DESIGN EXECUTIVE SUMMARY

County: WARREN Item No.: 3-110.00

Federal Project No.: UPN: FD52 114 0185 006-013

MARS No.: 7904701D UPN: STPR 5074 (6)

Project Description:

Reconstruction/Relocation of KY 185 from 2500 feet north of KY 263 (near Pruitt Road) to the Green River Bridge.

Roadway Classification:

☐ Local ☒ Collector ☐ Arterial ☐ Interstate ☒ Rural ☐ Urban

ADT(current) 4000 ADT (2035) 9400 DHV (2035) 1100

Posted Speed Limit: ☒ 55 (rural) ☐ 35 (urban) ☐ Other (Specify):

Design speed selected by the Project Team 55 mph

☒ Concurrence in noted Typical Exceptions to be obtained from Director of Design.

DESIGN CRITERIA	EXISTING	TYPICAL	PROJECT TEAM RECOMMENDATION
Number of Lanes	2	2	2
Pavement Width	20 feet	24 feet	22 feet
Shoulder Width, Slope	2 foot, 2%	4' Pav., 4' Earth 4%	4' Paved, 4' Earth 4%
Bridge Width	22-foot bridge	box culvert	box culvert
Minimum Radius (e_{max} = 8%)	320 feet	965 feet	3820 feet
Maximum Grade	8.0%	7.0%	6.0%
Minimum Sight Distance	153 feet	495 feet	593 feet
Border Area (urban)			

Design Criteria Notes:

DESIGN EXECUTIVE SUMMARY (continued)

Access Control Type: By Permit

Environmental Action: Level 3 Categorical Exclusion Approval Date: Pending

Existing Pavement Depths: 1.5 inch Asphalt Surface with 3 inch Bit. Conc. Base on an 8 inch DGA base

Attachments:
(1) Map showing project location.
(2) Typical sections, including any bridges, on "8 1/2 X 11".
(3) Cost comparison table of alternates vs. Six-Year Plan.

Discussions:
(1) Alternatives considered including Preferred and No Build.
(2) If Preferred alternate cost is 15% or more above Six -Year Plan cost.
(3) Maintenance of Traffic Plan.
(4) Avoidance Alternatives to Water-Related Impacts.
(5) Consideration for bicycle and pedestrian facilities.
(6) Purpose and Need Statement.

Submitted By: _____ Date: 5/31/2012
Project Engineer, check one: (Depart of Highway ☐ or Consultant ☒)

Recommended By: _____ Date: 6/4/2012
Project Manager

Recommended By: _____ Date: _____
Location Engineer

Recommended By: _____ Date: _____
T.E.B.M. for Location

Comments:

Design Exception for Pavement Width: The pavement width suggested by the Common Geometric Practices for Rural Collector roads is 24 feet. The Project Team endorsed 11-foot lanes (22-foot pavement width) to reduce both the excavation and embankment limits and to reduce pavement costs.

GEOMETRIC APPROVAL GRANTED BY:

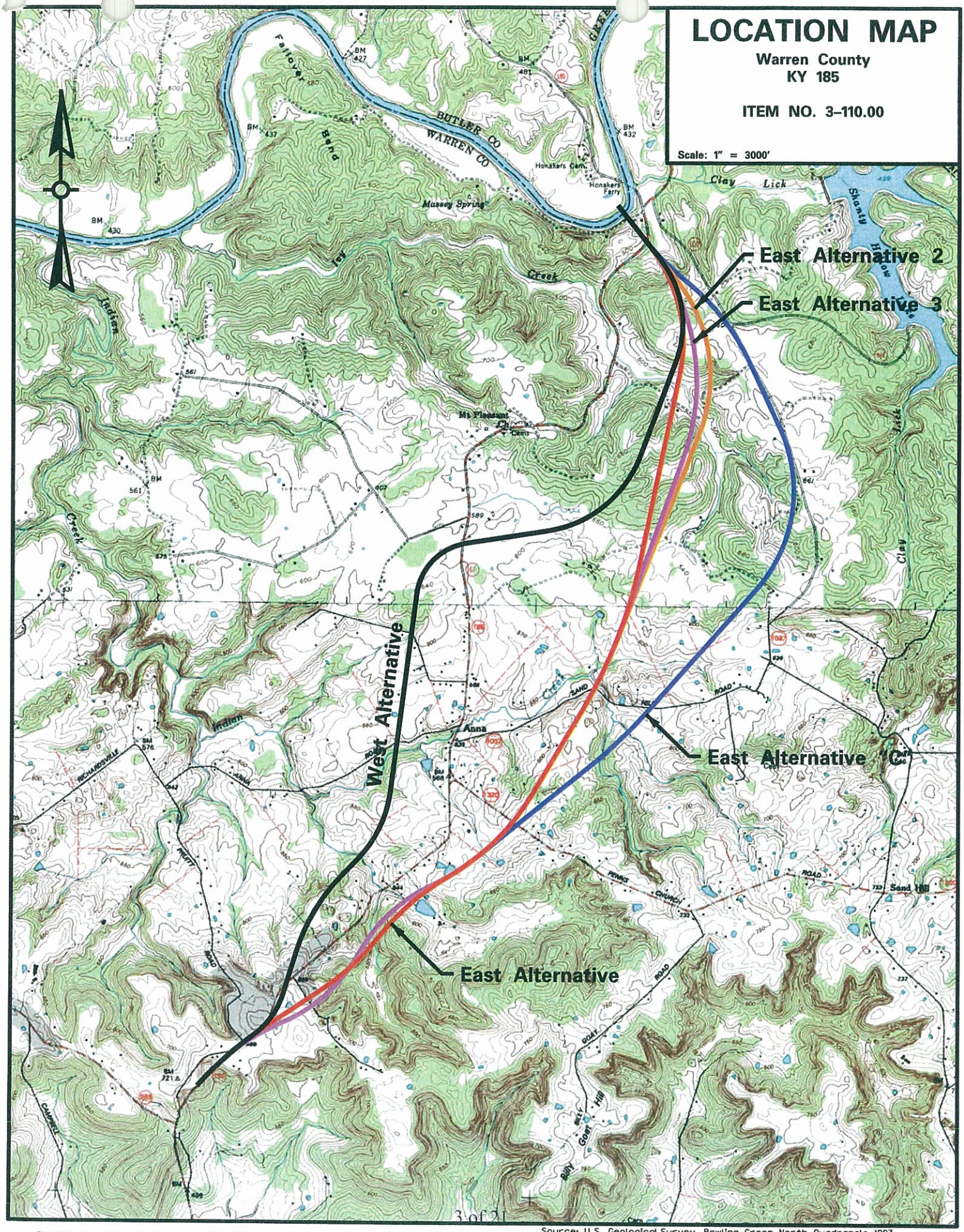
Signature: _____ Date: _____
Director, Division of Highway Design

LOCATION MAP

Warren County
KY 185

ITEM NO. 3-110.00

Scale: 1" = 3000'



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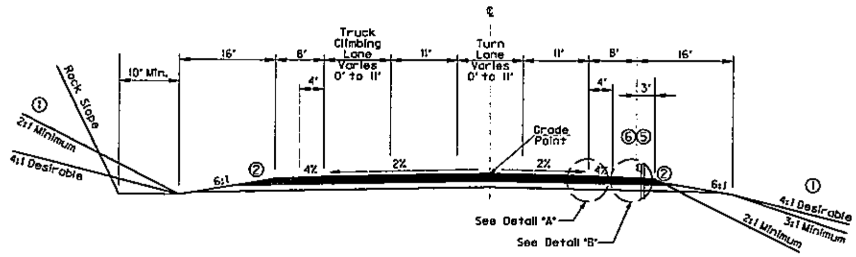
Source: U.S. Geological Survey, Bowling Green North Quadrangle 1993, and Reedyville Quadrangle, 1954 (Photoinspected 1979)

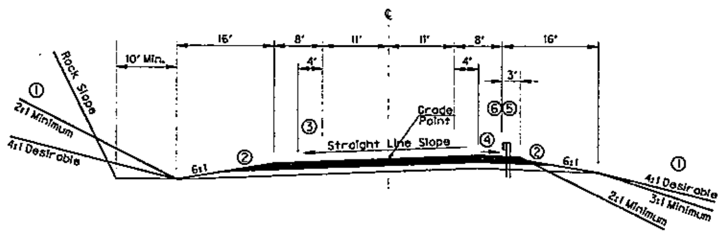
COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-110.00	

TYPICAL SECTIONS
KY 185

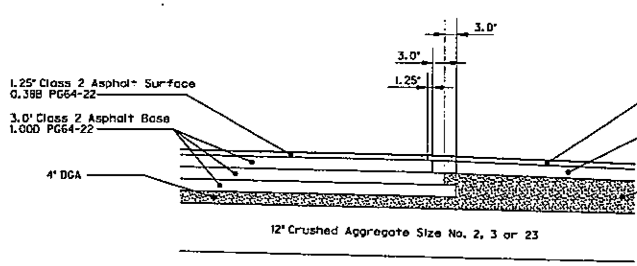
RURAL COLLECTOR CLASS ROADWAY
55 mph DESIGN SPEED
ROLLING TERRAIN
CONTROL OF ACCESS BY PERMIT



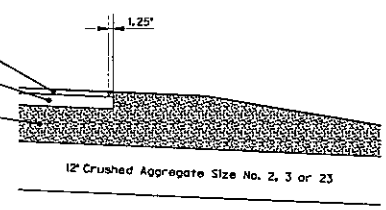
NORMAL SECTION



SUPERELEVATED SECTION



DETAIL "A"



DETAIL "B"

PAVEMENT DESIGN

NEW CONSTRUCTION: FLEXIBLE PAVEMENT

Roadbed Preparation:

- Fabric-Geotextile Type IV And Either:
  12" Crushed Aggregate Size No. 3
  or 12" Crushed Aggregate Size No. 2
  or 12" Crushed Aggregate Size No. 23

Pavement:

Pavement Design Not Finalized

Traffic Lanes:

- 4" compacted depth Dense Graded Aggregate Base
- 9.0" compacted depth Class 2 Asphalt Base 1.00D PG64-22 (3.0" + 3.0" + 3.0")
- 1.25" compacted depth Class 2 Asphalt Surface 0.38B PG64-22

Shoulders:

- Full Depth Dense Graded Aggregate Base
- 3.0" compacted depth Class 2 Asphalt Base 1.00D PG64-22
- 1.25" compacted depth Class 2 Asphalt Surface 0.38B PG64-22

Asphalt Seal:

- Emulsified Asphalt RS-2 2.4 lb/sq. yd. (2 applications)
- Asphalt Seal Aggregate 20 lb/sq. yd. (Size No. 8 or 9M) (2 applications)

Plan Note:

NOTES:

1. See Cross Sections for slopes beyond the limits of the shoulders.
2. Asphalt seal required from the outside edge of the paved shoulder to a point 2.0 feet down the ditch or fill slope.
3. Slope at same rate as superelevation except not flatter than slope indicated for normal shoulders.
4. High Side Superelevated Shoulder - construct to normal shoulder slope, except that the algebraic difference in shoulder slopes shall never exceed 8%.
5. Shoulder shall be widened three feet where Guardrail is to be installed.
6. Shoulders shall be paved full width within the guardrail limits. The remainder of the project shall be constructed with shoulders as otherwise shown.

KY 185
TYPICAL SECTIONS

KY 185

WARREN COUNTY

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DISCUSSION OF ALL CONSIDERED ALTERNATIVES

BACKGROUND:

The proposed project consists of the design and construction of a new, relocated KY 185 from 2500 feet north of the junction with KY 263 (near Pruitt Road) to the Green River Bridge located in Warren County, Kentucky. The existing KY 185 roadway from the beginning point to the Green River Bridge consists of two 10-foot lanes with grass shoulders. There are numerous horizontal and vertical deficiencies throughout this section of KY 185, especially north of the Mt. Pleasant Church of Christ. Upgrading this roadway would provide a safer facility for a segment of the Butler County population that drives KY 185 into Warren County daily for their jobs, local residents accessing both their homes and churches located along KY 185, school buses along the route, and recreational traffic to Shanty Hollow Lake.

Two relocated corridor alignments are proposed for KY 185, an eastern alignment from Pruitt Road to the Green River Bridge, and a western alignment which stays primarily on the west side of KY 185 then crosses KY 185 between Jack Simmons Road and Austin Raymer Road.

PURPOSE AND NEED:

The primary goals of this project are to improve traffic service and travel safety by providing modern roadway geometry with wider travel lanes and shoulders between project termini and providing a bypass for the most congested route segment in the Community of Anna. The proposed project would simultaneously serve to enhance highway accessibility and system connections for local communities and for Butler County to the north, particularly to I65 and the Western Kentucky Parkway, thereby promoting economic development potentials for the region. The reconstruction and widening of lanes in each direction will help relieve congestion and improve the reliability, speed, and travel expectations throughout the roadway segment. A safer, more efficient roadway network to accommodate the truck-auto mix projected for this growth area would also be anticipated to result from the reconstruction.

The "purpose and need" for this project is to provide the traveling public a safe facility which meets current design standards. The goals for this project are:

- To increase safety and reduce accidents.
- To improve capacity and the level of service of the roadway.
- To accommodate the forecasted increase in automotive and commercial truck traffic on KY 185. (Year 2006 – 4000 vehicles per day with 6.6% trucks; Year 2035 – 9400 vehicles per day with 10.2% trucks)
- To facilitate the movement of goods and services reinforcing economic development efforts in Warren and Butler Counties, while minimizing adverse economic,

environmental and community impacts in a most cost-effective manner.
- To provide a roadway facility that meets current design standards.

TYPICAL SECTION:

Division of Planning classified the new KY 185 as a Rural Collector. Geometric design criteria indicate a design speed of 55 mph for a Rural Collector roadway in rolling terrain with year 2035 Average Daily Traffic of 9400. The typical section will include two 11-foot lanes and 8-foot wide shoulders, of which 4-feet will be paved. KY 185 will also include an additional truck climbing lane where the criteria are met. The access to the new KY 185 road will be by permit.

NO BUILD ALTERNATIVE

A No Build Alternative would maintain the present roadway system with no improvements, which contains substandard horizontal curves for 55 mph design speed, unmet minimum sight distances at vertical sags and crests, and grades at more than the maximum allowable, and a continuation of present maintenance activities. While the No Build Alternative would not cause any community or environmental impact, it would fail to provide safety and accommodate future traffic volumes on KY 185. Also, the No-Build Alternative does not meet the purpose and need of the project.

ALIGNMENT ALTERNATIVES CONSIDERED

PRELIMINARY STUDIES
At the beginning of the preliminary phase of the project, four alternatives, two for each of the Eastern and Western Alternatives, were conceptually designed. Construction costs were not estimated for any of the alternatives during this conceptual phase.

The two eastern alternative alignments were very similar. Both alternatives followed generally the same alignment with one alternative being shifted 200 to 500 feet further east from the other. This shift was created by extending the existing horizontal curve, with a radius of 8618.57 feet, at the beginning of the project. The far eastern alignment was selected because of its better connection with many of the crossroads and its elimination of the need to acquire any of the homes near Pruitt Road along KY 185.

The two western alternative alignments were also very similar. Both alternatives followed the same alignment except where they crossed the existing KY 185 roadway. One alignment crossed halfway between Bratcher Road and Jack Simmons Road while the second alignment crossed between Jack Simmons and Anna Raymer Road. The second alignment was selected because it avoided taking several houses along KY 185 by crossing further north of Jack Simmons Road and also avoided the use of horizontal curves with minimum radii.

Preliminary Eastern Alternative
The Eastern Alignment Alternative that was studied begins approximately 350 feet south of Pruitt Road. The proposed roadway utilizes the existing horizontal curve at the beginning of the project and extends it to allow the proposed roadway to veer to the east away from the existing roadway. This will allow the existing roadway to remain open during the overlay construction of this section of the new road. Once the proposed alignment is in the cross-country portion of the proposed alignment, it will gradually be redirected northward until it ties into the existing roadway tangent extended from the Green River Bridge.

There will be no direct connection of the existing and proposed roadways at the project beginning location. Vehicles desiring to gain access to the proposed facility will use Scoggins Road for access. At the beginning of the project, a direct connection between existing KY 185 and the new proposed roadway alignment is not feasible because of the vertical elevation difference between the existing and the proposed roadway surfaces as well as the close proximity with Scoggins Road. A proposed cul-de-sac will be constructed along the existing roadway approximately 0.25 mile south of Scoggins Road. This cul-de-sac will allow for traffic turn-around on existing KY 185 and as well provide local access to the residences along the existing roadway adjacent to the proposed facility.

At the end of the proposed alignment, the existing roadway will be extended to provide a connection from the old KY 185 roadway to the new proposed alignment. The proposed KY 185 Connector utilizes an existing tangent and extends it towards the proposed KY 185 alignment. This intersection is located approximately 520 feet south of Lake Road. The KY 185 Connector will form a "T" intersection with the new facility. Left turn lanes will be provided in all directions to and from both the proposed roadways.

On the cross-country section of the proposed alignment, KY 185 will intersect with several crossroads and blueline streams. The proposed alignment crosses both Indian Creek just north of the new intersection with Anna-Sandhill Road, and Ivy Creek approximately 0.75 mile south of the proposed KY 185 Connector and 1600 feet upstream from the existing KY 185 Bridge. Between Scoggins Road and KY 1320, three horizontal curves are introduced shifting the proposed alignment within 700 feet of the existing KY 185 roadway at the intersection with a private entrance road. This was done to avoid several possible sensitive environmental areas.

Truck climbing lanes are proposed for KY-185 in the southbound direction only. Southbound, truck lanes are needed from the Green River Bridge to approximately 2,700 feet south of Jack Simmons Road and from 2,000 feet north of Scoggins Road to 700 feet south of Scoggins Road.

Fifty nine properties are affected, with four residences being taken by this alignment. This alignment also crosses five blue line streams, requiring five box culverts and one circular pipe, as well as crossing three farm ponds that will need to be drained and filled.

Preliminary Western Alternative

The Western Alignment Alternative that was studied begins approximately 250 feet south of Pruitt Road. The proposed alignment ties into an existing tangent then utilizes a horizontal curve to veer easterly from the existing roadway before crossing back over Existing KY 185 near the Scoggins Road intersection. An overlay condition at this tangent section will allow traffic to remain on the existing roadway during construction of this short section of the new roadway. From Scoggins Road, the proposed alignment will run on the west side of the existing roadway until veering to the east and crossing the existing road approximately 700 feet south of Austin Raymer Road. The proposed alignment then continues eastward before angling back to the north, tying into the tangent of the existing roadway located from the Green River Bridge.

Truck climbing lanes have been added on KY 185 in southbound direction only. Truck lanes are needed from the Green River Bridge to approximately 4200 feet north of the KY 185 South Connector and from 2000 feet south of KY 1320 to 1200 feet south of Scoggins Road.

Seventy-one properties are affected, with twelve residences being taken by this alignment. This alternative also crosses five blue line streams, requiring three box culverts, two elliptical pipe

culverts, and one single span bridge. Three farm ponds will be crossed and will need to be drained and filled.

Estimated Year 2008 costs at the Preliminary Line and Grade Stage for all alternatives are:

PHASE	2006 Six Year Plan Budgets	Eastern Alternative	Western Alternative
Right-of-Way Acquisition (FY 2011)	$5,000,000	$3,350,000	$6,100,000
Utilities Relocation (FY 2011)	$2,000,000	$1,960,000	$ 2,300,000
Construction (FY 2013)	$22,000,000	$40,012,874	$ 37,054,665
TOTAL	$29,000,000	$45,322,874	$45,454,665

The Project Team selected the Eastern Alignment as the preferred alternative at the Preliminary Line & Grade Meeting on March 19, 2009. The main reasons for choosing the Eastern Alternative over the Western Alternative are the following:

- The number of residences needed to be acquired for the Eastern Alternative (4) is one-third compared to the Western Alternative (12).
- The prime and unique farmland affected is just more than half of the area for the Eastern Alternative (48.8 ac) as compared to the Western Alternative (85.9 ac).
- The Eastern Alternative has a smoother alignment with fewer curves and intersections as compared to the Western Alternative as it is extends north from its existing alignment and continues following a cross-country path to the Green River Bridge.
- The Western Alternative crosses existing KY 185 twice. With the Eastern Alternative local traffic on the existing KY 185 roadway would not have to deal with the high speed thru traffic at both KY 1320 and the KY 185 South Connector Road intersections.
- The Eastern Alternative avoids disrupting the small subdivision atmosphere on Bratcher Road.
- The Eastern Alternative requires 0.50 miles less of truck climbing lanes compared to the Western Alternative.

Subsequent to the preliminary line and grade meeting, several revisions to the Eastern Alternative discussed above were explored. Three curves were added to the Eastern Alternative, shifting its preliminary alignment to the west approximately 500 feet adjacent to the Pruitt Saltpeter cave. Further iterations were then performed to move the alignment even further west.

Eastern Alternative Option 2 separates to the east from Existing KY 185 more quickly than the original Eastern Alternative, and then swings to the west an approximate additional 200 feet to be even further away from the exit to the Pruitt Saltpeter Cave. Separating to the east more quickly allows the alignment to avoid impacting two archaeological sites near Scoggins Road: a small rock shelter and a prehistoric open habitat. Eastern Alternative Option 2 then ties into the Eastern Alternative alignment near KY 1320 and follows it until Jack Simmons Road where the road separates to the east of the original Eastern Alternative. This shift to the east allows the profile to follow the ground-line more closely and greatly reduces the needed excavation, as

shown in the Table 1. This shift also reduces several of the cross roads' reconstruction lengths and avoids a historic farm/residence archaeological site, which was impacted by the original Eastern Alternative. Through movement on Scoggins Road to the proposed KY 185 alignment was eliminated. A new connection, South Connector, was added just south of Scoggins Road from Existing KY 185 to the proposed new alignment. A second connector, Central Connector, was added just south of KY 1320 that also connected Existing KY 185 to the proposed new alignment.

Eastern Alternative Option 3 attempts to avoid an archaeological site directly impacted by Eastern Alternative Option 2 that may require a Phase II archaeological assessment: a prehistoric rock shelter. Option 3 follows Option 2 until Jack Simmons Road. After this point, the alignment runs between the original Eastern Alternative and Option 2. This alignment avoids impacting the rock shelter near Ivy Creek, as well as the historic farm/residence that was impacted by the original Eastern Alternative. The excavation quantity does increase for Option 3 over Option 2 but still shows significant savings over the original Eastern Alternative.

Finally, a fourth option, Eastern Alternative C, was explored. A portion of this alternative is outside of the original mapping limits and was developed using contour data provided by the Warren County GIS department. Eastern Alternative C follows the Eastern Alternative until KY 1320. Instead of curving back to the north beyond KY 1320, as the original Eastern alternatives do, Alternative C continues to the east. At its farthest point, Eastern Alternative C is approximately 3500 feet east of the original Eastern Alternative. The alignment curves back to the north near Jack Simmons Rd, then runs adjacent to Lake Road before tying into the existing KY 185 before the Green River Bridge. A portion of existing Lake Road, between Jack Simmons Road and Shanty Hollow Road, will be removed and new access points will be provided to access the remaining portions of road. The main benefit of this alignment is the flatter terrain, allowing for a greatly reduced excavation quantity compared to the other Eastern Alternatives. This alignment also avoids the historic rock shelter site impacted by the original Eastern Alternatives. Eliminating the through movement on Scoggins Road to KY 185 remained as part of this alternative as well as the two new connections, South and Central Connectors, from the existing roadway to the proposed new alignment for KY 185. A cul-de-sac on Scoggins Road was added on the west side of KY 185. A cul-de-sac on KY 1320 was added on the west side of the proposed KY 185 alignment. This also eliminated the through movement on KY 1320. Traffic traveling south on the new KY 185 roadway would access the old road using the Central Connector.

At the December 8, 2011 meeting with the U.S. Fish and Wildlife Service, the possibility of lowering the profile near the Pruett Saltpeter Cave, which would necessitate blasting, was discussed. It was agreed that, due to the area's sandstone lithology, if controlled blasting were used when the habitat is unoccupied, no adverse impacts to the Indiana bat hibernaculum would be anticipated. The decision to utilize blasting in this area will be made only after the geotechnical study has been completed.

Shifting the alignment to the west to move farther away from the historic rock shelter at the north end of the project was also discussed. It was agreed that the alignment would be shifted in Phase II, if necessary, when more accurate mapping of the rock shelter location becomes available.

Table 1 Eastern Alternative Cost and Earthwork Comparisons

	Eastern Alternative	Eastern Alternative Option 2	Eastern Alternative Option 3	Eastern Alternative C
Total Construction Cost (FY 2013)	$40,012,874	$27,309,013	$28,740,093	$23,827,863
Roadway Excavation (CYD)	2,900,000	1,700,000	1,930,000	1,470,996**
Waste (CYD) *	302,600	19,800	393,000	17,512

* Waste quantity may be reduced by rock benching.
** This quantity includes profile and embankment benching.

On March 13, 2012, a second Preliminary Line & Grade Meeting was held and Eastern Alternative C was selected as the preferred alignment. Some of the same reasons still apply for Eastern Alternative C being selected as the preferred alternative over the Western Alternative and the three other eastern alignments.

- Three residences are needed to be acquired for the Eastern Alternative C.
- 39.9 acres of prime and unique farmland are affected by the Eastern Alternative C.
- Eastern Alternative C has significantly lower roadway excavation costs compared to all the other alternatives.
- Eastern Alternative C has the lowest construction costs of all the alternatives.
- The alignment for Eastern Alternative C has been shifted significantly further away from one of the exits from the Pruitt-Saltpeter Cave.
- Rockshelters, a natural ravine, and several archaeology sites have been avoided by the alignment of Eastern Alternative C.

PREFERRED ALTERNATE COST:

Estimated Year 2012 costs at the Preliminary Line and Grade Stage for all alternatives are:

PHASE	2012 Highway Plan Budgets	Eastern Alternative C
Right-of-Way Acquisition (FY 2012)	$3,700,000	$3,000,000
Utilities Relocation (FY 2012)	$2,250,000	$2,234,000
Construction (FY 2014)	$24,500,000	$23,827,863
TOTAL	$30,450,000	$29,061,863

ENVIRONMENTAL ISSUES:

During the preliminary design phase for the KY 185 project, sufficient environmental investigations were completed to permit completion of an Environmental Assessment. Findings of the environmental investigations are summarized below.

- Air Quality: The proposed project is in compliance with the Kentucky State Implementation Plan for Attainment and Maintenance of National and State Ambient Air Quality Standards. The proposed project is not expected to negatively impact the ambient air quality in the project area.

- Aquatic and Terrestrial: Eastern Alternative C is expected to impact 164 acres of habitat. Portions of 14 isolated and jurisdictional ephemeral streams; 11 isolated and jurisdictional intermittent streams; and 2 jurisdictional perennial streams will impacted by culverts or fill activities. Approximately 0.519 acre of two jurisdictional wetlands will be impacted; the entirety of one wetland/pond will be filled during construction. Eastern Alternative C has less stream, open water, and wetland impacts than some previously considered alternatives.

  Several permits will be required for the project. Wetland, stream, lake, and pond impacts will likely require U.S. Army Corps of Engineers (USACE) Individual Permits. Construction of Eastern Alternative C will result in surface disturbances of approximately 164 acres; therefore, a KPDES KYR10 storm water permit will be required. The floodplains of Ivy Creek and Indian Creek are designated Federal Emergency Management Agency (FEMA) Zone X; therefore, the project will require a permit to construct across or along a stream from the Kentucky Division of Water, Floodplain Management Section. Warren County is an MS4 community; therefore, the project must comply with the appropriate ordinance, including Erosion Prevention and Sediment Control.

- Threatened and Endangered Species: The project area's mixed-age woods and young woods habitat represent potential foraging areas for gray bat. The caves within the proposed project corridor represent potential roosting habitat for this species. The project area's young woods and mixed-age woods habitat represent potential for Price's potato bean. The project is located in the vicinity of a known Priority 3-4 Indiana bat hibernaculum. One cave was found within the study area of each alternative. A Phase I Habitat Assessment of the cave located within the study area of Eastern Alternative C was performed on December 2, 2011. Bat use of this feature was not evident, and based on the limited extent of this feature, it was not considered a potential Indiana bat hibernaculum. The results of the Phase I Assessment were presented to the U.S. Fish and Wildlife Service (USFWS) during a meeting on December 8, 2011. USFWS verbally concurred with the determination that the features do not represent potential Indiana bat hibernaculum; however, formal concurrence will be required through completion of a Biological Assessment of the preferred alternative. The requested Biological Assessment should address Indiana bat, gray bat, and Price's potato bean.

  Based on the revisions to the original Eastern Alternative under the proposed Eastern Alternative C, the Ecological Assessment Report concludes that the Eastern Alternative C causes minimal impact to the overall ecological community.

- Archaeology: A Phase I Archaeological Intensive Survey of the Eastern Alternative C was completed in 2011. On August 29, 2011, SHPO concurred with the survey's results that no further archaeological investigations of ten previously unidentified sites (15WA177-15WA 186) are warranted. SHPO stated that if Site 15WA353 could not be avoided, a Phase II NRHP evaluation will be required. Current preliminary plans show that the project will impact seven archaeological resources; however, Site 15WA353 will be avoided in final right-of-way design plans. Potential impacts and other discussions are listed below:

  Site 15Wa172 is a prehistoric open air habitation site with isolated historic artifacts. It is not eligible for inclusion on the National Register of Historic Places, and no further archaeological investigations are warranted.

  Site 15Wa178 is a historic house/farmstead. It is not eligible for inclusion on the National Register of Historic Places, and no further archaeological investigations are warranted.

  Sites 15Wa181, 15Wa182, 15Wa183, and 15Wa184 are prehistoric open air habitation sites. They are not eligible for inclusion on the National Register of Historic Places, and no further archaeological investigations are warranted.

  Site 15Wa353 is a prehistoric rockshelter occupation. It may be eligible for inclusion on the National Register of Historic Places and should be avoided or subjected to Phase II archaeological investigations to evaluate its significance. Currently, the site is located within the right-of-way on the preliminary designs. Due to the potential significance of the archaeological resource, the final right-of-way design plans will be shifted so that the site is avoided. Since the final right-of-way design plans will have no effect on the site, no Phase II archaeological investigation will be necessary.

  No Section 4(f) archaeological resource or "potential" Section 4(f) archaeological resource will be affected.

- Cultural Historic: In May 2011, a Cultural Historic Survey was conducted for Eastern Alternative C to determine if any historic properties would be impacted. Two historic properties, Sites 22 and 23, were found to be within the Area of Potential Effects (APE) for Alternative East C. Neither of these properties met any National Register of Historic Places (NRHP) Criteria for listing; therefore, they are not potentially eligible for the NRHP.

  Two nearby properties, Sites 15 and 18, were previously determined eligible for the National Register in a separate assessment had been previously completed for the original Eastern and Western Alternatives. Eastern Alternative C is 1,050 feet east of Site 15, the Young Barn, and is 5,500 feet east of Site 18, the Spout Spring. The construction of Eastern Alternative C will have no direct, indirect, or cumulative impacts to those characteristics which qualify Sites 15 and 18 for listing in the National Register of Historic Places.

  On October 11, 2011, the State Historic Preservation Office (SHPO) concurred that Eastern Alternative C will not impact Sites 15 and 18 and that there will be No Historic Properties Affected by the construction of Alternative East C. They also concurred that Sites 22 and 23 were ineligible for listing in the National Register of Historic Places.

- Noise: The Summary of Impacts by Scenario and Alternative lists the following Total Impacted Receptors:

Existing and predicted noise levels (dBA, L_{eq})

Site	2011 Field-Measured Existing	2035 No-Build	2035 Alternative East C	National Abatement Criteria
1	60	64	63	67
2	48	53	57	67
3	53	60	61	72

Predicted change in noise levels (dBA, L_{eq})

Site	Changes from 2011 Existing levels to 2035 Build levels	Changes from 2035 No-Build levels to 2035 Build levels
1	3	-1
2	9	4
3	8	1

- Socioeconomic: Eastern Alternative C is expected to relocate three residences. On December 1 and 2, 2011, KYTC District 3 staff conducted interviews with each of the households that may be relocated in order to obtain socioeconomic data from and to assess impacts to each household; none of the households contained minority residents. Two households include disabled individuals who earn less than $40,000 each year; according to the definitions outlined in Executive Order 12898, one household is considered low-income. The households containing disabled residents feel that if they are relocated, moving to Bowling Green would benefit them because they would have better access to healthcare services. The non-disabled household prefers living in rural Warren County; they would prefer the road take their home rather than live immediately adjacent to the road. This household would like to begin looking for land on which to build as soon as possible.

- Underground Storage Tank/Hazardous Materials: Several research and survey methods were utilized to complete the Phase I Environmental Site Assessment. The primary purpose of the assessment was to conduct an investigation of the subject properties and surrounding properties to identify *recognized environmental conditions* associated with the past or present uses of the properties. The term recognized environmental conditions is defined as the presence or likely presence of any hazardous substances or petroleum products under conditions that indicate an existing release, past release, or a material threat of a release that could impact the property. This environmental assessment was conducted following the ASTM E1527-05 Standard Practice for Environmental Site Assessments and 40 CFR 312. This assessment was also intended to identify potential off-site contaminant sources with the distances set forth in the ASTM E1527-05 guidelines and 40 CFR 312.

  The peripheries of the properties in the project area that may potentially be impacted by construction activities were viewed during site reconnaissance. Fifteen sites of environmental interest have the potential to impact the proposed project. If new right-of-way is required from these properties, additional investigations are recommended.

Sites of environmental interest

Parcel	Property Addresses	Points of Interest
036B-68	354 Runner Road	One used motor oil drum left by previous owner; adjacent property is goat farm/junkyard
036B-74-15	7571 Richardsville Anna Road	Adjacent property has/had septic tank spill
036B-76B	7815 Richardsville Anna Road	Barn with old cars, debris
036B-78F	7920 Richardsville Anna Road	Engine oil and coolant stored on site; transformer not tested for PCBs
036B-78H	7978 Richardsville Anna Road	Has/had sump, sand/grease trap, or oil-water separator
036B-93	9032 Richardsville Anna Road	Pesticides used on tobacco field and garden
036B-96	6677 Penns Chapel Road	Pond has been cleaned up (batteries, tires)
046A-57	1333 Lake Road	Trash, debris, ASTs, old equipment in yard
046A-57B	Lake Road	Oil tanks near Lake Road
046A-82-001	166 Glenmore Road	USTs
046A-69	Lake Road	coal residue from storage area near Old Highway 185 has been cleaned up
047A-01	7088 Penns Chapel Road	Oil well #53843, two 150-gallon oil tanks, transformer not tested for PCBs
047A-02	6936 Penns Chapel Road	Pesticides reportedly used on tobacco plot and garden
047A-04	6708 Penns Chapel Road	Sink holes previously used for trash disposal
047A-64C-001	Jack Simmons Road	Natural gas well on property with underground lines

MAINTENANCE OF TRAFFIC PLAN

EASTERN ALTERNATIVE C

Phase I

- Construct majority of the new cross-county alignment while maintaining temporary connections to all existing intersections and the entrance near 1577+00. Traffic will be maintained on the existing roadway.
- Construct the southern end tie-in with at least two minimum lane widths using part-width construction methods while maintaining traffic on the Existing KY 185 pavement. Work adjacent to Existing KY 185 will be accomplished behind a lane closure during daylight hours. The proposed paved shoulder on the east side may be used in some tight locations as part of the two temporary lanes. Use temporary guardrail as needed along the traveled way at locations with significant vertical differences between the existing and proposed roadways.
- Construct a majority of the crossroad connections as part of the overall mainline construction as follows:
    - Construct Pruitt Road by closing connection to KY 185 and diverting traffic to Lodge Hall Road to access Existing KY 185. Construct residential entrances at the same time. Once grading and surfacing are completed, provide temporary connection to Existing KY 185 and reopen to traffic.
    - Construct South Connector while maintaining traffic on the Existing KY 185 pavement. Work adjacent to Existing KY 185 will be accomplished behind a lane closure during daylight hours. Barricade access to the Proposed KY 185 roadway.

- Construct Scoggins Road using part-width construction methods and lane closures during daylight hours. Construct temporary tie in across Proposed KY 185 for Proposed Scoggins Road traffic to access existing Scoggins Road.
- Construct entrance at station 1577+00 at the same time as mainline portion, being sure to maintain existing residential access across Proposed KY 185.
- Construct Central Connector while maintaining traffic on the Existing KY 185 pavement. Work adjacent to Existing KY 185 will be accomplished behind a lane closure during daylight hours. Barricade access to the Proposed KY 185 roadway.
- Construct KY 1320 with at least two minimum lane widths using part-width construction methods while maintaining traffic on the Existing KY 1320 pavement. Construct temporary tie in to existing KY 1320 on the west side of Proposed KY 185 to allow traffic to cross Proposed KY 185. Work adjacent to Existing KY 1320 will be accomplished behind a lane closure during daylight hours. Traffic may be diverted on to Anna-Sandhill Road to complete the construction of KY 1320 east of the intersection with the proposed KY 185 alignment if necessary. Construct residential entrances at the same time. Once KY 1320 is completed, reopen to traffic allowing traffic to cross Proposed KY 185 while barricading access to the Proposed KY 185 roadway.
- Construct both Anna-Sandhill Road approaches by closing the road and diverting traffic to Jack Simmons Road. Construct residential entrances at the same time. Once the Anna-Sandhill Road approaches are completed reopen to traffic allowing traffic to cross Proposed KY 185 while barricading access to the Proposed KY 185 roadway.
- Construct Jack Simmons Road by closing the road and diverting traffic to the reconstructed Anna-Sandhill Road. Construct residential entrances at the same time. Once Jack Simmons Road is completed reopen to traffic allowing traffic to cross Proposed KY 185 while barricading access to the Proposed KY 185 roadway.
- Construct Lake Road South while maintaining traffic on Existing Lake Road pavement. Work adjacent to Lake Road will be accomplished behind a lane closure during daylight hours. Barricade access to the Proposed KY 185 roadway.
- Construct Shanty Hollow Road while maintaining traffic on Existing Shanty Hollow Road. Work adjacent to Existing Shanty Hollow Road will be accomplished behind a lane closure during daylight hours. Barricade access to the Proposed KY 185 roadway.
- Construct Lake Road Central while maintaining traffic on Existing Lake Road. Work adjacent to Existing Lake Road will be accomplished behind a lane closure during daylight hours. Barricade access to the Proposed KY 185 roadway.
- Construct North Connector. Work adjacent to Existing KY 185 will be accomplished behind a lane closure. Barricade access to the North Connector at its intersection with Existing KY 185.
- Construct the northern end tie-in with at least two minimum lane widths using part-width construction methods while maintaining traffic on the Existing KY 185 pavement. The proposed paved shoulder on the east side may be used in some tight locations as part of the two temporary lanes.
- Construct Lake Road North connection by closing the road and diverting traffic to the reconstructed Jack Simmons Road. Once Lake Road is completed reopen to traffic allowing traffic to access KY 185.

Phase II

- Shift traffic to Proposed KY 185.
- Finalize construction of the southern KY 185 tie-in by utilizing lane closures during daylight hours. Remove existing pavement adjacent to Proposed KY 185 not required for entrances.
- Finalize Pruitt Road intersection.
- Finalize South Connector tie-in to Existing KY 185. Construct entrances on South Connector and remove existing pavement adjacent to road.
- Finalize Scoggins Road intersection. Remove temporary tie in to existing Scoggins Road. Construct Cul-De-Sac on existing Scoggins Road to the west of Proposed KY 185 while maintaining local access to residences.
- Finalize Central Connector tie-in to Existing KY 185. Construct entrances on Central Connector.
- Finalize KY 1320 intersection. Remove temporary tie in to existing KY 1320. Construct Cul-De-Sac on existing KY 1320 to the west of Proposed KY 185 while maintaining local access to residences.
- Finalize Lake Road South tie-in with Existing Lake Road. Remove existing pavement along Lake Road to the north of the tie-in.
- Finalize Shanty Hollow Road tie-in with Existing Shanty Hollow Road. Remove existing pavement along Shanty Hollow Road to the north of the tie-in.
- Finalize Lake Road Central tie-in with Existing Lake Road. Remove existing pavement along Lake Road to the south of the tie-in.
- Open North Connector to Existing KY 185 traffic and remove any remaining existing pavement between North Connector and proposed roadway.
- Finalize construction of the northern KY 185 tie-ins by utilizing lane closures during daylight hours.

CONSIDERATION OF BICYCLE AND PEDESTRIAN FACILITIES

Bicycle and pedestrian facilities currently do not exist on this section of KY 185. Under the existing circumstances, cyclists would need to use the through lane for travel. Pedestrians would also have to step off the roadway onto the minimal earth shoulders or into the roadside ditch to avoid oncoming traffic.

KY 185 is listed as a scenic trail on the Warren County Greenways Plan. Bicyclists are attracted to this area because of the Shanty Hollow Lake recreational area. The proposed design includes wider travel lanes and 8-feet shoulders (4-feet paved), which have safety and operational advantages in providing a place for bicyclists and pedestrians to operate along this corridor. Both cyclists and pedestrians should encounter safer conditions within the limits of the proposed project than along the remainder of the KY 185 roadway in Butler County north of the Green River Bridge. The existing KY 185 roadway that remains after the construction of the new alignment may revert to a local rural road and could be designated as the bike way path if desired.

CONSIDERATION OF "PRACTICAL SOLUTIONS"

For Phase II Design, several design changes should be considered to help reduce the construction costs of the preferred alternative. The KY 185 typical section can be modified to help reduce construction costs and earthwork quantities. The following changes are recommended:

- Reducing the design speed from 60 mph to 55 mph
- Reducing the lane widths from 12 feet to 11 feet.
- Reducing the shoulders from 12 feet (10-foot paved) to 8 feet (4-foot paved).
- Reducing the clear zone from 30 feet to 24 feet.
- Using guardrail in the vicinity of culverts with 2:1 fill slopes to reduce disturb limits and culvert lengths in high fill areas.

KY 185

WARREN COUNTY

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ITEM NO. 3-110.00

AVOIDANCE OF WATER-RELATED IMPACTS

This project is located just south of the Warren-Butler County line in the northern portion of Warren County. It involves construction of a new two-lane facility from 2500 feet north of the junction with KY 263 (near Pruitt Road) to the Green River Bridge to improve safety and reduce accidents on KY 185.

All of the alternatives were designed using a 55 mph design speed. The typical section includes two 11-foot lanes and 8-foot wide shoulders, of which 4-feet will be paved. KY 185 will also include an additional truck climbing lane where the criteria are met.

Two alignment alternatives were initially studied for this project. Five tributaries of both Indian Creek and Ivy Creek are impacted by these alignments located within the project limits.

For the Eastern Alternative, the proposed culverts are located at the following locations:

Approximate Station	Estimated Culvert Size
Sta. 558+78	10' x 10' RCBC
Sta. 595+32	48" Pipe
Sta. 647+92	Dbl 10' x 6' RCBC
Sta. 652+46	Dbl 12' x 6' RCBC
Sta. 727+18	12' x 12' RCBC
Sta. 414+41 (Anna-Sandhill)	Dbl 10' x 6' RCBC

For the Western Alternative, the proposed culverts are located at the following locations:

Approximate Station	Estimated Culvert Size
Sta. 2573+28	Dbl 10' x 7' RCBC
Sta. 2602+73	52' Single Span Bridge
Sta. 2695+71	10' x 7' RCBC
Sta. 2737+02	Dbl 10' x 8' RCBC
Sta. 120+25 (Ex. KY 185)	48" Equiv. Ellip. Pipe
Sta. 323+40 (KY 1320)	48" Equiv. Ellip. Pipe

Eastern Alternative C was studied using mapping outside of the original project limits. Eastern Alternative C impacts six tributaries to either Ivy or Indian Creek.

For Eastern Alternative C, the proposed culverts are located at the following locations:

Approximate Station	Estimated Culvert Size
Sta. 1561+10	10' x 10' RCBC
Sta. 1635+73	10' x 6' RCBC
Sta. 1644+25	10' x 5' RCBC
Sta. 1649+75	7' x 4' RCBC
Sta. 1668+20	12' x 8' RCBC
Sta. 1757+50	6' x 3' RCBC

WATER RELATED IMPACTS SUMMARY

County	Warren	**Route No.**	KY 185	**Item No.**	3-110.00
Date	5-9-2011	**Program #**	N/A		
Federal Project No.	N/A				
State Project No.	N/A				
Location Engineer	Chuck Allen				

Section 1: Impact Checklist

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

FLOODPLAIN IMPACTS		
FEMA Study Type	**Yes**	**Community No.**
Detailed FEMA Study with delineated floodway*		
Detailed FEMA Study without delineated floodway*		
Approximate FEMA Study		
No FEMA Study	X	21227C

* 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.

SIGNIFICANT RESOURCE IMPACTS				
Are open sinkholes impacted? If so, how many sinkholes are impacted? 3	Yes	X	No	
Are wetlands impacted? If so, how many total acres are estimated? 0.8 acres	Yes	X	No	
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

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? If so, how many total linear feet are estimated? _____ LF	Yes		No	X
Will new culverts or culvert extensions be constructed? If so, how many total linear feet are estimated? 1188 LF	Yes	X	No	
Will temporary stream crossings be needed?	Yes		No	X
Will excess material sites that require permitting be needed?	Yes		No	X
Will bridges be constructed?	Yes		No	X
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

Guardrail was utilized in many of the culvert locations to shorten the culvert length.

The floodplains of Ivy Creek and Indian Creek in the vicinity of KY 185 are designated FEMA Zone X (Maps 21227C0075E and 21227C0160E).