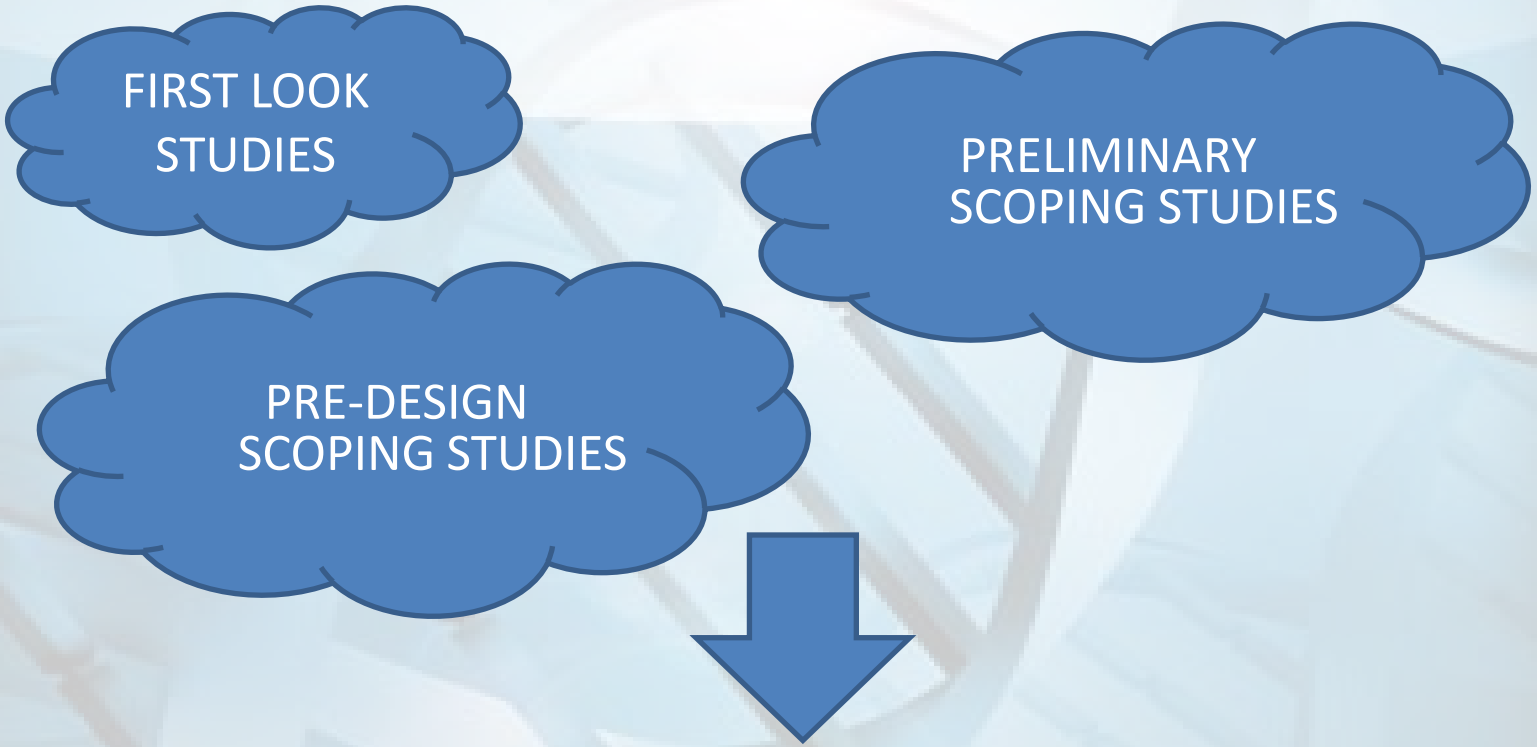
Breaking Down the DNA Plan

Things Designers and Consultants
Need to Know

KENTUCKY
TRANSPORTATION
CABINET

Background



DNA Scoping Studies

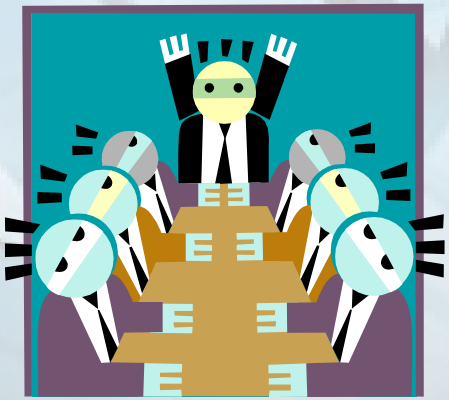
Background

- Data Needs Analysis (DNA) Scoping Study
  - Document Project Background
  - Better Define the Scope
  - Identify the Needs of the Project
  - Develop a Draft Purpose and Need Statement
  - Identify Potential Impacts (Environmental, Utility, Right of Way)
  - Develop Potential Alternatives and Preliminary Cost Estimates
  - Compare Preliminary Estimates with Funding in Highway Plan

Background

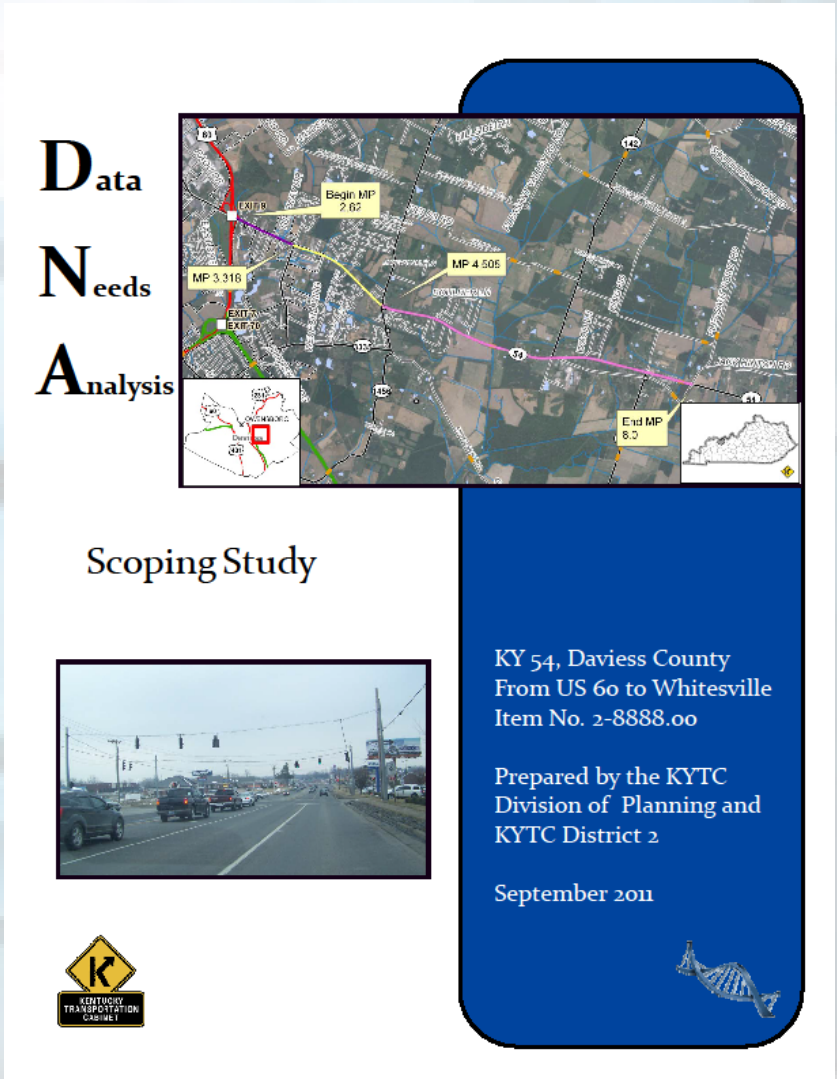
- The first DNAs written by C.O. Planning after a project team meeting and site visit with the district project development staff and others as needed.
- Originally, a DNA was to be completed on all projects prior to the Design phase.
- The recommended format closely followed the format of the previous First Look Studies.
- Expected time to complete – 10 working days

Maybe we should take another look at the First Look, I mean DNA format?

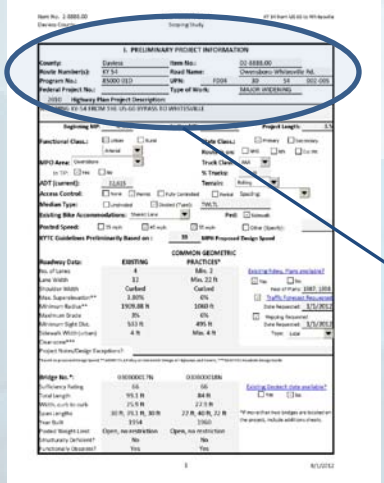


New DNA Format

- Approx. 8 pages
- Includes most of the information in previous DNA format (summarized)
- Provides a more consistent format



New DNA Format



Programming Information

I. PRELIMINARY PROJECT INFORMATION

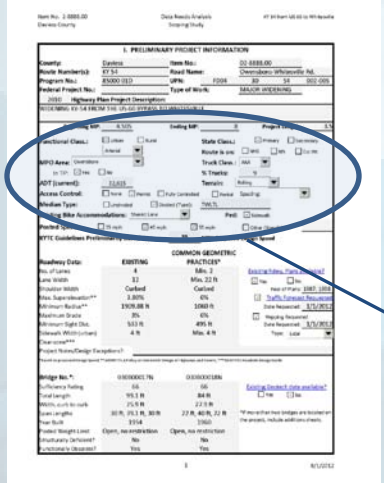
County:	Daviess	**Item No.:**	02-8888.00				
Route Number(s):	KY 54	**Road Name:**	Owensboro-Whitesville Rd.				
Program No.:	85000 01D	**UPN:**	FD04	30	54	002-005	
Federal Project No.:		**Type of Work:**	MAJOR WIDENING				

2010 **Highway Plan Project Description:**

WIDENING KY-54 FROM THE US-60 BYPASS TO WHITESVILLE

Beginning MP:	4.505	**Ending MP:**	8	**Project Length:**	3.5

New DNA Format



HIS Data

Functional Class.: ☑ Urban ☐ Rural — Arterial ▼

MPO Area: Owensboro ▼

In TIP: ☑ Yes ☐ No

ADT (current): 32,615

Access Control: ☐ None ☑ Permit ☐ Fully Controlled ☐ Partial Spacing: ▼

Median Type: ☐ Undivided ☑ Divided (Type): TWLTL

Existing Bike Accommodations: Shared Lane ▼

Posted Speed: ☐ 35 mph ☑ 45 mph ☑ 55 mph ☐ Other (Specify):

State Class.: ☑ Primary ☐ Secondary

Route is on: ☐ NHS ☐ NN ☐ Ext Wt

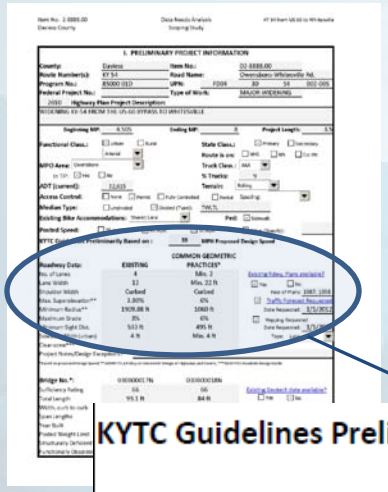
Truck Class.: AAA ▼

% Trucks: 9

Terrain: Rolling ▼

Ped: ☑ Sidewalk

New DNA Format



Design Guidance

KYTC Guidelines Preliminarily Based on : 55 **MPH Proposed Design Speed**

Roadway Data:	EXISTING	COMMON GEOMETRIC PRACTICES*
No. of Lanes	4	Min. 2
Lane Width	12	Min. 22 ft
Shoulder Width	Curbed	Curbed
Max. Superelevation**	3.80%	6%
Minimum Radius**	1909.88 ft	1060 ft
Maximum Grade	3%	6%
Minimum Sight Dist.	533 ft	495 ft
Sidewalk Width(urban)	4 ft	Min. 4 ft
Clear-zone***		

Existing Rdwy. Plans available?
☑ Yes ☐ No
Year of Plans: 1987, 1958

☑ Traffic Forecast Requested
Date Requested: 1/1/2012

☑ Mapping Requested
Date Requested: 1/1/2012
Type: Lidar

Project Notes/Design Exceptions?:

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

New DNA Format

Bridge Information

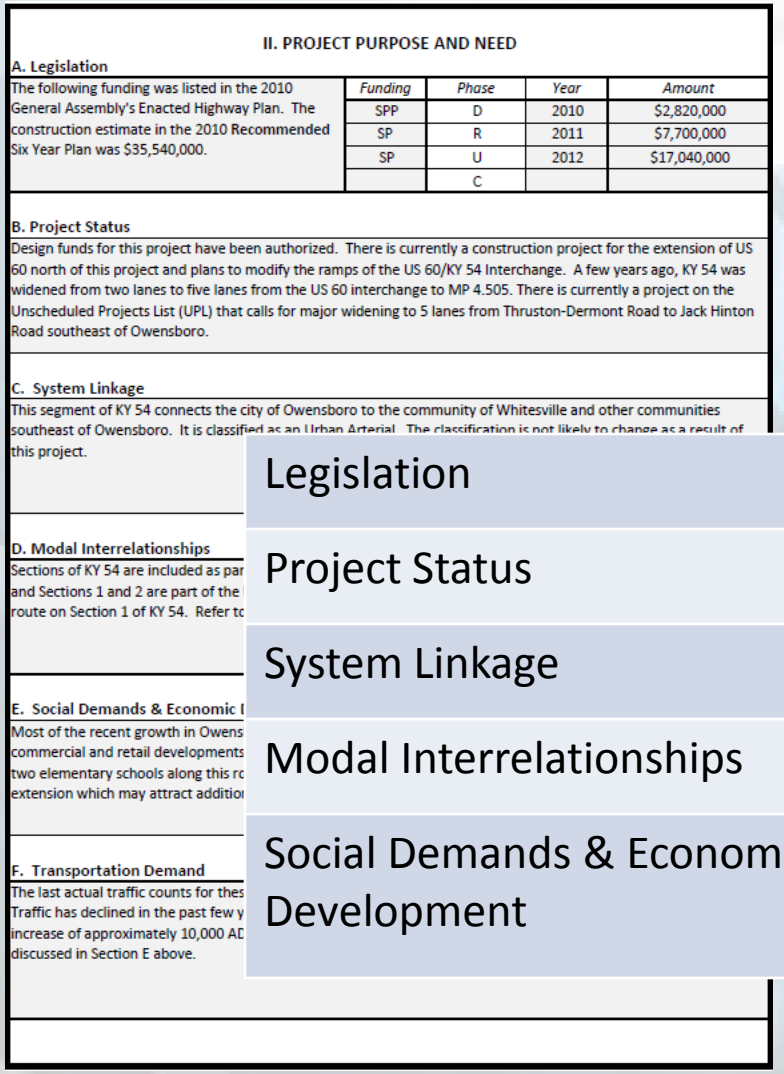
Bridge No.*:	030B00017N	030B00018N
Sufficiency Rating	66	66
Total Length	99.1 ft	84 ft
Width, curb to curb	25.9 ft	27.9 ft
Span Lengths	30 ft, 39.1 ft, 30 ft	22 ft, 40 ft, 22 ft
Year Built	1954	1960
Posted Weight Limit	Open, no restriction	Open, no restriction
Structurally Deficient?	No	No
Functionally Obsolete?	Yes	Yes

Existing Geotech data available?

☐ Yes ☑ No

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

New DNA Format



II. PROJECT PURPOSE AND NEED

A. Legislation

The following funding was listed in the 2010 General Assembly's Enacted Highway Plan. The construction estimate in the 2010 Recommended Six Year Plan was $35,540,000.

Funding	Phase	Year	Amount
SPP	D	2010	$2,820,000
SP	R	2011	$7,700,000
SP	U	2012	$17,040,000
	C		

B. Project Status

Design funds for this project have been authorized. There is currently a construction project for the extension of US 60 north of this project and plans to modify the ramps of the US 60/KY 54 Interchange. A few years ago, KY 54 was widened from two lanes to five lanes from the US 60 interchange to MP 4.505. There is currently a project on the Unscheduled Projects List (UPL) that calls for major widening to 5 lanes from Thruston-Dermont Road to Jack Hinton Road southeast of Owensboro.

C. System Linkage

This segment of KY 54 connects the city of Owensboro to the community of Whitesville and other communities southeast of Owensboro. It is classified as an Urban Arterial. The classification is not likely to change as a result of this project.

D. Modal Interrelationships

Sections of KY 54 are included as par
and Sections 1 and 2 are part of the
route on Section 1 of KY 54. Refer to

E. Social Demands & Economic I

Most of the recent growth in Owens
commercial and retail developments
two elementary schools along this ro
extension which may attract additio

F. Transportation Demand

The last actual traffic counts for thes
Traffic has declined in the past few y
increase of approximately 10,000 AD
discussed in Section E above.

Project Purpose and Need

NEPA's 9 Elements of Purpose & Need:

Legislation	Transportation Demand
Project Status	Capacity
System Linkage	Safety
Modal Interrelationships	Roadway Deficiencies
Social Demands & Economic Development	

New DNA Format

Project Purpose and Need (cont.)

II. PROJECT PURPOSE AND NEED (cont.)

G. Capacity

There is congestion in the area of the five-lane section of KY 54 near the bypass especially near Highland Elementary School. During the AM peak when school is in session, the traffic back-up from the school reduces the roadway to one through lane. In the past, the ramp backed up to US 60 (formerly US 60 Bypass). Given the recent traffic counts, the capacity of the existing two-lane roadway, Section 3, may become an issue in the future. The potential for development on KY 54 could impact the capacity of the roadway.

H. Safety

Collision stats for Sections 1

Collisions locations can be s
CRF = 1.10. Section 2 CRF =
occurring at the more cong

Collisions stats for Section 3

Collision locations can be se
CRF = 0.55. Although there
Section 3 were scattered th
the collisions were rear end

Collision data was obtained
December 31, 2010 for the

I. Roadway Deficiencies

Sections 1 and 2 were recer
gutter, and sidewalks. These sections meet KYTC's Common Geometric Practices for Urban Arterials. There are several signalized and non-signalized intersections and access points throughout the section. Section 3 was built in the 1950s, and currently has a rural template with 11-ft lanes and 2-ft shoulders. This section is currently classified as an Urban Minor Arterial. KYTC's Common Geometric Practices for Urban Arterial Streets recommends 12-ft lanes with curb and gutter and sidewalk. The existing alignment is within the minimum criteria for horizontal curvature and grade. There are several access points throughout the route. None of the section appear to have significant drainage problems.

Draft Purpose and Need Statement:

Needs: KY 54 near the interchange with US 60 is congested during peak traffic periods. Growth along this corridor is expected to continue. There are also collision patterns at intersections with KY 54 and a CRF of 1.10 on the more developed section of KY 54. KY 54 connects the communities of Whitesville and Owensboro.
Purpose: **The purpose of this study is to address the congestion of KY 54 during peak periods and to improve the safety, mobility, and connectivity between Owensboro and Whitesville.**

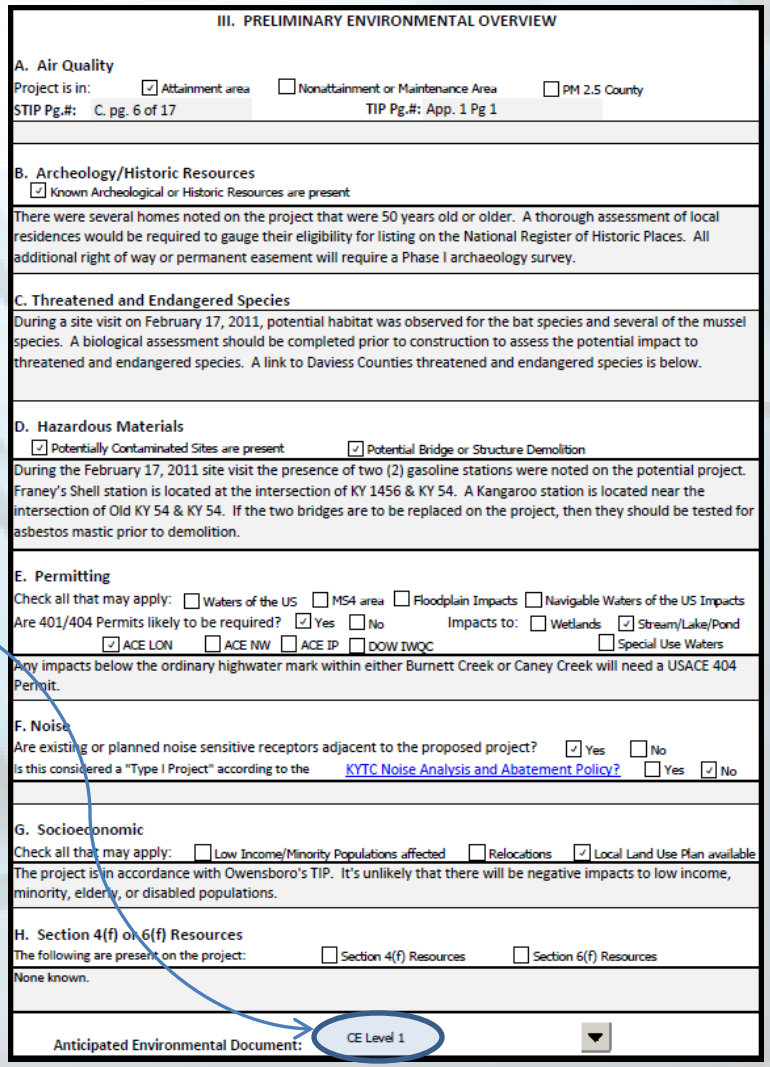
Draft Purpose and Need Statement:

Needs: KY 54 near the interchange with US 60 is congested during peak traffic periods. Growth along this corridor is expected to continue. There are also collision patterns at intersections with KY 54 and a CRF of 1.10 on the more developed section of KY 54. KY 54 connects the communities of Whitesville and Owensboro.
Purpose: **The purpose of this study is to address the congestion of KY 54 during peak periods and to improve the safety, mobility, and connectivity between Owensboro and Whitesville.**

New DNA Format

Preliminary Environmental Overview

If the anticipated environmental document is a CE3, EA/FONSI or EIS, then DEA will review the draft.



III. PRELIMINARY ENVIRONMENTAL OVERVIEW

A. Air Quality

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

STIP Pg.#: C. pg. 6 of 17 TIP Pg.#: App. 1 Pg 1

B. Archeology/Historic Resources

☑ Known Archeological or Historic Resources are present

There were several homes noted on the project that were 50 years old or older. A thorough assessment of local residences would be required to gauge their eligibility for listing on the National Register of Historic Places. All additional right of way or permanent easement will require a Phase I archaeology survey.

C. Threatened and Endangered Species

During a site visit on February 17, 2011, potential habitat was observed for the bat species and several of the mussel species. A biological assessment should be completed prior to construction to assess the potential impact to threatened and endangered species. A link to Daviess Counties threatened and endangered species is below.

D. Hazardous Materials

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

During the February 17, 2011 site visit the presence of two (2) gasoline stations were noted on the potential project. Franey's Shell station is located at the intersection of KY 1456 & KY 54. A Kangaroo station is located near the intersection of Old KY 54 & KY 54. If the two bridges are to be replaced on the project, then they should be tested for asbestos mastic prior to demolition.

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

Any impacts below the ordinary highwater mark within either Burnett Creek or Caney Creek will need a USACE 404 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

G. Socioeconomic

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

The project is in accordance with Owensboro's TIP. It's unlikely that there will be negative impacts to low income, minority, elderly, or disabled populations.

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

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

None known.

Anticipated Environmental Document: CE Level 1

New DNA Format

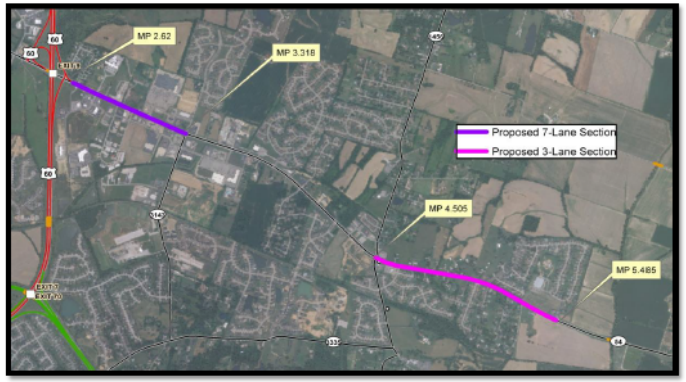
IV. POSSIBLE ALTERNATIVES

A. Alternative 1: No Build

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

B. Alternative 2

Widen KY 54 from 5 lanes to 7 lanes from MP 2.62 to MP 3.318 (0.698 miles) using an urban template with 6 thru lanes, a middle turn lane, curb and gutter, and sidewalk to address the congestion issues in this section. Widen KY 54 from 2 lanes to 3 lanes from MP 4.505 to a logical stopping point considering the funding allocated for the project. If there is enough funding available, stopping at Countryside Drive where the school entrance is located (MP 5.485) should be considered. Past this intersection there is a significant length of roadway with no development. Also, stopping at this point would avoid the expense of widening or replacing the bridges located over Barnett Creek and Caney Creek located further down the corridor. The widening of approximately 0.98 miles would utilize an urban template with 2 thru lanes, a middle turning lane, curb and gutter and sidewalk. Although the project was initially thought to include widening KY 54 from MP 4.505 to MP 8.0 (Section 3), it was determined that traffic volumes are decreasing on this section while increasing significantly from MP 2.62 to MP 3.318 (Section 1). Section 2 is not addressed in this alternative because the current 5-lane template adequately serves traffic volumes on this section. A sketch of the proposed project limits for this alternative can be seen below.



Preliminary Cost Estimate:

Phase	Estimate
Design	$2,820,000
R/W	$7,500,000
Utilities	$7,500,000
Const	$15,990,000
Total	**$33,810,000**

Link to Cost Estimate Worksheet

- Possible Alternatives
  - Include No Build
  - Alternatives need to address the draft purpose and need of the project
  - Discuss negative impacts of possible alternatives

New DNA Format

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 1-1140.00. 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).

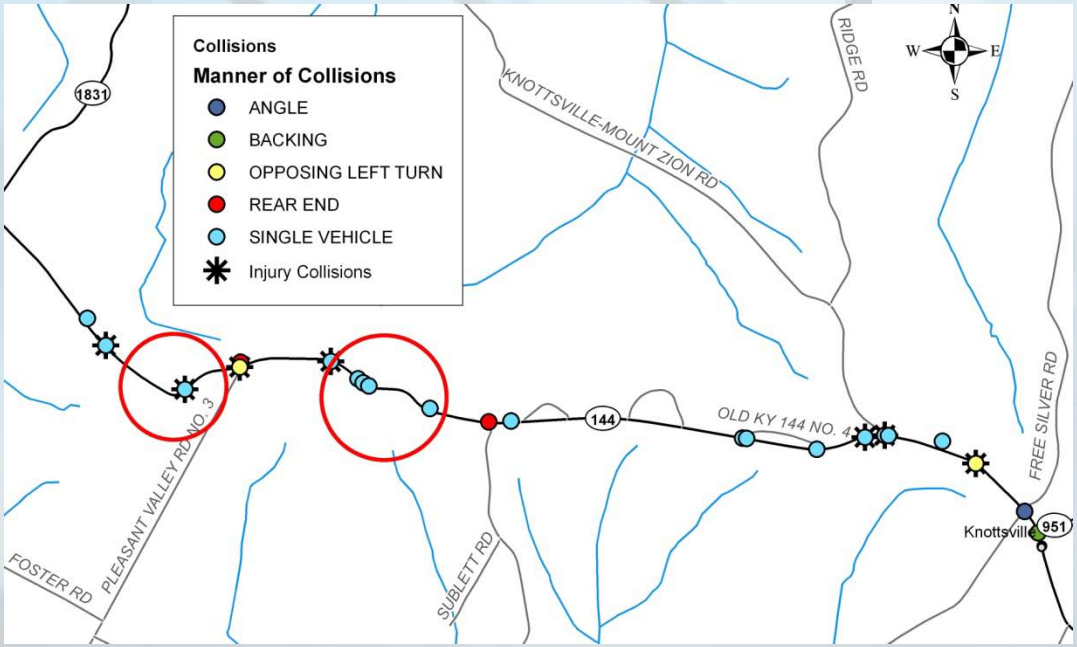
Alt #	Description	D ($)BRO	R ($)BRO	U ($)BRO	C ($)BRO	Total ($mil)
1	No Build	-	-	-	-	-
2	Replace in Existing Location	250,000	100,000	150,000	500,000	1,000,000
3	Replace to East/West	275,000	100,000	200,000	700,000	1,275,000
-	Current Hwy Plan Estimated Cost	220,000	150,000	200,000	400,000	970,000
-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

- Summary
  - Draft Purpose and Need Statement
  - Preliminary cost estimates should be compared to $ allocated in Highway Plan

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

New DNA Format

- Supporting Documentation
  - Project location map and crash location and tables are usually included in the DNA



New DNA Format

- Supporting Documentation
  - All other supporting documentation can be placed in Projectwise and given to the selected consultant at the Pre-Design Conference if considered useful by the Project Manager
    - Archived roadway plans
    - Crash Data
    - Traffic Forecast (if available)
    - Utility info

DESIGN PERSPECTIVES

- KYTC Has Published at Least 65 DNA Studies Statewide
- Comments Gathered From District Design Staffs Queried About Experiences Using DNA Studies

Advantages

- Encourages Multidisciplinary Team Decision Making
- Improve Understanding of Project Scope and Potential Challenges
- Potential Time and Cost Savings from Early Defined Scope

Advantages

- Clarify Legislative Intent
- Possible Early Public Involvement Where Appropriate

Disadvantages

- Potential Large Time Investment for Multiple Departments
- Perceived Limitation on Innovation and Creativity on Larger Projects

Draft DNA Policy

- DNA shall be completed on all projects with little or no previous planning activity and that will be designed utilizing consultant services.
- DNAs will be completed in-house.
- Project Team meetings are encouraged.
- A draft DNA study shall be sent to the Project Team for comments.

Draft DNA Policy (cont.)

- C.O. Planning will review all reports for continuity and consistency.
- Ultimate approval of the study and its content lies with the District's Project Development Branch Manager.
- The final draft shall be sent to C.O. Planning to post to the Division's web page.

DNA - Fact, Myth or Misunderstanding

"DNA's are a Planning Effort…"

The DNA documentation is usually completed by a District or C.O. Planner, but the development of the draft Purpose and Need and the scope of the project is a Project Development Team process, and should be a multidisciplinary effort.

DNA - Fact, Myth or Misunderstanding

"Including alternatives in DNAs limits the consultants' ability to develop innovative approaches…"

The design consultant is NOT limited to the alternatives in the DNA. Innovative solutions that address the P&N are encouraged within the scope of the project. However, at a minimum a description of the alternate used to develop the cost estimate should be included.

DNA - Fact, Myth or Misunderstanding

"DNAs are only used to put together the Bulletin, aren't they?"

While information on the DNA can be copied to the bulletin, we hope there is other data and information from the DNA process that will be helpful in future project phases.

DNA - Fact, Myth or Misunderstanding

"We can scope out a project without going through the process of writing a document."

Documentation is very helpful, especially if there are retirements, turnover in staff, or significant time lapses between phases. However, it may be helpful to be able to "right-fit" the amount of effort that goes into different types of projects…

Right Sizing a DNA

- DNAs are a Planning Level Study utilizing a TEAM Concept
- Know Your Limits
- Different Types of Projects require different types of DNAs
- *K.I.S.S.* Method

DNAs are a Planning Level Study

- They **are not** meant to create a set of Construction Plans
- They **are not** meant to replace the Preliminary Engineering Phase
- They **are not** meant to replace other Planning Studies

PLANNER'S SHOULD PLAN and

DESIGNER'S SHOULD DESIGN

Know Your Limits
DNAs SHOULD NOT BE USED FOR:

- New Corridor/Roadway Type Projects
- Alignments Greater than 3 miles
- Shoulder Widening Projects
- Rehabilitation Type Projects
- Projects that would normally be handled with SPR funded Studies (IJS, Feasibility, Programming, SUA, Alternatives)

Different Projects should use Different DNAs

Reconstruction/Major Widening

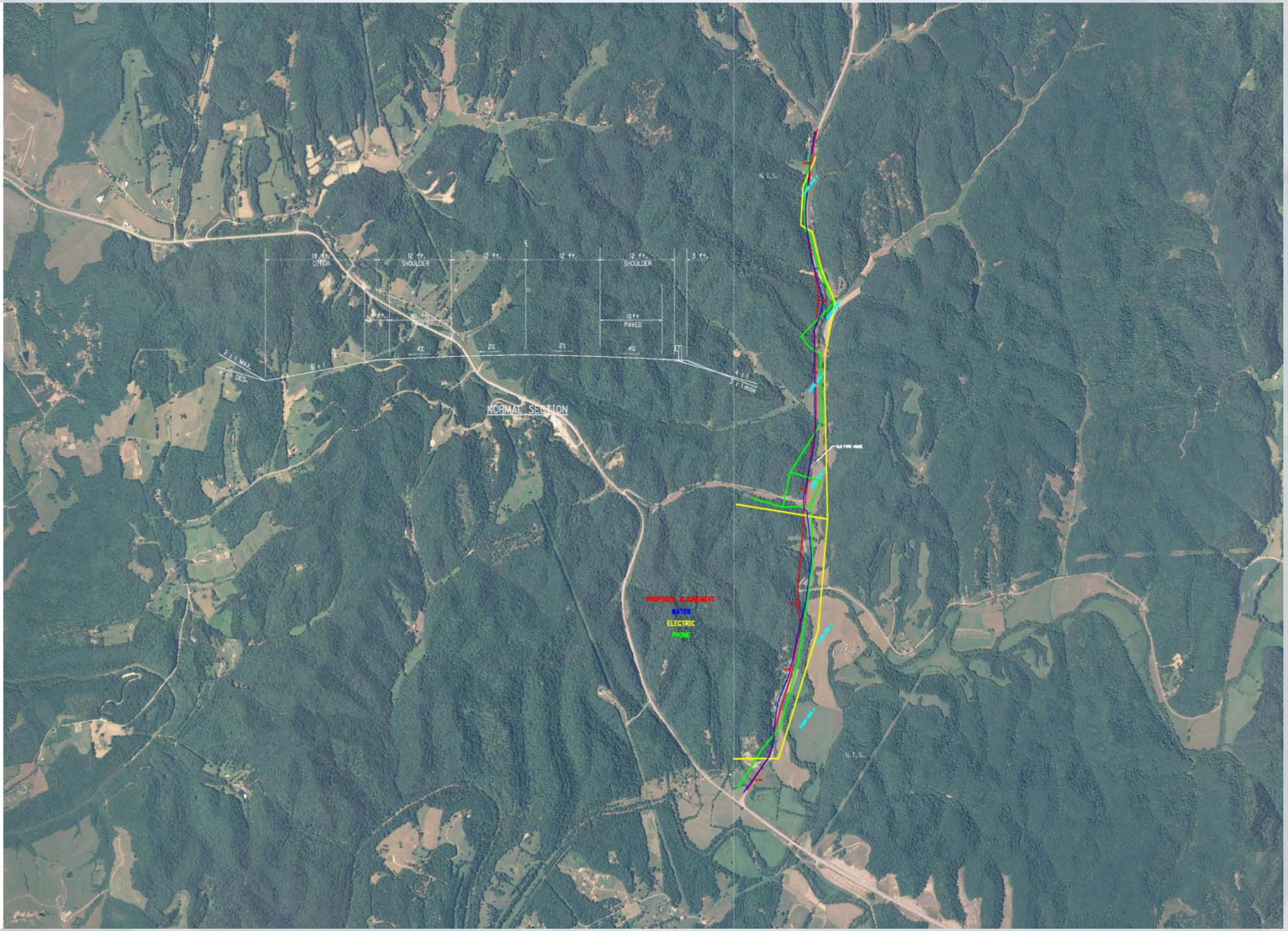
- Horizontal Alignment Options
- Vertical Alignment Options
- Typical Section Options
- Probably Require Utility Relocations
- Possibly mean Significant R/W involvement

Bridge Replacement

- Minor Horizontal Alignment Options
- Typical Section Options
- May Require Utility Relocations
- Typically Little R/W Involvement

Reconstruction/Major Widening

- More Extensive Projects need More Extensive Information


18 ft.
DITCH
12 ft.
SHOULDER
12 ft.
12 ft.
12 ft.
SHOULDER
3 ft.
18 ft
PAVED
NORMAL SECTION
PROPOSED ALIGNMENT
WATER
ELECTRIC
PHONE
N.T.S.
N.T.S.

Reconstruction/Major Widening

- More Extensive Projects need More Extensive Information
- Take someone with you for your field visit
- Try to show the project challenges
- Think of these in terms of Corridor Alignments

Bridge Replacements

- DO NOT OVERTHINK – You are simply replacing a bridge

Bridge Replacements

- DO NOT OVERTHINK – You are simply replacing a bridge
- Use the appropriate design criteria

Bridge Replacements *cont'd*

Bridge Replacements

- DO NOT OVERTHINK – You are simply replacing a bridge
- Use the appropriate design criteria
- Should only be looking at horizontal alignments
- Never more than 3 alternates for the team to review
- Should narrow to a minimum number of alternates for consultant

The *K.I.S.S.* Method

K eep

I t

S imple

S tupid

The *K.I.S.S.* Method *cont'd*

- Don't Waste time trying to fill the boxes

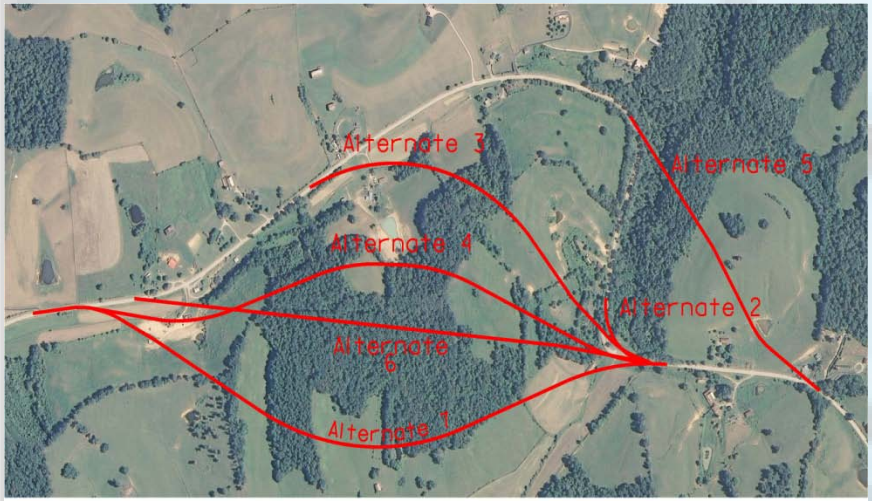
C. Threatened and Endangered Species
During a site visit on February 17, 2011, potential habitat was observed for the bat species and several of the mussel species. A biological assessment should be completed prior to construction to assess the potential impact to threatened and endangered species. A link to Daviess Counties threatened and endangered species is below.

Or Simply

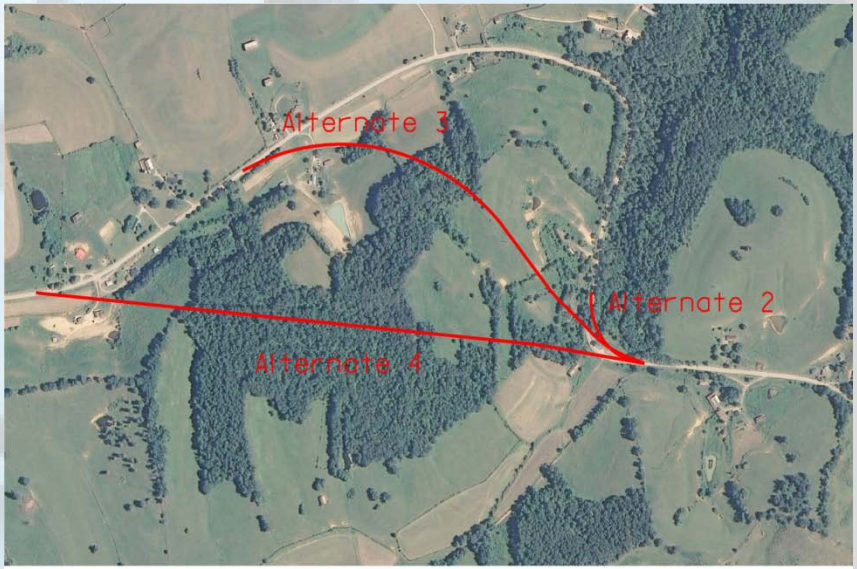
C. Threatened and Endangered Species
Possibly: Indiana bat, Kentucky Arrow Darter

The *K.I.S.S.* Method *cont'd*
2-3 Alternates are Plenty

TOO MANY



JUST RIGHT



The *K.I.S.S.* Method *cont'd*

Create "new" fields to save time.

Truck Class.:	AAA
% Trucks:	3.8
Terrain:	Mountainous
Detour Length:	13.60 miles

IV. PROJECT CHALLENGES
The Project Teams has identified the following challenges for this project: 1. MOT concerns during construction. 2. Waterline running next to existing road for entire project length. 3. Potential Historic home. 4. Potential Floodplain Impacts.