

TRANSPORTATION PLANNING REPORT

Special Bridge Replacement Program
LOCAL ROUTE 02613 – CRACKERS NECK ROAD
BRIDGE OVER VAUGHT CREEK @ L.M. 0.43
JOHNSON COUNTY
PIN: 040400.00



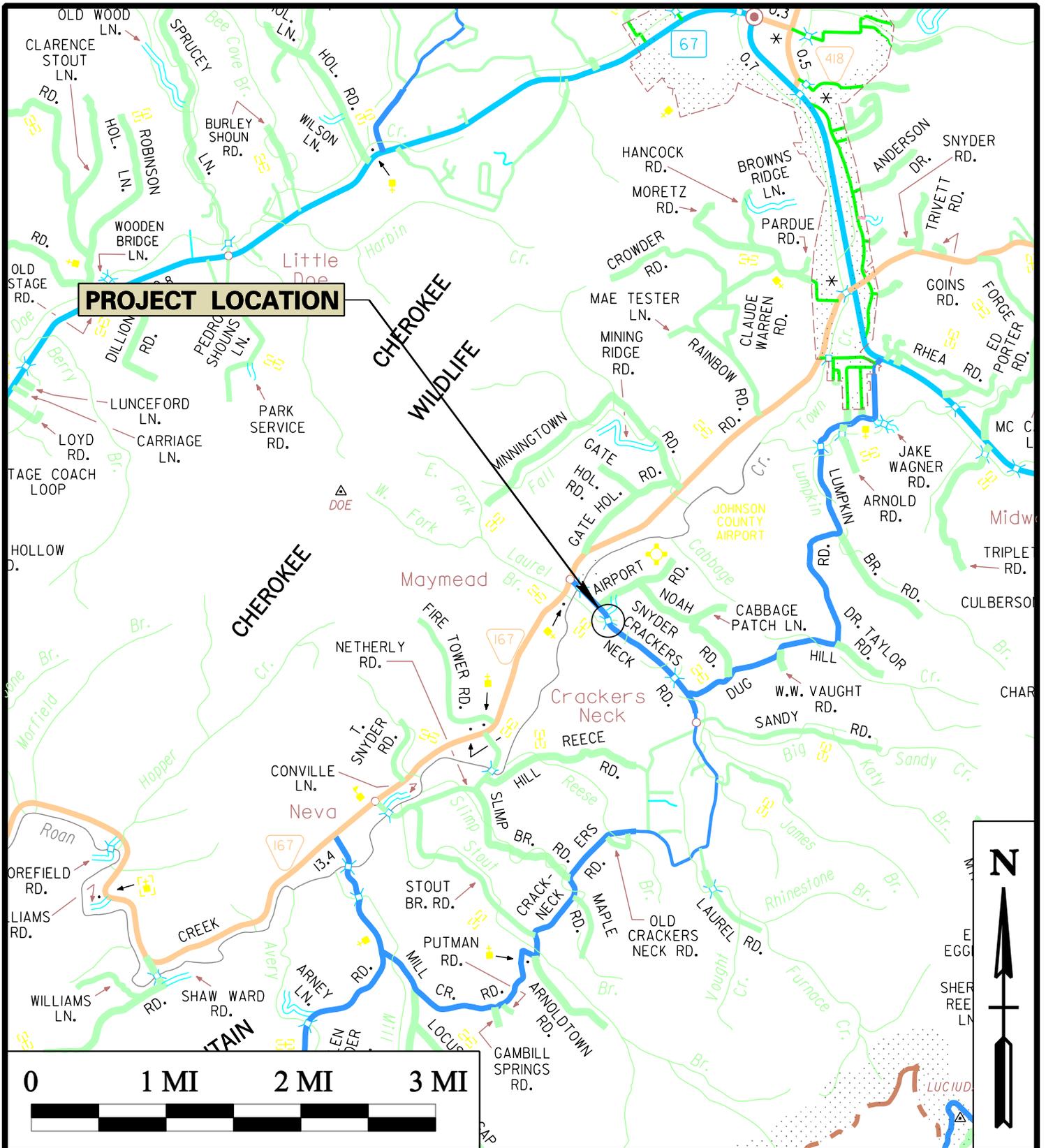
PREPARED BY
PROJECT PLANNING DIVISION
TENNESSEE DEPARTMENT OF TRANSPORTATION

Approved by [Signature] Date 4-17-13
Chief of Environment and Planning

Approved by [Signature] Date 4/20/13
Deputy Commissioner and Chief Engineer

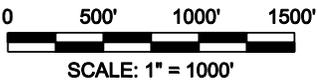
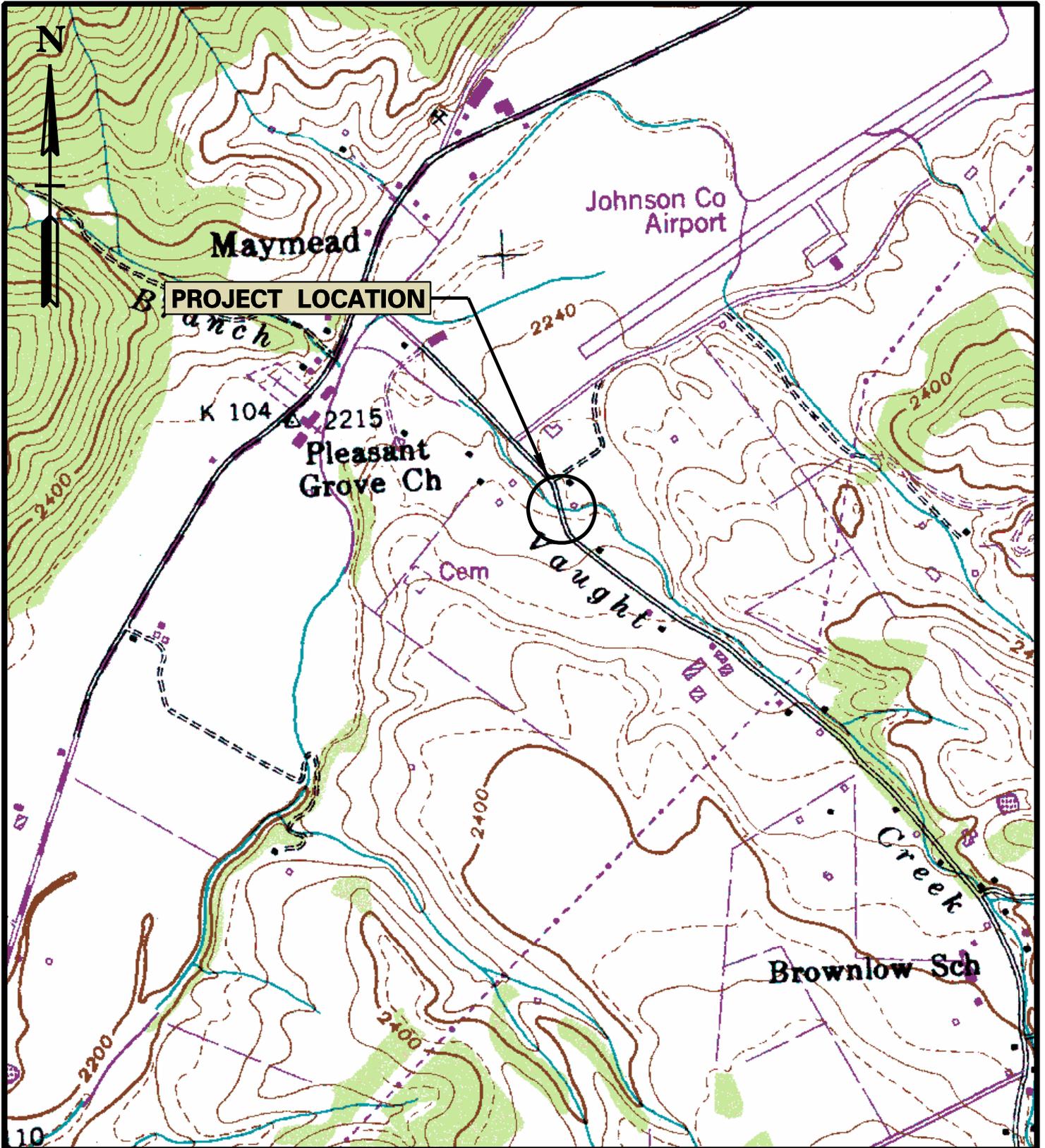
Approved by:	Signature	DATE
Transportation Director Project Planning Division	<u>[Signature]</u>	4-3-13
Engineering Director Design Division	<u>[Signature]</u>	4-8-13
Engineering Director Structures Division	<u>[Signature]</u>	4-15-13

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



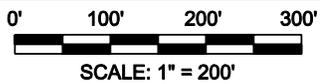
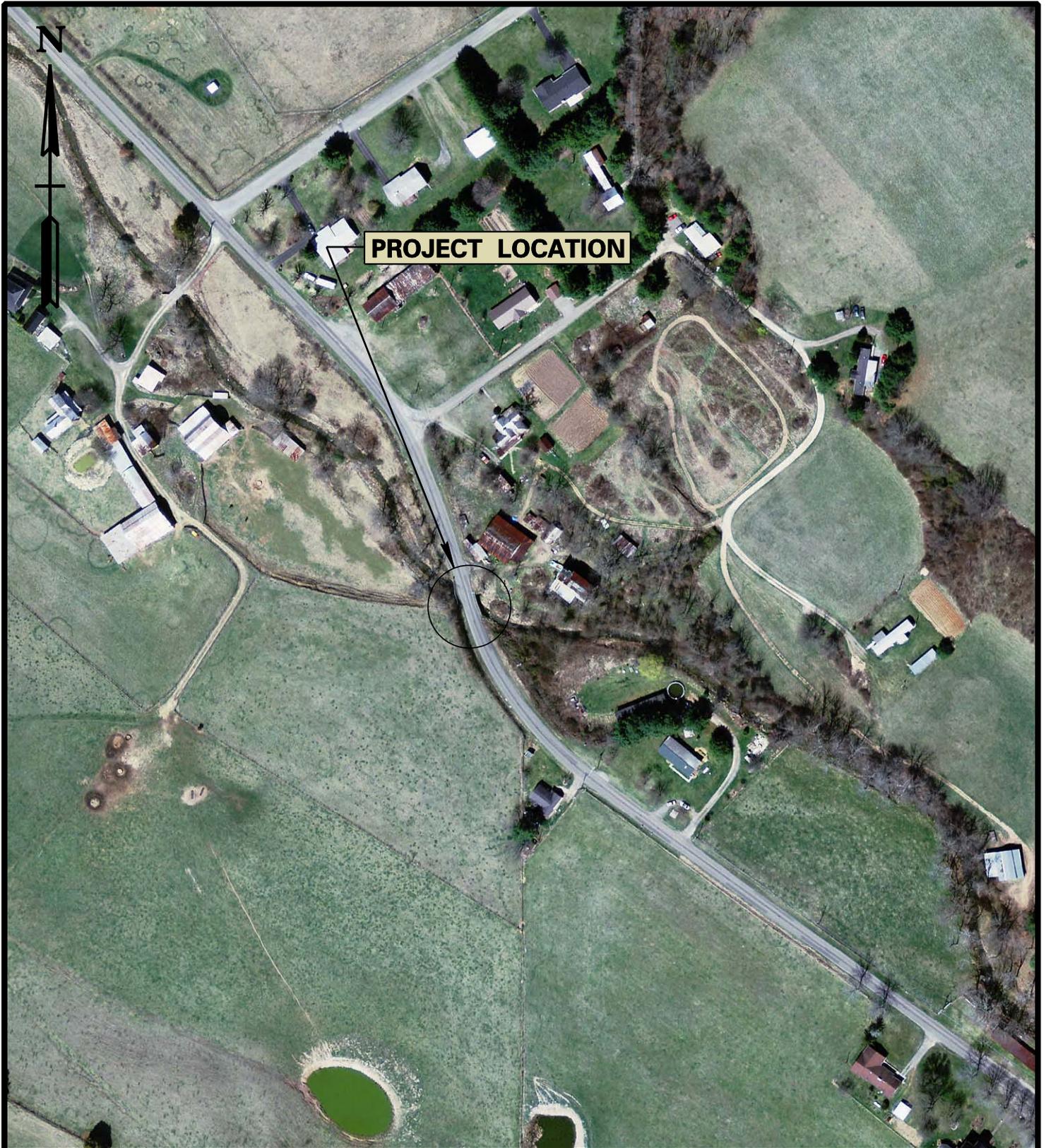
AREA MAP

**ROUTE 02613 JOHNSON COUNTY
 BRIDGE OVER VAUGHT CREEK @ L.M. 0.43
 ON CRACKERS NECK ROAD
 BRIDGE ID 46S25410003**



PROJECT MAP

**ROUTE 02613 JOHNSON COUNTY
BRIDGE OVER VAUGHT CREEK @ L.M. 0.43
ON CRACKERS NECK ROAD
BRIDGE ID 46S25410003**



AERIAL MAP
ROUTE 02613 JOHNSON COUNTY
BRIDGE OVER VAUGHT CREEK @ L.M. 0.43
ON CRACKERS NECK ROAD
BRIDGE ID 46S25410003

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

County: Johnson Route: 02613 Log Mile: 0.43
 Feature Crossed: Vaught Creek System: Local
 Functional Class: Rural Minor Collector Bridge ID: 46S25410003

EXISTING CONDITIONS

2016 AADT: 1,210 App. Cross Section: 18'/22'/50' No. Lanes: 2
 Approach Alignment: Tangent Year Built: 1928 Load Limit: H14
 Width (out to out): 24' 3" Sidewalks: Right -- Left -- Length: 29
 No. Spans: Approach: -- Main: 2
 Substructure: Single Span (Concrete Abutment) Vertical Clearance: 11.7' Sufficiency Rating: 22.9
 Other: None

PROPOSED IMPROVEMENTS

STANDARDS FROM RD01-TS- 1 Type of Work: Replace
 Design Year: 2037 Design AADT: 1,450 Terrain: Mountainous
 Project Length: 500' Bridge Length: 34 ft Approach Length: 100'
 Design Speed (MPH): 40 Posted Speed (MPH): 35
 Approach Width: 20' / 30' / As Req'd Bridge Width (O to O): 32 ft No. Lanes: 2
 Right-of-Way Required: 0.1 acre Tract(s) 1 Structure Type: Box Bridge

MAINTENANCE OF TRAFFIC

Temporary Detour: Temporary Runaround: Stage Construct:
 Alternate Route: Close road to through traffic from Airport Road to Dug Hill Road. Through traffic can use interconnecting county roads to reach SR 167 (See Detour Map - Page 13).
 Remarks: Fully loaded logging trucks were observed using this bridge by field review participants

ESTIMATED COST

Right-of-Way: \$20,000 Approaches: \$83,600 Structure: \$137,300
 Preliminary Engineering: \$35,200 Utilities: \$25,000 Misc./Cont.: \$70,400
 Mobilization: \$15,200 Total: \$386,700

Remarks: The existing alignment and grade will be maintained with a roadway width of 30 feet total with two (2) ten (10) feet travel lanes and five (5) feet shoulders in order to meet the design standards according to RD01-TS-1. ROW and utility relocations will be required for this bridge replacement.

Field Investigation by: Randy Plummer (Reg. 1 Design), Bailee Young (Reg. 1 Intern), Barry Bishop (Mountain City Rdwy. Sup.) Bob Ellen (Mountain City Highway Dept.), Mike Gilbert, David Duncan, and Terrance Hill (TDOT Planning)

Route:	Crackers Neck Road (02613)
Description:	Bridge Replacement over Vaught Creek @ L.M. 0.43
County:	Johnson
Length:	500 Feet
Date:	March 26, 2013

<u>DESCRIPTION</u>	<u>STATE (0%)</u>	<u>LOCAL (20%)</u>	<u>FEDERAL (80%)</u>	<u>TOTAL (100%)</u>
Right-of-Way	\$ -	\$ 4,000	\$ 16,000	\$ 20,000
Clearing and Grubbing	\$ -	\$ 2,000	\$ 8,000	\$ 10,000
Earthwork	\$ -	\$ -	\$ -	\$ -
Railroad Crossing or Separation	\$ -	\$ -	\$ -	\$ -
Drainage	\$ -	\$ 320	\$ 1,280	\$ 1,600
Utilities	\$ -	\$ 5,000	\$ 20,000	\$ 25,000
Structures	\$ -	\$ 27,500	\$ 109,800	\$ 137,300
Pavement Removal	\$ -	\$ 600	\$ 2,400	\$ 3,000
Paving	\$ -	\$ 7,200	\$ 28,900	\$ 36,100
Roadway and Pavement Appurtenances	\$ -	\$ -	\$ -	\$ -
Retaining Walls	\$ -	\$ -	\$ -	\$ -
Topsoil	\$ -	\$ -	\$ -	\$ -
Seeding	\$ -	\$ -	\$ -	\$ -
Sodding	\$ -	\$ -	\$ -	\$ -
Rip-Rap or Slope Protection	\$ -	\$ 1,800	\$ 7,200	\$ 9,000
Fencing	\$ -	\$ -	\$ -	\$ -
Signing	\$ -	\$ -	\$ -	\$ -
Pavement Markings	\$ -	\$ 100	\$ 300	\$ 400
Lighting	\$ -	\$ -	\$ -	\$ -
Signalization	\$ -	\$ -	\$ -	\$ -
Guardrail	\$ -	\$ 2,700	\$ 10,800	\$ 13,500
Other Construction Items (15%)	\$ -	\$ 7,700	\$ 30,700	\$ 38,400
Maintenance of Traffic	\$ -	\$ 2,000	\$ 8,000	\$ 10,000
Mobilization (5%)	\$ -	\$ 3,000	\$ 12,200	\$ 15,200
CONSTRUCTION COST (rounded)	\$ -	\$ 63,900	\$ 255,600	\$ 319,500
Engineering and Contingency (10%)	\$ -	\$ 6,400	\$ 25,600	\$ 32,000
TOTAL CONSTRUCTION COST (rounded)	\$ -	\$ 70,300	\$ 281,200	\$ 351,500
Preliminary Engineering (10%)	\$ -	\$ 7,000	\$ 28,200	\$ 35,200
PROJECT COST¹ (rounded)	\$ -	\$ 77,300	\$ 309,400	\$ 386,700

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	\$ 20,000.00	\$ 20,000
RIGHT-OF-WAY TOTAL (ROUNDED)					\$ 20,000
201-01	Clearing and Grubbing	LS	LS	\$ 10,000.00	\$ 10,000
CLEAR AND GRUBBING TOTAL (ROUNDED)					\$ 10,000
203-03	Borrow Excavation (Unclassified)	LS	LS	\$ 1,700.00	\$ 1,700
EARTHWORK TOTAL (ROUNDED)					\$ 1,700
202-03.01	Removal of Asphalt Pavement	SY	489	\$ 5.20	\$ 2,543
415-01.02	Cold Planing Bituminous Pavement	SY	244	\$ 1.84	\$ 449
PAVEMENT REMOVAL TOTAL (ROUNDED)					\$ 3,000
209-08.02	Temporary Silt Fence (w/ backing)	LF	400	\$ 4.00	\$ 1,600
DRAINAGE TOTAL (ROUNDED)					\$ 1,600
	Above Ground Utilities	LF	1500	\$ 10.00	\$ 15,000
770-18.10	35FT Wood Pole	EA	2	\$ 5,000.00	\$ 10,000
UTILITIES TOTAL (ROUNDED)					\$ 25,000
	Removal of Existing Bridge	SF	703.25	\$ 15.00	\$ 10,549
	Box Bridge	SF	1,207	\$ 105.00	\$ 126,735
STRUCTURES TOTAL (ROUNDED)					\$ 137,300
--	Full Depth Paving	TON	213.8	\$ 96.00	\$ 20,525
411-03.10	ACS Mix (PG76-22) Grading D	TON	16.2	\$ 96.00	\$ 1,555
403-01	Bituminous Material for Tack Coat (TC)	TON	0.2	\$ 511.00	\$ 102
303-01	Mineral Aggregate, TY A Base, Grading D	TON	661.6	\$ 21.00	\$ 13,894
PAVING TOTAL (ROUNDED)					\$ 36,100
712-01	Traffic Control	LS	\$ 10,000	\$ 10,000.00	\$ 10,000
MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)					\$ 10,000
716-11.01	Spray Thermo Pvmt Mrkng (4" Line)	LM	0.20	\$ 1,834.00	\$ 367
PAVEMENT MARKINGS TOTAL (ROUNDED)					\$ 400
705-04.04	Type 21 End Terminal	EACH	4	\$ 2,100.00	\$ 8,400
705-01.01	Guardrail at Bridge Ends	LF	81	\$ 62.00	\$ 5,022
GUARDRAIL TOTAL (ROUNDED)					\$ 13,500
709-05.06	Machined Rip-Rap (Class A-1)	TON	300	\$ 30.00	\$ 9,000
RIP-RAP OR SLOPE PROTECTION TOTAL (ROUNDED)					\$ 9,000



**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: March 25, 2013

SUBJECT: TPR Field Review (Special Bridge Replacement Program)
Local Route 02613 Bridge over Vaught Creek
Log Mile 0.43
Johnson County

A field review was held for the project on June 6, 2012.

The existing structure is a single span steel girder bridge with an out-to-out width of 24.25 feet. The overall bridge length is 29 feet with approximately 11.7 feet for the vertical clearance. The sufficiency rating for this bridge is 22.9. 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 10.3 feet and the 10-year flow depth is 7.6 feet.

The proposed alignment for this structure will remain on the existing centerline and will be designed to meet TDOT design standard RD01-TS-1 for a design speed of 40 mph (AADT 400 to 1500, Mountainous). The proposed clearance is above the 100-year flood depth; therefore, the grade will not need to be raised for this bridge.

The route has a base year (2017) AADT of 1,210 and a design year (2037) AADT of 1,450. The proposed bridge over Vaught Creek will consist of an out-to-out width of 32 feet with two (2) ten (10) foot lanes and five (5) feet shoulders in order to meet design standard RD01-TS-1 for mountainous terrain. The length of the entire project will be approximately 500 feet. It is being recommended that the proposed structure be a concrete box bridge with a total length of thirty-four (34) feet. The proposed vertical clearance will be approximately twelve (12) feet.

It is recommended, with the consent of Mountain City, that Crackers Neck Road be closed to through traffic from Airport Road (L.M. 0.30) to Dug Hill Road (L.M. 1.24) during construction. Through traffic may use interconnecting county roads (See Detour Map on page 13). There currently are two utility poles and a small extended section of a barn located adjacent to the existing structure. Both the poles and the extended section of the barn will require relocation in order to adjust the roads side slopes when widening the approaches. The side entrance to the barn adjacent to the existing structure will also need to be relocated to make room for the new wingwalls and guardrail at bridge end.

The required approach work, utility relocations, estimated replacement, and preliminary engineering costs for this bridge are approximately \$386,700.

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		
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
PROJECT PLANNING DIVISION**

PROJECT NO.: _____ ROUTE: Cracker Neck Rd. (02613)
 COUNTY: Johnson CITY: Mountain City
 PROJECT PIN NUMBER: 040400.0
 PROJECT DESCRIPTION: Special Bridge Replacement Program
Bridge over Vaught Creek
L.M. 0.43

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
1,210	2017	1,450	145	10	2037	65-35	1	2		

REQUESTED BY: NAME Michael Gilbert DATE 4/12/12
 DIVISION Planning
 ADDRESS 10th 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 April
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

This Traffic Based on [24 hour] Machine Count, (April 2012). The Future Traffic is based on Growth Rate from the ADAM Computer Program.

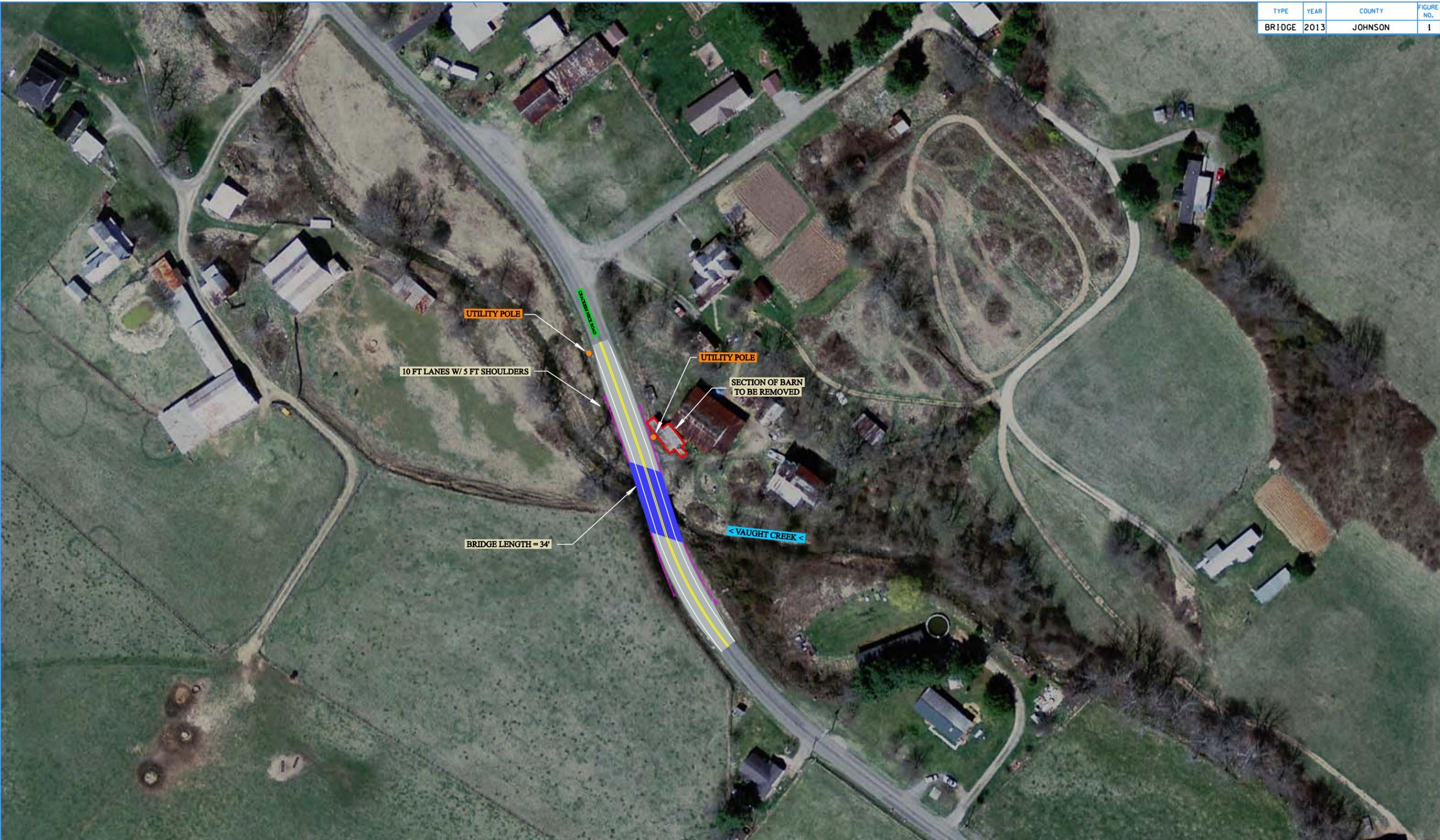
DHV'S ARE NOT REQUIRED FOR SIDE ROADS LESS THAN 1000 AADT.

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.

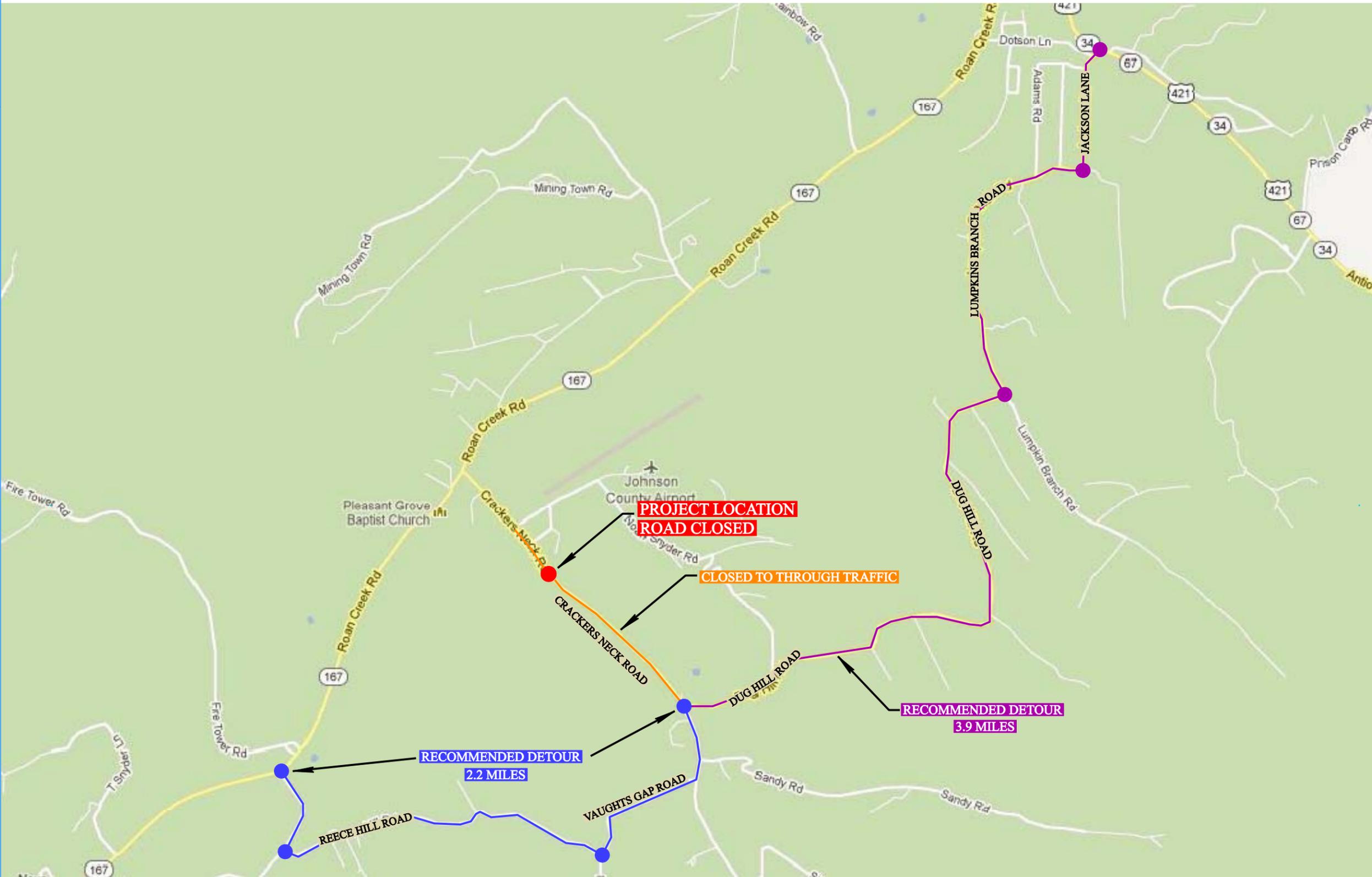
(REV. 4/10/12)

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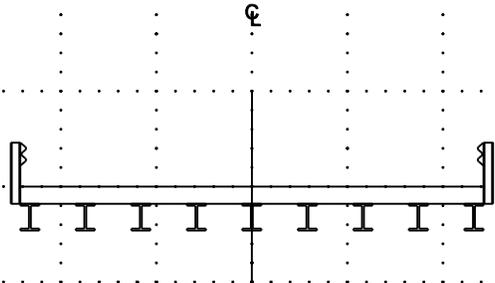
BRIDGE REPLACEMENT
 CRACKERS NECK ROAD (02613)
 L.M. 0.43
 JOHNSON COUNTY

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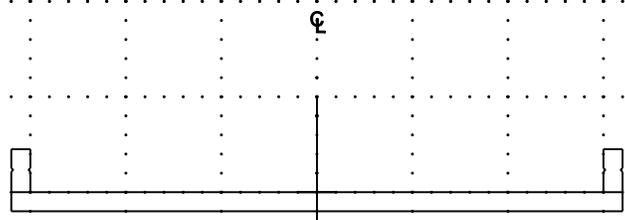


DETOUR MAP
 CRACKERS NECK ROAD (02613)
 L.M. 0.43 - BRIDGE OVER VAUGHT CREEK
 JOHNSON COUNTY

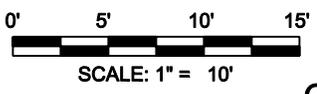
EXISTING STRUCTURE



COMPLETED PROPOSED STRUCTURE



TOTAL WIDTH = 32 FT



STAGE CONSTRUCTION DETAIL
CRACKERS NECK ROAD 02613 JOHNSON COUNTY
BRIDGE OVER VAUGHT CREEK @ L.M. 0.43
BRIDGE ID 46S25410003

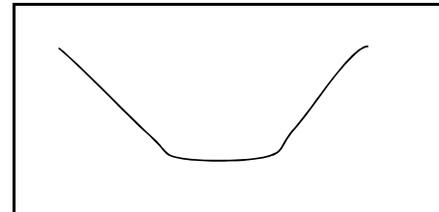
SITE INSPECTION

INSPECTION MADE BY: David Duncan
 Date: 7/20/12 Route Name: 02613

BRIDGE ID: 46S25410003 COUNTY: Johnson
 Stream Name: Vaught Creek @ L.M. 0.43

CHANNEL

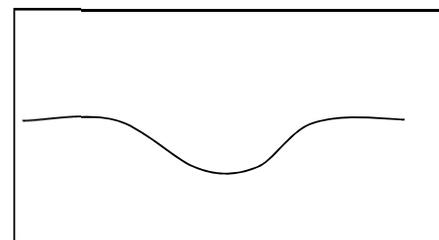
Approx depth and width of channel: Horizontal: 29' Vertical: 1'
 Depth of normal flow: 0.6' In Reservoir: Yes No
 Depth of Ordinary High Water: --
 Type of material in stream bed: Gravel and Stone
 Type of vegetation on banks: Heavy Brush
 "N" factor of the channel: 0.03
 Are channel banks stable: Yes No
 If the streambed is gravel: $D_{30} =$ -- $D_{85} =$ --
 Skew of the channel with the roadway: 35°



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: 29 No. of spans: 1 Structure type: Steel Beams No. of lanes: 1 Skew: 35°
 Width (out to out): 24' 3" Width (curb to curb): 23' 7" Approach: paved graveled
 Sidewalks on Structure: Yes No Bridgerail type: Guardrail Bridgerail height = 2.3'
 Superstructure depth: 4.5' Finished Grade to low girder = 2.2' Girder depth = 1.3'
 Are any substructures in the channel? Yes No Vertical Clearance = 11.7' 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.)? _____

PROPOSED STRUCTURE

Replacement Rehabilitate Widening New Location
 Bridge length: 34 ft Bridge type: Box Bridge Span arrangement: 2 @ 16 x 12 Skew: 35°
 Bridge width: 35.5 ft Sidewalks: None Design Speed (MPH): 40 ADT (2037) = 1,450
 Proposed grade: Maintain Existing Proposed alignment: Maintain Existing
 Method of maintaining traffic: Stage construction On site detour Close road Shift Centerline
 Cost of proposed Structure: \$105 per ft² X 34 / 35.5 length (ft) / width (ft) Cost = \$126,700
 Cost of bridge removal: \$15 per ft² X 29 / 24.3 length (ft) / width (ft) Cost = \$10,600
 Detour structure: Type and size = To be determined Cost = \$0
Total Structure Cost = \$137,300

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

County: Johnson
 Bridge ID: 46S25410003
 Route: 02613
 Feature Crossed: Vaught Creek
 Log Mile: 0.43

By: DD
 Date: 3/26/13
 PIN: 040400.00

DRAINAGE BASIN

Measurement from quad = 3,840 acres
 Contributing Drainage Area, CDA = acres/640 = 6.00 sq. mi.

USGS REGRESSION EQUATIONS FOR FLOW

$Q_2 = 207(CDA)^{0.725} =$ 759 cfs
 $Q_5 = 344(CDA)^{0.715} =$ 1,239 cfs
 $Q_{10} = 444(CDA)^{0.711} =$ 1,587 cfs
 $Q_{25} = 578(CDA)^{0.708} =$ 2,055 cfs
 $Q_{50} = 682(CDA)^{0.706} =$ 2,416 cfs
 $Q_{100} = 788(CDA)^{0.705} =$ 2,787 cfs

DEPTH OF FLOW EQUATIONS

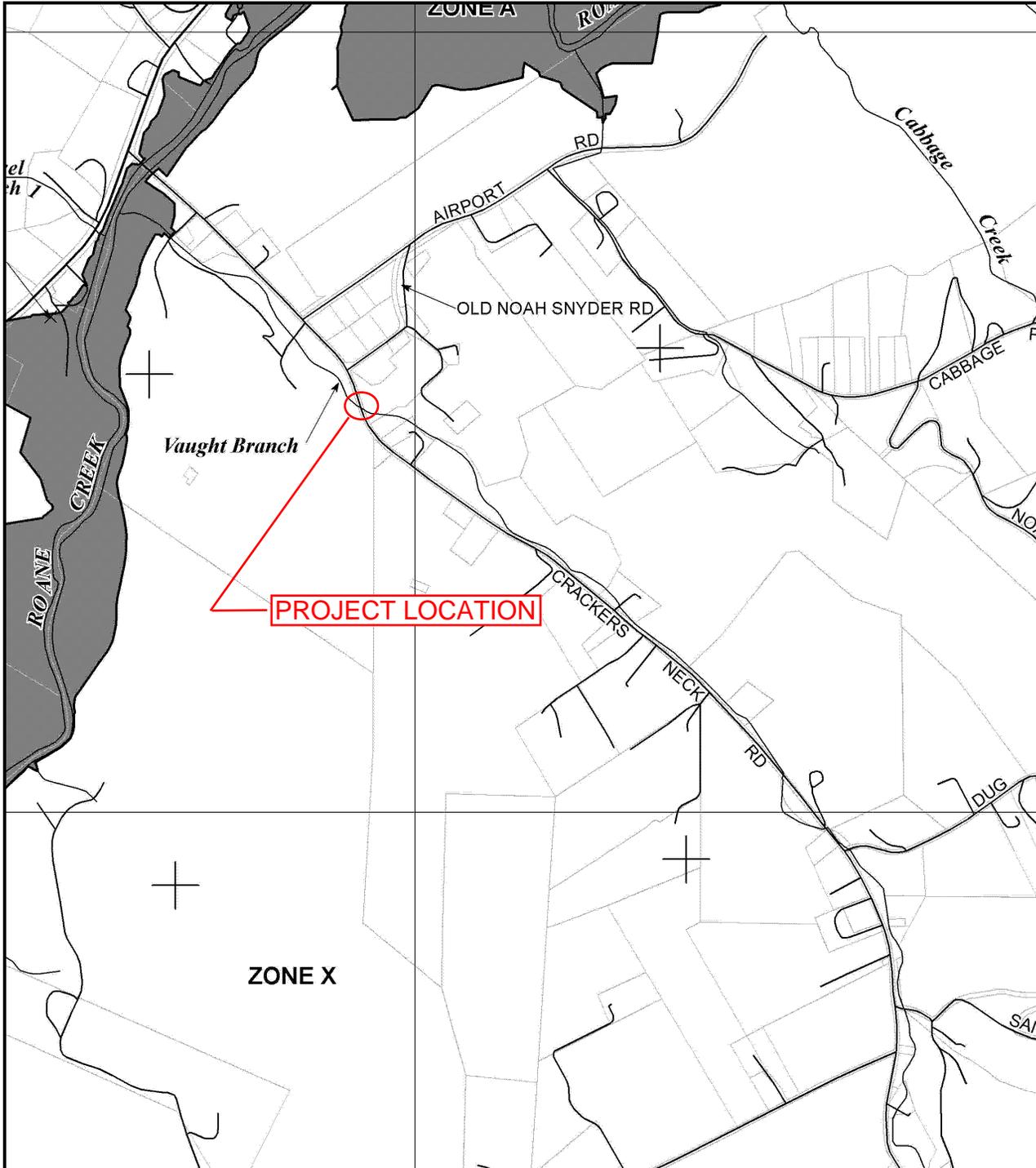
10-Year Flood Depth = $5.33(CDA)^{0.197} =$ 7.6 ft
 100-Year Flood Depth = $7.43(CDA)^{0.181} =$ 10.3 ft

AREAS

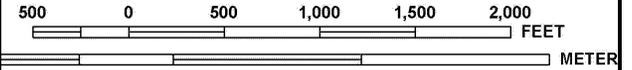
Existing Area Below Low Chord = 566 ft²
 Proposed Area Below Low Chord = 570 ft²
 Proposed 10-Year Flood Area, $A_{10} =$ 183 ft²
 Proposed 100-Year Flood Area, $A_{100} =$ 303 ft²

VELOCITIES

Proposed 10-Year Flood Velocity, $V_{10} = Q_{10}/A_{10} =$ 8.7 fps
 Proposed 100-Year Flood Velocity, $V_{100} = Q_{100}/A_{100} =$ 9.2 fps



MAP SCALE 1" = 1000'



NATIONAL FLOOD INSURANCE PROGRAM

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0140C

FIRM

FLOOD INSURANCE RATE MAP
JOHNSON COUNTY,
TENNESSEE
AND INCORPORATED AREAS

PANEL 140 OF 275

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
JOHNSON COUNTY	470230	0140	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.



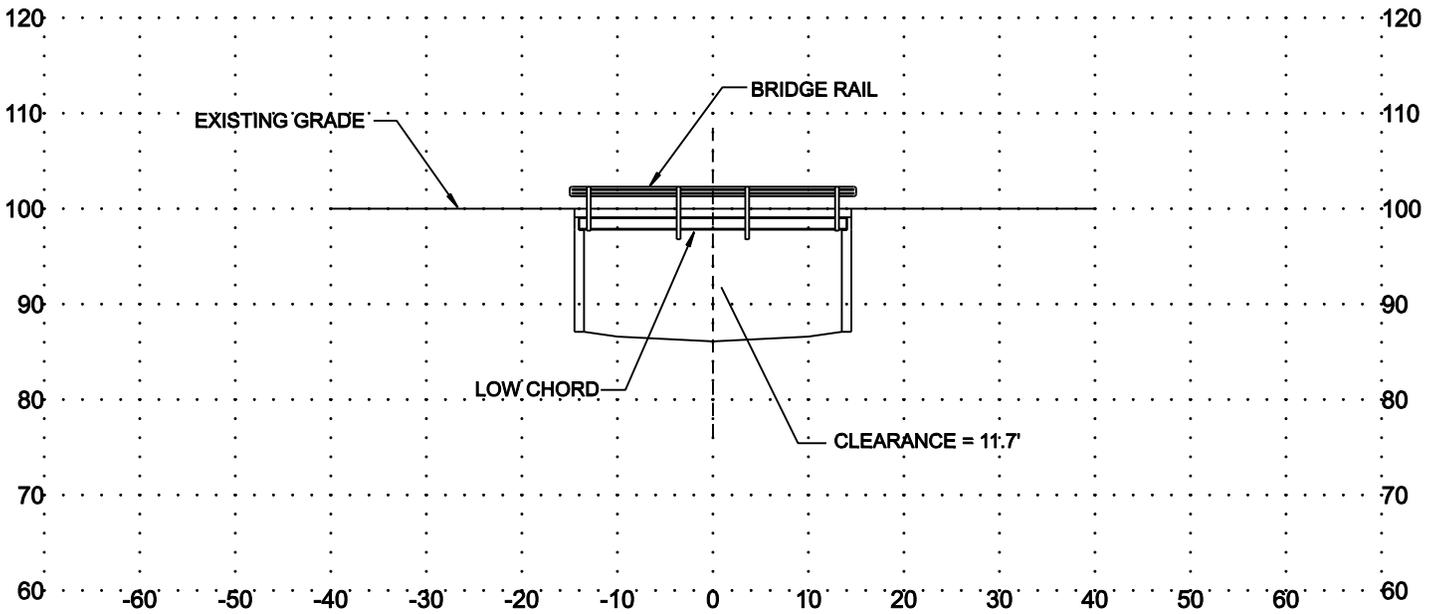
MAP NUMBER
47091C0140C

EFFECTIVE DATE
JUNE 16, 2009

Federal Emergency Management Agency

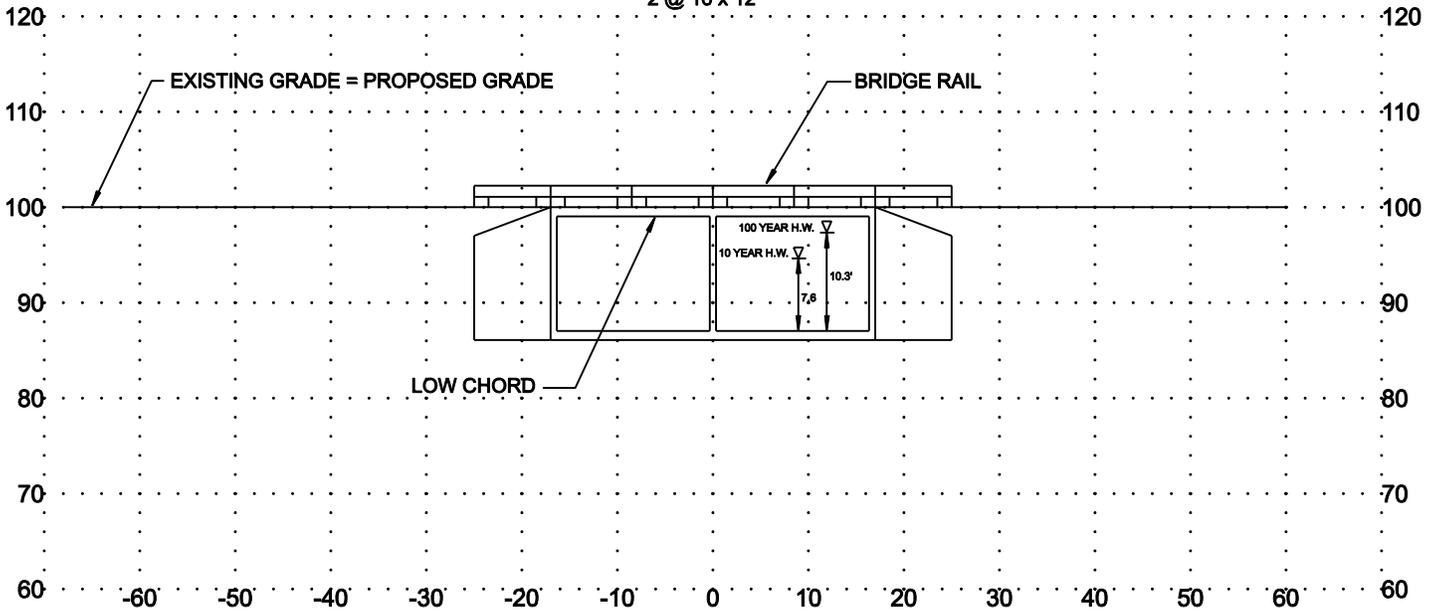
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EXISTING STRUCTURE (OUTLET)



PROPOSED STRUCTURE (OUTLET)

2 @ 16 x 12



BRIDGE SECTIONS
LOCAL ROUTE 02613 JOHNSON COUNTY
BRIDGE OVER VAUGHT CREEK @ L.M. 0.43
BRIDGE ID 46S25410003

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



County # / Route # / Log Mile



Inlet

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



Outlet



Southbound Approach (Looking North)

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



Southbound Approach (Looking South)



Northbound Approach (Looking South)

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



Northbound Approach (Looking North)



Downstream

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



Downstream (Right)



Downstream (Left)

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



Upstream



Upstream (Right)

BRIDGE OVER VAUGHT CREEK (02613)
BRIDGE ID: 24S25410003



Upstream (Left)



View Under Deck