Multimodal Regional Freight Plan
The Northeast Ohio Areawide Coordinating Agency (NOACA) is a public organization serving the counties of and municipalities and townships within Cuyahoga, Geauga, Lake, Lorain and Medina (covering an area with 2.1 million people). NOACA is the agency designated or recognized to perform the following functions:

• Serve as the Metropolitan Planning Organization (MPO), with responsibility for comprehensive, cooperative and continuous planning for highways, public transit, and bikeways, as defined in the current transportation law.
• Perform continuous water quality, transportation-related air quality and other environmental planning functions.
• Administer the area clearinghouse function, which includes providing local government with the opportunity to review a wide variety of local or state applications for federal funds.
• Conduct transportation and environmental planning and related demographic, economic and land use research.
• Serve as an information center for transportation and environmental and related planning.
• As directed by the Board, provide transportation and environmental planning assistance to the 172 units of local, general purpose government.

NOACA’s Board of Directors is composed of 45 local public officials. The Board convenes quarterly to provide a forum for members to present, discuss and develop solutions to local and areawide issues and make recommendations regarding implementation strategies. As the area clearinghouse for the region, the Board makes comments and recommendations on applications for state and federal grants, with the purpose of enhancing the region’s social, physical, environmental and land use/transportation fabric. NOACA invites you to take part in its planning process. Feel free to participate, to ask questions and to learn more about areawide planning.

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The NOACA Multimodal Regional Freight Plan is divided into three sections. First is Data Collection, which provides quantitative information from a variety of sources to explain the importance and magnitude of freight movement. Next is a SWOT Analysis, standing for Strengths, Weaknesses, Opportunities, and Threats. This section builds on the data collected as well as extensive stakeholder input in order to evaluate existing and projected issues of importance for freight movement. These sections are tied together in Goals, Objectives, and Performance Measures. The data and analysis from the preceding sections allows us to identify projects, initiatives, and targets that will help ensure an efficient freight system in Northeast Ohio.

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Executive Summary

Northeast Ohio is a key hub for freight movement in the country due to its robust multimodal shipping network and easy access to population centers in the United States and Canada. The region is fortunate to have five interstates, an international airport, two major railroad lines, and three Great Lakes port facilities, as well as a developed pipeline system for moving liquid products. With national and global populations continuing to grow indefinitely, and a corresponding increase in freight movement, it will be critical for NOACA and its stakeholders to plan and invest in transportation projects that make moving goods into, out of, and through the region as easy possible for all modes. Doing so will help existing businesses grow in Northeast Ohio, encourage the start-up of new businesses, and facilitate relocation of businesses into the region from other parts of the country or world.

While all of these modes are viable shipping methods in the region, trucking accounts for roughly 80% of all freight by both volume and value, which closely mirrors the national average. Trucking is expected to remain the dominant mode of goods movement; however, the region should facilitate every mode to improve security and resiliency. Having redundancy in the system means a disruption to one mode can be minimized by temporarily shifting to another. Encouraging other modes of shipping will also improve air quality, since trucks create more air pollution than rail or water shipping per ton-mile of goods shipped.

Manufacturers are the key freight generators, but commercial areas have the highest truck traffic. These are areas where wholesalers and retailers receive deliveries of manufactured products from several different sources. The wholesale industry is the highest paying but employs the smallest number of workers, while retail employs the most people but pays the least. Manufacturing employment is expected to decline but still make up a large share of jobs that pay better than the regional average. Given all of these factors, projects that facilitate growth in the manufacturing industry may prove to be the most beneficial. After all, the outbound shipments from a manufacturer are the inbound shipments to a wholesaler or retailer.

Despite the advantages of location and a strong multimodal system, there will be obstacles to growth in Greater Cleveland. Most pressingly, expenses are outpacing revenues for funding infrastructure, and 34% of roads and 11% of bridges are not in a state of good repair. The existing system continues to age in older communities while being expanded in newer communities, and the current gas tax is insufficient to meet these maintenance and construction needs. Several technological advancements may change the movement of freight, such as autonomous vehicles or aerial delivery by drone, and these will have implications for spending the limited funding available. A stable but moving regional population also has implications, as shifting locations of people will shift business locations and freight movement patterns.

With these factors in mind, the Northeast Ohio Areawide Coordinating Agency (NOACA) has extensively engaged the freight community to develop the following three goals to meet the needs of freight stakeholders; improve the transportation system for all users; and increase safety, security, and resiliency:

- Prioritize maintenance over capacity additions.
- Facilitate all modes of shipping.
- Use targeted strategies to reduce congestion where it impedes freight movement.
These goals are in line with NOACA’s Vision Statement as well as the National Freight Strategic Plan and Ohio Department of Transportation Comprehensive Freight Plan. Specific objectives and performance measures will be used to prioritize projects and track progress in meeting these goals.

The NOACA Multimodal Regional Freight Plan will be updated every four years to coincide with NOACA’s Long-Range Transportation Plan. Additionally, a “State of Freight” memo will be drafted annually to document project progress and ensure performance measures are being advanced. The freight community will be engaged throughout to ensure transportation spending reflects regional priorities. This Plan therefore provides a blueprint for NOACA and its partners to make decisions that lead to a successful and efficient freight system that advances the NOACA Vision Statement:

NOACA will STRENGTHEN regional cohesion, PRESERVE existing infrastructure, and BUILD a sustainable multimodal transportation system to SUPPORT economic development and ENHANCE quality of life in Northeast Ohio.
Introduction

Freight is synonymous with economic competitiveness and job creation. From the materials with which roads are built to the cars and bikes on those roads, to the products we’re going to the store to buy, freight is everywhere. Freight can be measured by the value of the product or the tonnage being shipped, and when these numbers are growing, it’s a good indication that the economy is growing as well. During 2015, 65,510 people were employed in transportation and material-moving occupations in the Cleveland-Elyria Metropolitan Statistical Area, and their goods movement supported 313,700 people employed in freight-related industries.¹ A focus on efficient freight movement will help businesses retain these jobs while positioning them for future growth.

Northeast Ohio, being within a day’s drive of 60% of the United States and Canadian population, is in a great position to capitalize on goods movement.² To take full advantage of this position, the infrastructure that allows freight to move around the region efficiently must be maintained. In the business world, time is money—delays in shipping cost businesses money, making it harder for existing businesses to grow and new businesses to locate in Northeast Ohio. Accordingly, NOACA has made freight planning an integral part of the decision-making process in allocating resources.

While freight planning has always been important, transportation planning with a focus on freight stakeholders has become more prominent over the past few years at all levels. In late 2015, the Federal Highway Administration (FHWA) released a draft National Freight Strategic Plan, and in 2016 it released draft performance measures that focus specifically on freight movement. After a public comment period, one performance measure was adopted in early 2017 to measure truck travel time reliability. With the passage of the Fixing America’s Surface Transportation (FAST) Act in late 2015, a freight-specific federal grant program was created for the first time, showing that Congress recognizes the importance of freight projects and is willing to fund them. The Ohio Department of Transportation (ODOT) conducted a Statewide Freight Study that it published in November 2013 and released a draft freight plan in 2015 which was finalized in January 2017. NOACA will regularly examine these sources and further develop processes at the regional level to enhance freight system performance while also improving the safety, security, and resiliency of the system.

The NOACA Multimodal Regional Freight Plan (the “Plan”) starts with NOACA’s vision statement for the agency:

NOACA will STRENGTHEN regional cohesion, PRESERVE existing infrastructure, and BUILD a sustainable multimodal transportation system to

SUPPORT economic development and ENHANCE quality of life in Northeast Ohio.

All freight planning efforts will ensure progress is made to realizing this vision. The NOACA Regional Strategic Plan: Going Forward, Together (RSP), adopted in 2015, contains this vision as well as goals, objectives and strategies to support it.\(^3\) The RSP specifically calls for NOACA to “develop a freight strategy and freight plan in collaboration with partner institutions to better serve the basic economy in the region” (p. 32) and “work to build a strong and robust network with the business and economic development community” (p. 31). The latter is a continuous effort, and freight planning will work regularly to ensure that freight stakeholders are heard.

In creating the Plan, NOACA received input from stakeholders throughout the region, as shown in Appendix A. Over several months, stakeholders were identified through NOACA networks and contacted in person, by phone, or by email. They were informed that this Plan was being created to supplement the NOACA Long-Range Transportation Plan, which will help direct $12.9 billion in regional infrastructure spending from 2020 to 2040. Many stakeholders were asked:

1. Their general thoughts about how infrastructure affects business retention and attraction
2. How NOACA should prioritize the different modes—road, rail, port, air, pipeline
3. How to prioritize within modes (i.e., road maintenance or capacity expansion)
4. What specific projects are needed (e.g., widened road, fixed road, turn lane, etc.)
5. Other comments

NOACA staff also participated in focus groups such as the Federal Highway Administration (FHWA) Administrator’s Roundtable discussion at the Ohio Conference on Freight. Through these various methods, NOACA was able to collect valuable insight from the freight and business communities that helped shape this Plan. A draft of the Plan was then shared with stakeholders and the general public for feedback and comments before a final version was completed.

In addition to the RSP, this Plan looks to the Northeast Ohio Sustainable Communities Consortium (NEOSCC) for insight. This initiative was funded by the Partnership for Sustainable Communities, a collaboration of the U.S. Department of Transportation (DOT), U.S. Department of Housing and Urban Development (HUD), and U.S. Environmental Protection Agency (EPA). NOACA was the lead implementing agency. The consortium resulted in the creation of Vibrant NEO 2040, a decision-making framework to result in a healthier and more economically and socially equitable region.\(^4\)

Vibrant NEO developed a tool kit of best practices, several of which are relevant to infrastructure and economic development:

- **Initiative 1.1:** Encourage infill and redevelopment through the use of tax credits and other direct and indirect public incentives.
- **Initiative 1.2:** Fix it First: Continue to privilege projects that maintain the existing road network in a state of good repair rather than building additional capacity.


- **Initiative 2.1:** Strengthen regional job centers—and the corridors that connect them—by diversifying and intensifying land uses and investing in strategic economic development within them.
- **Initiative 5.4:** Evaluate the condition of all existing rail trackage and rail crossings to determine what investments would be necessary to bring substandard infrastructure up to standard for freight and passenger service.
- **Recommendation 7:** Preserve our natural areas for future generations, provide outdoor recreation opportunities, and develop a regional approach to protecting air, water, and soil quality. (Although this is not a specific initiative, freight movement still plays a role because different modes of shipping have different environmental impacts.)

NOACA’s freight planning will consider these initiatives to ensure the sustainability of the freight system.

Development of this Plan is critical to realizing the goal of economic development in the region. According to a recent global survey of more than 500 CEOs of multinational firms, only 68% reported the United States was “extremely competitive” with respect to physical infrastructure. While this is second only to Germany at 73%, it demonstrates that the United States has significant infrastructure shortfalls that planning can help address. While the survey looked at the issue globally, the same can be done at the national level—appropriate planning can give Northeast Ohio a competitive advantage relative to other metro areas by providing a robust and efficient freight system. The report states that “the extent to which a country creates and maintains critical infrastructure determines the success it has in meeting key manufacturing requirements, including the movement of raw material and physical goods, energy production and delivery, and the transfer of information.” The same no doubt holds true regionally.

The NOACA Multimodal Regional Freight Plan provides a comprehensive view of freight activities in the region. It describes existing conditions and projects what the future may hold, which helps inform a SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis. Businesses regularly conduct this type of analysis to uncover strengths and weaknesses of the system and discover where there are Opportunities for improvement and potential Threats that may impede improvement. Through this insight, goals were developed that build on strengths, improve weaknesses, capitalize on opportunities, and mitigate threats. Specific performance measures are described that will help NOACA track progress in meeting these goals. Finally, a listing of recommendations and implementation action areas was developed based on the ability of projects to achieve the goals and performance measures. All of these activities have been, and will continue to be, informed by feedback from freight stakeholders as well as communities that are heavily impacted by freight.

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Data Collection

This section provides an overview of the system and its current condition, each mode, key commodities, freight origins and destinations, and projections for goods movement, as well as employment trends in associated industries.\textsuperscript{6} Next, the security, resilience, and safety of the system are profiled because maximizing these three areas ensures that goods and people can reliably move through the region.

Freight System and Conditions

The freight transportation system in Northeast Ohio boasts an extensive road and rail system, three ports, a major international airport, and several regional airports that may on occasion handle small amounts of freight. The regional freight network and key freight facilities can be seen in Map 1.

\textsuperscript{6} All tonnage and value figures come from the Federal Highway Administration Freight Analysis Framework (FAF4), \url{http://ops.FHWA.dot.gov/freight/freight_analysis/faf/index.htm#faf4}. Data is for the Cleveland-Akron-Canton Combined Statistical Area. It is appropriate to use this scale because freight regularly travels long distances and because of the interconnectedness of the regional economy.
Map 1: Regional Freight Network
Roads are the key method of moving goods in the region, just as they are in the rest of the country. Therefore, it is important to view our road network because its condition is a key factor in shipping costs and time. Trucking is described in detail in the following section.

Unsurprisingly, interstates have and will continue to have the highest truck volumes. NOACA has taken the additional step of identifying the regional freight network in Map 1 to reflect the fact that the Ohio Department of Transportation leads interstate projects while NOACA funding and planning efforts focus on other roads in the region. Projects will clearly have a greater effect on freight movement if they are on the corridors that receive the bulk of truck traffic, seen in Maps 2 and 3.

Map 2: 2012 Average Daily Truck Traffic
Pavement and bridge conditions must be monitored to keep the transportation system in a state of good repair. The NOACA Transportation Asset Management Program (TAMP) has identified that 34% of regional pavements and 11% of bridges are currently not in a state of good repair. NOACA projections based on pavement deterioration rates, traffic volume, and other factors indicate that $10 billion in improvements are necessary over the next 20 years to bring the entire system into a state of good repair.
Intermodal connectors are local roadways that connect the National Highway System with a different mode of transportation. In other words, they are roads that lead into and out of railyards, airports, and water ports. They will also be discussed in-depth in the next section, but it is critical to note that intermodal connector conditions are worse than the transportation system as a whole. According to an analysis conducted for the NOACA 2015 Intermodal Connector Technical Memo, 56% of pavements on freight intermodal connectors are not in a state of good repair. This can discourage their use and make shipping via rail, water, or air less viable options in Northeast Ohio.

Figure 1: 2014 Pavement Condition

Monitoring congestion levels on the road system is also necessary, because an increase in travel time will result in an increased cost of shipping goods. If congestion is too severe or travel time is unpredictable, it may discourage freight-generating businesses such as manufacturers from expanding in Northeast Ohio or locating here in the first place. NOACA uses the metric of Volume-Capacity Ratio (VCR) to determine if a road segment is congested based on these values:

**Table 1: Level of Service Definitions**

<table>
<thead>
<tr>
<th>Volume-to-Capacity Ratio</th>
<th>Assessment</th>
<th>Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.3</td>
<td>Free Flow Operations</td>
<td>A</td>
</tr>
<tr>
<td>0.3-0.49</td>
<td>Reasonably Free Flow Operations</td>
<td>B</td>
</tr>
<tr>
<td>0.5-0.69</td>
<td>Under Capacity</td>
<td>C</td>
</tr>
<tr>
<td>0.7-0.84</td>
<td>Near Capacity</td>
<td>D</td>
</tr>
<tr>
<td>0.85-0.99</td>
<td>At Capacity</td>
<td>E</td>
</tr>
<tr>
<td>1.0 and above</td>
<td>Over Capacity</td>
<td>F</td>
</tr>
</tbody>
</table>

Most congestion does not occur throughout the day, only during peak-period travel or as a result of unforeseen incidents such as accidents. NOACA therefore analyzes VCR to identify bottlenecks at certain times of the day. Different congestion management strategies are appropriate based on the cause(s) of congestion, such as rush hour. Therefore, planners and engineers need to develop context sensitive solutions. FHWA reports that only about 40% of congestion is due to inadequate roadway capacity, with the remainder caused by a variety of
factors including traffic incidents, bad weather, and road construction, among others. Identifying the cause(s) of congestion is necessary to determine if roadway expansion will be an effective solution to reduce vehicle delays. Congestion is projected to increase in the future due to population growth and a corresponding increase in freight tonnage, so monitoring corridors and addressing bottlenecks will be important in facilitating efficient freight movement.

Map 4: 2015 PM Peak Period Congestion

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The National Performance Measures Research Data Set (NPMRDS) uses voluntary transponder data to record travel times on the National Highway System every day at five-minute increments. NOACA can use the data to compare actual travel times to expected travel times based on posted speed limits. The map below depicts how the data can be used; shown here is the average travel speed for trucks between 5:00 p.m. and 6:00 p.m. during the week of November 2, 2015. By monitoring different days and times of day, planners can identify where and when bottlenecks occur and develop the best strategies to alleviate them. By knowing actual travel speeds, planners can determine how long it will take a truck to pass through a corridor. This time can then be compared to the time it should take based on the posted speed limit. If actual travel times vary wildly, they are said to be unreliable, which discourages shippers from using those roadways. In January 2017, FHWA finalized a rule stating that average Truck Travel Time Reliability for the interstate system should be calculated using this methodology. Similarly, the NOACA GIS portal shows existing and projected peak-period bottlenecks and is regularly updated as new data becomes available.\(^9\)

Map 6: NPMRDS Truck Speeds

Modes

Truck shipping is the dominant mode of freight movement; however, each mode has its benefits and drawbacks and is better suited for different types of goods. Having multiple options therefore makes it easier for businesses to operate in the region and increases system reliability and resiliency.
Figure 3: 2015 Freight by Mode

Source: FHWA Freight Analysis Framework

Truck/Road

Regional freight activity is dominated by truck traffic, which carries greater tonnage and value than all other modes combined. To support this, NOACA has developed a regional freight network to help prioritize projects in the Transportation Improvement Program (TIP) and ensure that the most heavily traveled truck routes are kept in a state of good repair. As of 2012, 11,700 people throughout the region were employed in truck transportation and related support activities, as shown in Map 7.\(^\text{10}\)

\(^{10}\) Ohio Department of Job and Family Services, Bureau of Labor Market Information, July 2015.
With Interstates 76, 80, and 90 traveling west-east and I-71 and I-77 traveling north-south, the region has ample road access to easily reach many major destinations across America. Northeast Ohio further features a robust network of state routes and local roads that has been built over several decades, in some cases to support existing growth but in other cases to support projected growth that may or may not have occurred. A legacy of jobs and population leaving the central cities and spreading through the region has increased the road network but affected the ability to maintain it. This lack of maintenance can cause delays that hurt all road users, including freight trucks.

When NOACA conducted a survey of freight stakeholders in 2011, respondents engaged in trucking stated that poor pavement was the number one concern, while highway congestion ranked fifth. Tight turning radii and turning at traffic lights were second and third. In a section asking about the best aspects of moving freight in Northeast Ohio, interstate access and access to markets were the top two, while low congestion was number three; no one chose road/bridge conditions. Taken together, these rankings indicate that freight stakeholders prioritize maintenance and improvement of existing infrastructure over additional capacity projects.
All types of products are shipped by truck, including but certainly not limited to wholesale and retail goods, base metals, many other manufactured products, and perishable foods. Many bulk commodities are shipped on our roadways as well, such as gravel, natural sands, base metals, nonmetal minerals, and scrap metal. Federal regulations set a weight limit of 80,000 pounds for a tractor-trailer; these bulk commodities are typically the ones that result in loads nearest to the weight limit and accordingly do the most road damage. As discussed later in the section on intermodal shipping, encouraging other modes of shipment for these products may be desirable to lessen wear and tear on the road network.

Trucks will always maintain a critical role though, as even rail and waterway shipping will typically involve trucks delivering goods to and from the rail or port facility. Only a select few businesses generate the volume of freight necessary to have a direct rail connection or port facility; these include businesses such as the steel mill on the Cuyahoga River and other bulk commodity or manufacturing enterprises. Commercial and retail establishments actually generate the majority of truck traffic in the region, as they have higher inventory turnover (the rate at which products are brought to the facility and then sold). This is a factor communities can consider in land-use decisions, as proper business siting can reduce vehicle miles traveled and thereby reduce pollutants and the potential for crashes. Communities may also designate truck routes and place signage to direct trucks to or away from certain roads to create safe roads for all users and minimize construction costs, as all roads do not need to be engineered to accommodate truck widths and weights. Care should be taken in these instances, however, because inefficient routing may discourage businesses from locating in the community as well as increase vehicle miles traveled for those businesses that do use the routes.

Intermodal

The intermodal connectors of the National Highway System (NHS) are the first and last miles of roadway used by truckers to travel between the major highways of the NHS and the nation’s ports, rail terminals, and air cargo hubs. Most NHS connectors are local roads that often weave their way through older industrial and residential neighborhoods.\(^{11}\) They represent an essential link between the highway system and intermodal facilities as well as end users. FHWA requires that states submit intermodal facilities periodically, and ODOT tasks NOACA with collecting data for the region. Connectors may be added or removed based on recent volume figures. As of October 2016, the region has 14 intermodal connectors for freight facilities.

### Table 2: Freight Intermodal Connectors

<table>
<thead>
<tr>
<th>Intermodal Connector</th>
<th>Community</th>
<th>Name of Connector</th>
<th>Volume</th>
<th>Criteria</th>
<th>Length (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH38P</td>
<td>Fairport Harbor/ Painesville Painesville Twp.</td>
<td>Union Sands Fairport Harbor</td>
<td>519,000</td>
<td>Tons/Year (2009)</td>
<td>3.86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermodal Connector</th>
<th>Community</th>
<th>Name of Connector</th>
<th>Volume</th>
<th>Criteria</th>
<th>Length (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH39P</td>
<td>Fairport Harbor/ Painesville Twp.</td>
<td>Port of Fairport Harbor-Grand River</td>
<td>2,319,000</td>
<td>Tons/Year (2006)</td>
<td>1.50</td>
</tr>
<tr>
<td>OH40P &amp; OH41P (combined data)</td>
<td>Lorain</td>
<td>Port of Lorain – USS/Kobe Steel (40) &amp; Amcor Marine Corp. (41)</td>
<td>2,154,000</td>
<td>Tons/Year (2006)</td>
<td>2.33 (OH40P) 0.06 (OH41P)</td>
</tr>
<tr>
<td>OH42P</td>
<td>Lorain</td>
<td>Port of Lorain – Jonick Dock &amp; Terminal</td>
<td>1,365,000</td>
<td>Tons/Year (2006)</td>
<td>1.17</td>
</tr>
<tr>
<td>OH43P &amp; OH45P (combined data)</td>
<td>Cleveland</td>
<td>Port of Cleveland – East Basin (43) &amp; Cuyahoga River Berths (45)</td>
<td>507,036 (international); 85,985 (cement)</td>
<td>Tons/Year (2014)</td>
<td>0.88 (OH43P) 0.56 (OH45P)</td>
</tr>
<tr>
<td>OH44P</td>
<td>Cleveland</td>
<td>Port of Cleveland – West Basin</td>
<td>3,401,789</td>
<td>Tons/Year (2014)</td>
<td>0.97</td>
</tr>
<tr>
<td>OH46P</td>
<td>Cleveland</td>
<td>Port of Cleveland – Berths &amp; R/R Truck Terminal</td>
<td>1,059,000</td>
<td>Tons/Year (2006)</td>
<td>2.37</td>
</tr>
<tr>
<td>OH47P</td>
<td>Cleveland</td>
<td>Port of Cleveland – Marathon Oil</td>
<td>1,367,000</td>
<td>Tons/Year (2006)</td>
<td>2.02</td>
</tr>
<tr>
<td>OH61R</td>
<td>Cleveland</td>
<td>CSX Intermodal &amp; Flexi-Flo Bulk Terminal</td>
<td>300</td>
<td>Trucks/Day (2007)</td>
<td>0.04</td>
</tr>
<tr>
<td>OH63R</td>
<td>Medina</td>
<td>Medina Supply Co. &amp; Stone Yard</td>
<td>500,000</td>
<td>Tons/Year (2007)</td>
<td>0.57</td>
</tr>
<tr>
<td>OH88R</td>
<td>Maple Heights/ Garfield Heights</td>
<td>Norfolk Southern Intermodal Terminal</td>
<td>209,776</td>
<td>TEU*/Year (2007)</td>
<td>1.05</td>
</tr>
</tbody>
</table>

*TEU = Twenty-Foot Equivalent Unit, the standard size of one rail car
NOACA released a comprehensive review of these intermodal connectors in November 2015 and posted them on the NOACA website. The technical memo concludes:

“The majority of the intermodal connectors have issues ranging from minor to pressing that will need to be addressed in the future. Identified conditions include:

• poor pavement conditions throughout many of the intermodal connectors
• localized congestion in select communities
• deteriorating and/or low bridges
• inadequate turning radii
• lack of signage and road markings

The presence of these conditions on intermodal connectors will impede the ability to realize the NOACA goal of supporting economic development and may also create safety issues for all road users.”

The NOACA Freight Stakeholder Survey in 2011 asked respondents to rate how certain infrastructure issues affected them on a scale of 1 (no problem) to 4 (very serious problem). Connectivity to intermodal connector facilities scored the highest of all options at 2.75. The condition of intermodal connectors scored a 2.5, which was tied for second highest with the condition of the roadway system as a whole.

The conclusions of the Intermodal Connector Technical Memorandum taken together with the stakeholder survey results indicate that infrastructure conditions at intermodal connectors may discourage their usage. Projects at these locations should be strongly considered to increase their viability as shipping options. Shipping intermodally removes trucks from our regions roads, thereby reducing road damage, congestion, and air pollution while providing lower cost options for businesses.

Air

Cleveland Hopkins International Airport is the primary air cargo carrier in the region. The airport offers several different cargo and handling companies—Delta Airlines Cargo, FedEx, Servisair GlobeGround, Southwest, United Cargo, UPS, and the United States Postal Service. While making up a very small fraction of all freight shipped in the region, air cargo is often highly valuable and profitable, which is necessary to justify the relatively higher cost and speed compared to other modes. In fact, air cargo has by far the greatest dollar value per ton of goods shipped. Goods commonly shipped by air include electronics, precision instruments, other smaller manufactured products, and pharmaceuticals. It will be important for NOACA to maintain adequate access and a state of good repair on the road network leading to and from Hopkins to ensure its continued success in shipping these high-value goods.

In 2016, the Aerozone Alliance was formed to “create a world-class innovation hub” around Hopkins to encourage business growth and attraction. Members are the airport itself; NASA Glenn Research Center; and the Cities of Berea, Brook Park, Cleveland, Fairview Park, and

12 Ibid., 7.
13 Ibid., 7, 24.
North Olmsted. NOACA can play a role in this economic development by supporting infrastructure projects to facilitate freight movement in this 15.5-mile district. The Alliance was created in response to a study from Cleveland State University on the feasibility of an “aerotropolis” around the airport. The idea of an aerotropolis is that the airport and its surrounding areas can act cohesively as a central business district to take advantage of the ability of the airport to move goods and people. As a regional entity with a goal of strengthening regional cohesion, NOACA is well situated to play a role in data collection and analysis for the Aerozone Alliance if its members request assistance.

Rail

The freight rail system in Northeast Ohio includes two Class I railroads, one Class II, and 5 short-line railroads. CSX and Norfolk Southern (NS) operate the main lines running east-west through Ohio, providing long-haul service, while regional and short lines provide access to the region's ports, airport, and intermodal terminals. The Wheeling and Lake Erie Railway is a Class II rail line that serves Northeast Ohio. The railway owns 558 miles of track in Ohio and has a significant amount of track rights over both CSX and NS tracks. The last mile of rail service depends on short-line operators to maintain the connectivity between the long-haul railroads and the factories, refineries, and transload facilities. They generally provide point-to-point service over short distances, and most operate between 10 to 100 track miles. These short lines operate mostly on tracks owned by either the Class I or Class II railroads, though they also operate as switching and terminal railroads, which provide local services. Descriptions and locations of rail facilities are provided below. Railroads are primarily suited for carrying larger or heavier products such as coal, machinery, plastics and rubber, scrap metal, other metal products, and agricultural commodities with long shelf lives.

Northeast Ohio Rail Inventory

Class I Rail Terminals:
- CSX Cleveland Terminal: East 152nd Street, Cleveland
  - Multi-commodity facility
  - 92 car parking spots
  - Access to Chicago; New York/New Jersey; Orlando; Miami; Jacksonville; Portsmouth, VA; Worcester, MA
- CSX transflow Terminal: West 3rd Street, Cleveland
  - Multi-commodity facility
  - 105 car spots
- Norfolk Southern Terminal: Chardon Road, Euclid
  - Bulk transfer terminal—transflow
  - 101 car spots
- Norfolk Southern Terminal: Broadway Avenue, Maple Heights
  - Bulk transfer terminal
  - Access to Chicago; New York/New Jersey; Norfolk/Portsmouth, VA

Short-line Railroad Operators:
- ArcelorMittal: Cleveland Works Railway
  - Operates 10 miles of track
  - Serves the Cleveland steel industries
- Cleveland Commercial Railroad
  - Operates more than 29 miles of lines in eastern Cleveland and between Cleveland and Mantua
- Flats Industrial Railroad
  - Provides switching service in the Cleveland area
  - Interchanges with both CSX and NS
- Lake Terminal Railroad
  - A switching carrier that serves steel mills and pipe manufacturers
- Newburgh & South Shore Railroad
  - Owns and operates three miles of track in the Cleveland area and services steel, lumber, flour, and metals industries in the area

As the Ohio Rail Development Commission notes, rail is critical because it “has the capacity to divert even more freight and passengers from highways in the future, which is vital in the face of estimated freight and passenger growth rates.” One rail car is the equivalent of about three tractor trailers, so moving freight by rail reduces congestion and air pollution by removing those trucks from the road.

The NOACA region has 454 at-grade railroad crossings. To warn passenger vehicles, 296 of these have gates, 56 have flashing lights, and 106 have another method such as signage (known as passive warnings). At-grade crossings slow freight movement because trains slow down to go through them, and they also contribute to congestion for passenger vehicles to the extent that a queue of vehicles has to wait for a train to pass. Further, at-grade crossings create potential safety issues when cars, bikes, or pedestrians cross the tracks, which is discussed further in the Safety section of this Plan.

Water

The five-county region has three cargo ports. The largest is the Port of Cleveland, where businesses moved 12,999,000 tons in 2014. The second-largest port is Fairport Harbor, which moved 1,719,000 tons. The Lorain Harbor is the smallest and moved 960,000 tons of cargo, according to the Army Corps of Engineers. Similar to rail freight, water facilities in Northeast Ohio are best suited for moving bulk commodities and other products that do not need to be delivered as rapidly, such as metallic ores, gravel, scrap metal, and agricultural commodities.

The Cleveland-Cuyahoga Port Authority has cargo terminals with 12 docks along the Lake Erie shoreline and the Cuyahoga River. The port facilities are operated by four different companies, and they include 80 acres of owned and leased property, a 45-acre bulk terminal, and 300,000 square feet of inside storage capacity. The Cleveland Bulk Terminal handles iron ore and limestone as well as other dry bulk cargo. The port maintains a full seaway depth and has

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17 Ibid., Chapter 1-1, 10.
direct access to major Interstates and Class I railroads. Total volume, encompassing shipments via the Port Authority itself as well as other businesses along the river, has more than doubled since the Great Recession of 2007-2009, when it bottomed out at 6,076,000 tons. Iron ore makes up more than half the total volume, with limestone, nonmetallic minerals, cement, and concrete also contributing large shares. In 2015, NOACA awarded $4.9 million dollars to the Port from the Congestion Mitigation and Air Quality (CMAQ) grant program. The funding was used to purchase cranes for loading and unloading containerized cargo and shows one way NOACA can facilitate multimodal shipping.

The Port partnered in 2013 with a European firm to become the first Great Lakes port to offer containerized shipping, which allows a wide variety of products to be shipped between Cleveland and Europe. In the past, these products were sent to East Coast ports, primarily by truck. Shipping them from Cleveland can therefore reduce truck traffic and its associated congestion, air pollution, and road damage while providing local businesses a low-cost shipping option. Furthermore, containerized shipping offsets some of the fluctuation of bulk commodity shipping, helping the Port remain viable.

Fairport Harbor in Lake County is a deep draft commercial harbor with 1.5 miles of channel on the Grand River. Like the Cleveland and Lorain ports, Fairport Harbor suffered in the Great Recession, with volume dropping to 1,122,000 tons in 2009. Unlike for the other two ports, 2014 was not the best year for Fairport Harbor; rather, 2011 saw a large increase, and tonnage has since declined. Limestone also makes up the bulk of the traffic, with nonmetallic minerals adding nearly all the rest of the volume.

The Lorain Harbor in Lorain County is also a deep draft commercial port. Primary commercial traffic includes limestone, sand, and gravel. Tonnage has continued to rebound from a recession low of 580,000 tons in 2009; however, the 2014 volume of 960,000 tons is still significantly lower than pre-Great Recession tonnage, which peaked at 3,617,000 tons in 2006.

**Pipeline**

Pipelines are often overlooked as movers of freight because they are fixed objects rather than moving vehicles, trains, boats, or planes. Pipelines, however, carry the second-highest tonnage of freight exported from and imported to the region; this is still projected to be the case in 2045. They carry a variety of liquid and gas products used for transportation, energy production, and industrial processes. These commodities have been found in significant quantities in the Marcellus and Utica shale formations, which are predominantly in the southeastern part of the state, however, the populous regions and manufacturing centers such as Northeast Ohio are where many of these products are used. While NOACA is primarily engaged in roadway projects due to its funding sources and mandates as a metropolitan planning organization, it will be important for planners, elected officials, and other community stakeholders to understand the role of pipelines in the region, including their siting, safety, condition, and compatible land uses.

**Commodities**

From an infrastructure perspective, it is important to focus on the tonnage of freight shipped through the region, as this will determine infrastructure needs. As previously shown, most freight moves by truck, so an increase in tonnage means an increase in trucks and their associated contribution to road damage, congestion, and pollution. From an economic
development perspective though, it may be useful to consider the most valuable goods because their manufacture and sale can generate significant regional wealth. Where commodities have both high value and large quantities, they can be regionally significant industries and potential key targets for freight infrastructure planning. Commodities that fit this description in the region include base metals, largely due to the iron and steel industry, and other foodstuffs, due to large agricultural areas. Mixed freight also belongs to this category, although by definition it encompasses a variety of commodities, making it unsuited for targeted freight planning.

Figure 4: Top 10 Exports by Value (in Millions)

Source: FHWA Freight Analysis Framework

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In FAF terminology, there are three commodity classes for agricultural inputs in their unaltered state: cereal grains, other agricultural products, and live animals/fish. Once processed, these categories become, respectively, milled grain products, other foodstuffs, and meat/seafood. “Other foodstuffs” therefore refers to any food product that is not made from grains or animals/fish.
Figure 5: Top 10 Exports by Tonnage (in Millions)

Source: FHWA Freight Analysis Framework

Figure 6: Top 10 Imports by Value (in Thousands)

Source: FHWA Freight Analysis Framework
The previous two sections have described the different modes of freight travel in the region and the main commodities exported and imported. By looking at these two factors together, we can see how the key commodities move. The ‘Modes’ section of this Plan showed the tonnage and value moved by each shipping method, while the ‘Commodities’ section ranked the top ten imports and exports by tonnage and value. The FHWA Freight Analysis Framework provides even further detail, allowing us to see the tonnage and value per mode for each commodity. Knowing how the top commodities are shipped can help identify important freight infrastructure.

Being aware of the travel mode of the key commodities can help planners and project sponsors better understand where funds may be needed to keep infrastructure optimized for shipping. As mentioned, base metals and foodstuffs are largely carried by truck but have significant rail and multimodal tonnages as well. Although railroads themselves are privately owned and their expansion or maintenance would not be funded by NOACA, it and other governmental entities can ensure adequate access, good conditions, and minimal congestion on the roads leading to and from rail facilities.
Table 3: Top 10 Exports by Tonnage by Mode

<table>
<thead>
<tr>
<th>Top 10 Exports by Tonnage</th>
<th>Air</th>
<th>Multiple Modes &amp; Mail</th>
<th>Other &amp; Unknown</th>
<th>Pipeline</th>
<th>Rail</th>
<th>Truck</th>
<th>Water</th>
<th>Total Tonnage</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tons</td>
<td>Value</td>
<td>Tons</td>
<td>Value</td>
<td>Tons</td>
<td>Value</td>
<td>Tons</td>
<td>Value</td>
<td>Tons</td>
</tr>
<tr>
<td>Nonmetal Mineral Products</td>
<td>4.7</td>
<td>$293</td>
<td>25</td>
<td>$302</td>
<td>0.26</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>14.0</td>
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<tr>
<td>Gravel</td>
<td>0.0</td>
<td>$0</td>
<td>236</td>
<td>$4</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>0</td>
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<tr>
<td>Base Metals</td>
<td>4.6</td>
<td>$136</td>
<td>408</td>
<td>$661</td>
<td>0.16</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>436.0</td>
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<tr>
<td>Coal n.e.c.</td>
<td>0.0</td>
<td>$0</td>
<td>656</td>
<td>$519</td>
<td>0.00</td>
<td>$0</td>
<td>5902</td>
<td>$1,622</td>
<td>187.0</td>
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<tr>
<td>Waste/Scrap</td>
<td>0.3</td>
<td>$27</td>
<td>549</td>
<td>$212</td>
<td>0.08</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>22.9</td>
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<tr>
<td>Other Foodstuffs</td>
<td>0.6</td>
<td>$6</td>
<td>205</td>
<td>$187</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>143.0</td>
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<td>Natural Sands</td>
<td>0.0</td>
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<td>12</td>
<td>$2</td>
<td>0.75</td>
<td>$0</td>
<td>0</td>
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<td>46.0</td>
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<td>Mixed Freight</td>
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<td>28</td>
<td>$530</td>
<td>24.25</td>
<td>$651</td>
<td>0</td>
<td>$0</td>
<td>23.4</td>
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<td>$1</td>
<td>4</td>
<td>$2</td>
<td>0.03</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>14.2</td>
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<tr>
<td>Waste/Scrap</td>
<td>0.8</td>
<td>$41</td>
<td>7</td>
<td>$27</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>0.6</td>
</tr>
<tr>
<td>Totals</td>
<td>6.6</td>
<td>$238</td>
<td>1870</td>
<td>$2,140</td>
<td>25.27</td>
<td>$651</td>
<td>5902</td>
<td>$1,622</td>
<td>1663.2</td>
</tr>
</tbody>
</table>

Table 4: Top 10 Imports by Tonnage by Mode

<table>
<thead>
<tr>
<th>Top 10 Imports by Tonnage</th>
<th>Air</th>
<th>Multiple Modes &amp; Mail</th>
<th>Other &amp; Unknown</th>
<th>Pipeline</th>
<th>Rail</th>
<th>Truck</th>
<th>Water</th>
<th>Total Tonnage</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tons</td>
<td>Value</td>
<td>Tons</td>
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<td>Tons</td>
<td>Value</td>
<td>Tons</td>
<td>Value</td>
<td>Tons</td>
</tr>
<tr>
<td>Gravel</td>
<td>0.03</td>
<td>$0</td>
<td>2580</td>
<td>$18</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>667</td>
</tr>
<tr>
<td>Nonmetal Mineral Products</td>
<td>3.56</td>
<td>$103</td>
<td>703</td>
<td>$295</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>353</td>
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<tr>
<td>Coal n.e.c.</td>
<td>0.30</td>
<td>$0</td>
<td>1</td>
<td>$9</td>
<td>0.00</td>
<td>$0</td>
<td>10126</td>
<td>$2,430</td>
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<td>Base Metals</td>
<td>5.24</td>
<td>$65</td>
<td>485</td>
<td>$469</td>
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<td>$0</td>
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<tr>
<td>Waste/Scrap</td>
<td>0.56</td>
<td>$209</td>
<td>716</td>
<td>$272</td>
<td>0.66</td>
<td>$1</td>
<td>0</td>
<td>$0</td>
<td>743</td>
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<tr>
<td>Mixed Freight</td>
<td>0.31</td>
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<td>44</td>
<td>$850</td>
<td>22.59</td>
<td>$105</td>
<td>0</td>
<td>$0</td>
<td>12</td>
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<tr>
<td>Metallic Ores</td>
<td>0.42</td>
<td>$1</td>
<td>886</td>
<td>$47</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>Other Foodstuffs</td>
<td>1.71</td>
<td>$15</td>
<td>103</td>
<td>$134</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>481</td>
</tr>
<tr>
<td>Natural Sands</td>
<td>0.21</td>
<td>$0</td>
<td>4</td>
<td>$0</td>
<td>0.00</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
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<td>Gasoline</td>
<td>0.06</td>
<td>$0</td>
<td>106</td>
<td>$76</td>
<td>0.00</td>
<td>$0</td>
<td>3519</td>
<td>$3,357</td>
<td>130</td>
</tr>
<tr>
<td>Totals</td>
<td>12.38</td>
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<td>5628</td>
<td>$2,169</td>
<td>23.24</td>
<td>$105</td>
<td>13645</td>
<td>$5,787</td>
<td>5173</td>
</tr>
</tbody>
</table>

Tons shown in thousands of tons. Value shown in millions of dollars.

*n.e.c. = Not elsewhere classified. This category contains all coal byproducts that do not fall under the commodity class “Coal”.

Source: FHWA Freight Analysis Framework
Mapping efforts can be undertaken to locate the businesses involved with these commodities. For example, base metal commodities are used by the fabricated metal industry. Seeing where the businesses are clustered provides insight into key shipping corridors that can be targeted for projects.

**Map 8: Fabricated Metal Product Manufacturers**

![Map 8: Fabricated Metal Product Manufacturers](image)

**Mode and Commodity Projections**

Tonnage and value of freight exported from and imported to Northeast Ohio are both expected to grow over the coming decades, and trucking is expected to remain the dominant mode of freight movement. Figures 8 through 11 represent what the FHWA considers its baseline estimates, with tonnage increasing by more than 50% and value by more than 100%, as well as optimistic and pessimistic scenarios. The tonnage increase in particular presents challenges for road maintenance, congestion, and air pollution, as it means significantly more trucks on the road. This is a key factor to consider as decisions are made regarding preservation versus capacity projects. While capacity increases seem like a logical response to an increase in vehicles, this must be balanced with budget constraints. If capacity is added to some corridors while others are not maintained, the result may be a shift in usage from one to the other, resulting in different places and patterns of congestion but no real systemic improvements.
Strategies involving asset management and transportation demand management will be crucial to best allocate funding. NOACA will continue to engage the business and freight communities regularly to best understand their needs and help inform spending decisions.

**Figure 8: Projected Export Tonnage (in Thousands)**

![Projected Export Tonnage Graph]

*Source: FHWA Freight Analysis Framework*

**Figure 9: Projected Export Value (in Millions)**

![Projected Export Value Graph]

*Source: FHWA Freight Analysis Framework*
Growth is expected among almost all modes of transportation for both imports and exports; the only exceptions are a slight decline in the value of products shipped via pipeline and a decline in the tonnage of goods exported via rail. When exports and imports are combined though, all modes see tonnage and value increases.
**Figure 12: 2015 Freight Tonnage and Value by Mode**

Source: FHWA Freight Analysis Framework

**Figure 13: 2045 Projected Freight Tonnage and Value by Mode**

Source: FHWA Freight Analysis Framework
Table 5: Growth of Tonnage and Value by Mode (Exports and Imports Combined)

<table>
<thead>
<tr>
<th>Mode</th>
<th>2015 Tonnage (in thousands)</th>
<th>2015 Value (in millions)</th>
<th>2045 Tonnage (in thousands)</th>
<th>2045 Value (in millions)</th>
<th>Tonnage Increase</th>
<th>Value Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>405</td>
<td>$45,129</td>
<td>1479</td>
<td>$193,731</td>
<td>265%</td>
<td>329%</td>
</tr>
<tr>
<td>Multiple Modes &amp; Mail</td>
<td>10,748</td>
<td>$44,886</td>
<td>15,248</td>
<td>$84,010</td>
<td>42%</td>
<td>87%</td>
</tr>
<tr>
<td>Other &amp; Unknown</td>
<td>53</td>
<td>$1,216</td>
<td>202</td>
<td>$4,884</td>
<td>283%</td>
<td>302%</td>
</tr>
<tr>
<td>Pipe</td>
<td>27,316</td>
<td>$13,990</td>
<td>37,711</td>
<td>$15,504</td>
<td>38%</td>
<td>11%</td>
</tr>
<tr>
<td>Rail</td>
<td>18,775</td>
<td>$10,966</td>
<td>21,323</td>
<td>$19,537</td>
<td>14%</td>
<td>78%</td>
</tr>
<tr>
<td>Truck</td>
<td>239,714</td>
<td>$256,040</td>
<td>370,218</td>
<td>$445,348</td>
<td>54%</td>
<td>74%</td>
</tr>
<tr>
<td>Water</td>
<td>16,840</td>
<td>$13,727</td>
<td>25,449</td>
<td>$47,276</td>
<td>51%</td>
<td>244%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>313,851</strong></td>
<td><strong>$385,954</strong></td>
<td><strong>471,630</strong></td>
<td><strong>$810,290</strong></td>
<td><strong>50%</strong></td>
<td><strong>110%</strong></td>
</tr>
</tbody>
</table>

Source: FHWA Freight Analysis Framework

Nearly all commodities are expected to grow. Out of 42 commodity classes, only building stone, coal, crude petroleum, fuel oils, gasoline, logs, tobacco products, and wood products are projected to decline in either tonnage or value. Tables 6 and 7 show the 10 commodities expected to grow the fastest in tonnage as well as their absolute tonnage. None of these commodities currently has large volumes in the region, but several are highly valuable. Planners, economic development partners, and others may choose to focus on these areas to ensure good access and infrastructure conditions and thus facilitate the expected growth.

Table 6: Fastest Growing Exports by Tonnage

<table>
<thead>
<tr>
<th>Exports</th>
<th>2045 Tonnage (in thousands)</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Equipment</td>
<td>847</td>
<td>311%</td>
</tr>
<tr>
<td>Precision Instruments</td>
<td>213</td>
<td>226%</td>
</tr>
<tr>
<td>Electronics</td>
<td>1,603</td>
<td>185%</td>
</tr>
<tr>
<td>Machinery</td>
<td>4,987</td>
<td>125%</td>
</tr>
<tr>
<td>Meat/Seafood</td>
<td>392</td>
<td>120%</td>
</tr>
<tr>
<td>Chemical Products</td>
<td>5,728</td>
<td>114%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>113</td>
<td>111%</td>
</tr>
<tr>
<td>Furniture</td>
<td>1,580</td>
<td>93%</td>
</tr>
<tr>
<td>Misc. Manufacturing Products</td>
<td>1,304</td>
<td>90%</td>
</tr>
<tr>
<td>Alcoholic Beverages</td>
<td>1,377</td>
<td>88%</td>
</tr>
</tbody>
</table>

Source: FHWA Freight Analysis Framework
Table 7: Fastest Growing Imports by Tonnage

<table>
<thead>
<tr>
<th>Imports</th>
<th>2045 Tonnage (in thousands)</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision Instruments</td>
<td>256</td>
<td>257%</td>
</tr>
<tr>
<td>Electronics</td>
<td>2,133</td>
<td>177%</td>
</tr>
<tr>
<td>Machinery</td>
<td>5,646</td>
<td>163%</td>
</tr>
<tr>
<td>Furniture</td>
<td>2,144</td>
<td>141%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>451</td>
<td>126%</td>
</tr>
<tr>
<td>Transportation Equipment</td>
<td>97</td>
<td>103%</td>
</tr>
<tr>
<td>Chemical Products</td>
<td>2,373</td>
<td>99%</td>
</tr>
<tr>
<td>Plastics/Rubber</td>
<td>8,164</td>
<td>97%</td>
</tr>
<tr>
<td>Animal Feed</td>
<td>1,169</td>
<td>95%</td>
</tr>
<tr>
<td>Printed Products</td>
<td>4,438</td>
<td>94%</td>
</tr>
</tbody>
</table>

Source: FHWA Freight Analysis Framework

For exports, electronics, machinery, and chemical products are all fast-growing and currently in the top 10 most valuable commodity exports. For imports, electronics, machinery, pharmaceuticals, plastics/rubber, and precision instruments are all fast-growing and currently in the top 10 most valuable commodity imports. Commodities that are both valuable and fast-growing can be the focus of economic development efforts because growth and value indicate that these sectors may be regionally important for job creation and wealth generation.

It is important to note that none of these projections is guaranteed—investments made by NOACA, ODOT, and others will shape them. Funding can become a self-fulfilling prophecy. For example, a decrease in funding for rail-related projects because rail tonnage is expected to grow the least may result in poor conditions on rail intermodal connectors, thereby leading shippers to avoid using rail. Freight transportation projects should therefore be evaluated based on their ability to contribute positively to regional goals and performance measures.

Origins and Destinations

The commodities described so far are mainly shipped to and from other areas in Ohio, further stressing the importance of maintaining a robust regional freight network. Most products shipped to the NOACA region come from other parts of the state, and most products exported from the region likewise go to other parts of the state.
Map 9: Export Destinations by State (in Tonnage)

Source: FHWA Freight Analysis Framework
At an even closer level, it can be seen that most businesses in Northeast Ohio ship to and from other businesses in Northeast Ohio, and this is expected to hold through 2045 (the entire length of the projections). NOACA will continue to work with other metropolitan planning organizations through the Ohio Association of Regional Councils as well as with the Ohio Department of Transportation to align planning efforts that extend beyond regional boundaries.
Figure 14: 2015 Export Destinations by Tonnage (in Thousands)

Source: FHWA Freight Analysis Framework

Figure 15: 2015 Import Origins by Tonnage (in Thousands)

Source: FHWA Freight Analysis Framework

FHWA estimates the weight of freight on National Highway System roads, so planners can see which corridors handle the highest volume. It also projects the tonnage on these roads in 2045 so that transportation investments can proactively meet future needs.
Map 11: 2012 Freight Tonnage by Road

Source: FHWA Freight Analysis Framework
Intuitively, these are the same corridors that have the highest truck volumes. Knowing tonnage estimates provides additional value, though, because road damage is a function of axle weight on vehicles. This data can assist the Transportation Asset Management Program in its calculation of road deterioration.

**Employment**

Understanding the tonnage and value of different commodities, their relative importance in the region, and where they come from and go to will help planners and project sponsors understand which infrastructure projects are highly valued in the freight community. To promote economic development further, these groups can also look at employment and wages in the industries that are moving the freight.

The wholesale and retail trade sector is the largest user of transportation services, according to the U.S. Bureau of Transportation Statistics. In 2014, the seven non-transportation sectors of the economy combined to use more than $1 trillion in transportation services, with the trade sector using $292 billion, or 27.8%, of the total. This is reflected in known traffic patterns in the NOACA region, which sees the highest truck traffic volumes along commercial corridors.
Manufacturing used $223.9 billion in transportation services, ranking third. The service sector ranks second, with $264.8 billion in services; however, due to how data is classified, this sector contains large numbers of bus and taxi drivers, traveling sales forces, and parking lot attendants, among others, although some light- and heavy-truck drivers are employed.\textsuperscript{21} For the purposes of freight planning and its associated economic development, it therefore makes sense to focus on wholesale and retail trade and manufacturing, as these are the sectors that rely on freight services from trucking companies, rail lines, airports, and ports.

The average earnings in 2012 for someone employed in the Greater Cleveland Metropolitan Statistical Area were $30,561.\textsuperscript{22} As seen in Table 8, the wholesale trade sector has the highest annual average wages, more than double this figure, and retail trade the lowest. Manufacturing wages are fairly high, with a large disparity within the sector. Freight planning and infrastructure investments that serve to support these well-paying sectors should be considered priorities, as they may help facilitate job retention and creation.

From a freight perspective, planners and policy makers may choose to focus further on the manufacturing sector rather than wholesale trade because it employs almost 80,000 more workers, although that number is expected to shrink over the next several years. Manufacturers are the entities that generate the freight sold at both the wholesale and retail level, however, so an emphasis on manufacturing businesses is still appropriate for freight planning. If manufacturers are unable to receive raw materials and deliver products efficiently, they may be unprofitable. Their closure or relocation would then have ripple effects on the wholesalers and retailers that sell the end products, both because they would be losing a supplier and because the employees of the manufacturer no longer have an income stream to buy other products.

\textbf{Table 8: Projected Employment Growth and Wages of Key Freight Sectors (next page)}

\textsuperscript{22} U.S. Census Bureau, 2012 American Community Survey 1-Year.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Annual Projected</td>
<td></td>
<td>Percent</td>
<td></td>
</tr>
<tr>
<td><strong>Manufacturing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>311</td>
<td>Food</td>
<td>5,400</td>
<td>4,900</td>
<td>-500 -9.3%</td>
<td>$42,294</td>
</tr>
<tr>
<td>312</td>
<td>Beverage &amp; tobacco product</td>
<td>600</td>
<td>600</td>
<td>0 0.0%</td>
<td>$35,495</td>
</tr>
<tr>
<td>322</td>
<td>Paper</td>
<td>3,700</td>
<td>3,000</td>
<td>-700 -18.9%</td>
<td>$60,756</td>
</tr>
<tr>
<td>323</td>
<td>Printing &amp; related support activities</td>
<td>4,400</td>
<td>3,800</td>
<td>-600 -13.6%</td>
<td>$41,844</td>
</tr>
<tr>
<td>325</td>
<td>Chemical</td>
<td>12,000</td>
<td>11,100</td>
<td>-900 -7.5%</td>
<td>$84,589</td>
</tr>
<tr>
<td>326</td>
<td>Plastics &amp; rubber products</td>
<td>7,400</td>
<td>6,500</td>
<td>-900 -12.2%</td>
<td>$45,629</td>
</tr>
<tr>
<td>327</td>
<td>Nonmetallic mineral product</td>
<td>2,800</td>
<td>3,000</td>
<td>200 7.1%</td>
<td>$49,625</td>
</tr>
<tr>
<td>331</td>
<td>Primary metal</td>
<td>8,700</td>
<td>8,200</td>
<td>-500 -5.7%</td>
<td>$69,655</td>
</tr>
<tr>
<td>332</td>
<td>Fabricated metal product</td>
<td>27,700</td>
<td>27,300</td>
<td>-400 -1.4%</td>
<td>$51,874</td>
</tr>
<tr>
<td>333</td>
<td>Machinery</td>
<td>15,300</td>
<td>13,400</td>
<td>-1,900 -12.4%</td>
<td>$61,820</td>
</tr>
<tr>
<td>334</td>
<td>Computer and electronic product</td>
<td>5,600</td>
<td>4,500</td>
<td>-1,100 -19.6%</td>
<td>$63,332</td>
</tr>
<tr>
<td>336</td>
<td>Transportation equipment</td>
<td>11,900</td>
<td>12,300</td>
<td>400 3.4%</td>
<td>$70,701</td>
</tr>
<tr>
<td>339</td>
<td>Miscellaneous</td>
<td>6,800</td>
<td>6,400</td>
<td>-400 -5.9%</td>
<td>$48,470</td>
</tr>
<tr>
<td><strong>Transportation and Warehousing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>484</td>
<td>Truck transportation</td>
<td>8,200</td>
<td>8,700</td>
<td>500 6.1%</td>
<td>$45,930</td>
</tr>
<tr>
<td>485</td>
<td>Transit and ground passenger transportation</td>
<td>2,200</td>
<td>2,500</td>
<td>300 13.6%</td>
<td>$20,234</td>
</tr>
<tr>
<td>488</td>
<td>Support activities for transportation</td>
<td>3,500</td>
<td>4,000</td>
<td>500 14.3%</td>
<td>$41,695</td>
</tr>
<tr>
<td><strong>Wholesale Trade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Retail Trade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

http://ohiolmi.com/proj/OhioJobOutlook.htm
Annual Wages calculated by NOACA based on LMI data
http://ohiolmi.com/asp/edeps/EdepsNAICS.htm
NOACA can direct funding in a way that facilitates growth in the industries that will employ more of the region’s residents. Northeast Ohio has historically been known for manufacturing. It remains so today, but the face of manufacturing is changing. Driving this change are productivity gains due largely to mechanization and automation—more goods can be produced by fewer workers. Research from the Federal Reserve Bank shows that manufacturing output has been steadily increasing for decades and is at an all-time high, while the number of employees in manufacturing has been declining and is near its lowest point in at least 25 years.\textsuperscript{23} Infrastructure projects will be able to have the biggest economic development impact if they support industries that are both increasing their volume of goods produced and creating jobs. The Ohio Development Services Agency recognizes 11 target industries important for the state’s economic future, including several that generate large freight volumes—advanced manufacturing (in iron and steel), automotive, food processing, logistics, and polymers and chemicals.\textsuperscript{24} Transportation equipment manufacturing is one sector expected to grow in employment, and it falls under both the automotive industry and advanced manufacturing industry because steel is used as a component of auto manufacturing.

The Reshoring Initiative is a nonprofit organization dedicated to bringing manufacturing jobs that have been outsourced around the world for various reasons back to the United States. It found in 2015 that "in the last decade the U.S. has gone from losing about 220,000 manufacturing jobs per year to breakeven. There are still 3 to 4 million manufacturing jobs offshore, a huge potential for U.S economic growth."\textsuperscript{25} Businesses make location decisions for a variety of reasons; the organization lists the number of reasons cited by businesses between 2007 and 2015 with whom the Initiative conducted interviews. Tables 9 and 10 list the reasons related to freight movement, showing that freight logistics and infrastructure are very important in the decision-making process.

\textsuperscript{25} Reshoring Initiative, Reshoring Initiative Data Report: Reshoring and FDI Continued to Boost U.S. Manufacturing in 2015, 2, \url{http://reshorennow.org/content/pdf/2015_Data_Summary.pdf}. 
Tables 9 and 10: Factors in Offshoring or Reshoring Decisions

<table>
<thead>
<tr>
<th>Reasons for Not Offshoring</th>
<th># of Cases Cited</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight cost</td>
<td>117</td>
<td>2</td>
</tr>
<tr>
<td>Delivery</td>
<td>51</td>
<td>5</td>
</tr>
<tr>
<td>Supply chain interruption risk</td>
<td>46</td>
<td>6</td>
</tr>
<tr>
<td>Duties/Tariffs/Customs</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Emergency Air Freight Required</td>
<td>7</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasons for Reshoring</th>
<th># of Cases Cited</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to market</td>
<td>146</td>
<td>3</td>
</tr>
<tr>
<td>Proximity to market/customers</td>
<td>133</td>
<td>5</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>62</td>
<td>9</td>
</tr>
</tbody>
</table>

As mentioned previously, Greater Cleveland enjoys robust access to major populations in the United States and Canada; maintaining the infrastructure that makes this possible may therefore encourage reshoring companies to locate in the region. Even though automation means individual manufacturing businesses no longer need as many employees, an increase in the number of businesses can still result in more job opportunities for Northeast Ohioans.

The Reshoring Initiative lists the number of jobs and companies reshored by industry; Table 11 shows the industries that correspond with commodity classes from the Freight Analysis Framework described throughout this Plan. Between 2010 and 2015, Ohio ranked eighth in the country in terms of jobs reshored at 5,198. Forty-nine companies moved these jobs to Ohio, ranking Ohio second in that metric. In other words, this is a very real phenomenon for which Northeast Ohio needs to prepare.

**Table 11: Reshored Jobs by Freight Sector, 2007-2015**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Jobs</th>
<th>Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Equipment</td>
<td>55,673</td>
<td>174</td>
</tr>
<tr>
<td>Electrical Equipment, Appliances, Components</td>
<td>17,430</td>
<td>101</td>
</tr>
<tr>
<td>Fabricated Metal Products</td>
<td>12,690</td>
<td>105</td>
</tr>
<tr>
<td>Plastic/Rubber Products</td>
<td>11,549</td>
<td>84</td>
</tr>
<tr>
<td>Computer/Electronic Products</td>
<td>7,707</td>
<td>46</td>
</tr>
<tr>
<td>Apparel/Textiles</td>
<td>6,688</td>
<td>102</td>
</tr>
<tr>
<td>Chemicals</td>
<td>6,474</td>
<td>59</td>
</tr>
<tr>
<td>Machinery</td>
<td>6,466</td>
<td>59</td>
</tr>
<tr>
<td>Wood &amp; Paper Products</td>
<td>5,212</td>
<td>41</td>
</tr>
<tr>
<td>Food &amp; Beverage</td>
<td>3,563</td>
<td>32</td>
</tr>
<tr>
<td>Non-metallic Mineral Products</td>
<td>3,414</td>
<td>18</td>
</tr>
<tr>
<td>Primary Metal Products</td>
<td>2,887</td>
<td>16</td>
</tr>
<tr>
<td>Energy, Petroleum &amp; Coal Products</td>
<td>2,440</td>
<td>12</td>
</tr>
<tr>
<td>Medical Equipment</td>
<td>1,390</td>
<td>28</td>
</tr>
<tr>
<td>Furniture &amp; Related Products</td>
<td>898</td>
<td>4</td>
</tr>
</tbody>
</table>
The fact that infrastructure and shipping needs are key factors in whether a business chooses to offshore or reshore should emphasize to planners and community officials the importance of maintaining a robust freight network. Knowing the industries in which these businesses are engaged further helps to identify potential locations that most need infrastructure maintenance and improvement to keep goods moving easily into and out of employment clusters and key transportation corridors.

Security & Resilience

From a freight perspective, security and resilience in planning mean reducing the likelihood of adverse events while also providing the ability to ship goods via multiple routes or methods if such an event does occur, whether natural or due to human activity. Northeast Ohio is vulnerable to natural threats, including blizzards, tornados, flooding, severe thunderstorms, and heatwaves, as well as human threats of terrorism. Furthermore, even natural disasters have a manmade component. Flooding, for example, is harmful to the extent that manmade infrastructure is damaged by it. Not only does a disaster like this impact infrastructure, it also impacts the commodities being shipped using the infrastructure. Again considering flooding, an event like this can significantly damage crops, thereby hurting agricultural and food processing related businesses and jobs. Residents are also vulnerable to short- and long-term impacts of pollution caused by transportation.

To limit the impacts of disasters and pollution, transportation planning should be done in a way that is adaptable to them (i.e., system redundancy) but that also helps mitigate disaster from happening (i.e., not expanding critical infrastructure in a flood-prone area). The region should maintain a diverse portfolio of freight transportation options. Being overly dependent on one mode or one part of a mode means a negative impact to that mode will have a larger adverse effect than if risk were spread across modes. The National Infrastructure Protection Plan from the U.S. Department of Homeland Security outlines how government and the private sector can work together to manage risk and achieve positive outcomes.²⁶

It may seem callous to think of economic considerations in the immediate aftermath of a disaster, but this has a real impact on residents of the region. If a business cannot send or receive shipments, it may be forced to close or reduce hours temporarily, which hurts the business, its employees, and its customers, all of which prolong recovery. Most importantly, disaster assistance will move through the region via these freight channels—food and water, temporary shelters, and construction materials for rebuilding will likely need to be delivered to the communities affected by the event.

Individual businesses and logistics service providers choose their shipping methods based on a variety of factors including, but not limited to, speed of delivery and cost, with these two increasing together. Externalities such as disasters and environmental considerations may not factor into this decision because the cost is borne by the public at large, not the specific business. In other words, the general public pays to repair after disasters and remediate pollution caused by freight transportation, effectively subsidizing the businesses and consumers who buy the products. Environmental disasters directly affect system resiliency, so as an

organization responsible for air and water quality planning, NOACA must examine these factors when making investment decisions with public money.

One of the biggest externalities is the release of the greenhouses gases (GHG) that drive global warming, particularly carbon dioxide. The transportation sector of the economy in 2013 released 1,810.3 million metric tons of carbon dioxide equivalent, representing 27.1% of all US GHG emissions; this is second only to the industrial sector at 28.8%. Within the transportation sector, freight accounts for 29.2% of the emissions; trucking makes up the bulk of this at 407.7 tons of carbon dioxide out of 528.8 total.²⁷ Projects and strategies to reduce freight emissions, particularly from trucks, are therefore critical to minimizing global warming. Because global warming is expected to result in a variety of weather extremes like increased flood risk, reducing freight sector emissions can therefore increase the resiliency of the system by reducing the risk of these extremes.

Truck shipping would be significantly more expensive if the trucking industry had to pay for the infrastructure and environmental damage it causes, and these increased shipping costs would in many cases be passed onto the consumer in the form of higher retail prices. According to a 2015 draft report of the Congressional Budget Office (CBO), the unpriced external costs of truck shipping are $2.62 to $5.86 per ton-mile of freight moved, while the same costs for rail are just $0.30 to $0.82.²⁸ These costs include pavement damage; traffic congestion; crash risk; greenhouse gases; and local air pollution, specifically particulate matter and the ground-level ozone precursor, nitrous oxides. Evidence shows that these air pollutants are linked to a variety of human and environmental health effects, including heart attacks, respiratory problems, and early death in people with heart or lung disease.²⁹ This report drew on an earlier Government Accountability Office (GAO) study that estimated conservatively that “freight trucking costs that were not passed on to consumers were at least six times greater than rail costs and at least nine times greater than waterway costs per million ton miles of freight transport. Most of these costs were external costs imposed on society.”³⁰ In other words, trucking causes a greater release of carbon dioxide, particulate matter, and nitrous oxides per tons of goods shipped.

Taken together, these reports indicate that freight-moving businesses are incentivized to choose trucking because they do not pay the full environmental and road maintenance costs. In a report to Congress in June 2015, the Congressional Budget Office stated that $65 billion dollars had been transferred from the Treasury general fund to the Highway Trust Fund since 2008 to meet obligations.³¹ In other words, all taxpayers pay to remediate pollution and maintain

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²⁹ U.S. Environmental Protection Agency analysis of scientific and technical research on air pollutants. https://www.epa.gov/criteria-air-pollutants.


infrastructure. Methods to transfer these costs from the public to the responsible businesses and consumers include gas taxes or road tolling. It is likely not feasible, legally possible, or desirable, however, to implement these options at a local or regional level. As such, NOACA and others can instead try to encourage alternate modes of shipping by making infrastructure and land-use decisions that make these modes easily accessible and efficient.

Even though shipping via rail or water is cheaper per ton-mile for businesses and has fewer negative external costs for the public, there are three main reasons trucks are the primary shipping mode: consumers demand fast delivery, most businesses do not have rail or waterway access in the same way they have robust road access, and the goods being shipped may be perishable or otherwise time-sensitive. Decades of investment primarily in roadways has created path dependency, whereby shipping via truck has become much more convenient. Even if the projections described earlier are not fully realized, it is still overwhelmingly likely that trucks will maintain their status as the primary way of moving goods. Important tradeoffs must therefore be considered when investing in freight projects. Projects that involve rail, waterways, or pipelines may improve quality of life via reduced pollution, but they may also hinder efforts at supporting economic development if they come at the expense of maintaining key truck corridors.

There are, however, opportunities for NOACA to facilitate the use of lower-polluting options while also encouraging economic development; these win-win scenarios should be explored as fully as possible. For example, the findings on intermodal connector shortcomings discussed earlier may indicate that more businesses would ship via rail or waterways but are discouraged from doing so due to poor infrastructure conditions. NOACA and county/local governments should consider intermodal connector projects as one method of mitigating harmful environmental impacts in our communities. Moreover, communities should consider freight movement when making land use and zoning decisions. Business location influences the freight modes available, so ensuring access to multiple methods will be a key to increasing resilience and mitigating environmental impacts.

**Safety**

As with environmental considerations, different modes of freight movement have different risks and benefits for safety. A truck crash will likely take place on a road and may involve other vehicles, while other modes of freight movement will rarely or never do so. Trains may crash or be derailed, causing a standstill in goods movement because there is no way to reroute other trains on the line; however, "freight moved by rail results in approximately ten percent of the number of fatalities per ton-mile than that moved by truck."\(^\text{32}\) Pipelines may have catastrophic safety failures such as an explosion, but the vast majority of accidents involve spills or leaks that don’t cause immediate death or serious injury the way a vehicle or train crash can. Just as with passenger travel, air is safer for freight on a per-mile basis, but a plane crash is typically much more serious and deadly in the rare cases it does happen. All of these factors are weighed by businesses when determining how to ship goods. NOACA and other stakeholders should consider them as well because transportation spending and land-use decisions, as mentioned

\(^{32}\) Ibid., 17; Chapter 1-1, 1.
above, will affect where and how businesses can ship freight, which in part determines the likelihood of harmful events.

Truck crashes are typically the most visible because they occur more frequently and are on the same roads passengers travel. Over the five years from 2011 through 2015, medium/heavy vehicles of all types were involved in 14,695 crashes in the region. This is about 6% of all crashes, but it is unknown if the freight vehicle was at fault in these incidents. Fifty-two resulted in a fatality and another 2,894 in an injury, with 301 of these considered severe. Interestingly, 20% of freight-related crashes resulted in death or serious injury, lower than the 26% rate for all regional crashes, despite the heavy weight of trucks. Because shipping via truck will remain the dominant mode for several reasons discussed in this Plan, planners and other stakeholders should prioritize projects that can reduce the risk of freight-truck crashes. The NOACA Regional Safety Program discusses strategies for improving roadway safety.

Although rail incident data is not available at the regional level, Federal Railroad Administration (FRA) data show that in Ohio, annual incidents decreased 42.6% between 1999 and 2008, with fatalities down 33.3% and injuries down 57.7%. This data includes all train accidents, crossing incidents, and rail-related accidents reported to the FRA.33

**Tying It All Together**

The Data Collection section has examined current and projected modes of freight shipment, commodity tonnage and value moving through the region, destinations, and employment in freight-generating sectors, as well as the security, resilience, and safety of the freight system. Analyzing this information comprehensively can provide useful insight into key freight sectors, their shipping routes, and their economic development potential. Two examples illustrate how all of this data can be used:

1. FAF4 data show that the commodity class of base metals was the third largest by tonnage in 2015 and is projected also to be so in 2045. It is one of only two commodities in the top 10 in both tonnage and value exported. Ohio Department of Jobs & Family Services (ODJFS) data show that fabricated metal product manufacturing, which uses base metals, is the largest regional employer in manufacturing and pays about 68% more than the average annual wage. Reshoring Initiative data further shows that this is the third-largest reshoring sector in both number of jobs and companies. Base metals are predominantly shipped via truck but have a large rail and multimodal presence, as well as some shipping by water. Shipping by several methods increases security and resiliency by building redundancy into the system, and it also increases road safety if some cargo is transferred from truck to another mode.

2. FAF4 data show that transportation equipment is expected to be the fastest growing commodity exported between now and 2045, with a growth of 311%, and the sixth-fastest-growing import. Transportation equipment manufacturing is one of only two sectors expected to see an increase in employment, according to ODJFS, and it pays more than double the annual average wage in Greater Cleveland. Reshoring data indicate that transportation equipment manufacturing is the biggest reshorer, bringing

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33 Ibid. 17; Chapter 7-1, 1.
more than three times as many jobs back to America as the number two reshoring industry.

These examples are not meant to suggest that specific businesses should be favored. Rather, they show a framework for analyzing potential economic development effects of transportation investments. Knowing land-use and zoning regulations, along with the location of existing businesses in a given industry or sector, will help determine where business expansion and attraction are likely to occur. Combining this knowledge with data on tonnage, employment, and projected growth, planners and decision makers can provide better insight into where transportation projects can positively affect economic development.

**SWOT Analysis**

An examination of the Strengths, Weaknesses, Opportunities, and Threats facing the region will help planners and community leaders determine where to prioritize funding to have the biggest positive impact.

**Strengths**

**Existing infrastructure and location**

In business, a competitive advantage is something that allows a company to provide a good or service at a better value to customers than its competitors. The best competitive advantages cannot be easily replicated, if at all. In Northeast Ohio, the competitive advantages are a robust existing system and geographical location. These can be capitalized on to facilitate economic development. As discussed in-depth earlier, the region has several interstates, two major rail lines, an international airport, three Great Lakes port facilities, and relatively fast access to major population centers. Few regions are fortunate enough to have all of these assets and be near so many major markets, and they are not assets that can relocate out of the area. NOACA should use its funding to the extent possible to ensure businesses have access to all of these modes of freight movement to maintain this competitive advantage.

**Relatively little congestion**

Congestion hot spots exist in certain corridors and at certain times of the day, but Greater Cleveland has relatively little congestion compared to other metro areas. In 2016, GPS maker TomTom rated Cleveland the fourth-best metro area for avoiding congestion in its Traffic Index, and the navigation app Waze rated the region third-best in its Driver Satisfaction survey, which measures road quality, congestion, and safe driving conditions. Fast and reliable travel times facilitate freight movement and can encourage existing businesses to stay and new businesses to locate in the region.

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Weaknesses

Access to the Port of Cleveland
The Port of Cleveland bulk storage terminal does not have an access road for trucks, which makes it harder to get commodities in and out of the facility, potentially discouraging its use.

Poor roadway conditions
As described in the beginning of this Plan, TAMP has identified that 34% of regional pavements and 11% of bridges are not in a state of good repair, with $10 billion in improvements necessary over the next 20 years. Furthermore, intermodal connector conditions are worse than the transportation system as a whole. Because this level of funding is not available, conditions will continue to deteriorate and add to the total cost, while also making it more difficult to ship by modes other than truck.

Opportunities

Autonomous and connected vehicles
New technology, particularly self-driving tractor-trailers, may bring a variety of benefits. The Ohio Turnpike through Cuyahoga and Lorain Counties is likely to have autonomous trucks sometime in 2017, according to an interview with Ohio Turnpike Director Randy Cole. In November 2016, one of these trucks traveled U.S. Route 33 in Central Ohio. Trucks will eventually engage in platooning, where a human driver would control the lead vehicle, while one or more autonomous trucks would follow closely behind, mimicking a train, known as vehicle-to-vehicle connectivity. This increases fuel efficiency and therefore reduces air pollution. Platooning will also decrease congestion because the trucks can follow more closely and stop and start as a unit. One study estimates that trucks operated in a three-truck platoon in a dedicated truck lane could allow for 1,500 trucks per lane per hour, which is double the current roadway capacity for individually driven trucks. Another likely benefit is more off-peak delivery, where travel speeds and therefore delivery times are faster. Many truck drivers work during the morning and evening commutes due to hours-of-service rules, even though it is inefficient for them to do so. An autonomous truck would not be bound to these rules, though. Getting trucks off the road during the rush hour periods would further reduce congestion and potentially lessen the need for capacity expansion projects.

Communities that have turnpike access should begin planning for the possibility of these trucks exiting the turnpike. Private or public facilities for drivers to take over the autonomous vehicles

36 “Kasich hopes to transform Rt. 33 into ‘smart road,’” The Columbus Dispatch, Nov. 30, 2016, http://www.dispatch.com/content/stories/local/2016/11/30/Kasich_hopes_to_transform_Rt_33_into_xsmart_road.html#.
may be necessary to enable them to navigate the more complex web of local streets, or logistics and warehousing facilities may be constructed where the autonomous vehicles could unload and reload cargo. Autonomous vehicles also have implications for road maintenance—the vehicles may use sensors, cameras, or other technology to interact with the road, meaning smooth pavements, clear lane markings, signs, and signals are imperative for the vehicles to function. This is particularly true if or when the technology advances to the point where autonomous trucks use the local network. Along with vehicle-to-vehicle connectivity, there is also vehicle-to-infrastructure, where the vehicle communicates with traffic signals and even the road itself. In 2017, ODOT will begin installing fiber optic cables and wireless sensors along the Route 33 corridor mentioned earlier, which will allow for this communication. Transportation funding, which until now has been used for maintenance or new construction, may have to be shifted to this new category of connecting infrastructure via internet, potentially having serious implications for the amount of funding raised and how it is allocated.

**Aerial Delivery**
Similar to autonomous vehicles, delivery by drone may be another technological advancement that changes shipping. In this scenario, packages may be dropped off by truck at a warehouse, and from there flown by drone to the consumer. Drones can replace trucks on the street, reducing congestion, noise, and pollution. This is especially true in the dense residential areas where shipping by drone is likely to be financially feasible because a drone will have time to make several trips per day and only have short return distances to travel without a package.

**Containerized shipping service**
The Cleveland-Cuyahoga County Port Authority currently has the only containerized shipping service direct to Europe from the Great Lakes. East Coast ports have become increasingly congested over the past decades, so Great Lakes shipping will be a more viable option for some businesses. This may encourage businesses to stay or locate in the area, and it will also minimize congestion by keeping trucks off the road.

**Shale formations in Ohio**
Underground natural resources in the eastern and southeastern parts of Ohio may spur economic development in the NOACA region as well. Natural gas is best known for heating homes, but it also has industrial uses such as production of chemicals and fertilizers.\(^{38}\) The chemical product commodity class is the eighth-largest export by value, and it is projected to be the sixth-fastest growing export and seventh-fastest growing import in tonnage between now and 2045. The chemical product sector of the manufacturing industry is the highest paying and third-largest employer in the industry.

In addition, natural gas liquids found underground are used to make a variety of plastic and rubber products.\(^{39}\) This commodity class is currently the sixth-largest export by value and seventh-largest import by value. It is expected to be eighth-fastest growing import by tonnage between now and 2045. The sector is the sixth-largest employer in the manufacturing industry in the region, and the fourth largest in national reshoring.

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These signs all indicate that having additional resources available in the state could lead to business and job growth. There are pollution concerns in the industry, as well as price volatility on the global market, but planners and communities should still consider how these resources may affect their existing businesses and freight system, particularly pipelines.

**Reshoring**

Companies returning from overseas was discussed extensively in the Employment section but should also be mentioned here. Northeast Ohio, along with the rest of the state and country, has moved away from being a manufacturing-driven economy and toward a service-based economy. Reshoring in many cases, however, involves companies that rely heavily on the freight system. If American companies that have gone overseas choose to relocate in the region, it will spur economic development and increase demands on the transportation system.

**Agriculture and local food**

There is opportunity for this industry to expand because the large rural and agricultural areas of Northeast Ohio provide crops and animals for the region and for export. Both of these sectors can create jobs. FAF4 data shows that foodstuffs, other agricultural products, animal feed, and meat/seafood are all either large or rapidly growing commodity classes in Northeast Ohio. As regional, state, national, and global populations expand over the coming decades, the demand for food will continue to grow. The *Vibrant NEO* report has a key objective to “preserve and value our prime farmland as a regional economic asset.”

A 2010 study determined that a shift to procuring 25% of all food consumed in the region from regional farms could create 27,664 jobs while increasing gross regional product by $4.2 billion and expanding state and local tax collections by $126 million. One way to do so is to promote infrastructure investment to support the movement of food within regional markets as well as ensuring easy access to national shipping modes. A 2014 report completed for The City of Cleveland Mayor’s Office of Sustainability concluded that “intermodal transport may reduce logistics costs for regional frozen food exports if adequate transfer storage is available” because rail transport is often inaccessible even though its low cost (relative to trucking) is necessary for financial feasibility.

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40 NEOSCC, *Vibrant NEO 2040*, Chap. 4, 93.
41 Brad Masi, Leslie Schaller, and Michael H. Shuman, *The 25% Shift: The Benefits of Food Localization for Northeast Ohio & How to Realize Them* (Cleveland, OH and Silver Spring, MD: Cleveland Foundation, ParkWorks, Kent State University Cleveland Urban Design Collaborative, Neighborhood Progress Inc., and Cleveland-Cuyahoga County Food Policy Coalition, December 2010), 2, 

42 Bush Consulting Group, *Developing a Sustainable Foods Business Cluster Roadmap for Cuyahoga County*, May 2014, 22, 
Threats

Lack of funding
Most notably, there are scarce financial resources available to maintain and grow the transportation system as needed. Insufficient and/or uncertain funding will delay project completion and may also cause businesses to scale back or delay their own growth plans due to fears of inadequate supporting infrastructure.

Irishtown Bend
The collapse of Irishtown Bend would close the Cuyahoga River to shipping upstream of this part of the shoreline south of the Detroit-Superior Bridge. The Cleveland-Cuyahoga County Port Authority and U.S. Army Corps of Engineers have both determined that streambank stabilization along this stretch of the river in Cleveland is necessary. Aging and failing infrastructure will give way if nothing is done, clogging the river and rendering it impassable. This would have catastrophic impacts on the several businesses that ship via the river. Riverbank collapse also threatens potential development in the Ohio City neighborhood above Irishtown Bend. In February 2017, the Port of Cleveland hired a design and engineering firm to study development potential, including a public park and bike trails. This study is being funded through a NOACA Transportation for Livable Communities Initiative (TLCI) grant, and it is possible in the future that development could be funded through a TLCI implementation grant. Riverbank collapse would prevent any such development from occurring until the shore could be rebuilt and stabilized.

Online shopping and rapid delivery
As consumers increasingly purchase goods online and expect them to be delivered in short time frames, it may lead to an increase in trucks on the road, as they are the freight mode most capable of quick home delivery. This will lead to increased congestion, road damage, and air pollution.

Land use and zoning
Incompatible land uses may prevent businesses from using a preferred shipping method or locating in a preferred place, along with forcing freight to travel greater distances. This may increase business costs and result in greater negative externalities such as road damage and pollution. For example, the Flats area of Cleveland has experienced rapid redevelopment over the past several years, with businesses and residents moving into what was once predominantly an industrial area; however, multiple businesses rely on this location to move freight via water. Planners will have to ensure compatibility in these situations through means such as designating freight routes on certain roads and creating and separating pedestrian and bike facilities.

Furthermore, industrial parks and commercial areas that are located farther away from the interstate network will necessarily see a greater truck volume on their local roads. Design decisions on these roads will therefore have to incorporate tractor-trailer movement, which may

mean wider lanes and greater turning radii at intersections; these elements may, however, be unwelcoming or unsafe to pedestrians and cyclists.

Declining regional population
Outmigration of existing residents and a lack of new residents moving into the region may affect freight in two ways. First, a declining tax base would make it harder to maintain infrastructure. Second, businesses in freight-generating and carrying industries would have a smaller pool of candidates for employment and consumers, which can discourage growth or location in the region.

Environmental and manmade disasters
Although discussed more fully in the Security and Resilience section, it is important to note here that disasters present threats to the freight infrastructure system, especially due to their unpredictability. Global warming in particular presents an increased likelihood and severity of flooding, which can temporarily close roads or even wash out bridges, and an increased heat wave intensity and frequency, which can cause road buckling. Ensuring redundancy in the system is necessary so that any disruption can be minimized, and reducing greenhouse gas emissions from the freight transportation sector will help minimize global warming.

Summary
This SWOT Analysis is not meant to be exhaustive, as dozens of items could be added to each category. For example, global economic forces have an outsized influence on freight movement because goods often travel around the world. The National Freight Strategic Plan and ODOT Comprehensive Freight Plan address issues of more national and international relevance. Rather, this analysis is intended to show prominent topics that may have particular regional importance to Northeast Ohio and of which planners and community leaders should be aware. Strengths are what make the region an attractive destination for businesses and shippers, and they should be capitalized on. Weaknesses will prevent the region from fully realizing its potential, so attention should be given to improving them. Opportunities and threats are forces over which NOACA, local governments, and other agencies may or may not have control. These organizations should ensure that the ones they do have control over, such as land use, are optimized for freight needs to the extent possible. In cases where there is no local control, such as autonomous vehicle technology, these groups nonetheless need to monitor the situation and plan based on the best information available at the time.

Goals, Objectives, and Measures

Goals

Three topics have been recurrent themes through stakeholder feedback, and data collection and SWOT Analysis reinforce their importance. Freight-specific goals have therefore been derived from them:

- **Prioritize maintenance over capacity additions.**
- **Facilitate all modes of shipping.**
- **Use targeted strategies to reduce congestion where it impedes freight movement.**

These goals closely mirror the goals derived from NOACA’s Vision Statement: PRESERVE existing infrastructure, BUILD a sustainable multimodal transportation system, and SUPPORT economic development. They also touch on the remaining two goals, in that freight travels across jurisdictional boundaries so planning will necessarily STRENGTHEN regional cohesion, and facilitating transfer from trucks to other modes will reduce pollution and thereby ENHANCE quality of life.

The three goals are also similar to goals in the Draft National Freight Strategic Plan that come from the Moving Ahead for Progress in the 21st Century Act (MAP-21) legislation as well as goals in the Ohio Department of Transportation’s *Transport Ohio: Comprehensive Freight Plan.*

<table>
<thead>
<tr>
<th>National Freight Strategic Plan Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>To invest in infrastructure improvements and to implement operational improvements that strengthen the contribution of the national freight network to the economic competitiveness of the United States; reduce congestion; and increase productivity, particularly for domestic industries and businesses that create high-value jobs.</td>
</tr>
<tr>
<td>To improve the safety, security, and resilience of freight transportation.</td>
</tr>
<tr>
<td>To improve the state of good repair of the national freight network.</td>
</tr>
<tr>
<td>To use advanced technology to improve the safety and efficiency of the national freight network.</td>
</tr>
<tr>
<td>To incorporate concepts of performance, innovation, competition, and accountability into the operation and maintenance of the national freight network.</td>
</tr>
<tr>
<td>To improve the economic efficiency of the national freight network.</td>
</tr>
<tr>
<td>To reduce the environmental impacts of freight movement on the national freight network.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ODOT Transport Ohio Comprehensive Freight Plan Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and operate a state transportation system that supports a competitive and thriving economy, attracts new businesses and provides predictable freight movements.</td>
</tr>
<tr>
<td>Reduce congestion and increase travel reliability.</td>
</tr>
<tr>
<td>Continue to improve transportation system safety.</td>
</tr>
</tbody>
</table>

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Promote cost-effective preservation of multimodal assets.
Increase customer access to Ohio’s multimodal transportation system and improve linkages between modes.
Advance financial, environmental, and social objectives for transportation investments.

NOACA freight goals will help ensure efficient and reliable travel by reducing congestion, facilitate all modes of shipping, and keep the system in a state of good repair by prioritizing maintenance. Realizing these goals will strengthen economic competitiveness by reducing shipping costs, make the system safer and more resilient, and reduce negative environmental impacts of freight movement.

Objectives

This Plan incorporates objectives found in the NOACA Regional Strategic Plan that are relevant for freight planning (listed below). These objectives then inform performance measures that will be the basis of planning efforts. Note that in the list of performance measures, the appropriate objectives of the RSP are shown in parentheses.

2.1.1: preserve or maintain existing infrastructure that serves currently developed areas of the region
2.1.2: facilitate improvements that connect existing activity centers and reinvigorate existing communities
2.1.4: promote environmental sustainability
3.1.2: improve access to regional job centers, employment opportunities, and city centers
3.1.3: facilitate intermodal transportation connections
3.1.4: reduce energy use and improve air quality
3.1.5: reduce greenhouse gas emissions
3.1.6: reduce reliance on auto travel
3.1.9: ensure and/or enhance safety
4.1: Provide funding priority and other preferences with scoring criteria to projects that support economic development
4.5: Direct investments and actions to create realistic opportunities for job creation and economic development
5.3: Ensure that safety factors are considered in the development of regional infrastructure

Performance Measures

In January 2017 FHWA finalized a performance measure related to freight performance on the interstate system for travel time reliability. In other words, if a trip is expected to take an hour based on posted speed limits, the performance measure will monitor how long the trip actually takes. ODOT will be the entity responsible for submitting this data, and it is unknown what role NOACA will play, although NOACA will track the measure. This metric is helpful because interstates receive the highest truck volumes, but NOACA will also monitor performance measures more appropriate to the regional level. The data used for the FHWA performance measure comes from the National Performance Measures Research Data Set (NPMRDS), and NOACA will maintain access to it for use on all roads of the National Highway System, which includes intermodal connectors. Meeting these regional performance measures will allow for
efficient goods movement that puts NOACA in the best position to meet freight goals and therefore realize the overall vision statement.

- **Average Truck Travel Time Reliability Index on Interstates and the National Highway System.** (3.1.2, 4.1, 4.5)
- **Pavement condition on freight intermodal connectors.** (2.1.1, 2.1.2, 2.1.4, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.9, 4.1, 4.5)
- **Pavement condition on corridors where either average daily truck traffic (ADTT) is greater than 1,600 or trucks make up at least 8% of all vehicles.** (2.1.1, 2.1.2, 4.1, 4.5)
- **Number of at-grade railroad crossings on National Highway System roads with at least 19 train crossings per 24 hours, which is the average number of trains per day for all regional crossings.** (2.1.4, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.9, 4.1, 4.5, 5.3)

These performance measures are primarily focused on roadways, as the majority of NOACA spending is designated for roads; however, they can facilitate all modes of shipping. Focusing on intermodal connectors is one way to improve roads while facilitating modes other than trucking, and eliminating at-grade rail crossings can improve safety for all infrastructure users and also remove potential bottlenecks that discourage rail shipping. NOACA will follow guidance from FHWA and ODOT in setting targets for these performance measures.

**Recommendations**

Economic growth is a key reason for freight planning, and infrastructure investments should be made with this in mind; however, projects should be viewed in a larger context. For example, every political jurisdiction in Cuyahoga County has agreed to an “anti-poaching” protocol for business attraction. In doing so, the communities have stated that a business moving from one community to another is a transfer of economic activity with no net growth, and that the communities believe they will all be better off in the long term by not engaging in this type of business attraction. Similarly, freight projects should facilitate business growth rather than relocation.

To this end, NOACA’s Transportation Improvement Program (TIP) scoring has been updated to better prioritize roads that receive the highest truck volumes or are intermodal connectors. The regional freight network shown in Map 1 was created to determine important shipping routes based on average daily truck traffic (ADTT). Corridors are placed in one of five categories based on ADTT, with points awarded in the TIP based on which category the corridor is in.

Transportation Asset Management should likewise be used to recognize deficiencies or poor conditions that have large negative impacts on freight. This process will ensure that highly used existing roads are prioritized for funding, which will help retain and grow the businesses using these roads rather than encourage them to move to a different community or out of the region altogether. As shown earlier in this Plan, businesses have indicated that preservation of roads they already use is a more pressing need than additional capacity.

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In addition to the number of trucks on a road, the percentage of vehicle miles traveled by truck is also important and has been incorporated into a performance measure. If trucks make up a large percentage of the total number of vehicle miles traveled on a road, it is a key indicator that the corridor is an important shipping route. Many roads in industrial areas may have low absolute traffic counts, which can potentially create a bias against them in project prioritization; however, a large proportion of vehicles being trucks suggests that the road is important from a shipping, and therefore economic development, perspective.

Employment along a corridor is already considered in TIP scoring, and this Plan presents another way of viewing the metric. If projects are completed along corridors served by growing industries, they may have a greater benefit in terms of facilitating job growth. Further, wages along the corridor or in business sectors that rely on the corridor can be another factor. Transportation projects should strive to facilitate growth in jobs that pay a living wage.

NOACA and local communities should support projects that make all modes of freight movement remain viable. Doing so provides businesses with the widest variety of options to meet their shipping needs, helping them balance cost and speed of delivery to maximize profits. Supporting all modes of freight movement also helps keep regional roads uncongested and in a state of good repair and reduces the negative environmental impacts of shipping. Intermodal connector conditions and access should be a high priority based on feedback from the freight community.

Reducing the environmental impacts of shipping, particularly air pollution, is one aspect of increasing quality of life, and other issues must also be considered for livability. Freight vehicles and distribution centers may significantly increase noise, potentially discouraging people from living nearby. Further, the infrastructure that may be considered optimal for these vehicles and centers may be hard to harmonize with other desired uses or roadway design. Projects, specifically if they expand capacity, may encourage greater truck volumes and therefore emissions. Land-use and zoning decisions will have to balance the desire for efficient freight movement with mobility and livability concerns. The report *Why Goods Movement Matters* from the Regional Plan Association and Volvo Research and Educational Foundations discusses several possibilities to help with this balance, such as clustering freight activity in certain zones, implementing off-hour delivery programs, or designating low emission zones.47

Balancing these competing concerns is particularly important given that many high-volume freight corridors pass through Environmental Justice (EJ) or Disadvantaged communities. These are areas with a high number of minority residents, senior citizens, or those living in poverty. Considering these populations is necessary to ensure fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies, including all phases of transportation project planning. NOACA recognizes that transportation projects must balance the benefits and burdens of governmental policies, and the agency works to ensure that all residents enjoy the mobility and access benefits of infrastructure projects and

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that no racial, ethnic, or socioeconomic group should bear a disproportionate share of negative consequences, such as air or noise pollution. This is especially true given that certain populations – seniors, children, or expecting mothers – are more susceptible to certain types of pollution.

Map 14: Environmental Justice Communities
For these reasons, land-use decisions are important for accommodating all residents and businesses, particularly in areas that have a mix of uses. For example, NOACA applied for federal funding in 2016 through the U.S. DOT’s FASTLANE grant program to reconstruct roads on the west bank of the Flats in Cleveland. This area is home to multiple businesses that rely on access to Lake Erie shipping. At the same time, current redevelopment will bring a wide variety of users onto the transportation system; a $405 million dollar apartment complex was announced in 2017, and bike lanes have been discussed by the City of Cleveland and Cleveland Metroparks on these roads. As redevelopment continues along the waterfront throughout the region, planners in coastal communities will have to ensure that the system is designed for residents to move safely and easily while not jeopardizing the success of businesses that provide jobs in these communities.

**Implementation Action Areas**

Key areas for improvement should be based on their ability to positively influence the performance measures, goals, and recommendations described in the previous sections.
Fitting with the goal of targeted congestion reduction, congestion management will be a key priority due to expected increases in truck volumes. Freight vehicles experience, and contribute to, the same congestion that passenger vehicles face, so the same strategies can be used. Solutions are context specific, so additional study of congested corridors will be necessary to determine the best strategy. Note that the top congested segments shown in Maps 4 and 5 are in many cases not on the interstate system, as Northeast Ohio has a very robust interstate network; however, interstates do have the largest volume of truck traffic in terms of absolute numbers of trucks as well as trucks as a percentage of all vehicles, so projects on them will nonetheless have a large effect on freight movement via truck.

Knowing that, the following lists highlight non-interstate projects. The following projects are currently listed in NOACA’s Transportation Improvement Program or Long-Range Transportation Plan and involve intermodal connectors or freight corridors where trucks make up at least 8% of all vehicles. In accordance with the three overarching freight goals, the following projects all have beneficial effects on maintenance, congestion reduction, or facilitation of intermodal shipping. Although these roads may have lower truck volumes than the interstates, these projects may be more beneficial in cases where congestion and roadway conditions are worse than what is experienced on the interstates. In other words, there may be more room for improvement on these corridors because the regional interstate system is in better condition.

Because this is the first comprehensive freight planning effort, Tables 12 and 13 show all projects in the TIP and LRTP on corridors where at least 8% of vehicles are trucks in order to be as comprehensive as possible. Future versions of this Plan, scheduled for update every four years, will be able to not just list projects, but prioritize them from a freight perspective. Factors will include absolute truck volume and employment along the corridor, which are already TIP scoring factors, as well the project’s ability to positively affect the performance measures described in this Plan.
Table 12: Projects currently programmed in the TIP to begin construction no later than 2019

<table>
<thead>
<tr>
<th>PID</th>
<th>Project</th>
<th>County</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>11230</td>
<td>SR 175</td>
<td>Cuyahoga</td>
<td>Bridge Replacement</td>
<td>$6,271,000</td>
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<tr>
<td>22213</td>
<td>Harvard Avenue</td>
<td>Cuyahoga</td>
<td>Bridge Replacement</td>
<td>$7,645,573</td>
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<tr>
<td>23414</td>
<td>US 42</td>
<td>Cuyahoga</td>
<td>Bridge Deck Replacement</td>
<td>$4,996,551</td>
</tr>
<tr>
<td>90908</td>
<td>SR 528</td>
<td>Geauga</td>
<td>Resurfacing</td>
<td>$1,957,000</td>
</tr>
<tr>
<td>92071</td>
<td>US 422</td>
<td>Geauga</td>
<td>Bridge Repair</td>
<td>$1,636,830</td>
</tr>
<tr>
<td>99202</td>
<td>SR 528/608</td>
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<td>Intersection Improvement</td>
<td>$525,537</td>
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<td>89270</td>
<td>SR 535</td>
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Table 13: Proposed Long-Range Transportation Plan Projects

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<tr>
<th>PID</th>
<th>Project</th>
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<th>Description</th>
<th>Cost</th>
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<td>Signage Upgrades and Tie to ODOT ITS</td>
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<td>PID</td>
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<td>New Cargo Access Road and Link to NS Railroad</td>
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<td>Medina</td>
<td>Intersection Improvement at Fenn Rd.</td>
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</tr>
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</table>

**Additional Projects**

Along with all of the listed projects, there are other potential projects stakeholders have raised that have not previously been included in a TIP or LRTP due to lack of funding, unknown costs, or other issues. These include:

- Reconstruction of Intermodal Connector OH44P in Cleveland, including Main Avenue, Elm Street, Center Street, and River Road
• Irishtown Bend stabilization

• Reconstruction of Rockefeller Road that is part of Intermodal Connector OH47P in Cleveland

• A new interchange on Interstate 71 south of the existing one at State Route 18 that would provide access to industrial areas in the City of Medina. The Medina County Economic Development Corporation has stated that this is the number one infrastructure priority in the county from an economic development perspective, as it may be more efficient than the existing route through downtown.

• Expansion of the Route 18 corridor from the Medina Hospital to the I-71 interchange.

Freight Hubs

In addition to projects like those listed above, further study can be given to specific freight hubs, also known as freight villages or cargo-oriented development areas. The idea behind a freight hub is that clustering businesses together enables easy shipping and receiving and potentially reduces vehicle miles traveled by truck. Furthermore, as some of these businesses may be industrial, and as shipping generates noise and local air pollution, clustering these businesses away from residential areas may be desirable from a community development standpoint. Lastly, developing these hubs can help complementary businesses locate near each other to reduce their own shipping costs, as a supplier can be in the same area as the buyer.

One important trait for all freight hubs is to be developed around an intermodal facility. These places, such as an airport or railyard, are large in both size and financial investment, are in a fixed location, and serve multiple users. It therefore makes sense for individual businesses to cluster around them. As noted earlier in the description of freight modes, the Aerozone Alliance effort is already underway among communities surrounding Cleveland Hopkins Airport. NOACA should participate in this to the extent possible and can study what transportation improvements would help facilitate the success of the Alliance. Another possible study area is the Port of Cleveland, both the Port Authority facilities and other intermodal facilities and connectors along the Cuyahoga River. Smaller port facilities in Fairport Harbor and Lorain may also be options. Finally, CSX and Norfolk Southern intermodal facilities are good candidates for study due to their size and importance to rail shipping.

Freight hub studies should recognize that these are long-term efforts to develop plans for maximizing facility usage and complementing the local community. No individual project is likely to be a catalyst for economic development on its own; rather, a series of projects, maintenance, and ongoing review will be necessary to ensure continued success and sustainability. Studies should also look at surrounding land use to see how it complements or detracts from the ability of businesses to locate near and ship goods and products from intermodal facilities. Studies can also look at the network for personal transportation in the area, as the businesses will need to be able to get employees to and from the facilities as easily as they ship products.
Conclusion

The Multimodal Regional Freight Plan will serve as the basis for infrastructure investment decisions from a freight perspective. Transportation project planning and prioritization must balance several competing objectives. This Plan presents a decision-making framework that uses objective and consistent criteria to help NOACA and regional stakeholders incorporate freight needs into an effective and sustainable transportation system.

This Plan provides a comprehensive review of freight-related data on modes of shipping; commodities; destinations; employment in related industries; projections for the future; and the safety, security, and resiliency of the system. Regional freight stakeholders also provided insight into how the system works for them and how this Plan can work to improve freight movement. It includes an analysis of the strengths and weaknesses of the regional freight network, and identifies key opportunities and threats that may affect it. Based on these inputs, the Plan contains goals, objectives, and performance measures, and key recommendations and implementation action areas are identified that will help NOACA realize these goals. With this understanding of the regional freight system, NOACA can best plan for system improvements that support each aspect of the NOACA Vision Statement:

**Strengthen Regional Cohesion:** Freight flows into, out of, and through all political jurisdictions, meaning communities must work together to ensure the efficient movement of goods. The success of a business in one community will depend in part on its ability to ship products through other communities, so collaboration is key. As with the case of the Aerozone Alliance, freight facilities themselves may span multiple political jurisdictions, so working together is in the best interests of all communities.

**Preserve Existing Infrastructure:** A freight stakeholder survey rated poor roadway conditions as a top concern for the ability to move goods efficiently. Further, the heavy weight of tractor-trailers causes a disproportionate amount of road damage. Preserving infrastructure is so important to the freight community that it has been developed into one of the three freight goals.

**Build a Sustainable Multimodal Transportation System:** Different businesses have different shipping needs, so it is important for the region to have access to all forms of goods movement. Additionally, safety, security, and resilience call for different modes of shipping to be readily available to ensure efficient movement in the face of disaster and to mitigate global warming. Like preserving infrastructure, multimodal shipping is so important that it has also been developed into one of the three freight goals.

**Support Economic Development:** As noted throughout this Plan, all goods-producing businesses are engaged in freight movement. A robust freight system allows businesses to receive materials and deliver finished products easily and enables consumers to have easy access to these products. This helps retain, attract, and grow businesses in the region. Efficient and reliable freight movement is a key location decision for businesses, so targeted congestion reduction has been developed into the third regional freight goal.

**Enhance Quality of Life:** Moving freight, mainly by truck, creates high amounts of pollutants that cause human and environmental health problems and drive global warming, so it is critical to evaluate projects based on their emissions and strive to reduce them whenever possible.
As mentioned throughout the Plan, linking freight planning and land use will help identify and prioritize freight needs to allow for efficient movement of the projected increase in freight volume. When transportation planning and land use are integrated together, projects can be prioritized that promote economic gains while also reducing the negative effects of freight such as increased traffic, noise, and pollution. This will help advance all five of the goals contained within NOACA’s Vision Statement. Investment decisions all too often create a dichotomy between economic growth and environmental protections. With proper freight and land-use planning, however, NOACA and regional stakeholders can work together to bring the transportation system into a state of good repair and also facilitate business and job growth and protect our air and water.
Appendix A

Stakeholder Input

Stakeholders Who Provided Input

American Seaway Foods

Business & Economic Impacts Stakeholder Session for the Long-Range Transportation Plan (a focus group of private and public stakeholders from the region)

Cargill

City of Medina Economic Development Department

City of Wadsworth Economic Development Department

Cleveland-Cuyahoga County Port Authority

Cleveland Freight Association

Greater Cleveland Partnership

Farm Fare

FHWA Administrator’s Roundtable (a focus group of private and public stakeholders from Ohio)

Flats Forward

International Freight Association

Lake County Port Authority

Lorain Port Authority

Medina County Economic Development Corporation

The Oberlin Project

Ohio Rail Development Commission

Ohio State University Extension–Cuyahoga County

St. Clair–Superior Development Corporation

Tremont West Development Corporation

Input

Several stakeholders provided similar input, showing the importance of a few key issues. These topics were then formulated into the three goals of this Plan. Land-use and freight integration was a fourth common topic. Due to the diversity of comments on the issue and the fact that NOACA does not make land-use decisions, these comments were not incorporated into a goal
of the Plan. Comments on the topic are, however, grouped together in this Appendix. Technology was a fifth common theme, which can be seen in the SWOT Analysis, so these comments are also grouped together. Comments that do not fit within any of these categories are grouped as "Other."

**Prioritize maintenance over capacity additions.**

The condition of roads in the Flats is terrible.

No new interchanges—not a good use of funds.

Maintain what we have first.

Don’t build more if we can't maintain what we have.

Maintaining infrastructure should be prioritized over adding new.

Generally, maintenance needs to be significantly upgraded.

Fund projects to support redevelopment, especially in existing communities—maintenance, but also new infrastructure if needed.

Poorly maintained roads can drive business away or discourage growth plans of existing companies; one company in a Medina industrial corridor referred to the roads as worse than ones he’d seen in Baghdad, and said that any expansion they might consider would likely take place outside Northeast Ohio.

Having a robust, well-maintained road system is critical for business expansion and attraction, particularly for companies with significant inbound and outbound freight activity.

For roads, it is our priority to maintain existing roads, keeping them in good condition. One exception is the need to expand capacity for industrial corridor access.

How much do you have in the budget to deal with road issues? We look at both (maintenance and expansion). Road maintenance for our businesses (specifically manufacturers/industrial) is vital for their success and ultimately our success. We work in those areas to ensure the roads are maintained. Expansion, important, but has to be systematically evaluated and constructed.

**Facilitate all modes of shipping.**

Infrastructure must serve multiple needs/users.

Other modes of shipping can help reduce truck traffic.

Access to rail/spurs is a big issue for businesses.

Rail seems to be underutilized in general.

Links to shale in SE Ohio will be important for some businesses involved in downstream activities.

Intermodal access, connectivity, and reliability should be emphasized.
Highway bias, they have received big subsidies for decades.

We need a better long-term focus. Especially with water and rail, large upfront costs are needed that may make them look unattractive.

Processes for funding allocation—project applications, grant requests, etc.—are tailored to road projects, making it harder for other modes to compete.

FAA [Federal Aviation Administration] has grant programs and funding for airports, but MARAD [Maritime Administration] and SLSDC [Saint Lawrence Seaway Development Corporation] don’t have comparable programs for ports.

Can we fund/subsidize rail spurs for specific businesses?

Rail connections to the ports. There is a lot of change going on right now with the ports. Cleveland is moving containers, Ashtabula Coal docks close, and there is a lot of excess capacity. Identifying ports and the rail serving them that should either be preserved or improved would be a good item to investigate.

Intermodal container traffic in the area. NE Ohio has several intermodal yards serving it. Taking a look at those yards, railroad expansion plans and the road infrastructure supporting them.

Direct-served rail businesses. While there are trends toward intermodal, a lot of traditional manufacturing industry still need direct rail service. Are there infrastructure needs that are preventing companies from better utilizing rail transportation in the area?

Rail safety. There is a lot of vehicular-train interaction. Are there safety concerns or other quality of life issues that are impacting the increased use of freight rail?

I believe that air service improvement is by far the most critical issue. I believe that if NEO businesses have to connect to go anywhere, that eventually we will have difficulty retaining them. Air service improvement is number 1, road # 2.

More money needs to be invested in port infrastructure. All ports had been working together at the state level to get dedicated port-related projects, but legislators wouldn’t act. Wisconsin has model legislation.

Sheet piling is 50-60 years old or more and needs repairs throughout the state.

Smaller ports get neglected in funding, which leads to poor infrastructure, which leads to being neglected by businesses, which leads to more neglect in funding, etc. This is true at the national level (Midwest vs. Coastal) and within the state.

Lack of railroad spurs can inhibit business attraction; many of the leads we’re getting from the State of Ohio call for large manufacturing buildings with access to railroad.

Within the rail mode, it would be helpful to have funding to maintain spurs.

Use targeted strategies to reduce congestion where it impedes freight movement.
Efforts to change several streets to one-way. Truck congestion (not just affecting salt trucks but all industries on Whiskey Island) can be a concern at certain times of the day and certain times of year, and one-way restrictions affecting truck movement to and from Whiskey Island would not be helpful.

When it comes to congestion, trucks and passengers use the same roads. Don’t silo the two as if projects only impact one or the other.

Focus on congestion hot spots like I-480 & Rockside Road.

Rail main line congestion. Northern Ohio has some of the busiest rail lines in the country. Are there specific bottlenecks that might represent public-private partnership opportunities on the rail system to resolve?

From an economic development perspective, the number-one priority is a new interstate interchange south of Route 18, off I-71, with more convenient and safe access to the Medina industrial area. Trucks need a better route that would save time and money (and wear and tear on roads in the historic downtown). This alternate route would help maintain the existing road system, enhance capacity and access, and mitigate congestion (currently, there are constant bottlenecks at the historic Medina Square). Medina has been working with a local task force and ODOT for the past several years; ODOT completed an Origin & Destination Study for this potential new interchange, but additional funding is needed for the next step—a feasibility study.

**Land-Use and Freight Integration**

Recently several bridges in the Flats area (including the Columbus Road and Center Street bridges near Whiskey Island) have implemented truck weight special restrictions; the effect has been to force local trucks to take circuitous routings to avoid them. This adds cost and means extra truck miles driven on Flats roads.

Cargill is concerned about the City proposing to rezone the streets approaching the mine to “LLR” (Limited Local Retail) which would allow the construction of residential units. Putting so much heavy truck activity next to prospective residence units will create a safety issue that will only get worse if more people decide to take up residence in the area.

Proposed closure of the W. 28th Eastbound ramp to the Shoreway will put lots more trucks through the W. 25th/Detroit intersection.

Preliminary Lake Front connector Bikeway plans propose reducing the width of River Road and putting parking on each side. At present, trucks with 53-ft. trailers need the full road width to turn onto River Road from Elm, Center, or Mulberry.

Industrial parks are often poorly designed—unsafe intersections, inadequate turning radii.

The same (poor design) applies to older areas—streets are often narrower, presenting another challenge to infill development by businesses.

Impact fees on greenfield development may promote infill.

There is sometimes a zoning mismatch between what the land is supposed to be used for and how roads are designed.
Truck traffic often discourages residents/redevelopment, but we need the industry and jobs.

People need to be connected to job centers.

Where do assets exist? Where are they underutilized?

Most businesses don’t know these things, they only notice when something goes wrong. More information from NOACA on upcoming projects, excess capacity, etc., could help business expansion/attraction.

What are the implications for freight on increased population downtown and along the waterfront?

How are decisions made on truck routes, where trucks aren’t allowed, etc.?

Sense of place is important for businesses, not just residents.

**Technology**

Online buying and overnight delivery will have a big impact on the number of truck trips in a community.

ITS, apps, other technology will become more common and help truckers know where/when to be somewhere.

Autonomous vehicles will grow in use.

Automation in industry is bad because it means fewer workers, but this will reduce congestion.

3D printing will change industries and where/how they get goods.

Driverless trucks will be an issue in the future.

Especially true on I-80 – may need to establish facilities near ramps where driverless trucks can be unloaded or human drivers can take over since surface streets/urban areas are more complex.

**Other**

The Willow Street Lift Bridge is going to operate on a restricted lift schedule this summer (2016) until a key piece of machinery can be replaced. This is not directly a roads issue, but is worth mentioning because as another example of deteriorating infrastructure, it’s just another straw on the camel’s back.

Take care of existing businesses first.

Federal government bias toward East Coast ports only exacerbates congestion at them.

Need better cost-benefit analysis of infrastructure investments.

Why was the Shoreway speed limit lowered to 35 when it still feels like a 50 mph road?
CMAQ is a valuable program—Port could not have purchased cranes without it.

Dille/Nottingham area could use specific projects to improve it.

Long-term commitments need to be made and need to align with other infrastructure/utilities.

Focus on nodes of activities, not just specific projects. Several projects may need to be completed over several years in the same node.

Look at difference in how we supply transportation infrastructure (i.e., capacity) vs. how we manage demand for it (incentivizing other modes, transit, pricing mechanisms, etc.). We can't keep adding capacity.

Environmental issues need better streamlining and reduction—NEPA, ballast water, sediment, etc.

For private sector involvement, just ask. It doesn’t need to be formal, don’t need standing councils, etc.

Rockefeller Avenue needs [to be] reconstructed.

Need better infrastructure for employees to get to work. Several bus stops are in places without sidewalks, such as Richmond Road in Bedford. This makes it dangerous and more difficult for employees who take the bus to get to work.

I don’t believe that RTA service extensions have any value.

New construction should be to open development sites, such as Jackson Street/Route 44 in Painesville would be number 1 Lake County new project because it would open up 300+ acres for industrial development.

Jonick Dock & Terminal uses Bridge Drive—heavy trucks damage road. Idaho Avenue, too.

Better long-term planning is needed.

Lorain Port probably wouldn’t exist without previous earmarks. Without them, it’s incredibly hard to get money.

Sewer capacity fees (on a local level) can also be detrimental to business growth plans and negatively influences the business climate.

Placement of guard rails in a corridor where they did not exist before is also a detriment to business growth (ODOT’s recent plans for safety upgrades in the Route 18 corridor between Medina and the Summit County line is an example—the businesses have rallied in protest against ODOT, and realtors are concerned that just the announcement of the guardrail plan will deter potential developers from investing in the corridor).

Roads are the most important, followed by rail. Local airports are next, followed by the Port of Cleveland (as Medina County doesn’t have a port of its own).

Fiber networks are also important in Medina County as an infrastructure offering.

For local airports, there are some minor upgrades that would make the airport more effective for transportation—a weather-tracking system that relies on more than a wind sock would be more of a priority than runway expansion, but consideration should also be given to that as well.
Another project would be funding for the expansion of the Route 18 corridor from the Medina Hospital to the I-71 interchange.

When dealing on new potential projects (either expansions or new companies into the community to build), the first item we need addressed is the infrastructure to properties that they are interested in. We look at and discuss the road network, utilities (electric, gas, water, sewer, storm water), rail lines if needed, and all infrastructure. I always have a rep from our engineering department available to discuss these items. Once we are able to get through this issue, everything else is usually easy: zoning, incentives, processes, etc. This is the major issue we deal with when working with developers. Ensuring the sites are shovel ready and if not, what needs to be done to have development occur on that site.

Prioritization: In my opinion, in my world, road, pipeline, rail, air, and port. People care about the first two. Rail, only a small percentage of manufacturers actually deal with rail directly.

We just did a road expansion project, and I thought it was a great public/private partnership. A developer wanted to install a road and make it a public road to open up land for development. The city and the developer worked together on the project. The developer is paying for the road through an assessment. The city oversaw the project, it was a city project. Our engineering staff and finance worked hard to develop the project with the developer and seek financing options for this construction to occur.

Specific projects that are needed (widened road, fixed road, turn lane, etc.): All of them. As a community grows and more traffic is generated, these items are needed. For economic development, whenever a project is proposed, they need to conduct a traffic survey, and we look at their impact to the existing road conditions. At times, they may need to widen the road, install turn lanes, and install signals. This is usually a difficult subject with many developers because they don’t want to put money into public roads. We have used TIFs [tax increment financing] before for projects as well in relationship to road improvements.