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**PROGRAMMING STUDY  
KY 121, GRAVES COUNTY  
RECONSTRUCT FROM 400 FEET SOUTH OF HARRIS LANE  
TO THE INTERSECTION WITH KY 945  
ITEM NO. 01-8100.00**

**I. INTRODUCTION**

***A. Study Purpose***

The purpose of this programming study was to evaluate the need to reconstruct KY 121 from 400 feet south of Harris Lane, MP 14.095, to the intersection of KY 945, MP 17.167.

The project was identified in the Kentucky Transportation Cabinet's (KYTC) FY 2003-2008 Six-Year Highway Plan as Item No. 01-8100.00.

Through this programming study, the Kentucky Transportation Cabinet (KYTC) is able to ensure that future project improvements effectively address the identified transportation needs and that background information is provided that can be utilized to provide documentation that meets the federal requirements of the National Environmental Policy Act (NEPA).

***B. Study Objectives and Tasks***

The primary objectives of this study were to:

- Define improvement needs;
- Develop improvement recommendations

The primary tasks involved in this study were:

- Establishing a project team to provide direction and review for the study. This team included representation from the various phases of project development from the Highway District office as well as the Area Development District, the Environmental Overview consultant representatives, Central Office Highway Design, and representatives from Central Office Planning;
- Initiating early coordination with resource agencies and local officials;
- Reviewing the project description and identifying logical termini;
- Developing a draft statement of project goals;

- Identifying existing conditions including geometrics, capacity, accidents, and other issues that are influencing the project.
- Developing future year traffic projections;
- Identifying preliminary environmental concerns;
- Identifying environmental justice concerns;
- Addressing, in general terms, the project design criteria;
- Developing recommendations for improvements including cost estimates and priorities as needed.

### ***C. Programming and Schedule***

Only the planning phase of this project was listed in the FY 2003–2008 Six-Year Highway Plan, with \$200,000 committed funds for FY 2003. No other design, right-of-way, utilities or construction phases were scheduled in the FY 2003–2008 Six-Year Highway Plan or the 2005-2010 Recommended Six-Year Highway Plan.

## **II. PROJECT LOCATION, EXISTING CONDITIONS, AND TRAFFIC**

### ***A. Project Location***

The project is located in Graves County, just outside the northwest urban limits of Mayfield, Kentucky. The project begins 400 feet south of Harris Lane on KY 121 at MP 14.095, and extends north to the intersection of KY 945 at MP 17.167 for a total project length of 3.072 miles. The project study area is shown in **Exhibit 1 in Appendix A**.

This project location description was revised from that listed in the 2003-2008 Six-Year Highway Plan, originally described as beginning at the Graves County High School Entrance and extending north to the KY 440 intersection. At the beginning of the study, construction had begun to convert the south end of the study segment from a two-lane to a five-lane urban, curb and gutter section, extending just north of the Graves County High School entrance. Also, KY 1830 reconstruction was in the Design phase at the start of this study, and included plans to three-lane the segment of KY 121 beginning at the five-lane section just north of the high school entrance. Those plans extended north beyond KY 1830 to a point 400 feet south of Harris Lane. The study team selected this location as the southern terminus of the project study. The northern terminus was extended beyond the intersection of KY 440 since potential improvements at that location would most likely involve the intersection immediately to the north, KY 945, due to the close proximity.

This segment of KY 121 is rolling with tangent horizontal alignment except for a single curve on the north end of the segment between KY 440 and

KY 945. There is a high school, a middle school and a planned elementary school just south of the southern terminus of the project study area. The Julian M. Carroll (Purchase) Parkway is located approximately one mile south of the study area and defines the outer urban limits of Mayfield. The Jackson Purchase Medical Center is located just within this boundary. The land use characteristics immediately south of the study area are predominantly commercial in an urban setting, however, beginning at the southern terminus and extending north through the study area, it is more rural with a mix of residential and agricultural land uses. There are several groups of houses having immediate driveway access to KY 121. Generally, the houses are not too closely spaced and have relatively deep setbacks from the road.

Photographs of the project area are shown in **Appendix B**.

### ***B. Existing Highway Features***

Data on existing conditions was taken from the Cabinet's Highway Information System (HIS) Database. This data was checked, verified, and /or updated through field surveys, as appropriate. Detailed summary data can be referenced in **Table 1, Appendix C**.

The KY 121 study segment has two 11 foot lanes with two-foot shoulders. The horizontal alignment is tangent except for one horizontal curve between KY 440 and KY 945. The vertical alignment is rolling. There was a sight distance problem noted at the intersection of KY 440 where a skewed horizontal alignment exists in combination with a crest vertical curve. There are two other intersections with state maintained routes in the study area with skewed horizontal alignment, KY 1276 and KY 945. None of the intersections in the study area are signalized. The posted speed limit is 55 mph with 41 percent passing sight distance. There are no bridges on this segment of KY 121. The study route was last surfaced in 1998. The average right-of-way width is 70 feet.

### ***C. Highway Systems***

Classification and system information for KY 121 is summarized in **Table 2, Appendix C**. The study portion of KY 121 is functionally classed as a Rural Minor Arterial and designated on the state system as a State Secondary. The study segment of KY 121 is not included in the National Highway System but is state designated on the National Truck Network (NN) allowing increased dimension vehicles (102 inches wide; 13 feet 6 inches high; semi-trailers up to 53 feet long; trailers up to 28 feet long – not to exceed two trailers per truck) to operate. This segment of KY 121 is

truck designated as “AAA” allowing a maximum gross weight of 80,000 pounds. KY 121 is the most direct truck route between Mayfield and Wickliffe.

#### ***D. Crash Analysis***

Crash data was collected for the three-year time period from January 1, 2000 through December 31, 2002 from the Kentucky State Police (KSP) Collision Report Analysis for Safer Highways (CRASH) database. Roadway segments greater than 0.1 mile and spot locations, less than or equal to 0.1 mile, were analyzed to determine a Critical Rate Factor (CRF). The CRF is the ratio of the actual crash rate compared to the critical crash rate for roads of similar functional class in Kentucky. The critical crash rate is determined by a statistical calculation based on the average crash rate for roads of similar functional class in Kentucky. A Critical Rate Factor greater than or equal to 1.0 indicates a segment or spot where crashes may not be occurring randomly, with a probability of 0.995. This is the methodology described in the Kentucky Transportation Center’s Analysis of Traffic Accident Data in Kentucky (1998-2002).

Crash analysis data are summarized in **Table 3, Appendix C**. Statistics for types of crash are summarized in **Table 4, Appendix C**. Crash segments, numbers and critical rates are shown in **Table 5 Appendix C and Exhibit 2, Appendix A**. The locations of the injury and fatal crashes are also shown in this figure. There were a total of 27 crashes in the study corridor for the three years evaluated. Of this number, five resulted in injuries, one involved a fatality and the remaining 21 were property damage only (PDO). Ten of the crashes were the result of a collision with an animal, seven were rear end crashes, six were run-off-the-road crashes and the remaining four were due to other causes. The fatal crash occurred on KY 121 approximately midway between KY 1830 and KY 1276. In this fatal crash, two vehicles were traveling on KY 121 in opposite directions. The northbound vehicle was turning left into a residential driveway and was hit in the passenger side door by the southbound vehicle. This was the only crash analyzed in the three year time period that occurred at dusk. Two of the injury crashes and one of the property- damage-only crashes cited occurred on KY 1276 within 0.125 mile of the intersection with KY 121. One of these injury crashes was a “collision with fixed object” and the other was described as “other collision on shoulder.” No crash segments or spots had Critical Rate Factors greater than or equal to 1.0. The highest Critical Rate Factor identified was 0.608 for the segment between KY 1276 and KY 440. For this segment, there were no fatal, four injury and six PDO crashes, including the three crashes on KY 1276 at or near the KY 121 intersection.

## **E. Traffic**

An analysis of the traffic and operational conditions on KY 121 was included in this study. A Level of Service (LOS) analysis was conducted for both existing and future conditions using Highway Capacity Analysis Software. Level of Service is a qualitative measure defined in the Highway Capacity Manual to describe traffic conditions. Individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and are given letter designations, from A to F, with LOS A representing free flow conditions and LOS F representing severe congestion or gridlock. Typically, a minimum of LOS D is acceptable in urban areas and LOS C in rural areas. The Highway Capacity Manual (latest edition: HCM 2000), published by the Transportation Research Board (TRB), provides guidelines on the analytical procedures for estimating LOS for highways.

### **1. Existing Traffic Volumes and Levels of Service (2002)**

The KYTC Highway Information System (HIS) was used to provide the existing traffic volumes and truck percentages (Year 2002) for three segments of KY 121 from 400 feet south of Harris Lane to the intersection with KY 945. The highest volume of traffic, 5,000 vehicles per day with 14.5 percent trucks, was identified on the southernmost segment, between 400 feet south of Harris Lane and the intersection of KY 1276. The next highest volume of traffic, 3,970 vehicles per day with 14.5 percent trucks, was identified in the next segment to the north, between KY 1276 and KY 440. The northernmost segment carried the least traffic volume, 2,960 vehicles per day, but had the highest percentage of trucks, 17.0 percent. All three of these segments comprising the entire study corridor are currently operating at Level of Service D. The “D” rating is due to the average travel speed being reduced to below 45 mph (between 43.5 and 44.7 mph) by a combination of narrow lanes and shoulders, access points, no passing zones, grades and heavy vehicles. The highest volume/capacity ratio of the three segments was only 0.25. The percent time spent following was below 65 percent (between 58.9 and 62.6 percent), good for LOS C had the average travel speed been higher. Existing traffic volumes, truck percentages and Levels of Service are depicted on the map in **Exhibit 3 of Appendix A**. As noted above, Level of Service D generally represents acceptable operating conditions in an urban environment, but unacceptable in a rural setting.

### **2. Future Traffic Volumes and Levels of Service (2030)**

Future year (2030) traffic volumes were calculated based on an annual growth rate of 2.4 percent. This is the average growth rate calculated for

a Rural Minor Arterial in Kentucky as reported in the 2002 Traffic Forecasting Report, Division of Multimodal Programs, Kentucky Transportation Cabinet. Truck percentages were assumed to be the same as existing for the purpose of calculating Levels of Service. The highest projected traffic volume for the year 2030 is 9,710 vehicles per day between 400 feet south of Harris Lane and KY 1276. The next highest projected traffic volume, 7,710 vehicles per day, is in the next segment to the north, between KY 1276 and KY 440. The lowest projected traffic volume for the study corridor, 5,750 vehicles per day, is in the northernmost segment, between KY 440 and KY 945. With no improvements, the entire study corridor is expected to maintain a Level of Service of D into the year 2030. The average travel speed for year 2030 calculated for the three segments on the study corridor is between 40.2 and 42.5 mph, which corresponds to LOS D. The percent time-spent following is between 66.0 and 76.8 percent for the three segments for year 2030, corresponding to LOS D. The volume/capacity ratios for the three segments were between 0.29 and 0.43, projected for year 2030. These future year Levels of Service with no improvement are shown in **Exhibit 4, Appendix A**. Reconstructing the study corridor as an improved two-lane roadway would achieve an improved Level of Service C, but only for two years. Then, the projected increase in traffic would reduce the LOS back to D where it would remain into the year 2030. Reconstructing as a four-lane roadway would achieve Level of Service A which would be maintained into the year 2030, given the 2.4 percent projected traffic growth rate.

#### ***F. Programmed Highway Improvements***

In addition to this planning study, there are several projects in the general study area that are planned and programmed in the FY 2003-2008 Six-Year Highway Plan. These projects are outlined in **Table 6 in Appendix C** with their respective phase costs and schedules. They include a new southern bypass around Mayfield, KY 303; new routes KY 80 and KY 121 paralleling existing KY 121 immediately southeast of Mayfield; major widening of US 45 immediately north of Mayfield; and reconstruction of KY 1830 between KY 121 and US 45 just north of Mayfield and immediately adjacent to the study area.

### **III. INITIAL PROJECT TEAM MEETING**

The first project team meeting was held on February 13, 2003 in the KYTC District 1 conference room in Paducah, Kentucky. The purpose of the meeting was to discuss the purpose, goals and objectives of the study and to share information about known issues and concerns that will need to be addressed as the project moves forward. A copy of the minutes from that

meeting is included in **Appendix D**. Items presented at the meeting include:

- The project was originally described in the Six-Year Highway Plan, FY2003-2008, beginning on KY 121 at the Graves County High School Entrance, and ending at the intersection with KY 440. Due to existing construction on the south end of this study segment and proposed reconstruction of KY 1830 to include a portion of KY 121 near its intersection with KY 1830, this southern terminus was changed to a point immediately north of the described construction activity to a point 400 feet south of Harris Lane. The northern terminus also was changed and moved north to the intersection of KY 945 due to the likelihood that any improvements to the intersection at KY 440 would also affect the intersection at KY 945.
- Prior studies conducted involving the project study area include:
  - KY 121 Corridor Planning Study, Existing Conditions Technical Memorandum 1997
  - Mayfield Urban Area Transportation Study, February 1999
  - KY 121 Corridor Planning Study, Final Report, February 2000The 1997 and 2000 study reports looked at the entire route between Mayfield and Wickliffe. The No. 1 priority identified in the 2000 report was the segment currently under consideration between the Julian M. Carroll (Purchase) Parkway and the intersection of KY 440. Two-lane improvements on four-lane right-of-way were recommended for that priority segment. Improving the KY 440 intersection was listed as Priority No. 2 in that report.
- No high crash segments or spots are located within the revised termini of the project study area.
- The segment within the study corridor with the highest traffic numbers is between the Julian M. Carroll (Purchase) Parkway and KY 1830, and is therefore already being addressed by the KY1830 and KY121 Bypass improvements previously discussed. AADT is 5,000 between KY 1830 and KY 1276 with 14.5 percent trucks. AADT is 3,970 for the remainder of the corridor to KY 440 with 14.5 percent trucks. The corridor is operating now at LOS D. If no improvements are made, it will continue to operate at LOS D into the year 2030 given a 2.4 percent growth rate. The best that could be achieved by reconstructing with a two-lane section would be LOS C. But, if the corridor experiences a 2.4 percent growth rate, it would be less than two years before it would return to LOS D. 2.4 percent is the average annual growth rate calculated for a Rural Minor Arterial in the state of Kentucky, as reported in the 2002 Traffic Forecasting Report, Division of Multimodal Programs, Kentucky Transportation Cabinet.
- Exhibits show a tangent horizontal alignment, and rolling vertical alignment through the study corridor. If the northern terminus is extended just beyond the KY 440 intersection to KY 945, this additional

length will include one horizontal curve. There was also a sight distance problem noted with the crest vertical curve at the KY 440 intersection.

- KY 121 is on the National Truck Network and is the only viable connector for freight movement between Mayfield and Wickliffe. Comments solicited from local trucking companies by the Purchase ADD indicate there is a problem with narrow lane and shoulder widths through this corridor. HIS data show eleven-foot lanes and two-foot shoulders.
- Noteworthy is a plan to develop a major Industrial Park to boost the region's economy, just north of Mayfield in the Folsomdale-Viola area along US 45. This would be a world-class, as large as 2,500 acre facility, capable of supporting a large national, or international firm. The Industrial Park would provide economic development benefits to a multi-county region. It is not known whether this plan will go forward, but, sentiment is, it is a likely possibility. Once begun, the Industrial Park might begin to see tenants within six to ten years.
- A list of questions prepared by KYTC Environmental Analysis was presented to meeting attendees for review, with the intent to obtain accurate, reliable information regarding real estate availability and value. Stacey Courtney of the Purchase ADD agreed to gather the information.
- The team consensus was that there did not appear to be a viable ITS solution for the identified problems and issues. The team also agreed that current bicycle and pedestrian guidelines will be followed, especially given the proximity of existing, and planned schools in the area.
- Benefits of the proposed project – Goals and Objectives
  - Primary Goal - Improve Safety.  
The following factors influenced the team's decision to make improving safety the primary goal of the study:
    - ✓ Skewed intersections with reduced sight distance
    - ✓ Narrow shoulders
    - ✓ Several schools near the project area
    - ✓ Close proximity to a large industrial employer
    - ✓ Relatively high percentage of trucks

The project team selected the following secondary goals:

- Relieve congestion, improve capacity and level of service.  
Much has already been done to relieve congestion on KY 121 at the Julian M. Carroll (Purchase) Parkway, south of the study corridor. For the segment currently under consideration, two-lane improvements would increase the level of service from D to C. Once achieved, this level of service could only be maintained for two years before falling back to D. Four-lane improvements,

however, achieve level of service A for year 2030 traffic projections. While the study corridor is located in a predominantly rural area, there are segments with residential dwellings and private driveway access continuous along both sides of KY 121. Other section alternatives need to be explored before finalizing any recommendations.

- Accommodate increased truck use and promote regional connectivity.

Both Wickliffe and Mayfield are home to companies that generate substantial numbers of trucks that travel along the study corridor. Questionnaires completed by trucking agencies, solicited by the Purchase ADD, point to problems with narrow lanes and shoulders. HIS data show eleven-foot lanes and two-foot shoulders through the corridor. KY 121 is on the National Truck Network and is the primary connector between Mayfield and Wickliffe. A Regional Industrial Park proposed north of Mayfield along US 45, if completed, would have a significant impact on traffic levels and truck percentages in the study corridor.

- The team did not see the likelihood that it would recommend that the functional class of this segment of KY 121 change from Rural Minor Arterial.
- Traffic is projected to be as high as 9,700 ADT through most of the study corridor by the year 2030 given an average growth rate of 2.4% per year. It was pointed out during the meeting that there are plans for a new elementary school on KY 121 immediately south of the study area with a planned enrollment of 500 children. 25% of these students are estimated to live north of the study area and will generate additional traffic through the study corridor.
- The speed limit through the study corridor is currently 55 miles per hour. The team agreed that a 55 mph design speed is appropriate for reconstruction. If during the course of this study it is determined that a significantly different roadway section is called for, a lower design speed may be necessary.
- Two-Lane - It was noted that the highest LOS attainable for an improved two-lane section given the current traffic is LOS C. At a growth rate of 2.4% per year, this LOS could only be maintained for approximately two years before it would revert back to LOS D and remain at D through the year 2030.
- Four-Lane - It was noted that for four-lane improvements, LOS A would be achieved for year 2030 traffic projections.
- The team agreed that KY 1276/KY 121 intersection improvements should be included in the study recommendations. It was noted that 2002 ADT on KY 1276 was 1,130 on the west end, at KY 121, and 1,450 on the east end, at US 45. The KY 1276/US 45 intersection is where Continental General Tire is located, one of the area's major employers and traffic generators.

- No intersections within the study corridor are signalized. There are no plans to signalize KY 1830 at KY 121 but KY 1830 will be signalized at US 45.
- There is a new elementary school planned on KY 121 to be located immediately north of the existing High School entrance.
- KY 945 intersects KY 440 and KY 121 immediately north of the KY 121/KY 440 intersection and will be included in plans to improve this intersection. There is a water tank located to the east of the KY 121/KY 440 junction. The intersection improvement plan included in the 2000 study would have some turning movement storage issues to be resolved. Also, the actual vertical alignment at this intersection (crest vertical curve) creates sight distance problems that cannot be visualized in the two-dimensional plan view depicted in the 2000 report. The intersection may need to be cut down to correct deficiencies.
- Access is currently by permit, and, by team consensus, should remain so.
- Our standard letter and distribution list will be used for agency coordination. Stacey Courtney will supply additional names from the Purchase ADD's list of contacts.
- There are no Public Information Meetings or Officials Meetings planned for this study. Public involvement will be handled through agency coordination. Depending on the agency responses received, further public involvement could be added.

#### **IV. ENVIRONMENTAL AND SOCIOECONOMIC OVERVIEW**

##### ***A. Environmental Overview and Footprint***

Qk4, under contract to assist the Division of Planning, developed an Environmental Overview and Footprint for this project. A copy of the Environmental Overview and Footprint are included in **Appendix E**. The following are the major findings of the environmental overview:

##### **1. Topography and Geology**

The project study area is located in the Jackson Purchase region of western Kentucky. Soil types in the study area consist of loess, alluvium, and unconsolidated coastal plain sediments susceptible to rapid erosion. The main drainage features in the study area are the West Fork of Mayfield Creek, Mayfield Creek and Key Creek. The topography consists of rolling hills, small stream valleys and dissected upland. Forested wetlands have been converted to cropland.

## 2. Culturally Sensitive Locations

- 2 cemeteries: Mount Zion Baptist Church Cemetery and one unnamed cemetery
- 1 church: New Hope Church
- Jackson Purchase Medical Center
- Graves County High School
- Gateway Academy High School
- County War Memorial Fairgrounds

## 3. Historic, Archaeological, and Cultural Resources

There are no National Register of Historic Places, NRHP, listings for historic sites in the study area. Three building sites were identified with potential to meet NRHP criteria. These are listed on the Environmental Footprint map as NRP. Of these, only Mt. Zion Cemetery is within the study bounds, 1200' off KY 121. There is one historic farm, Andrus Farm located in Mayfield, the exact location unidentified at the time of this writing.

There are no previously recorded archaeological finds within the study area, although there is moderate potential for discovery of significant deposits. A reconstruction project would require a Phase I level archaeological investigation (shovel test probe excavations).

## 4. Aquatic

30 streams could be impacted by sedimentation from construction activities. All are tributaries of Mayfield Creek which is a direct tributary of the Mississippi River. Kentucky Division of Water (KDOW) will require a non-point source pollution control plan and erosion control plan. KYTC Specific Specifications for Road and Bridge Construction and FHWA's Best Management Practices for Erosion and Sediment Control can be used to alleviate most sedimentation problems.

There are no wild or scenic rivers, outstanding resource waters, municipal intakes or recorded wells within the study area. The study area doesn't cross any special flood hazard areas (Zone A) and is located entirely within Zone X (areas outside 500-year floodplain).

## 5. Wetlands and Ponds

There are 24 wetlands from 0.1 to 4.6 acres within the study area, most probably created ponds. More intensive field surveys would be required to confirm/delineate wetlands and identify any not appearing on the map.

## 6. Terrestrial Resources

Plant and animal life is considered typical for the area. What was once grassland and forested wetlands has been converted to cropland. Numerous small wood lots are scattered throughout the project area.

## 7. Threatened and Endangered Species

The US Fish and Wildlife Service (USFWS) has indicated there are no federally protected species known to occur within the study area.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) indicated the copperbelly water snake is known to occur in the Hickory quad. It is federally listed as a threatened species in the northern part of its range but is not federally listed in the southern part of its range (including Kentucky) but could require mitigation if suitable habitat land (i.e., wetlands) is impacted and may require more intensive field studies.

The Kentucky State Nature Preserves Commission (KSNPC) identified two state-threatened species from the study area:

- Compass Plant - two sites near the study area on the south side of KY 121.
- Bachman's Sparrow – one site northwest and outside the study area.

## 8. Managed Land Areas

There are no known managed land areas within the study area. No agricultural districts are impacted.

## 9. Farmlands

There is between 40 and 50 percent prime farmland soil in the study area. About 31 percent of existing KY 121 crosses prime farmland. Some of this prime farmland's value has already been compromised by residential development and roadway construction.

## 10. Hazmat Concerns

Land use in the study area is predominantly agricultural and residential with some commercial facilities. There are four possible contamination sites within or near the study area:

- Site 1 - CITGO (outside the study area to the south across from the Graves County High School)
- Sites 2 - Vacant commercial property (outside the study area, at the KY 1830 intersection. Contains possible petroleum or

hazmat from former operations; also possible asbestos containing building materials (ACBM)

- Site 3 – Vacant commercial property (formerly Turners Body Shop) with possible petroleum or hazmat from former operations; also possible asbestos containing building materials (ACBM)
- Site 4 – Farmer’s Co-op (former gasoline station), contains potential hazmats

Also, various locations with:

- PCB’s associated with power pole mounted electrical transformers
- Above ground storage tanks (AST’s) – heating fuel oils, gasoline and liquid propane
- ACBM’s (Asbestos containing building materials) – residential and commercial buildings.

#### 11. Air Quality

Graves County is located within the Paducah-Cairo Interstate Air Quality control region. The area is designated as an Attainment Area for all transportation related pollutants. The project is not expected to adversely impact air quality in the region.

#### 12. Traffic Noise

The study area contains several residences, a motel, three schools (south of the study area), churches, cemeteries, a retirement home, and several small businesses. Properties somewhat removed from the roadway are not anticipated to be adversely affected by traffic noise. Noise barriers would interfere with roadway access for widely spaced single family residences. They should not be required for this project. The highest potential for impact is from additional right-of-way needs.

#### 13. Other

A water tank on the north end of study area was removed in 1999.

### ***B. Environmental Justice***

The Purchase Area Development District conducted an environmental justice assessment of the project area. Data was compiled from a number of sources including 2000 US Census data, KYTC Division of Planning, local officials, and field observations of the project area. The purpose of the review was to ensure equitable environmental protection regardless of race, ethnicity, age, disability, economic status or community, so that no segment of the population or community bears a disproportionate share of

the impacts to the natural and human environment attributable to a proposed project. A copy of the environmental justice and community impact information is included in **Appendix F**.

The project area crosses two Census Tracts with only one block group in each tract:

- Census Tract 201, Block Group 4 contains Census Blocks 4005, 4006, 4008 and 4009
- Census Tract 207, Block Group 3 contains Census Blocks 3018, 3019, 3020(no people) and 3021.

Census blocks are the smallest division used by the Census Bureau. The Census Bureau does not, however, break down poverty data smaller than the block group level.

#### 1. Minority Population

There were no significant block groups identified for minority populations. At the block group level, however, Census Block 4005 contains a significantly higher percentage of minority population, 15.5% vs. 9.5% PADD (Regional), 7.9% Graves County and 9.4% Kentucky.

#### 2. Low-Income Population

The percentage of county low-income population is higher than the region and state, 16.4% vs. 15.0% and 15.8%. There were no low-income populations identified using 16.4% as the threshold.

#### 3. Population by Age

There were no significant block groups identified for elderly populations, age 62 and older. However the following four census blocks had elderly population percentages greater than the threshold, county percentage of 18.8%:

- Census Block 3021 (CT207, BG 3) - 23.5%
- Census Block 4005 (CT201, BG 4) - 19.2%
- Census Block 4006 (CT201, BG 4) - 18.9%
- Census Block 4009 (CT201, BG 4) - 24.0% significantly above threshold

Based on data obtained from the U.S. Census Bureau for income and race, discussions with local officials and field observations, there is no defined Environmental Justice community within the project area. Analysis of the minority population data showed one Census Block having a percentage higher than the reference threshold percentage. This Census Block should be noted during any subsequent phases of this project but there is not sufficient minority population in the project area to

be considered an Environmental Justice community. Age analysis of the project area indicates that there is a distribution of elderly residents in the project area but no specific concentrations of elderly residents.

### **C. Real Estate and Relocation**

A questionnaire was developed by the Division of Environmental Analysis to explore real estate and relocation issues associated with the potential reconstruction of the subject study route. This questionnaire was introduced to the project team at the initial team meeting. The Purchase Area Development District collected the data and presented it in a report that is included in **Appendix G** at the end of this document.

The real estate information in the report included home characteristics, price ranges, number of homes built, number of homes on the market, available business relocations, dependence on existing location, and effect on farms and agricultural activities in the area.

The report concluded that there are suitable relocations available for residences. One lamp company indicated it would need to be relocated within a three to four mile radius due to other lamp businesses being located in Mayfield and competitive pressures. The impact to farms is expected to be minimal.

## **V. RESOURCE AGENCY COORDINATION**

Coordination letters were sent to various public officials, resource agencies, organizations, and internal Cabinet offices to obtain input and comments about the needs and potential impacts of the project. Copies of the request letters, mailing list, and the responses are included in **Appendix H**. The following is a summary of the issues and concerns raised:

- Kentucky Department of Military Affairs, Facilities Division – Reviewed for potential impacts to properties utilized by The Department of Military Affairs. None were found.
- Department of the Army, Corps of Engineers – Need to address the stream crossings impacted by the project. Open water areas and wetlands have been adequately inventoried by the preliminary study. After the stream crossings have been documented, permitting requirements will need to be addressed for all wetlands, stream crossings, and open water areas prior to construction.
- Department for Surface Mining Reclamation & Enforcement, Natural Resources and Environmental Protection Cabinet – Did not identify any specific issues or concerns at this time.
- Kentucky Geological Survey –

- Physiographic Region – Jackson Purchase (Gulf Embayment) Physiographic Region, which is a typical coastal plain made up of clays, silt, sand, and gravel.
- Karst Potential – probably would not encounter karst features such as sinkholes and caves.
- Landslide Potential – Probably would encounter pre- and /or post-landslide hazards.
- Unconsolidated Sediments – Would encounter clays, silt, sand and gravel.
- Resource Conflicts – Probably would not encounter any resource conflicts.
- Materials Suitability – The gravel of the continental deposits might be suitable for construction stone.
- Fault Potential – Would not encounter any faults.
- Earthquake Zone – The study area has probable peak ground acceleration (PGA) due to earthquake ground motion of 0.40 g. There would be a high potential for liquefaction or slope failure in the unconsolidated sediments.
- United States Environmental Protection Agency – Enclosed four population maps to assist us in our environmental justice review. No potential EJ areas shown on maps. Advised to include all the potential impacts and potential measures for impact mitigation in DEIS.
- 8th Coast Guard District, Bridge Branch – This is not a waterway over which the Coast Guard exercises jurisdiction for bridge administration purposes. A Coast Guard bridge permit is not required.
- United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) – Concerned with potential impacts upon prime farmland soils and additional farmlands of statewide importance.
- United States Department of the Interior, Fish and Wildlife Service – Concerned that highway projects frequently accelerate erosion and sedimentation in streams, resulting in adverse effects to the aquatic environment. Prevent through Best Management Practices. Endangered Indiana bat and gray bat may exist within study area. Recommend KYTC survey the project area for caves, rock shelters, and underground mines; identify any such habitats and avoid impacts. Only remove trees between October 15 and March 31 to avoid impacting Indiana bat “swarming” behavior. If the recommendations can’t be accomplished, have qualified biologist survey the project area, or, provide written documentation with site specific information that shows there is no suitable habitat in the project area.
- Kentucky Cabinet for Health Services – Project will not impact operations of Cabinet of Health Services.
- City of Mayfield – Proposed construction would relieve congestion and improve capacity. Would also accommodate increased truck use and promote regional connectivity.

- Kentucky Department of Fish and Wildlife Resources (KDFWR) – No federally threatened or endangered species are known to occur in the Hickory 7.5 minute USGS quadrangle. State threatened or endangered species are known to occur in the Hickory quad but are not found in the vicinity of the project. KDFWR does not anticipate impacts to critical habitats of fish and wildlife.
- Division for Air Quality, Department for Environmental Protection, Natural Resources and Environmental Protection Cabinet – Prevent particulate matter from becoming airborne. Cover open bodied trucks. Open burning prohibited except for expressed purposes.
- Geotechnical Branch, Division of Materials, Kentucky Transportation Cabinet (KYTC) – A large portion of the project will encounter Loess and Continental Deposits, which are highly erosive. Cut slopes in these materials may require flatter slopes (2½ :1 or flatter) especially in areas with high water tables. Slope protection may be required in some cases to prevent erosion. Embankment fill slopes may require flatter than normal slopes for fills higher than 15 to 20 feet. Sub-grade stabilization will be required throughout the project. The project is located in Seismic Zone 3 which is considered as a high risk for earthquake damage.
- Kentucky State Police – The Division of Police Services, Frankfort, received the resource agency coordination correspondence and forwarded it to the Commander of the Mayfield Post. No comments were received from the Mayfield Post.
- Division of Forestry, Department for Natural Resources, Natural Resources and Environmental Protection Cabinet – No immediate concerns if the project stays within or adjacent to the current right-of-way.
- Permits Branch, Kentucky Transportation Cabinet (KYTC) – Recommends all new projects be classified as partially controlled access and set all possible access points on the plan. Have the design speed be the same as the anticipated posted speed. Install access control fence in the partial control access portion. Notify Permits if the proposed roadway is to be placed on the NHS.
- Aeronautics Division, Kentucky Transportation Cabinet (KYTC) – Project unlikely to affect the Mayfield-Graves County Airport or any other public use Kentucky airport.
- Kentucky State Nature Preserves Commission (KSNPC) – No KSNPC-listed species or unique natural areas would be directly impacted.

## **VI. SECOND PROJECT TEAM MEETING**

The second (final) project team meeting was held on June 4, 2004. The meeting was conducted through video conferencing facilities located in Paducah and Frankfort, Kentucky. The purpose of the meeting was to review the purpose, goals and objectives of the study, evaluate new

information collected since the initial team meeting, and develop recommendations to be carried forward into subsequent project phases. A copy of the minutes from that meeting is included in **Appendix I**. Items presented at the meeting include:

- There were no major environmental issues noted that might jeopardize reconstruction efforts. A review of the high points included:
  - The topography and geology of the area consists of unconsolidated coastal plain sediments susceptible to rapid erosion.
  - Of the culturally sensitive locations listed, only Mt. Zion Cemetery is within the study bounds, being 1200 feet off KY 121, shown on **Exhibit 5 in Appendix A** as Site F on the north end of the study on the environmental footprint. An historic farm, Andrus Farm, is located somewhere in Mayfield, not known to be within the study area, but its exact location was not determined in the environmental overview. Meeting participants were not familiar with this farm or its location. There are no previously recorded archaeological sites but moderate potential for discovery of significant deposits.
  - Thirty streams could be impacted by sedimentation from construction activities. There are 24 wetlands from 0.1 to 4.6 acres, most of which are probably created ponds
  - Plant and animal life is considered typical for the area. The Kentucky Department of Fish and Wildlife Resources (KDFWR) indicated that the copperbelly water snake is known to occur in the Hickory quadrangle. It is federally listed as a threatened species in the northern part of its range but is not federally listed in the southern part of its range, including Kentucky. It could require mitigation if suitable habitat land (i.e., wetlands) is impacted and may require more intensive field studies. The Kentucky State Nature Preserves Commission (KSNPC) identified two state threatened species from the study area: Compass plant (two sites near the study area, south side of KY 121) and Bachman's Sparrow (one site northwest and outside the study area).
  - There is 40 to 50% prime farmland soil in the study area. About 31% of existing KY 121 crosses prime farmland. Some of the prime farmland value has already been compromised by development and roadway construction.
  - Only two of the hazmat sites listed in the overview are within the study area: Vacant commercial property, formerly Turners Body Shop (Site 3 on footprint) has possible petroleum or hazmat from former operations and also possible asbestos containing building materials (ACBM); and Farmer's Co-op, a former gasoline station (Site 4 on footprint) has potential hazmat.
  - The study area is in an air quality attainment area and improvements are not expected to adversely impact air quality in the region.

- Traffic noise should not adversely affect properties.
  - The water tank on the north end of the project area near the KY 121/KY 440 intersection has been removed.
- There were no readily identifiable minority or low-income groups at the Census Tract or Block Group level. If taken down to the Census Block (CB) level, CB 4005 has a higher percentage minority population, 15.4%, than 7.9% Graves County, 9.5% Region (Purchase Area Development District), 9.4% Kentucky, but lower than 30.9% US. Note, at this level, the 15.4% represents a total minority population of only 4 (approximately one family) compared to a total CB population of 26. There is a higher percentage of elderly residents in the project area, 18.3% age 62+, compared to 14.9% Kentucky and 14.7% US, but lower than 18.8% Graves County and 19.1% Region. The numbers however, are evenly distributed with no specific concentrated populations identified. These findings should be noted in future project planning and design phases. The general conclusion is that there is no defined Environmental Justice community within the project area.
  - After a review of real estate market information including home characteristics, price ranges, number of homes built, number of homes on the market, available business relocations, dependence on existing location, and effect on farms and agricultural activities in the area, it was concluded that there are suitable relocations for residences. One lamp company indicated it would need to be located within a three to four mile radius due to other lamp businesses being located in Mayfield and competitive pressures. The Eagles Club and Langston Trucking properties are located within the project area and were not included in the compiled information. Langston Trucking is located within the Y-intersection of KY 121 and KY 440. The impact to farms is expected to be minimal.
  - The following resource agency coordination response highlights were discussed:
    - The Corps of Engineers noted that the open water areas and wetlands have been adequately inventoried but that stream crossings would need to be documented and permitting requirements addressed for all wetlands.
    - The Kentucky Geological Survey responded that the project would probably encounter pre- and or post-landslide hazards and unconsolidated sediments. They noted that no faults would be encountered but that the project is in an earthquake zone and there would be a high potential for liquefaction or slope failure in the unconsolidated sediments.

- The United States Environmental Protection Agency forwarded four population maps. No potential environmental justice areas were shown on the maps.
  - The United States Department of Agriculture (USDA), Natural Resources Conservation Service responded with concerns about potential impacts upon prime farmland soils.
  - The United States Department of the Interior, Fish and Wildlife Service expressed concerns over accelerated erosion and sedimentation in streams that would be most effectively prevented through Best Management Practices. Fish and Wildlife also noted that the Indiana and Gray Bat may exist within the study area.
  - The City of Mayfield favors reconstruction of KY 121.
  - The Kentucky Department of Fish and Wildlife does not anticipate impacts to critical habitats of fish and wildlife.
  - The Division of Air Quality, Department of Environmental Protection, Natural Resources and Environmental Protection Cabinet wrote that project activities should include measures to prevent particulate matter from becoming airborne.
  - KYTC Geotechnical Branch noted that highly erosive continental deposits would be encountered requiring flatter than normal cut and fill slopes. The project is located in Seismic Zone 3, which is considered a high risk for earthquake damage.
  - The KYTC Permits Branch recommends all new projects be classified as partially controlled access and set all possible access points on the plan. The project team discussed this. The team had agreed in the initial team meeting that it would probably be best to recommend improvements for an access by permit facility. The team noted during this meeting that it would not be practical to classify this, or any number of other projects as partial control access, but the consideration of doing so would be documented in the report write-up.
  - The Kentucky State Nature Preserves Commission (KSNPC) responded that no KSNPC-listed species or unique natural areas would be directly impacted.
- There were several projects in the study area that could affect the recommendations of this study. The following is a summary of discussion on these related projects:
    - **I-66** – While the study to recommend alternatives for the location of an I-66 corridor is not yet complete, no additional project development phases are currently scheduled. That study team has looked at different locations for an Ohio or Mississippi River crossing. There are flood control features just south of the confluence of these two rivers that the Army Corps of Engineers wants to avoid. The Coast Guard also recommends a four-mile recovery distance downstream from the confluence, which will most

likely set the recommended location of a new bridge. Just south of this location, on the Kentucky side, are two National Register listed historic sites that must be avoided. There are also concerns with the possibility of having to maintain the existing bridge at Wickliffe in addition to a new bridge. While the final location of an I-66 corridor has not been decided, there are no major impacts anticipated to the KY 121 study corridor.

- **KY 1830** – The status of the KY 1830 reconstruction project was discussed. This project has not been deobligated but is a high priority with right-of-way acquisition going forward.
- **Regional Industrial Park** – Earlier bills to fund construction for a major regional industrial park in the Folsomdale/Viola area along US 45 north of Mayfield died in the House and Senate. More recently, \$5 million was allocated and this project is moving ahead with land acquisition.
- **I-69** – While the study to recommend an I-69 corridor is not complete, part of the I-69 corridor is expected to follow the Julian M. Carroll Purchase Parkway. If so, then traffic levels on KY 121 could rise more than those predicted using statewide average rates.
- The study team suggested several different improvement alternatives, considering recent KY 121 improvements between the current study segment and the Julian M. Carroll Purchase Parkway. Also considered were new schools along KY 121 and KY 1830, planned improvements to KY 1830, a planned Regional Industrial Park north of Mayfield, future I-66 and I-69 corridors, crash statistics, current and projected traffic and levels of service, truck percentages, environmental issues, relative cost and available resources. Suggested improvements were, do nothing, spot, two-lane, two-lane on four-lane right-of-way, three-lane, four-lane, and super-two on five-lane right-of-way. These improvements are described in detail in **Section X**.
- Before finalizing a recommendation, the team suggested getting KY 121 traffic projections taking into consideration a future I-69 corridor built along the Julian M. Carroll Purchase Parkway. The traffic projections will be requested from the Division of Multimodal Programs and evaluated to see if there is further justification to go to a four or five-lane recommendation. If not, the recommendation will be for a super-two on five-lane right-of-way.

## VII. TERMINI AND LENGTH

The original description listed in the Six-Year Highway plan described this project as a planning study to reconstruct KY 121 from the Graves County High School entrance to the KY 440 intersection; MP 12.714 to 16.588. However, the milepoints along KY 121 as originally described in the Six-Year Highway Plan

were increased by approximately 1.4 mile due to the extension of the KY 121 bypass. Also due to the extension of the KY 121 bypass, the segment of KY 121 immediately north of the Julian M. Carroll (Purchase) Parkway has been reconstructed from a two-lane to a five-lane urban, curb and gutter section. This portion extends just north of the Graves County High School entrance. And, KY 1830, which intersects KY 121 just north of the high school entrance, is scheduled for reconstruction. This reconstruction will include three-laning a portion of KY 121 from the north end of the five-lane section near the High School entrance to a point north of KY 1830.

The project team agreed that the south study terminus should be revised due to the reconstruction of KY 121 near the Julian M. Carroll Parkway and the scheduled reconstruction of KY 1830. The new south terminus should be located at the north end of the reconstructed portion of KY 121. The new south terminus description follows:

- Revised South Terminus: The south terminus was identified as a point 400 feet south of the KY 121/Harris Lane intersection; Milepoint 14.095.

Conditions at the KY 440 intersection include poor sight distance as a result of a combination of less than desirable horizontal and vertical alignment. Additionally, KY 945 intersects both KY 121 and KY 440 just north of this intersection. To more completely contain the elements pertinent to the intersection's problems, and solution, the team revised the north terminus as follows:

- Revised North Terminus: The north terminus was identified as the KY 121/KY 945 intersection; MP 17.167.

The revised project length is 3.072 miles.

## **VIII. SPECIAL TRAFFIC FORECAST**

The original traffic projections presented in the initial team meeting were based on state average growth rate multipliers by functional class of highway. These multipliers are calculated and updated annually and distributed by the Division of Multimodal Programs in their Traffic Forecasting Report. The annual growth rate multiplier used for KY 121, a rural minor arterial, was 2.4 percent annually. These projections, however, do not take into account a future I-69 corridor along the existing Julian M. Carroll Parkway. Neither do the projections consider a future I-66 corridor also planned for the region. Additionally, a large regional industrial park is planned for the Viola-Folsomdale area, north of Mayfield, that could employ as many as 4000 people by the year 2017. Funds have already been allocated for land acquisition. Given these circumstances, the project team requested a special forecast to determine the potential effects of these planned interstates and industrial park on the KY 121 study corridor. The Division of Multimodal Programs ran the Statewide Traffic Model using current year 2004

traffic volumes with 12 percent trucks, along with modified industrial employment data using the 1999 Mayfield Urban Area Transportation Study. Future year 2030 traffic was projected on KY 121 considering the addition of I-66, I-69 and a planned regional industrial park. The complete Traffic Forecast Report can be found in **Appendix J** of this document. The forecast determined that there are no traffic impacts anticipated for the year 2030 on KY 121 due to a future I-66 or I-69 corridor in the region. For the planned regional industrial park, only a slight increase, 200 trips per year for future year 2030, was anticipated.

## **IX. PROJECT PURPOSE AND NEED**

Goals and objectives were developed by the project team at the beginning of the study process based on identified needs. These goals and objectives were distributed to resource agencies and public officials as part of the resource agency coordination effort and revisited later by the project team to ensure accuracy toward meeting the project needs. The goals and objectives address safety, school access, bicycle and pedestrian access, roadway congestion, local economics, employment and truck traffic. The goals and objectives were used in developing the project Purpose and Need that will be carried forward during future project development. As future project phases are scheduled and funded, the Purpose and Need should be continually reevaluated and updated to address new issues and concerns. Following is an overview of the Purpose and Need for the proposed reconstruction of KY 121.

- **The proposed project is needed to improve safety on KY 121.**

Three schools located immediately south of the project area make safety a paramount concern. Crash data indicate less than critical crash rate factors on the study corridor, that is, crash rates less than the statewide average for routes of similar functional class. However, a high school and new elementary school located on KY 121 just south of the study corridor, and a middle school located on KY 1830 in the vicinity of the other two schools dictate a proactive approach in addressing potential safety concerns. KY 121 is on the National Truck Network (NN) and is the primary connector for commercial traffic between Mayfield and Wickliffe. Being on the NN permits the use of increased dimension vehicles (102-inch versus 96-inch wide trailers). The combination of school buses and teenage drivers traveling on the same road at peak hours with a relatively high volume of trucks, including increased dimension vehicles, presents a safety concern. While there are 11-foot wide lanes, the two-foot wide shoulders do not allow space to clear the road for emergency situations, especially when that situation involves increased dimension vehicles. In a survey conducted by the Purchase Area Development District, trucking company representatives have expressed concern over the narrow shoulder width on this segment of KY 121. Pedestrians and bicyclists attempting to travel to school along this route must also be considered from a safety standpoint. Further to the north on the study corridor, the KY 121/KY 440 intersection is skewed and contains a

combination of horizontal and vertical curvature that team members noted present sight distance problems. Just north of this intersection, KY 945 intersects both KY 121 and KY 440 at skewed angles. One other skewed intersection noted was KY 121/KY 1276. KY 1276 is a two-lane road that currently carries more than 1,100 vehicles per day on the west end nearest KY 121, and 1,450 vehicles per day, two miles to the east, near its intersection with US 45.

- **Reconstruction is needed to address factors that will increase the average travel speed and decrease the percent time-spent following.** The study corridor is located in a predominantly rural area in rolling terrain with clusters of residential dwellings and private driveway access along both sides of KY 121. South of the study corridor, urban five lane improvements have relieved congestion on KY 121 between the Julian M. Carroll (Purchase) Parkway to just north of the Graves County High School entrance. Reconstruction of KY 1830 is in the Right-of-Way acquisition phase and includes three lane improvements on KY 121 from immediately north of the Graves County High School entrance to just beyond the KY 1830 intersection (400 feet south of Harris Lane). For the study corridor, capacity is not a problem, with the highest volume to capacity (v/c) ratio being 0.25 for the segment between KY 1830 and KY 1276 in 2002. For the year 2030, the projected v/c is only 0.43. The study corridor was operating at LOS D for the year 2002, with a computed average travel speed (ATS) only slightly under 45 mph. ATS between 40 and 45 mph results in LOS D; between 45 and 50 mph, LOS C. Factors contributing to the reduced ATS included 11-foot lanes and 2-foot shoulders, a relatively high number of access points, and between 59 and 75 percent no-passing zones. An improvement in any one of these areas would increase the ATS to above 45 mph, thus improving the LOS to C. However, projected increases in volume cancel out the benefits expected from these improvements within a couple of years, and the LOS would go back to D. Average daily traffic, ADT, in 2002, ranged from 2,960 vehicles per day on the northern end of the study segment, to 5000 vehicles per day on the southern end. Using these starting figures and state average growth rate multipliers, year 2030 traffic projections would range from 5,750 vehicles per day on the northern end of the study corridor to 9,710 vehicles per day on the southern end. [It should be noted that at the time of this writing, those traffic projections have not yet materialized, and have actually decreased from 3,740 to 3,610 vehicles per day, approximately 3.5 percent, from 2003 to 2004 on the segment between KY 1830 and KY 440.] While these projected traffic volumes don't exceed even half the capacity of the roadway, the LOS is still adversely affected. At these volumes, both ATS and percent time-spent following (PTSF) result in LOS D for the corridor. For year 2030 projected traffic volumes, the PTSF is computed to be between 66 and 76.7 percent. PTSF between 65 and 80 percent results in LOS D. Factors contributing to this higher PTSF at the higher traffic volumes are the directional distribution

(assuming a 57/43 percent split) combined with the percentage of no-passing zones (59 to 75 percent).

- **An improved KY 121 is needed to accommodate increased truck use and promote regional connectivity.** Both Wickliffe and Mayfield are home to companies that generate substantial numbers of trucks that travel along the study corridor. Questionnaires completed by trucking agencies, solicited by the Purchase Area Development District, indicate concerns with narrow lanes and shoulders. HIS data show eleven-foot lanes and two-foot shoulders throughout the corridor. The truck percentage on KY 121 in 2002 was 14.5 percent on the segment immediately south of the KY 440 intersection. By 2004, that percentage had increased to 15.4 percent. KY 121 is a designated “AAA” weight class highway allowing 80,000 pound gross vehicle weights, is on the National Truck Network (NN) which permits the use of increased dimension vehicles (102-inch wide trailers versus 96-inches), and is the primary connector between Mayfield and Wickliffe.

## **X. ALTERNATIVES AND RECOMMENDATIONS**

### ***A. Geometric Design Features and Alternatives***

The study team suggested several different improvement alternatives, considering recent KY 121 improvements between the current study segment and the Julian M. Carroll Purchase Parkway. Also considered were existing and new schools along KY 121 and KY 1830, planned improvements to KY 1830, a planned Regional Industrial Park north of Mayfield, future I-66 and I-69 corridors, crash statistics, current and projected traffic and levels of service, truck percentages, environmental issues, relative cost and available resources. Suggested improvements were, do nothing, spot, two-lane, two-lane on four-lane right-of-way, three-lane, four-lane, and super-two on five-lane right-of-way.

- **Alternative 1, Do nothing** – This alternative does not address any of the project goals or purpose. No team members were in favor of a do-nothing recommendation.
- **Alternative 2, Spot Improvements** – For this study segment of KY 121, the only spot location of interest to the team was the Y-intersection at KY 440. An extreme skew combine with a crest vertical curve to reduce the sight distance at this location. A short, “unofficial” cut-across just west of the intersection is used by local traffic to negotiate turning movements. The northern study terminus was extended to the KY 945 intersection since it also is on a skew and would possibly be affected by any improvements made at the KY 440 intersection. KY 1276 also intersects KY 121 on a skew. Statistically

there are no crash problems at any of these intersections. While no team members recommended spot improvements as their first choice, most agreed that improvements need to be made at the KY 440 intersection.

- **Alternative 3, Two-lane** – Current level of service for the segment is D, as is the 2030 projected level of service. There are no crash problems on this segment compared to similar roads in Kentucky. KY 121 is on the National Truck Network (NN) and is the primary link between Mayfield and Wickliffe. Right-of-way funds have been allocated for a major Regional Industrial Park north of Mayfield along US 45 in the Viola-Folsomdale area. This industrial park, as well as a proposed I-66 and I-69 might increase traffic levels and truck percentages along KY 121, although a special traffic forecast conducted by the Division of Multimodal Programs found no anticipated impact. Timing and specific locations for the proposed interstates are still undecided. Two-lane improvements in the form of lane and shoulder widening would improve the ability to handle trucks on KY 121 but would not do anything significant to improve level of service for the long term. No team members were in favor of two-lane only improvements.
- **Alternative 4, Three-lane** - According to the Highway Capacity Manual, two-lane with two-way left-turn lane (TWLTL) improvements do not have a formal methodology for evaluating operational effectiveness. At current or projected traffic levels, no significant operational improvements are expected by adding a two-way left-turn lane (TWLTL). A TWLTL might be considered if there was a crash problem, especially a problem with rear-end crashes. No team members favored three-lane improvements.
- **Alternative 5, Two-lane on four-lane right-of-way** – This was the recommendation made for this segment of KY 121 in the 2000 Wilbur Smith Associates study. Team members noted that this recommendation would involve going off alignment due to the additional right-of-way needed, but would still fall within the project study corridor. This improvement would have the same advantages as the two-lane improvements noted above, with the added benefit of being able to provide additional capacity if needed in the future. The disadvantage would be the additional right-of-way costs. No team members favored this alternative.
- **Alternative 6, Four-lane** – Four lane improvements would involve either a four-lane rural divided section, or four-lane urban section with a TWLTL. The biggest advantage for either the rural or urban case, is that either would improve the current LOS from D to A, and would

accommodate increases in traffic, improving the projected 2030 LOS from LOS D to A. The downside is that this improvement may be more than is needed given the traffic levels now and the uncertainty of what will be needed in the future. Several team members spoke in favor of four-lane improvements, suggesting urban improvements from KY 1830 out to KY 1276 and then either a rural or urban section west of KY 1276.

- **Alternative 7, Super-two on five-lane right-of-way** - This alternative would have the same benefits as the two-lane improvements noted above with the advantages of being able to accommodate future increases in traffic if needed. The disadvantage is the same as that for the two-on-four case above, that it would require additional right-of-way. However, the right-of-way requirements would be less for the super-two compared to the two-on-four case and have a better chance to stay on the existing alignment. Several team members favored the super-two on five-lane right-of-way recommendation.

## ***B. Recommendations***

The ADT on the study segment ranged between 2,960 and 5,000 vehicles per day in 2002 and is projected to increase to between 5,750 and 9,710 vehicles per day by the year 2030. Level-of-service for the study segment is LOS D and is expected to remain at LOS D into year 2030 without improvements. Four-lane improvements would be expected to raise the level-of-service to LOS A. Two-lane improvements should achieve LOS C, but then revert back to LOS D within two years given projected increases in traffic using state average growth rate multipliers. The improved two-lane road would then be expected to stay at LOS D into the year 2030. Generally LOS D is not considered acceptable for a rural highway, but is considered acceptable on an urban highway. However, this is a borderline case between LOS C and D with no guarantees for the traffic growth expected. Also, any increase in traffic on this highway can be expected to be accompanied by a similar increase in development with the result of changing the setting more toward an urban landscape in which LOS D could be considered acceptable. Already, the south end of the study area very closely borders the urban outskirts of Mayfield. The special Traffic Forecast study conducted by the Division of Multimodal Programs and summarized in **Chapter VIII** of this report predicted no increase in traffic due to future I-66 and I-69 corridors and an insignificant increase in traffic due to a planned regional industrial park north of Mayfield.

Taking all of this into consideration, it is recommended to make those improvements that address the immediate safety concerns on the corridor

by providing full-width shoulders and realign the major intersections at KY 440, KY 945 and KY 1276. While, four or five lane improvements are not being recommended at this time, it is recommended to allow for such improvements in the future should they become justified, and purchase the additional right-of-way early, before development continues and property values and right-of-way costs increase. Therefore, the recommendation of this study is to build a super-two on five-lane right-of-way (Alternative 7). If traffic increases beyond projections, the additional right-of-way purchased can accommodate further improvements when needed. Full width shoulders are recommended due to the fact that this route is on the National Truck Network and designated to carry increased dimension vehicles. Improvements to realign the skewed intersections on the KY 121 study segment are recommended in the following priority order: KY 440, KY 945, KY 1276. It is recommended that these intersection improvements be implemented in the short term, followed by Alternative 7 recommended improvements. While there are no immediate crash problems on the roadway, having existing and new schools immediately south of the project study area demand that an increased emphasis be placed on safety while considering improvement alternatives. School bus safety will also benefit from wider shoulder and lane widths. Bicycle and pedestrian needs should also be addressed in future project phases. Turning lanes at the major intersections are also recommended.

**C. Project Phases and Cost Estimates**

District 1 personnel prepared phase-by-phase cost estimates for each of the improvement alternatives considered by the project team. A summary of these alternates and associated cost estimates is included in **Table 7 and 8, Appendix C**. Phase costs for recommended Alternative 7 and interim Spot Improvements, Alternative 2, are shown in **Appendix C** and below in **Table 9** as follows:

**Table 9. Estimated Phase Costs for Recommended Alternative 7 and Interim Spot Improvements, Alternative 2**

	Alternative 2	Alternative 7
Phase	Spot Improvements	Two-Lane on Five-Lane R/W
Design	325,000	1,250,000
Right-of-Way	500,000	5,500,000
Utility Relocation	600,000	2,000,000
Construction	1,400,000	7,500,000
<b>Total</b>	<b>2,825,000</b>	<b>16,250,000</b>

#### ***D. Concerns and Issues Considered During the Study***

- A high school and new elementary school are located on KY 121 just south of the project study area. A middle school is also located in this general area on KY 1830.
- Continental General Tire, one of the area's largest employers and traffic generators, stopped production at its Mayfield plant in December 2004 resulting in the loss of over 800 jobs. The plant is located immediately east of the project study area at the KY 1276/US 45 intersection.
- There are plans for a major regional industrial park to be developed in the Folsomdale-Viola area north of Mayfield on US 45. Initial funding for land acquisition has been delivered. Employment estimates start at 1000 in 2008 rising to 4000 in 2017.
- An I-69 corridor is in the planning phase. It is expected this corridor will follow the existing Julian M. Carroll Purchase Parkway.
- An I-66 corridor is planned for the region but the final location has not been decided. There are no major impacts anticipated to the KY 121 study corridor.
- The KY 1830 reconstruction project has moved forward with right-of-way acquisition. The utilities and construction phases are scheduled for 2005. A portion of this project includes intersection improvements at KY 121 as well as three-laning a segment of KY 121 immediately south of the project study area.
- Environmental concerns include numerous wetlands and streams, at least three potential threatened plant and animal species, 40 to 50 percent prime farmland soils, four possible hazardous materials contamination sites, and one cemetery within the project study area.

#### ***E. Recommended Public Involvement Activities***

Public involvement for this study included soliciting input from public officials and agencies through Resource Agency Coordination efforts. No officials, stakeholders or public meetings were held. When future phases of this project are scheduled and ready to move forward, public meetings should be held to involve the local business people and residents in the decision making process.

### **XI. ACKNOWLEDGEMENTS**

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Finally, thanks go to David Smith and other staff at Qk4 who worked on developing the Environmental Footprint.

## **XII. CONTACTS**

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