# ACCESS MANAGEMENT PLAN FOR SR-741 & MIAMISBURG-SPRINGBORO/ AUSTIN PIKE

# **MONTGOMERY COUNTY, OHIO**



Prepared For: Miami Valley Regional Planning Commission (MVRPC)

> Prepared By: DLZ Ohio, Inc. Project #0321-1003-00

> > August 2003





## TABLE OF CONTENTS

SECTION I PURPOSE AND OBJECTIVES	. 1
SECTION II STUDY AREA BOUNDARIES	. 1
SECTION III BACKGROUND INFORMATION Existing Conditions Dayton-Wright Brothers Airport Master Plan Study Previous Access Management Study Existing Access Management Guidelines, Policies & Limited Access I-75 at Miamisburg-Springboro Pike/Austin Pike Interchange Justification Study (IJS)	<b>1</b> 2 3 4
SECTION IV FINDINGS AND ANALYSIS Findings Analysis	<b>5</b> 5 6
SECTION V RECOMMENDATIONS	<b>7</b> 7 9
SECTION VI REFERENCES	10

#### LIST OF FIGURES

Figure 1	Aerial View of Study Area with Property Information & Proposed Access Control
Figure 2	Roadway Classification Information
Figure 3-4	Synchro Analyses of Potential Signalized Locations

#### APPENDICES

s
s



### SECTION I PURPOSE AND OBJECTIVES

The Ohio Department of Transportation (ODOT) <u>State Highway Access</u> <u>Management Manual</u> has probably the clearest and easiest to understand description of access management: "Access management maintains and improves accessibility to business, commercial, and residential development while discouraging undesirable, congested development that can diminish property values and degrade the character and quality of life of a community, making it economically and socially unattractive. Access management preserves and protects traffic mobility essential to economic and social well-being while providing access as appropriate and necessary in the interest of public and private transportation needs and as compatible with public health, safety and welfare." Essentially, a good access management plan provides the guidance to reach the transportation and social objectives, and allows the various agencies, jurisdictions and private enterprises to provide the development for needed economic growth to sustain an area or region.

The purpose of this study is to review existing access, roadway types/classifications and access management guidelines and policies to recommend a plan for access points and for possible signalization. Additional access control measures such as right in/right out and medians may also be recommended. The study objectives are to minimize congestion, improve safety and develop an access management plan for this developing area in coordination with all jurisdictions.

The land use issues for this area are being looked at as part of a separate study.

## SECTION II STUDY AREA BOUNDARIES

The study area is located in southern Montgomery County, Ohio. The general boundaries are Pennyroyal Road to the south, Washington Church Road to the east, Miami Village Drive/Met Life Driveway to the north, and Wood Road to the west. See Figure 1.

#### SECTION III BACKGROUND INFORMATION

#### EXISTING CONDITIONS

This area of Montgomery County is rural in nature, but has been growing and is rapidly becoming urbanized. As stated in the Austin Pike Area Major Investment Study (MIS), "Traffic congestion on the major arterial roadways within the area has been increasing as a result of a growing population and the trend of decentralization in the Dayton Metropolitan Area." While most land in this study area is currently vacant, much of the recent development nearby has been light industrial and office in nature, with a residential development in the northeast quadrant of the study area. The general trend for land use in this area is to



maintain the light industrial and office use. However, existing zoning for most of these properties allows for commercial, retail and residential uses to be developed.

State Route 741 (SR-741) is a five-lane roadway with a portion of it designated limited access, and a speed limit of 55 miles per hour (MPH). Miamisburg-Springboro Pike /Austin Pike is a two-lane roadway with a speed limit of 45 MPH. ODOT has responsibility for SR-741 and Montgomery County has responsibility for Miamisburg-Springboro Pike/Austin Pike. Sight distance issues are minimal and can be improved easily during property development construction, except at two points along the study area roadways. A vertical curve on SR-741 north of Austin Pike crests near the driveway for Waldruhe Park about 3,000 feet north of Austin Pike (just south of the traffic signal at Miami Village Drive), and a vertical curve on Austin Pike crests about 1,200 feet east of SR-741. The location of possible signalized roadways and/or driveways near these crests will need thorough evaluation.

Adjacent to the study area on SR-741 are three (3) traffic signals to the north and three (3) traffic signals to the south. These signals are included in the signal analysis. The approximate spacing of these signals is: North – Austin Pike to Miami Village Drive, 3950 feet; Miami Village Drive to Spring Valley Pike, 2100 feet; and Spring Valley Pike to Ferndown Drive, 780 feet; South - Austin Pike to Pennyroyal Road, 5100 feet; Pennyroyal Road to Remick Blvd., 1400 feet; and Remick Blvd. to Lytle Five Points Road, 1500 feet.

The existing traffic signals from Austin Pike to the north are interconnected in a Closed Loop Signal System using fiber-optic cable. The cable plant does continue to the south and those existing signals can be interconnected relatively easy. This type of computerized signal system allows for different types of system operation, some of which adjust to changing traffic conditions. This type of system can also be monitored for signal problems from a central location, allowing operators to make remote signal timing adjustments and provide quicker response to traffic signal and signal system malfunctions.

#### DAYTON-WRIGHT BROTHERS AIRPORT MASTER PLAN

The 1998 Dayton-Wright Brothers Airport Master Plan Study shows a proposed relocation of the terminal building, storage facilities and the main driveway access to Austin Pike, east of the existing runway. This relocation plan allows for the development of about 70 acres at the southeast corner of SR-741 and Austin Pike for commercial use with major access to SR-741 and to Austin Pike. The Master Plan also seeks to develop commercial property along Austin Pike between the new main access road and Washington Church Road. The plan also shows the possible relocation/shift of Austin Pike to the north along the airport property.



#### PREVIOUS ACCESS MANAGEMENT STUDY

Prior to this study, the Montgomery County Engineer's Office initiated an access management study for the area primarily around the intersection of SR-741 and Miamisburg-Springboro Pike/Austin Pike. That study was smaller in scope, focusing on the area immediately impacted by the proposed retail development for the southwest corner of the intersection. That study identified these major issues:

- > The area is rapidly becoming urbanized.
- There is strong potential for a new interchange at Miamisburg-Springboro Pike & I-75. This is the preferred corridor for an interchange. Currently, an interchange Justification Study (IJS) is being prepared.
- The proposed retail development in the southwest quadrant of the intersection and the current growth rate of the area will generate traffic volumes at Miamisburg-Springboro Pike & SR-741 that will require a long eastbound right turn lane at this intersection. If the proposed site plan is oriented to Miamisburg-Springboro Pike, this right turn lane will likely extend from SR-741 back through the main drive for the site located on Miamisburg-Springboro Pike. This main drive may meet the criteria for signalization.
- South The South Tech Industrial Park south of the proposed retail development will continue to develop, generating a higher mix of truck traffic. Usually, the amount of trucks on a roadway is in the 3-5% range. Warehouse and industrial developments will generate truck traffic in excess of 10%.
- North The Mead property in the northwest quadrant of SR-741 & Miamisburg-Springboro Pike will desire access to SR-741 and to Miamisburg-Springboro Pike when it is developed.
- East The Montgomery County Engineer's office is planning to widen Austin Pike, from SR-741 east to the Greene County Line, to five lanes.
- West Rapid development is expected west of I-75 to relocated Byers Road and Wood Road (where a High School is planned), due to the proposed new interchange.
- Provide one major signalized access on Miamisburg-Springboro Pike to the potential developments north and south of Miamisburg-Springboro Pike between I-75 and SR-741 to minimize access issues and improve safety.



A preliminary evaluation of interchange designs indicates a diamond interchange design may work for the freeway access and provide the best spacing for access along Miamisburg-Springboro Pike.

This study to develop an access management plan is a result of the initial access study of the smaller area, which highlighted issues and the need for a more comprehensive plan that all the jurisdictions in the area could use in making decisions with regards to roadway access.

# EXISTING ACCESS MANAGEMENT GUIDELINES, POLICIES & LIMITED ACCESS

Currently, guidelines or policies on access management have not been prepared for the Montgomery County segments of roadway. However, the county does have a thoroughfare plan, which establishes a roadway/right-of-way design guide. Under this plan Miamisburg-Springboro/Austin Pike is planned for up to a five-lane roadway in a 90-foot right-of-way (R/W) and SR-741 is indicated as a possible seven-lane roadway in 120 foot R/W.

ODOT's <u>State Highway Access Management Manual</u> establishes procedures and standards to protect the utility, function, capacity and safety of the state highway system. SR-741 was originally classified as a Category II highway. However, during the review process of the Traffic Impact Study for the retail development, it became clear that the area was rapidly becoming urbanized. Therefore, ODOT reclassified this section of SR-741 to Category III. For urban highways, Category III recommends signal spacing based on one-half mile intervals. One-quarter mile spacing may be allowed when there is no reasonable alternative access to the general street system. See Figure 2 for roadway classification information.

In the late 1970's, ODOT acquired right of way along SR-741 from the Warren County/Montgomery County line, north to Kingsridge Drive. This acquisition established a 120 foot right of way and it created Limited Access (L/A) control for most of the roadway (just south of Austin Pike to Kingsridge Drive). Points of Permissible Access were established at existing driveways and streets. Some driveways were combined in the process to reduce access points.

# I-75 AT MIAMISBURG-SPRINGBORO PIKE/AUSTIN PIKE INTERCHANGE JUSTIFICATION STUDY (IJS)

As stated in the Major Investment Study (MIS) for the Austin Pike Area Transportation Study, the adopted transportation plans for the Miami Valley Region and some Municipalities within the proposed study area stress the need to increase roadway capacity to sustain the region's growing population and to support planned economic development.

The IJS was developed because key roadway segments, intersections and interchanges along SR-725, SR-73, and SR-741 are currently congested and will become more congested in the future. Traffic congestion has been increasing as



a result of the growing population and economic base. Economic growth in the area reflects the trend of decentralized employment growth, especially in the SR-725, SR-73 and SR-741 corridors. The SR-725 and SR-73 interchanges with I-75 and the SR-725/I-675 interchange are not adequate to handle anticipated future traffic volumes.

The IJS for an interchange at I-75 and Miamisburg-Springboro/Austin Pike indicates an interchange is possible based on interchange spacing. The purpose of the proposed transportation improvements is:

- To relieve existing and future peak hour congestion on SR-725, SR-741, SR-73, and I-675 in the vicinity of I-75;
- To improve mobility on county, township, and municipal roadways in southern Montgomery and northern Warren Counties;
- > To improve access to and from I-75; and
- > To manage existing and planned future economic development.

The IJS indicates that an additional interchange on I-75, in the vicinity of Miamisburg-Springboro Pike, is justified on the basis of increased economic development. The new interchange would spur economic development in the surrounding area and create in excess of 3,200 jobs. Without the interchange, economic development in the surrounding area will continue to be hindered due to a lack of convenient access to the Interstate. The results also indicate no reduced level of service on I-75 and actually show improved level of service in some segments of the freeway.

The IJS studied various types of interchange designs and recommends a Diamond Interchange (Alternative No. 1) since it meets the capacity requirements for the 2035 projected traffic, requires the least amount of right-of-way, minimizes potential environmental impacts and has the lowest construction cost of the alternatives considered. Alternative No. 1 is a cross between a tight diamond and a regular diamond design due to the width of the I-75 median at Miamisburg-Springboro Pike, which is approximately 200 feet.

## SECTION IV FINDINGS AND ANALYSIS

#### FINDINGS

Based on the background research and field investigation, the following is a summary of findings:

Population, development and the accompanying traffic congestion have been increasing in the study area. The recently completed MIS and draft



IJS for the Austin Pike Area indicate this trend will continue. Transportation Systems Management (TSM) alternatives such as roadway improvements and traffic signal timing/phasing optimization will be needed, but as pointed out in the MIS, these improvements are only part of the transportation solution. Access management is needed in the overall effort to effectively manage the existing and forecasted traffic volumes.

- The amount of vacant land available in the study area provides access management options early in the planning process.
- The changes and development indicated in the 1998 Dayton-Wright Brothers Airport Master Plan Study will likely lead to the need for a signalized access to the airport on SR-741 and also on Austin Pike. These locations are just south and east of the intersection of SR-741 and Miamisburg-Springboro/Austin Pike. The proposed relocation of the main access driveway from the airport to Austin Pike is another potential location for a signal. A driveway from the proposed commercial property along Austin Pike between the new main airport access road and Washington Church Road is possible, but a signalized access to this property will probably be available at the Washington Church Road intersection.
- The vertical curves on SR-741 and Austin Pike must be evaluated closely with respect to sight and stopping distance issues, for potential signal locations and for existing driveway operation near these curves. The curves could be removed or modified during roadway improvements.
- The IJS for the Austin Pike Area indicates a diamond interchange design for an interchange on I-75 at Miamisburg-Springboro Pike is feasible. This type design provides good spacing for major access control and potential signals along Miamisburg-Springboro Pike.
- The existing signal spacing along SR-741 will help in determining a signal spacing plan. The signals to the north and south of the study area are spaced about 800 feet to 2100 feet from each other.
- There is Limited Access (L/A) on SR-741 which starts approximately 515 feet south of the center of the intersection with Miamisburg-Springboro/Austin Pike and continues north to approximately the south right-of-way line of Knightsbridge Drive. This L/A established Points of Permissible Access for existing drives and roadways at the time it was completed.

#### ANALYSIS

To develop access control in the study area, a three-stage approach was used. First, full access points that service the large undeveloped acreage and tie into



existing developments were determined. These major access points will have a strong possibility of being signalized. The signal operation and capacity issues for these proposed signalized major access points were analyzed using Synchro software. To determine the volumes for these potential signalized locations, the Year 2035 traffic volumes for major intersections in the study area were used from the IJS traffic modeling. Projected volumes for these potential locations were calculated by interpolating the IJS volumes and using estimated left turn volume percentages. These potential signal locations were added to the analysis of the existing signals on SR-741 to determine if the proposed locations would work from both capacity and signal timing aspects. The results indicate the proposed locations will work within the existing signal system and that signal spacing of 1/8 to 1/4 mile is feasible, if needed.

Second, points of partial access (right-in/right-out, left-in), which can provide access to one or more properties, were determined. This type of control provides a benefit to the system by reducing traffic volumes at the signalized locations, reducing turning conflicts and improving safety. Adequate spacing between the major/full access points with possible signals and the partial access points or curb cuts were determined from left turn storage needs using the projected volumes, ODOT Location and Design guidelines, Institute of Transportation Engineers (ITE) guidelines for access control and the Points of Permissible Access in the L/A plan.

Third, some full access un-signalized locations were determined to provide needed access to the roadway system. These un-signalized full access points occur where spacing between the possible signalized full access locations allows for all traffic movements, or when access from properties to the main roadway is partial access only and full access is available to another roadway. Right turn or left turn auxiliary lanes on the main roadways may be needed with this access design.

## SECTION V RECOMMENDATIONS

#### GENERAL RECOMMENDATIONS

Using ODOT's <u>State Highway Access Manual</u>, the established Limited Access points and the established signalized access pattern in the area as a guide, the traffic signal timing plan (Synchro) analysis showed positive results. The analysis indicates signals can be installed, when justified, along both SR-741 and Miamisburg-Springboro/ Austin Pike at 1/8 mile to 1/4 mile <u>+</u> spacing and still provide acceptable system operation with LOS D or better for year 2035 with a Miamisburg-Springboro Pike interchange at I-75 and TSM improvements. The analysis also indicates a LOS C or better operation with TSM improvements and no interchange. In both situations, the critical signal operation is at the SR-741 & Miamisburg-Springboro Pike/Austin Pike intersection. The 1/8-mile spacing should only be used in situations where no other means of safe access is



available and a signal can be justified. See Figures 3/3A - 4/4A. Traffic signals can be installed when justified as per the requirements of the <u>Ohio Manual of Uniform Traffic Control Devices</u>. Access on SR-741, signalized or un-signalized, will have to be reviewed by ODOT and may have to be reviewed through their variance request process.

To complete the access management plan, the limiting of access is needed for locations between the signalized major access points to minimize conflicts and maintain a desired LOS D or better for the roadway system. Implementing limited access may require some individual property owners to work together to develop adjoining drives, internal access drives or service roads to get access to their properties.

The following are general recommendations for the SR-741 & Miamisburg-Springboro/Austin Pike Access Management Plan:

- Controlling access to and from the properties on SR-741 and on Miamisburg-Springboro Pike/Austin Pike using driveway spacing recommendations, traffic signals at major access points and right-in/rightout access control, with possible left-in where spacing allows, for safe ingress and egress.
- Using right-in/right-out control on the approaches to the SR-741 & Miamisburg-Springboro Pike/Austin Pike intersection with the future plan to install medians on all four approaches (length of medians to be determined by left turn storage needs approaching traffic signal). L/A restrictions on SR-741 limit the availability of partial access locations.
- Limiting, relocating or closing access at existing sites as development occurs or when safety problems develop that cannot be solved with basic traffic engineering techniques, such as warning sings and peak hour turn restrictions.
- The controlled access locations for major intersections/driveways with potential traffic signals on both SR-741 and Miamisburg-Springboro Pike/Austin Pike may have room for minor shifting along the route, if the shift fits into the operation and capacity of the signal system and the restrictions of the L/A on SR-741. See Figures 3/3A-4/4A.
- If an interchange is built, a traffic signal on Miamisburg-Springboro Pike between I-75 and SR-741 will minimize truck and commercial/retail traffic mix on SR-741 and at the intersection of SR-741 & Miamisburg-Springboro/Austin Pike by providing a direct roadway from the light industrial development to the south and west of SR-741 & Miamisburg-Springboro Pike (South Tech Industrial Park). These types of businesses typically generate moderate truck traffic. However, a signal at this location will cause some reduction in capacity of this section of roadway because



of the minimal distance between the interchange and the major intersection in the roadway network. As traffic volumes increase on Miamisburg-Springboro Pike, an updated traffic analysis should be done to determine if this intersection operation needs to be changed. Such a change may include making the south leg right-in/right-out and the north leg right-in/right-out/left-in with an eastbound left turn phase. The analysis will also need to determine the impact of such changes on SR-741 and the rest of the roadway network.

#### RECOMMENDED ACCESS POINTS

Recommended access points along SR-741 and along Miamisburg-Springboro/Austin Pike are shown in Figure 1:

- = ODOT Access Variance may be required
- SR-741 Corridor (south to north)
  - Signal at Pennyroyal Road
  - Partial access at (right-in, right-out) north of Pennyroyal Road.
  - Full access un-signalized to 3 properties on west side (may require internal roadway or frontage road)
  - Partial access (right-in/right-out) south of West Tech Blvd
  - Potential signalized access at West Tech Blvd
  - Potential signalized access at South Tech Drive
  - Potential signalized access between South Tech Drive and Austin Pike
  - Signal at Austin Pike
  - Partial access (right-in/right-out) at existing drive to frontage road along east side of SR-741
  - Potential signalized access at Taos Drive that ties into the existing frontage road along the east side of SR-741
  - Partial access (right-in/right-out) north of proposed signal at Taos Drive
  - Full un-signalized access south of Miami Village Drive at Waldruhe Park entrance, unless operational problems develop prior to improvements to the vertical curve south of this drive
  - Partial access (right-in/right-out) to two east side properties south of Miami Village Drive (existing combined driveway between properties), with a long term plan to close this drive and utilize a service road to Miami Village Drive
  - Signal at Miami Village Drive
- Miamisburg-Springboro Pike (Wood Road to SR-741)
  - o Potential signalized access at Wood Road & future relocated Byers Rd
  - Partial access (right-in/right-out) at two locations between Wood Road and Byers Road
  - Potential signalized access at Byers Road that also services property to the south, changed to partial access with relocation of Byers Road
  - Potential signalized ramps to I-75 (if interchange justified)
  - Potential signalized access between I-75 and SR-741



- Partial access (right-in/right-out) midway between possible signalized access and SR-741
- o Signal at SR-741
- Full access un-signalized: Byers Road north of Miamisburg-Springboro Pike, Wood Road north and south of Miamisburg-Springboro Pike
- > Austin Pike (SR-741 to Washington Church Road)
  - o Signal at SR-741
  - Partial access (right-in/right-out) between SR-741 and proposed signalized access
  - Potential signalized access east of SR-741
  - Potential signalized access at main driveway to airport and properties to the north (may require internal roadway or frontage road)
  - Partial access (right-in/right-out) east of signalized main driveway to airport (at new street)
  - Full un-signalized access at Miami Village Drive
  - Potential signalized access at Washington Church Road and properties to the south

As the area continues to become more urbanized, additional reclassification of the SR-741 roadway may be needed and access points will need reevaluated.

The recommendations outlined above are guidelines which can be used to enhance a transportation system that will minimize congestion, enhance safety, and compliment the surrounding development, providing needed access and circulation initially and in the future.

## SECTION VI REFERENCES

- Institute of Transportation Engineers. 1991. Traffic Access and Impact Studies for Site Development – A Recommended Practice.
- Institute of Transportation Engineers. 1999. Traffic Engineering Handbook, 5<sup>th</sup> Edition.
- Montgomery County Engineer, MVRPC, ODOT (prepared by DLZ Ohio, Inc.). April, 2003. Major Investment Study – Prepared as Part of the Austin Pike Area Transportation Study (PID MOT-Austin Pike), Volume I: Study Report.
- Montgomery County Engineer (prepared by DLZ and Wilber Smith Associates). May, 2003. Preliminary Draft – Access Request Document for Interchange Justification Study, Proposed I-75 Interchange at Miamisburg-Springboro Pike/Austin Pike, Montgomery, Ohio.
- Ohio Department of Transportation. Current Revision, Ohio Manual of Uniform Traffic Control Devices.
- Ohio Department of Transportation. December, 2001. State Highway Access Management Manual.
- Ohio Department of Transportation, MOT-741-0.06 Right-of-Way (and Limited Access) Acquisition Plans.



# FIGURE 1

#### AERIAL VIEW OF STUDY AREA WITH PROPERTY INFORMATION AND PROPOSED ACCESS CONTROL



# FIGURE 2

## **ROADWAY CLASSIFICATION INFORMATION**



# FIGURE 3-4

## SYNCHRO ANALYSES OF POTENTIAL SIGNALIZED LOCATIONS



## **APPENDIX A**

## SYNCHRO OUTPUTS

The Synchro outputs are quite large. Since data was available from the preliminary draft IJS, the data was used to simulate future conditions using Synchro, with the understanding that future development could change conditions. The outputs will be made available upon request.



# **APPENDIX B**

TRAFFIC VOLUMES (YEAR 2035) FROM AUSTIN ROAD IJS



# **APPENDIX C**

SITE SPECIFIC PHOTOGRAPHS



# APPENDIX D

SR-741 R/W & L/A PLANS

