 522,450
STRUCTURE @ L.M. 6.80 TOTAL (ROUNDED)					\$ 565,500
--	Full Depth Paving	SY	9993.0	\$ 32.00	\$ 319,776
411-03.10	ACS Mix (PG76-22) Grading D	TON	19.1	\$ 85.00	\$ 1,624
403-01	Bituminous Material for Tack Coat (TC)	TON	2.23	\$ 480.00	\$ 1,070
303-01	Mineral Aggregate, TY A Base, Grading D	TON	7845	\$ 16.22	\$ 127,246
PAVING TOTAL (ROUNDED)					\$ 449,800
RETAINING WALLS TOTAL (ROUNDED)					\$ -
712-01	Traffic Control	LS			\$ 50,000
MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)					\$ 50,000
801-03	Water	MG	16	\$ 7.00	\$ 109
SEEDING TOTAL (ROUNDED)					\$ 200
803-01	Sodding (New Sod)	SY	17,350	\$ 4.00	\$ 69,400
SODDING TOTAL (ROUNDED)					\$ 69,400
713-99.91	Signs	S.F.	0.0	\$ 40.00	\$ -
713-15.41	Sign Removal	LS	LS	\$ -	\$ -
SIGNING TOTAL (ROUNDED)					\$ -
716-01.05	Temporary Raised Pavement Markers	EA	200	\$ 10.00	\$ 2,000
716-13.06	Spray Thermo Pvmt Mrkng (40 mil)(6" Line)	LM	4.000	\$ 2,542.00	\$ 10,168
PAVEMENT MARKINGS TOTAL (ROUNDED)					\$ 12,200
LIGHTING TOTAL (ROUNDED)					\$ -
730-40	Temporary Traffic Signal System	EACH	2	\$ 18,000.00	\$ 36,000
SIGNALIZATION TOTAL (ROUNDED)					\$ 36,000
FENCE TOTAL (ROUNDED)					\$ -
705-04.07	Type 38 End Terminal	EACH	8	\$ 2,500.00	\$ 20,000
705-01.01	Guardrail at Bridge Ends	LF	185	\$ 56.85	\$ 10,517
GUARDRAIL TOTAL (ROUNDED)					\$ 30,600
709-05.06	Machined Rip-Rap (Class A-1)	TON	200	\$ 30.00	\$ 6,000
RIP-RAP OR SLOPE PROTECTION TOTAL (ROUNDED)					\$ 6,000

SR 196

BRIDGE OVER SHAW CREEK @ L.M. 6.80



BRIDGE ID: 24S81090043



0' 100' 200' 300'
SCALE: 1" = 200'

AERIAL MAP
STATE ROUTE 196 (SR196) FAYETTE COUNTY
BRIDGE OVER SHAW CREEK @ L.M. 6.80
BRIDGE ID 24S81090043

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

County: Fayette Route: State Route 196 Log Mile: 6.80
 Feature Crossed: Shaw Creek System: STP
 Functional Class: Rural Major Collector Bridge ID: 24S81090043

EXISTING CONDITIONS

2016 AADT: 4,680 App. Cross Section: 22'/24'/70' No. Lanes: 2
 Approach Alignment: Tangent Year Built: 1982 Load Limit: H14
 Width (out to out): 32.1' Sidewalks: Right -- Left -- Length: 67'
 No. Spans: Approach: 2 Main: 1
 Substructure: Timber Vertical Clearance: 7' Sufficiency Rating: 37.1
 Other: State 196 is within the Wolf River wetland bank vicinity.

PROPOSED IMPROVEMENTS

STANDARDS FROM RD01-TS- 2 Type of Work: Replace
 Design Year: 2036 Design AADT: 6,890 Terrain Rolling DHV 896
 Project Length: 0.4 Miles Bridge Length: 90 ft Approach Length: Continuous w/ L.M. 7.11
 Design Speed (MPH): 60 Posted Speed (MPH): 45
 Approach Width: 24' / 40' / 114' Bridge Width (O to O): 43 ft No. Lanes: 2
 Right-of-Way Required: 2 acres Tract(s) 10 Structure Type: Prestress Box Beam Bridge

MAINTENANCE OF TRAFFIC

Temporary Detour: Temporary Runaround: Stage Construct:
 Alternate Route: Traffic to traverse across a minimum 10 ft lane regulated by two temporary traffic signals until the proposed structure is completed.
 Remarks: Existing structure will require reinforcement during the early phasing of construction.
Bridge will be let to contract with Bridge over Overflow @ L.M. 7.11.

ESTIMATED COST

Right-of-Way: See Estimate Approaches: See Estimate Structure: \$565,500
 Preliminary Engineering: See Estimate Utilities: See Estimate Misc./Cont.: See Estimate
 Mobilization: See Estimate Total: See Estimate

Remarks: The existing alignment will be altered so that horizontal curves meet TDOT standard RD01-SE-3 for 60 mph design speed. The grade will be raised 1.8' and the roadway will have two 12' lanes and two 8' shoulders in order to meet TDOT standard RD01-TS-2. The roadway will be upgraded to these standards from approximately L.M. 6.70 to L.M. 7.20. SR 196 current alignment is surrounded by several environmental constraints. The proposed alignment and roadway width which meet TDOT standards will likely disturb the surrounding wetland/TDEC conservation area when implemented.
 Field Investigation by: David Duncan, Mike Gilbert, & Terrance Hill (Planning), Jason Moody (Reg. 4 Traffic) Bobby Benson (Reg. 4 ROW), Jane Jones and Glen Blankenship (Region 4 Design),



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION**

PROJECT PLANNING DIVISION
SUITE 1000, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-2208

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

MEMORANDUM

TO: Project Planning Office

FROM: David Duncan, Roadway Specialist I
Conceptual and NEPA Planning Office

DATE: September 27, 2012

SUBJECT: TPR Field Review (Special Bridge Replacement Program)
State Route 196 over Overflow @ L.M. 6.80
Fayette County

A field review was held for the above-mentioned project on November 11, 2011.

The existing structure consists of three (3) spans with concrete channel sections within the superstructure, and the sub-structures are timber piers. The bridge has an out-to-out width of 28.5 feet and a total length of 67 feet. The sufficiency rating for the existing bridge is 37.1. The 10-year and 100-year discharges and depths of flow for the drainage basin were determined using the appropriate regression equations. The 10-year flood level is 12.0 feet and the 100-year flood level is 14.4 feet.

The route has a base year (2016) AADT of 4,680 and a design year (2036) AADT of 6,890. It is recommended by Region 4 that SR 196 is widened from eleven (11) feet lanes with two (2) feet shoulders to twelve (12) feet lanes with eight (8) feet shoulders (STD. DWG. RD01-TS-2) from approximately L.M. 6.70 to L.M. 7.20 to help improve safety along this corridor. The Bridge over Overflow at L.M. 7.11 is also being planned for replacement and will be let to contract in the same timeframe. The proposed alignment on SR 196 will be upgraded from L.M. 6.70 to L.M. 7.20 for a 60 mph design speed. This will include increasing the horizontal curve radii in some segments of the roadway to a minimum radius of 1432 feet ($0.08 E_{max}$) (STD. DWG. RD01-SE-3). The proposed roadway width will require approximately two (2) acres of right-of-way

acquisition to widen SR 196 from L.M. 6.70 to L.M. 7.20. There are also several above ground utilities that will need to be relocated along the route.

Early Environmental Screening (EES) maps (See Appendix) show that SR 196 is within the vicinity of a wetland and a TDEC conservation area. Widening SR 196 will impact the surrounding wetland.

The existing clearance under the structure is 7.0 feet which is below the 100-year flood depth (14.4 feet). In order for the structure to be above the 100-year flood level the grade would need to be raised 8.2 feet; however, given the level nature of the roadway it is being recommended that the grade only be raised 1.8 feet (increasing clearance to eight (8) feet). The proposed structure is to be three (3) span, prestressed box-beam bridge with a total length of ninety (90) feet.

It is recommended that this bridge be stage constructed since no viable detour route is available. SR 385 (US 269), which is not complete, could be used as detour if further evidence warrants using this alternative.

The required approach work, estimated replacement, right-of-way, utility relocation, preliminary engineering, and construction costs to replace both the bridge over Shaw Creek and bridge over Overflow is approximately \$3,403,200.

DD

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		X
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 (TDEC SITE)		x
14. Location coordinated with local officials		
15. Railroad crossings		
16. Hazardous materials site		

**TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION**

PROJECT NO.: 24017-0233-94 ROUTE: S.R. 196
 COUNTY: FAYETTE CITY: PIPERTON
 PROJECT PIN NUMBER: 101895.01
 PROJECT DESCRIPTION: SPECIAL BRIDGE REPLACEMENT PROGRAM
BRIDGE OVER OVERFLOW
L.M. 7.11

DIVISION REQUESTING:

MAINTENANCE	<input type="checkbox"/>	PAVEMENT DESIGN	<input type="checkbox"/>
PLANNING	<input checked="" type="checkbox"/>	STRUCTURES	<input type="checkbox"/>
PROG. DEVELOPMENT & ADM.	<input type="checkbox"/>	SURVEY & DESIGN	<input type="checkbox"/>
PUBLIC TRANS. & AERO.	<input type="checkbox"/>	TRAFFIC SIGNAL DESIGN	<input type="checkbox"/>
YEAR PROJECT PROGRAMMED FOR CONSTRUCTION:		OTHER _____	<input type="checkbox"/>
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
4,680	2016	6,890	896	13	2036	65-35	1	2		

REQUESTED BY: NAME TYLER KING DATE 4/5/11
 DIVISION PLANNING
 ADDRESS 900 JAMES K. POLK BLDG.
NASHVILLE, TN 37243

REVIEWED BY: TONY ARMSTRONG *Tony Armstrong* DATE 4-26-11
 TRANSPORTATION MANAGER 1
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: BILL HART *Bill Hart* DATE 4/26/11
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

THIS TRAFFIC BASED ON 2010 CYCLE COUNT NO. 93 IN FAYETTE COUNTY.
 FUTURE TRAFFIC BASED ON THE 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 AADT'S OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS.

SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS.

(REV. 9/20/07)

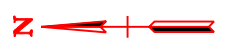
TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2012	FAYETTE	1



FIGURE 2
BRIDGE OVER SHAW CREEK

L.M. 7.20

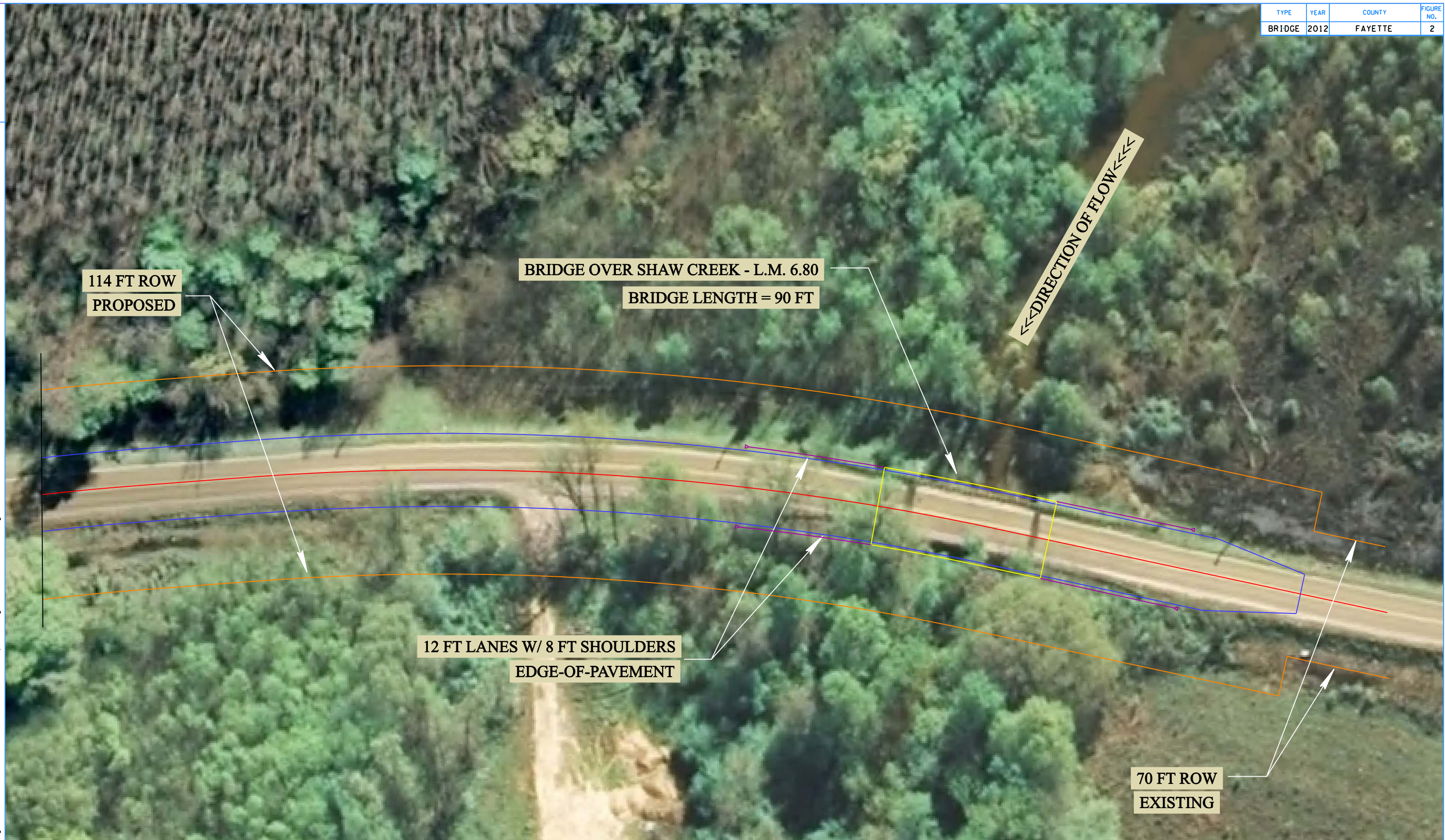
L.M. 6.70



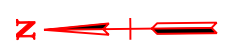
BRIDGE REPLACEMENT

STATE ROUTE 196
L.M. 7.20 TO L.M. 6.70
FAYETTE COUNTY

TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2012	FAYETTE	2

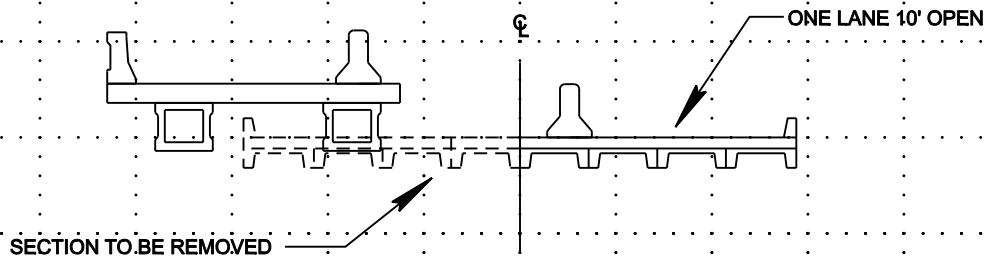


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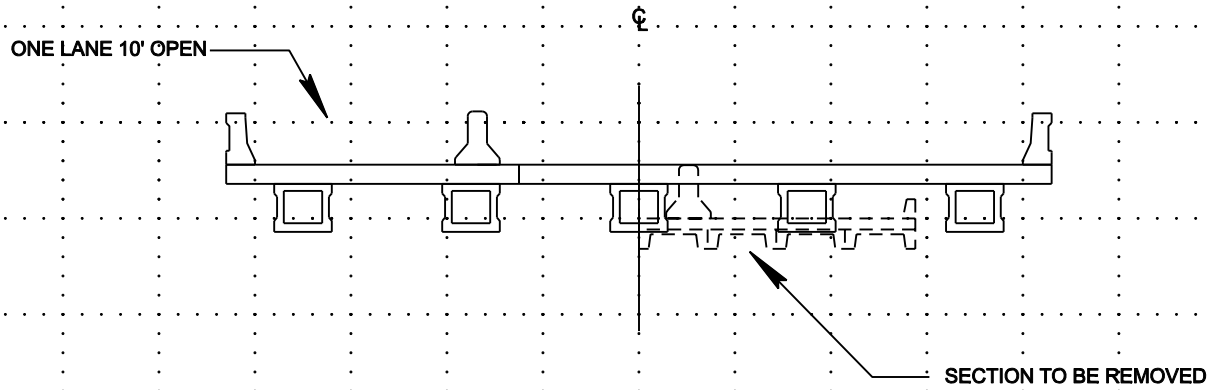


BRIDGE REPLACEMENT
STATE ROUTE 196
BRIDGE OVER SHAW CREEK L.M. 6.80
FAYETTE COUNTY

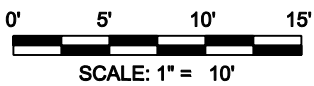
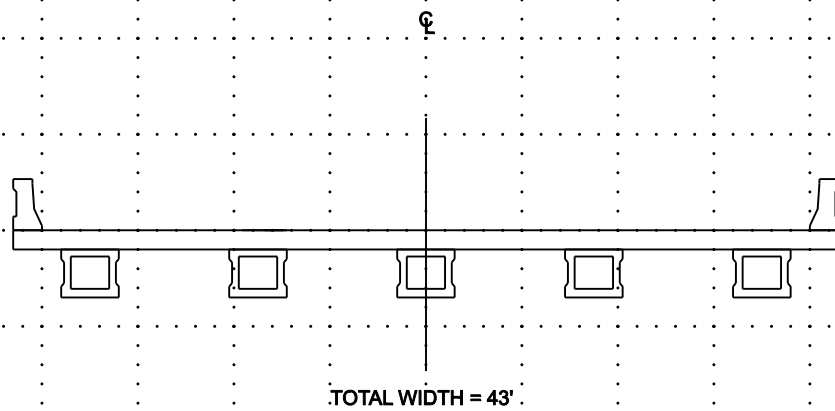
PHASE ONE



PHASE TWO



COMPLETED PROPOSED STRUCTURE



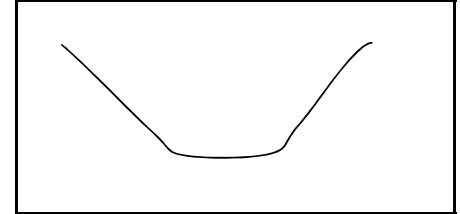
STAGE CONSTRUCTION DETAIL
STATE ROUTE 196 (SR196) FAYETTE COUNTY
BRIDGE OVER SHAW CREEK @ L.M. 6.80
BRIDGE ID 24S81090043

SITE INSPECTION

INSPECTION MADE BY: David Duncan BRIDGE ID: 24S81090043 COUNTY: Fayette
 Date: 8/2/12 Route Name: State Route 196 Stream Name: Shaw Creek @ L.M. 6.80

CHANNEL

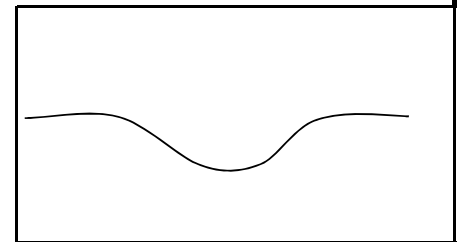
Approx depth and width of channel: Horizontal: _____ Vertical: --
 Depth of normal flow: 6" to 12" In Reservoir: Yes No
 Depth of Ordinary High Water: --
 Type of material in stream bed: Silt/Soil
 Type of vegetation on banks: Light Brush
 "N" factor of the channel: 0.040
 Are channel banks stable: Yes No
 If the streambed is gravel: D₃₀ = -- D₈₅ = --
 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.: Light Brush (0.050) 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: 67 No. of spans: 3 Structure type: Timber Beams No. of lanes: 2 Skew: 90°
 Width (out to out): 32.1' Width (curb to curb): 28.5' Approach: paved graveled
 Sidewalks on Structure: Yes No Bridgerail type: Guardrail Bridgerail height = 2.25'
 Superstructure depth: 3.87' Finished Grade to low girder = 1.62 Girder depth = 1'
 Are any substructures in the channel? Yes No Vertical Clearance = 7' ft
 Indications of overtopping: None
 High water marks: None
 Local scour: Yes, _____ No
 Any signs of stream aggradation or degradation? _____
 Any drift or drift potential? Yes, _____ No
 Any obstructions (pipes, stock fences, etc.)? None

PROPOSED STRUCTURE

Replacement Rehabilitate Widening New Location
 Bridge length: 90 ft Bridge type: Prestress Bridge Span arrangement: 3 @ 27'/36'/27' Skew: 90°
 Bridge width: 43.0 ft Sidewalks: None Design Speed (MPH): 60 ADT (2036) = 6,890
 Proposed grade: Raise 1.8' Proposed alignment: Maintain Existing
 Method of maintaining traffic: Stage construction On site detour Close road Shift Centerline
 Cost of proposed Structure: \$135 per ft² X 90 / 43.0 length (ft) / width (ft) Cost = \$522,500
 Cost of bridge removal: \$20 per ft² X 67 / 32.1 length (ft) / width (ft) Cost = \$43,000
 Detour structure: Type and size = N/A Cost = \$0
Total Structure Cost = \$565,500

**Bridge TPR Flow Calculations
For Hydrologic Area 4
Area > 186 Acres**

County: Fayette
 Bridge ID: 24S81090043
 Route: State Route 196
 Feature Crossed: Shaw Creek
 Log Mile: 6.80

By: DD
 Date: 8/2/12
 PIN: 101895.00

DRAINAGE BASIN

Measurement from quad = 29,203 acres
 Contributing Drainage Area, CDA = acres/640 = 45.63 sq. mi.

USGS REGRESSION EQUATIONS FOR FLOW

$Q_2 = 431(CDA)^{0.529} = 3,253$ cfs
 $Q_5 = 615(CDA)^{0.545} = 4,934$ cfs
 $Q_{10} = 735(CDA)^{0.554} = 6,103$ cfs
 $Q_{25} = 883(CDA)^{0.563} = 7,588$ cfs
 $Q_{50} = 991(CDA)^{0.568} = 8,680$ cfs
 $Q_{100} = 1100(CDA)^{0.573} = 9,821$ cfs

DEPTH OF FLOW EQUATIONS

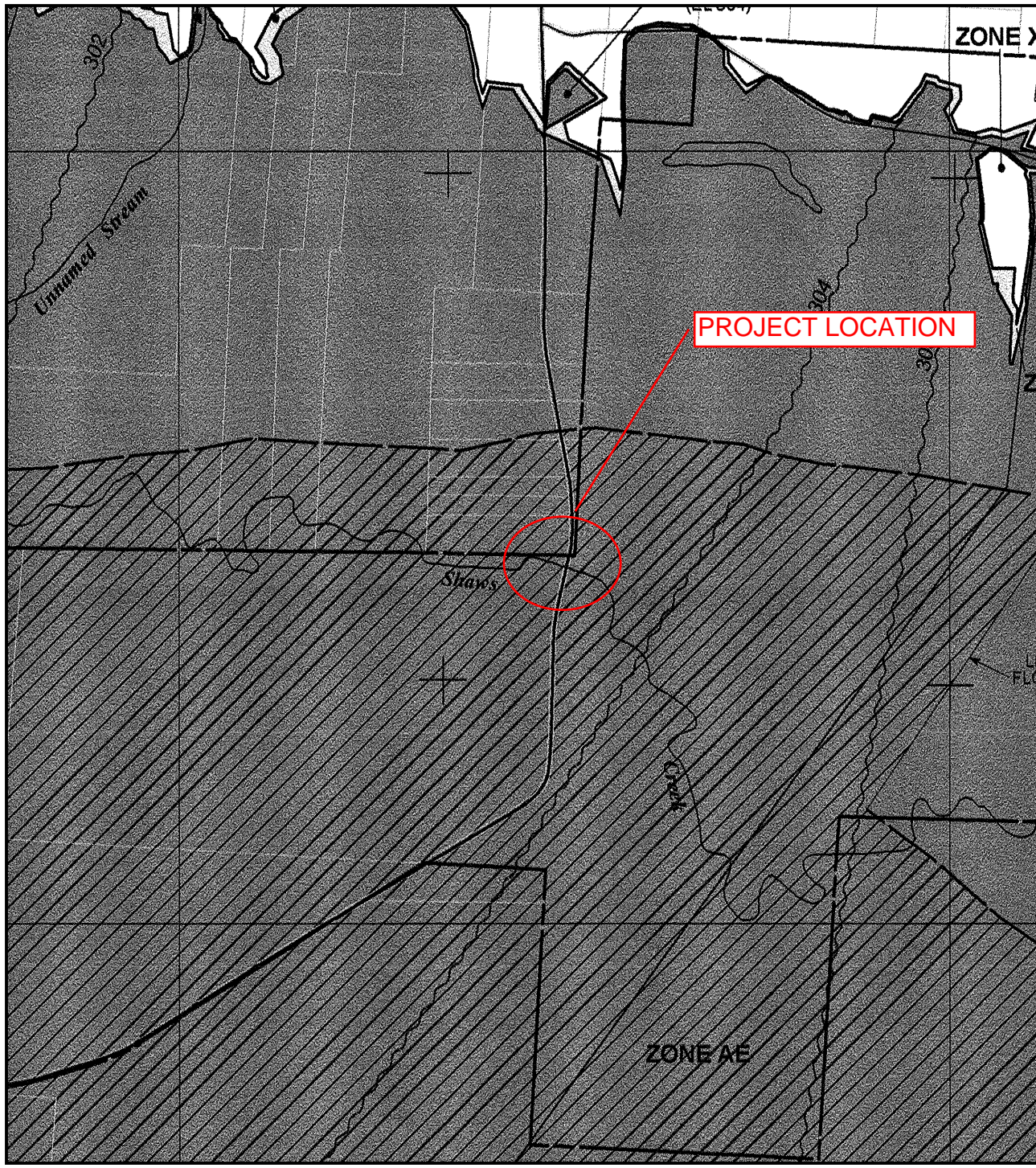
10-Year Flood Depth = $6.98(CDA)^{0.142} = 12.0$ ft
 100-Year Flood Depth = $9.24(CDA)^{0.116} = 14.4$ ft

AREAS

Existing Area Below Low Chord = 566 ft²
 Proposed Area Below Low Chord = 570 ft²
 Proposed 10-Year Flood Area, $A_{10} = 195$ ft²
 Proposed 100-Year Flood Area, $A_{100} = 298$ ft²

VELOCITIES

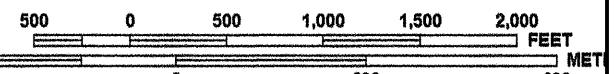
Proposed 10-Year Flood Velocity, $V_{10} = Q_{10}/A_{10} = 31.3$ fps
 Proposed 100-Year Flood Velocity, $V_{100} = Q_{100}/A_{100} = 33.0$ fps



ZONE X



MAP SCALE 1" = 1000'



PROJECT LOCATION

PANEL 0405C

FIRM
FLOOD INSURANCE RATE MAP
FAYETTE COUNTY,
TENNESSEE
AND INCORPORATED AREAS

PANEL 405 OF 605
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
FAYETTE COUNTY	470362	0405	C
PIPERTON, CITY OF	470401	0405	C

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
47047C0405C

EFFECTIVE DATE
NOVEMBER 5, 2008



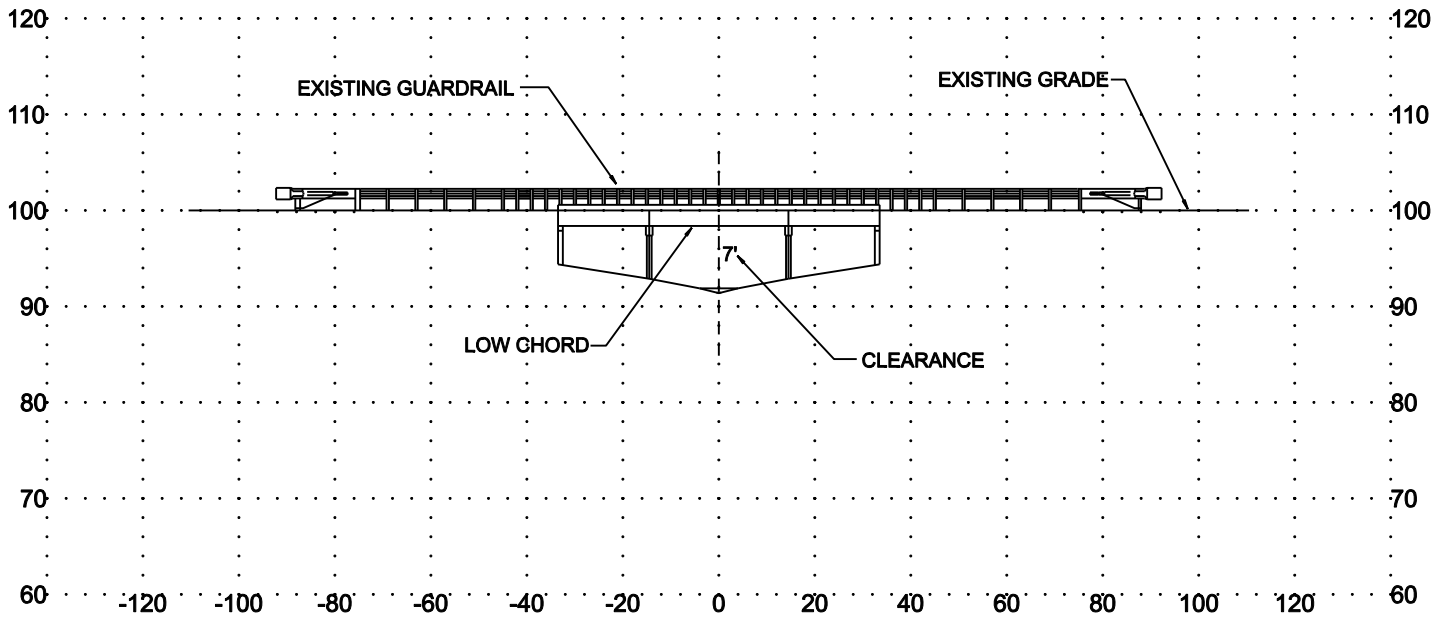
Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM
 FEDERAL EMERGENCY MANAGEMENT AGENCY

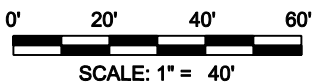
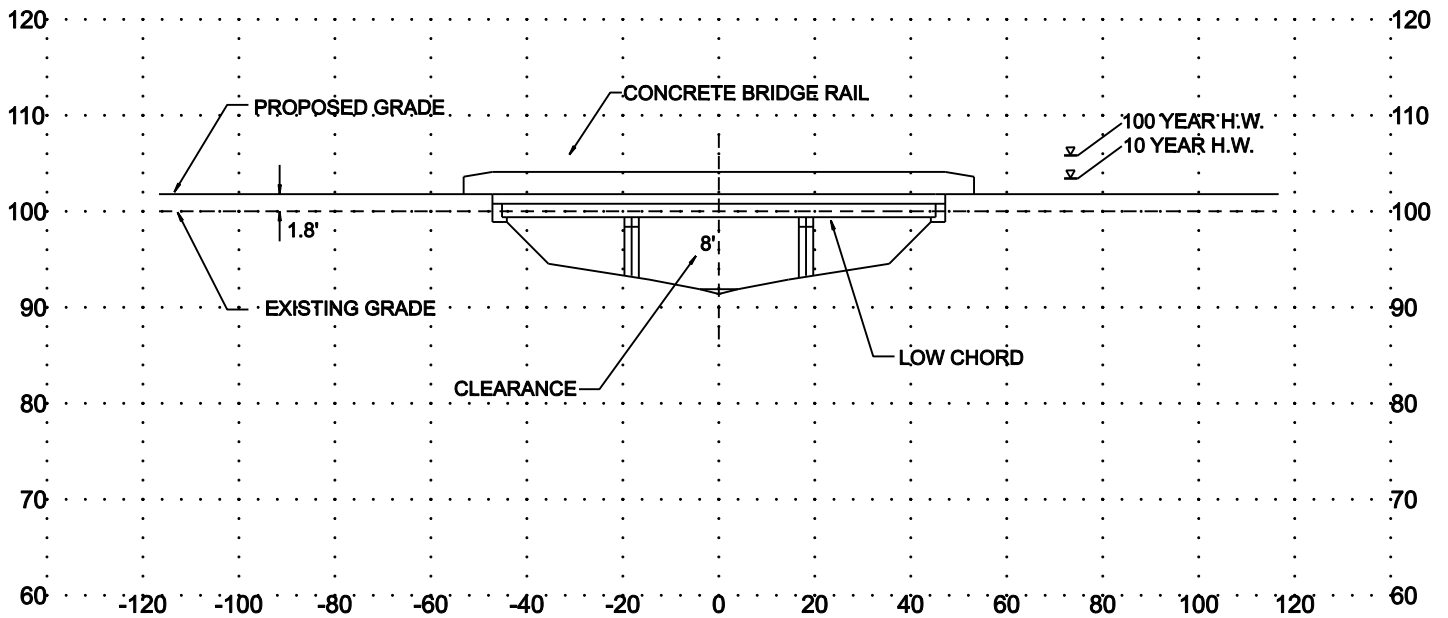
ZONE AE

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

EXISTING STRUCTURE (OUTLET)



PROPOSED STRUCTURE (OUTLET)



BRIDGE SECTIONS
STATE ROUTE 196 FAYETTE COUNTY
BRIDGE OVER SHAW CREEK @ L.M. 6.80
BRIDGE ID 24S81090043

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



County - State Route – Log Mile



Northbound Approach - Looking North

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Northbound Approach – Looking South



Southbound Approach – Looking North

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Southbound Approach – Looking South



Downstream

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Downstream Left



Downstream Right

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Upstream



Upstream Left

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Upstream Right



Inlet

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Outlet



Structure View

Fayette County – SR 196 L.M. 6.80
Bridge ID: 24S81090043



Bridge Abutment



Bridge Deck and Piers

SR 196

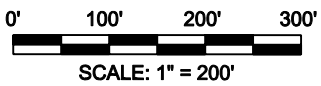
BRIDGE OVER OVERFLOW @ L.M. 7.11



BRIDGE ID: 24S81090003



PROJECT LOCATION



AERIAL MAP
STATE ROUTE 196 (SR196) FAYETTE COUNTY
BRIDGE OVER OVERFLOW @ L.M. 7.11
BRIDGE ID 24S81090003

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

County: Fayette Route: State Route 196 Log Mile: 7.11
 Feature Crossed: Overflow System: STP
 Functional Class: Rural Major Collector Bridge ID: 24S81090003

EXISTING CONDITIONS

2016 AADT: 4,680 App. Cross Section: 22'/24'/70' No. Lanes: 2
 Approach Alignment: Tangent Year Built: 1982 Load Limit: H14
 Width (out to out): 28.8' Sidewalks: Right -- Left -- Length: 134'
 No. Spans: Approach: 2 Main: 2
 Substructure: Timber Vertical Clearance: 7.7 Sufficiency Rating: 30.4
 Other: Concrete cracking under the deck. Steel rebar is exposed in some areas (See Images).

PROPOSED IMPROVEMENTS

STANDARDS FROM RD01-TS- 2 Type of Work: Replace
 Design Year: 2036 Design AADT: 6,890 Terrain Rolling DHV: 896
 Project Length: 0.1 Miles Bridge Length: 134 ft Approach Length: Continuous w/ L.M. 6.80
 Design Speed (MPH): 60 Posted Speed (MPH): 45
 Approach Width: 24' / 40' / 114' Bridge Width (O to O): 43 ft No. Lanes: 2
 Right-of-Way Required: 2 acres Tract(s) 10 Structure Type: Prestress Box Beam Bridge

MAINTENANCE OF TRAFFIC

Temporary Detour: Temporary Runaround: Stage Construct:
 Alternate Route: Traffic to traverse across a minimum 10 ft lane regulated by two temporary traffic signals until the proposed structure is completed.
 Remarks: Existing structure will require reinforcement during the early phasing of construction.
Bridge Replacement will be let to contract with Birdge over Shaw Creek @ L.M. 6.80.

ESTIMATED COST

Right-of-Way: See Estimate Approaches: See Estimate Structure: \$797,500
 Preliminary Engineering: See Estimate Utilities: See Estimate Misc./Cont.: See Estimate
 Mobilization: See Estimate Total: See Estimate

Remarks: The existing alignment will be altered so that the horizontal curves will meet TDOT standard RD01-SE-3 for 60 mph design speed. The grade will be raised 1.5' and the roadway will have two 12' lanes and two 8' shoulders in order to meet TDOT standard RD01-TS-2. The roadway will be upgraded to these standards from approximately L.M. 6.70 to L.M. 7.20. SR 196 current alignment is surrounded by several environmental constraints. The proposed alignment and roadway width which meet TDOT standards will likely disturb the surrounding wetland/TDEC conservation area when implemented.
 Field Investigation by: David Duncan, Mike Gilbert, & Terrance Hill (Planning), Jason Moody (Reg. 4 Traffic) Bobby Benson (Reg. 4 ROW), Jane Jones and Glen Blankenship (Region 4 Design)



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION**

PROJECT PLANNING DIVISION
SUITE 1000, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-2208

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

MEMORANDUM

TO: Project Planning Office

FROM: David Duncan, Roadway Specialist I
Conceptual and NEPA Planning Office

DATE: September 27, 2012

SUBJECT: TPR Field Review (Special Bridge Replacement Program)
State Route 196 over Overflow @ L.M. 7.11
Fayette County

A field review was held for the above-mentioned project on November 11, 2011.

The existing structure consists of seven (7) spans with concrete channel sections within the superstructure, and the sub-structures are timber piers. The bridge has an out-to-out width of 28.8 feet and a total length of 134 feet. The sufficiency rating for the existing bridge is 30.4. The 10-year and 100-year discharges and depths of flow for the drainage basin were determined using the appropriate regression equations. The 10-year flood level is 5.9 feet and the 100-year flood level is 8.1 feet.

The route has a base year (2016) AADT of 4,680 and a design year (2036) AADT of 6,890. It is recommended by Region 4 that SR 196 is widened from eleven (11) feet lanes with two (2) feet shoulders to twelve (12) feet lanes with eight (8) feet shoulders (STD. DWG. RD01-TS-2) from approximately L.M. 6.70 to L.M. 7.20 to help improve safety along this corridor. The Bridge over Shaw Creek at L.M. 6.80 is also being planned for replacement and will be let to contract in the same timeframe. The proposed alignment on SR 196 will be upgraded from L.M. 6.70 to L.M. 7.20 for a 60 mph design speed. This will include increasing the horizontal curve radii in some segments of the roadway to a minimum radius of 1432 feet ($0.08 E_{\max}$) (STD. DWG. RD01-SE-3). The proposed roadway width will require approximately two (2) acres of right-of-way

acquisition to widen SR 196 from L.M. 6.70 to L.M. 7.20. There are also several above ground utilities that will need to be relocated along the route.

Early Environmental Screening (EES) maps (See Appendix) show that SR 196 is within the vicinity of a wetland and a TDEC conservation area. Widening SR 196 will impact the surrounding wetland.

The existing clearance under the structure is 7.7 feet which is below the 100-year flood depth (8.1 feet). In order for the structure to be above the 100-year flood level the grade it is recommended that the grade be raised 1.5 feet. The proposed structure is to be four (4) span, prestressed box-beam bridge with a total length of 134 feet.

It is recommended that this bridge be stage constructed since no viable detour route is available. SR 385 (US 269), which is not complete, could be used as detour if further evidence warrants using this alternative.

The required approach work, estimated replacement, right-of-way, utility relocation, preliminary engineering, and costs to construct both bridges is approximately \$3,403,200.

DD

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	X
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 (TDEC SITE)	x
14.	Location coordinated with local officials	
15.	Railroad crossings	
16.	Hazardous materials site	

**TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION**

PROJECT NO.: 24017-0233-94 ROUTE: S.R. 196
 COUNTY: FAYETTE CITY: PIPERTON
 PROJECT PIN NUMBER: 101895.01
 PROJECT DESCRIPTION: SPECIAL BRIDGE REPLACEMENT PROGRAM
BRIDGE OVER OVERFLOW
L.M. 7.11

DIVISION REQUESTING:

MAINTENANCE	<input type="checkbox"/>	PAVEMENT DESIGN	<input type="checkbox"/>
PLANNING	<input checked="" type="checkbox"/>	STRUCTURES	<input type="checkbox"/>
PROG. DEVELOPMENT & ADM.	<input type="checkbox"/>	SURVEY & DESIGN	<input type="checkbox"/>
PUBLIC TRANS. & AERO.	<input type="checkbox"/>	TRAFFIC SIGNAL DESIGN	<input type="checkbox"/>
YEAR PROJECT PROGRAMMED FOR CONSTRUCTION:		OTHER _____	<input type="checkbox"/>
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
4,680	2016	6,890	896	13	2036	65-35	1	2		

REQUESTED BY: NAME TYLER KING DATE 4/5/11
 DIVISION PLANNING
 ADDRESS 900 JAMES K. POLK BLDG.
NASHVILLE, TN 37243

REVIEWED BY: TONY ARMSTRONG *Tony Armstrong* DATE 4-26-11
 TRANSPORTATION MANAGER 1
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: BILL HART *Bill Hart* DATE 4/26/11
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

THIS TRAFFIC BASED ON 2010 CYCLE COUNT NO. 93 IN FAYETTE COUNTY.
 FUTURE TRAFFIC BASED ON THE 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 AADT'S OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS.

SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS.

(REV. 9/20/07)

TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2012	FAYETTE	1

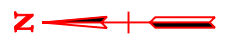


FIGURE 2
BRIDGE OVER OVERFLOW

L.M. 7.20

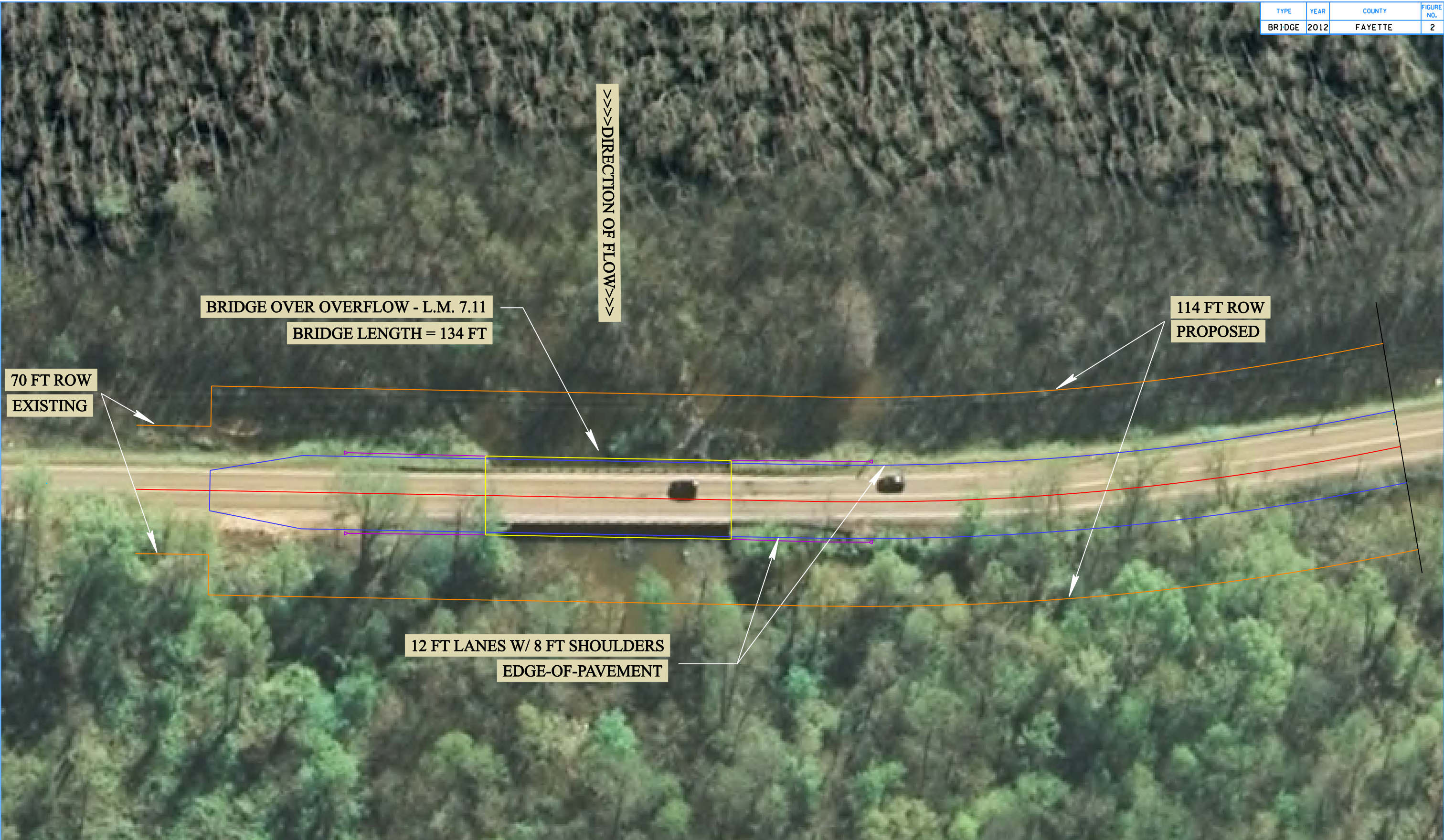
L.M. 6.70

9/27/2012 11:27:02 AM X:\Projects\Fayette\SR 196\Bridge over Show Creek LM 6.8\Microstation\Combined Alignments Overflow.dgn



BRIDGE REPLACEMENT

STATE ROUTE 196
L.M. 7.20 TO L.M. 6.70
FAYETTE COUNTY

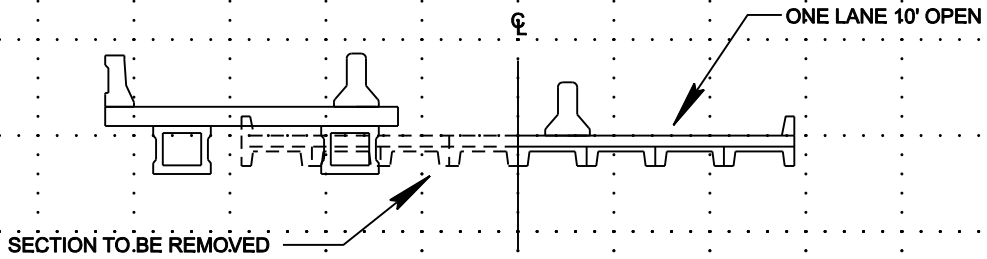


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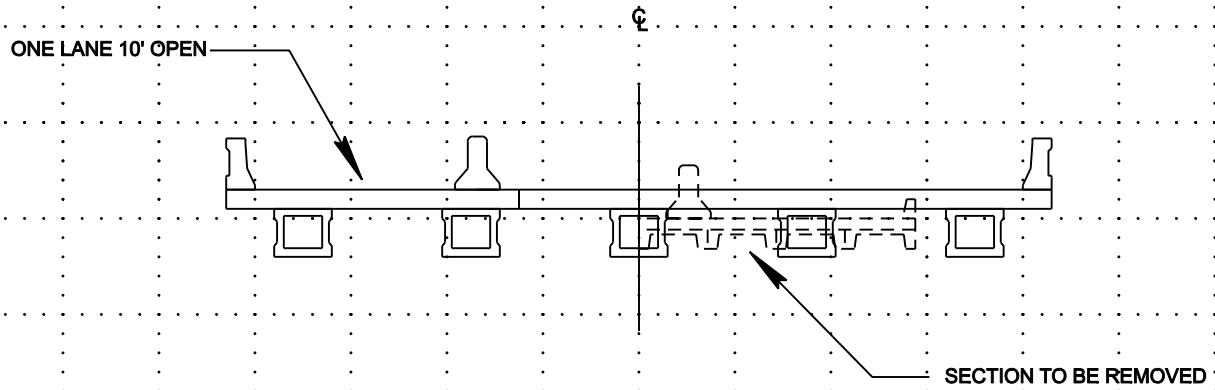


BRIDGE REPLACEMENT
STATE ROUTE 196
BRIDGE OVER OVERFLOW L.M. 7.11
FAYETTE COUNTY

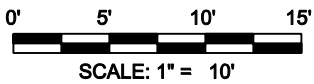
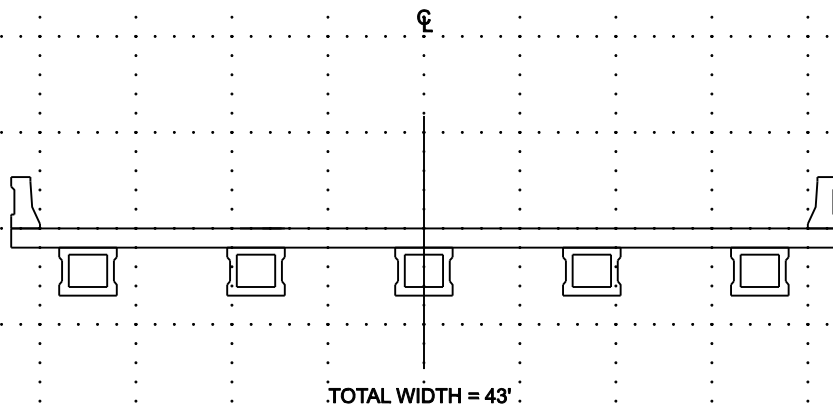
PHASE ONE



PHASE TWO



COMPLETED PROPOSED STRUCTURE



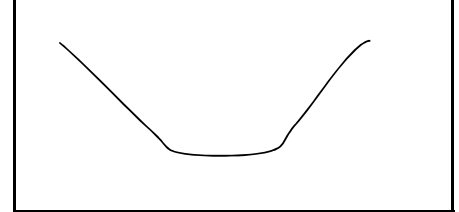
STAGE CONSTRUCTION DETAIL
STATE ROUTE 196 (SR196) FAYETTE COUNTY
BRIDGE OVER OVERFLOW @ L.M. 7.11
BRIDGE ID 24S81090003

SITE INSPECTION

INSPECTION MADE BY: David Duncan BRIDGE ID: 24S81090003 COUNTY: Fayette
Date: 2/24/12 Route Name: State Route 196 Stream Name: Overflow @ L.M. 7.11

CHANNEL

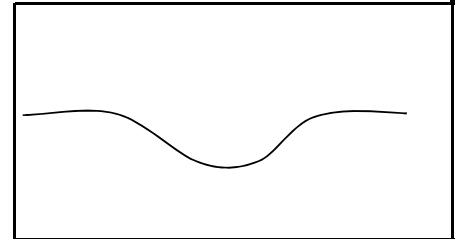
Approx depth and width of channel: Horizontal: 130' Vertical: --
Depth of normal flow: 6" to 12" In Reservoir: Yes No
Depth of Ordinary High Water: --
Type of material in stream bed: Silt/Soil
Type of vegetation on banks: Light Brush
"N" factor of the channel: 0.040
Are channel banks stable: Yes No
If the streambed is gravel: $D_{30} =$ -- $D_{85} =$ --
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.: Light Brush (0.050) 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: 134 No. of spans: 7 Structure type: Timber Beams No. of lanes: 2 Skew: 90°
Width (out to out): 28.8' Width (curb to curb): 27.5' Approach: paved graveled
Sidewalks on Structure: Yes No Bridgerail type: Guardrail Bridgerail height = 2.5'
Superstructure depth: 4.17' Finished Grade to low girder = 1.58' Girder depth = 1'
Are any substructures in the channel? Yes No Vertical Clearance = 7.7 ft
Indications of overtopping: None
High water marks: None
Local scour: Yes No
Any signs of stream aggradation or degradation? Under structure
Any drift or drift potential? Yes No
Any obstructions (pipes, stock fences, etc.)? None

PROPOSED STRUCTURE

Replacement Rehabilitate Widening New Location
Bridge length: 134 ft Bridge type: Prestress Bridge Span arrangement: 4 @ 33.5' Skew: 90°
Bridge width: 43.0 ft Sidewalks: None Design Speed (MPH): 60 ADT (2036) = 6,890
Proposed grade: Raise 1.5' Proposed alignment: Maintain Existing
Method of maintaining traffic: Stage construction On site detour Close road Shift Centerline
Cost of proposed Structure: \$125 per ft² X 134 / 43.0 length (ft) / width (ft) Cost = \$720,300
Cost of bridge removal: \$15 per ft² X 134 / 28.8 length (ft) / width (ft) Cost = \$57,900
Detour structure: Type and size = N/A Cost = \$0

Total Structure Cost = \$778,200

**Bridge TPR Flow Calculations
For Hydrologic Area 4
Area > 186 Acres**

County: Fayette
 Bridge ID: 24S81090003
 Route: State Route 196
 Feature Crossed: Overflow
 Log Mile: 7.11

By: DD
 Date: 8/2/12
 PIN: 101895.00

DRAINAGE BASIN

Measurement from quad = 205 acres
 Contributing Drainage Area, CDA = acres/640 = 0.32 sq. mi.

USGS REGRESSION EQUATIONS FOR FLOW

$Q_2 = 431(CDA)^{0.529} = 236$ cfs
 $Q_5 = 615(CDA)^{0.545} = 331$ cfs
 $Q_{10} = 735(CDA)^{0.554} = 391$ cfs
 $Q_{25} = 883(CDA)^{0.563} = 465$ cfs
 $Q_{50} = 991(CDA)^{0.568} = 519$ cfs
 $Q_{100} = 1100(CDA)^{0.573} = 573$ cfs

DEPTH OF FLOW EQUATIONS

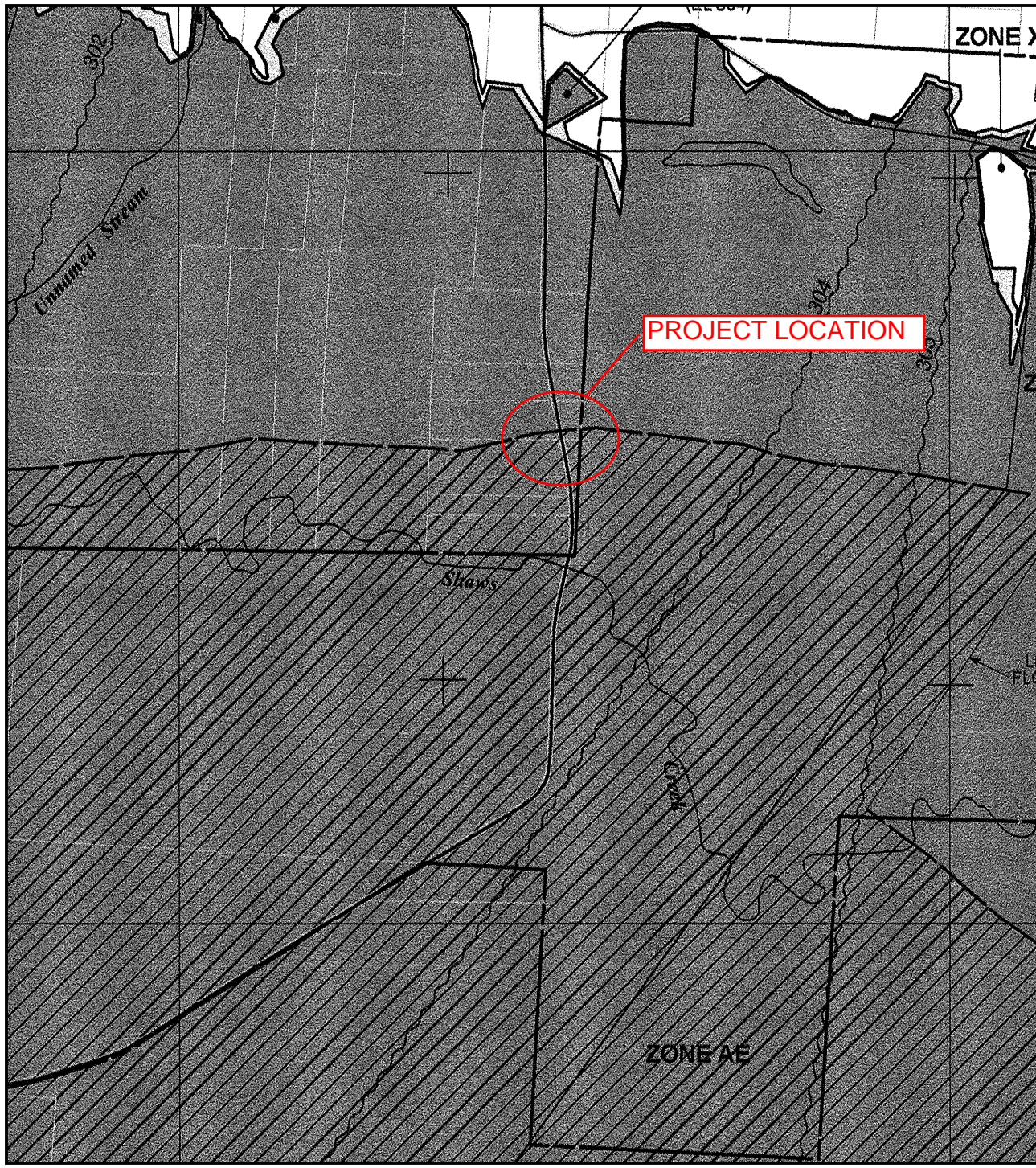
10-Year Flood Depth = $6.98(CDA)^{0.142} = 5.9$ ft
 100-Year Flood Depth = $9.24(CDA)^{0.116} = 8.1$ ft

AREAS

Existing Area Below Low Chord = 566 ft²
 Proposed Area Below Low Chord = 570 ft²
 Proposed 10-Year Flood Area, $A_{10} = 195$ ft²
 Proposed 100-Year Flood Area, $A_{100} = 298$ ft²

VELOCITIES

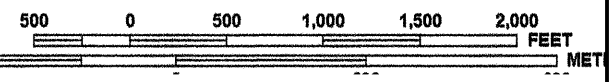
Proposed 10-Year Flood Velocity, $V_{10} = Q_{10}/A_{10} = 2.0$ fps
 Proposed 100-Year Flood Velocity, $V_{100} = Q_{100}/A_{100} = 1.9$ fps



ZONE X



MAP SCALE 1" = 1000'



PROJECT LOCATION

PANEL 0405C

FIRM
FLOOD INSURANCE RATE MAP
FAYETTE COUNTY,
TENNESSEE
AND INCORPORATED AREAS

PANEL 405 OF 605
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
FAYETTE COUNTY	470362	0405	C
PIPERTON, CITY OF	470401	0405	C

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
47047C0405C

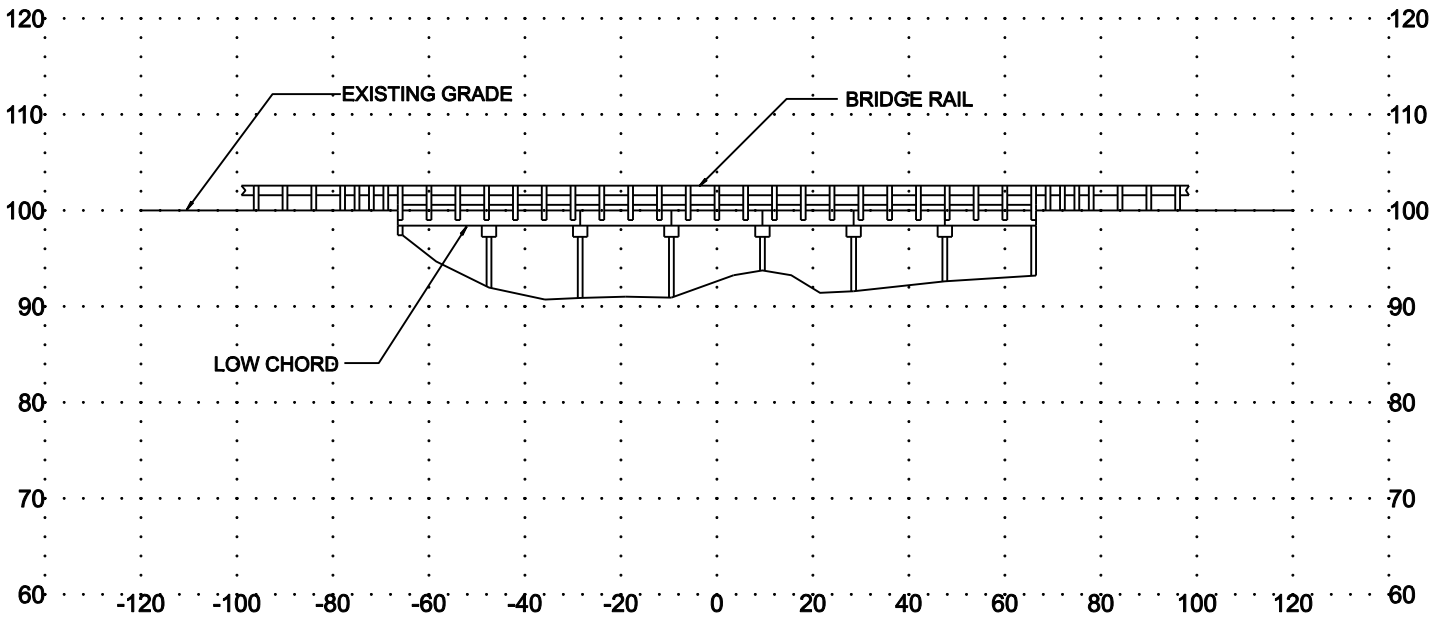


EFFECTIVE DATE
NOVEMBER 5, 2008

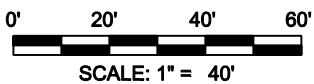
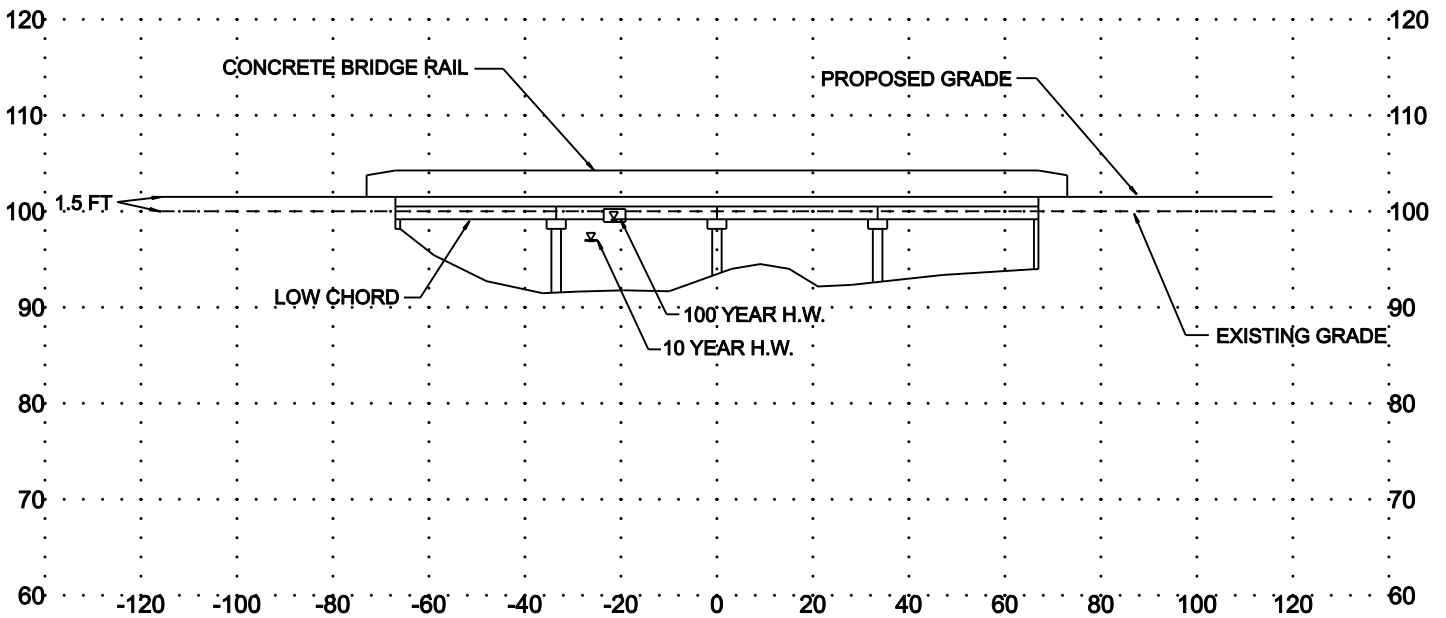
Federal Emergency Management Agency

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EXISTING STRUCTURE (OUTLET)



PROPOSED STRUCTURE (OUTLET)



BRIDGE SECTIONS
STATE ROUTE 196 FAYETTE COUNTY
BRIDGE OVER OVERFLOW @ L.M. 7.11
BRIDGE ID 24S81090003



Wetland Information Sign



TWRA Boundary Marker



County – State Route – Log Mile



Southbound Approach (Looking North)



Northbound Approach (Looking South)



Northbound Approach (Looking North)



Southbound Approach (Looking South)



Upstream



Upstream Looking Left



Upstream Looking Right



Downstream



Downstream Looking Left



Downstream Looking Right



Outlet



Inlet



Guardrail End Treatment



Guardrail Mounted to Bridge



Bridge Substructure



Concrete Channel Section (Exposed Rebar)



Concrete Channel Sections with Timber Substructures



Bridge Abutment (More Exposed Rebar)



Bridge View

APPENDIX

SR 196

BRIDGE OVER SHAW CREEK @ L.M. 6.80



BRIDGE OVER OVERFLOW @ L.M. 7.11



FAYETTE COUNTY – SR 196
BRIDGE OVER OVERFLOW @ L.M. 7.11
BRIDGE OVER SHAW CREEK @ L.M. 6.80

Early Environmental Screening Maps

TERRESTRIAL SPECIES



FAYETTE COUNTY – SR 196
BRIDGE OVER OVERFLOW @ L.M. 7.11
BRIDGE OVER SHAW CREEK @ L.M. 6.80

TDEC CONSERVATION SITE



FAYETTE COUNTY – SR 196

BRIDGE OVER OVERFLOW @ L.M. 7.11

BRIDGE OVER SHAW CREEK @ L.M. 6.80

WETLANDS

