

DESIGN EXECUTIVE SUMMARY

County: Jefferson Item No.: 5-972.00
 Federal Project No.: TCSP-STPS-8701-7 UPN: FD52 056 0042 009-010
 MARS No.: 61837 UPN: _____

Project Description:

Add a fifth lane on US 42 for left turns, from the Harrods Creek Bridge to River Road.

Roadway Classification:

Local Collector Arterial Interstate Rural Urban

ADT (2006) 24,600 ADT (2030) 56,200 DHV (2030) 5,900

Posted Speed Limit: 55 (rural) 35 (urban) Other (Specify): 45, posted

Design speed selected by the Project Team: 45 MPH

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

DESIGN CRITERIA	EXISTING	TYPICAL	PROJECT TEAM RECOMMENDATION
Number of Lanes	<u>4</u>	<u>5</u>	<u>5</u>
Pavement Width ¹	<u>4 - 10' to 11' lanes</u>	<u>4-11' lanes & turn lane</u>	<u>4-11' lanes & 12' turn lane</u>
Shoulder Width, Slope	<u>0-2', varies</u>	<u>8'</u>	<u>4', 8.0%</u>
Bridge Width	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Minimum Radius ($e_{max}=0.06$)	<u>4000'</u>	<u>660' *</u>	<u>4600'</u>
Maximum Grade	<u>1.73%</u>	<u>6.0%</u>	<u>1.73%</u>
Minimum Sight Distance	<u>949'</u>	<u>360'</u>	<u>949'</u>
Border Area (urban)	<u>15.5'</u>	<u>N/A</u>	<u>N/A</u>
Multi-use Path	<u>None</u>	<u>10'</u>	<u>10'</u>

Design Criteria Notes:

Typical design criteria were met in all categories except the design criteria for shoulder width. Further discussion is provided in the following section titled "Design Exceptions Required".

¹ Pavement widths came from the "Common Geometric Practices - Urban Roadway" design criteria.

* Typical Minimum Radius (e_{max} = normal crown) is 1039'.

DESIGN EXECUTIVE SUMMARY (continued)

Access Control Type: Permit

Environmental Action: CE anticipated Approval Date: September 7, 2010

Existing Pavement Depths: Varies – asphalt on gravel/concrete

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

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

Submitted By: [Signature] Date: 12-30-2010
Project Engineer, check one: (Department of Highway or Consultant

Recommended By: [Signature] Date: 1-6-2011
Project Manager

Recommended By: [Signature] Date: 1/10/11
Location Engineer

Recommended By: [Signature] Date: 1/10/11
T.E.B.M. for Location

Comments:

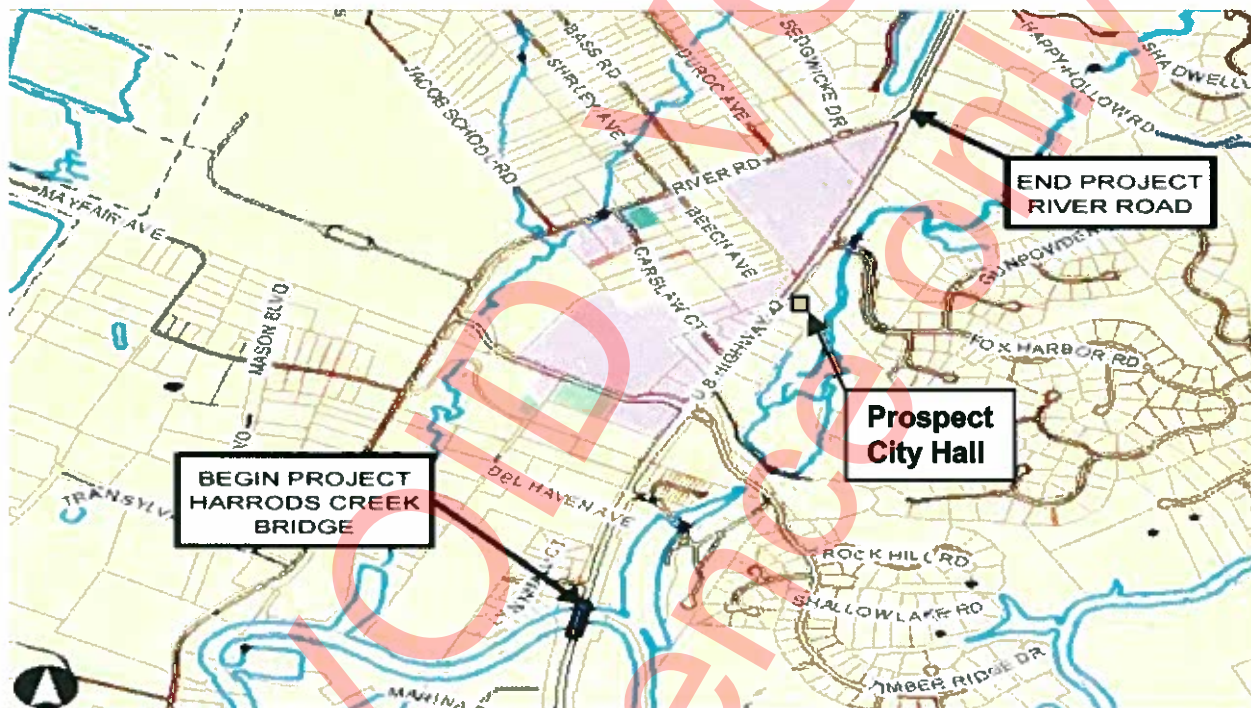
Though US 42, inside the projects limits, is currently classified as an Urban Principal Arterial, the ultimate roadway section will be a 5-lane hybrid section. Consisting of shoulder and ditches on the widened side (the south side) and utilizing the existing conditions on the north. The existing conditions on the north are a mixture of shoulders and curb and gutters. A design exception is required for the use of reduced width shoulders and ditches instead of curb and gutter.

GEOMETRIC APPROVAL GRANTED BY:

Signature: [Signature] Date: 1/10/11
Director, Division of Highway Design

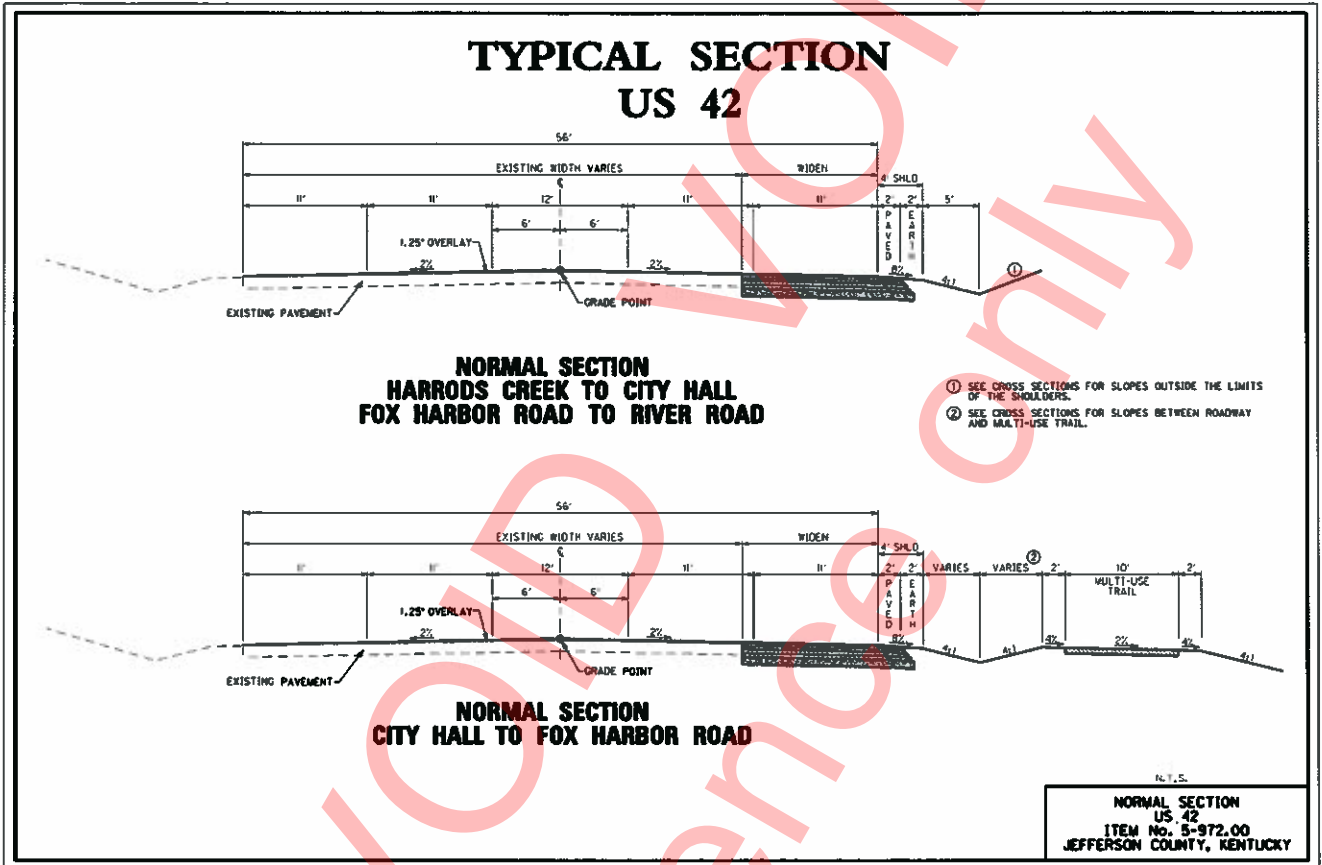
DESIGN EXECUTIVE SUMMARY (continued)

Map of Project Limits



ATTACHMENT 1
PROJECT LOCATION MAP
US 42
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JEFFERSON COUNTY, KENTUCKY

DESIGN EXECUTIVE SUMMARY (continued)



**ATTACHMENT 2
US 42 TYPICAL SECTION**

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DESIGN EXECUTIVE SUMMARY (continued)

Cost Comparison of alternates and the 6-year plan estimate.

Project Phase	Right of Way	Utilities	Construction	Total
ALT No. 1	\$4,353,000	\$2,740,000	\$4,186,000	\$11,279,000
ALT No. 2	\$3,933,000	\$2,565,000	\$3,140,000	\$9,638,000
ALT No. 3 (Preferred)*	\$673,500	\$535,000	\$1,200,000	\$2,408,500
ALT No. 4	\$2,619,000	\$630,000	\$1,700,000	\$4,949,000
6 YEAR PLAN	\$3,150,000	\$1,040,000	\$3,790,000	\$7,980,000

* Includes the cost of the multi-use trail from City Hall to Fox Harbor Road on the south side.

**ATTACHMENT 3
US 42 COST COMPARISON**

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JEFFERSON COUNTY, KENTUCKY

DESIGN EXECUTIVE SUMMARY DISCUSSION ITEMS

1. Alternatives considered including Preferred and No Build.
2. Design exception required.
3. Preferred Alternate Cost verses the 6 year Highway Plan cost.
4. Maintenance of Traffic Notes.
5. Avoidance Alternatives to Water-Related Impacts of Recommended Alternate.
6. Environmental
7. Right of way impacts
8. Utility impacts
9. Consideration for bicycle and pedestrian facilities.
10. Purpose and Need Statement.
11. Practical Solutions discussion.

**Item NO. 5-972.00
US 42
Jefferson County**

1. Alternates Considered

Project Description

This project consists of proposed improvements to US 42 in Jefferson County, Kentucky from the Harrods Creek Bridge to River Road. This length of US 42 is a major road in the town of Prospect, Kentucky, and also is a major arterial for the commuting traffic between the city of Louisville and the outlying suburbs. Through the project limits, approximately 1 mile, US 42 is a 4-lane facility with 7 approach roads, 3 of which are signalized and several private and commercial entrances. Additionally, there are several right turn lanes and a left turn lane is located at the Timber Ridge Drive intersection. This intersection, with the left turn lanes and two travel lanes in each direction, is the ultimate template that this project intends to produce throughout the project limits.

Generally speaking, the north side of US 42 is commercial property and the south side is residential property. This section of US 42 has current traffic volumes in excess of 24,000 vehicles per day, and that is expected to more than double to 56,000 vehicles per day by the year 2030. Most left hand turns off of US 42 must be made from the inside travel lane, therefore causing traffic to stop in that lane while the turning car waits for an opening in the opposing traffic. The combination of large traffic volumes and numerous turning movements have led to a high volume of rear end traffic accidents. To combat this problem the city of prospect has attempted to make several of the commercial entrances right in/ right out only. Though this does eliminate the traffic stoppage associated with left turns, it reduces mobility and access to the frontage property. Therefore, in order to improve traffic conditions for both the through traffic and the local traffic, this project is to study improving the safety and traffic congestion on US 42 by widening to provide for a continuous center turn lane through out the project limits.

Alternate Descriptions

In order to meet the purpose and need of the project, the design team considered two different widening options (alignments) combined with many differing design features; resulting in multiple alternates. The two alignments were functions of either doing pavement widening on both sides of US 42 or on only one side of US 42. In addition to considering both urban and rural roadway sections, pedestrian facilities were also studied. After discussing roundabouts, the design team determined that they were not appropriate for this project. The urban sections included studying a flush median, raised median with cut-throughs and a continuously (except at major approaches) raised median. The rural sections included roadways with and with out additional pedestrian facilities. All alternates, except for Alternate No. 1, will utilize the existing lane configuration at the Timber Ridge Drive intersection where the left turn lanes are fully developed. After several design team meetings, Local Public Officials meetings and a Public meeting, the design team gave final consideration to the following alternates.

"NO BUILD" ALTERNATE

While the "No Build" alternate is desirable from the standpoint of involving no financial expenditure, relocations, or conflicts with existing land use; there remains the problem with the existing and ever increasing traffic volumes and congestion associated with the roadway and with the current and future safety of the traveling public.

ALTERNATE No. 1

Alternate No. 1 is a 4-lane urban section with four 12' travel lanes and a 14' raised median. Left turn lanes are provided at Timber Ridge Drive, Fox Harbor and River Road. U-turns are provided at Timber Ridge Drive and River Road intersections. Right in/right out only turning movements will be required for entrances and minor approaches located through the limits of the raised median. Curb and gutter and 5' wide sidewalk are provided on both sides throughout the entire project limits. This alternate widens on both the North and South side of US 42. Additionally, the raised median can allow for approved landscaping. This alternate will impact utilities and properties on both sides of the road. An asphalt surface overlay of all existing pavement on US 42 is included in this alternate. The design speed for this alternate is 45 MPH.

ALTERNATE No. 2

Alternate No. 2 is a 5-lane urban section with four 11' travel lanes and a 12' continuous left turn lane. This alternative provides curb and gutter on both sides with a 5' sidewalk on the north and a 10' multi-use path on the south side. This alternate widens on both the North and South side of US 42. This alternate will impact utilities and properties on both sides of the road. An asphalt surface overlay of all existing pavement on US 42 is included in this alternate. The design speed for this alternate is 45 MPH.

ALTERNATE No. 3

Alternate No. 3 was developed in order to consider an alternate with minimum cost and minimum impact, also known as a practical solution, which would not exceed the original purpose of the project. To minimize cost and impact, the lane widths and shoulder width have been reduced, curb and gutter and pedestrian facilities have been eliminated and all widening is to happen on the south side. Alternate No. 3 is a 5-lane rural section with four 11' travel lanes and a 12' continuous left turn lane, 4' shoulders with ditches and no sidewalks. All widening on this alternate will happen only on the south side of US 42 and all existing roadway features on the north side will be utilized. This alternate will only impact property and utilities on the south side of the road. An asphalt surface overlay of all existing pavement on US 42 is included in this alternate. The design speed for this alternate is 45 MPH.

ALTERNATE No. 4

Alternate No. 4 was developed in order to consider an alternate with minimum cost and minimum impact, also known as a practical solution, which would meet the original purpose of the project and include pedestrian facilities. To minimize cost and impact, the lane widths and shoulder width have been reduced and the curb and gutter and pedestrian facilities have been proposed at only critical locations. Alternate No. 4 is a 5-lane hybrid section with four 11' travel lanes and a 12' continuous left turn lane. This alternative provides shoulders and ditches from Harrods Creek Bridge to Timber Ridge Drive. It also provides pedestrian access on the north from Timber Ridge Drive to Fox Harbor Road by utilizing existing sidewalks and constructing new sidewalks where necessary; and provides shoulders and ditches on the south with a multi-use trail from City Hall to Fox Harbor Road on the south. These sections of sidewalk and of multi-use trail were identified as high priority sections by local planners. With this alternate all lane widening will occur only on the south side of US 42. On the north side of US 42, through specific limits, curb and gutter and sidewalk will be constructed. This alternate will impact utilities and properties on both sides of the road. An asphalt surface overlay of all existing pavement on US 42 is included in this alternate. The design speed for this alternate is 45 MPH.

Preferred Alternate

The project team, after discussing each alternate and considering their associated cost as illustrated in the cost comparison table, selected Alternate No. 3 as the preferred alternate. Alternate 3, a practical solution, was chosen as the preferred alternate because it met the purpose and need of the project, had minimal impact to the adjacent properties and had a reasonable cost associated with it. However, the design team realized that this was the only alternate that did not improve the pedestrian or bicycle facilities. Therefore the design team decided to add into this preferred alternate, a section of multi-use trail that was identified as a high priority section of trail by local planners. This priority section of trail will be on the south side of US 42 and will connect Fox Harbor Subdivision to Prospect City Hall and will become part of the Louisville Loop Trail project in the future. Therefore, the enhanced preferred alignment meets the purpose of the project, increases pedestrian facilities and stays well below the estimated Six-Year Plan budget.

2. Design Exceptions Required

Though US 42, inside the projects limits, is classified as an Urban Principal Arterial, the ultimate roadway section will be a 5-lane hybrid section; consisting of shoulder and ditches on the widened side (the south side) and utilizing the existing conditions on the north. The existing conditions on the north are a mixture of shoulders and curb and gutters. A design exception is required for the proposed use of shoulders and ditches. Further exception is required because the proposed shoulder has a width of 4' while the required shoulder width for a Rural Arterial is 8'. The narrower shoulder was chosen to minimize right of way impacts.

The project team's decision to use ditches and shoulders instead of curb and gutter included the following two reasons. First, the ponding of runoff against the curb would be problematic due to a large portion of the project that has an existing 0% grade. This 0% grade does not allow water to travel efficiently to the inlets; therefore ponding is excessive unless the number of inlets is

drastically increased. By collecting the runoff in ditches, the water is removed from the driving lanes, and the ditch can be graded independently of the road to convey the runoff to the discharge location. Secondly, there was a significant cost savings by using ditches and reduced width shoulders verses using curb and gutters and the associated drainage structures.

Near the beginning of the project is an existing curve with a 4000' radius and a normal crown of 2%; therefore no superelevation exists. The proposed alignment in this area utilizes a 1425' long curve that has a radius of 4600' with no superelevation (a 2% normal cross slope is proposed). Using an e_{max} of 6% and a 45 MPH design speed, the 4600' radius requires a superelevation rate of 2.0%. However, using the design criteria for "Design for Low-Speed Urban Streets" the proposed 2% normal crown on this curve is acceptable. The decision to follow the "Design for Low-Speed Urban Streets" criteria and to not apply a superelevation to this proposed curve included the following three reasons. First, the existing roadway does not have a superelevation along this curve. Since this project includes overlaying the existing pavement, a large amount of asphalt would be required to create the superelevation throughout this 1425' long curve. Secondly, the project team is not aware of any existing traffic problems associated with this curve. The crash data for US 42 showed a lower concentration of accidents through this curve than for other locations throughout the project. Additionally, there were no "run-off" type accidents reported along this curve. Therefore it is perceived that the lack of superelevation of this curve is not a direct contributor to traffic accidents. Thirdly, within the limits of this curve is a signalized intersection at Timber Ridge Drive, which will routinely create stop conditions. Though a 2% superelevation is not excessive, it is undesirable to have the opposing lanes of traffic sloped towards the other travel lanes at a stop condition.

Therefore, for the reasons listed above, the only design exception required is for the use of reduced width shoulders.

3. Cost comparison discussion

Preferred Alternate Cost VS. Six-Year Plan

As shown in the cost comparison table, see Attachment 3, the total cost estimate for the Preferred Alternate (\$2,408,500) was only 30% of the forecasted Six-Year plan estimate (\$7,980,000). The reduced cost of the preferred alternate is due to the design changes implemented as a practical solutions design. By reducing the typical section and constructing on only one side of the roadway there was significant reduction in the amount of right of way required, amount of utility relocations and construction costs.

4. Maintenance of Traffic

Existing US 42 in the project limits is a 4-lane facility with a left turn at Timber Ridge Drive and several right turn lanes located along the project. During construction of the preferred alternate, traffic will be maintained on existing pavement. Since the pavement widening will happen only on the south side, traffic will be shifted to the north during construction to create working room. When construction activities are close to the existing travel lane, it will be necessary to close the

southernmost lane during approved times. However at least one lane of traffic in each direction will be maintained at all times.

5. Avoidance Alternatives to Water-Related Impacts of Recommended Alternate

The project consists of proposed improvements to US 42 in Jefferson County, Kentucky from The Harrods Creek Bridge to River Road, a distance of approximately 1 mile. The project area is within the USGS ANCHORAGE, KY. 7.5 minute topographic map. The map shows no blue line streams crossing the project limits. However, there is a tributary of Harrods Creek that is shown as a blue line stream, which is adjacent to the projects area. Additionally, Harrods Creek, shown as a blue line stream, is located just outside of the beginning of the project.

The general drainage pattern is such that runoff will flow across the project area towards the southeast to the Tributary of Harrods Creek and then ultimately to Harrods Creek. The preferred alternate minimized water related impacts by proposing minimal widening on only one side of US 42 and utilizing existing pipe crossings; therefore reducing the amount of disturbed land. Additionally, water related impacts were minimized by using proposed ditches instead of curb and gutter with storm sewers; the ditches will allow for more infiltration and will reduce the velocity of the water at the outfall. In order to protect the waterways, typical erosion control and sediment control measures will be utilized to minimize erosion within the project limits. These measures will include silt fence, ditch checks, silt traps, temporary ditches, seeding and protecting and inlet protection.

6. Environmental

Categorical Exclusion was approved on September 7, 2010.

7. Right of Way Impacts

Right of way impacts of the preferred Alternate have been minimized because all proposed improvements are on the south side of US 42. This side of the road is mostly residential and all existing structures except one, Prospect City Hall, are located a significant distance from the roadway. The local officials associated with City Hall have been aware of the possible impacts that the proposed roadway improvements may have on the City Hall property. The preferred alternate, in front of City Hall, moves the edge of the travel lane 14' closer to the face of the building, leaving 24' between the two. In order to increase the safety of pedestrians entering and exiting the building, curb and gutter (approx. 60') is proposed in front of City Hall.

A total of 17 properties will be impacted by the proposed right of way and easements. No property relocations will be required and no buildings will be acquired as a result of the proposed right of way and easements.

8. Utility Impacts

Utility impacts associated with the preferred alternate were minimized because all proposed improvements are on the south side of US 42. No major utility conflicts with the preferred alternate have been identified. Construction of mainline, approaches and entrances will conflict to some extent with utilities on the south side of US 42 including water, electric, communications and sanitary sewers.

9. Consideration for Bicycle and Pedestrians Facilities

Though other alternates provided pedestrian and bicycle facilities throughout the length of the project, the costs and impacts of those alternates was unjustified. The preferred alternate incorporates provisions for bicycle and pedestrian facilities by including the construction of a 10' multi-use trail on the south side of US 42 from Fox Harbor Road to the Prospect City Hall. This particular section of the trail was added to the preferred alternate because it was identified as a priority section of trail that was needed for pedestrian connectivity. Two factors that made this a priority section of the trail were 1) this section of the trail will connect Fox Harbor Subdivision to Prospect City Hall (which also contains the Library) and 2) this section of trail will become part of the Louisville Loop Trail project in the future. Since bicycles are intended to be used on the multi-use trail, and because of the high traffic volumes on US 42, bicycle lanes were not considered for this project.

In addition, further consideration will be given to the options of constructing a sidewalk on the north side of US 42 from Carlaw Court to Fox Harbor Road and / or constructing a multi-use trail on the south from Timber Ridge Drive to Prospect City Hall. After estimates are prepared for these additional improvements, they will then be evaluated to determine if any of these features are warranted by the project and if the additional costs are justified.

10. Purpose and Need Statement

The purpose of this project is to reduce traffic congestion and improve safety along US 42 from Harrods Creek Bridge to River Road. The need for the project is derived from the current traffic congestion that currently occurs on US 42 combined with the projected future traffic volumes. US 42 through Prospect, KY is a 4-lane facility that currently accommodates traffic volumes in excess of 24,000 vehicles per day, and is functionally classified as an "Urban Principal Arterial". This section of US 42 not only services the commercial developments of Prospect, but also serves as an arterial for the commuting traffic between Louisville and surrounding counties such as Oldham County. The anticipated traffic volumes in the year 2030 are estimated in excess of 56,000 vehicles per day. The majority of the US 42 traffic is trying to travel through the project limits. However the vehicles that are attempting to turn, particularly left, often cause traffic behind them to stop in the left lane while they wait for a break in the opposing 2 lanes of traffic. While this is happening, US 42 practically functions as single lane in that direction. Since traffic is often stopped in the travel lanes, rear end accidents are common and their frequency is expected to increase as the traffic volumes increase. In addition to meeting the purpose of the project, another project goal was to gather and consider public opinion about the roadway and its

use. Public opinion showed a strong interest in increasing the pedestrian facilities inside the project corridor. Therefore, the project solution shall meet the state transportation needs and give consideration to other public interests.

11. Practical Solutions Discussion

The design team was originally to study two different alternates to meet the purpose and need of the project, which was to add a fifth lane and improve traffic flow and safety along US 42. These two alternates used the same urban section throughout the project, which were sidewalks, curb and gutter, two travel lanes in each direction and a continuous left turn lane. After studying these original alternates, and determining that their costs and impacts exceeded the project budget; the design team decided to study two "Minimum Cost/Minimum Impact Solution" alternates (practical solutions). These two practical solution alternates, Alternate 3 and Alternate 4, still add the fifth lane to the roadway, but utilize reduced roadway geometrics and reduced the amount of proposed roadside features. Both practical solutions alternates utilize the same reduced proposed lane widths; which have been reduced from 62' (4 -12' travel lanes and 1- 14' center turn lane) to 56'(4 -11' travel lanes and 1- 12' center turn lane).

Alternate 3 met the purpose of the project, yet was the most basic alternate in that it utilized minimum pavement widening with reduced shoulder and ditches and did not include any curb and gutter (and associated drainage systems), sidewalks or multiuse trail. Furthermore this alternate widened only on the south side, which meant no impacts to the north side of the road.

Alternate 4 was a 5-lane hybrid section, a mixture of both urban and rural design elements. It utilized the same lane configuration and location as Alternate 3. However it provided pedestrian facilities by incorporating a priority section of sidewalk on the north and a priority section of multiuse trail on the south. The sidewalk on the north, proposed as part of the urban typical section, caused minor increase in utility relocation and construction costs when compared to the significant increase in cost associated with the additional right of way acquisition.

Of the four alternates that were given final consideration by the design team, two were practical solution alternates. This gave the design team a good basis of consideration to select the alternate that best met the purpose of the project, met the needs of the public and fit the anticipated available funding.