
Technical Memorandum

# Setting the Stage

Prepared for:

OHIO DEPARTMENT OF TRANSPORTATION

Prepared by:

CDM Smith

March 2013

# Table of Contents

## List of Tables



## List of Figures

# EXECUTIVE SUMMARY

Transportation is inexorably linked to economic, social, and environmental factors. In the ten years since the beginning of the last statewide planning effort, Ohio has seen a change in the socio-demographic profile of many areas. Each of these factors influences how Ohio will maintain the existing transportation system, while making hard choices on where to invest scarce resources in system improvements.

The **purpose of the Setting the Stage technical memorandum** is to examine these trends and evaluate what they suggest for transportation within the context of how Ohioans live and work, so that this information may inform future decisions. This work is an important component of ODOT's ongoing Long Range Transportation Plan, *Access Ohio 2040*. ODOT has circulated the memorandum to the *Access Ohio 2040* Steering Committee for review and comment. Specifically, ODOT was seeking input on which issues are most important for consideration in the development of performance measures and the identification of critical infrastructure (e.g. high priority corridors) within the *Access Ohio 2040* planning process.

This Executive Summary outlines the areas and trends addressed in the Setting the Stage technical memorandum and briefly highlights some of the key findings.

## Transportation System Overview

Ohio is a single day's drive from 60 percent of the United States and Canadian population. It has the nation's fourth largest interstate system and the second largest inventory of bridges. Ohio annually moves more tons of freight by water than flows through the Panama Canal, and is ranked fourth in the nation in the value of freight shipments moved by water. It is ranked third in the nation in active rail miles, recently surpassing California. Ohio's general and commercial airports generate $10.5 billion in economic activity. Ohio boasts the 12$^{th}$ highest transit ridership rate in the United States, encompassing both urban and rural users. And two of Ohio's major cities, Cleveland and Columbus, are nationally recognized for bicycle accessibility and usage. In the 2011 CNBC report *America's Top States for Business*, Ohio was ranked fourth under the category of transportation, behind only Texas, Georgia, and North Carolina in availability of air travel and quality of roads.

## Demographics

As of the 2010 U.S. Census, the population of Ohio had grown to 11,536,504, a 1.6 percent increase over the 2000 population. This makes Ohio the seventh most populated state in the country. 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. Approximately 8 percent of Ohio households do not own a vehicle, while 33 percent only own one vehicle. Approximately 80 percent of the zero-car households are located in urban areas. Ohio's median household income is $47,358.

## Travel Trends

Based upon American Community Survey data from 2006-2010, 83.1 percent of all trips to work are made by individuals driving alone in their car. The second highest is carpool, with 8.3 percent of trips to work. Given that there are different modes of transportation used to travel to work, the travel times to reach work differ significantly. While the mean time it takes an individual to travel to work is 22.7 minutes, 4.8 percent of trips take an hour or longer while 15.4 percent of trips take less than ten minutes.

## Land Use

From 2000 to 2010, Ohio continued to lose agricultural land. Farm acreage decreased from 14.77 million acres in 2000 to 13.70 million acres in 2010. The number of farms decreased from 79,000 in 2000 to 74,700 in 2010, but this does not indicate consolidation, as average acres per farm also decreased from 187 acres to 183 acres.

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

Transportation and land use are closely connected. The land use patterns of cities were influenced by the transportation choices available during their formation. However, today development and growth patterns result more from market forces than public policy, so effective planning cannot ignore 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. Transportation is one of many factors. Many sites near highways have similar transportation characteristics, but vary greatly in the cost of land, availability of labor, local policies, and nearby amenities.

With a high quality transportation system already in place, it is often difficult to tell whether additional transportation investments or land use planning is leading future development decisions. The reality is that both are working together to influence development patterns. Transportation agencies are often in the position of responding to congestion, safety, or other transportation problems in areas where the growth was desired by local officials but infrastructure was not included as part of the plan (or turned out to be inadequate). ODOT encourages local governments with the appropriate authority to implement land-use policies that promote or facilitate the desired outcomes for their region.

## Environmental Overview

ODOT is responsible for complying with a variety of environmental regulations, such as the Environmental Protection Agency's (EPA) Air Quality Regulations, NPDES (National Pollutant Discharge Elimination System) Program, and NEPA (National Environmental Policy Act). ODOT has long complied with all U.S. civil rights laws and regulations, including USDOT guidance on the Presidential Order on Environmental Justice, in the development and construction of all projects. These environmental regulations and policies are generally incorporated during project development, rather than long-range planning. However, there are trends and changes in environmental issues that impact overall transportation decision-making, including climate variability.

Climate variability impacts transportation mainly through weather extremes. Ohio's transportation system was built for the typical weather and climate experienced locally, including a reasonable range of extremes, such as flooding events occurring as rarely as once every 100 years. Weather and climate patterns have been changing over the past several decades and are projected to continue to change, with both negative and positive effects on the transportation system.

## Economic Profile

Ohio's economy depends on the ability to quickly and efficiently ship raw materials and finished goods throughout Ohio, the country, and the world. This is especially important to agriculture and manufacturing, and the logistics operations that support them.

Ohio's estimated 2011 Gross State Product (GSP) of $484 billion was the eighth largest in the United States overall. Ohio ranks fifth in manufactured goods and sixth in durable goods production. Compared to other nations, Ohio's GSP would be the 28$^{th}$ largest economy, between Pakistan and Colombia. In addition to a large GSP, Ohio also exported $41.4 billion in goods in 2010. Goods were exported to 212 countries and territories with Canada as the largest recipient.

As of 2010, the sector with the largest number of employees is government and government enterprises followed closely by health care and social assistance. Ohio has 60 Fortune 1000 businesses headquartered throughout the state. One emerging trend that is beginning to impact Ohio is the development of shale gas production principally from Marcellus Shale and, to a lesser extent, Utica Shale. Exploration, drilling, and production activities associated with oil and gas wells are extremely transportation intensive. Many rural roads overlying and near the Marcellus Shale will not meet standards necessary for large trucks that will be used to haul equipment, water, and other supplies to and from drill pad sites.

## Fiscal Overview

The Ohio Department of Transportation is facing the financial challenge of maintaining and improving a large system in an era of uncertain revenue streams. Based upon figures from fiscal year 2011, Ohio's transportation system receives approximately $3.6 billion in funding annually. ODOT controls approximately $2 billion, with about half coming from Federal Highway Revenue. About 46 percent comes from the Ohio Motor Fuel Tax, with the remaining 4 percent from registration and title fees. Local governments control approximately $1.58 billion, coming from Federal Highway Revenue, Ohio Public Works Commission (OPWC) Capital Improvement Program, the Ohio Motor Fuel tax, and vehicle registration and title fees.

In 2012, ODOT is at the beginning stages for several strategies that may provide the opportunity to leverage Ohio's transportation assets to fund continuing maintenance and critical system expansions. The initiatives currently under study include: conversion of non-interstate rest areas to service plazas; sponsorship and naming rights for certain projects; and public-private partnership (P3) opportunities.

# 1. INTRODUCTION

## 1.1 Purpose of this Technical Memorandum

Transportation is inexorably linked to economic, social, and environmental factors. The Ohio Department of Transportation (ODOT) is charged with operating, maintaining, and financing a vast transportation system, while addressing pressures to expand the system to address new challenges and opportunities.

In the ten years since the beginning of the last statewide planning effort, Ohio has seen a change in the socio-demographic profile of many areas. There is increased scrutiny from review agencies with regard to climate variability. There has been an increase in households with zero or one car, a rise in poverty levels, and a change in the racial/ethnic composition of some cities. Recent national and worldwide events have refocused public attention on the important link between public infrastructure investments and economic stability and growth, while funding for transportation fails to keep up with identified needs. Each of these factors influences how Ohio will maintain the existing transportation system, while making hard choices on where to invest scarce resources in system improvements.

The purpose of this technical memorandum is to examine these trends and evaluate what they suggest for transportation within the context of how Ohioans live and work, so that this information may inform future decisions. Only by understanding how Ohio is evolving can we develop an accurate vision of its future. This work is an important component of ODOT's ongoing Long Range Transportation Plan, *Access Ohio 2040*.

This memorandum will:

- provide an overview of Ohio's multi-modal transportation system;
- discuss demographic changes that impact transportation;
- examine land use trends and explore the relationship between transportation and land use;
- address program-level decisions that can enhance the natural and built environment and summarize the environmental regulatory framework that impacts transportation decision-making;
- provide a profile of Ohio's economy and ODOT's focus on linking transportation system investments with opportunities to grow the economy and add jobs; and
- explain the financial challenges of maintaining and improving a large transportation system in an era of uncertain revenue streams.

This document draws upon numerous existing state and national sources. Footnotes are provided so that the reader may examine the source material, if more detail is desired.

## 1.2 Next Steps

ODOT circulated this memorandum in draft form to the *Access Ohio 2040* Steering Committee for review and comment. The memo will be posted on the study's website to allow for review by the general public. Specifically, ODOT is seeking input on which issues are most important for consideration in the development of performance measures and the identification of critical infrastructure (e.g. high priority corridors) within the *Access Ohio 2040* planning process.

Based upon steering committee and public feedback, ODOT will distill the most influential trends and issues for presentation in the *Access Ohio 2040* Plan document.

# 2. TRANSPORTATION SYSTEM OVERVIEW

Ohio is a single day's drive from 60 percent of the United States and Canadian population. It has the nation's fourth largest interstate system and the second largest inventory of bridges. Ohio annually moves more tons of freight by water than flows through the Panama Canal, and is ranked as high as fourth in the nation in the value of freight shipments moved by water. It is ranked third in the nation in active rail miles, recently surpassing California. Ohio's general and commercial airports generate $10.5 billion in economic activity. Ohio boasts the 12th highest transit ridership rate in the United States, encompassing both urban and rural users. And two of Ohio's major cities, Cleveland and Columbus, are nationally recognized for bicycle accessibility and usage.[1]

When Queen Elizabeth I asked renowned philosopher, writer and statesman Sir Francis Bacon his opinion on what makes a country great, he simply replied, "Easy conveyance of men and goods from place to place." Ohio's transportation system reflects this understanding. In the 2011 CNBC report *America's Top States for Business*, Ohio was ranked fourth under the category of transportation, behind only Texas, Georgia, and North Carolina in availability of air travel and quality of roads.[2]

Following is a summary of the various components of Ohio's vast transportation system. The *Access Ohio 2040* plan document will discuss these topics in more detail.

## 2.1 Roadways

### 2.1.1 Lane Miles

The State of Ohio is responsible for 49,354 roadway lane miles[3]. This number includes 6,820 lane miles of Interstate highway, 11,102 U.S. Route lane miles, and 31,432 State Route lane miles.[4]

To provide a comparison to other states, we will include information from Tables HM-80 and HM-81 in FHWA's "Highway Statistics 2010" Sections 4.4.6.1 & 4.4.6.2 when they are released.

### 2.1.2 Bridges

Ohio is second in the country in total number of bridges, having 43,412 structures over ten feet in length.[5]

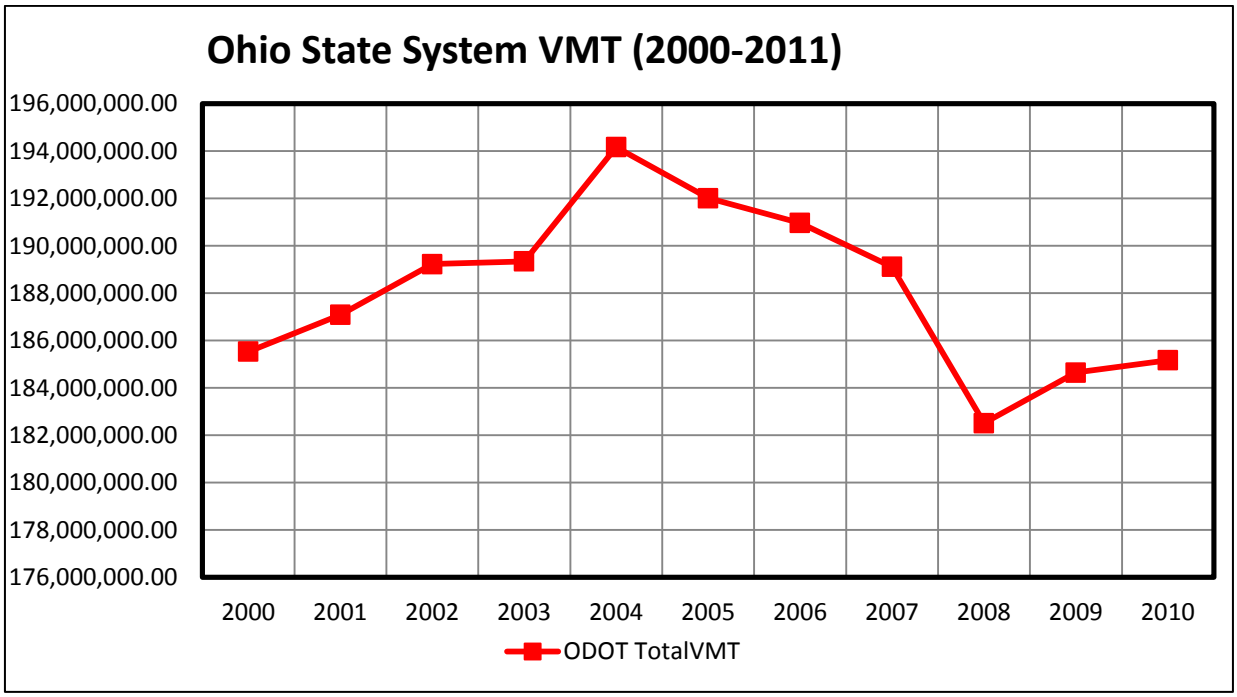
### 2.1.3 Vehicle Miles Traveled (VMT)

Between 2000 and 2010, the total Average Daily Vehicle Miles Traveled (VMT) on the ODOT maintained system ranged between 182 million and 195 million. In that decade, VMT peaked in 2004 at 194.1 million, declining to 182.5 million VMT by 2008. Both car and truck VMT dropped during that

[1] *ODOT Annual Report Fiscal Year 2011*, July 2011, page 3
[2] CNBC website, http://www.cnbc.com/id/41666602
[3] A "lane mile" is one mile of one travel lane of roadway. For example, one mile of a highway that has two lanes in each direction equals four lane miles.
[4] *2011 Ohio HPMS,* 2011 Ohio Roadway Inventory Files
[5] *ODOT Annual Report Fiscal Year 2011*, July 2011, page 3

time period, but truck traffic continued to decline through 2010 while car traffic began to rebound. In 2010, overall VMT had nearly recovered to 2000 levels, reaching 185.1 million VMT.[6] (**Figure 1**)

**Figure 1: Vehicles Miles Traveled on State Highway System, 2000-2011**




Ohio's 2010 VMT places it fifth in the nation for total vehicles miles traveled.[7] ODOT's Office of Statewide Planning and Research projects traffic to increase to nearly 240 million VMT by 2040, 14 percent of which is expected to be truck traffic.[8]

### 2.1.4 Bus Transit

Ohio has the 12th highest transit ridership rate in the United States.[9] There were 62 public transit systems in Ohio in 2010, comprised of 27 urban systems and 35 rural systems. Total ridership for the general public reached 107.4 million trips in 2010, including 15.2 million trips for elderly and disabled riders. Statewide, the public transit fleet consisted of 3,334 vehicles, 96.2 percent of which are wheelchair accessible. Additionally, 64 of Ohio's 88 counties are served by Specialized Transportation Programs, which are intended "to meet the special needs of elderly persons and persons with disabilities where existing transportation services are unavailable, insufficient or inappropriate." Only two counties in Ohio are not served by some type of public transit program.[10]

### 2.1.5 Safety

Ohio has one of the largest highway safety programs in the country, spending about $72 million annually on engineering improvements at high-crash or severe-crash locations. Those dollars are not

[6] Traffic Monitoring Section, Office of Technical Services, Ohio Department of Transportation
[7] *Highway Statistics 2010*, Office of Highway Policy, Federal Highway Admin, US Dept of Transportation
[8] Office of Statewide Planning and Research, Ohio Department of Transportation
[9] *ODOT Annual Report Fiscal Year 2011*, July 2011, page 3
[10] "Ohio Transit Facts," *Status of Public Transit in Ohio,* July 2011, ODOT Office of Transit

constrained to the state-maintained system, but also can be accessed by local governments to improve safety on any local roadway. Also, some state safety funding is used for education and enforcement programs that encourage safer driving. In addition to the funds allocated specifically for safety improvements, ODOT incorporates safety improvements whenever possible into roadway and bridge maintenance projects, as well as major highway renovations. As part of its safety program, a multi-discipline committee reviews all applications for safety funding and the supporting safety studies. ODOT focuses on both short-term, low cost improvements that can be implemented quickly and more complex improvements when warranted.[11]

In the 300,154 crashes that were reported in Ohio in 2010, 1,080 people were killed and 108,755 people were injured. Beyond the human toll, the economic impact of those crashes equated to roughly $10 billion in lost wages, increased health care, and other related costs. On the other hand, the number of fatalities in 2010 was the second lowest since 2000, and is part of a continuing downward trend of fatal crashes.[12] There were about 2.7 fatal crashes each day, killing approximately three persons. There were almost 298 people injured every day, at a rate of roughly one injury every 4.8 minutes. Driver error accounted for 86.2 percent of all crashes, as evidence by the fact that the most common causes of crashes were following too close, failure to control or yield, driving at unsafe speeds, and improper lane change.[13]

More information will be added on how Ohio compares to other states with regard to safety.

### 2.1.6 Intelligent Transportation Systems (ITS)

ODOT's Intelligent Transportation Systems (ITS) investment began in 1991, focusing on urban Freeway Management Systems (FMS). The first FMS deployed in Ohio was the Cincinnati/Northern Kentucky system, ARTIMIS, owned jointly by ODOT and the Kentucky Transportation Cabinet (KYTC). ARTIMIS began limited operation in June 1995 with full operations from the control center beginning in the spring of 1997.[14] Using lessons learned from that process, the FMS for the Columbus region was designed and deployed in 1998. Air quality improvements and safety needs were the original driving forces behind implementing FMS, but the realization of improved traffic flow spurred the development of systems for Cleveland, Akron-Canton, Dayton-Springfield and Toledo.

The six regional FMS cover a combined total of nearly 880 centerline miles of urban interstates and freeways. Additionally, ODOT expanded data coverage to provide real-time speeds on an additional 709 centerline miles of rural interstate routes between major metropolitan areas. Metropolitan and rural data monitoring and information dissemination is performed by a centralized Statewide Traffic Management Center located in ODOT's Central Office in Columbus. This allows cost-effective and consistent operation and information distribution for all FMS regions.[15]

FMS in Ohio deploys a combination of technologies. Information is distributed to the traveling public by Dynamic Message Signs, regional coverage of Highway Advisory Radio, and on the

[11] Office of Systems Planning & Program Management, ODOT: Safety Program Overview
[12] Office of Systems Planning & Program Management, ODOT: Safety
[13] Office of Systems Planning & Program Management, ODOT: Crash Data & Analysis, Fast Facts About 2010 Crash Stats
[14] http://www.artimis.org/about.php
[15] ODOT, Office of Traffic, "ODOT Statewide Freeway Management System/ITS" June 19, 2012

BuckeyeTraffic.org website. Additionally, ODOT is currently developing a real-time traffic/traveler information telephone service using a statewide 511 system. Traffic flow information is gathered by closed-circuit television (CCTV) cameras installed throughout the region and by real-time traffic speed data. Freeway Service Patrols (FSP) are also a component of each regional system. In addition to providing roadside assistance to motorists during peak travel times to improve safety and traffic flow, the FSP also identify and confirm traffic conditions and incidents for the regional FMS operations.[16]

## 2.2 Railroads

### 2.2.1 Freight Rail and Intermodal Facilities

#### 2.2.1.1 Freight Rail

Freight rail accounts for the bulk of rail traffic in Ohio, and is represented by three Class I railroads, 16 regional and short line railroads, and 15 terminal carriers. Freight rail carriers are categorized by the amount of operating revenue and/or miles of track over which they operate. Class I railroads have annual carrier operating revenues of $250 million or more, adjusted to 1991 dollars. Regional railroads operate over at least 350 miles of track and/or have revenues between $20 million adjusted and $250 million adjusted. Short line railroads operate over less than 350 miles of track and have annual revenue less than regional carriers. Terminal carriers, sometimes referred to as switching railroads, provide pick-up and delivery services within a specified area. [17]

The two major Class I railroads in Ohio are Norfolk Southern Corporation (NS) and CSX Transportation (CSX). The principal east-west routes for both pass through the state. NS operates the largest Class I railroad in the state, utilizing 2,233 miles of track in a rail network that operates primarily east of the Mississippi. The Port of New York and the Port of Norfolk generate much of the east coast traffic for NS's freight operations through Ohio. Its connections to western U.S. markets are located in Chicago, Kansas City, St. Louis, Memphis, New Orleans and Dallas.[18] CSX operates 1,912 miles of track in Ohio, as part of its rail network that serves all major Atlantic ports and covers 23 states east of the Mississippi River. Its primary east coast intermodal operation is located at the Port of New York and New Jersey. CSX has connections to western U.S. markets at Chicago, St. Louis, Memphis and New Orleans.[19] The third Class I railroad, Canadian National (CN), has an extremely limited presence in the state, operating seven miles in the state on a line between Toledo and Detroit.[20]

Ohio has three regional railroads operating in the state. The largest with 628 miles of track owned in the state, RailAmerica Lines, controls three subsidiary railroads in Ohio and operates primarily in the western part of the state. It has interchanges with Class I carriers CSX and NS, and with other regional railroads. Another regional railroad in Ohio, Wheeling and Lake Erie Railway, owns 558 miles of track in the state but also has significant trackage rights over both CSX and NS lines. The Wheeling and Lake Erie Railway operates primarily in northern Ohio, and has interchanges with CSX, NS, and RailAmerica Lines, as well as eight short line railroads. The smallest regional carrier in the state, Bessemer and Lake

[16] ODOT, Office of Traffic, "ODOT Statewide Freeway Management System/ITS" June 19, 2012
[17] Ohio Statewide Rail Plan, Chapter 3-1, May 10, 2010.
[18] Ohio Statewide Rail Plan, Chapter 3-8, May 10, 2010
[19] Ohio Statewide Rail Plan, Chapter 3-3, May 10, 2010
[20] Ohio Statewide Rail Plan, Chapter 3-11, May 10, 2010

Erie, operates five miles of track in Ohio on a route that extends from the Lake Erie port of Conneaut to North Bessemer, PA.[21]

There are a total of 30 short line railroads in Ohio, operating 1,206 route miles. A recent practice began where one umbrella company acquires multiple short line railroads, creating "short line families" or systems. In Ohio, three such short line families have multiple railroads: the Ohio Central Railroad System, RailAmerica, and the Wheeling & Lake Erie.[22]

#### 2.2.1.2 Intermodal Facilities

The purpose of intermodal transportation facilities is to connect different modes into a seamless transportation system through use of efficient transfer hubs/terminals. Materials involved may be transported in intermodal containers or trailers, or may involve non-containerized materials called bulk or break-bulk goods, depending on packaging. Non-containerized intermodal movements occur at transload facilities. Ohio is geographically situated and equipped with the necessary transportation resources to function as an important intermodal hub for freight movement. With its highway network, freight rail system and maritime ports on Lake Erie and the Ohio River, Ohio provides many opportunities for freight to transfer from one mode to another.[23]

Containerized freight transfer between rail and truck carriers occurs at 12 intermodal facilities located throughout the state. Four of these facilities are located in central Ohio, three are in Cincinnati, three are in northwest Ohio, and two are in Cleveland.

In addition to the rail/truck container transfer facilities, Ohio is focusing on improving its intermodal container transportation network to accommodate state-of-the-art equipment such as double stack container cars. Use of this equipment requires adequate vertical clearance under bridges or within tunnels along the entire rail route from port to transfer facility. Ohio has some full-clearance routes, including the NS Chicago Line through Cleveland and Toledo, and the CSX routes between Cleveland and Indianapolis. Shorter, full-clearance routes between Columbus and northern Ohio provide regional distribution routes for central Ohio.[24]

In an effort to provide greater rail access to intermodal facilities, Ohio is involved with intermodal rail improvement projects associated with NS and CSX. The NS Heartland Corridor Project will provide a new full-clearance route between the Port of Norfolk and Columbus at the newly constructed NS Rickenbacker Intermodal Facility.[25] The CSX National Gateway Project is intended to provide more efficient rail routes between Mid-Atlantic ports and Midwestern markets. The project focuses on providing full-clearance to three primary corridors, one of which is anticipated to connect the cities of Cincinnati, Toledo, Cleveland and Columbus. Also, a new intermodal container transfer terminal was recently constructed in the northwest Ohio town of North Baltimore as part of the National Gateway Project.[26]

[21] Ohio Statewide Rail Plan, Chapter 3-12, May 10, 2010
[22] Ohio Statewide Rail Plan, Chapter 3-13, May 10, 2010
[23] Ohio Statewide Rail Plan, Chapter 5-1, May 10, 2010
[24] Ohio Statewide Rail Plan, Chapter 5-5, May 10, 2010
[25] Ohio Statewide Rail Plan, Chapter 5-7, May 10, 2010
[26] Ohio Statewide Rail Plan, Chapter 5-8, May 10, 2010

Bulk transload facilities transfer either liquid or dry materials between truck and rail. Goods that are packaged in small, separable units such as bags, bales, boxes, pallets or drums are called break-bulk cargo. Bulk and break-bulk cargo are usually commodities that are used in manufacturing, construction, agriculture, food, and energy sectors. Public and private transload facilities provide rail transport to shippers lacking direct rail access. There are over 30 bulk transload facilities served by Class I railroads located throughout Ohio.[27]

The Ohio River system and the Great Lakes/St. Lawrence Seaway water system provide maritime port access to Ohio's railway networks. These intermodal facilities typically handle heavy commodities such as coal, petroleum products, grains, minerals, steel, iron ore, and construction materials. The Ohio River system has 75 ports with rail access; primary locations include the St. Clairsville/Bridgeport area, Portsmouth, and Cincinnati. Lake Erie and its tributaries have at least 67 ports with rail access. Toledo, Sandusky, Lorain, Cleveland, Fairport Harbor/Grand River, Ashtabula, and Conneaut all are home to maritime ports with rail access.[28]

### 2.2.2 Passenger Rail and Mass Transit

Passenger rail service is less prevalent in Ohio than freight rail. Amtrak provides intercity passenger rail travel on three routes that serve the state. Two of the routes cross northern Ohio from Cleveland to Toledo; one route crosses the southwest corner of the state at Cincinnati. The northern routes have eastern termini in New York City, Boston, and Washington, D.C. The southern route's eastern terminus is New York City. The western terminus for all three routes is Chicago. There is no passenger rail service in Columbus or any part of central Ohio. In Toledo, Amtrak provides Thruway Motorcoach service to East Lansing, Michigan, which connects the greater Detroit area to east-west passenger rail routes through Ohio.[29]

The Greater Cleveland Regional Transit Authority (GCRTA) is the only transit system in Ohio that provides rail mass transit. Its four rapid transit lines consist of one commuter rail route and three light rail routes that operate in conjunction with the GCRTA bus service. The Red Line Rapid Transit route uses 60 commuter rail cars serving 18 stations on 19 route miles of track, providing access to Cleveland Hopkins International Airport. GCRTA Blue, Green and Waterfront Rapid Transit lines use 48 light rail cars serving 34 stations on 15.3 route miles of track, providing access to Downtown Cleveland and the Waterfront from the eastern suburbs of Warrensville Heights and Shaker Heights.[30]

Other than the GCRTA system discussed above, there are no high speed or commuter rail services in operation in Ohio.[31] The cities of Cleveland, Columbus, and Cincinnati have all studied the possibility of implementing commuter rail, but none of the projects have moved beyond the planning stages at this time, for various reasons.[32]

[27] Ohio Statewide Rail Plan, Chapter 5-12, May 10, 2010
[28] Ohio Statewide Rail Plan, Chapter 5-15 through 22, May 10, 2010
[29] Ohio Statewide Rail Plan, Chapter 9-1 through 2, May 10, 2010
[30] GCRTA website http://www.riderta.com/ar_RTAfacts.asp
[31] Ohio Statewide Rail Plan, Chapter 9-7, May 10, 2010
[32] Ohio Statewide Rail Plan, Chapter 10-16 through 21, May 10, 2010

## 2.3 Airports

In addition to eight[33] commercial service airports, Ohio's airport system consists of 176 public use aviation facilities, including airports, heliports, and seaplane landing areas.[34] Eighty-four of Ohio's 88 counties have a publicly-owned airport. Among all those airports, more than 40 have a runway length of at least 5,000 feet which allows those airports to adequately serve the business demands of the surrounding communities. Other benefits of Ohio's extensive public airport network include medical transport and evacuation, access to rural areas, law enforcement support, fire protection, agricultural activities, wildlife management and recreation.[35]

## 2.4 Inland Waterways

### 2.4.1 Maritime Systems

Ohio's maritime network is comprised of the Lake Erie and Ohio River transport networks. Ohio's Lake Erie System contains 265 miles of coast line on the northern side of the state. Lake Erie is a part of the Great Lakes-St. Lawrence Seaway System which provides access to the Atlantic Ocean. In fact, the shortest distance to Europe from Ohio is through the St. Lawrence Seaway. Lake Erie also provides direct access to Canada's industrial heartland and Minnesota's Iron Range. The Lake Erie System transports 40.6 million tons of commodities 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.[36]

The state's Ohio River System contains 451 miles of coast line on southeastern and southern state boundary lines. The Ohio River connects with the Mississippi River at Cairo, Illinois. From there, the Mississippi River provides a connection to the Gulf of Mexico, which connects to the southern Atlantic Ocean and to the Pacific Ocean by way of the Panama Canal. Ongoing improvements to the Panama Canal, scheduled for completion in 2014, will allow larger ocean-going vessels to travel between the Atlantic and Pacific Oceans. 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.[37]

### 2.4.2 US DOT Maritime Highway Corridors

In August, 2011, the U.S. Department of Transportation designated 18 all-water Marine Highway Corridors as a cost-effective means to improve economic efficiency, environmental sustainability, public safety and security, and redundancy to the country's transportation system. Marine Highway Corridors are intended to alleviate congestion on land transportation corridors that they parallel, and are designated by the primary land interstate route associated with it.[38] Two of these maritime corridors, M-70 and M-90 are sponsored by ODOT and seek to address freight congestion on

[33] Cincinnati/Northern Kentucky International Airport is located outside of Ohio in the Commonwealth of Kentucky.
[34] ODOT Division of Operations, Office of Aviation
http://www.dot.state.oh.us/Divisions/Operations/Aviation/Pages/Airports.aspx
[35] "Ohio State Airport System Plan Update" Executive Summary, May 2006
[36] http://www.dot.state.oh.us/Services/Pages/Water.aspx
[37] http://www.dot.state.oh.us/Services/Pages/Water.aspx
[38] "America's Marine Highway Report to Congress," April 2011 USDOT, Maritime Administration

Interstate 70 and Interstate 90, respectively. Ohio is the only state sponsoring two Maritime Highway Corridors.[39]

The M-70 Corridor includes the Ohio, Mississippi, and Missouri River systems and serves transportation from Pittsburgh to Kansas City. It connects to the M-55 Corridor in St. Louis. Specific freight truck congestion points in this route include Kansas City, St. Louis, Louisville, Dayton, Cincinnati, Columbus and Pittsburgh. Rail congestion is also evident in Kansas City, St. Louis, and several segments of the corridor in Ohio. The purpose of this Marine Highway corridor is to alleviate a portion of the congestion from highway and railway routes while also contributing to increased economic activity by removing barriers to efficient freight transportation.[40]

The M-90 Corridor includes the Great Lakes and Erie Canal and serves transportation from Albany, NY to Chicago, IL and Duluth, MN. It connects to M-75 Detroit/Windsor Crossing near Detroit, MI and the M-71/77 Lake Erie Crossing near Cleveland, OH. By 2020, I-90 is expected to rank seventh in the nation for freight truck vehicle miles traveled. In addition to addressing land transportation issues on I-90, the M-90 Corridor also serves Interstate 80, which is Ohio's top freight truck corridor based on vehicle miles traveled. The purpose of this Marine Highway corridor is to take advantage of the nearly unlimited capacity between Western Lake Superior and the Atlantic Seaboard by providing new and expanded waterborne services in an effort to alleviate forecasted congestion on the landside corridor.[41]

### 2.4.3 Importance of Ohio's Maritime Ports

Ohio's maritime ports are increasingly involved in transporting superload oversize/overweight products to and from Ohio's industries throughout the state. ODOT's special hauling permits section focuses on routing these superloads the shortest distance possible by road to water, in an effort to minimize the impact on the highway system. These impacts include rolling road closures, raising overhead utility lines, and removing traffic signals while the superloads are in transit.[42] Rail transport cannot accommodate these situations because of bridge restrictions or similar conflicts.

One recent superload transport involved hauling three main power generation units, weighing 407,000 pounds from its manufacturer in Mount Vernon, Ohio, to Baku, Azerbaijan on the Caspian Sea. A year of planning determined that the only feasible export route was a 125-mile long highway route to the small harbor of Bellaire on the Ohio River in Belmont County. From there, the units travelled by barges towed down the Ohio and Mississippi Rivers to New Orleans. At that point, they were transferred to an ocean cargo vessel which carried them to Europe. Finally, they were transferred to smaller ships to travel through the Russian waterway system that connects to the Volga River, which flows into the Caspian Sea. The journey of over 10,000 miles took four months.[43]

[39] http://www.marad.dot.gov/documents/Marine_Highway_Corridors13_Sep_10.pdf
[40] http://www.dot.state.oh.us/Divisions/Planning/SPR/StatewidePlanning/Pages/Freight_News.aspx
[41] http://www.dot.state.oh.us/Divisions/Planning/SPR/StatewidePlanning/Pages/Freight_News.aspx
[42] "Oversize Load To Slow US 50, Ohio 128 Again" Eagle Country 99.3 FM
[43] ODOT District 11 Quarterly Newsletter, Summer 2011 "ODOT teamed up with manufacturer and customer to meet global market transportation needs"

Another oversize load transport that highlighted the importance of Ohio's waterways for the state's economy was the delivery of a two million pound machine manufactured in Salem, Ohio and delivered to Bremen, Germany. Butech Bliss was awarded the contract to manufacture the shear for ArcelorMittal with a competitive cost structure that included all-water transportation from the Port of Cleveland on Lake Erie and across the St. Lawrence Seaway to Germany.[44]

In addition to providing intermodal connections and access to cost-effective international transport, Ohio's ports are strategically located to serve the fleets of commercial and government vessels operating on the Great Lakes St. Lawrence Seaway. This is evidenced by the agreement between Rolls-Royce Commercial Marine and Great Lakes Shipyard to open a state-of-the-art marine service center in Cleveland, Ohio. With the opening of the marine service center, the Shipyard erected a 770-ton Mobile Boat Hoist that began operation on July 29, 2011. The Mobile Boat Hoist is the second largest boat hoist in the Western Hemisphere, the third largest in the world, and the largest on the US and Canadian Great Lakes.[45]

## 2.5 Active Transport

Ohio is home to more than 3,000 miles of bike paths, bike lanes and signed bike routes. Bicycling Magazine ranked Cleveland the 39th best city in the country for biking, while Columbus is ranked 20th in the nation in bicycle-to-work transportation.[46] The state not only boasts numerous local bikeways and trails, but also has long distance trails such as the Ohio to Erie (OTE) Trail that cross the state. When completed, this 325-mile trail will connect Cincinnati to Cleveland through Columbus and Akron. The OTE was ranked the 39th Best Bike Trail in America by Complex Magazine in May 2012.[47] Nearly 90 bicycle clubs are available for riders, representing every region of the state.[48]

[44] http://www.dot.state.oh.us/Divisions/Planning/SPR/StatewidePlanning/Pages/Freight_News.aspx
[45] Press Release, June 22, 2011 "Rolls Royce Commercial Marine and Great Lakes Shipyard Sign Services Agreement for New Marine Service Center in Cleveland, Ohio"
[46] ODOT Annual Report Fiscal Year 2011, pg. 3
[47] http://www.ohiotoerietrail.org
[48] http://www.dot.state.oh.us/Divisions/Planning/SPR/bicycle/Bicycle%20Information%20Downloads/Bike%20Clubs.pdf

# 3. DEMOGRAPHICS

Preparation of a long-range plan must consider the demographics of the population that the plan will cover. The 2010 Census provides information on population, age, race and ethnicity, and location. The American Community Survey, which is sent each year to about three million addresses nationwide, provides additional information on income, employment, commuting patterns, automobile ownership, and language.

## 3.1 Population Growth

As of the 2010 U.S. Census, the population of Ohio had grown to 11,536,504, a 1.6 percent increase over the 2000 population. This growth is less than the 4.7 percent growth between 1990 and 2000. Ohio's total population makes it the seventh most populated state in the country.[49]

No census has ever identified a decline in Ohio's population, but the rate of growth has slowed from the 15 percent and 20 percent growth experienced over the decades in the mid-20th century. Historic Ohio populations as well as the percent change in the population every ten years can be seen in **Table 1** while a map of the current county populations can be seen in **Figure 2**.

**Table 1: Ohio Population 1900-2010**

| Year | Population | Percent Change |
|---|---|---|
| 2010 | 11,536,504 | 1.6% |
| 2000 | 11,353,150 | 4.7% |
| 1990 | 10,847,115 | 0.5% |
| 1980 | 10,797,630 | 1.4% |
| 1970 | 10,652,017 | 9.7% |
| 1960 | 9,706,397 | 22.1% |
| 1950 | 7,946,627 | 15.0% |
| 1940 | 6,907,612 | 3.9% |
| 1930 | 6,646,697 | 15.4% |
| 1920 | 5,759,394 | 20.8% |
| 1910 | 4,767,121 | 14.7% |
| 1900 | 4,157,545 | - |

[49] Ohio Legislative Services Commission, September 2010. *Ohio Facts 2010 Edition.*

## Figure 2: Population by County, 2010

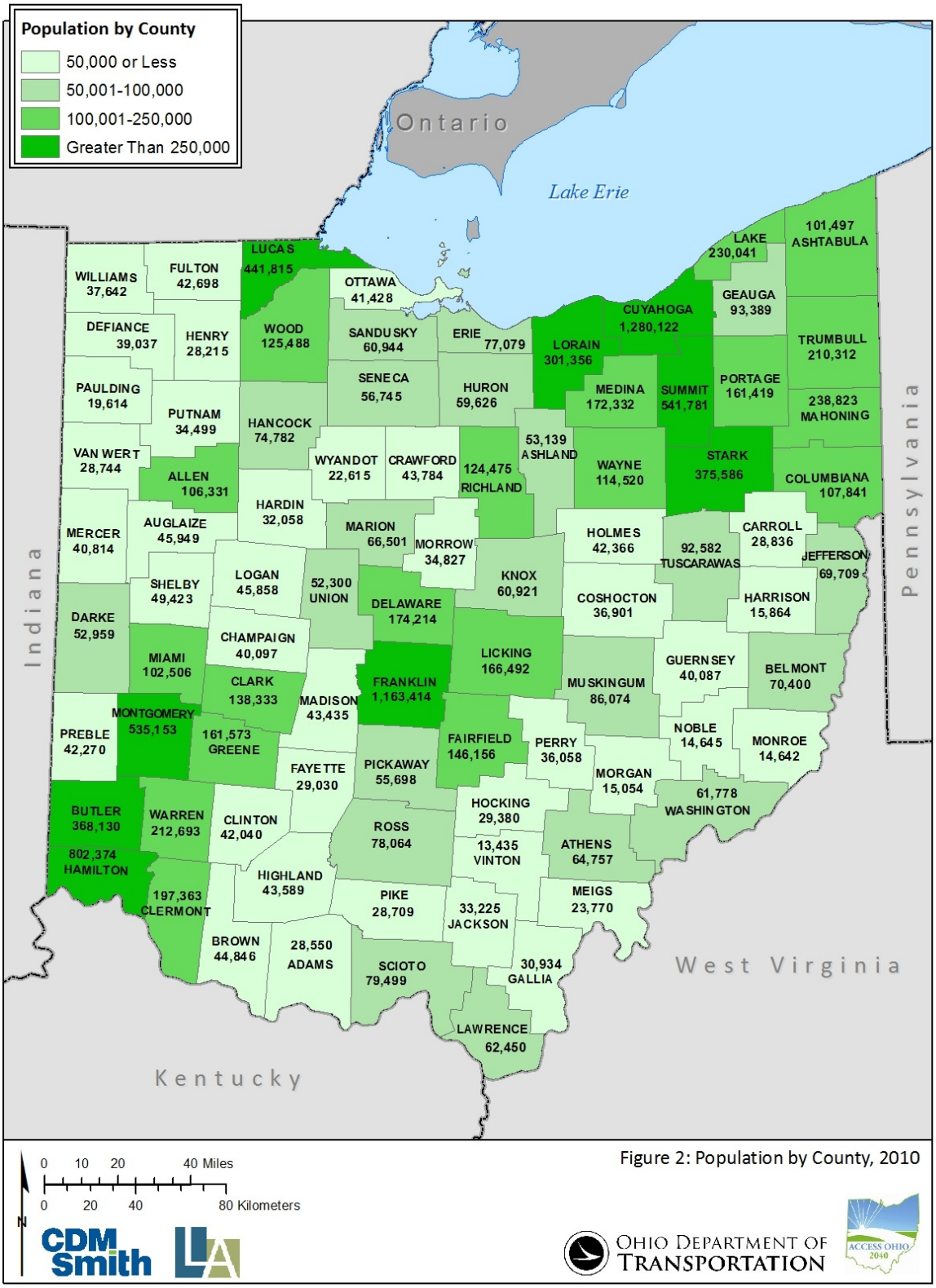



Figure 2: Population by County, 2010

## 3.2 Location and Density

While the Ohio population grew from 2000 to 2010, the growth was not evenly distributed throughout the state. Aside from Franklin County, which is home to the city of Columbus, urban counties with 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 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 in the state. Cuyahoga County is still Ohio's largest county with 1,280,122 residents and home to the city of Cleveland. The fewest number of residents can be found in southeast Ohio's Vinton County with a population of 13,435 in 2010. Ohio ranks 12th in population density, with 280.5 people per square mile. **Figure 3** shows the population change of all 88 Ohio counties from 2000 to 2010.

While the overall population of Ohio is still growing, it is growing at a slower pace than in the past. Some areas of the state, such as Delaware County, continue to grow while other portions of the state are declining in population. Finding the areas of growth and areas of decline will impact where new infrastructure may be needed compared to where maintenance of existing infrastructure is sufficient. **Figure 4** illustrates the locations where population is projected to grow through 2040.[50]

There also are high levels of vacant housing in urban and rural areas of the state. On average, 10 percent of the housing units in a census tract are vacant. The largest concentrations can be found in southeast Ohio as well as the inner core of large cities. A map of vacant housing by census tract can be seen in **Figure 5**.

Areas where there are large amounts of vacant housing may point towards underused infrastructure. These are areas where there once was a much higher concentration of people and the transportation infrastructure was likely developed to transport a larger population. As large urban areas lose population, they may find it difficult to maintain older infrastructure with a smaller tax base. Redevelopment of vacant properties could potentially be beneficial in getting optimal use out of existing infrastructure, thereby reducing the need to build new infrastructure.

[50] 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 upon updated information provided by the Miami Valley Regional Planning Commission (MVRPC), Greene County is projected to experience a population increase of 19% over that period. ODOD has reviewed MVRPC's data and concurs that the 19% population growth projection is appropriate and should be used for the long range plan update. ODOD will be developing a new population projection for Ohio and its counties. This data will be included in the *Access Ohio 2040* plan if available prior to publishing.

## Figure 3: Population Change by County, 2000-2010

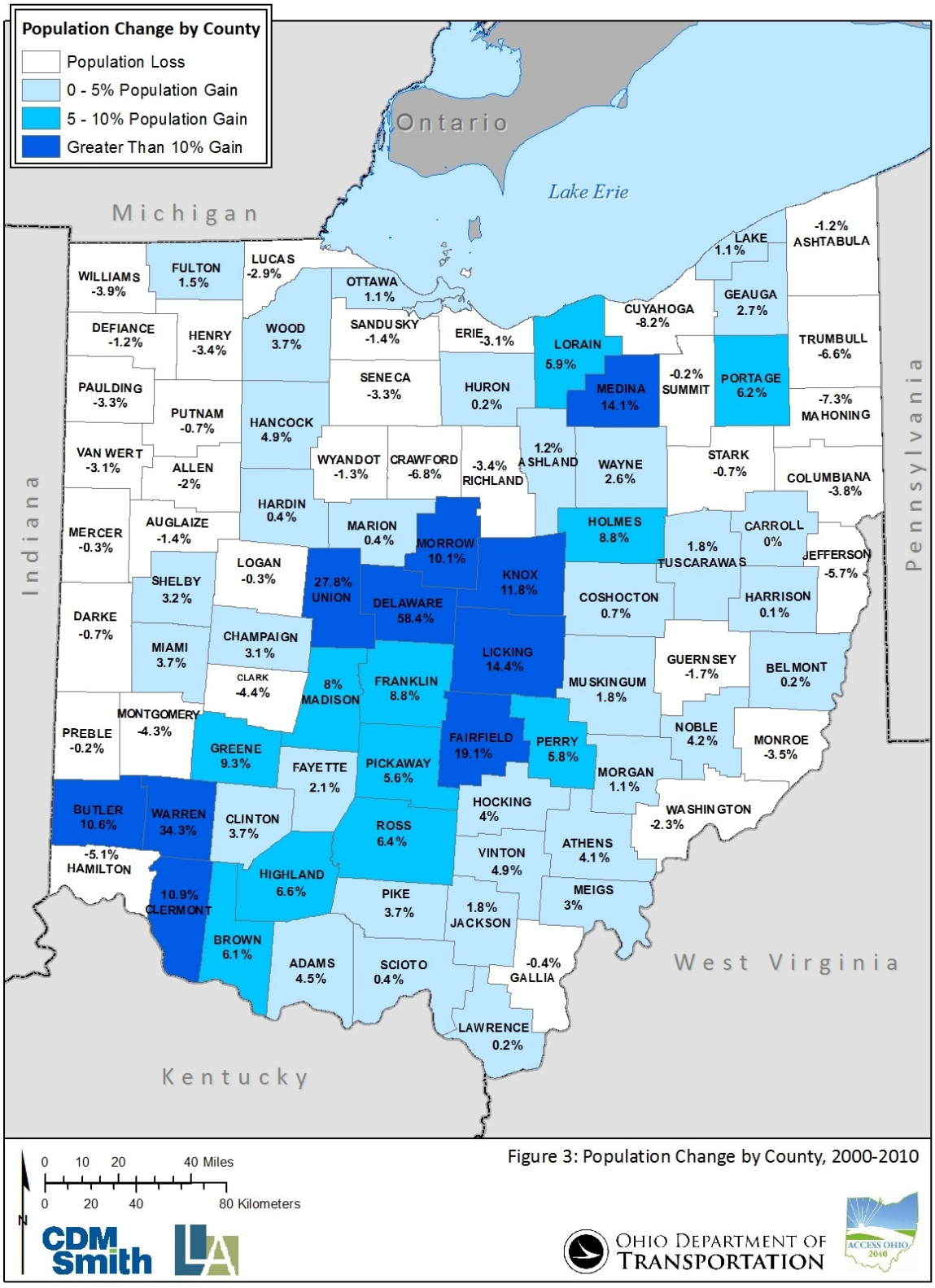
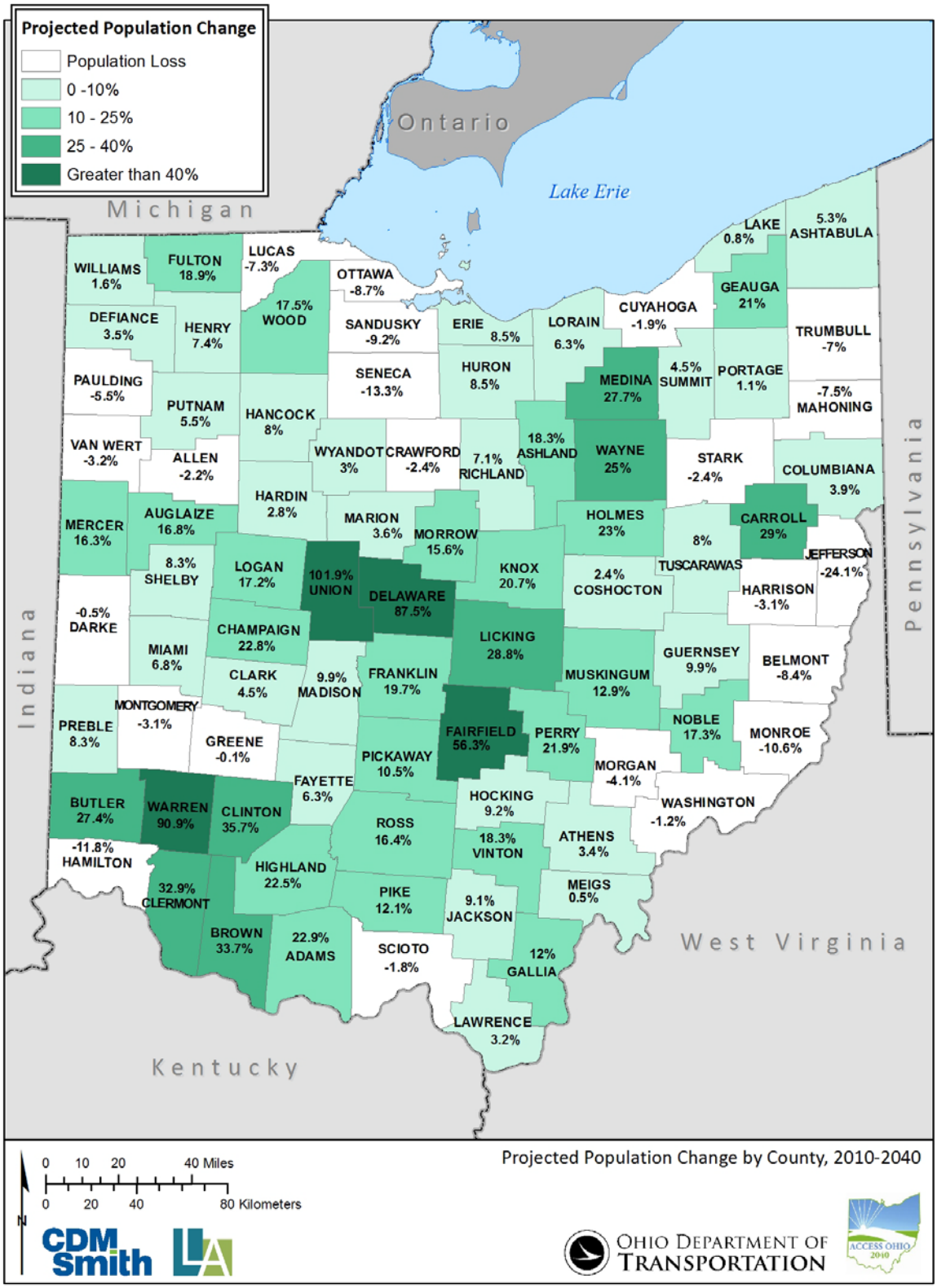



Figure 3: Population Change by County, 2000-2010

## Figure 4: Projected Population Change by County, 2010-2040



## Figure 5: Percentage of Vacant Housing, 2010

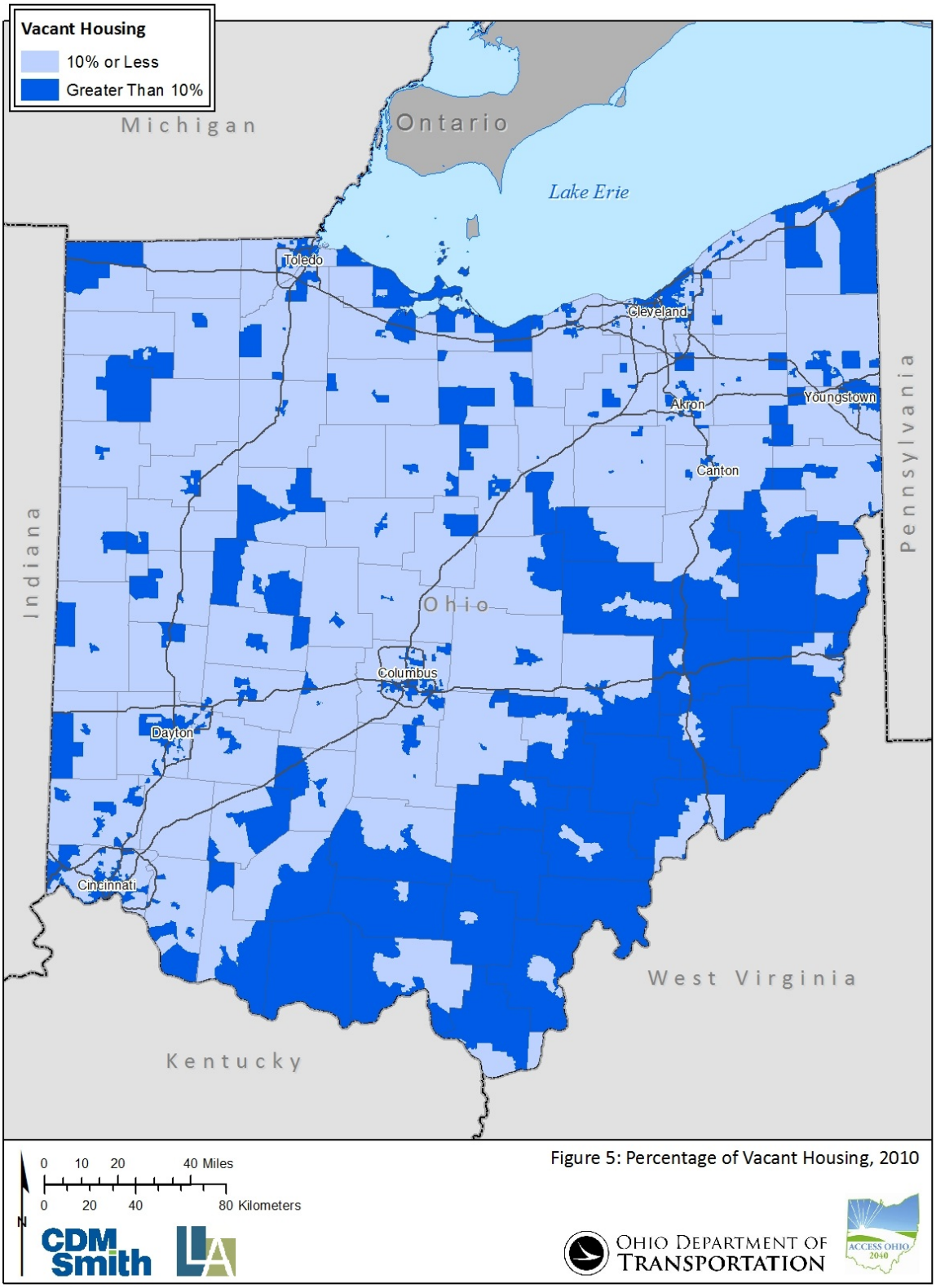
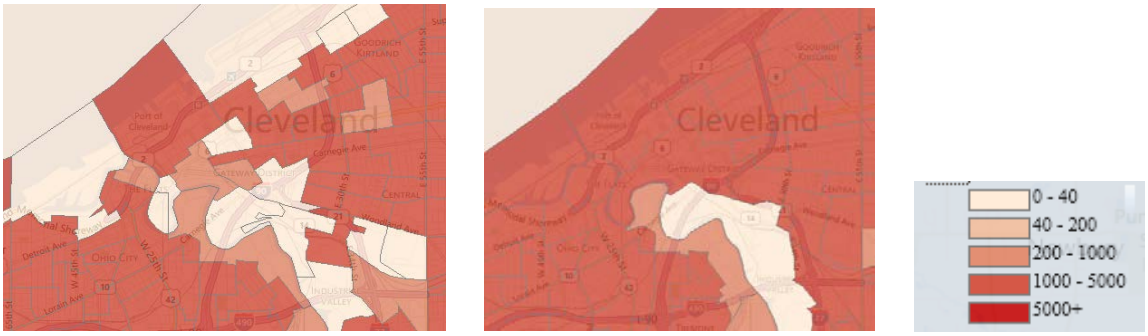



Figure 5: Percentage of Vacant Housing, 2010

The overall trend towards 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: college educated individuals are moving to urban centers in Cleveland, Columbus, and Cincinnati. For example, in Cleveland, a city where population has been in overall decline, population density has increased in downtown block groups from 2000 to 2010, particularly on the west and south sides of the city where newer/refurbished apartments and entertainment venues are located. At the same time, the percentage of college educated individuals has increased in the same block groups as shown in the illustrations below.

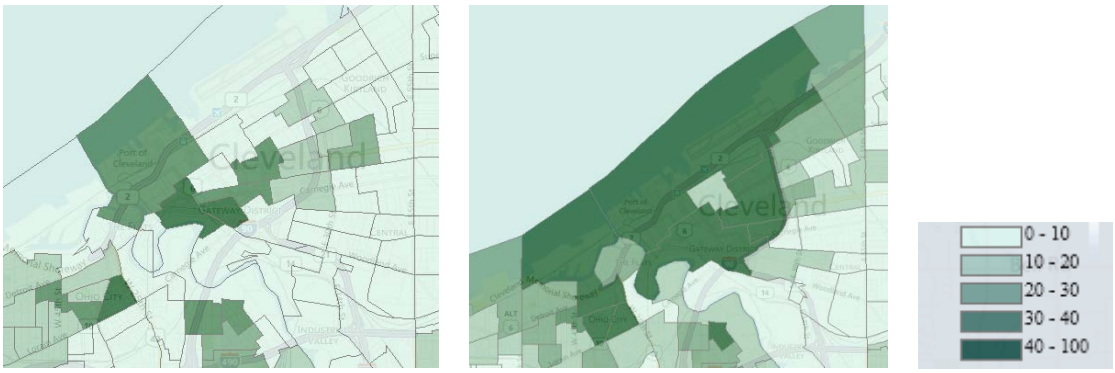
A similar comparison can be made for Columbus and Cincinnati. However, smaller, mid-size cities such as Akron, Toledo, and Dayton do not exhibit similar characteristics.

Population Density (people/square mile)




2000 2010 Legend

Percent of Residents with a College Degree




2000 2010 Legend

## 3.3 Age Distribution

In addition to population growth, the demographics of Ohio's population continue to 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**. As can be seen in **Figure 6**, there is a cluster of counties in the eastern portion of the state with high median age. This cluster includes Noble County, which at a median age of 48.6 is the highest in the state. The lowest median age is 26.3 found in Athens County.

**Table 2: 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 |

Transportation access is a concern for the aging population, particularly in southeastern Ohio. The Southeast Ohio Aging and Disabilities Resource Network list 29 transportation programs for seniors and people with disabilities in southeast Ohio Counties, including Athens, Hocking, Gallia, Meigs, Noble, Morgan and Monroe.

## 3.4 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. A distribution of vehicle ownership from the 2006-2010 American Community Survey is seen in **Table 3**. **Table 4** lists the number of registered vehicles in the state in 2010 by type.

**Table 3: Vehicles Available, 2010**

| Vehicles Available | Total |
|---|---|
| None | 8.1% |
| One | 33.3% |
| Two | 38.4% |
| Three or more | 20.3% |

A map of the percentage of no vehicle households by census block group is found in **Figure 7**. Concentrations of populations with higher amounts of no vehicle households appear to be located primarily in rural areas due to the sizes of the census blocks; however, over 80 percent of zero-car households are located in urban areas. These households may benefit from increased options in alternative modes of transportation.

**Table 4: Registered Vehicles by Type, 2010**

| Vehicle Type | Number Registered |
|---|---|
| Automobiles | 5,539,483 |
| Busses | 46,905 |
| Trucks | 4,139,330 |
| Motorcycles | 382,358 |
| **Total** | **10,108,076** |

## Figure 6: Median Age by County, 2010

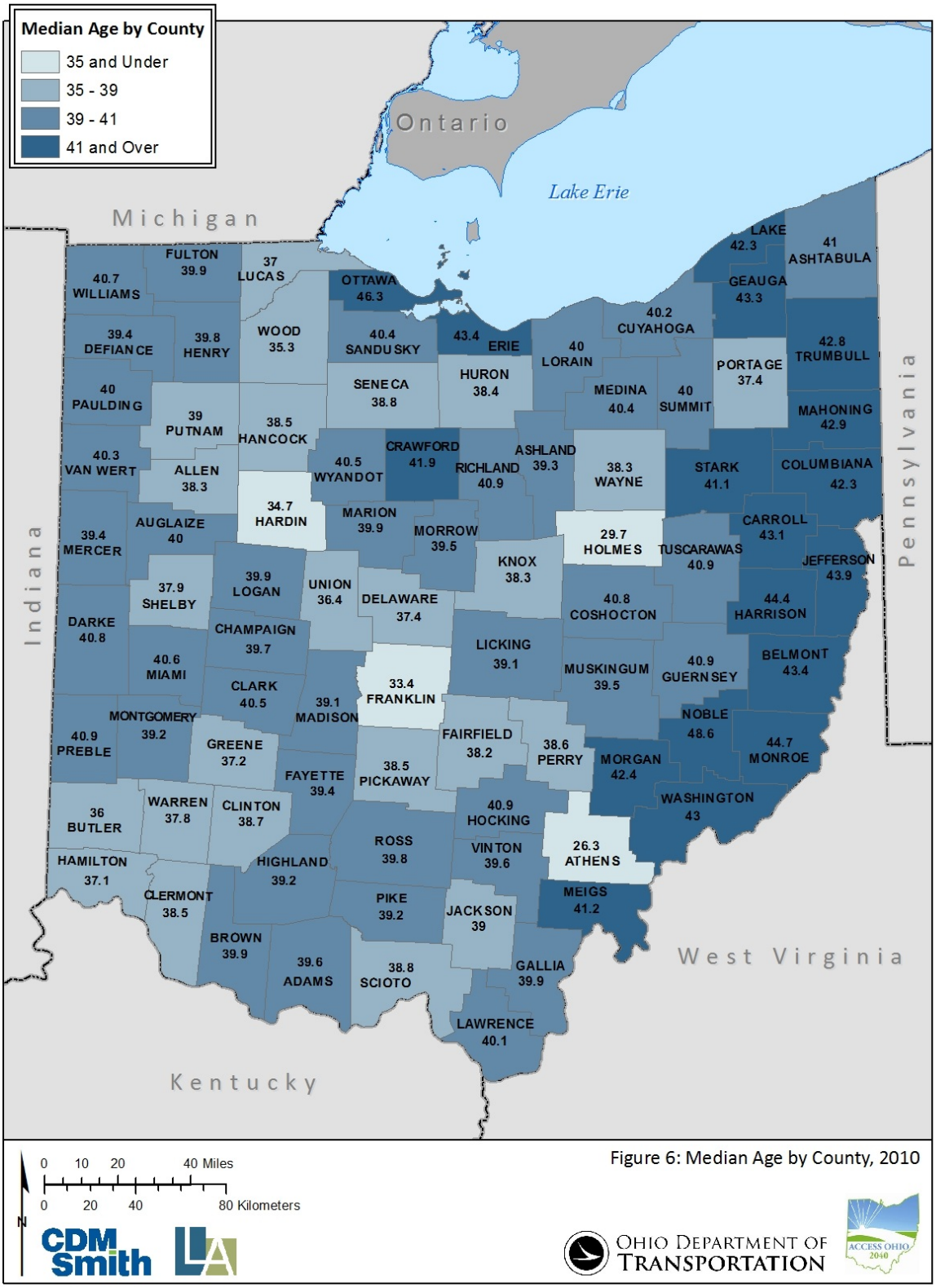
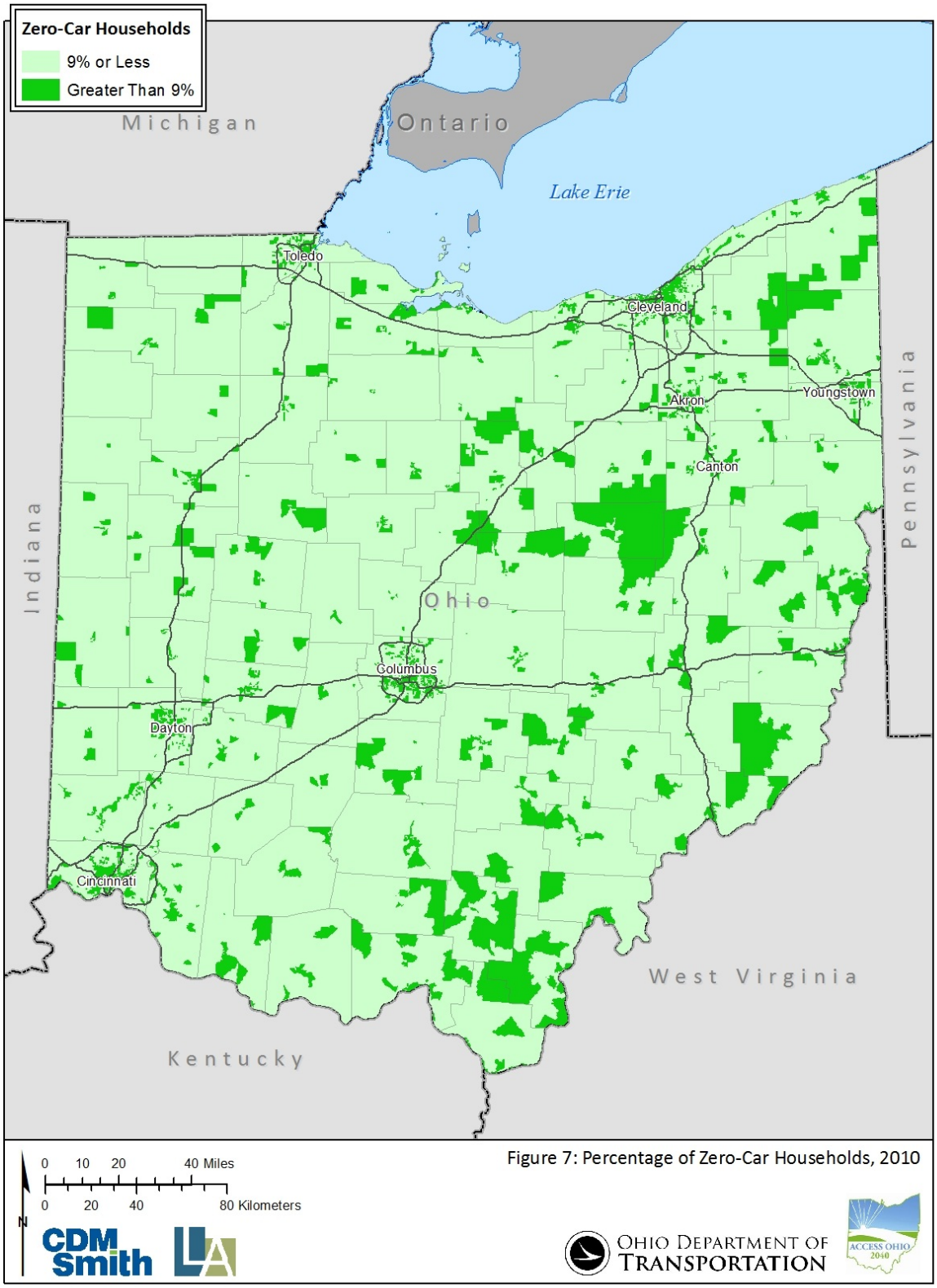



Figure 6: Median Age by County, 2010

## Figure 7: Percentage of Zero-Car Households, 2010



## 3.5 Income

Based upon the American Community Survey data for 2006-2010, Ohio's median household income is $47,358. The median household income by county is shown in **Figure 8**. 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. The change in median income from 2000-2010 is shown in **Figure 9**. The percentage of persons living below the federal poverty line is shown in **Figure 10**. The change in poverty levels from 2000-2010 is shown in **Figure 11**.

Areas with higher incomes tend to produce a greater volume of vehicle miles traveled (VMT). Areas with lower median incomes correlate with areas of higher median age and no vehicle households discussed above, which may necessitate alternative modes of transportation.

## 3.6 Race and Ethnicity

The racial distribution of Ohio's population is also changing. The largest growth was seen in the Hispanic population, increasing from 1.7 percent in 2000 to 3.1 percent in 2010. The racial distribution of Ohio's population, based upon the 2010 census, is shown in **Table 5**. **Figure 12** shows the percentage of minority population by county for 2010.

**Table 5: Ohio Population by Race**

| Race | Total | % of Total | Change |
|---|---|---|---|
| | 2010 | 2010 | 2000 - 2010 |
| White | 9,539,437 | 82.7% | -106,016 |
| Black | 1,407,681 | 12.2% | 106,374 |
| American Indian/Alaskan native | 25,292 | 0.2% | 806 |
| Asian | 192,233 | 1.7% | 59,600 |
| Pacific islander | 4,066 | 0.0% | 1,317 |
| Some other race | 130,030 | 1.1% | 41,403 |
| Two or more races | 237,765 | 2.1% | 79,880 |
| Hispanic (any race) | 354,674 | 3.1% | 137,551 |
| **Total** | **11,536,504** | **100.0%** | **183,364** |

## 3.7 English Language Proficiency

Based upon American Community Survey (2008-2010), 6.09 percent of Ohio's population age five years and over speaks a language other than English at home. Of those, roughly a third (33.81 percent) speaks Spanish. The next most common languages spoken at home are German, French, Arabic, Chinese, Pennsylvania Dutch, Italian, and Russian. Most of these households also speak English. However, 2.19 percent of Ohio's population over five years of age speaks English "less than very well" or "not at all".

The percentage in each county of those speaking English "less than very well" is shown in **Figure 13**.

## Figure 8: Median Household Income by County, 2010


Figure 8: Median Household Income by County, 2010

## Figure 9: Median Household Income Change, 2000-2010

## Figure 10: Percentage of Population in Poverty by County, 2010

## Figure 11: Change in Poverty by County, 2000-2010

## Figure 12: Minority Population by County, 2010

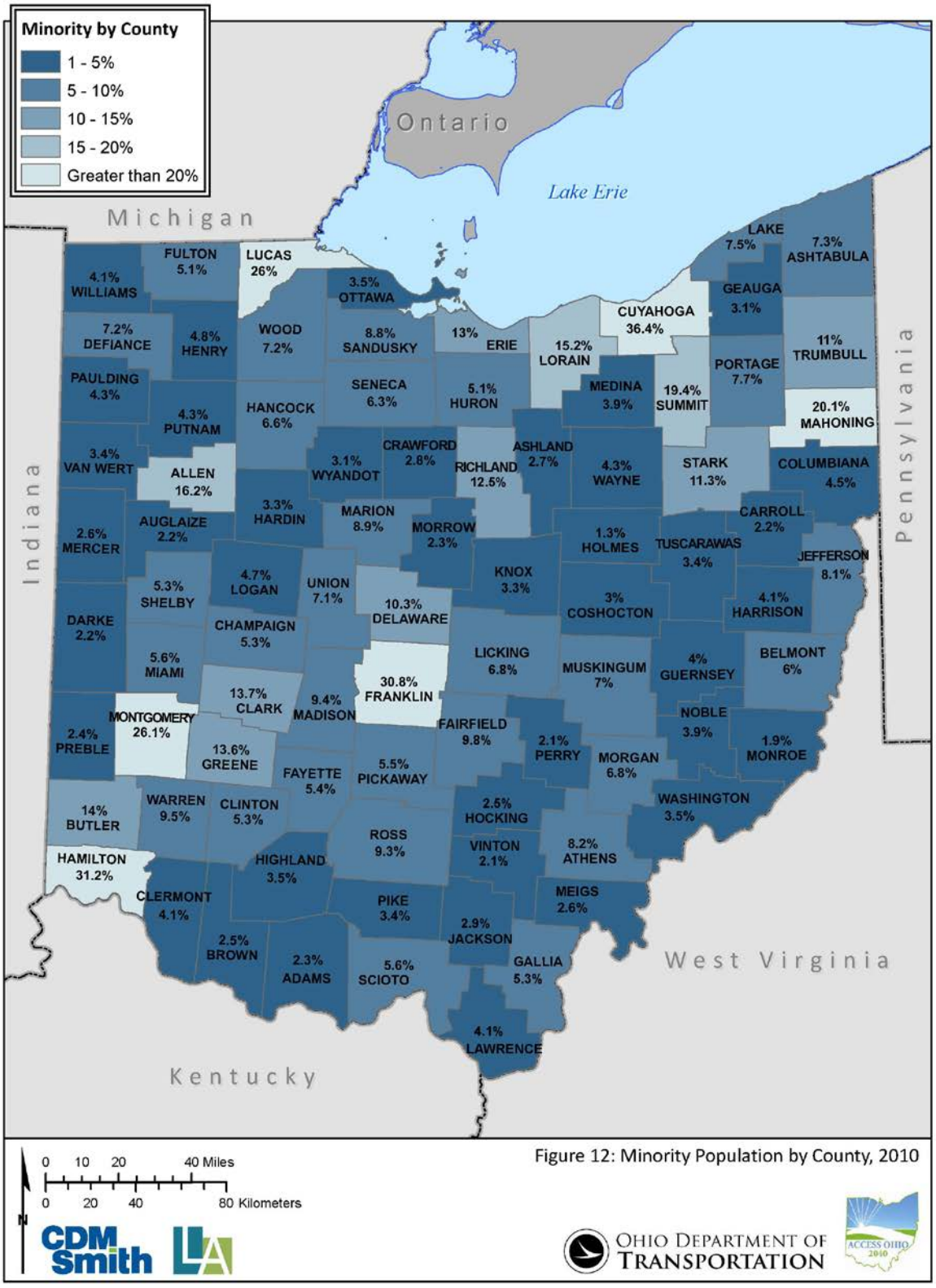



Figure 12: Minority Population by County, 2010

## Figure 13: Population Speaking English "Less than Very well," 2010

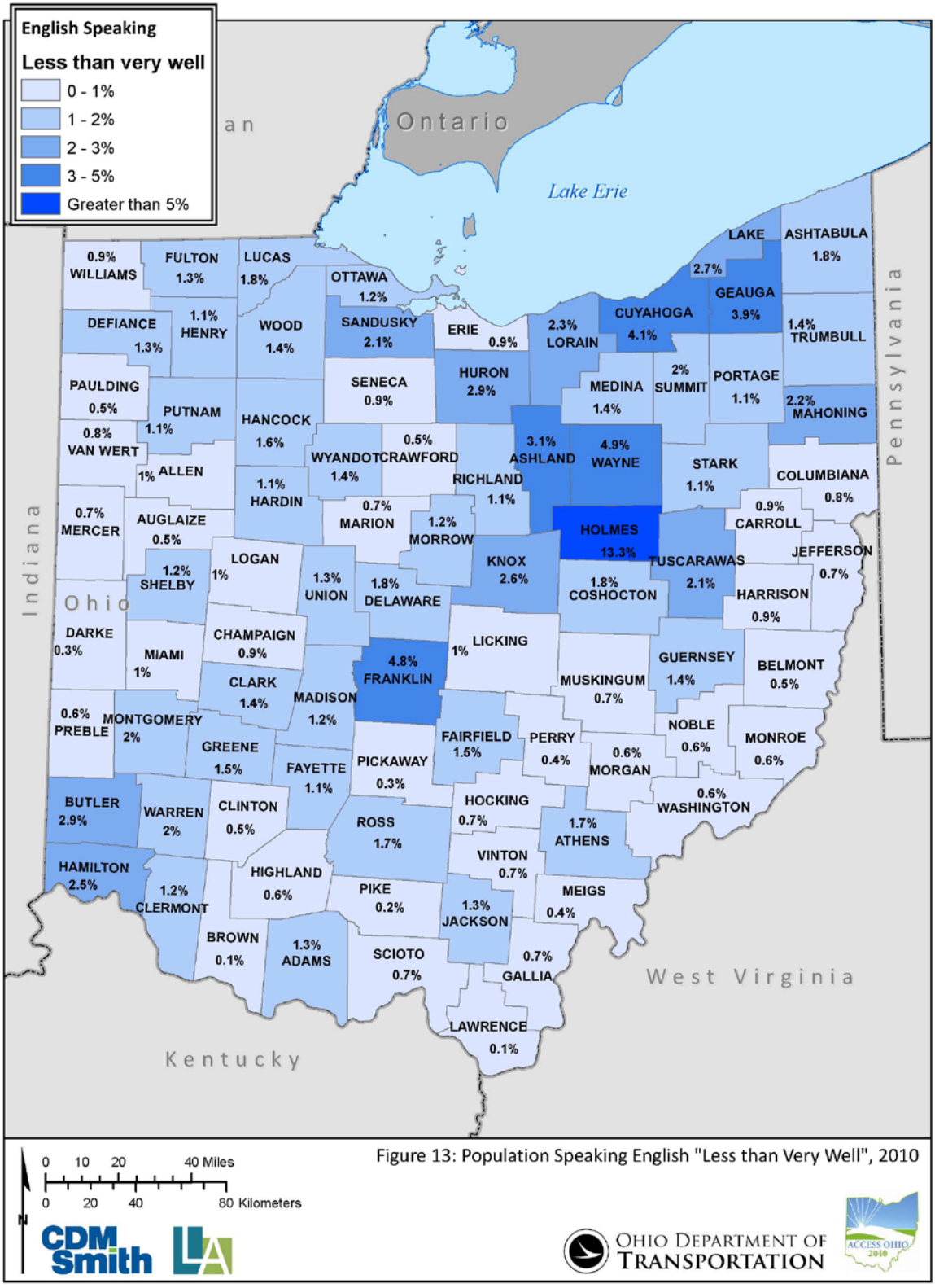



Figure 13: Population Speaking English "Less than Very Well", 2010

## 3.8 Travel Trends

### 3.8.1 Passenger Travel

There were almost eight million licensed drivers in Ohio in 2010. A breakdown of the licensed drivers by age is seen in **Table 6**.

**Table 6: Licensed Drivers by Age, 2010**

| Age | Licensed Drivers |
|---|---|
| 19 And Under | 489,382 |
| 20-29 | 1,272,071 |
| 30-39 | 1,245,556 |
| 40-49 | 1,459,302 |
| 50-59 | 1,533,309 |
| 60-69 | 1,058,671 |
| 70-79 | 584,346 |
| 80 And Over | 320,735 |
| **Total** | **7,963,372** |

Based upon American Community Survey data from 2006-2010, 83.1 percent of all trips to work are made by individuals driving alone in their car. The second highest mode choice is carpool with 8.3 percent of trips to work. The full breakdown can be seen in **Table 7**. A map of the percentage of work trips by county that are "drive alone" can be found in **Figure 14**.

**Table 7: Travel to Work by Method, 2010**

| Travel to Work | Total |
|---|---|
| Drove alone | 83.1% |
| Carpooled | 8.3% |
| Public transportation (excluding taxicab) | 1.8% |
| Walked | 2.3% |
| Bicycle | 0.3% |
| Taxicab, motorcycle, or 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.

Given that there are different modes of transportation used to travel to work, the travel times to reach work differ significantly. While the mean time it takes an individual to travel to work is 22.7 minutes, 4.8 percent of trips take an hour or longer while 15.4 percent of trips take less than 10 minutes. The full distribution of travel times can be seen in **Table 8**.

Areas with high percentages of multimodal trips indicate potential areas for consideration of transit, bicycle, or pedestrian investment.

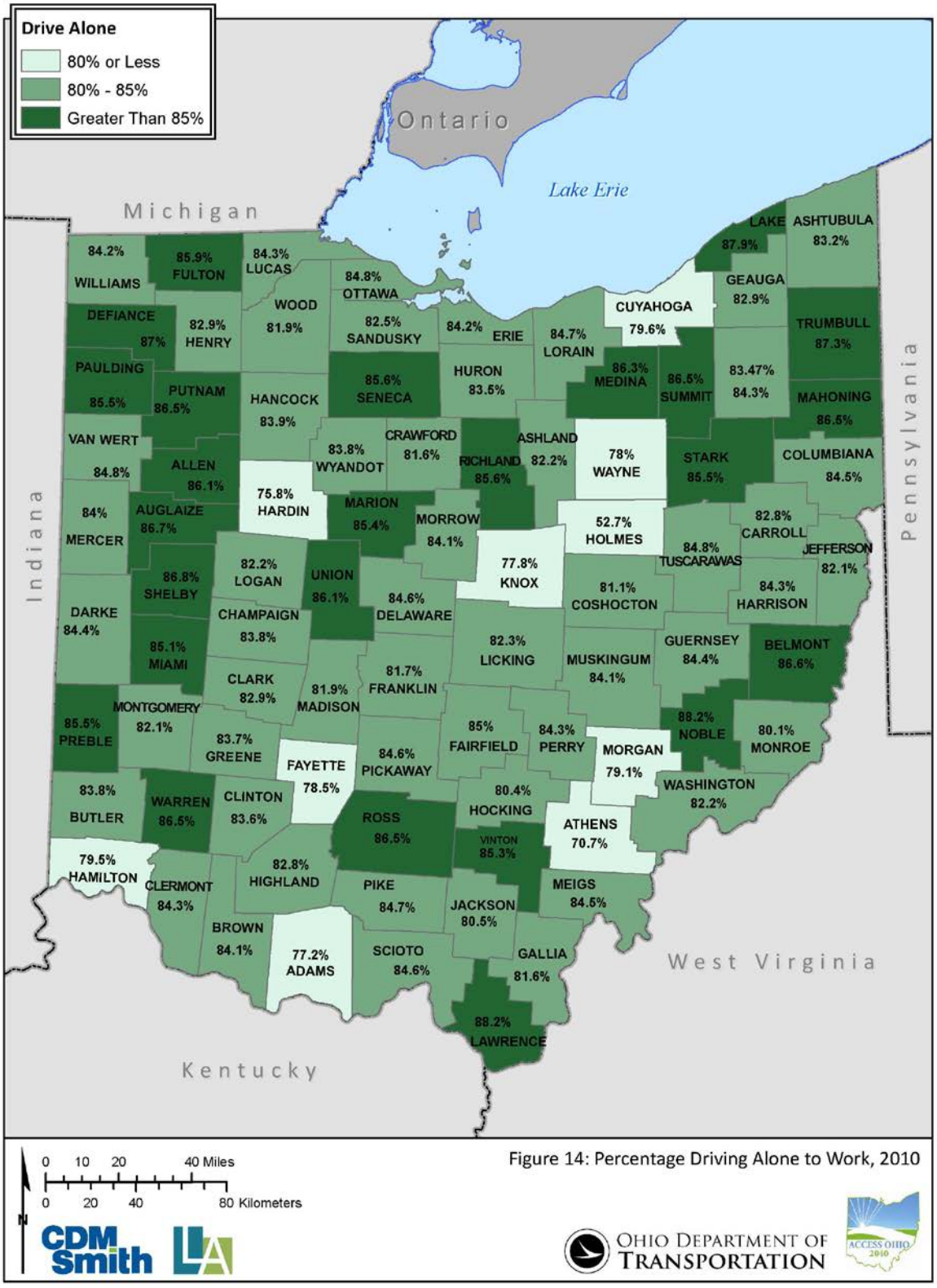
**Table 8: Travel Time to Work**

| Travel Time to Work | Total |
|---|---|
| Less than 10 | 15.4% |
| 10 to 14 | 15.4% |
| 15 to 19 | 16.5% |
| 20 to 24 | 16.3% |
| 25 to 29 | 7.5% |
| 30 to 34 | 12.3% |
| 35 to 44 | 6.1% |
| 45 to 59 | 5.7% |
| 60 or more | 4.8% |
| Mean travel time to | 22.7 |

### 3.8.2 Freight Transport

ODOT has an on-going freight study. A summary will be developed from this study for inclusion in *Access Ohio 2040*.

## Figure 14: Percentage Driving Alone to Work, 2010



# 4. LAND USE

## 4.1 Land Use Changes

From 2000 to 2010, Ohio continued to lose agricultural land. Farm acreage decreased from 14.77 million acres in 2000 to 13.70 million acres in 2010. Farm acreage was 15.60 million acres in 1990. This reveals a trend of converting about 100,000 acres of farmland per year. The number of farms decreased from 79,000 in 2000 to 74,700 in 2010, but this does not indicate consolidation, as average acres per farm also decreased from 187 acres to 183 acres.

Based upon the 2010 census, 10.8 percent of Ohio's land area is urbanized, encompassing 77.9 percent of the population. A statewide comparison to 2000 or earlier figures in not possible due to changes in how this data is reported; however, information is available for particular metropolitan areas. **Table 9** shows the land area in square miles for 2000 and 2010 for the top 15 urbanized areas in Ohio by population. The Columbus metropolitan area experienced the greatest growth from 2000 to 2010, both in population (20.7 percent) and in urbanized land area (28.3 percent).

**Table 9: Change in Population and Land Area for Urbanized Areas, 2000-2010**

| Metropolitan Area | Population | | | Urbanized Area (sq. miles) | | |
|---|---|---|---|---|---|---|
| | 2010 | 2000 | Change | 2010 | 2000 | Change |
| Cleveland | 1,780,673 | 1,786,647 | -0.3% | 772 | 647 | 19.3% |
| Cincinnati* | 1,624,827 | 1,503,262 | 8.1% | 788 | 672 | 17.3% |
| Columbus | 1,368,035 | 1,133,193 | 20.7% | 510 | 398 | 28.3% |
| Dayton | 724,091 | 703,444 | 2.9% | 351 | 324 | 8.6% |
| Akron | 569,499 | 570,215 | -0.1% | 325 | 308 | 5.7% |
| Toledo* | 507,643 | 503,008 | 0.9% | 240 | 202 | 18.8% |
| Youngstown* | 387,550 | 417,437 | -7.2% | 241 | 228 | 5.6% |
| Canton | 279,245 | 266,595 | 4.7% | 166 | 144 | 16.0% |
| Lorain-Elyria | 180,956 | 193,586 | -6.5% | 100 | 88 | 14.4% |
| Middletown | 97,503 | 94,355 | 3.3% | 56 | 48 | 16.8% |
| Springfield | 85,256 | 89,684 | -4.9% | 49 | 44 | 11.7% |
| Newark | 76,068 | 70,001 | 8.7% | 42 | 35 | 18.9% |
| Mansfield | 75,250 | 79,698 | -5.6% | 50 | 51 | -0.7% |
| Lima | 72,852 | 74,071 | -1.6% | 52 | 46 | 13.0% |
| Weirton-Steubenville* | 70,889 | 73,710 | -3.8% | 51 | 51 | -0.1% |

**Includes adjacent state*

## 4.2 Land Use and Transportation

Transportation and land use are closely connected. Over Ohio's history, towns grew up around crossroads, ports, canals, and railroad stations. Cities formed where there was an economic advantage of clustering, reducing the cost of transportation for workers and for getting goods to market. The land use patterns of cities were influenced by the transportation choices available during their formation. Older cities and many downtown areas were influenced by street car and horse-and-wagon (e.g. Cincinnati). Cities that grew later, after the automobile was in common use, have different development patterns (e.g. Columbus and other cities whose infrastructure developed after World War II). In the mid-20th century, the interstate system began construction, with the result that Ohio cities and towns were better connected to each other and to the rest of the nation. These changes resulted in increased mobility, along with positive economic and quality of life consequences.

Changes in transportation that allowed for decentralization also have impacted land use.[51] Mobility resulted in an increase in suburbanization, particularly around outerbelts of major cities. The transportation system we have today reflects this history. However, today development and growth patterns result more from market forces than public policy, so effective planning cannot ignore the economic forces that determine land use and development.[52]

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. Some communities have comprehensive plans, detailed zoning, specific development goals, access management policies, and development standards. Other areas have no zoning and no access management, other than the minimal protection offered by ODOT driveway permit requirements for state and U.S. routes.

Ohio's population is growing, and these individuals have to live and work somewhere. Therefore, growth and development will occur. The real question is *where*. Those responsible for location decisions – whether the head of the family or the head of the corporation – consider many factors: cost of land, labor, and transportation; travel time to and from work or travel time to market; access to good schools and transportation choices; access to customers and employees; quality of life, such as air quality, noise, crime, amenities, and a "sense of community".[53] Transportation is one of many factors. Many sites near highways have similar transportation characteristics, but vary greatly in the cost of land, availability of labor, local policies, and nearby amenities.

With a high quality transportation system already in place, it is often difficult to tell whether additional transportation investments or land use planning is leading future development decisions. The reality is that both are working together to influence development patterns. Transportation agencies are often in the position of responding to congestion, safety or other transportation problems in areas where the growth was desired by local officials but infrastructure was not included as part of the plan (or turned out to be inadequate). Likewise, some localities feel that their growth is

[51] *The Transportation/Land Use Connection*, American Planning Association, Terry Moore and Paul Thorsnes, January 1994.
[52] ibid
[53] *Influence of Transportation Infrastructure on Land Use*, Federal Highway Administration, ULI Advisory Services Workshop Report, December 6-8, 2004.

stunted because of lack of transportation infrastructure or because of investments being made to improve transportation access elsewhere.

Areas desiring more growth often clamor for transportation investments, or oppose investments in nearby areas. Residents in areas experiencing strong growth often want things to slow down and oppose transportation improvements that they believe will lead to more development.

Ohio, along with local governments, supply or regulate most transportation infrastructure, such as roadways, airports, transit, sidewalks, bike paths, and parking. To some degree, they have the power to control the price of access to roadways and the price of parking. Local and regional governments provide water and sewer services and can control the location, capacity, and pricing of those services. A body of research is available on transportation policies that impact long-term development patterns, most of which must begin at the local level. Some strategies that may be considered by local governments include[54]:

- Congestion pricing
- Pricing parking
- Pricing extensions of urban services
- Considering changes in property tax strategies
- Enhancing transportation infrastructure in areas of desired development

ODOT encourages local governments with the appropriate authority to implement land-use policies that promote or facilitate the desired outcomes for their region. ODOT makes transportation planning decisions based upon policies that are currently in place and what is likely to occur, not necessarily what is preferable nor what could be influenced to occur if policy changes were made at the local level.

[54] The Transportation/Land Use Connection, American Planning Association, Terry Moore and Paul Thorsnes, January 1994.

# 5. ENVIRONMENTAL OVERVIEW

ODOT's policy regarding the environment is to protect the natural environment and historic and cultural resources by avoiding, minimizing, or mitigating the environmental impacts of transportation improvements. ODOT is responsible for complying with a variety of environmental regulations, such as the Environmental Protection Agency's (EPA) Air Quality Regulations, NPDES (National Pollutant Discharge Elimination System) Program, and NEPA (National Environmental Policy Act). These regulations require ODOT to take actions or develop programs, policies, and projects to avoid, mitigate, or minimize negative impacts (caused by the construction or operation of transportation projects and facilities) to air, water, or other environmental, social, or cultural resources.[55]

ODOT's procedures identify environmentally, historically, and culturally sensitive areas early in the Project Development Process (PDP) and identify opportunities to avoid, minimize, or mitigate potential impacts from projects. [56] In addition, ODOT has long had a goal to comply with all U.S. civil rights laws and regulations, including USDOT guidance on the Presidential Order on Environmental Justice, in the development and construction of all projects.[57]

The above environmental regulations and policies are generally incorporated during project development, rather than long-range planning. However, there are trends and changes in environmental issues that impact overall transportation decision-making, such as national trends in addressing climate variability. These changes and trends require an expanded look at how Ohio's future transportation planning and policies affect the natural and built environments. The *Access Ohio 2040* plan document will address these topics in more detail.

## 5.1 Climate Variability and Adaptation

### 5.1.1 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 these discussions to ensure that policies balance the need for reductions with other transportation goals.[58]

A joint Ohio State University and Ohio University study[59] contains an inventory of GHG emissions in Ohio. The inventory shows that in 2011 transportation accounts for 25 percent of the GHG emissions in the state, with the highest component being CO2.

[55] Access Ohio 2004 - 2030
[56] Access Ohio 2004 - 2030
[57] Access Ohio 2004 - 2030
[58] US DOT Center for Climate Change Strategic Plan: http://climate.dot.gov/documents/splan_2006.pdf
[59] http://www.ohioghg.com/

A resource for adaptation planning and mitigation strategies for reducing GHG is the Center for Climate and Energy Solutions (C2ES).[60] The center offers a number of research papers, briefs, tables and summaries of states' strategies to implement adaptation planning and policies. In addition, C2ES provides information on a variety of mitigation strategies and how states are beginning to implement those including biofuels; low carbon fuel standards; plug-in electric vehicles; medium-duty and heavy-duty vehicles policies; vehicle miles traveled (VMT) policies and incentives; and ridesharing.[61]

### 5.1.2 Adaptation Planning

Climate variability impacts transportation mainly through weather extremes, such as very hot days, very cold days, or severe storms; increases in the probability of intense precipitation events and extended droughts; and sea level rise. Ohio's transportation system was built for the typical weather and climate experienced locally, including a reasonable range of extremes, such as 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 push environmental conditions outside the range for which the system was designed. Weather and climate patterns have been changing 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.[62] **Table 10** lists the potential climate changes of greatest relevance for transportation, including the level of uncertainty associated with each.

**Table 10: Potential Consequences of Climate Change Relevant to U.S. Transportation**[63]

| Potential Climate Change of Relevance to U.S. Transportation | Level of Uncertainty |
|---|---|
| Temperature | |
| Increases in very hot days and heat waves | *Very likely* |
| Decreases in very cold days | *Virtually certain* |
| Increases in Arctic temperatures | Virtually certain |
| Later onset of seasonal freeze and earlier onset of seasonal thaw | Virtually certain |
| Sea level rise | Virtually certain |
| Precipitation | |
| Increases in intense precipitation events | *Very likely* |
| Increases in drought conditions for some regions | *Likely* |
| Changes in seasonal precipitation and flooding patterns | Likely |
| Storms | |
| Increases in hurricane intensity | *Likely* |
| Increased intensity of cold-season storms, with increases in winds and in waves and storm surges | *Likely* |

Note: The following terminology describes uncertainty, that is, probability of occurrence: virtually certain, ≥99%; extremely likely, ≥95%; very likely, ≥90%; likely, ≥66%; more likely than not, ≥50%; unlikely, ≤33%; very unlikely, ≤10%; extremely unlikely, ≤5%.

[60] http://www.pewclimate.org/
[61] http://www.pewclimate.org/states-regions
[62] 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
[63] 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

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 and U.S. Transportation, Transportation Research Board and Division on Earth and Life Studies, National Research Council of the National Academies. 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**

The costs of redesigning and retrofitting transportation infrastructure to adapt to the potential impacts of climate change are likely to be significant. More strategic, risk-based approaches to investment decisions are needed. Transportation planners and engineers should incorporate more probabilistic investment analyses and design approaches that trade off the costs of making the infrastructure more robust against the economic costs of failure. Moreover, they should communicate these trade-offs to the policy makers who are responsible for investment decisions and for the authorization of funds.

- **Integrate evacuation planning and emergency response into transportation operations**

Projected increases in weather and climate extremes underscore the importance of emergency response plans for vulnerable locations. Transportation providers must work more closely with weather forecasters and emergency planners and assume a greater role in evacuation planning and emergency response. Climate extremes—such as more intense storms and more intense precipitation—will require near-term operational responses from transportation providers and greater attention to emergency response in transportation operations and budgets. Transportation agencies and service providers should build on the experience of jurisdictions that have integrated transportation into emergency response and evacuation plans.

- **Develop and implement monitoring technologies**

Monitoring the condition of the transportation infrastructure, particularly the impacts of weather and climate extremes, offers an alternative to the preventive retrofitting or reconstruction of some facilities in advance of climate variability. Greater use of sensors and other "smart" technologies would enable infrastructure providers to receive advance warnings of potential failure caused by water levels and currents, winds, and temperatures exceeding what the infrastructure was designed to withstand.

- **Share best practices**

As climate variability occurs, many areas of the United States will experience new weather patterns. The geographic extent of the United States can provide a laboratory for best practices and information sharing about climate variability. Drawing on technology transfer mechanisms, transportation professional and research organizations should develop a mechanism to encourage the sharing of best practices to address the potential impacts of climate variability.

- **Reevaluate design standards.**

Environmental factors are integral to transportation infrastructure design. Engineers have not addressed the sufficiency of current design standards, however, for accommodating climate variability. Climate projections, for example, indicate that today's 100-year precipitation event is likely to occur every 50 years or perhaps even every 20 years by the end of this century. Until new standards

are developed, infrastructure rehabilitation projects in highly vulnerable locations may be considered for higher design standards.

- **Evaluate the National Flood Insurance Program and flood insurance rate maps**

The Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRMs) are used as a data source for transportation planners and engineers. These maps do not take climate variability into account. TRB recommended that FEMA reevaluate the effectiveness of the National Flood Insurance Program and the FIRMs in risk reduction.

## 5.2 Water Quality

Protecting water quality is an important part of the transportation planning process. ODOT along with regional and Metropolitan Planning Organizations (MPOs) have processes to evaluate and plan for new transportation improvements which include considering water quality impacts. Water quality impacts are considered during several steps in the process.

### 5.2.1 Water Quality Regulatory Framework

The Federal Water Pollution Control Act (33 U.S.C. 1344), as amended by the United States Congress in 1972, became known as the Clean Water Act (CWA). The objective of the CWA is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States (U.S.). Section 404 of the CWA authorized the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the "Waters of the U.S." Section 401 of the Clean Water Act allows the State to regulate waters that are isolated and are not considered "Waters of the U.S."[64]

As these permits are normally project or action related, transportation planning activities generally take a broad brush approach to determining potential impacts on a regional basis. Although long-range planning can sometimes predict the type of permit or permits that might be required for regional transportation planning, most organizations deal with water quality issues on a larger watershed or regional basis. Section 6001 of the federal transportation bill passed in 2005, requires consideration of environmental issues during the development of long range plans, at the statewide and MPO level. Specifically, Section 6001 requires an evaluation of potential mitigation activities and potential areas to carry out these activities, as well as consultation with resource agencies.

### 5.2.2 Water Quality in Transportation Planning

Water quality issues are best addressed at a regional- or watershed-level. Local planning agencies typically address water resource protection and make sure that they take watersheds into account in their transportation planning process. For example, the Northeast Ohio Areawide Coordinating Agency (NOACA), which is responsible for transportation planning in a five county area around Cleveland, has a water quality program that focuses on managing and protecting water resources in northeast Ohio to sustain the region economically and environmentally. Their program addresses water quality on a regional scale, at the watershed level, and within individual communities.[65]

[64] http://www.epa.gov/lawsregs/laws/cwa.html
[65] http://www.noaca.org/

Some MPOs have environmental policy statements that they follow regarding all environmental areas including water quality. An example of such a policy statement is that of the Mid-Ohio Regional Planning Commission (MORPC), Columbus' MPO. Their policy statement recognizes the importance of a healthy natural environment for quality of life, economic prosperity, public health, and growth of a region. It goes on to state that they are dedicated to carrying out regional environmental programming in the areas of air quality, water quality, energy conservation, efficient land use, urban revitalization and alternative transportation.[66]

## 5.3 Air Quality

### 5.3.1 Air Quality Regulatory Framework

ODOT provides guidance to ensure that transportation projects are in compliance with regulations related to air quality. The Clean Air Act (CAA) was signed into law in 1970 and amended in 1990. Over the last 20 years, total emissions of the six principal air pollutants have decreased by more than 41 percent nationally.[67] The CAA requires the development of a State Implementation Plan (SIP). The SIP defines how states will comply with the CAA and improve air quality, which requires demonstration of conformity with air quality standards. Conformity in this context means that projects, such as those undertaken by ODOT, must not cause any new air quality violations, worsen existing air quality, or delay timely attainment.

The laws defining OEPA's role in implementing the federal regulatory framework as it pertains to transportation are found in Ohio Administrative Code (OAC) Chapter 3745-101 - Transportation Conformity Rules. The law delegates Ohio's responsibilities under the Clean Air Act to the OEPA, Metropolitan Planning Organizations (MPOs), ODOT, and FHWA/FTA. ODOT's responsibilities include:

- Developing the statewide transportation plan and STIP;
- Performing transportation modeling for MPOs as agreed to by the individual MPOs;
- Providing technical input on proposed revisions to motor vehicle emissions factors;
- Distributing draft and final project environmental documents to other agencies;
- Convening air quality technical review meetings on specific projects when requested by other agencies or as needed; and
- Coordinating the conformity process and making conformity determinations for rural non-attainment areas.[68]

In response to the CAA, the U.S. Environmental Protection Agency established National Ambient Air Quality Standards (NAAQS) for six priority pollutants that adversely affect human health and welfare. These include:

- Ozone ($O_3$) and precursors, volatile organic compounds (VOC) and oxides of nitrogen ($NO_x$)
- Particulate matter 2.5 microns or less and 10 microns or less (PM2.5/PM10)
- Carbon monoxide (CO)

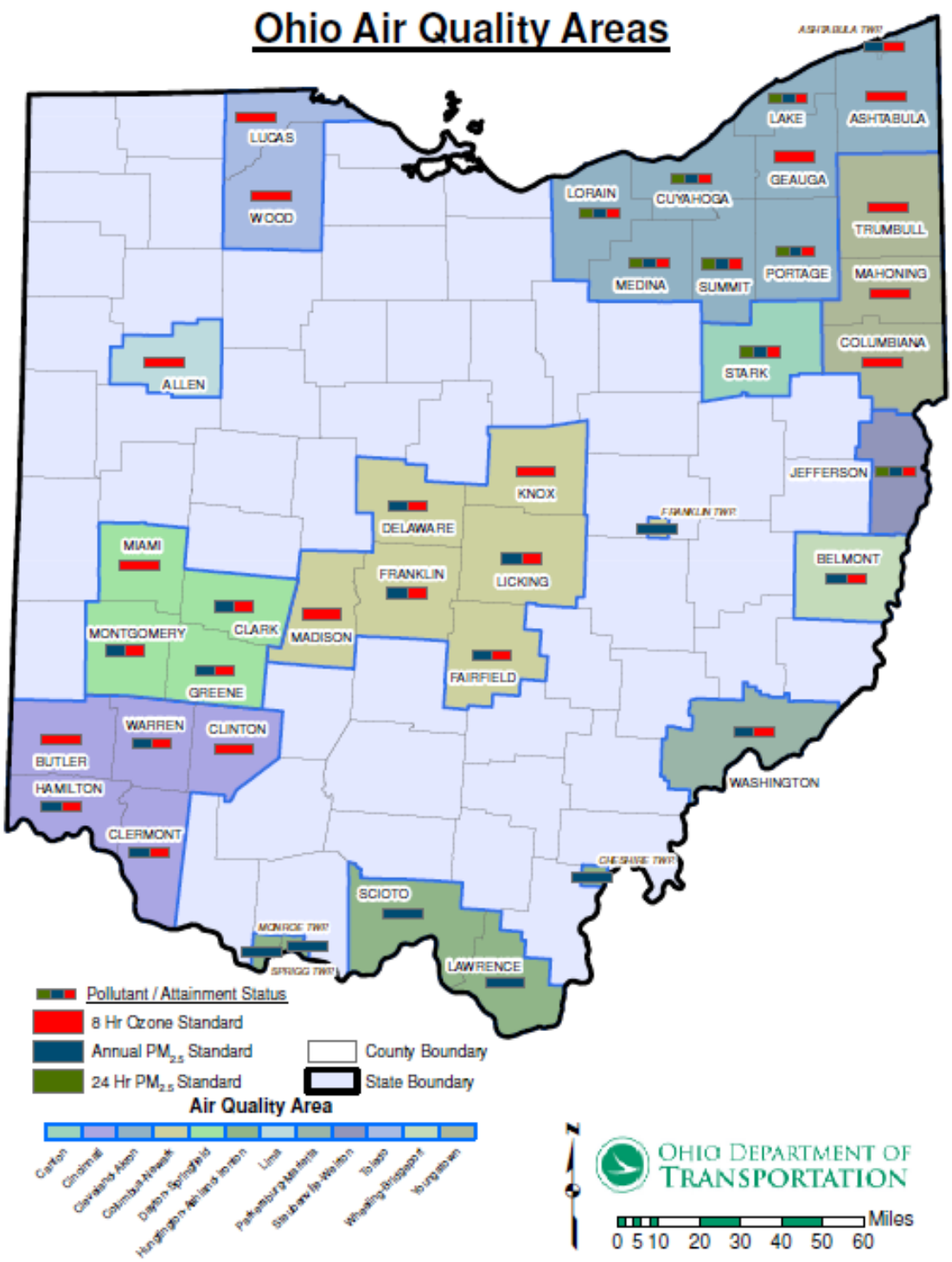
[66] http://www.morpc.org/pdf/MORPCEnvironmentalPolicy.pdf
[67] http://www.epa.gov/air/caa/, United States EPA
[68] Ohio Administrative Code (OAC) Chapter 3745-101 - Transportation Conformity Rules

There are two areas in Ohio listed as Maintenance Areas for PM10. Those areas are Cuyahoga County (Moderate) and Jefferson County (Moderate). USEPA has recently released proposed new standards for ozone. The current standards will remain in effect while the updated science undergoes review, which is scheduled to be completed in 2013.[69] **Figure 15** illustrates the areas of concern for Ozone and PM 2.5.

In addition to the criteria air pollutants which comprise the National Ambient Air Quality Standards (NAAQS), USEPA also regulates air toxics. Most air toxics originate from man-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Unlike the criteria pollutants, toxics do not have NAAQS benchmarks against which evaluations can be made. Therefore, the evaluations associated with toxics are more subjective.[70] To address stakeholders concerns and requests for MSAT analysis during project development and alternative analysis, FHWA developed the *Interim Guidance on Air Toxic Analysis in NEPA Documents*.[71] The guidance provides a tiered approach for analyzing MSAT in NEPA documents. Therefore, MSAT is addressed at the project-level rather than in long range planning.

[69] http://www.epa.gov/glo/actions.html
[70] http://www.fhwa.dot.gov/environment/air_quality/air_toxics/index.cfm[71]
http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm
[71] http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm

Figure 15: Ohio Air Quality Areas



# 6. ECONOMIC PROFILE

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

Industry employment gives indications as to the impact on transportation infrastructure. For example, manufacturing employment indicates trucking and intermodal infrastructure needs while finance or insurance simply indicates commuter needs. Projecting which industries will see growth in the future will be helpful in determining potential intermodal infrastructure needs.

Economic issues will be discussed in more detail in the *Access Ohio 2040* plan document.

## 6.1 Gross State Product

Ohio's estimated 2011 Gross State Product (GSP) of $484 billion was the eighth largest in the United States, 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. [72]

## 6.2 Employment

Employment in Ohio is made up of a diverse group of industries. As of 2010, the sector with the largest number of employees is government and government enterprises followed closely by health care and social assistance. The list of industries and their respective employment based upon data from the Ohio Department of Development can be found in **Table 11**.

[72] Ohio Department of Development, August 2012. *Gross Domestic Product from Ohio*.

### Table 11: Ohio Employment by Industry, 2010

| Industry | 2010 Employment |
|---|---|
| Farm employment | 78,009 |
| Forestry, fishing, and related activities | 12,863 |
| Mining | 27,897 |
| Utilities | 20,766 |
| Construction | 296,809 |
| Manufacturing | 648,563 |
| Wholesale trade | 236,989 |
| Retail trade | 671,590 |
| Transportation and warehousing | 215,544 |
| Information | 93,022 |
| Finance and insurance | 331,902 |
| Real estate and rental and leasing | 234,504 |
| Professional, scientific, and technical services | 367,874 |
| Management of companies and enterprises | 112,995 |
| Administrative and waste services | 387,061 |
| Educational services | 149,193 |
| Health care and social assistance | 830,538 |
| Arts, entertainment, and recreation | 119,534 |
| Accommodation and food services | 443,926 |
| Other services, except public administration | 339,300 |
| Government and government enterprises | 834,731 |

## 6.3 Major Employers

Ohio has 60 Fortune 1000 businesses headquartered throughout the state. A list of the largest employers in the state, based upon data from the Ohio Department of Development, can be found in **Table 12**.

**Table 12: Top Ohio Employers, 2011**

| Employer | Employees in Ohio | Headquarters | Sector |
|---|---|---|---|
| Wal-Mart Stores, Inc. | 52,275 | Bentonville, AR | Retail |
| Cleveland Clinic | 39,400 | Cleveland | Health |
| Kroger Co. | 39,000 | Cincinnati | Food Stores |
| Catholic Healthcare Partners | 30,300 | Cincinnati | Health |
| The Ohio State University | 28,300 | Columbus | Education and Health |
| Wright-Patterson AFB | 26,300 | Dayton | Military |
| University Hospitals | 21,000 | Cleveland | Health |
| JP Morgan Chase & Co | 19,500 | New York, NY | Finance |
| Giant Eagle, Inc. | 17,000 | Pittsburgh, PA | Food Stores |
| OhioHealth | 15,800 | Columbus | Health |

## 6.4 Exports

In addition to a large GDP, Ohio also exported $41.4 billion in goods in 2010. Goods were exported to 212 countries and territories with Canada as the largest recipient.

## 6.5 Policy and program support

### 6.5.1 Office of Jobs & Commerce

In 2011, ODOT established the Office of Jobs & Commerce to provide outreach and respond to business issues related to transportation funding in Ohio. This section participates in the Ohio Department of Development Review Committees to troubleshoot multi-agency and multi-jurisdictional transportation issues and offers site location recommendations to encourage business to use existing excess capacity of transportation infrastructure and assets.

By law, $18.7 million of state gas tax funding is committed for infrastructure needs for economic development projects, known as 629 funds. ODOT works with Jobs Ohio to implement these projects with the intent to promote job creation and retention.

### 6.5.2 Transportation Review Advisory Council

The Transportation Review Advisory Council (TRAC) was established by the Ohio General Assembly in 1997. The nine-member TRAC is charged with overseeing a project selection process for major transportation capacity projects and any project over $12 million. Per the TRAC Policy and Procedures, the Major New Capacity program is committed to enhancing Ohio's comparative economic advantage and quality of life.

The TRAC accepts applications for project funding and scores each project, with a maximum score of 100 points. Economic growth and development factors make up 25 possible points out of 100. The

community and economic growth and development factors include: (1) adopting appropriate land use measures; (2) positioning land for redevelopment; (3) economic impact/return on investment; and (4) economic distress.

In 2012, ODOT is evaluating the effectiveness of this scoring system. A consultant has been retained to evaluate the economic impact analysis conducted for transportation projects to identify potential TRAC policy and procedural improvements.

## 6.6 Emerging Trends – Shale Gas Exploration and Production

One emerging trend that is beginning to impact Ohio is the development of shale gas production principally from Marcellus Shale and, to a lesser extent, Utica Shale.

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 could recover an estimated 50 trillion cubic feet of natural gas. Conservative estimates state that the Marcellus shale contains 168 trillion cubic feet of natural gas; in reality, it could contain as much as 516 trillion cubic feet.[73]

As Ohio becomes more involved with this growing industry, it becomes important to analyze what has occurred in Pennsylvania. In January 2012, the Pennsylvania Center for Workforce Information & Analysis (CWIA) provided a Fast Facts publication quick snapshot of labor market information for Pennsylvania's Marcellus Shale related industries and related economic activity illustrating extensive economic and employment benefits from the shale gas industry and ancillary services.[74] Ohio more than likely will see the same trends, as activity in the Marcellus Shale grows.

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 the drilling site. As Marcellus activity increases in Ohio, ODOT's activity related to improving the transportation system to accommodate oil and gas exploration will increase.[75]

Many rural roads overlying and near the Marcellus Shale will not meet standards necessary for large trucks that will be used to haul equipment, water, and other supplies to and from drill pad sites. These roads will need to be upgraded through widening, surfacing, and alignment improvements.

Oil and gas specialists in the US 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. While the following information provides wide-ranging estimates, it is

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

[74] Marcellus Shale Fast Facts January 2012 Edition, Pennsylvania Department of Labor and Industry Center for Workforce Information & Analysis, January 10, 2012

[75] 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

still helpful in understanding and framing the large amount of truck traffic that will be associated with any oil or gas well.[76]

Estimates are as follows:

- Drill Pad and Road Construction Equipment – 10 to 45 truckloads
- Drilling Rig – 30 truckloads
- Drilling Fluid and Materials – 25 to 50 truckloads
- Drilling Equipment (casing, drill pipe, etc.) – 25 to 50 truckloads
- Completion Rig – 15 truckloads
- Completion Fluid and Materials – 10 to 20 truckloads
- Completion Equipment (pipe, wellhead) – 5 truckloads
- Fracture Stimulation Fluids and Materials – 100 to 1000 truckloads
- Fracture Stimulation Equipment (pump trucks, tanks) – 100 to 150 truckloads

Numerous truck-mounted pumps and temporary storage tanks are needed on location to fracture-treat wells. Larger well locations may be needed if hydraulic fracturing is part of a well completion procedure. Refracturing wells after three or four years has proven effective in the Barnett Shale of Texas. If this practice extends to the Marcellus Shale, then truck traffic will have few lulls.[77]

Ohio Governor John Kasich signed Amended Substitute Senate Bill 315, the state's comprehensive energy bill, into law on June 11, 2012. The bill was previously approved by the Ohio General Assembly and became effective September 9, 2012. The bill directly impacts the natural gas industry and shale drilling operations throughout Ohio. In addition, the bill establishes jurisdiction over natural gas gathering pipelines and processing facilities. These activities will be regulated by the Ohio Department of Natural Resources (ODNR) through its Division of Oil and Gas Resources Management.

A stipulation in the law that will be important in the transportation planning process is summarized by 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.[78]

[76] 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

[77] 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

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

As the emerging market of shale gas exploration and production comes on line in Ohio, ODOT will seek to take the impacts on the transportation system into consideration during the transportation planning process. In turn, ODOT will work with agencies and local governments in planning so that that the transportation resources in Ohio are in place to develop this vital emerging market.

# 7. FISCAL OVERVIEW

The Ohio Department of Transportation is facing the financial challenge of maintaining and improving a large system in an era of uncertain revenue streams. This section discusses the sources of transportation funding available to ODOT and the trends impacting funding levels and purchasing power. It also contains a summary of the strategies that ODOT is employing to meet this challenge.

The *Access Ohio 2040* plan document will expand on this topic.

## 7.1 Funding Sources for Transportation

Based upon figures from fiscal year 2011, Ohio's transportation system receives approximately $3.6 billion in funding annually. (**Figure 16**) ODOT controls approximately $2 billion, with about half coming from Federal Highway Revenue. About 46 percent comes from the Ohio Motor Fuel Tax, with the remaining 4 percent from registration and title fees. Local governments control approximately $1.58 billion, coming from Federal Highway Revenue, Ohio Public Works Commission (OPWC) Capital Improvement Program, the Ohio Motor Fuel tax, and vehicle registration and title fees.[79]

### 7.1.1 Federal Transportation Bill

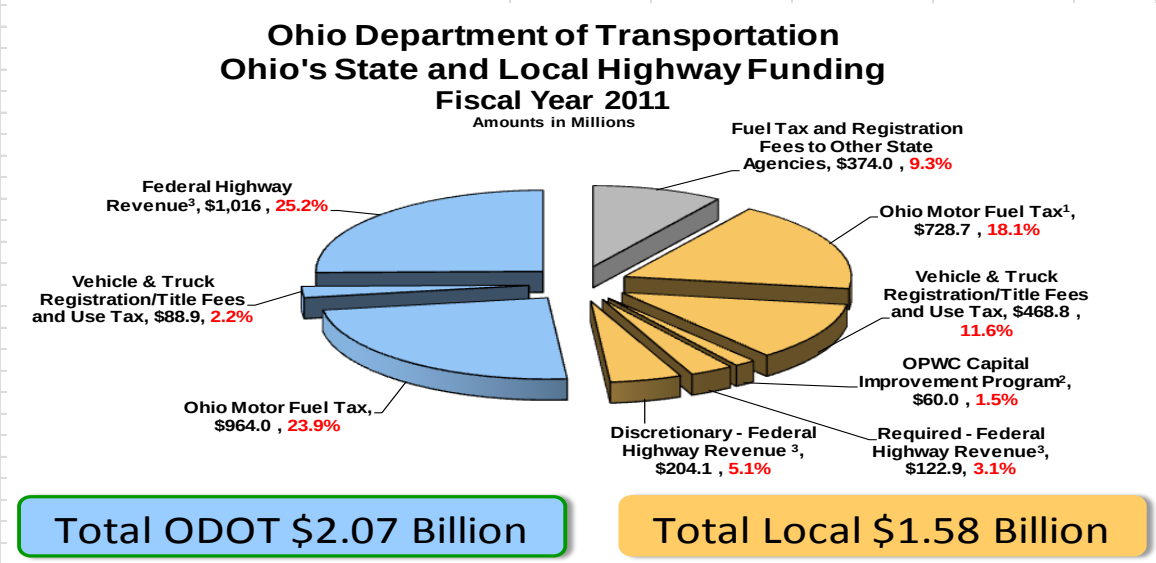
The federal motor fuel tax is currently 18.4 cents per gallon on gasoline and 22.4 cents on diesel. Nearly half of Ohio's transportation funding comes through the Federal Highway Trust Fund, which is based upon the federal gas tax. The future level of federal funding is difficult to predict. Congress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

Under current funding formulas, Ohio receives approximately 86 cents for every dollar Ohio 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.

Currently, the majority of Federal Highway projects are funded at 80 percent federal with a 20 percent state or local match. There has been discussion during on-going development of the next long-term national transportation bill of increasing the required state or local match (e.g., perhaps 70 percent federal, 30 percent state). If this occurs, ODOT may have inadequate state dollars to match the expected federal authorization.

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

**Figure 16: 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.

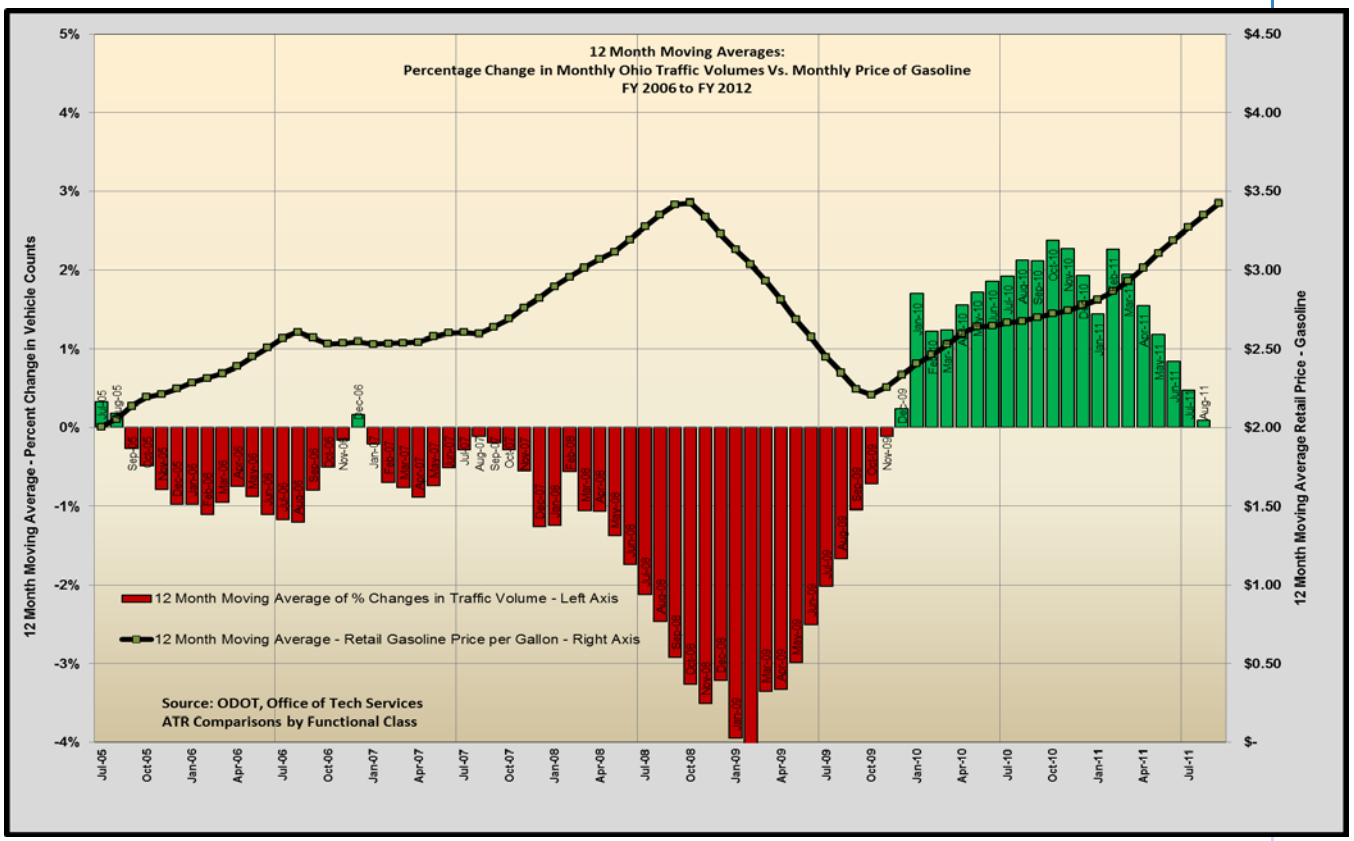
### 7.1.2 Ohio Motor Fuel Trends

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. 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 per gallon, not as a percentage, so the amount earned per gallon stays the same even as gas prices go up and down. Therefore, funding through the fuel tax is heavily impacted by economic conditions and consumer behaviors that affect the number of gallons purchased. Periods of economic decline reduce the vehicle miles traveled (VMT). There is a potential for fleets to be converted to Compressed Natural Gas (CNG), which is not taxed for transportation.

There has also been an increase in fuel efficient vehicles, leading to fewer gallons purchased, and less fuel tax revenue, while motorist can drive the same number of miles on Ohio's roads. This trend is expected to accelerate. In August 2012, the USDOT and USEPA released new fuel efficiency standards, increasing the average fuel efficiency requirement to 54.5 miles per gallon (mpg) for cars and light-duty trucks by model year 2025. (For comparison, the requirement for the 2016 model year is 35.5 mpg.) See Figure 17.

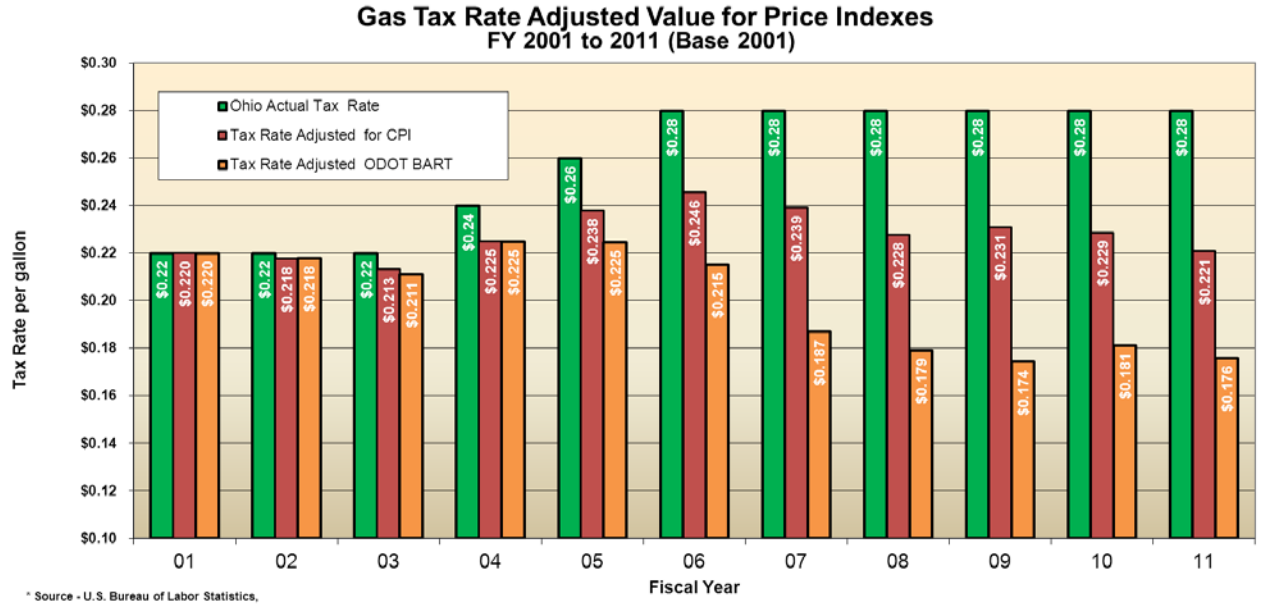
**Figure 17: Percentage Change in Monthly Ohio Traffic Volumes Vs. Monthly Price of Gasoline**




### 7.1.3 Inflation

As discussed above, Ohio's actual 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 diminished purchasing power over time. **Figure 18** 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) as well as ODOT's Bid Analysis Review Team (BART) analysis of construction bids.

Figure 18: State Motor Fuel Tax Contrasted with Inflation Rates, SFY 2001-2011




## 7.2 Strategies

In order to maximize the funding available for transportation infrastructure and to get the most from that investment, ODOT has developed several strategies.

### 7.2.1 Operational Efficiency

Approximately 25 percent of ODOT's budget is allocated to operational costs. Some of these result in visible user benefits, such as snow and ice control. Others are procedural or operational, such as issuance of overweight vehicle permits. All of ODOT's activities are being evaluated with an emphasis on improving efficiency within the Department itself. From January 2011 to April 2012, ODOT reduced its staff by approximately 400 people, saving an estimated $20 million annually that may be directed to other programs.

In addition to direct savings, ODOT's operations can indirectly influence the purchasing power of the available funds. ODOT has a goal of awarding construction contracts throughout the fiscal year, with 20 percent in the first quarter, 30 percent in the second quarter, 30 percent in the third quarter, and 20 percent in the fourth quarter. By distributing construction contracts throughout the year, with a larger portion in the fall and winter months, ODOT provides a stable program for the construction industry and reaps better bid prices as a result. Some estimates place that savings at 10 percent or more, simply based upon the time of year the project is sold and the quantity of projects being sold at that time. ODOT has placed a greater emphasis on project management skills than at any time in the organization's history by implementing a project management training program. ODOT will be counting on its project managers, working with the consulting industry, to deliver the program in accordance with the 20/30/30/20 goal.

### 7.2.2 Capitalizing on Ohio's Transportation Assets

In 2012, ODOT is at the beginning stages for several strategies that may provide the opportunity to leverage Ohio's transportation assets to fund continuing maintenance and critical system expansions.

Ohio owns 101 rest areas, which cost $50 million annually to maintain. Of these, 45 are located on the interstate system. The remaining 56 are located along state and U.S. routes. ODOT is exploring the conversion of non-interstate rest areas to service plazas, with the goal of improving service to the public and converting an expense into a revenue source. This strategy has the potential to result in $50 million per year in income.

Periodically, Ohio invests in significant infrastructure projects that are high profile. ODOT is developing a policy to seek sponsorship and naming rights for certain projects. Sponsorship and naming rights may generate up to $25 million per year.

### 7.2.3 Division of Innovative Delivery

ODOT has formed a Division of Innovative Delivery to seek out alternative and innovative sources of revenue. In addition to managing the above strategies, this Division is charged with soliciting and evaluating public-private partnership (P3) opportunities.

ODOT's P3 program is intended to result in timely delivery of appropriate projects by encouraging competition for innovation and establishing reliable processes to encourage private sector investment.

CDM Smith

cdmsmith.com