Setting the Stage: Economic Development White Paper

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Executive Summary

The Ohio Department of Transportation (ODOT) is developing an update to its long-range transportation plan, Access Ohio 2045 (AO45). AO45 will build on ODOT’s long-established foundation of strategic transportation investment to support broader State economic, societal, and environmental goals. AO45 is an opportunity to further ODOT’s reputation as a national leader, to prepare for current and future challenges, and to position the State for continued prosperity.

As a backbone of Ohio’s economy, the broad sector of transportation, trade, manufacturing, utilities, mining, construction, and agriculture employs about 2 million workers and generates $248 billion of Gross Domestic Product (GDP). This accounts for nearly 40 percent of the State’s $626 billion GDP. Ohio boasts the Nation’s 7th-largest economy and the 34th-largest global economy.

ODOT’s Division of Jobs and Commerce plays a direct role in economic development through transportation investments, while JobsOhio, the Ohio Development Services Agency (ODSA), and Governor’s Office of Workforce Transformation focus on attracting and retaining businesses and developing the workforce. While these offices set broader goals and provide guidance, a significant portion of economic development efforts occur at local and regional levels. Coordination between State and local efforts is crucial. With this in mind, ODOT partnered with five Regional Planning Organizations in 2013. These organizations were formally designated as Regional Transportation Planning Organizations (RTPO) by Ohio’s Governor on January 27, 2016.

The Jobs Ohio program supports job creation opportunities unique to Ohio’s six regions, and Joint Economic Development Districts (JEDD) foster coordination and cooperation across municipal boundaries. Working with these programs is critical to ensure ODOT addresses transportation decisions in the context of economic development.

Trade, freight growth, and logistics continue to play a significant role in Ohio due to geographic location and proximity to major U.S. markets. Ohio has the Nation’s 4th-largest Interstate highway system (6,735 miles); 104 airports, 3rd-largest rail network, 127 water ports and terminals, 13 intermodal freight facilities (2nd in the Nation), and access to 60 percent of North America’s manufacturing sites within one day’s drive. Major freight facilities are a strong business attractor, as they offer access to the global market and enable companies to optimize their supply chains.

A number of economic development and transportation-related opportunities and challenges which could impact Ohio’s future economic growth are explored in this white paper, including:

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• **Changing Manufacturing and Supply Chain Industries.** As production efficiency increases and labor costs rise globally, manufacturers are relocating production facilities back to the U.S., a trend known as reshoring. As such, transportation costs are becoming a more significant factor for manufacturers, who benefit from having close proximity to related sectors and consumer markets. At the same time, emerging technologies such as 3D printing and automated warehousing are shifting shipping patterns by enabling near or onsite production of components.

• **Shift to Service-Sector Jobs.** Transportation system investment should be informed by businesses and industry, connect workers to jobs, and serve to preserve and increase resilience of the system. Moreover, investments should be made in the State’s workforce, continuing to close the gap between skill sets and job availability. As employment patterns shift, it will become increasingly important to anticipate which transportation investments best support job growth throughout the State.

• **Shifting Energy Markets.** Energy trends are driven by the relationship between traditional oil prices and the evolution of renewable energy and alternative fuels in the transportation sector. Oil prices are down from the last decade’s record highs. If this trend continues, it could decrease domestic production and distribution costs and thereby increase locally generated goods and services. Meanwhile, the growth in renewable energy technologies and the changes in tax credits and other Government inducements will be capped by the ability of providers to achieve production efficiencies. Natural gas, which is a small percentage of the current consumption, is expected to increase dramatically between now and 2040. This trend signifies changes in the fueling, service, and truck stop industries.

Overall, the economic conditions examined in this paper highlight some of the ongoing and potential transformational changes to Ohio’s businesses, freight movement, logistics and distribution, productivity, employment, and commute patterns. Ohio’s existing programs and policies demonstrate how Ohio coordinates its response to economic opportunities. AO45 can serve to highlight the strategic role transportation planning—at a statewide, systems level—can play to support the process.

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Introduction

HOW THIS PAPER LINKS TO AO45

The Ohio Department of Transportation (ODOT) is developing the long-range transportation plan, Access Ohio 2045 (AO45). AO45 will build on ODOT’s long-established foundation of strategic transportation investment which links to broader State economic, societal, and environmental goals and promotes public resource stewardship consistent with ODOT’s mission, vision, and guiding principles. AO45 is an opportunity to further ODOT’s reputation as a national leader, and prepare for the future in order to successfully navigate current and future challenges and to position Ohio for continued prosperity.

AO45 will provide ODOT with a strategic blueprint to manage the changes facing the transportation system and serve as a reference point to align ODOT’s ongoing policies, plans, and programs. The blueprint involves the support of partners and builds a strategy fueled by the data-driven, performance-based decisions ODOT has worked tirelessly to establish.

The purpose of this paper is to help “set the stage” for AO45 development by exploring the relationship between transportation and economic development in Ohio. The information and conclusions developed in this white paper will help ensure that economic development is one of several critical issues that is effectively and comprehensively addressed as ODOT sets a course for the future.

CONNECTIONS BETWEEN ECONOMIC DEVELOPMENT AND TRANSPORTATION PLANNING IN OHIO

Transportation is one of the most influential drivers of economic development, and is heavily influenced by economic trends. The link between transportation and economic development became widely apparent throughout the Industrial Revolution, where large-scale production spawned the need for mass movement of goods. Ohio’s economy has been centered on making goods, with iron, steel, and machinery manufacturing driving economic growth—legacy industries that continue to this day. Multimodal transportation infrastructure provided Ohio businesses with access to regional, national and global markets, which still supports Ohio’s $50 billion trade industry. Additionally, transportation, trade, manufacturing, utilities, mining, construction, and agriculture employ about 37 percent of Ohio’s workforce.

The core functions of transportation as it relates to Ohio's economy can be summarized in two overarching themes: goods movement (freight), and passenger mobility and access to opportunity. First, infrastructure location, capacity, and operations have a significant impact on transport and supply chain costs—a major factor in natural resources, manufacturing, distribution, and trade industries. Strategic infrastructure investments that optimize supply chains impact Ohio's ability to attract and retain business ventures that drive job growth and revenue generation. As infrastructure ages and freight demand increases, system preservation and modernization become increasingly central to maintaining long-term economic competitiveness. Transportation investments also are key to supporting service-based industries, which rely on high-quality transportation systems to provide access to employees, patrons, and distributors.

The transportation sector also plays a key role in job creation by generating employment opportunities in construction, maintenance, shipping, logistics, and distribution. The Federal Council of Economic Advisers estimates that every $1 billion invested in highway and transit infrastructure could generate about 13,000 jobs for one year.7

Second, transportation infrastructure connects people to goods, services, and employment opportunities. Sprawling development patterns and suburbanization of employment have led to longer commuting times, which impacts access to jobs. Infrastructure investments that reduce travel time, and thus the overall cost of commuting, can have a significant impact on economic mobility. This concept is demonstrated in the Smart Columbus program, which leverages emerging technologies to improve multimodal connectivity. Additionally, transportation investments contribute to economic growth through the “multiplier effect,” where the value generated exceeds that directly tied to the initial investment.

**ECONOMIC DEVELOPMENT IN OHIO**

**Legislative Context**

Over the last decade Federal legislation has increasingly focused on leveraging transportation investments for economic development. Building on the Moving Ahead for Progress in the 21st Century Act (MAP-21), the Fixing America’s Surface Transportation Act (FAST Act) emphasizes job creation and economic growth as one of three overarching goals. The FAST Act underscores the importance of freight to State and national economies by requiring a State Freight Plan to link infrastructure investments with freight movement and economic vitality. The FAST Act requires that AO45 be consistent with the goals, objectives, and performance targets established in Transport Ohio, Ohio’s State Freight Plan.

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The FAST Act also authorized numerous discretionary funding programs geared towards economic development through system performance and innovative technologies, including the Advanced Transportation and Congestion Management Technologies Deployment Program (ATCMTD). In early 2017, the City of Marysville was awarded nearly $6 million in ATCMTD funding for the U.S. 33 Smart Mobility Corridor. The Transit Tech Ohio project also received $7 million through the Transportation Improvement Generating Economic Recovery (TIGER) program to increase broadband access and enhance transit service in rural parts of Ohio.

Federal investment dollars are not—and will not be in the future—sufficient to meet all of Ohio’s infrastructure needs. Thus, State expenditures on infrastructure are vital to job creation and retention. Investments in infrastructure are a sound economic development strategy that has benefits surpassing those of tax cuts or waivers that court corporate interests while reducing benefits to the public. As shown in Figure 1, Ohio’s investment in its infrastructure is on par with, yet declining slightly faster than, the national average since 2010. Infrastructure investments not only create value that is attractive to companies, but also support both short- and long-term job creation, especially in locations where unemployed or underemployed workers are available to fill new jobs.

**FIGURE 1—STATE AND LOCAL CAPITAL SPENDING ON TRANSPORTATION AS PERCENT OF GDP**

Source: Center on Budget and Policy Priorities, August 2017.

**Statewide Economic Development Goals**

At the State level, Ohio has engaged in numerous strategic planning efforts to boost economic development throughout the State. Overarching economic development goals across Ohio focus primarily on two strategic
elements: attracting and retaining jobs in key industries and workforce development to meet demand for increasingly advanced and technological skills. While transportation is not specifically called out in either of these goals, it is a clear connection to the State’s ability to meet both goals.

- **Key Industries**—Attracting and retaining key industries is critical to Ohio’s economic vitality. JobsOhio, one of the central economic development organizations in Ohio with ties to numerous Government initiatives, focuses development efforts on a targeted set of industries that either deliver high-paying long-term jobs or build on an existing specialization or natural advantage. These key industries identified by the program include:
  - Advanced manufacturing
  - Aerospace and aviation
  - Automotive
  - Biohealth
  - Information technology
  - Shale energy and petrochemical
  - Financial services
  - Food processing
  - Logistics and distribution

- **Workforce Development**—As high-paying jobs become increasingly technical and skills based, Ohio has made improving its citizens’ skills a top economic priority. The Governor’s Office on Workforce Transformation was created in 2012, with the mission to train Ohio’s workers in the skills most needed by businesses. The office coordinated with Ohio’s education agencies to set Attainment Goal 2025, which aims for 65 percent of working-aged Ohioans to have a degree, certificate, or other postsecondary workforce credential of value by 2025.

**ODOT Economic Development Goals**

One of the major selling points for Ohio as a destination for business and investment is its central location and extensive transportation infrastructure, which together put Ohio-based businesses close to significant population centers and provide multimodal access to major ports. ODOT’s transportation investments therefore play a key role in attaining statewide economic development goals. The following plans and programs describe ODOT’s agency-specific goals as they relate to economic development.

- **Current Long-Range Transportation Plan (AO40)**—ODOT’s role in supporting statewide economic development is outlined in one of six overarching goals from the current long-range plan, AO40:

  “Develop and operate a State transportation system that supports a competitive and thriving economy, attracts new businesses, and provides for predictable freight movements.”

- **State Freight Plan**—Ohio’s State Freight Plan, Transport Ohio, was released in 2017 and connects statewide freight activities to national freight goals and statewide transportation goals. Transport Ohio led ODOT to

**Overall economic development goals across Ohio focus primarily on two strategic elements: attracting and retaining jobs in key industries, and workforce development to meet demand for increasingly advanced and technological skills.**
establish freight performance measures and facilitated collaboration with local partners, modal offices, and State economic development offices. It also helped pursue public-private partnerships and guide strategic freight network improvements to increase economic competitiveness and efficiency in Ohio.

**ODOT Division of Jobs and Commerce**—This division’s mission is “aligning transportation investments and strategies with the needs of Ohio’s businesses and workers” and it furthers this mission through providing transportation infrastructure and project management assistance to Ohio’s businesses and communities.

**Ohio Major New Capacity Program**—ODOT integrates its economic development goals into practice under the Major New Capacity Program. Major New project applications are reviewed by the Transportation Review Advisory Council (TRAC). Scoring criteria under TRAC are intended to prioritize projects that enhance access to jobs, improve a region’s economic wellbeing, and make freight movement more efficient.
Where Are We Today?

ECONOMIC TRENDS

A strong economy is critical to supporting Ohio’s diverse population. While not growing as fast as the national average (0.6 percent annually), Ohio’s projected 0.3 percent population growth will raise its population from 11.6 million in 2015 to 12.6 million by 2045. Ohio’s industries are growing, with Ohio holding a well-earned reputation as one of the Nation’s key industrial centers. Ohio has access to over half of the U.S. population and many major ports within 600 miles—or a day’s drive.

FIGURE 2—OHIO’S STRATEGIC ACCESS TO U.S. MARKETS

OHIO’S ECONOMY

Ohio boasts the Nation’s 7th-largest economy and the 34th-largest global economy. As a backbone of Ohio’s economy the broad sector of transportation, trade, manufacturing, utilities, mining, construction, and agriculture employs about two million workers and generates $248 billion of Gross Domestic Product (GDP). This accounts for nearly 40 percent of the State’s $626 billion GDP (Figure 3), and 37 percent of the State’s workforce.

Ohio’s strong goods-producing economy is supported by the State’s robust transportation system—the transportation, trade, and utilities industry employs about 1 million workers, generates tax revenue, and enables the efficient movement of people and goods throughout the State. As shown in Figure 2, transportation and trade sectors generate about 16 percent of Ohio’s GDP.

FIGURE 3—OHIO’S GDP BY INDUSTRY SECTOR, 2016

Overview of Industries

Manufacturing

Ohio’s manufacturing industry alone makes up almost 17 percent of the State’s GDP—$106 billion in 2016, employing nearly 13 percent of the State’s workforce.11 There were 687,400 manufacturing employees in Ohio in 2016, with an average annual compensation of $72,534 in 2015—well above the median income of $49,429.12 The top 10 manufacturing sectors and their output are shown in Figure 4.

In 2016, Ohio manufacturers exported $49.14 billion in goods. Industrial machinery and vehicles and parts were the top commodities exported from Ohio, with aerospace products, electrical machinery, rubbers and plastics, iron and steel, and oil seed also making up a significant portion of economic output.13 While over half of Ohio’s GDP is generated in the three largest metropolitan areas, manufacturing plays a larger role in smaller communities where factories have historically been the main source of employment.

FIGURE 4—OHIO’S TOP 10 MANUFACTURING SECTORS BY GDP


Ohio is a national leader in iron and steel manufacturing. Eleven percent of the dollar value added by the U.S. iron and steel industry originated in Ohio, making the State the 3rd-largest overall source for such products at $5.72 billion according to the latest economic census.  

Transportation and Trade Industries

Transportation and logistics services contributed more than $15.5 billion to Ohio’s Gross Domestic Product (GDP) in 2015. The trucking industry is the largest part of this industrial sector at $7 billion (45 percent), followed by couriers and selected support services with an estimated $3.4 billion (22 percent), and warehousing and storage at $2.8 billion (18 percent). Other industries, such as air and water freight transportation and pipelines collectively provided about $2.4 billion in services (15 percent). Just over 4 percent of the national logistics services came from Ohio compared with 3.4 percent of total U.S. GDP originating here, indicating the transportation industry’s concentration in Ohio. Wholesale and retail trade also are important sectors of Ohio’s economy that are closely linked to transportation. Together, these trade sectors generated $76 billion in GDP in 2016, 12 percent of the State’s total GDP.

Other Goods-Sector Industries

Agriculture also is a core piece of Ohio’s economy, generating $105 billion annually in output and employing nearly 1 in 7 Ohioans. While farming does not make up a significant portion of the State’s output, the agrifood industry (consisting of food processing, wholesaling and retailing, and food services) has been a key driver of economic growth. Construction also is a growing sector according to the Bureau of Labor Statistics. Employment grew by 21 percent between 2010 and 2016 while GDP grew by 25 percent. While construction makes up only a small portion of Ohio’s economy, the rate of growth has drastically outpaced other goods-producing sectors.

Service-Sector Industries

Service-sector industries such as finance, insurance, health care services, education, and professional services make up nearly two-thirds of Ohio’s total GDP, an increase of about 10 percent since the late 1990s. Many of these businesses, such as hospitals and health care clinics, depend heavily on the movement of goods as part of their operations.

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While growth of goods-sector GDP has outpaced service-sector GDP, the Ohio Development Services Agency expects that nearly all employment growth through 2022 will occur in service-sector industries. Growing service-sector employment has implications for transportation as workforces and commute patterns shift geographically. Jobs in the fastest growing sectors—health care and social assistance, professional and technical services, and administrative and waste services—tend to be located in urban and suburban areas, requiring rural populations to commute further distances to access jobs.

**Employers**

The top six employers as identified by the Ohio Development Services Agency in 2017 employ over 235,000 people. The industry sectors range from retail to health to Government. Table 1 shows the top 6 employers with employment estimates and headquarter location. Although the State of Ohio employs about 51,000 workers, Government jobs (with the exception of Wright-Patterson Air Force Base) are not included in Table 1 to focus on the private sector.

Wal-Mart is the top private employer in Ohio and has 173 retail operations and 5 distribution centers in the State. The Cleveland Clinic Foundation is the 2nd-largest employer and the largest healthcare employer. The Wright-Patterson Air Force Base is the 6th-largest employer. According to the Ohio Development Services Agency, about two-thirds of the Air Force Base workforce is comprised of civilian workers. The Air Force Base occupies 8,145 acres and is the largest employer in Ohio at a single site.

<table>
<thead>
<tr>
<th>Company</th>
<th>Ohio Employment Estimate</th>
<th>Headquarters Location</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Wal-Mart Stores, Inc.</td>
<td>50,500</td>
<td>Bentonville, AR</td>
<td>Retail</td>
</tr>
<tr>
<td>2 Cleveland Clinic Foundation</td>
<td>49,050</td>
<td>Cleveland, OH</td>
<td>Health</td>
</tr>
<tr>
<td>3 Kroger, Co.</td>
<td>43,850</td>
<td>Cincinnati, OH</td>
<td>Retail</td>
</tr>
<tr>
<td>4 Ohio State University</td>
<td>32,100</td>
<td>Columbus, OH</td>
<td>Education and Health</td>
</tr>
<tr>
<td>5 Mercy Health</td>
<td>32,035</td>
<td>Cincinnati, OH</td>
<td>Health</td>
</tr>
<tr>
<td>6 Wright-Patterson Air Force Base</td>
<td>27,600</td>
<td>Dayton, OH</td>
<td>Government</td>
</tr>
</tbody>
</table>

**TABLE 1—TOP EMPLOYERS IN OHIO, 2017**


1 civilian, including private contractors, and military on base.

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Education

Education is closely linked to State and local economic development, as it is often indicative of the skill set and type of workforce available to employers. Areas with large populations of college-educated residents may attract more knowledge-based industries, while areas where residents have more vocational training may attract more service-sector and manufacturing jobs. However, there are many other factors that influence an employer’s decision to locate in a given area, and matching skill sets to job availability not only increases employment rates, but improves productivity.

Among individuals 18 years or older, 89.5 percent of Ohioans have a high school diploma or higher, while only 26.7 percent have a bachelor degree or higher. According to the Ohio Department of Higher Education, “Ohio will need to produce, by 2025, an estimated 1.7 million more adults with high-quality postsecondary certificates or degrees. At Ohio’s current rate of production, by 2025, almost 2 million Ohioans will lack the postsecondary education or training needed to be competitive in the labor market.” As employment continues to shift towards knowledge-based industries, professional services, and service-sector industries, matching skill sets to job opportunities will become increasingly important to fostering long-term economic growth.

Energy

Energy—whether from fossil fuels or renewable energy—plays a significant role in Ohio’s economy. Yet these markets can be risky and volatile, affected by both political and market actions.

Natural gas plays a significant role in Ohio’s energy economy. The Utica and Marcellus shale formations occupy nearly half of Ohio’s eastern land mass and account for 85 percent of growth in U.S. shale since 2012.

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However, these resources are located in some of the State’s least accessible areas, as Ohio’s transportation network was planned prior to this growing energy-sector activity. Rural and two-lane roads suffer from congestion and maintenance backloads, suggesting potential future restriction on natural gas production by limiting distribution.

Ohio is recognized as a leader in electric and alternative fuel vehicle technologies. Through programs such as Clean Fuels Ohio, which is working with Workhorse Group, Inc. to deploy 500 plug-in electric pickups for use by utility and delivery companies, the State is garnering a reputation as a friendly place for these types or programs. Between 2003 and 2011, Ohio Third Frontier granted over $90 million to improve fuel cell manufacturing efforts. Numerous Fortune 500 companies in Ohio are taking advantage of Ohio’s fuel cell market to improve their bottom line, while the Stark Area Regional Transit Authority (SARTA) has started incorporating hydrogen fuel cell buses into their fleet under their No Emissions Bus Program. ODOT provided $500,000 in State funding for the project, demonstrating how transportation investments can be used to support sustainable transportation systems while growing the green economy.

Ohio also has demonstrated how to leverage partnerships for advancement of clean energy transportation systems. A recent partnership between American Electric Power (AEP), the Public Utilities Commission, and the Sierra Club reached an agreement to implement AEP’s Ohio Electric Security Plan through expansion of electric vehicle charging stations and renewable energy generation and distribution grid reliability through 2024.

**Global Trade Patterns**

Shifting global trade patterns have brought significant changes to Ohio’s economy and will continue to play a transformative role as globalization intensifies. Digitalization has lowered barriers to market entry, improved communication, and enhanced overall productivity across economic sectors. While communication technologies and low-wage workforces in developing countries led to decades of offshoring, trends indicate that manufacturers are beginning to relocate production facilities to the U.S. This reshoring is largely tied to transportation. Automation of routine labor and distribution has significantly reduced production costs, shifting emphasis to supply chain efficiency and access to raw materials. Reshoring trends suggest continued growth of domestic manufacturing industries and additional demand on the transportation system.

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EXISTING PROGRAMS

Economic development efforts in Ohio are supported by numerous agencies and programs across the State. ODOT’s Division of Jobs and Commerce plays a direct role in economic development through transportation investments, while the Ohio Development Services Agency (ODSA), JobsOhio and the Governor’s Office of Workforce Transformation focus on attracting and retaining businesses and developing the workforce. While these offices set broader goals and provide guidance, a significant portion of economic development efforts occur at local and regional levels. For example, Joint Economic Development Districts (JEDD) foster coordination and cooperation across municipal boundaries. Understanding the role and relationship of these programs and services is critical to understanding the forces guiding economic development in Ohio and informing how ODOT will address transportation decisions in the context of economic development.

ODOT Division of Jobs and Commerce

Within ODOT, the Division of Jobs and Commerce is tasked with funding and managing strategic transportation investments to service business expansion or relocation to Ohio. The Division’s service offerings include project management, support for infrastructure improvements and access, transportation expertise and routing analysis, site selection analysis and recommendations, and partnership and funding assistance. If a prospective business venture finds that their operations are impeded by inadequate transportation infrastructure, the Division of Jobs and Commerce can fast-track solutions to ensure that the expansion or establishment of operations can continue as planned. The streamlining process works in four steps:

1. Existing or prospective businesses contact the Division of Jobs and Commerce with requests for needed transportation improvements.
2. The Division of Jobs and Commerce qualify the project request.
3. Potential project solutions are developed and reviewed.
4. The Division of Jobs and Commerce executes an agreement and maintains involvement throughout the construction process.

Success Story: Transportation Improvement for Business Expansion

Peerless Technologies is a defense engineering, information technology, and research firm based in Fairborn, OH. Peerless Technologies wanted to expand operations but was hindered by a congested corridor that made it challenging for employees to access the campus. Eager to support the expansion, ODOT’s Division of Jobs and Commerce worked with Peerless Technologies to find a solution. ODOT partnered with JobsOhio and county and municipal governments to conduct a study of the problem, devise a list of possible solutions, and agree to a cost-sharing arrangement for final implementation that resulted in success for all parties.

JobsOhio

JobsOhio is a private nonprofit that serves as the central economic development company for the State, with the primary mission to support expansion and location of companies from target industries in Ohio. Specific services offered include site selection assistance, incentive programs, industry introductions, and foreign investment facilitation. JobsOhio works closely with Government offices, such as the Ohio Development Services Agency, as well as with numerous other organizations through a formal partnership called the JobsOhio Regional Network. The Regional Network allows JobsOhio to work closely on relevant local projects with a more locally focused partner organization that represents each region’s strengths, experience, and interests. These local partners include:

- Appalachian Partnership for Economic Growth (Southeast Ohio).
- Columbus 2020.
- Dayton Development Coalition.
- REDI Cincinnati.
- Regional Growth Partnership (Northwest Ohio).
- Team NEO (Northeast Ohio).

Ohio Development Services Agency (ODSA)

ODSA is the official economic development office for the State of Ohio, whose mission is to “create jobs and build strong communities.” The ODSA has identified 11 target industries, four of which directly depend on Ohio’s transportation network: aerospace and aviation, automotive, food processing, and polymers and chemicals. While JobsOhio focuses on attracting large companies, ODSA hosts a range of programs aimed at small businesses, start-up incubators, entrepreneurship, community development, low-interest loans, and providing tax credits. A sampling of the many programs and initiatives of the ODSA include:

- Third Frontier—A technology-based economic development initiative aimed at accelerating startups and early stage technology companies.
- Ohio Minority Business Direct Loan Program—A program that provides fixed, low-interest loans to certified minority-owned businesses to purchase or improve fixed assets.
- Community Grants, Loans, Bonds, and Tax Credits—Funds are available through the ODSA for community improvement and safety projects, covering a range of concerns such as grants for abandoned gas station clean up, energy assistance loans, homelessness response and management, and training and technical assistance programs.

Success Story: Attracting the Supercar

In Marysville, OH, workers cheered as the first 2017 Acura NSX came off the line in spring, 2016. This victory was the result of a four year investment by Acura, the luxury division of Honda, who decided to redesign and build the NSX “supercar” in Ohio. Already home to a Honda manufacturing plant and research facility, Honda describes the decision to expand this operation alongside them as “a no-brainer.” The company cited the concentration of engineering, manufacturing, and R&D talent as one of the major factors in the decision. In addition, Ohio’s experience in different stages of automotive manufacturing, from parts supply manufacturing to vehicle assembly, made a great fit.

Governor’s Office of Workforce Transformation

Created by Governor John Kasich in 2012, the Office of Workforce Transformation works to build in-demand skills among Ohio’s workforce and connect those workers with the employers who need them. The office endorses or partners with initiatives throughout Ohio, and has three primary goals:

1. Identify businesses’ most urgent jobs needs.
2. Align training to these business needs.
3. Connect businesses and individuals.

The work that the office does is guided by the Governor’s Executive Workforce Board, which is made up of business leaders and workforce development experts that can directly attest to the needs of businesses in the State.

In 2014, the Governor’s Office of Workforce Transformation launched a series of Industry Workforce Alliances aimed at decentralizing workforce development programming. The pilot series was aimed at public-private collaborations that target local residents in all six JobsOhio regions. This program demonstrates Ohio’s commitment to workforce development in both urban and rural parts of the State.

Ohio State University (OSU) Extension Economic Programs

OSU runs a number of programs that serve as an economic development resource for communities across Ohio, each with a slightly different focus. The Ohio Cooperative Development Center provides technical assistance to rural areas, while the e-commerce program provides small businesses and entrepreneurs with an introduction to using the web. The Business Retention and Expansion Program is a training program for local governments that focuses on establishing and maintaining a long-term economic development strategy. Rather than engaging in economic development activities directly, the program provides resources, training, and tools to empower communities to do it themselves.

Joint Economic Development Districts (JEDD)

JEDDs provide a legal arrangement for neighboring local governments to share the responsibilities, and the resulting benefits, related to new industrial development. The contract outlines issues such as which entities provide necessary services like water, emergency response, and road maintenance, which land use and zoning rules apply, and the allocation of resulting income and property tax revenue from the development. The JEDD
is beneficial when one entity on its own does not have the resources to meet all the development’s needs, and allows for a more regional approach to economic development in Ohio.

TECHNOLOGY AND ECONOMIC DEVELOPMENT

Technology is a key factor in many of the economic development approaches in Ohio. With respect to transportation, Ohio has capitalized on early successes in new mobility technology to ensure that they are poised to take advantage of new opportunities. AO45’s Technology White Paper presents additional details on the most exciting and prominent successes in transportation technology in Ohio, including the three outlined below.

- The 2016 award of the Smart City Challenge to Columbus in 2016 means Ohio will be a high profile proving ground for connected vehicles and other intelligent transportation system, including new data sources and technology efficiency improvements. In addition to the $40 million from the U.S. DOT, the Smart City Challenge is expected to generate an estimated $500 million in investment through partnerships with local Government and private-sector stakeholders.28

- In 2016, the U.S. 33 Innovation Corridor Council of Governments, with the City of Marysville and in partnership with The Ohio State University’s (OSU) Center for Automotive Research (CAR), Honda Motors, and ODOT, announced a $15 million “Smart Mobility Corridor” to be equipped with high-capacity fiber-optic cable to send data from wireless sensors back to researchers.29 In January 2017, a partnership between OSU, JobsOhio, and the State of Ohio announced a $45 million investment in a Smart Mobility Advanced Research and Test (SMART) Center which is designed to test new technologies and highly automated vehicles in a closed, safe, secure, and repeatable real-world environment.

- ODOT, in partnership with broadband access organization Connect Ohio, was awarded a TIGER Grant in 2015 to simultaneously address the scheduling and dispatching challenges of rural transit providers. The project proposes capital investments in hardware and software to bolster GPS and other vehicle location systems and bridge vehicle-to-base connectivity gaps, as well as improving broadband access in rural communities.30


Findings and Future Direction

State and national trends indicate Ohio is well positioned for economic growth into the future. Ohio’s geographic location and core industries of manufacturing, automobiles, and agriculture will continue to serve as a backbone of the State’s economy. Additionally, the continued growth of research and development, healthcare and bioscience, and pharmaceuticals along with emergent sectors of connected and automated vehicle technology and alternative energy will expand statewide economic opportunities.

At the same time, shifting global trade patterns, technological innovation, and land development changes introduce a level of uncertainty to the future economic landscape. The pace of technological advancement will certainly influence how Ohio’s economy grows along with continued growth of freight movement and potential shifts from manufacturing towards service-sector jobs and exploration of new energy markets. The timing and integration of these changes could lead to a range of different transportation futures. Additionally, the long-term economic impacts of reshoring are speculative at this point and it’s unclear how fast potential impacts to production and employment will occur.

In a scenario of increasing global trade and reshoring, the amount of goods passing through Ohio’s borders could increase dramatically, requiring heavy investment and expansion of port and intermodal freight facilities. As such, Ohio’s manufacturing industry could experience a strong resurgence, with associated growth in transportation, logistics, and distribution sectors. The manufacturing renaissance could spur the streamlined implementation of intelligent freight transportation systems, modernization projects, and fuel-efficient technologies in an effort to move goods more efficiently throughout the State. In this scenario, freight could become the key driver of Ohio’s economy, with a massive statewide multimodal freight network that is a defining factor of future population, employment, and land use patterns.

In the occurrence of strong service-sector growth, urbanization, and reduced manufacturing and exports, Ohio’s freight network could become more localized, primarily serving as a mechanism to move goods throughout the State. The emphasis on urban goods movement would still utilize emerging freight technologies, but would likely result in greater focus on trucking and roadway infrastructure rather than rail and port intermodal facilities.

Therefore planning and investing in a robust transportation system will continue to be an important component of navigating change and supporting Ohio’s economic vitality. The following key economic patterns also can serve as transportation opportunities to explore further in the development of AO45.

- **Changing Manufacturing and Supply Chain Industries.** As production efficiency increases and labor costs rise globally, manufacturers are relocating production facilities back to the U.S., a trend known as reshoring. As such, transportation costs are becoming a more significant factor for manufacturers, who benefit from having close proximity to related sectors and consumer markets. At the same time, emerging technologies such as 3D printing and automated warehousing are shifting shipping patterns by enabling near or onsite production of components.

- **Shift to Service-Sector Jobs.** Transportation system investment should be informed by businesses and industry, connect workers to jobs, and serve to preserve and increase resilience of the system. Moreover, investments should be made in the State’s workforce, continuing to close the
gap between skill sets and job availability. As employment patterns shift, it will become increasingly important to anticipate which transportation investments best support job growth throughout the State.

- **Shifting Energy Markets.** Energy trends are driven by the relationship between traditional oil prices and the evolution of renewable energy and alternative fuels in the transportation sector. Oil prices are down from the last decade’s record highs. If this trend continues, it could decrease domestic production and distribution costs and thereby increase locally generated goods and services. Meanwhile, the growth in renewable energy technologies and the changes in tax credits and other Government inducements will be capped by the ability of providers to achieve production efficiencies. Natural gas, which is a small percentage of the current consumption, is expected to increase dramatically between now and 2040. This trend signifies changes in the fueling, service, and truck stop industries.

**Changing Manufacturing and Supply Chain Industries**

Ohio is a national leader in manufacturing, hosting 5.5 percent of all American manufacturing employment. However, manufacturing production is significantly outpacing employment growth as factories become increasingly automated. According to the Federal Reserve Bank of St. Louis, American manufacturing output is 47 percent higher than 1996 production levels. Under robot-assisted manufacturing, companies require fewer, more high-skilled employees, which causes many displaced workers to seek employment in service-sector industries, which are enjoying much higher rates of job growth. However, these industries typically pay much lower wages than traditional manufacturing jobs. This shift has led to growing income disparity and economic inequality that will continue to take a toll on State and national economies. In Ohio, goods-sector employment increased by only one percent between 2010 and 2016, while goods-sector GDP grew by 37 percent during the same period.

Nevertheless, other trends lean more positively towards manufacturing in Ohio. Some manufacturing is returning to Ohio as part of the “reshoring” trends after decades of exodus. Between 2010 and 2016, 139 companies reopened facilities in Ohio, including Whirlpool and Fiat Chrysler. During this time period, Ohio gained 18,755 jobs from reshoring, making it the 4th-most impacted state in the U.S. Several factors aside from automation have contributed to this resurgence, including port and canal expansion, e-commerce, and “green” manufacturing. While these trends are largely due to market forces, identifying and prioritizing infrastructure needs specific to key industries could help advance growth of manufacturing sectors. Supporting economic growth and prosperity may necessitate a focus on traditional industrial strongholds to maintain competitive advantage, while diversifying the State’s industrial portfolio to promote resiliency.

Working directly with key stakeholders such as business leaders, trade associations, and local governments,
could help ODOT assess the most pressing transportation needs for both legacy businesses and emerging industries.

Trends in shipping, logistics, and distribution industries also directly impact transportation needs. “Last mile” or same-day deliveries now represent 40 percent of the delivery market.\(^{35}\) Consumer demand for same-day deliveries, paired with 3D printing and automated warehousing and distribution systems, may incentivize manufacturers to disaggregate production facilities and locate them closer to related markets. This trend is evident through the growing popularity of Symbiotic, an automated warehousing company targeted at major retailers. In a recent interview, Symbiotic’s CEO stated that “because the technology can store more products in a smaller space, companies could have more compact warehouses closer to their retail outlets, requiring less trucking.”\(^{36}\) Shorter heavy haul routes, especially through urban areas, constitutes a major shift away from traditional distribution patterns. Disaggregated distribution networks also may enable right sizing of delivery vehicles, alleviating stress on Ohio’s transportation system.

Emerging technologies and big data markets are anticipated to play an enormous role in shaping the future of freight mobility. Intelligent Transportation Systems (ITS), like weigh-in-motion (WIM) and electronic toll collection (ETC) systems that collect data instantaneously may enable freight vehicles to move more quickly between origin and destination. Fiber-optic cables along the Ohio Turnpike, U.S. Route 33, and other key freight corridors also may help alleviate stress on Ohio’s infrastructure by providing real-time route planning capabilities.

**Opportunities for Ohio**

The future of the manufacturing industry will have significant impacts on Ohio’s transportation system and for its economic vitality. With investment in technology-forward industries, Ohio will likely continue to be a stronghold in auto and machinery manufacturing. However, increases in productivity may not necessarily lead to similar increases in employment. As we already are seeing, manufacturing employment is declining, which if it continues could lead to a scenario where production is isolated in remote areas and population booms in urban areas as workers migrate towards service-sector employment centers. Technology such as self-driving trucks, which may reduce production and distribution costs, also can further this trend.

Technology may alternatively lead to the decentralization of manufacturing and distribution facilities, exacerbating trends created by Amazon and other online retailers to locate distribution facilities near demand in urban and suburban population centers. Automated trucking and warehousing, 3D printing, and other trends, can increase the prevalence of flexible, more local supply chains that are less impacted by disruption than a centralized system.

Innovations in autonomous and connected vehicle technology, Intelligent Transportation System (ITS), and Unmanned Aerial System (UAS) have potential to drastically transform the transportation system. The ability of vehicles to communicate with each other, with infrastructure, and with people could greatly enhance

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safety and reliability, leading to more efficient utilization of existing roadway capacity. Real-time route planning capabilities that optimize travel times and reduce congestion also could alleviate stress on Ohio’s infrastructure. Technological innovations also hold promise for better asset management and decision-making, which are key to strategically investing resources and maximizing systemwide benefits.

Finally, the future may see Ohio’s agriculture and food processing sector once again become a focal point of economic growth, leading to increased connectivity in rural areas and fostering population growth in rural areas. Self-driving technologies support this rural connectivity, leading to strong regional growth and decentralization.

**Shift to Service-Sector Jobs**

There are three key areas where transportation and employment intersect: job creation, job preparation, and job access. Demographic shifts also are changing traditional patterns of employment.

An important part of job creation is supporting growth in existing industry clusters, even if the types of jobs in those industries are shifting. In lieu of routine manufacturing jobs, employers are seeking high-skilled technicians with training in mechanical and electrical engineering to support new automated systems. However, since jobs created through reshoring will be only a fraction of previous manufacturing employment, it also is important to attract and retain service sector and trade industry jobs that already are absorbing a significant share of employment growth. Although not supply-chain driven, industries like health care, retail, and food and administrative services rely on high-quality transportation to provide access to employees, patrons, and distributors.

Economic development in Ohio depends on the job readiness of Ohioans. From a transportation perspective access to job training programs and education could serve as an attractive advantage to retain and recruit businesses and incubate innovation. One of the clearest links between transportation and economic development is job access. As Ohio approaches 2045, long commutes will continue to grow—a trend that is fueled by sprawling development patterns. According to Greater Ohio Policy Center and OSU Extension research, Ohio’s growth has been primarily concentrated in the suburbs, while total population and population density has decreased in most of Ohio’s central cities. Migration from the urban core to more remote rural areas results in a need to extend infrastructure and services over a larger land area, which contributes to worsening congestion, increased cost of living, and reduced economic opportunity for Ohioans who must travel long distances to work. This impacts both auto and transit commuters, as demonstrated by the fact that in Cleveland, 85 percent of the regional workforce could not reach half of the top 10 employment centers by public transportation.37 Ensuring that all Ohioans have access to employment is key to ensuring long-term economic growth and prosperity.

Shifting demographics such as growing senior and millennial populations may impact local and statewide economies. As millennials comprise more and more of the workforce, transportation must adapt to fit their travel preferences, including improved access to public transportation, shared mobility, and active transportation options.

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The aging workforce also presents economic challenges. Workers are staying employed past typical retirement dates out of financial need, which impacts the job market for employees entering the workforce as well as the types of transportation infrastructure required to support commute patterns. While these shifts come with a clear set of challenges, they also represent opportunities to transform the transportation system to better meet the needs of residents and businesses.

Opportunities for Ohio

ODOT has an opportunity to continue to target transportation investment which compliments the State’s economic programs and policies and is reflective of changes in the industry. In particular transportation reliability across statewide and regional networks to move goods and services will remain vital. At the same time, increased transportation connectivity and access for workers with a wide variety of job skills will be increasingly important. These connections could extend to nearby community colleges and workforce training locations and programs.

Cost effective and well timed investments also could help Ohio maintain a competitive edge as the economy continues to diversify. Prompted by Federal legislation under the FAST Act, State DOTs are turning to performance management as a way to strategically prioritize projects and improve the transportation decision-making process. ODOT’s Transportation Asset Management Plan (TAMP) and Critical Success Factors (CSF) exemplify the shift towards a performance management approach to transportation planning. In particular, the TAMP uses a risk-based approach to asset management, using advanced data collection and pavement and bridge deterioration models to more efficiently allocate asset management resources. Strengthening asset management practices serves as an opportunity to further optimize freight movement on Ohio’s transportation system and maintain a level of reliable, seamless travel irrespective of an industry’s location or distance to markets or ports.

Shifting Energy Markets

With increasingly risky and volatile energy markets, building a diverse energy-sector portfolio can help mitigate risk and reduce environmental externalities. Although the national and State political climate around renewable energy sources currently is in flux, international trends suggest that renewable energy will continue to play a large role in the world economy.

Natural gas is expected to continue to play a significant role in Ohio’s economic growth. However, Ohio’s two-lane road network in areas of natural gas extraction pose potential limits on distribution. These capacity issues may increase demand for intermodal options (with a focus on rail) to provide alternatives to local road networks, as rail is an ideal mode for handling heavy bulk materials needed for drilling and transporting raw products from extraction. Infrastructure investments that support energy production and distribution would greatly benefit Ohio’s economy while serving other industries beyond oil and natural gas. Public-private partnerships that leverage private-sector capital to build mutually beneficial infrastructure projects are becoming an increasingly popular strategy for expanding intermodal facilities and transportation systems as a whole.

Alternative energy also is important to future economic development, especially with respect to manufacturing, which benefits from reduced production costs. Trends in the auto industry towards fuel-efficient vehicles also indicate growing demand for research and development of renewable energy sources.
Moreover, Ohio’s position as an automotive powerhouse lends it to multiple opportunities in terms of electric and alternative fuel vehicle technologies. Overall, shifts in the sourcing and technology surrounding energy will have implications for funding, planning, operation, and design of transportation systems. The Department of Energy estimates that over $14 trillion will be spent of electric energy and transportation fuels over the next 20 years, resulting in major economic impacts. As vehicle electrification advances, State and local governments will need to consider the location and capacity of charging stations throughout planning efforts.

**Opportunities for Ohio**

Ohio’s energy future could take numerous paths depending on policy decisions, global market trends, and timing of technological innovation. In the occurrence that population and employment centers become more dispersed, energy infrastructure may need to be more intensive to transport energy longer distances. However, sprawling development patterns also could spark a shift towards more renewable energy sources, such as solar and wind power, which can be transmitted directly from source to consumer. Comparatively, traditional fossil fuels extracted en masse need to travel further distances across the transmission network. A trend towards increased fossil fuel extraction, despite dwindling sources, also could imply greater reliance on the freight system to transport coal, oil, and natural gas.

Advancement of renewable energy technologies also could impact urban development patterns by enabling integration of decentralized energy systems into urban landscapes. Green buildings and infrastructure that directly harness energy from natural resources could lead to a scenario where urban areas are more energy independent, reducing the role of statewide planning for energy development and transport.

From an industry recruitment standpoint, reduced energy costs paired with the recurrence of extreme weather events in coastal regions may incentivize businesses to locate in Ohio. This scenario could enable expansion of manufacturing facilities in rural and/or urban areas and growth in research and technology industries that require large data centers in areas protected from weather risks which would increase the importance local transportation access and connectivity.

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