

## DESIGN EXECUTIVE SUMMARY

|                         |                  |                           |          |
|-------------------------|------------------|---------------------------|----------|
| <b>County:</b>          | ALLEN            | <b>Item #:</b>            | 3-320.00 |
| <b>Route Number(s):</b> | KY 100           | <b>State Program #:</b>   | 8962801D |
| <b>BMP/EMP:</b>         | MP 3.1 to MP 4.2 | <b>Federal Project #:</b> |          |
| <b>Type of Work:</b>    | Reconstruction   |                           |          |

**Highway Plan Project Description:** IMPROVEMENTS TO KY 100: CURVE, BRIDGE, AND INTERSECTION IMPROVEMENTS FROM NEAR THE STONY POINT ROAD INTERSECTION TO EAST OF THE ALONZO LONG HOLLOW ROAD INTERSECTION.

### EXISTING CONDITIONS

|  |   |                                  |  |   |       |
|--|---|----------------------------------|--|---|-------|
| <b>ADT (current):</b>                      | 2300  | <b>Truck Class:</b>              | AAA  | <b>Trucks:</b>  | 8.5 % |
| <b>Existing Functional Classification:</b> | <input type="checkbox"/> Urban <input checked="" type="checkbox"/> Rural<br>Collector | <b>Terrain:</b>                  | Rolling  | <b>Route is on (check all that apply):</b>  |       |
|  |   |                                  |  | <input type="checkbox"/> NHS <input type="checkbox"/> NN <input type="checkbox"/> Ext Wt <input checked="" type="checkbox"/> None |       |
| <b>Posted Speed Limit:</b>                 | _____ mph   | <b>or Statutory Speed Limit:</b> | <input type="checkbox"/> 35 mph (urban) <input checked="" type="checkbox"/> 55 mph (rural) |   |       |
| <b>Existing Bike Accommodations:</b>       | Shared Lane   | <b>Ped:</b>                      | <input type="checkbox"/> Sidewalk <input type="checkbox"/> Other: _____                    |   |       |

### PROPOSED CONDITIONS

|  |   |                           |            |                        |           |
|--|---|---------------------------|------------|------------------------|-----------|
| <b>Design Functional Classification:</b> | <input type="checkbox"/> Urban <input checked="" type="checkbox"/> Rural<br>Collector | <b>Design ADT (year):</b> | 3200       | <b>Access Control:</b> | By Permit |
|  |   | <b>DHV:</b>               | 298 veh/hr | <b>Min. Spacing:</b>   | _____     |

| CONTROLLING CRITERIA:              | EXISTING | AASHTO Guidance<br>(for design speed) | Recommendation | Design Exception<br>(Check if exception is needed) |
|------------------------------------|----------|---------------------------------------|----------------|--|
| Design Speed                       | 30 mph   | Minimum: 50 mph<br>Selected: 55 mph   | 55mph          | <input type="checkbox"/>                           |
| Lane Width, No. of Lanes           | 9.5', 2  | 12', 2                                | 12', 2         | <input type="checkbox"/>                           |
| Shoulder Width<br>(minimum usable) | 1.5'     | 8'                                    | 6'             | <input checked="" type="checkbox"/>                |
| Bridge Width (clear roadway)       | 22'      | 40'                                   | 36'            | <input type="checkbox"/>                           |
| Max. Grade                         | 8.30%    | 7.00%                                 | 7.00%          | <input type="checkbox"/>                           |
| Horiz. Radius (minimum)            | 717'     | 965'                                  | 1200'          | <input type="checkbox"/>                           |
| Stopping Sight Distance (minimum)  | 120'     | 495'                                  | 496'           | <input type="checkbox"/>                           |
| Normal Cross Slope                 | 2.00%    | 2.00%                                 | 2.00%          | <input type="checkbox"/>                           |
| Max. Superelev. Rate<br>(emax= 8%) | 8.00%    | 8.00%                                 | 7.80%          | <input type="checkbox"/>                           |
| Vert. Clearance                    | n/a      | n/a                                   | n/a            | <input type="checkbox"/>                           |

| OTHER CRITERIA:        | Design Variance          |
|------------------------|--------------------------|
| Border Area (urban)    | <input type="checkbox"/> |
| Sidewalk Width, slope  | <input type="checkbox"/> |
| Bike Lane Width, slope | <input type="checkbox"/> |
| Shared Use Path Width  | <input type="checkbox"/> |
| Other:                 | <input type="checkbox"/> |

## DESIGN EXECUTIVE SUMMARY

**Design Criteria Notes:** The typical section for this project provides a 5:1 fill slope and ditch foreslope, therefore, as per section 4.4.1 of 2011 AASHTO Green Book, this results in an 8' graded and usable shoulder. The only exception to this will be where guardrail will be installed and a 6' usable shoulder with a 9' graded shoulder will be provided. This typical section matches the typical section used in other new projects along the KY 100 corridor.

**Environmental Action:**

Overview ▼

**Completion Date:**

scheduled  actual

Currently Unscheduled

**Existing Pavement Depths:**

**Include:**

1. Typical sections, including bridges
2. Map showing project location
3. Project overview and existing conditions
4. Purpose and Need statement
5. Discussion of alternatives (including preferred and no build) with respective traffic control schemes, and environmental, utility and right-of-way impacts.
6. Discussion of Design Exceptions /Variances and mitigation strategies
7. Cost comparison table of alternatives vs. Highway Plan
8. Discussion if preferred alternate cost is >115% than highway plan
9. Discussion of clearzone
10. Consideration for bicycle and pedestrian facilities (see HDM 1502)
11. Water-related impacts summary

**Submitted by Project Engineer:**

*[Signature]*

KYTC  Consultant

**Date:** 1/31/2017

**Recommended by Project Manager:**

*[Signature]*

**Date:** 1/31/2017

**Tier Level Approval**

Tier 1  Tier 2  Tier 3

**Location Engineer:**

*Wendy Southworth*

**Date:** 2/2/2017

**Roadway Design Branch Manager:**

*Bruce Eldridge*

**Date:** 2/3/17

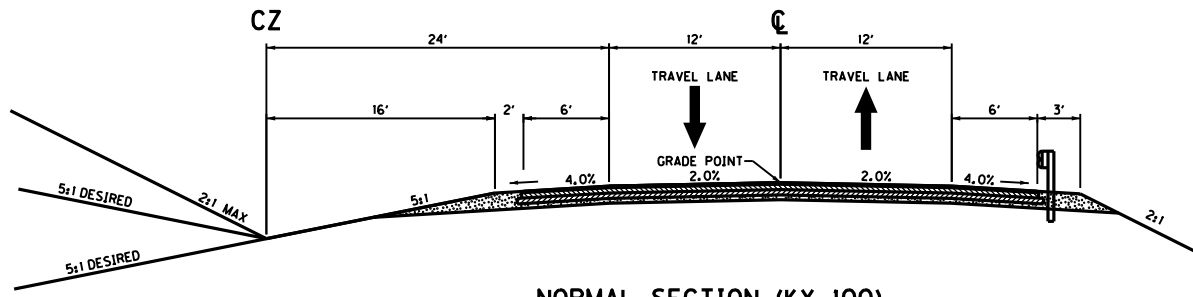
**Geometric Approval**

  ▼

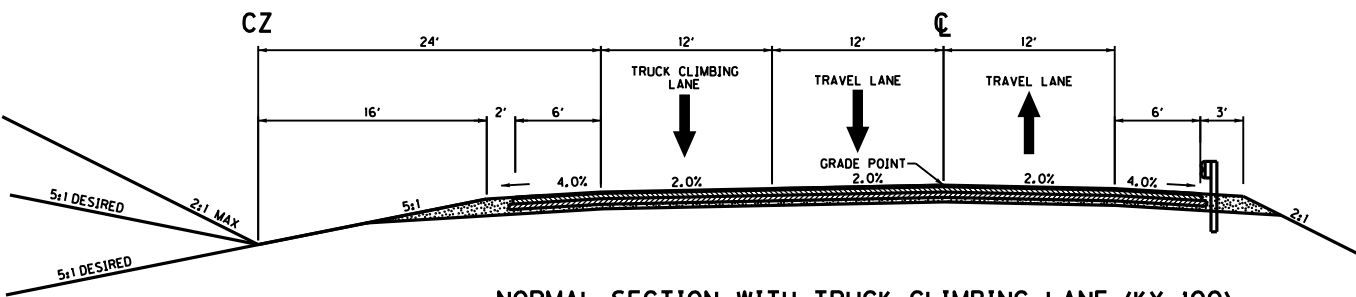
**Date:**

**Granted by:**

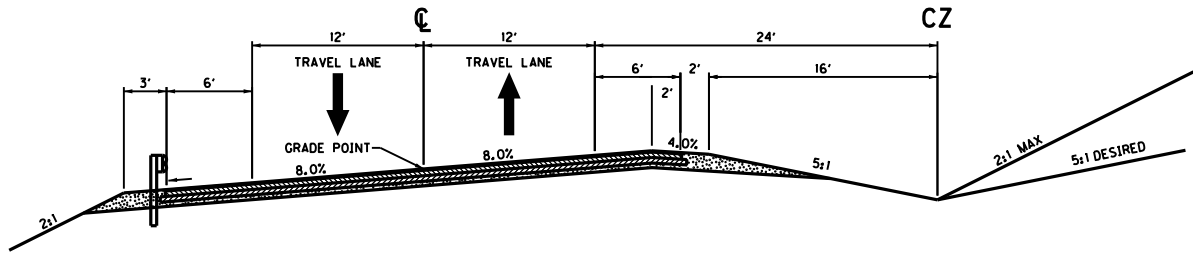
# TYPICAL SECTIONS



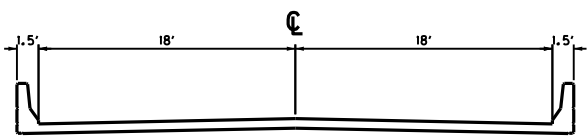
NORMAL SECTION (KY 100)



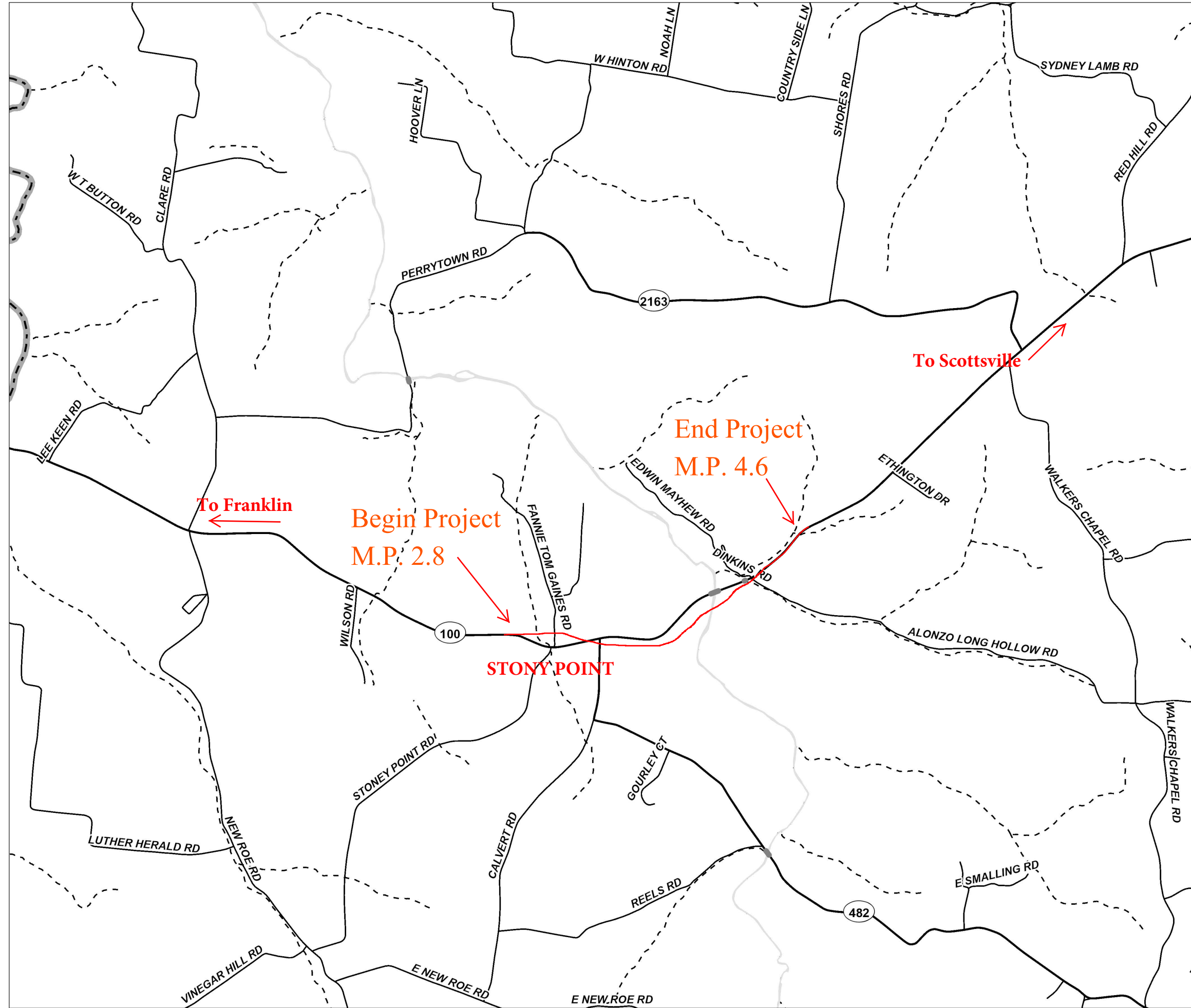
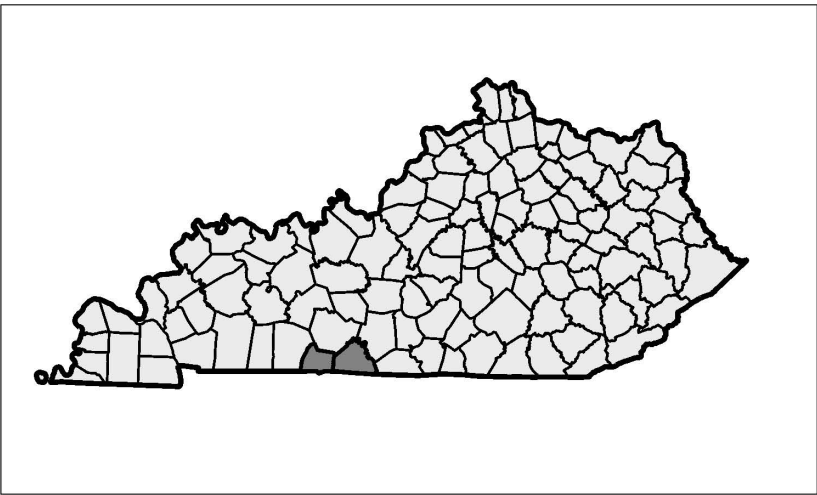
NORMAL SECTION WITH TRUCK CLIMBING LANE (KY 100)



MAXIMUM SUPERELEVATED SECTION (KY 100)



BRIDGE SECTION (KY 100)



## **Project Overview & Existing Conditions**

KY 100 is functionally classified as a “rural major collector” linking US 31W and US 231 in Simpson and Allen counties, respectively. A planning study was conducted in 2008 and included the KY 100 corridor between the cities of Franklin and Scottsville. As a result of this planning study, a spot improvement was recommended in the community of Stony Point. The project was the second of recommended improvements along the corridor. For this class of highway, the posted speed limit is 55 mph. The travel lane widths should be two 12-foot lanes with 8’ shoulders. The existing KY 100 roadway in the Stony Point community consists of two 9.5-foot lanes with 1.5-foot shoulders. There are numerous horizontal and vertical deficiencies along this route. Thirteen of the fifteen existing vertical curves within the project limits are substandard, creating poor sight and stopping distance especially at the intersection of KY 100 and KY 482. There are also two bridges in this section that are both classified as functionally obsolete. This section of the corridor also has a history of crashes including fatalities. Some of the following were identified as major roadway deficiencies that are contributors to the crashes: Poor sight distance from MP 2.8 to MP 3.7(in some areas is less than 200’) including the intersection of KY 100 and KY 482; substandard radii at MP 3.1, MP 3.6, MP 4.5; two functionally obsolete bridges at MP 3.99 and MP 4.15.

## **Purpose and Need Statement**

As part of the Kentucky State Primary Highway Network, KY 100 is rural two-lane facility which connects Scottsville in Allen County to Franklin in Simpson County. This route also provides access to small communities and agricultural activities in western Allen County. KY 100 is functionally classified as a “rural major collector” linking US 31W and US 231 in Simpson and Allen counties, respectively. This section of KY 100 has several horizontal and vertical deficiencies which are the cause of poor sight distance. Some locations have sight distance as little as 200’. The intersection with KY 482 is also an area of poor sight distance. Along with the poor sight distance, there are two functionally obsolete bridges that were built in 1933. The driving lanes and shoulders are also very narrow for this class of highway. Traffic in this section of the corridor consists primarily of passenger cars but there is also a significant presence of heavy trucks as well as horse and buggies. Inadequate sight distance and narrow shoulders result in very little room for driver error. The 2008 Planning Study of this corridor recommended this spot improvement as Priority #2. The public have also expressed concern about safety issues in the project area. The Purpose of this project is to improve the safety and mobility of KY 100 in the community of Stoney Point in Allen County.

## **Public Meeting Summary**

On May 12, 2016, an open house style public information meeting was held at Stony Point Volunteer Fire Station from 4:00pm to 6:00pm, CDT. Large display exhibits of the two proposed alignments including typical sections were on display for the meeting attendees. Project handouts were provided as well as survey questionnaires. Upon the expiration of the public comment period on May 31, 2016, the following forms of public responses were received by the project team: 31 survey questionnaires representing 38 individuals. The following table shows a breakdown of the responses and if they preferred the Northern Alternate, the Southern Alternate, Neutral preference, or a No Build option. Responses were identified as a result of clear sentiment on the part of the respondent. Responses labeled as neutral either were unclear or reflected both positive and negative sentiments towards the Northern and Southern Alternates.

| Response Type        | Quantity | People Represented (Individual) | Southern Alternate Preference (Individual) | Northern Alternate Preference (Individual) | Southern Alternate Negative Impacts (Individual) | Northern Alternate Negative Impacts (Individual) | Neutral Preference (Individual) | No Build Preference (Individual) |
|----------------------|----------|---------------------------------|--|--|--|--|---------------------------------|----------------------------------|
| Survey Questionnaire | 31       | 38                              | 26   | 8  | 1  | 11   | 2                               | 2                                |
| Unique Letters       | 0        | 0                               | 0  | 0  | 0  | 0  | 0                               | 0                                |
|                      |          | 38                              | 26   | 8  | 1  | 11   | 2                               | 2                                |

The survey questionnaires from the public meeting show much stronger support for the Southern Alternate. Most public responses said there was a dire need for major road improvement in the project area.

**Existing Road Concerns:**

- Safety
- Poor Sight Distance
- Dangerous curves
- Heavy tractor trailer truck traffic
- Dangerous intersection at KY 482
- Several accidents including fatalities
- Narrow lanes, bridges

**General Comments:**

- Recently bought farm and are concerned that either alternate will road noise closer to house.
- Thinks that the speed limit should be lowered and that a new straighter road will lead to higher speeds and more accidents. Concerned about traffic being closer to house.
- Noise level increase
- Impacts to agricultural practices
- Need for wider road
- Concerns that the Southern Alternate will be too close to home and concerned about truck noise and headlights shining into home. Also concerns of losing fruit trees.
- Northern Alternative will split farms
- Impacts to wildlife and hunting opportunities
- Wants to see the Alonzo area keep its simple secluded appeal. Also has concerns about development of property within corridor limits.
- Landowner who is greatly affected by either alternate says the Southern Alternate has less negative impacts to agriculture operations. Also the Northern Alternate will impact working oil wells on property.
- Concerns about the Northern Alternate being close to home having children and dogs.

## Alternate Discussion

### No Build Alternate:

- This alternate would not address the purpose and need or recommendations from the planning study of this corridor.

### Build Alternates:

- Northern Alternate - This alternate reconstructs KY 100 completely to the north of the existing roadway. It begins at MP 2.8 and ends at approximately MP 4.6. This alternate would only require one new bridge due to the fact it is downstream of the confluence of the two branches that the existing roadway crosses. This alternate would have an extension of KY 482 to provide connectivity and address the sight distance issues of its intersection with the existing KY 100. The long 7% upgrade along with a traffic flow rate of 400 vph, a truck flow rate at 25 vph, and a heavy truck speed reduction of 15mph, warrant the use of a truck-climbing lane. Traffic will be maintained on the existing roadway for the majority of construction. A small on-site diversion will be used to construct the west tie-in. Approximately 1.1 miles of the existing 1.8 mile section would remain including one existing bridge that is classified as functionally obsolete. This alternate would affect 15 parcels for a total 49.5 acres.
- Southern Alternate - This alternate begins at MP 2.8 and reconstructs KY 100 to the north for approximately a half mile where it then crosses the existing roadway at MP 3.3 and then reconstructs KY 100 to the south somewhat parallel to the existing roadway. This alternate also reconstructs the two bridges to the south of the existing roadway and ties back in to the existing roadway at approximately MP 4.1. It then overlays and widens the existing roadway to MP 4.6 This alternate would require approximately 700 feet of possible channel change. This alternate would also address the insufficient sight distance of 317' at the intersection of KY 482. The long 4.6% upgrade along with a traffic flow rate of 400 vph, a truck flow rate at 25 vph, and a heavy truck speed reduction of 15mph, warrant the use of a truck-climbing lane. Traffic will be maintained on the existing roadway for the majority of construction. A small on-site diversion will be used to construct the west tie-in. The overlay section will be maintained using part width and temporary lane closures. Most of the existing roadway will be removed other than a small portion on the west end and the overlay and widen section. This alternate would affect 22 parcels for a total 34.8 acres and including 5 structures with 3 of those being relocations. This alternate had strong public support. This is the preferred alternate.
- Reduced Southern Alternate – This alternate is the same alignment as the Southern Alternate, however it is only a portion of it. This reduced option would begin at MP 3.5 and end at MP 4.3. Traffic would be maintained on the existing roadway for the duration of the project. This alternate would affect 9 parcels for a total 17 acres. This alternate was created to meet the current 6-Year Plan Budget. Although this alternate meets the current 6-Year Plan Budget, it does not however address much of the Purpose

and Need including the following: insufficient sight distance from MP 2.8 to MP 3.4 due to substandard vertical curves; the intersection of KY 100 and KY 482; substandard radius at MP 4.5.

**Cost Comparison**

|                                   | <b>R/W (SPP 2018)</b> | <b>Utilities (SPP 2018)</b> | <b>Construction</b> | <b>Total</b> |
|-----------------------------------|-----------------------|-----------------------------|---------------------|--------------|
| <b>KYTC 6-year Plan</b>           | \$500,000             | \$900,000                   | Not in 6YP          |              |
| <b>Northern Alternate</b>         | \$1,130,000           | \$715,000                   | \$9,800,000         | \$11,645,000 |
| <b>Southern Alternate</b>         | \$1,700,000           | \$1,200,000                 | \$9,400,000         | \$12,300,000 |
| <b>Reduced Southern Alternate</b> | \$400,000             | \$300,000                   | \$5,700,000         | \$6,400,000  |

**Preferred Alternate Discussion**

The Southern Alternate was selected as the preferred alternate however it is not within 115% of the Highway Plan Budget for Right of Way and Utilities. The Northern Alternate is also not within 115% of the Highway Plan Budget for Right of Way. There was no budget programmed for Construction in the current Highway Plan. The Right of Way estimates are considerably higher than the Highway Plan Budget. However, we feel that the estimated Budget of \$500,000 was considerably low because it did not take in to account the large quantity of fee simple acquisitions or any relocations due to the cross country alignments. The strong public support of the Southern Alternate offsets the project team’s hesitations about the higher Right of Way costs due to relocations. The Reduced Southern Alternate was created to meet the current Highway Plan Budget. Although this alternate meets the current budgets, it does not address much of the Purpose and Need including the following: substandard sight distance from MP 2.8 to MP 3.4; the intersection of KY 100 and KY 482; substandard radius at MP 4.5. Therefore we feel it is in the best interest of the Cabinet to proceed with the Southern Alternate.

**Discussion of Clear Zone**

Using the AASHTO Roadside Design Guide a clear zone of 24’ was determined. With the proposed typical section, this corridor has a design speed of 55mph with 5:1 fill slopes and ditch foreslopes and a design year ADT of 3200 vehicles/day, which provides a clear zone width of 24’.

**Consideration for Bicycle and Pedestrian Facilities**

This project is located in a rural area with no existing bicycle or pedestrian facilities that would provide connectivity in this area. The long range plan for this area does not include the addition of such facilities and there are no local or regional bicycle plans that have designated bicycle improvements for this area. Therefore, the design team did not see the need to include bicycle or pedestrian specific facilities as part of this project. The proposed 6’ useable shoulder may be used to accommodate pedestrian or bicycle traffic along the proposed roadway.



## WATER RELATED IMPACTS SUMMARY

|                            |                       |                  |          |                 |          |
|----------------------------|-----------------------|------------------|----------|-----------------|----------|
| <b>County</b>              | Allen                 | <b>Route No.</b> | KY 100   | <b>Item No.</b> | 3-320.00 |
| <b>Date</b>                | 8/1/2016              | <b>Program #</b> | 8962801D |                 |          |
| <b>Federal Project No.</b> |                       |                  |          |                 |          |
| <b>State Project No.</b>   | FD04 002 0100 003-005 |                  |          |                 |          |
| <b>Location Engineer</b>   | Wendy Southworth      |                  |          |                 |          |

### **Section 1: Impact Checklist**

Complete this section for each alternative considered at the conclusion of Phase 1 design.

#### **Northern Alternate**

| <b>FLOODPLAIN IMPACTS</b>   |            |                      |
|---|------------|----------------------|
| <b>FEMA Study Type</b>  | <b>Yes</b> | <b>Community No.</b> |
| Detailed FEMA Study with delineated floodway*   | X          | 210267               |
| Detailed FEMA Study without delineated floodway*  |            |                      |
| Approximate FEMA Study  |            |                      |
| No FEMA Study   |            |                      |
| <p>* May require initiation of the map revision process if impacts to water surface elevations cannot be avoided. Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to Sections DR 203 and DR 204 of the Drainage Manual.</p> |            |                      |

| <b>SIGNIFICANT RESOURCE IMPACTS</b>  |     |                          |    |   |
|--|-----|--------------------------|----|---|
| Are open sinkholes impacted?<br>If so, how many sinkholes are impacted?  | Yes | <input type="checkbox"/> | No | X |
| Are wetlands impacted?<br>If so, how many total acres are estimated? _____ acres   | Yes | <input type="checkbox"/> | No | X |
| Are any of the streams in the project area designated "Special Use Waters" (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)? | Yes | <input type="checkbox"/> | No | X |
|  |     |                          |    |   |

Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the drainage manual. Wetland impacts and their costs are also discussed in DR 500 of the Drainage Manual.

Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environment analysis for more information.

**STREAM CHANNEL IMPACTS**

|   |     |   |    |  |
|---|-----|---|----|--|
| Will stream relocations (channel changes) be needed?<br>If so, how many total linear feet are estimated? <u>1430</u> LF   | Yes | X | No |  |
| Will new culverts or culvert extensions be constructed?<br>If so, how many total linear feet are estimated? <u>743</u> LF | Yes | X | No |  |
| Will temporary stream crossings be needed?  | Yes | X | No |  |
| Will excess material sites that require permitting be needed?   | Yes | X | No |  |
| Will bridges be constructed?  | Yes | X | No |  |

On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the drainage manual.

**Southern Alternate**

| <b>FLOODPLAIN IMPACTS</b>                        |            |                      |
|--|------------|----------------------|
| <b>FEMA Study Type</b>                           | <b>Yes</b> | <b>Community No.</b> |
| Detailed FEMA Study with delineated floodway*    | X          | 210267               |
| Detailed FEMA Study without delineated floodway* |            |                      |
| Approximate FEMA Study                           |            |                      |
| No FEMA Study                                    |            |                      |

\* May require initiation of the map revision process if impacts to water surface elevations cannot be avoided. Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to Sections DR 203 and DR 204 of the Drainage Manual.

| <b>SIGNIFICANT RESOURCE IMPACTS</b>   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| Are open sinkholes impacted?<br>If so, how many sinkholes are impacted?   | Yes                      | <input type="checkbox"/> | No                       | X                        |
| Are wetlands impacted?<br>If so, how many total acres are estimated? _____ acres  | Yes                      | <input type="checkbox"/> | No                       | X                        |
| Are any of the streams in the project area designated "Special Use Waters" (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)?  | Yes                      | <input type="checkbox"/> | No                       | X                        |
|   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <p>Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the drainage manual. Wetland impacts and their costs are also discussed in DR 500 of the Drainage Manual.</p> <p>Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environment analysis for more information.</p> |                          |                          |                          |                          |
| <b>STREAM CHANNEL IMPACTS</b>   |                          |                          |                          |                          |
| Will stream relocations (channel changes) be needed?<br>If so, how many total linear feet are estimated? <u>1680</u> LF   | Yes                      | X                        | No                       | <input type="checkbox"/> |
| Will new culverts or culvert extensions be constructed?<br>If so, how many total linear feet are estimated? <u>978</u> LF   | Yes                      | X                        | No                       | <input type="checkbox"/> |
| Will temporary stream crossings be needed?  | Yes                      | X                        | No                       | <input type="checkbox"/> |
| Will excess material sites that require permitting be needed?   | Yes                      | X                        | No                       | <input type="checkbox"/> |
| Will bridges be constructed?  | Yes                      | X                        | No                       | <input type="checkbox"/> |
| <p>On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the drainage manual.</p>  |                          |                          |                          |                          |

**Reduced Southern Alternate**

| <b>FLOODPLAIN IMPACTS</b>  |            |                      |
|--|------------|----------------------|
| <b>FEMA Study Type</b>   | <b>Yes</b> | <b>Community No.</b> |
| Detailed FEMA Study with delineated floodway*  | X          | 210267               |
| Detailed FEMA Study without delineated floodway*   |            |                      |
| Approximate FEMA Study   |            |                      |
| No FEMA Study  |            |                      |
| * May require initiation of the map revision process if impacts to water surface elevations cannot be avoided. Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to Sections DR 203 and DR 204 of the Drainage Manual. |            |                      |

| <b>SIGNIFICANT RESOURCE IMPACTS</b>   |     |  |    |   |
|---|-----|--|----|---|
| Are open sinkholes impacted?<br>If so, how many sinkholes are impacted?   | Yes |  | No | X |
| Are wetlands impacted?<br>If so, how many total acres are estimated? _____ acres  | Yes |  | No | X |
| Are any of the streams in the project area designated "Special Use Waters" (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)?  | Yes |  | No | X |
| <p>Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the drainage manual. Wetland impacts and their costs are also discussed in DR 500 of the Drainage Manual.</p> <p>Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environment analysis for more information.</p> |     |  |    |   |
|   |     |  |    |   |

| <b>STREAM CHANNEL IMPACTS</b>   |     |   |    |   |
|---|-----|---|----|---|
| Will stream relocations (channel changes) be needed?<br>If so, how many total linear feet are estimated? ___ LF   | Yes |   | No | X |
| Will new culverts or culvert extensions be constructed?<br>If so, how many total linear feet are estimated? <u>468</u> LF   | Yes | X | No |   |
| Will temporary stream crossings be needed?  | Yes | X | No |   |
| Will excess material sites that require permitting be needed?   | Yes | X | No |   |
| Will bridges be constructed?  | Yes | X | No |   |
| On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the drainage manual. |     |   |    |   |

## **Section 2: Impact Discussion**

The selected alternate is located on the FEMA Flood Map Panel 21003C0250C (Allen County) and is in a "Zone A" flood area. The alternate crosses the Middle Fork Drakes Creek and also the Middle Fork Drakes Creek Tributary 5 and cannot be avoided. Both of these crossings will be bridges that will replace existing "Functionally Obsolete" bridges on the existing roadway. Both of these crossings will be upstream of the existing bridges. There will be approximately 1680 LF of channel changes needed. The proposed fill slopes will encroach into existing intermittent streams. Approximately 978 LF of new culverts will be needed to cross intermittent streams. This project is borrow in terms of earthwork quantity. It is the contractor's responsibility to determine borrow material sites and provide the necessary permitting that applies. As a temporary measure to minimize impacts to these streams during construction, erosion and sediment control structures will be utilized. Permanent solutions to minimize erosion and thereby lessening any long-term effects to the affected streams will include, but not limited to: permanent seeding, turf reinforcement, channel protection, mat protection, and culvert outlet scour protection. It is believed that the proposed construction impact to the environment, specifically the streams, will be minimal.