

Data Needs Analysis



Scoping Study



KY 945
Graves County
Brush Creek
Bridge Replacement
Item No. 1-1146.00

Prepared by
KYTC District 1

June 2012



| I. PRELIMINARY PROJECT INFORMATION | | | |
|--|--|-------------------------|--|
| County: | Graves | Item No.: | 1-1146.00 |
| Route Number(s): | KY 945 | Road Name: | n/a |
| Program No.: | 86745 | UPN: | 042 0945 007-008 |
| Federal Project No.: | BRO 0103 (308) | Type of Work: | Bridge Replacement |
| 2013 Highway Plan Project Description: | | | |
| Replace bridge on KY 945 over branch of Brush Creek South of intersection with Burchard Road (CR 1416) (SR 16.8) 042B00206N | | | |
| Beginning MP: | 7.197 | Ending MP: | 7.237 |
| | | Project Length: | 0.04 |
| Functional Class.: | <input type="checkbox"/> Urban <input checked="" type="checkbox"/> Rural Collector ▼ | State Class.: | <input type="checkbox"/> Primary <input checked="" type="checkbox"/> Secondary |
| MPO Area: | Not Applicable ▼ | Route is on: | <input type="checkbox"/> NHS <input type="checkbox"/> NN <input type="checkbox"/> Ext Wt |
| In TIP: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | | Truck Class.: | A ▼ |
| ADT (current): | 325 2012 | % Trucks: | 0 |
| Access Control: | <input type="checkbox"/> None <input checked="" type="checkbox"/> Permit <input type="checkbox"/> Fully Controlled | Terrain: | Rolling ▼ |
| Median Type: | <input checked="" type="checkbox"/> Undivided <input type="checkbox"/> Divided (Type): | Partial Spacing: | ▼ |
| Existing Bike Accommodations: | None ▼ | Ped: | <input type="checkbox"/> Sidewalk |
| Posted Speed: | <input type="checkbox"/> 35 mph <input type="checkbox"/> 45 mph <input checked="" type="checkbox"/> 55 mph | Other (Specify): | |
| KYTC Guidelines Preliminarily Based on : 50 MPH Proposed Design Speed | | | |
| COMMON GEOMETRIC | | | |
| Roadway Data: | EXISTING | PRACTICES* | |
| No. of Lanes | 2 | 2 | Existing Rdwy. Plans available? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Year of Plans: <input checked="" type="checkbox"/> Traffic Forecast Requested Date Requested: 5/16/2012 <input type="checkbox"/> Mapping/Survey Requested Date Requested: Type: ▼ |
| Lane Width | 9' | 9' | |
| Shoulder Width | 2' earth | 2' paved | |
| Max. Superelevation** | | 6% | |
| Minimum Radius** | | 835' | |
| Maximum Grade | | 7% | |
| Minimum Sight Dist. | | 425' | |
| Sidewalk Width(urban) | | n/a | |
| Clear-zone*** | | 30' | |
| Project Notes/Design Exceptions?: Yes, DE for 50mph instead of 55mph to more closely match existing conditions. | | | |
| <small>*Based on proposed Design Speed, **AASHTO's A Policy on Geometric Design of Highways and Streets, ***AASHTO's Roadside Design Guide</small> | | | |
| Bridge No.*: | (Bridge #1) | | |
| Sufficiency Rating | 16.8 | | |
| Total Length | 36.1' | | |
| Width, curb to curb | 19.0' | | |
| Span Lengths | 17.1' | | |
| Year Built | 1938 | | |
| Posted Weight Limit | 10 ton | | |
| Structurally Deficient? | Yes | | |
| Functionally Obsolete? | No | | |
| | | | Existing Geotech data available? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <small>*If more than two bridges are located on the project, include additions sheets.</small> |

II. PROJECT PURPOSE AND NEED

A. Legislation

The following funding was listed in the FY 2012 - FY 2018 Highway Plan.

| <i>Funding</i> | <i>Phase</i> | <i>Year</i> | <i>Amount</i> |
|----------------|--------------|-------------|---------------|
| BRO | D | 2013 | \$220,000 |
| BRO | R | 2014 | \$150,000 |
| BRO | U | 2014 | \$200,000 |
| BRO | C | 2015 | \$400,000 |

B. Project Status

Design funds for this project have been requested. This project is to replace the bridge on KY 945 over a branch of Brush Creek, South of Intersection with Burchard Road (CR 1416). (SR 16.8) 042B00206N. The project with span from milepoint 7.197 to milepoint 7.237.

C. System Linkage

KY 945 is classified as Rural Minor Collector. It serves local travelers from the community of Melber, KY.

D. Modal Interrelationships

KY 945 is rated Truck Class A. Current traffic data shows no truck traffic. KY 945 is not a part of any known bike routes in Kentucky.

E. Social Demands & Economic Development

The area along KY 945 is made up mostly of residential and farm land. There looks to be very little expectation of Economic Development in this immediate area.

F. Transportation Demand

The last actual traffic count on KY 945 from MP 6.269 to MP 10.745 was in 2012 and showed an ADT of 325 (This data can be found in CTS). According to the traffic count data shown in CTS, the ADT has fluctuated a little, but stayed around 350-400 within a 12 year range.

Based upon the Traffic Forecast received 6/20/2012, the 2035 ADT is estimated to be 360. That is calculated using a growth rate of 0.5% per year.

II. PROJECT PURPOSE AND NEED (cont.)

G. Capacity

Based upon the current traffic count of 325 ADT for KY 945 at the bridge over Brush Creek and the roadway geometrics of two 9' lanes, and being mindful of the stagnation in traffic over the 12 year period and the very slow growth prediction in the Traffic Forecast, capacity does not look to be an issue at this time nor in the future.

H. Safety

The CRF for this section of roadway was not listed on the HIS mapping website. The closest section of KY 945 to have a CRF available is from MP 5.4 to MP 6.4 on KY 945 (just South of the bridge). The CRF for this section of roadway is 1.069.

The collision data was obtained from the Kentucky State Police database for a ten year period from January 1, 2002 to June 13, 2012 and stretching along KY 945 from MP 6.70 to MP 7.74 for the project. 5 collisions were found using these criteria. Collision locations can be seen in Exhibit 2 on Page 9. Included in the list of collisions are 2 with injuries, 3 with property damage, and 0 fatalities. 3 of the 5 collisions occurred during daylight hours. 2 of the 5 occurred in wet/slush conditions. 4 of the 5 are listed as having roadway characteristics of straight and level grade. 2 of the collisions are instances where the vehicles left the pavement and could not recover. (The other collisions consist of 2 animal and 1 collision with a fixed object.) Please see Table 1 on Page 10 for details.

I. Roadway Deficiencies

The existing roadway on KY 945 consists of two 9' lanes with 2' earth shoulders. These finding are consistant with the HIS assessment of two 9' lanes and 2' shoulders. Since this road is classified as Rural Minor Collector, KYTC's Practical Solutions Geometrics for Rural Collectors recommends using two 9' lanes with 2' paved shoulders. (This will require a design exception for use of a design speed of 50 mph to more closely match existing conditions.)

None of the roadway appears to have any significant drainage problems to address.

The bridge on KY 945 over Brush Creek was built in 1938. It is rated tructurally Deficient and has a Sufficiency Rating of 16.8. The load limit is posted for 10 ton on this bridge. Several notes have been made in the bridge report of the ongoing decay of the bridge. Please see Table 2 on Page 10 for details.

Draft Purpose and Need Statement:

Need: The bridge over Brush Creek needs to be improved due to being Structurally Deficient, having a Sufficiency Rating of 16.8, and poor roadway geometrics.

Purpose: The purpose of this study is to identify all necessary concerns involved with the replacement of the bridge over Brush Creek on KY 945 and to improve the reliability of this bridge via replacement.

III. PRELIMINARY ENVIRONMENTAL OVERVIEW

A. Air Quality

Project is in: ☒ Attainment area ☐ Nonattainment or Maintenance Area ☐ PM 2.5 County

STIP Pg. #: pg 50 2012-2018

TIP Pg. #:

B. Archeology/Historic Resources

☐ Known Archeological or Historic Resources are present

Project will require a Phase I study for both archaeology and historic resources.

C. Threatened and Endangered Species

Myotis sodalis- Indiana bat(903)(IB); Etheostoma chienense- relict darter(501)(RD); Cyprogenia stegaria-Fanshell(403)(FSM). IB habitat is present within the project area and will require the use of the programmatic agreement with the USFWS. Brush Creek is in the Mayfield Creek watershed. Relict Darter is found only in the Bayou de Chien and its tributaries and will not be affected by the project. Brush creek is intermittent in nature and does not have adequate size or flow to support the fanshell mussel.

D. Hazardous Materials

☐ Potentially Contaminated Sites are present ☒ Potential Bridge or Structure Demolition

The bridge will have to be examined for asbestos. No other hazmat sites were identified in the project area.

E. Permitting

Check all that may apply: ☒ Waters of the US ☐ MS4 area ☐ Floodplain Impacts ☐ Navigable Waters of the US Impacts
Are 401/404 Permits likely to be required? ☒ Yes ☐ No Impacts to: ☐ Wetlands ☒ Stream/Lake/Pond
☒ ACE LON ☒ ACE NW ☐ ACE IP ☐ DOW IWQC ☐ Special Use Waters

Brush creek is intermediate in nature in the project area. It was completely dry when inspected on 17 May 2012. ArcGIS mapping shows another drainage along the northwest side of the project area. If considered a blueline stream this may change the permit level to an ACE NW with possible mitigation.

F. Noise

Are existing or planned noise sensitive receptors adjacent to the proposed project? ☒ Yes ☐ No
Is this considered a "Type I Project" according to the [KYTC Noise Analysis and Abatement Policy?](#) ☐ Yes ☒ No

Noise receptors are located near the project area. The nearest is approximately 500' south. Any noise impacts from construction will be temporary in nature during active construction.

G. Socioeconomic

Check all that may apply: ☐ Low Income/Minority Populations affected ☐ Relocations ☐ Local Land Use Plan available
Project area is not within a listed environmental justice area.

H. Section 4(f) or 6(f) Resources

The following are present on the project: ☐ Section 4(f) Resources ☐ Section 6(f) Resources

N/A

Anticipated Environmental Document:

CE Level 1



IV. POSSIBLE ALTERNATIVES

A. Alternative 1: No Build

This alternative may be carried forward, but does not address the needs identified.

B. Alternative 2: Replace in Existing Location

Replace the two lane rural roadway approaches on KY 945 and bridge over Brush Creek in the same location as the existing. The new bridge may need to be widened to allow for the recommended geometrics. This alternate will not change the horizontal alignment. Since the existing bridge cannot remain open during construction, the road will be closed to through traffic during construction. Traffic will be detoured onto other roads. A sketch of the proposed project can be seen below.



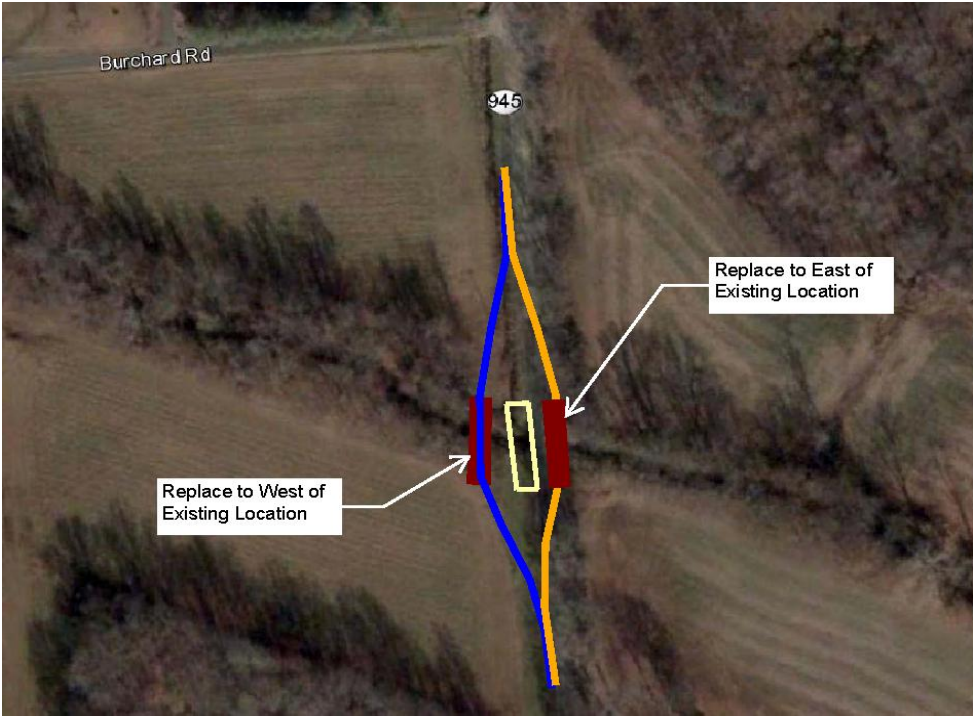
| | | |
|-------------------------------|--------------|--------------------|
| Planning Level Cost Estimate: | <u>Phase</u> | <u>Estimate</u> |
| | Design | \$250,000 |
| | R/W | \$100,000 |
| | Utilities | \$150,000 |
| | Const | \$500,000 |
| | Total | \$1,000,000 |

IV. POSSIBLE ALTERNATIVES (cont.)

B. Alternative 3: Replace Bridge to East / West of Existing Location

Replace the two lane rural roadway approaches on KY 945 and bridge over Brush Creek shifting the alignment West or East of the existing. Since the new bridge will be constructed away from the existing bridge, traffic could remain on the existing bridge during construction. Temporary diversions will be necessary to construct tie-ins. A sketch of the proposed project can be seen below.

Due to the low ADT (325ADT, 2012) the DNA Studies Team finds this alternative "fiscally not feasible".



| | | |
|-------------------------------|--------------|--------------------|
| Planning Level Cost Estimate: | <u>Phase</u> | <u>Estimate</u> |
| | Design | \$275,000 |
| | R/W | \$100,000 |
| | Utilities | \$200,000 |
| | Const | \$700,000 |
| | Total | \$1,275,000 |

V. Summary

This study is a Data Need Analysis (DNA) of a Bridge Replacement project of the KY 945 bridge over Brush Creek in Graves County, Item Number 1-1146.00. Through analysis of the existing roadway geometrics, crash data, site visits, and discussion with the project team, several needs were identified within the project limits. The following were identified as project needs:

There is a collision pattern within the project limits on KY 945.

KY 945 has poor roadway geometrics.

KY 945 has a CRF of 1.069 (MP 5.4 - MP 6.4 is the nearest section with an available CRF).

KY 945 (042B00206N) has a Sufficiency Rating of 16.8.

The purpose of this study is to address poor roadway geometrics, CRF, and SR; and to improve the safety and reliability of the roadway and bridge on KY 945.

Included in the alternatives were a no build recommendation, a replace in the existing location alternative, and a replace to the East or West of the existing location alternative. After review of the data and discussion at the project team meeting, it was determined that Alternative #2, Replace in the existing location would best address the purpose and need for the project. The estimate for this alternative is \$30,000 more than the funding listed in the current Highway Plan (see phases D, R, U, and C).

| Alt # | Description | D (\$)BRO | R (\$)BRO | U (\$)BRO | C (\$)BRO | Total (\$mil) |
|-------|---------------------------------|-----------|-----------|-----------|-----------|---------------|
| 1 | No Build | - | - | - | - | - |
| 2 | Replace in Existing Location | 250,000 | 100,000 | 150,000 | 500,000 | 1,000,000 |
| 3 | Replace to East/West | 275,000 | 100,000 | 200,000 | 700,000 | 1,275,000 |
| - | Current Hwy Plan Estimated Cost | 220,000 | 150,000 | 200,000 | 400,000 | 970,000 |
| - | Current Pre-Con Estimated Cost | 220,000 | 150,000 | 200,000 | 400,000 | 970,000 |

VI. Tables and Exhibits



Exhibit 1: Project Location Map

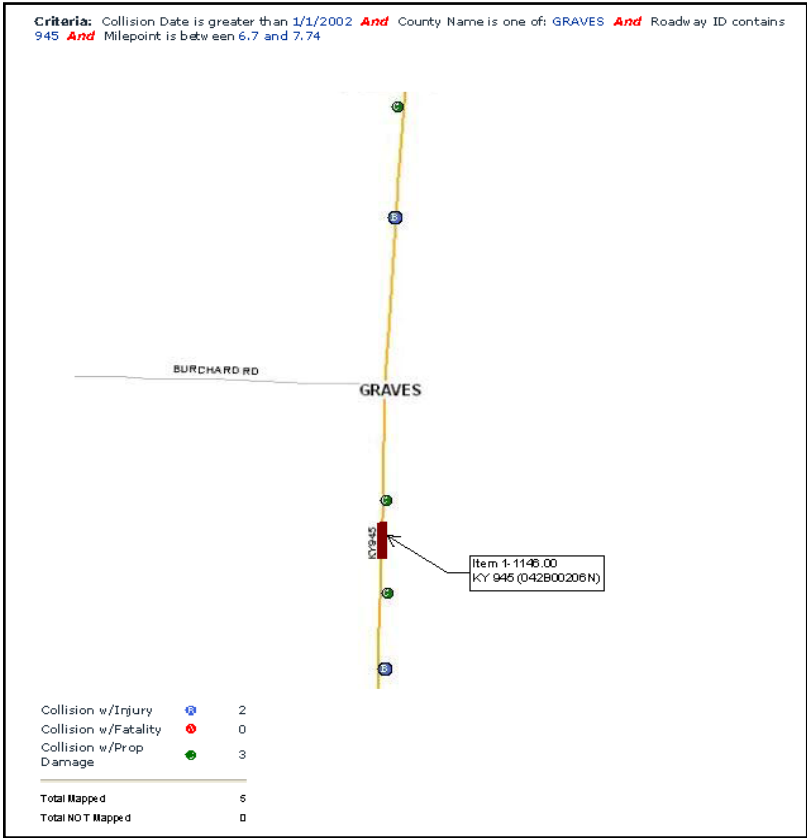


Exhibit 2: Collision Data from Kentucky State Police Database

VI. Tables and Exhibits (cont.)

Tables

| Table 1: Manners of Collisions | |
|--------------------------------|----------|
| Fixed Object | 1 |
| Left Pavement | 2 |
| Animal | 2 |
| Total | 5 |

Table 2: Specific Notes from 9/22/2011 Bridge Report

-Holes formed in web of beams 1 and 6 both spans. Heavy rust to beam 6 span 2.
Heavy rust to all beam ends.
-Heavy deterioration, crumbling, cracking with leaching & spalling in 36' of curb.
-Needs channel work to open stream up, runs under span 1 only.
-Moderate to heavy rust on beam ends. Holes ranging from small to large in web of beams on ends span 1 beams 1 and 6, span 2 beams 1 and 6.
-Deflection noted in bottom flanges of beam ends 1 and 6 in spans 1 and 2.
Moderate to heavy section loss to all beam ends.

(remaining bridge data and notes can be found in the Bridge Report dated 9/22/2011)

Helpful Links:

Projectwise folder containing all DNA Study documents: [Studies](#)

Collision Reports: [1146 Collision Report - 1 Left Pvmt - DUI.pdf](#)
[1146 Collision Report - 2 Left Pvmt - animal.pdf](#)
[1146 Collision Report - 3 Fxd Objt - DUI.pdf](#)

Bridge Report: [1146 Bridge Report 9-22-2011.pdf](#)

Bridge Pictures: [1146 Bridge Photos 9-22-2011.pdf](#)

Traffic Forecast: [Traffic Forecast 6-20-2012.pdf](#)

(A printed version of these documents can be made available to those without Projectwise access.)