

TRANSPORTATION INVESTMENT REPORT

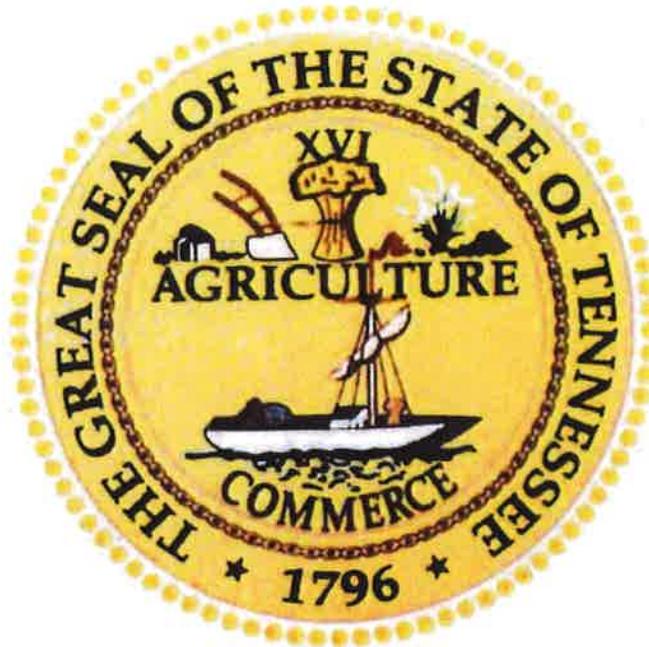
Special Bridge Replacement Program

LOCAL ROUTE 869 - (POWELL CHAPEL ROAD)

BRIDGE OVER HATCHIE RIVER AT L.M. 7.92

HARDEMAN COUNTY

PIN: 121539.00



PREPARED BY
VOLKERT, INC.

FOR THE

TENNESSEE DEPARTMENT OF TRANSPORTATION

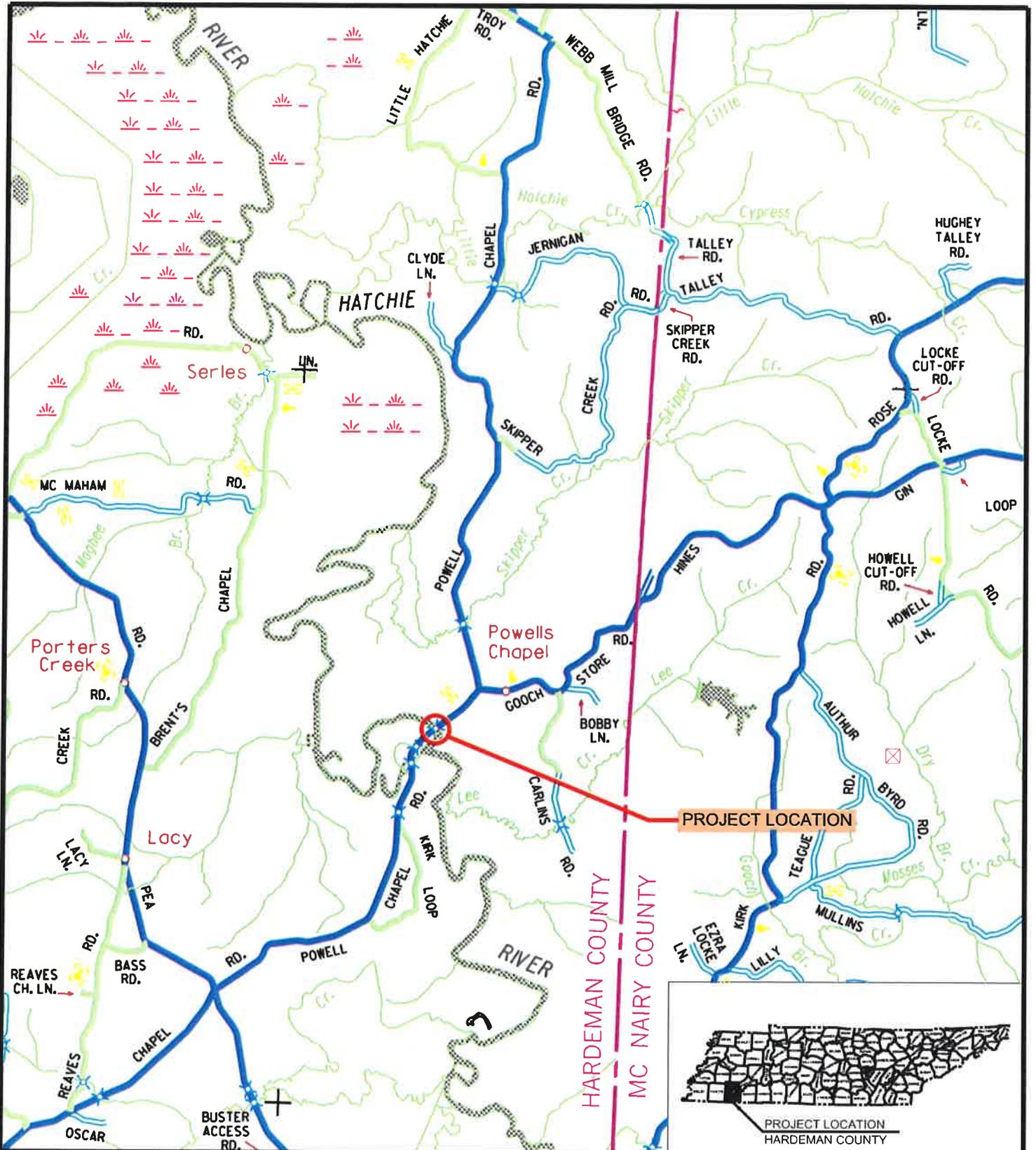
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Approved by _____ Date 9/30/15
Chief of Environment and Planning

[Handwritten Signature] Date 10/22/15
Deputy Commissioner and Chief Engineer

Approved by:	Signature:	Date:
Transportation Director Strategic Transportation Investment	<i>[Handwritten Signature]</i>	8-6-15
Project Development Director for Region 4	<i>[Handwritten Signature]</i>	9-10-15
Engineering Director Structures Division	<i>[Handwritten Signature]</i>	9-22-15

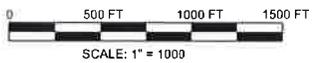
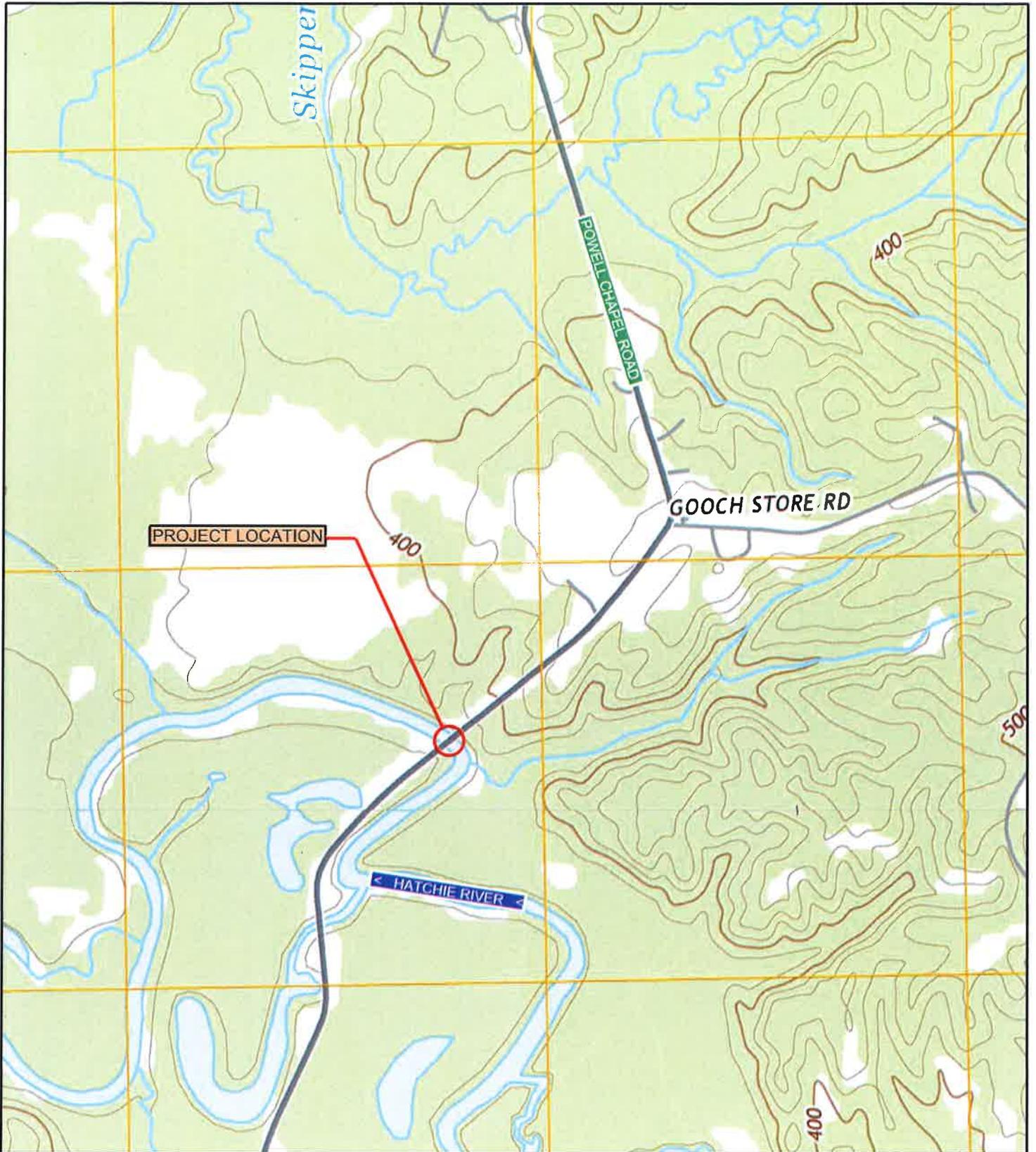
This document is covered by 23 USC § 409 and its production pursuant to fulfilling public planning requirements does not waive the provisions of § 409.



AREA MAP

POWELL CHAPEL ROAD (LR0869) HARDEMAN COUNTY
 BRIDGE OVER HATCHIE RIVER @ L.M 7.92
 BRIDGE ID 35S80810009
 PIN 121539.00

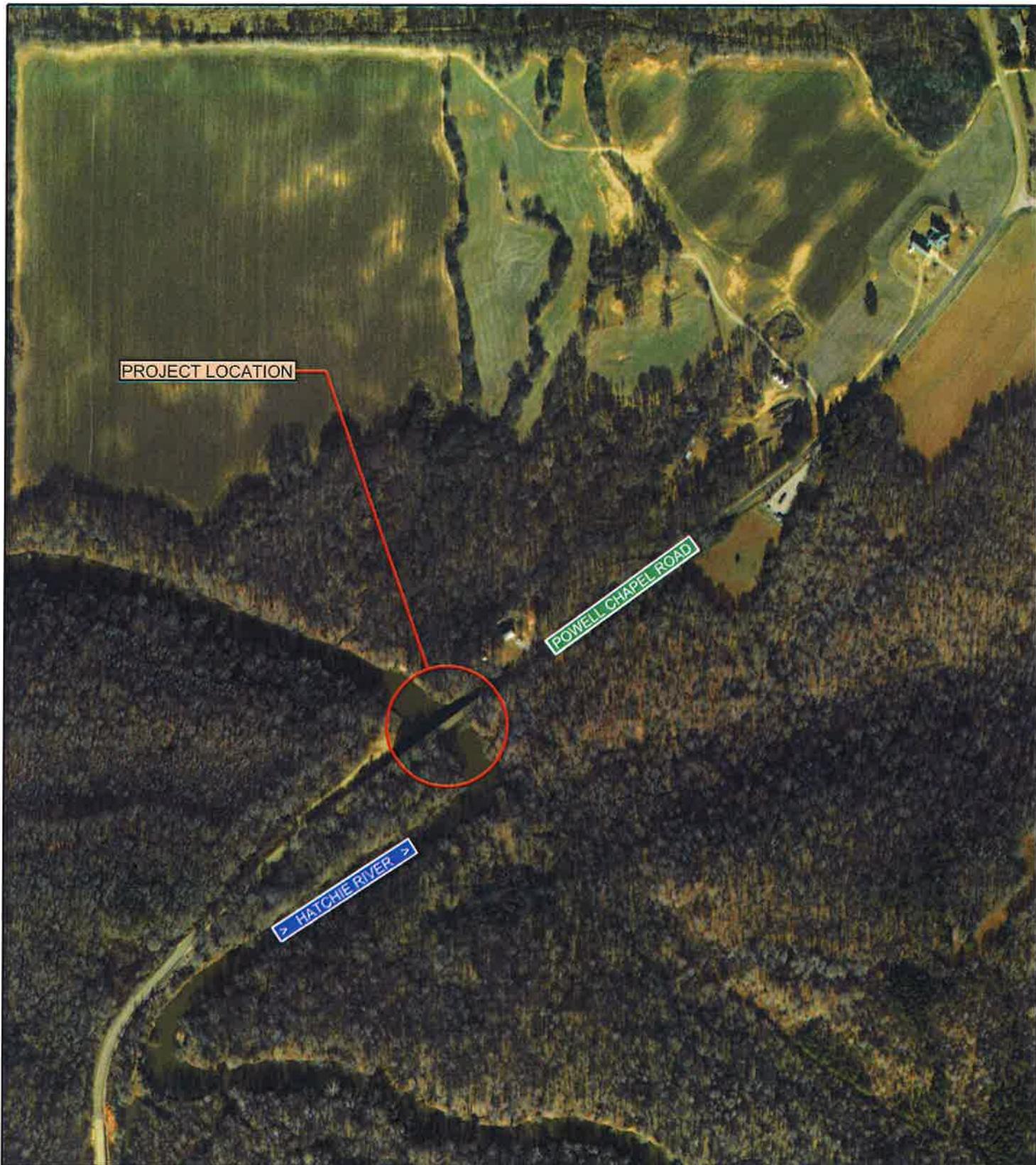




PROJECT MAP

POWELL CHAPEL ROAD (LR0869) HARDEMAN COUNTY
BRIDGE OVER HATCHIE RIVER @ L.M 7.92
BRIDGE ID 35S80810009
PIN 121539.00





AERIAL MAP

POWELL CHAPEL ROAD (LR0869) HARDEMAN COUNTY
BRIDGE OVER HATCHIE RIVER @ L.M 7.92
BRIDGE ID 35S80810009
PIN 121539.00



BRIDGE REPLACEMENT ANALYSIS, NEEDS, AND COSTS

County: Hardeman Route: Powell Chapel Road (LR0869) Log Mile: 7.92
Feature Crossed: Hatchie River System: Local Road
Functional Class: Rural Minor Collector Bridge ID: 35S80810009

EXISTING CONDITIONS

2019 AADT: 460 App. Cross Section: 22' / 26' / 50' No. Lanes: 2
Approach Alignment: Tangent section on each approach Year Built: 1954 Load Limit: 10 tons
Width (out to out): 26'-6" Sidewalks: Right -- Left -- Length: 372'
No. Spans: Approach: -- Main: 9
Substructure: Conc. pile bents & conc. piers on timber piles Vertical Clearance: 39.5' Sufficiency Rating: 47.4
Other: _____

PROPOSED IMPROVEMENTS

STANDARDS FROM RD01-TS-2 Type of Work: Replacement
Design Year: 2039 Design AADT: 510 Terrain Rolling ADL (F): -- (R): --
Project Length: 1,470 ft Bridge Length: 400 ft Approach Length: 2 at 535 ft
Design Speed (MPH): 50 Posted Speed (MPH): 45
Approach Width: 22' / 30' / As Required Bridge Width (O to O): 30'-5" ft No. Lanes: 2
Right-of-Way Required: 2.88 Ac Tract(s) 2 Structure Type: Steel W.P.G.

MAINTENANCE OF TRAFFIC

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

Remarks: Construct parallel structure, shift centerline 48 ft upstream, maintain two lanes of traffic on existing structure during construction

ESTIMATED COST

Right-of-Way: \$43,200 Approaches: \$375,900 Structure: \$2,155,500
Preliminary Engineering: \$335,100 Utilities: \$0 Misc./Cont: \$631,600
Mobilization: \$145,100 Total: \$3,686,400

Remarks: The existing structure will be replaced with a new structure on a parallel tangent alignment with curves at approaches to tie into existing roadway. The grade will be raised approximately 5.0 ft. The proposed structure will have two 11-foot lanes with two 3-foot shoulders in order to meet the design standards according to RD01-TS-2. ROW will be required from the adjacent land owners in order to realign the roadway approaches.

Field Investigation by: Jason Moody (Region 4 Traffic), Ryan Philpott, Stephanie Kissell (Region 4 Design), Herman Odle (TDOT R.O.W.), Shelton Merrell (SWTDD RPO), Gena Gilliam (TDOT STID), Jeremy Bowlan (TDOT STID), Mike Gilbert (TDOT STID), Zane Pannell (TDOT STID), Robby Dickenson, Justin Eckel (Volkert)

BRIDGE TIR COST ESTIMATE

Route: **Powell Chapel Road (LR 869)**
 Description: **Bridge over Hatchie River (35S80810009)**
 L.M. 7.92
 County: **Hardeman**
 Length: **0.28 miles**
 Date: **September 23, 2015**

<u>DESCRIPTION</u>	<u>LOCAL</u>	<u>STATE</u>	<u>FEDERAL</u>	<u>TOTAL</u>
Right-of-Way	\$ 8,640		\$ 34,560	\$ 43,200
Clearing and Grubbing	\$ 4,000		\$ 16,000	\$ 20,000
Earthwork	\$ 4,680		\$ 18,720	\$ 23,400
Railroad Crossing or Separation	\$ -		\$ -	\$ -
Drainage	\$ 4,000		\$ 16,000	\$ 20,000
Utilities	\$ -		\$ -	\$ -
Structures	\$ 431,100		\$ 1,724,400	\$ 2,155,500
Pavement Removal	\$ 4,520		\$ 18,080	\$ 22,600
Paving	\$ 23,260		\$ 93,040	\$ 116,300
Roadway and Pavement Appurtenances	\$ -		\$ -	\$ -
Retaining Walls	\$ -		\$ -	\$ -
Topsoil	\$ -		\$ -	\$ -
Seeding	\$ -		\$ -	\$ -
Sodding	\$ 2,200		\$ 8,800	\$ 11,000
Rip-Rap or Slope Protection	\$ 13,960		\$ 55,840	\$ 69,800
Fencing	\$ -		\$ -	\$ -
Signing	\$ 660		\$ 2,640	\$ 3,300
Pavement Markings	\$ 320		\$ 1,280	\$ 1,600
Lighting	\$ -		\$ -	\$ -
Signalization	\$ -		\$ -	\$ -
Guardrail	\$ 5,140		\$ 20,560	\$ 25,700
Pay Item Quantity Adjustment (15%) ¹	\$ 75,380		\$ 301,520	\$ 376,900
Maintenance of Traffic	\$ 2,440		\$ 9,760	\$ 12,200
Mobilization (5%)	\$ 29,020		\$ 116,080	\$ 145,100
CONSTRUCTION COST (rounded)	\$ 609,320		\$ 2,437,280	\$ 3,046,600
Engineering and Contingency (10%)	\$ 60,940		\$ 243,760	\$ 304,700
TOTAL CONSTRUCTION COST (rounded)	\$ 670,260		\$ 2,681,040	\$ 3,351,300
Preliminary Engineering (10%)	\$ 67,020		\$ 268,080	\$ 335,100
PROJECT COST² (rounded)	\$ 737,280	\$ -	\$ 2,949,120	\$ 3,686,400

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

² 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 (2.88 Acres)	LS	1	\$ 43,200.00	\$ 43,200
RIGHT-OF-WAY TOTAL (ROUNDED)					\$ 43,200
201-01	Clearing and Grubbing	LS	1	\$ 20,000.00	\$ 20,000
CLEAR AND GRUBBING TOTAL (ROUNDED)					\$ 20,000
203-01	Road & Drainage Excavation (Unclassified)	CY	592	\$ 5.10	\$ 3,019
203-03	Borrow Excavation (Unclassified)	CY	3,908	\$ 5.20	\$ 20,322
EARTHWORK TOTAL (ROUNDED)					\$ 23,400
202-03.01	Removal of Asphalt Pavement	SY	2,133	\$ 10.56	\$ 22,524
PAVEMENT REMOVAL TOTAL (ROUNDED)					\$ 22,500
209-99.91	Erosion Control	LS	1	\$ 20,000.00	\$ 20,000
DRAINAGE TOTAL (ROUNDED)					\$ 20,000
UTILITIES TOTAL (ROUNDED)					\$ -
	Removal of Existing Bridge	SF	9858	\$ 15.00	\$ 147,870
	Four Span Steel Girder Bridge (400'x30'-5')	SF	12167	\$ 165.00	\$ 2,007,555
STRUCTURES TOTAL (ROUNDED)					\$ 2,155,500
RAILROAD CROSSING OR SEPARATION TOTAL (ROUNDED)					\$ -
303-01	Mineral Aggregate, Ty A Base, Grading D	TON	1,609.0	\$ 19.00	\$ 30,570
307-01.01	Asphalt Concrete Mix (PG64-22)(BPMB-HM) Grade A	TON	492.2	\$ 78.76	\$ 38,766
307-01.08	Asphalt Concrete Mix (PG64-22)(BPMB-HM) Grade BM-2	TON	322.4	\$ 81.76	\$ 26,362
402-01	Bituminous Material for Prime Coat (PC)	TON	4.3	\$ 497.96	\$ 2,153
402-02	Aggregate for Cover Material (PC)	TON	14.3	\$ 23.81	\$ 340
403-01	Bituminous Material for Tack Coat (PC)	TON	1.2	\$ 626.55	\$ 774
411-01.10	ACS Mix (PG64-22) Grading D	TON	189.0	\$ 91.70	\$ 17,334
PAVING TOTAL (ROUNDED)					\$ 116,300
ROADWAY AND PAVEMENT APPURTENANCES TOTAL (ROUNDED)					\$ -
RETAINING WALLS TOTAL (ROUNDED)					\$ -
712-01	Traffic Control	LS	1	\$ 12,120.00	\$ 12,120
MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)					\$ 12,200
TOPSOIL TOTAL (ROUNDED)					\$ -
SEEDING TOTAL (ROUNDED)					\$ -
801-03	Water (Seeding & Sodding)	MG	4	\$ 7.76	\$ 31
803-01	Sodding (New Sod)	SY	4445	\$ 2.45	\$ 10,890
SODDING TOTAL (ROUNDED)					\$ 11,000
713-15.41	Sign Removal	LS	1	\$ 250.00	\$ 250
713-99.91	Signs	LS	1	\$ 3,000.00	\$ 3,000
SIGNING TOTAL (ROUNDED)					\$ 3,300
716-13.06	Spray Thermo P.M. (40 mil 4IN)	LM	1.12	\$ 1,376.74	\$ 1,542
PAVEMENT MARKINGS TOTAL (ROUNDED)					\$ 1,600
LIGHTING TOTAL (ROUNDED)					\$ -
SIGNALIZATION TOTAL (ROUNDED)					\$ -
FENCE TOTAL (ROUNDED)					\$ -
705-01.01	Guardrail at Bridge Ends	LF	200	\$ 64.44	\$ 12,888
705-04.07	Tan Energy Absg Term (NCHRP 350, TL3) - Type 38	EA	4	\$ 2,191.75	\$ 8,767

Hardeman County

Powell Chapel Road (LR 869)
L.M. 7.92 Bridge over Hatchie River

Pay Item Summary

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
705-04.09	Earth Pad for Type 38 Guardrail End Treatment	EA	4	\$ 991.02	\$ 3,964
GUARDRAIL TOTAL (ROUNDED)					\$ 25,700
709-05.08	Machined Rip-Rap (Class B)	TON	2,100	\$ 33.21	\$ 69,741
RIP-RAP OR SLOPE PROTECTION TOTAL (ROUNDED)					\$ 69,800



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS 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: Steve Allen, Director
Strategic Transportation Investments Division

FROM: Robby Dickenson, Project Manager
Volkert, Inc.

DATE: September 23, 2015

SUBJECT: TIR Field Review (Special Bridge Replacement Program)
Powell Chapel Road (LR 869), Bridge over Hatchie River
L.M. 7.92
Hardeman County
PIN 121539.00

A field review was held for the above-mentioned project on January 27, 2015

The existing bridge consists of a nine (9) span concrete and steel structure. The bridge has an out-to-out width of twenty-six feet, six inches (26'-6"), a total length of three hundred seventy-two feet (372'), and a vertical clearance of thirty-nine feet, six inches (39'-6"). The sufficiency rating for the existing bridge is 47.4. The 10-year and 100-year discharges and depths of flow were determined using the appropriate regression equations. It was determined that the 10-year flood depth is 18.4 feet and the 100-year flood depth is 20.4 feet.

The proposed structure will be a four (4) span 400 feet steel girder bridge with a main span of one hundred fifty (150) feet and a vertical clearance of forty-two feet, ten inches (42'-10"). A concrete bulb tee beam bridge could not be used because the appropriate length beams for the main span could not be delivered due to horizontal clearance constraints along the approach travelway. The proposed alignment for this structure will be shifted southeast approximately forty-eight (48) feet and the grade will be raised approximately five (5) feet to accommodate the larger steel beams. The structure and approaches will be designed according to TDOT standard drawing RD01-TS-2 with a design speed of 50 mph. The proposed bridge will have an out-to-out width of thirty feet, five inches (30'-5"), with eleven (11) foot travel lanes and three (3) foot shoulders to meet TDOT standards. The roadway widening and alignment shift will require two (2) tracts of right-of-way (ROW) totaling 2.88 acres (See Figure 1). No relocations will be required by the ROW acquisitions.

The route has a base year (2019) AADT of 460 and a design year (2039) AADT of 510. The proposed bridge over Hatchie River will be designed to meet the Road Design Standard RD01-TS-2.

It is recommended that the bridge centerline be shifted forty-eight (48) feet given the additional amount of roadway width required to replace the structure and no viable detour route that can maintain traffic on this route.

The required approach work, utility relocations, estimated replacement cost, right-of-way, and preliminary engineering costs for the bridge are approximately \$3,686,400. The total local match for this project is approximately \$737,280.

RD

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 | X |
| 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 | X |
| 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
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION**

PROJECT NO.: 99109-1453-04 ROUTE: POWELL CHAPEL RD. [0869]
 COUNTY: HARDEMAN CITY: POWELL'S CHAPEL
 PROJECT PIN NUMBER: 121539.00
 PROJECT DESCRIPTION: BRIDGE AND APPROACHES OVER HATCHIE RIVER @ L.M. 7.92.

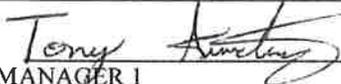
DIVISION REQUESTING:

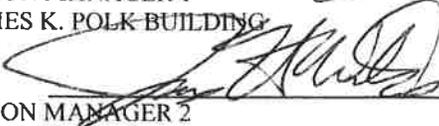
MAINTENANCE	<input type="checkbox"/>	PAVEMENT DESIGN	<input type="checkbox"/>
S.T.I.D.	<input checked="" type="checkbox"/>	STRUCTURES	<input type="checkbox"/>
PROG. DEVELOPMENT & ADM.	<input type="checkbox"/>	SURVEY & ROADWAY DESIGN	<input type="checkbox"/>
PUBLIC TRANS. & AERO.	<input type="checkbox"/>	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
460	2019	510	66	13	2039	65-35	2	3		

REQUESTED BY: NAME JEREMY BOWLEN DATE 11/20/14
 DIVISION STRATEGIC TRANS. INVESTMENTS
 ADDRESS 1000 J. K. POLK BUILDING
NASHVILLE TN 37243

REVIEWED BY: TONY ARMSTRONG  DATE 11-20-14
 TRANSPORTATION MANAGER I
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY:  DATE 11/20/14
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

PLEASE FURNISH TRAFFIC FOR BRIDGE REPLACEMENT STUDY.

THIS TRAFFIC IS BASED ON 2014 CYCLE COUNT. THE FUTURE TRAFFIC IS BASED ON A 0.5 % PER YEAR GROWTH RATE DUE TO NEGATIVE GROWTH FROM THE ADAM COMPUTER PROGRAM.

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

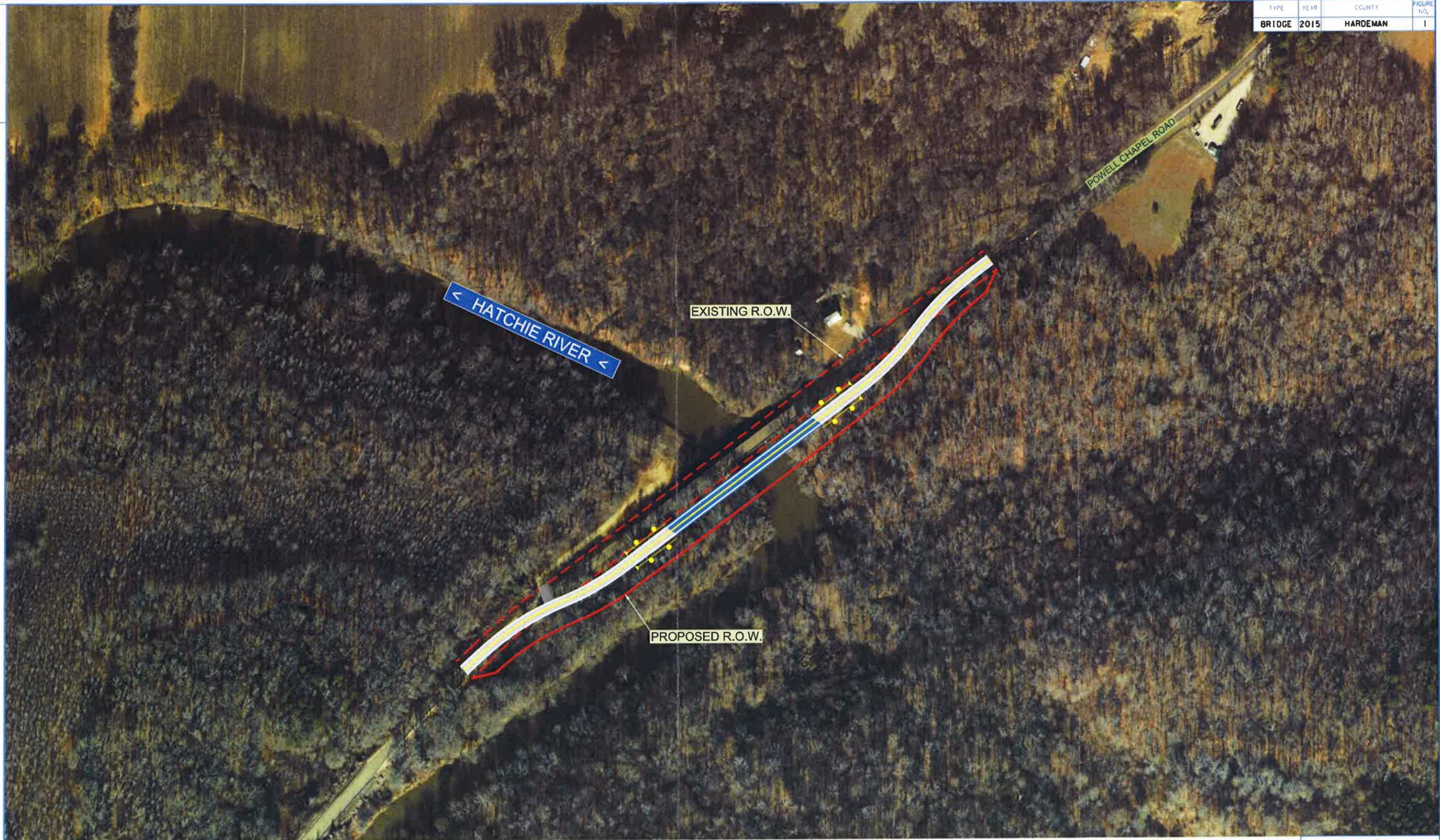
NOTE: FOR BRIDGE REPLACEMENT PROJECTS, ADLs ARE NOT REQUIRED FOR ADTs OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS.

SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS.

(REV. 7/1/14)

TENNESSEE D.O.T.
PROJECT PLANNING DIVISION
FILE NO. _____

TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2015	HARDEMAN	1



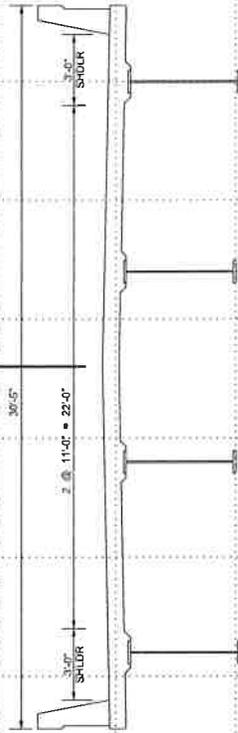
BRIDGE REPLACEMENT
POWELL CHAPEL ROAD (LR 869)
BRIDGE ID 35580810009 (L.M. 7.92)
PIN 121539.00
HARDEMAN COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION

FIGURE 1
L.R. 869
L.M. 7.92

48'-0"

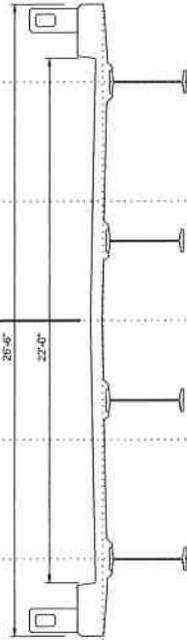
PROPOSED STRUCTURE
PROPOSED ϕ



TOTAL WIDTH = 39'-5"

100 YR. EL.

EXISTING STRUCTURE
EXISTING ϕ



TOTAL WIDTH = 26'-6"

H.W. EL. 374.5



CONSTRUCTION DETAIL

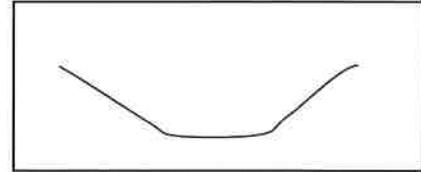
POWELL CHAPEL ROAD (LR0869) HARDEMAN COUNTY
BRIDGE OVER HATCHIE RIVER @ L.M 7.92
BRIDGE ID 35S80810009
PIN 121539.00

SITE INSPECTION

INSPECTION MADE BY: R. Dickenson/J.Eckel BRIDGE ID: 35S80810009 COUNTY: Hardeman
 Date: 9/23/15 Route Name: Powell Chapel Road Stream Name: Hatchie River

CHANNEL

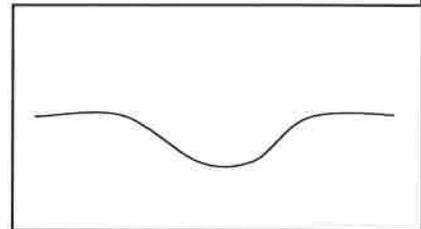
Approx depth and width of channel: Horizontal: 120' Vertical: 15'
 Depth of normal flow: 10' In Reservoir: Yes No
 Depth of Ordinary High Water: --
 Type of material in stream bed: Sand, silt, gravel
 Type of vegetation on banks: Large Timber
 "N" factor of the channel: 0.03
 Are channel banks stable: Yes No
 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.: 0.15 Right U.S.: 0.15
 Left D.S.: 0.15 Right D.S.: 0.15
 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: 372' No. of spans: 9 Structure type: CDG & Steel I No. of lanes: 2 Skew: 90 °
 Width (out to out): 26'-6" Width (curb to curb): 22'-0" Approach: paved graveled
 Sidewalks on Structure: Yes No Bridgerail type: Concrete Handrail Bridgerail height = 2.75'
 Superstructure depth: 1.7/3.1' Finished Grade to low girder = 1.7' Girder depth = 1.3/2.5'
 Are any substructures in the channel? Yes No Vertical Clearance = 39.5 ft
 Indications of overtopping: None
 High water marks: None
 Local scour: Yes No
 Any signs of stream aggradation or degradation? Moderate bank erosion
 Any drift or drift potential? Yes, Drift present No
 Any obstructions (pipes, stock fences, etc.)? ---

PROPOSED STRUCTURE

Replacement Rehabilitate Widening New Location
 Bridge length: 400 ft Bridge type: Steel WPG Span arrangement: 85',85',150',80' Skew: 70 °
 Bridge width: 30.4 ft Sidewalks: None Design Speed (MPH): 50 ADT (2039) = 510
 Proposed grade: Raise approximately 5' Proposed alignment: Parallel tangent alignment
 Method of maintaining traffic: Stage construction On site detour Close road Shift Centerline 48'
 Cost of proposed Structure: \$165 per ft² X 400 / 30.4 length (ft) / width (ft) Cost = \$2,007,600
 Cost of bridge removal: \$15 per ft² X 372 / 26.5 length (ft) / width (ft) Cost = \$147,900
 Detour structure: Type and size = --- Cost = ---
Total Structure Cost = \$2,155,500

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

County: Hardeman
 Bridge ID: 35S80810009
 Route: Powell Chapel Road
 Feature Crossed: Hatchie River
 Log Mile: 7.92

By: RD
 Date: 5/22/15
 PIN: 121539.00

DRAINAGE BASIN

Measurement from quad = 589,440 acres
 Contributing Drainage Area, CDA = acres/640 = 921.00 sq. mi.

USGS REGRESSION EQUATIONS FOR FLOW

$Q_2 = 431(CDA)^{0.529} = 15,943$ cfs
 $Q_5 = 615(CDA)^{0.545} = 25,374$ cfs
 $Q_{10} = 735(CDA)^{0.554} = 32,247$ cfs
 $Q_{25} = 883(CDA)^{0.563} = 41,194$ cfs
 $Q_{50} = 991(CDA)^{0.568} = 47,838$ cfs
 $Q_{100} = 1100(CDA)^{0.573} = 54,943$ cfs

DEPTH OF FLOW EQUATIONS

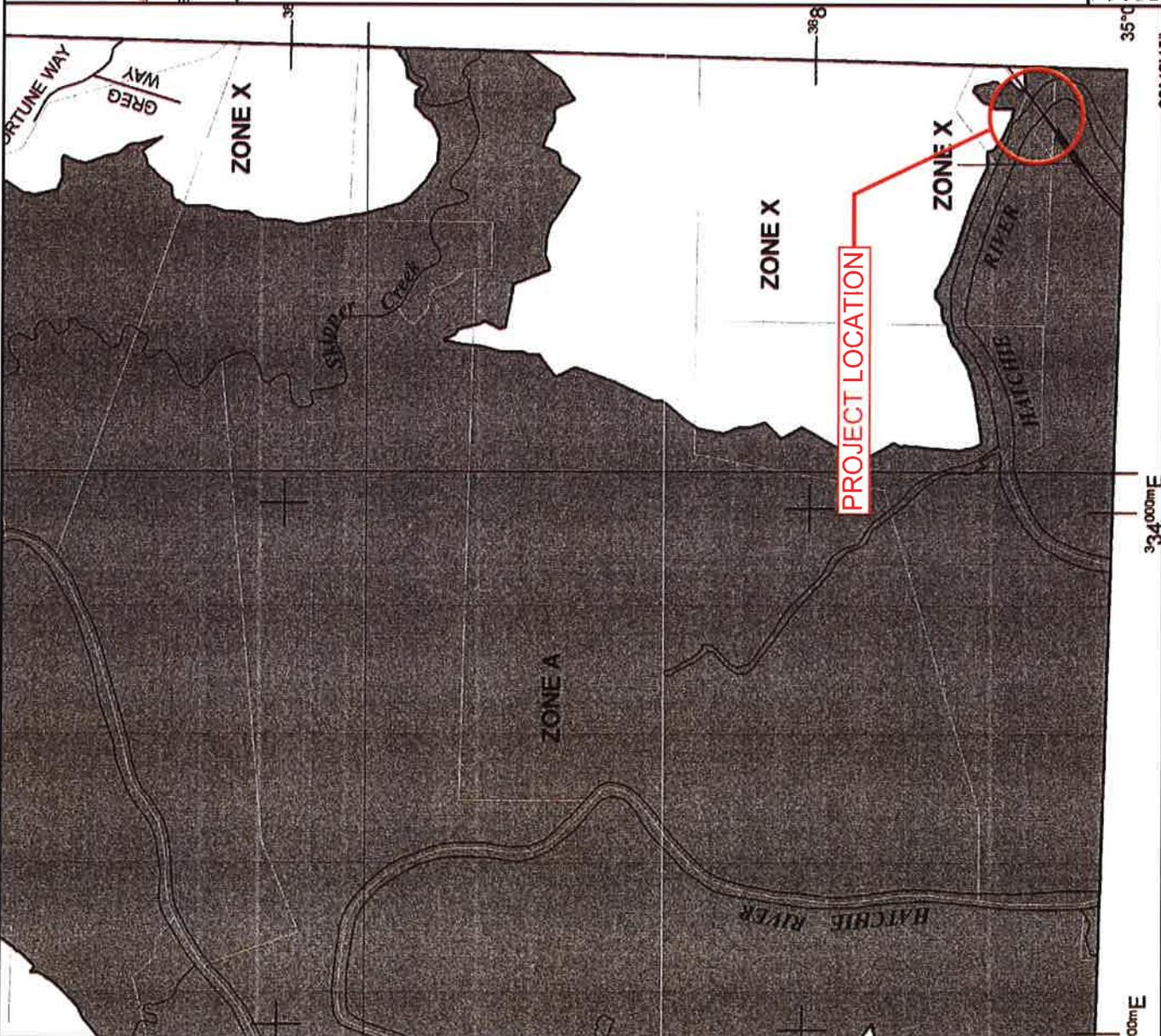
10-Year Flood Depth = $6.98(CDA)^{0.142} = 18.4$ ft
 100-Year Flood Depth = $9.24(CDA)^{0.116} = 20.4$ ft

AREAS

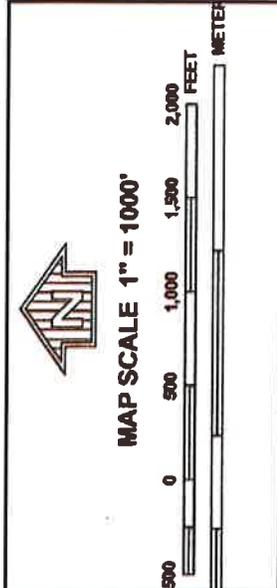
Existing Area Below Low Chord = 7,700 ft²
 Proposed Area Below Low Chord = 8,400 ft²
 Proposed 10-Year Flood Area, $A_{10} = 7,100$ ft²
 Proposed 100-Year Flood Area, $A_{100} = 7,800$ ft²

VELOCITIES

Proposed 10-Year Flood Velocity, $V_{10} = Q_{10}/A_{10} = 4.5$ fps
 Proposed 100-Year Flood Velocity, $V_{100} = Q_{100}/A_{100} = 7.0$ fps



ZONE A: No Base Flood Elevation Determined



NFIP
 NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0290C

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

PANEL 290 OF 500
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
 NUMBER 470690
 PANEL 0290
 SUFFIX C

COMMUNITY
 HARDEAN COUNTY

MAP NUMBER
 470690C0290C

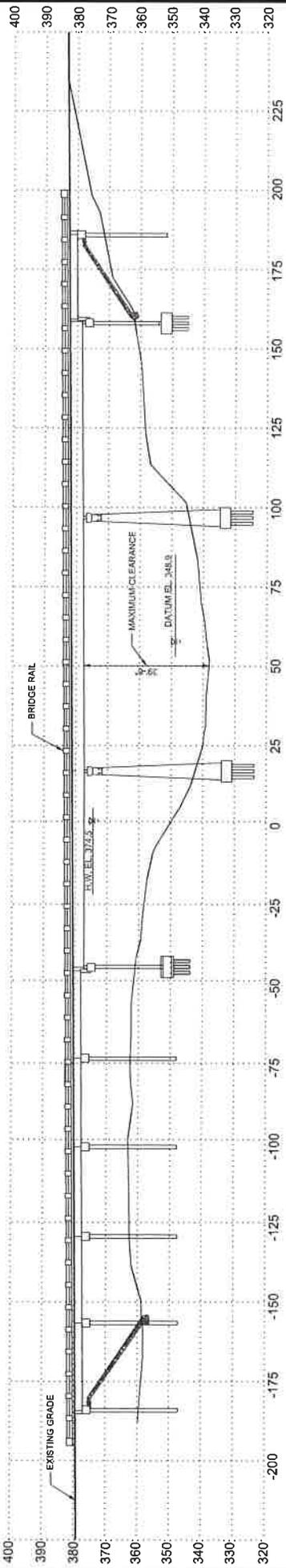
EFFECTIVE DATE
 SEPTEMBER 28, 2007

Federal Emergency Management Agency

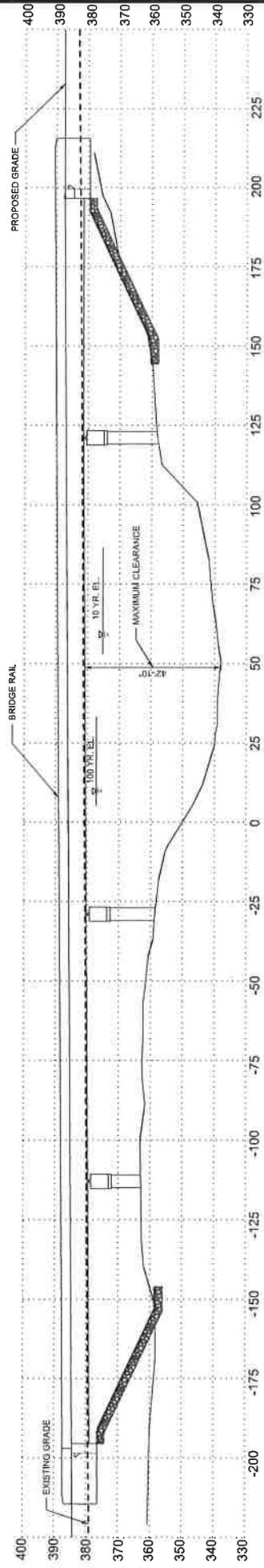
Notice to User: The Map Number shown below should be used when printing map content. The Community Number shown above should be used on insurance applications for the subject community.

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



PROPOSED STRUCTURE



BRIDGE SECTIONS

POWELL CHAPEL ROAD (LR0869) HARDEMAN COUNTY
 BRIDGE OVER HATCHIE RIVER @ L.M 7.92
 BRIDGE ID 35S80810009
 PIN 121539.00



Hardeman County
Bridge ID: 35S80810009



Bridge Number



Northbound Approach

Hardeman County
Bridge ID: 35S80810009



Southbound Approach



Inlet

Hardeman County
Bridge ID: 35S80810009



Outlet



Substructure (Looking North)

Hardeman County
Bridge ID: 35S80810009



Substructure (Looking West)



Bent Cap and Beams

Hardeman County
Bridge ID: 35S80810009



Left



Middle
Upstream



Right



Left



Middle
Downstream



Right