NORTHWEST PA COMMISSION

Regional Freight Study

FINAL REPORT

Northwest COMMISSION

June 27, 2017

Northwest Pennsylvania Commission

Regional Freight Study

Prepared for:

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Message from the RPO Chairman

Maintaining a strong freight network is crucial to sustaining our region's economy in what is becoming an increasingly competitive environment. In order for our region's businesses to grow and succeed, we must have a strong, sustainable freight transportation system in place.

One of the Northwest RPO's concerns has been how we best support our region's freight system, particularly the trucking industry. Motor carriers encounter many barriers in moving freight, including adequate parking, trailer width restrictions, and other bottlenecks. The region's highway and bridge network is aging, and many of our assets do not have the structural capacity to handle heavier loads. The situation is especially acute on local roadways and bridges that facilitate the movement of "first- and last-mile" freight movements.

The Northwest RPO is committed to maintaining and improving its freight transportation system. We have conducted freight studies of discrete problem areas in the past, but this study report represents the first time we have developed an approach that takes a holistic view of our freight transportation needs, region-wide. Originally billed as a freight facility inventory and corridor study, this Regional Freight Study summarizes our region's existing conditions as they pertain to goods movement, highlights the importance of the region's most strategic and critical freight corridors, and articulates a strategy for addressing our most pressing freight movement concerns. The RPO and its partners will use the report recommendations for improving the safety and mobility of our region's freight, which will enhance our economic competitiveness.

I invite you to read our latest planning effort, and join with us as we work together to ensure that our transportation system can continue to effectively support our region's shippers, receivers, and freight carriers.

Sincerely,

Dan Glotz, Chairman
Northwest Pennsylvania Rural Planning Organization
Transportation Advisory Committee

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A 25-year Chronology and Freight Retrospective

(selected milestones and highlights)

Northwest PA Region	Year	State, National, and Global
PA 8 missing link from Georgetown Road to old PA 8 is completed on a Super 2 alignment	1991	Congress passes ISTEA, creating a new framework in planning for multimodal transportation
	1995	Congress designates the National Highway System (NHS); PennDOT begins embracing a "Maintenance First" philosophy; Conrail Mainline is cleared for double-stack shipments
	1997	Act 3 revenue enhancement is passed by Pennsylvania's General Assembly
NS acquires Conrail assets throughout the region	1998	TEA-21 is passed by Congress
PA 8 Bypass is renamed PA 8 Business	2000	
The Western New York & Pennsylvania Railroad begins independent operations	2001	
The Bessemer & Lake Erie Railroad becomes the Bessemer Subdivision of Canadian National	2004	
Northwest Commission completes a regional freight analysis	2006	
	2007	Act 44 is passed by the General Assembly, originally generating $750 million in revenue
	2008	NS begins work on the Crescent Corridor to compete with OTR shipping
Titusville Truck Study completed, reviewing existing and projected truck traffic and improvement options	2009	The American Recovery and Reinvestment Act (ARRA) provides a one-time infusion of more than $1.3 billion for Pennsylvania transportation
	2012	MAP-21 is signed into law, expanding the NHS and establishing a performance-based program
	2013	Act 89 is passed, raising $2.3 billion in new money annually for transportation projects, including $144 million annually for a multimodal fund
	2015	The FAST Act is passed, with new requirements for freight planning at the state and MPO/RPO level
The Northwest RPO identifies candidate Critical Rural Freight Corridors for placement on the National Highway Freight Network	2016	Panama opens expansion of its canal after $5 billion in improvements, doubling its capacity and accommodating 13,000 TEU vessels
The Northwest RPO conducts its first-ever regional freight study	2017	National Freight Strategic Plan is adopted

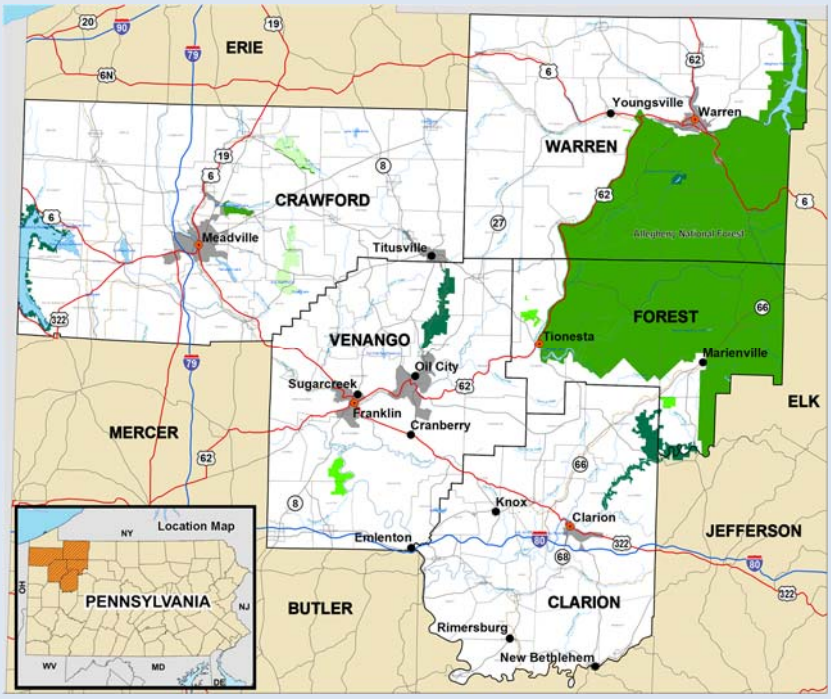
Our Regional Geographic Position

The Northwest PA region includes a 5-county area located in the northwestern corner of Pennsylvania. It is one of the state's smallest transportation planning regions by population, and consists of nearly 3,600 square miles of land area (or an area roughly half the size of the State of New Jersey).

The region's location just off the shores of Lake Erie also makes it an area with one of the harshest environments in the state. The region is situated within the winter snowbelt, and annually receives upwards of 100 inches of snowfall, along with 40-48 inches of rain. PennDOT typically spends anywhere from 100 to 150 days a year deicing the region's roadways.

Geologically, the region is located within the broader Appalachian Plateau region, with deposits of glacial till that can run more than 200 feet deep. This environmental phenomenon can substantially drive up the costs of bridge maintenance and construction, just as much as the region's freeze and thaw cycles can adversely affect roadway conditions.

The region in general is very rural, with a population density of only 64 persons per square mile. In addition, significant portions of the region are quite remote and inaccessible, with limited access to the national Interstate system. The largest municipalities in the region include the micropolitan statistical areas of Meadville, Oil City, and Warren. The Allegheny National Forest is a major geographic feature within the region and stretches across large portions of both Forest and Warren Counties.



Acknowledgements

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Executive Summary

Who initiated the study?

The study process was facilitated by the Northwest Commission, which provides the administrative staffing support for the Northwest PA Rural Planning Organization (RPO). The Commission contracted with Michael Baker International to help lead the study effort.

Why was this study initiated?

The regional Transportation Advisory Committee is responsible for more than just planning and programming. Its responsibility extends to all areas of transportation planning, including freight movement. Freight is the physical manifestation of our economy, and so planning for its success is a vital part of the Commission's work.

Who participated in the study process?

The plan was shaped through the input of a 19-member steering committee, which met three times over the course of the planning effort. The Commission also conducted a series of freight focus group meetings around the region, with events in Clarion, Meadville, Oil City, and Warren. The Commission also administered an online option, which generated over 1,410 points of data that were used in the identification of plan strategies and potential freight projects.

What are the study's major findings?

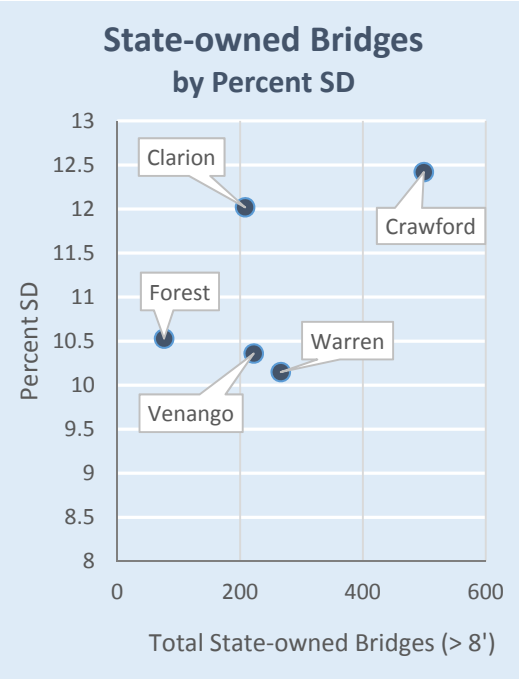
The planning process identified several major findings, including:

Reliance on Manufacturing – The region's economy is dominated by the manufacturing industry, with approximately 22 percent of all employment. Sectors such as this, along with the construction, wholesale and retail industry sectors are by nature very reliant on freight movement for their success. The region's share of workers employed in the manufacturing industry is more than twice that of the state rate.

Strategic Highway Routes – The region's interstates comprise only 1 percent of the entire regional roadway network, yet they facilitate the movement of 22 percent of all travel. For the National Highway System (NHS), the rates are 4.4 percent and 40 percent, respectively. These numbers illustrate the strategic importance of (and the need to continue to invest in) these higher-order roadways.

Increasing Number of Truck Crashes – Despite new Hours-of-Service regulations, the number of truck crashes has been increasing on Northwest roadways. The trend is particularly acute in Clarion County, where nearly two-thirds of all truck crashes occur on Interstate 80. For the decade ending 2015, the region averaged 145 truck crashes per year.

Improving Bridge Conditions – The region's total number of state-owned, structurally deficient bridges has been declining in recent years, from the 208 recorded in 2011, to 140 by July 2017.



Worsening Pavement Conditions – While there are no segments of Interstate highway within the region with an International Roughness Index (IRI) value that would be considered to be "Poor," the emphasis on bridges in recent years is being reflected in the region's pavement conditions. Pavement conditions on PennDOT's three other business plan networks have been declining, particularly on Non-NHS Routes with less than 2,000 ADT. OPI values, or Overall Pavement Indices have also been declining, over time.

Posted and Bonded Roadways – Nearly 60 percent of the region's state-owned roadways are posted and bonded. This creates circuitous routes and delays for shippers and haulers.

Critical Rail Assets – The rail network surrounding Franklin, Oil City and Titusville once hosted multiple direct routes to Buffalo, Corry, Olean, Pittsburgh, New Castle, and Warren. Today there remains one means of ingress and egress: the Western New York and Pennsylvania Railroad's Oil City Branch. The Oil City Branch and associated lines of the WNY&P include 24 bridges. All but two are sufficient for 286K car loadings. These two structures include bridges over Sugar Creek, and Oil Creek.

At the time of this report's writing, the Oil City Branch and associated trackage is in the best condition it has been in since the line was rebuilt by Conrail approximately 35 years ago. In order for the shippers of Franklin, Oil City, and Titusville to continue to receive viable rail freight service connecting to the national railroad system, a financial solution must be found to address these two load-challenged bridges.

Commodity Imports and Exports – The region is a net exporter of freight, with approximately 23 million tons of freight each year, at a total value of just over $17 billion. Warren County ranks 13th in the amount of freight tonnage (and ninth in total value) being generated. The growth in freight being shipped from the region is expected to grow to over 30 million tons by 2040. The top destinations for the region's freight include the metropolitan areas of Buffalo, Pittsburgh, Cleveland, and within the Northwest region itself. Top commodities being shipped out of the region include petroleum refining products, gravel or sand, liquefied gases, and coal.

Major study findings are summarized in the following table by major freight corridor.

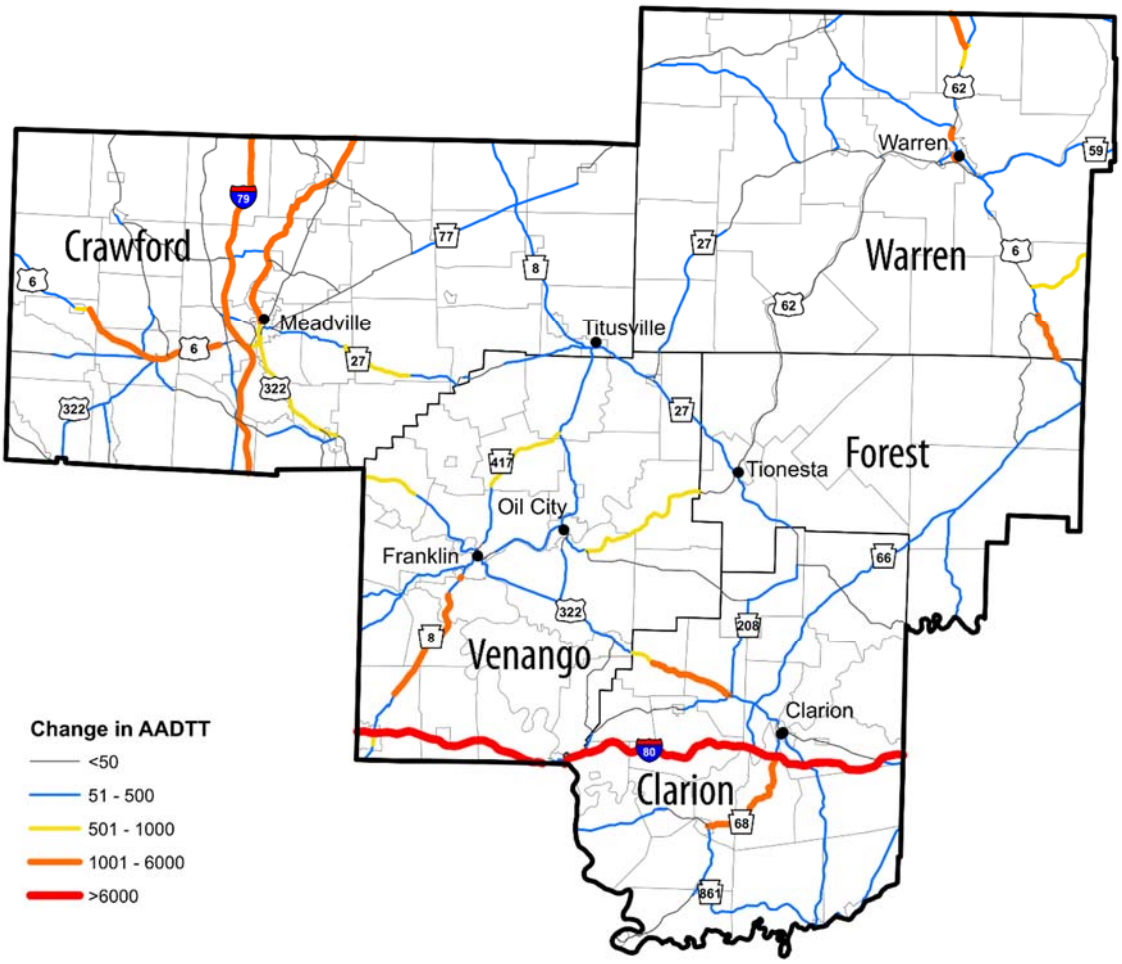
Study Inventory of Major Freight Routes and Corridors

Route	NHFN	NHS	CRFC	Major Shippers	Stakeholder Freight Concerns	Programmed Projects
	Y	Y	N		• Lack of DMS in Crawford County • Truck parking • Traffic incident management	• Preservation projects between mileposts 136 and 154
	Y	Y	N		• Truck parking • Traffic Incident Management – emergency routes needed	• Preservation projects between mileposts 27.6 to 34.5, and between 34 and 42.
	N	Y	Y, from I-79 to US 19	• Akron Products • Channellock Inc.	• Vertical bridge clearance in Columbus	• Bridge over French Creek
	N	Y	Y, from SR3018 to PA 666	• United Refining • Osram Sylvania • Pepsico	• Accessibility from Warren to I-86 • Site distance at PA 666 intersection • Serves energy exploration traffic	• Hunter Station bridge • Highway restoration from Liberty to Front Street • Retaining wall (Venango Co.)
	N	Y	Y, from US 62 to SR4004	• Franklin Industries Co.	• Movement of pre-manufactured housing • Issues with grades by Kronospan • Intersection geometry at PA 66 • Intersection geometry at US 19	• Bridge over Crooked Creek

Route	NHFN	NHS	CRFC	Major Shippers	Stakeholder Freight Concerns	Programmed Projects
	N	Y	N	• Latrobe Specialty Steel • Northwest Hardwoods	• Bridge weight limits in Titusville • Truck climbing lanes south of Franklin and Titusville • Access to Venango Regional Airport • Poor roadway conditions in Titusville • Concerns with converting to two-lane roadway between Franklin and Barkeyville	• Asset management study underway • Franklin St bridge • Highway restoration from Polk Cutoff to US 62
	N	N	Y, btw SR2029 and SR2028	• Charter Plastics • Titusville Dairy • International Waxes • Oil Creek Plastics	• n/a	• Bridge over Oil Creek • Grade crossing improvement
	N	N	N	• Kahles Cabinet Shop	• Truck climbing lanes south of Tionesta	• Bridge over Tionesta Creek
	N	Y, btw I-80 and US 322	Y, btw I-80 and US 322	• Colony Factory Crafted Homes • North East Hardwoods • Industrial Timber & Lumber	• Works Progress Administration (WPA) wall	• New Bethlehem PM
	N	Y, btw I-80 and US 322	N	• Francis Palo, Inc. • Owens Illinois	• n/a	• Dolby Street Intersection

FHWA's Freight Analysis Framework (FAF) incorporates data from agriculture, extraction, utility, construction, service, and other sectors in providing tonnage estimates by regions of origin and destination for 2012, the most recent year data is available from the Commodity Flow Survey. Truck flows and forecasts can be assigned to the highway network for 2045, as demonstrated in the accompanying figure.

Forecasted Percent Change in Absolute Truck Volume: 2012 to 2045



Source: Freight Analysis Framework (FAF4)

What happens next?

The Northwest PA Rural Planning Organization accepted the freight study report during its June 27, 2017 meeting. The report and its findings will be used by the RPO as part of its future planning and programming activities, including the update of the 2019 program.

Introduction

In updating its long range transportation plan (LRTP) in 2015, the Northwest Rural Planning Organization (RPO) uncovered a need for the region to take a harder look at how freight flows throughout the five-county Northwest Pennsylvania region. While the LRTP addressed freight concerns at a high level, an opportunity existed to conduct a more robust analysis of freight issues and concerns within the Northwest region. The RPO had conducted freight studies at a more localized level (such as the Titusville Truck Study in 2009), but it had never taken a holistic view of freight for the entire region.

The region's recently updated Comprehensive Economic Development Strategy (CEDS) from 2016 cites two specific strategic goals affecting goods movement, that of "Updating infrastructure to facilitate the attraction and retention of both businesses and residents to the region," and "promote and expand rail usage throughout the region and develop networks to other key rail hubs, with a focus on leveraging existing infrastructure."

In addition to recent local efforts, the timing of the development of a regional freight study coincided with efforts at the state and national levels. PennDOT in the summer of 2016 completed an update of Pennsylvania's long range transportation plan and first-ever comprehensive freight movement plan. The plan included a wealth of data on freight and freight forecasts that were made available to the Northwest Commission for its own planning purposes at a regional level. These are resources that would have been cost-prohibitive for the RPO to acquire on its own.

At a federal level, the passage of the FAST Act in December 2015 ushered in a new era for freight planning. The Act required the development of a National Freight Strategic Plan and a national freight policy. The release of MAP-21 final rulemaking for performance measures related to freight also became effective on May 20, 2017.

There are other major events currently happening outside of the region that will certainly have implications on freight movement within Northwest Pennsylvania. Key among these include Shell Chemical's decision to construct its so-called ethane "cracker plant" in Beaver County, approximately 30 miles northwest of Pittsburgh. Commercial operation of this plant is expected to begin early in the next decade and will also likely introduce broader changes in regional freight patterns. Supply chains are getting shorter, and other changes in shipping and e-commerce will contribute to long-standing freight problems, such as truck parking, posted and bonded roadways, and railroad crossing safety. Meeting the needs of the region's shippers and receivers of coal, lumber, powdered metals, and other commodities will continue to be important.

Looking longer range, the recent $5 billion expansion of the Panama Canal effectively doubled the capacity of that waterway with the completion of a third set of locks to accommodate a new generation of larger container ships. (Panama set shipping records in 2015 in the amount of cargo that passed through its locks.) Nicaragua is also exploring the construction of a new canal through that country that would be funded by the Chinese.

In sum, east coast ports will get busier, and so the Northwest region needs to plan now as to how well its transportation assets facilitate the movement of freight not only within the region, but also to more distant points, including international ports of entry. This study represents the first step in what will be a continuous process aimed at maintaining Northwest Pennsylvania's freight infrastructure. The intent as transportation planners is to ensure that the directions of the study will effectively support the region's many shippers, receivers, and carriers that underpin economic competitiveness.

Glossary of Acronyms

AADTT	Annual Average Daily Truck Traffic
ADT	Average Daily Traffic
BPRR	Buffalo & Pittsburgh Railroad
CIMS	Commodity Information Management System. A GIS-based, freight planning tool available through PennDOT.
CRFC	Critical Rural Freight Corridor. An element of the National Highway Freight Network and a target for funding under the National Highway Freight Program. The Northwest PA RPO identified over 40 miles of CRFCs for consideration by PennDOT and FHWA for eventual certification for placement on this national priority freight network. CRFCs lie outside of urbanized areas.
CUFC	Critical Urban Freight Corridor. Similar to CRFCs, only located within urbanized areas. There are no such segments within the Northwest RPO region.
DVMT	Daily Vehicle Miles of Travel. A measure of the total demand for travel. Within the Northwest Pennsylvania region, the highway network supported 7 million DVMT during 2015, a figure that has steadily declined over the past decade.
FAK	Freight All Kinds
FAST Act	Fixing America's Surface Transportation Act (FAST Act) was signed by the president in December 2015 and provides predictable, long-term funding for the nation's transportation system.
FHWA	Federal Highway Administration
IRI	International Roughness Index, a measure used to indicate the smoothness of a pavement's surface.
LRTP	Long-range transportation plan
LQ	Location Quotient, a measure of quantifying how concentrated a particular industry is in a region as compared to the state (or nation).
MAP-21	Moving Ahead for Progress in the 21st Century Act, predecessor act to the FAST Act, MAP-21 was signed into law in July 2012 and emphasized performance and outcomes-based plans.
MPO	Metropolitan Planning Organization
NHFN	National Highway Freight Network, an element of the National Multimodal Freight Network.
NHS	National Highway System. A network of strategic roadways first designated by Congress in 1995. MAP-21 subsequently expanded the network, which includes only 312.8 miles, or 4.4 percent of all roadway within the five-county Northwest PA region. The NHS however carries 40 percent of all the region's traffic, illustrating its strategic importance.
NHTSA	National Highway Traffic Safety Administration
NMFN	National Multimodal Freight Network
NS	Norfolk Southern, one of seven Class I rail carriers in the United States
OCTL	Oil Creek & Titusville Lines
OPI	Overall Pavement Index

PennDOT	Pennsylvania Department of Transportation
PHFS	Primary Highway Freight Network. An element of the National Highway Freight Network.
RPO	Rural Planning Organization
RSA	Road Safety Audit
STC	Standard Transportation Commodity
TAC	The Transportation Advisory Committee
TEU	Twenty-foot equivalent unit, used to measure a ship's cargo carrying capacity. The dimensions of one TEU are equal to that of a standard 20' shipping container.
TIGER	Transportation Investment Generating Economic Recovery
TIP	Transportation Improvement Program. The program constitutes as the first four-year period of the Twelve Year Program. The Northwest Commission's 2017 TIP includes $269.5 million in highway and bridge projects.
TYP	Twelve Year Program. The TYP is updated every two years and is approved by the State Transportation Commission by statute.
USDOT	United States Department of Transportation
VMT	Vehicle Miles of Travel. The Northwest region's roadway network supported just over 2.5 billion total miles of travel during 2015.
WNYP	Western New York & Pennsylvania Railroad

Oil Creek & Titusville Lines bridge 21.36 spans Oil Creek in Petroleum Center, connecting shippers and receivers in Titusville with the Western New York & Pennsylvania Railroad at Rouseville.

Methodology/Approach

The study process followed the following primary tasks, as illustrated in **Figure 1**:

Figure 1: Freight Study Methodology

Study steering committee – The Northwest Commission developed a steering committee to guide the study process. The committee included 19 members representing diverse interests including shippers/receivers, freight carriers, county planning, and state and federal government. The committee met three times over the course of the study process to provide input on draft study products and offer guidance to the Northwest Commission on research findings. A list of the study steering committee members is included in the Acknowledgements section of this report, beginning on page 6.

Critical Rural Freight Corridors – The development of the freight study occurred at the same time that USDOT was developing subsystems of its National Highway Freight Network (NHFN). PennDOT collaborated with the Northwest Commission and its counterparts statewide in the identification of Critical Rural Freight Corridors (CRFCs) to be considered for eventual inclusion on the NHFN. Successful candidates would become part of this national priority freight network and become eligible for funding through the National Highway Freight Program. There are over 40 miles of segments within the Northwest PA region that were identified for consideration by PennDOT and USDOT for inclusion into this network. At the time of this report's acceptance by the RPO, these were still being evaluated by PennDOT.

Regional multimodal freight profile – The study includes a detailed baseline of data and information regarding the region's freight assets. These include the extent and condition information related to its roadways, bridges, rail freight lines, and airports.

Commodity flow analysis – The Northwest Commission examined freight data available from IHS Global Insight through PennDOT in developing a picture of freight flows coming into, out of, and through the Northwest PA region. Data were summarized by county, by year, by mode. Major commodities being moved were highlighted and analyzed.

Stakeholder engagement – The RPO conducted a series of freight focus groups in Clarion, Meadville, Oil City, and Warren. The intent of the focus groups was to collect more anecdotal, qualitative data that would supplement the quantitative data gleaned through spreadsheets and PennDOT's various management systems. Follow-up telephone interviews were also made with area employers. In addition to in-person discussions, the RPO also solicited feedback via an online survey to help gauge what freight issues are seen as priorities by businesses and shippers within the RPO.

Themes and strategies – While the region's long range transportation plan includes strategies addressing goods movement, this study offered a more detailed offering of specific freight strategies. Strategies address capital, operational, institutional, and other policy goal areas in guiding RPO decision-making.

The following report summarizes the findings of the study process. Detailed tables documenting freight movement and the flow of commodities through the region are included in the report appendix.


TA
Exit 78
REFUEL. REPLENISH. REFRESH.
Country Pride
TACO BELL
EXIT 73
949
Corsica
2 MILES
708
EMERGENCY
CELLULAR
911
LIMITED COVERAGE
FFE TRANSPORTATION SERVICES
FFE
725595

Study Themes, Strategies, and Projects

The planning process identified several common themes that emerged. These include issues related to safety and security, mobility, operations, and planning. This section of the report highlights these themes and supporting strategies and projects.

Theme #1 - Safety and Security

Safety is a top priority for the Northwest RPO. The regional freight study seeks to advance policies and projects that will improve the safe movement of goods, as safety is vital not only to haulers, but also to the value of the freight that is being carried. The study process seeks to reduce the number and severity of truck crashes, and improve safety at railroad crossings.

- **Explore public/private partnerships for a truck stop/truck parking areas along I-79 in Crawford County**. Truck parking is a critical need throughout the region, particularly at areas along the interstates.
    - The Northwest Commission should reach out to leaders of business and industry within the region to raise awareness of this recommendation within the freight study and develop a strategy for addressing truck parking capacity issues along the region's interstate corridors.
    - A study conducted by the state Transportation Advisory Committee in 2007 identified the I-79 corridor as one with a shortfall in truck parking capacity. The segment between I-80 and Erie (both north- and south-bound) registered a demand of 238 spaces, with an estimated shortfall of 40 spaces. Truck volumes have only increased since the date this study was published, and the numbers are expected to continue to grow through 2040, with export tonnages expected to rise by 30 percent, and imports by nearly 50 percent over that period.
- **Address the region's at-grade railroad crossings, either through new technologies, or grade separation**.
    - The RPO should collaborate on this initiative with the Public Utilities Commission's Rail Safety Section as it conducts safety inspections for compliance with regulations imposed by the Federal Railroad Administration (FRA).
    - PennDOT's highway-rail grade crossing program is administered by its Bureau of Project Delivery. The state has a $29 million set-aside for rail grade crossing safety (elimination of hazards and the installation of protective devices) in the 2019-22 program.
- **Perform road safety audits (RSAs) on selected NHS routes and major freight corridors**. Audits would identify safety and operational issues such as signing, intersection geometry, etc. needed to reduce friction factors related to the movement of freight. Performing RSAs is a proactive approach to improve safety by addressing design problems in the roadway.

- PennDOT District personnel should organize an RSA team to review problem areas on the region's NHS network.
- The RSA should consider all users, particularly freight haulers accounting for the roadway's capabilities and limitations for the movement of freight, yet broad enough to consider the safety needs of all road users.
- PennDOT has allocated $7.1 million in HSIP funding to the RPO region for the 2019-22 program.

- **Advocate for commercialization of interstate highway rest areas**. Current Federal law prohibits the commercialization of rest areas along interstates. The Commonwealth could help provide a financially sustainable approach toward development and support of truck parking facilities while providing truckers with the services they need. The goal is to financially sustain commercial truck parking facilities.
  - As an issue that is national in scope, the RPO should write a letter of support for this proposed legislative change to Congressional representatives Bill Shuster, Mike Kelly, and Glenn Thompson.
- **Address truck routing through residential areas**. The presence of truck traffic through residential areas or areas adjacent to educational facilities such as elementary or middle schools should be discouraged where possible.
  - On municipal streets: The municipality has sole discretion on the installation of enforceable traffic control devices, although they must conform to the state's Vehicle Code, and in many cases, must be supported by an engineering study or justification. Municipalities may also choose to post their roadway limits at 6 tons, which would still allow access for school buses (which have a statewide exemption from the weight limit restriction), and package trucks for local deliveries.
  - On state roads: Pennsylvania Code identifies when municipalities have the authority to install, revise or remove traffic control devices and when such devices are solely under PennDOT's authority. A municipality may approach the appropriate PennDOT District to coordinate on signage or other roadway operational needs.
  - In support of this recommendation, there are several guidance documents and manuals available that govern signs. These include the Manual on Uniform Traffic Control Devices (MUTCD) and several PennDOT Publications, including Pub 111 (for installation standards and types), Pub 236 (sign details), Pub 212 (legislation), and Pub 46 (the Traffic Engineering Manual).

Theme #2 - Mobility

The movement of freight is the physical manifestation of our economy. Strategies in support of this theme serve to eliminate the barriers to the movement of freight. Total freight volume being exported from the Northwest PA region is expected to continue to grow, from 22.8 million tons in 2015, to an anticipated 30 million tons in 2040.

- **Link the region's freight-related industries in more rural areas to the interstate system**. This opens up the region's more remote areas and manufacturing centers such as Titusville and Warren to the interstate system. Projects could range from operations, to geometric improvements to additional capacity.
    - Continue making spot improvements to the region's secondary roadways through the LRTP and TIP processes.
- **Maintain the region's backlog of structurally deficient bridges at a rate below the state target of 10 percent (structurally deficient by deck area).** This would target the region's approximately 145 state-owned bridges that are currently SD. State-owned bridges within the region are currently 11.7 percent SD by deck area.
    - Continue to identify and address the region's structurally deficient bridges that serve primary freight routes and corridors, particularly routes on the NHFN.
- **Support Venango Regional Airport's efforts in developing air cargo capability**. A near-term need includes funding for the construction of a Cargo Transfer Point (CTP) at the airport for the loading and offloading of air cargo.
    - As the airport moves toward attaining this capability, the RPO could provide letters of support or assistance in obtaining funding through Pennsylvania Multimodal Aviation Funding (MMA), Capital Budget, Pennsylvania Infrastructure Bank (PIB), or other sources.
- **Examine roadway geometric issues and concerns raised by freight stakeholders and assess the potential need through PennDOT Connects**. Freight stakeholders identified several locations for PennDOT and the RPO to consider, including:
    - Site distance concerns at the intersection of US 62 and PA 666
    - PA 8/Franklin Street Bridge in Titusville
    - Huson Road outside of Saegertown
    - Truck climbing lanes on PA 8 south of Titusville; PA 36 south of Tionesta

- **Study options for addressing the region's short line rail bridges that are not 286k-compliant**. Having rail bridges that are 286k-compliant will allow for the movement of more freight to and from area businesses. Two bridges in particular that should be targeted as part of this initiative include OC 21.3 in Sugar Creek, and OC 33.1 in Oil City. The bridge in Petroleum Center is in need of $700,000 in rehabilitation work, while the second in Oil City needs replaced, at an estimated cost of between $5 to $7 million. Pennsylvania's Multimodal Transportation Fund and/or Capital Budget may present an opportunity for performing rehabilitation and replacement work to these structures.

  Other innovative funding arrangements could be considered and explored, including an 80/10/10 split among the Commonwealth, the railroad, and private shippers. Under this arrangement, private shippers could agree to a carload surcharge for a certain number of years. These bridges connect area rail-dependent businesses and industries to the national rail freight network. Without the rail option, these businesses would become less competitive and collectively result in the loss of hundreds of jobs.

  - The Northwest Commission should collaborate and coordinate with private railroad operators and the Commonwealth to determine the most effective combination of financial strategies to see these needs addressed on these critical rail bridges.

Theme #3 - Operations

There are just over 7,000 linear miles of roadway throughout the Northwest PA region. Very little new capacity has been added in recent years, and most of any new capacity has been on the local system. The role of system operations in transportation planning has only increased over time in light of this. The industry has sought to harness and integrate the power of technology and crowd-sourced information in improving such various facets of our transportation system as traffic operations, incident response, work zone management, and traveler notification. Investments in transportation operations also yield a favorably high benefit to cost ratio.

- **Improve Traffic Incident Management (TIM) on Interstate 79 and Interstate 80**. This strategy entails a planned and coordinated process to detect, respond to, and clear traffic incidents so that traffic can resume normal flow and operation. Having a TIM program would reduce the impact of traffic incidents on the region's interstates, including safety and congestion. This equates to less time lost by commercial vehicles waiting in queues created by incidents.

  - The RPO should perform a regional TIM self-assessment to identify TIM trends and future needs within the region. This assessment could be performed in partnership with surrounding planning partners, such as the North Central PA RPO, and Shenango Valley MPO to enhance TIM.

  - The RPO should develop an integrated corridor management plan for I-80 and I-79 that incorporates freight concerns.

- **Investigate installation of DMS along Interstate 79 in Crawford County**. Dynamic Message Signs (DMS) are constructed to inform truckers and motorists alike of traffic conditions, incidents, weather, roadway construction and maintenance, and safety initiatives. DMS can provide up-to-date traveler information and advisories, and provide rerouting information in the event of an incident.

  - The District Planning and Programming Manager should consult with the Assistant Traffic Engineer for ITS and Congestion Management on potential sitings for potential DMS applications along the I-79 corridor within Crawford County.

  - The RPO and PennDOT Districts may also wish to explore connecting traffic signals along the parallel detour routes to the state network for remote command and control during incidents to manage the increased traffic on those routes. Signalized intersections could easily become bottlenecks where an interstate detour would generate additional turning traffic.

Theme #4 - Planning

Freight is a vital element of the region's economic vitality. A healthy share of the region's workforce is employed in occupations related to manufacturing, construction, wholesale, and retail trade…all industries that are reliant on the efficient movement of goods for their success. (Planning for freight also directly supports the more than 2,600 workers within the region who are employed within the transportation and warehousing industries.) A hallmark of a successful planning program involves the ability of being able to balance the needs of shippers and haulers while protecting the environment. This is a challenge that can only be met through the implementation of a series of strategies that promote sustainable development.

- **The RPO should continue working with PennDOT and FHWA on the designation and certification of Critical Urban and Rural Freight Corridors**. This process is expected to be completed by December 2017. If successful, the region could have additional roadway mileage eligible for Federal funding.

  - Leadership for this initiative rests largely with PennDOT Central Office. The RPO's Program Manager should coordinate with the Program Center staff lead on this initiative as nominated segments are evaluated for potential designation and eventual certification by FHWA.

- **Create a special designation for the region's proposed CRFCs**. This proposed action would give critical first- and last-mile connections funding priority, regardless of any Federal action taken on the RPO's nominated freight segments.
    - Such a designation conferred by the RPO would be timely, given the 2017 roll-out of "PennDOT Connects," the Department's new initiative to ensure that all users of transportation infrastructure (including freight haulers) are being properly accommodated before projects move deeper into project delivery phases. The proposed designation would carry no funding connotation in this case, but would serve to help elevate the segments in question as those that have been identified by the RPO as critical first- and last-mile connections.
- **Support the organization of a chapter of the Pennsylvania Motor Truck Association in Northwest Pennsylvania**. There is currently no chapter that exists within the Northwest region of the state. The association promotes the common business interests of those engaged in the motor trucking industry and represents its concerns to members, government, regulatory agencies, and the general public. It is Pennsylvania's official representative of the trucking industry, and ensures that the state's legislators understand how new laws affect the industry.
    - The RPO would play a supporting role in this initiative. As one of the talking points in this freight study, the region's lack of involvement/representation in this organization should be highlighted throughout the PREP region and the region's chambers of commerce.
- **Support the region's short lines in future requests for public funding through the Rail Freight Assistance Program (RFAP), capital budget, or other public sources**. This offers the region's shippers a rail freight option for moving goods and can help create or maintain manufacturing jobs. The maximum state funding for a RFAP project or Capital Budget project is 70 percent of the total project costs, not to exceed $700,000.
    - The RPO should assist the region's short lines as needed/requested through the grant process, including letters of support.
- **Acknowledge freight industry needs in the next CEDS plan update**. The region's Comprehensive Economic Development Strategy (CEDS) was last revised in fall 2016. As a strategy-driven plan for economic development, the CEDS should recognize and address workforce development issues such as driver shortages and retention concerns within the motor carrier industry.[1]
    - The Northwest PREP region should draw greater attention to motor carrier labor needs, even as it recognizes the need for higher education programs and the ongoing specialization of the labor force. Programs need to be in place to train the region's

[1] The region's CEDS plan also includes the counties of Erie, Lawrence, and Mercer.

workforce with the necessary skill sets to support the region's existing business and industry.

  - As part of the next CEDS update, a subtask should identify clusters of freight-related industries (i.e., manufacturing, construction, wholesale, retail, etc.) within the region and the specific transportation issues facing each sector.

- **Assist in developing freight and land use guidance.** The RPO can play a role in educating municipal officials and planners on freight planning needs. Guidance can ensure that land use policies are supportive of goods movement and incorporated into local planning and design. The region needs to ensure that land located adjacent to valuable freight infrastructure is preserved for compatible uses, as opposed to retail, commercial, or residential uses.

  - PennDOT's District planners should ensure that goods movement needs are considered as part of the PennDOT Connects planning process.

  - The region's county planning directors should work with their counterparts at the municipal level as land use ordinances are considered for creation and updating.

- **The RPO should avail itself to a plethora of freight data and tools now available for future planning.** Many freight planning tools have emerged in recent years that have made freight planning easier and quantifiable for the RPO. FHWA provides periodic updates of its Freight Analysis Framework (FAF) dataset. PennDOT too has acquired data and developed tools as part of the development of its Comprehensive Freight Movement Plan (CFMP) during 2014-15. Other data sources and tools currently available to the RPO and its member counties are as shown in **Table 1**.

Table 1: Available Freight Planning Tools

Tool	What it Does/How It Should be Used	Location
Commodity Information System (CIMS)	• Provides tonnage and value quantities for truck, rail, air, and water modes against 700 commodity types for 2011 and forecasts for the years 2015, 2020, 2030, and 2040.	http://gisdemo1.cdmsmith.com/PACIMS/index.aspx
PennDOT Statewide Travel Demand Model (TDM)	• Understanding travel interactions (including county-to-county trips) with regions beyond the RPO. • Freight and goods movement projections (movement of goods and commercial vehicles is based on the application of the CUBE CARGO model).	Contact PennDOT's Program Center for model runs.
Commodity Flow Tool	• Applies commodities to the network.	Contact PennDOT's Program Center for model runs.

Tool	What it Does/How It Should be Used	Location
	• Can query up to 39 commodities at the 2-digit Standard Transportation Commodity Code (STCC) level. • Tool can display freight flows either by annual trucks or annual tonnages.	
Freight Analysis Tool	• An interactive, PennShare-hosted GIS mapping tool for freight systems analysis.	http://pennshare.maps.arcgis.com/home/webmap/viewer.html?webmap=3a0839aa61284738aabacad31dcbc778

Performance Measures

The Federal Highway Administration has finalized six inter-related performance rulemakings to implement the transportation performance management framework established by MAP-21 and the FAST Act. Collectively, these rules address the challenges facing the national transportation system, including

- Improving safety
- Maintaining infrastructure conditions
- Reducing traffic congestion
- Improving the efficiency of the system *and freight movement* (emphasis added)[2]
- Protecting the environment, and
- Reducing delays in project delivery.

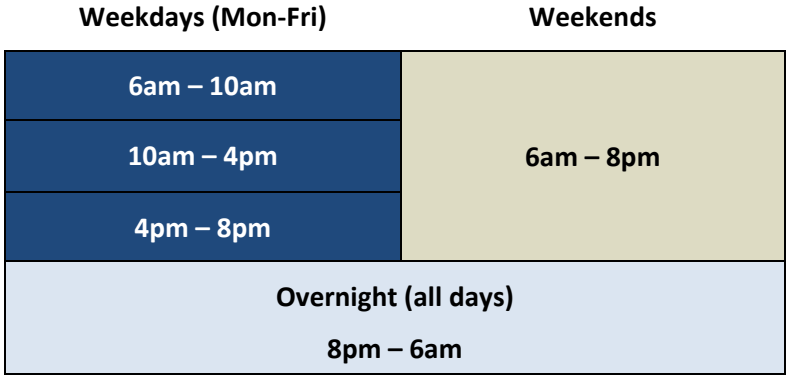
The rules establish national performance measures. As such, State DOTs such as PennDOT and its planning partners will be required to establish targets for applicable measures. New and existing plans will document strategies and investments used to achieve the targets, and progress toward the targets will be reported through new and existing mechanisms.

A freight reliability measure will measure travel time reliability on the Interstate system (Truck Travel Time Reliability (TTTR) Index). The measure considers factors that are unique to this industry, such as the use of the system during all hours of the day and the need to consider more extreme impacts to the system in planning for on-time arrivals. The freight measure will be used by PennDOT and its planning partners (including the Northwest Commission) in assessing the performance of the Interstates in

[2] This rule became effective on May 20, 2017

moving freight. The one performance measure regarding freight movement applies only to the Interstate System. The Truck Travel Time Reliability (TTTR) Index is defined as the ratio of the 95th percentile truck travel time to the 50th percentile truck travel time.

TTTR is to be calculated for the following time periods:



Source: USDOT

The highest TTTR ratio of the five time periods shown for a particular roadway segment is used to aggregate reporting segments for the entire Interstate System, which is weighted by segment length.

FHWA recognizes there may be time periods (15-minute bins) where there were no freight vehicle probes, resulting in blank data. For this metric, the Final Rule requires the all-traffic travel time be substituted for the freight vehicle travel time. Time periods when an NHS roadway is closed may be excluded from the calculations.

PennDOT and the Northwest Commission will be able to draw from the National Performance Management Research Data Set (NPMRDS) as this data set includes truck travel times for the full Interstate system.

PennDOT will establish 2- and 4-year targets for each set performance period. The first set of targets must be established within one year of the final rule, or May 20, 2018. Targets must be reported to FHWA by October 1 of that same year in the guise of a Baseline Performance Report. A subsequent Mid-Performance Period Progress Report is due October 1, 2020, with a Full Performance Period Progress Report due on that date two years afterward, in 2022.

Regional Freight Profile

This chapter of the freight plan addresses the extent, ownership, and condition of the region's freight infrastructure. **Table 2** begins with a summary of the chapter's content.

Table 2: Summary of Regional Freight Conditions and Attributes

Topic	Status
Total Population	• The region's total population is estimated at 224,698 (July 2016), a decline of 8,570 persons since the 2010 decennial census. • Between 2000 and 2010, Forest County was the only county in the region to register an increase in total population.
Employment by Industry	• Total employment in the region has dropped by nearly 3 percent, or nearly 3,000 jobs from 2005 to 2015. • Some of the regional economy's biggest losses have come in the manufacturing and construction industry sectors. • Manufacturing remains an important industry to the region, exceeding Pennsylvania's employment share within that industry.
Roadway Network	• The region boasts a roadway network of just over 7,000 linear miles, supporting 7 million vehicle miles of travel, daily. • Just over 1,525 miles of the region's roadways are posted or bonded.
Truck Travel Demand	• The region accommodates 3.6 percent of all truck traffic, statewide.
Critical Rural Freight Corridors	• The Northwest PA RPO has identified over 40 miles of Critical Rural Freight Corridors for potential certification by FHWA. • Successful certification of these priority freight segments would make them eligible for FHWA's National Highway Freight Program (NHFP) funds.
Pavement Quality	• Percent "Excellent" or "Good" OPI on the region's interstates has been declining from a 2010 value of 100 percent, to a 2016 rate of 93 percent.
Truck Crashes	• Total truck crashes has remained constant over time. For the decade ending 2015, the region averaged 145 truck crashes a year. • Clarion County leads the region in average annual truck crashes, with 48.
Bridge Conditions	• The region's total number of state-owned, structurally deficient bridges has been declining, to a July 2017 total of 140. • Structurally deficient *deck area* on state-owned bridges has also been declining, to a July 2017 rate of 7.8 percent. • The average state-owned bridge in the Northwest region is 53 years old. • One quarter of all locally-owned bridges (>20') were built prior to 1930.
Priority Networks	• Interstate 79 and 80 comprise just 1 percent of the region's total roadway mileage, but accommodate over a fifth (21.5%) of all travel.
Commodity Flow	• The region receives approximately 8.1 million tons of freight annually, and exports 22.8 million tons. • Northwest PA counts the Buffalo (NY) Bureau of Economic Analysis region as its top export destination, while the Greater Pittsburgh region and North Central PA counties are among the region's top trading partners. • The region's top commodity export by far is petroleum refining products. The region also imports a large share of goods related to this commodity type.

Table 3 provides a summary of freight indicators, by county.

Table 3: Freight Indicators, by County

	Clarion	Crawford	Forest	Venango	Warren	NW Region
Population *(2010)*	39,988	88,765	7,716	54,984	41,815	233,268
Population Forecast *(2040)*	40,680	89,260	8,020	54,260	39,620	231,840
Manufacturing Employment *Change from 2005-15*	(1,514)	(128)	(243)	(145)	(273)	(2,303)
Location Quotient *Mining, quarrying, oil and gas extraction*[3]	5.89	1.15	11.19	1.58	2.51	2.49
Roadway *Linear miles*	1,425	2,440	493	1,365	1,284	7,006
Posted and Bonded Roadway *Linear miles*	263	522	141	271	330	1,527
Truck Crashes *Average annual, 2005-15*	48	39	4	36	20	145
Bridges *State-owned (July 2017)*	207	500	76	223	267	1,273
SD Bridges *State-owned, rate by number*	11.6%	12.0%	10.5%	9.0%	10.5%	11.0%
At-grade Railroad Crossing Crashes *2000-15, total*	1	3	0	3	6	13
Freight Tonnage *millions exported, 2015*	2.47	5.05	0.27	1.84	13.19	22.80
Freight Tonnage *millions imported, 2015*	1.09	2.41	0.22	1.63	2.76	8.11

Source: various sources

[3] Location Quotient is a means of quantifying how concentrated a particular industry is within a region compared to (in this instance) the state as a whole. A value above "1" means the industry is a "basic" industry, or one that is typically export-oriented, bringing money into the region.

Population Change

Change in population is but one indicator in marking the health of a region's economy. Population characteristics are also important drivers in affecting the demand for freight. Population change in the Northwest PA region could be characterized as being static, with no dramatic "boom and bust" cycles, or precipitous changes, overall. In fact, the region's estimated population of 233,000 today is not much more than what it was fifty years ago, when the 1960 US Census recorded the region's total population at 230,721. The region's overall population peaked in 1980, but has steadily declined by nearly 16,000 persons since then.

For the decade ending 2010, Forest County was the only county in the region to register an increase in total population, adding 2,770 persons since the 2000 Census. The increase however, was not enough to offset losses in the region's other four counties, which experienced a net decline of over 5,200 persons, overall. The gains in Forest County were due largely to the arrival of a new state prison, which opened in 2004.

Looking ahead, data from the long-term county economic and demographic projections firm of Woods & Poole indicate that the region's total population is expected to continue to decline to an estimated 231,840 persons by the 2040 Census. This translates into an expected decline of just 48 persons per year through 2040, illustrating the region's demographic stability.

Current estimates (July 2016) from the US Census place the region's population at 224,698, or a loss of 8,570 persons since the 2010 decennial census.

Table 4 provides more detail on historic and projected changes in the region's population by county, dating back to 1960.

Table 4: Historic and Projected Total Population, by County, 1960-2040

	Clarion	Crawford	Forest	Venango	Warren	Total	% Change
1960	37,403	77,956	4,485	65,295	45,582	230,721	
1970	38,414	81,342	4,926	62,353	47,682	234,717	-1.73%
1980	43,362	88,869	5,072	64,444	47,449	249,196	6.17%
1990	41,699	86,169	4,802	59,381	45,050	237,101	-4.85%
2000	41,765	90,366	4,946	57,565	43,863	238,505	0.59%
2010	39,988	88,765	7,716	54,984	41,815	233,268	-2.20%
2020	40,150	88,740	7,710	54,450	40,800	231,850	-0.61%
2030	40,420	89,030	7,870	54,370	40,230	231,920	0.03%
2040	40,680	89,260	8,020	54,260	39,620	231,840	-0.03%

Source: 1960-2010-US Census; 2020, 2030 and 2040-2013 Woods & Poole

Just as the region's total population is expected to remain steady over the next 25 years, it is also expected to continue to age. There has been a significant increase in the region's senior population, a

phenomenon which has continued from 1990 to the present. The total population age 65 and older is growing in the region and across Pennsylvania. With the oldest of the baby boomer generation turning 65 in 2010, the size of this age group is expected to increase in the region and across the state. According to 2013 Woods & Poole projections, Pennsylvania is expected to be ranked sixth in the nation for total share of population over 65 by 2040, at 23.1 percent.

The percentage of the population 65 and over in the Northwest PA region is higher than that of Pennsylvania overall according to the US Census for 2000 and 2010 and projected to continue through 2040. Every county in the Northwest PA region is expected to experience an increase in the percentage of its total population in this age group, with Venango and Warren Counties expecting the highest percentages by 2040 of 27.4 percent and 28.7 percent respectively. **Table 5** depicts the percent population age 65 and over in each county in the Northwest PA region and for Pennsylvania from 2000 to 2040.

Table 5: Percent Population Age 65 and over, 2000–40

	Clarion	Crawford	Forest	Venango	Warren	Pennsylvania
2000	16.0%	15.8%	19.0%	16.9%	17.4%	15.2%
2010	16.0%	16.2%	25.8%	17.6%	18.3%	15.5%
2020	19.9%	21.0%	21.8%	22.5%	23.5%	18.6%
2030	23.1%	25.2%	23.6%	27.8%	29.0%	22.6%
2040	23.3%	25.5%	25.4%	27.4%	29.6%	23.1%

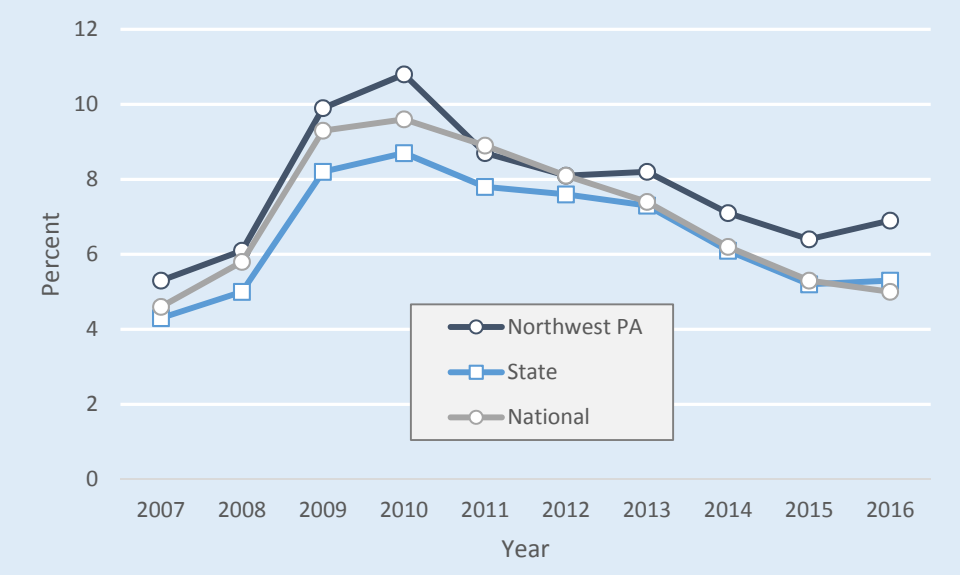
Source: 2000 and 2010-12 American Community Survey 5-year estimates Table S0101, 2020, 2030 and 2040-2013 Woods & Poole.

The growth of the region's senior population will have implications on the transportation system. These may include the need for planning for mature drivers, predictable construction zones, improved signing, access to public transportation and planning for autonomous and connected vehicles and other future technologies. More importantly for freight movement, as the region's population ages, a greater share of the region's population will be involved in wealth consumption (retirement) as opposed to wealth creation. This will involve changes in the level and composition of goods being hauled by the region's freight carriers.

Industry Structure of the Regional Economy

Regionally, participation in the labor force is estimated to be approximately 67,000. During 2009 and 2010, unemployment rates rose to double digits but have since eased to a rate of near 7 percent. The job losses regionally are attributed to the downturn in coal and transportation industries. One of these casualties involved Joy Global and its decision to close a plant in Franklin, laying off nearly 400 workers in 2016. **Figure 2** compares the region's unemployment rates with that of Pennsylvania and the nation as a whole.

Figure 2: Unemployment Rates, 2007-16



Source: US Bureau of Labor Statistics; US Census Bureau

The region's economy is built on small business. Eighty-four percent of the region's employers have fewer than 10 employees, and 94 percent have fewer than 100.[4] Data from the Bureau of Labor Statistics indicate that the region as a whole continues to decline in total employment. For the decade ending 2015, the region shed nearly 3,000 jobs, including 2,000 in the manufacturing sector and an additional 300 in the construction sector…two industries that are typically dependent on freight movement. Job losses within these two industries were offset to some extent by gains in other industries, including mining and oil/gas extraction, and information. Altogether, employment in freight-dependent industries (including wholesale, retail, manufacturing, and construction,) declined by nearly 2,700 over the past decade, as shown in **Table 6**.

Although manufacturing has been declining as an industry within in the region, it is still a significant employment sector, and a foundation of the regional economy, with nearly a quarter of the region's workers.

[4] Northwest Pennsylvania Comprehensive Economic Development Strategy (CEDS), 2016

Table 6: Change in Employment, by Industry, 2005-15

Industry	2005	2010	2015	Numeric Change 2005-15	Percent Change 2005-15
Overall	**79,227**	**77,843**	**76,358**	**(2,869)**	
Manufacturing	18,561	15,842	16,565	(1,996)	-11%
Health Care and Social Assistance	14,740	16,140	15,154	414	3%
Retail Trade	9,220	8,821	9,036	(184)	-2%
Accommodation and Food Services	6,452	6,211	6,098	(354)	-5%
Educational Services	5,752	5,784	4,854	(898)	-16%
Public Administration	3,815	3,428	3,284	(531)	-14%
Other Services (except Public Administration)	3,061	2,656	3,118	57	2%
Transportation and Warehousing	2,236	3,080	2,678	442	20%
Construction	2,925	2,650	2,631	(294)	-10%
Finance and Insurance	2,526	2,345	2,342	(184)	-7%
Administrative and Support and Waste Management and Remediation Services	1,886	2,063	2,184	298	16%
Wholesale Trade	1,920	1,673	1,735	(185)	-10%
Professional, Scientific, and Technical Services	1,698	1,636	1,569	(129)	-8%
Mining, Quarrying, and Oil and Gas Extraction	692	1,252	1,081	389	56%
Management of Companies and Enterprises	118	1,154	1,057	939	796%
Arts, Entertainment, and Recreation	1,294	883	780	(514)	-40%
Information	912	731	648	(264)	-29%
Agriculture, Forestry, Fishing and Hunting	390	424	577	187	48%
Utilities	464	583	550	86	19%

Source: U.S. Census Bureau, Center for Economic Studies, LEHD; https://ledextract.ces.census.gov/static/data.html

Major Employers

As noted previously, the most significant industries that dominate the region's employment picture include manufacturing, health care, retail trade, and accommodation/food services. Manufacturing is in fact the leading industry by employment in Crawford, Venango, and Warren Counties. Health care and social assistance leads all industries by employment in Clarion County. (Data is not available for Forest County.) The dominance of the manufacturing industry as an employer within Crawford County (28%) is easily seen in the listing of the region's major employers in **Table 7.** Within Clarion County, the influence of Clarion as a center for health care and retail is obvious. Warren County perhaps has the region's most diversified employer base, with a mix of manufacturing, retail trade, health care, and financial concerns.

Table 7: Major Employers, by County, March 2016

Clarion County	Crawford County	Forest County
PA State System of Higher Ed	Meadville Medical Center	State Government
Clarion Hospital	State Government	Cornell Abraxas Group So LLC
Wal-Mart	Crawford County	ITL LLC
Training Toward Self-Reliance	Crawford Central S.D.	Windsor, Inc.
State Government	Wal-Mart	Forest Area S.D.
New Light Inc.	Allegheny College	Pennsylvania General Energy
Riverview Intermediate Unit	Acutec Precision Machining	Federal Government
Clarion County	Penncrest School S.D.	Forest County
Redbank Valley S.D.	Ainsworth Pet Nutrition LLC	Joseph Muccio Transportation
Clarview Rest Home, Inc.	Wesbury United Methodist Comm	Taylor Diversion Programs, Inc.
Venango County	**Warren County**	
State Government	Blair Payroll LLC	
Joy Global Underground Mining	Warren County S.D.	
UPMC Northwest	Northwest Bank	
Venango County	State Government	
Wal-Mart	United Refining Company	
Liberty Electronics, Inc.	Warren General Hospital	
Franklin Area S.D.	Whirley Industries, Inc.	
Oil City Area S.D.	Rouse Estate	
Matric Limited	Wal-Mart	
Cranberry Area S.D.	Superior Tire & Rubber Corp.	

Source: Pennsylvania Department of Labor and Industry, PA Work Statistics

Location Quotient

Location Quotient is a metric used for measuring the relative strength of an area's economy in comparison with other areas. It compares an industry's share of employment at the local level to the industry's share of employment at the state level. As such, it is a measure of economic strength. According to economic base theory, industries with an employment share that exceeds the state

employment share have excess production – production that serves export markets. Because export activity injects new money into the local economy, these basic industries are considered "key drivers" of economic growth. **Table 8** demonstrates the strength of the region's economy by county, particularly in the manufacturing and oil and gas extraction sectors which are highly dependent upon the movement of freight. Hatching shown in the table is based upon each industry's location quotient within a particular county.

Table 8: Location Quotient, Counties Compared to Pennsylvania, 2015

Industry Sector	Clarion	Crawford	Forest	Venango	Warren	Region
Mining, Quarrying, and Oil and Gas Extraction	5.89	1.15	11.19	1.58	2.51	2.49
Manufacturing	1.15	2.62	0.97	2.27	1.84	2.11
Agriculture, Forestry, Fishing and Hunting	1.65	2.61	3.22	0.50	1.34	1.72
Public Administration	0.98	1.32	8.32	1.35	0.91	1.33
Other Services (except Public Administration)	1.32	1.21	0.38	1.09	0.98	1.14
Health Care and Social Assistance	1.24	1.06	1.33	1.22	1.07	1.14
Utilities	1.54	0.88	0.00	1.32	1.09	1.12
Retail Trade	1.19	0.94	0.48	1.14	1.03	1.04
Accommodation and Food Services	1.23	1.08	1.12	0.77	0.73	0.97
Educational Services	1.44	0.90	0.63	0.66	0.58	0.86
Transportation and Warehousing	0.54	0.40	0.63	0.97	1.75	0.82
Construction	1.35	0.70	0.78	0.62	0.53	0.76
Finance and Insurance	0.52	0.38	0.18	0.37	1.55	0.62
Wholesale Trade	0.65	0.52	0.39	0.72	0.43	0.57
Management of Companies and Enterprises	0.17	0.14	0.00	0.23	2.17	0.55
Information	0.49	0.64	0.20	0.49	0.39	0.52
Administrative and Support and Waste	0.30	0.54	0.09	0.66	0.45	0.51

Industry Sector	Clarion	Crawford	Forest	Venango	Warren	Region
Management and Remediation Services						
Arts, Entertainment, and Recreation	0.27	0.71	0.00	0.23	0.67	0.50
Real Estate and Rental and Leasing	0.49	0.45	**1.35**	0.64	0.24	0.48
Professional, Scientific, and Technical Services	0.26	0.33	0.10	0.47	0.28	0.34

Source: U.S. Census Bureau, Center for Economic Studies, LEHD; https://ledextract.ces.census.gov/static/data.html

Table Key:	< 1.0	**1.0 > x > 2.0**	**2.0 > x > 3.0**	**> 3.0**

Freight Infrastructure

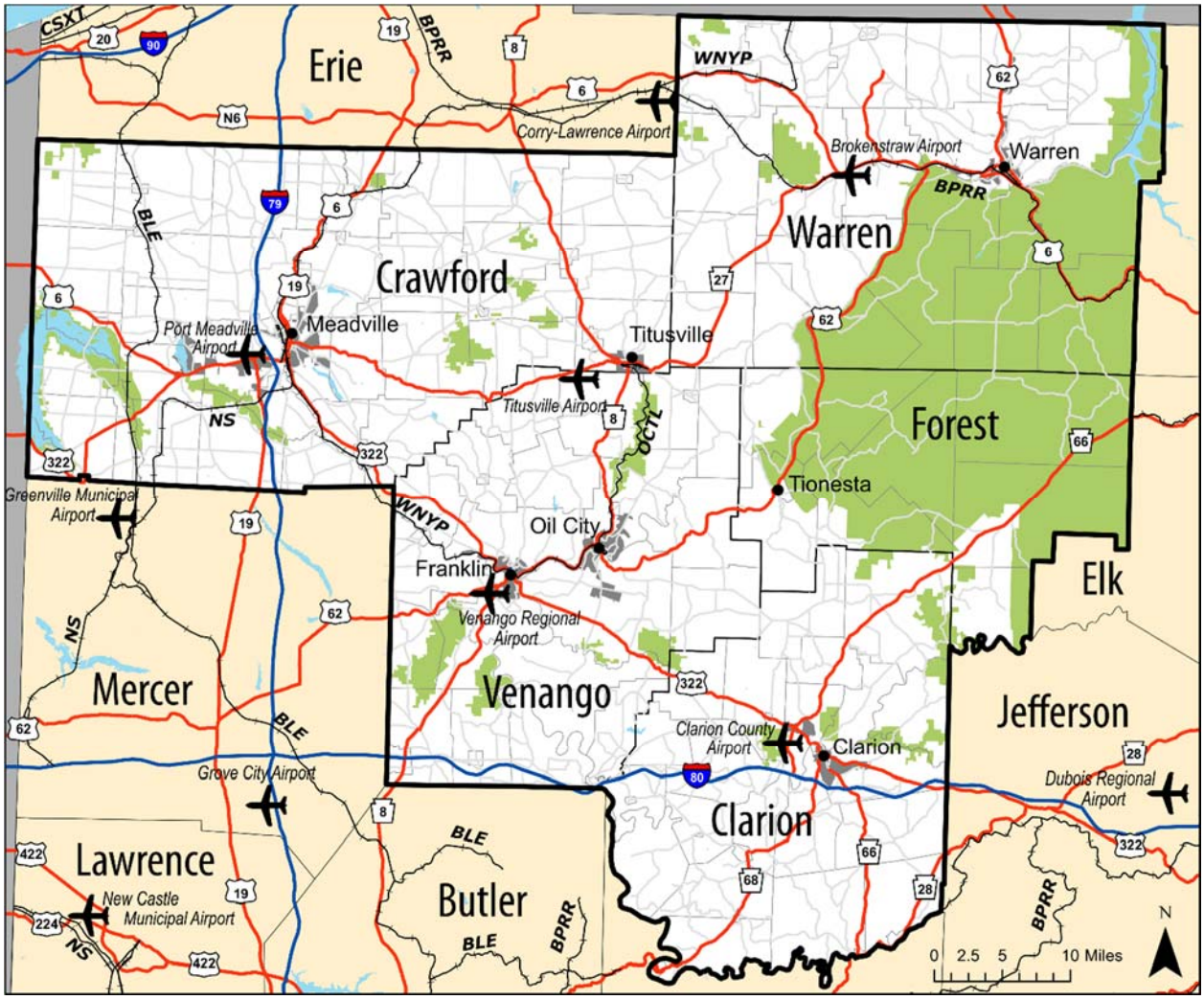
Northwest Pennsylvania's multimodal freight infrastructure includes a network of roadways that are both state- and locally-owned. It also includes a number of short line and regional railroads, and a commercial service airport in Venango Regional Airport.

The backbone of the region's freight system includes its 7,000-mile roadway network. These include nearly 70 miles of interstate highways (I-79 and I-80), and 313 miles of National Highway System (NHS) routes. The NHS facilitates the movement of 40 percent of the region's total travel demand. Of the region's total roadway network, only 1,635 miles (23%) are on the Federal-aid system. Important NHS routes include US 6, US 62, and US 322, among others.

Nearly 60 percent of the system is locally-owned, and 77 percent is not on the Federal-Aid System. Rail freight service is provided by a mix of rail carriers, including Class I, regional, and short lines. These include CN (Bessemer & Lake Erie), Norfolk Southern (NS), the Buffalo & Pittsburgh Railroad (B&P), the Western New York and Pennsylvania (WNY&P) Railroad and the Oil Creek and Titusville Lines (OCTL). Basic air cargo service is available at Venango Regional Airport in Franklin.

These freight assets are displayed in **Figure 3** and discussed in greater detail in the following section.

Figure 3: Northwest Pennsylvania Freight System Overview



Highway Networks

The Northwest RPO is responsible for over 2,600 linear miles of roadway. In addition, local governments maintain an extensive and growing network of roadways totaling over 4,000 linear miles. Altogether the region has just over 7,000 linear miles of roadway that accommodate more than 7.4 million daily vehicle miles of travel (DVMT). Approximately 1,638.7 miles, or 23 percent of the region's roadway network is Federal-aid eligible. With over 2,400 linear miles of roadway, Crawford County has the region's most expansive roadway network, and its 910 miles of state-owned roadway ranks eighth statewide in size.

Table 9 depicts the region's roadway mileage by ownership.

Table 9: Roadway Mileage by Ownership, 2015

County	PennDOT	Other Agencies	Local Municipal	Total Linear Miles
Clarion	468.93	11.35	944.59	1,424.87
Crawford	909.91	31.56	1,498.56	2,440.03
Forest	200.97	129.82	161.92	492.71
Venango	528.63	9.75	826.47	1,364.85
Warren	528.75	143.02	612.15	1,283.92
NW RPO	2,637.19	325.5	4,043.69	7,006.38

Source: PennDOT, Bureau of Planning and Research

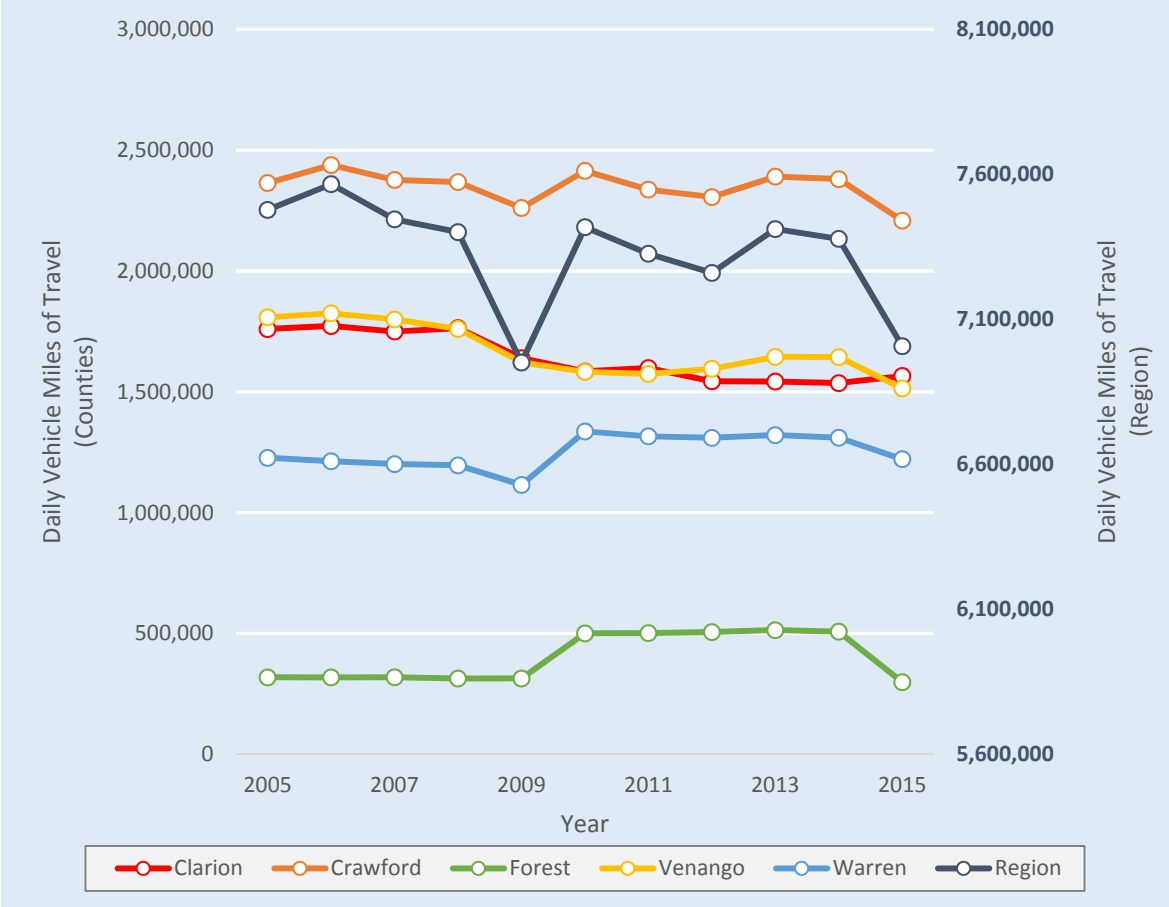
The region's roadways support an average of over 7 million vehicle miles of travel, daily. This is down from an historic peak of 7.56 million in 2006. The demand for travel within the region has been declining over the past decade, due to several factors. One is a decline in population overall, coupled with a growing share of senior population, an age group that tends to drive less. Another factor was the national recession and financial crisis of 2007-09, as well as the rise of e-commerce and internet shopping. The demand for travel naturally increased as the economy improved, but has since returned to levels last experienced during the economic downturn. The region's total truck share of DVMT is 3.6 percent. **Table 10** provides a snapshot of travel demand for 2015 by ownership, while **Figure 4** shows historic trends in travel demand for each county and the region overall.

Table 10: Daily Vehicle Miles of Travel (DVMT) by Ownership, 2015

County	PennDOT	Other Agencies	Local Municipal	Total DVMT
Clarion	1,388,716	29,658	146,999	1,565,373
Crawford	1,883,345	82,466	242,615	2,208,426
Forest	146,711	339,220	12,306	498,237
Venango	1,345,209	25,477	143,613	1,514,299
Warren	761,932	373,711	85,537	1,221,180
NW RPO	5,525,913	850,532	631,070	7,007,515

Source: PennDOT, Bureau of Planning and Research, Pub 600

Figure 4: Change in Regional Travel Demand, 2005-15

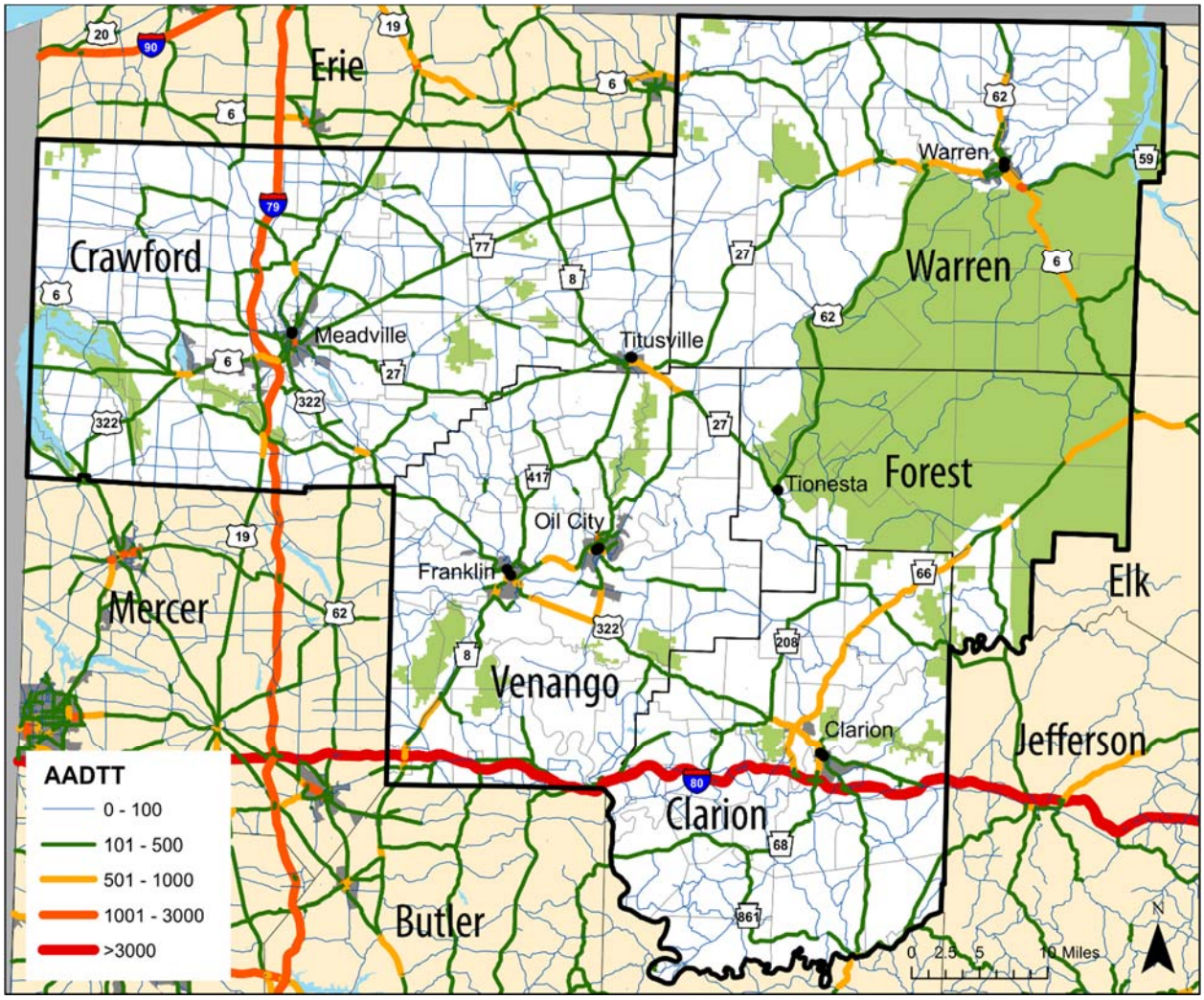


Source: PennDOT Bureau of Planning and Research

Truck traffic volumes vary widely across the region, largely according to the functional classification of the region's roadways. Heaviest truck volumes are naturally found on the region's interstates. Truck volumes are also notable on portions of the NHS, including US 322 in and around Clarion and Franklin, and US 6 in and around Meadville and Warren. Truck volumes are also notable on some non-NHS roadways, including PA 66 through Forest County, and PA 27 south of Titusville.

Figure 5 shows annual average daily truck traffic on the region's roadways.

Figure 5: Annual Average Daily Truck Traffic, 2016



Functional Classification

The RPO has been functionally classifying its roadways for many years. The use of networks in transportation planning has been performed by FHWA and its partners at the state and regional level at least since the Federal-aid Highway Act of 1973 required the practice for updating and modifying the Federal-aid highway system. PennDOT and the Northwest RPO have grouped the region's roadways into a hierarchy, according to the character of service they provide. Functional classification defines the role that any particular roadway should play in serving the movement of people and goods across the regional highway network.

Table 11 provides more information on the extent of the region's roadway network, by functional class, by county.

Table 11: Roadway Mileage by Functional Classification, 2015

County	Federal-aid Linear Miles					Non-Federal-Aid Linear Miles		Total Linear Miles
	Inter-state	Other Frwy/Expwy	Other Princ Arter	Minor Arter	Major Coll	Minor Coll	Local	
Clarion	28.1	0.0	38.3	126.0	64.6	127.5	1,040.3	1,424.9
Crawford	27.1	0.0	38.0	184.8	311.2	214.8	1,664.1	2,440.0
Forest	0.0	0.0	14.1	45.3	76.2	38.0	319.1	492.7
Venango	14.7	9.3	59.2	89.9	226.2	98.3	867.3	1,364.8
Warren	0.0	4.2	79.0	85.7	116.8	138.1	860.1	1,283.9
NW RPO	69.9	13.5	228.6	531.7	795.0	616.7	4,750.9	7,006.3

Source: PennDOT, Bureau of Planning and Research

National Highway System

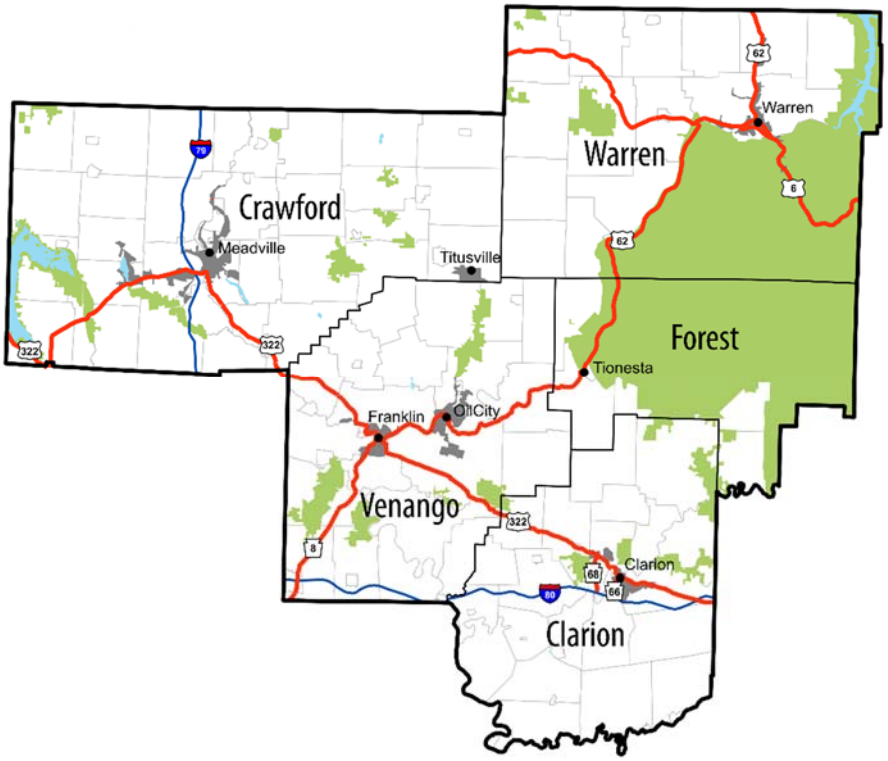
The region has 312.8 miles of roadway on the NHS. These include Interstate 79, Interstate 80, US 6, US 62, US 322, PA 28, PA 8, and PA 66 and PA 68 between Interstate 80 and US 322 in Clarion County. One of the hallmarks of MAP-21 included the expansion of the NHS network in October 2012. The Federal act expanded the NHS by eliminating the statutory mileage cap and including urban and rural principal arterials that were in existence at the time of the Act's passage. This system (referred to as the Enhanced NHS) is expected to focus Federal investment on a set of high priority routes. Unfortunately, the increase in NHS mileage in Pennsylvania did not increase the amount of the state's funding dedicated to the National Highway Performance Program (NHPP).

Within the Northwest PA region, the changes to the NHS effected only minor changes, and included the addition of only 15.3 miles to the network. Additions included a 3.5-mile segment of PA 66 between US 322 and Interstate 80; a 2.3-mile segment of PA 68 between US 322 and Interstate 80 in Clarion County; a 5-mile segment of US 322 in Crawford County; and a series of segments in the City of Warren, including portions of Business Route 6 (SR 6006), and Fifth Avenue.

PennDOT is currently conducting a Corridor Asset Management study of PA 8 south of Franklin. The study seeks to gather data and solicit input from which to make an informed recommendation on how best to economically manage a roadway corridor that meets the transportation needs of the region. The study area includes a 20.65-mile segment between SR 3003 to SR 3013 through the townships of Irwin, Sandy Creek, and Victory. The study will be completed in early 2018.

The interstates traversing the Northwest PA region entail just 1 percent of the region's total roadway mileage, yet accommodate nearly 22 percent of the region's total demand for travel. The numbers for the NHS are 4.4 percent, and 40 percent, respectively. These numbers illustrate the strategic importance of these higher-order roadways toward the movement of freight across the system. **Figure 6** illustrates the extent of the NHS across the Northwest PA region.

Figure 6: National Highway System



Interstate Management

Beginning with the creation of the 2007 TYP, PennDOT assumed responsibility as the lead planning agency for the Pennsylvania interstate system in cooperation with the planning partners. The approach is consistent with PennDOT's philosophy of managing Pennsylvania's Interstate System as a single, statewide asset.

Within the Northwest Commission region, this entails 70 linear miles of roadway through Clarion, Crawford, and Venango Counties in the form of Interstate 79 and 80. Despite the interstates' limited mileage, they carry 1,594,119 DVMT, or over a fifth (21.5%) of all the region's traffic. Projects on the interstates are managed on a separate Interstate Management TIP and funds are programmed centrally. The priority for the Interstate Management Program is for system preservation. PennDOT notifies the Northwest Commission of any TIP amendments and modifications, even though formal approval is not required. Within the region, PennDOT has programmed $126 million in system preservation projects on the interstates as part of the 2017 Program.

Priority Freight Networks

One of the early key initiatives of the FAST Act was the expansion of a proposed priority freight network that was originally suggested under MAP-21. The FAST Act's predecessor had designated 27,000 centerline miles nationwide to be considered as a Primary Freight Network (PFN). The PFN however was

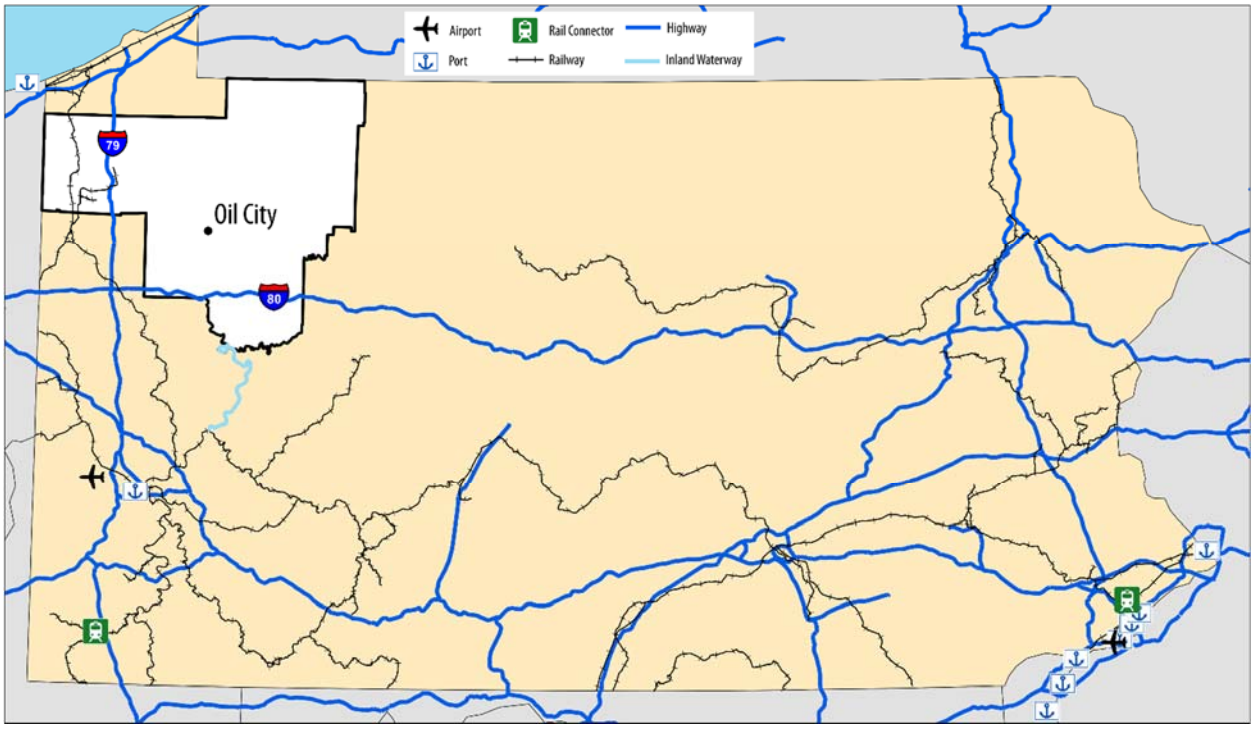
inadequate in that it did not entail enough roadway mileage to achieve a contiguous network, and that it was designated as "highway-only" and thus not multimodal in scope.

The region's Interstates carry over 20% of all the region's traffic.

In October 2015, USDOT released a draft Multimodal Freight Network (MFN) as part of its draft National Freight Strategic Plan. This updated network addressed the deficiencies of the PFN by identifying 65,000 centerline miles of road, more than 28 percent of the National Highway System (NHS) and approximately 1.6 percent of the nation's total public road mileage; 49,900 route miles of railways, including 35 percent of the nation's rail route miles; 78 ports that accounted for approximately 90 percent of total (2013) U.S. tonnage; and 56 airports that accounted for approximately 90 percent by weight of the nation's landed cargo in 2013.

Sometime during 2017, the USDOT is expected to designate a final National Multimodal Freight Network (NMFN). The NMFN is composed of several elements, as described in the following points, and shown in **Figure 7** and **Figure 8**. The figure shows the primary connections the region has to this national priority freight network, including Interstate 79; Interstate 80; the Canadian National/Bessemer & Lake Erie rail line through Crawford County; the NS rail line from Meadville to Sharon/Ferrona; and the NS line connecting the Meadville Line to JM Eagle and PGW Auto Glass.

Figure 7: Northwest PA Position on the National Multimodal Freight Network (NMFN)



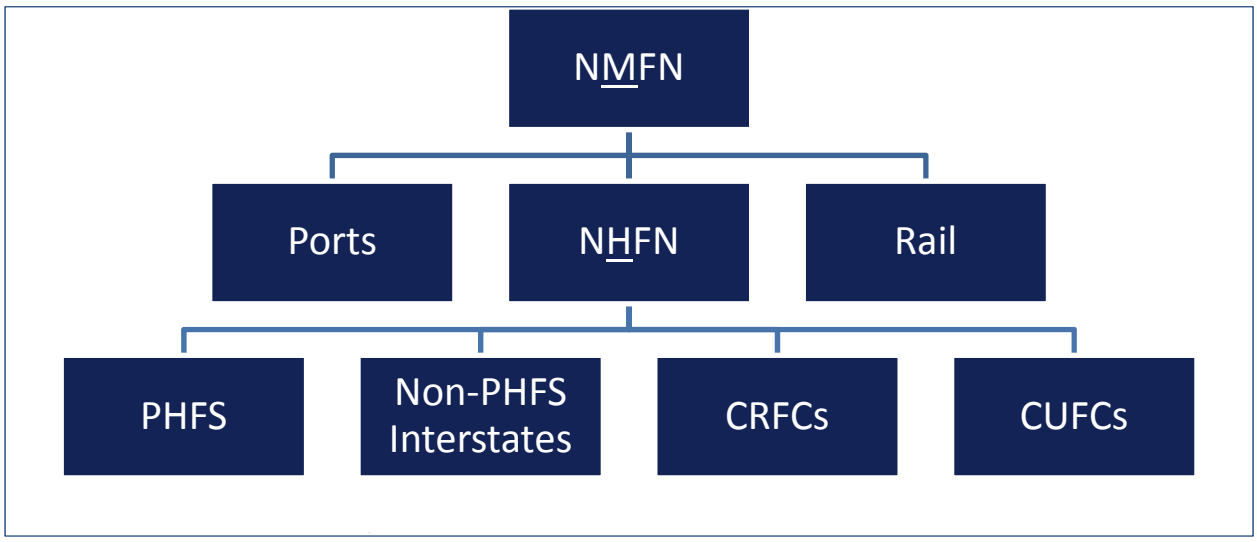
Source: U.S. Department of Transportation

National Multimodal Freight Network (NMFN) – Improves on the original PFN of MAP-21 by becoming more expansive, and multimodal in scope. It includes all the freight networks described below.

- **National Highway Freight Network (NHFN)** – This network is 51,029 miles in size, nationwide. Total mileage will fluctuate, as new Interstates are added to the system, and thus automatically become part of the network. The NHFN consists of the following four subsystems:
    - **Primary Highway Freight System (PHFS)** – this network is 41,518 miles in length, nationwide. Within the Northwest region, this network includes Interstate 80.
    - **Portions of Interstates not on the PHFS** – Within Pennsylvania, this includes routes such as Interstate 79 in its entirety, and Interstate 83 between the City of York and the Maryland State Line. Interstate 79 in fact is the only such corridor within the Northwest region on this network.
    - **Critical Urban Freight Corridors (CUFCs) –** These priority freight segments typically consist of first- or last-mile connector routes from high-volume freight corridors to freight-intensive land and key urban freight facilities. They must lie within an urbanized area, or urban cluster as defined by the Census Bureau. USDOT has capped Pennsylvania's share of these priority segments to 141.26 miles. Since the region does not have a population exceeding 500,000, there are no such segments within the region.
    - **Critical Rural Freight Corridors (CRFCs)** – Priority freight segments classified as CRFCs lie outside of an urbanized area and satisfy one of seven or more criteria as defined by USDOT. As the Northwest RPO considered which segments for this designation, it considered public roads that provide immediate links as first- and last-mile freight corridors to key rural freight facilities, including manufacturing centers, agricultural processing centers, farms, and intermodal facilities. The Northwest Commission, in consultation with PennDOT, identified over 40 miles of candidate CFRCs to the network. The eventual certification of CUFCs and CRFCs by USDOT makes them eligible for Federal NHFP formula funds and FASTLANE Grant Program funds. FHWA has instituted a mileage cap of 282 miles as Pennsylvania's share of this priority freight network.

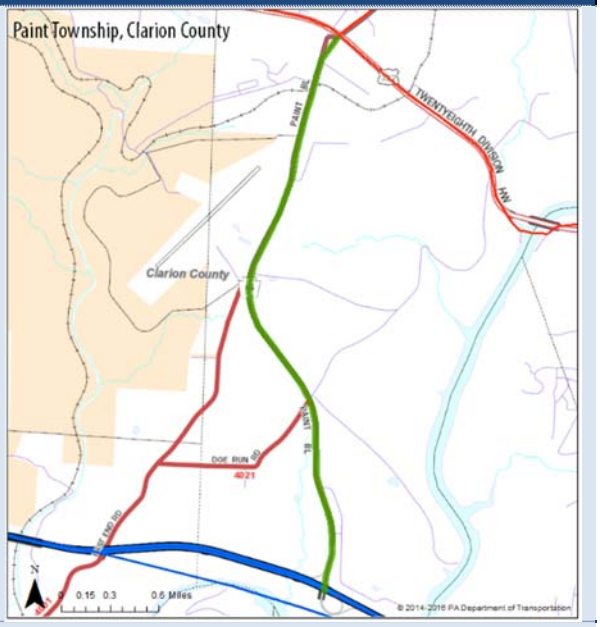
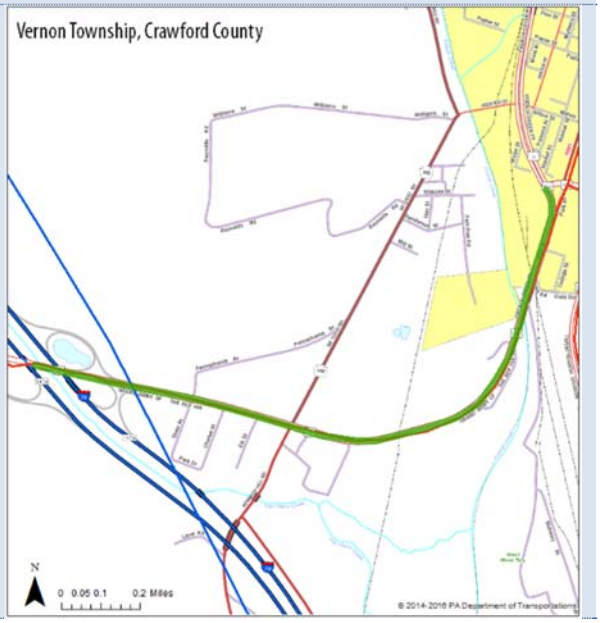
The relationship of the various subsystems within the National Multimodal Freight Network is illustrated in the accompanying figure.

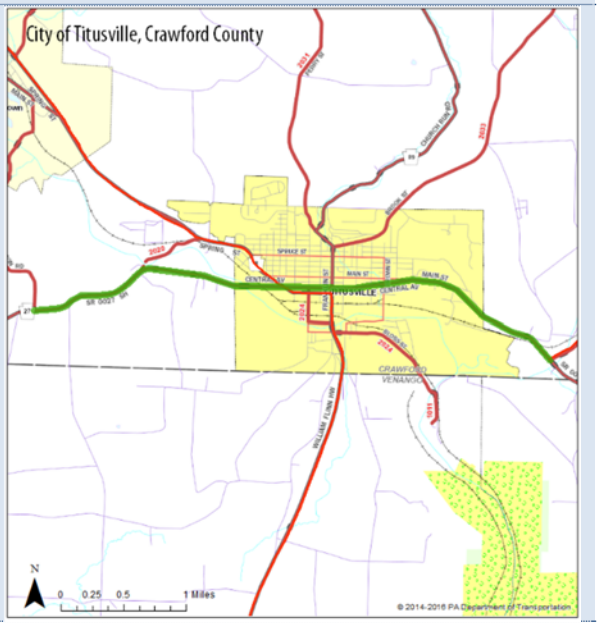
Figure 8: The National Multimodal Freight Network and Related Subsystems

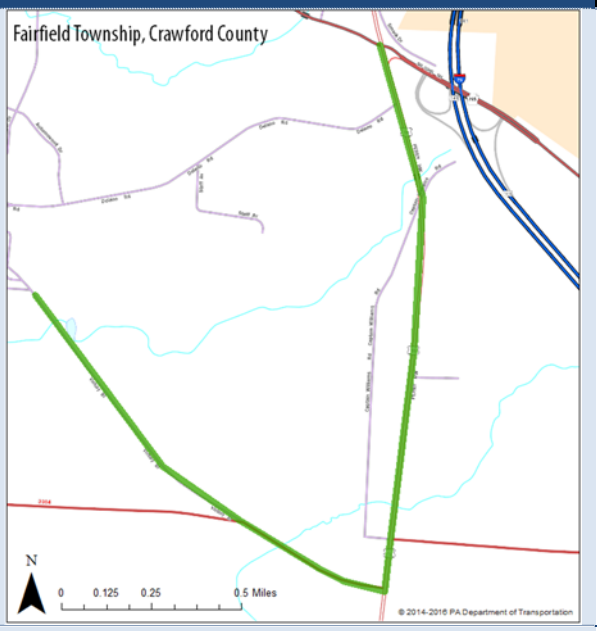
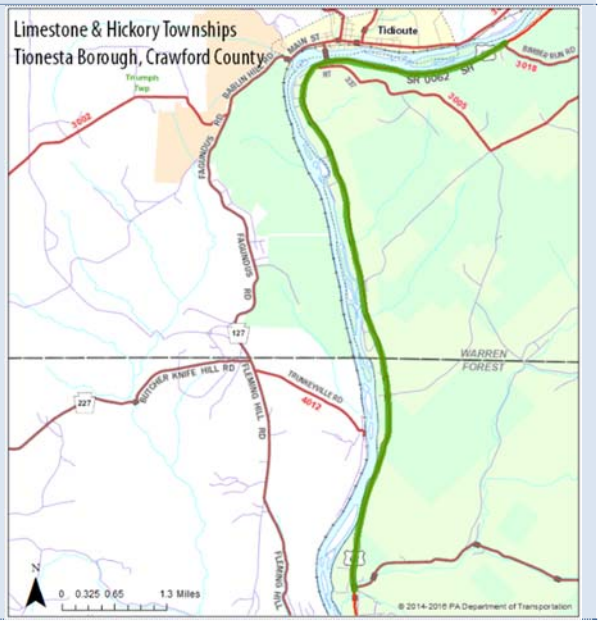


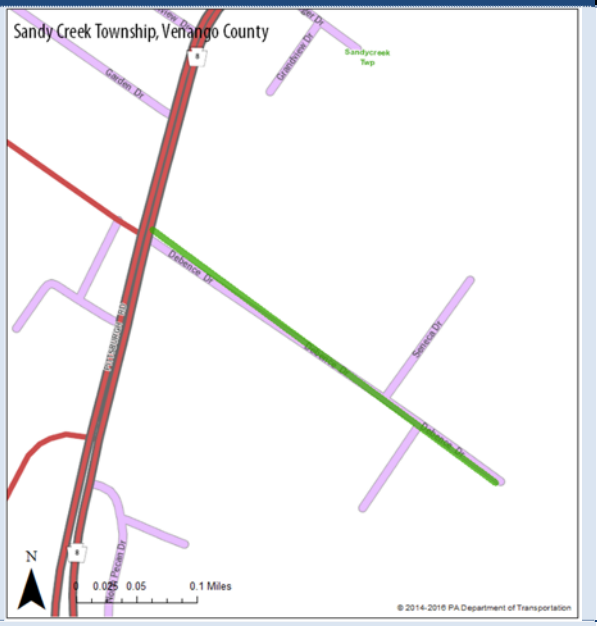
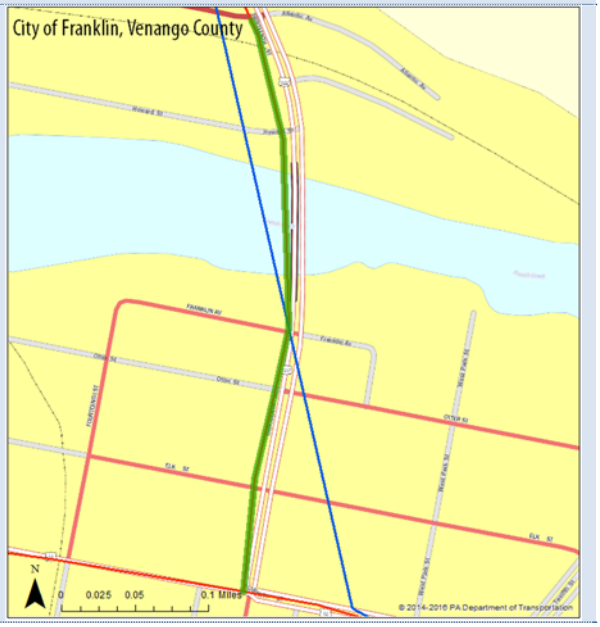
The Northwest Commission's candidate Critical Rural Freight Corridors are depicted in **Table 12**.

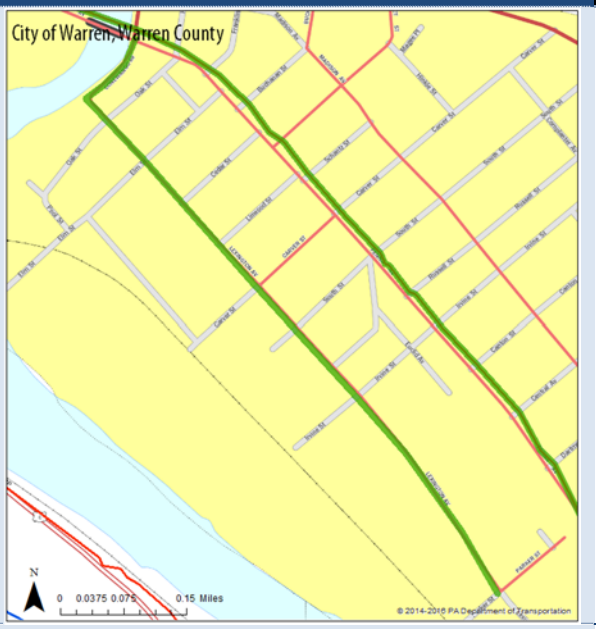
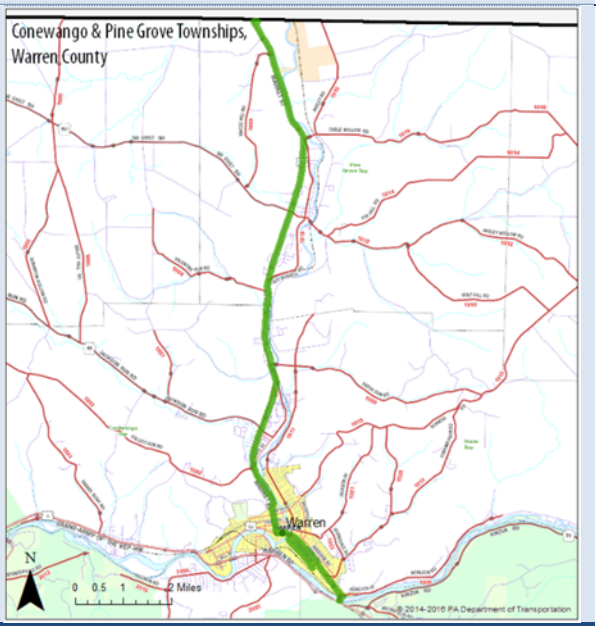
Table 12: Candidate Critical Rural Freight Corridor Segments

Candidate Critical Rural Freight Corridor Segment	Location
County: Clarion (H) **Municipality:** Paint Township **Roadway:** PA 66 **Limits:** I-80 to US 322 **Mileage:** 3.7 **Justification:** Corridor is an NHS route that is heavily traveled by pre-manufactured housing concern; Corridor also features the Clarion County Airport.	
County: Crawford (H) **Municipality:** Vernon Township **Roadway:** US 6/US 19 **Limits:** I-79 to US 19 at Terrace St. **Mileage:** 3.17 **Justification**: Route connects a majority of the Meadville area's industrial uses, including major shippers Akron Products, Tapco Tube Co., Channellock Inc., to I-79.	

Candidate Critical Rural Freight Corridor Segment	Location
County: Crawford (M) **Municipality:** Hayfield Township **Roadway:** PA 198 **Limits:** I-79 to US 6 **Mileage:** 3.0 **Justification:** This is a designated truck route into Saegertown, which features two S-curves, which slows truck traffic. Connects Greenleaf Corp., MVS Saegertown, LORD Corp., Saegertown Beverages, to I-79. A roundabout is currently under construction at the corridor's intersection with Main Street.	
County: Crawford (H) **Municipality:** City of Titusville **Roadway:** PA 27 **Limits:** SR 2029 to SR 2028 **Mileage:** 4.5 **Justification:** Major shippers: Charter Plastics, Titusville Dairy, Universal Stainless, Int'l Waxes, Baillie Lumber Co.	

Candidate Critical Rural Freight Corridor Segment	Location
County: Crawford (L) **Municipality:** Fairfield Township **Roadway:** SR 3004 and US-19 **Limits:** PA 385 to the terminus **Mileage:** 2.84 **Justification:** Connects industrial park with I-79.	
County: Forest/Warren (H) **Municipality:** Limestone and Hickory Townships and Tionesta Borough **Roadway:** US 62 **Limits:** SR 3018 to PA 666 **Mileage:** 9.32 **Justification:** Corridor serves energy exploration traffic and runs from Tidioute to Tionesta. It serves Tidioute Oil Co.; Industrial Timber and Lumber Co. and carries greater than 25% truck traffic.	

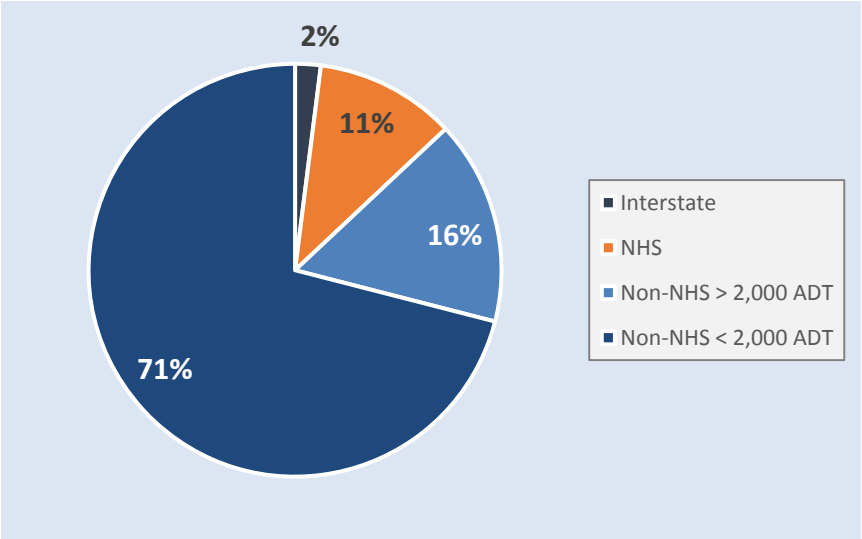
Candidate Critical Rural Freight Corridor Segment	Location
County: Venango (L) **Municipality:** Sandy Creek Township **Roadway:** Debence Dr. **Limits:** PA 8 to the terminus **Mileage:** 0.35 **Justification:** To Sandycreek Industrial Park; FedEx	
County: Venango (H) **Municipality:** City of Franklin **Roadway:** US 322/Grant St. **Limits:** US 62 to SR 4004 (Atlantic Ave.) **Mileage:** 1.75 **Justification:** Corridor is heavily traveled by truck traffic that has exited the interstates and is traveling to/from local destinations (e.g., Engles Trucking, Klapec Trucking, etc.)	

Candidate Critical Rural Freight Corridor Segment	Location
County: Warren (H) **Municipality:** City of Warren **Roadway:** Lexington Ave. **Limits:** Pennsylvania Ave. to Parker St. **Mileage:** 0.84 **Justification:** United Refining Co. and Osram Sylvania within one of the top 100 freight generating locations in the state. Includes Parker, Marion, South, and Carver Streets.	
County: Warren (M) **Municipality:** Conewango and Pine Grove Townships **Roadway:** Debence Dr. **Limits:** New York state line to the terminus **Mileage:** 11.5 **Justification:** Warren County's primary connection to I-86.	

Pavement Condition

Figure 9 shows how the region's roadways are organized across PennDOT's major business plan networks: Interstates; the National Highway System (NHS); non-NHS with greater than 2,000 ADT; and non-NHS with less than 2,000 ADT. The figure shows that the Interstates comprise a minute portion of the overall system, compared to the NHS and non-NHS roadways.

Figure 9: Segment Miles by Business Plan Network, 2015



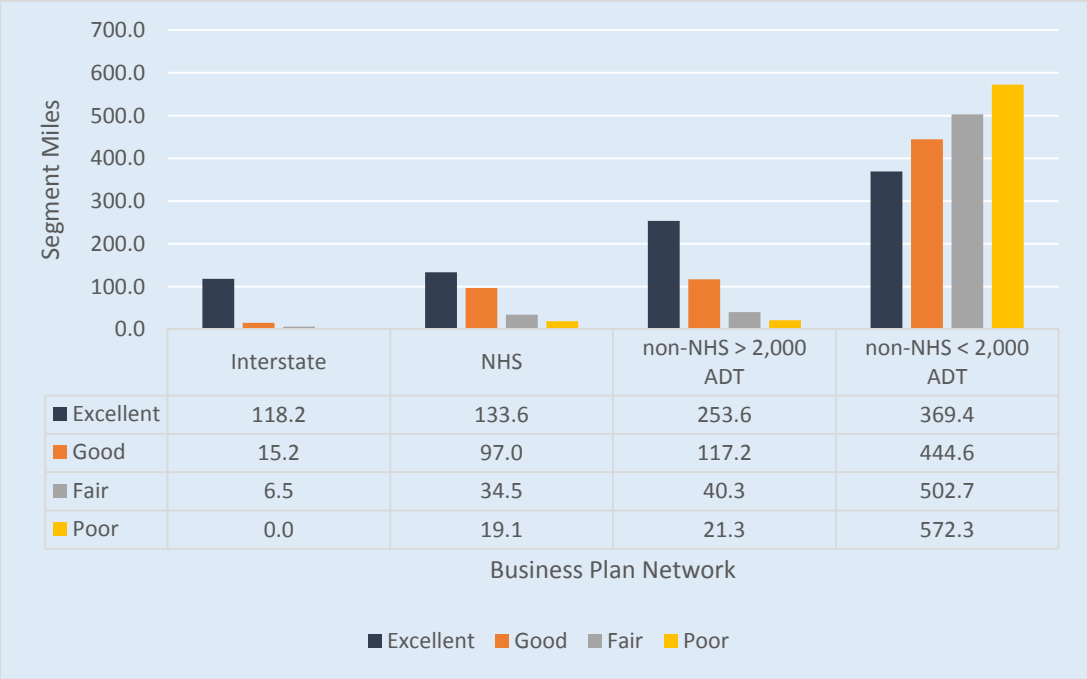
Source: PennDOT

PennDOT and the Northwest PA RPO analyze pavement needs in different ways, including International Roughness Index (IRI), which indicates the level of roughness on a roadway (a lower number indicates a better score). **Figure 10** shows a snapshot of the region's existing pavement conditions, by business plan network. The figure demonstrates that PennDOT and the Northwest RPO have driven down IRI values on its most important, higher-order networks such as its Interstates and NHS Non-Interstates that carry the most freight. **Table 13** depicts how IRI values are classified among the networks on the NHS.

Table 13: Rating Pavement Conditions

IRI Ranges (inches per Mile)	National Highway System	
	Interstate	Non-Interstate
< 70	Excellent	Excellent
71-75	Good	
76-100		Good
101-120	Fair	
121-150		Fair
151-170	Poor	
171-195		Poor
196-220		
> 220		

Figure 10: Pavement Condition (IRI Ratings) by Business Plan Network, 2016



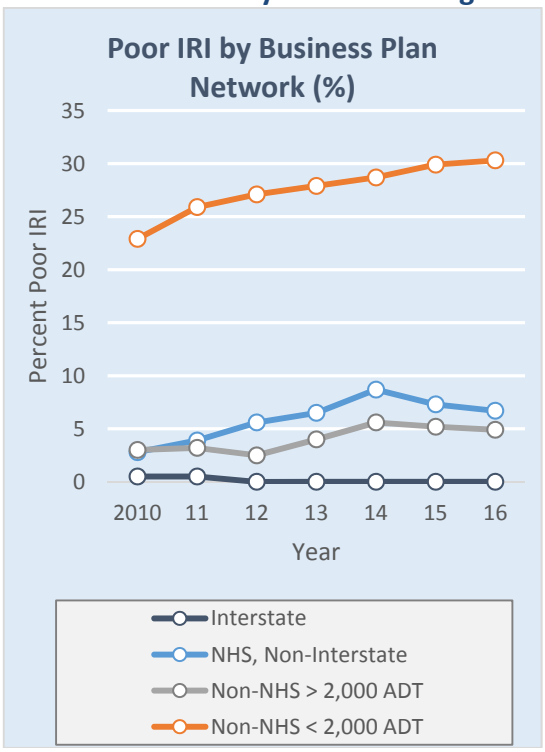
Source: PennDOT

Trends in IRI values have varied across the system in recent years, but in general have been increasing, signaling a decline in overall pavement quality. IRI values on the region's interstates however have improved to the point to where there are currently no segment miles of Interstate with IRI values considered as "Poor," a condition PennDOT has been able to maintain for several years. Pavement conditions on the other three business plan networks however have generally been declining over the past five years, as exhibited by the rising IRI values shown in **Figure 11**. The figure demonstrates that, while pavement quality has been worsening within the Northwest PA region, it compares favorably with statewide trends, when measured as a percentage of "Poor" IRI values.

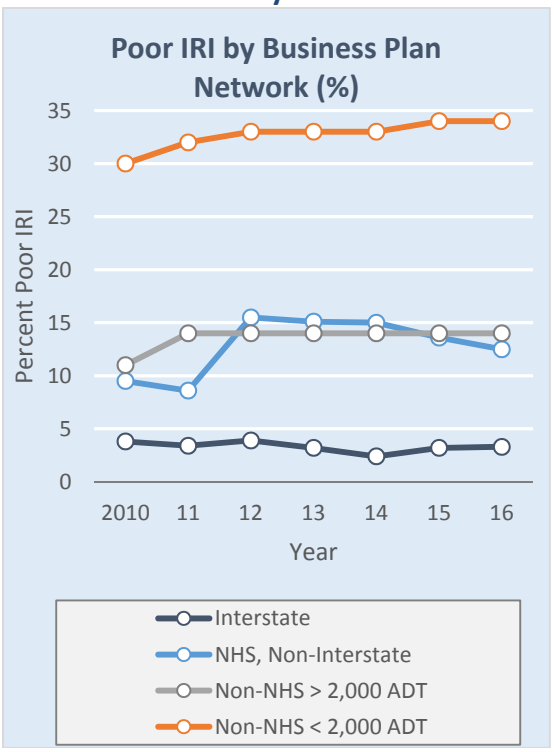
Some of the decline in IRI values for the NHS, Non-Interstate network could be attributed to the expansion of the NHS, as described on page 47.

Figure 11: "Poor" IRI Ratings by Business Plan Network, 2010-16 (%)

Northwest Pennsylvania RPO Region

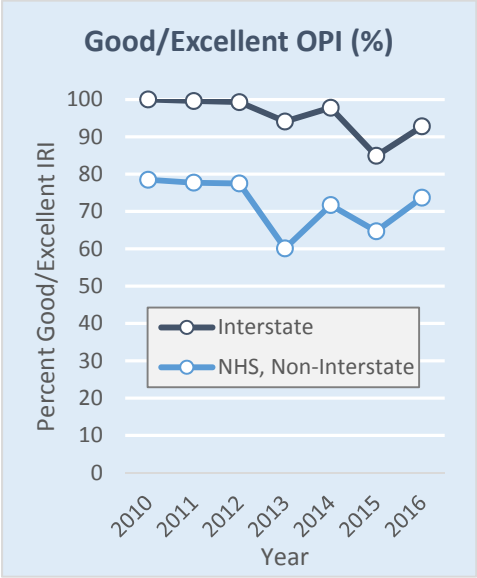


Pennsylvania



Source: PennDOT Performance Measure Reports

OPI values, or Overall Pavement Index, have also been declining in recent years. "Good" and "Excellent" OPI values on the region's highest-order roadways, such as its interstates and Non-Interstate NHS routes (e.g., US 62, US 322, etc.) have been declining since their 2010 baseline was established. The percentage of the region's Interstate segments rated as "Good" or Excellent" has fallen from a 2010 value of 100 percent, to a 2015 rate of 85 percent. Likewise, values of NHS Non-Interstate route segments have fallen over the same time period, from 79 percent, to just under 65 percent.



Posted and Bonded Roadways

Many of the region's older secondary and rural roads were not designed to support the weight they presently carry. This issue has been exacerbated in recent years by the arrival of the natural gas extraction industry. This industry relies on this network for the delivery of drilling equipment, which is often oversize/overweight; and water, sand, and manpower to the well sites. The industry has created not only an enormous increase in

truck traffic volumes overall, but it has also introduced new demands on local roadways that were not originally designed to sustain the level of demand being placed on them. While industry activity within the region has subsided from levels experienced just a few years ago, fluctuations in energy prices could usher in renewed increases in demand. The region's CEDS plan encourages planners to prepare for the ongoing development of the Marcellus, Utica, and Barnett shale gas industry.

Throughout Pennsylvania, there are nearly 11,000 miles of posted and bonded roadways. Posted and bonded roadways are primarily 4-digit numbered state routes, but may also include numbered state routes (e.g., PA 8, PA 198, etc.). The risk of damage to state roadways is not as severe, as they are generally built to more stringent design standards. The Commonwealth has moved to mitigate ongoing damage to state-owned secondary roads through its posted and bonded program, making heavy truck carriers responsible for the excess maintenance on the highways they use. When a roadway is to be used by heavy truck traffic, PennDOT conducts a study to determine if the road can accommodate the expected traffic demand. The first step in enacting a weight restriction is to complete an engineering study and traffic study and to examine the existing roadway conditions, including the pavement structure, to determine if a roadway should be posted. If PennDOT sets a weight limit on a roadway, anyone who intends to exceed that limit must then apply for a heavy hauling permit after entering into an agreement to pay for any "excess maintenance" work that would be required. PennDOT then continuously monitors conditions of the roadway to ensure repairs are timely and properly completed.

Bonding is required to ensure that if a hauler does cause damage, but does not complete proper repairs, the Commonwealth has the ability to use the bond security to make the needed repairs itself.

Table 14 depicts the total mileage of posted and bonded roadways in each county within the Northwest region. Illustrating the presence and impact of the gas extraction and similar industries operating within the region, Northwest has only 5.8 percent of the state's total roadway mileage, but nearly 14 percent of its posted and bonded roadways. Within the region itself, nearly 60 percent of its state-owned roadway network is posted.

Table 14: Posted and Bonded Roadways, January 2017

	Total Posted and Bonded Miles	Total State-owned Linear Miles	Share of State-owned Roads Posted	Overall Share of Region's Posted Roads
Clarion	262.58	468.93	56.0%	17.2%
Crawford	522.38	909.91	57.4%	34.2%
Forest	140.76	200.97	70.0%	9.2%
Venango	271.46	528.63	51.4%	17.8%
Warren	329.75	528.75	62.3%	21.6%
TOTAL	1,526.93	2,637.19	57.9%	n/a

Source: PennDOT BOMO

Figure 12 illustrates the extent of the region's posted and bonded roadways. An increase in the number of posted and bonded roadways forces the use of circuitous routes, adding to the cost of freight movement. Many of these roadways are not scheduled for reconstruction for many years.

Figure 12: Posted and Bonded Roadways, January 2017

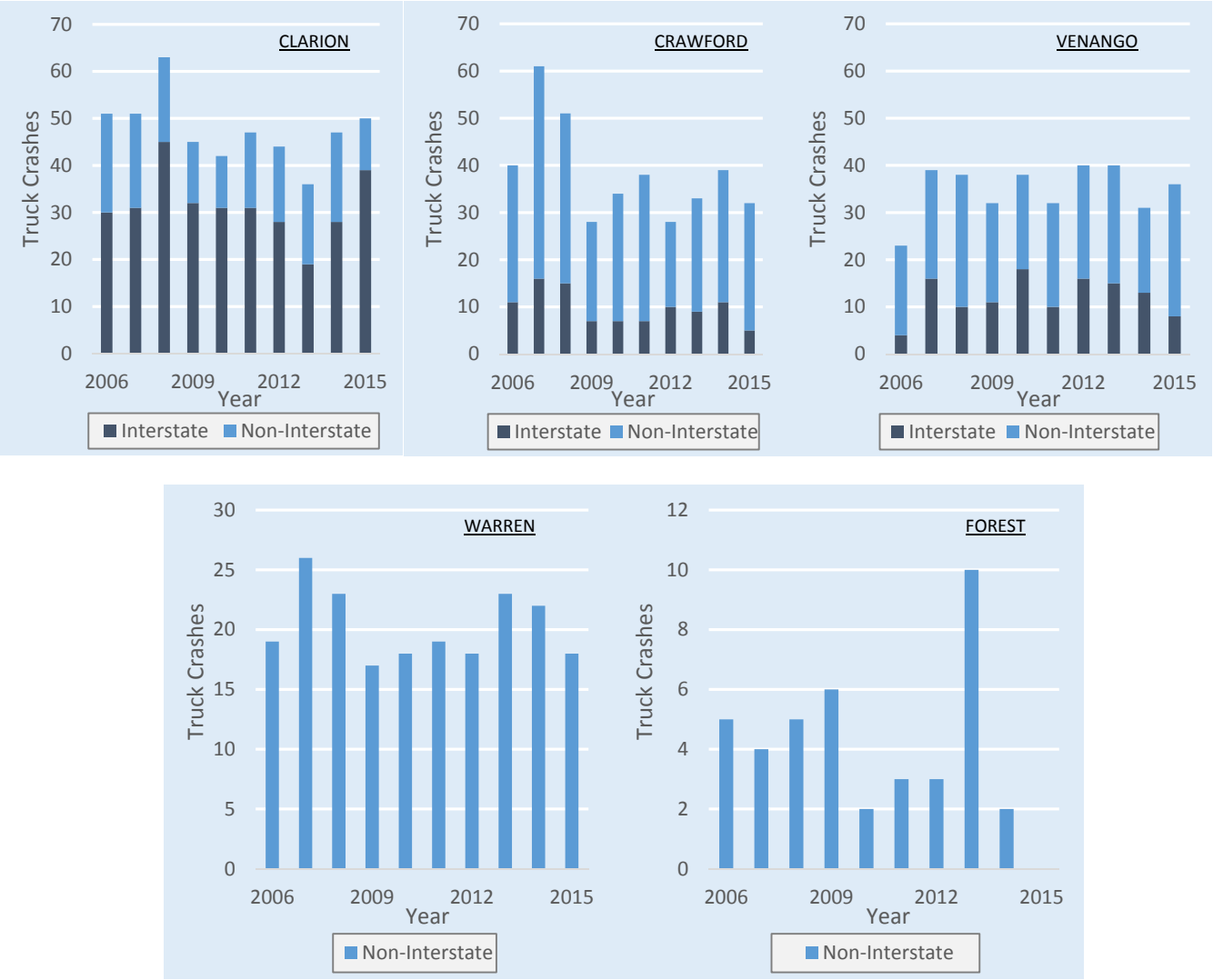
Highway Safety

The total number of truck crashes occurring within the region has remained somewhat constant over time. For the decade ending 2015, the region averaged 145 truck crashes per year. Clarion County historically leads the region in the total number of truck crashes, averaging 48 a year over the past decade. Nearly two-thirds of all truck crashes in Clarion County occur on Interstate 80. In Venango County, the figure is closer to one-third, while in Crawford County, nearly 25 percent of all truck crashes occur on Interstate 79. The overall regional trend has been one of a decline in total truck crashes. **Figure 13** shows truck crash trends in each county over the past decade.

Average Annual Truck Crashes
2006-15

Clarion	48
Crawford	38
Forest	4
Venango	35
Warren	20

Figure 13: Truck Crashes, 2006-15

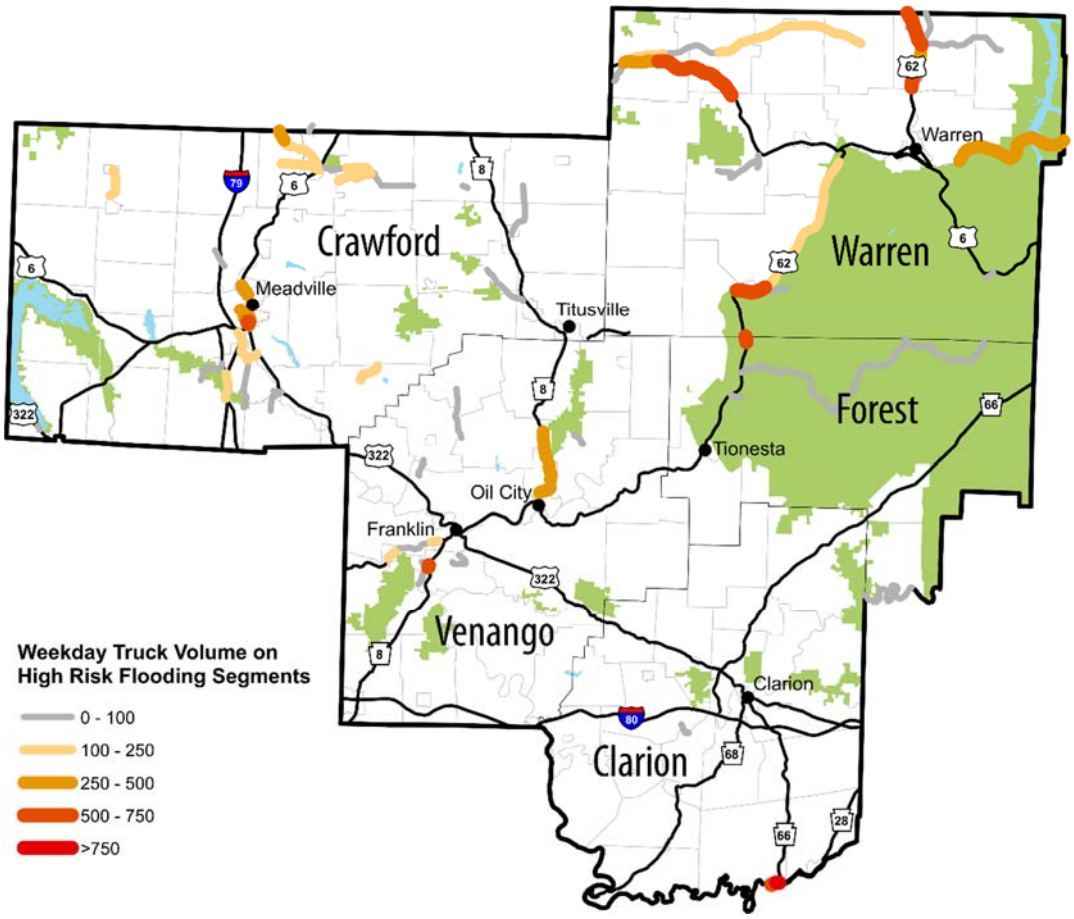


Source: PennDOT

Resiliency

PennDOT has recently completed an Extreme Weather Vulnerability Study to identify historic flooding locations on state-owned roads and bridges. The study used PennDOT's Road Conditions Reporting System (RCRS) and collected stakeholder comments representing more than 3,000 miles of vulnerable roadway segments statewide. This data was combined with truck volumes from PennDOT's Roadway Management System (RMS) and used to develop maps highlighting the locations of flooding vulnerabilities within the Northwest PA region. **Figure 14** provides color coding of each flooding location by the number of trucks travelling at that location.

Figure 14: Weekday Truck Volumes on High Risk Flooding Segments

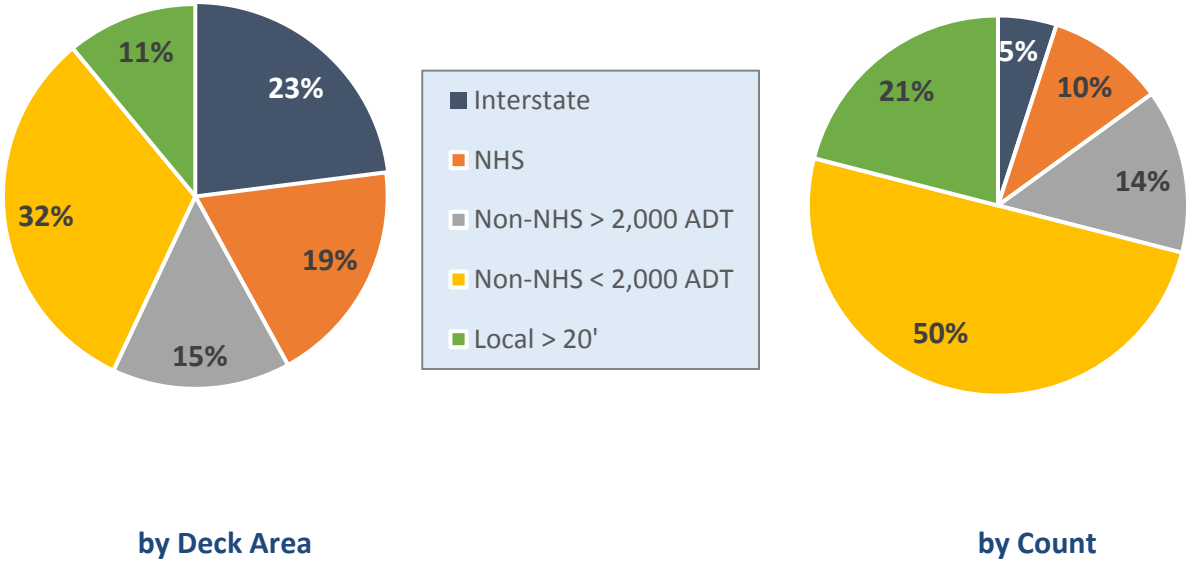


Bridges

There are nearly 1,275 state-owned bridges greater than 8 feet in length throughout the Northwest region. An additional 342 are locally-owned bridges greater than 20 feet in length. All of these bridges are tracked within PennDOT's Bridge Management System (BMS). The RPO has performed work in recent years to collect information on the region's locally-owned bridge stock, but the collective condition of these structures is not fully known.

Figure 15 shows how the region's bridges are arrayed across PennDOT's five major business plan networks: Interstates; the National Highway System (NHS); non-NHS with greater than 2,000 ADT; non-NHS with less than 2,000 ADT; and the Local system. The region's largest bridges are on the Interstate system, as only 5 percent of the region's bridges are Interstate bridges, yet they comprise nearly a quarter of all bridge deck area. Conversely, the bridges on the region's lower-order roadways tend to be shorter and more numerous, as indicated in the following figures.

Figure 15: Bridges by Business Plan Network, by Deck Area, and Count, December 2016 (%)

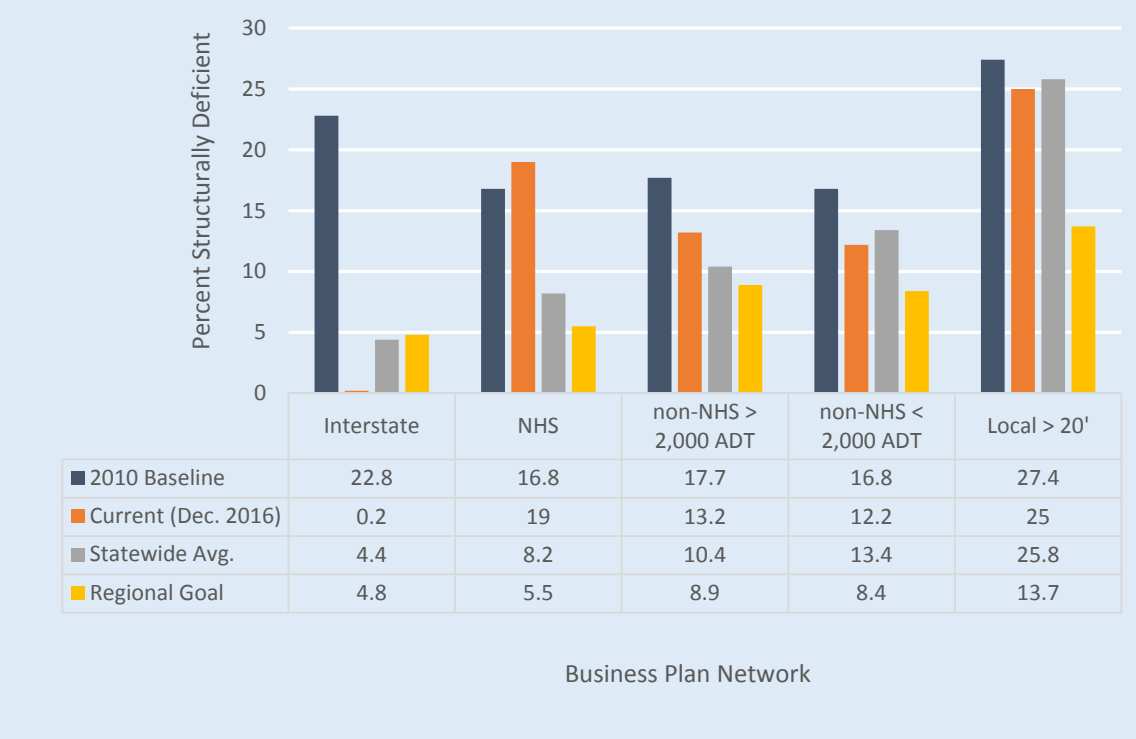


by Deck Area **by Count**

Figure 16 demonstrates the good work that PennDOT and the RPO have done over the past six years in maintaining the region's bridge inventory at an acceptable operating condition. The figure shows how bridge conditions have changed across the business plan networks since the 2010 base year. SD bridges on the region's Interstates are now almost completely addressed, with only 2,500 square feet of deck area remaining. Rates of SD bridges have also improved across the state's lower order networks and on the local system. With the exception of its Interstates, the region has yet to achieve its targets for SD ratings.

SD rates have increased on the NHS by virtue of a redefinition of that network via MAP-21. The previous Federal surface authorization law re-designated all principal arterials as part of the National Highway System, which became known as the "Enhanced NHS." The re-designation affected the region's numbers, which is evident in the accompanying figure.

Figure 16: Structural Deficiency by Business Plan Network, by Deck Area, December 2016 (%)



Source: PennDOT Bureau of Planning and Research

Table 15 provides more detailed information on the region's bridge conditions, by business plan network.

Table 15: Bridge Performance by Business Plan Network, December 2016

	Total Bridge Count	Total Deck Area (MSF)	Closed Bridges	Posted Bridges	SD Count	%SD Count	%SD Deck Area
State >8'; Interstate/Ramps	88	1.0533	0	0	2	2.2%	0.24%
State >8'; NHS (non-Interstate)	162	0.8521	0	0	15	9.2%	19.0%
State >8'; non-NHS > 2,000 ADT	220	0.6674	0	1	33	15.0%	13.2%
State >8'; non-NHS < 2,000 ADT	801	1.4391	1	11	95	11.9%	12.2%
Total – State Bridges (>8')	1,271	4.0119	1	12	145	11.4%	10.7%
Local > 20'	341	0.5022	8	108	132	38.7%	25.0%

Source: PennDOT Bureau of Planning and Research

Note: Data includes adjustments for MAP-21 Enhanced NHS. Local bridges on the Enhanced NHS are reported with Locally Owned Bridges.

Shown another way, **Table 16** depicts the region's bridge condition by county, as opposed to business plan network. Forest County has only 76 state-owned bridges, fewer than all but one other county in Pennsylvania (Cameron). Given in part to their small bridge population, these two counties are the only ones in the state to have their share of state-owned bridge deck area exceeding 20 percent SD. At just 4.6 percent, Clarion County has the region's lowest rate of SD bridges by deck area. The county also has some of the largest structures in the region's system, with large, multi-lane spans on Interstate 80 crossing features such as the Allegheny and Clarion rivers. The east- and west-bound bridges at Emlenton, at over 114,000 square feet in deck area, are the largest in the region, and were recently reconstructed.

Table 16: Bridges on State Route System, Length 8' or Greater

County	Total Count	Total Deck Area (MSF)	Closed Bridges	Posted Bridges	SD Count	% SD by Count	SD_Deck Area (MSF)	% SD by Deck Area
Clarion	207	1.000	0	1	24	11.6%	0.0462	4.6%
Crawford	500	1.448	0	6	60	12.0%	0.1290	8.9%
Forest	76	0.189	0	2	8	10.5%	0.0439	23.3%
Venango	223	0.706	0	1	20	8.9%	0.0479	6.8%
Warren	267	0.662	1	2	28	10.5%	0.0467	7.1%
NW RPO	1,273	4.005	1	12	140	11.0%	0.3137	7.8%
PA	25,399	114.578	29	653	3,472	13.7%	9.2638	8.1%

Source: PennDOT, July 3, 2017

PennDOT and the Northwest RPO continue to program bridge projects in driving down the region's rate and number of structurally deficient bridges. Just over the past six years, the total number of structurally deficient state-owned bridges throughout the region has been reduced by nearly a third, to 145. Total structurally deficient deck area has declined by over 40 percent, as shown in **Figure 17**. The Rapid Bridge Replacement (RBR) Project that was approved in September 2013 will replace 558 bridges statewide over a three-year period (2015-18). The Commonwealth will retain ownership of the bridges, but the contractor will be responsible for maintaining each bridge for 25 years after its replacement. Twenty-two of these structures are within the Northwest PA region.

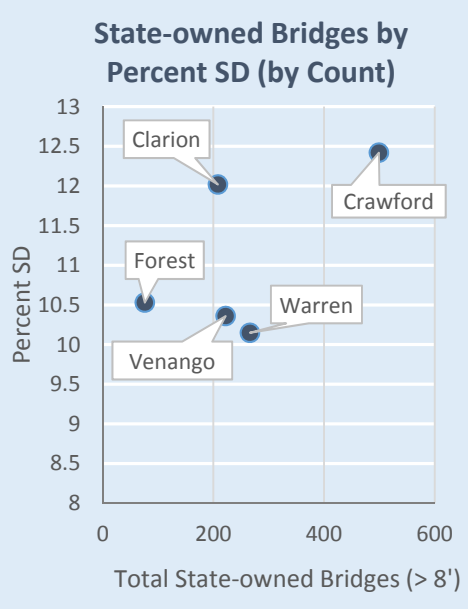
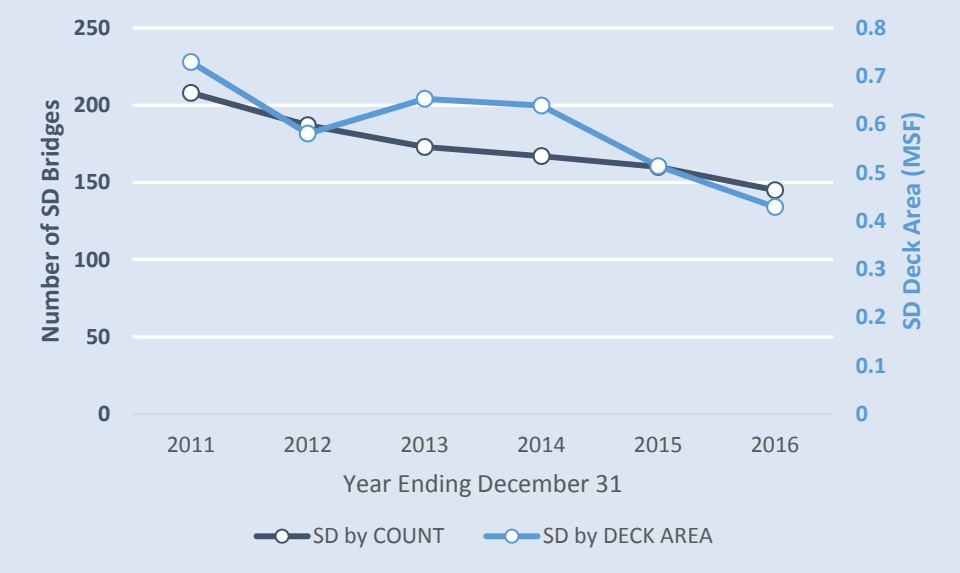


Figure 17: State-owned SD Bridges, by Number and Deck Area



Source: PennDOT

As noted elsewhere, conditions on the region's locally-owned bridge network are generally in poorer condition than on the state system. Within PennDOT's BMS, there are 341 locally-owned bridges within the region greater than 20 feet in length. Crawford County ranks 10th statewide in the total number of locally-owned bridges that are structurally deficient, with 57. Both Crawford County and Forest Counties have locally-owned bridge SD rates approximating 40 percent. Local bridges in Clarion County average less than 1,000 square feet in deck area, smaller than all but two counties (Juniata and Potter), statewide. **Table 17** provides more detail on the region's stock of locally-owned bridges.

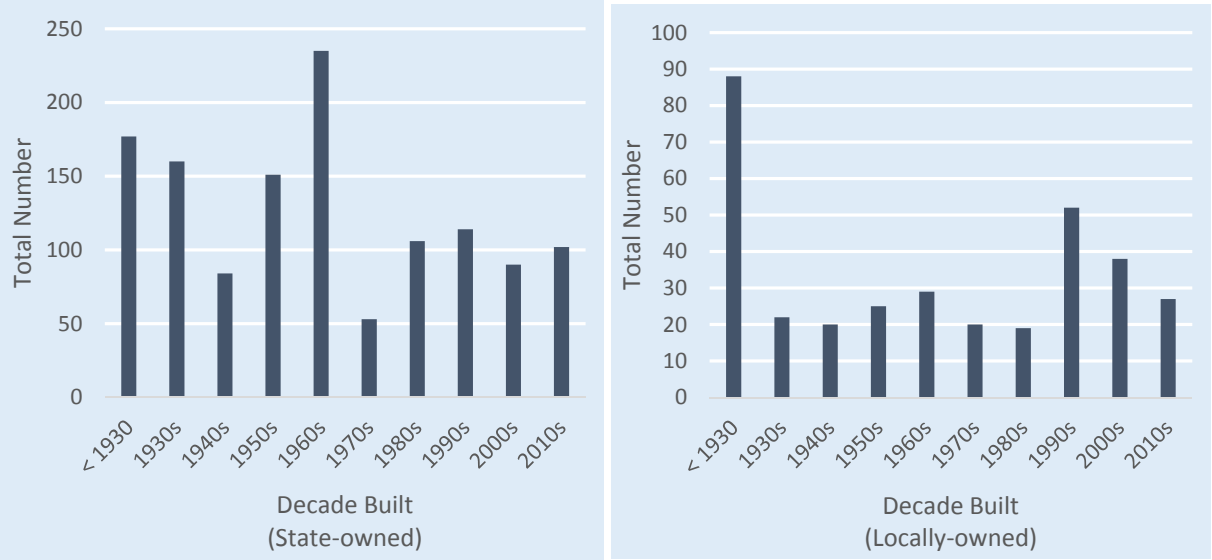
Table 17: Bridges on Local Route System, Length 20' or Greater

County	Total Count	Total Deck Area (MSF)	Closed Bridges	Posted Bridges	SD Count	% SD by Count	SD-Deck Area (MSF)	% SD by Deck Area
Clarion	64	0.061	3	24	14	21.9%	0.0085	14.0%
Crawford	131	0.157	4	43	57	43.5%	0.0627	39.8%
Forest	13	0.023	1	2	7	53.9%	0.0098	42.3%
Venango	67	0.135	0	21	26	38.8%	0.0234	17.4%
Warren	66	0.126	2	16	27	40.9%	0.0203	16.2%
NW RPO	341	0.502	10	106	131	38.7%	0.1247	25.0%
PA	6,539	14.599	195	1,615	2,038	31.2%	3.6435	25.0%

Source: PennDOT, July 3, 2017

Within the Northwest region, the average state-owned bridge is 53 years old. Locally-owned bridges are on average four years older. A time series analysis of both state- and locally-owned bridges in the Northwest region depicts a rapidly aging inventory. The RPO will be faced with a greater stock of interstate-era bridges (read: 1950s and 1960s construction) that are requiring greater maintenance and rehabilitation attention. Depression-era bridges also represent an inordinate share of the region's bridge stock (particularly those that are locally-owned) and may need to be replaced altogether. (Over a quarter of all the region's locally-owned bridges were built before 1930.) Many of these older bridges are now facilitating the movement of greater volumes of trucks, complicating the upkeep of these older structures.

Figure 18: Bridges by Decade Built, State- and Locally-owned



Source: PennDOT

The region has programmed $35.7 million in improvements for several off-system bridges as part of the 2017 Twelve Year Program. These are described in **Table 18**.

Table 18: Off-System Bridges on the 2017 TYP

County	Bridge	Phase	Year
Clarion	**Curllsville Bridge #2**	Final Design	2021
Clarion	**T-345 over Beaver Creek**	Construction	2021
Clarion	**Lickingville Bridge #2**	Construction	2024-25
Clarion	**Kahle Bridge**	Construction	2017
Crawford	**E. Spring Rd. (T-466)**	Prelim Eng.	2017
Crawford	**SR 2005 over Conneaut Creek**	Construction	2025
Crawford	**SR 4008 over Conneaut Creek**	Construction	2025
Crawford	**Kennedy Hill Rd. bridge**	Construction	2017

County	Bridge	Phase	Year
Crawford	**SR 1003 over Woodcock Creek**	Construction	2025
Venango	**McClelland Avenue**	Prelim. Eng.	2017
Warren	**SR 3012 Cemetery Rd**	Various	2017
Warren	**Browns Run Rd**	Various	2017
Warren	**Stewart Rd (T-639)**	Prelim. Eng.	2017
Warren	**Jones Hill Rd (T-438)**	Prelim. Eng.	2017
Warren	**Egypt Hollow Rd Br #1**	Prelim. Eng.	2017

Source: PennDOT

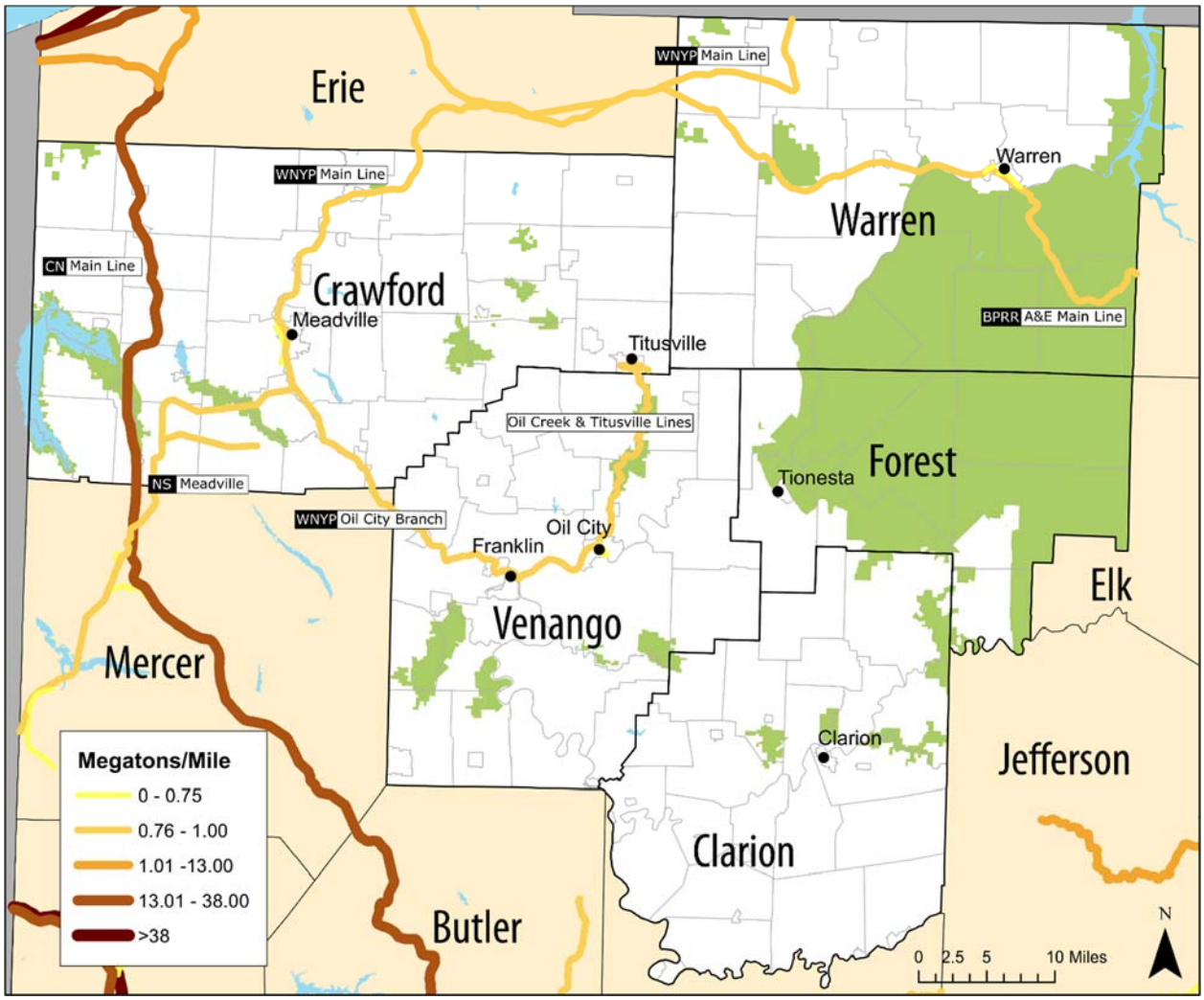
Rail Freight

According to the American Association of Railroads (AAR), Pennsylvania has the highest number of operating freight railroad companies in the United States. The Surface Transportation Board (STB) classifies freight railroads by inflation-adjusted revenue:

- Class I Railroads have more than $452.6 million of annual carrier operating revenue. They primarily operate haul service over high-density intercity traffic lanes.
- Class II or Regional railroads operate over at least 350 miles of track and/or have annual revenue greater than $36.2 million.
- Class III or Short line railroads operate over less than 350 miles of track and have annual revenue of less than $36.2 million per year.

Rail freight service within the region is provided by a mix of Class I, regional railroads, and short lines. These lines are pictured in **Figure 19** by line density, and described within this section.

Figure 19: Regional Rail Line Density



Source: PennDOT

Norfolk Southern

Norfolk Southern Corporation (NS) provides service between Sharon, Shenango and Meadville. At Meadville, NS connects with the Western New York & Pennsylvania Railroad. The NS Meadville Line carries less than 1 million gross tons annually. Norfolk Southern also provides a direct connection between the Northwest PA region and the Canadian National (CN) Bessemer Secondary, a major corridor connecting Pittsburgh to Erie.

The NS Meadville Line extends a total of 45.3 miles between French and Coalburg, OH. A total of 38.8 miles lie within Pennsylvania (in Crawford and Mercer Counties). CSX (Norfolk Southern's main Class I competitor in the East) has trackage rights between Norfolk Southern's Ferrona Yard in Sharon and Shenango. The line is primarily single track with maximum speeds of between 25-40 mph.

Buffalo and Pittsburgh (Genesee & Wyoming)

The Buffalo & Pittsburgh Railroad (BPRR) is a 368-mile regional freight railroad that interchanges with the Allegheny Valley Railroad, Canadian Pacific Railway, Canadian National, CSX Transportation, Nittany & Bald Eagle Railroad, Norfolk Southern, Rochester & Southern Railroad and Western New York and Pennsylvania Railroad.

The Allegheny and Eastern line (a subdivision of the Genesee & Wyoming system) runs from Erie through Warren County to BPRR's north-south mainline in Elk County. This line provides direct connections to US and Canadian Class I railroads (CSX, Norfolk Southern, Canadian National and Canadian Pacific), as well as other short line railroads. Historically the Allegheny and Eastern line linked Warren County to the International Paper operation in Erie. This operation has closed but other industries have increased their use of the line, ensuring its ongoing viability. The Warren County Comprehensive Plan Update (dated 2005), indicates that the line is critical to the county to retain major employers such as United Refining and Whirley Industries.

Western New York and Pennsylvania (WNYP)

The WNYP's Oil City branch and associated trackage is a 37-mile branch line extending from Meadville through Franklin and Oil City to Rouseville. The 3.65-mile South Side Industrial Track leaves the Oil City branch in downtown Oil City, proceeds through the Siverly subdivision along the north side of the Allegheny River, crosses the river, and proceeds along the south side of the Allegheny River to Darr Street. The Oil City Branch was leased by WNYP in 2005 from Norfolk Southern until 2031, unless terminated by either party. The Oil City Branch supports the following customers:

- Franklin Steel Industries, Franklin
- Consolidated Container Corporation (South Side IT), Oil City
- Sasol Chemical, Oil City
- 4N Corporation, Franklin
- Electralloy, Rouseville
- Numerous Titusville customers of the OCTL.

The entire line from Meadville to Oil City is 112# and largely continuously welded rail. Tie conditions had deteriorated so badly by 2014 that the entire line was reduced to 10 MPH operation due to numerous derailments. In ensuing years, WNYP performed a $2 million tie and surfacing project on the line with the help of an $840,000 Rail Transportation Assistance Program grant. With the improvements, the line has largely been restored to 25 MPH operation. In 2017 the railroad plans to spend an additional $350,000 of its own funds to install a final 3,000 ties along the line. It will then be in secure condition for 25 MPH operation over the next 20 years.

The line from Oil City to Rouseville is in solid condition for 10 MPH operation. This speed is satisfactory, due to multiple grade crossings, bridges, and pedestrian traffic. The railroad has worked with PennDOT and the City of Oil City to rebuild the highway surfaces of numerous grade crossings, representing a railroad investment of over $75,000.

New flashing light and gates signals were installed at Petroleum Street (US 62) in 2016 using Federal grade crossing safety funds. In 2017, in coordination with PennDOT and the City of Franklin, the 13th Street (US 322) grade crossing highway surface will be rebuilt with a railroad investment of over $30,000.

The South Side Industrial Track[5] is in very poor condition. It supplies one customer with rail service every other week. Track speed is only 5 MPH and there are currently no plans to improve it above that level.

The Oil City Branch and associated lines have 24 bridges. All but two rate sufficiently for 286K car loadings. These two structures are described further in **Table 19**:

Table 19: Load-challenged Bridges on the Oil City Branch

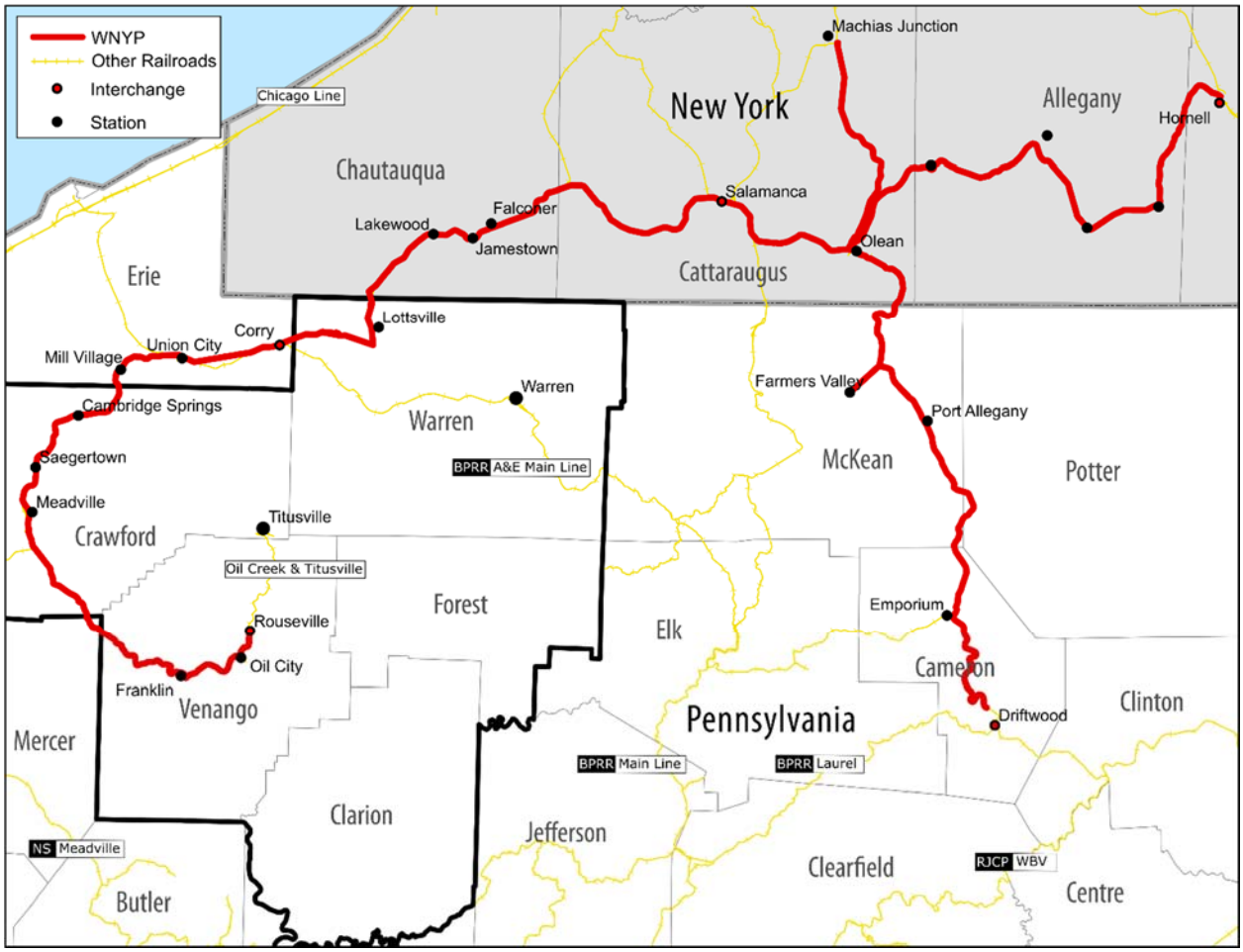
Bridge	Bridge OC-21.36 - Sugarcreek	Bridge OC-33.14 – Oil City
Feature Crossed	Sugarcreek	Oil Creek
Length	127 feet	2 span, 141-foot (282 foot total)
Bridge Type	through-truss	iron through-truss
Improvement Option(s)	Strengthening ($700,000) Replacement ($1,700,000)	Replacement ($5 to 7 million)

Source: WNYP

The rail network surrounding Franklin, Oil City and Titusville once hosted multiple direct routes to Buffalo, Corry, Olean, Pittsburgh, New Castle, and Warren. Today there remains one means of ingress and egress: the WNYP Oil City Branch. **Figure 20** displays the extent of the WNYP's operations within the Northwest PA region, and surrounding areas.

[5] 3.65 miles between downtown Oil City and Darr Street.

Figure 20: Extent of WNYP Operations



At the time of this report's writing, the Oil City Branch and associated trackage is in the best condition it has been in since the line was rebuilt by Conrail approximately 35 years ago. In order for the shippers of Franklin, Oil City, and Titusville to continue to receive viable rail freight service connecting to the national railroad system, a financial solution must be found to address the two deficient bridges noted previously.

Oil Creek & Titusville Lines (OCTL)

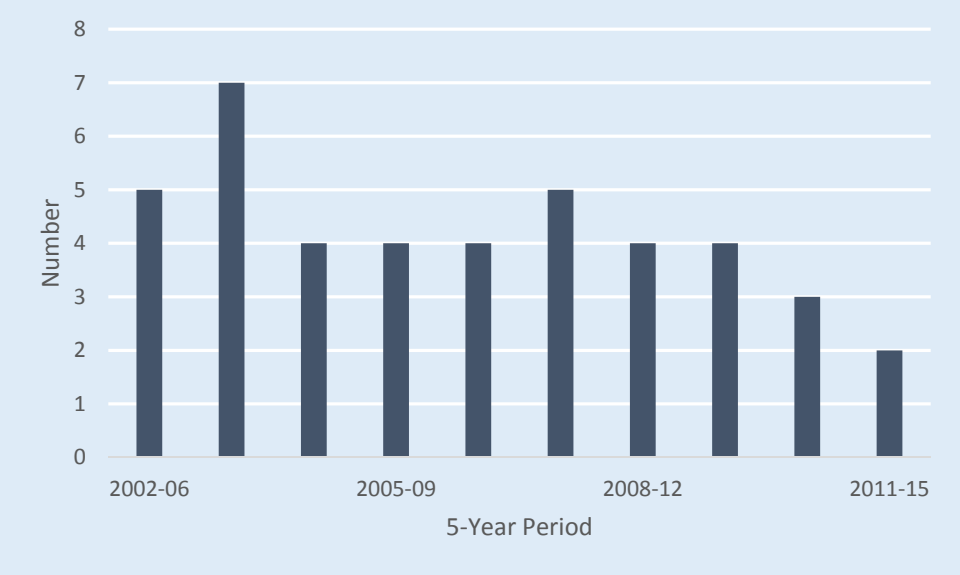
This 16-mile main line connects WNYP's Oil City Branch at Rouseville (Rynd Farm) in Venango County to Titusville in Crawford County. The line serves approximately seven industrial businesses and carries less than 1 million gross tons of materials (lumber, plastics, etc.) and operates several days per week. A potential trans-load facility located in the Titusville Opportunity Park could impact the utilization of this line; however, at this time the future of this facility is uncertain. The railroad has received grants to repair the Petroleum Center bridge and tie replacement to allow for 286K-pound compatible cars and higher operating speeds.

The railroad is one of 15 tourist railroads currently operating within Pennsylvania. An excursion train runs from Titusville to Rynd Farm in Venango County.

At-grade Crossings

Crashes involving highway and rail crossings are rare within the Northwest PA region, yet still remain a subject of concern, as these crashes tend to be very severe and result in serious injuries or fatalities. The number of rail-grade crossing crashes has declined in recent years, going against statewide trends. Many of the vehicle/train crashes that occur come as a result of motorists trying to circumvent or purposely violating active control devices. For the decade ending 2015, the region recorded six crashes at at-grade crossings. **Figure 21** shows trends in at-grade railroad crossing crashes within the region over the past several years.

Figure 21: At-grade Railroad Crossing Crashes



Source: PennDOT Statewide Crash Statistics

PennDOT has programmed nearly $28 million in railroad crossing safety projects within the region as part of the 2017 Program. Centralized management of the program allows for a formalized project selection process and promotion of higher utilization of funding and the ability to initiate higher-cost projects.

Aviation

The region's lone commercial service airport includes the Venango Regional Airport, owned by the County of Venango. It is located in the City of Franklin and Sandycreek Township. Southern Airways Express provides 19 roundtrip flights to Pittsburgh and plans to offer a flight to Harrisburg in the near future. Southern Airways took over commercial service in March 2016 and extended its passenger

service as part of the Essential Air Service program. The airport supports commercial service, general aviation and corporate customers. Venango Regional Airport offers a 5,200 ft. x 150 ft. grooved main runway with full instrument landing system (ILS), as well as MALSR approach lights, HIRL and PAPI Systems, a 3,700 ft. x 100 ft. cross-wind runway, and Approved ILS, VOR and GPS approach procedures, as well as FAA Index A firefighting capability. County government has expressed interest in growing services offered at the airport to include expansion of its existing cargo handling operations. This includes strengthening and lengthening its main runway, creating a cargo transfer point, and developing adjacent County-owned property into a business park with office space, storage facilities and warehousing.

Allegheny River Lock and Dam No. 9

The Allegheny River forms a portion of Clarion County's southern boundary. Allegheny River Lock and Dam No. 9 is located in Armstrong County, nearly seven miles downstream from East Brady Borough. The lock measures 56 feet by 360 feet, and has a lift of 22 feet. The dam measures 60 feet in height and is 918 feet long. The lock and dam were built by the Army Corps of Engineers 80 years ago to improve navigation along the Allegheny River. It became the last part of an integral slackwater system built to permit commercial barges access to 72 miles of the Allegheny River from its mouth in Pittsburgh to the mines and quarries near East Brady. The east abutment of the dam was removed in 1990 to add a hydro-electric power station.

USDOT has included the Allegheny River as part of the National Multimodal Freight Network (NMFN) from Pittsburgh to East Brady Borough. The Army Corps of Engineers is studying the future of aging and lesser-used locks on the upper reaches of the river. Federal funding for locks and dams is determined by how much commercial traffic passes through it. For the river's upper locks (such as at East Brady), traffic is almost entirely recreational in nature. The Corps is exploring a number of options regarding the best approach for the lock and dam's future, whether that be to invest, disinvest, transfer ownership to another entity, or remove them entirely. Initial estimates to remove a lock and dam are approximately $2 million, compared to tens of millions to refurbish them.

The 2017 Twelve Year Program (TYP)

The Northwest RPO works with PennDOT and other partners in developing a four-year transportation improvement program, which serves as the first four-year period of the Twelve Year Program (TYP). The State Transportation Commission (STC) adopted Pennsylvania's most recent TYP on August 11, 2016. Northwest Pennsylvania's share of this program includes nearly 300 projects and line items totaling over $800 million in roadway and bridge improvements.

Table 20 summarizes the program for the five-county, Northwest Pennsylvania region.

Table 20: Composition of the 2017 Twelve Year Program

Code	Project Type	Total Count	Cost ($000s)
LNITM	Regional Line Item	10	$196,858
HRST	Highway Restoration	52	$160,790
IMP	Interstate Management Program	3	$126,400
BRPL	Bridge Replacement	55	$94,775
BRST	Bridge Restoration	102	$80,403
SAFE	Safety	57	$66,961
PRVMT	Preventive Maintenance	28	$50,978
HRCT	Highway Reconstruction	4	$13,355
	Transit-related Projects	12	$8,401
BPRSF	Bridge Preservation	5	$6,060
TE	Transportation Enhancement	2	$620

Source: PennDOT, August 11, 2016

From the preceding table, it is evident that the region is programming a significant majority of its transportation dollars on maintenance, rehabilitation, and restoration projects. (Statewide, only a scant 3.2 percent of the 2017 Program is dedicated to capacity-adding projects.) A more detailed summary of each of these program line items follows:

- **Highway Restoration** – A majority of the region's highway dollars have been programmed for highway restoration projects. An illustrative sample of these include PA 8 between SR 3003 to SR 3013, and the Polk Cutoff to US 62 in Venango County.

- **Interstate Management** - Within the Interstate Management Program, there are three preservation projects totaling over $126 million. For the 2017 Program, Interstate improvement projects within the region include preservation projects on Interstate 79 between mileposts 136 and 154 in Crawford County, and on Interstate 80 between mileposts 27.6 to 34.5, and between mileposts 34 and 42 in Venango County.

- **Bridge Replacement** - One of the most notable bridge replacement projects in the region includes the Hunter's Station Bridge, which carries US 62 over the Allegheny River in Forest County. Construction funding has been programmed for the first four-year period, at $21 million. The let date was August 2016. In Clarion County, the Callensburg Bridge carries PA 58 over the Clarion River. The structure will be replaced at a cost of over $6 million.

- **Bridge Restoration** – There are over 100 of these project types on the program, underscoring the great need the region has in investing in its aging bridge stock. Major projects programmed as part of this include work on PA 36 over Tionesta Creek, and PA 127 over the Allegheny River. Both of these projects are in Forest County.

- **Safety** – Safety improvements are included as part of every programmed project, yet there are certain projects that are programmed specifically for the safety benefits. A few of the largest safety projects include Northwest Slide along US 62. Within Clarion County, there are several improvements involving PA 68: Dolby Street to Trout Run, and the intersection with Dolby Street itself. A new roundabout has also been programmed for construction in Crawford County on US 6. There are also several railroad grade crossing projects programmed in Crawford County: at PA 27, SR 2008, Mt. Pleasant Road, and Cambridge Springs.

- **Preventive Maintenance** – Major PM projects within the region include PA 36 Leeper North, and resurfacing projects on US 322, PA 58, and PA 338 in Knox.

- **Highway Reconstruction** – Programmed projects here include the $10 million reconstruction of US 6 Linden Street to Reynolds Avenue in Crawford County. Other notable highway reconstruction improvements include the intersections of US 6 with Railroad Street and PA 27 in Warren County, and the intersection of PA 8 and SR 4002 in Venango County.

- **Bridge Preservation** – The region has just five projects under this line item, including Greenville Pike Bridge #1 and #2 on PA 66 in Clarion County; Kennedy Hill Road Bridge (SR3025) in Crawford County; and US 62 over the Allegheny River in Venango County.

- **TAP Program** – Includes pedestrian improvements along PA 66 in Forest County. The project is expected to be let in July 2017, with Jenks Township as the sponsor.

- **Transit** – Costs under this line item include shared ride bus procurement for the Warren County Transit Authority, dispatching equipment and fleet vehicles for the Crawford Area Transportation Authority (CATA), and $6.2 million for a CATA storage facility. The Venango County Transportation Office is also receiving funding for fleet purchases and $10 million for a multimodal facility.

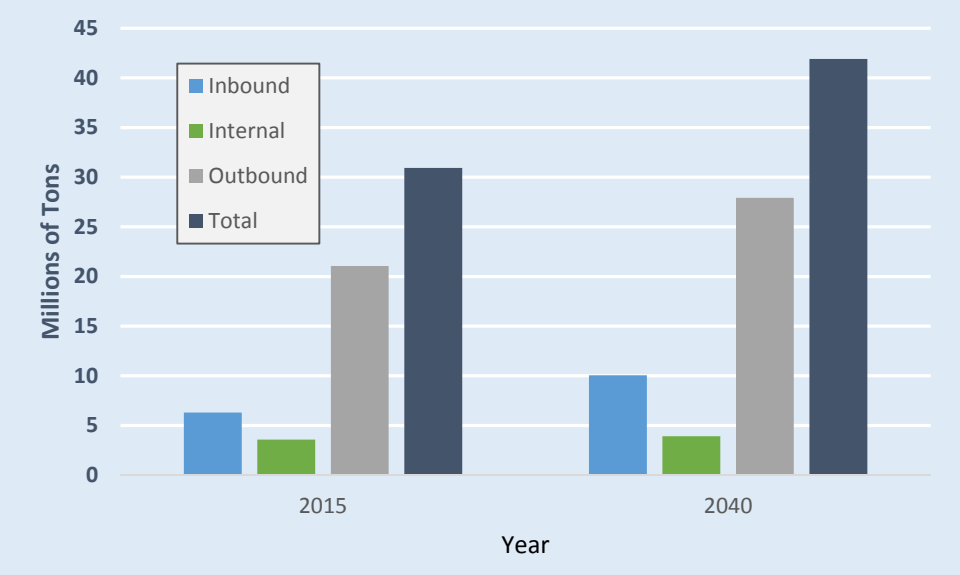

RYND FARM
DOWX
66354

Commodity Flow Analysis

The movement of freight within the Northwest region is conducted primarily by truck. Interstate 79, 80, and other arterials serve as the backbone of the region's freight transportation system. Interstate 79 connects the region to Pittsburgh and Erie, while Interstate 80 runs east-west through Clarion and Venango County. Other important roadways for freight movement include US 6, which runs across the region's northern tier, and NHS routes such as US 62, US 322, and PA 8, all of which connect the region to the interstate system.

According to 2015 data from IHS Global Insight, the Northwest region is a net exporter of freight. IHS Global Insight data indicates that the region annually generates approximately 23 million tons of freight, at a total value of just over $17 billion. (This production of freight contrasts with the nearly 8 million tons received by the region.) The growth in freight being shipped from the region is expected to increase to over 30 million tons by the year 2040, and is depicted in **Figure 22**. Among Pennsylvania counties, Warren County ranks 13th in the amount of freight tonnage (and ninth in value) being generated. The remaining Northwest region counties all rank among the bottom half of Pennsylvania counties in freight tonnage.

Figure 22: Tonnage of Freight Movement, 2015 and 2040



Source: IHS Global Insight

Table 21 depicts the share of freight tonnage and value that was imported and exported from the region within the Northwest region for both 2015 and the forecast year of 2040. As displayed in the table, freight tonnage is expected to grow significantly to the plan's forecast year of 2040.

Table 21: Value and Tonnage, 2015 and 2040 (Truck and Rail)

Year	County	FROM NORTHWEST PA			TO NORTHWEST PA		
		Tons (M)	Value ($M)	Value/ Ton	Tons	Value ($M)	Value/ Ton
2015	Clarion	2.47	$553	$223	1.09	$403	$369
	Crawford	5.05	$2,126	$421	2.41	$1,206	$500
	Forest	0.27	$85	$315	0.22	$59	$268
	Venango	1.84	$1,955	$1,063	1.63	$1,269	$779
	Warren	13.19	$12,140	$920	2.76	$2,564	$929
	REGION	22.8	$16,859	$726	8.11	$5,501	$678
2040	Clarion	2.71	$836	$308	1.42	$587	$413
	Crawford	7.00	$3,346	$478	3.74	$1,906	$509
	Forest	0.41	$163	$397	0.34	$89	$261
	Venango	8.93	$10,323	$1,156	3.26	$3,062	$939
	Warren	10.91	$10,256	$940	3.20	$2,912	$910
	REGION	29.96	$24,924	$832	11.96	$8,556	$715
Change		31.4%	47.8%	14.6%	47%	55.5%	5.4%

Source: Transearch Data, IHS Global Insight. All values are in present value (nominal) dollars. Trips include freight movement that is internal to the region.

The top destinations for the region's goods are depicted in **Table 22** while the top origins are found in **Table 23**. A significant majority of the region's freight is destined for locations in western Pennsylvania and New York's Southern Tier. The most significant destination includes the Buffalo-Niagara-Cattaraugus BEA[6] region, with over 6 million tons of freight. Other major destinations include the Northwest region itself, as well as surrounding regions within the state. Ontario, Canada, is also a major trading partner, with an estimated 216,000 tons of goods being shipped from the Northwest region to the province.

[6] Bureau of Economic Analysis

Table 22: Northwest Region: Top Commodity Destinations, 2015

Destination	Tonnage (MM) Received from Northwest PA
Buffalo BEA[7]	6.18
SPC Region	3.19
Northwest PA	1.75
Cleveland-Akron-Elyria BEA	1.41
Chautauqua County (NY)	1.03
North Central PA	0.91
Cattaragus County (NY)	0.69
Rochester-Batavia-Seneca Falls BEA	0.49
Syracuse-Auburn, NY BEA	0.30
Centre County	0.30
Ontario	0.22

Source: IHS Global Insight

Commodity Consumption and Production

Table 23 depicts the major commodities being shipped into the region.

Table 23: Northwest Region: Top Commodity Origins, 2015

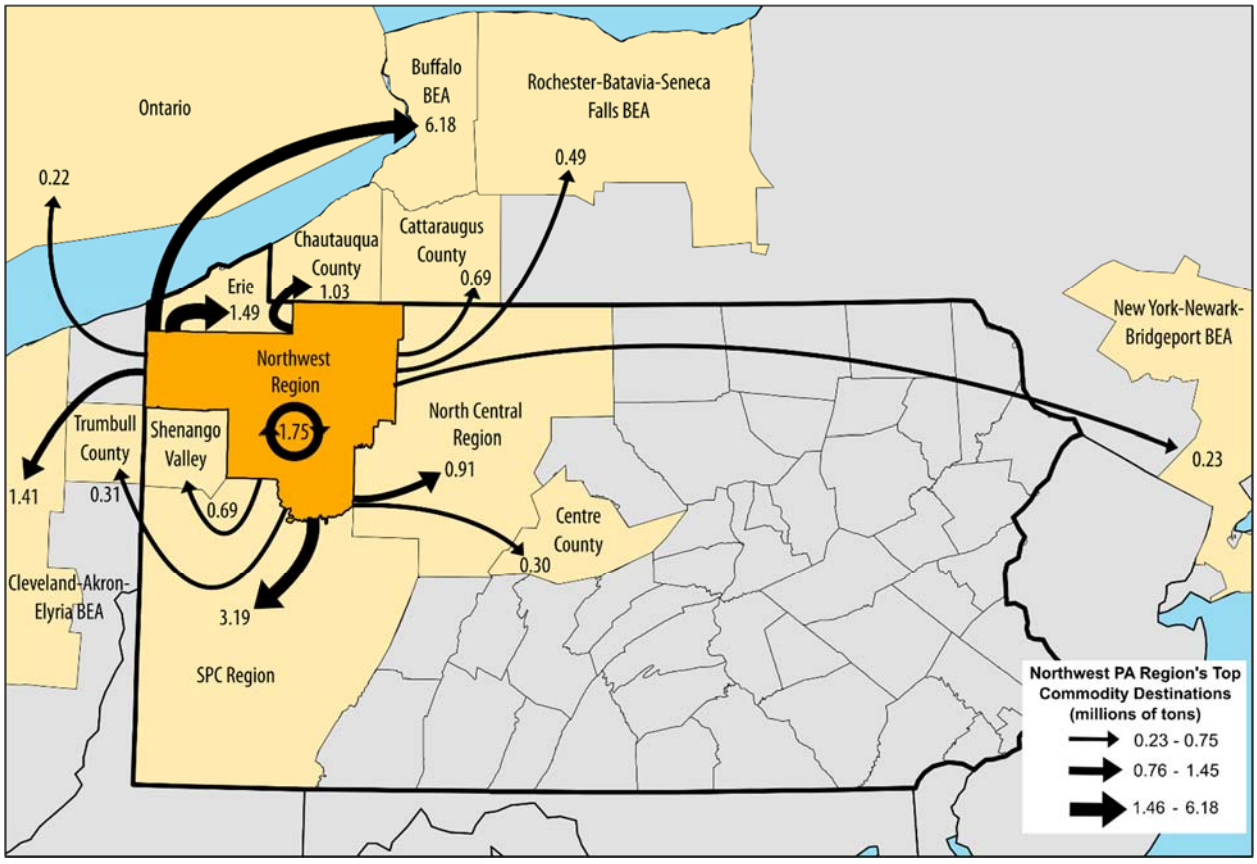
Origin (*with top export commodity to Northwest PA)*	Tonnage (MM) Received by Northwest PA
Northwest PA *(broken stone or riprap)*	1.75
SPC Region *(petroleum refining products)*	0.73
North Central PA *(primary forest materials)*	0.58
Cleveland-Akron-Elyria BEA *(primary forest materials)*	0.28
Delaware Valley BEA *(warehouse & distribution center)*	0.25
Erie County, PA *(gravel or sand)*	0.20

[7] Bureau of Economic Analysis region

Origin (*with top export commodity to Northwest PA)*	Tonnage (MM) Received by Northwest PA
Buffalo-Niagara-Cattaragus BEA *(grain)*	0.17
Rochester-Batavia-Seneca Falls BEA *(grain)*	0.14
Cattaragus County, NY *(gravel or sand)*	0.13
Mercer County, PA *(gravel or sand)*	0.08
Ontario *(petroleum refining products)*	0.06

Source: IHS Global Insight

Figure 23: Northwest Region Top Freight Destinations, 2015



Source: PennDOT; IHS Global Insight

The most significant commodities being exported from the region (by tonnage) are petroleum refining products. Aggregates are also a top commodity export for the region when measured by tonnage. Since 2007, shipments of coal have been declining nationally, averaging 6.1 percent annually. These declines

are expected to continue as the nation's energy mix changes in response to more stringent environmental regulations and the emergence of alternative energy sources. The region's top commodity exports, by tonnage, are as shown in **Table 24**.

Table 24: Northwest Region Top Commodity Exports, 2015

Commodity	Tonnage Exported
Petroleum Refining Products	11,908,199
Broken Stone or Riprap	2,447,940
Gravel or Sand	1,364,682
Liquefied Gases, Coal or Petroleum	838,024
Warehouse & Distribution Center	758,013
Primary Forest Materials	543,760
Grain	505,202
Flat Glass	498,409
Misc Field Crops	375,440
Dog, Cat, or Other Pet Food	367,668
Misc Sawmill or Planning Mill	365,408
Bituminous Coal	267,736

Source: IHS Global Insight

Top imports are as depicted in **Table 25**.

Table 25: Northwest Region: Top Commodity Imports, 2015

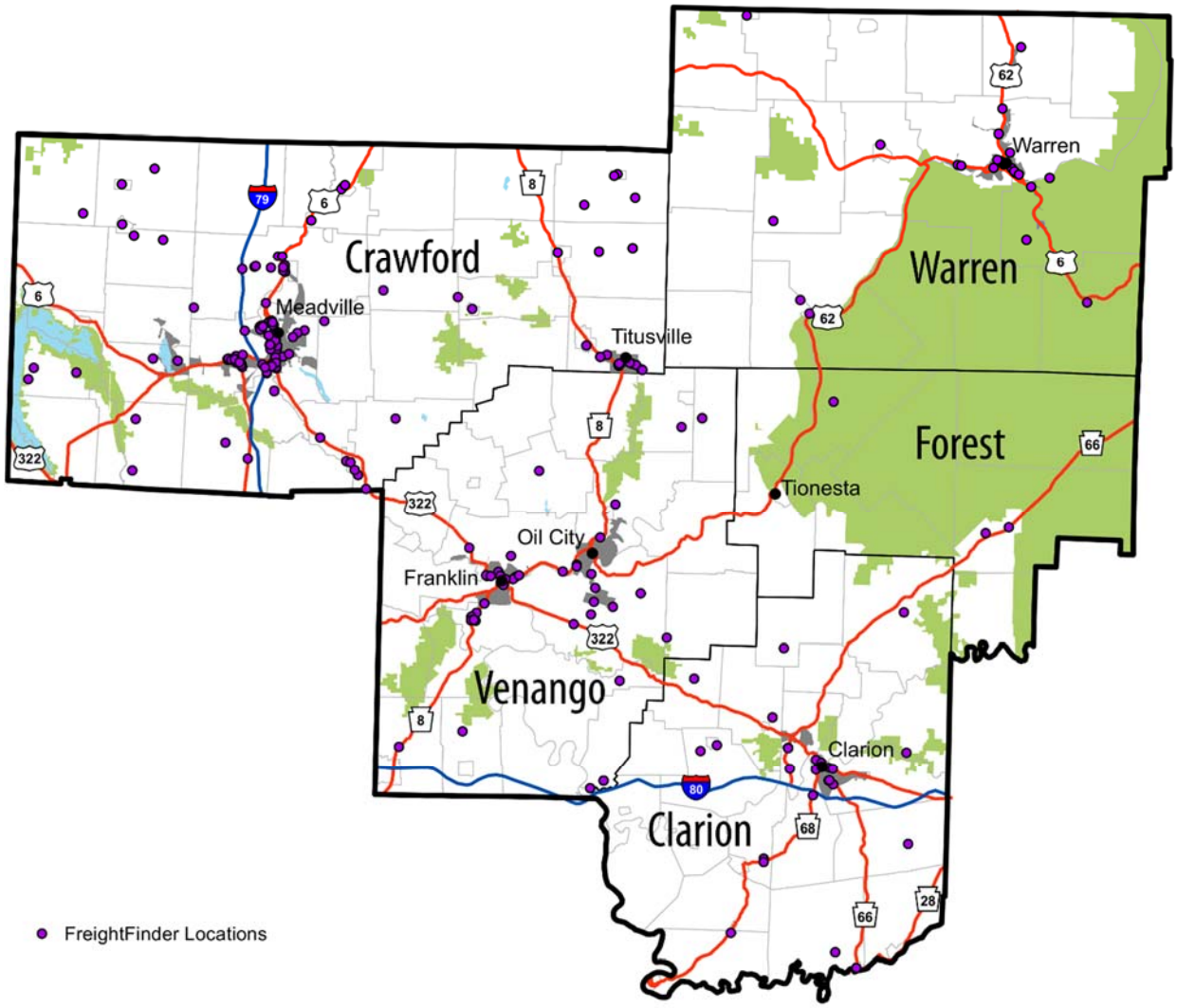
Commodity	Tonnage Imported
Warehouse & Distribution Center	1,445,631
Petroleum Refining Products	980,405
Primary Forest Materials	883,026
Broken Stone or Riprap	872,491
Gravel or Sand	717,620
Crude Prod of Coal, Gas, Petroleum	409,387
Misc Industrial Organic Chemicals	368,482

Commodity	Tonnage Imported
Grain	265,561
Plastic Matter or Synthetic Fibers	205,562
Primary Iron or Steel Products	197,254
Liquefied Gases, Coal, or Petroleum	100,449
Misc Industrial Organic Chemicals	95,967
Concrete Products	93,815
Ready-mix Concrete, Wet	92,908
Asphalt Paving Blocks or Mix	85,184

Source: IHS Global Insight

Freight data from PennDOT reveal not only freight movement by commodity group and mode of transportation, but also includes records on warehousing and manufacturing establishments. The "Freight Finder" data identifies significant locations on the region's freight transportation system, or establishments that are involved in the importing and exporting of freight. These points are shown spatially in **Figure 24** and show concentrations of freight activity in the region's cities and larger boroughs.

Figure 24: Freight Finder Locations, 2011



Source: IHS Global Insight, 2011

Motor Carrier

Trucking on roadways is the most common mode of freight movement, accounting for 82 percent of all the region's exports. Compared to rail freight options, trucks are commonly used on freight moves that are more time-sensitive and need only be moved shorter distances. Trucks also offer the door-to-door service that rail freight carriers cannot provide.

Interstate 80 by far carries the largest volume of truck traffic within the region. Various segments of the interstate through the region carry anywhere from 2,000 to 7,700 trucks, daily.

As another measure of the importance of freight to the region's economy, the Northwest region has one of the state's larger shares of truck traffic. While the region has 2.7 percent of the state's share of DVMT, it has 3.6 percent of all truck VMT in Pennsylvania.

Truck VMT, by MPO/RPO Region (% of Pennsylvania)

- SPC – 14.5
- DVRPC – 14.4
- Harrisburg – 7.9
- SEDA-COG – 6.2
- NEPA – 6.1
- Scranton/Wilkes-Barre – 5.9
- Lehigh Valley – 4.7
- North Central – 4.6
- Reading – 4.2
- Lancaster – 3.7
- **Northwest – 3.6**

Rail Freight

The region's rail carriers move an estimated 3.35 million tons of freight out of the region. Top commodities being moved by rail include petroleum refining products, coal, broken stone or riprap, sand, pulp and paper, lumber, and other primary forest materials. The presence of rail freight carriers gives the region's shippers and receivers additional options for moving freight. If not for the rail option, these tonnages would likely be transferred to the region's roadways (or in some cases, lost to the regional economy altogether).

Implications of Commodity Flows

The following list provides potential implications indicated by current and forecasted commodity flows to and from the Northwest region:

- Trends and forecasts in total manufacturing employment for the region would indicate increasing demand for goods movement. Manufacturing as an industry is naturally reliant on the movement of freight for business and the industry's importance to the region's economy is only expected to grow over the foreseeable future.
- Relative stability in retail trade indicates consistent truck traffic for movement of retail goods in the future. Increases statewide however may yield significant increases on the overall regional system, as well as increased frequency of truck trips to places like the Wal-Mart distribution center in Clearfield County.
- Potential job losses in education and in wholesale and retail trade may decrease the demand for truck freight, although these industries are not as reliant on freight movement as others.

- Potential growth in the mining/quarrying/gas extraction industry may likely contribute to increases in rail traffic, as well as increased truck traffic to where hydraulic fracturing may occur.

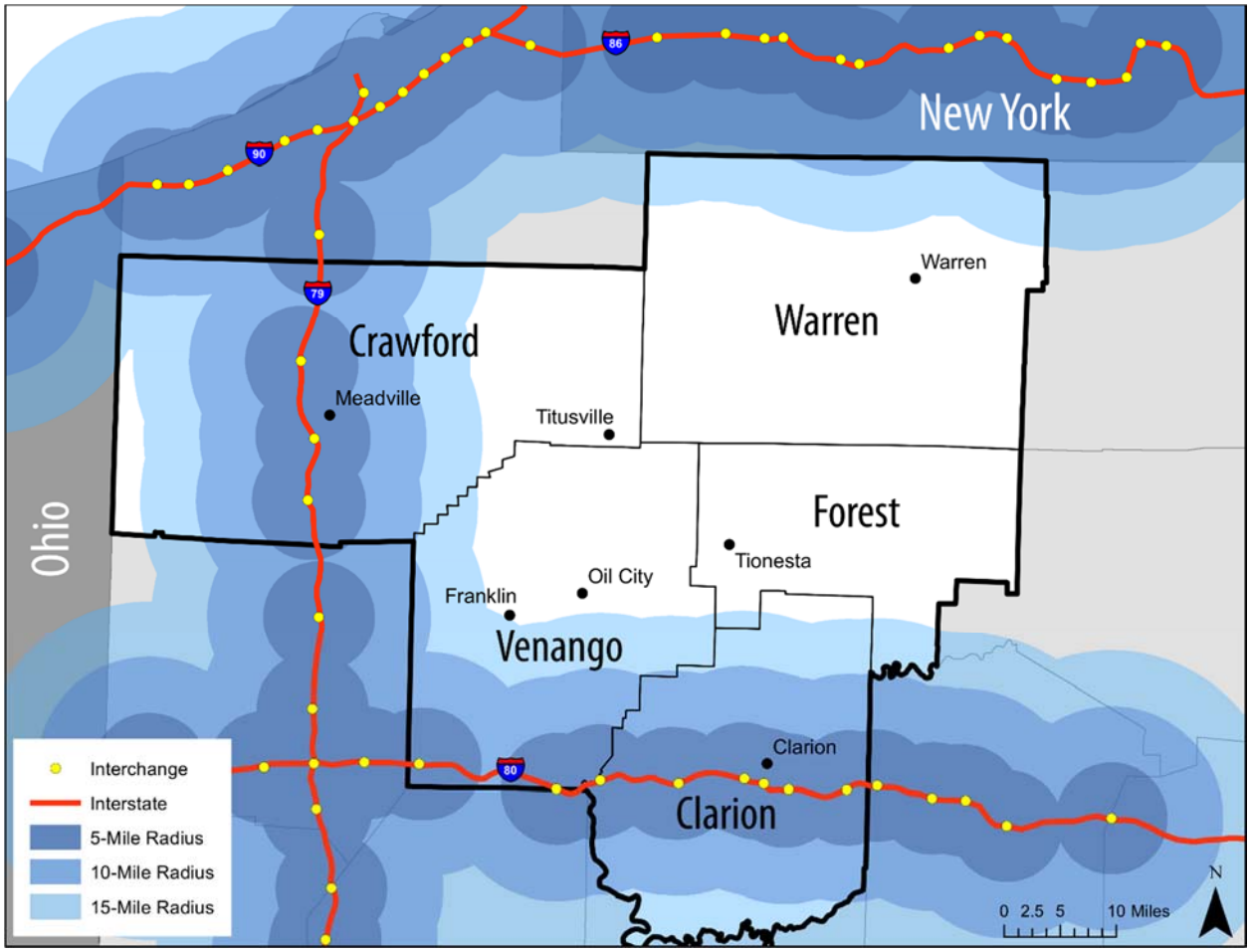
Appendix A: Commodity Flow Tables contains commodity flow tables for all five Northwest counties. The tables depict freight flows by tonnage and value, by mode (truck and rail), and by commodity for both 2011 and the 2040 forecast year.

Findings and Needs Assessment

This section of the report highlights several of the major themes expressed during the course of the planning effort's stakeholder engagement process. These common threads helped frame the development of the report's eventual themes, strategies, and proposed projects.

Heavy reliance on trucks and Interstate highways – The majority of the region's freight moves on its two interstates: Interstate 79 and Interstate 80. Much of the region's shippers and receivers are far removed from the national Interstate network and must rely on arterials in shipping and receiving goods. Warren County leads the region in total tonnage of freight being moved by a significant margin, yet does not have ready access to an Interstate highway. **Figure 25** displays the surrounding interstate corridors and areas within a 15-mile radius of an interstate interchange. The figure demonstrates that a significant majority of the region is not readily accessible by an interstate highway…even within a 15-mile radius.

Figure 25: Interstate Accessibility



Changes in international trade – Major geopolitical trends and passage of trade deals, such as the North American Free Trade Agreement (NAFTA) in 1993, and China's entry into the World Trade Organization

(WTO) in 2000 have brokered enormous changes in the state and regional economy. Over the past 25 years, China became a major manufacturer of consumer goods, a rise that coincided with the loss of manufacturing jobs. Just within the Northwest region, the five counties have shed 2,300 manufacturing jobs just since 2005. Loss of manufacturing jobs also tends to depress demand for non-manufacturing jobs, meaning that job losses are not just contained to manufacturing.

The results of the 2016 election have yet to fully wend their way into the economy. At the writing of this report, it is not fully known how policies being contemplated will reverse current trends, if at all. Manufacturing job losses over the past 20 years in states like Pennsylvania, Ohio, and Michigan have suppressed appetites on both sides of the political spectrum for additional trade deals, including the much-debated Trans Pacific Partnership (TPP).

Shipping lanes and changing supply chains – Events occurring thousands of miles from the Northwest PA region have very real implications for the movement of freight. For example, the $5 billion expansion of the Panama Canal in 2016 doubled the capacity of that waterway with the completion of a third set of locks to accommodate a new generation of ever-larger container ships. On the other side of the world in Egypt, improvements to the Suez Canal now allow for two-way travel. (Nicaragua is also exploring the construction of a new canal through that country that would be funded by the Chinese.) Some shippers are using Suez over Panama, while others ship to California ports and use transcontinental trains to move goods to the east coast. The land bridge option comes at a slightly higher cost, but with a time savings of just over a week that is particularly important for seasonal goods.

Still, in 2015 Panama set a record in the amount of cargo that passed through its locks. The largest ships that could navigate the canal (Panamax vessels) could carry 5,000 TEUs.[8] Newer ships with a carrying capacity of up to 13,000 TEUs are now able to use the canal (even though the very largest ships operating today can carry nearly 20,000 TEUs).

What does this mean for Northwest? Whether shippers from the Far East use Suez or Panama, the end result is that east coast ports will get busier. The ports of Baltimore, New York, and Norfolk have initiated plans to dredge their waterway channels and increase port depths. Within Pennsylvania, the $77 million dredging of the Delaware River Channel to 45 feet will allow for 10,000 TEU vessels to be able to call on ports in Southeast Pennsylvania. At a macro level, major truck and rail corridors between these east coast ports and the Northwest region should experience increased demand.

Loss in population – The region's population has declined by 4.8 percent since the turn of the century and by 2.7 percent just since the 2010 census. Fewer people translates into less consumption of goods, commodities, and services which may decrease freight activity. At a more macro level of analysis, the region is positioned directly between two growing "mega-regions," including the Northeast Megalopolis (which includes much of eastern Pennsylvania), and the Great Lakes region, which extends from Chicago

[8] Twenty-foot equivalent unit; used for units of cargo capacity on container ships and container terminals

eastward to Erie, Pittsburgh, and Altoona. The region could see increases in freight flows, as goods move within and between these major consumer markets.

Rail Safety – Rail safety is a primary concern for the region's railroads. The railroad operating environment is an inherently hazardous one. Railroads are frequently confronted with snowmobilers, ATVs, and pedestrians wearing headphones. Trespassing is also a leading cause of rail-related fatalities.

Truck Parking – Problems related to this are extremely complex. Federal hours-of-service regulations imposed by the Federal Motor Carrier Safety Administration permit long-haul truck operators to drive up to 11 hours in an on-duty window of 14 hours after being off-duty for a minimum of 10 consecutive hours. The 11-hour window of "revenue drive time" must frequently be cut short to allow drivers to search for parking. Thus, the issue of parking can make or break the productivity of the load. Having parking that is proximate to the final destination is critical in allowing motor carriers to get into and out of an area or distribution facility for greater efficiency. Most truckers prefer to stop at a private truck stop for their Federally-required 10-hour break, yet many of these truck stops are too far away from urban cores due to the availability and value of land. Private truck stops are preferred but many truckers end up parking on highway on-ramps or off-ramps. This creates challenges as shoulders are meant for temporary parking, and not constructed to handle these loads. In addition to the inevitable pavement distress that is caused, there are also many safety and environmental concerns with this practice. Additionally, there is no clear lead organization that is charged with providing a solution to this complex problem.

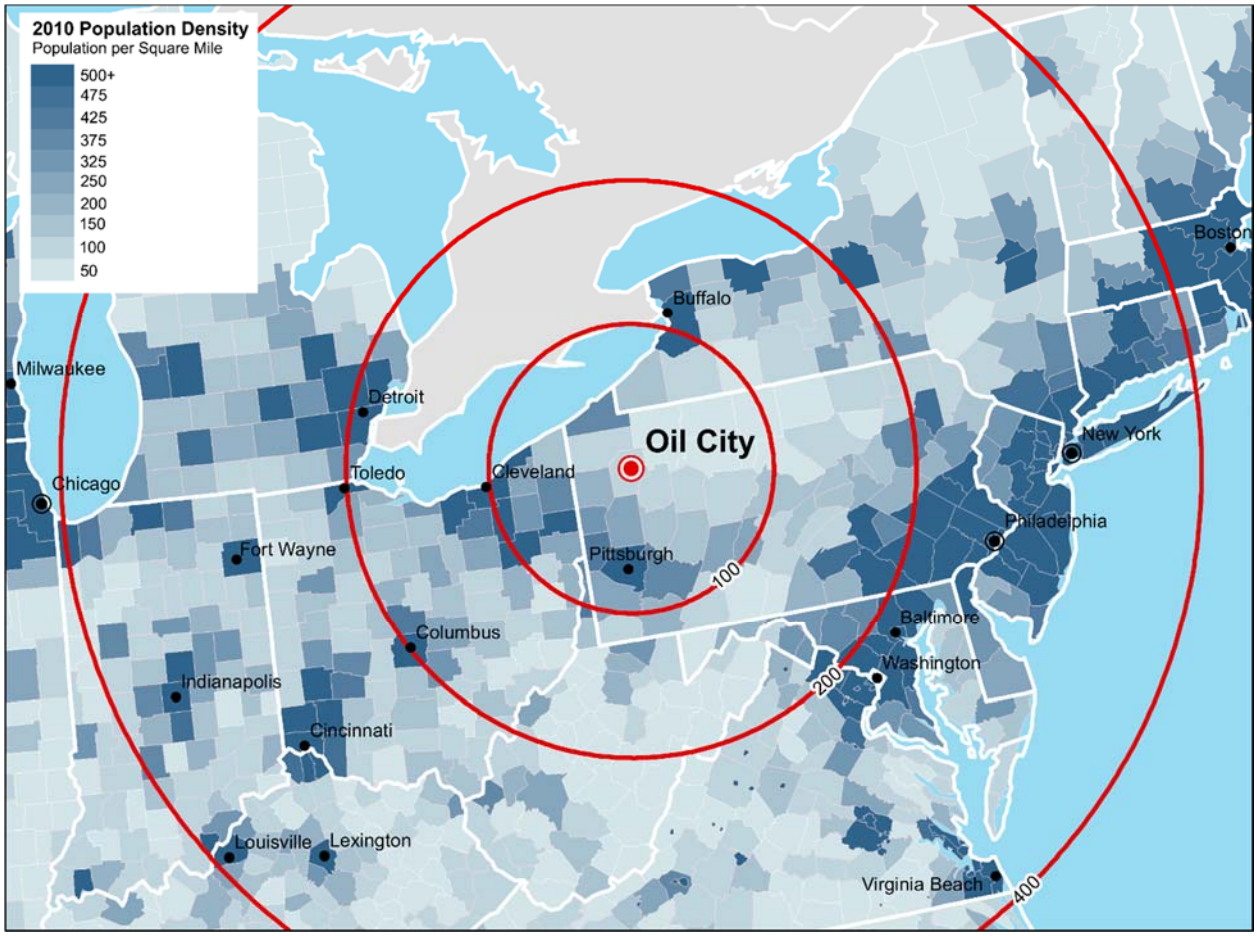
Several potential options range from investigating creative uses of right-of-way and looking at the potential of using large venues during off-peak hours, as well as the redevelopment of brownfield sites. Technology solutions are also needed to get real-time parking information pushed out to drivers to make them aware of available existing parking capacity. States can use their freight formula dollars as well as highway safety money to fund solutions to the truck parking challenge, and public-private partnership options can also be explored. "Jason's Law" – included as part of MAP-21 – dedicated Federal money to help construct, improve, or reopen commercial parking facilities along the NHS.

Connected and Highly Automated Commercial Vehicles – the first application of this emerging technology is expected to manifest itself within the transit and freight industries. Testing of highly automated commercial freight vehicles is already underway, with the benefits that platooning would have in increasing capacity, and decreasing the number of drivers that are needed in moving an increasing volume of freight. PennDOT policy regarding this restricts the testing of platooning to select trafficways, restricted to two commercial vehicles or three passenger vehicles (although additional vehicles can be added upon request). Testers must arrange for a demonstration with PennDOT staff prior to allowing additional vehicles in a platoon.[9]

[9] Platooning is the use of any equipment, device, or technology that allows a motor vehicle or series of motor vehicles to operate in an autonomous mode, while coupled or joined to a lead vehicle via a wireless connection in a caravan or motorcade.

Geographic Advantage – Northwest Pennsylvania is situated within 100 miles of major market areas in Buffalo, Cleveland, and Pittsburgh. Additionally, it is within a day's drive of Chicago, New York, Philadelphia, and Washington. The accompanying figure shows how much of the nation's major market areas are within reach of a day's drive of the Northwest PA region. These include international ports of entry in Baltimore, Philadelphia, and the Port of New York/New Jersey, as well as the Peace Bridge in Canada. Motor carriers from the Northwest region can reach over half of Canada's population within a same-day driving time.

Figure 26: Radius Map – Distance from Oil City



Aging Rail Lines – Rail needs to be maintained in a state of good repair. More and more rail cars exceed the 286,000-pound standard and up to 315,000 pounds is needed in order for rail carriers to remain competitive. Most Class I mainlines are capable of carrying 286,000-pound cars, while some can accommodate cars up to 315,000 pounds. Many older rail lines were designed and constructed to carry railcars weighing up to 263,000 pounds. Many smaller railroads do not have sufficient funds to maintain existing lines, or upgrade to the 286K standard. Bridges are primarily the delimiting factor.

Trailer widths – An issue affecting shippers and carriers statewide (not just in the Northwest Pennsylvania region) includes that of trailer widths. Once motor carriers get off of primary highways and onto four-digit SR routes, they have to go through what has been described as a “cumbersome” application process in order to approve 102” wide trailers. A trailer that is 96” wide is permitted anywhere, but they are no longer the standard, and in fact are now a special order. An option could be to make 102” trailers as standard, then post if not allowed.

Stakeholder Engagement

As part of the freight study's stakeholder engagement process, the Northwest Commission conducted a multi-pronged approach, which included facilitating four freight focus group meetings, targeted telephone interviews with businesses, and an online survey. A summary of the cross-cutting issues to emerge as a result of these outreach activities is summarized within this section.

Highway/Motor Carrier

Truck Parking – This is an issue statewide. A state TAC study performed on this topic is now over a decade old yet noted that existing truck stop locations were already operating at capacity. Some truckers park at the Wal-Mart in Clarion. This practice is not permitted although corporate policy regarding this is unclear. Truckers can be found parking on entrance and exit ramps to Interstate 80 throughout Clarion and Venango counties, despite the availability of truck stops in Brookville and Emlenton. With trucks pulling two trailers becoming more common, having sufficient locations to park these longer vehicles will be a growing concern. A restaurant off of the Cochranton/Greenwood exit from Interstate 79 (exit 141) has recently expanded into a truck stop.

Structurally Deficient Highway Bridges – There are nearly 150 state-owned bridges throughout the region that are classified as being structurally deficient. The rate of SD bridges within the region (7.8%) is on par with state averages, but avoiding them creates circuitous routes, adding time and cost for shippers and wear and tear on motor carriers. Local bridges are also problematic. The region has approximately 340 locally-owned bridges (greater than 20 feet in length), and of these, over 131 (39%) are structurally deficient. Getting local bridges on the regional TIP is difficult. In most cases, the district tries to address one local bridge per county a year.

Overhead Height Clearances – Stakeholders did not report widespread vertical clearance concerns, with the exception of the WNYP railroad bridge that spans US 6 in Columbus in Warren County.

Accessibility to the Interstate Network – Much of the region is farther than 15 miles from an interstate interchange. In areas such as Titusville and Warren, access to Interstate 80 is difficult. A study of the US 62 corridor north of Warren years ago identified improvements that resulted in some turning lanes at some of the corridor's intersections. Commercial and residential encroachment onto the highway makes widening difficult. When US 62 was reconstructed, New York State acquired a 200-foot wide right-of-way, while Pennsylvania bought only a 100-foot width, which has confined development. At one time there were plans to get freight traffic to the "T" with NY 60, and build a new road from there to Levant, NY. Updates to NY 60 would then carry freight traffic to Interstate 90 (and remove truck traffic from Falconer, NY). Presently, shippers within the City of Warren are within a 30-minute drive of Interstate 86, and 90 minutes of Interstate 80 at Clarion. An improved link to Interstate 86 would help the area's manufacturing industries.

There are also efforts aimed at improving access from the Greater Titusville area to Interstate 79 through individual spot improvements. Truck traffic to and from Titusville primarily occurs on two corridors from Interstate 79, including: PA 198 through Saegertown to PA 27 or PA 77; and PA 27 through Meadville.

Roadway Capacity – Pre-manufactured housing is a significant concern within Clarion County, with an estimated 550 workers employed within that industry. The industry is challenged with moving its products on narrow roadways. PennDOT has made spot improvements to horizontal and vertical curves on US 322 between Clarion and Cranberry, which has alleviated shipping within that corridor.

Incident Management – Incidents on Interstate 80 can sometimes create gridlock conditions on US 322 and within Clarion Borough. A recent relief route study that would have extended Second Avenue in Clarion was found not to be feasible with an estimated $18 million, 1,100-foot long bridge that would be needed to span Trout Run. Coordination among emergency management personnel and local police departments needs to be improved. Truckers use the PA 511 website to help monitor traffic and route trucks. Moreover, there are no dynamic message signs on Interstate 79 in Crawford County, although some do exist on Interstate 80 within the region.

Motor Carrier Overhead Costs – Electronic logs will become mandatory by December 2017, adding additional expense to motor carrier operations. The industry is also faced with a chronic shortage of drivers although training in the area is available at PA Pride outside Seneca, the New Castle School of Trades, and at Triangle Tech.

Permitting for Superloads – Stakeholders cited the permitting time for OS/OW loads as being more lengthy in Pennsylvania as opposed to neighboring Ohio. Times can vary as much as from several hours to obtain approval (in Ohio), to two to six weeks in Pennsylvania. The process is not automated, as each relevant PennDOT District must review each route being proposed to be used for transport. In another example, transporting a “superload” from New Castle to Warren required an extra three hours of travel time.

Rail Freight

Lack of Rail Service – The lack of rail service within Clarion County since the 1990s has been an economic development concern. The county is one of only several throughout Pennsylvania that have no such service. Lack of rail often discourages site selection consultants from seeking Clarion County as a business location.

Deficient Rail Bridges – In addition to highway bridges, railroad bridges also pose as a towering issue to the movement of freight. A major concern with the region’s railroads is their network of bridges, most of which were constructed between 1890 and 1915, and are usually the major limiting factor in the

maximum weight of railcar that can be handled. The old standard gross freight car weight limit of 263,000 lbs (263K) has been replaced, and shippers now expect to be able to ship railcars weighing 286,000 lbs (286K). An example of the bridge challenges faced by the region's railroads can be found in Crawford and Venango counties.

Three major freight shippers in Titusville, International Waxes, Charter Plastics, and Oil Creek Plastics have all upgraded their rail sidings at their own expense, and would be capable of receiving 286K rail cars if all of the region's rail bridges could handle them.

The Western New York & Pennsylvania Railroad's Oil City Branch and associated lines have 24 bridges, with all but two having sufficient rating for 286K. The two which cannot handle 286K are Sugar Creek Bridge OC-21.36 and Oil City Bridge OC-33.14. Bridge OC-21.36 is a 127-foot-long through-truss steel bridge that could be strengthened to meet 286K, at an approximate cost of $700,000. However, Bridge OC-33.14 is a 282 foot-long through truss iron bridge that cannot be strengthened, but will require replacement with a new bridge at an estimated cost of $5 to $7 million.

The Oil Creek & Titusville Lines (OCTL) has four major bridges crossing Oil Creek on its mainline between Titusville and its connection to the Western New York & Pennsylvania RR at Rouseville. In recent years, OCTL has replaced the decks on three of the four bridges, as well as replacing/repairing the supporting piers on Bridge 121.49. All these OCTL bridges rate for 286K, although Bridge 130.27 required strengthening to two panels of its bottom chord in 2014, and can only handle 286K with a 10MPH speed restriction. PennDOT recently awarded OCTL with a grant through Rail Freight Assistance Program to strengthen 12 additional panels on this bridge to improve its safety and allow for higher train speeds over the bridge. Work is slated to begin in either fall 2017, or spring 2018.

Bridge conditions outside of the region have also had serious implications for the region's economic development potential. A strong case in point involves a Norfolk Southern Railway bridge that crosses the Shenango River in the City of Sharon. The structure has a 263K weight limit, which limits freight coming into and out of the Northwest PA region. The posting and limited capacity of this bridge helped scupper an important economic development initiative in Crawford County at the Keystone Regional Industrial Park (exit 141 on I-79) that would have allowed for the creation of a facility to distribute nearly three million bushels of corn and soybeans annually. Without the ability to haul 286K carloads, the economics of operating a grain elevator facility out of the industrial park do not work.

Reliance on Freight Rail – Many shippers and receivers across the region would be compromised and less competitive without having a rail option. These include United Refining, Sasol Chemical, International Waxes, Franklin Industries, Charter Plastics, Oil Creek Plastics, Suit-Kote, Ainsworth Pets, and Consolidated Containers.

The region's railroads have invested in their lines in order to safely handle this freight traffic. In 2015 and 2016, WNYP, with the help of an $840,000 PennDOT RFAP grant, performed a $2 million tie and surfacing project between Meadville and Oil City. Over 22,000 ties and 5,000 tons of ballast were installed, which restored most of the line to 25 MPH operation. In 2017, WNYP plans to spend an

additional $350,000 of its own funds to install another 3,000 ties along the line to secure the safe operation of the line at 25 MPH over the next twenty-plus years.

In recent years, the OCTL, in addition to the previously mentioned bridge work, has also used PennDOT RFAP grants to significantly upgrade its 2.5-mile Fieldmore Springs industrial branch with new ties, heavier rail and new track switches, as well as tie replacement and curve-worn rail replacement on its mainline.

However, whereas track rehabilitation can be performed over a period of years, bridge replacement must be done at one time, and the huge costs of repairing or replacing bridges, create challenges for smaller railroads that do not have a high enough density of traffic to generate the revenues needed for such projects. Unlike highway projects for which detours around construction sites are readily available, many remaining rail lines and their communities have no redundant route options. Therefore, railroad bridge repair work must be done while maintaining traffic over the bridge, except for short periods of outages, and a bridge replacement means no rail traffic can move over that bridge to or from the communities beyond while the bridge is being replaced.

Aviation

Air Cargo – Venango Regional Airport is the region's primary provider of aviation services. The airport is currently able to provide basic air cargo service. There is a desire to handle more freight movement for area businesses, but the airport lacks adequate facilities to transfer between modes. The airport is in a prime location, with relatively good access to Interstates 79 and 80 via PA 8. There is interest in developing a business park on acreage that the County owns. Airport officials are interested in establishing relationships with area businesses that may be potential air freight users. The airport's plans to establish air freight service are conceptual and dependent upon documenting future demand. Landside connections to the airport are good, although travel through the City of Franklin can sometimes be slow.

The airport in Titusville is always looking for ways to grow. It is owned by the City and is privately managed. It is located in Cherrytree Township in Venango County.

Administration/Community Development

Project Solicitation – County planning directors have experienced mixed results when it comes to soliciting municipalities for projects for the transportation improvement program updates. Planners in Clarion County are not aware of any project needs or deficiencies currently being voiced by municipalities. Planners overall report diminished interest in the TIP solicitation process, despite efforts such as supervisors conventions that are held twice a year in Crawford County and monthly e-mail updates to municipalities on planning matters. Many rural areas of the region are challenged with

capacity issues and a lack of trained or paid staff. Turnover further complicates the TIP update process, as many municipalities need to reorient themselves every two years.

Shell's "Cracker" Plant – The construction of the ethylene cracker plant in Beaver County is widely expected to introduce changes to the region, both in workforce development needs, as well as in transportation. The region should look to capitalize on this development opportunity and strive to get ahead of the curve as it relates to preparing for the positive economic changes that the facility will potentially bring to the region.

Workforce Development – The commonwealth has set aside money for the development of a rural regional college for Cameron, Crawford, Elk, Erie, Forest, McKean, Potter, Venango, and Warren County. The intent is to provide a training center for the technical jobs the region wants to see being filled here in the region. An RFP to administer the college has been approved, with a site selected in Warren County for the administrative center. Education is a key variable in the region's economic development efforts and can bring future workers out of a path that may not be as lucrative. It is the first "community college-like" institution north of Interstate 80 aiming to provide affordable and accessible education opportunities for the region. There are plans to enroll its first students for fall 2017 classes.

Public Participation

The development of Pennsylvania's first-ever freight plan in 2016 included both public participation and stakeholder engagement. PennDOT employed an online survey platform in May 2014 to capture comments across a variety of topics, including freight concerns. Comments received through the survey process involving the Northwest PA region included the following:

PA On Track – Pennsylvania's Long Range Transportation Plan

Freight Concerns Noted By the Public within the Northwest PA Region

- **Roadway maintenance** - Clarion County Maintenance in PennDOT District 10-0 has an effective crack sealing program that has greatly reduced the number of potholes. This program should be adopted statewide.

  With problems on our interstate highways, more emphasis is needed on our primary and secondary roads. Once truckers know there are problems on the interstates they start looking at other roads to travel on. This puts additional weight and numbers on these roads that have less maintenance work done to them.

- **PA 68 Bypass** - A bypass is needed for PA 68 south of Clarion to Interstate 80. The existing roadway needs to be widened, realigned, with sidewalks. (Note: The Commission completed a detailed study of this corridor in 2016. The study recommended a mix of capital projects, operational improvements, and travel demand management strategies, including capacity expansion, additional connections to the surrounding street network, and other Transportation Demand Management strategies, and access management.)

- **Interstate maintenance** - Maintenance on Interstate 80 is extremely important.

- **Signing** - Better signing is needed to direct truck traffic.

- **Intersection improvement** – The intersection of PA 77/89 and SR 1024/Canadohta Lake Road west of Spartanburg needs to be realigned to improve safety.

- **Bridge maintenance** - Our region's bridges need to continue to be repaired and replaced.

- **Capacity expansion** - Extend the PA 8 Expressway from Interstate 80 south to Interstate 76.

- **Operations** - Eliminate traffic signals and replace with innovative intersections (e.g., roundabouts) wherever possible.

- **Capital project needs** - The concrete Works Progress Administration (WPA) wall along PA 66 needs to be replaced before it collapses and blocks the roadway.

- **First- and last-mile truck access** - Truck access off of PA 28 to Smuckers is needed to take truck traffic off residential streets in New Bethlehem.

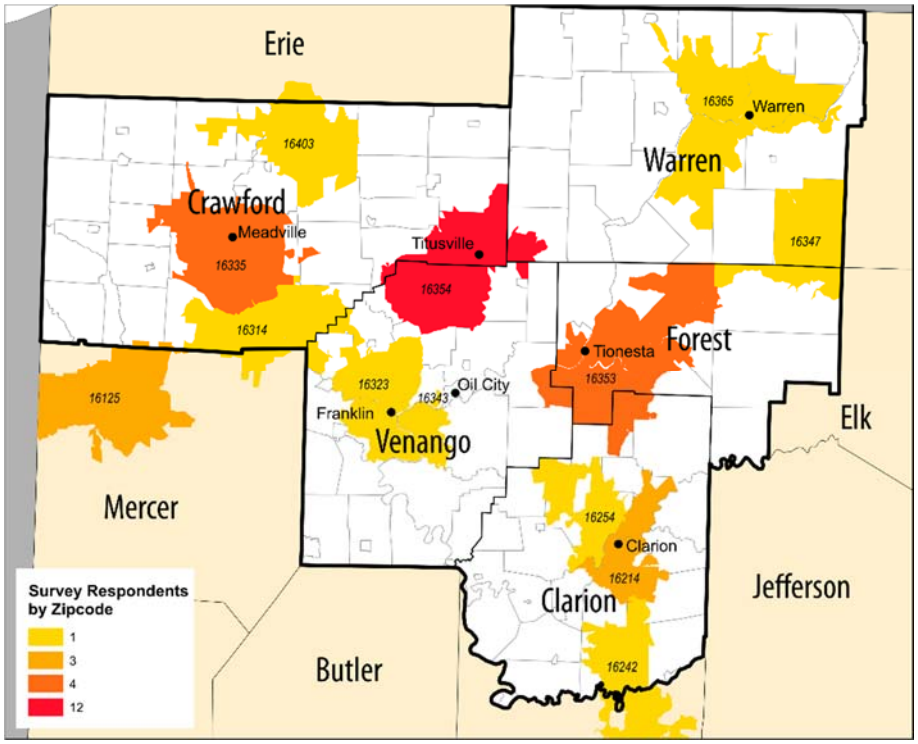
Online Survey

To supplement the in-person focus group meetings held throughout the RPO region, the Northwest Commission developed and administered an online survey. The Commission targeted the online survey to the region's freight stakeholders to solicit input about what freight issues most concern regional freight and businesses. There were a total of 58 survey respondents. The survey was organized into five sections, as described below.

1. **Welcome page**—Introduced the survey purpose
2. **Freight priorities page**—Prompted each participant to rank their top five categories of freight issues out of eight possible
3. **Strategy ratings page**—Expanded participants' top five priorities into a list of strategies associated with each, to be ranked on a five-point scale
4. **Interactive map page**—Prompted participants to place markers on a map of the region to show locations of six categories of freight issues
5. **Final questions page**—Asked optional questions about the participants themselves, such as email addresses, business zipcode, and other comments

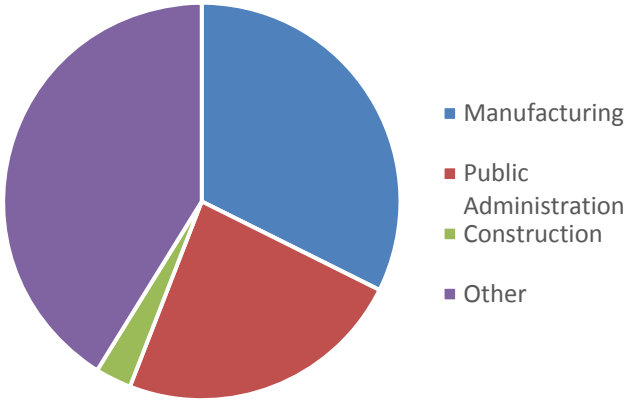
On the last page, each participant had the option of answering additional questions about themselves and their business, and 35 of the respondents filled out this section. The participants represented businesses across fourteen zip code regions, the most common being 16354 (Titusville) and 16335 (Meadville). **Figure 27** below shows the spatial distribution of survey respondents.

Figure 27: Survey Respondents' Business Zip Codes



The survey respondents represented multiple industries—a break-down of the industries represented can be seen in **Figure 28**.

Figure 28: Online Survey Industry Representation



In this section participants were also given the opportunity to give general comments about the state of freight transportation in the region that might not have been addressed by specific questions in the survey. Some of the issues that were raised include making roads safer in icy conditions, having sufficient signage for truck routes, and using transportation efficiency and safety to spur regional economic growth.

Freight Priorities

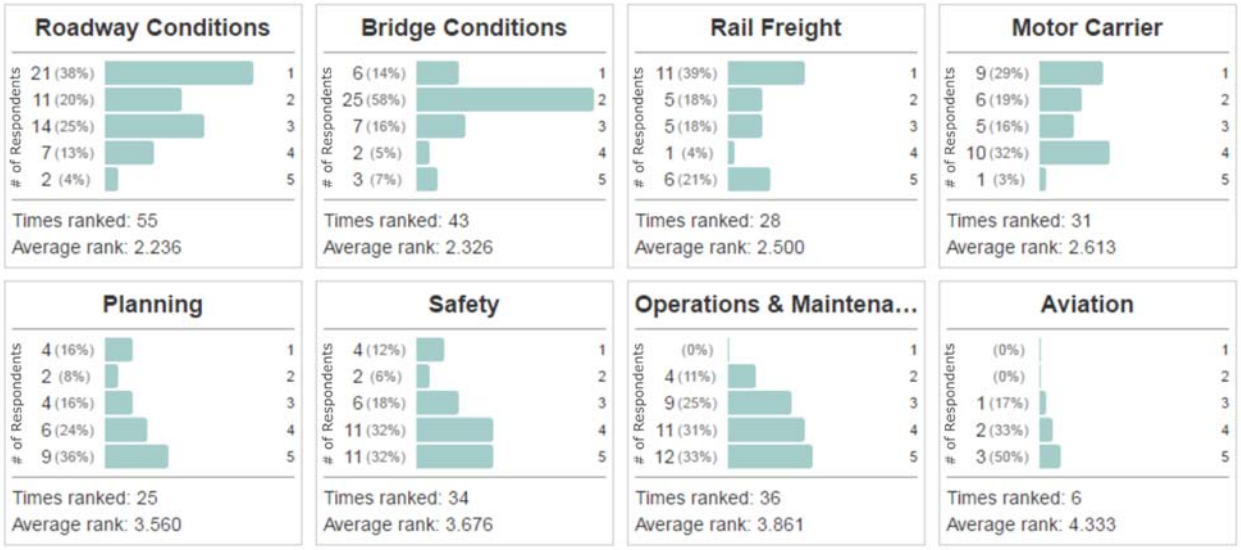
In the first section, survey participants were asked to choose up to five of their top freight priorities out of the eight listed, and then rank those top priorities from 1 to 5 ("1" representing an issue of primary importance). These freight priorities indicate which types of issues participants wanted most to be addressed. The priorities included:

- **Aviation** – The region supports the development of air cargo capability of the Venango Regional Airport (VRA) in Franklin.
- **Bridge Conditions** – State and local governments address our inventory of structurally deficient (SD) bridges. Currently 11.4 percent of all state-owned bridges in the region are considered "SD," and nearly 40 percent of locally-owned bridges carry that status.
- **Motor Carrier** – New capacity-adding projects are constructed, such as new roadways, lane additions, or new highway interchanges, to improve mobility and/or address congested bottlenecks.
- **Operations & Maintenance** – PennDOT and the region's municipalities work together to ensure the robust operation and maintenance of its highway freight system.

- **Planning** – The Northwest Commission maintains a current perspective of economic, demographic, planning, or freight market influences that drive freight movement trends within the five-county region.
- **Rail Freight –** Investments in rail freight projects are made when it is in the public interest, supporting projects that create and/or preserve jobs, and reduce impacts on the highway network.
- **Roadway Conditions** – We continue to address substandard pavement, improving the region's roads that currently have pavement rated as "poor" and in need of rehabilitation or reconstruction. We also address the more than 1,500 miles of state-owned roadway within the region that are posted and bonded.
- **Safety** – We continue to target safety funds in implementing the most cost-effective means toward improving highway safety.

Figure 29 below shows both how often and how highly the eight priorities were ranked.

Figure 29: Online Survey Freight Priorities Rankings



It is important to note that some priorities received high ratings among those who ranked them, despite being ranked as major priorities less frequently. To illustrate each priority's relative importance, **Table 26** lists the freight priorities first by average ranking, then by frequency of ranking.

Table 26: Freight Priorities: Average Rankings

Rank	Freight Priority	Average Rank	Freight Priority	Number of Times Ranked
1	Roadway Conditions	2.2	Roadway Conditions	55
2	Bridge Conditions	2.3	Bridge Conditions	43
3	Rail Freight	2.5	Operations & Maintenance	36
4	Motor Carrier	2.6	Safety	34
5	Planning	3.6	Motor Carrier	31
6	Safety	3.7	Rail Freight	28
7	Operations & Maintenance	3.9	Planning	25
8	Aviation	4.3	Aviation	6

Source: Northwest Commission

Freight Strategies

For each of the five freight priorities that respondents selected, they were given the opportunity to specify which strategies they preferred to see pursued under each priority. Each strategy was rated using a 5-star system (with "5" being the best), the results of which are shown below. In total, respondents rated 34 different strategies as shown in the following figures (and shown in no particular order).

Roadway Conditions

Secondary Roadways: 4.5 Stars
- Continue addressing pavement conditions on our secondary roadways.

Interstate Segments: 4.3 Stars
- Ensure our Interstates do not have any segments rated as "poor."

Simplify Permitting: 3.5 Stars
- Support ways of simplifying and streamlining permitting options.

Oversize/Overweight Loads: 3.5 Stars
- Partner with the private sector to designate future oversize and overweight corridors on secondary highways.

Clarify Posting/Bonding: 3.2 Stars
- Make the posting and bonding process more transparent to haulers.

Aviation

VRA Cargo Service: 4.3 Stars
- Pursue the development of air cargo service at Venango Regional Airport.

Essential Air Service: 4.3 Stars
- Maintain Essential Air Service at Venango Regional Airport.

Business Park: 3.8 Stars
- Develop adjacent county-owned property into a business park.

Operations & Maintenance

Congestion & Bottlenecks: 4.0 Stars
- Support highway improvements that address congestion bottlenecks.

Traffic Signal Timing: 4.0 Stars
- Ensure all traffic signals are properly timed and coordinated.

Use of Technology: 3.9 Stars
- Support use of technology in improving safety and efficiency of freight movement, including traveler information to truckers, truck parking availability, changing conditions, etc.

Targeted Studies: 3.5 Stars
- Supplement the regional freight study with targeted studies of specific freight problem areas or corridors, where warranted.

Planning

Monitor Funding: 3.8 Stars
- Monitor availability of Federal, state, and local funding sources for freight projects.

Planning & Programming: 3.6 Stars
- Consider freight concerns and interests in the planning and programming process

Policy & Regulation: 3.5 Stars
- Remain abreast of Federal policy and regulatory influences impacting freight.

Ethane Cracker Plant: 3.2 Stars
- Follow the construction of the ethane cracker plant in Beaver County.

Respond to Coal Declines: 2.8 Stars
- Coordinate with highway and rail stakeholders on declines in coal traffic.

Bridge Conditions

SD Bridge Reduction: 4.4 Stars
- Continue reducing the number of structurally deficient bridges on our Interstates and US Routes that carry the most freight.

Local Bridges: 4.3 Stars
- Coordinate with local government on local bridge needs, particularly on critical first- and last-mile connectors.

Weight-Restricted Bridges: 3.8 Stars
- Address weight-restricted bridges.

Motor Carrier

Investment Focus: 4.2 Stars
- Focus investments on Interstates and US Routes that carry the most freight volumes.

Connect Rural Areas: 4.0 Stars
- Make spot improvements to better connect rural areas to the Interstates.

Design: 4.0 Stars
- Infrastructure designed for ease of truck movements (generous turning radii, truck lanes, bypasses, etc.).

Truck Climbing Lanes: 3.5 Stars
- Add truck climbing lanes where needed.

Motor Truck Association: 2.9 Stars
- Create a chapter of the PA Motor Truck Association for Northwest PA.

Rail Freight

Rail Freight Service: 4.6 Stars
- Preserve rail corridors for freight service.

State Grant Funding: 4.3 Stars
- Assist area railroads in providing local match dollars to obtain state grant funds.

Weight-Restricted Bridges: 4.2 Stars
- Address weight-restricted railroad bridges.

Service Expansion: 4.2 Stars
- Explore potential rail service expansions with counties and economic development agencies.

At-Grade Crossing: 3.6 Stars
- Collaborate with PennDOT in prioritizing safety improvement needs at at-grade railroad crossings.

Safety

HSIP Funding: 3.8 Stars
- Target Highway Safety Improvement Program dollars on identified "hotspots" for truck crash locations.

Safety Audits: 3.7 Stars
- Perform roadway safety audits to correct safety problems on high-priority freight corridors.

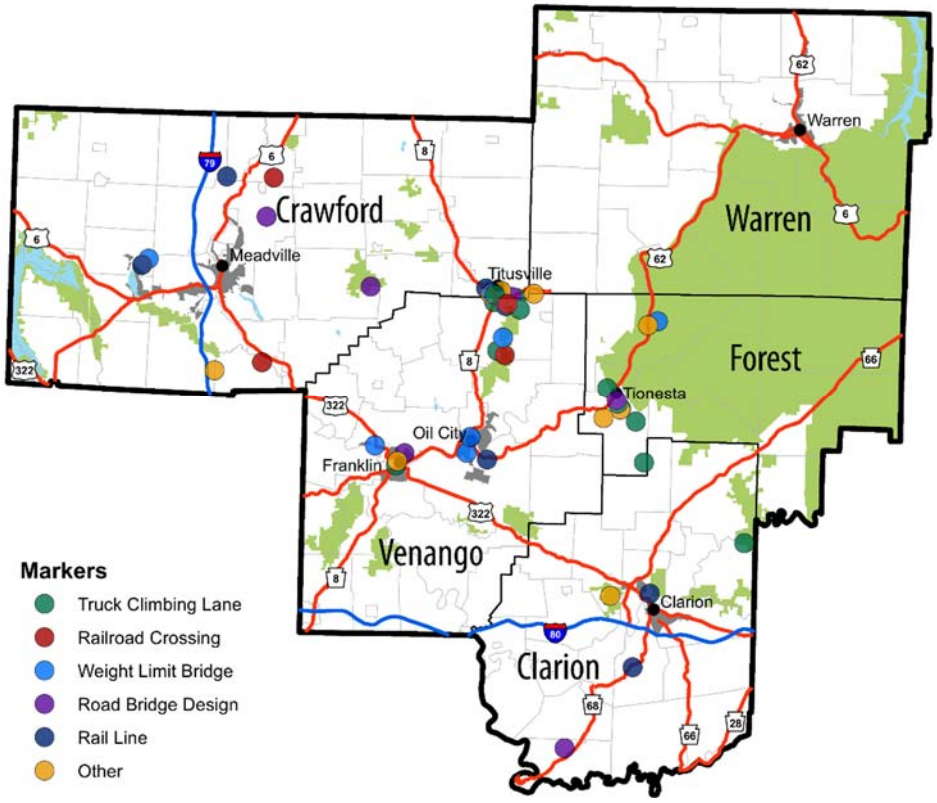
Incident Management: 3.7 Stars
- Improve how incidents are handled on I-79 and I-80. Ensure the highest level of emergency response possible.

Truck Parking: 3.5 Stars
- Provide parking for truckers so they can comply with federal hours of service regulations, and pull off the road to rest or avoid congestion.

Interactive Map

A third feature of the online survey provided respondents with an opportunity to interact with an online map. The feature allowed users to identify specific freight issues or concerns located across the region. Survey respondents left a total of 75 markers on the interactive map (**Figure 30**), with corresponding comments. The following bullets summarize the comments received from survey respondents.

Figure 30: Interactive Map Markers



Truck Climbing Lane Needs

- Near SR 1001/Gravel Lick Road in Clarion County
- SR 4001/Tionesta Road outside Tionesta Borough
- PA 8 south of Titusville
- PA 27/Plank Road east of Titusville
- PA 36/Tionesta Dam Hill
- Fieldmore Hill

Railroad Crossings

- Railroad crossings in Titusville need work

- Railroad crossings in Cambridge Springs
- Rail crossing at Shaws Landing near Cochranton has limited site distance on a high traffic road.

Bridge Weight Limits

- Village of Endeavor, Forest County
- South Franklin Street, Titusville
- Perry Street Bridge in Titusville is in poor condition.
- There are several railroad bridges in northern Mercer County that have weight limitations that are preventing more materials to move through the region by rail. Metals, ores, grains and other goods must travel via truck as a result - inhibiting opportunities to fully utilize the rail systems available from the Great Lakes to the industrial centers in Ohio and Pennsylvania.

Roadway/Bridge Design Issues

- Huson Road outside of Saegertown
- PA 27 East signs are hard to understand for out of town drivers (on PA 8 NB approach to Titusville)
- One way streets in Titusville are hard to understand for out of town drivers.
- PA 27 east of Titusville
- The Franklin Street (PA 8) bridge in Titusville spanning Oil Creek needs to be replaced with one that can handle over-weight / over-dimensioned loads. The steel arch bridge is now over 75 years old (1940) and is structurally deficient.
- It is difficult for large trailers to turn from 15th Street to Liberty Street in the City of Franklin. A business bypass to PA 417 would help to address any safety hazards associated with this congested area.

Rail Line

- An open and general use public load facility for inbound rail cargo is needed.
- There is a low weight restriction on a rail bridge outside of the region near Sharon. It is negatively impacting site and job development at a site in Greenwood Township, Crawford County.
- Maintaining good rail infrastructure on OCTL and WNYP railroads between Meadville and Titusville is critical.
- Alternate/Truck PA 8 at Perry Street needs crossing rebuilt to remedy damage from heavy truck traffic.
- WNYP RR bridge OC-33.14 in Oil City over Oil Creek needs replacing in order to allow Oil City and Titusville industries to receive 286,000 lb railcars.
- WNYP RR bridge 21.36 needs strengthening in order to allow 286,000 lb railcars to be delivered to industries in Franklin, Oil City, and Titusville.

- A pressing concern regarding railroad infrastructure in the Franklin, Oil City and Titusville region includes the inability to ship railcars to/from Franklin, Oil City, and Titusville with a gross weight over 263,000 lbs (263K).

Other Freight Concerns

- There is a significant need for truck/trailer parking between Meadville and Greenville - truckers would be directed to these zones prior to their appointment times at local manufacturers rather than congesting rural roads, streets and larger retail parking lots. The Greenville or Cochranton exits of I-79 would be ideal for such a space, or truck stop.
- There are storm water issues on PA 36 south of Tionesta.
- There are sight distance issues at the intersection of US 62 and PA 666 in Forest County.
- Roadway conditions on PA 8 through Titusville are poor.
- There are no easy instructions for drivers coming into Titusville. Also, trucks should not have to go past the middle school.

Literature Review

Several reports and studies were examined as part of the study process. Below provides a brief description of each as well as its relevance to the Northwest PA region.

- **Regional Freight Analysis (2006)** – The Commission conducted its first regional freight planning effort over a decade ago. The study analyzed both inbound and outbound freight movements by commodity for each of the five member counties. The study acknowledged the region's reliance on its roadway network, and recommended that the roadway network, particularly the NHS, be well maintained. Despite this, the study also acknowledged that some regional businesses would not survive without rail freight access. The study concluded that the region is a net exporter of freight. Major commodities being moved within the region include petroleum products, modular homes, machined metal products, sand and gravel, and lumber.

- **Truck Parking in Pennsylvania (2007) –** While the Pennsylvania State Transportation Advisory Committee (TAC) completed its landmark study on truck parking a decade ago, it remains one of the definitive works on the subject within the state. The report examined the trends and issues facing the state, including expected growth in truck activity, lack of parking capacity, and revised Federal hours-of-service regulations. Using survey data, along with a review of current best practices and interviews with other states and stakeholders, TAC recommended a 12-point strategy that would expand parking capacity, eliminate unsafe parking practices, and foster public private partnerships.

  The study revealed that many truck parking facilities in the region are near, at, or over capacity, often resulting in motor carriers parking along shoulders and interchanges. The study identified I-79 from Interstate 80 to Erie as a top corridor statewide where there is a truck parking shortfall.

- **Titusville Truck Study (2009)** – This study summarizes a review of existing truck traffic, future truck projections, and truck-related improvement options for the City of Titusville in Crawford County. Titusville's mixed development patterns have generated many benefits for the city and its residents, but have also resulted in an increase in truck volumes and more conflicts between trucks, cars, and pedestrians. Much of the roadway system in Titusville also pre-dates the emergence of modern design standards for today's larger tractor-trailer trucks, so trucks often have difficulties navigating through town due to narrow roads and intersections, on-street parking, or utilities close to the roadway. Rail activities, steep grades approaching Titusville, and pass-through trucks destined to or from neighboring communities compound the problem.

  The study process resulted in the development of a set of implementable and cost-effective solutions to better accommodate the city's truck traffic. Potential improvement options included general improvement options, ranging from signing, operational improvements, and planning in general, to area-specific improvement options, including: Skyline Industrial Park; Titusville Industrial Park; Titusville Opportunity Park; and downtown Titusville.

- **PA On Track: Pennsylvania's Long Range & Comprehensive Freight Movement Plan (2016) –** PA On Track represents Pennsylvania's first-ever comprehensive freight movement plan. Completed in summer 2016, the Comprehensive Freight Movement Plan was a multi-faceted plan that addressed several freight planning concerns, including: a profile of the state's freight infrastructure, a set of strategic directions (including related performance measures), an analysis of commodity flows by county, by mode, for multiple forecast years. The planning process also included the development of several freight planning tools available for use by both PennDOT and its family of planning partners. These included the availability of raw commodity flow data from Transearch, an updated state travel demand model, a Commodity Information Management System (CIMS) Tool, and a Commodity Flow Tool. PennDOT also provided the Northwest Commission and its counterparts with the results of its May 2014 statewide public participation process, which culminated in a geo-referenced map with over 7,000 points of information left by Pennsylvanians through an online platform.

  The plan process also included the acquisition of long-haul truck data from the American Transportation Research Institute (ATRI) that helped identify truck bottlenecks and the top 100 freight generating locations within the state. These data points are included elsewhere within this study report.

Appendix A: Commodity Flow Tables

Freight data as compiled by IHS Global Insight was acquired by PennDOT and made available for use in this freight study report. It should be noted that the values shown are *modeled numbers*, and are not intended to be exact representations of the tonnage and value of commodities being moved.

For example, data related to rail freight were developed by IHS by using a combination of Surface Transportation Board (STB) and modeled data. The waybill data is a sample of carload waybills for all U.S. rail traffic submitted by those rail carriers terminating 4,500 or more revenue carloads annually. Therefore, to account for fewer than 4,500 carloads, it is necessary to model some of the data. Therefore, local knowledge is essential when considering these numbers for planning purposes.

Values are shown for each county by both tonnage and value, and for both 2011 and the forecast year of 2040. Tables show both originating as well as destination freight, by county.

2011 Freight Origins – Clarion County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Origins by Truck					
Broken Stone or Riprap	1,075,671	53%	Glass Containers	$105	20%
Bituminous Coal	203,698	10%	Miscellaneous Plastic Products	$56	11%
Glass Containers	153,076	7%	Miscellaneous Field Crops	$48	9%
Lumber or Dimension Stock	134,564	7%	Prefab Wood Buildings	$33	6%
Miscellaneous Field Crops	88,038	4%	Fabricated Structural Metal Products	$31	6%
Grain	70,683	3%	Biscuits, Crackers or Pretzels	$27	5%
Miscellaneous Wood Products	46,016	2%	Dairy Farm Products	$22	4%
Primary Forest Materials	39,765	2%	Miscellaneous Wood Products	$21	4%
Dairy Farm Products	25,965	1%	Trailer Coaches	$21	4%
Miscellaneous Sawmill or Planing Mill	25,933	1%	Lumber or Dimension Stock	$19	4%
All Other Commodities	181,075	9%	All Other Commodities	$135	26%
2011 Origins by Rail					
NA					
2011 Origins by Air					
NA					
2011 Origins by Water					
NA					
Total 2011 Origins					
Broken Stone or Riprap	1,075,671	53%	Glass Containers	$105	20%
Bituminous Coal	203,698	10%	Miscellaneous Plastic Products	$56	11%
Glass Containers	153,078	7%	Miscellaneous Field Crops	$48	9%
Lumber or Dimension Stock	134,564	7%	Prefab Wood Buildings	$33	6%
Miscellaneous Field Crops	88,038	4%	Fabricated Structural Metal Products	$31	6%
Grain	70,683	3%	Biscuits, Crackers or Pretzles	$27	5%
Miscellaneous Wood Products	46,020	2%	Dairy Farm Products	$22	4%
Primary Forest Materials	39,765	2%	Miscellaneous Wood Products	$21	4%
Dairy Farm Products	25,965	1%	Trailer Coaches	$21	4%
Miscellaneous Sawmill or Planing Mill	25,933	1%	Lumber or Dimension Stock	$19	4%
All Other Commodities	181,097	9%	All Other Commodities	$135	26%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Origins – Crawford County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Origins by Truck					
Broken Stone or Riprap	1,171,977	25%	Petroleum Refining Products	$586	24%
Gravel or Sand	1,064,340	23%	Miscellaneous Metal Work	$123	5%
Petroleum Refining Products	641,352	14%	Dog,cat or Other Pet Food,nec	$112	5%
Dog,cat or Other Pet Food,nec	265,169	6%	Dairy Farm Products	$110	4%
Grain	249,410	5%	Miscellaneous Plastic Products	$109	4%
Miscellaneous Field Crops	152,582	3%	Adhesives	$99	4%
Primary Forest Materials	152,028	3%	Special Dies,tools,jigs,etc.	$84	3%
Ready-mix Concrete, Wet	143,931	3%	Miscellaneous Field Crops	$83	3%
Dairy Farm Products	127,307	3%	Bolts, Nuts, Screws, Etc.	$83	3%
Miscellaneous Sawmill or Planing Mill	106,938	2%	Edge or Hand Tools	$82	3%
All Other Commodities	631,900	13%	All Other Commodities	$1,013	41%
2011 Origins by Rail					
Railroad Cars	4,800	37%	Railroad Cars	$5	45%
Oil Kernels, Nuts or Seeds	4,752	36%	Petroleum Refining Products	$4	39%
Petroleum Refining Products	3,280	25%	Oil Kernels, Nuts or Seeds	$1	13%
Miscellaneous Fabricated Wire Products	93	1%	Miscellaneous Fabricated Wire Products	$0	2%
Metal Scrap or Tailings	53	0%	Chemical Preparations, Nec	$0	1%
Primary Iron or Steel Products	28	0%	Primary Iron or Steel Products	$0	0%
Chemical Preparations, Nec	26	0%	Metal Scrap or Tailings	$0	0%
Lumber or Dimension Stock	24	0%	Lumber or Dimension Stock	$0	0%
Potassium or Sodium Compound	6	0%	Potassium or Sodium Compound	$0	0%
Chemical or Petroleum Waste	3	0%	Chemical or Petroleum Waste	$0	0%
All Other Commodities	2	0%	All Other Commodities	$0	0%
2011 Origins by Air					
NA					
2011 Origins by Water					
NA					
Total 2011 Origins					
Broken Stone or Riprap	1,171,977	25%	Petroleum Refining Products	$590	24%
Gravel or Sand	1,064,340	23%	Miscellaneous Metal Work	$123	5%
Petroleum Refining Products	644,634	14%	Dog,cat or Other Pet Food,nec	$112	5%
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Primary Forest Materials	152,028	3%	Special Dies,tools,jigs,etc.	$84	3%
Ready-mix Concrete, Wet	143,931	3%	Miscellaneous Field Crops	$83	3%
Dairy Farm Products	127,307	3%	Bolts, Nuts, Screws, Etc.	$83	3%
Miscellaneous Sawmill or Planing Mill	106,938	2%	Edge or Hand Tools	$82	3%
All Other Commodities	641,691	14%	All Other Commodities	$1,020	41%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Origins – Forest County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Origins by Truck					
Gravel or Sand	100,178	53%	Miscellaneous Sawmill or Planing Mill	$27	34%
Miscellaneous Sawmill or Planing Mill	45,981	25%	Miscellaneous Metal Work	$18	22%
Primary Forest Materials	11,627	6%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$8	10%
Grain	7,509	4%	Shipping Containers	$8	10%
Miscellaneous Field Crops	6,416	3%	Miscellaneous Field Crops	$4	4%
Miscellaneous Metal Work	6,304	3%	Miscellaneous Freight Shipments	$3	4%
Dairy Farm Products	2,037	1%	Fabricated Structural Metal Products	$3	4%
Shipping Containers	1,874	1%	Mail and Express Traffic	$2	3%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	1,690	1%	Dairy Farm Products	$2	2%
Fabricated Structural Metal Products	1,127	1%	Kitchen Cabinets,wood	$2	2%
All Other Commodities	2,839	2%	All Other Commodities	$4	5%
2011 Origins by Rail					
NA					
2011 Origins by Air					
NA					
2011 Origins by Water					
NA					
Total 2011 Origins					
Gravel or Sand	100,178	53%	Miscellaneous Sawmill or Planing Mill	$27	34%
Miscellaneous Sawmill or Planing Mill	45,981	25%	Miscellaneous Metal Work	$18	22%
Primary Forest Materials	11,627	6%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$8	10%
Grain	7,509	4%	Shipping Containers	$8	10%
Miscellaneous Field Crops	6,416	3%	Miscellaneous Field Crops	$4	4%
Miscellaneous Metal Work	6,304	3%	Miscellaneous Freight Shipments	$3	4%
Dairy Farm Products	2,037	1%	Fabricated Structural Metal Products	$3	4%
Shipping Containers	1,874	1%	Mail and Express Traffic	$2	3%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	1,690	1%	Dairy Farm Products	$2	2%
Fabricated Structural Metal Products	1,127	1%	Kitchen Cabinets,wood	$2	2%
All Other Commodities	2,839	2%	All Other Commodities	$4	5%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Origins – Venango County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Origins by Truck					
Flat Glass	397,432	26%	Mining Machinery or Parts	$427	22%
Warehouse & Distribution Center	378,503	24%	Warehouse & Distribution Center	$424	22%
Primary Iron or Steel Products	236,179	15%	Primary Iron or Steel Products	$318	16%
Gravel or Sand	100,177	6%	Primary Metal Products, Nec	$123	6%
Primary Forest Materials	72,707	5%	Flat Glass	$110	6%
Primary Metal Products, Nec	57,455	4%	Surgical or Medical Instruments	$88	4%
Grain	44,844	3%	Industrial Controls or Parts	$82	4%
Mining Machinery or Parts	38,116	2%	Current Carrying Wiring Equipment	$65	3%
Miscellaneous Field Crops	37,688	2%	Miscellaneous Metal Work	$51	3%
Asphalt Paving Blocks or Mix	27,446	2%	Miscellaneous General Industrial	$32	2%
All Other Commodities	167,800	11%	All Other Commodities	$246	13%
2011 Origins by Rail					
Metal Scrap or Tailings	4,028	89%	Metal Scrap or Tailings	$1	69%
Primary Iron or Steel Products	498	11%	Primary Iron or Steel Products	$1	31%
Chemical or Petroleum Waste	1	0%	Chemical or Petroleum Waste	$0	0%
Rubber or Plastic Scrap	0	0%	Rubber or Plastic Scrap	$0	0%
All Other Commodities	0	0%	All Other Commodities	$0	0%
2011 Origins by Air					
NA					
2011 Origins by Water					
NA					
Total 2011 Origins					
Flat Glass	397,432	25%	Mining Machinery or Parts	$427	22%
Warehouse & Distribution Center	378,503	24%	Warehouse & Distribution Center	$424	22%
Primary Iron or Steel Products	236,677	15%	Primary Iron or Steel Products	$318	16%
Gravel or Sand	100,177	6%	Primary Metal Products, Nec	$123	6%
Primary Forest Materials	72,707	5%	Flat Glass	$110	6%
Primary Metal Products, Nec	57,455	4%	Surgical or Medical Instruments	$88	4%
Grain	44,844	3%	Industrial Controls or Parts	$82	4%
Mining Machinery or Parts	38,116	2%	Current Carrying Wiring Equipment	$65	3%
Miscellaneous Field Crops	37,688	2%	Miscellaneous Metal Work	$51	3%
Asphalt Paving Blocks or Mix	27,446	2%	Miscellaneous General Industrial	$32	2%
All Other Commodities	171,832	11%	All Other Commodities	$247	13%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Origins – Warren County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Origins by Truck					
Petroleum Refining Products	11,017,059	86%	Petroleum Refining Products	$10,039	85%
Liquefied Gases, Coal or Petroleum	802,849	6%	Liquefied Gases, Coal or Petroleum	$652	6%
Miscellaneous Coal or Petroleum Products	260,218	2%	Warehouse & Distribution Center	$251	2%
Warehouse & Distribution Center	223,872	2%	Miscellaneous Coal or Petroleum Products	$204	2%
Miscellaneous Field Crops	74,950	1%	Iron or Steel Forgings	$147	1%
Iron or Steel Forgings	73,581	1%	Miscellaneous Plastic Products	$122	1%
Dog,cat or Other Pet Food,nec	49,163	0%	Miscellaneous Field Crops	$41	0%
Grain	46,754	0%	Tires or Inner Tubes	$37	0%
Miscellaneous Plastic Products	37,151	0%	Dairy Farm Products	$31	0%
Dairy Farm Products	36,220	0%	Steel Wire, Nails or Spikes	$29	0%
All Other Commodities	181,256	1%	All Other Commodities	$236	2%
2011 Origins by Rail					
Petroleum Refining Products	423,484	90%	Petroleum Refining Products	$513	91%
Liquefied Gases, Coal or Petroleum	33,488	7%	Liquefied Gases, Coal or Petroleum	$34	6%
Primary Iron or Steel Products	10,720	2%	Primary Iron or Steel Products	$17	3%
Chemical or Petroleum Waste	3,640	1%	Miscellaneous Coal or Petroleum Products	$0	0%
Miscellaneous Coal or Petroleum Products	614	0%	Railroad Cars	$0	0%
Railroad Cars	37	0%	Metal Scrap or Tailings	$0	0%
Metal Scrap or Tailings	9	0%	Chemical or Petroleum Waste	$0	0%
All Other Commodities	0	0%	All Other Commodities	$0	0%
2011 Origins by Air					
NA					
2011 Origins by Water					
NA					
Total 2011 Origins					
Petroleum Refining Products	11,440,610	86%	Petroleum Refining Products	$10,552	85%
Liquefied Gases, Coal or Petroleum	836,340	6%	Liquefied Gases, Coal or Petroleum	$685	6%
Miscellaneous Coal or Petroleum Products	260,840	2%	Warehouse & Distribution Center	$251	2%
Warehouse & Distribution Center	223,872	2%	Miscellaneous Coal or Petroleum Products	$205	2%
Miscellaneous Field Crops	74,950	1%	Iron or Steel Forgings	$147	1%
Iron or Steel Forgings	73,581	1%	Miscellaneous Plastic Products	$122	1%
Dog,cat or Other Pet Food,nec	49,163	0%	Miscellaneous Field Crops	$41	0%
Grain	46,754	0%	Tires or Inner Tubes	$37	0%
Miscellaneous Plastic Products	37,151	0%	Dairy Farm Products	$31	0%
Dairy Farm Products	36,220	0%	Steel Wire, Nails or Spikes	$29	0%
All Other Commodities	195,668	1%	All Other Commodities	$252	2%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Destinations – Clarion County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Destinations by Truck					
Broken Stone or Riprap	202,155	22%	Warehouse & Distribution Center	$131	24%
Gravel or Sand	158,215	17%	Plastic Matter or Synthetic Fibers	$47	8%
Warehouse & Distribution Center	117,158	13%	Motor Vehicles	$30	5%
Primary Forest Materials	71,785	8%	Petroleum Refining Products	$22	4%
Grain	32,981	4%	Distilled or Blended Liquors	$10	2%
Petroleum Refining Products	24,614	3%	Primary Forest Materials	$9	2%
Plastic Matter or Synthetic Fibers	23,107	3%	Containers or Boxes,paper	$8	1%
Ready-mix Concrete, Wet	18,643	2%	Motor Vehicle Parts or Accessories	$7	1%
Asphalt Paving Blocks or Mix	17,213	2%	Miscellaneous Sawmill or Planing Mill	$7	1%
Lumber or Dimension Stock	15,724	2%	Pharmaceuticals	$7	1%
All Other Commodities	233,734	26%	All Other Commodities	$272	49%
2011 Destinations by Rail					
NA					
2011 Destinations by Air					
NA					
2011 Destinations by Water					
NA					
Total 2011 Destinations					
Broken Stone or Riprap	202,155	22%	Warehouse & Distribution Center	$131	24%
Gravel or Sand	158,215	17%	Plastic Matter or Synthetic Fibers	$47	8%
Warehouse & Distribution Center	117,158	13%	Motor Vehicles	$30	5%
Primary Forest Materials	71,785	8%	Petroleum Refining Products	$22	4%
Grain	32,981	4%	Distilled or Blended Liquors	$10	2%
Petroleum Refining Products	24,614	3%	Primary Forest Materials	$9	2%
Plastic Matter or Synthetic Fibers	23,107	3%	Containers or Boxes,paper	$8	1%
Ready-mix Concrete, Wet	18,643	2%	Motor Vehicle Parts or Accessories	$7	1%
Asphalt Paving Blocks or Mix	17,213	2%	Miscellaneous Sawmill or Planing Mill	$7	1%
Lumber or Dimension Stock	15,724	2%	Pharmaceuticals	$7	1%
All Other Commodities	233,761	26%	All Other Commodities	$272	49%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Destinations – Crawford County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Destinations by Truck					
Broken Stone or Riprap	316,711	16%	Warehouse & Distribution Center	$283	19%
Warehouse & Distribution Center	253,196	13%	Plastic Matter or Synthetic Fibers	$118	8%
Gravel or Sand	235,605	12%	Primary Iron or Steel Products	$65	4%
Primary Forest Materials	234,764	12%	Motor Vehicles	$59	4%
Grain	128,456	6%	Petroleum Refining Products	$55	4%
Petroleum Refining Products	60,372	3%	Processed Milk	$38	2%
Plastic Matter or Synthetic Fibers	58,044	3%	Miscellaneous Prim Nonferr Smelter Products	$32	2%
Primary Iron or Steel Products	50,030	2%	Miscellaneous Industrial Inorganic Chemicals	$30	2%
Processed Milk	43,043	2%	Primary Forest Materials	$29	2%
Ready-mix Concrete, Wet	38,958	2%	Miscellaneous Metal Work	$27	2%
All Other Commodities	588,190	29%	All Other Commodities	$792	52%
2011 Destinations by Rail					
Potassium or Sodium Compound	56,080	33%	Plastic Matter or Synthetic Fibers	$84	74%
Nonmetal Minerals, Processed	39,880	23%	Potassium or Sodium Compound	$18	16%
Plastic Matter or Synthetic Fibers	38,960	23%	Flour or Other Grain Mill Products	$4	3%
Gravel or Sand	23,836	14%	Malt Liquors	$4	3%
Flour or Other Grain Mill Products	8,080	5%	Nonmetal Minerals, Processed	$3	3%
Malt Liquors	3,920	2%	Petroleum Refining Products	$0	0%
Petroleum Refining Products	435	0%	Gravel or Sand	$0	0%
Cyclic Intermediates or Dyes	111	0%	Cyclic Intermediates or Dyes	$0	0%
Distilled or Blended Liquors	104	0%	Railroad Cars	$0	0%
Wet Corn Milling or Milo	99	0%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$0	0%
All Other Commodities	191	0%	All Other Commodities	$0	0%
2011 Destinations by Air					
NA					
2011 Destinations by Water					
NA					
Total 2011 Destinations					
Broken Stone or Riprap	316,711	15%	Warehouse & Distribution Center	$283	17%
Gravel or Sand	259,442	12%	Plastic Matter or Synthetic Fibers	$203	12%
Warehouse & Distribution Center	253,196	12%	Primary Iron or Steel Products	$65	4%
Primary Forest Materials	234,764	11%	Motor Vehicles	$59	4%
Grain	128,456	6%	Petroleum Refining Products	$55	3%
Plastic Matter or Synthetic Fibers	97,004	4%	Processed Milk	$38	2%
Petroleum Refining Products	60,807	3%	Miscellaneous Prim Nonferr Smelter Products	$32	2%
Potassium or Sodium Compound	56,080	3%	Miscellaneous Industrial Inorganic Chemicals	$30	2%
Primary Iron or Steel Products	50,031	2%	Primary Forest Materials	$29	2%
Processed Milk	43,043	2%	Miscellaneous Metal Work	$27	2%
All Other Commodities	679,533	31%	All Other Commodities	$822	50%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Destinations – Forest County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Destinations by Truck					
Primary Forest Materials	78,576	58%	Warehouse & Distribution Center	$17	28%
Warehouse & Distribution Center	14,984	11%	Primary Forest Materials	$10	16%
Broken Stone or Riprap	5,535	4%	Petroleum Refining Products	$4	6%
Petroleum Refining Products	4,157	3%	Miscellaneous Sawmill or Planing Mill	$1	2%
Asphalt Paving Blocks or Mix	2,894	2%	Barks or Gums,crude	$1	2%
Grain	2,792	2%	Miscellaneous Metal Work	$1	2%
Miscellaneous Sawmill or Planing Mill	2,390	2%	Primary Iron or Steel Products	$1	2%
Gravel or Sand	2,095	2%	Distilled or Blended Liquors	$1	2%
Ready-mix Concrete, Wet	1,474	1%	Newspapers	$1	1%
Prepared or Canned Feed	1,226	1%	Railroad Cars	$1	1%
All Other Commodities	19,700	15%	All Other Commodities	$22	37%
2011 Destinations by Rail					
NA					
2011 Destinations by Air					
NA					
2011 Destinations by Water					
NA					
Total 2011 Destinations					
Primary Forest Materials	78,576	58%	Warehouse & Distribution Center	$17	28%
Warehouse & Distribution Center	14,984	11%	Primary Forest Materials	$10	16%
Broken Stone or Riprap	5,535	4%	Petroleum Refining Products	$4	6%
Petroleum Refining Products	4,157	3%	Miscellaneous Sawmill or Planing Mill	$1	2%
Asphalt Paving Blocks or Mix	2,894	2%	Barks or Gums,crude	$1	2%
Grain	2,792	2%	Miscellaneous Metal Work	$1	2%
Miscellaneous Sawmill or Planing Mill	2,390	2%	Primary Iron or Steel Products	$1	2%
Gravel or Sand	2,095	2%	Distilled or Blended Liquors	$1	2%
Ready-mix Concrete, Wet	1,474	1%	Newspapers	$1	1%
Prepared or Canned Feed	1,226	1%	Railroad Cars	$1	1%
All Other Commodities	19,701	15%	All Other Commodities	$22	37%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Destinations – Venango County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Destinations by Truck					
Petroleum Refining Products	309,346	19%	Petroleum Refining Products	$283	15%
Broken Stone or Riprap	270,979	16%	Warehouse & Distribution Center	$207	11%
Warehouse & Distribution Center	184,902	11%	Primary Iron or Steel Products	$116	6%
Primary Iron or Steel Products	88,568	5%	Miscellaneous Industrial Inorganic Chemicals	$63	3%
Gravel or Sand	69,112	4%	Pharmaceuticals	$53	3%
Primary Forest Materials	56,062	3%	Motor Vehicles	$41	2%
Miscellaneous Industrial Inorganic Chemicals	37,308	2%	Miscellaneous Prim Nonferr Smelter Products	$34	2%
Liquefied Gases, Coal or Petroleum	33,820	2%	Miscellaneous Metal Work	$33	2%
Concrete Products	23,520	1%	Miscellaneous Plastic Products	$31	2%
Soft Drinks or Mineral Water	22,668	1%	Liquefied Gases, Coal or Petroleum	$27	1%
All Other Commodities	562,715	34%	All Other Commodities	$1,047	54%
2011 Destinations by Rail					
Plastic Matter or Synthetic Fibers	26,360	78%	Plastic Matter or Synthetic Fibers	$57	87%
Petroleum Refining Products	6,330	19%	Petroleum Refining Products	$8	12%
Primary Iron or Steel Products	781	2%	Primary Iron or Steel Products	$0	1%
Liquefied Gases, Coal or Petroleum	235	1%	Liquefied Gases, Coal or Petroleum	$0	0%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	29	0%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$0	0%
Railroad Cars	9	0%	Railroad Cars	$0	0%
Specialty Cleaning Preparations	3	0%	Nonferrous Wire	$0	0%
Nonferrous Wire	1	0%	Specialty Cleaning Preparations	$0	0%
Dog,cat or Other Pet Food,nec	1	0%	Refrigeration Machinery	$0	0%
Primary Metal Products, Nec	0	0%	Primary Copper Smelter Products	$0	0%
All Other Commodities	3	0%	All Other Commodities	$0	0%
2011 Destinations by Air					
NA					
2011 Destinations by Water					
NA					
Total 2011 Destinations					
Petroleum Refining Products	315,676	19%	Petroleum Refining Products	$290	15%
Broken Stone or Riprap	270,979	16%	Warehouse & Distribution Center	$207	10%
Warehouse & Distribution Center	184,902	11%	Primary Iron or Steel Products	$116	6%
Primary Iron or Steel Products	89,349	5%	Miscellaneous Industrial Inorganic Chemicals	$63	3%
Gravel or Sand	69,112	4%	Plastic Matter or Synthetic Fibers	$57	3%
Primary Forest Materials	56,062	3%	Pharmaceuticals	$53	3%
Miscellaneous Industrial Inorganic Chemicals	37,308	2%	Motor Vehicles	$41	2%
Liquefied Gases, Coal or Petroleum	34,054	2%	Miscellaneous Prim Nonferr Smelter Products	$34	2%
Plastic Matter or Synthetic Fibers	26,360	2%	Miscellaneous Metal Work	$33	2%
Concrete Products	23,520	1%	Miscellaneous Plastic Products	$31	2%
All Other Commodities	585,429	35%	All Other Commodities	$1,075	54%

Source: IHS Global Insight; CDM Smith Inc. analysis

2011 Freight Destinations – Warren County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2011 Destinations by Truck					
Warehouse & Distribution Center	737,533	28%	Warehouse & Distribution Center	$826	29%
Petroleum Refining Products	554,720	21%	Petroleum Refining Products	$502	17%
Crude Prod Of Coal,gas,petroleum	393,827	15%	Crude Prod Of Coal,gas,petroleum	$333	11%
Miscellaneous Industrial Organic Chemicals	223,718	9%	Miscellaneous Industrial Organic Chemicals	$219	8%
Liquefied Gases, Coal or Petroleum	46,647	2%	Plastic Matter or Synthetic Fibers	$78	3%
Grain	45,195	2%	Miscellaneous Industrial Inorganic Chemicals	$53	2%
Plastic Matter or Synthetic Fibers	37,650	1%	Primary Iron or Steel Products	$47	2%
Blast Furnace or Coke Oven Products	36,293	1%	Blast Furnace or Coke Oven Products	$41	1%
Primary Iron or Steel Products	35,005	1%	Liquefied Gases, Coal or Petroleum	$36	1%
Miscellaneous Industrial Inorganic Chemicals	31,086	1%	Motor Vehicles	$32	1%
All Other Commodities	471,195	18%	All Other Commodities	$732	25%
2011 Destinations by Rail					
Miscellaneous Industrial Organic Chemicals	127,506	47%	Miscellaneous Industrial Organic Chemicals	$159	85%
Gravel or Sand	124,973	46%	Plastic Matter or Synthetic Fibers	$8	5%
Petroleum Refining Products	6,630	2%	Petroleum Refining Products	$8	4%
Liquefied Gases, Coal or Petroleum	5,187	2%	Miscellaneous Coal or Petroleum Products	$5	2%
Miscellaneous Coal or Petroleum Products	4,102	2%	Liquefied Gases, Coal or Petroleum	$5	2%
Plastic Matter or Synthetic Fibers	3,920	1%	Gravel or Sand	$1	1%
Primary Iron or Steel Products	447	0%	Primary Iron or Steel Products	$0	0%
Wet Corn Milling or Milo	41	0%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$0	0%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	32	0%	Cyclic Intermediates or Dyes	$0	0%
Cyclic Intermediates or Dyes	22	0%	Wet Corn Milling or Milo	$0	0%
All Other Commodities	14	0%	All Other Commodities	$0	0%
2011 Destinations by Air					
NA					
2011 Destinations by Water					
NA					
Total 2011 Destinations					
Warehouse & Distribution Center	737,533	26%	Warehouse & Distribution Center	$826	27%
Petroleum Refining Products	561,350	19%	Petroleum Refining Products	$510	17%
Crude Prod Of Coal,gas,petroleum	393,827	14%	Miscellaneous Industrial Organic Chemicals	$377	12%
Miscellaneous Industrial Organic Chemicals	351,224	12%	Crude Prod Of Coal,gas,petroleum	$333	11%
Gravel or Sand	124,973	4%	Plastic Matter or Synthetic Fibers	$86	3%
Liquefied Gases, Coal or Petroleum	51,834	2%	Miscellaneous Industrial Inorganic Chemicals	$53	2%
Grain	45,195	2%	Primary Iron or Steel Products	$47	2%
Plastic Matter or Synthetic Fibers	41,570	1%	Blast Furnace or Coke Oven Products	$41	1%
Blast Furnace or Coke Oven Products	36,293	1%	Liquefied Gases, Coal or Petroleum	$40	1%
Primary Iron or Steel Products	35,452	1%	Motor Vehicles	$32	1%
All Other Commodities	506,494	18%	All Other Commodities	$738	24%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Origins – Clarion County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Origins by Truck					
Broken Stone or Riprap	1,203,036	44%	Glass Containers	$182	20%
Glass Containers	256,282	9%	Miscellaneous Plastic Products	$176	19%
Bituminous Coal	250,726	9%	Biscuits, Crackers or Pretzles	$60	6%
Lumber or Dimension Stock	211,179	8%	Fabricated Structural Metal Products	$55	6%
Primary Forest Materials	122,442	4%	Miscellaneous Machinery or Parts	$50	5%
Miscellaneous Wood Products	105,731	4%	Prefab Wood Buildings	$50	5%
Grain	98,105	4%	Miscellaneous Wood Products	$45	5%
Miscellaneous Field Crops	81,123	3%	Miscellaneous Field Crops	$44	5%
Miscellaneous Plastic Products	53,755	2%	Dairy Farm Products	$38	4%
Dairy Farm Products	44,289	2%	Miscellaneous Food Preparations, Nec	$36	4%
All Other Commodities	319,116	12%	All Other Commodities	$197	21%
2040 Origins by Rail					
NA					
2040 Origins by Air					
NA					
2040 Origins by Water					
NA					
Total 2040 Origins					
Broken Stone or Riprap	1,203,036	44%	Glass Containers	$182	20%
Glass Containers	256,287	9%	Miscellaneous Plastic Products	$176	19%
Bituminous Coal	250,726	9%	Biscuits, Crackers or Pretzles	$60	6%
Lumber or Dimension Stock	211,181	8%	Fabricated Structural Metal Products	$55	6%
Primary Forest Materials	122,442	4%	Miscellaneous Machinery or Parts	$50	5%
Miscellaneous Wood Products	105,745	4%	Prefab Wood Buildings	$50	5%
Grain	98,105	4%	Miscellaneous Wood Products	$45	5%
Miscellaneous Field Crops	81,123	3%	Miscellaneous Field Crops	$44	5%
Miscellaneous Plastic Products	53,755	2%	Dairy Farm Products	$38	4%
Dairy Farm Products	44,289	2%	Miscellaneous Food Preparations, Nec	$36	4%
All Other Commodities	319,187	12%	All Other Commodities	$197	21%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Origins – Crawford County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Origins by Truck					
Broken Stone or Riprap	1,581,080	22%	Petroleum Refining Products	$690	15%
Gravel or Sand	1,553,863	22%	Miscellaneous Metal Work	$383	8%
Petroleum Refining Products	755,701	11%	Dog,cat or Other Pet Food,nec	$294	7%
Dog,cat or Other Pet Food,nec	739,199	10%	Bolts, Nuts, Screws, Etc.	$226	5%
Grain	399,226	6%	Adhesives	$211	5%
Miscellaneous Sawmill or Planing Mill	245,843	3%	Edge or Hand Tools	$192	4%
Dairy Farm Products	208,990	3%	Dairy Farm Products	$180	4%
Miscellaneous Field Crops	157,737	2%	Miscellaneous Sawmill or Planing Mill	$143	3%
Miscellaneous Metal Work	137,210	2%	Warehouse & Distribution Center	$138	3%
Ready-mix Concrete, Wet	126,661	2%	Primary Metal Products, Nec	$136	3%
All Other Commodities	1,258,411	18%	All Other Commodities	$1,925	43%
2040 Origins by Rail					
Railroad Cars	10,054	45%	Railroad Cars	$10	60%
Oil Kernels, Nuts or Seeds	9,478	42%	Oil Kernels, Nuts or Seeds	$3	16%
Petroleum Refining Products	2,125	10%	Petroleum Refining Products	$3	16%
Miscellaneous Fabricated Wire Products	228	1%	Miscellaneous Fabricated Wire Products	$1	4%
Metal Scrap or Tailings	167	1%	Chemical Preparations, Nec	$0	2%
Chemical Preparations, Nec	127	1%	Primary Iron or Steel Products	$0	1%
Primary Iron or Steel Products	104	0%	Metal Scrap or Tailings	$0	0%
Lumber or Dimension Stock	53	0%	Lumber or Dimension Stock	$0	0%
Potassium or Sodium Compound	13	0%	Chemical or Petroleum Waste	$0	0%
Chemical or Petroleum Waste	11	0%	Potassium or Sodium Compound	$0	0%
All Other Commodities	5	0%	All Other Commodities	$0	0%
2040 Origins by Air					
NA					
2040 Origins by Water					
NA					
Total 2040 Origins					
Broken Stone or Riprap	1,581,080	22%	Petroleum Refining Products	$693	15%
Gravel or Sand	1,553,863	22%	Miscellaneous Metal Work	$383	8%
Petroleum Refining Products	757,830	11%	Dog,cat or Other Pet Food,nec	$294	6%
Dog,cat or Other Pet Food,nec	739,200	10%	Bolts, Nuts, Screws, Etc.	$226	5%
Grain	399,226	6%	Adhesives	$211	5%
Miscellaneous Sawmill or Planing Mill	245,843	3%	Edge or Hand Tools	$192	4%
Dairy Farm Products	208,990	3%	Dairy Farm Products	$180	4%
Miscellaneous Field Crops	157,737	2%	Miscellaneous Sawmill or Planing Mill	$143	3%
Miscellaneous Metal Work	137,210	2%	Warehouse & Distribution Center	$138	3%
Ready-mix Concrete, Wet	126,661	2%	Primary Metal Products, Nec	$136	3%
All Other Commodities	1,278,668	18%	All Other Commodities	$1,938	43%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Origins – Forest County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Origins by Truck					
Gravel or Sand	228,250	54%	Miscellaneous Metal Work	$71	32%
Miscellaneous Sawmill or Planing Mill	95,528	22%	Miscellaneous Sawmill or Planing Mill	$55	25%
Primary Forest Materials	41,464	10%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$24	11%
Miscellaneous Metal Work	25,440	6%	Shipping Containers	$18	8%
Fabricated Structural Metal Products	5,596	1%	Fabricated Structural Metal Products	$15	7%
Dairy Farm Products	5,449	1%	Miscellaneous Freight Shipments	$8	4%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	5,120	1%	Primary Forest Materials	$5	2%
Shipping Containers	4,515	1%	Surgical or Medical Instruments	$5	2%
Grain	4,080	1%	Dairy Farm Products	$5	2%
Miscellaneous Field Crops	2,338	1%	Newspapers	$3	2%
All Other Commodities	7,170	2%	All Other Commodities	$9	4%
2040 Origins by Rail					
NA					
2040 Origins by Air					
NA					
2040 Origins by Water					
NA					
Total 2040 Origins					
Gravel or Sand	228,250	54%	Miscellaneous Metal Work	$71	32%
Miscellaneous Sawmill or Planing Mill	95,528	22%	Miscellaneous Sawmill or Planing Mill	$55	25%
Primary Forest Materials	41,464	10%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$24	11%
Miscellaneous Metal Work	25,440	6%	Shipping Containers	$18	8%
Fabricated Structural Metal Products	5,596	1%	Fabricated Structural Metal Products	$15	7%
Dairy Farm Products	5,449	1%	Miscellaneous Freight Shipments	$8	4%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	5,120	1%	Primary Forest Materials	$5	2%
Shipping Containers	4,515	1%	Surgical or Medical Instruments	$5	2%
Grain	4,080	1%	Dairy Farm Products	$5	2%
Miscellaneous Field Crops	2,338	1%	Newspapers	$3	2%
All Other Commodities	7,170	2%	All Other Commodities	$9	4%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Origins – Venango County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Origins by Truck					
Warehouse & Distribution Center	5,957,738	66%	Warehouse & Distribution Center	$6,670	61%
Flat Glass	1,078,443	12%	Mining Machinery or Parts	$2,178	20%
Gravel or Sand	540,942	6%	Primary Iron or Steel Products	$364	3%
Primary Iron or Steel Products	278,121	3%	Flat Glass	$316	3%
Mining Machinery or Parts	194,665	2%	Miscellaneous General Industrial	$194	2%
Concrete Products	157,271	2%	Miscellaneous Metal Work	$185	2%
Asphalt Paving Blocks or Mix	140,920	2%	Surgical or Medical Instruments	$168	2%
Primary Forest Materials	134,674	1%	Industrial Controls or Parts	$134	1%
Miscellaneous Sawmill or Planing Mill	95,691	1%	Primary Metal Products, Nec	$115	1%
Miscellaneous Metal Work	66,154	1%	Current Carrying Wiring Equipment	$104	1%
All Other Commodities	367,547	4%	All Other Commodities	$589	5%
2040 Origins by Rail					
Metal Scrap or Tailings	9,762	84%	Metal Scrap or Tailings	$3	60%
Primary Iron or Steel Products	1,838	16%	Primary Iron or Steel Products	$2	40%
Chemical or Petroleum Waste	3	0%	Chemical or Petroleum Waste	$0	0%
Rubber or Plastic Scrap	1	0%	Rubber or Plastic Scrap	$0	0%
All Other Commodities	0	0%	All Other Commodities	$0	0%
2040 Origins by Air					
NA					
2040 Origins by Water					
NA					
Total 2040 Origins					
Warehouse & Distribution Center	5,957,738	66%	Warehouse & Distribution Center	$6,670	61%
Flat Glass	1,078,444	12%	Mining Machinery or Parts	$2,178	20%
Gravel or Sand	540,942	6%	Primary Iron or Steel Products	$366	3%
Primary Iron or Steel Products	279,960	3%	Flat Glass	$316	3%
Mining Machinery or Parts	194,665	2%	Miscellaneous General Industrial	$194	2%
Concrete Products	157,271	2%	Miscellaneous Metal Work	$185	2%
Asphalt Paving Blocks or Mix	140,920	2%	Surgical or Medical Instruments	$168	2%
Primary Forest Materials	134,674	1%	Industrial Controls or Parts	$134	1%
Miscellaneous Sawmill or Planing Mill	95,691	1%	Primary Metal Products, Nec	$115	1%
Miscellaneous Metal Work	66,154	1%	Current Carrying Wiring Equipment	$104	1%
All Other Commodities	377,321	4%	All Other Commodities	$592	5%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Origins – Warren County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Origins by Truck					
Petroleum Refining Products	8,017,721	75%	Petroleum Refining Products	$7,277	70%
Warehouse & Distribution Center	1,181,785	11%	Warehouse & Distribution Center	$1,323	13%
Liquefied Gases, Coal or Petroleum	534,415	5%	Liquefied Gases, Coal or Petroleum	$433	4%
Miscellaneous Coal or Petroleum Products	188,187	2%	Iron or Steel Forgings	$264	3%
Iron or Steel Forgings	130,918	1%	Miscellaneous Plastic Products	$228	2%
Miscellaneous Plastic Products	69,572	1%	Miscellaneous Coal or Petroleum Products	$129	1%
Miscellaneous Field Crops	67,040	1%	Steel Wire, Nails or Spikes	$93	1%
Grain	61,992	1%	Tires or Inner Tubes	$80	1%
Dog,cat or Other Pet Food,nec	59,925	1%	Valves or Pipe Fittings	$72	1%
Concrete Products	58,463	1%	Electric Lamps	$57	1%
All Other Commodities	340,355	3%	All Other Commodities	$414	4%
2040 Origins by Rail					
Petroleum Refining Products	274,380	87%	Petroleum Refining Products	$333	89%
Liquefied Gases, Coal or Petroleum	23,697	8%	Liquefied Gases, Coal or Petroleum	$23	6%
Primary Iron or Steel Products	12,125	4%	Primary Iron or Steel Products	$19	5%
Chemical or Petroleum Waste	3,751	1%	Miscellaneous Coal or Petroleum Products	$0	0%
Miscellaneous Coal or Petroleum Products	1,083	0%	Railroad Cars	$0	0%
Railroad Cars	127	0%	Metal Scrap or Tailings	$0	0%
Metal Scrap or Tailings	29	0%	Chemical or Petroleum Waste	$0	0%
All Other Commodities	0	0%	All Other Commodities	$0	0%
2040 Origins by Air					
NA					
2040 Origins by Water					
NA					
Total 2040 Origins					
Petroleum Refining Products	8,292,230	75%	Petroleum Refining Products	$7,610	71%
Warehouse & Distribution Center	1,181,785	11%	Warehouse & Distribution Center	$1,323	12%
Liquefied Gases, Coal or Petroleum	558,121	5%	Liquefied Gases, Coal or Petroleum	$456	4%
Miscellaneous Coal or Petroleum Products	189,283	2%	Iron or Steel Forgings	$264	2%
Iron or Steel Forgings	130,918	1%	Miscellaneous Plastic Products	$228	2%
Miscellaneous Plastic Products	69,572	1%	Miscellaneous Coal or Petroleum Products	$129	1%
Miscellaneous Field Crops	67,040	1%	Steel Wire, Nails or Spikes	$93	1%
Grain	61,992	1%	Tires or Inner Tubes	$80	1%
Dog,cat or Other Pet Food,nec	59,925	1%	Valves or Pipe Fittings	$72	1%
Concrete Products	58,463	1%	Electric Lamps	$57	1%
All Other Commodities	356,404	3%	All Other Commodities	$433	4%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Destinations – Clarion County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Destinations by Truck					
Broken Stone or Riprap	317,232	20%	Warehouse & Distribution Center	$283	26%
Gravel or Sand	267,802	17%	Plastic Matter or Synthetic Fibers	$89	8%
Warehouse & Distribution Center	252,678	16%	Solid State Semiconducts	$48	4%
Primary Forest Materials	171,155	11%	Motor Vehicles	$34	3%
Plastic Matter or Synthetic Fibers	44,210	3%	Pharmaceuticals	$25	2%
Grain	34,778	2%	Petroleum Refining Products	$25	2%
Ready-mix Concrete, Wet	34,345	2%	Miscellaneous Plastic Products	$22	2%
Petroleum Refining Products	27,392	2%	Primary Forest Materials	$21	2%
Lumber or Dimension Stock	27,351	2%	Motor Vehicle Parts or Accessories	$18	2%
Concrete Products	25,403	2%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$17	2%
All Other Commodities	365,976	23%	All Other Commodities	$499	46%
2040 Destinations by Rail					
NA					
2040 Destinations by Air					
NA					
2040 Destinations by Water					
NA					
Total 2040 Destinations					
Broken Stone or Riprap	317,232	20%	Warehouse & Distribution Center	$283	26%
Gravel or Sand	267,802	17%	Plastic Matter or Synthetic Fibers	$89	8%
Warehouse & Distribution Center	252,678	16%	Solid State Semiconducts	$48	4%
Primary Forest Materials	171,155	11%	Motor Vehicles	$34	3%
Plastic Matter or Synthetic Fibers	44,210	3%	Pharmaceuticals	$25	2%
Grain	34,778	2%	Petroleum Refining Products	$25	2%
Ready-mix Concrete, Wet	34,345	2%	Miscellaneous Plastic Products	$22	2%
Petroleum Refining Products	27,392	2%	Primary Forest Materials	$21	2%
Lumber or Dimension Stock	27,351	2%	Motor Vehicle Parts or Accessories	$18	2%
Concrete Products	25,403	2%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$18	2%
All Other Commodities	366,118	23%	All Other Commodities	$499	46%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Destinations – Crawford County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Destinations by Truck					
Primary Forest Materials	681,117	17%	Warehouse & Distribution Center	$655	19%
Warehouse & Distribution Center	585,497	15%	Solid State Semiconducts	$260	8%
Broken Stone or Riprap	527,669	14%	Plastic Matter or Synthetic Fibers	$177	5%
Gravel or Sand	375,121	10%	Motor Vehicles	$142	4%
Grain	267,642	7%	Processed Milk	$98	3%
Processed Milk	110,413	3%	Primary Iron or Steel Products	$88	3%
Plastic Matter or Synthetic Fibers	87,495	2%	Primary Forest Materials	$85	3%
Primary Iron or Steel Products	68,650	2%	Pharmaceuticals	$67	2%
Ready-mix Concrete, Wet	67,349	2%	Miscellaneous Prim Nonferr Smelter Products	$62	2%
Prepared or Canned Feed	66,880	2%	Miscellaneous Plastic Products	$56	2%
All Other Commodities	1,059,244	27%	All Other Commodities	$1,699	50%
2040 Destinations by Rail					
Nonmetal Minerals, Processed	87,722	32%	Plastic Matter or Synthetic Fibers	$115	73%
Potassium or Sodium Compound	68,564	25%	Potassium or Sodium Compound	$22	14%
Plastic Matter or Synthetic Fibers	52,949	19%	Nonmetal Minerals, Processed	$8	5%
Gravel or Sand	44,250	16%	Malt Liquors	$6	4%
Flour or Other Grain Mill Products	10,752	4%	Flour or Other Grain Mill Products	$5	3%
Malt Liquors	6,638	2%	Cyclic Intermediates or Dyes	$1	0%
Petroleum Refining Products	561	0%	Petroleum Refining Products	$0	0%
Cyclic Intermediates or Dyes	471	0%	Gravel or Sand	$0	0%
Distilled or Blended Liquors	297	0%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$0	0%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	116	0%	Railroad Cars	$0	0%
All Other Commodities	431	0%	All Other Commodities	$0	0%
2040 Destinations by Air					
NA					
2040 Destinations by Water					
NA					
Total 2040 Destinations					
Primary Forest Materials	681,117	16%	Warehouse & Distribution Center	$655	18%
Warehouse & Distribution Center	585,497	14%	Plastic Matter or Synthetic Fibers	$292	8%
Broken Stone or Riprap	527,669	13%	Solid State Semiconducts	$260	7%
Gravel or Sand	419,371	10%	Motor Vehicles	$142	4%
Grain	267,642	6%	Processed Milk	$98	3%
Plastic Matter or Synthetic Fibers	140,444	3%	Primary Iron or Steel Products	$88	2%
Processed Milk	110,413	3%	Primary Forest Materials	$85	2%
Nonmetal Minerals, Processed	87,775	2%	Pharmaceuticals	$67	2%
Primary Iron or Steel Products	68,652	2%	Miscellaneous Prim Nonferr Smelter Products	$62	2%
Potassium or Sodium Compound	68,564	2%	Miscellaneous Plastic Products	$56	2%
All Other Commodities	1,212,689	29%	All Other Commodities	$1,742	49%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Destinations – Forest County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Destinations by Truck					
Primary Forest Materials	241,504	68%	Warehouse & Distribution Center	$35	25%
Warehouse & Distribution Center	31,585	9%	Primary Forest Materials	$30	21%
Broken Stone or Riprap	16,341	5%	Petroleum Refining Products	$4	3%
Miscellaneous Sawmill or Planing Mill	5,691	2%	Miscellaneous Sawmill or Planing Mill	$3	2%
Petroleum Refining Products	4,762	1%	Missile or Space Veh Parts	$3	2%
Ready-mix Concrete, Wet	3,960	1%	Solid State Semiconducts	$3	2%
Gravel or Sand	3,930	1%	Miscellaneous Metal Work	$2	2%
Concrete Products	3,188	1%	Miscellaneous Electrical Industrial Equipment	$2	2%
Asphalt Paving Blocks or Mix	2,925	1%	Railroad Cars	$2	2%
Grain	2,700	1%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$2	1%
All Other Commodities	38,705	11%	All Other Commodities	$53	38%
2040 Destinations by Rail					
NA					
2040 Destinations by Air					
NA					
2040 Destinations by Water					
NA					
Total 2040 Destinations					
Primary Forest Materials	241,504	68%	Warehouse & Distribution Center	$35	25%
Warehouse & Distribution Center	31,585	9%	Primary Forest Materials	$30	21%
Broken Stone or Riprap	16,341	5%	Petroleum Refining Products	$4	3%
Miscellaneous Sawmill or Planing Mill	5,691	2%	Miscellaneous Sawmill or Planing Mill	$3	2%
Petroleum Refining Products	4,762	1%	Missile or Space Veh Parts	$3	2%
Ready-mix Concrete, Wet	3,960	1%	Solid State Semiconducts	$3	2%
Gravel or Sand	3,930	1%	Miscellaneous Metal Work	$2	2%
Concrete Products	3,188	1%	Miscellaneous Electrical Industrial Equipment	$2	2%
Asphalt Paving Blocks or Mix	2,925	1%	Railroad Cars	$2	2%
Grain	2,700	1%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$2	1%
All Other Commodities	38,707	11%	All Other Commodities	$53	38%

Source: IHS Global Insight; CDM Smith Inc. analysis

2040 Freight Destinations – Venango County

Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Destinations by Truck					
Warehouse & Distribution Center	857,401	20%	Warehouse & Distribution Center	$960	12%
Petroleum Refining Products	613,645	15%	Solid State Semiconducts	$882	11%
Broken Stone or Riprap	282,644	7%	Petroleum Refining Products	$561	7%
Primary Iron or Steel Products	223,977	5%	Primary Iron or Steel Products	$297	4%
Primary Forest Materials	222,130	5%	Motor Vehicles	$233	3%
Concrete Products	97,143	2%	Miscellaneous Metal Work	$230	3%
Gravel or Sand	85,048	2%	Pharmaceuticals	$214	3%
Miscellaneous Metal Work	82,493	2%	Oil Field Machinery or Equipment	$213	3%
Liquefied Gases, Coal or Petroleum	65,220	2%	Miscellaneous Plastic Products	$182	2%
Miscellaneous Plastic Products	55,706	1%	Valves or Pipe Fittings	$123	2%
All Other Commodities	1,624,288	39%	All Other Commodities	$4,249	52%
2040 Destinations by Rail					
Plastic Matter or Synthetic Fibers	35,825	78%	Plastic Matter or Synthetic Fibers	$78	87%
Petroleum Refining Products	8,165	18%	Petroleum Refining Products	$10	11%
Primary Iron or Steel Products	1,242	3%	Primary Iron or Steel Products	$1	1%
Liquefied Gases, Coal or Petroleum	435	1%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$0	0%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	151	0%	Liquefied Gases, Coal or Petroleum	$0	0%
Railroad Cars	22	0%	Railroad Cars	$0	0%
Specialty Cleaning Preparations	12	0%	Specialty Cleaning Preparations	$0	0%
Nonferrous Wire	3	0%	Nonferrous Wire	$0	0%
Refrigeration Machinery	1	0%	Refrigeration Machinery	$0	0%
Dog,cat or Other Pet Food,nec	1	0%	Primary Copper Smelter Products	$0	0%
All Other Commodities	6	0%	All Other Commodities	$0	0%
2040 Destinations by Air					
NA					
2040 Destinations by Water					
NA					
Total 2040 Destinations					
Warehouse & Distribution Center	857,401	20%	Warehouse & Distribution Center	$960	12%
Petroleum Refining Products	621,810	15%	Solid State Semiconducts	$882	11%
Broken Stone or Riprap	282,644	7%	Petroleum Refining Products	$570	7%
Primary Iron or Steel Products	225,219	5%	Primary Iron or Steel Products	$298	4%
Primary Forest Materials	222,130	5%	Motor Vehicles	$233	3%
Concrete Products	97,143	2%	Miscellaneous Metal Work	$230	3%
Gravel or Sand	85,048	2%	Pharmaceuticals	$214	3%
Miscellaneous Metal Work	82,493	2%	Oil Field Machinery or Equipment	$213	3%
Liquefied Gases, Coal or Petroleum	65,655	2%	Miscellaneous Plastic Products	$182	2%
Miscellaneous Plastic Products	55,706	1%	Valves or Pipe Fittings	$123	1%
All Other Commodities	1,660,312	39%	All Other Commodities	$4,327	53%

Source: IHS Global Insight; CDM Smith Inc. analysis

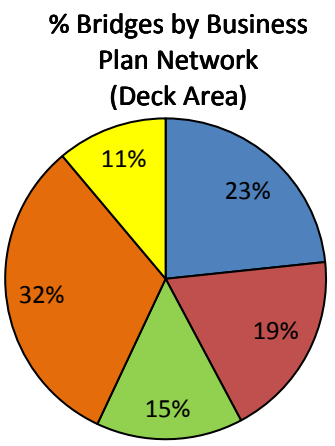
2040 Freight Destinations – Warren County

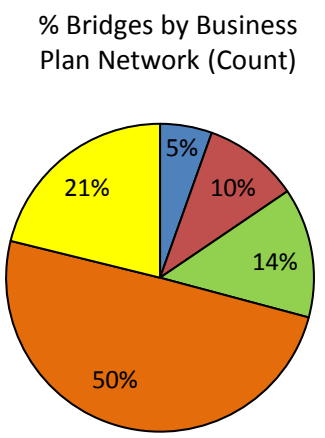
Commodity	Tons	Percent	Commodity	Value (Millions)	Percent
2040 Destinations by Truck					
Warehouse & Distribution Center	1,136,048	37%	Warehouse & Distribution Center	$1,272	32%
Crude Prod Of Coal,gas,petroleum	398,135	13%	Crude Prod Of Coal,gas,petroleum	$336	9%
Petroleum Refining Products	309,449	10%	Petroleum Refining Products	$277	7%
Miscellaneous Industrial Organic Chemicals	199,653	6%	Miscellaneous Industrial Organic Chemicals	$197	5%
Primary Forest Materials	79,451	3%	Solid State Semiconducts	$107	3%
Grain	45,971	1%	Plastic Matter or Synthetic Fibers	$80	2%
Primary Iron or Steel Products	42,920	1%	Motor Vehicles	$69	2%
Paper Waste or Scrap	38,362	1%	Pharmaceuticals	$63	2%
Concrete Products	38,159	1%	Primary Iron or Steel Products	$57	1%
Plastic Matter or Synthetic Fibers	38,112	1%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$53	1%
All Other Commodities	755,572	25%	All Other Commodities	$1,422	36%
2040 Destinations by Rail					
Gravel or Sand	231,923	55%	Miscellaneous Industrial Organic Chemicals	$210	88%
Miscellaneous Industrial Organic Chemicals	168,393	40%	Plastic Matter or Synthetic Fibers	$12	5%
Liquefied Gases, Coal or Petroleum	6,151	1%	Petroleum Refining Products	$5	2%
Plastic Matter or Synthetic Fibers	5,327	1%	Liquefied Gases, Coal or Petroleum	$5	2%
Petroleum Refining Products	4,392	1%	Miscellaneous Coal or Petroleum Products	$4	2%
Miscellaneous Coal or Petroleum Products	3,564	1%	Gravel or Sand	$2	1%
Primary Iron or Steel Products	710	0%	Primary Iron or Steel Products	$0	0%
Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	165	0%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$0	0%
Cyclic Intermediates or Dyes	93	0%	Cyclic Intermediates or Dyes	$0	0%
Wet Corn Milling or Milo	45	0%	Refrigeration Machinery	$0	0%
All Other Commodities	26	0%	All Other Commodities	$0	0%
2040 Destinations by Air					
NA					
2040 Destinations by Water					
NA					
Total 2040 Destinations					
Warehouse & Distribution Center	1,136,048	32%	Warehouse & Distribution Center	$1,272	30%
Crude Prod Of Coal,gas,petroleum	398,135	11%	Miscellaneous Industrial Organic Chemicals	$407	10%
Miscellaneous Industrial Organic Chemicals	368,046	11%	Crude Prod Of Coal,gas,petroleum	$336	8%
Petroleum Refining Products	313,841	9%	Petroleum Refining Products	$282	7%
Gravel or Sand	231,923	7%	Solid State Semiconducts	$107	3%
Primary Forest Materials	79,451	2%	Plastic Matter or Synthetic Fibers	$91	2%
Grain	45,971	1%	Motor Vehicles	$69	2%
Primary Iron or Steel Products	43,631	1%	Pharmaceuticals	$63	2%
Plastic Matter or Synthetic Fibers	43,439	1%	Primary Iron or Steel Products	$58	1%
Paper Waste or Scrap	38,362	1%	Miscellaneous Shipments N.E.C. excluding Freight Forwarders and Shippers	$53	1%
All Other Commodities	803,790	23%	All Other Commodities	$1,433	34%

Source: IHS Global Insight; CDM Smith Inc. analysis

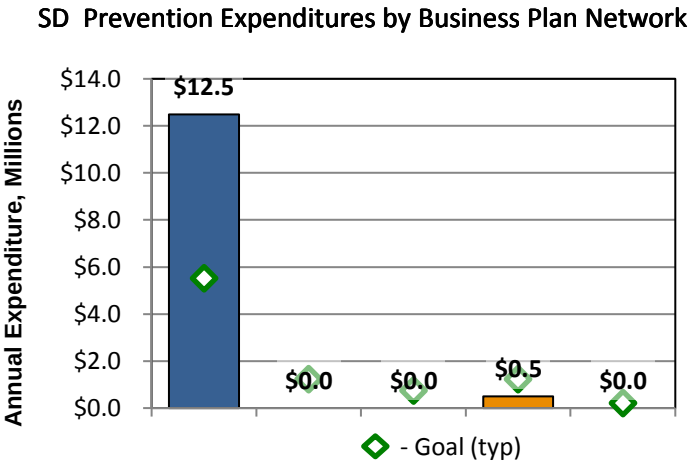
Appendix B: 2016 Bridge and Pavements Performance Reports

2016 Performance Measures Annual Report - Bridges





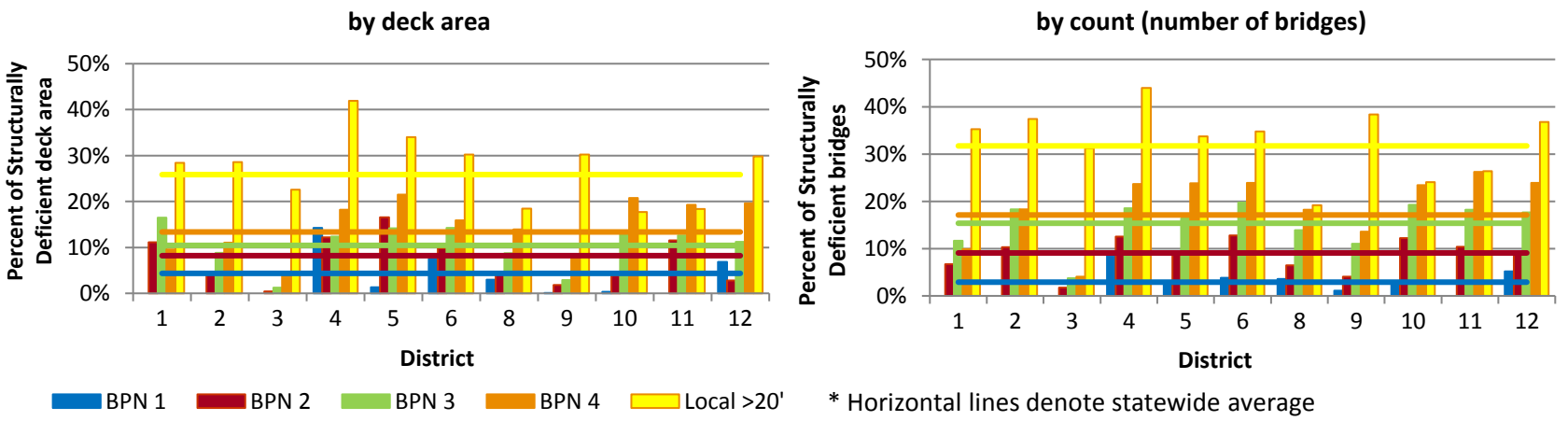
Northwest



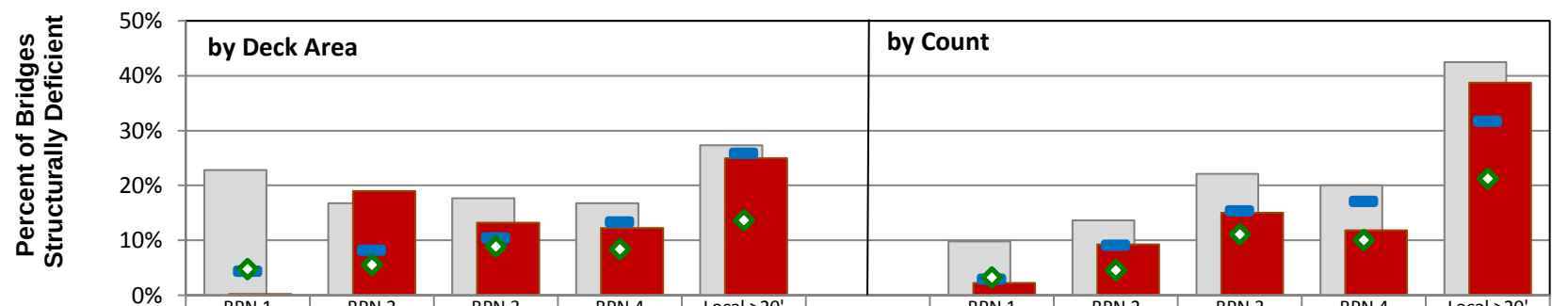
BPN 1 BPN 2 BPN 3 BPN 4 Local >20'

*-State bridges ≥8'

SD By District



Structural Deficiency by Business Plan Network (BPN)



	BPN 1	BPN 2	BPN 3	BPN 4	Local >20'		BPN 1	BPN 2	BPN 3	BPN 4	Local >20'
2010 Baseline	22.8%	16.8%	17.7%	16.8%	27.4%		9.8%	13.6%	22.1%	20.0%	42.5%
Current (Dec 2016)	0.2%	19.0%	13.2%	12.2%	25.0%		2.3%	9.3%	15.0%	11.9%	38.7%
Statewide Ave.	4.4%	8.2%	10.4%	13.4%	25.8%		2.9%	9.1%	15.4%	17.1%	31.7%
Regional Goal	4.8%	5.5%	8.9%	8.4%	13.7%		3.3%	4.5%	11.1%	10.0%	21.2%

*-State bridges ≥8'

Bridge Data Date: 12/31/16

2016 Performance Measures Annual Report -- Bridges — Northwest

Current Status of Bridges in Region:

Network	Total Bridge Count	Total Deck Area (Msf)	Aver. Bridge DA (sf)	Closed Bridges	Posted Bridges	Struct. Deficient Count	% SD by Count	SD-Deck Area (Msf)	% SD by Deck Area	Non-SD Bridges with a "5" Condition Rating
BPN 1	88	1.0533	11,969	0	0	2	2.27%	0.0025	0.24%	41
BPN 2	162	0.8521	5,260	0	0	15	9.26%	0.1620	19.02%	62
BPN 3	220	0.6674	3,034	0	1	33	15.00%	0.0884	13.24%	72
BPN 4	801	1.4391	1,797	1	11	95	11.86%	0.1760	12.23%	252
Total - State Bridges (≥8')	**1,271**	**4.0119**	**3,157**	**1**	**12**	**145**	**11.41%**	**0.4290**	**10.69%**	**427**
Local≥20'	341	0.5022	1,473	8	108	132	38.71%	0.1256	25.00%	82

Note: Data includes adjustments for MAP-21 Enhanced NHS. Local Bridges on Enhanced NHS are reported with Locally Owned Bridges.

GOALS

Annual Performance Measures - *by SD Bridge Count*

Network	SD by Count: Long Range Goal SD Count (max.)	SD by Count: Target 2016 SD Count (max.)	SD by Count: Actual SD Count	Reducing Rate of Deterioration: Actual Annual New SD Count (SD "on")
BPN 1	3	7	2	0
BPN 2	7	17	15	1
BPN 3	30	52	33	4
BPN 4	76	131	95	11
Total - State Bridges (≥8')	**115**	**207**	**145**	**16**
Local≥20'	72	125	132	**10**

Goals Legend

- Target - Optimum Threshold
- Target - Cautionary Threshold
- Actual - At Optimum Threshold
- Actual - At Cautionary Threshold
- Actual - Not Meeting Cautionary Threshold

Annual Performance Measures - *by SD Deck Area*

Network	% SD by Deck Area: Long Range Goal % SD by DA (max.)	% SD by Deck Area: Target %2016 SD DA (max.)	% SD by Deck Area: Actual %SD DA	Reducing Rate of Deterioration: Actual Annual New SD DA (SD "on")
BPN 1	4.8%	18.8%	0.2%	0.00%
BPN 2	5.5%	13.9%	19.0%	0.05%
BPN 3	8.9%	15.4%	13.2%	1.07%
BPN 4	8.4%	14.6%	12.2%	2.23%
Total - State Bridges (>8')	**7.7%**	**15.8%**	**10.7%**	**0.99%**
Local≥20'	13.7%	23.8%	25.0%	0.88%

Annual Performance Measures - SD Prevention

Network	SD Prevention - Expenditures: Min. SD Prevention (million$)	SD Prevention - Expenditures: Min. SD Prevention (million$)	SD Prevention - Expenditures: Actual SD Prevention (million$)	SD Prevention - Count: Actual SD Prevention (# bridges)
BPN 1	$5.51	$2.76	$12.49	8
BPN 2	$1.24	$0.62	$0.00	0
BPN 3	$0.75	$0.38	$0.00	0
BPN 4	$1.23	$0.62	$0.50	1
Total - State Bridges (>8')	**$8.73**	**$4.37**	**$12.98**	**9**
Local≥20'	$0.21	$0.10	$0.00	0

2016 Performance Measures Annual Report -- Pavements

Northwest RPO

Current Pavement Smoothness Summary by Business Plan Network

Business Plan Network	Total Segment Miles	IRI: Tested Segment Miles	IRI: Excellent Seg-Mi	IRI: Good Seg-Mi	IRI: Fair Seg-Mi	IRI: Poor Seg-Mi	IRI: Median IRI	Low Level Network: Segment Miles	Low Level Network: Seal Coat Out-of-Cycle Seg-Mi
Interstate	62.8	139.8	118.2	15.2	6.5	0.0	111		
NHS, Non-Interstate	285.1	284.2	133.6	97.0	34.5	19.1	81		
Non-NHS, ≥ 2000 ADT	435.4	432.4	253.6	117.2	40.3	21.3	94	22.6	0.0
Non-NHS, < 2000 ADT	1,894.7	1,889.0	369.4	444.6	502.7	572.3	183	1,553.9	21.8
Total - Roadway	**2,678.1**	**2,745.4**	**874.8**	**673.9**	**584.0**	**612.7**		**1,576.5**	**21.8**

Current Overall Pavement Index Summary

Business Plan Network	Total Segment Miles	OPI: Tested Segment Miles	OPI: Excellent Seg-Mi	OPI: Good Seg-Mi	OPI: Fair Seg-Mi	OPI: Poor Seg-Mi	OPI: Median OPI	Surface Out-of-Cycle Seg-Mi	Pavement Age > 40 years Out-of-Cycle Seg-Mi
Interstate	62.8	122.6	23.0	90.9	8.8	0.0	90	0.0	0.0
NHS, Non-Interstate	285.1	282.4	33.5	174.7	54.9	19.4	87	75.7	48.5
Non-NHS, ≥ 2000 ADT	435.4	431.3	121.9	162.9	132.0	14.4	85	124.8	
Non-NHS, < 2000 ADT	1,894.7	1,885.1	327.1	963.0	449.3	145.7	77	140.3	
Total - Roadway	**2,678.1**	**2,721.3**	**505.5**	**1,391.3**	**644.9**	**179.5**		**340.8**	**48.5**

Interstate and NHS, Non-Interstate Goals

Goal: Reduce Poor IRI

Business Plan Network	Long Range % IRI Seg-Mi	Target 2017 % IRI Seg-Mi	Actual 2016 % IRI Seg-Mi
Interstate	0.0%	0.0%	0.0%
NHS, Non-Interstate	5.0%	6.4%	6.7%

Goal: Maintain % Good and Excellent OPI

Business Plan Network	Long Range % OPI Seg-Mi	Target 2017 % OPI Seg-Mi	Actual 2016 % OPI Seg-Mi
Interstate	84.9%	84.9%	92.8%
NHS, Non-Interstate	72.0%	67.6%	73.7%

Goal: Reduce Surface Out-of-Cycle (Fair and Poor OPI)

Business Plan Network	Long Range % OPI Seg-Mi	Target 2017 % OPI Seg-Mi	Actual 2016 % OPI Seg-Mi
Interstate	0.0%	0.0%	0.0%
NHS, Non-Interstate	10.0%	13.7%	17.7%

Goal: Maintain Pavement Potentially Past Design Service Life, Out-of-Cycle (Poor OPI)

Business Plan Network	Long Range % OPI Seg-Mi	Target 2017 % OPI Seg-Mi	Actual 2016 % OPI Seg-Mi
Interstate	0.0%	0.0%	0.0%
NHS, Non-Interstate	4.1%	4.1%	3.1%

Non-NHS Goals

Goal: Maintain Poor IRI

Business Plan Network	Long Range % IRI Seg-Mi	Target 2017 % IRI Seg-Mi	Actual 2016 % IRI Seg-Mi
Non-NHS, ≥ 2000 ADT	5.2%	5.2%	4.9%
Non-NHS, < 2000 ADT	29.9%	29.9%	30.3%

Goal: Maintain % Good and Excellent OPI

Business Plan Network	Long Range % OPI Seg-Mi	Target 2017 % OPI Seg-Mi	Actual 2016 % OPI Seg-Mi
Non-NHS, ≥ 2000 ADT	64.1%	64.1%	66.0%
Non-NHS, < 2000 ADT	69.8%	69.8%	68.4%

Goal: Maintain Surface Out-of-Cycle (Poor OPI)

Business Plan Network	Long Range % OPI Seg-Mi	Target 2017 % OPI Seg-Mi	Actual 2016 % OPI Seg-Mi
Non-NHS, ≥ 2000 ADT	1.8%	1.8%	1.5%
Non-NHS, < 2000 ADT	0.1%	0.1%	0.3%

Goal: Reduce Seal Coat (Low Level) Network Out-of-Cycle

Business Plan Network	Long Range % Seg-Mi	Target 2017 % Seg-Mi	Actual 2016 % Seg-Mi
Non-NHS, ≥ 2000 ADT	1.8%	1.8%	0.2%
Non-NHS, < 2000 ADT	0.1%	0.1%	1.4%

Note: for the Interstate and NHS, Non-Interstate Business Plan Networks, the IRI and OPI data is for 2016. For the Non-NHS Business Plan Networks, the IRI and OPI data for most recent year captured, either 2015 or 2016.

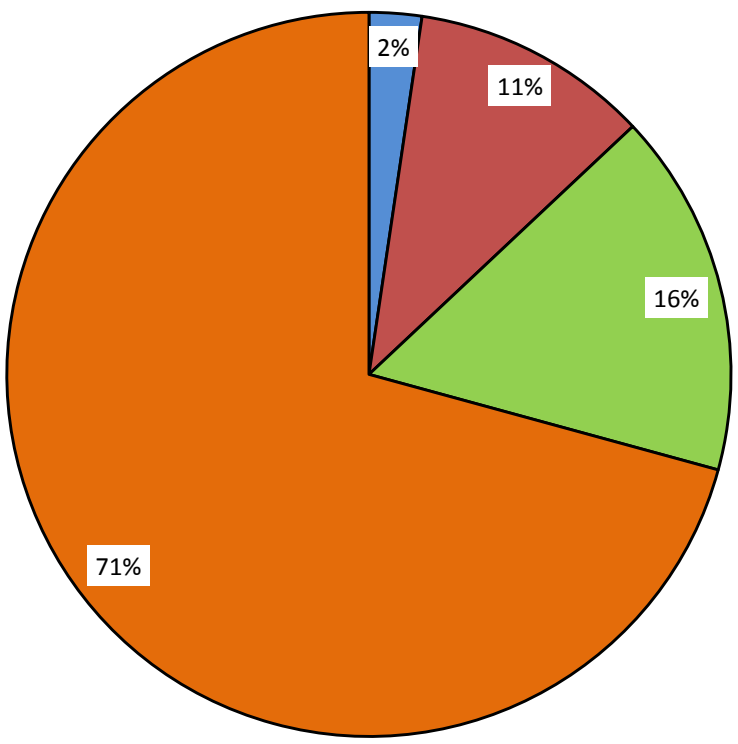
Note: Pavement Potentially Past Design Service Life, Out-of-Cycle is defined as old pavements (pre-2009 pavement age) greater than 40 years.

Note: Coloration of the Actual 2016 column is based on the Target set for 2016. Long-Range Goals are for 2020.

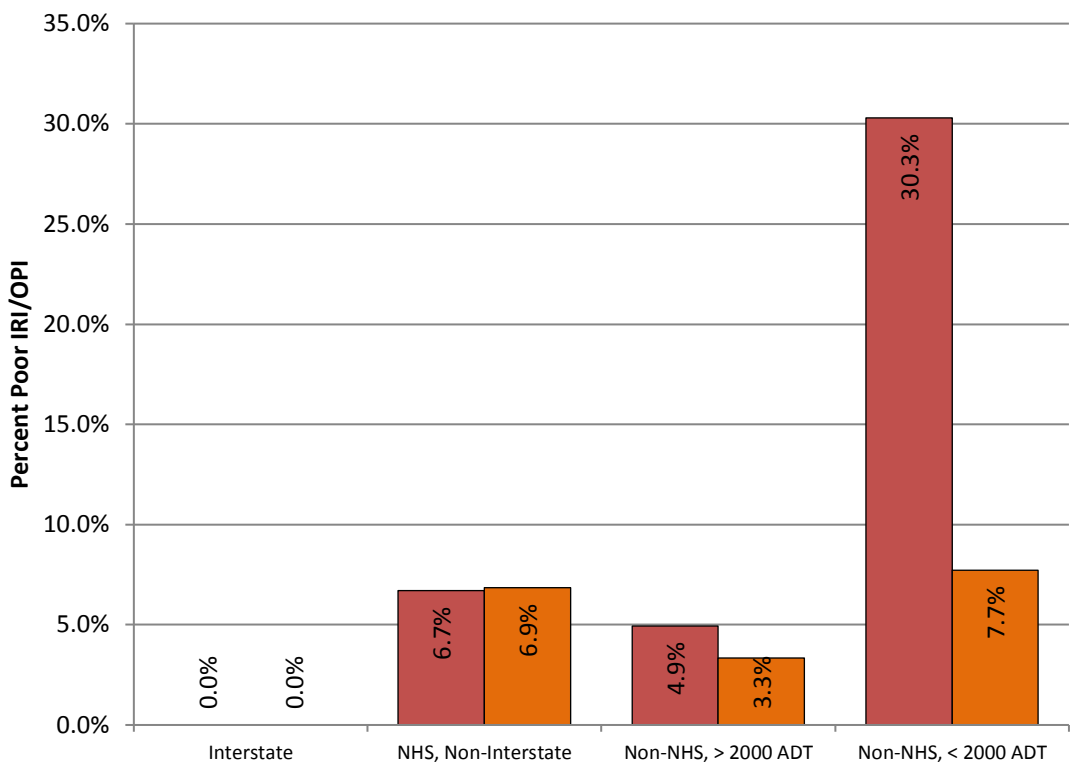
Legend

Target - Opimum Threshold
Target - Cautionary Threshold
Actual - At Optimum Threshold
Actual - At Cautionary Threshold
Actual - Not Meeting Cautionary Threshold

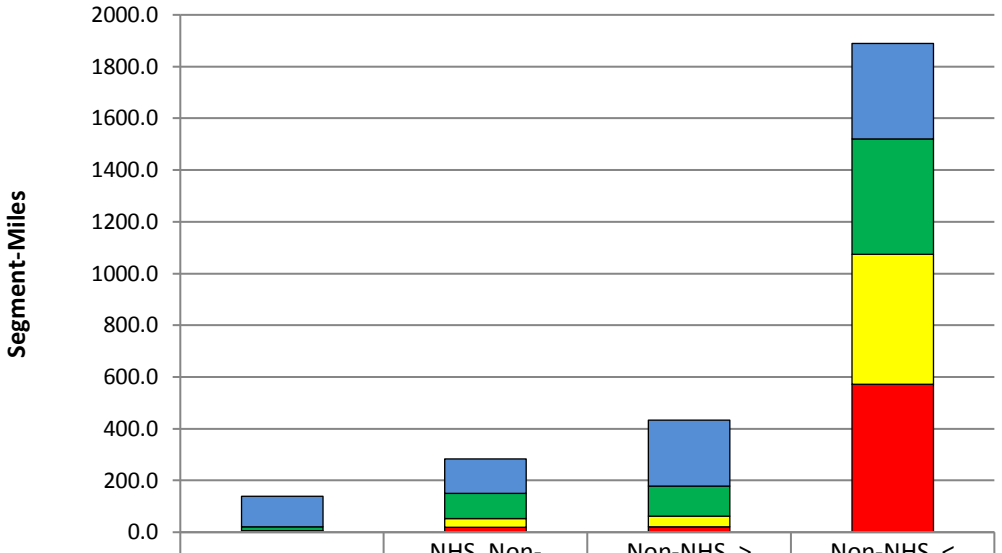
Percent Segment Miles by Business Plan Network



Percent of Segment Miles with a Poor IRI and Poor OPI by Business Plan Network

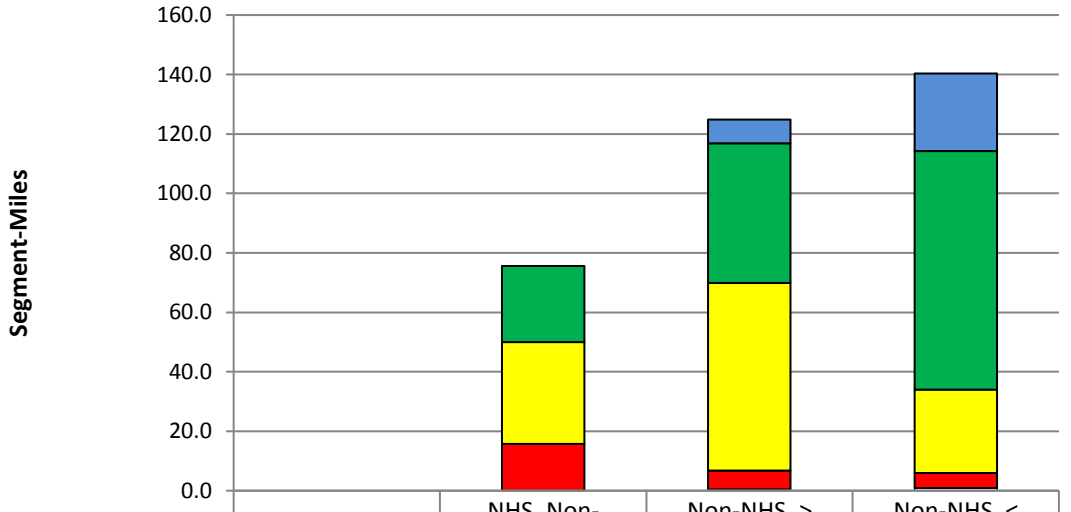


Segment Miles by Business Plan Network with IRI Ratings



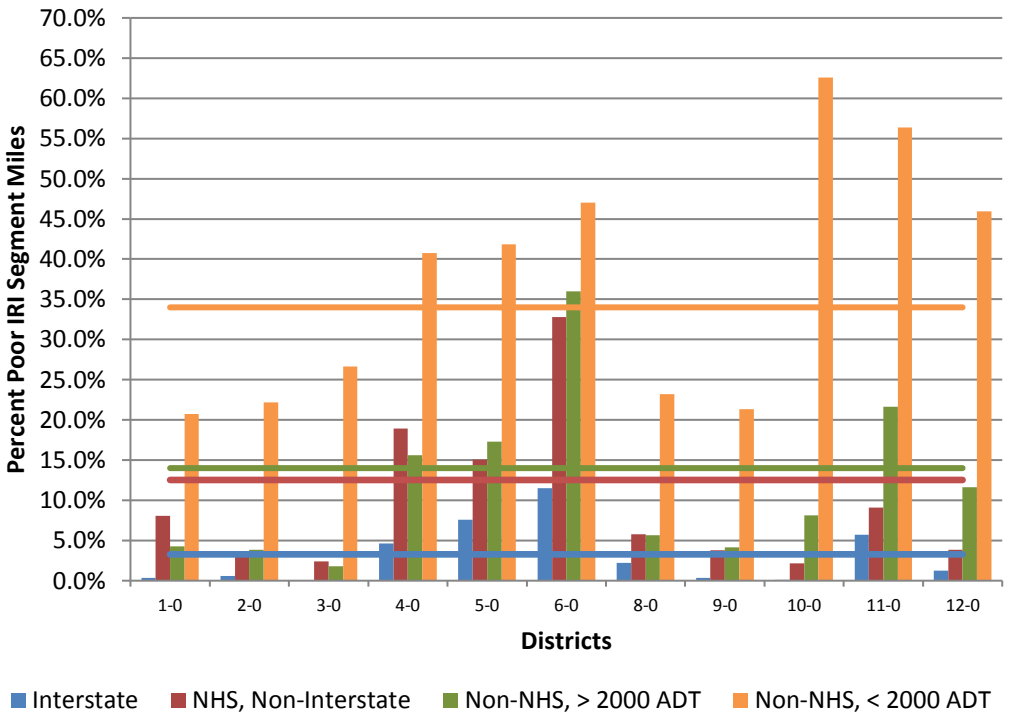
	Interstate	NHS, Non-Interstate	Non-NHS, > 2000 ADT	Non-NHS, < 2000 ADT
Excellent IRI	118.2	133.6	253.6	369.4
Good IRI	15.2	97.0	117.2	444.6
Fair IRI	6.5	34.5	40.3	502.7
Poor IRI	0.0	19.1	21.3	572.3

Surface Out-of-Cycle Segment Miles by Business Plan Network with OPI Ratings



	Interstate	NHS, Non-Interstate	Non-NHS, > 2000 ADT	Non-NHS, < 2000 ADT
Excellent OPI	0.0	0.0	7.9	26.0
Good OPI	0.0	25.5	47.0	80.3
Fair OPI	0.0	34.3	63.2	28.1
Poor OPI	0.0	15.7	6.3	5.0
No Reported OPI	0.0	0.0	0.4	0.9

Percent Poor IRI by District, by Business Plan Network



Segment Miles of Pavement Potential Past Design Service Life, Out-of-Cycle

	Interstate	NHS, Non-Interstate
Excellent OPI	0.0	0.0
Good OPI	0.0	14.5
Fair OPI	0.0	25.2
Poor OPI	0.0	8.8
No Reported OPI	0.0	0.0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