PA On Track

PA'S LONG RANGE TRANSPORTATION &
COMPREHENSIVE FREIGHT MOVEMENT PLAN

COMPREHENSIVE FREIGHT MOVEMENT PLAN

"Never leave til tomorrow that which you can do today." -- Benjamin Franklin

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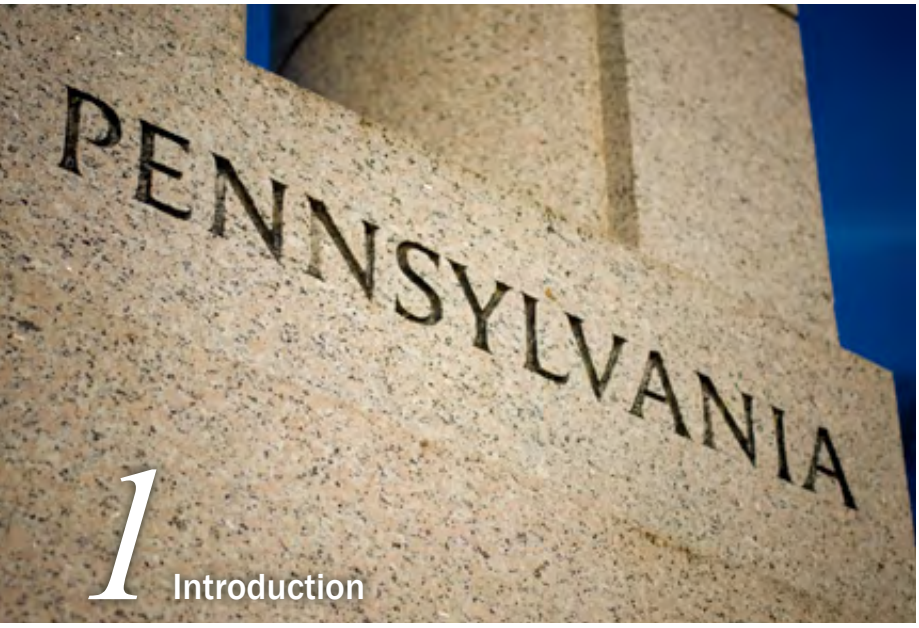

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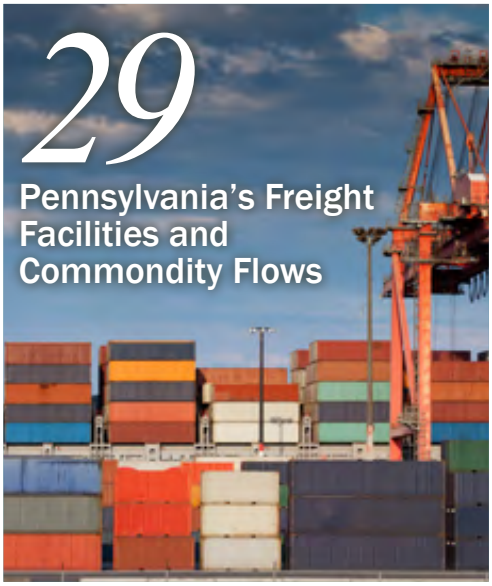

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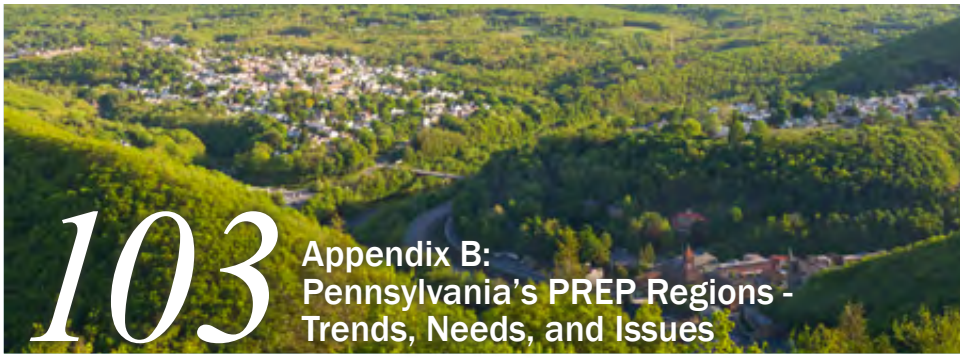

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Introduction

Pennsylvania maintains the nation's fifth-largest state-owned roadway network with over 41,000 linear miles of roadway, the fourth-highest number of interstate miles, and has the third largest number of bridges with approximately 25,000 state-owned bridges.[1] In 2011, Pennsylvania ranked first among states in the number of railroads (60); fifth in railroad mileage (5,095 miles of track); and seventh and tenth in tons and carloads respectively that originate and terminate within the state. Pennsylvania is also the only state that has all three types of ports: deep water, inland waterway, and Great Lakes. Inland waterways, including the Ohio River system, connect to ports on the Gulf and provide an efficient, cost-effective means of transporting goods to domestic and international markets. Pennsylvania is home to two of the top 100 cargo airports in the U.S. in terms of total tonnage in 2013: Philadelphia (#18) and Pittsburgh (#56). Combined, these modal assets create a multimodal freight transportation system that carries 7.5 percent of the goods and materials produced, used, or exported in the nation.

In 2011, Pennsylvania's multimodal freight transportation system carried approximately $1.6 trillion (1.1 billion tons) of goods into, within, out of, and through the state, and by 2040, the same system is projected to carry over $3.7 trillion (1.9 billion tons). Pennsylvania is truly the Keystone State for freight – linking its multimodal freight transportation system to consumers across the state, across the country, and throughout the world is critical, both for bringing materials and components to companies that create the final product and for transporting finished goods.

Freight transportation represents a key competitiveness factor for Pennsylvania's businesses. To ensure the Pennsylvania multimodal freight transportation system supports and enhances efficient goods movement and sustainable economic growth, the Pennsylvania Department of Transportation (PennDOT) in coordination with the state's 24 planning partners and numerous statewide freight stakeholders led the development of Pennsylvania's first ever multimodal statewide freight plan. The Comprehensive Freight Movement Plan (CFMP) is intended to:

- Identify strategies, policies, and locations to improve freight access, interconnectivity, and mobility on Pennsylvania's multimodal freight transportation system, with the goal of improving its competitive position by attracting, retaining, and expanding industries and jobs; and
- Help guide the state's investment decisions regarding the infrastructure that supports freight movements.

[1]The total roadway mileage figure includes 779 miles of roadway owned by "Other" state agencies that typically would not receive any truck traffic (e.g., state forests and parks, etc.).

The CFMP was developed in parallel with the 2040 Long Range Transportation Plan (PA on Track). The planning process emphasized the early, active, and ongoing engagement with stakeholders, Metropolitan Planning Organizations, Rural Planning Organizations, PennDOT District Offices and modal bureaus, other state agencies and departments, and PennDOT leadership to:

- Define the vision, goals, objectives, and performance measures;
- Identify and evaluate current and future conditions of Pennsylvania's multimodal freight transportation system;
- Examine current and future trends and the issues influencing how businesses move their products today and potential changes due to technology advancements, supply chain adjustments, commodity flows, new regulations, and shifts in population;
- Identify recommendations, strategies, focus areas, and projects to preserve, maintain, and connect Pennsylvania's multimodal freight transportation system, to ensure it remains an asset to citizens and businesses and supports the state's economic competitiveness; and
- Develop a project prioritization process, illustrative freight project list, strategies, and policies to support and inform the decision-making process.

PA On Track and the Comprehensive Freight Movement Plan are centered on the following four goal areas that support the achievement of Pennsylvania's transportation vision and guide PennDOT and the planning partners in addressing transportation priorities:

- **System preservation** - Preserve transportation assets using sound asset management practices within the limitations of available resources;
- **Safety** - Improve statewide safety for all modes and all users;
- **Personal and freight mobility** - Expand and improve system mobility and integrate modal connections; and
- **Stewardship** - Increase efficiency through modernization of assets and streamlining of processes.

Table 1 presents the CFMP's goals, objectives, and performance measures developed through stakeholder outreach activities. The CFMP meets the federal requirements of the *Moving Ahead for Progress in the 21st Century Act* (MAP-21) and is designed to address national, state, regional, and local freight priorities.

Table 1: CFMP Goals, Objectives, and Performance Measures

SYSTEM PRESERVATION

Goal: Preserve transportation assets using sound asset management practices within the limitations of available resources.

Objectives

- Optimize pavement conditions
- Reduce the number of structurally deficient bridges
- Encourage state-of-good-repair initiatives for all modes
- Limit the number of load-restricted bridges

Performance Measures

- Percent of pavements in excellent, good, fair, and poor condition (International Roughness Index (IRI))
- Pavement structure index (Overall Pavement Index (OPI))
- Percent of structurally deficient bridges (by deck area) (MAP-21 measure)
- Number of load-restricted bridges

SAFETY

Goal: Improve statewide safety for all modes and all users.

Objectives

- Reduce statewide transportation system fatalities
- Reduce serious injury crashes statewide (MAP-21 measure)
- Invest in cost-beneficial approaches and technologies that enhance the safety of the transportation system
- Improve public understanding of high-risk traveling behaviors
- Reduce crashes, injuries, and fatalities in work zone areas
- Promote, develop, and sustain multijurisdictional traffic incident management programs to achieve enhanced responder safety and safe and quick traffic incident clearance

Performance Measures

- Number of fatalities and serious injuries
- Rates of crashes with fatalities and serious injuries per vehicle miles traveled
- Number of fatalities and serious injuries in work zones
- Number of rail-crossing fatalities, serious injuries, and incidents

PERSONAL & FREIGHT MOBILITY

Goal: Expand and improve system mobility and integrate modal connections.

Objectives

- Provide multimodal infrastructure and technology advancements to eliminate bottlenecks and improve system efficiency and trip predictability
- Increase access to jobs, labor, and transportation choices in urban, suburban, and rural communities
- Support communities through appropriate and equitable transportation modal options and investments
- Improve first and last mile intermodal access and connections
- Improve bridge under-clearances and intersection geometry

Performance Measures

- Annual hours of truck/auto delays (cost of delays)
- Percent/number of freight bottlenecks eliminated
- Annual transit ridership (e.g., fixed route, shared ride service, etc.)

STEWARDSHIP

Goal: Increase efficiency through modernization of assets and streamlining of processes.

Objectives

- Ensure a high standard of quality and maximize effectiveness of agency and user investments
- Enhance the performance of the transportation system while protecting the state's natural, cultural, and historic resources
- Encourage the development and use of innovative technologies
- Support transportation investments to reflect the diversity of Pennsylvanians and their needs
- Support coordination of land use and transportation planning
- Support economic development
- Support technical assistance/training courses offered to municipalities
- Support clean air initiatives
- Promote initiatives aimed at improving system operations and energy efficiency

Performance Measures

- Annual savings through PennDOT modernization
- Timely delivery of approved local projects
- Timely delivery of highway occupancy permits (issued for occupancy of highway right-of-way, opening the surface of highway, placing a facility or structure, or opening access to the highway)
- Number of municipal officials trained through the Local Technical Assistance Program (LTAP) on the coordination of land use and transportation planning.

The CFMP addresses the following national freight goals identified in MAP-21:

- Improve the contribution of the multimodal freight transportation system to economic efficiency, productivity, and competitiveness;
- Reduce congestion on the multimodal freight transportation system;
- Improve the safety, security, and resilience of the multimodal freight transportation system;
- Improve the state-of-good repair of the multimodal freight transportation system;
- Use advanced technology, performance management, innovation, competition, and accountability in operating and maintaining the multimodal freight transportation system; and
- Reduce adverse environmental and community impacts of the multimodal freight transportation system.

The MAP-21 national performance and freight goals are addressed through one or more of the four CFMP goals. These include:

- Economic competitiveness;
- Reducing congestion;
- Increasing productivity and economic efficiency;
- Improving safety, security, and resilience;
- State-of-good repair;
- Use of advanced technology;
- Making use of performance management, innovation, competition, and accountability; and
- Enhancing the environment.

Meeting these goals that preserve, maintain, modernize, and connect the freight transportation system require public and private investments over the next 25 years. While proposals have been put forth to strengthen federal transportation funding, the most likely scenario is that future federal transportation funding for Pennsylvania will remain flat. However in 2013, Pennsylvania's General Assembly provided PennDOT dedicated and stable long-term funding through Act 89. Act 89 is Pennsylvania's first major transportation funding legislation in over 15 years and generates an additional $2.3 billion annually by Fiscal Year 2017-18 to address transportation system needs.

PLAN ORGANIZATION

The Comprehensive Freight Movement Plan is organized in the following chapters:

- **Chapter 1** – Introduction: Establishes the CFMP purpose; introduces the MAP-21 national goals and the aligning CFMP goals.
- **Chapter 2** – Stakeholder and Public Engagement: Outlines the extensive stakeholder and public participation process.
- **Chapter 3** – Economic Importance and Trends: Discusses the importance of freight and its contributions to the State's economy and identifies and examines economic, demographic, infrastructure, environmental, and technology trends.
- **Chapter 4** – Freight Facilities and Commodity Flows: Discusses the state's freight transportation system and provides information on 2011 and 2040 commodity flows by mode.
- **Chapter 5** – Policies, Strategies, and Projects: Promotes strategies that will preserve, maintain, modernize, and connect the freight transportation system and enhance Pennsylvania's economic competitiveness; and identifies projects and project areas that improve freight efficiency.

Additional information is provided in the following appendices:

- **Appendix A** – Freight Glossary and Acronyms;
- **Appendix B** – Pennsylvania PREP Regions, Trends, Needs, and Issues;
- **Appendix C** – Projects Identified by Planning Partners; and
- **Appendix D** – Summary of Pennsylvania Freight Funding Programs.

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Stakeholder and Public Engagement

STAKEHOLDER ENGAGEMENT

Engaging stakeholders in the development of the Comprehensive Freight Movement Plan was a PennDOT priority. PennDOT performed stakeholder engagement through several approaches, including stakeholder webinars, surveys, and interviews.

Stakeholder Webinars

In reaching a wide range of stakeholders, PennDOT used outreach methods such as the internet (www.paontrack.com) and nine interactive webinars that brought together statewide freight stakeholders. Webinar participants included local planning partners, local officials, private sector businesses, PennDOT central office and district office staff, modal operators, and representatives from adjacent states. The webinars solicited participant feedback and input on PA On Track and the Comprehensive Freight Movement Plan via polling questions and open question and answer segments. Stakeholders also were able to provide input by submitting comments at www.paontrack.com and PennDOT posted summaries and dispositions of all website comments received. An average of 75 attendees participated in each webinar.

Stakeholder & Public Engagement: Take-Aways

- The development of the freight plan was not accomplished in isolation, but with broad-based involvement of many stakeholder groups and the public through a multi-pronged approach. The process ensured that the interests of the public and the freight community were incorporated into the plan.
- The anecdotal feedback received from stakeholders and the public supplemented available freight data in informing the plan's directions.

Motor Carrier Survey

PennDOT conducted a survey of the state's motor carriers to solicit input on freight operations and conditions throughout Pennsylvania. Survey output identified key truck corridors and hubs, perceptions of travel time performance, understanding of motor carrier route selection criteria, and a quantification of freight mobility concerns. The motor carrier survey was made available in hard copy and as an online survey and was advertised through targeted emails to: 1) the Pennsylvania, New Jersey, and Maryland state trucking associations memberships; and 2) the American Transportation Research Institute (ATRI) carrier distribution list. A hardcopy version of the survey was distributed at the Pennsylvania Motor Trucking Association's Annual Conference. A total of 50 motor carriers responded to the survey.

Stakeholder Interviews

A series of in-person and telephone interviews were conducted with freight industry stakeholders. These interviews helped to affirm the data collected from IHS Global Insight (commodity flows) and ATRI (truck travel times) to further describe freight demand, operational issues, and bottlenecks.

The survey process included 29 interviews, including:

- Seven motor carriers, including truckload, less than truckload, package, and specialty haulers;
- Two shippers that also operate private fleets;
- Six shippers in different commodity groups and regions;
- One freight forwarder;
- One real estate developer and distribution location services provider;
- Two rail intermodal terminals;
- Two trucking and shipper associations;
- Three major port authorities and PennPORTS; and
- Four regional public sector organizations.

Interview targets were selected to achieve a balance of type of business, commodity group, and location in Pennsylvania. The geographic basis for the interviews was developed using the PA Department of Community and Economic Development's (DCED's) Partnership for Regional Economic Performance (PREP) regions.

In addition, PennDOT leveraged the following transportation planning and policy bodies to communicate progress and build momentum for CFMP implementation:

- County Planning Directors Association;
- Department of Community and Economic Development;
- Local Development Districts (LDD);
- PennDOT Planning Partners;
- Rail Freight Advisory Committee (RFAC); and
- Transportation Advisory Committee (TAC).

The concerns expressed by carriers, shippers, and other service providers (such as warehouse operators) covered a wide range of topics:

- **Infrastructure** - The concern most frequently mentioned by carriers and shippers alike involved the condition of Pennsylvania's bridges. This was expressed in two ways – concern for a specific bridge vital to their operation, and the overall effect that bridge repairs would have on funding maintenance and system expansion.
- **Network Capacity and Congestion** - Pennsylvania plays a significant and growing role in support of distribution through the Northeast and along the Eastern Seaboard. Pennsylvania's intermodal facilities have global supply chain importance. Capacity on the major highway arteries is constrained and congestion has a detrimental effect on transit time and utilization. There is also interest in improving how non-recurring congestion (e.g., crashes, weather, and special events, etc.) is addressed and communicated to freight interests.
- **Secondary Highways** - The national highway network focuses largely on the interstate system as the primary freight routes. Many secondary routes are used heavily as these routes provide direct and indirect access to the interstate system. The capacity and smooth operation of secondary highways is as important to a regional economy as the interstate system. This is particularly true in Pennsylvania, where much of the state's industry is located in remote areas, and where agriculture and natural gas extraction are a major part of the economy.

- **Connectivity and Redundancy** - Despite recent improvements, there are still vast areas of the state where limited connectivity and/or redundancy in the highway system exist. Pennsylvania's North Central and Northwest regions for example are primarily served by two-lane roadways over rugged terrain. Incremental improvements have been made to the highway system in the state's Appalachian region, with truck climbing lanes, improved intersection geometry, and bypasses around communities such as Johnsonburg, Myersdale, and Ridgway. Many of the state's economic centers – such as Warren and St. Marys – remain isolated from the interstate system.

- **Rail Access** - Many of the stakeholders who were interviewed noted that there is inadequate access to rail facilities and services. (This was particularly prevalent outside the eastern part of the state.) The redevelopment or renovation of properties or sites that have traditionally had access to rail service via sidings or other connections may result in the encroachment of non-rail-dependent businesses along key rail corridors. The resulting loss in rail operations (the rail option) may be difficult or impossible to restore. Capacity issues on some Class I and connecting shortlines have forced some shippers to resort to highway modes.
- **Oversize and Overweight** - Based on the number of permits issued, the oversize and overweight (OS/OW) shipment volume across the country is currently at its highest levels. This is partly due to the increase in transporting very large cargo associated with the wind industry and natural gas industries.
- **Truck Parking** - The current shortage of truck parking in Pennsylvania diminishes truckers' operational efficiency and contributes to safety and environmental problems. The lack of truck parking is less an issue for local and regional carriers who have facilities that help manage the load planning. However, staging for pickups and deliveries within more urban areas can be problematic even for those operations. The largest need exists in and around the urban areas and at the major connection points in the interstate system.
- **Land Use** - Stakeholders noted the disconnect in current approaches to coordinating economic development, land use planning, and infrastructure improvements. The freight transportation providers noted that these functions operate in silos, in many cases leading to rapid development without providing sufficient transportation improvements to maintain safe and efficient travel conditions. Many existing land use/transportation processes – such as the Highway Occupancy Permit process – do not even consider freight, except perhaps under geometric considerations.

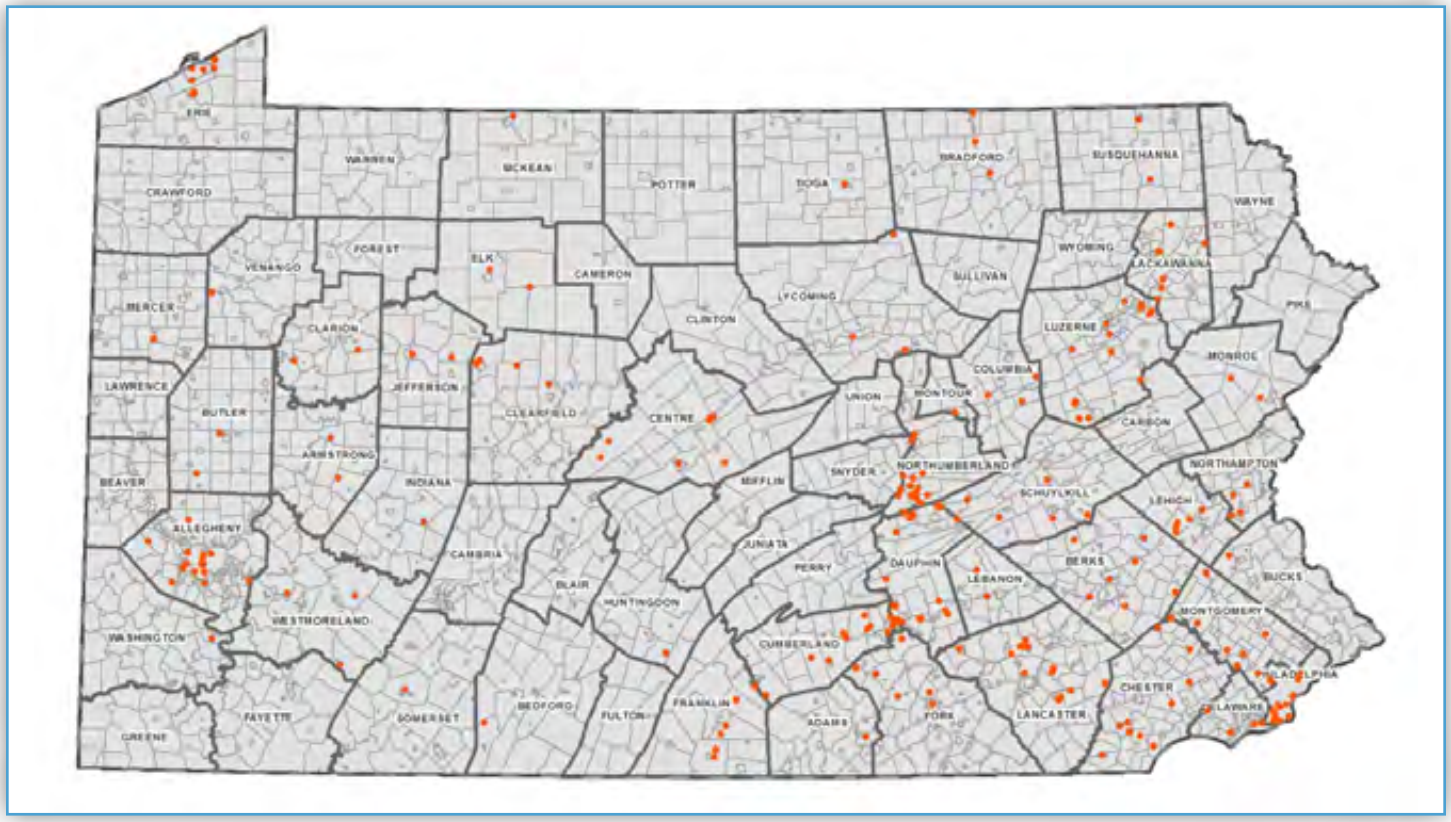
PUBLIC ENGAGEMENT

In addition to engaging stakeholders, PennDOT also provided specific opportunities for public engagement. Chief of these involved the use of MetroQuest, an online platform whose software enabled the public to learn about the freight planning process and provide feedback using a series of interactive screens. The online platform included the following five elements:

- Background on statewide long range transportation and freight plans;
- Program areas for user ranking;
- Investment scenarios for review and evaluation;
- Interactive map to receive spatial comments; and
- General comment screen with links to the project website.

The online platform attracted nearly 3,700 website visits and over 2,500 visitors provided data and information. Through the interactive map exercise, the public provided comments on nearly 7,000 locations (including 235 freight locations), which were saved to a database and shared with the state's planning partners. **Figure 1** illustrates the spatial distribution of the freight-related comments received.

Figure 1: Location of Freight-related Concerns Identified by the Public



The MetroQuest online platform also generated over 500 comments on program priorities. These comments will be reviewed by PennDOT and its partners (MPOs/RPOs) to inform future plans and programs. While not exhaustive, the following provides a high-level overview of the public comments received, by priority area:

- **Aviation** – Respondents noted the value of the state's commercial service airports as an integral part of a massive logistics and distribution system that provides efficient coordination between wings and wheels, as goods are commonly shipped by truck to and from airports to distribution centers throughout the state. Maintaining the state's aviation infrastructure is a concern, as is improving capacity at Philadelphia International.

- **Bridge Conditions** – Respondents noted that bridge maintenance must be addressed and sustained. As one respondent stated, “Being number one in structurally deficient bridges is not a ranking Pennsylvania should have.” Trucks have a greater impact on pavements and bridges than passenger vehicles. Furthermore, an extent and condition analysis of the state’s locally-owned bridges is important as it relates to trucks, and could include factors such as geometrics, turning radii, shoulder widths, and bridges with weight limits under 80,000 pounds and vertical clearances less than 20 feet.
- **Highway Safety** – Respondents noted that safety needs to remain PennDOT’s highest priority. A multi-prong strategy is needed, including education and enforcement to address behavioral concerns such as distracted and aggressive driving, as well as to address the unique issues associated with new drivers and mature drivers. Low-cost improvements, such as signing and roadway markings should be implemented in addition to improvements in roadway design. It is also important to maintain infrastructure and safety through commercial motor vehicle safety and weight inspections.
- **Land Use and Planning** – The public noted the disconnect that exists in how economic development, land use, and transportation decisions are made within the state. PennDOT needs to prioritize transportation improvements in areas where investments in other infrastructure have already been made. As one commenter noted: “Transportation decisions need to be made in harmony with local land-use policy...or rather, local land-use policy needs to be adjusted to better serve regional transportation plans.” Locating future freight facilities needs to consider the unequal impact of noise, air pollution, congestion, and safety. Conversely, land use planning should be responsive to protecting the safety and viability of freight transportation.
- **New Roads or Widening** – According to respondents, adding capacity should be done strategically, recognizing the competing demands for resources. Interest in specific major projects was noted, including extending I-83 north into New York (via US 15), addressing the missing link at US 220 near Lock Haven, the Laurel Valley Improvement Project, and the widening of US 322 in Delaware County. Other noted projects, such as the Central Susquehanna Valley Thruway and US 322 Potters Mills Gap, have already been programmed. Other projects that address the state’s major truck bottlenecks should also be considered, which could include project types such as climbing lanes and longer on- and off-ramps, since trucks accelerate and decelerate at different speeds.

- **Operational Improvements** – Respondents' feedback included a desire for additional technology investment in roadway improvements such as adaptive traffic signals, ramp metering, and operational improvements through travel time display on message boards. PennDOT was also urged to collaborate with online traffic information providers to provide improved detour and travel time information. Improved travel information can increase motor carrier productivity and efficiency, thus lowering the cost of doing business.
- **Pavement Condition** – Respondents noted that this aspect of our transportation system directly impacts the most important priority – that of safety. Potholes and crumbling pavement degrades highway safety and are concerns to roadway users, including motorists and motor carriers alike. The needed durability of pavements was also raised as a concern, as was proper winter roadway maintenance.
- **Ports and Waterways** – Respondents noted that the state's ports and waterways are important transportation assets that can give shippers and receivers cost-effective options while alleviating demand on the highway network.
- **Rail Freight** – Pennsylvania is a leader nationally in recognizing the importance of a high quality rail freight network. According to respondents, the state should continue to make investments in private infrastructure where public benefits can be clearly demonstrated. More freight on rail also has the side benefit of improving the surface life of the highway network and its safety. The value of shortline railroads in connecting shippers and receivers to the national rail freight network was also emphasized, as was improving at-grade railroad crossing safety.
- **Technology/Energy Efficiency** – Respondents commented that the timing of traffic signals is important to improve efficiency and reduce congestion. Using technology to ease traffic flow would improve efficiency and address aggressive driving. It can also lessen the degradation of pavements, as heavy trucks can cause excessive damage with the unnecessary braking that comes with uncoordinated signals. Improved operations ultimately can lower the overhead costs of shipping freight, which is of special importance to shippers, receivers, and carriers.

Economic Importance and Trends

INTRODUCTION

Pennsylvania's transportation system carries approximately $1.6 trillion of goods into, out of, and through the state. In other words, 7.5 percent of the goods and materials produced, used, or exported by the entire nation travel on Pennsylvania's transportation system.

Pennsylvania's transportation infrastructure supports 5.2 million jobs in the State.

An efficient multimodal freight transportation system reduces transportation and supply chain transaction costs and increases connectivity, reliability, and accessibility to local, regional, and global markets. An efficient freight transportation system supports state, regional, and local economic development and it fosters the expansion of trade, employment, and personal income. This chapter discusses the importance of freight transportation to some of Pennsylvania's key industrial sectors and provides insight into why freight is critically important to the state's economic development.

INDUSTRIES AND GLOBAL TRADE

In 2013, Pennsylvania's exports totaled $41 billion, which ranked 11th in the U.S. – up 5.4 percent from 2012. Exports accounted for eight percent of the state's gross domestic product in 2012. Future demand for U.S. goods is projected to increase in many of Pennsylvania industry sectors.

Of the 15,881 Pennsylvania export companies identified by the U.S. Census in 2011, 14,175 (89.3 percent) were small or medium-sized businesses with fewer than 500 employees.[3] According to a 2009 study, one quarter of Pennsylvania's export companies are in rural counties, though most of these export only ten percent of their output.[4]

Economic Importance and Trends: Take-Aways

- Pennsylvania exports totaled $41 billion in 2013, ranking 11th in the U.S.
- Pennsylvania ranked 6th in the nation in both tonnage and value of commodities moved.
- Goods traveling on Pennsylvania's transportation system are projected to grow to 1.9 billion tons valued at $3.7 trillion, by 2040.
- Approximately 7.5 percent of the goods and materials produced, used, or exported by the entire nation travel on Pennsylvania's freight transportation system.
- The majority (89.3 percent) of Pennsylvania export companies are small or medium-sized businesses with fewer than 500 employees.
- One quarter of Pennsylvania's export companies are located in rural counties.

[2]US GDP = Real gross domestic product -- the output of goods and services produced by labor and property located in the United States; real state GDP are calculated to show chained dollars so values are not double counted by multiple states. http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm

[3]US Census web site, census.gov

[4]Christrofides, Constantinos PhD., Todd Behr, and Pattabiraman Neelakantan, PhD., Business Economics Research Group, East Stroudsburg University of Pennsylvania, "Rural Exports: A Baseline Study," sponsored by The Center for Rural Pennsylvania, May 2009.

Linking Pennsylvania's freight transportation system to state, U.S., and global consumers is critical, both to bring materials and components to companies that create the final product and to transport finished goods. Global trade connects companies with markets in fast-growing and developing countries, supports local manufacturers, and creates jobs in warehousing, transportation, and logistics.

In 2013 Pennsylvania exported nearly $41 billion in goods, ranking 11th among all U.S. states.

Table 2 shows the top five Pennsylvania export destinations by value in 2013, along with the percent change from the previous year and the share of the state's total exports. By far, Canada is the largest importer of Pennsylvania's products followed by Mexico, China, Netherlands, and Germany. The Netherlands is Pennsylvania's fastest-growing export partner.

Table 2: Top Pennsylvania Global Export Destinations

Destination	Value of Exports (in billions)	Change 2012-2013	Percent of Total State Exports
1. Canada	$11.6	1.0%	28.3%
2. Mexico	$3.4	21.5%	8.4%
3. China	$2.9	1.7%	7.1%
4. Netherlands	$2.4	86.1%	5.8%
5. Germany	$1.7	-7.8%	4.1%

Source: U.S. Census, Foreign Trade Statistics, 2013

The U.S. petrochemical production is projected to grow due to new technologies, lower energy costs, and ability to drill on private property. Pennsylvania refineries are benefitting because of the increased oil production in North Dakota and Canada being transported by rail.[5] Chemicals, the fastest-growing non-durable export segment, are the main export from the Port of Philadelphia, and exports of chemicals from the Delaware River ports are projected to grow by nearly 80 percent between 2010 and 2020.[6]

The Pittsburgh region's main export by weight is coal, and as U.S. demand for coal decreases, companies are increasing exports to Asia. For example, mines in Greene County are among the largest suppliers of North American coal to China.[7] The region accounted for 42 percent of all U.S. mining exports in 2011,[8] and these exports are expected to grow by 64 percent by 2020. Between 2010 and 2020 the total value of exports from Pittsburgh is expected to increase by 67 percent.[9] Transportation equipment and petroleum and coal products led export growth nationwide from 2010 to 2012,[10] and Pennsylvania is a top producer of these products.

[5] *Wells Fargo Securities LLC, Pennsylvania Economic Outlook 2013, October 25, 2013.*

[6] *Ibid.*

[7] *According to CEO Brett Harvey, CONSOL Mines, as written by Anya Litvak, Pittsburgh Business Times: "Pittsburgh Coal Exports Lead Nation," September 13, 2012.*

[8] *Ibid.*

[9] *U.S. Metro Economies*

[10] *Export Nation 2013*

Economic Importance and Trends: Take-Aways

- As a leader in energy development, Pennsylvania is in a position to gain jobs and grow its economy as a major energy producer.
  - The Marcellus and Utica Shale formations are the second-largest natural gas field in the world.
  - Pennsylvania was the nation's sixth-largest natural gas producer, in 2011.
- Pennsylvania ranked 5th in the nation for technology and innovation and the state is focused on attracting and growing robotics, cyber-security, digital, and other technology companies.
- Every $1 million increase in demand for manufactured products in Pennsylvania creates 4.2 direct and indirect jobs.
- Pennsylvania's 2,300 food processing companies contribute $32 billion to the state's economy each year, making it 4th in the nation in value-added food production.
- Pennsylvania is a global leader in life sciences, known for developing new drugs and vaccines, diagnostic tools, and other medical devices that promote health around the world.
- Panama Canal expansion impacts to Pennsylvania will likely include increased demand on truck and rail routes from regional ports that will be able to accommodate larger ships.
- To realize new technology benefits, trucking companies, equipment manufacturers, and federal and state transportation agencies must collaboratively work together to implement new systems that provide vehicle-to-vehicle and vehicle-to-infrastructure communication and cooperation.

Food manufacturing is one of the ten fastest-growing U.S. export sectors, ranking 9th in 2013. Manufactured food product exports increased by 92 percent between 2001 and 2010, and are projected to increase by an additional 49 percent between 2011 and 2020. This is encouraging news for 2,300 Pennsylvania food processing companies, which employ nearly 67,000 workers in producing a diverse range of foods including chocolate, potato chips and other snack foods, cheese products, and bakery foods (see **Table 3** and **Table 4**).

Table 3: Top Pennsylvania Global Exports (by value) in 2013

Industry	Value of Millions	Change 2012-2013
1. Chemicals	$7.3	-6%
2. Non-electrical machinery	$4.7	-2%
3. Computers and electronics	$3.8	2%
4. Transportation equipment	$3.7	18%
5. Primary metal manufacturing	$3.6	-6%
6. Minerals and ores	$2.2	58%
7. Petroleum and coal products	$2.1	89%
8. Electrical equipment and components	$2.2	11%
9. Food manufacturing	$1.8	4%
10. Miscellaneous manufactured commodities	$1.6	3%

Source: export.gov

Table 4: Fastest Growing Pennsylvania Global Export Products, 2008-2013

Product Category	Increase 2008-2013
Oil and gas	2,605%
Newspapers, books, and other published material	267%
Beverages and tobacco products	131%
Minerals and ores	126%
Food Manufacturing	73%

Source: export.gov

EXISTING AND EMERGING INDUSTRIES

Pennsylvania's economy was built on agriculture and manufacturing, and continues to evolve. However, today's economy is more diverse and the Department of Community and Economic Development (DCED) identified seven industries (Advanced Manufacturing and Materials, Agribusiness, Energy, Film, Life Sciences, Technology, and Tourism) vital to the state's economic future. The following four industries are highly dependent on freight transportation:

- Energy;
- Advanced manufacturing and materials;
- Agribusiness; and
- Life sciences.

Our transportation infrastructure needs to be responsive to ongoing changes in the state's economy and how goods need to move across the system. The following section briefly examines these industries and discusses trends, reliance on freight and goods movement, and discusses the critical relationship between the Pennsylvania economy and freight transportation.

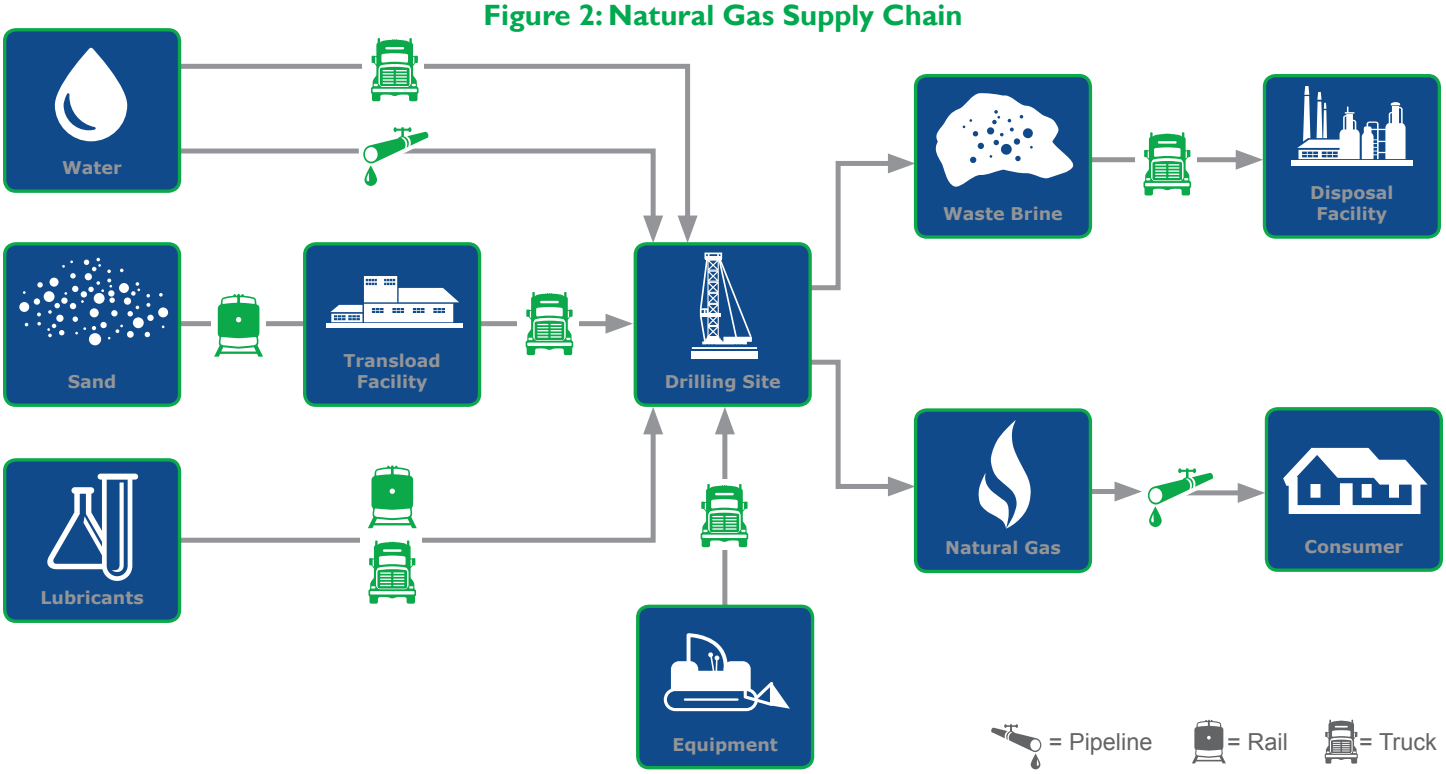
Energy

Since 2007, Pennsylvania has become a major natural gas production state due to the Marcellus and Utica Shale formations. These vast natural resources are the second-largest natural gas field in the world. Consequently, in 2011, Pennsylvania was the nation's sixth-largest natural gas producer.[12] The top seven natural gas producing counties are Bradford, Susquehanna, Lycoming, Greene, Washington, Tioga, and Wyoming.[13] A proposed new multi-billion dollar petrochemical plant (also known as the ethane "cracker plant") in Beaver County will create even more high-wage jobs in the industry, bolster the region's manufacturing industry, and induce needed investments in rail, inland waterway, and highway and bridge infrastructure.

As shown in **Figure 2**, the energy industry relies on an efficient multimodal freight transportation system to transport raw materials to the drilling site and waste and finished products from the drilling sites. Highways, bridges, railroads, pipeline, and ports have seen a level of demand not experienced since the start of the coal resource extraction industry years ago. New wells drilled for natural gas represent a significant amount of truck and rail-related traffic on Pennsylvania roadways. Each new well pad, for example, can require up to 40 rail carloads of drill-related equipment including sand, pipe, barites (barium sulfate), and miscellaneous chemicals – equivalent to 50 to 150 eighteen-wheel tractor trailer loads. Every item used at the drill site arrives via highways by truck, because the well sites are predominately located in rural areas without rail access. Truck trips are required for the construction of the drill site, the pipeline gathering systems, and compressor stations, which brings the total to approximately 1,450 truck trips per well. Many of these trucks are oversized and overweight (OS/OW) due in part to the cargo associated with natural gas extraction.

Once the wells start extracting natural gas, truck and rail services are required to remove drill cuttings and brine water. In many locations with limited access to pipelines, liquefied natural gas is also transported by rail. Rail car volume on carriers such as the Wellsboro & Corning increased from 841 rail cars in 2009 to 2,130 in 2010. Total employment within the Northern Tier RPO – at the epicenter of the gas extraction industry – has also grown, with 7,400 new jobs from 2009 to 2012.[14]

Figure 2: Natural Gas Supply Chain



[12] *Energy Information Administration, Pennsylvania State Profile and Energy Estimates, http://www.eia.gov.state/?sid+PA#tabs-3*

[13] *Wells Fargo Securities LLC, Pennsylvania Economic Outlook 2013, October 25, 2013.*

[14] *This information comes from a power point presentation compiled and presented by Sandy Tosca, P.E., District Executive, PennDOT Engineering District 3. This presentation illustrates early industry development, infrastructure damage and cooperative reconstruction by the industry: http://www.slideshare.net/preservationcombination/transportation-impacts-of-marcellus-shale-drilling*

Increased natural gas production has put substantial demands on local rural roads. In many areas of the state, developers have taken on the task of building roads to a higher standard and maintaining them to support their operations. Municipalities have also entered into excess maintenance agreements with shippers to cover costs in excess of normal maintenance caused by use of oversize and overweight vehicles.

Advanced Manufacturing and Materials

Pennsylvania companies continue to adopt process innovations and new technologies, including automation and additive manufacturing. Pennsylvania ranked 5th in the nation for technology and innovation and the state is focused on attracting and growing robotics, cyber-security, digital, and other technology companies.[15] Manufacturing has a high economic multiplier in that for every dollar spent in manufacturing, another $1.48 is added to the economy.

Pennsylvania has increased its number of manufacturing jobs every year since 2010, creating 12,100 jobs in 2011 alone, and in 2012 over 574,000 workers were employed in the manufacturing sector (accounting for 10 percent of the state's workforce) and another 189,300 jobs were created in employment related to the export of manufactured goods. A 2011 study found that a $1 million increase in demand for manufactured products in Pennsylvania creates 4.2 direct and indirect jobs.[16]

Transportation infrastructure is crucial for advanced manufacturing, according to the manufacturers themselves. Key site selection criteria mentioned by companies seeking to locate or expand include the following:

- Access to interstate highways;
- Access to Class I railroads with connections to an on-site rail line; and
- Efficient travel times to companies that supply parts directly to the manufacturer within 100 miles.

These factors, along with the availability of a skilled workforce, site and environmental factors, incentives offered, training support, and utilities and other infrastructure capacity must be met if a new site is to be considered.

Agribusiness

Pennsylvania is a leader in agriculture, producing a variety of crops and animal products, as well as manufactured food products. Pennsylvania's 2,300 food processing companies contribute $32 billion to the state's economy each year, making it 4th in the U.S. in value-added food production in 2011. The state's PA Preferred brand marks products as grown in Pennsylvania, and confers on the thousands of partner companies and stores the quality inherent in the brand. Top products include mushrooms, where the state ranks first, chocolate and cocoa, bakery foods and tortillas, potato chips and similar snacks, and animal foods. Pennsylvania is among the top five states producing apples, corn, strawberries, maple syrup, and Christmas trees, as well as animal products such as milk, chickens, trout, and eggs. It also ranks 8th in winemaking. The state's beverage industry generated $4.1 billion in 2011, ranking 2nd in the U.S. Total exports of food products topped $1.7 billion in 2011.

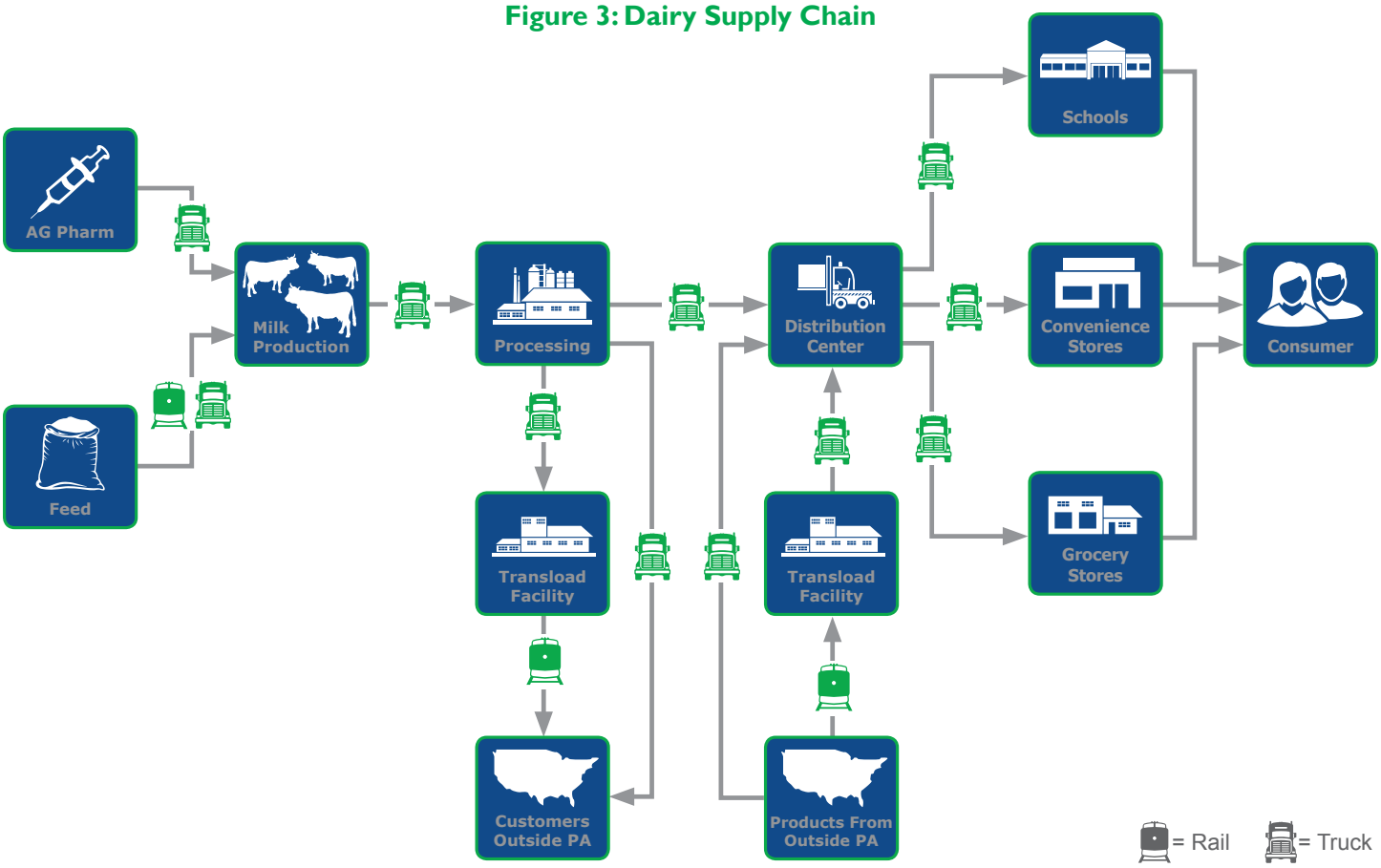
[15] *CNBC: America's Top States for Business, 2012.*

[16] *Pennsylvania's True Commonwealth: The State of Manufacturing – Challenges and Opportunities, 2011*

Pennsylvania's agribusiness industry requires an efficient multimodal freight transportation system because it supplies products to state, national and global customers and imports products from around the world. Products such as grains and cocoa beans arrive through the Port of Philadelphia where these products are transloaded to trucks and rail for final delivery.

As shown in **Figure 3**, Pennsylvania dairy producers require resilient infrastructure and efficient connections to highway and rail to transport milk from farm to market. Milk tankers make multiple pickups from dairy farms within their service areas. The weight of agricultural equipment is increasingly a concern in terms of axle ratios and equipment size, especially for many rural roadways and bridges. To accommodate these large weights, milk haulers carry special annual permits that allow them to operate trucks at 95,000 pounds (although no permit may be issued for this type of movement upon an interstate highway).

Figure 3: Dairy Supply Chain



Life Sciences

Pennsylvania is a global leader in life sciences, known for developing new drugs and vaccines, diagnostic tools, and other medical devices that promote health around the world. Over 79,000 workers are employed in the life sciences in Pennsylvania, including 19,500 in medical device manufacturing.

Philadelphia has created a life sciences hub, centered on its large concentration of leading academic institutions and pharmaceutical companies. Located between New York's financial markets and regulatory agencies in Washington, D.C., the area boasts more than 1,200 life science companies including large multinationals as well as new, fast-growing firms. Access to venture capital, leading research institutions and teaching hospitals, and innovation hubs such as the Ben Franklin Technology Partnership continue to contribute to the success of Pennsylvania's life sciences sector.

Shipping biological materials and other healthcare products can entail issues not encountered in transporting most other manufactured goods. Pharmaceutical products for example are high value shipments requiring additional security. The airline industry, in particular, is developing new solutions for controlling temperature and preventing contamination to improve on-time deliveries.

SUPPLY CHAINS

Pennsylvania's economy relies on an efficient multimodal freight transportation system for industries and businesses to import and export goods and services throughout the state – a key factor in Pennsylvania companies' ability to move goods and services to local, national, and global markets. The transportation dependence of a given sector is only part of the overall business-transportation connection. Managing the risk and reliability of supply chains is closely tied to the performance and capacity of the transportation system, as well. As shown in the dairy and natural gas supply chains, industry and businesses depend on efficient, integrated, secure, and sustainable freight transportation systems. Congestion, poor infrastructure conditions, conflicting regulations, and anything else that creates delay erodes the efficiency of supply chains and undermine competitiveness.[17]

ECONOMIC IMPACTS

Pennsylvania's public and private sector freight facilities and carriers such as air cargo facilities, trucking companies, ports, and railroads employ thousands of Pennsylvanians and have a significant impact on the state's economy. Each mode benefits the state's economy by generating jobs and income, revenue from output (sales), and from tax revenues. Jobs are generated through three different mechanisms:

- **Direct Jobs** – Jobs such as truck drivers, rail and air cargo employees, and longshoreman that are directly related to freight activities;
- **Indirect jobs** – Local jobs created through direct expenditures of the operators and manufacturers dependent on the freight activities; and
- **Induced Jobs** – Local jobs created through expenditures by direct employees.

Trucking

In 2014, Pennsylvania's trucking industry employed approximately 72,600 truck drivers at an average wage of $43,260 per year, or approximately $3.14 billion in total payroll.[18]

Rail

Pennsylvania ranks 8th nationally in total railroad employment (6,977) and rail wages ($483.2 million). In 2005, the Pennsylvania State Transportation Advisory Committee completed a study of the economic impacts of rail freight to the state. While dated, this study estimates that in 2001 the rail transportation sector had a total output of $3.3 billion, which comprised about 0.5 percent of the total state output.[19,20] In 2003, the value of goods shipped by rail that originated in Pennsylvania was estimated at over $14.4 billion, which was associated with 52,000 jobs and $4.5 billion in value added benefits.[21]

[17]Ivey Business Journal, "Freight Transportation Infrastructure in North America: Getting Value for (Billions of) Dollars," 2009.

[18]Bureau of Labor Statistics, May 2014

[19]Reader should note this pre-dates the emergence of the Marcellus Shale gas extraction industry in Pennsylvania

[20]Economic Impact of Railroads in Pennsylvania, Pennsylvania State Transportation Advisory Committee, January 2005, p25.

[21]Economic Impact of Railroads in Pennsylvania, Pennsylvania State Transportation Advisory Committee, January 2005, p25.

Aviation

Pennsylvania's aviation system supports over 304,000 jobs, $9.1 billion in total payroll, and almost $24 billion in total output. Aviation economic impacts extend to aerospace industries located off-airport. Pennsylvania has a significant number of off-airport businesses that support aviation through aircraft maintenance, aircraft manufacturing, and aerospace and aircraft parts manufacturing. Off-airport businesses support over 25,000 jobs, approximately $1.3 billion in payroll, and $6.5 billion in total economic benefit to the state can be attributed to aerospace industries. The Pennsylvania Department of Labor and Industry's Labor Market Statistics indicated that total employment in the aerospace industry in Pennsylvania increased 14 percent from 2008 to 2012.[22]

Water

In 2013, the Philadelphia Regional Port Authority reported 3,392 direct jobs and 3,141 indirect jobs for a total of 6,533 jobs related to activity at PRPA facilities. This work resulted in $280 million in labor income and generated $890 million in business activity, thereby generating total tax revenue of about $122 million.

In 2004, the Port of Pittsburgh Commission performed an economic impact study for the port district. Based on the data collected and evaluated, the river system generated 45,079 direct jobs. Of these, 14,887 jobs were associated with firms providing services on the river (including river terminals, trucking firms, railroads, towing companies, and government agencies) and 30,192 jobs were held by employees of industrial users such as steel plants, coal mines, and power plants. River activities further supported 149,534 indirect jobs and 23,264 induced jobs, for a total of 217,877 jobs. In 2004, these jobs generated over $10 billion in income and over $800 million in business revenue (not including value of products or production). River activities generated over $3 billion in Federal, state, and local taxes.[23]

The Port of Erie supports approximately 250 direct jobs. The Port of Erie reports an additional 170 jobs are expected to result from contracts at Donjon Shipbuilding and Repair, for an estimated direct job total of 420. This indicates an additional 840 indirect or induced jobs, for a total of about 1,260 jobs.

[22] *Pennsylvania Aviation Conditions, Trends and Implications Technical Memorandum, February 2014, p 21*

[23] *Martin Associates 2004*

TRENDS

Identifying trends that impact how we move and transport goods enables PennDOT to plan effectively to create a multimodal freight transportation system well-prepared for future demand. This section identifies major national and statewide trends and issues that impact Pennsylvania's transportation system. While not all future developments can be foreseen, it is known that freight movement will be affected by the state's ability to address transportation infrastructure and operational needs. Detailed information on regional trends, issues, and impacts by PREP region is provided in **Appendix B**.

Recent Improvements in Infrastructure

PennDOT has been making significant infrastructure improvements that support efficient freight movement. According to PennDOT's 2013 Annual Highway Performance Report, Publication 711, Issue 2, since 2006, PennDOT's roadway and bridge infrastructure is improving. The report shows that the:

- Percent of structurally deficient (SD) bridge deck area is declining;
- Number of SD bridges are declining;
- Total number of fatalities are declining; and
- Percent of Interstate and NHS non-interstate pavement miles in excellent/ good condition is increasing.

Notable improvements have been occurring across the state's other freight modes as well:

- **Ports** – Projects at Philadelphia, Pittsburgh, and Erie have resulted in improved cargo handling capacity and employment, as well as improved port productivity and efficiency. Incentive programs have been launched to ocean carriers that increase their container volume from one six-month period to the next.
- **Freight Rail** – Expansion at Norfolk Southern's Rutherford Yard in Harrisburg will support the rapid growth of regional intermodal freight traffic; double-stack clearance projects in southwest Pennsylvania will advance CSXT's National Gateway Project.
- **Aviation** – PennDOT continues to maintain a strategic focus on airport safety and access. In FY2013-14, PennDOT's Bureau of Aviation administered $12.6 million in federal funding and $11.2 million in state funding for Pennsylvania's airport system.

These improvements assist in maintaining an efficient freight transportation system. However, based on the following trends, PennDOT and its planning partners will need to continue to focus on addressing future demands on the freight transportation system.

- In 2011, the U.S. transportation system moved 17.6 billion tons of goods valued at more than $16.8 trillion.
  - FHWA estimates that in the next 30 years, there will be 60 percent more freight to be moved across the country.
- In 2011, Pennsylvania's multimodal freight transportation system moved 1.1 billion tons of goods valued at $1.6 trillion.
  - Goods traveling on Pennsylvania's multimodal freight transportation system are projected to grow to 1.9 billion tons valued at $3.7 trillion by 2040.

[24] *U.S. Dep't of Transp., Fed. Highway Admin. (FHWA), Freight Facts and Figures Report 10 (2012); U.S. Dep't of Transp., Research and Innovative Tech. Admin. (RITA), Transp. Statistics Annual Report 1 (2012)*

[25] *Ibid. p. 9*

[26] *Transearch Analysis White Paper, 2014 produced for LRTP and CFMP, p. 7*

- In 2011, approximately 7 percent of the tons and 10 percent of the value of all goods moved across the nation traveled on Pennsylvania's multimodal freight transportation system.
  - Based on USDOT Freight Analysis Framework (FAF) data, in 2012 Pennsylvania ranked 6th in the nation in terms of both tonnage and value of commodities moved.

Panama Canal

The Panama Canal is undergoing a $5.25 billion expansion to accommodate more and larger ships. Currently expected to be completed in 2016, the expansion will impact demand on U.S. ports, rail service, and highways. Pennsylvania will experience transportation impacts as ships on Panama Canal routes are replaced with larger vessels over time. Out-of-state ports, such as those in New York/New Jersey, Maryland, and Virginia, are also currently used by Pennsylvania businesses and industries will experience increases in shipments, which will result in additional truck and rail traffic impacting Pennsylvania. In sum, rail and water infrastructure serving the Panama Canal trade routes will need to be monitored to determine if shippers and carriers shift traditional supply chains to take advantage of this improved international routing option. Some considerations that need to be made include the following:

- **Toll rates on the Panama Canal will be increased** – Panama has a significant challenge to repay its bonds, so an increase in revenue is necessary. However, with a shifting of trade flow, with ships vacating west coast ports for east coast ports, then the Class I railroads will likely respond by lowering their rates.
- **New locks will accommodate ships up to 13,200 TEU** – This is a significant increase from the 5,000 TEU capacity of the old locks. However, there are already over 40 container ships in the 14,000 to 19,000 TEU size that cannot fit the new Panama Canal locks. Some of these larger ships are already being used in the Europe – U.S. lanes, so they are already serving U.S. northeast ports.
- **An increase of eight sailing days will characterize by-passing west coast ports, traversing the new Panama Canal locks and using east coast ports** – This additional goods-to-market time will be harmful to time-sensitive goods in highly competitive markets. This is especially so with seasonal goods.

Future scenarios may not provide any clues as to the anticipated shifts in maritime traffic through the Panama Canal. The primary factors that will drive changes in routing are ship size, and cost, as eight additional sailing days and high lock fees may not be cost-effective, or time efficient. Other expansion factors and trends related to the Panama Canal include:

- The larger locks will allow passage of container ships up to 13,200 TEUs; almost triple the capacity of ships now traversing the canal.[27] Several factors will likely occur that could alter some U.S. shipping patterns. These include the economies of scale from use of larger ships, which could lower overall maritime transportation costs of U.S. imports and exports. Conversely, Panama Canal transit tolls could increase to not only maintain existing throughput fees, but to help pay off the massive debt. Further, goods travelling from Asian countries in the Pacific Northwest, bypassing the Ports of Los Angeles and Long Beach, to a U.S. east coast port will require an additional eight sailing days. Many other factors related to U.S. port costs, transportation operational costs, and overall transit time will not be fully known until the new locks are operational and enough time has elapsed to provide actual information on how shippers and carriers are adjusting supply chains to optimize operations due to the Panama Canal expansion.
- Only a few U.S. east coast ports have initiated plans to dredge their waterway channels and increase port depths, to accommodate the larger draft ships. These include ports in New York, Baltimore, and Norfolk. Other consequences such as limited landside space to process higher cargo quantities, increased demand of rail and truck from these few ports on main linehaul routes, and changes in commodity and products types and quantities being handled by all east coast ports could alter freight flows. East coast ports have experienced increased volumes in recent years due to efficient routes from Southwest Asia via the Suez Canal. Similar volume shift will likely occur due to the Panama Canal expansion.

[27] *http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5082003*

- The impact to Pennsylvania will likely be increased demand on truck and rail routes from ports that will be able to accommodate the larger ships. Major truck corridors supporting freight movements from key east coast ports include I-78, I-81, I-83, and I-95. Truck traffic on these commerce corridors often exceeds 30 percent of traffic. Due to the close proximity to major ports, I-70, I-76, and I-80 could also experience increased truck traffic due to the Panama Canal expansion.
- The I-81 Coalition, a public-private partnership including PennDOT and five other state DOTs, developed a "GO-81" vision to become the national model for applied truck information systems. GO-81 is an action-oriented project that will use technology to improve the safety and efficiency of freight movement in and around the I-81 Corridor, which stretches 856 miles from the urban markets in the northeastern United States to the agricultural markets and manufacturing areas of the South and Midwest and also provides direct connections to the eastern deep-water ports. In Pennsylvania the corridor is connected to the Port of Baltimore and NY/NJ ports via I-83 and I-78, respectively. With 232.6 miles, Pennsylvania has the second highest mileage of I-81 among the six states in the Coalition.
- The Norfolk Southern Crescent Corridor, the heart of the railroad's operations, is well positioned to support increased intermodal container shipments. This could lead to increased intermodal rail activity into Pennsylvania. The Norfolk Southern Heartland Corridor allows intermodal container rail shipments from Norfolk to the Midwest to bypass Pennsylvania. CSXT is also well positioned to take advantage of increased container shipments from major east coast ports. Several of the CSXT main routes traverse Pennsylvania. Collectively, the Class I railroads will likely increase their train volumes into and through Pennsylvania.
- The FHWA released a report which projects freight volumes will increase by 45 percent over the next thirty years.[28] Even as U.S. freight volumes increase due to more consumer demand, supply chain management professionals will continue to seek balance between quality service and cost. The Panama Canal expansion offers an additional opportunity to optimize U.S. supply chains.

Figure 4: Container Ships

As global trade has increased, there have been corresponding increases in the size of container ships that carry the world's goods. Since the 1970s, container ship capacities have increased from 2,400 TEU to 19,000 TEU*. Currently, the largest container vessel that can call on the port of Philadelphia is 8,000 TEU (this will increase to 10,000 TEU after the current dredging of the Delaware River Channel is completed in 2017-18).

**The TEU, or twenty-foot equivalent unit, is used to describe the capacity of container ships and container terminals.*

Source: CDM Smith, Inc.

[28] *http://www.dot.gov/sites/dot.gov/files/docs/Draft_Beyond_Traffic_Framework.pdf*

Inland Waterway System and Great Lakes Ports

The maritime ports associated with the St. Lawrence Seaway and the Great Lakes facilitate the movement of bulk cargo (i.e., heavy equipment, iron ore, coal, steel, etc.). Recently, the Port of Cleveland initiated the Cleveland-Europe Express service for containerized cargo. Thus far it has been successful. However, the St. Lawrence Seaway normally closes for 60-75 days during the harsh winter months, when all service stops. Also, ships that operate within the Great Lakes St. Lawrence Seaway System must be smaller than ships that operate exclusively from coastal seaports. Otherwise, these inland ports (such as Erie) have dredging issues, similar to seaports. However, the Great Lakes ports do not compete with east coast seaports.

It is also unlikely that the inland waterway system would be significantly affected by improvements to the Panama Canal, since the Mississippi River-Ohio River system is used almost exclusively for bulk cargo.

Energy

As a leader in energy development, Pennsylvania is in a position to gain jobs and grow its economy as a major energy producer. The Marcellus Shale formation in Pennsylvania produced 793 billion cubic feet of natural gas in the first half of 2012, and is projected to eventually produce 17.5 billion cubic feet of natural gas per day by 2020.[29] Moreover, the U.S. is projected to become a net exporter of dry natural gas via pipeline and liquefied natural gas by vessel as a result of increased natural gas production. Projections estimate this industry could create 1.7 million permanent jobs by 2020, and GDP in the energy sector could increase by $115 to $225 billion during the same time period. The Delaware River oil refineries that had been threatened with closure just a few years ago are now part of the thriving U.S. domestic refining sector, serving both domestic and export markets.

Oversize, Overweight and Specialized Cargo

Pennsylvania is experiencing growth in oversize and overweight (OS/OW) cargo volume, due in part to key industries, such as dairy, agricultural equipment, and the energy industry.

- **Dairy producers require resilient infrastructure and efficient highway connections to transport milk from farm to market** – As noted previously, milk haulers carry special annual permits that allow them to operate trucks at 95,000 pounds (on non-interstate highways). There are many variations in the regulations state to state, and Pennsylvania haulers moving milk into other states may be required to have additional OS/OW permits.
- **Agricultural equipment** – Agriculture equipment is increasingly a concern in terms of axle ratios and equipment size, especially for many rural roadways and bridges. Slurry wagons associated with confinement livestock often exceed weight limits.
- **Weight limitations are an issue for the energy industry** – Pennsylvania is experiencing growth in OS/OW cargo volume, due in part to the increase in cargo associated with natural gas extraction. Increased production activity has put heavy demands on what are largely local rural roads.

[29] *Marcellus Shale Coalition*

Connected and Autonomous Vehicles

In 2014, PennDOT commissioned Carnegie Mellon University to assess the implications of connected and autonomous vehicles on the management and operation of the state's surface transportation system. The final report[30] discusses the potential impact this technology could have on the safety and efficiency of Pennsylvania's transportation system and advises PennDOT to consider this technology in new investment decisions. As the technology advances, real time data on parking availability, congestion, and road and weather conditions will be able to be transmitted between vehicles, roadside units, and traffic management centers.

PennDOT will play a significant a role in implementing this technology on the transportation system and legislative issues will need to be addressed by the General Assembly. The first autonomous vehicles could be operating on Pennsylvania roads over the next five to 10 years and driverless trucks are probably a decade or more away. However, "cooperative" trucks that use sensors to communicate with other vehicles and roadway infrastructure will be realized much sooner: within the next five years. This new technology aims to save fuel, increase lane capacity, and improve traffic flow. To realize these benefits, trucking companies, equipment manufacturers, and federal and state transportation agencies must work collaboratively to implement new systems that provide vehicle-to-vehicle and vehicle-to-infrastructure communication and cooperation.

The CMU report further acknowledges that most decisions related to freight and automation are in the hands of federal regulators and the private sector. PennDOT however, can play a role in moving the industry toward automation by providing test beds and insuring that information on incidents and overweight/oversize vehicle movements is available to connected vehicles.

The Digital Freight Marketplace

New start-ups are bringing technology for on-demand freight shipping to the local trucking industry. New platforms enable shippers to list available jobs that local carriers with excess capacity can complete. By making the connection, companies can help drivers make more money, while shipping more effectively with more efficient routing. Other cumulative benefits, these and similar programs would have, include their positive role in congestion reduction, lessening infrastructure impacts, and more efficient use of energy.

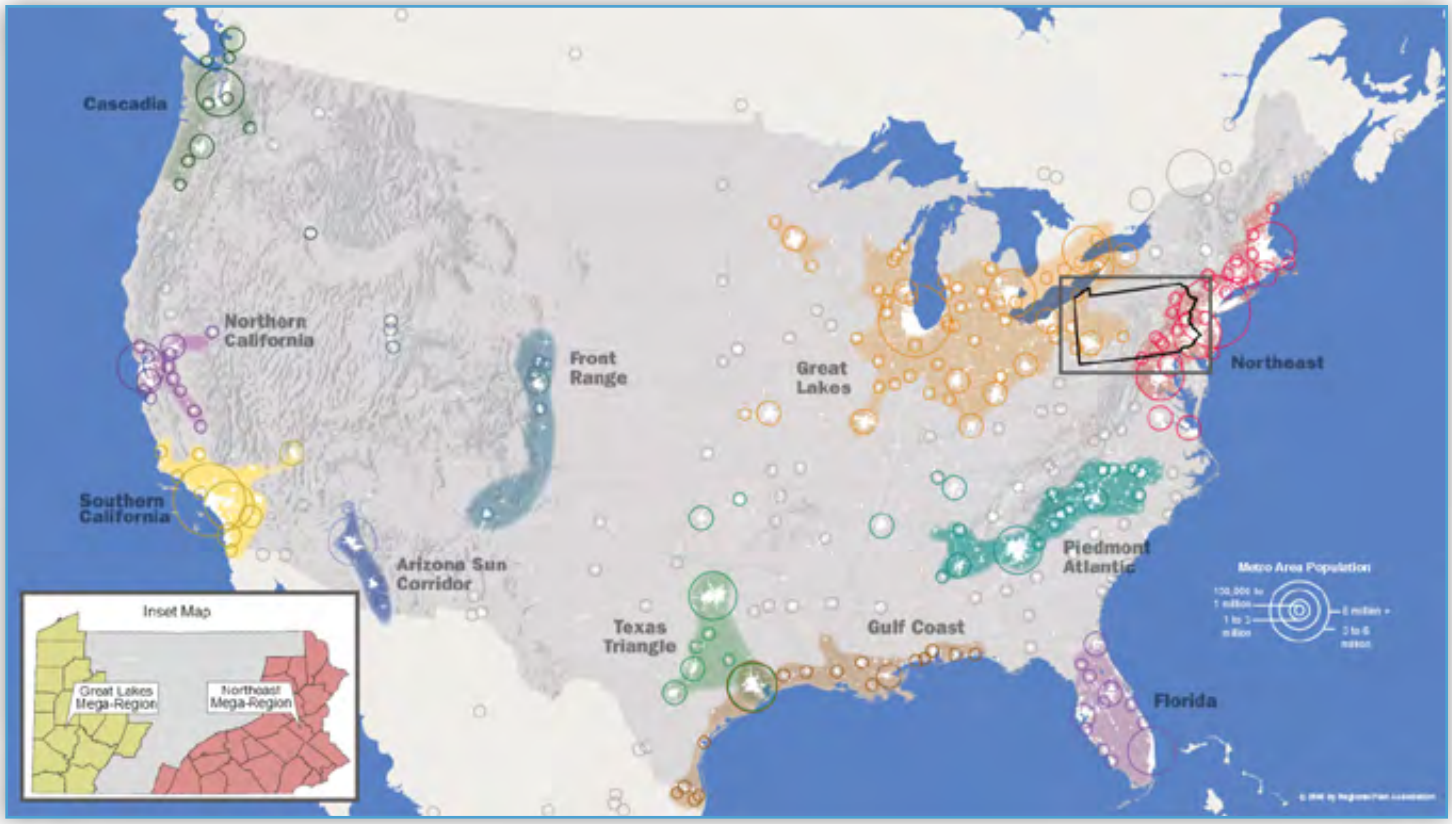
[30] *Connected and Autonomous Vehicles 2040 Vision Contract CMUIGA2012 - Work order No. 1, Carnegie Mellon University, May 13, 2014.*

Population

Mega-regions have been described as "one or a grouping of several urban areas, linked by social, economic, demographic, environmental, and cultural ties."[31] Demographers have identified 11 mega-regions across the U.S. and as shown in **Figure 5**, Pennsylvania is included in two growing mega-regions (Northeast and Great Lakes). These mega-regions account for only 30 percent of the nation's geographical area but account for 77 percent of both population and employment, 81 percent of gross regional product, and 92 percent of Fortune 500 Companies' revenue (all 2008).

With shifts in population to mega-regions, Pennsylvania will experience increases in freight flows as goods move within and between these areas. With these large mega-regions consisting of similar agglomerations of related economic activity, transportation links, and cultural relationships, they represent important frameworks for planning for the challenges inherent in a global economy. Moreover, nearly all of Pennsylvania's MPO regions are located within one of the defined mega-regions, and can be important actors within a mega-regional framework, given their ongoing role in planning for transportation, land use, infrastructure, and the environment.

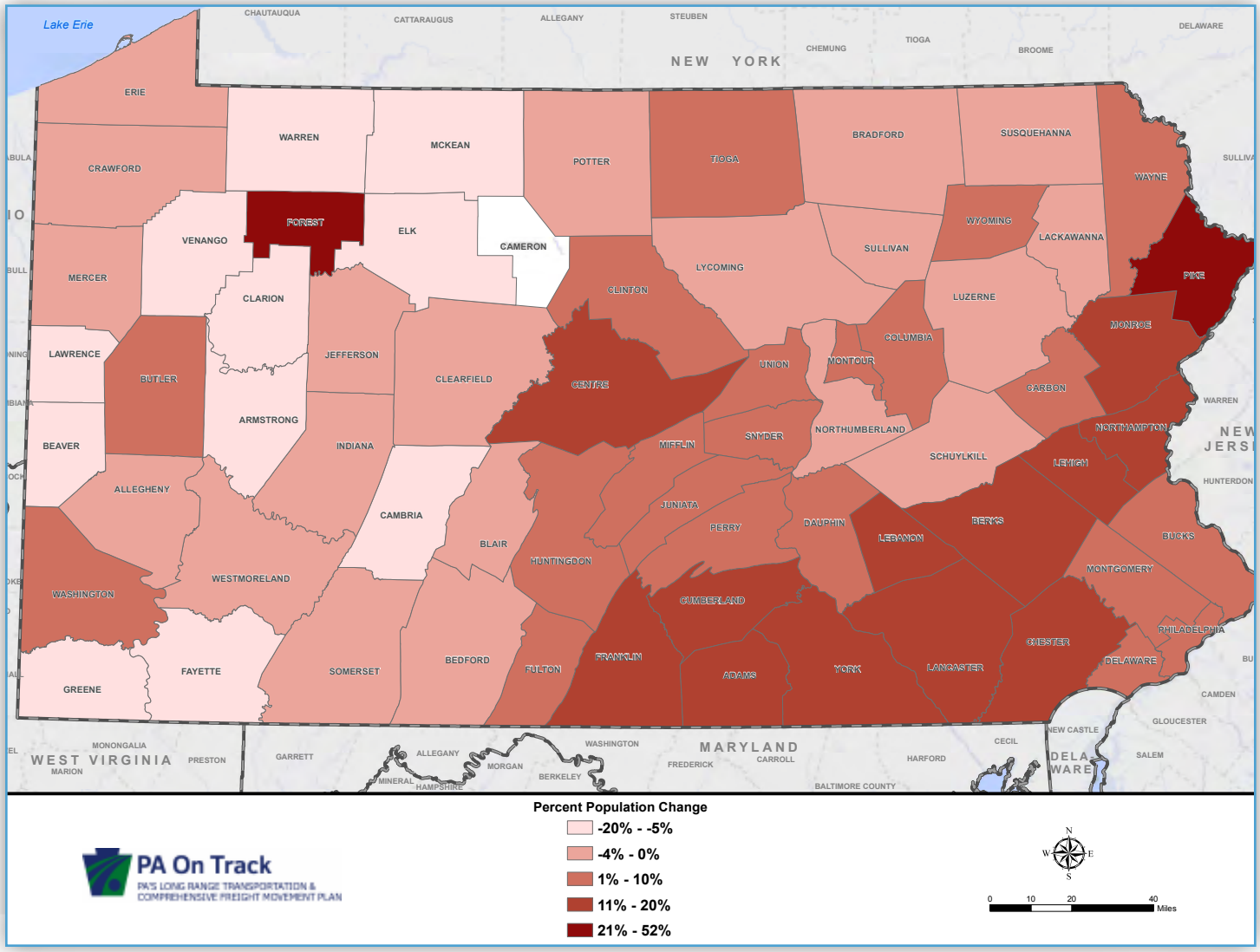
Figure 5: Pennsylvania's Share of the Great Lakes and Northeast Mega-Regions



[31] *Attributed to Shirley Franklin in "Planning for Mega-Regions", Fleming, Billy, The New Planner. Winter 2012 American Planning Association.*

Recent (2014) estimates from the U.S. Census Bureau indicate that Pennsylvania's population has grown by over half a million since the 2000 Decennial Census, when 12.28 million Pennsylvanians were counted. Much of this growth has occurred within the suburban Philadelphia counties of Chester and Montgomery, while the City of Philadelphia continues its reversal of a decades-long trend of population decline. Pennsylvania's largest city has grown by nearly 3 percent since the turn of the century, and at the 2010 Census registered its first 10-year population gain since 1950. Other large counties within the Northeast Mega-region, such as Berks, Lancaster, Lehigh, and York counties have all added significant numbers of population since 2000. Much of the state's population growth occurred in the eastern and southern regions, with in-migration from the urban centers of New York, Baltimore, and Washington. The growth in these counties has offset the population declines that continue to occur in much of the state's western half, which has experienced significant declines in manufacturing employment, along with a rise in generally lower-paying service and retail jobs. This has contributed to lackluster economic growth, spurring outmigration of young adults and working age adults. In terms of rates of increase, the most significant gains have occurred in Forest, Monroe, and Pike counties.[32] **Figure 6** shows the changes that have occurred in total population between 2000 and 2014. It shows "two Pennsylvanias": the counties within the central and eastern regions, which have collectively grown by over 645,000, or 7.7 percent since 2000, and the counties in the state's western half, which have collectively declined by nearly 140,000, or 3.5 percent over the same period.

Figure 6: Pennsylvania Population Change, by County, 2000-14



Source: U.S. Census Bureau

[32] *In the case of Forest County (a county of only 5,000 persons), the large population rate increases were due largely to the 2004 opening of a new state prison.*

What These Trends Mean For Pennsylvania

Pennsylvania residents and businesses buy and sell U.S. and global products and materials. Globalization and new technologies continue to transform economies around the world, redefining how companies operate, challenging supply chains and transportation networks, and creating new opportunities for business in places where it was previously inconceivable. To compete in this global marketplace, Pennsylvania businesses and transportation agencies must continue to work together to optimize every asset – workforce skills, competitively priced products, and reliable transportation systems – to ensure customers receive quality goods and services on-time. As the importance of trade and innovation and the demands of customers continue to advance, companies depend more than ever on integrated, resilient, and efficient freight networks to compete in this changing global marketplace.

Thus, efficient, reliable, and safe freight transportation is critical to Pennsylvania's economic competitiveness and future growth. An efficient and integrated freight transportation system reduces transportation and supply chain transaction costs and increases connectivity, reliability, and accessibility to local, state, regional, and global markets. It also supports economic development and fosters trade expansion, employment and personal income growth, and quality of life.

To address freight trends and issues, Pennsylvania must continue to be nimble and able to adopt policies and programs based on economic, demographic, infrastructure, environmental, and technology changes. Investing in critical transportation improvements and creating a resilient transportation system is essential because Pennsylvania's economy depends on the efficient movement of raw materials, components, and finished goods.

Pennsylvania's Freight Facilities and Commodity Flows

This chapter summarizes the extent of Pennsylvania's freight-related transportation infrastructure, key elements of which are listed in Table 5.

Table 5: Summary of Pennsylvania's Freight-related Transportation Infrastructure

Transportation Mode
Roadways
• 41,117 linear miles of state-owned roadway[33] • 78,008 linear miles of locally-owned roadway
Bridges
• 25,403 state-owned bridges greater than 8 feet in length • 6,400 locally-owned bridges greater than 20 feet in length • 4,300 locally-owned bridges between 8 and 20 feet in length[34]
Appurtenances
• 14,000+ traffic signals (all but a few of these are locally-owned) • 5,531 culverts • 12 roadway tunnels • Numerous retaining walls, signs, guiderails, intelligent transportation systems
Freight Rail
• Over 5,095 miles of track • 4 Class I freight railroads • 2 Class II freight railroads • 34 Class III (Short Line) railroads • 26 switching or terminal railroads
Aviation
• 7 major airports • 134 public use airports
Ports and Waterways
• 3 major ports (Philadelphia, Pittsburgh, Erie) Source: PennDOT

[33] *This total includes 779 miles of roadway owned by "Other" agencies that typically would not receive any truck traffic (e.g., state forests and parks, etc.)*

[34] *TAC Study, Financial Needs of Counties and Municipalities for Highways and Bridges (2011)*

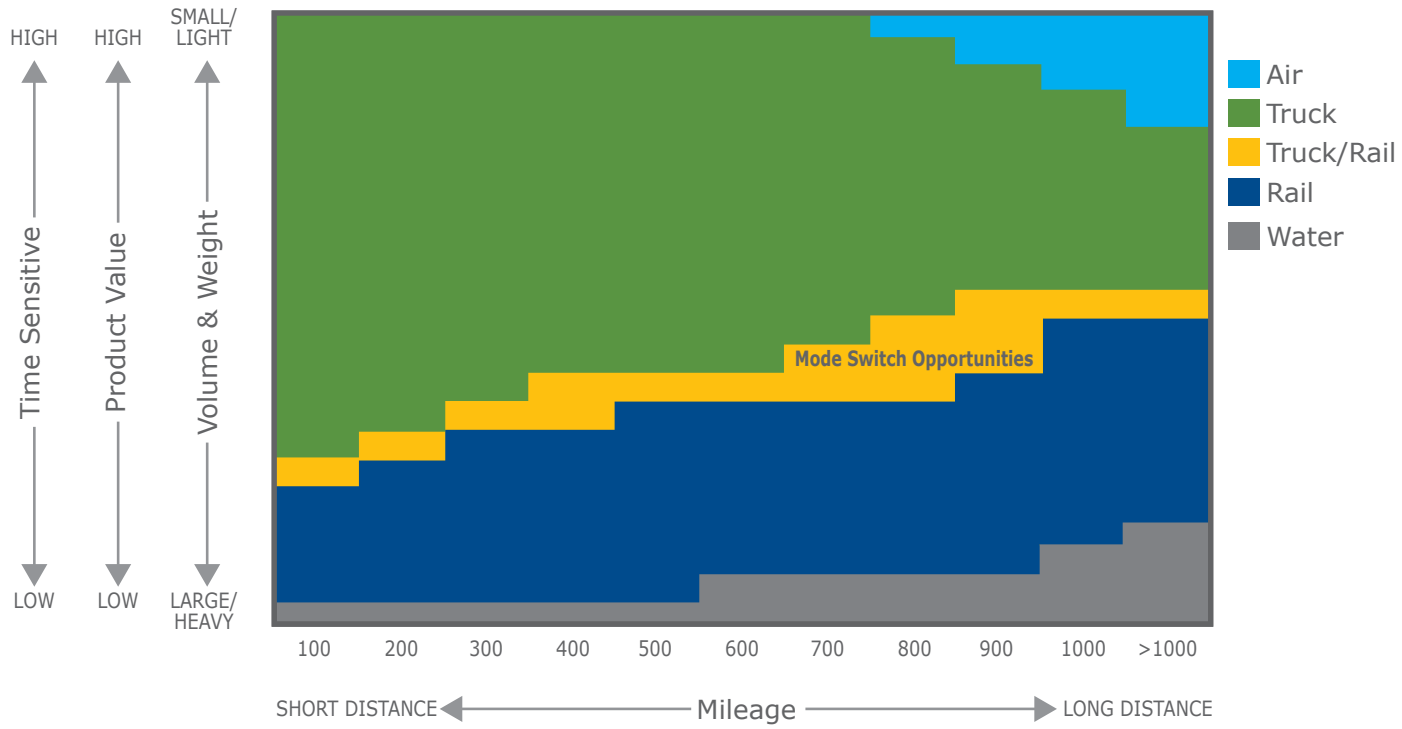
Freight Facilities and Commodity Flows: Take-Aways

The following are significant points concerning Pennsylvania's multimodal freight system:

- PennDOT maintains the 5th largest state-maintained highway system, third-largest number of bridges, and the fourth-highest number of interstate miles in the nation.
- Pennsylvania has more than 6,400 bridges with a length greater than 20 feet that are owned by other entities, mostly townships, counties, and cities/boroughs.
- Pennsylvania has 25 FHWA-designated freight intermodal connectors.
- Pennsylvania ranks 1st in the U.S. in total number of railroads (60).
- Pennsylvania is the only state that has all three types of ports: deep water, inland waterway, and Great Lakes.
- Pittsburgh is the second-busiest inland port in the nation. (USACE)
- Pennsylvania has 17 locks and most have exceeded their useful life and/or are failing.
- There are 15 commercial service airports – all of which provide passenger and air cargo/freight service.
- Pennsylvania's multimodal freight transportation system carries 1.1 billion tons of freight, valued at $1.6 trillion and is projected to grow to nearly 1.9 billion tons at a value of over $3.7 trillion by 2040.
- In 2011, trucks handled 76 percent of the tons moved in, out, internally, and through the state and 81 percent of the value. This is expected to grow to 80 percent and 85 percent, respectively, by 2040.

of several variables. **Figure 7** demonstrates the viability of each mode, depending upon variables related to shipment weight, shipment value, the origin and destination, and when the product is needed. Although not shown, other variables enter into modal selection, including security and safety, transportation costs, and customer needs. The graphic also implicitly conveys the critical importance of having well-maintained, multimodal freight infrastructure available for Pennsylvania's shippers and receivers in supporting the state's economic competitiveness.

Figure 7: Domestic Freight Modal Selection



Source: CDM Smith, Inc.

Pennsylvania's multimodal freight transportation system carries approximately $1.6 trillion of goods into, within, out of, and through the state. It carries 7.5 percent of the goods and materials produced, used, or exported by the entire country. Pennsylvania is truly the Keystone State for freight—linking its multimodal freight transportation system to consumers across the state, U.S., and globally is critical, both for bringing materials and components to companies that create the final product and for transporting finished goods. This chapter discusses Pennsylvania's multimodal freight transportation system and the volume of freight it accommodates today, and will be expected to accommodate in the future.

INVENTORY

Highway System

Pennsylvania's highway system is owned and maintained by state and local governments. Pennsylvania maintains the fifth-largest state-maintained roadway system, third-largest number of bridges, and fourth-highest number of interstate miles in the U.S.

Highway Networks

As depicted in **Table 6**, PennDOT is directly responsible for nearly 40,000 linear miles of roadway. In addition, local governments maintain an extensive and growing network of roadways totaling over 78,000 linear miles. Altogether there are approximately 120,000 miles of roadway in Pennsylvania that accommodate more than 270 million daily vehicle miles of travel (DVMT). Approximately 24 percent of the total Pennsylvania highway system is federal-aid eligible. The non-federal aid eligible highway system is comprised of minor collectors and local roads, a majority of which are in rural areas. The total system's share of truck DVMT is 28 percent, while on interstates, it is as high as 35 percent.

Approximately 6,800 state-maintained roadway miles (17 percent) are currently rated in "poor" condition. The majority of Pennsylvania's pavement structure has exceeded its design life and requires significant reconstruction and rehabilitation. A comprehensive asset management system would include the right mix of pavement preservation and reconstruction projects. The result is that subsequent preservation treatments would be more effective and last longer. PennDOT is working on an asset management plan, which is expected to improve pavement conditions over time.

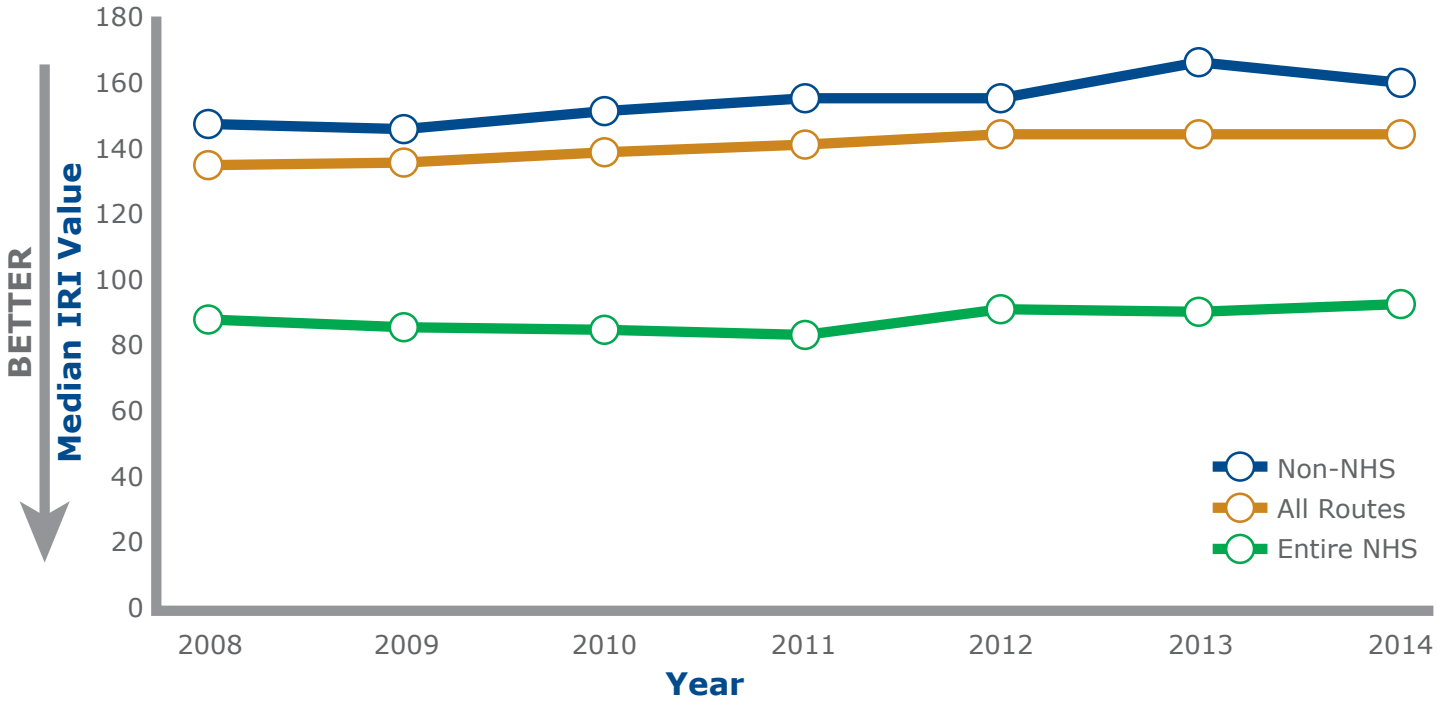
Table 6: Pennsylvania Highway Statistics (2014)

	Linear Miles	Daily Vehicle Miles of Travel
Total System	**120,039**	**273,648,047**
Rural	73,918	98,387,066
Urban	46,121	175,265,981
Federal Aid System	**28,211**	**229,268,160**
Non Federal Aid System	**91,817**	**44,379,887**
PennDOT-Owned	39,770	205,468,504
Turnpike	554	16,305,216
Other Agency-Owned	779	1,983,448
Non-State Owned	78,935	49,890,879

Source: Pub 600 (9-15) Pennsylvania Highway Statistics 2014 Highway Data

Figure 8 shows changes in International Roughness Index (IRI) values across the state, by network. Median IRI values have increased on both the NHS and non-NHS in recent years, to 91 and 166, respectively. PennDOT's five-year goal is to reduce the number of roadway miles rated as "poor" to 1.5 percent on interstate highways, and 5 percent of non-Interstate NHS highways, and to maintain current pavement conditions on the remainder of the highway network.

Figure 8: Pennsylvania Statewide Median IRI values, by Business Plan Network, 2008-14



Source: PennDOT Highway Administration

The role of locally-owned roadways (78,000 miles) should not be understated, as these roadways accommodate over 47 million vehicle miles of travel on a daily basis, or 18 percent of the overall state total. These roadways are also often commonly part of the "first and last mile" for shippers and carriers, and thus an important component (especially to energy and agribusiness) in facilitating the movement of freight. The importance of local roadways has been identified by FHWA as an area for improved awareness and PennDOT has completed much work in recent years with its partners in obtaining more information regarding the extent of this network. This importance was recognized and validated by an increased investment in the local system as part of Act 89.

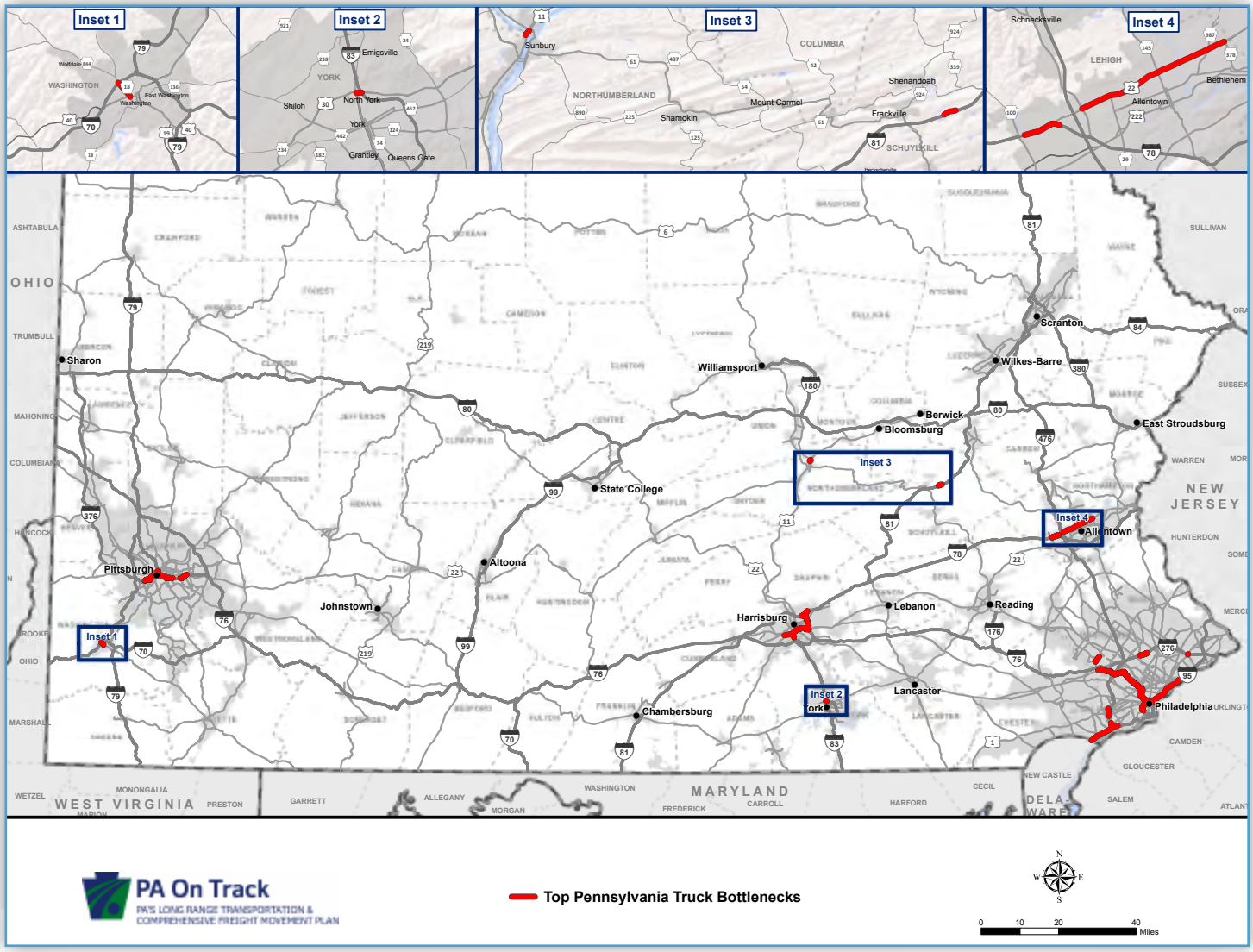
Truck Bottlenecks

Pennsylvania's top truck bottlenecks were identified using statewide truck performance measures derived from ATRI's truck GPS 2013 database for the Interstate and National Highway System (NHS). The analysis incorporated average speeds along with an indicator of volume to generate a congestion index for over 6,000 Pennsylvania highway segments. These segments are a mile or less each in length, which provides for a more detailed assessment. Based on a comparison of truck speeds on each segment over the course of a year, the top 100 truck bottlenecks were identified. **Figure 9** illustrates the top 100 truck bottleneck segments/ locations on Pennsylvania's interstates and NHS. Major interstates in Philadelphia, Pittsburgh, Harrisburg, and Allentown accounted for the majority of the identified truck bottlenecks and many of these locations have expansion or operational needs that require additional general purpose lanes, truck climbing lanes, or ITS infrastructure to improve freight movement.

Investment on the Local System

On the 2015 Twelve Year Program, there are currently $221 million in state funds programmed for local projects in addition to $870 in federal funds. This includes funding for not only bridges, but Transportation Alternatives projects, and federal funds programmed on locally-owned (but federal-aid) routes. Multimodal funds from PennDOT add another $892 million to this total.

Figure 9: Top 100 Truck Bottlenecks in Pennsylvania



Source: ATRI GPS data

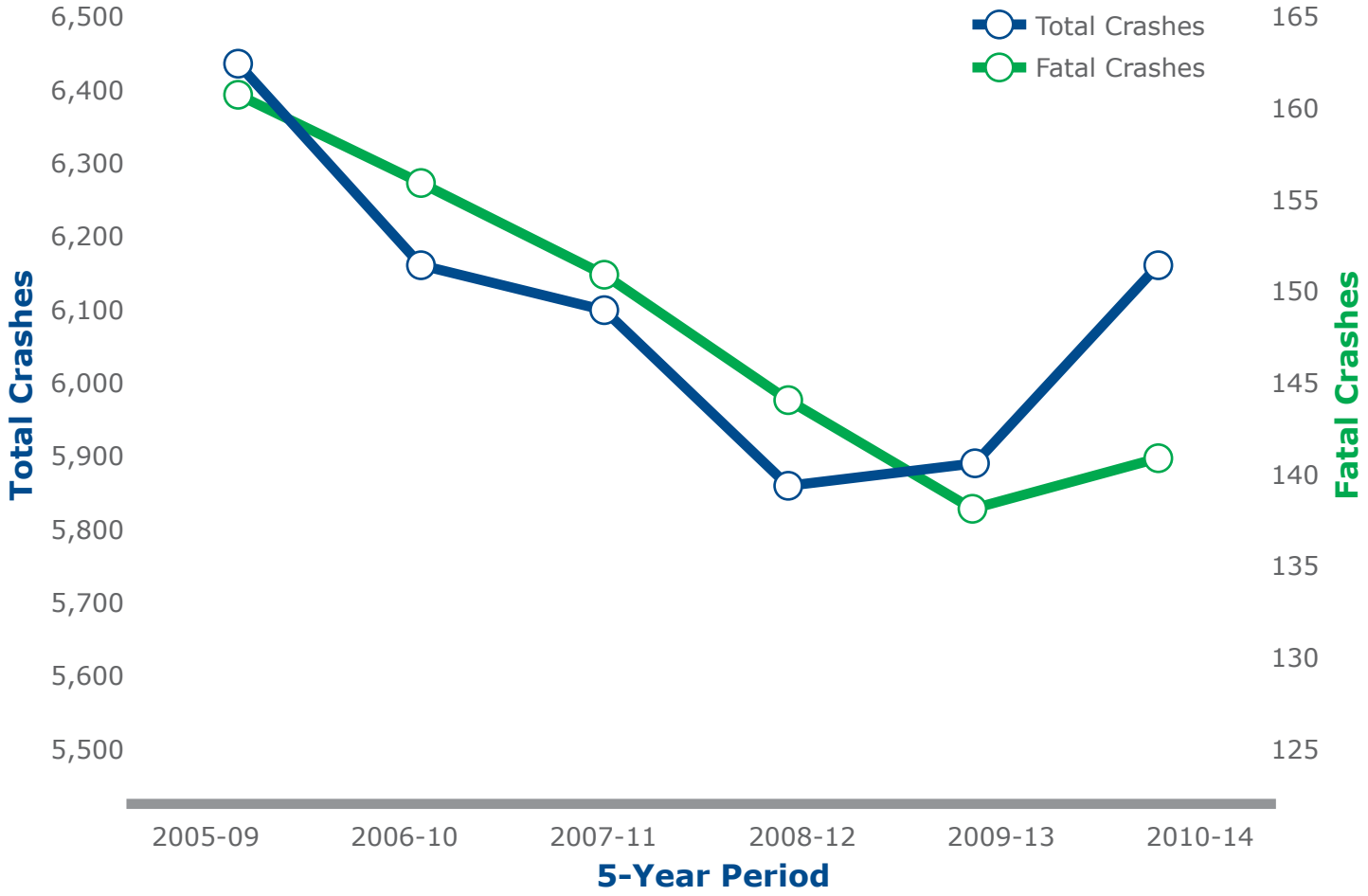
Truck Parking

Demand for truck parking, in Pennsylvania and nationwide, is increasing due to several factors. The causes are complex, and include the growth in trucking, which reflects population increases and economic markets – particularly the growing volume of imports that serve this consumer base. New federal hours-of-service regulations require more down time for drivers, which translates into an increase in demand for truck parking. The supply of truck parking is not keeping pace with steadily growing demand. A 2007 study by the state's Transportation Advisory Committee identified a shortfall of nearly 4,400 parking spaces across the state. Moreover, a 2013 PA On Track survey of motor carriers found that "Limited Overnight Truck Parking" was cited as a "very serious problem" by nearly a third of respondents. No other issue ranked as highly. This shortfall compromises safety and contributes to other environmental problems. Moreover, there has been no clear champion or lead organization to address the problem: the public and private sectors each have a role, but there is a limit to each side's responsibility, legal authority, and capability to construct and operate facilities.

Highway Safety

The safety of all motorists travelling Pennsylvania's highways is PennDOT's highest priority. While PennDOT has made progress in recent years in reducing the number of heavy truck crashes and fatalities, there were nearly 6,600 crashes involving heavy trucks in 2014 – the highest total since 2007, yet 136 of these were fatal crashes, the lowest such total registered since 2009. For the 5-year period ending 2014, an annual average of 141 heavy truck-related fatal crashes was recorded on Pennsylvania roadways. Heavy truck-related crashes accounted for approximately 12 percent of the state's total fatal crashes and 5.4 percent of all crashes in 2014. **Figure 10** illustrates the five-year average for heavy truck-related crashes and fatal crashes from 2005 to 2014.

Figure 10: Average Annual Heavy Truck-Related Crashes and Fatal Crashes, 2005-14



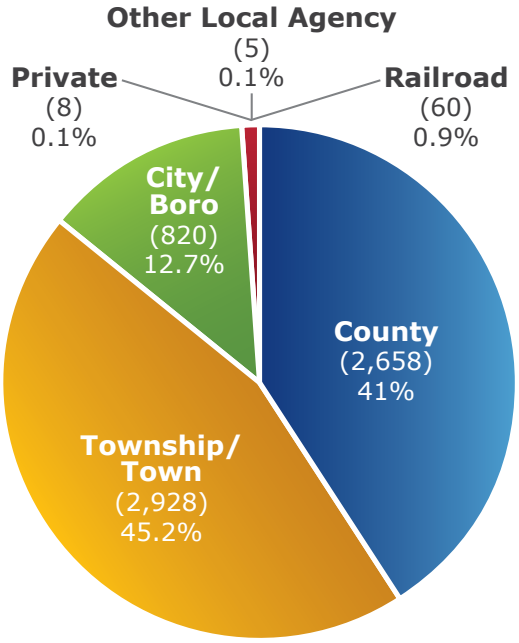
Source: PennDOT Highway Safety and Traffic Operations Division

Bridge Inventory

The state's size, topography, and expansive roadway system have resulted in the need for a large bridge inventory. As noted previously, there are over 25,000 state-owned bridges greater than 8 feet in length. Pennsylvania's bridges serve as a crucial link in the state's transportation system. Pennsylvania bridges also represent one of PennDOT's largest capital investments. The cost of constructing the more than 25,000 bridges greater than 8 feet in length that the State currently maintains has been estimated at $30-40 billion. Maintaining the state's bridge assets protects this investment and ensures that bridges are safe and resilient to move people and goods efficiently.

In addition to the state-owned bridges, as shown in **Figure 11** there are more than 6,400 bridges with a length greater than 20 feet that are owned by other entities, mostly townships, counties, and cities/boroughs.[35] While most counties do not own roads, counties own 41 percent of the state's local bridges.[36]

Figure 11: Local Bridge Count (greater than 20 feet), by Owner, 2014



Source: PennDOT Bridge Management Systems, December 2014

Faced with an aging infrastructure and limited resources, Pennsylvania experienced a steady increase in its number of structurally deficient (SD) bridges.[37] In fact, compared to other state DOTs, PennDOT has the highest number of SD bridges in the country. PennDOT saw the number of its structurally deficient bridges climb to an all-time high of 6,034 in 2008, or 24 percent of its bridge stock. Since 2011, Pennsylvania has reduced its total number of SD bridges more than any other state. Today, 15.8 percent of the state-owned bridges are classified structurally deficient and 17 percent are rated functionally obsolete. A structurally deficient bridge typically requires significant rehabilitation or replacement to address the deterioration of one or more of its elements.

Another important measure to evaluate bridge conditions is evaluating the percentage of structurally deficient deck area, which factors in the size of bridges. By focusing on all sizes of bridges, including large bridges (over 500 feet in length), PennDOT has significantly reduced the percentage of structurally deficient deck area. Today, the state-owned share of structurally deficient deck area is 10.2 percent.

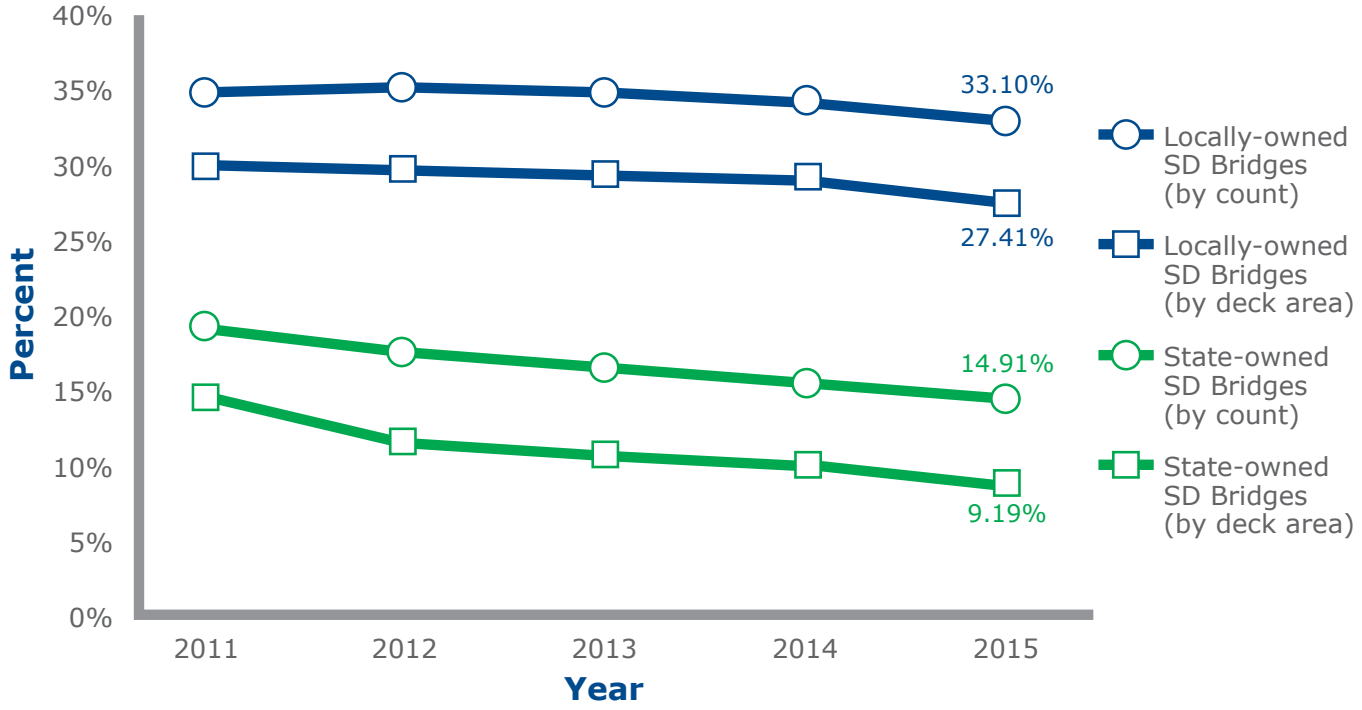
Of Pennsylvania's non-state-owned bridges, nearly 2,200 (35 percent) are considered SD, and nearly 1,900 (14 percent) are posted or closed. **Figure 12** shows how state and local bridge conditions have improved by both number and deck area, for the four-year period ending 2014.

[35] *Local government is not required to report on bridges less than 20 feet in length to PennDOT's Bridge Management System (BMS).*

[36] *Only five counties do not own any bridges: Centre, Erie, Juniata, Potter, and Warren.*

[37] *These are structures that have been identified as having structural weaknesses or inadequate waterway.*

Figure 12: Percent of Structurally Deficient Bridges, State and Locally Owned, 2011-15



Source: PennDOT Bridge Management Systems, December 2015

Rail

Pennsylvania is a national leader in a number of freight rail categories. In 2011, Pennsylvania ranked:

- First among states in the number of railroads (60);
- Fifth in railroad mileage (5,095 miles of track);
- Between seventh and tenth in tons and carloads originating and terminating within the state; and
- Eighth in total railroad employment (6,977) and rail wages ($483.2 million).[38]

Class I Railroads are defined by the Federal Surface Transportation Board (STB) based on the value of annual carrier operating revenue. The required minimum revenue is adjusted annually. Class I railroads primarily operate long-haul service over high-density intercity traffic lanes.
Class II or Regional railroads are defined by STB as having annual revenue between the limits set for Class I and Class III railroads.
Class III or Short line railroads have annual revenue less than a threshold established annually by STB.

Class I Freight Rail Inventory

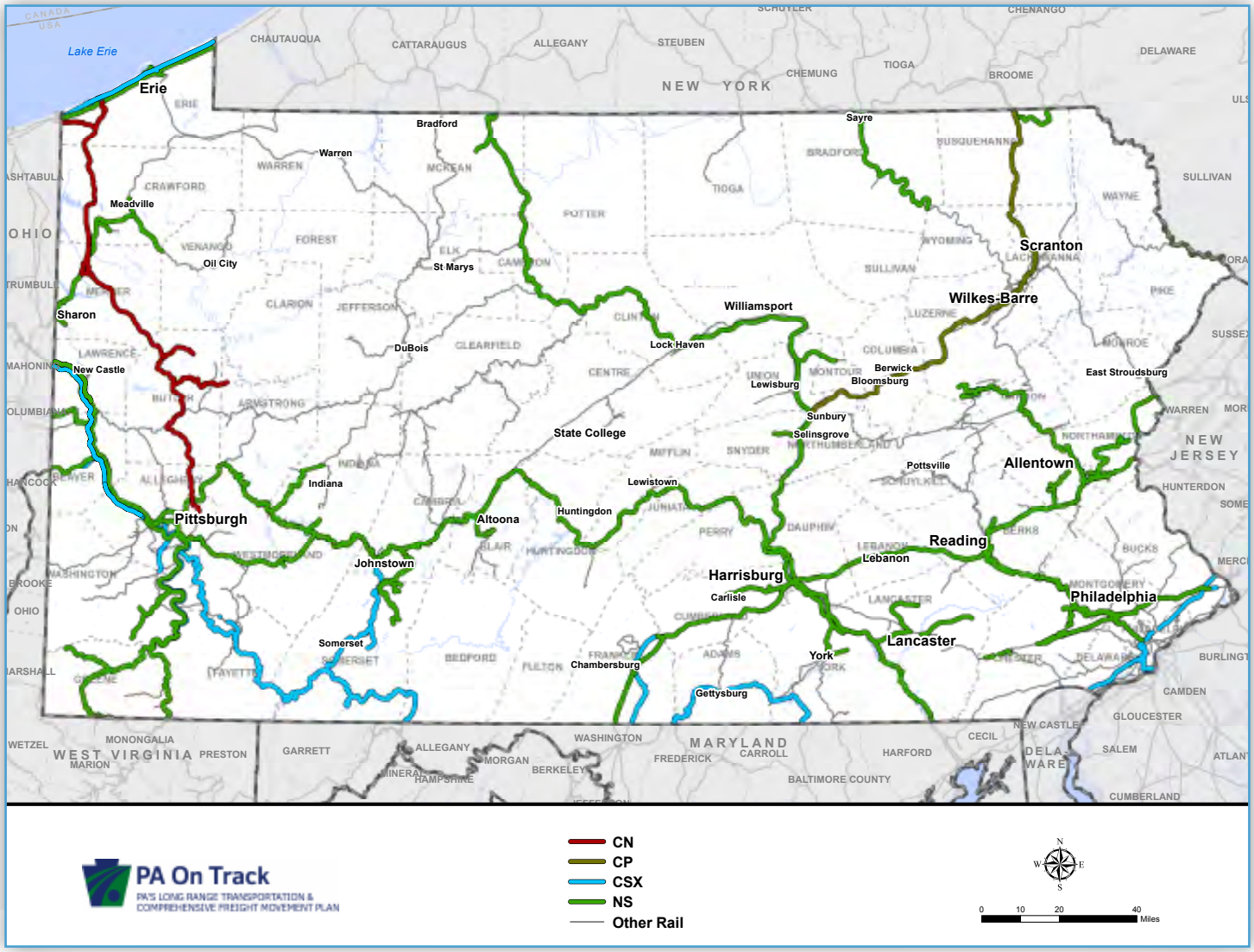
Pennsylvania is served by four privately-owned Class I railroads: Canadian National Railroad, Canadian Pacific Railroad, CSX Transportation, and Norfolk Southern. These railroads function as line-haul carriers, in that they predominantly move freight long distances between terminals over high-density intercity rail lines. Although Class I railroad miles constitute approximately 26 percent of the total rail miles in the state, they carry approximately 90 percent of rail freight volume in the state. **Figure 13** shows the Class I freight railroad lines in Pennsylvania.

The Canadian National Railroad (CN), through its U.S. Great Lakes Transportation subsidiary operates the Bessemer and Lake Erie Railroad Company (BLE), which extends between the Lake Erie port of Conneaut, Ohio and steel mills in the Pittsburgh area. Within Pennsylvania, this CN subsidiary owns and operates over 156 track miles.[39] The BLE operates a rail yard and maintenance facility in Greenville.

[38] *Association of American Railroads*

[39] *Grand Trunk Corp. Class I Annual Report, Year ending December 31, 2012*

Figure 13: Pennsylvania's Class I Rail Freight Network



Source: Rail Freight Conditions, Trends, and Implications Technical Memorandum

The Canadian Pacific Railroad (CP), through its U.S. Soo Line subsidiary, has operated within Pennsylvania since 1991 when it purchased the Delaware & Hudson Railway. It operates over 127 track miles of lines it owns and 325 track miles via trackage rights within Pennsylvania.[40] The railroad operates over its own lines from Binghamton, New York, providing service to Scranton and Sunbury. CP also extends direct service to Bethlehem via trackage rights. Although it no longer serves Philadelphia directly, it does market its services in the South Philadelphia Port area, which is delivered to CP via haulage agreements with CSX Transportation and Norfolk Southern. Canadian Pacific Railroad also services transload facilities in Scranton, Taylor, and Wilkes-Barre.

CSX Transportation (CSXT) operates over 1,040 miles of track in Pennsylvania comprised of 428 miles owned, 76 miles of proprietary railroads or lines operated under lease or contract, and 536 miles operated via trackage rights.[41] CSXT operates primarily over three major corridors:

- A corridor extending from New York State to Chicago via Erie (Lake Shore and Erie West Subdivisions);

[40] *Soo Line Corp. Class I Annual Report, Year ending December 31, 2012*

[41] *CSX Transportation Class I Annual Report, Year ending December 31, 2012*

- A corridor extending from Maryland to Ohio via the southwest portion of Pennsylvania from the Pennsylvania/ Maryland border at Cumberland, MD north through Pittsburgh to Greencastle (Keystone, Pittsburgh, and New Castle Subdivisions); and,
- A corridor extending from Delaware to New Jersey via Philadelphia, which parallels Amtrak Northeast Corridor Line (Philadelphia, Harrisburg, and Trenton Subdivisions).

CSXT operates major rail yards at Philadelphia (Greenwich Yard) and Pittsburgh (Demler Yard). It services intermodal facilities at Chambersburg and Philadelphia, TRANSFLO facilities at Butler, Chester, Philadelphia, and Pittsburgh, and an auto distribution center at Aston (Twin Oaks). CSXT also serves port terminals including the Tioga Marine Terminal in South Philadelphia and the South Philadelphia Port Complex.

Norfolk Southern (NS) operates over 2,278 miles of track in Pennsylvania comprised of 1,636 miles of NS-owned track, 5 miles operated under contract, and 637 miles operated via trackage rights.[42] NS line haul freight movements in Pennsylvania are conducted primarily over seven corridors:

- NS' Mainline corridor between Philadelphia-Harrisburg-Pittsburgh, which provides access between Mid-Atlantic ports and Chicago and other Midwest destinations (Harrisburg, Pittsburgh, and Youngstown Lines);
- A corridor between Reading-Bethlehem-Easton that extends into New Jersey (Reading and Lehigh Lines);
- A corridor extending from Delaware and Maryland (Perryville) to Harrisburg (Port Road Branch);
- A corridor extending NS' Mainline to Maryland via Harrisburg-Chambersburg-Hagerstown, MD (Lurgan Branch);
- A corridor between southwest Pennsylvania and West Virginia via Pittsburgh-Brownsville-Waynesville (Mon Line);
- A corridor connecting Harrisburg and Buffalo, NY via Harrisburg-Lock Haven-Emporium-Port Alleghany (Buffalo Line); and,
- A corridor connecting Buffalo, NY to Ohio via Erie (Lake Erie District).

NS operates classification yards in Allentown, Conway, Enola, and Harrisburg, serves intermodal facilities in Bethlehem, Harrisburg (Rutherford Yard), Morrisville, Pittsburgh, Sayre, and Scranton (Taylor Yard), and recently opened a new intermodal facility at Greencastle. NS also serves port terminals including the West Elizabeth Monongahela River Terminal Cluster, the Donora Industrial Park Terminal, the Tioga Marine Terminal in South Philadelphia, the South Philadelphia Port Complex, and the Novolog Port Facility.

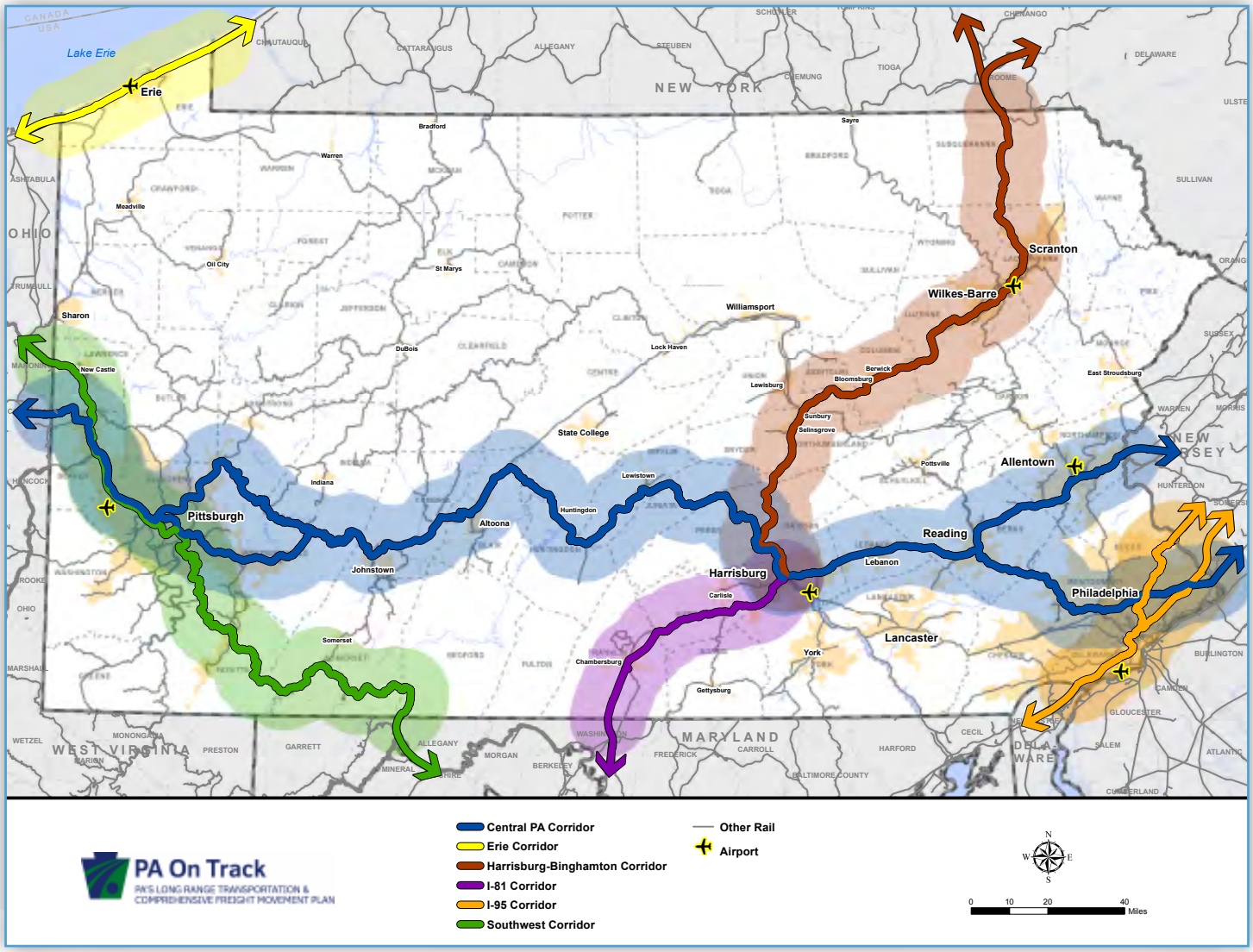
[42] *Norfolk Southern Corp. Class I Annual Report, Year ending December 31, 2012*

Emerging Rail Freight Corridors

Class I railroads generally move traffic through Pennsylvania along high density corridors that often parallel major highway corridors. These corridors may also include operations and individual lines owned by multiple railroads. Although these major Class I railroad corridors constitute only approximately 26 percent of the total rail miles in the state, they are estimated to carry approximately 90 percent of rail freight volume in the state. These major rail freight corridors are shown in **Figure 14** and described below.

- **Central Corridor:** This NS rail corridor is the most heavily used in Pennsylvania in terms of total tonnage of rail traffic moved. The corridor within Pennsylvania extends across the state, from its western end near Midland east to Reading. At Reading it divides to Easton northeast along the I-78 corridor, and southeast to Philadelphia. As of 2011, almost 1.5 million carloads (one-third of the total carloads) and 54 percent of total rail ton-miles traveled over this corridor. Ton-miles are a unit of rail traffic density that measures annual tonnage over a specific segment of rail line. Forty percent of the traffic was through traffic, with the remainder equally divided by originating and terminating traffic. Four NS intermodal terminals are located on the corridor at Pittsburgh, Harrisburg, Bethlehem, and Morrisville and over 50 percent of the traffic over the line is intermodal. Coal, which comprises approximately 20 percent of carloads, is the next largest commodity moved over this corridor.
- **I-81 Corridor:** This NS rail corridor extends 67 miles in central Pennsylvania from the PA/MD border near Hagerstown, MD to Enola Yard in Harrisburg. This corridor is part of the NS Crescent Corridor, which extends from the Gulf Coast and Memphis to Harrisburg, Philadelphia, and the New York metropolitan area. The NS Rutherford intermodal terminal is located on the corridor at Harrisburg with an additional intermodal terminal in Greencastle. Almost 50 percent of the traffic on this corridor is inbound to Pennsylvania. Over 60 percent of the traffic is intermodal, with coal also comprising an additional 10 percent of the corridor's traffic.
- **Southwest Corridor:** This CSXT rail corridor crosses the southwest portion of Pennsylvania from the PA/MD border near Cumberland, MD north through Pittsburgh to the Ohio border near New Castle. The total length of the corridor is 183 miles. This corridor is part of CSXT's National Gateway and two CSXT intermodal terminals are located on the corridor at Chambersburg and Pittsburgh. This corridor carries approximately 13 percent of the state's carloads and 17 percent of its ton-miles. Two-thirds of the traffic over the corridor is through traffic, with intermodal and coal constituting over half of its traffic. Steel, waste, and scrap materials are also major commodities carried over the corridor.
- **Harrisburg-Binghamton Corridor:** This CP/NS rail corridor extends approximately 180 miles north from Harrisburg along the Susquehanna River to Scranton, where it extends north to Binghamton, NY. CP operates between Sunbury and Binghamton, and NS operates between Sunbury and Harrisburg via trackage rights over CP. This corridor carries approximately four percent of all traffic in the state with coal and intermodal as the leading commodities on the corridor, which extends to New York, New England and Canadian markets.

Figure 14: Emerging Rail Freight Corridors in Pennsylvania



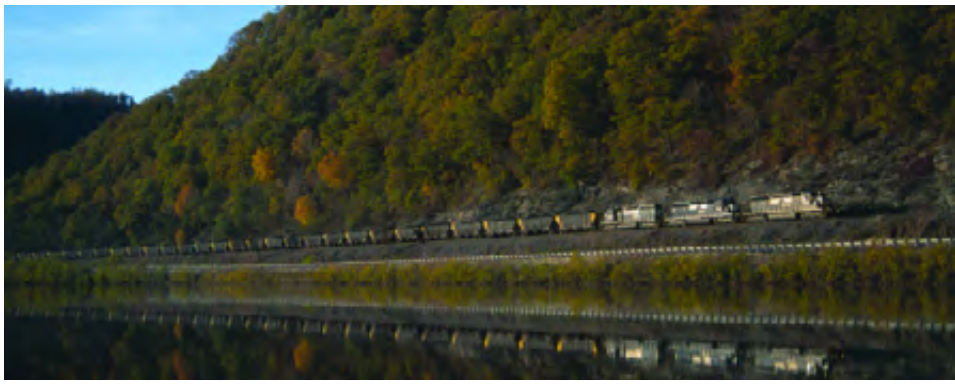
- **Erie Corridor:** This corridor, which extends between Buffalo, NY and Cleveland, OH, is comprised of parallel NS and CSXT lines along Lake Erie in northwest Pennsylvania. Although the corridor has only 95 miles of track within Pennsylvania, or two percent of the total state rail network, it carries 20 percent of total carloads. Through traffic makes up 85 percent of the rail traffic carried over these lines. Major commodities carried over the corridor are intermodal shipments, coal, and transportation equipment.
- **I-95 Corridor:** This CSXT rail corridor parallels I-95 in southeastern Pennsylvania from Chester north through Philadelphia to the New Jersey/ Pennsylvania border at Yardley. Intermodal constitutes 50 percent of the corridor's carloads, with a CSXT intermodal terminal located on the corridor in South Philadelphia. Other major commodities moved over the corridor include food, automobiles, chemicals, and petroleum, most of which is through traffic.

The volume of intermodal and coal traffic over these corridors is shown in **Table 7**.

Table 7: Commodity Movements on Major Freight Corridors

	Carload % of Corridor Total		
	Intermodal	Coal	Others
Central	58%	14%	28%
Erie	50%	13%	37%
I-95	52%	7%	41%
Southwest	37%	15%	48%
I-81	59%	20%	21%
Harrisburg-Binghamton (NY)	51%	15%	34%

Source: Pennsylvania Intercity Passenger and Freight Rail Plan 2010



Class II Railroads

Pennsylvania has two privately-owned Class II railroads: the Buffalo & Pittsburgh Railroad (BPRR) and the Wheeling and Lake Erie Railway. BPRR, a part of the Genesee & Wyoming Corporation's New York/Ohio/Pennsylvania Region, extends from both Buffalo, New York and Erie to Pittsburgh and New Castle over 368 miles of track. BPRR transload facilities in Pennsylvania are located at Erie and DuBois. The BPRR interchanges with all Class I carriers and major commodities carried include aggregates, brick and cement, automotive products, chemicals, coal, food and feed products, metallic ores and minerals, steel, scrap materials, and construction grade lumber.

The Wheeling & Lake Erie Railway operates over 840 miles of track between Toledo, Ohio, and Hagerstown, Maryland, with operations concentrated in eastern Ohio and western Pennsylvania. The railroad owns 575 miles of track and operates over 265 additional miles via trackage rights. Within Pennsylvania the railroad operates over 103 miles, serving southwest Pennsylvania and connecting Pittsburgh and Connellsville to Bellevue, Akron, and Carey, Ohio.

Class III Railroads

Class III railroads are generally classified as either local railroads or switching or terminal railroads that operate over less than 350 miles of track and have annual operating revenue of less than a threshold established annually by the Surface Transportation Board.

Local railroads are short line rail railroads that provide direct access to freight customers not served directly by Class I or Class II railroads. Switching or terminal railroads are short line railroads that primarily switch cars between other railroads or provide service from other lines to a common terminal. Pennsylvania leads the nation in the number of Class III railroads with 33 local railroads and 26 switching or terminal railroads.

Most short line railroads were formed from former Class I branch lines that were no longer economical to operate. Class III railroads serve as a feeder system to Class I railroads, connecting communities and small businesses to the national rail network. Class III railroads provide customized, competitive service to businesses that would otherwise have to rely solely on truck transportation, although some short lines are forced to abide by constraining contractual provisions in line sale agreements they accepted in exchange for receiving the lines.

Bulk Transload Locations

In addition to the major yard and intermodal facilities noted above, Pennsylvania has 28 rail transload facilities. These facilitate the delivery of bulk materials by rail for direct distribution or transfer to other modes, primarily truck. These facilities are located on both large and small railroads within the state. They are typically owned by either railroads or private distribution or storage companies and provide track space for rail cars to be unloaded. The leading commodities transloaded at these facilities include chemicals, acids, foods, plastics, and petroleum products. These facilities provide the ability for small scale businesses to take advantage of rail except for the final few miles of the entire trip.

Transload facilities are also in high demand in areas where new wells are being drilled for oil or natural gas. The availability of transload facilities to deliver water, sand and drilling fluids reduces the need for long-distance trucking and the extension of rail lines to drill sites.

Analyzing rail needs provided by either the railroads or by local agency applicants through PennDOT's Rail Freight Assistance Program (RFAP) or Rail Transportation Assistance Program (RTAP) indicates that Class I railroad needs in Pennsylvania are aimed at increasing network efficiency. Improving system efficiency typically includes capacity increases through additional tracks, upgrading signal and communication systems, and removing double-stack clearance restrictions.

These needs are largely due to the existing and prospective increases in intermodal traffic, for which Pennsylvania plays a dual role as not only a port state but also major connecting state between the Atlantic coast ports and the Midwest. This role also contributes to the additional new/improved terminal and facility needs noted by the railroads.

Association of American Railroads 2007 National Rail Freight Infrastructure Capacity and Investment Study, with input from individual Class I railroads, estimated that Pennsylvania's major rail corridors would approach or reach available capacity by 2035, and the I-81 and I-95 corridors could exceed capacity earlier.

Class II and Class III railroads require track infrastructure rehabilitation, bridges to accommodate heavier car loadings, and at-grade crossing improvements.

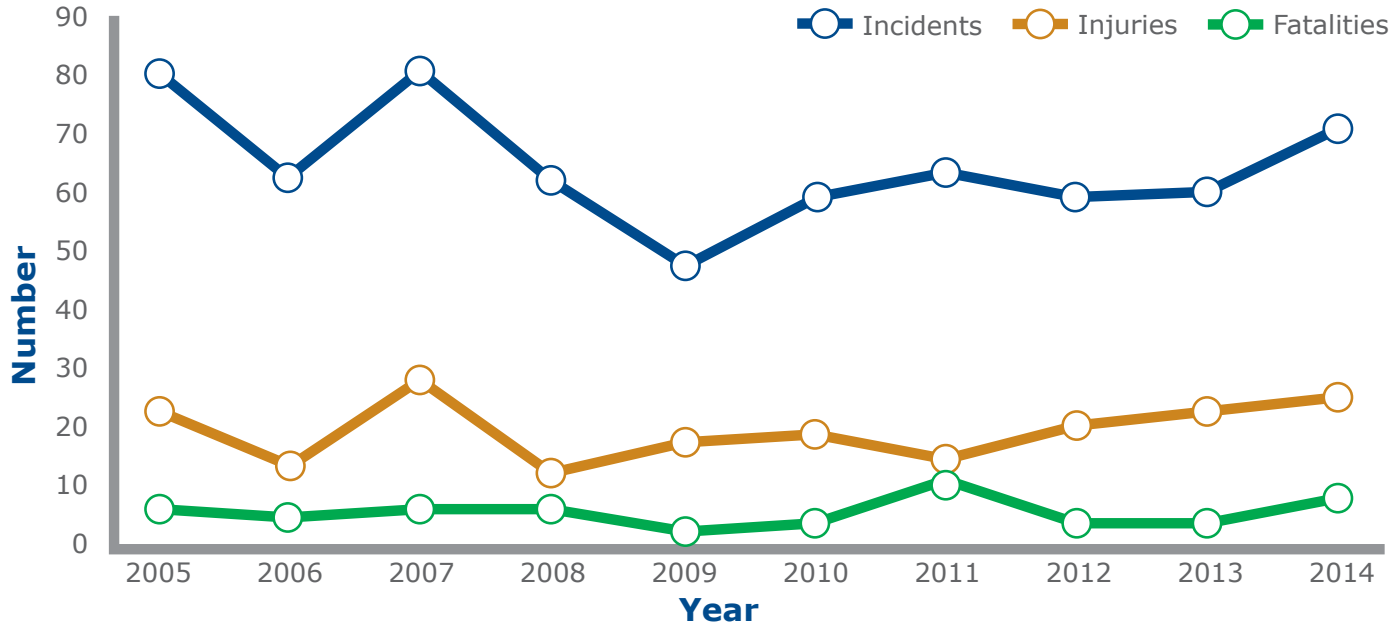
The railroads have focused most recently on supporting the natural gas market demands created by the Marcellus and Utica Shale deposits in Pennsylvania and surrounding states. This demand has spurred additional needs for new or improved rail access to drilling or distribution sites as well as rail transload facilities in Pennsylvania.

At-Grade Railroad Crossings

According to the Federal Railroad Administration (FRA), there are approximately 3,487 public at-grade railroad crossings throughout Pennsylvania. Allegheny County leads the state in the total number of such crossings, with 395.[43] The closure of at-grade crossings is an issue that is very important for the state's railroads. Eliminating at-grade crossings (either through consolidation or grade-separation) would reduce liability and allow carriers to move freight more quickly.

For the decade ending 2014, Pennsylvania recorded 644 incidents at its public and private at-grade railroad crossings **(Figure 15)**. These incidents resulted in 191 injuries, and 47 fatalities. Over this period, Allegheny County recorded the state's greatest number of incidents, with 54, while Northumberland County registered the most fatalities, with five.

Figure 15: Highway-Rail Incidents in Pennsylvania, 2005-14



Source: Federal Railroad Administration

[43]*Federal Railroad Administration (FRA)*

Water

Moving freight by water is one of the lowest cost, most energy efficient, and most environmentally friendly means of transport per ton. It is, however, typically the slowest and least time-reliable mode. Ports and marine terminals are gateways for waterborne cargo to be imported or exported, providing consumers with access to lower-cost goods and industries with access to raw materials and resources.

The location and development of major cities and industries in Pennsylvania is directly tied to the locations of the major waterways in the state and access to them. It is not a coincidence that three of the four largest cities in Pennsylvania are located directly on major navigable water bodies. Philadelphia is at the confluence of the Delaware and Schuylkill Rivers with direct access to the Atlantic Ocean. The Allegheny and Monongahela Rivers form the Ohio River at Pittsburgh, and Erie was developed on the banks of Lake Erie where it was sheltered by Presque Isle.

Pennsylvania is the only state that has all three types of ports: deep water, inland waterway, and Great Lakes. Inland waterways, including the Ohio River system, serve as domestic trade routes connecting western Pennsylvania with trading partners in 18 states, providing an efficient, cost-effective means of transporting goods to both domestic and international markets. This section describes the existing conditions for the Delaware River ports serving the Philadelphia area, Pittsburgh area ports, and the Port of Erie, and the associated waterways.

Marine Highway Corridors

The U.S. Department of Transportation's (USDOT's) Marine Highway Program is an initiative to move more cargo via water rather than on congested highways. The designation incorporates these waterways into the greater U.S. transportation system, especially where marine transportation services are the most efficient, effective, and sustainable transportation option. Federal Marine Highway Corridors such as M-70 in Pittsburgh and M-95 in Philadelphia are part of this national network. The Philadelphia Regional Port Authority (PRPA) is currently exploring the feasibility of a Marine Highway project that would analyze the market and financial feasibility of using the Port of Philadelphia for a domestic marine highway service.

Ownership of Pennsylvania Ports

Marine facilities in Pennsylvania may be either publically or privately owned. Public facilities in Pennsylvania are maintained by the public sector but leased to operators for loading and unloading of ships (stevedoring) and other cargo handling operations. All facilities, both public and private, rely on marine infrastructure maintained by the public sector. Maintenance of channels in navigable waterways is the responsibility of the Federal Government. This includes canal dredging and maintenance and repair of the lock and dam system on the inland waterways by the U.S. Army Corps of Engineers (USACE). Capital improvements to these channels and associated facilities are generally accomplished with matching funds from a local sponsor (e.g., the Philadelphia Regional Port Authority (PRPA) is the local sponsor for the Delaware River channel deepening).

Delaware River Ports

Delaware River ports include the marine facilities on the Pennsylvania side of the Delaware River and on the Schuylkill River, from the Delaware state line north to Fairless Hills, Pennsylvania (Port of Bucks). This includes facilities in Bucks, Delaware, and Philadelphia Counties. The Philadelphia Regional Port Authority owns a portion of the terminals within Philadelphia County, with the balance of the terminals owned and operated by the private sector. The Delaware River channel is currently being deepened to 45 feet to allow greater access for larger vessels. The project is expected to be completed in mid-2017. The dredging will allow for more cargo on ships coming into the ports, and allow larger ships from Asia to sail the river when the Panama Canal expansion is completed in 2016. The largest U.S. ports already maintain deeper drafts, including Charleston, S.C. (45 feet), and Baltimore and Norfolk, Va. (50 feet). The Port of New York and New Jersey is being deepened to 50 feet from 45.

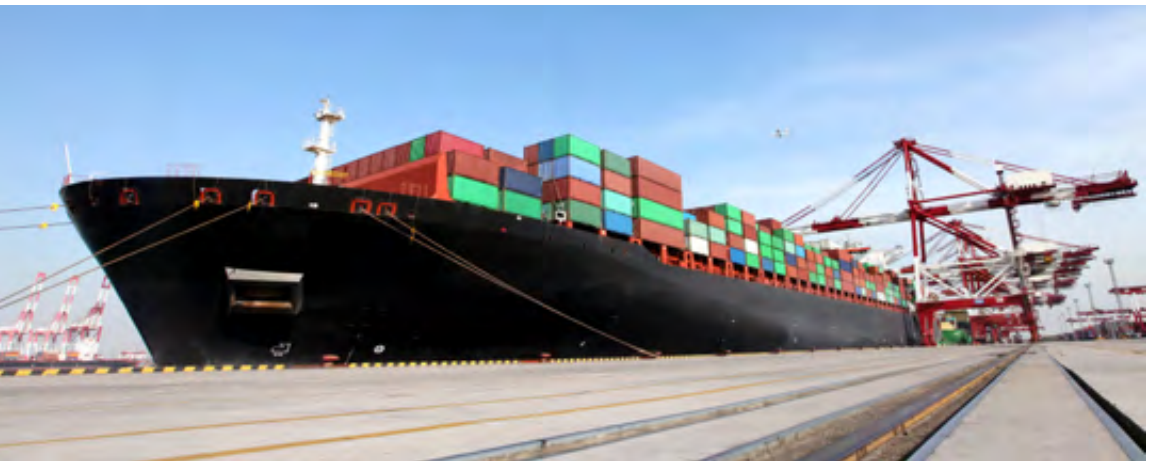
The Delaware River channel deepening and the ability to expand terminal facilities is expected to capture new services and markets, providing Delaware River ports the opportunity to maintain or increase growth relative to the industry. Developments in the production and logistics of petroleum products related to natural gas are expected to spur development of new markets and modernization of facilities, suggesting cargo volumes will increase in the near term well beyond what is indicated in the forecast. It should also be noted that the port facilities in the Philadelphia region handle a lot of break-bulk commodities. A plausible outcome of the increase in container traffic due to the expansion of the Panama Canal could be that ports in the Delaware Valley may be able to attract more break-bulk commodities currently being handled by other ports.

Port of Pittsburgh

The Port of Pittsburgh Commission defines the Pittsburgh Port District as a 12-county area and includes the three major rivers in southwestern Pennsylvania: the Allegheny, the Monongahela, and the Ohio. Together, these rivers encompass essentially all 200 miles of commercially navigable waterways in southwestern Pennsylvania.

Based on information developed by USACE and provided by the Port of Pittsburgh Commission, there are over 200 facilities on the three-river system that have, or had river access or wharf or dock structures.[44] The terminals themselves consist of dry bulk (minerals), dry bulk (coal), cement, petroleum products, chemicals, general cargo, metals, miscellaneous equipment, marine service providers, and shipbuilding and repair facilities. Generally, facilities serve barge traffic for cargo handling. Many of these facilities support marine operations such as towing services or by providing mooring locations, but do not have a specific cargo purpose.

[44] *Dock List, Port Series No. 60, U.S. Army Corps of Engineers Institute for Water Resources, 2004.*



Barge traffic accessing the Port of Pittsburgh is made possible by a series of locks and dams located along the Allegheny, Monongahela, and Ohio rivers that are the responsibility of the USACE. Seventeen of these locks are located in the Pittsburgh Port District and most have exceeded their useful life and require replacement. If lock and dam needs are not addressed by the USACE, it will impede the ability of barges to access Port of Pittsburgh facilities. This will create an economic disadvantage and impact critical supply chains that will put a greater demand on Pennsylvania roadways and rail lines. A catastrophic failure within the inland waterway system would also have serious effects on the industries that rely on river transport for shipping and receiving of commodities.

The locks and dams were constructed well over 50 years ago to maintain a minimum 300-foot wide shipping channel and pool depth of 9 feet along the riverway. The Port of Pittsburgh Commission reports that of the three sets of locks and dams on the Ohio River, two are in “very poor” condition. Of the six sets of locks and dams on the Monongahela River, two are in “poor” condition, and of the eight sets of locks and dams on the Allegheny River, five are in “poor” condition, and one is in “very poor” condition.

Presently, two of the locks and dams are under reconstruction which will result in the elimination of one of the lock and dam sets on the Monongahela River. Also, there is a project to rehabilitate one of the lock and dam sets along the Ohio River. No plans exist to widen or deepen the lock system.

MARAD - The U.S. Maritime Administration

MARAD is an agency within the U.S. Department of Transportation dealing primarily with waterborne transportation. Among its many duties, MARAD determines services and routes necessary to develop and maintain American foreign commerce and requirements of ships necessary to provide adequate service on such routes. Additionally, it works in shipbuilding, port operations, vessel operations, national security, environmental issues, and safety concerns.

Port of Erie

The Port of Erie is located on the southeast shore of Lake Erie in a natural bay formed and sheltered by Presque Isle. Erie´s harbor entrance channel is 29 feet deep. This is deeper than the draft available through the St. Lawrence Seaway and Lake St. Clair and is not considered a limiting factor for either Great Lakes or international trade. Entrance to the bay is through the Presque Isle Channel, which is a jetty protected structure. The Port of Erie is served by CSXT rail.

The port currently supports two industries, Donjon Shipbuilding and Repair and Erie Sand and Gravel Co. Erie Sand and Gravel is the only cargo facility and is configured as a dry-bulk operation (sand and gravel). The terminal also houses one of the largest cranes on the Great Lakes and can accommodate project cargo.[45] In 2013, this included exporting 50 GE locomotives to Africa, as well as importing 200 ton transformers from South Africa.

[45] *Project Cargo: typically pieces of manufactured equipment that are too large or too heavy to fit in a container.*

Air

Shipping freight by air is typically quickest and most reliable. It is also the most costly transportation mode, and is therefore reserved for highly perishable, time-sensitive, or particularly high value commodities moving distances of at least several hundred miles. Air cargo plays a critical role in supporting Pennsylvania's emerging high-tech and biomedical industries. Connectivity between airports and truck routes is imperative. Trucks transfer these high value, perishable products and materials to and from their source of production and consumption to nearby airports. Pennsylvania's continued investment in its aviation facilities and their surrounding highway and rail infrastructure provides unique opportunities for Pennsylvania businesses to minimize transportation costs by leveraging the connectivity of these three modes.

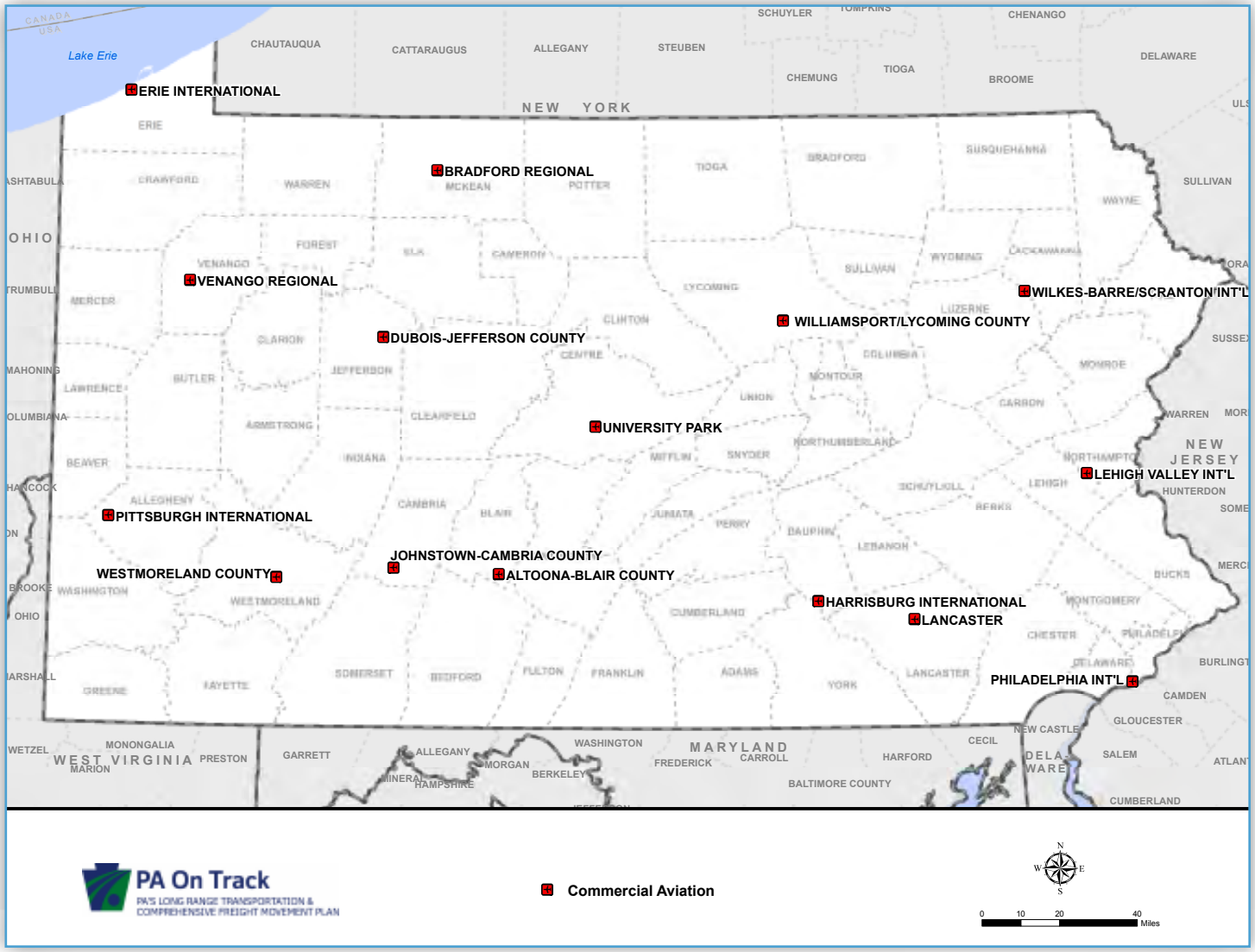
There are 15 commercial service airports in Pennsylvania and each provides passenger and air cargo/freight service. These are shown in **Figure 16**. The top five freight cargo airports include: Philadelphia International Airport, Pittsburgh International Airport, Harrisburg International Airport, Lehigh Valley International Airport, and University Park Airport.

Foreign Trade Zone (FTZ)

Foreign-Trade Zones (FTZ) are secure areas under U.S. Customs and Border Protection (CBP) supervision that are generally considered outside CBP territory upon activation. Located in or near CBP ports of entry, they are the United States' version of what are known internationally as free-trade zones. Foreign and domestic merchandise may be moved into zones for operations, including storage, exhibition, assembly, manufacturing, and processing.
While in the zone, merchandise is not subject to U.S. duty or excise tax. Certain tangible personal property is generally exempt from state and local taxes.

Infrastructure needs at public-use aviation facilities are dictated by demand. Actively used facilities have system preservation needs such as pavement rehabilitation, building refurbishing, and utility and equipment replacement, as well as upgrades to runway length and width, runway approach and departure area clearing, building area size and setback, and aircraft navigation equipment siting. Aviation facilities seeking governmental funding through the Federal Aviation Administration and PennDOT's Bureau of Aviation have their Airport Capital Improvement Program reviewed and evaluated yearly. These reviews determine whether the aviation facilities' proposed projects meet criteria established for available federal funding.

Figure 16: Pennsylvania's Commercial Service Airports



Pipelines

With the growth of the state's gas industry, pipelines are gaining more visibility as an important element of Pennsylvania's transportation capacity. The Commonwealth has formed a pipeline task force in order to bring planning and best practices to a pipeline building boom that includes an estimated 4,600 new miles of interstate pipes anticipated over the next three years. The group is led by the Pennsylvania Department of Environmental Protection (DEP).

States have little regulatory authority in this arena, since interstate pipelines are regulated almost exclusively by the federal government. However, Pennsylvania's pipeline task force does include three representatives from the federal government, including one from the Federal Energy Regulatory Commission (FERC) – the agency charged with siting and approving new pipelines. DEP expects the industry to add 20-25,000 miles of gathering lines, or smaller pipelines that connect gas wells to processing plants or main transmission lines.

Intermodal Facilities

Intermodal facilities are locations where freight is transferred between modes. Intermodal facilities include warehouses, freight transfer facilities, and other freight gateways. Many of these facilities, such as ports and warehouses, are privately owned and operated.

Goods frequently move back and forth between ocean vessels, river barges, freighters, highways, railroads, air cargo carriers, and pipelines. These moves may include transfers into and out of warehouses. Bottlenecks at any point on the system and inefficient transfers between modes can seriously impede freight mobility and drive up the cost of the impacted goods. For this reason, improving the efficient and safe flow of freight connecting between all modes of transportation is critical to the health of Pennsylvania's economy and global competitiveness.

In April 1995, FHWA issued Guidelines for Identifying National Highway System Connectors to Major Intermodal Terminals. This document indicated that NHS connectors must be public roads leading to major intermodal terminals and that those roads must have a critical bearing on the efficient operation of that facility. Intermodal terminals were defined as facilities that provide for the transfer of freight (or passengers) from one mode to another. As such, these intermodal connectors play a key role in facilitating the movement of freight, and also support the efficient combination of modes.

Table 8 lists the 25 FHWA-designated freight intermodal connectors in Pennsylvania.

Intermodal rail freight traffic is highly concentrated in a few freight corridors and is primarily carried by two Class I railroads, Norfolk Southern and CSXT. Each of these railroads operates multiple facilities in the state. The largest of these hubs include the NS-operated facility near Harrisburg (Rutherford Yard) and the new CSXT facility at Chambersburg. Descriptions of the Class I railroad freight intermodal facilities located in Pennsylvania are listed in **Table 9**.

In addition to the Class I intermodal terminals displayed in **Table 9**, CSXT operates five TRANSFLO terminals throughout the state, with locations in Butler, Chester, Philadelphia (2), and Pittsburgh. As a unit of CSXT, Transflo Terminal Services provides transloading (transfers of freight between railcars and trucks), materials management, and logistics services.

Table 8: Pennsylvania's Freight Intermodal Connectors

Facility	Type	County	Connector Description	Connector Length
Atlantic Pipeline Company	Truck/ Pipeline	Berks	East on Mountain Home Road (SR 3012) to Columbia Avenue (SR 3016) or Woodrow Road and North to US 422	1.62
Atlantic Pipeline Company	Truck/ Pipeline	Berks	Woodrow Avenue - from US 422 Alternate, north to SR 3016	1.62
Bethlehem Intermodal Transloading Center	Truck /Rail	Northampton	PA 412 Hellertown Road. Commerce Center Way to I-78	0.69
CSXT Eastside Bulk	Truck/ Rail	Philadelphia	From I-76 along Moore Street, Warfield Street, Passyunk Avenue and Wharton Street to facility	1.6
CSXT Twin Oaks Auto	Truck/ Rail	Delaware	Bethel Road to US 322 (Conchester Road)	0.53
Donora Industrial Park Terminal	Port Terminal	Washington	Southeast on McKean Avenue (PA 837) to SR 1077 to SR 3013 to PA 201 and connects to I-70: Southeast on McKean Avenue and PA 837 to Coyle Curtain Road to Future Mon/Fayette Expressway	11.15
Harrisburg Intermodal Lucknow Terminal	Truck/ Rail	Dauphin	South on Industrial Road to Wildwood Park Drive to Cameron Street; North on Industrial Road to Linglestown Road (PA 39) to US 22	3.41

Table 8: Pennsylvania's Freight Intermodal Connectors (continued)

Facility	Type	County	Connector Description	Connector Length
Harrisburg International Airport	Airport	Dauphin	Served by an existing NHS route (PA 230)	0
Keystone Industrial Port Complex	Port Terminal	Bucks	South Pennsylvania Avenue to US 1	2.82
Lehigh Valley International Airport	Airport	Lehigh	Served by an existing NHS route (PA 987)	0
Neville Island Freight Cluster	Port Terminal	Allegheny	Southeast on Neville Road to PA 51; Northwest on Neville Road, West on Grand Avenue to I-79	3.22
Norfolk Southern Morrisville	Truck/Rail	Bucks	East Cabot Boulevard to Oxford Valley Road to US 1	1.74
Penn Terminals	Port Terminal	Delaware	North on Saville Avenue, East on Industrial Highway (PA 291), North on Stewart Avenue (SR 2033) to I-95	2.06
Petroleum Products Corporation Terminal	Truck/ Pipeline	Blair	From PA 764, along Burns Avenue to facility	0.94
Petroleum Products Corporation Terminal (Silver Spring Township)	Truck/ Pipeline	Cumberland	Texaco Road to PA 114 to US 11	2.43
Philadelphia International Airport - Freight Facilities	Airport	Delaware/ Philadelphia	North on Scott Way, Northeast on Penrose Avenue (PA 291) to I-95 NB: North on Scotts Way, Northeast on Bartram Avenue to I-95 SB	2
Philadelphia International Airport - Freight Facilities	Airport	Delaware/ Philadelphia	East on Hog Island Avenue, North on Fort Mifflin Avenue to Enterprise Avenue to I-95 Northbound; West Enterprise Avenue to Island Avenue to I-95 Southbound	8.33
Pitcairn Intermodal Terminal	Truck/Rail	Allegheny	Southeast on Wall Avenue to PA 48 North on PA 48 to I-376	3.99
Pittsburgh International Airport- Air Cargo Terminal	Airport	Allegheny	From US 60/ PA 60 along PA Business Route 60 to facility	7
Port of Erie	Port Terminal	Erie	Served by an existing NHS route (SR 4034)	0
Rutherford Intermodal Yard	Truck/Rail	Dauphin	West on Grayson Road to Rupp Hill Road to Paxton Street to Penhar Drive to US 322	3.47
South Philadelphia Port Complex	Port Terminal	Philadelphia	North on Old Delaware Avenue to Columbus Boulevard (same as S. Philadelphia Rail Complex)	0
South Philadelphia Rail Complex	Truck/Rail	Philadelphia	North on Old Delaware Avenue to Columbus Boulevard	0.55
Tioga Marine Terminal	Port Terminal	Philadelphia	Delaware Avenue to Castor Avenue to I-95; Delaware Avenue to Alleghany Avenue to I-95	1.28
W Elizabeth Monongahela River Terminal Cluster	Port Terminal	Allegheny/ Washington	Northeast on New State Highway (PA 837) to PA 51; Southwest on New Street Highway and PA 837 to SR 1006 to Mon/Fayette Expressway	5.15

Table 9: Class I Intermodal Terminals

Rail Intermodal Terminals	Description	Rail Operator
Bethlehem Yard	Serves trains to/from Chicago, Kansas City, Los Angeles, San Bernardino, and St. Louis	Norfolk Southern
Chambersburg Yard	Provides access to nearby warehousing and logistics parks and I-81	CSXT
Franklin County Regional Intermodal Facility	Part of Norfolk Southern's "Cresent Corridor," connecting the south-east and the north-east regions of the US	NS
Morrisville Yard	Serves trains to/from Atlanta, Chicago, Dallas, Jacksonville, Kansas City, Los Angeles, Memphis, and Miami	Norfolk Southern
Philadelphia Greenwich Yard	18,000 feet loading tracks, 2,000 truck parking spaces, 30,000 feet of support tracks	CSXT
Pitcairn Yard	Serves trains to/from Chicago, Elizabeth (NJ), and Kansas City; a local role is to provide a transfer location for containers moving from truck to rail, or rail to truck.	Norfolk Southern
Pittsburgh Intermodal Facility	Part of CSXT's "National Gateway Project" – a double-stack cleared railroad corridor between the Mid-Atlantic and the Midwest, and located near McKees Rocks.	CSXT
Rutherford Yard Harrisburg	Serves trains to/from Chicago, New Jersey, Kansas City, Los Angeles, Norfolk, San Bernardino, and St. Louis	Norfolk Southern
Scranton Taylor Yard	Handles international containers to/from Chicago and domestic containers	Norfolk Southern

The issue of intermodal access was discussed in interviews and meetings with private sector freight stakeholders during the development of the CFMP. Concerns and needs raised by the private sector include the following:

- **Inadequate access to rail facilities, both intermodal and carload.** The redevelopment or renovation of properties or sites that have traditionally had access to rail service via sidings or other connections may result in the encroachment of non-rail dependent businesses along key rail corridors. The resulting loss in rail operations capabilities may be difficult or impossible to restore.
- **Pennsylvania's Class II and III railroads are critical.** Some businesses are solely dependent on these railroads for shipping and receiving.
- **The development of large warehousing installations along two lane roads is a concern.** At issue is the reliance of these large facilities on these roadways to provide the access required for their operations. Areas of particular concern included:
  - Around Allentown and Bethlehem;
  - From Carlisle to Chambersburg; and
  - The Norfolk Southern intermodal terminal (Lucknow) along Industrial Road in Harrisburg.
- **A lack of available warehouse and distribution facility space in some areas of the state.** Interviewees noted this may be due to community concerns about freight as a neighbor. These conditions not only affect the freight business but can also cause an industrial facility to relocate when adequate facilities and services are not available. Other reasons include the rezoning of property to preclude additional or new industrial development, and the reuse of former brownfield locations for mixed use development. Property acquisition/parcel aggregation requirements may be prohibitive, which may also be a factor.
- **The need to preserve certain railroad corridors for future potential service.** Many rail lines in rural areas were abandoned by Class I carriers due to low demand. In certain areas of the state, new industry (such as the Marcellus gas extraction industry) could benefit from the availability of rail service. It is costly to rebuild the tracks or to re-convert after they become bicycle/pedestrian facilities, or abandoned altogether.

TONNAGE AND VALUE BY MODE

Pennsylvania's multimodal freight transportation system carries 1.1 billion tons of freight, valued at $1.6 trillion and it is projected to grow to nearly 1.9 billion tons at a value of over $3.7 trillion by 2040. Trucks handled 76 percent of the tons moved in, out, internally, and through the state and 81 percent of the value in 2011. By 2040, it is estimated that trucks will handle 80 percent of all tonnage and 85 percent of the value. The boost in trucking as a mode of freight transport will be fueled by ongoing population growth, the expansion of the energy sector, and foreign trade. The shares of freight by tonnage and value, by mode and by year is graphically depicted in **Figure 17** and underscores the importance of this freight plan:

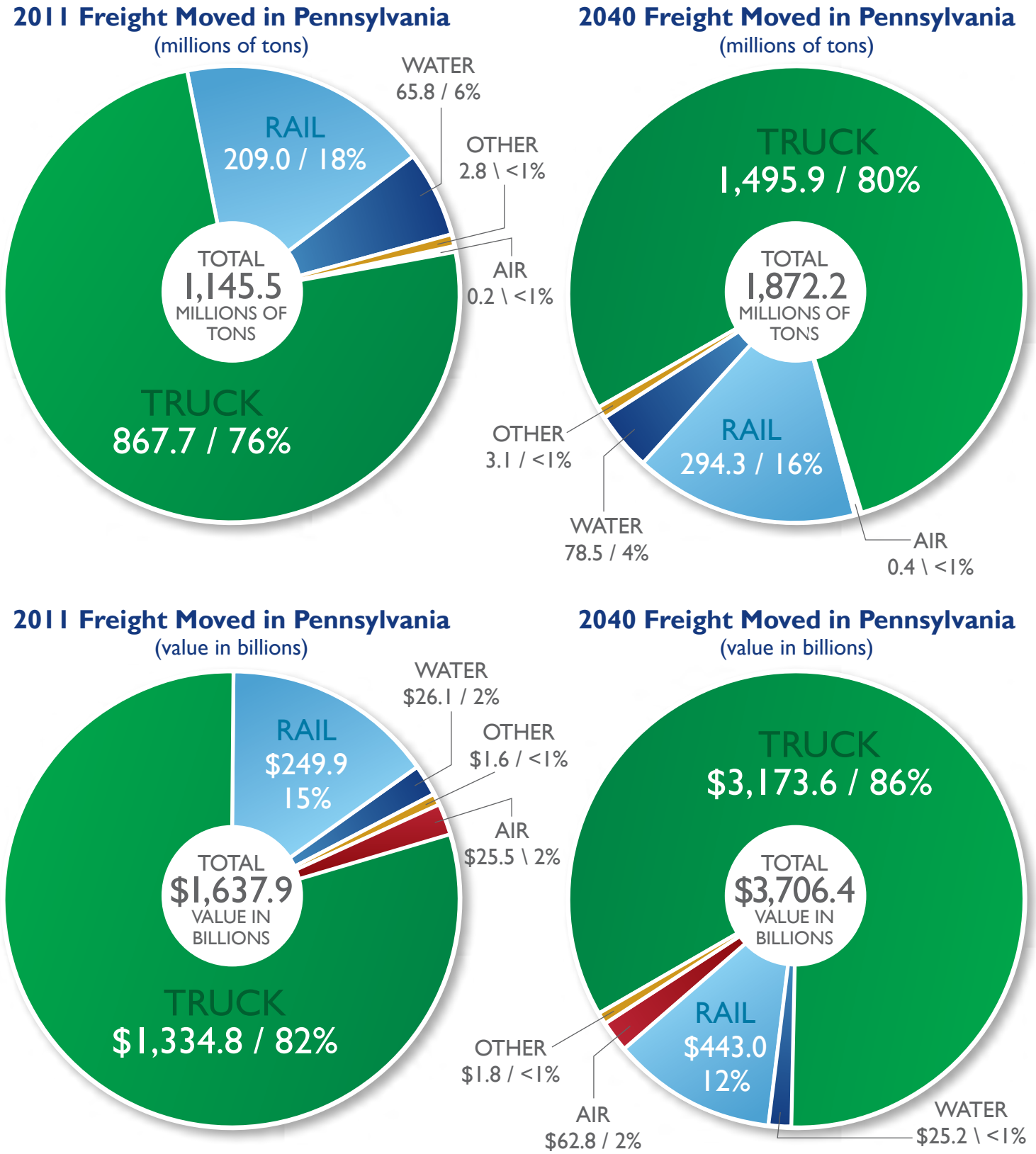
1) **The magnitude of freight being moved** – Pennsylvania's transportation infrastructure will be expected to accommodate 1.9 billion tons of freight by 2040. With this kind of growth, Pennsylvania needs a comprehensive freight movement plan that will proactively guide investment in its freight infrastructure and keep its economy moving. It also points to a need for Pennsylvania's transportation planners to continue engaging and reaching out to all the state's freight stakeholders, both public and private, on an ongoing basis.[46]

2) **The growth of total freight (in both tonnage and value)** – *all* modes of transportation will be expected to deliver more freight in coming years. As the importance of trade increases, Pennsylvania businesses will increasingly rely on the state's freight infrastructure in sustaining and enhancing their competitive position. PennDOT and its partners must play a critical role in supporting the strength of the state's economy.

3) **The reliance on the state's highway and bridge network** – The state's highway and bridge network currently facilitates the movement of over three-quarters of the state's freight. By 2040, trucking's dominance of freight movement as a share of the state's total is expected to increase to 80 percent by tonnage, and 86 percent by value. In light of these projections, addressing safety and bottlenecks on the highway system will become even more critical over time, as will the identification of priority freight networks for planning and programming. MAP-21 has introduced the concept of a National Freight Network (NFN), and PennDOT will be working with its partners on the identification of a Multimodal Economic Competitiveness (MEC) Network that strategically addresses freight concerns. Freight moves through our largest urban areas, as well as our smaller economic centers, so identifying and prioritizing rural freight corridors and connectors will also be a priority.

[46]Planning agencies and freight stakeholders sometimes operate under varying time horizons that can limit the level of engagement. However, application requirements for cooperation and consistency in grant programs such as the Multimodal Transportation Fund are effective means to foster increased engagement in project development and planning processes.

Figure 17: Pennsylvania Freight in Tons (millions) and Value ($billions) by Mode, 2011 and 2040



Source: CDM Smith analysis of 2011 PA Transearch data

Trucking

In 2011, trucks moved approximately 76 percent (by tons) of goods and 81 percent (by value) of commodities on Pennsylvania highways. The distribution of truck movements by direction are depicted in **Table 10**. Through freight movements by truck were the largest component in 2011, accounting for 338.1 million tons (39 percent). This indicates that 61 percent of all truck movements across the state's transportation network are contributing to Pennsylvania's economy as opposed to the 39 percent that is just passing through. **Figure 18** illustrates these truck tonnage movements in 2011 and 2040, respectively. By 2040, truck traffic in Pennsylvania is expected to grow by 72 percent by weight and 138 percent by value over the same period. The compounded annual growth rates by tons and by value are 1.9 percent and 3.0 percent, respectively.

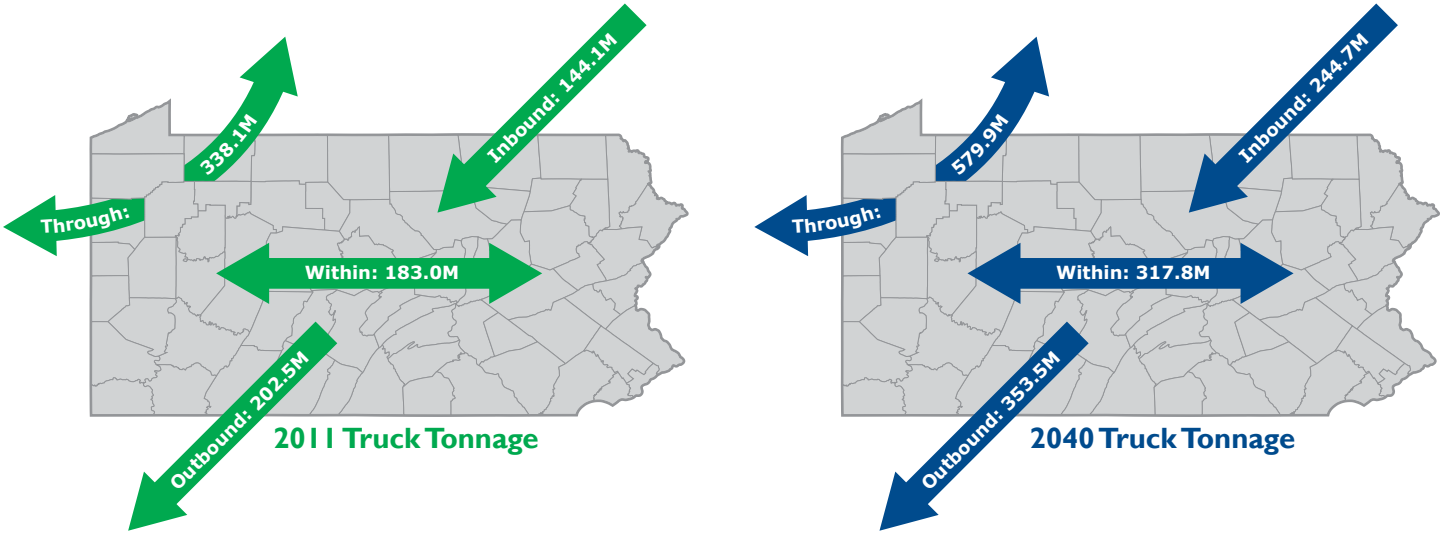
Table 10: Growth in Pennsylvania Truck Freight through 2040

Direction	Truck Tonnage (Millions)			Truck Value ($Billions)		
	2011	2040	Growth	2011	2040	Growth
Inbound	144.16	244.70	70%	$223.70	$520.1	132%
Internal	182.95	317.84	74%	$118.60	$240.4	103%
Outbound	202.52	353.50	75%	$248.30	$527.2	112%
Through	338.12	579.90	72%	$744.20	$1,885.9	153%
Total	**867.74**	**1,495.94**	**72%**	**$1,334.80**	**$3,173.6**	**138%**

Source: Transearch Data

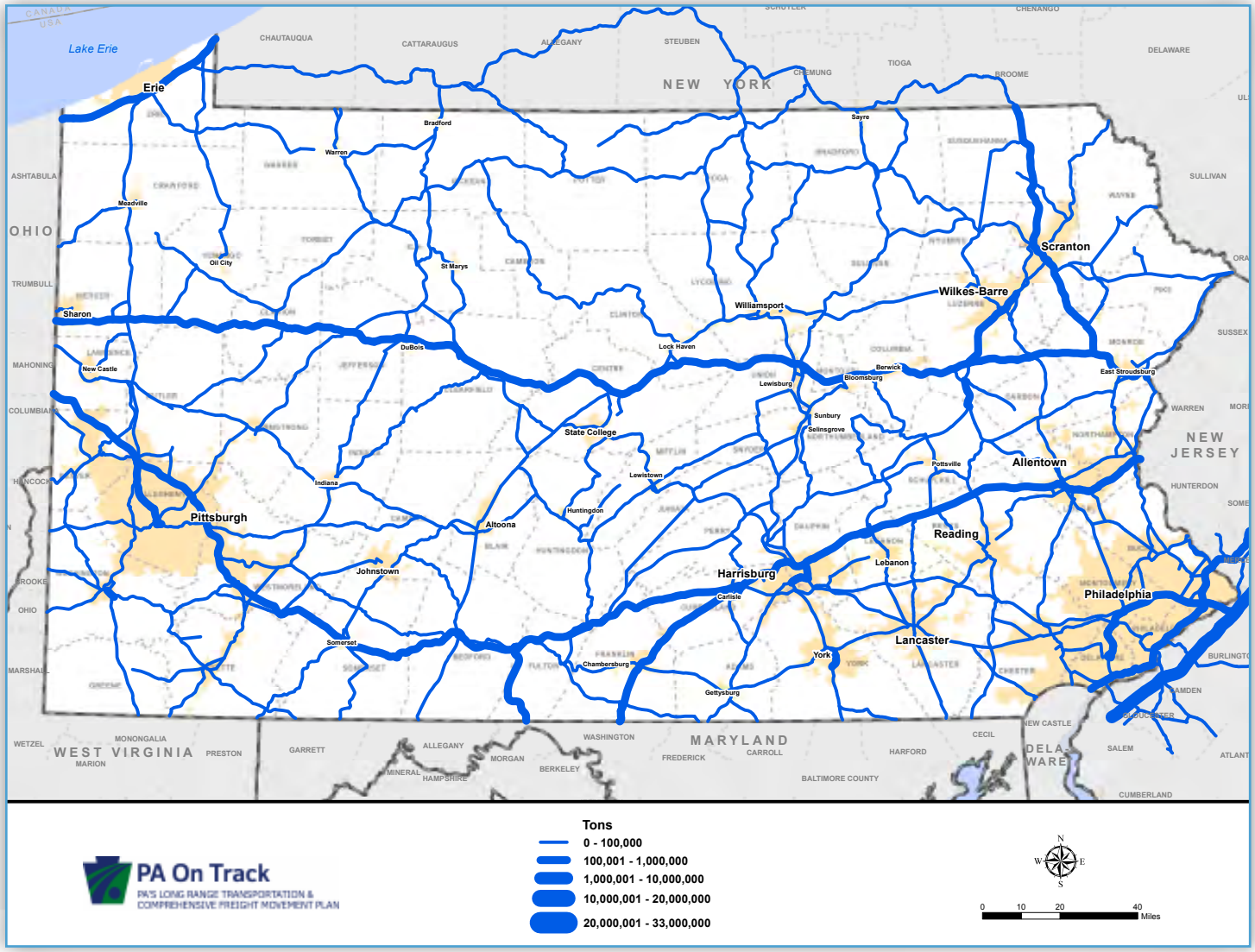
Figure 18: Truck Freight Movements by Tons (2011 and 2040)

Source: CDM Smith analysis of 2011 PA Transearch Data



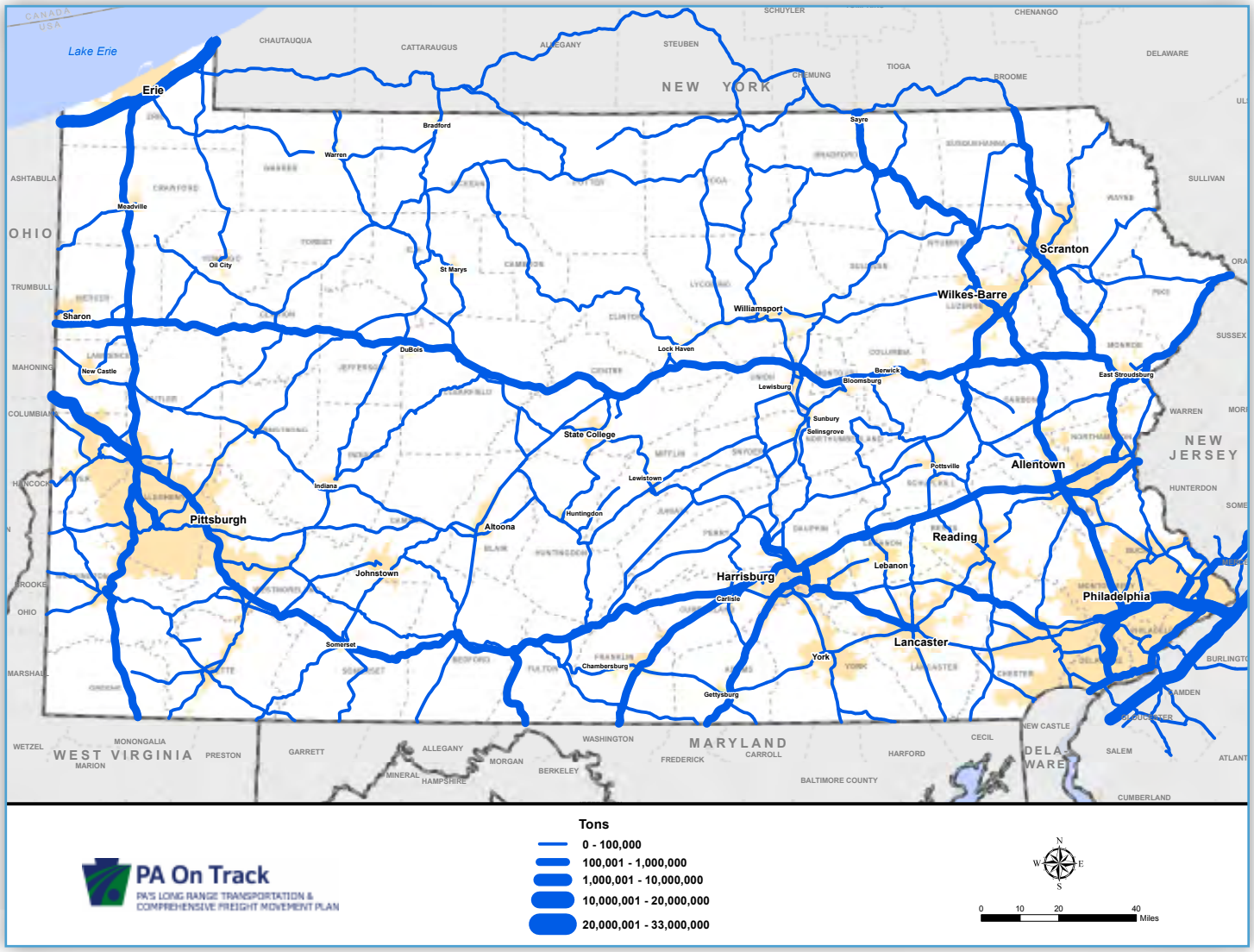
The interstate system carries the largest truck freight tonnage. Heavy truck volumes are evident in and around Philadelphia, Pittsburgh, Harrisburg, the Lehigh Valley, and other major areas, as shown in **Figure 19**. Pennsylvania's physiography is such that businesses and industries located throughout rural and more remote areas place a significant freight burden on Pennsylvania's local and non-limited access roadways. **Figure 20** also shows that strong growth in freight volumes will occur through 2040 on north/south roadways in the eastern and western regions of the state. **Figure 21** shows the current top freight generating locations in Pennsylvania based on IHS Global Insight analysis and ATRI GPS transponder data. The "Freight Finder Locations" as shown in the figure signify areas that qualify as top freight generating and receiving facilities, linking Transearch data to actual shippers and receivers.

Figure 19: Total Truck Tons by Route (2011)



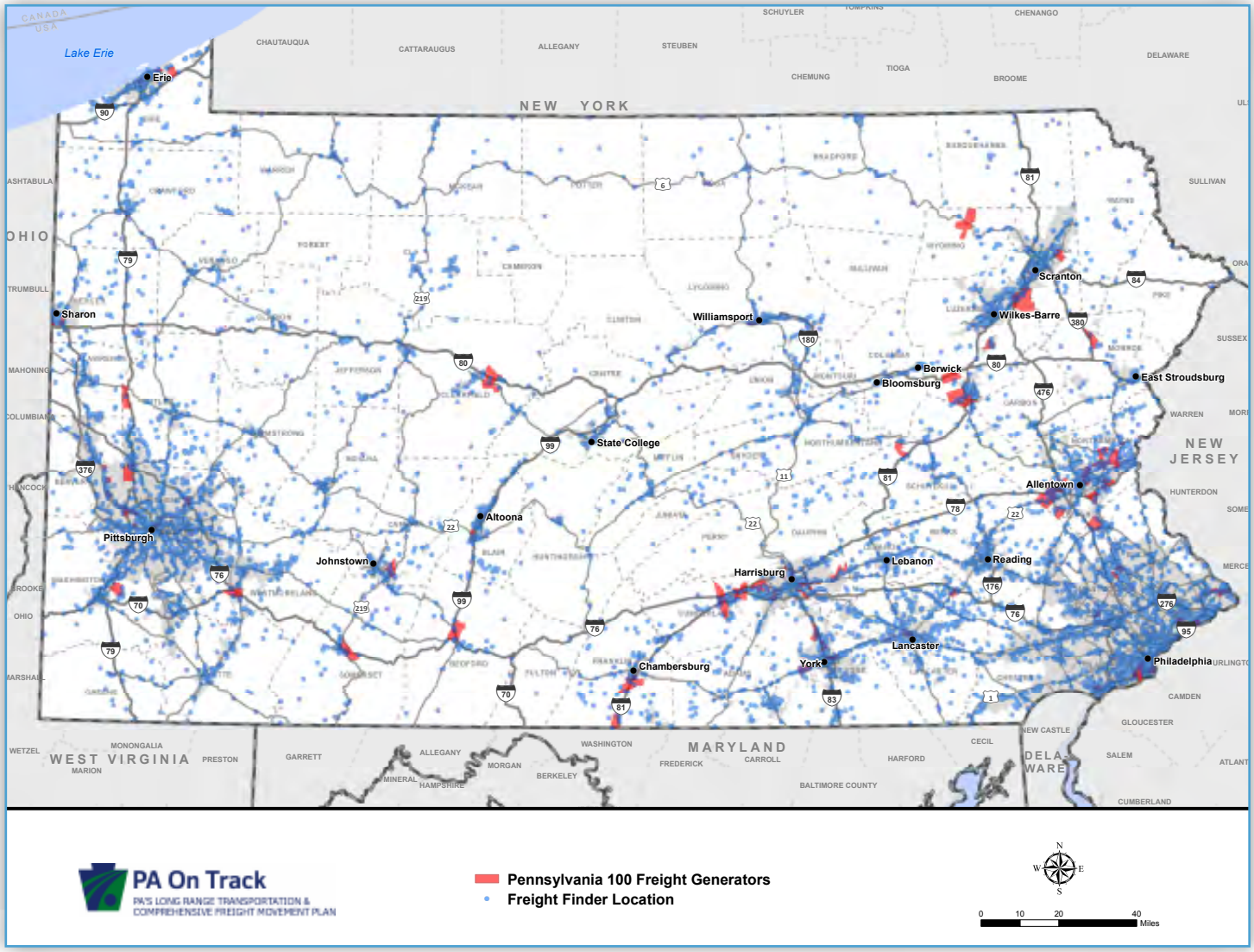
Source: CDM Smith analysis of 2011 PA Transearch Data

Figure 20: Total Truck Tons by Route (2040)



Source: CDM Smith analysis of 2011 PA Transearch Data

Figure 21: Freight Generating Locations in Pennsylvania



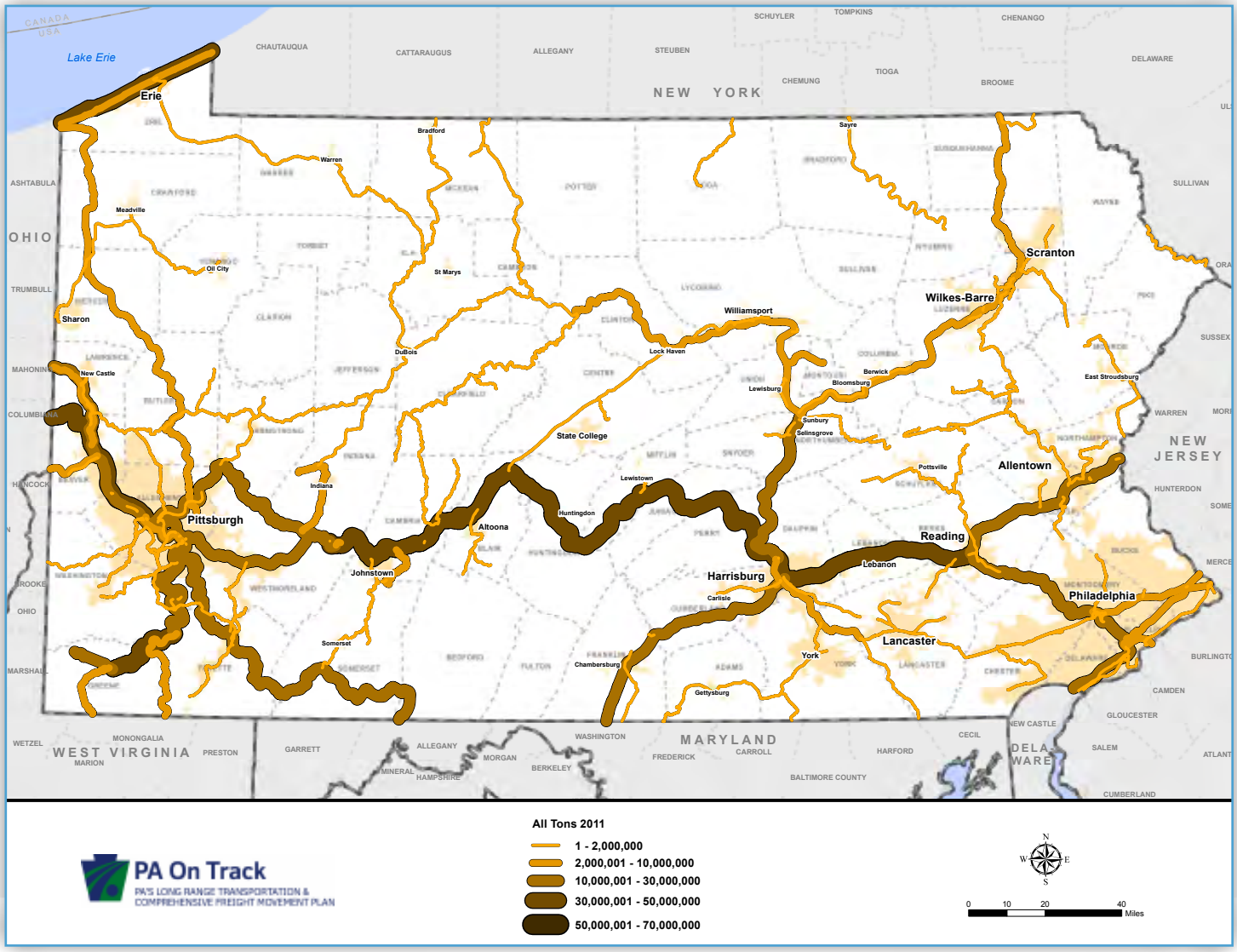
Source: Locations based on Freight Finder from IHS Global Insight and Top 100 Generators based on ATRI GPS Data

Rail

In 2011, the Pennsylvania rail freight network carried an estimated 209.0 million tons, which accounted for approximately 18 percent of the total freight tonnage and 15 percent of the total freight value. **Figure 22** shows the total rail flow movements for 2011. Intermodal movements (containers), which are generally limited to the Class I railroads' primary intermodal routes that provide the capacity, clearances, and allowable speeds necessary for this time-sensitive traffic, are shown in **Figure 23**. Today, coal and chemicals rank first and second for specific commodities and account for almost half of the total rail tonnage moved in the state.

By 2040, total rail tonnage in Pennsylvania is projected to grow to 294.3 million tons, a 41 percent increase. As shown in **Figure 24**, the projected increases in line density ranges occur primarily on Pennsylvania's major rail corridors, and are consistent with the Association of American Railroads' projected growth in trains per day of 50 to 100 percent by the year 2035.[47] Among the top commodities by weight, the largest increases for combined inbound and outbound Pennsylvania rail traffic are projected to be in miscellaneous shipments (+93 percent), gravel or sand (+86 percent), miscellaneous organic chemicals and plastic matter or synthetic fiber (+57 percent each), and broken stone or riprap (+55 percent). Coal movements are projected to decrease by 23 percent for inbound and outbound traffic and to decrease by 21 percent in total for through and intrastate movements.

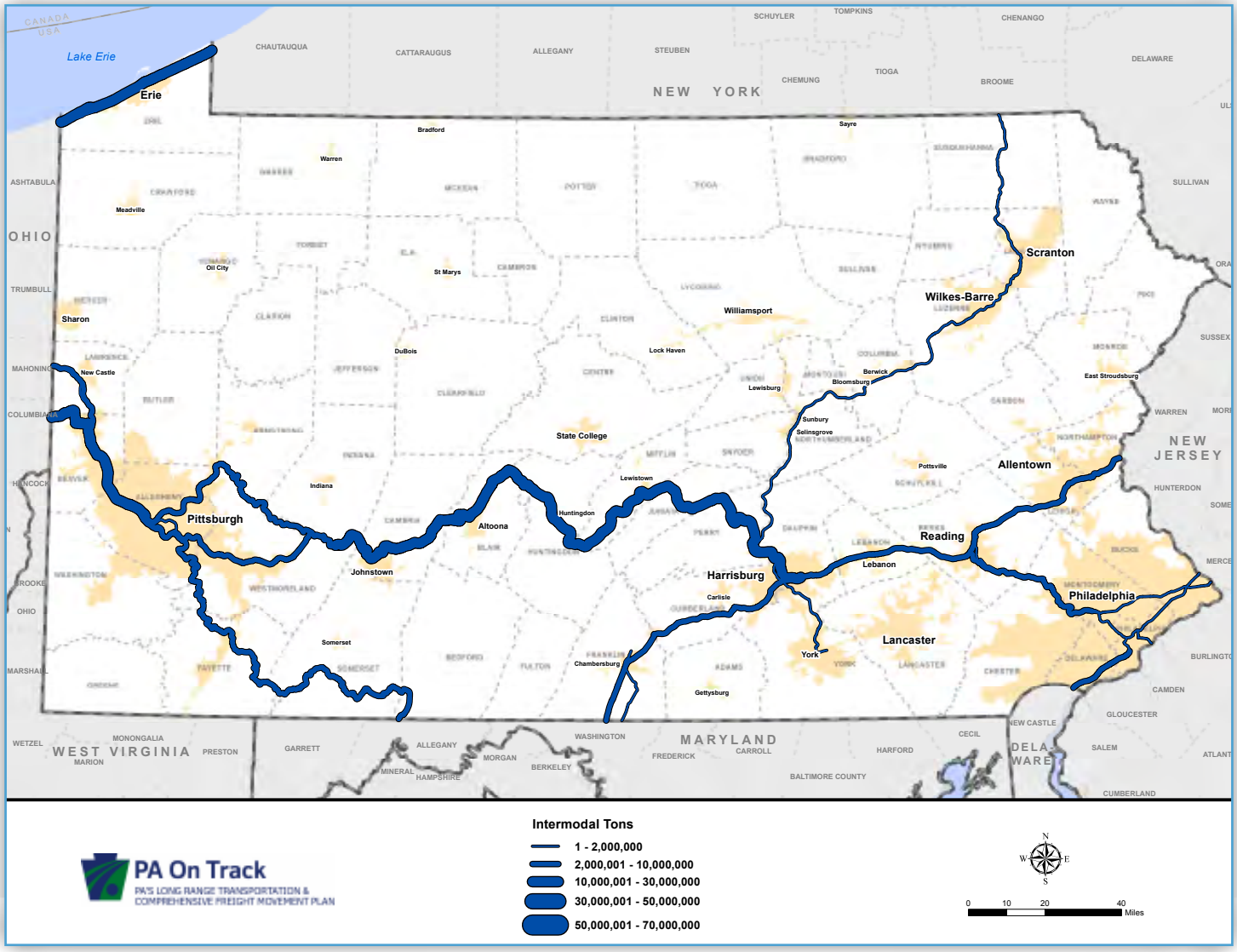
Figure 22: Pennsylvania Rail Line Densities by Total Net Rail Tonnage, 2011



Source: STB 2011 Waybill Data Processed by IHS Global Insight

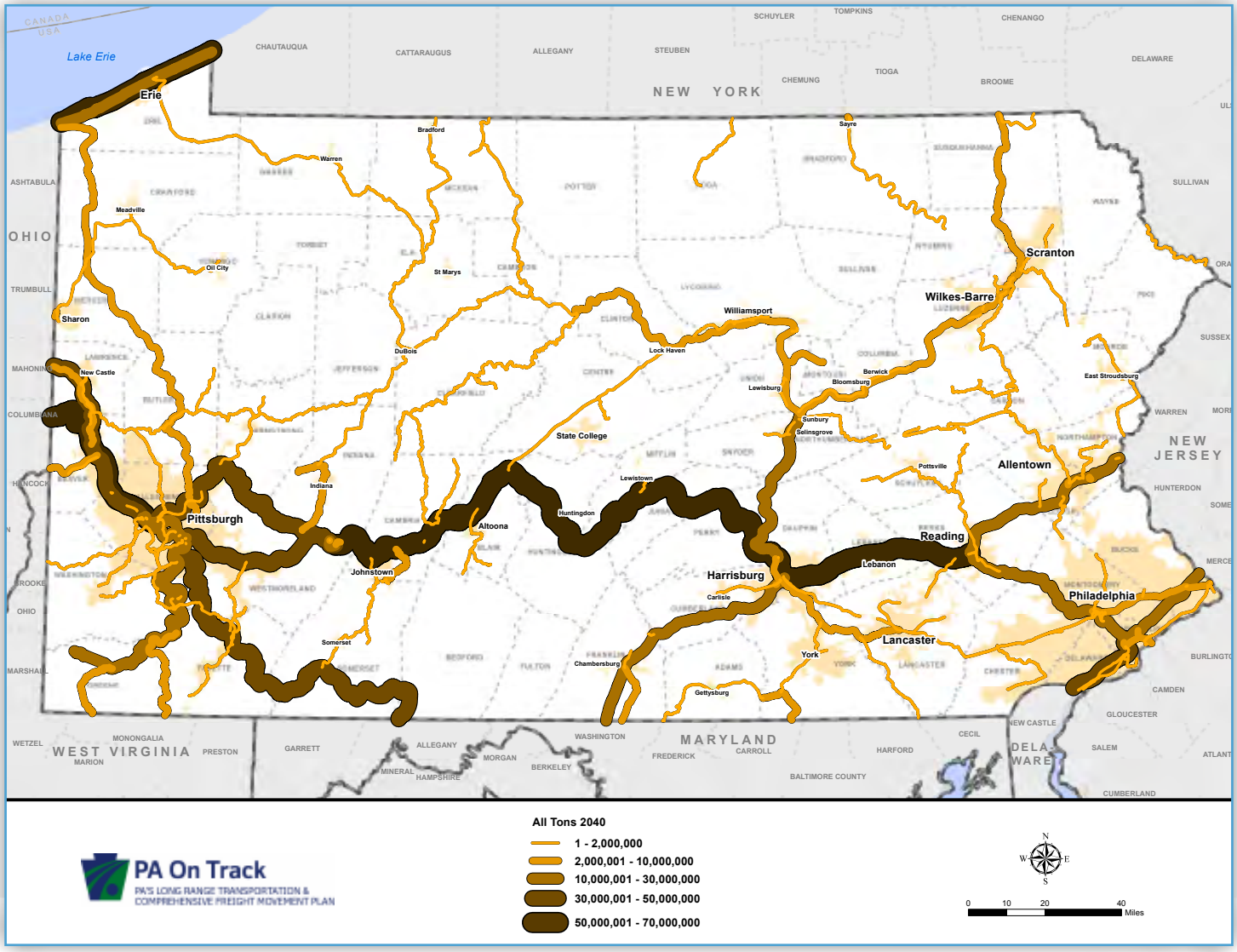
[47] *National Rail Freight Infrastructure Capacity and Investment Study, AAR, September 2007*

Figure 23: Total Rail Intermodal Movement Flows in Pennsylvania by Net Tonnage, 2011



Source: STB 2011 Waybill processed by IHS Global Insight

Figure 24: Projected Pennsylvania Rail Line Densities by Total Net Rail Tonnage, 2040



Source: STB 2011 Waybill Data Processed by IHS Global Insight

As depicted in **Table 11**, 47 percent of rail movements in the state are through movements followed by inbound (25 percent), outbound (22 percent), and internal (6 percent).

Table 11: Pennsylvania Rail Traffic by Type (2011)

	Inbound	Outbound	Through	Internal	Total
Tons	52,723,302	45,042,773	99,237,221	11,962,517	208,965,813
Units	1,067,630	862,131	2,520,476	119,569	4,569,806

Source: STB 2011 Waybill Processed by IHS Transearch

Inbound rail movements represent rail traffic that originates in another state or province and terminates in Pennsylvania. In 2011, the top five tonnage from originating locations included Illinois (10.6 million tons), West Virginia (10.3 million tons), Ohio (8 million tons), Ontario, Canada (2.6 million tons), and New York (2 million tons).

Rail outbound movements represent rail traffic generated within the state that terminates outside of the state. In 2011, the top five tonnage destination locations included Maryland (16.7 million tons), Ohio (6.5 million tons), Illinois (3.1 million tons), Virginia (3 million tons), and Indiana (1.9 million tons).

Although rail movements through the state do not contribute to the economy of the state by directly serving existing businesses, they do have a significant impact on the available capacity of rail lines and ultimately the levels of service these lines can provide. Thus, it is important to consider these movements, especially in Pennsylvania, which is a bridge state between a number of Atlantic ports and Midwest rail hubs. Through rail traffic in Pennsylvania is primarily limited to the state's major rail corridors.

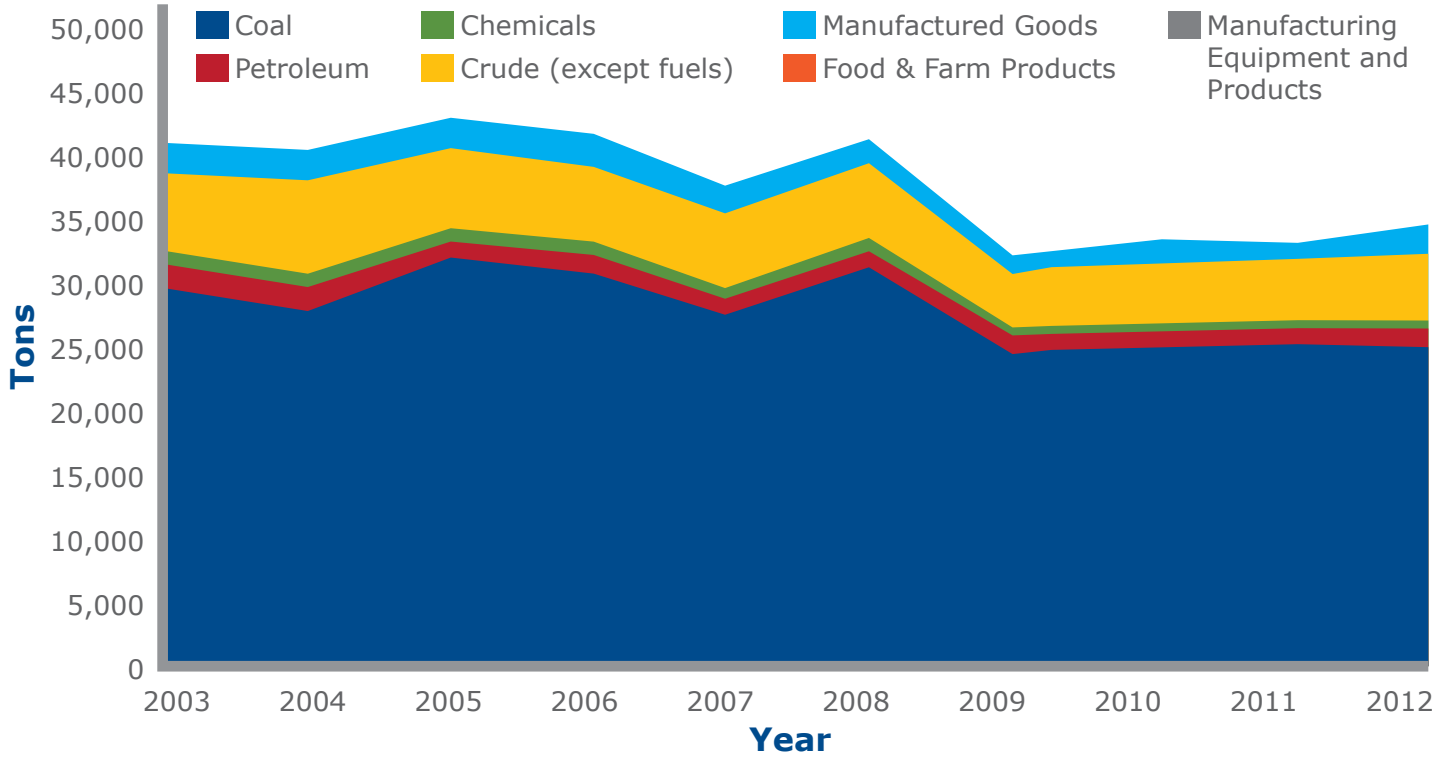
The availability of passenger rail service can also be an imposition on rail freight service. A recent study that illustrates this includes the Keystone West High Speed Rail Study for the line between Harrisburg and Pittsburgh. As a conceptual-level study, more detailed investigation and analysis would be required before undertaking any of the recommended actions, although even the planning-level costs that were identified for maintaining passenger service with increases in freight demand were significant.

Water

Waterways are a significant transportation mode and support the Pennsylvania economy. Based on 2011 data from the USACE Waterborne Commerce Statistics Center, about 87 million tons of goods were moved by water, at a total estimated value of $58 billion. Inbound water transport accounted for approximately 58 million tons, while outbound accounted for approximately 22 million tons. Water movements within the state equaled 7.6 million tons. These tonnage estimates are higher than the estimates based on Transearch data, as the latter source does not include international movements by water with origins or destinations outside North America. The domestic portion of international freight movements to and from the ports is included in the Transearch database.

The USACE found that Port of Pittsburgh was the second-busiest inland port in the U.S. in 2012. In 2012, the Port handled a total of 35 million tons of cargo (all domestic). This volume is down from a high of over 43.6 million tons handled in 2005. At 25.5 million total tons, coal is the largest component of the Port of Pittsburgh's cargo mix, comprising approximately 75 percent of the total tonnage, as shown in **Figure 25**.[48]

Figure 25: Pittsburgh Port Commission Commodity Tonnages, 2003-12 (000s)



Source: Pittsburgh Port Commission

[48]*Pittsburgh Port Commission*

Air

In 2011, less than 0.1 percent by weight and 1.6 percent by value of Pennsylvania freight shipped by air. However, air movements carry the highest commodity values per ton compared to other modes; values range from $47,606 per ton to $154,480 per ton by direction, as shown in Table 12. Most goods transported via air are high value goods such as electrical and optical equipment or time sensitive goods such as pharmaceuticals.

Table 12: Pennsylvania Air Cargo Traffic (2011-2040)

Direction	Tons	Percent	Value (Billions)	Percent	Average Value/Ton
2011					
Inbound	92,412	52%	$12.90	50%	$139,199
Internal	2,986	2%	$0.14	1%	$47,589
Outbound	77,595	43%	$11.50	45%	$148,830
Through*	6,038	3%	$0.93	4%	$154,457
Total	**179,031**	**100%**	**$25.50**	**100%**	**$142,360**
2040					
Inbound	203,683	56%	$34.80	55%	$171,029
Internal	6,998	2%	$0.29	0%	$41,623
Outbound	142,173	39%	$25.20	40%	$177,125
Through*	12,840	4%	$2.50	4%	$193,882
Total	**365,694**	**100%**	**$62.80**	**100%**	**$171,741**

**Through air cargo movements represents the tonnage of goods moved via air that landed at an airport in Pennsylvania, but were not unloaded in Pennsylvania.*

Source: CDM Smith analysis of Transearch Data

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Goals, Strategies, and Projects

Pennsylvania's General Assembly and PennDOT leadership have historically advanced multimodal transportation strategies, policies, legislation, and funding programs that improve freight mobility and access needed to support its businesses and industries. Based on future trends and needs, this chapter promote strategies that will preserve, maintain, modernize, and connect the freight transportation system and enhance Pennsylvania's economic competitiveness.

STRATEGIC APPROACH TO MEETING GOALS

PA On Track and the Comprehensive Freight Movement Plan are centered on the following four goal areas that support the achievement of Pennsylvania's transportation vision and guide PennDOT in addressing transportation priorities:

- **System preservation** - Preserve transportation assets using sound asset management practices within the limitations of available resources;
- **Safety** - Improve statewide safety for all modes and all users;
- **Personal and freight mobility** - Expand and improve system mobility and integrate modal connections; and
- **Stewardship** - Increase efficiency through modernization of assets and streamlining of processes.

Goals, Strategies, and Projects: Take-Aways

The following are significant messages concerning the plan's goals, strategies, and projects:

- The Comprehensive Freight Movement Plan is organized around the following four goal areas: System Preservation, Safety, Personal and Freight Mobility, and Stewardship.
- The state's transportation system will be called upon over time to facilitate the movement of an ever greater share of people and goods. Pennsylvania cannot effectively be "the Keystone State" if its transportation system cannot sustain existing and future demands placed upon it.
- MAP-21 provides eligible state DOTs with a potential maximum federal funding share of 95 percent for an Interstate system project and 90 percent for a non-Interstate system project "if the project makes a demonstrable improvement in the efficiency of freight movement and is identified in a State freight plan."
- Freight-related projects from the "Road and Bridge Progress" listing have been identified and are summarized within this chapter. (Additional project suggestions from the planning partners are included in Appendix C.)

Goal/Strategies

System Preservation

PennDOT, through its various management systems and federal and regional partners has enormous amounts of data available on the assets that it owns and maintains. What is not clearly known is the magnitude and condition of locally-owned transportation infrastructure. Gains have been made in this area in recent years, but more work remains to be done.

Asset management has gained greater prominence in recent years – the shortage of funding makes it a critical business practice. It entails a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on engineering and economic analysis based upon quality information. MAP-21 advanced the practice of asset management even further, even as it becomes more accepted and understood.

Strategies related to system preservation are as follows:

- Develop an inventory, condition information, and management strategy for all locally-owned transportation system assets;
- Implement enterprise asset management for programming and decision-making;
- Prioritize state-of-good repair approaches that preserve transportation system assets; and
- Implement a Capital Inventory and Planning Tool to store, maintain, edit, and report on transit's capital assets.

Goal/Strategies

Safety

In 2014, there were over 121,000 reportable crashes in Pennsylvania, which claimed the lives of nearly 1,200 people and injured nearly 80,000 more. The estimated economic loss due to crashes was $14 billion, or approximately $1,100 for every Pennsylvanian. It should be noted that this figure far exceeds PennDOT's annual budget. While much of this cost is borne through insurance, there is also a public cost. On average, 14 crashes were reported every hour, and 1 out of every 44 Pennsylvanians was involved in a reportable traffic crash. The number of total crashes, while unacceptably high, nevertheless represented the lowest statewide total recorded since the early 1950s.

While progress has been made in improving safety, these numbers underscore the need to take additional strides in addressing safety across the system, and maintain safety as a primary focus of the state's transportation planning. PennDOT is working with safety stakeholders to establish a "Toward Zero Deaths" initiative in the state, agreeing that even one death is unacceptable. Recent advances in safety, including the implementing centerline and edgeline rumble strips countermeasures have improved highway safety. Pennsylvania's anti-texting while driving law, which went into effect in March 2012, gave law enforcement officials more heft in addressing distracted driving. Strategies to address the state's safety concerns are as follows:

- Implement the Strategic Highway Safety Plan;
- Emphasize the Highway Safety Manual in all design processes;
- Address safety issues during earlier phases of project planning;
- Partner to expand driver improvement programs for seniors and younger drivers;
- Emphasize safety for pedestrians and bicyclists through design modifications, education, and aggressive coordination with enforcement;
- Ensure highway design accommodates transit and freight;
- Support efforts by the General Assembly to enact tougher laws that address distracted driving; and
- Address the transport of hazardous materials in business plans, long range transportation plans, and county local hazard mitigation plans.

Goal/Strategies

Personal and Freight Mobility

The state's transportation system will be called upon over time to facilitate the movement of an ever greater share of people and goods. Pennsylvania cannot effectively be "the Keystone State" if its transportation system cannot sustain the existing and future demands that will be placed upon it. PennDOT has many initiatives in place to maintain and improve system mobility. One such initiative is PennDOT's Corridor Modernization program, which is a planning for Transportation Systems Management and Operations (TSM&O) effort to optimize the performance of existing infrastructure by implementing systems, services, and projects that preserve capacity and improve the security, safety, and reliability of the state's transportation system. Additionally, Corridor Modernization will further integrate operations data, performance metrics, and processes into the project planning and programming process.

PA On Track (and new tools related to the long range plan, such as the project prioritization process) was developed in alignment with PennDOT's ongoing work on Corridor Modernization for seamless implementation. The strategies being advanced by PA On Track serve to reinforce the work that PennDOT has initiated on Corridor Modernization.

Strategies related to personal and freight mobility are as follows:

- Optimize multimodal infrastructure through improved operations;
- Incorporate a project prioritization tool into statewide planning and programming as a validation process;
- Identify the Multimodal Economic Competitiveness Network in collaboration with Pennsylvania's MPOs and RPOs;
- Prioritize and enhance intermodal connections;
- Implement station improvements and interlocking projects on the Keystone Corridor (the Amtrak-owned line between Harrisburg and Philadelphia);
- Integrate freight mobility and truck parking accommodation needs into the Corridor Modernization program;
- Inventory substandard bridge underclearances for rail;
- Partner with private sector freight carriers to investigate strategies to improve modal efficiency; and
- Advocate for additional funding for the state's ports, locks and dams.

Goal/Strategies

Stewardship

Strategies related to stewardship reflect not only PennDOT's desire to minimize transportation's footprint on the environment, but also in how effectively PennDOT maximizes its use of tax dollars in constructing, operating and maintaining the state's transportation infrastructure. In recent years, there have been major cultural shifts within the state's program and project development processes through Smart Transportation and Linking Planning and NEPA. Also, PennDOT has advanced initiatives to modernize and optimize the way the agency works while looking for ways to cut costs and realign available resources. Additionally, the State Transportation Innovation Council (STIC) has fostered collaboration in which new ideas and innovations can be evaluated and implemented more quickly.

PA On Track's strategies related to stewardship are as follows:

- Assess weather-related vulnerability of the transportation network in statewide and regional planning;
- Investigate opportunities to incorporate technology and Intelligent Transportation Systems (ITS) across Pennsylvania;
- Continue and accelerate implementation of the "Linking Planning and NEPA Process" to advance project delivery;

- Support the use of alternative fuels and related equipment and facilities;
- Continue sponsoring course offerings on critical land use topics that protect the state's investments in the transportation system;
- Use public-private partnerships to expand the available pool of capital and tap into private innovation and approaches;
- Coordinate with local/county governments on traffic signal management operation and maintenance agreements;
- Continue to plan for the advent of autonomous/connected vehicles; and
- Raise awareness of freight's value to the economy and its impacts on Pennsylvania's transportation infrastructure.

FOCUS AREAS AND OPPORTUNITIES

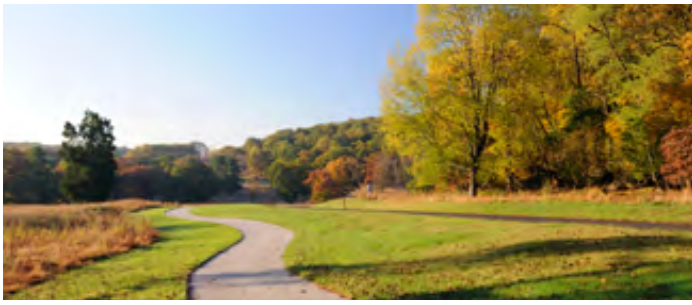
The state's freight trends and issues discussed in Chapter 3 require actions that address critical challenges and help to ensure future generations have an efficient transportation system.

The CFMP planning process and findings identified locations and opportunities to improve freight access, interconnectivity, and mobility on Pennsylvania's transportation system in order to improve its competitive position in attracting, retaining, and expanding industries and jobs throughout the state. Focus areas and opportunities include the following:

- **Preserve the system** - Understanding the state's infrastructure conditions along its freight corridors can help PennDOT to prioritize infrastructure needs and improve freight movements.
- **Design and plan for safety** - Freight stakeholders identify safety as their number one priority. Crashes involving shipments are costly in many ways. They can result in the loss of life, commodities, and slow the overall efficient movement of freight traffic. Improving safety through better design can improve freight mobility and improve the efficiency of the system.
- **Improve operations** - This entails implementing sustainable planning for operations in a way that optimizes the performance of existing transportation infrastructure by implementing systems, services, and projects that preserve capacity and improve the security, safety, and reliability of PennDOT's transportation system. A related opportunity would be to integrate transportation operations data, performance metrics, and processes into the project planning and programming process.

- **Implement Pennsylvania's new project prioritization tool** - In updating its LRTP, PennDOT has pursued the development of a project prioritization tool, elements of which consider freight interests in the evaluation of candidate projects. The process methodology considers projects from all modes and uses various technical measures to evaluate each candidate project. The importance of addressing freight needs is integrated into the tool and provides PennDOT with the opportunity to prioritize freight interests. The tool will not take the place of any existing local tool or process, but will be shared with other organizations that are responsible for long range planning.
- **Coordinate with the planning partners to identify the Multimodal Economic Competitiveness Network** - To sustain a dynamic economy and support the creation of additional jobs, Pennsylvania must continue to reinforce and enhance its competitive business environment, optimizing the factors that are critical to a company's operations and global competitiveness. Thus, the purpose of the MEC network is to identify statewide, regional, and local transportation infrastructure assets and services, such as highway and rail lines and develop a network that links to ports, intermodal terminals, airports, and tourist locations. Once developed, PennDOT and the planning partners should identify improvements that improve freight efficiencies and connectivity.
- **Focus on improving truck bottleneck locations** - The CFMP identified the top 100 truck bottleneck locations throughout the state. While the truck bottleneck locations and specific improvements require further study, the freight bottlenecks should be examined by PennDOT and the planning partners to identify specific projects to improve freight efficiency throughout the state.
- **Monitor and prepare for truck size and weight changes** - On the federal highway system, the last significant increase in truck load or carrying capacity occurred in 1982, when Congress passed the Surface Transportation Assistance Act, which raised the weight limit on Interstate and the National Truck Network highways from 73,280 pounds to 80,000 pounds, and also established dimension standards for tractor-trailer semi combinations. In MAP-21, Congress called on the USDOT to conduct a study of specific areas regarding federal truck size and weight limits, their operation, and their impacts. The analysis will address differences in safety risks and infrastructure impacts, and the effect on levels of enforcement between trucks operating at or within federal limits and trucks legally operating in excess of federal limits. The Comprehensive Truck Size and Weight Limits Study was completed and released in 2015. PennDOT should continue to monitor for possible federal regulatory changes in truck size and weight and be prepared to implement any changes to the federal-aid highway system.
- **Prepare for connected and autonomous vehicles and new technologies**[49] - PennDOT and the planning partners should evaluate any planned or potential capacity enhancement project prior to making final project investment decisions. For instance adding roadway capacity through widening may not be necessary by the year 2040 as a result of connected and fully automated driving. PennDOT should evaluate all upcoming ITS related investments and capacity enhancement projects to be compatible with a connected and automated vehicle fleet.
  - PennDOT should ensure that information on overweight/oversize equipment movements be made available to connected vehicles in the vicinity of such movements as connected vehicles begin to appear.
  - PennDOT should encourage the availability of electronic driver logs in commercial vehicles for providing data on commercial vehicle movements and for apportioning federal diesel fuel tax revenues.
  - PennDOT should convene a stakeholder group to address infrastructure, policy, and regulatory needs related to automation.
  - PennDOT should play a significant role in moving the industry toward automation by providing test beds and ensuring that information on incidents and overweight/oversize vehicle movements is available to connected vehicles.

[49]Most of the strategies are from Connected and Autonomous Vehicles 2040 Vision Contract CMUIGA2012 - Work order No. 1, Carnegie Mellon University, May 13, 2014. USDOT in June 2015 released technical reports for this study, which found that the data limitations are so profound, that no changes in relevant laws and regulations should be considered until these limitations are overcome.



- PennDOT and the planning partners should identify locations for roadside units that would generate substantial safety and/or mobility benefits such as high crash intersections, narrow roads, tunnels and sharp curves.
- PennDOT and the planning partners should identify traffic signal systems and other ITS locations (e.g. toll facilities, ramps) that would need equipment (i.e. controller) upgrades.

- **Update Automated Permit and Route Analysis System** - During the Automated Permit and Route Analysis System (APRAS) update for over-height and overweight vehicles, PennDOT should consider the numerous opportunities connected and autonomous vehicle capabilities will present. The update is also an opportunity for PennDOT to work with the trucking industry and State Police to design features tailored to these stakeholders. Both enforcement and freight movement will be significantly enhanced as a result of an improved APRAS. Specifically, PennDOT should take the opportunity of the APRAS system update to include local regulators, to make real time re-routing possible and to ensure routes are followed as required.
- **Address access and mobility issues for all modes, including intermodal connectivity** - As discussed throughout the CFMP, freight travels on and between all modes. Businesses and industries choose the most time and cost efficient mode to move their products. Providing seamless access to and between modes improves Pennsylvania businesses and industries freight options and the state's ability to expand existing and attract new business. As capacity enhancements are identified, such as those at port facilities, land side connections (specifically road and rail connections) must also be evaluated, as these are frequently the critical bottleneck in the overall capacity of a port system. For example, the Port of Philadelphia has the benefit of being proximal to Class I rail connections and major highways, but the connections to these corridors must be maintained and enhanced to accommodate future commodity growth.
- **Prioritize and enhance intermodal connections ("first and last mile")** - Often, access between the National Highway System and to modal facilities, such as to rail yards, water and airport facilities, requires freight to travel on locally-owned and maintained infrastructure. Conditions such as pavement, clearance, geometrics, etc. on these first and last mile segments may be inadequate to move freight efficiently. Pennsylvania's planning partners often have the best knowledge of these problem areas. PennDOT should work with its planning partners to address first and last mile freight connections.
- **Support local efforts to evaluate potential land use options for Freight as a Good Neighbor** - Implementing land use planning with freight in mind can help avoid conflicting land uses and improve overall mobility and access of freight movements.

- **Integrate freight into NEPA and Preliminary Engineering processes** - Identifying freight issues and concerns early in the project development process results in projects designed with freight in mind and improved project delivery times.
- **Advocate for additional funding for the state ports, locks and dams** - The locks and dams on the Ohio River system are owned, maintained, and operated by the USACE. To ensure Pennsylvania waterways remain a viable transportation option, additional federal funding is essential to address these critical infrastructure needs. Funding cuts at the national level will reduce the hours of operation for commercial operations at all locks and dams and this will impact Pennsylvania's overall freight capacity and economic competitiveness.
- **Support freight rail corridors** - Class I railroads generally move traffic through Pennsylvania along high density corridors that often parallel major highway corridors. Although these major Class I railroad corridors constitute approximately 26 percent of the total rail miles in the state, they carry approximately 90 percent of rail freight volume in the state. PennDOT should continue to coordinate with the Class I railroads to assist in implementing highway safety and operational improvements that will maintain and improve freight rail operations.
- **Address inadequate access to rail facilities, both intermodal and carload** - Stakeholders interviewed during the CFMP noted that they are concerned that the redevelopment or renovation of properties or sites that have traditionally had access to rail service via sidings or other connections may result in the encroachment of non-rail dependent businesses along key rail corridors. The resulting loss in rail operations capabilities may be difficult or impossible to restore.
- **Monitor the development of large warehousing installations along rural two lane roads** - Many of these two-lane roads carry heavy truck traffic and, as future development occurs, safety and operational improvements should be implemented.
- **Support projects that address major freight corridors, including multi-state initiatives** - Current and future major truck and rail freight corridors were identified through the CFMP planning process. These included many of the state's interstates, major rail and roadway routes, and routes connecting to water ports. These routes are corridors where PennDOT and planning partners can focus to improve freight access and mobility. They include areas such as I-83 around Harrisburg, I-95, I-81, Appalachian Development Highway System (ADHS) corridors, and strategic routes connecting to east coast ports. Information on the I-95 Corridor Coalition, in which PennDOT is an active participant, is provided on the following page. Additionally, new planning networks, such as FHWA's forthcoming Primary Freight Network and the forthcoming Pennsylvania's Multimodal Economic Competitiveness Network will identify critical freight infrastructure assets that will assist PennDOT and the planning partners in freight planning.

Freight Planning:

A Multi-state and Multimodal Approach

Supply chains and freight flows vary by commodity, industry, supply and demand, and origins and destinations and are rarely limited to a single jurisdiction. Transportation freight plans are best approached by a multi-faceted perspective of trade lanes, key commodities, or key industries in the U.S. and neighboring trade partners, such as Latin America and Canada, rather than simply from a state's geography.

Pennsylvania, for example, is a critical component of the freight movement system in the I-95 Corridor – a region of 16 States (from Maine to Florida) generating 41 percent of the Nation's Gross Domestic Product and representing 40 percent of the Nation's population. Within this essential region are:

41

Ports and Coastal Shipping Lanes in the Atlantic and the Intercostal and Inland Waterways

106,000+

Airports

907,000

Miles of Highway

30,495

Miles of Freight Railroad Track, with 1,111 heavy-rail directional route miles (70 percent of the national total)

As international markets continue to emerge for imports and exports, and with expansions of the Panama and Suez Canals, the port-airport-rail-highway system in the I-95 Corridor will remain one of the most critical components of the United States' freight network.

Comprehensive freight planning must address the systems within individual political jurisdictions or state boundaries while recognizing the multi-state economic corridor that comprises the trip of a particular mode. Assistance for addressing the growing needs of the industry will come from the USDOT national freight strategic plan guidance, with its national freight framework built upon multistate corridors.

States understand that economic corridor planning is comprehensive, not simply mode specific. Connectivity to the state's airports, rail, and seaports is key to a competitive and comprehensive state freight plan. Through implementation and use of more efficient economic corridors, states can optimize the network for not only more reliable freight flows but better commute time for its end users.

This combined individual- and multi-jurisdictional perspective allows better identification of vital freight improvement projects, sustaining an economically robust freight system for supply chains moving within Pennsylvania and beyond. In the development of this freight plan, PennDOT recognizes and supports the need for collaboration in freight planning within regional jurisdictions and across economic corridors, enhancing mobility at the local, state, multi-state, and national level.

FREIGHT-RELATED INSTITUTIONS AND FUNDING AGENCIES

As in many states, there is no central contact or organization responsible for the public role of freight transportation in Pennsylvania. There are, however, several organizations throughout the state that have a vested interest in and authority to plan, fund, and implement projects to improve freight efficiencies. These organizations guide freight-related transportation investments, and assess how freight decisions affect non-freight transportation investment decisions and freight improvement strategies (both operational strategies and policy changes).

Freight-related institutions in Pennsylvania can be categorized as regulators, infrastructure owners, funding agencies, planning organizations, and users. Some institutions, such as freight railroads, fit into several categories while others such as trucking companies are primarily classified as just one (users). These institutions, organizations, and agencies are summarized below in terms of their freight-related roles.

PennDOT

PennDOT oversees programs and policies affecting highways, bridges, urban and rural public transportation, airports, railroads, ports, and waterways. In addition, several organizations within PennDOT provide support for intermodal freight movement within Pennsylvania by providing planning, funding, and regulatory oversight for freight-related transportation and infrastructure.

- **Bureau of Aviation** - Responsible for regulatory oversight, airport funding, and technical assistance.
- **Bureau of Maintenance and Operations** - Provides guidance and policy to the district and county maintenance organizations, provides field tools (materials, equipment, training, data, and reports) to monitor and improve operations, oversees the Agility Program, and houses the Central Permit Office for the permitting of over size and overweight vehicles.
- **Bureau of Planning and Research** - Provides transportation research, GIS data, and mapping and transportation statistics for the purposes of transportation planning.
- **Bureau of Rail Freight, Ports, and Waterways** - Tasked with preserving and improving rail freight infrastructure and service, promoting economic development through rail freight opportunities and grants, providing financial and technical assistance to railroads and businesses, and assisting with the integration of rail freight and other transportation modes.
- **Center for Program Development and Management** - Serves as a resource to the state's local governments, overseeing the municipal and county liquid fuels program, DOT Grants, and a variety of other programs and services, as well as developing and managing the State's transportation plans, programs, and projects.
- **Policy Office** - Develops new program initiatives and suggests changes to existing Commonwealth programs to improve the efficiency and effectiveness of services, assesses the feasibility and desirability of proposed program changes, coordinates the implementation of Commonwealth policies, and assesses the effectiveness of those policies.

Provisions within Act 89 legislation enabled PennDOT to combine the non-highway modes such as ports, railways, aviation, and transit into a single Multimodal Deputate and the creation of a multimodal fund to finance associated projects. With a guaranteed revenue source, Act 89 enabled multi-year planning for these modes of transportation.

In addition to PennDOT's Central Office, PennDOT Districts play a large role in maintaining roadways and bridges to facilitate the movement of freight. Districts also issue hauling permits for freight carriers and post and bond roadways to ensure damage caused by heavy freight vehicles is reduced and/or mitigated.

Pennsylvania Turnpike

The Pennsylvania Turnpike accommodates a large amount of commercial traffic annually. Given the extent and condition of the Turnpike's physical assets, it has a significant interest in maintaining optimum levels of service for freight traffic.

The Pennsylvania Turnpike Commission owns and operates 552 miles of highways on its Mainline, Northeastern Extension, and Western Expansions. Of the nearly 193 million vehicles per year that use the turnpike, 13 percent are commercial vehicles and these account for 43 percent of the turnpike's total revenue.[50]

Many of the 42 interchanges on the Turnpike's Mainline and Northeast Extension date to their original designs in the late 1930s through 1950s. These facilities are challenged to meet current and future traffic demands, safety concerns, and customer expectations. The introduction of electronic toll collection (ETC) has delivered benefits in processing speeds, but has also presented new safety issues.

There are 850 bridges on the Turnpike system. Approximately 55 percent of these structures are less than 100 feet long. More than 85 percent of the structures are over 40 years old, many dating from the original Turnpike construction. With a design life of 75 years, many of these structures are at or nearing the end of their anticipated life.

The Turnpike's signature feature includes its tunnels. The Turnpike currently operates five tunnels, each with two tubes. The opening dates of the tubes vary from 1940 (four tubes) through 1991 (second Lehigh tube). All of the tubes meet the 16'-6" minimum vertical clearance, with the exception of the original Lehigh tube (14'-9"). The original 1940 tubes have major deficiencies in ventilation equipment, waterproofing (ceiling slabs), lighting and power supply, and traffic levels of service. The maintenance requirements of the tunnels have increased, over time. Bypassing the older tunnels is a future possibility, as has been completed in the past on the Turnpike (Laurel Hill in 1964, and both Sideling Hill and Rays Hill in 1968).

[50]Pennsylvania Turnpike "Fast Facts" (2013), data is for the 2012 calendar year.

MPOs and RPOs

Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs) are responsible for freight planning and other project development processes within their respective planning regions. They conduct planning studies and prioritization of infrastructure projects specific to freight, vehicle passenger movement, transit, bicycle, pedestrian, and other forms of transportation for inclusion in the transportation improvement program, and the financially constrained LRTP.

Counties and Municipalities

Pennsylvania municipalities own many of the roadways used by freight – specifically, those that connect to the state-owned system to and from freight generators. These are referred to as "first and last mile" connectors and are critical linkages for freight shippers and receivers. In addition, municipalities make land use decisions that make it more or less attractive for freight-related businesses to operate within its jurisdiction.

Counties and larger municipalities or those with significant freight traffic also incorporate freight improvements into their planning documents and programs to accommodate efficient goods movement in their community. They also plan for freight activities through long range planning, comprehensive planning, and through capital improvement programming.

PennPORTS

PennPORTS was established in 1989 to strengthen the state's ports. Its mission is to act as the Commonwealth's liaison to each of its port communities. In this role, PennPORTS promotes economic development, waterborne tourism, and statewide commerce by facilitating port development, assisting in improvement of intermodal transportation, and fostering global port competitiveness nationally and internationally.

The PennPORTS program provides grants and interagency agreements to support operations and improvements to the Ports of Philadelphia (i.e., Delaware River Ports), Erie and Pittsburgh. PennPORTS was originally created as a program within the Pennsylvania Department of Community and Economic Development. The program was transferred to PennDOT in July 2013.

Port Authorities

Pennsylvania's water ports provide a vital contribution to the overall transportation system. As such, highways and rail lines provide essential intermodal connections to port facilities in Pittsburgh, Philadelphia, and Erie. These ports areas are comprised of multiple terminals operated by private companies and a few publically owned. Public agencies in each of the three ports are tasked with working with private operators to secure additional cargoes, and seek funding for port and waterway improvements.

Trucking Companies

Private trucking companies carry the largest portion of freight cargo in the U.S. and Pennsylvania. There are nearly 100 private commercial trucking companies in the state.[51] Trucking companies are users of the roadway transportation system and, in addition to facilitating point to point pick-up and delivery, trucks supply critical intermodal connections to rail, airports, and water ports.

Railroads

In recent years, railroads have made significant network infrastructure investments to become more competitive and efficient in moving freight cargo. Private railroads assume the financial responsibility to address its infrastructure needs. Private-public partnerships may also be a major source of financing, especially if sufficient public benefits can be identified for individual projects.

[51] http://www.fleetdirectory.com/bylocation/Pennsylvania.htm

FREIGHT-FOCUSED FUNDING PROGRAMS

This section summarizes federal and state grant and loan programs available to fund freight projects in Pennsylvania. A table summarizing these programs is included in **Appendix D**.

Federal

The following are federal funding programs that assist in funding freight projects:

- **TIGER Discretionary Grants** – The TIGER Discretionary Grants program provides funding for transportation agencies to invest in freight-related road, rail, and port projects to achieve specific national objectives. CSXT's National Gateway project is a prominent example of an initiative that has been awarded this funding. The project will ultimately create a more efficient double-stack cleared rail corridor between east coast sea ports and consumption centers and Midwest distribution centers.
- **Congestion Mitigation and Air Quality (CMAQ) Program** – CMAQ money supports transportation projects that reduce mobile source emissions in areas designated by the U.S. Environmental Protection Agency as in nonattainment or maintenance of national ambient air quality standards. Eligible freight-related activities include rail freight transportation improvements include: rehabilitation of rail lines, construction of intermodal facilities to alleviate truck trips, rail and marine diesel retrofits, etc.
- **The Appalachian Regional Commission's ADHS and Access Road Program** – The Appalachian Regional Commission (ARC) is a regional economic development agency that represents a partnership of federal, state, and local governments. MAP-21 did not continue Appalachian Development Highway System (ADHS) funding, although states may continue to access SAFETEA-LU funding. ARC also administers its Access Road Program to link businesses, communities, and residents to the ADHS and to other key parts of the Appalachian region's transportation network. Many Access Road Program projects commonly have a freight component to them, addressing "first and last mile" concerns in connecting shippers and receivers with the national freight network. Of Pennsylvania's 67 counties, 52 are located within the ARC region and have benefitted from ARC funding.
- **Transportation Infrastructure Finance and Innovation Act (TIFIA)** – The goal of TIFIA financing is to leverage federal resources to stimulate private capital investment to improve transportation infrastructure by providing credit assistance in the form of direct loans, loan guarantees, and standby lines of credit for projects of national or regional significance. TIFIA financing is available for large-scale public or private transportation projects. The program is aimed at large projects with a value greater than $50 million.
- **The Railroad Rehabilitation and Improvement Financing Program** – Under this program established in 1998, the FRA provides up to $35 billion in direct loans and loan guarantees with $7 billion reserved for Class I railroad projects. The loans can be used to refinance outstanding debt that result from infrastructure projects, which the program also helps to finance. State and local governments, government-sponsored authorities, corporations, railroads, and others can participate in the program.
- **Airport Improvement Program (AIP)** – The Airport Improvement Program is administered by the Federal Aviation Administration and provides grants for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS). The majority of Pennsylvania's public airports use this program to fund airport safety, capacity, security, and environmental improvements.
- **Fixing America's Surface Transportation Act (FAST ACT)** – The FAST Act establishes and funds two new intermodal freight programs, one formula-based and one that awards grants via a competitive U.S. Department of Transportation (USDOT) selection. The first is a National Highway Freight Program funded at $1.2 billion annually, which will be divided among all states states via formula. Pennsylvania's share is approximately $50 million dollars a year. These dollars can be spent on any project that contributes to the efficient movement of freight on a newly yet-to-be-established National Highway Freight Network.

  The second new freight program provides $900 million annually for the National Significant Freight and Highway Projects Program and will give USDOT the discretion to select large projects of national and regional significance. These projects must be over $100 million in cost and the minimum grant size is $25 million. The grant's share of project cost cannot exceed 60 percent and 25 percent of the total awards must be made in rural areas.

State

The following are state funding programs that assist in funding freight projects:

- **Multimodal Transportation Fund** – The Multimodal Transportation Fund was established by Act 89 of 2013 and provides grants to encourage economic development and ensure that a safe and reliable transportation system is available to Pennsylvanians. Funds may be used by both PennDOT and DCED to develop, rehabilitate, and enhance transportation infrastructure assets. Grants are available for projects with a total cost greater than $100,000 and up to $3 million. Eligible participants include municipalities, councils of government, businesses, economic development organizations, public transportation agencies, and ports and rail freight entities. The act will generate $144 million a year by 2017-18, with minimum annual funding levels established for each of the following freight-related modes, including:
  - $6 million for aviation programs;
  - $10 million for rail freight programs; and
  - $10 million for ports and waterway programs.
- **Act 13 Highway Bridge Improvement Fund/County Critical Bridge Legacy Funding** – Act 13 of 2012 established a Marcellus Legacy Fund that allocates a portion of the Marcellus Shale Impact Fee to the Highway Bridge Improvement Restricted Account and the Motor License Fund. These funds are distributed to counties (based on share of state population) to fund the replacement or repair of locally-owned (county or municipal), at-risk deteriorated bridges, including those that are structurally deficient and/or posted with weight restrictions. Act 13 requires state, regional, and local organizations to collaborate to improve critical transportation infrastructure. PennDOT must approve submitted plans to repair at-risk deteriorated bridges, and counties must work with their respective MPOs or RPOs to include the project in a financially constrained Transportation Improvement Program. In 2015, PennDOT allocated $20.55 million in Act 13 monies to the counties.
- **Rail Freight Assistance Program and Rail Transportation Assistance Program** – These two separate but related programs provide financial assistance for rail freight infrastructure. The objectives of these programs are to preserve essential rail freight service where economically feasible, and to preserve or stimulate economic development by generating new or expanded rail freight service. Rail Transportation Assistance Program (Rail TAP) funds are available to railroads that have a line item in the current Capital Budget bill, which is a competitive selection process. Eligible recipients include railroad owners, railroad operators, railroad operators or lessees, railroad users or shippers, and municipalities and other governmental entities. PennDOT's Bureau of Rail Freight funded 26 RFAP and 13 RTAP grant projects totaling over $35.8 million in 2014.
- **Act 13 Rail Infrastructure Set Aside** – Act 13 Impact Fees provide PennDOT $1 million annually for rail infrastructure. This is a dedicated amount that is to be used at the discretion of PennDOT's Bureau of Rail Freight to augment the Rail Freight Assistance Program and Rail Transportation Assistance Program.
- **Pennsylvania Infrastructure Bank** – The Pennsylvania Infrastructure Bank (PIB) is a revolving loan fund administered by PennDOT. The PIB offers flexible financing opportunities for eligible transportation improvement projects throughout the state. The PIB provides direct, low-interest loans currently at one-half the prime lending rate as published by the Federal Reserve with a period of up to ten years for repayment. Among the objectives of the PIB are spurring economic development and facilitating non-traditional projects, including intermodal facilities.
- **Port of Pittsburgh** – The Port of Pittsburgh Commission (PPC) enabling act provides the Commission with the ability to issue private-activity lease-backed bonds to finance economic development projects in the 12-county Pittsburgh Port District. For these projects, the company typically agrees to make lease payments to amortize bonds, and must demonstrate investment grade management and repayment capabilities. The company is then eligible for a fixed or variable lease at a low interest rate. The PPC also administers a revolving loan fund to assist water-related manufacturing and transportation industry growth in communities in the Pittsburgh Port District.

- **Philadelphia Regional Port Authority (PRPA)** – The Pennsylvania legislature created this authority as an independent state agency in 1989. PRPA leases terminals to private operators and provides maintenance, marketing, and other services. The Authority seeks to generate activity that will maximize port-related employment and revenues by promoting the use of the Philadelphia regional port system by Pennsylvania-based industries. PRPA also has the ability to issue bonds, and may enter into any trust indentures or other agreements with any bank or trust company as security for the construction, improvement, operation, maintenance, and repair of port facilities.
- **PA Intermodal Cargo Growth Incentive Program (PICIP)** – The Governor's Office is implementing the PA Intermodal Cargo Growth Incentive Program (PICIP). PICIP is designed to help maximize the growth of container cargo through those Pennsylvania terminals that handle containerized cargo. This will result in a higher utilization of ports infrastructure assets, improve productivity at the ports, and provide direct and indirect economic benefits to the Commonwealth through increased cargo volume and employment. PennDOT will use container cargo volume data from January through June 2015 as baseline data.

FREIGHT PROJECTS

MAP-21 includes several freight provisions that elevate freight movements within the national transportation planning and funding arena. MAP-21 provides eligible state DOTs with a potential maximum federal funding share of 95 percent for projects on the Interstate system and 90 percent for any other project if the U.S. Department of Transportation Secretary certifies that the project meets the requirements of Section 1116.

MAP-21 explains that eligible projects may include, but are not limited to:

- Construction, reconstruction, rehabilitation, and operational improvements directly relating to improving freight movement;
- Intelligent transportation systems and other technology to improve the flow of freight;
- Efforts to reduce the environmental impacts of freight movement on the primary freight network;
- Railway-highway grade separation;
- Geometric improvements to interchanges and ramps;
- Truck-only lanes;
- Climbing and runaway truck lanes;
- Truck parking facilities eligible for funding under Section 1401,"Jason's Law;"
- Real-time traffic, truck parking, roadway condition, and multimodal transportation information systems;
- Improvements to freight intermodal connectors; and
- Improvements to truck bottlenecks.

PennDOT and its planning partners are continually implementing freight projects. While these may be classified as bridge, roadway, safety, or other types of projects, they can also be defined as freight projects. A freight project may be either:

- **Freight Focused:** where the primary purpose of the project is to address a specific freight transportation need;
- **Freight Related:** where the primary purpose of the project is to address multiple transportation concerns, of which freight is one element; or
- **Freight Impacted:** where although the primary purpose of the project is to address general transportation needs, freight mobility may be positively affected.

As discussed earlier, the top 100 truck bottleneck locations were identified throughout the state. While the truck bottleneck locations and specific improvements require further operational and environmental study, the freight bottlenecks provide areas where improvements are needed to improve freight efficiencies. The following provides a portion of the truck bottlenecks throughout the state and MAP-21 eligibility will be determined as these locations are further studied:

- **Philadelphia area:**
  - I-95
  - I-476 south of the city
  - Portions of PA 363, I-276, and US 1, all north of the city
  - I-76 and I-676 in center city
  - I-76 extending from I-676 to US 202 near King of Prussia
  - I-76 at Girard Avenue
  - US 202 at Darby Paoli Road
  - I-95 at US 1
  - I-95 at Chestnut Street
  - I-95 at I-476 interchange
  - US 202 at US 422
  - I-76 at Walnut Lane
- **Pittsburgh area:**
  - I-376 nearly the entire corridor within the city
  - Portions of I-279 and PA 28
  - I-70 at I-79
- **Harrisburg area:**
  - The Eisenhower Interchange (I-81, I-83, I-283)
  - Portions of I-83, and PA 581
- **Other areas:**
  - PA 18 in Washington
  - US 11 in Northumberland near the Susquehanna River bridge
  - I-81 near Frackville
  - US 22 and I-78 in Allentown
  - US 30 near I-83 in York

The Comprehensive Freight Movement Plan is the result of a collaborative process that included PennDOT staff, MPOs, RPOs, local government, freight carriers and operators. The CFMP was developed and guided by representatives from multiple sectors and that supported identifying freight projects and improvement areas that improve freight efficiency. Numerous freight efficiency projects are already in the planning, programming, and implementation phases, whether in state, regional and local long range plans. **Table 13** provides a list of example freight efficiency projects included in PennDOT's "Road and Bridge Progress" listing that may be eligible for FAST Act freight funding. Additional freight-related projects were solicited from the planning partners. These are depicted in **Table 25** in **Appendix C**. These projects may be considered for future programming based on the availability of future funding.

Table 13: Example Freight Efficiency Projects

Project ID	Planning Partner	SR	Description	Improvement Type	Length	MAP-21 Criteria (see Key at bottom of table)
78672	Adams	SR0094	PA 94 and Berlin Road	Intersection Improvement	1.7	A
58136	Adams	SR0015	US-15/US-30 Interchange	Interchange Improvement	4.3	A
58137	Adams	n/a	Eisenhower Blvd Extension	New Roadway	N/A	A
96820	Centre	n/a	Western Interch -Mainline	New Roadway	11.4	E
102273	DVRPC	n/a	2nd Collegeville Br X-ing	New Bridge	N/A	E
85282	DVRPC	SR0076	I-76 Interstate Restoration	Add Lane	15.7	A,E,K
88716	Erie	n/a	Millfair Road Project	New Bridge	1.9	E
95558	Erie	SR4012	SR 4012: Intrchng Rd Impr	Widen	2.2	A,E
87201	Franklin	SR0081	Interstate Exit 3 Improve	Intersection Improvement	0.8	E
93055	Franklin	SR0081	I-81 New Interchange	New Interchange	8.9	A
101504	Franklin	n/a	Parkwood Drive Extension	New Roadway	N/A	E
87146	Franklin	SR8010	Norland Ave/ Walker Rd Int	Intersection Improvement	0.2	A, E
87147	Franklin	SR0030	US 30 Coldbrook Ave	Intersection Improvement	0.2	E
85337	Harrisburg	SR2019	Milroy Road Underpass	Widen	1.0	A, D, J
96198	Harrisburg	SR0322	US 322 Ramp Ext	Reconstruct	2.7	A
94913	Harrisburg	SR2029	Trindle/St Johns Church	Intersection Improvement	0.4	A
94914	Harrisburg	SR2029	St Johns Church Rd signal	Intersection Improvement	0.2	E
84548	Harrisburg	SR0300	PA-283/I-76 Interchange	Interchange Improvement	3.0	E
92940	Harrisburg	SR0174	I-81 Exit 29	Interchange Improvement	2.8	E
92945	Harrisburg	SR0322	US 322 & Chambers Hill Rd	Intersection Improvement	1.9	A
88256	Johnstown	SR0219	US219/PA553 Intersection	Intersection Improvement	0.7	A
22657	Johnstown	SR0056	Strayer St Improvements	Corridor Safety Improvement	1.0	A

Table 13: Example Freight Efficiency Projects (continued)

Project ID	Planning Partner	SR	Description	Improvement Type	Length	MAP-21 Criteria (see Key at bottom of table)
83168	Lancaster	SR0030	Gap Bottleneck Improve	Corridor Safety Improvement	1.4	A
89207	Lancaster	SR0023	PA 23 TSM Improvements	Intersection Improvement	11.9	B
80930	Lancaster	SR0030	US30/Hbg Pike Interchange	Reconstruct	1.2	B
64767	Lancaster	SR4057	Centerville Rd Interchange	Interchange Improvement	N/A	A
94910	Lancaster	SR0462	Columbia Ave & Rohrstn Rd	Intersection Improvement	0.4	A
94912	Lancaster	SR0023	PA 23 / PA 741 Int. Imp.	Intersection Improvement	0.5	K
101505	Lancaster	n/a	Centerville Road Widening	Widen	N/A	A
89198	Lancaster	SR0501	PA 501/Oregon Pk Intsct	Intersection Improvement	2.3	E
89654	Lancaster	SR4020	Hbg. Pike/ Dillerville Rd	Intersection Improvement	3.7	A
11443	Lehigh Valley	n/a	American Parkway	New Bridge	N/A	A
12327	Lehigh Valley	SR0412	SR 412 Improvement	Reconstruct	2.5	A
85144	Lehigh Valley	SR0022	22 Sec 400_ Ph 1 (145) LI	Reconstruct	1.5	A
94603	Lehigh Valley	SR0412	SR 412 Connector Road	New Roadway	N/A	A, D
94871	Lehigh Valley	SR2005	Lehigh Street Corridor	Corridor Safety Improvement	4.0	A
99697	Lehigh Valley	SR0145	7th St Multimodal Corridor	Corridor Safety Improvement	1.0	A
70742	Lehigh Valley	SR0309	SR 309/Center Valley Pky	New Interchange	2.4	A
97376	Lehigh Valley	SR0022	US22 Widen III-15th- 309	Widen	20.0	E
96384	Lehigh Valley	SR0022	US 22 Widening	Widen	9.0	A
96432	Lehigh Valley	SR0309	309 & Tilghman I/C Recon	Interchange Improvement	5.5	E
97227	Lehigh Valley	SR0222	222 N. Widen-LVTS	Widen	3.0	A
57615	Lehigh Valley	SR0022	22 Sec 400- Ph 2 (LRB)	Reconstruct	4.0	A
97231	NEPA	SR0080	I-80 Reconstruction II	Reconstruct	5.5	A
12613	NEPA	SR0061	Deer Lake North	Corridor Safety Improvement	7.2	A

Table 13: Example Freight Efficiency Projects (continued)

Project ID	Planning Partner	SR	Description	Improvement Type	Length	MAP-21 Criteria (see Key at bottom of table)
97262	NEPA	SR0033	33 Saylorsburg Ramps	Reconstruct	0.8	A
26064	North Central	SR0322	PA 28/US 322 Intersection	Intersection Improvement	0.7	A
70163	Northern Tier	SR0011	US 11/PA 171	Corridor Safety Improvement	1.2	A
88781	Reading	SR0012	SR 12 and SR 73	Intersection Improvement	0.3	A,J
88792	Reading	SR0061	SR 61 and Tuckerton Road	Intersection Improvement	0.6	A
92411	Reading	SR0222	SR 222 & 662 Intersection	Intersection Improvement	1.8	A
92414	Reading	SR0222	SR 222_73 & Genesis Dr	Intersection Improvement	2.6	A
90569	Reading	SR0222	SR 222 & Long Lane	Intersection Improvement	3.1	E
97234	Reading	SR0222	222 N. Kutz to Lehigh CL	Widen	3.8	E
61972	Reading	SR0222	SR 222 Widening	Widen	4.5	A
70274	Reading	n/a	River Road Extension	New Roadway	0.3	E
81743	Reading	SR0222	Route 222/422 Urban ITS	Variable Message Signs	23.8	E
74974	SEDA-COG	n/a	Loop Road Phase I	New Roadway	N/A	A
94746	SEDA-COG	n/a	Auction Road Phase II	New Interchange	1.6	A, E
9128	Scranton/W-B	SR0115	SR 115 over I-81	Interchange Improvement	1.1	A, E
70249	Scranton/W-B	SR0415	Dallas Int. 5 Leg w/SR1045	Intersection Improvement	1.0	A
86733	Scranton/W-B	SR0081	I81& 924 Interchange Study	Interchange Improvement	2.9	E
8890	Scranton/W-B	n/a	Airport Access Road	New Roadway	N/A	B,I
9234	Scranton/W-B	n/a	South Valley Parkway	New Roadway	0.5	B,I
70467	Scranton/W-B	n/a	Ext of 424 to SR 924	New Roadway	N/A	E
75357	S. Alleghenies	n/a	US 219 Garrett Paving	New Roadway	0.8	E
75362	S. Alleghenies	n/a	US 219 Garrett Bridges	New Roadway	0.8	E
23620	S. Alleghenies	n/a	219 Garrett Erthwk Ln Itm	New Roadway	15.5	E

Table 13: Example Freight Efficiency Projects (continued)

Project ID	Planning Partner	SR	Description	Improvement Type	Length	MAP-21 Criteria (see Key at bottom of table)
98512	SVTS	SR0018	Brdway Ave: PA 18-Council	Widen	2.0	E
1485	SVTS	SR0376	I-376/PA 318 Interch Imp	Interchange Improvement	1.7	A
85574	SPC	SR0422	Margaret Rd Intersection	Intersection Improvement	0.5	E
98689	SPC	SR0422	Dunbar Dip, Kittanning Twp	Reconstruct	1.9	E
100975	SPC	SR0088	SR 88 - Milford Drive	Relocation/ Realignment	N/A	E
91038	SPC	SR0119	US119:CoLine-Crossover Rd	Reconstruct	10.1	A
97028	SPC	SR0376	I376/Banksville Interchan	Interchange Improvement	2.6	E
92908	SPC	SR0228	Mars RR Br West Expansion	Widen	4.8	A
100787	SPC	SR0051	Saw Mill Rn Blvd - Whited	Add Lane	1.1	J
27179	SPC	SR0028	PA 28 Widen/ Troy-31st St	Widen	2.4	A
37590	SPC	n/a	P3-136 ov MonRiver Tribut	New Bridge	0.7	A
32079	SPC	SR0119	US 119/PA 819 Interchange	Interchange Improvement	2.6	A
47103	SPC	SR0028	PA 28 Widen/ I579-E Ohio	Widen	4.6	A,E
88991	SPC	SR0019	US19/Freedom Rd/PA228 Int	Intersection Improvement	1.5	A
67016	SPC	SR2004	Freedom Rd Upgrade - Ph C	Relocation/ Realignment	2.3	A
69988	SPC	SR0119	Wake Robin Curve	Relocation/ Realignment	1.7	A
72214	SPC	SR0021	Thompson Xing to Mall Ent	Widen	2.0	B
72377	SPC	SR2004	Freedom Road Improvement	Widen	2.5	A
82615	SPC	SR2004	Freedom Rd Upgrade - Ph A	Relocation/ Realignment	1.0	E
82616	SPC	SR2004	Freedom Rd Upgrade - Ph B	Relocation/ Realignment	1.7	E
95695	SPC	SR0040	US 40 @ New Salem Road	Intersection Improvement	0.8	A,E
98078	SPC	SR0422	US 422 ITS - Armstrong	Variable Message Signs	15.9	A
98084	SPC	SR0019	US 19 ITS	Variable Message Signs	30.0	E

Table 13: Example Freight Efficiency Projects (continued)

Project ID	Planning Partner	SR	Description	Improvement Type	Length	MAP-21 Criteria (see Key at bottom of table)
98106	SPC	SR0022	US 22 Indiana Co. I.T.S	Variable Message Signs	36.1	A
99145	SPC	SR0422	US 422 ITS - Butler	Variable Message Signs	50.0	A
99319	SPC	SR0119	US 119 Indiana ITS	Variable Message Signs	36.7	A,K
99681	SPC	SR0228	PA 228 ITS - Butler	Variable Message Signs	N/A	E
24523	SPC	n/a	Moraine State Park Access	New Interchange	0.6	E
25834	SPC	n/a	Rose Street Extension #2	New Roadway	N/A	E
31872	SPC	SR0030	Jeannette - Amos K Bypass	Interchange Improvement	2.8	A
47432	SPC	SR0088	PA 88 & 837 Carroll Twp	Add Lane	0.2	A
57452	SPC	SR0031	PA31:Donegal-381/711 Int	Intersection Improvement	1.9	A
91457	SPC	SR0119	McClure Street Crossing	RR High Type Crossing	0.5	E
70100	SPC	SR0356	PA 356 Truck Climbing Ln	Reconstruct	1.1	A
6000	Williamsport	SR0220	US 220/4th St Interchange	Interchange Improvement	4.8	A
92923	York	SR0015	Blue-Gray Highway Reconst	Widen	4.2	A
61308	York	SR1012	Emig Road RR Underpass	Widen	0.5	A
32032	Interstate	SR0070	New Stanton Interchange	Interchange Improvement	3.2	A
70024	Interstate	SR0083	I-83 East Shore Section 1	Add Lane	8.2	A,E
70047	Interstate	SR0070	Bentleyville Interchange	New Interchange	5.3	A,E
75762	Interstate	SR0084	I84-I4R SR 6 to NY Line	Reconstruct	17.5	A
76372	Interstate	SR0081	I-81 Leb. Co. to Pine Gve	Reconstruct	15.6	A
89177	Interstate	SR0083	I-83/PA-581 Bottleneck	Interchange Improvement	6.9	A
92924	Interstate	SR0083	North York Widening	Reconstruct	8.0	A,E
92931	Interstate	SR0083	Eisenhower Interchange	Reconstruct	9.1	E
100235	Interstate	SR0081	I-83 Exit 24-28 Study	New Interchange	10.0	E

Table 13: Example Freight Efficiency Projects (continued)

Project ID	Planning Partner	SR	Description	Improvement Type	Length	MAP-21 Criteria (see Key at bottom of table)
97828	Interstate	SR0083	I-83 East Shore Section 3	Reconstruct	3.8	E
57921	Interstate	SR0080	I-80/Exit 308 Realignment	Interchange Improvement	3.0	A
31894	Interstate	SR0070	I-70 @ PA 31 Interchange	Interchange Improvement	4.5	A
31895	Interstate	SR0070	I-70 @ Yukon Interchange	Interchange Improvement	3.8	E
47022	Interstate	SR0070	I-70 @ PA 481 Interchange	Interchange Improvement	2.6	A
47955	Interstate	SR0081	Reconstruct Exit178 Avoca	Interchange Improvement	2.6	A
62880	Interstate	SR0083	I-83 Exit 18	Interchange Improvement	5.7	E
73514	Interstate	SR0070	I70: 79-S to SR 136 Intch	Widen	4.0	A
75933	Interstate	SR0081	I-81 Delano to McAdoo	Bridge Replacement	1.2	A
75976	Interstate	SR0081	I-81 Exit 219	Interchange Improvement	2.5	E
75978	Interstate	SR0070	I-70 @ PA 51 Interchange	Reconstruct	5.1	A
76860	Interstate	SR0084	Pike I-84 I4R E34 - MP 40	Reconstruct	14.7	A
76861	Interstate	SR0084	I-84 E&W I-4R Wayne - E26	Reconstruct	14.4	E
87236	Interstate	SR0070	I70: I79N to SR 136 Intch	Widen	5.6	B,I
87795	Interstate	SR0084	I-84 E&W I-4R E26 to E34	Reconstruct	14.7	B,I
88508	Interstate	SR0070	I-70 Arnold City Interch	Interchange Improvement	6.6	B,I
97027	Interstate	SR0376	I376/Carnegie Interchange	Interchange Improvement	2.0	B,I
97029	Interstate	SR0376	I376/Greentree Interchang	Interchange Improvement	2.0	B,I

A.Construction, reconstruction, rehabilitation, and operational improvements directly relating to improving freight movement;
B. Intelligent transportation systems and other technology to improve the flow of freight;
C. Efforts to reduce the environmental impacts of freight movement on the primary freight network;
D. Railway-highway grade separation;
E. Geometric improvements to interstates, interchanges and ramps;
F. Truck-only lanes;
G. Climbing and runaway truck lanes;
H. Truck parking facilities eligible for funding under Section 1401,"Jason's Law;"
I. Real-time traffic, truck parking, roadway condition, and multimodal transportation information systems;
J. Improvements to freight intermodal connectors; and
K. Improvements to truck bottlenecks.

CONCLUSIONS

It is critical to the State's economic future that the Comprehensive Freight Movement Plan be an actionable and implementable plan. To accomplish this, strategic recommendations were developed to support the freight plan's goals, objectives, and performance measures. The recommendations include broad-based policies and potential projects, as well as freight bottleneck locations that require further study to identify freight efficiency improvements and potential MAP-21 funding. The recommendations, focus areas, project areas, and projects assist PennDOT and its planning partners to proactively address future challenges and improve Pennsylvania's economic position.

To be successful, Pennsylvania needs federal, state, and regional partners working together to confront the challenges of today and tomorrow by funding and implementing freight infrastructure solutions that will improve safety, travel times and reliability, and intermodal connectivity for all modes of freight that moves into, out of, within, and through the state, which will ultimately benefit Pennsylvania's economic competitiveness.

Appendix A: Freight Glossary and Acronyms

#

3P – See P3.

3PL – *third party logistics* – a firm that specializes in providing services related to the flow of goods to other companies.

4PL – *fourth party logistics* – a supply chain integrator that serves to supply a comprehensive supply chain solution by managing all phases.

5-axle tractor-semitrailer – one trailer up to 53 feet long.

6-axle tractor-semitrailer – one trailer up to 53 feet long with six axles.

A

A-train combination –truck combinations consisting of a tractor (engine) and two or more trailers using a converted dolly between trailers.

AADT – *annual average daily traffic* – a measure of the number of vehicles crossing a specified point on an average day during the year.

AAPA – *American Association of Port Authorities*

AAR – *Association of American Railroads* – an industry trade group representing the major freight railroads in Canada, Mexico, and the U.S.

AASHTO – *American Association of State Highway and Transportation Officials*

access control – measures taken to manage the flow of vehicles getting on and coming off a roadway, typically highways with interchanges.

access management – proactive management of vehicular access points to land parcels adjacent to all manner of roadways.

Act 89 – Pennsylvania's first major transportation funding legislation in over 15 years, generating an additional $2.3 billion annually by Fiscal Year 2017-18 to address transportation system needs.

approach improvement – changes made to roadways as they near an intersection or interchange via the addition of turn lanes, auxiliary lanes, or other design changes.

arterial roadway – a local roadway that provides a primary route for through traffic; roadway providing the highest level of service at the greatest speed for the longest uninterrupted distance, with some degree of access control.

ATA – American Trucking Association

at-grade intersection – a point where two roadways intersect (or roadway/railroad), typically requiring traffic control such as a stop sign, traffic signals, or crossbucks.

ATRI – the American Transportation Research Institute

auxiliary lane – a non-continuous travel lane used to facilitate the entering or exiting of traffic.

AVL – automatic vehicle location technologies

B

B-train combination – a truck combination consisting of a tractor (engine) and two trailers. It utilizes a unique trailer assembly that extends from the first trailer to the fifth wheel of the second trailer.

BAB – *Build America Bonds* – Tax credit bonds administered by the U.S. Treasury Department and introduced as part of the February 2009 American Recovery and Reinvestment Act.

backhaul – a load of cargo to take back to a truck's origination point or region.

BEA regions – *Bureau of Economic Analysis regions* – 179 geographic regions defined by the U.S. Department of Commerce. BEA Regions are made up of markets surrounding metropolitan or micropolitan statistical areas. They consist of one or more economic nodes and the surrounding counties that are economically related to the nodes.

block (rail) – a segment of rail track designated for operating purposes; or, a grouping of railcars destined for the same terminal or the same freight customer (see also **automatic block system**).

BNSF – *Burlington Northern Santa Fe Railroad* – one of several Class I railroads operating primarily between Chicago and the west coast of the United States.

bobtail – regional term for a straight truck or a commercial tractor in transit without a trailer.

bolted rail – see jointed rail.

box truck – a truck with an attached cargo area. (see also straight truck).

BPRR – *Buffalo & Pittsburgh Railroad*

break-bulk – freight facilities that move discretely packaged cargo (such as automobiles, steel girders, or palletized cargo, etc.) that must be loaded individually, and not in intermodal containers nor in bulk as with oil or grain

breakdown flow – the slowing of traffic due to a large number of vehicles on the road.

breakdown point – the traffic volume at which the capacity of a roadway is exceeded.

bulk carrier – carriers that haul bulk commodities (i.e., fuel, gravel, grain, fertilizer, vegetable oil, ammonia, scrap metal, coal, etc.). Liquid bulk is transported in tanker trailers and solid bulk is typically moved in open top trailers.

C

capacity – the number of vehicles that a roadway can reasonably accommodate over a certain period of time.

carload (rail) – a loaded railcar; typically used in descriptions of freight traffic activity.

carrier – an enterprise engaged in the business of transporting goods.

cartage – charge for pick-up and delivery of goods, or movement of goods locally (short distances).

centralized traffic control – a train movement system by which a remote dispatcher controls the throwing of switches and clearing of signals.

chargeable weight – shipment weight used in determining freight charges. The chargeable weight may be the dimensional weight or, for container shipments, the gross weight of the shipment less the tare weight of the container.

city logistics – the process for optimizing logistics and transport activities by private companies in urban areas.

Class I railroad – are defined by the Federal Surface Transportation Board as having more than a minimum threshold value of annual carrier operating revenue. The threshold is adjusted annually by the STB. They primarily operate long-haul service over high-density intercity traffic lanes. Currently seven railroads operating in the U.S. (and four in Pennsylvania) are classified as Class I.

Class II railroad – a classification of regulated carriers based upon annual operating revenues; Class II railroads have annual revenue between the minimum threshold established annually by the Surface Transportation Board for Class I railroads and the maximum established for Class III railroads. Regional railroads also operate over at least 350 miles of track. There are two Class II railroads operating in Pennsylvania: the Buffalo & Pittsburgh Railroad, and the Wheeling & Lake Erie Railway.

Class III railroads – also called short line railroads, operate over less than 350 miles of track and have annual operating revenue of less than a threshold established annually by the Surface Transportation Board.

CMU – *Carnegie Mellon University*

CN – *Canadian National Railroad*

CO – *carbon monoxide*

container on barge – a form of Intermodal freight transport where containers are stacked on a barge and towed to its destination

container on flat car – the practice of moving truck or Oceanic containers by rail

collector road – a roadway that transfers traffic between larger (arterial) streets and local roads; provides less highly developed level of service at a speed for shorter distances by collecting traffic from local roads and connecting them with arterials.

commercial land uses – areas of land that are generally used for commercial development.

committed improvement – roadway improvement that has been approved and funded.

common carrier – an individual or business that advertises to the public that it is available for hire to transport people or property in exchange for a fee.

consolidation – collecting smaller shipments to form a larger quantity in order to realize lower transportation rates.

container – steel boxes used internationally to transport freight by sea, rail, and highway; typically 40 or 48 feet long, eight feet tall and eight feet wide.

containerization – the technique of using a boxlike device in which a number of packages are stored, protected, and handled as a single unit in transit.

contingency – in terms of dollar expenditures, an amount that is added to the total cost to account for unforeseen costs.

continuous welded rail – rail that has been welded into continuous lengths of a quarter mile or more. Sections of track laid with such rail are easier to maintain and provide a smoother ride.

cross dock – operational activity transferring goods from one piece of transportation equipment to another (see also **transload**).

CRFC – *Critical Rural Freight Corridor*, an FHWA designation

CSA – *commercial service airport*

CSCMP – *Council of Supply Chain Management Professionals*

CSXT – *CSX Transportation* – a Class I rail carrier that serves most markets east of the Mississippi River.

CV – *commercial vehicle*

CVISN – *Commercial Vehicle Information Systems and Networks* – a key component of the Federal Motor Carrier Safety Administration's drive to improve commercial motor vehicle safety. CVISN supports FMCSA's goals by focusing safety enforcement on high-risk operators; integrating systems to improve the accuracy, integrity, and verifiability of credentials; improving efficiency through electronic screening of commercial vehicles; and enabling online application and issuance of credentials.

CWA – *Clean Water Act* – passed in 1972, CWA is the cornerstone of surface water quality protection in the United States.

D

DCED – Department of Community and Economic Development

density – the concentration or intensity of something expressed as a rate relative to time or space.

design criteria – a set of guidelines that direct the design and construction of the roadway.

design standards – a set of physical standards established by each state for highway design and construction.

design year – a designated year, generally no less than 20 years after the expected construction of a project, signifying the point in time at which the improvements will operate at their functional capacity.

discounted total savings – the projected future dollar savings that are due to a roadway improvement, shown in current dollar value.

distribution center – warehousing facilities used to receive, temporarily store, and redistribute goods for distribution to wholesale, retail, or consumer locations.

distribution channel – the route by which a company distributes goods.

DOT – *Department of Transportation*

double-stack – railcars designed so that the containers may be stacked two high, enabling more containers per rail car and shorter train lengths.

double trailer combinations – one type of high performance vehicle with a tractor (engine) and two trailers.

drayage carrier – the service offered by a motor carrier for transport of containers between modes or between a mode and a shipper or receiver.

DVRPC – *Delaware Valley Regional Planning Commission*

E

evaluation factor – a basis on which to compare two or more alternatives.

exclusive use – vehicles that a carrier assigns to a specific shipper for its exclusive use.

expressway – a multi-lane (typically four or more) highway with limited, controlled access and access points consisting of intersections or interchanges.

F

FAF – *Freight Analysis Framework* – a USDOT tool that integrates data from a variety of sources to estimate commodity flows and related freight transportation activity.

FAK – *freight of all kinds* – typically found in trailer on freight car (TOFC) service that provides a standardized rate base, regardless of National Motor Freight Class (NMFC) classification; charges are calculated on weight and distance traveled.

FARS – *Fatality Analysis Reporting System* – a census of fatal crashes of motor vehicles on a trafficway. It is generally considered to be the most reliable national crash database.

FHWA – *Federal Highway Administration*

field warehouse – a warehouse that stores goods on the goods owner's property while the goods are under a bona fide public warehouse manager's custody.

first and last mile - term used in supply chain management and transportation planning to describe the movement of people and goods from a transportation hub to a final destination.

flat car – a railcar without sides, used for hauling machinery.

flatbed – a type of trailer without sides used in trucking operations to transport bulk goods, such as steel or machinery.

FMCSA – *Federal Motor Carrier Safety Administration*

FMCSRs – *Federal Motor Carrier Safety Regulations*

forced flow – a condition where the excessive number of vehicles on a roadway slows the free movement of traffic.

forgiving roadway – a roadway that includes design features to accommodate driver error.

for-hire – fleets that exist to move other people's freight under contract. Common examples of these include Schneider National, Conway, and UPS.

free-flow conditions – a condition when the movement of traffic on a roadway is at a speed that should be expected for the type of facility.

freeway – a multi-lane (typically four or more) highway with access provided only at grade-separated interchanges.

freight – cargo being transported for commerce, manufacturing, or personal use, usually via commercial vehicles.

freight class – determined by the National Motor Freight Traffic Association, the National Motor Freight Class (NMFC) reflects the freight's density, degree to which it is breakable, and the value; the higher the NMFC, the higher the freight charges.

freight forwarder – an enterprise that provides services to facilitate the transport of shipments.

functionally obsolete – a bridge that has inadequate deck geometry (e.g., too narrow), is improperly aligned with the roadway, has insufficient vertical clearance, or has inadequate load-carrying capacity.

G

GA airports – general aviation airports

GDP – gross domestic product; U.S. Bureau of Economic Analysis definitions of GDP and state GDP are provided below:

> *GDP by state is the state counterpart of the Nation's GDP: GDP by state is derived as the sum of the GDP originating in all the industries in a state. The statistics of real GDP by state are prepared in chained (2005) dollars. Real GDP by state is an inflation–adjusted measure of each state's gross product that is based on national prices for the goods and services produced within that state. The statistics of real GDP by state and of quantity indexes with a base year of 2005 were derived by applying national chain–type price indexes to the current–dollar GDP–by–state values for the 64 detailed NAICS–based industries for 1997 forward.*
>
> ***Relation of GDP by state to U.S. Gross Domestic Product (GDP):*** *An industry's GDP by state, or its value added, in practice, is calculated as the sum of incomes earned by labor and capital and the costs incurred in the production of goods and services. That is, it includes the wages and salaries that workers earn, the income earned by individual or joint entrepreneurs as well as by corporations, and business taxes such as sales, property, and Federal excise taxes—that count as a business expense. GDP is calculated as the sum of what consumers, businesses, and government spend on final goods and services, plus investment and net foreign trade. In theory, incomes earned should equal what is spent, but due to different data sources, income earned, usually referred to as gross domestic income (GDI), does not always equal what is spent (GDP). The difference is referred to as the "statistical discrepancy."*

general purpose lanes – interstate highway lanes used by any type of legal, motorized vehicle.

geometric design – the design of a roadway where the horizontal and vertical components, expressed as line segments and curves, are set to specific lengths and directions.

GIS – *geographic information system* – a computerized system that integrates hardware, software and data to capture, manage, analyze and display geographically referenced information.

GPS – *global positioning navigation system* – a satellite system that provides location, time, and routing information via GPS receivers.

grade – the degree of rise or descent of a surface typically expressed as a percent (change in elevation divided by change in length); in terms of transportation, the change in the longitudinal elevation of a roadway is expressed as a grade.

grade-separated – a roadway or railway crossing which has an overpass or underpass.

gross weight – the total weight of the vehicle and the payload of freight or passengers.

GSP – *gross state product* – uses a formula similar to gross domestic product, but for only a single state.

GVWR – *gross vehicle weight rating*

H

HC – hydrocarbons

HEC-2 modeling – a water surface elevation computer model developed by the Hydraulic Engineering Center of the U.S. Army Corps of Engineers.

highway trust fund – a fund into which highway users (carriers and automobile operators) pay; the fund pays for federal government's highway construction share.

HMRs – *hazardous materials regulations*

horizontal alignment or curve – the configuration of a roadway comprised of curves and straight sections.

HOS – *hours of service* – regulation defining the measure of time an operator may operate a commercial vehicle and specifying required breaks; the total number of hours worked in a period.

HOT lanes – *high occupancy toll lanes* – lanes provided for uncongested right of way for vehicles by extracting a fee for usage, on a per vehicle basis.

HOV lanes – *high occupancy vehicle lanes* – lanes reserved for vehicles with a driver and one or more passengers.

HPMS – *Highway Performance Monitoring System*

HPVs – *high productivity vehicles* – trucks that are able carry more or heavier freight due to their design or configuration.

I

inbound freight flows – freight that originates outside a particular state or region and terminates in that state or region.

infrastructure – the underlying foundation for development; for example, a city's water, sewer, or transportation systems.

inland carrier – an enterprise that offers overland service to or from a point of export.

interchange (rail) – the practice of exchanging rail cars between railroads when, for example, a rail car arrives in an area on one railroad but is destined for a freight customer served by the other; or, the junction point where such practice is typically carried out.

Interchange (highway) - a road junction that typically uses grade separation, and one or more ramps, to permit traffic on at least one highway to pass through the junction without directly crossing any other traffic stream.

intermodal – freight that travels from origin to destination on more than one kind of transportation.

Intermodal connector - roads that provide access between major intermodal facilities and other elements of the National Highway System.

intermodal transfer facility – a facility where cargo is transferred from one mode of transportation to another, usually between ship or truck and rail.

internal flows – freight that originates and terminates within a particular municipality, county, state, or region. Sometimes referred to as "intra" freight flow.

intersection control – a mechanism used in controlling and/or directing traffic through an area where two roads converge; for example, traffic signals and left- or right-turn lanes

interstate commerce – the transportation of persons or property between states; commercial trade, business, movement of goods or money, or transportation from one state to another.

interstate freeway – a freeway that traverses one or more than one state and is designated as part of the federal interstate system.

interstate standard – a set of criteria that must be met in the design and construction of an interstate freeway.

ISTEA – *Intermodal Surface Transportation Efficiency Act* – legislation passed by the U.S. Congress in 1991 which emphasizes enhancing a transportation system's efficiency, monitoring and improving its performance, and ensuring that future investments reflect consideration of their economic, environmental, and quality-of- life impacts.

ITS – *intelligent transportation systems* – ITS encompass a broad range of wireless and land-line communications, information, and electronics technologies or information processes used singly or in combination or that are integrated into the transportation system's infrastructure and assist vehicles in relieving congestion, improving safety, and enhancing efficiency and productivity of a surface transportation system.

J

JIT – *just-in-time delivery* – a manufacturing strategy that minimizes inventory investment by scheduling delivery of raw materials or supplies to the point where they are needed, at the precise time required.

job year – the equivalent of one year of full-time employment.

jointed rail – rail laid in 39-foot sections and bolted together, as opposed to being continuous welded. At the time most railroad lines were originally built, the typical freight car was 40 feet long. Making the joints one foot shorter and staggering them resulted in the smoothest ride.

just-in-time inventory system – a manufacturing strategy that minimizes inventory investment by scheduling delivery of raw materials or supplies to the point where they are needed, at the precise time required.

L

land use – the categorization of land according to its use; for example, commercial or recreational.

LCV – *long combination vehicle* – freight carriers made up of more than two trailers and/or carriers over 90 feet in length.

lead time – the total time that elapses between an order's placement and its receipt.

less than carload – less than carload rail service.

line-haul carriers – rail carriers that predominately move freight long distances between terminals.

link – term used by planners to define the individual roadway alignments within a segment.

LNG – *liquefied natural gas*

local (rail) – a train operating usually within a division, or over a short distance. The purpose of the local is to provide direct access to the freight customers served as opposed to the rapid movement of freight over a longer distance.

local road – consists of all roads not defined as arterials or collectors; primarily provides access to land with little or no through movement.

logistics – the process of planning, implementing, and controlling procedures for the efficient and effective storage of goods, services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. This definition includes inbound, outbound, internal, and external movements.

LOS – *level of service* – a measure of a highway's ability to serve a specific volume of traffic, defined by letters A through F.

LRTP – *long range transportation plan* – a long range (typically 20 or more years) plan developed to guide the effective investment of public funds in multimodal transportation facilities.

LTL – *less than truckload* – describes carriers who consolidate many smaller shipments from multiple shippers located in a common area or region, sort them at dock facilities according to common designation, and then line-haul trailers to a destination dock for delivery. Shipment size is typically 70 to 20,000 pounds.

M

MAP-21 – *Moving Ahead for Progress in the 21st Century* – federal transportation bill adopted on July 6, 2012 and expiring September 2014. A subsequent long-term spending plan is being considered by Congress (as of June 2015).

MCMIS – *Motor Carrier Management Information System* – information on the safety fitness of commercial motor carriers and hazardous material shippers subject to the Federal Motor Carrier Safety Regulations and the Hazardous Materials Regulations. MCMIS is a collection of safety information including state-reported crashes, compliance review and roadside inspections results, enforcement data, and motor carrier census data.

MEC Network – The *Multimodal Economic Competitiveness Network*, a network of the state's most strategic transportation facilities comprising part of the framework for the project prioritization process.

meet (rail) – the location where two trains are scheduled to meet one another. If on single track, one train will be instructed to wait in the siding for the other.

metric – measure utilized to gauge performance, efficiency, or rate, as in "metric based organization."

mileage rate – a rate based upon the number of miles the commodity is shipped.

minimize impact – the act of decreasing the negative effects of a particular action.

MIS – *major investment study* – an evaluation, usually conducted in an urban area, to identify needs for public or quasi-public investments (for example, related to public transportation) and strategies to address those needs.

mitigation – measures taken to eliminate or reduce the effects of a problem.

MOA – *memorandum of agreement* – a document of agreement between different reviewing government agencies that stipulates the responsibilities and procedures to be undertaken with regard to a particular issue or element.

mobility provider – transportation facility (road, highway, or bus route) that allows people to travel from one point to another.

MOE – *measures of effectiveness* – a group of factors that evaluate transportation components such as vehicle miles traveled, vehicle hours traveled, average speed, accident cost, travel cost, etc.

mosaic – in transportation, an aerial photograph of a land surface.

MPO – *metropolitan planning organization* – an organization that oversees the development of an urban area; similar to a regional planning commission.

multimodal – involving more than one form of transportation.

multiple regression equation – an equation that contains multiple variables to determine a best-fit solution for a given number of cases.

N

NAICS – *North American Industry Classification System* – a numerical coding system adopted by the U.S. Census Bureau in 1997. It replaces the 1987 Standard Industrial Classification system.

national ambient air quality standards (NAAQS) – criteria for measuring pollutants in the air, ambient air meaning the general conditions over an area.

NEPA – *National Environmental Policy Act* – federal regulations which define the process of evaluating the possible impacts of federally funded projects, including transportation projects.

NFN – *National Freight Network*, called for in MAP-21 and to include the Primary Freight Network, interstate highways not in the Primary Freight Network, and Critical Rural Freight Corridors.

NHS – *National Highway System*

NHTSA – *National Highway Traffic Safety Administration*

NOx – *nitrogen oxide*

NS – *Norfolk Southern Railway* - a Class I rail carrier that serves most markets east of the Mississippi River.

O

O-D – *origin-destination* – the beginning and ending location of a trip.

O&M cost – *operations and maintenance costs* – the costs involved in operating and maintaining a highway.

ocean port intermodal terminal – one of three general types of intermodal terminals serving container traffic at ports:

- on-dock:
  - a rail to ship transfer facility at the marine terminal that eliminates the need to transfer
  - containers by truck on city streets
- near-dock:
  - typically located within a few miles of port terminals; transfer between rail and ship requires a truck move and additional container lifts. This type of terminal has the advantage of serving multiple ocean carriers
  - inland port or satellite:
  - located away from the port. Most advantageous if shuttle trains operate between the inland terminal and port facilities to avoid port traffic congestion.

OS&D – overage, shortage, and damage **outbound freight flows** – freight that originates in particular state or region and terminates outside of that state or region.

overhead flows – freight traffic volumes that originate and terminate beyond the borders of a state or region, but that use transportation infrastructure of the state or region during transit. See **through freight flows**.

over-the-road – a motor carrier operation that reflects long-distance moves.

P

PAAC – *Port Authority of Allegheny County*

P3 - PPP – *public-private partnership* – a venture which is funded and operated through a partnership between a governmental agency and one or more private sector companies.

palustrine – part of the Cowardin classification system of wetlands; includes all non-tidal wetlands dominated by trees and shrubs.

parent rock – the mineral materials from which soil forms.

partially-folded diamond – an interchange configuration consisting of one loop ramp and three standard ramps.

passive retention treatment pond – a low maintenance treatment pond used in the storage of storm-water runoff.

PennDOT – The *Pennsylvania Department of Transportation*

perennial stream (wetland) – a stream that has measurable flow of water all year long.

PFN – *Primary Freight Network*, called for in MAP-21

physiography – the study of the physical characteristics of an area's natural features.

planning partners – in Pennsylvania – the MPOs and Rural Planning Organizations in the state.

power unit – the engine and operational component of a truck or vehicle.

PPP – see **P3**.

preferred alternative – based on the evaluation of the alternatives and their impacts, the option for transportation improvements recommended in an environmental document.

PREP regions – stands for Partnership for Regional Economic Performance. Pennsylvania has established ten PREP regions to focus on economic growth and development.

private carriers – private carrier fleets are operated by businesses whose primary function is something other than transportation, including manufacturers, distributors, retailers, and other businesses operating trucks as an internal value-added function primarily to meet their own business shipping needs.

private fleets – shippers who use their own trucks (at least some of the time). The bigger the "shipper" the more likely they use both for-hire trucks and private trucks. For example, Walmart uses Walmart-owned trucks for freight movement and also hires Schneider National and others to move some of their freight.

profile – a side or elevation view of a road.

PRPA – *Philadelphia Regional Port Authority*

public-private partnership – see **P3**.

Q

queue or queues – a row of people or things waiting for a turn at something or for admittance.

quick response – a method of maximizing the efficiency of the supply chain by reducing inventory investment.

R

rail weight reference – weights of rail are expressed in weight per yard of length. Thus 136-pound rail weighs 136 pounds per yard.

RCRA – *Resource Conservation and Recovery Act* – legislation for the management of hazardous waste sites.

recharge – the process of surface water replenishing the sub-surface groundwater supply system (see **losing stream**).

recovery area – the area of a roadway provided to help drivers regain control of their vehicle.

red flag – a major environmental, historic, community, or other feature that represents a resource that cannot be or would be financially excessive to avoid or mitigate for, creating a significant challenge to project implementation.

reefer – a container with a self-contained refrigeration unit, used for the transportation of perishable cargo.

regional highway – a highway that serves and connects several communities in a state, county, or economic area.

regulatory stream – a stream that is regulated under the provisions of the Clean Water Act, Section 404 permitting process (see **Section 404 of the Clean Water Act**).

relay terminal – a motor carrier terminal that facilitates the substitution of one driver for another who has driven the maximum hours permitted.

residual soil – soils formed by bedrock that has been worn away by the elements.

retail – the sale of goods or articles directly to the customer.

reverse logistics – focus on logistical needs and requirements after the final transport to the consumer, typically as returns for repair and return for credit.

RFID – *radio frequency identification*

right-of-way – the property needed for the construction of a roadway.

riparian – term used to classify vegetation that is associated with rivers and streams; water source has had influence over the type of vegetation that is present; similar to riverine.

riverine – term used to classify vegetation that is associated with rivers and streams; water source has had influence over the type of vegetation that is present; similar to riparian.

Ro-Ro – *roll-on, roll-off* – type of ship allowing for cargo to be driven or wheeled on and off the vessel; typically used for the movement of automobiles and large wheeled or tracked machinery.

roadway deficiencies – elements of a roadway that do not meet current state or federal design standards.

roadway design feature – design characteristics of a roadway.

roadway line – the straight part of a roadway alignment.

Rocky Mountain double – one type of HPV with a tractor (engine) and two trailers, one 48 feet long and the other 28 feet long.

ROD – *record of decision* – a document that states the government's decision to either continue a highway improvement project into design or to postpone the improvement. This document is executed upon the completion of the EIS and provides the authority for federal funds to be utilized in the construction of the improvements.

roundabout – a type of intersection control where traffic enters a one-way stream around a central island, yielding to the traffic already within the roundabout.

ROI – *return on investment*

ROW – *right-of-way*

RPC – *regional planning commission* – a body or group, typically enabled through state laws, concerned with the economic and development planning of a geographic region.

RPO – *rural planning organizations* – the rural counterpart to the Metropolitan Planning Organizations.

S

SAFETEA-LU – *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* – federal legislation signed in 2005 to provide funding for highways, highway safety, and public transportation.

scoping – the process of gathering information about a project's important issues.

secondary impact – impacts which result from actions caused or influenced by the project; an example would be impacts caused by new development induced by the project.

Section 106 – a review process under the National Historic Preservation Act. It requires federal agencies to take into account the effects of their projects on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the project prior to taking action to implement it.

Section 4(f) – a federal procedure for reviewing projects which may affect a public park, wildlife refuge, or historic site. The report produced is referred to as the Section 4(f) evaluation. The FHWA may not approve the use of land from a significant publicly owned park or recreation area, wildlife or waterfowl refuge, or any significant historic site unless there is no feasible and prudent alternative to the use of land from the property and the project includes all possible planning to minimize harm to the property resulting from the project.

Section 404 of the Clean Water Act – a program which regulates the discharge of dredged or fill material into waters of the United States, including wetlands.

Section 404 permit – required before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation.

selected alternative – the chosen option for improvements after public review of recommendations within an EIS or other public document at an official hearing.

SEPTA – *Southeastern Pennsylvania Transportation Authority*

shadow bid – a risk adjusted estimate of a project's costs and benefits to be developed as if the project were delivered as a P3. It includes the best estimate of full life cycle costs, benefits, and risks over the contract term.

shippers – entities whose core business model is to make, own, and/or sell goods, and secondarily rely on trucks to move their goods. Common examples include Procter & Gamble, Walmart, 3M, Exxon Mobil, and Hallmark. In some instances these shippers contract with for-hire motor carriers to move their goods, and sometimes they own or use their own trucks (private trucks or private fleets).

short line railroad – an independently operated branch line that connects a Class I railroad with another short line or customers.

SIB – *state infrastructure bank program* – a funding program established as part of the Intermodal Surface Transportation Efficiency Act of 1991.

SIC – *Standard Industry Classification* – a U.S. Census Bureau coding system replaced by NAICS.

siding – a short section of railroad track parallel to the main line and connected to the main line by switches to allow one train to wait for and be passed by another.

SEIS – *supplemental environmental impact statement* – a document that helps fulfill the National Environmental Policy Act of 1969, which requires that before design and construction of federally funded or permitted projects, proposed projects must be evaluated in terms of their impacts to both the natural and man-made environment. The SEIS typically adds or amends information presented in an earlier EIS.

signalized intersection control – traffic light used to direct and control traffic where two roads come together.

single unit trucks – trucks with the tractor (engine) and van , tank, or hopper attached to the same frame.

slip ramp – a diagonal ramp connecting parallel roads typically traveling in the same direction.

socio-economic data – demographic data relating to the social environment.

solid waste transfer station – a station that receives garbage for transfer to the disposal site.

SPC – *Southwestern Pennsylvania Commission*

specialized carrier – motor carriers who transport specific types of goods including construction and military materials, oversize or overweight items, and hazardous materials.

spot (rail) – the act of placing a carload at a freight customer's location for loading or unloading, or the location itself.

spring switch – a switch that is spring-loaded so that a train may trail through it in either direction. On short stretches of double track in un-signaled territory, pairs of spring switches are used to direct each train to the "right" regardless of its direction.

STAA - The Surface Transportation Assistance Act (STAA) of 1982 allows large trucks to operate on the Interstate and certain primary routes called collectively the National Network. STAA-Dimensional vehicles are those currently specified as the federal maximum allowable lengths (i.e., 53 foot trailers, twin 28 foot trailers, etc.). Most state DOTs have ceased labelling their routes as STAA highways, since all of their state facilities are approved to accommodate the federal maximum lengths. An MPO may want to do this however, since many local routes may not have the appropriate dimensions to accommodate the full extent of federally approved truck lengths. The term "STAA Routes" has been used very little for many years. As such, many younger commercial drivers may not understand it.

stabilized shoulders – roadway shoulders that are made of asphalt or concrete and not of gravel.

stevedoring – one who is employed loading or unloading ships

STIC – *State Transportation Innovation Council – in Pennsylvania*

STIP – *statewide transportation improvement program* – a list of federally-funded transportation projects that are located outside metropolitan planning organization (MPO) boundaries. In Pennsylvania the STIP includes the compilation of regional TIPs plus the Wayne County projects.

structurally deficient – a bridge that has identified structural weaknesses or inadequate waterway.

supply chain – a group of physical entities such as manufacturing plants, distribution centers, conveyances, retail outlets, people, and information which are linked together through processes (such as procurement or logistics) in an integrated fashion to supply goods or services from source through consumption.

switch engine – a railroad engine that is used to move railcars short distances within a terminal and plant.

switcher – utilized to move trailers within a terminal or facility's yard; also known as a hostler or yard mule.

T

TAC –Pennsylvania's *Transportation Advisory Committee*.

tandem – a truck that has two drive axles or a trailer that has two axles.

tangent – in a roadway description, the straight area that connects two consecutive curves.

tare weight – the weight of the vehicle when it is empty or the packaging surrounding or beneath a shipment of goods.

TAZ – *traffic analysis zone* – a geographical unit used to represent homogeneous employment, population, and travel characteristics within a certain area.

TEUs – *twenty-foot equivalent units* – a measure of container traffic.

TFAC – Pennsylvania's *Transportation Funding Advisory Committee*

theoretical capacity – the calculated or unproven amount of traffic that an arterial roadway can maintain in a given period of time.

through freight flows – freight traffic volumes that originate and terminate beyond the borders of a state or region, but that use transportation infrastructure of the state or region during transit.

through lane – a lane of a roadway that is intended for traffic that does not turn or exit.

through trip – a trip from one point to another that does not stop in a given area.

TIF – *tax increment financing* – allows a community to capture, for a specific period of time, the tax revenues generated from the increased values of properties within an established district.

TIFIA – *Transportation Infrastructure Finance and Innovation Act* – a program that provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance.

TIGER Discretionary Grants – *Transportation Investments Generating Economic Recovery*, a grant program established as part of the American Recovery and Reinvestment Act of 2009.

TIP – *transportation improvement program* – a list of approved, short-range capital improvement projects for regional highway, transit and bike and pedestrian projects.

TL – *truckload*

TOFC – *trailer on flat car* – a common type of intermodal freight.

TOL – *truck-only lane* – dedicated highway lane for heavy truck usage that is physically separated from the general purpose lanes of a highway.

toll – a user fee paid for use of a transportation system.

ton-mile – a freight transportation output measure that reflects the shipment's weight and the distance the carrier hauls it.

topographic data – information related to the surface features of a region such as rivers, lakes, canals, or bridges.

topography – surface features of a region such as rivers, mountains, and lakes.

transload(ing) – the practice of transferring product between truck and rail transportation. In most instances, a transload facility operator, third-party logistics company, or broker facilitates transloading for both the shipper and the consignee; operations where contents are transferred between ocean containers and, typically, 53-foot trailers or domestic containers for movement beyond the immediate port area.

transportation cost savings – the amount of total monies saved through improved system operations (travel distance, travel time, and accidents).

transportation network – the entire group of transportation facilities including roadways, rail lines, airports, ports and waterways, intermodal facilities, and pedestrian and bicycle facilities included in the study area.

triple-trailer combination – one type of HPV with a tractor (engine) and three 28- or 28.5-foot trailers. Not allowed in all states.

trucker – used in conversations and informal materials to describe any entity in the trucking industry. Trucking company, motor carrier, or truck fleet are usually used to describe the corporate trucking entity.

truck driver – the more technical term for the person behind the wheel; can be an employee driver, an owner-operator who owns his or her own truck, or an independent contractor who is essentially an owner-operator without his or her own truck and uses a company truck instead.

truckload carrier – the motor carrier segment which generally does not operate across a regular route, but rather delivers shipments directly to recipients; these carriers also seek back haul shipments.

truck-semitrailer combination – one type of truck with a tractor (engine) and one 38- to 53-foot trailer.

truck-trailer combinations – trucks with the tractor (engine) and van, tank, or hopper attached to the same frame and one 28- to 48-foot trailer.

TSM – *transportation systems management* – measures taken to improve the operations or efficiencies of a transportation system, usually small-scale improvements that focus on improving existing systems such as traffic signals or changes in access.

travel demand modeling – a computer model procedure that projects the future traffic volumes on the transportation network.

turnpike double – one type of HPV with a tractor (engine) and two 48-foot trailers.

turntable (rail) – a short stretch of rail track which is rotated to connect a locomotive with one or more other tracks to redirect the locomotive into a storage space or a maintenance area.

TWC – *track warrant control* – a train movement system in which all train movements are governed by oral and/or written instructions issued by the dispatcher, often by radio.

U

uneconomical remnants – the land remaining after right-of-way acquisition that has less than optimal or only minimal utility for certain activities, such as a very small portion of farmland.

UP – *Union Pacific Railroad* – the largest railroad in North America, covering 23 states across two-thirds of the United States.

urban arterial roadway – street in an urban area that provides a primary route for through traffic.

USACE – *United States Army Corps of Engineers*

USDOT – *United States Department of Transportation*

USEPA – *United States Environmental Protection Agency*

USFWS – *United States Fish and Wildlife Service*

USGS – *United States Geological Survey*

V

V2I – *vehicle to infrastructure* – a type of autonomous vehicle technology

V2V – *vehicle to technology* – a type of autonomous vehicle technology

vertical alignment or curve – the configuration of a roadway comprised of changes in the slope or elevation.

VHT – *vehicle hours of travel* – a measure of the amount of time vehicles are on the road on a daily basis within a transportation network; in computerized traffic modeling, this measure is calculated by summing the travel time made by each vehicle trip in the transportation network.

VMT – *vehicle miles of travel* – a measure of the aggregated distances vehicles travel between their origin and destination on a daily basis within a transportation network; in computerized traffic modeling, this measure is calculated by summing the travel distances made by each vehicle trip in the transportation network.

W

weight break – the shipment volume at which the LTL (less than truckload) charges equal the TL (truckload) charges at the minimum weight.

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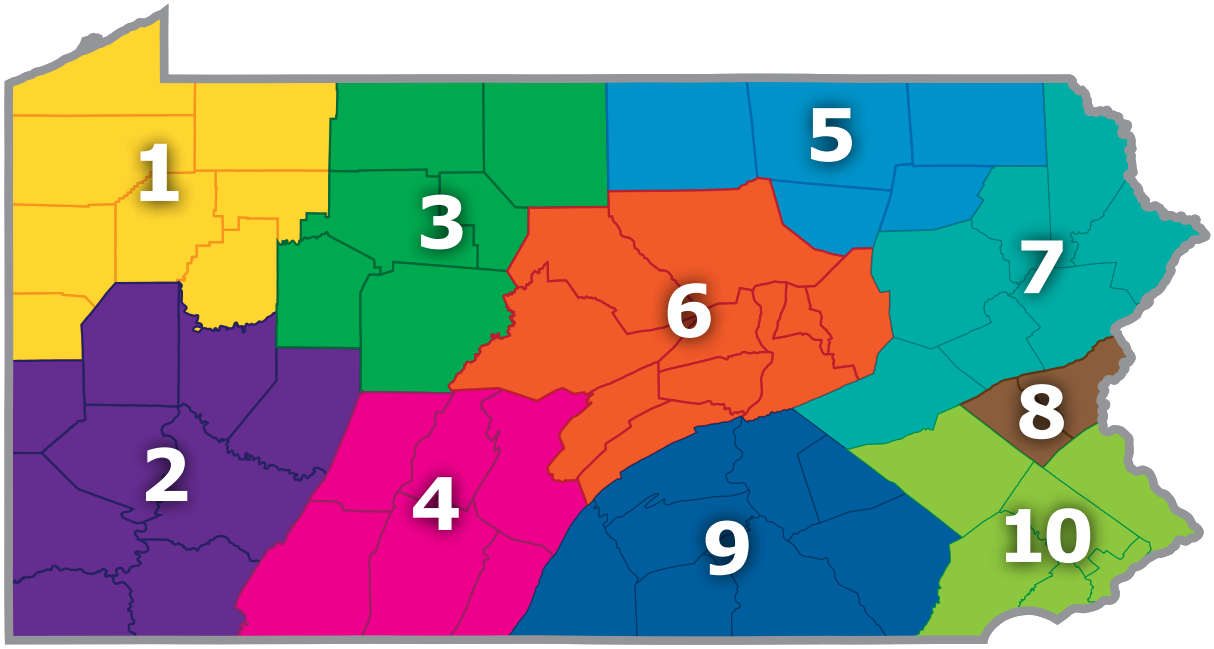
Appendix B: Pennsylvania's PREP Regions - Trends, Needs, and Issues

This appendix supplements the national trends and issues Section of this CFMP. It provides the trends, needs, and impacts for Pennsylvania's ten Partnerships for Regional Economic Performance (PREP) regions. PREP region locations are shown in **Figure 26**.

Figure 26: PREP Regions (Partnerships for Regional Economic Performance)



Source: DCED

The national and statewide trends discussed impact each PREP region to varying degrees. This section summarizes how national, statewide, and several unique regional trends may impact the transportation system in each PREP region.

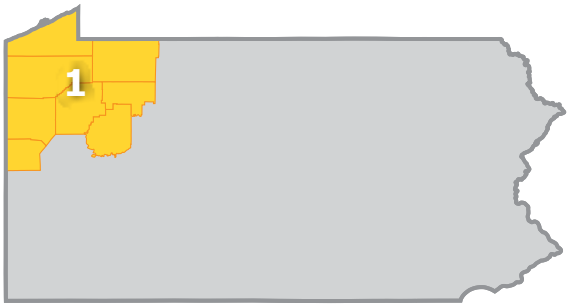
Consistent Trends Across all PREP Regions: Based on projections by IHS Global Insight, total freight tonnages and values from 2011 and 2040 are expected to almost double across the state and for each individual PREP region.[52] The data also indicates that the regional percentages of statewide tonnage and value, for each region in both 2011 and 2040 remain proportionally the same. In other words, if a PREP region handled 11 percent of the statewide value or tonnage of commodities in 2011, it is projected to continue to handle approximately 11 percent in 2040. **Table 14** presents a value and tonnage table for all PREP Regions for 2011-2040.

[52] *Pennsylvania's Transearch Analysis White Paper*, Section 5 is the source for all data in this section. This specific information can be found in Table 5-1 in that report.

Table 14: Value and Tonnages by PREP Regions (2011-2040)

Region	Inbound to PREP Region		Internal to PREP Region		Outbound from PREP Region		Total	
	Tons	Value (Millions)	Tons	Value (Millions)	Tons	Value (Millions)	Tons	Value (Millions)
2011								
1: Northwest	21,552,183	$23,729	6,269,086	$2,571	34,333,894	$30,890	62,155,163	$57,189
2: Southwest	79,636,009	$60,193	43,326,827	$8,569	69,701,936	$50,340	192,664,772	$119,102
3: North Central	7,077,444	$5,815	1,905,134	$297	14,890,321	$11,602	23,872,899	$17,714
4: Southern Alleghenies	11,154,593	$11,355	1,993,372	$229	23,619,739	$10,683	36,767,704	$22,267
5: Northern Tier	4,598,505	$3,229	376,052	$26	9,436,412	$4,452	14,410,969	$7,707
6: Central	16,179,296	$13,214	5,668,546	$230	19,752,308	$14,957	41,600,150	$28,401
7: Northeast	19,496,639	$22,713	2,508,199	$540	21,409,770	$18,667	43,414,608	$41,919
8: Lehigh Valley	23,386,433	$25,290	896,607	$2,647	14,791,149	$17,853	39,074,189	$45,790
9: South Central	50,490,632	$70,380	19,374,422	$22,846	61,496,362	$64,379	131,361,416	$157,606
10: Southeast	95,206,848	$129,046	24,920,228	$23,344	91,127,452	$130,793	211,254,528	$283,183
2040								
1: Northwest	38,610,002	$52,424	8,952,048	$2,418	55,107,897	$56,135	102,669,947	$110,977
2: Southwest	100,076,764	$126,216	62,970,060	$16,497	102,895,035	$100,584	265,941,859	$243,297
3: North Central	12,201,742	$10,972	2,437,930	$821	26,672,519	$25,315	41,312,191	$37,108
4: Southern Alleghenies	18,119,289	$23,891	2,602,876	$488	27,536,099	$21,449	48,258,264	$45,829
5: Northern Tier	7,466,205	$6,010	835,483	$45	15,831,116	$7,131	24,132,804	$13,186
6: Central	25,182,260	$27,879	10,640,344	$518	33,420,763	$31,890	69,243,367	$60,287
7: Northeast	36,237,293	$51,085	4,563,122	$1,581	35,415,972	$47,223	76,216,387	$99,889
8: Lehigh Valley	38,280,581	$53,114	2,509,414	$7,652	34,382,469	$53,500	75,172,464	$114,266
9: South Central	84,403,583	$158,055	40,515,303	$38,526	104,976,169	$112,840	229,895,055	$309,421
10: Southeast	154,936,262	$280,062	44,991,862	$48,901	160,119,233	$273,378	360,047,357	$602,341

REGION 1: NORTHWEST



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011, PREP Region 1: 62 million tons, valued at $57 billion, traveled into, out of, or internally/within the region.
- Small businesses predominate in the region. Although manufacturing has been decreasing, it remains a significant employer in the region and existing manufacturing clusters include primary metals, machinery, fabricated metals, plastics, and oil and gas extraction.[53]
- Based on data from Freight Finder™, several sand and gravel and aggregate companies and GE Transportation are among the largest freight generators in the region.
- Marcellus and Utica Shale formations lie under all counties in this region.
- Petroleum products are the largest by tonnage and value leaving the region. It is projected that warehousing and distribution centers will replace petroleum by 2040. The top commodity movements also show considerable rail movements in the region. A key and growing commodity in the region is semiconductors, which move to the top commodity by 2040 (by value) in destination.
- While Forest County experienced a 56 percent population growth rate from 2000 to 2010, this is not relevant for freight movements. The county's low base population numbers (4,946), coupled with the opening of a new, state maximum security prison in 2004, significantly affected its population growth rate.

Modal Infrastructure Trends and Issues

- Truck and rail are the dominant modes of transportation, with trucks accounting for more than 90 percent of commodity movements in 2011 and 2040. The interstates carry heavy volumes through the region.
- Interstates 80 and 90 carry truck volumes making up over 25 percent of total traffic. Interstate 79 also serves the region.
- One of the top 100 freight bottlenecks identified through the CFMP is along I-80 in western Clarion County.
- The Port of Erie is located in this region, and data shows inbound water movements are significant. IHS growth projections suggest a doubling of inbound tonnages and values.
- The NS and CSXT Class I rail line that parallels I-90 is one of the emerging rail corridors, the Erie Corridor. The region is also served by the Buffalo & Pittsburgh Railroad.

Impacts on Transportation System

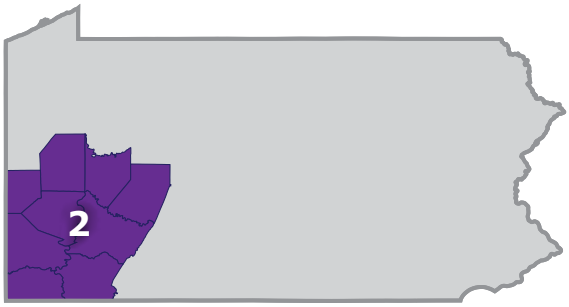
Trends, issues, and impacts on transportation in PREP Region 1 are summarized in **Table 15**.

Table 15: Trends, Issues, and Impacts on PREP Region 1 – Transportation System

Trends and Issues	Impacts on PREP Region 1's Transportation System
Growth in Port of Erie inbound commodities	• Inbound port tonnages are expected to grow, demanding more capacity. • This may also result in greater demand on railroads and roadways that serve the region.
Heavy truck and interstate dependence; More outbound than inbound truck traffic	• Highway congestion will continue to grow on key freight corridors. • Business may look to alternative supply chain strategies like transloading, which may require new or expanded rail intermodal facilities. • Locations for new warehousing will increase in demand.
National projections of manufacturing growth; Projected regional semi-conductor growth	• Major international destination and routes to these destinations can be expected to experience higher volumes of traffic on all modes of transportation. • Manufacturing facilities including small businesses in the region may also see increases in traffic.
Growth in international trade	• Ports and international trade routes from this region will see increasing demand and volumes. • There will be a greater need to partner with neighboring states and Canada for improvements to multi-state corridor highways. • Landside infrastructure and connectivity to ports, roadways and rail routes including those connected to the Panama Canal will need to be monitored to determine if shippers and carriers shift their supply chains to take advantage of this new international routing.

[53] Northwest PREP Region Profile. 1/28/2013. Accessed at www.newpa.com/prep 7/2013.

REGION 2 - SOUTHWEST



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011 PREP Region 2: 193 million tons, valued at $119 billion, traveled into, out of, or internally/within the region. This is the second largest amount by weight and the third largest by value of all the regions in the state.
- The region's primary economic center, the City of Pittsburgh, outperformed the United States in employment growth. Health care and manufacturing rank among the region's top employment sectors.
- In the greater Pittsburgh region over 96 percent of the firms would be categorized as small- to medium-size and over 83 percent would be categorized as small. These small firms are responsible for more than 17 percent of the region's employment, and nearly 21 percent of new employment.
- The region's largest commodities (by tonnage and value) are predominately steel or iron products and coal. Petroleum products are also a large volume of what is being moved in, internally/within, and out of this region. The mining sector showed the greatest annual percentage increase, due to the subsector that includes Marcellus Shale gas.
- Based on data from Freight Finder™ a variety of coal, stone, food, and pharmaceutical industries are the area's largest freight generators.

Modal Infrastructure Trends and Issues

- Truck and rail are the dominant modes of transportation, with trucks accounting for more than 75 percent of commodity movements in 2011 and 2040. This is projected to continue. Between 2010 and 2040 Allegheny County is expected to experience 6 to12 percent growth in tonnage destined outside the state.
- Interstates 79, 76, 376, and 70 carry some of the highest volumes of freight; however, truck volumes are below 25 percent of total traffic in most of the region. Many of the top 100 truck bottlenecks identified through the CFMP are in the heavily urbanized areas of Pittsburgh and near Washington, PA (although this may be due to construction).
- Ports along the inland river system serving the greater Pittsburgh area offer modal options to businesses; however, the poor condition of the locks and dams is inhibiting growth.
- CN, CSXT, and NS Class I railroads serve the region and are parts of the Central PA and Southwest emerging rail corridors. A wide variety of short line and regional railroads also serve the region, including the Buffalo & Pittsburgh, and the Wheeling & Lake Erie.

Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 2 are summarized in **Table 16**.

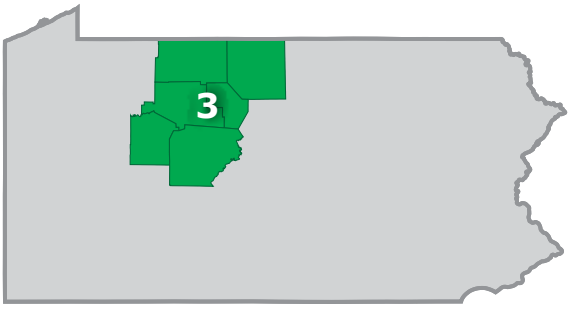
Table 16: Trends, Issues, and Impacts on PREP Region 2 – Transportation System

Trends and Issues	Impacts on PREP Region 2's Transportation System
International trade growth	• Growing international demand for the region's key products (such as health care related products, manufacturing, and Marcellus Shale gas) will put increasing demand on multi-state highways, air and water ports, rail, and international trade routes as well as routes to major urban population centers. • There will be a greater need to partner with – neighboring states for improvements to multi-state corridor highways – air and water port owners and managers to improve national and international freight routes • Manufacturing facilities will also see increases in traffic.

Table 16: Trends, Issues, and Impacts on PREP Region 2 – Transportation System (continued)

Trends and Issues	Impacts on PREP Region 2's Transportation System
Deteriorating ports conditions	• The condition of the locks and dams on the river system will need to be addressed to maintain economic competitiveness of the region. • Landside infrastructure (ports, rail, and roadways) should be monitored to determine if shippers and carriers shift their supply chains to take advantage of the Panama Canal expansion and new international routing options
Congestion	• As highway congestion continues to grow in urban areas and key freight corridors, shippers and carriers may seek alternative supply chain routes and strategies like transloading. • Demand for rail intermodal facilities and locations for new warehousing will increase.
Changing demands on rail capacity	• Railroads may experience healthy growth in some markets, especially intermodal. • Railroads and water ports may experience growth in the types of commodities they are asked to carry. • Regional economic models predict a decrease in the shipment of Appalachian coal, which will offset to some extent the growth in other rail freight commodities. The decline in coal has a similar predicted effect on net water tonnage. • Railroads are making facility investments to support fracking-based energy development and increased intermodal traffic.
Growth in fracking	• Impacts on Pennsylvania's freight highway networks may result from numerous vehicles carrying heavy cargoes of sand and materials used for hydraulic fracturing traveling on lower functional class routes.

REGION 3 - NORTH CENTRAL



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011, PREP Region 3: 24 million tons, valued at $18 billion, traveled into, out of, or internally/within the region.
- The energy sector is a growth potential for the region, particularly Marcellus Shale. A Keystone Opportunity Zone also exists in the region and the DuBois Regional Airport has been designated as a foreign trade zone (FTZ).[54] Increasingly, employers in the region are either in the public sector, retail, and health care.
- Based on data from Freight Finder™ Walmart distribution, American Refining Group, Keystone Powdered Metals, a waste company, and a paper company are some of the region's top freight generators.
- Approximately 40 percent of the world's powdered metal parts are produced in north central Pennsylvania for applications in the automotive industry, lawn and garden products, and home appliances. The region is known as the "Powdered Metal Capital of the World."
- The largest commodities by tonnage and value originating in the region are petroleum refining products, both in 2011 and forecast for 2040. Coal is a top commodity in all movements by tonnage for 2011.
- The region lost 5.5 percent of its population from 2000-14, with every county recording declines.

Modal Infrastructure Trends and Issues

- Truck and rail are the dominant modes of transportation, accounting for nearly 100 percent by value of commodity movements in 2011 and 2040.
- The region is served by NS, the B&P, and R.J. Corman Railroad. It is not part of any emerging rail corridor. A rail corridor is currently being considered to re-open between Curwensville and DuBois in order to provide better connections between east-west and north-south movements by rail.
- The RPO has completed an issues analysis with the possible intent of forming a regional rail authority.
- The region has some freight movement from its regional airports in DuBois and Bradford.

Impacts on Transportation System

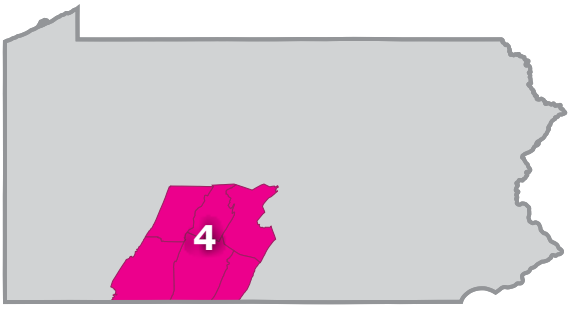
Trends, issues, and impacts on transportation in PREP Region 3 are summarized in **Table 17**.

Table 17: Trends, Issues, and Impact on PREP Region 3 – Transportation System

Trends and Issues	Impacts on PREP Region 3's Transportation System
Growth in Marcellus Shale drilling	• With the growing gas extraction industry in the region, fracking sand is being shipped by rail from other parts of the U.S. and unloaded to trucks. These trucks, carrying heavy cargoes of sand and other fracking materials, travel on the region's lower functional class routes to reach the wells and are putting increased stress on these roadways.
Loss in population	• Fewer people translate to less consumption of goods, commodities, and services which may decrease freight activity.

[54] North Central PREP Region Profile. 1/28/2013. Accessed at www.newpa.com/prep 7/2013.

REGION 4 - SOUTHERN ALLEGHENIES



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011, PREP Region 4: 37 million tons, valued at $22 billion, traveled into, out of, or internally/within the region.
- Based on data from Freight Finder™ several manufacturers, distribution centers, food processing, and mining companies were the region's largest freight generators.
- The region's largest commodity by tonnage (originating) in 2011 was bituminous coal, falling to second highest in 2040. Bituminous coal is not one of the top commodities originating in the region by value.
- Warehouse and distribution center goods are the highest value commodity for all movements in both 2011 and 2040.
- Dairy farm products are one of the top commodities for all movements by value in 2011 and 2040, with the exception of movements originating in the region in 2040. Several roadways in the region carry the highest values of the state's dairy industry products.
- The decline in manufacturing and the concurrent growth of other sectors including healthcare, retail trade, construction services, and accommodation/food services has led to a diversification of the economy in the region. There is no reliance on any one sector. Businesses in the region are generally small. Manufacturers constitute five percent of all businesses but account for 19 percent of payroll dollars.

Modal Infrastructure Trends and Issues

- Truck and rail account for nearly 100 percent of movements in the region in 2011 and 2040. Truck is the dominant mode, with over 80 percent of all movements by tonnage in 2011 and 2040. There are no water or air freight movements in the region.
- The Pennsylvania Turnpike and I-70 travel through the region and carry over 25 percent truck volumes. None of the state's top truck bottlenecks are in the region.
- The region is served by NS and CSXT. Two emerging rail corridors cross the region, the Central PA and the Southwest Corridor. The region is also served by short lines in and around Altoona, Johnstown, and the northern coal regions of Cambria County.

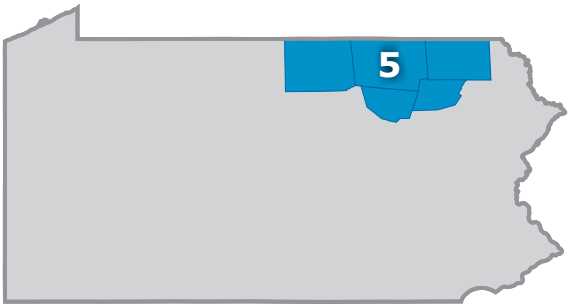
Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 4 are summarized in **Table 18**.

Table 18: Trends, Issues, and Impacts PREP Region 4 – Transportation System

Trends and Issues	Impacts on PREP Region 4's Transportation System
Growth in food, dairy, healthcare	• Freight volumes are expected to continue to grow, increasing demand on the region's highway system.
Growing international demand for products from the region	• As international demand for food products grows, freight volumes can be expected to grow slowly and steadily. • Routes leading to the Port of Baltimore and potentially Philadelphia may see increasing demand from products destined for international markets.
Demand for more warehousing	• Railroads may experience healthy growth in some markets, especially intermodal. Demand for rail intermodal facilities and locations for new warehousing will increase.

REGION 5 - NORTHERN TIER



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011, PREP Region 5: 14 million tons, valued at $8 billion, traveled into, out of, or internally/within the region.
- Based on data from Freight Finder™ food and product manufacturers and chemical companies, including P&G and DuPont, are several of the region's largest freight generators.
- The Northern Tier region has a diverse and growing economy ranging from mining and logging to education services and government. As a result of Marcellus Shale development, natural gas related companies are a growing industry in the region.
- One of the region's largest commodities by tonnage is broken stone and riprap. Meat products are a high value commodity originating from the region, with livestock as a high tonnage and value commodity destined for and moving internally/within the region both in 2011 and 2040.
- A Marcellus Shale Freight Transportation Study was completed for the region in November 2011. There is one urban cluster of a micropolitan statistical area in the region that includes Sayre Borough. It is on the edge of the Philadelphia-NY-DC mega region and its eastern counties are experiencing some growth as a result.

Modal Infrastructure Trends and Issues

- Truck and rail account for nearly 100 percent of freight movements in the region. Movements by truck account for about 85 percent of the trips by tonnage in both 2011 and 2040. I-84 carries more than 25 percent trucks.
- PennDOT invested over $250 million in modernizing U.S. 15 over a 15-year period to the New York state border, with the northern-most (final) section opening to traffic in 2008.
- None of the state's top truck bottlenecks are in the region.
- It is part of Harrisburg-Binghamton emerging rail corridor.
- Based out of Wellsboro, the Wellsboro & Corning is an important short line railroad serving the Marcellus gas extraction industry. The railroad's geographic orientation covers one of the largest and most active portions of the Marcellus Shale formation. This has resulted in customers referring to the railroad as the "Main Line to the Marcellus."

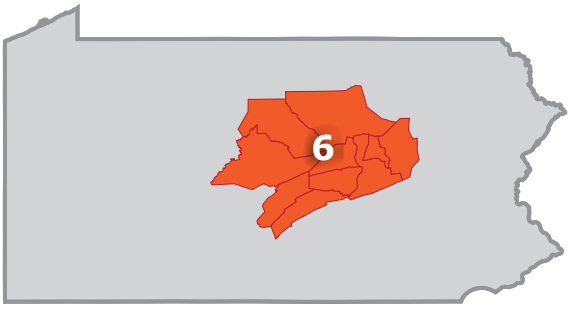
Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 5 are summarized in **Table 19**.

Table 19: Trends, Issues and Impacts on PREP Region 5 – Transportation System

Trends and Issues	Impacts on PREP Region 5's Transportation System
International demand for U.S. food products	• Flow volumes are expected to continue to grow based on increased demand for the region's products. • Routes used by these products will experience greater freight traffic.
Growth in Marcellus Shale drilling	• Impacts on Pennsylvania's freight highway networks will result from numerous vehicles carrying heavy cargoes of sand and materials used for hydraulic fracturing traveling on lower functional class routes.

REGION 6 - CENTRAL



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011 PREP Region 6: 42 million tons, valued at $28 billion, traveled into, out of, or internally/within the region.
- Based on data from Freight Finder™ Con-Agra, Del Monte Foods, and Frito-Lay are some of the region's largest freight generators.
- The region also has a high value of commodities related to prepared food, including bread or other bakery products and canned specialties, leaving the region. Grain is a top commodity in the region by weight, both originating from and destined for the region. In 2011 and 2040, plastic products are among the top commodities by value originating in the region.
- The largest commodity by value originating in the region is warehouse and distribution center goods in both 2011 and 2040.
- The Central Pennsylvania Workforce Development Corporation's Industry Cluster Analysis identifies advanced materials and diversified manufacturing; lumber, wood and paper products; education; healthcare; and energy as prominent or emerging clusters in the Central PREP Region and the state. The energy sector has become a focus for the region, particularly Marcellus Shale.
- Centre County, with 13.4 percent growth from 2000 to 2010, has one of the highest population growth rates in the state.

Modal Infrastructure Trends and Issues

- Truck movements account for over 80 percent of trips by tonnage in 2011 and 2040. Rail movements account for about 19 percent and 13 percent of trips by tonnage in 2011 and 2040 respectively.
- SEDA-COG's Joint Rail Authority owns five short line railroads comprising nearly 200 miles throughout the region, providing rail freight service to 70 customers.
- I-80 and I-180 carry 25 percent truck traffic. One of the top truck bottlenecks in the state is located in Northumberland County on US 11 in Northumberland Borough.

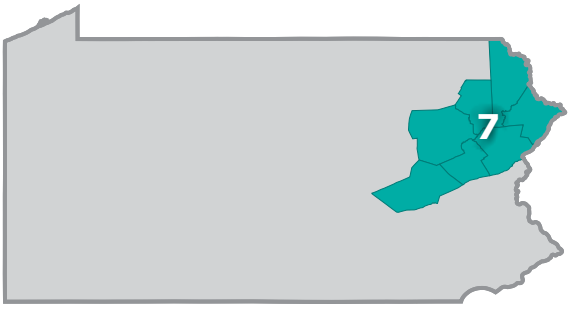
Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 6 are summarized in T**able 20**.

Table 20: Trends, Issues, and Impacts on Region 6 – Transportation System

Trends and Issues	Impacts on PREP Region 6's Transportation System
Growing international demand for U.S. food products	• Freight volumes can be expected to grow slowly and steadily as the Pennsylvania economy grows and as international demand for the products from this region increase.
Growing demand for warehousing	• In the short term, with the high consumer demand for next day delivery, there will be increases in the demand for regional distribution centers and warehouses.
Marcellus Shale growth	• Freight flow volumes are expected to continue to grow with the growing fracking industry as more trucks are going to rural locations not accessible by other modes. Sand is shipped by rail from other parts of the U.S. and then trucked to the wells throughout more rural locations in Pennsylvania. • Impacts on Pennsylvania's freight highway networks will result from numerous vehicles carrying heavy cargoes of sand and materials used for hydraulic fracturing traveling on lower functional class routes.

REGION 7 - NORTHEAST



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011, PREP Region 7: 43 million tons, valued at $42 billion, traveled into, out of, or internally/within the region.
- Based on data from Freight Finder™ several distribution centers and quarries are the region's largest freight generators.
- The largest commodity by value originating in the region is pharmaceuticals, both in 2011 and 2040. Warehouse and distribution goods are also among top commodities originating in 2011 and 2040. Warehouse and distribution goods and grain are the top two commodities by weight destined for the region in both 2011 and 2040.
- Region 7 is part of the growing New York-Philadelphia-Washington DC mega region. Two of its counties (Pike with 23.9 percent growth and Monroe with 22.5 percent growth) experienced the highest population growth rates in the state from 2000 to 2010.

Modal Infrastructure Trends and Issues

- Truck movements account for over 90 percent of trips by tonnage in the region in 2011 and 2040. Rail trips account for about eight percent in 2011 and six percent in 2040.
- I-81- and I-84 carry truck volumes of 25 percent or higher.
- None of the state's top truck bottlenecks is located within the region.
- Several regional and short line railroads serve the region, including the Reading, Blue Mountain, and Northern, and the Delaware-Lackawanna Railroad Co. Additionally, CPRail operates a Class I strategic line through the region.

Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 7 are summarized in **Table 21**.

Table 21: Trends, Issues, and Impacts PREP Region 7 – Transportation System

Trends and Issues	Impacts on PREP Region 7's Transportation System
Part of mega region – population growing	• More people translate to more consumption of goods, commodities, and services which increases freight activity.
Key industry products are in growing demand	• Flow volumes are expected to continue to grow. • High consumer demand for regional products will also increase the demand for regional distribution centers and warehouses.
Location near NY, DC, and Philadelphia population center is ideal for additional warehouses	• To meet the demand for next day delivery, it is anticipated that more warehouses and distribution centers will be developed to get products to consumers quickly.

REGION 8 - LEHIGH VALLEY

Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011 the two counties in PREP Region 8: 39 million tons, valued at $46 billion, traveled into, out of, or internally/within the region.
- Based on data from Freight Finder™ medical and chemical producers are some of the region's major freight generators.
- The region is part of the growing New York-Philadelphia-Washington DC mega region. The two- county Lehigh Valley region is the smallest geographically and the third-largest PREP region by population (behind Region 10, Southeast, and Region 2, Southwest). Both of its counties (Lehigh with 12 percent growth and Northampton with 11.5 percent growth) experienced some of the highest population growth rates in the state from 2000 to 2010.
- It has tremendous natural and recreational resources that make for a high quality of life and a broad and ever-expanding commercial and industrial base that offers a diversity of high-quality employment opportunities.
- It is within one day's drive of 40 percent of the U.S. and one-half of Canadian consumers.
- In 2011 the top commodity originating in Lehigh Valley in terms of weight was broken stone or riprap. The top commodity coming into the Valley by weight in 2011 was petroleum refining products. In 2011 and 2040, the top commodity coming into and leaving Lehigh Valley in terms of value is goods from warehouses and distribution centers.
- Several of the state's top freight generators are located in the region. The area currently is adding various high-tech industries to its employment base — such as biotech, pharmaceutical and optoelectronic companies — to improve the region's economic diversity and set the stage for long-term growth. Transportation planning functions within the region are administered by the Lehigh Valley MPO.
- Since 2000, the region's population has grown by nearly 80,000, a rate increase of 13.7 percent.

Modal Infrastructure Trends and Issues

- Truck and rail are the dominant modes of transportation, with truck accounting for more than 75 percent of commodity movements in 2011 and 2040. Overall, freight traffic in Lehigh Valley is projected to grow by 87 percent from 2011 to 2040 in terms of tons, and 133 percent from 2011 to 2040 in terms of value. The compounded annual growth rates for tons and value are 1.6 percent and 2.2 percent respectively.
- I-476, I-78, and NS Mainline serve the area; it is part of the Central PA Emerging Rail Corridor. The East Penn Railroad also provides service within Lehigh County.
- Sections of US 22 and I-78 are among the top truck bottlenecks in the state.

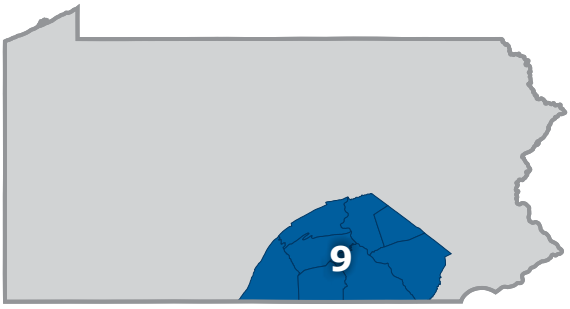
Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 8 are summarized in **Table 22**.

Table 22: Trends, Issues, and Impacts on PREP Region 8 – Transportation System

Trends and Issues	Impacts on PREP Region 8's Transportation System
In a growing mega region; one of the fastest growing regions of PA	• More people translate to more consumption of goods, commodities, and services which increases freight activity. • The region will see increases in freight flows.
Location is close to 40 percent U.S. population	• Over time the high cost for next day home delivery, high fuel costs, and driver shortages will cause businesses to re-evaluate shipping approaches. • Shippers will require more warehousing and distribution centers close to population centers. • To meet demand, it is anticipated that more warehouses and distribution centers will be developed in this region.
Congestion	• Already the location of some of the state's top truck bottlenecks, congestion will continue unless addressed. • As highway congestion grows in urban areas and key freight corridors, shippers and carriers will seek alternative supply chains that may slow the pace of regional growth.

REGION 9 - SOUTH CENTRAL



Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011 PREP Region 9: 131 million tons, valued at $158 billion, traveled into, out of, or internally/within the region. This is the third highest in tonnage and second highest in value of any PREP region in the state.
- Based on data from Freight Finder,™ The Hershey Company is one of the largest freight generators in the region.
- Approximately 40 percent of the United States population and more than 60 percent of Canada's population are within a 500-mile radius of the region.
- Three of its eight counties (Franklin with 18.2 percent, York with 15.5 percent, and Cumberland with 14.1 percent growth) experienced some of the highest growth rates in the state from 2000 to 2014.[55] Over that same period, the region's total population expanded by over 207,000 – a rate increase of 12 percent.
- The region's diverse economy includes logistics firms, government, agriculture and food processing, business and financial services, and advanced manufacturing. Manufacturing is one of the largest sectors of the regional economy. Targeted regional industry growth includes advanced manufacturing, food processing and packaging, life sciences and health care, logistics, technology services, and finance and insurance. An Enterprise Zone, Keystone Innovation Zone, and Foreign Trade Zone 147 are within the region. Unemployment rates in the region were slightly lower than the state rate of 7.5 percent as of July 2013.
- Many of the state's top 100 freight generators are located in this region. In 2011 the top commodity originating in the region in terms of weight is broken stone or riprap. The top commodity coming into the region in terms of weight in 2011 was petroleum refining products. In 2011 and 2040, the top commodity originating in the region in terms of value is rail intermodal drayage from ramp. The top commodity in terms of value in 2040 is warehouse and distribution goods.

Modal Infrastructure Trends and Issues

- The region is a logistics hub of the mega-region from stretching from Boston to Washington along the east coast.
- I-76, I-81, I-83, U.S.22, and U.S. 15 converge in this region. Many of the state's top truck bottlenecks are located on these routes in the region. All of these routes carry, at some point, more than 25 percent truck traffic.
- NS serves the area with lines that crisscross going east-west and north-south. CSXT also serves the region, making this one of the key rail hubs for the state. The region includes three of the five emerging rail corridors in the state (Central PA, Harrisburg-Binghamton, and I-81). Several short line railroads, including the Middletown & Hummelstown Railroad and the East Penn Railroad, operate within the region.
- Truck movements accounted for over 85 percent of trips in 2011 and will grow to 87 percent in 2040. Rail accounts for about 15 percent and 13 percent of trips in 2011 and 2040 respectively.
- Analysis of the routes that dairy-related products take shows this region carrying some of the highest values of this commodity in the state.

Impacts on Transportation System

Trends, issues, and impacts on transportation in PREP Region 9 are summarized in **Table 23**.

Table 23: Trends, Issues, and Impacts PREP Region 9 – Transportation System

Trends and Issues	Impacts on PREP Region 9's Transportation System
Rail hub with growing rail services	• Rail intermodal facilities and locations for new warehousing will increase in demand. • Railroads may experience healthy growth in some markets, especially intermodal.

[55] Source: Pennsylvania State Data Center

Table 23: Trends, Issues, and Impacts PREP Region 9 – Transportation System (continued)

Trends and Issues	Impacts on PREP Region 9's Transportation System
Growing population	• More people translate to more consumption of goods, commodities, and services which increases freight activity and truck traffic.
Access to NY-Philadelphia-DC mega region	• Overall economic growth will put increasing demand on multi-state highways, ports, and international trade routes. • It is anticipated that more warehouses and distribution centers will be developed to address the increased consumer demand. • There will be a greater need to partner with – neighboring states for improvements to multi-state corridor highways – air and water port owners and managers to improve national and international freight routes
Growing manufacturing sector	• Freight flow volumes can be expected to grow slowly and steadily as the regional economy grows.
Congestion in the urban area	• The intensity of the top truck bottlenecks will continue to grow unless they are addressed. • As highway congestion continues to grow in urban areas and key freight corridors, shippers and carriers will seek alternative supply chain strategies like transloading.

REGION 10 - SOUTHEAST

Economic, Demographic, Environmental, and Technology Trends and Issues

- In 2011 PREP Region 10: 211 million tons, valued at $283 billion, traveled into, out of, or internally/within the region. This is the highest by volume and value of any region in the state.
- Southeast Pennsylvania is the densest region of the Commonwealth in terms of businesses, employment, and population. Business sectors in the region include industrial and highly advanced manufacturing, professional services, technology and life sciences, energy, agrarian, higher education, and medical. Montgomery and Philadelphia counties account for roughly half of the businesses and half the jobs in the region. There is a concentration of high growth businesses in the region. *A Long-Range Vision for Freight* was completed in 2010 for the DVRPC region.
- In 2011 and 2040, the top commodity originating in the region both in terms of weight and value is petroleum refining products. Crude petroleum is the top commodity by weight entering the region and one of the top commodities by value entering the region in 2011. Warehouse and distribution goods are the top commodity coming into the region in 2011 and 2040 by both weight and value.
- This region is part of the growing mega-region that extends along the eastern seaboard to include Boston, Philadelphia, and Washington, DC. While the entire region is growing, much of the growth is shifting to its suburbs. Chester County west of Philadelphia grew 18.3 percent from 2000 to 2014.
- Center City Philadelphia's population (an area generally defined as being encompassed by the Schuylkill and Delaware rivers, and Pine and Vine streets) has grown by 16 percent from 2000 to 2014.

Modal Infrastructure Trends and Issues

- Truck movements account for 81 percent of trips in 2011 and 86 percent in 2040. Rail movements account for about six percent of trips in 2011 and 2040. Water movements account for about 11 percent of trips in 2011 and drop to about seven percent in 2040.
- The region is served by all modes of transportation including the Port of Philadelphia, Philadelphia International Airport, I-95,I-76, I-276, I-476, I-676, and two Class I railroads, NS and CSXT. There are several short lines as well, including East Penn Railroad.
- Conrail is a "shared asset service provider" for CSXT and Norfolk Southern, with 370 miles of track. In addition to providing local service for customers along the shared assets lines, it also provides local freight service along Amtrak's Northeast Corridor between Philadelphia and Trenton, NJ.
- Highway congestion in the region is extensive, if not the worst in the state, in terms of top truck bottlenecks.
- Analysis of the routes that dairy-related products take shows this region carrying some of the highest values of that commodity in the state.

Impacts on Transportation Infrastructure

Trends, issues, and impacts on transportation in PREP Region 10 are summarized in **Table 24**.

Table 24: Trends, Issues, and Impacts PREP Region 10 – Transportation System

Trends and Issues	Impacts on PREP Region 10's Transportation System
Part of the growing mega region	• Growing population will drive increasingly higher levels of freight activity, especially truck traffic. • There will be a greater need to partner with neighboring states for improvements to multi-state corridor highways, air and water port owners and managers to improve national and international freight routes. • Manufacturing facilities will also see increases in traffic. • Overall economic growth will put increasing demand on multi-state highways, ports, and international trade routes as well as routes to major urban population centers. • To meet the demand for next day delivery, it is anticipated that more warehouses and distribution centers will be developed to get products to consumers quickly.
Population growth	• More people translate to more consumption of goods, commodities, and services which increases freight activity. • Lower functional class roadways will see increasing freight volumes.
Heavy congestion	• If not addressed, congestion will continue to grow and negatively impact the region's growth.
Water ports and airports with access to international markets	• As manufacturing returns to the Americas and Pennsylvania, manufacturing production and exports are rising, and as the U.S. economy resurges there will be continuing growth in freight traffic and increasing demand on the region's air and water ports because of their access to major international destination and routes. • Connectivity to rail and water routes linking to the Panama Canal will need to be closely monitored to determine if shippers and carriers shift their supply chains to take advantage of this new international routing.
Rail service options	• Market opportunities for freight rail and intermodal rail will grow; railroads may experience growth in the types of commodities they are asked to ship. • Demand for rail intermodal facilities and locations for new warehousing will increase.

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Appendix C: Pennsylvania Freight Projects Identified by Planning Partners

In addition to the freight projects identified in the "Road and Bridge Progress" listing from **Table 13**, **Table 25** in this section lists freight projects identified by planning partners. These projects may be considered for future programming based on the availability of future funding.

Table 25: Freight Projects Identified by Planning Partners

Project ID	Planning Partner	Project Name	Description	Source
	Centre	Rt 322 Potters Mills Gap Alternative	Centre/Mifflin Co Line to Potters Mills; Ext of 4-Ln Rd, eliminate at-grade intersections	Tom Zilla, CRCOG email
	Centre	I-99/I-80 High Speed Interchanges	Expressway connections w/ semi-directional Y design & Rt 26 betterment	Centre Co MPO Comments; Metroquest Survey
	Centre	Rt 322/144/45 Corridors	Potters Mills to I-80/I-99 area	Centre Co MPO Comments
	Centre	Rt 322 Corridor	Port Matilda to I-80	Centre Co MPO Comments
	DVRPC	I-95 Betsy Ross Interchange and Bridge Street Ramps	Reconstruct/Widen 2 Interchanges - 3 phases	AASHTO Nov2014 Board Mtg for Proj of National/ Regional Sign - PNRS Survey Responses
	DVRPC	PA 309 Connector	Create new connector roadway between PA Turnpike and PA 309	DVRPC staff e-mail
	DVRPC	Old Delaware Avenue	Upgrade connector roadway from Columbius Blvd to Southport	DVRPC staff e-mail
	DVRPC	PA 322	Reconstruct ramps to better accommodate large trucks at Twin Oaks interchange	DVRPC staff e-mail
	DVRPC	CSXT Philadelphia and Trenton Subdivisions	Add additional capacity (i.e., sidings and/or main track)	DVRPC staff e-mail
	DVRPC	Norfolk Southern Morrisville Line	Add additional capacity (i.e., sidings and/or main track)	DVRPC staff e-mail
	DVRPC	Southport	Create a new cargo marine terminal adjacent to Packer Ave Marine Terminal	DVRPC staff e-mail
	DVRPC	Philadelphia International Airport	Undertake Capacity Enhancement Program and relocate air cargo facilities as needed	DVRPC staff e-mail

Table 25: Freight Projects Identified by Planning Partners (continued)

Project ID	Planning Partner	Project Name	Description	Source
13347	DVRPC	I-95 at PA Turnpike	New partial interchange at I-276; Widen PA Turnpike from US 1 to NJ; Widen I-95 from PA 413 to PA Turnpike	DVRPC staff e-mail
13549/ 93446	DVRPC	US 1 (Bucks County)	Reconstruct from I-276 (PA Turnpike) to NJ state line; Widen from PA Turnpike to PA 413; Interchange improvements	DVRPC staff e-mail
	DVRPC	US 30 Coatesville-Downingtown Bypass	Reconstruct from Exton Bypass to PA 10; interchange improvements at Airport Road and PA 113; potential addition of through lanes and capacity enhancements between PA 113 and PA 340	DVRPC staff e-mail
14747/ 69815/ 69816/ 69817	DVRPC	US 322	Widen and reconstruct from US 1 to I-95	DVRPC staff e-mail
57858/ 79863/ 79864/ 87392	DVRPC	Lafayette Street	Extend roadway from Barbadoes Street to Diamond Avenue	DVRPC staff e-mail
50364/ 63486/ 63490/ 63491	DVRPC	US 202 (Section 600)	Widen and reconstruct from Johnson Highway to PA 309	DVRPC staff e-mail
77211	DVRPC	PA 309 Connector Road	Construct new road from Allentown Road to County Line Road; Improve PA 309 Interchange	DVRPC staff e-mail
46956/ 102102	DVRPC	North Delaware Avenue	Extend roadway from Lewis Street to Bridge Street	DVRPC staff e-mail
17782/ 79903	DVRPC	Adams Avenue Connector	Extend roadway to new ramps at I-95 and Aramingo Avenue	DVRPC staff e-mail
64796	DVRPC	US 422 and PA 363 Interchange (River Crossing)	Intersection/interchange improvements at US 422 and PA 363 Interchange	DVRPC staff e-mail
66952/ 70197	DVRPC	US 422 Bridge and PA 23 Interchange (River Crossing)	Bridge replacement and new bridge over Schuylkill River - Intersection/interchange improvements at US 422 and PA 23 Interchange	DVRPC staff e-mail
	DVRPC	US 422 Mainline Widening (River Crossing)	Reconstruct and widen from 4 to 6 Lanes from US 202 to PA 363	DVRPC staff e-mail
15251	DVRPC	US 1 at PA 352	Reconstruct cloverleaf interchange, new through lanes to remove lane drops	DVRPC staff e-mail
	DVRPC	I-95 and I-476	One new lane in each direction on I-95 through interchange. Addition of lane on ramp from SB I-476 to SB I-95 and addition of lane on ramp from NB I-95 to NB I-476	DVRPC staff e-mail
16665/80021 /80022	DVRPC	US 202 (Section 500) Markley St.	Reconstruct from Main St. to Johnson Highway; widen to add center turn lane between Marshall St. and Johnson Highway	DVRPC staff e-mail

Table 25: Freight Projects Identified by Planning Partners (continued)

Project ID	Planning Partner	Project Name	Description	Source
17821 / 47394 / 47811 / 47812 / 47813 / 79685 / 79686 / 79825 / 79826 / 79827 / 79828 / 79903 / 79904 / 79905 / 79908 / 79910 / 79911 / 79912 / 79683 / 80094 / 80014 / 82818 / 83640	DVRPC	I-95 Philadelphia North	Reconstruct throughout Philadelphia; Interchange improvements at Vine, Girard, Allegheny, Betsy Ross Bridge, Bridge, and Cottman interchanges	DVRPC staff e-mail
	DVRPC	I-476 and I-76	Ramp modifications	DVRPC staff e-mail
	DVRPC	I-76 at PA 23 Matsonford Rd	Interchange modification	DVRPC staff e-mail
84308	DVRPC	US 422 at Sanatoga Interchange	Ramp modifications	DVRPC staff e-mail
	DVRPC	I-276/PA 611 Willow Grove	Interchange modification	DVRPC staff e-mail
84308	DVRPC	US 422	Reconstruct from Berks County line to Schuylkill River Bridge, reconfigure “S” curve in West Pottsgrove, and realign Stowe interchange	DVRPC staff e-mail
15385 / 95430	DVRPC	US 202 Intersection Improvements	at PA 926	DVRPC staff e-mail
14698 / 16738 / 64220 / 64222 / 66986	DVRPC	US 422	Reconstruct from Sanatoga Interchange to just East of Stowe Interchange and west of Schuylkill River bridge; realign from Porter to Park Road; improve acceleration lane for westbound on-ramp from Sanatoga Interchange; reconstruct bridge over Schuylkill River providing for 14’ Schuylkill River Trail crossing	DVRPC staff e-mail
14580 / 14581 / 15367 / 68535	DVRPC	US 1	Reconstruct from Schoolhouse Road to Maryland State Line	DVRPC staff e-mail
	DVRPC	I-95 Philadelphia South	Reconstruct/Rehabilitate from Queen Street to north of the Girard Point Bridge	DVRPC staff e-mail
83736	DVRPC	US 1 / Roosevelt Boulevard	Bridge Replacement over Wayne Junction	DVRPC staff e-mail
80054 / 90096 / 90097	DVRPC	Bridges over Vine Street Expressway	Reconstruct Spring Garden Street Bridges over I-76 and the Schuylkill River; reconstruct 18th Street, 19th Street, 20th Street, 21st Street, 22nd Street, the Free Library Pedestrian Walkway, and Family Court Pedestrian Walkway structures over Vine Street Expressway	DVRPC staff e-mail
	DVRPC	I-76 Center City	Reconstruct/Rehabilitate from Arch Street to Grays Ferry Avenue	DVRPC staff e-mail

Table 25: Freight Projects Identified by Planning Partners (continued)

Project ID	Planning Partner	Project Name	Description	Source
95558	Erie	SR 4012: Interchange Rd Improvement	Widen	Committed Road and Bridge Progress projects
85337	Harrisburg	Milroy Road Underpass	Widen	Road and Bridge Progress Projects
	Harrisburg	NS - grade separated crossing in Lemoyne	Grade-separation crossing	Metroquest Survey
94724	Harrisburg	US22 & PA39 Intersection	Safety - Intersection improvement	Road and Bridge Progress Projects
94914	Harrisburg	St. Johns Church Rd Signal	Congestion - Intersection improvement	Road and Bridge Progress Projects
96198	Harrisburg	US 322 Ramp Extension	Reconstruction - safety	Road and Bridge Progress Projects
	Johnstown	PA 53	Wilmore Borough, vertical clearance under Norfolk Southern mainline insufficient for tractor trailers.	MPO staff
	Johnstown	PA 53	Portage Township, vertical clearance under Norfolk Southern mainline insufficient for tractor trailers.	MPO staff
96384	Lehigh Valley	US 22 Widening	Widen	Committed Road and Bridge Progress Projects
	Lehigh Valley	Rt 100/I-78 Interchange	New interchange near Adams Rd/I-78	Metroquest Survey
11645	NEPA	PA 115 Widening	Add Lane	Committed Projects NOT Flagged in Road and Bridge Progress Projects
	North Central	PA 255	Improve roadway between St. Marys and DuBois	
	North Central	Brookville-DuBois Rail Corridor	Upgrade rail connection between Brookville and DuBois	
	North Central	Rt 322 corridor b/t I-80 in Clearfield to I-99 in Centre Co.	Upgrade	North Central RPO Comments
	North Central	Railroad connection b/t Buffalo & Pittsburg and RJ Corman Railroad.	Rebuild 20 miles of railroad, some bridges	North Central RPO Comments
	North Central	SR 153 Climbing Lane	From Penfield PA to US 219	North Central RPO Comments
	North Central	Railroad track upgrades	Upgrade railroad connection between Brookfield and DuBois	North Central RPO Comments
61972	Reading	SR 222 Widening	Widen	Committed Road and Bridge Progress projects
	SEDA-COG	Rt 93 Expand truck lanes	Add	Metroquest Survey
	SEDA-COG	Central Susquehanna Valley Transportation (CSVT) Project		

Table 25: Freight Projects Identified by Planning Partners (continued)

Project ID	Planning Partner	Project Name	Description	Source
	Through Snyder, Union, and Northumberland Counties	SEDA-COG MPO Comments		
	SEDA-COG	US 220	Complete SR 220 four lane section from Salona Exit (SR 477) to I-80 in Clinton County.	SEDA-COG MPO Comments
	SEDA-COG	I-80 and US 220	High Speed Interchange at I-80 and SR 220 (Future I-99), Clinton County	SEDA-COG MPO Comments
	SEDA-COG	Rail service extension	Railroad Expansion for Great Stream Commons and the Timber Run Industrial Park Union and Lycoming Counties (extending rail service from the Great Streams Common park in Allenwood, Union County, to the Timber Run Industrial Park in Lycoming County)	SEDA-COG MPO Comments
	SEDA-COG	NS Bridge rehab	Rehabilitation of NS bridge over the Susquehanna River between Selinsgrove, Snyder County and Northumberland County	SEDA-COG MPO Comments
	SEDA-COG	US Routes 11 and 15 Corridors	Traffic Signal Enhancements, in Monroe Township/Shamokin Dam from the end of the existing expressway to Veteran's Memorial Bridge and PA 61.	SEDA-COG MPO Comments
	SEDA-COG	US Route 15 Corridor	Traffic signal enhancements in Lewisburg from Smoketown Road to Zeigler Road in Kelly Township.	SEDA-COG MPO Comments
	SEDA-COG	US 11/PA 54	Traffic signal enhancements in Danville area.	SEDA-COG MPO Comments
	SEDA-COG	Route 322 Potters Mills Gap Project,	Centre/Mifflin County Line to Potters Mills, (refer to submissions from Centre County for mapping and project limits)	SEDA-COG MPO Comments
	SEDA-COG	Route 322/144/45 Corridors Improvements	(formerly SCCCTS), Centre County	SEDA-COG MPO Comments
	SEDA-COG	I-80/I-99	At-speed interchange between Interstate 80 and Interstate 99, Centre County	SEDA-COG MPO Comments
	SEDA-COG	US 220	Complete SR 220 to a 4-lane limited access facility from Jersey Shore to Linden (Future I-99), Lycoming County	SEDA-COG MPO Comments
101828	SPC	I-376 and PA 18 interchange	Highway realignment in Center and Potter Townships near the Borough of Monaca, Beaver County.	SPC
25834	SPC	Rose Street Extension #2	New Roadway	Committed Road and Bbidge Progress Projects
69988	SPC	Wake Robin Curve	Relocation/ Realignment	Committed Road and Bridge Progress Projects
25472	SPC	Grove Chapel Climb Lane	Add Lane	Committed Projects NOT Flagged in Road and Bridge Progress Projects

Table 25: Freight Projects Identified by Planning Partners (continued)

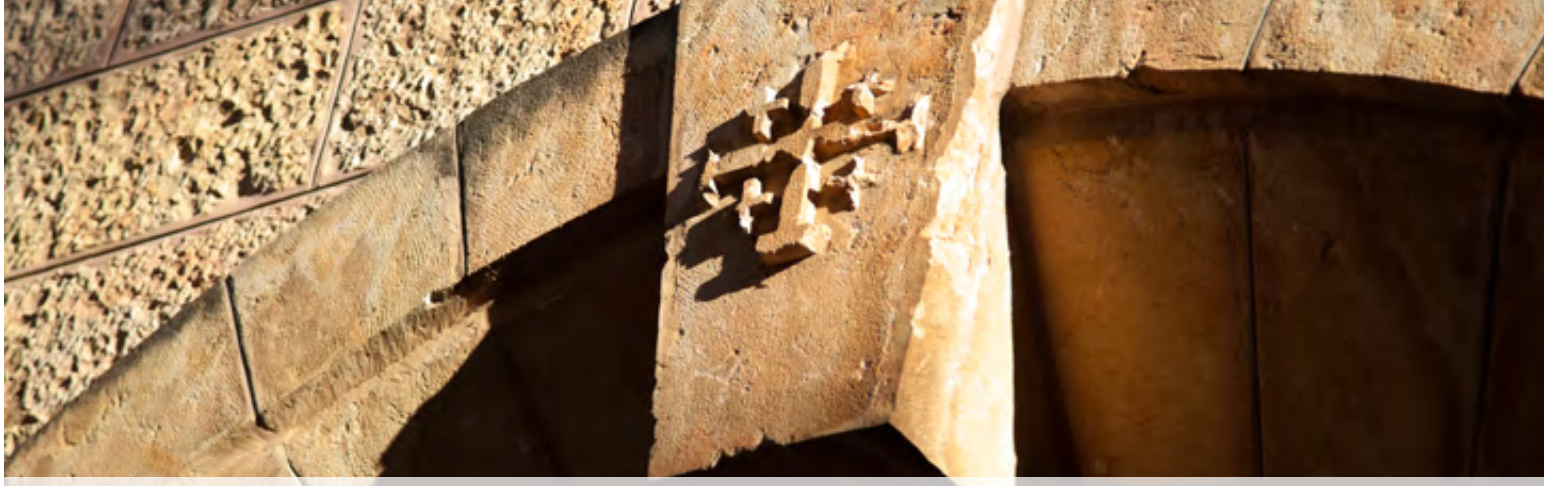
Project ID	Planning Partner	Project Name	Description	Source
	SPC	Pittsburgh Clearance Project: Closing the Gap		AASHTO Nov2014 Board Mtg for Proj of National/ Regional Sign - PNRS Survey Responses
	SPC	US 30 Corridor	Allegheny Co Line through Hempfield Twnsp; Prel Eng Study; Widening, interchange redesigns, safety improvements	SPC; Westmoreland Co Dept of Plan/Dev
		Laurel Valley Improvement Project	SR981 from Arnold Palmer Airport to PA Turnpike; limited access unmanned slip ramp interchange; series of upgrades and bypasses	SPC; Westmoreland Co Dept of Plan/Dev
	SPC	Extension of Port Authority Allegheny Co East Busway to Monroeville	Extension of Busway	Westmoreland Co Dept of Plan/Dev
	SPC	Keystone West Rail Corridor	Amtrak rail corridor improvements b/t Pittsburgh and Harrisburg	Westmoreland Co Dept of Plan/Dev
	SPC	Turnpike AET Interchange Improvements	Penn Twnsp, Mt. Pleasant (as part of Laurel Valley Improvement Project) - electronic tolling interchanges at SR130 and SR981	Westmoreland Co Dept of Plan/Dev
	SPC	SR 66 Capacity improvements	From SR22 (Delmont Area) north to Armstrong County Line); Prel. Eng Study to gauge capacity improvements	Westmoreland Co Dept of Plan/Dev
	SPC	Southern PA Railroad	SPR from Greensburg to Smithfield, replace/ upgrade track for safety and more hauling capacity	Westmoreland Co Dept of Plan/Dev
94651	SPC	Pkwy East Corridor	I-376 corridor between Downtown Pittsburgh and Monroeville	SPC
97027	SPC	I376/Carnegie Interchange	I 376, Carnegie Interchange, Carnegie Borough, Allegheny County.	SPC
97028	SPC	I376/Banksville Interchange	I376 Banksville Interchange, City of Pittsb. Includes SR 19/51 at Woodville Ave to I376 WB.	SPC
97029	SPC	I376/Greentree Interchange	Reconfigure interchange. Construct new ramps, extend accel/decel ramps, extend climbing lanes in both EB and WB directions, construction new retaining walls, new signals	SPC
104328	SPC	I79 at 910 Interchange	Widening/add travel lane	SPC
104325	SPC	I79/S. Pointe - Bridgevil	From S Pointe/Henderson Exit in Cecil Twnsp to Bridgeville Exit; widening	SPC
98093	SPC	376W at Settlers Ridge	I376 Parkway West from Robinson Twnsp Center exit to Ridge Ave (Settlers Ridge); congestion reduction	SPC
	SPC	PA21 to PA166	Fayette Co; PA 21: Thompsons Xroads to PA 166	SPC
	SPC	I-70 Zediker Interchange	I-70 Zediker Interchange	SPC
	SPC	I-70	Washington Co; Cool Valley Development; Roadway improvements	SPC
	SPC	I79 Southern Beltway	Washington Co: N Junction to Allegheny Co Line	SPC

Table 25: Freight Projects Identified by Planning Partners (continued)

Project ID	Planning Partner	Project Name	Description	Source
	SPC	I79 Waynesburg South	Greene Co; I79: Waynesburg to West Virginia (includes Mt. Morris)	SPC
	SPC	I70 West of Washington	Washington to Ohio Border	SPC
	SPC	I70 Washington to New Stanton	Washington to New Stanton	SPC
	SPC	I79: Meadowlands	Washington Co; Auxiliary lanes	SPC
	SPC	PA66/US22	PA 66 Improvements N of US 22	SPC
	SPC	US19/Morrisville	Green Co; safety improv phase 2	SPC
	SPC	US119 McClure Rd	Westmoreland Co; US 119 McClure Road/ Kingview Road Intersections	SPC
	SPC	SR228/SR19/SR2020	Roadway Improvements to SR228 from SR19 to SR 8, as well as SR2020 (Freedom Road) west of US19	SPC
	SPC	I-79	Butler/Beaver Co; Widen I-79 north of I-279	SPC
	SPC	Double stack NS Mainline	Horizontal and vertical clearance is insufficient to allow double-stack operation on the NS mainline	SPC
	SPC	CSXT McKees Rocks Intermodal Facility Access	Improve roadways connecting the Intermodal facility with the freeway system (MECN) to facilitate truck access to the facility	SPC
	SPC		Truck parking facilities	SPC
	SPC	NS Mainline	Upgrades b/t Harrisburg and OH/PA state line. Provide needed increase in rail freight capacity and allows operation of a higher level of passenger rail service in the corridor.	SPC
	SPC	ITS Deployment	Provide real-time information on traffic conditions for trucking	SPC
	SPC	I-70 Modernization	Safer operation of trucks and other traffic on this obsolete facility	SPC
	SPC	Allegheny Valley Expressway	Roadway improvements to provide limited access highway to connect Armstrong/Indiana Co with I-80	SPC
	SPC	Shortline/ regional rail infrastructure	Upgrade local access b/t industrial centers, transload facilities and Class I railroads. Priorities would be on track upgrade to 286K; bridge repair and replacement, and extension of new rail service to key industries.	SPC
	SPC	Multimodal Double Stack Clearance Program	22 ft +/- b/t top of rail and lowest point on any newly rehabbed or replaced roadway bridge. Surface profile may need altered to meet new req.	SPC
	SPC	Spot Freight Improvement Program	Line item funding for small scale freight enhancements, such as increased turn radii, remediation of low clearance obstacles, overhead utility burial, etc. to permit efficient movement by larger vehicles.	SPC
	Williamsport	Signalized intersection upgrades	Main /Water St (PA 405/SR 2014)	Lycoming Co Planning Commission
	Williamsport	Signalization upgrades	US 220 / PA 405 intersection realignment in Hughesville	Lycoming Co Planning Commission

Table 25: Freight Projects Identified by Planning Partners (continued)

Project ID	Planning Partner	Project Name	Description	Source
	Williamsport	I-99 Corridor	Jersey Shore to Williamsport; design & construct new 4-Ln limited access hwy along US 220	Lycoming Co Planning Commission
	Williamsport	US 220 Corridor Access Management Initiative	Design & construct access changes along US 220 corridor b/t Jersey Shore & Williamsport to improve safety	Lycoming Co Planning Commission
100235	York	I-83 Exit 24-28 Study	Roadway solutions for increased congestion	York Co PC
92924	York	N York Widening	North of Exit 18 - PA 238 Interchange	York Co PC
	York	Rt 30 Widening	I-83 to N Hills Rd	York Co PC
	Various partners	Crescent Corridor	Norfolk Southern - upgrades include straightening curves; adding passing lanes, double tracks, and signals; building terminals.	AASHTO Nov2014 Board Mtg for Proj of National / Regional Sign - PNRS Survey Responses



Appendix D: Summary of Pennsylvania Freight Funding Programs

Table 26: Summary of Pennsylvania Freight Funding Programs

Funding Program/ Source	Source/ Organization	Eligible Organizations	Program/Source Summary
Fixing America's Surface Transportation Act (FAST Act)	U.S. Department of Transportation (USDOT)	State and local governments, port authorities, metropolitan planning organization (MPOs), multi-state or multi-jurisdiction groups	• National Highway Freight Program funded at $1.2 billion annually, which will be divided among all states states via formula. Pennsylvania's share is approximately $50 million dollars a year. • $900 million annually for the National Significant Freight and Highway Projects Program and will give USDOT the discretion to select large projects of national and regional significance
Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants Program	U.S. Department of Transportation (USDOT)	State and local governments, transit agencies, port authorities, metropolitan planning organizations (MPOs), and multi-State or multi-jurisdictional groups	• Appropriated $600 million in 2014 to be awarded by the USDOT for national infrastructure investments • Nearly $1 billon has been allocated for freight projects • Applicants must detail the benefits their project would deliver in terms of safety, economic competitiveness, state of good repair, livability, and environmental sustainability
Congestion Mitigation and Air Quality (CMAQ) Program	Federal Highway Administration (FHWA)	MPOs/RPOs	• Financial support for transportation projects that reduce mobile source emissions in areas designated by the EPA as nonattainment or maintenance areas • Eligible projects must be in the MPO's transportation improvement program
Appalachian Regional Commission	Appalachian Regional Commission (ARC)	State, regional, local and other governmental agencies, and nonprofit organizations	• ARC's Access Road program is designed to better link businesses, communities, and residents to the Appalachian Development Highway System and to other key parts of the region's transportation network

Table 26: Summary of Pennsylvania Freight Funding Programs (continued)

Funding Program/ Source	Source/ Organization	Eligible Organizations	Program/Source Summary
Transportation Infrastructure Finance and Innovation Act (TIFIA)	U.S. Department of Transportation (USDOT)	State departments of transportation, transit operators, special authorities, local governments, and private entities	• Provides credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to transportation projects of national or regional significance • Aimed at large projects with a minimum value of approximately $50 million • Maximum TIFIA funds of 33 percent of total project funding
The Railroad Rehabilitation and Improvement Financing Program	Federal Railroad Administration (FRA)	State and local governments, government-sponsored authorities, corporations, and railroads	• Provides up to $35 billion in direct loans and loan guarantees with $7 billion reserved for Class I railroad projects
Airport Improvement Program (AIP)	Federal Aviation Administration (FAA)	Airports included in the National Plan of Integrated Airport Systems (NPIAS)	• Provides grants for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS) • Eligible projects include improvements related to enhancing airport safety, capacity, security, and environmental concerns
EDA Investment Programs	Department of Commerce, (DOC) Economic Development Administration (EDA)	Distressed Communities, state and local governments/ organizations, companies, universities, and nonprofits	• A variety of programs to develop, diversify, and sustain economic growth, aimed particularly in economically disadvantaged areas
Act 13 Highway Bridge Improvement Fund / County Critical Bridge Legacy Funding	Motor License Fund	Counties	• Establishes a Marcellus Legacy Fund that allocates a portion of the Marcellus Shale Impact Fee to the Highway Bridge Improvement Restricted Account in the Motor License Fund
Act 13 Rail Infrastructure Set Aside	Motor License Fund	PennDOT Bureau of Rail Freight	• Funding to be used at the discretion of PennDOT's Bureau of Rail Freight to augment the Rail Freight Assistance Program and Rail Transportation Assistance Program
Rail Freight Assistance Program and Rail Transportation Assistance Program	General Fund/ Capital Budget	Railroad owners, railroad operators or lessees, railroad users or shippers, and municipalities and other governmental entities	• Funding to preserve essential rail freight service where economically feasible, and to preserve or stimulate economic development through the generation of new or expanded rail freight service
Port of Pittsburgh	Port of Pittsburgh	Private companies	• Issues private-activity lease-backed bonds to finance economic development projects in the port district • Also administers a revolving loan fund to assist water-related manufacturing and transportation industry growth in the port district

Table 26: Summary of Pennsylvania Freight Funding Programs (continued)

Funding Program/ Source	Source/ Organization	Eligible Organizations	Program/Source Summary
Pennsylvania Infrastructure Bank	PennDOT	Municipalities, councils of governments, businesses, economic development organizations, public transportation agencies, and ports and rail freight entities	• Revolving loan fund administered by PennDOT to provide flexible financing opportunities for eligible transportation improvement projects • Among the objectives of the PIB are spurring economic development and facilitating non-traditional projects, including intermodal facilities
Multimodal Transportation Fund	PennDOT	Municipalities, councils of governments, businesses, economic development organizations, public transportation agencies, and ports and rail freight entities.	• Provides grants to encourage economic development and ensure safe and reliable transportation
Airport Improvement Program	Federal Aviation Administration (FAA)	Commercial Service Airports	• Federal funding administered directly by the FAA to federally eligible airports, mostly commercial service airport sponsors and any general aviation airport they may own.
State Block Grant Program	PennDOT Bureau of Aviation	General Aviation Airports	• Federal funding administered by the state to federally eligible general aviation airport sponsors
Aviation Development Program	PennDOT Bureau of Aviation	Public Use Airports	• State funding that is generated from taxes on jet fuel and available for eligible projects at any public-use airport

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