CHAPTER 5
TRANSPORTATION ELEMENT

5.1 INTRODUCTION.

A community's land use pattern and transportation system interact with one another. Different types of land uses have different transportation needs; for example, single-family residential uses require local and collector streets for collecting and breaking up traffic flow, while commercial uses require arterial streets for handling major traffic volumes caused by shoppers. Conversely, the transportation system may have an impact upon the types of land uses that predominate in a particular area; for example, ready rail and interstate access are important for industrial uses.

The Delaware-Muncie Metropolitan Plan Commission coordinates transportation planning and policy for the metropolitan area. The Commission has the status of a Metropolitan Planning Organization (MPO) under the rules of the U.S. Department of Transportation, and therefore has access to TEA-21 funds and other transportation funds.

Map 5-1, Transportation System, shows the transportation system for the County, including the thoroughfare system, rail system, airport, and bicycle/pedestrian system.

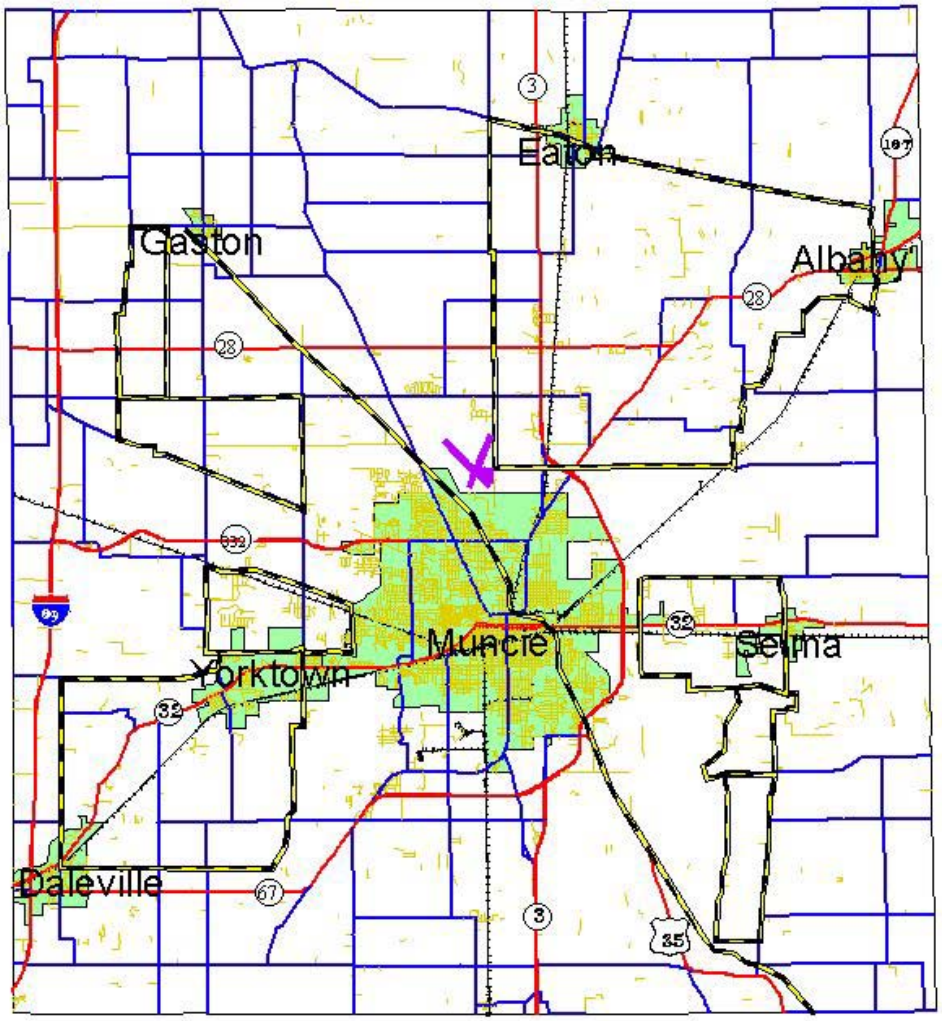
5.2 DESCRIPTION OF TRANSPORTATION SYSTEM.

5.2.1 Thoroughfare System. Of all the modes of transportation in Delaware County, the thoroughfare system (surface transportation) is the most important and visible. Map 5-1 shows the thoroughfare system, broken down by major roadway classification.

The classification system may be described as follows[1]:

- *Highways* are devoted to high-speed, long-distance traffic movement with (ideally) little or not access to adjacent land. Federal highways (i.e., I-69) are multi-lane, and have controlled access. State highways may be multi-lane or single-lane, and may, according to the policy of the Indiana Department of Transportation, have curb cuts.
- *Arterials* move traffic between principal traffic generators. Direct residential access is generally discouraged, but access to commercial or industrial areas is allowed.
- *Collectors* serve internal traffic functions within the urban area, and generally function to connect local streets (below) to arterials. They can also provide direct access to property.
- *Local streets* exist primarily to provide access to adjacent land. They may be found in grid, loop, or cul-de-sac systems.

[1] After Kaiser, Gottshcalk, and Chapin (1994:231).



Map 5-1: Transportation System

5.2.1.1 Highways. Several federal and state highways service the County. I-69 crosses the western portion of the County, and is under the purview of the U.S. Department of Transportation, Federal Highway Administration. U.S. Highway 35 enters the County from the southeast, and becomes part of the Muncie Bypass. State Roads 3, 28, 32, 67, 167, and 332 provide access to Muncie and the surrounding towns, and are under the purview of the Indiana Department of Transportation (INDOT). With the exception of I-69, which traverses the County but does not intercept the City of Muncie, these highways radiate towards the City. State Roads 3 and 67, together with US 35, merge to form the Muncie Bypass.

Daily traffic levels for these routes (except I-69 and US 35) at several heavily-traveled points, and their projected traffic in the Year 2015, are listed in the following table[2]:

Table 5-1: State Highway Traffic Counts

Route	*Intersection/Vicinity*	*Average Daily Traffic (1995)*	*Projected (2015)*
S.R. 3	400 N (Bypass)	12,430	18,470
	Mississinewa River	7,460	9,110
	SR 28	9,420	11,500
	Riggin Road	6,285	9,339
S.R. 28	I-69	6,810	8,310
	SR 3	7,090	8,650
S.R. 32	Country Club Rd.	19,856	29,505
	Andrews Rd. (500 W)	15,850	23,560
	Stockport Dr.	15,556	23,131
	Tiger Drive	13,099	19,464
	CR 400 E	16,296	24,215
S.R. 67	CR 400 S	11,610	17,260
S.R. 167	N/A	N/A	N/A
S.R. 332	Bethel Avenue	25,469	37,145
	Morrison Road	17,206	25,568
	Tillotson Avenue	18,554	27,569
Bypass	Centennial Ave.	23,229	34,517
	Memorial Dr.	18,500	27,491

As can be seen, the state highways carry a great deal of traffic. Most of these points (although not all) are found either in the City of Muncie or in the western portion of the County, where most of the existing land uses are concentrated. SRs

[2] *1995-2015 Delaware-Muncie Transportation Plan: An Intermodal Foundation for the Future* (1994). Delaware-Muncie Metropolitan Plan Commission. The Year 2015 was the furthest year out for average daily traffic projections. Traffic projections were developed prior to the land use plan (Chapter 4), and hence do not take it into account. One-count volumes for two-directional flows were divided in half in order to compare to one-way counts.

32, 67, 332, and the Bypass are approaching capacity in some areas, including areas within the City of Muncie and the County.

5.2.1.2 Arterials. Several arterial streets serve the City of Muncie, including Wheeling Avenue, Tillotson Avenue/Martin L. King Jr. Boulevard, Port Avenue, McGalliard Road, Walnut Street, Broadway Avenue, and Meeker Avenue. Wheeling Avenue and Port Avenue, which also provide access outside of the City of Muncie. Traffic counts for these streets are shown in the following table:

Table 5-2: Muncie Arterial Traffic Counts

Route	*Intersection/Vicinity*	*Average Daily Traffic (1995)*	*Projected (2015)*
Wheeling Ave.	Moore Road	10,482	15,576
	Ashland Ave	24,101	35,813
	McGalliard Rd.	19,889	29,555
	Lindweth Place	19,590	29,110
Tillotson Ave.	Devon Rd.	24,698	36,699
	Bethel Ave. (SB)	8,703	12,933
	Ethel Ave.	20,590	30,595
Port Ave.	N/A	N/A	N/A
McGalliard Rd.	Tillotson	26,559	39,465
	Walnut St.	30,175	44,838
	Broadway	17,142	25,473
	Elgin Street	15,014	22,311
	Rosewood (WB)	11,240	16,703
Walnut St.	23rd St.	11,832	17,582
	Harvard Ave.	8,587	12,761
	Roosevelt St.	15,019	22,318
	Victor St.	10,803	16,053
Broadway Ave.	Siretta	11,259	16,731
	Manor	15,196	22,581
	Princeton	20,672	30,718
	Waid	14,366	21,348
Meeker Ave.	N/A	N/A	N/A

Certain arterials in the City are handling exceptional amounts of traffic, particularly Wheeling Avenue and McGalliard Road. Problems with capacity are developing in areas along McGalliard Road, Tillotson Avenue, Walnut Street, and Wheeling Avenue.

Arterial streets also service the County areas outside of Muncie. The number of arterials is too high to list them all here. Suffice it to say that these arterials generally form a grid pattern in the County, and allow for easy movement between different areas. These roadways have been relatively free from the congestion that troubles some areas of Muncie.

5.2.1.3 Collector/Local System. A grid street pattern is apparent within the older, more densely-developed areas of Muncie and the outlying towns. Newer subdivisions exhibit looping and cul-de-sac streets.

5.2.2 Rail and Air Transportation. As noted in Chapter 3, three main rail lines traverse the County, primarily converging on the City of Muncie. Norfolk Southern operates a line that runs north-south, through the Town of Eaton and the City of Muncie. Another Norfolk Southern line enters the County to the west, travels through Muncie, and then heads northeast through the Town of Albany. CSX operates the last line, which enters the County near the Town of Daleville in the southwest, travels through Muncie, and then extends to the east through the Town of Selma. In 1999, a rail connection between CSX and Norfolk Southern lines in Alexandria (in Madison County, to the west of Delaware County) was constructed, which will increase rail traffic on this route.

With the exception of Muncie's CBD, most rail crossings in the County are at-grade, including those with state highways. At-grade crossings require whistle-blowing safety measures and consideration of alternatives should occur to mitigate adverse noise impacts, particularly in urban neighborhoods such as in and around the CBD where all train traffic converges.

As noted in Chapter 3, the Delaware County Airport contains two runways of 6,500 and 5,000 feet in length. These runways are insufficient for larger passenger and cargo jets (which generally require 12,000-foot runways), and mainly accommodate general aircraft. The smaller Reese Airport with a 2,800-foot runway is located southeast of Muncie. The Delaware County Airport provides an economic amenity and opportunity as a multi-use hub for travel alternatives to the automobile and warrants continued support and enhancement.

5.2.3 Bicycle and Pedestrian Pathways. A bicycle-pedestrian system exists, and is comprised primarily of four on-street bicycle "loops" in each of the four quadrants of the County (northwest, northeast, southwest, and southeast). Typically, the system consists of a shared shoulder, with appropriate signage being introduced along the routes.

The Cardinal Greenway, an off-road trail developed (and currently being developed) out of an abandoned rail corridor, extends from the northwest corner of the County, connects to Gaston before heading southeast, then bisects the City of Muncie before paralleling US 35 to the southeast.

Sidewalks are evident in most older portions of the City of Muncie and outlying towns. These sidewalks are in varying condition; an inventory of conditions should be conducted. Newer subdivisions vary as to whether they include sidewalks at all.

5.2.4 Mass Transit. Bus service exists for the City of Muncie, but not for any of the other municipalities. No light or commuter rail system exists or is planned within the City or County.

5.3 EFFECTS OF LAND USE PLAN.

5.3.1 Thoroughfares. Much of the new residential development takes place in areas around the Towns of Gaston, Eaton, Albany, Selma, and Yorktown. Access to these areas takes place (respectively) along Wheeling Avenue, SR 3, SR 28, SR 32 (east), and SR 32 (west). Many of these corridors are already experiencing traffic congestion. Estimated additional traffic volumes (assuming full buildout, an assumption which, as discussed in Chapter 4, may not occur) are listed in the following table:

Table 5-3: Additional Residential Trip Generation

Corridor	*Additional Residential Acreage*[3]	*Additional Daily Trips Generated*
Wheeling Avenue	450	6,460
SR 3	150	2,150
SR 28	300	4,310
SR 32 (east)	450	6,460
SR 32 (west)	435	6,240
TOTAL	1,785	25,620

[3] Assumes 1.5 dwelling units per acre, and 9.57 daily vehicle trips per unit (as per *Trip Generation Manual* (1997), Institute of Traffic Engineers).

Areas of new office development include the I-69/McGalliard Road interchange, the Central Business District, and the I-69/SR67 interchange. Additional acreages, and the trips generated by these developments, are listed in the following table:

Table 5-4: Additional Office Trip Generation

Corridor	*Additional Office Acreage*[4]	*Additional Daily Trips Generated*
McGalliard (I-69)	250	14,360
CBD[5]	35	5,000
SR67 (I-69)[6]	80	5,560
TOTAL	365	24,920

Areas of new retail development (other than mixed office-retail, which were discussed above in Table 5-4) are located primarily along McGalliard Road. Assuming that this is primarily shopping-center retail[7], then the approximately 600 acres of planned commercial development will result in approximately 56,000 additional daily vehicle trips (assuming full build-out) in the western McGalliard Road corridor.

New industrial uses are focused at the McGalliard Road/I-69 interchange, the I-69 Daleville interchange, and eastern McGalliard Road. The following table lists the traffic impacts at these areas:

Table 5-5: Additional Industrial Trip Generation

Corridor	*Additional Office Acreage*[8]	*Additional Daily Trips Generated*
McGalliard (I-69)	950	14,060
McGalliard (east)	220	3,260
SR67 (I-69)	350	5,180
TOTAL	1,520	22,500

In conclusion, the Land Use Plan substantially impacts upon several corridors. Improvements to these corridors, in addition to major modifications of the thoroughfare system, will be required to accommodate these land uses.

5.3.2 Other Impacts. Industrial uses are generally placed in close proximity to rail lines. The rail usage of these uses is unknown, and will be heavily affected by the types

[4] *Trip Generation Manual* (1997) Institute of Traffic Engineers. Assumes 3.32 trips generated per employee, and 17.3 employees per acre.
[5] Mixed office/specialty retail; assumptions include: 30% retail (22.36 trips per employee), 70% office. Some replacement of residential taken into account.
[6] Mixed office/fast-food retail; assumptions include: 30% fast-food retail (5 seats per acre, 19.52 trips per seat), 70% office.
[7] Assumptions include 42.92 trips per 1,000 s.f. of gross leasable area, and a floor-to-area ratio of 0.05.
[8] *Trip Generation Manual* (1997) Institute of Traffic Engineers. Assumes 3.02 trips generated per employee, and 4.9 employees per acre.

of industries that are marketed by the local economic development program. Rail lines are more often utilized by heavy industrial users, which points to more impacts being experienced at the I-69/McGalliard Road interchange, where most of the heavy industrial users are expected to located.

Existing usage of bicycle and pedestrian facilities is unknown. An increase in usage may be expected, proportional to population increase.

5.4 THOROUGHFARE IMPROVEMENTS.

Map 5-2, Transportation Plan, describes the proposed projects and activities for accommodating the increased population and employment expected through the implementation of the Land Use Plan and for maintaining and enhancing regional access. Components of the proposed projects and activities are described below:

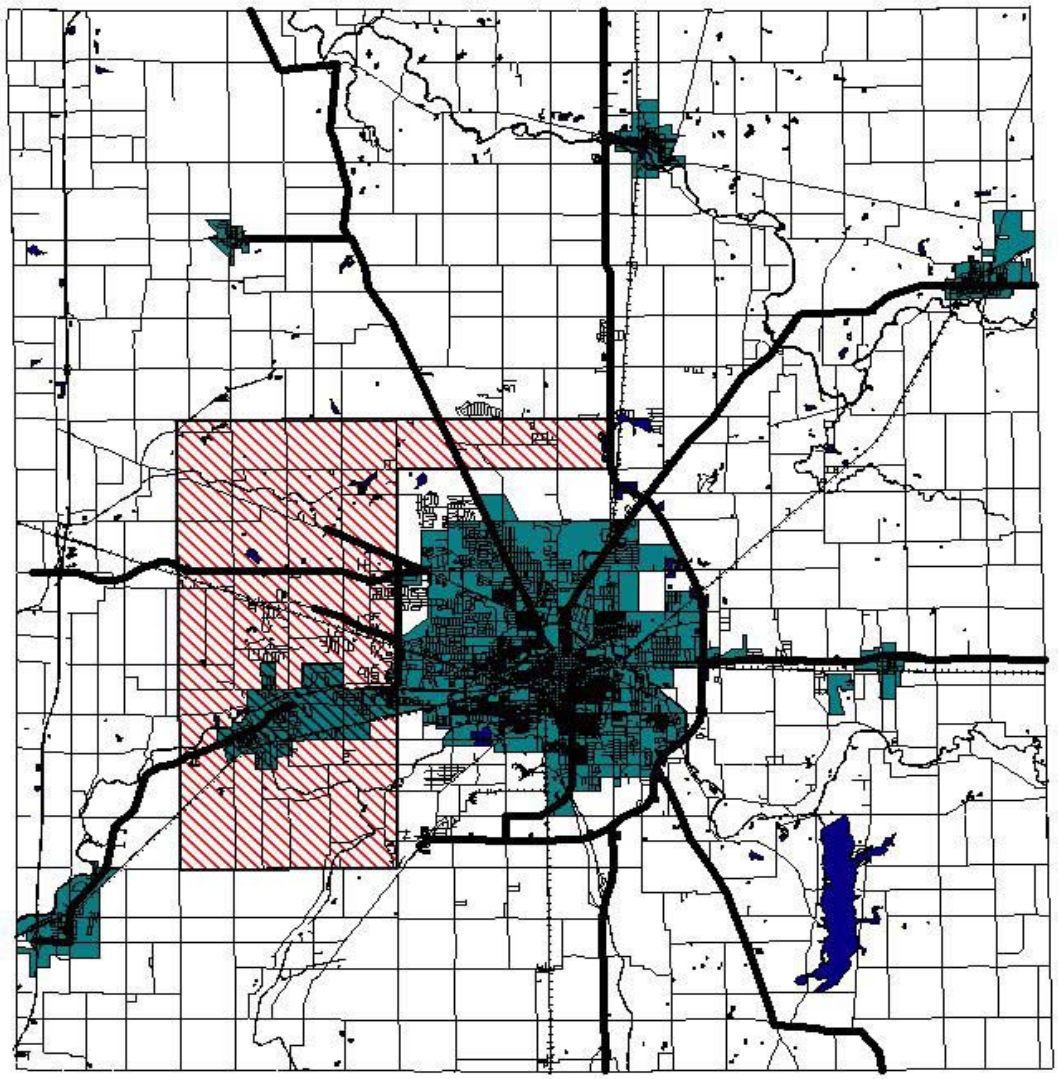
5.4.1 Accommodation of Western Growth & Arterial Circulation. This is an important transportation project for alleviating existing and projected congestion in the McGalliard Road corridor and for improving circulation and congestion of north/south arterials. The project would also provide access for the residential development west of Muncie, as proposed in the Land Use Plan, and enhance regional connections.

The concept of a western loop, connecting with the By-Pass, has been proposed and re-proposed at several points over the last two decades. A western loop alignment was listed in the 1977 Plan. The design of the western loop was to be equivalent to the design of the existing Bypass, i.e., four moving lanes, controlled access, etc.

With the high cost of a new route such as this and the need to address the congestion and circulation issues previously noted, the Transportation Plan calls for a traffic engineering study of the urban arterial system to determine how to best address these issues in the most cost-efficient manner. If new roadways are proposed, the study should determine the best alignment for the routes. Land use is also a key element of the study. If new roadways are endorsed, land use along the corridor must be addressed and the projections on the Land Use Plan in Chapter 4 should not be considered finalized until this arterial study is completed.

5.4.2 Access Roads to Focused Residential Development. As discussed in Chapter 4, residential development is primarily focused around the Towns and in the area west of Muncie. These residential areas will require adequate access in order to be viable. Residents of these areas will primarily work and shop in the City of Muncie, so transportation access should be aligned accordingly.

Many of the improvements listed here will not require roadway expansion. Instead, appropriate signage and striping to clarify routes and lanes and resurfacing/maintenance should be priorities. In addition, traffic flow will be generally improved through the



Map 5-2: Transportation Plan

implementation of right-turn lanes and signalized intersections. Affected corridors are discussed as follows:

Wheeling Avenue. The additional traffic generated from Gaston's residential areas will total about 6,500 daily vehicles, or about 650 vehicles during peak hour. Even adding this to the approximately 525 peak-hour vehicles in the vicinity of Moore Road, the two-lane configuration should suffice. Right-turn lanes should be a priority within the City of Muncie. The CR 850N stub that connects the Town of Gaston to Wheeling Avenue may require lane-width expansion.

SR 3. This state highway serves as access to the Town of Eaton and to areas outside of Delaware County, particularly Hartford City. The residential areas at Eaton will generate an additional 2,150 daily vehicle trips (215 peak-hour). Again, the two-lane configuration should suffice here.

SR 28. Albany is accessed by this corridor on the east, as is the City of Portland, IN (Jay County). Residential areas located at Albany will generate an additional 4,310 daily vehicle trips (430 peak-hour). This route also provides access to the west – Madison County, Elwood, Alexandria as well as I-69. The existing two-lane configuration will suffice here, although some grading would be a welcome improvement.

SR 32 (east). Selma's residential areas will generate an additional 6,460 vehicle trips (650 peak-hour). This additional traffic may push total vehicles to about 1,860 vehicles at peak hours beyond the Year 2015, which is less than the capacity of the existing roadway (estimated at 2,200 vehicles per lane per hour for a four-lane roadway). SR 32 also provides access east of the County to Winchester, IN (Randolph County).

SR 32 (west). Yorktown's residential areas are expected to generate an additional 6,240 daily vehicle trips (625 peak-hour). When added to existing traffic, total peak-hour vehicle trips could total 1,800 beyond the Year 2015, thereby reaching the (single-lane) capacity of a two-lane roadway. Projected congestion could be mitigated somewhat by the implementation of a western loop, making it premature to discuss roadway expansion projects here. Still, traffic in this area should be closely monitored.

5.4.3 McGalliard Road and Western Muncie. These areas deserve special attention because of the new industrial, commercial, and residential development that is planned here. Particular areas of concern are noted as follows:

McGalliard Road/I-69 Interchange. This major industrial/office node will primarily take advantage of the presence of I-69. Some reconfiguration of the existing interchange (currently a "spread diamond") will be required in order to accommodate increased truck and vehicle traffic. Office and industrial development in this vicinity should incorporate an internal street system that minimizes the utilization of McGalliard Road for intra-development movement.

McGalliard Road/Bethel Avenue Intersection and Vicinity. This area is the focus of concentrated retail development with a great deal of trip generation potential. In order to accommodate some of this traffic, there are thoroughfare plan amendments in effect and planned improvements on McGalliard from Tillotson Avenue to Morrison Road. Improvements to Morrison Road should also alleviate some of the congestion. McGalliard Road itself should be widened to six lanes in this vicinity, with breakdown (turning) lanes. Intersections should be minimized, meaning that commercial development should incorporate frontage roads with a minimum of access to McGalliard.

McGalliard-S.R. 332, Delaware County

Morrison Road. Most of the residential development in western Muncie-Yorktown has access to this north-south roadway, and to little else. Ideally, this roadway should be expanded to four lanes from McGalliard Road to SR 32. Access to the Bypass can be afforded through Jackson Street.

5.4.4 Other Improvements. Several roadway improvement projects are underway which enhance the efficiency of the thoroughfare system, and are not listed on Map 5-2, Transportation Plan. One project is the SR 67 expansion project, now completed, stretching from Daleville to the Bypass. Another is the Hoyt Avenue project, which will provide the CBD with better access from the Bypass/SR 67. Other proposed projects are listed as follows with additional provisions on SR 67:

Madison Street. The importance of Madison Street as an entrance to Downtown Muncie from the Bypass should be recognized and capitalized upon.

Daleville/I-69 Interchange. SR 67 should be able to accommodate the planned industrial and commercial development in this corridor, provided that internal movements are accommodated in a manner similar to that discussed for the McGalliard Road/I-69 interchange (above). As with that other interchange, the configuration of the interchange (currently a "spread diamond") will need to be reconsidered in order to accommodate increased truck and vehicle traffic.

SR 3 and US 35 (south). These two highways provide access to areas outside of the County, including (respectively) New Castle and Richmond. While roadway expansion is not required, signage, striping, and turning lanes are all appropriate improvements that should be incorporated into local and state maintenance programs.

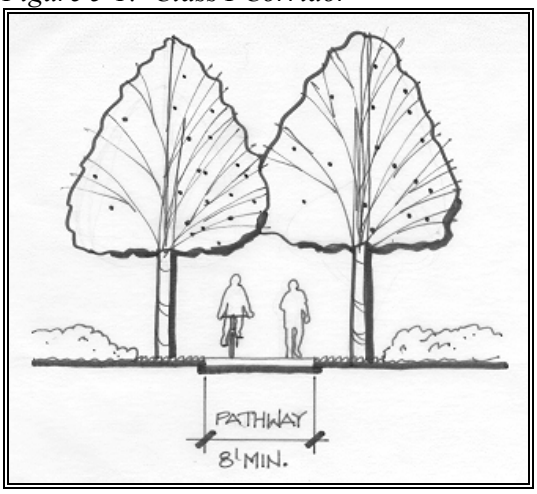
SR 67 (south). With the four-lane expansion project complete, the importance of maintaining SR 67 for the efficient movement of traffic from I-69 to the City of Muncie should be emphasized and it's transportation function protected. As indicated by the Land Use Plan, no major land use changes are proposed.

5.5 OTHER IMPROVEMENTS.

Not all transportation improvements relate to surface transportation. Additional modes are considered below:

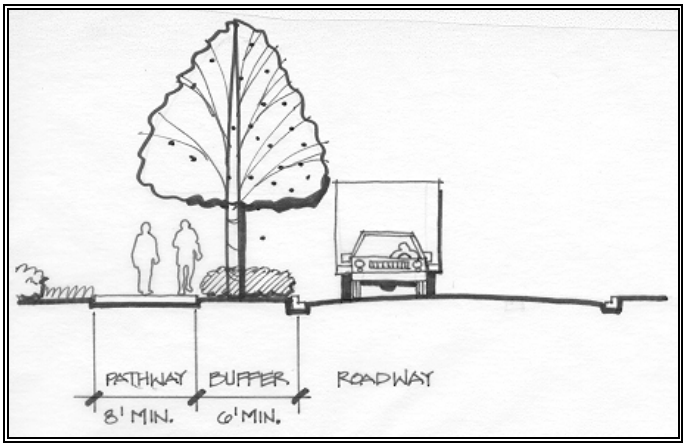
Bicycle and Pedestrian Pathways. Currently, the County's development ordinances do not contain provisions pertaining to on- or off-street bicycle/pedestrian pathways. These pathways may be in many forms, and can be added to roads, either existing or planned, or may be off-road in nature. Examples of such pathways include the following:

Figure 5-1: Class I Corridor



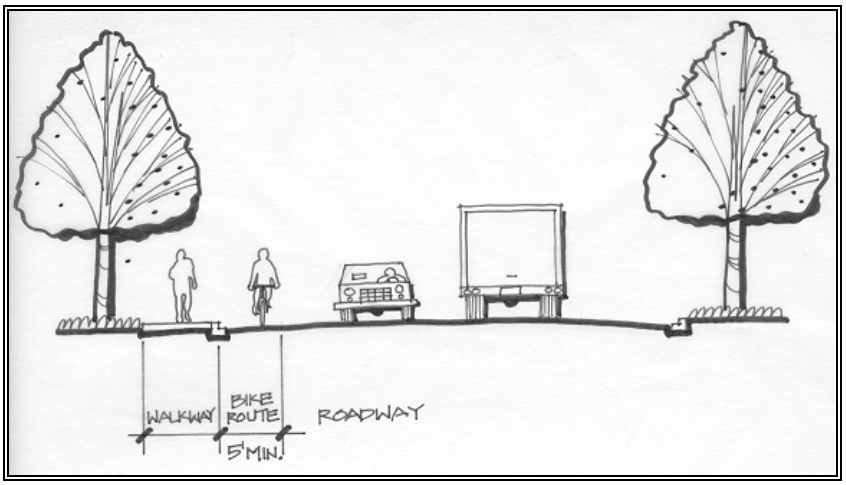
The class I corridor is completely separated from the roadway and is designed to serve a variety of users, including bicycle, equestrian, and pedestrian users.

Figure 5-2: Class IIA Corridor



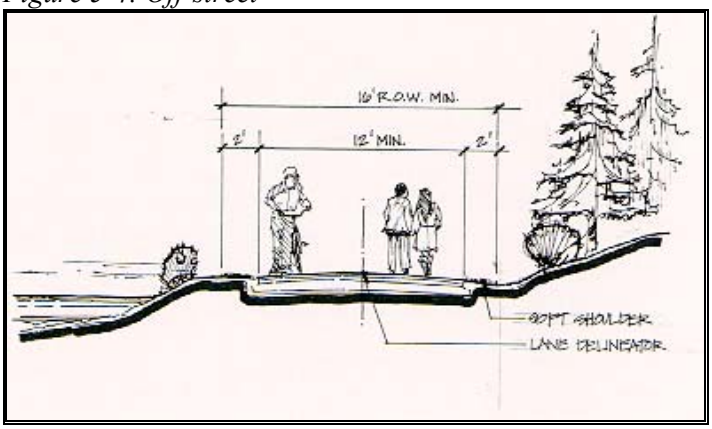
The class IIA corridor separates the path from the roadway with a landscaped buffer not less than six feet in width. This category is preferred when new roadways are constructed in the future.

Figure 5-3: Class IIB Corridor



The class IIB corridor is a striped portion of the roadway reserved for bicycles to separate motorists from bicycles.

Figure 5-4: Off-street



The standard design for all off-street facilities is a multi-use pathway. Off-street zones are all areas where a bicycle facility is located in its own right-of-way, not on a roadway.

Note: The dimensions noted on the figures above are requirements designated by the American Association of State Highway and Transportation Officials (AASHTO) Guide for Development of New Bicycle Facilities.

Design standards for pathways should consider items such as pavement width and material, right-of-way, separation/barriers, vegetation/buffering, signage, striping, bridge and underpass treatment, bicycle storage, emergency phones, intersection treatment, and traffic calming.

- *Commuter Rail*. The growth of the northeast corridor of Indianapolis, and the connection to this region provided by the existing Conrail Railroad, provide an opportunity for the exploration of this transit mode. Currently, a study is underway in Indianapolis regarding transportation options for the northeast corridor; the alternatives under consideration in this study include light rail and commuter rail from Indianapolis north to Fishers and Noblesville. Depending upon the recommendations and outcomes of that study, the feasibility of connecting into that system via commuter rail may be worthy of further research.