CHAPTER 3
STATE OF THE REGION

3.1 Overview

The Miami Valley Region (hereafter the Region), located in southwest Ohio, is defined as Greene, Miami, and Montgomery counties and the cities of Franklin, Carlisle, and Springboro in northern Warren County. The Region is situated approximately 50 miles north of Cincinnati, 70 miles west of Columbus, and 90 miles east of Indianapolis.

As of 2010, the Region is home to approximately 839,000 people in 1,300 square miles with 81 units of county, city, village, and township governments. Montgomery County is the largest county, with 67% of the Region’s total population, and the City of Dayton is the largest city with approximately 141,500 residents. The Region is also home to Wright Patterson Air Force Base (WPAFB), the largest single-site employer in Ohio.

The Region is served by a variety of transportation modal choices. The Dayton International Airport is located in the northern part of Montgomery County and a Greyhound bus terminal is located in Trotwood. Further, an extensive network of roads, transit services, bikeways, and pedestrian facilities provide mobility, accessibility, and connectivity within and outside the Region. Freight infrastructure and facilities support the efficient movement of freight passing through and moving within the Miami Valley.

According to the 2010 Census, the majority of residents in the Region live and work within the same county, although Montgomery County attracts a significant number of its workers from the surrounding counties. The Region is also heavily dependent on personal vehicles, with approximately 93% of work trips made by automobiles averaging a 20.6 minute commute to work.

Under the assumption that the development patterns of the past will remain predominant in the future, it is anticipated that the Region will continue to develop along freeway corridors and their fringes. Overall, the Region is expected to increase in population by approximately 2.6%, with the eventual stabilization of population loss in the older urban areas, continued growth in the suburbs, and some spillover of that growth into the surrounding rural areas. On the other hand, employment is expected to grow by 5% over the next 30 years.

The regional Travel Demand Forecasting Model that predicts transportation assignment forecasts based on future assumptions of development patterns has been updated for use in the transportation planning process.

3.2 The Miami Valley Region Today

When the Region was first settled in the late 1700s, urban land uses followed the river valleys, which were the main transportation arteries prior to the development of mechanized forms of transportation. Most of the heavy industries were located along the rivers, which also provided the major source of water.
Today, employment is still concentrated in some of the original locations even though the Region's economy has since diversified from its industrial base. Although the current land use patterns in the Region have been shaped more by history than by any inherent physical limitations or advantages, the development patterns of the Miami Valley Region can be characterized as following the main transportation network.

Over the past 50 years, the Region has experienced a drastic change in developed areas characterized by an outward movement from the central city to the suburban areas following Interstates I-75, I-70, and I-675 and US 35, as seen in Figure 3.1. According to the 2010 Census, the urbanized area extends north for 20 miles into the City of Troy in Miami County; east for 15 miles into the City of Xenia in Greene County; south for 15 miles to northern Warren County; and west for 8 miles from the Dayton Central Business District (CBD). Further, the 2010 Census indicates that densely settled areas have emerged scattered locations throughout the Region.

3.2.1 Land Use

MVRPC used its GIS capabilities along with the latest aerial photography to examine how the land was utilized in the year 2007. Figure 3.2 shows the generalized land use/land cover in 2007.

Figure 3.2 shows that residential development in the Region is spread fairly evenly throughout the urbanized area, with high concentrations between the eastern half of Montgomery County and western part of Greene County and along I-75 in Miami County. Since 2000, increased residential development has occurred in northern Warren County as well. The Region’s residential development is largely low-density in character.

Commercial development is spread somewhat less evenly, with concentrations around three suburban malls and in the Dayton CBD. Additional commercial areas are found along the major transportation routes, such as Interstates, US Routes, and State Routes, and at the junctions of major roadways, such as the intersection of I-75/I-675, I-70/SR 202, and I-675/SR 48. However, outside of these highly concentrated locations, there is still a mixture of shopping centers, strip center development, and neighborhood shopping districts, with several rural and suburban municipalities also retaining recognizable downtown commercial districts. As a result, most parts of the Region are well served by retail and service facilities.
Figure 3.1
Urbanization Trends:
1950 - 2010

Source: Census 1950 - 2010

May 2016
Figure 3.2
Generalized Land Use
In 2007
Industrial development in the Region generally follows the I-75 corridor, which parallels the Great Miami River and provides access to major factories and office clusters stretching from the City of Piqua at the northern edge of the Region to the southern Montgomery County border. The most important concentration of employment outside the I-75 corridor is located along the Greene/Montgomery County border, near the intersection of I-70 with SR 4, and along I-675.

### 3.2.2 Socioeconomic Data

Three main sources of information were utilized to produce socioeconomic variables. For residence-related variables, the Census was the sole source. For employment, MVRPC used a combination of Covered Employment and Wages by Industry data known as ES202 prepared by the Ohio Department of Jobs and Family Services and obtained from the Ohio Department of Transportation, as well as a commercially available employment database (AmeriList) purchased by MVRPC.

Residence-related data were extracted directly from the 2010 Census at the block level and then aggregated to the Traffic Analysis Zone (TAZ). In addition, the 2006-2010 American Community Survey (ACS) data was used for variables unavailable from the 2010 Census products, for example, automobile availability. For employment-related variables, several steps were taken in order to develop base year data. First, the ES202 data obtained from ODOT was geocoded to the TAZ level. Second, the AmeriList employment database and other in-house databases were used as secondary data sources to complement the ES202 data and fine-tune employment figures. Third, extensive field reviews were conducted throughout the Region for areas with high employment concentrations to verify the locations of individual businesses. Finally, the total employment and employment by 10 industry sectors were generated at the TAZ level following Standard Industry Classification (SIC) codes. The 2000 data were then updated to 2005 and 2010 based on known development patterns. A summary of the Region’s socioeconomic data and the percentage share by county is shown in Table 3.1 below.

<table>
<thead>
<tr>
<th>County</th>
<th>Population¹</th>
<th>Households¹</th>
<th>Employment²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greene</td>
<td>161,573 (20.2%)</td>
<td>62,770 (18.5%)</td>
<td>88,282 (20.0%)</td>
</tr>
<tr>
<td>Miami</td>
<td>102,506 (12.8%)</td>
<td>40,917 (12.0%)</td>
<td>53,256 (12.1%)</td>
</tr>
<tr>
<td>Montgomery</td>
<td>535,153 (66.9%)</td>
<td>223,943 (65.8%)</td>
<td>299,855 (67.9%)</td>
</tr>
<tr>
<td>Warren*</td>
<td>39,780 (4.7%)</td>
<td>12,529 (3.7%)</td>
<td>11,041* (2.5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>839,012</strong></td>
<td><strong>340,159</strong></td>
<td><strong>441,393</strong></td>
</tr>
</tbody>
</table>

Note:  * Warren County includes only the Cities of Franklin, Carlisle and Springboro. The employment number for Warren County is an aggregate of TAZs because the employment numbers were developed at the TAZ level. The area covered by these TAZs is slightly larger than the area covered by the cities of Franklin, Carlisle and Springboro.

Source: ¹ 2010 Census Summary File 1; ² MVRPC;
Figure 3.3
Population Distribution - Population Density by Block Group

Source: Census 2010
May 2016
The Region is home to a population of 839,012. The majority of the population, (67%), lives in Montgomery County. However, a closer look at the population density distribution indicates that the Region has significant variations as shown in Figure 3.3. In general, higher population density is observed around the City of Dayton with the density decreasing away from the center and into the surrounding rural areas. Nonetheless, some of the municipalities in the rural areas also have population densities similar to those found inside the urbanized area.

There are approximately 340,000 households in the Region, with 65.8% located in Montgomery County. The household density distribution is similar to the population density distribution; household density is highest in the developed areas in the City of Dayton and in the immediate suburbs, and gradually decreases outward into the rural areas.

The Region is also home to nearly 442,000 jobs. Similar to the population and household distributions, Montgomery County has the largest employment share, with 67.9% of the Region’s total employment, followed by Greene (20%), Miami (12.1%), and northern Warren (2.5%) counties.

### 3.2.3 Functional Classification

Approximately every ten years, MVRPC, in cooperation with ODOT, conducts a major review of the existing Functional Classification System following the urbanized area changes made by the Decennial Census. MVRPC carried out the most recent update to the functional class system in 2015. MVRPC’s proposed regional functional classification system can be seen in Figure 3.4.

According to FHWA, Functional Classification is the grouping of roads, streets, and highways in a hierarchy based on the type of service they provide. Type of service is defined by combinations of mobility and land access as follows:

- Arterials include those classes of highway emphasizing a high level of mobility for the through movement of traffic, with land access being a secondary function. Interstates and freeways represent the highest class of arterials.
- As their name indicates, collectors collect traffic from the lower class facilities and distribute it to the higher class facilities. Their function is divided equally between mobility and land access.
- Local streets are located at the bottom of the hierarchy, their primary function being to provide access to adjacent land uses.

Using these three major categories as the base, roads are then subdivided into rural or urban as shown in Table 3.2.

It should also be noted that only roadways that are functionally classified above the rural minor collector category are eligible to use federal funds, the exception being bridges on non-classified roads.
Figure 3.4
Highway Functional Classification

Downtown Dayton

Source: FHWA, ODOT & MVRPC
May 2016
### Table 3.2 — Functional Classification System

<table>
<thead>
<tr>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Principal Arterial (Interstate)</td>
<td>• Principal Arterial (Interstate)</td>
</tr>
<tr>
<td>• Principal Arterial (Other)</td>
<td>• Principal Arterial (Freeway/Expressway)</td>
</tr>
<tr>
<td>• Minor Arterial</td>
<td>• Principal Arterial (Other)</td>
</tr>
<tr>
<td>• Major Collector</td>
<td>• Minor Arterial</td>
</tr>
<tr>
<td>• Minor Collector</td>
<td>• Collector (Major and Minor)</td>
</tr>
</tbody>
</table>

Source: FHWA

#### 3.2.4 Multimodal Transportation System

The Region offers a variety of multimodal transportation opportunities as seen in Figure 3.5. The Region is served by the Dayton International Airport located in the northern part of Montgomery County, three Interstate highways, and a Greyhound bus terminal located in Trotwood.

Together they connect the Miami Valley Region to other regions in the U.S. by air and ground. Within the Region, a variety of intermodal facilities, such as an extensive transportation network of roads, transit, bikeways, and pedestrian facilities, provide multi-faceted transportation options for better mobility, accessibility, and connectivity. The Region’s roadway networks include three interstates (I-70, I-75, and I-675), freeways, and principal arterials, including the intersection of I-70/I-75, a major focal point for intermodal traffic.

Figure 3.6 illustrates multimodal freight infrastructure and facilities located in the Region. Networks of railroads, pipelines, and roadways, along with facilities such as the Dayton International Airport and truck terminals, support the efficient movement of raw materials, manufactured items, merchandise, and/or other material goods passing through and moving within the Region.

The Region is also served by four transit agencies. The Greater Dayton Regional Transit Authority (GDRTA) serves Montgomery County residents with an extensive network of seven different types of fixed routes covering nearly 1,000 miles of directional roadways serving approximately 9 million passenger trips per year. Further, GDRTA’s Transit Hubs, located throughout Montgomery County, connect the central city and the suburban areas with bus services at centralized locations.
Greene County is served by the Greene County Transit Board (Greene CATS) on a demand-responsive basis, providing over 185,000 one-way passenger trips per year. Recently, Greene CATS introduced flex-route service from Fairborn to Beavercreek, from Xenia to downtown Dayton, and to provide east-west transit services within Xenia and Fairborn. The Miami County Transit System which consolidated with the City of Piqua Transit System in 2007, provides demand-responsive transit service for Miami County residents including residents of the City of Piqua, with approximately 62,300 passenger trips per year. The Warren County Transit System provides demand-responsive services in Warren County and provides 66,000 passenger trips per year.

The Region offers excellent opportunities for pedestrians and bikers, with an extensive network of bikeways and sidewalks. Further, intermodal facilities such as Park-N-Bike and Park-N-Ride are located throughout the Region.

3.2.5 Airports

The Miami Valley has a long aviation history since the ideas of two young bicycle shop owners became a reality with the first flight of the Wright-B Flyer in 1903. This tradition is continued today at Wright-Patterson Air Force Base, one of the premier aviation research and development centers in the world, and also at the Dayton International Airport, the United States’ top 90-minute air market. In addition to the Dayton International Airport, the Region is served by four general aviation airports eligible for funding by the ODOT (see Figure 3.5). The Dayton International Airport is the focal point of the Region’s air transportation network, including freight. The other airports in the Region are mainly general aviation airports that serve small private planes for personal and agricultural uses.

James M. Cox Dayton International Airport

The James M. Cox Dayton International Airport (DAY) serves as the primary commercial service airport for the MVRPC Region. The Dayton Airport is located approximately 11 miles north of downtown Dayton in northern Montgomery County on 3,870 acres. The Dayton Airport is less than five minutes from the I-70/I-75 interchange and has three runways: a 10,900-foot primary, a 7,000-foot parallel with operations on a parallel runway when necessary, and an 8,500-foot crosswind runway. The dual runway system allows simultaneous operations on parallel runways with landings and departures on the crosswind runway.

There were five airlines serving the airport in 2015, with Delta Airlines as the single largest passenger carrier. For the 12-month period ending December 31, 2014, the airport had an average of 147 aircraft operations per day, 48% of which were air taxi, 29% commercial, 22% general aviation and less than 1% were military. There are 31 aircrafts based at this airport. There are more than 85 passenger flights a day with nonstop service to 12 major domestic markets carrying over a million passengers annually. In 2015, total passenger enplanements at the Dayton International Airport were 1,072,620. That is a decrease of 6.2 percent from the total passenger enplanements in 2014.
Figure 3.5
Multimodal Passenger Facilities

Sources: GDRTA, Greene CATS, and MVRPC

May 2016
Figure 3.6
Multimodal Freight Facilities
Atlanta, Chicago and Dallas, respectively, are the three busiest domestic routes for the airport between December 2014 and November 2015.

Overall, passenger traffic continues to decrease at the Dayton airport. Passenger traffic at the airport dropped from 162,311 in the first two months of 2014 to 152,061 during the same time period in 2015. In 2015, Dayton airport carried over 8,540 tons of air cargo, a decrease of 6.5% over 2014. The majority (90%) of air cargo through the Dayton airport is FedEx freight.

The City of Dayton continues to pursue a strategy for re-use of the former UPS Cargo Hub at the airport. The facility was acquired by the Industrial Realty Group, a specialist in re-using old sites. It is marketing the building to potential tenants for uses that could include air freight and cargo sorting, manufacturing, storage, bulk commodity distribution, and even an office call center. Because of the building’s size — 1.2 million square feet — its managers envision it as home for multiple tenants and mixed uses. A project, currently under development, could extend rail service to the facility.

Greene County Lewis A. Jackson Regional Airport

The Greene County Lewis A. Jackson Regional Airport (I19), situated 8 miles east of Dayton in Beavercreek Township, is undergoing numerous improvements to support increasing general aviation needs in eastern Montgomery County and Greene County. The airport underwent a significant expansion in 2005, adding runway and taxi length as well as service buildings and roads. The Greene County Regional Airport Authority owns the airport and is comprised of seven members of the community.

The 3,975 feet of paved runway at the airport was extended to 4,500 feet with FAA and local funding. For the 12-month period ending September 10, 2015, the airport had an average of 117 aircraft operations per day, 100% of which were general aviation. There are 56 aircrafts based at this airport.

Dayton-Wright Brothers Airport

The Dayton-Wright Brothers Airport (MGY) is a general aviation airport located approximately 12 miles south of the City of Dayton, on State Route 741. I-75 allows easy access to and from the airport. The Dayton-Wright Brothers Airport covers an area of 541 acres which contains one asphalt paved runway (2/20) measuring 5,000 feet.

For the 12-month period ending August 2, 2013, the airport had 89,060 aircraft operations, an average of 244 per day: 93% general aviation, 7% air taxi, and <1% military. There are 73 aircraft based at this airport.

Piqua Hartzell Field Airport

The Piqua Airport — Hartzell Field, home to 27 aircrafts, is located approximately 3 miles from downtown Piqua. The airport has a 4,000-foot runway and is the home of the Hartzell Propeller Factory Service Center. For the 12-month period ending September 25, 2015, the airport had an average of 28 aircraft operations per day: 59% transient general aviation, 39% local general aviation, and 2% air taxi.
3.2.6 Journey to Work Characteristics

The Region’s journey-to-work characteristics were examined for Greene, Miami, Montgomery, and Warren counties using data from the 2006-2010 American Community Survey (ACS) 5-year estimates. Warren County was included as a whole for journey to work analysis purposes since detailed place “city” level data is unavailable for the cities of Franklin, Carlisle, and Springboro in the Region. However, an examination of available data indicates that over 60% of Franklin, Springboro, and Carlisle residents worked outside Warren County. This is consistent with the location of these municipalities at the edge of the Montgomery/Warren County border.

Work trip characteristics were examined because, although work trips make up only 10% of person trips during peak commute hours, that increment often makes the difference in straining the capacity of the transportation system. Figure 3.7 summarizes journey-to-work characteristics, including commuting patterns, means of transportation, and average travel time to work for Greene, Miami, Montgomery, and Warren counties.

The ACS data revealed that, although the majority of Greene, Miami, Montgomery, and Warren county residents work in the same county in which they live, Montgomery County was a major “work destination” for commuters living in the surrounding counties. Significant portions of Greene and Miami County residents were found to be traveling to Montgomery County for work. Nearly one-third of Greene County residents (31.2%), and 20.7% of Miami County residents worked in Montgomery County according to the 2006-2010 ACS data.

Average travel time to work was analyzed for the Region using the ACS data. The data revealed the average commute time in the Miami Valley Region to be 21.3 minutes. The average commute time was 20.8 minutes for Montgomery County workers, 19.5 minutes for Greene County workers, and 20.7 minutes for Miami County workers.

Travel trends in the Miami Valley Region follow national patterns. As is the case with the U.S., the automobile represents the preferred mode of travel. According to the 2006-2010 ACS, approximately 84% of the Region’s residents drove their automobile alone to work.

3.3 The Miami Valley Region in the Year 2040

3.3.1 The Region in 2040

The Plan assumes that the development patterns of the past will remain predominant in the future. The Region will spread further away from the central city and beyond the boundaries of existing suburbs. The future of the Region will be characterized by less concentrated, low density development patterns, away from existing urban centers, and by fragmented land uses where complementary developments are not always in close proximity. However, it is expected that there will be a close relationship between transportation and land use, as future development is likely to occur along freeway corridors.

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2 Federal Highway Administration (FHWA), 1995 National Personal Transportation Survey.
MVRPC, as a regional agency, maintains locally adopted future land use plans for jurisdictions located in the Region and constantly updates the data as jurisdictional updates become available. Although future land use plan horizon years vary among jurisdictions, they are good indicators of future growth patterns (see Figure 3.8).

As illustrated in Figure 3.8, residential areas are to remain in the eastern part of Montgomery County, western part of Greene County, and along the I-75 corridor in Miami County. However, it is observed that additional residential developments are planned beyond what is currently developed throughout the Region.

Industrial and commercial areas are planned for the western part of the City of Dayton in the vicinity of SR 49 and southern part of Montgomery County near the county line. In Greene County, commercial areas are planned in the vicinity of the I-675/US 35 interchange and industrial areas along the US 35 bypass south of the City of Xenia. In Miami County, industrial areas are planned on the outskirts of the Cities of Tipp City, Troy, and Piqua.

In addition to the expansion of residential, commercial, and industrial areas, it is expected that a certain level of infill development will occur over the next 30 years. For instance, the greater Downtown Dayton area is attracting more businesses and people; several research facilities have been planned in the vicinity of the University of Dayton, Downtown Dayton and surrounding areas are witnessing a spurt in residential development, the inner suburb of Kettering is attracting office and other retail establishments, and in Moraine, the vacant former General Motors plant complex has been reinhabited by a large overseas automotive glass manufacturing company and several other smaller companies.

In summary, MVRPC anticipates that much of the growth in the Region, as illustrated in Figure 3.9, will continue to occur along the fringes of the I-675 corridor in both Greene and Montgomery counties, the I-70 corridor in Montgomery County, the I-75 corridor in Miami County, and the southern portion of I-75 in Montgomery County. Further development will occur along US 35 from the Montgomery/Greene County border, stretching around the eastern edge of the City of Xenia, and along SR 49 in western Montgomery County. Northern Warren County is also projected to experience new development.
Figure 3.7
Regionwide Journey-to-Work

<table>
<thead>
<tr>
<th>To</th>
<th>Work at Home</th>
<th>Greene</th>
<th>Miami</th>
<th>Montgomery</th>
<th>Warren</th>
<th>Outside Region</th>
<th>Total Working Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greene</td>
<td>2,623</td>
<td>41,630</td>
<td>426</td>
<td>24,126</td>
<td>998</td>
<td>7,583</td>
<td>77,386</td>
</tr>
<tr>
<td>Miami</td>
<td>1,354</td>
<td>1,332</td>
<td>28,494</td>
<td>10,109</td>
<td>239</td>
<td>7,438</td>
<td>48,727</td>
</tr>
<tr>
<td>Montgomery</td>
<td>6,979</td>
<td>23,035</td>
<td>4,404</td>
<td>181,478</td>
<td>5,790</td>
<td>22,646</td>
<td>238,542</td>
</tr>
<tr>
<td>Warren</td>
<td>4,017</td>
<td>2,008</td>
<td>118</td>
<td>12,867</td>
<td>36,955</td>
<td>42,884</td>
<td>98,849</td>
</tr>
<tr>
<td>Outside Region</td>
<td>11,911</td>
<td>9,463</td>
<td>34,460</td>
<td>39,152</td>
<td></td>
<td></td>
<td>94,986</td>
</tr>
<tr>
<td>Total Workers</td>
<td>14,973</td>
<td>79,916</td>
<td>42,905</td>
<td>263,040</td>
<td>83,134</td>
<td>80,551</td>
<td></td>
</tr>
</tbody>
</table>

* Only outside residents working inside the region are considered.

Source: American Community Survey 2006-2010

May 2016
Figure 3.8
Adopted Land Use Plans

Sources: City and County Comprehensive Plans
Greene County: 1974-2007
Miami County: 2003-2007
Montgomery County: 1970-2006
Warren County: 1981-1999

May 2016
Figure 3.9
Projected Areas of Concentrated Growth: 2010 - 2040

1970 Developed Areas
2010 Developed Areas
Probable Growth Areas: 2010 - 2040

Source: MVRPC
May 2016
3.3.2 Population and Employment Projections

MVRPC developed 2040 population and employment projections to identify the Region’s future socioeconomic characteristics and for subsequent use by the travel demand forecasting model and LRTP analyses. Projections were generated for Greene, Miami, and Montgomery counties.

For the 2016 update of the 2040 LRTP, MVRPC used the forecasts developed for the 2012 LRTP based on the 2010 Census population release. Since the last Plan update, the Ohio Development Services Agency (ODSA) had also updated its long range population forecast. MVRPC compared 2015 projections from ODSA and the MVRPC 2012 LRTP to an extrapolated “2015 Census” by extending the 2010-2014 growth based on the population estimates program for an additional year. The ODSA 2040 projections for Greene and Miami counties showed hardly any growth, while MVRPC’s projections appear to be tracking better with the Census Population Estimates Program. Recognizing this, MVRPC worked with ODOT and other interagency consultation partners to be allowed to continue to use its 2012 LRTP population forecast for the 2016 update of the LRTP.

Based on the county level population forecasts, MVRPC estimated county level household changes using the assumption that the group quarter population will remain constant over the planning period and that year 2010 household characteristics will apply through the year 2040. The county level data were then disaggregated to the Traffic Analysis Zone (TAZ) level by assigning known and/or expected growth or decline.

For employment, MVRPC identified several data sources to examine historical trends: Bureau of Labor Market Information of the Ohio Department of Job and Family Services (ODJFS), U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis, and Census County Business Patterns. MVRPC then used the ES202 historical data from ODJFS as the basis to generate 2040 employment forecasts to ensure consistency between the 2010 base year and 2040 horizon year data sources.

Adjustments were also made (at the TAZ level) to the base year employment to account for manufacturing job loses between 2000 and 2010, recognizing that the local economy is moving away from a manufacturing base. The same adjustments were applied to the 2040 projections.

The county level data was disaggregated to the TAZ level by examining a variety of GIS data including:

- Population and urbanized area trends from 1970 to 2010;
- Currently available developable land based on 2007 land use information;
- TAZ proximity to water and sewer service;
- Areas planned for development from local jurisdiction land use plans;
- Areas zoned for development from local jurisdiction zoning plans;
- Areas outside of the 100-year floodplain;
- Subdivision plans acquired from local jurisdictions and/or newspaper development articles; and
- Aerial photography.
Overall, the population of the Region is expected to slightly increase 2.63% over the next 30 years as shown in Table 3.3. However, Miami and Greene counties are expected to gain while Montgomery County is expected to lose population.

Table 3.3 — Population Projections: 2010 – 2040

<table>
<thead>
<tr>
<th>County</th>
<th>Census 2010</th>
<th>MVRPC 2040</th>
<th>% Change (2010 – 2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greene</td>
<td>161,573 (19.2%)</td>
<td>191,945 (23.4%)</td>
<td>18.80%</td>
</tr>
<tr>
<td>Miami</td>
<td>102,506 (12.9%)</td>
<td>109,494 (13.3%)</td>
<td>6.82%</td>
</tr>
<tr>
<td>Montgomery</td>
<td>535,153 (67.9%)</td>
<td>518,788 (63.2%)</td>
<td>-3.06%</td>
</tr>
<tr>
<td>Total</td>
<td>799,232</td>
<td>820,227</td>
<td>2.63%</td>
</tr>
</tbody>
</table>

Source: 2010 Census/MVRPC

Figure 3.10 shows the population percentage changes from 2010 to 2040 at the TAZ level, illustrating where the population growth and decline are expected to occur. It is anticipated that there will be a continuing outward movement of population characterized by the stabilization of population losses in the older urban areas, continued growth in the newer suburbs, and some spillover of that growth into the surrounding rural areas. Thus, the central city and suburbs are expected to experience the highest population declines while the outlying areas, such as southeastern Montgomery County, areas along the I-75 corridor in Miami County and areas between the City of Beavercreek and along US 35, are expected to experience the highest population gains. Areas in and around the new Austin Pike Interchange are projected to see strong growth, including areas in northern Warren County. Further, downtown Dayton is expected to moderately offset the trend of population decline in the central city when considering continued redevelopment efforts.

Table 3.4 summarizes population density by area type between 2010 and 2040. Overall, the densities for the CBD, suburban, and rural areas are anticipated to be higher in 2040 than in 2010, while the urban area is expected to experience lower density in 2040. Specifically, both Greene and Miami counties will have slightly higher densities in 2040 than in 2010 for both suburban and rural areas because of the outward movement of population. Conversely, Montgomery County is expected to experience a slightly different pattern. As a result of the downtown revitalization efforts, the CBD area will have higher density in the year 2040 than in the year 2010. However, urban and suburban areas are expected to have lower densities in the future, primarily because of the population loss that is forecasted to occur over the next 30 years.
Figure 3.10
2010-2040 Population Change Projection by Traffic Analysis Zone

Population Change
- Below -5.0%
- -4.9% - +5.0%
- 5.1% - 25.0%
- 25.1% - 50.0%
- Over 50.1%

Source: MVRPC
May 2016
Table 3.4 — Population Density by Area Type: 2010 – 2040 (Persons per Acre)

<table>
<thead>
<tr>
<th>Area Type</th>
<th>Greene 2010</th>
<th>Greene 2040</th>
<th>Miami 2010</th>
<th>Miami 2040</th>
<th>Montgomery 2010</th>
<th>Montgomery 2040</th>
<th>Total 2010</th>
<th>Total 2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBD</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.48</td>
<td>4.73</td>
<td>4.47</td>
<td>4.73</td>
</tr>
<tr>
<td>Urban</td>
<td>5.63</td>
<td>5.63</td>
<td>7.89</td>
<td>7.89</td>
<td>5.99</td>
<td>5.40</td>
<td>6.10</td>
<td>5.55</td>
</tr>
<tr>
<td>Suburban</td>
<td>1.90</td>
<td>2.35</td>
<td>1.04</td>
<td>1.31</td>
<td>1.99</td>
<td>1.83</td>
<td>1.79</td>
<td>1.87</td>
</tr>
<tr>
<td>Rural</td>
<td>0.14</td>
<td>0.19</td>
<td>0.15</td>
<td>0.16</td>
<td>0.17</td>
<td>0.17</td>
<td>0.15</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Source: MVRPC

Overall, employment in the Region is expected to grow over the next 30 years by approximately 5%. The employment projections by county are summarized in Table 3.5. Both Greene and Miami counties are expected to experience moderate employment growth between 2010 and 2040 (18.81% in Greene County and 7.16% in Miami County). Montgomery County employment is expected to fluctuate. Employment declined from 2005 to 2010 mirroring population losses but is expected to slightly rebound even as it continues to slide as a percentage of the regional employment.

Table 3.5 — Employment Projections: 2010 – 2040

<table>
<thead>
<tr>
<th>County</th>
<th>2010</th>
<th>2040</th>
<th>% Change (2010 – 2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greene</td>
<td>88,282 (20.0%)</td>
<td>104,887 (22.6%)</td>
<td>18.81%</td>
</tr>
<tr>
<td>Miami</td>
<td>53,256 (12.1%)</td>
<td>57,068 (12.3%)</td>
<td>7.16%</td>
</tr>
<tr>
<td>Montgomery</td>
<td>299,855 (67.9%)</td>
<td>301,668 (65.0%)</td>
<td>0.61%</td>
</tr>
<tr>
<td>Total</td>
<td>441,393</td>
<td>463,633</td>
<td>5.03%</td>
</tr>
</tbody>
</table>

Source: MVRPC

In general, it is anticipated that the urbanized areas will experience minor employment decline, while outlying areas will experience slight employment growth through 2040. The greater Downtown Dayton area is projected to experience a moderate resurgence in employment due to various revitalization efforts. However, the employment growth is mainly expected to occur along major road corridors such as Interstate I-75, I-70, US 35, SR 4, and SR 49.

Employment density changes over the next 30 years are summarized in Table 3.6. As a Region, the greater Downtown Dayton Areas and suburban areas are expected to gain employment density between 2010 and 2040 due to downtown redevelopment efforts and the anticipation of jobs following population to the outlying areas of the Region. Urban and suburban areas in Greene and Miami counties are expected to experience the highest employment density growth, while rural area densities will remain constant. Overall, the urban area is the only area expected to have a lower employment density by 2040 (3.07 in 2010 and 2.86 in 2040).
3.4 Travel Demand Forecasting Model

ODOT and MVRPC have worked closely together to establish and maintain a regional travel demand forecasting model since the 1960s (last updated in 2007, with a validation year of 2005). The model is a series of computerized mathematical programs using databases to rationalize the social, physical, and psychological constraints of travel patterns.

3.4.1 Combined OKI/MVRPC Travel Demand Model

The OKI/MVRPC Travel Demand Forecasting Model (TDFM) includes the combined planning regions under the jurisdictions of the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) and MVRPC. The combined OKI/MVRPC TDFM was developed as part of the North-South Transportation Initiative which extended the OKI model to the combined OKI/MVRPC super-region. For MVRPC, the combined model provides additional modeling capabilities including the ability to model and forecast mode choice and the addition of a truck model component. Further, the combined model also incorporated the results of a 1995 external travel survey by ODOT. In 2005, the combined model was updated again to incorporate the results of a household interview survey in the MVRPC Region, change the model interface to Cube Voyager, and improve model functionality. The changes primarily affected trip generation distribution functions in the MVRPC Region. In 2007, in preparation for the 2008 LRTP update, the model was validated using circa 2005 traffic counts and socioeconomic data and in 2011 the horizon year was extended to 2040. The remainder of the discussion in this section focuses on the MVRPC Region.

Figure 3.11 shows the basic model structure and how different components interact with one another. Data inputs are shown in green and the various model steps are shown in pink. The results of the model are then used in model applications (violet) such as congestion management, air quality, or as needed by on-going regional transportation studies.

The OKI/MVRPC Regional Travel Demand Model is based on the conventional trip-based four-step modeling approach. The main model components fall within the following five categories:

- Data Inputs — data inputs include the socioeconomic variables used in trip generation, as well as the transit and highway networks;
- Trip Generation — the process of estimating the number of person trip productions and attractions in each Traffic Analysis Zone (TAZ);
- Trip Distribution — the process of creating joined person-trips by linking trip productions and attractions across the combined super-region;
- Modal Choice — the process of estimating the number of person-trips using a particular mode for each origin/destination interchange; and
- Trip Assignment — the process of accumulating auto and transit trips onto specific highway and transit facilities in the Region.

Figure 3.11 — Basic Model Structure

3.4.2 Data Inputs
Model data inputs fall into two main categories: socioeconomic variables and transportation networks.

Socioeconomic variables at the TAZ level are used as an input to trip generation and can be broadly divided between households and related variables (persons, workers, and autos per household) and employment classified into three categories (low, medium, and high) based on the ability of an establishment to attract trips. Employment was subdivided by category using SIC codes. Table 3.7 shows the industry sectors that comprise each category.

Three main sources of information were utilized to produce the 2010 base-year model. For residence-related variables, the 2010 Decennial Census was the sole source. For employment, MVRPC used a combination of ES202 data prepared by the Ohio Department of Jobs and Family Services as well as a commercially available employment database (AmeriList) purchased by MVRPC.
Households and employment are forecasted for year 2040. For intermediate years, the model has the built-in capability of interpolating between available data sets, 2010-2040. Information on the forecasting methodology and data sources is available in Section 3.3.2 of this chapter. Table 3.8 summarizes 2010 and 2040 Census/forecasted socio-economic variables.

### Table 3.7 — Employment Classification by SIC Code

<table>
<thead>
<tr>
<th>Employment Category</th>
<th>Industry Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Agricultural, Construction, Mining, Manufacturing, and Transportation</td>
</tr>
<tr>
<td>Medium</td>
<td>Fire-Insurance-Real Estate, Public, Service, and Wholesale Retail</td>
</tr>
<tr>
<td>High</td>
<td>Retail</td>
</tr>
</tbody>
</table>

Source: U.S. Office of Management and Budget

### Table 3.8 — Year 2010 and 2040 Forecasted Socioeconomic Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>CBD</th>
<th>Urban</th>
<th>Suburban</th>
<th>Rural</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td># of TAZs</td>
<td>65</td>
<td>209</td>
<td>413</td>
<td>130</td>
<td>817</td>
</tr>
<tr>
<td>Acres</td>
<td>880</td>
<td>30,675</td>
<td>297,967</td>
<td>495,879</td>
<td>825,401</td>
</tr>
<tr>
<td>2010 Census Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>799,232</td>
</tr>
<tr>
<td>2010 Households</td>
<td>2,151</td>
<td>77,584</td>
<td>220,039</td>
<td>27,856</td>
<td>327,630</td>
</tr>
<tr>
<td>2010 Employment</td>
<td>28,042</td>
<td>94,306</td>
<td>303,504</td>
<td>15,541</td>
<td>441,393</td>
</tr>
<tr>
<td>2040 Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>820,227</td>
</tr>
<tr>
<td>2040 Households</td>
<td>2,280</td>
<td>70,336</td>
<td>229,678</td>
<td>32,550</td>
<td>334,844</td>
</tr>
<tr>
<td>2040 Employment</td>
<td>29,653</td>
<td>87,835</td>
<td>329,415</td>
<td>16,730</td>
<td>463,633</td>
</tr>
<tr>
<td>2010 Persons per Household</td>
<td>1.30</td>
<td>2.33</td>
<td>2.41</td>
<td>2.66</td>
<td>2.40</td>
</tr>
<tr>
<td>2010 Workers per Household</td>
<td>0.61</td>
<td>1.11</td>
<td>1.27</td>
<td>1.41</td>
<td>1.22</td>
</tr>
<tr>
<td>2010 Autos per Household</td>
<td>0.63</td>
<td>1.42</td>
<td>1.82</td>
<td>2.26</td>
<td>1.74</td>
</tr>
</tbody>
</table>

Source: 2010 Census/MVRPC

The base-year transportation network is based on the existing year 2010 roadway facilities and available fixed transit routes. The network is updated on an annual basis using a combination of field surveys and orthophotos. Roadway inventory information, such as number of lanes, is then coded in the format required by the model, along with all other relevant information such as roadway capacity and speeds. A transit network, based on the 2010 GDRTA fixed transit routes (local and express), was also developed for two different time periods: peak and off-peak. The travel demand model does not have the capability of forecasting demand-responsive transit services; therefore, mode choice is only available in Montgomery County.

Future-year highway networks are developed for the following years (2019 E+C, 2020, 2030, and 2040) based on the feasibility period in the congestion management project list provided in Chapter 5 and also include completed projects between 2010 and 2015. The 2019 E+C (Existing plus Committed) network includes all projects that are currently funded in the Transportation Improvement Program (TIP). On the transit side, all future year networks are based on current (2015) transit routes, since transit service levels are expected to remain constant throughout the planning period.
3.4.3 Trip Summary Overview

The forecasting model and methodology first replicated existing (2010) conditions. The network was then used to forecast traffic for year 2040 based on the Existing plus Committed transportation system (2040 E+C) and for the year 2040 based on all the projects in the CM list (2040 Plan). Intermediate year forecasts were also produced for years 2020, 2022, 2030, and 2040 for use in the air quality conformity analysis.

Table 3.9 shows trips by trip purpose and mode for year 2010 and 2040 Plan. The table shows trips increasing by approximately 6% from 2010 to 2040.

<table>
<thead>
<tr>
<th>Analysis Period</th>
<th>Person Trips</th>
<th>Vehicle Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Auto</td>
<td>Transit</td>
</tr>
<tr>
<td></td>
<td>HBW</td>
<td>HBU</td>
</tr>
<tr>
<td>2010 Peak</td>
<td>326,621</td>
<td>12,926</td>
</tr>
<tr>
<td>2010 Off-Peak</td>
<td>214,682</td>
<td>22,400</td>
</tr>
<tr>
<td>2010 Total</td>
<td>541,303</td>
<td>35,326</td>
</tr>
<tr>
<td>2040 Peak</td>
<td>327,633</td>
<td>13,090</td>
</tr>
<tr>
<td>2040 Off-Peak</td>
<td>215,140</td>
<td>22,672</td>
</tr>
<tr>
<td>2040 Total</td>
<td>542,773</td>
<td>35,762</td>
</tr>
</tbody>
</table>

Source: MVRPC