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: 4/28/13
Deputy Commissioner and Chief Engineer

<table>
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<tr>
<th>Approved by:</th>
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<th>DATE</th>
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<tbody>
<tr>
<td>Transportation Director</td>
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<tr>
<td>Project Planning Division</td>
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<td>Engineering Director</td>
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<td>Structures Division</td>
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This document is covered by 23 USC § 409 and its production pursuant to fulfilling public planning requirements does not waive the provisions of § 409.
AERIAL MAP

ROUTE 02813  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

<table>
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<tr>
<th>County: Johnson</th>
<th>Route: 02613</th>
<th>Log Mile: 0.43</th>
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<tbody>
<tr>
<td>Feature Crossed: Vaught Creek</td>
<td>System: Local</td>
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<tr>
<td>Functional Class: Rural Minor Collector</td>
<td>Bridge ID: 46S25410003</td>
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### EXISTING CONDITIONS
- **Year Built:** 1928
- **Load Limit:** H14
- **AADT:** 1,210
- **Approach Alignment:** Tangent
- **Width (out to out):** 24' 3"
- **No. Lanes:** 2
- **No. Spans:** Approach: --, Main: 2
- **Substructure:** Single Span (Concrete Abutment)
- **Vertical Clearance:** 11.7'
- **Sufficiency Rating:** 22.9

### PROPOSED IMPROVEMENTS
- **Design Year:** 2037
- **Design AADT:** 1,450
- **Terrain:** Mountainous
- **Project Length:** 500'
- **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

### MAINTENANCE OF TRAFFIC
- **Temporary Detour:** Yes
- **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
- **Preliminary Engineering:** $20,000
- **Approaches:** $83,600
- **Utilities:** $25,000
- **Misc./Cont.:** $70,400
- **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)
## Crackers Neck Road (02613)

### Bridge Replacement over Vaught Creek @ L.M. 0.43

**County:** Johnson  
**Length:** 500 Feet  
**Date:** March 26, 2013

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

- **RIGHT-OF-WAY TOTAL (ROUNDED):** $20,000
- **CLEAR AND GRUBBING TOTAL (ROUNDED):** $10,000
- **EARTHWORK TOTAL (ROUNDED):** $1,700
- **PAVEMENT REMOVAL TOTAL (ROUNDED):** $3,000
- **DRAINAGE TOTAL (ROUNDED):** $1,600
- **UTILITIES TOTAL (ROUNDED):** $25,000
- **STRUCTURES TOTAL (ROUNDED):** $137,300
- **PAVING TOTAL (ROUNDED):** $36,100
- **MAINTENANCE OF TRAFFIC TOTAL (ROUNDED):** $10,000
- **PAVEMENT MARKINGS TOTAL (ROUNDED):** $400
- **GUARDRAIL TOTAL (ROUNDED):** $13,500
- **RIP-RAP OR SLOPE PROTECTION TOTAL (ROUNDED):** $9,000
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) feet 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
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.

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<thead>
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<tbody>
<tr>
<td>1.</td>
<td>Agricultural land usage</td>
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<td>Airport (existing or proposed)</td>
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<td>3.</td>
<td>Commercial area, shopping center</td>
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<td>4.</td>
<td>Floodplains</td>
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<td>Forested land</td>
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<td>6.</td>
<td>Historical, cultural, or natural landmark</td>
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<td>Industrial park, factory</td>
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<td>Institutional usages</td>
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<td>c. Hospital or other medical facility</td>
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<td>d. Public building, e.g., fire station</td>
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<td>e. Defense installation</td>
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<td>Recreation usages</td>
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<td>b. Game preserve or wildlife area</td>
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<td>Coast Guard</td>
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<td>TVA Section 26a review</td>
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<td>14.</td>
<td>Location coordinated with local officials</td>
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<td>15.</td>
<td>Railroad crossings</td>
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<td>16.</td>
<td>Hazardous materials site</td>
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### 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 ☐
- PLANNING ☒
- PROG. DEVELOPMENT & ADM. ☐
- PUBLIC TRANS. & AERO. ☐
- **PAVEMENT DESIGN** ☐
- **STRUCTURES** ☐
- **SURVEY & DESIGN** ☐
- **TRAFFIC SIGNAL DESIGN** ☐
- **OTHER** ☐

**YEAR PROJECT PROGRAMMED FOR CONSTRUCTION:**

**PROJECTED LETTING DATE:**

### TRAFFIC ASSIGNMENT:

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<th>DESIGN YEAR</th>
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<th>DESIGN AVERAGE DAILY LOADS</th>
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<td>AADT</td>
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<td>1,210</td>
<td>2017</td>
<td>1,450</td>
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**REQUESTED BY:**
- **NAME:** Michael Gilbert
- **DIVISION:** Planning
- **ADDRESS:** 10th Floor
  - J.K. Polk Bldg

**REVIEWED BY:**
- **NAME:** TONY ARMSTRONG
  - TRANSPORTATION MANAGER 1
  - SUITE 1000, JAMES K. POLK BUILDING
- **DATE:** 4.20.12

**APPROVED BY:**
- **NAME:** DUDLEY DANIEL
  - TRANSPORTATION MANAGER 2
  - SUITE 1000, JAMES K. POLK BUILDING
- **DATE:** 26 April

**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)
**SITE INSPECTION**

**INSPECTION MADE BY:** David Duncan  
**BRIDGE ID:** 46S25410003  
**COUNTY:** Johnson  
**Date:** 7/20/12  
**Route Name:** 02613  
**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:** No

- **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

- **If skew is gravel:**
  - $D_{30} = \_\_\_\_\_\_\_\_\_
  - $D_{86} = \_\_\_\_\_\_\_\_

- **Skew of the channel with the roadway:** 35°

---

**FLOODPLAIN**

- **Is the skew same as the channel?** Yes
- **Is it symmetrical about the channel?** Yes

- **Type of vegetation in the floodplain and "N" factors**
  - **Left U.S.:** Light Brush (0.050)
  - **Right U.S.:** Light Brush (0.050)

- **Are roadway approaches lower than the structure?** Yes

- **Are there any buildings in the floodplain?** No

- **Approx. floor elevations:**

- **Flood information from local residents:**

---

**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"

- **Sidewalks on Structure:** Yes
- **Roadway:**
  - **Approach:** Paved
  - **Girder depth =** 1.3'

- **Superstructure depth:** 4.5'
- **Finished Grade to low girder =** 2.2'

- **Indications of overtopping:** None

- **High water marks:** None

- **Local scour:** Yes

- **Any signs of stream aggradation or degradation?** Yes

- **Any drift or drift potential?** Yes

- **Any obstructions (pipes, stock fences, etc.)?**

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**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 =
  - **Cost =** $0

**Total Structure Cost = $137,300**
### Bridge TPR Flow Calculations

For Hydrologic Area 2

**Area > 300 Acres**

<table>
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<th>By: DD</th>
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<td>Route: 02613</td>
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<td>Feature Crossed: Vaught Creek</td>
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<td>Log Mile: 0.43</td>
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### DRAINAGE BASIN

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

### USGS REGRESSION EQUATIONS FOR FLOW

| Q = 207(CDA)^0.725 | = 759 cfs |
| Q = 344(CDA)^0.715 | = 1,239 cfs |
| Q = 444(CDA)^0.711 | = 1,587 cfs |
| Q = 578(CDA)^0.708 | = 2,055 cfs |
| Q = 682(CDA)^0.706 | = 2,416 cfs |
| Q = 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 ft$^2$
- **Proposed Area Below Low Chord =** 570 ft$^2$
- **Proposed 10-Year Flood Area, A$_{10}$ =** 183 ft$^2$
- **Proposed 100-Year Flood Area, A$_{100}$ =** 303 ft$^2$

### 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
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
Upstream (Left)

View Under Deck