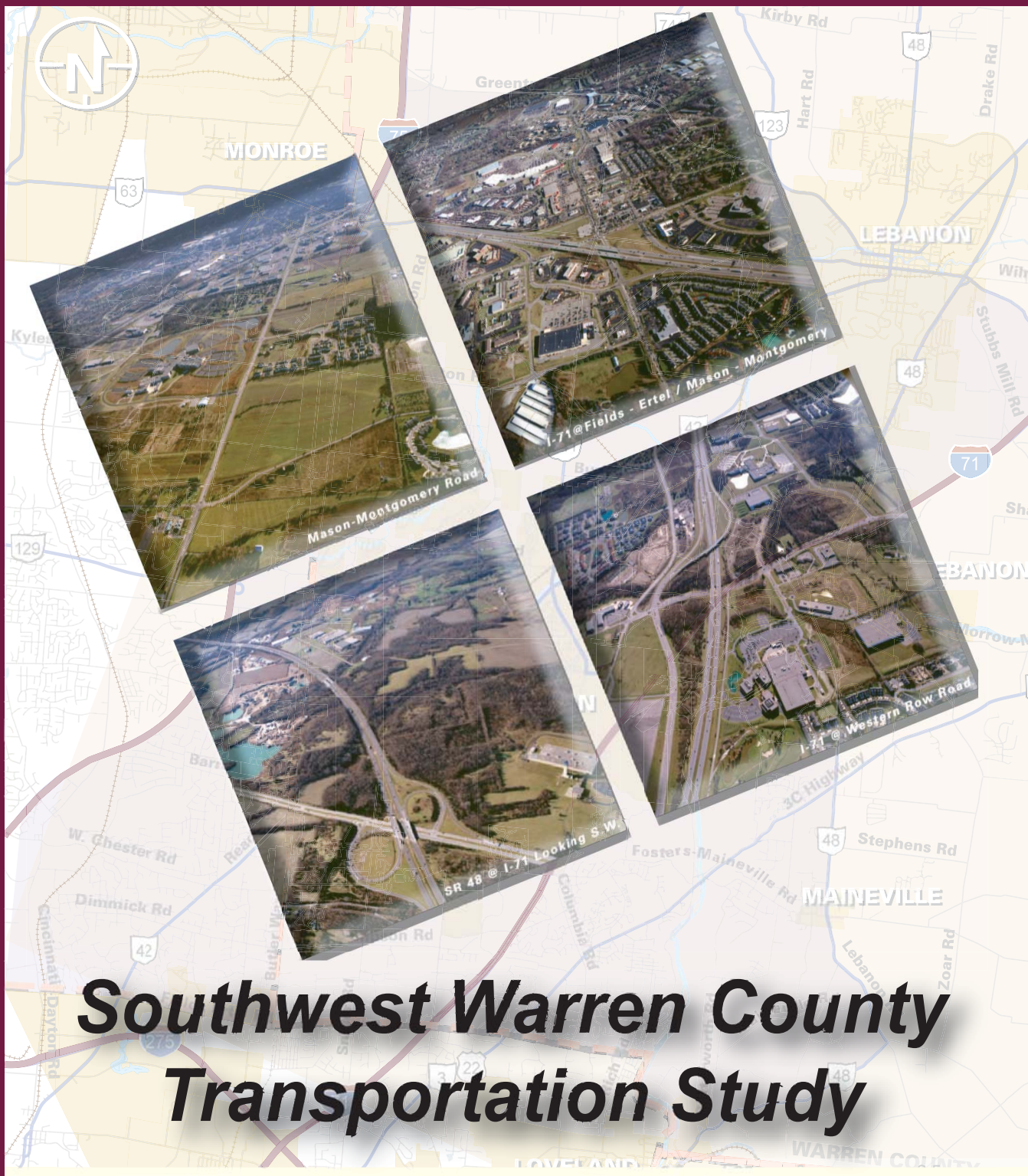
Southwest Warren County
Transportation Study

OKI
Ohio · Kentucky · Indiana
Regional Council of Governments



Southwest Warren County Transportation Study

BURGESS & NIPLE

HSR BUSINESS TO BUSINESS

HARDLINES DESIGN COMPANY

Southwest Warren County Transportation Study

September 2005

OKI
Ohio · Kentucky · Indiana
Regional Council of Governments

The preparation of this document was financed cooperatively by the Federal Highway Administration, Federal Transit Administration, Ohio Department of Transportation and units of local and county government in the OKI Region. The opinions, findings and conclusions expressed in this document are those of the OKI Regional Council of Governments and are not necessarily those of the U.S. Department of Transportation. This report does not constitute a standard, specification or regulation.

Acknowledgements

Agency	Ohio-Kentucky-Indiana Regional Council of Governments Mark Policinski, Executive Director
Project Manager	Dory Montazemi, PE, AICP, Deputy Executive Director
Senior Planner	Margo Lindahl
Administrative Assistant	Regina Brock

We would like to express our appreciation
for the time and effort given to this process by
members of the Southwest Warren County Transportation Task Force and
Chairman David Young.

We would also like to acknowledge the assistance and participation of
the Warren County Engineer and
the District 8 Office of the Ohio Department of Transportation
and acknowledge the contributions of
Burgess & Niple, Inc. of Columbus, Ohio;
LJB of Dayton, Ohio;
HSR Business to Business of Cincinnati, Ohio; and
Hardlines Design Company of Columbus, Ohio.

EXECUTIVE SUMMARY

I. Introduction

The Southwest Warren County Transportation Study is focused on a 100 square mile area with numerous transportation problems that call for a multitude of solutions (see map on next page). The study's purpose is to create a transportation plan for Southwest Warren County that will balance transportation, environmental and quality-of-life goals and ultimately improve regional mobility for people and goods. The plan horizon is 2030.

This study to address transportation needs was sponsored by the Ohio-Kentucky-Indiana Regional Council of Governments (OKI), Warren County, and the following townships and municipalities within the study area:

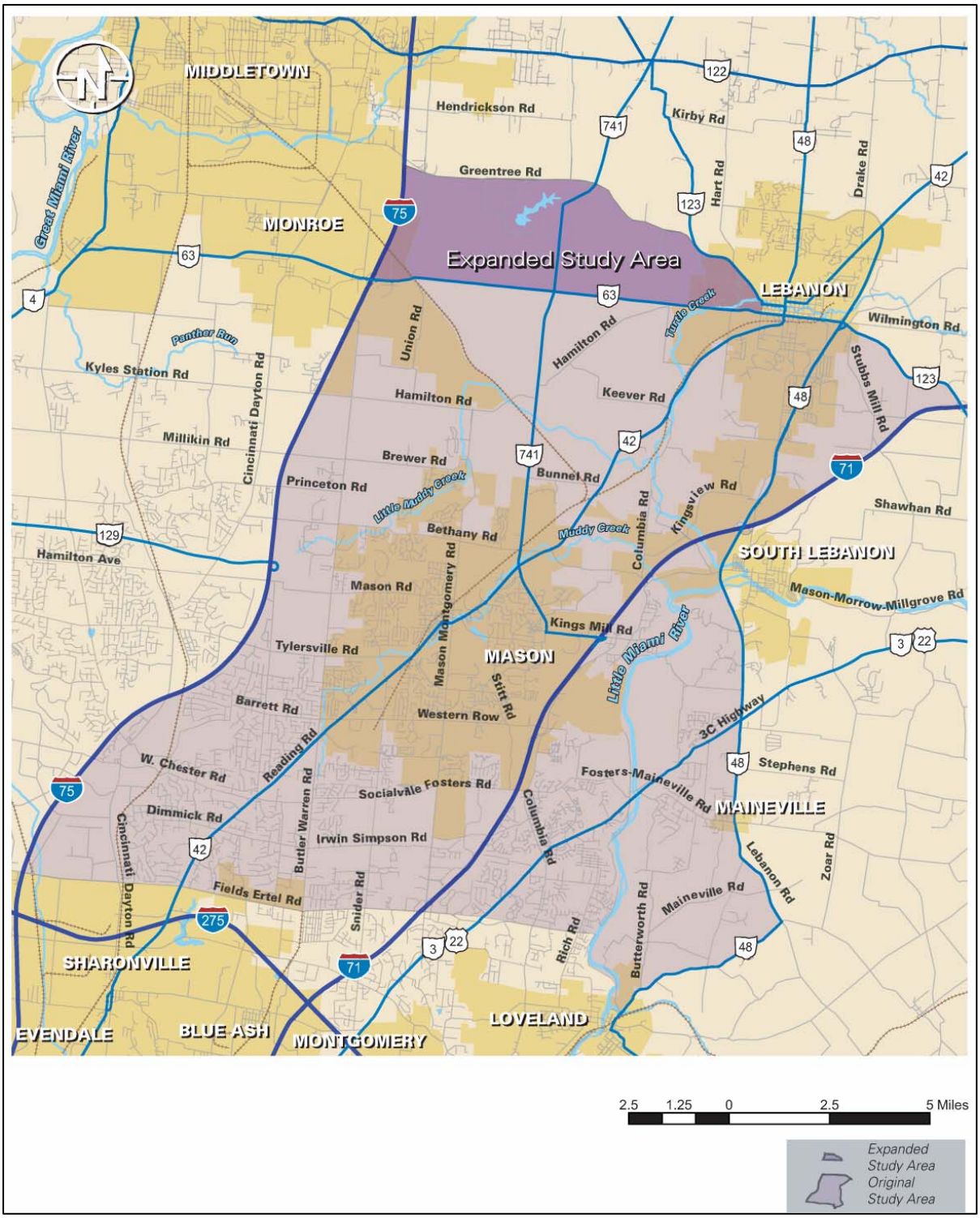
City of Lebanon	Deerfield Township	Turtlecreek Township
City of Mason	Hamilton Township	Union Township

A Southwest Warren County Transportation Task Force (23 members) directed the study's progress, providing a forum for local governments, business leaders, environmental organizations, and public agencies. Former Warren County Commissioner Larry Crisenbery was the Task Force's original chair. After his retirement, Warren County Administrator Robert Price became the chair. In April 2005, Warren County Commissioner David Young succeeded Mr. Price.

The Task Force established three primary goals for the study. The goals and objectives are as follows:

- Improve Mobility for People and Goods
- Accommodate the growth of traffic
- Improve traffic movement through the study area
- Move truck traffic more efficiently
- Improve the operating efficiency of existing roadways
- Protect capacity through access management
- Identify alternatives for expanding transit

Study Area


MIDDLETOWN
MONROE
LEBANON
SOUTH LEBANON
MASON
MAINEVILLE
SHARONVILLE
EVENDALE
BLUE ASH
MONTGOMERY
LOVELAND
Expanded Study Area
Great Miami River
Hendrickson Rd
Greentree Rd
Kirby Rd
Hart Rd
Drake Rd
Wilmington Rd
Stubbs Mill Rd
Shawhan Rd
Mason-Morrow-Millgrove Rd
Kyles Station Rd
Panther Run
Cincinnati Dayton Rd
Union Rd
Hamilton Rd
Keever Rd
Turtle Creek
Millikin Rd
Brewer Rd
Princeton Rd
Little Muddy Creek
Bunnel Rd
Kingsview Rd
Columbia Rd
Bethany Rd
Muddy Creek
Hamilton Ave
Mason Montgomery Rd
Mason Rd
Kings Mill Rd
Little Miami River
Tylersville Rd
Stitt Rd
Barrett Rd
Western Row
3C Highway
Reading Rd
W. Chester Rd
Fosters-Maineville Rd
Stephens Rd
Socialvale Fosters Rd
Dimmick Rd
Butler Warren Rd
Irwin Simpson Rd
Lebanon Rd
Zoar Rd
Fields Ertel Rd
Snider Rd
Rich Rd
Maineville Rd
Butterworth Rd
2.5 1.25 0 2.5 5 Miles
Expanded Study Area
Original Study Area

Protect the Environment and Quality of Life

- Improve transportation consistent with county and local land use plans
- Protect the Little Miami River's values as a designated scenic river
- Enhance opportunities for walking and biking as alternatives to driving

Improve Travel Safety

- Reduce conflicts between modes of transportation
- Improve the safety of intersections and roadways that have a high incidence of accidents or problematic design
- Reduce deficiencies of rural roadways that carry greater traffic volumes than their original design

This study accounts for a series of other recent studies (beginning in 1998) on transportation needs to address the impacts of development. Previous studies include the Butler County Transportation Improvement District's Major Investment Study and an Interchange Modification Study for the I-75/SR 129 interchange, the North-South Transportation Initiative by the Miami Valley Regional Planning Commission and OKI, an I-71 Corridor Transportation Study by OKI, a corridor study of SR 63 across northern Butler County, the Warren County Engineer's study of truck traffic in and through the city of Lebanon, and a study to examine potential improvements at the Fields Ertel Road/Mason Montgomery Road interchange with I-71.

As can be seen from the preceding map, the study area includes a portion of Butler County. Its inclusion was to help assess the impacts of traffic growth and east-west movement across the area. Recommendations were not provided for Butler County because the study was focused in Warren County.

II. Public Involvement

The Public Involvement / Public Information Plan implemented as an integral part of the study was launched at the first meeting of the Task Force in January 2004. The public involvement process was designed to encourage dialogue among citizens, elected officials, and the Task Force (nine Task Force meetings). The highlights of the public involvement process are as follows:

Media Relations – Five press releases were distributed to media that serve the study area. In addition, continual contact was maintained with media representatives.

Public Meetings – Three rounds of public meetings were held to provide opportunities for public review and input at critical milestones in the study process. Each round featured two meetings with exhibits in an open-house format where members of the study team were

available. At the first round of meetings in May 2004, citizens were asked to comment on area traffic problems. Those survey results were posted on the study's web site.

A second round of public meetings was held in May 2005. At this session, preliminary recommendations of primary and secondary improvements were presented and the public was asked to comment. Survey results again were posted on the study web site.

A third and final round of public open houses was conducted in July 2005. The public was presented with the recommended improvements and their priority for implementation as high, medium, or low. Again, attendees were asked to complete a survey to assist the Task Force in gauging their reactions to the recommendations.

Special Public Forums – The May 2005 public meetings resulted in two additional public forums in June 2005 to specifically discuss two of the transportation improvements: the proposed Bethany Road widening and the Lebanon Bypass.

Web Site – The study web site (**www.plan4swwarrenco.com**) was launched prior to the first round of public meetings. The site was updated regularly and served as a central source of information. Visitors to the site were also given the opportunity to submit questions and comments.

Individual Response – Individuals submitted questions and comments to the website and also by e-mail and phone calls to members of the study team. Individual responses were provided by the study team via e-mail or telephone.

Community Cable Access – Leaders of the Task Force appeared on a local cable community affairs program and discussed the on-going study and opportunities for the public to assist the study process. The program was cablecast six times in June 2005.

Stakeholder Relations – Study team members met with the Residents Association of West Central Warren County to explain the study process and answer questions.

Media Monitoring – Media coverage of the study was monitored regularly.

III. Existing Conditions

Definition of Problems

At the first meeting of the Task Force, members were asked to identify transportation problem areas and issues. The problem list was taken to the first round of public meetings for review and comment and subsequently provided a base for developing different concepts that could be solutions to the identified problems. The problems were classified in the following categories:

- East-West traffic problems
- Interchanges/intersection problems
- Little Miami River crossing issues
- Impacts of I-75/SR129 interchange on the Study Area
- Other traffic problems or problem areas
- Other transportation modes
- Land use and other policy issues

Developing Area

The study area has experienced rapid growth in recent years due to expansion of suburbanization from the inner Cincinnati suburbs. Because of its location between two interstate highways in a county between two major metropolitan areas, the study area is experiencing rapid business growth in addition to population growth. In conjunction with this growth pattern, agricultural lands are being transformed into housing subdivisions, "big box" retail, office parks, and commercial and industrial parks.

The study area has grown from an estimated 84,000 people in the year 2000 to 96,000 in 2004. Population is projected at 154,000 for 2030. Warren County is the second fastest growing county in Ohio, according to the 2000 U.S. Census, growing from a population of 38,000 in 1950 to 158,000 in 2000. In April 2004, Warren County was ranked 52nd in the U.S. Census listing of the 100 fastest growing counties in the United States between 2000 and 2003.

Existing Traffic Conditions

The study area contains more than 600 miles of roadway. The transportation network analyzed for this study includes 200 miles of roadway and more than 500 intersections (both signalized and un-signalized).

Capacity and Level of Service (LOS) analyses were conducted to identify those areas where travel demand is significantly greater than available capacity on a roadway or at an intersection. Capacity analysis was conducted using 2004 traffic volumes, which were validated with existing count data. Geometric information was used to calculate the

approximate carrying capacity of the roadway, and intersection capacity was based on the number of approach lanes.

Several major roadways are near or over capacity based on LOS, which uses a letter scale from A to F as a measure of available capacity of the roadway and existing demand. LOS A indicates that a driver may maneuver on the roadway unimpeded by other drivers and with little delay. LOS E indicates the uppermost operational limit of traffic, indicating that traffic is moving with little or no maneuverability, increased delay, and slower speeds. LOS F indicates that the roadway is over capacity and is indicative of roadways that experience severe congestion and stopped or slow conditions. Roadways near or over capacity (LOS E or F) include sections of thirteen roads: Tylersville Road, Mason Montgomery Road, Fields Ertel Road, Kings Mill Road, Snider Road, Western Row Road, SR 741, U.S. 42, Bethany Road, SR 63, U.S. 22, Mason-Morrow-Millgrove Road, and Butler-Warren Road.

Intersections can often create significant delays and congestion by serving as choke points on roadways that otherwise have an adequate number of lanes. Of the 110 signalized intersections in the study area, 57 percent were identified as being at or near capacity (LOS E or F). Many of these intersections are located on those routes that are near or over capacity.

During recent years, traffic volumes in the study area have increased dramatically and are outpacing the ability to add or expand transportation facilities to accommodate the demand. For instance, the area between the Little Miami River and SR 48 has seen a surge in subdivision development. This area (east of the Little Miami River) depends on U.S. 22/SR 3 and I-71 (west of the Little Miami River) for access to employment, shopping, etc. The existing river crossings are accessed on substandard roadways on their historic alignment or, for U.S. 22/SR 3, involve travel under congested conditions during rush hours.

Historically, rapid development has occurred without ensuring that roadways and access control are in place before land development. Although regulations are in place for land developers to dedicate right-of-way and improve roadways in proximity to a new development, this approach provides a patchwork of upgrades and does not provide system-wide continuity of improvements. Additionally, the quantity of traffic generated by land development is outpacing the ability to implement solutions to alleviate area traffic growth**.**

Some congested areas in the study area are also directly affected by a lack of connectivity. This lack of connectivity is apparent in deficient access to, from, and between I-71 and I-75. Along the 10-mile stretch of I-71, only four and a half interchanges are provided (referring to the half interchange to the south at Western Row Road). On I-71, there is a five mile stretch between Kings Mills Road and Fields Ertel Road with no access to/from the northbound direction. It is between these two routes where the densest development within the study area is found. Furthermore, direct east-west access between I-71 and I-75 is limited to Tylersville/Western Row Road and to SR 63/SR 123. The ability to improve SR 63 as an interstate connector is limited by its routing through the historic district in Lebanon, where it cannot be widened beyond its recently improved three lane section.

Safety

While some transportation facilities have been upgraded to current standards, many roadways have changed little from their original construction. Many problem roadways in the study area have substandard lane and shoulder widths and substandard horizontal and vertical alignments to meet current traffic conditions. This situation results in safety problems for the motoring public and lessens the capacity of the roadways to meet current traffic demand. According to an accident analysis, 30 percent of crashes in the study area are single vehicle crashes, including fixed object crashes and drivers running off the road. The high percentage of single vehicle accidents is indicative of deficiencies on the rural roadway network in the study area.

Multi-Modal Usage

The dominant mode of transportation in the study area is a single operator in a private vehicle. Park and Ride public transit facilities are located at King's Island and Fields Ertel Road and are used for car-pooling and parking for METRO's regular and express bus service to downtown Cincinnati. Warren County Transit provides a paratransit service on an on-call basis. There are no commuter rail, subway or light rail transit systems in operation in the study area. The study area contains a few constructed bicycle and shared use facilities, in addition to the recreational Little Miami Trail along the river valley. The availability of sidewalks varies widely throughout the study area.

IV. Future Conditions

Transportation analysis involved a review of current and future socio-economic data and trip data, including trip distribution, trip growth, and trip characteristics. In 2004, the study area produced approximately 236,000 daily trips, of which 102,900, or 44 percent, travel to Hamilton County. In 2030, the same analysis predicted that 171,200 of the 385,300 study area trips will be to Hamilton County. Examples of predicted travel growth within the study area are presented on the next page.

ADT Growth 2004 - 2030 Between Selected Locations

	Average Daily Traffic		
Road	**2004**	**2030**	**% Change**
SR 63 between SR 74l and U.S. 42	9,100	17,100	88
Tylersville Road between Snider Road and U.S. 42	28,200	36,300	29
Western Row Road between Snider Road and Mason Montgomery Road	11,100	16,500	49
U.S. 22 north of Socialville Fosters Road	11,800	36,500	209
Irwin Simpson east of Butler Warren Road	7,000	10,800	54
Mason Montgomery Road between Western Row Road and Socialville Fosters Road	27,700	36,400	31

Network analysis was conducted to determine the effect of the changes in travel patterns on the operation of the existing transportation network. The base transportation network for 2030 analysis included all existing infrastructure combined with all committed infrastructure (improvements for which identified funding is already in place).

The largest increases in daily vehicle miles of travel (VMT), vehicle hours of travel (VHT), and vehicle hours of delay (VHD) in the study area occur along I-71 and I-75. The following table shows the total change in VMT, VHT, and VHD for the study area and for the OKI Region.

2004 and 2030 VMT, VHT, and VHD for Study Area and OKI Region

	Study Area			OKI Region		
	2004	**2030**	**Growth**	**2004**	**2030**	**Growth**
VMT	4,358,000	7,201,000	65%	49,843,000	67,342,000	35%
VHT	113,000	283,000	150%	1,331,000	2,190,000	65%
VHD	17,000	125,000	635%	120,000	566,000	372%

All of the transportation system forecasts show increases (some dramatic) of traffic on roadways in the study area. The forecasts show that without improvements, future demands will not be met by the transportation infrastructure currently in place.

Level of Service analysis was conducted for each roadway segment and at each signalized intersection for the peak hour traffic demand in 2030. Based upon these traffic volumes, it is estimated that by 2030, approximately two-thirds of the roadways within the study area will exceed their capacity, based on existing conditions. The majority of those roadways now operating under capacity are expected to operate at Levels of Service D, E, or F where capacity is approached, speeds decrease, and delay and congestion increase. By 2030, the number of roads operating at LOS E or F grows from thirteen to twenty-two. In addition to the roads already mentioned, portions of Deerfield Road, SR 48, Columbia Road, Irwin Simpson Road, Socialville Fosters Road, Fosters-Maineville Road, Greentree Road, Grandin Road, and Mason Road deteriorate to LOS E or F.

V. Development of Solutions

Process

The process of developing solutions began with a focus on the need for major improvements to the roadway network. Improvements were presented as concepts, consistent with this study's relationship to the Ohio Department of Transportation's Project Development Process (this study covers the first four steps in a 14-step process for advancing transportation improvements from planning to design to implementation). The concepts were refined during this planning phase based on discussion with the Task Force and review of data on operational impacts, costs, and environmental considerations.

The development of "primary improvements" to address the need for major transportation improvements in the study area was followed by the development of "secondary improvements." Secondary improvements are smaller and less capital-intensive projects than primary improvements and involve widening roadways or improving transit service or bike facilities. Future traffic projections were calculated for each improvement and the roadway network was then analyzed, which resulted in further refinement of some primary improvements. From the outset, it was established that the study would not address the need for transportation improvements in the Butler County portion of the study area or for adding capacity to the I-71 mainline (existing capacity is adequate and future needs would require a separate study).

Primary and secondary improvements were taken to the second round of public meetings (May 2005) for review and comment. The public meetings were followed by public forums (question and answer sessions) to provide additional opportunity for input on the Bethany Road improvement and the Lebanon Bypass concepts. In response to public review and comment and additional consultation with local officials, some improvements were refined at the eighth Task Force meeting in June 2005. Also at this meeting, the Task Force prioritized improvements by categorization as high, medium, or low. To facilitate prioritization, data was developed indicating positive and negative impacts. The recommended projects and prioritization were taken to a third round of public meetings (July 2005) for review and comment and then brought back to the Task Force for approval.

Improvements presented at the public meetings were categorized as four primary improvements, I-71 interchange improvements, secondary improvements (roadways recommended for the addition of one lane in each direction), and transit and bike improvements.

Primary Roadway Improvements

Lebanon Bypass – The Lebanon Bypass Improvement started as a bypass to reduce truck traffic through downtown Lebanon as well as to improve connectivity. There were six concepts considered, each involving a new, 4-lane limited access roadway that connected with I-71 to the east (via an interchange or via a roadway near an interchange) and with

SR 63, which then connects with I-75 to the west. The concepts proposed at-grade intersections with the major roads they crossed. Following the second round of public meetings and the Lebanon Bypass public forum, additional consultation with the City of Lebanon, and discussion with the Task Force, all concepts for this improvement were dropped. They were replaced by recommendations for improvements to SR 741 between SR 63 and U.S. 42 and extensions and improvements to Glosser and Bunnel Roads (some of these were already planned by the City of Lebanon).

Bethany Widening – This improvement involved connecting Bethany and Mason-Morrow-Millgrove roads and widening both roads to six lanes, including a landscaped median and turn bays, from the proposed Cox Road extension to SR 48 with an option for an I-71 interchange at Mason-Morrow-Millgrove Road. Based on public input provided at the second round of public meetings and the Bethany Road Forum, this improvement was revised to be a four-lane facility with a landscaped median and turn bays and without an I-71 interchange at Mason-Morrow-Millgrove Road. The four lane concept was presented at the third round of public meetings and still was not acceptable to the public. The final concept approved by the Task Force was a three lane facility that included turning lanes with right of way for five lanes.

Western Row Road Extension (includes the Little Miami River crossing) – This improvement would extend Western Row Road east and southeast across the Little Miami River as a 6-lane facility and connect with Fosters-Maineville Road. It was evaluated both with and without the completion of a full interchange at I-71 and Western Row Road. Due to public involvement, this concept recommended with the stipulations that it avoid subdivisions and that the project be constructed in the least intrusive manner.

Waterstone Connector – The Waterstone Connector would extend Waterstone Drive across I-71 to Duke Drive. It was evaluated as a 4-lane facility to divert vehicles from the Fields Ertel Road/Mason Montgomery Road interchange with I-71.

I-71 Interchange Improvements

Fields Ertel Road/Mason Montgomery Road interchange – Two reconfiguration strategies of the Fields Ertel/Mason Montgomery Road interchange were proposed initially, but due to high construction cost (estimated at $150 million), a feasibility study was recommended to identify a comprehensive solution that might be less expensive. The need to improve the interchange is a major transportation issue in the study area.

Western Row Road – This improvement would provide for a full interchange.

SR 741/Kings Mill Road Interchange – The improvement would involve widening the SR 741 approach and reconfiguring the existing interchange.

New Interchange at Mason-Morrow-Millgrove Road – This improvement was initially proposed for its potential benefits to the concept of a Lebanon Bypass, but it also had implications for traffic on Bethany Road. This interchange concept was unacceptable to the public since they felt it would create a high speed connector on Bethany and Mason-Morrow-Millgrove roads. Due to this resistance and the fact that travel demand modeling did not show many benefits with this interchange, it was deleted as a recommendation.

Bikeway Improvements

Based on a review of existing bike facilities and proposed bikeways in OKI and local plans and studies, three additional bikeway/pedestrian facilities were proposed: the Maineville Connector from Socialville Fosters Road west of the Little Miami River to Maineville, the Hamilton Connector between Butler County and Mason Montgomery Road, and the SR 741 Connector between Bunnel and Hamilton Roads.

Transit Improvements

A two-way loop circulator was proposed to connect existing activity centers, retail development, schools, and residential neighborhoods and tie to existing express service at the current METRO Park and Ride lots. Service would be provided by one bus each 30 minutes during the peak periods and one bus every 60 minutes during the off-peak.

Secondary Roadway Improvements

To improve mobility in the study area, eight existing roads were selected for future widening by the addition of one lane each direction. These roads were selected after a number of travel demand model runs were completed. It was determined that these widenings, along with the primary improvements, would have the greatest benefit to the study area's transportation system. All of these roads are currently two lanes except for Mason Montgomery Road, which is currently two lanes in each direction. As part of the modifications that occurred at the eighth meeting of the Task Force, two segments of SR-741 were also selected for the addition of one lane in each direction (the improvement to SR 741 between Greentree Road and SR 63 would also involve relocation). In addition, Glosser and Bunnel Roads are to be improved by the addition of one lane and extended to improve connectivity. The secondary improvements are:

- Butler Warren Road between Barrett Road and Bethany Road
- Snider Road between Fields Ertel Road and Tylersville Road
- Mason Montgomery Road between Fields Ertel Road and Western Row Road
- SR 63 between I-75 and SR 741
- SR 741 (1 of 3 segments) between U.S. 42 and Kings Mill Road
- SR 741 (1 of 3 segments) between SR 63 and Greentree Road
- SR 741 (1 of 3 segments) between SR 63 and U.S. 42
- SR 48 between U.S. 22 and Mason-Morrow-Millgrove Road (includes widening the bridge)
- U.S. 22 between Columbia Road and SR 48 (includes widening the bridge)

- Columbia Road between Kings Mill Road and Mason-Morrow–Millgrove Road
- Glosser Road (extension north to SR 123 and south to Fujitec Drive)
- Bunnel Road (extension east to McKinley Boulevard)

VI. Recommended Improvements and Prioritization

The projects and prioritization recommended in the Southwest Warren County Transportation Study provide a basis for public agencies to improve transportation to address existing problems and meet future needs. The improvements are recommended for serving transportation needs of the entire study area over the next 25 years. The recommended projects can be incorporated into the Metropolitan Transportation Plan prepared and updated by OKI to qualify them for federal funding. As projects move toward implementation, they will be further refined and there will be additional opportunities for public input.

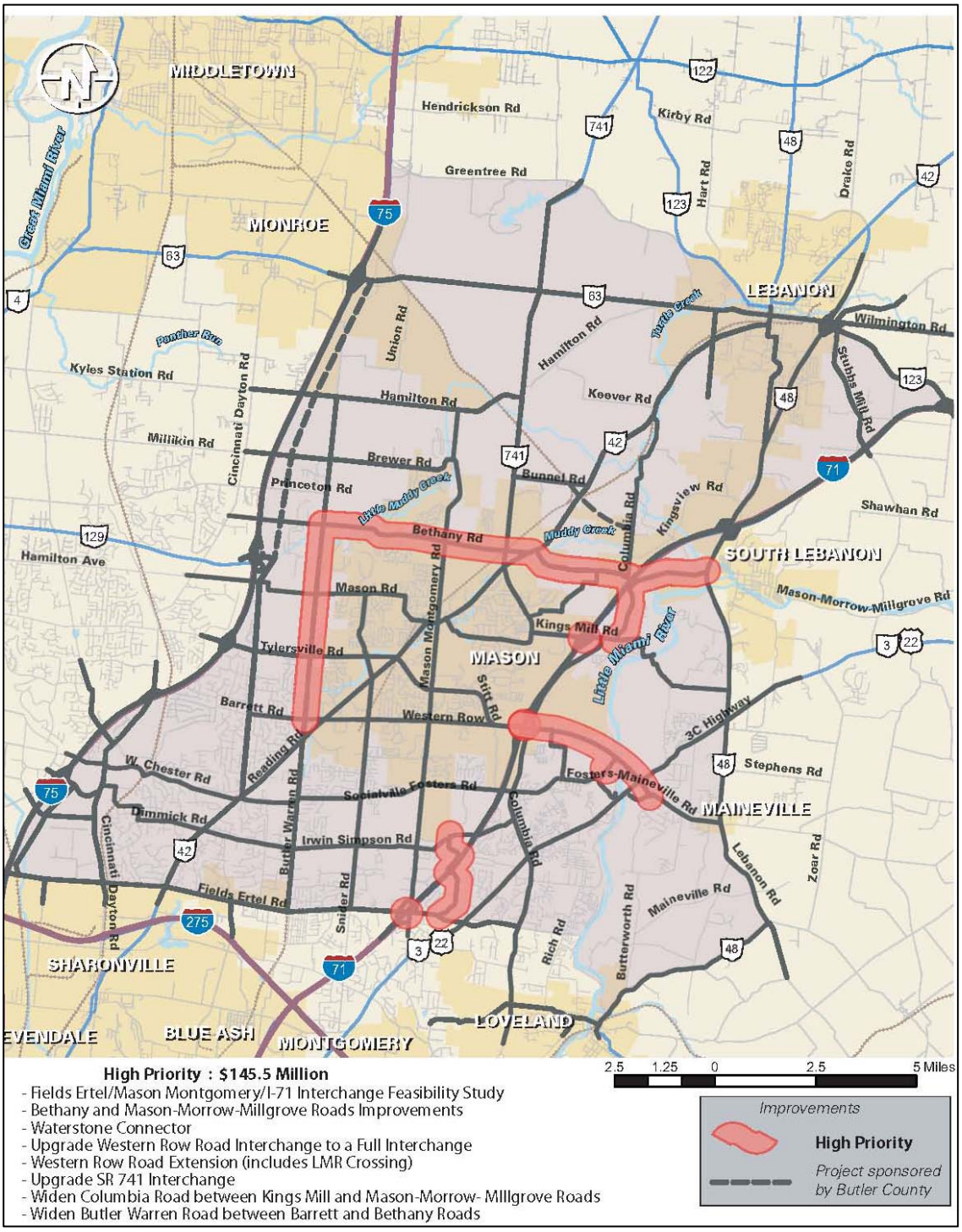
The recommended projects, along with priority and cost, are shown on the following table. The locations of the high, medium, and low priority projects are illustrated on the following maps.

Recommended Prioritization and Cost Estimates

HIGH PRIORITY	COST[a]
Feasibility Study for I-71 interchange at Fields Ertel and Mason Montgomery Roads to identify a comprehensive solution	$400,000[b]
Bethany Road – Widen and connect Bethany and Mason-Morrow-Millgrove Roads between Butler Warren Road and SR 48 (3-lane facility with right of way for 5 lanes)	$27,600,000
Waterstone Connector – Extend Waterstone Drive across I-71 to connect with Duke Drive	$5,000,000
Full interchange at Western Row Road	$21,000,000
Western Row Road Extension (includes LMR crossing) – Extend Western Row Road southeast and across the Little Miami River to connect with Fosters Maineville Road (6-lane facility)	$43,000,000[c]
Improvement to I-71 interchange at SR 741/Kings Mill Road	**$30,000,000**
Columbia Road – Widen one lane in each direction between Kings Mill and Mason-Morrow-Millgrove Roads	$4,300,000
Butler Warren Road – Widen one lane in each direction between Barrett and Bethany Roads	$14,200,000
Subtotal	**$145,500,000**
MEDIUM PRIORITY	
US 22 – Widen one lane in each direction between Columbia Road and SR 48 (includes bridge)	$43,900,000
Mason Montgomery Road – Widen one lane in each direction between Fields Ertel and Western Row Roads	$7,200,000
SR 63 – Widen one lane in each direction between I-75 and SR 741	$12,600,000
SR 48 – Widen one lane in each direction between US 22 and Mason-Morrow-Millgrove Road (includes bridge)	$25,600,000
SR 741 – Widen one lane in each direction between US 42 and Kings Mill Road	$6,400,000
SR 741 – Relocate and widen between SR 63 and Greentree Road	$9,200,000
Bikeway Facilities	$2,900,000
Subtotal	**$107,800,000**
LOW PRIORITY	
Snider Road – Widen one lane in each direction between Fields Ertel and Tylersville Roads	$19,200,000
Glosser and Bunnel Road Improvements – Add one lane only. Extend Glosser north to SR 123 and south to Fujitec Drive and Bunnel to McKinley Road	$19,100,000
SR 741 – Widen one lane in each direction between SR 63 and US 42	$12,800,000
Bus Circulator System (Capital Costs)	$1,250,000[d]
Subtotal	**$52,350,000**
GRAND TOTAL FOR ALL IMPROVEMENTS	**$305,650,000**

[a] Estimates do not include cost for right-of-way, utilities, engineering, or administration.
[b] The rough cost of reconstructing the interchange is $150 million. Due to the high cost, a feasibility study is recommended to identify a comprehensive solution that might be less expensive.
[c] This cost has been previously shown as $30,500,000 for a six lane facility. The cost has been updated to include additional information.
[d] Annual operating costs estimated at $1.05 million, part of which would be covered by farebox revenues (estimated $.48 million) and part of which would be subsidized (estimated $.57 million annual subsidy).

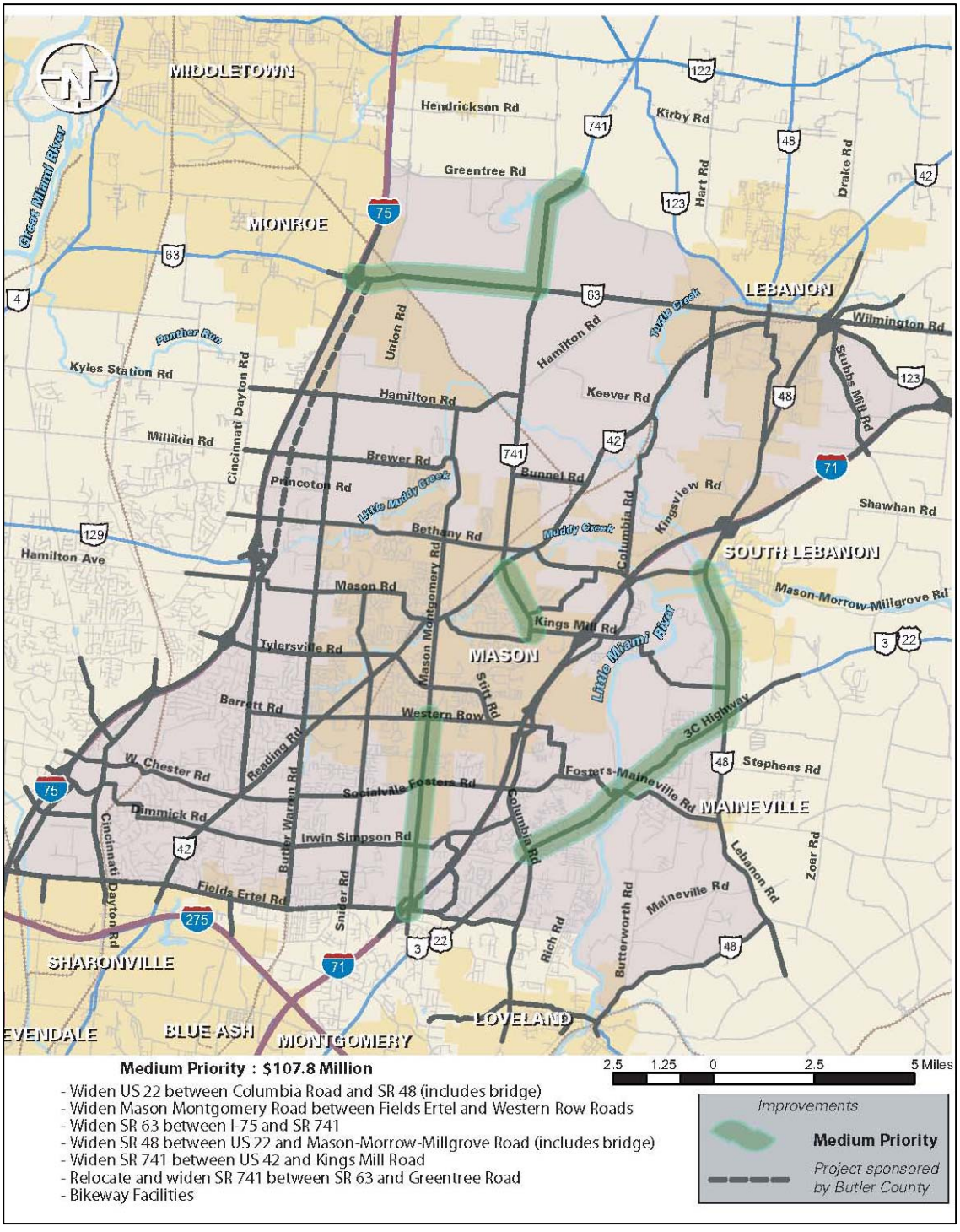
High Priority Projects



High Priority : $145.5 Million

- Fields Ertel/Mason Montgomery/I-71 Interchange Feasibility Study
- Bethany and Mason-Morrow-Millgrove Roads Improvements
- Waterstone Connector
- Upgrade Western Row Road Interchange to a Full Interchange
- Western Row Road Extension (includes LMR Crossing)
- Upgrade SR 741 Interchange
- Widen Columbia Road between Kings Mill and Mason-Morrow- Millgrove Roads
- Widen Butler Warren Road between Barrett and Bethany Roads

Medium Priority Projects



Low Priority Projects

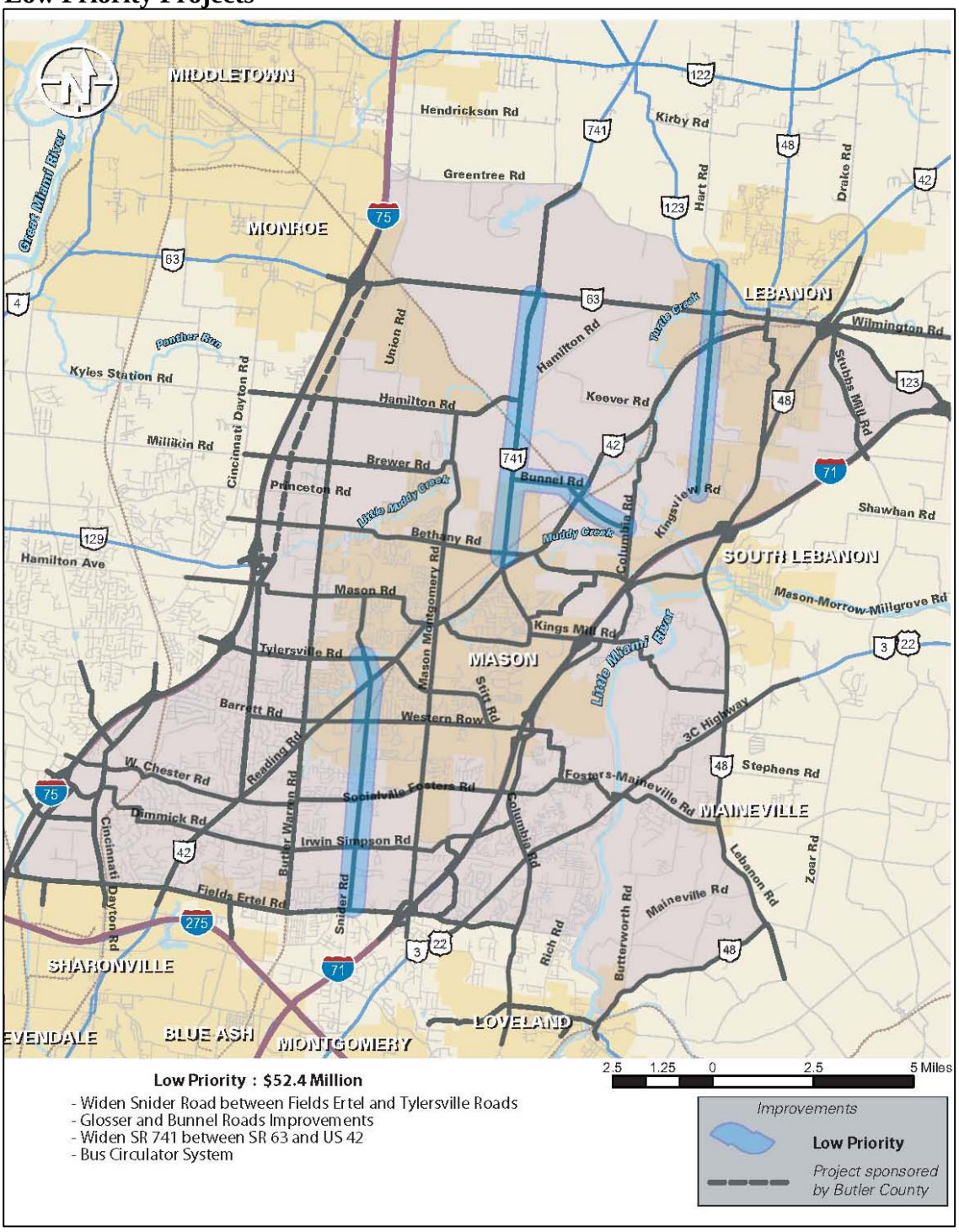


TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

CHAPTER 1 INTRODUCTION

A. Project History

The Southwest Warren County Transportation Study was initiated by local elected officials concerned about the area's burgeoning development and its impact on the transportation facilities in the study area. Figure 1 displays the area studied for this project.

During the past 10 to 15 years, the issue of growth and its attendant impacts had increasingly become a concern of the area's residents and elected officials. Recognizing this, Warren County Commissioners enlisted several elected officials in the county in an effort to secure commitments and funding for a regional transportation study to address concerns and problems in the area's transportation system. Warren County leadership then worked with the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) to move this effort forward.

Generally, land use in the study area is characterized by denser, more developed areas in the southern part and less dense to rural areas in the northern part. Most of the development in the study area is comprised of single-family houses. Employment centers in the Mason area include the Procter & Gamble complex, Kings Island and many local companies. With the exception of I-71 and I-75, the major roads in the study area were developed to connect farming centers. In the 1950s and 1960s, I-71 and I-75 were constructed through the area as part of the Interstate Highway System. Within southwest Ohio, I-71 connects Cincinnati with Columbus and I-75 connects Cincinnati with Dayton. However, these interstate highways have evolved to be major national north-south transportation facilities for passenger cars and freight carriers. As the area became increasingly suburbanized, some rural roads were widened and straightened in response to the increasing traffic. A few new roads with greater traffic capacity were also developed, such as Kings Island Drive, the Tylersville Road connection, the SR 48 bypasses of Lebanon and South Lebanon and the extension of SR 741 south of U.S. 42.

Various transportation planning efforts have been conducted in recent years within (or adjacent to) the study area. The Butler County Transportation Improvement District has completed a Major Investment Study (MIS) and an Interchange Modification Study (IMS) for the Liberty Interchange. The project would modify the I-75/SR 129 interchange by connecting it to Hamilton Road and extending Cox Road to the north. In 2000, the Miami Valley Regional Planning Commission (MVRPC) and the OKI undertook a major planning effort known as the North South Transportation Initiative. The Initiative was a comprehensive evaluation of the transportation needs along the I-75 corridor from northern Kentucky to the Miami County, Ohio line. In 1998, OKI completed the Final Report on the I-71 Corridor Transportation Study. That study investigated the mass transit alternatives along the I-71 Corridor from Kings Mills in Warren County to Florence, Kentucky and the

Cincinnati Northern Kentucky International Airport in Kentucky. Light rail transit was ultimately selected as the preferred alternative for this corridor.

A SR 63 Corridor Study was conducted to study the possible establishment of an east-west transportation corridor across northern Butler County. That study began at the I-75/SR 63 interchange and ran west past the city of Trenton to the city of Oxford. In 2002, a Lebanon Truck Origin & Destination (O&D) Study was completed by the Warren County Engineer's Office in cooperation with the city of Lebanon. The purpose of the O&D study was to determine the traffic characteristics of trucks on state and U.S. routes within the city of Lebanon. Also, a recent study was conducted by LJB to study feasible alternative improvements at the Fields Ertel Road/Mason Montgomery Road interchange with I-71. The study identified significant problems at the interchange, which frequently caused system breakdowns on both Fields Ertel Road and Mason Montgomery Road. Further details of these studies can be found in the Existing and Future Conditions Report (Appendix B).

B. Purpose of Study

The Southwest Warren County Transportation Study addresses a sub-regional area within the OKI region, and does not concentrate on a particular corridor or given transportation problem. Instead, it addresses a 100 square mile area with numerous problems and a multitude of solutions. Therefore, the purpose of this study was not to solely identify and solve a particular problem, but was to establish a mechanism for which the multitude of problems within the study area could be addressed. To this end the project purpose was developed for three areas:

- Identify and evaluate existing and future transportation problems.
- Identify, develop and evaluate potential conceptual improvement strategies that address existing and future transportation needs.
- Provide a mechanism for prioritization of identified problems and solutions, capable of affording a consensus by local and regional stakeholders as to the best allocation of limited resources in meeting the transportation needs of the study area and the OKI region.

The goal of the Study is to create a transportation plan that strives to achieve balance in meeting transportation, environmental and quality-of-life goals. The plan was developed using various outreach techniques for the public and stakeholders as outlined in the Ohio Department of Transportation's (ODOT) Project Development Process (PDP). An overriding goal is to produce a plan that will improve regional mobility of people and goods that can be locally supported to facilitate implementation.

Within the PDP process there are several key documents that get produced along the way. The Existing and Future Conditions Report documents the current conditions of the area as well as the 2030 conditions and was finalized in June 2005. Existing and Future Conditions reports detail information pertaining to the travel patterns, traffic counts, congestion, system capacity analysis, geometrics analysis, physical conditions of the roadways, etc. This study's Existing and Future Conditions Report is included as Appendix B. The task force decided in July 2005 to allow the expansion of the study area to the north. A description of this expansion follows in the next section. An addendum to the Existing and Future Conditions Report for this expanded study area can be found in Appendix C.

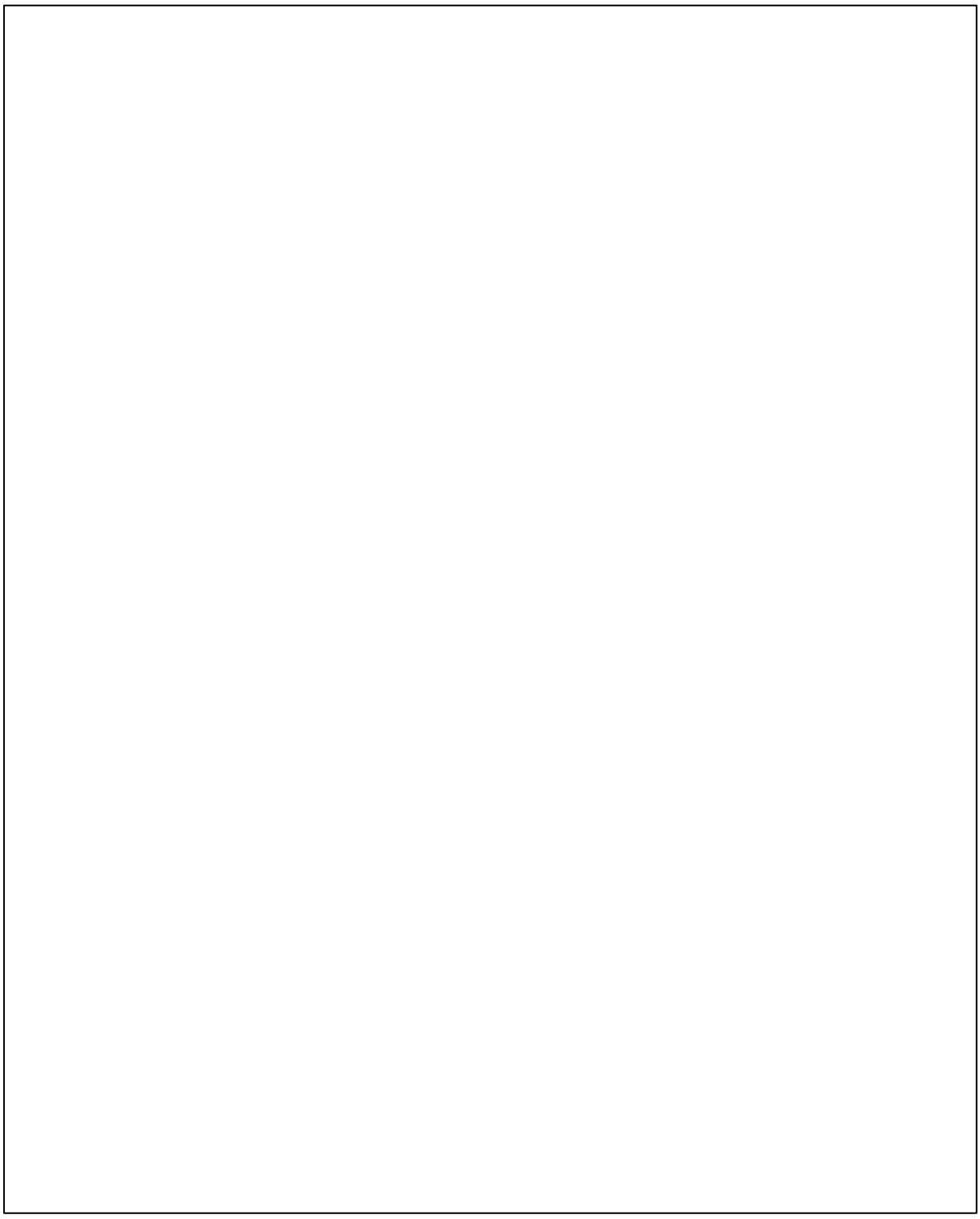
Another key document included in the study is the Purpose and Need. It is intended to qualitatively and quantitatively define any transportations problems that would create a need for a project. According to the ODOT PDP process Step 2 for Major Projects, it "is the catalyst for identifying and analyzing reasonable alternative solutions and strategies". This document is included in Appendix E.

C. Study Area

The study area is located in southwest Warren County and southeast Butler County. It was bounded originally on the north by SR 63 and SR 123, on the east by I-71 and SR 48, on the south by the southern Warren and Butler County lines, and on the west by I-75 (Figure 1). As the study progressed, additional development was being planned for the area between SR 63 and Greentree Road that could have significant impact to those facilities and to SR 741. The study area was thus expanded to include the area bounded by I-75 on the west; Greentree Road and SR 123 to West Street as the north and east boundaries; and SR 63 on the south.

The study area included a portion of Butler County to help assess the impacts of traffic growth and east-west movement across the area. Recommendations were not provided for Butler County because the study was focused in Warren County.

Figure 1 – Southwest Warren County Transportation Study Area



D. Task Force

The Southwest Warren County Transportation Study Task Force is comprised of 23 members. The members included business leaders; environmental organizations; city, township, and county officials/leaders; and state and federal transportation officials. Mr. Larry Crisenbery, a Warren County Commissioner, originally chaired the task force. After Mr. Crisenbery's retirement, the task force was chaired by Mr. Robert Price, Warren County Administrator. The current chair of the task force is Mr. David Young, Warren County Commissioner, who took over in April 2005 after the retirement of Mr. Price. The Task Force provided oversight during the study process, which included review of input from the public involvement process.

The following are the members of the task force charged with representing stakeholders' interests in southwestern Warren County.

Current Members

Mr. David Young	Warren County Commissioner (Chair)
Mr. Jim Ashworth	American Financial Group
Mr. Jerry Ballard	Ohio Department of Natural Resources
Mr. Bob Buffenbarger	Residents Association of West Central Warren County
Mr. Patrick Clements	City of Lebanon
Mr. Robert Craig	Warren County Regional Planning Commission
Mr. Quentin Graves	Procter & Gamble
Mr. Greg Horwedel	Deerfield Township
Mr. Dan Jones	Turtlecreek Township
Mr. Brad Knapp	Warren County Board of Realtors
Ms. Sharon Lawhorn	Union Township
Ms. Diana Martin	ODOT, District 8
Ms. Christine Matacic	Liberty Township
Mr. John McCurley	City of Mason
Mr. David McElroy	Warren County Soil and Water Conservation District
Mr. Don Miller	Paramount's Kings Island
Mr. Eric Partee	Little Miami Incorporated
Mr. Marc Throckmorton	Cintas
Ms. Jackie Terwilleger	Hamilton Township
Mr. Neil Tunison	Warren County Engineer
Mr. Mark VonderEmbse	Federal Highway Administration
Mr. Greg Wilkens	Butler County Engineer
Mr. Steve Wulff	Amos Project

CHAPTER 2
PUBLIC INVOLVEMENT

CHAPTER 2 PUBLIC INVOLVEMENT

A. Overview

The Southwest Warren County Transportation Study public involvement and communication activities were tailored to reach defined target audiences. Those audiences include citizens, businesses, elected officials and media in and around the study area. The study area includes all or parts of the cities of Lebanon, Mason and Monroe; Deerfield, Union, Hamilton and Turtlecreek townships; and the villages of South Lebanon and Maineville.

The Public Involvement/Information Plan (PI/IP) was initiated in January of 2004. It was developed to encourage dialogue among citizens, elected officials and the Task Force throughout the duration of the study. The tactics focused on communicating the purpose and need of the study, proactively disseminating information developed during the course of the study, and enhancing a productive exchange of ideas and opinions.

The PI/IP goals included:

- Ensure that the public understands the purpose and vision of the study.
- Provide the public and other stakeholders with an opportunity to voice issues and concerns and take ownership in the study process.
- Partner with the media to provide accurate information as it relates to alternatives, public involvement and other important key aspects.

The document for the PI/IP process has been included in Appendix F (under separate cover) along with more detailed information that has been provided to the public.

B. Components of the PI/IP

Media Relations

Five press releases were prepared and disseminated to the media between May 2004 and July 2005. Additionally, ongoing media relations were conducted throughout the study which included phone and e-mail updates to media contacts as well as scheduling interviews, suggesting story ideas, and providing information and fact checking.

The following is a list of the press releases distributed:

- May 2004 – Rapid Growth Means More Headaches in Southwest Warren County
  - This press release announced the commencement of the project and invited the public to the first public meeting.
- August 2004 – Southwest Warren County Transportation Study Adds Hotline For Citizen Feedback
  - The August press release informed the public about the new hotline and how to get in touch with study participants using the hotline.
- May 2005 – Preliminary Recommendations for Warren County Traffic Problems
  - This press release announced the second public meetings and provided an overview of what would be presented.
- June 2005 – Bethany Road Public Forum
  - Announced the Bethany Public Forum location and date.
- July 2005 – Task Force Seeks Comments on Recommended Transportation Improvements
  - This press release announced the dates and location for the final public meetings. It also informed the public as to the contents of these meetings.

Public Meetings

Three rounds of public meetings were held to enable stakeholders and other interested people to review study information during critical milestones. Approximately 450 people attended the public meetings, with some attendees electing not to sign in. All of the chosen meeting locations were ADA accessible. The three rounds of meetings were each held over a two-day period with the same information being displayed both evenings. Displays were organized in an open-house style format allowing people the opportunity to review the information and talk with members of the study team stationed at each display.

- The first round of public meetings took place in May 2004. Citizens were asked to provide input about the traffic problems in southwest Warren County. A survey was developed and distributed to identify what areas in southwest Warren County were considered problematic due to congestion, access, traffic or other associated factors. Following the meetings, the survey was posted to the study web site so that people could download the file and submit their comments.

Thirty-six people attended the two meetings held at the following locations:

- Tuesday, May 25, 2004
  5 – 7:30 p.m.
  Warren County One-Stop
  Business Employment Center
  (Old Warren County Courthouse)
  300 East Silver Street
  Lebanon, OH

- Wednesday, May 26, 2004
  5 – 7:30 p.m.
  Mason Heights Elementary School
  200 Northcrest Drive
  Mason, OH

- The second round of public meetings was held in early May, 2005. At this forum, preliminary and secondary improvements were shown and the public was asked to provide comments. The survey for this round of meetings focused on the improvements and asked respondents to check a box marked support, does not support or no opinion. The back of the survey also provided space for additional comments. Following the meetings, the survey was posted to the web site.

A total of approximately 250 people attended the two meetings held at the following location:

- Tuesday, May 3, 2005 & Wednesday, May 4, 2005
  5 – 7:30 p.m.
  Warren County Administration Building
  Commissioners' Meeting Room 128
  406 Justice Drive
  Lebanon, OH

- The third and final round of public meetings was held July 25 and July 26, 2005, at the Warren County Administration Building. The purpose of the meetings was to present the prioritized list of recommendations approved at the June 24, 2005 Task Force meeting. The public was invited to view and provide feedback on the prioritized projects. Over the course of two evenings, 167 people attended between 5:00 p.m. – 7:30 p.m. to voice their opinions and seek additional information about the transportation recommendations.

Attendees signed in and received a handout summarizing the prioritized list of recommendations along with a study area map showing the locations of recommended improvements and a survey to provide feedback. Displays and maps detailing the recommended prioritizations were set up with members of OKI, ODOT, and members of the project team on hand to answer questions. The displays and maps were arranged in an open house format with duplicate displays, so attendees could walk around the room, view the information and ask questions at their own pace. This also assisted in helping to prevent crowding around any one specific display. Tables and chairs were provided in the center of the room for attendees to sit and fill out their feedback forms. The survey form asked attendees if they agreed or disagreed with the recommendations, or had no opinion.

Special Public Forums

The May 2005 public meetings resulted in two additional public forums to specifically discuss two of the transportation improvements, the proposed Bethany Road widening and the Lebanon Bypass. There were 105 attendees at the special meeting regarding the proposed Bethany Road widening and 100 attendees at the Lebanon Bypass meeting.

Both meetings were held at 7 p.m. at the Warren County Administration Building on the following days:

- Bethany Road Forum - Tuesday, June 7, 2005
- Lebanon Bypass Forum – Tuesday, June 21, 2005

Web Site

The study web site, **www.plan4swwarrenco.com** was launched prior to the first round of public meetings in May 2004. The site was developed to serve as a central source of information about the study.

The site was updated regularly and featured all of the maps and visuals from the public meetings. This was a key feature of the site because it enables those who attended the public meetings to refer back to the site at their leisure if they needed additional information. The site also featured a comments section, which encouraged visitors to submit a question or general comment. Those inquiries were submitted to the public involvement manager, who then routed the communication to the study team for follow-up. Another highlight of the site was the ability for visitors to sign-up to receive e-mail updates. More than 400 people registered and received meeting notices via e-mail. Other pages on the site include:

- Frequently Asked Questions
- Study Fact Sheet
- Study Overview
- Task Force member list
- Meeting dates

- Public meeting exhibits
- Task Force meeting minutes
- Study documents
- Press releases
- Recent articles

From the site's debut in early 2004 through September 2005 the web site recorded nearly 237,000 "hits."

Individual Response

Individual questions and comments submitted via the website and also by e-mail and telephone calls to members of the study team received individual responses from the study team.

Community Cable Access

Dory Montazemi, deputy director of OKI and project manager, and David Young, Warren County Commissioner and task force chairman, appeared on Community Report, a community affairs program on the Intercommunity Cable Regulatory Commission (ICRC). The interview was taped May 23, 2005 and provided study representatives the opportunity to discuss the study and also announce upcoming meetings.

The program aired on cablecast at the following times:

- Monday, June 20, 8 p.m.
- Tuesday, June 21, 10:30 a.m.
- Wednesday, June 22, 6 p.m.
- Thursday, June 23, 9:30 a.m.
- Saturday, June 25, 6 p.m.
- Sunday, June 26, 3 p.m.

Stakeholder Relations

On September 28, 2004 two members of the study team attended a meeting of the Residents Association of West Central Warren County. The meeting was held in Turtle Creek Township at 7:30 p.m., with 20 people in attendance.

The study team presented information about the Southwest Warren County Transportation Study, an overview of the study process, and the work done to date. The study team responded to questions and discussed transportation issues. This presentation occurred as a result of an invitation from the Resident's Association.

Media Monitoring and Coverage

Media coverage was monitored regularly through 2004 and 2005. Media coverage increased in April 2005 in anticipation of the May 2005 public meetings. Total media coverage included 50 placements (newspaper articles, broadcasts, and internet).

CHAPTER 3
GROWTH TRENDS

CHAPTER 3 GROWTH TRENDS

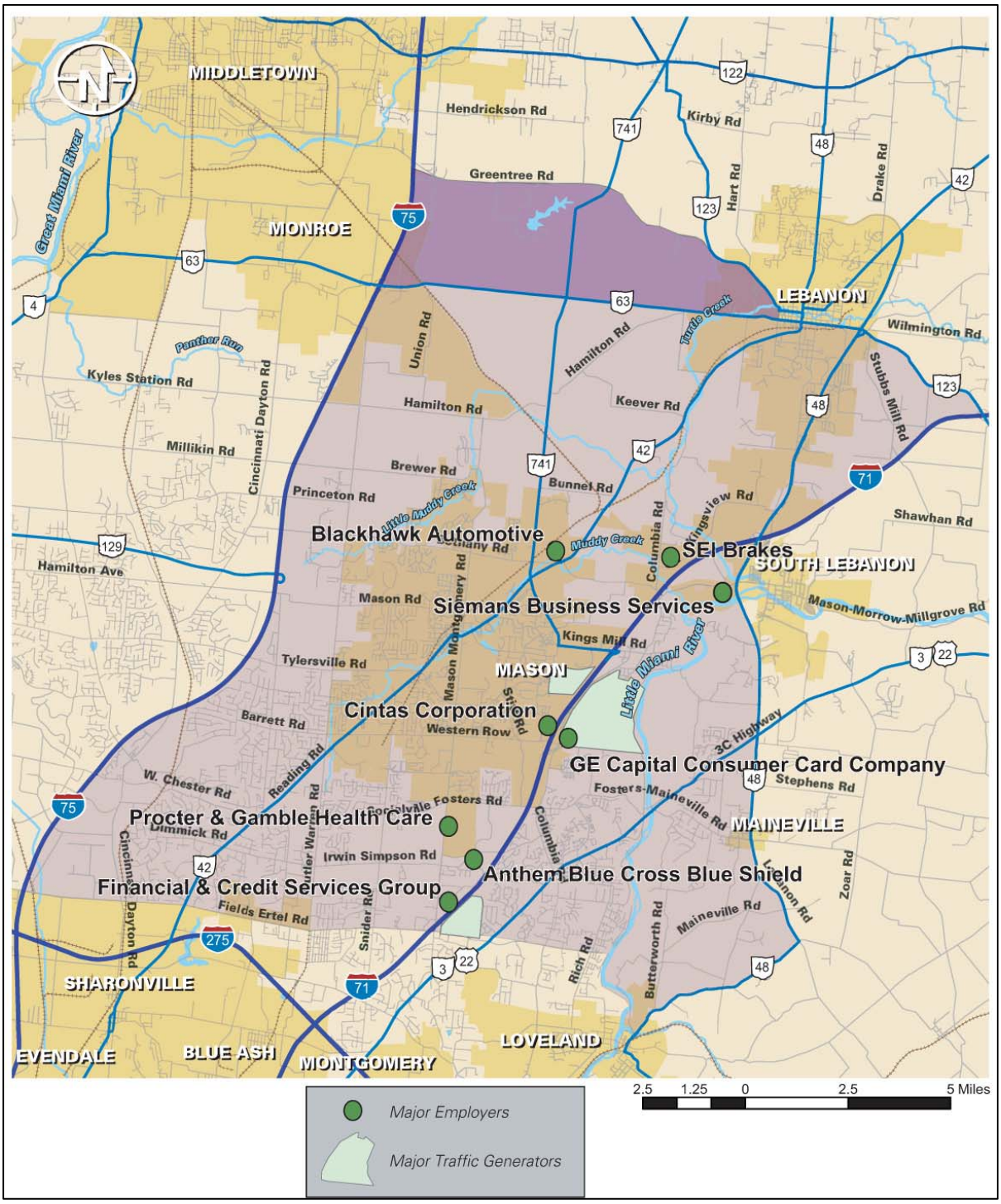
In April 2004, Warren County was ranked 52nd in the U.S. Census' listing of the one hundred fastest growing counties in the United States from April 1, 2000 to July 1, 2003. Using the OKI Travel Demand Model (TDM) for the year 2000, which incorporates census data, the study area (approximately one-fourth of the land area of the county) contained more than 53 percent of the county's 158,000 residents. The growth trends for the county and study area are expected to continue throughout the study's planning horizon year of 2030.

Because of its location between two interstate highways and two major metropolitan areas, Warren County is experiencing rapid business growth in addition to the population growth. Much of this growth has occurred in the study area, where proximity to both 1-75 and 1-71 and the density of housing development have resulted in a concentration of the county's commercial, industrial and retail activities. For instance, all of the major employers in Warren County (defined for this study as firms with 500 or more employees) are located in the study area, primarily along the I-71 corridor. These employers are listed in Table 1. Their locations are shown in Figure 2.

Table 1 – Major Employers (>500 Employees)

Company Name	Total Employees
Financial & Credit Services Corp.	2,417
Procter & Gamble Health Care Research Center	2,400
G.E. Capital Consumer Card Company	1,865
Cintas Corporation	1,800
Anthem Blue Cross & Blue Shield	1,300
Blackhawk Automotive Plastics, Inc.	733
Siemens Business Services, Inc.	500
SEI Brakes, Inc.	500

Figure 2 – Major Employer Locations



Warren County in general, and the study area in particular, are experiencing rapid population and economic growth. As a result, agricultural lands are being transformed into housing subdivisions, “big box” retail, office parks, and commercial and industrial parks. While the existing land use for the project area shows that agricultural use is still prevalent in the northern section of the project area, with residential, commercial and institutional use dominating the remainder, the recent development trends in the county and the study area are expected to continue. This expectation is supported by the existing zoning for the project area, which shows that little of the area is zoned for agricultural use. Instead, the zoning is primarily residential, with a fair amount of land zoned for commercial and industrial uses.

OKI collects and maintains historical, current, and estimated future socio-economic data for the OKI region which consists of Hamilton, Clermont, Warren, and Butler counties in Ohio, Boone, Kenton, and Campbell counties in Kentucky, and Dearborn county in Indiana. Between 1980 and 2000 the population growth of the OKI region was approximately 14 percent. Warren County where most of the study area is located, reported a growth of approximately 60 percent during the same time period. Between 2004 and 2030 the study area is expected to continue this rapid growth in the number of households, population and number of jobs with a forecasted population growth of 64 percent between 2004 and 2030. The number of households and the population in the study area are expected to grow approximately three times as fast as the OKI region as a whole, with the number of jobs in the study area growing twice as fast. The following table provides data for 2004 and the 2030 planning horizon.

Table 2 – Growth Statistics

	Study Area			OKI Region		
	2004	**2030**	**Growth**	**2004**	**2030**	**Growth**
Households (HH)	35,000	59,000	69%	763,000	928,000	22%
Population	96,000	157,000	64%	1,899,000	2,273,000	20%
Workers	52,000	87,000	67%	984,000	1,199,000	22%
Employment	58,000	81,000	40%	1,039,000	1,211,000	20%
Persons/HH	2.74	2.66	-3%	2.49	2.41	-3%
Workers/HH	1.49	1.47	-1%	1.29	1.29	0%
Jobs/Person	0.60	0.52	-13%	0.55	0.56	2%

The implication of the study area growth is that the roadway network must not only serve pass through trips but also a significant increase in traffic to other parts of the area.

CHAPTER 4
PURPOSE & NEED

CHAPTER 4 PURPOSE & NEED

This section summarizes the salient aspects of the Purpose and Need document. It is intended to qualitatively and quantitatively define the project's purpose and need. This statement was developed as part of the ODOT Project Development Process and can be found in its entirety in Appendix E.

A. Study Goals

Based upon the early public involvement activities and through consensus of the Task Force members, three primary goals were established for the study. These include

1. Improve mobility for people and goods
2. Protect the environment and quality of life
3. Improve travel safety

Multiple objectives supporting each of the three primary goals were then developed for the study. All study goals and objectives for the Southwest Warren County study area are summarized below.

Improve Mobility for People and Goods

1. Accommodate the growth of traffic
2. Improve traffic movement through the study area
3. Move truck traffic more efficiently
4. Improve the operating efficiency of existing roadways
5. Protect capacity through access management
6. Identify alternatives for expanding transit

Protect the Environment and Quality of Life

1. Improve transportation consistent with county and local land use plans
2. Protect the Little Miami River's values as a designated scenic river
3. Enhance opportunities for walking and biking as alternatives to driving

Improve Travel Safety

1. Reduce conflicts between modes of transportation
2. Improve the safety of intersections and roadways that have a high incidence of accidents or problematic design
3. Reduce deficiencies of rural roadways that carry greater traffic volumes than their designed capacity

B. Need for Transportation Improvements

Once the goals and objectives for the study area were established, the project purpose was developed to provide direction for the study throughout the remaining steps of the Ohio Department of Transportation's (ODOT) Project Development Process (PDP). As stated previously, the Southwest Warren County Transportation Study addresses a sub-regional area within the OKI region, and does not concentrate on a particular corridor or given transportation problem. Instead it addresses an approximate 100 square-mile area with numerous problems and a potential multitude of solutions.

Population Growth Trends

The study area has experienced rapid growth in recent years due to expansion of suburbanization from the Cincinnati suburbs. Warren County is ranked as the second fastest growing county in Ohio (Delaware County in suburban Columbus is ranked first). This once rural county had a population of 38,000 in 1950. The 2000 U.S. Census identified Warren County as having a population of 158,000. Census estimates released in April 2004, indicate that the Warren County population has increased 14.7 percent in the last three years to a total of 181,000 in 2003. The study area had a population of 84,000 in 2000 (96,000 based on 2004 estimates) and is expected to have a population of 154,000 by 2030 (based on OKI travel demand model projections).

Warren County grew in population by 60 percent between 1980 and 2000. This is in contrast to the growth in the OKI area of 14 percent for the same period. The study area will experience significant growth in the number of households, population, number of workers, and number of jobs compared with the rest of the OKI region, based on OKI 2004 – 2030 forecasts. A transportation study is needed to support the traveling requirements of this area's growing population.

Traffic Capacity-Mobility Problems

During recent years traffic volumes in the area have increased dramatically and are outpacing the development of new transportation facilities meant to accommodate the demand. For instance, the area between the Little Miami River and SR 48 has seen a surge in subdivision development in recent years. These motorists desire to travel on U.S. 22/SR 3 and I-71 for regional access to employment. Traffic from those subdivisions frequently must travel on substandard roadways that are in topographically rolling areas where the roads follow their historic alignment. Traffic on Maineville Road and the Old 3C Highway trying to cross the Little Miami River on U.S. 22/SR 3 experiences lengthy rush hour back-ups.

Historically, rapid development has occurred without ensuring that roadways and access control are in place before land was developed. Although systems are in place for land developers to dedicate right-of-way and improve roadways in proximity to a new development, this approach provides a patchwork of upgrades and does not provide system-

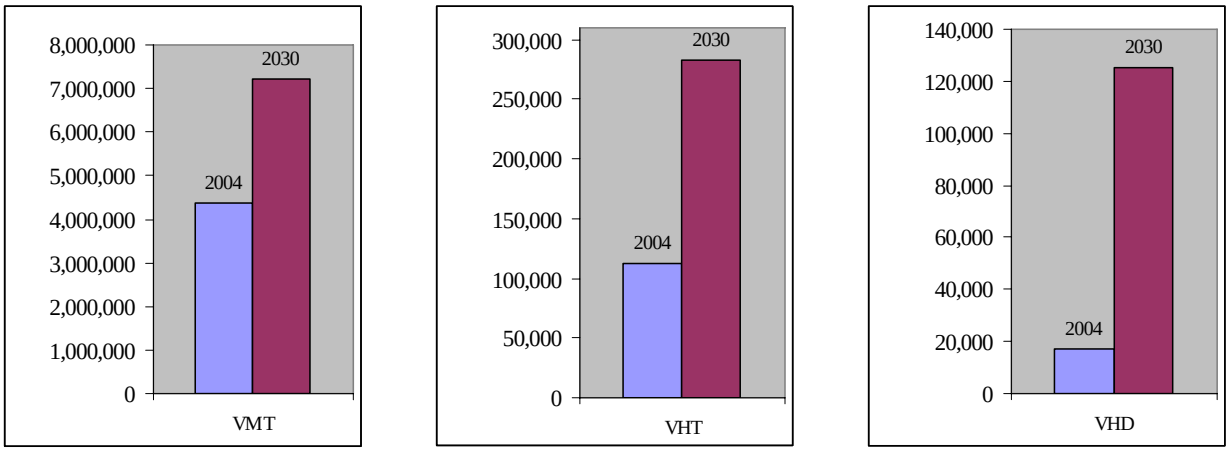
wide continuity of improvements. Additionally, the quantity of traffic generated by the land development growth is outpacing the ability to implement solutions to alleviate the traffic growth.

The Existing and Future Conditions Report (Appendix B) notes that trip lengths are expected to increase between 2004 and 2030. Table 3 shows that the Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Vehicle Hours of Delay (VHD) are expected to be substantially greater in 2030 in the study area compared with the OKI region for the existing and planned transportation infrastructure. Figure 3 provides this information graphically.

Table 3 – 2004 and 2030 VMT, VHT, and VHD for Study Area and OKI Region

	Study Area			OKI Region		
	2004	**2030**	**Growth**	**2004**	**2030**	**Growth**
VMT	4,358,000	7,201,000	+65%	49,843,000	67,342,000	+35%
VHT	113,000	283,000	+150%	1,331,000	2,190,000	+65%
VHD	17,000	125,000	+635%	120,000	566,000	+372%

Figure 3 – Study Area Growth



The Existing and Future Conditions Report also provides forecasted analyses of transportation growth in the study area between 2004 and 2030 (see Figures 4 and 5). All of the transportation system forecasts studied in the Existing and Future Conditions Report show increases (some dramatic) of traffic on roadways in the study area. The forecasts show that without improvements, future demands will not be met by the transportation infrastructure currently in place and planned. Considering the unmet existing needs, this means that the problems will only worsen.

Figure 4 – 2004 Average Daily Traffic

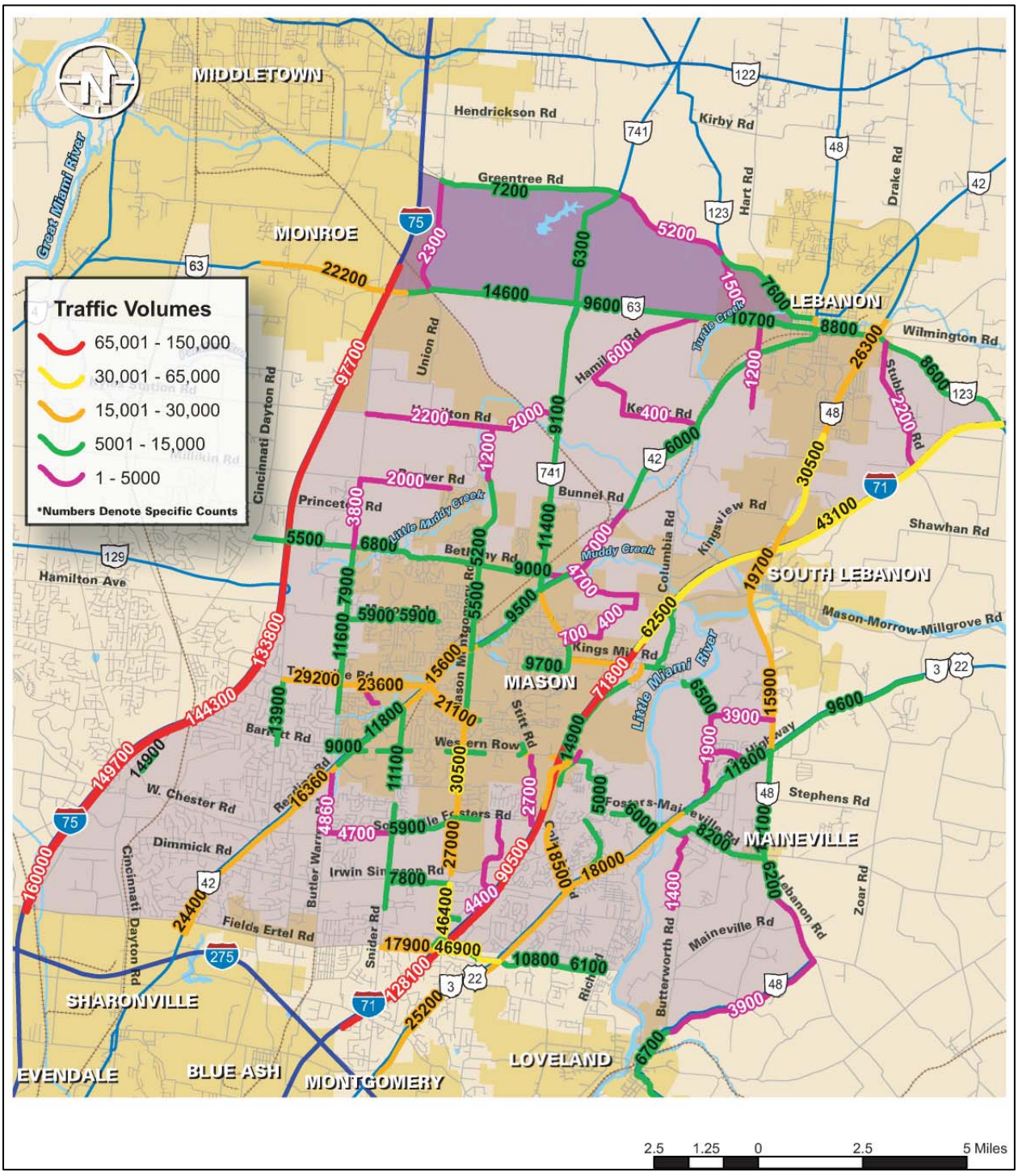
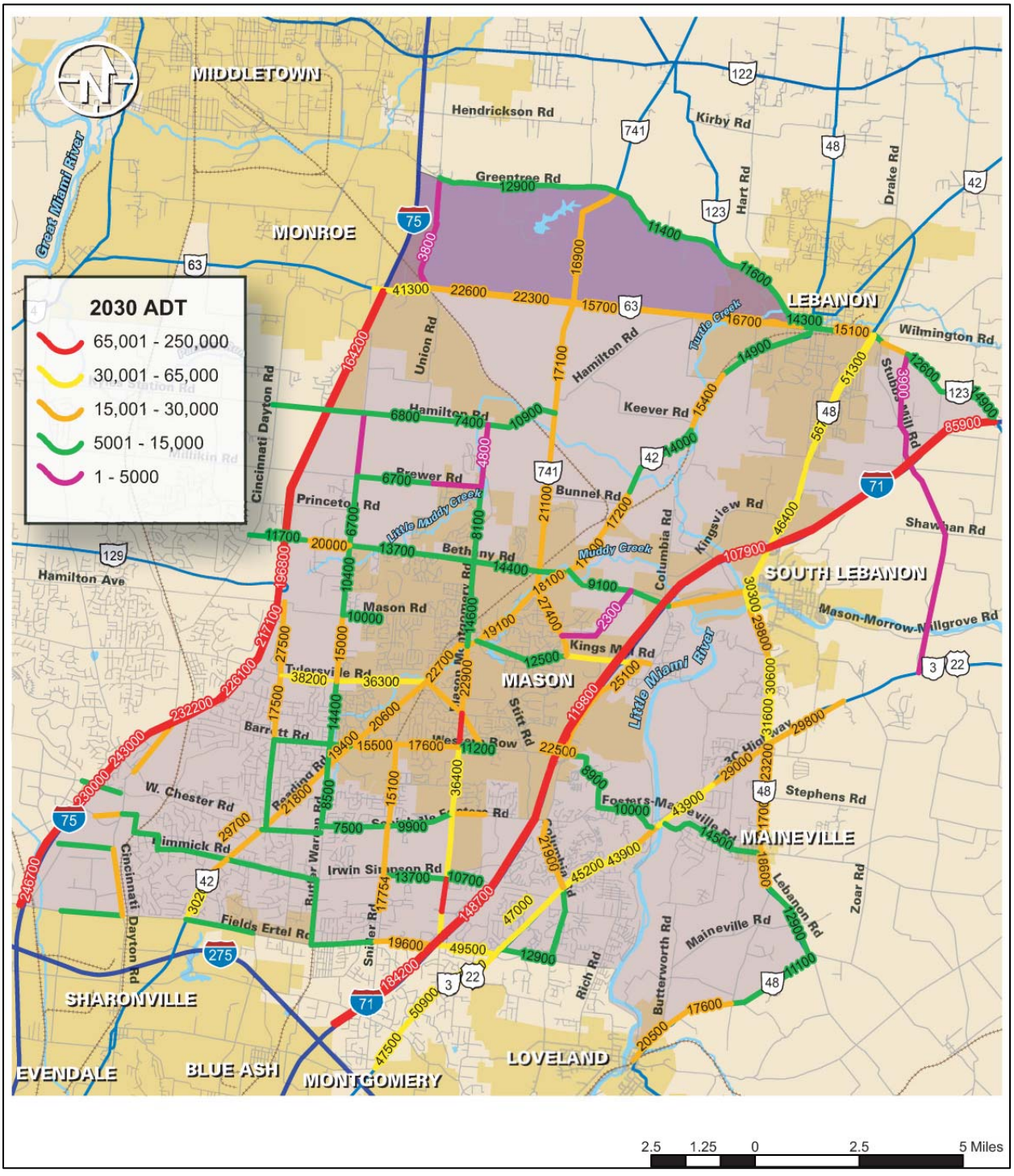


Figure 5 – 2030 Average Daily Traffic



It can also be noted that the study area VHD is projected to grow at a rate four times greater than the rate of VHT, which is twice the rate of VMT growth. Additionally, the study area growth rates for all three measures of travel are twice that of the OKI region. This suggests that congestion can be expected to grow dramatically between 2004 and 2030.

Based upon the forecasted traffic volumes it is estimated that in the year 2030 approximately two-thirds of the roadways within the study area will exceed their capacity based on existing conditions. The majority of those operating under capacity are expected to operate at Levels of Service (LOS) D or E, which are approaching capacity and would be expected to experience decreasing speeds and increasing delays and congestion. Figures 6 and 7 show the 2004 and 2030 LOS.

Many congested areas in the study area are also a direct result of a lack of connectivity within the transportation network. This lack of connectivity is apparent in the deficient access to, from and between Interstates 71 and 75. Along the 10-mile stretch of I-71, only four and a half interchanges are provided when accounting for the half interchange to the south at Western Row Road. On I-71 there is a five-mile stretch between Kings Mill Road and Fields Ertel Road with no access to/from the north. It is in between these two routes where the densest development within the study area is found. Furthermore, access between the interstates is limited with continuous access between I-71 and I-75 found only on Tylersville/Western Row Road and on SR 63/SR 123. Impairing this latter route is that the portion through the historic district in Lebanon cannot be widened beyond the existing three-lane section.

Roadway and Safety Deficiencies

While some transportation facilities have been upgraded to current standards, many roadways have changed little from when originally constructed. Many problem roadways in the study area have substandard lane and shoulder widths, and substandard horizontal and vertical alignments. This situation results in safety problems for the motoring public and reduces the capacity of the roadways to serve current traffic demand. The accident analysis prepared for the Existing Conditions Report indicates 30 percent of crashes in the study area are single vehicle crashes, including fixed object crashes and drivers running off the road. The high percentage of single vehicle accidents is indicative of the deficiencies on the rural roadway network in the study area. Roadway and intersection crash rates can be found in Figures 8 and 9.

Multi-Modal Usage

The dominant mode of transportation in the study area is by single operators in private vehicles. There are currently no commuter rail, subway or light rail transit systems in operation in the study area. OKI has completed a light rail study that would extend service from downtown Cincinnati to the city of Mason. However, implementation is dependent on funding which does not appear available in the near future.

Figure 6 – 2004 LOS

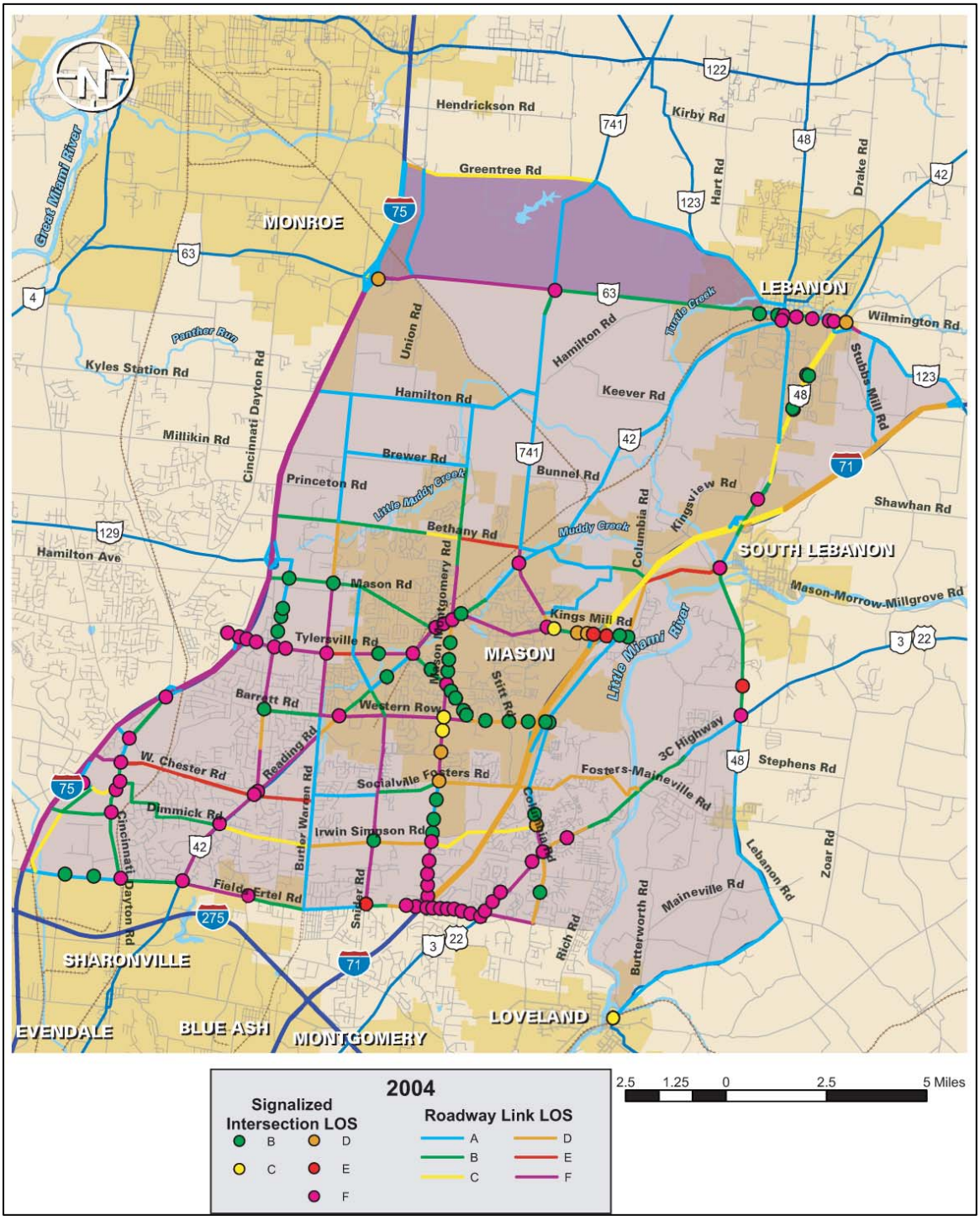


Figure 7 – 2030 LOS

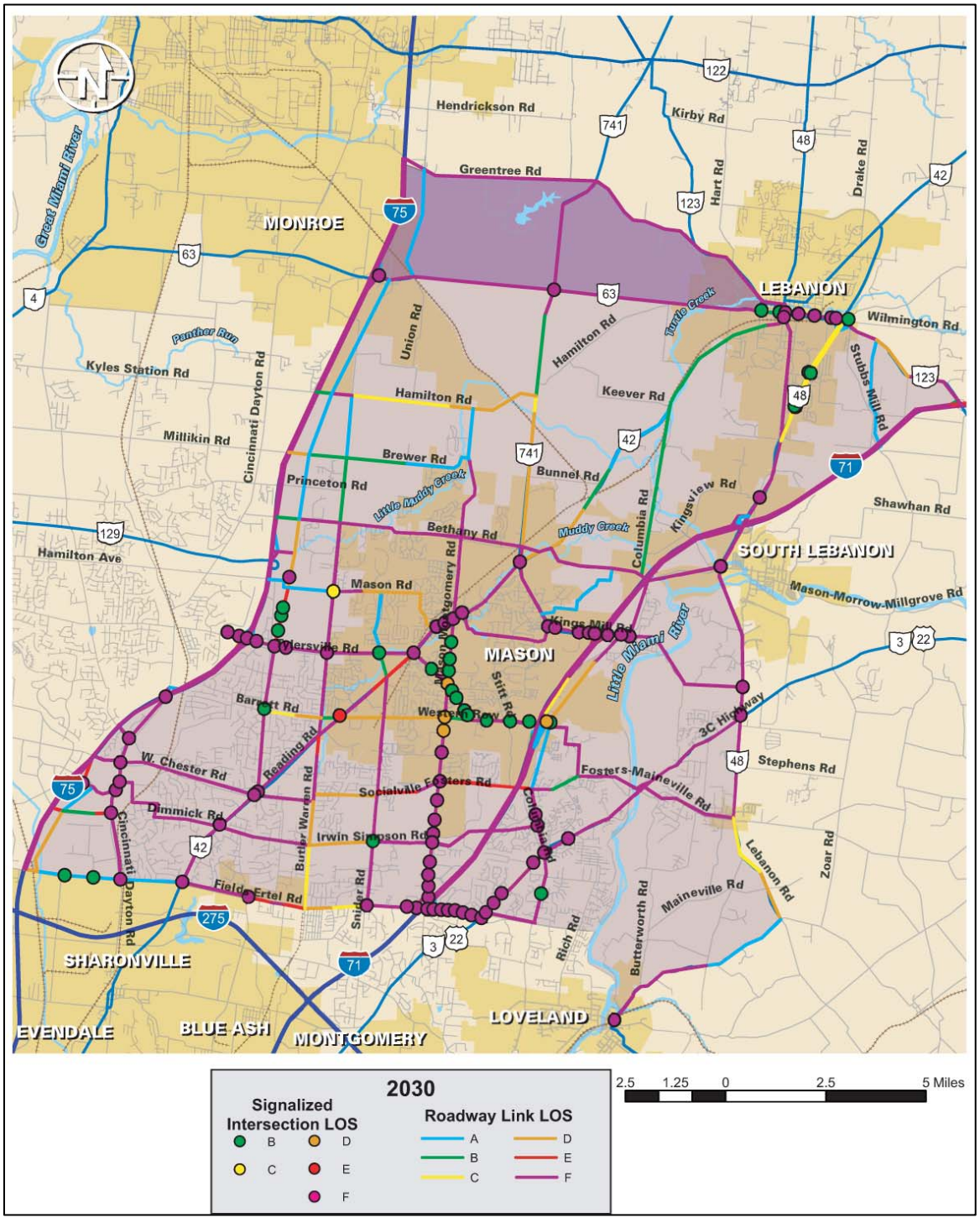


Figure 8 – 2004 Roadway Crash Rates

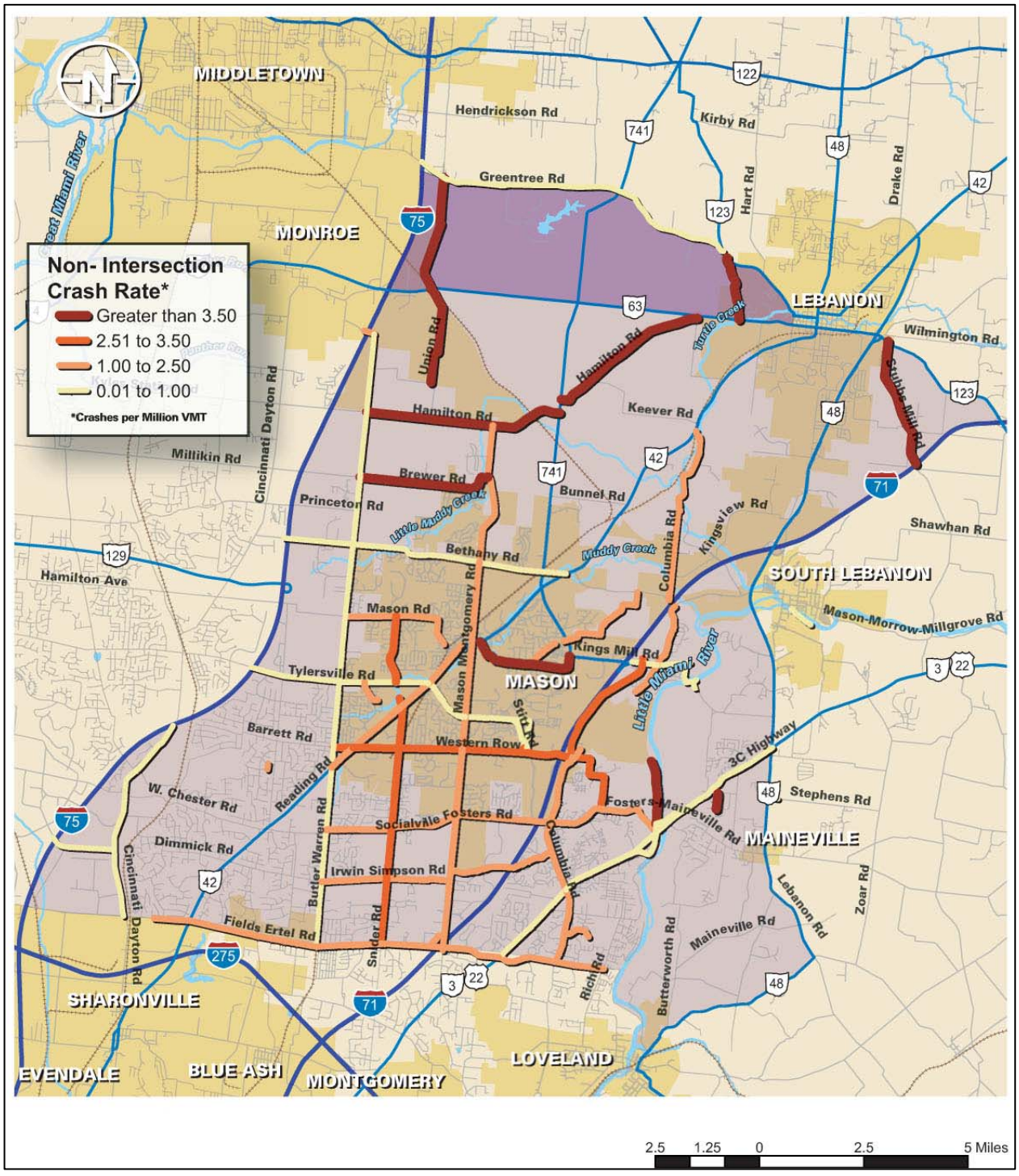
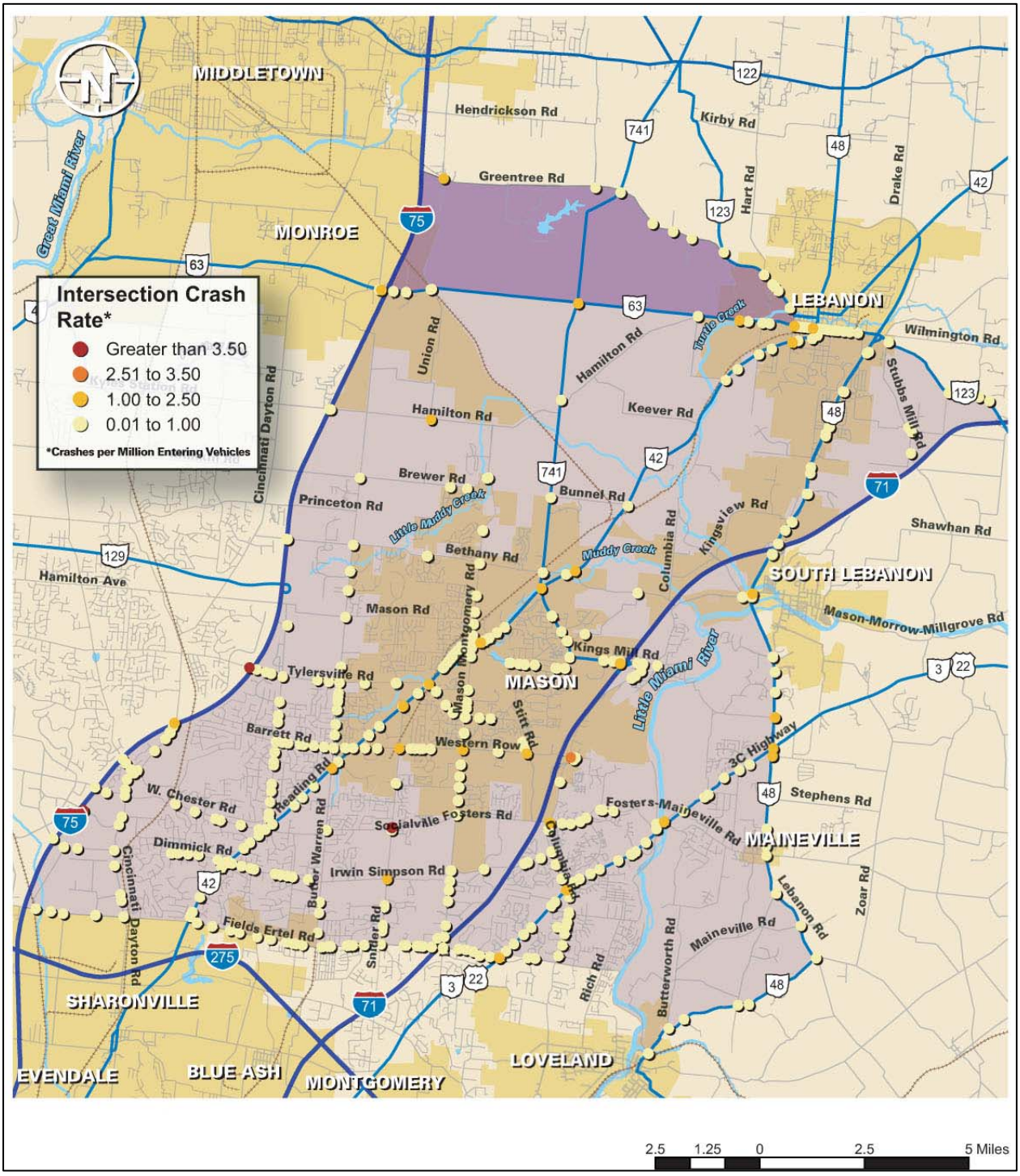


Figure 9 – 2004 Intersection Crash Rates



Park and Ride facilities are located at Paramount's Kings Island and Fields Ertel Road and are used for car-pooling and parking for Cincinnati's transit service (METRO), regular and express bus service to downtown Cincinnati. Warren County Transit provides a paratransit service on an on-call basis. Walking as a transportation alternative is limited by the lack of availability of safe walking areas (sidewalks, trails, etc.) and distance to walkable destinations. The availability of these walking components varies widely throughout the study area.

Financial Resources

According to the OKI 2030 Regional Transportation Plan, an estimated $7.43 billion for transportation improvements is expected to be available in the OKI region between 2004 and 2030. The estimated cost of the recommendations already identified within the long range transportation plan total $7.43 billion. There is an additional $2.67 billion in needed transportation improvements beyond available funding. Due to the exceedingly high cost of project needs in the OKI region it is necessary to provide a mechanism that adequately evaluates and prioritizes necessary improvements in southwest Warren County that considers the area-wide and regional improvements made by alternative solutions so that the projects may vie for limited funding in the region. Reaching a consensus among local stakeholders and jurisdictions on which improvements are the most needed will serve to support regional improvements in the study area and make them competitive for placement in the OKI 2030 Regional Transportation Plan and available for funding through state and national resources.

CHAPTER 5
STUDY PROCESS

CHAPTER 5 STUDY PROCESS

A. ODOT Project Development Process

The study was conducted using the ODOT Project Development Process (PDP) for major projects. Steps 1 through 4 of the 14-step process that ODOT uses to take transportation improvement projects from inception through construction were followed. The four steps are as follows:

Step 1: Work with Stakeholders to Understand Problems, Needs and Goals

1. Define study area
2. Identify and work with ODOT and external stakeholders including environmental justice populations
3. Develop Public Involvement Plan
4. Develop stakeholder goals and measures of project success

Step 2: Conduct Research and Technical Studies

1. Review existing data and analyses
2. Prepare base maps
3. Prepare Existing and Future Condition Report
4. Confirm study area/logical termini
5. Develop Red Flag Summary
6. Draft Purpose and Need Statement

Step 3: Identify and Evaluate Conceptual Alternative Solutions

1. Identify conceptual alternative solutions
2. Develop cost estimates for each
3. Quantitatively compare and evaluate alternatives using measures from Steps 1 and 2
4. Document alternatives, analysis and reasoning

Step 4: Develop Strategic Plan

1. Recommend design concept and scope
2. Recommend funding, timetable and delivery strategy
3. Revise purpose and need
4. Document the decision-making process and recommendations
5. Determine National Environmental Policy Act requirements
6. Develop final project strategic plan
7. Seek Ohio-Kentucky-Indiana Regional Council of Governments concurrence of the plan

B. Problem Definition

The first meeting of the Southwest Warren County Transportation Study task force in January 2004 included a round table discussion facilitated to get each member's views of the problems and needs within the study area. These views were further discussed in the task force's April 2004 meeting and taken to the public in May 2004 to receive input on the transportation concerns in the study area. The following is a summary of those problems and issues identified by stakeholders and the general public.

East-West Traffic Problems

1. Impact of traffic moving between I-75 and I-71 in Lebanon and Mason
2. Lack of continuity of many of the east-west routes
3. Need for truck bypass for Lebanon's SR 63/Main Street
4. Worsening traffic on SR 123/SR 63 through Lebanon now that the road is improved (major I-71/I-75 connection)
5. Need for SR 63/SR 123 and SR 48 to move traffic more effectively between I-75 and I-71 and for local and regional traffic to be better integrated

Interchange/Intersection Problems

1. Need to identify existing problem intersections (e.g., review crash data)
2. Mason Montgomery Road/Fields Ertel Road interchange
3. Bottleneck issues at U.S. 22/SR 3, Fields Ertel Road, and I-71
4. I-71 access at Western Row Road and other points
5. Lack of left turn at Mason-Morrow-Millgrove Road/SR 48 for westbound traffic
6. Access to and egress from the P&G Research Center
7. Access to the I-71/SR 48 interchange from Hamilton and Union Townships

Little Miami River Crossing Issues

1. Bridge at U.S. 22/SR 3 and roadway east to SR 48
2. Access to bridge on U.S. 22/SR 3 from Hamilton Township
3. Management of traffic on U.S. 22/SR 3 and SR 48 (and from southeast section of the study area) so that new bridges will not be necessary
4. Impact of growth east of the Little Miami River on the Little Miami River bridges
5. Need for widening of SR 48 at the Little Miami River to correct sight distance problem

Impacts of I-75/SR 129 Interchange on the Study Area

1. I-75/SR 129 interchange will increase traffic in Deerfield Township and Mason
2. SR 129 and Cox Road development will affect roads in the study area (may relieve Tylersville Road but have worse impacts on others)
3. Mason and Warren County roads with low volume capacities will be made to serve as cross-county connectors for developing residential areas

Other Traffic Problems / Problem Areas

1. Lack of east-west and north-south connectors for accessing the Mason Montgomery Road/Fields Ertel Road area
2. Bottleneck issues in the study area
3. I-71 connectivity for the Lebanon Commerce Park and Innovation Way

Other Transportation Modes

1. Need to consider other modes of transportation; transit is inadequate
2. Need to look at alternative modes (bike and pedestrian needs)
3. Lack of pedestrian crossings for major collectors in the Mason Montgomery Road/Fields Ertel Road area

Land Use and Other Policy Issues

1. Improve existing roadways as an alternative to building new roadways through farm lands
2. Try to preserve green space and stream quality in all tributary streams that drain into the Little Miami River
3. Consider past plans and studies
4. Minimize traffic growth in Turtlecreek Township
5. Develop north-south and east-west grids to take traffic off I-75 and avoid adding more interchanges
6. Consider aesthetic and environmental issues
7. Identify major terminus points (origins and destinations) that affect traffic patterns
8. Link land use and transportation decisions and improve assessment of their impacts on each other
9. Improve existing roadways to relieve pressure on secondary roads
10. Account for the potential need to fund a large number of projects
11. Take account of what is happening outside the study area; apply a regional perspective and interagency coordination

Concurrent with the aforementioned public process, data was collected and analyzed on the existing and future traffic conditions (from the travel demand model) for the study area's roadways. The results of this analyses served to further reinforce the issues and problems identified by the Task Force and the public. Specific problems/issues from this analysis are discussed below. The Existing and Future Conditions Report in Appendix B contains additional data.

East-West Traffic Problems

The capacity and level of service (LOS) analysis for the existing (year 2004) traffic volumes showed that several major roadways are already near or over capacity and experience significant congestion. Specific east-west roads that have sections experiencing congestion include:

- Fields Ertel Road from Mason Montgomery Road to Columbia Road
- Western Row Road between Butler Warren Road and Tylersville Road
- Tylersville Road from I-75 (in Butler County) to US 42
- Bethany Road between Mason Montgomery Road and SR 741
- SR 63 from I-75 to SR 741
- US 22 between Fields Ertel Road and Columbia Road
- SR 741 from Bethany Road to Kings Mill Road

Additionally, a number of intersections on these roads are also at or near capacity which also affects the operations of sections (or links) of the roadways. In fact, of the 110 signalized intersections in the study area, 63 (or approximately 57%) were identified as being at or near capacity.

For the horizon year of the study (2030) travel demand, the LOS analysis for the study area indicated that approximately two-thirds of the roadways would exceed their capacity. In addition to the previously identified roads, additional problems were identified for the following east-west roads:

- All of Bethany Road
- Mason-Morrow-Millgrove Road from US 42 to SR 48
- SR 63 from I-75 to Lebanon
- SR 123 through Lebanon to SR 48
- Kings Mill Road/SR 741 from US 42 past I-71 and Paramount's Kings Island
- Fosters-Maineville Road between US 22 and SR 48
- US 22 from the bridge over the Little Miami River to SR 48
- Irwin Simpson from Butler Warren Road to Columbia Road
- Fields Ertel Road from Snider Road to Columbia Road

The 2030 LOS analysis also revealed that a number of north-south roadways would also experience severe congestion. These included:

- Butler Warren Road from Socialville Fosters Road to Bethany Road
- Snider Road between Fields Ertel Road and US 42
- Mason Montgomery Road from Fields Ertel Road to Brewer Road
- SR 48 between Fosters-Maineville Road and Mason-Morrow-Millgrove Road

Little Miami River Crossings

There has been, and continues to be, considerable growth in the eastern portion of the study area. Specifically, it is the area bound by I-71, SR 48, and the Warren/Hamilton county line. The area is bisected by the Little Miami River which forms the boundary between the townships of Deerfield and Hamilton. Hamilton Township over the past several years has experienced a large amount of residential development in its portion of the study area.

Traffic analysis for the study area as a whole showed that 44% of all traffic generated is destined for Hamilton County. Much of the local traffic desires to use I-71 and will use the four interchanges on this stretch of the freeway. Therefore, traffic from the eastern portion of the study area has to cross the Little Miami River to access the interstate.

Since there are only four river crossings in the study area, the traffic attracted to and/or generated by this area must use one of the four bridges, all of which are two-lane structures. The four bridges are:

- SR 48
- US 22
- Socialville Fosters/Fosters-Maineville Roads
- Kings Road

The latter two bridges are lower-level crossings on county roads and have geometric deficiencies and environmental constraints. By 2030, each of the four bridges will be operating at LOS F if no roads in the study area are changed (other than those which have received funding commitments).

Interchange Problems

Significant work has been done on I-71 during the past decade. This work started in 1993 with the widening and lengthening of the bridges at the Fields Ertel/Mason Montgomery interchange and was completed in 2002 as the freeway was widened from south of I-275 to SR 48. During this time period, the growth and development in Deerfield Township and the city of Mason continued at a rapid pace. This placed strains on the local roads and the three interchanges at SR 741, Western Row Road, and Fields Ertel/Mason Montgomery Roads which were not upgraded as part of the widening. The public and local businesses were particularly concerned about the latter interchange because of congestion and safety issues.

The problems at the Fields Ertel/Mason Montgomery interchange were further confirmed in 2004 by a study completed by the Hamilton County and Warren County Engineer's Offices. Problems identified included:

- insufficient capacity at the southbound on ramp to I-71
- insufficient capacity along Mason Montgomery Road north of the interchange
- insufficient queue storage between intersections (often backing traffic up to the interstate)
- physical constraints due to the large amount of business and retail establishments in close proximity to the interchange

C. Existing and Future Conditions

A copy of the entire Existing and Future Conditions Report can be found in Appendix B. The addendum to this report, which contains information for the expanded study area, can be found in Appendix C.

Existing Conditions

During this early stage of the study, data for a number of elements was collected and analyzed. Information collected included: traffic and accident data; environmental information including wetlands, hazardous material sites, historical and archaeological sites, soils and geological information, floodplains, farmlands, and socio-economic data; roadway inventories; transit data; and additional information to provide a clear picture of existing conditions within the approximately 100 square mile study area. The study area contains more than 600 miles of roadway serving local, countywide and regional traffic demands. The Study Area Roadway Network (SARN) that was analyzed for this study includes 200 miles of roadway and more than 500 intersections.

Red Flag Summary

Red Flags, including environmental and engineering issues, are locations of concern within the study area. Red Flags do not necessarily identify locations that must be avoided, but rather identify locations that will entail additional study coordination, creative management, or design approaches, or increased right-of-way or construction costs. Locations that must be avoided are referred to as fatal flaws. Consultation with appropriate specialists is required to determine the level of concern for each red flag item. In addition to the narrative Red Flag summary below, an ODOT Red Flag Summary spreadsheet/checklist has been completed and is provided in Appendix D.

Floodplains

Floodplains are considered red flag areas, especially when associated with a State and National Wild and Scenic River. However, floodplains in general would not constitute fatal flaws. Figure 10 provides the location of these resources in the project area.

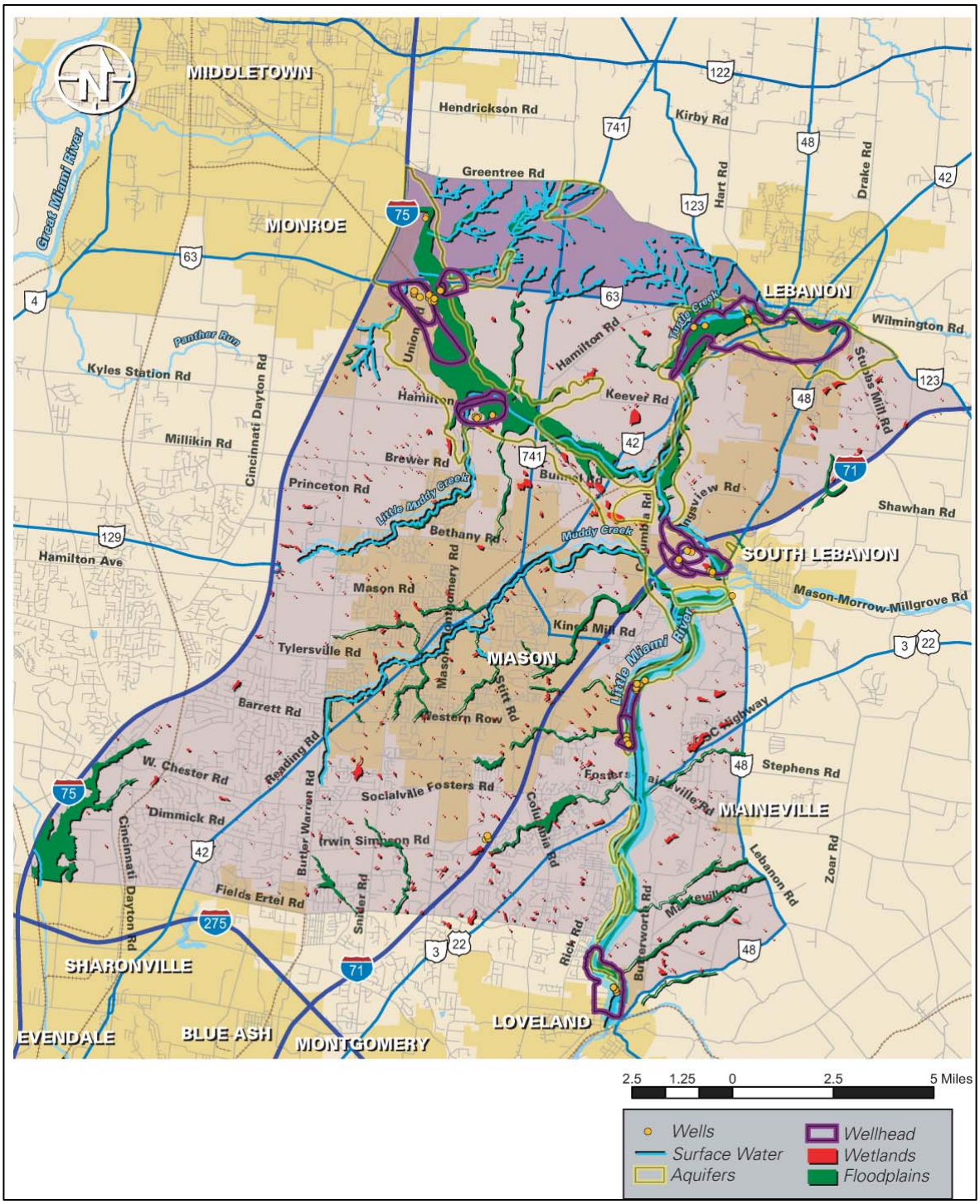
Groundwater/Aquifers, Wellheads and Drinking Water Supplies

Sole Source Aquifers and Wellhead Protection Areas are red flag areas. If adversely impacted, they are considered fatal flaws. Figure 10 provides the location of these resources in the study area.

Little Miami River

This steep, slide prone river corridor is a red flag area which presents construction challenges and raises construction cost. Figure 10 provides the location of these resources in the study area.

Figure 10 – Natural Environment Red Flags



Wetlands
Wetlands are red flag areas. High quality wetlands, if adversely impacted, may be fatal flaws. Figure 10 provides the location of these resources in the study area.

Intensely Developed Land
Generally, intensely developed land uses are considered red flag areas due to the high cost of right-of-way acquisition. Strip takes for existing roadway widening are usually manageable, but new corridors in heavily developed areas are often cost prohibitive.

Listed Threatened or Endangered Species
The majority of the listed threatened or endangered species habitat in the study area is concentrated in the Little Miami River corridor. Although field studies are required beyond the four step process to determine the presence of such species, these are red flag areas to be considered at this stage.

Farmland
Agricultural Districts or Current Agricultural Use Value (CAUV) properties can be red flag areas.

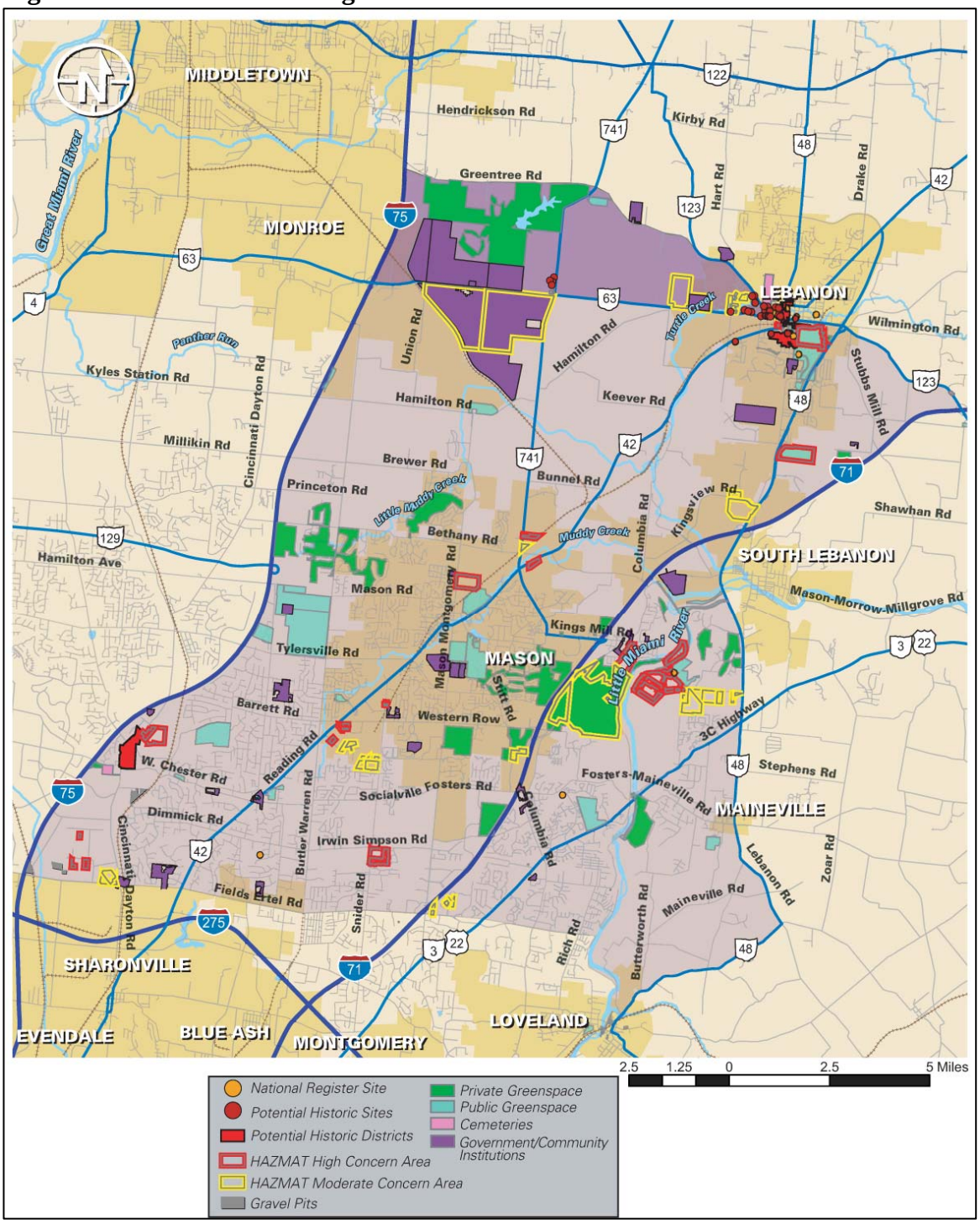
Government and Community Institutions
Schools and other public institutions are red flag areas, and can often become fatal flaw areas due to the high cost and practicality of replacing these facilities. See Figure 11 for the location of these resources in the study area.

Cemeteries
Strip takes from cemeteries, not involving graves, would be considered red flag areas. Severing of cemetery lands or relocation of graves are considered fatal flaws. See Figure 11 for cemetery locations.

Parks and Public Recreation Areas
Public recreation areas are considered red flag areas for minimal impact. These can become fatal flaw areas if major impact is anticipated, due to the protected status these resources may have under the federal Section 4(f) provision. This provision stipulates that federal funding cannot be used on a transportation project that requires the use of land from a Section 4(f) resource unless there are no other prudent and feasible alternatives to the use.

Hazardous Waste Sites
Potentially contaminated sites constitute red flag areas, since mitigation of impacts on hazardous waste sites can be cost prohibitive. See Figure 11 for the location of these sites in the study area. At this level of study, the exact location of contamination on a particular parcel is not known. Therefore, on Figure 11, the entire parcel of these sites is identified, however, the potential contamination may have affected only a portion of the parcel.

Figure 11– Man-made Red Flags



Environmental Justice Areas
At this level of screening no substantial concentrations of Environmental Justice populations are apparent.

Cultural Resources/National Register of Historic Places
Sites "listed on, or eligible for" the National Register of Historic Places are red flag areas because it must be proven that there is "no feasible and prudent alternative" that avoids the adverse effect before the federal action can be approved. Figure 11 provides locations that are currently listed or have the potential to be listed on the register.

Noise Sensitive Receptors
Areas with noise sensitive receptors are red flag areas because of the potential impact on project design, cost, and controversy. Although these are considered red flag areas, effective mitigation of some noise impacts is often possible.

Capacity and Level of Service

Capacity and Level of Service (LOS) analyses were conducted for the SARN under the existing traffic demand for both individual roadway links and major intersections. Due to the size of the study area and the number of study roads, the capacity analysis was designed to identify those areas where the travel demand is significantly greater than the available capacity on the roadway or at the intersection.

Capacity analysis was conducted using 2004 vehicle trips from the OKI regional model. Capacity analysis was conducted for a peak hour which assumed 10 percent of the Average Annual Daily Traffic (AADT) would travel during the peak hour with a 60/40 directional split. Model traffic volumes were validated with existing traffic count data. Roadway geometric information was then used to calculate the approximate carrying capacity of the roadway based on its functional classification, using OKI classification designations. Intersection capacity was estimated using similar methods based on the number of approach lanes.

Based on the available capacity of the roadway and the existing demand, LOS measures were calculated. LOS rates the motorists' ability to maneuver in the traffic stream using a letter scale A to F. LOS A indicates that the driver may maneuver on the roadway unimpeded by other drivers with little delay. LOS E indicates the uppermost operational limit of traffic indicating that traffic is moving with little or no maneuverability available with increased delay and slower speeds. LOS F indicates that the roadway is over capacity, and is indicative of roadways that experience severe congestion and stopped or slow conditions.

Several major roadways are near or over capacity, specifically, sections of Tylersville Road, Mason Montgomery Road, Fields Ertel Road, Kings Mill Road, Snider Road, Western Row

Road, SR 741, U.S. 42, Butler Warren Road, Bethany Road, SR 63, U.S. 22, and Mason-Morrow-Millgrove Road.

Intersections can often create significant delays and congestion by serving as "choke points" on roadways that otherwise have adequate carrying capacity (number of lanes). Of the 110 signalized intersections in the study area, 57 percent have been identified as being at or near capacity (LOS E or F). Intersections that are near capacity closely parallel those routes that have been identified as potentially deficient. A majority of these intersections are adjacent to each other on Mason Montgomery Road, Fields Ertel Road, Tylersville Road, SR 63, U.S. 42, and U.S. 22. This results in "gridlock" where an intersection with adequate capacity will operate at LOS F due to backups from the adjacent intersection.

Future Conditions

Transportation analyses was performed to review current and future socio-economic data and trip data, including trip distribution, trip growth, and trip characteristics. This analysis is conducted to identify significant changes in population and employment centers that could positively or negatively affect the operation of the transportation network based on changing travel patterns. Analysis is based on current and future socio-economic data maintained in the OKI travel demand model and existing and committed transportation infrastructure. For the purposes of this study travel demand model runs for the years 2004 and 2030 were conducted.

Trip data is classified in two ways, by market segment and by trip purpose. For the purpose of this study, the market segments are classified as the number of automobiles owned per household. The four trip purposes are as follows:

- Home — Based Work (HBW)
- Home — Based University (HBU)
- Home — Based Other (HBO)
- Non-Home — Based (NHB)

Reviewing the data presented, the total number of HBO trips within the OKI region increases by 622,000 between 2004 and 2030. NHB trips increase by 361,000, HBW by 254,000, and HBU by 13,000. The total number of transit trips for HBW decreases by 3,000 trips, while HBO transit trips decrease by 1,000 and NHB transit trips increase by 1,000. The number of HBU transit trips does not change noticeably between 2004 and 2030. More detailed trip information can be found in Appendix B in the Existing and Future Conditions Report. Tables with trip purpose information can also be found in this appendix.

The trip purpose data is also reviewed by origin and destination. By reviewing the data in this manner, changes in trip distribution can be noted. In 2004, the study area produces approximately 5 percent of all trips within the eight county OKI region and attracts 6 percent of the total trips. Of the 236,000 trips originating in the study area, 102,900, or 44 percent, travel to Hamilton County. Since Hamilton County has almost half the total OKI regional

population and employment, this trip pattern is not unexpected. In 2030, 7 percent of all trips start in the study area, while 6 percent end there. Again, Hamilton County is the destination for the majority of trips originating in the study area. In fact, 171,200 of the 385,300 study area trips in 2030 travel to Hamilton County. Figure 12 on the following page displays the trips going into and out of the study area.

Network Analysis

Using the OKI travel demand model which is based upon the socio-economic and trip data, Average Daily Traffic (ADT) volumes and peak hour traffic volumes were developed for the study area. Six individual locations are listed in Table 4 to indicate forecast travel growth in the study area.

Table 4 – Sample Average Daily Traffic

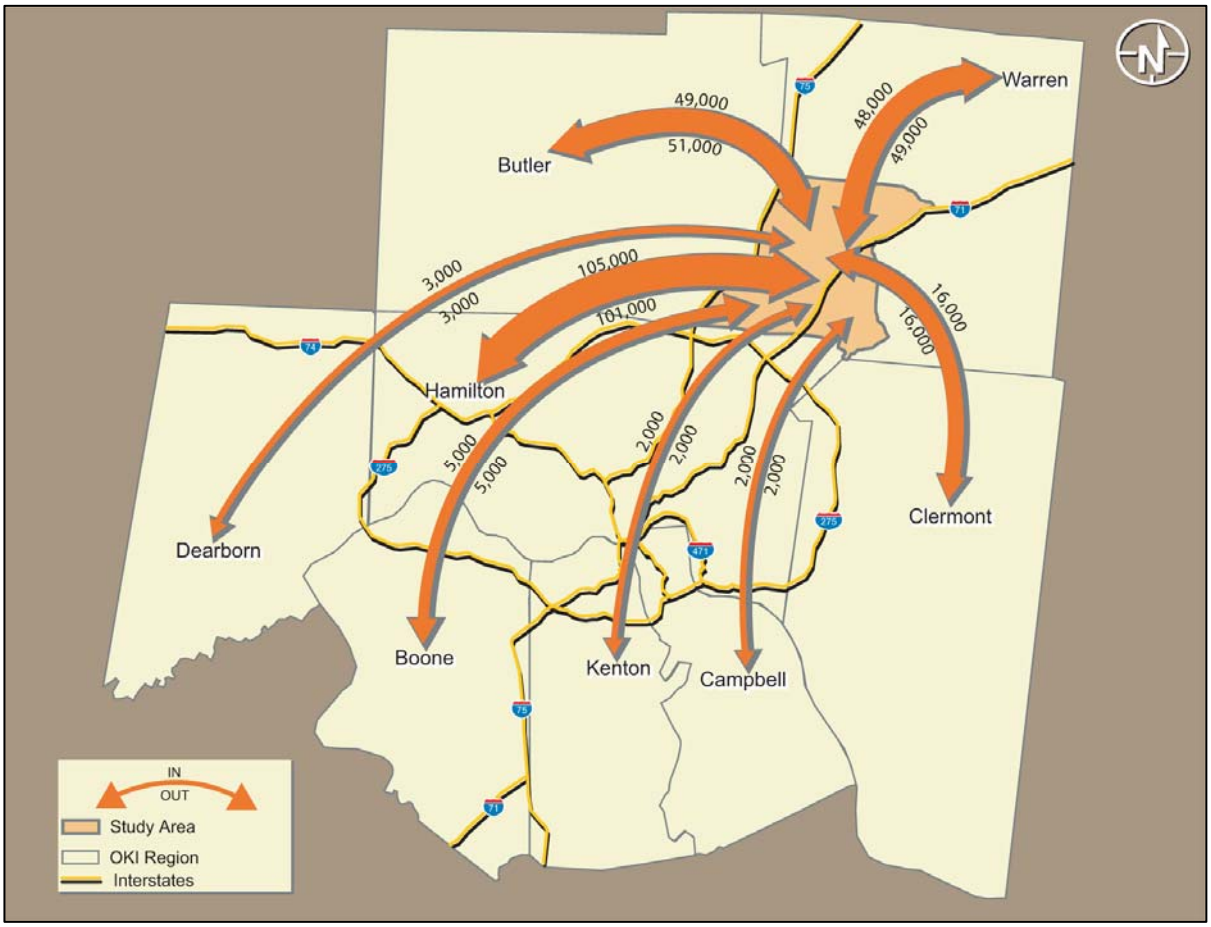
Road	Average Daily Traffic		
	2004	2030	Change
SR 63 between SR 741 and U.S. 42	9,100	17,100	88%
Tylersville Road between Snider Road and U.S. 42	28,200	36,300	29%
Western Row Road between Snider Road and Mason Montgomery Road	11,100	16,500	49%
U.S. 22 north of Socialville Fosters Road	11,800	36,500	209%
Irwin Simpson east of Butler Warren Road	7,000	10,800	54%
Mason Montgomery Road between Western Row Road and Socialville Foster Road	27,700	36,400	31%

Network analysis was conducted to determine the effect of the changes in travel patterns on the operation of the existing transportation network. The base transportation network for future year 2030 analysis included all existing infrastructure combined with all committed infrastructure (identified funding already in place). At the conception of this project, the Liberty Interchange Interchange Justification Study (IJS) was nearing completion. At that time, it was believed that Cox Road would be extended from the interchange to SR 63 and was included in the 2030 No Build base network.

Analysis of the network was conducted by examining average trip length, vehicle miles of travel (VMT), vehicle hours of travel (VHT), and vehicle hours of delay (VHD) on both a

regional scale and in the study area. In addition, individual capacity analysis was conducted for each roadway link in the network using the OKI model and at each signalized intersection using Highway Capacity Software® to identify specific areas where roadway capacity is deficient.

Figure 12– Trips Into and Out of the Study Area



The largest increases in daily VMT, VHT, and VHD in the study area occur along both I-71 and I-75. There are no significant decreases in the study area. Table 3 on page 18 shows the total changes in VMT, VHT, and VHD for the study area and for the OKI Region.

D. Development of Solutions

Introduction

Solutions were developed through a process that involved the project team (OKI and consultant staff, the Ohio Department of Transportation, and the Warren County Engineer's office), Task Force, and the public. Input from the public meetings and public forums was presented to the task force along with proposals and analysis developed by the project team.

It has been previously mentioned that during the first task force meetings held in January and April of 2004, members were asked to identify transportation problems in the study area. This led to the identification of seven major transportation problems and three major study goals. The transportation problems were identified as east-west traffic problems, interchange/intersection problems, Little Miami River Crossing issues, the impacts of the I-75/SR 129 interchange on the study area, other general traffic problems, other transportation modes, and land use and other policy issues. The three main goals identified were to improve mobility, protect the environment and quality of life, and improve travel safety.

After the public reviewed the problems and goals that the study would address, a working session was held with the task force in August 2004. During this meeting, conceptual alternatives were considered and discussed in detail. The effort of this brainstorming session was to develop the best ideas for fixing the identified problem areas while maintaining the study goals. As a result, the project team analyzed four primary highway improvements and four I-71 interchanges. The term "primary" was chosen to simplify explanations to the public and to the task force, for improvements that address the study area's major problems. Secondary improvements, which included lane additions and transit and bikeway improvements, were subsequently added. Finally, adjustments were made to some of the improvements based on assessments of their combined impacts and consideration of additional task force and public input. Future traffic projections were calculated for all of these improvements using the OKI model.

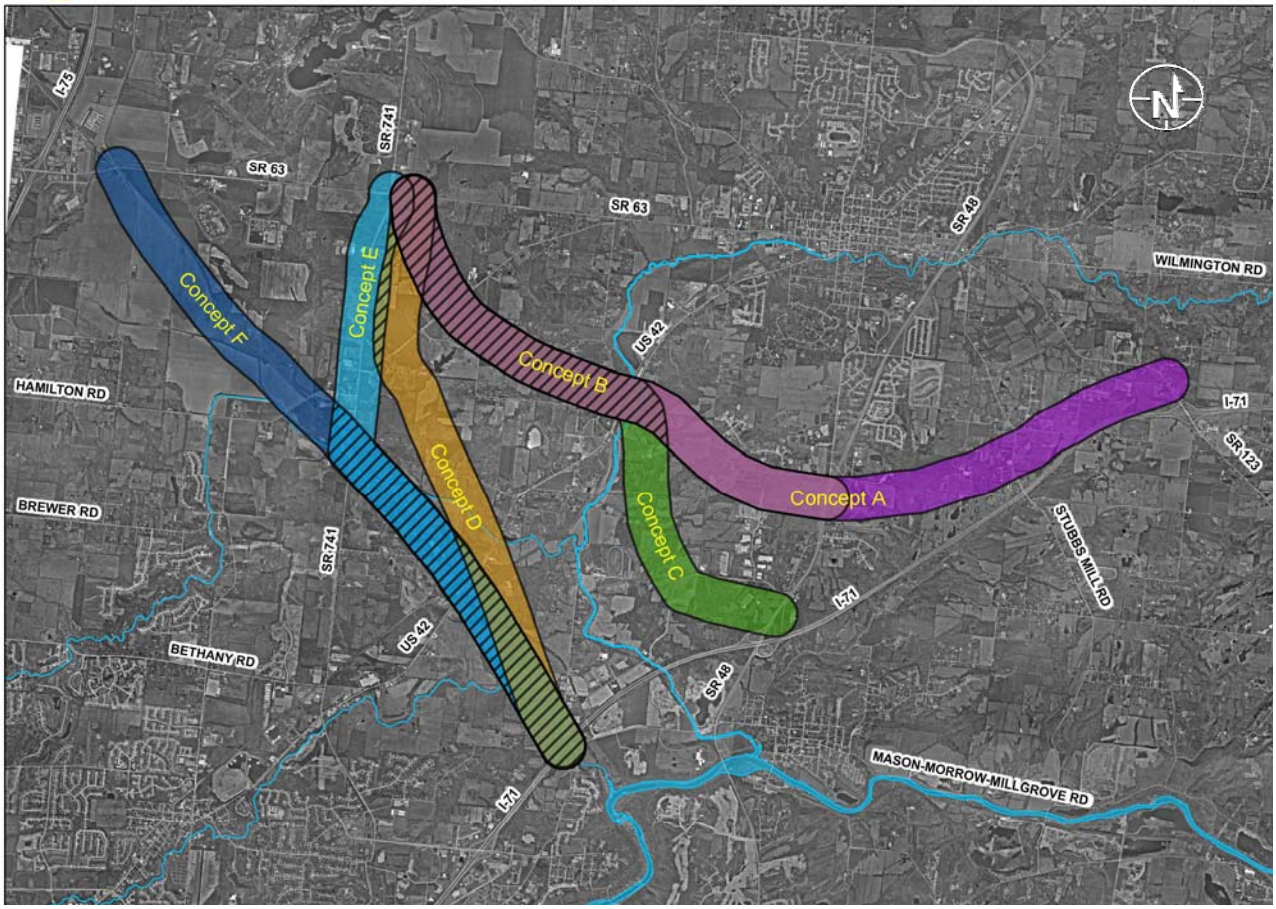
Primary Roadway Improvements

Lebanon Bypass

The Lebanon Bypass Improvement concept originally started as a truck bypass to reduce the number of trucks traveling through downtown Lebanon and to improve connectivity in the area. This improvement spawned six separate concepts to represent the typical range of alternatives considered in ODOT's PDP. Figure 13 shows the six corridor concepts. Each concept involved the construction of a new four lane limited access facility. Concept A started at SR 123 and went south of Lebanon to SR 63 near SR 741. Concept B followed the same path as Concept A but started at SR 48 instead. Concept C began at SR 48 just north of the I-71 interchange and ended at SR 63 just east of SR 741. Concept D started at a new interchange at I-71 and Mason-Morrow-Millgrove Road and continued northwest to end at SR 63 near SR 741. Concept E also included the new Mason-Morrow-Millgrove interchange

but then intersected SR 741 and followed SR 741 north to SR 63. This concept would have required widening on portions of SR 741. Concept F also began with a new Mason-Morrow-Millgrove interchange and continued northwest to intersect SR 63 east of the I-75/SR 63 interchange.

Figure 13 – Lebanon Bypass



Each of these concepts decreased the VHT and VHD but increased the VMT within the study area. None of the concepts diverted significant vehicles out of downtown Lebanon. Table 5 on the following page contains individual concept preliminary cost estimates, VMT, VHT, VHD, and traffic volumes at pertinent locations.

In each of the concept descriptions there is a minimum and maximum volume given to illustrate how much traffic would use each concept. The volumes given in Table 5 are taken between SR 741 and U.S. 42. Table 6 provides truck volumes east and west of the city of Lebanon. The number of trucks diverted is the number of trucks that would no longer use SR 63 due to the "assumed construction" of a concept.

Concept A carried between 13,600 and 24,400 vehicles per day on the new alignment and diverted 3,100 to 6,200 vehicles per day away from downtown Lebanon. Of the number of vehicles diverted per day only 300 to 700 were trucks. Furthermore, the addition of Concept A to the network adds between 200 and 300 vehicles per day to Bethany Road between Butler Warren Road and U.S. 42. This is a result of vehicles attempting to gain access to the new bypass. Throughout the study area there is slightly less than a 2 percent reduction in VHT and a 4 percent reduction in VHD. The cost of this concept was estimated at $67 million.

Concept B, which follows a similar alignment as Concept A, carried 16,400 to 22,600 vehicles per day. Through the city of Lebanon 2,500 to 5,700 vehicles per day were diverted. This included only 200 to 600 trucks per day. Bethany Road volume was increased by approximately 100 vehicles per day. Study area VHT and VHD were reduced by 1 percent and 2 percent respectively. This concept carries an estimated cost of $40 million.

Table 5– Impact Analysis for the Lebanon Bypass Concepts

		No Build	CONCEPTS					
			A	B	C	D	E	F
	Preliminary Cost (millions)	$0	$67	$40	$77	$56	$59	$67
	VMT	7,201,000	7,239,000	7,232,000	7,228,000	7,207,000	7,213,000	7,229,000
	VHT	283,000	278,000	280,000	274,000	274,000	276,000	275,000
	VHD	125,000	120,000	122,000	116,000	117,000	119,000	118,000
Volume (vehicles per day)	**New Alignment** Between SR 741 & U.S. 42	0	23,700	22,000	25,900	14,200	12,100	19,600
	SR 63 East of I-75 interchange	28,100	29,200	29,200	28,800	28,500	28,600	33,600
	SR 63 West of Lebanon	11,900	5,700	6,200	6,800	10,400	10,800	7,500
	SR 63 East of Lebanon	20,900	17,800	18,400	19,100	20,600	20,600	20,600
	Bethany Road West of Butler Warren	14,500	14,800	14,700	14,700	14,200	14,200	13,900
	Bethany Road West of Mason Montgomery	13,500	13,700	13,500	13,500	13,100	12,700	12,000
	Bethany Road East of Mason Montgomery	12,500	12,800	12,600	12,700	12,300	11,400	10,400

Like the other concepts, Concept C was a new four lane limited access facility. It would go between SR 48 and SR 741 and carried an estimated 20,600 to 31,700 vehicles per day. The concept diverted 1,800 vehicles per day east of downtown Lebanon and 5,100 west of downtown Lebanon including only 100 to 700 trucks per day. There was a 3 percent reduction in VHT and a 7 percent reduction in VHD. The concept was estimated to cost approximately $77 million.

Table 6 – Impact Analysis of Truck Volumes on the Lebanon Bypass

		No Build	CONCEPTS					
			A	B	C	D	E	F
Truck Volume (trucks per day)	**New Alignment** Between SR 741 & U.S. 42	0	2,200	2,200	1,800	1,400	1,300	2,400
	SR 63 West of Lebanon	1,500	800	900	800	1,300	1,400	800
	SR 63 East of Lebanon	1,300	1,000	1,000	1,200	1,400	1,400	1,300

Concept D was evaluated with the inclusion of a new Mason-Morrow-Millgrove interchange. The new facility carried 12,200 to 19,000 vehicles per day. It diverted only 200 trucks west of the city of Lebanon and 300 to 1,500 of the total number of vehicles per day. This concept diverted 200 to 400 vehicles per day off Bethany Road between Butler Warren Road and U.S. 42. The reduction in study area VHT and VHD were 3 percent and 6 percent respectively. The estimated cost for this concept was $56 million.

Concept E was also evaluated with a new Mason-Morrow-Millgrove interchange. This was the only Lebanon Bypass concept that would not be on completely new alignment. A portion of this concept would follow existing SR 741 from just south of Hamilton Road to SR 63. This concept carried between 12,100 and 29,300 vehicles per day. It diverted 300 to 1,100 vehicles per day out of Lebanon, which included only 100 trucks west of Lebanon. This concept moved 800 to 1,100 vehicles per day off Bethany Road. It also reduced study area VHT by 2 percent and VHD by 5 percent. Cost was estimated at $59 million.

Concept F was evaluated with a new Mason-Morrow-Millgrove interchange and had between 18,700 and 26,600 vehicles per day travel on it. It diverted 300 to 4,400 vehicles per day out of Lebanon. These numbers include the 700 trucks per day that were diverted west of the city. The concept pulls between 1,200 and 2,100 vehicles per day off Bethany Road between Butler Warren Road and U.S. 42. Estimated cost was $67 million and it reduced study area VHT and VHD by 3 percent and 6 percent respectively.

During a special Lebanon Bypass forum held in June 2005, the public voiced concerns with the potential property takes that might result from these corridors. Through several discussions with the public and with city of Lebanon officials, it was proposed that a concept

be evaluated that stayed mainly on existing roads. This improvement included the widening of SR 741 by one lane in each direction between SR 63 and U.S. 42, widening existing Glosser and Bunnel roads by one lane only, extending Glosser Road north to SR 123 and from its southern point south to Fujitec Drive, and incorporating a Bunnel Road extension from U.S. 42 to McKinley Boulevard. These improvements are shown in Figure 14 and Table 7 including preliminary costs, VMT, VHT, VHD, and volume information for these improvements. For prioritization, this improvement was split into its different components. As indicated in Figure 14, the city of Lebanon had already been planning the improvements on Glosser Road north of SR 63 and the Bunnel Road extension.

Figure 14 –Lebanon Area Improvements

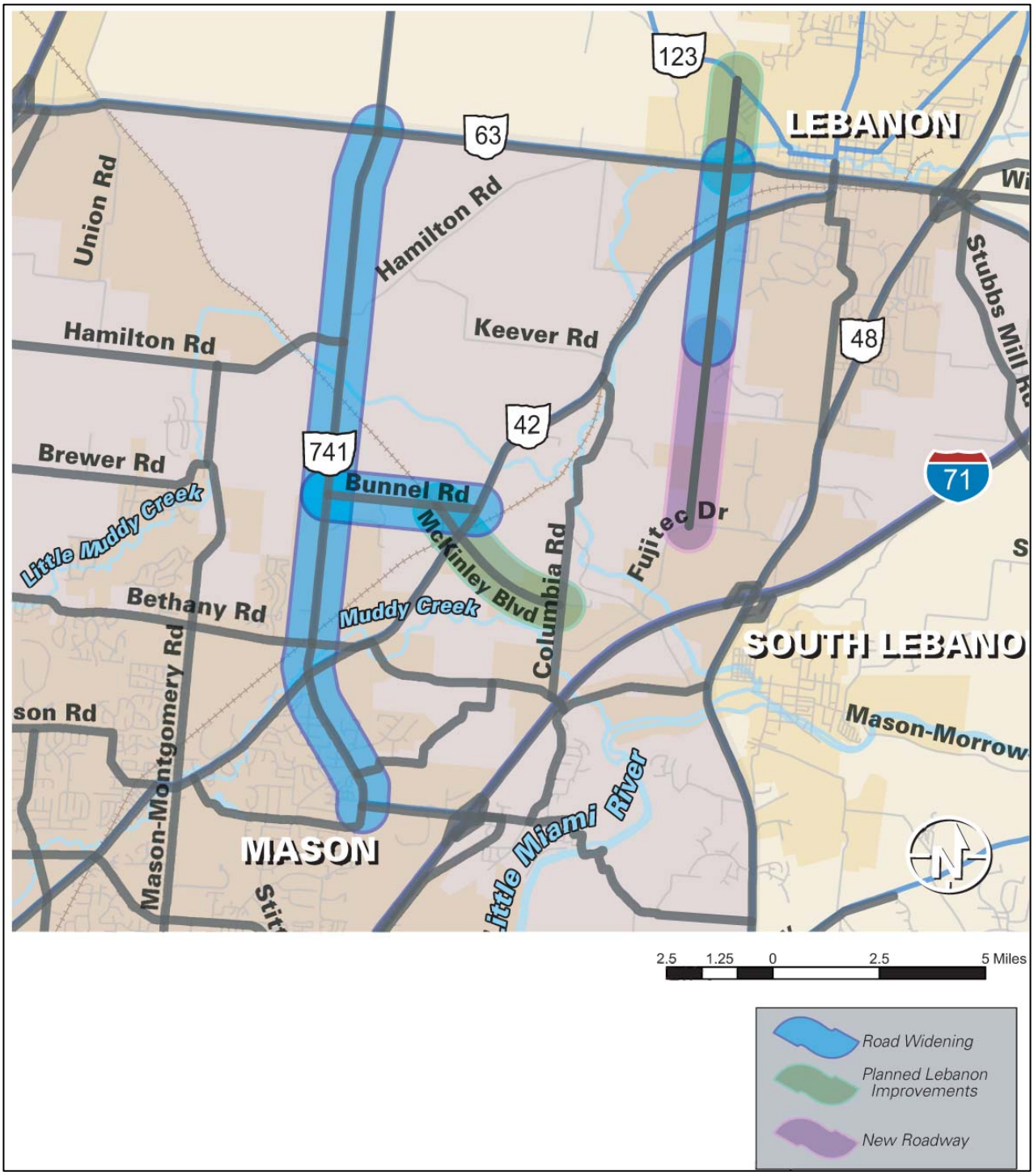


Table 7 – Impact Analysis for Lebanon Area Improvements

		No Build	Widen SR 741 between SR 63 and U.S. 42	Bunnel and Glosser Road Improvements
	Preliminary Cost (millions)	$0	$12.8	$19.1
	VMT	7,201,000	7,203,000	7,205,000
	VHT	283,000	282,000	281,000
	VHD	125,000	124,000	123,000
Volume (vehicles per day)	**SR 741** Between SR 63 and Hamilton Road	18,600	19,300	17,200
	SR 63 East of I-75 interchange	28,100	28,300	27,900
	SR 63 West of Lebanon	11,900	11,900	10,700
	SR 63 East of Lebanon	20,900	21,100	19,800
	Bethany Road West of Butler Warren Road	14,500	14,500	14,500
	Bethany Road West of Mason Montgomery Road	13,500	13,500	13,600
	Bethany Road East of Mason Montgomery Road	12,500	12,500	12,500
	Tylersville Road East of I-75	51,600	51,700	52,200
	U.S. 42 North of Tylersville Road	30,000	30,000	30,200
	Mason Road East of Butler Warren Road	11,700	11,400	11,700
	Western Row Road East of Mason Montgomery Road	9,100	9,000	8,900
	Mason Montgomery Road North of I-71	67,000	67,000	66,800

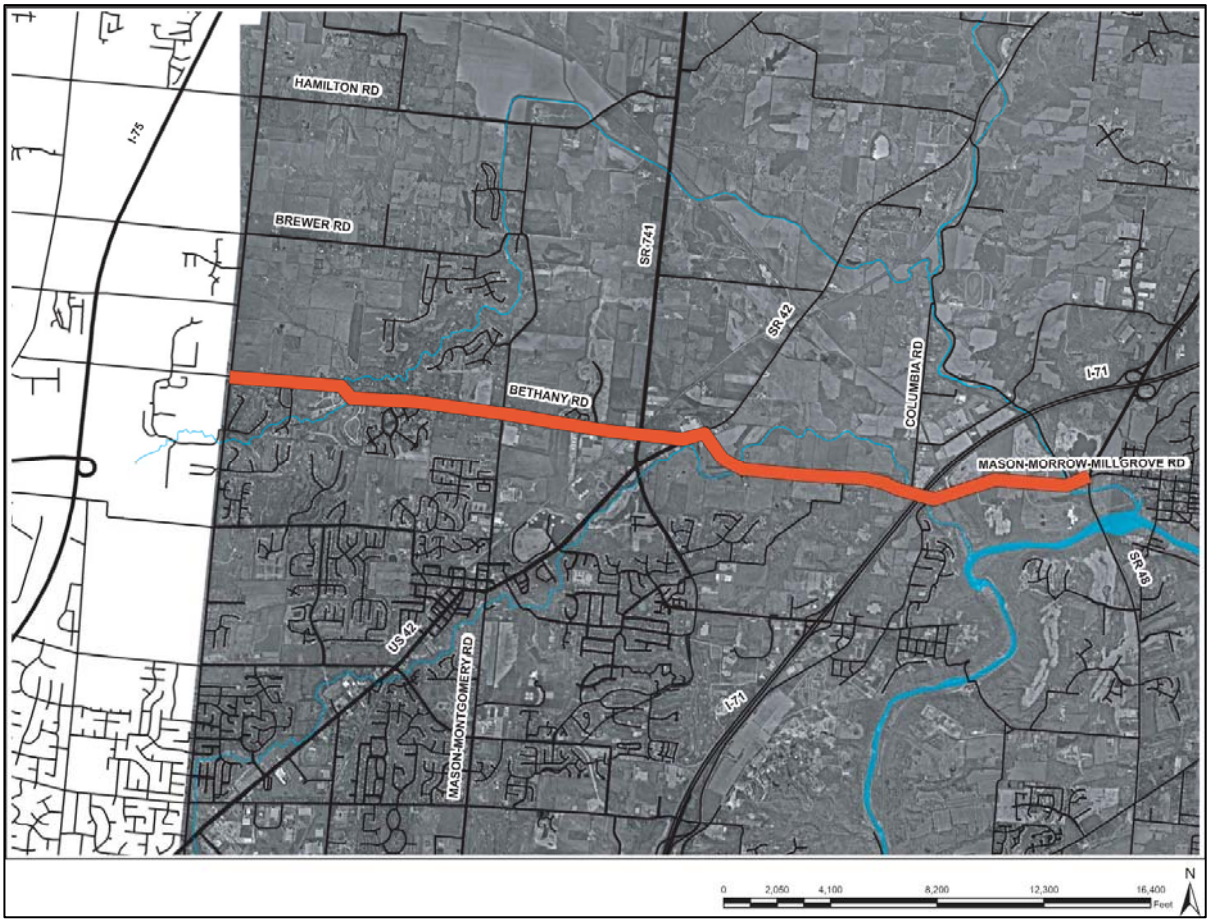
The majority of the recommended revised Lebanon area improvements widen only existing roads. The widening of SR 741 between SR 63 and U.S. 42 did not significantly divert vehicles away from downtown Lebanon. In fact, there was a 200 vehicle per day increase on SR 123 east of Lebanon. The SR 741 widening did not affect the vehicles per day on Bethany Road. The improvement did slightly decrease study area VHT and VHD. In both cases, this reduction was less than 1 percent. The estimated cost to widen this section of SR 741 was $12.8 million.

The Bunnel and Glosser road improvements divert between 1,100 and 1,200 vehicles east and west of Lebanon respectively. Widening and extending Bunnel and Glosser roads also decreased the study area delay by slightly less than 2 percent. The only change to Bethany Road volume was a slight increase between Butler Warren Road and Mason Montgomery Road of 100 vehicles per day. The estimated cost for the Bunnel and Glosser roads improvements was $19.1 million.

Bethany Widening

Widening Bethany and Mason-Morrow-Millgrove Roads was originally analyzed as a major four-lane connector with turning lanes between I-75 and I-71 with sparse signalized intersections, an operating speed limit of 41 mph, and a capacity of 1,160 vehicles per lane per hour. The operating speed used represents the average speed a vehicle is assumed to travel in the model. It is a roadway attribute directly related to type of roadway facility. The model analysis was conducted both with and without a new I-71 interchange at Mason-Morrow-Millgrove Road. This improvement would start at the new Cox Road extension (part of the Liberty Interchange improvements), follow Bethany Road to its intersection with U.S. 42, realign the Mason-Morrow-Millgrove Road intersection with U.S. 42 to line up with Bethany Road, and continue along Mason-Morrow-Millgrove Road to SR 48 (as shown in Figure 15).

Figure 15 – Bethany and Mason-Morrow-Millgrove Roads Widening



Analysis of the improvement showed that an east-west connector met a distinct travel need within the study area. A significant volume of traffic shifted north to Bethany and Mason-Morrow-Millgrove Roads from the south and south to Bethany and Mason-Morrow-Millgrove Roads from the north. The shift of these vehicles also allowed vehicles further north and south to shift "inward" in a domino effect. This shift in traffic was significant enough to cause concern and a cut-line analysis was performed to verify that the alternative had been coded correctly and that the model was functioning properly. The results of this cut-line analysis are shown in Tables 8 and 9. The process for this analysis involved taking a vertical line through the study area and noting the volume of vehicles on each east-west roadway. The links cut by this line are shown in Figure 16.

The sum total of vehicles traveling east or west should remain static regardless of what improvement is implemented. Tables 8 and 9 detail the volumes on the east-west roads. A comparison of the east/north volumes shows a 1.16 percent increase between the 2030 No Build and the 2030 model run with the Bethany and Mason-Morrow-Millgrove Roads improvement without the Mason-Morrow-Millgrove interchange and a 1.08 percent increase for west/south volumes. This increase is minimal compared with the margin of error inherent in the model itself. This small increase indicates the model was processing properly.

The four lane Bethany and Mason-Morrow-Millgrove Roads conceptual alternative was first presented to the task force on October 29, 2004. The alternative without a Mason-Morrow-Millgrove interchange carried an estimated cost of $35 million, not including right-of-way, utilities, or engineering costs. With the interchange this cost changed to $48.0 million. Under the improvement without the interchange, Bethany Road carried between 43,100 and 60,300 vehicles per day while Mason-Morrow-Millgrove Road carried 38,300 and 45,800 vehicles per day. With the interchange these volumes changed to 45,800 to 60,500 vehicles per day on Bethany Road and 36,000 to 56,500 on Mason-Morrow-Millgrove Road. Table 10 contains additional volume, VMT, VHT, VHD, and preliminary cost information.

The high volumes on Bethany and Mason-Morrow-Millgrove Roads led to unacceptable delay on both these roads. For this area Level of Service (LOS) A through D are considered acceptable delay. LOS has been defined on page 36. The facility was no longer wide enough to handle the amount of traffic wanting to make this east-west movement. The concept was modified to include an additional lane in each direction so that the facility recommendation would operate with acceptable delay. By widening Bethany and Mason-Morrow-Millgrove Roads to a six lane facility with turn lanes, most of the delay locations were improved. While there was still unacceptable delay, it was greatly decreased. The road was still meant to be an east-west connector and was coded into the model as a major connector with sparse signalized intersections, a 41 mph operational speed limit, and a capacity per lane per hour of 1,160 vehicles. This six-lane facility was taken to the task force and approved on April 8, 2005.

Table 8 – Bethany Cut Line Analysis – East and Northbound Movements

Street Name	2030 No Build	Bethany as Major 4-Lane East-West Connector[a]	Bethany as a 4-Lane Major Local Road[b]	Bethany as a 4-Lane Minor Local Road[c]
EB Bethany	6,800	28,347	17,516	8,815
EB Brewer	1,881	1,191	1,183	2,086
EB Fields Ertel	15,510	15,589	15,490	15,408
EB Greentree	3,493	2,738	3,167	3,405
EB Hamilton	2,766	1,210	1,723	2,597
EB Hopewell	2,510	2,379	2,458	2,445
EB I-275	64,362	63,610	63,975	64,323
EB Irwin Simpson	5,497	5,522	5,536	5,485
EB Manchester	3,158	2,935	3,043	3,098
EB Socialville Foster	6,300	5,909	6,090	6,180
EB SR 122	14,830	14,172	14,350	14,697
EB SR 63	11,191	8,179	10,121	10,911
EB Tylersville	12,225	9,834	11,326	11,828
EB U.S. 42	14,071	10,296	12,074	13,993
EB Western Row	8,292	7,137	7,383	8,308
NB I-71	79,713	78,265	78,969	79,670
NB I-75	73,335	73,523	73,427	73,372
NB Kemper	6,323	6,383	6,363	6,420
NB Loveland Madeira	10,640	10,823	10,733	10,719
NB Mason Montgomery	20,980	20,860	21,036	20,976
NB S Dixie Hwy	8,877	8,725	8,803	8,787
NB U.S. 22	17,616	17,287	17,594	17,713
TOTAL	**390,370**	**394,914**	**392,360**	**391,236**
% Difference		**1.16%**	**0.51%**	**0.22%**

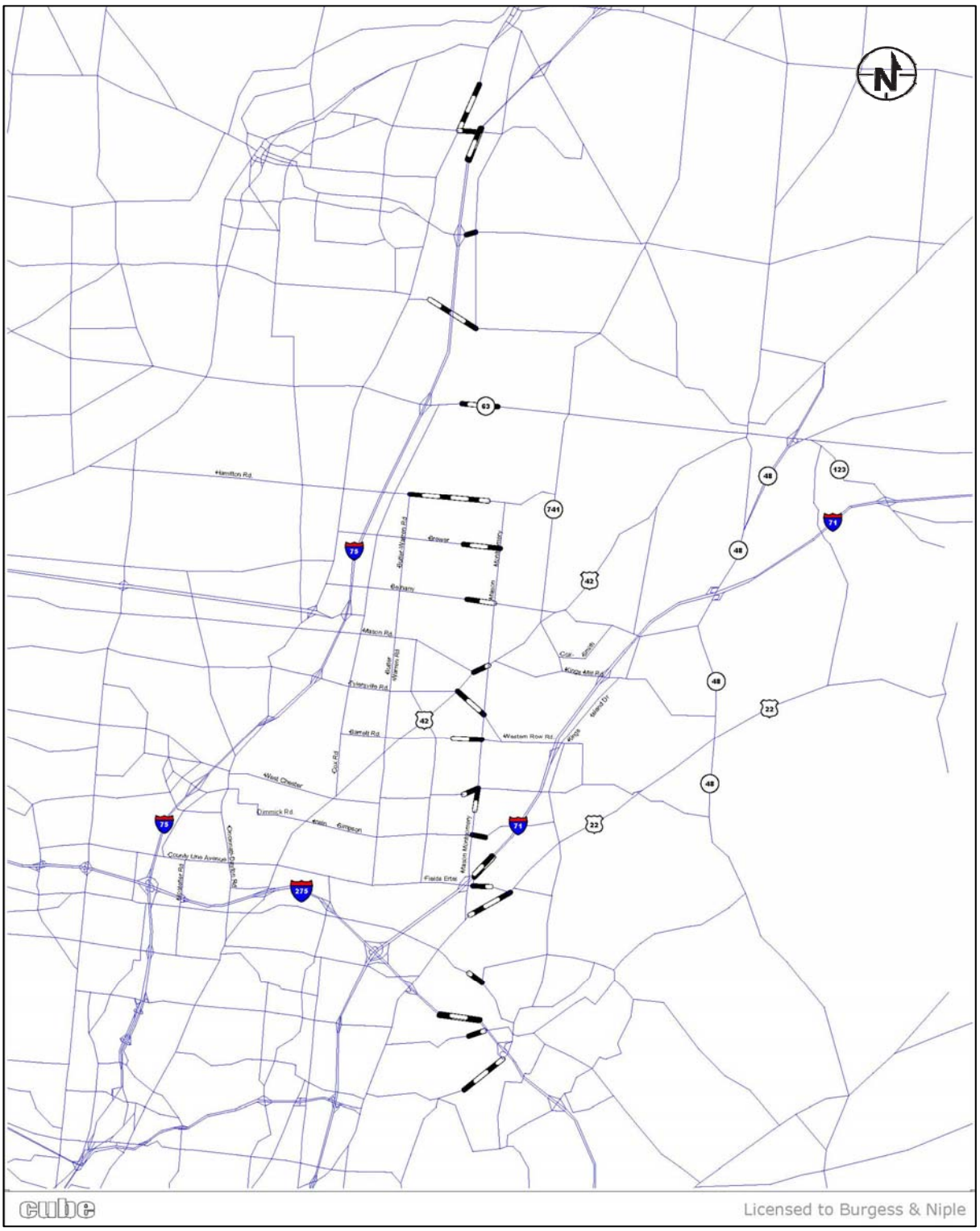
[a] Operating speed limit of 41 mph
[b] Operating speed limit of 36 mph
[c] Operating speed limit of 26-29 mph

Table 9 – Bethany Cut Line Analysis – West and Southbound Movements

Street Name	2030 No Build	Bethany as Major 4-Lane East-West Connector[a]	Bethany as a 4-Lane Major Local Road[b]	Bethany as a 4-Lane Minor Local Road[c]
WB Bethany	6,672	27,360	17,061	8,551
WB Brewer	1,870	1,207	1,199	2,001
WB Fields Ertel	16,701	16,701	16,795	16,668
WB Greentree	3,293	2,644	3,027	3,214
WB Hamilton	2,726	1,320	1,841	2,676
WB Hopewell	1,636	1,593	1,633	1,664
WB I-275	65,333	64,867	65,080	65,320
WB Irwin Simpson	6,557	6,285	6,467	6,522
WB Manchester	3,098	2,949	2,964	3,071
WB Socialville Foster	6,678	6,263	6,641	6,478
WB SR 122	14,861	14,311	14,491	14,717
WB SR 63	11,102	8,257	10,007	10,880
WB Tylersville	11,871	10,265	11,233	11,798
WB U.S. 42	14,749	9,767	12,114	14,510
WB Western Row	7,550	6,437	7,060	7,460
SB I-71	79,337	79,129	79,005	79,218
SB I-75	71,232	71,094	71,141	71,267
SB Kemper	6,988	7,087	7,113	6,957
SB Loveland Madeira	10,424	10,262	10,428	10,348
SB Mason Montgomery	21,618	21,106	21,019	21,614
SB S Dixie Hwy	8,255	8,119	8,185	8,181
SB U.S. 22	16,364	16,100	16,374	16,415
TOTAL	**388,915**	**393,123**	**390,878**	**389,530**
% Difference		**1.08%**	**0.50%**	**0.16%**

[a] Operating speed limit of 41 mph
[b] Operating speed limit of 36 mph
[c] Operating speed limit of 26-29 mph

Figure 16 – Cut Line Locations for Bethany Road Analysis



The six lane Bethany and Mason-Morrow-Millgrove Roads widening, along with the other Primary and Secondary Improvements, was presented to the public on May 3 and 4, 2005. The Bethany/Mason-Morrow-Millgrove east-west connector met with public resistance. Results of the survey completed by the public indicated 87 percent were against the Bethany and Mason-Morrow-Millgrove Roads widening. They also strongly objected to having a new interchange built at Mason-Morrow-Millgrove Road. They felt that this interchange, along with the proposed widening, would introduce large volumes of traffic, particularly trucks. They were also concerned about safety, locations of new traffic signals, vehicle speeds, increased noise, decreased property values, and right-of-way property purchases**.** Objections to the widening were so numerous that a special Bethany Forum was held to discuss the concerns.

Prior to the special Bethany Road forum, the modifications to the Bethany and Mason-Morrow-Millgrove Road improvement were analyzed for providing some east-west connectivity but without attracting the same volume of traffic. First, the Mason-Morrow-Millgrove interchange with I-71 was removed from the process. The option of widening to six lanes was also taken off the table. Neither option would be analyzed as part of any improvement. Next, the road widening was modeled as a four lane major local road with center turn lanes, an operational speed limit of 36 mph, numerous intersections, and a capacity of 930 vehicles per lane. It was also modeled as a four lane minor local road with center turn lanes, an operational speed limit of 26 – 29 mph, numerous signalization, and a capacity of 480-560 vehicles per lane. The previous cut-line tables contain the cut-line volumes for these two conceptual alternatives.

To meet the original goal of improving east-west mobility, the four lane major local road conceptual alternative was selected. This concept was presented to the public during the Bethany Forum on June 7, 2005.

The modified widening still met with some resistance but seemed to be more acceptable than the original proposed widening. The four lane with center turn lane Bethany and Mason-Morrow-Millgrove Roads were presented to the task force on June 24, 2005 as one of the high priority projects. The process for project ranking can be found in the document under Project Prioritization.

Table 10 – Impact Analysis for Bethany and Mason-Morrow-Millgrove Roads

		No Build	4-lane Major Connector Facility without Mason-Morrow-Millgrove interchange (41 mph)	4-lane Major Connector Facility with Mason-Morrow-Millgrove interchange (41 mph)	6-lane Major Connector Facility without Mason-Morrow-Millgrove interchange (41 mph)	6-lane Major Connector Facility with Mason-Morrow-Millgrove interchange (41 mph)	4-lane Major Road Facility without Mason-Morrow-Millgrove interchange (36 mph)
	Preliminary Cost (millions)	$0	$35.0	$48.0	$49.8	$62.8	$35.0
	VMT	7,201,000	7,263,000	7,266,000	7,278,000	7,296,000	7,220,000
	VHT	283,000	272,000	259,000	273,000	259,000	274,000
	VHD	125,000	116,000	104,000	118,000	104,000	117,000
Volume (vehicles per day)	**Bethany Road** West of Butler Warren Road	14,500	60,300	60,500	66,000	67,200	38,700
	Bethany Road West of Mason Montgomery Road	13,500	55,700	56,700	59,700	61,800	34,600
	Bethany Road East of Mason Montgomery Road	12,500	52,200	53,500	56,000	58,800	32,700
	SR 63 East of I-75 interchange	28,100	23,600	23,100	23,600	23,200	26,700
	SR 63 West of Lebanon	11,900	6,400	6,000	6,200	5,900	7,800
	SR 63 East of Lebanon	20,900	19,200	18,800	19,100	19,200	20,300
	Tylersville Road East of I-75	51,600	46,700	46,300	47,200	46,800	49,900
	Mason Road East of Butler Warren Road	11,700	8,200	7,800	8,100	7,700	9,900
	Western Row Road East of Mason Montgomery Road	9,100	8,300	8,200	8,200	8,200	8,600

The prioritized projects were presented to the public on July 25 and 26, 2005 and the Bethany/Mason-Morrow-Millgrove widening still met with resistance. In response, the Bethany Road improvement was presented to the task force during its final meeting on August 19, 2005 as a three lane local road with right-of-way reserved for five lanes. At that time, the task force agreed to the Bethany Road modifications and left it as a high priority project. The five lane right-of-way will enable Bethany and Mason-Morrow-Millgrove Roads to be expanded efficiently to a four lane facility with turning lanes in the future when three lanes are no longer adequate.

Figures 17 and 18 show the amount of unacceptable delay in the study area when Bethany and Mason-Morrow-Millgrove Roads are widened to a four-lane major connector and when it is widened to a six-lane major connector. As can be seen in Figure 18, the six-lane facility is the most effective at reducing delay on Bethany and Mason-Morrow-Millgrove Roads. In these figures, low congestion levels correlate to a LOS E. Medium to very high congestion levels are all worsening degrees of LOS F.

Figure 17 – 2030 Unacceptable Delay with Bethany Widened as a Four Lane Major Connector

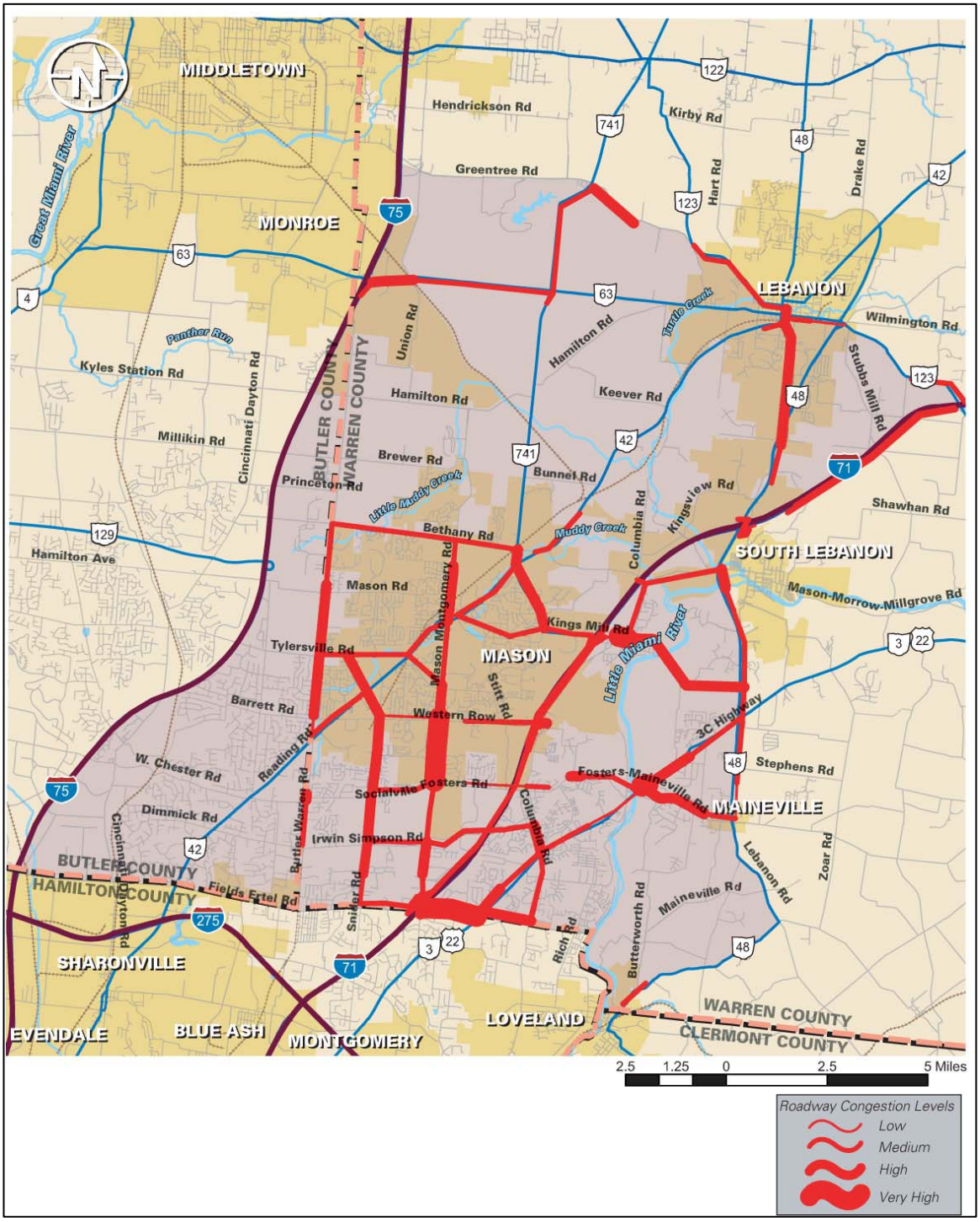
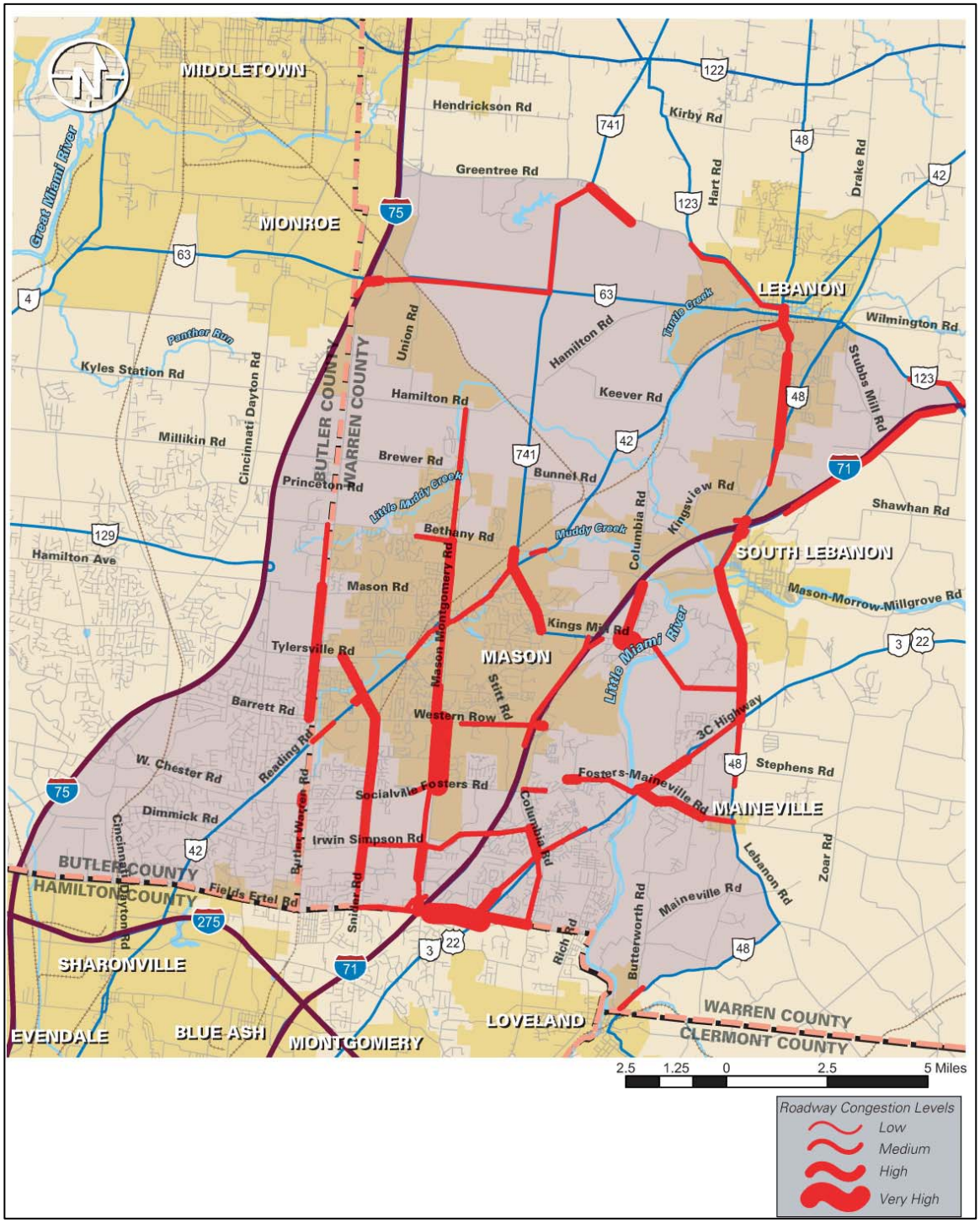


Figure 18 – 2030 Unacceptable Delay with Bethany Widened as a Six-Lane Major Connector



Western Row Road Extension (includes the Little Miami River Crossing)

The Western Row Road Extension was analyzed originally as a four lane facility that would extend Western Row Road east and southeast across the Little Miami River (LMR) and connect with Fosters-Maineville Road. It was evaluated both with and without the completion of a full interchange at I-71 and Western Row Road. For this concept the river crossing portion of the improvement was located in close proximity to the current Socialville Fosters Road LMR crossing. The alternative was developed to provide better east-west connectivity in the study area, primarily to facilitate vehicles requiring movement across the LMR. The Western Row Road interchange currently has ramp movement from northbound I-71 to Western Row Road and from Western Row Road to southbound I-71. Completion of the interchange would add the missing two ramp movements. Figure 19 illustrates the location of this improvement. Table 11 includes cost, VMT, VHT, VHD, and detailed volume information. Figure 20 shows the conceptual interchange improvements.

Figure 19 – Western Row Road Extension (Includes the Little Miami River Crossing)

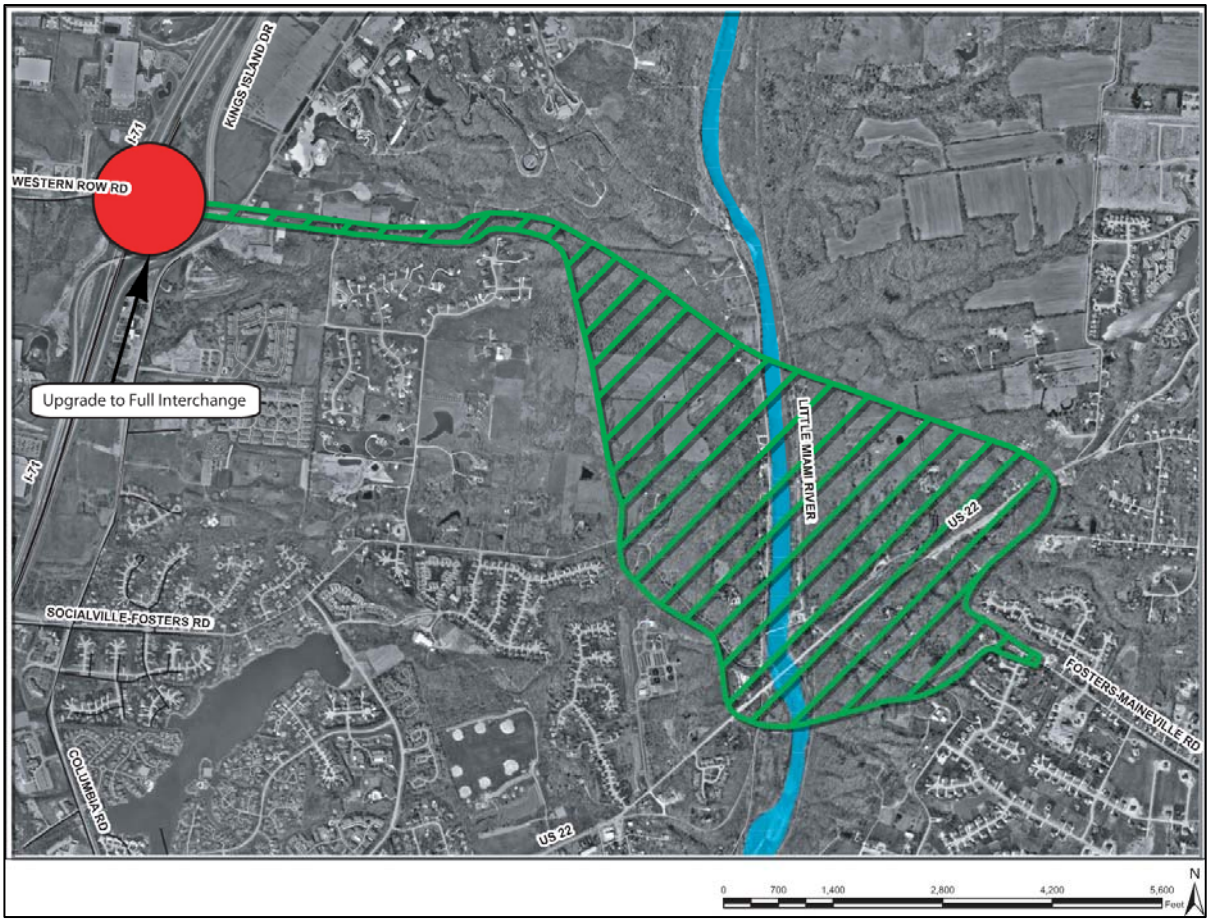
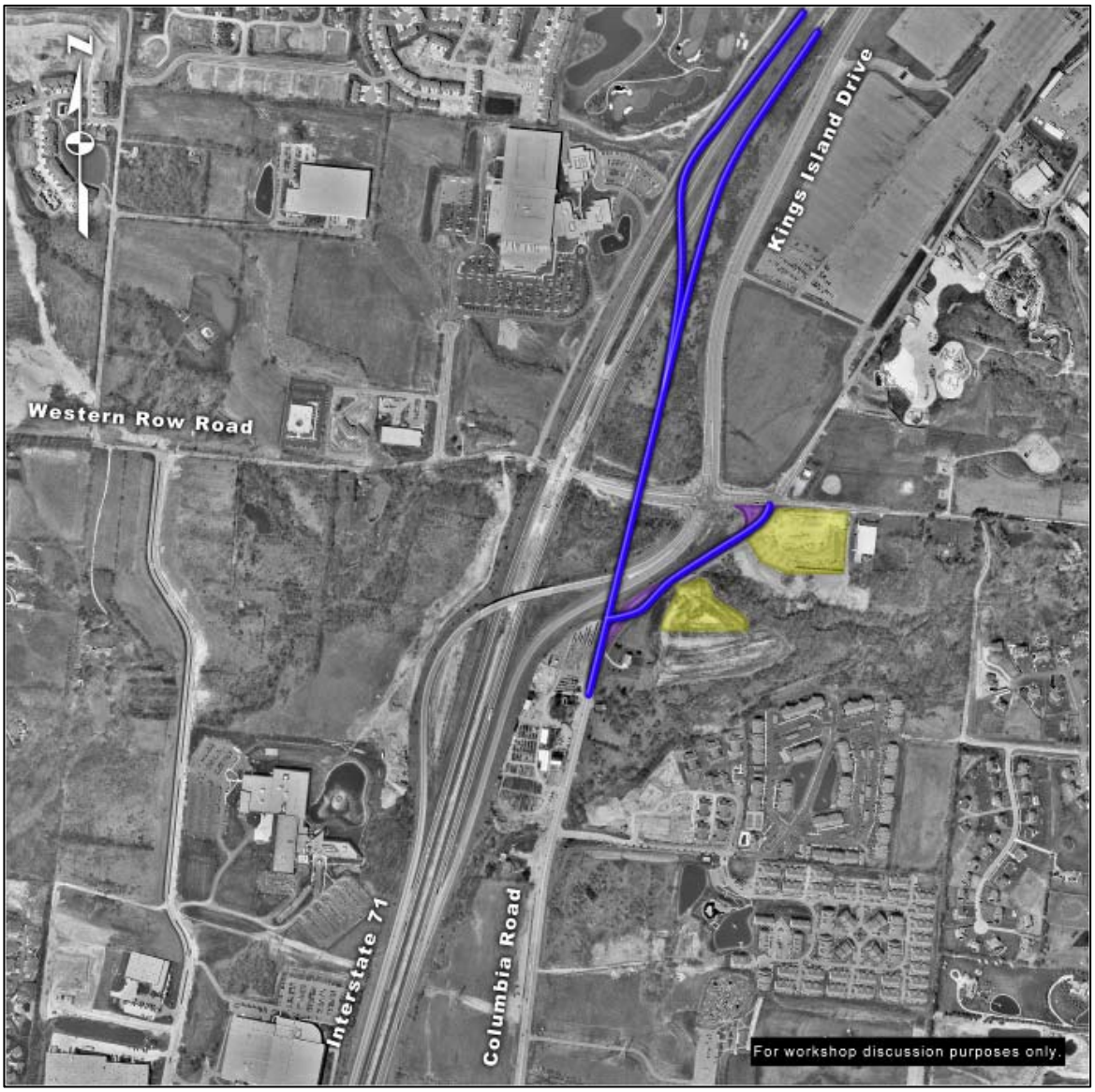


Table 11 – Impact Analysis for the Western Row Road Extension

		No Build	4-lane Western Row Road Extension with full Western Row Road Interchange	4-lane Western Row Road Extension without full Western Row Road Interchange	6-lane Western Row Road Extension with full Western Row Road Interchange	6-lane Western Row Road Extension without full Western Row Road Interchange
	Preliminary Cost (millions)	$0	$56	$35	$64	$43
	VMT	7,201,000	7,208,000	7,202,000	7,207,000	7,204,000
	VHT	283,000	271,000	272,000	270,000	274,000
	VHD	125,000	113,000	114,000	112,000	115,000
Volume (Vehicles per day)	**New Alignment** Northwest of U.S. 22	0	35,600	32,800	37,100	33,600
	Fields Ertel Road West of the I-71 interchange	21,100	21,200	21,400	21,200	21,400
	Fields Ertel Road East of the I-71 interchange	32,200	30,700	31,500	30,600	31,500
	U.S. 22 South of new alignment	43,800	37,500	40,600	37,000	40,400
	Bethany Road West of Butler Warren Road	14,500	14,400	14,300	14,400	14,500
	Bethany Road West of Mason Montgomery Road	13,500	13,100	13,100	13,100	13,200
	Bethany Road East of Mason Montgomery Road	12,500	12,000	12,100	12,000	12,100
	SR 63 East of I-75 interchange	28,100	27,700	27,700	27,700	27,800
	SR 63 West of Lebanon	11,900	10,800	11,200	10,700	11,200
	SR 63 East of Lebanon	20,900	20,700	20,700	20,800	20,700
	Western Row Road East of Mason Montgomery Road	9,100	11,300	9,700	11,300	9,700
	Mason Montgomery Road North of I-71	67,000	66,400	66,500	66,400	66,400

This concept was first presented to the task force in October 2004. An estimated cost of the facility was produced for the task force by January 2005. With the interchange completed, this improvement cost was $56 million. Without the interchange, it was estimated at $35 million. The new facility carried between 25,200 and 32,800 vehicles per day without a full interchange and between 28,700 and 35,600 vehicles per day with a full Western Row Road interchange. Study area VHT and VHD reduced by 4 percent and 10 percent with a full interchange and by 4 percent and 9 percent without one. As a four lane facility with a new interchange, this improvement also diverted 1,500 vehicles per day off Fields Ertel Road east of the I-71 interchange.

Figure 20 – Western Row Road Full Interchange



The new Western Row Road Extension operated with unacceptable delay as a four lane facility. For this reason it was also modeled as a six lane facility. Cost estimates were $43 and $64 million without and with the full interchange respectively. The six lane facility carried between 26,000 and 33,600 vehicles per day without a full interchange and between 30,200 and 37,100 vehicles per day with a full interchange. The study area VHT and VHD without a full interchange decreased by 3 percent and 8 percent respectively. Again the improvement diverted vehicles off Fields Ertel Road east of the I-71 interchange. Specifically, 1,600 vehicles per day were diverted. With the full interchange study area VHT and VHD were reduced by 5 percent and 10 percent respectively. The six lane facility improvements were presented to the public in May 2005 and prioritized as high priority projects by the task force in June 2005.

In late July and early August 2005, the public voiced its objections to this concept via e-mails and phone calls to OKI, the Warren County Engineer's Office, and ODOT. The public felt that the concept shown at public meetings would go through too much private property. At the August 2005 task force meeting, the original concept was maintained as a high priority project with the stipulations that it avoid subdivisions and that the project be constructed in the least intrusive manner.

Waterstone Connector

The Waterstone Connector would extend Waterstone Drive across I-71 to Duke Drive. It was evaluated as a four-lane facility meant to divert vehicles from the Fields Ertel Road/Mason Montgomery Road intersection and the interchange with I-71. Figure 21 depicts the location of this improvement. Table 12 on the following page contains preliminary costs, VMT, VHT, VHD and volume information.

The Waterstone Connector would divert 4,500 vehicles off Mason Montgomery Road just north of I-71 and carry between 12,000 and 12,400 vehicles per day. It would reduce the study area delay by slightly less than 2 percent. Fields Ertel Road shows a reduction in vehicles per day of 3,100 east of the I-71 interchange.

Figure 21 – Waterstone Connector

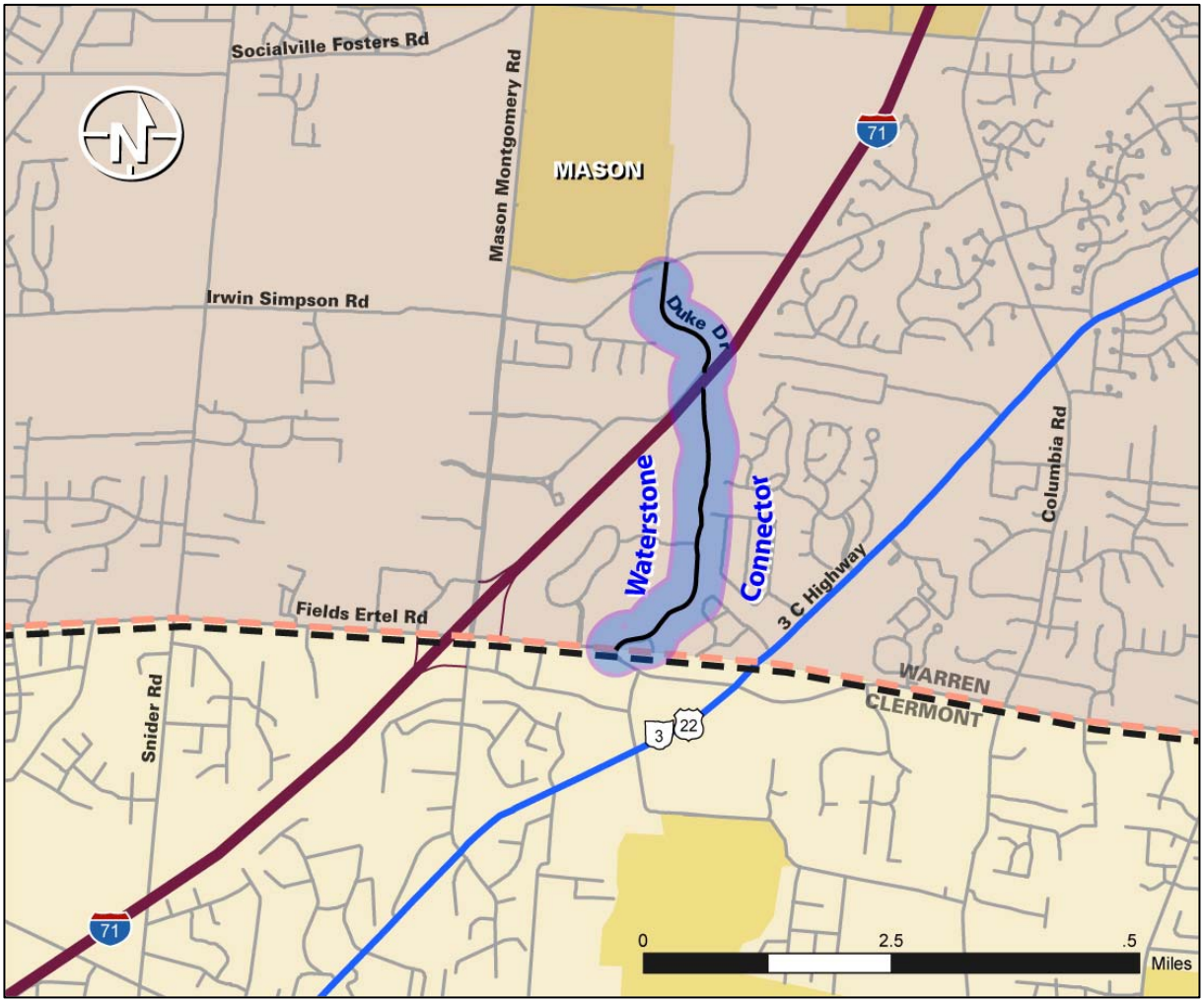


Table 12 – Impact Analysis for the Waterstone Connector

		No Build	Waterstone Connector
	Preliminary Cost (millions)	$0	$5.0
	VMT	7,201,000	7,210,000
	VHT	283,000	281,000
	VHD	125,000	123,000
Volume (vehicles per day)	**Waterstone Drive** On new facility	0	12,400
	Fields Ertel Road West of I-71 Interchange	21,100	21,200
	Fields Ertel Road East of I-71	32,200	29,100
	Bethany Road West of Butler Warren Road	14,500	14,600
	Bethany Road West of Mason Montgomery Road	13,500	13,400
	Bethany Road East of Mason Montgomery Road	12,500	12,400
	SR 63 East of I-75 interchange	28,100	28,200
	SR 63 West of Lebanon	11,900	11,900
	SR 63 East of Lebanon	20,900	20,900
	Tylersville Road East of I-75 Interchange	51,600	52,100
	U.S. 42 North of Tylersville Road	30,000	30,000
	Mason Road East of Butler Warren Road	11,700	10,800
	Western Row Road East of Mason Montgomery Road	9,100	9,300
	Mason Montgomery Road North of I-71 Interchange	67,000	62,500

I-71 Interchanges

Initially, analysis was conducted for four existing interchanges and a potential new interchange at Mason-Morrow-Millgrove Road. The analysis showed that no major improvements are needed for the SR 48 interchange but intersection improvements are planned locally. Two conceptual alternatives were developed for each of the following interchanges:

- Improvements to the Fields Ertel Road/Mason Montgomery Road interchange
- New interchange at Mason-Morrow-Millgrove Road
- Improvements to the SR 741/Kings Mill Road interchange
- Complete a full interchange at Western Row Road

The locations of these interchanges are shown on Figure 22. Preliminary cost, VMT, VHT, VHD, and volume data can be found in Table 13. The data in Table 13 refers to the preferred configuration.

Fields Ertel Road/Mason Montgomery Road Interchange

Initial results from the first public meeting and from the first several task force meetings identified the Fields Ertel/Mason Montgomery interchange as one of the largest problem locations in the study area. Two configurations for updating this interchange were evaluated briefly along with several minor improvements. The analysis involved reconfiguring the directional ramps to I-71 (shown in Figure 23), and it was determined that this type of improvement would likely also impact the I-71/I-275 interchange. Such a large endeavor had a rough cost estimate of $150 million. Figure 24 depicts the other conceptual alternative for this interchange. This concept involved a loop road around the interchange with all right-turn movements and no access. It would greatly increase capacity at intersections but have such a major impact on existing development that it was considered not feasible.

Additionally, smaller Transportation System Management (TSM) improvements were considered for this interchange. They included signal timing adjustments, signing/striping modifications, access management, and adjusting curb radii. Replacing the current Fields Ertel/Mason Montgomery intersection with a continuous flow intersection (CFI) was also considered. Ultimately, the benefits derived by these improvements could not be adequately analyzed within the scope of a regional travel demand model. As a result, it was recommended that this interchange be subjected to a more detailed feasibility study. The cost for this study was estimated at $400,000. The feasibility study was included as a high priority project by the task force.

Figure 22 – I-71 Interchange Improvements

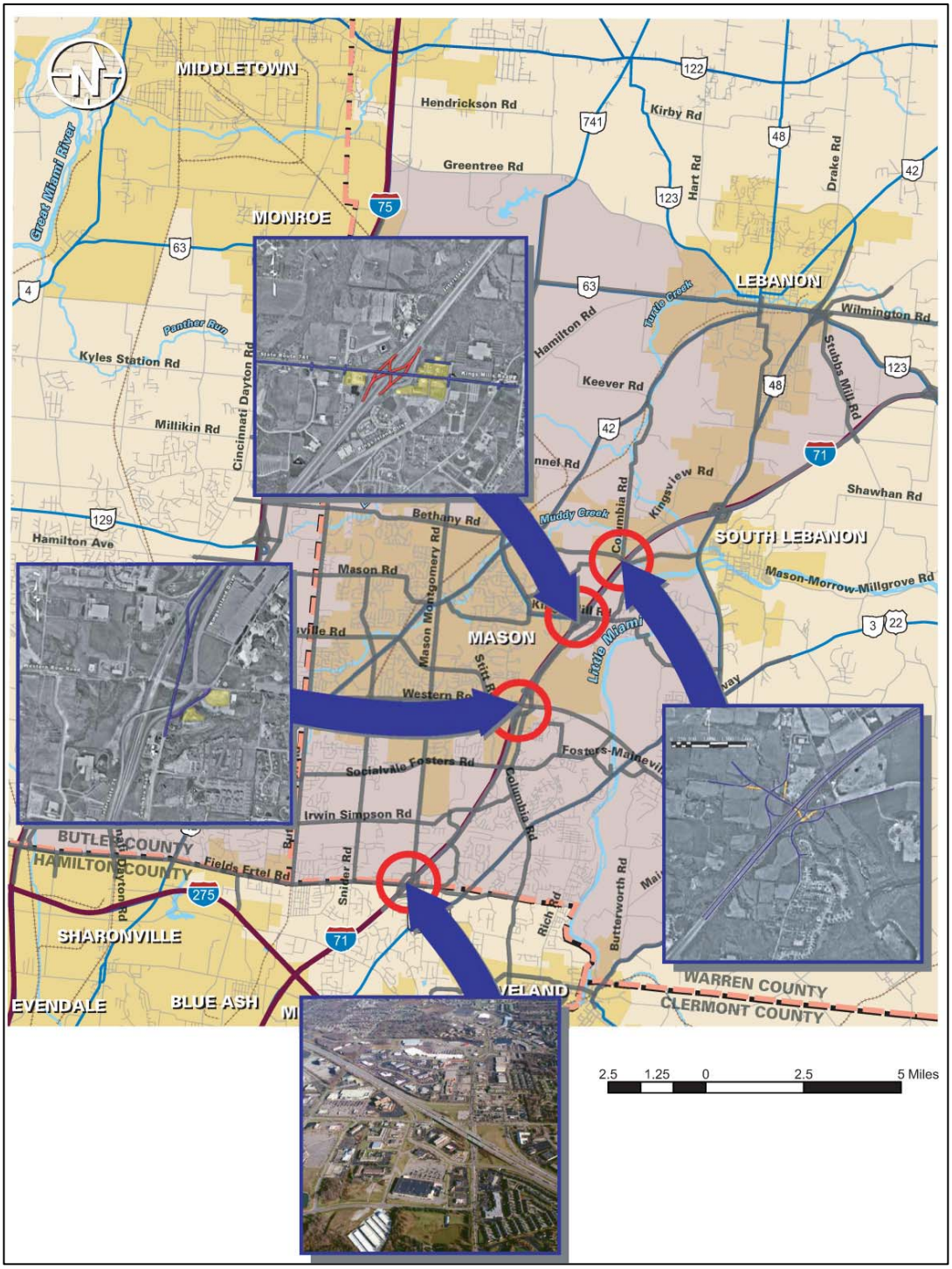


Table 13 – Impact Analysis for the Interchange Improvements

		No Build	New Mason-Morrow-Millgrove Road Interchange	Improvement to SR 741/Kings Mill Road Interchange	Full Interchange at Western Row Road
	Preliminary Cost (millions)	$0	$13.0	$30.0	$21.0
	VMT	7,201,000	7,204,000	7,207,000	7,202,000
	VHT	283,000	278,000	283,000	282,000
	VHD	125,000	120,000	125,000	125,000
Volume (vehicles per day)	**Bethany Road** West of Butler Warren Road	14,500	14,400	14,500	14,500
	Bethany Road West of Mason Montgomery Road	13,500	13,000	13,400	13,300
	Bethany Road East of Mason Montgomery Road	12,500	12,300	12,400	12,500
	SR 63 East of I-75 interchange	28,100	27,800	28,100	27,800
	SR 63 West of Lebanon	11,900	11,800	11,900	11,600
	SR 63 East of Lebanon	20,900	20,900	20,900	20,700
	Tylersville Road East of I-75	51,600	51,500	51,900	52,400
	U.S. 42 North of Tylersville Road	30,000	29,700	29,800	29,100
	Mason Road East of Butler Warren Road	11,700	11,500	11,600	11,800
	Western Row Road East of Mason Montgomery Road	9,100	9,400	9,200	10,700
	Mason Montgomery Road North of I-71	67,000	66,400	67,000	65,700

Figure 23 – Directional Ramp Improvement to the Fields Ertel/Mason Montgomery Interchange with I-71

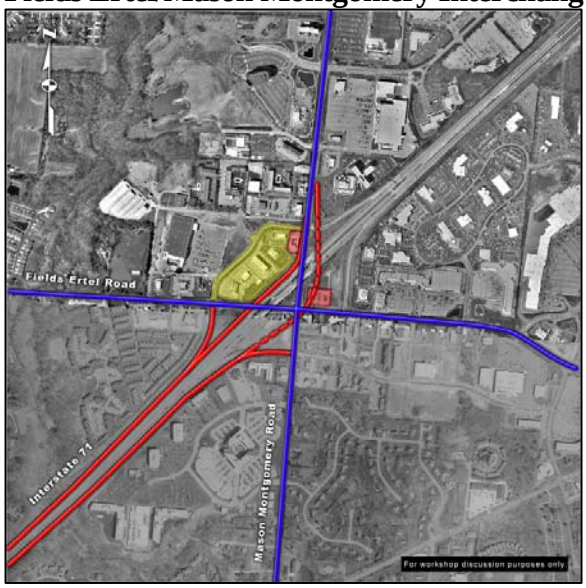
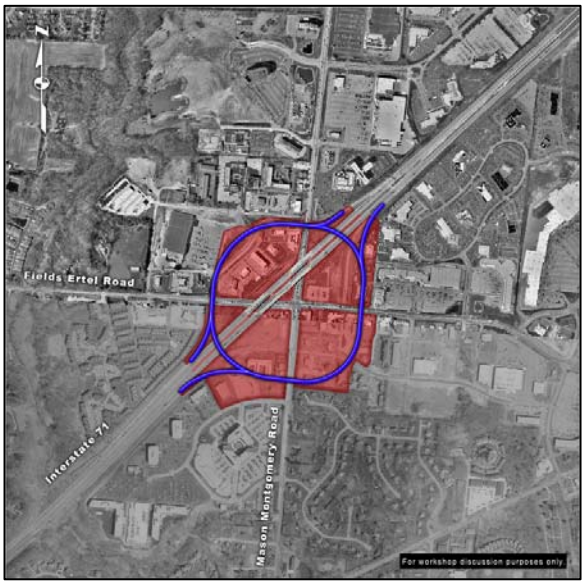


Figure 24 – Loop Road Improvement at the FieldsErtel/Mason Montgomery Interchange with I-71



Mason-Morrow-Millgrove Road Interchange

The new interchange at Mason-Morrow-Millgrove Road was evaluated by itself as well as in conjunction with Lebanon Bypass Concepts D, E, and F and the Bethany Road/Mason-Morrow-Millgrove Road widening. Overall, this new interchange proved to be largely ineffective in the diversion of traffic. Additionally, it was viewed unfavorably by the public. As a consequence of both these items, the proposed new interchange was dropped from the study. Figures 25 and 26 display the two geometric concepts. They depict the minimum and maximum configurations evaluated. The maximum configuration is the basis for information presented in Table 13.

Figure 25 – Mason-Morrow-Millgrove Road Interchange with I-71 (Minimum Configuration)

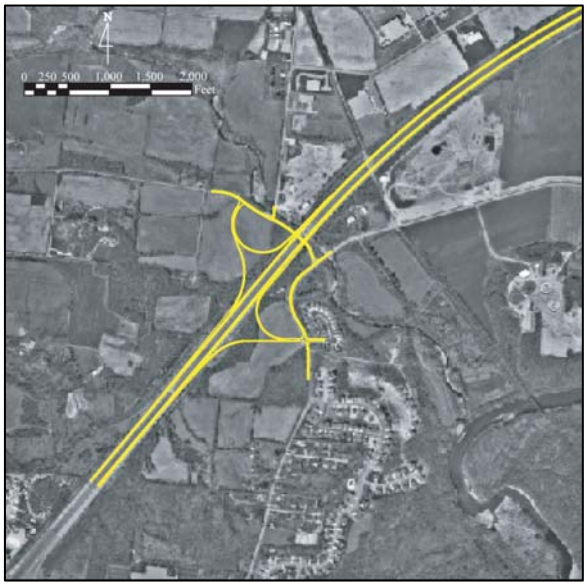
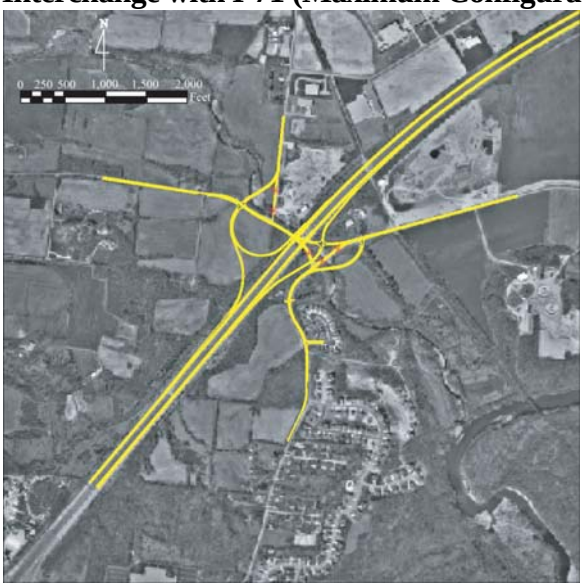


Figure 26 – Mason-Morrow-Millgrove Road Interchange with I-71 (Maximum Configuration)



SR 741/Kings Mill Road Interchange

The proposed improvement at this location was to take the current diamond configuration and improve the ramps (shown in Figure 27) or build a Single Point Urban Interchange (SPUI) (shown in Figure 28) instead. The SPUI configuration would minimize impacts and improve mobility through the interchange area, and is the basis for the information that is presented in Table 13.

Figure 27 – SR 741/Kings Mill Road Interchange with I-71 (Current Diamond Configuration)

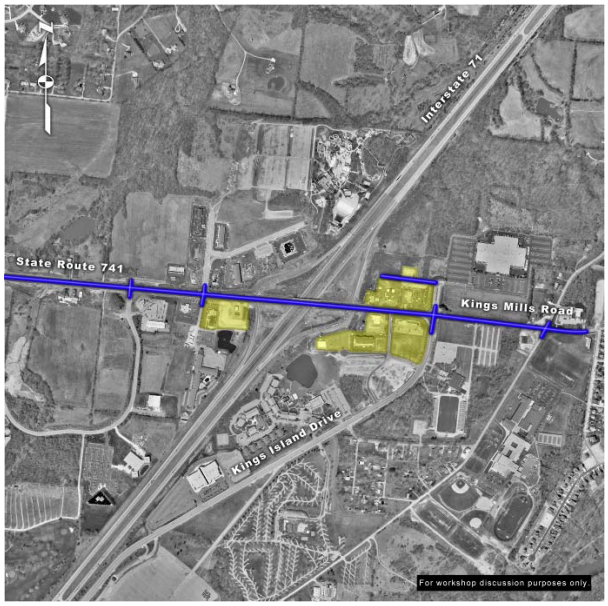
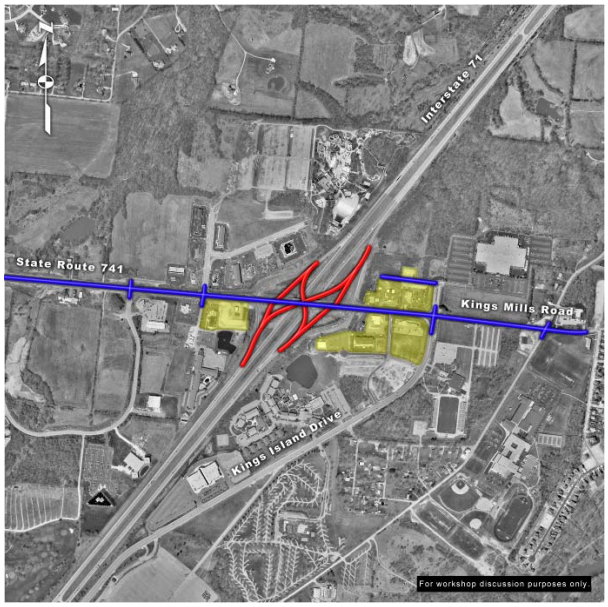


Figure 28 – SR 741/Kings Mill Road Interchange with I-71 (SPUI Configuration)



Full Interchange at Western Row Road

The current interchange configuration at Western Row Road does not allow complete access to I-71. Both proposed concepts would add access from Western Row Road to northbound I-71 and an off ramp from southbound I-71 to Western Row Road. The two configurations are shown in Figures 29 and 30. Configuration 1 shown in Figure 29 is the basis for the data presented on Table 13.

This interchange improvement was evaluated as a stand alone improvement as well as in conjunction with the previously described Western Row Road extension. As a stand alone improvement the completed interchange does not reduce study area delay or significantly divert vehicles off surrounding roads. Part of the purpose for this interchange was to divert vehicles away from the Fields Ertel/Mason Montgomery interchange with I-71. The largest improvement occurs on Mason Montgomery Road north of I-71 with a 2 percent reduction in the total daily number of vehicles (or 1,300 vehicles). Fields Ertel Road volumes drop by 200 and 400 vehicles per day west and east of the I-71 interchange respectively. The effect of this improvement in conjunction with the Western Row Road extension has been previously documented in the Western Row Road Extension section.

Figure 29 – Western Row Road Full Interchange (Configuration 1)

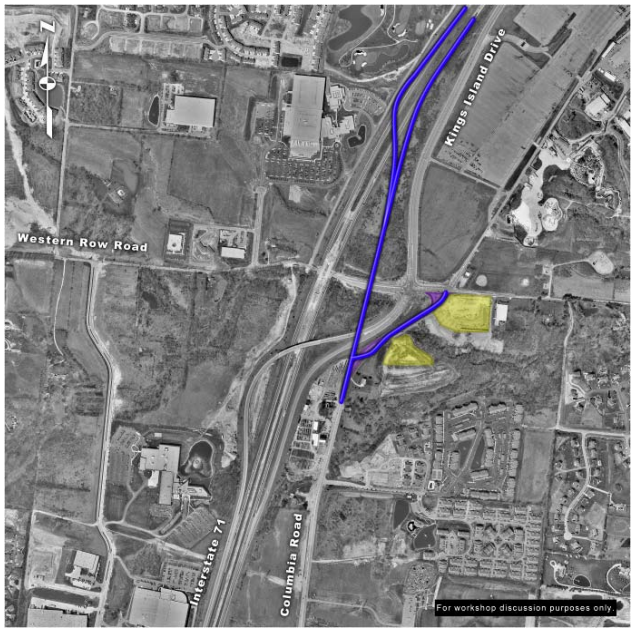
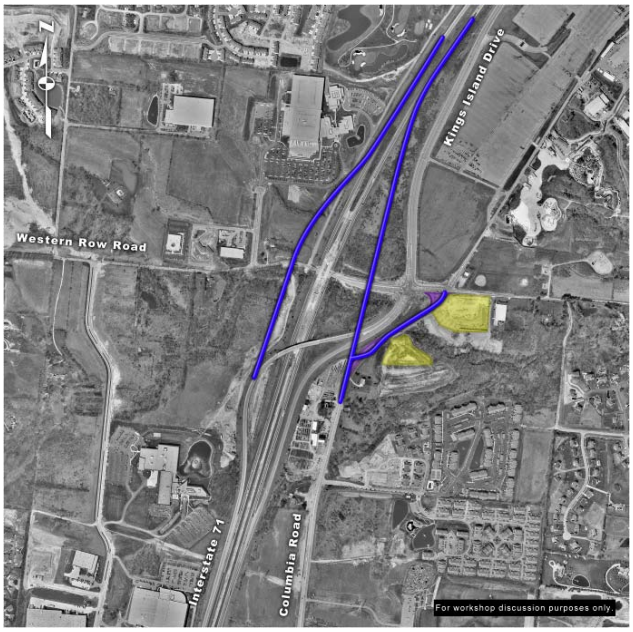


Figure 30 – Western Row Road Full Interchange (Configuration 2)



Secondary Roadway Improvements

Evaluation of all the primary highway improvements showed that travel mobility east and west in the study area had been improved a reasonable amount. This evaluation of secondary roadway improvements was completed prior to public input. Therefore, the primary roadway improvements evaluated in this combined network were all the original concepts (i.e. Bethany and Mason-Morrow-Millgrove Roads widening was as a six-lane major connector). In spite of the major improvements, large amounts of unacceptable delay (LOS E or F) still can be seen in the study area (Figure 31). In this figure, low congestion levels correlate to a LOS E. Medium to very high congestion levels are all worsening degrees of LOS F.

To improve mobility, nine existing roads were selected based on which ones could be prudently widened while protecting the environment and quality of life. They are listed below:

- Widen Butler Warren Road from one lane in each direction to two lanes in each direction between Barrett Road and Bethany Road
- Widen Snider Road from one lane in each direction to two lanes in each direction between Fields Ertel Road and Tylersville Road
- Widen Mason Montgomery Road from two lanes in each direction to three lanes in each direction between Fields Ertel Road and Western Row Road
- Widen SR 63 from one lane in each direction to two lanes in each direction between I-75 and SR 741
- Widen SR 741 (part 1) from one lane in each direction to two lanes in each direction between U.S. 42 and Kings Mill Road
- Widen SR 741 (part 2) from one lane in each direction to two lanes in each direction between SR 63 and Greentree Road
- Widen SR 48 from one lane in each direction to two lanes in each direction between U.S. 22 and Mason Morrow Milgrove Road
- Widen U.S. 22 from one lane in each direction to two lanes in each direction from Columbia Road to SR 48 (this includes widening the bridge)
- Widen Columbia Road between Kings Mill Road and Mason-Morrow-Milgrove Road from one lane in each direction to two lanes in each direction

Tables 14 and 15 list the individual impacts each of these improvements produced and Figure 32 displays their locations.

Figure 31 – Areas of Unacceptable Delay After the Implementation of All the Primary Improvements (Year 2030)

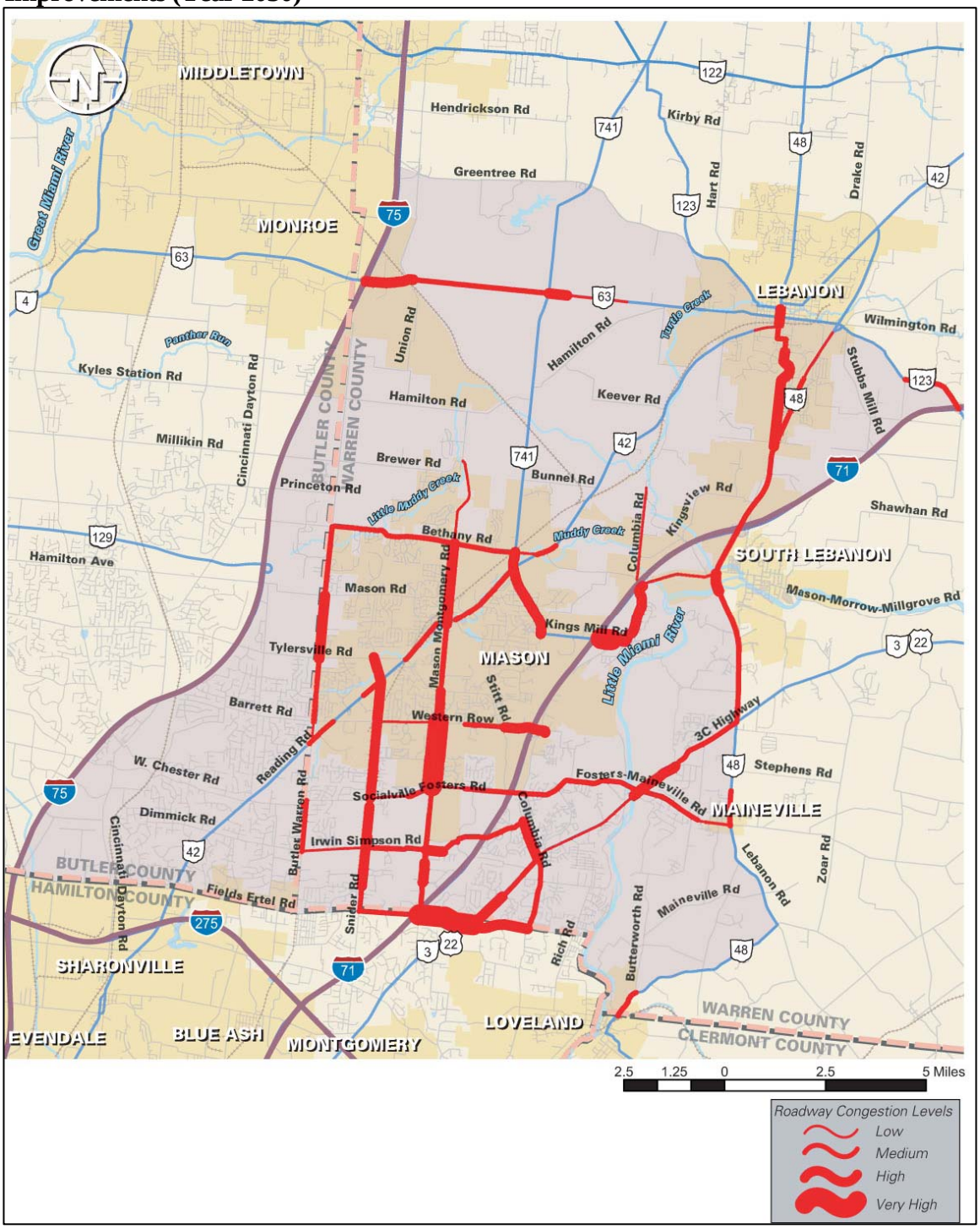


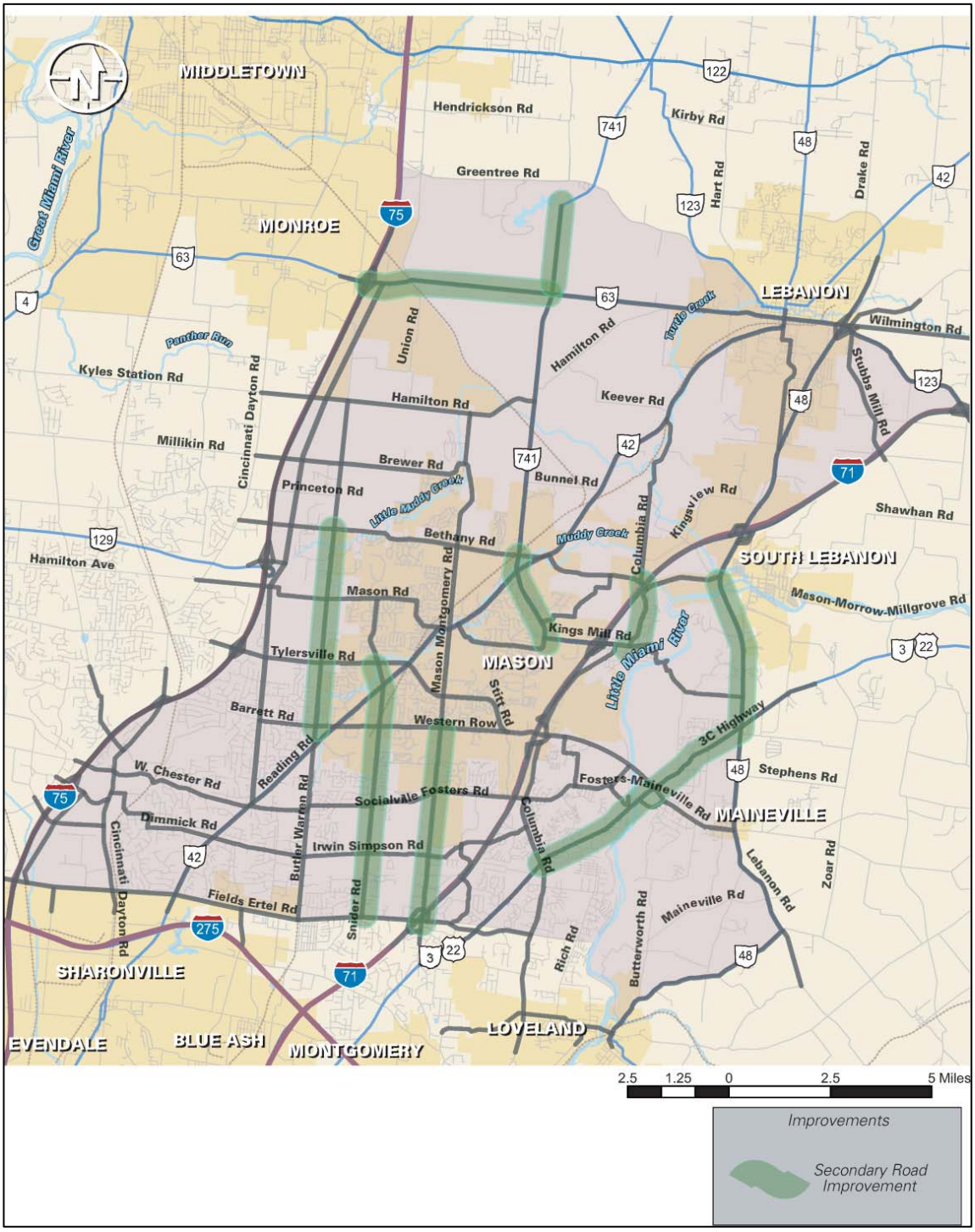
Table 14 – Impact Analysis for the Secondary Improvements

		No Build	Butler Warren Road	Snider Road	Mason Montgomery Road	SR 63	SR 741 (part 1)
	Preliminary Cost (millions)	$0	$14.2	$19.2	$7.2	$12.6	$6.4
	VMT	7,201,000	7,204,000	7,201,000	7,205,000	7,223,000	7,207,000
	VHT	283,000	284,000	282,000	279,000	282,000	281,000
	VHD	125,000	125,000	124,000	121,000	123,000	123,000
Volume (vehicles per day)	**Bethany Road** West of Butler Warren Road	14,500	14,500	14,500	14,600	14,400	14,400
	Bethany Road West of Mason Montgomery Road	13,500	13,300	13,400	13,500	13,300	13,500
	Bethany Road East of Mason Montgomery Road	12,500	12,300	12,400	12,100	12,200	12,700
	SR 63 East of I-75 interchange	28,100	27,900	28,000	28,100	34,000	27,900
	SR 63 West of Lebanon	11,900	11,800	11,900	11,900	13,500	11,700
	SR 63 East of Lebanon	20,900	20,900	20,800	20,800	21,200	20,800
	Tylersville Road East of I-75 Interchange	51,600	51,800	51,900	51,900	51,700	51,900
	U.S. 42 North of Tylersville Road	30,000	29,800	29,900	30,000	29,900	30,100
	Mason Road East of Butler Warren Road	11,700	11,400	11,900	11,600	11,500	11,400
	Western Row Road East of Mason Montgomery Road	9,100	9,100	9,400	9,700	9,100	9,100
	Mason Montgomery Road North of I-71 Interchange	67,000	67,000	66,700	73,700	66,800	66,800

Table 15 – Impact Analysis for the Secondary Improvements (Continued)

		No Build	SR 741 (part 2)	SR 48	U.S. 22	Columbia Road
	Preliminary Cost (millions)	$0	$9.2	$25.6	$43.9	$4.3
	VMT	7,201,000	7,207,000	7,216,000	7,196,000	7,200,000
	VHT	283,000	286,000	283,000	275,000	281,000
	VHD	125,000	128,000	125,000	117,000	123,000
Volume (vehicles per day)	**Bethany Road** West of Butler Warren Road	14,500	14,600	14,600	14,400	14,600
	Bethany Road West of Mason Montgomery Road	13,500	13,500	13,400	13,400	13,500
	Bethany Road East of Mason Montgomery Road	12,500	12,500	12,500	12,300	12,400
	SR 63 East of I-75 interchange	28,100	27,800	28,000	27,800	28,000
	SR 63 West of Lebanon	11,900	12,100	12,000	11,500	11,900
	SR 63 East of Lebanon	20,900	20,900	21,100	20,800	20,900
	Tylersville Road East of I-75 Interchange	51,600	51,800	51,800	51,800	51,800
	U.S. 42 North of Tylersville Road	30,000	30,000	29,900	30,000	29,900
	Mason Road East of Butler Warren Road	11,700	11,400	11,500	11,400	11,500
	Western Row Road East of Mason Montgomery Road	9,100	9,100	9,100	9,100	9,100
	Mason Montgomery Road North of I-71 Interchange	67,000	66,900	66,900	67,200	66,900

Figure 32 – Location of Secondary Improvements



Bikeway and Transit Improvements

Bikeways

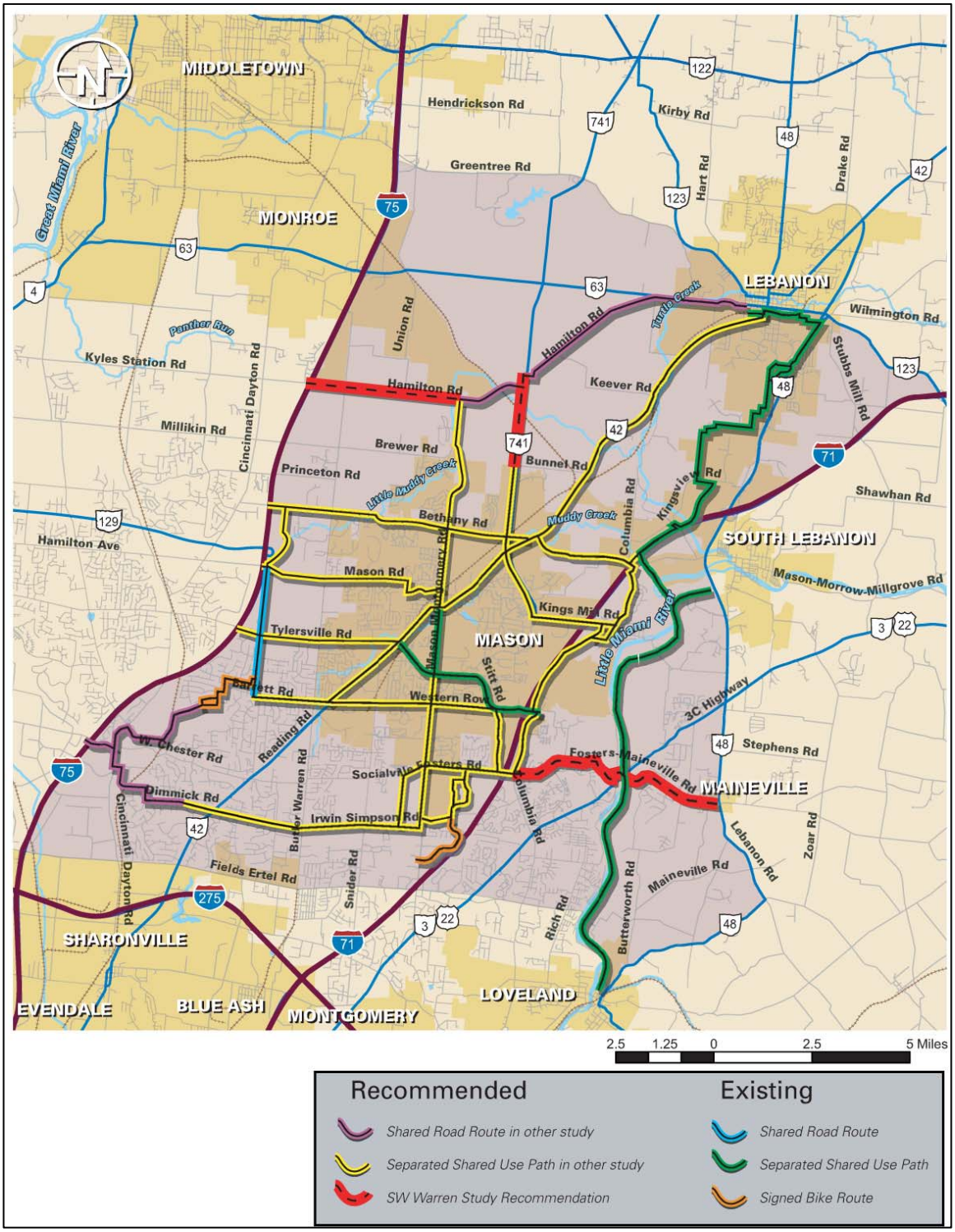
To determine the location of potential new bikeways, the study team first reviewed proposed bikeways from previous plans and studies. These included the Feasibility Study for the Miami 2 Miami Connection, City of Mason Bicycle and Pedestrian Master Plan, and OKI's Major Bicycle Corridors Map. From this investigation, three additional bikeway/pedestrian facilities were proposed. Figure 33 depicts their locations.

The Maineville Connector would continue the proposed separated shared use path on Socialville Fosters Road from Columbia Road, across the Little Miami River to Fosters Maineville Road, and follow Fosters Maineville Road to SR 48. The length of this connector is 4.0 miles with an estimated cost of $1.2 million that does not include right of way (ROW).

The Hamilton Connector would connect the proposed shared road route on Hamilton Road west from Mason Montgomery Road to I-75. This connector has an estimated cost of $1.1 million, not including ROW, and a length of 3.5 miles.

The last proposed connector, the SR 741 connector north, would extend the proposed separated shared use path on SR 741 from Bunnel Road north to Hamilton Road. The length of the SR 741 bikeway is 1.5 miles with an estimated cost of $0.6 million. Again, this cost does not include right-of-way.

Figure 33 – Proposed Bikeway Improvements



Transit

The currently developed portion of Southwest Warren County presents transit challenges that are common in most suburban areas. Residential development generally consists of middle and upper-class single family neighborhoods that tend to generate minimal transit usage. The existing commercial and office development tends to be set back from the roadway network, requiring any transit riders to walk long distances from bus stops across a sea of parking. The circuitous roadway network and diverse nature of the local street network (divided arterials and rural two-lane roadways) further complicate route planning.

Against this typical suburban backdrop, the study area does offer some potential opportunity for fixed-route transit. First, the express service to the Fields Ertel Park and Ride lot provides both inbound service to downtown Cincinnati and outbound reverse commute service to the study area. While the area transit destinations tend to be relatively sparse, Jewish Hospital North, the Proctor and Gamble Research Center, Mason Municipal Center, and the concentration of Mason schools provide a string of possible transit stops. Other office park concentrations along Duke Drive, Waterstone Boulevard, and Innovation Way could also generate some transit ridership. Finally, Paramount Kings Island could be a magnet for both employee and visitor transit trips during the summer season.

In response to these challenges and opportunities, the bus route displayed in Figure 34 was developed to link existing activity centers, retail development, schools, and residential neighborhoods with each other and with the express service originating at the current Park and Ride lot. The route would operate as a two-way loop, with service in both directions. The Park and Ride offers a convenient location for a layover, although there are no restroom facilities.

The Mason Montgomery Road portion of the route provides access to the various commercial and employment centers noted above. Bus stops would be located at half mile intervals, or less, at each of the activity centers. At Main Street, the route would connect to Kings Mill Road, which is generally residential in nature. Sidewalks along Kings Mill could help encourage some ridership in the residential area. The nature of the route changes again at SR 741 which consists of strip commercial, undeveloped land, and freeway-oriented development.

After crossing the freeway, the route turns south along Kings Island Drive. Passenger boarding and alighting in this stretch would tend to be seasonal, although the movie theatre across from Kings Island could generate some ridership. Turning west along Western Row, and south along Innovation Way, some limited transit activity could be generated by the office development along these streets. Columbia Road and Irwin Simpson East are generally flanked by residential development. Again, the existence of some sidewalks in the area could encourage transit usage originating in these areas.

The Anthem office complex at the corner of Irwin Simpson and Duke Drive signals another change in land use along the proposed route. As indicated in Figure 34, the route would

continue along Duke to a new connection over I-71 linking with existing Waterstone Boulevard. This route segment would serve existing office space and future office development that will occur on undeveloped parcels along Waterstone. The route then continues along the commercial stretch of Fields Ertel connecting to the existing Park and Ride lot. Figure 34 depicts the proposed circulator route as well as existing routes that are in the study area.

To estimate the capital and operating requirements for the proposed route, several assumptions were made regarding the hours and frequency of service. These assumptions are identified in Table 16. Weekday service would extend for 16 hours with 30 minute service in the morning and afternoon peak periods and hourly service in the mid-day and evening. Half hour service is also assumed all-day on Saturday, and hourly service on Sundays and holidays.

The operating costs are driven by the hours and frequency of service as outlined above. This service level would cost about $1 million per year. Increases to service (i.e. hours, frequency) would also increase operating cost. Reductions in hours or frequency of service would result in lower operating cost.

The proposed service could be operated with four vehicles in service at one time, plus one spare. Capital costs for five 30’ vehicles would be approximately $1,250,000. The high annual mileage associated with the routes would probably require vehicle overhaul or replacement at a shorter interval than usual.

Daily ridership for this route was estimated using the OKI regional travel demand model. This tool works well for predicting ridership on a corridor or regional level, but is less reliable at the route level. This is particularly true for unique routes such as suburban circulators with atypical trip generators (e.g., Paramount Kings Island).

The proposed circulator was modeled assuming two-way operation with 30 minute service in the peak and 60 minute service in the off peak. This route was appended to the existing METRO bus network, and the METRO fare structure was applied to the new route. The model indicated that about 1,500 daily trips would be attracted to the service, most of which would use the circulator to access peak hour express service to and from downtown.

Figure 34 – Proposed Circulator Route

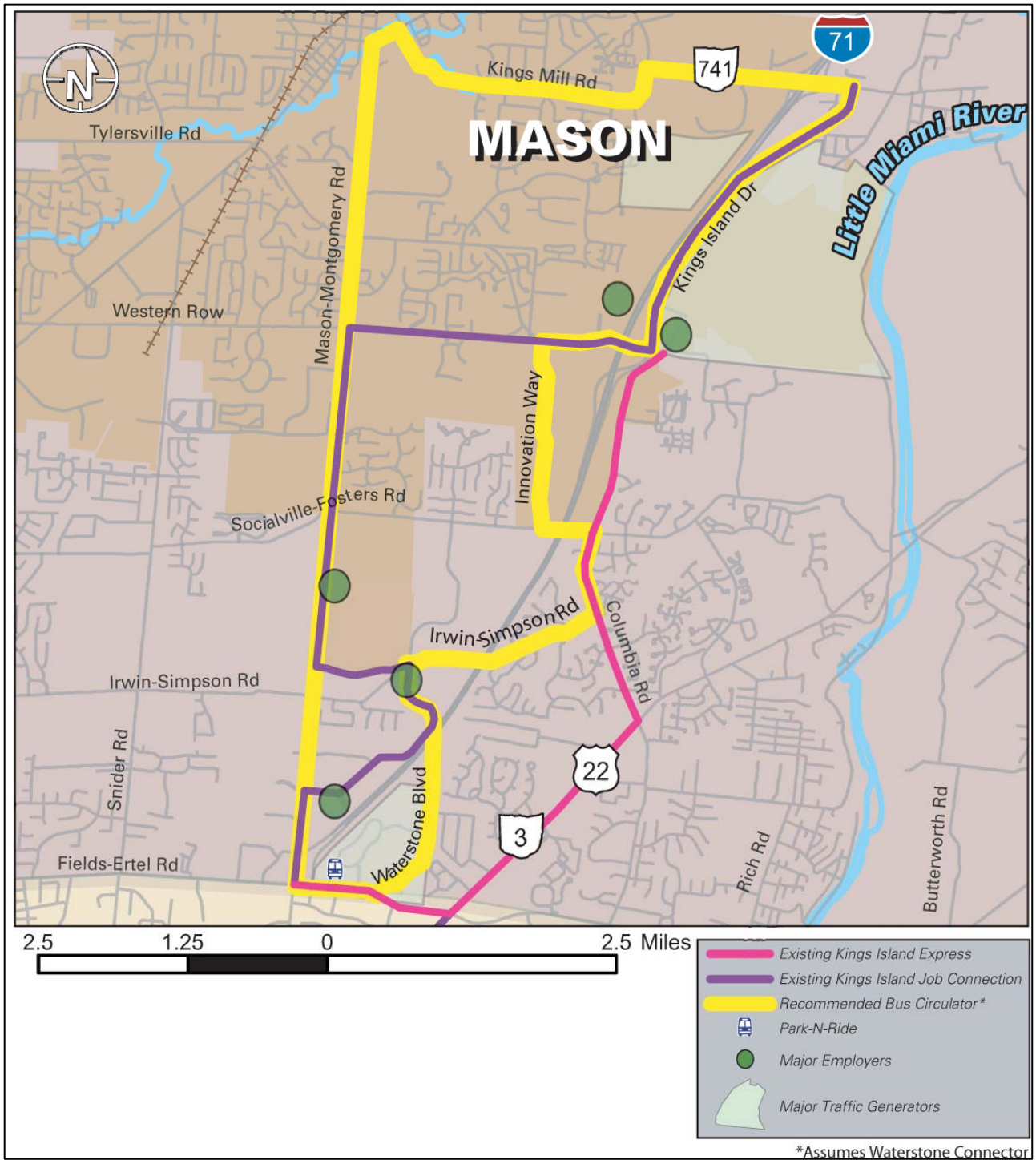


Table 16 – Cost Estimate for Southwest Warren County Transit Loop (Two-Way)

Inputs		**Source/Notes**
Route Length (miles)	14.4	Field survey
Average Speed (mph)	15	Professional judgement
Layover (minutes)		Reflected in 15 mph speed
Hours of Service		
morning peak	3	
miday	6	
afternoon peak	4	
evening	3	
Headway		
morning peak	30	
miday	60	
afternoon peak	30	
evening	60	
Saturdays	30	
Sundays & Holidays	60	
Cost per Hour	56.07	From TANK
Cap. Cost/Bus (30 foot)	250000	Professional Judgement
Boarding Fare	$ 0.80	From OKI Travel Demand Model
Transer Fare	$ 0.10	From OKI Travel Demand Model
Outputs		
Buses required	5	Includes 1 spare
Capital Cost	1250000	
Annual bus hours	16812	
Annual Operating Cost	1046849	Includes $104,200 in Annual Bus Replacement Costs
Annual bus miles	252180	
Annual miles/bus	50436	
Farebox Revenues	438000	

Additional Modeling Analysis

In addition to the model runs that were completed for each of the individual improvements, several more runs were done that included combinations of improvements. Most of these were for the city of Lebanon or the Ohio Department of Transportation (ODOT). The results of these runs were provided as volume plots to the city of Lebanon, ODOT, and the Warren County Engineer's office.

Several runs were also completed to determine the portions of roads that would have unacceptable delay should all the Primary improvements be built, should all the Primary and Secondary improvements be built, and how much widening would have to occur for all roads in the study area to be at an acceptable amount of delay. The results of these runs were presented to the public during the second round of public meetings in July 2005.

CHAPTER 6
PRIORITIZATION PROCESS

CHAPTER 6 PRIORITIZATION PROCESS

Once the Primary and Secondary Improvements had been approved by the Task Force for presentation at a third round of public meetings, it was necessary to prioritize them. This was accomplished in three stages. The first step involved presenting the technical data in terms of positive and negative impacts. The improvements were evaluated based on the following criteria:

- Operations
  - Level of Service (LOS) on the new/improved facility
  - Reduction in average congested speed
- Mobility
  - Reduction in study area Vehicle Hours of Travel (VHT)
  - Reduction in study area Vehicle Hours of Delay (VHD)
  - Reduction in average travel time within the study area
- Safety
  - Improvement to high accident locations
  - Potential Environmental Issues
  - Impact to wetland areas
  - Impact to air quality
  - Impact to cultural sites
  - Impact to streams
  - Impact to hazardous material sites
- Access to Interstates
- Overall Connectivity

The evaluation/prioritization matrix can be found in Figure 35. The estimated capital costs as presented at the Task Force meeting of June 24, 2005, are also listed for informational purposes. These criteria reflected the study goals and objectives and provided a means for measuring how well the improvements addressed the study area's transportation problems.

As shown in the matrix, LOS was determined for each new/improved facility and represented by a symbol. An LOS of A received a full bubble, LOS B received a ¾ bubble. LOS C received a ½ bubble, LOS D received ¼ bubble, and LOS E and F an empty bubble. For each improvement, reductions in the average congested speed, study area VHT, study area VHD, and average travel time were calculated by comparing the No Build conditions to that of each alternative. For safety, positive impacts were determined by whether the facility originally had a high number of accidents that could be reduced by the recommended improvement. To determine potential environmental impacts, each improvement was compared with the natural environment and human environment red flags.

Figure 35 – Evaluation Matrix

Evaluation/Prioritization Matrix

Improvement	Operations		Mobility			Safety	Potential Environmental Issues					Access to Interstate	Connectivity	Capital Costs (in millions)	SUM
	LOS[1]	Reduction in Ave Congested Speed	Reduction in Study Area VHT[2]	Reduction in Study Area VHD[3]	Reduction in Ave Travel Time[4]	Improvement to high accident locations	Wetlands	Air Quality	Cultural	Stream	Hazardous Materials				
Western Row Road Extension (includes LMR crossing)[6]	◑	●	●	●	●	●	◑	●	◑	○	◑	●	●	$51.5	●
Widen US 22 (including bridge)	◑	●	●	●	◕	●	◑	●	◑	◔	◑	◑	◑	$43.9	●
Bethany and Mason-Morrow-Millgrove Road Improvements[5]	◔	●	●	●	●	◕	◑	●	◔	◔	◔	◑	●	$35.0	●
Widen Mason Montgomery Road	◔	◑	●	◕	●	●	◑	◕	◑	◑	◑	◑	◑	$7.2	●
Upgrade Western Row to Full Interchange	●	◑	◕	◑	◕	●	◑	◑	◔	◑	◑	●	◑	$21.0	●
Upgrade SR 741 Interchange	●	◑	◕	◑	◕	◑	◑	◑	◑	◑	◑	●	◑	$30.0	●
Waterstone Connector	●	◑	◕	◑	◕	◑	◔	◑	◑	◑	◑	◑	●	$5.0	●
Widen Columbia Road	◕	◑	◕	◑	◑	◕	◑	◑	◑	◑	◑	◑	◑	$4.3	◕
Widen Snider Road	◔	◑	◕	◑	◕	●	◑	◑	◑	◑	◑	◑	◑	$19.2	◕
Glosser and Bunnel Road Improvements	◑	●	◕	◑	◕	◑	◔	◑	◑	◑	◑	◑	◕	$19.1	◕
Widen SR 63	○	●	◕	◑	◕	◕	◑	◑	◑	◑	◔	◑	◑	$12.6	◕
Widen SR 48 (including bridge)	◕	◑	◕	◑	◕	◕	◑	◑	◑	◔	◑	◑	◑	$25.6	◕
Widen Butler Warren Road	◔	◑	◕	◑	◕	◑	◑	◑	◑	◑	◑	◑	◑	$14.2	◕
Widen SR 741 between US 42 and Kings Mill Road	○	●	◑	◑	◑	◕	◑	◑	◑	◑	◔	◑	◕	$6.4	◕
Relocate and widen SR 741 between SR 63 and Greentree Road	◕	◑	◑	◔	◑	◑	◑	◔	◑	◑	◑	◑	◑	$9.2	◑
Widen SR 741 between SR 63 and US 42	●	◑	◑	◑	◔	◑	◑	◑	◑	◑	◔	◑	◑	$12.8	◑
FE/MM/I-71 Feasibility Study[7]						●	◑		◑	◑	◑	●	●	$0.4	●

○: Negative Impact
◔: Moderate Negative Impact
◑: Neutral Impact
◕: Moderate Positive Impact
●: Positive Impact

1 Level of Service on new/improved facility
2 Vehicle Hours of Travel within the study area
3 Vehicle Hours of Delay within the study area
4 Within the study area
5 4-lane facility
6 6-lane facility. Includes the cost of $21 million to upgrade the Western Row Road interchange
7 A feasibility study has been recommneded for the Fields Ertel/Mason Montgomery interchange with I-71 to find a detailed comprehensive solution

Damaging environmental impacts would include impacts to the Little Miami River or impacts to properties that might be eligible for the National Register of Historic Places. There was a positive impact on access to the interstate if an alternative had interchange modifications. Connectivity was a positive impact if the improvement increased mobility.

The second stage of prioritization involved using qualitative judgment. Based on the project team's knowledge and experience and consideration of the quantitative matrix, the projects were classified as high, medium, and low priority as indicated below:

HIGH PRIORITY

- Fields Ertel/Mason Montgomery/I-71 Interchange Feasibility Study
- Bethany and Mason-Morrow-Millgrove Road Improvements
- Waterstone Connector
- Upgrade Western Row Road/I-71 Interchange to Full Interchange
- Western Row Road Extension (includes LMR crossing)
- Upgrade SR 741 Interchange
- Widen Columbia Road between Kings Mill and Mason-Morrow-Millgrove Roads

MEDIUM PRIORITY

- Widen U.S. 22 between Columbia Road and SR 48 (includes bridge)
- Widen Mason Montgomery Road between Fields Ertel and Western Row Roads
- Widen SR 63 between I-75 and SR 741
- Widen SR 48 between U.S. 22 and Mason-Morrow-Millgrove (includes bridge)
- Widen Butler Warren Road between Barrett and Bethany Roads
- Widen SR 741 between U.S. 42 and Kings Mill Road
- Relocate and widen SR 741 between SR 63 and Greentree Road
- Bikeway Facilities

LOW PRIORITY

- Widen Snider Road between Fields Ertel and Tylersville Roads
- Glosser and Bunnel Road Improvements
- Widen SR 741 between SR 63 and U.S. 42
- Bus Circulator System

The last stage involved presenting both the evaluation/prioritization matrix and the prioritization of the projects to the Task Force for their consideration.

Using its judgment, the Task Force revised the priority for "the widening of Butler Warren Road" from the medium to the high priority category. Within each category all projects have equal priority.

CHAPTER 7
RECOMMENDED IMPROVEMENTS

CHAPTER 7 RECOMMENDED IMPROVEMENTS

There are nineteen recommendations for improving transportation in Southwest Warren County. The recommended improvements are intended to address existing transportation problems and meet future needs through 2030. The recommended projects and estimated costs are presented in Table 17, along with the projects' categorization as high, medium, or low priority. Figures 36-38 show the locations of the projects based on their priority.

The prioritization of the recommendations in Table 17 is consistent with the prioritization approved by the Task Force at its meeting on June 24, 2005. That list of prioritized projects was presented at the final round of public meetings in July of 2005. Public comments on the recommended projects were considered by the Task Force (see Chapter 5) and resulted in the recommendations approved by the Task Force at their meeting of August 19, 2005, and as presented in Table 17.

The total estimated cost of the recommended improvements is $305,650,000. The high priority projects represent 48% ($144.9 million) of the total cost. As a group, the eight high priority projects serve to improve the I-71 interchange at Fields Ertel-Mason Montgomery Roads and improve east-west connectivity and access to I-71. Specifically, the Fields Ertel-Mason Montgomery Roads interchange is addressed by the recommended Feasibility Study and the Waterstone Connector. Improvements to east-west connectivity rely on the recommended improvements to Bethany Road, the Western Row Road Extension, and Butler Warren Road (to improve access between Bethany Road and the Liberty Interchange slated for construction on I-75). Access to I-71 is to be improved by recommendations for the Western Row Road interchange, the SR 741/Kings Mill Road interchange, and Columbia Road (to improve access between the SR 741 interchange and Mason-Morrow-Millgrove Road).

The projects recommended in this study will be implemented depending upon state or local initiative. The initiative begins with ODOT, the county, or a local government identifying funds for implementation. Within each project category (high, medium, low priority), the projects can be implemented in any sequence providing that funds are identified.

Improvements to county and local roads depend on local funding. Improvements to state or federal roads are eligible for federal funding (80% federal and 20% local funds). For eligible projects to qualify for federal funds, this study must first be approved by OKI's Policy Board and the project must be included as a recommendation in the region's Metropolitan Transportation Plan, which is routinely updated by OKI. Projects that receive federal funding are then subject to ODOT's Project Development Process (referred to in Chapter V), which entails preliminary engineering and environmental studies and additional public involvement as a basis for design, engineering, and ultimate implementation.

Table 17 – Recommended Prioritization and Cost Estimates

HIGH PRIORITY	COST[a]
Feasibility Study for I-71 interchange at Fields Ertel and Mason Montgomery Roads to identify a comprehensive solution	$400,000[b]
Bethany Road – Widen and connect Bethany and Mason-Morrow-Millgrove Roads between Butler Warren Road and SR 48 (3-lane facility with right of way for 5 lanes)	$27,600,000
Waterstone Connector – Extend Waterstone Drive across I-71 to connect with Duke Drive	$5,000,000
Full interchange at Western Row Road	$21,000,000
Western Row Road Extension (includes LMR crossing) – Extend Western Row Road southeast and across the Little Miami River to connect with Fosters Maineville Road (6-lane facility)	$43,000,000[c]
Improvement to I-71 interchange at SR 741/Kings Mill Road	$30,000,000
Columbia Road – Widen one lane in each direction between Kings Mill and Mason-Morrow-Millgrove Roads	$4,300,000
Butler Warren Road – Widen one lane in each direction between Barrett and Bethany Roads	$14,200,000
Subtotal	**$145,500,000**
MEDIUM PRIORITY	
US 22 – Widen one lane in each direction between Columbia Road and SR 48 (includes bridge)	$43,900,000
Mason Montgomery Road – Widen one lane in each direction between Fields Ertel and Western Row Roads	$7,200,000
SR 63 – Widen one lane in each direction between I-75 and SR 741	$12,600,000
SR 48 – Widen one lane in each direction between US 22 and Mason-Morrow-Millgrove Road (includes bridge)	$25,600,000
SR 741 – Widen one lane in each direction between US 42 and Kings Mill Road	$6,400,000
SR 741 – Relocate and widen between SR 63 and Greentree Road	$9,200,000
Bikeway Facilities	$2,900,000
Subtotal	**$107,800,000**
LOW PRIORITY	
Snider Road – Widen one lane in each direction between Fields Ertel and Tylersville Roads	$19,200,000
Glosser and Bunnel Road Improvements – Add one lane only. Extend Glosser north to SR 123 and south to Fujitec Drive and Bunnel to McKinley Road	$19,100,000
SR 741 – Widen one lane in each direction between SR 63 and US 42	$12,800,000
Bus Circulator System (Capital Costs)	$1,250,000[d]
Subtotal	**$52,350,000**
GRAND TOTAL FOR ALL IMPROVEMENTS	**$305,650,000**

[a] Estimates do not include cost for right-of-way, utilities, engineering, or administration.
[b] The rough cost of reconstructing the interchange is $150 million. Due to the high cost, a feasibility study is recommended to identify a comprehensive solution that might be less expensive.
[c] This cost has been previously shown as $30,500,000 for a six lane facility. The cost has been updated to include additional information.
[d] Annual operating costs estimated at $1.05 million, part of which would be covered by farebox revenues (estimated $.48 million) and part of which would be subsidized (estimated $.57 million annual subsidy).

Figure 36 – High Priority

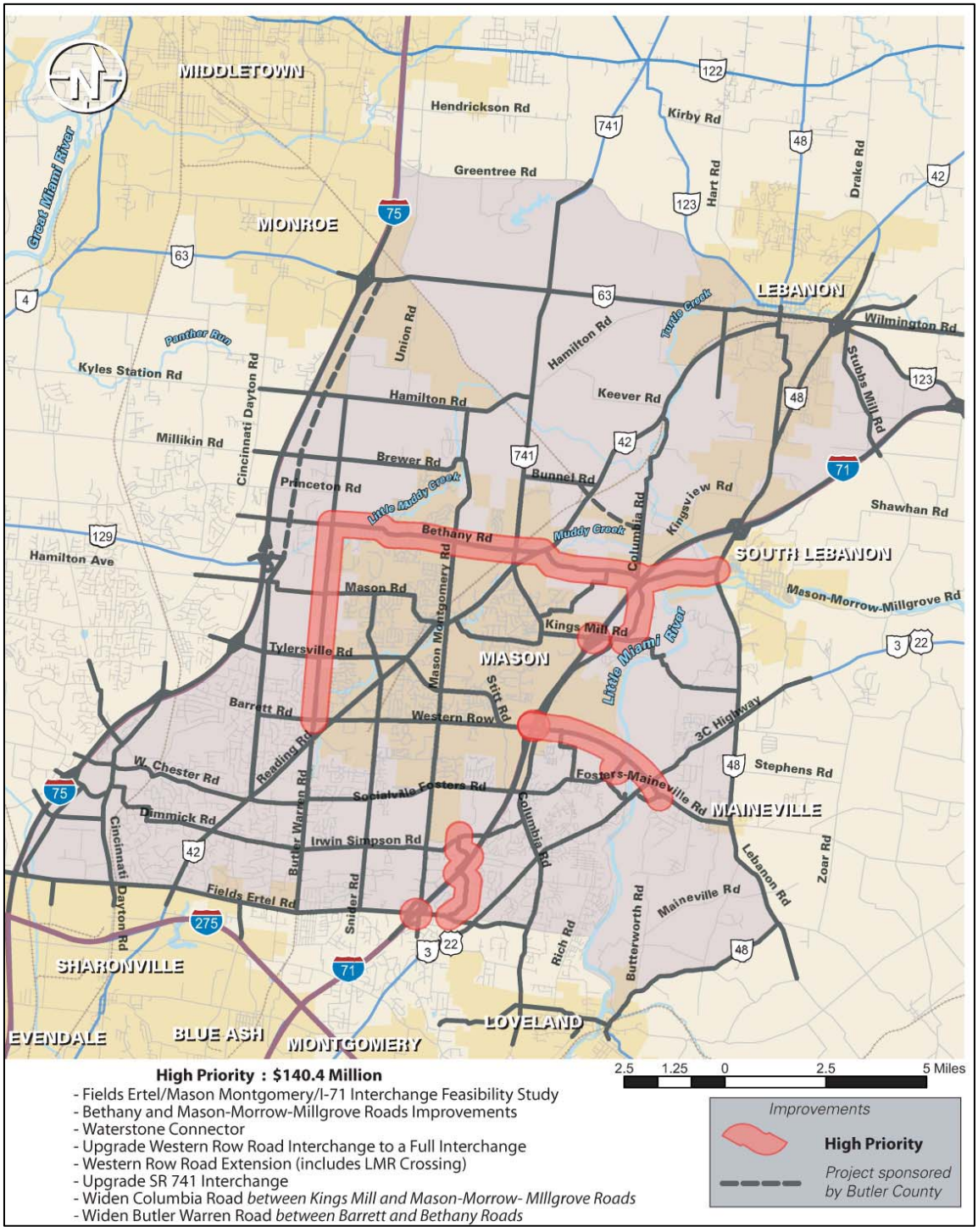


Figure 37 – Medium Priority

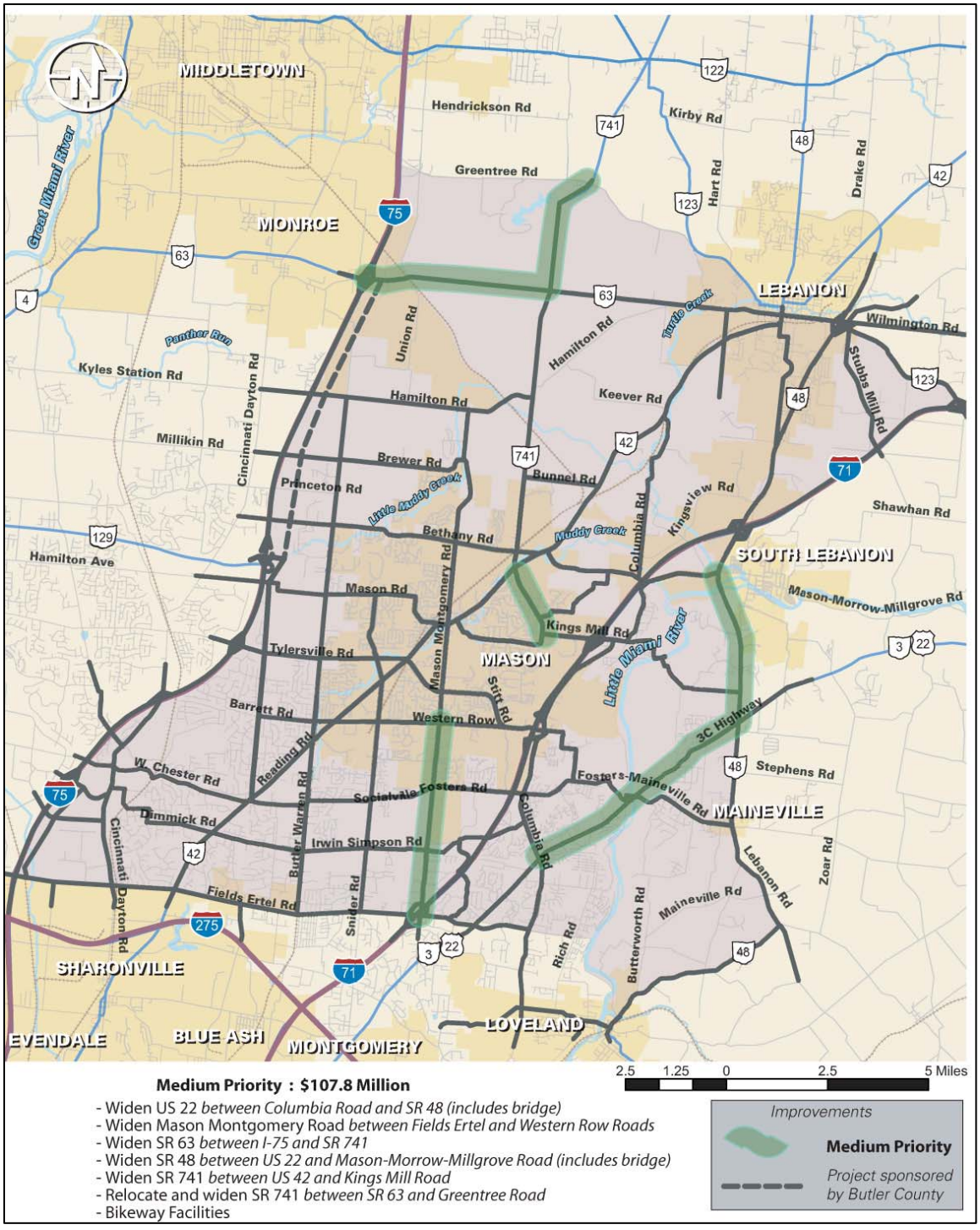
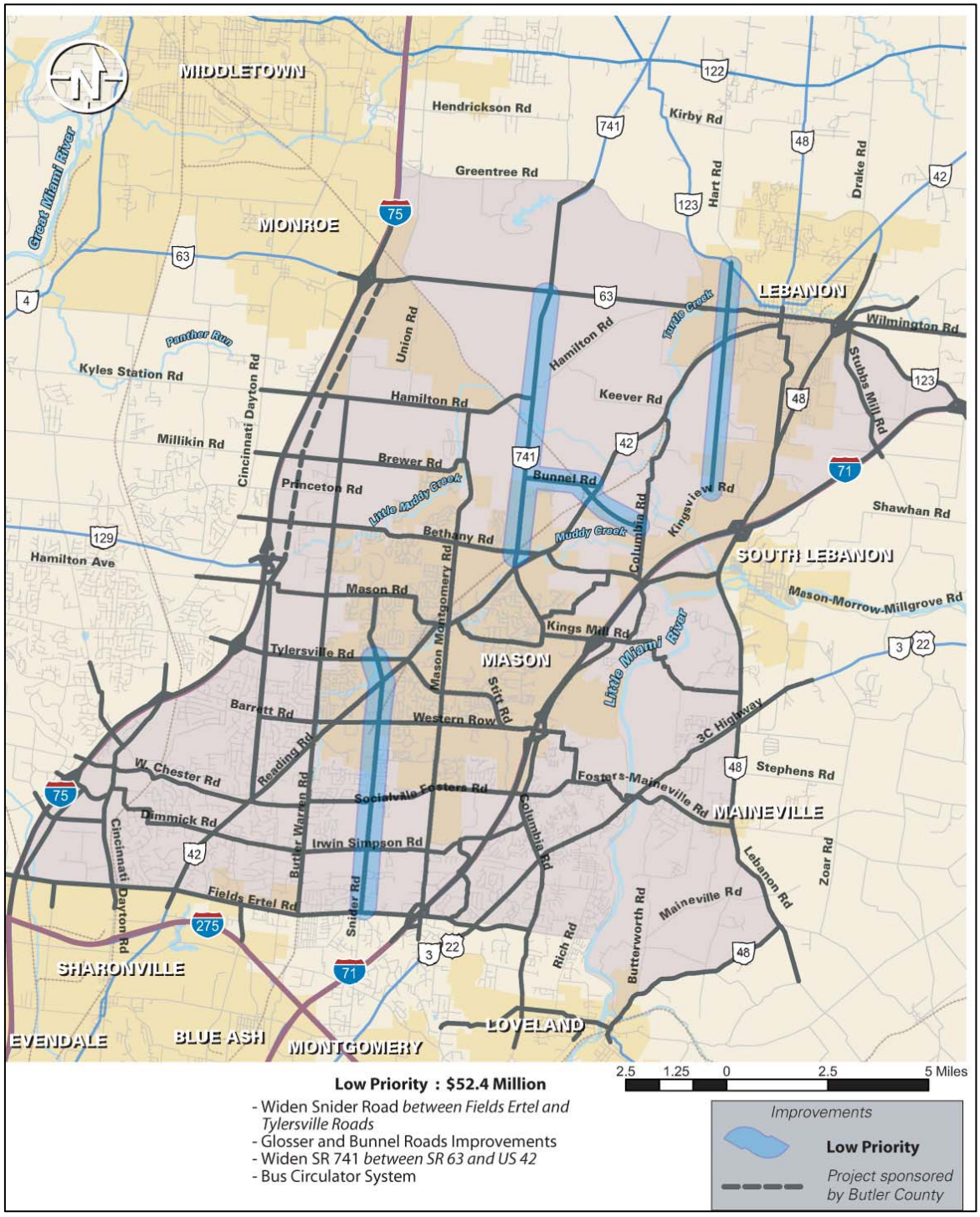


Figure 38 – Low Priority



APPENDIX A
LEVEL OF SERVICE ANALYSIS

APPENDIX A LEVEL OF SERVICE ANALYSIS

A Level of Service (LOS) analysis for all the Primary Improvements was completed to see which roads had an unacceptable amount of delay. The 24-hour trip information was used from the OKI model. This information is a valuable tool to determine change in volume, travel time, and delay but requires adjustment to properly calculate a usable LOS. This adjustment involved refining the traffic volume by one of two methods depending on the 2004 count volumes. If the 2004 count in a location was greater than 2,000 vehicles, the 2004 model volume was subtracted from the 2030 model volume and this volume difference was applied to the count volume. If the 2004 count was less than 2,000 vehicles, the 2030 model volume is divided by the 2004 model volume and this ratio is applied to the 2004 count (refer to the equations below).

If 2004 count volume >2,000 vehicles
2030 refined traffic volume = (2030 model-2004 model) + 2004 count
If 2004 count volume <2,000 vehicles
2030 refined traffic volume = (2030 model/2004 model) * 2004 count

This process is also detailed in the National Cooperative Highway Research Report (NCHRP) number 255 and was agreed upon by the members of the project team during the October 11, 2004 meeting. There were several roads in the study area that did not have count data. The refined traffic volume on these roads was estimated using a general ratio of 1.13 which was applied to the 2030 model volumes of these roads. This ratio was based on all the other roads within the study area. The 2030 No Build refined traffic volume compared with the 2030 No Build model volume was taken for all roads to create this ratio.

The peak hour LOS was then calculated by multiplying the refined traffic volume on each roadway link by 0.10 (10 percent peak hour factor) and 0.60 (60 percent directional factor) and then dividing by the number of lanes and the hourly capacity. This method of calculating LOS was established and documented by the project team in the October 21, 2004 memo.

It should be noted that the *relative* change in LOS is the most important aspect of the analysis. Any travel demand model is incapable of analyzing signal timing, width of the road, or other pertinent data in calculating an accurate LOS. What the model can give is a measure of relative improvement. In order to measure the true operational impacts of these alternatives, a more detailed analysis is warranted using an operational modeling tool, such as Synchro, to specifically quantify the interaction of signals and intersection/alignment geometry.

By 2030, traffic conditions are expected to deteriorate to the point where 67 percent of the Study Area Road Network (SARN), not including the interstates, will be operating at LOS E or F. If all of the original four primary roadway improvements are constructed, 53 percent of the SARN will operate at LOS E or F, (this includes the Lebanon Bypass and Bethany Road

widened to six lanes). If all roadway improvements are constructed the SARN will operate with 41 percent of its roadways at a LOS of E or F.

APPENDIX B
EXISTING & FUTURE CONDITIONS REPORT

Southwest Warren County Transportation Study

Existing and Future Conditions Report

June 2005

Prepared for:

OKI
Ohio · Kentucky · Indiana
Regional Council of Governments

Consultant Team:

BURGESS & NIPLE

and

JJb

Southwest Warren County
Transportation Study

Table of Contents

List of Figures

List of Tables

List of Charts

Introduction

This report details existing and future transportation conditions for a study area in Southwest Ohio. The study area is located primarily in southwest Warren County and is bounded on the north by State Routes 63 and 123; on the east by I-71 and State Route 48; on the south by the southern Warren and Butler County lines; and on the west by I-75. **Figure 1** shows a map of the study area. The following document provides socio-economic, trip distribution, trip growth, and trip characteristic data of 2004 and 2030 travel conditions.

History

The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) is conducting a Major Investment Study (MIS) for southwest Warren County. It includes all or part of the following jurisdictions in Warren County:

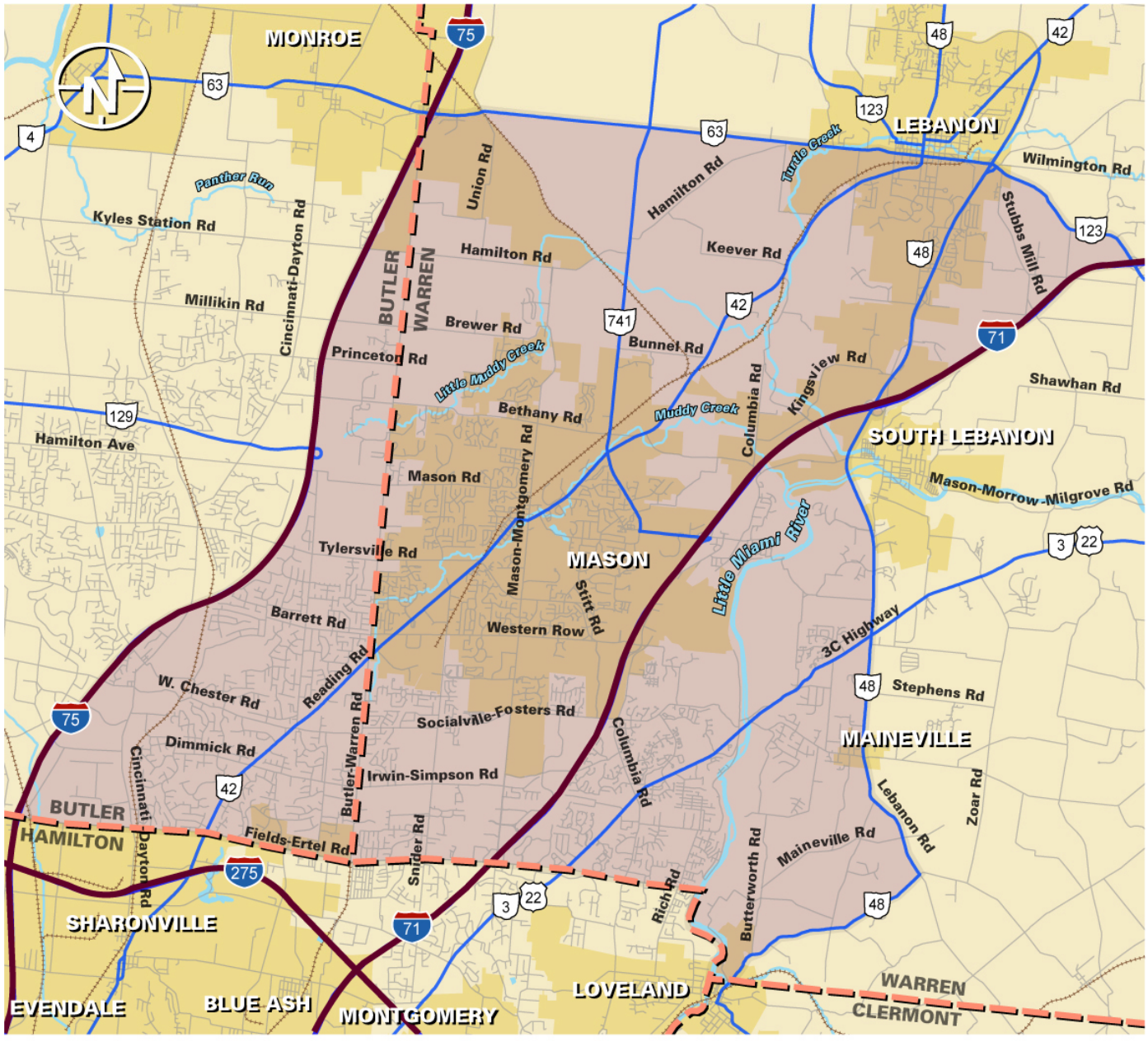
- City of Lebanon
- Deerfield Township
- Union Township
- Turtlecreek Township
- City of Mason
- Hamilton Township
- South Lebanon
- Maineville
- City of Monroe

The study area also includes parts of Liberty and West Chester Townships in Butler County, to develop the regional transportation model and analyze impacts of these areas on southwest Warren County. However, this study will not evaluate or recommend any improvements within Butler County.

Study Scope

The goal of the Study is to create a transportation plan that strives to achieve balance in meeting transportation, environmental and quality-of-life goals. The plan will be developed using various outreach techniques for the Public and Stakeholders utilizing ODOT's latest version (dated November 2004) of their Project Development Process. An overriding goal is to produce a plan that will improve regional mobility of people and goods, and that can be locally supported to facilitate implementation.

Figure 1: Study Area



OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

Section 1:
Existing Conditions

Data Collection

Data was collected to document regional mobility constraints, basic roadway and infrastructure capacity, and regional environmental concerns within the study area. The base data in the existing conditions report is from secondary source data documenting existing or known conditions. Examples of data sources include: existing land use, zoning, and transportation plans; existing geographic or environmental information; and existing transportation/roadway infrastructure, traffic counts, accident data, etc. Data was collected from OKI, Warren County and the cities and townships within the study area. This data was supplemented, as required, by field data, field counts, traffic analysis, etc. to document the operation of existing transportation system and existing conditions that may influence future improvements either positively or negatively.

Existing Transportation Studies

Several transportation studies have been completed or are ongoing within or just outside the study boundaries. These studies address regional mobility of the I-75 and I-71 corridors, which, if implemented, would influence transportation needs within the study area. Other studies address and examine localized areas of congestion in the study area.

Liberty Interchange (2003)

Butler County Transportation Improvement District (BCTID) is proposing a Liberty Interchange that would modify the I-75/State Route 129 interchange by connecting it to Hamilton Road and extending Cox Road to the north. This will provide access to and from I-75/State Route129 to the area east of I-75. OKI has approved adding the Liberty Interchange to both the short range (2005-2008) Transportation Improvement Program (TIP) and the 2030 Regional Transportation Plan.

The BCTID is finalizing the Major Investment Study (MIS) at this time. They have also initiated an Interchange Modification Study (IMS) and environmental studies in advance to expedite the project. The IMS will determine how the Liberty Interchange will affect traffic volumes and roadway capacity levels on I-75, State Route 129, Tylersville, Hamilton and Cox Roads in the area. This will affect traffic demand on the western side of the study area.

I-75 Corridor Study –North South Transportation Initiative (2003)

In 2000, the Miami Valley Regional Planning Commission (MVRPC) and OKI undertook a major planning effort know as the North South Transportation Initiative (NSTI). The Initiative is a comprehensive evaluation of the transportation needs within the major north/south transportation artery that spans nearly 100 miles from Northern Kentucky, through Cincinnati and Dayton to the Miami County line. The transportation corridor that is being studied includes the major cities of Cincinnati, Middletown and Dayton as well as seven (7) counties, 22 other cities, six villages and 14 townships. Principle elements of this corridor include Interstate 75 (I-75) and its adjacent north/south railroad lines.

Components of this study have been identified for implementation within the study area. Currently ODOT is adding one lane in each direction on I-75 from I-275 to Tylersville Road. Two major I-75 interchange modifications have been identified and advanced in the planning process at State Route 63 and State Route 129 (Liberty Interchange).

I-71 Corridor Study (1998)

In 1998, OKI completed the Final Report on the I-71 Corridor Transportation Study. The study explored mass transit alternatives along the I-71 Corridor from Kings Mills in Warren County to Florence and the Greater Cincinnati Airport in Kentucky. Light Rail Transit (LRT) was ultimately selected as the preferred alternative for this corridor. This alternative was 42.97 miles in length. In 1996 dollars the estimated cost was $1,157,597,000 or $26,937,000 per mile.

Because of the cost of the system, obtaining funding was an issue. Federal funding assistance was available; however, a local matching commitment was needed to secure the Federal funds. A tax initiative was proposed in Hamilton County to increase the county sales tax one cent to fund the local share of a LRT system from downtown Cincinnati to Blue Ash. The electorate turned down this tax increase.

Butler State Route 63 Corridor Extension Study (2000)

The State Route 63 Corridor Study refers to a collective undertaking by local and regional representatives, including the Butler County Engineer's Office, to study the possible establishment of an east-west transportation corridor across northern Butler County. The study begins at the I-75/State Route 63 interchange and runs west past the City of Trenton to the City of Oxford.

Three options were considered:

1. Build a controlled-access highway on new or combined new and existing alignment within the corridor;

2. Upgrade and possibly widen existing roadways;

3. No build.

The draft Environmental Impact Statement (EIS) was sent in February 2003 to the Federal Highway Administration for review and comment. Since that time the Butler County Engineer's website reports that "The inability to secure local funding has effectively closed the project 12/12/03 -- The Ohio Department of Transportation's TRAC (Transportation Review Advisory Council) committee -- ODOT's official project review board -- released its revised list of major new highway projects on Tuesday, December 9, 2003. The list did not include funding for the State Route 63 Extension. The $27.7 million that had originally been allocated for the project was withdrawn by TRAC because of insufficient local match funds. It is unlikely that there will be any further development of the State Route 63 Extension at this time."

Lebanon Truck Origin & Destination (O&D) Study (2002)

The Warren County Engineer's Office in cooperation with the City of Lebanon prepared this study in 2001/2002. The purpose of the O-D study was to determine the following traffic characteristics of trucks on numbered routes (State and U.S. Routes) within the City of Lebanon:

- To determine the number of trucks entering and leaving the City limits.
- To identify truck traffic classification.

- To distinguish trucks entering Lebanon for local business from trucks that have non-Lebanon related destinations.
- To determine the origin (point of entry) and destination (point of exit) of both through and Lebanon-based truck trips.

The following general conclusions, resulting from the O-D survey, are of particular importance to the SWWCTS:

- 46% of all truck traffic in the City is caused by trucks traveling through the City without stopping. The percentage (53%) is even higher for Heavy Trucks.
- State Route 63 and State Route 123 (east of City) accounted for 63% of the total truck trip ends, and 75% of the total heavy truck trip ends. Of the 330 validated "through" heavy truck trips, 72% traveled between State Route 63 and State Route 123 (east). Similarly, 82% of the total "through" trips used this route. This data shows that a large majority of non-Lebanon related traffic is traveling from east to west. In 2003, 665 trucks traveled State Route 63 and State Route 123. Of these, 343 (52%) traveled through the City. In 2003, 665 trucks traveled State Route 63 and State Route 123. Of these, 343 (52%) traveled through the City.
- 3.2 trucks per minute enter Lebanon during the peak traffic hour, 1.5 of which are through trips.
- 60% of the truck traffic entering the City on State Route 123 from the east originates from I-71, or farther east.
- 87% of the truck traffic entering the City on State Route 63 from the west is originates from I-75, or farther west.

Fields Ertel Road/Mason Montgomery Road Interchange Feasibility Study (2004)

A recent study was conducted in coordination with the Hamilton County and Warren County Engineer's Offices to study feasible alternative improvements at the Fields Ertel Road/Mason Montgomery Road Interchange. The study documented significant problems at the interchange, which frequently caused system breakdowns on I-71, Fields Ertel Road and Mason Montgomery Road. Problems were identified which included insufficient capacity along Mason Montgomery Road north of the interchange area, insufficient capacity at the southbound on-ramp to I-71, and insufficient queue storage area between intersections. A primary challenge at the interchange is the presence of a directional distribution, which varies significantly between AM, Noon, and PM peak periods overloading different segments of the interchange area.

The final recommendations of the study included the identification of multiple TSM improvements, which have the potential to reduce the frequency of system breakdowns, caused by minor incidents on the system. The need to provide additional connections to both I-71 and between Mason Montgomery Road and Fields Ertel Road was also identified as a recommendation to reduce congestion within the interchange. Significant improvements at the Fields Ertel Road/Mason Montgomery Road interchange were not identified due to 1) the significant impacts associated with expansion of the interchange and 2) the poor geometry at the interchange due to the alignment and proximity of I-71 with Mason Montgomery and Fields Ertel Road.

Roadway Infrastructure

Systems Inventory

The study area contains over 600 miles of roadway serving local, countywide and regional traffic demands. Roads within the study area are comprised of over 24 miles of interstate with I-75 and I-71 bordering the study area and over 50 miles of State and U.S. Routes. Additional countywide and regional traffic connections are made by county and city maintained roadways. Approximately 400 miles of roadway within the study area serves local traffic. For the purpose of this study local roads will not be evaluated, and only major roads that provide city, county or regional connectivity within the study area will be included. **Figure 2** shows the S**tudy Area Roadway Network (SARN)** to be used in the existing conditions analysis and evaluation.

Data collection and analysis efforts were undertaken to document the existing geometric, safety and operational conditions of the SARN to identify existing transportation needs and available capacities within the existing system. Traffic volume data was obtained from the traffic count programs maintained by the Ohio Department of Transportation, the Warren County Engineer's Office and the City of Mason Engineering Department. Traffic volume data for the years 1999-2003 was collected from these sources and increased by a 6% annual growth rate to represent 2004 traffic volumes. This information was supplemented by 24-hour traffic volume and vehicle classification data collected by the project team. **Figure 3** shows the Average Annual Daily Traffic (AADT) volumes on the SARN. This information was used for preliminary analysis and in providing validation and calibration of the OKI regional travel demand model, which was used to estimate travel volumes for all study roads for both year 2004 and year 2030.

Traffic control at all major intersections within the study area was documented to identify potential choke points on the network. The SARN contains over 500 intersections, 105 of which are controlled by a traffic signal. Twenty intersections on the SARN are controlled by four-way stop signs. These intersections present a significant capacity reduction of through traffic along the major routes. **Figure 4** shows the intersection traffic control present on the SARN.

In addition to traffic volume and control data, the project team also collected roadway information. Roadway information collected included documentation of the roadway sections including the number and width of lanes, shoulder widths and general vertical grades along the roadway. Approximately 150 miles of the 200 miles of roads on the study network are two-lane facilities with lanes ranging from 10 to 11 feet. The majority of these roads have little or no shoulder and minimal auxiliary turning lanes. This section is typical in the more rural sections of the study area where traffic volumes and demand is less. This information was used in later stages of the project for the determination of roadway capacity along the SARN.

The project team also identified horizontal and vertical geometric deficiencies present on the roadway network. These included areas where advisory speed limits and advanced warning signs were present and in locations noted in the field investigations where deficient sight distance and/or design speeds were present. Several locations have been documented which have advisory speeds of 10 mph or less with significantly restricted sight distance. Geometric deficiencies such as these can cause both operational and safety problems. In addition, extremely deficient areas may necessitate restrictions of larger vehicles as is present on Cox-Smith Road, which serves the Lebanon Commerce Park. These areas are shown as "Warning" in **Figure 5**. Other factors that can impact roadway operations, including at-grade railroad crossings ("Railroad"), one-lane roadways ("One Way"), underpasses with low clearance ("Low Clearance") and school zones ("School Zones") are also shown in Figure 5.

Figure 2: Study Area Roadway Network (SARN)

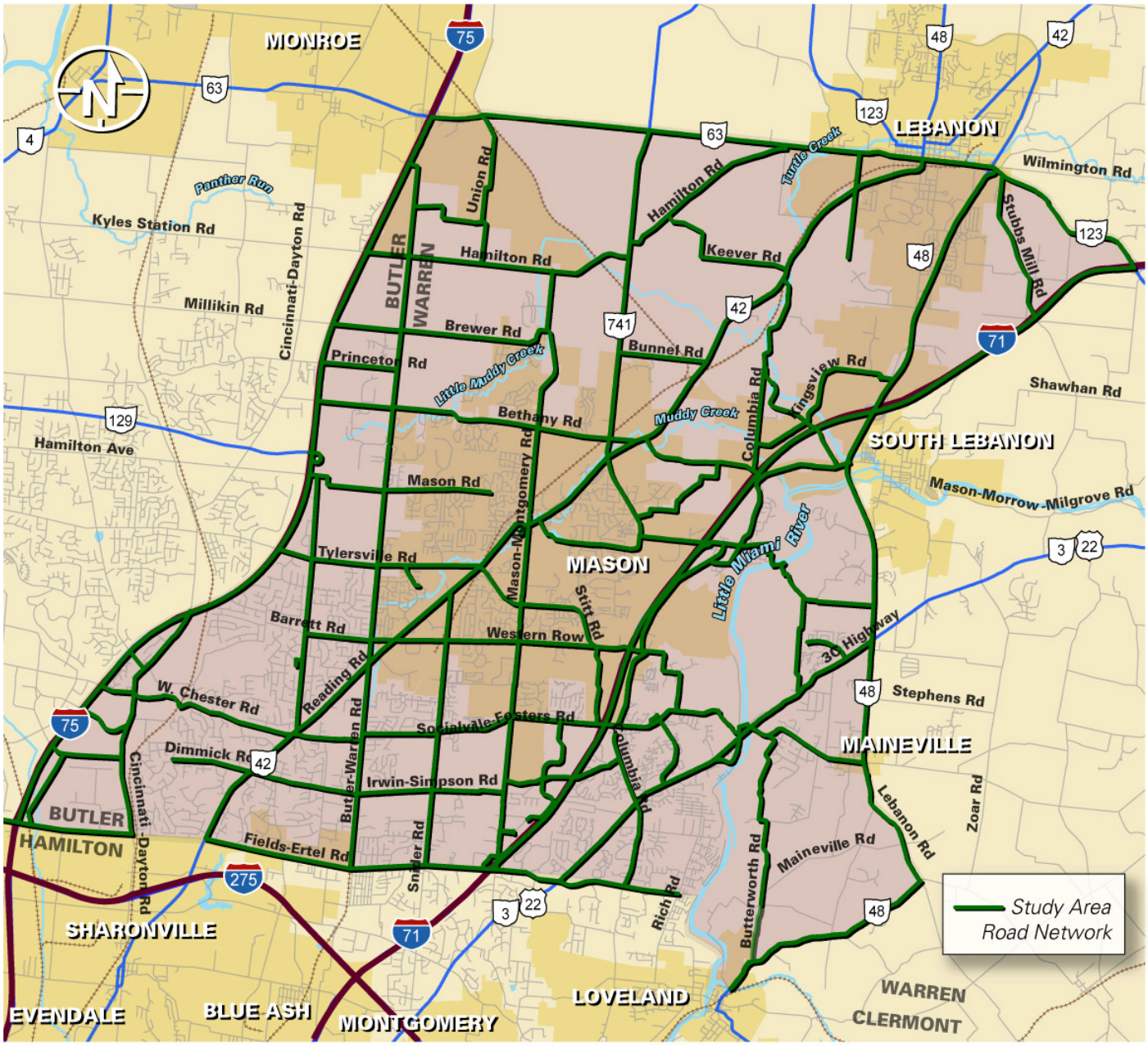
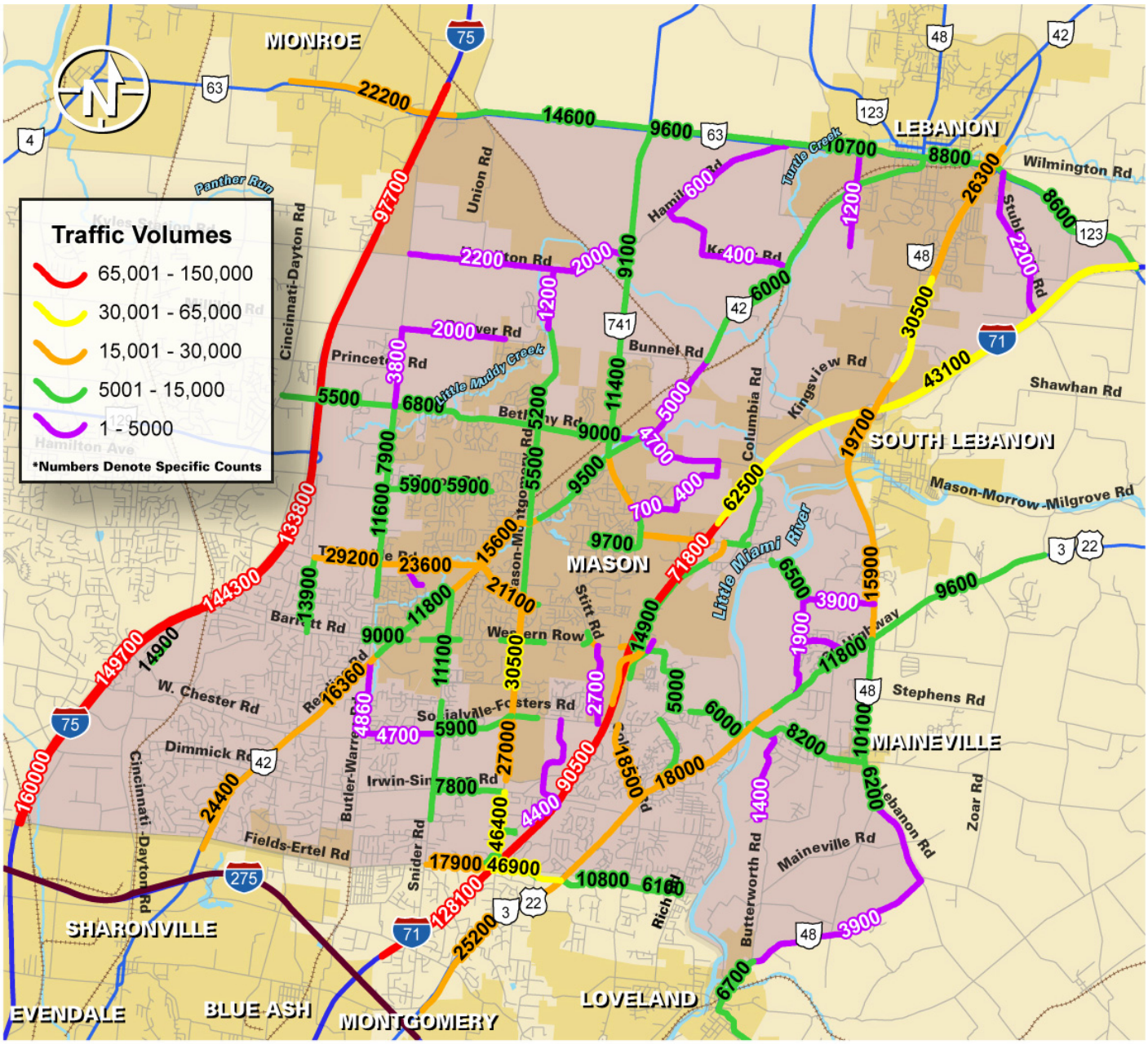


Figure 3: Existing (2004) Traffic Volumes



2.5 1.25 0 2.5 5 Miles

OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

Figure 4: Traffic Control

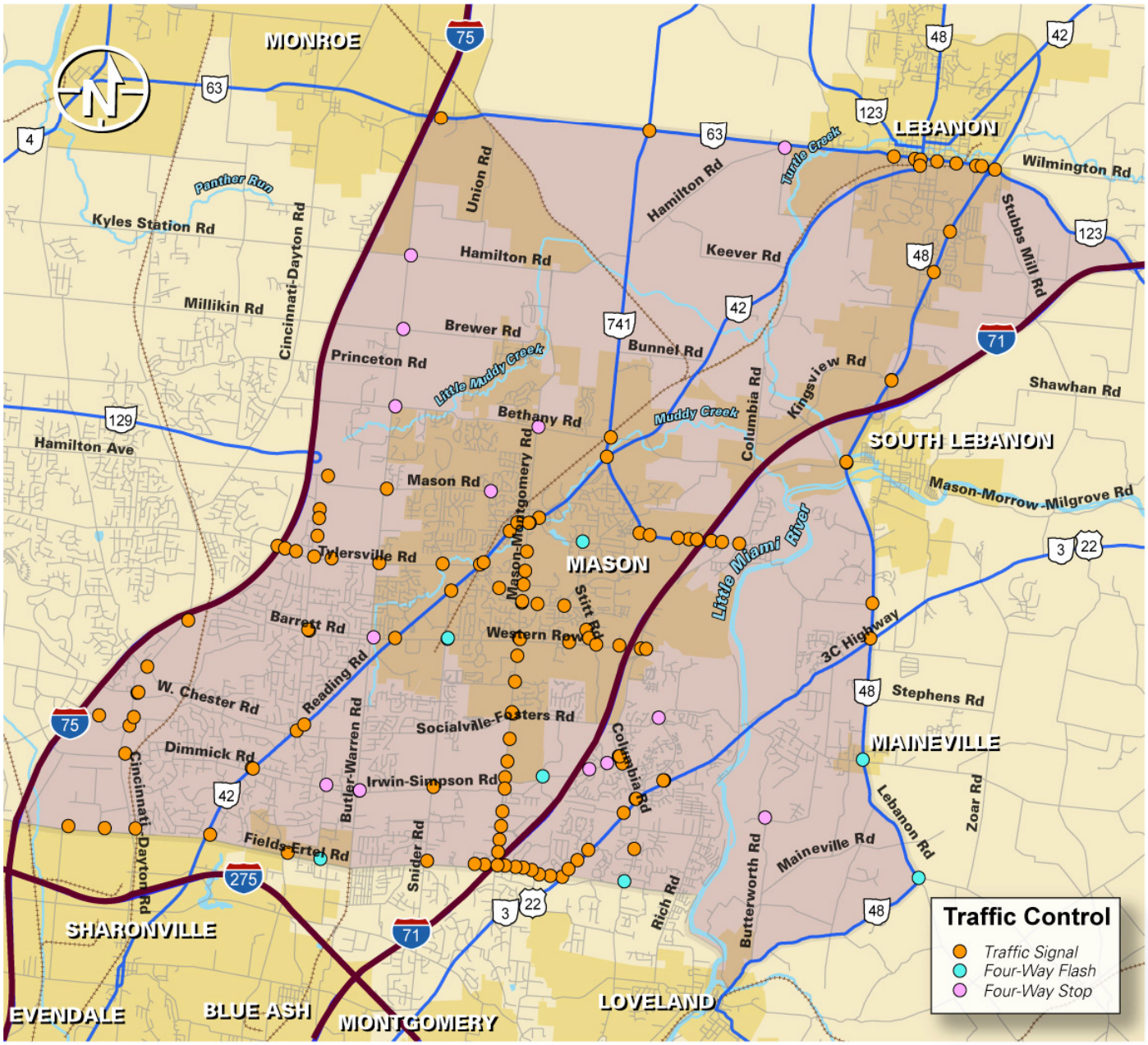
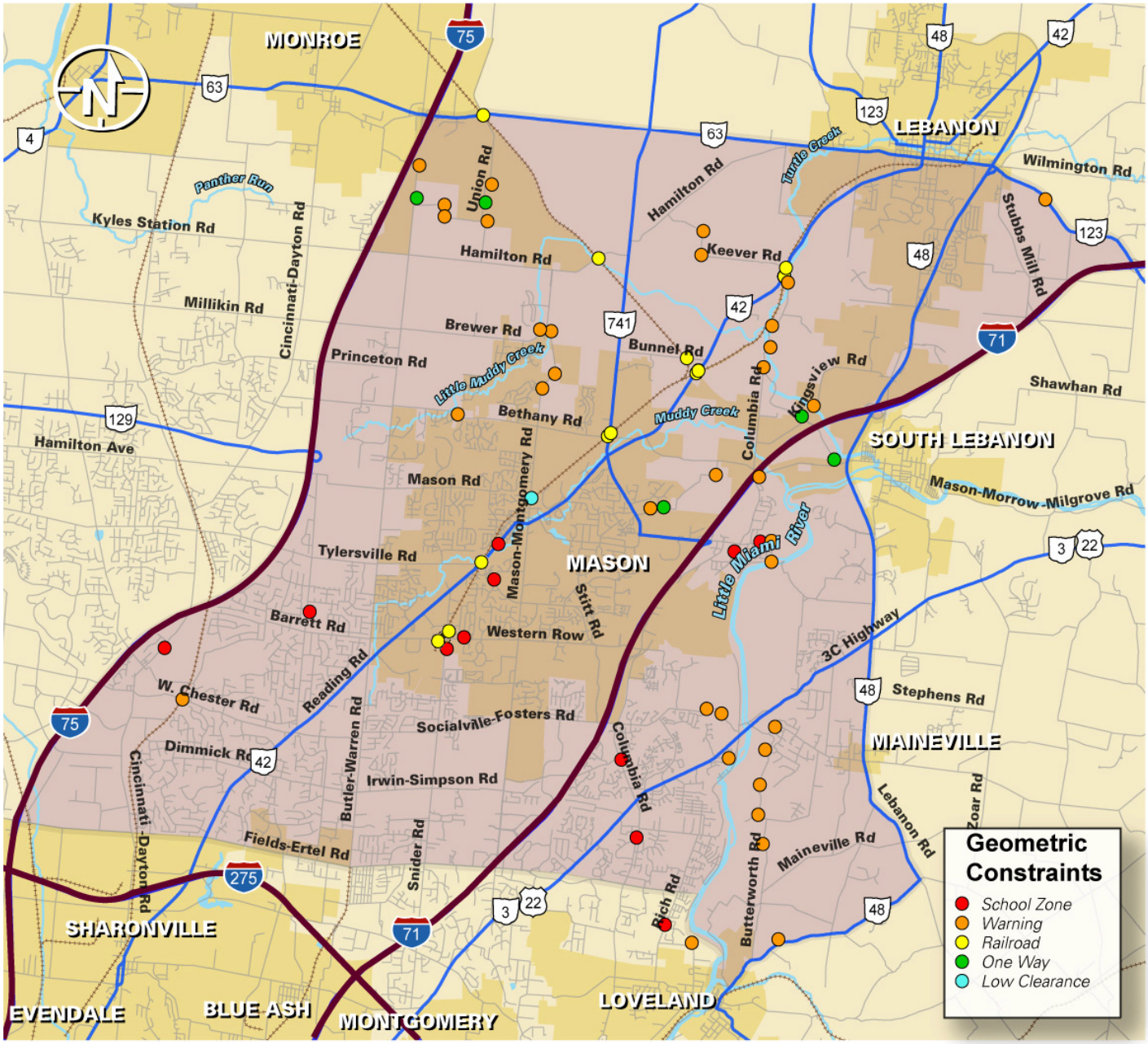


Figure 5: Geometric Constraints



2.5 1.25 0 2.5 5 Miles

OKI Ohio · Kentucky · Indiana Regional Council of Governments
BURGESS & NIPLE

Capacity Analysis

Capacity and Level of Service analysis was conducted for the SARN under the existing and future traffic demand for both individual roadway links and major intersections. Due to the size of the study area and the number of study roads, the capacity analysis was designed to identify those areas where the travel demand is significantly greater than the available capacity on the roadway or at the intersection. This analysis will not recommend improvements (such as signalization, auxiliary turn lanes, etc.) for local intersections to improve minor capacity constraints, but instead will identify roadways, corridors and potential chokepoints within the SARN.

Capacity analysis was conducted using 2004 volume output from the OKI regional model. Capacity analysis was conducted for a peak hour which assumed 10 percent of the AADT would travel during the peak hour with a 60/40 directional split. Model traffic volumes were validated with existing count data identified in Section I. **Figure 3** shows the 2004 AADT used in the capacity analysis. Roadway geometric information was then used to calculate the approximate carrying capacity of the roadway based on the functional classification of the roadway, using OKI classification designations. Intersection capacity was estimated using similar methods based on the number of approach lanes at the intersection.

Based on the available capacity of the roadway and the existing and future demand, Level of Service (LOS) measures were calculated. LOS rates the motorists ability to maneuver in the traffic stream using a letter scale A to F. LOS A indicates that the driver may maneuver on the roadway unimpeded by other drivers with little delay. LOS E indicates the uppermost operational limit of traffic indicating that traffic is moving with little or no maneuverability available with increased delay and slower speeds. LOS F indicates that the roadway is over capacity, and is indicative of roadways that experience severe congestion and stopped or slow conditions. **Figure 6** show the LOS results of the intersection and roadway capacity analysis under the existing traffic demand.

As can be seen from Figure 6, several major roadways are near or over capacity. Specifically, sections of Tylersville Road, Mason Montgomery Road, Fields Ertal Road, Kings Mill Road, Snider Road, Western Row Road, State Route 741, U.S. Route 42, Cox Road, Butler-Warren Road, State Route 48 and I-75 are near or over capacity.

Intersections can often create significant delays and congestion by serving as “choke points” on roadways that otherwise have adequate carrying capacity (number of lanes). Of the 110 signalized intersections in the study area, 57 percent have been identified as being at or near capacity (LOS E or F). As can be seen from Figure 6, intersections that are near capacity closely parallel those routes that have been identified as potentially deficient. A majority of these intersections are adjacent to each other on Mason Montgomery Road, Fields Ertel Road, Tylersville Road, Cincinnati-Dayton Road, State Route 63, U.S. Route 42, and U.S. Route 22. This results in “gridlock” where an intersection with adequate capacity will operate at LOS F due to backups from the adjacent intersection.

Figure 6: 2004 Existing Level of Service

Safety Overview

Accident Analysis was conducted for all roadways within the SARN to identify areas with significant safety problems that contribute to overall deficiencies within the regional transportation system. Crash analysis was conducted using three years of crash information obtained from the ODOT ITRS database for the years 2000-2002. Crash analysis was conducted for both entire roadway segments and for individual intersections. The primary measure of accident experience used in the analysis was the accident rate measured in Accidents per Million Vehicle Miles of Travel (MVMT) for roadway analysis and Accidents per Million Entering Vehicles (MEV) for intersection analysis. For the purpose of this study, roadways on the State Highway System were examined independently of county and city roadways due to differences in the availability and quality of data. The following sections outline the methodology and identify areas of concern identified by the crash analysis.

State Highway System

ODOT has several programs in place, which monitor and evaluate the crash statistics of roadways on the State Highway System. The Highway Safety Program (HSP) evaluates high crash locations based on the crash rates, crash severity, change in crash rates over time, etc. Based on this historical crash experience, roadways and intersections are ranked to provide prioritization of safety issues. Six intersections and four roadway sections located within the SARN are ranked in the top 1000 based on the HSP rankings. **Table 1** below identifies these locations and their respective HSP ranking.

Table 1:
Highway Safety Program Ratings

Location	HSP Rank
Roadway Sections	
U.S. Route 22 from Winding Way to Locust Drive (MP 1.03-1.48)	144
U.S. Route 22 from Steeplechase Lane to Winding Lane (MP 0.52-1.02)	174
U.S. Route 22 from the county line to Steeplechase Lane (MP 0.00-0.49)	230
U.S. Route 22 Landon Drive to Southland Drive (1.88-2.38)	464
U.S. Route 42 from Dimmick Road to Cox Road (Butler County; MP 1.17-2.17)	81
Intersections	
U.S. Route 22 at State Route 48	42
State Route 48 at Mason-Morrow-Millgrove Road	221
U.S. Route 22 at Columbia Road	300
U.S. Route 42 at Tylersville Road	374
State Route 48 at Grandin Road	377
State Route 63 at State Route 741	677

In addition to the HSP, ODOT also maintains a Safety/Congestion work plan, which identifies "Safety Hot Spot Locations" on the State Highway System. Hot Spot locations are based on total number of crashes in an area regardless of traffic volume or other factors. Hot Spot locations are determined by dividing the roadways of the state into two-mile sections and summing the number of crashes in each section over a three-year period. The total number of crashes in each two-mile section is then compared to predetermined crash thresholds to determine whether a Hot Spot exists. For instance, any freeway section with over 200 crashes or any non-freeway section with greater than 100 crashes would be classified as a Safety Hot Spot.) Six miles of Interstate 75 through Butler County on the western boundary of the study area have been identified as Safety Hot Spots. In addition, U.S. Route 22 in Warren County and U.S. Route 42 in Butler County have been identified as a non-freeway Safety Hot Spots with over 100 accidents in a three-year period.

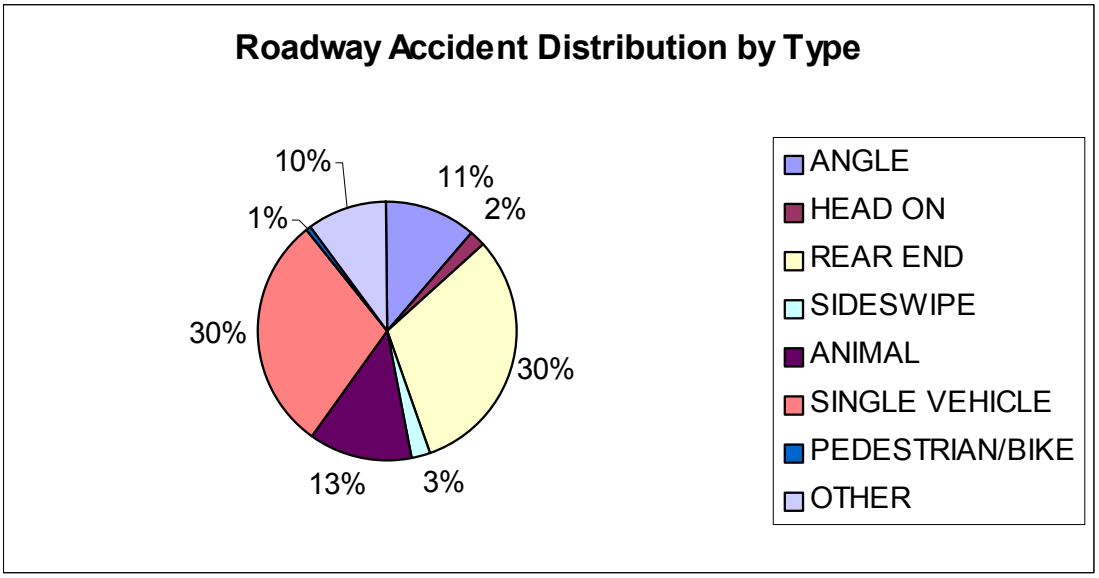
Figure 7 shows an accident density map highlighting areas of significant accident occurrence on state highways within the SARN.

Local Roadway Section Crash Analysis

In addition to the state highway system, crash analysis was conducted for all county and local roads within the SARN. Crash analysis consisted of both statistical analysis and accident rate analysis of individual roadways.

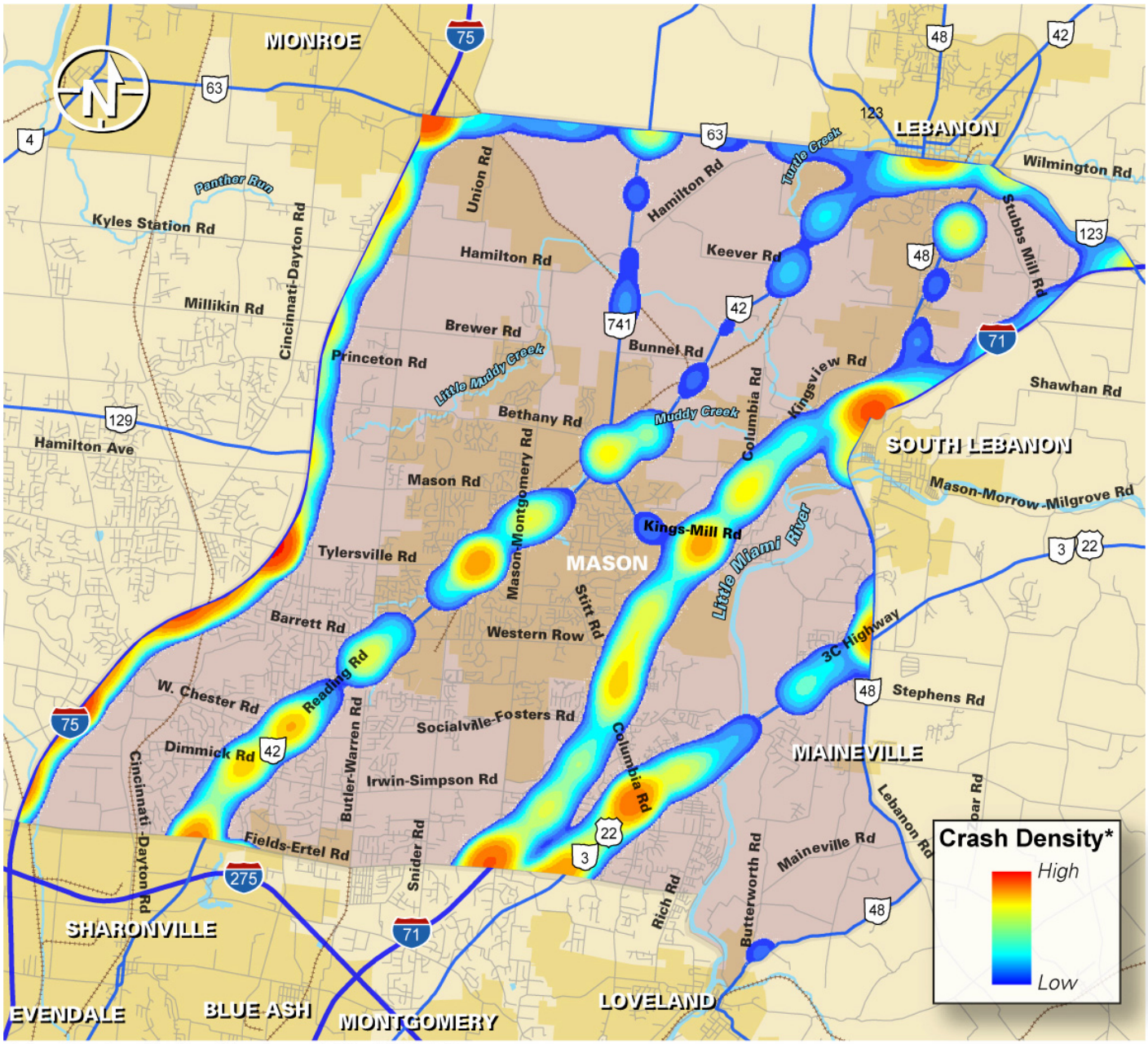
Statistical analysis was conducted to identify specific crash patterns unique to the characteristics of the SARN. **Chart 1** shows the distribution of crashes by accident type. As can be seen from this figure, 30 percent of crashes are single vehicle crashes, which includes fixed object crashes, drivers running off the road, etc. This high percentage of single vehicle accidents is indicative of the rural

Chart 1



nature of many of the roadways within the SARN. Roadway characteristics that may increase

Figure 7: State Highway Crash Density



* Crash Density = Number of Crashes per Million Vehicle Miles

2.5 1.25 0 2.5 5 Miles

single vehicle accidents include narrow roads, narrow shoulder widths and geometric deficiencies, conditions that are all prevalent in the study area. Rear end crashes also account for 30 percent of crashes in the study area, which is indicative of increasing congestion rates within the study area.

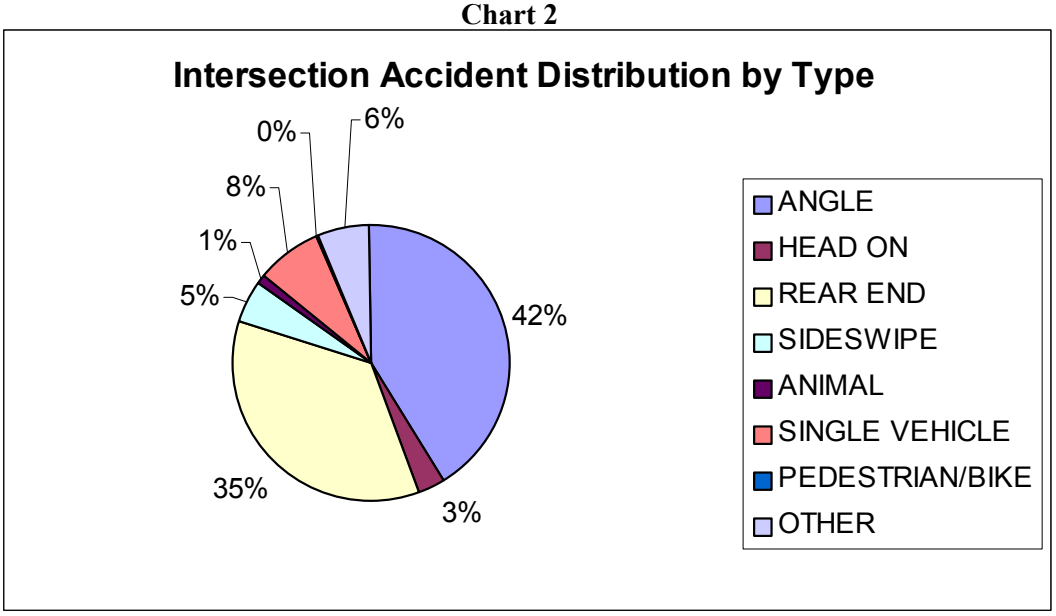
Accident rate analysis was also conducted for the local roadway sections. **Figure 8** shows the accident rates for the SARN. As can be seen from the figure the majority of roads having high accident rates are located primarily outside of the urban area. These roadways have been identified as having geometric deficiencies with limited sight distances and deficient horizontal and vertical alignments. Kings Mill Road was also identified as having a high accident rate, which may be due to the frequent congestion experienced around Kings Island.

Local Roadway Intersection Crash Analysis

Accident analysis was also conducted to identify potential safety problems at intersections. Crash analysis consisted of both statistical analysis and accident rate analysis of individual intersections.

Statistical analysis was conducted to identify specific crash patterns unique to the characteristics of the study intersections. **Chart 2** shows the distribution of crashes by accident type. Angle accidents account for the highest percentage of crashes within the data set. This may be indicative of the high number of unsignalized, two-way stop controlled intersections within the study area. Review of the

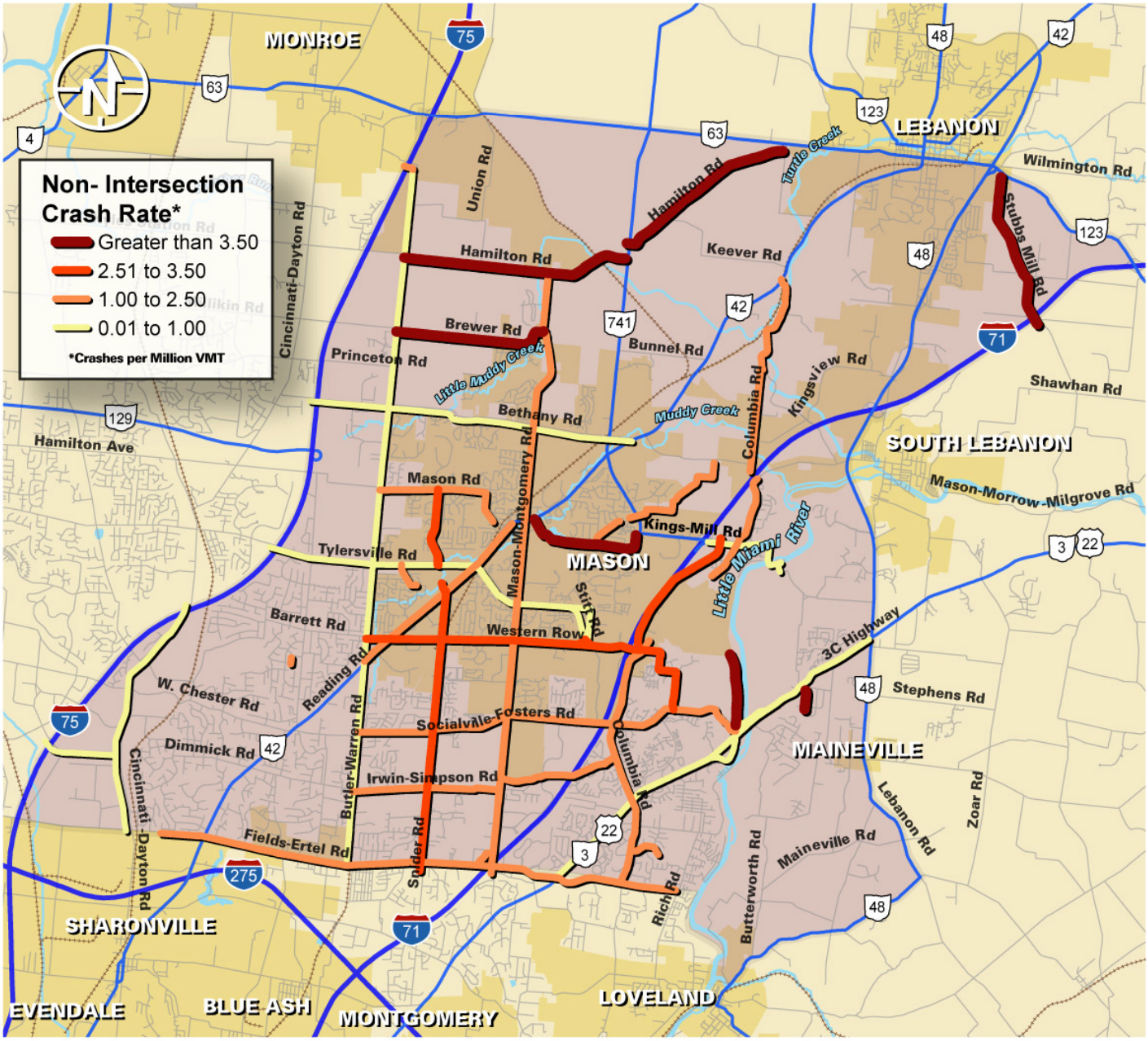
Chart 2



capacity analysis indicated that of the 36 local intersections at or near capacity, 25 were unsignalized intersections. Rear end accidents also account for a significant portion (35 percent) of total accident types, which is typical for intersection related crash patterns.

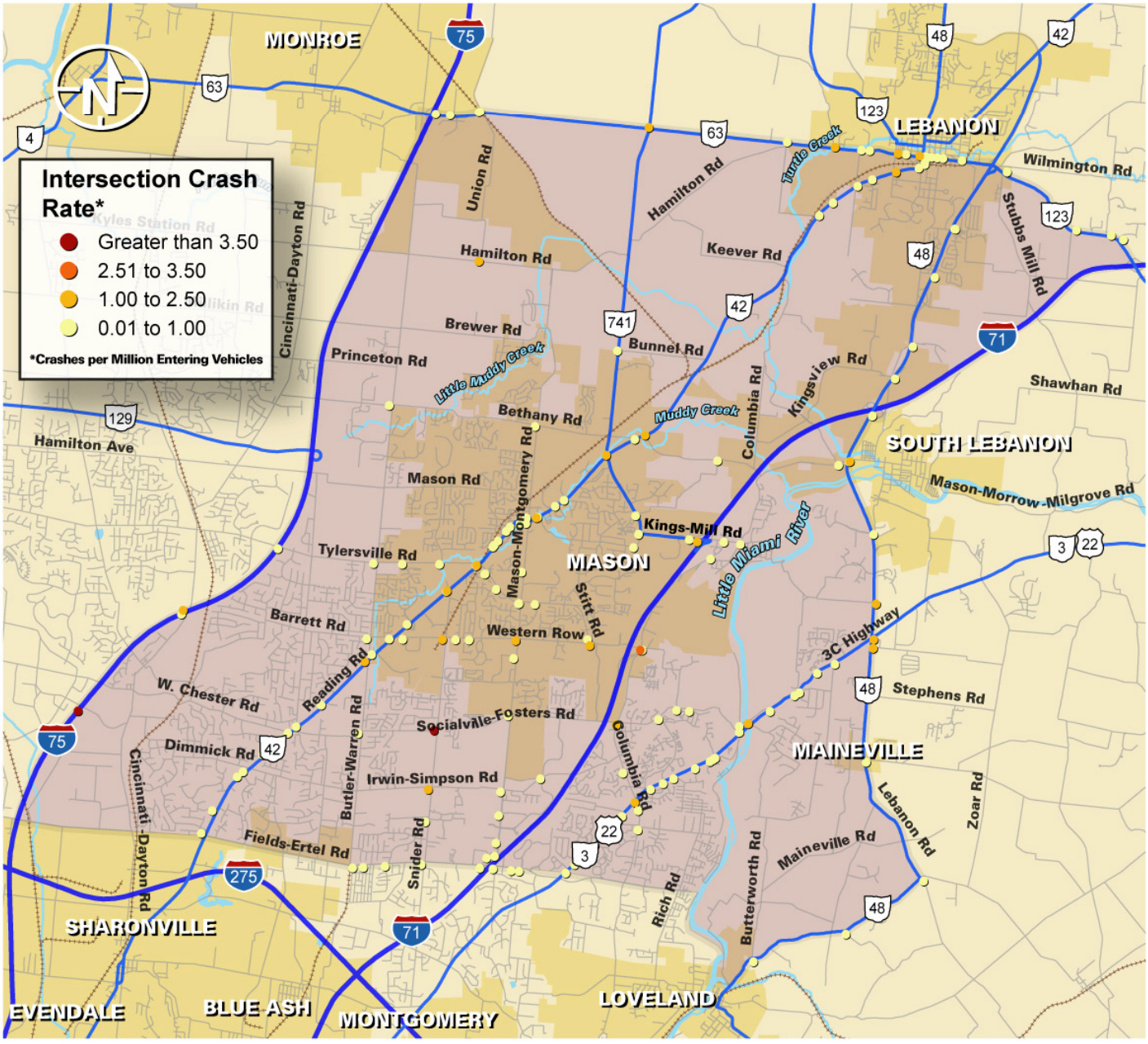
Accident rate analysis was also conducted for the local roadway intersections. **Figure 9** shows these accident rates. As can be seen from the figure, the majority of intersections having higher accident rates are located primarily inside the urban areas, near the City of Mason, the City of Lebanon and near interchanges with I-71 and I-75. As indicated in the statistical analysis, these high crash

Figure 8: Local Roadway Crash Rates



OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

Figure 9: Intersection Crash Rates



2.5 1.25 0 2.5 5 Miles

OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

frequencies can likely be attributed to the high volumes of traffic present within these developing areas.

Freight Movements

Due to the proximity of the study area to both I-71 and I-75, freight movements in the area are significant. I-71 and I-75 carry approximately 12,000 and 19,000 commercial vehicles per day (cvpd), respectively. The state routes through the area carry between 700-1000 cvpd providing regional connections to local destinations. State Route 63 carries additional commercial traffic (approximately 1500 cvpd) due to the connection it provides between I-71 and I-75. In addition to the state routes, local roads such as Tylersville Road, Fields Ertel Road and Mason Montgomery Road play an important role in providing east-west and north-south connectivity between the interstates and the numerous industrial facilities and/or major freight generators, such as the Lebanon Commerce Park.

Transit Operations

Bus Service

Southwest Ohio Regional Transit Authority (SORTA, a.k.a. METRO) provides transit service in the study area through Park and Ride facilities, regular bus service and express bus service. The METRO Park and Ride facilities are located at Kings Island (Western Row Road and Columbia Road) and Fields Ertel Road at Mason Montgomery Road. These facilities are used for car-pooling and parking for METRO's regular and express bus service to downtown Cincinnati. METRO's bus service includes the "Kings Island Job Connection" service, which provides transit from the Cincinnati city center by following a network of roadways (including Kenwood Road, Montgomery Road, Mason Road, and Fields Ertel Road) through densely developed commercial areas north to Kings Island. A second bus line provides similar service via Reading Road. Both lines access the Fields Ertel and Kings Island Park and Ride facilities. METRO express bus service is also provided to the Cincinnati city center from the Park & Ride lots during the A.M. and P.M. commuting periods.

The Warren County Transit System (WCTS) provides demand-responsive bus/transit service to any resident of Warren County, and to any destination within 50 miles of the county boundary. This service, available to all residents of Warren County, requires the rider to schedule the trip 24 hours in advance (short-notice trips are also accommodated when possible, depending on the availability of resources). The service is basically offered from 6 A.M. to 6 P.M. on weekdays, with fares ranging between $.75 and $3.00.[1] **Figure 10** provides the route and facility locations for bus service in the study area.

Pedestrian and Bicycle Facilities

Walking as a transportation alternative is limited by availability of safe walking areas (sidewalks, trails, etc.) and distance to walkable destinations. The availability of these walking components varies widely throughout the study area.

[1] Information on the Warren County Transit Service was obtained from the draft version of *The Warren County Transportation Plan, June 2004* prepared for the Ohio Department of Transportation Office of Transit.

The project area contains several facilities that provide paths for bicycle and pedestrian use that area separated from roadways carrying automobile traffic. **Figure 10** provides the location of existing bicycle/pedestrian facilities in the project area. The Little Miami Scenic Trail is a dedicated bicycle/pedestrian path (separated from automobile traffic) that enters from the east and follows the Little Miami River for 13 miles through the study area. Although the Little Miami Trail traverses the study area along the former rail line in the Little Miami River valley, this trail is primarily a recreational route and is not heavily used by commuters. The City of Mason also has dedicated bicycle/pedestrian facilities on both Snider and Mason-Montgomery Roads north of Tylersville Road, and on Tylersville/Western Row Road from Reading Road to Columbia Road.

Shared road facilities are also present in the project area (see Figure 10 for the location of these facilities). In Westchester Township in Butler County, Cox Road between Hamilton Mason Road and Hopewell Jr. High School contains a bike lane on a roadway shared with automobile traffic. This bike path continues westward from Hopewell Jr. High on a network of local roads (including Barrett Road) that are identified by bike route signs.

In addition to existing facilities, Mason, the City of Lebanon, Deerfield Township, Westchester Township (Butler County) and OKI have several conceptual bicycle facilities under consideration in the project area, including the regional *Miami to Miami Connector*. Figure 10 provides the location of proposed bicycle facilities in the study area.

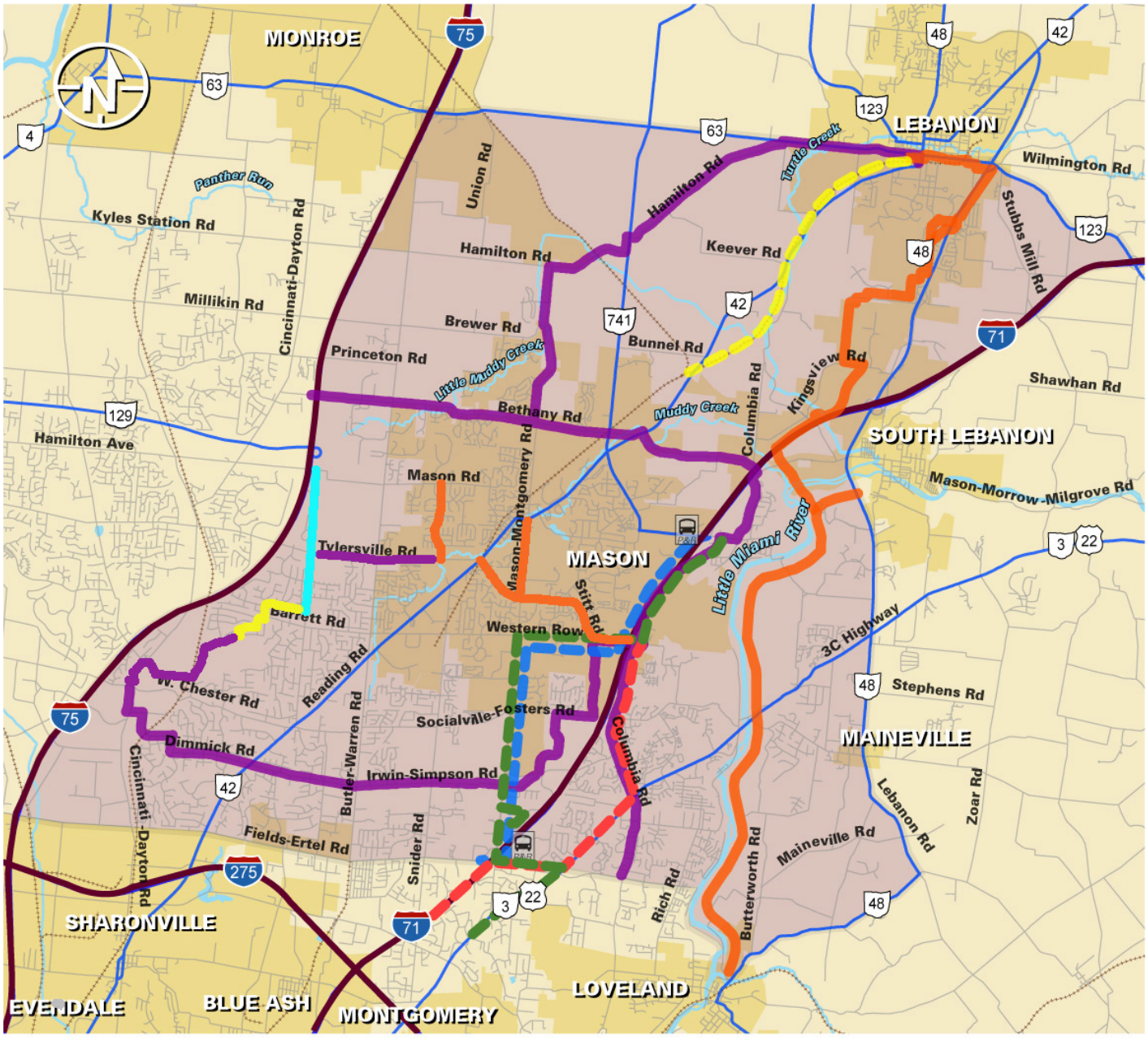
Rail Operations

There are currently no commuter rail, subway or light rail transit systems in operation in the study area. OKI has completed a light rail study that would extend service from downtown Cincinnati to Kings Mill Road; however, implementation is dependent on funding, which does not appear available in the near future. The proposed light rail line originates in the Cincinnati central business district and proceeds north and east. The line enters the study area along the west side of I-71 at Fields Ertel Road, the location for a both a Park and Ride station and a transit center. The line then proceeds north along Mason Montgomery Road. At Western Row Road, it turns east and continues towards I-71, where it again turns north and follows the west side of I-71 to Kings Mills Road. Additional Park and Ride stations are proposed at the following locations: the intersection of Mason Montgomery Road and Western Row Road; the area of the I-71 interchange with Western Row Road; and the area of the I-71 interchange with Kings Mills Road. **Figure 10** identifies the light rail line proposed in the study area.

The Indiana & Ohio Railroad operates a spur line in the project area that carries freight to stations located in the cities of Mason and Monroe. No passenger service is associated with this rail line. Two rail lines owned by Norfolk Southern that carry freight to and from Cincinnati traverse the extreme southwest corner of the project area in Butler County. Passenger service is not provided on these lines. See Figure 10 for the location of these freight lines.

The Cincinnati Railway Company operates a scenic railway service along the original CL&N line, from downtown Lebanon southwest to the line's intersection with U.S. Route 42. See Figure 10 for the location of the rail line. This rail service is recreational only, providing one-hour scheduled and chartered rides on weekends during the summer and around some off-season holidays. This line does not provide commuter-type passenger service.

Figure 10: Bus, Bicycle/Pedestrian, and Rail Facilities



OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

Planned Improvements

Figure 11 provides locations for the following planned improvements. Each listed project is identified on the map by the plan it appears in (TIP or LRP) and number it is associated with (1., 2., 3., etc.) below.

OKI Transportation Improvement Plan (TIP) (2004 to 2007)

1. Reconstruct the I-75/State Route 63 Interchange to increase capacity (Butler County).

2. Add turn lanes & realign the U.S. Route 42 intersection at Butler-Warren Road (Butler County).

3. Reconstruct the Liberty Interchange (State Route 129/I-75) to provide access to the east to Hamilton Mason Road and extend Cox Road to the north (Butler County).

4. Add turn lanes and access control on State Route 63 from I-75 to Union Road. 0.9 mile (Warren County).

5. Widening of U.S. Route 22 to 5 lanes from Fields Ertel to Columbia Road, and to 3 lanes from Columbia Road to the Foster Viaduct (Warren County).

Projects listed in the OKI TIP have received funding commitments. These projects are identified on the **Figure 11**.

OKI Long Range Plan (LRP) (2030)

1. Add one lane on Columbia Road from Locust to Fields Ertel (1.3 miles).

2. Add one lane on Mason-Morrow-Millgrove Road from U.S. Route 42 to U.S. Route 48 (3 miles).

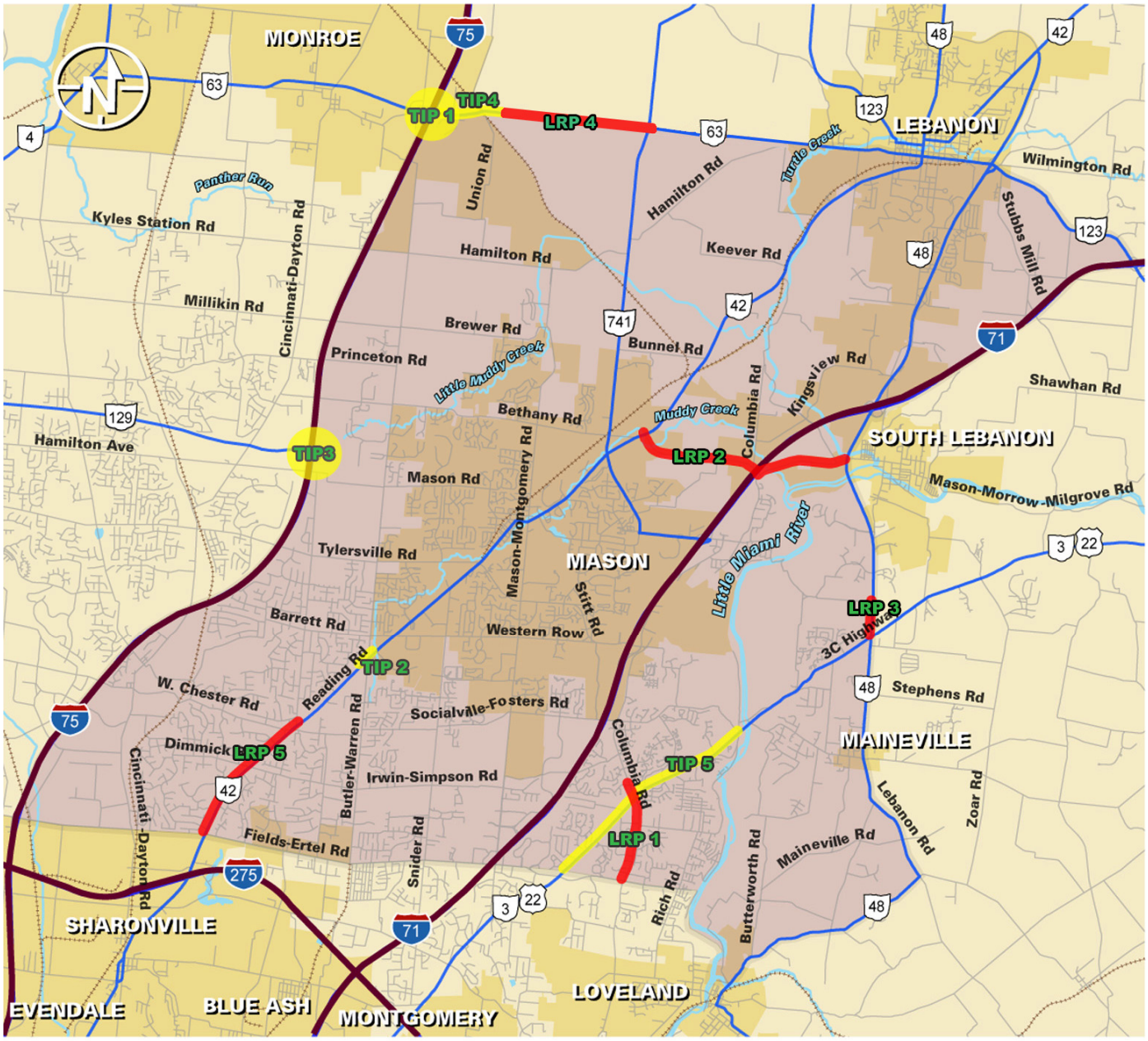
3. Add 2 lanes on State Route 48 from U.S. Route 22 to Grandin Road (0.5 miles).

4. Add 2 lanes on State Route 63 from Monroe to State Route 741 (3 miles).

5. Add 1 lane to U.S. Route 42 between Fields Ertel and Cox Roads (2 miles).

Projects listed in the OKI LRP are identified on the **Figure 11**.

Figure 11: OKI TIP and LRP Projects



OKI Ohio · Kentucky · Indiana Regional Council of Governments
BURGESS & NIPLE

Red Flags - The Natural Environment

Soils & Geology

Glaciers covered all of Warren and Butler Counties in the Illinoian age and glaciers covered the majority of the counties in the Wisconsin age. This general area of Ohio was along the southern limit of the Wisconsin age glaciers; therefore soil materials deposited during the glacier retreat form many of the soil types in the counties. The underlying bedrock of the study area is comprised of limestone or shale.

Soil Associations within the study area include all of the associations mapped in Warren County as follows: the Clermont-Avonburg Association, the Rossmoyne-Hickory-Fairmount Association, the Russell-Miamian-Xenia-Wynn Association, the Fincastle-Brookstone Association, the Genesee-Fox Association, and the Patton-Henshaw Association. Soil Associations within the Butler County portion of the study area include the Russell-Miamian-Wynn Association, the Xenia-Wynn-Russell Association, the Rossmoyne-Cincinnati-Eden Association, the Wynn-Eden Association, the Fincastle-Ragsdale-Xenia Association, and the Fincastle-Patton-Xenia Association. **Table 2** describes the drainage and slope limitations, general location, and development constraints of these soil associations.

Table 2: Soil Associations

Soil Association Name	County	General Location	Slopes and Drainage	Limitations for Transportation Projects
Clermont-Avonburg	Warren	Isolated ridgeline locations east of I-71	Nearly level to gently sloping-poorly drained and somewhat poorly drained	Moderate-wetness
Rossmoyne-Hickory-Fairmount	Warren	Stream valleys east of I-71	Gently sloping to steep-moderately well drained and well drained	Severe-steep slopes and shallow depth to bedrock
Russell-Miamian-Xenia-Wynn	Warren	Widespread areas west of I-71	Nearly level to sloping-well drained and moderately well drained	Moderate-some erosion hazards and shallow depth to bedrock
Fincastle-Brookstone	Warren	Isolated ridgeline locations west of I-71	Nearly level or gently sloping-somewhat poorly drained and very poorly drained	Moderate-wetness, poor drainage
Genesee-Fox	Warren	Turtle Creek, Little Miami River and Muddy Creek valleys	Nearly level to moderately steep-well drained	Severe-flooding problems

Patton-Henshaw	Warren	Millers Creek and Little Muddy Creek valleys	Nearly level-very poorly drained and somewhat poorly drained	Severe-wetness
Russell-Miamian-Wynn	Butler	East Fork Mill Creek headwaters at West Chester	Gently sloping to moderately steep- well drained	Severe-low strength and frost action hazard
Xenia-Wynn-Russell	Butler	Mill Creek tributary headwaters between Gano and Pisgah	Nearly level to gently sloping-moderately well drained and well drained	Severe-low strength and frost action hazard
Rossmoyne-Cincinnati-Eden	Butler	Headwaters of Sharon Creek in southeast corner of the County	Gently sloping to very steep-moderately well drained and well drained	Severe-low strength and frost action hazard
Wynn-Eden	Butler	Isolated locations along the west Mill Creek valley wall	Gently sloping to very steep-well drained	Severe-low strength and steep slopes
Fincastle-Ragsdale-Xenia	Butler	Broad ridgeline along the east County boundary	Nearly level and gently sloping-somewhat poorly drained, very poorly drained, and moderately well drained	Severe-low strength, wetness, and frost action hazard
Fincastle-Patton-Xenia	Butler	Mill Creek valley	Nearly level and gently sloping-somewhat poorly drained, poorly drained, and moderately well drained	Severe- low strength, wetness, and frost action hazard

The topography west of I-71 in the study area is characterized by nearly level to gently rolling. East of I-71 it is characterized by rolling to very steep slopes along the Little Miami River which flows in a north-south direction through the study area. The river corridor valley varies from 2000' to 4000' wide from top of valley walls. Elevation differentials average 150' to 200' from top of valley wall to the river. Along the river these steep slopes support numerous natural springs and are subject to considerable erosion or landslides. This steep, slide prone river corridor is a *Red Flag* area which presents construction challenges and raises construction cost.

From an engineering or construction standpoint, soils in the remainder of the study area present no unique or unusual barriers to construction. Other than the steep, slide prone areas noted above, there are no other *Red Flag* areas, which would affect selection of conceptual modes or corridors in this Major Investment Study.

Floodplains

Figure 12 provides mapping of the existing floodplains in the study area based on GIS data provided by OKI. Floodplains are an area of concern when considering the impacts of conceptual alternatives,

and would therefore be considered *red flag* areas, especially when associated with a State and National Wild and Scenic River. However, floodplains in general would not constitute *Fatal Flaws.*

Groundwater/Aquifers, Wellheads and Drinking Water Supplies

Sole Source Aquifers are present in the northern and eastern part of the study area. The Little Miami River, Millers Creek, Shaker Creek, Little Muddy Creek and Turtle Creek have Sole Source Aquifers following the majority of their alignments in the study area. Sole Source Aquifers are *Red Flag* areas requiring extra environmental consideration and special design/construction techniques. See **Figure 12**.

Figure 12 also provides the locations of Wellhead Protection Areas within the study area. Generally, protection zone distances are determined based on 1 to 5 year underground infiltration travel times. These are established either by local Wellhead Protection Plans or the Ohio Environmental Protection Agency. Wellhead Protection Areas are *Red Flag* areas requiring extra environmental consideration and special design/construction techniques. If adversely impacted, they are *Fatal Flaws*. [2]

Wetlands

Figure 12 provides the location of all known wetlands in the study area based on National Wetlands Inventory (NWI) maps. Wetlands are classified as either Category 1, 2 and 3, with Category 1 categorizing the lowest quality and Category 3 categorizing the highest quality. Wetlands are *Red Flag* areas requiring extra environmental consideration and special design/construction mitigation techniques. On a case-by-case basis, high quality wetlands, if adversely impacted, are *Fatal Flaws*.

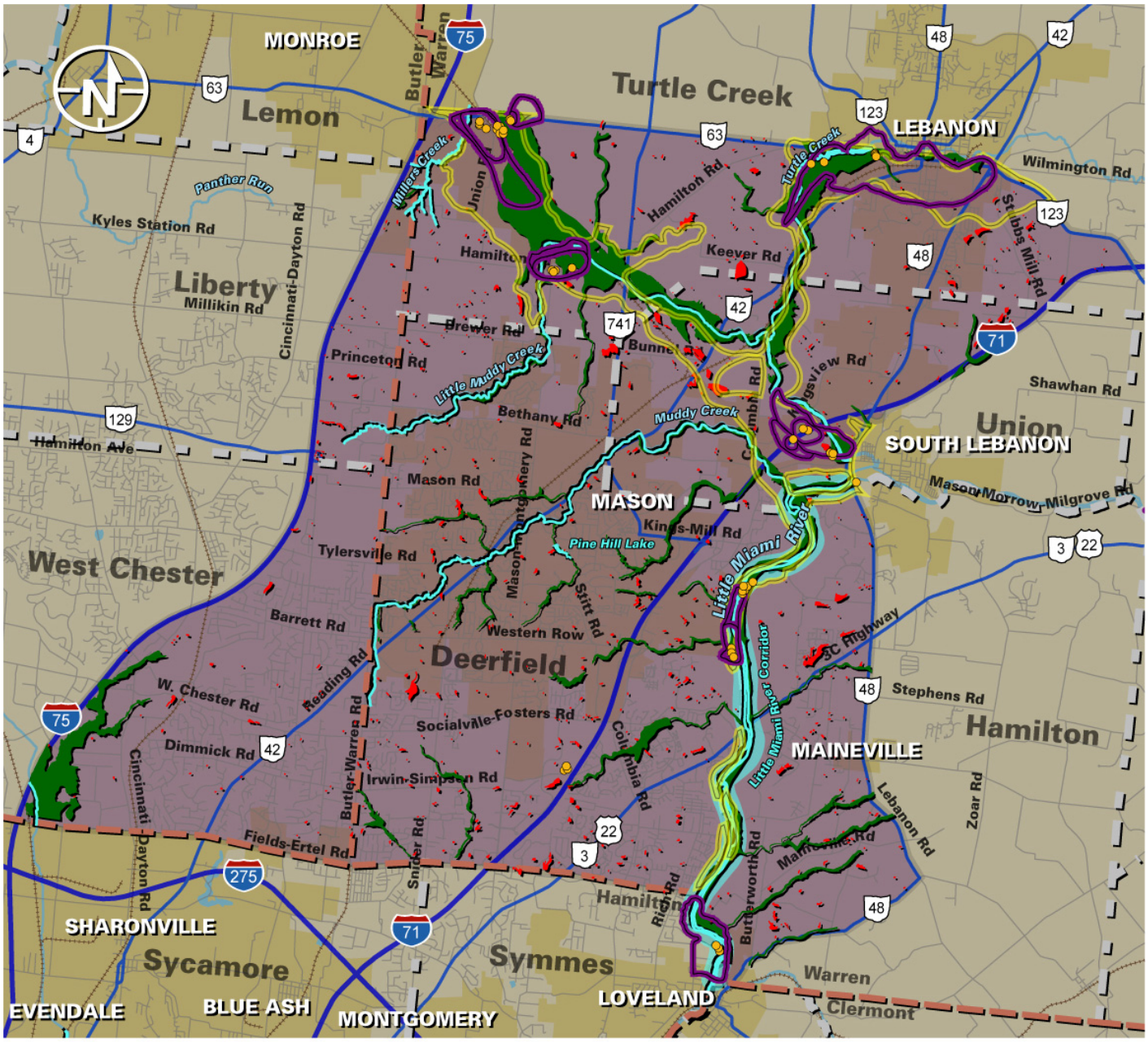
Streams, Rivers, and Water Bodies

Figure 12 locates and provides the name of the streams, rivers and waterbodies in the study area.[3] The Little Miami River is designated a State and National Wild and Scenic River. In addition, the Director of the Ohio Department of Natural Resources (ODNR) must approve any transportation project outside a municipality and within 1000' of the river. The river corridor is a *Red Flag* area.

[2] The Ohio Environmental Protection Division of Drinking & Ground Water provided the presence and location of sole source aquifers, wellhead protection areas and wells for the project area.

[3] Identified through review of U.S Geological Service topographic maps for the following Ohio quadrangles: South Lebanon, Monroe, Lebanon, Glendale, and Mason.

Figure 12: Natural Environment Red Flags



Wildlife, Habitats and Threatened & Endangered Species

Table 3 lists the state and Federally-listed endangered, threatened, potentially threatened, species of concern, and candidate species for the study area. The United States Fish and Wildlife Service (USFWS) and the Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves provided information on the potential presence of listed species in the study area. USFWS commented that the study area lies within the range of the Indiana bat (*Myotis sodalis*), a Federally-listed endangered species. In fact, all of Ohio is within the range of this endangered species. USFWS recommends that tree cutting be kept to a minimum to maintain summer habitat. If this is not feasible, the service commented that trees should not be cut between April 15 and September 15 when bats are utilizing trees for summer habitat.

Table 3: Threatened and Endangered Species

Scientific Name	Common Name	State Status*	Federal Status**
Mammals			
Myotis sodalis	Indiana bat	E	E
Birds			
Nyctanassa violacea	yellow-crowned night-heron	T	
Reptiles			
Sisterus catenatuss	Eastern massasauga	E	C
Fishes			
Hiodon alosoides	goldeye	E	
Moxostoma carinatum	river redhorse	SC	
Notropis boops	bigeye shiner	T	
Noturus eleutherus	mountain madtom	E	
Mollusks			
Anodonta suborbiculata	flat floater	SC	
Epioblasma triquetra	snuffbox	E	
Obliquaria reflexa	threehorn wartyback	T	
Quadrula nodulata	wartyback	E	
Truncilla donaciformis	fawnsfoot	T	
Truncilla truncata	deertoe	SC	
Villosa fabalis	rayed bean	E	C
Crayfishes			
Orconectes sloanii	Sloan's crayfish	T	
Plants			
Acalypha virginica var. deamii	Deam's three-seeded mercury	T	
Lophotocarpus calycinus	Southern wapato	P	
Opuntia humifusa	common prickly pear	P	
Phaseolus polystachios	wild kidney bean	P	
Ribes missouriense	Missouri gooseberry	E	
Trifolium stoloniferum	running buffalo clover	E	E
Viburnum rufidulum	Southern black-haw	P	
* E=endangered, T=threatened, P=potentially threatened, SC=species of concern			
** E=endangered, C=candidate species			

The USFWS commented that the study area is within the range of the running buffalo clover (*Trifolium stoloniferum*), a Federally-listed endangered species. This species is found in partially shaded woods, mowed areas, and along streams and trails.

The USFWS commented that the study area is within the range of the eastern massasauga (*Sisturus catenatus*), a Federal candidate species. This species is a reclusive rattlesnake that is declining throughout its national range.

The USFWS also commented that the study area is within the range of the rayed bean mussel (*Villosa fabalis*), a Federal candidate species. This species is known to occur in the Little Miami River and further coordination with the service would be needed if transportation solutions affect the river.

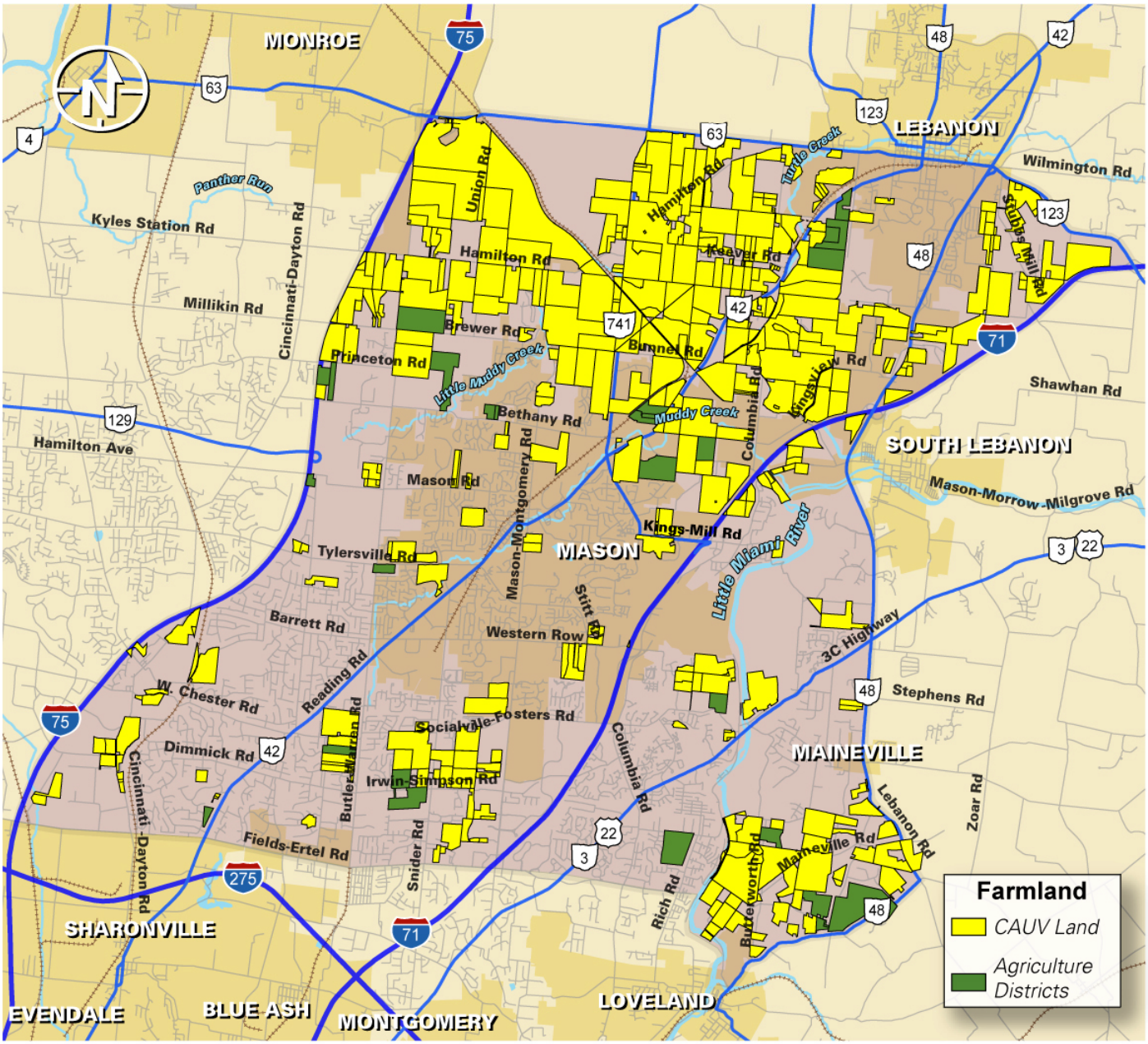
Threatened and Endangered Species involvements are *Red Flag* areas and can be *Fatal Flaws*.

Farmland

Based on Warren County and Butler County Auditor's property records, properties within the study area recorded as being within Agricultural Districts or enrolled in the Current Agricultural Use Value (CAUV) program were identified and mapped (**Figure 13**). Property owner(s) can organize Agricultural Districts if the land in the proposed district is 1) devoted to agriculture over the past three years, 2) composed of tracts that make up a combined total of at least 10 acres, and 3) generate an average yearly gross income of $2,500 during the past three years. Ohio law provides the landowner of property in Agricultural Districts additional protection from public agencies desiring to use eminent domain for property acquisition. Public agencies in Ohio are required to conduct coordination with the Ohio Department of Agriculture when acquiring 10 acres or 10% (whichever is greater) of a parcel in an Agricultural District for non-agricultural use. The CAUV program allows farmland to be assessed at an agricultural value for real estate tax purposes rather than at the highest and best use valuation. The amount of farmland directly and indirectly impacted by Federally funded projects are tracked by the U.S. Department of Agriculture (USDA) under the Farmland Protection Policy Act and the USDA provides comments on the selection of project alternatives to minimize impacts to farmland.

Agricultural Districts and CAUV properties are primarily within the northern part of the study area, however, these properties are also scattered in other parts of the area. Agricultural Districts and CAUV properties can be found in nearly all of the townships and municipalities in the study area. In the study area, all properties in an Agricultural District are also enrolled in the CAUV program. However, many CAUV properties in the study area are not associated with an Agricultural District. While the acquisition of Agricultural District or CAUV properties for transportation projects can be considered a *Red Flag* needing further review, such acquisition typically is not considered a *Fatal Flaw* to transportation project development.

Figure 13: Agricultural Land



Red Flags - The Human Environment

Population Growth

The study area has experienced rapid growth in recent years due to expansion of suburbanization from the inner Cincinnati suburbs. Warren County is frequently ranked as the second fastest growing county in Ohio (Delaware County in suburban Columbus is ranked first). While this once rural agricultural county had a population of 38,000 in 1950, the 2000 U.S. Census placed Warren County population at 158,000, and the population of the study area at 84,000. Population estimates released in April 2004 by the Ohio Department of Development indicate that Warren County's population has increased 14.7% from 2000 to 2003, for a total of 182,000. The estimated population for the study area in 2003 is 96,000. In April 2004, Warren County was ranked number 52 in the U.S. Census' listing of the 100 fastest growing counties in the U.S. from April 1, 2000 to July 1, 2003.

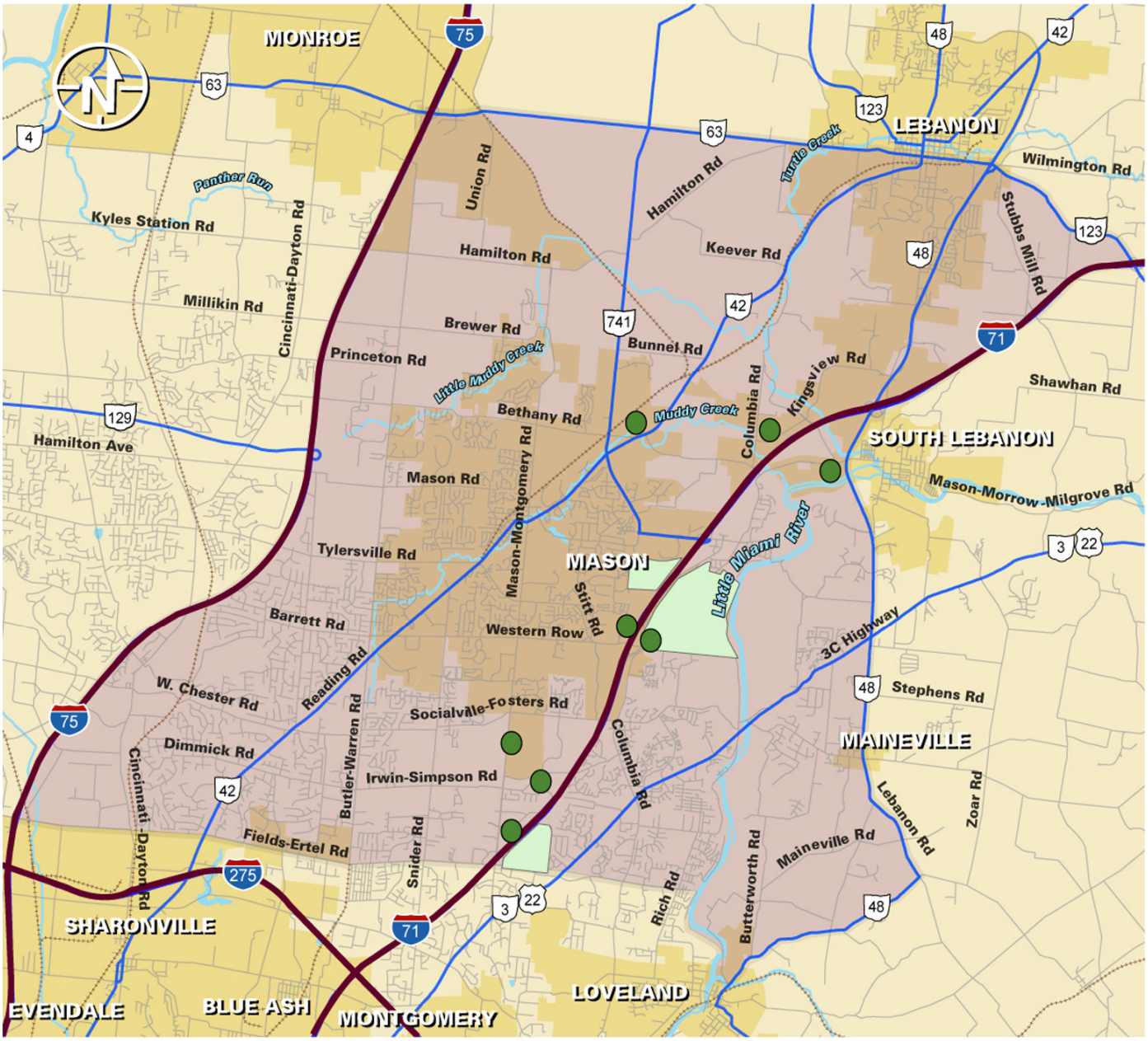
Economic Profile

Because of its location between two interstate highways and two major metropolitan areas, Warren County is experiencing rapid business growth in addition to the population growth discussed above. In Warren County in general, the labor force increased by 14 percent from 1998 to 2002, a result of businesses locating in and expanding in the county. Much of this growth has occurred in the study area, where proximity to both I-75 and I-71 and the density of housing development have resulted in a concentration of the county's commercial, industrial and retail activities. For instance, all of the major employers in Warren County (defined for this study as firms with 500 or more employees) are located in the study area, primarily along the I-71 corridor (see **Figure 14**).

Table 4: Major Employers (> 500 Employees)

Company Name	Total Employees
Financial & Credit Services Corp	2417
Proctor & Gamble Health Care Research Center	2400
G.E. Capital Consumer Card Company	1865
Cintas Corporation	1800
Anthem Blue Cross & Blue Shield	1300
Blackhawk Automotive Plastics, Inc.	733
Siemans Business Services, Inc.	500
SEI Brakes	500

Figure 14: Major Employers & Other Major Traffic Generators



Land Use and Development Trends

As indicated in the two previous sections ("Population Growth" and "Economic Profile"), Warren County in general, and the study area in particular, is experiencing rapid population and economic growth. As a result, agricultural lands are being transformed into housing subdivisions, "big box" retail, office parks, and commercial and industrial parks. While the existing land use for the project area shows that agricultural use is still prevalent in the northern section of the project area, with residential, commercial and institutional use dominating the remainder (see **Figure 15**), the recent development trends in the county and the study area are expected to continue. This expectation is supported by the existing zoning for the project area, which shows that little of the area is zoned for agricultural use, as shown in **Figure 16.** Instead, the zoning is primarily residential, with a fair amount of land zoned for commercial and industrial uses.

Generally, intensely developed land uses are considered *Red Flag* areas due to the high cost of right-of-way acquisition. Strip takes for existing roadway widenings are usually manageable, but new corridors in heavily developed areas are often cost prohibitive.

Major Traffic Generators

Major traffic generators in the study area include businesses listed in Table 4, the Fields Ertel Road/Mason Montgomery commercial area, Paramount's Kings Island theme park (seasonal), and The Golf Center at Kings Island during ATP events.

Government and Community Institutions

Community services, government institutions and schools are considered *Red Flag* areas and potentially fatal flaws, due to the high cost of replacement. See **Figure 17** for the location of these facilities in the study area.

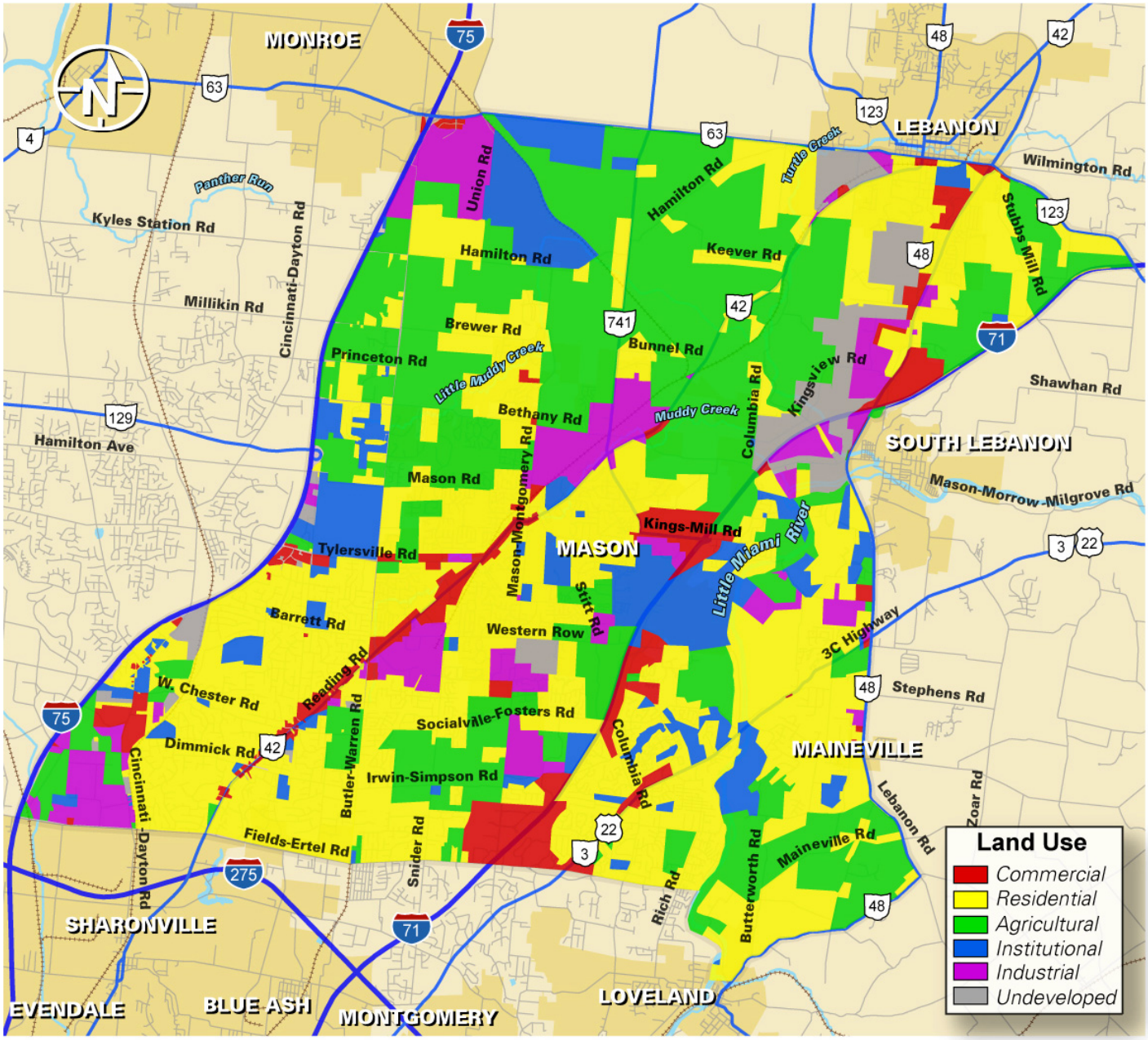
Cemeteries

Figure 17 provides the locations of cemeteries in the study area. Impacts involving strip takes of right of way that do not involve gravesites would constitute a *Red Flag* for a transportation project. Severing of cemetery lands or relocation of graves would constitute *Fatal Flaw*s.

Parks and Recreation Areas

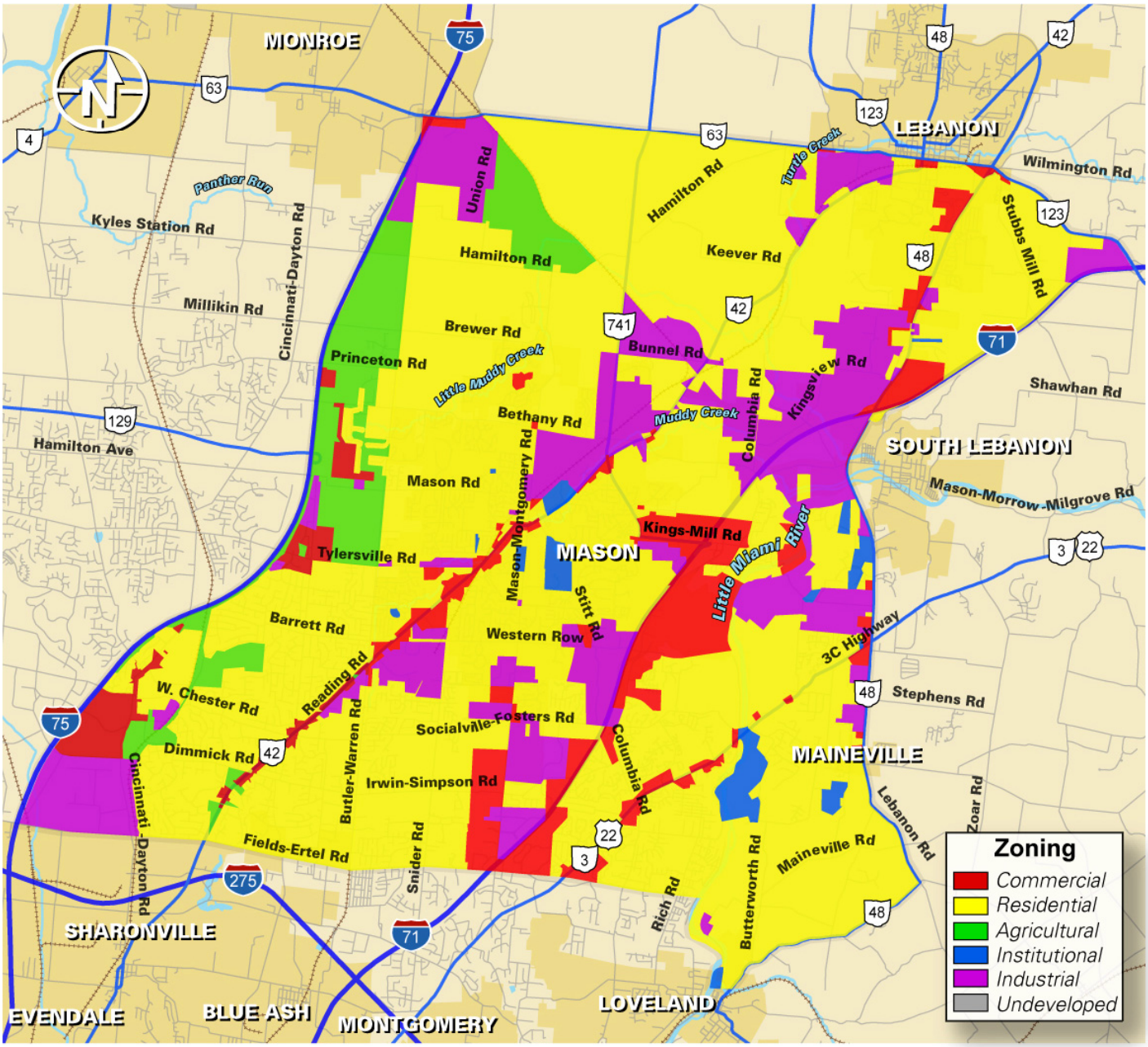
Figure 17 locates and identifies these locations in the study area. Public recreation areas are considered *Red Flag* areas for minimal impact. However, greater impacts can result in these becoming *Fatal Flaw* areas, due to the protected status these resources may have under the federal Section 4 (f) provision. This provision stipulates that federal funding cannot be used on a transportation project that requires the use of land from a Section 4(f) resource unless there are no other prudent and feasible alternatives to the use.

Figure 15: Existing Land Use



OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

Figure 16: Existing Zoning



Environmental Justice Populations

Census block group data from the 2000 U.S. Census was used to screen for the presence Environmental Justice populations (minority populations and/or low-income populations as defined by Executive Order 12898) within the study area. Minorities comprised 10 percent or less of the populations in 43 of these 50 census block groups. Of the seven remaining block groups, six contained between 10 and 25 percent minority. Only one block group contains a minority population over 25 percent, with a range between of 40 to 46.8 percent. This block group contains the Lebanon Correctional Institution, housing an inmate population comprised of 1057 minorities (55 percent of the prison population), which accounts for the elevated minority population compared to surrounding census block groups. Low-income residents comprise 10 percent or less of the population in all census block groups in the study area, with 42 of the 50 groups comprised of 5 percent or less.

At this level of screening no substantial concentrations of Environmental Justice populations are apparent. However, any alternatives carried forward from this study will require more detailed scrutiny of the respective project areas for Environmental Justice communities.

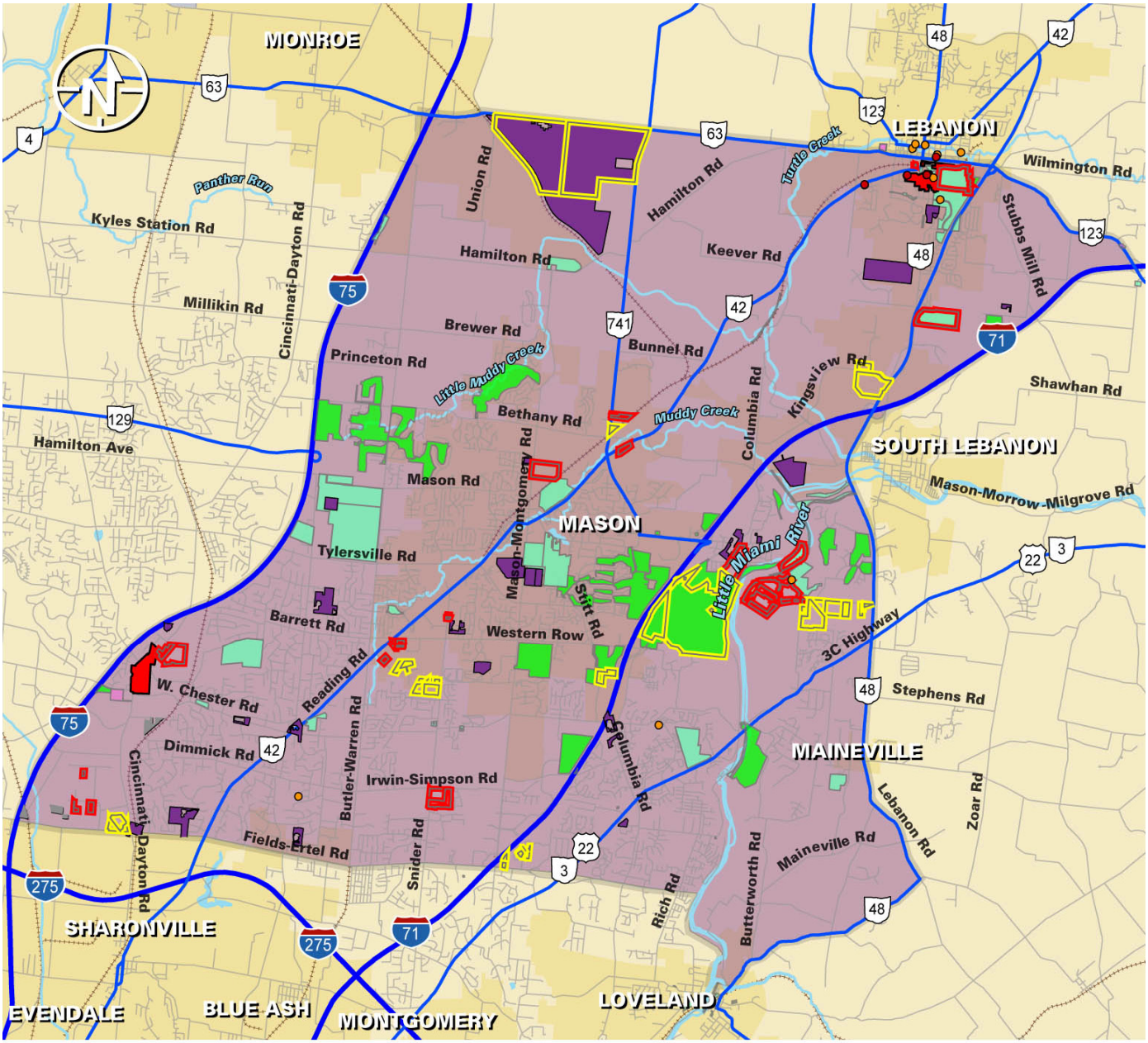
Cultural Resources/National Register Of Historic Places

The Historic Preservation Act of 1966 requires that projects using federal funds or involving Federal actions must take into account any potential adverse effects on properties *listed on*, *or eligible fo*r, the National Register of Historic Places (NRHP). Thus sites "*listed on, or eligible for"* become *Red Flag* areas because it must be proven that there is "no feasible and prudent alternative" that avoids the adverse effect before the federal action can be approved.

The study area contains three Historic Districts, nine buildings and two archaeological sites that are listed on the National Register on Historic Places. The Districts are Lebanon's Commercial Historic District, Lebanon's Floraville Historic District and the Lebanon East End Historic District. **Figure 17** provides the location of these resources. Additional structures and other historic resources that may be eligible for listing on the National Register of Historic Places have also been identified on that figure. The Ohio Historical Inventory (OHI) contains 308 inventoried buildings, many of which may be eligible for inclusion on the NRHP.

Within the study area the Ohio Archaeological Inventory (OAI) contains 281 sites. In some cases, the archeological sites have been excavated and artifacts have been removed from the sites to make way for construction or other activities. In other cases only preliminary testing has been completed at the sites leaving open the possibility for future investigations. The OAI is often used to estimate the concentration of archaeological sites within an area. Information can be used to avoid locations with dense concentrations of archeological sites and thus a high probability of being *Red Flag* areas. Not all OAI recorded sites are listed on or are eligible for the National Register. In order to protect the integrity of the archaeological sites from looting, they are not mapped.

Figure 17: Human Environment Red Flags



2.5 1.25 0 2.5 5 Miles

- National Register Site
- Potential Historic Sites
- Potential Historic Districts
- HAZMAT High Concern Area
- HAZMAT Moderate Concern Area
- Gravel Pits
- Private Greenspace
- Public Greenspace
- Cemeteries
- Government/Community Institutions

OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

Hazardous Waste

A government records search was obtained from FirstSearch Technology Corporation for the Southwest Warren study area. The search included ODOT's mandatory databases and several discretionary databases. The locations of the following classes of records were verified:

- National Priority List (NPL) (Superfund)
- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and State-Equivalent Sites with suspected abandoned/uncontrolled hazardous wastes
- CERCLIS No Further Remedial Action Planned (NFRAP) Sites
- Resource Conservation and Recovery Act (RCRA) Hazardous Waste Treatment Storage and Disposal (TSD) Facilities
- RCRA Facilities undergoing Corrective Actions (CORRACTS)
- RCRA Hazardous Waste Generators with Violations/Enforcement Actions
- Emergency Response Notification System (ERNS) Sites where the record indicates potential for large or long-term releases.
- Ohio Environmental Protection Agency (OEPA) Open Dumps (historic landfills)
- Town Gas Sites (coal gasification facilities)

The field-located sites are discussed in a separate report and are depicted on **Figure 17**. These records were classified as having higher and lower potential to present a significant threat, based upon the type of government listing, the number of databases on which the facility appears, the number of violations/enforcement actions against the facility, and other indicators. At this level of study, the exact location of contamination on a particular parcel is not known. Therefore, on Figure 17 the entire parcel of these sites is identified, however the potential contamination may have affected only a portion of the parcel.

Because gravel pits were historically utilized as landfills and dumpsites, an attempt was also made to identify gravel pits using the Warren County and Butler County Soil Surveys and the USGS topographic maps for the study area. Figure 17 identifies these sites.

In total, fifteen higher priority sites, including two National Priority List sites, were identified within the study area. Eighteen lower-priority sites were identified. Approximately fifteen former gravel pits were identified within the project area; seven of these cover large acreages.

Air Quality in the Greater OKI Area

Regulatory Background. In 1990, Congress adopted the Clean Air Act Amendments (CAAA) to address the country's major air pollution problems. The CAAA regulates six major pollutants: sulfur dioxide, nitrogen dioxide, lead, carbon monoxide, particulate matter and ozone. On April 15th, 2004 the USEPA designated the Greater Cincinnati region in "Basic Non-attainment" for air quality.

The CAAA clarifies how EPA designates nonattainment areas for three pollutants (ozone, carbon monoxide and fine particulate matter) and how those areas are classified in accordance with the severity of the area's air pollution problem. Assignment of an area to one of the nonattainment classifications triggers various planning requirements with which the area must comply in order to meet the standard. The requirements vary by pollutant and they increase in number and stringency with the severity of pollution. A seven county area encompassing the Greater Cincinnati area was designated by EPA, pursuant to provisions of the CAAA 90, as a moderate nonattainment area for ozone based on air quality measurements from 1988-1990. The nonattainment area included Butler, Clermont, Hamilton and Warren Counties in Southwest Ohio, and Boone, Campbell and Kenton Counties in Northern Kentucky. Areas with more serious problems are required to take more numerous and stringent actions, but have more time to do so than areas with less severe problems. Any area that fails to meet the standards by its deadline could be bumped into a more stringent classification with stricter compliance requirements. The conformity process is a mechanism to ensure that federal funding and approval are given to those transportation activities that are consistent with the air quality goals.

On July 5, 2000 EPA determined that the region had attained the one-hour ozone standard based on three consecutive years without a violation of the standard. The region was redesignated to a maintenance area and must continue to monitor for exceedances of the one-hour ozone standard in order to ensure compliance. The ten-year maintenance plans submitted by both Ohio and Kentucky contain emissions budgets for both volatile organic compounds (VOC) and oxides of nitrogen (Nox). These budgets establish a maximum allowable limit on future emissions from vehicles (mobile sources). Through the conformity process, OKI's transportation plans and programs must be shown not to exceed those established budgets.

In 1997, EPA completed its review of the national air quality standard for ozone and replaced the one-hour 0.12 parts per million standard with a new eight-hour average 0.08 parts per million standard. A violation of the eight-hour national air quality standard for ozone occurs when the three-year average of the annual 4th highest daily maximum eight-hour concentration exceeds 0.08 parts per million. This new 8-hour standard was promulgated in April 2004. As mentioned above, the USEPA designated the Greater Cincinnati region (including the study area) in "Basic Non-attainment" for air quality.

The Transportation Efficiency Act for the Twenty-First Century (TEA-21) strengthens the CAAA's ability to meet its objectives and to ensure that improvements in air quality will not be reversed by growth in travel. TEA-21 continued many of the programs which began under its predecessor, the Intermodal Surface Transportation Efficiency Act (ISTEA), and gives state and local officials tools for adapting the transportation system to meet the CAAA requirements, including increased funding, flexibility to mix project types (e.g., transit, bicycle), and metropolitan and statewide planning requirements. The OKI regional transportation plan defines local commitments to promote alternatives to automobile travel and to enhance mobility while minimizing highway construction. Air

quality is a key criterion for OKI in making decisions for transportation plans, programs, and projects. Projects that emerge from this study will need to exhibit air quality conformity before they can be added to the OKI regional transportation plan.

Noise Sensitive Receptors

In accordance to ODOT and Federal Highway Administration policies, the primary areas of concern regarding potential impacts to noise-sensitive receptors are all residential areas found in the study area. Other potential sites can include motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and other lands where serenity and quiet are of extraordinary importance and that serve an important public need. Areas with noise sensitive receptors warrant consideration of potential noise impacts and therefore are *Red Flag* areas because of the potential to impact project design, cost and controversy. Although these are considered Red Flag areas, effective mitigation of some noise impacts is often possible.

Red Flag Summary

Red Flags, including environmental and engineering issues, are locations of concern within the study area. Red flags do not necessarily identify locations that must be avoided, but rather identify locations that will entail additional study coordination, creative management, or design approaches, or increased right-of-way or construction costs. Locations that must be avoided are referred to as Fatal Flaws. Consultation with appropriate specialists is required to determine the level of concern for each Red Flag item. In addition to the narrative Red Flag Summary below, an ODOT Red Flag Summary spreadsheet/checklist has been completed and is provided in **Appendix A**.

Floodplains

Floodplains are considered *Red Flag* areas, especially when associated with a State and National Wild and Scenic River. However, floodplains in general would not constitute Fatal Flaws. Figure 12 provides the location of these resources in the project area.

Groundwater/Aquifers, Wellheads and Drinking Water Supplies

Sole Source Aquifers and Wellhead Protection Areas are *Red Flag* areas. If adversely impacted, they are considered *Fatal Flaw*s. Figure 12 provides the location of these resources in the study area.

Little Miami River

The river's designation as a State and National Wild and Scenic River creates a *Red Flag* area. Figure 12 provides the location of these resources in the study area.

Little Miami River Valley Slopes

This steep, slide prone river corridor is a *Red Flag* area which presents construction challenges and raises construction cost. Figure 12 provides the location of these resources in the study area.

Wetlands

Wetlands are *Red Flag* areas. High quality wetlands, if adversely impacted, may be *Fatal Flaws*. Figure 12 provides the location of these resources in the study area.

Intensely Developed Land

Generally, intensely developed land uses are considered *Red Flag* areas due to the high cost of right-of-way acquisition. Strip takes for existing roadway widening are usually manageable, but new corridors in heavily developed areas are often cost prohibitive.

Listed Threatened or Endangered Species

The majority of the listed Threatened or Endangered Species habitat in the study area is concentrated in the Little Miami River Corridor. Although field studies are required beyond the 4-Step Process to determine the presence of such species, these are *Red Flag* areas to be considered at this stage.

Farmland

Agricultural Districts or Current Agricultural Use Value (CAUV) properties can be *Red Flag* areas. Figure 13 provides the location of farmland in the project area.

Government and Community Institutions

Schools and other public institutions are *Red Flag* areas, and can often become *Fatal Flaw* areas due to the high cost and practicality of replacing these facilities. See Figure 17 for the location of these resources in the study area.

Cemeteries

Strip takes from cemeteries, not involving graves, would be considered *Red Flag* areas. Severing of cemetery lands or relocation of graves are considered *Fatal Flaw*s. See Figure 17 for cemetery locations.

Parks and Public Recreation Areas

Public recreation areas are considered *Red Flag* areas for minimal impact. These can become *Fatal Flaw* areas if major impact is anticipated, due to the protected status these resources may have under the federal Section 4 (f) provision. This provision stipulates that federal funding cannot be used on a transportation project that requires the use of land from a Section 4(f) resource unless there are no other prudent and feasible alternatives to the use.

Hazardous Waste Sites

Potentially contaminated sites constitute *Red Flag* areas, since hazardous waste can vary from being time consuming to the point of being cost prohibitive. See Figure 17 for the location of these sites in the study area. At this level of study, the exact location of contamination on a particular parcel is not known. Therefore, on Figure 17 the entire parcel of these sites is identified, however the potential contamination may have affected only a portion of the parcel.

Environmental Justice Areas

At this level of screening no substantial concentrations of Environmental Justice populations are apparent.

Cultural Resources/National Register Of Historic Places

Sites "*listed on, or eligible for"* the National Register of Historic Places are *Red Flag* areas because it must be proven that there is "no feasible and prudent alternative" that avoids the adverse effect before the federal action can be approved. Figure 17 provides locations that are currently listed or have the potential to be listed on the Register.

Noise Sensitive Receptors

Areas with noise sensitive receptors are *Red Flag* areas because of the potential to impact project design, cost and controversy. Although these are considered *Red Flag* areas, effective mitigation of some noise impacts is often possible.

Section 2:
Future Conditions

Travel Demand Analysis

Transportation analysis was performed to review current and future socio-economic data and trip data, including trip distribution, trip growth, and trip characteristics. This analysis is conducted to identify significant changes in population and employment centers that could positively or negatively affect the operation of the transportation network based on changing travel patterns. Analysis is based on current and future socio-economic data and existing and committed transportation infrastructure that is maintained in the OKI travel demand model. For the purposes of this study travel demand model runs for the years 2004 and 2030 were conducted.

Socio-Economic Data

OKI collects and maintains historical, current, and estimated future socio-economic data for the eight county OKI region. Between 1980 and 2000, the population growth of the OKI region was approximately 14 percent. Warren County, where the study area is primarily located, reported a growth of approximately 60 percent during the same time period. Between 2004 and 2030 the study area is expected to continue this rapid growth in the number of households, population and number of jobs with a forecasted population growth of 64% by the year 2030. The number of households and the population in the study area is expected to grow approximately three times as fast as the OKI region as a whole, with the number of jobs in the study area growing twice as fast. **Table 5** provides 2004 and 2030 comparative population numbers for the study area. **Figure 18** summarizes the existing and forecasted growth of the OKI region by county between 1980 and 2030.

Figure 18: OKI Regional Population Change by County (1980-2030)

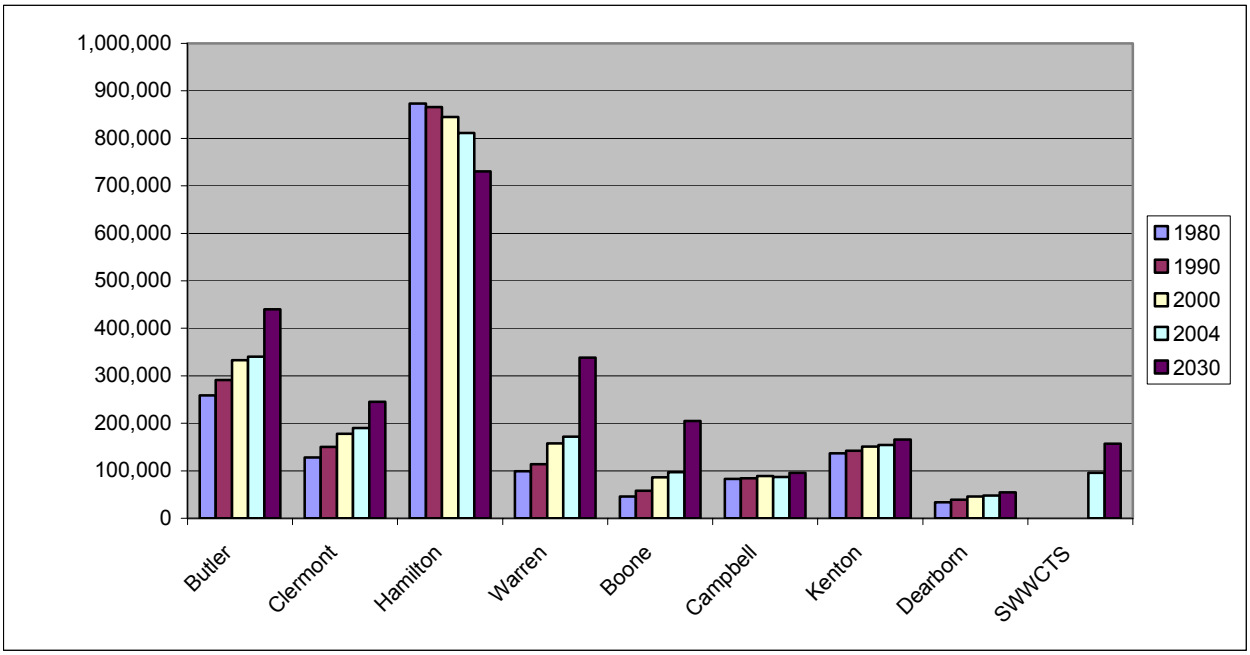


Table 5: Projected Demographic Growth (2004-2030)

	Study Area			OKI Region		
	2004	2030	Growth	2004	2030	Growth
Households (HH)	35,000	59,000	69%	763,000	928,000	22%
Population	96,000	157,000	64%	1,899,000	2,273,000	20%
Workers	52,000	87,000	67%	984,000	1,199,000	22%
Employment	58,000	81,000	40%	1,039,000	1,244,000	20%
Persons/HH	2.74	2.66	-3%	2.49	2.41	-3%
Workers/HH	1.49	1.47	-1%	1.29	1.29	0%
Jobs/Person	0.60	0.52	-13%	0.55	0.56	2%

Based on this data the study area, which is now a net importer of jobs, will be a net exporter of jobs in the year 2030. The implication for the region is that the study area network must not only serve pass through trips but also a significant increase in traffic to other parts of the region.

Trip Data

Trip data is classified in two ways; by market segment and by trip purpose. For the purpose of this study, the market segments are classified as the number of automobiles owned per household. The four trip purposes are as follows:

- Home – Based Work (HBW)
- Home – Based University (HBU)
- Home – Based Other (HBO)
- Non-Home – Based (NHB)

Table 6 identifies the number of trips by trip purpose and market segment for the OKI region. Reviewing the data presented in Table 6, the total number of OKI HBO trips increase by 622,000 between 2004 and 2030. NHB trips increase by 361,000, HBW by 254,000, and HBU by 13,000. The total number of transit trips for HBW decrease by 3,000 trips, while HBO transit trips decrease by 1,000 and NHB transit trips increase by 1,000. The number of HBU transit trips is negligible and does not change noticeably between 2004 and 2030.

The trip purpose data is also reviewed by origin and destination. By reviewing the data in this manner, changes in trip distribution can be noted. In 2004, the study area produces approximately 5% of all trips within the eight county OKI region and attracts 6% of the total trips. Of the 236,000 trips originating in the study area, 102,900, or 44%, travel to Hamilton County. Since Hamilton County has almost half the total OKI regional population and employment, this trip pattern is not

Table 6: OKI Region Daily Person Trips by Market Segment

Home – Based Work

Sub-Mode	Market Segment 1 0 Autos/HH			Market Segment 2 1 Auto/HH			Market Segment 3 2 Autos/HH			Market Segment 4 3+ Autos/HH			Total HBW		
	2004	2030	Difference	2004	2030	Difference	2004	2030	Difference	2004	2030	Difference	2004	2030	Difference
Drive Alone	0	0	N/A	66,000	88,000	33%	511,000	620,000	21%	388,000	469,000	21%	965,000	1,177,000	22%
2 Person Auto	26,000	31,000	19%	26,000	34,000	31%	54,000	66,000	22%	33,000	40,000	21%	139,000	171,000	23%
3+ Person Auto	6,000	8,000	33%	11,000	15,000	36%	19,000	24,000	26%	10,000	12,000	20%	46,000	59,000	28%
Total Auto	*32,000*	*39,000*	*22%*	*103,000*	*137,000*	*33%*	*584,000*	*710,000*	*22%*	*431,000*	*521,000*	*21%*	*1,150,000*	*1,407,000*	*22%*
Local Bus	18,000	15,000	-17%	5,000	5,000	0%	11,000	10,000	-9%	2,000	2,000	0%	36,000	32,000	-11%
Express Bus	0	0	N/A%	1,000	1,000	0%	2,000	2,000	0%	0	1,000	100%	3,000	4,000	33%
Total Transit	*18,000*	*15,000*	*-17%*	*6,000*	*6,000*	*0%*	*13,000*	*12,000*	*-8%*	*2,000*	*3,000*	*50%*	*39,000*	*36,000*	*-8%*
All Trips	50,000	54,000	8%	109,000	143,000	31%	597,000	722,000	21%	433,000	524,000	21%	1,189,000	1,443,000	21%
Mode Split	0.3600	0.2778	-23%	0.0550	0.0420	-24%	0.0218	0.0166	-24%	0.0046	0.0057	24%	0.0328	0.0249	-24%

Home – Based University

Sub-Mode	Total HBU		
	2004	2030	Difference
Drive Alone	49,000	60,000	22%
2 Person Auto	8,000	10,000	25%
3+ Person Auto	2,000	2,000	0%
Total Auto	*59,000*	*72,000*	*22%*
Local Bus	0	0	N/A
Express Bus	0	0	N/A
Total Transit	*0*	*0*	*N/A*
All Trips	59,000	72,000	22%
Mode Split	0	0	N/A

Home Based Other

Sub-Mode	Market Segment 1 0 Autos/HH			Market Segment 2 1 Auto/HH			Market Segment 3 2 Autos/HH			Market Segment 4 3+ Autos/HH			Total HBO		
	2004	2030	Difference	2004	2030	Difference	2004	2030	Difference	2004	2030	Difference	2004	2030	Difference
Drive Alone	0	0	N/A	288,000	350,000	22%	653,000	767,000	18%	362,000	427,000	18%	1,303,000	1,544,000	19%
2 Person Auto	42,000	58,000	38%	200,000	243,000	22%	632,000	741,000	17%	265,000	313,000	18%	1,139,000	1,355,000	19%
3+ Person Auto	32,000	44,000	38%	119,000	145,000	22%	543,000	637,000	17%	188,000	222,000	18%	882,000	1,048,000	19%
Total Auto	*74,000*	*102,000*	*38%*	*607,000*	*738,000*	*22%*	*1,828,000*	*2,145,000*	*17%*	*815,000*	*962,000*	*18%*	*3,324,000*	*3,947,000*	*19%*
Local Bus	15,000	14,000	-7%	5,000	5,000	0%	3,000	3,000	0%	1,000	1,000	0%	24,000	23,000	-4%
Express Bus	0	0	N/A%	0	0	N/A%	0	0	N/A%	0	0	N/A	0	0	N/A%
Total Transit	*15,000*	*14,000*	*-7%*	*5,000*	*5,000*	*0%*	*3,000*	*3,000*	*0%*	*1,000*	*1,000*	*0%*	*24,000*	*23,000*	*-4%*
All Trips	89,000	116,000	30%	612,000	743,000	31%	1,831,000	2,148,000	17%	816,000	963,000	18%	3,348,000	3,970,000	19%
Mode Split	0.1685	0.1207	-28%	0.0082	0.0067	-18%	0.0016	0.0014	-13%	0.0012	0.0010	-17%	0.0072	0.0058	-19%

Non-Home – Based

Sub-Mode	Total NHB		
	2004	2030	Difference
Drive Alone	1,133,000	1,346,000	19%
2 Person Auto	476,000	568,000	19%
3+ Person Auto	291,000	346,000	19%
Total Auto	*1,900,000*	*2,260,000*	*19%*
Local Bus	9,000	10,000	11%
Express Bus	0	0	N/A
Total Transit	*9,000*	*10,000*	*11%*
All Trips	1,909,000	2,270,000	19%
Mode Split	0.0047	0.0044	-6%

unexpected. In 2030, 7% of all trips start in the study area, while 6% end there. Again, Hamilton County is the destination for the majority of trips originating in the study area. In fact, 171,200 of the 385,300 study area trips in 2030 travel to Hamilton County. **Figure 19** details trips traveling into the study area, and **Figure 20** shows the destination or trips originating within the study area. **Table 7** provides the existing and future person trips distribution by county and study area.

Figure 19: Study Area Trip Originations by County

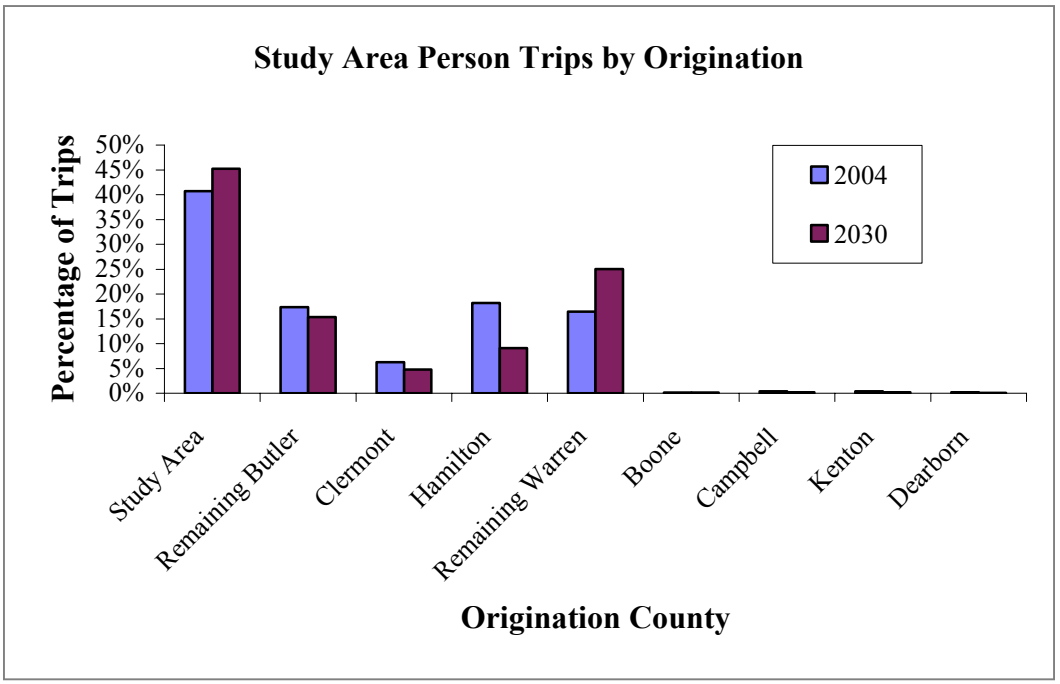
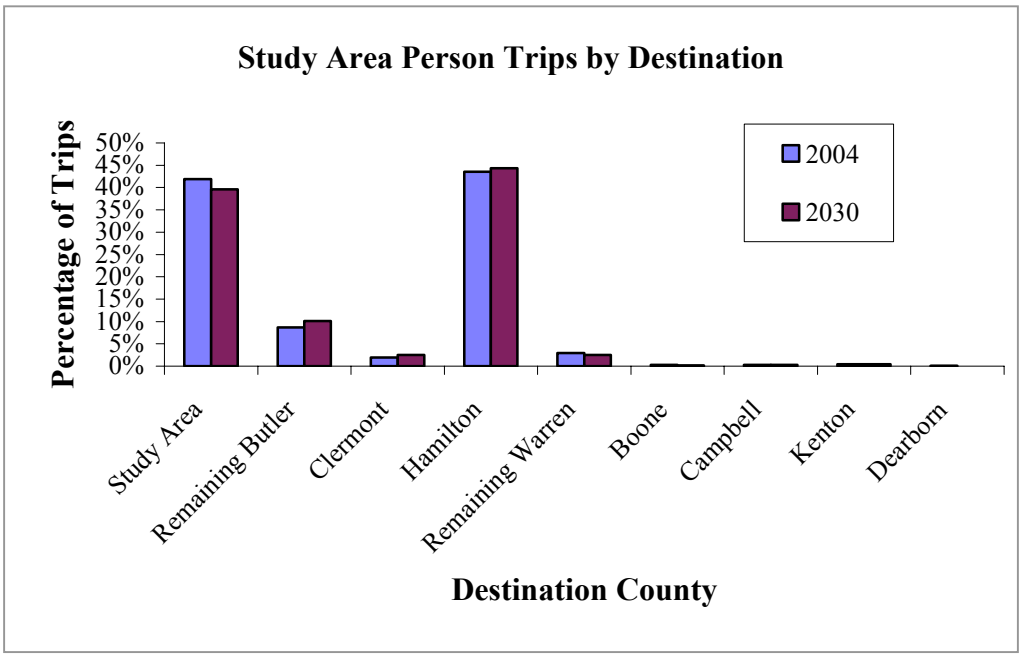


Figure 20: Study Area Trip Destinations by County



Southwest Warren County
Transportation Study

Table 7: Existing and Future Person Trip Distribution by County and Study Area

2004 Person Trip Distribution by County

HBW

Person Trips

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	16,400	7,800	2,100	31,800	1,900	400	400	700	100	61,600
Remaining Butler	13,200	91,500	1,700	67,000	6,500	1,200	800	1,600	800	184,300
Clermont	5,200	2,800	43,000	58,700	800	3,000	3,000	4,400	100	121,000
Hamilton	15,500	26,300	13,300	421,500	1,300	5,300	4,900	9,600	3,900	501,600
Remaining Warren	11,100	10,800	1,900	17,500	13,800	300	300	500	0	56,200
Boone	200	300	400	9,000	0	38,400	2,700	13,400	700	65,100
Campbell	500	500	800	24,100	0	6,300	11,600	10,800	100	54,700
Kenton	600	600	1,000	28,200	100	28,200	8,400	32,200	400	99,700
Dearborn	200	800	100	10,200	0	3,800	400	1,400	11,300	28,200
Total	62,900	141,400	64,300	668,000	24,400	86,900	32,500	74,600	17,400	1,172,400

Attraction Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	27%	13%	3%	52%	3%	1%	1%	1%	0%	100%
Remaining Butler	7%	50%	1%	36%	4%	1%	0%	1%	0%	100%
Clermont	4%	2%	36%	49%	1%	2%	2%	4%	0%	100%
Hamilton	3%	5%	3%	84%	0%	1%	1%	2%	1%	100%
Remaining Warren	20%	19%	3%	31%	25%	1%	1%	1%	0%	100%
Boone	0%	0%	1%	14%	0%	59%	4%	21%	1%	100%
Campbell	1%	1%	1%	44%	0%	12%	21%	20%	0%	100%
Kenton	1%	1%	1%	28%	0%	28%	8%	32%	0%	100%
Dearborn	1%	3%	0%	36%	0%	13%	1%	5%	40%	100%
Total	5%	12%	5%	57%	2%	7%	3%	6%	1%	100%

Production Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	26%	6%	3%	5%	8%	0%	1%	1%	1%	5%
Remaining Butler	21%	65%	3%	10%	27%	1%	2%	2%	5%	16%
Clermont	8%	2%	67%	9%	3%	3%	9%	6%	1%	10%
Hamilton	25%	19%	21%	63%	5%	6%	15%	13%	22%	43%
Remaining Warren	18%	8%	3%	3%	57%	0%	1%	1%	0%	5%
Boone	0%	0%	1%	1%	0%	44%	8%	18%	4%	6%
Campbell	1%	0%	1%	4%	0%	7%	36%	14%	1%	5%
Kenton	1%	0%	2%	4%	0%	32%	26%	43%	2%	9%
Dearborn	0%	1%	0%	2%	0%	4%	1%	2%	65%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

HBO

Person Trips

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	82,500	12,600	2,500	71,100	5,100	200	200	400	0	174,600
Remaining Butler	28,700	336,300	1,500	154,700	21,600	700	600	1,200	300	545,600
Clermont	10,100	2,400	210,300	114,900	1,100	2,400	3,100	3,600	0	347,900
Hamilton	28,700	43,800	27,800	1,298,400	400	2,200	4,000	7,200	3,400	1,415,900
Remaining Warren	29,000	18,300	3,800	29,100	83,000	200	200	400	0	164,000
Boone	100	100	200	2,500	0	142,100	2,000	22,900	300	170,200
Campbell	400	300	1,200	25,300	0	10,100	77,900	38,900	0	154,100
Kenton	400	300	1,200	25,300	0	10,100	77,900	38,900	0	154,100
Dearborn	200	1,100	100	21,800	0	5,300	400	2,000	46,900	77,800
Total	180,100	415,200	248,600	1,743,100	111,200	173,300	166,300	115,500	50,900	3,204,200

Attraction Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	47%	7%	1%	41%	3%	0%	0%	0%	0%	100%
Remaining Butler	5%	62%	0%	28%	4%	0%	0%	0%	0%	100%
Clermont	3%	1%	60%	33%	0%	1%	1%	1%	0%	100%
Hamilton	2%	3%	2%	92%	0%	0%	0%	1%	0%	100%
Remaining Warren	18%	11%	2%	18%	51%	0%	0%	0%	0%	100%
Boone	0%	0%	0%	1%	0%	83%	1%	13%	0%	100%
Campbell	0%	0%	1%	16%	0%	7%	51%	25%	0%	100%
Kenton	0%	0%	1%	16%	0%	7%	51%	25%	0%	100%
Dearborn	0%	1%	0%	28%	0%	7%	1%	3%	60%	100%
Total	6%	13%	8%	54%	3%	5%	5%	4%	2%	100%

Production Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	46%	3%	1%	4%	5%	0%	0%	0%	0%	5%
Remaining Butler	16%	81%	1%	9%	19%	0%	0%	1%	1%	17%
Clermont	6%	1%	85%	7%	1%	1%	2%	3%	0%	11%
Hamilton	16%	11%	11%	74%	0%	1%	2%	6%	7%	44%
Remaining Warren	16%	4%	2%	2%	75%	0%	0%	0%	0%	5%
Boone	0%	0%	0%	0%	0%	82%	1%	20%	1%	5%
Campbell	0%	0%	0%	1%	0%	6%	47%	34%	0%	5%
Kenton	0%	0%	0%	1%	0%	6%	47%	34%	0%	5%
Dearborn	0%	0%	0%	1%	0%	3%	0%	2%	92%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Total

Person Trips

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	98,900	20,400	4,600	102,900	7,000	600	600	1,100	100	236,200
Remaining Butler	41,900	427,800	3,200	221,700	28,100	1,900	1,400	2,800	1,100	729,900
Clermont	15,300	5,200	253,300	173,600	1,900	5,400	6,100	8,000	100	468,900
Hamilton	44,200	70,100	41,100	1,719,900	1,700	7,500	8,900	16,800	7,300	1,917,500
Remaining Warren	40,100	29,100	5,700	46,600	96,800	500	500	900	0	220,200
Boone	300	400	600	11,500	0	180,500	4,700	36,300	1,000	235,300
Campbell	900	800	2,000	49,400	0	16,400	89,500	49,700	100	208,800
Kenton	1,000	900	2,200	53,500	100	38,300	86,300	71,100	400	253,800
Dearborn	400	1,900	200	32,000	0	9,100	800	3,400	58,200	106,000
Total	243,000	556,600	312,900	2,411,100	135,600	260,200	198,800	190,100	68,300	4,376,600

Attraction Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	42%	9%	2%	44%	3%	0%	0%	0%	0%	100%
Remaining Butler	6%	59%	0%	30%	4%	0%	0%	0%	0%	100%
Clermont	3%	1%	54%	37%	0%	1%	1%	2%	0%	100%
Hamilton	2%	4%	2%	90%	0%	0%	0%	1%	0%	100%
Remaining Warren	18%	13%	3%	21%	44%	0%	0%	0%	0%	100%
Boone	0%	0%	0%	5%	0%	77%	2%	15%	0%	100%
Campbell	0%	0%	1%	24%	0%	8%	43%	24%	0%	100%
Kenton	0%	0%	1%	21%	0%	15%	34%	28%	0%	100%
Dearborn	0%	2%	0%	30%	0%	9%	1%	3%	55%	100%
Total	6%	13%	7%	55%	3%	6%	5%	4%	2%	100%

Production Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	41%	4%	1%	4%	5%	0%	0%	1%	0%	5%
Remaining Butler	17%	77%	1%	9%	21%	1%	1%	1%	2%	17%
Clermont	6%	1%	81%	7%	1%	2%	3%	4%	0%	11%
Hamilton	18%	13%	13%	71%	1%	3%	4%	9%	11%	44%
Remaining Warren	17%	5%	2%	2%	71%	0%	0%	0%	0%	5%
Boone	0%	0%	0%	0%	0%	69%	2%	19%	1%	5%
Campbell	0%	0%	1%	2%	0%	6%	45%	26%	0%	5%
Kenton	0%	0%	1%	2%	0%	15%	43%	37%	1%	6%
Dearborn	0%	0%	0%	1%	0%	3%	0%	2%	85%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

2030 Person Trip Distribution by County

HBW

Person Trips

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	28,700	14,100	3,700	51,700	2,200	300	600	900	100	102,300
Remaining Butler	17,000	121,000	2,100	90,000	5,700	700	1,000	2,000	700	240,200
Clermont	5,300	2,900	68,500	75,300	500	2,000	3,800	4,800	100	163,200
Hamilton	10,800	23,100	12,700	395,300	300	2,600	4,500	7,800	3,700	460,800
Remaining Warren	26,100	24,300	4,000	32,600	26,100	100	300	500	100	114,100
Boone	200	400	600	16,900	0	82,600	5,800	33,100	1,600	141,200
Campbell	400	400	900	26,700	0	4,700	15,400	11,500	100	60,100
Kenton	400	500	900	32,400	0	25,800	10,200	39,900	400	110,500
Dearborn	100	700	100	12,300	0	1,900	300	800	15,300	31,500
Total	89,000	187,400	93,500	733,200	34,800	120,700	41,900	101,300	22,100	1,423,900

Attraction Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	28%	14%	4%	51%	2%	0%	1%	1%	0%	100%
Remaining Butler	7%	50%	1%	37%	2%	0%	0%	1%	0%	100%
Clermont	3%	2%	42%	46%	0%	1%	2%	3%	0%	100%
Hamilton	2%	5%	3%	86%	0%	1%	1%	2%	1%	100%
Remaining Warren	23%	21%	4%	29%	23%	0%	0%	0%	0%	100%
Boone	0%	0%	0%	12%	0%	58%	4%	23%	1%	100%
Campbell	1%	1%	1%	44%	0%	8%	26%	19%	0%	100%
Kenton	0%	0%	1%	29%	0%	23%	9%	36%	0%	100%
Dearborn	0%	2%	0%	39%	0%	6%	1%	3%	49%	100%
Total	6%	13%	7%	51%	2%	8%	3%	7%	2%	100%

Production Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	32%	8%	4%	7%	6%	0%	1%	1%	0%	7%
Remaining Butler	19%	65%	2%	12%	16%	1%	2%	2%	3%	17%
Clermont	6%	2%	73%	10%	1%	2%	9%	5%	0%	11%
Hamilton	12%	12%	14%	54%	1%	2%	11%	8%	17%	32%
Remaining Warren	29%	13%	4%	4%	75%	0%	1%	0%	0%	8%
Boone	0%	0%	1%	2%	0%	68%	14%	33%	7%	10%
Campbell	0%	0%	1%	4%	0%	4%	37%	11%	0%	4%
Kenton	0%	0%	1%	4%	0%	21%	24%	39%	2%	8%
Dearborn	0%	0%	0%	2%	0%	2%	1%	1%	69%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

HBO

Person Trips

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	123,800	24,700	6,000	119,500	7,600	200	500	700	0	283,000
Remaining Butler	34,900	434,700	2,300	207,800	18,800	400	900	1,600	500	701,900
Clermont	10,800	3,100	289,300	144,700	1,100	1,400	4,300	4,300	0	459,000
Hamilton	20,000	40,000	28,400	1,158,200	200	900	3,700	5,400	3,500	1,260,300
Remaining Warren	58,300	44,100	9,100	81,700	128,700	300	500	700	0	323,400
Boone	200	400	700	9,500	0	272,900	7,000	57,300	1,800	349,800
Campbell	200	200	1,300	26,500	0	5,200	95,000	37,200	0	165,600
Kenton	300	400	1,100	25,300	0	62,500	30,200	173,100	200	293,100
Dearborn	100	800	0	25,200	0	2,100	300	1,100	58,500	88,100
Total	248,600	548,400	338,200	1,798,400	156,400	345,900	142,400	281,400	64,500	3,924,200

Attraction Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	44%	9%	2%	42%	3%	0%	0%	0%	0%	100%
Remaining Butler	5%	62%	0%	30%	3%	0%	0%	0%	0%	100%
Clermont	2%	1%	63%	32%	0%	0%	1%	1%	0%	100%
Hamilton	2%	3%	2%	92%	0%	0%	0%	0%	0%	100%
Remaining Warren	18%	14%	3%	25%	40%	0%	0%	0%	0%	100%
Boone	0%	0%	0%	3%	0%	78%	2%	16%	1%	100%
Campbell	0%	0%	1%	16%	0%	3%	57%	22%	0%	100%
Kenton	0%	0%	0%	9%	0%	21%	10%	59%	0%	100%
Dearborn	0%	1%	0%	29%	0%	2%	0%	1%	66%	100%
Total	6%	14%	9%	46%	4%	9%	4%	7%	2%	100%

Production Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	50%	5%	2%	7%	5%	0%	0%	0%	0%	7%
Remaining Butler	14%	79%	1%	12%	12%	0%	1%	1%	1%	18%
Clermont	4%	1%	86%	8%	1%	0%	3%	2%	0%	12%
Hamilton	8%	7%	8%	64%	0%	0%	3%	2%	5%	32%
Remaining Warren	23%	8%	3%	5%	82%	0%	0%	0%	0%	8%
Boone	0%	0%	0%	1%	0%	79%	5%	20%	3%	9%
Campbell	0%	0%	0%	1%	0%	2%	67%	13%	0%	4%
Kenton	0%	0%	0%	1%	0%	18%	21%	62%	0%	7%
Dearborn	0%	0%	0%	1%	0%	1%	0%	0%	91%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Total

Person Trips

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	152,500	38,800	9,700	171,200	9,800	500	1,100	1,600	100	385,300
Remaining Butler	51,900	555,700	4,400	297,800	24,500	1,100	1,900	3,600	1,200	942,100
Clermont	16,100	6,000	357,800	220,000	1,600	3,400	8,100	9,100	100	622,200
Hamilton	30,800	63,100	41,100	1,553,500	500	3,500	8,200	13,200	7,200	1,721,100
Remaining Warren	84,400	68,400	13,100	114,300	154,800	400	800	1,200	100	437,500
Boone	400	800	1,300	26,400	0	355,500	12,800	90,400	3,400	491,000
Campbell	600	600	2,200	53,200	0	9,900	110,400	48,700	100	225,700
Kenton	700	900	2,000	57,700	0	88,300	40,400	213,000	600	403,600
Dearborn	200	1,500	100	37,500	0	4,000	600	1,900	73,800	119,600
Total	337,600	735,800	431,700	2,531,600	191,200	466,600	184,300	382,700	86,600	5,348,100

Attraction Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	40%	10%	3%	44%	3%	0%	0%	0%	0%	100%
Remaining Butler	6%	59%	0%	32%	3%	0%	0%	0%	0%	100%
Clermont	3%	1%	58%	35%	0%	1%	1%	1%	0%	100%
Hamilton	2%	4%	2%	90%	0%	0%	0%	1%	0%	100%
Remaining Warren	19%	16%	3%	26%	35%	0%	0%	0%	0%	100%
Boone	0%	0%	0%	5%	0%	72%	3%	18%	1%	100%
Campbell	0%	0%	1%	24%	0%	4%	49%	22%	0%	100%
Kenton	0%	0%	0%	14%	0%	22%	10%	53%	0%	100%
Dearborn	0%	1%	0%	31%	0%	3%	1%	2%	62%	100%
Total	6%	14%	8%	47%	4%	9%	3%	7%	2%	100%

Production Percentages

Origin \ Destination	Study Area	Butler	Clermont	Hamilton	Warren	Boone	Campbell	Kenton	Dearborn	Total
Study Area	45%	5%	2%	7%	5%	0%	1%	0%	0%	7%
Remaining Butler	15%	76%	1%	12%	13%	0%	1%	1%	1%	18%
Clermont	5%	1%	83%	9%	1%	1%	4%	2%	0%	12%
Hamilton	9%	9%	10%	61%	0%	1%	4%	3%	8%	32%
Remaining Warren	25%	9%	3%	5%	81%	0%	0%	0%	0%	8%
Boone	0%	0%	0%	1%	0%	76%	7%	24%	4%	9%
Campbell	0%	0%	1%	2%	0%	2%	60%	13%	0%	4%
Kenton	0%	0%	0%	2%	0%	19%	22%	56%	1%	8%
Dearborn	0%	0%	0%	1%	0%	1%	0%	0%	85%	2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Network Analysis

Using the OKI travel demand model based upon the socio-economic and trip data examined above, Average Daily Traffic (ADT) volumes and peak hour traffic volumes were developed for the study area. Existing (2004) ADT is shown on **Figure 3**, and future (2030) is shown on **Figure 21**. Six individual locations are listed in the table below to help illustrate potential travel growth in the study area. Changes in ADT are shown in **Table 8**.

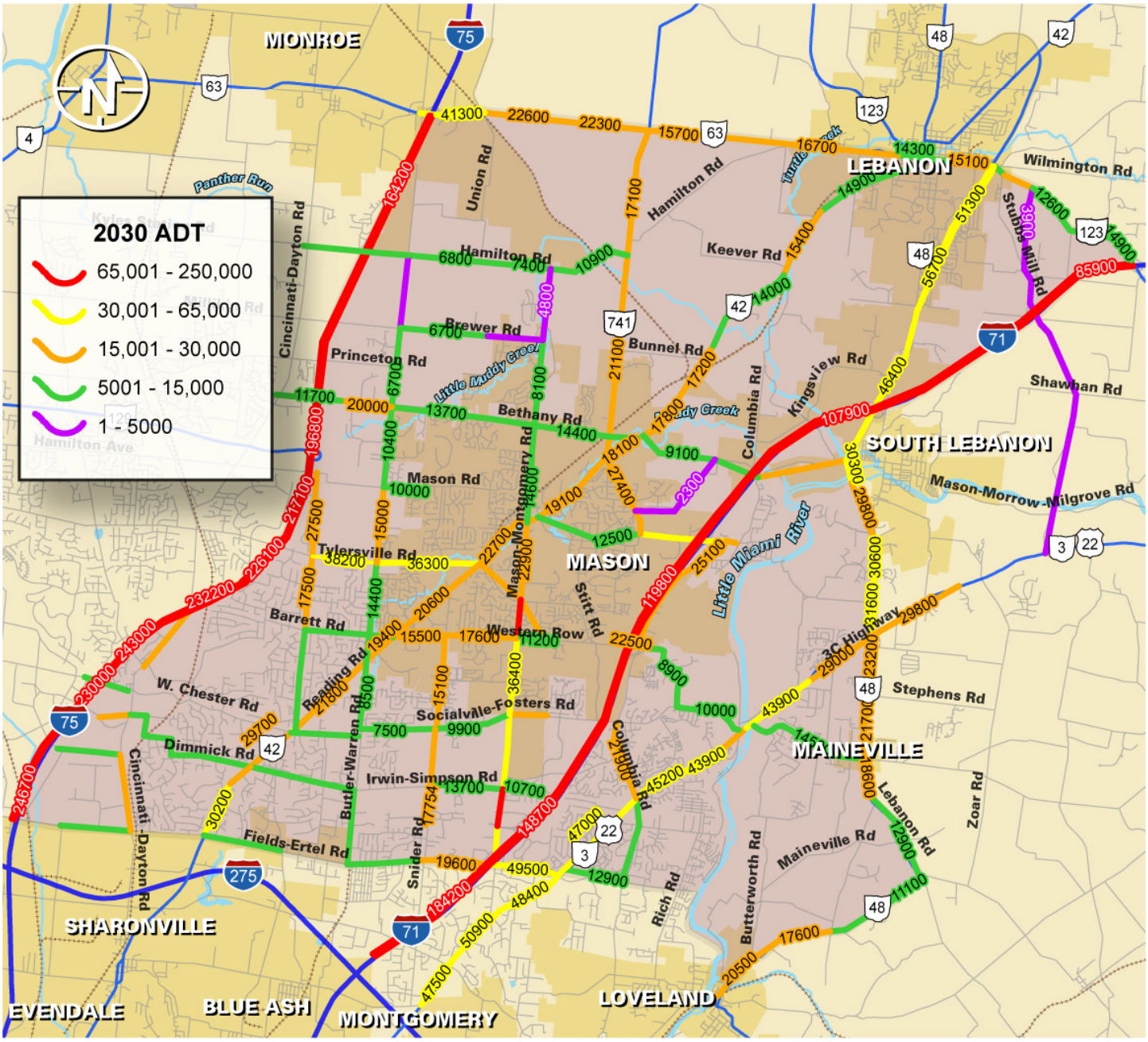
Table 8: Sample Average Daily Traffic (ADT) Volumes

Road	Average Daily Traffic		
	2004	2030	% Change
SR 63 – between SR 741 and US 42	9,100	17,100	88%
Tylersville Rd. – between Snider Rd. and US 42	28,200	36,300	29%
Western Row Rd. – between Snider Rd. and Mason-Montgomery Rd.	11,100	16,500	49%
US 22 north of Socialville-Fosters Rd.	11,800	36,500	209%
Irwin Simpson east of Butler Warren Rd.	7,000	10,800	54%
Mason-Montgomery – between Western Row Rd. and Socialville Foster Rd.	27,700	36,400	31%

For purposes of this study, roadway ADT's were analyzed to determine an estimated peak hour volume percentage for the study area. A sampling of ADT's was used to determine an approximate percentage of traffic that occurs in the peak hour. The peak hour volumes are not calculated separately for each roadway link and intersection, since it is assumed that a calculated percentage may be used for modeling purposes. For this study, the sampling of ADT's reveals a worst-case volume of 10% (of the ADT) during any given peak hour with a directional distribution of 60 percent in the peak direction and 40 percent in the off-peak direction. These assumptions yield a "general" peak hour volume for planning purposes, which is not specific to the AM or PM peak period. The subsequent levels of service for roadway links and intersections discussed in this study are therefore representative of the worst-case peak hour for each link or intersection for comparison purposes only. They do not represent a specific hour during the average day, since each link or intersection in the network may have it's peak period at a different time of day.

Network analysis was conducted to determine the effect of the changes in travel patterns on the operation of the existing transportation network. The base transportation network for future year 2030 analysis included all existing infrastructure combined with all committed infrastructure (identified funding already in place). Network analysis was conducted by examining average trip length, vehicle miles of travel (VMT), vehicle hours of travel (VHT), and vehicle hours of delay (VHD) on both a regional scale and on the study area. In addition, individual capacity analysis was conducted for each roadway link in the network and at each signalized intersection to identify specific areas where the roadway capacity is deficient.

Figure 21: 2030 ADT



To determine changes in network congestion, the average trip lengths for 2004 and 2030 are compared. Trip length can be defined as either the amount of time (in minutes) required for a trip or the average distance (in miles) traveled during a trip. When defining trip length in minutes, all the peak period trip purposes show an increase in average travel time. The largest increase occurs with the HBO trips. Conversely, when defining trip length as distance, HBW and NHB trips show a decrease in average travel distance while HBU and HBO show an increase in travel distance between 2004 and 2030. This data is shown in **Figures 22 and 23** for all peak period trips.

Figure 22: Trip Length (minutes) by Trip Purpose

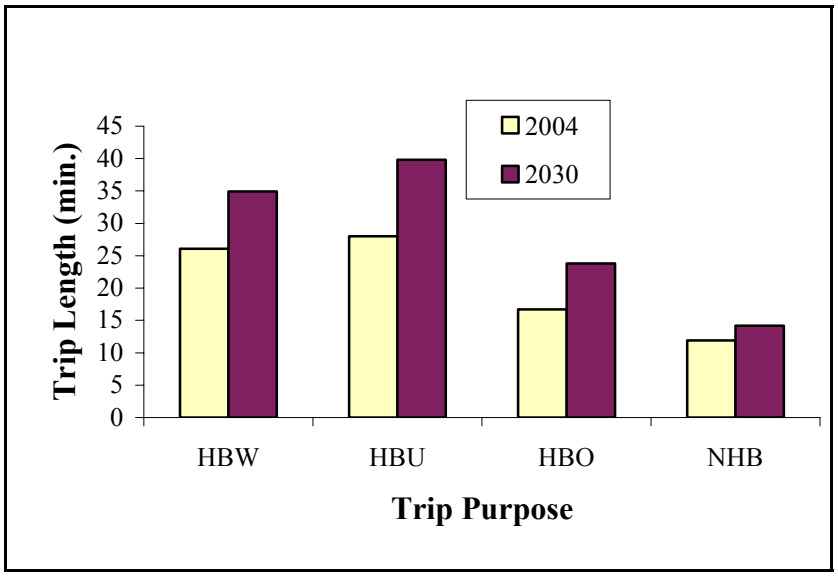
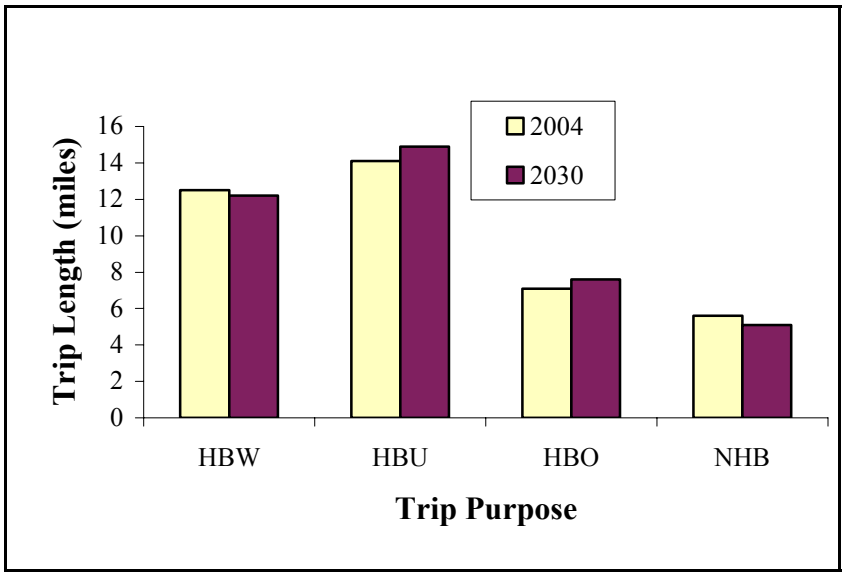


Figure 23: Trip Length (miles) by Trip Purpose



The largest increases in daily VMT, VHT, and VHD in the study area occur along both the I-71 and I-75 interstates. There are no significant decreases in the study area. **Table 9** lists the total changes in VMT, VHT, and VHD for the study area and for the OKI Region.

Table 9: 2004 and 2030 VMT, VHT and VHD for SWWCTS Area and OKI Region

	Study Area			OKI Region		
	2004	**2030**	**% Difference**	**2004**	**2030**	**% Difference**
VMT	4,358,000	7,201,000	65%	49,843,000	67,342,000	35%
VHT	113,000	283,000	150%	1,331,000	2,190,000	65%
VHD	17,000	125,000	635%	120,000	566,000	372%

It can also be noted that the study area VHD is projected to grow at a rate four times greater than the rate of VHT, which is twice the rate of VMT growth. Additionally, the study area growth rates for all three measures of travel are twice that of the OKI region. This suggests that congestion can be expected to grow dramatically between 2004 and 2030.

Level of Service (LOS) analysis was conducted for each roadway segment and at each signalized intersection for the peak hour traffic demand for the future year 2030. Based upon these traffic volumes it is estimated that in the year 2030, approximately two-thirds of the roadways within the study area will exceed the capacity based on existing conditions. The majority of those operating under capacity are expected to operate at Levels of Service D or E, which are approaching capacity and would be expected to experience decreasing speeds and increasing delays and congestion. **Figure 24** shows the peak hour level of service of all major roadways within the study area and **Figure 25** shows the peak hour level of service for all signalized intersections in the study area.

Figure 24: 2030 Peak Hour Roadway Level of Service

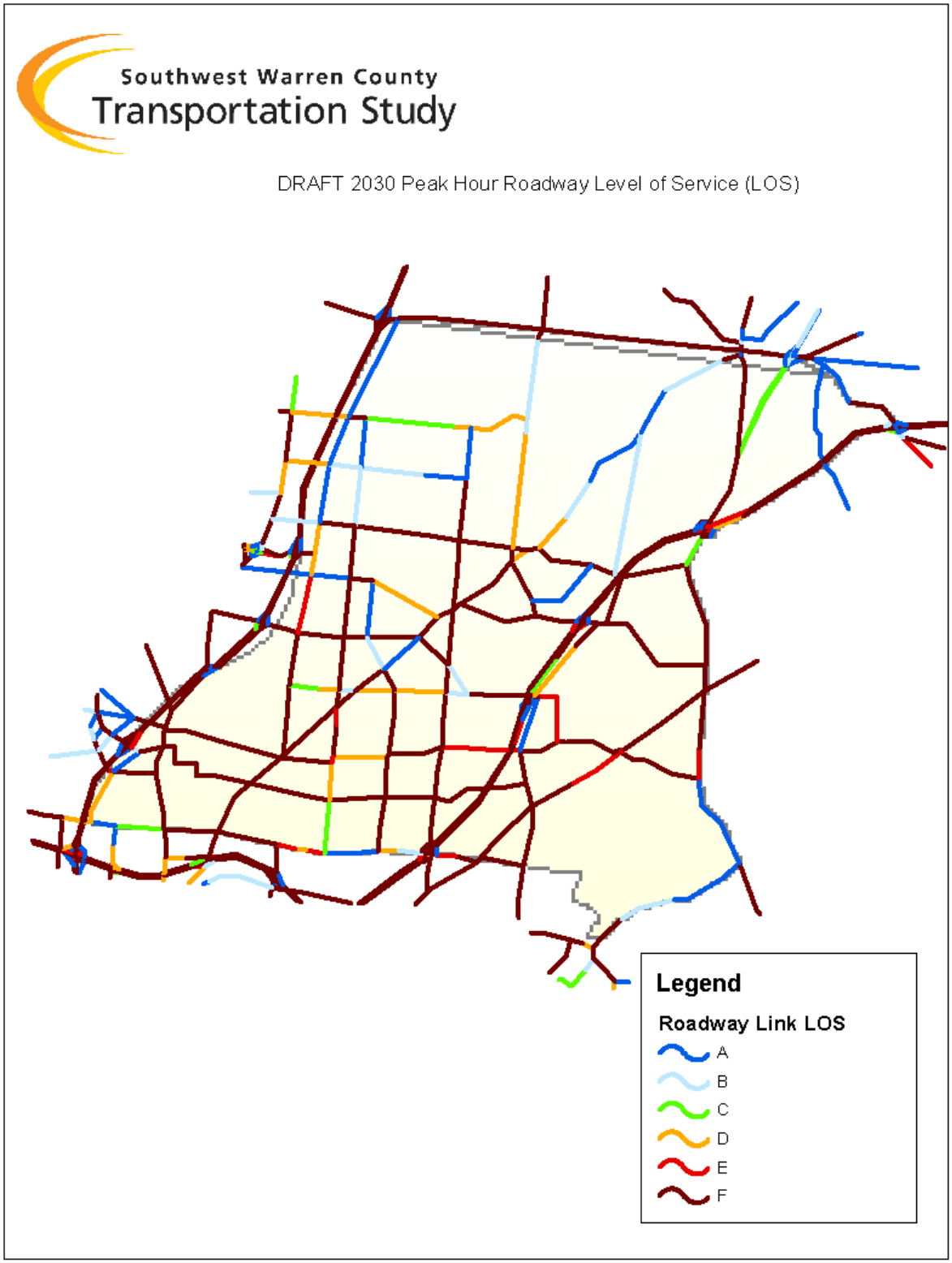
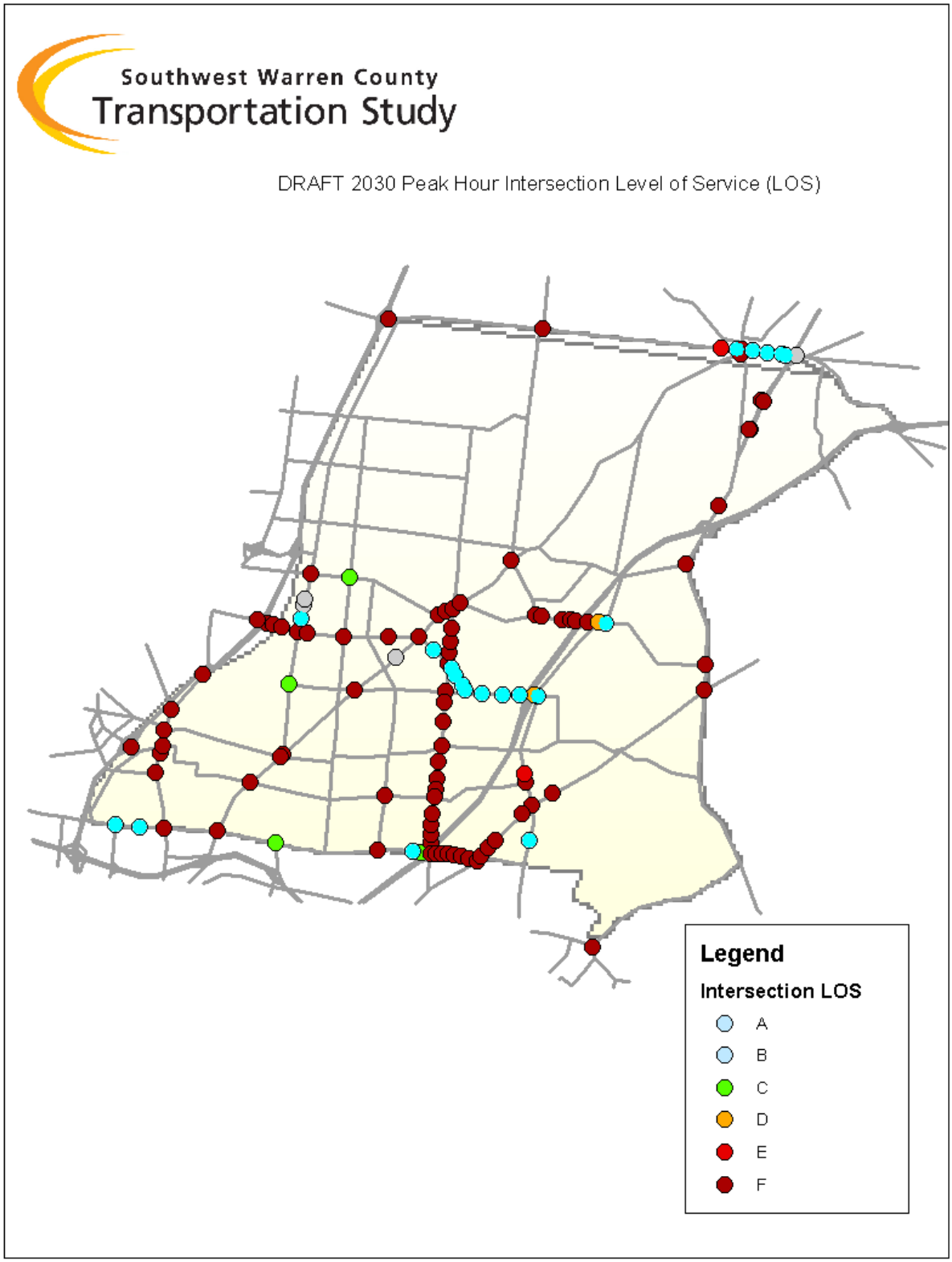


Figure 25: 2030 Peak Hour Intersection Level of Service



Bibliography/References

Studies/Maps/Publications

Balke American. Northwest Butler Transportation Study: A Recommendation of a Preferred Strategy for a Long Range Transportation Plan for Northwest Butler County for Consideration for Incorporation into the OKI Long Range Regional Plan. Prepared for the Northwest Butler Transportation Study Committee, 2003.

Barge Waggoner Sumner & Cannon, Inc. Feasibility Study for the Miami to Miami Connection. Prepared for the Miami 2 Miami Coalition and the Ohio-Kentucky-Indiana Regional Council of Governments, October 2002.

Burgess & Niple. I-71 Corridor Study. Prepared for the Ohio-Kentucky-Indiana Regional Council of Governments, 1998.

Edwards and Kelcey. City of Lebanon Comprehensive Plan. Prepared for the city of Lebanon, January 2004.

Lakatos Group. Warren County Transportation Development Plan. Prepared for the Ohio Department of Transportation Office of Transit, June 2004.

LJB Inc. Western Row Interchange Feasibility Study (Draft). Prepared for the Warren County (Ohio) Engineer's Office, May 1999.

McKenna Associates, Incorporated and LJB Inc. Mason Bicycle and Pedestrian Way Master Plan - 2001. Prepared for the city of Mason, Ohio, 2001.

Pflum, Klausmeier & Gehrum. "Deerfield Township Zoning Map." Prepared for Deerfield Township and Warren County, Ohio, Revised January 2000.

URS Greiner Woodward Clyde, Bechtel Infrastructure, Balke Engineers. 2020Vision for the Eastern Corridor: A Comprehensive Plan for Improving Transportation in the Cincinnati Metropolitan Area. Prepared for the Ohio Kentucky Indiana Regional Council of Governments, September 1999.

Woolpert LLP. (Final) Comprehensive Plan Update for the City of Mason. Prepared for the city of Mason, Ohio, 2001.

Woolpert. Warren County Official Thoroughfare Plan: Adopted July 1996. Prepared for the Warren County (Ohio) Regional Planning Commission and the Warren County (Ohio) Engineer, 1996.

Woolpert LLP. "Existing Regional Land Use." Prepared for the Ohio Kentucky Indiana Regional Council of Governments Land Use Commission, October 2000.

City of Mason Thoroughfare Plan. City of Mason Engineering, Building & Planning Department, November 2003.

Fiscal Years 2004 – 2007 Transportation Improvement Program. Prepared by the Ohio-Kentucky-Indiana Regional Council of Governments, amended September 2003.

Guidance and Best Practices for Incorporating Environmental Justice into Ohio Transportation Planning and Environmental Processes. Prepared by the Ohio Department of Transportation, August 2002.

"Hamilton Township Land Use Plan." Prepared by the Warren County Regional Planning Commission, December 1999.

North South Transportation Initiative Technical Report & Appendices. Ohio Kentucky Indiana Regional Council of Governments, Miami Valley Regional Planning Commission. http://www.oki.org/transportation/northsouth.html

Ohio Department of Transportation Public Involvement Guide. Prepared by the Ohio Department of Transportation, December 2002.

OKI 2030 Regional Transportation Plan. Prepared by the Ohio-Kentucky-Indiana Regional Council of Governments, June 2004.

OKI Regional Bicycle Plan. Prepared by the Ohio-Kentucky-Indiana Regional Council of Governments. http://www.oki.org/transportation/bike/okibikeplan.html

Project Development Process. Ohio Department of Transportation Office of Urban and Corridor Planning, November 2004.

"Turtlecreek Township Land Use Plan." Prepared by the Warren County Regional Planning Commission, October 1994.

"United State Department of the Interior Geological Survey, Glendale Quadrangle Ohio" map. United States Geological Survey, photorevised 1974.

"United State Department of the Interior Geological Survey, Lebanon Quadrangle Ohio – Warren Co." map. United States Geological Survey, photorevised 1974

"United State Department of the Interior Geological Survey, Mason Quadrangle Ohio" map. United States Geological Survey, photorevised 1981.

"United State Department of the Interior Geological Survey, South Lebanon Quadrangle Ohio" map. United States Geological Survey, photoinspected 1979

"United State Department of the Interior Geological Survey, Monroe Quadrangle Ohio" map. United States Geological Survey, 1974.

"Union Township Land Use Plan." Prepared by the Warren County Regional Planning Commission, October 1994.

"Warren County 2020 Generalized Land Use Plan." Warren County Regional Planning Commission, October 2003.

Warren County Profile. Ohio State University Department of Human and Community Resource Development, 2003. http://www.osuedc.org/profiles/pdf/warren_county_profile.pdf

"Zoning Map: City of Mason." City of Mason Engineering, Building & Planning Department.

"Zoning Districts: City of Mason." City of Mason Engineering, Building & Planning Department.

Coordination Letters/Correspondence

United States Department of the Interior Fish and Wildlife Service. Letter to LJB. 29 January 2004.

Ohio Department of Natural Resources. Letter to LJB Inc. 22 January 2004.

GIS Data

Mason, City of, provided the following GIS data: city zoning, roadway centerlines, edge of pavement, floodplains, parcels, railroad, December 2003.

Ohio-Kentucky-Indiana Regional Council of Governments provided the following GIS data for the study area: census, bike route, flood planes, wetland locations from the National Wetlands Inventory, parcels, street centerlines, TAZs, and watersheds, December 2003; generalized land use, generalized zoning, April 2004.

Warren County provided the following GIS data: property, hydrology, road centerlines, DEM, topo, planimetric, orthophotos.

Potentially Contaminated Sites

EPA. Descriptions of 14 Proposed Sites and Seven Final Sites Added to the National Priorities List in April 2003. April 2003.

EPA. NPL Fact Sheets for Ohio: Skinner Landfill. Updated January 2003.

FirstSearch. Environmental FirstSearch Report: Warren County, Ohio. January 9, 2004.

ODOT. Aerial Photographs. *1956, 1958, 1976, 1981, 1986, 1993 and 2003.*

State Fire Marshal. BUSTR Website: https://www.com.state.oh.us/odoc/sfm/bustr/

Historic Architecture/Archeology Bibliography and References as researched and identified by Hardlines Design Company, Columbus Ohio.

Chadderdon, J. 1998 *Phase IB Archaeological Survey of a 75-Acre Parcel, Voice of America Bethany Relay Station Union Township, Butler County, Ohio.* Submitted by Louis Berger and Associates, Inc., Chicago, Illinois. Submitted to U.S. General Services Administration, Chicago, Illinois. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

City of Lebanon, Ohio. 1990 *Procedures for Architectural Review in Architecural Review Districts, Section 1137.17e*. On file at City of Lebanon Planning and Zoning Office.

Clarke, W. S., J. Darbee, D. R. Bier, and R. Norris. 1981 *Phase II Survey of Four Sensitive Areas and Phase III Assessment of Ten Archaeological Sites and Two Historic Structures Located in Warren County, Ohio*. Submitted by The Ohio Historical Society, Department of Contract Archaeology, Columbus, Ohio. Submitted to the Landen Farm Company, Maineville, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Cleveland, B. 1977 *National Register Nomination, The Golden Lamb.* Ohio Historic Preservation Office, Warren County National Register Nomination File.

DeRegnaucourt, T. 1992 *A Phase I and II Archaeological Reconnaissance of the Mulhauser Road Extension and the Proposed Allen Road Interchange Study Area on Interstate 75 near Gano in Union Township, Butler County, Ohio.* Submitted by UMVARA, Ansonia, Ohio. Submitted to the Butler County Engineer's Office, Hamilton, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Doershuk, J. F. 1990 *Phase I and Phase II Cultural Resources Survey of the United States Postal Services Proposed Maineville Post Office Location (2.6 acres) in Warren County, Ohio. Submitted by 3D/Environmental Services, Cincinnati, Ohio*. Submitted to Untied States Postal Service, Louisville Facilities Service Office, Louisville, Kentucky. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Fricke, M. L. 1980 *Phase I and Phase II Low-Intensity Cultural Resources Investigation of Undeveloped Sections of the Landen Project, Warren County, Ohio*. Submitted by M. L. Fricke, Consulting Archaeologist. Submitted to the Landen Farm Company, Maineville, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Hawkins, R. A., and S. A. Walley. 1994 *Phase I Archaeological, Historical, and Architectural Study of the Proposed Tylersville Extension Near Mason, Warren County, Ohio*. Submitted by Algonquin Archaeological Consultants, Inc., Cincinnati, Ohio. Submitted to City Engineer, Mason, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Jackson, C., D. Blanton, M. Temple, and L. O'Donnell. 1996 *A Phase I Literature Review and Reconnaissance for the Proposed Allen Road and Interstate I-75 Interchange in Union Township, Butler County, Ohio*. Submitted by ASC Group, Inc., Columbus, Ohio. Submitted to Dodson-Stilson, Inc., Columbus, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Jackson, K. E. 1992 *Phase I and II Investigations of the Cincinnati Gas and Electric Company's Proposed Foster-Lebanon Transmission Line (Preferred and Alternate Alignments), and the Proposed Lebanon Substation, Warren County, Ohio*. Submitted by Gray and Pape, Cincinnati, Ohio. Submitted to Cincinnati Gas and Electric Company, Cincinnati, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Kitchen, Judith. 1971 *National Register Nomination, Glendower.* Ohio Historic Preservation Office, Warren County National Register Nomination File.

Kreinbrink, J., and N. Ross-Stallings. 1990 *Phase I and Phase II Cultural Resources Report for Section 5 (4.4 miles) of Texas Gas Transmission Corporation's Proposed Mainline Loop Natural Gas Pipeline in Butler and Warren Counties, Ohio*. Submitted by Wapora, Inc., Cincinnati, Ohio. Submitted to Texas Gas Transmission Corporation, Owensboro, Kentucky. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

McAlester, Virginia and Lee. 1989 *A Field Guide to American Houses*. New York: Alfred A. Knopf.

Mills, W. C. 1914 *Archaeological Atlas of Ohio*. Ohio State Archaeological and Historical Society, Columbus, Ohio.

Ohio Historic Preservation Office. *Cultural Resources GIS Mapping and Database*. Ohio Historic Preservation Office.

Ohio Historic Preservation Office. *National Register Nomination Forms for Butler and Warren Counties, Ohio*. Ohio Historic Preservation Office, Franklin and Delaware National Register Nomination Files.

Ohio Historic Preservation Office. Ohio Archaeological Inventory (OAI) Forms for Butler and *Warren Counties, Ohio*. Ohio Historic Preservation Office, Franklin and Delaware County OAI Files.

Pape, W. K.. 1986 *An Archaeological and History/Architecture Assessment of the Proposed State Route 741 Improvement, Warren County, Ohio.* Submitted by Gray and Pape, Cincinnati, Ohio. Submitted to Savage-Walker and Associates, Inc., Cincinnati, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Parish, C., C. J. Baltz, T. Fugate, E. J. Harris, S. Holland, and C. Miller. 1999 *Phase I Cultural Resources Investigations of the Proposed Cincinnati Crossings Project Area, Liberty and Lemon Townships, Butler County and Turtle Creek Township, Warren County, Ohio*. Submitted by Gray and Pape, Cincinnati, Ohio. Submitted to The Taubman Company, Bloomfield Hills, Michigan. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Thatcher, J. P., M. A. Smolek, and F. A. Finney. 1977 *An Archaeological Reconnaissance of the Lower Little Miami River Waste Water Treatment System Planning Area, Warren County, Ohio*. Submitted by the Wright State University Laboratory of Anthropology, Dayton, Ohio. Submitted to the Ralph L. Woolpert Company, Dayton, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Village of West Chester, Ohio. *Map of Olde West Chester Historic Design Overlay District*. On file at Village of West Chester Planning and Zoning Office.

Walley, S. A., and R. A. Hawkins. 1999 *Phase I Survey of Four Borrow Pit and Fill Areas for the Butler Regional Highway, and Phase II Evaluation of Prehistoric Site 33Bu631, Butler County, Ohio*. Submitted by Algonquin Archaeological Consultants, Inc., Cincinnati, Ohio. Submitted to Balke Engineers, Cincinnati, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Walsh, R. 1984 *National Register Nomination, Lebanon Multiple Resources Area*. Ohio Historic Preservation Office, Warren County National Register Nomination File.

White, C. F. 1979 *An Archaeological Impact Assessment of the Southwest Warren County Wastewater Treatment Plant (R.A.I. No. 78-507), Union Township, Warren County, Ohio and A Preliminary Archaeological (Planning) Survey of the Lower Six Miles of the Turtle Creek Valley, Union and Turtle Creek Townships, Warren County, Ohio*. Submitted by C. F. White, Consulting Archaeologist. Submitted to the Ralph L. Woolpert Company, Dayton, Ohio. On file at the Ohio Historic Preservation Office, Columbus, Ohio.

Websites

Butler County Transportation Improvement District, Liberty Interchange Project: http://www.liberty-township.com/fw/main/fw_link.asp?URL=http%3A//www.bctid.org&Title

Deerfield Township, Warren County, Ohio: http://www.deerfieldtwp.com/

Hamilton Township, Warren County, Ohio: http://www.hamilton-township.org/

Lebanon, Ohio: http://www.ci.lebanon.oh.us/

Mason, Ohio: http://www.imaginemason.org/

Ohio Department of Natural Resources: http://www.dnr.state.oh.us/

Ohio Department of Transportation: http://www.dot.state.oh.us/

Ohio-Kentucky-Indiana Regional Council of Governments: http://www.oki.org/index.asp

Ohio Historic Preservation Office: http://www.ohiohistory.org/resource/histpres/

South Lebanon, Ohio: http://www.southlebanonohio.org/

United States Census 2000: http://www.census.gov/main/www/cen2000.html

United States Department of the Interior: http://www.doi.gov/

United States Fish & Wildlife Service Wetlands Online Mapper: http://wetlandsfws.er.usgs.gov/wtlnds/launch.html

United States Environmental Protection Agency EnviroMapper: http://www.epa.gov/enviro/html/em/

United States Geological Survey: http://www.usgs.gov/

Warren County, Ohio: http://www.co.warren.oh.us/geninfo/index.

APPENDIX C
ADDENDUM TO EXISTING & FUTURE CONDITIONS REPORT

Southwest Warren County

Transportation Study

EXPANDED STUDY AREA ADDENDUM To the Existing and Future Conditions Report

September 2005

Prepared for:

OKI
Ohio · Kentucky · Indiana
Regional Council of Governments

Consultant Team:

BURGESS & NIPLE

and

IJb

Table of Contents

List of Figures

List of Tables

Introduction

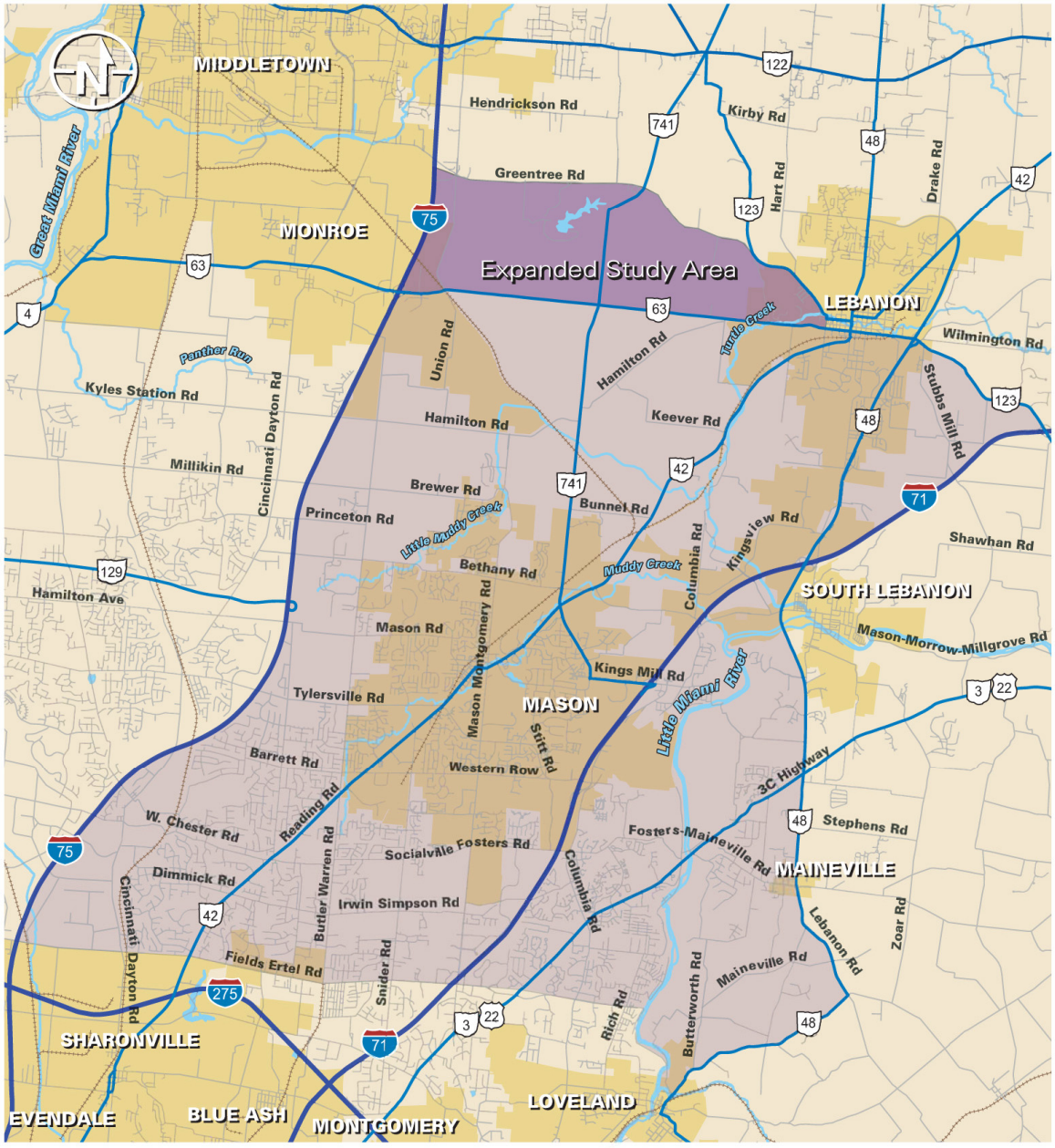
This report provides an addendum to the initial Existing & Future Conditions Report for the Southwest Warren County Transportation Study, which details existing and future transportation conditions for the study area in Southwest Ohio. The addendum expands the original study area by replacing the northern boundary of the study area (State Route 63) with Greentree Road and State Route 123 - the eastern, southern and western boundaries remain the same. **Figure 1-a** shows the entire study area (original study area and the expanded area). This addendum supplements the original Existing & Future Conditions Report with data covering the expanded study area. Many of the general study area discussions provided in the original Existing and Future Conditions report also pertain to the expanded study area, and are therefore not duplicated in this addendum. Updated maps and descriptions depicting existing and future conditions specific to the expanded study area have been provided in this addendum.

Since the initiation of the Southwest Warren County Transportation Study, residential developments north of State Route 63 have been platted (1282 total residential lots) that will place additional demand on State Route 63 and connecting roadways. Evidence of this development trend (addressed again in the section "Land Use and Development Trends") necessitated expansion of the initial project study area that was the subject of the original Existing & Future Conditions Report. To adequately account for existing and future conditions impacting transportation needs in the study area, the "original project study area" (which is how the study area from the original Existing & Future Conditions Report will be referred to in the addendum) has been expanded to the north as described in the previous paragraph, and will be referred to as the "expanded study area" in this addendum.

Figure 1-a:

Southwest Warren County
Transportation Study

Study Area



OKI Ohio · Kentucky · Indiana Regional Council of Governments
LJB
BURGESS & NIPLE

2.5 1.25 0 2.5 5 Miles

Expanded Study Area
Original Study Area

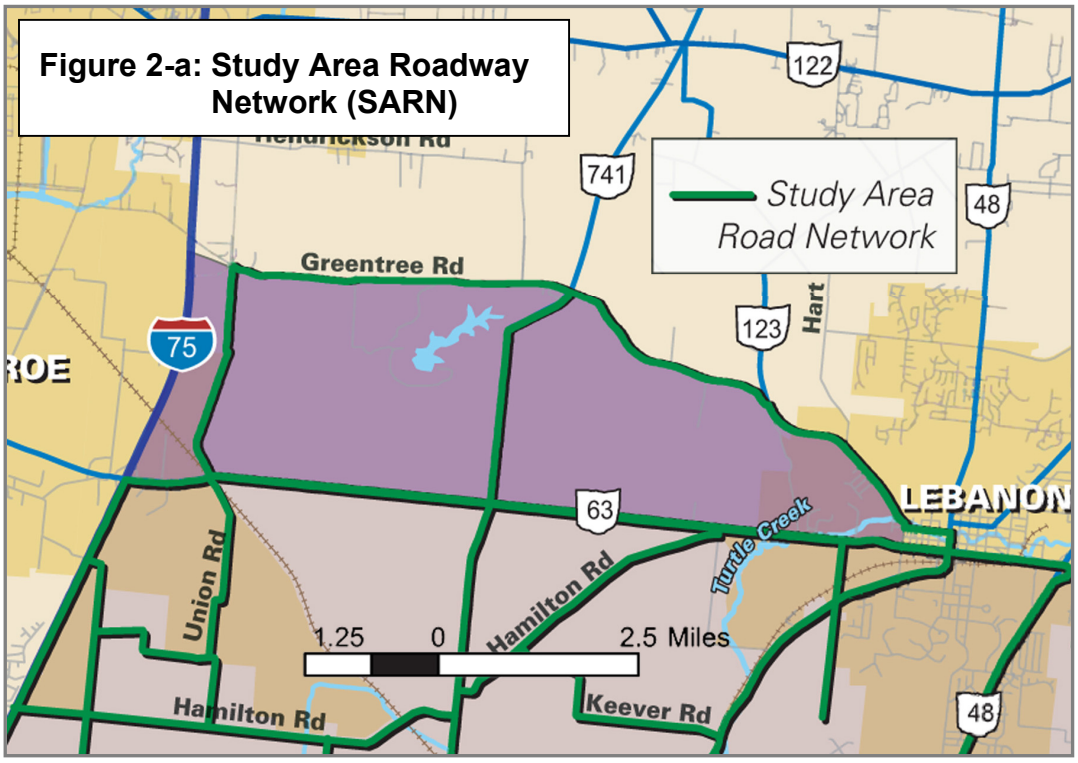
Southwest Warren County
Transportation Study

Section 1:
Existing Conditions

Roadway Infrastructure

Systems Inventory

As stated in the original Existing & Future Conditions report, only major roads that provide city, county or regional connectivity within the study area are included in the S**tudy Area Roadway Network (SARN)**. The SARN for the expanded study area is shown in **Figure 2-a.** The same methods of data collection and analysis were applied to the expanded area, as detailed in the original report. **Figure 3-a** shows the Average Annual Daily Traffic (AADT) volumes on the expanded area SARN, and **Figure 4-a** shows the intersection traffic control. In addition, horizontal and vertical geometric deficiencies where inadequate sight distance and/or design speeds are present are shown as "Warning" in **Figure 5-a**. Additional factors that can affect roadway operations were also inventoried – a school zone was the only additional factor identified in the expanded study area, also shown on Figure 5-a.



Capacity Analysis

In the expanded study area, the same methods of analysis were used to determine existing and future roadway capacity and measure the roadway level of service (LOS), as described in the original Existing and Future Conditions Report. **Figure 3-a** shows the 2004 AADT used in the capacity analysis. **Figure 6-a** shows the LOS results of the intersection and roadway sections under the existing traffic demand. This figure shows that a link of State Route 63 bordering the expanded study area is currently at LOS F. No other roadways in this area currently experience a LOS worse than LOS C.

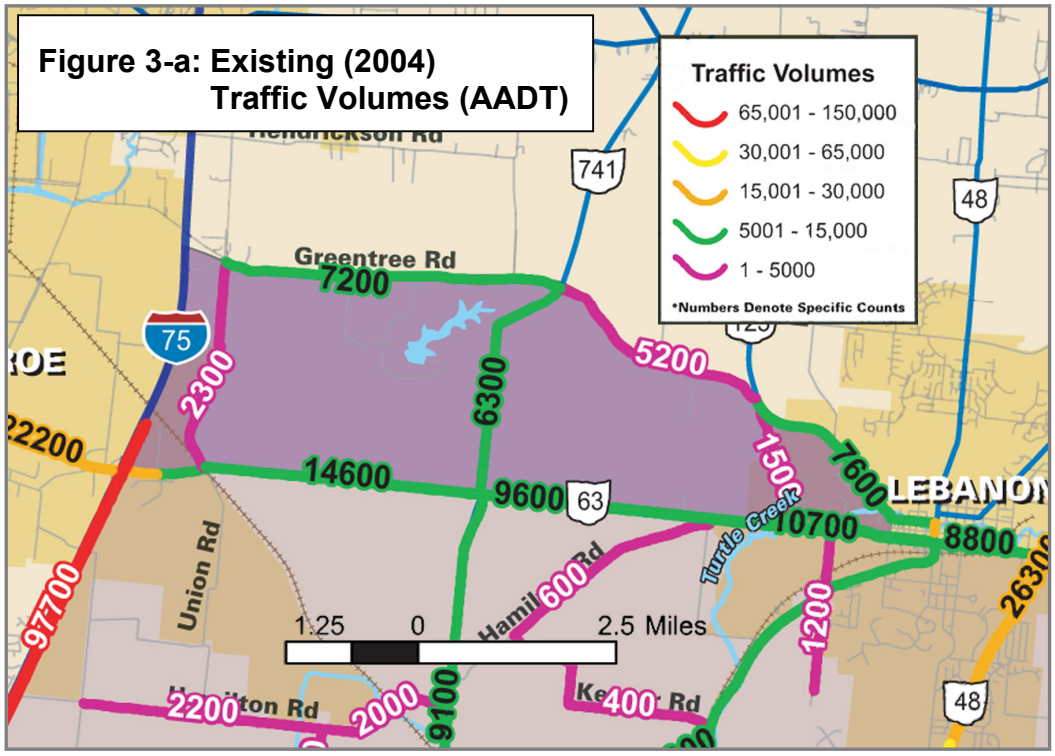


Figure 3-a: Existing (2004)
Traffic Volumes (AADT)
Traffic Volumes
65,001 - 150,000
30,001 - 65,000
15,001 - 30,000
5001 - 15,000
1 - 5000
*Numbers Denote Specific Counts
Greentree Rd
7200
5200
2300
6300
14600
9600
63
1500
7600
10700
8800
LEBANON
97700
Union Rd
Turtle Creek
600
1200
2200
2000
9100
400
741
48
75
1.25 0 2.5 Miles

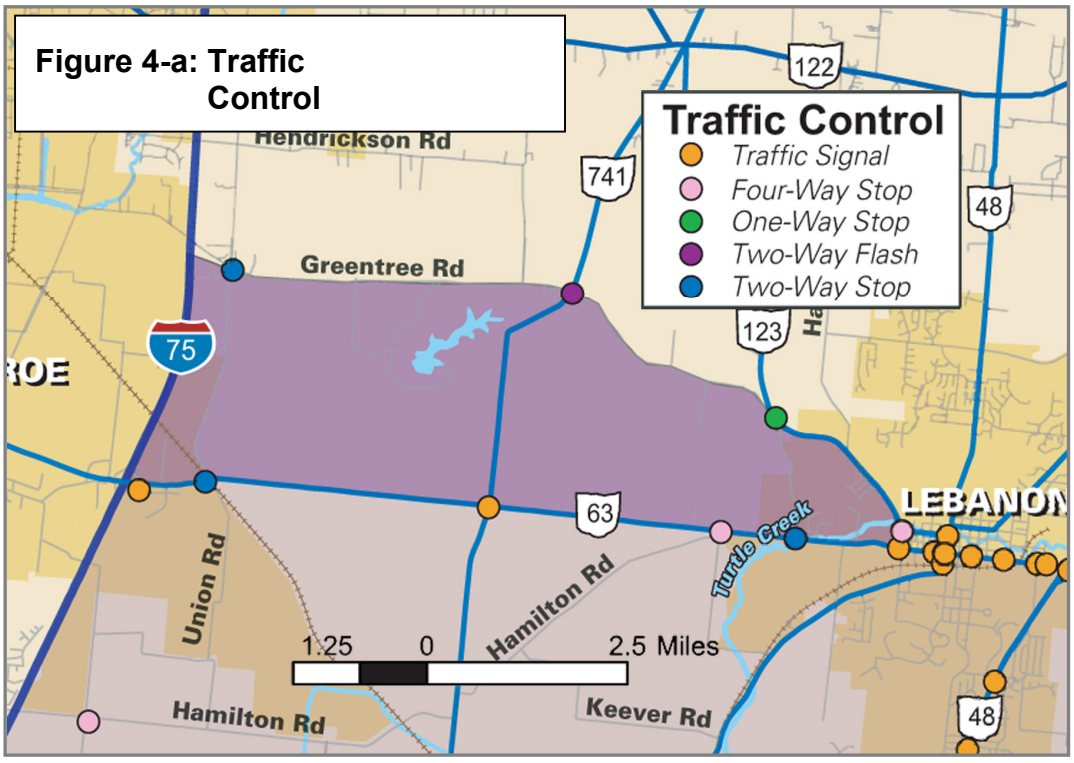


Figure 4-a: Traffic
Control
Traffic Control
Traffic Signal
Four-Way Stop
One-Way Stop
Two-Way Flash
Two-Way Stop
Hendrickson Rd
Greentree Rd
741
122
123
48
75
63
LEBANON
Union Rd
Hamilton Rd
Turtle Creek
Keever Rd
1.25 0 2.5 Miles

Figure 5-a: Geometric Constraints

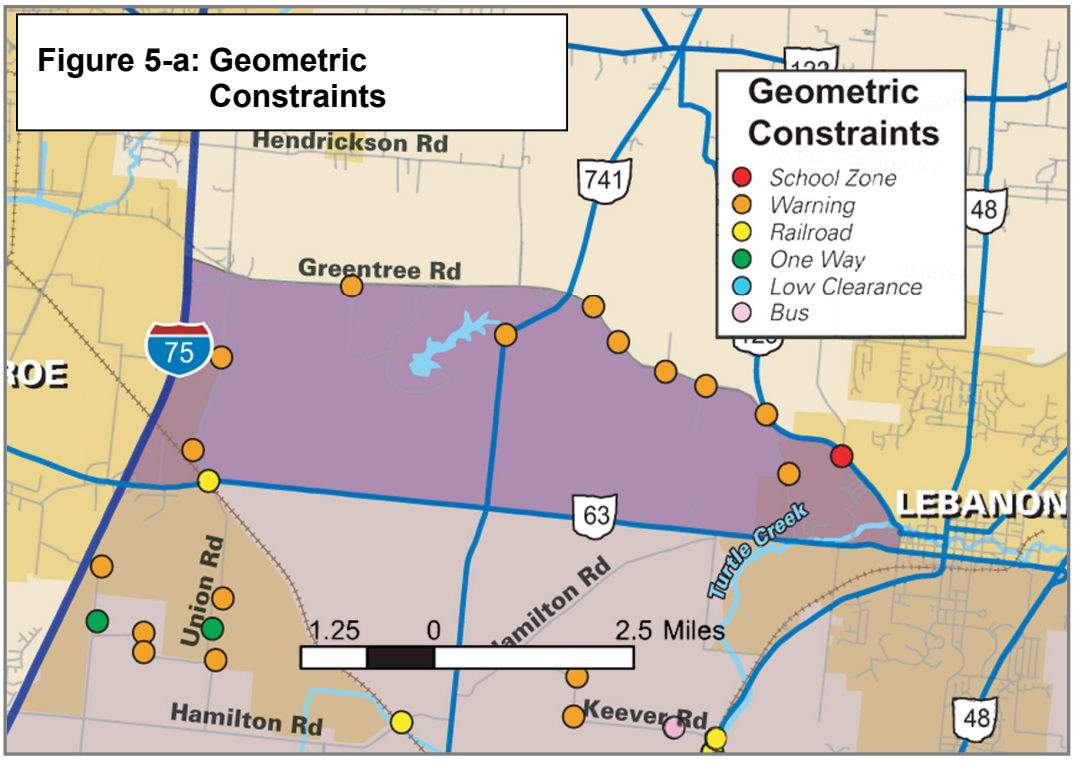
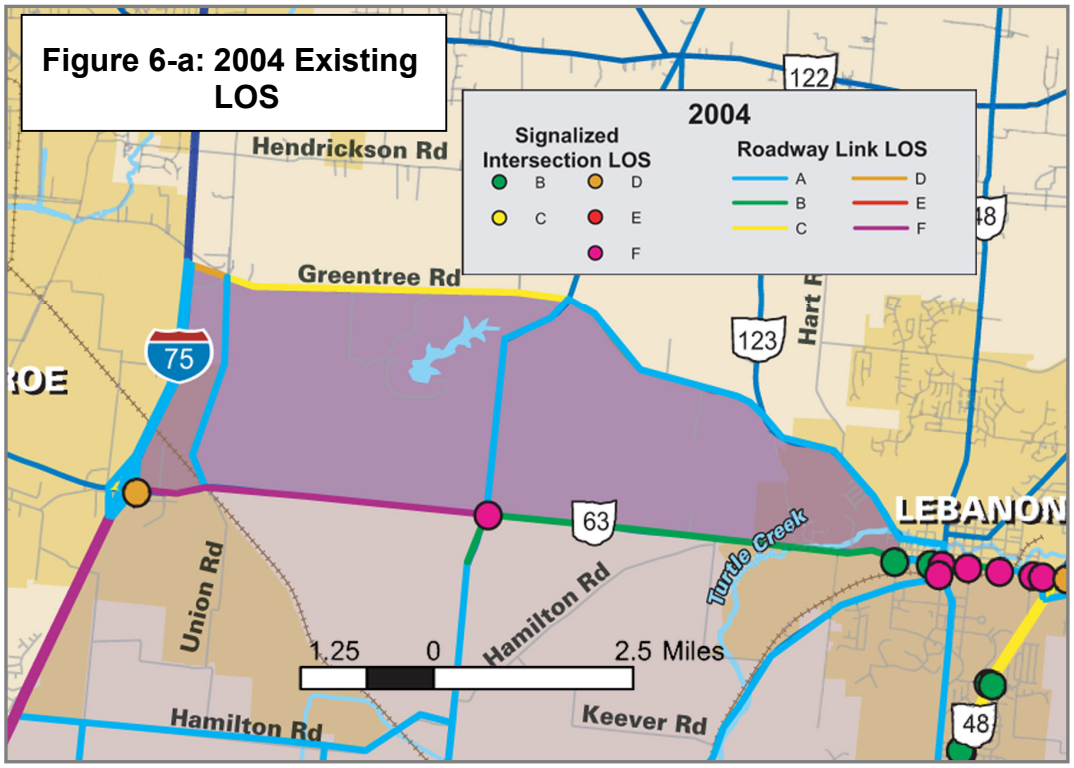


Figure 6-a: 2004 Existing LOS



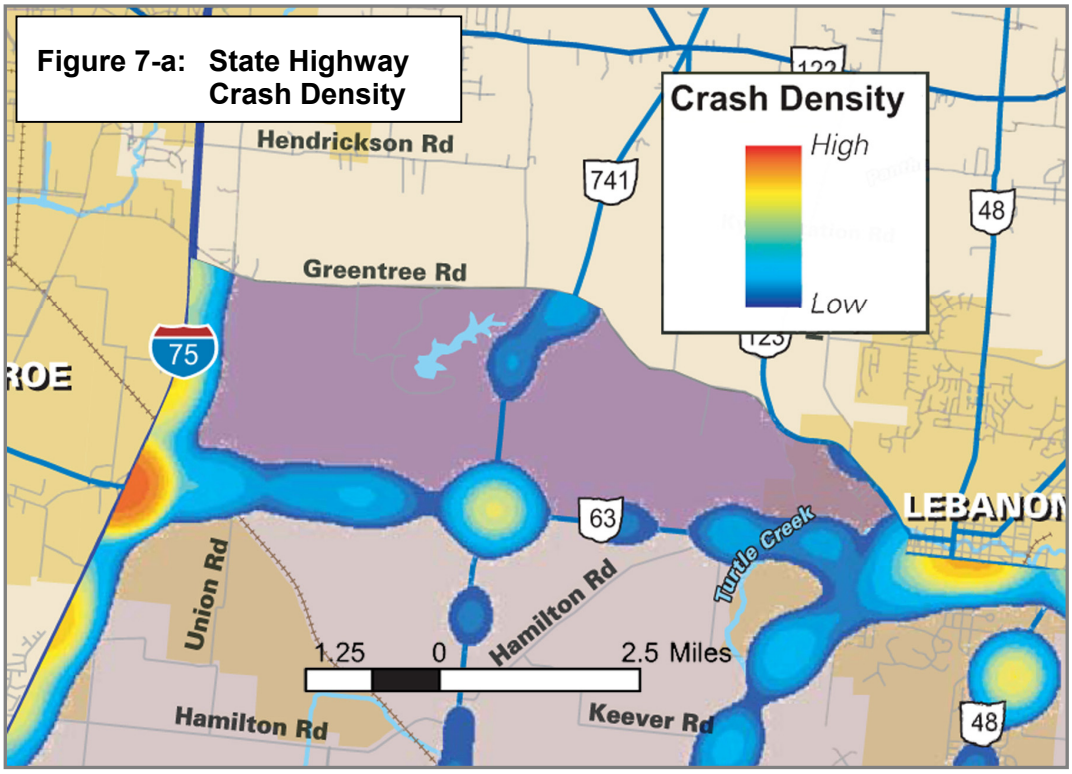
Safety Overview

An accident analysis was conducted for all roadways within the SARN to identify areas with significant safety problems that contribute to overall deficiencies within the regional transportation system. The same methodology used in the crash analysis in the original report was applied to the expanded study area – a detailed discussion of this methodology is provided in the original report in the "Safety Overview" section.

State Highway System

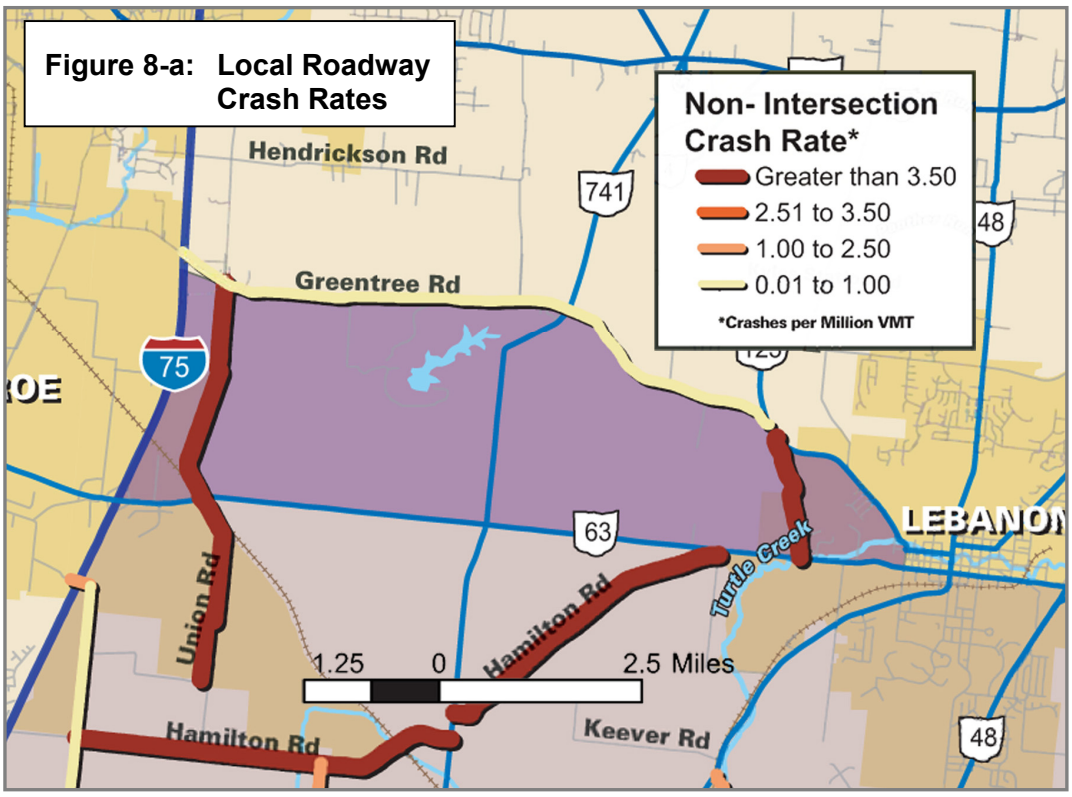
As discussed in the original report, The Highway Safety Program (HSP) evaluates and ranks high crash locations based on the crash rates, crash severity, change in crash rates over time, etc. While several locations within the original study area are ranked under this program, no locations within the expanded study area are ranked on the HSP list. In addition to the HSP, ODOT also maintains a Safety/Congestion work plan, which identifies "Safety Hot Spot Locations" on the State Highway System. No hot spot locations are present in the expanded study area.

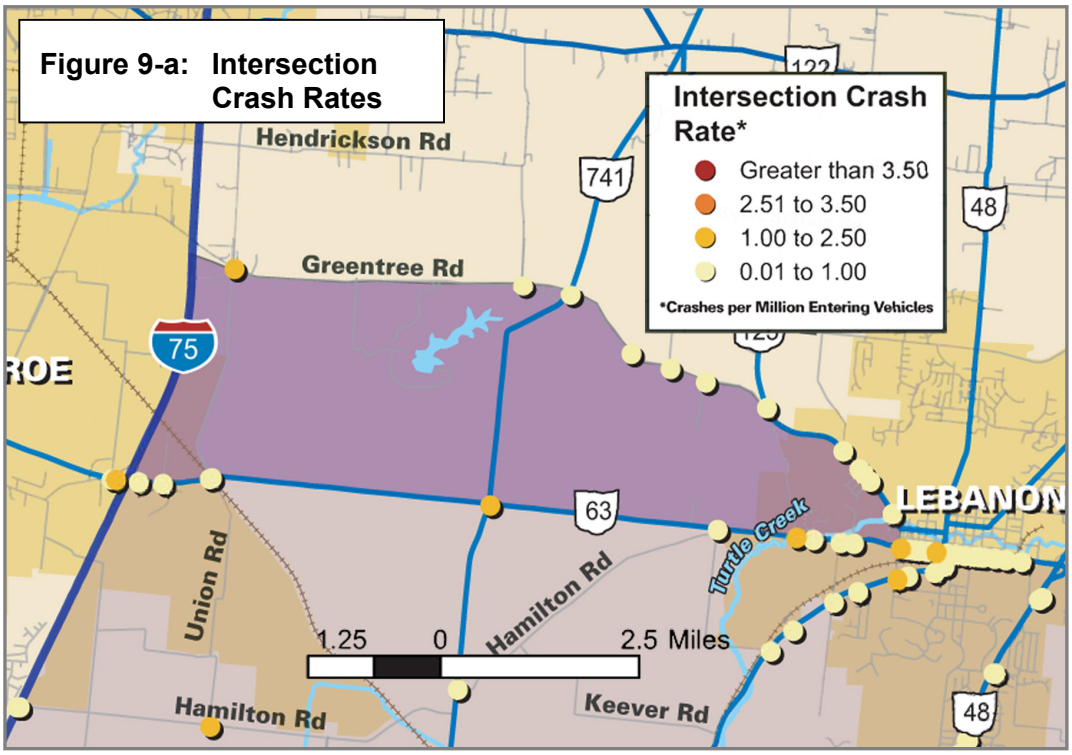
Figure 7-a shows an accident density map highlighting areas of significant accident occurrence on state highways within the SARN. Within the expanded study area, locations with an elevated crash density include the intersection of State Route 63 and State Route 741, the Interstate 75 interchange with State Route 63, and State Route 63 in the area of the Lebanon central business district.



Local Roadway Section Crash Analysis and Intersection Crash Analysis

In addition to the state highway system, a crash analysis was conducted for all county and local roads within the expanded study area, following the same methodology detailed in the original report. **Figures 8-a and 9-a** show the crash rates for roadways and intersections within the expanded area respectively. Figure 8-a shows that Union Road and Markey Road experience a high rate of accidents per million vehicles traveled, while Figure 9-a shows no intersections within the expanded area that experience an accident rate exceeding 2.50 accidents per million vehicles traveled.





Transit Operations

Bus Service

Southwest Ohio Regional Transit Authority (SORTA, a.k.a. METRO) provides transit service in the original study area through Park and Ride facilities, regular bus service and express bus service. However, this service does not extend into the northern area of the study area, and therefore does not proved transit service to the expanded study area. The Warren County Transit System (WCTS) provides demand-responsive bus/transit service to any resident of Warren County, and to any destination within 50 miles of the county boundary, as detailed in the original Existing & Future Conditions report. Therefore, the WCTS does provide transit service to the expanded study area.

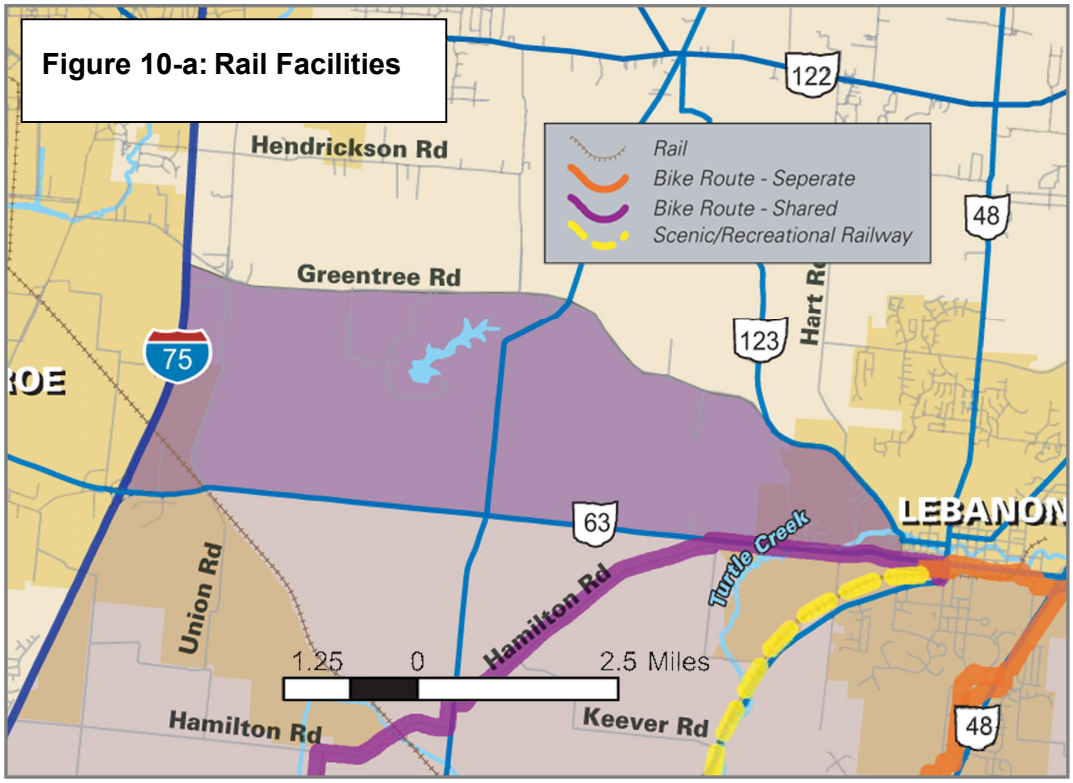
Pedestrian and Bicycle Facilities

Walking as a transportation alternative is limited by availability of safe walking areas (sidewalks, trails, etc.) and distance to walkable destinations. While the availability of these walking components varies widely throughout the original study area, few safe walking areas and walkable destinations exist within the expanded study area. Those that do exist are present in urbanized areas within or adjacent to the City of Lebanon on the eastern side of the expanded study area.

The original Existing and Future Conditions Report inventories existing bicycle/pedestrian facilities in the study area, and also discusses the extensive network of facilities proposed by plans and studies that preceded the Southwest Warren County Transportation Study. The expanded study area does not contain any existing bikeways, and prior plans and studies do not propose any such facilities in this area.

Rail Operations

There are currently no commuter rail, subway or light rail transit systems operating in the study area. The Indiana & Ohio Railroad operates a freight rail spur line that traverses the southwest corner of the expanded study area and carries freight to stations in the cities of Mason and Monroe. No passenger service is associated with this rail line. **Figure 10-a** maps the location of this freight line.



Planned Improvements

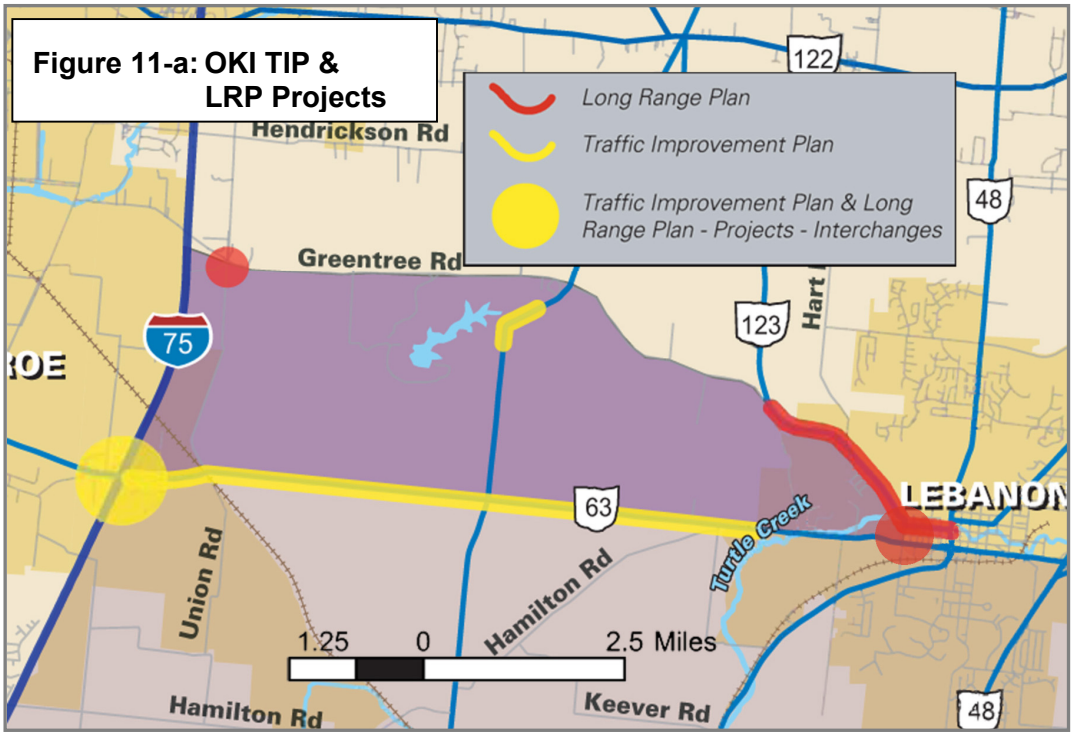
Descriptions of transportation improvements planned for the expanded study area are described below and mapped on **Figure 11-a**. Each improvement appears on either OKI's Transportation Improvement Plan (TIP) or Long Range Plan (LRP). Projects listed in the OKI TIP have received funding commitments.

OKI Transportation Improvement Plan (TIP) (2006 to 2009)

1. Planing and resurfacing of existing pavement on State Route 63, from the eastern corporation line of the City of Monroe to the western corporation line of the City of Lebanon.
2. Reconstruction of the curve on State Route 741 north of State Route 63 and south of Greentree Road to address safety issues.

OKI Long Range Plan (LRP) (2030)

1. Add turn lane to State Route 123 between Greentree Road and West Street.
2. Systems modification at the Greentree and Union Road intersection.
3. New connector linking State Route 123 with State Route 63 west of the City of Lebanon.
4. Add 2 lanes on State Route 63 from Monroe to State Route 741 (3 miles) – this improvement was identified and mapped in the original Existing and Future Conditions Report and is therefore not included on the Addendum mapping.



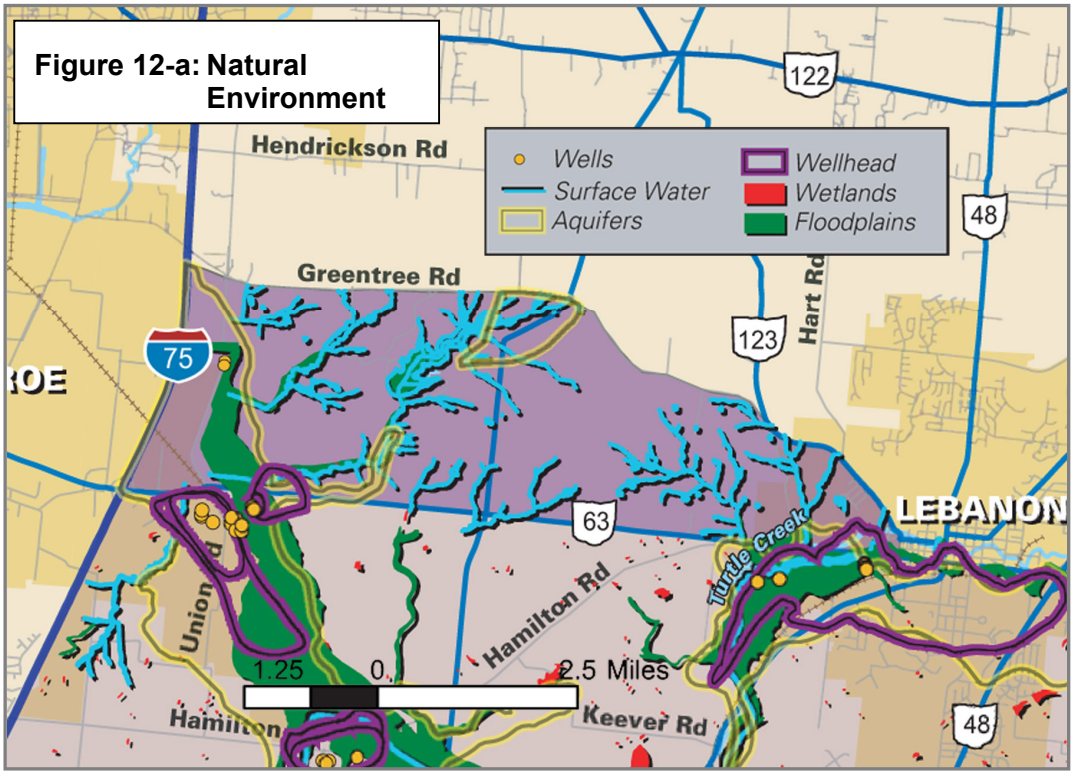
Red Flags - The Natural Environment

Soils & Geology

A detailed discussion on soil types found in Warren County and potential geological constraints in the study area is provided in the original Existing & Future Conditions Report. The soils and geology in the expanded study area do not present unique or unusual barriers to construction, and therefore are not likely to affect the selection of conceptual modes or corridors as part of this study.

Floodplains

Figure 12-a provides mapping of floodplains in the expanded study area based on GIS data provided by OKI. Floodplains are an area of concern when considering the impacts of conceptual alternatives, and would therefore be considered *Red Flag* areas. However, floodplains in general would not constitute *Fatal Flaws*.



Groundwater/Aquifers, Wellheads and Drinking Water Supplies

A Sole Source Aquifer is present in the central part of the expanded study area, generally following the alignment of the Shaker Creek. Sole Source Aquifers are *Red Flag* areas requiring extra environmental consideration and special design/construction techniques. See Figure 12-a.

Figure 12-a also provides the locations of Wellhead Protection Areas within the expanded study area. Generally, protection zone distances are determined based on 1 to 5 year underground infiltration travel times. These are established either by local Wellhead Protection Plans or the Ohio Environmental Protection Agency. Wellhead Protection Areas are *Red Flag* areas requiring extra environmental consideration and special design/construction techniques. If adversely impacted, they are *Fatal Flaws*.

Wetlands

Figure 12-a provides the location of all known wetlands in the expanded study area based on National Wetlands Inventory (NWI) maps. Wetlands are classified as either Category 1, 2 and 3, with Category 1 categorizing the lowest quality and Category 3 categorizing the highest quality. Wetlands are *Red Flag* areas requiring extra environmental consideration and special design/construction mitigation techniques. On a case-by-case basis, high quality wetlands, if adversely impacted, are *Fatal Flaws*.

Streams, Rivers, and Water Bodies

Figure 12-a provides the location of streams and water bodies in the expanded study area. A small reservoir is present in the center of the study area on Shaker Creek, traversing the Shaker Run Golf Course and Armco Park west of State Route 741 and south of Greentree Road. Several small streams are also present in the expanded project area, including Shaker Creek, Hoovers Run, Rhoads Branch, Reeders Run, and unnamed tributaries to the Little Muddy and Turtle Creeks. These resources are *Red Flag* areas requiring extra environmental consideration and special design/construction mitigation techniques.

Wildlife, Habitats and Threatened & Endangered Species

The discussion on these resources in the original Existing & Future Conditions Report pertains to the expanded study area as well. Please review this section in the initial report for a detailed discussion on the potential presence of these resources in the entire study area (including the expanded study area). In summary, the following information is provided for purposes of this addendum:

The USFWS commented that the study area lies within the range of the Indiana bat (*Myotis sodalis*), a Federally-listed endangered species. In fact, all of Ohio is within the range of this endangered species. USFWS recommends that tree cutting be kept to a minimum to maintain summer habitat. If this is not feasible, the service commented that trees should not be cut between April 15 and September 15 when bats are utilizing trees for summer habitat.

The USFWS commented that the study area is within the range of the running buffalo clover (*Trifolium stoloniferum*), a Federally listed endangered species. This species is found in partially shaded woods, mowed areas, and along streams and trails.

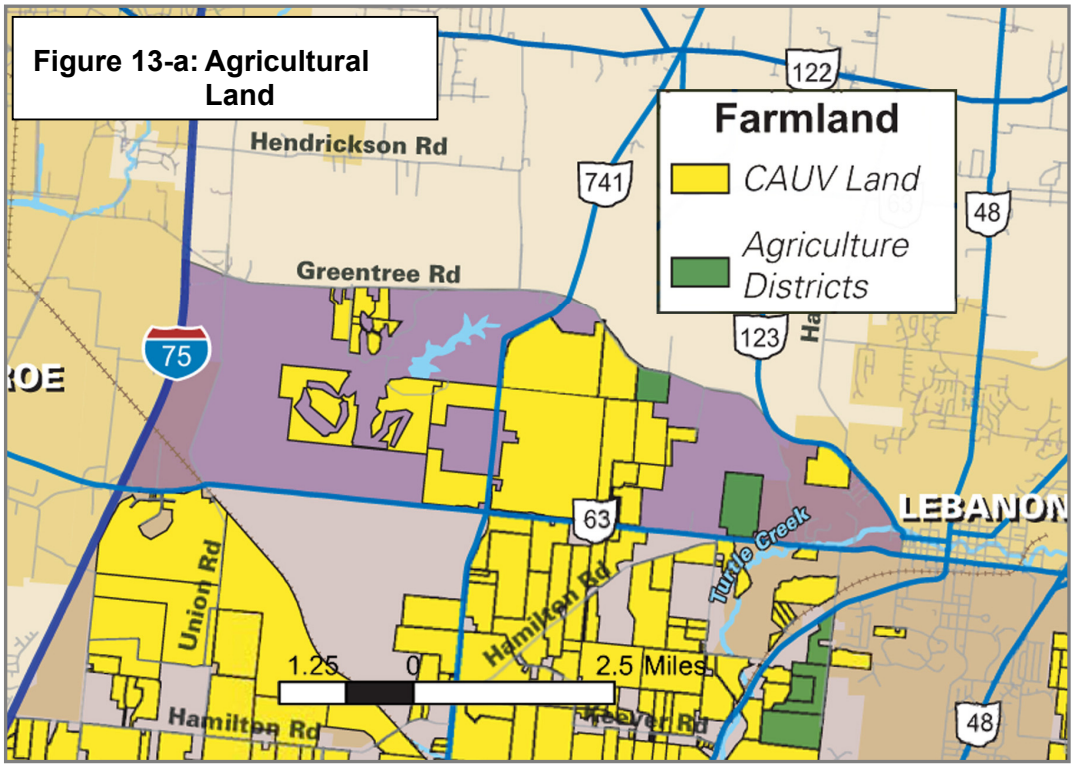
The USFWS commented that the study area is within the range of the eastern massasauga (*Sisturus catenatus*), a Federal candidate species. This species is a reclusive rattlesnake that is declining throughout its national range.

Threatened and Endangered Species involvements are *Red Flag* areas and can be *Fatal Flaws*.

Farmland

Based on Warren County Auditor's property records, properties within the expanded study area recorded as being within Agricultural Districts or enrolled in the Current Agricultural Use Value (CAUV) program were identified and mapped on **Figure 13-a**. A detailed discussion of the characteristics and requirements for properties to obtain these designations, and the protections these designations afford those properties, is provided in the original Existing & Future Conditions Report under the "Farmland" section.

CAUV properties are primarily concentrated within the central part of the expanded study area, with additional CAUV and Agricultural Districts also present in other areas. While the acquisition of Agricultural District or CAUV properties for transportation projects can be considered a *Red Flag* needing further review, such acquisition typically is not considered a *Fatal Flaw* to transportation project development.

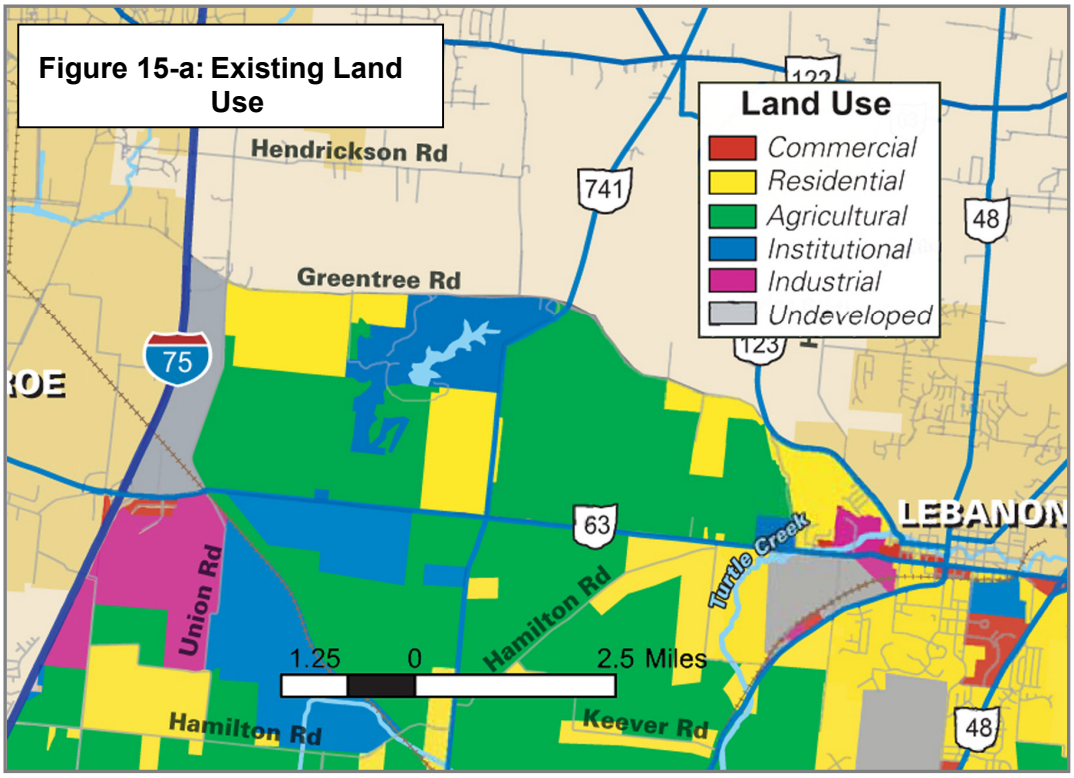


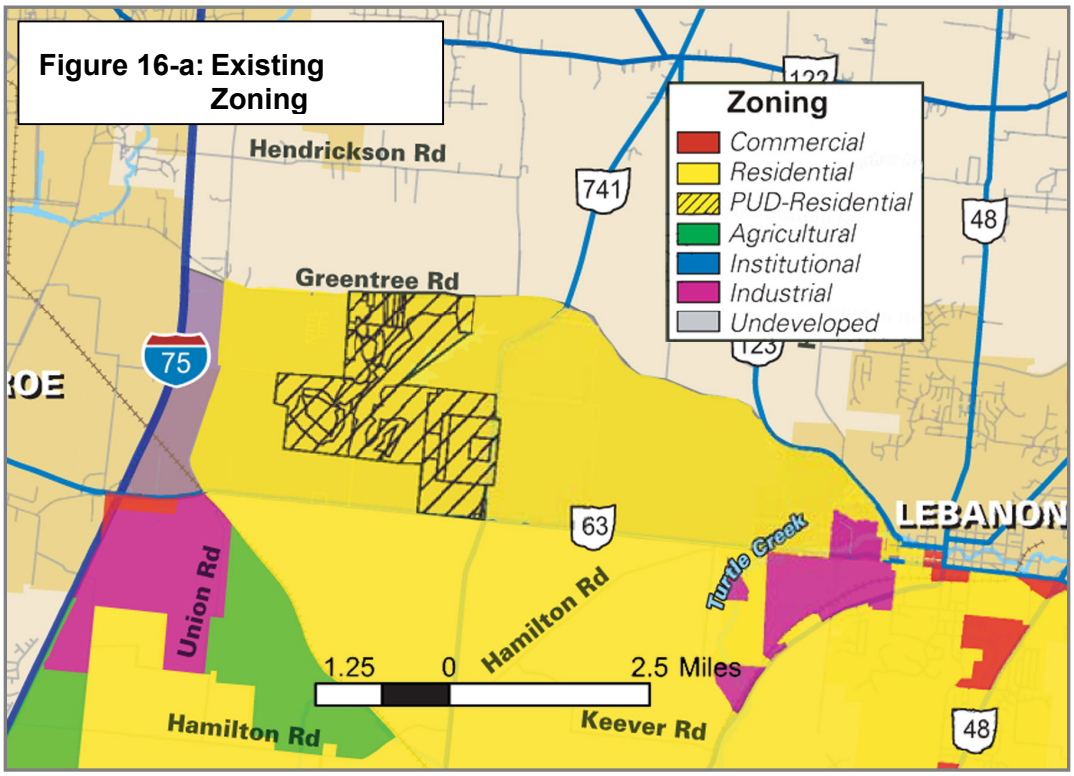
Red Flags - The Human Environment

Land Use and Development Trends

As discussed in detail in the original Existing and Future Conditions Report, Warren County in general, and the entire study area in particular, is experiencing rapid population and economic growth. As a result, agricultural lands are being transformed into housing subdivisions, "big box" retail, office parks, and commercial and industrial parks. For example, in the expanded study area multiple subdivisions have been platted north and south of Greentree Road containing nearly 1300 housing units, with some currently under construction. While the existing land use for the expanded project area shows that agricultural use is still prevalent (see **Figure 15-a**), the recent development trends in the county and the entire study area are expected to continue. This expectation is supported by the existing zoning for the expanded project area, which shows that none of the area is zoned for agricultural use, as shown in **Figure 16-a.** The vast majority of the expanded study area is zoned for residential use.

Generally, intensely developed land uses are considered *Red Flag* areas due to the high cost of right-of-way acquisition. Strip takes to widen existing roadways are usually manageable, but new corridors in heavily developed areas are often cost prohibitive.





Major Traffic Generators

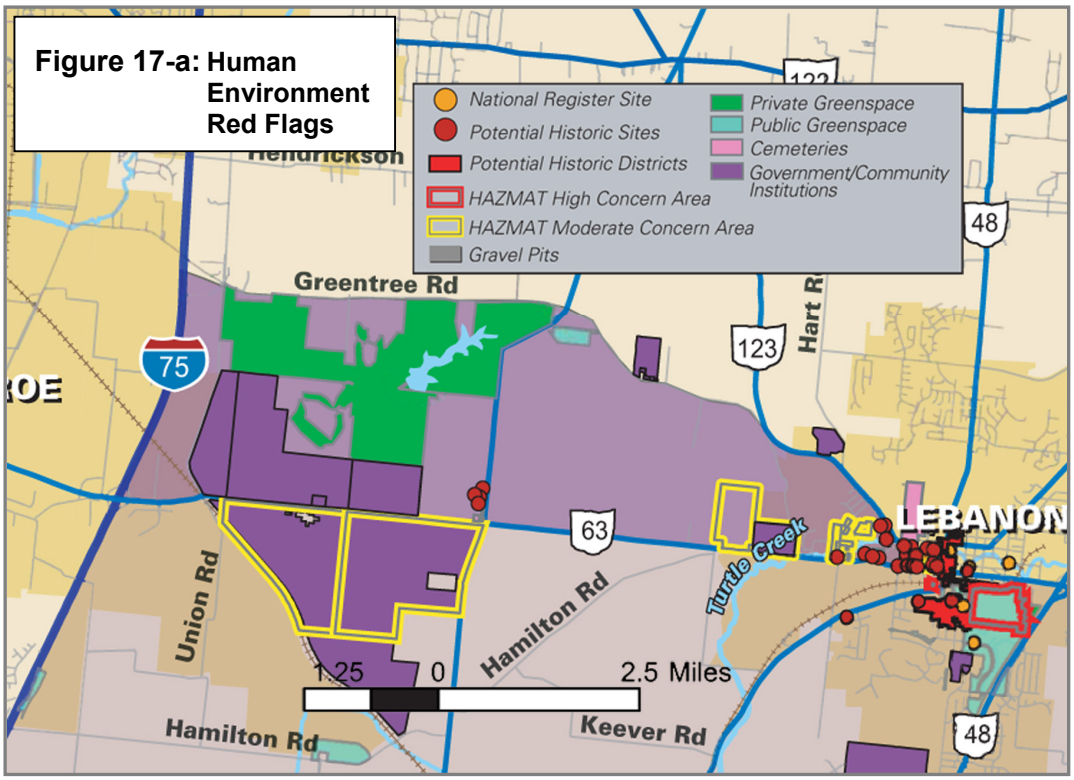
No major traffic generators are present in the expanded study area.

Government and Community Institutions

Community services, government institutions and schools are considered *Red Flag* areas and potentially fatal flaws, due to the high cost of replacement. In the expanded study area these types of facilities include the Lebanon Correctional Institution, the Warren County Engineer's Office, the Lebanon-Warren County Airport, and the Bowman School. See **Figure 17-a** for the location of these facilities.

Cemeteries

Figure 17-a provides the locations of cemeteries in the expanded study area, which include the Otterbein Shaker Cemetery at the intersection of State Route 63 and State Route 741, and the Lebanon Cemetery northeast of State Route 123. Impacts involving strip takes of right of way that do not involve gravesites would constitute a *Red Flag* for a transportation project. Severing of cemetery lands or relocation of graves would constitute *Fatal Flaw*s.



Parks and Recreation Areas

Figure 17-a locates and identifies these locations in the study area. Public recreation areas are considered *Red Flag* areas for minimal impact. However, greater impacts can result in these becoming *Fatal Flaw* areas, due to the protected status these resources may have under the federal Section 4(f) provision. This provision stipulates that federal funding cannot be used on a transportation project that requires the use of land from a Section 4(f) resource unless there are no other prudent and feasible alternatives to the use. Turtlecreek Township Park is the only public recreation area identified in the expanded study area. Armco Park, a large private park owned by AK Steel and open only to employees, is located at the intersection of State Route 741 and Greentree Road. Because this is a privately owned park that is not open to the general public, it is unlikely that the Section 4(f) provision would apply to this property.

Environmental Justice Populations

U.S. Census 2000 data was used to screen for the presence of Environmental Justice populations (minority populations and/or low-income populations as defined by Executive Order 12898) within the expanded study area. Minorities comprised less than 10 percent of the populations for almost the entire expanded study area, except in the census block group containing land used by the Lebanon Correctional Institution. As discussed in the original Existing and Future Conditions Report, the prison houses an inmate population comprised of 1057 minorities (55 percent of the prison population), which accounts for the elevated minority population compared to surrounding census block groups. Low-income residents comprise 10 percent or less of the population in all block groups

in the expanded study area, with over two-thirds of the area comprised of less than a 5 percent low income population.

At this level of screening no substantial concentrations of Environmental Justice populations are apparent. However, any alternatives carried forward from this study will require more detailed scrutiny of the respective project areas for Environmental Justice communities.

Cultural Resources/National Register Of Historic Places

The National Historic Preservation Act of 1966 requires that projects using federal funds or involving Federal actions must take into account any potential adverse effects on properties listed on, or eligible for, the National Register of Historic Places (NRHP). Thus sites *listed on, or eligible for* become *Red Flag* areas because it must be proven that there is no feasible and prudent alternative that avoids the adverse affect before the federal action can be approved.

The expanded study area contains one Historic District located in the City of Lebanon, and the Ohio Historical Inventory (OHI) lists 30 structures and other potentially historic resources within the expanded study area that may be eligible for listing on the NRHP. The locations of the historic district and OHI resources are identified on Figure 17-a.

Two archaeological sites that are listed on the NRHP are present in the expanded study area, and the Ohio Archaeological Inventory (OAI) contains 14 sites located within the expanded study area. In some cases, the archeological sites have been excavated and artifacts have been removed from the sites to make way for construction or other activities. In other cases only preliminary testing has been completed at the sites leaving open the possibility for future investigations. The OAI is often used to estimate the concentration of archaeological sites within an area. Information can be used to avoid locations with dense concentrations of archeological sites and thus a high probability of being *Red Flag* areas. Not all OAI recorded sites are listed on or are eligible for the National Register. In order to protect the integrity of the archaeological sites from plundering, archeological sites are not mapped.

Hazardous Waste

The U.S. Environmental Protection Agency online EnvironMapper was accessed to identify properties with the potential for hazardous waste contamination. This database provides the location of Superfund sites, sites with known toxic releases, air emissions, and/or documented hazardous waste issues. Figure 17-a provides the locations of parcels with the potential for contamination, which include the County Engineer's garage facility and several commercial/industrial type businesses in or near the City of Lebanon on the east side of the expanded project area.

Air Quality in the Greater OKI Area

OKI's air quality policy is addressed in the original Existing and Future Conditions Report. Since that policy covers the entire OKI region, and the expanded study area is in the OKI region, the material presented in the original report applies to the expanded study area.

Noise Sensitive Receptors

In accordance with ODOT and Federal Highway Administration policies, the primary areas of concern regarding potential impacts to noise-sensitive receptors are all residential areas found in the study area. Other potential sites can include motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and other lands where serenity and quiet are of extraordinary importance and that serve an important public need. Areas with noise sensitive receptors warrant consideration of potential noise impacts and therefore are *Red Flag* areas because of the potential to impact project design, cost and controversy. Although these are considered Red Flag areas, effective mitigation of some noise impacts is often possible.

Red Flag Summary

Red Flags, including environmental and engineering issues, are locations of concern within the study area. Red flags do not necessarily identify locations that must be avoided, but rather identify locations that will entail additional study coordination, creative management or design approaches, or increased right-of-way or construction costs. Locations that must be avoided are referred to as Fatal Flaws. Consultation with appropriate specialists is required to determine the level of concern for each Red Flag item.

Floodplains

Floodplains are considered *Red Flag* areas, especially when associated with a State and National Wild and Scenic River. However, floodplains in general would not constitute Fatal Flaws. Figure 12-a provides the location of these resources in the project area.

Groundwater/Aquifers, Wellheads and Drinking Water Supplies

Sole Source Aquifers and Wellhead Protection Areas are *Red Flag* areas. If adversely impacted, they are considered *Fatal Flaw*s. Figure 12-a provides the location of these resources in the expanded study area.

Wetlands

Wetlands are *Red Flag* areas. High quality wetlands, if adversely impacted, may be *Fatal Flaws*. Figure 12-a provides the location of these resources in the expanded study area.

Intensely Developed Land

Generally, intensely developed land uses are considered *Red Flag* areas due to the high cost of right-of-way acquisition. While much of the expanded study area consists primarily of vacant/agricultural land and rural residential development, more intense development is emerging particularly along Greentree Road. Also, the eastern end of the expanded study area falls within existing urban residential and commercial development adjacent to the City of Lebanon's central business district. Strip takes to widen existing roadways are usually feasible, but new corridors in heavily developed areas are often cost prohibitive.

Listed Threatened or Endangered Species

The majority of the listed Threatened or Endangered Species habitat in the entire study area are concentrated in the Little Miami River Corridor. Field studies are required beyond the 4-Step Process to determine the presence of such species in the expanded study area. If present, areas with a presence of threatened or endangered species would be considered *Red Flag* areas.

Farmland

Agricultural Districts or Current Agricultural Use Value (CAUV) properties can be *Red Flag* areas. Figure 13-a provides the location of farmland in the project area.

Government and Community Institutions

Schools and other public institutions are *Red Flag* areas, and can often become *Fatal Flaw* areas due to the high cost and practicality of replacing these facilities. See Figure 17-a for the location of these resources in the study area.

Cemeteries

Strip takes from cemeteries, not involving graves, would be considered *Red Flag* areas. Severing of cemetery lands or relocation of graves are considered *Fatal Flaw*s. See Figure 17-a for cemetery locations.

Parks and Public Recreation Areas

Public recreation areas are considered *Red Flag* areas for minimal impact. These can become *Fatal Flaw* areas if major impact is anticipated, due to the protected status these resources may have under the federal Section 4(f) provision. This provision stipulates that federal funding cannot be used on a transportation project that requires the use of land from a Section 4(f) resource unless there are no other prudent and feasible alternatives to the use. See Figure 17-a.

Hazardous Waste Sites

Potentially contaminated sites constitute *Red Flag* areas, since hazardous waste can vary from being time consuming to the point of being cost prohibitive. See Figure 17-a for the location of these sites in the study area. At this level of study, the exact location of contamination on a particular parcel is not known. Therefore, on Figure 17-a the entire parcel of these sites is identified, however the potential contamination may have affected only a portion of the parcel.

Environmental Justice Areas

At this level of screening no substantial concentrations of Environmental Justice populations are apparent.

Cultural Resources/National Register Of Historic Places

Sites "*listed on, or eligible for"* the National Register of Historic Places are *Red Flag* areas because it must be proven that there is "no feasible and prudent alternative" that avoids the adverse effect before the federal action can be approved. Figure 17-a provides locations that are currently listed or have the potential to be listed on the Register.

Noise Sensitive Receptors

Areas with noise sensitive receptors are *Red Flag* areas because of the potential to impact project design, cost and controversy. Although these are considered *Red Flag* areas, effective mitigation of some noise impacts is often possible.

Section 2:
Future Conditions

Network Analysis

Using the OKI travel demand model, which is based on the socio-economic and trip data discussed in the original Existing and Future Conditions Report, Average Daily Traffic (ADT) volumes and peak hour traffic volumes were developed for the expanded study area. Existing (2004) ADT is shown on Figure 3-a, and future (2030) is shown on **Figure 21-a**. For the expanded study area, several roadway links are listed in **Table 1** below to help illustrate potential travel growth. Changes in ADT are also shown.

Table 1: Sample Average Daily Traffic (ADT) Volumes

Road	Average Daily Traffic		
	2004	2030	% Increase
Greentree Road – between Union Road and SR 741	7200	12900	79%
Greentree Road – between SR 741 and Markey Road	5200	11400	119%
SR 741 – between SR 63 and Greentree Road	6300	14200	125%
SR 123 – between Markey Road and downtown Lebanon	7600	11600	53%
SR 63 – between SR 741 and US 42	9,100	17,100	88%

The table shows that a substantial increase in traffic volume is anticipated for all of the primary roadways in the expanded study area under future (2030) conditions.

Level of Service (LOS) analysis was conducted for each roadway segment and at each signalized intersection for the peak hour traffic demand for the year 2030. Based on these traffic volumes, most of the roadways within the expanded study area will exceed capacity under the current facility capacities. At this LOS, users are expected to experience decreasing speeds and increasing delays and congestion. **Figure 24/25-a** shows the future peak hour LOS of all major roadways, and peak hour LOS for all signalized intersections in the expanded study area.

Figure 21-a: 2030 ADT

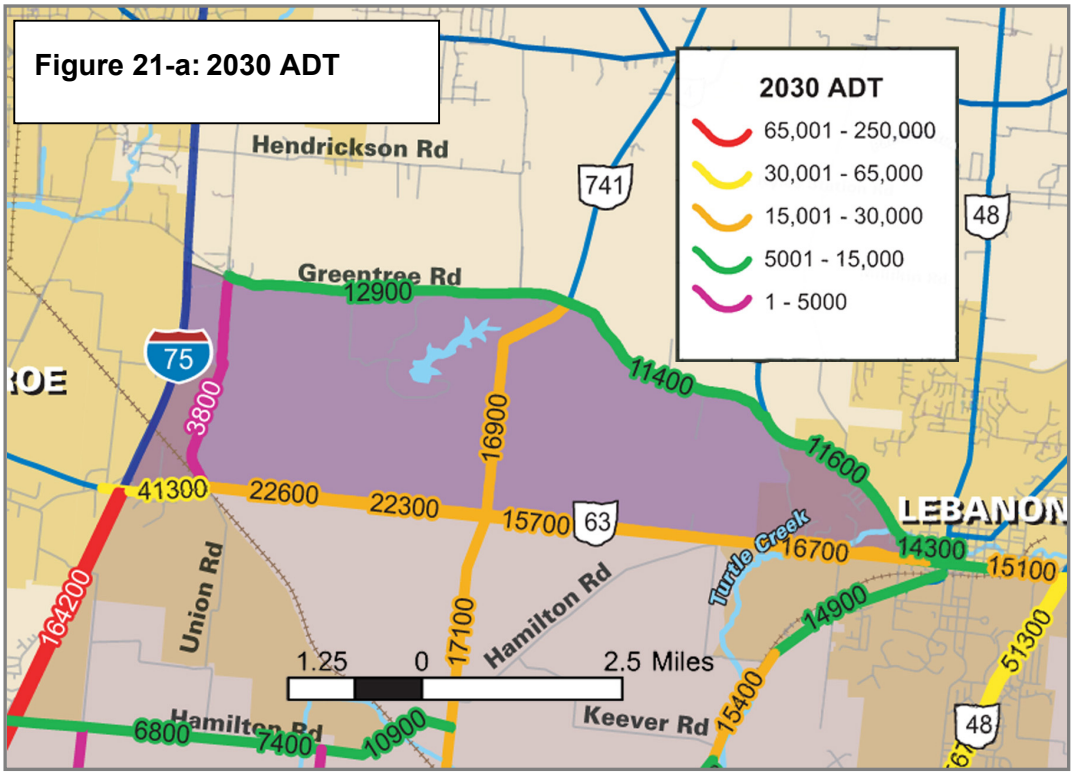
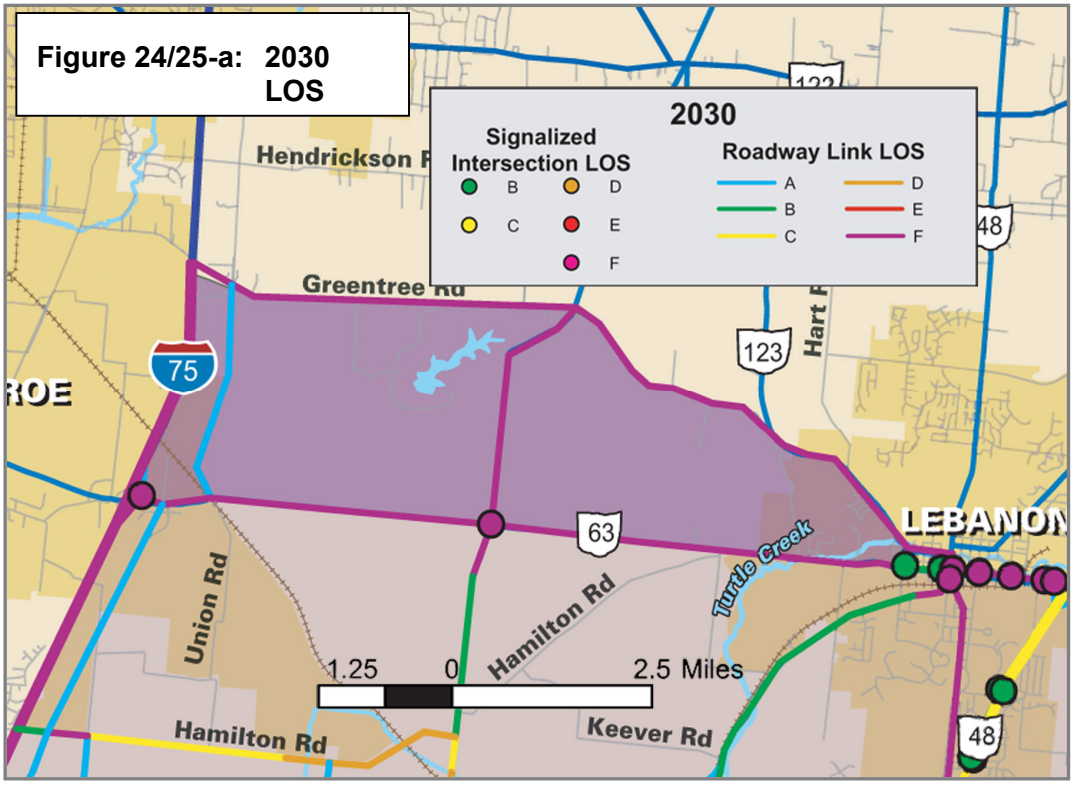


Figure 24/25-a: 2030 LOS



APPENDIX D
RED FLAG REPORT

Southwest Warren County

Transportation Study

RED FLAG REPORT

November 2004

OKI

Ohio · Kentucky · Indiana

Regional Council of Governments

Consultant Team

BURGESS & NIPLE

and

JJb

RED FLAG SUMMARY

Red Flag Summary Completed: November 2004

The purpose of this Red Flag summary is to identify concerns that could cause revisions to the anticipated design and construction scope of work, the purposed project development schedule, the estimated project budget, or the potential impacts of the project on the surrounding area.

Date Red Flag Summary Completed:	12/15/2004
District	8
Project Name (County, Route, Section):	Southwest Warren County Transportation Study
City, Township or Village Name(s):	Lebanon, Mason, Union Twp., Turtle Creek Twp., Deerfield Twp., Hamilton Twp., South Lebanon & Maineville.
PID	75988
Prepared By:	David Newhouse-LJB
ODOT Project Manager:	Nicholas Smith

GENERAL PROJECT PLANNING INFORMATION

Project Description:

History

The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) is conducting a Major Investment Study (MIS) for southwest Warren County. It includes all or part of the following jurisdictions in Warren County: City of Lebanon; Deerfield Township; Union Township; Turtlecreek Township; City of Mason; Hamilton Township; South Lebanon; Maineville; City of Monroe. The study area also includes parts of Liberty and West Chester Townships in Butler County.

Study Area Description

The Study Area is bounded on the north by State Route 63 and State Route 123 from I-75 to I-71; on the east by I-71 to State Route 48 south to the Warren/Hamilton County line; on the south by Warren / Butler County line, and on the west by I-75 to the interchange at State Route 63. See Figure 1 for a map of the study area.

Study Scope

The goal of the Study is to create a transportation plan that strives to achieve balance in meeting transportation, environmental and quality-of-life goals. The plan will be developed using various outreach techniques for the Public and Government Stakeholders utilizing ODOT's latest version (currently dated 2/3/04) of their 14 Step Planning Process. An overriding goal is to produce a plan that will improve regional mobility of people and goods, and that can be locally supported to facilitate implementation. Because the study is developing a sub-regional plan, it includes more than 600 miles of existing roadways. Approximately 200 of the 600 miles have been identified as the STUDY AREA ROADWAY NETWORK (SARN). Since the SARN is comprised mainly of arterial and high volume collector routes that provide the major transportation service to the area, it represents the "backbone"roads that will be analyized in this study. This study will produce several conceptual stategies addressing different transportation problems and areas. Those strategies selected for funding and implementation will each become seperate projects and enter ODOT's Step 5 of the process for further development.

The study area is located primarily in southwest Warren County and is bounded on the north by State Routes 63 and 122; on the east by I-71 and State Route 48; on the south by the southern Warren and Butler County lines; and on the west by I-75. The study area is approximately 100 square miles in area. Figure 1 shows the study area.

List Structures:

Bridge No.:	N/A now	Structure File #:	
Bridge No.:		Structure File #:	
Bridge No.:		Structure File #:	
Bridge No.:		Structure File #:	
Bridge No.:		Structure File #:	
Bridge No.:		Structure File #:	

Estimated Project Cost: Current Study is $800,000.

Funding Source(s):

[x] Federal

[ ] State

[x] Local

[ ] Private

Are Funding Splits Reqired?

[ ] Yes

[x] No

Specify Splits:

Anticipated Quarter and Fiscal Year of Project Awarded: Project implementation is beyond 4 year TIP.

Project Sponser, if any: Will ultimately be several local jurisdictions for several projects.

Is Local Legislation Required?

[x] Yes

[ ] No

Is FHWA Oversight Required?

[x] Yes

[ ] No

Is the project located on the congestion / safety list?

[ ] Yes

[x] No

Problem identified by (indicated document date):

[ ] District Work Plan

[ ] Congestion Study

[ ] Safety Study

[ ] Major New

[ ] MPO TIP

[ ] MPO LRP

[ ] Access Ohio

[x] Other: The purpose of this study is to identify & prioritize the problems & conceptual solutions for this area.

Are there any projects in the area (ODOT, Local, Utility) that might conflict with the project (e.g. a local project on the proposed detour route, a resurfacing project a year after the pavement marking project)?

[ ] Yes

[x] No

Specify:

Are there growth or land use changes in the area surrounding the project that could have an impact on the project scope?

[x] Yes

[ ] No

Specify: Rapidly developing land use is contributing to the transportation problems, however the project(s) will not be identified until near the end of this study.

Are there known public involvement issues?

[x] Yes

[ ] No

Specify: General congestion the the study area caused by rapid development is a common complaint.

Purpose and Need Statement (Must be a separate document for Major Projects):

The Purpose & Need Statement is provided in Appendix B of the Existing and Future Conditions Report.

Other Information / Notes:

Much of the data in the Red Flag Summary is geared for a single project approach rather than the large subarea and multiple, different problems in this study. Therefore many of the Red Flag detailed design questions are not applicable at this time. This is because the study will result in several different conceptual strategies addressing several different problems instead of the normal conceptual alternatives for a much smaller area with more narrowly defined problems. Below these are marked N/A now, but the study will result in seperate projects and that will enter ODOT's Step 5 of the process for futher development.

EXISTING INFORMATION:

Check all information that was reviewed for the Red Flag Summary. Not all information is available or necessary for every project. The scope of the Red Flag Summary should be commensurate with the nature of the proposed project.

- [ ] Legal Speed — Varies from 25 to 65 MPH.
- [ ] Design Speed — N/A now - to be determined.
- [ ] Traffic Data:
  - Opening Year ADT: N/A now.
  - Design Year ADT: N/A now
  - Design Hourly Volume: N/A now
  - Directional Distribution: N/A now
  - Trucks (24 Hr. B&C):

  (Traffic data does not need to be certified for the Red Flag Summary.)
- [ ] Turning Movement Traffic Counts
- [x] Functional Classification:
  - [x] Interstate, Freeway
  - [x] Arterial
  - [x] Collector
  - [x] Local
- [x] Locale:
  - [x] Rural
  - [x] Urban
- [x] National Highway System (NHS):
  - [x] NHS Routes: I-71, I-75
  - [ ] Non-NHS Routes: 576 miles of other roades in the study area.
- [ ] (3R) Project?
  - [ ] Yes
  - [ ] No

- [x] Aerial Mapping
- [ ] Ohio Utility Protection Service (OUPS) Markings
- [x] United States Geologic Survey (USGS) topographic mapping
- [x] Federal Emergency Management Agency (FEMA) flood plain study mapping
- [x] Natural Resources Conservation Services (NRCS) mapping
- [x] County Map(s)
- [x] Airport locations within 4 miles of project
- [ ] Tax maps
- [ ] Property deeds
- [ ] Pavement marking log

- [ ] Original construction plans:
- [x] Existing Right-of-Way plans:
- [ ] Bridge Inspection Reports
- [ ] Bridge Load Ratings
- [ ] Pile Driving Logs
- [ ] Recorded vertical clearances for overpasses and underpasses
- [ ] Old soil borings
- [ ] Old Geologic reports
- [ ] Pavement Cores
- [ ] Dynaflec Testing
- [ ] Deck Cores
- [ ] Ground Penetrating Radar (GPR Data)
- [ ] Maintenance history
- [ ] Pavement Condition Ratings (PCRs)
- [ ] County manager concerns
- [x] Traffic studies, Highway Safety Program (HSP) studies
- [ ] Previous Maintenance of Traffic concerns on roadway
- [x] Accident history / Accident reports
- [ ] Past Project Construction Diaries
- [ ] Permitted Lane Closure Map
- [ ] Property owner contacts
- [x] National Register of Historic Places
- [ ] Other:

EXISTING GEOTECHNICAL INFORMATION:
Identify all geotechnical references found. It is assumed , based on the project type, that not all reference materials listed herein will be applicable for use during the Red Flag Study. This study should provide a comprehensive review of all existing information available for the project area and should be supplemented with a complete field reconnaissance

Review of Information From ODOT:

- [ ] Original Construction Plans including plan views, profiles, and cross-sections
- [ ] Construction diaries and inspection reports for original construction
- [ ] Compile information on changes to the plans during construction activities (e.g., slope, spring drains)
- [x] Interview people knowledgeable with the previous projects
- [ ] Maintenance records
- [ ] Boring log on file with the Office of Geotechnical Engineering
- [x] History and occurrence of landslides
- [ ] History and occurrence of rockfalls
- [ ] Other

Review of information from ODNR:

From the Division of Geological Survey

- [ ] Boring logs on file
- [ ] Measured geological sections
- [ ] Bedrock Geological Maps
- [ ] Bedrock Topography Maps
- [ ] Bedrock Structure Maps
- [ ] Geologic Map of Ohio
- [ ] Quaternary Geology of Ohio
- [ ] Known and Probable Carst in Ohio
- [ ] Bulletins
- [ ] Information Circulars
- [ ] Report of Investigations

- [ ] Locations and Information on underground mines
- [ ] Location and characteristics of karst features
- [ ] Landslide Maps
- [ ] Other

From the Division of Mineral Resource Management

- [ ] Applications and permits files for surface mines (coal & industrial mineral)
- [ ] Active, reclaimed or abandoned surface mines
- [ ] Abandoned Mine Land (AML) sites
- [ ] Emergency Projects
- [ ] Other

From the Division of Soil & Water

- [ ] Water well Logs
- [x] Soil Survey
- [x] Ohio Wetland Inventory Maps
- [x] National Wetland Inventory Maps
- [ ] Presence of lake bed sediments, organic soils or peat deposits
- [ ] Other

Other Sources:

- [x] Aerial photography
- [ ] Satellite imagery
- [x] USGS quadrangles
- [x] USGS publications and files
- [x] City and County Engineers
- [ ] Academia with engineering or geology programs
- [ ] USGS open File Map Series #78-1057 "Landslide and Related Features"
- [ ] Other

SITE VISIT:

A site visit is required for ALL projects. The site visit shall consist of visual inspection of the entire project area including the ditch lines, cut slopes, stream banks, bridge foundations, pavement, rock / soil slopes, etc.

Date(s) of Site Visit: 3/25/04

ODOT DISCIPLINE INVOLVEMENT:

List name and phone number of individual(s) representing each discipline during the site visit and preparation of the Red Flag Summarry. One individual may represent multiple disciplines. Check box if individual attended the site visit.

[ ]	District Project Manager		Phone:
[ ]	Geometrics		Phone:
[ ]	Hydraulics		Phone:
[ ]	Pavements		Phone:
[ ]	Geotechnical		Phone:
[ ]	General Roadway		Phone:
[ ]	Structures		Phone:
[ ]	Traffic Control		Phone:
[ ]	Signals		Phone:
[ ]	Maintenance of Traffic		Phone:
[ ]	Right-of-Way / Real Estate		Phone:
[ ]	Utilities		Phone:
[ ]	Survey		Phone:
[ ]	Environmental		Phone:
[ ]	Highway Management		Phone:

	CO Program Mangager		Phone:	
	County Manager(s)**		Phone:	
	Production Administrator**		Phone:	
	Planning Administrator**		Phone:	

** The County Manager, District Production Administrator, and District Planning Administrator (or qualified represenative) must attend the site visit.

EXTERNAL AGENCY INVOLVEMENT:

Indicate external agency involvement during identification of red flags. List the name and phone number of individual(s) representing each agency during the site visit. Check box if individual attended the field review.

	Federal Highway Administration (FHWA)		Phone:	
x	County Engineer	Neil Tunison, Warren County Engineer	Phone:	513-937-695-1364
	City Engineer		Phone:	
	Other Local Public Agency		Phone:	
	Federal Emergency Management Agency (FEMA)		Phone:	
	US Army Corps of Engineers (USACE)		Phone:	
	U.S. Coast Guard		Phone:	
	Ohio Department of Natural Resources (ODNR)		Phone:	
	Ohio Environmental Protection Agency (OEPA)		Phone:	
	Railroad Railway Company		Phone:	
	State Historical Preservation Office (SHPO)		Phone:	
x	Metropolitan Planning Organization (MPO)	Dory Montazemi	Phone:	513-621-7060
	Utilities Company list:			
	Electric		Phone:	
	Telephone		Phone:	
	Water		Phone:	
	Gas		Phone:	
	Sanitary		Phone:	
	Cable		Phone:	
	Other		Phone:	
	Other		Phone:	
x	Other	Herb Mack (B&N) David Newhouse (LJB)	Phone:	937-259-5084

ODOT COUNTY MANAGER CONCERNS:
List any comments / requests from the ODOT County Manager

ACCIDENT DATA:

Summarize accident history. Indicate and design features that should be revised to increase safety

Accident data is contained in the existing & futures conditions report. This study will recommend accident strategy concepts and not detail design features or specific countermeasures.

ENVIRONMENTAL ISSUES:
Make a preliminary determination on whether the following resources will be affected by the proposed project.

Involvement:	Resource	Comments	References*
[ ] Yes [ ] No [x] Possible	Parkland, nature preserves and wildlife areas (Name)	See existing conditions report for listing and discussion of these features within the 100 square mile study area.	
[ ] Yes [x] No [ ] Possible	Cemetery (Name)	Should be avoided.	
[ ] Yes [ ] No [x] Possible	Scenic River (Name)	Little Miami River may be involved.	EPM: 104.2, 104.2.4
[ ] Yes [ ] No [x] Possible	Public Facilities (Name)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [ ] No [x] Possible	Threatened and Endangered Species and/or habitat (e.g., Indiana bat trees, etc.)	See existing conditions report for listing and discussion of these features within the 100 square mile study area.	EPM: 104.2, 104.2.6
[ ] Yes [ ] No [x] Possible	Existing cat tails (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [ ] No [x] Possible	Existing wet areas (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	EPM: 104.2, 104.2.3
[ ] Yes [ ] No [x] Possible	Streams, rivers and watercourses (Use Designation)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	EPM: 104.2, 104.2.4
[ ] Yes [ ] No [x] Possible	Historic Building(s) (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	EPM: 104.3
[ ] Yes [x] No [ ] Possible	Historic Bridge(s) (Location)	Should be avoided.	EPM: 104.3
[ ] Yes [ ] No [x] Possible	Farmland (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [ ] No [x] Possible	Landfill(s) (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [x] No [ ] Possible	Total Maximum Daily Load (TDML) Streams		
[ ] Yes [ ] No [x] Possible	ODOT MS4 Phase 2 Regulated Areas	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [ ] No [x] Possible	Evidence of hazardous materials (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	EPM: 104.7
[ ] Yes [ ] No [ ] Possible	Sensitive environmental justice areas	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [ ] No [x] Possible	Federal Emergency Management Agency (FEMA) floodplains	See existing conditions report for listing and discussion of these features within the 100 square mile study area	EPM: 104.2, 104.2.5
[ ] Yes [x] No [ ] Possible	Lake Erie Coatal Management Area		EMP: 104.2
[ ] Yes [ ] No [x] Possible	Sole Source Acquifers (Location)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [x] No [ ] Possible	Wellhead Protection Areas (Specify)	See existing conditions report for listing and discussion of these features within the 100 square mile study area	
[ ] Yes [x] No [x] Possible	Does it appear that noise abatement will be an issue for the project?	Not at this time.	
[ ] Yes [ ] No [x] Possible	Other Environmental Issues	See existing conditions report for listing and discussion of these features within the 100 square mile study area	

GEOMETRIC ISSUES:
Use the design speed, design functional classification and available traffic data to make a preliminary determination as to the geometric standards for the project. Compare these requirements to accident data and impacts if deviations are being considered

Design Exception Required?	Design Feature	Preliminary Comments Regarding Justification	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Lane Width (including curve widening)	N/A now.	LDV1: 301.1.1
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Graded Shoulder Width	N/A now	LDV1: 301.2.3
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Bridge Width	N/A now	LDV1: 302.1
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Structural Capacity	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Horizontal Alignment (including Excessive Deflections, Degree of Curve, Lack of Spirals, Transition/Taper Rates and Intersection Angles)	N/A now	LDV1: 202, 401.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Vertical Alignment (including grade breaks)	N/A now	LDV1: 203
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Grades	N/A now	LDV1: 203.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Stopping Sight Distance	N/A now	LDV1: 201.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Pavement Cross Slopes	N/A now	LDV1: 301.1.5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Superelevation (Maximum rate, transition, position)	N/A now	LDV1: 202.4
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Horizontal Clearance	N/A now	LDV1: 301.2.5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Vertical Clearance	N/A now	LDV1: 302.1

Indicate if the following geometric issues are present or should be considered during project development. Consider work on the mainline as well as any side roads or service roads. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the existing horizontal alignment need to be modified?	N/A now	LDV1:202
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the existing vertical alignment need to be modified?	N/A now	LDV1:203
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does stopping sight distance need to be increased?	N/A now	LDV:201.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does intersection sight distance need to be increased?	N/A now	LDV1: 201.3
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any hazards in the clear zone? Specify treatment.	N/A now	LDV1: 600.2, 601
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does existing guardrail need to be replaced (e.g., too low, poor condition)?	N/A now	LDV1: 602, 603
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there sufficient area for guardrail anchor assemblies (E-98 or B-98)?	N/A now	LDV1: 602, 603
[ ] Yes [x] No [ ] Possible [x] Not Applicable	Does the number of turn lanes appear to be adequate?	N/A now	LDV1: 401.7, 402
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the number of through lanes appear to be adequate?	N/A now	LDV1: 401.7

[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Are changes to access control required?	This is under consideration as a recommendation of the study.	LDV1: 800, 801, 802
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any drive locations that will require special attention during design (e.g., very steep grades, high volume commercial drives, drives close to bridges or intersections)?	N/A now	LDV1: 803, 804, 805
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are new mailbox turnouts required?		LDV1: 803.1
[ ] Yes [x] No [ ] Possible [ ] Not Applicable	Is there any evidence of accidents due to substandard vertical clearance on overpass structures?		
[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Will an interchange be added or modified?	This is under consideration as a recommendation of the study	LDV1: 403, 404
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do the existing intersection radius returns need to be modified to accommodate larger truck turning movements?		LDV1: 401.5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does grading need to be upgraded? To what criteria (e.g., clear zone, safety, standard)?	N/A now	LDV1: 307
[x] Yes [ ] No [ ] Possible [ ] Not Applicable	Are there any other geometric issues? Describe	Major defiecencies on the 200 mile network have been catogorized & noted in the Existing Conditions Report.	

HYDRAULIC ISSUES:

Indicate if the following drainage issues are present or should be considered during project development. Side road and service road work should be considered in this assessment. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Based on visual evidence (height of debris, erosion or other markings left from high water) and approximate drainage areas, does the existing drainage system (culverts, storm sewers and/or ditches) appear to be appropriately sized and functioning properly? Describe deficiencies.		LDV2: 1003 - 1006
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there evidence of alignment or flow velocity problems (e.g., scour, bank erosions, silting) at culvert entrances or exits?		LDV2: 1107
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there sinkholes or other deterioration in the pavement that would indicate separations in the existing pipes?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Should guardrail over culverts be eliminated with clear zone grading?		LDV1: 307.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Should the existing culverts be replaced?		LDV2: 1105
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Should the existing culverts be extended?		LDV2: 1105
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will a new alignment concentrate flow (in culverts) that is currently overland flow?		LDV2: 1105
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will the maximum height of cover (100') be exceeded for any culvert?		LDV2: 1008
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will bankfull design be used for any culverts?		LDV2: 1105.3.3
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Could materials with long lead times (e.g., large boxes) have an impact on construction schedule?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the existing drainage system have an odor that might indicate that it includes septic connections?		LDV2: LD-30 Form 1111.1
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the exposed curb height in existing gutters adequate to contain flow (include height of proposed resurfacing)?		LDV2: 1103
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do the existing inlets or catch basins need to be raised to meet proposed grade?		

[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Is the project in a FEMA flood zone?		LDV2: 1005
[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Does the project affect a wetland or waterway (e.g., stream, river, jurisdictional ditch)?		LDV2: 1001.2

[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the existing and/or proposed channel alignment compatible with the existing/proposed structure?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will channel relocation be required?		LDV2: 1102.2.4
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will Municipal Separate Storm Sewer System (MS4) requirements apply?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will post construction flow requirements be required?		LDV2: 1115.1 LDV2: 1115.2
[x] Yes [ ] No [ ] Possible [ ] Not Applicable	Is there evidence of existing field tiles?		LDV2: 1002.3.6, 1108
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are underdrain outlets functioning properly?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will a new storm sewer outfall be required?		LDV2: 1104
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is ditch cleanout required?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the drainage work warrant any special maintenance of traffic considerations?		TEM: PART 6
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other hydraulic issues? Describe.		

GEOTECH ISSUES:
"Geotechnical Red Flag" features may include, but are not limited to, known or suspected geologic hazards (e.g., organic soils, karst, rockfalls, landslides, surface and underground mines, poor subgrade conditions, or difficulty in correcting existing surface or subsurface drainage problems).

GEOLOGY
{Provide a brief geologic description of the project area}
{Provide a description of the hydrogeologic setting}
{Describe the characteristics of the soils}
{Describe the characteristics of the rock}

ORIGINAL CONSTRUCTION PLAN OBSERVATIONS
{Provide a bulleted list of all pertinent features found during the plan and specification review}
{Include findings from previous geotechnical reports or investigations}
{If general alignment or corridor is known, develop profiles to graphically present subsurface conditions (e.g., soil, rock, groundwater).
{Describe soil classifications and problem conditions}
{Describe bedrock and problem conditions}

DISTRICT NOTATIONS
{Provide synopsis of information compiled through the District and County Garages}
{Include construction issues and maintenance problems}

FIELD REVIEW
{Summarize the findings from a complete field reconnaissance}
{Provide bulleted items with references to locations}
{Include conditions of embankments, soil & rock cut slopes, surface water erosion, ground water seeps or springs, settlements, surface deformation, abnormal pavement cracking, etc.}

SUMMARY OF GEOTECHNICAL ISSUES
Based on the information compiled during this study indicate whether or not the following geotechnical issues are present or should be further considered during project development. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Is there evidence of soil drainage problems (e.g., wet or pumping subgrade, standing water, the presence of seeps, wetlands, swamps, bogs)?	Wetlands have been identified from secondary sources.	SSI: 2.1, 2.2

[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Is there evidence of any embankment or foundation problems (e.g., differential settlement, sag, foundation failures, slope failures, scours, evidence of channel migrations)?	Conceptual Strategies will involve the Little Miami River Valley, where landslide and foundation problems are prevalent.	SSI: 2.1, 2.2
[ ] Yes [ ] No [x] Possible [ ] Not Applicable	Is there evidence of any landslides?	Conceptual Strategies will involve the Little Miami River Valley, where landslide and foundation problems are prevalent	SSI: 2.1, 2.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there evidence of unsuitable materials (e.g., presence of debris or man-made fills or waste pits containing these materials, indications from old soil borings)?		SSI: 2.1, 2.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there evidence of rock strata (e.g., presence of exposed bedrock, rock on the old borings)?		SSI: 2.1
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there evidence of active, reclaimed or abandoned surface mines?		SSI: 2.1, 2.2, AUM
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there information pertaining to the existence of underground mines?		SSI: 2.1, 2.2, AUM
[ ] Yes [x] No [ ] Possible [ ] Not Applicable	Are soil borings needed for pavement design, foundations (bridge, headwall, retaining wall, noise wall) or slopes?		SSI: 2.1, 2.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does an undercut appear to be needed?		SSI: 5.3.2.1
[ ] Yes [x] No [ ] Possible [ ] Not Applicable	Should the Office of Geotechnical Engineering be contacted to evaluate the project site?		SSI: 1.3
[ ] Yes [x] No [ ] Possible [ ] Not Applicable	Are There any other geotechnical issues? Describe.		

Provide a list of bulleted items referencing additional areas of concern or special notation.

PAVEMENT ISSUES:

Indicate if the following pavement issues are present or should be considered during project development. Side road and service road work should be considered in this assessment. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are pavement cores needed to determine the existing pavement buildup and/or condition?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the proposed pavement buildup known? (For pavement preservation projects, pavement treatment, including pavement type & thickness should be specified in the design scope of services)		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the existing pavement concrete or asphalt?		

[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are dynaflect tests available to assess existing pavement condition?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the proposed pavement buildup need to be approved by the Pavement Selection Committee?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are joint repairs needed?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are pressure relief joints needed?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are pavement repairs needed?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the maintenance of traffic scheme require additional permanent or temporary pavement?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does curb need to be replaced due to deteriorated condition or lack of curb reveal?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does sidewalk need to be replaced or installed?		LDV1: 306.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are new curb ramps needed?		LDV1: 306.3
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do truncated domes need to be installed?		LDV1: 306.3.5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there any work on side roads, service roads or ramps?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any special drive treatments or preferences (e.g., concrete for all drive aprons, curved aprons, etc.)?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Has the site received repeated resurfacings in recent years?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does pavement deterioration appear to be caused by drainage or geotechnical problems?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other pavement issues? Specify.		

STRUCTURAL ISSUES:
Indicate if the following strucutre issues are present or should be considered during project development. Provide additional comments as needed.
Provide a separate table for each structure.

Structure:	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can the structure be replaced with a prefabricated box culvert or 3-sided box?		BDM: 201
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the bridge (including foundation) meet current design live loading?		BDM: 301.4, 301.4.1, 301.4.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Was the existing structure built according to plan?		BDM: 206, 401.1, 610.1
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is deck coring needed?		BDM: 412
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the deck delaminated? Specify.		BDM: 412
[ ] Yes [ ] No [ ] Possible [ ] Not Applicable	Is non-destructive testing needed to determine the amount of delamination?		BDM: 412
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the bridge deck in good condition?		BDM: 412

☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Has a deck condition survey (Bridge Design Manual, Section 412) been performed?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there areas to be patched or repaired on the deck?		BDM: 403.1, 404.3
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is the bridge a good candidate for an overlay? Specify type of overlay if known.		BDM: 404.1, 404.2
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Does the bridge rail meet current standards?		BDM: 209.2, 304, 410
☐ Yes ☐ No ☐ Possible ☐ Not Applicable	Is a fatigue analysis required?		BDM: 402.2, 402.3
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Should all fatigue prone details be retrofitted or replaced? Specify.		BDM: 402.2, 402.3
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is the abutment (including backwall, beam seats, breatwall, wingwall, etc.)) in good condition? Specify location and level of deterioration.		BDM: 403.1
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is there any evidence of substructure movement (e.g., settlement, rotation)?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Should the piers be replaced or reused? Specify.		BDM: 303.3
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is there any evidence of existing beam deterioration/section loss, strands exposed, shear joints leaking or longitudinal cracks?		BDM: 402.1
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are the bearings in good condition?		BDM: 411
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Can the deck joint be eliminated? If not, specify what modifications are necessary.		BDM: 205.8, 205.9, 406
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are new approach slabs needed?		BDM: 209.5
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Can hinges be removed to make the members continuous?		BDM: 402.8
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Does existing vertical and horizontal clearance meet design standards?		BDM: 207.1, 207.3, 209.8
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is the bridge on a curve, skew or superelevation transition?		BDM: 207.5, 209.1
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is there any evidence that the bridge does not meet hydraulic capacity?		BDM: 202.5, 203
☐ Yes ☐ No ☐ Possible ☐ Not Applicable	Are there existing sidewalks on or adjacent to the bridge?		BDM: 209.11
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Will the structure work require any special maintenance of traffic (e.g., closing of roadway for erection of beams, special location of cut line, etc.)? Specify.		BDM: 208, 409, 304.3.5
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is the structure in a Federal Emergency Management Agency (FEMA) flood plain?		BDM: 203
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is there any erosion in the existing channel?		BDM: 203.3
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is the foundation exposed due to scour?		BDM: 203.3, 409.3
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Will there be more than 25' of channel relocation?		

[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any opportunities to construct the bridge faster (e.g., precast walls, segmental construction)?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is there any railroad involvement?		BDM: 209.8
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the bridge need to accommodate future additional roadway lanes or railroad tracks?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will temporary shoring be required next to the roadway?		BDM: 208.3
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Could materials with long lead times for delivery (e.g., steel beams) have an impact on the construction schedule?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any problems with existing retaining walls?		BDM: 204.9
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other structures issues? Specify		

x

TRAFFIC CONTROL ISSUES:

Indicate if the following traffic control (signals, signing, pavement markings, etc.) issues are present or should be considered during project development. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do the existing signs need to be replaced due to poor condition?		TEM: 260
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any obvious deviations from requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD)?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is a particular type of pavement marking desired (e.g., paint, epoxy, thermoplastic)?		TEM: 320
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will pavement planing affect loop detectors?		TEM: 450-10.7, 420-5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will pavement widening affect pole locations?		TEM: 450-6
[ ] Yes [ ] No [ ] Possible [ ] Not Applicable	Will resurfacing effect signal height?		TEM: 450-7
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does it appear that any traffic control items will fall outside the existing right of way limits (e.g., large signs, strain poles)?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any special pedestrian considerations?		TEM: 404
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any accidents that can be related to existing signal deficiencies (e.g., timing, lack of turn lanes)?		TEM: 402-3.5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do turn lane lengths appear to have sufficient storage capacity?		LDV1: 401.7
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the controller need to be upgraded?		TEM: 460
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do proprietary materials need to be specified?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Should signs or signal installations be supplemented with lighting?		TEM: 408
[ ] Yes [ ] No [ ] Possible [ ] Not Applicable	Are any TODS signs present?		TEM: 207-3
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Could material with long lead times for delivery have an impact on the construction schedule (e.g., strain poles)?		

[ ] Yes [ ] No [ ] Possible [x] Not Applicable	If traffic control at an intersection is being changed from stop control to signalization, does the stop condition road need to be upgraded to accommodate faster traffic?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other traffic control issues? Specify.		

MAINTENANCE OF TRAFFIC ISSUES:

Indicate if the following maintenance of traffic issues are present or should be considered during project development. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can traffic be detoured?		TEM: 602-6
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the local alternate detour route in good condition? Are there any load limits or bridge width restrictions?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will the detour route have a detrimental impact on emergency vehicles, school buses or other sensitive traffic?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any load limits on the proposed detour route?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the project fall within the permitted lane closure map?		TEM: 630-4
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is existing bridge width sufficient to maintain traffic? Number of beam lines sufficient?		TEM: 640-2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will temporary pavement be required?		TEM: 640-2, 640-11
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Should temporary pavement be retained after project completion?		TEM: 640-11
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will the speed limit be lowered by more than 10 mph during construction?		TEM: 640-18
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is the existing shoulder in good enough condition to support traffic during construction?		TEM: 640-5
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does pedestrian traffic need to be maintained?		TEM: 64-25
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will additional width be required on culverts or bridges to maintain traffic?		TEM: 640-2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will a temporary structure / run-around be required?		TEM: 640-11
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will a cross over be utilized?		TEM: 640-11
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will the road need to be closed for short durations (e.g., 15 minutes for beam erection)?		TEM: 640-8
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can drive access be maintained at all times?		TEM: 640-10
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can trucks make turning movements during construction?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will portable concrete barrier wall obstruct stopping sight distance?		LDV1-201.2
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will additional signal heads be needed for drives and/or side roads?		TEM: 605-13
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any issues regarding access to the work site?		TEM: 640-9

[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any issues regarding construction timeframes (e.g., time of day, time limits)?		TEM: 606-3, 640-14
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Have innovative contracting ideas been considered? Specify.		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there specific requirements for maintaining railroad traffic?		TEM: 606-19
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does it appear that the maintenance of traffic will require additional right of way?		
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other maintenance of traffic issues? Specify.		

RIGHT OF WAY / SURVEY ISSUES:
Indicate if right of way or survey issues are present or should be considered during project development. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will there be any work beyond the existing right of way limits?	N/A now.	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will major real estate relocation acquisition be involved?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will relocation of residences be involved?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will relocation of businesses be involved?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does access control need to be revised?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any obvious encroachments?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can the number of involved property owners be determined? If so, how many?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will temporary parcels be needed (e.g., for drive work)?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will right of way need to be acquired for an agency other than ODOT (e.g., county, city)? Specify.	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will additional right of way be needed for utility relocations?	N/A now	
[ ] Yes [ ] No [ ] Possible [ ] Not Applicable	Will right of way need to be acquired for storm sewer outfalls?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do property owners need to be contacted for the locations of underground items such as leach fields, septic systems or field tiles that might be effected by the proposed take?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any mineral rights considerations?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any specific property owner concerns?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will right of way acquisition from a railroad/railway be involved?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can work agreements be used?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does the centerline of construction match the centerline of right of way?	N/A now	

[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will right of way be acquired for wetland or stream mitigation?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other right of way or survey issues? Specify.	N/A now	

UTILITY ISSUES:
Indicate if the following utility issues are present or should be considered during project development. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Do existing utilities need to be relocated?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Can utility conflicts be minimized (e.g., by careful placement of storm sewer and underdrains)?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Would the project benefit from subsurface utility engineering (SUE)?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there existing utilities on an existing structure that need to be relocated?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any specific utility requirements or concerns? Specify.	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there facilities that require a large lead time to relocate?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is additional right of way needed to accommodate utility relocations?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there water or sanitary lines that will be relocated as part of the ODOT contract?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Are there any other utility issues? Specify	N/A now	

PERMIT ISSUES:
Indicate if the following permit issues are present or should be considered during project development. Provide additional comments as needed.

	Design Issue	Comments	References*
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will an individual Corps of Engineers/Environmental Protection Agency 404/401 permit be required?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Does it appear that the project can be constructed under a nationwide 404/401 permit? If so, which permit and what specific requirements apply?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Will a Coast Guard Permit be Required	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is review by a local public agency or project sponsor required? Specify.	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is Airway/Highway clearance analysis required?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is Federal Emergency Management Agency (FEMA) approval required?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is railroad/railway coordination required?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is State Historic Preservation Office (SHPO) coordination for work involving historic bridges or historic properties required?	N/A now	
[ ] Yes [ ] No [ ] Possible [x] Not Applicable	Is coordination with ODNR for work involving State Scenic Rivers, State Wildlife Areas or State Recreational Areas required?	N/A now	

☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Is coordination with any other agency required? (See Location and Design Manual, Figures 1402-2 through Figure 1402-7.)	N/A now	

MISCELLANEOUS ISSUES:
Indicate if the following issues are present or should be considered during project development. Provide additional comments as needed

	Design Issue	Comments	References*
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Will a value engineering study be required due to project cost (total cost greater than $20 million) or project complexity?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Will warranties be used?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there aesthetic concerns? Specify.		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there any concerns relating to noise walls?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there areas available within the existing right of way for portable plans or waste and borrow sites?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there specific concerns related to pedestrian access?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Any concerns related to landscaping?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there any concerns related to existing or proposed lighting (e.g., light trespass, river navigation, airway clearance)?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Are there any other concerns? Specify.		

RED FLAG MAPPING:
Is a map showing locations of red flag areas attached?
☒ Yes ☐ No **Figures 2 and 3 provide mapping of known Red Flags in the study area.**

GEOTECHNICAL DELIVERABLES:
Include copies of plan views, geologic cross-sections, existing boring logs, and soil and rock testing data. This information should be augmented with data from ODOT's archived files of previous projects in the area. Additional information on soil survey data, glacial deposits, bedrock topography, bedrock structure, and aquifer mapping, etc. should be compiled as a GIS workspace. Both digital ortho-quarter quadrangles and U.S.G.S. quadrangles should be available for base mapping. Copies of the reference maps and ArcView files should be provided.

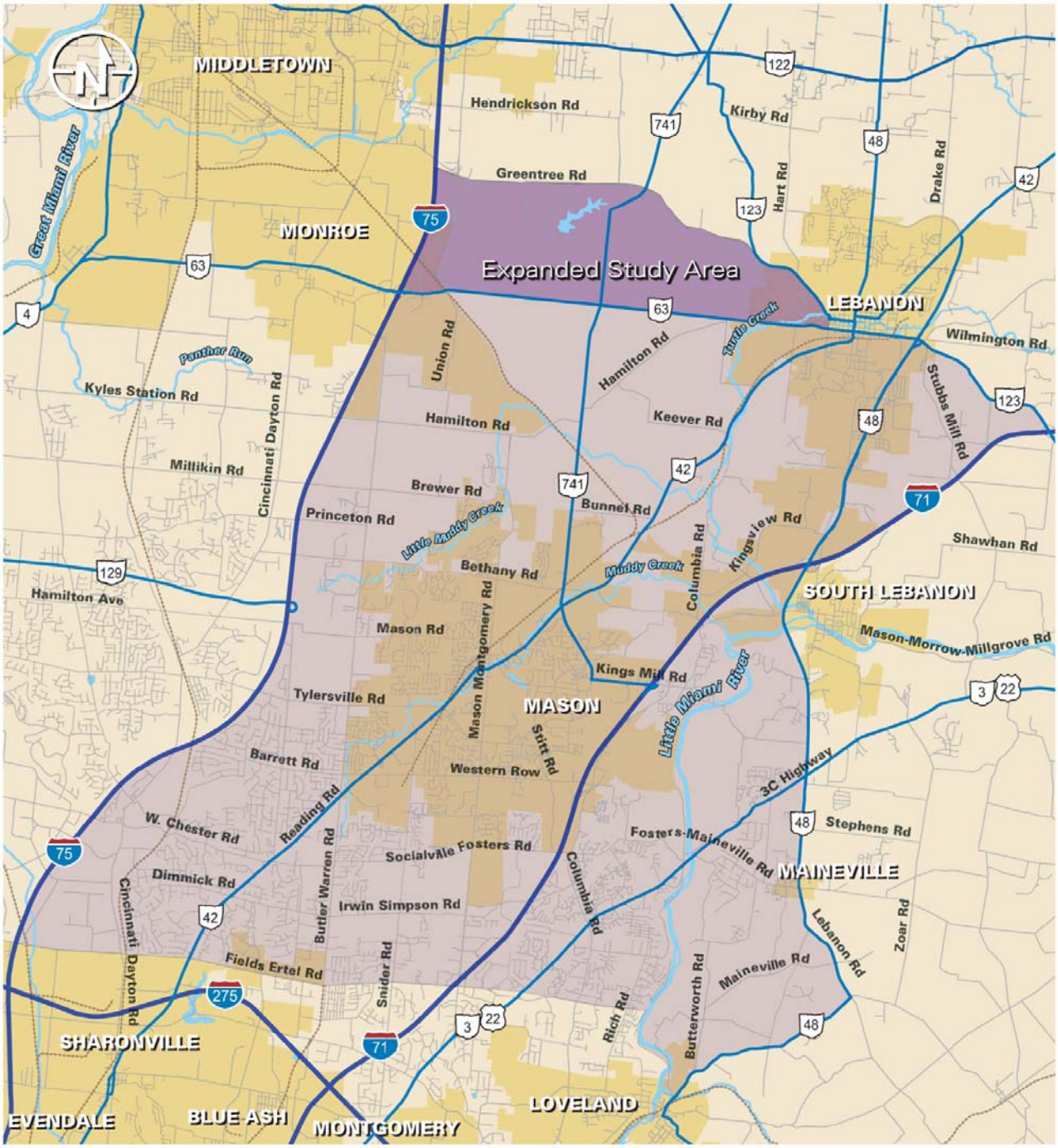
SCOPE, SCHEDULE AND BUDGET CONSIDERATIONS:
Based on the responses to the red flag questions, do any of the following need to be modified?

	Design Issue	Comments	References*
☐ Yes ☒ No ☐ Possible ☐ Not Applicable	Conceptual (draft) scope?		
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Work limits?		LDV3: 1307.7
☐ Yes ☐ No ☐ Possible ☒ Not Applicable	Probable environmental document type?		
☐ Yes ☒ No ☐ Possible ☐ Not Applicable	Major / minor / minimal classification?		LDV3: 1400
☐ Yes ☒ No ☐ Possible ☐ Not Applicable	Schedule?		
☐ Yes ☒ No ☐ Possible ☐ Not Applicable	Budget?		

Abbreviations:
AUM = Manual for Abandoned Underground Mine Inventory and Risk Assessment
BDM = Bridge Design Manual
LDV1 = Location and Design Manual, Volume 1
LDV2 = Location and Design Manual, Volume 2
LDV3 = Location and Design Manual, Volume 3
SSI = Specifications for Subsurface Investigations
TEM = Traffic Engineering Manual
EPM = Environmental Process Manual

Southwest Warren County Transportation Study

Figure 1: Study Area

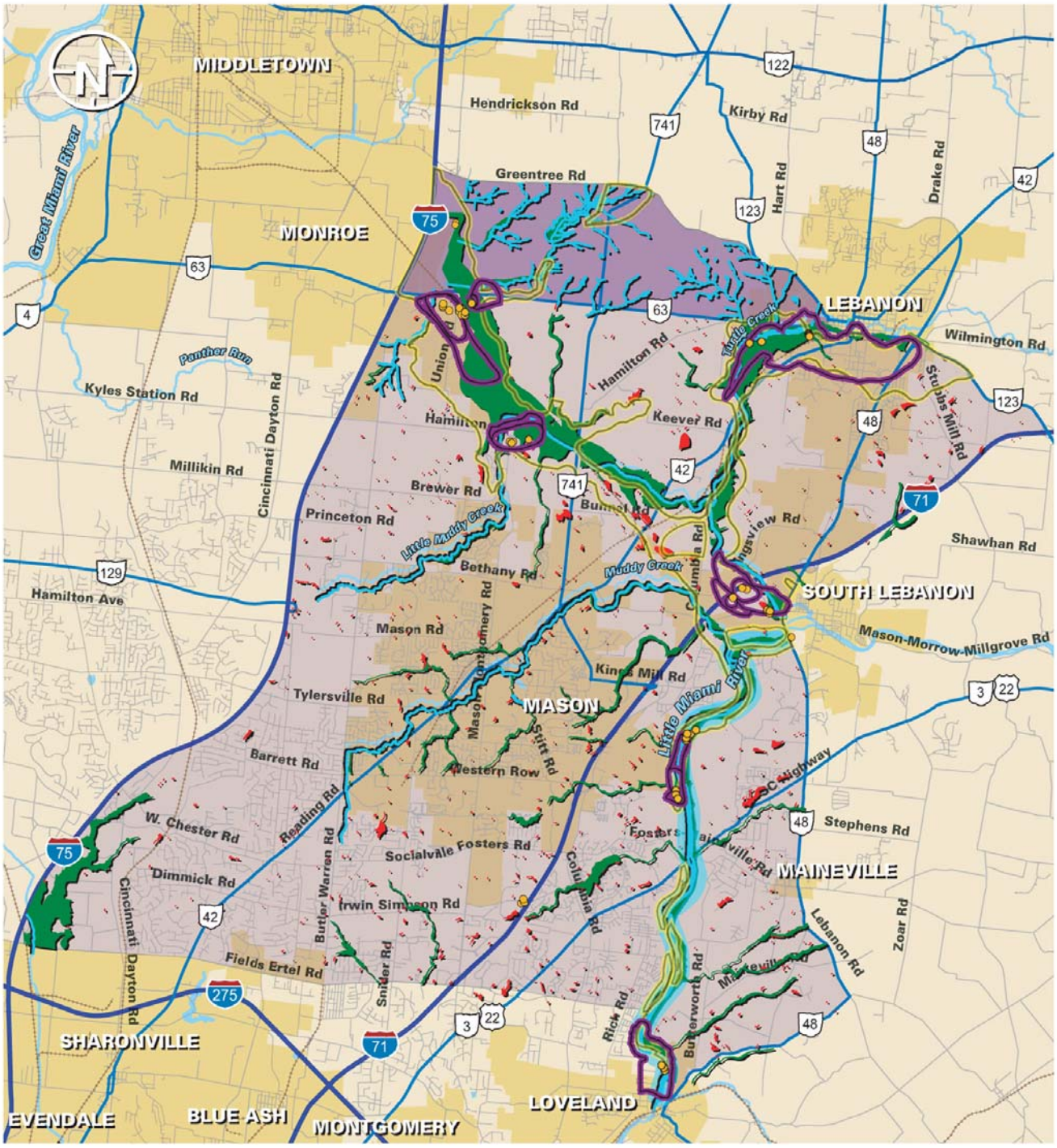


OKI Ohio · Kentucky · Indiana Regional Council of Governments

BURGESS & NIPLE

Southwest Warren County Transportation Study

Figure 2: Natural Environment Red Flags

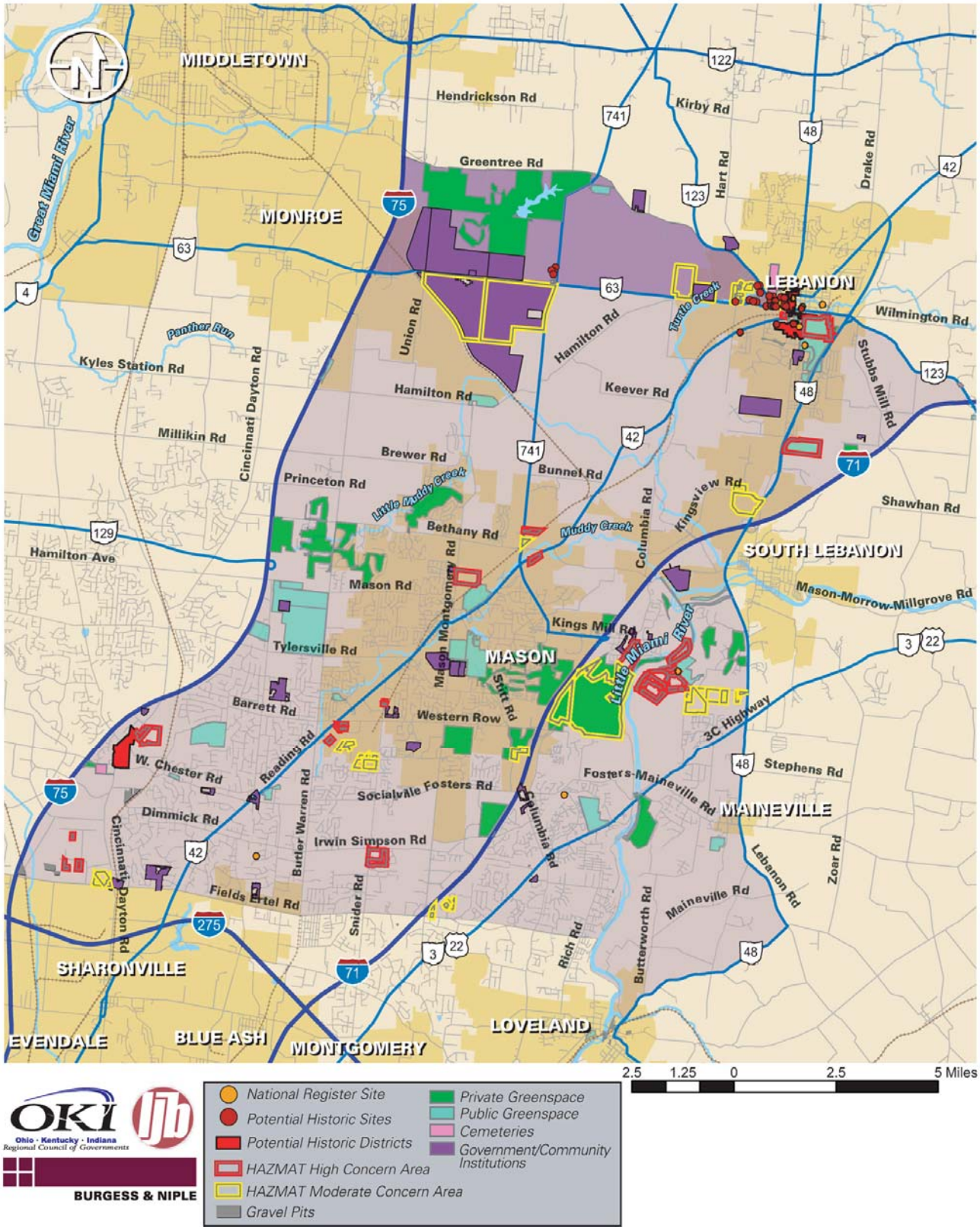


OKI Ohio · Kentucky · Indiana Regional Council of Governments

BURGESS & NIPLE

Southwest Warren County Transportation Study

Figure 3: Human Environment Red Flags



APPENDIX E
PURPOSE & NEED STATEMENT

Southwest Warren County Transportation Study

Purpose & Need Statement

June 2005

Prepared for:

OKI
Ohio · Kentucky · Indiana
Regional Council of Governments

Consultant Team:

BURGESS & NIPLE

and

IJb

Southwest Warren County
Transportation Study

Introduction

Background

A Purpose and Need Statement establishes the reasons why the expenditure of public funds is justified and worthwhile. The Southwest Warren County Transportation Study (SWWCTS) is currently in the early steps of the planning process. *At this early stage, the Purpose and Need Statement serves as a broad "umbrella" statement covering a large study area.* During later stages, transportation solutions will be analyzed to determine if they satisfy the goals and objectives of the study. Figures 1 and 2 provide the location of the study area. When the environmental/design process is initiated after the conclusion of this study, individual Purpose and Need Statements (building upon the planning-level Purpose and Need Statement) will be prepared for each independent project recommended by the planning study.

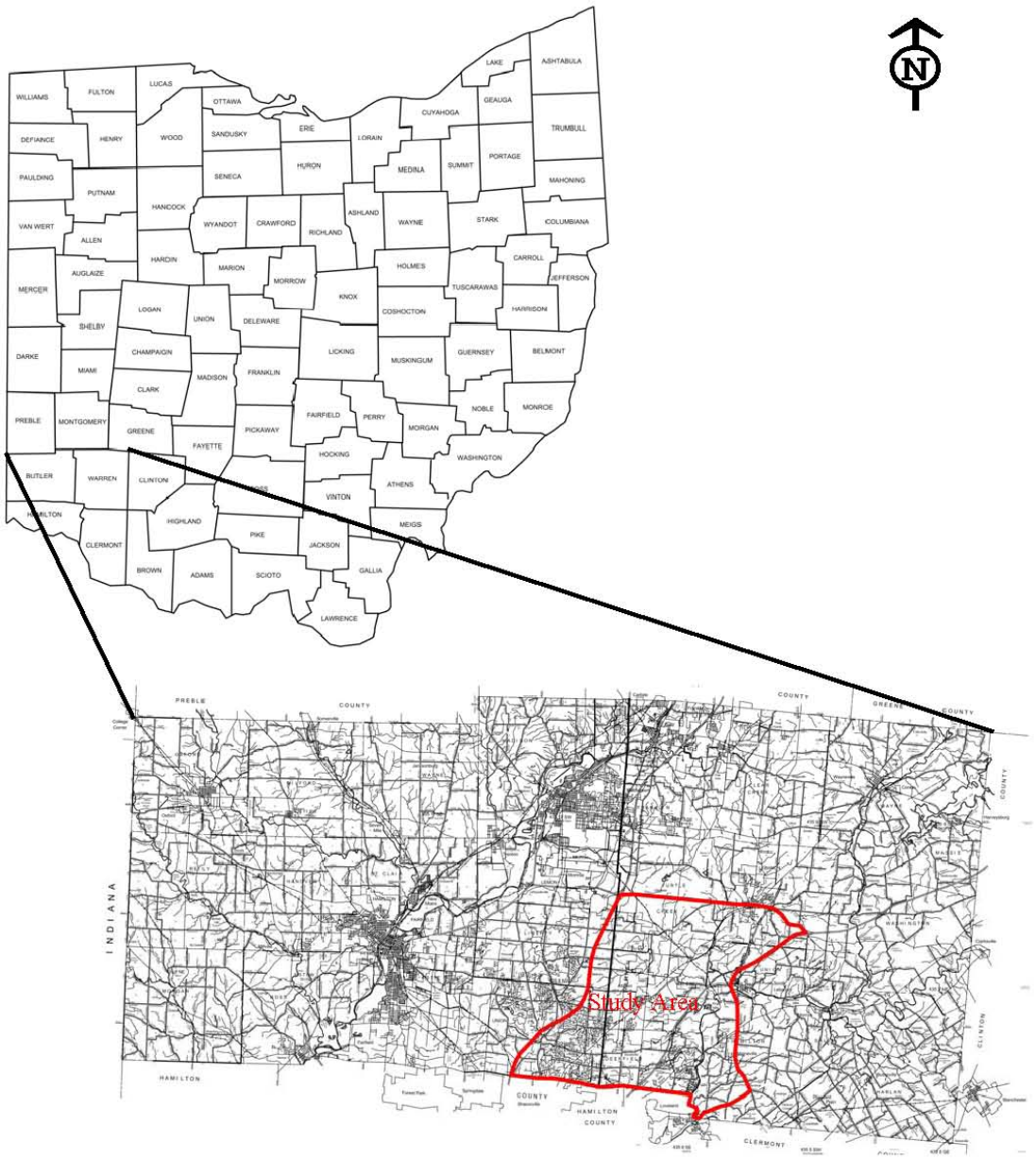
Public Involvement Comments

Public Involvement (PI) meetings were held for the project on May 25 and 26, 2004, and this Purpose and Need Statement has been revised to include the public comments on transportation deficiencies for the area. 46 persons attended the PI meetings for this project and 36 provided written comments. 40 percent of commenters described their travel in the SWWCTS area as satisfactory. Recognizing that roadway vehicles are the dominant mode of travel, 38 percent of commenters mentioned that bike/pedestrian facilities should be expanded or improved. The Fields Ertel/Mason Montgomery roads interchange with I-71 was the most frequently noted area by commenters as having the worst transportation problems in the SWWCTS area. Other problem areas frequently noted by commenters included Mason Montgomery Road, S.R. 741/Kings Mill Road, Fields Ertel Road, and U.S. 42. Further information on the PI meeting comments can be found in the SWWCTS Summary of Survey Responses memorandum.

Sponsoring Agency and Task Force Members

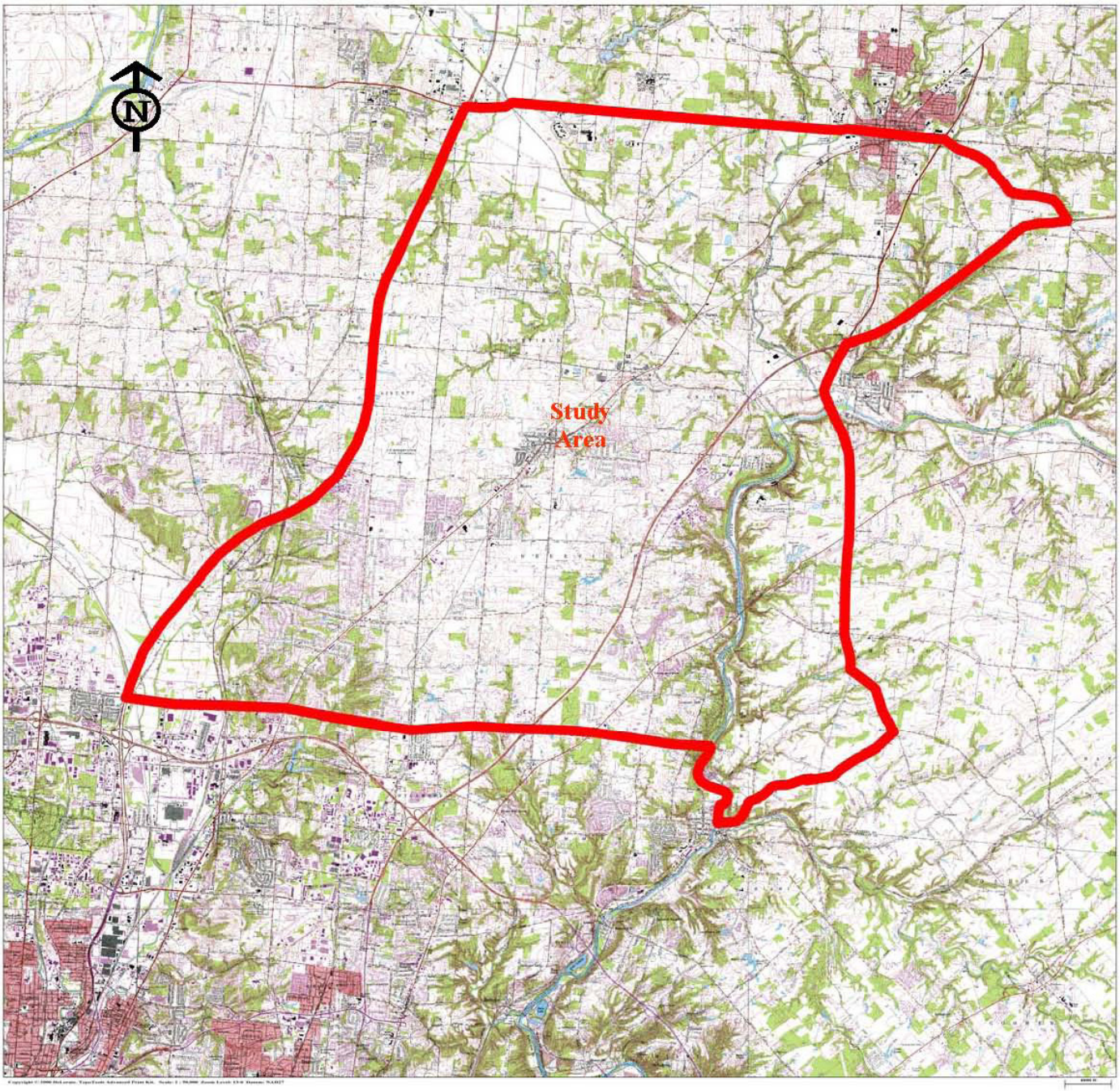
For this project, the sponsoring agency is the Ohio-Kentucky-Indiana Regional Council of Governments (OKI), a regional planning agency. OKI's mission is to serve as a "council of local governments, business organizations and community groups committed to developing collaborative strategies, plans and programs which will improve the quality of life and the economic development potential of the Tri-state." The government entities that are participating in funding this $1,000,000 study are OKI ($800,000), Warren County ($100,000) and the study area townships and municipalities ($100,000). The Southwest Warren County Transportation Study Task Force, comprised of 23 members, assists OKI on this project. The members include business leaders; advocacy group members; city, township, and county officials/leaders; and state and federal transportation officials. Mr. Larry Crisenbery, a Warren County Commissioner, originally chaired the task force. After Mr. Crisenbery's retirement, the task force was chaired by Mr. Robert Price, Warren County Administrator. The current chair of the task force is Mr. Dave Young, Warren County Commissioner, who took over in April 2005 after the retirement of Mr. Price.

Not to Scale



Southwest Warren County Transportation Study

Figure 1: Project Location Map



Southwest Warren County Transportation Study

Figure 2: Project Location Map on USGS

Land Use and Transportation History

Generally, land use in the SWWCTS area is characterized by denser, more developed areas in the southern part, and less dense to rural areas in the northern part. Most of the development in the SWWCTS area is comprised of single-family houses. Employment centers in the Mason area include the Procter & Gamble complex, Kings Island and other local companies. With the exception of I-71 and I-75, the major roads in the SWWCTS area were developed to connect farming centers in the area. In the 1950s and 1960s, I-71 and I-75 were constructed through the area as part of the Interstate Highway System. Within the southwest Ohio region, I-71 connects Cincinnati with Columbus, and I-75 connects Cincinnati with Dayton. However, these interstate highways have evolved to be major, national north-south transportation facilities for passenger cars and freight carriers. As the area became increasingly suburbanized, the country roads were widened and straightened in response to the increasing traffic. A few new roads with greater traffic capacity were also developed, such as Kings Island Drive, the Tylersville Road connection, the S.R. 48 bypasses of Lebanon and South Lebanon and extension of S.R. 741 south of U.S. 42.

SWWCTS Area Transportation Planning

Various transportation planning efforts have been conducted in recent years within (or adjacent to) the SWWCTS area. The Butler County Transportation Improvement District is currently finalizing a Major Investment Study (MIS) and has initiated an Interchange Modification Study (IMS) for the Liberty Interchange. The project would modify the I-75/State Route 129 interchange by connecting it to Hamilton Road and extending Cox Road to the north. In 2000, the Miami Valley Regional Planning Commission (MVRPC) and OKI undertook a major planning effort know as the North South Transportation Initiative. The Initiative was a comprehensive evaluation of the transportation needs along the I-75 corridor from northern Kentucky to the Miami County, Ohio line. In 1998, OKI completed the Final Report on the I-71 Corridor Transportation Study. That study investigated the mass transit alternatives along the I-71 Corridor from Kings Mills in Warren County to Florence and the Greater Cincinnati Airport in Kentucky. Light rail transit was ultimately selected as the preferred alternative for this corridor.

A State Route 63 Corridor Study was recently conducted to study the possible establishment of an east-west transportation corridor across northern Butler County. That study begins at the I-75/State Route 63 interchange and runs west past the City of Trenton to the City of Oxford. In 2002, a Lebanon Truck Origin & Destination (O&D) Study was completed by the Warren County Engineer's Office in cooperation with the City of Lebanon. The purpose of the O&D study was to determine the traffic characteristics of trucks on state and U.S. routes within the City of Lebanon. A recent study was conducted to study feasible alternative improvements at the Fields Ertel Road/Mason Montgomery Road Interchange. The study identified significant problems at the interchange, which frequently caused system breakdowns on both Fields Ertel Road and Mason Montgomery Road. Further details of these studies can be found in the SWWCTS Existing Conditions Report. Additionally, SWWCTS is listed as an Ohio line item on page 24 of OKI's Fiscal Year 2004-2007 Transportation Improvement Program (TIP).

Study Goals

Based upon the early public involvement activities and through a consensus of the Task Force Members, 3 primary goals were established for the study. These include 1) Improve mobility for people and goods, 2) Protect the environment and quality of life and 3) Improve travel safety. Multiple objectives supporting each of the three primary goals were then developed for the study. All study goals and objectives for the Southwest Warren County Study Area are summarized below.

Improve Mobility for People and Goods

- Accommodate the growth of traffic.
- Improve traffic movement through the study area.
- Move truck traffic more efficiently.
- Improve the operating efficiency of existing roadways.
- Protect capacity through access management.
- Identify alternatives for expanding transit.

Protect the Environment and Quality of Life

- Improve transportation consistent with county and local land use plans.
- Protect the Little Miami River's values as a designated scenic river.
- Enhance opportunities for walking and biking as alternatives to driving.

Improve Travel Safety

- Reduce conflicts between modes of transportation.
- Improve the safety of intersections and roadways that have a high incidence of accidents or problematic design.
- Reduce deficiencies of rural roadways that carry greater traffic volumes than what they were designed for.

Project Purpose

Once the goals and objectives for the study area were established, the SWWCTS project purpose was developed to provide direction for the study throughout the remaining steps of the Project Development Process (PDP). As stated, the SWWCTS addresses a sub-regional area within the OKI region, and does not concentrate on a particular corridor or given transportation problem. Instead it addresses a 100 square mile area with numerous problems and a multitude of solutions. Therefore the purpose of this project is not to solely identify and solve a particular problem, but is to establish a mechanism for which the multitude of problems within the study area can be addressed. To this end the project purpose has been developed in three areas:

- Identify and evaluate existing and future transportation problems.
- Identify, develop and evaluate potential conceptual improvement strategies that address existing and future transportation needs.
- Provide a mechanism for prioritization of identified problems and solutions, capable of affording a consensus by local and regional stakeholders as to the best allocation of limited resources in meeting the transportation needs of the study area and the OKI region.

Project Need

Population Growth Trends. The SWWCTS area has experienced rapid growth in recent years due to expansion of suburbanization from the inner Cincinnati suburbs. Warren County is frequently ranked as the second fastest growing county in Ohio (Delaware County in suburban Columbus is ranked first). This once rural county had a population of 38,000 in 1950. The 2000 U.S. Census identified Warren County as having a population of 158,000. Census estimates released in April 2004, indicate that the Warren County population has increased 14.7% in the last three years to a total of 181,000 in 2003. According to the 2000 U.S. Census, the SWWCTS area has a population of 84,000 (96,000 based on 2003 estimates) and the Census Bureau expects the SWWCTS area to have a population of 154,000 by 2030. In April 2004, Warren County ranked number 52 in the U.S. Census' listing of the 100 fastest growing counties in the U.S. from April 1, 2000 to July 1, 2003.

The Existing Conditions Report prepared for this study states that Warren County grew in population by 60% between 1980 and 2000. This is in contrast to the growth in the OKI area of 14% for the same period. The report also describes that the SWWCTS area will experience significant growth in the number of households, population, number of workers, and number of jobs compared with the rest of the OKI region. This data is based on OKI 2004-2030 forecasts (see Table 1). A regional transportation plan is needed to support the traveling requirements of this growing population.

Table 1
Population Change Forecasts

	SWWCTS Area			OKI Region		
	2004	**2030**	**% Change**	**2004**	**2030**	**%Change**
Households (HH)	35,000	59,000	+69%	763,000	928,000	+22%
Population	96,000	157,000	+64%	1,899,000	2,233,000	+18%
Workers	52,000	87,000	+67%	984,000	1,199,000	+22%
Employment	58,000	81,000	+40%	1,039,000	1,244,000	+20%
Persons/HH	2.74	2.66	-3%	2.49	2.41	-3%
Workers/HH	1.49	1.47	-1%	1.29	1.29	0%
Jobs/Person	0.60	0.52	-13%	0.55	0.56	+2%

Traffic Capacity-Mobility Problems. During recent years, traffic volumes have increased dramatically and are outpacing the development of new transportation facilities to accommodate the demand. For instance, the area between the Little Miami River and S.R. 48 has seen a surge in subdivision development in recent years. These motorists desire to travel on U.S. 22/S.R. 3 and I-71 for regional access to employment. Traffic from those subdivisions frequently must travel on substandard roadways that are in topographically rolling areas where the roads follow their historic alignment. Traffic on Maineville Road and the Old 3C Highway trying to cross the Little Miami River on U.S. 22/S.R. 3 experience lengthy rush hour back-ups. Historically, rapid development has occurred without an

Adequate Public Facilities Ordinance to ensure that roadways and access control are in place before land was developed. Although systems are in place for land developers to dedicate right-of-way and improve roadways in proximity to a new development, this approach provides a patchwork of upgrades and does not provide system-wide continuity of improvements. Additionally, the quantity of traffic generated by the land development growth is outpacing the transportation facility owners' ability to implement solutions to alleviate the traffic growth on an area-wide basis.

The Future Conditions Report provides forecasted analyses of transportation growth in the SWWCTS area between 2004 and 2030. All of the transportation system forecasts studied in the Future Conditions Report show increases (some dramatic) of traffic on roadways in the SWWCTS area. The forecasts show that without improvements, future demands will not be met by the transportation infrastructure currently in place and planned. For example, the Future Conditions Report comments that the number of person trips traveling through the SWWCTS area (i.e., external to external trips) is forecasted to grow by 51 percent from 49,000 trips in 2004 to 74,000 trips in 2030. Forecasted trips traveling to the SWWCTS area from other areas (i.e., external to internal trips) are expected to increase 45 percent from 386,000 trips in 2004 to 558,000 trips in 2030. By studying traffic origins and destinations, the Future Conditions Report states that the SWWCTS area produces five percent and attracts six percent of all trips in the OKI region in 2004. In 2030, the number of trips originating in the SWWCTS area is expected to increase to seven percent while the number of trips attracted is forecasted to remain at six percent. 44-percent of the trips originating in the SWWCTS area travel to Hamilton County. The Future Conditions Report also notes that trip lengths are expected to increase between 2004 and 2030. Further, Table 2 from the Future Conditions Report shows that the Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay are forecasted to be substantially greater in 2030 in the SWWCTS area compared with the OKI region for the existing and planned transportation infrastructure.

Table 2
Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Vehicle Hours of Delay (VHD)

	SWWCTS Area			OKI Region		
	2004	**2030**	**% Change**	**2004**	**2030**	**%Change**
VMT	4,358,000	7,201,00	+65%	49,843,000	67,342,000	+35%
VHT	113,000	283,000	+150%	1,331,000	2,190,000	+65%
VHD	17,000	125,000	+635%	120,000	566,000	+372%

It can also be noted that the study area VHD is projected to grow at a rate four times greater than the rate of VHT, which is twice the rate of VMT growth. Additionally, the study area growth rates for all three measures of travel are twice that of the OKI region. This suggests that congestion can be expected to grow dramatically between 2004 and 2030.

Based upon these traffic volumes it is estimated that in the year 2030, approximately two-thirds of the roadways within the study area will exceed their capacity based on existing conditions. The majority of those operating under capacity are expected to operate at Levels of Service D or E, which are approaching capacity and would be expected to experience decreasing speeds and

increasing delays and congestion. **Figure 3** shows the peak hour level of service of all major roadways within the study area.

Many congested areas in the study area are also directly linked to a lack of connectivity within the transportation network. This lack of connectivity is apparent in the deficient access to, from and between the Interstates 71 and 75. Along the ten-mile stretch of Interstate 71, only 4 and a half interchanges are provided when accounting for the half interchange to the south at Western Row Road. On Interstate 71 there is a 5-mile stretch between Kings Mills Road and Fields Ertel Road with no access to/from the northbound direction. It is in between these two routes where the densest development within the study area is found. Furthermore, access between the interstates is limited with continuous access between I-71 and I-75 found on Tylersville/Western Row Road and via State Route 63. Impairing State Route 63 is that is runs through the historic Lebanon district and cannot be widened beyond the existing three-lane section.

Roadway and Safety Deficiencies. While some transportation facilities have been upgraded to current standards, many roadways have changed little from when originally constructed. Many problem roadways in the SWWCTS area have substandard lane and shoulder widths, and substandard horizontal and vertical alignments to meet current traffic conditions. This situation results in safety problems for the motoring public and lessens the capacity of the roadways to meet current traffic demand. According to the accident analysis prepared for the Existing Conditions Report, 30 percent of crashes in the SWWCTS area are single vehicle crashes, including fixed object crashes and drivers running off the road. The high percentage of single vehicle accidents is indicative of the deficiencies on the rural roadway network in the SWWCTS area. Further details on accidents in the SWWCTS area can be found in the Existing Conditions Report. An example of these type of rural roadways is the eastern portion of Socialville-Fosters Road. This road follows the Simpson Creek stream valley downhill as it flows to its confluence with the Little Miami River. The road is very steep with two tight curves, 11-foot wide lanes, and no shoulders. It serves as one of the main east-west connectors from the Hopkinsville/Maineville area to I-71 across the Old 3C Highway bridge over the Little Miami River.

Multi-Modal Usage. The dominant mode of transportation in the SWWCTS area is by single operators in private vehicles. There are currently no commuter rail, subway or light rail transit systems in operation in the SWWCTS area. As described earlier, OKI has completed a light rail study that would extend service from downtown Cincinnati to the City of Mason, however, implementation is dependent on funding which does not appear available in the near future. Park and Ride facilities are located at King's Island and Fields Ertel Road and are used for car-pooling and parking for Metro's regular and express bus service to downtown Cincinnati. Warren County Transit provides a paratransit service on an on-call basis. Walking as a transportation alternative is limited by availability of safe walking areas (sidewalks, trails, etc.) and distance to walkable destinations. The availability of these walking components varies widely throughout the SWWCTS area. Although the Little Miami Trail traverses the SWWCTS area along the former railroad bed in the Little Miami River valley, this trail is primarily a recreational route

and is not heavily used by commuters. The Future Conditions Report describes that forecasted total transit usage declines from 0.7% in 2004 to 0.6% in 2030. Home to work trips for single occupant vehicles are forecasted to increase by 22 percent between 2004 and 2030. Home to work shared ride trips are forecasted to increase by 24 percent over the same period.

Financial Resources. According to the OKI 2030 Regional Transportation Plan, an estimated $7.53 billion for transportation improvements is expected to be available in the OKI region between 2004 and 2030. The estimated cost of the recommendations already identified within the transportation Plan, total $7.43 billion with an estimated $10.1 billion worth of transportation improvements that are needed, $2.67 billion over the estimated available funding. Due to the exceedingly high cost of project needs in the OKI region it is necessary to provide a mechanism that adequately evaluates and prioritizes necessary improvements in the Southwest Warren County Transportation study area that accurately evaluates the area wide and regional improvements made by alternative solutions so that the projects may vie for limited funding in the region. Reaching a consensus among local stakeholders and jurisdictions on which improvements are the most needed will serve to support regional improvements in the study area and make them competitive for placement in the long range transportation plan and available for funding through state and national resources.

Study Area and Logical Termini

The study area is bounded by I-75 to the west, S.R. 63 and S.R. 123 to the north, I-71 and S.R. 48 to the east, and the Hamilton County boundary to the south. While many areas of Warren County are growing at a rapid rate, the SWWCTS area was identified as an area with the most urgent need for transportation planning solutions. The area is situated between I-75 and I-71 and is already one of the most developed portions of the county and is the first ring of suburbs north of Hamilton County. The study boundary was also determined based on logical break points in congestion, land use and political and jurisdictional boundaries. Butler County has undertaken extensive improvements west of I-75 (specifically, the construction of S.R. 129), and I-275 to the south of the SWWCTS area has been recently widened east of U.S. 42 and will be widened west of U.S. 42 in 2008. Current land density lessens greatly to the east of S.R. 48 and to the north of S.R. 63. All the jurisdictions in the SWWCTS area experience similar development pressures; therefore, a comprehensive, coordinated, and multi-jurisdictional approach is needed to determine potential solutions to the transportation problems in the SWWCTS area.