Technical Memorandum

State of the System

Prepared for:

Ohio Department of Transportation

Prepared by:

CDM Smith

June 2013

Table of Contents

1. Introduction 1

2. Setting the Stage 2

2.1 Demographics 2
- 2.1.1 Population Growth 2
- 2.1.2 Generational Differences 5
- 2.1.3 Age Distribution 6
- 2.1.4 Automobile Ownership 6
- 2.1.5 Income 6
- 2.1.6 Travel Trends 8

2.2 Land Use 8
- 2.2.1 Land Use Policy 8

2.3 Environment 9
- 2.3.1 Greenhouse Gas Emissions 9
- 2.3.2 Adaptation Planning 9

2.4 Economic Profile 9
- 2.4.1 Gross State Product 10
- 2.4.2 Major Employers 10
- 2.4.3 Exports 10
- 2.4.4 Inland Waterways 10
- 2.4.5 Emerging Trends – Shale Gas Exploration and Production 10

2.5 Fiscal Overview 11
- 2.5.1 Funding Sources for Transportation 11
- 2.5.2 Inflation 13

2.6 Setting the Stage Conclusions 13
- 2.6.1 Demographics 13
- 2.6.2 Mode Options 14
- 2.6.3 Economy 14

3. Goals and Objectives 15

3.1 Process 15

4. Passenger 17

4.1 Roadways and Bridges 17
- 4.1.1 Existing Conditions 17
- 4.1.2 Future Roadway and Bridge Needs 20
- 4.1.3 ODOT Roadway Needs 21
- 4.1.4 Bridge Needs 22
- 4.1.5 Local Roadway and Bridge Needs 24

4.2 Transit 24
- 4.2.1 Existing Conditions of Public Transit in Ohio 24
- 4.2.2 Future Transit Needs in Ohio 25

4.3 Aviation ... 31
4.3.1 Existing Aviation Service in Ohio ... 31
4.3.2 Passenger Aviation Needs ... 33
4.4 Passenger Rail ... 34
4.4.1 Existing Passenger Rail Service in Ohio ... 34
4.4.2 Passenger Rail Needs ... 35
4.5 Intercity Bus ... 37
4.5.1 Private Providers ... 37
4.5.2 Gaps and Future Needs ... 39
4.6 Bikeways ... 41
4.6.1 Bikeway Facility Types ... 41
4.6.2 Sidewalk Facilities ... 45
4.6.3 Statewide Trails of Significance ... 45
4.6.4 Bikeway Conditions ... 47
4.6.5 Developing the State Bicycle Route System ... 47
4.6.6 Developing Ohio's National Bicycle Route System Segments ... 47
4.6.7 Integration with Other Plans and Programs ... 50
4.6.8 Bikeway Summary ... 51
5. Freight ... 52
5.1 Stakeholder Insight Summary ... 54
5.2 Ohio's Freight System ... 55
5.2.1 Rail ... 55
5.2.2 Maritime ... 56
5.2.3 Roadway ... 56
5.2.4 Air Cargo ... 57
5.2.5 Intermodal Container Facilities ... 57
5.3 Economic Trends and Freight Flows ... 59
5.4 Future Needs ... 64
5.4.1 Problem Areas ... 64
6. Ohio Finance ... 68
6.1 Baseline Projection – Roadways ... 68
6.2 Baseline Projection – Transit ... 70
6.2.1 Inflation Indices ... 73
6.2.2 Baseline Roadway Revenue Projection Summary ... 73
6.3 Needs (Roadway and Transit) ... 73
6.3.1 Roadways and Bridges ... 74
6.3.2 Transit ... 75
6.4 Needs vs. Revenues Gap ... 77
7. Conclusions ... 79
APPENDIX A: Acronyms and Glossary ... 82
APPENDIX B: Local Governments Transportation Needs ... 91

List of Tables

Table 2-1: Ohio Population by Age and Gender, 2010 ... 6
Table 2-2: Travel to Work by Mode in Ohio, 2010 ... 8
Table 2-3: Top Ohio Employers, 2012 ... 10
Table 3-1: Goals and Objectives ... 16
Table 4-1: Centerline Miles and Lane Miles by Responsible Agency ... 17
Table 4-2: 2011 Pavement Condition by State Roadway System Classification ... 18
Table 4-3: Roadway Bridges by Responsibility ... 19
Table 4-4: Types of Bridge Needs ... 21
Table 4-5: Summary of State Maintained Roadway Needs, 2014-2040, in Millions ... 22
Table 4-6: Bridge Needs on the State Maintained Roadway System, in Millions ... 22
Table 4-7: Non-major Bridge Needs, in Millions ... 22
Table 4-8: Major Bridge Needs, in Millions ... 23
Table 4-9: Ohio Transit Needs by Category ... 27
Table 4-10: Costs to Maintain Existing Services, 2014-2040, in Millions ... 29
Table 4-11: Costs for Enhanced Transit Services, 2014-2040, in Millions ... 30
Table 4-12: Air Carriers Operating in the Ohio Airport System ... 33
Table 4-13: Historic Enplanements, 2000-2010 ... 33
Table 4-14: *Cardinal* Service Segments and Mileage between Stations ... 35
Table 4-15: Costs to Maintain Existing Services through Year 2040 (2011 Dollars) ... 40
Table 4-16: Costs for Enhanced Transit Services through Year 2040 (2011 Dollars) ... 41
Table 4-17: Total Costs Transit Services through Year 2040 (2011 Dollars) ... 42
Table 4-18: Bike Lane Mileage ... 44
Table 4-19: Bike Route Mileage ... 45
Table 4-20: Shared Use Mileage ... 46
Table 4-21: Total Mileage ... 46
Table 4-22: Trails of Statewide Significance ... 46
Table 6-1: Total Expected Baseline Revenues ... 68
Table 6-2: Federal/State Revenue Growth Rates ... 68
Table 6-3: Historic Revenue Forecast Summary, FY2014 to FY2040 ... 69
Table 6-4: Estimated Forecast of Transit Revenues FY2014 to FY2040 ... 72
Table 6-5: Summary of Ohio Roadway and Bridge Needs, 2014-2040, in Millions ... 74
Table 6-6: Summary of ODOT Roadway Needs, 2014-2040, in Millions ... 74
Table 6-7: Non-state Roadway Needs 2014-2040, in Billions ... 75
Table 6-8: Ohio Bridge Needs, 2014-2040, in Millions ... 75
Table 6-9: Transit Needs by Functional Element, 2014-2040 ... 76
Table 6-10: Ohio Transit Needs by Category ... 76
Table 6-11: Costs to Maintain Existing Services 2014-2040, in Millions ... 76

List of Figures

Figure 2-1: Population Change by County, 2000-2010 3
Figure 2-2: Projected Population Change by County, 2010-2040 4
Figure 2-3: Population Density (people/square mile) 5
Figure 2-4: Percent of Residents with a College Degree 5
Figure 2-5: Percentage of Zero-Car Households, 2010 7
Figure 2-6: Sources of Funding for Transportation in Ohio 12
Figure 2-7: State Motor Fuel Tax Contrasted with Inflation Rates, SFY 2001-2011 13
Figure 4-1: Location of Urban and Rural Public Transit Agencies 26
Figure 4-2: Ohio Airport System, 2012 32
Figure 4-3: Current Amtrak Service Routes in Ohio 36
Figure 4-4: Go Bus Routes and Stops 38
Figure 4-5: Ohio Bicycle Facilities 43
Figure 4-6: Draft National and Statewide Bicycle Routes 48
Figure 4-7: Bicycle Network Gaps - Bicycle Routes by Bike Level of Service (BLOS) Grade 49
Figure 4-8: Sample Bikeway Signs 51
Figure 5-1: Centers of Logistics Employment 53
Figure 5-2: Active Rail Lines, Abandoned Rail Lines, and Rail Intermodal Facilities 58
Figure 5-3: Summary of Modal Split by Annual Volume and Annual Value, 2007 and 2040 60
Figure 5-4: Through vs. Ohio-based Truck Volumes, 2012 Annual 62
Figure 5-5: Total Truck Flows 2012 - 2040 65
Figure 5-6: OH-based Automotive & Chemical Traffic by Truck (2012) with Roadway Bottlenecks 66
Figure 6-1: U.S. Consumer Price Index, 1996-2011 73
Figure 6-2: 2014-2040 Needs vs. Revenues 77

1. INTRODUCTION

The Ohio Department of Transportation (ODOT) is in the process of updating Ohio's long-range transportation plan, *Access Ohio*. The new Plan, with a horizon year of 2040, will include a comprehensive inventory of transportation services and infrastructure, forecasts of transportation demand, asset condition and performance, and an analysis of the trends and issues affecting transportation in Ohio. This plan, which is expected to be published in December 2013, will set the stage for ODOT transportation policies and investment strategies for the coming decades. One of the Plan's primary objectives is to strengthen the connection between the economic health of Ohio and its transportation network.

This *State of the System Report* is a summary of the work completed to-date for *Access Ohio 2040*. The report:

- Identifies the Plan's goals and objectives
- Inventories the existing conditions of all modes
- Explains the most important trends impacting freight transportation
- Specifies future transportation needs by mode
- Details expected revenues through 2040

Public involvement was initiated for the *Access Ohio* plan update in the spring of 2012 with a customer preference survey. The survey gathered input from a statistically valid sample of more than 1,900 households across Ohio. In their survey responses, Ohioans indicated their top transportation priorities were safety and congestion relief. Among the transportation modes, Ohio residents chose highways and public transit as the most important.

In addition to the survey, ODOT has collaborated with the Access Ohio Steering Committee to ensure the final Plan is representative of the views and values of all Ohioans. The Steering Committee met three times in 2012, and more meetings are scheduled for 2013. Additional outreach efforts include soliciting comments through the Access Ohio public involvement website, www.accessohio2040.com.

Additional information on the customer preference survey and the long-range plan can be found at the Access Ohio website: www.access.ohio.gov.

2. SETTING THE STAGE

Transportation is tightly linked to Ohio's economic, social, and environmental challenges and opportunities. ODOT is charged with balancing a set of sometimes competing mandates to operate, maintain, and expand a vast transportation system with limited financial resources. In the 10 years since the beginning of the last statewide planning effort, Ohio has seen a change in the socio-demographic profile of many areas, including a rise in poverty levels and a change in the racial and ethnic composition of some cities. Recent national and worldwide events have refocused public attention on the important link between infrastructure investments and economic competitiveness. Despite the increase in awareness for infrastructure improvements, funding for transportation has remained stagnant. These financial, demographic, and economic considerations will influence ODOT's decision-making as it considers how to balance future maintenance and expansion investment needs. This chapter provides an overview of the macro-level trends and issues affecting transportation conditions in Ohio.

2.1 Demographics

As stated above, one of the major factors affecting ODOT's decisions on how to invest in infrastructure improvements will be the demographic make-up of the state; this includes population growth, generational differences, age distribution, automobile ownership, income, and travel trends.

2.1.1 Population Growth

Ohio ranks seventh in population among states in the United States. According to the U.S. Census, the population of Ohio grew to 11,536,504 by 2010, a 1.6 percent increase over the state's population in 2000. This growth, which is less than the 4.7 percent growth that occurred between 1990 and 2000, occurred unevenly throughout the state. Aside from Franklin County, which is home to Columbus, urban counties home to Ohio's largest cities are shrinking in population, while the neighboring suburban counties are growing. Suburban Delaware County saw a 58.4 percent increase in population from 2000 to 2010, the largest growth rate of any county in the state. On the other hand, urban Cuyahoga County lost 8.2 percent of its population from 2000 to 2010, the largest population decline of any county in the state. Cuyahoga County, home to Cleveland, is still Ohio's largest county, with 1,280,122. The fewest number of residents is found in southeast Ohio's Vinton County, with a 2010 population of 13,435. Ohio ranks 12th in the nation in population density, with an average density of 280.5 people per square mile. **Figure 2-1** presents the state's population change between 2000 and 2010 by county. While the overall population of Ohio is still growing, it is growing at a slower pace than in the past. Understanding these trends – where the areas of growth and decline are now and are likely to be in the future – will help ODOT determine how best to allocate its resources to reinforce existing infrastructure and to invest in new growth opportunities. **Figure 2-2** illustrates the locations where population is projected to grow through 2040.[1]

[1] The figures for population change by county provided by the Ohio Department of Development (ODOD) indicate a negative population change for Greene County from 2010-2040. Based on updated information provided by the Miami Valley Regional Planning Commission (MVRPC), Greene County is projected to experience a population increase of 19 percent over that period. ODOT has reviewed MVRPC's data and concurs that the 19 percent growth projection is appropriate and should be used for the long-range plan update.

Figure 2-1: Population Change by County, 2000-2010

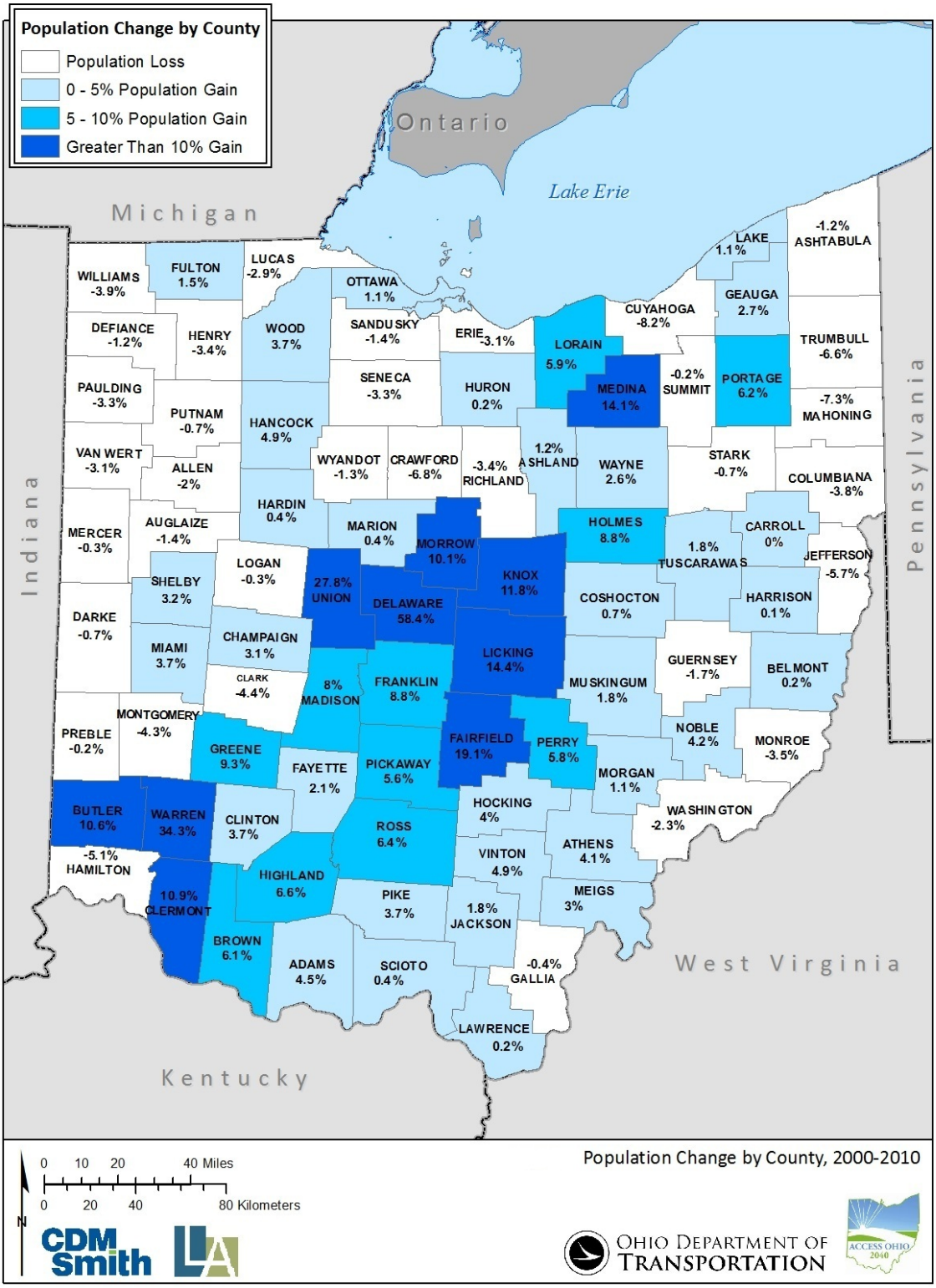
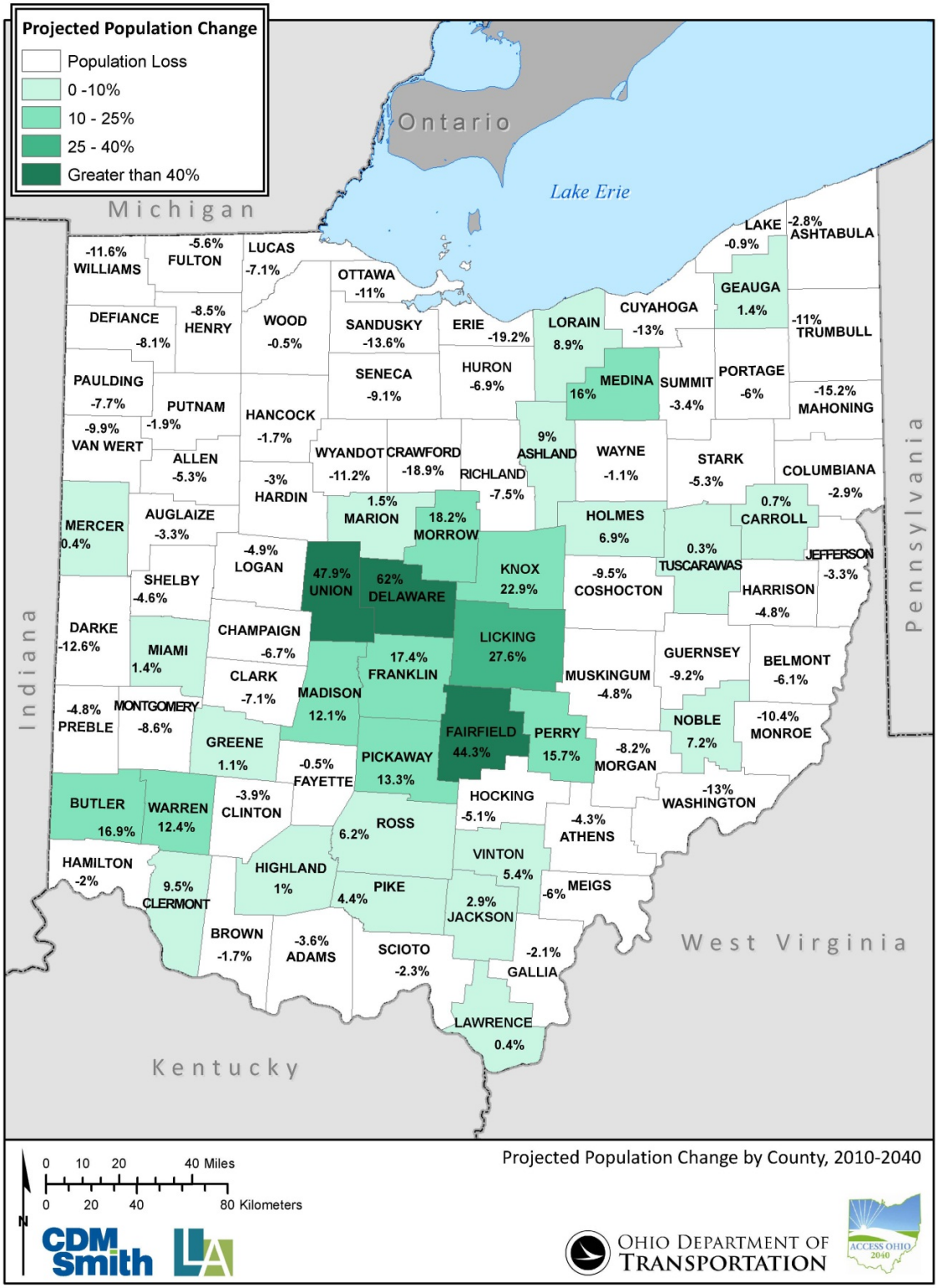


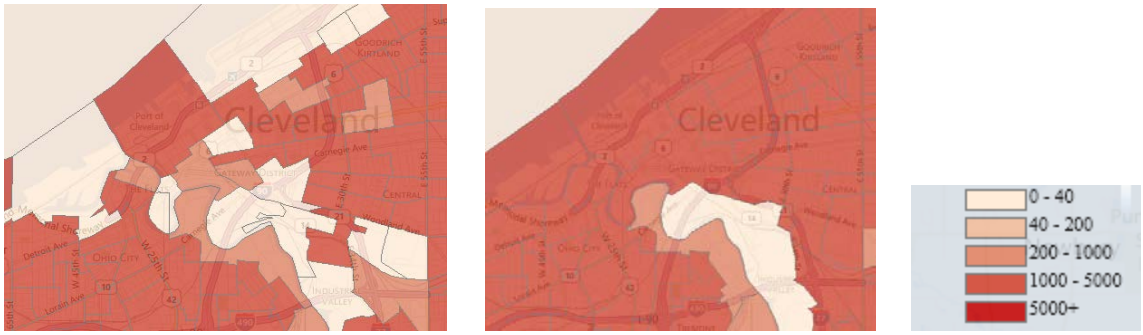
Figure 2-2: Projected Population Change by County, 2010-2040



2.1.2 Generational Differences

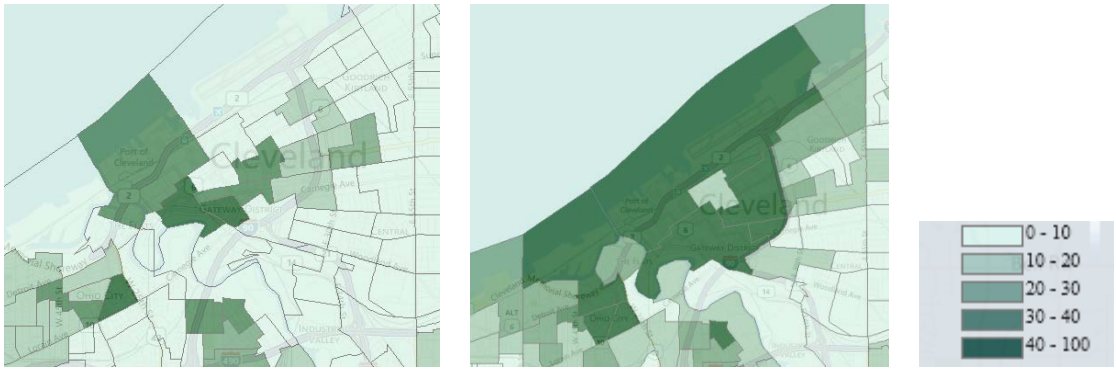
The overall trend to shrinking urban populations masks a potential shift in attitudes towards urban living. Looking closely at the downtowns of Ohio's larger cities reveals a counter-trend: many college-educated individuals are moving to urban centers in Cleveland, Columbus, and Cincinnati. For example, in Cleveland, a city with an overall population decline, population density has increased in downtown areas between 2000 to 2010, particularly on the west and south sides of the city where newer/refurbished apartments and entertainment venues are located (**Figure 2-3**). At the same time, the percentage of college-educated individuals has increased in the same block groups as shown in **Figure 2-4**. A similar comparison can be made for Columbus and Cincinnati. However, smaller mid-sized cities such as Akron, Toledo, and Dayton do not exhibit similar characteristics.

Figure 2-3: Population Density (people/square mile)



2000 2010 Legend

Figure 2-4: Percent of Residents with a College Degree



2000 2010 Legend

2.1.3 Age Distribution

Ohio's population continues to grow and change. The median age of Ohioans continues to increase, up to 38.8 in 2010, compared to 36.4 in 2000 and 33.3 in 1990. A distribution of the population by age and sex is provided in **Table 2-1**. Noble County has the highest median age in the state, at 48.6. The lowest median age is 26.3, found in Athens County, home of Ohio University.

Table 2-1: Ohio Population by Age and Gender, 2010

Age	Number		
	Total	Male	Female
Total	**11,536,504**	**5,632,156**	**5,904,348**
Under 5 years	720,856	367,479	353,377
5 to 9 years	747,889	382,641	365,248
10 to 14 years	774,699	396,152	378,547
15 to 19 years	823,682	420,975	402,707
20 to 24 years	763,116	384,202	378,914
25 to 29 years	718,630	357,837	360,793
30 to 34 years	691,329	344,087	347,242
35 to 39 years	718,462	356,420	362,042
40 to 44 years	761,369	377,896	383,473
45 to 49 years	855,134	420,425	434,709
50 to 54 years	887,057	434,740	452,317
55 to 59 years	786,857	383,440	403,417
60 to 64 years	665,409	320,421	344,988
65 to 69 years	478,864	223,797	255,067
70 to 74 years	371,370	167,142	204,228
75 to 79 years	297,519	126,706	170,813
80 to 84 years	243,833	95,450	148,383
85 to 89 years	153,874	52,291	101,583
90 years +	76,555	20,055	56,500

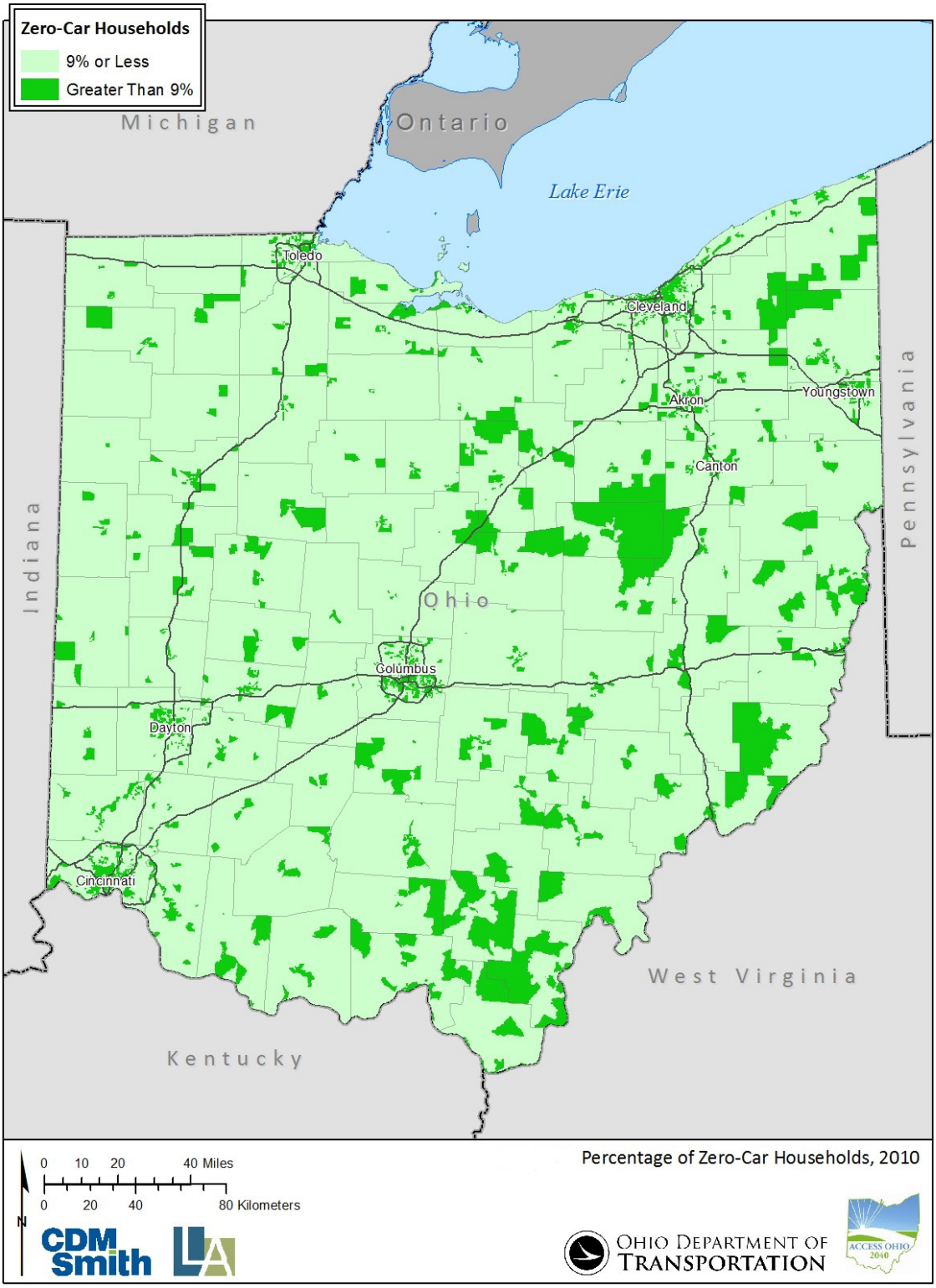
2.1.4 Automobile Ownership

While a majority of work trips are made by driving alone, not all households have that option. For example, 8.1 percent of Ohio households do not own a vehicle, while 33.3 percent only own one vehicle. More than 80 percent of zero-car households are located in urban areas, as seen in **Figure 2-5**. These households have the benefit of increased choices in alternative modes of transportation. Many of the remaining 20 percent of households that do not own private vehicles in rural areas lack access to these alternative modes of transportation.

2.1.5 Income

Based upon the 2006-2010 statistics from the American Community Survey, Ohio's median household income is $47,358. The counties with the highest median incomes are Delaware, Union, Warren, Geauga, and Medina counties. The lowest median incomes are generally located in southern and eastern Ohio. Areas with higher incomes tend to produce a greater volume of vehicle miles traveled (VMT). Areas with lower median incomes have higher than average proportions of households with older residents and no private vehicles, both of which indicate a need for alternative modes of transportation.

Figure 2-5: Percentage of Zero-Car Households, 2010



2.1.6 Travel Trends

Based upon 2006-2010 American Community Survey data, 83.1 percent of trips to work in Ohio are made by individuals driving alone. The second highest mode choice is carpooling, with 8.5 percent of trips to work. All of the modes are shown in **Table 2-2**.

Table 2-2: Travel to Work by Mode in Ohio, 2010

Mode	Total
Drove alone	83.1%
Carpool	8.3%
Public transportation (excluding taxi)	1.8%
Walked	2.3%
Other means	0.8%
Worked at home	3.4%

While an overwhelming majority of work trips are made by people driving alone, there are areas with higher concentrations of carpooling and use of other modes. For example, only 69 percent of work trips in Athens County are made by motorists driving alone.

2.2 Land Use

From 2000 to 2010, Ohio continued to lose agricultural land. Farm acreage decreased from 14.8 million acres in 2000 to 13.7 million acres in 2010. This trend has been in place since at least 1990, when farmland accounted for 15.6 million acres of the state's total area; it equates to a conversion rate of 100,000 acres of farmland to another land use per year. The number of farms decreased from 79,000 in 2000 to 74,700 in 2010, but this does not indicate an industry consolidation, as the average acreage per farm also decreased from 187 acres to 183 acres.

Based upon 2010 U.S. Bureau of the Census data, 10.8 percent of Ohio's land area is urbanized, encompassing 77.9 percent of the population. The Columbus metropolitan area, for example, experienced the greatest growth from 2000 to 2010, both in population (20.7 percent) and in urbanized land area (28.3 percent).

2.2.1 Land Use Policy

Transportation and land use are closely connected. The land use patterns of cities were influenced by the transportation choices available during their formation. Today, development and growth patterns are strongly influenced by market forces, and effective planning must recognize the economic forces that determine land use and development. Ohio is a home rule state where local governments make land use decisions; as a result, the state is a tapestry of various approaches to land use controls.

Like most departments of transportation, ODOT can only influence land use decision-making by educating local partners on its policies on capacity provision and access management. Without a clear understanding of the Department's financial constraints, local transportation agencies (and ODOT itself) may be asked to respond to congestion, safety, or other transportation problems in areas where development decisions are being pursued by local officials but infrastructure is not included as part of the Plan (or will turn out to be inadequate). ODOT encourages local governments to coordinate land-use and transportation decisions to promote or facilitate the desired outcomes for their regions.

2.3 Environment

2.3.1 Greenhouse Gas Emissions

At the current rate of growth, transportation's share of human-produced greenhouse gas (GHG) emissions in the U.S. will increase from 28 percent to 36 percent by 2020. For this reason, transportation is often considered to be a major source of the problem and a target (of Congress and environmental groups) for developing solutions. The U.S. Department of Transportation (USDOT) has stated that transportation agencies must participate in and contribute to discussions around balancing the objective of achieving reductions with other transportation goals.[2]

A joint Ohio State University and Ohio University study[3] contains an inventory of GHG emissions in Ohio. The inventory shows that in 2011, transportation accounted for 25 percent of the GHG emissions in the state, with the highest component being CO_2.

2.3.2 Adaptation Planning

Climate variability impacts transportation mainly through weather extremes (for example, very hot days, very cold days, or severe storms); intense precipitation events and extended droughts; and rising sea levels. Ohio's transportation system was built for the typical weather and climate experienced locally, including a reasonable range of extremes, like flooding events occurring as rarely as once every 100 years. Changes in weather and climate extremes can have a considerable impact on transportation, especially if they exceed the range of environmental conditions for which the system was designed. Weather and climate patterns have changed over the past several decades and are projected to continue to change in the future, with both negative and positive effects on the transportation system.[4]

A source for information on climate variability adaptation is provided by *Potential Impacts of Climate Change on U.S. Transportation*, by the Committee on Climate Change. The report provides a series of recommendations for consideration at the federal level. Issues that are most relevant to Ohio are summarized below:

- Adopt strategic, risk-based approaches to decision-making
- Integrate evacuation planning and emergency response into transportation operations
- Develop and implement monitoring technologies
- Share best practices
- Reevaluate design standards
- Evaluate the National Flood Insurance Program and flood insurance rate maps

2.4 Economic Profile

Ohio's transportation system is essential to keeping and creating jobs. The state's economy depends on the ability to ship raw materials and finished goods quickly and efficiently throughout Ohio, the country, and the world. This is especially important to agriculture and manufacturing, as well as the logistics operations that support them.

---

[2] USDOT Center for Climate Change Strategic Plan: http://climate.dot.gov/documents/splan_2006.pdf

[3] http://www.ohioghg.com/

[4] Potential impacts of climate change on U.S. transportation, Committee on Climate Change and U.S. Transportation, Transportation Research Board and Division on Earth and Life Studies, National Research Council of the National Academies (Transportation Research Board special report ; 290). 2008.

Different industries depend on the transportation system in different ways. For example, manufacturing relies on trucking and intermodal infrastructure needs, while the finance and insurance sector largely creates commuter transportation demands. Projecting which industries will see growth in the future will help determine potential intermodal infrastructure needs.

2.4.1 Gross State Product

Ohio's estimated 2011 Gross State Product (GSP) of $484 billion is the eighth largest in the U.S., falling between New Jersey and North Carolina. Ohio ranks fifth in manufactured goods and sixth in durable goods production. Compared to other nations, Ohio's GSP would be the 28th largest economy, between Pakistan and Colombia.[5]

2.4.2 Major Employers

Ohio has 56 Fortune 1000 businesses headquartered throughout the state. A list of the largest employers in the state, based on data from the Ohio Department of Development, is shown in **Table 2-3**.

Table 2-3: Top Ohio Employers, 2012

Employer	Employees in Ohio	Headquarters	Sector
Wal-Mart Stores, Inc.	50,625	Bentonville, AR	Retail
Cleveland Clinic	39,300	Cleveland	Health
Kroger Co.	39,000	Cincinnati	Food Stores
Catholic Healthcare Partners	31,300	Cincinnati	Health
The Ohio State University	28,300	Columbus	Education and Health
Wright-Patterson AFB	27,100	Dayton	Military
University Hospitals	21,000	Cleveland	Health
JP Morgan Chase & Co.	20,500	New York, NY	Finance
Giant Eagle, Inc.	19,500	Pittsburgh, PA	Food Stores
OhioHealth	16,500	Columbus	Health

2.4.3 Exports

In addition to a large GSP, Ohio also exported $46.4 billion in goods in 2011. Goods were exported to 216 countries and territories, with Canada as the largest recipient.

2.4.4 Inland Waterways

The Lake Erie System transported 40.6 million tons of commodities in 2008 valued at $3.6 billion and predominantly serves electric utility, steel, and manufacturing industries. Commodities shipped through this system include coal, limestone, and iron ore. The Ohio River System transports 63 million tons of commodities annually, valued at $7.4 billion, and predominantly serves the electric utility industry, which relies on waterways to ship coal to water-served power plants.[6]

2.4.5 Emerging Trends – Shale Gas Exploration and Production

An emerging trend that will impact Ohio is the development of shale gas production principally from Marcellus shale deposits and – to a lesser extent – Utica shale deposits.

[5] Ohio Department of Development, August 2012. *Gross Domestic Product for Ohio*.
[6] http://www.dot.state.oh.us/Services/Pages/Water.aspx

The Marcellus shale is a deep layer of rock that lies 5,000 to 9,000 feet underground and runs from the southern tier of New York through the western portion of Pennsylvania, into the eastern half of Ohio, and through West Virginia. While this area has produced natural gas for years, many gas production companies are now interested in the Marcellus shale because of higher energy prices and new drilling technologies that have the potential to recover an estimated 50 trillion cubic feet of natural gas. Estimates for Marcellus shale range from 168 trillion cubic feet to as much as 516 trillion cubic feet of natural gas.[7]

Exploration, drilling, and production activities associated with oil and gas wells are extremely transportation intensive. Large numbers of vehicles are needed to transport equipment and other supplies to drilling sites. As Marcellus shale activity increases in Ohio, so does the demand on Ohio's transportation infrastructure.[8]

Many rural roads overlying and near the Marcellus shale will not meet capacity and geometric standards necessary for large trucks to haul equipment, water, and other supplies to and from drill pad sites. These roads will require widening, surfacing, and alignment improvements.

Oil and gas specialists in the U.S. Department of the Interior, National Park Service's Geologic Resources Division estimate that the average oil and gas well requires 320 to 1,365 truckloads of equipment to bring a well into production.

Ohio Governor John Kasich signed Amended Substitute Senate Bill 315, the state's comprehensive energy bill, into law on June 11, 2012. A stipulation in the law that will be important in the transportation planning process is summarized by the Ohio Department of Natural Resources (ODNR) as follows:

> *Encourages well operators to enter into a Road Use Maintenance Agreement (RUMA) with local government. A RUMA is an agreement between local government and well operators placing responsibility for road construction, repairs, and maintenance on those well operators. The agreement also stipulates designated travel routes for heavy equipment haulers to ensure safety and minimize impact. SB 315 requires ODNR and ODOT work with local officials to review and report on the effectiveness of the RUMA process.*[9]

2.5 Fiscal Overview

2.5.1 Funding Sources for Transportation

Based upon figures from fiscal year 2011, Ohio's transportation system receives approximately $3.6 billion in funding annually, as shown in **Figure 2-6**. ODOT controls approximately $2 billion, with about half from federal highway revenue. Approximately 46 percent is derived from the Ohio Motor Fuel Tax, with the remaining four percent from registration and title fees. Local governments control

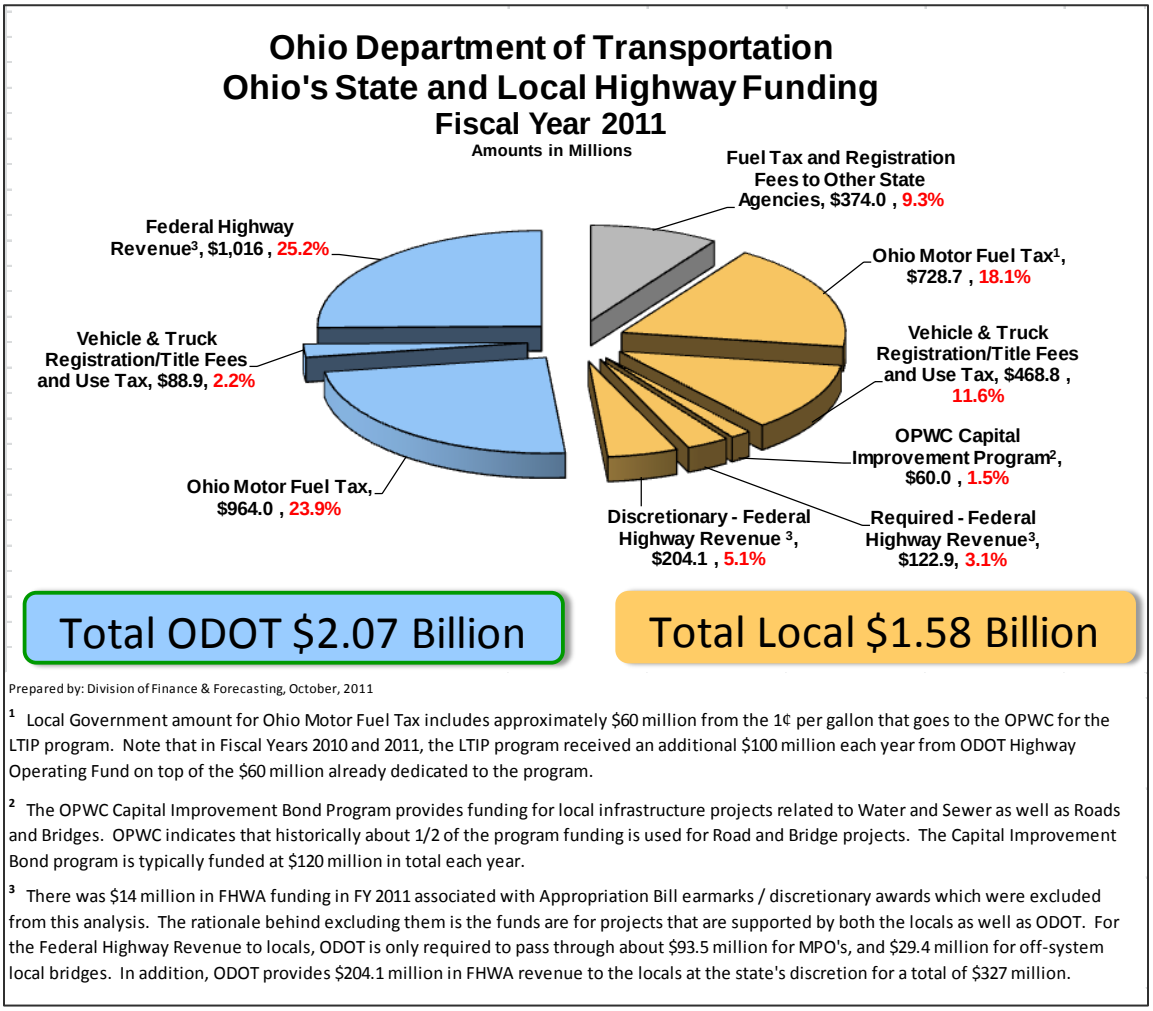
[7] Marcellus Shale: What Local Government Officials Need to Know Marcellus Education Team, Pennsylvania State University, 2008

[8] Development of the Natural Gas Resources in the Marcellus Shale New York, Pennsylvania, Virginia, West Virginia, Ohio, Tennessee, and Maryland, National Park Service U.S. Department of the Interior Natural Resource Program Center. November 2009.

[9] http://www.dnr.state.oh.us/tabid/23947/Default.aspx

approximately $1.58 billion from federal highway revenue, the Ohio Public Works Commission (OPWC) Capital Improvement Program, the Ohio Motor Fuel tax, and vehicle registration and title fees.[10]

Figure 2-6: Sources of Funding for Transportation in Ohio



Prepared by: Division of Finance & Forecasting, October, 2011

[1] Local Government amount for Ohio Motor Fuel Tax includes approximately $60 million from the 1¢ per gallon that goes to the OPWC for the LTIP program. Note that in Fiscal Years 2010 and 2011, the LTIP program received an additional $100 million each year from ODOT Highway Operating Fund on top of the $60 million already dedicated to the program.

[2] The OPWC Capital Improvement Bond Program provides funding for local infrastructure projects related to Water and Sewer as well as Roads and Bridges. OPWC indicates that historically about 1/2 of the program funding is used for Road and Bridge projects. The Capital Improvement Bond program is typically funded at $120 million in total each year.

[3] There was $14 million in FHWA funding in FY 2011 associated with Appropriation Bill earmarks / discretionary awards which were excluded from this analysis. The rationale behind excluding them is the funds are for projects that are supported by both the locals as well as ODOT. For the Federal Highway Revenue to locals, ODOT is only required to pass through about $93.5 million for MPO's, and $29.4 million for off-system local bridges. In addition, ODOT provides $204.1 million in FHWA revenue to the locals at the state's discretion for a total of $327 million.

The federal motor fuel tax is currently 18.4 cents per gallon on gasoline and 22.4 cents on diesel. Nearly half of Ohio's transportation is funded through the Federal Highway Trust Fund, which is based upon the federal gas tax. The future level of federal funding is difficult to predict. Congress passed on June 29, 2012, *Moving Ahead for Progress in the 21st Century* (MAP-21), a 27-month transportation bill to maintain approximately existing funding levels through fiscal year 2014.

Under current funding formulas, Ohio receives approximately 86 cents for every dollar the state sends to Washington from the federal motor fuel tax. Ohio has been advocating for a larger return on that investment, but past trends suggest that future funding levels will be similar to recent levels.

The current Ohio motor fuel tax is 28 cents per gallon on gasoline and diesel. This rate has been unchanged since July 1, 2005. According to the American Petroleum Institute, the national average for state taxes and fees is 31.1 cents per gallon. Ohio ranks 20th nationally in the amount of motor fuel tax

[10] ODOT Division of Finance and Forecasting, October 2011

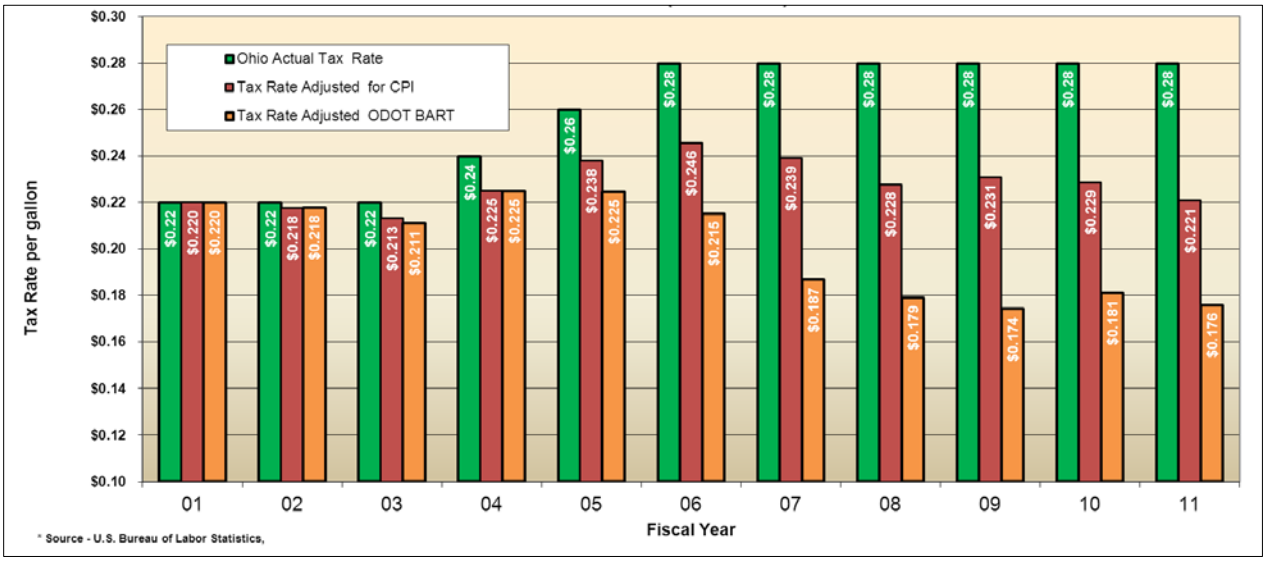
received. Nearby states with higher rates include Illinois, Indiana, Michigan, West Virginia, Wisconsin, and Pennsylvania. Lower rates are found in Kentucky and Maryland.

The motor fuel tax is levied on a per gallon basis, not as a percentage, so the amount earned per gallon remains the same whether gas prices go up or down. Therefore, funding through the fuel tax is heavily impacted by economic conditions and consumer behaviors affecting the number of gallons purchased. Periods of economic decline reduce the VMT, thereby reducing fuel tax revenue. An increase in the fuel efficiency of vehicles has also occurred, leading to fewer gallons purchased and less fuel tax revenue, even as motorists incur the same level of wear and tear on Ohio's roads. In August 2012, the USDOT and USEPA released new fuel efficiency standards, increasing the average fuel efficiency requirement from 35.5 mpg in 2016 to 54.5 mpg by 2025. These trends have reduced the amount of state motor fuel tax revenue that ODOT receives. There is a potential for fleets to be converted to Compressed Natural Gas (CNG), which is not taxed for transportation funding.

2.5.2 Inflation

As discussed previously, Ohio's state tax rate has been 28 cents per gallon since 2005 (state fiscal year 2006). Even as tax rates and funding levels have remained relatively flat, inflation has been rising. As a result, tax receipts have experienced diminished purchasing power over time. **Figure 2-7** shows the tax rate for state fiscal years 2001 through 2011, contrasting the actual rate with the effective tax rate based upon the Consumer Price Index (CPI) and ODOT's Bid Analysis Review Team (BART) analysis of construction bids.

Figure 2-7: State Motor Fuel Tax Contrasted with Inflation Rates, SFY 2001-2011



2.6 Setting the Stage Conclusions

There are several macro-level trends and issues affecting transportation in Ohio. Conversely, there are several macro-level trends and issues that are being affected by transportation.

2.6.1 Demographics

Population growth has slowed in Ohio over the last decade, but significant migrations of people across the various regions of the state continue. The internal shifts in population greatly affect transportation,

creating areas of the state that have underutilized infrastructure and other areas experiencing growing levels of congestion. As these trends and their implications become more apparent, the Department will adjust its allocation of mobility, safety, and preservation resources to meet these changing needs.

2.6.2 Mode Options

Three trends point toward a need for increased modal options beyond single occupant vehicle use in the coming years. First, a generational shift in lifestyle preferences among young, educated people toward urban living has occurred, coinciding with redevelopment of some of Ohio's urban areas. These areas are desirable to the young educated populations for their transportation options, density, and the close proximity of activities and entertainment. This desire has a direct connection to Ohio's economy, because many businesses are looking to attract young, well-educated people. Second is the concentration of low-income and zero-car households needing access to basic services such as healthcare, employment, and shopping, especially in urban areas. Finally, aging of the population will continue to present mobility and safety issues. The modal solutions needed to address these three trends are not necessarily the same; for example, bike sharing is likely most appealing to the young, educated urban resident. However, the trends point to a need for creative thinking and a leveraging of resources to address the needs that these trends represent.

2.6.3 Economy

The economy is inexorably linked to transportation. In the future, ODOT will need to track changes in employment across industries, as transportation needs vary by industry. ODOT will also need to communicate with industry leaders about their needs for managing and growing their operations within the state, as well as whether those needs are focused on commuters or on operating on a robust transportation system capable of moving goods with trucks, rail, maritime, air cargo, and intermodal facilities.

3. GOALS AND OBJECTIVES

The development of goals, objectives, and critical success factors (performance measures) is a fundamental and pivotal process in the development of a statewide plan. The goals and objectives provide a focus and direction for Access Ohio 2040 and support ODOT's existing strategic priorities and current customer preferences. They define a vision for a comprehensive, multimodal, realistic, and implementable transportation future for the State of Ohio. The critical success factors provide a framework for assessing, tracking, and reporting on how the statewide plan addresses transportation needs. Together, the goals, objectives, and critical success factors are called *Guiding Principles*.

Access Ohio 2040's Guiding Principles help identify policy options and evaluate the likely impacts and outcomes that such policies and strategies will have on long-term transportation system performance. After the Plan is completed, the Guiding Principles will be used to inform agency strategic decisions and to assess whether Plan policies and investments are having the desired impact on system performance.

3.1 Process

Access Ohio's Guiding Principles were developed using a collaborative process designed to integrate the priorities of ODOT and numerous other stakeholders, including the general public. A series of interactive meetings, where ideas and information were presented and then refined, were an important step in the development of the Guiding Principles. These meetings involved a variety of groups, including the Access Ohio 2040 Steering Committee, which is primarily composed of external stakeholders; the ODOT Working Technical Group, which includes ODOT experts in different aspects of transportation; and ODOT's Executive Management team.

These discussions produced a consensus on six goal areas: **preservation, safety, mobility and efficiency, accessibility and connectivity, stewardship,** and **economic development**.

Table 3-1 presents the final Guiding Principles, including goals and objectives of Access Ohio 2040. The critical success factors are still being finalized and will be presented in the final Plan document.

Table 3-1: Goals and Objectives

Goal Area	Definition	Objectives
Preservation	– Promote cost-beneficial preservation of multimodal assets	– Preserve transportation assets and meet or exceed acceptable levels-of-service – Assist modal partners in achieving state-of-good-repair – Manage transportation networks to improve system performance while working with local government partners to preserve community values
Safety	– Continue to improve transportation system safety	– Reduce the total number of transportation-related fatalities and serious injuries – Reduce the total number of transportation crashes – Improve security of the transportation system – Fund projects/programs as developed in the Strategic Highway Safety Plan (SHSP)
Mobility and Efficiency	– Reduce congestion and increase reliability for personal and freight travel	– Increase travel time reliability for passengers and freight – Minimize travel delays due to construction – Improve the efficiency and effectiveness of system operations
Accessibility and Connectivity	– Increase customer access to state's multimodal transportation system and improve linkages between modes	– Ensure, enhance, and improve access to the existing multimodal system – Support non-Single Occupancy Vehicle (SOV) travel – Enhance connectivity for intermodal freight movements – Increase access to jobs, labor, freight markets, and economic development opportunities – Ensure and increase system access for underserved populations
Stewardship	– Advance triple bottom line – financial, environmental, and social objectives – for all investments	– Optimize ODOT's investment and expand the use of Public Private Partnerships (P3)/tolling – Increase local participation in funding transportation – Minimize the environmental impacts of building, maintaining, and operating the state highway system – Minimize the air quality impacts of the state system – Continuously collect data on customer preferences and integrate into planning efforts
Economic Development	– Develop and operate a state transportation system that supports a competitive and thriving economy, attracts new businesses, and provides for predictable freight movements	– Identify and deliver economic development projects – Increase system accessibility and reliability for both passenger and freight travel

4. PASSENGER

The State of the System's *Passenger* chapter describes the extent, condition and performance of the vast system of infrastructure and services that support passenger travel within, to and through the state of Ohio. This system includes roadways and bridges, transit, aviation, rail, intercity bus, and bikeways. The components of this system that provide mobility, access and connections between Ohio's cities, towns, and rural areas are largely the responsibility of the Department of Transportation.

4.1 Roadways and Bridges

4.1.1 Existing Conditions

4.1.1.1 Roadway Miles

Ohio's roadway system is composed of 123,247 centerline miles of public roadways and 258,773 lane miles. Of this total, ODOT is responsible for 17,270 centerline miles (14 percent) and 43,211 lane miles (16.7 percent). The Interstate network, U.S. Route network, and State Route network make up the state system. According to Ohio's Home Rule law, municipalities are responsible for all roads within their jurisdiction, with the exception of Interstates. Townships and counties are responsible for roads within their jurisdiction with the exception of Interstates, U.S. Routes, and State Routes. This leaves ODOT responsible for the Interstates and the U.S. and State Routes outside of municipalities.

The remaining miles in the Ohio roadway system are owned and maintained by municipality, county, and township agencies throughout Ohio. As shown in **Table 4-1** municipalities are responsible for 33,668 (27.3 percent) of roadway miles and 75,712 (29.3 percent) of the lane miles. Counties and townships collectively own and maintain the largest share of the roadway system within Ohio. These jurisdictions are responsible for 70,404 (57.1 percent) of the centerline miles and 135,260 (52.3 percent) of the lane miles. While municipality, county, and township agencies are responsible for these miles, ODOT provides and maintains access to these roadways.

Table 4-1: Centerline Miles and Lane Miles by Responsible Agency

Road Maintenance Responsibility	Number of Centerline Miles	Number of Lane Miles
State	17,270	43,211
Municipality	33,668	75,712
County/Township	70,404	135,260
Turnpike Authority	241	1,263
Park/Federal Roads	1,664	3,328
Total	**123,247**	**258,774**

Source: 2011 Ohio HPMS; 2011 Ohio Roadway Inventory Files; ODOT Tech Services

The state roadway system is subdivided into three categories: Priority, Urban, and General. ODOT maintains the Priority and General system, while municipalities maintain the Urban system. The remainder of this section focuses on the Priority and General systems. The following provides a short description of each of the system elements:

- **Priority** – Interstate and four-lane divided roadways
- **Urban** – State roadways within municipalities
- **General** – Primary two-lane roadways across the state

4.1.1.2 Roadway Pavement Condition

ODOT has a pavement condition rating (PCR) scale that is used for the Department's pavement needs analysis. PCR ratings are based on a visual survey of pavement conditions and account for deficiencies such as rutting, cracking, and potholes. A deficient pavement in Ohio has a PCR rating of under 65 for the Priority system and 60 for the General system. The PCR score is calculated by deducting points based on both the frequency and severity of the distresses present in the section. Scoring is both a manual and subjective process.

According to these standards, 16,757 miles (97 percent) of the state's roadway system falls with the acceptable conditions range for pavement. **Table 4-2** presents the distribution of pavement conditions according to the conditions thresholds described previously. "Good" is based on Federal Highway Administration (FHWA) levels for adequate pavement. ODOT's critical success factor for pavement is the threshold between "Acceptable" and "Not Acceptable." The Priority system has 2,837 miles of Acceptable pavement, which amounts to 97.5 percent of the total Priority system mileage. Of the total General system mileage, 13,920 miles are in Acceptable condition (96.9 percent). In 2012, the state roadway system exceeded the goal levels of 95 percent of Priority system pavement at 60 PCR or above and 90 percent of General system pavements at 55 PCR or above.

Table 4-2: 2011 Pavement Condition by State Roadway System Classification

Condition	Priority		General		State Total	
	Miles	Percent	Miles	Percent	Miles	Percent
Good	2,151	73.9%	6,806	47.4%	8,957	51.9%
Acceptable	686	23.6%	7,115	49.5%	7,800	45.2%
Total Acceptable	**2,837**	97.5%	**13,920**	96.9%	**16,757**	97.0%
Unacceptable	73	2.5%	440	3.1%	513	3.0%
Total	**2,910**	**100.0%**	**14,360**	**100.0%**	**17,270**	**100.0%**

Source: 2011 Ohio HPMS; 2011 Ohio Roadway Inventory Files

4.1.1.3 Number of Bridges

Ohio has 44,766 bridges, with a total deck area of more than 157.5 million square feet.[11] There are 1,184 of non-roadway bridges and 43,582 structures that carry automobile traffic. Of the roadway bridges, there are 13,941 state maintained bridges. State maintained bridges span more than 104 million square feet of deck area, which accounts for 66.1 percent of all deck area within the state of Ohio.

Table 4-3 presents the distribution of the state's 43,582 roadway bridges by maintenance responsibility. As mentioned previously, there are 13,941 state maintained bridges in Ohio. This is 32 percent of all roadway bridges. County and municipality bridges account for the largest number of bridges at 28,771 – more than 64 percent of all roadway bridges in the state. The use of "maintained" in this section refers to the maintenance responsibility of the bridge as prescribed in by ODOT's

[11] Bridge counts and deck area as of March 13, 2013, per ODOT Office of Structural Engineering

maintenance database. It is important to realize that, for example, river crossing bridges are also major bridges, which are state maintained. However, the river crossing bridges have been separated from the other major bridges in this table because construction and maintenance costs for river crossing bridges are sometimes shared with bordering states.

Table 4-3: Roadway Bridges by Responsibility

Maintenance Responsibility	Description Type	Structure Count	Percent	Structure Count	Percent	Structure Count
State	Non-major ODOT Bridges	10,085	23.1%	13,941	32.0%	43,582
	Non NBI-length ODOT Bridges	3,670	8.4%			
	Major Bridges	155	0.4%			
	River Crossings	31	0.1%			
Local	Locally Maintained Bridges (FAE)	15,906	36.5%	28,771	66.0%	
	Non-Federal Aid Eligible	12,797	29.4%			
	State-Supported	68	0.2%			
Other	Turnpike	541	1.2%	870	2.0%	
	Federal and park, private	329	0.8%			

4.1.1.4 Size of Bridges

In Ohio, bridge size (as measured by deck area) ranges from less than 1,000 to almost 600,000 square feet. Of these structures, 90 percent of bridges measure 12,000 square feet or less. The average bridge size is almost 6,000 square feet, which corresponds to a 2-lane structure approximately 170 feet long. About 1 percent of bridges exceed 50,000 square feet.

4.1.1.5 Bridge Sufficiency Ratings

Until 2012, a bridge condition rating known as the sufficiency rating was used to determine a bridge's eligibility for federal funding. With the 2012 enactment of MAP-21 in 2012, sufficiency rating was dropped as the trigger for federal funding eligibility. While the use of sufficiency ratings for funding has changed, they remain useful indicators of bridge condition. The sufficiency rating formula provides a single numeric value that is indicative of a bridge's ability to remain in service.[12] The sufficiency formula includes factors for structural condition, bridge geometry, traffic considerations, and special items dealing with safety and detour length. This rating system, developed by FHWA, is based on a scale from zero to 100 with zero being an unusable structure and 100 being new. Bridges with ratings under 50 may need replacement or major rehabilitation.

Almost 70 percent of reviewable bridges[13] in the state have a sufficiency rating of 80 or higher, with just 7 percent rated below 50. Ratings for state-maintained bridges tend to have higher rating values than the local bridges. A review of the bridges maintained by ODOT that are of NBI length indicates that almost 77 percent of these ODOT bridges (7,788) have a sufficiency rating of 80 or higher, while less than two percent (161) have a rating below 50.

[12] http://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf

[13] "Reviewable bridges" refers to those bridge structures that have records in the NBI database. These bridges are greater than 20 feet in length. NBI is an annual database produced by state DOTs and submitted to the FHWA.

4.1.1.6 Bridge Status

When all reviewable bridges in Ohio are considered, more than 9 percent are structurally deficient and 14 percent are functionally obsolete. For bridges maintained by ODOT, 5 percent (475) have a status of structurally deficient, while 17 percent (1,665) are functionally obsolete.

4.1.2 Future Roadway and Bridge Needs

This needs assessment was completed using several techniques. For roadways, "need" is an unconstrained effort to reach and maintain Ohio's critical success factors through preservation and expansion. For bridges, "need" equates to improving/replacing bridges as necessary and maintaining conditions in acceptable rating levels. For the needs analysis, this means optimizing the system based on bridge sufficiency ratings.

4.1.2.1 Roadway Needs Methodology

Needs for roadways on the state's Federal-Aid System were assessed using a combination of tool applications, including FHWA's HERS-ST – Highway Economics Requirements System, State Version. The HERS-ST model[14] is designed to analyze the effects of alternative funding levels on roadway performance. The model simulates roadway conditions and performance levels and identifies deficiencies through the use of engineering principles. In selecting improvements for implementation, the model is designed to select only those projects whose benefits exceed initial costs.

The roadway condition database known as the Highway Performance Monitoring System (HPMS) provides the input information for this analysis. ODOT updates the state roadway system component of the HPMS annually. In this analysis, HERS-ST estimated future needs utilizing Ohio HPMS data for 2011. ODOT staff helped establish the values for key HERS-ST input parameters, including design standards, acceptable thresholds for roadway condition, and improvement costs, as well as other parameters that are customized to reflect ODOT's business practices.

HERS-ST does not account for needs such as signals, signage, safety, and operational improvements. Information from the Transportation Review Advisory Council (TRAC), which prioritizes the selection of very significant transportation projects for the state, was utilized to identify future capacity addition needs. Safety, signals, and signage needs were developed using historical allocation information.

4.1.2.2 Roadway Need Categories

The roadway needs are presented in terms of five categories:

- **Preservation** – the improvement of pavement only - actions that do not change roadway geometry
- **Reconstruction** – includes full-depth replacement of the roadway
- **TRAC** – capacity adding projects or any committed projects that exceed $12 million
- **Safety** – roadway system upgrades, such as rail/road grade separations, that address identified safety issues

[14] HERS-ST, Version 4.x, Highway Economic Requirements System State Version, Users Guide, U.S. Department of Transportation, FHWA. July 2009.

- **Maintenance** – capital improvements – such as signage, guardrail replacement, and interchange reconfigurations – that improve or sustain the safe and efficient operation of the roadway system

4.1.2.3 Bridge Need Methodology

The National Bridge Investment Analysis System (NBIAS) is an investment analysis tool that predicts bridge repair, rehabilitation, and functional improvement needs. The system is based on the same analytical framework as the Pontis bridge program first developed by the FHWA in 1989 and subsequently taken over by the American Association of State Highway and Transportation Officials (AASHTO).

NBIAS incorporates economic forecasting analysis tools to provide planning staff with the ability to forecast the multi-year funding needs required to meet user-selected performance metrics over the length of a specified period. The NBIAS is modified to work with bridge conditions as reported by the States for the National Bridge Inspection System, as well as the attribute/condition state inspection regime used in Pontis.

To identify those bridges in need of rehabilitation, the NBIAS relies on input tables from the user with improvement policy criteria. The criteria, also referred to as threshold conditions, are specific to each state and contain the legal condition standards for each bridge type. The deficiency values trigger an improvement action when a bridge falls below the respective standard. Additionally, design value standards set the bridge dimensions and engineering specifications that the NBIAS uses to determine the need for a replacement bridge.

4.1.2.4 Bridge Need Categories

Bridge needs are presented in terms of three categories, as shown in **Table 4-4**.

Table 4-4: Types of Bridge Needs

Bridge Needs	Description of Bridge Needs
Maintenance	Routine and as need maintenance
Rehabilitation	Major work to improve structural integrity, safety, and functionality
Replacement	Replacement of bridge

The bridge needs types for rehabilitation and maintenance are similar in nature to their roadway counterparts of preservation and reconstruction. However, bridges may need to be replaced for reasons other than insufficient width to accommodate additional travel lanes or address deficiencies.

4.1.3 ODOT Roadway Needs

The total roadway needs for Ohio total $38 billion (**Table 4-5**) through the analysis period from 2014 to 2040. The majority of needs (63 percent) are projected to be for preservation activities, while the TRAC program will account for another 24 percent. The TRAC program includes committed projects that foster economic development, increase safety, and add capacity. Safety needs account for eight percent of total roadway needs. Maintenance of signals, signs, and guardrail account for the other five percent of roadway needs.

Table 4-5: Summary of State Maintained Roadway Needs, 2014-2040, in Millions

Type of Roadway Need	Total	Percent
Preservation and Reconstruction	$24,000	63%
TRAC	$9,000	24%
Safety	$3,000	8%
Maintenance	$2,000	5%
Total	**$38,000**	100%

4.1.4 Bridge Needs

Total state system bridge needs over the 27-year period from 2014 to 2040 are projected to be $9.2 billion. Each category shown in **Table 4-6** is discussed in detail in the following sections.

Table 4-6: Bridge Needs on the State Maintained Roadway System, in Millions

Category	$M
Non-major ODOT Bridges	$7,437
Non NBI-length ODOT Bridges	$236
State-Supported	$165
Major Bridges	$721
River Crossings	$149
Culverts	$486
State System Total	**$9,194**

4.1.4.1 Non-major Bridge Needs

There are 13,941 state maintained structures in Ohio, as shown previously in Table 4-3. **Table 4-7** presents the long-term needs estimate for the share of these structures (10,085) that are greater than 20 feet in length and that are not major or river crossing bridges, which are treated separately in terms of funding commitments and/or analysis procedures.

Table 4-7: Non-major Bridge Needs, in Millions

All ODOT Bridges > 20 feet	$M	No. of Bridges
Maintenance	$2,120	N/A
Rehabilitation	$582	802
Replacement	$4,735	2,029
Total Needs	**$7,437**	**2,831**

Notes: Expressed in base year 2011 Dollars.

The needs for state-maintained non-major Bridges total $7.4 billion between 2014 and 2040. The analysis finds that 2,029 bridges need to be replaced through 2040, at a cost of $4.7 billion. A total of 802 bridges need to be rehabilitated through some modernization effort, at a cost of $582 million. Basic maintenance totals $2.1 billion from 2014 to 2040.

4.1.4.2 Non NBI-length ODOT Bridges

ODOT maintains bridges greater than 10 feet in overall length. The NBI database, which was used for the NBIAS analysis, only contains bridges greater than 20 feet. Therefore, an additional analysis for the needs of these 3,670 bridges was required. A life-cycle analysis was conducted – based on the methodology provided by ODOT and County Engineers Association of Ohio – and is presented in

Appendix B. Through this process, the total needs from 2014 to 2040 for these bridges are estimated to be $236 million.

4.1.4.3 State-Supported System

Throughout Ohio, several bridges are maintained by the state while ownership rests with a county or city agency. The routes served by these bridges typically are higher functional classification roadways (such as Major Arterials) and thus receive special ODOT consideration for maintenance and preservation. Using the life-cycle analysis based on the methodology in **Appendix B**, the total needs from 2014 to 2040 for these bridges are estimated to be $165 million.

4.1.4.4 Major Bridge Needs

Major bridges are maintained by ODOT. The average size (deck area) of bridges identified as major is more than 99,000 square feet. There are 186 of these structures in Ohio. However, 31 of these structures cross the Ohio River into Kentucky or West Virginia. This subset is discussed in the subsequent section.

Estimated improvement actions for major bridges are shown in **Table 4-8**. The needs total $721 million for these major bridges, accounting for only 8 percent of the total $9 billion in bridge needs. This comparatively small percentage is due to the considerable recent improvement investments to major bridges made by ODOT.

Table 4-8: Major Bridge Needs, in Millions

Major ODOT Bridges	$M	No. of Bridges
Maintenance	$457	N/A
Rehabilitation	$11	3
Replacement	$253	10
Total Needs	**$721**	**13**

4.1.4.5 River Crossing Bridge Needs

31 bridges connect Ohio to West Virginia and Kentucky over the Ohio River. These are a subset of the 186 major bridges mentioned previously. Of these bridges, ODOT is the lead agency for two structures:

- **U.S. Grant Bridge** – carrying U.S. Route 23 between Portsmouth, Ohio and South Shore, Kentucky
- **Ironton-Russell Bridge** – carrying a two-lane state route between Ironton, Ohio and Russell, Kentucky

This means ODOT is primarily responsible for maintenance with support from neighboring states. While one state may be the lead agency for certain structures, both states contribute to the maintenance of the bridge financially. When ODOT is not the lead agency, it contributes up to 30 percent of annual maintenance costs and splits the cost of major investments in bridge replacements.

The total Ohio River bridge needs analysis is estimated at $149 million, including replacements, maintenance, minor rehabilitation, and painting. This total reflects only ODOT's share of the total costs. Since ODOT does not anticipate financing the Brent Spence Bridge with traditional

transportation funding sources, the replacement costs of the Brent Spence Bridge are not reflected in the total Ohio River crossing bridge needs estimate. However, the needs do include ODOT's share of the construction cost of the new bridge connecting Brilliant, OH with Wellsburg, WV. Any bridge needs estimated for the U.S. Grant Bridge location were included in the major bridge analysis as the structure in 100 percent ODOT maintained.

4.1.4.6 Culvert Needs

ODOT estimates annual culvert needs to be $18 million. Over 27 years, from 2014 to 2040, the total needs are expected to be $486 million.

4.1.5 Local Roadway and Bridge Needs

A discussion of local roadway and bridge needs is contained in **Appendix B**.

4.2 Transit

4.2.1 Existing Conditions of Public Transit in Ohio

The following provides a brief description of the types of transit service and agencies in Ohio.

4.2.1.1 Types of Service

According to the U.S. Census Bureau, 2006-2010 American Community Survey (ACS), approximately 1.8 percent of trips to work in Ohio are made by public transportation.[15] In addition, approximately 8.3 percent of Ohioans travel by carpool to work. Public transit and/or specialized transportation systems serve some portions of urban and rural communities for 86 of the 88 counties in Ohio. These agencies provide a range of service options to residents, such as fixed-route, route deviation, and demand response. A brief description follows:

- **Fixed-route transit service**: Transit service using rubber-tired passenger vehicles operating on fixed routes and schedules. These services travel along a specific route with vehicles stopping to pick up and deliver passengers to specific locations at specific times; each fixed route trip serves the same origins and destinations.

- **Route deviation service:** The bus may deviate from the route alignment to serve destinations within a prescribed distance (e.g., 0.75-mile) of the route. Following an off route deviation, the bus must return to the point on the route it left. Passengers may use the service in two ways: (1) if they want to be taken off route as part of a service deviation, they must tell the bus operator when boarding; or (2) if they want to be picked up at an off route location, they must call the transit system and request a pickup, and the dispatcher must notify the bus operator.

- **Demand response service:** This transit mode is composed of passenger cars, vans, or small buses operating in response to calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick up the passengers and transport them to their destinations. A demand response (DR) operation is characterized by the following: (1) vehicles that do not operate over a fixed route or on a fixed schedule except, perhaps, on a temporary basis to satisfy a special need; and (2) vehicles that may be dispatched to

[15] http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

pick up several passengers at different pick-up points before taking them to their respective destinations and may even be interrupted en route to these destinations to pick up other passengers.

4.2.1.2 Transit Agencies

Ohio has 27 urban transit agencies providing service within small and large urban areas throughout the state. Thirty-five rural transit agencies provide service to or within 36 counties and the specialized agencies provide service to or within 64 counties. **Figure 4-1** illustrates the 62 public transit agency locations.

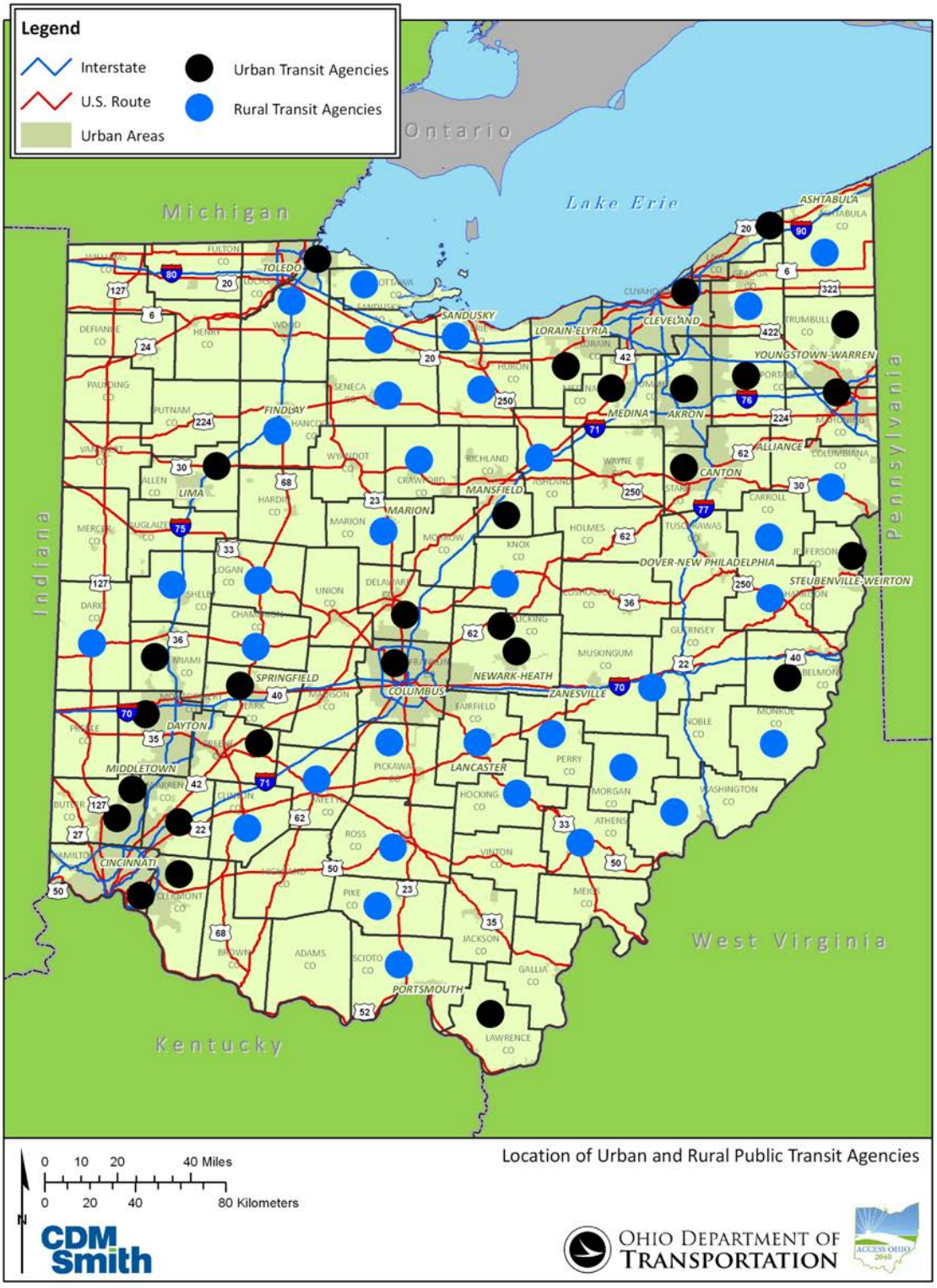
Approximately 75 percent of urban transit system ridership within Ohio, including bus and rail, occurs in the more densely populated cities of Cleveland, Columbus, and Cincinnati. The large urban systems rely primarily on local funding sources, as well as passenger fares and contract revenues to cover operating expenses. Small urban systems depend on federal operating assistance, passenger fares, and contract revenues for support of their programs. Large urban systems are more likely to have dedicated local funding streams through either county sales tax or property tax. Most small urban systems lack this type of dedicated funding stream, and the state does not provide any local match since the Ohio Constitution restricts state gas tax revenue to roadways only.

4.2.2 Future Transit Needs in Ohio

Currently, many customers in Ohio use public transportation because no other transportation options are available. To address future mobility needs, transit must continue to serve the needs of the transit-dependent population, while offering a competitive alternative to customers that choose to ride.

ODOT classifies transit systems with more detailed than the Federal Transit Administration (FTA) defined large urban, small urban, and rural programs. Large urban transit systems serve communities with a population over 200,000. For communities with 50,000 to 200,000 residents, transit agencies are considered small urban transit systems. Communities with a population less than 50,000 in population have rural transit systems. **Table 4-9** presents ODOT urban category designations by agency for large and small urban systems.

Figure 4-1: Location of Urban and Rural Public Transit Agencies



Source: ODOT Status of Public Transit, 2012.

Table 4-9: Ohio Transit Needs by Category

Category	Designation	Systems
I	Rail/Bus Systems	Greater Cleveland RTA
II	Large Bus Systems	Southwest Ohio RTA Central Ohio Transit Authority Greater Dayton RTA
III	Mid-Sized Bus System	Metro RTA (Akron) Toledo Area RTA
IV	Intermediate Bus Systems	Butler County Niles Trumbull Transit System Laketran Stark Area RTA Western Reserve Transit Authority
V	Small Bus Systems	Allen County RTA Clermont Transportation Connection Delaware Area Transit Agency Eastern Ohio RTA Greene CATS Lawrence County Transit Services Licking County Transit Services Lorain County Transit Medina County Transit Miami County Transit System Middletown Transit System Newark-Health Earthworks Transit Portage Area RTA Richland County Transit Springfield City Area Transit Steel Valley RTA Warren County Transit Service

4.2.2.1 Baseline Data

The primary source of information used to establish a baseline of public transportation needs is data reported to ODOT annually from each individual transportation agency. The following list includes the primary sources of data:

- Status of Public Transit in Ohio 2007 through 2012
- Vehicle data reported by agency
- Office of Transit Overview
- 2011 Urban and Rural Data for TGIS
- Intercity Bus Study Final, 2007
- 5310 January-December 2011 Vehicle reports

The needs were summarized into two scenarios:

1. Maintain existing services
2. Enhanced services

4.2.2.2 Maintain Existing Services Methodology

The long-range transit operating and capital costs to maintain existing services were prepared as follows:

- **Operating Costs:** To calculate the long-term needs for maintaining existing services, a 2011 constant dollar for operating expenses was applied to each of the 62 transit agencies for the life of this Plan to 2040, for a total of 27 years.
- **Capital Costs:** To calculate the capital costs for maintaining existing services, two separate categories were used.

  1. Cost for replacing the existing vehicle fleet
  2. Non-vehicle capital cost

Fleet data by agency, including the approximate value of each vehicle upon arrival to the transit agency, was used to create a baseline of data for the needs analysis. These values were used to estimate the average cost to replace the entire fleet. In addition, the average age of the fleet per agency was prepared. Based upon the average age and vehicle types used at the agency, the number of times the vehicles would be replaced in 27 years was determined. The calculations also factored in the FTA-defined life-cycle of a vehicle – for example, four years for small body on chassis vehicles or 12 years for heavy duty vehicles.

The non-vehicle capital cost for maintaining existing services was also calculated. These costs may include facility maintenance, bus stop improvements, stations, administration buildings, fare equipment, computer hardware, etc. Unfortunately, very little existing data by agency are available for rural or specialized programs for non-vehicle expenses. The following were used to develop the baseline assumptions:

- **Rural Transit Agencies** – 1 percent of the agency operating budget per year is assumed for the non-vehicle capital expenses.
- **Small and Large Urban Agencies** – National Transit Database (NTD) information was extracted for 2008, 2009, 2010 from the Capital Applied Expenses. A three-year average was calculated. This average was multiplied by 27 years for the life of the Plan.

Table 4-10, summarizes the operating, administration, and capital costs to maintain the existing services to 2040 by program category. Annual costs and total cost are presented. This analysis produces a needs estimate of $23.4 billion.

Table 4-10: Costs to Maintain Existing Services, 2014-2040, in Millions

Program Category		Maintain Services (annual)	Maintain 2040 Total (27 yrs) 2014-2040	Maintain Services (annual)	Maintain 2040 Total (27 yrs) 2014-2040	Maintain 2040 Total (27 yrs) 2014-2040
		Oper/Admin	Oper/Admin	Capital	Capital	Oper/Admin/Cap
I	Rail/Bus	$245,647	$6,632,479	$93,325	$2,519,788	$9,152,266
II	Large Bus	$243,986	$6,587,614	$57,330	$1,547,921	$8,135,535
III	Mid-sized Bus	$70,623	$1,906,819	$20,426	$551,500	$2,458,319
IV	Intermediate Bus	$40,129	$1,083,477	$12,910	$348,569	$1,432,046
V	Small Bus	$33,408	$902,019	$8,761	$236,553	$1,138,572
5311	Rural	$29,394	$793,637	$4,110	$110,963	$904,601
5310	Specialized Transportation Program	n/a	n/a	$6,711	$181,192	$181,192
	Total	**$663,187**	**$17,906,045**	**$203,574**	**$5,496,486**	**$23,402,531**

Source: ODOT Public Transit Status Report, CDM Smith, 2012.

These needs are assumed to be met with a combination of federal, state, and local funds as they have been in the past. Historically, federal revenue has been used for 80 percent of all capital costs. Operating expenses have followed a different trend. Operating costs are eligible for a 50 percent federal match; however, historically federal match has only accounted for 20 percent of total operating costs. This makes 80 percent of operating costs the responsibility of local transit agencies. Based on these considerations, $8.2 billion of the 2040 maintain existing services needs estimate is assumed to be the responsibility of ODOT (federal and state funding) and the remaining $15.2 billion the responsibility of local transit agencies.

4.2.2.3 Enhanced Services Methodology

The second scenario for estimating future public transportation needs is Enhanced Services, which simply implies a higher level of service or more service alternatives for residents of Ohio than exists today. The data sources for obtaining future transit needs are shown in the following:

- State of Ohio Human Services Coordination Plans
- Metropolitan Planning Organization (MPO) Long-Range Transportation Plans
- Transit Development Plans for urban areas
- Intercity Bus Needs Assessment
- Statewide Demographic Profile
- ODOT Strategic Plan
- *ODOT 2012 Statewide Customer Preference Survey*
- *Guiding Principles (Goals & Objectives)*
- Finance Technical Memorandum
- Feedback from *Access Ohio 2040* Regional Steering Committee and Executive Management Team

- Coordination with Greyhound Public Affairs representatives
- *Access Ohio 2040* public comments from website and ODOT information outposts

These planning documents were the primary resources used to identify future transit needs for the small and large urban systems and rural and specialized programs. For some areas of the state, typically in the urban areas, more detailed future cost and project information were available. In other areas, projects were identified and shown as needed, but the plans did not include cost estimates for the service or project. In these cases, average transit performance measures were used to determine a cost for the project or recent estimates for similar projects completed by the consultant team.

If specific agency future transit needs were not available, a 25 percent increase in operating costs was used to identify enhanced service needs for the 27-year life of the Plan. The conservative but realistic 25 percent, represents a 5 percent growth for each full 5-year time period. These estimates were prevalent in calculating the rural area enhanced services for operating and capital needs. Many needs for expanded rural and urban services were identified from recent public outreach efforts, within the above adopted plans, and also in nearly all of the human services coordination plans. The needs included more frequent service, evening, weekend, employment services, and rural transit connections to major activity locations.

Table 4-11 shows a summary of the operating, administration, and capital costs for enhanced transit services from 2014-2040.

Table 4-11: Costs for Enhanced Transit Services, 2014-2040, in Millions

Program Category		Enhanced Services	Enhanced Services	Enhanced Services TOTAL	2040 Total (27 yrs) 2014-2040 Maintain + Enhanced
Category		Oper/Admin	Capital	Oper/Admin/Cap	Oper/Admin/Cap
I	Rail/Bus	$1,658,120	$115,700	$1,773,820	$10,926,086
II	Large Bus	$1,174,288	$727,739	$1,902,027	$10,037,562
III	Mid-sized Bus	$359,443	$367,105	$726,548	$3,184,867
IV	Intermediate Bus	$250,660	$106,631	$357,291	$1,789,337
V	Small Bus	$163,991	$51,189	$215,180	$1,353,752
5311	Rural	$226,567	$38,877	$265,444	$1,170,045
5310	Special Services	n/a	$45,298	$45,298	$226,490
	Total	**$3,833,070**	**$1,452,539**	**$5,285,608**	**$28,688,139**

Source: Enhanced services were derived from locally adopted plans, future estimations, and existing ODOT transit baseline data. CDM Smith, 2012.

The cost to maintain and enhance the existing system totals $28.7 billion; an increase of roughly $5.3 billion over the maintain-only scenario. Using historical trends to assign financial responsibility leaves ODOT (federal and state funding) with $2 billion of the $5 billion in incremental needs for enhanced services. Local transit agencies would be responsible for the remaining $3.3 billion, beyond the maintain-only amount.

4.3 Aviation

4.3.1 Existing Aviation Service in Ohio

The following sections provide a profile of Ohio's airports, air carriers, passenger enplanements, and aviation needs.

4.3.1.1 Number of Airports

The existing Ohio Airport System consists of 104 airports, of which eight are commercial service[16] and the remainder are general aviation airports as classified by the Federal Aviation Administration (FAA). This analysis also includes Kentucky's Cincinnati/Northern Kentucky International Airport (CVG), since it serves the Cincinnati market. The eight commercial service airports analyzed are Akron-Canton Regional (CAK), Dayton International (DAY), Port Columbus International (CMH), Cleveland-Hopkins International (CLE), Rickenbacker International (LCK), Toledo Express (TOL), and Youngstown-Warren Regional (YNG), as well as CVG.

According to the National Plan of Integrated Airport Systems (NPIAS), 12 Ohio general aviation airports are classified as reliever airports. These airports are intended to alleviate congestion at nearby commercial service airports. Reliever airports are airports designated by the FAA to relieve congestion at commercial service airports and to provide improved general aviation access to the overall community. These may be publicly or privately owned. **Figure 4-2** illustrates the location of each airport within the Ohio Airport System and CVG.

4.3.1.2 Air Carriers

Passenger airline service (at the eight commercial service airports included in this study) is provided by 10 different commercial airlines, primarily domestic legacy carriers. However, several low-cost carriers such as Allegiant, Southwest/AirTran, and Frontier also operate at a number of these commercial service airports. Legacy carriers are those airlines that had established interstate routes by the time of the Airline Deregulation Act of 1978 and are distinguished from the relatively newly established low-cost carriers that compete with the legacy carriers. **Table 4-12** lists the number of air carriers operating out of the commercial service airports examined. Several of these airports also serve an important role in the movement of air cargo. CVG is one of DHL's three global "super hubs," along with Hong Kong and Leipzig, Germany. This indicates that CVG is the primary hub for DHL on this continent (about 92 percent of the company's volume in the U.S. moves through CVG). Rickenbacker International also caters to international freight airlines from Asia. More information on air freight is discussed in the freight chapter (**Chapter 5**).

[16] Cincinnati/Northern Kentucky International Airport is located outside of Ohio in the Commonwealth of Kentucky.
Source: JobsOhio - Ohio Commercial Service Airports Economic Impact Study, CDM Smith 2012.

Figure 4-2: Ohio Airport System, 2012

Source: CDM Smith

Table 4-12: Air Carriers Operating in the Ohio Airport System

ID	City	Airport	Nonstop Destinations	Number of Air Carriers
CAK	Akron-Canton	Akron-Canton Regional	13	5
DAY	Dayton	Dayton International	18	8
CMH	Columbus	Port Columbus International	33	8
CLE	Cleveland	Cleveland-Hopkins International	70	8
LCK	Columbus	Rickenbacker International	1	1
TOL	Toledo	Toledo Express	5	4
YNG	Youngstown	Youngstown-Warren Regional	3	1
CVG	Covington	Cincinnati/Northern Kentucky International	53	7

Major airlines, including US Airways, Delta Airlines, United Airlines, and American Airlines and their affiliates serve five of the eight commercial airports, and low-cost carriers serve several of Ohio's commercial airports. At smaller airports, such as Youngstown, flights are typically to seasonal tourist destinations. A number of these airports serve as hubs for airlines. Cleveland-Hopkins International is a hub airport for United Airlines. Delta Airlines, despite a drawdown in flights, uses CVG as a transfer point (hub) for many of its flights in the Midwest.

4.3.1.3 Passenger Enplanements

Between 2000 and 2010, passenger enplanements at Ohio's commercial service airports declined as a whole. Statewide, enplanements decreased at an average annual rate of 1.7 percent. When enplanements from CVG are included in the total, enplanements fell at an average annual rate of 4.7 percent. From 2000 to 2010, enplanements decreased at five of the eight Ohio commercial airports. **Table 4-13** shows the total enplanements for Ohio's commercial service airports and CVG from 2000 to 2010.

Table 4-13: Historic Enplanements, 2000-2010

Year	CAK	DAY	CMH	CLE	LCK	TOL	YNG	CVG
2000	388,940	1,144,918	3,447,628	6,364,790	770	249,165	34,463	11,156,305
2001	361,107	1,128,865	3,412,384	5,982,377	197	338,508	26,377	9,047,648
2002	414,643	1,076,388	3,204,770	5,223,503	756	325,452	13,466	9,930,857
2003	536,589	1,269,718	3,149,103	4,996,766	5,485	290,385	7,196	10,447,887
2004	652,477	1,444,236	3,021,583	5,268,160	92,738	313,781	20,647	10,758,562
2005	706,664	1,253,502	3,263,061	5,553,860	42,163	258,391	8,175	11,578,681
2006	720,827	1,275,069	3,274,398	5,436,824	6,491	200,277	9,613	8,509,283
2007	683,007	1,392,789	3,725,782	5,537,153	3,587	170,027	17,680	7,802,758
2008	709,338	1,440,170	3,493,739	5,485,860	5,318	139,793	18,109	6,923,015
2009	717,212	1,302,298	3,102,363	4,731,869	5,494	97,731	16,418	5,448,191
2010	757,805	1,221,235	3,125,149	4,606,419	4,692	87,177	24,279	4,207,006
AAGR (2000-2010)	**6.9%**	**0.6%**	**-1.0%**	**-3.2%**	**19.8%**	**-10.0%**	**-3.4%**	**-9.3%**

Source: FAA TAF issued January 2012

4.3.2 Passenger Aviation Needs

Ohio's system of airports provides a valuable transportation and economic asset to the people and businesses of Ohio. In August 2012, ODOT – in partnership with the FAA – initiated the Ohio Statewide Airport Focus Study. This 24-month comprehensive analysis of Ohio's airport system will aid the FAA

and ODOT in identifying capacity shortfalls and overlaps, as well as helping allocate resources so that the system can continue to function in a safe and efficient manner. While this analysis includes the state's air carrier airports, the primary focus is on general aviation airports and activities.

The Ohio Focus Study includes two major components: a comprehensive aviation system plan and an economic impact study. A robust public outreach program is being initiated to ensure accurate dissemination of data and to include input from a wide range of interests. The aviation system plan will examine airport capacity and facility needs for the state on a region-by-region basis. Airport market areas will be assessed using GIS to clearly identify overlaps and shortfalls. Any shortfalls or oversaturation in airport capacity or compliance issues will be addressed in the recommendations section of the study. Additionally, the costs to develop the system will be estimated and compared to available anticipated FAA and ODOT funding streams.

The economic impact study will quantitatively assess each airport's economic contribution to the state's economy on an annual basis. Additionally, the study will undertake several supplemental analyses, including aviation's contribution to Ohio's tax base and an estimate of the replacement cost of the Ohio airport system. Specialized case studies will provide detailed anecdotal evidence of how aviation benefits the people of Ohio.

An extensive public outreach effort is an integral part of the study. From the very beginning, public involvement will be a key component for purposes of communicating with the public, both in terms of how the study is progressing and getting public input for the process. In addition to input from a project advisory committee, three sessions of statewide outreach meetings will take place during the study. A number of survey efforts will be completed to get feedback from airport sponsors, airport tenants, economic development agencies, and the traveling public. The study has a two-year timeline and is expected to conclude in 2014.

4.4 Passenger Rail

4.4.1 Existing Passenger Rail Service in Ohio

Intercity passenger rail travel is provided by the National Railroad Passenger Corporation, also known as Amtrak, to a limited number of cities across Ohio's northern and southern regions. Amtrak's passenger services in Ohio are discussed in the following sections. ODOT does not act as the fiduciary agent for Amtrak in Ohio. Amtrak is funded by the Federal Rail Administration (FRA). **Figure 4-3** shows Amtrak service routes in Ohio.

4.4.1.1 Cardinal

The *Cardinal* route operates between New York City and Chicago and consists of one round-trip three days a week. The *Hoosier State* route joins the Cardinal route in Indianapolis providing a daily route to Chicago. The *Cardinal* route only makes one station stop in Ohio at Union Terminal in Cincinnati. Other stops include Philadelphia; Baltimore; Washington, DC; and Charleston, West Virginia. The Cincinnati stop occurs at 1:13 a.m. (westbound) and 3:17 a.m. (eastbound). **Table 4-14** shows the distances between some of the major stops. The busy Cardinal route segment between Indianapolis and Chicago is shared with other passenger trains (and freight trains). Capacity problems on this line segment would affect the Cardinal running through Ohio. Delayed trains on this route outside of Ohio impact riders boarding and alighting trains in Ohio.

Table 4-14: *Cardinal* Service Segments and Mileage between Stations

Beginning & End Points	Distance
New York – Cincinnati	828 miles
Cincinnati – Indianapolis	123 miles
Indianapolis – Chicago (Cardinal & Hoosier Lines)	196 miles
Total:	**1147 miles (45 miles within Ohio)**

4.4.1.2 Capitol Limited

The *Capitol Limited* route operates between Washington, DC and Chicago. The service consists of one round-trip daily, stopping at Alliance, Cleveland, Elyria, Sandusky, and Toledo. Intermediate stops outside of Ohio include Pittsburgh and South Bend, Indiana. Stops are made in Ohio between 1:35 a.m. to 5:08 a.m. (westbound) and 10:56 p.m. to 2:07 a.m. (eastbound).

4.4.1.3 Lake Shore Limited

The *Lake Shore Limited* route operates between Boston and New York City (the two sections connecting in Albany, New York) and Chicago. The service consists of one round-trip per day, stopping at Cleveland, Elyria, Sandusky, Toledo, and Bryan. Intermediate stops outside of Ohio include Syracuse, New York; Erie, Pennsylvania; and South Bend, Indiana. In the westbound direction, trains leave New York City at 3:45 p.m. and Boston at 11:55 a.m. and arrive in Chicago at 9:45 a.m. the next day. West of Cleveland, the *Lake Shore Limited* travels the same route as the *Capitol Limited*. Stops in Ohio occur between 3:27 a.m. and 7:05 a.m. In the eastbound direction, the train leaves Chicago at 9:30 p.m. and arrives in Boston at 9:10 p.m. and New York at 6:35 p.m. the next day. Stops in Ohio occur between 1:40 a.m. and 5:35 a.m.

4.4.2 Passenger Rail Needs

Amtrak's 2009 Report on Accessibility and Compliance with Americans and Disabilities Act of 1990 identified $12.9 million of needs to address ADA compliance and state of good preservation at Amtrak stations in Ohio. Almost $8 million, or 62 percent, of the needs are for the Cleveland and Toledo Amtrak stations, which are the two busiest Ohio Amtrak stations in terms of boardings and alightings. One of the passenger rail needs identified in Amtrak's 2009 report included a new passenger shelter, along with lighting and platform upgrades at the Alliance Station. Based on the Amtrak Fact Sheet, Fiscal Year 2011, State of Ohio, this improvement was completed and the total passenger rail needs in Ohio total $12 million.

Figure 4-3: Current Amtrak Service Routes in Ohio

Source: Amtrak

4.5 Intercity Bus

ODOT conducted a needs assessment in 2007 to determine if a rural intercity bus service would benefit the rural communities of Ohio. This study identified several areas, including the City of Athens, which had a need for an intercity service and also had the infrastructure in place to accommodate such a service.

In 2010, ODOT awarded the City of Athens funding for two rural intercity bus routes: Athens to Columbus and Athens to Cincinnati. To make this program possible, ODOT and the City of Athens partnered with a variety of groups and organizations. The City of Athens asked Hocking Athens Perry Community Action Program (HAPCAP), a non-profit corporation dedicated to the needs of the region, to administer the project on the city's behalf. Lakefront Lines was selected as the service operator, while Greyhound Lines provided in-kind match, including use of their terminal and ticketing system.

The new service, dubbed GoBus, began operation in November 2010. GoBus and its $10 tickets caught on quickly, especially with students at Ohio University. In February 2012, a new route from Athens to Marietta and Parkersburg was added, further increasing the rural to intercity connections and enhancing access to job opportunities, healthcare, and education. The bus routes directly connect southeastern Ohio with Greyhound's nationwide system in Columbus and Cincinnati and the Port Columbus International Airport. Each route is run twice daily. **Figure 4-4** shows the locations of the GoBus routes and stops.

ODOT, through the FTA Section 5311(f) program, provides a 100 percent federal subsidy for the GoBus service between Marietta, Athens, and Columbus, as well as between Marietta, Athens, and Cincinnati. The routes are 100 percent funded, after subtracting the farebox revenues. ODOT has a contract with HAPCAP, which reimburses expenses paid to Lakefront Lines for service provision and for HAPCAP's administrative expenses.

In 2011, statewide operational and administrative costs for GoBus were $1.65 million. The 2012 budget is approximately $1.97 million, which includes the new route serving Marietta, Athens, and Cincinnati that began in February 2012. Average GoBus ridership on both routes has increased overall to approximately 4,400 passengers per month. In 2011, the first full year of service, ridership was approximately 30,000 annual trips. 2012 ridership was approximately 50,000 annual trips, which is a 70 percent increase.

4.5.1 Private Providers

Currently, approximately 40 urban areas in Ohio have Intercity Bus service (ICB). Greyhound Lines (GLI) is the major intercity bus operator in Ohio, with services to destinations throughout the country. Lakefront Lines (LFL) also provides intercity bus service. The company reports a similar number of service locations in Ohio as Greyhound, most of which are commonly served by both companies at the present time (albeit along different, connecting routes). Both operators are private for-profit companies. One additional intercity provider is Megabus, which serves Cincinnati, Columbus, Toledo, and Cleveland. The for-profit service began in 2006 and is well-known for its low-cost, online reservation bookings. The company reports 18 million passengers across the U.S. since its inception.

Figure 4-4: Go Bus Routes and Stops

4.5.2 Gaps and Future Needs

ICB needs for FTA-funded and private provider intercity services were identified through the Access Ohio statewide planning process. Several outreach methods, which including government agencies, steering and advisory committees, local staff, and the general public, were involved in the development of this Plan. The purpose of the outreach was to provide information about the study process and to receive feedback on local, regional, and statewide needs and concerns for the state transportation network.

Future ICB service needs in Ohio were prepared and aggregated for the FTA-funded 5311(f) program. Because ODOT does not provide specific regulation, or access to operational funding data, for the private provider intercity bus companies, those calculations are not included in this study.

The following sections provide information used to calculate the overall statewide needs to maintain existing ICB services and to enhance ICB services in the future for the categories above.

4.5.2.1 Baseline Data

The primary source of data used to establish the baseline and existing ICB information includes the following:

- Report on status of public transit in Ohio 2007 through 2012
- Vehicle data reported by agency
- Office of Transit overview
- Intercity Bus Needs Assessment, Final, 2007

The next steps in Access Ohio included calculating the ICB future needs section. The needs were summarized into the following two scenarios:

1. Maintain existing services
2. Enhanced services

4.5.2.2 Maintain Existing Services

The long-range transit operating and capital costs to maintain existing services were prepared only for GoBus, due to limited data available for the private providers.

- ***Operating Costs:*** To calculate the long-term needs to maintain existing services, a 2011 constant dollar for operating expenses was applied to the GoBus budget for the life of this Plan to 2040, a time period of 27 years.

- ***Capital Costs:*** To calculate the capital costs to maintain existing services, the following two categories were used.

    1. Cost for replacing the existing vehicle fleet
    2. Non-vehicle capital cost

Fleet information for GoBus was used as the base data to estimate and develop the average cost to replace the entire fleet. In addition, the average fleet age per agency was estimated. Based on the

average age and vehicle types used at the agency, the number of times the vehicles would be replaced in 27 years was also estimated. The calculations also factored in the FTA-defined life-cycle of a vehicle.

The future non-vehicle capital cost for maintaining GoBus services was also estimated. These costs could include facility maintenance, bus stop improvements, computer hardware, etc. Non-vehicle capital expense data were not available; thus, five percent of the agency operating budget per year, which equates to approximately $100,000, was assumed for the non-vehicle capital expenses.

Table 4-15 summarizes the operating, administration, and capital costs to maintain the existing services through 2040.

Table 4-15: Costs to Maintain Existing Services through Year 2040 (2011 Dollars)

Program		Maintain Services (annual)	Maintain 2040 Total (27 yrs) 2014-2040	Maintain Services (annual)	Maintain 2040 Total (27 yrs) 2014-2040	Maintain 2040 Total (27 yrs) 2014-2040
		Oper/Admin	Oper/Admin	Capital	Capital	Oper/Admin/Cap
5311(f)	Intercity	$1,970,000	$53,190,000	$259,611	$7,009,500	$60,199,500
TOTAL		**$1,970,000**	**$53,190,000**	**$259,611**	**$7,009,500**	**$60,199,500**

Source: GoBus and CDM Smith, 2012.

4.5.2.3 Enhanced Services

The second scenario for estimating future ICB needs is enhanced services, which simply implies a higher level of service or more service alternatives for residents of Ohio than exists today. The following data sources were used to identify future ICB needs:

- State of Ohio MPO long-range transportation plans
- Transit development plans for urban areas
- 2007 Intercity Bus Needs Study
- Statewide demographic profile
- ODOT Strategic Plan
- Draft Finance Technical Memo, Access Ohio 2040 Plan
- Feedback from AO40 Regional Steering Committee and Executive Management Team
- Coordination with Greyhound public affairs representatives
- Public comments from Access Ohio 2040 website and ODOT information outposts

The existing planning documents were the primary resources used to identify future ICB needs, along with the other public outreach methods. At the present time, ODOT does not subsidize any private services like Greyhound or Megabus. These services are important to transportation within Ohio but are not under the purview of ODOT. The Department has an interest in understanding how changing market demand will affect routing and service levels over time. Currently, and as an example of coordination among the intercity service providers, GoBus has an interlining agreement with Greyhound as part of their contract for services.

FTA-funded 5311(f) ICB service operating and capital future needs were derived from existing planning documents. Future needs were identified in the studies and costs were assigned for those future needs. From the 2007 Intercity Needs Study, ODOT selected four routes to pursue based upon needs across the state. Two of those routes, Route 1 (Marietta, Athens, and Columbus) and Route 2

(Marietta, Athens and Cincinnati), are in operation today and are included in the maintenance of existing services category.

A realistic future goal for ODOT, as presented in the 2007 Intercity Needs Study, is to fund Route 3 (Knox County to Columbus) and Route 4 (Warren to Zanesville). Other areas identified for services were noted and may be included in future planning. In addition, looking forward it may be possible that the private providers, Megabus and Greyhound, could stop providing service due to lack of ridership on certain routes. At that point, priorities for selecting intercity bus routes will be reviewed and could change. At this time, ODOT identified the four bus routes as a priority for GoBus.

Table 4-16 shows the operating, administration, and capital costs for enhanced transit services through 2040.

Table 4-16: Costs for Enhanced Transit Services through Year 2040 (2011 Dollars)

Program		Enhanced Services		
		Oper/Admin	Capital	Total Oper/Admin/Cap
5311(f)	Intercity	$20,000,000	$7,692,308	$27,692,308
TOTAL		**$20,000,000**	**$7,692,308**	**$27,692,308**

Source: GoBus existing operating statistics and CDM Smith, 2012.

4.5.2.4 Summary of Ohio Intercity Bus Transit Needs

To summarize, the total needs to maintain existing intercity transit services and for enhanced services are shown in **Table 4-17**.

4.6 Bikeways

In recent years, the state of Ohio has substantially expanded its commitment to building a statewide system of bikeways for recreational travel and commuting. This section describes the current and future development of a true system of connections within and to urban areas, as well as a system of connections to longer distance routes between cities and rural areas. It discusses the state's multi-purpose bicycle facilities – including bike lanes, bike routes, and shared-use paths, and the coalition of interests that are helping to improve the system's connectedness and safety. **Figure 4-5** shows the existing bicycle corridors greater than 20 miles in length, existing bike lanes, and future off-road facility connections that are scheduled to be constructed within the next 5 years. This information is current as of 2012. Areas shaded in grey indicate MPOs that produce more detailed mapping.

4.6.1 Bikeway Facility Types

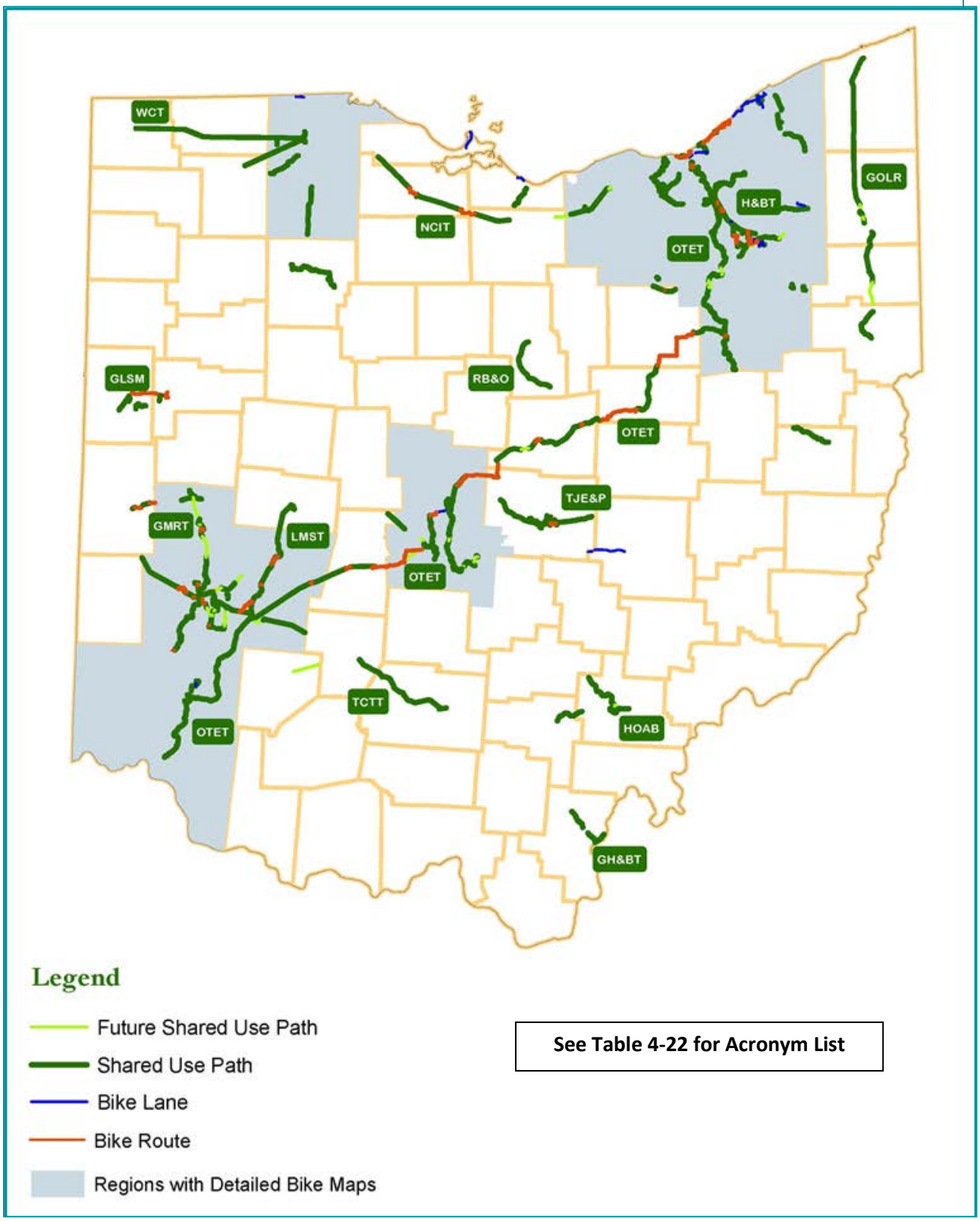
Current statewide bikeway facility information was gathered from MPOs, various park districts, and other local jurisdictions, then compiled into one database currently maintained by the Office of Statewide Planning and Research. Local municipalities and park districts are the primary owners of most of these facilities. However, there are segments of shared use path, bike lanes, and bike routes located within the ODOT right-of-way. This bikeway inventory was a key tool in the development of statewide and national bike routes; some individual bikeway segments may belong to the statewide bikeway system, the statewide and national bikeway system, or neither. The following subsections provide further descriptions of each type of bikeway facility.

Table 4-17: Total Costs Transit Services through Year 2040 (2011 Dollars)

Program		Maintain Services (annual)	Maintain 2040 Total (27 yrs) 2014-2040	Maintain Services (annual)	Maintain 2040 Total (27 yrs) 2014-2040	Maintain 2040 Total (27 yrs) 2014-2040	Enhance Services			2040 Total (27 yrs) 2014-2040 Maintain + Enhanced
		Oper/Admin	Oper/Admin	Capital	Capital	Oper/Admin/Cap	Oper/Admin	Capital	Total Oper/Admin/Cap	Oper/Admin/Cap
5311(f)	Intercity	$1,970,000	$53,190,000	$259,611	$7,009,500	$60,199,500	$20,000,000	$7,692,308	$27,692,308	$87,891,808
TOTAL		**$1,970,000**	**$53,190,000**	**$259,611**	**$7,009,500**	**$60,199,500**	**$20,000,000**	**$7,692,308**	**$27,692,308**	**$87,891,808**

Source: GoBus and CDM Smith, 2012.

Figure 4-5: Ohio Bicycle Facilities



4.6.1.1 Bike Lanes

A bike lane, as defined by the AASHTO, is a portion of the roadway that has been designated for preferential or exclusive use by bicyclists via pavement markings and (if used) signs. Bike lanes are intended for one-way travel, usually in the same direction as the adjacent traffic lane, unless designated as a contra-flow lane. The width of the lane varies from four to six feet and can be buffered with special pavement markings if placed on a high speed roadway. **Table 4-18** shows the bike lane mileage within each MPO area.

Bike Lanes in Columbus on W. Broad Street

Table 4-18: Bike Lane Mileage

MPO Area	Number of Centerline Miles	Number of Lane Miles
AMATS (Akron area)	20	39
BEL O MAR (Belmont County)	2	3
BHJTS (Jefferson County)	0	0
CCSTS (Clark County)	0	0
EASTGATE (Youngstown area)	3	6
ERPC (Erie County)	2	4
KYOVA (Huntington area)	0	0
LACRPC (Allen County)	0	0
LCATS (Licking County)	1	2
MORPC (Columbus area)	36	73
MVRPC (Dayton area)	5	10
NOACA (Cleveland area)	55	110
OKI (Cincinnati area)	12	23
RCRPC (Mansfield County)	0	0
SCATS (Stark County)	0	0
TMACOG (Toledo area)	10	20
WWW IPC (Marietta area)	0	0
Outside MPO	23	45
Total	**169**	**335**

Source: ODOT and MPO GIS Bicycle Inventories

4.6.1.2 Bike Routes

A bike route is defined by a given jurisdiction or agency as a roadway or bikeway, either with a unique route designation or with bike route signs, along which bicycle guide signs may provide directional and distance information. Signs that provide directional, distance, and destination information for bicyclists do not necessarily establish a bike route. Routes must carefully balance the need for safe bicycling conditions with the need for direct access to destinations. Routes can be established at the national, statewide, regional, and local levels. Criteria used by ODOT for roadway bike route designations include an examination of the type of roadway; surface condition; Average Daily Traffic (ADT); truck traffic percentages; and the presence of geometric deficiencies, shoulders, and rumble stripes. Looped routes for recreational riding are not considered. The numbers of centerline and lane

miles is the same because the rider should be riding in the farthest right travel lane, regardless of number of lanes on a roadway. **Table 4-19** provides the bike route mileage.

Table 4-19: Bike Route Mileage

MPO Area	Number of Centerline Miles	Number of Lane Miles
AMATS (Akron area)	11	11
BEL O MAR (Belmont County)	0	0
BHJTS (Jefferson County)	0	0
CCSTS (Clark County)	2	2
EASTGATE (Youngstown area)	1	1
ERPC (Erie County)	0	0
KYOVA (Huntington area)	0	0
LACRPC (Allen County)	1	1
LCATS (Licking County)	0	0
MORPC (Columbus area)	57	57
MVRPC (Dayton area)	7	7
NOACA (Cleveland area)	21	21
OKI (Cincinnati area)	28	28
RCRPC (Mansfield County)	0	0
SCATS (Stark County)	1	1
TMACOG (Toledo area)	9	9
WWW IPC (Marietta area)	0	0
Outside MPO	79	79
Total	**217**	**217**

Source: ODOT and MPO GIS Bicycle Inventories

4.6.1.3 Shared Use Path Mileage

A shared use path is physically separated from motor vehicle traffic by an open space or barriers and is either within the roadway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users. Most shared use paths are designed for two-way travel. They must be a minimum of eight feet in width and must have a start and end point. Closed loop systems are not considered transportation facilities. **Table 4-20** and **Table 4-21** show the shared used mileage and total mileage.

4.6.2 Sidewalk Facilities

Currently, there are 2,043 miles of sidewalk on U.S. and State Routes monitored by the Office of Technical Services. This inventory includes some sidewalks within a municipality not maintained by ODOT. ODOT's roadway inventory team has identified sidewalks on U.S. and State Routes and given them a condition rating of good, fair, and poor.

4.6.3 Statewide Trails of Significance

ODOT's Bicycle and Pedestrian Program has identified a system of trails of statewide significance whose segments are 20 miles or greater in length. Nine of the 13 segments are near population centers of 50,000 or greater and could be connected directly with additional investment. **Table 4-22** lists the 13 bikeways that are considered trails of statewide significance. This list is expected to be revised as additional national and cross state bikeway corridors are developed.

Table 4-20: Shared Use Mileage

MPO Area	Number of Centerline Miles	Number of Lane Miles
AMATS (Akron area)	105	210
BEL O MAR (Belmont County)	3	5
BHJTS (Jefferson County)	0	0
CCSTS (Clark County)	31	61
EASTGATE (Youngstown area)	54	108
ERPC (Erie County)	6	12
KYOVA (Huntington area)	0	0
LACRPC (Allen County)	8	15
LCATS (Licking County)	49	97
MORPC (Columbus area)	329	658
MVRPC (Dayton area)	230	460
NOACA (Cleveland area)	260	519
OKI (Cincinnati area)	171	245
RCRPC (Mansfield County)	18	37
SCATS (Stark County)	70	140
TMACOG (Toledo area)	168	335
WWW IPC (Marietta area)	3	7
Outside MPO	372	744
Total	**1,877**	**3,653**

Source: ODOT and MPO GIS Bicycle Inventories

Table 4-21: Total Mileage

Bikeway Type	Number of Centerline Miles	Number of Lane Miles
Bike Lanes	168	337
Bike Routes	216	216
Shared Use Paths	1,877	3,654
Total	**2,261**	**4,207**

Source: ODOT and MPO GIS Bicycle Inventories

Table 4-22: Trails of Statewide Significance

Acronym: Trail Name	
WCT: Wabash Cannonball Trail	H&BT: Hike and Bike Trails
GLSM: Grand Lake St. Mary's	TCTT: Tri-County Triangle Trails
NCIT: North Coast Inland Trail	GMRT: Great Miami River Trail
GOLR: Great Ohio Lake to River Greenway	LMST: Little Miami Scenic Trail
OTET: Ohio to Erie Trail	GH&BT: Gallia Hike & Bike Trail
RB&O: Richland B&O Trail	HOAB: Hockhocking Adena Bikeway
TJE&P: TJ Evans and Panhandle Bike Paths	

4.6.4 Bikeway Conditions

Currently, no federal or state requirement exists for data collection on bikeways, such as counts or pavement condition rating (crashes involving bicyclists and pedestrians are recorded only when involved in a vehicle crash). Some Ohio MPOs and park districts have collected bicycle and pedestrian count data at the roadway and trail usage level for a number of years. MORPC has conducted volunteer-based bicycle and pedestrian counts twice a year since 2005, and NOACA has done the same since 2011. Counts were conducted at 87 locations within Ohio on various shared use paths.

4.6.5 Developing the State Bicycle Route System

As part of Access Ohio 2040, ODOT is developing a network of statewide bicycle routes. These routes connect all urban areas in Ohio with a population of more than 50,000, as well as many smaller towns, and take advantage of existing bikeways and roadways wherever possible. The collaborative route selection process resulted in 17 numbered state bike routes connecting the state's largest urban areas and many smaller towns. A numbering scheme was developed based upon a proposal in Shawn Richardson's "Bike Route Numbering System for Ohio's Bike Paths."[17] North-south bicycle routes are given odd numbers, while east-west bicycle routes are given even numbers. Generally, lower number routes start in the southern and western part of the state. The routes are shown in **Figure 4-6.**

4.6.6 Developing Ohio's National Bicycle Route System Segments

AASHTO has developed a conceptual bikeway corridor plan that defines a first-ever national system of bikeways. The corridor plan has designated five routes through Ohio, with three running west-east and two running north-south. State DOTs are charged with defining these routes in each of their states, and they have a 50-mile bandwidth from which to identify the best road or off-road facility. ODOT is using off road existing trails of statewide significance wherever possible and then identifying the safest on road routing to complete the corridor. Bike route segments belonging to an AASHTO national bike route are given the AASHTO route number, regardless of where they may fit within the state numbering system. The national route selection process took place as part of the statewide route system's development.

4.6.6.1 Gaps

Although the route identification process provided suitable routes in most areas, a few gaps still exist along many statewide and national routes. Also, a few routes have bikeway segments that will be constructed in the next few years. Some high traffic areas are unavoidable due to lack of alternative routes, which includes some bridges. Also routes with a number of hills were moved to other routes. **Figure 4-7** illustrates the gaps in the bicycle route network.

4.6.6.2 Future Steps

So that these bicycle routes can be used by Ohio bicyclists in the future as part of a recognized state system, several steps will need to be undertaken. First, routes will need to be formally designated by local jurisdictions. Then, strategies will be developed to fill or minimize gaps along the statewide and national bicycle routes.

[17] Richardson, Shawn E. 2012. *Ohio's Bike Route Numbering System.*

Figure 4-6: Draft National and Statewide Bicycle Routes

Figure 4-7: Bicycle Network Gaps - Bicycle Routes by Bike Level of Service (BLOS) Grade

4.6.6.3 Route Review and Designation

As noted, AASHTO national bike routes and state routes will need to be formally designated by each jurisdiction through which the route passes. This step includes a field review with local stakeholders and experts to finalize the route. This ensures that the Bicycle Level of Service (BLOS) scores have accurately determined whether a road is suitable for bicycling. Also, many of the areas with unknown BLOS will be evaluated during field review to determine their BLOS. Field review and in-depth discussion with local stakeholders also can help determine if alternate routes are needed or a gap will be filled by a future local project. This step is not mandatory for the statewide routes, but local consultation and approval is still highly recommended.

Once the route has been finalized in conjunction with local stakeholders, a signed approval resolution is then required from each participating jurisdiction – this includes villages, cities, and counties. This process has already been completed for several of the counties through which National Bike Route 50 passes through in western and central Ohio.

4.6.6.4 Filling Gaps

Some of the gaps along the bike routes may be filled in the future using a variety of techniques. In many of the state's urban areas, these gaps may be filled by trails planned for the future. Some of the roads with poor BLOS may have other projects in upcoming years that improve shoulder width or other key roadway features, thereby improving conditions for cyclists. In other areas, the gaps may be reduced by simply relocating the bicycle route to local roads better suited for bicycling.

4.6.7 Integration with Other Plans and Programs

The national and statewide bicycle routes can also play a role in future MPO and other local plans. MPOs can identify other local bikeways within their areas to connect to statewide and national bicycle routes to link the routes to key local attractions and businesses.

Signage will not be required, but if a local agency decides to post them, specific designs for the national AASHTO U.S. Bike Routes and the Ohio cross state bike routes from the OMUTCD will be required. The U.S. Bicycle Route sign, M1-9, requires a route designation as assigned by AASHTO and has a black legend and border with a reflectorized white background. The Bicycle Route (M1-8) sign, used for cross state routes, also has a route designation and a green background with a reflectorized white legend and border. The Bicycle Route (M1-8a) sign can also be used for cross state bike routes and contains the same information as the M1-8 sign. Additionally, it includes a pictograph or words that are associated with the route or with the agency that has jurisdiction over the route. See **Figure 4-8** that shows sample bikeway signs.

Figure 4-8: Sample Bikeway Signs

4.6.8 Bikeway Summary

The national and statewide bicycle routes help support the state's multimodal transportation system. By proposing routes on existing bikeways and roadways, the existing transportation infrastructure is used more effectively in an era of limited budgets. The bicycle level of service model and analysis provided a meaningful measure of bicycle route suitability without extensive field work, but more work will be required before these routes are fully designated.

5. FREIGHT

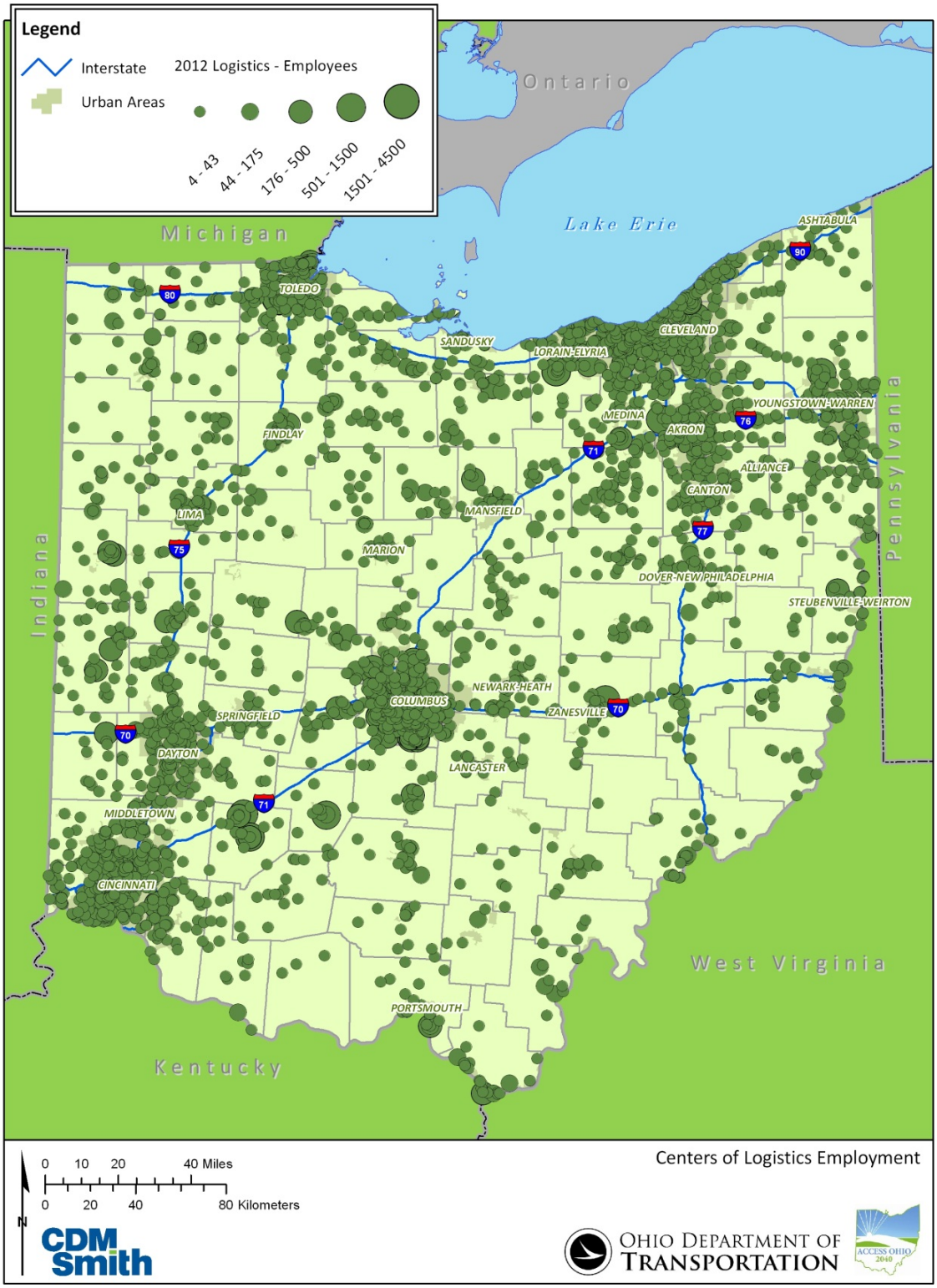
Freight transportation is vital to the daily life of the people of Ohio and the prosperity of the state. Freight and logistics activity accounts for well over 100,000 jobs in Ohio and appears in every county, but that is just a part of its importance (see **Figure 5-1** for centers of employment). Virtually every item that our citizens own or use was carried to them by the freight system, from the food on the table and the electronics around the house, to the seed in the garden and the fuel in the car. The Ohio companies where they work are similarly reliant on freight. For many businesses, logistics are essential to how they compete – in service to markets and in costs to customers. This isn't just true for industry and agriculture. Distribution methods are a key strategy in consumer retail whether in stores or on-line. Ohio hospitals depend on freight carriage not only for timely supplies of everything from medicine to bed linen, but for keeping their costs down and their facility space available for patients instead of inventory storage. All of these aspects add up to a system that is essential to our daily lives and livelihoods and that supports us locally and globally.

Ohio freight also is a mainstay for the entire country. The state ranks generally sixth in the nation for its volume of freight shipped in or out, measured by tonnage or value of goods.[18] Traffic shipped through Ohio or between Ohio and other markets accounted for 70 percent of the state's tonnage and 87 percent of its freight value in 2007, and the through traffic alone represented 43 percent of tons and 58 percent of value. These statistics demonstrate the significance of the state in the nation's commerce, both for the contribution of Ohio-based shipping and the volume borne for other states. The quality of the transportation system over which this traffic travels is reported as "strong" by freight users contacted for the development of this Plan, and it is considered an asset for attracting and retaining business. Its powerful array of multimodal options is beneficial for many types of companies and the varied needs that many of them have: waterborne shipping by lakes and river, competitive air service including major facilities at Cincinnati and Columbus, and rail service from four Class I carriers and 31 others operating more than 5,300 miles of track (the most per square mile of track in the country). With no sprawling metropolitan areas, Ohio freight congestion is not as punishing as in other major states. While the roadway system is not without challenges and will face more with growth, shippers and motor carriers alike view Ohio as a good place for their operations. These are substantial advantages for the state to maintain and utilize.

> "Few supply chain companies have been compelled to make network adjustments for Ohio deficiencies, and the cost of adjustments was largely negligible"
>
> *– Tompkins Supply Chain Consortium*

[18] FHWA Freight Analysis Framework, 2010. Ohio outbound traffic ranked 8th by tonnage but 6th by value, and inbound traffic ranked 6th by both measures.

Figure 5-1: Centers of Logistics Employment



This chapter describes Ohio's freight system. It begins with a review of key points from a database of regional performance factors from a consortium of supply chain companies and interviews with Ohio-based automotive manufacturers. It then presents an inventory of assets serving trucking, rail, marine, and air cargo modes, followed by a summary of economic trends and freight traffic patterns. Finally, highlights of future needs in the freight system lead to a description of potential strategies the state may employ.

5.1 Stakeholder Insight Summary

Freight stakeholder insights were obtained from regional performance benchmarks maintained by the Tompkins Supply Chain Consortium and direct interviews with original equipment manufacturers in the automotive industry operating in Ohio. Primary findings were:

- **Continued inventory minimization**. Competitive supply chains run on the least possible inventory, and those that already maintain low levels continually look for ways to cut it further. The consequence is that delivery service requirements are very high, and sensitivity to disruption is substantial.
- **Growing concern for supply chain risk**. Low inventories mean no buffers, and breakdowns spread rapidly through the supply chain. Weather events, infrastructure failures, and lack of recovery options affect performance, which in turn affect facility location decisions.
- **Continued reconsideration of networks**. Supply chain networks are not optimized and changes of design and location are ongoing. Distribution facilities are regionalizing. Sourcing and production locations are shifting.
- **Dependency on trucking**. Trucking captures two-thirds of supply chain expenditures – first, because of its quality of service, flexibility, and responsiveness, and second, because supplier locations favor it.
- **Necessity of air freight**. This is a corollary to low-inventory policy. Air is not the go-to mode for most products and supply chains try to minimize it. Instead, it serves as the fail-safe system.
- **Rail intermodal growth**. Mode shifts in favor of rail intermodal are increasing if not prevalent, because of improving quality, accessibility of service, and favorable costs. Automotive companies who have traditionally avoided it are giving it more, although modest, consideration.

Source: Parsons Brinckerhoff

- **Quality of Ohio location**. The availability of suppliers within an overnight drive of facilities, good and less congested roadways, its multimodal options, and its skilled labor force make Ohio a favorable place to be – but these are qualities that must be maintained.

- **Dependency on Ohio two-lane network**. Automotive manufacturers report that many plants and suppliers are not located on interstates. Interstates are critical, but the two-lane network is a primary system, and its conditions are vital.
- **Utility of Intelligent Transportation Systems (ITS) for logistics management**. Companies actively manage their supply networks and look for events that affect it. Real-time information fed directly into their management systems can make this process more effective.
- **Significance of truck driver shortage**. This is not a typical state concern, but companies stress that the lack of qualified truck drivers is worsening, costing them money, and putting their operations at risk.
- **Emergence of the natural gas market as an alternative to diesel fuel**. The lower cost of natural gas, along with growth in production and eventually in distribution, is a trend companies are watching and Ohio equipment manufacturers can utilize for their benefit.

5.2 Ohio's Freight System

Ohio is a crossroads state with a mature, intermodal transportation system. Some elements of the freight system are aging and in need of investment, some modes face overcapacity issues, and significant new investments in intermodal rail hubs need to be made.

5.2.1 Rail

The Ohio freight rail network is a mature system consisting of the major North American carriers – CSX, Norfolk Southern (NS), and Canadian National (CN) – as well as significant regional carriers and short line railroads. Ohio was a bellwether for national rail trends, as Class I railroads abandoned significant miles of rail lines in the 1970s and 1980s or sold some unprofitable branch lines to short line carriers.

Even though Ohio has lost thousands of rail miles over the years, the system is carrying record amounts of tonnage on less infrastructure. In terms of financial health and infrastructure, Ohio rail infrastructure is in very good condition, with adequate investment, efficient switching terminals, good operating speeds, and significant investments in new intermodal facilities (detailed in a later section). In support of doublestack container operations, CSX, NS, and the State of Ohio have invested a significant amount of funds to raise tunnels and bridges to increase intermodal container train productivity.

In terms of infrastructure conditions, Ohio rail carriers operate over a "legacy" system largely designed in the late 1800s, with significant urban development and road growth since. Therefore, rail lines through central business districts are often constrained by capacity, curvature, and grade crossings with other railroads; such locations include CBDs in Cincinnati (Mill Creek Valley); Toledo (Vickers Crossing); and Columbus (Scioto Tower). It is usually quite cost-prohibitive to eliminate the chokepoints in these locations. Beyond the large rail companies, short line carriers vary in their capital structure and ability to maintain a system of good repair, which results in some deficient short line railroads. Also, smaller railroads have a difficult time upgrading their rail and bridges to accommodate 286,000 pound railcars, which can impact the viability of their operations.

5.2.2 Maritime

Through the Great Lakes and the Ohio River, Ohio has access to two of the nation's largest inland waterway systems that connect with the Gulf of Mexico and the North Atlantic Ocean. Great Lakes traffic is dominated by bulk cargo shipment with some international trade of general cargo (primarily steel) via the St. Lawrence Seaway. The state is home to eight ports on Lake Erie. Three ports (Toledo, Cleveland, and Ashtabula) stand out in terms of their capabilities and cargo volume, while the others have moved considerably less freight in recent years. The Port of Toledo, including seven miles on the Maumee River, supports a large general cargo dock and terminals that handle grain, coal, petroleum products, and iron ore. The Port of Cleveland includes general cargo facilities and terminals for limestone, gravel, salt, cement, iron ore, and petroleum products. The Port of Ashtabula includes the outer harbor and 1.7 miles of the Ashtabula River, a general cargo facility, and an NS Railroad terminal for coal, limestone, and iron ore. It has by far the greatest storage capacity for bulk commodities in Ohio. Ports in Sandusky, Huron, Lorain, Fairport Harbor, and Conneaut operate at different levels of facility development but primarily handle only bulk shipments of coal, limestone, iron ore, cement, stone, and salt.

On the Ohio River, commercial navigation is made possible through a series of lock and dam facilities that raise and lower barges that connects Cairo, Illinois to Pittsburgh, Pennsylvania. These facilities are maintained by the U.S. Army Corps of Engineers (USACOE). Slow speeds and low supply chain visibility limit the viability of this mode to bulk commodities such as coal, iron ore, stone, and agricultural staples. Barge terminals are clustered in three principal regions along the Ohio River: Cincinnati, Portsmouth-Marietta, and the West Virginia Panhandle. Like Lake Erie ports, Ohio River terminals predominantly handle bulk cargo like coal, aggregate, iron ore, and chemical products. Some Ohio terminals have the capability to handle general cargo such as steel products, and the river is very important for handling shipments of very large products such as industrial machinery.

5.2.3 Roadway

ODOT is responsible for ownership and maintenance of 43,211 miles of paved roadway and 13,941 bridges. Freight is carried over these rights-of-way by trucks in private fleets, for-hire truckload, less-than truckload, and other specialized trucking services. The trucking mode is the most vital part of the state's freight system, handling 97 percent of Ohio's freight value (federal statistics, 2007). Trucks dominate freight carriage because they can reach every shipper and be flexible in terms of shipment size and schedule.

Trucks make up about 13 percent of the traffic on the state system (all State, U.S., and Interstate Routes) and 18 percent of traffic on the subset of Ohio's Interstates. Average daily truck traffic on Ohio Interstate Routes is about 10,500, and approached 15,000 on the heaviest truck routes (I-75 and I-70). Five-axle, semi-tractor trailers comprise 80 percent of the truck traffic on rural interstate roadways, while urban truck traffic has a higher percentage of two- and three-axle vehicles like panel and dump trucks.

Ohio is significant as a "crossroads" state. Fully 34 percent of Ohio truck traffic is "overhead," passing non-stop through the state. Another 41 percent of Ohio truck traffic is "internal," originating and terminating in the state. The Ohio Turnpike (I-80/90) exemplifies an overhead truck route, with 69 percent of truck trips originating and terminating outside the state.

5.2.4 Air Cargo

Ohio was once home to the most air cargo hubs of any state in the nation, but drastic changes in the industry have caused all but one to close (DHL is still in operation at the Cincinnati-Northern Kentucky Airport). The air cargo business has shifted in three significant ways: (1) more shipments shifted to trucks due to cost; (2) more air cargo is carried in the belly of passenger aircraft; and (3) FedEx and UPS emerged as a near duopoly in expedited parcel shipments (with their primary hubs in Memphis and Louisville, respectively). Consequently air cargo hubs in Dayton, Wilmington, and Toledo have closed, and the Rickenbacker Airport was never able to retain an air cargo carrier hub.

The Ohio Freight Study evaluated the capacity and condition of air freight facilities at Wilmington, Toledo, Rickenbacker (Columbus), and Cincinnati-Northern Kentucky Airports. All these facilities are in relatively good condition, with Wilmington and Cincinnati-Northern Kentucky facilities virtually new. In lieu of attracting new air cargo hubs which is increasingly unlikely, the major investment needs for these air cargo operations will be conversion to new uses.

Although air hub operations may not be likely for these airports, potential still exists for substantial logistics operations, and with that potential, a need to improve connecting road networks also exists. This is certainly the case at Rickenbacker, where the state and local governments are funding a major road connector. Recent improvements have been made at Cincinnati-Northern Kentucky, and similar road improvements may be necessary to support the conversion of air hub operations in Toledo.

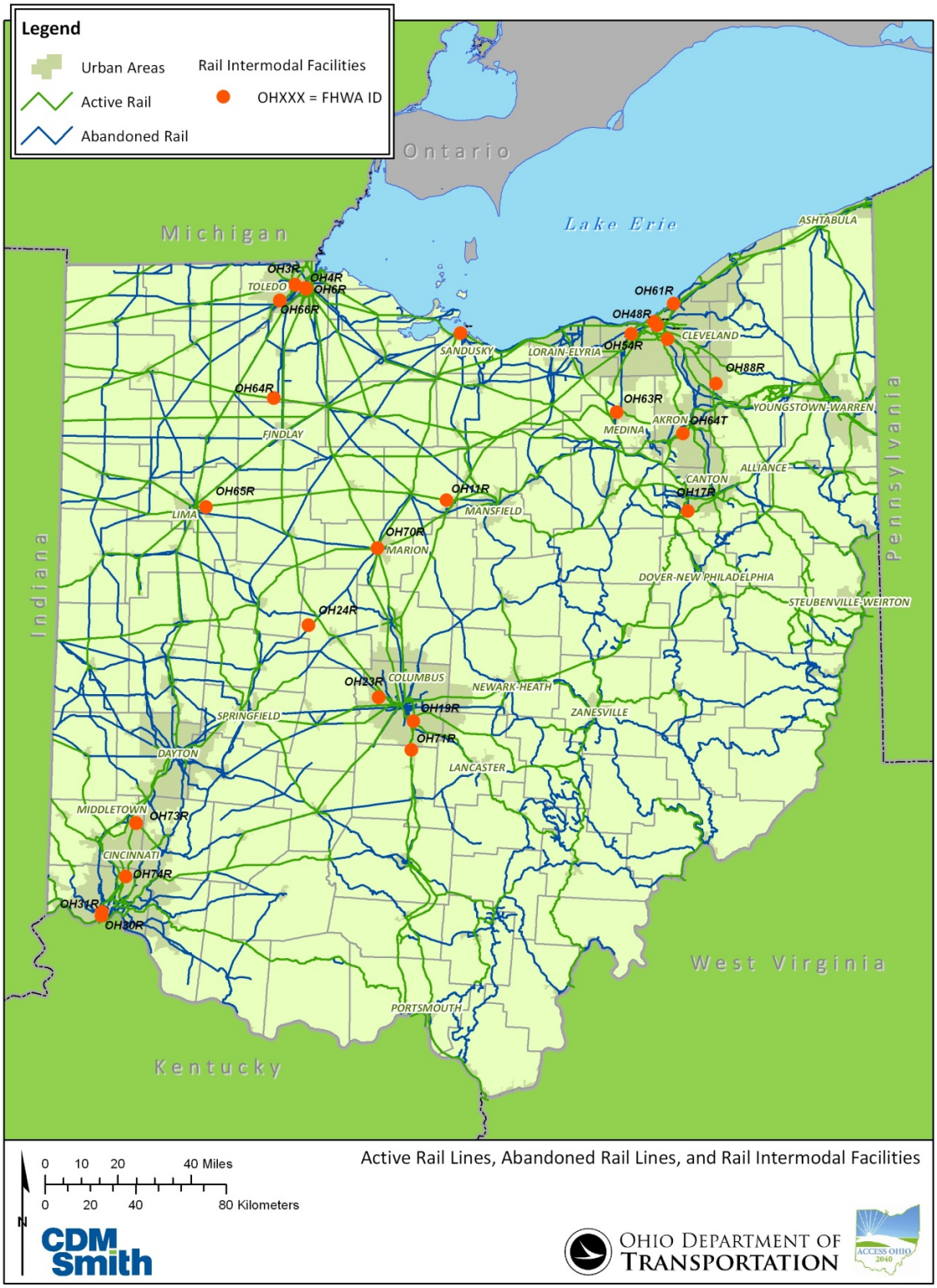
5.2.5 Intermodal Container Facilities

The major Ohio infrastructure development in the past ten years has been the up-swing in volume and investment in railroad container intermodal facilities. Ohio hosts 26 intermodal facilities in nine metropolitan areas, second only to Illinois in the number of facilities statewide. Rail carriers, with the assistance of some public subsidies, have invested heavily in creating terminals bridging the modal capabilities of roadways, rail, and marine cargo. NS Railroad, with assistance from public grants, invested heavily in the Rickenbacker Intermodal facility and doublestack clearance projects from Chicago, through Ohio, to Norfolk, Virginia.

The Northwest Ohio Integrated Logistics Center in North Baltimore opened in 2011, serves the CSX network, and is operationally focused on bypassing Chicago to distribute intermodal freight east of the Mississippi via a hub and spoke arrangement. CSX is also currently expanding the Buckeye Yard in Columbus to double operating capacity to 300,000 containers per year. **Figure 5-2** details active and inactive rail corridors and intermodal facilities.

In addition to the Rickenbacker and North Baltimore investments, railroads and private interests have also made significant investments in intermodal facilities in Marion (CSX), Columbus-Buckeye Yard (CSX), and Toledo (NS). The location of Ohio's intermodal facilities is advantageous because of the Ohio market, the good condition of Ohio's road system, and the proximity to the national market. While intermodal growth over the past 20 years was primarily driven by international trade (specifically imports), development of new intermodal facilities and railroad operating and marketing practices has increased the viability of all-domestic intermodal moves.

Figure 5-2: Active Rail Lines, Abandoned Rail Lines, and Rail Intermodal Facilities



5.3 Economic Trends and Freight Flows

While total freight volumes are expected to escalate from 1.4 billion tons in the base year of 2007 to 2.0 billion tons in 2040, the modes will not be affected equally, and demands for capacity creation will put stress on Ohio's network of Interstates and other roadways.

- Base year modal split for all freight by tonnage: trucking at 68 percent, rail at 28 percent, water at four percent, and air cargo totaling 0.1 percent (which has since declined precipitously)
- Trucking moved 93 percent of intrastate tonnage and 97 percent of intrastate value in 2007
- Top trucking commodities by weight were base metals (eight percent), gravel (eight percent), and non-metal mineral products (six percent) in 2007
- By 2040, gravel will rank first (nine percent), with waste/scrap (seven percent), and other foodstuffs (seven percent) displacing base-metals and non-mineral products by 2040
- Through tonnage was 596 million (43 percent), intrastate 415 million (30 percent), inbound 215 million (16 percent), and outbound 158 million (11 percent) in 2007

Multimodal freight flow profiles drawn from the FHWA's Freight Analysis Framework 3 (FAF3) database appear in **Figure 5-3**. They are summarized by type, tonnage, product value, and mode for freight traveling on Ohio road, rail, water, and aviation assets, with annual volumes for 2007 and 2040 forecasts extrapolated from the 2007 base year. Evaluations of tonnage relate to the physical demand on facilities, while measures of freight value gauge relationship to the economy. Traffic types distinguish shipments outbound and inbound from and to Ohio, internal within the state, and shipments traveling through Ohio between origins and destinations externally. Modal activity differs markedly by traffic type. In the 2007 base year, 93 percent of intrastate (Ohio-to-Ohio) tonnage was carried by truck, along with 97 percent of intrastate value. The 158 million outbound tons in 2007 were 76 percent truck (120 million tons), 20 percent rail (31 million tons), and four percent water (seven million tons). Air accounted for a tenth of a percent for tonnage but was more significant by value. For 2007 inbound flows, rail was stronger at 30 percent (64 million tons), with truck carrying 52 percent (111 million tons) and water 18 percent (39 million).

Of the additional 639 million annual tons forecast for all modes by 2040, 314 million annual tons (52 percent) are expected to be "through" traffic, while 48 percent will be Ohio-based. Trucking is projected to carry 628 million tons (98 percent of all incremental tonnage to 2040). Additional trucked tonnage will be evenly split between Ohio-based and "through" traffic. For rail, FAF3 predicts a modest gain of six million tons (less than one percent of all incremental tonnage), with two-thirds of it being "through" traffic. For commodity gains in trucking, most of the marginal tons are increasing volumes of gravel (66 million tons, or 11 percent of trucking's gain), waste and scrap (49 million, or eight percent), and "other food" (45 million, or seven percent). These FAF3 forecasts do not take into account recent changes in the transportation market spurred by energy resource development.

Figure 5-3: Summary of Modal Split by Annual Volume and Annual Value, 2007 and 2040

Figure 5-3a

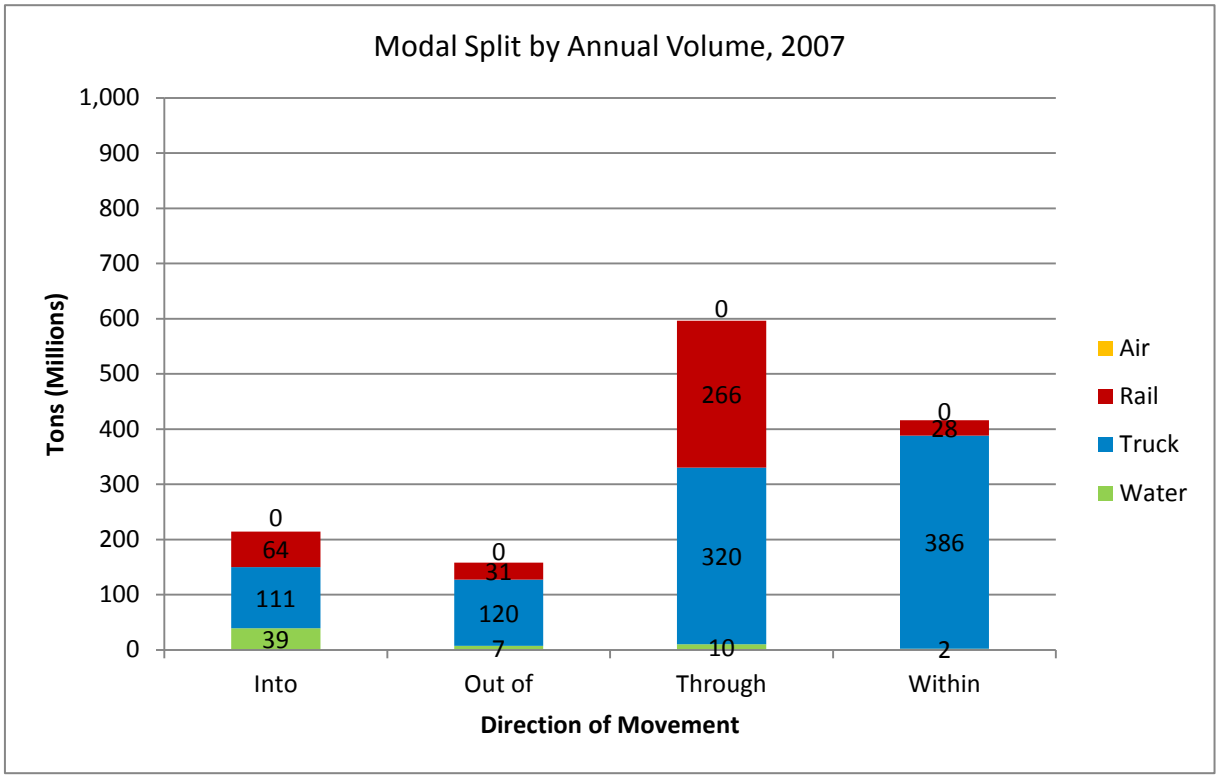


Figure 5-3b

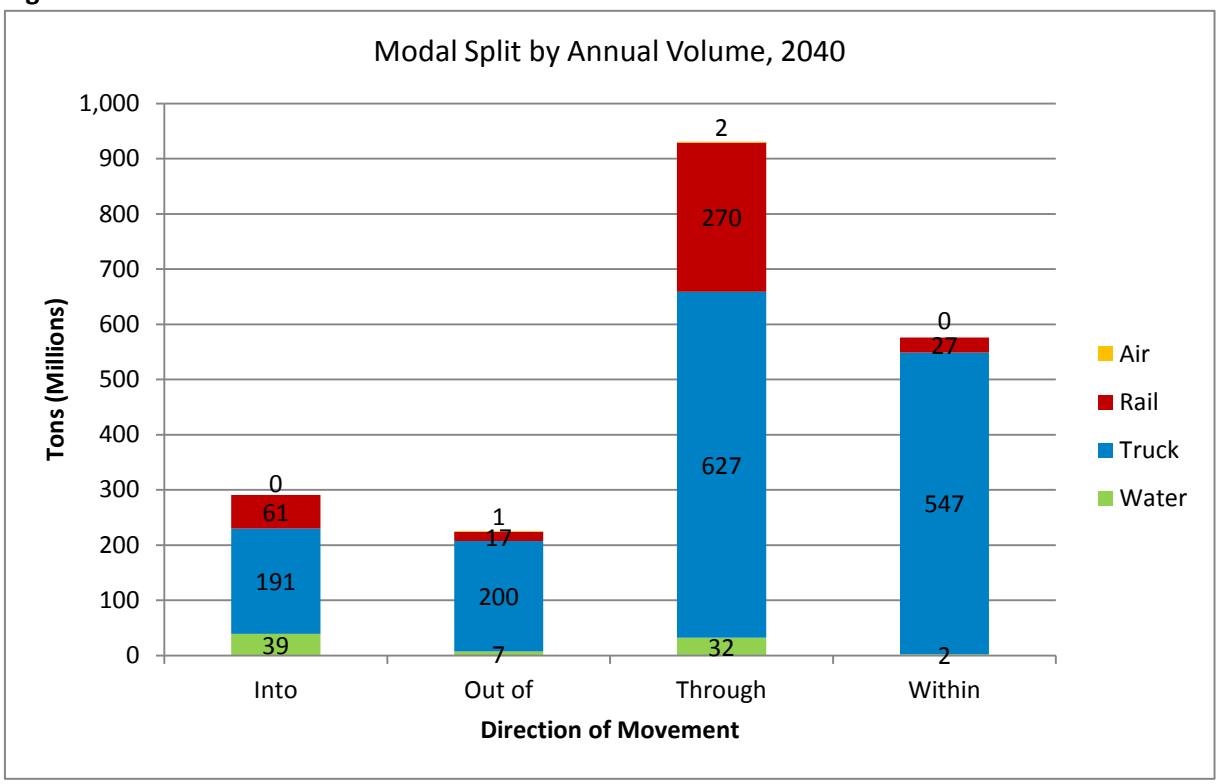


Figure 5-3c

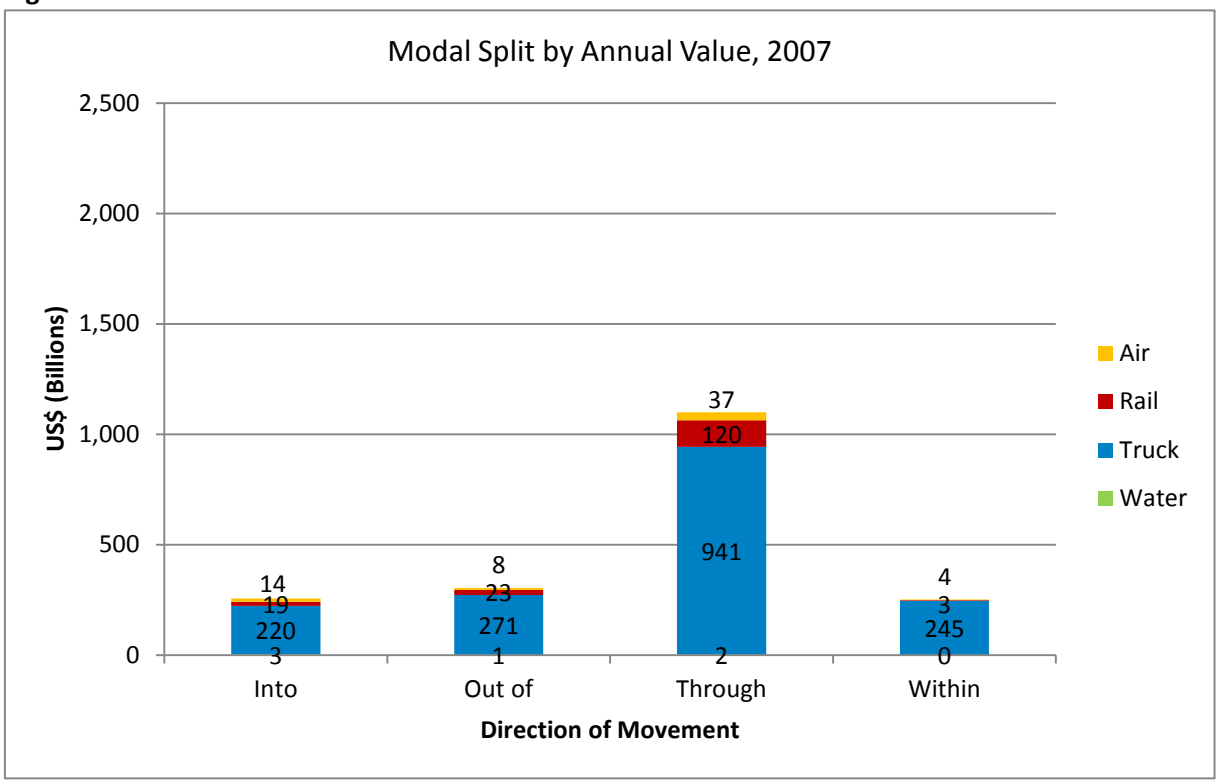
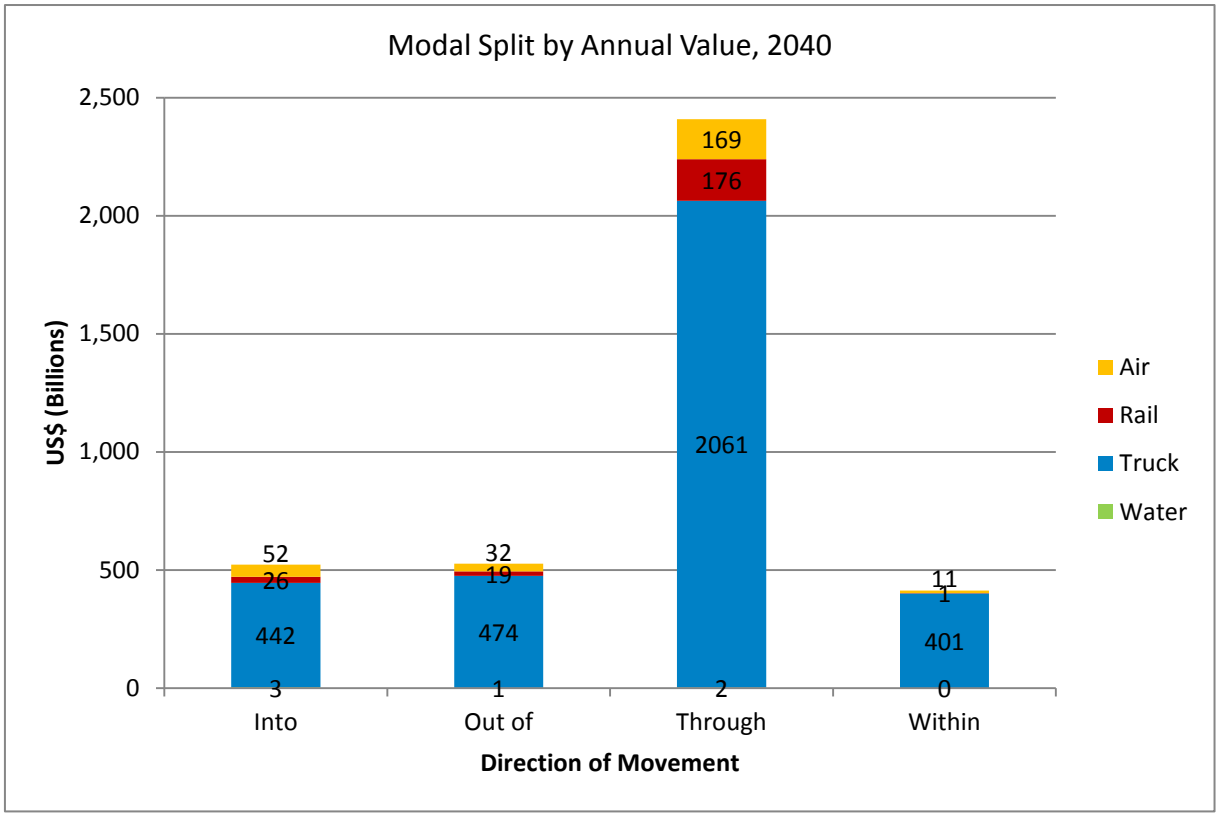


Figure 5-3d



By tonnage, through traffic was the largest single contributor to freight capacity demand in 2007, claiming 43 percent (596 million tons) of the volume that year. By 2040, outbound volumes are expected to increase in share to 12 percent of tonnage moved annually, claiming 245 million. Through tonnage will increase to 45 percent of tonnage moved that year (910 million), while inbound and intrastate totals decline slightly in approaching 2040, according to FAF3 estimates that predate the development of the Marcellus and Utica shale gas deposits. Differences in traffic patterns by travel market correspond to divergent usage of the roadway freight system in Ohio.

As **Figure 5-4a and Figure 5-4b** indicate, through traffic and state-related flows adhere to distinct patterns in traversing the road network. These images compare total truck flows to through flows (those beginning and ending externally to Ohio) in 2012. The external travel generally favors interstates and other large capacity routes, most notably the east-west corridors of I-70 and the Ohio Turnpike (with I-75 prominent too, but not I-71). Alternately, **Figure 5-4b** compares the total to "Ohio-based" truck trips, those being shipments that originate and/or terminate inside the state. Two characteristics stand out for the state-based shipping: first is that I-75 remains important but I-71 is now the backbone, crossing between the major cities of Cincinnati, Columbus, and Cleveland, and second is that the state's two-lane network emerges as a primary system. In 2007, state truck volumes totaled 937 million tons. Of that traffic, Ohio-based shipping accounted for 617 million tons, or nearly two-thirds of the total, with the remaining third borne by through shipping. County origins for truck shipping appear in **Figure 5-4c**. The primary urban centers and surrounding areas of the I-71 corridor

Figure 5-4: Through vs. Ohio-based Truck Volumes, 2012 Annual

Figure 5-4a

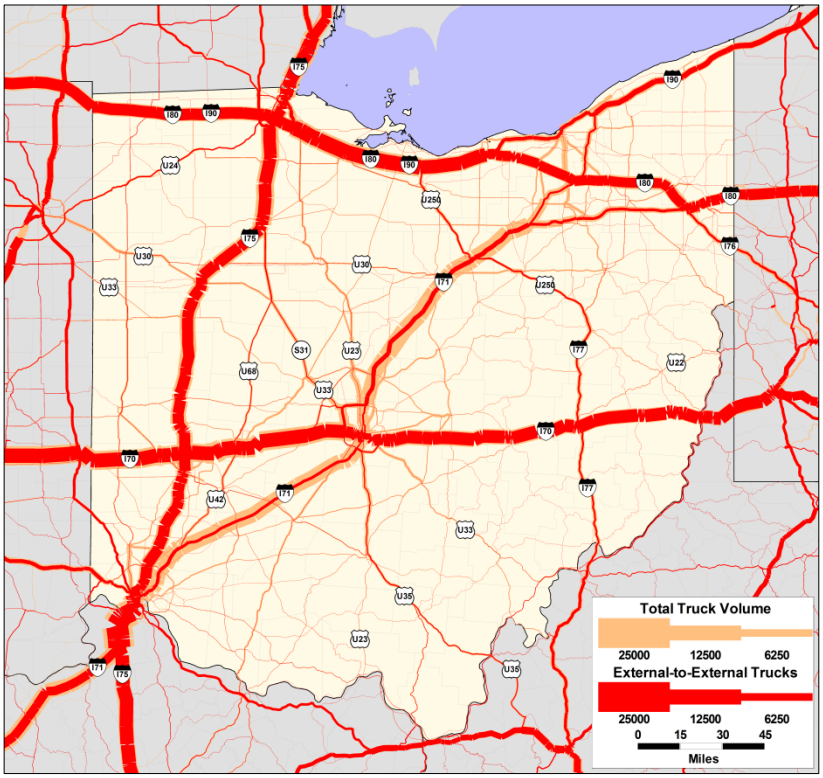


Figure 5-4b

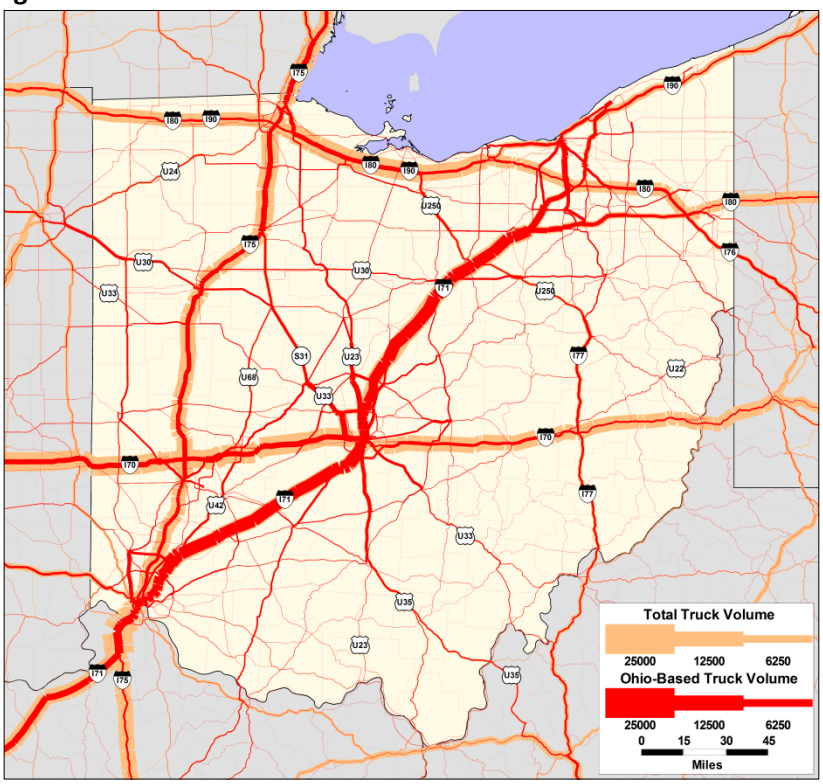
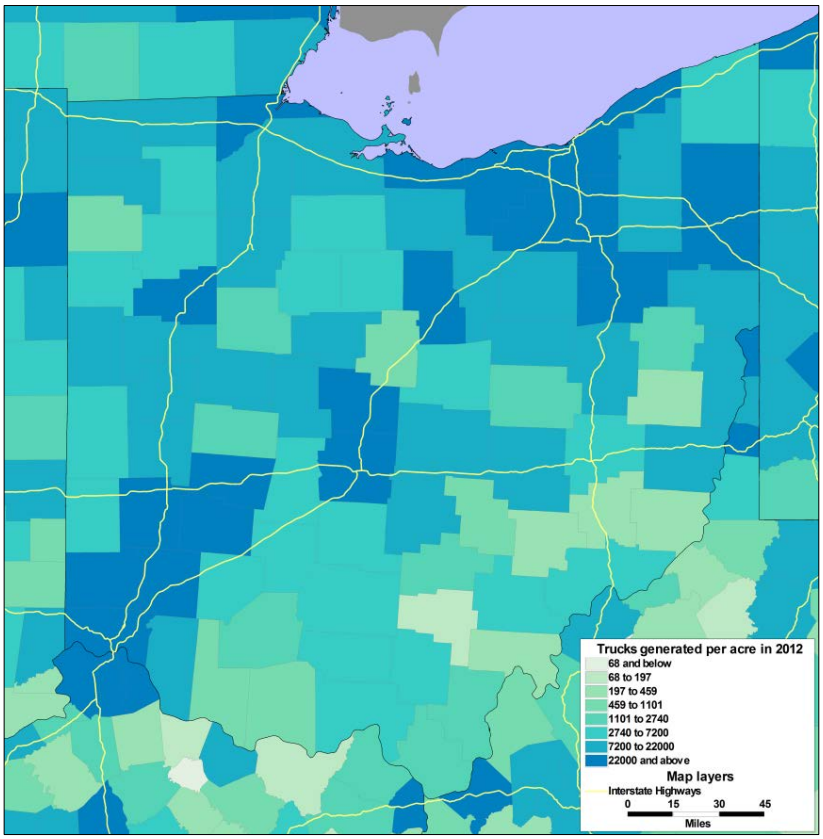


Figure 5-4c



are visible as the top generators for trucking, tracing a diagonal axis southwest to northeast. The north-south axis of I-75 appears as well, in the urban regions around Cincinnati, Dayton, and Toledo. The function of the two-lane network in penetrating to industry located throughout this territory can be seen by comparing the roadways and county activity of Figure 5-4b and Figure 5-4c. The state is responsible for freight within its borders, and truck traffic makes demands on infrastructure. Nevertheless, Ohio-based freight serves Ohio commerce and population, and efforts to support that aspect of transportation will focus on distinct portions of the system.

5.4 Future Needs

Freight forecasts place the weight of future requirements on the roadway system, but multimodal service is one of Ohio's key strengths. Therefore, the following examination of roadway needs also includes emerging freight needs across the board.

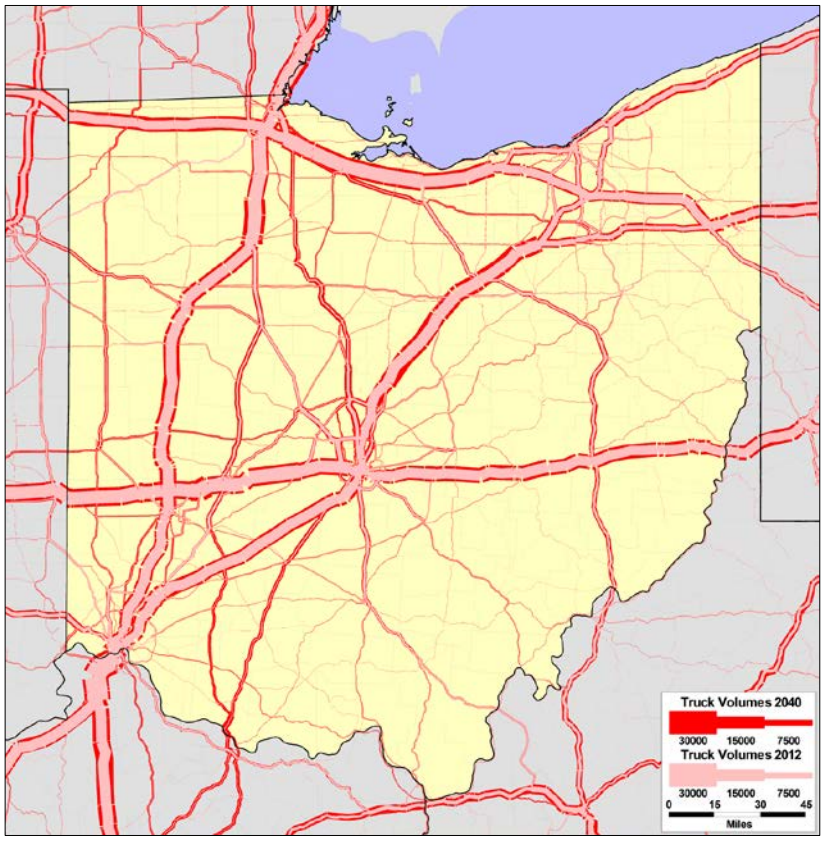
- Roadway needs come from pressures of growth and the requirement for end-to-end service.
- Facilities serving Ohio-based and through traffic are both affected, but Ohio-based needs are more pervasive because of dependence on the two-lane network.
- Immediate roadway needs are freight bottleneck solutions in urban areas and route redundancy coupled with ITS-based management on the two-lane system.
- Longer term, two-lane capacity expansions should be expected.
- Rail bottlenecks are present, but solutions mostly fall to the private sector.
- Rail needs are arising in the shale oil territory in Southeast Ohio, and systematic implementation of 286K track capability remains desirable.
- Dredging for Lake Erie ports and lock and dam upgrades on the Ohio River are the main requirements on a waterway system that otherwise has adequate capacity.
- Because of market shifts, air cargo requirements are mostly limited to efficient facility access.

5.4.1 Problem Areas

A strong freight network is crucial to retaining and attracting businesses and jobs, because network performance shapes the logistics performance that Ohio businesses use to compete. There are two pillars to competitive performance.

The first pillar is fast, reliable, productive freight service for which the risks of disruption are managed and the pressures of growth on the network are addressed. The location of those pressures appears in **Figure 5-5** as dark colored 2040 total truck volumes surrounding the lighter colored volumes of today. The evident pattern is that pressure will pervade the system, with heavy growth from both through and Ohio-based traffic, and capacity needs will be broad-based.

Figure 5-5: Total Truck Flows 2012 - 2040



The second pillar is freight service end-to-end, from pick-up at the shipper's door to delivery at the receiver's door. The basic premise of a freight shipment is that the buyer receives the goods. It is no more satisfactory or effective for a network to perform well for only part of the way than for an on-line purchase to be delivered 30 miles away from someone's home: the job isn't finished and no one is happy. This means that the Ohio two-lane network connecting its towns and businesses and the urban networks that cut through to industrial parks and commercial zones are as much a part of competitive freight performance as the Interstates. Moreover, this is the part of the system that mainly provides service to the Ohio-based traffic.

Figure 5-6 illustrates the challenges for the Ohio-based freight system. For automotive and chemical products – two industries targeted for development by Jobs Ohio – the maps show the amount of truck shipping picked up and delivered by county, the roadway volumes for Ohio-based shipping, and freight bottlenecks on the roadways. Three things stand out:

- First, the industries rely on different sections of the network, implying that support to these industries will require attention to different parts of the system.
- Second, both industries make extensive use of the two-lane road network, allowing them to ship from and serve customers in counties throughout much of the state.
- Third, the freight bottlenecks delaying service today are chiefly in the urban areas surrounding the I-71 and I-75 corridors.

Figure 5-6: OH-based Automotive & Chemical Traffic by Truck (2012) with Roadway Bottlenecks

Figure 5-6a

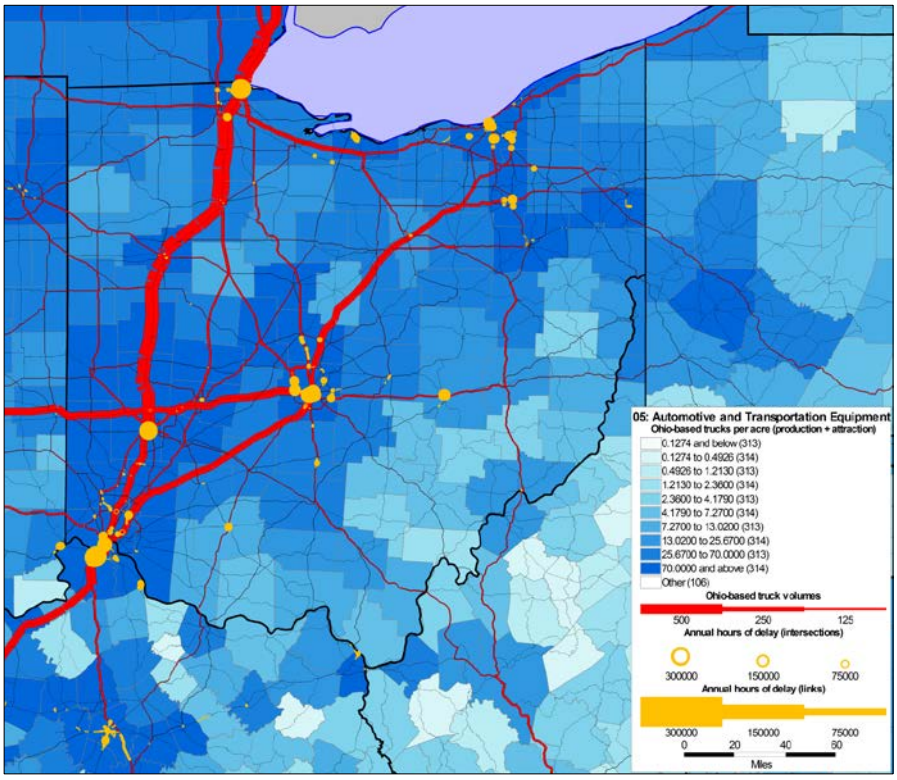
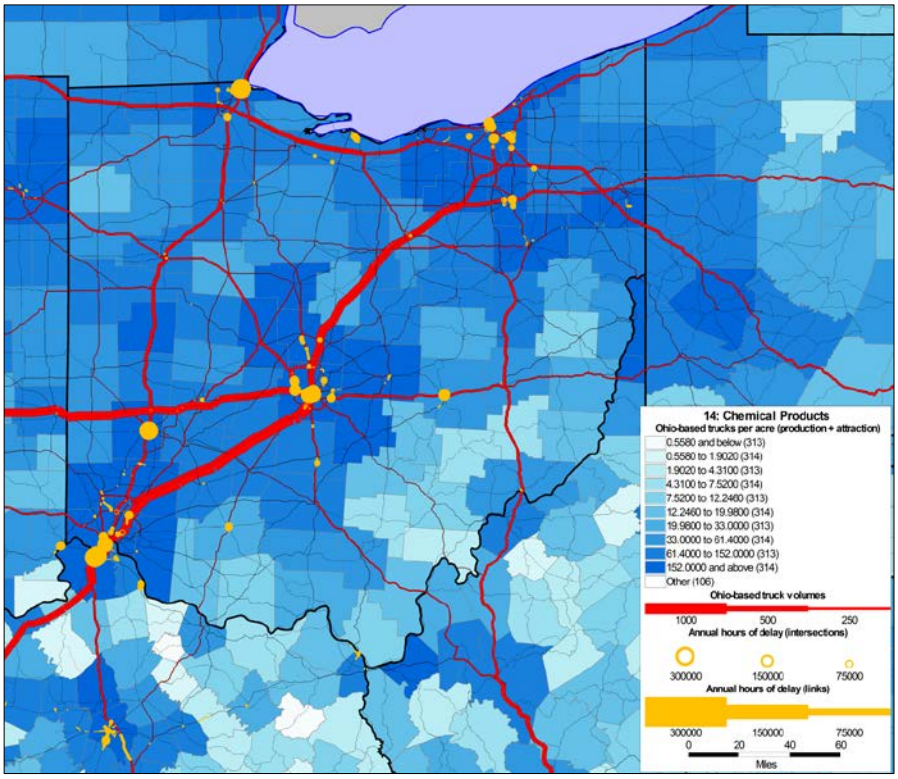


Figure 5-6b



The implications for performance needs are 1) that the urban networks require most of the immediate improvements (and projects at some bottlenecks are underway), and 2) that service assurance on the two-lane system is more about intermittent disruption than chronic delay. The immediate two-lane solutions are route alternatives and ITS information systems for roadway and logistics management. Nevertheless, as the effects of forecast growth and successful development take hold, the few bottlenecks on the two-lane network promise to increase. Longer term, there will be capacity needs on the system outside the cities.

Other needs affecting truck performance range from rest areas to support productive compliance with tightened safety regulations, to a shortage of qualified drivers, to fueling stations to exploit the growth in natural gas alternatives to diesel. Rail system needs include a series of choke points mainly on the Class I railways, which fall to the private sector owners to address. Intermodal traffic should continue to expand, especially on corridors where railroads have been making investments; this affords modest roadway relief but creates rising demand on roads accessing intermodal facilities. Completion of track upgrade to the 286,000-pound industry weight standard is an important need on the short line networks that feed the larger system, so that Ohio rail operates in a seamless fashion statewide. Development of shale petroleum production in southeast Ohio poses both an increasing challenge and opportunity to the rail system. Railroads are well-suited to handle the great volumes of heavy bulk materials required for drilling and have been successful in carrying raw product from other shale formations. However, the southeast part of the state lacks the rail corridor density that assures service and has a high proportion of inactive rail lines (as illustrated in **Figure 5-2**). Facilitation of private development of new rail services can help this Ohio industry to grow, with less new demand on local roads.

Marine facilities on Lake Erie are presently overbuilt and operating under capacity. Even so, maintenance of clear navigational channels through dredging – and the associated disposal of dredge material – is essential for ports to function. Dredging on the lakes is a federal responsibility for which funding is chronically undersupplied and even the highest volume facilities have unmet needs. On the Ohio River, terminals are mostly single user with no capacity problems or growth impediments for markets where they are competitive. The challenge is on the river itself, where capacity is capped by the slow operation and size limitations of an aging lock and dam infrastructure. There are nine structures on the Ohio-adjacent section of the river alone, while the federal Inland Waterways Trust Fund allows improvements to just two or three per year anywhere in the nation. With the stress placed by drought on Mississippi River channels, Ohio River needs may be kept waiting.

The problems facing the air cargo industry are largely economic and industry-wide. The top air freight carriers continue to replace airplanes with high service truck networks wherever possible. Regional air hubs are consolidating in larger markets like Chicago and Detroit, with Ohio facilities facing reduced demand. The state's more active cargo airports in Cincinnati and Columbus mainly face challenges from rising roadway congestion, affecting the truck feeder services that connect air cargo to customers on the ground. On-airport facility conditions are adequate, with decreased parking availability the greatest concern.

6. OHIO FINANCE

This chapter summarizes baseline projections prepared for federal/state roadway and federal/state transit revenues available to Ohio. The revenue projections shown in Section 6.1 for roadways and Section 6.2 for transit correspond to the dollar amounts available to address state system roadway needs and ODOT's contribution toward metropolitan and rural transit needs (based on historic participation). **Table 6-1** presents a summary of the total expected revenues over the 30 year period in constant 2011 dollars.

Table 6-1: Total Expected Baseline Revenues

(In Millions – Constant 2011 Dollars)

Mode	Total Available Revenue FY 2014 - FY 2040
Roadway (federal & state)	$36,538
Transit (federal & state)	$4,482
Total	**$41,020**

This chapter also provides in **Section 6.3** a summary of the needs presented in **Chapter 4** and the resulting gap between revenues and needs in **Section 6.4.**

6.1 Baseline Projection – Roadways

The 27-year baseline financial forecast is a planning-level projection of ODOT revenues available for roadway capital programming. The forecast was deflated according to standard industry practice to account for the effects of inflation over time (2.5 percent inflation assumed, based on historic consumer price index rates – see **Section 6.1.3**).

ODOT's Division of Finance provided gross revenue projections that align with historic revenue growth rates. State revenues grew beginning in 2013, while federal funds grew beginning in 2015, at the rates shown in **Table 6-2**:

Table 6-2: Federal/State Revenue Growth Rates

Description	Federal $	State $
Historic Growth	3%/year	1%/year

Table 6-3 summarizes the resulting 27-year forecast.

Table 6-3: Historic Revenue Forecast Summary, FY2014 to FY2040

(In Millions – Current Year Dollars except "Constant" line)

Funding	Total Available Revenue FY 2014 - FY 2040
State Revenue	$37,894
Deduction - State Debt Service	($4,669)
Subtotal State	**$33,225**
Deduction - Operations	($24,880)
Net State Revenue	**$8,345**
Federal aid (highways)	**$53,179**
Deduction - Debt Service	($3,144)
Deduction - Operations (Federal)	($1,350)
Deduction - Dedicated Federal Takedown	($12,823)
Net Federal Aid (roadways)	**$35,862**
Additional Revenue (State & Federal Bonds, Carryover Balance)	**$10,187**
Grand Total (Current Dollars)	**$54,394**
Total Available (Constant 2011 Dollars)	**$36,538**

Several points to note:

- The federal-aid forecast is based on MAP-21 apportionments.
- ODOT's projections for operations expenditures, debt service and takedowns – such as support for non-state elements – are subtracted to produce an estimate of state capital investments only.
- $9.2 billion of the $10.2 billion identified as additional revenue is generated from bond revenues and other innovative funding sources.
- $1 billion in "carryover" is included (FY2013 carryover to FY2014).

ODOT's historic revenue forecast estimates that $36.5 billion will be available from 2014 to 2040 (constant 2011 dollars). From 2004 to 2012, ODOT state gas tax revenues increased at an average of 0.8 percent per year and federal gas tax revenue increased at an average of three percent per year. ODOT feels these revenue estimates provide a reasonable fiscal environment to advance *Access Ohio 2040*. ODOT recognizes that there is some risk with these growth assumptions, as they are based on historical averages and are not necessarily indicative of future trends. The final Access Ohio 2040 Plan will address these risks. ODOT shares a significant amount of federal aid with Ohio's local governments, summarized in the following major programs (dollars expressed in "current" amounts, not adjusted to 2011 constant dollars):

- **MPO Program and "large cities" (non-MPOs)** – $196.2 million in FY2014 and $7.3 billion over the Plan period, from three federal sources (STP – *Surface Transportation Program*; CMAQ – *Congestion Mitigation and Air Quality Program*; and TA – *Transportation Alternatives Program*)

- **MPO Planning and Research** – $12.4 million in FY2014 and $492.2 million over the Plan period, from the federal STP
- **Municipal Bridge** – $9.2 million in FY2014 and $336.7 million over the Plan period, from the federal STP
- **County Highway Assistance (roads, bridge, safety)** – $64.8M in FY2014, $2.4B over the Plan period, from Federal STP and HSIP
- **Small Cities** – $9.2 million in FY2014 and $336.7 million over the Plan period, from the federal STP
- **Transportation Alternatives** – $11.0 million in FY2014 and $343.4 million over the Plan period, from FTA
- **Safe Routes to School** – $5.7 million in FY2014 and $173.2 million over the Plan period, from FTA
- **Transit Assistance** – $20.0 million in FY2014 and $540 million over the Plan period, from the federal STP and CMAQ

In summary, ODOT expects to share more than $11.8 billion (current year dollars) in federal aid with Ohio's local governments over the 27-year Access Ohio planning horizon. While these revenues are part of the ODOT revenue stream, they are made available to local governments for use, primarily on non-ODOT facilities and are subject to the administrative rules set forth in the *ODOT Program Resource Guide (2013)*, which can be found here: http://www.dot.state.oh.us/Divisions/Planning/LocalPrograms/Documents/ODOT%20Program%20Resource%20Guide.pdf. The local government support dollars are not included in the baseline revenue forecast. It should also be noted that local agencies are responsible for providing the non-federal match needed to leverage these funds.

6.2 Baseline Projection – Transit

Transit services in Ohio are funded primarily through the FTA. While these are not ODOT funds, it is important to quantify the level of funding available in Ohio for transit expenditures as part of the long-range transportation planning process. ODOT has historically participated in funding for transit through two primary sources: General Revenue Fund support (about $7.3 million annually, of which $400,000 is used for administration) and about $20 million annually in Federal highway funding (STP and CMAQ). The following summary presents a baseline revenue forecast of federal transit dollars and state transit contributions (based on historic participation).

The same historic annual growth rate of three percent used to forecast roadway revenues was used to forecast federal transit apportionments. Also, federal highway revenues flexed[19] for transit and state support from the General Revenue Fund were assumed to remain flat over the life of the Plan. This

[19] Flexible funds are legislatively specified funds that may be used either for transit or highway purposes. In this case, "flexed" indicates that flexible federal highway funds from eligible programs were transferred for transit expenditures.

Plan assumption is based on historic participation and does not reflect a commitment from ODOT or the State of Ohio to continue these contributions.

Table 6-4 presents the estimated forecast of:

1. FTA apportionments to year 2040 (in current dollars) based upon FTA's projected apportionment under MAP-21. The three percent annual growth rate was applied to the estimated year 2014 MAP-21 revenues. The estimated forecast totals nearly $6.1 billion between FY 2014 and FY 2040.

2. State transit support from the General Revenue Fund. After deducting the portion used for ODOT administration, the remaining $6.9 million per year was held constant to 2040. The estimated forecast totals nearly $186.3 million between FY2014 and FY2040.

Federal highway funds (STP and CMAQ) flexed for transit use. The FY2012 and FY2013 amount of $20 million was assumed constant for FY 2014 to FY 2040, totaling $540 million over the life of the plan.

In current dollars (not adjusted for inflation), the total of transit revenue expected from federal and state sources between FY2014 and FY2040 is $6.8 billion. **Adjusted for inflation, the total revenue expected to be available for Ohio transit from FY 2014 to FY 2040 is $4.5 billion**.

Largely, FTA revenues are for capital expenditures. However, Section 5307, 5310, and 5311 funds may be used for operating expenses, at a higher non-federal match (50 percent instead of 20 percent). Adequate operating cash is a constant challenge for transit agencies and the additional match requirement to obtain federal operating assistance is an additional burden.

In 2012 and 2013, the majority of the $20 million in federal highway funds flexed for transit went to Ohio's eight large urban operations, with $6 million being distributed by urban formula and $14 million distributed via a discretionary application process. These dollars are used primarily for state of good repair projects.

The majority of the state support historically provided for transit from the General Revenue Fund goes to rural transit operations. These state dollars may be used for operations.

Table 6-4: Estimated Forecast of Transit Revenues FY2014 to FY2040

(in Current Year Dollars except "Constant 2011 Dollars" column)

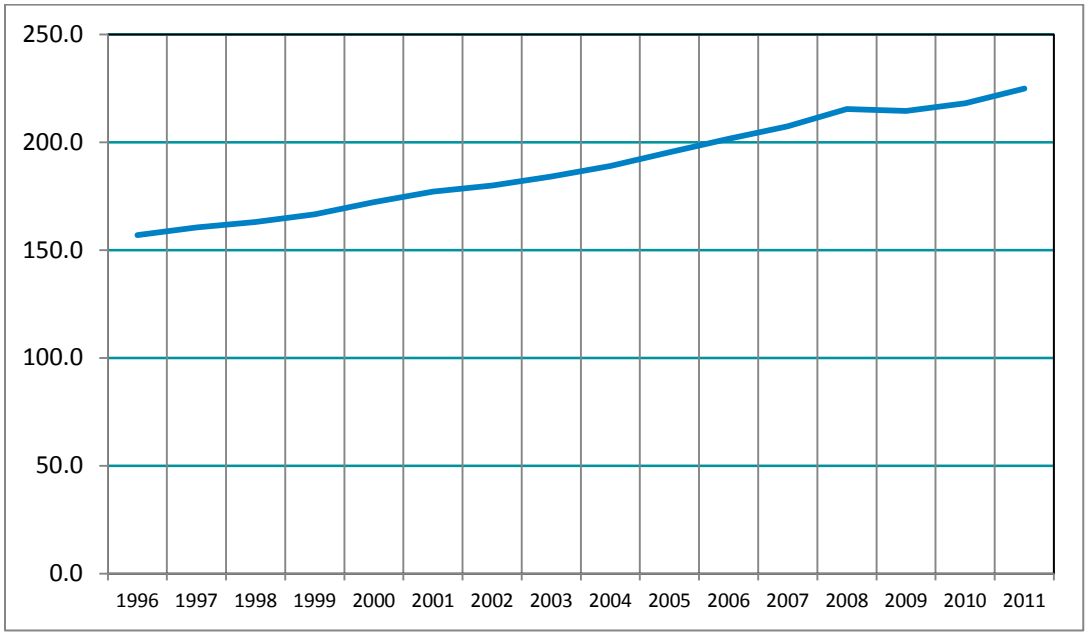
FTA Apportionments Line Item	FY 2014 (Current Dollars)	FY 2020 (Current Dollars)	FY 2030 (Current Dollars)	FY 2040 (Current Dollars)		
SECTION 5303 METROPOLITAN TRANSPORTATION PLANNING PROGRAM	$2,949,015	$3,521,278	$4,732,303	$6,359,819	Estimated Total FY 2014 - FY 2040 (Current Dollars)	**Estimated Total FY 2014 - FY 2040 (Constant 2011 Dollars)**
SECTION 5304 STATEWIDE TRANSPORTATION PLANNING PROGRAM APPORTIONMENTS	$612,895	$731,829	$983,517	$1,321,765		
SECTION 5307 AND SECTION 5340 URBANIZED AREA APPORTIONMENTS						
Amounts Apportioned to Urbanized Areas 1,000,000 or more in Population	$47,798,163	$57,073,506	$76,702,020	$103,081,101		
Amounts Apportioned to Urbanized Areas 200,000 to 1 million in Population	$30,261,283	$36,133,555	$48,560,476	$65,261,219		
Amounts Apportioned to State Governors for Urbanized Areas 50,000 to 199,999 in Population	$8,200,554	$9,791,891	$13,159,482	$17,685,244		
FTA FY 2013 SECTION 5307 OPERATING ASSISTANCE SPECIAL RULE OPERATOR CAPS (Data Not Yet Available)						
SMALL TRANSIT INTENSIVE CITIES PERFORMANCE DATA AND APPORTIONMENTS (Section 5307 Component, Values included in Section 5307)	$313,218	$373,999	$502,623	$675,484		
SECTION 5310 ENHANCED MOBILITY OF SENIORS AND INDIVIDUALS WITH DISABILITIES APPORTIONMENTS						
Amounts Apportioned to Urbanized Areas 200,000 or more in Population	$6,009,843	$7,176,067	$9,644,034	$12,960,776		
Amounts Apportioned to State Governors for Urbanized Areas 50,000 to 199,999 in Population	$1,280,952	$1,529,523	$2,055,551	$2,762,489		
Amounts Apportioned to State Governors for Non-urbanized Areas Less than 50,000 in Population	$2,114,771	$2,525,147	$3,393,586	$4,560,696		
SECTION 5311 AND SECTION 5340 RURAL AREA APPORTIONMENTS	$19,855,163	$23,708,103	$31,861,708	$42,819,472		
SECTION 5311(b)(3) RURAL TRANSIT ASSISTANCE PROGRAM (RTAP) APPORTIONMENTS	$243,759	$291,061	$391,162	$525,689		
SECTION 5311(c)(2) APPALACHIAN DEVELOPMENT PUBLIC TRANSPORTATION ASSISTANCE PROGRAM APPORTIONMENTS	$838,721	$1,001,477	$1,345,901	$1,808,779		
SECTION 5311(c) PUBLIC TRANSPORTATION ON INDIAN RESERVATIONS ILLUSTRATIVE FORMULA ALLOCATIONS (Data Not Yet Available)						
SECTION 5337 STATE OF GOOD REPAIR APPORTIONMENTS						
High Intensity Fixed Guideway Sate of Good Repair	$18,785,130	$22,430,428	$30,144,620	$40,511,848		
High Intensity Motorbus State of Good Repair	$59,890	$71,511	$96,105	$129,157		
SECTION 5339 BUS AND BUS FACILITIES FORMULA APPORTIONMENTS						
Amounts Apportioned to Urbanized Areas 200,000 or more in Population	$8,114,546	$9,689,192	$13,021,464	$17,499,759		
Amounts Apportioned to State Governors for Urbanized Areas 50,000 to 199,999 in Population	$827,390	$987,947	$1,327,718	$1,784,342		
State/Territory Allocation	$1,087,554	$1,298,597	$1,745,205	$2,345,410		
Total FTA Apportionments	$149,039,631	$177,961,113	$239,164,855	$321,417,566	$6,067,348,742	**$4,002,824,139**
State Transit Support (General Revenue Fund)	$6,900,000	$6,900,000	$6,900,000	$6,900,000	$186,300,000	**$122,908,072**
Federal Highway Revenues "Flexed" for Transit	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$540,000,000	**$356,255,282**
Grand Total	$175,939,631	$204,861,113	$266,064,855	$348,317,566	$6,793,648,742	**$4,481,987,493**

Source: Year 2013 and 2014 revenues estimated using http://fta.dot.gov/12308_14875.html and http://images.politico.com/global/2012/07/120703_transit_apportionment.html.
Section 5310 and Section 5339 revenues include entire apportionments for multi-state urbanized areas.

6.2.1 Inflation Indices

An important aspect of plan-level financial forecasting is to deflate forecasted revenues to a base year (2011 for *Access Ohio 2040*), which accounts for expected future inflation. Because infrastructure "needs" are developed using today's costs, this calculation allows a direct comparison between needs and revenues. The Consumer Price Index has been the standard for documenting historic inflation for several decades. Less volatile than the other indices, the index is accepted by FHWA as a measure of past and future inflation. **Figure 6-1** shows the U.S. Consumer Price Index since 1996.

Figure 6-1: U.S. Consumer Price Index, 1996-2011



The CPI data equates to an average annual rate of 2.43 percent. Based on this information, ODOT elected to use a future deflator of 2.5 percent for *Access Ohio 2040*.

6.2.2 Baseline Roadway Revenue Projection Summary

The total funds available for roadway planning purposes at baseline, modeled for the Plan, is $54.4 billion (current dollars), as shown in Table 6-3. Once these current revenues are adjusted to account for future inflation and expressed in constant base year dollars, the value in year 2011 dollars is reduced by more than 30 percent, depending on the inflation assumptions. The Constant 2011 Dollars line in Table 6-3 uses a 2.5 percent annual inflation adjustment based on Consumer Price Index (CPI) history. Using these assumptions, the current revenues are reduced to $36.5 billion – this is the amount available to address roadway needs estimates presented in Section 4 of this document.

6.3 Needs (Roadway and Transit)

Roadway/bridge and transit needs were presented in **Chapter 4**. The following section details 27-year needs (2014-2040) for all of Ohio's roadway and bridges.

In the next section (**Section 6.3**), the funding "gap" and development of investment scenarios are discussed – analysis and discussion is limited to the state's system assets (which consist of 17,270 centerline miles).

6.3.1 Roadways and Bridges

Table 6-5 summarizes 2014-2040 roadway and bridge needs for the entire Ohio roadway system, organized by functional element and jurisdiction. The analysis of unconstrained needs for Ohio – including the state, county, municipal, and township-maintained components – totals $87.9 billion.

Table 6-5: Summary of Ohio Roadway and Bridge Needs, 2014-2040, in Millions

Maintenance Responsibility	Roadway	Bridge	Total
State	$38,000	$9,194	$47,194
Non-State	$37,120	$3,580	$40,700
Total	**$75,120**	**$12,774**	**$87,894**

Source: CDM Smith, ODOT Planning, County Engineers

ODOT's roadway and bridge needs for related spending total $47.2 billion, including $24 billion for roadways (preservation and modernization projects); $9.2 billion for preservation, replacement, and new construction of bridges; $9 billion for capacity adding projects; $2 billion for safety; and $3 billion for operations and other capital projects.

6.3.1.1 Roadways (State System)

As shown in **Table 6-6**, the total of roadway needs expected for Ohio from 2014 to 2040 is $38 billion. These needs occur on the 17,270 centerline miles (43,210 lane miles) under state responsibility.

Table 6-6: Summary of ODOT Roadway Needs, 2014-2040, in Millions

Type of Roadway Need	Total	Percent
Preservation and Reconstruction	$24,000	63%
TRAC	$9,000	24%
Safety	$3,000	8%
Maintenance	$2,000	5%
Total	**$38,000**	100%

6.3.1.2 Non-ODOT Roadway Needs

The needs for non-state maintained roadways (102,085 centerline miles) are estimated at $37.1 billion over 27 years (2014-2040), as shown in **Table 6-7**. These needs focus on the general preservation of the existing system and do not attempt to address any potential capacity needs. These non-ODOT roadway needs are not considered in the gap analysis (**Section 6.3**) which focuses only on the state system.

Table 6-7: Non-state Roadway Needs 2014-2040, in Billions

System	County	Township	Municipal	All Non-State
Totals:	$8.94	$9.10	$19.07	$37.12
Percent of total	24%	25%	51%	100%

Note: Expressed in base year 2011 Dollars

Also, needs for the Ohio Turnpike and Park/Federal Roads are not included in this Plan, because these systems are entirely supported by other sources.

6.3.1.3 Bridges

As explained in **Chapter 4**, the state's system of 43,582 bridges is maintained by a combination of state, local, and county agencies. **Table 6-8** presents the 27-year needs (2014-2040) estimate for all of Ohio's bridges. The total of $12.8 billion includes the rehabilitation, maintenance, and replacement activities needed to maintain a safe, modern, high-capacity system of bridges. Total state system bridge needs over the 27-year period are projected to be $9.2 billion. Non-state system bridge needs were not considered in the gap analysis (**Section 6.3**), which focuses only on the state system.

Table 6-8: Ohio Bridge Needs, 2014-2040, in Millions

	$ Millions
State System	
Non-major ODOT Bridges	$7,437
Non NBI-length ODOT Bridges	$236
State-Supported	$165
Major Bridges	$721
River Crossings	$149
Culverts	$486
Sub-total	**$9,194**
Non-State System	$3,580
Total	**$12,774**

The primary analysis tool used to estimate bridge needs was the NBIAS.

6.3.2 Transit

As presented in **Section 4.2**, Ohio has 27 urban transit agencies providing service within small and large urban areas throughout the state. Thirty-five FTA 5311 rural transit agencies provide service to or within 36 counties, and the FTA 5310 specialized agencies provide service to or within 64 counties.

Over the 27-year planning horizon, total statewide modernization and preservation needs for transit are estimated at $23.4 billion, as shown in **Table 6-9**. To provide the Department's historical share of these identified costs, ODOT will need to spend $8.2 billion to maintain existing services.

Table 6-9: Transit Needs by Functional Element, 2014-2040

	$ Millions
Modernization & Preservation	$23,402.5
Expansion	$5,285.6
Total	**$28,688.1**

Table 6-10 presents the ODOT urban category designations by agency for large and small urban systems. Table 4-9 in Chapter 4 shows transit systems by the designations presented here.

Table 6-10: Ohio Transit Needs by Category

Category	Designation
I	Rail/Bus Systems
II	Large Bus Systems
III	Mid-Sized Bus System
IV	Intermediate Bus Systems
V	Small Bus Systems

Data reported to ODOT annually from each individual transportation agency served as the primary source of documents used to establish the baseline and existing public transportation information.

6.3.2.1 Maintain Existing Services

Table 6-11 summarizes the operating, administration, and capital costs to maintain and expand the existing services from to 2040.

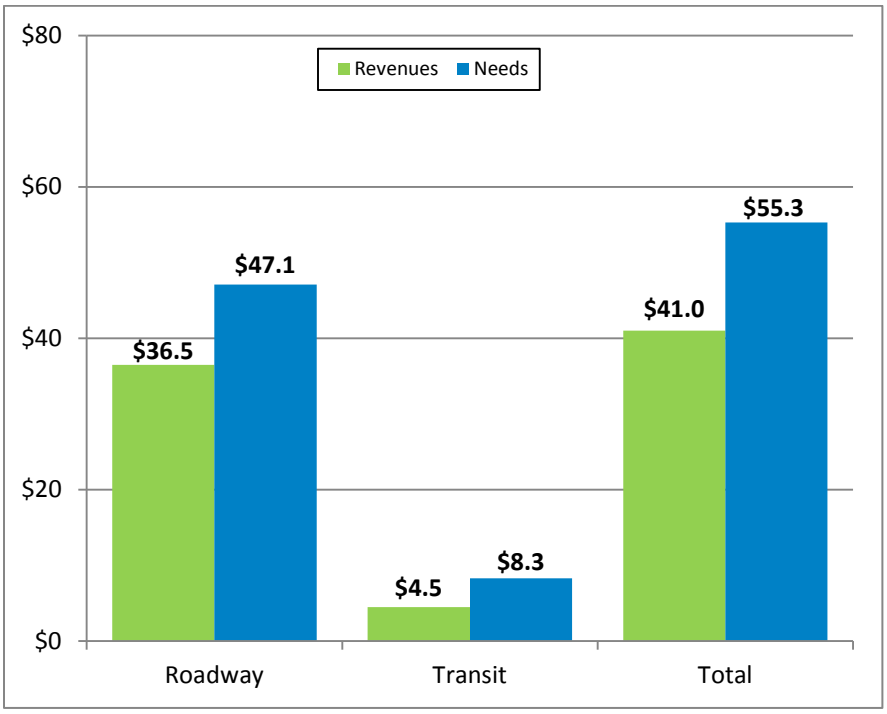
Table 6-11: Costs to Maintain Existing Services 2014-2040, in Millions

Program Category		Maintain Services	Enhance Services	Total
I	Rail/Bus	$9,152.3	$1,773.8	$10,926.1
II	Large Bus	$8,135.5	$1,902.0	$10,037.5
III	Mid-sized Bus	$2,458.3	$726.5	$3,184.8
IV	Intermediate Bus	$1,432.0	$357.3	$1,789.3
V	Small Bus	$1,138.6	$215.2	$1,353.8
5311	Rural	$904.6	$265.40	$1,170.0
5310	Specialized Transportation Program	$181.2	$45.3	$226.5
	Total	$23,402.5	$5,285.6	$28,688.1

Preservation and Modernization: Preservation and modernization investments are designed to keep equipment operating safely and to minimize the inconvenience and disruption of equipment failures. Information technologies, such as those that inform travelers of route status and expected arrival and departure times, are included as well.

Expansion: Population growth over the next 27 years will increase the demand for public transportation services, including urban, rural, and intercity services. A number of planning documents, outlined in **Section 4.2**, were the primary resources used to identify future transit needs for the small and large urban systems and rural and specialized programs.

Figure 6-2: 2014-2040 Needs vs. Revenues



6.4 Needs vs. Revenues Gap

The current baseline revenue forecast estimates that from 2014 to 2040 ODOT will have inadequate revenues to both meet its roadway-related investment needs and will be unable to provide sufficient funding to meet the Department's share of transit capital and operating support needs.

The following discussion relates only to those roadway needs for which ODOT is presumably responsible and transit needs in line with ODOT's historic voluntary participation:

- Ohio's needs for roadway and related spending total $47.1 billion, including $37.9 billion for roadways (preservation, modernization, and expansion projects as well as TRAC projects) and $9.1 billion for preservation, replacement, and new construction of bridges. This compares to anticipated revenues of $36.5 billion and results in an expected roadway funding gap of $10.5 billion.

- Over the 27-year planning horizon, total statewide needs for transit capital and system operations/administration are estimated at $23.4 billion. To provide the Department's historical share of these identified costs, ODOT will need to spend $8.2 billion to maintain existing services, in keeping with its historic contribution to transit. This compares to estimated available ODOT transit resources of $4.5 billion, which includes $4.0 billion of FTA funding and about $0.5 billion of state general fund/roadway flex funding. The resulting transit funding gap at the state level is thus $3.8 billion.

- ODOT's combined state roadway and transit spending needs total $55.3 billion, compared to anticipated total revenues of $41.0 billion. The Department's resulting total funding gap for 2014-2040 is thus $14.3 billion.

In addition to the investments described above, ODOT also provides significant federal-aid funding for local road improvements. In total, the 27-year needs to preserve and improve local federal-aid roads are estimated at $10.1 billion. ODOT-supported funding for the local federal-aid road system is estimated at 6.1 billion, resulting in a projected shortfall of $4.1 billion. It should also be noted that local governments in Ohio face a projected need of another $27.01 billion over the 2014-2030 period to preserve and improve local roads that are not eligible for federal-aid funding.

7. CONCLUSIONS

Ohio boasts a robust multi-modal transportation system with extensive roadway, transit, rail, maritime, aviation, bicycle, and pedestrian networks, as well as numerous intermodal facilities. This modally balanced transportation system provides for the efficient movement of people and goods, and supports a thriving economy and a high quality of life for the state's residents and visitors. Currently, the majority of Ohio's transportation system is in good condition, but continued investments must be made in order to maintain the system's condition in the coming decades. Access Ohio 2040 will assist ODOT decision makers as they prioritize Ohio's future transportation investments.

Goals and objectives were developed for Access Ohio in coordination with numerous stakeholders including the general public. Six goal areas were established, providing the framework for the development and implementation of Access Ohio. The goal areas are: preservation, safety, mobility and efficiency, accessibility and connectivity, stewardship, and economic development.

Ohio has more than 250,000 lane miles of public roadways. The state roadway system includes all Interstate, US Route, and State Route lane miles. This represents about 20 percent of the state's total roadway mileage. ODOT is responsible for maintaining all Interstate lane miles as well as US and State Route lane miles that are located outside of municipal jurisdictions. Local governments are responsible for state routes within municipalities, and all county, township, and municipality roadways. To ensure that roadways are in an acceptable condition, ODOT rates road condition using a pavement condition rating (PCR), and approximately 97 percent of the lane miles on Ohio's state system of roadways have a PCR that is acceptable or better.

Of Ohio's more than 25,000 bridges, approximately 40 percent are located on the state system. ODOT is responsible for maintaining all bridges on the state system. Bridge conditions are measured with a bridge sufficiency rating that considers structural condition, bridge geometry, and traffic on a scale of 0 to 100. In general, a sufficiency rating below 80 indicates that a bridge may be in need of rehabilitation and a sufficiency rating below 50 indicates that a bridge may need replaced. It is important to note, however, that a bridge with a sufficiency rating below 50 does not mean that a bridge is unsafe to travel on. Almost 77 percent of bridges on the state system have a sufficiency rating over 80, and two percent have sufficiency ratings below 50.

From 2014 to 2040, approximately $38 billion will be needed to maintain PCR at acceptable levels, address safety concerns, and support increased travel on state system roadways. Almost two-thirds of these expected needs are for roadway preservation, such as repaving and reconstruction. A quarter of the expected needs are for projects that add capacity to address increased travel, safety concerns, or economic development needs. The remaining needs are for general maintenance such as signage and guardrail replacement. In addition to future roadway needs, approximately $9 billion is needed to ensure that all bridges on the state system are maintained with a sufficiency rating above 50 through 2040.

Ohio has over 4,000 miles of class I rail lines, the majority of which are owned by the Norfolk Southern, CSX and CN railroads. There are an additional 31 short line carriers operating almost 2,500 miles of railroad. These short line railroads provide vital connections to businesses and industries across the state. With the highest concentration of rail lines of any state, the freight rail network in Ohio is critical to the state's economy.

Ohio's maritime freight network is also vital to the health of the state's economy. Ohio has access to two of the nation's largest inland waterway systems: the Great Lakes and the Ohio River. The Ohio River system connects Ohio to the Gulf of Mexico via the Mississippi River or the Tennessee Tombigbee Waterway; and the Great Lakes system provides access to the North Atlantic Ocean via the St. Lawrence Seaway. Great Lakes traffic is dominated by bulk cargo shipment, with some international trade of general cargo (primarily steel). The Ohio River terminals predominantly handle bulk cargo like coal, aggregate, iron ore and chemical products.

With 13 intermodal terminals, Ohio is second only to Illinois. These terminals provide Ohio shippers with expanded transportation options helping to make Ohio a desirable place for businesses and industry to locate. They also support Ohio's $16 billion logistics industry. Along with Ohio's major maritime terminals and international airports; Ohio is well positioned to move large quantities of products to and from the global market place.

Ohio's freight tonnage is expected to increase by 67 percent between now and 2040. Though most of this increased tonnage is expected to be carried by trucks, the maritime and rail networks will continue to play a vital role in the statewide freight network, especially for heavier commodities.

Statewide, public transportation ridership has not varied significantly over the past decade, except for a short term spike in 2008 during a period of record high gas prices. While transit ridership trends have remained relatively constant, there are ongoing underlying demographic trends that point to future increases in transit ridership demand:

1. A number of Ohio's largest urban centers are experiencing residential growth. Young adults are residing in urban centers to take advantage of the entertainment, employment, and urban lifestyle amenities present in these settings, including access to strong urban transit services.
2. Many of Ohio's urban areas continue to have concentrations of low income populations. These populations remain dependent on traditional transit services to access jobs, healthcare, education and other personal needs.
3. Ohio's rural areas also include significant low income, elderly, and disabled populations, and there are many rural single or zero car households. These rural populations depend on transit services to meet their mobility needs.

Demographic trends show that the average age of Ohioans is increasing. As Ohio's urban and rural populations age, transit services will continue to be an important factor in providing mobility for all Ohioans.

Between 2014 and 2040, almost $18 billion in operating costs and approximately $5.5 billion in capital costs will be needed to maintain Ohio's public transportation services at their current level of service.

Almost $4 billion in additional operating costs and approximately $1.5 billion in additional capital costs will be needed to expand the state's public transportation system to meet projected future demand.

Ohio has 104 publicly owned airports; seven of these are commercial airports that provide regularly scheduled passenger service, and the remaining 97 are general aviation airports. The FAA has designated 12 of the general aviation airports to serve as relievers to help relieve congestion from nearby commercial airports. Over the past decade, total passenger enplanements in Ohio have decreased by almost 20 percent due to changes in the airline industry.

There are approximately 4,200 miles of bike facilities in Ohio, including bike lanes, shared use paths, and on-road bike routes designated by local jurisdictions. Planning for future bike and pedestrian needs is largely a local issue because these transportation modes are typically used for shorter trips and are located in municipal jurisdictions; however, ODOT is exploring the gaps that currently exist to develop an interconnected statewide bike system that supports and connects to a national bikeway system.

Ohio's transportation system is currently modally balanced and in good condition. The primary challenge is to secure the adequate funding to maintain, operate, and expand Ohio's modal transportation networks to meet future demands. Projections used in Access Ohio assume that federal and state transportation funding revenues will grow at an annual rate of three percent and one percent, respectively. Construction costs are expected to grow at 2.5 percent per year, consistent with the consumer price index. Based on these estimates, ODOT's revenue through 2040 is projected to be $41 billion. Projected revenues fall short of the estimated $55 billion in roadway and transit needs resulting in a $14 billion funding gap through 2040.

A complex mix of public and private revenue sources will be needed to successfully address the fiscal challenges facing the preservation of Ohio's transportation infrastructure. Ohio has done well in maintaining its transportation system in past decades but will need to secure additional funding in the future to maintain a world-class transportation system.

APPENDIX A: ACRONYMS AND GLOSSARY

Acronym List

AASHTO	American Association of State Highway and Transportation Officials
ACS	American Community Survey
ADT	Average Daily Traffic
BART	Bid Analysis Review Team
BLOS	Bicycle Level of Service
CMAQ	Congestion Mitigation and Air Quality
CNG	Compressed Natural Gas
CPI	Consumer Price Index
CSF	Critical Success Factor
DR	Demand Response
FAA	Federal Aviation Administration
FAE	Federal-Aid Eligible
FAF3	Freight Analysis Framework 3
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GSP	Gross State Product
HERS-ST	Highway Economics Requirements System
HSIP	Highway Safety Improvement Program
HPMS	Highway Performance Monitoring System
ITS	Intelligent Transportation System
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
NBI	National Bridge Inventory
NBIAS	National Bridge Investment Analysis System
NPIAS	National Plan of Integrated Airport Systems
NTD	National Transit Database
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OPWC	Ohio Public Works Commission
P3	Public Private Partnership
PCR	Pavement Condition Rating
PUG	Priority, Urban, and General Roadway Systems
RUMA	Road Use Maintenance Agreement
SHSP	Strategic Highway Safety Plan
SOV	Single Occupancy Vehicle
STP	Surface Transportation Program
TA	Transportation Alternatives
TRAC	Transportation Review Advisory Council
VMT	Vehicle Miles Traveled
USACOE	United States Army Corps of Engineers
USDOT	United States Department of Transportation

Glossary

A

American Association of State Highway and Transportation Officials (AASHTO) – A nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico. Its primary goal is to foster the development, operation, and maintenance of an integrated national transportation system that represents all five modes – air, highways, public transportation, rail, and water.

American Community Survey – A household survey developed by the Census Bureau to replace the long form of the decennial census. The ACS is a large demographic survey collected throughout the year using mailed questionnaires, telephone interviews, and visits from Census Bureau field representatives to about 3 million household addresses annually.

Amtrak (National Railroad Passenger Corporation) – An agency created by Congress in 1970 to operate the national passenger railroad system. Amtrak also operates commuter rail service under contract with many local public transit systems.

Average Daily Traffic (ADT) – The average number of vehicles that passes a specified point during a 24-hour period, measured in one or both directions.

B

Bid Analysis Review Team (BART) – A team inclusive of ODOT technical experts. The team has three primary responsibilities: track market trends, perform in-depth data and cost analyses, and develop construction project inflation rates and forecasts for the Department.

Bond – Fixed income security that allows the issuer (ODOT) to pay back the amount borrowed on a specific date.

C

Climate Variability – The differences between long-term statistics of meteorological elements calculated for different periods. One of the primary issues with climate variability is the impact that extreme weather events have on the transportation system. The increased frequency of the extreme weather events increases the cost to maintain the existing transportation system.

Committee on Climate Change – The National Research Council is one of four organizations housed under the National Academies of the U.S. The Committee on Climate Change produces research for the National Academies with the intent of fostering atmospheric, oceanic, and related research aimed at advancing knowledge and understanding of the physical climate system and forced climate change.

Compressed Natural Gas (CNG) – A fossil fuel that can be used as an alternative to gasoline in internal combustion engines. It is less harmful to the environment compared to most other fossil fuels.

Congestion Mitigation and Air Quality (CMAQ) – A federal transportation program created under the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. The program was implemented to support surface transportation projects and other related efforts that contribute air quality improvements and provide congestion relief.

Consumer Price Index (CPI) – An index of the changes in the cost of goods and services to a typical consumer, based on the costs of the same goods and services at a base period.

CO_2 – Carbon dioxide is a naturally occurring compound that is essential for human and plant life. It is also one of the five greenhouse gases. Human beings and land animals exhale CO_2, while plants use CO_2 during photosynthesis.

D

Demand Response Service – A public transit service comprised of passenger cars, vans, or small buses operating in response to calls from passengers or their agents to the transit operator; the service then dispatches a vehicle to pick up the passengers and transport them to their destinations. A demand response (DR) operation is characterized by the following: 1) vehicles that do not operate over a fixed route or on a fixed schedule except, perhaps, on a temporary basis to satisfy a special need; and 2) vehicles that may be dispatched to pick up several passengers at different pick-up points before taking them to their respective destinations and may even be interrupted en route to these destinations to pick up other passengers.

E

Enplanements – This is a count of the number of individuals boarding an airplane, including all scheduled passenger flights

F

Federal-Aid System – The Federal-Aid System is the designated network of roadways that are eligible to receive federal gas tax funds for transportation maintenance, operational, and improvement projects. The Federal-Aid System includes roadways with certain functional classification.

Federal Aviation Administration (FAA) – The administrative agency within USDOT with the responsibility to regulate, promote, and develop air commerce; control the use of navigable airspace of the U.S., including the regulation and operation of military and civilian aircraft; promote, encourage, and develop civil aeronautics; consolidate research and development with respect to air navigation; install and operate air navigation facilities; develop and operate a common system of air traffic control and navigation for both civilian and military aircraft; and develop and implement programs and regulations to control aircraft noise and other environmental effects of civil aviation.

Federal Highway Administration (FHWA) – The administrative agency within USDOT with the responsibility to ensure the development of an effective national highway and road system.

Federal Inland Waterways Trust Fund – The U.S. Army Corps of Engineers manages the trust fund that receives funding from tax on fuel used in commercial transportation on inland waterways. The trust fund will pay no more than one-half of the cost of any construction eligible under the Water Resources Development Act of 1986.

Federal Railroad Administration (FRA) – The administrative agency within USDOT responsible for coordinating government activities related to the railroad industry.

Federal Transit Administration (FTA) – The administrative agency within USDOT responsible for administering federal transit grants to states, local governments, and transit agencies for the purpose of developing, maintaining, and operating local public transit services.

Fixed-Route Transit Service – Transit service using rubber-tired passenger vehicles operating on fixed routes and schedules. Services are provided on a repetitive, fixed schedule basis along a specific route

with vehicles stopping to pick up and deliver passengers to specific locations; each fixed route trip serves the same origins and destinations.

Freight Analysis Framework 3 (FAF3) – FHWA database that integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by modes of transportation. With data from the 2007 Commodity Flow Survey and additional sources, FAF version 3 (FAF3) provides estimates for tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode for 2007 (the most recent year) and forecasts through 2040.

Functional Classification – The grouping of roads, streets, and highways into a hierarchy within an integrated network based on their relative importance to mobility and access to adjoining land. The hierarchy of roadway classification is as follows:

- Rural Areas – Principal Arterials, Minor Arterials, Major Collectors, Minor Collectors, and Local Roads
- Urban Areas – Principal Arterials, Minor Arterials, Collectors, and Local Streets

G

General Aviation Airports – All airports not classified as commercial, cargo, or reliever are considered general aviation airports. This airport type is the largest single group of airports in the U.S. system. The category also includes privately owned, public-use airports that enplane 2,500 or more passengers annually and receive scheduled airline service.

General Revenue Funds (GRF) – State funds from all major tax sources (income, sales, business, etc.) that are not dedicated to or limited for specific purposes or programs.

Geographic Information System (GIS) – A computerized data management system designed to capture, store, retrieve, analyze, and report geographic and demographic information (such as addresses, business locations, etc.); relate various pieces of data based on location; and display the information on maps.

Gross State Product (GSP) – The total economic output of a state. It is a subset of the nation's Gross Domestic Product (GDP).

H

HERS-ST – Highway Economics Requirements System – An FHWA developed engineering/economic analysis (EEA) tool that uses engineering standards to identify highway deficiencies and then applies economic criteria to select the most cost-effective mix of improvements for system-wide implementation.

Highway Performance Monitoring System (HPMS) – A national database maintained by FHWA that uses data provided by the states to inventory the nation's highways and report information related to highway usage, traffic volumes, physical conditions, performance, and needs.

Highway Safety Improvement Program (HSIP) – A federal transportation program created under SAFETEA-LU as a core federal-aid program. The purpose of the program is to achieve a significant reduction in traffic fatalities and serious injuries on public roads through the implementation of infrastructure-related highway safety improvements.

I

Inflation – The persistent, substantial rise in the general level of prices related to an increase in the volume of money and resulting in the loss of value of currency.

Intelligent Transportation Systems (ITS) – Transportation monitoring and information systems that apply electronics and communications technologies such as traveler information, traffic monitoring, traffic management centers, traffic signal operation and coordination, electronic toll and fare collection, vehicle navigation systems, emergency alert systems, etc. to improve the efficiency and safety of surface transportation systems.

M

Metropolitan Planning Organization (MPO) – An organization required by U.S.C. 134 and 49 CFR Chapter 53, formed by local elected officials and designated by the Governor that, in cooperation with the state, is responsible for transportation planning in urbanized areas.

Mode – One of several forms of transportation or travel for both people and freight, including highways, railroads, waterways, public transit, aviation, walkways, and bike paths.

MAP-21 – Moving Ahead for Progress in the 21st Century Act – The surface transportation bill signed into law on July 6, 2012. It provides $105 billion nationally in transportation funds for federal fiscal years 2013 and 2014.

N

National Bridge Inventory (NBI) – FHWA database containing information on bridges in the U.S. The States compile the information to meet the requirements of the National Bridge Inspection Standards, which outlines bridge inspection procedures.

National Bridge Investment Analysis System (NBIAS) – The NBIAS is an analysis tool used to analyze the investment needs associated with bridge repair, rehabilitation, and functional improvements. The system can be used to examine the backlog of needs, in dollars and number of bridges; distribution of work done, in dollars and number of bridges; agency and user benefits; benefit-cost ratios for work performed; and physical measures of bridge conditions. Outcomes can be presented by type of work, functional classification, whether the bridges are part of the National Highway System, and/or whether the bridges are part of the Strategic Highway Network.

National Highway System (NHS) – Inclusive of Interstates, Strategic Highway Network (STRAHNET), Major Strategic Highway Network Connectors, Intermodal Connectors, and Other Principal Arterials.

- Interstate: The Eisenhower Interstate System of highways retains its separate identity within the NHS.
- Other Principal Arterials: These are highways in rural and urban areas that provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facility.
- Strategic Highway Network (STRAHNET): This is a network of highways that are important to the U.S.'s strategic defense policy and provide defense access, continuity, and emergency capabilities for defense purposes.

- Major Strategic Highway Network Connectors: These are highways that provide access between major military installations and are part of the Strategic Highway Network.
- Intermodal Connectors: These highways provide access between major intermodal facilities and the other four subsystems making up the National Highway System.

National Plan of Integrated Airport Systems (NPIAS) – Plan that identifies nearly 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive federal grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports.

Non-State System Roadway – Roads that are not classified as an Interstate, U.S. Route or State Route. These roads are maintained by a municipality, county, or township.

O

Ohio Construction Price Forecast – A product produced by the Bid Analysis Review Team that projects construction inflation for the near future.

P

Pavement Condition Rating (PCR) – A numerical rating of pavement distress measured on a scale of 0 to 100, with 100 being best.

Public Private Partnership (P3) – Contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects.

PUG System – ODOT organizes the state roadway system into Priority, Urban, and General:

- Priority – Interstate and 4-lane divided roadways
- Urban – State roadways within municipalities
- General – Primary 2-lane roadways across the state

R

Reliever Airports – Airports designated by the FAA to relieve congestion at Commercial Service Airports and to provide improved general aviation access to the overall community. These may be publicly or privately-owned.

Route Deviation Service – This is a public transit service where the bus may deviate from the route alignment to serve destinations within a prescribed distance (e.g., 0.75-mile) of the route. Following an off-route deviation, the bus must return to the same point on the route it left. Passengers may use the service in two ways: (1) if they want to be taken off route as part of a service deviation, they must tell the bus operator when boarding; or (2) if they want to be picked up at an off route location, they must call the transit system and request a pickup, and the dispatcher must notify the bus operator.

S

SAFETEA-LU – Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users – The transportation bill signed into law on August 10, 2005, which provided for $244.1 billion in

transportation funding. The bill was set to expire September 30, 2009; however, 11 extensions were granted by Congress allowing the bill to officially expire on September 30, 2012.

Single Occupancy Vehicle (SOV) – A privately owned vehicle where the driver is the only occupant.

State Maintained Roadway System – This includes all Interstates, U.S. Routes outside of municipalities, and State Routes outside of municipalities. Ohio's Home Rule law makes municipalities responsible for all roads within their jurisdiction, with the exception of Interstates. Townships are responsible for all roads within their jurisdiction, with the exception of Interstates, U.S. Routes, and State Routes. Similarly, counties are responsible for all roads with the exception of Interstates, U.S. Routes, and State Routes.

State System – Roadways classified as an Interstate, U.S. Route, and State Route.

Strategic Highway Network (STRAHNET) – A network of highways that are important to the U.S.'s strategic defense policy and provide defense access, continuity, and emergency capabilities for defense purposes.

Strategic Highway Safety Plan – A statewide-coordinated safety plan that provides a comprehensive framework and specific goals and objectives for reducing highway fatalities and serious injuries on all public roads, or a plan developed by the State DOT in accordance with U.S.C. 148(a)(6).

Surface Transportation Program (STP) – A federal transportation program that provides flexible funding that may be used by states and localities for projects on any federal-aid highway, including the NHS, bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities.

T

Tompkins Supply Chain Consortium – Source for supply chain benchmarking and best practices knowledge. The consortium sponsors a comprehensive repository of more than 10,000 data points complemented by search capabilities and online analysis tools.

Transportation Alternatives (TA) – A federal transportation program that was first authorized under MAP-21 legislation. The program provides funds for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities, and environmental mitigation; recreational trail program projects; safe routes to school projects; and projects for the planning, design, or construction of boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways.

Transportation Research Board (TRB) – A division of the National Research Council – a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities.

Transportation Review Advisory Council (TRAC) – A permanent 9-member body established in 1997 by the Ohio General Assembly chaired by the Director of ODOT. It's members are jointly appointed by the Governor, Speaker of the Ohio House of Representatives, and President of the Ohio Senate to oversee the Major New Project Selection Process at ODOT. The TRAC has authority to identify major new funding priorities, select projects, modify the selection process and criteria, hear appeals from project sponsors, and respond to public comments and concerns regarding new projects and the selection process.

Turnpike Authority – The Ohio Turnpike Commission is the governmental agency responsible for operating the James N. Shocknessy Ohio Turnpike.

U

U.S. Army Corps of Engineers (USACOE) – A federal agency housed under the Department of Defense. The agency's mission is to provide vital public engineering services in peace and war to strengthen our nation's security, energize the economy, and reduce risks from disasters. One of the primary responsibilities is the construction and operation of locks and dams along the navigable waterways of the U.S.

V

Vehicle Miles Traveled (VMT) – A measurement of the total miles traveled by all vehicles in an area for a specified time period or, in the case of transit, the number of vehicle miles operated on a given route or line during a specified time period.

W

Working Technical Group – A group of ODOT Central Office Administrators and technical experts that meet to discuss topics related to Access Ohio, including goals, objectives, performance measures, and plan implementation strategies.

APPENDIX B: LOCAL GOVERNMENTS TRANSPORTATION NEEDS

The Ohio Department of Transportation (ODOT) is responsible for 16 percent (19,256 centerline miles) of public roads in the state; leaving local governments responsible for 84 percent (102,085 centerline miles) of the state's public roads. Local governments include counties, townships, and municipalities. This appendix identifies Ohio's roadway needs for the local system both on and off the Federal-Aid System.

Roadway Miles

Ohio's roadways are functionally classified based on the general characteristics in which the roadway operates such as geography, population density, traffic volumes, highway spacing, and distance and speed of travel. ODOT is tasked with determining the classification of each roadway. ODOT uses 12 functional classifications that align with the FHWA functional classification system. This is demonstrated in **Table B-1**. The functional classification system is used to determine roadways that are part of the Federal-Aid System. Roadways on the Federal-Aid System are eligible for federal funding. Ohio's functional classifications 1, 2, 6, 7, 11, 12, 14, 16, and 17 are part of the Federal-Aid System, while functional classifications 8, 9, and 19 are not.

Table B-1: Functional Classification

Functional Classification		
FHWA	ODOT	Functional Classification Description
1	1	Principal Arterial - Interstate (Rural)
3	2	Principal Arterial - Other (Rural)
4	6	Minor Arterial (Rural)
5	7	Major Collector (Rural)
6	8*	Minor Collector (Rural)
7	9*	Local (Rural)
1	11	Principal Arterial - Interstate (Urban)
2	12	Principal Arterial - Other Freeway/Expressway (Urban)
3	14	Principal Arterial - Other (Urban)
4	16	Minor Arterial (Urban)
5	17	Collector (Urban)
7	19*	Local (Urban)

**Off the Federal-Aid System*

For the purpose of this analysis, the needs for the locals have been broken down to those roadways on the Federal-Aid System and those off the Federal-Aid System. The majority of ODOT's roadways fall on the Federal-Aid System. The reverse is true for the local system where close to 90 percent of the local roadway system is off the Federal-Aid System.

ODOT's Office of Technical Services publishes total centerline miles per functional class for the state system and the local system. **Table B-2** shows the total centerline miles per functional class for the local system. The lane miles were computed by multiplying the centerline miles times the number of lanes for each roadway segment and aggregating the sum of each roadway to functional class.

Table B-2: Local Roadway Centerline Miles and Lane Miles by Functional Classification

FHWA	ODOT	County System		Township System		Municipal System	
FC	FC	Centerline	Lane Miles	Centerline	Lane Miles	Centerline	Lane Miles
1	1	0.000	0.000	0.000	0.000	0.000	0.000
3	2	0.997	1.994	0.205	0.820	0.000	0.000
4	6	11.530	23.480	0.010	0.020	5.490	10.980
5	7	3,149.932	6,364.412	90.991	182.838	157.651	342.204
6	8*	5,035.301	10,067.439	336.405	662.269	120.363	251.106
7	9*	17,499.275	34,832.320	33,054.859	60,305.158	2,975.018	5,978.734
1	11	0.000	0.000	0.000	0.000	0.000	0.000
2	12	2.850	11.400	0.000	0.000	2.460	9.840
3	14	45.298	154.484	0.139	0.278	340.747	1,251.478
4	16	682.621	1,647.804	40.380	87.830	1,862.856	5,615.216
5	17	1,329.173	2,779.704	245.542	513.178	2,723.653	6,956.273
7	19*	1,191.057	2,424.524	7,687.015	15,200.441	23,494.016	49,152.570
	Totals:	28,948.034	58,307.561	41,455.546	76,952.832	31,682.254	69,568.401

**Off the Federal-Aid System*

Needs Methodology

The needs are based on a unit cost per lane mile per service life for each functional class. All unit costs have an assumed service life that represents the cost to maintain the road over a given number of years and is unique to the functional classification. **Table B-3** identifies the unit cost and service life for each functional class for county, township, and municipal systems.

Table B-3: Unit Cost by Functional Classification

FHWA	ODOT	County System		Township System		Municipal System	
FC	FC	Unit Cost	Service Life	Unit Cost	Service Life	Unit Cost	Service Life
1	1	$0	12	$0	12	$0	12
3	2	$100,000	12	$100,000	12	$100,000	12
4	6	$100,000	12	$70,000	12	$70,000	12
5	7	$100,000	12	$70,000	12	$70,000	12
6	8	$75,000	15	$60,000	15	$60,000	15
7	9	$75,000	15	$50,000	15	$50,000	15
1	11	$0	12	$0	12	$0	12
2	12	$100,000	12	$700,000	12	$700,000	12
3	14	$100,000	12	$200,000	12	$200,000	12
4	16	$100,000	12	$200,000	12	$200,000	12
5	17	$100,000	12	$100,000	12	$100,000	12
7	19	$75,000	12	$100,000	12	$100,000	12

**Off the Federal-Aid System*

The unit cost was divided by the service life and then multiplied by the total lane miles to develop the needs per year. The yearly needs where multiplied by 27 to account for the years 2014 to 2040. The needs are shown in constant 2011 dollars.

Unit Cost

ODOT consulted with the County Engineers Association of Ohio (CEAO) to develop unit costs which were based on historic averages. Township and municipal unit costs were derived from the Office of Technical Services by collecting a sample of costs from county and municipal engineers and validating them against a generic cost model used by the Office of Technical Services. All unit costs are inclusive of all types of roadway work. This includes, but is not limited to, resurfacing, pavement widening, reconstruction, modification alignments, movement marking, guardrail, etc.

Projected Local Roadway Needs

Future needs on roads owned and maintained by local governments are estimated at $37 billion through the years 2014 to 2040. **Table B-4** demonstrates the total local needs categorized by county, township, and municipality for both on and off the Federal-Aid System in constant 2011 dollars.

Table B-4: Total Local Roadway Needs, in Billions

System	County	Township	Municipal	
On the Federal-Aid	$2.47	$0.18	$7.45	
Off the Federal-Aid	$6.47	$8.92	$11.62	**Grand Total**
Total	**$8.94**	**$9.10**	**$19.07**	**$37.12**
Percent	24%	25%	51%	100%

Shown in billions of dollars

The Municipal System has 51 percent of the non-state system needs, even though it only has 33,669 centerline miles out of the 104,027 total for the three systems. The needs are larger due to the higher functional classifications of roadways present in the municipalities. The same is true for the County System as it contributes 24 percent of the total non-state system needs, yet only has 28,948 centerline miles. The Township System has 25 percent of the non-state system needs. Its system, while the largest at 41,455 centerline miles, is mainly comprised of local roads.

Projected Local Bridge Needs

Local bridge needs were determine through two methods. First, the federal-aid eligible bridges found in the NBI database were analyzed through NBIAS. Second, needs for those bridges not eligible and not found in the NBI database (12,797 total) will have to be estimated according to a life-cycle analysis. This methodology, like the roadways under local responsibility, was provided by the County Engineers Association of Ohio.

There are 15,906 non-ODOT-maintained bridges that are eligible for federal-aid for replacement, rehabilitation, and improvement. These bridges are on lower classification roads, such as Collectors and Local Roads. They are maintained by non-state agencies, including counties and municipalities. Local bridge needs were derived using NBIAS. NBIAS is an investment analysis tool used to analyze bridge repair, rehabilitation, and functional improvement investment needs. Local bridge needs are estimated at $3.1 billion through the years 2014 to 2040.

Of the $3.1 billion, as shown in **Table B-5**, almost two-thirds of needs are for replacement of bridges.

Table B-5: Locally Maintained Bridge Needs (Federal-Aid Eligible), 2014-2040, in Millions

	$M	Bridges
Need Category		
Maintenance	$807	N/A
Rehabilitation	$137	611
Replacement	$2,123	3,282
Total Needs	**$3,067**	**3,893**

Note: Expressed in base year 2011 Dollars.

Lastly, there are 12,797 bridges with a total deck area of 5,251,096 square feet that are not eligible for federal funding that are owned and operated by non-state transportation agencies. NBIAS was not available to use for this needs estimation, so a general life-cycle analysis was implemented. The equation used is shown below:

Annual Cost = (∑ Bridge Square Footage × Unit Cost) / Life Expectancy of Asset

Where:

- ∑ Bridge Square Footage – the sum of deck area for the bridges analyzed, in square feet.
- Unit Cost – the combined average improvement cost, in dollars per square foot. For this analysis, items such as construction, preliminary engineering, right-of-way costs, and annual maintenance were used. The unit cost in this calculation was $181 per square foot. Costs used represent the average for all counties, both rural and urban, across all terrain types in Ohio.
- Life Expectancy of Asset – the average expectancy of the asset before it needs to be replaced again. For this calculation, a 50-year life span was used.

The annual total from this calculation was multiplied by 27 to determine the local needs from 2014 to 2040. Needs for these bridges are estimated at $513 million.

As shown in **Table B-6**, total non-state bridge needs are estimated to be $3.6 billion.

Table B-6: Total Bridge Needs Off the Federal-Aid System, 2014-2040, in Millions

Federal-Aid Eligible	Non-Federal Aid Eligible	Total
$3,067	$513	$3,580

Total Local Needs

Local roadway and bridge needs total $40.7 billion dollars for 2014-2040. This total is inclusive of county, township, and municipality roadway and bridge needs.

CDM Smith

cdmsmith.com