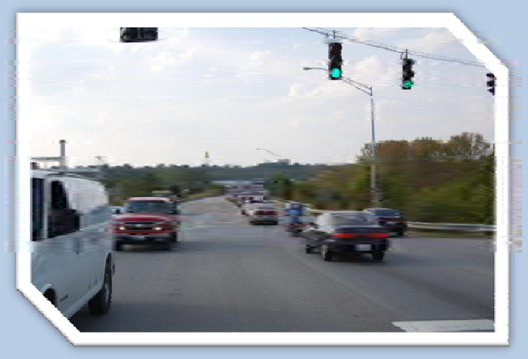
Item No. 5-8201.01

FINAL

Oldham County Interchange Justification Study

Summary of Findings and Recommendations



Prepared for:
Kentucky Transportation Cabinet

Prepared by:
Parsons Brinckerhoff

February 2011

EXECUTIVE SUMMARY – OLDHAM COUNTY INTERCHANGE JUSTIFICATION STUDY

Introduction and Study Area

This project is an Interchange Justification Study (IJS) for a proposed new interchange along I-71 in Oldham County, Kentucky between the existing interchanges of KY 393 and KY 53. This study focuses on the justification of such an interchange based on traffic, access, and traffic operating conditions and needs.

The study area is an area that extends north of KY 146, just east of KY 53, south of KY 2856 and west of the I-71 / KY 146 interchange. **Figure ES-1** below depicts the study area.

Figure ES-1: Study Area

Study of an overpass or full interchange in this location has been ongoing over the past ten years. More recently, the Kentucky Transportation Cabinet (KYTC) had a consultant perform an initial feasibility study of an interchange in 2008. Comments from the Federal Highway Administration (FHWA) on the feasibility study led the KYTC to contract with PB Americas, Inc. (PB) to prepare a full IJS. The IJS fulfills the requirement by the FHWA that seeks an evaluation of impacts for all new requests for interstate access.

Purpose and Need

The Purpose of this study was to determine the need for and explore options to improve safety, traffic operations, connectivity, and regional access in the LaGrange, Oldham County area through the evaluation of the need for a new interchange on I-71 between KY 393 and KY 53.

The planning-level need for a proposed new interchange on I-71 is to:

- Increase mobility and accessibility
- Reduce travel times and overall delay
- Improve safety of local network by reducing exposure on identified high crash segments
- Reduce emergency response times
- Provide access to developing areas along Commerce Parkway and south of I-71
- Create a “middle connector” between KY 393 and KY 53
- Provide a western “bypass” of LaGrange
- Provide an “outlet” when I-71 is shutdown during an incident

These needs were assessed throughout the study process and ultimately used as a measure to select a preferred improvement scenario for the study area.

Existing Facilities

A detailed analysis was completed examining the existing highway characteristics and geometrics, traffic volumes, truck traffic, traffic operations, and crash rates of the major study area roads (I-71, KY 146, KY 53, KY 393, KY 2856, KY 2857, Commerce Parkway, Parker Drive, and New Moody Lane).

Existing traffic volumes were determined from the CTS database as well as through turning movement counts conducted for this study. Average Daily Traffic (ADT) volumes on the major roadways are as follows:

- I-71: 35,500 – 51,300
- KY 146: 6,360 – 13,800
- KY 53: 7,490 – 17,000
- KY 393: 3,960 – 8,190

Levels of service (LOS) were calculated for the major roadway sections and intersections to determine the existing traffic operations. The majority of poor LOS sections (LOS E or F) are located on KY 53 south of I-71 and on KY 146 north of I-71 and between KY 393 and KY 53. Most of the intersections evaluated along KY 393 operate poorly.

The safety analysis showed high crash rates along KY 53 with section critical crash rate factors between 1.24 and 4.80. The high spot crash rates calculated on KY 53 ranged from 1.25 to 4.34.

Evaluation Scenarios and Methodology
Multiple evaluation scenarios were developed to examine the need for a new interchange along I-71 between KY 393 and KY 53. The goal of the evaluation was to fully test whether or not the observed transportation system deficiencies could be addressed by various other projects or if the system would require a new interchange. These scenarios are listed below along with a brief description.

- **Scenario 1: MTP –** No interchange, but has other projects such as those already existing and committed (E+C) projects in KIPDA's Metropolitan Transportation Plan (MTP).
- **Scenario 2: MTP-** – Includes existing and committed (E+C) MTP projects but removes the proposed overpass and Allen Lane underpass to specifically test those projects.
- **Scenario 3: MTP+ –** Same as Scenario 1 with the addition of Ring Road.
- **Scenario 4a: TSM –** Same as Scenario 3 but with more projects including upgrades to KY 53, KY 146, etc.
- **Scenario 4b: TSM –** Same as Scenario 4a but with the proposed LaGrange Bypass.
- **Scenario 5: Standard Interchange –** Diamond interchange with MTP+ projects.
- **Scenario 6: Interchange with Collector / Distributor (C / D) Road –** Also includes MTP+ projects.

During the initial evaluation process of the scenarios, it became necessary to perform a multi-stage evaluation and screening process. This allowed for the initial overview of all scenarios and then further refinement of the most promising scenarios. Two analysis levels were performed – Level 1 and Level 2.

Level 1 Analysis
The Level 1 screening process took into consideration all of the evaluation scenarios and included:

- Average Daily Traffic Volumes (ADT)
- Peak Hour Volumes (AM and PM)
- System Vehicle Miles of Travel (VMT) and Vehicle Hours of Travel (VHT)
- Segment and Intersection Level of Service (LOS)
- Ramp Junction Level of Service (LOS)

In order to perform an analysis of traffic operations for each scenario, traffic forecasts were prepared. The KIPDA travel demand model (TDM) was the preferred modeling tool for use in determining future year (2035) traffic volumes. Output from the model also included vehicle miles travelled (VMT) and vehicle hours travelled (VHT). The scenarios with an interchange (Scenarios 5 and 6) had the biggest reduction in VMT and VHT (almost 8,000 and 5,000 respectively) compared to a reduction of between 100 and 300 VMT and 1,000 and almost 2,000 VHT.

Based on the new volumes and any additional geometric changes such as roadway widening or adding turn lanes, the HCS+ software was used to calculate new levels of service for each of the segments and intersections. For all evaluation scenarios, I-71 operates at an acceptable level of service on the mainline. However, the ramp junction analysis showed that there are poor levels of service for all evaluation scenarios. The evaluation scenarios with the fewest issues were MTP+ and 4a TSM. From a segment capacity perspective, most sections of KY 53 and KY 393 north to the I-71 ramps operates at an undesirable LOS (LOS E or F). This continues as an issue for both of the interchange evaluation scenarios. The only scenarios that address some of these issues are evaluation scenarios 4a and 4b (TSM). Under these scenarios, the sections of KY 393 south of the I-71 interchange that were previously failing now operate at an acceptable LOS.

At the intersection level, evaluation scenarios 4b (TSM) and 6 (Interchange with a Collector / Distributor) operate the best in the AM peak period. During the PM peak period, evaluation scenario 4b (TSM) has the best operations. It should be noted that this analysis may be slightly skewed though as the target of the TSM evaluation scenarios was to provide improvements that would make the intersection operations improve to an acceptable level. Therefore, the achievement of the improved levels of service has a cost associated with it for adding turn lanes, installing traffic signals, and roadway widening.

Planning-level cost estimates for this level of evaluation were prepared and presented as a range. The lowest cost estimate was for Scenario 2 which was $110 million and ranged up to a high of $198 million for Scenario 4b. These costs included all of the existing and committed projects costs in addition to the estimated costs for the completion of new projects.

Based on the results of this analysis, evaluation scenarios that best met the study purpose and need were advanced to the next level of analysis (Level 2). The second level of analysis further refines these evaluation scenarios and was used to select the best recommendation for this study.

Level 2 Analysis
The scenarios moved forward into the second level of analysis (Level 2) included:

Scenario 3: MTP+
Scenario 5: Standard Interchange
Scenario 6: Interchange with Collector / Distributor Road

A new scenario was added (Scenario 4c) in place of Scenarios 4a and 4b to represent a true TSM option as the other ones included widening options that did not necessarily fit with the TSM description.

The results of the Level 2 analysis showed operational improvement at the intersection level for Scenario 4c. There was some operational improvement at the intersection level with both Scenarios 5 and 6 as well as some operational improvement along I-71 with Scenario 6. Overall, one scenario does not address all of the operational issues identified within the study area. As a result, after presenting the analysis to the PDT during a meeting on October 29, 2010, it was determined that an upgraded TSM option, a standard interchange with TSM improvements, and

an interchange with a collector / distributor road and TSM improvements should be analyzed to determine what would be required to improve all segments and intersections to an acceptable LOS. Scenarios 5 and 6 in combination with arterial widening projects and capacity enhancing spot improvements were analyzed. Widening projects were added to Scenario 4c along with several spot projects that originally were considered to be a higher magnitude of work than a typical TSM project.

New levels of service were calculated based on the revised traffic forecasts. The segment levels of service primarily remained the same as most traffic volume adjustments were made at the intersection level. I-71 remains at a good level of service with some poor levels of service related to the diverge to KY 393 and the merge from KY 393.

A queue length analysis showed that queues would exceed the current storage capacity at the KY 53 northbound off-ramp and at the KY 393 northbound off-ramp, possibly backing up onto I-71 in Scenario 3 (MTP+). All scenarios would address this issue.

More detailed cost estimates were also prepared at this level. They are still planning-level estimates in 2010 constant dollars. Scenario 4c has a total cost estimate of $31.1 million compared to Scenario 5 which has a cost estimate of $153.5 million, while Scenario 6 has a total cost of $163.9 million.

Recommendation

The purpose of this study was to determine the need and explore methods to improve safety, traffic operations, connectivity, and regional access in the LaGrange / Oldham County area through the evaluation of the need for a new interchange on I-71 between KY 53 and KY 393.

After a careful review and consideration of the existing conditions, the cost and benefits, and constraints of constructing either a standard diamond interchange or collector/distributor interchange system, the Project Development Team recognizes that all of the study's final scenarios fulfill FHWA's stipulation of maintaining acceptable traffic operations of the system within the study area (FHWA Policy Statement No.1 and No. 2.) Reviews of all project considerations were made by KYTC in consultation with the Office of the Secretary of KYTC. At present, the Project Development Team recommends that Scenario 4c, TSM improvements, that would allow access to and from the developing areas of the Oldham Reserve be advanced. After the options in the TSM Scenario are committed and attained and a need for additional access arises, the study area is to be revisited in regards to new access to I-71.

At this time, given cost considerations, similar traffic operations, and uncertain future development, the TSM alternative is prudent. The cost estimate for the TSM alternative did not include the I-71 widening to six lanes as the individual projects included in this alternative would not impact the capacity of the interstate. However, based on previous experience working on interstate projects with FHWA, it was assumed that they would require system improvements along I-71 with the construction of a new interchange. This would likely include the widening of I-71 to six lanes which would also require the widening of existing overpasses within the study area.

The reasons to advance Scenario 4c along with all existing and committed projects, including the overpass at Allen Lane, are as follows:

- The current estimated cost of constructing a full interchange (plus additional projects required to achieve an acceptable LOS) is significantly higher than the TSM alternate ($154 million and $164 million, versus $31 million). This is true even if the cost of widening I-71 through the study area to six lanes is removed from the totals for the interchange project.
- The TSM scenario has fewer anticipated right-of-way and environmental impacts
- The interchange options, as compared to the TSM scenario, would have no appreciable benefit to traffic operations on the interstate. The TSM scenario would provide congestion relief to the same level as the full interchange options
- An overpass accessing the proposed development areas has long been recognized and included in plans prepared by the Oldham County Government
- TSM improvements would not require consideration of FHWA eight policy statements for an Interchange Justification Study (IJS); any interchange scenario will require FHWA approval

Should an alternate that includes an interchange (Scenario 5 or 6) be advanced, it will require further detailed design and analysis, including a full IJS and National Environmental Policy Act (NEPA) analysis and documentation, in addition to detailed engineering and design and coordination and approval by FHWA.

The construction of an overpass connecting KY 146 via Allen Lane with New Moody Lane and Ring Road is still considered an important project as it will provide for an outlet for traffic from the new development. It is recommended that this project continue as specified in the KIPDA MTP.

The full list of projects included in Scenario 4c is provided below.

Scenario 4c:

- Option 4c-1 – I-71 Eastbound Ramps / KY 146: This option considers the widening of the eastbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. A traffic signal is also proposed.
- Option 4c-2 – I-71 Westbound Ramps / KY 146: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. A traffic signal is also proposed.
- Option 4c-3 – I-71 Westbound and Eastbound / KY 393: This option considers signalizing both intersections and adding a second northbound left turn lane onto I-71 westbound from KY 393 and adding a free-flow right turn lane from I-71 eastbound to KY 393 southbound. It includes widening the interchange to provide four through lanes (two per direction) through the interchange.
- Option 4c-4 – I-71 Westbound Ramps / KY 53: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 53 and a second

northbound left turn lane onto I-71. As a result of the second turn lane, the bridge over I-71 westbound must be widened.

- Option 4c-5 – I-71 Eastbound Ramps / KY 53: This option considers the widening of the eastbound off-ramp to include a dual right turn movement and a separate left turn lane.
- Option 4c-6 – KY 53 / Parker Drive Intersection: This option considers the signalization of the intersection.
- Option 4c-7 – KY 53 south of I-71: This option considers widening KY 53 to 4 lanes from KY 2856 to I-71 (approximately 2 miles).
- Option 4c-8 – KY 393 south of I-71: This option considers paving a second northbound lane along KY 393 between KY 2856 and I-71 to make this a true 4-lane section.
- Option 4c-9 – I-71 Eastbound to KY 146: This option considers extending the deceleration lane from I-71 eastbound to KY 146 to a minimum of 1100 feet.
- Option 4c-10 – I-71 Eastbound to KY 393: This option considers extending the deceleration lane from I-71 eastbound to KY 393 to a minimum of 800 feet.
- Option 4c-11 – I-71 Westbound to KY 146: This option considers extending the deceleration lane from I-71 westbound to KY 146 to a minimum of 1100 feet.
- Option 4c-12 – KY 146 to I-71 Westbound: This option considers extending the acceleration lane from KY 146 to I-71 westbound to a minimum of 800 feet.

Project Prioritization

Scenario 4c contains numerous projects; therefore, a priority grouping was assigned to the projects in order to assist KYTC and KIPDA with implementation. Based on discussions with KYTC and technical analysis, the project priority ranking is as follows.

<u>High Priority</u>

Option 4c-3
Option 4c-4

<u>Medium Priority</u>

Option 4c-6
Option 4c-7
Option 4c-8

<u>Low Priority</u>

Option 4c-5
Option 4c-9
Option 4c-12
Option 4c-10
Option 4c-1
Option 4c-2
Option 4c-11

Next Steps

As appropriate, stakeholders and other interested parties will be informed of the study outcome. Project Information Forms will be developed by KIPDA and / or KYTC District 5 for the higher priority project in order to initially place them on the Unscheduled Needs List. In the future, they may be incorporated into the KYTC Six-Year Highway Plan and the KIPDA MTP. The need and feasibility of a new interchange should be evaluated at a future date pending changes in future land use and development.

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 PURPOSE AND SCOPE OF THE STUDY 1
1.2 REPORT ORGANIZATION 1
1.3 PROJECT HISTORY 1
1.4 STUDY AREA DESCRIPTION 1
1.5 STAKEHOLDER INVOLVEMENT 1
2.0 REVIEW OF EXISTING STUDIES 3
3.0 PURPOSE AND NEED 9
3.1 PURPOSE 9
3.2 NEED 9
3.3 GOALS AND OBJECTIVES 9
4.0 EXISTING FACILITIES 10
4.1 HIGHWAY CHARACTERISTICS AND GEOMETRICS 10
4.2 TRAFFIC VOLUMES 10
4.3 LEVEL OF SERVICE EVALUATION 14
4.4 QUEUE LENGTH EVALUATION 21
4.5 RAMP JUNCTION ANALYSIS 22
4.6 SAFETY ANALYSIS 23
4.7 FIELD REVIEW 29
4.8 EXISTING FACILITIES SUMMARY 29
5.0 EVALUATION SCENARIOS 31
6.0 EVALUATION METHODOLOGY 39
6.1 SCREENING ANALYSIS 39
6.2 TRAVEL DEMAND MODEL USE 39
7.0 LEVEL 1 ANALYSIS 40
7.1 EVALUATION SCENARIOS 40
7.2 TRAFFIC FORECASTING 40
7.3 LEVEL OF SERVICE 44
7.4 COST ESTIMATE 59
7.5 PURPOSE AND NEED COMPATIBILITY 59
8.0 LEVEL 2 ANALYSIS 61
8.1 EVALUATION SCENARIOS 61
8.2 TRAFFIC FORECASTING 61
8.3 SCENARIO 4C IMPROVEMENTS 72
8.4 LEVEL OF SERVICE 81
8.5 QUEUE LENGTH 93
8.6 COST ESTIMATES 93
8.7 MODEL SENSITIVITY ANALYSIS 93
8.8 PURPOSE AND NEED COMPATIBILITY 98
9.0 EVALUATION OF LEVEL 1 AND LEVEL 2 ANALYSIS 100
10.0 FHWA REQUIREMENTS 116
11.0 RECOMMENDATION 119
11.1 PROJECT PRIORITIZATION 119
11.2 FUTURE STEPS / REQUIREMENTS 120

APPENDICES

Appendix A: Meetings Minutes
Appendix B: Field Review Summary
Appendix C: Level 1 Traffic Volumes
Appendix D: Level 1 Detailed Tables
Appendix E: Level 2 Traffic Volumes
Appendix F: Level 2 Detailed Tables
Appendix G: Detailed Cost Estimate Sheets
Appendix H: Support Letters

LIST OF TABLES

Table 1: List of Previous Studies 3
Table 2: Study Area Highway Characteristics Summary 11
Table 3: LOS Criteria for Two-Lane Highways 14
Table 4: LOS Criteria for Intersections 15
Table 5: Current Segment Levels of Service (AM) 16
Table 6: Current Segment Levels of Service (PM) 18
Table 7: Current Intersection Levels of Service 21
Table 8: Current Queue Lengths 22
Table 9: LOS Criteria for Ramp Junctions 22
Table 10: Current Merge / Diverge Levels of Service 22
Table 11: Crash Rates by Segment 25
Table 12: Crash Rate Spot Analysis 28
Table 13: VMT / VHT Summary 44
Table 14: Level 1 2035 Segment LOS 45
Table 15: Level 1 2035 Intersection LOS - AM 47
Table 16: Level 1 2035 Intersection LOS - PM 49
Table 17: Level 1 2035 Ramp Junction LOS 58
Table 18: Level 1 Evaluation Scenario Planning Level Cost Estimate (in millions) 59
Table 19: Level 1 Purpose and Need Evaluation Matrix 60
Table 20: Level 2 Evaluation Scenarios 70
Table 21: Level 2 2035 Segment LOS 82
Table 22: Level 2 2035 Intersection LOS – AM 84
Table 23: Level 2 2035 Intersection LOS – PM 86
Table 24: Level 2 2035 Ramp Junction LOS 88
Table 25: Level 2 Queue Lengths 94
Table 26: Level 2 Evaluation Scenario 4c Planning Level Cost Estimate 95
Table 27: Level 2 Evaluation Scenario 5 Planning Level Cost Estimate 96
Table 28: Level 2 Evaluation Scenario 6 Planning Level Cost Estimate 97
Table 29: Year 2000 Socioeconomic Data 98
Table 30: Year 2030 Socioeconomic Data 98
Table 31: Level 2 Purpose and Need Evaluation Matrix 99
Table 32: Scenarios 4c, 5 & 6 2035 Segment LOS 103
Table 33: Scenarios 4c, 5 & 6 2035 AM Intersection LOS 105
Table 34: Scenarios 4c, 5 & 6 2035 PM Intersection LOS 107
Table 35: Scenarios 4c, 5 & 6 2035 Ramp Junction LOS 109
Table 36: Scenarios 4c, 5 & 6 Queue Lengths 110
Table 37: Scenarios 4c, 5 & 6 Cost Estimate 115

LIST OF FIGURES

Figure 1: Study Area 2
Figure 2: Current (2009) Traffic Volumes 13
Figure 3: Level of Service Definition 14
Figure 4: Current Levels of Service 20
Figure 5: Individual Crashes by Severity 24
Figure 6: Crash Rates by Segment and Spot 27
Figure 7: Crash Types (April 2007 – March 2010) 28
Figure 8: Existing Facilities Summary of Issues 30
Figure 9: Scenario 1 (MTP) Projects 32
Figure 10: Oldham Reserve Master Plan 33
Figure 11: Scenario 3 (MTP+) Projects 34
Figure 12: Scenario 4a (TSM) Projects 35
Figure 13: Standard Diamond Interchange 37
Figure 14: Interchange with Collector/Distributor Road 38
Figure 15: Summary of Interchange Traffic Volume 40
Figure 16: Summary of ADT on KY 53 North of I-71 41
Figure 17: Summary of ADT on KY 53 South of I-71 41
Figure 18: Summary of ADT on KY 393 North of I-71 42
Figure 19: Summary of ADT on KY 393 South of I-71 42
Figure 20: Summary of ADT on KY 146 North of I-71 to KY 393 43
Figure 21: Summary of ADT on KY 146 between KY 393 and KY 53 43
Figure 22: Level 1 - Scenario 1 (MTP) 2035 Levels of Service 51
Figure 23: Level 1 - Scenario 2 (MTP-) - 2035 Levels of Service 52
Figure 24: Level 1 - Scenario 3 (MTP+) - 2035 Levels of Service 53
Figure 25: Level 1 - Scenario 4a (TSM) - 2035 Levels of Service 54
Figure 26: Level 1 - Scenario 4b (TSM) - 2035 Levels of Service 55
Figure 27: Level 1 - Scenario 5 (Standard Diamond Interchange) - 2035 Levels of Service 56
Figure 28: Level 1 - Scenario 6 (Interchange with C / D Road) - 2035 Levels of Service 57
Figure 29: Scenario 5 – Standard Diamond Interchange Geometric Layout 62
Figure 30: Scenario 5 – Standard Diamond Interchange Interstate Distances 63
Figure 31: Scenario 5 – Standard Diamond Interchange Signing Plan 64
Figure 32: Scenario 6 – Standard Diamond Interchange with C / D Road Geometric Layout 65
Figure 33: Scenario 6 – Standard Diamond Interchange with C / D Road Interstate Distances 68
Figure 34: Scenario 6 – Standard Diamond Interchange with C / D Road Signing Plan 69
Figure 35: Select Link Analysis 71
Figure 36: Scenario 4c – Option A – I-71 Eastbound Ramps / KY 53 Intersection 73
Figure 37: Scenario 4c – Option B – I-71 Westbound Ramps / KY 53 Intersection 74
Figure 38: Scenario 4c – Option C – KY 53 / KY 146 Intersection 75
Figure 39: Scenario 4c – Option D – KY 53 / Parker Drive Intersection 76
Figure 40: Scenario 4c – Option E – I-71 Eastbound Ramps / KY 146 Intersection 77
Figure 41: Scenario 4c – Option F – I-71 Westbound Ramps / KY 146 Intersection 78
Figure 42: Scenario 4c – Option G – I-71 Eastbound Ramps / KY 393 Intersection 79
Figure 43: Scenario 4c – Option H – I-71 Westbound Ramps / KY 393 Intersection 80
Figure 44: Level 2 - Scenario 3 (MTP+) - 2035 Levels of Service 89
Figure 45: Level 2 - Scenario 4c (TSM) - 2035 Levels of Service 90
Figure 46: Level 2 - Scenario 5 (Standard Diamond Interchange) - 2035 Levels of Service 91
Figure 47: Level 2 - Scenario 6 (Interchange with C / D Road) - 2035 Levels of Service 92
Figure 48: Scenario 4c – 2035 Levels of Service 111
Figure 49: Scenario 5 – 2035 Levels of Service 112
Figure 50: Scenario 6 – 2035 Levels of Service 113

1.0 INTRODUCTION

1.1 Purpose and Scope of the Study

This project is an Interchange Justification Study (IJS) for a proposed new interchange along I-71 in Oldham County, Kentucky between the existing interchanges of KY 393 and KY 53. This study focuses on the justification of such an interchange based on traffic, access, and operating conditions and needs. Federal Highway Administration (FHWA) policy states that all requests for new access must include sufficient supporting information to allow FHWA to independently evaluate the request and ensure that all pertinent factors and alternatives have been appropriately considered before granting approval of a new interchange. That information is derived from an IJS and provides a comprehensive analysis of existing conditions and problems in and around the study area that are to be solved by the new interchange. This document provides FHWA with a preferred alternative as well as all supporting information needed to arrive at that recommendation.

1.2 Report Organization

In order to meet the project purpose of identifying the need for a new interchange, the report is organized into the following tasks:

- Review of Existing Studies
- Purpose and Need
- Existing Facilities
- Evaluation Scenarios
- Analysis of Improvement Scenarios
- FHWA Requirements
- Recommendation

1.3 Project History

The project originally began as one that sought to provide another way to link KY 146 west of LaGrange to the developing areas to the south along Commerce Parkway and towards I-71. The Allen Lane underpass was proposed in conjunction with a link over I-71 to provide an alternative to the existing at-grade railroad crossings. The new roadways would provide a way to bypass the often congested KY 53 corridor, especially when trains pass through downtown LaGrange. When Oldham County purchased the Oldham Reserve and future development there seemed likely, the leaders of the County began to think about an interchange and requested that KYTC examine this option in lieu of an overpass. The Kentucky Transportation Cabinet (KYTC) had a consultant perform an initial feasibility study of an interchange in 2008. Comments from the FHWA on the feasibility study led the KYTC to contract with PB Americas, Inc. (PB) to prepare a full IJS.

1.4 Study Area Description

The study area is an area that extends north of KY 146, just east of KY 53, south of KY 2856 and west of the I-71 / KY 146 interchange. **Figure 1** on the following page depicts the study area.

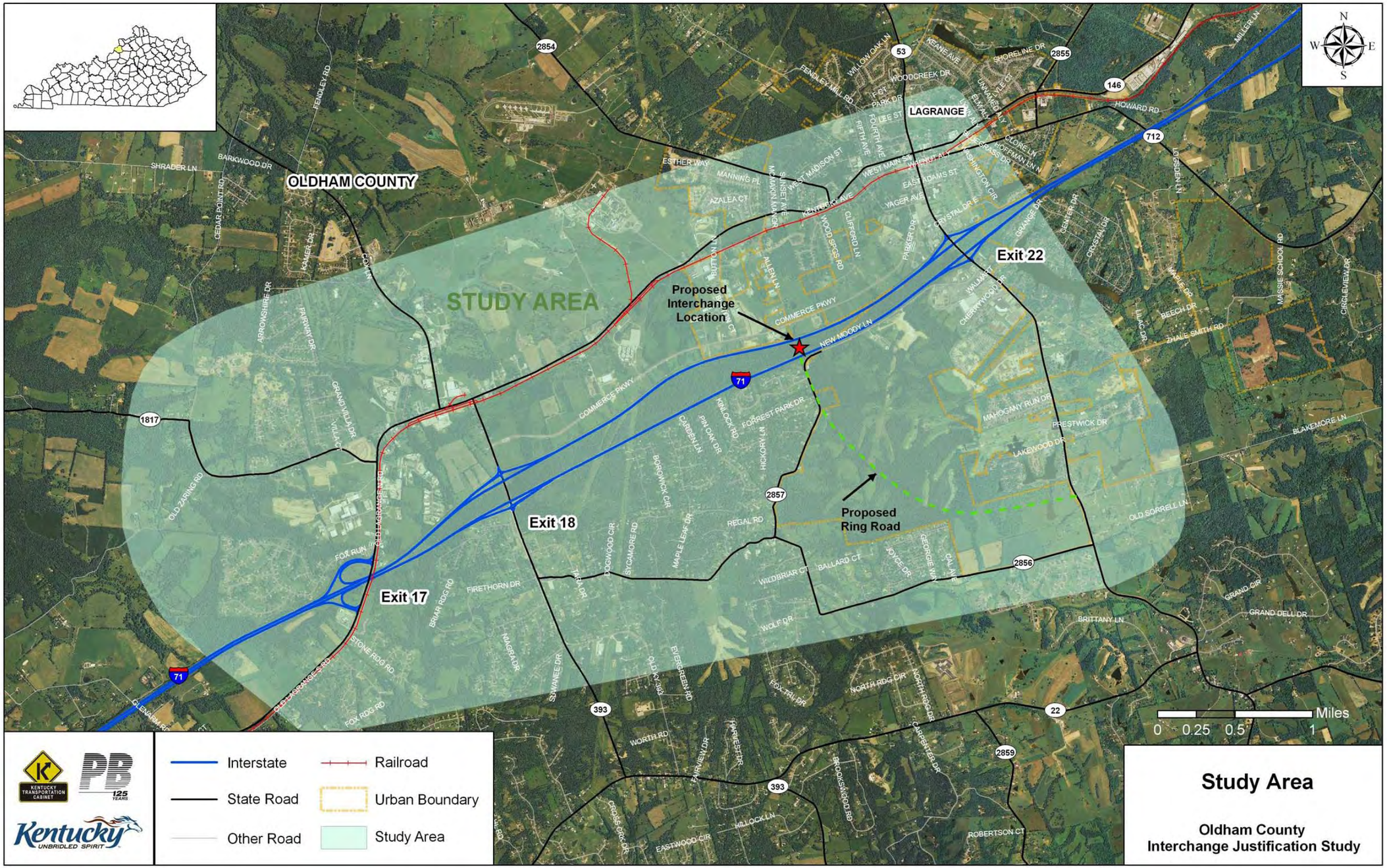
Figure 1 includes the proposed interchange location along I-71, just west of the existing interchange with KY 53. Also shown in the figure is a proposed route (Ring Road), which is expected to be constructed as part of the ongoing development close to KY 53.

It should be noted that as shown in **Figure 1**, I-71 geographically runs east west through the study area. Technically it is a north-south route and should be referred to as such, but for the purposes of this study it will be referred to as east-west (or eastbound / westbound). This will help distinguish it from other north-south routes within the study area such as KY 53 and KY 393.

1.5 Stakeholder Involvement

Coordination with stakeholders occurred throughout the project. This included multiple meetings with the Project Development Team (PDT), which included representatives of KYTC, the Kentuckiana Regional Planning & Development Agency (KIPDA), FHWA, and PB. In addition, two meetings were held with representatives of Oldham County in order to obtain information critical for the development of future year scenarios within the study area. Minutes from all meetings held during this study are included in **Appendix A** in chronological order.

Figure 1: **Study Area**



2.0 REVIEW OF EXISTING STUDIES

Eleven previous studies have been identified as being pertinent to this IJS. **Table 1** lists the previous studies, as well as their dates and authors.

Table 1: List of Previous Studies

Title	Author	Date	Notes
LaGrange Bypass Scoping Study: Summary of Findings and Recommendations	PB	8/1/2002	For KIPDA / Oldham County Fiscal Court / City of LaGrange / KYTC
Oldham County Mobility System: Existing Conditions and Issues	Wilbur Smith Associates / Context Town Planning	8/1/2003	For Oldham County Planning and Zoning Commission
Alternatives Development and Analysis Technical Document	Wilbur Smith Associates / Context Town Planning	8/1/2003	For Oldham County Planning and Zoning Commission
Oldham County Major Thoroughfare Plan	Wilbur Smith Associates / Context Town Planning	12/1/2003	For Oldham County Planning and Zoning Commission
Development Plan Report for the OCEDA Economic Development Campus	Tetra Tech, Inc.	12/21/2005	For Oldham county Economic Development Authority; Includes Original TIS by WSA
Oldham County Modeling and Forecasting Report	Wilbur Smith Associates	4/1/2007	For DLZ
Traffic Impact Study: I-71 Overpass & CSXT Grade Separation Crossing	DLZ	1/4/2008	For Oldham County Fiscal Court
The Potential Economic Impacts of the Oldham Reserve Office Campus Development	Paul Coomes, PhD	3/18/2008	For Oldham County Economic Development
I-71 / Proposed Overpass Interchange Feasibility Study	Qk4	11/1/2008	For KYTC
Road Classification and Proposed Future Roads	URS / Jacobs / JJG	4/1/2010	For Oldham Planning and Development Services
Kentucky Highway 53 Corridor Study	HNTB	5/1/2010	For Oldham County Planning and Zoning Commission

As shown, some studies have multiple components such as those prepared by Wilbur Smith Associates for the Oldham County Planning and Zoning Commission. The findings of these studies are summarized below beginning with the most recent study.

Kentucky 53 Corridor Study – May 2010

The Oldham County Department of Planning and Zoning identified a need for an access management and enhancement plan for KY 53. The study area for the project included the KY 53 corridor from I-71 in the south to Main Street in the north. The width of study area includes the properties immediately adjacent to the corridor and identified parcels for redevelopment. Additionally, broader community influences were included in terms of their general impact to the corridor.

Goals of the study were to:

- Advance economic development goals by promoting more efficient use of land and transportation systems;
- Create a unified and aesthetic corridor that further enhances the image of Oldham County; and
- Preserve the public investment in infrastructure.

The report contains the final technical memoranda for the three major parts of the study. The project was conducted through a series of meetings, presentations, exercises, and programming sessions, and specific concepts were developed, reviewed, and revised.

The end product was a series of physical improvements largely aimed at access management designed to increase safety and improve traffic flow and operations in the study area. The study is useful for detailing access management and other systems operations improvements that are acceptable in the KY 53 corridor. It was also noted that bicycle and pedestrian links across the overpass and the interchange signal will be included on the south side of the interstate.

Road Classification and Proposed Future Roads – April 2010

The study was completed for the Oldham County Planning and Development Services (OCPDS). OCPDS decided that a current road classification for the existing road system in Oldham County needed to be designated. A consultant team was retained to analyze the current and proposed road classification systems. The classification only pertained to the roads within Oldham County and was separate from the functional classification system maintained by the KYTC. According to the study, the road classification will be used to guide development standards for land that is currently undeveloped. The road classifications detailed in the report will be incorporated into the Oldham County Comprehensive Plan and land development regulations.

Proposed new roads developed as part of the Comprehensive Plan or other planning type elements in the County were included as part of the proposed future roads system. This included numerous collectors and distributors in and around the LaGrange area and the rest of the County as well. They include:

1. KY 393 Reconstruction – create a grade-separated crossing with KY 393 and the CSX railroad west of LaGrange
2. North LaGrange Connector – create a connector between Dawkins Road (KY 2854), KY 53 and Fort Pickens Road (KY 2855)

3. New I-71 Interchange (the focus of this study) – between KY 53 and KY 393 with connections to KY 146 and KY 53 via collector streets
4. Commerce Parkway Extension – create a new collector by extending Commerce Parkway from KY 393 west to Mattingly Court
5. New I-71 Interchange with connections to US 42 and KY 22 – create a new interchange in western Oldham County to facilitate access in this part of the County (which would also require an IJS and approval by FHWA)
6. Zhale Smith Road / KY 22 Connector – create a connector from Zhale Smith Road east of LaGrange southward across Blakemore Lane to KY 22

These roadways would pertain to this current IJS and could be part of the future build or TSM scenarios that would be required as a comparison to the interchange project. The roadway additions above, except for the interchange, could be part of a package of improvements designed to make the system more efficient. Such a package could be modeled in lieu of the actual interchange per the Policy Points of the FHWA.

Projects 2 and 5 with a connection through the existing Spring House Estates subdivision would create a "western bypass" of LaGrange from south KY 53 to north KY 53. This project presents a series of highway improvements that could become part of a package of alternatives to improve system operations in the LaGrange area.

I-71 Proposed Overpass Interchange Feasibility Study – November 2008

An Overpass Interchange Feasibility Study was performed by a consultant in November 2008. The purpose of this study was to evaluate the feasibility of constructing a new interchange in Oldham County at the I-71 overpass between Exits 18 and 22 (KY 393 and KY 53). High crash rates along KY 53 and I-71, poor current and future year LOS, traffic queues on the KY 53 NB exit ramp and improved access to the Oldham Reserve were listed as the main needs driving the study. This study examined six alternatives:

- Do nothing;
- Traffic system management improvements and spot improvements;
- Construct a standard diamond interchange at the new overpass;
- Construct a collector-distributor system with the I-71 / KY 53 interchange;
- Improve the existing roadways in the area (Commerce Parkway, Allen Lane and New Moody Lane); and
- Construct a new road between KY 393 and New Moody Lane south of I-71.

The alternatives were compared with respect to an analysis of traffic conditions in 2008, 2015 and 2035, a safety analysis, existing interchange geometry, cost comparison, and identification of constraints. Based on these criteria, the report recommended constructing an interchange at the proposed overpass. It was noted that further design and analysis, including a full interchange justification study would be needed to determine the particular alternate that should be constructed. This study was an initial attempt at detailing the problems and potential solutions an interchange could address. Per FHWA's comments, it did not fully address the transportation issues associated with an IJS, but is a basis for starting a more robust analysis.

The Potential Economic Impacts of the Oldham Reserve Office Campus Development – March 2008

This report was performed by Paul Coomes, Ph.D. in March 2008. It estimated the potential economic and fiscal impacts of the development of a large parcel of land along I-71 near the proposed LaGrange interchange. The development is the Oldham Reserve and is planned to be a 1,000 acre business campus. The goals of the development are to increase employment for county residents, increase personal income of residents, increase tax revenue for county government, diversify county tax base and contribute to overall quality of life in the area. The findings of the report are summarized in the following list:

- The development will generate between $8 and $14 million annually in tax revenues.
- It will create thousands of high-paying private-sector jobs.
- The site will reduce commuting time and save residents who switch from a job in Jefferson County to one at Oldham Reserve around $3,000 per year in auto mileage expense as well as give them $1,000 per year in gained leisure time.
- The development will create business for company vendors. For 2,000 office workers an estimated 822 other jobs would be created elsewhere in the County. Restaurants, health care providers, grocery stores and other retail and personal service firms would make an estimated additional $5 million in sales.
- The development will diversify the County's tax base by supporting between 4,000 and 11,000 jobs, representing a new payroll base between $150 and $470 million.

The report is a reference that can be used for understanding the magnitude and impacts of the development in terms of affects on the local transportation system in and around LaGrange.

Traffic Impact Study: I-71 Overpass & CSXT Grade Separation Crossing – January 2008

This document discussed the anticipated impacts to traffic resulting from an overpass project as well as a grade separation crossing project. The overpass project would construct a new north-south route that connects Commerce Parkway at Allen Lane to New Moody Lane passing over I-71. The grade separation crossing project would provide an uninterrupted grade separated crossing of the CSX Railroad from KY 146 to Commerce Parkway. This would also provide a bypass to downtown LaGrange and alleviate congestion along KY 53.

These two projects provide a bypass to downtown LaGrange intended to alleviate congestion along KY 53 due to projected growth within the county. Three different alternatives were considered for the grade separation crossing. The preferred alternative evaluated in this report is Alternative 3, which would improve Commerce Parkway from Allen Lane to Button Lane and then realign Button Lane from Commerce Parkway to KY 146.

The study examined the existing and projected traffic impacts at the following intersections:

- KY 393 and Elder Park / Firethorn Drive
- KY 393 and Commerce Parkway
- KY 393 and KY 146
- KY 146 and Button Lane
- Button Lane and Commerce Parkway
- KY 146 and Allen Lane
- Allen Lane / Overpass and Commerce Parkway
- KY 53 and Blakemore Lane
- KY 53 and New Moody Lane
- KY 53 and Parker Drive
- KY 53 and KY 146
- Overpass and New Moody Lane
- Yager Avenue and KY 53
- Yager Avenue and KY 146

The main focus of this study was to evaluate the anticipated traffic impacts of the two proposed improvements and to identify other improvements necessary for the overpass and the grade separation crossing intersections to accommodate the future traffic volumes. In addition, this study was also conducted to identify any existing or potential traffic impacts at the other intersections within the project area. The study did not identify potential solutions for these other intersections within the study area. The study described the existing conditions, future traffic operations with (Build) and without (No Build) the proposed improvements.

This study described the traffic projections, and identified intersection level of service for the No Build and Build conditions. This report discussed the benefits of the Build versus No Build conditions. Traffic Modeling and forecasting was performed by another consultant under the Oldham County Modeling and Forecasting Report. The analysis focused on the usefulness of the two projects and alleviating delay at intersections and along KY 53 given certain other improvements to the local system. Some study area locations experienced Level of Service (LOS) F and extended delays, even with the intended improvements.

This study is useful as it lays out various test scenarios that can be used in the non-interchange improvements for the I-71 IJS. It also is valuable as a benchmark reference for various intersection and roadway counts depicting background and future levels of traffic.

Oldham County Modeling and Forecasting Report – April 2007

This was a consultant-produced traffic modeling and forecasting analysis and report for Oldham County. Specifically, the report looked at various transportation system improvement projects and their respective impacts on the system in and around LaGrange.

Other key activities included:

- Data Collection: Turning movement counts were collected at four intersections in LaGrange, Kentucky.
- Travel Demand Model Validation: The existing 2003 Oldham County travel demand model was updated with new population and employment data. The external trips were adjusted based on the Kentuckiana Regional Planning and Development Agency's (KIPDA's) model, the Kentucky Statewide Traffic Model and the National Cooperative Highway research Project (NCHRP) 365 equations. The model was validated to 2003 traffic counts. A new automated TransCAD GISDK script was written to facilitate the running of the validated model.
- Travel Demand Model Application: The new travel demand model was used to develop traffic forecasts in a subarea of LaGrange.
- Traffic Forecasting: Traffic forecasts were made for the opening year of 2010 and a design year of 2030 for the Do-Nothing alternative and three build alternatives.

The turning movement counts were performed at the following intersections:

- KY 393 / KY 146
- KY 146 / Button Lane.
- KY 393 / Commerce Parkway
- KY 53 / New Moody Lane

The updated Oldham County travel demand model was utilized to perform traffic forecasts for the following alternatives:

- Do-Nothing;
- Phase 1: This alternative's main change from the Do-Nothing Alternative is an overpass of I-71 connecting New Moody Lane and Commerce Parkway.
- Phase 2: This alternative includes the I-71 Overpass, a faster travel time on Allen Lane/Button Lane Corridor and an underpass (or overpass) of the CSX railroad near the Allen Road/KY 146 intersection.
- Phase 3: This alternative includes the I-71 Overpass, the improved Allen Lane/Button Lane Corridor, the underpass (or overpass) near KY 146 at Allen Lane, the KY146-Dawkins Lane connector, and the LaGrange Parkway connecting KY 53 to New Moody Lane.

The following years were considered in the study: base year of 2003; year opening to traffic of 2010; and horizon year of 2030. The report concluded that in general, "the model is replicating existing traffic counts very well". The Travel Demand Model Development report states that the root mean square error (RMSE) % (the most common measure of accuracy for travel demand models) was 24.22% for the entire model which exceeds the typical KYTC standard of 30% RMSE."

The design hour volumes were derived using a combination of K-factors and D-factors based on existing turning movement counts and default averages for new or greatly modified intersections. The default turning movement factors were:

- K-factor = 10%
- D-factor = 60%

This report is useful for it helps detail the modeling work in around LaGrange and the area adjacent to the Oldham Reserve Project. It will be useful in determining model inputs into the Highway Capacity Software (HCS+) model that will be used for the IJS.

Development Plan Report for the Oldham County Economic Development Authority (OCEDA) Economic Development Campus – December 2005

This study was prepared by a team of consultants to support the Phase I Infrastructure Development Plan for the Campus. The purpose was to obtain development plan approval for the infrastructure needed to serve Phases 1a and 1b as identified in the Master Plan. This report was the submittal document which included plans for general development of the property, including some roadway infrastructure. Phase 1 of the Infrastructure Development plans includes:

- Additional left turn lane on New Moody Lane at KY 53;
- New intersection into the Campus from New Moody Lane at Eden Parkway;
- Eden Parkway, south from New Moody Lane to the Roundabout;
- Roundabout intersection;
- Peak Road, west from the Roundabout to New Moody Lane; and
- Water, sanitary sewer, and utilities associated with these portions of Eden Parkway and Peak Road.

In addition to discussing the plan for infrastructure, the appendix of the report contained a traffic impact study for Phases 1a and 1b of the Master Plan. The traffic impact study addressed the needed roadway improvements that would result directly from the development impacts. 2005 was the base year for the study. The No Build conditions assumed a 2.5% to 4.0% growth rate per year. For the analysis, Phase 1a was analyzed for 2005 and 2007 and Phase 1b was analyzed for 2008 and 2010. Existing roadways, signalized intersections and unsignalized intersections that were analyzed included:

- I-71
- KY 53
- New Moody Lane
- Kroger Entrance / Exit
- Grange Drive

According to the study, the existing operations of the roadway segments and intersections under consideration were acceptable. The new development would necessitate the need for additional roadway improvements based on new trips generated by the development.

For Phase 1a, the traffic impact analysis demonstrated that the only unacceptable LOS (LOS E/F) caused by the development of Phase 1a in 2010 was the New Moody Lane intersection with KY 53 and Eden Parkway intersection with New Moody Lane. To mitigate the problems at the New Moody Lane / KY 53 intersection, it was recommended that a second exclusive left-turn lane be added on New Moody Lane and the adjacent traffic signal be retimed as needed. This would result in the approach LOS F becoming LOS D and an overall intersection LOS change from LOS E to LOS C. To mitigate the impacts at Eden Parkway, it was recommended that left and right turn lanes be added along New Moody Lane to promote better operations. Another option is to reconfigure the intersection to make Eden Parkway the primary movement. With this configuration, LOS is C or better and no turn lanes would be warranted.

The following improvement should also be considered: upgrade the I-71 eastbound ramps from the Louisville direction to allow right-turn vehicles direct access to the right turn movement along KY 53 onto New Moody Lane.

If development is sufficient to cover both the 1a and 1b full build-out phases, New Moody Lane would be unable to accommodate the additional traffic. As a result additional access would be needed. The consultant also tested a set of additional system-wide improvements in the immediate area. Those included:

- Widen the I-71 Eastbound off –ramp to two lanes with a third shorter right turn lane. The middle lane could allow right and left turn vehicles.
- Extend the KY 53 right turn lane onto New Moody Lane to the I-71 ramp.
- Provide double left turn lanes from New Moody Lane onto I-71. The through and right-turn lane would remain a single lane.
- Signalize the KY 53 / Grange Drive intersection and add an additional lane on Grange Drive from Wal-Mart to allow for an exclusive left turn lane. It is understood that signalizing Grange Drive may cause progression disruption along KY 53; however, with the increased congestion along New Moody Lane, the signal will provide additional left-turn options.

The study noted that the above recommendations provide system enhancements to New Moody Lane and the surrounding intersections. However, four (4) of the six (6) intersections analyzed would operate at an unacceptable LOS (LOS E/F). Additional strategies would be needed to accommodate all the projected traffic. A sensitivity analysis was also done to determine at what level the incremental traffic would cause many of the roadways in the area to degrade to unacceptable operational levels. It was determined that this threshold was approximately 20% to 40% of the Phase 1b levels.

This report can be used to gain insight into some of the improvements that were suggested to alleviate potential traffic problems as a result of the Oldham Reserve Development. These projects can be used as part of the Transportation Systems Management (TSM) scenario for the IJS analysis.

Oldham County Mobility System: Existing Conditions and Issues Phase I Deliverable – August 2003

In February 2002, the Oldham County Planning and Zoning Commission began an update of the Oldham County Comprehensive Plan. In order for the Planning Commission to study in greater detail the issues pertaining to the transportation element and subsequently develop a list of recommended improvements, this study was undertaken. This study also helped realize the goal of developing the Oldham County Thoroughfare Plan, a follow on study process and report. Essentially this portion of the work provided the background data necessary to develop the

Thoroughfare Plan. It is the first of three documents that make up the Oldham County Major Thoroughfare Plan Study.

The study was designed to analyze the existing roadway network and alternatives for roadway improvements. The final project document summarized the detailed study of the current and future transportation needs in all of Oldham County, and proposed a transportation plan for the implementation of recommended improvements. The scope was limited to the analysis of present and future automobile travel, transit services and pedestrian facilities. Some consideration was also given to recent and planned highway improvements within Oldham County. For this Existing Conditions and Issues report, information regarding the existing roadway network, public involvement to-date, socioeconomic data, and the county-wide traffic model was also presented. Since Oldham County has grown and changed considerably in the ensuing 6 + years since the report was written, much of the background and the conclusions reached by the study are no longer totally relevant. What is relevant is the list of various issues identified, as many of them are still of concern today as they have not been totally solved or taken care of. Those include:

1. Roadway Character, Design and Safety
   - A number of issues were identified along KY 146: minimal geometric standards, problem railroad crossings, and the need for intersection improvements.
   - Incident management for I-71 diverts traffic onto other roads (KY 22, KY 146 and US 42) where traffic congestion is often already an issue.
   - Input should be sought from sources such as: school bus drivers, police, fire and other emergency service workers.

2. Traffic Congestion and Transportation Improvements
   - KY 53 through LaGrange and north and south of I-71 west from Exit 14 (KY 329) toward Jefferson County (widening).
   - A new interchange on I-71 in Jefferson County at KY 1694 should be constructed.

Other suggested improvements included:
   - The US 42 and KY 393 intersection is skewed and could be improved for better sight distance.
   - KY 146 should be widened to provide for truck traffic in the area of the business park on the west side of LaGrange.

As part of the work, the consultant also developed a county wide travel demand model and performed the following tasks:

   - Established the system which included all of Oldham County in addition to a band around Oldham County
   - Determined socioeconomic data for population and employment for the base year TAZ
   - Developed base year model and Year 2000 model application

Overall, the document provides a good history as to what issues were examined in the past and what technical analysis and associated work, including the development and calibration of a county wide model, was done in the past.

Alternatives Development and Analysis Technical Document – August 2003

This document was the second part of the Oldham County Major Thoroughfare Plan Study from Wilbur Smith Associates in August of 2003. This document discusses socioeconomic forecasts for Oldham County as well as the development of the future year traffic model, a public needs assessment, alternatives development and public involvement.

Based on the existing conditions geometrics, traffic and level of services measures, preliminary future traffic model results, high crash locations, transportation initiatives in Oldham County and input from public involvement; a preliminary list of improvement projects was developed. Cost estimates were developed for each of the projects, and a number of the projects were tested using the travel demand model. The alternatives were then evaluated with respect to improvement of system service, how well they address safety concerns, reduction of future congestion and public/agency support. Cost estimates for construction were also developed. These alternatives were then brought back to the public to receive feedback.

The identification of projects is the most relevant part of this study to the IJS efforts. Projects that were identified that may have an impact on the background traffic scenario for the IJS include:

   - Project N – Major Widening of I-71 to six lanes countywide.
   - Project O – Widening of KY 146 to four lanes from KY 393 to LaGrange, with a left-turn lane at the KY 393 intersection.
   - Project P – Improvements to downtown LaGrange, including consideration of signalization, parking improvements, and railroad safety improvements.
   - Project Q – Minor widening for turning lanes and access management improvements from I-71 to downtown LaGrange.
   - Project R – Consider signalization of the KY 53 / Cherrywood Drive intersection.
   - Project S – Provide a new two-lane connector in southwest LaGrange from KY 146 to KY 2856 to KY 22.
   - Project T – Reconstruction of KY 53 to two lanes from the Shelby County line to New Moody Lane (KY 2856).

Oldham County Major Thoroughfare Plan – December 2003

The Oldham County Major Thoroughfare Plan is a plan for the implementation of recommended transportation improvements in Oldham County including highway improvements, funding opportunities, transit, bicycle and pedestrian facilities, facility design standards and access management guidelines. This is the third technical document that is part of the Major Thoroughfare Plan Study.

The document identifies study area projects programmed in KYTC's 6-Year Highway Plan, as well as projects that are on the Unscheduled Needs List. There is one project in the IJS study area that was in the 6-Year Plan in 2003, which was to reconstruct and widen KY 393 from KY 22 to north of I-71. The following projects (that are in the IJS study area) were on the Unscheduled Needs List:

- Widen KY 146 from I-71 to KY 393 – High Priority
- Widen Allen Lane from Business Park Road to KY 146 and provide a rail underpass – High Priority
- Widen I-71 to 6 lanes from KY 329 to KY 53 – Low Priority
- Widen KY 146 from KY 393 to KY 53 – Low Priority

Based on the work completed and discussed in the two previous documents, 20 highway improvement projects were recommended in the Thoroughfare Plan ranging from intersection and safety improvements to major reconstruction of existing routes and new connections. Below is a list of the projects that are recommended in the IJS study area:

- Improve access management, upgrade signals and modify intersections along KY 53 from I-71 north to downtown LaGrange.
- Widen KY 146 to 4-lanes from KY 329B to KY 393.
- Reconstruct / widen KY 53 to 5 lanes from KY 22 to I-71 and consider a traffic signal at KY 53 and Cherrywood Drive.
- Add a new north-south roadway connection from KY 146 to KY 2586 to KY 22.
- Widen KY 146 from KY 393 to LaGrange to 3 lanes in urban areas and 4 lanes in rural areas.
- Consider signal warrant study and evaluation of intersection approaches at the KY 53 and KY 146 intersection.

In addition to roadway improvements, the Plan recommends some improvements to transit and bicycle and pedestrian facilities. Improvements to transit include developing a more direct service from Louisville to urban areas in Oldham County, providing a single stop in Oldham County at a centralized location, adding park and rides and adding bus pull-offs. Bicycle and pedestrian improvements include the Oldham County Interurban Greenway project that will link all the cities along the KY 146 corridor and provide a shared use path. A bicycle/pedestrian route between LaGrange and the John Black Convention Center and aquatic complex is also recommended.

The plan analyzed the various improvements for their performance both on a route and system-basis. Measures included: VHT, VMT, LOS, and V/C ratio. The plan included design recommendations, including various roadway cross sections, access management guidelines and access for other modes including transit.

The plan is the culmination of efforts begun with the previous technical documents produced in August 2003. It is relevant to the I-71 IJS for it lays out some plans that the county intends to pursue over the long range time frame. These plans are likely to become part of the list of system improvements that will be tested and compared against a new interchange.

LaGrange Bypass Scoping Study – August 2002

The LaGrange Bypass Scoping Study was developed for the Kentuckiana Regional Planning and Development Agency (KIPDA) in cooperation with the Oldham County Fiscal Court and the City of LaGrange. This technical transportation study explored multimodal solutions to transportation and traffic problems associated with access, mobility, safety, congestion and other issues.

An existing conditions analysis was performed that looked at roadway characteristics, traffic operations, level of service, safety and crash data as well as intermodal / pedestrian / bicyclist facilities in the LaGrange area. Forecasts were for the horizon year 2025. The traffic forecasts predicted that all of the intersections on KY 53 from New Moody Lane north to KY 146 would operate at LOS F in the average peak hour and the design peak hour.

A review of projects from the KIPDA Transportation Improvement Plan and Long Range Transportation Plan and the KYTC 6-Year Highway Plan and the unscheduled highway plan needs was also performed. Projects on these lists include widening KY 393, widening KY 146, reconstructing KY 53, constructing an I-71 overpass from New Moody Lane to Allen Lane, constructing a railroad underpass at Allen Lane, widening I-71 and constructing a LaGrange bypass. An environmental overview was included in the report as well. Based on this information, as well as input from the public, a wide range of improvement alternates were developed to respond to transportation deficiencies in the study area.

A set of alternate multimodal solutions were developed, including: No Build, Transportation Systems Management (TSM), bicycle, pedestrian, transit and various other roadway options, perhaps including a bypass. The alternates were grouped into three categories: low build, medium build and high build; and further divided into geographic groups: entire study area, downtown LaGrange, KY 53 near I-71, south study area and north study area. Sixty-five alternates were developed and evaluated as well as a no-build scenario. The alternates were evaluated using a three step process, beginning with a fatal flaw screening, then a more general screening analysis that examined each alternate with respect to traffic and pedestrian conditions, support of new development, community, property and environmental impacts and capital costs / benefits, and finally a detailed analysis and refinement of alternates based on more detailed traffic and transportation, costs, impacts and execution information.

After the alternates were evaluated, 11 low-build, 5 medium-build and 9 high-build projects were recommended. Some low-build projects include access management, installing traffic signals, updating phasing, converting intersections to four-way stops, and installing lights and audible warnings at a railroad crossing. Medium-build projects include roadway realignment, downtown signal and intersection improvements, and restriping. High-build projects include widening existing roadways, building new roadways, and adding a new bypass from New Moody Lane to KY 53 via an I-71 overpass.

Although the study is relevant in terms of an overall history of what issues, projects and solutions have been examined in LaGrange, its scope was more widespread in nature and thus few specific points related to the interchange are relevant. Also, since it was produced in 2002, most of the traffic volumes and turning movement counts would need to be updated. However, they do provide a baseline for locations where more recent data does not exist.

3.0 PURPOSE AND NEED

It is important to establish the Purpose and Need for a project during its early stages since it defines the actual reason(s) for doing the study and provides the basis for the development, evaluation, and comparison of all alternates. According to current KYTC policy, there are three parts to a complete Purpose and Need statement:

1. The Purpose
2. The Need
3. Goals and Objectives

The Purpose identifies the problem to be solved by the study and is supported by the Need. Goals and Objectives are other elements of the study that go beyond the transportation issues in the study and should be considered and addressed as part of a successful solution to the problem.

3.1 Purpose

The Purpose of this study was to determine the need and explore methods to improve safety, traffic operations, connectivity, and regional access in the LaGrange, Oldham County area through the evaluation of the need for a new interchange on I-71 between Exit 18 and Exit 22.

3.2 Need

The planning-level need for a proposed new interchange on I-71 is to:

- Increase mobility and accessibility
- Reduce travel times and overall delay
- Improve safety of local network by reducing exposure on identified high crash segments
- Reduce emergency response times
- Provide access to developing areas particularly along Commerce Parkway and south of I-71
- Create a “middle connector” between KY 393 and KY 53
- Provide a western “bypass” of LaGrange
- Provide an “outlet” when I-71 is shutdown during an incident

These needs were assessed throughout the study process and used as a measure to select a preferred improvement scenario for the study area.

3.3 Goals and Objectives

In accordance with KYTC’s policy on Purpose and Need statements, the following goals and objectives were developed to balance environmental and community issues with transportation issues.

- Consider cost-effective solutions.
- Consider pedestrian and bicycle facilities in conjunction with alternative improvement options.
- Consider noise, water, and air quality concerns.

4.0 EXISTING FACILITIES

A detailed analysis was completed examining the existing highway characteristics and geometrics, traffic volumes, truck traffic, traffic operations, and crash rates of the major study area roads. Highway and traffic data was collected from a variety of sources including:

- KYTC Highway Information System Database
- KYTC CTS Traffic Counts Summary Database
- 24-hour vehicle classification counts
- Various KYTC Division of Planning data sources

4.1 Highway Characteristics and Geometrics

Within the study area, the major roadways include:

- I-71
- KY 146
- KY 53
- KY 393

Other state-maintained roadways evaluated (as data was available) include KY 2856 and KY 2857.

There are also several county roads and city streets for which data was collected as available. These include:

- Commerce Parkway
- Parker Drive
- New Moody Lane

A summary of the highway characteristics is included as **Table 2.**

4.2 Traffic Volumes

Average daily traffic (ADT) counts on study area roadways were obtained through the CTS database. The count years ranged from 2007 – 2009. Counts from the years 2007 and 2008 were forecasted to the current year (2009) based on a growth rate determined from historical count data. Growth rates ranged from one to three percent per year. These volumes are depicted on **Figure 2**.

At the intersection level, turning movement counts were collected for the major study area intersections. As it was not possible to obtain / perform counts at all intersections within the study area, the most critical intersections were selected and turning movement counts performed. All counts were conducted between 7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM. The following lists the count locations and when they were conducted.

- I-71 / KY 53 interchange: Conducted by KYTC in March 2009
- KY 146 / KY 53 intersection: Conducted by KYTC in March 2009
- KY 53 / Parker Drive intersection: Conducted by PB in April 2010
- KY 53 / New Moody Lane intersection: Conducted by PB in April 2010
- I-71 / KY 393 interchange: Conducted by PB in April 2010
- KY 146 / KY 393 intersection: Conducted by PB in April 2010
- I-71 / KY 146 interchange: Conducted by PB in 2006 in the PM peak only

As the I-71 / KY 146 interchange is not directly adjacent to the proposed interchange, it was determined that new traffic counts were not necessary. These counts were forecasted to 2009 volumes using historical growth rates. All counts were balanced where appropriate (i.e. where there were no major intersections between the intersections for this evaluation).

The balanced peak hour volumes are shown in **Figure 2** for each of the study area intersections.

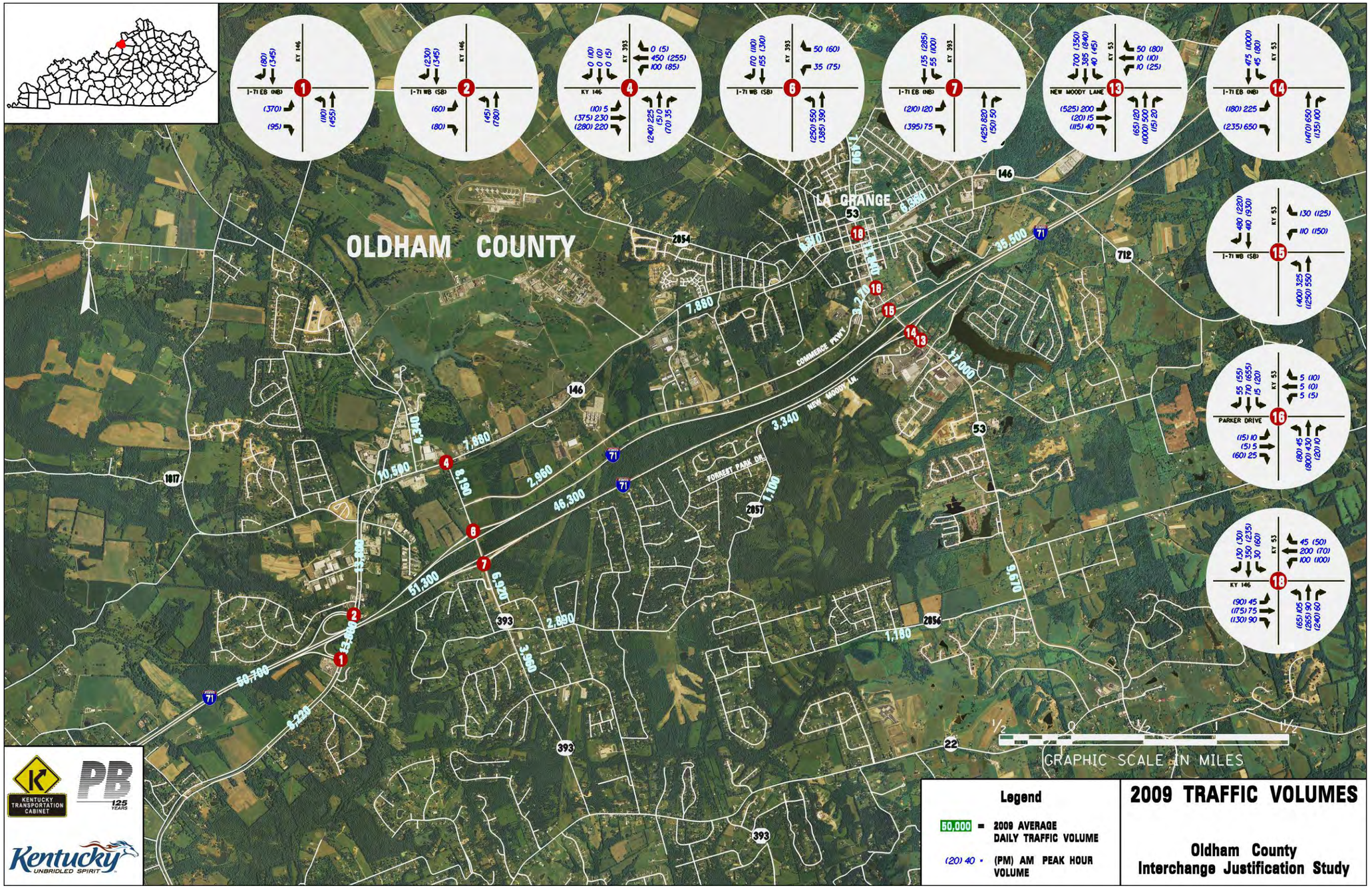
Table 2: Study Area Highway Characteristics Summary

Route	Section	County	Begin Milepoint	End Milepoint	Section Length (miles)	Functional Class	Facility Type	Lane Width (feet)	Shoulder Width (feet)	Median Type	Median Width (feet)	Posted Speed Limit (MPH)
I-71	1	Oldham	17.000 (West of KY 146)	17.478 (KY 146)	0.48	Urban Interstate	4-Lane Divided Highway	12	10	Depressed	54	70
I-71	2	Oldham	17.478 (KY 146)	18.507 (KY 393)	1.03	Urban Interstate	4-Lane Divided Highway	12	10	Depressed	93	70
I-71	3	Oldham	18.507 (KY 393)	21.869 (KY 53)	3.36	Urban Interstate	4-Lane Divided Highway	12	10	Depressed	93	70
I-71	4	Oldham	21.869 (KY 53)	22.250 (East of KY 53)	0.38	Rural Interstate	4-Lane Divided Highway	12	10	Depressed	93	70
KY 146	1	Oldham	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	0.76	Urban Minor Arterial	2-Lane Undivided Highway	10	4	None	0	55
KY 146	2	Oldham	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	0.31	Urban Minor Arterial	2-Lane Divided Highway	10	10	Raised Non Mountable	16	55
KY 146	3	Oldham	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	0.20	Rural Principal Arterial	2-Lane Divided Highway	10	10	Raised Non Mountable	16	45
KY 146	4	Oldham	6.273 (North of Fox Run)	6.829 (KY 1817)	0.56	Rural Principal Arterial	2-Lane Undivided Highway	10	2	None	0	45
KY 146	5	Oldham	6.829 (KY 1817)	7.640 (KY 393 South)	0.81	Rural Principal Arterial	2-Lane Undivided Highway	10	2	None	0	35
KY 146	6	Oldham	7.640 (KY 393 South)	8.000 (East of KY 393 South)	0.36	Rural Principal Arterial	2-Lane Undivided Highway	10	2	None	0	35
KY 146	7	Oldham	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	1.21	Rural Principal Arterial	2-Lane Undivided Highway	10	2	None	0	55
KY 146	8	Oldham	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	0.78	Rural Principal Arterial	2-Lane Undivided Highway	10	2	None	0	45
KY 146	9	Oldham	9.990 (Sunset Avenue)	10.336 (KY 2854)	0.35	Rural Principal Arterial	2-Lane Undivided Highway	10	2	None	0	35
KY 146	10	Oldham	10.336 (KY 2854)	10.988 (KY 53)	0.65	Urban - Other Principal Arterial	2-Lane Undivided Highway	10	2	None	0	35
KY 146	11	Oldham	10.988 (KY 53)	11.400 (Lynn Alley)	0.41	Urban Minor Arterial	2-Lane Undivided Highway	10	2	None	0	35
KY 53	1	Oldham	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	0.56	Rural Minor Arterial	2-Lane Undivided Highway	10	2	None	0	45
KY 53	2	Oldham	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	0.97	Rural Principal Arterial	2-Lane Undivided Highway	9	2	None	0	45

Table 2: Study Area Highway Characteristics Summary (cont.)

Route	Section	County	Begin Milepoint	End Milepoint	Section Length (miles)	Functional Class	Facility Type	Lane Width (feet)	Shoulder Width (feet)	Median Type	Median Width (feet)	Posted Speed Limit (MPH)
KY 53	3	Oldham	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	0.21	Rural Principal Arterial	2-Lane Undivided Highway	11	6	None	0	45
KY 53	4	Oldham	5.890 (North of Market Street)	6.296 (I-71)	0.41	Rural Principal Arterial	4-Lane Undivided Highway	12	4	None	0	45
KY 53	5	Oldham	6.296 (I-71)	7.055 (KY 146)	0.76	Rural Principal Arterial	4-Lane Undivided Highway	10	2	None	0	35
KY 53	6	Oldham	7.055 (KY 146)	7.400 (North of Park Drive)	0.35	Urban Minor Arterial	2-Lane Undivided Highway	10	2	None	0	35
KY 393	1	Oldham	3.800 (Echo Valley Circle)	3.968 (KY 2856)	0.17	Urban Collector Street	2-Lane Undivided Highway	11	3	None	0	45
KY 393	2	Oldham	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	0.46	Urban Collector Street	2-Lane Undivided Highway	11	3	None	0	45
KY 393	3	Oldham	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	0.11	Urban Collector Street	2-Lane Divided Highway	11	3	Raised Non Mountable	16	45
KY 393	4	Oldham	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	0.23	Urban Collector Street	2-Lane Divided Highway	11	3	Raised Non Mountable	16	45
KY 393	5	Oldham	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	0.41	Rural Minor Arterial	2-Lane Undivided Highway	9	3	None	0	45
KY 393	6	Oldham	5.177 (KY 146)	6.200 (Saddlers Mill Road)	1.02	Rural Minor Collector	2-Lane Undivided Highway	10	3	None	0	35
KY 2856	1	Oldham	0.000 (KY 393)	0.183 (East of KY 393)	0.18	Urban Collector Street	2-Lane Undivided Highway	12	6	None	0	35
KY 2856	2	Oldham	0.183 (East of KY 393)	1.658 (KY 2857)	1.48	Urban Collector Street	2-Lane Undivided Highway	10	3	None	0	35
KY 2856	3	Oldham	1.658 (KY 2857)	3.200 (East of Cal Ave)	1.54	Rural Minor Collector	2-Lane Undivided Highway	10	3	None	0	35
KY 2856	4	Oldham	3.200 (East of Cal Ave)	4.103 (KY 53)	0.90	Rural Minor Collector	2-Lane Undivided Highway	8	3	None	0	35
KY 2857	1	Oldham	0.000 (KY 2856)	1.372 (New Moody Lane)	1.37	Urban Collector Street	2-Lane Undivided Highway	9	3	None	0	45
Commerce Pkwy	1	Oldham	0.000 (KY 393)	1.584 (Button Lane)	1.58	Urban Collector Street	2-Lane Undivided Highway	10	4	None	0	N/A
Parker Drive	1	Oldham	0.000 (KY 53)	0.204 (Commerce Parkway)	0.20	Urban Collector Street	2-Lane Undivided Highway	12	3	None	0	N/A
New Moody Lane	1	Oldham	0.000 (West City Limits of LaGrange)	1.194 (KY 53 in LaGrange)	1.19	Urban Collector Street	2-Lane Undivided Highway	9	3	None	0	N/A

Figure 2: Current (2009) Traffic Volumes

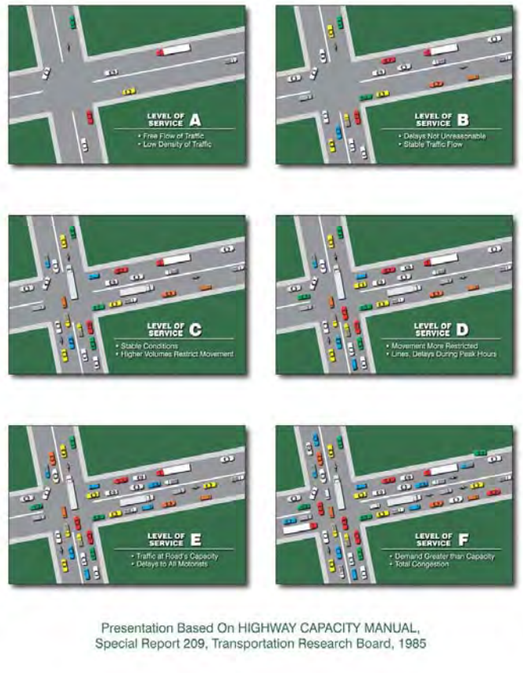


4.3 Level of Service Evaluation

Using the gathered geometric and existing highway information, the Highway Capacity Software Plus (HCS+) was used to determine level of service (LOS). LOS is used to provide a rating scale for congestion and operations of a roadway.

LOS A represents a free flowing facility with little time spent following another vehicle and plenty of opportunities for passing on a two-lane facility. Percent time following increases and opportunities to pass and travel speeds decrease with level of service down to LOS F which represents a congested roadway that is over capacity with no opportunities to pass and low travel spends. Refer to **Figure 3** for a graphical representation of what each LOS looks like from a capacity perspective.

Figure 3: Level of Service Definition



LOS D is the threshold for desirable traffic operations in this study, based on guidance from the AASHTO Policy on Geometric Design of Highways and Streets[1]. While there are various roadway types in the study area, including urban and suburban freeways and arterials, as well as rural freeways, (which have a desired LOS of B or C), the majority of roadways fall under the categories of urban and suburban collector and local roads, as well as rural rolling local roads, which have a desired LOS of D. It was determined that all roadways should be evaluated using the same criteria and that operations below this threshold should be noted as undesirable and warrant improvement.

4.3.1 Two-Lane Highway Evaluation Methodology

For the two-lane highways (KY 53, KY 146, KY 393 and KY 2857), a corridor LOS analysis was prepared using the HCS+ two-lane road analysis module. This is based on the Highway Capacity Manual 2000 (HCM)[2]. For this method, there are two classes of roadways: Class I highways which include higher speed arterials and daily commuter routes, and Class II highways which include lower speed collector roadways, and roads primarily designed to provide access. Driver expectations regarding speed and flow are important in determining a highway's class. All state routes were assumed to be major through routes in the study area, and were therefore considered to be Class I highways. Levels of service for Class I highways are based on the estimated average travel speeds and percent time vehicles spend following other vehicles as shown in **Table 3**. Levels of service for Class II highways are defined only in terms of the percent time vehicles spend following other vehicles. Average travel speed is not considered since drivers typically will tolerate lower speeds on a Class II facility because of its function as an access roadway (serving shorter trips and fewer through trips). Refer to the HCM for more details.

Table 3: LOS Criteria for Two-Lane Highways

	Class I Highways		Class II Highways
LOS	Percent Time Spent Following	Average Travel Speed	Percent Time Spent Following
A	≤ 35	>55	≤ 40
B	>35 – 50	>50 – 55	>40 – 55
C	>50 – 65	>45 – 50	>55 – 70
D	>65 – 80	>40 – 45	>70 – 85
E	>80	≤40	>85
F	LOS F applies whenever the flow rate exceeds the capacity		

Source: Highway Capacity Manual (2000)

For Class I highways, the LOS D threshold corresponds to an average travel speed of > 40 miles per hour with ≤ 80 percent time spent following another vehicle.

It should be noted that KY 2856, Commerce Parkway, Parker Drive, and New Moody Lane are also two-lane highways; however, sufficient data was not available for a LOS to be calculated.

4.3.2 Freeway Evaluation Methodology

To analyze peak hour traffic operations for I-71, the HCS+ freeway analysis package was used, also based on the HCM. Levels of service for freeway sections are based on density in terms of passenger cars per mile per lane (pc/mi/ln), similar to multilane highway analysis. Again, LOS D is the threshold for desirable traffic operations used in this study, which corresponds to a density between 26 and 35 passenger cars per mile per lane. (Refer to the HCM for more specific information.)

4.3.3 Intersection Evaluation Methodology

Level of service is a measure of intersection delay based on driver tolerance for stopped delay and signal efficiency. The LOS criteria for signalized and unsignalized intersections, as developed in the *2000 Highway Capacity Manual, Special Report 209*, are summarized in **Table 4**.

Highway Capacity Manual (HCM) standards use LOS D as the limit of acceptable operating conditions at intersections in urban areas during peak hours. However, it is not uncommon for side streets and driveways to function at LOS F during peak traffic periods. A traffic signal is not always warranted to distribute only the side street traffic in the peak hour.

[1] Policy on Geometric Design of Highways and Streets, AASHTO.
[2] Highway Capacity Manual 2000, Transportation Research Board.

Table 4: LOS Criteria for Intersections

LOS	Description	Average Delay/Vehicle, sec.	
		Signalized	Unsignalized
A	Operations with very low control delay occurring with favorable progression and short cycle lengths.	d ≤ 10.0	d ≤ 10.0
B	Operations with low control delay, short queues, good signal progression and short cycle lengths.	10.0< d ≤ 20.0	10.0< d ≤ 15.0
C	Operations with average control delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.0< d ≤ 35.0	15.0< d ≤ 25.0
D	Operations with longer control delays due unfavorable progression, occasional cycle failures, long cycle lengths, and/or high V/C ratios.	35.0< d ≤ 55.0	25.0< d ≤ 35.0
E	Operations with high control delays, poor progression, long cycle lengths, frequent cycle failures and volume-capacity ratios >= 1.0.	55.0< d ≤ 80.0	35.0< d ≤ 50.0
F	Operation with control delays unacceptable to most drivers occurring due to over saturation, poor progression, and/or very long cycle lengths.	d > 80.0	d > 50.0

Source: Highway Capacity Manual (2000)

4.3.4 (2009) Level of Service

The most recent 24-hour KYTC traffic counts shown in **Figure 2** were used to evaluate corridor operating conditions. Peak hour traffic volumes for highway segments were estimated based on the average daily traffic volumes for those segments using K-factors (factor based on the 30th highest hour of the year) derived from the KYTC count. The current lane widths, shoulder widths, percent passing and other design factors were also used. The segment levels of service are listed in **Tables 5** and **6** and are shown in **Figure 4.**

Current year levels of service were also calculated for major intersections in the study area. **Table 7** shows study area intersection LOS. Intersection turning movement counts were used to calculate LOS.

Table 5: Current Segment Levels of Service (AM)

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2009 ADT	K-Factor	2009 DHV	Peak Dir. %	Off Peak Dir. %	Posted Speed (MPH)	% Trucks	Est. Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	0.48	50,700	0.112	5,670	57	43	70	18.4	67.4	-	25.5	C
	2	17.478 (KY 146)	18.507 (KY 393)	1.03	51,300	0.109	5,600	56	44	70	17.6	67.4	-	25.2	C
	3	18.507 (KY 393)	21.869 (KY 53)	3.36	46,300	0.105	4,845	50	50	70	21.0	68.2	-	21.8	C
	4	21.869 (KY 53)	22.250 (East of KY 53)	0.38	35,500	0.100	3,550	53	47	70	19.8	69.8	-	15.5	B
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	0.76	8,220	0.103	850	71	29	55	9.0	40.5	69.9	-	D
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	0.31	8,220	0.103	850	71	29	55	9.0	41.8	69.9	-	D
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	0.20	13,800	0.104	1,430	68	32	45	16.8	27.9	82.2	-	E
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	0.56	13,800	0.104	1,430	68	32	45	16.8	25.3	82.2	-	E
	5	6.829 (KY 1817)	7.640 (KY 393 South)	0.81	10,500	0.108	1,130	57	43	35	16.8	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	0.36	7,880	0.103	815	67	33	35	5.6	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	1.21	7,880	0.103	815	67	33	55	5.6	39.4	68.5	-	E
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	0.78	7,880	0.103	815	67	33	45	5.6	29.4	68.5	-	E
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	0.35	7,880	0.103	815	67	33	35	5.6	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	0.65	8,310	0.084	700	58	42	35	8.1	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	0.41	6,360	0.084	535	68	32	35	9.0	*	*	*	*
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	0.56	9,670	0.122	1,180	59	41	45	5.6	27.2	77.4	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	0.97	9,670	0.107	1,035	57	43	45	5.6	27.0	74.6	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	0.21	17,000	0.064	1,085	60	40	45	16.8	31.0	75.5	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	0.41	17,000	0.064	1,085	60	40	45	16.8	30.1	75.5	-	E
	5	6.296 (I-71)	7.055 (KY 146)	0.76	13,840	0.089	1,225	57	43	35	16.8	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	0.35	7,490	0.093	700	74	26	35	7.1	*	*	*	*

Table 5: Current Segment Levels of Service (AM) (cont)

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2009 ADT	K-Factor	2009 DHV	Peak Dir. %	Off Peak Dir. %	Posted Speed (MPH)	% Trucks	Est. Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	0.17	3,960	0.126	500	81	19	45	7.0	31.5	64.4	-	C
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	0.46	6,920	0.156	1,080	81	19	45	7.4	28.5	77.3	-	D
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	0.11	6,920	0.156	1,080	81	19	45	7.4	28.5	77.3	-	D
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	0.23	8,190	0.071	580	55	45	45	7.4	31.3	62.7	-	C
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	0.41	8,190	0.071	580	55	45	45	9.9	29.5	62.7	-	C
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	1.02	4,340	0.117	510	63	37	35	9.2	*	*	*	*
KY 2857	1	0.000 (KY 2856)	1.372 (New Moody Lane)	1.37	1,100	0.109	120	54	46	45	7.4	34.7	33.3	-	A

Notes:
- 2009 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report
- 2009 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report
- Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM
- Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum
- Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Table 6: Current Segment Levels of Service (PM)

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2009 ADT	K-Factor	2009 DHV	Peak Dir. %	Off Peak Dir. %	Posted Speed (MPH)	% Trucks	Est. Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	0.48	50,700	0.106	5,360	56	44	70	18.4	68.5	-	23.9	C
	2	17.478 (KY 146)	18.507 (KY 393)	1.03	51,300	0.096	4,950	55	45	70	17.6	68.2	-	22	C
	3	18.507 (KY 393)	21.869 (KY 53)	3.36	46,300	0.092	4,270	53	47	70	21.0	68.3	-	19.2	C
	4	21.869 (KY 53)	22.250 (East of KY 53)	0.38	35,500	0.105	3,725	55	45	70	19.8	69.8	-	16.3	B
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	0.76	8,220	0.122	1,005	56	44	55	9.0	39.5	74.0	-	E
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	0.31	8,220	0.122	1,005	56	44	55	9.0	40.8	74.0	-	D
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	0.20	13,800	0.103	1,415	59	41	45	16.8	28.0	81.9	-	E
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	0.56	13,800	0.103	1,415	59	41	45	16.8	25.4	81.9	-	E
	5	6.829 (KY 1817)	7.640 (KY 393 South)	0.81	10,500	0.111	1,170	57	43	35	16.8	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	0.36	7,880	0.101	795	57	43	35	5.6	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	1.21	7,880	0.101	795	57	43	55	5.6	39.6	67.9	-	E
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	0.78	7,880	0.101	795	57	43	45	5.6	29.6	67.9	-	E
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	0.35	7,880	0.101	795	57	43	35	5.6	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	0.65	8,310	0.081	670	58	42	35	8.1	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	0.41	6,360	0.116	740	54	46	35	9.0	*	*	*	*
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	0.56	9,670	0.122	1,180	59	41	45	5.6	27.2	77.4	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	0.97	9,670	0.107	1,400	57	43	45	5.6	24.5	81.6	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	0.21	17,000	0.121	2,060	52	48	45	16.8	23.4	90.0	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	0.41	17,000	0.121	2,060	52	48	45	16.8	22.5	90.0	-	E
	5	6.296 (I-71)	7.055 (KY 146)	0.76	13,840	0.011	155	57	43	35	16.8	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	0.35	7,490	0.100	750	54	46	35	7.1	*	*	*	*

Table 6: Current Segment Levels of Service (PM) (cont)

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2009 ADT	K-Factor	2009 DHV	Peak Dir. %	Off Peak Dir. %	Posted Speed (MPH)	% Trucks	Est. Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	0.17	3,960	0.109	450	59	41	45	7.0	31.8	57.3	-	C
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	0.46	6,920	0.167	1,155	59	41	45	7.4	28.1	77.0	-	D
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	0.11	6,920	0.167	1,155	59	41	45	7.4	28.1	77.0	-	D
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	0.23	8,190	0.083	680	54	46	45	7.4	30.9	64.9	-	C
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	0.41	8,190	0.083	680	54	46	45	9.9	29.1	64.9	-	C
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	1.02	4,340	0.117	510	63	37	35	9.2	*	*	*	*
KY 2857	1	0.000 (KY 2856)	1.372 (New Moody Lane)	1.37	1,100	0.109	120	54	46	45	7.4	34.7	33.3	-	A

Notes:
- 2009 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report
- 2009 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report
- Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM
- Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum
- Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Figure 4: Current Levels of Service

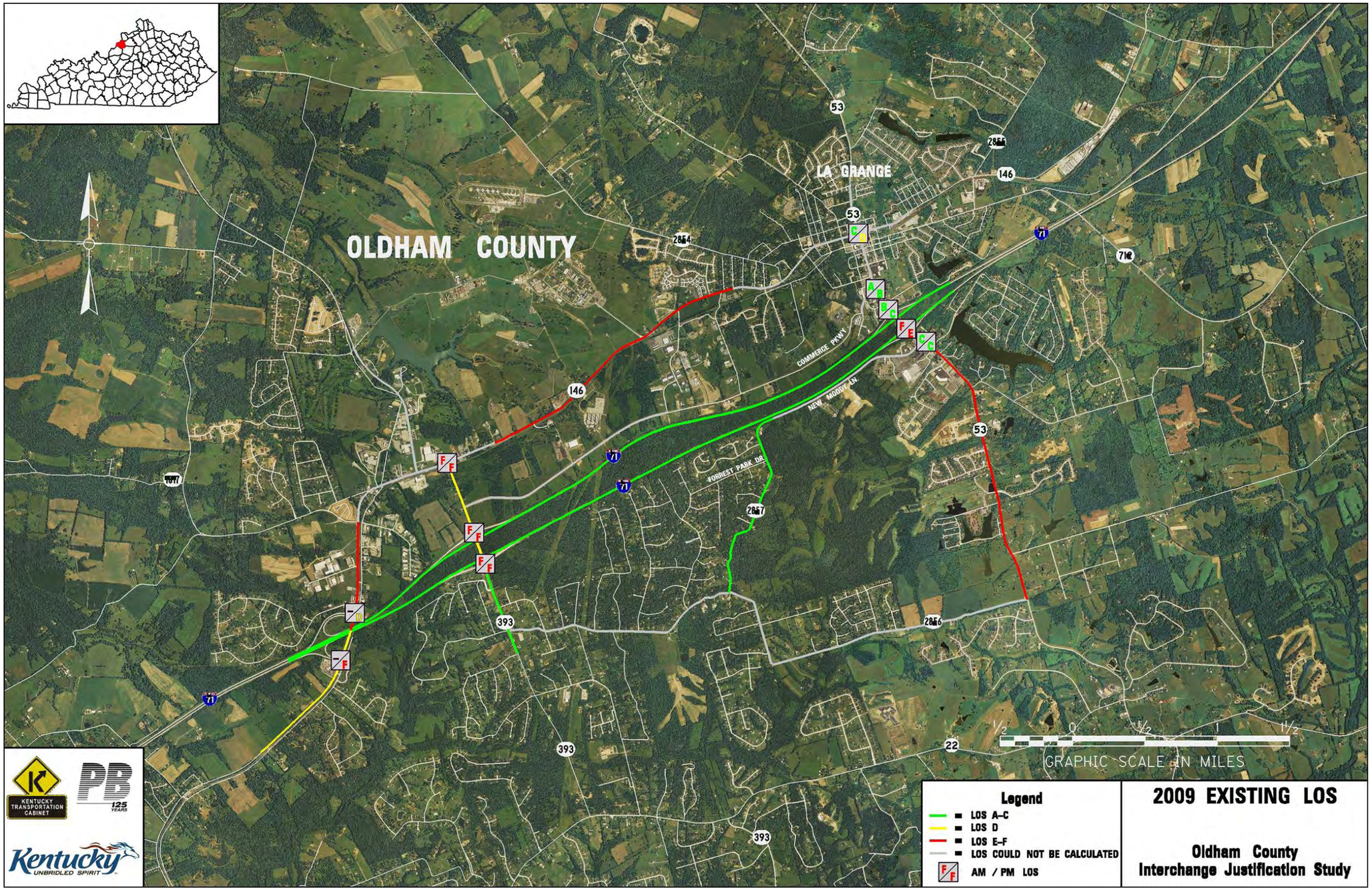


Table 7: Current Intersection Levels of Service

Intersection	Type	Approach	AM		PM	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled	Eastbound	-	-	620.8	F
		Northbound	-	-	8.5	A
		Southbound	-	-	-	-
I-71 WB / KY 146	STOP Controlled	Eastbound	-	-	34.2	D
		Northbound	-	-	8.3	A
		Southbound	-	-	-	-
KY 146 / KY 393	STOP Controlled	Eastbound	8.4	A	7.8	A
		Westbound	8.8	A	9.6	A
		Northbound	344.7	F	378.4	F
		Southbound	-	-	17.2	C
I-71 WB / KY 393	STOP Controlled	Eastbound	142.4	F	62.9	F
		Northbound	9.7	A	8.9	A
		Southbound	-	-	-	-
I-71 EB / KY 393	STOP Controlled	Eastbound	55.9	F	310.6	F
		Northbound	-	-	-	-
		Southbound	10.4	B	8.8	A
KY 53 / New Moody Lane	Signalized	Eastbound	36.3	D	37.1	D
		Westbound	39.8	D	36.7	D
		Northbound	12.4	B	28.6	C
		Southbound	34.0	C	27.3	C
		Whole Int.	27.9	C	30.2	C
I-71 EB / KY 53	Signalized	Eastbound	128.8	F	86.9	F
		Northbound	78.9	E	89.4	F
		Southbound	30.4	C	17.2	B
		Whole Int.	87.5	F	63.9	E
I-71 WB / KY 53	Signalized	Westbound	40.8	D	72.1	E
		Northbound	8.8	A	19.7	B
		Southbound	11.7	B	47.2	D
		Whole Int.	14.6	B	33.7	C
KY 53 / Parker Drive	STOP Controlled	Eastbound	21.7	C	26.2	D
		Westbound	26.5	D	30.2	D
		Northbound	10.6	B	10.5	B
		Southbound	8.8	A	10.7	B
KY 53 / KY 146	STOP Controlled	Eastbound	13.8	B	28.6	D
		Westbound	30.7	D	19.5	C
		Northbound	18.8	C	39.2	E
		Southbound	21.9	C	17.8	C
		Whole Int.	22.3	C	28.9	D

4.4 Queue Length Evaluation

According to the HCM, the average back of queue length is a measure that can be used to evaluate the performance of an intersection. The back of queue length is the number of vehicles queued depending on vehicle arrival patterns and vehicles that do not clear the intersection during a given green phase (if signalized). Typically, the 95th percentile back of queue (BOQ) value is used from the Highway Capacity Software (HCS+) output. To determine what that translates into as far as an actual length of queued traffic at an intersection approach, the 95th percentile BOQ is multiplied by the average queue spacing. The average queue spacing is defined as the average length between the front bumper of the queued vehicle and the front bumper of the next queued vehicle. Table 3-1 in the Institute of Transportation Engineers Traffic Engineering Handbook (6th Edition) provides average vehicle lengths. According to this book, typical vehicle length is 13 to 18.5 feet. Adding on the additional length between the rear bumper and front bumper of the next vehicle (approximately 6 feet) would then give an average spacing of 22 feet. Therefore, the actual BOQ length is the 95th percentile BOQ multiplied by 22 feet.

Table 8 lists these values for each of the interchange intersections to determine how far traffic may back up during the peak periods. As a measurement of impact to I-71, the length of the existing ramp was measured so that the queue length could be compared to the actual storage. As shown on the table, currently none of the ramps experience queue lengths that exceed the available storage.

To compare to the software analysis findings, several field reviews were made during peak period conditions. The KY 53 ramp from I-71 (eastbound) was observed during a typical weekday when school was in session. Vehicle queues came close to the I-71 mainline around the 4:30 PM time period but never actually backed up onto the freeway. Other observations found that queued traffic typically occurred on the arterial street system and did not affect the interstate. This confirms the findings from the HCS+ output.

Table 8: Current Queue Lengths

Location	Evaluation Description	AM	PM
KY 53 NB Off Ramp	Queue (# vehicles)	61	40
	Queue Length (ft)	1,349	869
	Ramp Length	1,455	1,455
	Mainline Impact	**No**	**No**
KY 53 SB Off Ramp	Queue (# vehicles)	11	15
	Queue Length (ft)	233	337
	Ramp Length	1,280	1,280
	Mainline Impact	**No**	**No**
KY 393 NB Off Ramp	Queue (# vehicles)	6	38
	Queue Length (ft)	137	845
	Ramp Length	1,845	1,845
	Mainline Impact	**No**	**No**
KY 393 SB Off Ramp	Queue (# vehicles)	5	5
	Queue Length (ft)	118	110
	Ramp Length	1,670	1,670
	Mainline Impact	**No**	**No**
KY 146 NB Off Ramp	Queue (# vehicles)	-	41
	Queue Length (ft)	-	899
	Ramp Length	-	1,845
	Mainline Impact	-	**No**
KY 146 SB Off Ramp	Queue (# vehicles)	-	3
	Queue Length (ft)	-	71
	Ramp Length	-	2,350
	Mainline Impact	-	**No**

4.5 Ramp Junction Analysis

For the ramp junctions (merge and diverge areas of I-71) level of service is measured by density in terms of passenger cars per mile per lane. The HCS+ ramps analysis package was used, which is also based on the 2000 HCM. LOS A thru E will be designated in stable operations, based on the density, however if the flow departing from the merge area exceeds the capacity of the downstream segment, the result is LOS F and no density will be given. **Table 9** shows the LOS criteria for ramp junctions. Similar to the segment and intersection LOS analysis, LOS D is considered the limit of acceptable operating conditions.

Table 9: LOS Criteria for Ramp Junctions

LOS	Density (pc/mi/ln)
A	≤ 10
B	>10 - 20
C	>20 – 28
D	>28 – 35
E	>35
F	Demand exceeds capacity

Source: Highway Capacity Manual (2000)

The merge and diverge LOS (as calculated from HCS+) are shown in **Table 10** below. All ramp junctions shown operate at an acceptable LOS.

Table 10: Current Merge / Diverge Levels of Service

Direction	Route	Type	Peak Period	
			AM	PM
EB	KY 146	Diverge	D	D
EB	KY 146	Merge	C	D
EB	KY 393	Diverge	D	D
EB	KY 393	Merge	C	C
EB	KY 53	Diverge	D	C
EB	KY 53	Merge	C	C
WB	KY 53	Diverge	C	C
WB	KY 53	Merge	C	C
WB	KY 393	Diverge	D	C
WB	KY 393	Merge	D	C
WB	KY 146	Diverge	D	C
WB	KY 146	Merge	D	C

4.6 Safety Analysis

4.6.1 Crash Analysis Methodology

The KYTC provided crash data for a three-year period from April 1, 2007 through March 31, 2010. Individual crashes by severity are shown in **Figure 5**.

Crash rates were computed for specific segments of each major study area highway using the methodology provided in the crash analysis report periodically published by the Kentucky Transportation Center (KTC)[3]. The section crash rates are based on the number of crashes on a specified section, the ADT on the roadway, the time frame of analysis, and the length of the section. They are expressed in terms of crashes per 100 million vehicle-miles. A section's crash rate was then compared to a statewide critical crash rate[4] derived from critical crash rate tables for highway sections in the KTC crash report (Appendix D of KTC crash report). This comparison is expressed as a ratio of the section crash rate to the critical crash rate and is referred to as the critical crash rate factor. Sections with a critical crash rate factor greater than one indicate a safety concern.

The section crash rate is also compared directly to the statewide average crash rate presented in the KTC crash report. The statewide averages consider all crashes for a specified period that are listed in the Collision Report Analysis for Safer Highways (CRASH) database maintained by the Kentucky State Police and stratified by functional classification (Table B-2 in KTC crash report). Section rates that exceed the statewide average crash rate but not the critical crash rate may be problem areas, but they are not statistically proven to be higher crash areas. Therefore, this second comparison is used to identify a second tier of highway sections that may have crash problems and could be considered for safety improvements if warranted based on further analysis.

4.6.2 Section Crash Analysis

For the major roadways within the study area, many of the observed section crash rates exceed the critical crash rate for that roadway type. The critical crash rate factors range from 0.18 to 4.80. **Table 11** shows the crash statistics for the segments analyzed and **Figure 6** shows the segments on a map.

4.6.3 Spot Crash Analysis

To determine if there are any crash rate problems in specific locations throughout the study area, a spot crash analysis was conducted. A spot location is defined as a section of highway 0.3 miles in length. The methodology used to calculate the spot crash rates is similar to that used for calculating the section crash rates with the exception that length is no longer a component used in the calculation. The crash rates at these "spots" were compared to the critical crash rates for similar facilities derived from critical spot crash rate tables in the KTC crash report (Appendix E in KTC crash report). All major intersections and areas with numerous crashes were evaluated. From this analysis, there are high crash spots on most roadways in the study area. **Table 12** shows all of the spots that were evaluated. There are high crash rate spots throughout the study area, with a concentration of them located along KY 53. **Figure 6** shows the locations of the high crash rate spots as represented by the red dots.

4.6.4 Severity of Crash Analysis

Due to the number of crashes within the primary study area, an additional crash analysis was conducted to look at severity, i.e. what proportion of the crashes involved an injury, fatality, or was property damage only.

A breakdown of the crash severity for the entire area is provided below.

Severity	Number of Crashes	Percentage
Property Damage Only	637	79.2%
Injury	165	20.5%
Fatality	2	0.3%
	804	100.0%

The majority of crashes were property damage only (PDO) crashes (637). One-fifth of the crashes involved at least one injury, and two fatal crashes occurred between April 1, 2007 and March 31, 2010. One of the crashes was a single vehicle collision on the shoulder, and the other was an angle collision with an animal. The weather was not a contributing factor in either of these crashes.

4.6.5 Manner of Collision Analysis

A review of all crash types for the study area was performed to determine the most frequent type. The majority of crashes were angle (29.0%) and rear end crashes (28.9%), although there were also a significant number of sideswipe, and single vehicle crashes. **Figure 7** shows the results.

Also, for each segment, the most frequent manner of collision (crash type) was listed in **Table 11** along with the percent of crashes that were of this type. As expected, the majority of crashes on I-71 were single vehicle crashes as there are fewer conflict points for crashes with other vehicles. There was a mix of crash types on KY 393, with rear-end being the most common type on KY 146 and angle crashes being the most common type on KY 53.

[3] Analysis of Traffic Crash Data in Kentucky (2004 – 2008), Kentucky Transportation Center Research Report KTC-07-26/KSP2-07-1F.
[4] The critical crash rate is the threshold above which an analyst can be statistically certain (at a 99.5% confidence level) that the section crash rate exceeds the average crash rate for a similar roadway and is not mistakenly shown as higher than the average due to randomly occurring crashes.

Figure 5: Individual Crashes by Severity

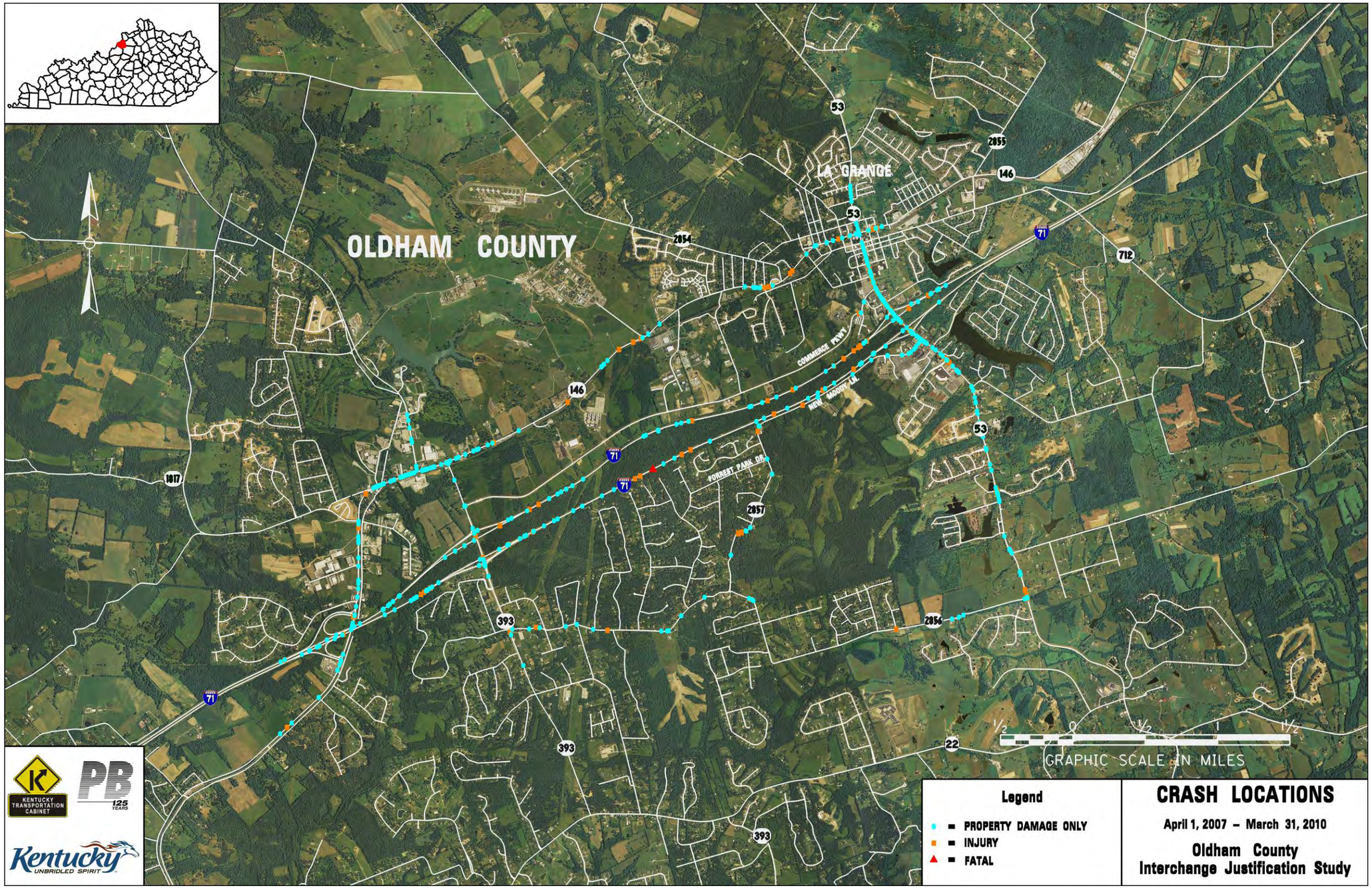


Table 11: Crash Rates by Segment

Route	Section	Begin Milepoint	End Milepoint	Total Crashes	Average Daily Traffic	Statewide Average Crash Rate	Section Crash Rate	Statewide Critical Crash Rate	Critical Crash Rate Factor	Manner of Collision	Light Condition	Weather
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	21	50,700	81	79	135	0.59	Rear-End (43%)	Daylight (71%)	Clear (76%)
	2	17.478 (KY 146)	18.507 (KY 393)	48	51,300	81	83	124	0.67	Single Vehicle (60%)	Daylight (46%)	Clear (46%)
	3	18.507 (KY 393)	21.869 (KY 53)	87	46,300	81	51	113	0.45	Single Vehicle (50%)	Daylight (57%)	Clear (59%)
	4	21.869 (KY 53)	22.250 (East of KY 53)	22	35,500	41	149	143	1.04	Single Vehicle (73%)	Daylight (73%)	Clear (55%)
KY 146	1	5.000 (Old LaGrange Road Connector)	6.073 (I-71 Overpass)	20	8,220	240	207	397	0.52	Single Vehicle (35%)	Daylight (60%)	Clear (50%)
	2	6.073 (I-71 Overpass)	6.829 (KY 1817)	23	13,800	88	201	298	0.68	Rear-End (39%)	Daylight (65%)	Clear (48%)
	3	6.829 (KY 1817)	7.640 (KY 393 South)	43	10,500	88	461	324	1.42	Rear-End (63%)	Daylight (86%)	Clear (65%)
	4	7.640 (KY 393 South)	9.210 (West of KSR Main Entrance)	20	7,880	88	148	304	0.49	Rear-End (50%)	Daylight (85%)	Clear (70%)
	5	9.210 (West of KSR Main Entrance)	10.336 (KY 2854)	15	7,880	88	154	317	0.49	Rear-End (40%)	Daylight (67%)	Clear (60%)
	6	10.336 (KY 2854)	10.988 (KY 53)	37	8,310	318	624	433	1.44	Angle (57%)	Daylight (89%)	Clear (62%)
	7	10.988 (KY 53)	11.400 (Lynn Alley)	12	6,360	240	418	476	0.88	Angle (67%)	Daylight (42%)	Clear (67%)
KY 393	1	3.968 (KY 2856)	4.534 (I-71 Underpass)	4	6,920	121	93	459	0.20	All Equal Types	Daylight (100%)	Clear (50%)
	2	4.534 (I-71 Underpass)	5.177 (KY 146)	11	8,190	121	191	436	0.44	Angle (45%)	Daylight (82%)	Cloudy (45%)
	3	5.177 (KY 146)	6.200 (Saddlers Mill Road)	18	4,340	214	370	359	1.03	Rear-End (44%)	Daylight (89%)	Clear (78%)

Critical Crash Rate Factor >1, Section Crash Rate Exceeds Statewide Critical Rate (High Crash Rate Section)
Critical Crash Rate Factor <1, Section Crash Rate Exceeds Statewide Average Rate
Critical Crash Rate Factor <1, Section Crash Rate Lower Than Statewide Average Rate

Table 11: Crash Rates by Segment (Cont.)

Route	Section	Begin Milepoint	End Milepoint	Total Crashes	Average Daily Traffic	Statewide Average Crash Rate	Section Crash Rate	Statewide Critical Crash Rate	Critical Crash Rate Factor	Manner of Collision	Light Condition	Weather
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	14	9,670	167	235	346	0.68	Single Vehicle (50%)	Daylight (71%)	Clear (43%)
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	31	9,670	88	302	313	0.96	Angle / Rear-End (29%)	Daylight (65%)	Clear (55%)
	3	5.685 (Zhale Smith Road)	6.296 (I-71)	98	17,000	88	862	322	2.68	Angle (46%)	Daylight (77%)	Clear (59%)
	4	6.296 (I-71)	7.055 (KY 146)	179	13,840	88	1556	324	4.80	Angle (40%)	Daylight (80%)	Clear (58%)
	5	7.055 (KY 146)	7.400 (North of Park Drive)	16	7,490	240	565	457	1.24	Angle / Sideswipe (25%)	Daylight (69%)	Clear (69%)
KY 2856	1	0.000 (KY 393)	1.658 (KY 2857)	13	2,890	121	248	447	0.55	Single Vehicle (46%)	Daylight (77%)	Clear (54%)
	2	1.658 (KY 2857)	3.200 (East of Cal Ave)	9	1,180	214	452	456	0.99	Single Vehicle (56%)	Daylight (67%)	Clear (56%)
	3	3.200 (East of Cal Ave)	4.103 (KY 53)	4	1,180	214	343	530	0.65	Sideswipe (50%)	Daylight (100%)	Clear (100%)
KY 2857	1	0.000 (KY 2856)	1.372 (New Moody Lane)	11	1,100	121	666	584	1.14	Single Vehicle (82%)	Daylight (45%)	Clear (50%)
Comm. Pkwy	1	0.000 (KY 393)	1.584 (Button Lane)	4	2,960	121	78	442	0.18	Angle (50%)	Daylight (75%)	Clear (50%)
Parker Dr.	1	0.000 (KY 53)	0.204 (Commerce Parkway)	2	3,270	121	274	564	0.49	All Types Equal	Daylight (100%)	All Types Equal
New Moody Lane	1	0.000 (West City Limits of LaGrange)	1.194 (KY 53 in LaGrange)	42	3,340	121	962	465	2.07	Angle (50%)	Daylight (79%)	Clear (64%)

Critical Crash Rate Factor >1, Section Crash Rate Exceeds Statewide Critical Rate (High Crash Rate Section)
Critical Crash Rate Factor <1, Section Crash Rate Exceeds Statewide Average Rate
Critical Crash Rate Factor <1, Section Crash Rate Lower Than Statewide Average Rate

Notes:
- Analysis Period: 3 Years (April 1, 2007 to March 31, 2010) from KYTC Data
- Crash rates are expressed in crashes per 100 MVM (100 million vehicle miles traveled)
- Exposure (M) = [(ADT) x (365) x (Time Frame of Analysis (Years)) x (Section Length)] / 100,000,000
- Section Crash Rate = Total Crashes / Exposure
- Critical Crash Rate Factor = Section Crash Rate / Statewide Critical Crash Rate
- ADT = Average Daily Traffic, MVM = Million Vehicle Miles
- For the Manner of Collision, Light Condition, and Weather, the type and percentage reflect the most commonly occurring type

Sources:
- Statewide Rates from KTC Research Report KTC-09-16/KSP2-09-1F, Analysis of Traffic Crash Data in Kentucky (2004 - 2008)

Figure 6: Crash Rates by Segment and Spot

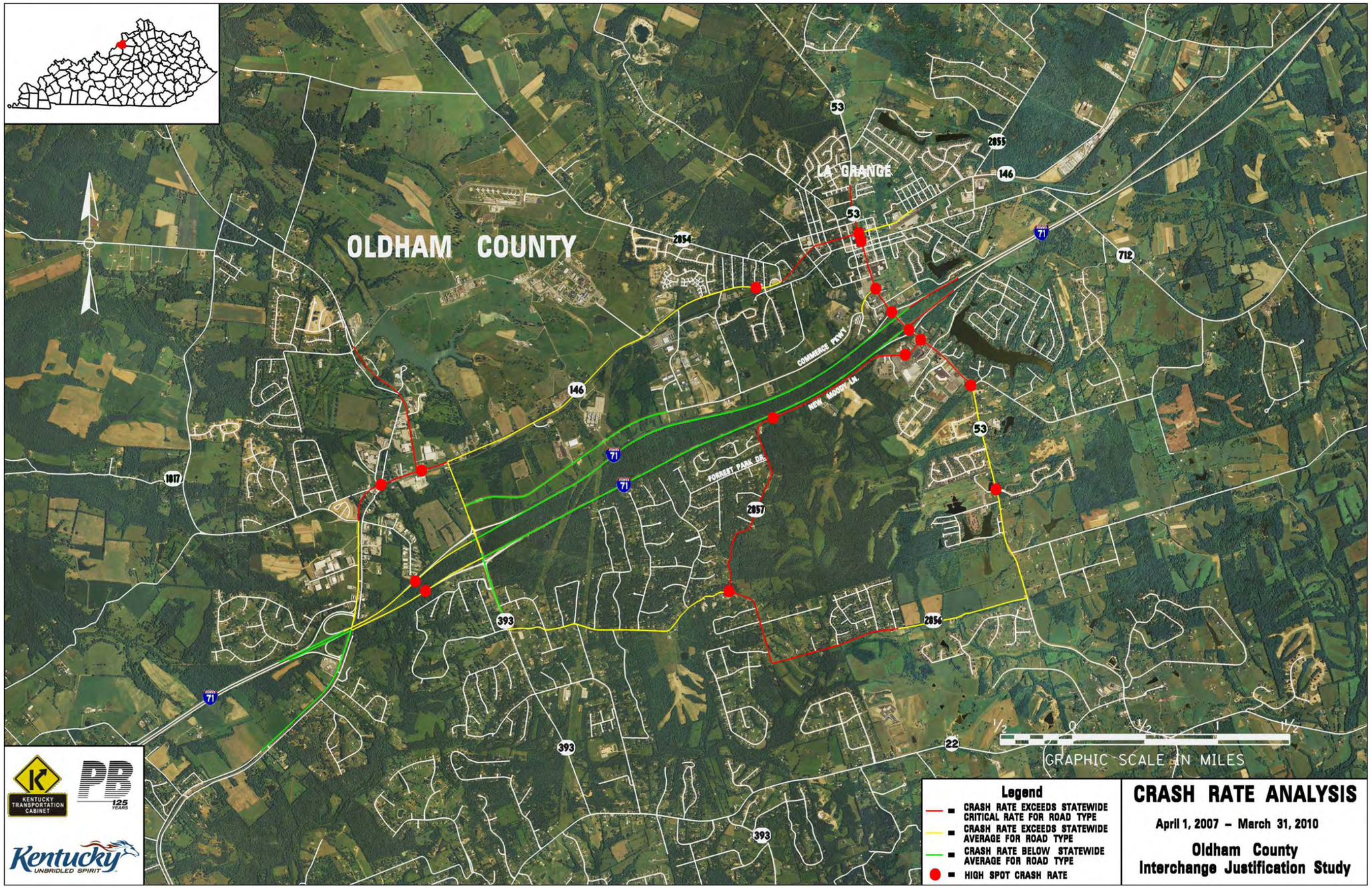


Table 12: Crash Rate Spot Analysis

Route	Location	Total Crashes	Average Daily Traffic	Spot Crash Rate	Critical Crash Rate	Critical Crash Rate Factor
I-71	Between KY 146 and KY 393 (17.900 - 18.200)	28	51,300	0.50	0.44	1.13
KY 146	I-71 NB Interchange (5.750 - 6.050)	12	8,220	1.33	1.50	0.89
KY 146	I-71 SB Interchange (6.051 - 6.351)	9	13,800	0.60	1.09	0.55
KY 146	Old LaGrange Rd / Old Cedar Point Rd (7.000 - 7.300)	18	10,500	1.57	1.15	1.36
KY 146	KY 393 (7.301 - 7.601)	23	10,500	2.00	1.15	1.74
KY 146	Anchor Avenue (10.000 - 10.300)	11	7,880	1.27	1.24	1.03
KY 146	Fifth Avenue (10.500 - 10.800)	10	8,310	1.10	1.50	0.73
KY 146	KY 53 (10.838 - 11.138)	37	7,880	4.29	1.51	2.84
KY 393	KY 2856 (3.818 - 4.118)	1	3,960	0.23	1.85	0.12
KY 393	I-71 NB Interchange (4.275 - 4.575)	2	6,920	0.26	1.57	0.17
KY 393	I-71 SB Interchange (4.576 - 4.686)	0	8,190	0.00	1.50	0.00
KY 393	Commerce Parkway (4.687 - 4.987)	3	8,190	0.33	1.50	0.22
KY 393	KY 146 (4.988 - 5.1770)	8	8,190	0.89	1.23	0.73
KY 53	Lakewood Drive (4.800 - 5.100)	19	9,760	1.78	1.17	1.52
KY 53	Zhale Smith Road (5.700 - 6.000)	29	17,000	1.56	1.05	1.48
KY 53	New Moody Lane (6.001 - 6.200)	48	17,000	2.58	1.07	2.41
KY 53	I-71 NB Interchange (6.201 - 6.347)	21	13,840	1.39	1.11	1.25
KY 53	I-71 SB Interchange (6.348 - 6.540)	66	13,840	4.36	1.11	3.92
KY 53	Parker Drive (6.541 - 6.841)	73	13,840	4.82	1.11	4.34
KY 53	KY 146 (6.842 - 7.142)	42	13,840	2.77	1.11	2.50

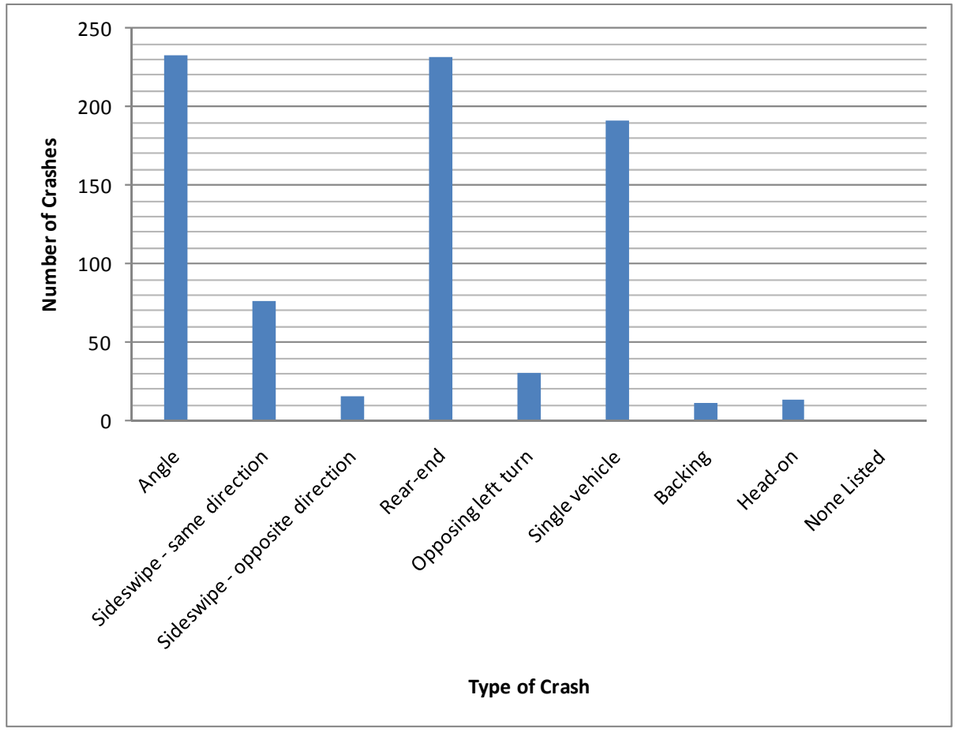
Table 12: Crash Rate Spot Analysis (cont).

Route	Location	Total Crashes	Average Daily Traffic	Spot Crash Rate	Critical Crash Rate	Critical Crash Rate Factor
KY 2856	KY 2857 (1.700 - 2.000)	7	1,180	5.42	2.37	2.29
KY 2857	Wingfield Circle (0.200 - 0.500)	6	1,100	4.98	2.83	1.76
New Moody Lane	KY 53 (0.894 - 1.194)	24	3,340	6.56	1.94	3.38

Notes:
- Analysis Period: 3 Years (April 1, 2007 to March 31, 2010)
- Spot Crash Rate = [(1,000,000) x (Total Crashes)] / [(365) x (Analysis Period in Years) x (Average Daily Traffic)]
- Critical Crash Rate Factor = Spot Crash Rate / Critical Crash Rate

Sources:
- Crash data for Aprill 1, 2007 to March 31, 2010 from KYTC Data
- Critical Crash Rates from KTC Research Report KTC-09-16/KSP2-09-1F, Analysis of Traffic Crash Data in Kentucky (2004 - 2008)

Figure 7: Crash Types (April 2007 – March 2010)



4.7 Field Review

Multiple field visits were conducted over the course of the study in order to fully understand the existing traffic operations. Particular attention was given to the I-71 / KY 53 interchange as this was identified by stakeholders as a problem location.

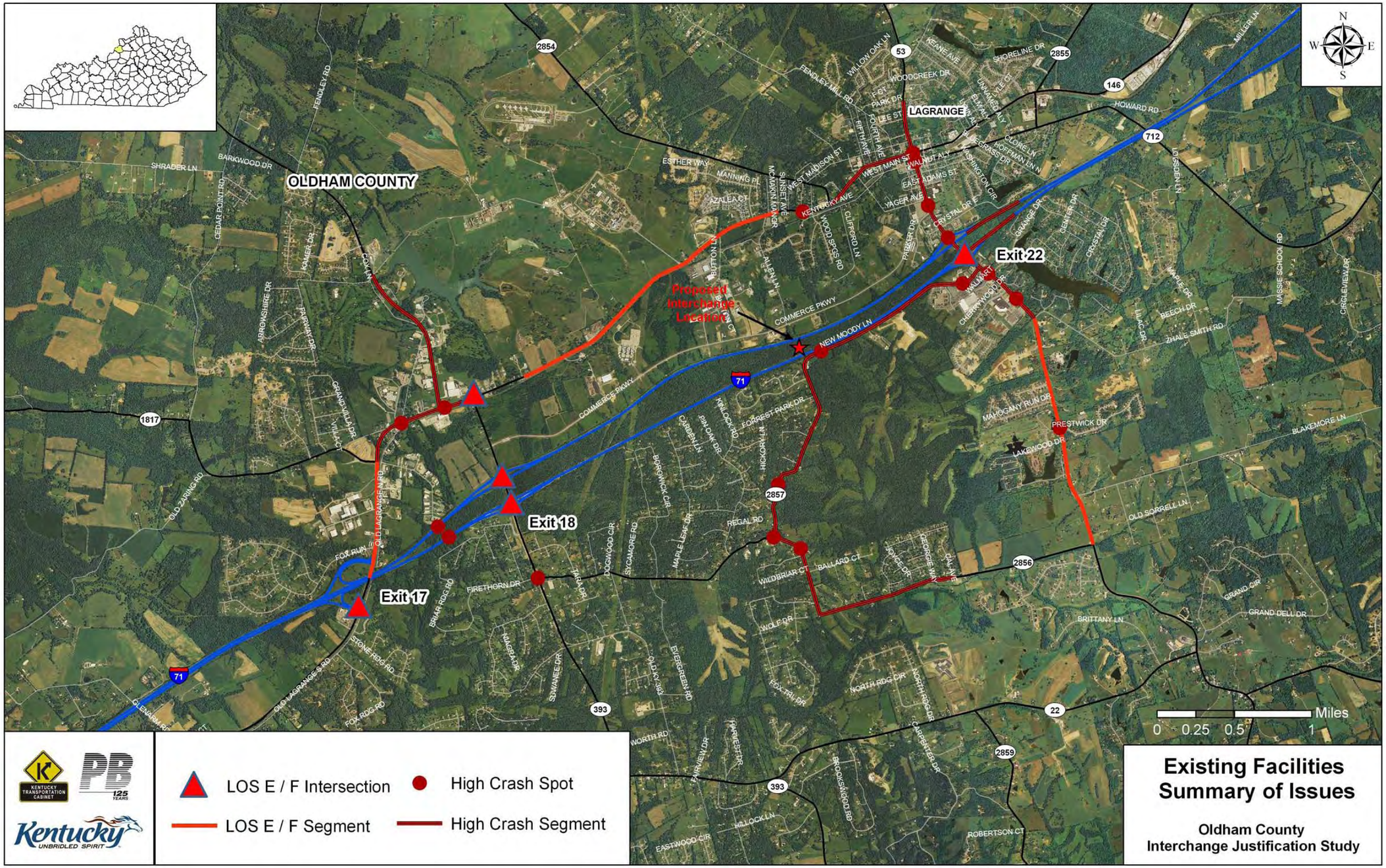
Notes and photos from specific field visits are included in **Appendix B**.

4.8 Existing Facilities Summary

The evaluation of the existing facilities included an evaluation of highway geometrics, current (2009) traffic volumes, level of service, queue lengths, ramp junctions, and a safety analysis. From this review, some operational and safety issues have been identified. These are summarized on the following figure (**Figure 8**).

As shown, the majority of the poor LOS sections (LOS E or F) and high crash rate segments / spots are located along KY 53 and to a lesser extent KY 146 and the intersections along KY 393. I-71 currently operates well with the only operational concerns being the ramp intersections with the arterial system as most of these have a poor LOS and high spot crash rate.

Figure 8: Existing Facilities Summary of Issues



5.0 EVALUATION SCENARIOS

Multiple scenarios were developed to test and evaluate the need for a new interchange along I-71 between KY 393 and KY 53. These scenarios are listed below along with a description. For reference, the study area falls under the planning jurisdiction of KIPDA, and as such, the base scenarios that include projects currently committed are based on the Metropolitan Transportation Plan (MTP) developed by KIPDA for the Horizon Year 2030 (Final Draft of MTP published in August 2010). The projects that pertain to this study listed in the MTP are also coded in the KIPDA Travel Demand Model (TDM).

Scenario 1: MTP

This is the most basic scenario which includes only the projects pertinent to the study area listed in the MTP. No other projects other than those existing and committed in the MTP are considered as part of this scenario. The projects included in the MTP are as follows:

- KY 146 Widening (KY 329 to Allen Lane Extension)
- KY 393 Realignment (North of KY 146)
- KY 393 Extension (South to KY 22)
- KY 53 Widening (0.4 miles in length south of I-71)
- KY 22 Widening (Chamberlain Lane to KY 393 Extension)
- I-71 Overpass
- Allen Lane Underpass

For a graphical depiction of these improvement projects, refer to **Figure 9** on the following page.

Scenario 2: MTP-

This scenario is similar to Scenario 1: MTP, with the exception of the I-71 overpass and Allen Lane underpass. These two projects were removed in order to understand the impacts associated with these projects on the transportation system.

Scenario 3: MTP+

This scenario is also similar to Scenario 1: MTP, with the addition of Ring Road. The Ring Road project forms a new roadway from the new overpass to KY 53 near Blakemore Lane. **Figure 10** is a copy of the Oldham Reserve Master Plan which includes Ring Road. The addition of this project changes the system substantially as it was not included in the KIPDA TDM initially and required model adjustments (new centroid connectors) to account for the new road. As the build-out of Ring Road is a committed project as part of the Oldham Reserve development in the future year, the MTP+ scenario was determined to be the complete base for existing and committed projects for use in the subsequent scenarios. The inclusion of Ring Road as a committed project and the MTP+ used as a baseline were decisions approved by the PDT as part of a conference call on June 15, 2010 after PDT Meeting #2. F**igure 11** summarizes the projects in Scenario 3.

Scenario 4a: TSM

Scenario 4a builds upon Scenario 3: MTP+ and includes several additional improvements to the roadway system to improve traffic operations and safety. These include:

- KY 53 Widening (South of Interchange)
- KY 53 Widening (North of Interchange)
- KY 146 Widening (Allen Lane Extension to KY 53)
- KY 393 Widening (North to KY 146)

As the KIPDA TDM is not sensitive to specific intersection improvements, other improvements were determined for the intersection level based on an initial review of level of service. Spot improvements such as turn lanes and / or traffic signal installation were evaluated and proposed to improve identified locations with a poor level of service (LOS E or F). Generally this consisted of providing separate turn lanes at the KY 393 and KY 146 interchanges along with installing traffic signals to regulate traffic flow. The specific improvements proposed at the intersection level are shown on **Figure 12**.

It should be noted that this alternative is loosely labeled as a Transportation System Management (TSM) alternative. However, the projects proposed in this scenario are not completely appropriate per the definition of a true TSM alternative. According to the Transportation Planning Handbook[5], a TSM alternative may consist of “operation and small physical improvements, plus selected highway upgrades through intersection improvements, minor widening and other focused traffic engineering actions”. While the intersection improvements meet the definition of a TSM solution, the widening proposed as part of this alternative may not. To address this concern, a true TSM scenario was developed in the later stages of this project and evaluated as part of the subsequent analysis.

Scenario 4b: TSM

This scenario is similar to 4a with the addition of the LaGrange Bypass segment. This scenario was included to determine the impact of this project (in comparison to 4a) on KY 53 and KY 146. The latest planning document prepared for the Oldham Planning and Development Services that includes the LaGrange Bypass is the Road Classification and Proposed Future Roads Study prepared by URS / Jacobs / JJG in April 2010. As shown in the study, the bypass would run between KY 53 and the Allen Lane underpass / I-71 overpass with a disconnect through the Springhouse Estates subdivision. As this was the most recent Oldham County plan, the KIPDA TDM was coded to reflect this configuration. This issue was discussed at a Project Development Team (PDT) meeting (August 31, 2010). There was discussion as to whether another scenario should be modeled that would connect the missing link; however, the PDT determined that such a model run would not be necessary as the bypass is shown according to plan.

[5] Institute of Transportation Engineers Transportation Planning Handbook, 3rd Edition.

Figure 9: Scenario 1 (MTP) Projects

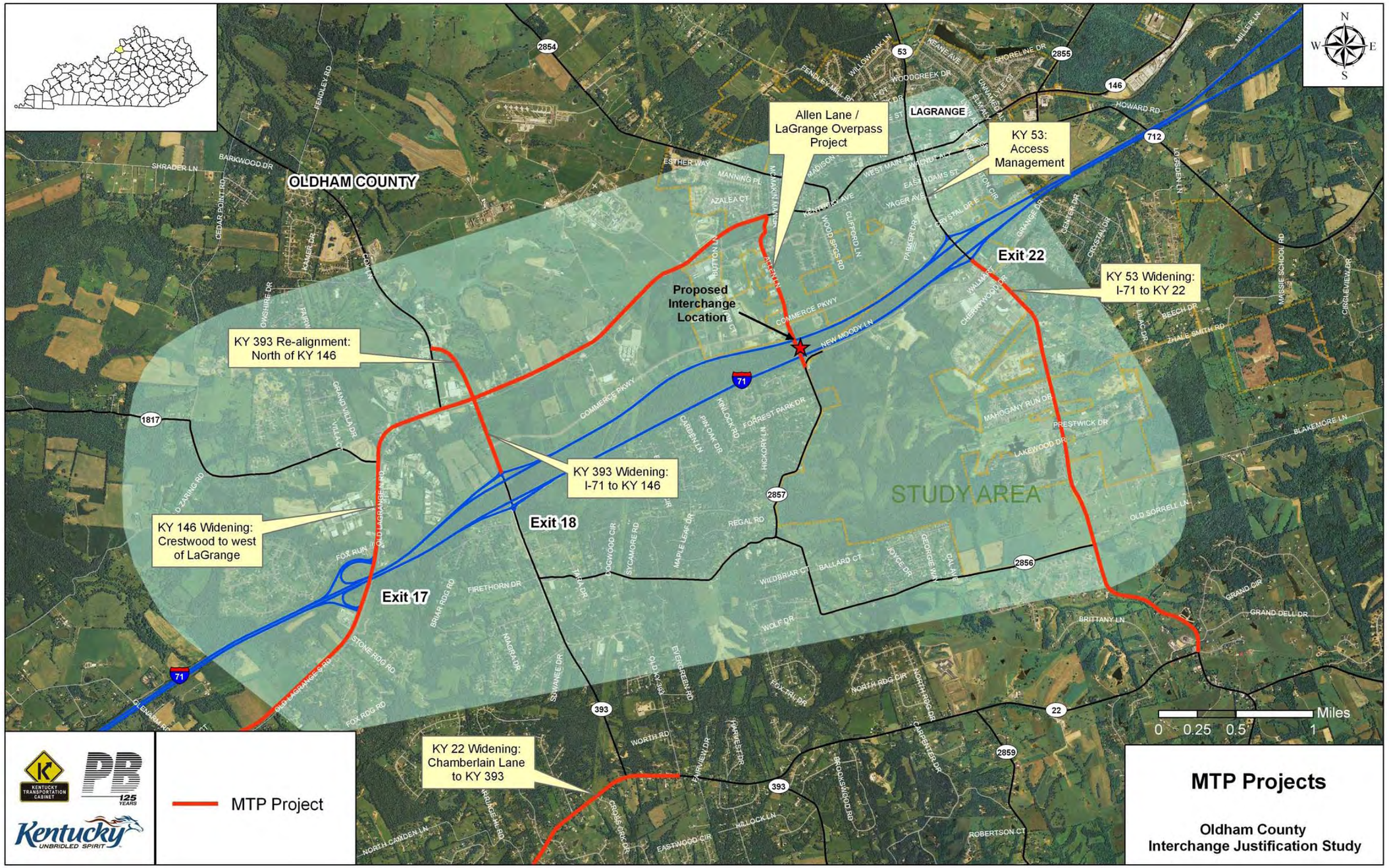


Figure 10: Oldham Reserve Master Plan

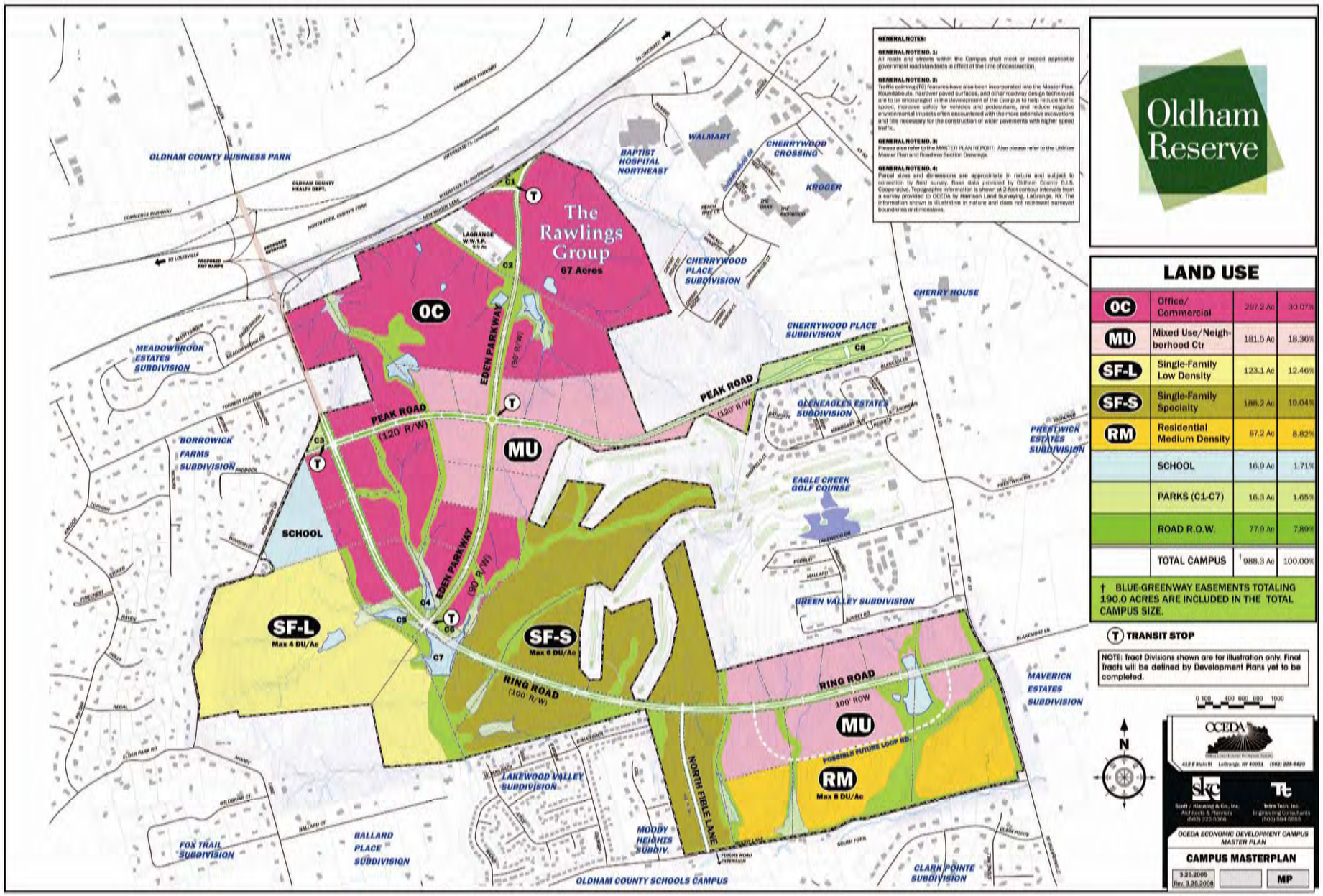
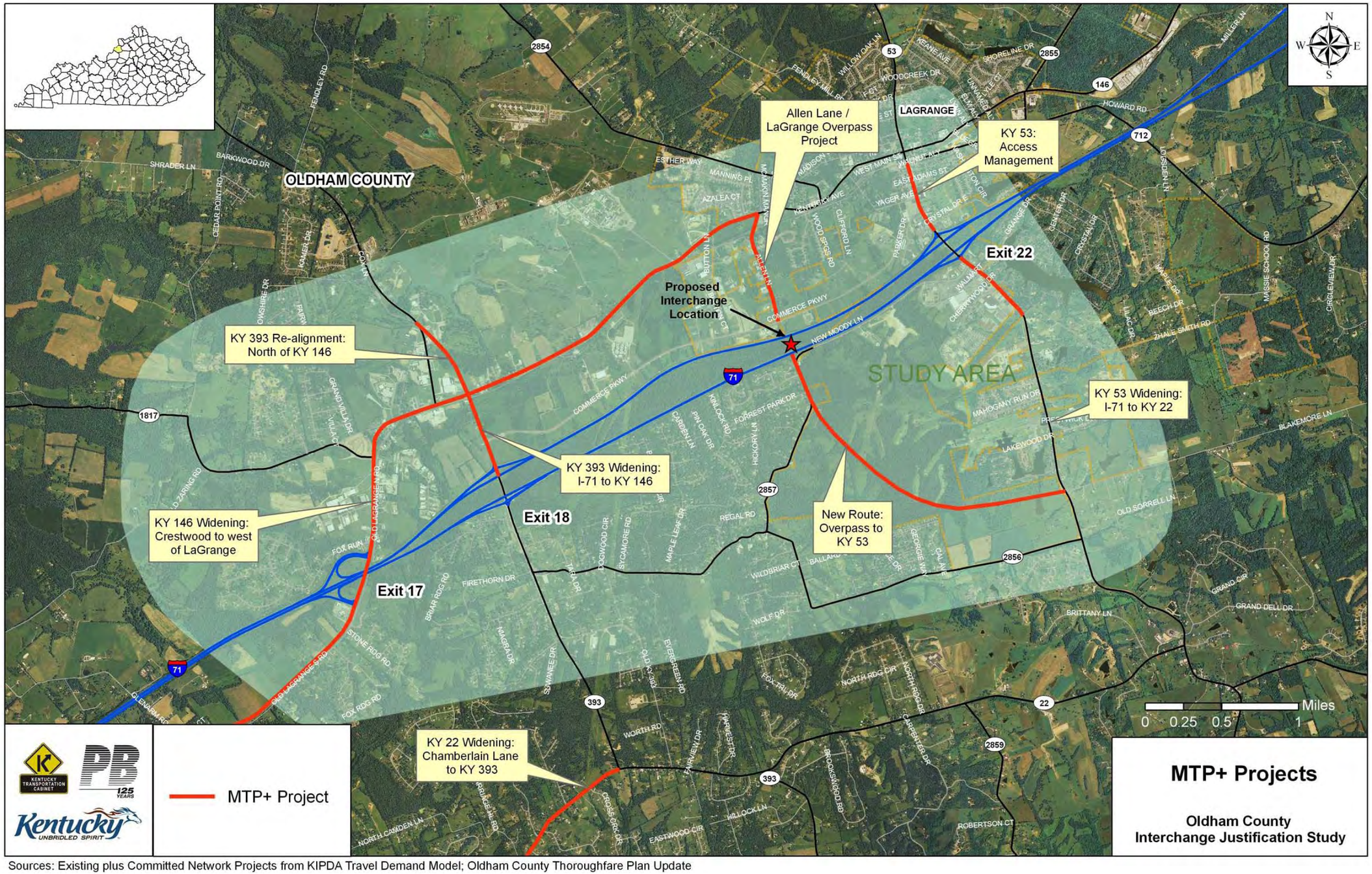
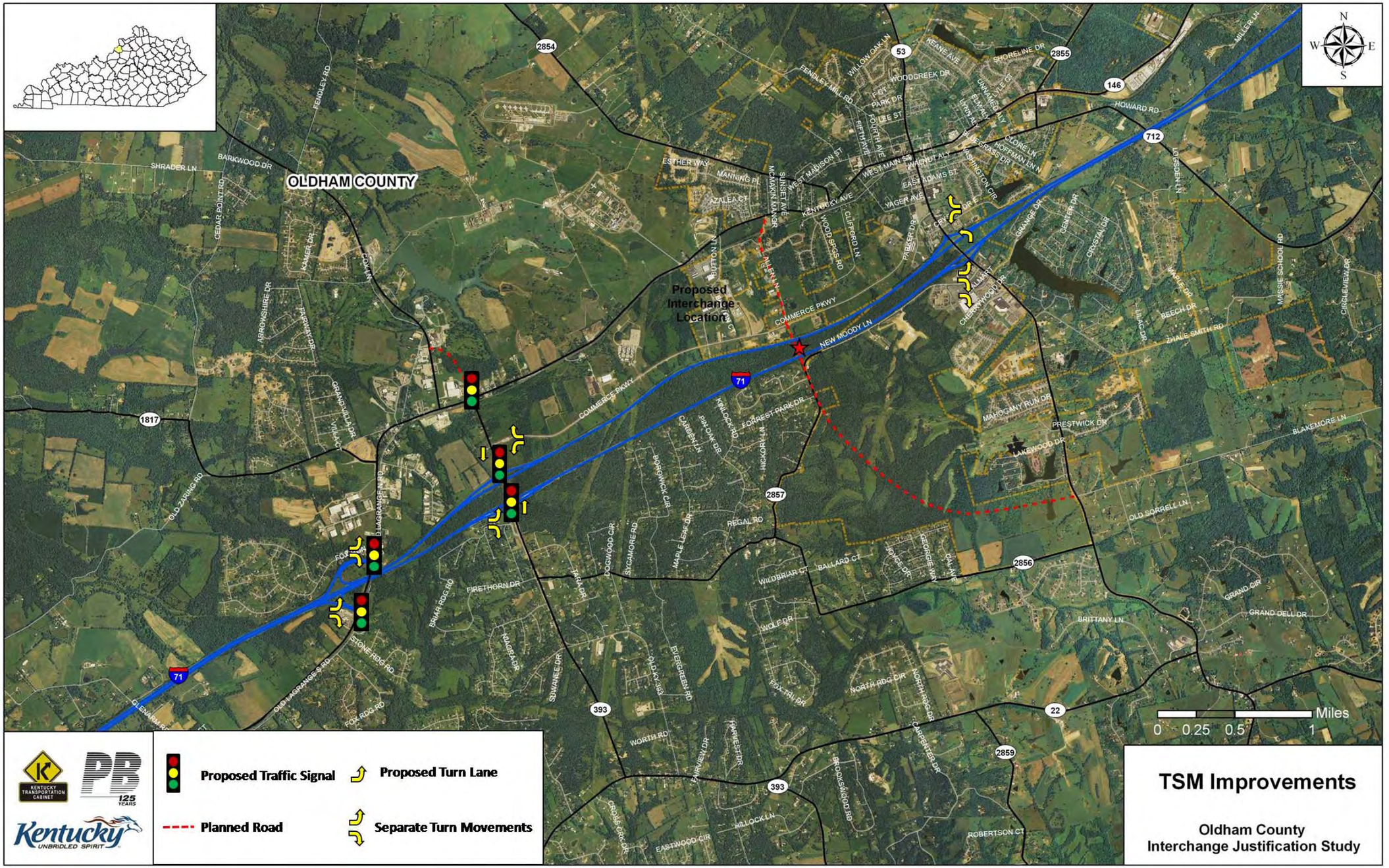


Figure 11: Scenario 3 (MTP+) Projects



Sources: Existing plus Committed Network Projects from KIPDA Travel Demand Model; Oldham County Thoroughfare Plan Update

Figure 12: Scenario 4a (TSM) Projects



Scenario 5: Standard Interchange

Using the MTP+ scenario as the base, this scenario adds a standard diamond interchange at the proposed new interchange location. For analysis purposes and determination of whether or not an interchange is justified, the exact type of interchange is not critical to the analysis. The KIPDA TDM is not sensitive enough to determine changes in traffic volumes due to interchange type (i.e. single point urban interchange versus a standard diamond interchange).

A planning-level schematic of a new interchange using the diamond configuration was prepared to assist with other evaluation criteria such as cost estimates and to check geometric compatibility with current highway standards. **Figure 13** shows a general layout for the interchange.

Scenario 6: Interchange with Collector / Distributor Road

This scenario also builds upon the MTP+ with the addition of an interchange similar to the previous scenario and a collector / distributor (C/D) system for the new interchange and the KY 53 interchange. In this scenario, it was assumed the C/D road was added without major reconstruction of the KY 53 interchange. **Figure 14** shows the general layout of this scenario.

Figure 13: Standard Diamond Interchange

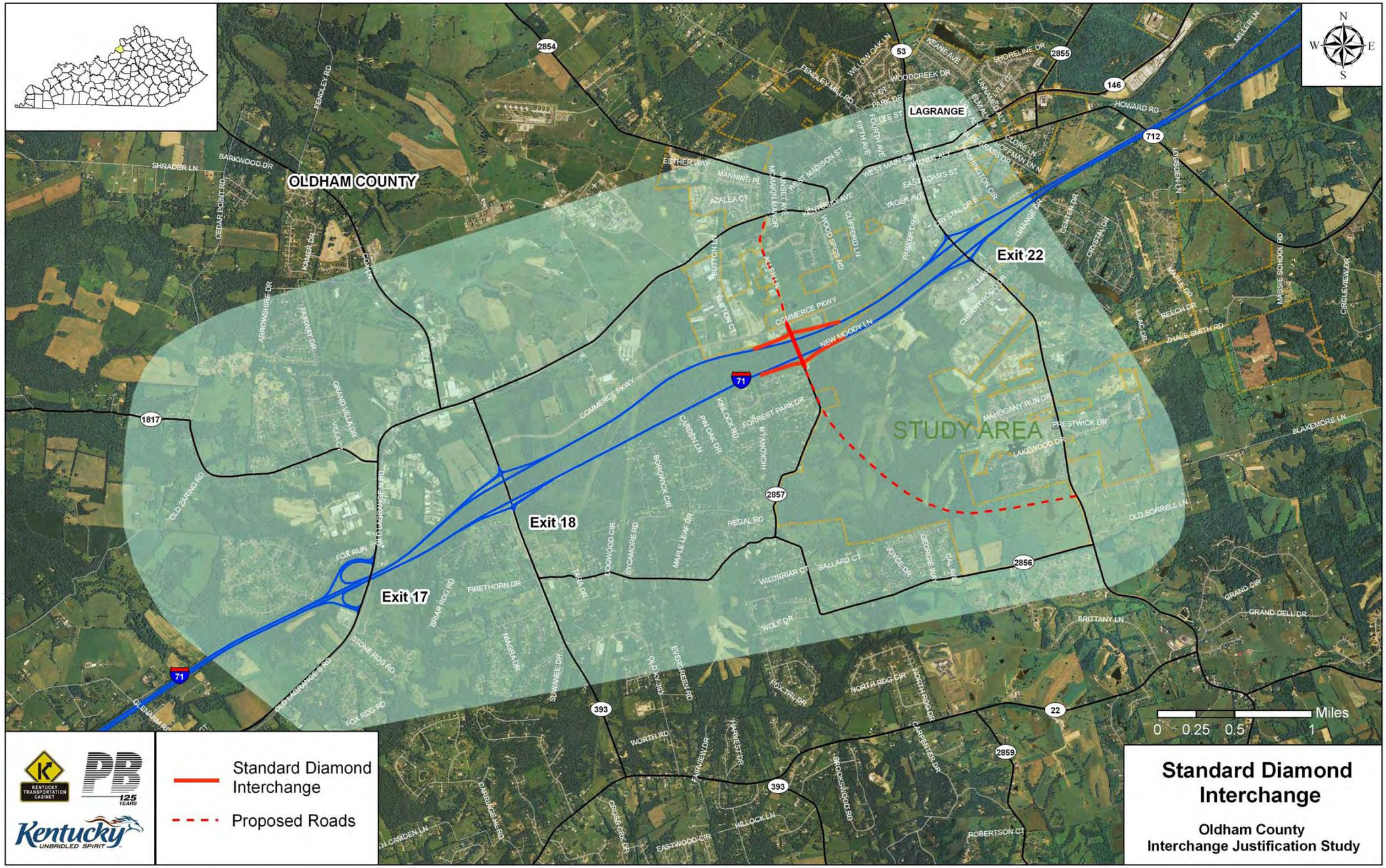
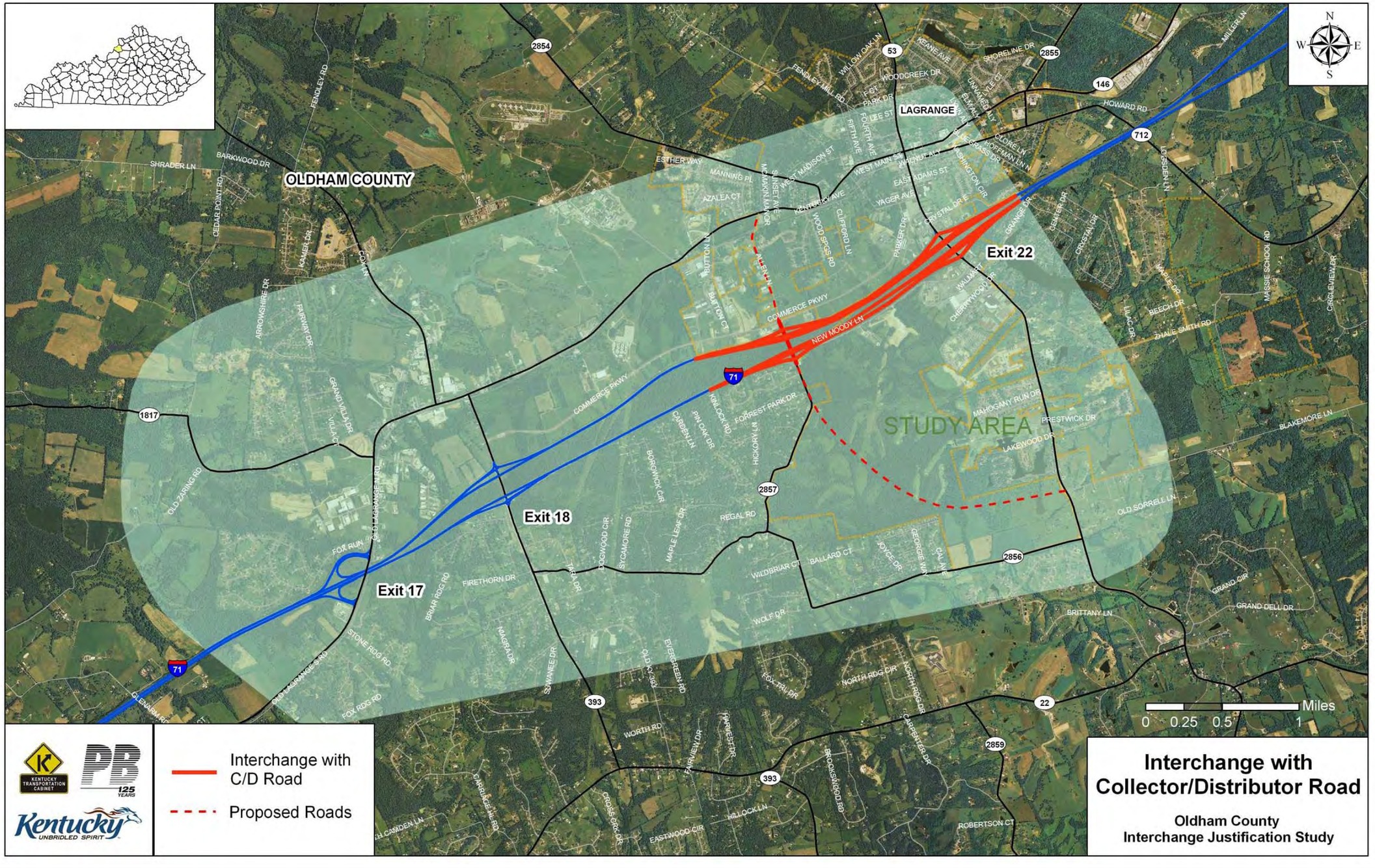


Figure 14: Interchange with Collector/Distributor Road



6.0 EVALUATION METHODOLOGY

6.1 Screening Analysis

During the evaluation process of the scenarios presented in the previous chapter, it became necessary to perform a multiple stage screening process. This allows for the initial overview of all scenarios and then further refinement of the most promising ones. Two analysis levels were performed – Level 1 and Level 2. The Level 1 screening process took into consideration all of the evaluation scenarios and included:

- Average Daily Traffic Volumes (ADT)
- Peak Hour Volumes (AM and PM)
- System Vehicle Miles of Travel (VMT)
- System Vehicle Hours of Travel (VHT)
- Segment and Intersection Level of Service (LOS)
- Ramp Junction Level of Service (LOS)

Based on the results of this analysis, evaluation scenarios that best meet the study purpose and need were advanced to the next level of analysis (Level 2). The second level of analysis further refined these evaluation scenarios and was used to select the best recommendation for this study.

6.2 Travel Demand Model Use

The future analysis year for this study was determined to be 2035. In order to develop traffic volume forecasts for each of the scenarios for the future analysis year, two travel demand models were available.

1. KIPDA Travel Demand Model (TDM) with a base year of 2000 and a future year of 2030.
2. Kentucky Statewide Traffic Model (KYSTM) with a base year of 2003 and a future year of 2030 and the ability to forecast any year in between.

The KYSTM is a statewide model which includes all of the 120 counties in Kentucky in addition to areas outside of the state. While the model has the ability to focus on urbanized areas, its strengths include forecasting in less urban areas. On the other hand, the KIPDA model is a regional, 5-county model that focuses on the Louisville Metro area and surrounding counties. The larger traffic analysis zones (TAZs) were noted as a potential limitation to the model's ability to forecast.

At the beginning of the IJS project, the KYSTM was updated to include aspects of the KIPDA TDM that were not in the existing version of the KYSTM. After those additions, both models were provided to PB and run to ensure the base models were working properly and to determine the differences between the models. The overpass over I-71 was also tested in each model to determine each model's sensitivity to such a change. Differences noted between the models include:

- The mainline traffic volumes on I-71 were realistic in both models.
- While the TAZ geographies were generally similar to each other, the KIPDA TDM included a little more detail with respect to the network.
- Overall, the KIPDA TDM matched counted traffic volumes slightly better than the KYSTM within the study area.
- The KYSTM tended to underassign traffic along the proposed overpass over I-71.
- The KIPDA TDM produced more realistic results along the proposed overpass;
- The KIPDA TDM produced 'lumpy' results on the proposed Ring Road route through the proposed Oldham Reserve development. However, discussions with KIPDA resulted in attributing this to the larger TAZ structure in this area of the KIPDA TDM.

After subsequent reviews and discussion, a decision was made to go forward with using the KIPDA TDM as the preferred tool for the analysis. This model was chosen for the following reasons:

- The KIPDA TDM is more sensitive to changes within the model as it is a regional model compared to the KYSTM.
- The KIPDA TDM produced slightly better assignment results when compared to the KYSTM.
- Per FHWA requirements, an approved interchange must be included in the local and regional land use and transportation plans. The MTP is the current transportation plan which forms the KIPDA TDM. Therefore, the KIPDA TDM should be a reflection of the outcome of this study to be in accordance with FHWA requirements. By using this model for the study, this work will already be complete.

With the preferred modeling platform selected, all projects / assumptions were coded into model networks as necessary for the evaluation scenarios. The model was then run for each scenario in a manner prescribed by KIPDA with initial model runs sent to KIPDA for concurrence on procedure and results.

7.0 LEVEL 1 ANALYSIS

7.1 Evaluation Scenarios

All evaluation scenarios presented in the previous chapters were evaluated as part of the Level 1 analysis. For reference these include the following:

- Scenario 1: MTP – No new interchange but has other projects such as those already existing and committed (E+C) projects in KIPDA's Metropolitan Transportation Plan (MTP)
- Scenario 2: MTP- – Includes E+C MTP projects and removes overpass and underpass to test those projects
- Scenario 3: MTP+ – Same as Scenario 1 with the addition of Ring Road
- Scenario 4a: TSM – Same as Scenario 3 with more projects including upgrades to KY 53, KY 146, etc.
- Scenario 4b: TSM – Same as Scenario 4a with the LaGrange Bypass
- Scenario 5: Standard Interchange – Same as Scenario 3 with a new interchange between KY 53 and KY 393
- Scenario 6: Interchange with Collector / Distributor – Same as Scenario 5 with a Collector / Distributor system

7.2 Traffic Forecasting

As noted, the KIPDA TDM was the preferred tool for use in this study. Utilizing this model, segment volumes were determined for each of the evaluation scenarios. Considering the model is a 24-hour (daily) model, it was assumed that the changes in the daily volumes would be consistent with the peak hour changes.

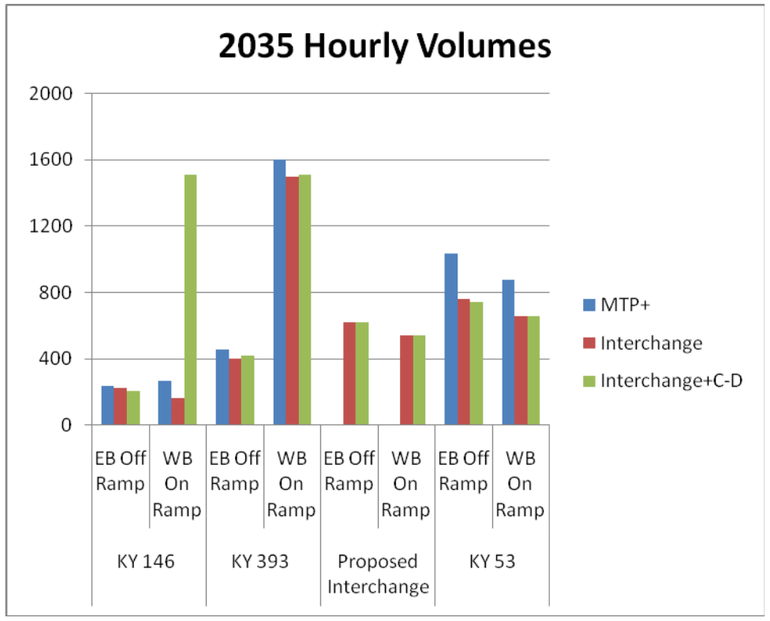
ADT volumes from the base KIPDA TDM (Year 2000) for the freeway mainline and ramps as well as arterial roadway segments were compared to the known traffic counts provided by KYTC. This provided a basis for how well the KIPDA TDM calibrated to each of those links.

Next, the 2030 future model was compared to the 2000 base model. The 2030 scenario was reflective of Scenario 1 described above. This resulted in a growth and / or percent changes between the base scenario and future scenario. The percent difference between the 2000 existing volumes and the 2030 volumes was then applied to the year 2009 / 2010 current year segment traffic volumes obtained for this study in addition to the 2010 turning movement counts. This process was repeated for each scenario in order to use a similar methodology. The yearly growth rate for each segment was calculated, and then forecasted out to the year 2035. These new volumes were used to calculate the 2035 LOS for each scenario.

The resulting traffic volumes for each scenario are show in the **Appendix C** (**Figures C-1** through **C-7**).

For the interchanges, daily peak hour volumes were examined for the scenarios to determine their level of effectiveness at rerouting or reducing traffic, especially on KY 53 and KY 393. As displayed by the graph below (**Figure 15**), with the interchange, a small decrease of traffic volume resulted (7%) on both ramps for KY 393. The new interchange resulted in a larger decrease in traffic volume (32%) for the KY 53 interchange. Overall, there is a negligible difference in the traffic volumes for the standard diamond interchange and the interchange with a collector – distributor (C/D) roadway system.

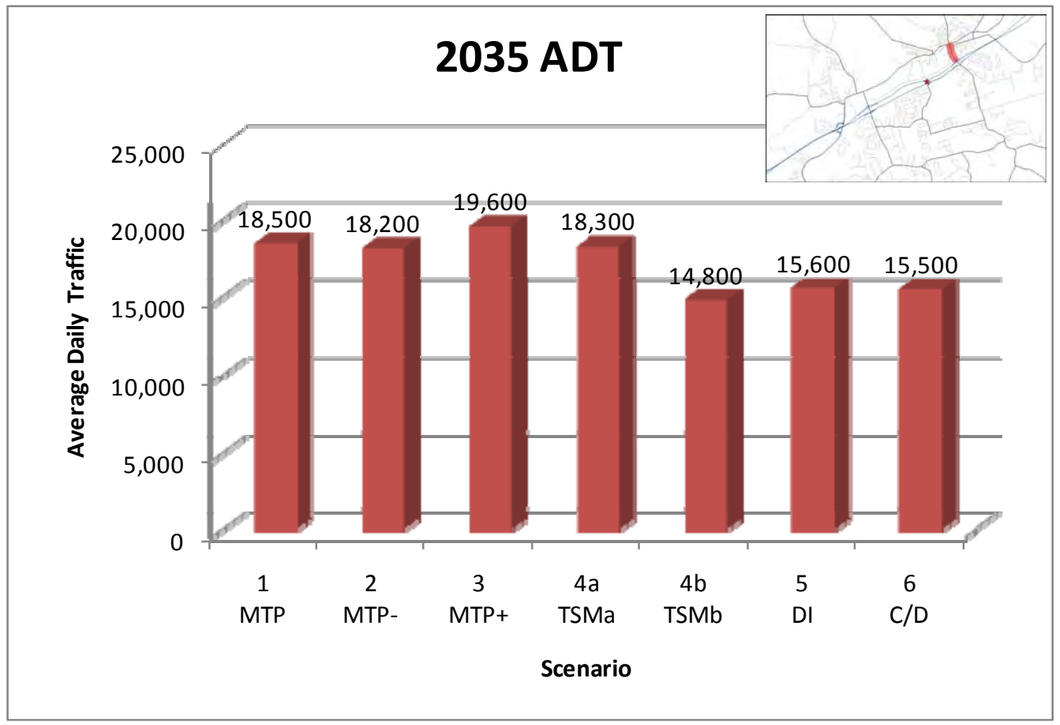
Figure 15: Summary of Interchange Traffic Volume



A summary analysis was also performed along the major roadways in the study area. Major arterials that were examined included: KY 53, KY 146 and KY 393.

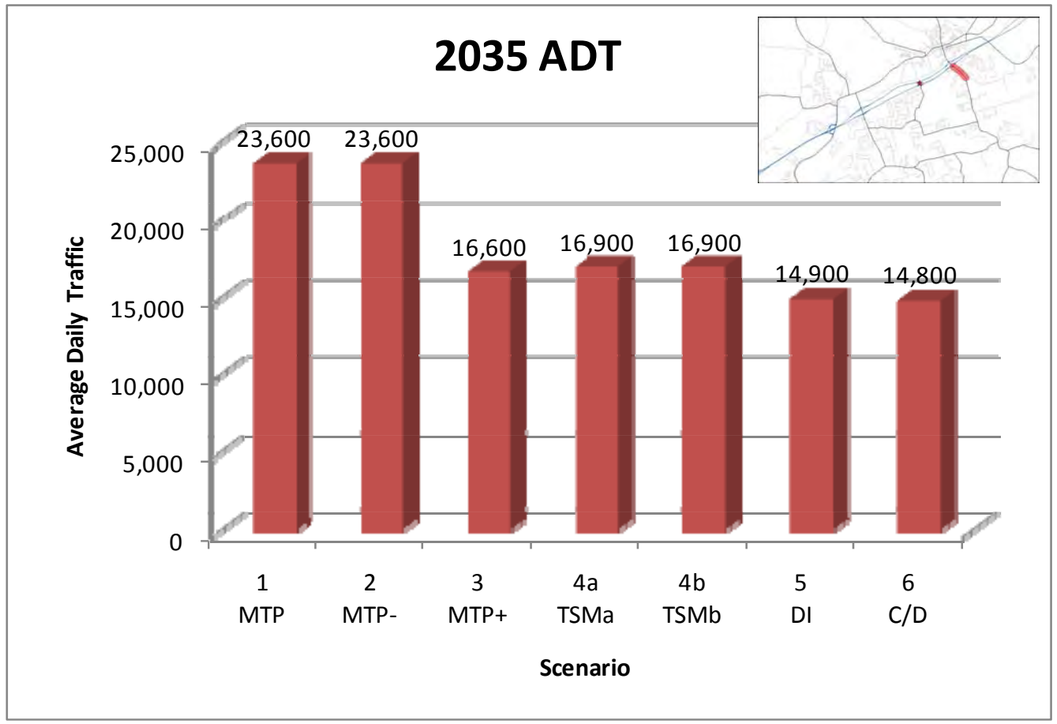
For the sections of KY 53 north of I-71, the 2010 volume is 13,800. The projected volume in 2035 is 18,500. That represents a 34% increase over the current volumes in the MTP scenario. The highest volumes are produced with Scenario 3 (MTP+), while the lowest are with 4b (TSM). There is little difference among the interchange scenarios, although they represent a 20% decrease in future year volumes. **Figure 16** illustrates the changes in traffic volumes for this segment.

Figure 16: Summary of ADT on KY 53 North of I-71



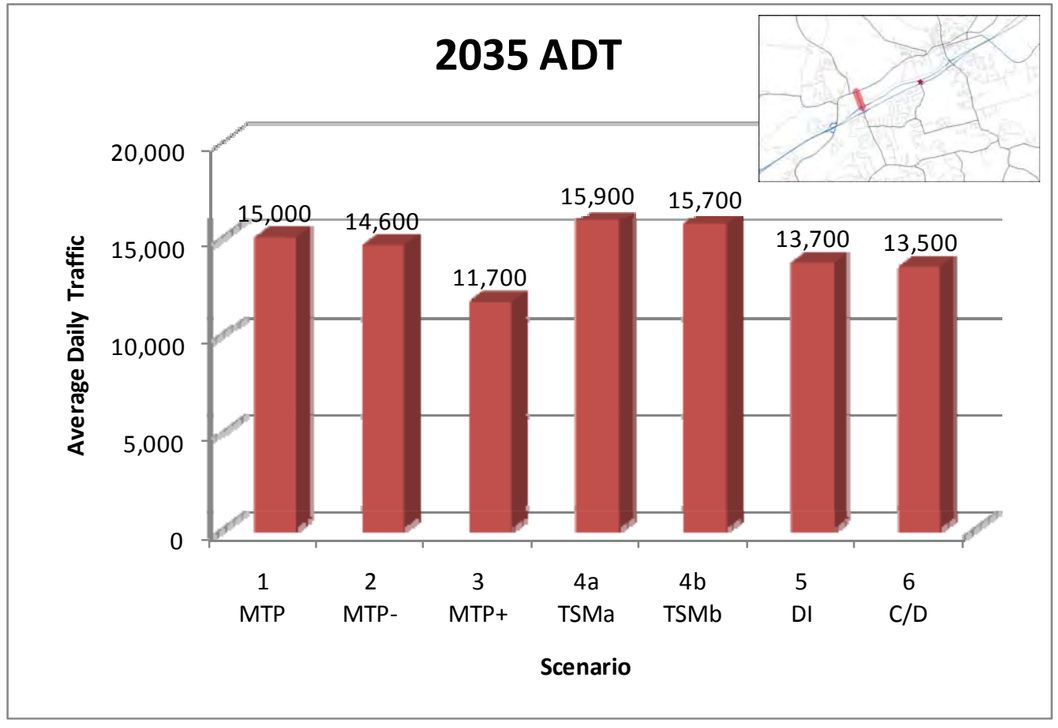
For the sections of KY 53 south of I-71, the 2010 volume is 17,000. The projected volume in 2035 is 23,600. That represents a 39% increase over the current volumes for the MTP scenario. The highest volumes are produced with Scenarios 1 (MTP) and 2 (MTP-), while the lowest are with Scenario 6 (Interchange with Collector / Distributor system). There is little difference among the interchange scenarios, although they represent a 10% decrease in future year volumes. **Figure 17** illustrates the changes in traffic volumes for this segment.

Figure 17: Summary of ADT on KY 53 South of I-71



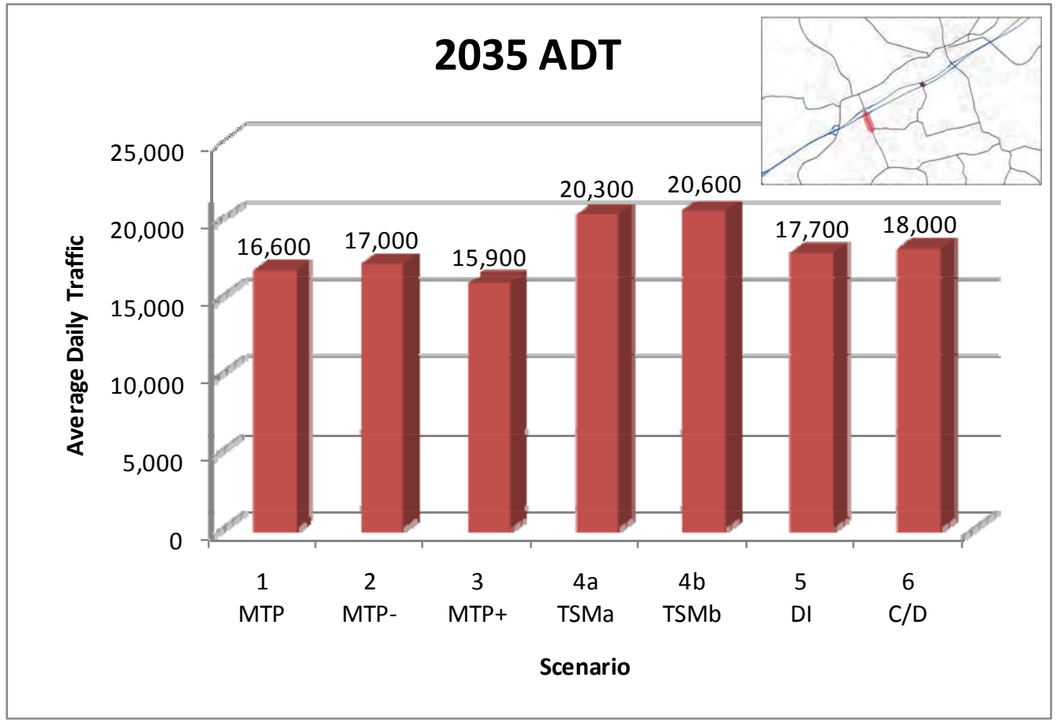
For the sections of KY 393 north of I-71, the 2010 volume is 8,200. The projected volume in 2035 is 15,000. That represents an 82% increase over the current volumes in the MTP scenario. The highest volumes are produced with Scenario 4b (TSM), while the lowest are with Scenario 3 (MTP+). There is little difference among the interchange scenarios, although they represent a 17% decrease in future year volumes. **Figure 18** illustrates the changes in traffic volumes for this segment.

Figure 18: Summary of ADT on KY 393 North of I-71



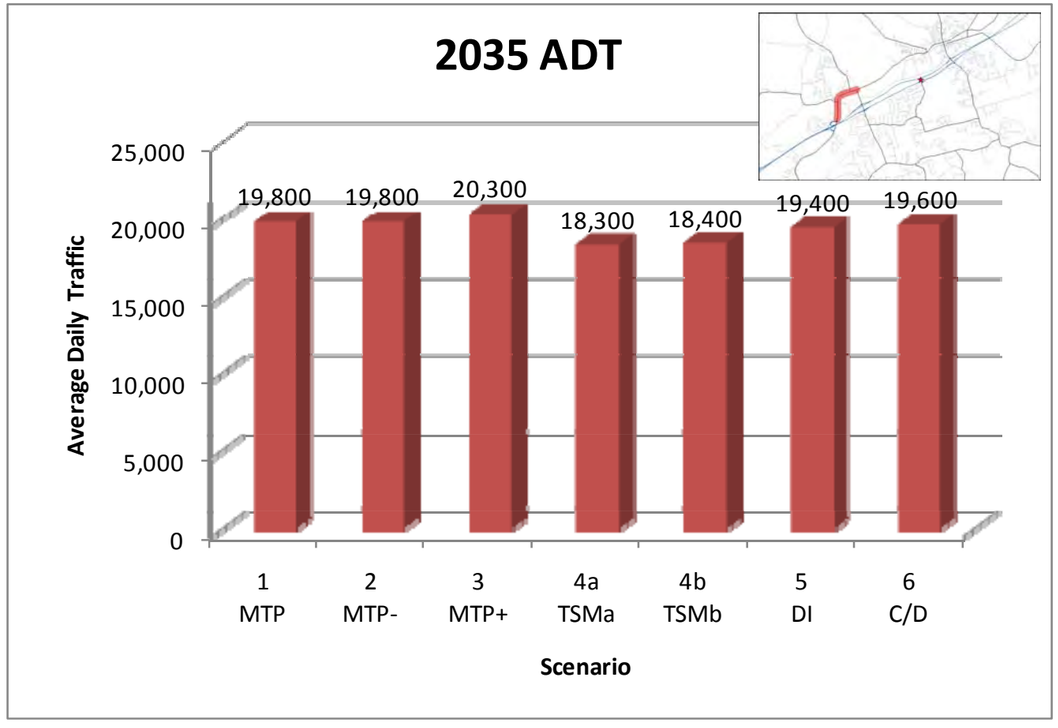
For the sections of KY 393 south of I-71, the 2010 volume is 6,900. The projected volume in 2035 is 16,600. That represents a 140% increase over the current volumes in the MTP Scenario. The highest volumes are produced with Scenario 4b (TSM), while the lowest are with Scenario 3 (MTP+). There is little difference among the interchange scenarios, although they represent an 11% increase in future year volumes. **Figure 19** illustrates the changes in traffic volumes for this segment.

Figure 19: Summary of ADT on KY 393 South of I-71



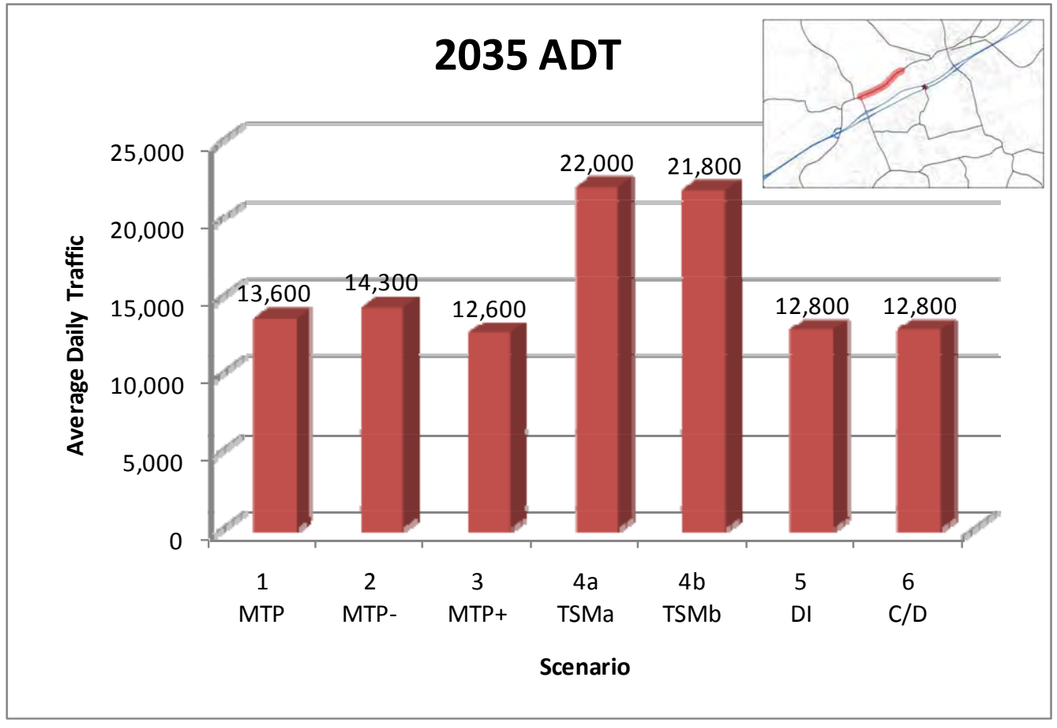
For the sections of KY 146 from I-71 to KY 393, the 2010 volume is 10,500. The projected volume in 2035 is 19,800. That represents an 89% increase over the current volumes in the MTP Scenario. The highest volumes are produced with Scenario 3 (MTP+), while the lowest are with 4a (TSM). There is little difference among the interchange scenarios, although they represent a 4% decrease in future year volumes. **Figure 20** illustrates the changes in traffic volumes for this segment.

Figure 20: Summary of ADT on KY 146 North of I-71 to KY 393



For the sections of KY 146 from KY 393 to KY 53, the 2010 volume is 8,300. The projected volume in 2035 is 13,600. That represents a 64% increase over the current volumes in the MTP Scenario. The highest volumes are produced with Scenario 4a (TSM), while the lowest are with 3 (MTP+). There is no difference among the interchange scenarios, although they represent a 2% decrease in future year volumes. **Figure 21** illustrates the changes in traffic volumes for this segment.

Figure 21: Summary of ADT on KY 146 between KY 393 and KY 53



Based on modeling results, the Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) were compiled for the system. For the VMT and VHT analysis, the following table (**Table 13**) summarizes the differences.

Table 13: VMT / VHT Summary

Scenario	Description	VMT	VMT Difference	VHT	VHT Difference
1	MTP	2,447,320	--	64,471	--
2	MTP-	2,451,557	--	62,246	--
3	MTP+	2,428,936	--	59,844	--
4a	TSMa	2,429,007	71	58,867	-978
4b	TSMb	2,429,228	292	58,123	-1,722
5	DI	2,422,656	-6,280	57,675	-2,169
6	C/D	2,420,984	-7,952	54,977	-4,868

As indicated, only Scenarios 4a, 4b, 5 and 6 show any differences in travel. For VMT, Scenarios 4a and 4b actually increase VMT slightly but decrease VHT, especially when compared to Scenario 1. This is true because vehicles make slightly longer trips due to travel on primarily surface roadways (arterials, secondary roads, etc.) because intersections and some capacity are improved. Scenarios 5 and 6 show the most benefit in terms of reducing VMT and VHT. That is expected because these scenarios add new links and nodes to the model and create new “paths” for travel, especially for longer distance travel that wants to reach a higher speed facility, i.e. I-71.

7.3 Level of Service

Based on the new volumes and any additional geometric changes such as roadway widening or adding turn lanes, the HCS+ software was used to calculate new levels of service for each of segments and intersections. The segment levels of service are presented in **Table 14** with the intersection levels of service presented in **Table 15** and **16**.

Overall, **Figures 22 – 28** provide a graphical summary of the segment and intersection levels of service. **Table 17** details the ramp junction levels of service.

Appendix D contained additional information related to HCS+ output for the Level 1 segment and ramp junction levels of service.

Table 14: Level 1 2035 Segment LOS

Route	Section	Begin Milepoint	End Milepoint	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4a: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
				Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.5	D	62.5	D	62.6	D	63.2	D	63.2	D	62.3	D	62.4	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.5	D	61.6	D	61.7	D	62.3	D	62.3	D	61.1	D	61.4	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	65.0	D	64.7	D	66.9	D	67.2	C	67.1	C	64.2	D	64.1	D
	4	20.XXX (Allen Lane)	21.869 (KY 53)	65.0	D	64.7	D	66.9	D	67.2	C	67.1	C	67.3	C	69.8	B
	5	21.869 (KY 53)	22.250 (East of KY 53)	69.7	C	69.7	C	69.7	C	69.7	C	69.7	C	69.7	C	69.7	C
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	-	B	-	B	-	B	-	A	-	A	52.5	B	52.5	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	-	B	-	B	-	B	-	A	-	A	52.5	B	52.5	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	-	C	-	C	-	C	-	B	-	B	45.0	C	45.0	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	-	C	-	C	-	C	-	B	-	B	45.0	C	45.0	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	-	B	-	B	-	B	-	B	-	B	52.5	B	52.5	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	-	B	-	B	-	B	-	B	-	B	45.0	B	45.0	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Table 14: Level 1 2035 Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4a: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
				Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	24.4	E	24.5	E	24.9	E	26.4	E	26.4	E	22.9	E	22.9	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	21.0	E	21.1	E	21.6	E	23.5	E	23.5	E	19.0	E	19.0	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	-	F	-	F	24.0	E	23.5	E	23.6	E	26.3	E	26.4	E
	4	5.890 (North of Market Street)	6.296 (I-71)	-	F	-	F	23.1	E	22.6	E	22.7	E	25.4	E	25.5	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	19.2	F	19.0	F	18.8	F	-	D	-	D	20.0	F	19.7	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	15.2	F	14.6	F	16.1	F	-	C	-	C	N/A	F	N/A	F
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	15.2	F	14.6	F	16.1	F	-	C	-	C	N/A	F	N/A	F
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	27.5	D	27.7	D	29.2	D	-	A	-	A	28.2	D	28.3	D
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	25.7	D	25.9	D	27.3	D	-	A	-	A	26.4	D	26.5	D
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Notes:
- 2035 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report and 2035 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report and Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM and Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum

Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Table 15: Level 1 2035 Intersection LOS - AM

Intersection	Type	Approach	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4a: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled (Signalized for 4a/4b)	Eastbound	14.0	B	14.3	B	14.0	B	22.1	C	21.9	C	13.5	B	12.9	B
		Northbound	7.7	A	7.7	A	7.7	A	16.8	B	16.7	B	7.6	A	7.6	A
		Southbound	-	-	-	-	-	-	15.3	B	15.3	B	-	-	-	-
		Whole Int.	-	-	-	-	-	-	18.2	B	18.0	B	-	-	-	-
I-71 WB / KY 146	STOP Controlled (Signalized for 4a/4b)	Eastbound	410.7	F	355.9	F	610.3	F	28.2	C	27.9	C	229.1	F	232.7	F
		Northbound	12.1	B	12.1	B	12.3	B	12.3	A	12.3	A	11.9	B	11.9	B
		Southbound	-	-	-	-	-	-	14.8	B	14.8	B	-	-	-	-
		Whole Int.	-	-	-	-	-	-	15.0	B	14.9	B	-	-	-	-
KY 146 / KY 393	Signalized	Eastbound	24.9	C	26.4	C	19.5	B	10.9	B	11.3	B	22.2	C	22.6	C
		Westbound	159.7	F	148.9	F	99.1	F	69.7	E	67.3	E	118.5	F	107.5	F
		Northbound	412.1	F	372.2	F	253.6	F	202.4	F	203.1	F	298.6	F	320.9	F
		Southbound	33.5	C	34.9	C	34.3	C	22.4	C	22.5	C	29.7	C	33.7	C
		Whole Int.	149.4	F	137.5	F	88.2	F	72.3	E	70.8	E	108.7	F	100.0	F
I-71 WB / KY 393	STOP Controlled (Signalized for 4a/4b)	Westbound	-	F	-	F	-	F	39.5	D	39.7	D	N/A	F	N/A	F
		Northbound	142.0	F	150.0	F	91.1	F	28.7	C	32.9	C	164.8	F	171.7	F
		Southbound	-	-	-	-	-	-	47.9	D	47.7	D	-	-	-	-
		Whole Int.	-	-	-	-	-	-	31.1	C	34.6	C	-	-	-	-
I-71 EB / KY 393	STOP Controlled (Signalized for 4a/4b)	Eastbound	10952.0	F	11459.0	F	6887.0	F	186.8	F	202.4	F	12637.0	F	15019.0	F
		Northbound	-	-	-	-	-	-	40.5	D	47.2	D	-	-	-	-
		Southbound	33.8	D	36.4	E	26.6	D	146.2	F	146.2	F	38.8	E	41.1	E
		Whole Int.	-	-	-	-	-	-	68.0	E	74.8	E	-	-	-	-
KY 53 / New Moody Lane	Signalized	Eastbound	95.8	F	95.8	F	51.8	D	51.2	D	51.2	D	35.1	D	35.1	D
		Westbound	257.6	F	257.6	F	63.7	E	50.3	D	50.3	D	39.0	D	39.0	D
		Northbound	9.5	A	9.5	A	9.2	A	12.3	B	12.3	B	12.1	B	12.1	B
		Southbound	59.1	E	59.1	E	15.9	B	22.5	C	22.2	C	13.5	B	20.3	C
		Whole Int.	55.1	E	55.1	E	19.9	B	23.8	C	23.7	C	17.1	B	20.3	C
I-71 EB / KY 53	Signalized	Eastbound	419.7	F	410.5	F	196.4	F	26.7	C	26.7	C	70.2	E	64.1	E
		Northbound	147.6	F	150.3	F	92.3	F	34.5	C	34.3	C	49.9	D	49.9	D
		Southbound	28.1	C	28.2	C	39.8	D	23.4	C	21.8	C	31.5	C	31.4	C
		Whole Int.	225.6	F	223.0	F	117.9	F	28.1	C	27.9	C	52.1	D	49.7	D

Table 15: Level 1 2035 Intersection LOS – AM (cont)

Intersection	Type	Approach	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4a: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 WB / KY 53	Signalized	Westbound	69.0	E	79.0	E	26.8	C	20.4	C	20.4	C	27.8	C	27.8	C
		Northbound	21.5	C	21.1	C	16.9	B	8.3	A	8.2	A	6.8	A	6.6	A
		Southbound	28.4	C	28.7	C	19.8	B	19.2	B	17.8	B	12.1	B	12.0	B
		Whole Int.	30.1	C	31.7	C	19.4	B	13.8	B	12.9	B	11.5	B	11.4	B
KY 53 / Parker Drive	STOP Controlled	Eastbound	57.2	F	54.2	F	138.7	F	55.7	E	25.4	D	26.3	D	26.1	D
		Westbound	65.6	F	62.7	F	154.9	F	63.7	F	31.5	D	34.7	D	34.5	D
		Northbound	13.4	B	13.3	B	14.5	B	13.3	B	11.1	B	11.4	B	11.4	B
		Southbound	9.6	A	9.6	A	9.9	A	9.6	A	8.9	A	9.0	A	9.0	A
KY 53 / KY 146	STOP Controlled	Eastbound	22.1	C	23.3	C	21.0	C	53.9	F	47.9	E	20.7	C	20.1	C
		Westbound	219.8	F	222.0	F	215.4	F	259.1	F	237.4	F	97.0	F	196.7	F
		Northbound	45.0	E	46.1	E	56.0	F	54.7	F	31.2	D	31.0	D	29.7	D
		Southbound	86.3	F	91.1	F	87.4	F	106.6	F	89.7	F	79.8	F	76.4	F
		Whole Int.	105.8	F	108.0	F	106.8	F	124.0	F	110.7	F	66.9	F	94.9	F
I-71 EB / Allen Lane (New Interchange)	Signalized	Eastbound	-	-	-	-	-	-	-	-	-	-	16.4	B	16.4	B
		Northbound	-	-	-	-	-	-	-	-	-	-	17.7	B	17.7	B
		Southbound	-	-	-	-	-	-	-	-	-	-	18.4	B	18.4	B
		Whole Int.	-	-	-	-	-	-	-	-	-	-	17.0	B	17.0	B
I-71 WB / Allen Lane (New Interchange)	Signalized	Westbound	-	-	-	-	-	-	-	-	-	-	17.9	B	17.9	B
		Northbound	-	-	-	-	-	-	-	-	-	-	6.7	A	6.7	A
		Southbound	-	-	-	-	-	-	-	-	-	-	6.3	A	6.3	A
		Whole Int.	-	-	-	-	-	-	-	-	-	-	7.3	A	7.3	A

Table 16: Level 1 2035 Intersection LOS - PM

Intersection	Type	Approach	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4a: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled (Signalized for 4a/4b)	Eastbound	1979.0	F	2082.0	F	2611.0	F	27.4	C	26.1	C	2178.0	F	1842.0	F
		Northbound	9.9	A	9.9	A	10.0	B	20.4	C	20.2	C	9.8	A	9.8	A
		Southbound	-	-	-	-	-	-	17.9	B	17.9	B	-	-	-	-
		Whole Int.	-	-	-	-	-	-	21.5	C	21.0	C	-	-	-	-
I-71 WB / KY 146	STOP Controlled (Signalized for 4a/4b)	Eastbound	45.6	E	39.7	E	65.3	F	27.4	C	27.3	C	35.1	E	40.6	E
		Northbound	9.2	A	9.2	A	9.2	A	18.4	B	18.0	B	9.1	A	9.1	A
		Southbound	-	-	-	-	-	-	12.4	B	12.4	B	-	-	-	-
		Whole Int.	-	-	-	-	-	-	17.2	B	16.9	B	-	-	-	-
KY 146 / KY 393	Signalized	Eastbound	81.5	F	66.6	E	51.7	D	20.3	C	20.3	C	58.6	E	67.2	E
		Westbound	122.8	F	111.0	F	124.6	F	69.2	E	69.2	E	125.6	F	95.1	F
		Northbound	280.0	F	264.7	F	183.9	F	98.3	F	98.3	F	228.2	F	275.8	F
		Southbound	15.4	B	15.5	B	18.9	B	24.5	C	24.5	C	17.6	B	17.0	B
		Whole Int.	130.8	F	117.5	F	93.6	F	52.7	D	52.7	D	109.0	F	111.8	F
I-71 WB / KY 393	STOP Controlled (Signalized for 4a/4b)	Westbound	18710.0	F	18710.0	F	10392.0	F	41.9	D	42.1	D	27898.0	F	19803.0	F
		Northbound	18.2	C	18.3	C	13.7	B	9.9	A	10.0	A	18.1	C	18.1	C
		Southbound	-	-	-	-	-	-	36.0	D	35.9	D	-	-	-	-
		Whole Int.	-	-	-	-	-	-	19.2	B	19.2	B	-	-	-	-
I-71 EB / KY 393	STOP Controlled (Signalized for 4a/4b)	Eastbound	6699.0	F	6909.0	F	4517.0	F	234.4	F	255.8	F	6279.0	F	6699.0	F
		Northbound	-	-	-	-	-	-	18.8	B	19.1	B	-	-	-	-
		Southbound	14.1	B	14.3	B	12.7	B	50.8	C	44.9	D	14.5	B	14.7	B
		Whole Int.	-	-	-	-	-	-	75.2	E	79.3	E	-	-	-	-
KY 53 / New Moody Lane	Signalized	Eastbound	86.9	F	86.9	F	33.0	C	41.3	D	41.3	D	32.2	C	32.2	C
		Westbound	382.2	F	382.2	F	65.3	E	44.0	D	44.0	D	35.1	D	35.1	D
		Northbound	48.7	D	48.7	D	22.9	C	43.3	D	42.6	D	25.5	C	25.5	C
		Southbound	29.3	C	29.3	C	22.1	C	39.1	D	38.8	D	24.5	C	24.4	C
		Whole Int.	61.5	E	61.5	E	26.3	C	41.2	D	40.9	D	26.9	C	26.8	C
I-71 EB / KY 53	Signalized	Eastbound	448.5	F	448.8	F	218.9	F	41.1	D	41.1	D	56.9	E	55.0	E
		Northbound	232.0	F	232.0	F	49.0	D	44.2	D	42.7	D	37.4	D	36.4	D
		Southbound	19.3	B	18.0	B	28.2	C	18.9	B	12.8	B	19.6	B	19.5	B
		Whole Int.	186.7	F	187.2	F	62.1	E	33.1	C	31.6	C	32.3	C	31.5	C

Table 16: Level 1 2035 Intersection LOS - PM (cont)

Intersection	Type	Approach	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4a: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 WB / KY 53	Signalized	Westbound	158.9	F	172.2	F	88.0	F	35.3	D	35.3	D	39.6	D	35.4	D
		Northbound	135.9	F	136.5	F	70.9	E	16.7	B	16.1	B	11.2	B	11.3	B
		Southbound	61.3	E	52.9	D	61.0	E	38.0	D	25.5	C	108.1	F	106.0	F
		Whole Int.	114.2	F	113.5	F	68.2	E	27.0	C	21.3	C	52.3	D	51.2	D
KY 53 / Parker Drive	STOP Controlled	Eastbound	136.0	F	120.0	F	345.4	F	120.0	F	31.9	D	37.9	E	37.9	E
		Westbound	121.5	F	109.0	F	-	F	109.0	F	38.0	E	47.7	E	47.7	E
		Northbound	13.7	B	13.4	B	14.8	B	13.5	B	11.0	B	11.5	B	11.5	B
		Southbound	13.5	B	13.3	B	14.3	B	13.3	B	11.2	B	11.6	B	11.5	B
KY 53 / KY 146	STOP Controlled	Eastbound	177.1	F	198.0	F	147.2	F	474.7	F	450.1	F	151.2	F	151.2	F
		Westbound	60.7	F	61.4	E	60.6	F	68.4	F	62.2	F	57.0	F	57.0	F
		Northbound	181.5	F	178.4	F	219.1	F	186.9	F	95.8	F	104.3	F	104.3	F
		Southbound	33.3	D	33.5	E	33.3	D	35.4	E	32.3	D	32.3	D	32.3	D
		Whole Int.	132.6	F	138.8	F	138.6	F	265.9	F	236.9	F	95.8	F	95.8	F
I-71 EB / Allen Lane (New Interchange)	Signalized	Eastbound	-	-	-	-	-	-	-	-	-	-	9.8	A	9.8	A
		Northbound	-	-	-	-	-	-	-	-	-	-	18.2	B	18.2	B
		Southbound	-	-	-	-	-	-	-	-	-	-	18.5	B	18.5	B
		Whole Int.	-	-	-	-	-	-	-	-	-	-	13.9	B	13.9	B
I-71 WB / Allen Lane (New Interchange)	Signalized	Westbound	-	-	-	-	-	-	-	-	-	-	18.0	B	18.0	B
		Northbound	-	-	-	-	-	-	-	-	-	-	7.4	A	7.4	A
		Southbound	-	-	-	-	-	-	-	-	-	-	6.2	A	6.2	A
		Whole Int.	-	-	-	-	-	-	-	-	-	-	7.7	A	7.7	A

Figure 22: Level 1 - Scenario 1 (MTP) 2035 Levels of Service

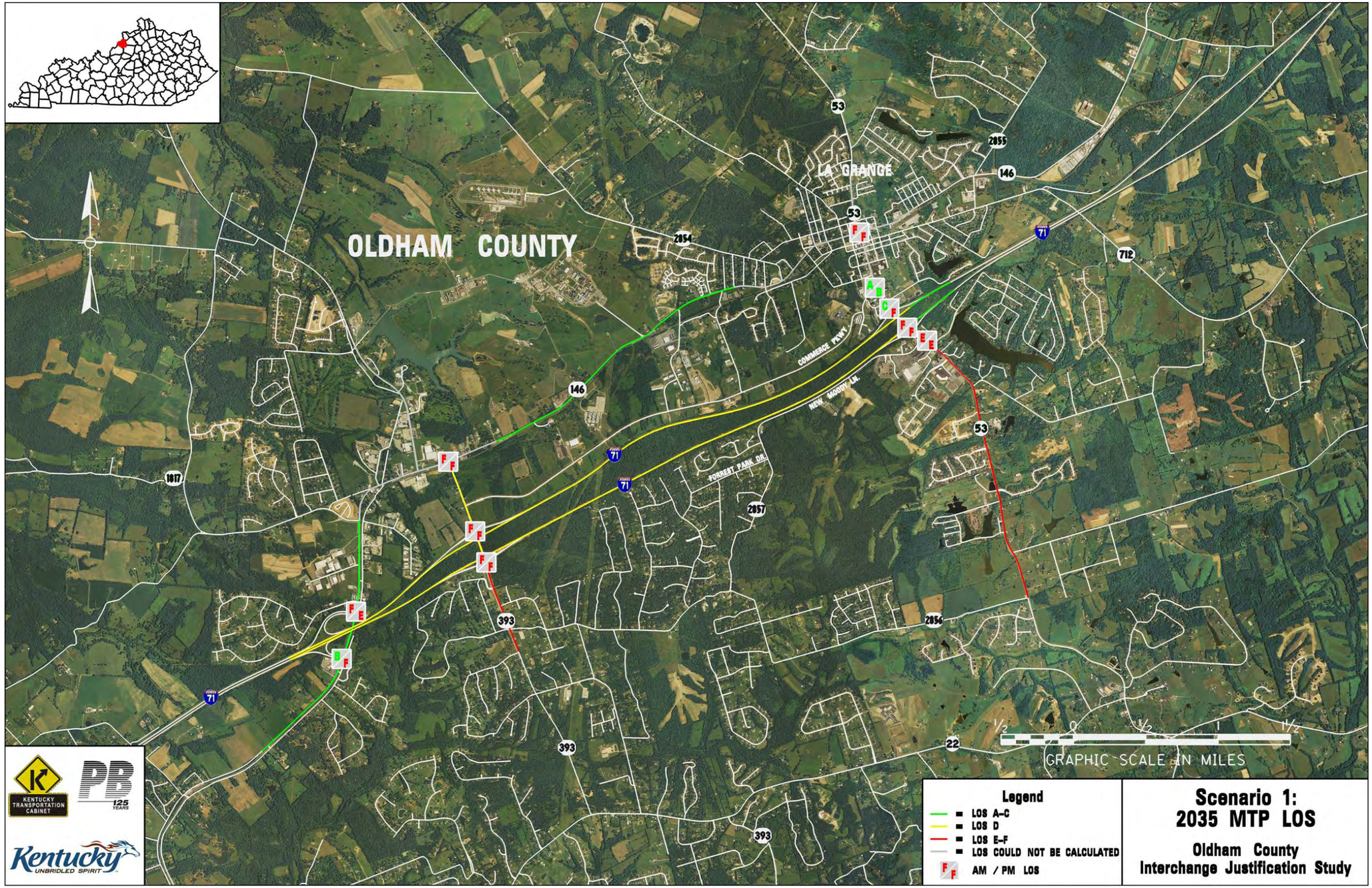


Figure 23: Level 1 - Scenario 2 (MTP-) - 2035 Levels of Service

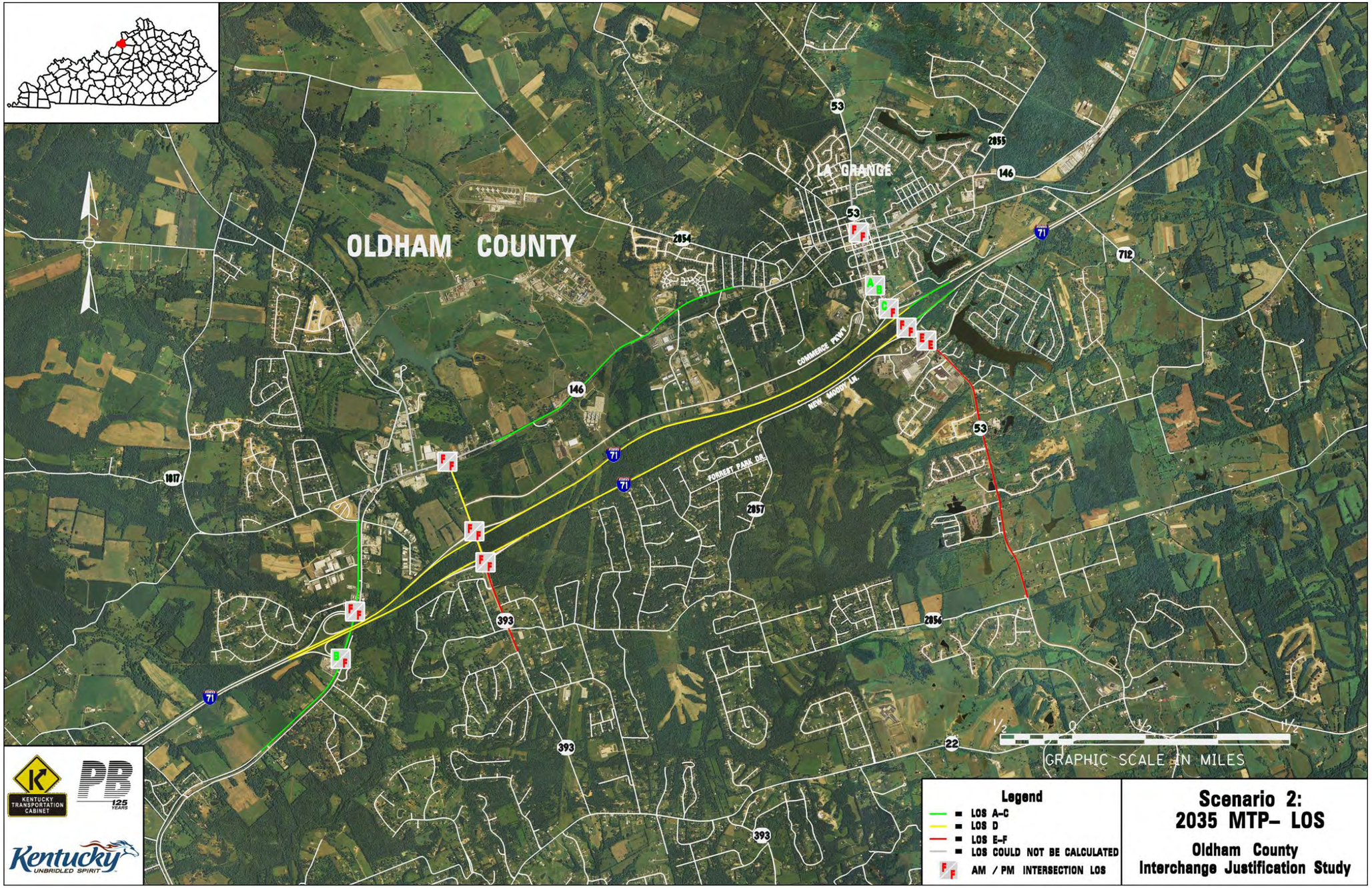


Figure 24: Level 1 - Scenario 3 (MTP+) - 2035 Levels of Service

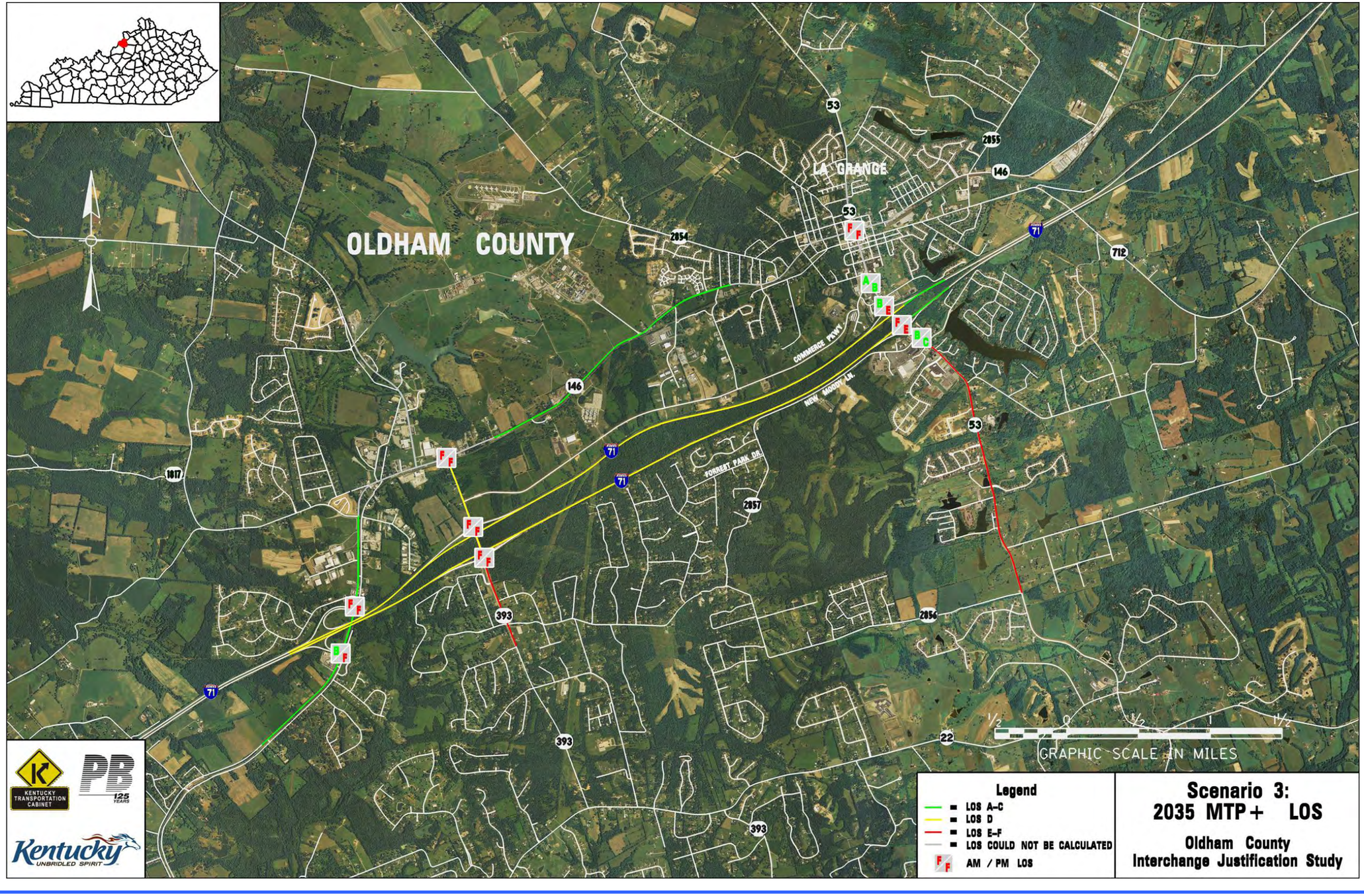


Figure 25: Level 1 - Scenario 4a (TSM) - 2035 Levels of Service

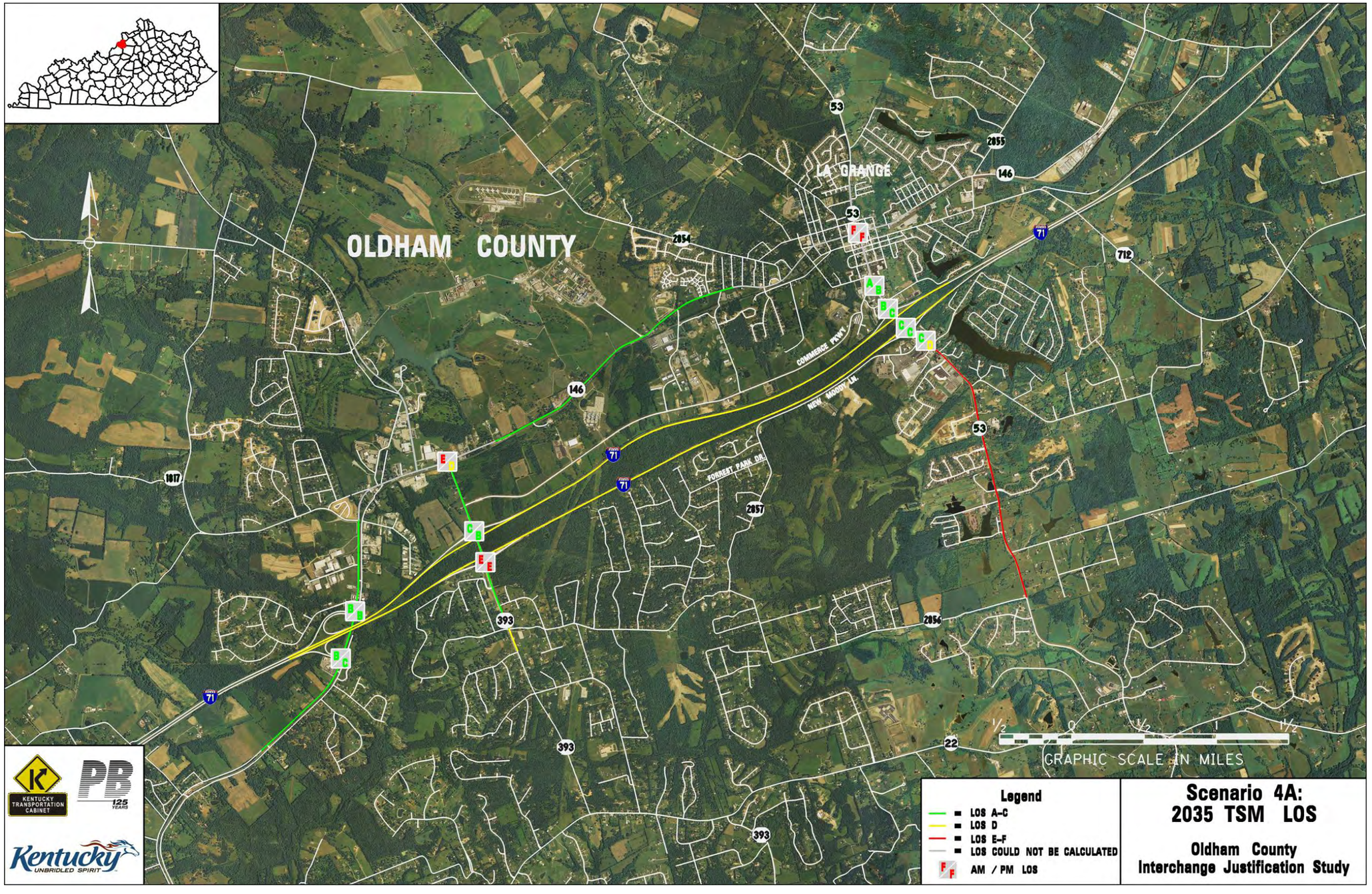


Figure 26: Level 1 - Scenario 4b (TSM) - 2035 Levels of Service

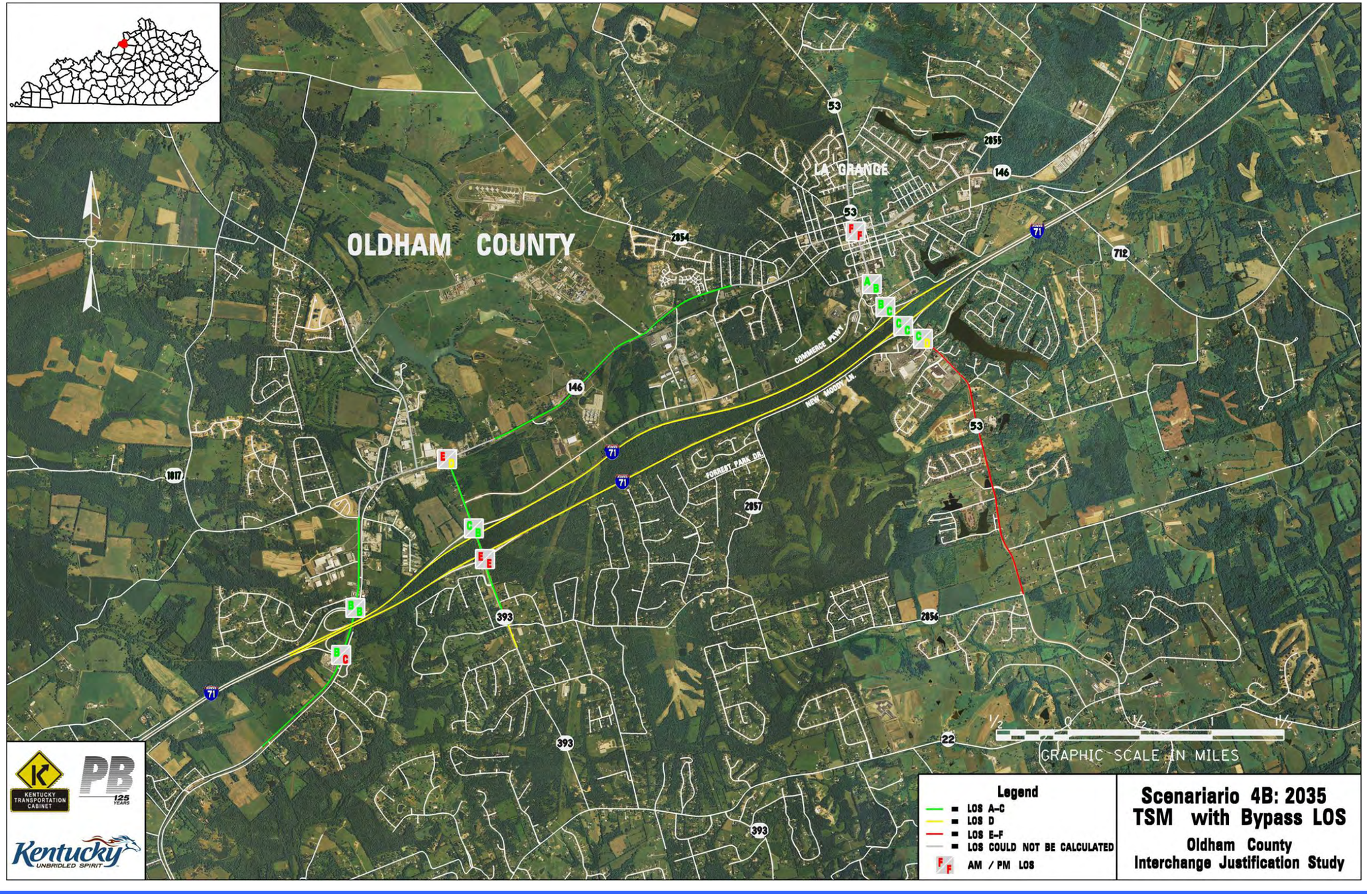


Figure 27: Level 1 - Scenario 5 (Standard Diamond Interchange) - 2035 Levels of Service

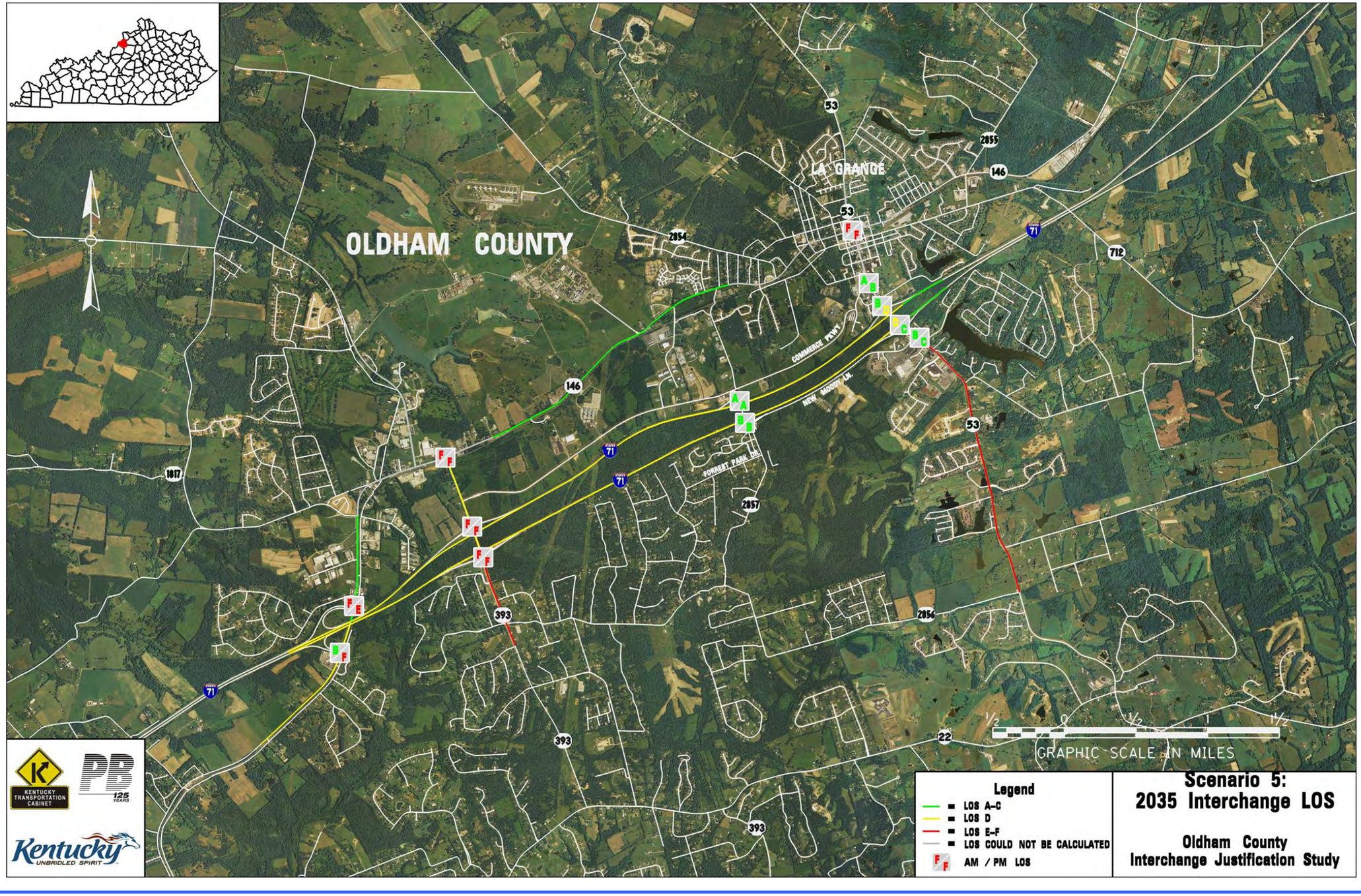


Figure 28: Level 1 - Scenario 6 (Interchange with C / D Road) - 2035 Levels of Service

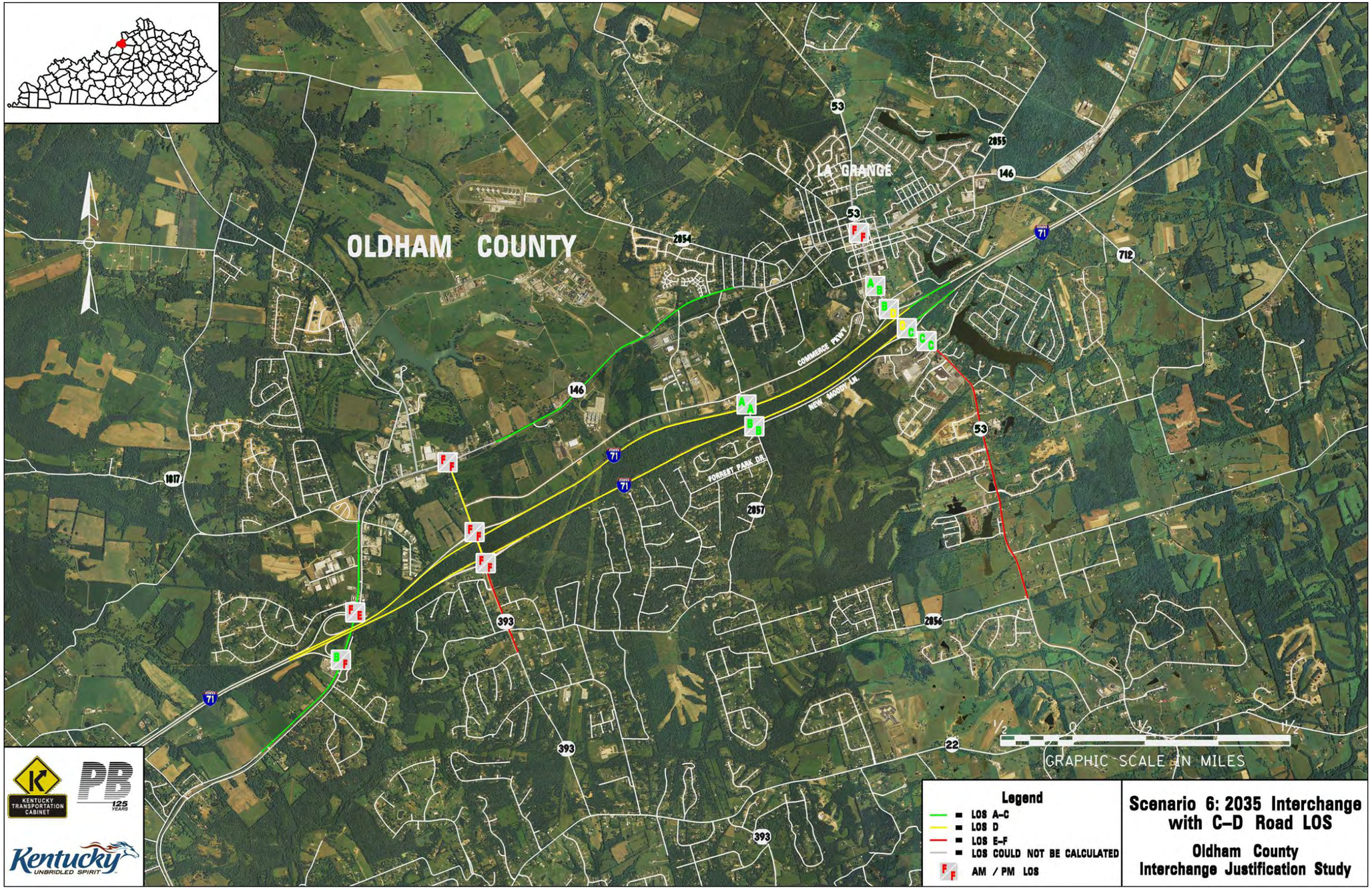


Table 17: Level 1 2035 Ramp Junction LOS

Direction	Route	Type	Scenario 1: MTP		Scenario 2: MTP-		Scenario 3: MTP+		Scenario 4A: TSM		Scenario 4b: TSM		Scenario 5: Standard Interchange		Scenario 6: Collector / Distributor	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
EB	KY 146	Diverge	D	E	D	E	D	E	D	E	D	E	D	E	D	E
EB	KY 146	Merge	C	E	D	E	D	D	D	E	D	D	D	E	D	E
EB	KY 393	Diverge	D	E	D	E	D	E	D	E	D	E	D	E	D	E
EB	KY 393	Merge	C	D	D	D	C	C	D	D	C	C	D	D	D	D
EB	C/D Road	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	E	E
EB	C/D Road	Merge	-	-	-	-	-	-	-	-	-	-	-	-	C	C
EB	New Interchange	Diverge	-	-	-	-	-	-	-	-	-	-	E	E	D	C
EB	New Interchange	Merge	-	-	-	-	-	-	-	-	-	-	D	D	B	A
EB	KY 53	Diverge	D	E	E	D	D	D	E	D	D	D	E	D	B	B
EB	KY 53	Merge	C	E	C	D	C	C	C	C	C	C	C	C	A	A
WB	KY 53	Diverge	C	C	D	C	D	C	D	C	D	C	D	C	A	A
WB	KY 53	Merge	C	C	D	C	D	C	D	C	D	C	D	C	A	A
WB	New Interchange	Diverge	-	-	-	-	-	-	-	-	-	-	D	C	B	B
WB	New Interchange	Merge	-	-	-	-	-	-	-	-	-	-	D	C	B	B
WB	C/D Road	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	C	C
WB	C/D Road	Merge	-	-	-	-	-	-	-	-	-	-	-	-	D	C
WB	KY 393	Diverge	D	D	E	D	D	C	E	D	D	C	E	D	E	D
WB	KY 393	Merge	D	C	F	C	F	D	F	D	F	D	F	D	F	D
WB	KY 146	Diverge	D	D	E	D	E	D	E	D	E	D	E	D	E	D
WB	KY 146	Merge	D	C	E	C	E	C	E	C	E	C	E	C	E	C

7.3.1 Interstate Operations

For all evaluation scenarios, I-71 operates at an acceptable level of service on the mainline. However, the ramp junction analysis showed that there are poor levels of service for all evaluation scenarios. The primary locations with problems occur at the eastbound and westbound diverge and merge for KY 146 and I-71. With the new interchange, the eastbound diverge is a LOS E, and the eastbound CD (collector / distributor) diverge is a LOS E.

7.3.2 Arterial Operations

From a segment capacity perspective, most sections of KY 53 and KY 393 north to the I-71 ramps operates at an undesirable LOS (LOS E or F). This continues as an issue for both of the interchange evaluation scenarios. The only scenarios that address some of these issues are evaluation Scenarios 4a and 4b (TSM). Under these scenarios, the sections of KY 393 south of the I-71 interchange that were previously failing now operate at an acceptable LOS.

At the intersection level, evaluation Scenarios 4b (TSM) and 6 (Interchange with a Collector / Distributor) operate the best in the AM peak period. This is based on a review of each intersection by approach movement and determining which evaluation scenario has the best LOS / delay. During the PM peak period, evaluation Scenario 4b (TSM) has the best operations. It should be noted that this analysis may be slightly skewed though as the target of the TSM evaluation scenarios was to provide improvements that would make the intersection operations improve to an acceptable level. Therefore, the achievement of the improved levels of service has a cost associated with it for adding turn lanes, installing traffic signals, and roadway widening. The costs are discussed in the next section.

7.4 Cost Estimate

Each scenario was also evaluated in terms of its overall costs, including those for design and construction. For the most part, costs were derived from the KIPDA MTP for those projects and from bid-tabulations available from the KYTC for new projects such as the interchanges. Design was estimated at 10% of the of the total construction costs. The planning level costs are shown in **Table 18**.

It should be noted that the first total line in **Table 18** represents the costs for completing each evaluation scenario; therefore the costs for the MTP+ scenario are included with the cost for Scenarios 4 – 6. A separate line item cost total was provided at the end of the table to show the construction-only cost for TSM improvements and the cost of an interchange.

As shown, the costs for the TSM evaluation scenarios are slightly higher than the costs for the scenarios with an interchange. This can be attributed to the widening projects associated with the TSM scenarios and the construction of the bypass in Scenario 4b.

Table 18: Level 1 Evaluation Scenario Planning Level Cost Estimate (in millions)

Phase	Scen. 1: MTP	Scen. 2: MTP-	Scen. 3: MTP+	Scen. 4a: TSM	Scen. 4b: TSM	Scen. 5: Standard Interchange	Scen. 6: Collector / Distributor
Design	$12	$10	$13	$17	$18	$15	$16
Construction	$120	$100	$128	$165	$180	$152	$162
Total	**$132**	**$110**	**$141**	**$182**	**$198**	**$167**	**$178**
Total (w/o MTP+ projects)	**-**	**-**	**-**	**$41**	**$57**	**$26**	**$37**

Note: Constant 2010 Dollars in millions

7.5 Purpose and Need Compatibility

Further, the scenarios were evaluated on how well they addressed each of the points outlined by the project's Purpose and Need statement. The following matrix (**Table 19**) outlines that evaluation. As shown on the table, red indicates an evaluation scenario does not meet the purpose and need criteria, yellow means it moderately addresses the purpose and need criteria, and green indicates it meets the purpose and need criteria. Overall, the two interchange evaluation scenarios best meet the purpose and need at this level of evaluation.

Table 19: Level 1 Purpose and Need Evaluation Matrix

Scenario	Description	PURPOSE AND NEED								Total Rating Number
		Increase mobility and accessibility	Reduce travel times and overall delay	Improve safety of local network	Reduce emergency response times	Provide access to developing areas	Create a "middle connector"	Provide a western "bypass"	Provide outlet when I-71 is shutdown	
1	MTP	2	2	2	2	2	3	1	1	**15**
2	MTP-	1	1	1	1	1	1	1	1	**8**
3	MTP+	3	3	3	2	3	3	2	3	**22**
4a	TSM	3	4	3	2	3	3	1	3	**22**
4b	TSM with Bypass	4	4	4	3	4	3	5	3	**30**
5	Standard Interchange	5	5	5	5	5	5	3	5	**38**
6	C-D Road with Interchange	5	5	5	5	5	5	3	5	**38**

1	Lowest
2	
3	
4	
5	Highest

8.0 LEVEL 2 ANALYSIS

8.1 Evaluation Scenarios

With the results from the initial screening (Level 1), an elimination process was undertaken to further pare down the scenarios to the ones that merited further analysis. The elimination process was discussed and agreed upon by the PDT during follow-up discussions from the August 31, 2010 meeting. The Level 1 scenarios that were carried forward into screening for Level 2 included Scenarios 3, 5 and 6. Eliminated scenarios included: 1, 2, 4a and 4b as it was determined that the base MTP scenarios with and without the overpass project were not enough to sustain the system at adequate levels.

A new evaluation scenario was developed as it was determined that evaluation Scenarios 4a and 4b did not meet the true definition of a TSM alternative with the major widening projects included as part of these scenarios. As such, evaluation Scenario 4c was created which consists only of spot improvements (i.e. adding turn lanes and traffic signals). The widening of KY 53 was not included in this evaluation scenario.

The following text describes each of the scenarios considered in the Level 2 Analysis:

- Scenario 3: This scenario is the same as the scenario described in the Level 1 Analysis. This includes all projects in KIPDA's MTP as well as Ring Road connecting the proposed I-71 overpass with KY 53.

- Scenario 4c: This scenario includes a range of lower cost improvements throughout the study area with the intent of improving traffic operations. Details of the improvements and how they were developed are described in Section 8.3.

- Scenario 5: This scenario considers a standard diamond interchange. It features four through lanes on the overpass and exclusive left turn lanes onto the I-71 on-ramps. The off-ramps consist of single turn lanes. The interchange concept is shown in **Figure 29**. Gore to gore spacing is 3,900 feet in the eastbound direction on I-71 and 3,969 feet in the westbound direction. **Figure 30** displays these distances. With respect to other distances, the distance between the intersection created with the I-71 westbound ramps and the intersection with Commerce Parkway is approximately 300 feet; however, this is considered acceptable for the spacing between intersections. The distance between the I-71 eastbound ramps and New Moody Lane is slightly longer with the re-routing of New Moody Lane further to the south to form the new intersection. A signing plan was also developed for Scenario 5 and is shown in **Figure 31**.

- Scenario 6: This scenario considers a similar standard diamond interchange with a collector / distributor road that starts west of the new interchange and ends east of the KY 53 interchange. The standard diamond interchange features four through lanes on the overpass, dual northbound turn lanes onto I-71 westbound and a single exclusive turn lane southbound onto I-71 eastbound. The westbound off-ramp separates the right and left turn movements while the eastbound off-ramp shares a lane. The interchange concept is shown in **Figure 32**. Gore to gore spacing from the KY 53 interchange to the new interchange along I-71 mainline is 11,325 feet in the eastbound direction on I-71 and 10,380 feet in the westbound direction on I-71. With respect to interchange spacing between KY 393 and KY 146, the distance from KY 393 to the proposed interchange is 11,120 feet and from the proposed interchange to KY 53 is 6,500 feet. The distances between Commerce Parkway and New Moody Lane are similar to that described in Scenario 5. **Figure 33** displays these distances. A signing plan was also developed for Scenario 5 and is shown in **Figure 34**.

Table 20 provides a summary of the evaluation scenarios moving forward for the Level 2 analysis.

8.2 Traffic Forecasting

Generally, the traffic forecasting procedures used for the Level 1 Analysis were used for the Level 2 Analysis. One exception was changes made to KY 393. At the third PDT meeting (August 31, 2010), it was suggested that further investigation be made into the high projected traffic growth along KY 393. Traffic growth was higher than expected, even with the anticipated increase in households and employment in the study area. A review of the KIPDA TDM indicated higher than expected growth along KY 2856 (Moody Lane). Further investigation resulted in an analysis of the increase of traffic in and out of Zone 633, which is between KY 393 and the zone representing the proposed Oldham Reserve development.

Follow-up discussion was held with a KIPDA TDM representative. It was noted that the employment forecasts for Zone 633 were higher than expected. KIPDA agreed additional employment is not expected within that zone based on current land use utilization and future designations. This unexpected increase in employment directly contributed to the higher traffic growth along KY 393 as this route appears to provide the shortest path for the origins and destinations produced and attracted to that zone.

A test was conducted using the KIPDA TDM to determine the impact of reducing the proposed employment growth within Zone 633. The model indicated that the traffic on the ramps would be reduced between 5% and 10%. In addition, the traffic on KY 393 is reduced by approximately 15% as the vehicles must travel along the route to access the ramps.

The KIPDA TDM provides the ability to conduct a select link analysis. A select link analysis is a procedure which summarizes the origins and destinations utilizing a particular link (or links) within a model. Such an analysis can be useful for a variety of reasons. In this instance, the select link analysis was used to identify the links that were associated with trips with an origin or destination in Zone 633.

The select link analysis indicates that between 10% and 15% of the traffic volume on the KY 393 ramps to and from Louisville is attributed to traffic generated and attracted to Zone 633. This reduction was applied to the traffic volumes for the Level 2 analysis.

Figure 35 displays a graphical representation of the select link analysis.

Figure 29: Scenario 5 – Standard Diamond Interchange Geometric Layout

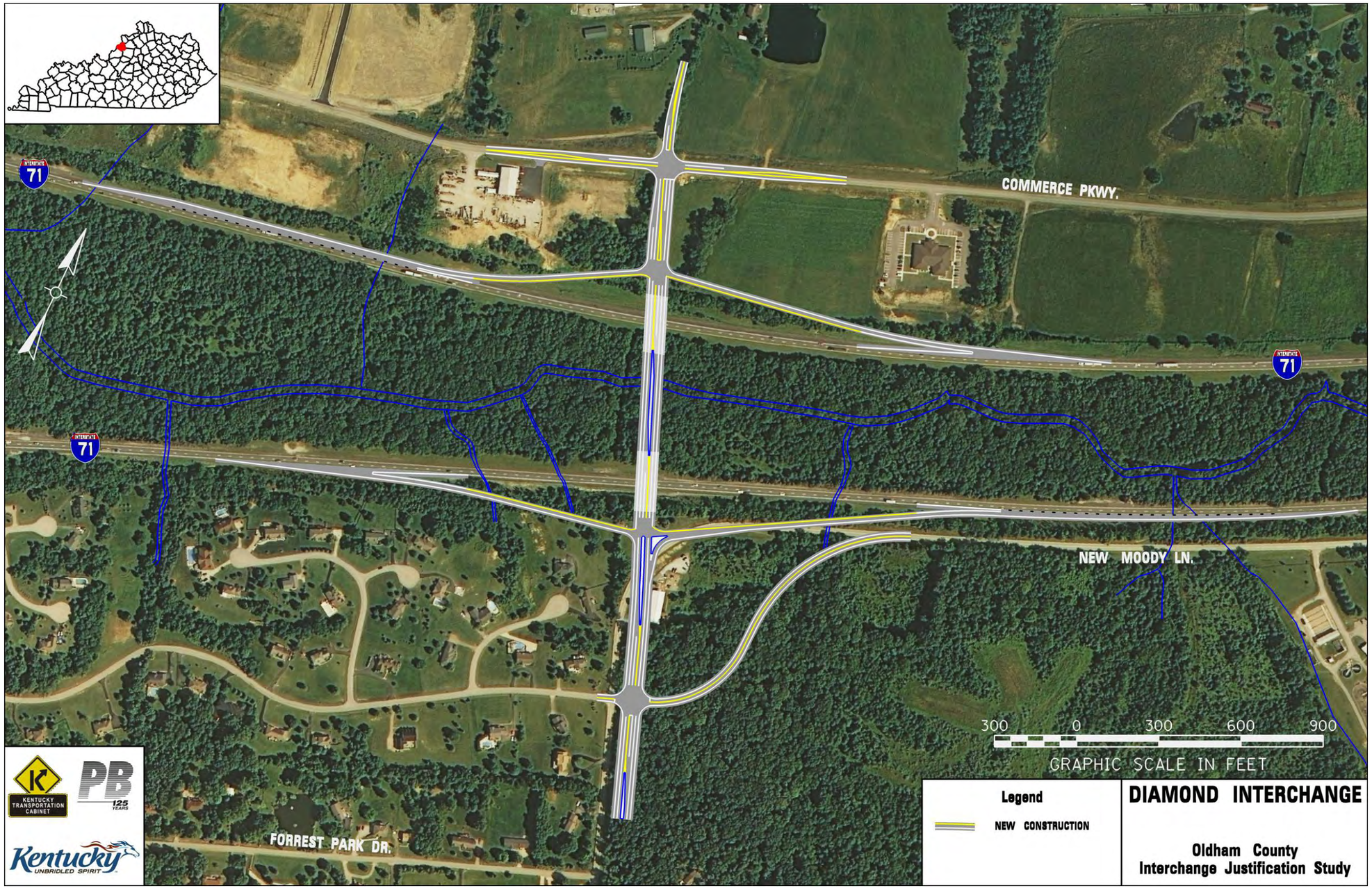


Figure 30: Scenario 5 – Standard Diamond Interchange Interstate Distances

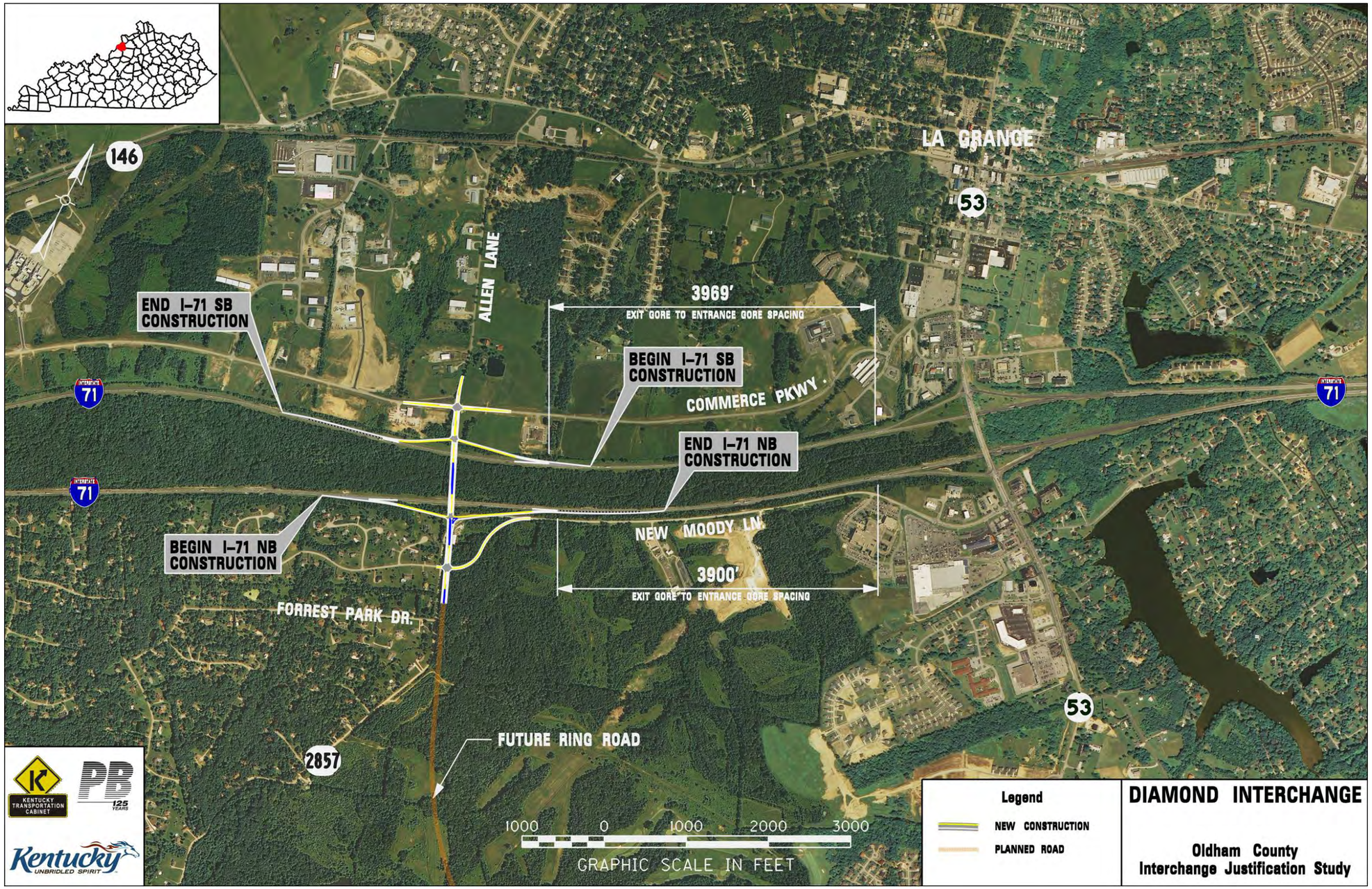


Figure 31: Scenario 5 – Standard Diamond Interchange Signing Plan

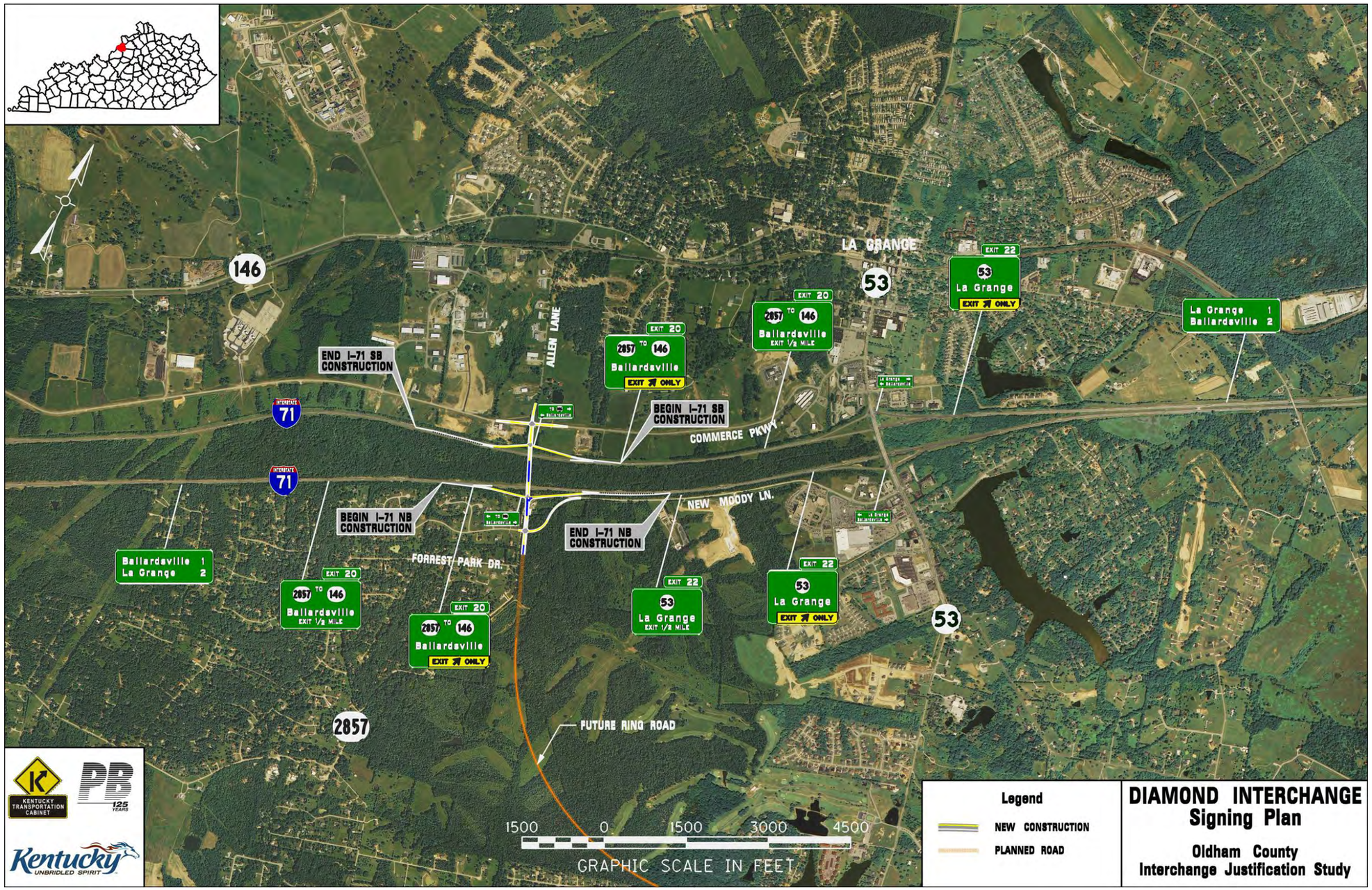


Figure 32: Scenario 6 – Standard Diamond Interchange with C / D Road Geometric Layout

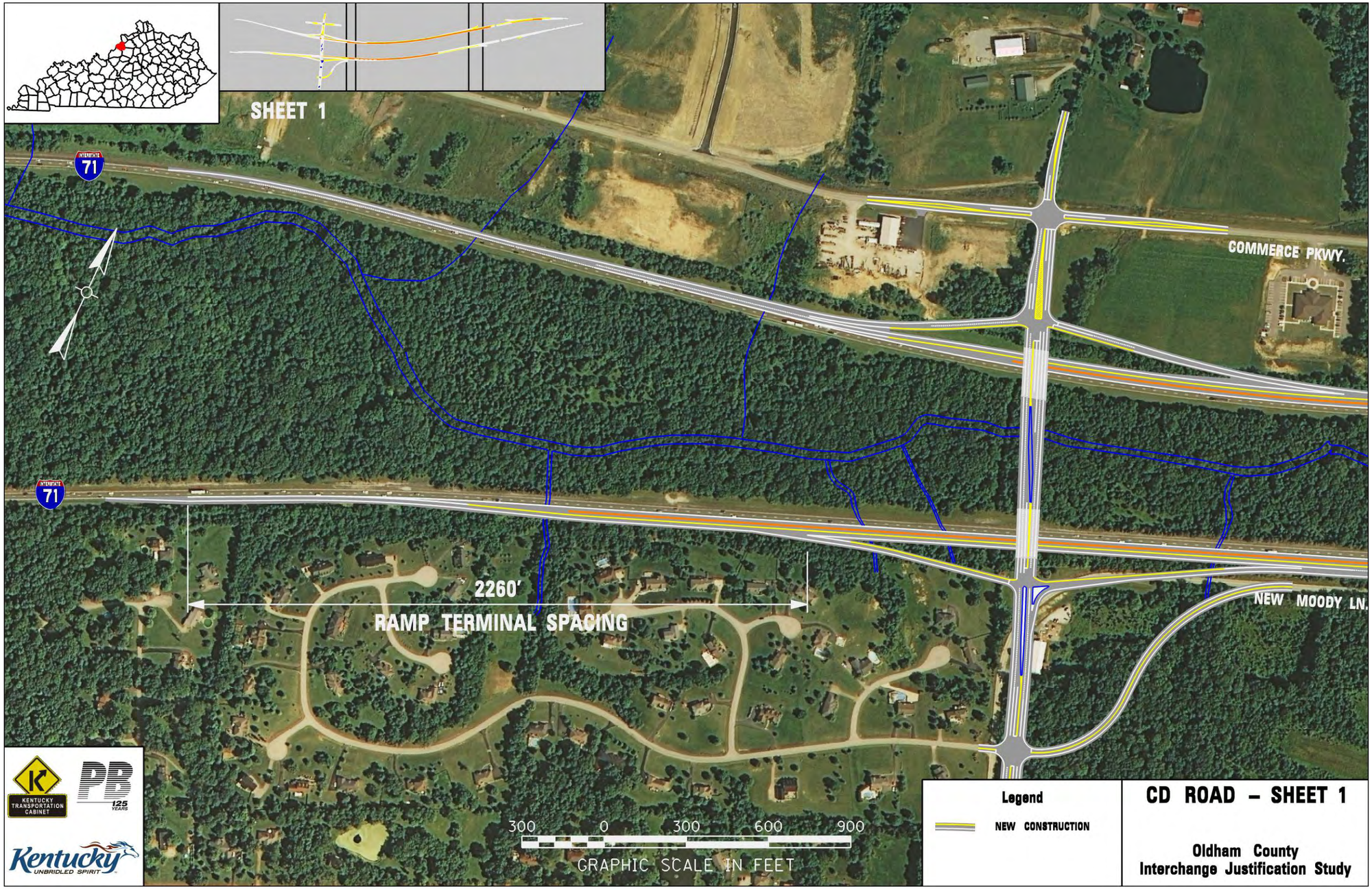


Figure 32: Scenario 6 – Standard Diamond Interchange with C / D Road Geometric Layout (cont)

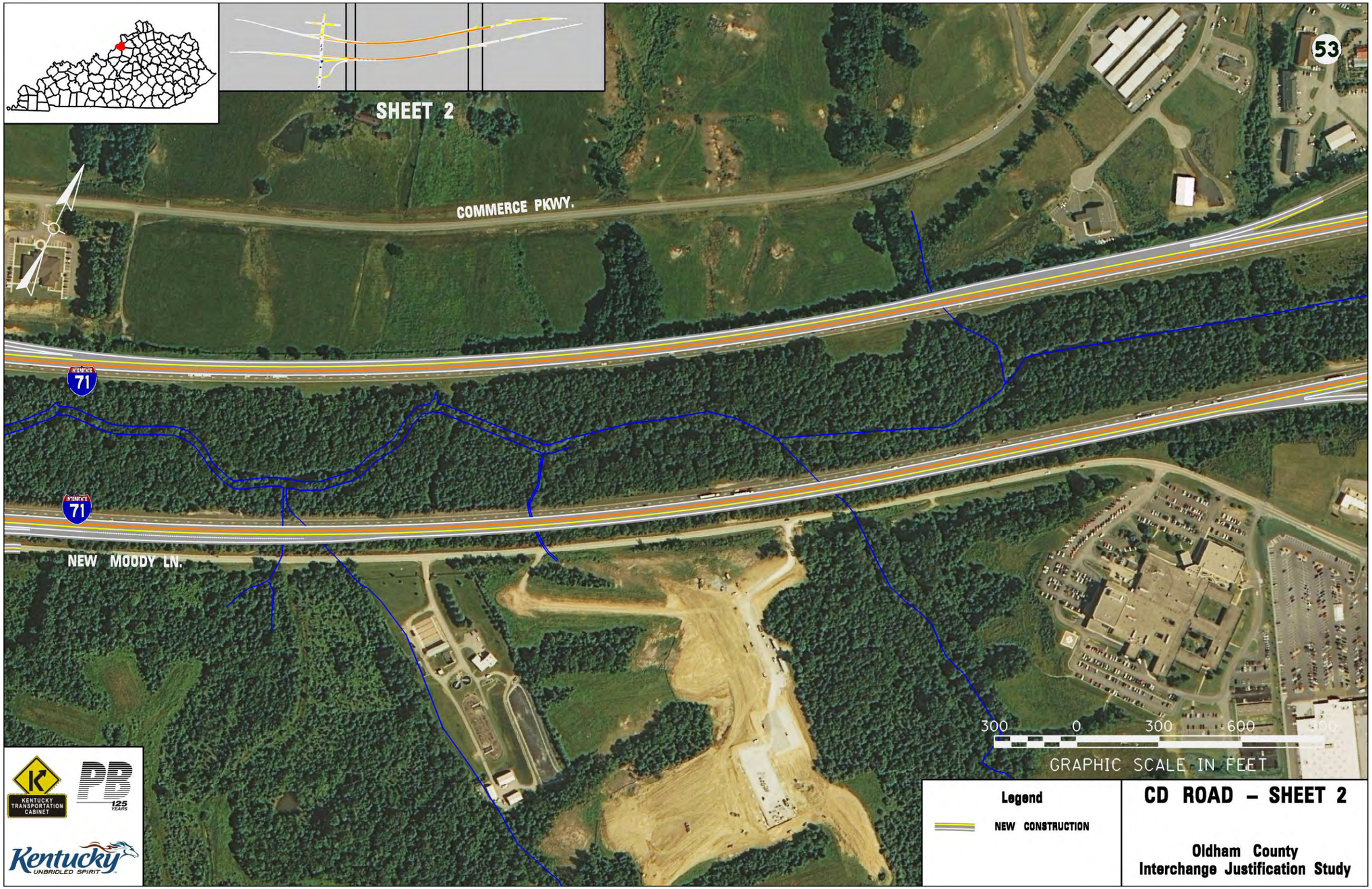


Figure 32: Scenario 6 – Standard Diamond Interchange with C / D Road Geometric Layout (cont)

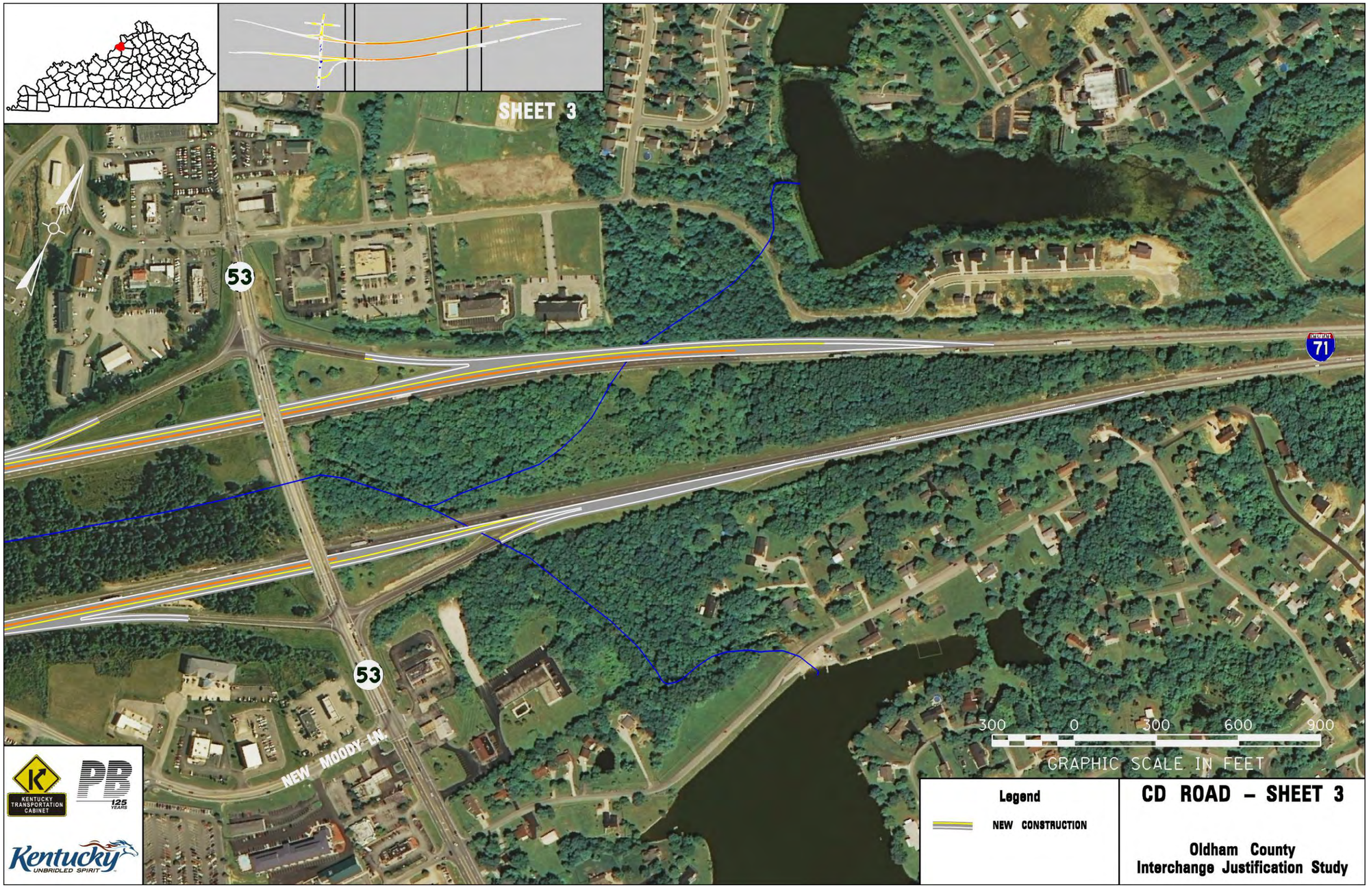


Figure 33: Scenario 6 – Standard Diamond Interchange with C / D Road Interstate Distances

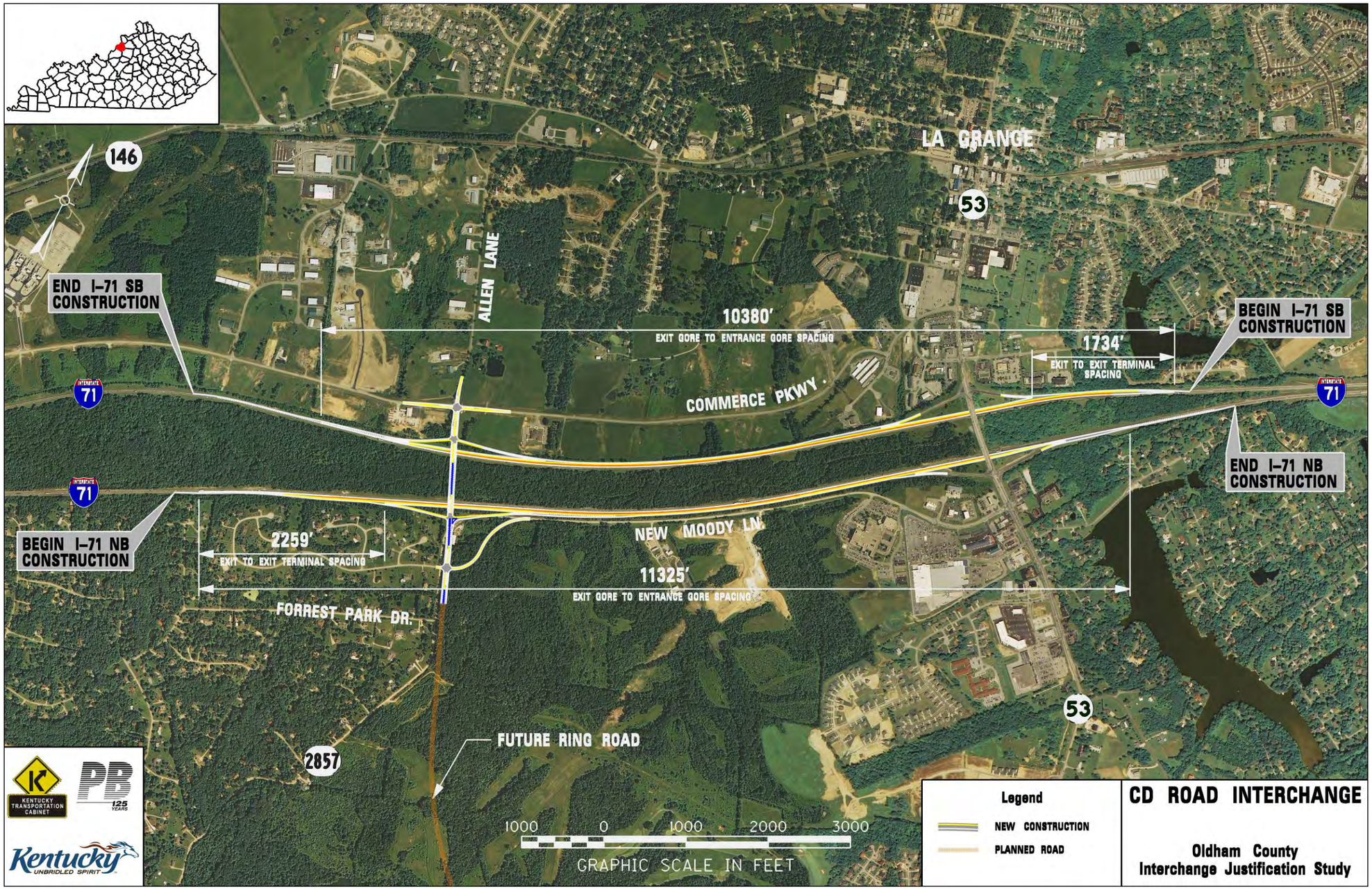


Figure 34: Scenario 6 – Standard Diamond Interchange with C / D Road Signing Plan

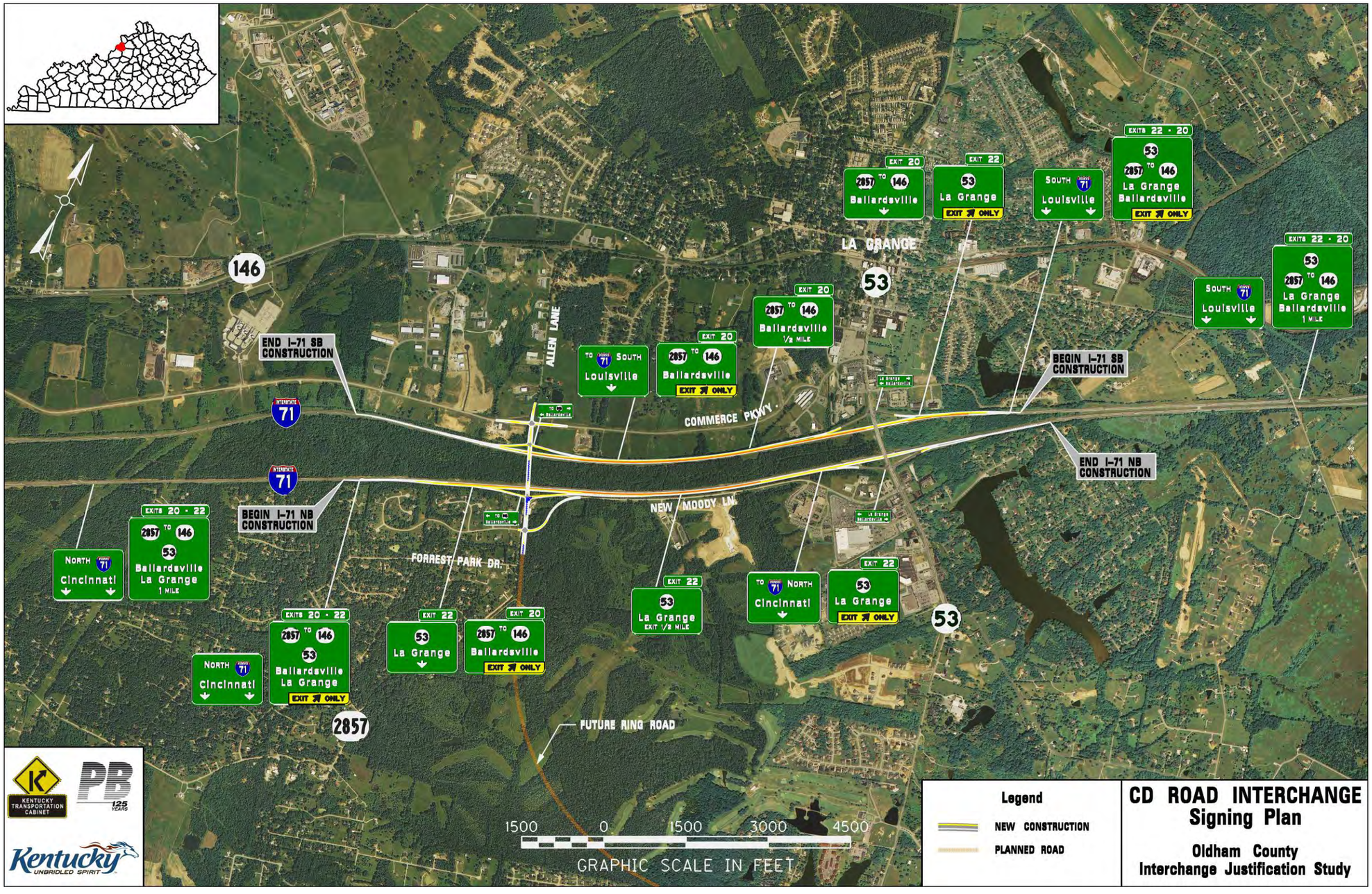
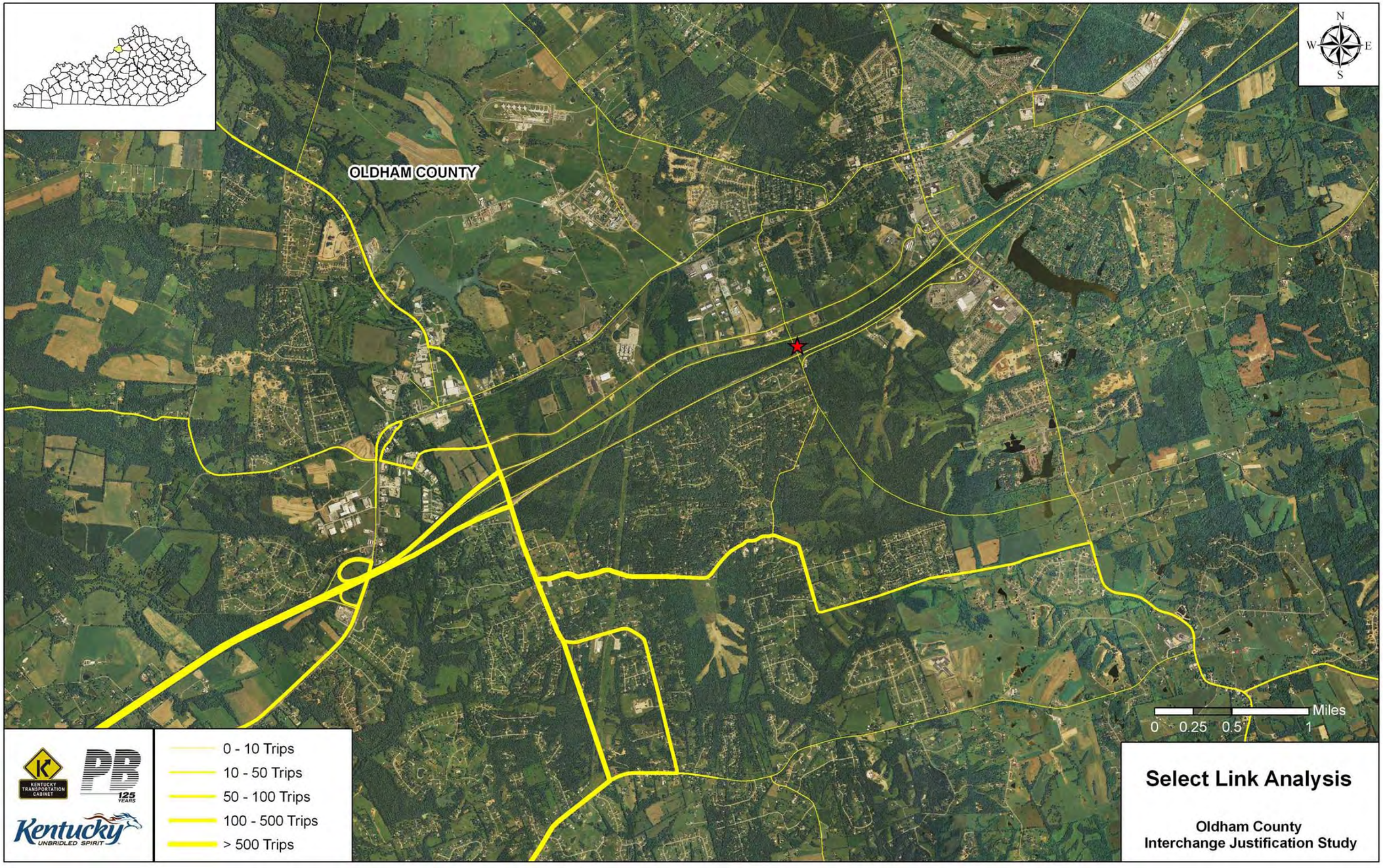


Table 20: Level 2 Evaluation Scenarios

Scenario	Name	Detailed Description	Projects
3	MTP+	This model run is the same as Scenario 3 in the Level 1 Scenarios with the exception that KY 393 will be re-coded as a 5 lane facility from I-71 ramps to KY 146 per the follow-up discussion from PDT #3.	- KY 146 widening (Crestwood to LaGrange) - KY 393 realignment at KY 146 - KY 22 widening from Chamberlain Lane to KY 393 - Allen Lane underpass at KY 146 - I-71 overpass at Allen Lane - Ring Road in Oldham Reserve - KY 393 widened to 5 lane from I-71 to KY 146
4c	TSM	This model run builds upon Scenario 3. This scenario includes TSM improvements as they are defined in FHWA descriptions.	Varies – See Section 8.3
5	Standard Diamond Interchange	This model run is the same as Scenario 5 in the Level 1 Scenarios with the exception that KY 393 will be re-coded as a 5 lane facility from I-71 ramps to KY 146 per the follow-up discussion from PDT #3.	- KY 146 widening (Crestwood to LaGrange) - KY 393 realignment at KY 146 - KY 22 widening from Chamberlain Lane to KY 393 - Allen Lane underpass at KY 146 - I-71 overpass at Allen Lane - Ring Road in Oldham Reserve - KY 393 widened to 5 lane from I-71 to KY 146
6	Interchange with C-D Road	This model run is the same as Scenario 6 in the Level 1 Scenarios with the exception that KY 393 will be re-coded as a 5 lane facility from I-71 ramps to KY 146 per the follow-up discussion from PDT #3.	- KY 146 widening (Crestwood to LaGrange) - KY 393 realignment at KY 146 - KY 22 widening from Chamberlain Lane to KY 393 - Allen Lane underpass at KY 146 - I-71 overpass at Allen Lane - Ring Road in Oldham Reserve - KY 393 widened to 5 lane from I-71 to KY 146

Note: All scenarios run for Year 2030 (KIPDA Model).

Figure 35: Select Link Analysis



In addition to a review of traffic growth on KY 393, further investigation was performed related to the traffic utilizing the three primary study area interchanges (KY 393, the new interchange, and KY 53). Traffic volumes on KY 393 were still higher than what would be expected and, in general, the balance of traffic volume between the three interchanges seemed to favor KY 393.

To provide an independent check on traffic volume utilization at the three interchanges, the KYSTM was consulted. It was thought that a regional perspective may provide a more likely identification of realistic traffic volume distribution in the future. The model was run for Scenarios 3, 5 and 6. The percentage split between the interchanges is as follows:

- Scenario 3 (MTP+):
  - KY 393 = 45.9%
  - KY 53 = 54.1%
- Scenarios 5 / 6 (With New Interchange):
  - KY 393 = 23.4%
  - New Interchange = 50.2%
  - KY 53 = 26.4%

These compared to the following percentage splits determined from the KIPDA model:

- Scenario 3 (MTP+):
  - KY 393 = 47.4%
  - KY 53 = 52.6%
- Scenarios 5 / 6 (With New Interchange):
  - KY 393 = 37.3%
  - New Interchange = 26.1%
  - KY 53 = 36.6%

It should be noted that the presence of a C/D road does not impact the traffic volume distribution between interchanges.

Generally, the percentage of traffic volume split between KY 393 and KY 53 is similar for both models in the Scenario 3. The differences occur in Scenarios 5 and 6 where a substantial amount of traffic utilizes the new interchange based on the KYSTM output compared to output from KIPDA. In order to provide realistic traffic volumes for the study area interchanges, it was determined that the results from both models would be averaged, which led to the following percentage splits:

- Scenario 3 (MTP+):
  - KY 393 = 46.6%
  - KY 53 = 53.4%
- Scenarios 5 / 6 (New Interchange):
  - KY 393 = 30.4%
  - New Interchange = 38.1%
  - KY 53 = 31.5%

These percentages were further broken down by ramp by direction and applied to the turn movement volumes.

The revised traffic volumes for each scenario based on the changes resulting from the select link analysis and the interchange distribution are shown in **Appendix E**.

8.3 Scenario 4c Improvements

As noted, TSM options were identified as an alternative to a new interchange. These were determined using the HCS+ software and were required in order to achieve an improved LOS. In some instances, it was not possible to achieve an acceptable LOS such as at KY 146 and KY 393 intersection. The TSM improvements had to be within reason and feasible. An example of an improvement determined to be not feasible was at the I-71 Westbound Ramps / KY 53 intersection. A second northbound left turn lane would be required to improve intersection operations to an acceptable level; however, the overpass bridge would be required to be widened and the receiving ramp would need to be widened as well. Given the magnitude of these projects and cost, this would not be a TSM improvement. Therefore, the LOS is not quite at an acceptable level for this intersection.

The improvements determined from the HCS+ output to improve traffic flow through the study area intersections include:

- Option A – I-71 Eastbound Ramps / KY 53: This option considers the widening of the eastbound off-ramp to include a dual right turn movement and a separate left turn lane. In addition, a northbound right turn lane is added to KY 53 along with widening of the on-ramp to accommodate the turning vehicles. The proposed improvement is shown in **Figure 36**.
- Option B – I-71 Westbound Ramps / KY 53: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 53. The proposed improvement is shown in **Figure 37**.
- Option C – KY 53 / KY 146 Intersection: This option considers the signalization of the intersection. Due to right-of-way constraints, widening was not considered. The proposed improvement is shown in **Figure 38**.
- Option D – KY 53 / Parker Drive Intersection: This option considers the signalization of the intersection. The proposed improvement is shown in **Figure 39**.
- Option E – I-71 Eastbound Ramps / KY 146: This option considers the widening of the eastbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. Also, a traffic signal is installed to regulate traffic flow. The proposed improvement is shown in **Figure 40**.
- Option F – I-71 Westbound Ramps / KY 146: This option considers the widening of the eastbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. The intersection is also signalized. The proposed improvement is shown in **Figure 41**.
- Option G – I-71 Eastbound Ramps / KY 393: This option considers widening of the eastbound off-ramp to provide separate right and left turn lanes. The intersection is also signalized. The proposed improvement is shown in **Figure 42**.
- Option H – I-71 Westbound Ramps / KY 393: This option considers the signalization of this intersection. The proposed improvement is shown in **Figure 43**.

Figure 36: Scenario 4c – Option A – I-71 Eastbound Ramps / KY 53 Intersection

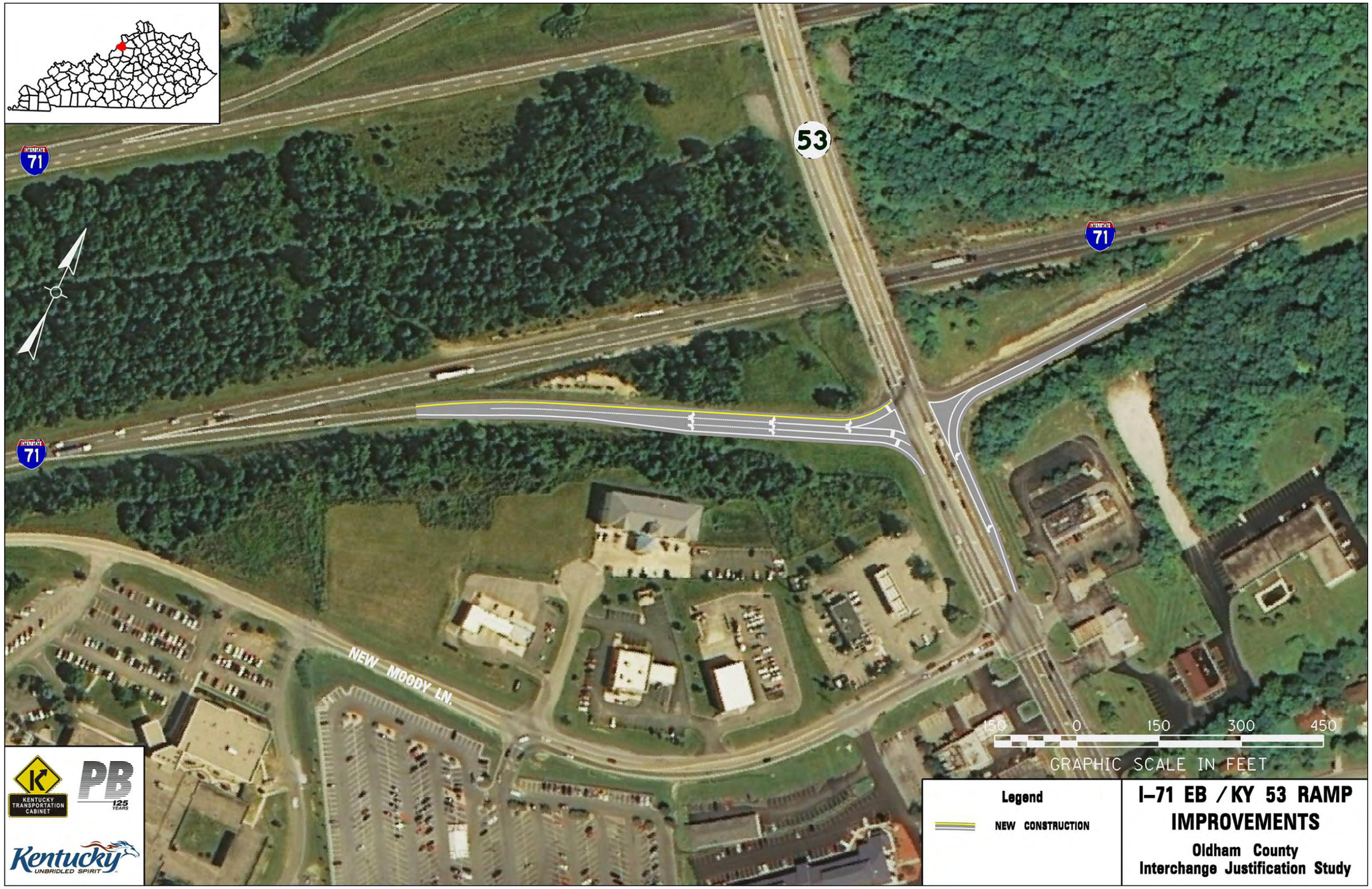


Figure 37: Scenario 4c – Option B – I-71 Westbound Ramps / KY 53 Intersection

Figure 38: Scenario 4c – Option C – KY 53 / KY 146 Intersection

Figure 39: Scenario 4c – Option D – KY 53 / Parker Drive Intersection

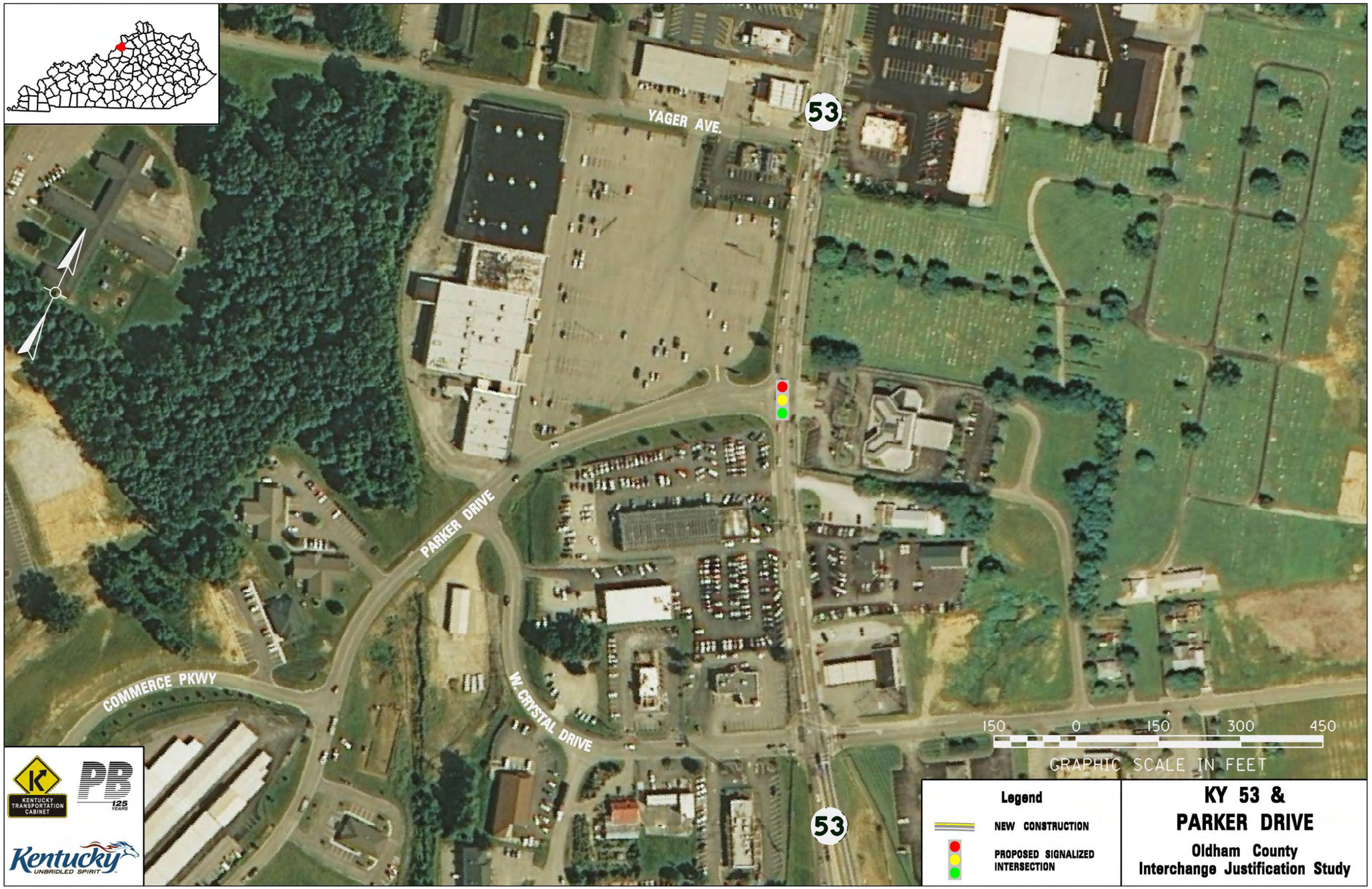


Figure 40: Scenario 4c – Option E – I-71 Eastbound Ramps / KY 146 Intersection

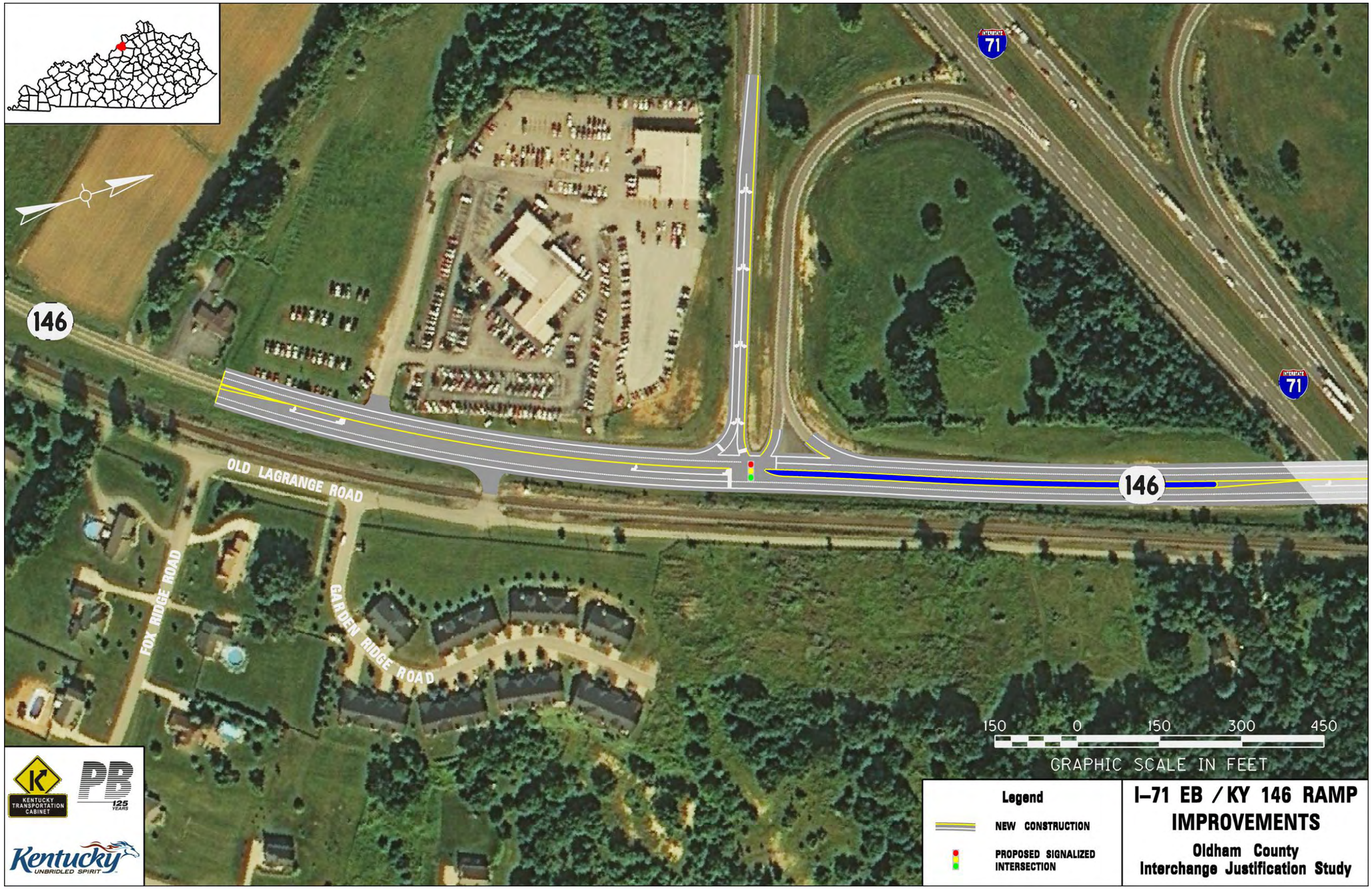


Figure 41: Scenario 4c – Option F – I-71 Westbound Ramps / KY 146 Intersection

Figure 42: Scenario 4c – Option G – I-71 Eastbound Ramps / KY 393 Intersection

Figure 43: Scenario 4c – Option H – I-71 Westbound Ramps / KY 393 Intersection

8.4 Level of Service

Using the new traffic volumes for the remaining evaluation scenarios, new segment and intersection levels of service were calculated using HCS+ output. The segment levels of service primarily remained the same as most traffic volume adjustments were made at the intersection level.

Table 21 shows the Level 2 segment LOS. **Tables 22** and **23** show the intersection LOS for Level 2. **Figures 44** – **47** show the segment and intersection levels of service on a map. **Table 24** shows the ramp merge and diverge LOS for Level 2.

Appendix F contains additional information related to HCS+ output for the Level 2 segment and ramp junction levels of service.

8.4.1 Interstate Operations

I-71 operates at an acceptable LOS under all four evaluation scenarios. The segment between Allen Lane and KY 53 improves from LOS D to LOS C in Scenario 5 and LOS B in Scenario 6.

An evaluation of merge and diverge level of service showed some improvements with Scenario 6.

- The diverge from EB I-71 to KY 53 changes from a LOS C/D (AM/PM) to LOS B/A.
- The merge from KY 53 to EB I-71 changes from a LOS B/D to LOS A/A.
- The merge from KY 53 to WB I-71 changes from a LOS C/C to a LOS A/B.

There are a few locations where there are declines in LOS resulting from Scenarios 5 and 6 which include the following.

- The diverge from WB I-71 to KY 393 goes from LOS D to LOS E.
- The merge from KY 393 to WB I-71 goes from LOS D/C to LOS E/D.

There are no freeway weave segments in Scenarios 3, 4c or 5. The Highway Capacity Manual defines a weaving segment as a segment whose length is less than or equal to 2500 feet. In Scenarios 3, 4c and 5 the distances between interchanges are never 2500 feet or less. Scenario 6 has two weaving segments, one in each direction. In the northbound direction there is a weaving segment between the KY 393 on-ramp and the CD road off-ramp, and in the southbound direction between the C/D road on-ramp and the KY 393 off-ramp. Both of the weaving segments operate at LOS E during the AM peak and LOS D during the PM peak.

Table 21: Level 2 2035 Segment LOS

Route	Section	Begin Milepoint	End Milepoint	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
				Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	32.7	D	32.7	D	62.4	D	62.4	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.4	D	61.4	D	61.0	D	61.0	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	67.1	D	67.1	D	64.2	D	64.2	D
		20.XXX (Allen Lane)	21.869 (KY 53)	67.1	D	67.1	D	68.4	C	69.8	B
	4	21.869 (KY 53)	22.250 (East of KY 53)	69.7	C	69.7	C	69.7	C	69.7	C
C-D	1	C-D Begin	C-D End	--	--	--	--	--	--	55.0	A
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	55.0	B	55.0	B	55.0	B	55.0	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	55.0	B	55.0	B	55.0	B	55.0	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	45.0	C	45.0	C	45.0	C	45.0	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	45.0	C	45.0	C	45.0	C	45.0	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	55.0	B	55.0	B	55.0	B	55.0	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	45.0	B	45.0	B	45.0	B	45.0	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*	*	*

Table 21: Level 2 2035 Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
				Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	24.9	E	24.9	E	23.0	E	23.0	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	21.6	E	21.6	E	19.1	E	19.1	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	24.8	E	24.8	E	26.4	E	26.4	E
	4	5.890 (North of Market Street)	6.296 (I-71)	23.9	E	23.9	E	25.5	E	25.5	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	19.2	F	19.2	F	20.4	F	20.4	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	17.8	E	17.8	E	15.1	F	15.1	F
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	17.8	E	17.8	E	15.1	F	15.1	F
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	45.0	A	45.0	A	45.0	A	45.0	A
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	45.0	A	45.0	A	45.0	A	45.0	A
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*	*	*

Notes:
- 2035 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report and 2035 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report and Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM and Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum

Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Table 22: Level 2 2035 Intersection LOS – AM

Intersection	Type	Approach	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled (Signalized for 4c)	Eastbound	13.4	B	20.3	C	13.1	B	13.1	B
		Northbound	7.6	A	5.0	A	7.6	A	7.6	A
		Southbound	-	-	4.6	A	-	-	-	-
		Whole Int.	-	-	9.4	A	-	-	-	-
I-71 WB / KY 146	STOP Controlled (Signalized for 4c)	Eastbound	460.6	F	27.9	C	205.2	F	205.2	F
		Northbound	11.9	B	3.3	A	11.6	B	11.6	B
		Southbound	-	-	4.1	A	-	-	-	-
		Whole Int.	-	-	6.2	A	-	-	-	-
KY 146 / KY 393	Signalized	Eastbound	7.3	A	23.0	C	7.1	A	7.1	A
		Westbound	9.9	A	31.5	C	9.2	A	9.2	A
		Northbound	20.7	C	27.0	C	24.7	C	24.7	C
		Southbound	19.1	B	38.8	D	19.1	B	19.1	B
		Whole Int.	11.7	B	29.2	C	12.3	B	12.3	B
I-71 WB / KY 393	STOP Controlled (Signalized for 4c)	Westbound	-	F	93.3	F	3727.0	F	3727.0	F
		Northbound	51.9	F	82.0	F	11.0	B	11.1\0	B
		Southbound	-	-	136.1	F	-	-	-	-
		Whole Int.	-	-	88.5	F	-	-	-	-
I-71 EB / KY 393	STOP Controlled (Signalized for 4c)	Eastbound	6801.0	F	176.0	F	1036.0	F	1036.0	F
		Northbound	-	-	123.3	F	-	-	-	-
		Southbound	24.6	C	52.5	D	14.8	B	14.8	B
		Whole Int.	-	-	123.4	F	-	-	-	-
KY 53 / New Moody Lane	Signalized	Eastbound	51.6	D	51.6	D	39.8	D	39.8	D
		Westbound	60.9	E	60.9	E	65.0	E	65.0	E
		Northbound	8.9	A	8.9	A	8.7	A	8.7	A
		Southbound	14.4	B	14.4	B	13.6	B	13.6	B
		Whole Int.	18.8	B	18.8	B	17.1	B	17.1	B
I-71 EB / KY 53	Signalized	Eastbound	377.7	F	34.6	C	83.3	F	83.3	F
		Northbound	196.6	F	17.9	B	51.9	D	51.9	D
		Southbound	68.1	E	44.6	D	21.4	C	21.4	C
		Whole Int.	238.8	F	32.2	C	53.5	D	53.5	D

Table 22: Level 2 2035 Intersection LOS – AM (cont.)

Intersection	Type	Approach	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 WB / KY 53	Signalized	Westbound	103.1	F	23.0	C	34.2	C	34.2	C
		Northbound	66.3	E	58.6	E	8.9	A	8.9	A
		Southbound	15.4	B	16.7	B	13.8	B	13.8	B
		Whole Int.	56.5	E	40.2	D	14.5	B	14.5	B
KY 53 / Parker Drive	STOP Controlled	Eastbound	125.3	F	39.1	F	25.6	D	25.6	D
		Westbound	136.8	F	38.3	F	34.5	D	34.5	D
		Northbound	14.3	B	2.4	B	11.4	B	11.4	B
		Southbound	9.8	A	2.9	A	9.0	A	9.0	A
		Whole Int.	-	-	4.4	A	-	-	-	-
KY 53 / KY 146	STOP Controlled	Eastbound	23.4	C	15.2	B	23.9	C	23.9	C
		Westbound	230.1	F	36.0	D	229.2	F	229.2	F
		Northbound	68.6	F	225.4	F	35.6	E	35.6	E
		Southbound	102.8	F	16.6	B	89.9	F	89.9	F
		Whole Int.	120.8	F	64.4	E	112.6	F	112.6	F
I-71 EB / Allen Lane (New Interchange)	Signalized	Eastbound	-	-	-	-	37.0	D	37.0	D
		Northbound	-	-	-	-	41.9	D	41.9	D
		Southbound	-	-	-	-	46.6	D	46.6	D
		Whole Int.	-	-	-	-	41.2	D	41.2	D
I-71 WB / Allen Lane (New Interchange)	Signalized	Westbound	-	-	-	-	43.6	D	43.6	D
		Northbound	-	-	-	-	20.9	C	20.9	C
		Southbound	-	-	-	-	42.4	D	42.4	D
		Whole Int.	-	-	-	-	27.5	C	27.5	C

Table 23: Level 2 2035 Intersection LOS – PM

Intersection	Type	Approach	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled (Signalized for 4c)	Eastbound	2178.0	F	22.4	C	1829.0	F	1829.0	F
		Northbound	9.8	A	10.5	B	9.7	A	9.7	A
		Southbound	-	-	8.8	A	-	-	-	-
		Whole Int.	-	-	13.1	B	-	-	-	-
I-71 WB / KY 146	STOP Controlled (Signalized for 4c)	Eastbound	48.7	E	34.5	C	38.9	E	38.9	E
		Northbound	9.1	A	3.0	A	9.0	A	9.0	A
		Southbound	-	-	2.0	A	-	-	-	-
		Whole Int.	-	-	4.2	A	-	-	-	-
KY 146 / KY 393	Signalized	Eastbound	4.3	A	4.3	A	5.5	A	5.5	A
		Westbound	9.5	A	9.5	A	12.7	B	12.7	B
		Northbound	32.9	C	32.9	C	35.6	D	35.6	D
		Southbound	26.4	C	26.4	C	23.8	C	23.8	C
		Whole Int.	12.8	B	12.8	B	15.3	B	15.3	B
I-71 WB / KY 393	STOP Controlled (Signalized for 4c)	Westbound	1250.0	F	33.0	C	888.8	F	888.8	F
		Northbound	11.7	B	8.3	A	10.0	A	10.0	A
		Southbound	-	-	17.1	B	-	-	-	-
		Whole Int.	-	-	14.2	B	-	-	-	-
I-71 EB / KY 393	STOP Controlled (Signalized for 4c)	Eastbound	2511.0	F	76.8	E	1079.0	F	1079.0	F
		Northbound	-	-	43.1	D	-	-	-	-
		Southbound	11.1	B	93.8	F	10.2	B	10.2	B
		Whole Int.	-	-	70.4	E	-	-	-	-
KY 53 / New Moody Lane	Signalized	Eastbound	31.6	C	31.6	C	32.2	C	32.2	C
		Westbound	58.9	E	58.9	E	35.1	D	35.1	D
		Northbound	22.3	C	22.3	C	25.5	C	25.5	C
		Southbound	21.4	C	21.4	C	24.4	C	24.4	C
		Whole Int.	25.3	C	25.3	C	26.8	C	26.8	C
I-71 EB / KY 53	Signalized	Eastbound	656.9	F	65.5	E	281.2	F	281.2	F
		Northbound	173.9	F	54.6	D	31.4	C	31.4	C
		Southbound	20.9	C	30.8	C	11.2	B	11.2	B
		Whole Int.	213.8	F	48.5	D	60.8	E	60.8	E

Table 23: Level 2 2035 Intersection LOS – PM (cont.)

Intersection	Type	Approach	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 WB / KY 53	Signalized	Westbound	70.4	E	37.7	D	38.1	D	38.1	D
		Northbound	378.2	F	394.4	F	53.5	D	53.5	D
		Southbound	53.0	D	49.2	D	50.7	D	50.7	D
		Whole Int.	241.8	F	247.5	F	51.5	D	51.5	D
KY 53 / Parker Drive	STOP Controlled	Eastbound	318.5	F	53.1	D	37.0	E	37.0	E
		Westbound	-	F	35.1	D	46.3	E	46.3	E
		Northbound	14.6	B	13.5	B	11.4	B	11.4	B
		Southbound	14.1	B	3.7	A	11.5	B	11.5	B
		Whole Int.	-	-	11.5	B	-	-	-	-
KY 53 / KY 146	STOP Controlled	Eastbound	167.0	F	42.6	D	208.9	F	208.9	F
		Westbound	53.4	F	87.6	F	59.3	F	59.3	F
		Northbound	310.0	F	108.9	F	157.0	F	157.0	F
		Southbound	33.8	D	17.3	B	34.3	D	34.3	D
		Whole Int.	153.6	F	69.0	E	130.3	F	130.3	F
I-71 EB / Allen Lane (New Interchange)	Signalized	Eastbound	-	-	-	-	25.2	C	25.2	C
		Northbound	-	-	-	-	29.7	C	29.7	C
		Southbound	-	-	-	-	16.9	B	16.9	B
		Whole Int.	-	-	-	-	25.4	C	25.4	C
I-71 WB / Allen Lane (New Interchange)	Signalized	Westbound	-	-	-	-	37.6	D	37.6	D
		Northbound	-	-	-	-	20.0	B	20.0	B
		Southbound	-	-	-	-	39.2	D	39.2	D
		Whole Int.	-	-	-	-	28.1	C	28.1	C

Table 24: Level 2 2035 Ramp Junction LOS

Direction	Route	Type	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			AM	PM	AM	PM	AM	PM	AM	PM
EB	KY 146	Diverge	D	E	D	E	D	E	D	E
EB	KY 146	Merge	D	E	D	E	D	E	D	E
EB	KY 393	Diverge	D	E	D	E	C	E	D	E
EB	KY 393	Merge	C	C	C	C	C	D	C	D
EB	C/D Road	Diverge	-	-	-	-	-	-	D	E
EB	C/D Road	Merge	-	-	-	-	-	-	B	C
EB	New Interchange	Diverge	-	-	-	-	C	D	B	B
EB	New Interchange	Merge	-	-	-	-	C	D	B	A
EB	KY 53	Diverge	C	D	C	D	C	D	B	A
EB	KY 53	Merge	B	D	B	D	B	C	A	A
WB	KY 53	Diverge	B	B	B	B	C	C	A	A
WB	KY 53	Merge	C	C	C	C	C	C	A	B
WB	New Interchange	Diverge	-	-	-	-	C	C	B	B
WB	New Interchange	Merge	-	-	-	-	D	D	C	B
WB	C/D Road	Diverge	-	-	-	-	-	-	C	C
WB	C/D Road	Merge	-	-	-	-	-	-	D	D
WB	KY 393	Diverge	D	D	D	D	E	E	E	E
WB	KY 393	Merge	D	C	D	C	E	D	E	D
WB	KY 146	Diverge	E	D	E	D	E	D	E	D
WB	KY 146	Merge	E	C	E	C	E	C	E	C

Figure 44: Level 2 - Scenario 3 (MTP+) - 2035 Levels of Service

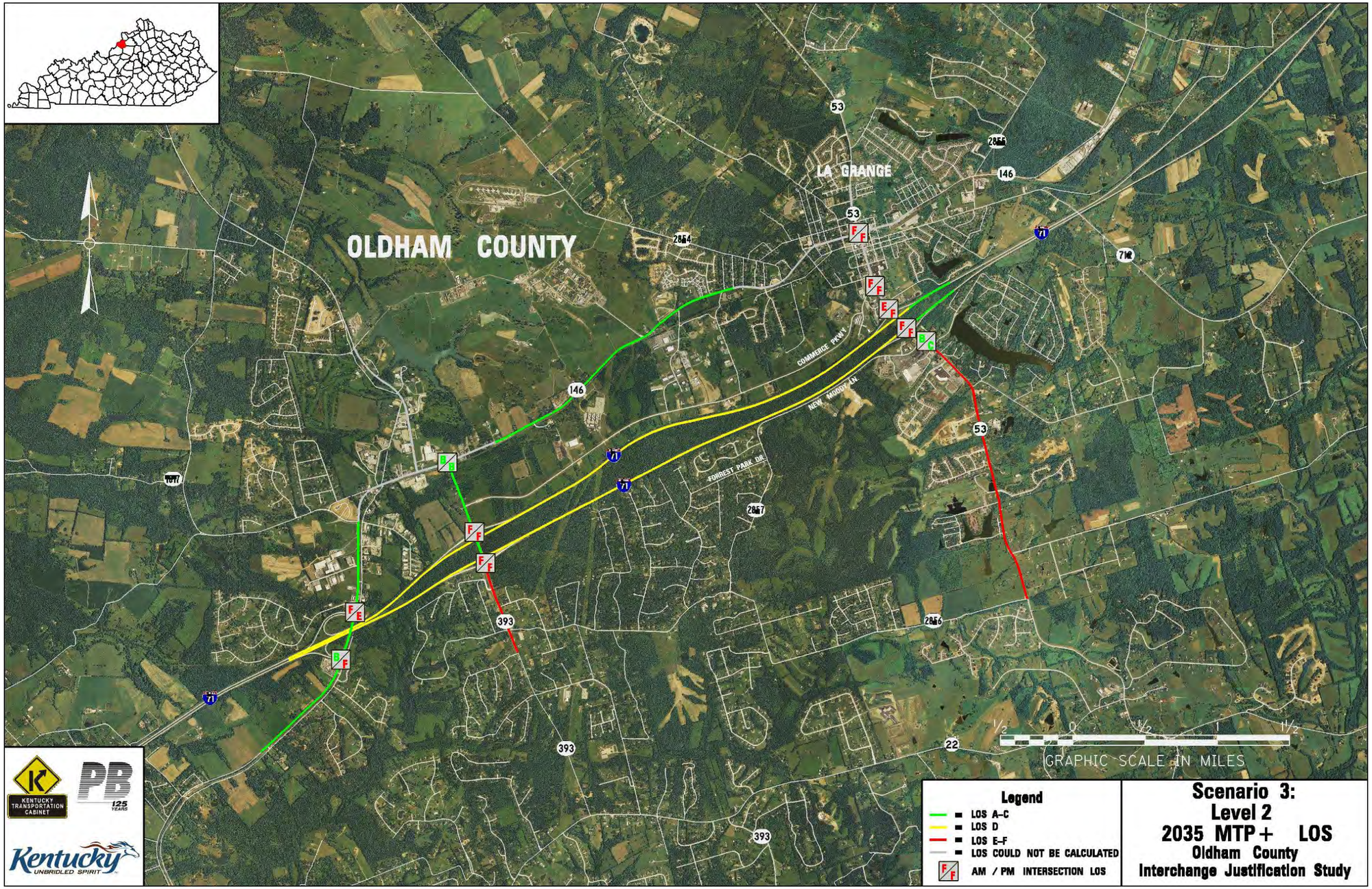


Figure 45: Level 2 - Scenario 4c (TSM) - 2035 Levels of Service

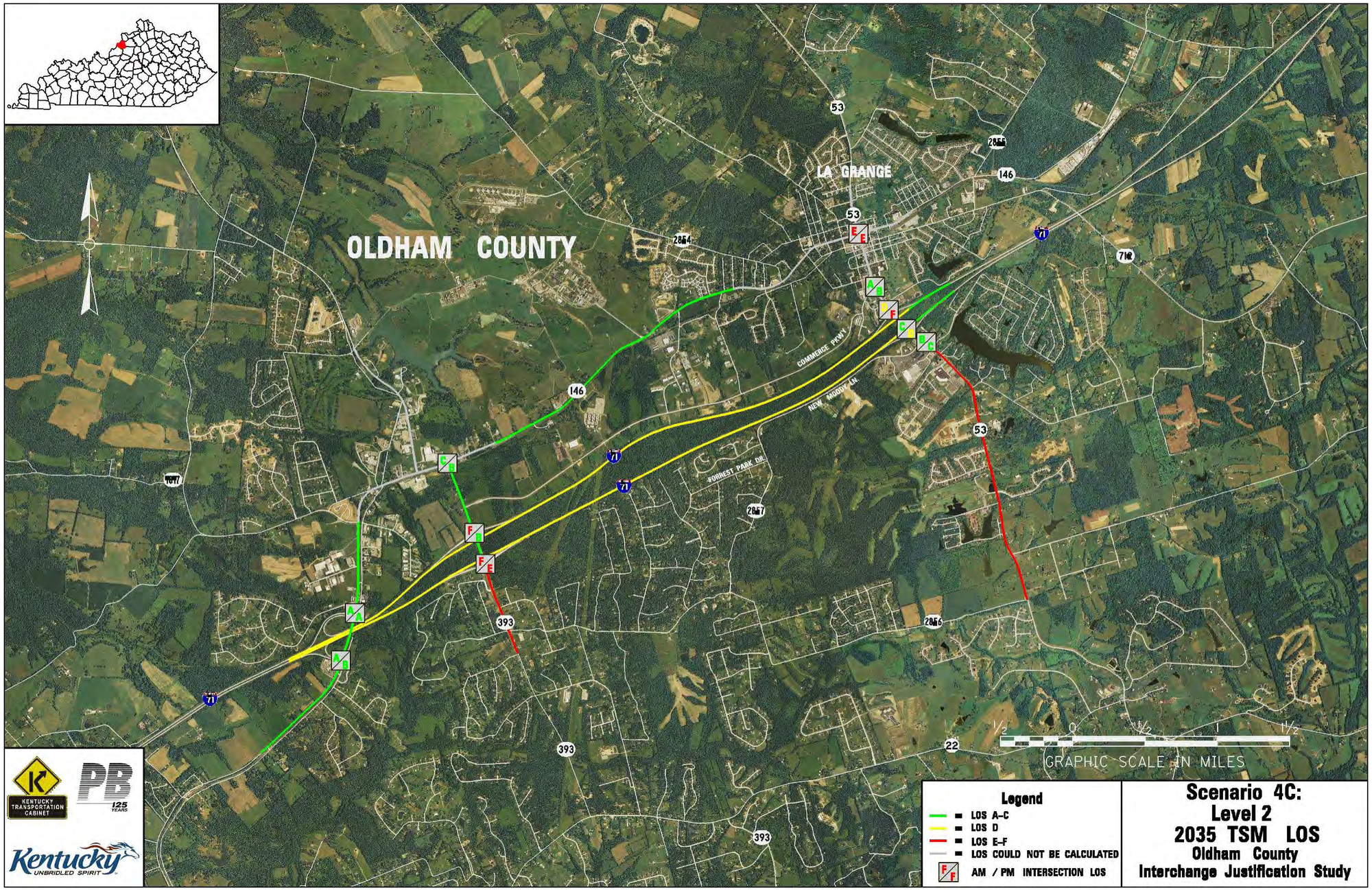


Figure 46: Level 2 - Scenario 5 (Standard Diamond Interchange) - 2035 Levels of Service

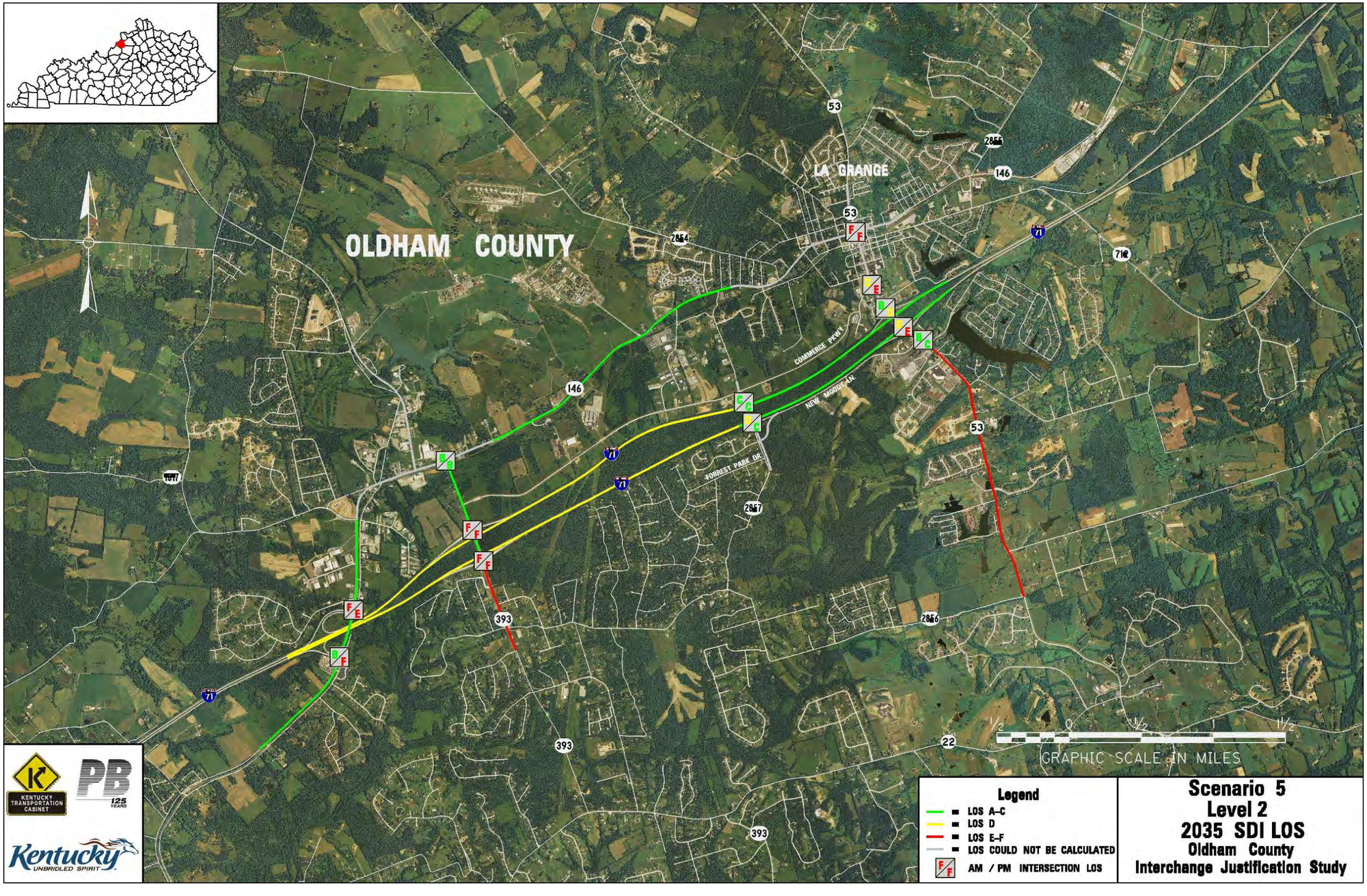
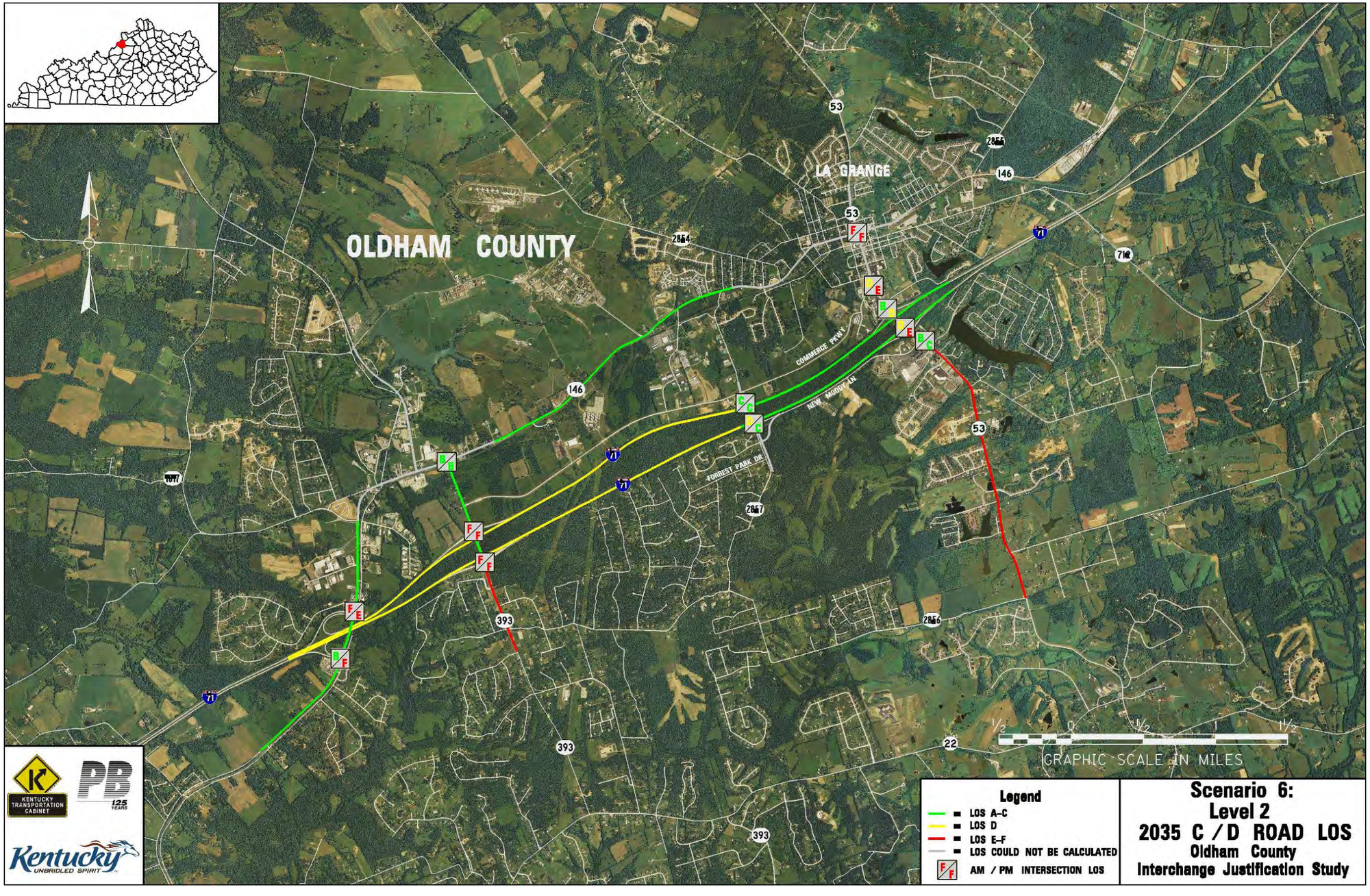


Figure 47: Level 2 - Scenario 6 (Interchange with C / D Road) - 2035 Levels of Service



8.5 Queue Length

With the more detailed evaluation of the remaining scenarios, it was necessary to review queue lengths at the interchange intersections to determine if there is any backup onto I-71. Similar to the methodology used in the existing facilities section (Section 4.4), the 95th percentile queue was determined from the HCS+ output and multiplied by 22 feet (average vehicle length plus distance between adjacent vehicle). **Table 25** shows the results of the evaluation.

The analysis shows that with Scenario 3, there will be vehicle queues which exceed the current storage capacity and may backup onto the mainline. The locations where this may happen are:

- KY 53 northbound off-ramp (AM and PM peak periods)
- KY 393 northbound off-ramp (PM peak period)

Both the TSM and interchange (Scenarios 4c, 5 and 6) address this issue and do not have any queues that exceed the available storage.

8.5.1 Arterial System Operations

There are no substantial changes to LOS from a segment capacity perspective from the Level 1 analysis. At the local intersection level, there are some changes resulting from the changes to traffic volumes. Generally, it can be said that Scenarios 4c, 5 and 6 improve traffic operations compared to Scenario 3. Several intersections operate at a better LOS under Scenario 4c given that improvements are made to intersection capacity such as adding a turn lane or signalizing the intersection. There are some intersections that do operate better (and at an acceptable LOS) under Scenarios 5 and 6 without any additional capacity improvements. The intersections that do improve include I-71 WB / KY 53 and KY 53 / Parker Drive in the AM peak period. During the PM peak period, the KY 53 / New Moody Lane and I-71 WB and KY 53 intersections operate at a better LOS in Scenarios 5 and 6 compared to Scenario 4c.

The number of turn lanes had to be increased for the new interchange when performing the intersection LOS analysis given the additional volume now utilizing this interchange. From I-71 eastbound, there will need to be separate left and right turn lanes and a separate southbound left turn lane to get on I-71 eastbound. In the westbound direction, from I-71 westbound there will need to be separate left and right turn lanes as well as dual lefts turning from Allen Lane to I-71 westbound.

From an intersection level of analysis, overall some improvements can be made to make the intersections operate at a better LOS, but there are some locations / approaches that will continue to operate poorly.

8.6 Cost Estimates

As with Level 1, each scenario was also evaluated in terms of its overall costs. Costs are shown as 2010 constant dollars. Right-of-way and utility costs were not estimated at this time and would need to be determined from further analysis and evaluation.

For this level of analysis, costs for each specific improvement are listed for Scenario 4c (TSM). **Table 26** shows these costs. The costs range from $160,000 to $550,000. The highest cost is for improvements at the eastbound I-71 / KY 53 intersection as this intersection requires multiple turn lane construction. The total cost for all spot improvements under the Scenario 4c is approximately $1,560,000.

Table 27 provides the costs for Scenario 5 (standard diamond interchange). The overall cost for this scenario is approximately $18,800,000.

Table 28 provides the costs for Scenario 6 (C/D Road). The overall cost for this scenario is approximately $35,000,000.

As shown, the costs for Scenario 4c are substantially lower than that for Scenarios 5 and 6 (new interchange). This could change somewhat, however, once a true assessment of right-of-way impacts is made for each of the improvements.

8.7 Model Sensitivity Analysis

Each of the scenarios tested to this point utilized the socioeconomic forecasts presented to the PDT by KIPDA. For a similar comparison among alternatives, the forecasts were not adjusted. The forecasts in the traffic analysis zones reflect forecasts prepared by Oldham County during the last update to the KIPDA model. The forecasts were approved as part of KIPDA's certification process with FHWA and reflect future year MTP conditions.

As part of the March 10, 2010 meeting with officials with the Oldham County Planning and Zoning, the attendees noted growth estimates in the current KIPDA model may be lower than recent revisions to those estimates. This was substantiated by the report by Dr. Coomes mentioned in Chapter 2 of this report.

Upon further investigation, three zones within the KIPDA model were analyzed in more detail. These included:

- Zone 611 – this zone represents households and employment in the area designated for Commerce Parkway developments.
- Zone 633 – this zone represents land use west of the Oldham Reserve zone and south of Zone 611 (south of I-71). This is same zone previously discussed in this chapter for which the select link analysis was conducted.
- Zone 634 – this zone represents the area designated for the Oldham Reserve development.

Table 25: Level 2 Queue Lengths

Location	Evaluation	Scenario 3: MTP+		Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
	Description	AM	PM	AM	PM	AM	PM	AM	PM
KY 53 NB Off Ramp	Queue (# vehicles)	194	150	27	31	52	60	52	60
	Queue Length (ft)	4,268	3,300	594	682	1,144	1,320	1,144	1,320
	Ramp Length	1,455	1,455	1,455	1,455	1,455	1,455	1,455	1,455
	Mainline Impact	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**
KY 53 SB Off Ramp	Queue (# vehicles)	22	21	7	9	11	9	11	9
	Queue Length (ft)	484	462	154	198	242	198	242	198
	Ramp Length	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
New Interchange NB Off Ramp	Queue (# vehicles)	-	-	-	-	31	26	31	26
	Queue Length (ft)	-	-	-	-	682	572	682	572
	Ramp Length	-	-	-	-	1,455	1,455	1,455	1,455
	Mainline Impact	**-**	**-**	**-**	**-**	**No**	**No**	**No**	**No**
New Interchange SB Off-Ramp	Queue (# vehicles)	-	-	-	-	9	4	9	4
	Queue Length (ft)	-	-	-	-	198	88	198	88
	Ramp Length	-	-	-	-	1,280	1,280	1,280	1,280
	Mainline Impact	**-**	**-**	**-**	**-**	**No**	**No**	**No**	**No**
KY 393 NB Off Ramp	Queue (# vehicles)	63	135	41	27	23	53	23	53
	Queue Length (ft)	1,386	2,970	902	594	506	1,166	506	1,166
	Ramp Length	1,845	1,845	1,845	1,845	1,845	1,845	1,845	1,845
	Mainline Impact	**No**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**
KY 393 SB Off Ramp	Queue (# vehicles)	-	36	9	6	54	39	54	39
	Queue Length (ft)	-	792	198	132	1,188	858	1,188	858
	Ramp Length	-	1,670	1,670	1,670	1,670	1,670	1,670	1,670
	Mainline Impact	**-**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
KY 146 NB Off Ramp	Queue (# vehicles)	2	63	4	15	2	57	2	57
	Queue Length (ft)	44	1,386	88	330	44	1,254	44	1,254
	Ramp Length	1,845	1,845	1,845	1,845	1,845	1,845	1,845	1,845
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
KY 146 SB Off Ramp	Queue (# vehicles)	15	3	6	3	8	2	8	2
	Queue Length (ft)	330	66	132	66	176	44	176	44
	Ramp Length	2,350	2,350	2,350	2,350	2,350	2,350	2,350	2,350
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Table 26: Level 2 Evaluation Scenario 4c Planning Level Cost Estimate

ITEM	I-71 EB/KY 146	I-71WB/KY 146	I-71 WB/KY 53	I-71 EB/KY 53	KY 53/KY 146	KY 53/PARKER
	ESTIMATED COST	ESTIMATED COST	ESTIMATED COST	ESTIMATED COST	ESTIMATED COST	ESTIMATED COST
PAVEMENT	$53,000	$60,000	$80,000	$180,000	$0	$0
GRADING, DRAINAGE, AND EROSION CONTROL	$45,000	$40,000	$60,000	$110,000	$0	$0
STRUCTURES	$0	$0	$0	$0	$0	$0
MAINTENANCE OF TRAFFIC	$18,000	$18,000	$18,000	$26,000	$0	$0
SIGNALIZATION	$0	$0	$0	$0	$120,000	$120,000
GUARDRAIL	$0	$0	$9,000	$8,000	$0	$0
LIGHTING	$24,000	$18,000	$34,000	$63,000	$0	$0
SIGNING	$10,000	$3,000	$23,000	$23,000	$0	$0
STRIPING	$1,100	$1,000	$1,000	$2,000	$0	$0
MISCELLANEOUS	$0	$0	$0	$0	$0	$0
MOBILIZATION / DEMOBILIZATION	$10,000	$10,000	$15,000	$28,000	$10,000	$10,000
CONSTRUCTION TOTAL:	**$160,000**	**$150,000**	**$240,000**	**$440,000**	**$130,000**	**$130,000**
15% CONTINGENCY:	**$24,000**	**$25,000**	**$36,000**	**$66,000**	**$20,000**	**$20,000**
DESIGN:	**$16,000**	**$15,000**	**$24,000**	**$44,000**	**$10,000**	**$10,000**
TOTAL (INCLUDING CONTINGENCY AND DESIGN):	**$200,000**	**$190,000**	**$300,000**	**$550,000**	**$160,000**	**$160,000**
TOTAL COST (FOR ALL PROJECTS	**$1,560,000**					

NOTES:
1. Estimated costs are based on 2010 constant dollars.
2. Roadway and traffic construction quantities based on conceptual alternates.
3. Earthwork assumed at $6 a cubic yard.

Table 27: Level 2 Evaluation Scenario 5 Planning Level Cost Estimate

ITEM	ESTIMATED COST
PAVEMENT	$3,500,000
GRADING, DRAINAGE, AND EROSION CONTROL	$1,200,000
CROSSROADS AND RAMPS EARTHWORK	$700,000
STRUCTURES	$6,400,000
MAINTENANCE OF TRAFFIC	$600,000
SIGNALIZATION	$360,000
GUARDRAIL	$80,000
LIGHTING	$480,000
SIGNING	$350,000
STRIPING	$20,000
MISCELLANEOUS	$460,000
MOBILIZATION / DEMOBILIZATION	$920,000
CONSTRUCTION TOTAL:	**$15,000,000**
15% CONTINGENCY:	**$2,300,000**
DESIGN:	**$1,500,000**
TOTAL (INCLUDING CONTINGENCY AND DESIGN):	**$18,800,000**

NOTES:

1. Estimated costs are based on 2010 constant dollars.
2. Roadway and traffic construction quantities are based on conceptual alternates.
3. Earthwork assumed at $6 a cubic yard.

Table 28: Level 2 Evaluation Scenario 6 Planning Level Cost Estimate

ITEM	ESTIMATED COST
PAVEMENT	$13,000,000
GRADING, DRAINAGE, AND EROSION CONTROL	$3,400,000
CROSSROADS AND RAMPS EARTHWORK	$300,000
STRUCTURES	$6,200,000
MAINTENANCE OF TRAFFIC	$1,200,000
SIGNALIZATION	$400,000
GUARDRAIL	$1,000,000
LIGHTING	$770,000
SIGNING	$580,000
STRIPING	$50,000
MISCELLANEOUS	$900,000
MOBILIZATION / DEMOBILIZATION	$2,000,000
CONSTRUCTION TOTAL:	**$27,800,000**
15% CONTINGENCY:	**$4,200,000**
DESIGN:	**$2,800,000**
TOTAL (INCLUDING CONTINGENCY AND DESIGN):	**$35,000,000**

NOTES:

1. Estimated costs are based on 2010 constant dollars.
2. Roadway and traffic construction quantities are based on conceptual alternates.
3. Earthwork assumed at $6 a cubic yard.

Table 29 represents Year 2000 socioeconomic data in the KIPDA model for these three zones while **Table 30** represents Year 2030 data.

Table 29: Year 2000 Socioeconomic Data

KIPDA Zone ID	Zone Description	Year 2000					
		Population	Households	Total Emp.	Retail Emp.	Service Emp.	Other Emp.
611	Commerce Parkway Developments	65	20	73	11	4	58
633	Zone west of Oldham Reserve Development	1127	373	74	1	25	48
634	Oldham Reserve Development	1768	633	1021	504	437	80

Table 30: Year 2030 Socioeconomic Data

KIPDA Zone ID	Zone Description	Year 2030					
		Population	Households	Total Emp.	Retail Emp.	Service Emp.	Other Emp.
611	Commerce Parkway Developments	936	395	1886	73	103	1710
633	Zone west of Oldham Reserve Development	2054	706	632	120	214	298
634	Oldham Reserve Development	4844	1669	3231	1017	154	2060

Comparing the two tables, the KIPDA model predicts each zone is expected to substantially grow with respect to population, households, and employment. The employment forecasts for the Commerce Parkway and Oldham Reserve zones (611 and 634) seemed logical based on a conversation with KIPDA. However, the employment total was much lower than the maximum of 11,000 additional employees predicted in the Coomes report.

Two adjustments were made to the model to address each of the concerns previously mentioned. The changes included:

1. Removing the anticipated employment growth in Zone 633 (to eliminate the probable error in the model discussed at the beginning of this chapter).
2. Doubling the employment estimate in the Oldham Reserve zone. While this is still less than the employment forecasts in the Coomes report, it was considered a substantial change to that zone which would have a direct impact on the I-71 corridor and the rest of the system under evaluation.

The results indicated:

- The new trips from the additional employment attributed to the changes in employment were spread throughout the local system.
- Most of the trips stayed within Oldham County as opposed to being attracted toward the Louisville Metro area.
- The proposed new interchange received a higher percentage of new trips when compared to KY 53 and KY 393. This is due to the close proximity of the proposed Ring Road around the Oldham Reserve development.

8.8 Purpose and Need Compatibility

As during the Level 1 analysis, the remaining scenarios were re-evaluated on how well they addressed each of the points outlined by the project's Purpose and Need statement. The following matrix (**Table 31**) outlines that evaluation. As shown on the table, red indicates an evaluation scenario does not meet the purpose and need criteria, yellow means it moderately addresses the purpose and need criteria, and green indicates it meets the purpose and need criteria. Overall, the interchange evaluation scenarios (5 and 6) best meets the purpose and need as shown on the following table.

Table 31: Level 2 Purpose and Need Evaluation Matrix

Scenario	Description	PURPOSE AND NEED								Total Rating Number
		Increase mobility and accessibility	Reduce travel times and overall delay	Improve safety of local network	Reduce emergency response times	Provide access to developing areas	Create a "middle connector"	Provide a western "bypass"	Provide outlet when I-71 is shutdown	
3	MTP+	3	3	3	2	3	1	2	3	**20**
4c	TSM	3	4	3	2	3	1	1	3	**20**
5	Standard Diamond Interchange	5	5	5	5	5	5	3	5	**38**
6	C-D Road with Interchange	5	5	5	5	5	5	3	5	**38**

1	Lowest
2	
3	
4	
5	Highest

9.0 EVALUATION OF LEVEL 1 AND LEVEL 2 ANALYSIS

The Level 1 analysis consisted of seven different evaluation scenarios. These included the following:

- Scenario 1: MTP
- Scenario 2: MTP-
- Scenario 3: MTP+
- Scenario 4a: TSM
- Scenario 4b: TSM with bypass
- Scenario 5: Standard Interchange
- Scenario 6: Interchange with Collector / Distributor Road

The scenarios moved forward into the second level of analysis (Level 2) included:

- Scenario 3: MTP+
- Scenario 5: Standard Interchange
- Scenario 6: Interchange with Collector / Distributor Road

A new scenario was added (Scenario 4c) in place of Scenarios 4a and 4b to represent a true TSM option as the other ones included widening options that did not necessarily fit with the TSM description.

As shown in Chapter 8, the results of the Level 2 analysis showed operational improvement at the intersection level for Scenario 4c. There was some operational improvement at the intersection level with both Scenarios 5 and 6, as well as some operational improvement along I-71 with Scenario 6. Overall, one scenario does not address all of the operational issues identified within the study area. As a result, after presenting the analysis to the PDT during a meeting on October 29, 2010, it was determined that an upgraded TSM option as well as a standard interchange with TSM improvements and an interchange with a collector / distributor road and TSM improvements should be analyzed to determine what would be required to improve all segments and intersections to an acceptable LOS (LOS D or better). Scenarios 5 and 6 in combination with arterial widening projects and capacity enhancing spot improvements were analyzed. Widening projects were added to Scenario 4c along with several spot projects that originally were considered to be a higher magnitude of work than a typical TSM project. The full list of improvement projects proposed for these alternatives based on the need to achieve acceptable LOS throughout the system at both intersections and segments is provided below.

Scenario 4c:

- Option 4c-1 – I-71 Eastbound Ramps / KY 146: This option considers the widening of the eastbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. A traffic signal is also proposed.
- Option 4c-2 – I-71 Westbound Ramps / KY 146: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. A traffic signal is also proposed.
- Option 4c-3 – I-71 Westbound and Eastbound / KY 393: This option considers signalizing both intersections and adding a second northbound left turn lane onto I-71 westbound from KY 393 and adding a free-flow right turn lane from I-71 eastbound to KY 393 southbound. It includes widening the interchange to provide four through lanes (two per direction) through the interchange.
- Option 4c-4 – I-71 Westbound Ramps / KY 53: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 53 and a second northbound left turn lane onto I-71. As a result of the second turn lane, the bridge over I-71 westbound must be widened.
- Option 4c-5 – I-71 Eastbound Ramps / KY 53: This option considers the widening of the eastbound off-ramp to include a dual right turn movement and a separate left turn lane.
- Option 4c-6 – KY 53 / Parker Drive Intersection: This option considers the signalization of the intersection.
- Option 4c-7 – KY 53 south of I-71: This option considers widening KY 53 to 4 lanes from KY 2856 to I-71 (approximately 2 miles).
- Option 4c-8 – KY 393 south of I-71: This option considers paving a second northbound lane along KY 393 between KY 2856 and I-71 to make this a true 4-lane section.
- Option 4c-9 – I-71 Eastbound to KY 146: This option considers extending the deceleration lane from I-71 eastbound to KY 146 to a minimum of 1100 feet.
- Option 4c-10 – I-71 Eastbound to KY 393: This option considers extending the deceleration lane from I-71 eastbound to KY 393 to a minimum of 800 feet.
- Option 4c-11 – I-71 Westbound to KY 146: This option considers extending the deceleration lane from I-71 westbound to KY 146 to a minimum of 1100 feet.
- Option 4c-12 – KY 146 to I-71 Westbound: This option considers extending the acceleration lane from KY 146 to I-71 westbound to a minimum of 800 feet.

Scenario 5:

- Option 5-0 – Standard Diamond Interchange (SDI): This scenario includes the SDI (new structure and ramps only).
- Option 5-1 – KY 53 south of I-71: This option considers widening KY 53 to 4 lanes from KY 2856 to I-71 (approximately 2 miles).
- Option 5-2 – KY 393 south of I-71: This option considers paving a second northbound lane along KY 393 between KY 2856 and I-71 to make this a true 4-lane section.
- Option 5-3 – I-71 Westbound Ramps / KY 146: This option considers the signalization of the intersection.
- Option 5-4 – I-71 Eastbound Ramps / KY 146: This option considers the signalization of the intersection.
- Option 5-5 – I-71 Westbound and Eastbound / KY 393: This option considers signalizing both intersections and adding a second northbound left turn lane onto I-71 westbound from KY 393 and adding a free-flow right turn lane from I-71 eastbound to KY 393 southbound. It

includes widening the interchange to provide four through lanes (two per direction) through the interchange.

- Option 5-6 – I-71 Eastbound Ramps / KY 53: This option considers the widening of the eastbound off ramp to separate the left and right turn lanes onto KY 53.
- Option 5-7 – KY 53 / Parker Drive Intersection: This option considers the signalization of the intersection.
- Option 5-8 – I-71 Eastbound to KY 146: This option considers extending the deceleration lane from I-71 eastbound to KY 146 to a minimum of 800 feet.
- Option 5-9 – I-71 Eastbound to KY 393: This option considers extending the deceleration lane from I-71 eastbound to KY 393 to a minimum of 1000 feet.
- Option 5-10 – I-71 Westbound to KY 393: This option considers extending the deceleration lane form I-71 westbound to KY 393 to a minimum of 800 feet.
- Option 5-11 – KY 393 to I-71 Westbound: This option considers extending the acceleration lane from KY 393 to I-71 westbound to a minimum of 1100 feet.
- Option 5-12 – I-71 Westbound to KY 146: This option considers extending the deceleration lane from I-71 westbound to KY 146 to a minimum of 1100 feet.
- Option 5-13 – KY 146 to I-71 Westbound: This option considers extending the acceleration lane from KY 146 to I-71 westbound to a minimum of 800 feet.
- Option 5-14 – I-71 Auxiliary Lane: This option considers adding an auxiliary lane between the new standard diamond interchange at Allen Lane and the existing KY 53 interchange on both directions of I-71.
- Option 5-15 – KY 53 Bridge over I-71: This option considers widening the KY 53 bridges over I-71 to accommodate I-71 as a 6-lane facility. Two bridges must be widened as part of this project; one over I-71 westbound and one over I-71 eastbound.
- Option 5-16 – I-71 Widening: This option considers widening I-71 to 6 lanes throughout the study area. This does not include structures.
- Option 5-17 – KY 393 Bridge over I-71: This option considers widening the KY 393 bridge over I-71 to accommodate I-71 as a 6 lane facility.
- Option 5-18 – KY 146 Bridge over I-71: This option considers widening the KY 146 bridge over I-71 to accommodate I-71 as a 6 lane facility.

Scenario 6:

- Option 6-0 – This scenario includes the Standard Diamond Interchange and the C / D road. This includes structure and ramps for new interchange, retaining wall at KY 53 interchange, and new pavement for C / D road.
- Option 6-1 – KY 53 south of I-71: This option considers widening KY 53 to 4 lanes from KY 2856 to I-71 (approximately 2 miles).
- Option 6-2 – KY 393 south of I-71: This option considers paving a second northbound lane along KY 393 between KY 2856 and I-71 to make this a true 4-lane section.
- Option 6-3 – I-71 Westbound Ramps / KY 146: This option considers the signalization of the intersection.
- Option 6-4 – I-71 Eastbound Ramps / KY 146: This option considers the signalization of the intersection.
- Option 6-5 – I-71 Westbound and Eastbound / KY 393: This option considers signalizing both intersections and adding a second northbound left turn lane onto I-71 westbound from KY 393 and adding a free-flow right turn lane from I-71 eastbound to KY 393 southbound. It includes widening the interchange to provide four through lanes (two per direction) through the interchange.
- Option 6-6 – I-71 Eastbound Ramps / KY 53: This option considers the widening of the eastbound off ramp to separate the left and right turn lanes onto KY 53.
- Option 6-7 – KY 53 / Parker Drive Intersection: This option considers the signalization of the intersection.
- Option 6-8 – I-71 Eastbound to KY 146: This option considers extending the deceleration lane from I-71 eastbound to KY 146 to a minimum of 800 feet.
- Option 6-9 – I-71 Eastbound to KY 393: This option considers extending the deceleration lane from I-71 eastbound to KY 393 to a minimum of 1000 feet.
- Option 6-10 – I-71 Westbound to KY 393: This option considers extending the deceleration lane form I-71 westbound to KY 393 to a minimum of 800 feet.
- Option 6-11 – KY 393 to I-71 Westbound: This option considers extending the acceleration lane from KY 393 to I-71 westbound to a minimum of 1100 feet.
- Option 6-12 – I-71 Westbound to KY 146: This option considers extending the deceleration lane from I-71 westbound to KY 146 to a minimum of 1100 feet.
- Option 6-13 – KY 146 to I-71 Westbound: This option considers extending the acceleration lane from KY 146 to I-71 westbound to a minimum of 800 feet.
- Option 6-14 – KY 53 Bridge over I-71: This option considers widening the KY 53 bridges over I-71 to accommodate I-71 as a 6-lane facility. Two bridges must be widened as part of this project; one over I-71 westbound and one over I-71 eastbound.
- Option 6-15 – I-71 Widening: This option considers widening I-71 to 6 lanes throughout the study area. This does not include structures.
- Option 6-16 – KY 393 Bridge over I-71: This option considers widening the KY 393 bridge over I-71 to accommodate I-71 as a 6 lane facility.
- Option 6-17 – KY 146 Bridge over I-71: This option considers widening the KY 146 bridge over I-71 to accommodate I-71 as a 6 lane facility.

The three scenarios share many of the same improvements. In general, Scenarios 5 and 6 are the same with the addition of the C/D road in Scenario 6. Scenario 4c requires additional widening of the I-71 EB and WB ramps at KY 146 in addition to signalizing these intersections (which is an option for all three scenarios). Scenario 4c requires widening the I-71 WB ramp, while no widening of that ramp is required for Scenarios 5 and 6. The I-71 EB and KY 53 off ramp is widened to allow for separate left and right turn lanes in all three scenarios, however in Scenario 4c dual right turn lanes are required. Scenarios 5 and 6 require extending the deceleration lane from I-71 WB to KY 393 and the acceleration lane from KY 393 to I-71 WB, while these improvements are not necessary for Scenario 4c. Scenario 6 also requires extending the deceleration lane from I-71 to the C/D road. Options to add an auxiliary lane between the new standard diamond interchange and the existing KY 53 interchange as well as widen I-71 to 6 lanes and widen all of the bridges on KY 146, KY 393 and KY 53 so they can accommodate a 6 lane facility are included in Scenarios 5 and 6; however, they are not required for these scenarios to operate at an acceptable level of service.

Tables 32 – 35 show the segment, intersection, and ramp merge and diverge LOS for the three scenarios with the improvement options listed above. (The options that include adding an auxiliary lane between the new standard diamond interchange and the KY 53 interchange, as well as the options to widen I-71 to 6 lanes and widen the bridges on KY 146, KY 393 and KY 53 to accommodate a 6 lane facility are not included for the LOS analysis.) **Table 36** shows the queue lengths. **Figures 48, 49** and **50** show the segment and intersection LOS for each scenario on a map. As can be seen from this analysis, all segments operate at an acceptable LOS as does all merge / diverge areas. All intersections operate at an acceptable LOS overall with the exception of the KY 146 / KY 53 intersection. This intersection is in the downtown LaGrange area, surrounded by businesses and buildings that prevent additional build-out of the intersection. Signalizing the intersection does not solve the operational issues at this location and without the ability to construct additional turn lanes (without impacting the surrounding buildings), this intersection remains at a poor operating LOS. It should be noted that there are a few approaches for other intersections that also operate at a poor LOS, but overall the intersection operations are improved to a LOS D or better. The queue length analysis did not show any vehicle queues that exceed the given storage on the ramps evaluated.

Table 32: Scenarios 4c, 5 & 6 2035 Segment LOS

Route	Section	Begin Milepoint	End Milepoint	Scenario 4C: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Standard Diamond Interchange with C-D Road	
				Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.7	D	62.4	D	62.4	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.4	D	61.0	D	61.0	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	67.1	D	64.2	D	64.2	D
		20.XXX (Allen Lane)	21.869 (KY 53)	67.1	D	68.4	C	69.8	C
	4	21.869 (KY 53)	22.250 (East of KY 53)	69.7	C	69.7	C	69.7	C
C-D	1	C-D Begin	C-D End	--	--	--	--	55.0	A
KY 146	1	5.000 (Old LaGrange Road	5.763 (Old LaGrange Road)	55.0	B	55.0	B	55.0	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	55.0	B	55.0	B	55.0	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	45.0	C	45.0	C	45.0	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	45.0	C	45.0	C	45.0	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	55.0	B	55.0	B	55.0	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	45.0	B	45.0	B	45.0	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*

Table 32: Scenarios 4c, 5 & 6 2035 Segment LOS (cont.)

Route	Section	Begin Milepoint	End Milepoint	Scenario 4C: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Standard Diamond Interchange with C-D Road	
				Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS	Est. Travel Speed (MPH)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	45.0	B	45.0	B	45.0	B
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	45.0	B	45.0	B	45.0	B
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	45.0	B	45.0	B	45.0	B
	4	5.890 (North of Market Street)	6.296 (I-71)	45.0	B	45.0	B	45.0	B
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	45.0	C	45.0	C	45.0	C
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	45.0	C	45.0	C	45.0	C
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	45.0	C	45.0	C	45.0	C
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	45.0	A	45.0	A	45.0	A
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	45.0	A	45.0	A	45.0	A
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*

Notes:

- 2035 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report and 2035 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report and Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM and Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum

Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Table 33: Scenarios 4c, 5 & 6 2035 AM Intersection LOS

Intersection	Type	Approach	Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled (Signalized for 4c,5 & 6)	Eastbound	20.3	C	20.8	C	20.8	C
		Northbound	5.0	A	5.9	A	5.9	A
		Southbound	4.6	A	5.4	A	5.4	A
		Whole Int.	9.4	A	10.1	B	10.1	B
I-71 WB / KY 146	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	27.9	C	28.6	C	28.6	C
		Northbound	3.3	A	3.2	A	3.2	A
		Southbound	4.1	A	3.7	A	3.7	A
		Whole Int.	6.2	A	5.4	A	5.4	A
KY 146 / KY 393	Signalized	Eastbound	23.0	C	7.1	A	7.1	A
		Westbound	31.5	C	9.2	A	9.2	A
		Northbound	27.0	C	24.7	C	24.7	C
		Southbound	38.8	D	19.1	B	19.1	B
		Whole Int.	29.2	C	12.3	B	12.3	B
I-71 WB / KY 393	STOP Controlled (Signalized for 4c, 5 & 6)	Westbound	47.8	D	37.9	D	37.9	D
		Northbound	8.2	A	17.4	B	17.4	B
		Southbound	51.2	D	40.8	D	40.8	D
		Whole Int.	17.4	B	20.8	C	20.8	C
I-71 EB / KY 393	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	155.8	F	126.9	F	126.9	F
		Northbound	8.0	A	11.4	B	11.4	B
		Southbound	106.2	F	122.1	F	122.1	F
		Whole Int.	44.4	D	36.1	D	36.1	D
KY 53 / New Moody Lane	Signalized	Eastbound	51.6	D	39.8	D	39.8	D
		Westbound	60.9	E	65.0	E	65.0	E
		Northbound	8.9	A	8.7	A	8.7	A
		Southbound	14.4	B	13.6	B	13.6	B
		Whole Int.	18.8	B	17.1	B	17.1	B
I-71 EB / KY 53	Signalized	Eastbound	34.6	C	24.1	C	24.1	C
		Northbound	17.9	B	51.9	D	51.9	D
		Southbound	44.6	D	21.4	C	21.4	C
		Whole Int.	32.2	C	33.2	C	33.2	C

Table 33: Scenarios 4c, 5 & 6 2035 AM Intersection LOS (cont.)

Intersection	Type	Approach	Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 WB / KY 53	Signalized	Westbound	23.0	C	34.2	C	34.2	C
		Northbound	6.6	A	8.9	A	8.9	A
		Southbound	16.7	B	13.8	B	13.8	B
		Whole Int.	12.3	B	14.5	B	14.5	B
KY 53 / Parker Drive	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	39.1	D	22.5	C	22.5	C
		Westbound	38.3	D	22.3	C	22.3	C
		Northbound	2.4	B	11.5	B	11.5	B
		Southbound	2.9	A	12.9	B	12.9	B
		Whole Int.	4.4	A	12.8	B	12.8	B
KY 53 / KY 146	STOP Controlled	Eastbound	15.2	B	23.9	C	23.9	C
		Westbound	36.0	D	229.2	F	229.2	F
		Northbound	225.4	F	35.6	E	35.6	E
		Southbound	16.6	B	89.9	F	89.9	F
		Whole Int.	64.4	E	112.6	F	112.6	F
I-71 EB / Allen Lane (New Interchange)	Signalized	Eastbound	-	-	37.0	D	37.0	D
		Northbound	-	-	41.9	D	41.9	D
		Southbound	-	-	46.6	D	46.6	D
		Whole Int.	-	-	41.2	D	41.2	D
I-71 WB / Allen Lane (New Interchange)	Signalized	Westbound	-	-	43.6	D	43.6	D
		Northbound	-	-	20.9	C	20.9	C
		Southbound	-	-	42.4	D	42.4	D
		Whole Int.	-	-	27.5	C	27.5	C

Table 34: Scenarios 4c, 5 & 6 2035 PM Intersection LOS

Intersection	Type	Approach	Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 EB / KY 146	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	22.4	C	18.3	B	18.3	B
		Northbound	10.5	B	15.3	B	15.3	B
		Southbound	8.8	A	12.1	B	12.1	B
		Whole Int.	13.1	B	15.3	B	15.3	B
I-71 WB / KY 146	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	34.5	C	43.0	D	43.0	D
		Northbound	3.0	A	2.9	A	2.9	A
		Southbound	2.0	A	1.8	A	1.8	A
		Whole Int.	4.2	A	3.9	A	3.9	A
KY 146 / KY 393	Signalized	Eastbound	4.3	A	5.5	A	5.5	A
		Westbound	9.5	A	12.7	B	12.7	B
		Northbound	32.9	C	35.6	D	35.6	D
		Southbound	26.4	C	23.8	C	23.8	C
		Whole Int.	12.8	B	15.3	B	15.3	B
I-71 WB / KY 393	STOP Controlled (Signalized for 4c, 5 & 6)	Westbound	33.0	C	41.3	D	41.3	D
		Northbound	3.9	A	36.6	D	36.6	D
		Southbound	12.7	B	21.2	C	21.2	C
		Whole Int.	10.5	B	33.6	C	33.6	C
I-71 EB / KY 393	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	24.0	C	44.9	D	44.9	D
		Northbound	23.3	C	16.1	B	16.1	B
		Southbound	45.6	D	46.6	D	46.6	D
		Whole Int.	30.9	C	31.3	C	31.3	C
KY 53 / New Moody Lane	Signalized	Eastbound	31.6	C	32.2	C	32.2	C
		Westbound	58.9	E	35.1	D	35.1	D
		Northbound	22.3	C	25.5	C	25.5	C
		Southbound	21.4	C	24.4	C	24.4	C
		Whole Int.	25.3	C	26.8	C	26.8	C
I-71 EB / KY 53	Signalized	Eastbound	65.5	E	47.2	D	47.2	D
		Northbound	54.6	D	31.4	C	31.4	C
		Southbound	30.8	C	11.2	B	11.2	B
		Whole Int.	48.5	D	25.8	C	25.8	C

Table 34: Scenarios 4c, 5 & 6 2035 PM Intersection LOS (cont.)

Intersection	Type	Approach	Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
I-71 WB / KY 53	Signalized	Westbound	37.7	D	38.1	D	38.1	D
		Northbound	18.3	D	53.5	D	53.5	D
		Southbound	49.2	D	50.7	D	50.7	D
		Whole Int.	30.6	C	51.5	D	51.5	D
KY 53 / Parker Drive	STOP Controlled (Signalized for 4c, 5 & 6)	Eastbound	53.1	D	23.1	C	23.1	C
		Westbound	35.1	D	22.3	C	22.3	C
		Northbound	13.5	B	19.3	B	19.3	B
		Southbound	3.7	A	12.9	B	12.9	B
		Whole Int.	11.5	B	16.8	B	16.8	B
KY 53 / KY 146	STOP Controlled	Eastbound	42.6	D	208.9	F	208.9	F
		Westbound	87.6	F	59.3	F	59.3	F
		Northbound	108.9	F	157.0	F	157.0	F
		Southbound	17.3	B	34.3	D	34.3	D
		Whole Int.	69.0	E	130.3	F	130.3	F
I-71 EB / Allen Lane (New Interchange)	Signalized	Eastbound	-	-	25.2	C	25.2	C
		Northbound	-	-	29.7	C	29.7	C
		Southbound	-	-	16.9	B	16.9	B
		Whole Int.	-	-	25.4	C	25.4	C
I-71 WB / Allen Lane (New Interchange)	Signalized	Westbound	-	-	37.6	D	37.6	D
		Northbound	-	-	20.0	B	20.0	B
		Southbound	-	-	39.2	D	39.2	D
		Whole Int.	-	-	28.1	C	28.1	C

Table 35: Scenarios 4c, 5 & 6 2035 Ramp Junction LOS

Direction	Route	Type	Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
			AM	PM	AM	PM	AM	PM
EB	KY 146	Diverge	D	D	D	D	D	D
EB	KY 146	Merge	D	D	D	D	D	D
EB	KY 393	Diverge	C	D	C	D	D	D
EB	KY 393	Merge	B	C	C	D	C	D
EB	C/D Road	Diverge	-	-	-	-	D	D
EB	C/D Road	Merge	-	-	-	-	B	C
EB	New Interchange	Diverge	-	-	C	D	B	B
EB	New Interchange	Merge	-	-	C	D	B	A
EB	KY 53	Diverge	D	D	C	D	B	A
EB	KY 53	Merge	C	D	B	C	A	A
WB	KY 53	Diverge	B	B	C	C	A	A
WB	KY 53	Merge	C	C	C	C	A	B
WB	New Interchange	Diverge	-	-	C	C	B	B
WB	New Interchange	Merge	-	-	D	D	C	B
WB	C/D Road	Diverge	-	-	-	-	C	C
WB	C/D Road	Merge	-	-	-	-	D	D
WB	KY 393	Diverge	D	D	D	D	D	D
WB	KY 393	Merge	D	C	D	C	D	D
WB	KY 146	Diverge	D	D	D	C	D	D
WB	KY 146	Merge	D	C	D	C	D	C

Table 36: Scenarios 4c, 5 & 6 Queue Lengths

Location	Evaluation	Scenario 4c: TSM		Scenario 5: Standard Diamond Interchange		Scenario 6: Collector / Distributor	
	Description	AM	PM	AM	PM	AM	PM
KY 53 EB Off Ramp	Queue (# vehicles)	31	31	26	17	26	17
	Queue Length (ft)	682	682	572	374	572	374
	Ramp Length	1,455	1,455	1,455	1,455	1,455	1,455
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**
KY 53 WB Off Ramp	Queue (# vehicles)	7	9	11	9	11	9
	Queue Length (ft)	154	198	242	198	242	198
	Ramp Length	1,280	1,280	1,280	1,280	1,280	1,280
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**
New Interchange EB Off Ramp	Queue (# vehicles)	-	-	31	26	31	26
	Queue Length (ft)	-	-	682	572	682	572
	Ramp Length	-	-	1,455	1,455	1,455	1,455
	Mainline Impact	**-**	**-**	**No**	**No**	**No**	**No**
New Interchange WB Off-Ramp	Queue (# vehicles)	-	-	9	4	9	4
	Queue Length (ft)	-	-	198	88	198	88
	Ramp Length	-	-	1,280	1,280	1,280	1,280
	Mainline Impact	**-**	**-**	**No**	**No**	**No**	**No**
KY 393 EB Off Ramp	Queue (# vehicles)	34	20	25	30	25	30
	Queue Length (ft)	748	440	550	660	550	660
	Ramp Length	1,845	1,845	1,845	1,845	1,845	1,845
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**
KY 393 WB Off Ramp	Queue (# vehicles)	14	7	11	16	11	16
	Queue Length (ft)	308	154	242	352	242	352
	Ramp Length	1,670	1,670	1,670	1,670	1,670	1,670
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**
KY 146 EB Off Ramp	Queue (# vehicles)	4	15	8	16	8	16
	Queue Length (ft)	88	330	176	352	176	352
	Ramp Length	1,845	1,845	1,845	1,845	1,845	1,845
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**
KY 146 WB Off Ramp	Queue (# vehicles)	6	3	5	4	5	4
	Queue Length (ft)	132	66	110	88	110	88
	Ramp Length	2,350	2,350	2,350	2,350	2,350	2,350
	Mainline Impact	**No**	**No**	**No**	**No**	**No**	**No**

Figure 48: Scenario 4c – 2035 Levels of Service

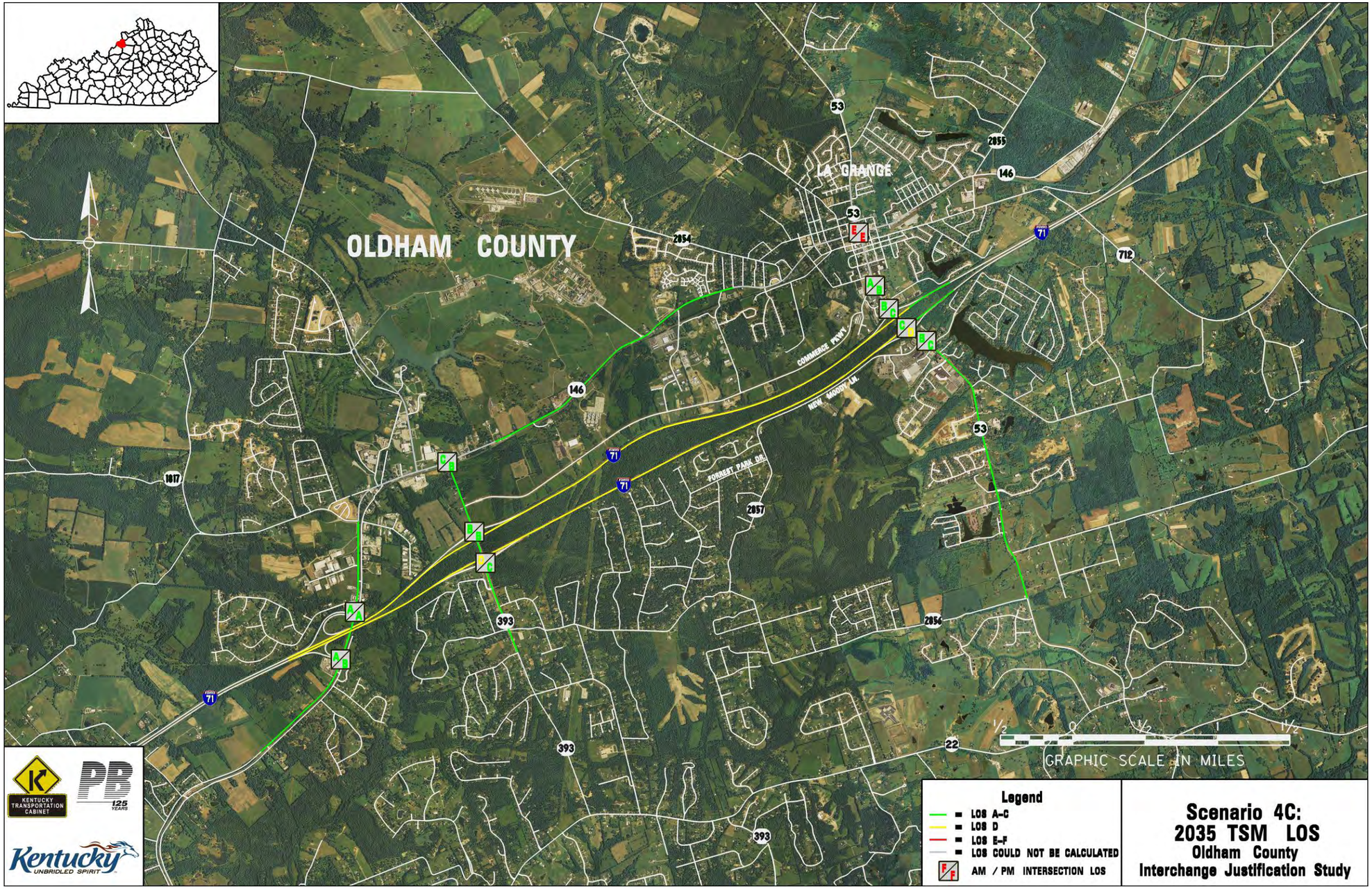


Figure 49: Scenario 5 – 2035 Levels of Service

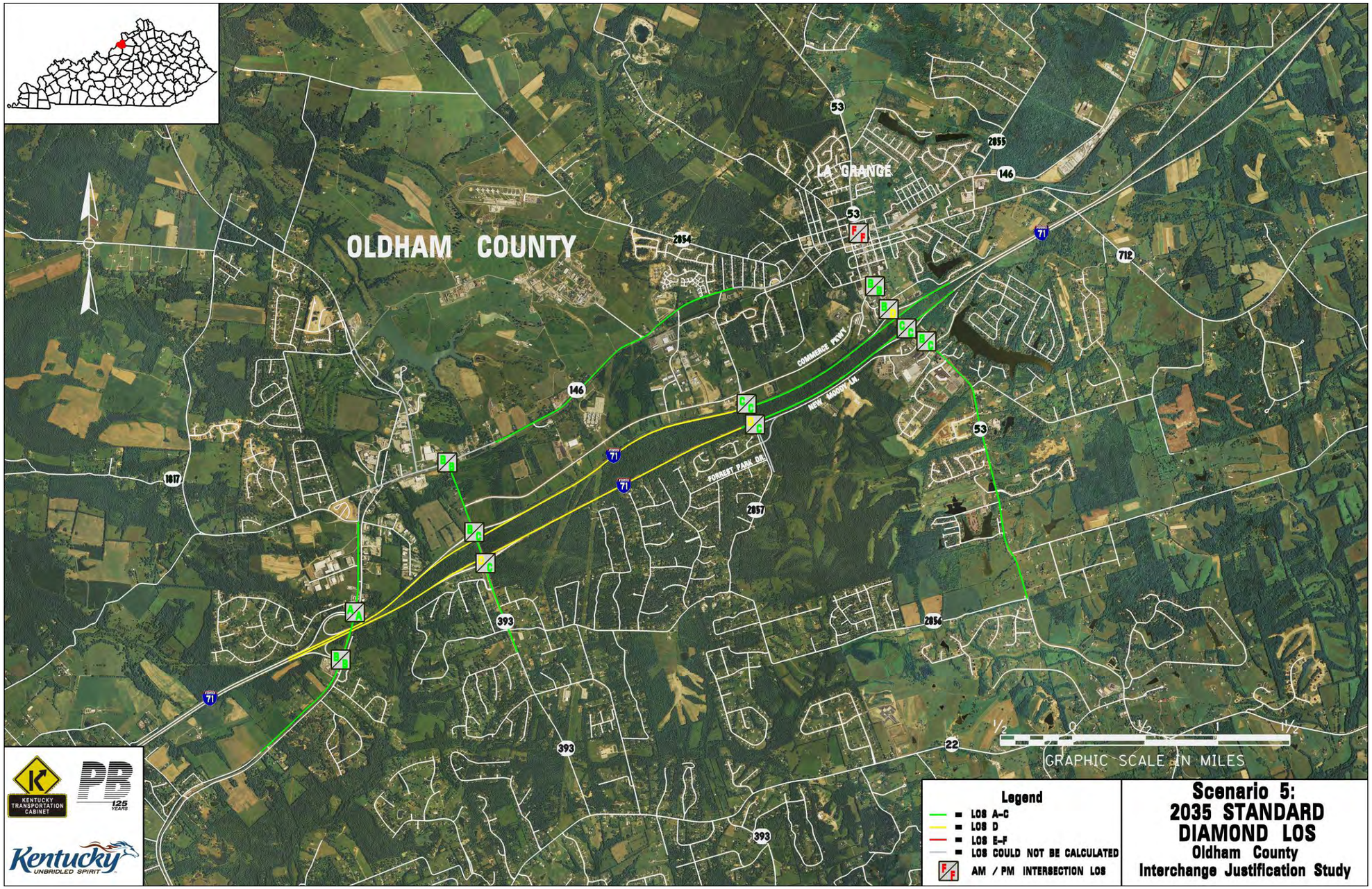
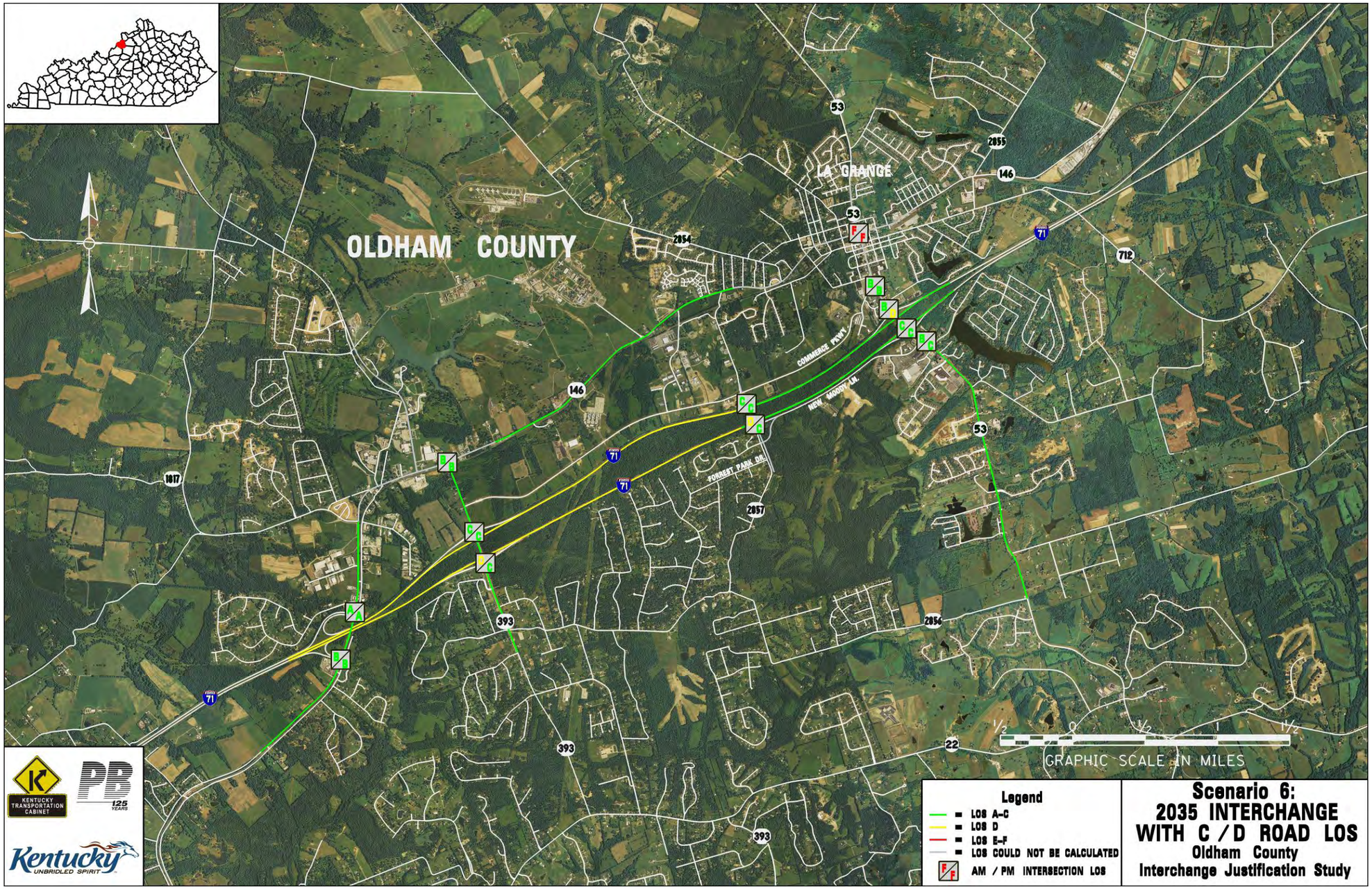


Figure 50: Scenario 6 – 2035 Levels of Service



Planning-level construction cost estimates were prepared for the revised three scenarios (4c, 5, and 6) and are shown on **Table 37**. It should be noted that the estimated costs are based on 2010 dollars, costs do not include right-of-ways or utilities, and construction quantities are based on conceptual alternatives. The detailed spreadsheets per scenario are found in **Appendix G**.

As shown by the previous analysis (LOS and queue length), any of the three scenarios can adequately serve the projected future traffic volumes. Given this, Scenario 4c is significantly less expensive to construct than Scenarios 5 and 6. Therefore, from a cost and operations standpoint, Scenario 4c appears to be the preferred recommendation. When evaluating the scenarios compared to the purpose and need, it has been shown in the previous two levels of analysis that Scenarios 5 and 6 better meet the stated needs of this study.

The purpose and need for this study focuses on safety, travel time, and connectivity. Scenario 4c does meet those that are related to safety and travel time as the improvements proposed as part of this scenario help to increase system capacity and provide for traffic regulation. Therefore, Scenario 4c satisfies the following needs:

- Increase mobility and accessibility
- Reduce travel times and overall delay

To some degree, it meets the following need as it improves the efficiency of the system.

- Reduce emergency response times

Only a scenario with an interchange addresses the following needs as the new interchange redistributes traffic and provides new linkages.

- Improve safety of local network by reducing exposure on identified high crash segments
- Provide access to developing areas particularly along Commerce Parkway and south of I-71
- Create a “middle connector” between KY 393 and KY 53
- Provide a western “bypass” of LaGrange
- Provide an “outlet” when I-71 is shut down during an incident

The recommendation for this study must consider all of these study aspects in conjunction with whether or not an interchange is warranted based on the FHWA requirements discussed in the next chapter.

Table 37: Scenarios 4c, 5 & 6 Cost Estimate

Option	Description	Cost
4C-1	I-71 Eastbound Ramps / KY 146	$390,000
4C-2	I-71 Westbound Ramps / KY 146	$380,000
4C-3	I-71 / KY 393	$10,200,000
4C-4	I-71 Westbound Ramps / KY 53	$8,360,000
4C-5	I-71 Eastbound Ramps / KY 53	$540,000
4C-6	KY 53 / Parker Drive Intersection	$160,000
4C-7	KY 53 Widening South of I-71	$8,400,000
4C-8	KY 393 Widening South of I-71	$500,000
4C-9	I-71 Eastbound to KY 146 Extend Decel	$520,000
4C-10	I-71 Eastbound to KY 393 Extend Decel	$570,000
4C-11	I-71 Westbound to KY 146 Extend Decel	$550,000
4C-12	KY 146 to I-71 Westbound Extend Accel	$550,000
	Total:	**$31,120,000**

Option	Description	Cost
5-0	Standard Diamond Interchange	$20,400,000
5-1	KY 53 Widening South of I-71	$8,400,000
5-2	KY 393 Widening South of I-71	$500,000
5-3	I-71 Westbound Ramps / KY 146	$160,000
5-4	I-71 Eastbound Ramps / KY 146	$160,000
5-5	I-71 / KY 393	$10,200,000
5-6	I-71 Eastbound Ramps / KY 53	$470,000
5-7	KY 53 / Parker Drive Intersection	$160,000
5-8	I-71 Eastbound to KY 146 Extend Decel	$520,000
5-9	I-71 Eastbound to KY 393 Extend Decel	$700,000
5-10	I-71 Westbound to KY 393 Extend Decel	$550,000
5-11	KY 393 to I-71 Westbound Extend Accel	$650,000
5-12	I-71 Westbound to KY 146 Extend Decel	$520,000
5-13	KY 146 to I-71 Westbound Extend Accel	$550,000
5-14	I-71 Auxiliary Lane	$4,590,000
5-15	KY 53 Bridge over I-71	$18,770,000
5-16	I-71 Widening to 6 Lanes	$71,690,000
5-17	KY 393 Bridge over I-71	$7,020,000
5-18	KY 146 Bridge over I-71	$7,560,000
	Total:	**$153,570,000**

Option	Description	Cost
6-0	Standard Diamond Interchange with C /D	$33,600,000
6-1	KY 53 Widening South of I-71	$8,400,000
6-2	KY 393 Widening South of I-71	$500,000
6-3	I-71 Westbound Ramps / KY 146	$160,000
6-4	I-71 Eastbound Ramps / KY 146	$160,000
6-5	I-71 / KY 393	$10,200,000
6-6	I-71 Eastbound Ramps / KY 53	$470,000
6-7	KY 53 / Parker Drive Intersection	$160,000
6-8	I-71 Eastbound to KY 146 Extend Decel	$520,000
6-9	I-71 Eastbound to KY 393 Extend Decel	$700,000
6-10	I-71 Westbound to KY 393 Extend Decel	$550,000
6-11	KY 393 to I-71 Westbound Extend Accel	$650,000
6-12	I-71 Westbound to KY 146 Extend Decel	$520,000
6-13	KY 146 to I-71 Westbound Extend Accel	$550,000
6-14	KY 53 Bridge over I-71	$20,500,000
6-15	I-71 Widening to 6 Lanes	$71,690,000
6-16	KY 393 Bridge over I-71	$7,020,000
6-17	KY 146 Bridge over I-71	$7,560,000
	Total:	**$163,910,000**

NOTE: Estimated costs are based on 2010 constant dollars.

10.0 FHWA REQUIREMENTS

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) contained revised requirements for planning a proposed interchange on the existing Interstate Highway System. These requirements are implemented in the Federal Highway Administration's (FHWA's) policy and through Federal regulation 23 CFR part 450. The policy for *Interstate System Access Information Guide (August 2010)* contains eight policy statements that FHWA must take into consideration before it will allow a new interchange. This section discusses each policy statement as it relates to a proposed new I-71 interchange and this study.

Policy Statement No. 1: Existing Facilities Capability

"The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonable improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a))."

The existing roads and interchanges currently have poor levels of service on KY 53, KY 146 and numerous study area intersections (refer to Section 4.3). The existing system cannot adequately handle the existing background traffic and the anticipated growth in new traffic generated by the development that is expected in the immediate study area as shown by

- Poor levels of service in the 2035 MTP scenarios
- Queue lengths which back up from the interchange to the interstate at the KY 53 northbound off-ramp and KY 393 northbound off-ramp (refer to **Table 25**)

Improvements as presented in the TSM evaluation scenarios were evaluated to determine if the existing system could be improved to accommodate future demand. The results showed an improvement in LOS to an acceptable LOS (LOS D) at a cost of $31.1 million to construct.

The construction of a new interchange only would not improve the LOS throughout the system to an acceptable level. Additional widening and spot improvements would be necessary to achieve a similar LOS as that with the TSM scenarios. Therefore, the existing interstate and local roads and streets can be improved to accommodate design-year traffic demands.

Policy Statement No. 2: Transportation System Management

"The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a))."

Transportation System Management (TSM) and local spot roadway improvement alternatives are typically lower-cost improvement options. TSM options generally are such activities as signing, striping, new traffic signals, updating the timing for existing traffic signals, and simple roadway improvements such as removing vegetation to improve sight distance / visibility, improving the radius of a street corner, or the addition of a turn lane. Spot Improvements include concepts such as reconstructing relatively short substandard curves, hills, intersections, etc., to address a safety concern or operations concern and then reconnecting them with the existing roadway system. Transit options include lower cost additions such as express bus service, or higher cost services ranging from the addition of High Occupancy Vehicle (HOV) lanes and park-and-ride lots, to the construction of fixed guideway transit service such as light rail or commuter rail.

Although such alternative concepts could be implemented on study area roadways, none would significantly or fully address the issues of:

1. Mitigating congestion as documented on KY 53 and KY 146 currently;
2. Providing additional connectivity of the road and interstate network as no additional link would be provided to access the Oldham Reserve; and
3. Improving safety as KY 53 north of Zhale Smith Road has been identified as having a high crash rate and multiple high crash rate spots. The TSM evaluation scenario does not significantly reduce traffic volumes on KY 53 in this location as compared to the reduction resulting from the new interchange.

Bus transit is currently provided from LaGrange into Metro Louisville. The capacity and frequency of the service indicates that it is not enough to preclude the need for highway improvements. No ITS systems, or ramp meters, nor HOV lanes are provided in Oldham County at the present time. Also, it can be interpreted that operational improvements such as intelligent transportation systems (ITS) solutions, such as dynamic signal control and/or ramp metering, or the use of high occupancy vehicle (HOV) lanes are not appropriate or sufficient either.

The TSM type highway project solutions proposed as part of Scenario 4c performed in combination with some widening projects as proposed are able to address the transportation needs and some of the concepts in the project's purpose and need statement. The project and its analysis demonstrate that there are other options besides the interchange that help alleviate the identified problems.

Policy Statement No. 3: Operational Analysis

"An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2 (a), 655.603 (d) and 771.111 (f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the

proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2 (a) and 655.603 (d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and the local street network (23 CFR 625.2 (a) and 655.603 (d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109 (d) and 23 CFR 655.603 (d)).”

On I-71, the current spacing of the center of the interchanges from KY 393 (Exit 18) to KY 53 (Exit 22) is 3.35 miles. The proposed new interchange described in Scenarios 5 and 6 would be 1.24 miles west of Exit 22 and 2.11 miles east of Exit 18.

A traffic operational analysis was performed for several future scenarios including the MTP+ (Scenario 3) which comprises the existing and committed projects (base scenario), a TSM evaluation scenario (Scenario 4c), the interchange concept with a standard diamond interchange (Scenario 5) and a standard diamond interchange with a collector / distributor road (Scenario 6). The analyses illustrated that the proposed interchange would not adversely affect the safety or operation of the interstate weaving movements, nor adversely affect other parts of the system for future traffic as compared to the base scenario (MTP+). The segment LOS improves on some sections of I-71 from a LOS D to a LOS B or C and remains at a LOS D on other segments. All of the existing interchange intersections operate better with the addition of the new interchange as traffic volumes get distributed between an additional interchange access point to LaGrange.

Policy Statement No. 4: Access Connections and Design

“The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.4 (a)(2), and 655.603 (d)).”

The proposed interchange will connect to public roads in the area, namely New Moody Lane and Ring Road to the south and Allen Lane to the north, and provide for a fully directional interchange according movements in all directions. It should be noted that Ring Road is currently a conceptual road and will be put in by the developers as the Oldham Reserve builds out. During a PDT meeting (October 29, 2010), concern was expressed that in order for the interchange to have logical termini, Ring Road should be in a comprehensive planning document and a committed project prior to the commitment of a new interchange.

Based on the traffic utilization, the interchange will require separate left and right turn lanes on the off-ramps from I-71 and dual northbound left turn lanes onto I-71 westbound. The interchange will be in accordance with current standards for Federal-aid projects, and meet KYTC highway design standards.

Policy Statement No. 5: Transportation and Land Use Plans

“The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.”

Chapter 2 of this document summarizes a list of prior studies conducted within or adjacent to the study area. The proposed interchange is consistent and compatible with the Oldham County Comprehensive Plan - Outlook 2020 and the Oldham County Thoroughfare Plan. Both documents outline changing land use patterns in the LaGrange area and highlight the need for transportation improvements in the vicinity of the proposed interchange. The Comprehensive Plan and the overall development strategy for Oldham County calls for the attraction of more jobs and businesses in the County, largely to relieve the tax burdens that are currently placed on residents. The Oldham Reserve Project, just to the south and east of the proposed interchange, will play a large role in this. The Rawlings Group with its some 600+ employees may be a catalyst for more development.

More specifically, the Oldham County Thoroughfare Plan points out a need for a new interchange at Allen Lane, the site for the proposed interchange under consideration by this study. It shows the location on a map as a “Proposed Interchange”. Also, a companion piece to the Thoroughfare Plan, the Oldham County Road Classification and Future Roads report also provides a project page dedicated for the new interchange along I-71 near Allen Lane. The KIPDA TDM, which reflects all proposed projects in the MTP, includes the overpass in the approved model which was modified for this analysis to include the full interchange.

Specifically though, the new interchange with the overpass is not currently listed in the MTP, STIP or TIP.

Policy Statement No. 6: Comprehensive Interstate Network Study

“In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109 (d), 23 CFR 625.2 (a), 655.603 (d), and 771.111).”

There is another proposed interchange on I-71 approximately nine miles south of the current location under consideration. The proposed interchange is part of a new connector road from KY 1447 to US 42 in Oldham County. That roadway project is in the KIPDA MTP as project #952. Also, the proposed interchange being considered for this study is in the KIPDA MTP as project #1279. Due to the differentiating characteristics of Oldham County near this proposed interchange compared to the location of the proposed interchange discussed in this report, the impact of these two interchanges is expected to be independent of each other.

In addition, there is a proposed HOV / HOT study for I-71 also in the KIPDA MTP as project #1341. However, there is nothing imminent about the HOV / HOT study to indicate it is likely to be implemented in the time horizon for this project. The analysis for this project took into account how the existing and proposed interchanges will operate.

Policy Statement No. 7: Coordination with Transportation System Improvements

"When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2 (a) and 655.603 (d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2 (a) and 655.603 (d))."

As stated throughout the planning study, and in Policy Statement No. 5, the interchange has been taken into consideration by the local and regional planning agencies and is supported by the planned land use developments within and adjacent to the study area. The interchange is viewed by Oldham County and the Oldham LaGrange Economic Development Authority as being vital to the build out success of the planned mixed use business / residential area – the Oldham Reserve – just to the south and east of the proposed interchange. The Master Plan for the Oldham Reserve calls for a series of infrastructure improvements, including interior access roads and more than adequate multimodal connections to the rest of the transportation system in Oldham County and in the City of LaGrange.

Policy Statement No. 8: Status of Planning and NEPA

"The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111)."

This project and its processes and objectives are designed to detail the initial feasibility of the interchange. If FHWA and KYTC find operational analysis of the proposed interchange feasible given other likely projects that may meet the needs of the transportation system in the area, then further planning and analysis will be undertaken to understand the environmental consequences under National Environmental Policy Act (NEPA) as well as a full public involvement process. It was universally agreed upon at the scoping meeting for this project attended by the FHWA, KYTC and others that engaging in the NEPA and public involvement processes at this juncture was premature, for it might have invited false hope and not been an economical use of funds if the interchange proved not to be operationally feasible.

It is anticipated that the process and information required by NEPA and an Interchange Justification Study (IJS) will result in a project that could be advanced as an EA/FONSI or CE-Level 3 rather than an EIS. To date, there exists little public controversy surrounding the project. And, since the project is largely in an already highly disturbed and built up area, the likelihood and consequence for negative results on either the natural and / or human environments is negligible.

11.0 RECOMMENDATION

The purpose of this study was to determine the need and explore methods to improve safety, traffic operations, connectivity, and regional access in the LaGrange / Oldham County area through the evaluation of the need for a new interchange on I-71 between KY 53 and KY 393.

After a careful review and consideration of the existing conditions, the cost and benefits, and constraints of constructing either a standard diamond interchange or collector/distributor interchange system, the Project Development Team recognizes that all of the study's final scenarios fulfill FHWA's stipulation of maintaining acceptable traffic operations of the system within the study area (FHWA Policy Statement No.1 and No. 2.) Reviews of all project considerations were made by KYTC in consultation with the Office of the Secretary of KYTC. At present, the Project Development Team recommends that Scenario 4c, TSM improvements, that would allow access to and from the developing areas of the Oldham Reserve be advanced. After the options in the TSM Scenario are committed and attained and a need for additional access arises, the study area is to be revisited in regards to new access to I-71.

At this time, given cost considerations, similar traffic operations, and uncertain future development, the TSM alternative is prudent. The cost estimate for the TSM alternative did not include the I-71 widening to six lanes as the individual projects included in this alternative would not impact the capacity of the interstate. However, based on previous experience working on interstate projects with FHWA, it was assumed that they would require system improvements along I-71 with the construction of a new interchange. This would likely include the widening of I-71 to six lanes which would also require the widening of existing overpasses within the study area.

The reasons to advance Scenario 4c along with all existing and committed projects, including the overpass at Allen Lane, are as follows:

- The current estimated cost of constructing a full interchange (plus additional projects required to achieve an acceptable LOS) is significantly higher than the TSM alternate ($154 million and $164 million, versus $31 million). This is true even if the cost of widening I-71 through the study area to six lanes is removed from the totals for the interchange project.
- The TSM scenario has fewer anticipated right-of-way and environmental impacts
- The interchange options, as compared to the TSM scenario, would have no appreciable benefit to traffic operations on the interstate. The TSM scenario would provide congestion relief to the same level as the full interchange options
- An overpass accessing the proposed development areas has long been recognized and included in plans prepared by the Oldham County Government
- TSM improvements would not require consideration of FHWA eight policy statements for an Interchange Justification Study (IJS); any interchange scenario will require FHWA approval.

Should an alternate that includes an interchange (Scenario 5 or 6) be advanced, it will require further detailed design and analysis, including a full IJS and National Environmental Policy Act (NEPA) analysis and documentation, in addition to detailed engineering and design and coordination and approval by FHWA.

The construction of an overpass connecting KY 146 via Allen Lane with New Moody Lane and Ring Road is still considered an important project as it will provide for an outlet for traffic from the new development. It is recommended that this project continue as specified in the KIPDA MTP.

11.1 Project Prioritization

Since the identified transportation problems can be adequately addressed by other means including the TSM options, those projects need to be officially incorporated into the region's Metropolitan Transportation Plan (MTP) by Oldham County, the KYTC or another sponsoring agency. Scenario 4c offers a range of solutions that addresses identified problems but are lower in costs and impacts than a new interchange.

The following section discusses likely priorities of the projects identified for Scenario 4c.
The projects identified as Options 4c-3 and 4c-4 should be pursued first to alleviate existing problems at KY 393 and KY 53 respectively. Those projects are:

1. Option 4c-3 – I-71 Westbound and Eastbound / KY 393: This option considers signalizing both intersections and adding a second northbound left turn lane onto I-71 westbound from KY 393 and adding a free-flow right turn lane from I-71 eastbound to KY 393 southbound. It includes widening the interchange to provide four through lanes (two per direction) through the interchange.
2. Option 4c-4 – I-71 Westbound Ramps / KY 53: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 53 and a second northbound left turn lane onto I-71. As a result of the second turn lane, the bridge over I-71 westbound must be widened.

The other priorities in the study area that are needed address other operational problems with KY 393 and / or KY 53 including the following projects along these heavily used arterials:

3. Option 4c-6 – KY 53 / Parker Drive Intersection: This option considers the signalization of the intersection.
4. Option 4c-7 – KY 53 south of I-71: This option considers widening KY 53 to 4 lanes from KY 2856 to I-71 (approximately 2 miles).
5. Option 4c-8 – KY 393 south of I-71: This option considers paving a second northbound lane along KY 393 between KY 2856 and I-71 to make this a true 4-lane section.

The next priority would be to address the mainline / exit / entrance ramps for I-71 to the arterials in the study area to include the following projects:

6. Option 4c-5 – I-71 Eastbound Ramps / KY 53: This option considers the widening of the eastbound off-ramp to include a dual right turn movement and a separate left turn lane.
7. Option 4c-9 – I-71 Eastbound to KY 146: This option considers extending the deceleration lane from I-71 eastbound to KY 146 to a minimum of 1100 feet.

8. Option 4c-12 – KY 146 to I-71 Westbound: This option considers extending the acceleration lane from KY 146 to I-71 westbound to a minimum of 800 feet.
9. Option 4c-10 – I-71 Eastbound to KY 393: This option considers extending the deceleration lane from I-71 eastbound to KY 393 to a minimum of 800 feet.
10. Option 4c-1 – I-71 Eastbound Ramps / KY 146: This option considers the widening of the eastbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. A traffic signal is also proposed.
11. Option 4c-2 – I-71 Westbound Ramps / KY 146: This option considers the widening of the westbound off-ramp to separate the left and right turn lanes onto KY 146. This widening is intended to complement the anticipated widening of KY 146. A traffic signal is also proposed.
12. Option 4c-11 – I-71 Westbound to KY 146: This option considers extending the deceleration lane from I-71 westbound to KY 146 to a minimum of 1100 feet.

11.2 Future Steps / Requirements

As appropriate, stakeholders and other interested parties will be informed of the study outcome. Project Information Forms will be developed by KIPDA and / or KYTC District 5 for the higher priority project in order to initially place them on the Unscheduled Needs List. In the future, they may be incorporated into the KYTC Six-Year Highway Plan and the KIPDA MTP. The need and feasibility of a new interchange should be evaluated at a future date pending changes in future land use and development.

Appendix A: Meetings Minutes

PB

Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Project Development Team Meeting 1 (Kick-off Meeting)

DATE & TIME: December 22, 2009 – 1:30 PM

LOCATION: Kentucky Transportation Cabinet District 5
Conference Room
Louisville, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Telephone	Email
Larry Chaney	KIPDA	502-266-6084	larry.chaney@ky.gov
Andy Rush	KIPDA	502-266-6084	andyh.rush@ky.gov
Pat Matheny	KYTC District 5	502-210-5488	patrick.matheny@ky.gov
Brian Meade	KYTC District 5	502-210-5414	brian.meade@ky.gov
Tom Hall	KYTC District 5	502-210-5479	tom.hall@ky.gov
Jeff Schaefer	KYTC District 5	502-210-5438	jeff.schaefer@ky.gov
Tala Quinio	KYTC District 5	502-210-5478	tala.quinio@ky.gov
Jill Asher	KYTC C.O. Planning	502-564-7183	jill.asher@ky.gov
Scott Thomson	KYTC C.O. Planning	502-564-7183	scott.thomson@ky.gov
Robert Farley	KYTC C.O. Design	502-566-3288	bob.farley@ky.gov
Anne Warnick	PB	859-245-3877	warnick@pbworld.com
Shawn Dikes	PB	859-245-3865	dikes@pbworld.com
Scott Walker	PB	859-245-3873	walkersc@pbworld.com

MEETING SUMMARY:

The purpose of this meeting with the Kentucky Transportation Cabinet (KYTC), Kentuckiana Regional Planning and Development Agency (KIPDA), and Parsons Brinckerhoff (PB) was to discuss the Oldham County Interchange Justification Study (IJS) along I-71 in Oldham County.

Scott Walker began the meeting by noting that he would be the Project Manager for PB with Shawn Dikes serving as the Principal-in-Charge for the project. Scott asked each attendee to introduce themselves. Jill Asher noted that Scott Thomson would be serving as the Central Office lead for this project due to his new position in KYTC Planning and his experience with modeling / forecasting.

A handout was given to each attendee which included an agenda, two study area maps (with and without aerial photography) and FHWA IJS guidelines.

Scott noted that it has been several months since the scoping meeting for this project and the purpose of this meeting was to get the Project Development Team (PDT) on the same page. It was noted that there was no one in attendance from the Federal Highway Administration (FHWA) who will be responsible for approval or rejection of the IJS.

Next, the study area shown on the two maps in the handouts was discussed. One attendee questioned whether the study area included the planned Ring Road near the proposed OCEDA development. It was confirmed that the study area does include the road. It was also noted that the study area does include the existing three interchanges along I-71 which are important pieces of the study area.

Scott then led a review of FHWA's IJS Guidelines which included general information regarding an IJS, the eight (8) policy points that must be addressed, and information regarding the operational analysis. The following items were discussed regarding the eight policy points of the IJS:

- It was noted that this IJS would not include an environmental analysis or public involvement. An environmental analysis will not be included because the type of interchange or improvement has not been selected. Public involvement will not be included because this study could result in no interchange being built.
- The question was asked as to what type of operational analysis would be performed (i.e., HCS or microsimulation). It was noted that according to FHWA, any analysis would need to be supported by HCS. Therefore, HCS will be the main method used for operational analysis. However, microsimulation will be considered if appropriate to aid in the technical analysis.

Existing studies that were noted as important for this study include the OCEDA Traffic Impact Study prepared by Wilbur Smith Associates and the I-71 Interchange Feasibility Study prepared by Qk4. One attended suggested a review of the KY 53 study north of the existing KY 53 interchange. KYTC will obtain these documents for PB. Also, the Oldham County Thoroughfare Plan should be reviewed and it was noted that the plan will be updated in 2010. Louise Allen with Oldham County Planning and Zoning should be contacted about this update.

The discussion then revolved around the traffic forecasting / operational analysis tasks of this project. Two models were identified for possible use in this project:

- Kentucky Statewide Traffic Model (KYSTM) maintained by KYTC: The KYSTM has been updated over the past couple of years. Within the study area, the model calibrates quite well. Limitations of the model may be reduce sensitivity due to the size of the model and size of the traffic analysis zones. The base year of the model is 2003 and forecasts can be made to Year 2030.
- KIPDA Travel Demand Model maintained by KIPDA: The KIPDA model includes the study area; however, the proposed interchange is at the fringe of the model area which could cause issues with how the external / internal trips are handled. The base year of the model is 2000; however, a 2009 interim model has been developed, but it has not been calibrated. A new calibrated / validated 2007 base model is currently in the works. In addition, a year 2030 model does exist.

Additional information related to traffic modeling / forecasting includes:

- Both the KYSTM and KIPDA models will be run to produce base year 2009 results in order to determine how well the models are calibrated / validated in the study area.

- Related to years of analysis, it was determined that a base year of 2010 and a future year of 2035 would be used.
- It was noted that the two models are different and that an 'apples to apples' comparison will be not be achieved; however, KYTC and KIPDA will work together to share information that might be useful to refine their particular model including network differences as well as socioeconomic (population and employment) values.
- Scott Thomson noted that Commerce Parkway and Allen Lane were added to the KYSTM.
- Projections to year 2035 may require extrapolation of existing data. If necessary, trends to 2030 will be extended with proper documentation of how this was conducted.
- Various scenarios regarding economic development and different transportation system alternatives will need to be assessed using the models. Information obtained from the stakeholders meeting will be used to identify the most appropriate and likely scenarios.
- A meeting will be set up in late January to discuss the progress of the modeling exercises.

The capacity analysis will be conducted using Highway Capacity Software Plus (HCS+). Microsimulation may be used in limited applications and will be used to complement (not replace) HCS+ results. Capacity analysis will include freeway section analysis, ramp junction analysis, weave analysis, and ramp intersection analysis.

Project Purpose and Need was also discussed. Safety, congestion, and economic development were identified as potential elements to the study Purpose and Need. The attendees agreed that economic develop is a legitimate component for this particular study.

A Stakeholders meeting will be scheduled in late January in order to obtain information from them related to the proposed development. PB will work with KYTC to ensure that the appropriate stakeholders are invited. Oldham County emergency responders were noted as an important stakeholder.

Alternatives analyzed as part of this project will include:

- No Build;
- Overpass only;
- Diamond Interchange;
- Interchange with Collector-Distributor Road; and
- An unidentified interchange configuration.

Other notes made during the meeting include:

- KIPDA will prepare the Environmental Justice report for this project.
- There is a current design effort for the proposed overpass that has been put on hold pending the results of this study.
- It was noted that the interchanges types will be tested after the forecasts are complete as it is assumed that the interchange type would not greatly influence the use of a new interchange.

The IJS will be completed in late October 2010. The next PDT meeting was scheduled for March 23, 2010 at 9:30 AM. Another PDT meeting will be schedule in late August.

The meeting adjourned around 3:00 PM.

PB

PB
Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Public Officials Meeting 1

DATE & TIME: March 5, 2010 – 10:00 AM

LOCATION: Oldham County Fiscal Court Building
Conference Room
La Grange, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Email
Steve Greenwell	Oldham County Fiscal Court	springhillsteve@bellsouth.net
Duane Murner	Oldham County Fiscal Court	dmurner@oldhamcounty.net
David Voegele	Oldham County Fiscal Court	davidvoegele@aol.com
Louise Allen	Oldham County Planning and Zoning	lallen@oldhamcounty.net
Wade Helm	Oldham-LaGrange Dev. Authority	w.helm@insightbb.com
Don Basham	Oldham-LaGrange Dev. Authority	dlbasham@bellsouth.net
Deana E. Karem	Oldham-LaGrange Dev. Authority	dekarem@oldhamcountychamber.com
Elsie Carter	City of LaGrange	mayorelsie@aol.com
Bill Lammlein	Main Street	billlammlein@bellsouth.net
Kevin Nuss	Oldham County Emergency Response	knuss@oldhamcounty.net
Major Keith Smith	LaGrange Fire Department	ksmith@lfrd.org
Major Frank Conway	LaGrange Police Department	(not provided)
John W. Black	Resident	JohnBlack5Z@bellsouth.net
Larry Chaney	KIPDA	larry.chaney@ky.gov
Andy Rush	KIPDA	andyh.rush@ky.gov
Pat Matheny	KYTC District 5	patrick.matheny@ky.gov
Brian Meade	KYTC District 5	brian.meade@ky.gov
Tom Hall	KYTC District 5	tom.hall@ky.gov
Jeff Schaefer	KYTC District 5	jeff.schaefer@ky.gov
Andrea Clifford	KYTC District 5	andrea.clifford@ky.gov
Matt Bullock	KYTC District 5	matt.bullock@ky.gov
Jill Asher	KYTC C.O. Planning	jill.asher@ky.gov
Scott Thomson	KYTC C.O. Planning	scott.thomson@ky.gov
Anne Warnick	PB	warnick@pbworld.com
Shawn Dikes	PB	dikes@pbworld.com
Scott Walker	PB	walkersc@pbworld.com

MEETING SUMMARY:

The purpose of this meeting was for members of the Kentucky Transportation Cabinet (KYTC), Kentuckiana Regional Planning and Development Agency (KIPDA), and Parsons Brinckerhoff (PB) to discuss the Oldham County Interchange Justification Study (IJS) along I-71 with public officials from Oldham County.

Pat Matheny of KYTC introduced the project to the attendees. He noted that an overpass was planned and currently under design to provide a north-south connection over I-71. At the request of officials in Oldham County, the KYTC was asked to consider an interchange at the overpass location. The overpass project is currently on hold pending the outcome of the IJS. Pat also noted that the current study (IJS) does not include an environmental phase and the project will be completed by the end of the year.

Scott Walker continued by noting that he was serving as Project Manager for the study which would focus on traffic analysis for the proposed interchange. Scott then asked each attendee to introduce themselves.

Next, Scott provided a quick overview of the meeting agenda which was included in a handout provided to each attendee. He noted that one of the initial tasks for the current study included a review of previous studies. Then the use of models such as the KIPDA model and/or the Kentucky Statewide Traffic Model would be used for inputs into the forecasting and scenario analysis.

The attendees were invited to look at the maps included in the handout. The maps highlighted the study area which included I-71, and most of the existing interchanges along I-71 in Oldham County (Exits 17, 18, and 22), as well as other local roadways. There were two questions regarding the study area:

- One attendee asked whether the environmental phase will include the same study area as the traffic study. The KYTC responded by noting that the study area for an environmental analysis will likely be reduced to a smaller area close to the interchange, if justified.
- A second question inquired why the study area along I-71 was larger than previous studies. It was noted that the close proximity of the study area interchanges and the desire to provide a comprehensive analysis of a proposed new interchange on the operations existing ones spurred the decision to include the study area shown in the maps.

The requirements established in an IJS by FHWA were discussed. This included general information, policy information, and an overview of the operational analysis. It was noted that public involvement was not included in this study but would be part of the environmental phase.

Multiple scenarios would be included in this study, which include:

- No Build (no overpass and no interchange);
- Overpass only (no interchange); and
- With interchange.

Louise Allen then provided an update on the Oldham Reserve project. This included:

- The project is moving forward and is currently on track according to the schedule established for the project.
- One tenant is currently in place with over 600 employees.
- The full build out is targeted for Year 2025.
- There is also development anticipated for Commerce Parkway. This is because Oldham Reserve will not permit "big box" stores in the development; however, there are not restrictions along Commerce Parkway.
- A copy of the master plan schedule is included in the Wilbur Smith Associates traffic study.

Additional discussion items related to the development included:

- The interchange will not connect to New Moody Lane. Instead, it will connect to Ring Road. Ring Road will connect to KY 53 further south.
- A report developed by Paul Coomes is available which discusses traffic impacts, number of employees, build out scenarios, and economic impacts of Oldham Reserve.
- Sewer capacity has been a limiting factor in the area. A sewer plan is available which may be useful in identifying areas of probable growth.
- The KY 53 access management report is in its final design stages. The report presents mostly safety improvements along KY 53. Attendees noted that some intersections will still fail operationally. The report is expected to be completed by June 30; however, current recommendations can be provided to KYTC / PB.
- The KY 53 interchange is considered dangerous by first responders which presents problems getting to the interchange.
- With respect to the schedule of the IJS, PB noted that a draft IJS would be prepared by late August / early September.
- With respect to the northern terminus point of the new road north of the interchange / overpass, it was suggested by one attendee that it should connect to KY 146 to the north. It should not end at Commerce Parkway. It was noted that that a 6-year Plan Item has been established to provide a rail underpass with Allen Lane as a possible location.
- Brian Meade of KYTC noted that the attendees need to discuss what needs to happen to justify the interchange. FHWA may require certain infrastructure to be in place in order to justify the interchange.
- One question from an attendee inquired about the footprint of the interchange. It was noted that the study process will minimize the size of that footprint.
- Another attendee inquired about logical termini along arterials. It was noted that FHWA prefers to see logical termini on projects.
- One attendee noted two potential school sites. The Project Team would like to get information on these schools.
- It was also noted that a new bus compound was planned near the Allen Lane / Commerce Parkway intersection.
- The previous Interchange Feasibility Study considered a number of alternatives including a scenario with only the overpass. PB committed to looking at costs with and without an interchange to determine the benefits of the ramps.
- One attendee inquired about the overpass-only alternative. It was noted that the overpass currently has funding in the KTYC Six-Year Plan.

The attendees were then invited to discuss any other items related to the project. One question posed by PB to the attendees was about the issues that are trying to be solved by the project. Response included:

- One attendee noted that KY 53 is grid-locked. The congestion has worsened with the addition of the new company with 600 employees in Oldham Reserve. The attendee suggested that KYTC / PB show the footprint of Oldham County in 2035 and how KY 53 will operate without the interchange.
- Another attendee suggested that better access to critical facilities (schools, hospitals, etc.) is needed.
- Trains along the railroad track in LaGrange were noted as causing queues to the KY 53 ramps. It was noted that an I-71 overpass and a train underpass are critical for first responders.
- One attendee noted that an alternative route to the interstate may eliminate the need to do major widening on KY 53 near the interchange. Instead, spot improvements may be only warranted.

Final discussion items noted at the meeting included:

- The KIPDA model may need to be updated to include the proposed 11,000 new jobs at Oldham Reserve. The model already includes growth in the area but the exact numbers should be revisited. Similarly, the KYSTM should be updated with similar values in order to keep as much consistency among the models as possible.
- With respect to multiple scenarios that will be analyzed, the Coomes report provides several scenarios that could be considered.
- The Rawlings Group has data regarding where employees live and commute from. The Oldham Chamber of Commerce may be able to provide this information.
- The attendees were curious about the level of involvement with FHWA. KYTC and PB noted that a meeting with FHWA will be setup in Frankfort so that they are aware of this project.
- A two week timeframe was established for city and county agencies to provide additional information to KYTC on the project. The information should be forwarded to Pat Matheny at KYTC.

The meeting adjourned around 11:30 AM.

PB

Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Briefing with Federal Highway Administration (FHWA)

DATE & TIME: May 14, 2010 – 9:30 AM

LOCATION: Kentucky Transportation Cabinet Central Office
Conference Room 517
Frankfort, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Telephone	Email
Jill Asher	KYTC C.O. Planning	502-564-7183	jill.asher@ky.gov
Scott Thomson	KYTC C.O. Planning	502-564-7183	scott.thomson@ky.gov
Robert Farley	KYTC C.O. Design	502-566-3288	bob.farley@ky.gov
Gilberto DeLeon	FHWA – Kentucky	502-223-6757	gilberto.deleon@dot.gov
Pat Matheny	KYTC D-5 Design	502-210-5488	patrick.matheny@ky.gov
Tom Hall	KYTC D-5 Planning	502-210-5479	tom.hall@ky.gov
Dane Blackburn	KYTC D-5 Planning	502-210-416	dane.blackburn@ky.gov
Shawn Dikes	PB	859-245-3865	dikes@pbworld.com
Scott Walker	PB	859-245-3873	walkersc@pbworld.com

MEETING SUMMARY:

The purpose of this meeting with the Kentucky Transportation Cabinet (KYTC), the Federal Highway Administration (FHWA) Kentucky Division, and Parsons Brinckerhoff (PB) was to discuss the Oldham County Interchange Justification Study (IJS) along I-71 in Oldham County and to brief the FHWA's representative on what has happened to date on the project and what work is yet to be done.

After self-introductions, Pat Matheny began the meeting with a brief history of the project including an overview of the current overpass design project which led to the concept of an interchange at the same location.

Scott Walker then led the discussion by noting that this project is part of PB's Statewide Planning contract. He noted that it had been several months since the scoping meeting for this project which has included a member of FHWA that was no longer part of FHWA in Kentucky. Therefore, the purpose of this meeting was to get FHWA involved with the project again as FHWA's input is critical to the success of the project.

Scott then distributed a handout to the attendees which included study area maps. The study area was discussed which included the proposed interchange location. Scott described the

other roadways in the study vicinity as well as the Oldham Reserve, a mixed use office / commercial / residential development south of I-71 and west of KY 53.

Scott then briefly described the eight (8) IJS policy points and talked about how PB's scope addressed them. He noted that there wasn't going to be any environmental work at this stage. An environmental analysis will not be included because the type of interchange or improvement has not been selected. Pat Matheny noted that the environmental could be included as part of a current study to consider an underpass at the railroad tracks in LaGrange. Also, public involvement will also not be included because this study could result in no interchange being built.

Existing and past studies were noted as being important for this study. Those include the OCEDA Traffic Impact Study prepared by Wilbur Smith Associates, the I-71 Interchange Feasibility Study prepared by Qk4, the LaGrange Bypass Scoping Study prepared by PB and others.

The discussion then turned to the tools that were being used for future travel demand. Three options were available:

- The Kentucky Statewide Traffic Model (KYSTM) maintained by KYTC;
- The KIPDA Travel Demand Model maintained by KIPDA; and
- The Oldham County Travel Demand Model maintained by Oldham County.

Scott noted that the Oldham County model did not function as noted in the instructions provided in the model files. However, the network geography in the Oldham county model (TAZs and network) contain attributes that can be used as inputs into the KYSTM and KIPDA models. PB will coordinate the transfer of data with KIPDA and KYTC.

The models will be used to derive traffic forecasts which will be included in the HCS+ operational analysis. PB has already begun the existing conditions work, including existing and future traffic (including new traffic and turning movement counts at six locations) as well as a crash analysis, and level of service (LOS) analysis. Scott noted the modeling aspect will be important, and that coordination between the KYTC and KIPDA has already been underway.

In addition, PB has also produced a draft Purpose and Need and begun to address the 8 policy points. The design aspect will also be important. PB has in-house highway design engineers, and has already identified some concept interchange configurations and designs. The Purpose and Need and conceptual interchange configurations will be presented at the next Project Development Team (PDT) meeting.

Alternatives analyzed as part of this project will include:

- No Build; which will comprise some existing and committed projects
- Overpass only;
- Diamond Interchange;
- Interchange with Collector-Distributor Road; and
- An unidentified interchange configuration.

It was also noted that one or more of the scenarios above, the No Build and/or Overpass only will also include system improvements as required by FHWA's 8 Policy Points.

The primary analysis tool will be HCS+. PB will examine segment and location and focus on weave, merge and diverge analysis. We will also thoroughly document the entire process in a report.

Finally, Scott pointed out that there is a meeting on May 18, 2010 with Oldham County officials, mainly focusing on economic development and the build out scenarios related to the Oldham Reserve Development.

It was noted that the existing / planned projects should be mapped and in a project graphic. Also, Gilberto should be given copies of the previous reports and the FHWA's (Bill Hanson's) comments.

The meeting adjourned at approximately 10:30 AM.

PB

Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Meeting with Oldham County Planning and Economic Development Officials

DATE & TIME: May 18, 2010 – 10:00 AM

LOCATION: Oldham County Fiscal Court Building
LaGrange, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Email
Duane Murner	Oldham County Fiscal Court	dmurner@oldhamcounty.net
Louise Allen	Oldham County Planning and Zoning	lallen@oldhamcounty.net
Deana E. Karem	Oldham-LaGrange Dev. Authority	dekarem@oldhamcountychamber.com
Don Basham	Oldham-LaGrange Dev. Authority	dlbasham@bellsouth.net
Pat Matheny	KYTC D-5 Design	patrick.matheny@ky.gov
Dane Blackburn	KYTC D-5 Planning	dane.blackburn@ky.gov
Shawn Dikes	PB	dikes@pbworld.com
Scott Walker	PB	walkersc@pbworld.com

MEETING SUMMARY:

The purpose of this meeting with Planning and Development and Economic Development Officials from Oldham County was to discuss overall development patterns in LaGrange as well as the County. More specifically, the purpose was to specifically discuss the planned development in the immediate vicinity of the Interchange Justification Study (IJS) study area and the Oldham Reserve areas and the impacts of development on the need for an additional interchange on I-71.

The meeting began with a brief discussion on the purpose of the meeting. Scott Walker, PB's Project Manager, then discussed the work PB has done to date. It was noted that the existing conditions information was not distributed to attendees at this meeting since KYTC has not had a chance to review it.

Existing Conditions – Traffic: To date, existing conditions work completed with respect to traffic includes a summary and analysis of existing traffic, including:

- Calculating level of service (LOS) for specific intersections (spots) and segments. Highlights include: KY 53 is at LOS E from I-71 to KY 146, KY 146 is at LOS E near KY 53, KY 393 is at LOS C to the south and LOS D at the interchange.
- Conducting traffic counts (turning movement counts).
- Analyzing data from KIPDA travel demand model.

Existing Conditions – Crashes: Crash data was analyzed for the previous three years. The analysis indicated that KY 53 from I-71 to KY 146 has a high crash rate with angle crashes being the most frequent type of crash. Most roadways in the study area also show higher than normal crash rates for similar types of roadways in Kentucky. They also experience similar crash types.

With respect to the crashes along KY 53, Louise Allen remarked that an Access Management Study is currently being finalized. The study includes improvements slated for KY 53 from I-71 towards KY 146. The results of this study conducted by HNTB can be provided by Louise. Judge Murner called the improvements short term and a "band-aid" to the problems.

Purpose and Need: A draft purpose and need statement is being developed. It focuses on needed improvements to facilitate mobility, access, reduce travel times and facilitate economic development. Also noted in the purpose and need is the concept of a "middle connector" – a new roadway between KY 393 and KY 53. Also, the need for better and more connections to reduce fire / police / and EMS response times and travel times to the local hospital is discussed. The attendees also discussed that economic development is a legitimate purpose, but that transportation needs generated by the planned growth in economic development is more important.

Existing and Past Studies: PB has examined eight to nine previous studies. These studies are important for this study as they describe what improvements are needed in the area and what work has already been done in terms of developing projects and forecasting traffic. Those include the OCEDA Traffic Impact Study prepared by Wilbur Smith Associates, the I-71 Interchange Feasibility Study prepared by Qk4, the LaGrange Bypass Scoping Study prepared by PB and others.

The traffic model developed for the overpass studies was mentioned. Specifically, the traffic analysis zones (TAZs) have been updated in that model as of 2008. With some minor adjustments that may be required as part of the County's coordination with KIPDA, the data in the TAZs is appropriate to use for the IJS.

Meeting with the FHWA: PB along with the KYTC met with the FHWA on May 14, 2010. At the meeting, it was communicated that the Project Development Team wants, expects and needs FHWA's involvement. Gilberto DeLeon is the designated FHWA representative. PB briefed him on the work to date and he was in agreement with it. He is aware of the previous study that examined basic feasibility of an interchange along with the FHWA's previous comments.

The discussion then turned to planning and economic development issues.

Judge Murner noted that the County is going to sign a master developer agreement with the Hocker Group on Friday, May 21, 2010. Talmage Hocker is head of the firm who specializes in the development of retail centers such as Oxmoor and Springhurst in Louisville. The Group has already begun marketing the Oldham Reserve to potential tenants.

The Oldham Reserve is zoned for Planned Unit Development (PUD). It is slated as a mixed-use development with office / commercial, retail and residential. The Oldham Reserve does not allow "big box" retailers. Buckner Crossing, another development near Commerce Parkway and KY 393, is similar in nature. It does, however, permit "big box" retailers. Oldham County wants to diversify the tax base with these two developments and offer residents a chance to live, work

and shop within the County. More high density residential is planned along Commerce Parkway as well.

With the recent economic downturn, the pace of development has slowed somewhat. Mostly, the County is seeing that projects are on hold or are being delayed a few years. Still there are a number of requests for rezoning and for extensions on past actions at the Planning Commission. The pace of development is going to be governed by the County's ability to provide wastewater infrastructure. There are plans to develop a long-term strategy to solve the wastewater issues and a meeting has been scheduled to discuss these issues. Louise Allen pledged to provide some information on zoning requests / permits.

According to the attendees, infrastructure, including wastewater, seems to be the governing public utility type of service that is metering development. It was stated that most residents are attracted to Oldham County because of the schools. The school system is well-positioned to handle the need for new schools and to accommodate the existing and new students as well. So, aside from roadways, the attendees stated that there aren't any public infrastructure needs that need to be addressed. There is a new school along Allen Lane and planned schools near the Oldham Reserve. Also a new library along Commerce Parkway is very busy.

The attendees focused on Dr. Coomes' report in which he lays out the scenarios for the development of the Oldham Reserve well. Up to 11,000 new jobs could be created in the development with another 4,000 related jobs elsewhere in the vicinity. The Oldham Reserve and the LaGrange area are becoming and are intended to become the commercial hub of the County. Most of the commercial, retail and social activities of residents are moving towards LaGrange. People in the western part of the County associate more with Louisville and Jefferson County, but others associate with LaGrange more as the County Seat.

As noted, Hocker is actively pursuing tenants for the Oldham Reserve. They have shown some prospective tenants what is available already. They have indicated that transportation access is critical to the marketability of the parcels. Baptist Hospital is looking to expand as is the Rawlings Group. Employers are also concerned about access for their workers and customers, especially those along KY 53. The Oldham Reserve Master Plan lays out the general development pattern. However, market conditions, the mixture of current, new and future tenants and what Hocker can do to attract tenants may change. There is already discussion that 180 acres slated for retail may not be enough. If changes are made the Master Plan and PUD will require approval of the Oldham County Planning Commission and a rezoning. In addition, that would increase the number of trips attracted to the development.

The Oldham Reserve development may be more retail oriented than had been expected. To what degree that happens and how the amount of retail relates to the amount of residential is yet to be seen. In any case, it was noted that a connection from the Oldham Reserve to Commerce Parkway and the development at Buckner Crossing is needed. Access continues to be a key to development. The residential zoning in both the Buckner Crossing and Oldham Reserve developments are likely to be a mixture of types.

According to the attendees, there are numerous development scenarios that could take place:

- Best Case – According to the attendees, a full build out of both the Buckner Crossing and Oldham Reserve areas could take place. This is likely to overwhelm the existing transportation system and add significant jobs and tax revenues to the County.

- Worst Case – Limited build out of both locations and background traffic exceeds capacity of the system, especially at peak times. The tax base is diversified somewhat, but the majority of the burden is still on residents.
- Most Likely – The most likely scenario is that the pace of development picks up and extends outward. Both developments noted will experience growth close to build out, perhaps at a slower pace (e.g., 2030 expectations are met in 2035). This scenario was noted as likely because the main players Hocker and the County are committed to success and both are financially sound.

Judge Murner also noted that the County has a new AA bond rating and Hocker brings considerable experience and resources to the table. Other partners including the joint LaGrange – Oldham County Economic Development Authority and the City of LaGrange are also committed to success. The Coomes' report also lays out some scenarios as well. In addition, the County is funneling development and programs to make the Commerce Parkway / KY 146 corridor a focal point.

Deliverable that will be provided to the KYTC and PB will include:

- Existing / planned projects and rezoning requests mapped in a project graphic. Louise agreed to see if the County could provide that. She will also detail the rezoning and development trends in a tabular format.
- Support letters from fire / police and EMS.
- Details on the access management improvements slated for KY 53.

The meeting adjourned at approximately 11:20 AM.

PB

PB

Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Project Development Team Meeting #2

DATE & TIME: June 3, 2010 – 9:30 AM

LOCATION: Kentucky Transportation Cabinet District 5
Conference Room
Louisville, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Telephone	Email
Andy Rush	KIPDA	502-266-6084	andyh.rush@ky.gov
Pat Matheny	KYTC District 5	502-210-5488	patrick.matheny@ky.gov
Brian Meade	KYTC District 5	502-210-5414	brian.meade@ky.gov
Dane Blackburn	KYTC District 5	502-210-5416	dane.blackburn@ky.gov
Scott Thomson	KYTC C.O. Planning	502-564-7183	scott.thomson@ky.gov
Robert Farley	KYTC C.O. Design	502-566-3288	bob.farley@ky.gov
Lindsay Walker	PB	859-245-3869	walkerli@pbworld.com
Shawn Dikes	PB	859-245-3865	dikes@pbworld.com
Scott Walker	PB	859-245-3873	walkersc@pbworld.com

MEETING SUMMARY:

The purpose of this Project Development Team (PDT) meeting with the Kentucky Transportation Cabinet (KYTC), Kentuckiana Regional Planning and Development Agency (KIPDA), and Parsons Brinckerhoff (PB) was to discuss the status of the Oldham County Interchange Justification Study (IJS) along I-71 in Oldham County.

Pat Matheny, Project Manager for KYTC, began the meeting with a welcome to attendees and a quick update on the project. Scott Walker, Projector Manager for PB, then led the meeting by noting that the purpose of this meeting was to update the status of the project. It was noted that a FHWA representative was not present, although Pat and Scott indicated that Gilberto DeLeon had been to a previous meeting in which members of KYTC and PB provided an overview of the project and the work done to date. It was noted that Gilberto's main comment during that meeting was to ensure that there is a No-Build scenario included in the analysis. Pat suggested a conference call with Gilberto to keep him up to date on the project. Pat agreed to contact Gilberto and set this call up.

A handout was given to each attendee which included an agenda, study area maps, and figures detailing existing conditions within the study area (traffic volumes, operational analysis, and crash analysis). Scott then proceeded to discuss the handout accompanied by PowerPoint slides. The study area was reviewed by attendees.

Scott noted that the study area is bounded by KY 53 to west of KY 146. The location of a possible interchange had been added to the study area maps. The exact location of the interchange and why it had been selected is not known, but is probably due to the connection to New Moody Lane. It was noted that the interchange location will be dictated by traffic operations, more specifically spacing and weaving of the existing and new ramps, and that the interchange location may have to move slightly to ensure safe and effective operations. Also, a future environmental document will require a discussion of the interchange.

The discussion then briefly turned to interchange types. It was discussed that a partial interchange is not recommended because it is operationally difficult and provides less advantages. In addition, FHWA is less likely to consider or approve a partial interchange. The IJS report will need to discuss why it was not included.

Next, the participants discussed the I-71 system of interchanges. An interchange on I-71 near the Oldham / Jefferson County line has been investigated. It is not expected to have much of an impact on the interchange considered for this study. Lane balance along I-71 will need to be addressed as part of this study. The new interchange between KY 53 and KY 393 may require I-71 to be 6 lanes. The discussion of operations of 4 vs. 6 lanes from the Gene Snyder Freeway to perhaps the Henry County line will need to be part of the discussion in the IJS Report.

Scott briefly discussed the FHWA's 8 Policy Points, noting that PB will address 7 of them. The environmental analysis (in Policy Point #8) will not be part of the project. Rather, it will be incorporated into future design work.

Next was a discussion of the work to date. PB has been examining previous reports that are available. There has been on-going work to analyze the transportation system in the LaGrange area for about 10 years. PB looked at eight previous reports from 2002 to the present. More recently, the County has been updating their Thoroughfare Plan and is completing a KY 53 Access Management Study. Scott Thomson offered to obtain a copy of that report. Each of the documents reviewed will help identify projects that are part of various modeling scenarios, including the No-Build and TSM options.

There have been two meetings with stakeholders in Oldham County:

- March 5, 2010 to generally discuss the project
- May 18, 2010 to discuss planning, development and economic development.

The meetings allowed communication back and forth between members of the Project Development Team and key officials in Oldham County. Key notes made from the meetings include:

- LaGrange area is becoming the hub for Oldham County;
- The County has signed a master development agreement with the Hocker Group for the Oldham Reserve Property. The Oldham Reserve project is mostly on track and may take a more retail-oriented development pattern (in terms of the number of acres devoted to retail) as a result of the agreement with the Hocker Group. Despite the economic slowdown, the stakeholders in Oldham County still believe that the development will occur.
- Planners indicated "big box" retailers will be allowed North of I-71 only; however, "big box" retailers will not be allowed in the Oldham Reserve development south of I-71.

Also, a result of the second stakeholder meeting, PB has received letters of support for a new interchange from local police / fire / EMS officials. These letters will be in an appendix of the report.

PB then presented the existing traffic data. PB has gathered the existing geometrics, along with volumes and has performed level of service (LOS) calculations and looked at crash data. Lindsay Walker of PB presented the analysis on a series of maps which included a discussion of the high crash area along KY 53. As a follow up to the meeting, PB will detail the source for the I-71 / KY 53 counts from 2009 as well as review the crash data for the westernmost segment of I-71.

As of the meeting, the design year 2030 forecasts for various scenarios had not been completed. It was noted that a discussion with Andy Rush and Scott Thomson to discuss the modeling issues would take place following the adjournment of the PDT meeting.

The PDT then engaged in a discussion regarding the Environmental Justice (EJ) needed for this project which will be performed by KIPDA. It is expected that the analysis will show that there are no adverse impacts and will not influence the traffic aspect of the project. Therefore, the analysis will not need to be completed until the fall, when the IJS is near completion. Andy Rush will ask Lori Kelsey (both of KIPDA) what information she needs to get started on this.

Shawn Dikes then discussed the draft Purpose and Need developed for the IJS. It was noted that one criticism of past studies was that the proposed interchange was focused too much on driving economic development. In this study, PB is taking a safety and operations approach to the purpose and need process. Shawn discussed the seven "needs" for the interchange. The participants generally agreed with the seven points and remarked that safety should be moved further up the list. Brian Meade commented that a need for an effective and efficient detour route in the area is needed when I-71 is shutdown due to an incident. The impact on I-71 can be further intensified if there is a train in LaGrange. The configuration of the local roadway system and the fact that the operation of the train cuts off many roads are all factors in the Purpose and Need and Brian commented that these two items should be addressed. The need for an underpass along KY 146 is also related to this. As an action item, PB will develop a point that discusses this need and put it into the Purpose and Need statement.

Next was the discussion of the various scenarios or alternatives that PB will examine. After discussion, it was determined that:

- The No Build scenario would includes projects that are defined as Existing and/or Committed and are contained in KIPDA's Metropolitan Transportation Plan (MTP). Any projects that are not in these two documents will not be included in the No Build.
- PB should also examine an overpass only scenario that included an underpass at Allen Lane.
- There will be a Transportation Systems Management (TSM) scenario that includes other system improvements such as those to KY 53 etc. (more access management, more capacity) which maximizes the efficiency and operations of the system short of an interchange. PB will work with KYTC to identify projects to include in this scenario.
- There are also several interchange types that will be examined. These are largely for cost estimating purposes as the modeling will see little differences in interchange type. PB proposes to examine:
    - A diamond interchange;

    - An interchange with a Collector-Distributor (C-D) road system. It was noted that the C-D may need to be started further back along I-71 to ensure adequate spacing for drivers to make the appropriate weave (if necessary);
    - An interchange with roundabout at the ramp termini.

As requested, PB will need to address the need for and location of signs, including the appropriate distances.

Next, the project schedule was discussed. It is PB's intent to:

- Perform the traffic forecasting in July 2010;
- Perform the operations analysis in August; and
- Hold a PDT Meeting sometime in late August as well.

An email discussion or a series of phone calls may be needed to discuss the scenarios under consideration to ensure that the right ones are being examined.

A Draft IJS report will be ready approximately at the beginning of September 2010 and a Draft report will be delivered to FHWA in October.

The meeting adjourned around 11:45 AM.

Following the formal PDT meeting, a separate meeting was held with Andy Rush (KIPDA), Pat Matheny (KYTC), Scott Thomson (KYTC), and Scott Walker (PB) to discuss the forecasting for the project. Highlights included:

- The attendees discussed the analysis of the zonal attribute that was conducted on the Oldham County travel demand model. Andy Rush and Scott Thomson both indicated that the data in the Oldham County model was noticeably different from their respective models. It was decided that since Oldham County had approved the socioeconomic data in the KIPDA model for Oldham County, the Oldham County model data would not be used.
- It was decided that PB would take the lead on running the KIPDA model due to other commitments of KIPDA staff. Andy Rush and Scott Walker would coordinate on the following Monday to transfer model files and make sure the model was running properly.
- Scott Thomson indicated that he would take the lead on running scenarios for the Kentucky Statewide Model.
- The attendees briefly discussed the various scenarios that would be run for the project. PB indicated that this list would be formalized and shared with the two agencies for comment.

This meeting adjourned around 12:30 PM.

On June 15, 2010 at 9:30 AM, a telephone conference call was conducted to brief FHWA Kentucky on the outcomes of the PDT meeting. Attendees included Gilbert DeLeon (FHWA), Bob Farley (KYTC), Scott Thomson (KYTC), Pat Matheny (KYTC), Shawn Dikes (PB) and Scott Walker (PB). The attendees reviewed the presentation from the PDT meeting held on June 3, 2010. Key notes from the conference call include:

- Gilberto inquired whether an alternative considered for this study would include the improvement of existing facilities. It was noted that a TSM alternative would be

considered which includes improvements to KY 53, KY 146, KY 393, and other routes as appropriate. Costs for such improvements would be documented.

- There were not major comments with respect to the existing conditions overview.
- With respect to purpose and need, there was agreement that moving the safety statement higher in the list would be more appropriate to indicate its importance.
- During the conference call, Scott Walker emailed the attendees a copy of proposed scenarios for this project in a spreadsheet.
- The use of KIPDA's MTP projects were noted a reasonable "Future No-Build" for this project. The variations of these scenarios were agreed upon by the attendees.
- When considering the costs of alternatives, all costs should be included such as right-of-way (land, lost business, relocation costs), utilities and other economic impacts.
- Gilberto concurred with the idea of dismissing a partial interchange as an alternative.
- With respect to I-71, Gilberto indicated that it may be premature to address the future congestion along I-71 since the scope of this project is the interchange. However, an analysis of I-71 will be included as part of the overall capacity analysis for the project, which may provide a look at the future operations of I-71.
- The attendees discussed which build-out scenarios to explore. It was determined that 30%, 70%, and 100% build-out scenarios would be appropriate. It was noted that 30% build-out was assumed to be reflected currently in KIPDA's 2030 model.
- The next PDT meeting was scheduled for Tuesday, August 31, 2010, at KYTC's office in Frankfort, KY.

This conference call adjourned around 10:30 AM.

PB

PB

Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Project Development Team (PDT) Meeting #3

DATE & TIME: August 31, 2010 – 10:00 AM

LOCATION: Kentucky Transportation Cabinet Central Office
5th Floor Conference Room
Frankfort, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Telephone	Email
Andy Rush	KIPDA	502-266-6084	andyh.rush@ky.gov
Pat Matheny	KYTC District 5	502-210-5488	patrick.matheny@ky.gov
Brian Meade	KYTC District 5	502-210-5414	brian.meade@ky.gov
Travis Thompson	KYTC District 5	502-210-5481	travis.thompson@ky.gov
Dane Blackburn	KYTC District 5	502-210-5416	dane.blackburn@ky.gov
Tom Hall	KYTC District 5	502-210-5479	tom.hall@ky.gov
Tala Quinio	KYTD District 5	502-210-5475	tala.quinio@ky.gov
Robert Farley	KYTC C.O. Design	502-564-3280	bob.farley@ky.gov
Jill Asher	KYTC C.O. Planning	502-564-7183	jill.asher@ky.gov
Scott Thomson	KYTC C.O. Planning	502-564-7183	scott.thomson@ky.gov
Scott Walker	PB	859-245-3873	walkersc@pbworld.com
Lindsay Walker	PB	859-245-3869	walkerli@pbworld.com
Shawn Dikes	PB	859-245-3865	dikes@pbworld.com
Anne Warnick	PB	859-245-3877	warnick@pbworld.com

MEETING SUMMARY:

The purpose of this Project Development Team (PDT) meeting #3 with the Kentucky Transportation Cabinet (KYTC), Kentuckiana Regional Planning and Development Agency (KIPDA), and Parsons Brinckerhoff (PB) was to discuss the status of the Oldham County Interchange Justification Study (IJS) along I-71 in Oldham County.

Scott Walker, Project Manager for PB, began the meeting by noting that the purpose of this meeting was to present the findings of the traffic analysis and discuss a recommendation and next steps.

Scott began the presentation by reviewing the project scope, study area and proposed developments within the study area. One attendee questioned whether residential development would be shown on a map of proposed development. Scott replied that the proposed development map simply showed areas where major retail / office / mixed use development

would occur, but that potential residential development in the area was included in the model used for traffic forecasting.

A brief review of the second PDT meeting was given as well as an overview of work done since that meeting. The revised purpose and need statement was also shown which included: 1) moving safety to a higher priority within the purpose and need list; and 2) adding a statement regarding the need for an outlet when I-71 is shutdown during an incident. An attendee asked if the purpose of reducing emergency response times was the same as improving access to the hospital. Scott replied that the two are related.

The use of traffic models was also discussed. Scott explained the reason that the KIPDA model was chosen for analysis over the KY Statewide Model was the fact that the KIPDA model is more sensitive to changes within the model and also would provide KIPDA a starting point if the interchange were to move forward as a definitive project.

Next, the scenarios that were modeled, forecasted and analyzed were presented. One attendee asked if there was a scenario analyzed that showed I-71 as 6 lanes. A 6-lane section was not modeled. The various projects and components of each scenario were described, which included:

- Scenario 1: KIPDA's Metropolitan Transportation Plan (MTP) which included a new overpass over I-71 and the Allen Lane Extension.
- Scenario 2: MTP- which was similar to Scenario 1, but without the overpass and the Allen Lane Extension.
- Scenario 3: MTP+ which is similar to the Scenaro 1, but with the proposed Ring Road through the Oldham Reserve.
- Scenario 4a: TSM which builds upon Scenario 3. This scenario includes widening projects as well as typical TSM-type improvement such as signal optimization and turn lane additions. It was noted that TSM changes will be clarified in the documentation.
- Scenario 4b: This is similar to Scenario 4a but with the addition of a bypass around LaGrange.
- Scenario 5: This scenario builds upon Scenario 3 but adds a standard diamond interchange along I-71.
- Scenario 6: Similar to Scenario 5, a diamond interchange is added along I-71. In this scenario, a collector-distributor system was added as well between the proposed interchange and KY 53.

Scenario 4b included TSM improvements as well as the LaGrange Bypass. Scott explained that the recently published "Road Classification and Proposed Future Roads" document which included the proposed LaGrange Bypass showed that there is a missing link in the bypass through the Springhouse Estates subdivision. As this was the most recent Oldham County plan, the model was coded to reflect this configuration. There was discussion as to whether another scenario should be modeled that would connect the missing link; however, the PDT determined that such a model run would not be necessary as the bypass is shown according to plan.

Following the presentation of the scenarios, the key location volume outputs from the model runs were discussed. This included an overview of the interchanges as well as six key locations along KY 53, KY 393, and KY 146. One attendee noted that the segments highlighted on the maps should be more specific to where the volume actually occurs in the model. As part of this discussion, the attendees focused on the future of KY 393. According to the KYTC District 5 attendees, KY 393 between I-71 and KY 146 is proposed to be 5 lanes. However, using

information provided in the KIPDA model, the section of KY 393 was modeled as 3 lanes in all scenarios except 4a and 4b. The attendees agreed to flag this as a follow up item for this meeting to determine the anticipated number of lanes for KY 393. If the determination is 5 lanes, the impact that this change has on the model will need be evaluated.

After discussing the traffic volumes, Lindsay Walker presented the highway capacity analysis of the roadway segments and intersections. The analysis of the intersections and segments varied by scenario as the presence of an interchange did have an impact on some locations. A discussion of TSM improvements in scenarios 4a and 4b were discussed against the impact of the interchanges in scenarios 5 and 6.

An attendee asked whether or not FHWA would have a good reason to move this project forward since the roadway segment and intersection levels of service did not vary significantly among the alternatives. It was noted that the further differentiation between the TSM scenarios and the interchange scenarios were necessary as the TSM scenarios contains projects which may not be feasible and are technically beyond the true definition of "TSM" according to FHWA guidance.

An attendee recommended that the new Ring Road be added to the aerials of the scenarios in which it exists. Scott Thomson also suggested double checking the model to be sure that there is not an unrealistic link in the model between Ring Road and KY 393 that is causing the very high volumes and poor LOS on KY 393 south of I-71. The attendees again noted the impact of whether KY 393 will be widened to 5 lanes between I-71 and KY 146.

Next, Scott Walker discussed the freeway operations with regards to the various scenarios, specifically the merge, diverge and weave areas. Scott mentioned that the weave areas in the existing conditions as well as the non-interchange scenarios were technically not weave areas because the spacing between the interchanges is more than 2,500 feet. It was agreed that these should not be included in the analysis. Also mentioned were the limitations of the Highway Capacity Software (HCS+) being able to only analyze the merge and diverge conditions, without taking into account the delay and queues at the ramp termini intersections. An attendee noted that there are long queues that currently exist at the I-71 NB off ramp to KY 53. These queues have the potential to back up to the mainline interstate and impact the diverge area. HCS+, however, does not analyze the whole system, and therefore does not necessarily account for any spillback from the ramp intersections. As a follow-up item, PB will look at the queue analysis from the intersection HCS+ files and determine if the mainline and ramp junctions will be impacted by queues on the ramps. It was recommended that the documentation focus on the impacts to the interstate in addition to the analysis already conducted on the arterials.

Scott also shared a summary of total vehicle miles traveled (VMT) and vehicle hours traveled (VHT) for each scenario's model output. This is a direct post-processing output from the model analysis. This analysis shows that the two interchange scenarios reduce total VMT and VHT in the system. It was recommended that these values be used as part of a benefit/cost type analysis of the different scenarios. This recommendation also came with the warning that while a benefit/cost analysis may be useful, that alone does not justify the need for an interchange. If an interchange is to be recommended, the IJS must clearly show that there is a transportation problem on the interstate without an interchange, and that an interchange is the only solution that will address that problem.

Next, planning-level design for the various interchange alternatives were shown, as well as cost estimates for the various scenarios. It was noted that the cost of Scenario 4b (MTP with LaGrange Bypass) was very similar to that of Scenario 6 (interchange with C-D road).

Finally, an evaluation matrix was presented that compared the scenarios with respect to how well they address the identified elements of the purpose and need statement. The matrix also included a summary of the traffic operations analysis and the costs. One suggestion was to revise one of the purpose and need items regarding access to the Oldham Reserve. It was suggested to change the reference to "Oldham Reserve" to providing access to development in general since Oldham County is anticipating new development in other areas in addition to Oldham Reserve. This change would encompass all economic development activity and potential in the study area. It was also recommended that a more refined evaluation scale be used to allow more than three values for ranking.

The meeting ended with a general discussion of what should be the recommendation going forward. The following comments were made at the end of the meeting:

- The IJS should focus on the impacts to the interstate. The report should provide information with respect to the queues at the interchanges and whether or not they spillback vehicles onto the interstate.
- The report should identify whether or not there are any serious problems with the interstate without any improvements, and if so what the improvements are going to do for the interstate system.
- The IJS should look at how much of the VMT and VHT savings are a result of the development. Scenarios should be run for the current year and see if the actual geometric changes themselves (i.e. interchange or TSM) provide the VMT and VHT savings or if those are a result of the proposed developments.
- Based on the freeway merge and diverge analysis, the analysis indicates that adding an interchange without a C-D road (Scenario 5) will cause interstate operations to deteriorate. Therefore, the PDT agreed that if an interchange is to be recommended, it will be Scenario 6 that includes the C-D road.

The attendees agreed that all of the necessary analysis has been performed; however, the existing problems with the interstate need to be highlighted, and based on how each scenario affects the interchange, a recommendation should be made. PB will go through the data and determine if an interchange is justified or if the problems are more on the arterials and can be solved with TSM-type improvements. PB will contact Pat Matheny in a couple of weeks with a general recommendation of where the study is going, which will allow a couple of additional weeks to establish existing deficiencies within the system. Pat may relay that information to the PDT. At that point, PB will move forward with a draft report. After the submittal of the draft report, another meeting will be held to discuss the recommendations. Finally, Gilberto DeLeon of FHWA will be sent the meeting minutes so he is aware of what was discussed at this meeting.

The meeting adjourned at 12:45 PM.

PB

Meeting Minutes

PROJECT: Oldham County Interchange Justification Study (IJS)

MEETING: Project Development Team (PDT) Meeting #4

DATE & TIME: October 29, 2010 – 1:00 PM

LOCATION: Kentucky Transportation Cabinet Central Office
5th Floor Conference Room
Frankfort, Kentucky

ATTENDEES:

NAME	AGENCY/COMPANY	Telephone	Email
Andy Rush	KIPDA	502-266-6084	andyh.rush@ky.gov
Pat Matheny	KYTC District 5	502-210-5488	patrick.matheny@ky.gov
Brian Meade	KYTC District 5	502-210-5414	brian.meade@ky.gov
Tom Hall	KYTC District 5	502-210-5479	tom.hall@ky.gov
Tala Quinio	KYTC District 5	502-210-5475	tala.quinio@ky.gov
Jeff Schaefer	KYTC District 5	502-210-5438	jeff.schaefer@ky.gov
Robert Farley	KYTC C.O. Design	502-564-3280	bob.farley@ky.gov
Gilberto Deleon	FHWA	502-223-6757	gilberto.deleon@dot.gov
Michael Loyselle	FHWA	502-223-6748	michael.loyselle@dot.gov
Jill Asher	KYTC C.O. Planning	502-564-7183	jill.asher@ky.gov
Scott Thomson	KYTC C.O. Planning	502-564-7183	scott.thomson@ky.gov
Scott Walker	PB	859-245-3873	walkersc@pbworld.com
Lindsay Walker	PB	859-245-3869	walkerli@pbworld.com
Steve Slade	PB	859-245-3862	slade@pbworld.com

MEETING SUMMARY:

The purpose of this Project Development Team (PDT) Meeting #4 with the Kentucky Transportation Cabinet (KYTC), Kentuckiana Regional Planning and Development Agency (KIPDA), Federal Highway Administration (FHWA) and Parsons Brinckerhoff (PB) was to discuss the draft report and recommendation of the Oldham County Interchange Justification Study (IJS) along I-71 in Oldham County.

Introductions were made, and then Scott Walker, Project Manager for PB, began the meeting by providing an overview of the study. This overview was requested by KYTC in order to brief FHWA on the background of the project.

The study area was shown which included a review of major study area roadways and the existing interchanges. The figure depicting the current poor levels of service and high crash rates was shown to familiarize those in attendance with current operational issues within the

system. The purpose and need was reviewed to provide a frame of reference for identified issues and needs within the study area.

After the overview of the study, a PowerPoint presentation prepared by PB was given and served as a summary of the tasks completed since PDT #3. This included a list of discussion points related to comments identified by KYTC on the draft report. As part of the presentation, the contents of the report were shown along with the initial list of evaluation scenarios. The evaluation criteria were also listed for each of the Level 1 and Level 2 screenings. The general methodology for determining future year traffic forecasts through traffic modeling was included as well as the draft recommendation and comments by KYTC.

Two major topics were discussed related to the study during this overview.

1) Traffic modeling methodology; and
2) Ring Road

With respect to the traffic modeling methodology, there were some initial questions posed by KYTC about the methodology prior to the meeting. PB noted the following about the traffic model use:

- Two tools were available for assisting in determining future traffic demand – the Kentucky Statewide Traffic Model (KYSTM) and the KIPDA Travel Demand Model (TDM).
- All modeling work was originally completed with the KIDPA TDM as it is more local in scale.
- When evaluating the distribution of traffic related to the existing KY 393 and KY 53 interchanges combined with the new interchange, it was noted that the KIPDA TDM was assigning a lower portion of traffic to the new interchange.
- The KYSTM was consulted which showed a much higher utilization of the new interchange compared to the existing KY 393 and KY 53 interchanges.
- It was determined through engineering judgment that the traffic utilization would best be illustrated by averaging the results from the models, providing a balance of traffic volumes through the three interchanges.

This methodology was discussed with those in attendance at the meeting. Concern was raised about the differences in the traffic assignment produced in each model. One attendee from KYTC noted that this was the preferred methodology when working with multiple traffic models based on a recent webinar that he had attended. After further discussion, the attendees agreed upon averaging the volumes between the two model platforms as the best way to predict future traffic volumes at the existing and proposed new interchange for this study and further text additions regarding the modeling would be added to the IJS.

The second major topic of discussion was Ring Road which is the proposed road that would connect the new interchange with KY 53 around the proposed Oldham Reserve development. FHWA noted that Ring Road (as shown on the MTP+ evaluation scenario) is not a committed project in planning documents for either KYTC or KIPDA. This project is directly related to the Oldham Reserve development and would occur in conjunction with that development. The concern raised by FHWA was related to logical termini of a new intersection, and Ring Road would need to be a committed project to be constructed before or along with a new interchange. Without Ring Road, the new interchange would connect to New Moody Lane and KY 2857 which are both public roads (per FHWA policy point #4). However, the connection to Ring Road

would be more logical termini given direct access to the developing area south of I-71 and a connection to KY 53 bypassing the KY 53 interchange. The attendees agreed that that Ring Road is required to be constructed as part of the development (per FHWA policy point #7) in order for the new interchange to be considered. Further discussion will be added to the IJS documentation.

The remainder of the meeting was spent discussing the project recommendation. It was noted that the current recommendation in the draft report was for a new interchange with a collector – distributor (C-D) road and was based on that scenario meeting the project purpose and need and also re-directing some of the traffic within the study area. As previously noted, PB is currently reviewing the proposed construction costs associated with the various evaluation scenarios. With some additional design concerns (i.e. existing bridge constraints over I-71 for additional of auxiliary lanes), the costs are expected to increase for this alternative to a point that may make it beyond feasible. Therefore, it may be more reasonable to re-evaluate the standard diamond interchange. This was initially not considered for further evaluation given the constraints in spacing between the existing interchanges and some concern about merge / diverge and weaving. The FHWA representatives indicated that the standard diamond interchange could be included for consideration despite the interchange spacing concerns. As a result, PB will incorporate the standard diamond interchange concept back into the Level 2 screening and provide more detailed costs for the Level 2 evaluation scenarios.

The FHWA representatives also indicated they would like to see a recommendation that solves the identified issues currently. Neither of the proposed interchange concepts addresses all existing operational issues. Some of these issues relate to poor intersection level of service and require additional turn lanes to improve operations. Therefore, a recommendation should include some spot improvements in conjunction with an interchange concept if that is what is required to improve the entire system. This will be considered a "hybrid" scenario.

To determine the appropriate recommendation for this study, the costs for the two interchange concepts plus any additional spot improvements will be evaluated and provided to KYTC. KYTC and PB will make a decision at this point as to which scenario to recommend in the IJS documentation. Once a final recommendation has been made, the report will be finalized and provided to KYTC and FHWA. All other comments that were provided to PB by KYTC, though perhaps not discussed at this meeting, will be addressed prior to finalization. Some other noteworthy changes to the document included:

- Revisions to the evaluation matrices for purpose and need as the previous ones may be a little simple.
- Noting directional orientation for this study is EB / WB when referring to I-71 even though it is a north-south route, within the study area it geographically is east-west.
- Updates to mapping (i.e. adding in the railroad to the study area and mapping crashes using latitude and longitude coordinates).
- Increasing (within reason) the length of the acceleration / deceleration lanes to provide an acceptable level of service for the evaluation scenarios.

It is understood that the final report will be distributed to KYTC and FHWA, who upon their recommendation will need to send to the main office in Washington, D.C. for final approval.

The meeting adjourned at 4:00 PM.

Appendix B: Field Review Summary

Multiple field visits were conducted over the course of the study in order to fully understand the existing traffic operations. Particular attention was given to the I-71 / KY 53 interchange as this was identified by stakeholders as a problem location.

AM Peak Period

A field visit was conducted at the aforementioned interchange from roughly 7:35 AM to 8:30 PM on September 24, 2010. Key items noted include:

- The I-71 northbound off-ramp currently splits traffic at the top of the ramp with a painted "island". The ramp is also wide enough for two lanes of storage from the stop bars all the way down (west) to the gores. However, the ramp is not striped for two lanes.
- The STOP bar at the right turn from I-71 northbound onto KY 53 southbound should be moved up (i.e., closer to KY 53). At its current location, the STOP bar prevents the right turning traffic from moving sometimes as there is poor sight distance from the north north.
- Vehicles going southbound that wants to make a right turn to New Moody also drift / merge over just after the northbound ramp terminal intersection which can create some conflict between vehicles.
- The queues for turning left turns and right turns on the I-71 northbound off-ramp always cleared.
- School busses and tractor trailers have an effect on traffic operations, but not enough to back up onto the main line of I-71.
- The I-71 northbound off-ramp was only about half full.
- Within LaGrange, CSX train operations were observed. The train that was witnessed during the field visit blocked traffic for approximately three and a half minutes.

PM Peak Period

A field visit was conducted from roughly 4:30 PM to 5:30 PM on September 2, 2010. Key items noted include:

- The traffic was steady and there were few trucks.
- As noted in the AM observations, the ramp is wide enough for two lanes though it is not striped. There are not any shoulders so an incident on the ramp could affect the mainline with spillback.
- The traffic signals always flushed the stacked queues on the I-71 northbound off-ramp. The vehicles did not queue to the mainline; however, there were a couple of cycles of the traffic signals where the ramps were approximately 75% full.

Ramp from I-71 EB to KY 53

Ramp Storage on I-71 EB to KY 53

Ramp Gore on I-71 EB to KY 53

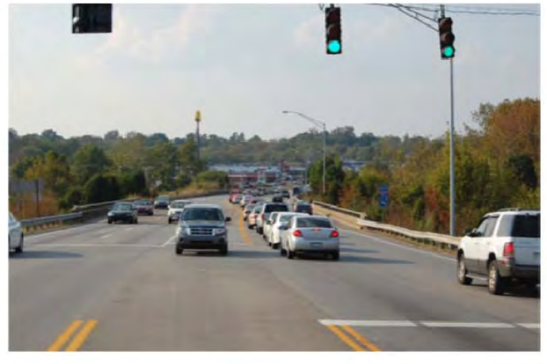
Ramp from I-71 EB to KY 53

Ramp terminal from I-71 EB at KY 53

Ramp Terminal Stop Bars from I-71 EB to KY 53

Ramp Terminal from I-71 EB to KY 53

KY 53 SB just S of I-71 off ramp



Looking N on KY 53 at I-71 off ramp

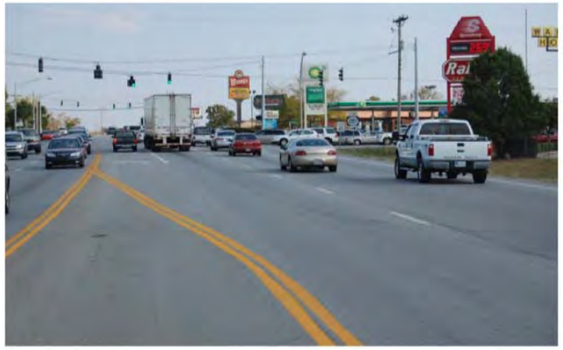
Truck squeezing right turn late on I-71 off ramp to KY 53

KY 53 and KY 2857 intersection looking N

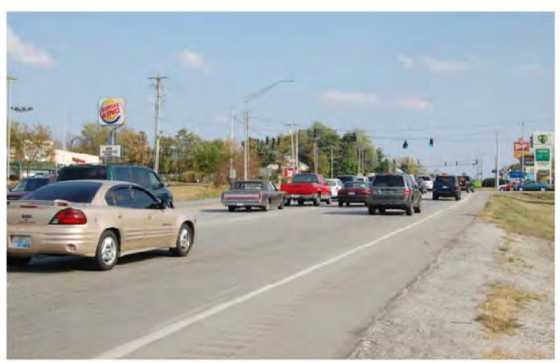
Turn lane from KY 53 SB to KY 2857 WB

Looking S on KY 53 near I-71 EB off ramp

Right turn lane from KY 53 SB to KY 2857 WB



KY 53 looking SB to intersection with KY 2857



KY 53 SB just S of I-71 EB off ramp

KY 53 SB looking at intersection with KY 2857

Looking S on KY 53 near I-71 EB off ramp

Appendix C: Level 1 Traffic Volumes

Figure C-1: Scenario 1: MTP 2035 Traffic Volumes

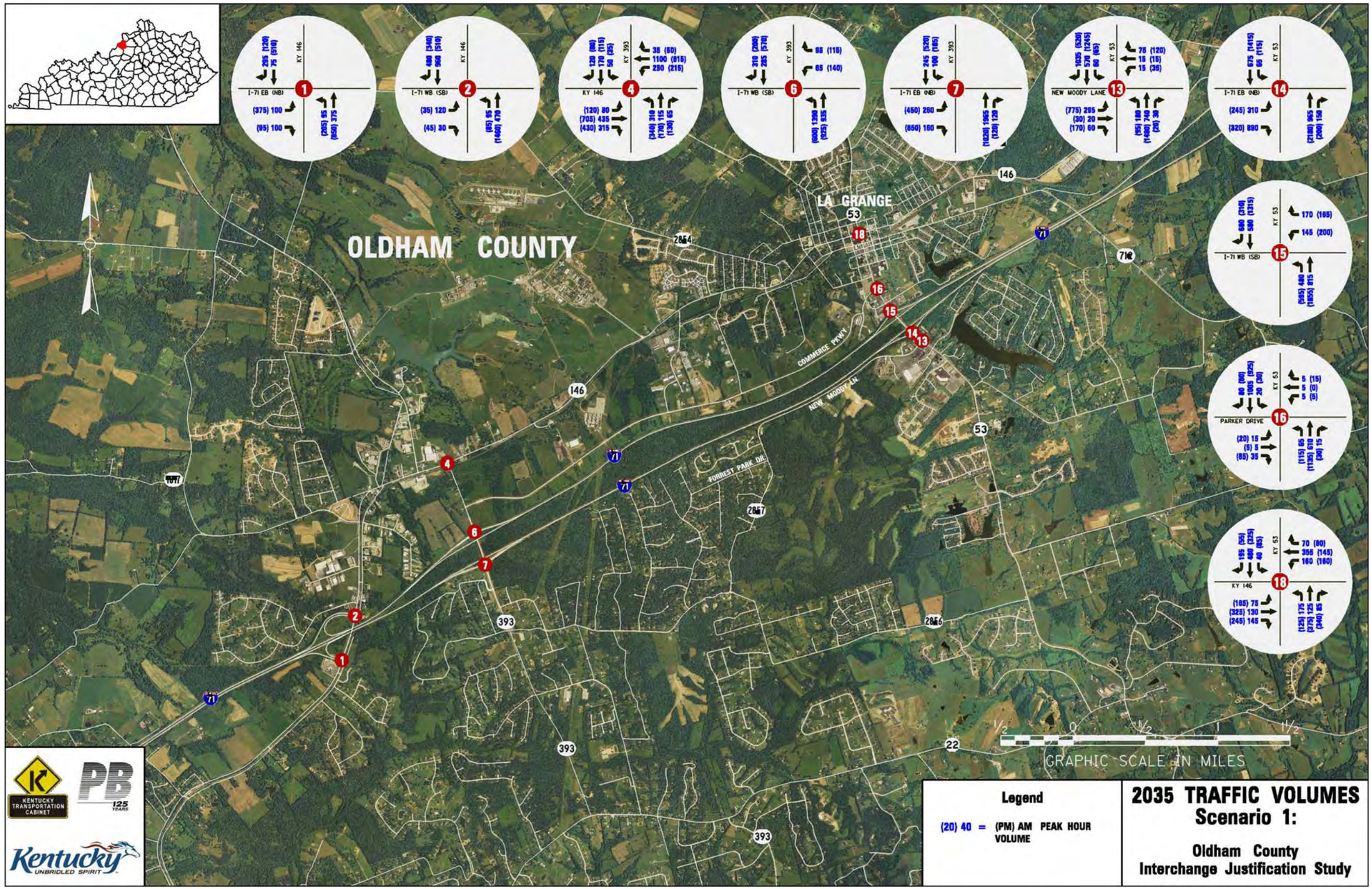


Figure C-2: Scenario 2: MTP- 2035 Traffic Volumes

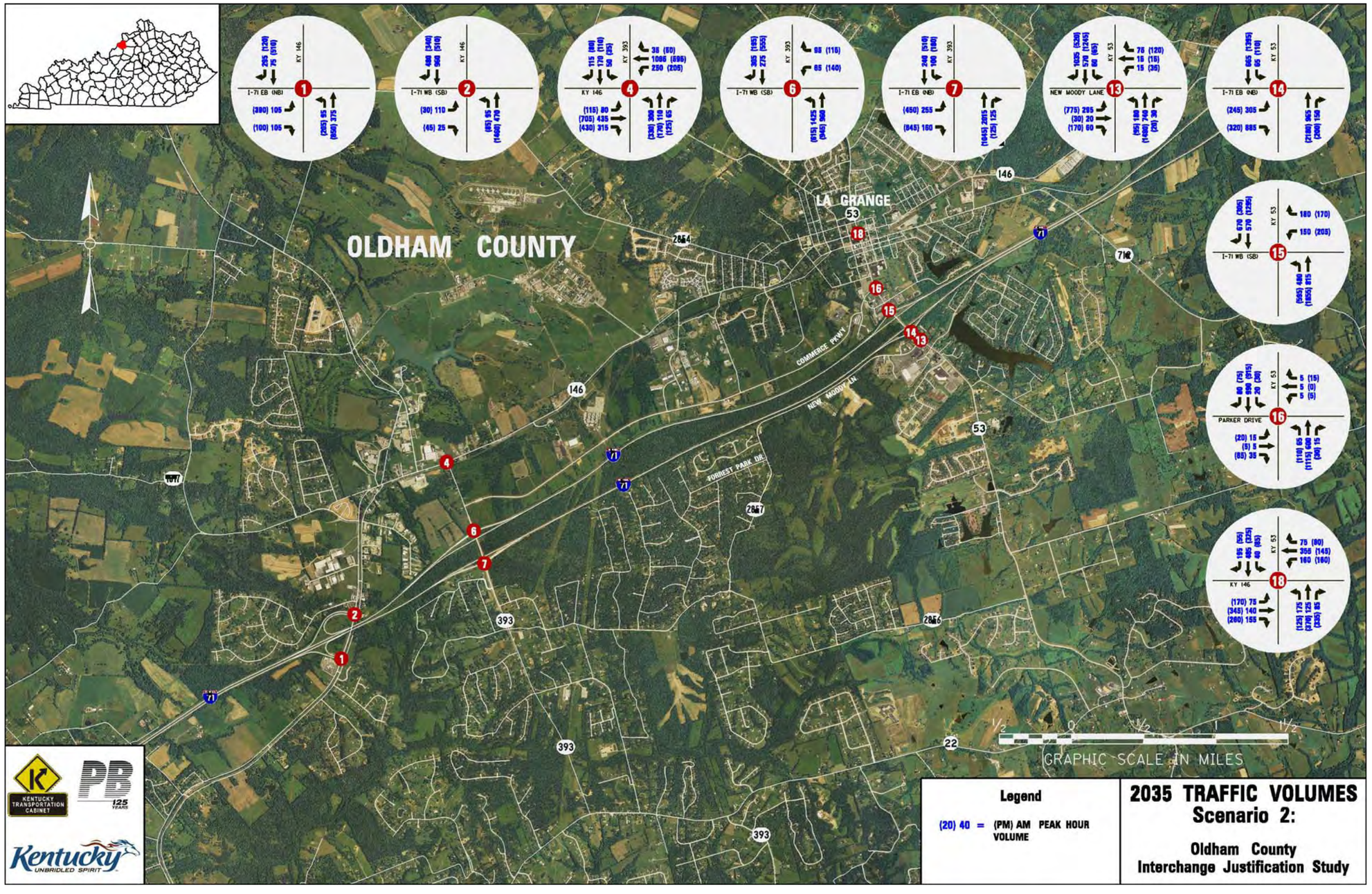


Figure C-3: Scenario 3: MTP+ 2035 Traffic Volumes

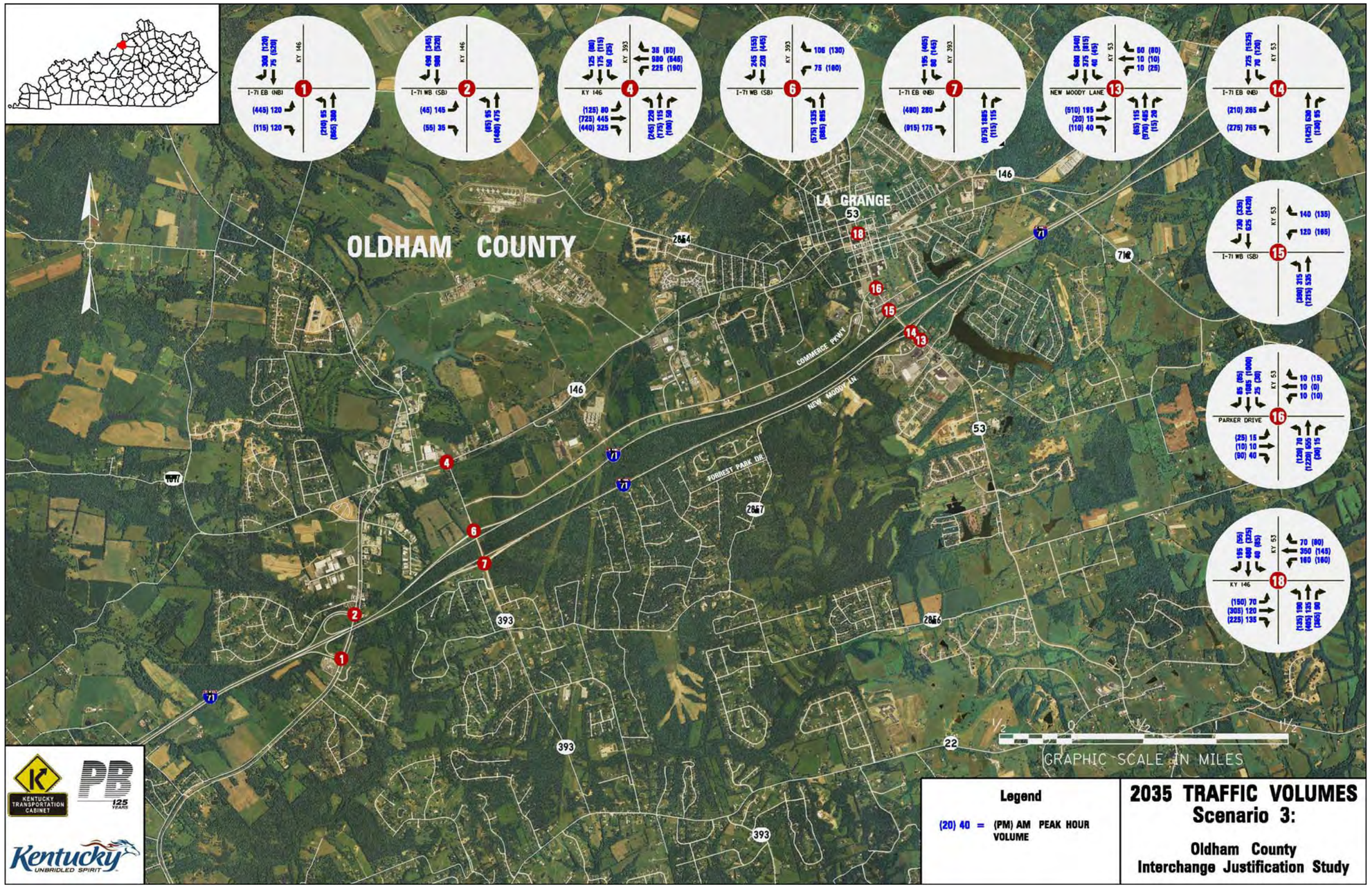


Figure C-4: Scenario 4a: TSM 2035 Traffic Volumes

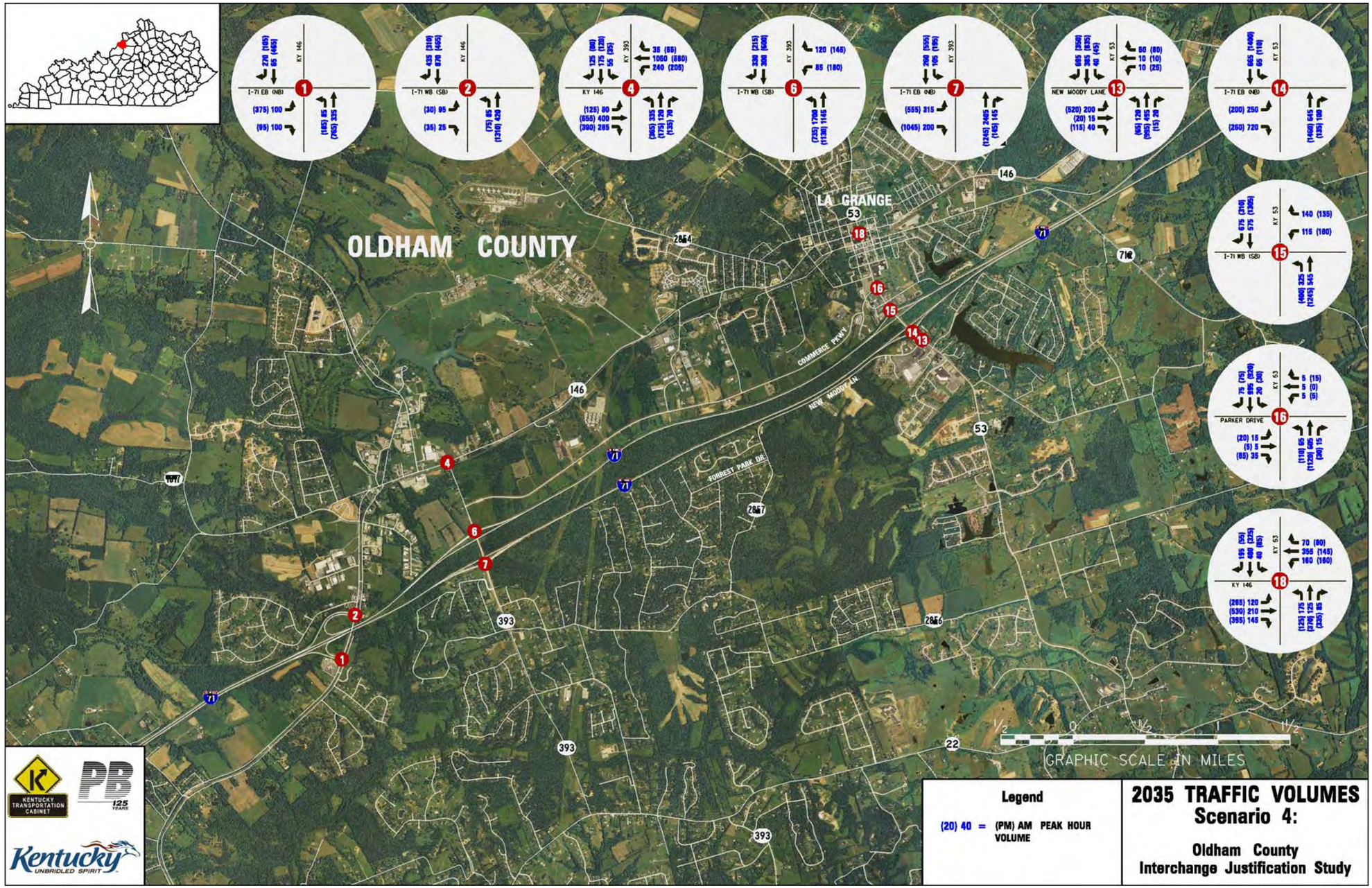


Figure C-5: Scenario 4b: TSM 2035 Traffic Volumes

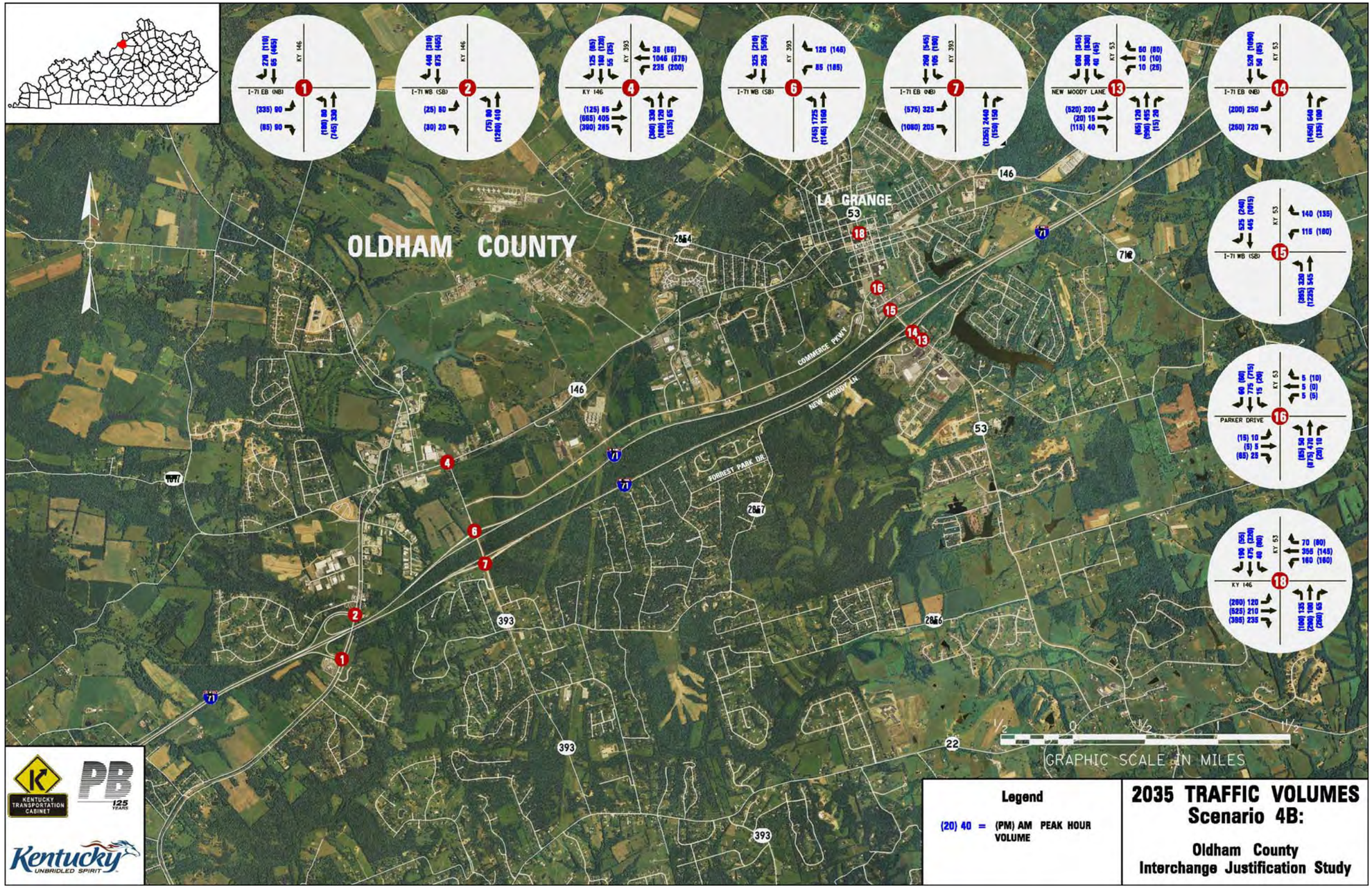


Figure C-6: Scenario 5: Standard Diamond Interchange 2035 Traffic Volumes

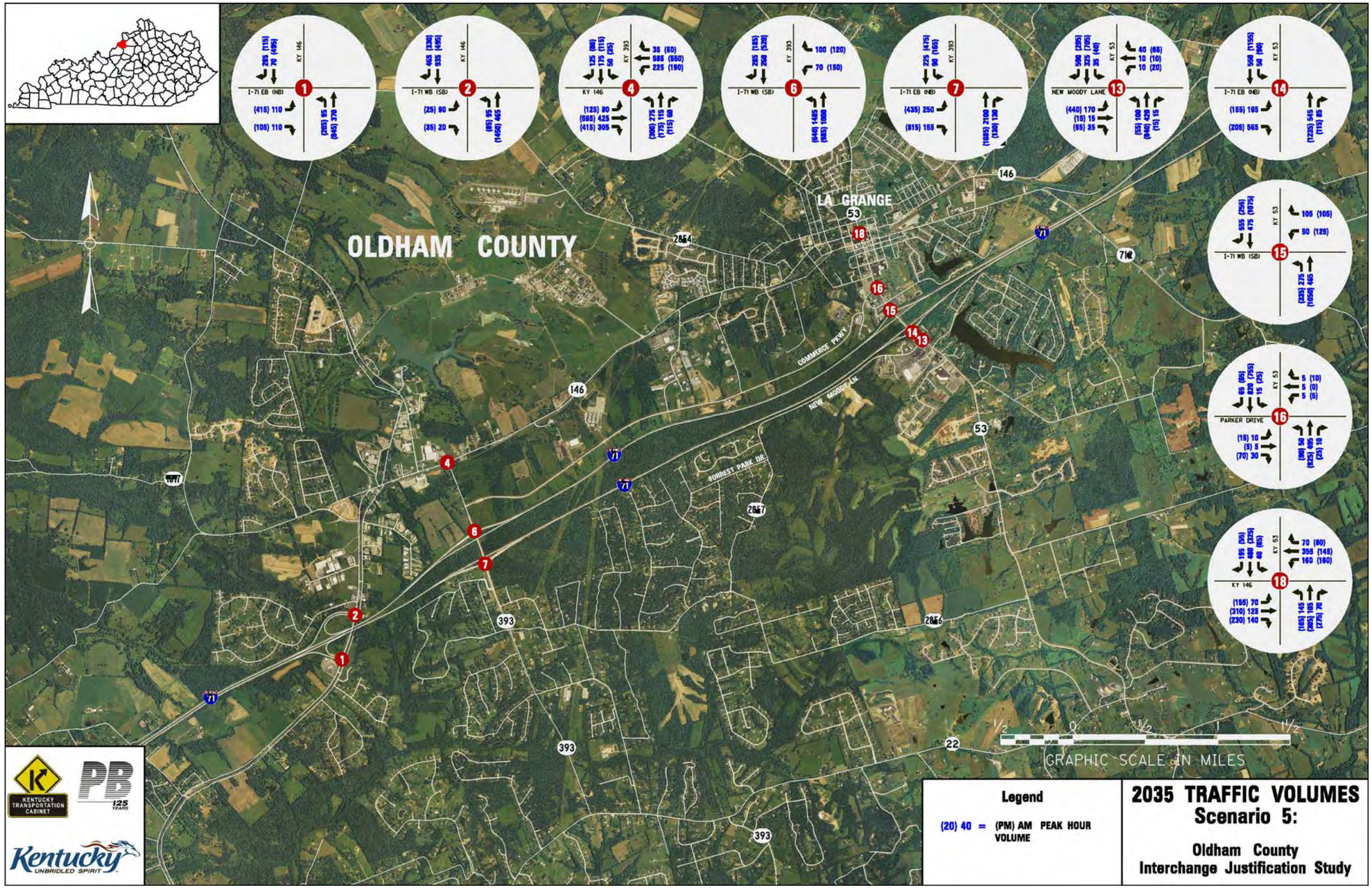
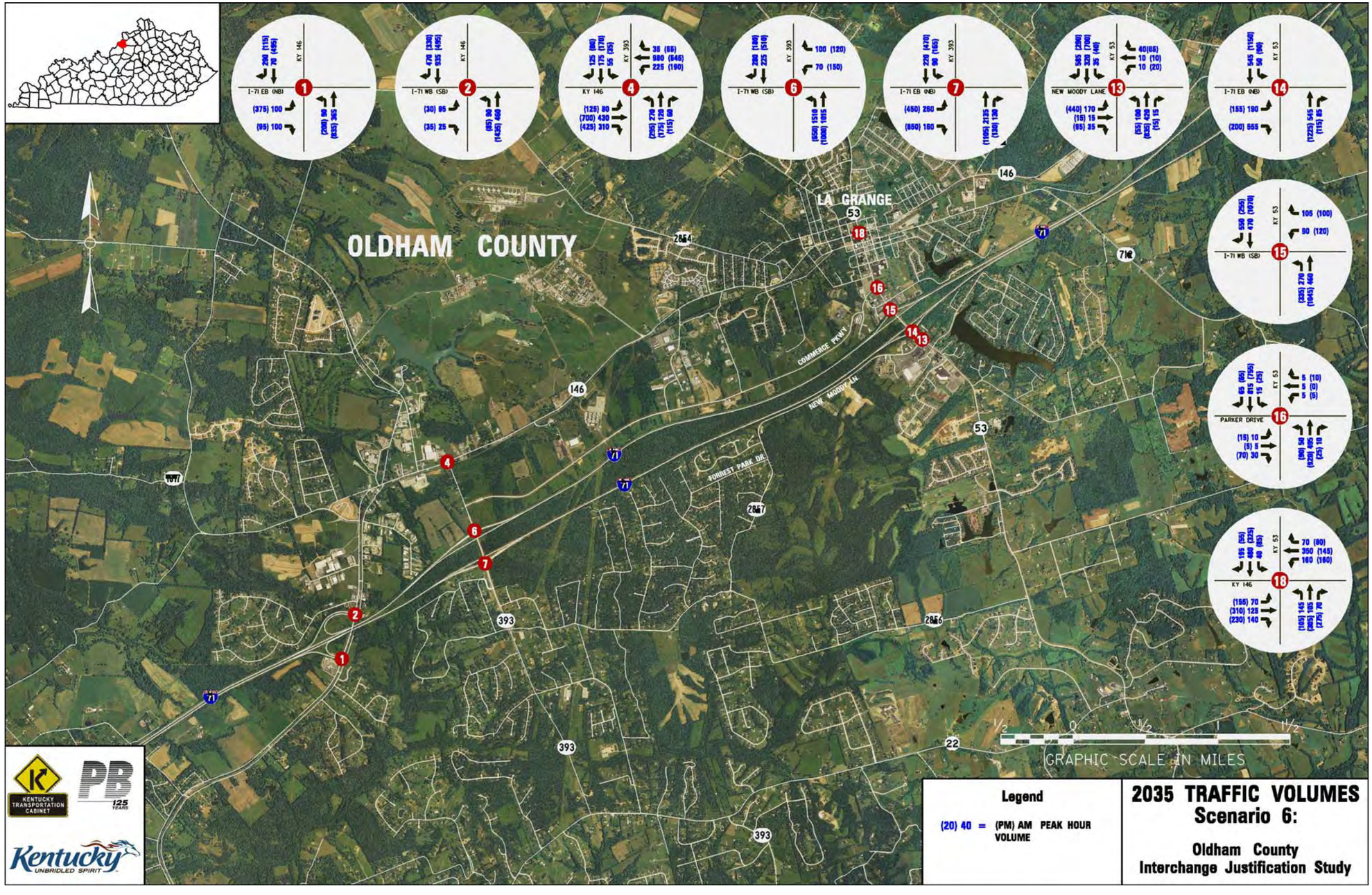


Figure C-7: Scenario 6: Interchange with Collector / Distributor Road 2035 Traffic Volumes



Appendix D: Level 1 Detailed Tables

Table D-1: Level 1 2035 Detailed Segment LOS

Route	Section	Begin Milepoint	End Milepoint	Scenario 1: MTP				Scenario 2: MTP-			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.5	-	33.1	D	62.5	-	33.0	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.5	-	34.2	D	61.6	-	34.2	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	65.0	-	29.5	D	64.7	-	30.0	D
		20.XXX (Allen Lane)	21.869 (KY 53)	65.0	-	29.5	D	64.7	-	30.0	D
	4	21.869 (KY 53)	22.250 (East of KY 53)	69.7	-	21.1	C	69.7	-	21.1	C
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	-	-	11.1	B	-	-	11.1	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	-	-	11.1	B	-	-	11.1	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	-	-	19.2	C	-	-	19.2	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	-	-	19.2	C	-	-	19.2	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	-	-	14.2	B	-	-	13.8	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	-	-	17.4	B	-	-	16.8	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 1: MTP				Scenario 2: MTP-			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	24.4	84.2	-	E	24.5	84.0	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	21.0	87.8	-	E	21.1	87.6	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	-	96.5	-	F	-	96.5	-	F
	4	5.890 (North of Market Street)	6.296 (I-71)	-	96.5	-	F	-	96.5	-	F
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	19.2	94.6	-	F	19.0	94.9	-	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	15.2	95.5	-	F	14.6	95.9	-	F
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	15.2	95.5	-	F	14.6	95.9	-	F
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	27.5	78.5	-	D	27.7	77.9	-	D
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	25.7	78.5	-	D	25.9	77.9	-	D
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 3: MTP+				Scenario 4a: TSM			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.6	-	32.9	D	63.2	-	32.1	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.7	-	33.9	D	62.3	-	33.2	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	66.9	-	26.4	D	67.2	-	25.8	C
		20.XXX (Allen Lane)	21.869 (KY 53)	66.9	-	26.4	D	67.2	-	25.8	C
	4	21.869 (KY 53)	22.250 (East of KY 53)	69.7	-	21.1	C	69.7	-	21.1	C
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	-	-	11.3	B	-	-	10.0	A
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	-	-	11.3	B	-	-	10.0	A
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	-	-	19.6	C	-	-	17.5	B
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	-	-	19.6	C	-	-	17.5	B
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	-	-	12.7	B	-	-	13.5	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	-	-	15.5	B	-	-	16.6	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 3: MTP+				Scenario 4a: TSM			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	24.9	83.3	-	E	26.4	79.6	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	21.6	86.9	-	E	23.5	83.8	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	24.0	89.4	-	E	23.5	89.9	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	23.1	89.4	-	E	22.6	89.9	-	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	18.8	95.2	-	F	-	-	30.0	D
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	16.1	94.7	-	F	-	-	25.5	C
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	16.1	94.7	-	F	-	-	25.5	C
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	29.2	73.1	-	D	-	-	9.1	A
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	27.3	73.2	-	D	-	-	9.2	A
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 4b: TSM				Scenario 5: Standard Interchange			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	63.2	-	32.1	D	62.3	-	33.3	D
	2	17.478 (KY 146)	18.507 (KY 393)	62.3	-	33.2	D	61.1	-	34.7	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	67.1	-	25.8	C	64.2	-	30.7	D
		20.XXX (Allen Lane)	21.869 (KY 53)	67.1	-	25.8	C	67.3		25.5	C
	4	21.869 (KY 53)	22.250 (East of KY 53)	69.7	-	21.1	C	69.7	-	21.1	C
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	-	-	9.8	A	52.5	-	11.7	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	-	-	9.8	A	52.5	-	11.7	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	-	-	17.5	B	45.0	-	18.7	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	-	-	17.5	B	45.0	-	18.7	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	-	-	13.5	B	52.5	-	13.5	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	-	-	16.5	B	45.0	-	15.6	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 4b: TSM				Scenario 5: Standard Interchange			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	26.4	79.6	-	E	22.9	86.6	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	23.5	83.8	-	E	19.0	90.2	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	23.6	89.8	-	E	26.3	86.4	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	22.7	89.8	-	E	25.4	86.4	-	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	-	-	30.4	D	20.0	93.6	-	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	-	-	25.9	C	N/A	96.5	-	F
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	-	-	25.9	C	N/A	96.5	-	F
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	-	-	9.0	A	28.2	76.6	-	D
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	-	-	9.1	A	26.4	76.6	-	D
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 6: Collector / Distributor			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.4	-	33.2	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.4	-	34.4	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	64.1	-	30.9	D
		20.XXX (Allen Lane)	21.869 (KY 53)	69.8	-	16.4	B
	4	21.869 (KY 53)	22.250 (East of KY 53)	69.7	-	21.1	C
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	52.5	-	11.5	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	52.5	-	11.5	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	45.0	-	23.7	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	45.0	-	23.7	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	52.5	-	13.4	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	45.0	-	15.5	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*

Table D-1: Level 1 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 6: Collector / Distributor			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	22.9	86.6	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	19.0	90.2	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	26.4	86.3	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	25.5	86.3	-	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	19.7	93.9	-	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	N/A	96.8	-	F
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	N/A	96.8	-	F
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	28.3	76.3	-	D
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	26.5	76.3	-	D
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*

Notes:
- 2035 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report
- 2035 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report
- Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM
- Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum

Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Table D-2: Level 1 2035 AM Detailed Ramp Junction LOS

Direction	Route	Type	Scenario 1: MTP			Scenario 2: MTP-			Scenario 3: MTP+			Scenario 4A: TSM			Scenario 4b: TSM		
			Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS
EB	KY 146	Diverge	57.4	28.5	D	57.4	33.7	D	57.3	33.6	D	57.4	33.8	D	57.5	33.2	D
EB	KY 146	Merge	59.0	27.5	C	57.0	32.7	D	57.0	32.9	D	57.0	32.6	D	58.0	31.8	D
EB	KY 393	Diverge	57.5	28.2	D	56.8	34.4	D	56.7	34.3	D	56.5	34.5	D	56.5	33.7	D
EB	KY 393	Merge	61.0	22.7	C	57.0	30.4	D	59.0	27.9	C	57.0	30.5	D	59.0	27.8	C
EB	C/D Road	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	C/D Road	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	New Int.	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	New Int.	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	KY 53	Diverge	55.5	28.7	D	54.6	36.5	E	55.0	33.4	D	55.2	36.1	E	55.2	32.9	D
EB	KY 53	Merge	61.0	20.1	C	60.0	25.1	C	60.0	24.9	C	60.0	24.8	C	60.0	24.8	C
WB	KY 53	Diverge	57.3	23.2	C	57.1	29.0	D	57.3	29.0	D	57.3	29.0	D	57.3	29.0	D
WB	KY 53	Merge	60.0	25.0	C	57.0	32.1	D	59.0	28.5	D	58.0	30.0	D	59.0	28.0	D
WB	New Int.	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	New Int.	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	C/D Road	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	C/D Road	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	KY 393	Diverge	57.8	28.5	D	57.6	36.0	E	57.5	33.3	D	57.4	36.0	E	57.4	32.8	D
WB	KY 393	Merge	58.0	28.4	D	44.0	39.4	F	40.0	40.7	F	33.0	42.7	F	34.0	42.2	F
WB	KY 146	Diverge	57.3	34.8	D	57.6	42.7	E	57.5	42.5	E	57.7	42.7	E	57.7	41.7	E
WB	KY 146	Merge	57.0	32.7	D	53.0	36.4	E	53.0	36.9	E	53.0	36.2	E	54.0	35.4	E

Table D-2: Level 1 2035 AM Detailed Ramp Junction LOS (cont)

Direction	Route	Type	Scenario 5: Standard Interchange			Scenario 6: Collector / Distributor		
			Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS
EB	KY 146	Diverge	57.4	33.9	D	57.4	33.8	D
EB	KY 146	Merge	57.0	33.0	D	57.0	32.7	D
EB	KY 393	Diverge	56.9	34.7	D	56.8	34.6	D
EB	KY 393	Merge	57.0	30.7	D	57.0	30.8	D
EB	C/D Road	Diverge	-	-	-	53.9	36.6	E
EB	C/D Road	Merge	-	-	-	60.0	22.9	C
EB	New Int.	Diverge	56.2	36.7	E	56.2	31.2	D
EB	New Int.	Merge	57.0	32.6	D	61.0	16.9	B
EB	KY 53	Diverge	55.8	36.9	E	55.9	19.9	B
EB	KY 53	Merge	60.0	24.6	C	62.0	4.8	A
WB	KY 53	Diverge	57.5	29.0	D	57.5	9.0	A
WB	KY 53	Merge	59.0	28.9	D	62.0	9.5	A
WB	New Int.	Diverge	57.8	32.3	D	57.8	17.7	B
WB	New Int.	Merge	57.0	32.6	D	61.0	19.3	B
WB	C/D Road	Diverge	-	-	-	27.2	27.7	C
WB	C/D Road	Merge	-	-	-	56.0	32.4	D
WB	KY 393	Diverge	57.5	36.9	E	57.5	37.0	E
WB	KY 393	Merge	41.0	40.2	F	41.0	402.0	F
WB	KY 146	Diverge	57.7	43.0	E	57.7	42.8	E
WB	KY 146	Merge	53.0	36.2	E	53.0	36.2	E

Table D-3: Level 1 2035 AM Detailed Ramp Junction LOS

Direction	Route	Type	Scenario 1: MTP			Scenario 2: MTP-			Scenario 3: MTP+			Scenario 4A: TSM			Scenario 4b: TSM		
			Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS
EB	KY 146	Diverge	56.7	40.6	E	56.6	40.5	E	56.4	40.5	E	56.7	40.6	E	56.8	39.9	E
EB	KY 146	Merge	55.0	35.4	E	55.0	35.4	E	55.0	35.6	D	55.0	35.4	E	56.0	34.5	D
EB	KY 393	Diverge	54.3	37.3	E	54.3	37.2	E	54.0	37.1	E	53.4	37.3	E	53.3	36.4	E
EB	KY 393	Merge	58.0	28.6	D	58.0	28.8	D	59.0	26.6	C	58.0	29.1	D	59.0	26.8	C
EB	C/D Road	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	C/D Road	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	New Int.	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	New Int.	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EB	KY 53	Diverge	56.4	34.1	D	56.4	34.4	D	56.6	31.6	D	56.7	34.1	D	56.7	31.1	D
EB	KY 53	Merge	59.0	28.1	D	59.0	28.0	D	59.0	27.7	C	59.0	27.6	C	59.0	27.6	C
WB	KY 53	Diverge	57.0	26.1	C	56.9	26.1	C	57.2	26.1	C	57.2	26.1	C	57.2	26.1	C
WB	KY 53	Merge	59.0	26.7	C	59.0	26.9	C	60.0	24.1	C	60.0	25.3	C	60.0	23.6	C
WB	New Int.	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	New Int.	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	C/D Road	Diverge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	C/D Road	Merge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WB	KY 393	Diverge	57.3	30.2	D	57.3	30.2	D	57.2	27.9	C	57.1	30.2	D	57.1	27.5	C
WB	KY 393	Merge	59.0	27.6	C	59.0	27.6	C	58.0	28.2	D	58.0	29.2	D	58.0	28.7	D
WB	KY 146	Diverge	57.8	31.4	D	57.8	31.4	D	57.7	31.3	D	57.8	31.4		57.9	30.7	D
WB	KY 146	Merge	59.0	27.5	C	59.0	27.4	C	59.0	27.7	C	59.0	27.2		60.0	26.6	C

Table D-3: Level 1 2035 AM Detailed Ramp Junction LOS (cont)

Direction	Route	Type	Scenario 5: Standard Interchange			Scenario 6: Collector / Distributor		
			Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS
EB	KY 146	Diverge	56.5	40.7	E	56.7	40.7	E
EB	KY 146	Merge	55.0	35.8	E	55.0	35.5	E
EB	KY 393	Diverge	54.4	37.5	E	54.3	37.4	E
EB	KY 393	Merge	58.0	29.1	D	58.0	29.3	D
EB	C/D Road	Diverge	-	-	-	55.4	35.0	E
EB	C/D Road	Merge	-	-	-	60.0	26.4	C
EB	New Int.	Diverge	56.6	35.0	E	56.6	20.2	C
EB	New Int.	Merge	58.0	30.8	D	62.0	9.6	A
EB	KY 53	Diverge	57.0	34.9	D	57.0	12.1	B
EB	KY 53	Merge	60.0	26.1	C	62.0	5.7	A
WB	KY 53	Diverge	57.4	26.1	C	57.4	9.8	A
WB	KY 53	Merge	60.0	24.6	C	62.0	8.4	A
WB	New Int.	Diverge	57.8	27.3	C	57.8	14.8	B
WB	New Int.	Merge	59.0	27.3	C	61.0	15.5	B
WB	C/D Road	Diverge	-	-	-	57.2	24.9	C
WB	C/D Road	Merge	-	-	-	59.0	27.1	C
WB	KY 393	Diverge	57.2	30.9	D	57.2	31.0	D
WB	KY 393	Merge	59.0	28.0	D	59.0	28.0	D
WB	KY 146	Diverge	57.8	31.6	D	57.8	31.5	D
WB	KY 146	Merge	59.0	27.2	C	59.0	27.3	C

Appendix E: Level 2 Traffic Volumes

Figure E-1: Scenario 3: MTP+ 2035 Traffic Volumes

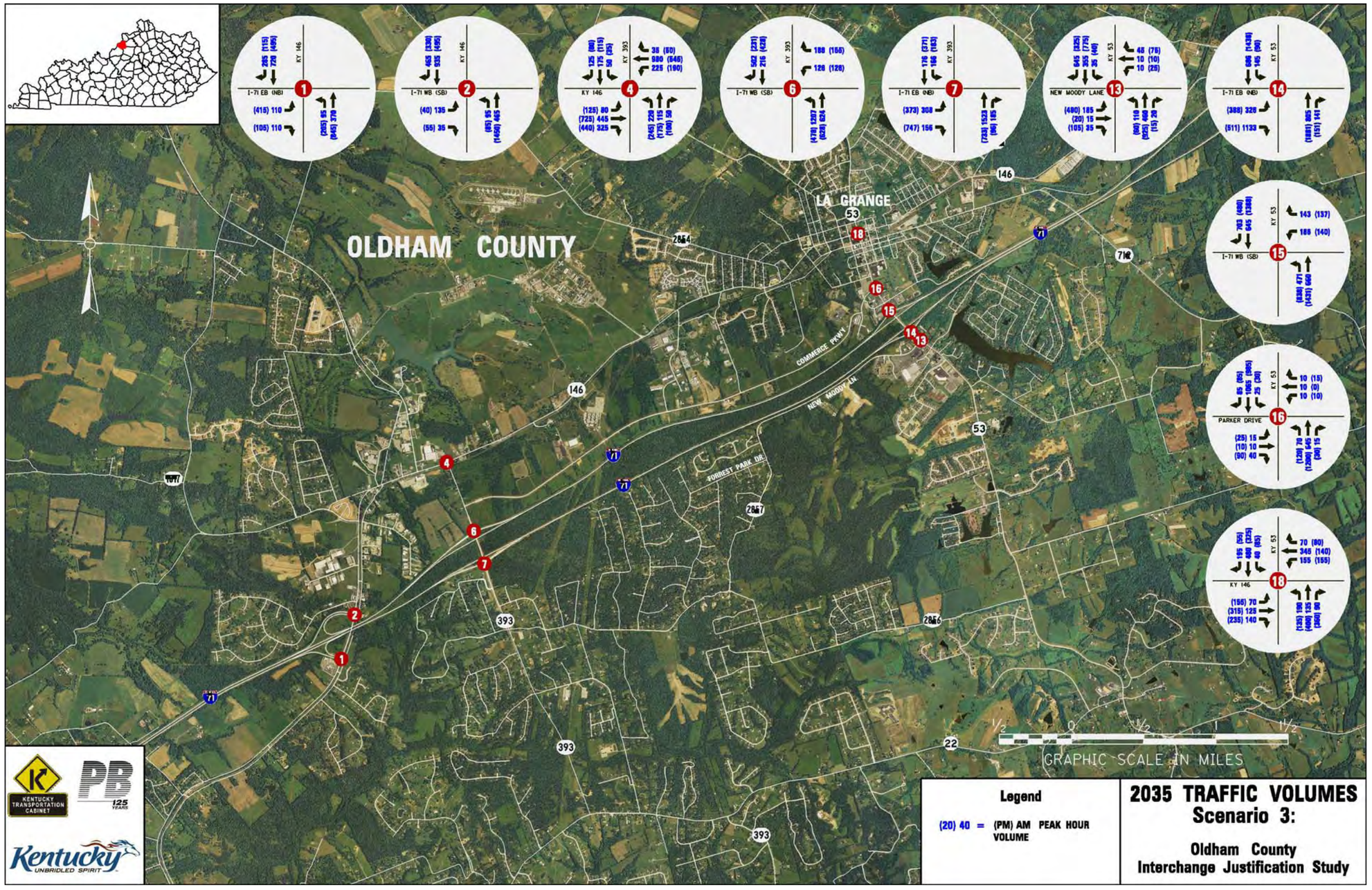


Figure E-2: Scenario 4c: TSM 2035 Traffic Volumes

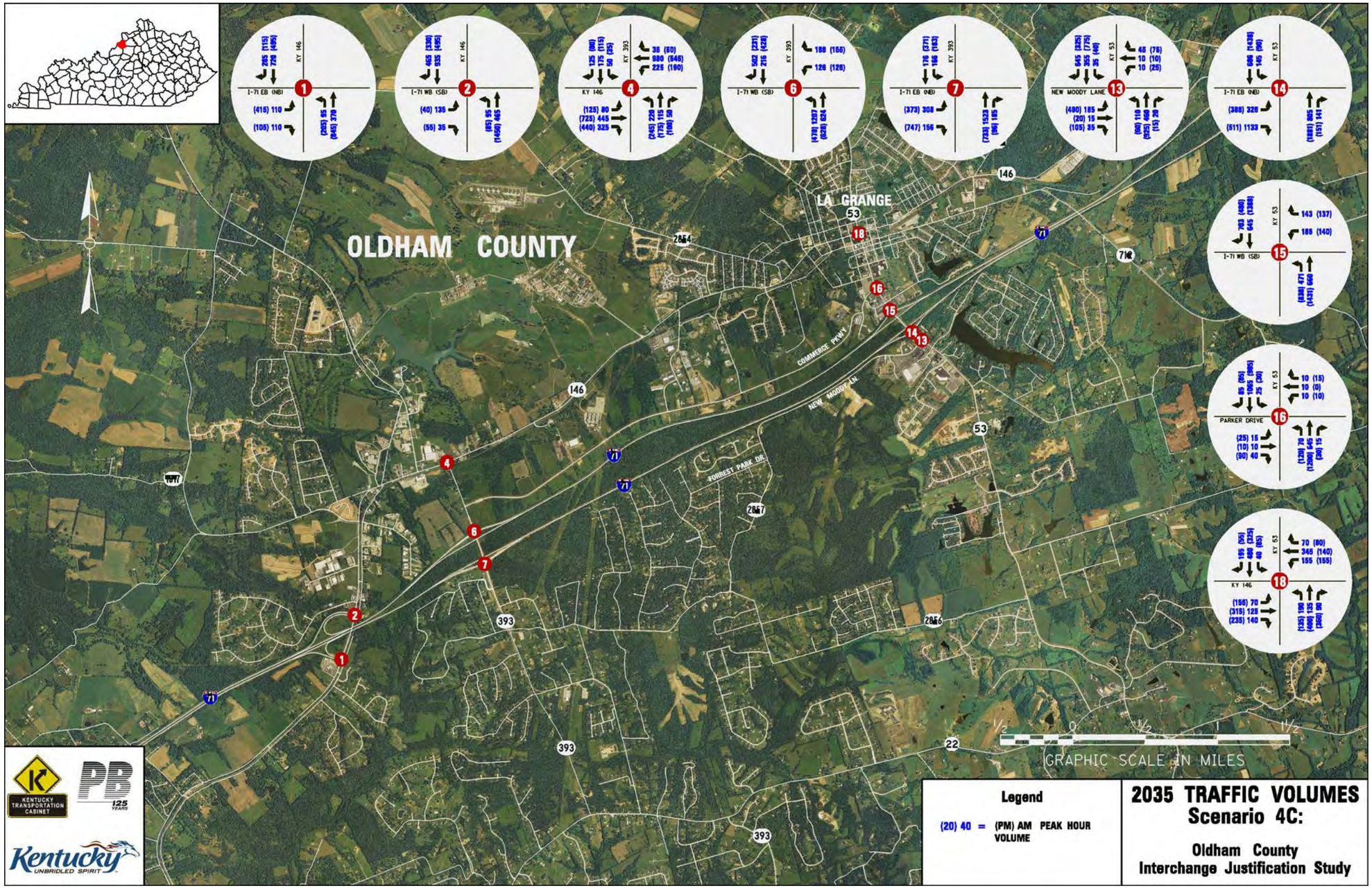
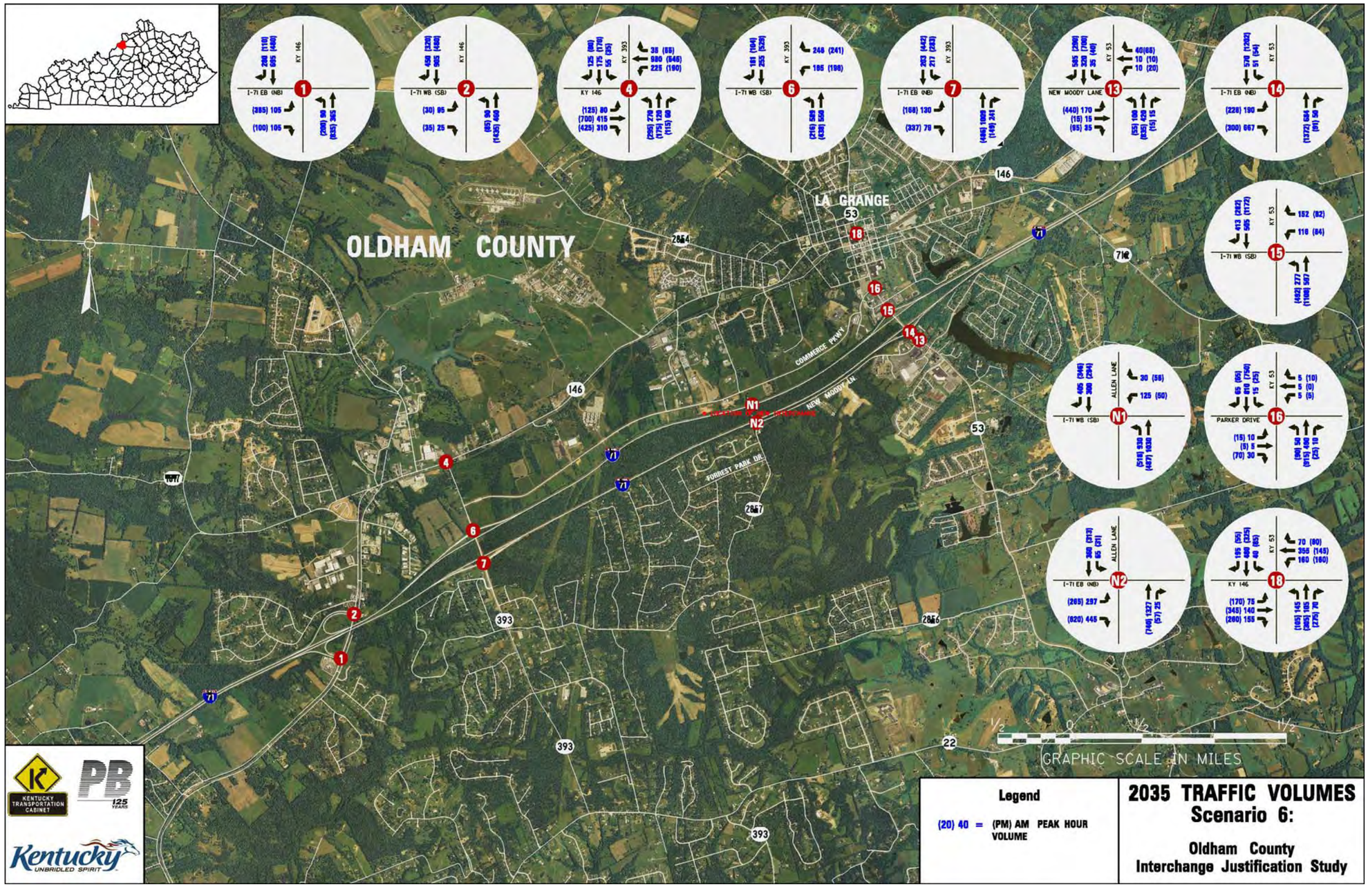


Figure E-3: Scenario 6: Interchange with Collector / Distributor Road 2035 Traffic Volumes



Appendix F: Level 2 Detailed Tables

Table F-1: Level 2 2035 Detailed Segment LOS

Route	Section	Begin Milepoint	End Milepoint	Scenario 3: MTP+				Scenario 4c: TSM			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.7	-	32.9	D	32.7	-	32.9	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.4	-	34.3	D	61.4	-	34.3	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	67.1	-	26	D	67.1	-	26	D
	4	20.XXX (Allen Lane)	21.869 (KY 53)	67.1	-	26	D	67.1	-	26	D
	5	21.869 (KY 53)	22.250 (East of KY 53)	69.7	-	21.1	C	69.7	-	21.1	C
C-D	1	C-D Begin	C-D End	-	-	-	-	-	-	-	-
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	55.0	-	11.1	B	55.0	-	11.1	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	55.0	-	11.1	B	55.0	-	11.1	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	45.0	-	18.7	C	45.0	-	18.7	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	45.0	-	18.7	C	45.0	-	18.7	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	55.0	-	13.3	B	55.0	-	13.3	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	45.0	-	16.3	B	45.0	-	16.3	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*	*	*	*	*

Table F-1: Level 2 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 3: MTP+				Scenario 4c: TSM			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	24.9	83.3	-	E	24.9	83.3	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	21.6	86.9	-	E	21.6	86.9	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	24.8	88.4	-	E	24.8	88.4	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	23.9	88.4	-	E	23.9	88.4	-	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	19.2	94.6	-	F	19.2	94.6	-	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	17.8	93.1	-	E	17.8	93.1	-	E
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	17.8	93.1	-	E	17.8	93.1	-	E
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	45.0	8.5	-	A	45.0	8.5	-	A
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	45.0	8.6	-	A	45.0	8.6	-	A
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*	*	*	*	*

Table F-1: Level 2 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 6: Collector / Distributor			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
I-71	1	17.000 (West of KY 146)	17.478 (KY 146)	62.4	-	33.2	D
	2	17.478 (KY 146)	18.507 (KY 393)	61.0	-	34.8	D
	3	18.507 (KY 393)	20.XXX (Allen Lane)	64.2	-	30.7	D
	4	20.XXX (Allen Lane)	21.869 (KY 53)	69.8	-	16.4	B
	5	21.869 (KY 53)	22.250 (East of KY 53)	69.7	-	21.1	C
C-D	1	C-D Begin	C-D End	55.0	-	10.5	A
KY 146	1	5.000 (Old LaGrange Road Connector)	5.763 (Old LaGrange Road)	55.0	-	10.9	B
	2	5.763 (Old LaGrange Road)	6.073 (I-71 Overpass)	55.0	-	10.9	B
	3	6.073 (I-71 Overpass)	6.273 (North of Fox Run)	45.0	-	18.1	C
	4	6.273 (North of Fox Run)	6.829 (KY 1817)	45.0	-	18.1	C
	5	6.829 (KY 1817)	7.640 (KY 393 South)	*	*	*	*
	6	7.640 (KY 393 South)	8.000 (East of KY 393 South)	*	*	*	*
	7	8.000 (East of KY 393 South)	9.210 (West of KSR Main Entrance)	55.0	-	12.8	B
	8	9.210 (West of KSR Main Entrance)	9.990 (Sunset Avenue)	45.0	-	15.7	B
	9	9.990 (Sunset Avenue)	10.336 (KY 2854)	*	*	*	*
	10	10.336 (KY 2854)	10.988 (KY 53)	*	*	*	*
	11	10.988 (KY 53)	11.400 (Lynn Alley)	*	*	*	*

Table F-1: Level 2 2035 Detailed Segment LOS (cont)

Route	Section	Begin Milepoint	End Milepoint	Scenario 6: Collector / Distributor			
				Estimated Travel Speed (MPH)	% Time Spent Following	Density (pc/mi/ln)	LOS
KY 53	1	4.153 (KY 2856)	4.715 (North of Blakemore Lane)	23.0	86.5	-	E
	2	4.715 (North of Blakemore Lane)	5.685 (Zhale Smith Road)	19.1	90.1	-	E
	3	5.685 (Zhale Smith Road)	5.890 (North of Market Street)	26.4	86.3	-	E
	4	5.890 (North of Market Street)	6.296 (I-71)	25.5	86.3	-	E
	5	6.296 (I-71)	7.055 (KY 146)	*	*	*	*
	6	7.055 (KY 146)	7.400 (North of Park Drive)	*	*	*	*
KY 393	1	3.800 (Echo Valley Circle)	3.968 (KY 2856)	20.4	93.0	-	F
	2	3.968 (KY 2856)	4.426 (I-71 NB Ramps)	15.1	95.6	-	F
	3	4.426 (I-71 NB Ramps)	4.534 (I-71 Underpass)	15.1	95.6	-	F
	4	4.534 (I-71 Underpass)	4.764 (North of I-71 SB Ramps)	45.0	8.5	-	A
	5	4.764 (North of I-71 SB Ramps)	5.177 (KY 146)	45.0	8.6	-	A
	6	5.177 (KY 146)	6.200 (Saddlers Mill Road)	*	*	*	*

Notes:

- 2035 ADT = Average Daily Traffic (count or estimate) based on CTS
- K-Factor = Design Hour Factor obtained from KYTC 2008 Traffic Forecasting Report
- 2035 DHV = Design Hour Volume (ADT x K)
- % Peak Direction obtained from KYTC 2008 Traffic Forecasting Report
- Posted Speed Limit obtained from Highway Information System
- % Trucks and Buses obtained from 2010 Vehicle Classification System Database. Roadways where data did not exist were estimated using the KYTC 2008 Traffic Forecasting Report.
- Level of Service (LOS) and % Time Spent Following calculated using Highway Capacity Software Plus (HCS+)
- % RVs were obtained from Exhibit 12-14 of the HCM
- Number of access points per mile were obtained from Exhibit 12-4 of the HCM
- *HCS+ software will not calculate a level of service if the free-flow speed is less than 45 mph.
- ** Lane widths less than 9 ft were entered in as 9 ft since that is the HCS minimum

Sources: Highway Information System Database, KYTC 2008 Traffic Forecasting Report, KYTC 2010Vehicle Classification Database

Table F-2: Level 2 2035 AM Detailed Ramp Junction LOS

Direction	Route	Type	Scenario 3: MTP+			Scenario 4c: TSM			Scenario 6: Collector / Distributor		
			Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS
EB	KY 146	Diverge	57.4	33.6	D	57.4	33.6	D	57.4	33.8	D
EB	KY 146	Merge	57.0	32.9	D	57.0	32.9	D	57.0	32.9	D
EB	KY 393	Diverge	56.7	30.4	D	56.7	30.4	D	57.4	29.6	D
EB	KY 393	Merge	60.0	25.9	C	60.0	25.9	C	59.0	26.8	C
EB	C/D Road	Diverge	-	-	-	-	-	-	53.1	32.4	D
EB	C/D Road	Merge	-	-	-	-	-	-	61.0	16.1	B
EB	New Int.	Diverge	-	-	-	-	-	-	55.9	19.3	B
EB	New Int.	Merge	-	-	-	-	-	-	62.0	11.3	B
EB	KY 53	Diverge	53.8	27.7	C	53.8	27.7	C	55.6	13.4	B
EB	KY 53	Merge	62.0	11.9	B	62.0	11.9	B	62.0	4.7	A
WB	KY 53	Diverge	57.1	19.9	B	57.1	19.9	B	57.2	7.8	A
WB	KY 53	Merge	60.0	24.3	C	60.0	24.3	C	62.0	9.9	A
WB	New Int.	Diverge	-	-	-	-	-	-	57.6	11.3	B
WB	New Int.	Merge	-	-	-	-	-	-	61.0	20.1	C
WB	C/D Road	Diverge	-	-	-	-	-	-	56.7	22.6	C
WB	C/D Road	Merge	-	-	-	-	-	-	54.0	34.7	D
WB	KY 393	Diverge	57.1	28.2	D	57.1	28.2	D	56.8	40.1	E
WB	KY 393	Merge	53.0	34.0	D	53.0	34.0	D	51.0	35.8	E
WB	KY 146	Diverge	57.5	42.8	E	57.5	42.8	E	57.7	43.0	E
WB	KY 146	Merge	53.0	36.7	E	53.0	36.7	E	53.0	36.2	E

Table F-3: Level 2 2035 PM Detailed Ramp Junction LOS

Direction	Route	Type	Scenario 3: MTP+			Scenario 4c: TSM			Scenario 6: Collector / Distributor		
			Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS	Estimated Travel Speed (MPH)	Density (pc/mi/ln)	LOS
EB	KY 146	Diverge	56.5	40.4	E	56.5	40.4	E	56.6	40.7	E
EB	KY 146	Merge	55.0	35.6	E	55.0	35.6	E	55.0	35.7	E
EB	KY 393	Diverge	54.8	39.9	E	54.8	39.9	E	56.6	41.8	E
EB	KY 393	Merge	60.0	26.0	C	60.0	26.0	C	53.0	34.8	D
EB	C/D Road	Diverge	-	-	-	-	-	-	53.7	41.2	E
EB	C/D Road	Merge	-	-	-	-	-	-	60.0	26.3	C
EB	New Int.	Diverge	-	-	-	-	-	-	55.5	17.3	B
EB	New Int.	Merge	-	-	-	-	-	-	62.0	2.2	A
EB	KY 53	Diverge	55.4	32.6	D	55.4	32.6	D	56.5	10.0	A
EB	KY 53	Merge	57.0	32.4	D	57.0	32.4	D	62.0	5.1	A
WB	KY 53	Diverge	57.2	19.7	B	57.2	19.7	B	57.5	6.2	A
WB	KY 53	Merge	60.0	25.7	C	60.0	25.7	C	62.0	10.2	B
WB	New Int.	Diverge	-	-	-	-	-	-	57.7	11.7	B
WB	New Int.	Merge	-	-	-	-	-	-	61.0	16.9	B
WB	C/D Road	Diverge	-	-	-	-	-	-	57.2	21.2	C
WB	C/D Road	Merge	-	-	-	-	-	-	57.0	31.3	D
WB	KY 393	Diverge	57.2	30.0	D	57.2	30.0	D	56.8	36.1	E
WB	KY 393	Merge	59.0	27.5	C	59.0	27.5	C	58.0	28.3	D
WB	KY 146	Diverge	57.7	31.5	D	57.7	31.5	D	57.8	31.7	D
WB	KY 146	Merge	59.0	27.6	C	59.0	27.6	C	59.0	27.3	C

Appendix G: Detailed Cost Estimate Sheets

Table G-1: Detailed Construction Cost Estimate Scenario 4c

OLDHAM COUNTY INTERCHANGE JUSTIFICATION STUDY
CONSTRUCTION COST ESTIMATE - SCENARIO 4C

SUMMARY												
ITEM	ESTIMATED COST											
	4C-1 I-71 EB / KY 146	4C-2 I-71 WB / KY 146	4C-3 I-71 / KY 393	4C-4 I-71 WB / KY 53	4C-5 I-71 EB / KY 53	4C-6 KY 53 / PARKER	4C-7 KY 53 SOUTH OF I-71	4C-8 KY 393 SOUTH OF I-71 (PAVING NEW LANE)	4C-9 I-71 EB to KY 146 EXTEND DECEL	4C-10 I-71 EB to KY 393 EXTEND DECEL	4C-11 I-71 WB to KY 146 EXTEND DECEL	4C-12 KY 146 to I-71 WB EXTEND ACCEL
PAVEMENT	$50,000	$60,000	$600,000	$690,000	$230,000	$0	$3,800,000	$250,000	$200,000	$230,000	$200,000	$200,000
GRADING, DRAINAGE, AND EROSION CONTROL	$50,000	$40,000	$210,000	$460,000	$60,000	$0	$1,600,000	$60,000	$65,000	$75,000	$90,000	$90,000
CROSSROAD AND RAMP EARTHWORK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STRUCTURES	$0	$0	$5,400,000	$4,107,500	$0	$0	$0	$0	$0	$0	$0	$0
MAINTENANCE OF TRAFFIC	$20,000	$20,000	$400,000	$140,000	$17,000	$0	$150,000	$20,000	$50,000	$50,000	$50,000	$50,000
SIGNALIZATION	$120,000	$120,000	$240,000	$120,000	$0	$120,000	$20,000	$0	$0	$0	$0	$0
GUARDRAIL	$0	$0	$90,000	$80,000	$8,100	$0	$40,000	$0	$10,000	$0	$20,000	$20,000
LIGHTING	$20,000	$20,000	$10,000	$146,220	$34,000	$0	$0	$0	$5,000	$5,000	$5,000	$5,000
SIGNING	$10,000	$3,000	$10,000	$70,000	$20,000	$0	$10,000	$5,000	$2,000	$2,000	$0	$0
STRIPING	$1,000	$1,000	$12,000	$1,452	$2,000	$0	$30,000	$5,000	$5,000	$5,000	$5,000	$5,000
MISCELLANEOUS	$0	$0	$35,000	$0	$0	$0	$140,000	$0	$15,000	$20,000	$15,000	$15,000
MOBILIZATION (5%) / DEMOBILIZATION (1.5%)	$18,000	$17,000	$455,000	$378,000	$24,000	$0	$380,000	$22,000	$23,000	$32,000	$25,000	$25,000
CONSTRUCTION TOTAL:	**$290,000**	**$280,000**	**$7,500,000**	**$6,190,000**	**$400,000**	**$120,000**	**$6,200,000**	**$360,000**	**$380,000**	**$420,000**	**$410,000**	**$410,000**
25% CONTINGENCY:	**$70,000**	**$70,000**	**$1,900,000**	**$1,550,000**	**$100,000**	**$30,000**	**$1,600,000**	**$90,000**	**$100,000**	**$110,000**	**$100,000**	**$100,000**
DESIGN:	**$30,000**	**$30,000**	**$800,000**	**$620,000**	**$40,000**	**$10,000**	**$600,000**	**$50,000**	**$40,000**	**$40,000**	**$40,000**	**$40,000**
TOTAL (INCLUDING CONTINGENCY & DESIGN):	**$390,000**	**$380,000**	**$10,200,000**	**$8,360,000**	**$540,000**	**$160,000**	**$8,400,000**	**$500,000**	**$520,000**	**$570,000**	**$550,000**	**$550,000**

NOTES:
1. Estimated costs are based on 2010 dollars.
2. Costs do not include right of way or utilities.
3. Construction quantities are based on conceptual alternates.

Table G-2: Detailed Construction Cost Estimate Scenario 5

OLDHAM COUNTY INTERCHANGE JUSTIFICATION STUDY
CONSTRUCTION COST ESTIMATE - SCENARIO 5

SUMMARY												
ITEM	ESTIMATED COST											
	5-0 DIAMOND INTERCHANGE	5-1 KY 53 SOUTH OF I-71	5-2 KY 393 SOUTH OF I-71	5-3 I-71 WB / KY 146	5-4 I-71 EB / KY 146	5-5 I-71 / KY 393	5-6 I-71 EB / KY 53	5-7 KY 53 / PARKER	5-8 I-71 EB to KY 146 EXTEND DECEL	5-9 I-71 EB to KY 393 EXTEND DECEL	5-10 I-71 WB to KY 393 EXTEND DECEL	5-11 KY 393 to I-71 WB EXTEND ACCEL
PAVEMENT	$3,500,000	$3,800,000	$250,000	$0	$0	$600,000	$140,000	$0	$200,000	$230,000	$230,000	$250,000
GRADING, DRAINAGE, AND EROSION CONTROL	$1,200,000	$1,600,000	$60,000	$0	$0	$210,000	$70,000	$0	$65,000	$150,000	$75,000	$80,000
CROSSROAD AND RAMP EARTHWORK	$700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STRUCTURES	$6,400,000	$0	$0	$0	$0	$5,400,000	$0	$0	$0	$0	$0	$0
MAINTENANCE OF TRAFFIC	$600,000	$150,000	$20,000	$0	$0	$400,000	$25,000	$0	$50,000	$50,000	$50,000	$60,000
SIGNALIZATION	$360,000	$20,000	$0	$120,000	$120,000	$240,000	$0	$120,000	$0	$0	$0	$0
GUARDRAIL	$80,000	$40,000	$0	$0	$0	$90,000	$10,000	$0	$10,000	$25,000	$0	$30,000
LIGHTING	$480,000	$0	$0	$0	$0	$10,000	$50,000	$0	$5,000	$5,000	$5,000	$5,000
SIGNING	$350,000	$10,000	$5,000	$0	$0	$10,000	$20,000	$0	$2,000	$2,000	$2,000	$3,000
STRIPING	$20,000	$30,000	$5,000	$0	$0	$12,000	$5,000	$0	$5,000	$5,000	$5,000	$5,000
MISCELLANEOUS	$460,000	$140,000	$0	$0	$0	$35,000	$0	$0	$15,000	$20,000	$15,000	$15,000
MOBILIZATION (5%) / DEMOBILIZATION (1.5%)	$920,000	$380,000	$22,000	$0	$0	$455,000	$23,000	$0	$23,000	$32,000	$25,000	$29,000
CONSTRUCTION TOTAL:	**$15,100,000**	**$6,200,000**	**$360,000**	**$120,000**	**$120,000**	**$7,500,000**	**$340,000**	**$120,000**	**$380,000**	**$520,000**	**$410,000**	**$480,000**
25% CONTINGENCY:	**$3,800,000**	**$1,600,000**	**$90,000**	**$30,000**	**$30,000**	**$1,900,000**	**$90,000**	**$30,000**	**$100,000**	**$130,000**	**$100,000**	**$120,000**
DESIGN:	**$1,500,000**	**$600,000**	**$50,000**	**$10,000**	**$10,000**	**$800,000**	**$40,000**	**$10,000**	**$40,000**	**$50,000**	**$40,000**	**$50,000**
TOTAL (INCLUDING CONTINGENCY & DESIGN):	**$20,400,000**	**$8,400,000**	**$500,000**	**$160,000**	**$160,000**	**$10,200,000**	**$470,000**	**$160,000**	**$520,000**	**$700,000**	**$550,000**	**$650,000**

NOTES:
1. Estimated costs are based on 2010 dollars.
2. Costs do not include right of way or utilities.
3. Construction quantities are based on conceptual alternates.

Table G-2: Detailed Construction Cost Estimate Scenario 5 (cont.)

OLDHAM COUNTY INTERCHANGE JUSTIFICATION STUDY
CONSTRUCTION COST ESTIMATE - SCENARIO 5

SUMMARY							
ITEM	ESTIMATED COST						
	5-12 I-71 WB to KY 146 EXTEND DECEL	5-13 KY 146 to I-71 WB EXTEND ACCEL	5-14 I-71 AUX LANE	5-15 KY 53 BRIDGE OVER I-71 (6 UNDER)	5-16 I-71 6 LANES	5-17 KY 393 BRIDGE OVER I-71 (6 UNDER)	5-18 KY 146 BRIDGE OVER I-71 (6 UNDER)
PAVEMENT	$200,000	$230,000	$1,400,000	$3,100,000	$12,300,000	$0	$0
GRADING, DRAINAGE, AND EROSION CONTROL	$65,000	$75,000	$1,200,000	$900,000	$11,500,000	$0	$0
CROSSROAD AND RAMP EARTHWORK	$0	$0	$0	$150,000	$0	$0	$0
STRUCTURES	$0	$0	$0	$8,000,000	$19,700,000	$5,200,000	$5,600,000
MAINTENANCE OF TRAFFIC	$50,000	$50,000	$220,000	$650,000	$2,700,000	$0	$0
SIGNALIZATION	$0	$0	$0	$50,000	$0	$0	$0
GUARDRAIL	$10,000	$0	$60,000	$60,000	$650,000	$0	$0
LIGHTING	$5,000	$5,000	$240,000	$20,000	$330,000	$0	$0
SIGNING	$2,000	$2,000	$10,000	$10,000	$30,000	$0	$0
STRIPING	$5,000	$5,000	$6,000	$25,000	$300,000	$0	$0
MISCELLANEOUS	$15,000	$15,000	$30,000	$40,000	$2,300,000	$0	$0
MOBILIZATION (5%) / DEMOBILIZATION (1.5%)	$23,000	$25,000	$210,000	$850,000	$3,240,000	$0	$0
CONSTRUCTION TOTAL:	**$380,000**	**$410,000**	**$3,400,000**	**$13,900,000**	**$53,100,000**	**$5,200,000**	**$5,600,000**
25% CONTINGENCY:	**$100,000**	**$100,000**	**$850,000**	**$3,480,000**	**$13,280,000**	**$1,300,000**	**$1,400,000**
DESIGN:	**$40,000**	**$40,000**	**$340,000**	**$1,390,000**	**$5,310,000**	**$520,000**	**$560,000**
TOTAL (INCLUDING CONTINGENCY & DESIGN):	**$520,000**	**$550,000**	**$4,590,000**	**$18,770,000**	**$71,690,000**	**$7,020,000**	**$7,560,000**

NOTES:
1. Estimated costs are based on 2010 dollars
2. Costs do not include right of way or utilities
3. Construction quantities are based on conceptual alternates

Table G-3: Detailed Construction Cost Estimate Scenario 6

OLDHAM COUNTY INTERCHANGE JUSTIFICATION STUDY
CONSTRUCTION COST ESTIMATE - SCENARIO 6

SUMMARY												
ITEM	ESTIMATED COST											
	6-0 DIAMOND INTERCHANGE + CD ROAD	6-1 KY 53 SOUTH OF I-71	6-2 KY 393 SOUTH OF I-71	6-3 I-71 WB / KY 146	6-4 I-71 EB / KY 146	6-5 I-71 / KY 393	6-6 I-71 EB / KY 53	6-7 KY 53 / PARKER	6-8 I-71 EB to KY 146 EXTEND DECEL	6-9 I-71 EB to KY 393 EXTEND DECEL	6-10 I-71 WB to KY 393 EXTEND DECEL	6-11 KY 393 to I-71 WB EXTEND ACCEL
PAVEMENT	$8,100,000	$3,800,000	$250,000	$0	$0	$600,000	$140,000	$0	$200,000	$230,000	$230,000	$250,000
GRADING, DRAINAGE, AND EROSION CONTROL	$2,900,000	$1,600,000	$60,000	$0	$0	$210,000	$70,000	$0	$65,000	$150,000	$75,000	$80,000
CROSSROAD AND RAMP EARTHWORK	$1,100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STRUCTURES	$6,600,000	$0	$0	$0	$0	$5,400,000	$0	$0	$0	$0	$0	$0
MAINTENANCE OF TRAFFIC	$1,300,000	$150,000	$20,000	$0	$0	$400,000	$25,000	$0	$50,000	$50,000	$50,000	$60,000
SIGNALIZATION	$360,000	$20,000	$0	$120,000	$120,000	$240,000	$0	$120,000	$0	$0	$0	$0
GUARDRAIL	$920,000	$40,000	$0	$0	$0	$90,000	$10,000	$0	$10,000	$25,000	$0	$30,000
LIGHTING	$640,000	$0	$0	$0	$0	$10,000	$50,000	$0	$5,000	$5,000	$5,000	$5,000
SIGNING	$750,000	$10,000	$5,000	$0	$0	$10,000	$20,000	$0	$2,000	$2,000	$2,000	$3,000
STRIPING	$60,000	$30,000	$5,000	$0	$0	$12,000	$5,000	$0	$5,000	$5,000	$5,000	$5,000
MISCELLANEOUS	$630,000	$140,000	$0	$0	$0	$35,000	$0	$0	$15,000	$20,000	$15,000	$15,000
MOBILIZATION (5%) / DEMOBILIZATION (1.5%)	$1,500,000	$380,000	$22,000	$0	$0	$455,000	$23,000	$0	$23,000	$32,000	$25,000	$29,000
CONSTRUCTION TOTAL:	**$24,900,000**	**$6,200,000**	**$360,000**	**$120,000**	**$120,000**	**$7,500,000**	**$340,000**	**$120,000**	**$380,000**	**$520,000**	**$410,000**	**$480,000**
25% CONTINGENCY:	**$6,200,000**	**$1,600,000**	**$90,000**	**$30,000**	**$30,000**	**$1,900,000**	**$90,000**	**$30,000**	**$100,000**	**$130,000**	**$100,000**	**$120,000**
DESIGN:	**$2,500,000**	**$600,000**	**$50,000**	**$10,000**	**$10,000**	**$800,000**	**$40,000**	**$10,000**	**$40,000**	**$50,000**	**$40,000**	**$50,000**
TOTAL (INCLUDING CONTINGENCY & DESIGN):	**$33,600,000**	**$8,400,000**	**$500,000**	**$160,000**	**$160,000**	**$10,200,000**	**$470,000**	**$160,000**	**$520,000**	**$700,000**	**$550,000**	**$650,000**

NOTES:
1. Estimated costs are based on 2010 dollars.
2. Costs do not include right of way or utilities.
3. Construction quantities are based on conceptual alternates.

Table G-3: Detailed Construction Cost Estimate Scenario 6 (cont.)

OLDHAM COUNTY INTERCHANGE JUSTIFICATION STUDY
CONSTRUCTION COST ESTIMATE - SCENARIO 6

SUMMARY						
ITEM	ESTIMATED COST					
	6-12 I-71 WB to KY 146 EXTEND DECEL	6-13 KY 146 to I-71 WB EXTEND ACCEL	6-14 KY 53 BRIDGE OVER I-71 (6 UNDER + CD)	6-15 I-71 6 LANES	6-16 KY 393 BRIDGE OVER I-71 (6 UNDER)	6-17 KY 146 BRIDGE OVER I-71 (6 UNDER)
PAVEMENT	$200,000	$230,000	$3,100,000	$12,300,000	$0	$0
GRADING, DRAINAGE, AND EROSION CONTROL	$65,000	$75,000	$900,000	$11,500,000	$0	$0
CROSSROAD AND RAMP EARTHWORK	$0	$0	$150,000	$0	$0	$0
STRUCTURES	$0	$0	$9,300,000	$19,700,000	$5,200,000	$5,600,000
MAINTENANCE OF TRAFFIC	$50,000	$50,000	$650,000	$2,700,000	$0	$0
SIGNALIZATION	$0	$0	$50,000	$0	$0	$0
GUARDRAIL	$10,000	$0	$60,000	$650,000	$0	$0
LIGHTING	$5,000	$5,000	$20,000	$330,000	$0	$0
SIGNING	$2,000	$2,000	$10,000	$30,000	$0	$0
STRIPING	$5,000	$5,000	$25,000	$300,000	$0	$0
MISCELLANEOUS	$15,000	$15,000	$40,000	$2,300,000	$0	$0
MOBILIZATION (5%) / DEMOBILIZATION (1.5%)	$23,000	$25,000	$850,000	$3,240,000	$0	$0
CONSTRUCTION TOTAL:	**$380,000**	**$410,000**	**$15,200,000**	**$53,100,000**	**$5,200,000**	**$5,600,000**
25% CONTINGENCY:	**$100,000**	**$100,000**	**$3,800,000**	**$13,280,000**	**$1,300,000**	**$1,400,000**
DESIGN:	**$40,000**	**$40,000**	**$1,500,000**	**$5,310,000**	**$520,000**	**$560,000**
TOTAL (INCLUDING CONTINGENCY & DESIGN):	**$520,000**	**$550,000**	**$20,500,000**	**$71,690,000**	**$7,020,000**	**$7,560,000**

NOTES:
1. Estimated costs are based on 2010 dollars.
2. Costs do not include right of way or utilities
3. Construction quantities are based on conceptual alternates.

Appendix H: Support Letters

LaGrange Fire & Rescue Department

P.O. Box 41
121 W. Main Street LaGrange, KY. 40031
Office (502) 222-1143 Fax (502) 222-3168
www.lfrd.org

To Oldham County Judge/Executive Duane Murner
100 West Jefferson Street, Suite 4
LaGrange, Ky. 40031
March 31, 2010

The LaGrange Fire & Rescue Department definitely supports a new interchange (in the area of the 20 mile marker I-71), an overpass over I-71 (connecting New Moody Lane to Commerce Parkway and Allen Lane) and an overpass or underpass under the CSX railroad tracks at Allen Lane (leading to West Highway 146).

The CSX railroad runs approximately 20 plus trains a day thru the center of LaGrange. It takes each train approximately 15 minutes to get through the City. This has caused the fire department and other emergency services numerous delays in responding to emergency runs. It delays our volunteers in getting to our stations and it delays our apparatus in getting to the emergency. These aren't isolated incidents, they happen fairly often.

Right now, the quickest way to get to the businesses and residence that are located on the South side of the interstate is to travel thru the congested traffic of South First Avenue / South Highway. The six (6) traffic lights located on South First Avenue / South Highway 53 also add to the traffic congestion.

This situation will definitely get worse as more growth occurs. The three construction projects mentioned above will help alleviate the delays faced by the emergency services, that's created by the trains going thru town, the traffic congestion caused by the trains, and the traffic congestion caused by one main artery, South First Avenue, crossing the interstate. If this main artery was ever compromised, such as a tractor trailer severely damaging the supports of the overpass, with no second means of an egress across I-71 would put the emergency services in severe bind in providing services.

The quicker LaGrange Fire & Rescue gets to the scene will help create a better end result in accomplishing our mission in saving life and property. The interchange project will definitely accomplish this.

Sincerely, Chief Jim Sitzler

LaGrange Fire & Rescue Department

Oldham County Police Department

1855 North Highway 393
LaGrange, Kentucky 40031

www.oldhamcountypolice.com

Duane Murner
County Judge Executive

D. Michael Griffin
Chief of Police

Tuesday, March 30, 2010

Honorable Duane Murner
Oldham County Judge Executive
100 West Jefferson Street
LaGrange, KY 40031

Judge Murner:

The Oldham County Police Department supports the request for the traffic study and government funding to improve the intersections of KY 53 and Main Street, and KY 53 and New Moody Lane.

These interchanges already are operating at capacity today. We support state and local efforts to act now to address this issue in order to maintain Oldham County's strong commitment into securing the safety of its citizens. If this corridor continues to be congested, there will be serious delays to drive times, not to mention safety concerns and economic ramifications for the City of LaGrange. Police, fire and rescue find it very difficult to use this roadway due to the heavy traffic congestion.

The KY 53 Corridor serves one of Oldham County's most vital centers of employment and plays a critical role in recruiting and retaining high quality talent and in moving goods and services into the marketplace more efficiently and safely. Not only will this project positively impact drive time for emergency responders, employees and accessibility to critical suppliers, it also will continue to promote Oldham County's image as a great place to live and work.

I would be happy to provide more input on congestion issues and how it impacts Oldham County and in particular the City of LaGrange and other vital services such as police fire and rescue should you require it. I look forward to continuing this dialogue and providing assistance for this project.

Sincerely,

Michael Griffin
Chief - OCPD

"Oldham County's Police"
An Equal Opportunity Employer
C:\Documents and Settings\dikes\My Documents\KY 53 Corridor.docx

May 12, 2010

Honorable Duane Murner
Oldham County Judge Executive
100 West Jefferson Street
LaGrange, KY 40031

Judge Murner:

Oldham County Emergency Medical Services strongly supports the request for the traffic study and government funding to improve the intersections of KY 53 and Main Street, and KY 53 and New Moody Lane.

We often find it very difficult to navigate our ambulances and response vehicles through these interchanges due to the heavy traffic congestion. It is apparent that the interchanges are currently operating at capacity and we support all state and local efforts to address this issue. Should the congestion worsen, it would surely raise serious safety concerns.

Since the only hospital and the largest urgent care center are both located along the Kentucky 53 Corridor, it plays a critical role in EMS providing prompt medical care to the citizens of Oldham County. Not only will this project positively impact response time and safety for emergency responders, it will also continue to promote Oldham County's image as a great place to live and work.

Should you require any further input, I would be glad to review the congestion issues and how it has impacted Oldham County EMS with you. Please feel free to contact me at any time and let me know how I might provide any further assistance for this project.

Sincerely,

Ron Wilder
Director
Oldham County EMS

Oldham County Emergency Medical Services
3639 West Highway 146, Lagrange, Kentucky 40031
Mailing Address: P.O. Box 444, Buckner, Kentucky 40010
(502) 222-7250 • Fax (502) 222-7281
www.oldhamcountyems.com

Oldham County Public Library
LIBRARY
Main Library
308 Yager Avenue, LaGrange, KY 40031
502-222-9713 fax 502-222-1141
www.oldhampl.org

June 4, 2010

The Honorable Duane Murner
Oldham County Judge/Executive
100 West Jefferson Street
LaGrange, KY 40031

Dear Judge Murner:

As you know The Oldham County Public Library recently opened a new state-of-the-art Library certified as a Gold LEED building by the US Green Building Council. The Library is located off Commerce Parkway and Hwy 53 in LaGrange, but services citizens from all over the county. As word spreads about the features and services provided by the Library, our traffic continues to grow every month. Overall the Library has experienced upwards of a 69% increase in patrons coming into the new building.

The traffic on Hwy 53 can be a problem for visitors, often having to make left turns off of Hwy 53 during high congestion periods. Because it is easier to locate the Library from Commerce Parkway, but more difficult coming off Interstate 71 through LaGrange exit 22, many of our patrons complain that negotiating the busy highway makes our location harder to find.

A new interchange and exit on I71 would be a tremendous boost to the Library's accessibility. This would allow our patrons to exit and take a right immediately accessing our facility. It would be so much more convenient and safer than having to travel Hwy 53. If the Library becomes more convenient to Interstate 71, it will allow more citizens to utilize it and more visitors to learn about our sustainable building.

Please support this new interchange and exit and urge other state officials to get behind this very important project. If you have any questions please don't hesitate to give me a call.

Sincerely yours,

Susan Eubank
Library Director
susane@oldhampl.org

BAPTIST HOSPITAL NORTHEAST

RECEIVED
JUDGE-EXECUTIVE

June 4, 2010

1025 New Moody Lane
La Grange, KY 40031
502-222-5388
502-222-3411 fax

The Honorable Duane Murner
Oldham County Judge/Executive
Oldham County Fiscal Court
100 West Jefferson
LaGrange, KY 40031

Dear Judge Murner:

Thank you for allowing me to address my thoughts regarding the possibility of having an interchange at mile marker 20 on I-71. Obviously, this would have an enormously positive impact not only for Baptist Hospital Northeast, but also for Oldham County.

Baptist Hospital Northeast is a 120-bed general acute care community hospital located on New Moody Lane in La Grange. Baptist Hospital Northeast provides emergency services, women's and children's services (including obstetrics), surgical services, diagnostic imaging services, ambulatory care, skilled nursing care, rehabilitation services and cardiopulmonary services.

Last year Baptist Hospital Northeast served just over 48,000 outpatients and 3,300 inpatients. Our average growth rate over the past several years has been about 3%. Baptist Hospital Northeast is the largest healthcare provider for Oldham, Henry and Trimble Counties but also serves patients from Carroll and Jefferson Counties.

Baptist Hospital Northeast has total budget of $48 million with 480 employees and a payroll of $24 million. Baptist Hospital Northeast has three medical office buildings on campus that house 30 full and part-time physician offices. The average practice employs three office personnel.

Baptist Hospital Northeast has as a part of its Strategic and Master Facility Plan a plan for an outpatient expansion. This expansion would not only add jobs to Baptist Hospital Northeast but also attract more physicians and their staffs to our campus. This expansion is necessary to meet the growth of Oldham and the surrounding counties and to meet the increasing demand of medical services.

Since the addition of the Rawlings Corporation and their 600 employees to the Oldham Reserve Business Campus adjacent to Baptist Hospital Northeast, traffic along New Moody Lane, Highway 53 and I-71 has increased dramatically, particularly at rush hour. If other corporations with significant numbers of employees move into the Oldham Reserve Business Campus next to the hospital, this problem will only increase, unless an interchange is developed.

An interchange would greatly alleviate the dependence of Exit 22 as the only access point to I-71 from LaGrange. This would not only allow easier access to the hospital for physicians and employees, but also for emergency vehicles and patients. An interchange is a must to ensure proper access to the hospital, as the Oldham Reserve Business Campus grows.

As you know, Oldham County has to reduce its dependence on residential property taxes as its main source of revenue, while continuing to provide a high quality of life for its citizens. I feel strongly that the main way to do this is to attract business and industry to Oldham County, especially in the Oldham Reserve Business Campus. However, we will neither be able to attract businesses in or handle a growing demand for infrastructure, without an interchange at mile marker 20 on I-71.

Again, thank you for allowing me to address the issues that are in the best interest of all citizens of Oldham and the surrounding counties.

Sincerely,

Dennis B. Johnson
Administrator

Member Baptist Healthcare System

TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov

Steven L. Beshear
Governor

Joe Prather
Secretary

April 30, 2009

The Honorable Geoff Davis
United States Representative, Fourth District
1108 Longworth House Office Building
Washington, DC 20515-1704

Dear Congressman Davis:

Subject: Oldham County; I-71 Interchange between Exits 18 and 22

Thank you for the opportunity to provide the Kentucky Transportation Cabinet's perspective with regards to the proposed project to construct a new interchange on I-71 between Exits 18 and 22 in Oldham County, Kentucky, that you are recommending for special funding consideration by the House Transportation and Infrastructure Committee.

The interchange on I-71 between Exits 18 and 22 would connect Commerce Parkway north of the interstate with New Moody Lane on the south. An overpass feasibility study completed in November 2008 concluded that a new interchange would improve local economic development and reduce congestion for the motoring pubic within this area of Oldham County.

This project is needed to ensure the future viability of Kentucky's highway system. If we can be of any further assistance, or if any additional information is needed, please contact us without hesitation.

Sincerely,

Joe Prather
Secretary

JP:MH:RBR:EAP

c: Mike Hancock, State Highway Engineer
Steve Waddle, Executive Director for Project Development
Matt Bullock, Chief District Engineer, District 5
Ron Rigney, Director, Division of Program Management

Kentucky
UNBRIDLED SPIRIT

An Equal Opportunity Employer M/F/D

DUANE MURNER
JUDGE-EXECUTIVE
dmurner@oldhamcounty.net

PAULA GISH
DEPUTY JUDGE-EXECUTIVE
pgish@oldhamcounty.net

OLDHAM COUNTY FISCAL COURT
OFFICE 502-222-9357 FAX 502-222-3210
100 WEST JEFFERSON STREET, SUITE 4, LAGRANGE, KENTUCKY 40031
www.oldhamcounty.net

September 3, 2009

Memo For: Senator Ernie Harris
Representative David Osborne

From: Duane Murner, Judge/ Executive
Paula Gish, Deputy Judge/Executive

Subject: Two Priority Road Projects

With all of the uncertainty surrounding the funding of road projects in the state, I want to ask for your support on two critical projects in Oldham County that have already passed several stages of approval. The two projects and the rationale behind them are as follow:

1. **The interstate justification study for proposed Exit 20 off I 71.**

   The current status of this project is that the consultants who have done the preliminary work surrounding the I 71 overpass have been meeting. The funding has also been secured by using some of the previously approved overpass funds. The decision has been made by Mike Hancock to select a consultant from the state revolving list, and Jill Asher has been named as the KYTC project manager. What has not yet happened is the "order to proceed".

   This study is pivotal to completing the Oldham Reserve economic initiative. Our contract with the Hocker Group uses agreement for the interchange as the trigger for the rest of the development. But even more important, it has now become clear that an interchange would make a dramatic difference in the Exit 22/ SR 53 traffic and safety problem that has been studied nearly to paralysis as the "Hwy 53 Access Project" (HNTB Consultants)

   Everything seems in alignment for this project to proceed and I would appreciate whatever "nudge" you could provide.

2. **North SR 393**

   This is a project that has been on the drawing board for much too long. Design is completed and some right-of-way acquisition has already occurred. It addresses the single most congested intersection in Oldham County – SR 146 and SR 393. More important, it provides a badly needed way across the CSX tracks for emergency vehicles. In fact, it would be the only non-grade crossing in Oldham County except for the 329 by-pass in Crestwood.

Oldham County
Quietly Amazing

"An Equal Opportunity Employer"

In addition to these critical benefits, this project fills another important economic objective. The design calls for the elimination of our Road Department, maintenance building, and recycling center. We have negotiated with the Department of Corrections a 60-acre piece of land on which we could locate these displaced structures if we would agree to build a central fueling station and a vehicle washing facility. Both of these would be for the use and benefit of all public vehicles in Oldham County – our Police Department, the Sheriff's Office, city of LaGrange vehicles, Road Departments, Jail, Reformatories, etc. In order to complete this agreement we need to finalize the state's payment for the land acquisition. As he was exiting the employ of KYTC, John Callahan gave us an oral estimate of $1.4 million which would be sufficient to fulfill our obligations under the agreement with DOC. But we can't move on the project until final approval is given. Finally, some of the County buildings that are scheduled to be re-located are badly in need of repair or replacement, and we will have to do something about these soon.

Both of these projects are well-along in design and funding, and we really need some help in moving them to the next step. Please let me know what I can do to further the process.

Copies: Mike Hancock
Matt Bullock
Brian Campbell
Louise Allen
Shawn Boyle
Don Basham
Fiscal Court Magistrates

The Honorable Duane Murner
Oldham County Judge/Executive
100 West Jefferson Street
LaGrange, KY 40031

June 4, 2010

Dear Judge Murner:

The purpose of this letter is to ask for your support for a new interchange and a exit 20 on I71. As you know traffic congestion has been a problem on HWY 53. I am opposed to the fixed median solution because the majority of my customers travel north on HWY 53 to reach my facility. The current solution would require them all to drive past my business and attempt a U turn. I know this will hurt my business and cost me sales. If it becomes too much of a hassle my customers will go elsewhere. This new interchange should allow for at least one opening in the median to service my customers.

The new interchange and exit will allow much of the traffic that is currently getting off at exit 22 and clogging up HWY 53 to get off earlier at exit 20 and take the under utilized Commerce Parkway to LaGrange. This will be more convenient for those citizens and will be beneficial for every business in LaGrange.

It will provide better access to the business locations on Commerce Parkway and it will spur growth there. Since this new exit will reduce the traffic on HWY 53 it will benefit all the business locations on that corridor as well as Main Street and HWY's 22 and 146.

This is a solution that is a win for all of Oldham County. Your support of this new interchange and exit is very important for the long term success and growth for the business locations in LaGrange.

Please don't hesitate to contact me if you have any questions or need further input.

Yours Truly,

Fred Tolsdorf
President