



MIAMI VALLEY REGIONAL FREIGHT PROFILE

MAY 2017



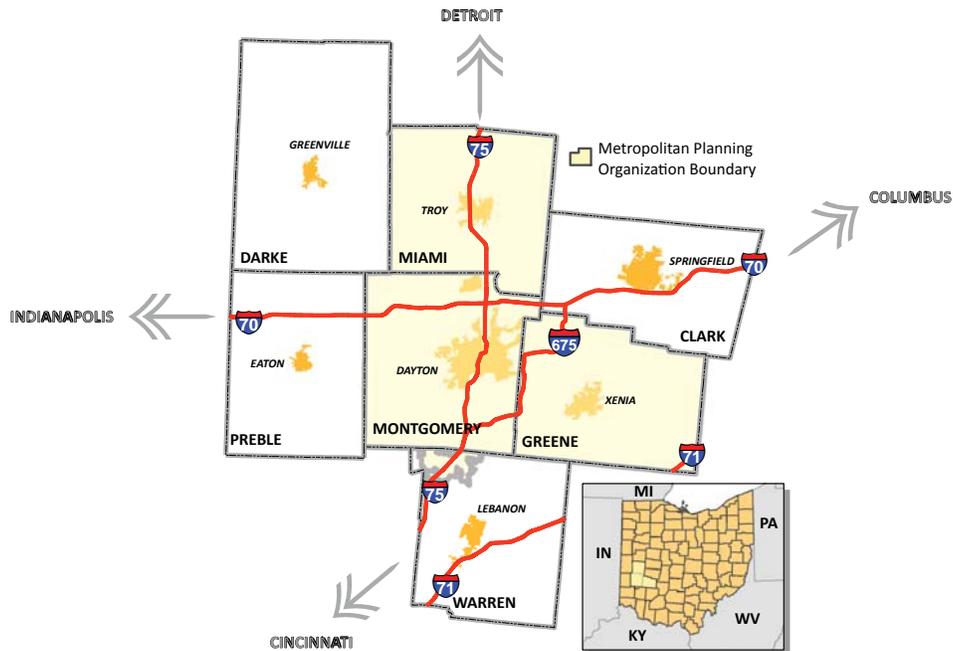
MIAMI VALLEY
Regional Planning Commission

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MVRPC AND FREIGHT PLANNING

The Miami Valley Regional Planning Commission (MVRPC) is a voluntary association of local governments and non-governmental organizations serving as the Regional Planning Commission for Darke, Greene, Miami, Montgomery, and Preble Counties, and northern Warren County in west-central Ohio. MVRPC is also the Metropolitan Planning Organization (MPO) for the Dayton Region that includes Greene, Miami, and Montgomery Counties and the cities of Carlisle, Franklin, and Springboro in Warren County, Ohio.



MVRPC recognizes the importance of freight transportation in contributing to the economic vitality of the Region. Responsible for transportation planning in the Region, MVRPC has made considerable efforts to advance its freight planning program. Several tools are employed, including truck modeling, route planning, conducting freight workshops, and providing technical assistance for freight planning studies. MVRPC solicits and evaluates freight projects for inclusion in the Region's Long Range Transportation Plan (LRTP) and corresponds with regional freight stakeholders regarding all freight transportation planning activities, including inviting participation in the long range transportation plan development process.

The Dayton Region is located near the median center of U.S. population in 2010 as calculated by the U.S. Census Bureau.

THE FAST ACT, MAP-21 AND PERFORMANCE-BASED FREIGHT PLANNING

Regional freight planning at MVRPC is conducted under the overall guidance and rules set by federal legislations. The Fixing America’s Surface Transportation Act or “FAST Act” includes several provisions to improve the condition and performance of the national freight network and to support investment in freight-related surface transportation projects. These include:

- Establishing a National Multimodal Freight Policy
- Developing a National Freight Strategic Plan in consultation with State DOTs, MPOs, and other stakeholders
- Establishing a National Multimodal Freight Network
- Encouraging States to establish State Freight Advisory Committees
- Requiring States to develop State Freight Plans
- Investing in Freight Data and Planning Tools

The FAST Act also established a dedicated freight funding source with an approximate allocation of \$39 million in Ohio.

The FAST Act continues to place emphasis on the performance management approach, first specified in the Moving Ahead for Progress in the 21st Century Act (MAP-21). It required state DOTs and MPOs to establish performance- and outcome-based programs. This includes making educated investment and policy decisions to increase performance in seven national priority areas including Freight Movement and Economic Vitality. The Act also requires the U.S. DOT secretary — in consultation with states, MPOs and other stakeholders — to establish standards that measure freight movement on the interstate system.

MVRPC has been keeping abreast of national trends in performance management and has been collecting data on regional freight movement as part of its ongoing transportation plans and studies. This should expedite the process of freight performance target setting, in consultation with the Ohio Department of Transportation (ODOT), when the MPO timeframe window for setting targets begins.

On January 18, 2017, the Federal Highway Administration (FHWA) published the Final Rule to assess the performance of freight movement on the interstate system. The Truck Travel Time Reliability (TTTR) Index has been identified by the FHWA as a performance measure to evaluate truck travel time reliability on the interstate system.



All State DOTs, including ODOT, have one year (March 2018) from the effective date of the Final Rule to set targets in relation to this performance measure.



Once state targets are set, all MPOs including MVRPC, have 180 days (September 2018) to set their targets in relation to the freight performance measure in consultation with the State DOT.



ODOT and MVRPC are required to integrate these performance targets within their planning processes, and report periodically on their progress.

FREIGHT TRANSPORTATION SYSTEM INFRASTRUCTURE

Freight movement in the Miami Valley Region occurs over a number of transportation modes, including truck, rail, air, and pipeline. The Region's multimodal freight network consists of:

- Nearly 7,000 miles of roadways including three interstates (I-70, I-75, and I-675), freeways, and principal arterials carrying more than 140 million tons of goods annually,
- Two Class I railroads – CSX Transportation and the Norfolk Southern Corporation – operating over 100 miles of mainline track and carrying more than 2.8 million tons of freight annually,
- A major cargo airport – the Dayton International Airport,
- An extensive pipeline network, and
- Intermodal connectors – short roadway segments that tie rail terminal facilities, airports, and pipeline terminal facilities to the National Highway System (NHS).

These networks, along with ancillary facilities such as truck terminals and rail yards, serve the Region's as well as the Nation's economy by efficiently moving all manner of freight in, out, through and within the Region.

National Highway System (NHS)

The NHS, a critical component of the nation's freight system, is a federal transportation system designated by Congress that includes nearly 223,000 miles (post MAP-21) of nationally significant interstate highways and roads for interstate travel, national defense, intermodal connections, and international commerce. The NHS includes the following subsystems of roadways:

- *Interstate Roadway System*: Three interstates (I-70, I-75, and I-675) serve the Miami Valley Region. I-70 and I-75 are major freight carrier thoroughfares and the Region's busiest truck routes. All three interstates are part of the primary freight network (PFN) and there are additional opportunities to designate other urban corridors as part of this network in the future. Freight projects on the PFN are eligible for dedicated freight funding under the FAST Act.
- *Other NHS*: This category is comprised of other principal arterials i.e. highways in rural and urban areas that provide access between an arterial and a major port, airport, public transportation facilities, or other intermodal transportation facilities.
- *Strategic Highway Network (STRAHNET)*: A system of public highways that provide access, continuity, and emergency transportation of personnel and equipment in times of peace and war. The STRAHNET system is comprised of approximately 47,000 miles of interstate and defense highways and 16,000 miles of other public highways.
- *STRAHNET Connectors*: STRAHNET is complemented by about 1,700 miles of connectors – additional highway routes linking more than 200 military installations and ports to the network. Two STRAHNET connectors (SR 844 and a portion of SR 444) are located in the Miami Valley Region linking the Wright Patterson Air Force Base (WPAFB) to the STRAHNET system.
- *Intermodal Connectors*: are short roadway segments that tie airport, seaport, and rail terminal facilities to the NHS. They tend to carry lower volumes of traffic at slower speeds than a typical NHS route. However, large and heavy trucks use these critical roadway segments to carry commodities essential to the Nation's economy. Portions of Dog Leg Road, US 40 and Old Springfield Road that connect Dayton's Airport Access Road to the Dayton International Airport serve as an intermodal connector in the Miami Valley.

Figure 1 shows the federally designated NHS network within the Miami Valley area.

Truck Terminals: are facilities where freight is unloaded from interstate trucks and/or intermodal trailers and containers carried on the railroad and loaded onto local delivery trucks. As shown in Figure 1, the majority of the truck terminals in the Miami Valley Region are located along the I-75 corridor, especially in and around downtown Dayton, near the I-70 and I-75 interchange, and the Dayton International Airport. These companies include contract, as well as heavy and light haulers; liquid or dry bulk, and motor freight carriers.

Rest Areas: An important category of highway support facilities are rest areas suitable for commercial vehicles. Highway safety regulations and rules regarding driver hours of operation underscore the importance of having enough high-capacity truck rest areas for long-haul freight carriers. Truck stops help expedite and facilitate the movement of freight by providing convenient locations where truckers can park, eat, refuel, and continue on their way with a maximum of ease and minimum of lost time. Over time, truck stops have evolved into full-service travel centers or travel plazas that today offer professional drivers (and in many cases even the general public) a host of amenities, including showers, brand-name restaurants, ATMs, internet kiosks, and wi-fi access. Figure 1 shows the locations of the two public safety rest areas maintained by ODOT in the Miami Valley that can accommodate commercial vehicles. Both rest areas are located near Piqua in Miami County on I-75 northbound and southbound directions. Figure 1 also shows the location of three private travel centers in the Miami Valley Region, owned by Loves, Pilot Flying J, and Travel Centers of America.

Truck Weigh and Inspection Stations: Truck weigh and inspection stations, owned by ODOT and operated by the Ohio State Highway Patrol Facilities Management, are located at entry points into Ohio on the interstate highway system. Enforcement at these stations is intended to ensure that trucks do not exceed the prescribed legal size and weight limits. Weigh and inspection stations also ensure that commercial vehicles are in safe operating condition, and that drivers are complying with regulations such as hours of service and driver credentials. There are no truck weigh and inspection stations located in the Miami Valley Region. The closest truck weigh and inspection facility outside the Region is located on I-71 north and south of US 68 in Clinton County.

Compressed Natural Gas (CNG) Fueling Stations: Six CNG stations are located in the Region as shown in Figure 1. While five of these stations are publicly owned (one in Troy in Miami County, and four in Montgomery County), Vectren owns the CNG fuel station in Fairborn in Greene County. The CNG stations provide a cheaper and environmentally better fuel option for the heavy duty and commercial fleet industries.

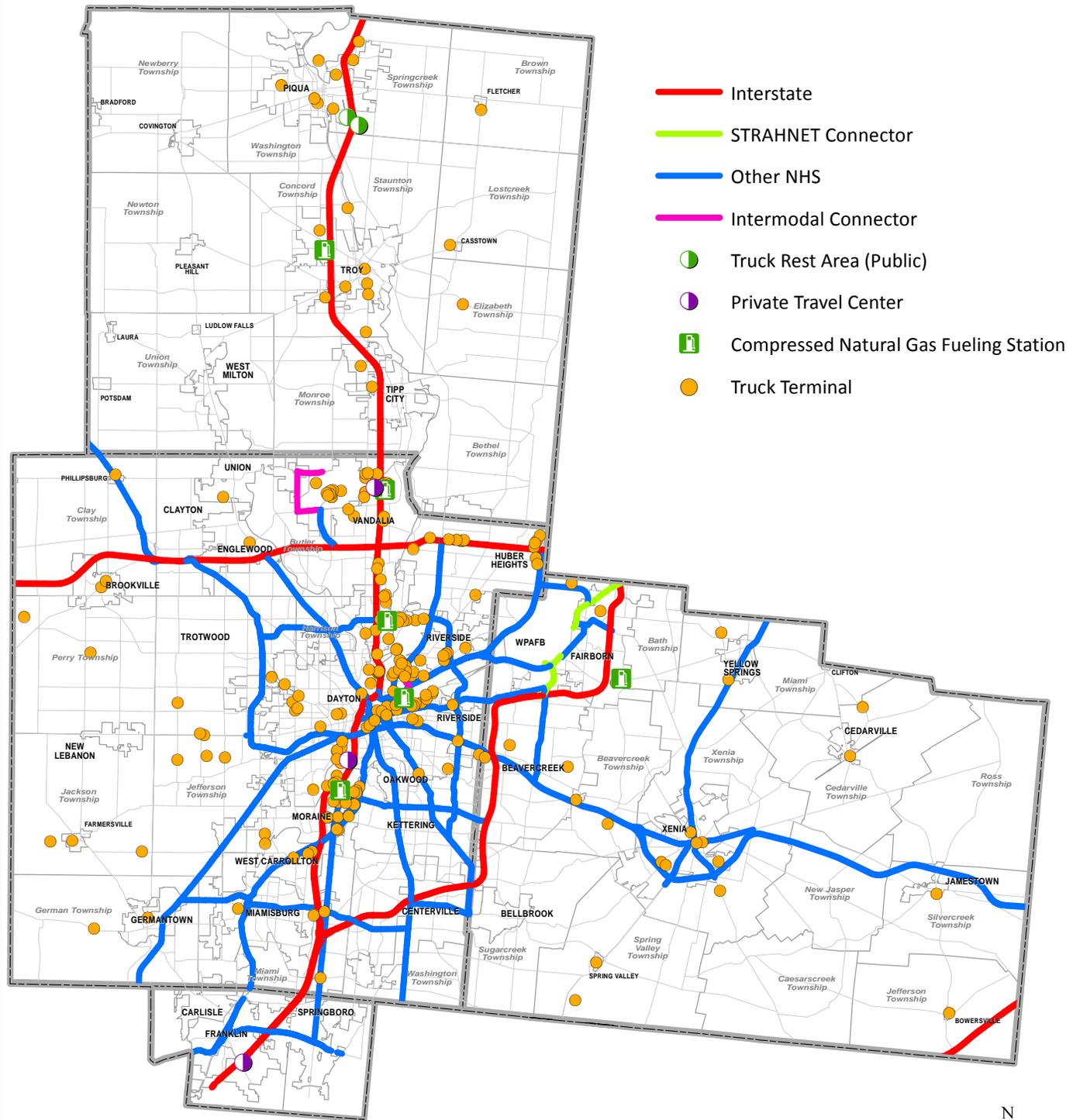
Railroads

Two U.S. Class I rail companies, CSX Transportation and Norfolk Southern, operate in the Miami Valley area.

CSXT owns and operates an approximately 60-mile, north-south line within the Region from northern Warren County to the northern boundary of Miami County. This former B&O line, part of the CSX network's "Toledo subdivision", extends approximately 200 miles between the Toledo and the Cincinnati terminal areas. This is primarily a single track line with extensive passing sidings. The maximum speed allowed is 50 mph. Train movements are controlled by a centralized traffic control (CTC) system. This line is part of CSX's core intermodal network, handling about 40 trains per day.

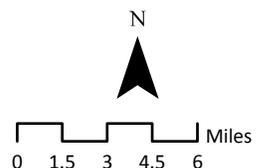
Norfolk Southern owns and operates an approximately 41-mile, northeast-southwest line within the Region between northern Warren County and Clark County. This former Conrail line, referred to by NS as the "Dayton District" of its Central Division, extends between Columbus and Cincinnati and handles around 18 trains per day. The line has both single and double track segments with trains controlled by CTC. Maximum speeds on the line are 50 mph and 60 mph for intermodal trains where appropriate.

Figure 1: National Highway System



Source: FHWA,
ODOT & MVRPC

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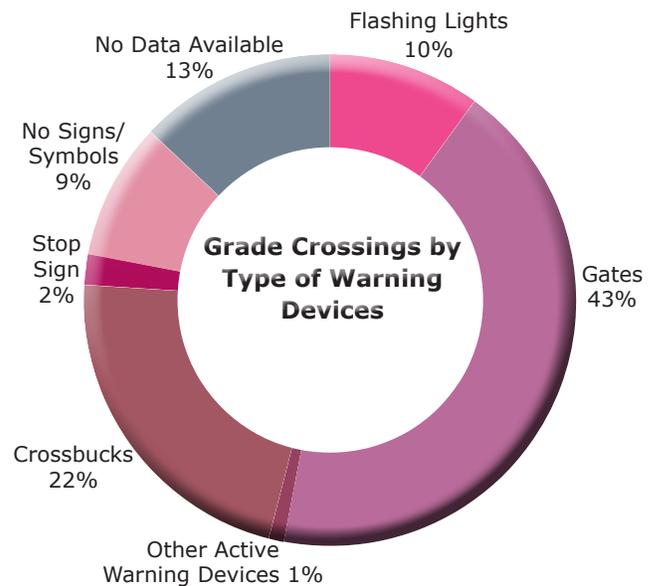
There are no regional railroads operating in the Region, but one local, private, linehaul railroad (the Germantown Rail Siding Company) operates on the 4.6 mile spur from Germantown to the CSXT line in Carlisle. Figure 2 shows the extent and ownership of the Region’s railroads.

Rail Yards: The Miami Valley has three railyards in the Region as shown in Figure 3. Norfolk Southern has two yards and CSXT has one yard in the Miami Valley area. These yards fall into two functional categories: classification yards and industrial support yards. Classification yards are for the purpose of sorting rail cars according to their destination and placement on the train. Industrial support yards hold freight cars used by local industries.

Norfolk Southern: One of Norfolk Southern’s railyards is located in an area bounded by East First Street, East Monument Avenue, Keowee Street, and Findlay Street. This railyard is no longer an active classification yard, and is used as a storage facility. The other Norfolk Southern railyard is located in an area bounded by Dorothy Lane, I-75, Dryden Road, and Springboro Pike. This railyard is an industrial support yard serving several businesses in the area. Part of the yard also serves as a classification yard, having 14 classification tracks and a 500-car capacity (this only represents switching capacity).

CSXT Corporation: The only yard that CSXT operates in the Miami Valley Area is located between Wagner Ford Road and Webster Street south of Needmore Road. This yard is also categorized as both an industrial support and classification yard. This yard has a capacity of 1,000 cars.

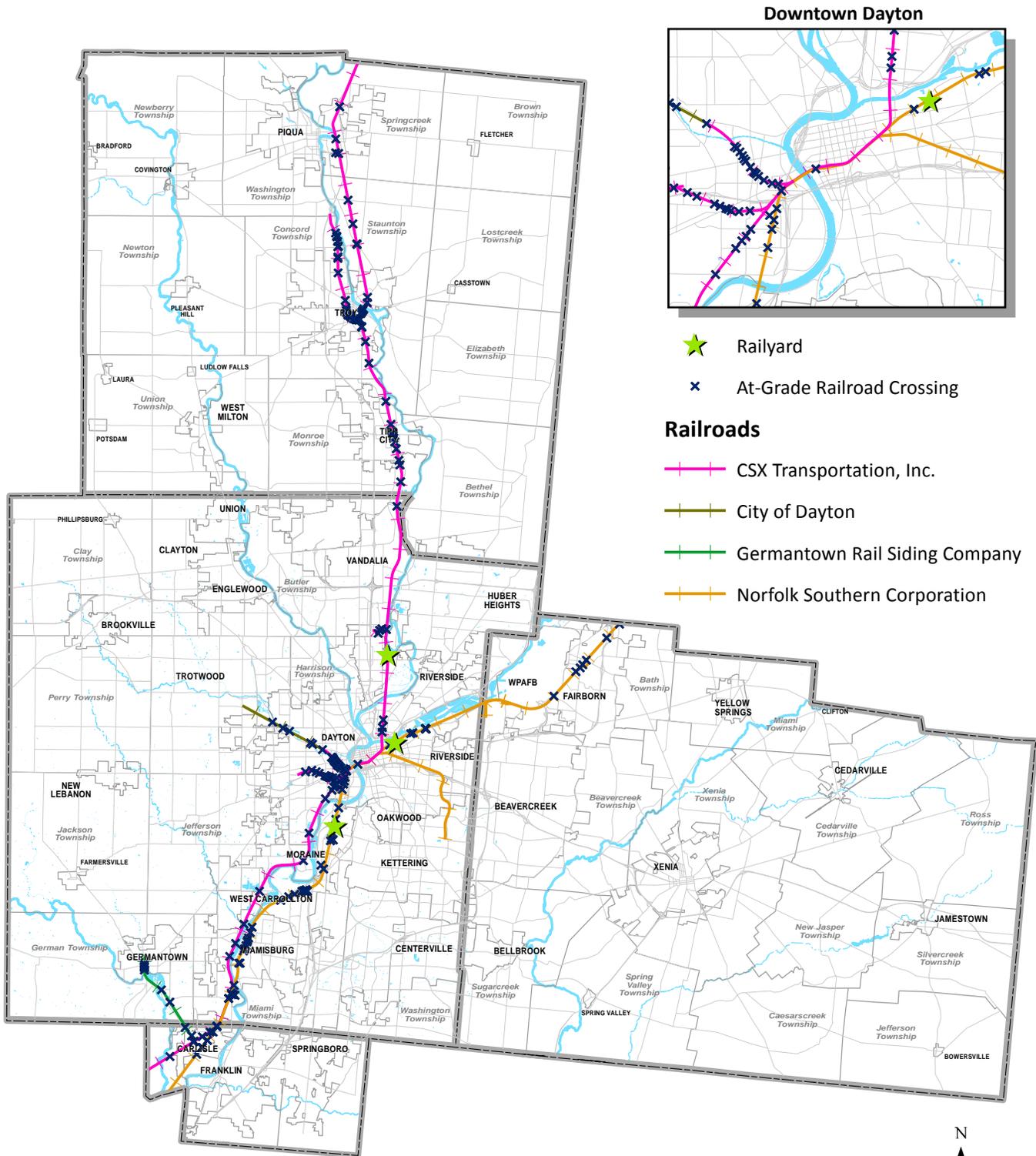
Railroad Crossings: The Federal Railroad Administration (FRA) maintains a database of all grade crossings in the state of Ohio. For the Miami Valley area, the database lists 186 at-grade crossings in 2015, 77% of which are public, as shown in Figure 2. In the Miami Valley Area there are six geographic areas where a cluster of railroad crossings can be found: Troy, Tipp City, Dayton, Miamisburg, Germantown and Carlisle. Where a cluster of railroad crossing exists, the potential for accidents is increased. The problem is exacerbated in areas like Miamisburg and West Carrollton where the speed limit on the tracks is higher than in other areas. A potential problem for moving freight by truck over grade crossings is illustrated by several crossings in Tipp City where the grade of the road is steep. According to the data maintained by the FRA, around 100 at-grade crossings are protected by active warning devices, while around 44 are protected by passive warning devices including crossbucks and stop signs. Around 17 crossings are not protected by any sign or symbol and data is not available for about 25 crossings, all of those being private at-grade crossings.



Air Freight

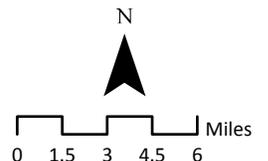
The Miami Valley is home to the Wright-Patterson Air Force Base (WPAFB), one of the premier aviation and research centers in the world and also the Dayton International Airport, the United States’ top 90-minute air market. In addition to the Dayton International Airport, the Dayton Urbanized Area is served by four general aviation airports eligible for funding by ODOT (see Figure 3). The Dayton International Airport is the focal point of the Region’s air transportation network, including freight. The other airports in the Region are mainly general aviation airports that serve small private planes for personal and agricultural uses.

Figure 2 : Active Railroads



Source: Federal Railroad Administration, ODOT & MVRPC

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James M. Cox Dayton International Airport: The James M. Cox Dayton International Airport (airport code DAY) serves as the primary commercial service airport for the MVRPC Region. Dayton Airport is located approximately 11 miles north of downtown Dayton in northern Montgomery County on 3,870 acres as shown in Figure 4. The Dayton Airport is less than five minutes from the I-70/I-75 interchange. The Airport has three runways: 10,900 foot primary, 7,000 foot parallel, with operations on a parallel runway when necessary, and an 8,500 foot crosswind runway. The dual runway system allows simultaneous operations on parallel runways, with landings and departures on the crosswind runway. The Airport is host to 5 airlines serving 14 non-stop destinations with over a million passenger enplanements in 2015.

Table 1 — Dayton International Airport: Passenger Enplanements and Air Cargo Trends

	2015	2014	% CHANGE
PASSENGER ENPLANEMENTS	1,072,620	1,143,724	-6.2%
AIR CARGO (U.S. TONS)	8,542.09	9,132.61	-6.5%
FedEx Freight	8,151.01	8,878.18	-8.2%
All Other Freight	388.76	253.53	53.3%
Air Mail	2.32	0.90	157.8%
LANDED WEIGHT (1,000 POUND UNITS)	1,285,499.68	1,357,194.71	-5.3%
COMMERCIAL/CARGO LANDINGS	18,141	19,278	-5.9%
Commercial Aircraft Landings	17,882	19,010	-5.9%
Cargo Only Landings	259	268	-3.4%

Owned and operated by the City of Dayton since 1936, the Dayton Airport was the North American hub for Emery Worldwide till 2001 and one of the ten busiest cargo airports in the country. Emery was operated by Menlo from 2001-2005, when the facility was acquired by United Parcel Service (UPS). In 2006, UPS closed its heavy freight hub at the Airport. The air-cargo business has shifted in three significant ways: (1) more shipments have shifted to trucks because of cost; (2) more air cargo is carried via passenger aircraft; and (3) FedEx and UPS have emerged as a near duopoly in expedited parcel shipments (with their primary hubs in Memphis and Louisville, respectively). The City of Dayton continues to pursue a strategy for re-use of the former UPS cargo hub at the airport. The facility was acquired by the Industrial Realty Group, a specialist in re-using old sites. It is marketing the building to potential tenants for uses that could include air freight and cargo sorting, manufacturing, storage, bulk commodity distribution, and even an office call center. Because of the building's size — 1.2 million square feet — its managers envision it as home for multiple tenants and mixed uses. A project, currently under development, could extend rail service to the facility.

As described in Table 1, in 2015, Dayton airport carried over 8,500 tons of air cargo, a decrease of 6.5% over 2014. The majority (95%) of air cargo through the Dayton airport is FedEx freight. The landed weight of all cargo at the Airport was nearly 1.3 billion pounds in 2015.

Pipelines

Pipelines within the Miami Valley are used to transport natural gas, and petroleum products such as gasoline, kerosene, diesel fuel or jet fuel to terminals within the Region. Some pipelines that pass through the Region transport crude oil to refineries in Lima and Toledo. Although the Miami Valley is not a producer of gas and oil, its reliance upon them is enormous. This Region depends on an extensive underground pipeline network to supply its fuel. The establishment of this pipeline network has linked this Region to the entire Nation and provided it with easy access to oil and gas for its energy needs.

Pipelines are not discussed in detail in this profile due to security concerns that preclude identification of certain facilities. At least nine companies operate major pipelines within the Miami Valley Region: Allegheny Pipeline Company, British Petroleum Company, Columbia Gas Transmission Company, Consolidated Natural Gas Transmission Corporation, Vectren, Marathon Ashland Petroleum LLC, Mid-Valley Pipeline Company, Texas Eastern Products Pipeline Company and Texas Eastern Transmission Corporation. (See Figure 3).

Pipeline Terminals: Four pipeline terminals within the Region are located in a cluster approximately two miles north of downtown Dayton. This cluster of facilities forms an intermodal terminal for the Region's supply of gasoline, kerosene, diesel fuel and jet fuel. From this cluster of terminals, most of the fuel for local airports and service stations is distributed. The four terminals are as follows:

- Kinder Morgan Liquids Terminals — 621 Brandt Pike, Dayton, Ohio 45404. The commodities handled include petroleum and ethanol.
- Buckeye Terminals — 801 Brandt Pike, Dayton, Ohio 45404. Commodities handled include ultra low sulfur diesel, conventional gasoline and ethanol.
- Citgo Petroleum Corporation — 1800 Farr Drive, Dayton, Ohio 45404. Commodities handled include ultra low sulfur diesel and conventional gasoline.
- Sunoco Partners Marketing & Terminals — 1708 Farr Drive, Dayton, Ohio 45404. Commodities handled include ultra low sulfur diesel, jet fuel, ethanol, CBOB, PBOB (gasoline blendstocks).

Intermodal Connections

Within the Miami Valley Area there are various intermodal facilities, where one mode of transportation connects with another.

Pipeline-Truck: The most prevalent intermodal connection in the Region is the pipeline-to-truck transfer used to deliver gasoline, kerosene, diesel fuel and aviation fuel to the Miami Valley. Four terminals are found in northeast Dayton between Troy Street and Brandt Pike north of Stanley Avenue (see Figure 3). These terminals receive petroleum products from both the north and south via pipeline, and transfer the products to trucks for delivery to dispensing facilities and airports throughout a wide area of west-central and southwest Ohio.

Air-Truck: Another significant intermodal connection within the Miami Valley Region involves the air-truck connections associated with air cargo facilities at the Dayton International Airport. US Route 40, Dog Leg Road, and Old Springfield Road have been designated intermodal connectors on the NHS (See Figure 1).

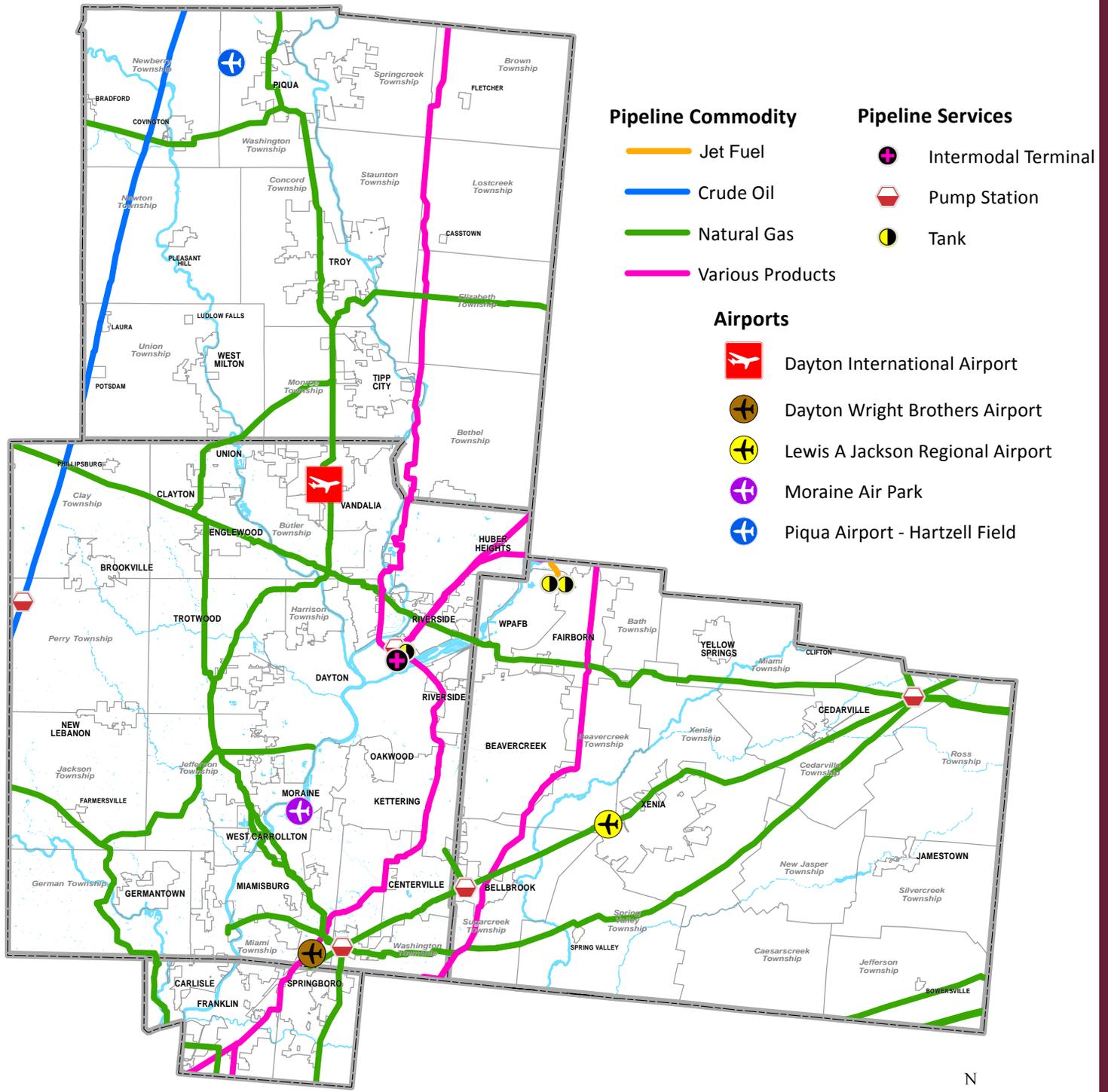
Rail-Truck: There are no rail-truck intermodal facilities within the Region. Rail-truck intermodal facilities, however, exist in Cincinnati and Columbus via CSXT and Norfolk Southern terminals.

Water-Truck: Although there are no direct water transportation connections within the MPO Region, water-truck connections are possible approximately 50 miles to the south via the Ohio River in the Cincinnati area.

Pipeline-Air: The only pipeline-air connection currently existing within the three-county study area is a fuel pipeline serving Wright-Patterson Air Force Base. This pipeline serves a fuel storage area.

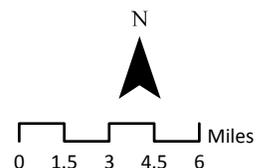
There are no direct air-rail or pipeline-rail or water-rail intermodal connections in the Miami Valley area. However, funding is currently being sought to determine the feasibility of establishing rail service from the CSXT mainline to the Dayton International Airport.

Figure 3: Pipelines, Airports, and Intermodal Terminals



Source: MVRPC and Miami Valley Freight Movement Study, 2006

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ECONOMIC TRENDS AND FREIGHT FLOWS

- As of 2010, Miami Valley is home to approximately 839,000 people and 445,000 jobs in 1,300 sq.mi..
- Montgomery County is the largest county and the City of Dayton is the largest city in the Region.
- The regional land use pattern continues to be characterized by less concentrated, low density development patterns outward from the urban core, along freeway corridors.
- The service sector is the largest economic sector with 60% of the regional employment.
- Nearly 30% of the Region's economy is employed in "freight intensive" industries, such as manufacturing, construction, mining and extraction, retail trade, wholesale trade, transportation and logistics.
- In recent years, increasing emphasis is being placed on developing the Region as a logistics hub by capitalizing on its many location, trained workforce, and transportation assets.

The private sector economy in the Miami Valley Region is led by the service sector. As described in Table 2, in 2010, service providing industries employed nearly 60% of the total employees in the Region. Education and health services followed by information, finance and other professional and technical services comprise a large component (nearly 80%) of the overall service employment in the Region.

The manufacturing sector, once the largest employer in the Region in the 1970s, has been surpassed by jobs in the service and retail trade industries. The shift from a manufacturing to a service economy, deregulation, the advent of freight logistics, just-in-time deliveries and e-commerce, have all resulted in changes in the nature and volumes of goods shipped and the origins and destinations of shipments. However, the Miami Valley Region continues to have a relatively high concentration of industries that traditionally generate heavy freight activity such as construction and manufacturing. Table 3 provides an overview of freight establishments in the Miami Valley by industry type and their freight generation characteristics.

In recent years, expansion is occurring in the traditional "freight-intensive" industries — the inner suburb of Kettering is attracting office and other retail establishments, and in Moraine, the vacant former General Motors plant complex has been reinhabited by Fuyao Glass America, a

large overseas automotive glass manufacturing company, and other smaller companies. According to the Region's LRTP, industrial and commercial areas are planned for the western part of Dayton in the vicinity of SR 49 and southern part of Montgomery County near the county line. In Greene County, commercial areas are planned in the vicinity of the I-675/US 35 interchange and industrial areas along the US 35 bypass south of the City of Xenia. In Miami County, industrial areas are planned on the outskirts of the Cities of Tipp City, Troy, and Piqua.

Manufacturing and Logistics in the Miami Valley

The Miami Valley Region is an ideal location for companies and organizations that rely on quick and easy access and distribution. The Region's effective transportation network lends itself to an attractive environment for logistics and distribution companies, manufacturers and product delivery. The Region not only offers access to major interstates, rail and air travel, but it also supports quick movement of goods and products internally throughout the Region.

Table 2 — Employment by Industry: 2010 - 2050

EMPLOYMENT CATEGORY	2010		2050		% CHANGE 2010-2050
	TOTAL	SHARE	TOTAL	SHARE	
AGRICULTURE, FORESTRY, FISHING & HUNTING	976	0.2%	1,364	0.3%	39.8%
GOODS-PRODUCING	55,130	12.4%	64,279	12.2%	16.6%
Mining	197	0.0%	197	0.0%	0%
Construction	17,881	4.0%	20,141	3.8%	12.6%
Manufacturing	37,052	8.4%	43,941	8.4%	18.6%
WHOLESALE TRADE	13,490	3.0%	13,737	2.6%	1.8%
RETAIL TRADE	45,816	10.3%	40,724	7.8%	-11.1%
TRANSPORTATION, WAREHOUSING & UTILITIES	18,678	4.2%	28,755	5.5%	63.5%
SERVICE-PROVIDING	266,009	59.8%	323,199	61.8%	21.5%
Information, Finance and Insurance, Real Estate, Management of Companies and Enterprises, Professional and Technical, and Administrative and Waste Services	93,733	21.0%	109,991	21.0%	17.3%
Education and Health Services	117,612	26.4%	148,074	28.4%	25.9%
Leisure and Hospitality Services	41,069	9.2%	50,453	9.6%	22.8%
Other Services, except Public Administration	13,595	3.1%	14,681	2.8%	8.0%
PUBLIC ADMINISTRATION	44,933	10.1%	51,223	9.8%	14.0%
TOTAL	445,032	100.0%	523,281	100.0%	17.6%

The manufacturing sector continues to be one of the basic economic sectors of the Region, even after suffering significant losses in the last few years. In 2010, it provided over 37,000 jobs or over 8% of the Region’s employment. Dayton’s long history of automotive manufacturing and its location at the intersection of Interstates 70 and 75 have traditionally made this Region a very attractive location for the automotive industry.

Regional planning efforts have focused on improvements to the I-70 and I-75 corridors, which also benefit freight movement. Continued upgrade of design elements of older problem locations as well as addition of new interchanges and highway facilities have enabled trucks to move smoothly and safely through intersections and interchanges on Miami Valley’s roadways. Projects supported by MVRPC that had direct impact on improving freight movement in the Region include the I-75 Downtown Dayton Subcorridor reconstruction, Exit 47 improvements near UPS and Fuyao Glass America, Inc. site (former General Motors site), County Road 25A in Miami County, and various I-70 corridor widening projects. Several other major investment projects are in the pipeline including improvements to the US 35 corridor in Greene and Montgomery Counties, upgrades to Austin Boulevard, and upgrades to US 40 near the Dayton International Airport.

As a result of these continuous stream of transportation and infrastructure investments, and the Region’s strategic location, distribution facilities are on the increase and the logistics industry has built a large presence in the Region taking optimal advantage of the Region’s strengths. Proximity to the intersection of I-70 and I-75, just minutes north of downtown Dayton, has spurred the growth of many trucking and warehousing facilities. The transportation and warehousing industry includes those industries focusing on the transportation of passengers and cargo, warehousing and storage for goods, and support activities related to transportation.

Table 3 — Freight Characteristics in the Region by Industry Type

INDUSTRY	IN THE MIAMI VALLEY	FREIGHT GENERATION CHARACTERISTICS
AGRICULTURE	The Region is located within a strong agricultural production area within Ohio and the United States.	The agricultural sector requires strong freight movement links that allow farms to obtain inputs such as seeds, fertilizers, and chemicals, and to export grain and livestock products to wholesalers and manufacturing operations. Much of the freight movement associated with this sector utilizes the truck mode; however, grain is also shipped via rail.
MINING	Most of the mining sector establishments within the Region are related to sand, gravel, and limestone extractions.	These operations supply materials to a regional market due to the heavy weight of the materials. Good links are necessary between such operations and construction areas.
CONSTRUCTION	Construction establishments are dotted throughout the Region. Significant construction is occurring in the Region as part of the Downtown Dayton Revitalization project in recent years.	The construction sector requires transportation of heavy freight materials from sand, gravel, and limestone deposits to building sites. Most construction materials are transported by trucks.
MANUFACTURING	The Region is dotted with many small, medium, and large-sized enterprises providing support services and component parts to the automotive industry. The Region is also one of the largest centers for tooling and machining technology with several companies providing service to a diverse client base — from automotive to aerospace, from computers to the growing medical industry. The WPAFB is the headquarters for the Air Force Materiel Command and the Aeronautics System Center — the foremost aeronautical acquisition center in the U.S. Air Force.	These establishments depend upon cost-effective and timely delivery of a variety of input materials and good transportation links to markets for a variety of products, with most industrial establishments located along rail and freeway corridors to take advantage of the access they provide. In addition to trucks and rail, some lightweight, high-value durable manufacturing parts and products are transported to and out of the Region as air freight.
WHOLESALE TRADE	Some distribution centers within the Region are inter-modal transfer points, such as the pipeline-supplied bulk terminals providing fuel to the various gasoline stations in the Region. Others include distribution centers for chains of retail operations such as the Meijer regional distribution center located in Tipp City in Miami County.	The wholesale trade sector provides a link between production sites and the retail sector and is primarily made up of distribution centers and bulk terminals serviced by all modes of freight transportation.
RETAIL TRADE	The retail trade sector consists of a few large concentrated shopping areas, numerous smaller shopping centers, and a large number of independently located establishments along the major thoroughfares.	The retail sector requires periodic truck shipments to maintain an in-store inventory of goods. Freight delivery shipments have shifted from declining older retail areas to the growing newer retail areas.
TRANSPORTATION, WAREHOUSING & UTILITIES	The Miami Valley Region has a strong transportation sector due to its location at the crossroads of two major interstate freeways — I-70 & I-75, presence of two Class I railroads and the Dayton International Airport. Public utilities keep the Region supplied with water, sanitary services, power and fuel.	These establishments use transportation equipment and facilities as productive assets. Public utilities require periodic delivery of materials for treating water, transportation of waste material to disposal sites, fuel for generating electricity and steam, and for powering transportation vehicles, running industrial processes, and heating buildings.
SERVICES	The Region is home to several institutions of higher learning as well as premium health facilities. Several educational and health institutions are expanding their campuses. Financial as well as hospitality services sectors remain the Region’s most consistent employment clusters and are forecasted for continual growth.	Most of these establishments require delivery of office goods and other small-scale items in relatively small trucks rather than large inter-city shipments. However, certain large institutions such as hospitals and universities generate significant amounts of local freight traffic.
GOVERNMENT	Wright Patterson Air Force Base (WPAFB) has been Dayton’s largest, most influential employer, with more than 26,000 civilian and enlisted personnel.	Government facilities generate various levels of freight traffic, depending upon their size and type of service. Significant government facilities in relation to freight traffic include the post office, military facilities such as the WPAFB, and public service facilities.

According to the 2015 report *Economic Impact of the Logistics Industry on the Dayton, Ohio MSA* by the Wright State University's Center for Urban and Public Affairs, the total estimated 2015 economic output of the three-county (Miami, Montgomery and Greene) economy, resulting from the regional logistics and transportation industry, is nearly \$2.5 billion, representing nearly 20,000 permanent jobs, \$855 million in labor income, and nearly \$27 million in state and local sales and income tax revenues due to industry operations.

Using the QCEW business inventory data for the MPO Region combined with MVRPC's tracking of new developments in the Region, a list of major freight dependent establishments was compiled. Figure 4 shows areas with significant manufacturing, transportation and warehousing, wholesale trade (more than 50 employees), and logistics businesses in the Region. These enterprises are generally found along the freeway corridors, specifically along the entire length of the I-75 corridor, which has the greatest concentration of industrial zoning in the Region. The other major corridors with significant freight-related establishments include I-70, I-675 in Montgomery County, SR 4, and US 35 in Greene County.

Future Economic Trends

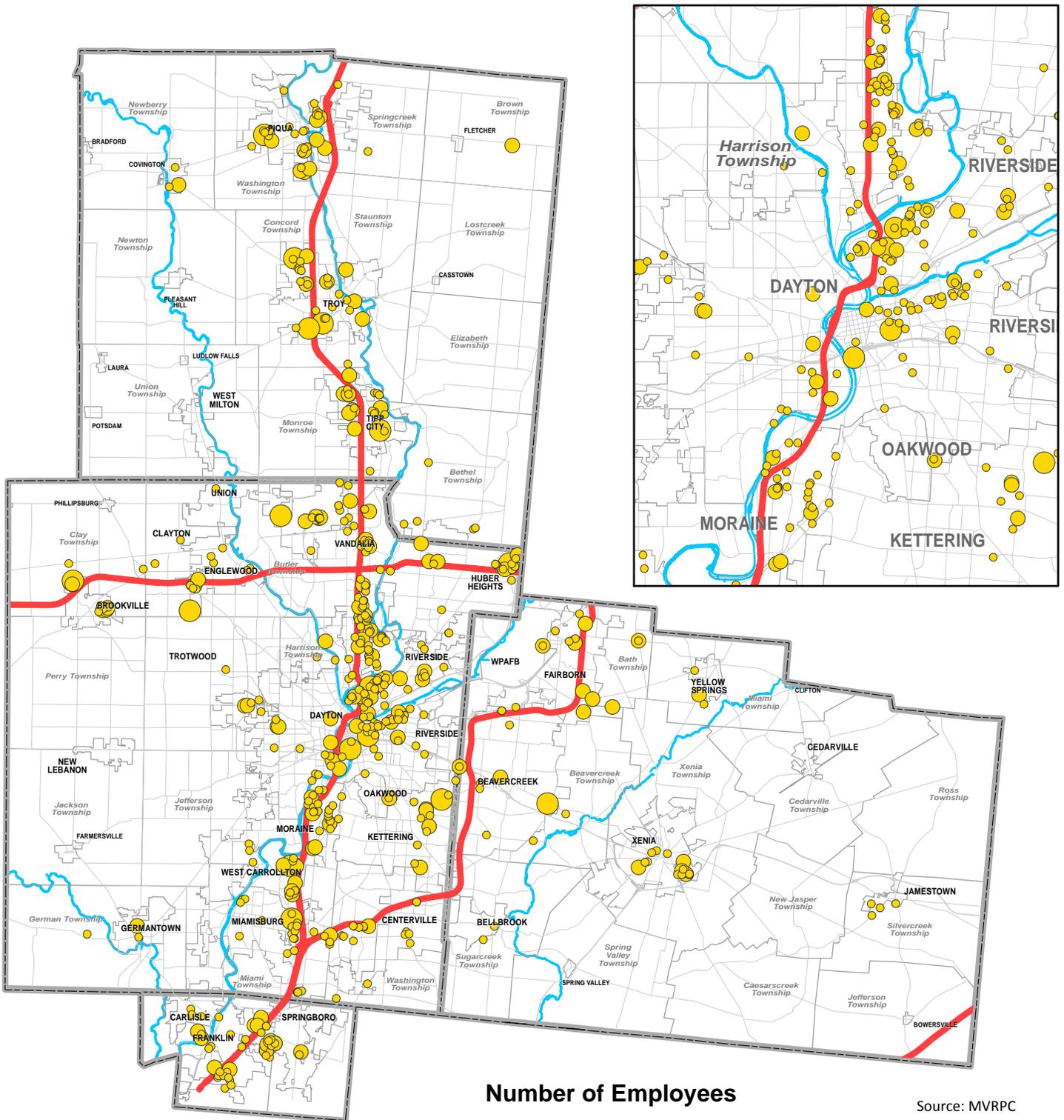
Overall, the Region is expected to grow in employment by over 17% over the next 40 years with nearly all major economic sectors projected to have employment increases except the retail trade sector. The service industry is projected to grow over 20% by 2050, with education and health services leading the growth. The manufacturing sector is expected to stay volatile, challenged by labor shortages and global and domestic competition, while working towards a resurgence. The transportation and warehousing sector is estimated to grow by over 60% by 2050. This is largely due to continued efforts in the Region to leverage its attractive location, transportation, and workforce assets to spur growth in logistics. To support this growth and maintain the leverage, the Region's infrastructure system must continue to receive investments and upgrades so as to remain competitive on the global stage.

Importance of Manufacturing and Logistics to Ohio's Economy

- Logistics is the moving and storing of raw materials as well as intermediate and finished goods from the beginning to the end of the supply chain, including coordinating all aspects of the process.
- Logistics services comprise close to 84% of the \$16.16 billion transportation and warehousing sector in Ohio and about 2.4% of the state's total GDP.
- Logistics services added more than \$13.5 billion to Ohio's GDP, with trucking as the largest part of the industry at \$6.17 billion.
- Overall logistics employment has grown 8.4% in Ohio from less than 121,300 in 2010 to 131,500 in 2013.
- The motor vehicle industry in Ohio added \$15.84 billion in value to the U.S. output during 2014 - 9.7% of the national total. In comparison, 3.4% of all U.S. goods and services came from Ohio, indicating the industry's concentration here.
- The net value of the automotive industry goods produced in Ohio has more than tripled since 2009, but remains below the peak of \$18.7 billion.
- Some of the large advanced manufacturing establishments in the Miami Valley Region include Behr Dayton Thermal Products LLC, DMAX Ltd, Fuyao Glass America in Montgomery County representing the automotive industry, Unison / General Electric in Greene County representing the fabricated metal products industry.

Source: Ohio Development Services Agency Logistics, Motor Vehicles and Advanced Manufacturing Industry Profiles 2015-2016

Figure 4 : Freight Dependent Businesses in the Miami Valley



Number of Employees

- 25 - 100
- 100 - 500
- More than 500 employees

Interstate

Source: MVRPC
May 2017



0 1.5 3 4.5 6 Miles

Note: Includes Manufacturing businesses, Transportation and Warehousing businesses, Wholesale Trade businesses with more than 50 employees, Process, Physical Distribution, and Logistics Consulting Services businesses, and Commercial and Industrial Machinery and Equipment Repair and Maintenance businesses.

Freight Flows

In 2010, MVRPC partnered with the Ohio-Kentucky-Indiana Regional Council of Governments (OKI), the Cincinnati region MPO, to collect data relating to freight transportation trends in both the regions. A commodity flow assessment was conducted to analyze the goods flowing through the MVRPC Region, including their directional flow, volume, and value. Based on the current flows, a demand forecast was derived to predict the future flow of goods in the Region. The data used in the commodity flow analysis was derived from IHS Global Insight's 2009 TRANSEARCH® database and forecast. The commodity flow analysis only includes data for Greene, Miami and Montgomery Counties as segmented data for Franklin, Carlisle and Springboro was not available.

The data confirms that trucking shall continue to be the predominant mode of freight transportation in the Region. As described in Table 4, as of 2009, 98 percent of freight volumes and 99 percent of freight value in the Miami Valley Region moves by truck, with I-70 and I-75 being the busiest truck corridors. Truck's share of freight in the Region will increase very slightly over the forecast period. Both, rail commodities and air cargo, comprise a tiny share of the Region's freight.

Total freight volumes will more than double over the forecast period due to growth in population and economic activity, whereas value will increase by a factor of 2.8, indicating that over time the mix of goods moving in and through the Miami Valley area will contain commodities of higher value per ton.

Table 4 — Total Freight Flows by Mode, 2009-2040

MODE	TONS (THOUSANDS)			VALUE (MILLIONS - IN 2009 \$)		
	2009	2040	%CHANGE	2009	2040	% CHANGE
	142,962	288,986	102.1%	\$222,488	\$635,667	185.7%
	2,824	3,912	38.5%	\$1,409	\$1,743	23.7%
	7	15	114.3%	\$511	\$1,213	137.4%

The highest concentration of sources of inbound freight is in the neighboring midwest region. Import gateways centered around New York/New Jersey and the Houston area also contribute a large volume of freight. More broadly, the eastern and southern sections of the United States supply more freight to the Miami Valley Region than the western half of the country.

Outbound freight exiting the Region is more dispersed than inbound freight. Although outbound freight is also largely concentrated in the midwest, the western half of the country, particularly the trade gateways in Southern California, are also a significant recipient of the Region's goods. Population centers and ports in the northeast and mid-Atlantic regions are also major destinations.

The truck commodity mix largely reflects the overall commodity mix in the Region. Secondary traffic, which includes movements of mixed final goods between warehouses, wholesale and retail locations, comprises the largest commodity by both volume and value, although it is projected to be surpassed by electrical equipment in value terms by 2040. The top three commodities by volume are secondary traffic, farm products, and food or kindred products for 2009 and 2040. In 2009, these three commodities represented nearly 49% of total truck tons ~ 70 million tons. By value, secondary traffic, transportation equipment, and machinery comprise the top three commodities in the Region for 2009 as well as the forecast year of 2040. Together, these three commodities represented nearly \$86 billion of trade in the Region in 2009.



Top Truck Commodities in the Miami Valley Region by Volume, 2009

Top Truck Commodities in the Miami Valley Region by Value, 2009



I-70 and I-75 are the Region’s two busiest truck movement corridors. According to the TRANSEARCH data, in 2009, over 66 million of the 143 million tons of freight that moved into, out of, and through the Region traveled on I-70 during part of their trip. Freight traffic along I-70 is expected to grow at an average of 2.4% annually to 2040. In 2009, over 87 million of the 143 million tons of freight that moved in to, out of, and through the Region traveled on I-75 during part of their movement. Freight traffic that travels along I-75 is expected to grow at an average annual rate of 2.3 percent to 2040.

Figure 5 shows the volume of annual daily truck traffic on roadways in the Region based on 2012-2015 ODOT classified traffic counts. According to the ODOT counts, the state averages for truck volume on Interstates is 14%, on US Routes is 9.2%, and on State Routes is 6.1%.

Truck volume patterns are heavily affected by local economic activity. They are also heavily influenced by the presence or absence of large through-freight movements. As expected, I-70 and I-75 carry the maximum truck traffic in the Region, carrying between 12,000 - 15,000 and 11,000 - 16,500 trucks per day, respectively. High truck volume corridors of major roadways in the Region include:

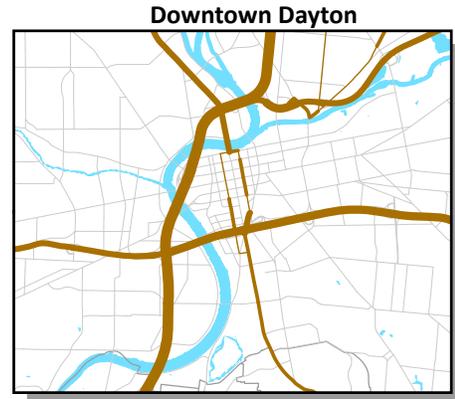
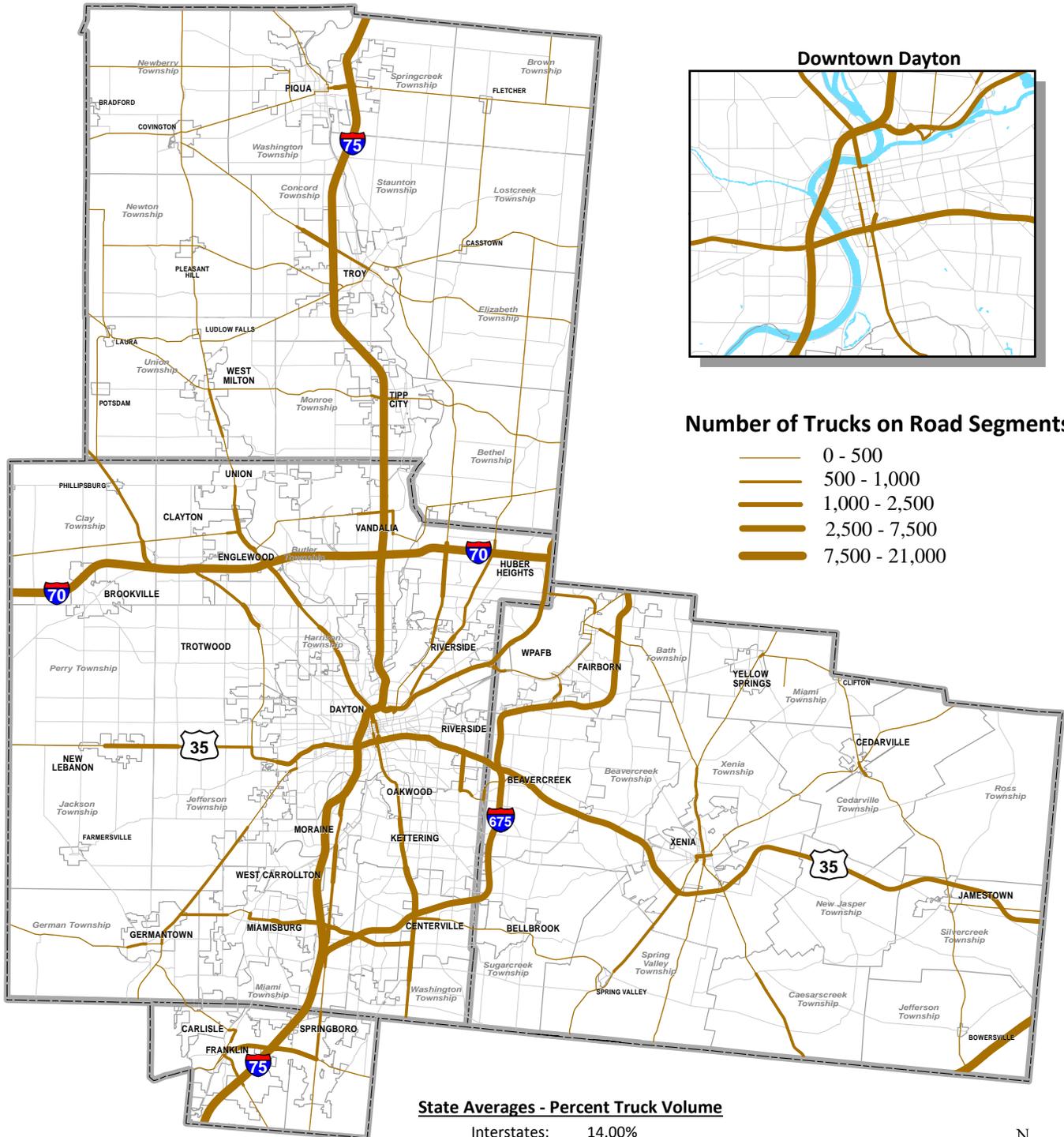
- I-70 through Montgomery County
- I-75 through Miami, Montgomery and Warren County
- I-71 through Greene County
- US 35 in Greene County

The segment of I-75 between Tipp City and downtown Dayton has a high percentage of truck traffic because it serves as a connection between I-70 and both the Dayton International Airport and the cluster of industrial operations in the northern part of the urbanized area.

Intelligent Transportation Systems (ITS) deployment along the I-70 corridor, west of I-75, consists of cameras, highway advisory radio and a dynamic message sign. I-70, east of I-75, is outfitted with cameras. There is also full ITS deployment along the entire length of the I-75 corridor in the MPO Region including highway advisory radios, cameras, and dynamic message signs.



Figure 5: Truck Traffic on Roadway Segments



Number of Trucks on Road Segments

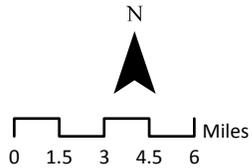
- 0 - 500
- 500 - 1,000
- 1,000 - 2,500
- 2,500 - 7,500
- 7,500 - 21,000

State Averages - Percent Truck Volume

Interstates:	14.00%
US Routes:	9.17%
State Routes:	6.10%

Source: ODOT & MVRPC

May 2017



FREIGHT TRANSPORTATION SYSTEM RELIABILITY AND SAFETY

Highway bottlenecks affecting freight are a problem today because they delay large numbers of truck freight shipments. With the regional economy highly dependent on reliable and cost-effective truck-freight transportation, truck delays, either due to congestion or crashes or both, add to the cost of freight shipments, increasing the cost of doing business in the Region and the cost of living.

- According to the *2015 Urban Mobility Scorecard* by the Texas Transportation Institute, nationally, trucks account for 18% of the urban “congestion invoice” although they only represent 7% of urban travel.
- In 2014, the truck congestion cost — the yearly value of operating time and wasted fuel for commercial trucks — for the Region was estimated at \$69 million, compared to an average of \$94 million for peer urban areas.
- According to INRIX data, the annual cost of commercial vehicle delay on the Region’s freeways was \$15.3 million in 2016.
- Portions of I-75 and Keowee Street are major freight bottlenecks in the Region with travel time index values of greater than 2.0.

Road Network Reliability

The Dayton urban area (Greene, Miami and Montgomery Counties only) performs better than the Nation and peer urban areas with respect to truck congestion cost as evidenced in the *2015 Urban Mobility Scorecard* by the Texas Transportation Institute. However, as discussed in the previous section, freight volumes in the Region are forecast to double from 2009-2040. This will generate more demand for truck freight shipments, resulting in additional commercial trucks on the Region’s roadways and, likely, increased overall congestion in the Region.

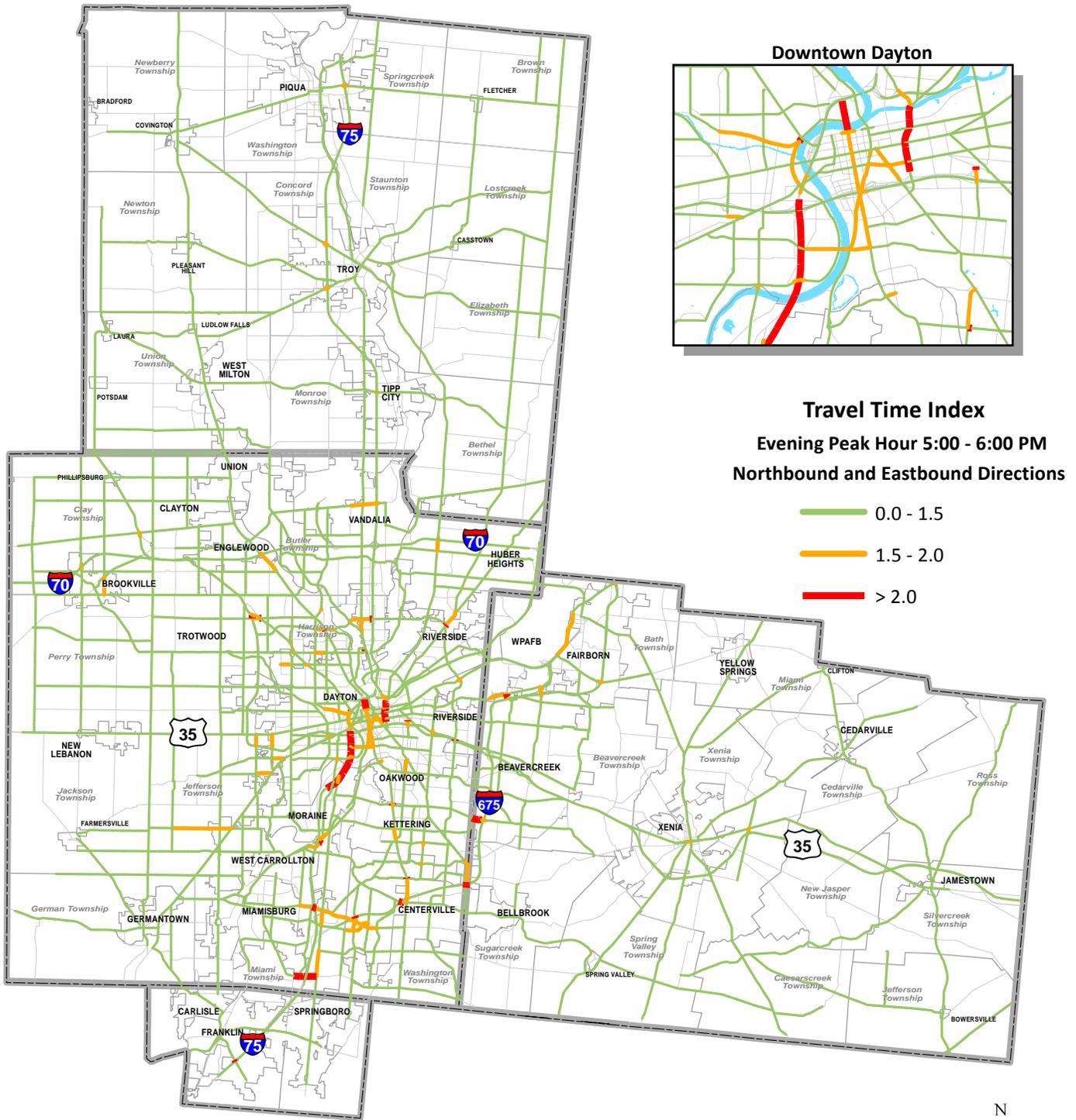
To identify freight congestion bottlenecks in the Region, MVRPC utilized third-party vendor INRIX’s website to generate statistics for regional travel time reliability performance measures. Travel time reliability is a measure of the amount of congestion users of the transportation system experience at a given time. It is measured through several mobility and reliability indicators that impact the individual traveler such as travel time index, buffer time index, and planning time index.

Figure 6 shows the mapped 2016 northbound and eastbound directions, evening peak hour (5pm-6pm), travel time index values — the ratio of average peak period travel time as compared to free-flow travel time — on the Region’s roadways. Of particular interest to this analysis was to identify where congested locations overlap with freight-intensive highway segments. As described in Figure 6, the major freight bottlenecks in the Region include:

- Northbound I-75, between US 35 and S. Dixie highway,
- Northbound I-75 at Needmore Road and SR 725, and
- Keowee Street, between US 35 and SR 4.

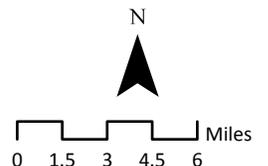
Figure 6 shows that, overall, the Region has a fairly reliable freight transportation road network, though a few freight bottlenecks exist. I-75, south of US 35, is particularly problematic with travel time index values exceeding 3.0. To facilitate smooth and efficient flow of all travel, including freight, the Region continues to address these challenges with several tools including corridor reconstruction improvements, interchange improvements, highway capacity additions, construction management, deployment of intelligent transportation systems, and a variety of other congestion management strategies as outlined in MVRPC’s *2015 Congestion Management Process Technical Report*.

Figure 6: Regional Road Network Reliability



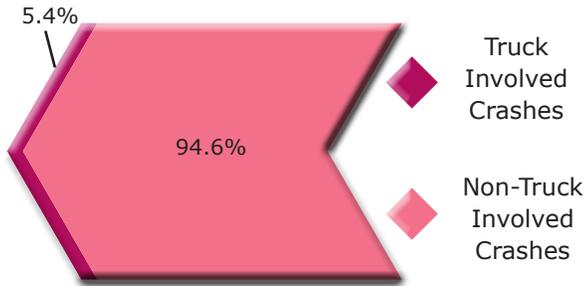
Source: INRIX & MVRPC

May 2017



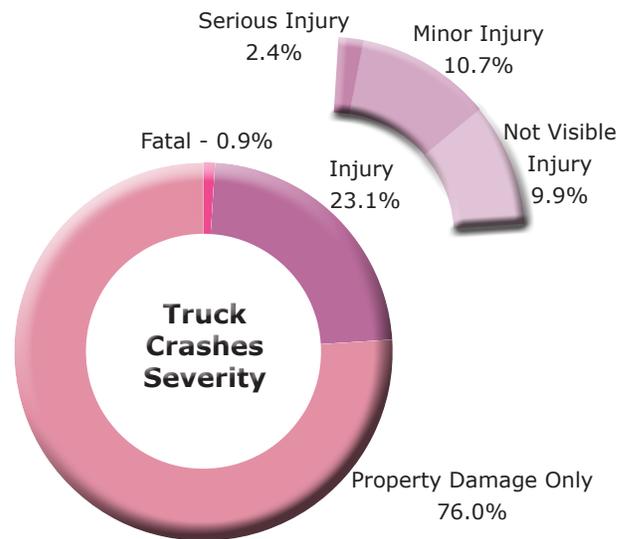
Safety

Truck involved crashes are a major concern for both truck drivers and passenger vehicle drivers primarily because the severity of these crashes is much greater than for non-truck involved crashes. An analysis of truck crashes was undertaken for the Miami Valley Region using data obtained from ODOT and Ohio Department of Public Safety (ODPS) for the 3-year period from 2011-2013. All construction zone crashes and crashes involving animals were excluded from the analysis.

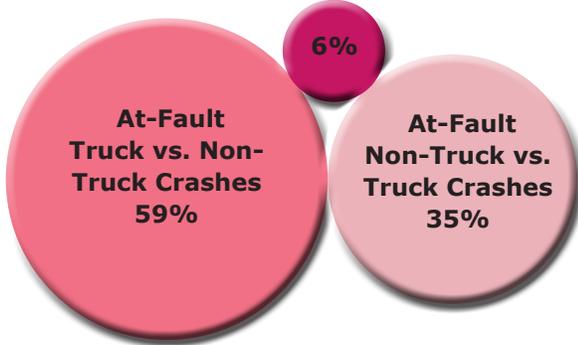


Truck involved crashes comprise 5.4% (2,292 crashes) of the total analyzed crashes (42,502) in the 2011-2013 analysis period.

Of the total crashes, less than 1% (21 crashes) were fatal, and 2.4% (56 crashes) caused a serious injury. 76% of truck involved crashes caused property damage only (PDO - over \$1,000).



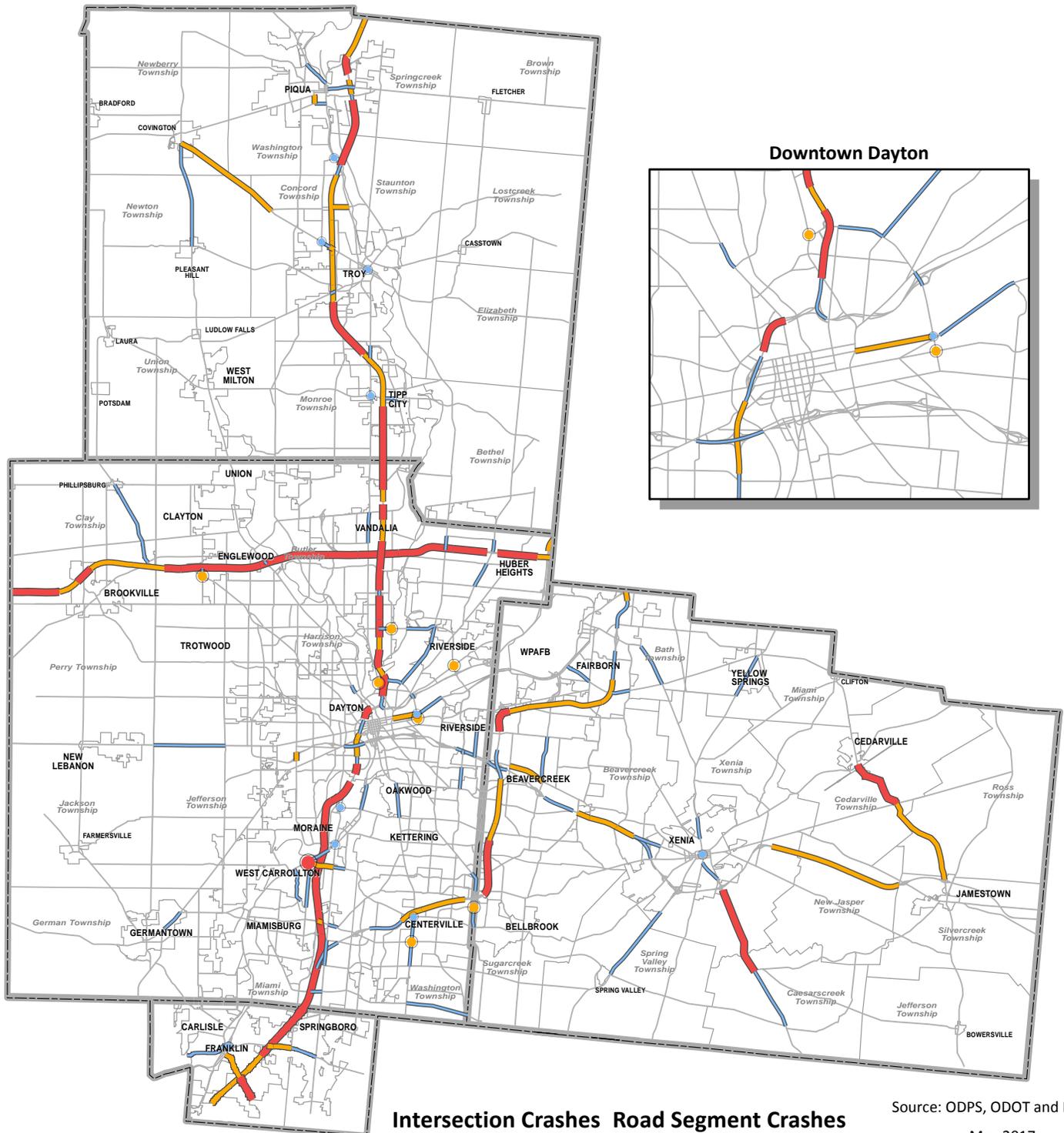
Truck vs. Truck Crashes



59% of the crashes involving trucks had the truck driver being held responsible for the cause of the accident vs. the non-truck driver, while 35% of truck involved crashes were determined to be caused by non-truck vehicle drivers. 6% of all truck involved crashes occurred between trucks.

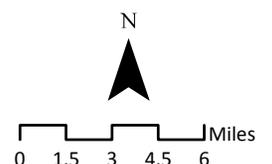
Intersections and roadway segments with 3 or more crashes were ranked based on the frequency and severity of truck crashes. These high-crash locations were prioritized as low, medium and high priority, and include 19 intersections and 164 segments. These priority high-crash locations are displayed in Figure 7. The intersection of Alex Road and E. Dixie Drive in West Carrollton witnessed 15 truck related crashes over the 3-year period. Overall, 33% of the crashes occurred at intersections or were intersection related, whereas 62% were non-intersection crashes. A portion of I-75 in Miami County, east and south of Piqua, and I-70 in Butler Township in Montgomery County witnessed over 50 truck crashes from 2011-2013.

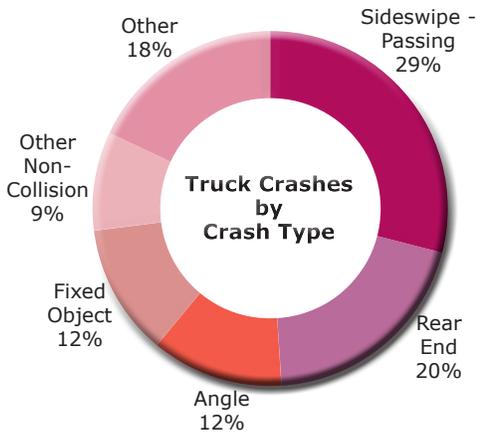
Figure 7: Truck Crashes



Source: ODPS, ODOT and MVRPC
May 2017

Note: Crashes in construction areas excluded from this analysis.

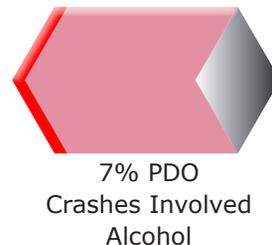
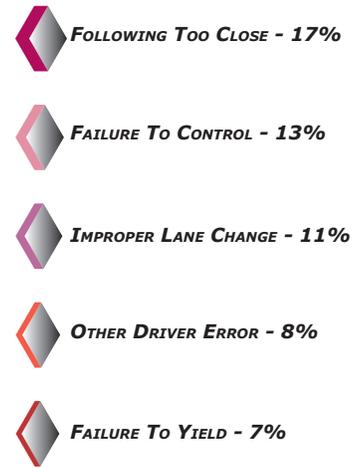




Sideswipe-passing and rear end crashes were the most common truck crash types (nearly 50%) on the regional roadway network.

Following too close was the most reported contributing cause of crashes.

52% (11 crashes) of total truck involved fatal crashes involved a "had been drinking" at-fault driver.



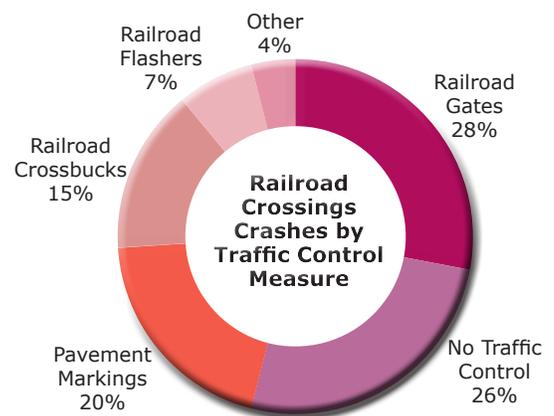
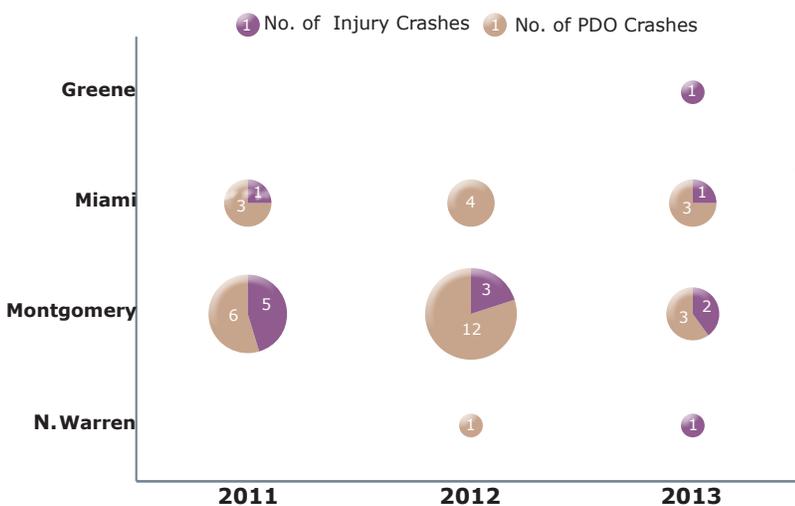
% Alcohol Involved Crashes (At-Fault Driver Crashes Only)

Overall, while truck involved crashes comprise a tiny proportion of the total crashes in the Region, their severe impacts dictate investing in strategies, programs, and projects that help minimize damages to life and property.

Crashes at Railroad Crossings

According to the ODOT and ODPS crash data, there were 46 crashes at railroad crossings between 2011-2013. Montgomery County accounted for over 67% of these crashes. 4 of these crashes were train collisions. 14 crashes were injury causing crashes while the rest were PDO crashes; there were no fatalities. 50% of the crashes occurred at or near crossings that were protected by gates, crossbucks or flashing lights, while 12 crashes occurred at or near crossings that did not have any traffic control measure.

Crashes at Railroad Crossings



FUTURE TRENDS AND INNOVATIONS IN FREIGHT TRANSPORTATION

According to the U.S. DOT's *National Freight Strategy Framework — Beyond Traffic 2045*, the freight industry is experiencing a technological revolution as information and communications technologies are applied to optimize global supply chains. These technologies are expected to bring in several benefits:

- Better data collection and analysis capabilities will enable faster and more accurate analysis of freight routes, travel times, and infrastructure capacity.
- Advanced automation will increase productivity in the freight industry and change the skill sets needed to work in freight, requiring skilled workers to maintain and operate new technologies.
- Technology will also automate and expedite inspection processes, improving safety, lowering costs, and allowing for more reliable trips on existing capacity .

At the same time, because the benefits of these technologies cannot be maximized without broad fleet penetration and an interoperable system across all manufacturers, regulatory action will likely play a large role.

Workforce availability is a major concern for the freight industry and often a factor in selecting sites for new or expanded investments. The American Trucking Association has identified driver shortages as one of the most critical issues facing the trucking industry. As the emphasis of last mile logistics continues to shift towards personalized delivery services, the number of trucks on the Region's roadways will grow. However, these additional trucks are likely to be smaller on average. The potential impact of automated trucks, drone deliveries, and other disruptive technologies is difficult to plan for, however, MVRPC has made efforts to keep abreast of developments in these areas and is prepared to support research, promote adoption of new technologies and best practices, and to engage elected officials and the general public as needed.

- E-commerce is changing the retail landscape leading to the conversion of brick and mortar stores to urban distribution centers, introducing new transportation providers, and changing the way products are distributed to the end customer.
- Innovative applications are being developed that connect shippers directly with trucks eliminating "middlemen" brokerage firms as well as changing the last mile logistics through personalized delivery services, such as drones.
- Automated or semi-automated truck driving developments are happening in parallel with the emergence of self-driving passenger cars. Virtually all global automobile manufacturers are dabbling in some form of automation, including features ranging from parallel parking assistance to "autopilot" systems.
- Automated trucks rely on technologies like GPS, LIDAR, and radar to sense their environment and navigate roads without human input, allowing for increased throughput and more reliable trips on existing capacity.
- Connected vehicles applications, being developed concurrently with automated technology, provide connectivity among vehicles (which prevents collisions), between vehicles and infrastructure (which promotes safety and mobility) and among vehicles, infrastructure and wireless devices (which provides continuous real-time connectivity to all system users).
- Technologies such as Positive Train Control and the FAA's Next Generation Air Transportation System (NextGen) have been designed to make freight rail and air transportation safer and more reliable.

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The contents of this document reflect the views of the Miami Valley Regional Planning Commission, which is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the views of the U.S. DOT or ODOT. This document does not constitute a standard, specification, or regulation.



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