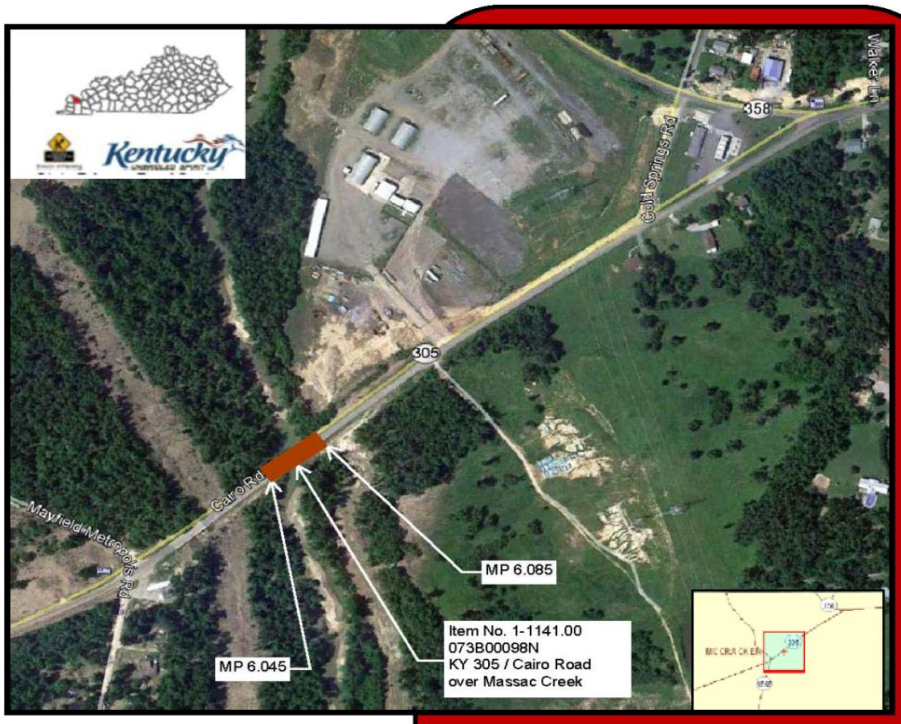
Data Needs Analysis



Scoping Study

KENTUCKY TRANSPORTATION CABINET

KY 305
McCracken County
Replace Bridge
over Massac Creek
Item No. 1-1141.00

Prepared by
KYTC District 1

June 2012

I. PRELIMINARY PROJECT INFORMATION

County: McCracken **Item No.:** 1-1141.00
Route Number(s): KY 305 **Road Name:** Cairo Road
Program No.: 86698 **UPN:** 073 0305 006-007
Federal Project No.: BRO 5020(010) **Type of Work:** Bridge Replacement

2013 **Highway Plan Project Description:**

REPLACE BRIDGE ON KY 305 OVER MASSAC CREEK 0.023 MILES EAST OF KY 1565 (SR 20.7) 073B00098N

Beginning MP: 6.045 **Ending MP:** 6.085 **Project Length:** 0.04

Functional Class.: ☐ Urban ☑ Rural — Collector
State Class.: ☐ Primary ☑ Secondary
Route is on: ☐ NHS ☐ NN ☐ Ext Wt
MPO Area: Not Applicable
Truck Class.: A
In TIP: ☐ Yes ☑ No
% Trucks: 14.2
ADT (current): 3200 2012
Terrain: Rolling
Access Control: ☐ None ☑ Permit ☐ Fully Controlled ☐ Partial Spacing:
Median Type: ☑ Undivided ☐ Divided (Type):
Existing Bike Accommodations: None **Ped:** ☐ Sidewalk
Posted Speed: ☐ 35 mph ☐ 45 mph ☑ 55 mph ☐ Other (Specify):
KYTC Guidelines Preliminarily Based on : 45 **MPH Proposed Design Speed**

Roadway Data:	**EXISTING**	**COMMON GEOMETRIC PRACTICES***
No. of Lanes	2	2
Lane Width	11'	11'
Shoulder Width	2' (1' paved 1' earth)	4' (2' paved 2' earth)
Max. Superelevation**		8%
Minimum Radius**		600'
Maximum Grade		7%
Minimum Sight Dist.		360'
Sidewalk Width(urban)	n/a	n/a
Clear-zone***		30'

Existing Rdwy. Plans available? ☐ Yes ☑ No — Year of Plans:
☑ Traffic Forecast Requested — Date Requested: 5/16/2012
☐ Mapping/Survey Requested — Date Requested:
Type:

Project Notes/Design Exceptions?: Yes, DE for 45mph instead of 55mph to more closely match existing conditions.

*Based on proposed Design Speed, **AASHTO's A Policy on Geometric Design of Highways and Streets, ***AASHTO's Roadside Design Guide

Bridge No.*:	(Bridge #1)
Sufficiency Rating	20.7
Total Length	83.0'
Width, curb to curb	22.6'
Span Lengths	80.1'
Year Built	1974
Posted Weight Limit	15 ton
Structurally Deficient?	Yes
Functionally Obsolete?	No

Existing Geotech data available? ☑ Yes ☐ No

*If more than two bridges are located on the project, include additions sheets.

II. PROJECT PURPOSE AND NEED

A. Legislation

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

Funding	*Phase*	*Year*	*Amount*
BRO	D	2013	$325,000
BRO	R	2014	$125,000
BRO	U	2014	$500,000
BRO	C	2015	$1,250,000

B. Project Status

Design funds for this project have been requested.

This project is to replace the bridge on KY 305 over Massac Creek, 0.023 miles East of KY 1565 (SR 20.7) 073B00098N. The project will span from milepoint 6.045 to milepoint 6.085.

C. System Linkage

KY 305 is classified as Rural Major Collector. It serves local travelers going from the I-24 area at Exit 3 to the West Paducah area.

D. Modal Interrelationships

KY 305 is rated Truck Class A and has 14.2% total trucks. KY 305 is not a part of any known bike routes in Kentucky.

E. Social Demands & Economic Development

The area along KY 305 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 305 from MP 5.266 to MP 7.252 was in 2012 and showed an ADT of 3,200 (This data can be found in CTS). According to the traffic count data shown in CTS, there has been a steady decline of approximately 300 ADT over the last 17 years.

Based upon the Traffic Forecast received 6-28-2012, the 2035 ADT is estimated to be 4,500. That is calculated using a growth rate of 1.5% per year.

II. PROJECT PURPOSE AND NEED (cont.)

G. Capacity

Based upon the current traffic count of 3200 ADT for KY 305 at the bridge over Massac Creek and the roadway geometrics of two 11' lanes with 2' shoulders, and being mindful of the decline in traffic over the past 17 years and a 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 KY 305 is 1.54.

The collision data was obtained from the Kentucky State Police database for a ten year period from January 1, 2002 to June 12, 2012 and stretching along KY 305 from MP 5.60 to MP 6.50 for the project. 6 collisions were found using these criteria. Collision locations can be seen in Exhibit 2 on Page 9. Included in the list of collisions are 1 with injuries, 5 with property damage, and 0 fatalities. 3 of the 6 collisions occurred during daylight hours. 2 of the 6 occurred in wet/slush conditions. 4 of the 6 are listed as having roadway characteristics of straight and level grade. 2 of the collisions are sideswipe collisions due to crossing the centerline. (The other collisions consist of 1 animal, 2 rear end, and 1 collision with a fixed object.) Please see Table 1 on Page 10 for details. Out of all of these collisions, only 2 of the collisions listed, the 2 sideswipes to be exact, occurred on the project.

I. Roadway Deficiencies

The existing roadway on KY 305 consists of two 11' lanes with 1' of paved shoulder and an inconsistent 1' earth shoulder (more in some areas and less in others). These findings fit with the HIS assessment of two 10' lanes and 2' paved shoulder, which matches a rural template. Since this road is classified as a Rural Major Collector, KYTC's Practical Solutions Geometrics for Rural Collectors recommends using two 11' lanes with 4' shoulders - 2' paved and 2' earth. (This design will require a design exception for use of a design speed of 45mph to more closely match existing conditions.)

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

The bridge on KY 305 was built in 1974. It is rated Structurally Deficient. It has a Sufficiency Rating of 20.7. The load limit is posted for 15 ton only, but several tractor trailers have been noted crossing 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 Massac Creek needs to be improved due to being Structurally Deficient, having a Sufficiency Rating of 20.7, a CRF of 1.54 along this stretch of KY 305, and multiple roadway collisions from poor roadway geometrics.

Purpose: The purpose of this study is to identify all necessary concerns involved with the replacement of the bridge over Massac Creek on KY 305 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 110 2012-2018 **TIP Pg.#:**

B. Archeology/Historic Resources

☑ Known Archeological or Historic Resources are present

Will require a minimum of a Phase I study for archaeology and historic once plans are received. Areas located along streams close to rivers are known to have sites.

C. Threatened and Endangered Species

Myotis sodalis-Indiana bat(IB)(903); Potamilus capax-fat pocketbook(FPBM)(418); Plethobasus cooperianus-orangefoot pimpleback(OFPM)(414); Lampsilis abrupta-pink mucket(PMM)(409); Obvaria retusa- ring pink(RPM)(412); Plethobasus cyphyus- Sheepnose(SNM)(415); Pleurobema plenum- rough pigtoe(RPTM)(417) Cyprogenia stegaria-fanshell(FSM)(403); Cumberlandia monodonta- spectaclecase(SCM)(402); Sterna antillarum- interior least tern(ILT)(802) Indiana bat habitat is present at the bridge site. Use of the programmatic agreement with USFWS is possible. A survey will be needed due to the size of Massac Creek and its proximity to the Ohio River. Interior Least Tern habitat is usually near large rivers like the Ohio. The project is about 3 miles from the Ohio River which is probably outside of its normal habitat, but large farm fields adjacent to the project will require investigation.

D. Hazardous Materials

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

Bridge will need testing for asbestos. Construction company to the northeast side is potential hazmat 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

National wetlands mapping indicates wetlands are present in the area. Project is within the 100 year floodplain mapping also. Depending on the extent of instream impacts project will likely require no more than an ACE nationwide permit.

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 impacts are expected to occur during construction activities and are considered temporary in nature. The nearest noise receptor is approximately 500' from the site.

G. Socioeconomic

Check all that may apply: ☐ Low Income/Minority Populations affected ☐ Relocations ☑ Local Land Use Plan available

Project is not within the boundaries of a low income area. McCracken County does have a local land use plan.

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 Bridge in Existing Location

Replace the two lane rural roadway approaches on KY 305 and bridge over Massac 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.

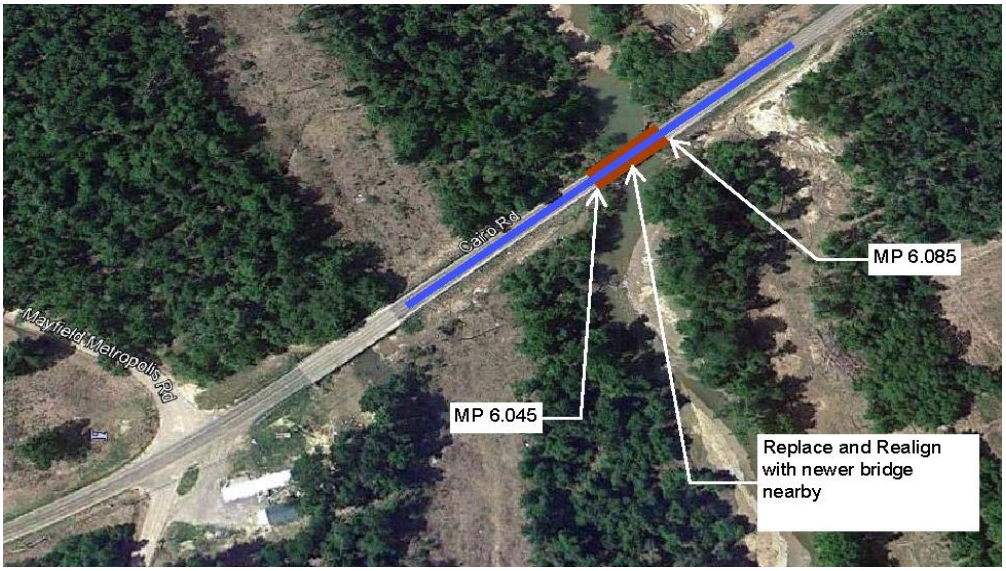
Planning Level Cost Estimate:

Phase	Estimate
Design	$350,000
R/W	$200,000
Utilities	$500,000
Const	$1,250,000
Total	**$2,300,000**

IV. POSSIBLE ALTERNATIVES (cont.)

B. Alternative #3: Replace and Realign Bridge

Replace the two lane rural roadway approaches on KY 305 and bridge over Massac Creek and shift the alignment so as to realign it with the newer bridge Southwest of the Massac Creek bridge in order to remove an unnecessary slight curve in the road between the two bridges. 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:

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Total	**$2,300,000**

V. Summary

This study is a Data Need Analysis (DNA) of a Bridge Replacement project of the KY 305 (Cairo Road) bridge over Massac Creek in McCracken County, Item Number 1-1141.00. 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:

KY 305 has poor roadway geometrics.

KY 305 has a CRF of 1.54. There is a collision pattern within the project limits on KY 305.

KY 305 has a Sufficiency Rating of 20.7.

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 305.

Included in the alternatives were a no build recommendation, a replace in the existing location alternative, and a replace and realign with the newer bridge nearby alternative. After review of the data and discussion at the project team meeting, it was determined that Alternative #3, Replace and realign with the newer bridge nearby would best address the purpose and need for the project.

The estimate for this alternative is $100,000 more than the funding listed in the current Highway Plan (see phases D and R).

Alt #	Description	D ($)BRO	R ($)BRO	U ($)BRO	C ($)BRO	Total ($mil)
1	No Build	-	-	-	-	-
2	Replace in Existing Location	350,000	200,000	500,000	1,250,000	2,300,000
3	Replace and Realign	350,000	200,000	500,000	1,250,000	2,300,000
-	Current Hwy Plan Estimated Cost	325,000	125,000	500,000	1,250,000	2,200,000
-	Current Pre-Con Estimated Cost	352,000	125,000	500,000	1,250,000	2,200,000

VI. Tables and Exhibits

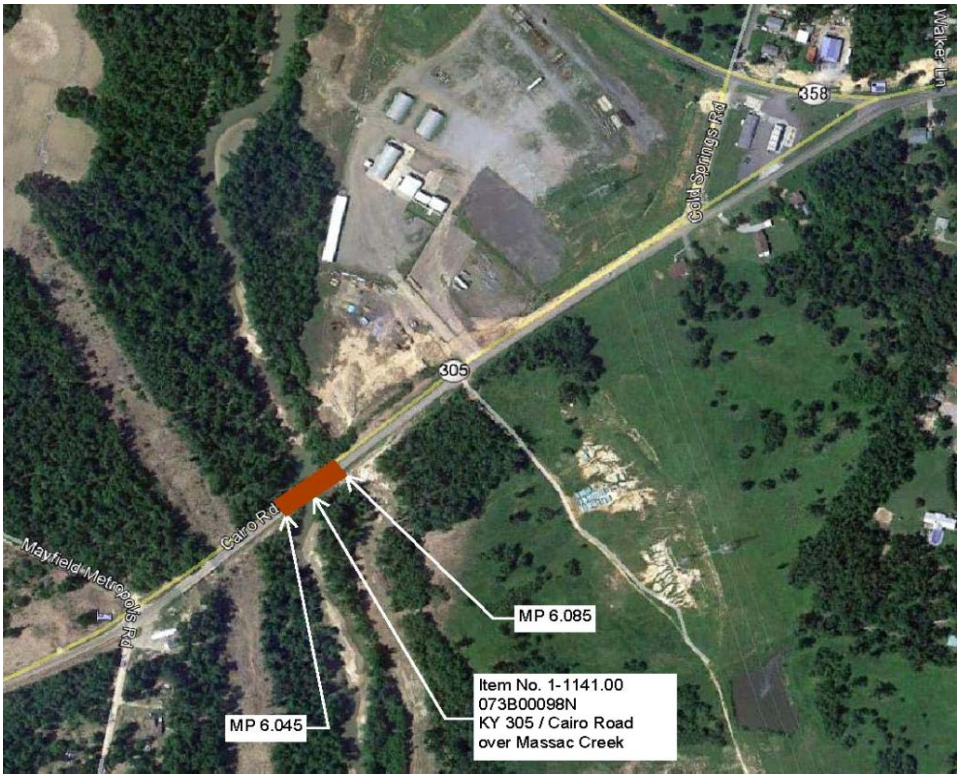

Exhibit 1: Project Location Map

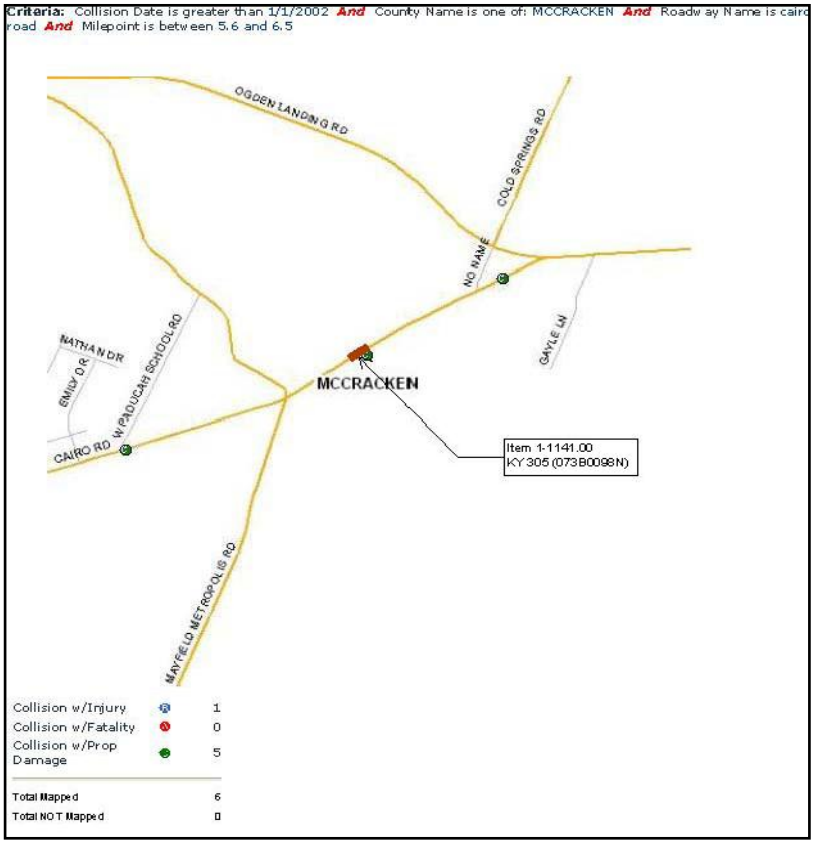

Exhibit 2: Collision Data from Kentucky State Police Database
(collisions that were GPS'ed incorrectly will not appear on this map)

VI. Tables and Exhibits (cont.)

Tables

Table 1: Manners of Collisions	
Fixed Object	1
Rear End	2
Sideswipe	2
Animal	1
Total	**6**

Table 2: Specific Notes from 5/1/2012 Bridge Report
-Asphalt overlay on box beams, asphalt breaking up -Moderate to heavy deterioration to exposed sections of steel pile Bent 1. -Moderate deterioration , cracking and spalls. -Heavy to critical deterioration, deformation of top and bottom flanges, heavy to critical section loss throughout. -Heavy to critical deterioration to steel cap Abutment 1. -Stream has large scour area under structure, scour at bent 1. -Tension rods are broken, noted shifting of beams, joints opening, asphalt overlay breaking up. -Has washed away on slope of Bent 2, concrete place at foot of Abutment 1 breaking up and failing. Sheet pile in North East corner has become undermined. -False bent in place at Bent 1. Box beams are resting on false bent beam, noticeable sag in beam. Viewed several large (over 15 ton) tractor trailers cross bridge.

(remaining bridge data and notes can be found in the Bridge Report dated 5/1/2012)

Helpful Links:

Projectwise folder containing all DNA Study documents: Studies
Collision Reports: 1141 Collision Report - 1.pdf
1141 Collision Report - 2.pdf
Bridge Report: 1141 Bridge Report 5-1-2012.pdf
Bridge Pictures: 1141 Bridge Photos 5-1-2012.pdf
Traffic Forecast: 1141 Traffic Forecast 6-28-2012.pdf

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