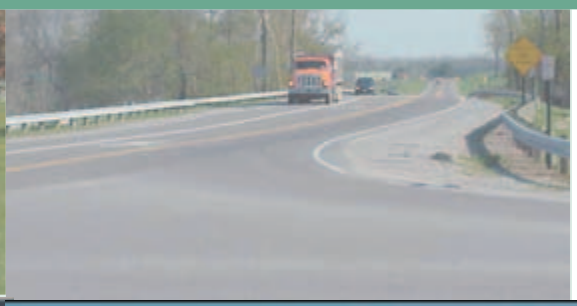
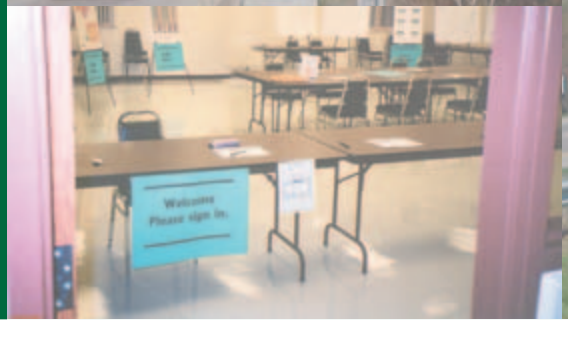
# GREENE 35 CORRIDOR STUDY

***PREPARED FOR:***
***Miami Valley Regional Planning Commission***

mvrpc
MIAMI VALLEY REGIONAL PLANNING COMMISSION
ONE REGION... ONE VISION... ONE FUTURE






**Submitted by:**
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**Team Members**
Parsons Brinckerhoff
Transportation Resources Management
Traffic Safety Analysis Systems & Services

# PLANNING STUDY REPORT

**Prepared for:**

mvrpc
MIAMI VALLEY
REGIONAL PLANNING COMMISSION
ONE REGION... ONE VISION... ONE FUTURE

## Miami Valley Regional Planning Commission

# GRE-35 Corridor Study

**Prepared by:**

M•E COMPANIES

**M•E Companies, Inc.**
**635 Brooksedge Boulevard**
**Westerville, OH 43081**
**614-818-4900**

**With Contributing Team Members:**

**Parsons Brinkerhoff, Inc. • Traffic Resources Management • TSASS • ASC**

# EXECUTIVE SUMMARY

## STUDY PURPOSE

The Miami Valley Regional Planning Commission (MVRPC) commissioned a study to recommend a strategy to convert a section of US 35 in the City of Beavercreek and Beavercreek and Xenia townships, Greene County, Ohio to a limited-access facility. The section of US 35 between North Fairfield Road and the Xenia Bypass currently carries 39,000 vehicles per day, has five at-grade intersections and is the only segment of US 35 between I-75 and West Virginia not presently programmed for conversion to a freeway. Designated a "macro" facility by the Ohio Department of Transportation, US 35 is intended primarily to carry long distance trips. Two previous studies (ODOT, 1982 and MVRPC, 1998) recommended various schemes to convert US 35 to a limited-access facility.

This study followed the first four steps of ODOT's 14-Step Planning Study Process to identify, assess and analyze the transportation problems, evaluate alternative solutions, and explain the benefits and problems for each alternative to MVRPC and ODOT. The process was iterative and incorporated public involvement through an Oversight Committee and Public Involvement meetings.

The purpose of this study was threefold:

1) Recommend an acceptable strategy to convert this section of US 35 to a limited-access facility
2) Address impacts to regional mobility, the local road network and the environment
3) Identify a comprehensive, cost-effective package of transportation solutions meeting the public need and the area's long-term transportation planning goals.

## STUDY GOALS

Study goals focused on recommending one or two interchanges to eliminate the existing at-grade intersections and to provide acceptable Levels of Service on US 35. Additional concerns included:

- Access to US 35
- Impacts to the local road network caused by trips shifted from US 35
- Traffic Safety
- Access to local businesses adjacent to US 35
- Impacts to the environment
- Preservation of open space
- Economic development opportunities and long-term growth issues

Three main needs for the area emerged in the Purpose and Need statement:

- *Travel efficiency* - The 2003 levels of service are at or close to failing at the US 35/Factory Road intersection. The second worst intersection is the US 35 intersection with Valley-Trebein Road. By 2030, US 35 approaches to the signals at

Factory, Orchard Lane and Valley-Trebein will be LOS F.

- *Traffic safety* - This section of US 35 has severe safety problems related to the five at-grade intersections. There is a very distinct crash pattern of rear-end and sideswipe-passing crashes related to stopped or slowing vehicles. The crash rates at all five intersections exceed statewide averages.
- *System linkage* - It has been recognized for more than 20 years that this section of US 35 needs improvement to provide consistent system linkage and free-flow connectivity to promote commerce and provide a safe facility for the traveling public.

There was initial consensus that Shakertown should be extended to Factory Road and that interchanges should be constructed at both Factory and Valley-Trebein Roads. Numerous alternatives were initially considered, including new interchanges at Factory and Valley-Trebein Roads with overpasses and/or cul-de-sac terminations at Alpha Road and Orchard Lane. Two primary configurations with various permutations were evaluated for each interchange location. Local business access at Alpha Road and Orchard Lane was a major concern, especially north of US 35. Following the evaluation of these preliminary alternatives, two alternatives at each area of the study, in addition to the No Build alternative, were advanced for further evaluation. Further evaluation of the alternatives including input from the Oversight Committee and ODOT resulted in the Recommended Alternative. It includes interchanges at Factory Road and Valley-Trebein Road, a US 35 overpass over Orchard Lane, relocation of Shakertown Road and an Alpha Road extension. An extension of Heller Drive to Factory Road is also included. In addition to the elimination of the at-grade intersections on US 35, several local collector roads are recommended for realignment. The total estimated cost is $70 million.

**GRE-35 Corridor Study Final Cost Estimate**

| | Construction | R/W | TOTAL |
|---|---|---|---|
| Shakertown Relocation | $5,700,000 | $1,460,000 | **$7,160,000** |
| Factory /Orchard Connector | By Others | By Others | **By Others** |
| Factory Road Interchange | $18,000,000 | $5,000,000 | **$23,000,000** |
| Valley-Trebein Interchange | $19,900,000 | $1,000,000 | **$20,900,000** |
| Alpha Road Extension | $318,000 | $295,000 | **$613,000** |
| Heller Drive Extension | $3,500,000 | $1,535,000 | **$5,035,000** |
| US 35 Over Orchard Lane | $13,547,000 | $0 | **$13,547,000** |
| **Subtotal** | **$60,965,000** | **$9,290,000** | |
| **Grand Total** | | | **$70,255,000** |

Staged construction is recommended with the local road connections preceding the construction of the Factory Road interchange, Orchard Lane grade separation and the Valley-Trebein interchange. Due to safety concerns, the three signals should be replaced within a very short time period to avoid having only one remaining signal for any length of time.

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**LIST OF EXHIBITS**

**LIST OF EXHIBITS (CONTINUED)**



**LIST OF APPENDICES**

# INTRODUCTION

## BACKGROUND

The Miami Valley Regional Planning Commission (MVRPC) commissioned a study to recommend a strategy for converting a section of US 35 in the City of Beavercreek and Beavercreek and Xenia townships, (in Greene County, Ohio) to a limited-access facility. The section of US 35 between North Fairfield Road and the Xenia Bypass currently has five at-grade intersections and is the only segment of US 35 between I-75 and West Virginia that is not presently programmed for conversion to a freeway. Designated a "macro" facility by the Ohio Department of Transportation (ODOT), US 35 is intended primarily to carry longer distance trips and not to provide closely spaced access points to service adjacent land. Two previous studies (by ODOT in 1982 and MVRPC in 1998) recommended various schemes for converting US 35 to a completely limited-access facility. MVRPC has contracted with the Study Team to update and expand upon these previous efforts.

## STUDY PURPOSE

The purpose of this study was threefold:

1. Recommend an acceptable strategy to convert this section of US 35 to a limited- access facility
2. Address impacts to regional mobility, the local road network and the environment
3. Identify a comprehensive, cost-effective package of transportation solutions meeting the public need and the area's long-term transportation planning goals.

## PROJECT GOALS

The goals for this study focused on recommending solutions to current problems at the existing at-grade intersections and on providing acceptable Levels of Service on US 35. Goals also include addressing the transportation needs and concerns as identified by the project Oversight Committee. When interchange and access control solutions are identified for US 35, the local stakeholders' concerns involve adequate consideration of:

- Access to US 35
- Impacts to the local road network caused by trips shifted from US 35
- Traffic Safety
- Access to local businesses adjacent to US 35
- Impacts to the environment
- Preservation of open space
- Economic development opportunities and long-term growth issues

## PROJECT HISTORY

Previous Studies

Two previous studies (by ODOT in 1982 and MVRPC in 1998) recommended various schemes for converting US 35 to a completely limited-access facility.

*GRE-35 Preliminary Engineering Source Document*

This study, completed by Barrett, Cargo, Withers and Associates in 1982 for ODOT-District 8, considered a number of full interchange options and other improvements for the North Fairfield Road, Factory Road, and North Valley Road Study Areas. The City of Beavercreek and ODOT have since moved forward with constructing an interchange at North Fairfield Road and US 35. It opened to the public in June 2003.

*Access Management Plan for the US 35 Corridor in Greene County, Ohio*

In 1998 the Miami Valley Regional Planning Commission completed a comprehensive study of the US 35 corridor between Beavercreek and Xenia. For the Beavercreek area, new roads, improvements, and access management options were recommended for the following roadways:

- US 35
- Dayton-Xenia Road
- Indian Ripple Road
- Grange Hall Road
- Kemp Road
- North Valley/Dayton-Xenia/Trebein Road
- North Fairfield Road
- Factory Road
- Alpha Road
- Orchard Lane
- North Valley Road
- Heller Road
- New Proposed Parallel Road System (south of US 35)

The new proposed parallel road system is recommended to be a three-lane road. Its functional classification is a Major Collector with a posted speed of 35 miles per hour (mph) within the City of Beavercreek and 45 mph within Beavercreek Township. The new road is assigned to Access Category III.

For the Xenia Area, this study considered full interchange options and other improvements for the West Xenia Interchange, US 42 Interchange, US 68 Interchange, and the Bickett Road Interchange Study Areas. (Only the West Xenia Interchange Study Area overlaps with the GRE-35 Corridor Study Area.) New roads, improvements, and access management options were recommended in the West Xenia Interchange Study Area for the following roadways:

- Fairground Road
- Dayton-Xenia Road
- West Second Street
- Dayton Avenue
- Allison Avenue
- US 35-Business
- Massie Drive
- Progress Drive
- US 68

Problem Areas

Meetings between the study team and the Oversight Committee resulted in goals for this study: eliminate the existing at-grade intersections and providing acceptable Levels of Service (LOS) on US 35. Goals also included addressing the transportation needs and concerns as identified by the project Oversight Committee. Problem areas cited by the project Oversight Committee include:

*1. Access to US 35: Highway Network Considerations*

- Access to US 35
- Factory Road interchange as second Beavercreek access point along US 35
- Airport access
- Interchange spacing along US 35

*2. Travel Safety*

- Existing roadway deficiencies on local roads
- Existing traffic crashes at US 35 intersections
- Future traffic safety problems at US 35 at-grade intersections as traffic volumes increase

*3. Local Road Concerns*

- New connections between local roads to replace access to US 35
- Potential need for capacity improvements on local roads
- Access to Orchard Lane for soccer fields and business traffic
- Local roads for local traffic
- Access management on local roads
- Beavercreek north-south access for vehicles, pedestrians and bicyclists across US 35

*4. Management of Long-Term Growth*

- Management of development at new interchange(s) on US 35
- Compatibility between recommended transportation solutions and local planning
- Preservation of the character of the Alpha Community

Interchange and access control solutions for US 35 will involve adequate consideration of the local stakeholders' concerns, including:

- Access to US 35
- Impacts of access changes to US 35 on the local road networks
- Access to local businesses adjacent to US 35
- Impacts to the environment
- Preservation of open space
- Economic development opportunities and land use issues

Other Considerations

Other considerations include potentially significant environmental impacts. These include, but are not limited to, disproportional impacts on low income or minority populations, wetlands, water quality, threatened and endangered species, air and noise impacts, cultural resources, and hazardous materials.

# STUDY ORGANIZATIONAL STRUCTURE

## SPONSOR

The Miami Valley Regional Planning Commission (MVRPC), the metropolitan planning organization for the greater Dayton, Ohio area, sponsored this study.

## REVIEW AGENCIES

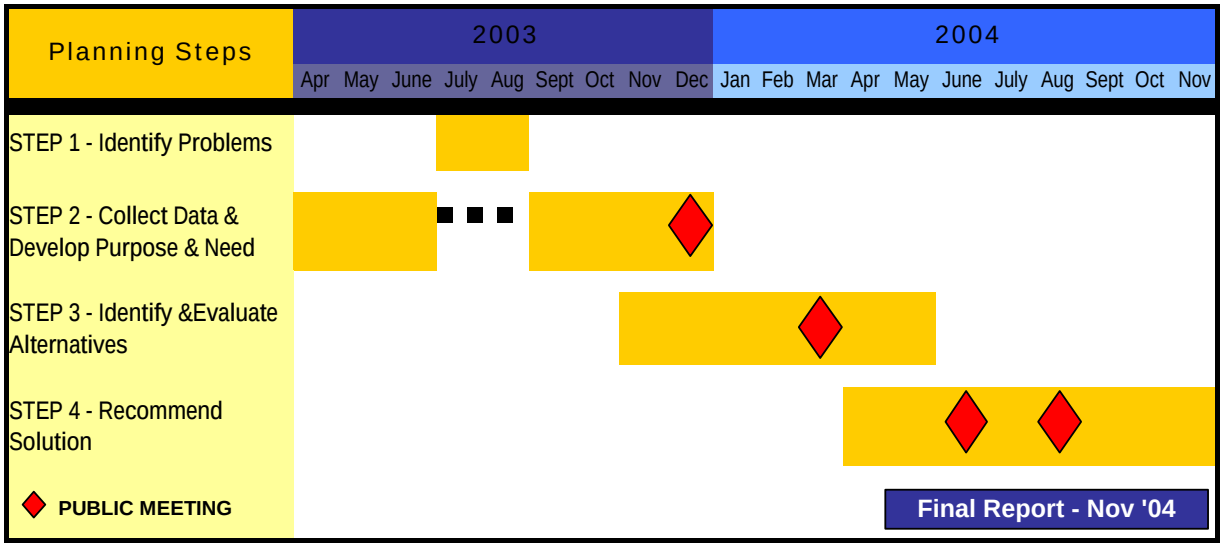
In addition to MVRPC, both the Central and District 8 ODOT offices were review agencies for the results of this study effort. The Federal Highway Administration (FHWA), Ohio Division, located in Columbus, Ohio participated through membership in the review committee.

## STUDY GOVERNANCE

The official organizational structure of this study is shown in Exhibit 1.

## TIMELINE

A timeline of the planning process for the GRE-35 Corridor Study is shown below. The study started in April 2003 with the collection of traffic and crash data for roadways within the study area. It concluded with the submission of the final report in November 2004.



# STUDY AREA

The Study Area for the GRE-35 Corridor Study is shown in Exhibits 2 and 3. The Study Area is located in Greene County, Ohio, along a 4.3-mile section of US 35 between North Fairfield Road and the Xenia Bypass. Logical termini on US 35 were established between North Fairfield Road and the Xenia Bypass because these two roadways are the limits of the US 35 section that is not completely limited-access. Local roads parallel to US 35 were used as north and south boundaries. As a result, North Fairfield Road to the west, Dayton-Xenia Road to the north, the Xenia Bypass to the east, and Indian Ripple Road/Valley Road to the south bound the study area.

# PUBLIC INVOLVEMENT PROCESS

## PUBLIC INVOLVEMENT PLAN

At the beginning of this study, a Public Involvement Plan (PIP) was created to serve as an action plan to involve the public in the study for converting US 35 to a limited-access facility. The PIP included the required elements set forth in MVRPC's then-current public involvement policy and was approved by MVRPC as well as the Oversight Committee.

From the beginning, the PIP was intended to be flexible, recognizing varying degrees of public involvement to meet the needs of the varying interest groups. This flexibility enabled the project team to add stakeholders meetings as necessary and to extend the study by holding two additional Oversight Committee meetings and one additional Public Meeting.

## OVERSIGHT COMMITTEE

MVRPC established an Oversight Committee at the beginning of this study. This group met on a regular basis to help define the study objectives, needs, goals, alternatives and final recommendations.

The Oversight Committee included:

| Member | Representing |
|---|---|
| Don Spang | MVRPC |
| Ken LeBlanc | MVRPC |
| Bob Baronti | MVRPC |
| Bob Geyer | Greene County Engineer |
| Dave Beach | City of Beavercreek |
| Eric Winston | City of Xenia* |
| Carol Graff | Beavercreek Township |
| Hans Jindal | ODOT District 8 |
| Mark Vonder Embse | FHWA |
| Larry Sutherland | ODOT Central Office |
| Dirk Gross | ODOT Central Office |

* Various representatives from Xenia attended in Eric Winston's place.

The Oversight Committee began meeting August 11, 2003 and concluded with the eighth meeting on August 3, 2004. Meeting agendas and minutes are provided in Appendix C.

## PUBLIC INVOLVEMENT PLAN GOALS

The goals of the public involvement plan were to:

- Establish the legitimacy of the GRE-35 Corridor Study.
- Identify and follow ODOT's 4-Step planning and problem-solving process.

- Create early involvement with stakeholders to confirm and clarify the problem, needs and goals of the study.
- Develop a dialogue with stakeholders that will create a clear understanding of the project needs and conclusions.
- Communicate clearly and accurately with the public on the project.
- Be responsive to public comments and concerns; provide feedback when necessary.
- Work towards public consensus on the alternatives identified for further consideration.
- Develop a partnership with the media to ensure accurate reporting of information.

**PUBLIC MEETINGS**

Four public meetings were held during the course of the study. Originally, two or three public meetings were anticipated; however, based upon input from the local businesses, a fourth meeting was added.

| Meeting Date | Number of Attendees | Number of Comment Sheets Submitted |
|---|---|---|
| December 9, 2003 | 29 | 14 |
| March 18, 2004 | 64 | 22 |
| June 17, 2004 | 65 | 6 |
| August 18, 2004 | 73 | 37 |
| Totals | 231 | 79 |

All four public meetings were held at the City of Beavercreek Maintenance Facility due to its central location on Orchard Lane in the study area and amenities. Meetings were well publicized using several communications vehicles. Public notices appeared as paid advertisements in local newspapers, were mailed or hand-delivered to interested parties, libraries, local residents and businesses owners, displayed in public areas and posted on MVRPC's Web site. Prior to each public meeting, exhibits were posted on the Web site for review.

All public involvement meetings were held in an open house-style format. Exhibits were displayed around the perimeter of the room. Attendees were asked to sign in at the entrance and Oversight Committee members and the consultant team wore name tags for identification. Comment sheets were made available at all meetings. Informational handouts were available at the last three meetings (a handout wasn't necessary for the first meeting).

Media coverage about the study included televised interviews for the first three meetings, multiple newspaper articles and a radio interview.

**STAKEHOLDER MEETINGS AND CORRESPONDENCE**

Stakeholder meetings were held as necessary. Three meetings were held with local business representatives and one meeting was held with the Beavercreek Environmental Advisory Committee.

Local business owners expressed concern about how their access to US 35 would change based on closing the at-grade intersections and the recommended treatment at each of the intersections on US 35. Because many of these businesses are located on Orchard Lane or Heller Drive, north of US 35, they were particularly concerned with the loss of access at this intersection.

Correspondence from the offices of Representative Kevin DeWine, Senator DeWine and Congressman Hobson was answered as a result of constituent contact from the business owners.

The following is a summary of the meetings with the local business owners. Please reference Appendix C for additional information.

May 19, 2004:

The owner of Hidy Honda (located on Orchard Lane) invited M•E Companies and MVRPC to a meeting on May 19, 2004, to discuss the study with local businesses that would be impacted by the current proposed alternatives. There was much discussion about how the alternatives impacted businesses on the north side of US 35 differently from those on the south.

June 25, 2004:

This meeting was held after the local business owners had the opportunity to review the alternatives presented at the June 17th public meeting. Hidy Honda presented some thoughts on how Heller Drive could be extended to Factory Road to improve access to businesses located north of US 35. Most of the meeting focused on discussing the pros and cons of these concepts that included considerable park impacts.

After much discussion, two additional concerns emerged:

- Concern that the alternatives will negatively impact traffic to and from the soccer fields.
- Concern that the heavy truck traffic from Phillips Sand & Gravel would use the proposed Factory-Orchard Connector or Dayton –Xenia Road, both of which were viewed as unsafe.

August 12, 2004:

This meeting was held at Phillips Sand & Gravel located on Heller Drive and was called by Eileen Austria of Congressman Hobson's office. Representatives of the study team, MVRPC, local businesses, the soccer field and the Greene County Engineer attended this

meeting. M•E presented a proposed extension of Heller Drive from its present terminus at Alpha Road to Factory Road. The conceptual plan for this extension involved bridging the Beaver Creek, Creekside Bikeway and a roadway in the Beavercreek Township-owned Girl Scout Memorial Park.

September 14, 2000 - Beavercreek Environmental Advisory Committee Meeting

The Beavercreek Environmental Advisory Committee invited M•E to their September 14, 2004 monthly meeting. Six BEAC members as well as the M•E Project Manager for the GRE-35 Corridor Study and an ODOT, District 8 representative attended this meeting. M•E provided an overview of the history of access on US 35 and previous study recommendations. Following a summary of the development of alternatives, the final recommendations package was explained. The group was generally acceptive of the recommendations, especially those related to preservation of the Little Miami River. Concern was expressed about potential impacts to the Girl Scout Memorial Park.

**CAC, TAC AND MVRPC BOARD MEETINGS**

Following MVRPC's protocol for planning studies, M•E made presentations about the GRE-35 Corridor Study to the MVRPC's Citizens Advisory Committee (CAC) and the Technical Advisory Committee (TAC) twice. The Oversight Committee, MVRPC and M•E had initially planned to conclude the study following the June 16th Public Meeting. However, based upon input from the local businesses owners, the study was extended. Consequently, M•E presented to the CAC on June 16th and again on August 18th following each public meeting. Presentations were made to the TAC on June 17th and August 19th. The second round of presentations included a modified recommended alternative with the Heller Drive extension.

The final presentation on this study was to the MVRPC Board on September 2, 2004 at which time the board endorsed the study's recommendations.

# RED FLAG SUMMARY

Date Red Flag Summary Completed: 3-17-03

District: 8

Project Name (County, Route and Section): GRE-USR 35 Study Corridor

City, Township or Village Names(s): City of Beavercreek and Beavercreek Township

PID:

Prepared by: K. Butterworth, K. Burton and J. Espelage, P.E.

ODOT Project Manager: Hans Jindal, P.E.

**GENERAL PROJECT PLANNING INFORMATION**

***Project Description:***

See pages 1-2 Appendix 1- *GRE-USR 35 Study Corridor Existing Conditions Report- Prepared by M•E Companies (November 2003).*

Date Entered into Ellis:

Project Limits: Starting at the US35 bypass of Xenia west to the North Fairfield Rd. interchange

Structures:

| | | | |
|---|---|---|---|
| Bridge Number: | GRE-035-0207 | Structure File Number: | 2900092 |
| Bridge Number: | GRE-035-0227 | Structure File Number: | 2900122 |
| Bridge Number: | GRE-035-0266 | Structure File Number: | 2900149 |
| Bridge Number: | GRE-035-0294 | Structure File Number: | 2900157 |
| Bridge Number: | GRE-035-0383 | Structure File Number: | 2900181 |
| Bridge Number: | GRE-035-0455 | Structure File Number: | 2900211 |
| Bridge Number: | GRE-035-0614 | Structure File Number: | 2900289 |
| Bridge Number: | GRE-035-0654 | Structure File Number: | 2900300 |

Estimated Cost: $70 million

Funding Source(s):

- [ ] Federal
- [ ] State
- [X] Local Miami Valley Regional Planning Commission (MVRPC)
- [ ] Private

Anticipated quarter and Fiscal Year of project award: 2008 - 2011

Project Sponsor: MVRPC

Is local legislation required? [X] Yes [ ] No

Is FHWA oversight required? [X] Yes [ ] No

Is project location on the congestion/safety list? [X] Yes [ ] No

Problem identified by *(indicate document date)*:

- [ ] District Work Plan
- [ ] Congestion Study
- [ ] Safety Study
- [ ] Major New
- [ ] MPO TIP
- [X] MPO LRP 2001
- [X] Access Ohio 1993
- [ ] Other

Are there any other projects in the area (ODOT, local or utility) that might conflict with the project (e.g., a local project on the proposed detour route for the ODOT project, a resurfacing project a year after a 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 project scope?

[X] Yes [ ] No *Specify:* Possible conversion of quarry to parkland

Are there any known public involvement issues?

[ ] Yes [X] No *Specify:* _____
[ ] Yes [X] No *Specify:* _____

***Purpose and Need (Must be a separate document for Major Projects):***
See Appendix 2- *GRE-USR 35 Study Corridor Draft Purpose and Need Report- Prepared by M•E Companies (November 2003).*

**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.

[X] Legal Speed 50

[X] Design Speed 65

[ ] Traffic Data:
Opening Year ADT: _____
Design Year ADT: _____
Design Hourly Volume: _____
Directional Distribution: _____
Trucks (24 Hour B&C): _____
*(Traffic data does not need to be certified for the Design Red Flag Summary.)*

[X] Turning movement traffic counts- See pages 18-30 Appendix 1- *GRE-USR 35 Study Corridor Existing Conditions Report- Prepared by M•E Companies (November 2003).*

[X] Functional Classification:

| | |
|---|---|
| | Interstate, freeway |
| X | Arterial |
| | Collector |
| | Local |

[X] Locale:

| | |
|---|---|
| X | Rural |
| X | Urban |

[ ] National Highway System (NHS):

| | |
|---|---|
| | NHS Routes: |
| | Non-NHS Routes: |

[ ] (3R) Project?
- [ ] Yes
- [X] No

- [X] Aerial mapping
- [ ] Ohio Utility Protection Service (OUPS) Markings
- [X] United States Geological 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 _____
- [X] Tax maps
- [ ] Property deeds
- [ ] Pavement marking log
- [ ] Original construction plans _____
- [ ] Existing right of way plans _____
- [X] Bridge inspection reports
- [ ] Bridge Load Ratings
- [ ] Pile Driving Logs
- [X] Recorded vertical clearances for overpasses and underpasses
- [ ] Old Soil borings
- [ ] Old Geologic reports
- [ ] Pavement Cores
- [ ] Dynaflect Testing
- [ ] Deck Cores
- [X] Maintenance history
- [X] Pavement Condition Ratings (PCR's)
- [ ] County Manager concerns
- [ ] 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: _____

**SITE VISIT:**
A site visit is required for ALL projects.
Date of site visit: 3-02-04 and 3-09-04

**RED FLAG SUMMARY:**
Is a map showing locations of red flag areas attached? [X] Yes [ ] No
(See Exhibit 4)

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

| | | |
|---|---|---|
| ☐ | District Project Manager | Hans Jindal, (513) 933-6594 |
| ☐ | Geometrics | |
| ☐ | Hydraulics | |
| ☐ | Pavements | |
| ☐ | Geotechnical | |
| ☐ | General Roadway | |
| ☐ | Structures | |
| ☐ | Traffic Control | |
| ☐ | Signals | |
| ☐ | Maintenance of Traffic | |
| ☐ | Right of Way/Real Estate | |
| ☐ | Utilities | |
| ☐ | Survey | |
| ☐ | Environmental | Hans Jindal, (513) 933-6594 |
| ☐ | Highway Management | |
| ☐ | Central Office Program Manager | |
| ☐ | ODOT County Manager** | |
| ☐ | District Production Administrator** | |
| ☐ | District Planning and Programming Administrator** | |

** The County Manager, Production Administrator and Planning/Programming Administrator (or qualified representatives) 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) | Mark Vonderembse, (614) 280-6845 |
| ☐ | County Engineer | Robert Geyer (937) 562-7500 |
| ☐ | City Engineer | David Beach (Beavercreek), (937) 427-5513 |
| ☐ | Other local public agency | |
| ☐ | Federal Emergency Management Agency (FEMA) | |
| ☐ | U.S. Army Corps of Engineers (USACE) | |
| ☐ | U.S. Coast Guard | |
| ☐ | Ohio Department of Natural Resources (ODNR) | |
| ☐ | Ohio Environmental Protection Agency (OEPA) | |
| ☐ | Railroad/Railway Company | |
| ☐ | State Historic Preservation Office (SHPO) | |
| ☐ | Metropolitan Planning Organization (MPO) | Don Spang, (937) 223-6323 |
| ☐ | Utility Companies: | (Power) |
| | | (Telephone) |
| | | (Water) |
| | | (Gas) |
| | | (Sanitary) |
| | | (Cable) |
| ☐ | Other | |

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

**ACCIDENT DATA:**
Summarize accident history. Indicate any design features that should be revised to increase safety.

See page 30 Appendix 1- *GRE-35 Study Corridor Existing Conditions Report- Prepared by M•E Companies (November 2003).*

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

| Involvement | Resource | Comments |
|---|---|---|
| [X] Yes [ ] No [ ] Possible | Parkland, nature preserves and wildlife areas *(Name)* | Creekside Reserve, Beavercreek Township Park and Glen Thompson Reserve, John McKeney Soccer Complex |
| [X] Yes [ ] No [ ] Possible | Cemetery *(Name)* | Valleyview Memorial Gardens |
| [X] Yes [ ] No [ ] Possible | Scenic River *(Name)* | Little Miami River |
| [X] Yes [ ] No [ ] Possible | Public Facilities *(Name)* | Greene County Water Treatment plant |
| [ ] Yes [ ] No [X] Possible | Threatened and Endangered Species and/or habitat (e.g., Indiana bat trees, etc.) | |
| [X] Yes [ ] No [ ] Possible | Existing cat tails *(Location)* | Roadside ditches along USR 35 |
| [X] Yes [ ] No [ ] Possible | Existing wet areas *(Location)* | See Exhibit 4 |
| [ ] Yes [ ] No [X] Possible | Streams, rivers and watercourses (*Use designation*) | See Exhibit 4 -Little Miami River (SRW and WWH) and Beaver Creek (WWH) |
| [ ] Yes [ ] No [X] Possible | Historic Building(s) *(Location)* | See Exhibit 4 |
| [ ] Yes [X] No [ ] Possible | Historic Bridge(s) *(Location)* | |
| [ ] Yes [ ] No [X] Possible | Farmland *(Location)* | See Exhibit 4 |
| [ ] Yes [X] No [ ] Possible | Landfill(s) *(Location)* | |
| [ ] Yes [ ] No [X] Possible | Evidence of hazardous materials *(Location)* | See Exhibit 4 |
| [ ] Yes [ ] No [X] Possible | Sensitive environmental justice areas | See Exhibit 4 |
| [ ] Yes [ ] No [X] Possible | Federal Emergency Management Agency (FEMA) floodplains | See Exhibit 4 |
| [ ] Yes [X] No [ ] Possible | Lake Erie Coastal Management Area | |
| [ ] Yes [X] No [ ] Possible | Other environmental issues | |

**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 |
|---|---|---|
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Lane Width (including curve widening) | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Graded Shoulder Width | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Bridge Width | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Structural Capacity | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Horizontal Alignment (including Excessive Deflections, Degree of Curve, Lack of Spirals, Transition/ Taper Rates and Intersection Angles) | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Vertical Alignment (including grade breaks) | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Grades | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Stopping Sight Distance | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Pavement Cross Slopes | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Superelevation (Maximum rate, transition, position) | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Horizontal Clearance | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Vertical Clearance | |

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 |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Does the existing horizontal alignment need to be modified? | Adjustments to side roads at proposed interchange locations |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does the existing vertical alignment need to be modified? | Adjustments to side roads at proposed interchange locations |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does stopping sight distance need to be increased? | Grades adjusted at interchange locations to meet criteria |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does intersection sight distance need to be increased? | Factory Road at US35 |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any hazards in the clear zone? Specify treatment. | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does existing guardrail need to be replaced (e.g., too low, poor condition)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is there sufficient area for guardrail anchor assemblies (E-98 or B-98)? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Does the number of turn lanes appear to be adequate? | Northbound left turn at Factory Road and US35 |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Does the number of through lanes appear to be adequate? | Additional through lanes are not anticipated |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are changes to access control required? | |
| [ ] Yes [ ] No [X] Possible [ ] 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)? | Bikeway along north side of Factory Rd./US35 intersection |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are new mailbox turnouts required? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is there any evidence of accidents due to substandard vertical clearance on overpass structures? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Will an interchange be added or modified? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Do the existing intersection radius returns need to be modified to accommodate larger truck turning movements? | Design criteria will be met. |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does grading need to be upgraded? To what criteria (e.g., clear zone, safety, standard)? | Standard and clear zone on side roads |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any other geometric issues? Describe | |

**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 |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] 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. | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is there evidence of alignment or flow velocity problems (e.g. scour, bank erosions, silting) at culvert entrances or exits? | Minor silting |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there sinkholes or other deterioration in the pavement that would indicate separations in the existing pipes? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Should guardrail over culverts be eliminated with clear zone grading? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Should the existing culverts be replaced? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Should the existing culverts be extended? | Bikeway culvert under Factory Road on north side of US35 will be disturbed during interchange work |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Could materials with long lead times (e.g., large boxes) have an impact on construction schedule? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Does the existing drainage system have an odor that might indicate that it includes septic connections? | |
| [ ] Yes [ ] No [ ] Possible [X] Not Applicable | Is the exposed curb height in existing gutters adequate to contain flow (include height of proposed resurfacing)? | |
| [ ] Yes [ ] No [ ] Possible [X] Not Applicable | Do the existing inlets or catch basins need to be raised to meet proposed grade? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is the project in a FEMA flood zone? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Does the project affect a wetland or waterway (e.g., stream, river, jurisdictional ditch)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is the existing and/or proposed channel alignment compatible with the existing/proposed structure? | |

| | | |
|---|---|---|
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will channel relocation be required? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will Municipal Separate Storm Sewer System (MS4) requirements apply? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will post construction flow requirements be required? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Is there evidence of existing field tiles? | |
| [ ] Yes [ ] No [ ] Possible [X] Not Applicable | Are underdrain outlets functioning properly? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will a new storm sewer outfall be required? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Is ditch cleanout required? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does the drainage work warrant any special maintenance of traffic considerations? | Bridge work for potential interchange |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any other hydraulic issues? Describe. | |

**GEOTECHNICAL ISSUES:**

Indicate if the following geotechnical 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 |
|---|---|---|
| [X] Yes [ ] No [ ] 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)? | Northwest on Trebein Road and Factory road south of US35 |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is there evidence of any embankment or foundation problems (e.g., differential settlement, sag, foundation failures, slope failures, scour, evidence of channel migrations)? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is there evidence of any landslides? | |
| [X] Yes [ ] No [ ] Possible [ ] 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)? | Orchard Lane south |

| | | |
|---|---|---|
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is there evidence of rock strata (e.g., presence of exposed bedrock, rock on the old borings)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is there evidence of active, reclaimed or abandoned surface mines? | Existing Gravel pits and ponds in area |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is there information pertaining to the existence of underground mines? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are soil borings needed for pavement design, foundations (bridge headwall, retaining wall, noise wall) or slopes? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does an undercut appear to be needed? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Should the Office of Geotechnical Engineering be contacted to evaluate the project site? | Several streams and mining sites in area |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any other geotechnical issues? Specify. | |

For projects with geotechnical issues, complete Reconnaissance and Planning Checklist in the Geotechnical Engineering Design Checklists.

**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 |
|---|---|---|
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are pavement cores needed to determine the existing pavement buildup and/or condition? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is the proposed pavement buildup known? (This can further evaluated during subsequent design development.) | |
| [ ] Yes [ ] No [ ] Possible [ ] Not Applicable | Is the existing pavement concrete or asphalt? | Asphalt |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are dynaflect tests available to assess existing pavement condition? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Does the proposed pavement buildup need to be approved by the Pavement Selection Committee? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are joint repairs needed? | |

| | | |
|---|---|---|
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are pressure relief joints needed? | For low roads |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are pavement repairs needed? | |
| [ ] Yes [ ] No [X] Possible [ ] 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 [X] Possible [ ] Not Applicable | Does sidewalk need to be replaced or installed? | Bikeway access |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are new curb ramps needed? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Do truncated domes need to be installed? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is there any work on side roads, service roads or ramps? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are there any special drive treatments or preferences (e.g., concrete for all drive aprons, curved aprons, etc.)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Has the site received repeated resurfacings in recent years? | US35- see GRE-35 Existing Conditions Report |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Does pavement deterioration appear to be caused by drainage or geotechnical problems? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any other pavement issues? Specify. | |

**STRUCTURAL ISSUES:**
Indicate if the following structure 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 |
|---|---|---|
| [ ] Yes [ ] No [ ] Possible [X] Not Applicable | Can the structure be replaced with a prefabricated box culvert or 3-sided box? | |
| [ ] Yes [ ] No [ ] Possible [X] Not Applicable | Does the bridge (including foundation) meet current design loading? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Was the existing structure built according to plan? | |

| | | |
|---|---|---|
| [ ] Yes [ ] No [ ] Possible<br>[X] Not Applicable | Is deck coring needed? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is the deck delaminated? Specify. | |
| [ ] Yes [ ] No [ ] Possible<br>[X] Not Applicable | Is non-destructive testing needed to determine the amount of delamination? | |
| [X] Yes [ ] No [ ] Possible<br>[ ] Not Applicable | Is the bridge deck in good condition? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Has a deck condition survey (Bridge Design Manual, Section 412) been performed? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Are there areas to be patched or repaired on the deck? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is the bridge a good candidate for an overlay? Specify type of overlay if known. | |
| [X] Yes [ ] No [ ] Possible<br>[ ] Not Applicable | Is the bridge rail in good condition? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Has a fatigue analysis been performed on all existing steel members? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Should all fatigue prone details be retrofitted or replaced? Specify. | |
| [X] Yes [ ] No [ ] Possible<br>[ ] Not Applicable | Is the abutment (including backwall) in good condition? Specify location and level of deterioration. | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Are there any noticeable footing problems? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is there any evidence of substructure movement (e.g., settlement)? | |
| [X] Yes [ ] No [ ] Possible<br>[ ] Not Applicable | Are the bearings in good condition? | |
| [ ] Yes [ ] No [ ] Possible<br>[X] Not Applicable | Can the deck joint be eliminated? If not, specify what modifications are necessary. | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Are new approach slabs needed? | |
| [ ] Yes [ ] No [ ] Possible<br>[X] Not Applicable | Can hinges be removed to make the members continuous? | |

| | | |
|---|---|---|
| [ ] Yes [ ] No [ ] Possible<br>[X] Not Applicable | Does existing vertical and horizontal | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is the bridge on a curve, skew or superelevation transition? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is there any evidence that the bridge does not meet hydraulic capacity? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Are there existing sidewalks on or adjacent to the bridge? | |
| [ ] Yes [ ] No [X] Possible<br>[ ] Not Applicable | Will the structure work require any special maintenance of traffic (e.g., closing of roadway for erection of beams, maintenance of waterway traffic, special location of cut line, etc.)? Specify. | Lane closures likely during interchange and overpass construction |
| [X] Yes [ ] No [ ] Possible<br>[ ] Not Applicable | Is the structure in a Federal Emergency Management Agency (FEMA) flood plain? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is there any erosion in the existing channel? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is the foundation exposed due to scour? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Will there be more than 25' of channel relocation? | |
| [ ] Yes [ ] No [X] Possible<br>[ ] Not Applicable | Are there any opportunities to construct the bridge faster (e.g., precast walls, segmental construction)? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Is the bridge over or under a railroad/railway? | |
| [ ] Yes [ ] No [X] Possible<br>[ ] Not Applicable | Does the bridge need to accommodate future additional roadway lanes or railroad tracks? | Factory Road north |
| [ ] Yes [ ] No [X] Possible<br>[ ] Not Applicable | Could materials with long lead times for delivery (e.g., steel beams) have an impact on the construction schedule? | Structural steel for new bridges |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Are there any problems with existing retaining walls? | |
| [ ] Yes [X] No [ ] Possible<br>[ ] Not Applicable | Are there any other structures issues? Specify. | |

**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 |
|---|---|---|
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Do the existing signs need to be replaced due to poor condition? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are there any obvious deviations from requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD)? | Lack of lane use signing. |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is a particular type of pavement marking desired (e.g., paint, epoxy, thermoplastic)? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will pavement planning affect loop detectors? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Will pavement widening affect pole locations? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will resurfacing effect signal height? | |
| [ ] Yes [ ] No [X] Possible [ ] 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)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are there any special pedestrian considerations? | Bikeway crossing north of US35 |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are there any accidents that can be related to existing signal deficiencies (e.g., timing, lack of turn lanes)? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Do turn lane lengths appear to have sufficient storage capacity? | Factory Road north bound left turn |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does the controller need to be upgraded? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Do proprietary materials need to be specified? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Should signs or signal installations be supplemented with lighting? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are any TODS signs present? | |
| [ ] Yes [ ] No [X] Possible [ ] 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 [X] No [ ] Possible [ ] 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 |
|---|---|---|
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Can traffic be detoured? | Detours on side roads likely -short term during non-peak hours |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is the local alternate detour route in good condition? Are there any load limits or bridge width restrictions? | No restrictions |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will the detour route have a detrimental impact on emergency vehicles, school buses or other sensitive traffic? | |
| [ ] Yes [X] No [ ] Possible [ ] 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? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is the existing bridge width sufficient to maintain traffic? | Side road bridges are narrow |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will temporary pavement be required? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Should temporary pavement be retained after project completion? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will the speed limit be lowered by more than 10 mph during construction? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Is the existing shoulder in good enough condition to support traffic during construction? | US 35 only |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does pedestrian traffic need to be maintained? | Bikeway traffic |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will additional width be required on culverts or bridges to maintain traffic? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will a temporary structure/runaround be required? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will a cross over be utilized? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will the road need to be closed for short durations (e.g., 15 minutes for beam erection)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Can drive access be maintained at all times? | |

| | | |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Can trucks make turning movements during construction? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will portable concrete barrier wall obstruct stopping sight distance? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will additional signal heads be needed for drives and/or side roads? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any issues regarding access to the work site? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any issues regarding construction timeframes (e.g., time of day, time limits)? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Have innovative contracting ideas been considered? Specify. | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there specific requirements for maintaining railroad traffic? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Does it appear that the maintenance of traffic will require additional right of way? | Temporary R/W |
| [ ] Yes [X] No [ ] Possible [ ] 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 |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Will there be any work beyond the existing right of way limits? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will major real estate relocation acquisition be involved? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will relocation of residences be involved? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will relocation of businesses be involved? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Does access control need to be revised? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there any obvious encroachments? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Can the number of involved property owners be determined? If so, how many? | |

| | | |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Will temporary parcels be needed (e.g., for drive work)? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Will right of way need to be acquired for an agency other than ODOT (e.g., county, city)? Specify. | Side roads are county and/or township |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will additional right of way be needed for utility relocations? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will right of way need to be acquired for storm sewer outfalls? | |
| [ ] Yes [ ] No [X] Possible [ ] 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? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are there any mineral rights considerations? | Gravel mining in area |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are there any specific property owner concerns? | Car dealerships and/or parks |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will right of way acquisition from a railroad/railway be involved? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Can work agreements be used? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Does the centerline of construction match the centerline of right of way? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Will right of way be acquired for wetland or stream mitigation? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are there any other right of way or survey issues? Specify. | Several large tower line easements |

**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 |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Do existing utilities need to be relocated? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Can utility conflicts be minimized (e.g., by careful placement of storm sewer and underdrains)? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Would the project benefit from subsurface utility engineering (SUE)? | |

| | | |
|---|---|---|
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Are there existing utilities on an existing structure that need to be relocated? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are there any specific utility requirements or concerns? Specify. | Several large tower lines, substation north of US35 |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are there facilities that require a large lead-time to relocate? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Is additional right of way needed to accommodate utility relocations? | |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Are there water or sanitary lines that will be relocated as part of the ODOT contract? | Minor relocations near side roads. |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Are there any other utility issues? Specify. | Many towers in area. Tower at northwest corner of the US35? Factory Rd. could conflict with horizontal and vertical alignments associated with a grade separated intersection. |

**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 |
|---|---|---|
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Will an individual Corps of Engineers/Environmental Protection Agency 404/401 permit be required? | |
| [ ] Yes [X] No [ ] Possible [ ] 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? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Will a Coast Guard permit be required? | |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is review by a local public agency or project sponsor required? Specify. | MVRPC, City of Beavercreek, and Beavercreek Township |
| [ ] Yes [ ] No [X] Possible [ ] Not Applicable | Is Airway/Highway clearance analysis required? | Greene County Airport |
| [X] Yes [ ] No [ ] Possible [ ] Not Applicable | Is Federal Emergency Management Agency (FEMA) approval required? | |
| [ ] Yes [X] No [ ] Possible [ ] Not Applicable | Is railroad/railway coordination required? | |

| | | |
|---|---|---|
| ☐ Yes ☐ No ☒ Possible ☐ Not Applicable | Is State Historic Preservation Office (SHPO) coordination for work involving historic bridges or historic properties required? | |
| ☒ Yes ☐ No ☐ Possible ☐ Not Applicable | Is coordination with ODNR for work involving State Scenic Rivers, State Wildlife Areas or State Recreational Areas required? | |
| ☐ Yes ☐ No ☒ Possible ☐ Not Applicable | Is coordination with any other agency required? (See Location and Design Manual, Figures 1402-2 through Figure 1402-7.) | USFWS, Threatened and Endangered species |

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

| | Design Issue | Comments |
|---|---|---|
| ☒ 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. | Parks and Scenic river, new interchanges/bridges |
| ☐ 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? | Bikeway |
| ☐ 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)? | Airport nearby |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Are there any other concerns? Specify. | |

Based on the responses to the red flag questions, do any of the following need to be modified?

| | Issue | Comments |
|---|---|---|
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Conceptual scope? | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Work limits? | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Probable environmental document type? | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Major/Minor/Minimal classification? | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Schedule? | |
| ☐ Yes ☒ No ☐ Possible ☐ Not Applicable | Budget? | |

# EXISTING AND FUTURE CONDITIONS

## ENVIRONMENTAL AND COMMUNITY CHARACTERISTICS

### Environmental Literature Reviews

Three literature reviews of cultural resources, ecological resources and hazardous materials sites within the GRE-35 Corridor Study area were prepared by the ASC Group, Incorporated. Below is a brief summary of each of these reports.

*Cultural Resources*

Numerous cultural resources that are eligible or likely eligible for the National Register of Historical Places (NRHP) exist in the project area. One building and two historic archaeological sites have been determined eligible. Previous cultural resource surveys have identified a number of properties and sites that may prove to be eligible for inclusion in the NRHP. These resources consist of three buildings, one bridge, six prehistoric archaeological sites, five historic archaeological sites, and nine archaeological sites with both prehistoric and historic components. In addition to these resources, many more have been included in the Ohio Historic Inventory (OHI) and Ohio Archaeology Inventory (OAI), but have not had their eligibility evaluated yet. They include 22 architectural resources and 39 archaeological sites. Furthermore, three cemeteries located in the project area have not been evaluated for listing on the NRHP.

*Ecological Resources*

There were 37 wetlands found to exist within the project area. There are three federally endangered species whose ranges include Greene County. These are the Indiana Bat, the Eastern Massasauga, and the Clubshell mussel. All of the above-mentioned are also included in the Ohio endangered species list. None, however, are documented to exist within the project area boundaries. Within the project area exists one State and National Scenic River, the Little Miami State and National Scenic River, and one Scenic River Access location. The project area contains portions of the 100-year floodplain.

*Hazardous Materials*

The Environmental Site Assessment literature review was completed to determine the presence of hazardous substances within the project area. Historic and present day land use information and regulatory databases were reviewed to identify parcels that may have an impact on alternative selection.

The Environmental Site Assessment literature review identified 12 parcels of concern with regard to alternative selection. If selection of an alternative impacts any of these parcels, additional environmental assessment of the affected parcels will be necessary in later steps. The parcels are:

- Nu-Glo Laboratory, 3465 Dayton-Xenia Road
- M and S Garage and Body Shop, 1025 North Fairfield Road
- Carl Schaefer, 1426 Howell Road

- Waste Management, Inc., Maginn and Glenshaw Roads
- Elano Corp., 2455 Dayton-Xenia Road
- Unknown, Adjacent to 785 Factory Road
- City of Beavercreek, 2260 Dayton-Xenia Road
- Lang Chevrolet, 635 Orchard Lane
- Valley Asphalt Corp., Valley Road
- Systems Technology Systech, 245 North Valley Road
- Greene County Sanitary Engineering, 667 Dayton-Xenia Road
- Armentrout Excavation, 766 Hawkins Road

Socioeconomic Profile

A secondary source literature review was conducted for social and economic resources for the GRE-35 Corridor Study. The corridor study covers portions of the City of Beavercreek, Beavercreek Township, Xenia Township, and City of Xenia (The USGS 7.5" quadrangle maps include Bellbrook and Xenia.) The secondary source literature review considered the following data for the study area:

- Population comparisons and characteristics
- Predominant industries and employment statistics
- Economic Information
- Commuting Patterns
- Agricultural Activity

*Population Comparisons and Characteristics*

As shown in Exhibit 5, Greene County remained at around 30,000 from 1900 to 1940. From 1940 to 1990, Greene County showed a population growth increase up to approximately 140,000. The State of Ohio increased in population from 1900 to 1970 (see Exhibit 6), though after 1970 the State remained steady into 1990 at around 11 million. At the City and Township level in 2000, Beavercreek Township and the City of Beavercreek had around the same size of population at approximately 40,000; the City of Xenia had an approximate population of 25,000; and the smallest population was in Xenia Township at about 6,000 (see Exhibit 7).

Other population characteristics were compared between the State and County, City, and Township levels. As can be seen in Exhibit 7, the State of Ohio, along with the County, two cities, and two townships in the study area are predominately white in 2000. Xenia Township does have a substantial Black/African American population (24%); Beavercreek Township and the City of Beavercreek both have substantial Asian populations (3.2%); and the City of Xenia has a substantial population of two or more races (2.4%). The 1999 percentage of the population below the poverty level in Ohio was 10%. In comparison, Greene County was below this percentage at 8%. The cities and townships in the study were at or below the State percentage with the City of Xenia having the highest percentage at 11%. The 2000 percentage of people with a disability in

Ohio was 17%. Greene County was below this percentage at 14%. The cities and townships in the study were at or below the State percentage.

Exhibit 8 shows the percentage grouping of the population in the study area by age as compared to the State and Greene County. The age group from 25-39 contains the highest percentage of population in the State with the age groups from 40 years old and over having high percentages also. Greene County and the City of Xenia mirror the State's percentages for the most part, though Greene County does have some higher percentages in the younger age groups than the State. The age group containing the highest percentage of the population in Xenia Township was the 18-24 group with the 40 years and older groups also having high percentages. The City of Beavercreek and Beavercreek Township diverge from the State in that the higher age group percentages are in the older age groups. The 25-39 age group does have a high percentage of the population, but the age groups from 40 years and older contain most of the population. In looking at the elderly population in particular, the 2000 State of Ohio percentage of the population over 65 years of age was 13% (Exhibit 9). Greene County was similar to the State at 12%. The cities and townships were also similar to the State.

*Predominant Industries and Employment Statistics*

As shown in Exhibit 10, the highest percentage of the State's population in 1997 worked in the manufacturing industry (24%). The next largest industries were retail trade (16%) and accommodation & foodservices (10%). In comparison, Exhibit 11 shows the employment industry percentages for Greene County. The industry employing the largest percentage of the population in Greene County was retail trade (29%). The next largest industries were professional, scientific, & technical services (17%), accommodation and foodservices (16%), and manufacturing (16%).

In 2000, unemployment for the State of Ohio and Greene County was 5%. Both the City of Beavercreek and Beavercreek Township were lower at three percent. The City of Xenia and Xenia Township were both higher, at six percent and eight percent, respectively (see Exhibit 12).

*Economic Information*

Greene County statistics exceed the state statistics for Median Household Income and Per Capita Income, have a lower percentage of Households Below the Poverty Level, and have a lower percentage of Zero Car Households.

**Economic Information**

| Data Set | Greene County 2000 | Ohio 2000 |
|---|---|---|
| Median Household Income | $48,656 | $40,956 |
| Per Capita Income | $23,057 | $21,003 |
| % Households Below Poverty | 8.5 | 10.6 |
| Zero Car Households | 2,897 (5.2%) | 380,179 (8.6%) |

**Source:** U.S. Census Bureau, Census 2000.

*Commuting Patterns*

Commuting patterns statistics in Greene County are comparable to Ohio statistics, except in the use of public transportation and a larger percentage of people in Greene County walk to work. The average commute time in Greene County is approximately 2.5 minutes shorter than the statewide average.

| Commuting Patterns | | |
|---|---|---|
| Data Set | Greene County 2000 | Ohio 2000 |
| Car, Truck, or Van (alone) | 61,601 (84.4%) | 4,3952,059 (82.8%) |
| Car, Truck, or Van (carpool) | 6,037 (8.3%) | 494,602 (9.3%) |
| Public Transportation (excluding taxicab) | 194 (0.3%) | 110,274 (2.1%) |
| Walked | 2,590 (3.5%) | 125,882 (2.4%) |
| Other Means | 439 (0.6%) | 38,432 (0.7%) |
| Worked at Home | 2,097 (2.9%) | 146,253 (2.8%) |
| Mean Travel Time to Work (min.) | 20.3 | 22.9 |

**Source:** U.S. Census Bureau, Census 2000.

A high percent of the County's population, 44.5%, commutes outside of the County for work, while 34.2% of that population commutes to Montgomery County. In the project area, almost half of the population for the City of Beavercreek and Beavercreek Township commutes outside of the County, and less than 40% of the population for the City of Xenia and Xenia Township commutes outside of the County.

| Out-of-County Commuting | |
|---|---|
| Geographic Location | Percent Commuting Outside of Greene County in 2000 |
| Greene County | 44.5% |
| City of Beavercreek | 49.2% |
| Beavercreek Township | 49.3% |
| City of Xenia | 37.6% |
| Xenia Township | 32.2% |

**Source:** U.S. Census Bureau, Census 2000.

*Agricultural Activity*

Agricultural statistics are similar in Greene County to those in Ohio. The number of full-time farms decreased while the average size of farms increased. Even though the average size of a full-time farm increased, overall land in farms decreased three percent in Greene County and one percent in the state. Market value of agricultural products increased 14 percent in Greene County and 20 percent statewide.

| Agricultural Activity | | | | |
|---|---|---|---|---|
| Data Set | Greene County | | Ohio | |
| | 1992 | 1997 | 1992 | 1997 |
| Number of Farms | 445 | 349 | 34,604 | 31,022 |
| Average Farm Size (acres) | 221 | 233 | 201 | 206 |
| Crops Grown (Top Five Categories) | 1.) Soybeans<br>2.) Corn for grain<br>3.) Nursery and greenhouse crops<br>4.) Hogs and pigs<br>5.) Cattle and calves | 1.) Soybeans,<br>2.) Corn for grain<br>3.) Poultry products<br>4.) Dairy products<br>5.) Nursery and greenhouse crops | | |

**Source:** USDA, Natural Agricultural Statistics Services.

Community and Recreational Services

The study area is composed mainly of commercial, industrial, and residential land uses. A search of the social services; justice, order, and public safety services; churches and schools; sports and recreation; and medical facilities was conducted to locate community resources in the study area. Exhibit 13 shows locations of those resources found in the study area. (These locations are approximate and have not been field verified.)

*Social Services*

Many different social services were identified, including four individual and family social services, five daycares, and one vocational agency. The following justice, public order, and safety services were identified: one fire department. The following churches and schools were identified: two public schools, ten churches and religious groups, and five cemeteries. The following sports and recreational services were identified: five parks. No major medical services were identified in the study area. All of these services are shown and labeled in Exhibit 13.

Within the study area, the Montgomery County Sheriff's Department, Greene County Sheriff's Department, Dayton Police Department, Riverside Police Department, and Beavercreek Police Department provide law enforcement services. The Miami Valley Emergency Management Authority, Beavercreek City Fire Department, Beavercreek Township Fire Department, City of Dayton Fire Department, Riverside Fire Department, Xenia Township Fire Department, and City of Xenia Fire Department provide fire and emergency medical services in the study area. The Cancer Treatment Center, Good Samaritan Hospital, Miami Valley Hospital, Kettering Memorial Hospital, Greene Memorial Hospital, and Wright-Patterson Medical Center also service the study area.

*Festivals and Special Events*

In June, Beavercreek has Ohio Statehood Days, and Xenia has 'Keeping the Tradition' Pow-Wow. In July and August, Xenia has the Greene County Fair. In September, Beavercreek has its Popcorn Festival, and Xenia has the Xenia Old-Fashioned Days.

*Local Culture and Heritage:*
American Indians have lived in Greene County for over 15,000 years. There have been two mound-building cultures, the Hopewell (200 B.C. to 500 A.D.) and the Fort Ancient (1000 A.D. to 1650 A.D.). The Miami tribe inhabited the area until they left in 1763 after the French and Indian War. The Shawnee then took possession after a dispute with the Wyandot and the Mingo. The Shawnee abandoned the area in 1805. The Wyandots followed in 1811. To celebrate this American Indian Heritage, Xenia has the Blue Jacket Outdoor Drama from mid-June through Labor Day, which combines theatre, history, and athleticism. Set during the American Revolution, this epic play chronicles the lives of Ohio's Shawnee Indians, frontier settlers and escaping slaves as they struggle for peace and freedom. Also, the "Keeping the Tradition" Pow Wow is an annual two-day multi-tribal celebration of American Indian culture - dancing, singing, drumming, and arts and crafts. It is held at Caesar's Ford Park Amphitheater in Xenia.

*Outdoor Recreation:*
Greene County has over 30 unique and beautiful parks, reserves and wetlands, totaling almost 2,000 acres. These areas have educational programming and nature hikes, as well as recreation, leisure, wellness, and cultural arts activities. In particular, there is the Little Miami Scenic Bicycle Trail and System. Four trail systems combine to form the Greene Ways Shared Use Trail Systems providing over 40 miles of shared-use trails in Greene County. The Little Miami Scenic Trail is 70 miles of trail running from Milford to Springfield. 15 of those miles are in Greene County. The Creekside Trail is 10.6 miles and connects Xenia to Beavercreek. The Ohio-To-Erie Trail is 8.6 miles and connects Xenia with Cedarville. Kauffman Avenue Bikeway is 4.3 miles and connects downtown Fairborn to the Wright Brothers Memorial Park. There is also a replica of Xenia's 19th century railroad hub where the first three trails converge at Xenia Station.

Narrows Reserve and Nature Center is part of the Greene County Park District in Beavercreek, where there are 162 acres of natural area along the scenic Little Miami River. Activities include a canoe launch and primitive camping by permit. Also in Beavercreek are the Beaver Creek Wetlands and Trails, which are sanctuaries to rare or endangered animal and plant life. Most trails are primitive but a new boardwalk at the Siebenthaler Fen on Fairgrounds Road eliminates the need for special clothing during most of the year.

Xenia also has skydiving opportunities at "Skydive Greene County." Skydive Greene County provides both a tandem skydive and an accelerated free-fall program.

*Local Attractions:*
The *Greene County Historical Society* is an award-winning local organization that has earned a state and national reputation for brining history to life. Located in Xenia, three floors of handicapped-accessible exhibits at the Brantley Carriage House Museum, the authentically restored Victorian Town House, and the historically significant Galloway

Log House tell the Greene County story from prehistoric hunters to Tecumseh to Norman Vincent Peale. Also located in Xenia is the Kil-Kare Speedway. There is NHRA Drag-racing on the quarter mile strip and NASCAR Winston Racing Series stockcar racing on the three-quarter mile oval from April to August.

## EXISTING AND FUTURE LAND USE

### Existing Land Use and Transportation

The section of US 35 within the study area is a major corridor linking Montgomery and Greene Counties and carries significant commuting traffic between these two Counties. Running parallel to US 35 is the Creekside Trail Bikeway, a converted rail-trail that connects to other bikeways in both Dayton and Xenia.

The land use within the study area varies from residential in the Beavercreek/Alpha area on the west to commercial in the Orchard Lane area along both sides of US 35 to rural, undeveloped in the southeastern portion of the study area. The Country Club of the North golf course is located in the southern portion of the study area. The Lewis A. Jackson Regional Airport is located south of US 35 off Valley Road. There are two commercial sand and gravel operations located within the study area. Also located within the study area are two parks along Factory Road north of US 35 and the Glenn Thompson Nature Reserve located adjacent to US 35 and the Little Miami River.

Greene County grew 8.2% between 1990 and 2000 while the number of persons employed both living and working in Greene County increase by 19.2%, indicating that, as a percentage of population, fewer Greene County residents are traveling outside of the county for employment.

The City of Beavercreek is a growing city (13.5% increase from 1990 to 2000) that historically has served as a bedroom community for the greater Dayton area. As Beavercreek has grown in population, there have been two basic impacts to the US 35 Corridor:

1. The need to access US 35 as a means of reaching employment and shopping destinations; and
2. The need to cross US 35 from north to south and vice-versa in order to reach destinations within the greater Beavercreek area.

The soccer fields located south of US 35 just of Orchard Lane are a good example of the expanding community's need to cross US 35 to reach intra-community destinations. The increasing traffic volumes and turning movements on Factory Road at the US 35 intersection are a good example of the community's use of US 35 to reach destinations outside the study area. Beavercreek Township, located between the Cities of Beavercreek

and Xenia, saw a population increase of 17.3% from 1990 to 2000. The township growth rate is faster than that of the City.

The impact on US 35 from increasing development and trips in both Beavercreek and Beavercreek Township is felt primarily in the operation of the traffic signals at Factory Road and Orchard Lane. As turning movements to and from the crossroads increase and as cross traffic increases, green time is redistributed at these signalized intersections. The net result is that an ever-decreasing amount of green time is available for through traffic on US 35. This causes lengthy traffic queues and delays and contributes to the high traffic crash rates that are apparent today along US 35. Both of these items are discussed later in this section.

Future Land Use and Transportation

Both the City of Beavercreek and especially Beavercreek Township are expected to continue to grow over the next two decades. Data from MVRPC indicate that considerable growth is projected in Beavercreek Township both north and south of US 35. As new residents are added to this area, an average of 10 trip-ends per day per single-family dwelling unit will be added to area roadways. Many of these trips will use US 35 to leave the study area while other trips will simply be to destinations on the other side of US 35. There will be increased turning movements to and from the crossroads, especially Shakertown, Factory and Valley/Trebein, as the population and trips increase. Unless capacity is added to US 35 and/or the crossroads or unless access changes are made to US 35, the impact on US 35 from population increases within and adjacent to the study area will be a continued degradation of the green time available to serve through motorists on US 35 and a continued rise in the traffic crashes that occur within the study area.

## TRANSPORTATION NETWORK

Study Area Roadways

Exhibit 3 shows the main roadways within the Study Area. A brief description of each of the roadways is listed below:

US 35

US 35 runs east-west through the study area and is a four-lane Principal Arterial with 1998 average daily traffic (ADT) ranging from 36,400 vehicles per day (vpd) just east of I-675 to 31,400 vpd just east of North Fairfield Road. Just west of Factory Road, the 1998 ADT is 31,300 vpd and is 28,100 vpd just east of North Valley Road.

INDIAN RIPPLE ROAD

Indian Ripple Road runs east-west through the study area, and is a two-lane Minor Arterial east of Sylvania Drive and a four-lane Principal Arterial to the west. Its 1998 ADT ranges from 28,000 vpd at I-675 to 7,000 vpd just east of North Fairfield Road. Just west of Alpha-Bellbrook Road, the 1998 ADT is 6,600 vpd and is 7,000 vpd at Upper Bellbrook Road.

NORTH FAIRFIELD ROAD

North Fairfield Road runs north-south through the study area. It is classified as a Minor Arterial. An interchange between North Fairfield Road and I-675 was recently completed and opened to traffic in June 2003. The posted speed is 35 mph between Shakertown Road and Dayton-Xenia Road

SHAKERTOWN ROAD

Shakertown Road runs east-west through the study area and is a two-lane Urban Collector with 1998 ADT ranging from 3,900 vpd at I-675 to 6,900 vpd at US 35.

HANES ROAD

Hanes Road runs north-south through the study area and is a two-lane Urban Collector. Its 1998 ADT is 4,900 vpd between Kemp Road and Dayton-Xenia Road.

FACTORY ROAD

Factory Road runs north-south within the study area. It is currently a two-lane undivided roadway and is functionally classified as an Urban Collector. The posted speed is 35 mph south of US 35 and 40 mph north of US 35. It has an ADT of 4,000 vpd.

ORCHARD LANE

Orchard Lane is functionally classified as an Urban Local Road. Orchard Lane has two traveling lanes until it widens to three lanes north of Heller Road. Orchard Lane has a posted speed of 35 mph.

Beaver Valley Road

Beaver Valley Road runs north-south through the study area and is a two-lane Urban Collector where the ADT ranges from 1,900 vpd just south of Fairground Road to 3,600 vpd just north of Dayton-Xenia Road.

GRANGE HALL ROAD

Grange Hall Road runs north-south through the study area and is a Minor Arterial north of Research Boulevard and an Urban Collector south of Research Boulevard. Its 1998 ADT ranges between 8,700 vpd at Kemp Road to 5,100 vpd at Indian Ripple Road.

RESEARCH BOULEVARD

Research Boulevard runs east-west through the study area and is a four-lane Minor Arterial. Its 1998 ADT ranges from 7,100 vpd at I-675 to 5,200 vpd at US-35.

I-675

I-675 runs north-south along the western edge of the study area. It is a six-lane Interstate Principal Arterial where the 1998 ADT ranges from 59,000 vpd at US-35 to 57,000 vpd at Indian Ripple Road.

ALPHA ROAD/ALPHA-BELLBROOK ROAD

Alpha Road is a two-lane undivided roadway. It has a posted speed of 25 mph and a functional classification of Urban Local. Alpha-Bellbrook Road runs north-south through the study area and is a two-lane Urban Collector where the ADT ranges from 3,100 vpd at Factory Road to 1,400 vpd just south of Indian Ripple Road.

Fairground Road

Fairground Road runs east-west through the study area and is a two-lane Minor Rural Collector from Beaver Valley Road to Hilltop Road. The ADT is 1,400 vpd.

Trebein Road

Trebein Road runs north-south through the study area and is a two-lane Major Rural Collector where the ADT ranges from 3,100 vpd just north of Fairground Road to 2,700 vpd just south of Ankeny Road.

North Valley Road
North Valley Road runs north-south within the study area. It is a two-lane undivided roadway, which is functionally classified as a Major Rural Collector. It has a posted speed of 55 mph along its entire 2.7-mile length between Upper Bellbrook Road and Dayton-Xenia Road. Its ADT ranges between 3,400 vpd north of US 35 to 2,800 vpd south of US 35.

Heller Road
Heller Road is a two-lane undivided road. It serves as a frontage road for the businesses along US 35. It has a functional classification of Heller Road as Urban Local and a posted speed of 25 mph.

DAYTON AVENUE
Dayton Avenue is a two-lane undivided roadway. It is functionally classified as an Urban Minor Arterial. The posted speed is 25 mph between Allison Avenue and Sheelin Road, 35 mph between Sheelin Road and the north part of Richard Drive, and 45 mph west of the north part of Richard Drive. This street has a three-lane cross section between Allison Avenue and Poe Lane.

US-35 Business
US-35 Business is a four-lane divided highway with a grass median. It is functionally classified as an Urban Principal Arterial. The posted speed is 50 mph.

Dayton-Xenia Road
Dayton-Xenia Road runs east-west through the study area. It is a two-lane undivided roadway, which is situated parallel to US 35 and functions as an Urban/Rural Minor Arterial. It has a posted speed of 45 mph on the section between Factory Road and Whitey Marshall Drive and 55 mph on the section between Whitey Marshall Drive and North Valley Road. Its 1998 ADT ranges from 13,500 vpd at I-675 to 15,700 vpd just east of North Fairfield Road. Just east of Hanes Road, the 1998 ADT is 6,600 vpd and is 4,500 vpd at Trebein Road.

WEST SECOND STREET
West Second Street is a three-lane road for most of its length. It is functionally classified as an Urban Minor Arterial. The posted speed is 25 mph between Allison Avenue and Rockwell Drive, 35 mph between Rockwell Drive and Progress Drive, and 45 mph from Progress Drive to the west.

Allison Avenue
Allison Avenue is a three-lane road with two traveling lanes and a median turning lane. The posted speed is 25 mph. It is functionally classified as an Urban Collector.

PROGRESS DRIVE
Progress Drive is a three-lane road with a median turning lane. The posted speed is 35 mph. It is functionally classified as Urban Local.

## Existing Pavement Conditions

### *Data Collection*

In order to adequately evaluate potential solutions to any highway problem it is necessary to develop an accurate representation of the existing roadway conditions. Towards this goal, a desktop review was conducted to collect and review information from available relevant databases.

### *Pavement Condition Ratings (PCR)*

The following table summaries the most recent ODOT pavement ratings. These ratings are based on detailed visual inspection of the conditions of the pavement. The pavement is evaluated in terms of severity and extent of distress. A deduction factor is assigned for

each item of distress and subtracted from a base score of 100 points. For example, pavement considered in perfect condition would receive a PCR of 100.

| District | County Code | Route | Direction | Log Begin | Log End | PCR | Date |
|---|---|---|---|---|---|---|---|
| 8 | GRE | 35 | WB | 1.87 | 2.39 | 94 | 4/23/03 |
| 8 | GRE | 35 | EB | 1.87 | 2.39 | 97 | 4/23/03 |
| 8 | GRE | 35 | WB | 2.39 | 7.26 | 91 | 4/23/03 |
| 8 | GRE | 35 | EB | 2.39 | 7.26 | 91 | 4/23/03 |

Pavement standards, as defined by ODOT, indicate that pavements with a PCR of 65 or lower are considered deficient. This data indicates that the pavement in this study area ranges from a PCR of 91 to a PCR of 97. Therefore, no section in this study area is considered deficient.

*Maintenance Records and Maintenance Quality Survey Information*

The most recent Traffic Maintenance System (TMS) data has been reformatted from raw data provided by the Ohio Department of Transportation, Office of Maintenance Administration. The roadway maintenance activities on GRE- 35 include sign and pavement maintenance and inspection, pothole patching, underdrain maintenance, roadway patrol, traffic control, engineering and inspection services. Bridge maintenance activities on GRE-35 at mileposts 0.08, 0.55, 0.74 and 1.07 include bridge inspection and cleaning and bridge deck repair. This information is summarized in the following table:

| Date | Roadway | From Milepost | To Milepost | Maintenance Description |
|---|---|---|---|---|
| **Roadway Maintenance** | | | | |
| 01/18/02 | GRE 35 | 1 | 15 | Sign-Flat Sheet Maintenance |
| 02/01/02 | GRE 35 | 0.3 | 0.3 | Pothole Patching |
| 02/01/02 | GRE 35 | 0 | 0.3 | Pothole Patching |
| 02/04/02 | GRE 35 | 1 | 1 | Pothole Patching |
| 02/05/02 | GRE 35 | 1 | 1 | Pothole Patching |
| 02/06/02 | GRE 35 | 1 | 1 | Filling and Sealing Cracks |
| 02/06/02 | GRE 35 | 0.5 | 1 | Traffic Control |
| 02/19/02 | GRE 35 | 0 | 25 | Sign-Flat Sheet Maintenance |
| 02/20/02 | MOT 35 | 17.97 | 21.03 | Daytime Inspection of Signs, etc. |
| 02/20/02 | GRE 35 | 0 | 25 | Daytime Inspection of Signs, etc. |
| 02/21/02 | MOT 35 | 16.42 | 18.07 | Daytime Inspection of Signs, etc. |
| 02/25/02 | MOT 35 | 19.7 | 21.03 | Daytime Inspection of Signs, etc. |
| 03/12/02 | GRE 35 | 0 | 25 | Daytime Inspection of Signs, etc. |
| 03/22/02 | GRE 35 | 0.3 | 0.3 | Pothole Patching |
| 03/25/02 | GRE 35 | 0.3 | 0.4 | Pothole Patching |
| 03/27/02 | GRE 35 | 0 | 25 | Daytime Inspection of Signs, etc. |
| 04/03/02 | GRE 35 | 0 | 25.5 | Sign-Flat Sheet Maintenance |
| 04/04/02 | GRE 35 | 0.2 | 0.2 | Pothole Patching |
| 04/19/02 | GRE 35 | 1 | 5 | Undermain Maintenance |
| 05/08/02 | GRE 35 | 0.3 | 0.3 | Pothole Patching |

| Date | Roadway | From Milepost | To Milepost | Maintenance Description |
|---|---|---|---|---|
| **Roadway Maintenance** | | | | |
| 05/09/02 | GRE 35 | 0.3 | 0.3 | Pothole Patching |
| 05/09/02 | GRE 35 | 1 | 25 | Sign-Flat Sheet Maintenance |
| 05/10/02 | GRE 35 | 0.08 | 0.08 | Field Work |
| 05/15/02 | GRE 35 | 0.3 | 0.3 | Pothole Patching |
| 06/19/02 | GRE 35 | 0 | 25.5 | Sign-Flat Sheet Maintenance |
| 06/19/02 | GRE 35 | 1 | 1 | Daytime Inspection of Signs, etc. |
| 06/21/02 | GRE 35 | 0 | 0 | Sign-Flat Sheet Maintenance |
| 06/24/02 | GRE 35 | 0 | 25 | Roadway Patrol |
| 06/25/02 | GRE 35 | 0.8 | 0.5 | Cleaning Pavement |
| 07/30/02 | GRE 35 | 0.5 | 0.5 | Sign-Flat Sheet Maintenance |
| 07/31/02 | GRE 35 | 0 | 25 | Sign-Flat Sheet Maintenance |
| 08/07/02 | GRE 35 | 0 | 0.5 | Traffic Control |
| 08/11/02 | GRE 35 | 0.03 | 0.03 | Traffic Control |
| 08/12/02 | GRE 35 | 0 | 0.5 | Traffic Control |
| 09/17/02 | MOT 35 | 16.89 | 17 | Side-Mounted Sign Maintenance |
| 10/07/02 | GRE 35 | 0 | 25 | Daytime Inspection of Signs, etc. |
| 10/23/02 | GRE 35 | 0 | 25 | Cleaning and Reshaping Ditches |
| 11/22/02 | GRE 35 | 0 | 25 | Traffic Control |
| 12/12/02 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 01/09/03 | GRE 35 | 0 | 25 | Ground-Mounted Flatsheet Sign Maint |
| 01/28/03 | GRE 35 | 0 | 25 | Roadway Patrol |
| 01/30/03 | GRE 35 | 0 | 14.48 | Inspection of Signs, Markings, etc. |
| 02/04/03 | GRE 35 | 0 | 22 | Inspection of Signs, Markings, etc. |
| 02/13/03 | GRE 35 | 0 | 15 | Inspection of Signs, Markings, etc. |
| 02/17/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 02/18/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 02/19/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 02/19/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/20/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/20/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 02/20/03 | GRE 35 | 0 | 8.26 | Inspection of Signs, Markings, etc. |
| 02/23/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/24/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/25/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/25/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 02/26/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/27/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 02/27/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 02/28/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/02/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/03/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/04/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/04/03 | GRE 35 | 1 | 1 | Ground-Mounted Flatsheet Sign Maint |
| 03/05/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/06/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/07/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |

| Date | Roadway | From Milepost | To Milepost | Maintenance Description |
|---|---|---|---|---|
| **Roadway Maintenance** | | | | |
| 03/10/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 03/10/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/10/03 | GRE 35 | 0 | 15 | Inspection of Signs, Markings, etc. |
| 03/11/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 03/12/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/12/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 03/12/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 03/13/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/13/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 03/14/03 | MOT 35 | 19.29 | 19.29 | Construction Inspection Service |
| 03/14/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 03/17/03 | MOT 35 | 19.29 | 19.29 | Engineering Service |
| 03/17/03 | GRE 35 | 0 | 25 | Ground-Mounted Flatsheet Sign Maint |
| 03/19/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 03/26/03 | GRE 35 | 0 | 25 | Ground-Mounted Flatsheet Sign Maint |
| 04/05/03 | GRE 35 | 0 | 0 | Construction Activities |
| 04/07/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 04/11/03 | GRE 35 | 0 | 23 | Inspection of Signs, Markings, etc. |
| 04/19/03 | GRE 35 | 0 | 0 | Construction Activities |
| 05/02/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 05/03/03 | GRE 35 | 0 | 0 | Construction Activities |
| 05/09/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 05/20/03 | MOT 35 | 17.5 | 17.5 | Traffic Control |
| 05/20/03 | MOT 35 | 17 | 18 | Traffic Control |
| 05/21/03 | GRE 35 | 0 | 0 | Inspection of Signs, Markings, etc. |
| 05/27/03 | GRE 35 | 0 | 25 | Inspection of Signs, Markings, etc. |
| 06/02/03 | MOT 35 | 19 | 20 | Traffic Control |
| **Bridge Maintenance** | | | | |
| Various Milepost Locations | | | | |
| 02/08/02 | GRE 35 | 0.08 | 0.55 | Bridge Inspection |
| 02/22/02 | GRE 35 | 0.74 | 4.55 | Bridge Inspection |
| 05/31/02 | GRE 35 | 0.08 | 24.5 | Bridge Inspection |
| 09/27/02 | GRE 35 | 0 | 8 | Bridge Inspection |
| 02/06/03 | GRE 35 | 0.08 | 1.75 | Bridge Inspection |
| 04/01/03 | GRE 35 | 0 | 22.11 | Bridge Inspection |
| Milepost 0.08 | | | | |
| 01/28/02 | GRE 35 | 0.08 | 0.08 | Bridge Inspection |
| 05/30/02 | GRE 35 | 0.08 | 0.08 | Bridge Cleaning |
| 08/07/02 | GRE 35 | 0.08 | 0.08 | Bridge Deck Repair |
| 08/09/02 | GRE 35 | 0.08 | 0.08 | Bridge Deck Repair |
| 08/10/02 | GRE 35 | 0.08 | 0.08 | Bridge Deck Repair |
| 08/19/02 | GRE 35 | 0.08 | 0.08 | Bridge Inspection |
| 02/05/03 | GRE 35 | 0.08 | 0.08 | Bridge Inspection |
| Milepost 0.55 | | | | |
| 01/28/02 | GRE 35 | 0.55 | 0.55 | Bridge Inspection |
| 01/29/02 | GRE 35 | 0.55 | 0.55 | Bridge Inspection |

| Date | Roadway | From Milepost | To Milepost | Maintenance Description |
|---|---|---|---|---|
| **Roadway Maintenance** | | | | |
| 02/07/02 | GRE 35 | 0.54 | 0.54 | Bridge Inspection |
| 05/17/02 | GRE 35 | 0.54 | 0.54 | Bridge Cleaning |
| 01/31/03 | GRE 35 | 0.55 | 0.55 | Bridge Inspection |
| 03/24/03 | GRE 35 | 0.54 | 0.54 | Bridge Inspection |
| Milepost 0.74 | | | | |
| 01/29/02 | GRE 35 | 0.74 | 0.74 | Bridge Inspection |
| 02/05/03 | GRE 35 | 0.74 | 0.74 | Bridge Inspection |
| Milepost 1.07 | | | | |
| 01/29/02 | GRE 35 | 1.07 | 1.07 | Bridge Inspection |
| 02/06/02 | GRE 35 | 1.07 | 1.07 | Bridge Inspection |
| 05/10/02 | GRE 35 | 1.07 | 1.07 | Bridge Cleaning |
| 02/05/03 | GRE 35 | 1.07 | 1.07 | Bridge Inspection |
| 03/18/03 | GRE 35 | 1.07 | 1.07 | Bridge Inspection |

*Repairs*

The most recent pavement repairs include the following sections:

| 1996 GRE 35, Sections 1.17 through 9.57 | | |
|---|---|---|
| **Layer Number** | **AC Overlay Without Repair** | **Pavement Type Added** |
| Layer 1 | 1.25 in | 446 AC SC |
| Layer 2 | 1.75 in. | 446 AC SC IC |
| Layer 3 | 2.50 in. | 301 BIT |

*AC – Asphalt Concrete* *IC – Intermediate Course* *SC – Surface Course* *BIT -Bituminous*

*Planned Improvements*

The following table list those projects included in ODOT's District Multi-year Work Plan-2002 Submittal:

| Project | PID | Length | Category | Treatment |
|---|---|---|---|---|
| GRE-35-7.26 | 24945 | 5.61 | Miscellaneous | Signing/urban freeway reference makers |

Existing Bridge Conditions

The following data is a summary of information collected from ODOT Bridge Inventory and Bridge Inspection reports:

| Stationing on GRE 35 | Structure Type | Length in Ft./ Number of Spans | Feature Intersected | Sufficiency Rating | General Appraisal & Operational Status | Last Inspection Date |
|---|---|---|---|---|---|---|
| 2.07 | Steel Beam Simple | 77/1 | Over: Ramp=S835*E-US35*W | 84 | 7 A | 02/06/02 |
| 2.27 | Steel Beam Continuous | 111/2 | Over: Little Beaver Creek | 85 | 7 A | 02/06/02 |

| Stationing on GRE 35 | Structure Type | Length in Ft./ Number of Spans | Feature Intersected | Sufficiency Rating | General Appraisal & Operational Status | Last Inspection Date |
|---|---|---|---|---|---|---|
| 2.66 | Steel Beam Continuous | 195/2 | Under: North Fairfield Road | IDA | NA | NA |
| 2.94 | Steel Culvert filled | 21/1 | Over: Trib. Little Beaver Creek | 70 | 7 A | 02/06/02 |
| 3.83 | Steel Culvert filled | 10/1 | Over: Trib. Little Beaver Creek | 70 | 7 A | 02/07/02 |
| 4.55 | Steel Beam Continuous | 133/3 | Over: Beaver Creek | 85 | 6 A | 02/07/02 |
| 6.14 | Pre-stressed concrete girder continuous | 225/3 | Over: Little Miami River | 85 | 7 A | 02/07/02 |
| 6.54 | Concrete culvert filled | 18/2 | Over: Trib. Little Miami | 43 FO | 7 A | 02/07/02 |

IDA=Insufficient Data for Analysis (inspection report has not been done yet; structure too new)

SD= Structurally Deficient

FO= Functionally Obsolete

*As of 6-10-03*

Sufficiency rating is a measure of a bridge's overall condition, based on regular required inspections. The rating is used to determine when a bridge is eligible for rehabilitation or replacement. A new bridge, for instance, would have a sufficiency rating of 100. A sufficiency rating of less than 50 qualifies a bridge replacement using federal funds.

Bridges are structurally deficient if they have been restricted to light vehicles, require immediate rehabilitation to remain open, or are closed. Bridges are functionally obsolete if they have deck geometry, load carrying capacity, clearance or approach roadway alignment that no longer meet the criteria for the system of which the bridge is a part.

Of the eight bridges listed above, 12 percent (one of eight) are listed as deficient. In this inventory 12 percent (one of eight) is listed as functionally obsolete and zero percent (zero of eight) are listed as structurally deficient. This compares to the state average of 17 percent deficient (13 percent functionally obsolete and four percent structurally deficient, as listed in the U.S. Department of Transportation web page *Deficient Bridges by State and Highway System.*

General appraisal and operational status is a two part item describing the general, overall condition of the bridge and the operational status of the bridge. The general appraisal is based on the existing condition of the bridge compared to its as-built condition. Load carrying capacity is not used in evaluating general condition. The fact that a bridge was designed for less than current legal loads may be posted, but it will have no influence upon the condition ratings.

The composition of the eight bridges listed is as follows: 75 percent (six of eight) received a general appraisal rating of seven, 12 percent (one of eight) received a general appraisal rating of six, and one bridge did not have a general appraisal rating. The functionally obsolete structure received a rating of seven. (Percentages were rounded to the nearest whole number.) The following table describes General Appraisal and Operational Status codes used (as listed in the "Bridge Inspection Manual", 2001, Ohio Department of Transportation).

| General Appraisal Codes | |
|---|---|
| **Code** | **Description** |
| 9 | As built condition. |
| 8 | Very good condition – no problems noted. |
| 7 | Good condition – some minor problems. |
| 6 | Satisfactory condition – structural elements show some minor deterioration. |
| 5 | Fair condition – all primary structural elements are sound, but may have minor section loss, cracking, or spalling. Secondary elements may have significant deterioration. |
| 4 | Poor condition – advanced section loss, deterioration, or spalling. |
| 3 | Serious condition – loss of section, deterioration, or spalling have seriously affected primary structural components. Local failures or cracks in concrete or both may be present. |
| 2 | Critical condition – advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present. Bridge should be closed or closely monitored, until corrective action is taken. |
| 1 | "Imminent" failure condition – major deterioration or section loss present structural components. Bridge is closed to traffic but corrective action may put back in light service. |
| 0 | Failed condition – out of service – beyond corrective action. |

| Operational Status Codes | |
|---|---|
| **Code** | **Description** |
| A | Open, no restriction. |
| B | Open, posting recommended but not legally implemented (all signs not in place). |
| D | Open, would be posted or closed except for temporary shoring, etc. to allow for unrestricted traffic. |
| E | Open, temporary structure in place to carry legal loads while original structure is closed and awaiting replacement or rehabilitation. |
| G | New structure not yet open to traffic. |
| K | Bridge closed to all traffic. |
| P | Posted for load-carrying capacity restriction (may include other restrictions). |
| R | Posted for other than load-carrying capacity restriction (speed, number of vehicles on bridge, etc.). |
| X | Bridge closed for reasons other than condition or load-carrying capacity. |

**Source:** ODOT, Office of Structural Engineering, Bridge Maintenance Manual.

## Existing and Future Traffic Volume Data

In order to obtain an accurate representation of normal weekday traffic within the study area, data was collected on Tuesdays, Wednesdays, or Thursdays during April 2003. To determine the Average Daily Traffic (ADT) on the major roadways within the study area,

machine counts were used to collect 24 hours of volume counts. Appendix B contains printouts of the manual and machine counts. Exhibit 14 shows the 2003 ADT results for major roads within the study area.

Manual traffic counts of turning movement volumes at signalized and major un-signalized intersections were taken from 7:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m. during normal weekdays. Each intersection in the study area had specific weekday hours that experienced the highest volume of traffic between 7:00 a.m. and 9:00 a.m. in the morning and 3:00 p.m. and 6:00 p.m. in the evening. The morning and evening regional peak hours that best represent the entire study area were selected. The regional weekday AM and weekday PM peak hours are from 7:15 a.m. to 8:15 a.m. and 4:45 p.m. to 5:45 p.m., respectively. Exhibits 15 and 16 show the weekday peak-hour traffic volumes for the AM and PM periods.

Peak period volumes for the 2030 Horizon Year were calculated by applying growth factors to the 2003 peak hour volumes at each intersection. The 2030 MVRPC regional travel demand model output (Exhibit 17) for the study area was used as a guide in selecting the growth factors. However, much of the traffic growth, which was forecasted by the model to occur between 1995 and the 2030 horizon year, has apparently occurred during the first eight years. The calculated 1995 to 2003 rate of growth along the US 35 Corridor is approximately 2.5 percent to 2.8 percent per year. The model's horizon year volumes would allow approximately 0.45 percent growth per year (straight line) for the remaining years from 2003 to 2030. This is significantly less than the present growth rate within the corridor. After considering the model output, present growth rate and the capacity of existing US 35 to carry through traffic, the study team selected a 1.0 percent growth rate (compounded) for the 2003 to 2030 period. This rate was selected because it results in through traffic volumes on US 35 that are the maximum that could be handled by the US 35 and Factory Road signalized intersection. The Factory Road intersection is the critical point along the US 35 Corridor because it has the highest crossroad traffic volumes for US 35. With upwards of 950 vehicles per hour per lane on US 35, this growth rate resulted in 2030 volumes that calculated to severe LOS F on US 35. Most motorists would probably tolerate the resulting delay but if the delay were to increase beyond this level, some motorists would likely select another route. Therefore, a one percent annual growth rate to the year 2030 represents the maximum practical through volumes that could be handled by US 35, assuming the continued existence of the traffic signals and especially the signal at Factory Road. A 1.5 percent annual growth rate was used for local roads within the study area based on analysis of the present and expected future growth and better existing levels of service at local road intersections. Exhibits 18 and 19 show the calculated 2030 AM and PM peak period volumes used in the future Level of Service calculations.

Level of Service Calculations

*Highway Capacity Software 2000 (HCS2000)* was used to calculate both 2003 and 2030 Levels of Service for the 17 intersections within the study area. These intersections are located in three corridors within the Study Area:

- US 35 Corridor
- Dayton-Xenia Road Corridor, located north of US 35
- Indian Ripple/Upper Bellbrook Road Corridor, located south of US 35

Exhibits 14-16 and 18-19 show the *HCS2000* results for 2003 and 2030, respectively.

The capacity analysis results provided level of service (LOS) data. LOS is a qualitative measure of the effect of traffic flow factors, such as travel time, interruptions, freedom to maneuver, driver comfort, convenience, and (indirectly) safety and operating cost. It is defined in the *Highway Capacity Manual* (Transportation Research Board, 1994) as ranging from *A* to *F*. LOS A is the best rating, indicating free flow conditions. LOS B represents essentially free flow conditions. LOS C indicates nearly free flow speeds, but freedom to maneuver is beginning to be restricted. At LOS D, travel speeds are reduced and the ability to maneuver is limited. At LOS E, the roadway is near capacity and traffic flow is unstable. At LOS F, the traffic volumes exceed the roadway's capacity, which may result in queues and stop-and-go conditions. LOS was calculated for all intersections in the study area.

*US 35 Corridor*

This section of US 35 includes intersections with Shakertown Road, Factory Road, Alpha Road, Orchard Lane and Trebein Road-Valley Road. US 35 within this area is a four-lane divided, controlled access facility with separate turn lanes at intersections. The 2003 ADT ranges from 33,000 west of Factory Road to 39,100 between Factory Road and Alpha Road. The unsignalized intersection of Orchard Lane and Heller Road is included in this corridor. All unsignalized intersections were assumed to remain unsignalized in 2030.

US 35 & Shakertown Road – Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | B | D | B | D |
| | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | LTR | F | F | F | F |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | F | F | F | F |
| | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | LTR | F | F | F | F |

US 35 & Factory Road – Signalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | F | F | D | F | F | F |
| | T | D | F | | | | |
| | R | C | C | | | | |
| Westbound | L | E | F | F | F | | |
| | T | F | F | | | | |
| | R | C | C | | | | |
| Northbound | LTR | F | F | F | F | | |
| Southbound | L | C | C | C | D | | |
| | TR | C | D | | | | |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | F | F | F | F | F | F |
| | T | F | F | | | | |
| | R | C | C | | | | |
| Westbound | L | F | F | E | F | | |
| | T | D | F | | | | |
| | R | C | C | | | | |
| Northbound | LTR | F | F | F | F | | |
| Southbound | L | D | F | D | E | | |
| | TR | D | E | | | | |

US 35 & Alpha Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | C | D | C | D |
| | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | B | B | B | B |
| | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | LTR | B | F | B | F |
| Southbound | LTR | C | F | C | F |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | B | C | B | C |
| | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | C | C | C | C |
| | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | LTR | F | F | F | F |
| Southbound | LTR | F | F | F | F |

US 35 & Orchard Lane - Signalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | F | F | C | D | C | E |
| | T | B | C | | | | |
| | R | B | B | | | | |
| Westbound | L | B | E | C | F | | |
| | T | C | F | | | | |
| | R | B | B | | | | |
| Northbound | L | C | C | C | C | | |
| | TR | C | C | | | | |
| Southbound | L | C | C | C | C | | |
| | TR | C | C | | | | |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | F | F | C | F | C | E |
| | T | C | F | | | | |
| | R | B | B | | | | |
| Westbound | L | F | F | C | D | | |
| | T | C | D | | | | |
| | R | B | B | | | | |
| Northbound | L | C | C | C | C | | |
| | TR | C | C | | | | |
| Southbound | L | C | C | C | C | | |
| | TR | C | C | | | | |

US 35 & Valley Road-Trebein Road - Signalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | E | F | C | C | C | E |
| | T | B | C | | | | |
| | R | A | A | | | | |
| Westbound | L | B | B | C | F | | |
| | T | C | F | | | | |
| | R | B | B | | | | |
| Northbound | LTR | C | C | C | C | | |
| Southbound | LTR | C | D | C | D | | |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | F | F | D | F | C | F |
| | T | B | C | | | | |
| | R | A | A | | | | |
| Westbound | L | A | B | B | B | | |
| | T | B | C | | | | |
| | R | A | A | | | | |
| Northbound | LTR | C | C | C | C | | |
| Southbound | LTR | D | F | D | F | | |

Orchard Lane & Heller Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | C | A | C |
| Westbound | LTR | A | C | A | C |
| Northbound | LTR | B | A | B | A |
| Southbound | LTR | B | A | B | A |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | B | A | B |
| Westbound | LTR | A | C | A | C |
| Northbound | LTR | B | A | B | A |
| Southbound | LTR | B | A | B | A |

*Dayton-Xenia Road Corridor*

Dayton-Xenia Road runs roughly parallel to and north of the US 35 corridor. Within the study area, it includes the intersections with Factory Road, Beaver Valley Road, Alpha Road, Orchard Lane, Hilltop/Trebein Roads and the Trebein Road/Dayton-Xenia Road "T" intersection at the east end of the study area. Based on M•E counts, the 2003 ADT along Dayton-Xenia Road ranges from 16,000 west of Factory Road to 4,650 just west of Trebein Road. The unsignalized intersections were assumed to remain unsignalized in 2030.

Dayton-Xenia & Factory Road - Signalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | T | C | D | C | C | C | D |
| | R | A | A | | | | |
| Westbound | L | D | E | C | D | | |
| | T | B | B | | | | |
| Northbound | L | C | D | C | D | | |
| | R | B | B | | | | |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | T | D | F | C | F | C | F |
| | R | A | A | | | | |
| Westbound | L | D | E | C | D | | |
| | T | B | B | | | | |
| Northbound | L | C | D | D | F | | |
| | R | D | F | | | | |

Dayton-Xenia & Beaver Valley Road - Signalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | B | F | B | E | B | C |
| | T | B | B | | | | |
| Westbound | TR | B | C | B | C | | |
| Southbound | L | B | B | B | C | | |
| | R | B | C | | | | |

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | L | D | F | C | F | C | F |
| | T | B | B | | | | |
| Westbound | TR | B | C | B | C | | |
| Southbound | L | B | C | C | C | | |
| | R | C | C | | | | |

Dayton-Xenia & Alpha Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | LT | A | A | A | A |
| Northbound | LTR | B | B | B | B |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | LT | A | A | A | A |
| Northbound | LTR | B | B | B | B |

Dayton-Xenia & Orchard Lane - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | A | A | A | A |
| | T | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | L | B | B | B | B |
| | TR | A | A | | |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | A | A | A | A |
| | T | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | L | C | C | B | C |
| | TR | B | B | | |

Dayton-Xenia & Trebein Road/Hilltop Road - Signalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LT | B | B | B | B | B | B |
| | R | B | B | | | | |
| Westbound | LTR | B | B | B | B | | |
| Northbound | L | B | B | B | B | | |
| | TR | B | B | | | | |
| Southbound | L | A | A | B | B | | |
| | TR | B | B | | | | |

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LT | B | B | B | B | B | C |
| | R | B | B | | | | |
| Westbound | LTR | B | B | B | B | | |
| Northbound | L | B | E | B | C | | |
| | TR | B | B | | | | |
| Southbound | L | A | A | B | C | | |
| | TR | B | C | | | | |

Dayton-Xenia & Trebein Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Westbound | L | B | C | B | C |
| | R | B | B | | |
| Northbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Southbound | L | A | A | A | A |
| | T | Free Flow | Free Flow | Free Flow | Free Flow |

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Westbound | L | C | F | B | E |
| | R | B | B | | |
| Northbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Southbound | L | A | B | A | B |
| | T | Free Flow | Free Flow | Free Flow | Free Flow |

*Indian-Ripple Road/Upper Bellbrook Road Corridor*

This corridor represents the southern boundary of the study area as it includes Indian-Ripple and Upper Bellbrook Roads that run roughly parallel to and south of US 35. These are two-lane county roads with some horizontal and vertical curves. ADT's along this corridor range from 3,200 on Indian-Ripple just north of Upper Bellbrook to 6,500 on

Indian-Ripple west of North Alpha-Bellbrook Road. All intersections within this corridor are presently unsignalized and were assumed to remain unsignalized in 2030.

North Alpha-Bellbrook Road & Factory Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | B | C | B | C |
| Northbound | LT | A | A | A | A |
| Southbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | C | D | C | D |
| Northbound | LT | A | A | A | A |
| Southbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |

Indian-Ripple Road & North Alpha-Bellbrook Road - Unsignalized (4-Way Stop), Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | B | A | B | A | B |
| Westbound | LTR | A | B | A | B | | |
| Northbound | LTR | A | B | A | B | | |
| Southbound | LTR | A | B | A | B | | |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2003 | 2030 | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | B | C | B | C | B | C |
| Westbound | LTR | A | B | A | B | | |
| Northbound | LTR | A | B | A | B | | |
| Southbound | LTR | A | B | A | B | | |

Indian-Ripple Road & Factory Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | A | A | A |
| Westbound | LTR | A | A | A | A |
| Northbound | LTR | B | B | B | B |
| Southbound | LTR | A | B | A | B |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | A | A | A |
| Westbound | LTR | A | A | A | A |
| Northbound | LTR | B | B | B | B |
| Southbound | LTR | B | C | B | C |

Indian-Ripple Road & Upper Bellbrook Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LT | A | A | A | A |
| Westbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Southbound | LTR | B | C | B | C |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LT | A | A | A | A |
| Westbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Southbound | LTR | B | C | B | C |

Upper Bellbrook Road & Valley Road - Unsignalized, Capacity Analysis Results:

| Weekday AM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | A | A | A |
| Westbound | LTR | A | A | A | A |
| Northbound | LTR | B | B | B | B |
| Southbound | LTR | B | B | B | B |

| Weekday PM Peak Hour (2003) & Horizon Year (2030) | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2003 | 2030 | 2003 | 2030 |
| Eastbound | LTR | A | A | A | A |
| Westbound | LTR | A | A | A | A |
| Northbound | LTR | B | B | B | B |
| Southbound | LTR | B | C | B | C |

Crash Data

TSASS, Inc. provided in-depth research on 783 traffic crashes that occurred on major roadways and crossroads within the study area during the 2000 through 2002 three-year period. Detailed information on the crashes is provided in Exhibits 20, 21 and 22. Exhibit 20 is a summary of all the crashes on the major roads within the study area. Each road is

divided into a number of intersections and links between intersections. Crash data for intersection and intersection-related crashes was assigned to intersection sites while non-intersection crashes were assigned to links. The crash rate for each link is calculated in crashes per annual million vehicle miles (crashes/AMVM). The calculated crash rate on each link (Link Rate) is compared to the statewide average crash rate (Base Rate) for that type of roadway. For intersections, the rate is expressed in crashes per annual million vehicles (crashes/AMV). (The most recent statewide average rates were obtained from ODOT Office of Planning for use in this study.) The Rate Factor is simply the Link Rate divided by Base Rate. Rate Factor numbers greater than 1.0 represent crash rates worse than the statewide average rate based on the number of lanes, divided or undivided facility and urban or rural location. Rate Factors less than 1.0 indicate that a link experiences crashes at a rate less than the statewide average for comparable facilities. Exhibit 22 shows a graph displaying the Link Rate versus the Base Rate for each major roadway link within the study area.

Exhibit 21 contains details regarding crash types and lighting, pavement and location information for the 783 crashes within the study area. The typical crash within the study area during the 2000-2002 period is a Property Damage Only non-intersection rear-end crash that occurred on dry pavement, during daylight hours on a straight section of road and involved an at-fault driver traveling eastbound or westbound.

The rolled up crash data for all the major roads within the study area yields an average crash rate about 2.5 times greater than the weighted statewide average for all major roads within the study area. However, analysis of individual intersections and links within the various major corridors shows that not all of these locations have crash rates greater than the statewide average. Several locations have crash rates well in excess of the averages while others are considerably less than the averages.

An overview of the crash data by major corridor within the study area follows.

*US 35 Corridor – North Fairfield Road to Milepost 7.0*

During the three-year period, 446 crashes occurred on US 35 or on crossroads intersecting US 35 within the study area. As expected, most crashes on US 35 occur at or near the signalized intersections of US 35 with North Fairfield Road, Factory Road, Orchard Lane and Valley-Trebein Road. The US 35 and North Fairfield Road intersection had the highest number (95) of crashes and the Factory Road intersection had the second highest total (87). The Orchard Lane intersection had 57 crashes while the Valley-Trebein Road intersection had 48 attributed crashes. The unsignalized intersections at Alpha and Shakertown Roads had 21 crashes each but had the highest crash rates (about 4.5 times greater than the statewide average) because crossroad volumes are much lower than at the signals. Crash data along US 35 from North Fairfield Road to Milepost 7.0 (4.3 miles) indicate that the overall average rate for the 4.3-mile section is 2.64 or about four times

the statewide average. The section between Shakertown and Factory Roads had the highest rate, approximately 1.7 times higher than the statewide average. (The North Fairfield Road intersection was replaced by an interchange in June 2003.)

The typical crash types within the US 35 corridor are intersection-related rear-end, sideswipe passing, and "animal" crashes. The majority of these crashes occurred during daylight hours, on dry roads and involved at-fault vehicles traveling eastbound or westbound. About 27.5 percent of the 446 crashes involved injuries or fatalities.

*Dayton-Xenia Road Corridor – North Fairfield Road to Hawkins Road*
A total of 229 crashes occurred on the 5.3 mile Dayton-Xenia Road corridor between North Fairfield Road and Hawkins Road during the 2000 to 2002 period. The overall average crash rate for the section is about five times higher than the statewide average. The link from North Fairfield Road to Factory Road had 70 crashes and a rate 4.4 times greater than the statewide average. The link from Factory Road to Beaver Valley Road had only 25 crashes but had a rate 11.6 times greater than the statewide average. Eighty of the 229 crashes along this corridor were rear-end crashes and thirty-four of these occurred in the link between North Fairfield Road and Factory Road. Other links within the Dayton-Xenia Road corridor had crash rates nearer to the statewide average.

*Indian-Ripple Road/Upper Bellbrook Road Corridor*
A total of 49 crashes occurred on the 3.75-mile long section of Indian-Ripple Road between North Fairfield Road and Upper Bellbrook Road during the three-year period from 2000 to 2002. Rates were near the statewide average rates. The highest frequency of intersection crashes (16) occurred at the Indian-Ripple/Upper Bellbrook Road intersection, resulting in a crash rate that is 26.3 times greater than the statewide average for this type of road; however nine of these crashes were coded as "animal" crashes. Indeed, 18 of the 49 crashes within this corridor are coded as "animal" and ten were listed as "Other". Discounting the high proportion of these two crash types along this corridor yields very few remaining crashes and no predominate patterns.

A total of 43 crashes occurred on Upper Bellbrook Road corridor between Wildwood Lane and Haines Road during the three-year period from 2000 to 2002 However, 19 (44.2%) of the 43 crashes were coded as "animal" and the remaining crashes do not indicate any apparent patterns.

*Other Roadways*
Other roadways such as Alpha-Bellbrook, Alpha, Valley, Shakertown and Trebein Roads and Orchard Lane have crash frequencies and rates that, after discounting "animal" crashes, indicate no particular safety problems on the roads.

Vehicle Classification Data

In addition to its role as a commuter route linking the Dayton and Xenia areas, this section of US 35 also increasingly serves as an important inter-county and intrastate commercial route. Based on ODOT Traffic Survey data, the percentage of Type B & C commercial vehicles continues to increase on US 35 within the study area.

| US 35 Commercial Vehicles at Valley Road | | | |
|---|---|---|---|
| Year | ADT | Type B & C Commercial | |
| | | Percent | Volume |
| 1994 | 28,080 | 6.3% | 1,760 |
| 1997 | 30,640 | 8.8% | 2,690 |
| 2000 | 30,230 | 8.5% | 2,580 |
| 2003 | 34,500 | 9.9% | 3,420 |

Transportation Options

*Transit Options and Plans*

The Greater Dayton Regional Transit Authority (GDRTA) is the transit provider that currently serves Montgomery County and is the nearest fixed route transit provider to the project area. California Medi-Van (MV) Transportation, Inc. is the provider of the Greene County (Greene CATS) Paratransit services. Greene CATS oversees transportation services for the communities of Xenia, Beavercreek and the remainder of Greene County, Ohio. The agency's goal is to serve the special transportation needs of the social service agencies and service centers through one coordinated provider, MV. The service is open to the public; however, the services to the public are limited in scope and must be arranged in advance.

The operation utilizes 23 Paratransit vehicles. The services operate approximately 35,170 hours per year through the efforts of 24 dedicated drivers and professionals. MV provides operations and management, with Greene CATS performing maintenance services.

*Airports*

There are two airports in or near the study area, the Greene County-Lewis A. Jackson Regional Airport and Wright Patterson Air force Base, Wright and Patterson Fields.

*Passenger & Commercial Freight Lines*

The Grand Trunk Western (GTW) commercial freight line is the nearest rail line to the study area. It passes through the northwest portion of the County near Wright Patterson Air force Base.

*Bikeways*

The Little Miami Scenic Bicycle Trail and System serves this project area. Four trail systems combine to form the "Greene Ways Shared Use Trail Systems" providing over 40

miles of shared-use trails in Greene County. The Little Miami Scenic Trail is 70 miles of trail running from Milford to Springfield. 15 of those miles are in Greene County. The Creekside Trail is 10.6 miles and connects Xenia to Beavercreek. The Ohio-To-Erie Trail is 8.6 miles and connects Xenia with Cedarville. Kauffman Avenue Bikeway is 4.3 miles and connects downtown Fairborn to the Wright Brothers Memorial Park. These trails are mainly used for recreational uses, but can also serve both bikers and pedestrians as alternative transportation options.

**SUMMARY**

Located between the cities of Xenia and Dayton, the section of US 35 between North Fairfield Road and the Xenia Bypass currently has five at-grade intersections and is the only segment of US 35 between I-75 and West Virginia that is not presently programmed for conversion to a freeway. Designated a "macro" facility by ODOT, US 35 is intended primarily to carry longer distance trips and not to provide closely spaced access points to service adjacent land. Two previous studies (by ODOT in 1982 and MVRPC in 1998) recommended various schemes for converting US 35 to a completely limited-access facility.

In addition to the goal of converting US 35 to a limited-access facility, the local community has concerns involving access to US 35 for the City of Beavercreek and Beavercreek Township, traffic safety due to the high number of crashes on US 35, improvements to local roads necessitated by loss of access to US 35 and management of long term growth as Beavercreek and Xenia continue to grow closer together.

Environmental and Community Characteristics

One building and two historic archaeological sites have been determined eligible for the National Register of Historic Places. Previous cultural resource surveys have identified a number of properties and sites that may prove to be eligible for inclusion in the NRHP. These resources consist of three buildings, one bridge, six prehistoric archaeological sites, five historic archaeological sites, and nine archaeological sites with both prehistoric and historic components. Three cemeteries are located within the study area. A total of 37 wetlands were found to exist within the study area as well as the Little Miami River that is recognized as a State and National Scenic River. Twelve parcels were identified that may contain hazardous substances. If impacted by any alternatives, these parcels will require additional environmental assessment.

The study area has a high population of persons older than 40 as well as persons 18 to 24. Beavercreek Township and the City of Beavercreek both have substantial Asian populations (3.2%), and the City of Xenia has a substantial population of two or more races (2.4%). The area is at or below statewide average of population below the poverty level. Transportation within the study area is primarily by passenger vehicle although many people also walk to work. The area is below the statewide average for use of transit

because there is no regularly scheduled transit service within the study area. Commuting times within Greene County are approximately 2.5 minutes less than the statewide average.

Greene County is one of the fastest growing counties within the State, and the portion of Greene County located within the study area is transforming from a rural agricultural past to a suburban present and future. As a result, the number of farms has decreased in the area in recent years although the average size of farms has increased. Retail trade and professional, scientific and technical services are the largest non-farm employers in the region. The area has unemployment close to the statewide average of 5.2 percent.

The study area contains many community services, including American Indian performances, parks and nature preserves, historic building museums, and recreational activities. Especially of note is the Creekside Bikeway and a canoe launching area at the nature preserve located on Trebein Road. Also within the study area are many churches, schools, and cemeteries.

Existing and Future Land Use

Land use and transportation facilities are closely linked in most communities. Within this study area, Beavercreek and Beavercreek Township are rapidly growing residential areas that will add traffic to US 35 and increase the number of trips that simply wish to cross US 35. As turning movements to and from the crossroads increase and as cross traffic increases, green time will be redistributed at the signalized intersections within the study area. The net result is that an ever-decreasing amount of green time is available for through traffic on US 35. This causes lengthy traffic queues and delays and contributes to the high traffic crash rates that are apparent today along US 35.

Transportation Network

The study area is bisected east-west by US 35 that carries approximately 34,000 vehicles per day. This roadway functions as the backbone of highway transportation within the study area and it presently has five at-grade intersections with local crossroads. The area is bounded on the north by Dayton-Xenia Road that is the former US 35 before the expressway was constructed and by the Indian Ripple Road/Upper Bellbrook Road corridor on the south. Dayton-Xenia Road continues to be an important road within the study area and carries as much as 12,000 vehicles per day within the study area compared to only 5,000 on the Indian Ripple Road/Upper Bellbrook Road corridor. Of the north-south roads within the study area, Factory Road is by far the most traveled, carrying about 11,000 vehicles per day between US 35 and Dayton-Xenia Road compared to about 7,900 on Trebein Road north of US 35.

Current levels of service on roadways within the corridor are related to the function of intersections. The US 35 intersection with Factory Road carries the most traffic and has the poorest level of service. The other signalized intersections on US 35 at Orchard Lane

and Valley-Trebein Roads have poor levels of service during peak periods in the morning and afternoon. Traffic flow characteristics along the Dayton-Xenia Road and Indian Ripple Road/Upper Bellbrook Road corridors are presently better than US 35 because these roads carry local traffic and not the intercity and inter-county traffic that is present on US 35.

The ODOT's Highway Safety Program has identified the section of US 35 within the study area as a "Hot Spot." US 35 exhibits a distinct rear-end crash pattern within the study area. Theses crashes are concentrated at the signalized intersections, especially at Factory Road. The section between Shakertown and Factory Roads had the highest rate, approximately 6.3 times higher than the statewide average.

Crash types within the US 35 corridor are predominantly intersection related rear-end, sideswipe passing and "other" crashes. The majority of these crashes occurred during daylight hours, on dry roads and involved at-fault vehicles traveling eastbound or westbound. About 25 percent of the 229 crashes involved injuries or fatalities. The Dayton-Xenia and Indian Ripple Road/Upper Bellbrook Road corridors have much lower crash rates than US 35 and operate much closer to the statewide average.

The recent construction of the North Fairfield Road interchange with US 35 has improved one long-standing local concern regarding traffic safety on US 35. The remaining at-grade intersections within the study area have both traffic congestion and safety issues that will be addressed in subsequent steps of this study.

# PURPOSE AND NEED

## IDENTIFIED NEEDS

After review of the existing conditions of the area and meetings with the Oversight Committee to identify problem areas, three main needs for the area surfaced:

- Travel efficiency
- Traffic safety
- System linkage

### Travel Efficiency

Travel efficiency is the predominant transportation issue in the project area. As detailed in the Existing Conditions, US 35, with five at-grade intersections in the study area, does not have enough capacity to serve the transportation demands.

Traffic data for 2003 was collected by M•E (see Exhibit 14), and traffic data for 2030 was provided by MVRPC (see Exhibit 17). *Highway Capacity Software 2000* (HCS2000) was used to calculate both 2003 and 2030 Levels of Service from the 2003 and 2030 traffic data for the 17 intersections within the study area. These intersections are located in three corridors within the Study Area: US 35 Corridor; Dayton-Xenia Road Corridor, located north of US 35; Indian Ripple/Upper Bellbrook Road Corridor, located south of US 35. Exhibits 15-16 and 18-19 show the HCS2000 results for 2003 and 2030, respectively.

Current levels of service on US 35 within the corridor are related to the function of intersections. The US 35 intersection with Factory Road carries the most traffic and has the poorest level of service. The other signalized intersections on US 35 at Orchard Lane and Valley-Trebein Roads have poor levels of service during peak periods in the morning and afternoon. Traffic flow characteristics along the Dayton-Xenia Road and Indian Ripple Road/Upper Bellbrook Road corridors are presently better than US 35 because these roads carry local traffic and not the intercity and inter-county traffic that is present on US 35.

As a result, the present day levels of service are at or close to failing at the US 35/Factory Road intersection within the study area. The second worst intersection in terms of level of service is the US 35 intersection with Valley-Trebein Road. By the 2030 horizon year, the US 35 approaches to the signals at Factory Road, Orchard Lane and Valley-Trebein Roadwill be LOS F.

### Traffic Safety

One of the primary problems noted in this section of US 35 is safety. This section is identified locally and statewide as a high crash area, and ODOT has identified this section as a Non-Freeway "Hot Spot" based on crash frequency. According to Ohio Department of Public Safety (ODPS) crash records, 446 crashes occurred on the US 35 mainline and at crossroad intersections within the study area during the 2000 through

2002 period. Of the 446 crashes, 117 were coded as non-intersection crashes and 329 were listed as intersection crashes.

Detailed information on the crashes is provided in Exhibit 20. US 35 crash locations are divided into a number of intersections and links between intersections. Crash data for intersections and intersection-related crashes was assigned to intersection sites while non-intersection crashes were assigned to links. The crash rate for each link is calculated in crashes per annual million vehicle miles (crashes/AMVM) using 2003 ADT numbers. The calculated crash rate on each link, the link rate, is compared to the statewide average crash rate (SW Average Rate) for that type of roadway or intersection. For intersections, the rate is expressed in crashes per annual million vehicles (crashes/AMV). (The most recent statewide average rates were obtained from ODOT Office of Planning for use in this study.) The rate factor is the link rate divided by SW Average Rate. Rate factor numbers greater than 1.0 represent crash rates worse than the statewide average rate based on the number of lanes, divided or undivided facility and urban or rural location. Rate factors less than 1.0 indicate that a link experiences fewer crashes than the statewide average for comparable facilities. Exhibit 21 shows a graph displaying the intersection rate versus the SW Average Rate for five intersections within the US 35 study area. Exhibit 22 shows the link rate versus the SW Average Rate for the six links within the study area.

**US 35 Corridor Non-Intersection Crash Breakdown 2000-2002 Data**

| US 35 Link | Head On | Rear End | Backing | Side Swipe Meeting | Side Swipe Passing | Angle | Right Turn | Left Turn | Parked Vehicle | Fixed Object | Animal | Other Non Collision | Link Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **North Fairfield to Shakertown** | 0 | 8 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 5 | 7 | 12 | 39 |
| **Shakertown to Factory** | 0 | 7 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| **Factory to Alpha** | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| **Alpha to Orchard** | 0 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 8 |
| **Orchard to Trebein-Valley** | 0 | 7 | 1 | 1 | 5 | 1 | 0 | 0 | 0 | 4 | 8 | 3 | 30 |
| **Trebein-Valley to Milepost 7.0** | 0 | 4 | 0 | 0 | 6 | 0 | 0 | 1 | 1 | 6 | 6 | 4 | 28 |
| **TOTALS** | **0** | **28** | **1** | **1** | **26** | **2** | **0** | **1** | **1** | **16** | **21** | **20** | **117** |

The ODOT statewide average crash rate for a four-lane Divided Urban Principle Arterial roadway is 0.68 crashes/AMVM. The links in the US 35 study area between North Fairfield Road and Milepost 7.0 (near the Xenia Bypass) have 117-recorded crashes and have calculated link rates between 0.28 and 1.15 crashes/AMVM. These rates are not

substantially higher than the statewide average for equivalent roadways, which is normal for a flat, divided, access-controlled highway.

Analysis of the non-intersection crash-type breakdown shows that rear-end and sideswipe-passing are the predominant crash types, but these crashes are most likely related to the intersections. There is a probable relation because the long queues of stopped vehicles starting at the signalized intersections can back up along the roadways into the sections categorized as links. Also, a backup can occur when vehicles slow down to make a turn at both signalized and non-signalized intersections.

**US 35 Corridor Intersection Crash Breakdown 2000-2002 Data**

| US 35 and Intersecting Crossroad | Head On | Rear End | Backing | Side Swipe Meeting | Side Swipe Passing | Angle | Right Turn | Left Turn | Parked Vehicle | Fixed Object | Animal | Other Non Collision | Intersection Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **North Fairfield*** | 0 | 65 | 1 | 0 | 18 | 2 | 0 | 0 | 2 | 2 | 0 | 5 | 95 |
| **Shakertown** | 1 | 8 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | 2 | 1 | 4 | 21 |
| **Factory** | 0 | 42 | 1 | 0 | 16 | 10 | 0 | 6 | 0 | 1 | 3 | 8 | 87 |
| **Alpha** | 0 | 10 | 1 | 0 | 8 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 21 |
| **Orchard** | 0 | 18 | 1 | 1 | 14 | 5 | 1 | 11 | 0 | 2 | 0 | 4 | 57 |
| **Trebein-Valley** | 0 | 11 | 1 | 0 | 8 | 3 | 0 | 8 | 0 | 5 | 6 | 6 | 48 |
| **TOTALS** | **1** | **154** | **5** | **1** | **67** | **21** | **1** | **26** | **3** | **12** | **11** | **27** | **329** |

* The North Fairfield Road intersection was replaced by an interchange that opened in June 2003.

During the three-year period, 329 intersection crashes occurred on US 35 within the study area. Most intersection crashes on US 35 occur at or near the signalized intersections of US 35 with North Fairfield Road, Factory Road, Orchard Lane and Valley-Trebein Road. The US 35 and North Fairfield Road intersection had the highest number (95) of crashes and the Factory Road intersection had the second highest total (87). The Orchard Lane intersection had 57 crashes while the Valley-Trebein Road intersection had 48 attributed crashes. The unsignalized intersections at Alpha and Shakertown Roads had 21 crashes each but these intersections had the highest crash rates (about 4.5 times greater than the statewide average) because crossroad volumes are much lower than at the signals and the statewide average rate for unsignalized intersections is lower.

The signalized intersection of US 35 and North Fairfield Road was replaced by an interchange that opened in June 2003; therefore the number of crashes at this newly opened interchange should be considerably less than at the former signalized intersection. The Factory Road intersection is now the first signalized at-grade intersection that motorists encounter when traveling eastbound on US 35 as they leave the Dayton-Beavercreek area. With the elimination of the North Fairfield Road

intersection and signal, eastbound travel speeds should increase on the approach to Factory Road, and the number and severity of eastbound rear-end crashes could increase at this intersection.

The predominant intersection crash types within the US 35 corridor are rear-end and sideswipe-passing crashes. The majority of these crashes occurred during daylight hours, on dry roads and involved at-fault vehicles traveling eastbound or westbound. The intersection crashes are caused by the five at-grade intersections within the study area and the slowing and turning vehicles at the intersections and the queues of stopped vehicles that form at the signalized intersections. About 30.7 percent of the 329 intersection crashes involved injuries or fatalities.

This section of US 35 has severe safety problems related to the five at-grade intersections within the study area. The crash pattern is very distinct with most crashes being rear-end or sideswipe-passing and related to stopped or slowing vehicles. As traffic and congestion increase in coming years, the crash rates and crash frequency at all five intersections are expected to increase if no improvements are made to the intersections. The economic loss for the 446 crashes over the three-year period was $23.3 million based on ODPS costs by crash severity.

<u>System Linkage</u>

In 1982, a study conducted by Barret, Crago and Withers and Associates outlined several schemes for converting this section of US35 to limited-access using full interchange options at North Fairfield Road, Factory Road and North Valley Road

In October of 1993, ODOT released a study known as *Access Ohio – Macro Phase*. The study included a statewide, multi-modal analysis that was used to establish the state's long-range transportation plan. This analysis used a rigorous process using databased criteria that encompassed traffic data, demographics, economic trade/ intermodal centers, and natural and agricultural resources. In that study, US 35 was designated a "macro level" improvement corridor. By definition a "macro level" corridor has statewide significance with respect to Ohio's economic vitality. This type of facility is intended primarily to carry longer distance trips and not to provide closely spaced access points to service adjacent land. The section of US 35 addressed in this study (between North Fairfield Road and the Xenia Bypass) currently has five at-grade intersections that expose through traffic to signals and cross traffic and is the only segment of US 35 in Ohio between I-75 and West Virginia that is not presently programmed for conversion to a freeway (see Exhibit 23).

In 1998, the MVRPC conducted a study concerning access management of US 35 in Greene County. One of the main issues addressed in that report was the importance of completing the improvements to this highway link and its relationship to economic development. US 35 connects to five other interstate highways (I-70, I-71, I-675, and I-64

and I-77 in West Virginia) and is a major thoroughfare for travelers and businesses locally, statewide and regionally. This study recommended various schemes for converting US 35 to a completely limited-access facility along with other improvements including reconstruction and widening and/or realignment of certain cross roads, intersection improvements, bridge replacements and the reconstruction of the intersection at North Fairfield Road with a full movement interchange.

Most recently, in the MVRPC's 2001 Update of their 2025 Long Range Transportation Plan, improvement to this section of US35 was designated as a "regionally significant project." A regionally significant project is defined as a transportation project that is on a facility which "….serves regional transportation needs that include access to and from the area outside of the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals, as well as most terminals themselves…"

As demonstrated by these studies, it has been recognized for more than 20 years that this section of US 35 would need improvement to complete this important highway link. One goal of this project is to provide consistent system linkage and free-flow connectivity to promote commerce and provide a safe facility for the traveling public.

## CONCLUSIONS

As documented in this report, several problems were identified in the study area. Below is a summary of the major transportation needs discussed in the above document and the criteria that will be used to measure the alternatives developed in the next step of this study.

### Travel Efficiency

Within the study area, US 35 exhibits a commuter-related pattern that moves into and out of Dayton during the morning and evening peak hours, respectively. This area of US 35 experiences poor levels of service at the Factory Road intersection along with long queues of vehicles at the two other signalized intersections, Orchard Lane and Valley-Trebein. As both US 35 and crossroad traffic increases over the coming years, the LOS is expected to decline to LOS F at the at-grade intersections along this section of US 35. To improve travel efficiency, improvements need to be designed to eliminate the factors that are contributing to the congestion problems. One option to would be to upgrade the existing intersections to provide additional capacity on both the US 35 and crossroad approaches. These improvements could increase the efficiency and traffic flows on US 35. A second option would be to remove some of the five at-grade intersections by converting the local cross-roads to cul-de-sacs, interchanges, grade separated overpasses, or connect them to service roads. This option would effectively reduce the congestion caused by having at-grade intersections on US 35.

Traffic Safety

Currently, the portion of US 35 within the study area is designated as a "Hot Spot" by ODOT due to high crash frequency. Most of the 446 crashes during the 2000-2002 period occurred at the five at-grade intersections in the study area; and most of the 329 intersection-related crashes occurred at the three signalized intersections. The Factory Road signalized intersection had 87 crashes during the 2000-2002 period. The crash rate at this intersection is 3.5 times higher than the statewide average. At the two unsignalized intersections, the rates are 4.5 times higher than the statewide average. To improve highway safety, improvements need to be designed to eliminate the factors that contribute to the safety problems. One option to would be to upgrade the existing intersections to provide additional capacity on both the US 35 and crossroad approaches. These improvements could increase the efficiency of the traffic flows on US 35; and therefore reduce the crashes resulting from backed-up traffic. Another option would involve eliminating the at-grade intersections via interchanges, grade separations, cul-de-sacs or service roads to convert the section to a limited-access facility. This option would effectively eliminate the crashes caused by having at-grade intersections on US 35.

System Linkage

As a designated macro-level facility, US 35 is planned as a freeway across most of its route through Ohio and into West Virginia. As US 35 is converted to a fully limited-access freeway between I-75 and West Virginia, this section of the route will become even more of an anomaly with its at-grade intersections. In order to encourage system linkage, improvements need to be designed to upgrade this section of US 35 to a more modern roadway. One option to would be to upgrade the existing intersections to provide additional capacity on both the US 35 and crossroad approaches to improve the efficiency and traffic flows on US 35. A second option would be to remove the five at-grade intersections through converting the local cross-roads to cul-de-sacs, interchanges, grade separated overpasses, or connect them to service roads. This option would effectively complete the system linkage for US 35 between I-75 and I-77/I-64 in West Virginia by providing a full limited-access freeway.

# ALTERNATIVES DEVELOPMENT

## PRELIMINARY ALTERNATIVES

In a 1998 study, MVRPC developed alternatives to reduce congestion and increase safety throughout the limits of the GRE-35 Corridor Study. Alternative 1 (see Exhibit 24) is the product of that study and is incorporated into this Corridor Study, to be compared to additional alternatives.

Alternatives 2, 2A, 3 and 3A were developed early during the GRE-35 Corridor Study. The purpose of these initial alternatives was to test the impact that one or two interchanges had on the interchange LOS and on the local road network. These alternatives were presented to the Oversight Committee on October 15, 2003. Alternatives 2 and 2A (see Exhibits 25 and 26) included two interchanges, one each at Factory and Valley-Trebein. The difference between the two was the conceptual treatment of the Orchard Lane intersection. Alternative 2 showed a cul-de-sac at Orchard Lane while Alternative 2A showed an overpass.

Alternatives 3 and 3A (see Exhibits 27 and 28) included an interchange only at the Factory Road intersection while the Valley-Trebein intersection was proposed to be receive a grade separation. The difference between the two was the conceptual treatment of the Orchard Lane intersection. Alternative 3 showed a cul-de-sac at Orchard Lane while Alternative 3A showed an overpass.

There was consensus among the members of the GRE-35 Corridor Study Oversight Committee that two interchanges within the study limits were necessary to provide an acceptable LOS to the traveling public in the 2030 design year. Highway capacity calculations demonstrated that traffic volume assignments for a single interchange would overload the local circulation system, particularly the Dayton-Xenia Road corridor.

**GRE-35 Corridor Study Alternative Initial Evaluation Criteria**

| Alternative | Full Movement Interchanges | Interchange at Factory Road | Interchange at Valley-Trebein Road | Avoid 4(f) Impacts |
|---|---|---|---|---|
| Alternative 1* | | | √ | √ |
| Alternative 2 | √ | √ | √ | TBD |
| Alternative 2A | √ | √ | √ | TBD |
| Alternative 3 | √ | √ | | TBD |
| Alternative 3A | √ | √ | | TBD |

* Alternative 1 included partial access to US 35 east and West of Factory Rd.

As shown in the GRE-35 Corridor Study Alternative Initial Evaluation Criteria Table, Alternatives 2 and 2A, with two interchanges, provided the best opportunity to meet the overall objectives within the study area. In order to further develop Alternatives 2 and 2A, it was necessary to establish required and desirable criteria for the ultimate configuration. In the interest of increased safety of motorists, cyclists and pedestrians,

congestion mitigation, regional mobility, improved traffic flow and LOS, it is essential to eliminate at-grade intersections and to maintain acceptable interchange spacing (minimum of one-mile in urban/suburban areas).

### ALTERNATIVES BY INTERSECTION

Criteria applicable to the various intersections were identified for alternatives evaluation and are shown in the table below:

**GRE-35 Applicable Corridor Study Evaluation Criteria by Intersection**

| Criteria | Factory Road | Local Access | Orchard Lane | Valley-Trebein Road |
|---|---|---|---|---|
| Eliminate At-Grade Intersections | √ | √ | √ | √ |
| Maintain acceptable interchange spacing | √ | NA | NA | √ |
| Emergency access | √ | √ | √ | √ |
| Environmental impacts | √ | √ | √ | √ |
| Constructability | √ | √ | √ | √ |
| Maintenance of Traffic during Construction | √ | √ | √ | √ |
| Reasonable Cost | √ | √ | √ | √ |
| Utility Impacts | √ | √ | √ | √ |
| Flood areas | √ | NA | NA | NA |
| Greene County Factory-Orchard Connector | NA | √ | NA | NA |
| Business Access | √ | √ | √ | √ |
| Property Access | √ | √ | √ | √ |
| Bikeway Access | √ | √ | √ | NA |

Each alternative was compared to these criteria to determine its viability. Numerous alternatives were developed, and many were eliminated based on these factors. The most viable alternatives (listed below) were presented to the Oversight Committee for consideration on February 24, 2004. Based upon the Committee's consensus, the alternatives were presented to the public at the March 18, 2004 Public Involvement Meeting. The following table indicates exhibit numbers for the presented alternatives.

| Alternative Designation | Exhibit Number |
|---|---|
| Shakertown 1 | 29 |
| Shakertown 2 | 30 |
| Shakertown 3 | 31 |
| Factory 1 | 32 |
| Factory 2 | 33 |
| Orchard 1 | 34 |
| Orchard 2 | 35 |
| Valley-Trebein 1 | 36 |
| Valley-Trebein 2 | 37 |

A brief description along with the positive and negative attributes (pros and cons) of each alternative is presented below:

| Shakertown 1 Alternative – Local Access with 4-way intersection | |
|---|---|
| **Description** | Factory Road is realigned and North Alpha-Bellbrook Road is extended to transition into Factory Road. High left turn volume from Shakertown Road to northbound Factory Road. Northbound traffic on North Alpha-Bellbrook Road continues north to Factory without turns. Additional lanes on Factory Road. |
| **Pros** | **Cons** |
| ▪ High number of left turns converted to a through movement<br>▪ Better access and route continuity for Factory Road<br>▪ Makes use of Greene County right of way for connection to soccer field area | ▪ Higher cost ($11 M) |

| Shakertown 2 Alternative – Local Access with 3-way intersection (west) | |
|---|---|
| **Description** | Shakertown Road is realigned to transition into Factory Road, intersecting with North Alpha-Bellbrook Road. Eastbound traffic on Shakertown Road continues east and north to Factory without turns. Additional lanes on Factory Road. |
| **Pros** | **Cons** |
| ▪ Highest number of left turns converted to a through movement<br>▪ Better access and route continuity for Factory Road<br>▪ Makes use of proposed Factory-Orchard Connector for access to Orchard Lane | ▪ To travel southbound on North Alpha-Bellbrook, traffic will need to turn left<br>▪ High cost ($10 M) |

| Shakertown 3 Alternative – Local Access with 3-way intersection | |
|---|---|
| **Description** | Shakertown Road is realigned, intersects North Alpha-Bellbrook Road, and finally intersects Factory Road. Northbound traffic on North Alpha- Bellbrook Road turns right onto Shakertown Road to proceed to Factory Road, turning left to proceed northbound on Factory Road. Additional lanes on Factory Road. |
| **Pros** | **Cons** |
| ▪ Better access and route continuity for Factory Road<br>▪ Lowest cost ($8 M) | ▪ Does not make use of proposed Factory-Orchard Connector for access to soccer field area<br>▪ No left turns converted to through movement<br>▪ Very high left turn volumes; anticipate need for four left turn lanes from Shakertown Road onto Factory Road |

| Factory 1 Alternative – Factory Tight Diamond Interchange | |
|---|---|
| **Description** | Tight diamond interchange with dual left turn lanes onto southbound Factory Road. Additional lanes on Factory Road and access control along Factory Road south to intersection at Shakertown Road. Factory Road south of US35 realigned and Shakertown Road terminated in a cul-de-sac. |

| Pros | Cons |
|---|---|
| ▪ Conventional design<br>▪ Lower construction cost ($25 M)<br>▪ Minimal right of way needs<br>▪ Ability to reduce median width to reduce right of way impacts<br>▪ Bike access via widened or additional structure | ▪ Handles fewer left turns<br>▪ Requires greater left turn storage lengths<br>▪ Less efficient than SPUI<br>▪ Two ramp intersections |

| Factory 2 Alternative –Single Point Urban Interchange (SPUI) | |
|---|---|
| **Description** | Modern urban interchange design with just one centrally located signalized ramp intersection on Factory Road, rather than two. Free flowing right turns onto US-35 and non-conflicted left turns from exit ramps onto Factory Road. Additional lanes on Factory Road and access control along Factory Road south to intersection at Shakertown Road. Factory Road south of US35 realigned and Shakertown Road terminated in a cul-de-sac. |

| Pros | Cons |
|---|---|
| ▪ Only one ramp terminal intersection<br>▪ Handles more left turns<br>▪ Larger radius for left turns from exit ramps<br>▪ Better MOT during construction (wider deck area)<br>▪ More efficient than Diamond<br>▪ Bike access via widened or additional structure | ▪ Less conventional design<br>▪ Greater right-of-way requirements<br>▪ Higher construction cost ($29 M) |

| Orchard 1 Alternative – Orchard Lane Overpass | |
|---|---|
| **Description** | Orchard Lane overpasses US 35. Orchard is elevated for more than 1,500 feet. |

| Pros | Cons |
|---|---|
| ▪ Provides access across US 35 for fire and emergency services, soccer fields, businesses<br>▪ Less disruption to US 35 traffic during construction<br>▪ Lower cost ($7 M) | ▪ Highest right-of-way impacts to businesses located along Orchard Lane on both sides of US 35<br>▪ Bikeway accommodation via widened or additional bridge<br>▪ Impacts Heller/Orchard intersection on the north side and Heller/frontage road on the south side |

| Orchard 2 Alternative – Orchard Lane Underpass | |
|---|---|
| **Description** | US 35 overpasses Orchard Lane. US 35 is elevated for approximately 3,000 feet. |
| **Pros** | **Cons** |
| ▪ Provides access across Orchard Lane for fire and emergency services, soccer fields, businesses<br>▪ Bikeway accommodation under bridge | ▪ Little to no right-of-way impacts to businesses located along Orchard Lane<br>▪ More disruption to US 35 traffic during construction<br>▪ Higher cost ($14 M) |

| Valley-Trebein 1 Alternative – Loop Interchange | |
|---|---|
| **Description** | Interchange constructed east of the existing intersection. Interchange is a variety of spread diamond with an additional full loop for southbound-to-eastbound traffic. |
| **Pros** | **Cons** |
| ▪ Provides full access at US 35 with an additional loop to accommodate the heaviest movement<br>▪ Maintains access to quarry operations<br>▪ Can be signalized as necessary | ▪ More right-of-way impacts<br>▪ Less acceptable interchange spacing<br>▪ Higher cost ($24.3 M) |

| Valley-Trebein 2 Alternative – Half-Loop Interchange | |
|---|---|
| **Description** | Interchange constructed east of the existing intersection. Interchange is ¾ of a spread diamond with an additional half loop for southbound-to-eastbound traffic. |
| **Pros** | **Cons** |
| ▪ Provides full access at US 35<br>▪ Maintains access to quarry operations<br>▪ Less right-of-way impacts<br>▪ More acceptable interchange spacing<br>▪ Lower cost ($22.9 M)<br>▪ Can be signalized as necessary | ▪ Southbound to eastbound traffic will need to move through stop-controlled intersection |

### PUBLIC COMMENT ON INTERSECTION ALTERNATIVES

The Oversight Committee met on April 14, to discuss the outcome of the March 18, public meeting. Based on extensive evaluation and discussion of the public's input, the Committee voted to refine the alternatives as follows. (Comment sheets and public meeting summary can be found in Appendix B.)

- Realign Shakertown 1 with a four-leg intersection at relocated Alpha-Bellbrook Road/Factory-Orchard Connector intersection with this intersection located to as close to US 35 as is functionally feasible (keeping in mind desirable intersection spacing for traffic flow on Factory/North Alpha-Bellbrook Road).
- Consider revisions to provide more direct access to the businesses located near and presently served by the Orchard Lane and US 35 intersection.

- Noted that both the diamond and SPUI interchange configurations at Factory Road can be designed to provide acceptable LOS although the SPUI is expected to be somewhat more costly due to the larger bridge size. The interchange configurations will be compared in more detail in a subsequent step of the project development process. It is understood that either interchange type is compatible with any of the Shakertown alternatives presented.
- Eliminated Valley-Trebein 1 in favor of Valley-Trebein 2, which provides better interchange spacing from the US 35 Business interchange east of the study area.

### PRELIMINARY RECOMMENDATION PACKAGE

The refined alternatives, including the recommended treatments at each of the five intersections and the proposed relocation of Shakertown and Alpha-Bellbrook Roads, were assembled into a preliminary recommendation package shown in Exhibit 38. This recommendation package incorporates the best improvement options for each of the five at-grade intersections on US 35. The package also addresses local road modifications to better handle local traffic shifts that will result from the proposed US 35 access changes. The following Table lists the details of the preliminary recommendation package.

| Intersection | Preliminary Recommendation | Preliminary Cost Estimate |
|---|---|---|
| Shakertown Road | Relocate Shakertown to extended Alpha-Bellbrook; relocate Factory south of US 35 | $7,160,000 |
| Factory Road | Construct tight diamond interchange | $23,000,000 |
| Alpha Road | On the north, provide cul-de-sac at US 35 and maintain connection to Heller Drive; on the south, construct connection to Factory-Orchard Connector using existing right-of-way | $613,000 |
| Orchard Lane | Construct US 35 grade separation over Orchard | $13,547,000 |
| Valley-Trebein Road | Construct diamond interchange with one loop ramp | $20,90,000 |
| | **TOTAL COST** | **$65,220,000** |

The preliminary recommendation package was presented to the Oversight Committee on May 27, 2004. The committee agreed to present the package for public input at the June 17, 2004 public meeting.

### HELLER DRIVE ALTERNATIVES

Hidy Honda requested to meet with the project team on May 19, 2004. They invited representatives of Orchard Lane- and Heller Drive-area businesses from both sides of US 35 to discuss the preliminary recommendations with respect to business access. Access to businesses on the north side of US 35 was a particular concern on the group.

On June 25, 2004, a second meeting was held with the local area businesses to discuss the preliminary recommendation package. To address the business owners' concerns, two additional Oversight Committee meetings were held on July 8, 2004 and August 3, 2004. Business representatives attended both meetings and were allowed one representative "at the table" to participate as a committee member. At both meetings, the group discussed in detail different options to provide better access to the businesses north of US 35. It was decided that revisions would be made to the Preliminary Recommended Alternative to provide more direct access from US 35 to properties and businesses north of US 35 at Orchard Lane. An extension of Heller Drive from Alpha Road to Factory Road and the Heller Drive extension in combination with conceptual westbound US 35 loop ramps were considered.

The Heller Drive extension provided improved access between the Factory Road interchange and the businesses in the Orchard Lane area. The Heller Drive extension was conceptualized as a two-lane road, similar to existing Heller, which would have a bridge over the Beaver Creek, a Conspan-type grade separation with the Creekside Bikeway and a structure over the park road located in the Girl Scout Memorial park that is owned by the Beavercreek Township Park Board. It was understood by all parties that a 4(f) situation existed with regard to the Heller Drive extension and that this recommendation and other alternatives would be investigated further in the environmental phase. Section 4(f) refers to that portion of the original Department of Transportation Act (1966) which requires particular consideration of impacts to publicly owned park and recreational lands, wildlife and waterfowl refuges and historic sites in the preliminary development process. If any of these resources are impacted, the Section 4(f) process will be used to ensure that no feasible and prudent alternative to the use of land from the property exists and that the action includes all possible planning to minimize harm to the property. The Heller Drive alternatives are shown in Exhibits 39 and 40.

| **Heller Extension Alternative with Loop Ramp** | |
|---|---|
| **Description** | Heller Drive is extended as a two-way road from Alpha Road to Factory Road creating a four-way intersection with Factory Road. |
| **Pros** | **Cons** |
| ▪ Provides two-way access from Factory Road to Alpha Road via proposed Heller extension, continuing to Orchard via Heller Drive<br>▪ Four-way intersection at Factory Road and Heller Drive<br>▪ Conspan-type structure can accommodate Girl Scout Memorial park traffic circulation and Creekside Bikeway<br>▪ Acceptable intersection spacing on Factory Road<br>▪ Can be signalized as necessary | ▪ Two loop ramps at Factory Road interchange<br>▪ Right-of-way impacts in old Alpha and near Alpha Road<br>▪ Greater impact to Girl Scout Memorial Park east of and Nutter Park west of Factory Road<br>▪ Higher cost ($4.3 M) not including park structure |

| Heller Extension Alternative | |
|---|---|
| **Description** | Heller Drive is extended as a two-way road from Alpha Road to Factory Road creating a three-way intersection with Factory Road. |
| **Pros** | **Cons** |
| ▪ Provides two-way access from Factory Road to Alpha Road via proposed Heller extension, continuing to Orchard via Heller Drive<br>▪ No impact to Nutter Park<br>▪ Conspan-type structure can accommodate Girl Scout Memorial park traffic circulation and Creekside Bikeway<br>▪ Less right of way impacts<br>▪ Acceptable intersection spacing on Factory Road<br>▪ Lower cost ($3.5 M) not including park structure<br>▪ Can be signalized as necessary | ▪ Right-of-way impacts in old Alpha and near Alpha Road<br>▪ Some impact to Girl Scout Memorial park east of Factory |

The impact to the Nutter Park from the proposed loop ramps west of Factory Road was considered to be extensive; therefore, the loop ramps option was eliminated from further consideration. The Oversight Committee voted to add the Heller Drive extension to the Preliminary Alternative on August 3, 2004. The revised Preliminary Recommendation Alternative was presented to the public as the Recommended Alternative at the fourth and final Public Meeting on August 18, 2004.

# FINAL RECOMMENDATIONS AND STRATEGIC PLAN

## US 35 MAINLINE RECOMMENDATIONS

Analysis of 2030 design year US 35 mainline traffic volumes indicates that the US 35 Levels of Service with the signalized intersections and the current two lanes in each direction are expected to continue to decline to level of service (LOS) E and F as the result of a steady increase in through traffic on US 35 and increased development in the Beavercreek/Xenia area. LOS is a qualitative measure of the effect of traffic flow factors, such as travel time, interruptions, freedom to maneuver, driver comfort, convenience, and (indirectly) safety and operating cost. It is defined in the *Highway Capacity Manual* (Transportation Research Board, 1994) as ranging from *A* to *F*. LOS A is the best rating, indicating free flow conditions. At LOS F, the traffic volumes exceed the roadway's capacity, which may result in queues and stop-and-go conditions.

The goal of this study is to provide a limited access facility for US 35. Removal of the signalized and un-signalized intersections will provide additional capacity on US 35 and address safety issues within the study area.

## US 35 INTERSECTION RECOMMENDATIONS

The recommended alternative shown in Exhibit 41 provides a freeway facility with two through lanes in the eastbound and westbound directions, interchanges at Factory Road and Valley-Trebein Road, and an overpass of US 35 over Orchard Lane.

### Factory Road Interchange

The signalized intersection at Factory Road will be replaced by an interchange. Future evaluation will determine the intersection type and configuration. It is anticipated that the interchange will be a tight urban diamond interchange (TUDI) or a single point urban interchange (SPUI).

### Valley-Trebein Road Interchange

The signalized intersection at Valley-Trebein will be replaced with an interchange. Future evaluation will determine the intersection type and configuration. It is anticipated that the interchange will be a diamond interchange with loop ramps for one or two key movements.

### Shakertown Road

In the recommended alternative, Shakertown Road is relocated to create a four-leg intersection at the relocated North Alpha-Bellbrook Road/Greene County Factory-Orchard Connector intersection. The Shakertown Road alignment continues across this four-leg intersection and becomes the Greene County Factory-Orchard Connector, which terminates at Orchard Lane near the soccer fields. The Greene County Factory-Orchard

Connector provides access to Orchard Lane, the soccer fields and businesses in the Orchard Lane area. The existing Shakertown Road is terminated in a cul-de-sac just south of US 35. Existing Factory Road is realigned to the west, immediately south of US 35 and transitions to North Alpha-Bellbrook Road. Factory Road south of the water and wastewater treatment plant is realigned to intersect with North Alpha-Bellbrook, while the existing Factory Road alignment provides access to the treatment plant and is terminated in a cul-de-sac.

Alpha Road

Alpha Road will terminate in a cul-de-sac both south and north of US 35. The proposed extension of Heller Drive will intersect with Alpha Road and continue to its intersection with Factory Road. South of US 35, a new roadway along the old Alpha Road alignment is provided to access businesses south of US 35 at Alpha Road. This roadway intersects with the Greene County Factory-Orchard Connector on the south and terminates on the north in a cul-de-sac just south of US 35. The Factory-Orchard Connector and the proposed extension of Alpha-Bellbrook Road to the interchange provide access to the businesses and soccer fields located south of US 35.

Orchard Lane

US 35 will bridge over Orchard Lane in the elevated section of US 35. There will be no access from US 35 to or from Orchard Lane. Orchard Lane will remain very similar to its existing configuration and maintain its present intersection with Heller Drive. Located north of US 35, the Heller Drive extension begins at the west end of existing Heller Drive, curving to the north to form a T-intersection with Factory Road. The Heller Drive extension provides access between the Factory Road interchange and the businesses in the Alpha Road and Orchard Lane area, north of US 35. Orchard Lane will provide a connection between the businesses located north and south of US 35 and provide emergency vehicle access to the area south of US 35.

## TRAFFIC VOLUME DATA AND LEVEL OF SERVICE CALCULATIONS

In addition to the traffic volumes that were collected for the 2003 existing (Exhibits 15 and 16) and the 2030 design year (Exhibits 18 and 19) No Build conditions, traffic assignments were made for the road network defined by the recommended alternative. Exhibit 42 contains the AM traffic assignments and *Highway Capacity Software 2000 (HCS2000)* LOS calculation results for the local road network recommended in this study. Exhibit 43 contains the PM traffic assignments and *Highway Capacity Software 2000 (HCS2000)* LOS calculation results. The recommended alternative with the associated interchanges and network improvements will provide a very acceptable LOS in the 2030 design year for most of the network. There are a few locations, such as the intersections along Dayton-Xenia Road that will require improvements not included in this study. For example, the City of Beavercreek may elect to provide additional turn lanes and/or improved signal timing and progression, especially at the intersections of Dayton-Xenia

Road with Factory Road and Beaver Valley Road. The intersection of Dayton-Xenia Road and Orchard Lane may require signalization in the future. It should also be noted that the area contains several large developable parcels. With appropriate controls of future development and associated driveway accesses, these improvements will be in accordance with the growth rates used in the models.

In addition to the *HCS2000* analysis, Synchro 6 Software was used to model the network for the recommended alternative in the design year along the Factory Road corridor. Because Synchro uses a different algorithm that more accurately models traffic responsive signals in a coordinated system, the Synchro LOS for each intersection is generally one level better than *HCS2000.* Exhibits 44 and 45 show the results of the Synchro analysis of the Factory Road corridor for the 2030 AM and PM peak hour periods, respectively. These exhibits are included in this report because the Synchro analysis was prepared for and used at several public involvement meetings as a means of illustrating the recommended roadway network in the Orchard Lane/Heller Drive area. LOS was calculated for all intersections in the study area with the 2030 Build traffic assignments for both the AM and PM periods. The results are summarized in the following tables.

*Factory Road Corridor*

This section of Factory Road includes the proposed interchanges with Factory Road as well as intersections with Heller Drive extension and relocated Shakertown Road. A tight diamond interchange was recommended for the Factory Road interchange.

Factory Road & US 35 Eastbound Ramps – Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | L | D | D | C | C | C | C |
| | TR | C | C | | | | |
| Northbound | T | B | B | C | C | | |
| | R | C | C | | | | |
| Southbound | T | A | A | A | A | | |
| | L | D | D | | | | |

Factory Road & US 35 Westbound Ramps – Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Westbound | L | C | C | C | C | C | C |
| | TR | D | C | | | | |
| Northbound | T | A | A | B | B | | |
| | L | D | D | | | | |
| Southbound | T | B | B | C | C | | |
| | R | C | C | | | | |

Factory Road & Heller Drive Extension– Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Westbound | L | C | C | C | C | B | B |
| | TR | C | C | | | | |
| Northbound | T | B | B | B | B | | |
| | R | B | B | | | | |
| Southbound | T | A | A | A | A | | |
| | L | C | C | | | | |

Factory Road & Relocated Shakertown Road - Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | L | D | D | D | D | C | B |
| | T | C | C | | | | |
| | R | C | C | | | | |
| Westbound | L | D | D | C | C | | |
| | T | D | D | | | | |
| | R | B | B | | | | |
| Northbound | L | D | D | C | C | | |
| | T | C | C | | | | |
| | R | C | C | | | | |
| Southbound | L | C | C | B | A | | |
| | T | A | A | | | | |
| | R | A | A | | | | |

Alpha-Bellbrook Road & Relocated Factory Road – Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Westbound | LR | C | | B | | C | B |
| Northbound | TR | A | | A | | A | A |
| Southbound | L | A | | A | | A | A |

*Heller Drive*

Heller Drive & Alpha Road- Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LT | A | A | A | A |
| Westbound | TR | A | A | A | A |
| Southbound | LR | B | A | B | B |

Heller Drive & Orchard Lane- Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LTR | A | B | A | B |
| Westbound | LTR | A | B | A | B |
| Northbound | LTR | B | B | B | B |
| Southbound | LTR | B | C | B | C |

*Dayton-Xenia Road Corridor*

Dayton-Xenia Road runs roughly parallel to and north of the US 35 corridor. Within the study area, it includes the intersections with Factory Road, Beaver Valley Road, Alpha Road, Orchard Lane, Hilltop/Trebein Roads and the Trebein Road/Dayton-Xenia Road "T" intersection at the east end of the study area. The un-signalized intersections were assumed to remain un-signalized in 2030.

Dayton-Xenia & Factory Road - Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | T | F | F | F | F | E | F |
| | R | B | A | | | | |
| Westbound | L | F | F | D | D | | |
| | T | C | B | | | | |
| Northbound | L | E | E | E | F | | |
| | TR | C | F | | | | |

Dayton-Xenia & Beaver Valley Road - Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | L | C | C | D | F | E | F |
| | T | E | F | | | | |
| Westbound | TR | F | F | F | F | | |
| Southbound | L | C | F | E | F | | |
| | R | F | F | | | | |

Dayton-Xenia & Alpha Road - Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | LT | A | B | A | A |
| Northbound | LR | C | E | C | E |

Dayton-Xenia & Orchard Lane - Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Westbound | L | B | B | B | B |
| | T | Free Flow | Free Flow | Free Flow | Free Flow |
| Northbound | L | F | F | E | F |
| | R | B | D | | |

Dayton-Xenia & Trebein Road/Hilltop Road - Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LT | B | B | B | B | B | D |
| | R | B | B | | | | |
| Westbound | LTR | B | B | B | B | | |
| Northbound | L | B | F | B | E | | |
| | TR | B | B | | | | |
| Southbound | L | A | A | B | C | | |
| | TR | B | C | | | | |

Dayton-Xenia & Trebein Road - Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Westbound | L | E | F | D | F |
| | R | C | D | | |
| Northbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Southbound | LT | A | C | A | C |

Trebein Road & US 35 Westbound Ramps – Signalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Westbound | L | B | B | B | B | B | C |
| | TR | C | C | | | | |
| Northbound | T | C | C | C | C | | |
| | L | C | C | | | | |
| Southbound | T | B | C | B | C | | |
| | R | B | B | | | | |

Trebein Road & US 35 Eastbound Ramps – Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | L | A | B | A | B | A | B |
| | R | A | A | | | | |
| Northbound | L | A | A | A | A | | |
| | R | A | A | | | | |
| Southbound | T | A | A | A | B | | |
| | R | A | B | | | | |

*Indian-Ripple Road/Upper Bellbrook Road Corridor*

This corridor represents the southern boundary of the study area as it includes Indian-Ripple and Upper Bellbrook Roads that run roughly parallel to and south of US 35. These are two-lane county roads with some horizontal and vertical curves. All intersections within this corridor are presently un-signalized and were assumed to remain un-signalized in 2030.

Indian-Ripple Road & North Alpha-Bellbrook Road - Unsignalized (4-Way Stop), Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | | | |
|---|---|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | | Intersection LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LTR | C | D | C | D | B | C |
| Westbound | LT | B | B | B | B | | |
| Northbound | LTR | B | B | B | B | | |
| Southbound | TR | B | C | B | C | | |

Indian-Ripple Road & Factory Road - Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LTR | A | A | A | A |
| Westbound | TR | A | A | A | A |
| Northbound | L | B | B | B | B |
| Southbound | LR | B | C | B | C |

Indian-Ripple Road & Upper Bellbrook Road - Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LT | A | A | A | A |
| Westbound | TR | Free Flow | Free Flow | Free Flow | Free Flow |
| Southbound | LR | C | C | C | C |

Upper Bellbrook Road & Valley Road - Unsignalized, Capacity Analysis Results:

| Weekday 2030 AM & PM Peak Hours | | | | | |
|---|---|---|---|---|---|
| Approach | Movement | Movement LOS | | Approach LOS | |
| | | 2030 AM | 2030 PM | 2030 AM | 2030 PM |
| Eastbound | LTR | A | A | A | A |
| Westbound | LTR | A | A | A | A |
| Northbound | LTR | B | B | B | B |
| Southbound | LTR | C | C | C | C |

## CONSTRUCTION COST ESTIMATE AND SEQUENCING

Due to the cost and complexity of the recommended alternative, several construction projects will be necessary for the improvements to be implemented. The road network to the north and south of US 35 may be constructed as funding becomes available, although it is critical that the realigned Shakertown Road and the Greene County sponsored Factory-Orchard Connector are operational prior to beginning of construction of the interchanges or mainline US 35.

It is suggested that the construction projects be sequenced as shown in the table below:

| GRE-35 Recommended Alternative Construction Sequencing | | | |
|---|---|---|---|
| Construction Area | Phase | Requires Completion of Previous Phase | Notes |
| Factory-Orchard Connector | 1 | None | Under Design |
| Shakertown Relocation | 2 | None | May be combined with 1, 3 and 4 |
| Heller Drive Extension | 3 | None | May be combined with 1, 2 and 4 |
| Alpha Road Extension | 4 | None | May be combined with 1, 2 and 3 |
| Factory Road Interchange | 5 | Completion of 1 & 2 required, completion of 3 & 4 desirable | May be combined with 6 |
| Valley-Trebein Interchange | 6 | Completion of 1 & 2 required, completion of 3 & 4 desirable | May be combined with 5 |
| US 35 Over Orchard Lane | 7 | Completion of 1 & 2 required, completion of 3, 4, 5, & 6 desirable | 2 Phases (EB Phase and WB Phase) |

The total estimated construction cost of the entire package is $70.3 million in 2004 dollars. This includes right-of-way and construction costs for the improvement package within the logical termini. Staged construction is recommended with the local road connections preceding the construction of the Factory Road interchange, Orchard Lane grade separation and the Valley-Trebein interchange. Due to safety concerns, the three remaining traffic signals should be replaced within a very short time period (1-2 years) to avoid having only one remaining signal for any length of time.

It is recommended that Phase 1 of the project be pursued as a locally-funded construction project because of the need to complete Phase 1 prior to beginning construction of the US 35 mainline and interchanges. Phase 1 is currently under design for the Greene County Engineer's office. From a maintenance of traffic perspective, it will probably be necessary to construct the eastbound US 35 mainline before or after the completion of the westbound mainline, to maintain access to the major crossroads and to accommodate through traffic.

| GRE-35 Corridor Study Final Cost Estimate | | | |
|---|---|---|---|
| | Construction | R/W | TOTAL |
| Shakertown Relocation | $5,700,000 | $1,460,000 | $7,160,000 |
| Factory /Orchard Connector | By Greene County Engineer | By Greene County Engineer | By Greene County Engineer |
| Factory Road Interchange | $18,000,000 | $5,000,000 | $23,000,000 |
| Valley-Trebein Interchange | $19,900,000 | $1,000,000 | $20,900,000 |
| Alpha Road Extension | $318,000 | $295,000 | $613,000 |
| Heller Drive Extension | $3,500,000 | $1,535,000 | $5,035,000 |
| US 35 Over Orchard Lane | $13,547,000 | $0 | $13,547,000 |
| Subtotal | $60,965,000 | $9,290,000 | |
| **Grand Total** | | | **$70,255,000** |

## OTHER RECOMMENDATIONS

### Signal Coordination

To improve the efficiency of movement of traffic along the US 35 corridor prior to removal of the signalized intersections, signal timing improvements and coordination between the three signals could help to alleviate congestion and safety issues on US 35. Although Factory Road has the most cross traffic and consequently takes the most green time away from US 35, the coordination of the Factory Road signal with the adjacent Orchard Lane signal could ensure better traffic flow on US35, Factory Road, Orchard Lane and Valley-Trebein Road.

### Bikeways

Greene County has extensive bikeways including the Creekside Bikeway located within the study area. There are several opportunities to provide bikeway access across US 35, with the objective of connecting the bikeway system north of US 35 with the bikeways south of US 35. The Factory Road interchange could provide a widened structure or a separate structure for the bikeway, for either the SPUI or TUDI type interchanges. Alternatively, the bikeway may continue along a widened Shakertown Road and Greene County Factory-Orchard Connector crossing under US 35 at Orchard Lane. The bikeway may share a widened Orchard Lane or be separated from vehicular traffic by a barrier. If the bikeway follows Shakertown Road and Greene County Factory-Orchard Connector to cross US 35 at Orchard Lane, it may be provided additional grade separations at intersections.

Grade separations should be provided to eliminate bikeway conflicts with Factory Road and the extension of Heller Drive to the north of US35.

Parks and Scenic River

Northeast of the Factory Road interchange is a park which contains a memorial to a Girl Scout troop and their leaders. The extension of Heller Drive will traverse the park at its narrowest point, while providing a grade crossing for the park road to minimize the 4(f) impacts to this resource. Section 4(f) provides that no impacts to parks can occur if there is a feasible and prudent alternative that does not result in such impacts. During the development of the environmental document for the Heller Drive extension, such alternatives will be reconsidered.

Valley-Trebein Road intersects US 35 near the Little Miami River, which holds both State and National Scenic River designations. Construction of the Valley-Trebein interchange will require additional roadway width over the Little Miami River for entrance and exit ramps and tapers. The associated bridge widening will require a design that avoids or minimizes impacts to the Little Miami River. The design should also avoid impacts to the canoe launching area northwest of the Valley-Trebein intersection to insure that no 4(f) impacts occur. The recommended alternative provides access to the canoe launching area, the quarry operations and the agricultural properties south of US35.

Old Alpha Community

The extension of Heller Drive will intersect with Alpha Road very near the community of Alpha. Old Alpha residents have expressed a desire that Heller Drive not provide direct access into their community. The decision of how to address controlling access to the community of Alpha, while allowing access to the Post Office and other businesses and emergency services, is a local decision that is beyond the scope of this study. Local officials will need to weigh these criteria to reach the best decisions for the all those affected.

Soccer Fields

The soccer fields southwest of the Orchard Lane intersection are a community asset as well as a traffic generator. Access to the soccer fields is a key component in the decision to recommend an overpass for US35 at Orchard Lane. The recommended alternative also provides access to the soccer fields and properties south of US35 via the Greene County Factory-Orchard Connector.