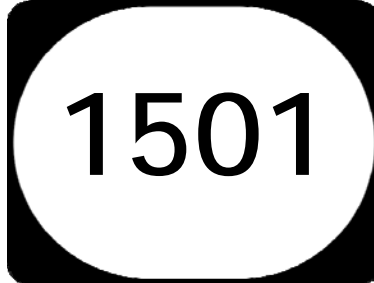


ALTERNATIVES PLANNING STUDY

Final Report



Kentucky 1501 (Hands Pike)

From KY 16 to KY 17 in the City of Covington

Kenton County, Kentucky

Item No. 6-8307.00

Prepared for:

KENTUCKY TRANSPORTATION CABINET

DIVISION of PLANNING

Prepared by:



December 2008



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EXECUTIVE SUMMARY

Study Background and Purpose

In 2003, the Ohio-Kentucky-Indiana Regional Council of Governments (OKI), the designated metropolitan transportation planning organization for the greater Cincinnati metropolitan area, completed the Kenton County (KY) Transportation Plan in conjunction with the Kentucky Transportation Cabinet, the Northern Kentucky Area Planning Commission, and the Transit Authority of Northern Kentucky. That plan, which included “recommendations for improving a multi-modal transportation system within the constraints imposed by financial resources” listed improvements to KY 1501 (Hands Pike) as a priority project. The 2006-2012 KYTC Six-Year Highway Plan identified this study as Item 6-8307. In 2007 KYTC selected the consulting firm of Qk4 to conduct the study.

Study Location and Limits

Hands Pike is a 2.52-mile state-maintained collector roadway within Kenton County. It is located in southern Covington, south of I-275 between KY 16 and KY 17.

Project Goals

The goals for projects to be evaluated in the Hands Pike study result from discussions with the KYTC Project Team, local officials, and other project stakeholders. The project goals include:

- ❖ Improve safety conditions of KY 1501
- ❖ Improve access for local traffic

Further, it was explicitly stated that the goals did not include providing for an improved connector between KY 16 and KY 17.

Conditions Analysis

Traffic counts on Hands Pike reveal an estimated 2008 average daily traffic volume (ADT) of 9,600 vehicles a day (vpd) near the intersection with KY 17, with a Level of Service (LOS) of D, and 4,400 vpd near the intersection with KY 16, with an LOS of C. The entire corridor has a critically high crash rate, but the worst section is along Hands Pike Hill, where more than 90 percent of crashes occurred during wet weather. The percentage of trucks in the traffic stream is less than five percent. In the recent past, KY 17 was widened and reconstructed. That project included rebuilding the approach of KY 1501 to current design standards for approximately 1,100 feet east. From that point to KY 16, the lane widths are a substandard 9 feet wide and the shoulders are 1 foot or less. Access control is by permit only, and the posted speed limit is 35 miles per hour (mph). Right-of-way (R/W) widths average 60 feet. It should be noted that KYTC has programmed, and is buying right-of-way for the reconstruction of KY 16, which will include approximately 1,000 feet of KY 1501.

Alternatives Development and Evaluation

There are discreet transportation issues that vary by location along the Hands Pike corridor. Thus, the corridor was segmented into four analysis sections. Those analysis sections and the short- and long-term improvements options considered for each follow:

ANALYSIS SECTIONS AND IMPROVEMENT CONCEPTS

ANALYSIS SECTION 1

Hands Pike Hill
 KY 17 (MP 0.22) to
 near Crystal Lake
 Drive (MP 0.91)

Short Term Options

❖ **Hands Pike Hill Spot Improvements 1:** This short-term improvement would reconstruct the horizontal curve at the bottom of the hill, just east of Wayman Branch Road (KY 3035). At the direction of the KYTC Project Team, the curve would be improved to 45 mph design speed for an added margin of safety. It would include widening the travel lanes from 9 to 12 feet as well as the addition of 2-foot-wide shoulders with rumble strips and a 4-foot-wide flat bottom ditch along the east side of the roadway. Existing 8-inch and 16-inch sewer lines would be relocated and a box culvert would be replaced and extended.

Approximate Length: 2,200 feet **Estimated Cost:** \$6.8 million

❖ **Hands Pike Hill Spot Improvements 2:** This short-term improvement would address the top portion of Hands Pike Hill. Beginning near MP 0.6 and ending near MP 0.9, it would include widening the travel lanes from 9 to 12 feet as well as the addition of 2-foot-wide shoulders with rumble strips and a 4-foot-wide flat bottom ditch along the north and east side of the roadway (i.e., adjacent to the downhill travel lane). The existing horizontal curve radius would be increased and there would be additional widening on the inside of the curve. Existing cross-drainage structures would be improved and slopes along the north and east side of the roadway would be cut back to improve sight distance.

Approximate Length: 2,400 feet **Estimated Cost:** \$1.5 million

Long Term Options

❖ **Alternative Concept 1.0:** This long-term improvement option would reconstruct KY 1501 in its current location—it is essentially a combination of Spot Improvements 1 and 2. It would begin near the intersection of Hands Pike with KY 3035 and include two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists and 4:1 slopes outside the shoulder.

Approximate Length: 4,750 feet **Estimated Cost:** \$8.3 million

Alternatives 1.1 through 1.5 are options that would relocate Hands Pike on new alignment from the top, or near the top, of the hill to KY 17. The different options were explored to identify opportunities, constraints, and costs associated with building on new alignment. Each option includes two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists and 4:1 slopes outside the shoulder.

❖ **Alternative Concept 1.1:** This improvement would begin near the intersection of Madison Pike and KY 17 approximately 0.3 mile south of the current intersection of Hands Pike with KY 17 and would traverse an easterly then northeasterly path, tying in with the current Hands Pike alignment near mile point (MP) 0.65. This option is less expensive than the others because it would require less excavation.

Approximate Length: 3,850 feet **Estimated Cost:** \$9.0 million

❖ **Alternative Concept 1.2:** As with Alternative 1.1, this improvement would begin near the intersection of Madison Pike and KY 17 but would traverse a more easterly path than Alternative 1.1, tying in with the current Hands Pike alignment near MP 0.9.

Approximate Length: 3,650 feet **Estimated Cost:** \$13.2 million

❖ **Alternative Concept 1.3:** This improvement would begin approximately 0.6 mile south of the intersection of Hands Pike and KY 17 and traverse a northerly then easterly corridor, tying in with the current Hands Pike alignment near the intersection with Crystal Lake Road (MP 1.03). The concept's length would enable a vertical grade of less than 5%, but the length is why this option is notably more costly than other options.

Approximate Length: 4,850 feet **Estimated Cost:** \$27.0 million

❖ **Alternative Concept 1.4:** This improvement would deviate from the existing Hands Pike alignment near MP 0.4 and traverse north and east of the current road before tying back in near MP 0.9. This alignment is notably more expensive than the others, even though it is shorter, because of right-of-way acquisition costs.

Approximate Length: 3,150 feet **Estimated Cost:** \$27.8 million

❖ **Alternative Concept 1.5:** This improvement would deviate from the existing Hands Pike alignment at the junction with KY 3035 near MP 0.17 and traverse south and west of the current road before tying back in near Crystal Lake Road (MP 1.03).

Approximate Length: 4,000 feet **Estimated Cost:** \$17.0 million



Figure ES-1: Project Analysis Sections

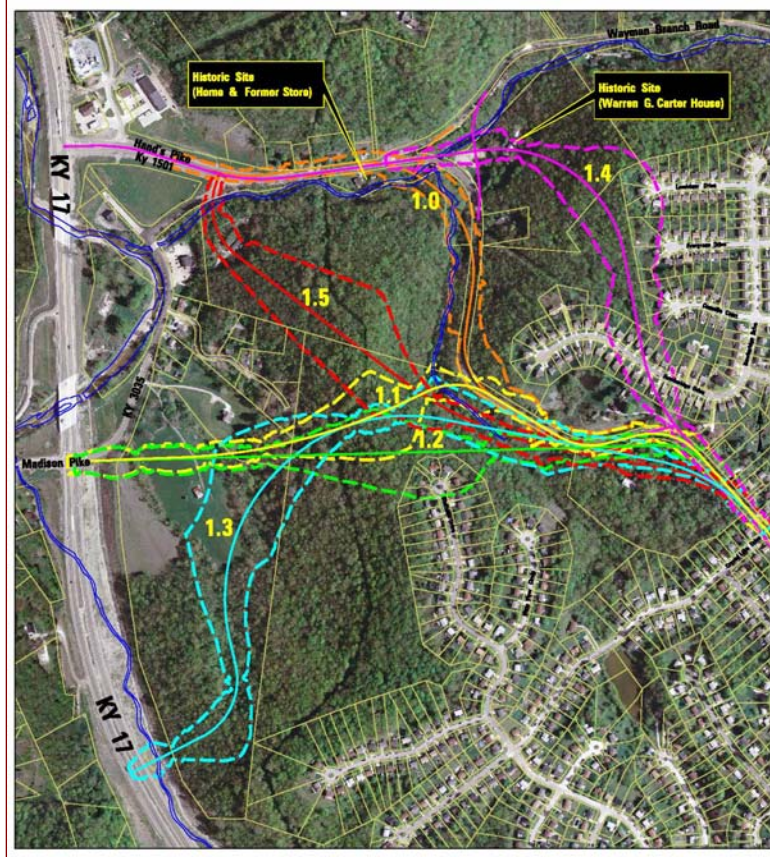


Figure ES-2: Alternate Corridors, Analysis Section 1

ANALYSIS SECTIONS AND IMPROVEMENT CONCEPTS (Continued)

<p>ANALYSIS SECTION 2 Near Crystal Lake Drive (MP 0.91) to Near Otter Court (MP 1.47)</p>	<p>❖ Alternative Concept A: A 3-lane urban section (curb and gutter) was considered. This concept included a center two-way left-turn lane and improvement of a sag curve between MPs 1.2 and 1.3. A conventional sidewalk would be provided on one side of the road and a wider sidewalk would be provided on the other side as a multi-use bicycle/pedestrian path. Approximate Length: 3,000 feet Estimated Cost: \$4.6 million</p> <p>❖ Concept A1: An additional improvement considered within this section was the construction of a roundabout at the intersection of Tripoli Lane/Tamarack Drive. Approximate Length: n/a Estimated Cost: \$3.7 million</p> <p>Total Estimated Cost, Both Concepts: \$8.3 million</p>
<p>ANALYSIS SECTION 3 Near Otter Court (MP 1.47) to East of Edwin Drive (MP 2.17)</p>	<p>❖ Alternative Concept A: This concept is a new corridor south and west of existing Hands Pike from near the intersection with Otter Court (MP 1.47) to the vicinity of MP 2.17. A 2-lane urban section was envisioned with a conventional sidewalk on one side of the road and a wider sidewalk on the other, provided as a multi-use bicycle/pedestrian path. Approximate Length: 3,700 feet Estimated Cost: \$11.2 million</p> <p>❖ Alternative Concept B: This concept improves the existing corridor. As with Alternative Concept A, this improvement could include a 2-lane urban section with a conventional sidewalk on one side of the road and a wider sidewalk on the other, provided as a multi-use bicycle/pedestrian path. Approximate Length: 4,000 feet Estimated Cost: \$13.5 million</p>
<p>ANALYSIS SECTION 4 East of Edwin Drive (MP 2.17) to KY 16 (MP 2.52)</p>	<p>❖ Alternative Concept A: A 2-lane urban section was envisioned along the existing and proposed new alignment associated with the KY 16 improvements with a conventional sidewalk on one side of the road and a wider sidewalk on the other, provided as a multi-use bicycle/pedestrian path. Approximate Length: 1,850 feet Estimated Cost: \$2.0 million</p>

Recommendations

The following project improvements were recommended in priority order:

1. **ANALYSIS SECTION 1: Spot Improvements 2**—Near-term improvements at the top of the hill, estimated to cost \$1.5 million.

Also, carry both **Alternative Concepts 1.0** and **1.1** to the Design phase of project development, where a final decision would be made regarding which alternative to select. The rural cross section is to include 6-foot-wide paved shoulders as a provision for bicyclists. The estimated cost is \$8.3 to 9.0 million depending upon the alternative chosen and the extent to which spot improvements ultimately can be integrated into final improvements.

2. **ANALYSIS SECTION 2: Alternative Concept A**—3-Lane Urban Section with Center Left-Turn Lane. A conventional sidewalk would be constructed on one side of the road and a wider sidewalk would be provided on the other side as a multi-use bicycle/pedestrian path. The estimated cost is \$4.6 million.
3. **ANALYSIS SECTION 3: Alternative Concept A**—2-Lane Urban Section on New Alignment. A conventional sidewalk would be constructed on one side of the road and

a wider sidewalk would be provided on the other side as a multi-use bicycle/pedestrian path. The estimated cost is \$11.2 million.

4. **ANALYSIS SECTION 4: Concept A—2-Lane Urban Section.** A conventional sidewalk would be constructed on one side of the road and a wider sidewalk would be provided on the other side as a multi-use bicycle/pedestrian path along the existing and proposed new alignment associated with the KY 16 improvements. The estimated cost is \$2 million.

The total estimated cost of these recommended improvements is **\$27.6 or \$28.3 million**, depending on which Alternative Concept (1.0 or 1.1) in Section 1 is selected and how the spot improvements are integrated.



2.0 STUDY GOALS

The goals for projects to be evaluated in the Hands Pike study result from discussions with the KYTC Project Team, local officials, and other project stakeholders. The key project goals include:

- ❖ Improve safety conditions along Hands Pike, where one of the main safety concerns is the steep and curvy hill west of Crystal Lake Drive as well as the typical section on top of the ridge through the residential area. Traffic volumes are high in the western section of the corridor (see Section 3.1, below) and the entire corridor has a high crash rate (see Section 3.2, below).
- ❖ Improve access for local traffic, including local bicycle and pedestrian traffic.

Further, it should be noted that the goals do *not* include providing for an improved connector between KY 16 and KY 17.

Photographs below, taken along Hands Pike, illustrate unsafe conditions such as damaged guard rails indicative of accident locations, the curvilinear and hilly roadway with very narrow/ nonexistent shoulders and narrow travel lanes, conflicting signage, and obstructions (utility poles and mailboxes) within/immediately adjacent to the right-of-way.



3.0 EXISTING AND FUTURE NO-BUILD CONDITIONS

3.1 Highway and Traffic Characteristics

Existing conditions on Hands Pike were compiled from the KYTC Highway Information System (HIS) database and from KYTC crash records. Traffic counts conducted on Hands Pike in recent years by KYTC reveal an estimated year 2008 average daily traffic volume (ADT) of 9,600 vehicles per day (vpd) near the intersection with KY 17 and 4,400 vpd near the intersection with KY 16. The percentage of trucks in the traffic stream is less than 5% and the entire corridor has a critically high crash rate. In the year 2030, ADT volumes at these two sites are projected to be 12,600 vpd and 5,800 vpd, respectively.

In the recent past, KY 17 was widened and reconstructed. That project included rebuilding the approach of KY 1501 to current design standards for approximately 1,100 feet east. From that point to KY 16, the lane widths are a substandard 9 feet wide and the shoulders are 1 foot or less. Access control is by permit only, and the posted speed limit is 35 miles per hour (mph). Right-of-way (R/W) widths average 60 feet. A summary of highway characteristics data for Hands Pike is presented in Table 1.

Table 1: Hands Pike Roadway Characteristics

Roadway Characteristics	Begin MP 0.22 to End MP 1.16	Begin MP 1.16 to End MP 2.17	Begin MP 2.17 to End MP 2.52
Driving Lanes	2	2	2
Lane Width	9	9	9
Shoulder Type	Paved w/ Bituminous Material	Paved w/ Bituminous Material	Paved w/ Bituminous Material
Shoulder Width	1	1	1
2008 ADT	9,600	4,400	4,400
2008 Level of Service	D	C	C
Posted Speed Limit	35	35	35
Average R/W Width	60	60	60
Type Road	Undivided Highway	Undivided Highway	Undivided Highway
Median	None	None	None
Functional Class	Urban Collector	Urban Collector	Urban Collector
State Primary Road System	State Secondary	State Secondary	State Secondary
National Hwy System	NO	NO	NO
National Truck Network	NO	NO	NO
Truck Weight Class	A	A	A
Terrain	Rolling	Rolling	Rolling
Pavement Type	High Flexible	High Flexible	High Flexible – Mixed Bituminous

3.2 Future Traffic Volumes and Level of Service

Level of Service (LOS) is a qualitative indicator of operational conditions in a traffic stream based on speed, travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. Levels of service are described according to a letter rating system (similar to school grades) ranging from LOS A (free flow, minimal or no delays—best conditions) to LOS F (stop and go conditions, very long delays—worst conditions). For 2-lane roadways such as Hands Pike, level of service is a function of the average percent of time a vehicle spends following another vehicle. West of the intersection with Tripoli Lane, where traffic

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volumes are higher, the current LOS is D. This means one vehicle is following another 70% of the time during peak travel times. East of the intersection with Tripoli Lane, where traffic volumes are somewhat lower, the current Los is C. This means one vehicle is following another less than 70% but more than 55% of the time. Tables 2 and 3, below, and Exhibit 2 in Appendix A show traffic volume/LOS data.

Based on the traffic projections (see Tables 2 and 3) that were developed for Hands Pike for the year 2030, these levels of service are not expected to worsen between now and then due to the relatively low forecasted growth rates in traffic volumes.

Table 2: Hands Pike Levels of Service—Existing (Year 2006) and Projected (Year 2030)

Beginning MP	Beginning Feature	Ending MP	Ending Feature	2006 ADT	2030 ADT	2006 LOS	2030 LOS
0	KY 17	1.163	Tripoli Lane	9,900	12,600	D	D
1.163	Tripoli Lane	2.519	KY 16	4,000	5,800	C	C

Table 3: Historical and Projected Traffic Volumes and Growth Rates

Year	West of Tripoli Lane	East of Tripoli Lane
1979	3390	2200
1982	4030	2310
1988	5240	2310
1991	6690	3230
1994	7470	3300
1996	7970	3110
1999	8170	3430
2008	9600	4400
Historical Average Annual Growth Rate	3.9%	2.1%
% Change from 1979 to 2006	192%	81%
2030	12,600	5,800
Forecasted Average Annual Growth Rate	1.0%	1.5%
Projected % Change from 2006 to 2030	27%	45%

3.3 Crash Analysis

KYTC provided crash data for a five-year period from January 1, 2002, through December 31, 2006. During this period, 201 crashes occurred on Hands Pike. Crash rates were computed for spots with a length of 0.1 mile. Spot crash rates are typically expressed in terms of crashes per 100 million vehicle-miles to take into account the volume of traffic on a particular highway. A spot's crash rate is then compared to a statewide critical crash rate for the same type of roadway to identify high crash locations. Highway spots with a crash rate higher than the critical crash rate are considered statistically significant high crash locations and are potential candidates for safety improvements. Results of this analysis for Hands Pike are shown in Table 4. As shown, the corridor in its entirety is a statistically significant high crash location.

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Table 4: Spot Crash Analysis

Beginning MP	Ending MP	Total Number of Crashes	Crash Rate	Critical Crash Rate	Critical Crash Rate Factor
Corridor					
0.0	2.52	201	663.47	340.55	1.95
Spots					
0.0	0.1	13	1.198	0.625	1.918
0.3	0.4	26	2.504	0.635	3.945
0.4	0.5	28	4.131	0.749	5.518
0.5	0.6	7	1.033	0.749	1.379
0.6	0.7	9	1.328	0.749	1.774
0.9	1.0	16	2.361	0.749	3.153
1.0	1.1	9	1.328	0.749	1.774
1.1	1.2	7	1.033	0.749	1.379
1.7	1.8	7	1.033	0.749	1.379

With the exception of the spot between MP 1.7 and 1.8 (just east of the intersection with Ken Drive), each of these spots is located west of the intersection with Tripoli Lane/Tamarack Drive (see Exhibit 1, Appendix A). The greatest concentration of crashes is in the westernmost one-mile section known as the "Hands Pike Hill." That one-mile section was the location of 135 crashes between January 1, 2002, and December 31, 2006, and has a critical crash rate factor of 3.317.

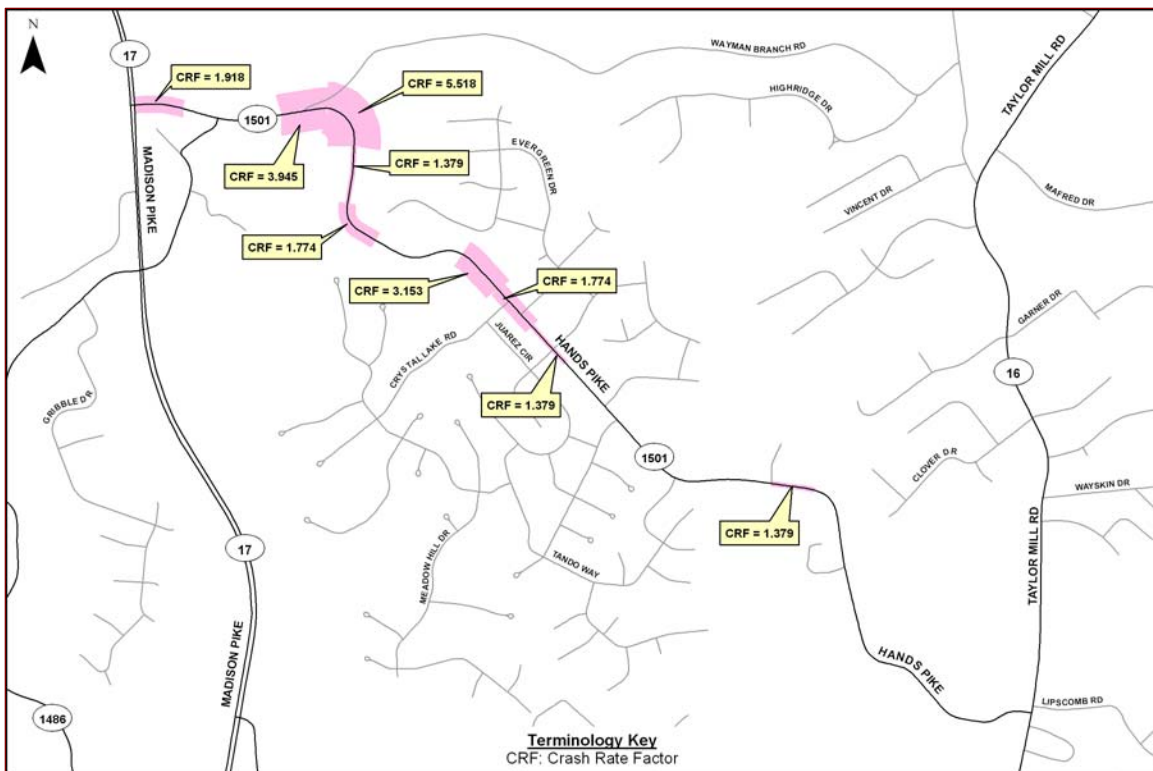


Figure 3: High Crash Spot Locations

4.0 HUMAN ENVIRONMENT OVERVIEW

4.1 Environmental Justice

An *Environmental Justice and Community Impact Report* (EJ Report) that was prepared by the Northern Kentucky Area Development District (NKADD) in June 2008 for this *Hands Pike Study* examined feasible improvement opportunities for Hands Pike. An EJ Report is an assessment of community demographics within the study area and a comparison of these demographics with those of the surrounding area, particularly regarding low income, minority, and elderly populations. The goal of such an effort is to ascertain if any of these populations might be disproportionately impacted by improvements to the Hands Pike corridor. The full EJ Report prepared for this study is included in Appendix G.

NKADD concluded that no defined Environmental Justice community exists within the project study area and hence no disproportionate impacts on minority, low-income, or elderly or disabled populations would occur as a result of any improvements to the Hands Pike corridor.

4.2 Underground Storage Tanks/Hazardous Materials

A record search of environmental data for the Hands Pike corridor, conducted in September 2007, revealed a total of three potential HAZMAT sites exist in the project study area (see Exhibit 2 in Appendix A). The three sites are: 1) a landscaping company along Hands Pike, 2) a gas station at the corner of Hands Pike and KY 17, and 3) a gas station at the corner of Hands Pike and KY 16. None of these sites are undergoing corrective actions or have any known violations.

4.3 Previously Documented Cultural Historic and Archeological Sites

An archaeological resource overview was prepared for this project in May 2008. The overview included a review of the existing databases of the Office of State Archaeology, National Park Service, and the Kentucky Heritage Council and revealed no sites currently listed on the National Register of Historic Places (NRHP) within the project study area. However, the study area was assessed for the potential for prehistoric and/or historic archaeological sites. The type of topography present in Kenton County suggests a probability of seasonal prehistoric archaeological sites. Further, the possibility of historic archaeological sites relating to Civil War battles or camp sites exists due to the documented Civil War activities in Kenton County. Because of this high potential for prehistoric and historic archaeological sites, a Phase 1 Archaeological Survey is recommended as a part of any future project development activities.

A separate cultural historical resource overview was also conducted for the project study area in August 2007. This overview revealed two properties that previous studies had identified as **eligible for the NRHP**:

- ❖ Site A, the Banklick Christian Church (Figure 4)
- ❖ Site B, the Log Cabin Inn (Figure 5).

Research conducted specifically for the current study indicated that two additional individual properties appear to meet NRHP criteria:

- ❖ Site C, a log house on Hands Pike (Figure 6)

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- ❖ Site D, the Warren G. Carter House on Hands Pike (Figure 7)

Exhibit 2 in Appendix A shows the locations of the four potentially eligible properties.



Figure 4: Banklick Christian Church



Figure 5: Log Cabin Inn



Figure 6: Log House

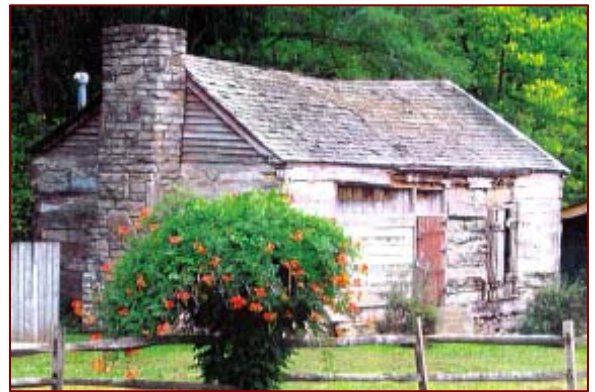


Figure 7: Warren G. Carter House

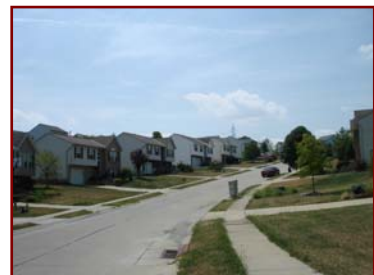
4.4 Land Use



Single-family residential development is the predominant land use within this mixed rural and urban corridor. Several large subdivisions are located atop the ridge traversed by Hands Pike. Some commercial development exists at the Hands Pike intersections with both KY 16 and KY 17, and there are also institutional uses present in the study corridor—Covington Fire Station #3 and a private Calvary Christian School. As is apparent in the aerial photograph, Figure 2 on page 2, forested areas surrounding the subdivisions comprise much of the

remaining, undeveloped land use in the Hands Pike study corridor. This portion of Covington and Kenton County are considered a bedroom area for the larger Cincinnati metropolitan area. Because of the hilly topography the land use is not expected to convert to a more urban-like density; however, some infill residential development could be expected on the less hilly areas near KY 16.

Appendix B contains photographs showing the roadway and land uses along the study corridor from KY 17 to KY 16.



5.0 NATURAL ENVIRONMENT OVERVIEW

Threatened and Endangered Species

Both the Kentucky Department of Fish and Wildlife Resources (KDFWR) and the Kentucky Nature Preserves Commission (KSNPC) provided general information regarding threatened and endangered species throughout Kenton County. KDFWR submitted *Federal Threatened, Endangered, and Candidate Species observations for selected counties: Kenton*, and KSNPC provided its *Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities for Kenton County, Kentucky*. These lists are included in Appendix E.

KSNPC has noted that the wooded areas near the confluence of Wayman's Branch and Banklick Creek "harbor a significant population of Redback salamander (*Plethodon cinereus*). This species is very restricted in range in Kentucky, occurring primarily in a small portion of Kentucky's northern tier of counties. Every effort should be made to minimize disturbance to these wooded areas to protect the population of Redback salamanders in the Hands Pike project area." (See KSNPC email dated January 8, 2008, in Appendix E.)

Table 5: KDFWR List of Kentucky Status Endangered Species

Scientific Name and Life History	Common Name and Pictures	KY Status
<i>Epioblasma obliquata</i>	Catspaw	E
<i>Pleurobema clava</i>	Clubshell	E
<i>Cyprogenia stegaria</i>	Fanshell	E
<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell	E
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	E
<i>Lampsilis abrupta</i>	Pink Mucket	E
<i>Obovaria retusa</i>	Ring Pink	E
<i>Pleurobema plenum</i>	Rough Pigtoe	E

Areas of Special Concern

No state nature preserves or wildlife management areas are present within the project corridor. No state or national parks and forests or wild and scenic rivers are located in the corridor.

Streams

Two blueline streams exist in the study area: Wayman Branch (also known as Hands Branch Creek) and Banklick Creek. The headwater of Wayman Branch/Hands Branch Creek is crossed by Hands Pike in the eastern portion of the corridor, closer to KY 16. It flows north and then west before going under Hands Pike near Wayman Branch Road in the western portion of the corridor, before flowing into Banklick Creek. Banklick Creek is bridged by KY 17, but does not cross Hands Pike (or any of the proposed realignment alternatives). Any reconstruction of the Hands Pike crossings of Wayman Branch/Hands Branch Creek would require use of best management practices to minimize impacts, and coordination with the Kentucky Division of Water and the US Army Corps of Engineers and receipt of either an Individual Permit or a General Permit (i.e., Nationwide 14) prior to any construction.

6.0 PUBLIC INVOLVEMENT AND AGENCY COORDINATION

6.1 *Public Involvement Program Summary*

Project Team—A KYTC Project Team was created for the *Hands Pike Study*. Representatives of the KYTC Planning, Design, Environmental Analysis, Traffic, Utilities, Maintenance, and Construction functions of KYTC met on three occasions during the course of the study to provide guidance and decision-making. Minutes of these meeting are included in Appendix C.

Meetings with Local Officials and Other Project Stakeholders—Meetings with Local Officials and Other Project Stakeholders were held twice during the course of the study. The first meeting was held to introduce local officials to the study and to solicit their input at an early stage in the study process. The second meeting was held to provide a summary of the comments receive at the public meeting regarding preliminary alternative concepts, and to solicit their comments on recommended improvements. Minutes of these meeting are also included in Appendix C.

Public Meeting—One public meeting was held, on February 7, 2008, to present preliminary improvement alternatives and solicit public feedback on those proposals. Fifty-six people signed in at the public meeting. Questionnaires were distributed to those in attendance, and thirty-three completed surveys were returned, either at the meeting or by mail in the following weeks. A summary of the public meeting is included in Appendix D.



6.2 *Agency Coordination*

One agency mailing was prepared and distributed after base information had been collected. A copy of the mailing and the list of recipients are both included in Appendix F for reference.

Responses were received from a variety of agencies. Many of the responses indicated that their agency did not anticipate any significant project related issues in the study area. Others outlined standard requirements and guidance related to project planning, design, and construction. A third set of agencies did have specific concerns or issues that they wanted to be considered in the study. A summary of the substantive responses received is provided below. A summary of all agency comments and copies of all agency correspondence received are included in Appendix F.

- ❖ **Geotechnical Engineering Branch, Division of Structural Design:** Identified no geologic preference among alternative corridors, but the letter did identify concerns about construction in glacial fill areas.

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- ❖ **Kentucky State Nature Preserves Commission:** Urged minimized disturbance to wooded areas to protect Redback salamander.
- ❖ **Kentucky Department of Fish and Wildlife Resources:** Noted that state/federal threatened and endangered species are known to occur near the project area, but impacts to listed species are not anticipated due to the location of the project. Recommended erosion control and other measures to minimize impacts to waterways, and identifying stream mitigation on-site or within the Banklick Creek watershed.
- ❖ **Kentucky State Police:** Recommended adding a left-turn to Hands Pike at the KY 16 intersection, cutting back vegetation restricting sight distance at the intersection with Wayman's Branch Road, and installing flashing beacons along Hands Pike on either side of its intersection with Otter Drive. Further suggested making one or more (non-specific) intersections along Hands Pike between Crystal Lake Road and Otter Drive four-way stops.
- ❖ **KYTC Bicycle Pedestrian Coordinator:** Urged providing bicycle and pedestrian accommodations.
- ❖ **Kentucky Division of Water:** Noted endorsement of the project.
- ❖ **Underground Storage Tank Branch, Division of Waste Management:** Reported eight active registered tanks but no facilities undergoing corrective action.
- ❖ **Solid Waste Branch, Division of Waste Management:** Reported no mapped landfills in the area.
- ❖ **Federal Aviation Administration:** Identified no issues unless cranes (or other equipment) to be used during construction exceed 150 feet in height; in which case a formal FAA assessment of impacts would be required. (The same concern was expressed by the Kentucky Airport Zoning Commission.)
- ❖ **Natural Resources Conservation Service:** Noted additional coordination with NRCS would be necessary if the project impacts farmland and federal dollars are to be used to convert important farmlands to non-agricultural uses.
- ❖ **Senator Jack Westwood:** Urged expeditious improvements to Hands Pike.
- ❖ **Kentucky Geologic Survey:** Noted that karst features may be encountered, some areas may be prone to landslides, and there is a low potential for geologic faults or earthquakes.
- ❖ **U.S. Coast Guard:** Stated that no Coast Guard bridge permit would be required.

7.0 ALTERNATIVES DEVELOPMENT AND EVALUATION

7.1 Analysis Sections

The Hands Pike corridor between KY 17 and KY 16 is a distance of approximately 2.5 miles, within which are discreet transportation issues that vary by location along the corridor. Thus, the corridor was segmented into four analysis sections (see Figure 8).

The analysis of Hands Pike focused on four segments:

- ❖ **Analysis Section 1:** KY 17 (MP 0.22) to near Crystal Lake Drive (MP 0.91) (Hands Pike Hill)
- ❖ **Analysis Section 2:** Near Crystal Lake Drive (MP 0.91) to Near Otter Court (MP 1.47)
- ❖ **Analysis Section 3:** Near Otter Court (MP 1.47) to East of Edwin Drive (MP 2.17)
- ❖ **Analysis Section 4:** East of Edwin Drive (MP 2.17) to KY 16 (MP 2.52)



Figure 8: Project Analysis Sections

**ANALYSIS
SECTION 1**

KY 17 (MP 0.22) to near
Crystal Lake Drive (MP
0.91, Hands Pike Hill)



This segment, excluding the westernmost 0.22 mile section that was reconstructed along with KY 17, is characterized by Hands Pike Hill and four separate, significant horizontal curves:

- ❖ MP 0.38 – 0.49: 17.8 degrees
- ❖ MP 0.61 – 0.67: 22.9 degrees
- ❖ MP 0.76 – 0.82: 14.9 degrees
- ❖ MP 0.86 – 0.91: 17.2 degrees

The hill is a 13.0% grade. Traffic volumes along Hands Pike are highest in this section. Drainage problems exist, and travel speeds appear to exceed the 35 mph speed limit. Crashes along this segment are very frequent and disproportionately wet-roadway related.

**ANALYSIS
SECTION 2**

Near Crystal Lake
Drive (MP 0.91) to Near
Otter Court (MP 1.47)



Section 2 is characterized by providing access to residential subdivisions. It also provides access to the Fire Station, and has an overall more urban character, as compared to the other sections character, including some sidewalks and turning lanes, and access points to several subdivisions and driveways.

Section 2 has a large vertical curve sag between MP 1.2 and MP 1.3. Traffic volumes have decreased from Analysis Section 1. At MP 1.47 there is a 12.7 degree horizontal curve that begins the transition into Analysis Section 3.

**ANALYSIS
SECTION 3**

Near Otter Court (MP
1.47) to East of Edwin
Drive (MP 2.17)

Section 3 transitions from the more urban area of Section 2 to a rural residential character. Winding eastward toward KY 16 it provides direct access to several homes adjacent to Hand Pike. This segment has four separate significant horizontal curves.

**ANALYSIS
SECTION 4**

East of Edwin Drive (MP
2.17) to MP 2.52, where
the proposed KY 16
reconstruction will rebuild



Section 4 is a connector section between Section 3 and the programmed improvements to KY 1501 as part of KYTC's efforts to rebuild KY 16. Traffic volumes are currently averaging 4,400 vpd. The primary problem noted by the public in this section was the difficulty of turning left onto KY 16 due to the high volumes of traffic on that road.

7.2 Alternative Development

The stated project goals include improving safety and access for local traffic along Hands Pike. To achieve this goal the alternates that were explored continued to allow Hands Pike to function as a Local Collector Road with out raising this facility to an Urban Arterial Roadway. All alternates that were explored used the concepts of Context Sensitive Design and the new KYTC Practical Solutions Guideline to achieve a roadway that meet the needs expressed by the local community without proposing a roadway that is overly obtrusive or needlessly expensive. The discussion below is structured around sections discussed in Section 7.1, above.

The Analysis Section locations are shown on Figure 8. The recommended alternative concepts are illustrated on Exhibit 3 in Appendix A. Table 7 (p. 20) provides cost estimates for the Section Analysis alternatives, and Table 8 (p. 21) compares the alternatives' costs, right-of-way, relocation, impacts/benefits, public rankings, and cost estimates.

Analysis Section 1: KY 17 (MP 0.22) to near Crystal Lake Drive (MP 0.91, Hands Pike Hill)

As reported in the discussion above concerning the crash history on Hands Pike, this segment has a significant safety problem. Thus, both short- and long-term alternative solutions were developed for Analysis Section 1 to enable potential rapid implementation of short-term measures to improve safety. As depicted in Figure 9, the long-term improvements would be on new alignment for either all or a portion of their distance. Figure 10 shows the typical section for the spot improvement concepts, and Figure 11 shows the typical section for the long-term concepts.

- ❖ **Hands Pike Hill Spot Improvements 1:** This short-term improvement would begin near the intersection of Hands Pike with KY 3035. Improvements include the addition of 2-foot-wide shoulders with rumble strips and a 4-foot-wide flat bottom ditch along the east side of the roadway. At the direction of the KYTC Project Team, the horizontal curve beginning just east of the junction with Wayman's Branch Road would be improved to 45 mph design speed for an added margin of safety. Existing 8-inch and 16-inch sewer lines would be relocated and a box culvert would be replaced and extended. Studies at the Kentucky Transportation Center (KTC) at the University of Kentucky (UK) have indicated that improvements to horizontal curves can reduce the occurrence of crashes by 40%.

Approximate Length: 2,200 feet **Estimated Cost:** \$6.8 million

- ❖ **Hands Pike Hill Spot Improvement 2:** This short-term improvement would begin near MP 0.6 and end near MP 0.9. Improvements include the addition of 2-foot-wide shoulders with rumble strips and a 4-foot-wide flat bottom ditch along the east side of the roadway. The existing horizontal curve radius would be increased and there would be additional widening on the inside of the curve. Existing drainage structures would be improved, and slopes along the north and east side of the roadway would be cut back to improve sight distance. Nearly all of the crashes in this area occur during wet weather. Studies at KTC have indicated that drainage improvements can reduce the occurrence of all crashes by 20% and wet-weather crashes by 40%.

Approximate Length: 2,400 feet **Estimated Cost:** \$1.5 million

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- ❖ **Alternative Concept 1.0:** This long-term improvement would begin near the intersection of Hands Pike with KY 3035 and include two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists, and 4:1 slopes outside the shoulder. Studies at KTC have indicated that this type of improvement can reduce the occurrence of crashes by 40%.

Approximate Length: 4,750 feet **Estimated Cost:** \$8.3 million

- ❖ **Alternative Concept 1.1:** This long-term improvement would begin near the intersection of Madison Pike and KY 17 approximately 0.3 mile south of the current Hands Pike/KY 17 intersection and would traverse an easterly then northeasterly path, tying in with the current Hands Pike alignment near MP 0.65. The concept includes two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists and 4:1 slopes outside the shoulder. Studies have indicated that this type of improvement can reduce the occurrence of crashes by 40%.

Approximate Length: 3,850 feet **Estimated Cost:** \$9.0 million

- ❖ **Alternative Concept 1.2:** As with Alternative 1.1, this long-term improvement would begin near the intersection of Madison Pike and KY 17 approximately 0.3 mile south of the intersection of Hands Pike with KY 17 but would traverse a more easterly path than Alternative 1.1, tying in with the current Hands Pike alignment near MP 0.9. The concept includes two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists and 4:1 slopes outside the shoulder. This type of improvement can be expected to reduce the occurrence of crashes by 40%.

Approximate Length: 3,650 feet **Estimated Cost:** \$13.2 million

- ❖ **Alternative Concept 1.3:** This long-term improvement would begin approximately 0.3 mile south of the intersection of Madison Pike and KY 17 and traverse a northerly then easterly corridor, tying in with the current Hands Pike alignment near the intersection with Crystal Lake Road (MP 1.03). This concept includes two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists and 4:1 slopes outside the shoulder. The concept's length would enable a vertical grade of less than 5% percent. This type of improvement can be expected to reduce the occurrence of crashes by 40%.

Approximate Length: 4,850 feet **Estimated Cost:** \$27.0 million

- ❖ **Alternate Concept 1.4:** This long-term improvement would deviate from the existing Hands Pike alignment near MP 0.4 and traverse north and east of the current road before tying back in near MP 0.9. The concept includes two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists, and 4:1 slopes outside the shoulder. This type of improvement can be expected to reduce the occurrence of crashes by 40%.

Approximate Length: 3,150 feet **Estimated Cost:** \$27.8 million

- ❖ **Alternative Concept 1.5:** This long-term improvement would deviate from the existing Hands Pike alignment at the junction with KY 3035 near MP 0.17 and traverse south and west of the current road before tying back in near Crystal Lake Road (MP 1.03). This concept includes two 12-foot-wide lanes with 8-foot-wide paved shoulders to accommodate bicyclists and 4:1 slopes outside the shoulder, as shown in Figure 11. This type of improvement can be expected to reduce the occurrence of crashes by 40%.

Approximate Length: 4,000 feet **Estimated Cost:** \$17.0 million

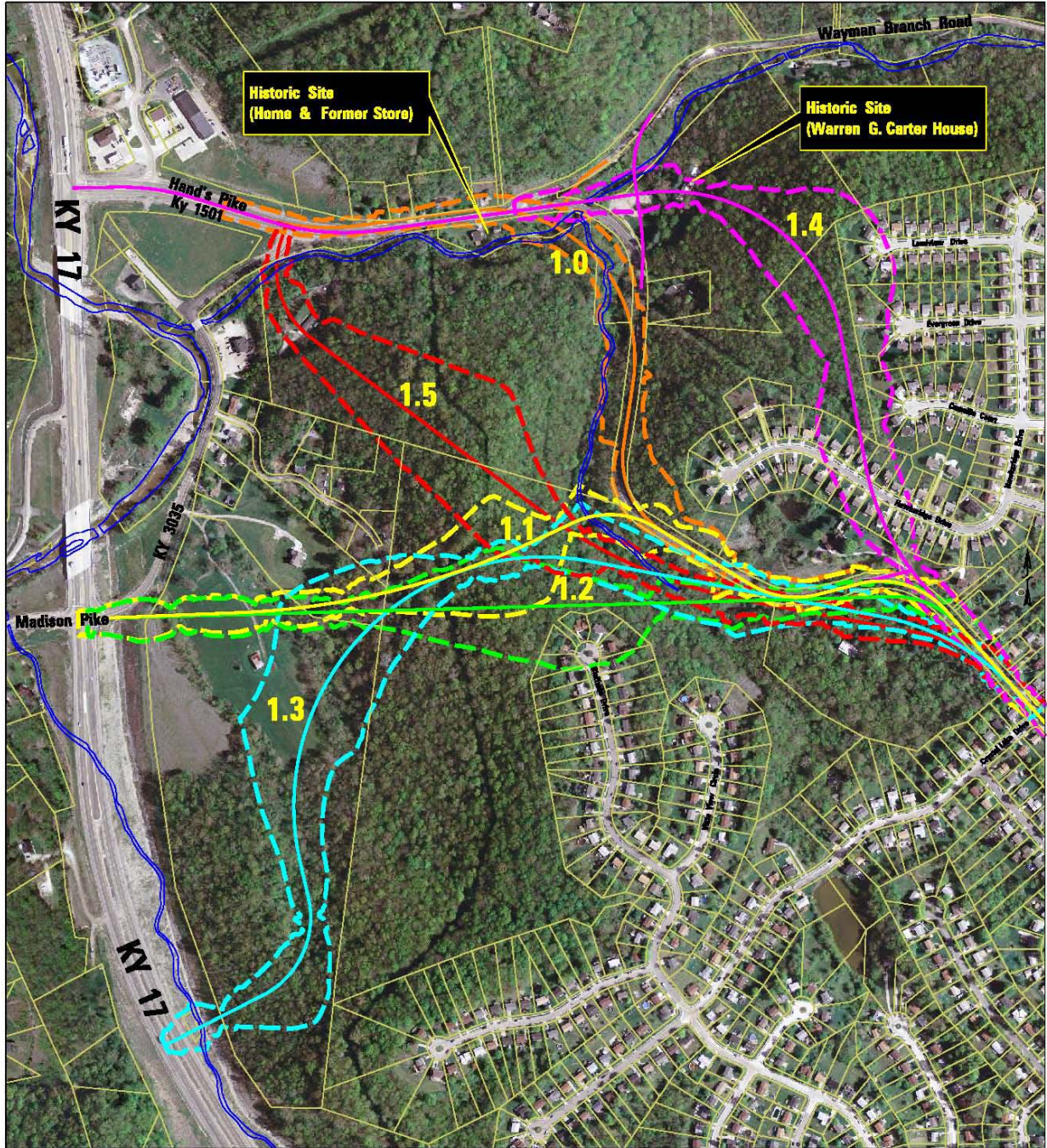


Figure 9: Alternate Corridors, Analysis Section 1

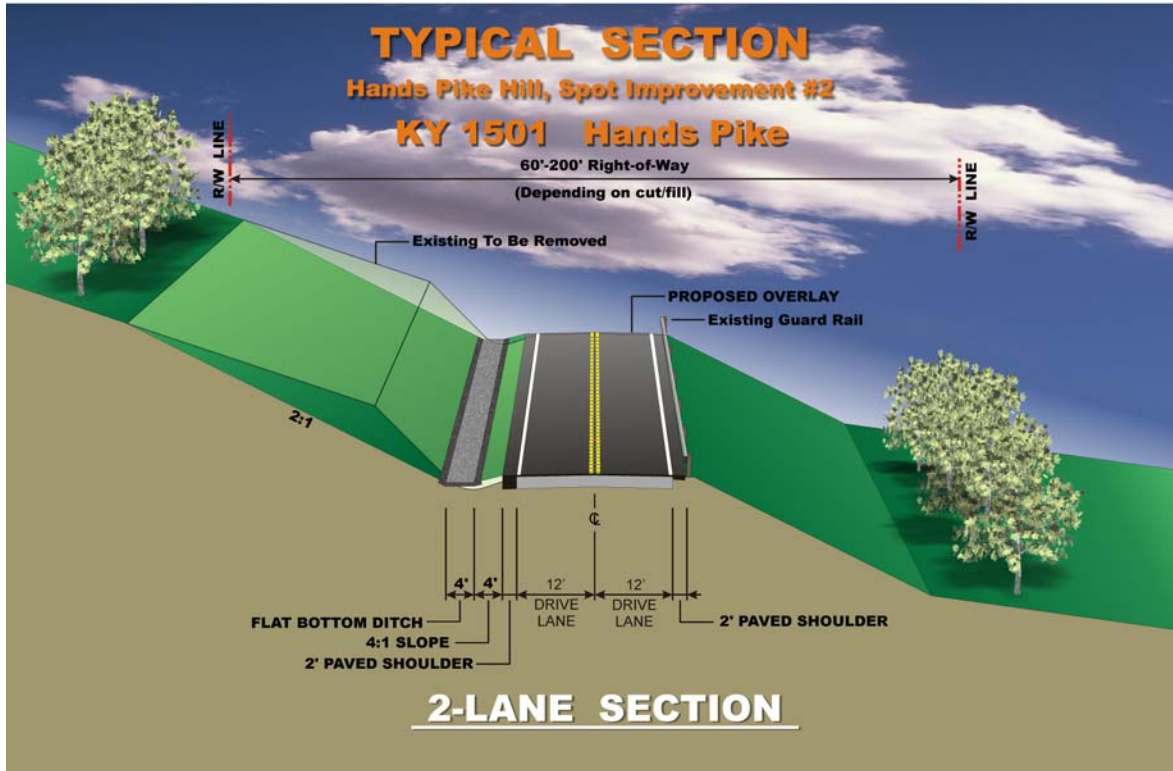


Figure 10: Analysis Section 1—Typical Section for Short-Term Reconstruction

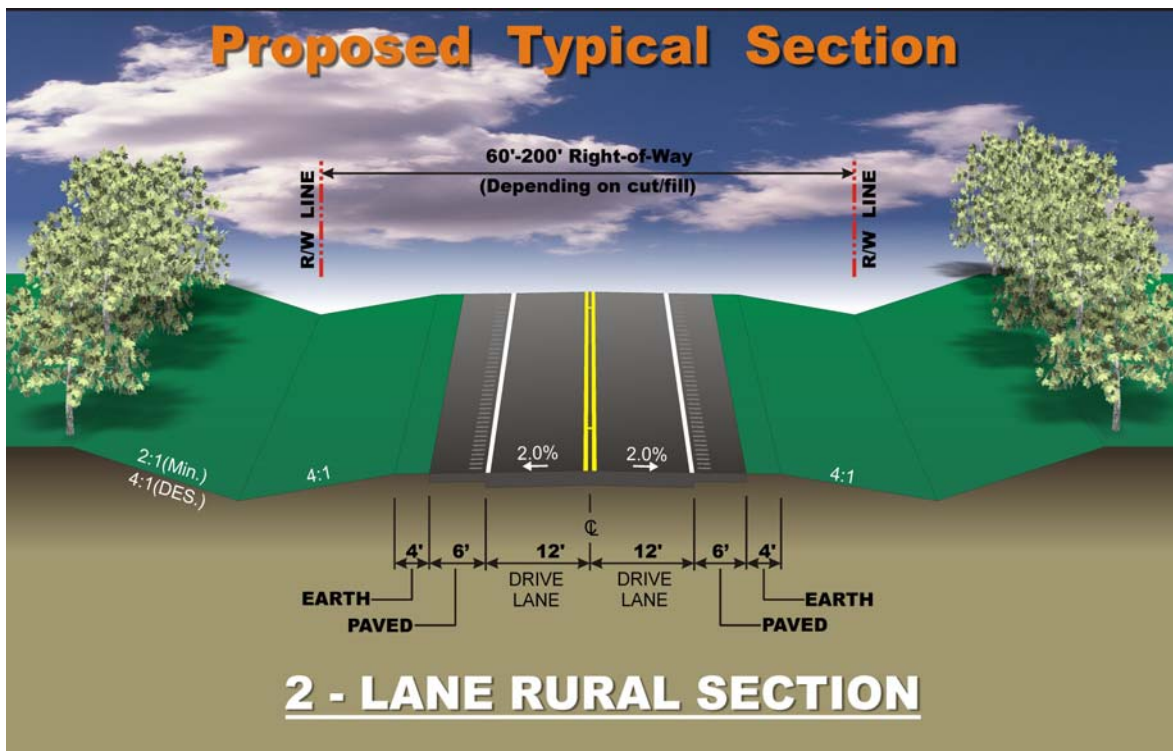


Figure 11: Analysis Section 1—Typical Section for Long-Term Reconstruction

Analysis Section 2: Near Crystal Lake Drive (MP 0.91) to Near Otter Court (MP 1.47)

- ❖ **Alternative Concept A:** A 3-lane urban section (curb and gutter) as shown in Figure 11 was considered based on a planning assumption that the roadway centerline would remain as is. The actual centerline alignment (such as shifting it to the right or left) was assessed to be a design detail that could be better addressed in subsequent project development phases. This overall concept includes a center two-way left-turn lane and improvement of a sag curve by raising the grade between MPs 1.2 and 1.3. A conventional sidewalk would be provided on one side of the road and a wider sidewalk would be provided on the other side as a multi-use bicycle/pedestrian path.

Approximate Length: 2,650 feet **Estimated Cost:** \$4.6 million

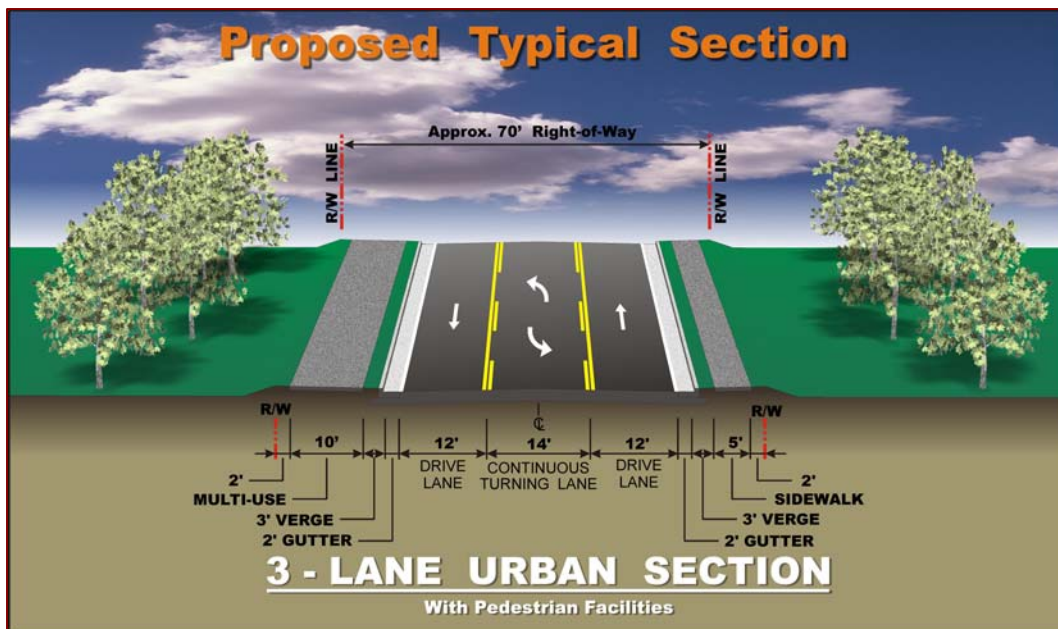


Figure 12: Analysis Section 2—3-Lane Typical Section

- ❖ **Concept A1:** An additional improvement considered within this section was the construction of a roundabout at the intersection of Tripoli Lane/Tamarack Drive.

Estimated Cost: \$3.7 million
TOTAL ESTIMATED COST, BOTH CONCEPTS: \$8.3 million

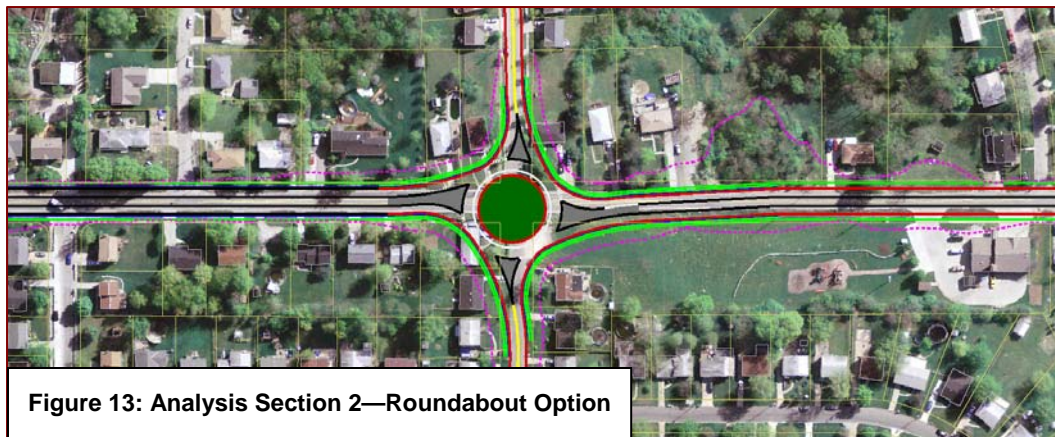


Figure 13: Analysis Section 2—Roundabout Option

Analysis Section 3: Near Otter Court (MP 1.47) to East of Edwin Drive (MP 2.17)

Two alternative improvements were considered. The typical section for these improvements is shown on Figure 13.

- ❖ **Alternative Concept A:** This concept is new corridor south and west of existing Hands Pike from near the intersection with Otter Court (MP 1.47) to the vicinity of MP 2.17. A 2-lane urban

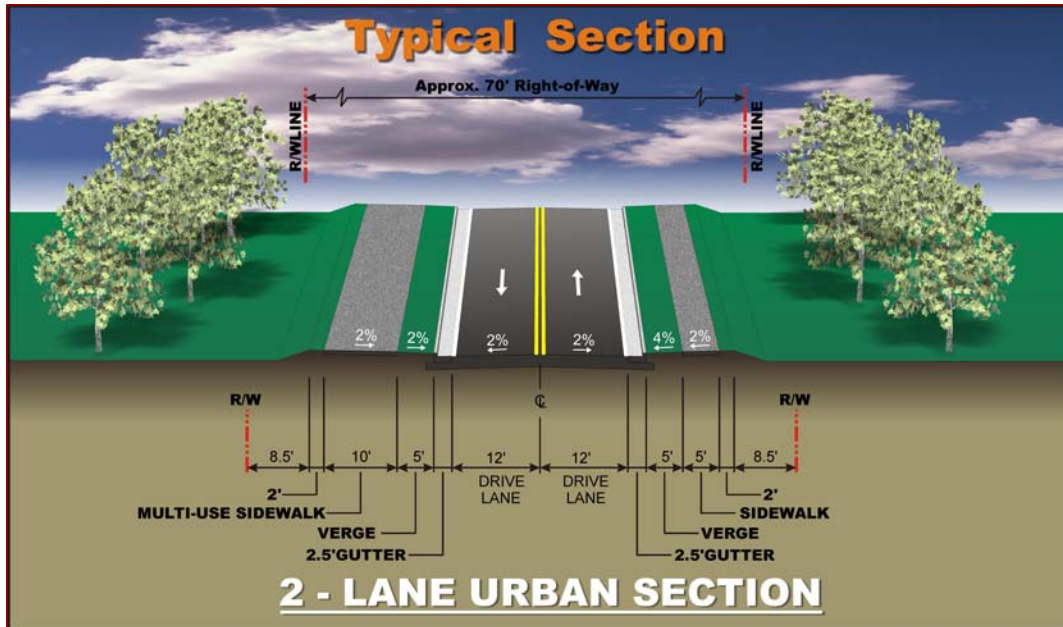


Figure 14: Analysis Sections 3 and 4 Typical Section for Long Term Reconstruction

is section envisioned with a conventional sidewalk on one side of the road and a wider sidewalk on the other to provide a multi-use bicycle/pedestrian path.

Approximate Length: 3,325 feet **Estimated Cost:** \$11.2 million

- ❖ **Alternative Concept B:** This concept improves the existing corridor. As with Alternative Concept A, this improvement could include a 2-lane urban section with a conventional sidewalk on one side of the road and a wider sidewalk on the other to provide a multi-use bicycle/pedestrian path.

Approximate Length: 4,000 feet **Estimated Cost:** \$13.5 million

Analysis Section 4: East of Edwin Drive (MP 2.17) to KY 16 (MP 2.52)

- ❖ **Alternative Concept A:** A portion of this eastern-most section (from approximately MP 2.4 east) is planned for improvement in conjunction with a KY 16 reconstruction project. For the remaining short section between Edwin Drive and MP 2.4, a 2-lane urban section (see Figure 14) is envisioned with a conventional sidewalk on one side of the road and a wider sidewalk on the other to provide a multi-use bicycle/pedestrian path.

Approximate Length: 1,400 feet **Estimated Cost:** \$2.0 million

7.3 Public Commentary

The public was given the opportunity to comment on, as well as recommend additions to, the initial list of alternative concepts that was presented at an open-house style meeting held on February 7, 2008. A summary of comments and recommendations is provided below. A table of how important it was felt to improve a particular analysis section is summarized in Table 6. The public meeting summary is included in Appendix D.

- Reconstruction of Section 1 is the top priority
- Of the Section 1 options the Spot improvements are the most supported
- For Sections 2, 3, and 4:
 - A 3-lane section, with a continuous left turn lane is supported
 - Sidewalks are supported
 - Bike Lanes are not supported
 - A roundabout at Tripoli is not supported

Analysis Section 1: KY 17 (MP 0.22) to near Crystal Lake Drive (MP 0.91) (Hands Pike Hill)—More than 96% of respondents to the survey form distributed at the public meeting felt that improvements to this section were “important” or “very important.” More than 63% felt that Spot Improvement 1 was the highest priority, while 37% favored Spot Improvement 2. Among the long-term alternative concepts, Alternate 1.0 was scored as the highest priority followed closely by Alternate 1.1. Alternate concept 1.3 was clearly the least favorite long-term option.

Analysis Section 2: Near Crystal Lake Drive (MP 0.91) to Near Otter Court (MP 1.47)—Nearly 40% of respondents viewed improvements to this section as not very important. Slightly more than 60% of survey respondents favored the concept of a three-lane, curb and gutter section with a continuous center left-turn lane. Only 30% favored a roundabout at the intersection with Tripoli Lane/Tamarack Drive. Sidewalks were favored by 63% while bicycle lanes were favored by 43% percent.

Analysis Section 3: Near Otter Court (MP 1.47) to East of Edwin Drive (MP 2.17)—A new roadway in a new corridor south and west of existing Hands Pike was preferred by 65% of respondents. Sidewalks were favored by 64% while bicycle lanes were favored by only 36%.

Analysis Section 4: East of Edwin Drive (MP 2.17) to KY 16 (MP 2.52)—Though one commentator suggested that a 5-lane segment with two-way center left-turn lane be added to the alternatives being considered, no improvements to this segment were ranked with a high priority.

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Table 6: Analysis Section Priorities As Expressed at Public Meeting

Sections	Public Ranking					Weighted Score (ranking x weight)
	Not Important (1)	(2)	Important (3)	(4)	Very Important (5)	
Section 1:	1	0	0	3	25	138
Section 2:	6	3	9	2	4	67
Section 3:	4	3	11	4	3	74
Section 4:	4	2	6	4	9	87

7.4 Comparison of Alternative Concepts

Table 7 provides the estimated costs for design, right-of-way, utilities, and construction, in Year 2008 dollars, that are associated with each of the Analysis Section alternative concepts evaluated in this study. Table 8 compares the alternatives' right-of-way, relocation, some impacts, public rankings, and total estimated costs.

Table 7: Cost Estimates (2008 Dollars)—Alternative Concepts and Spot Improvements

Analysis Section	Alternative Concept	Cost Estimates (in Millions)				
		Design	R/W	Utility	Construction	Total
ANALYSIS SECTION 1	Hands Pike Hill Spot Impvts 1	\$0.5	\$1.5	\$0.3	\$4.5	\$6.8
	Hands Pike Hill Spot Impvts 2	\$0.08	\$0.3	\$0.3	\$0.8	\$1.5
	Alt. Concept 1.0	\$0.6	\$1.8	\$0.6	\$5.3	\$8.3
	Alt. Concept 1.1	\$0.5	\$2.3	\$1.1	\$5.1	\$9.0
	Alt. Concept 1.2	\$0.7	\$4.1	\$1.1	\$7.3	\$13.2
	Alt. Concept 1.3	\$2.03	\$3.5	\$1.1	\$20.3	\$27.0
	Alt. Concept 1.4	\$0.9	\$18.0	\$0.1	\$8.8	\$27.8
	Alt. Concept 1.5	\$1.3	\$3.0	\$0.1	\$12.6	\$17.0
ANALYSIS SECTION 2	Alt. Concept A	\$0.2	\$2.2	\$0.4	\$1.8	\$4.6
	Concept A1	Would be included in "A"	\$2.9	\$0.3	\$0.5	\$3.7
	Total A+A1	\$0.2	\$5.1	\$0.7	\$2.3	\$8.3
ANALYSIS SECTION 3	Alt. Concept A	\$0.6	\$5.0	\$0.1	\$5.5	\$11.2
	Alt. Concept B	\$0.6	\$6.5	\$0.4	\$6.0	\$13.5
ANALYSIS SECTION 4	Alt. Concept A	\$0.1	\$0.8	\$0.1	\$1.0	\$2.0

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Table 8: Comparison of Alternative Concepts and Spot Improvements

Analysis Section	Alternative Concept	Length (Feet)	R/W (Acres)	Relocations (Approx.)	# of Stream Crossings	Public Survey Results ¹ , by Section	Cost Estimate (Mil.)
ANALYSIS SECTION 1 KY 17 (MP 0.22 to near Crystal Lake Drive (MP 0.91, Hands Pike Hill))	Hands Pike Hill Spot Impvts 1	2,200'	5.2	3	1	Highest ranking of all in Section	\$6.8
	Hands Pike Hill Spot Impvts 2	2,400'	1.8	0	1	2 nd highest ranking of all in Section	\$1.5
	Alt. Concept 1.0	4,750'	9.3	3	1	Highest ranking long-term improvement in Section	\$8.3
	Alt. Concept 1.1	3,850'	14.5	2	1	Average Ranking in Section	\$9.0
	Alt. Concept 1.2	3,650'	16.5	7	1	Average Ranking in Section	\$13.2
	Alt. Concept 1.3	4,850'	26.7	1	1	Low ranking of all in Section	\$27.0
	Alt. Concept 1.4	3,150'	22.1	51	1	Low ranking of all in Section	\$27.8
	Alt. Concept 1.5	4,000'	19.6	2	2	Average Ranking in Section	\$17.0
ANALYSIS SECTION 2 Near Crystal Lake Drive (MP 0.91) to Near Otter Court (MP 1.47)	Alt. Concept A	2,650'	2.3 to 3.3 ²	6 to 20	1	17 yes / 11 no	\$4.6
	Concept A1	n/a	1.3	9	1	7 yes / 16 no	\$3.7
	Total A+A1	--					\$8.3
ANALYSIS SECTION 3 Near Otter Court (MP 1.47) to East of Edwin Drive (MP 2.17)	Alt. Concept A	3,325'	14.3	11	1	15 yes / 8 no	\$11.2
	Alt. Concept B	4,000'	11.4	17	1	6 yes/ 15 no	\$13.5
ANALYSIS SECTION 4 East of Edwin Drive (MP 2.17) to KY 16 (MP 2.52)	Alt. Concept A	1,400'	1.3	2	0	18 yes/ 8 no	\$2.0
<p>1 Because of the number of alternatives in Analysis Section 1, the survey questionnaire asked that each alternative be ranked from 1 through 5, with 1 being the lowest priority and 5 the highest. For the other Analysis Sections, those surveyed were asked to simply indicate YES or NO to select/reject an alternative. The survey summary is provided in full in Appendix D.</p> <p>2 Ranges are provided because Section 2 could be widened to the left, right, or equally down the middle.</p>							

8.0 RECOMMENDATIONS

8.1 Recommended Alternatives

In consideration of the existing and projected future transportation system conditions along Hands Pike in Kenton County; the project goals; the preferences of the KYTC Project Team, local officials and stakeholders, and the general public; the alternative concepts considered; and a desire for a set of fiscally responsible recommendations that would result in the greatest chance of implementation, the following project improvements were recommended in priority order: Exhibit 3, Appendix A, shows these recommended improvements.

1. **ANALYSIS SECTION 1—Spot Improvements 2**, full Improvements. **Estimated cost:** \$1.5 million.

Also, carry both **Alternative Concepts 1.0** and **1.1** to the Design phase of project development where a final decision would be made. Six-foot wide paved shoulders are to be included in this rural cross-section as a provision for bicyclists. **Estimated cost:** \$8.3 to \$9.0 million depending upon the alternative chosen in the Design phase and the extent to which spot improvements ultimately can be integrated into final improvements.

2. **ANALYSIS SECTION 2—Alternative Concept A:** Construct a 3-lane urban section with center left-turn lane along the existing alignment, and provide a conventional sidewalk on one side of the road and a wider sidewalk on the other side to serve as a multi-use bicycle/pedestrian path. **Estimated cost:** \$4.6 million.
3. **ANALYSIS SECTION 3—Alternative Concept A:** Construct a 2-lane urban section on new alignment, and provide a conventional sidewalk on one side of the road and a wider sidewalk on the other side to serve as a multi-use bicycle/pedestrian path. **Estimated cost:** \$11.2 million. It was noted that, since implementation of improvements in this section is not expected in the near-term, ultimately improvements might instead be made to the existing roadway due to potential development that may occur in the corridor of the proposed new roadway. Under that scenario, the estimated cost would increase to \$13.5 million.
4. **ANALYSIS SECTION 4—Alternative Concept A:** Construct a 2-lane urban section. Provide a conventional sidewalk on one side of the road and a wider sidewalk on the other side as a multi-use bicycle/pedestrian path. **Estimated cost:** \$2.0 million

The total estimated cost of these recommended improvements is **\$27.6 or \$28.3 million**, depending on which Alternative Concept (1.0 or 1.1) in Section 1 is selected and how the spot improvements are integrated. If improvements in Analysis Section 3 are made to the existing corridor rather than on a new alignment, the total cost could be as high as \$30.6 million.

8.2 Comparison of Recommendation to Project Goals

Each recommended improvement was reviewed in comparison to the project goals and qualitatively “scored” based on the degree to which satisfaction of each project goal would likely be achieved through implementation of that recommendation. Results of this qualitative scoring are shown in Table 9.

Based on research by the Kentucky Transportation Center at the University of Kentucky, each of the five recommendations would improve safety on Hands Pike by reducing the occurrence of crashes by between 25 and 50 percent. Access for local traffic would be enhanced by improving horizontal and vertical geometry, sight distance, and/or providing storage for left-turning vehicles.

Table 9: Goal Satisfaction of Recommended Improvements

	SECTION 1 Spot Improvement 2, Hands Pike Hill	SECTION 1 Reconstruct Section One Using Either Alternative 1.0 or 1.1	SECTION 2 Construct 3-Lane Urban Section w/ Center Left-Turn Lane	SECTION 3 Construct 2-Lane Urban Section on New Alignment	SECTION 4 Construct 2-Lane Urban Section w/ Center Left-Turn Lane
Improve Safety on Hands Pike	<i>Good</i>	<i>Good</i>	<i>Good</i>	<i>Good</i>	<i>Good</i>
Improve Access for Local Traffic	<i>Good</i>	<i>Good</i>	<i>Good</i>	<i>Good</i>	<i>Good</i>