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A RESOLUTION
BY THE
TRANSPORTATION POLICY BOARD
OF THE
MEMPHIS URBAN AREA METROPOLITAN PLANNING ORGANIZATION
ADOPTION OF THE GREATER MEMPHIS REGIONAL FREIGHT PLAN

RESOLUTION #2017-06

WHEREAS, the Memphis Urban Area Metropolitan Planning Organization (MPO) is the organization responsible for planning an efficient transportation system in the Memphis Metropolitan Planning Area and for the appropriate use of federal transportation funds in that area; and

WHEREAS, as a regional transportation planning organization, the Memphis Urban Area MPO is federally mandated to provide adequate multi-modal transportation planning, including freight planning; therefore, the Greater Memphis Regional Freight Plan addresses the needs of the freight sector and supports regional economic development potential; and

WHEREAS, as "America's Distribution Center," the Greater Memphis Area plays a critical role in the nation's global supply chain, with the presence of major multimodal freight facilities and investments in freight infrastructure; as a result, freight plays a very important role in the region's economy, with almost 30% of the employment concentrated in the transportation and warehousing sector; and

WHEREAS, the plan provides an overview of the region's freight transportation system and goods movements; and

WHEREAS, the plan identifies key issues and challenges to the region's overall freight system as well as strategic freight corridors; and

WHEREAS, the plan assesses all modes of freight transportation, such as: Truck, Rail, Pipeline, Waterways, and Air; and

WHEREAS, the plan analyzes future threats to economic competitiveness of freight in the region; and

WHEREAS, notice of public availability of the Greater Memphis Regional Freight Plan was published in the newspapers & made available in the public libraries in the Memphis Metropolitan Planning Area as specified in the approved Public Participation Plan for a period of thirty (30) days prior to consideration by the Transportation Policy Board to allow the public opportunity to review & comment; and

WHEREAS, the Engineering and Technical Committee (ETC) has reviewed the Greater Memphis Regional Freight Plan and recommends adoption; and

NOW, THEREFORE, BE IT RESOLVED, that the Transportation Policy Board of the Memphis Urban Area Metropolitan Planning Organization (MPO) does hereby adopt the Greater Memphis Regional Freight Plan.

Resolution duly passed on November 16, 2017

Mayor Mark H. Luttrell, Jr., Chairman
Memphis Urban Area Metropolitan Planning Organization
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Greater Memphis Regional Freight Plan
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
1.1 Introduction

As "Hub City," the Greater Memphis region plays a critical role in the nation’s global supply chain. Freight transportation in the region is characterized by the abundant inland waterway transportation of the Mississippi River, the presence of five Class I railroads in the region, a recognition as the second largest air freight hub in the world, eleven Interstate and U.S. designated roadways, as well as regional petroleum and energy pipelines. The region’s land use includes 3,402 industrial buildings comprising 238 million square feet of industrial space.\(^1\) The regional freight transportation system serves the area’s origin and destination traffic as well as the through traffic that carries beyond the region and state.

As a regional transportation planning organization, the Memphis MPO has developed the Greater Memphis Regional Freight Plan to enhance the mobility of people and goods, while addressing the unique characteristics of the region and encouraging economic development. The Regional Freight Plan seeks to address the freight competitiveness of industrial sites served by transportation, as well as recommend near- and medium-term projects, policies and programs which provide for adaptation and continuous improvement in the ever-changing freight environment.

This chapter serves as guidance to the Regional Freight Plan, both providing a summary of the effort and serving as a reference for how the different aspects of freight have been studied and organized in this report.

1.2 Study Area

The Regional Freight Plan focuses on the existing and anticipated mobility needs of freight industries in the Greater Memphis region. Displayed in Figure 1-1, the Greater Memphis region is defined by the Memphis Metropolitan Statistical Area, TN-MS-AR (MSA). The census defined MSA covers nine counties in three states: Tennessee, Mississippi, and Arkansas.

\(^1\) CoStar Group, Inc. 2014
The Memphis Urban Area Metropolitan Planning Organization (Memphis MPO) is the planning body responsible for the planning and programming of federal transportation funds for the Memphis Urban Area. Displayed in Figure 1-2, the Memphis MPO planning area covers all of Shelby County, Tennessee and DeSoto County, Mississippi and portions of Fayette County, Tennessee and Marshall County, Mississippi.

Figure 1-2: The Memphis Urbanized Area Metropolitan Planning Organization Planning Area
The Greater Memphis Regional Freight Plan utilizes Freight Analysis Framework (FAF) data to provide a regional freight profile from which to define the characteristics that represent the Greater Memphis region as it pertains to freight movements on a state and national level. The FAF, produced through a partnership between the Bureau of Transportation Statistics (BTS) and the Federal Highway Administration (FHWA), compiles data from several sources to create a comprehensive picture of freight movement among states and major metropolitan areas. Starting with data from the 2012 Commodity Flow Survey (CFS) and international trade data from the Census Bureau, FAF incorporates data from agriculture, extraction, utility, construction, service, and other sectors. FAF version 4 (FAF4) provides estimates for tonnage (in thousand tons) and value (in million dollars) by regions of origin and destination, commodity type, and mode. This report utilized a FAF4 dataset which was accessed from their online data tabulation tool in November of 2016. Due to the continuous updating of estimates, numbers may differ from those presently available. For the Greater Memphis region, FAF data is available only for the Tennessee portion of the CFS area, which is identical to the MSA discussed earlier. Displayed in Figure 1-3, the Memphis, TN-MS-AR CFS Area (TN Part) Freight Analysis Framework Zone (Memphis FAF zone) covers all of Shelby, Fayette, and Tipton counties in Tennessee.

2 http://fafornl.gov/fafweb/
For the purpose of the Greater Memphis Regional Freight Plan, the Greater Memphis region will serve as the study area. However, it is important to note that due to differing datasets and reporting requirements that other geographies may be used to help represent the region and is identified accordingly.
1.3 Plan Organization

The Greater Memphis Regional Freight Plan has been segmented into chapters to focus in on each specific area that impacts how freight moves and its resulting effects and needs. This section describes how the chapters have been divided and arranged, as well as the terminology and techniques used.

1.3.1 Chapter Progression

This section describes how the report chapters relate with one another, including the appendices. For the Greater Memphis Regional Freight Plan, the following chapters have been segmented:

- Chapter 1 - Executive Summary
- Chapter 2 - Regional Overview
- Chapter 3 - Stakeholder Outreach
- Chapter 4 - Workforce and Community
- Chapter 5 - Road Network Connections
- Chapter 6 - Railroad Network
- Chapter 7 - Inland Waterways
- Chapter 8 - Air Cargo
- Chapter 9 - Emerging Zone Development
- Chapter 10 - Environmental
- Chapter 11 - Technology
- Chapter 12 - Freight Performance Measures
- Chapter 13 - Greater Memphis Region as a Global Logistics Hub
- Chapter 14 - Plan Alignment
- Appendix 1 - Freight Trade Tables
- Appendix 2 - National Highway Freight Network in the Memphis MPO Area
- Appendix 3 - Regional Industrial Area Descriptions
- Appendix 4 - Listing of Projects
- Appendix 5 - Freight Funding Programs
- Appendix 6 - Outreach Survey

Although the chapters remain separate, each builds on and provides reference to the others. The grouping of several chapters also helps the reader understand the logical ordering. Chapter 1 - Executive Summary and Chapter 2 - Regional Overview provide the report’s introduction. Chapter 3 - Stakeholder Outreach and Chapter 4 - Workforce and Community expand on the introduction as it pertains to the public. Chapter 5 - Road Network Connections, Chapter 6 - Railroad Network, Chapter 7 - Inland Waterways, and Chapter 8 - Air Cargo serve as modal profiles. Chapter 9 - Emerging Zone Development describes the region’s industrial areas. Chapter 10 – Environmental explains freight’s impacts on the environment. Chapter 11 – Technology identifies the evolving trends in freight transportation. Chapter 12 – Freight Performance Measures evaluates and recommends potential freight performance measures for the Memphis MPO. Chapter 13 - Greater Memphis Region as a Global Logistics Hub paints a vision for how the region would like to operate. Chapter 14 - Plan Alignment evaluates and identifies recommended projects needed for the region. Appendix 1 – Freight Trade Tables, Appendix 2 - National Highway Freight Network in the Memphis MPO Area, Appendix 3 - Regional Industrial Area Descriptions, Appendix 4 - Listing of Projects, and Appendix 5 - Freight Funding Programs provide the detailed information used in the report chapters. Each chapter is described below:
Chapter 1 - Executive Summary
This chapter introduces the reader to the report. This includes defining the study area and plan organization. Chapter 1 also provides a summary of the public participation, existing conditions, and recommendations of the plan.

Chapter 2 - Regional Overview
This chapter provides a regional freight overview. This includes describing general current conditions, modes, commodities, trends, and anticipated outcomes. This chapter introduces reported items that reoccur throughout the report, including tonnages and values of goods moved.

Chapter 3 - Stakeholder Outreach
This chapter describes the public and stakeholder outreach used in the development of the report. This includes a review of past public involvement as well as recent interviews and surveys. Chapter 3 also describes the regional priorities that were identified from these outreach efforts.

Chapter 4 - Workforce and Community
This chapter summarizes the workforce and community that is employed by regional industries. This includes defining the demographics, sustainability, accessibility, and social justice of the region’s workforce.

Chapter 5 - Road Network Connections
This chapter is the first of the modal chapters and focuses on the roadway and trucking mode of transportation. This includes defining the current roadway infrastructure, demands, and freight bottlenecks. Chapter 5 also provides a summary of the potential strategies for a more efficient roadway network.

Chapter 6 - Railroad Network
This chapter is the second of the modal chapters and focuses on the railway and rail mode of transportation. This includes defining the current railroad infrastructure, demands, and freight bottlenecks. Chapter 6 also provides a summary of the potential strategies for a more efficient railroad network.

Chapter 7 - Inland Waterways
This chapter is the third of the modal chapters and focuses on the river and water mode of transportation. This includes defining the current waterway infrastructure, demands, and freight bottlenecks. Chapter 7 also provides a summary of the potential strategies for a more efficient waterway system.

Chapter 8 - Air Cargo
This chapter is the last of the modal chapters and focuses on the runways and air mode of transportation. This includes defining the current roadway infrastructure, demands, and landside impacts.

Chapter 9 – Emerging Zone Development
This chapter summarizes the region’s industrial areas. This includes defining the scaled approach used to define the industrial areas as well as indicators used to compare the many aspects that make each area unique. Chapter 9’s summary can be explored in greater detail in Appendix 2.

Chapter 10 – Environmental
This chapter describes the environmental impacts of freight transportation. This includes description and identification of status and regulations of air quality as well as noise impacts. Chapter 10 also provides potential strategies to mitigate the negative effects on the environment.
Chapter 11 – Technology
This chapter describes the evolving technology trends in freight transportation. This includes descriptions of different technologies and how they can be implemented. Chapter 11 also provides a summary on what the MPO’s role in technology should be into the future.

Chapter 12 – Freight Performance Measures
This chapter provides an overview of freight performance measures across the nation. This includes listing and descriptions of Federal, State and peer MPO efforts. Chapter 12 also provides recommendations for the Memphis MPO to consider for the implementation of freight performance measures.

Chapter 13 - Greater Memphis Region as a Global Logistics Hub
This chapter provides a description of the Greater Memphis regional goals and desires concept for “Hub City”. This includes providing a gap analysis and strategies for the region to continue progressing.

Chapter 14 - Plan Alignment
This chapter provides an assessment of the plan with future conditions. This includes assessing freight related projects, as well as evaluating the potential impacts these projects may have. Chapter 14 also examines the benefits they may generate, and how these impacts and benefits align with the stated federal, state, and regional goals and objectives for freight movement. The chapter results in recommendations for the region.

Appendix 1 – Freight Trade Tables
This appendix provides tables with data of freight trade with the Memphis FAF zone and the Megaregions and Gateway Cities. This includes segmentation of the data by tonnage, value, mode, and direction. Appendix 1 is referenced in Chapter 2 – Regional Overview as well as the modal chapters.

Appendix 2 - National Highway Freight Network in the Memphis MPO Area
This appendix provides a listing of the region’s National Highway Freight Network. This includes listings of the Primary Highway Freight System (PHFS), PHFS Intermodal Connectors, Critical Urban Freight Corridors and Critical Rural Freight Corridors for the Memphis MPO planning boundary. Appendix 2 is referenced in Chapter 5 – Road Network Connections.

Appendix 3 - Regional Industrial Area Descriptions
This appendix provides detailed descriptions of each industrial area. This includes describing infrastructure and access, truck traffic, safety indicators, workforce, real estate, and industrial health for each of the region’s freight zones and areas. Appendix 3 is summarized and discussed regionally in Chapter 9 – Emerging Zone Development.

Appendix 4 - Listing of Projects
This appendix provides a listing of projects assessed in this report. This includes listing roadway projects by corridors and type groupings for the Memphis MPO to give priority to achieve freight goals. Appendix 4 is visualized and discussed regionally in Chapter 14 – Plan Alignment.

Appendix 5 - Freight Funding Programs
This appendix provides a listing of potential freight funding programs for use on recommended freight projects. Appendix 5 is referenced in Chapter 14 – Plan Alignment.
Appendix 6 – Outreach Survey
This appendix provides a listing of the outreach surveys. Appendix 6 is referenced in Chapter 3 – Stakeholder Outreach.

1.3.2  Regional Freight Geographies
Throughout its history, industrial land has emerged in particular sections of the Greater Memphis region. The regional industries range in location based on their needs and access to resources and customers. They are geographically dispersed to take advantage of the surrounding infrastructure assets as well as proximity to trading partners. This study takes a scaled approach to depict how industrial development takes form. Figure 1-4 illustrates the relationship between the differing geographies. The initial building block is each individual industrial site. Freight Zones are locations where clusters of industrial sites form in a manner that share similar traits. Freight Areas are groupings of Freight Zones by their locational proximity. Functional Freight Areas are groupings of Freight Zones, aggregated not by location but by the manner in which the zones share similar needs and trading patterns. Points of Interest are locations where industrial activity is likely to emerge based on local desires. Detailed descriptions of the Freight Industrial Areas used for this report are available in in Chapter 9 – Emerging Zone Development and Appendix 3.
1.3.3 Regional Freight Corridors

The Greater Memphis regional roadway network supports the movement of freight throughout the Region. Freight Corridors have been defined to identify facilities that are most critical to the Regional Industrial Areas and support of through movements. The Freight Corridors have been classified to indicate how each type functions to serve regional truck movements.

Freight Mobility Corridors are characterized by higher speed and less access. The function of Freight Mobility Corridors is to allow for longer distance freight deliveries such as through, inbound, and outbound movements. Freight Mobility Corridors are separated into Interstate and non-Interstate.
Freight Accessibility Corridors are characterized by lower speed and more access. The function of Freight Accessibility Corridors is to allow for freight deliveries to local industries such as internal, inbound, and outbound movements.

Freight Mobility and Accessibility Corridors are characterized by higher speed and more access. The function of Freight Mobility and Accessibility Corridors serves dual purposes allowing for freight deliveries to local industries such as internal, inbound, and outbound movements while also supporting higher speeds and longer distance freight deliveries. Figure 1-5 displays the Regional Freight Corridors in relation to the Regional Industrial Areas they serve and the accessibility to Interstate/freeway facilities. Further detail of the Regional Freight Corridors used for this report is available in Chapter 5 – Road Network Connections.
Figure 1-5: Regional Freight Corridors
1.4 Public Participation

Freight transportation affects each of the region’s stakeholders, yet often in different ways. Importantly, the Regional Freight Plan examined the ways in which the Plan would affect the region through a series of meetings and diverse venues to gather stakeholder perspectives about freight. Information was gathered from stakeholders representing industry, transportation facility managers and transportation providers regarding regional freight transportation patterns to help shape the regional freight voice.

The general public attended meetings and completed surveys to provide an insight related to freight travel patterns regionally and locally. Collectively, stakeholder meetings and survey input provide an additional perspective for current and future conditions related to the freight study.

1.5 Existing Conditions of Regional Freight Infrastructure

The Greater Memphis region is comprised of all modes of transportation pertaining to freight. Figure 1-6 shows major freight infrastructure in the Greater Memphis region and how it connects to the national and global economy. The Region is recognized as a freight hub due to the connectivity of the extensive freight infrastructure to the global economy. The Greater Memphis region connects to the global economy by supporting the following modes of freight: road, rail, river, runway, and pipeline.
The Greater Memphis region contains more than 840 miles of Interstate and US designated highways. The major roadways include I-55 which travels north-south providing connection to New Orleans to the south and St Louis to the North. Another major roadway is US 78/I-22 which connects the Region to the city of Birmingham to the south. I-40 connects the east side of Tennessee including the cities of Knoxville, Nashville, and Jackson to the Greater Memphis region. In addition, I-40 connects the Greater Memphis region on the west to Little Rock.

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3 Greater Memphis Freight Infrastructure Plan, 2009
Oklahoma City, and continues to Mexico and the southern portion of California. I-240 loops around the City of Memphis connecting I-40 to I-55. Current and future portions of I-69 and I-269 provide an outer bypass for the Region, connecting the primary Interstates. With these major roadway connections, 45 states can be reached by two-day truck service from the Greater Memphis region.

**Rail**

Memphis is one of five cities in the United States with service by five Class I railroads. The railroads include Canadian National (CN), BNSF Railway Company (BNSF), Union Pacific (UP), CSX Transportation (CSXT), and Norfolk Southern (NS). The BNSF rail services connect the Midwest and Northwest to the Southeast. The CN services connect Chicago and New Orleans. NS connects the Region to the Coastal, Northeast, and Southeast. CSXT services connect the Region to Nashville and the Northeast. UP services connect the Region to the West and Northwest. RJ Corman (RJCK), a shortline railroad, provides switching services at BNSF’s Tennessee Yard. Grenada Railway (GRYR) continues CN’s southern connection into Mississippi. In addition to the railroad connections, the regional rail infrastructure is complemented with four intermodal terminals which allow for container shipments in and out of the Region. With the five Class I railroads in and out of Greater Memphis region, 49 states plus Mexico and Canada can be reached by single system rail.

**River**

The Greater Memphis region is situated along the Mississippi River and has historically used the Mississippi River as a mode for trade. The Mississippi River is a vein that connects the north of the United States to the Gulf of Mexico and all the cities in-between. Today, through The International Port of Memphis, the region is still supported by the Mississippi River for the movement of Freight. The International Port of Memphis is currently the fifth largest inland port in the country and has facilities in two states: Tennessee and Arkansas. The port is designated as a Port of Entry and Foreign Trade Zone and consists of the Port of Memphis, in Tennessee, and the Port of West Memphis, in Arkansas. On the Tennessee side, three separate slack water harbors exist: Pidgeon Industrial Park, Lake McKellar and Wolf River Harbor.

**Runway**

The Greater Memphis region has nine public use airports, several are capable of providing air freight and reliever service. The Memphis International Airport (MEM) is the only qualified FAA All-Cargo Airport in the region and is the second largest cargo airport in the world and first in the United States in metric tons. The airport is situated south of the I-240 loop and provides easy access to I-55, US 78, and I-240 which provides the network connectivity to access all major roadways described above. The Memphis International Airport is an anchor as it pertains to freight in the Greater Memphis region and is home to multiple freight airline companies including: FedEx Express (FedEx), United Parcel Service (UPS), Air Transport Int’l (previous Bax Global), and Mountain Air.

**Pipeline**

Within the Greater Memphis region gas pipelines are used for distribution of energy producing natural gas and gas as a feedstock for use in the petrochemical industry. Finished petroleum product pipelines for jet fuel, diesel fuel and gasoline are used to bring dedicated volumes of products to users and distribution facilities such as the airport and distribution terminals respectively.

### 1.6 Recommendations

Resulting from the Regional Freight Plan, recommendations are provided to improve freight mobility in the Region. These recommendations seek to address different aspects that may have a negative effect on industrial
growth and the efficient movement of freight. Recommendations in this Plan have been grouped into categories to identify the different types of improvements that can be made at the programmatic, policy, and project levels. Greater detail of the Plan’s recommendations is described in Chapter 14 – Plan Alignment with Future Conditions.

1.6.1 Potential Program(s) of Work

The Regional Freight Plan identifies several candidate work programs and project categories that have the potential to benefit the Region and aid in attracting, serving and retaining industry’s supply chains. The Plan has enabled a coalescence of conditions and opportunities that may have been seen intermittently across the region previously but can now be more readily aggregated. These include:

- Improving arterial roadway-to-Interstate traffic flows;
- Providing a greater definition and coordination of freight movement on the region’s railroad network; and
- Identifying and continuously improving on a “Smart” real time traffic management and wayfinding system.

1.6.2 Potential Policies

The Memphis MPO, in collaboration with its peer organizations on a local, state and federal level, may be in a position to initiate, as well as collaborate on, various freight and overall transportation initiatives that will benefit the Region. These policies would seek to:

- Maximize the role of IT and its contribution to freight movement and the operational and infrastructure performance within the MPO, leveraging ongoing innovations and the continued expansion of data availability and sources;
- Establish a framework to analyze the traffic and congestion impacts from the combined I-40 / I-55 dual segment in West Memphis, Arkansas and the manner in which this can impact the MPO’s road freight network;
- Examine potential strategies and roles for the MPO’s key East-West arterials to reduce roadway congestion, encourage economic competitiveness, and improve safety on the MPO’s road network;
- Continue to implement complementary economic development policy which encourages and incentivizes private sector companies to locate within the MPO and take advantage of the competitive advantage which its multimodal freight network offers. This includes sustaining the Region’s ongoing and ground-breaking efforts to enhance the alignment of the Region’s workforce and workplaces; and
- Leverage TDOT’s and MDOT’s efforts and initiatives for transportation demand management (TDM) where applicable to the freight sector, with continued participation by private sector companies in regard to the potential diversion of road freight to rail. Enabling freight mode shifts that reduce roadway congestion can be an elusive goal (due to existing disparities between supply of and demand for road freight vehicles), but one that does hold the potential to reduce congestion, provide environmental benefits, and improve safety on the MPO’s roadways.

1.6.3 Prioritization of Projects/Programs/Initiatives

The Regional Freight Plan identifies several projects and project groupings that provide the largest impact on benefits to the Region. These projects should receive the highest priority for freight improvements in the Region. These include:
• Near Term Focus on Lamar Avenue
• Increase Capacity on Key East-West Routes
• Leverage Recent Private Sector Investment
• Improve Signaling and ITS on Memphis MPO’s Freight Corridors
• Develop Strategy for Addressing Funding of Big Ticket Road Infrastructure Projects
• Address Provision of Additional Truck Parking
Chapter 2 – Regional Overview

Greater Memphis Regional Freight Plan
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
2.1 The Region Today

The Greater Memphis Region is comprised of all modes of transportation pertaining to freight. Figure 2-1 shows major freight infrastructure in the Greater Memphis region and how it connects to the national and global economy. The Region is recognized as freight hub due to the connectivity of the extensive freight infrastructure to the global economy. The Greater Memphis region connects to the global economy by supporting the following modes of freight: road, rail, river, runway, and pipeline.

Figure 2-1: Major Connections for the Greater Memphis Region
**Road**

The Greater Memphis region contains 840 miles of interstate and US designated highways. Situated as a gateway between cities in the eastern and western US, Memphis serves as a major connection for many transcontinental truck shipments. The major roadways include I-55 which travels north-south providing connection to New Orleans to the south, St Louis to the North, and continues to Chicago. Another major roadway is US 78/I-22 which connects the Region to the city of Birmingham to the south. I-40 connects the east side of Tennessee including the cities of Knoxville, Nashville, and Jackson to the Greater Memphis region. In addition, I-40 connects the Greater Memphis region on the west to Little Rock, Oklahoma City, and continues to Mexico and the southern portion of California. I-240 loops around the City of Memphis connecting I-40 to I-55. Current and future portions of I-69 and I-269 provide an outer bypass for the Region, connecting the primary interstates. With these major roadway connections, 45 states can be reached by two-day truck service from the Greater Memphis region.

**Rail**

Memphis is one of five cities in the United States with service by five Class I railroads. The railroads include Canadian National (CN), BNSF Railway Company (BNSF), Union Pacific (UP), CSX Transportation (CSXT), and Norfolk Southern (NS). The BNSF rail services connect the Midwest and Northwest to the Southeast. The CN services connect Chicago and New Orleans. NS connects the Region to the Coastal, Northeast, and Southeast. CSXT services connect the Region to Nashville and the Northeast. UP services connect the Region to the West and Northwest. RJ Corman (RJCK), a shortline railroad, provides switching services at BNSF’s Tennessee Yard. Grenada Railway (GRYR) continues CN’s southern connection into Mississippi. In addition to the railroad connections, the regional rail infrastructure is complimented with four intermodal terminals which allow for container shipments in and out of the Region. With the five Class I railroads in and out of Greater Memphis region, 49 states plus Mexico and Canada that can be shipped by single system rail.

**River**

The Greater Memphis region is situated along the Mississippi River and has historically used the Mississippi River as a mode for trade. The Mississippi River is a vein that connects the north of the United States to the Gulf of Mexico and all the cities in-between. Today, through The International Port of Memphis, the region is still supported by the Mississippi River for the movement of Freight. The International Port of Memphis is currently the fifth largest inland port in the country and has facilities in two states: Tennessee and Arkansas. The port is designated as a Port of Entry and Foreign Trade Zone and consists of the Port of Memphis, in Tennessee, and the Port of West Memphis, in Arkansas. On the Tennessee side, three separate slack water harbors exist: Pidgeon Industrial Park, Lake McKellar and Wolf River Harbor.

**Runway**

The Greater Memphis region has nine public use airports capable of providing air freight and reliever service. The Memphis International Airport (MEM) is the only qualified All-Cargo Airport in the region and is the second largest cargo airport in the world and first in the United States in metric tons. The airport is situated south of the I-240 loop and provides easy access to I-55, US 78, and I-240 which provides the network connectivity to access all major roadways described above. The Memphis International Airport is an anchor as it pertains to freight in the Greater Memphis region and is home to multiple freight airline companies including: FedEx Express (FedEx), United Parcel Service (UPS), Air Transport Int’l (previous Bax Global), and Mountain Air. Eight other public use airports provide the Greater Memphis region with freight services for “high priority” items.
Pipeline
The Memphis region has 1,200 miles of pipeline.\(^1\) Within the Greater Memphis region gas pipelines are used for distribution of energy producing natural gas and gas as a feedstock for use in the petrochemical industry. Finished petroleum product pipelines for jet fuel, diesel fuel and gasoline are used to bring dedicated volumes of products to users and distribution facilities such as the airport and distribution terminals respectively.

2.2 Freight Movement in the Region

The Greater Memphis region’s extensive freight infrastructure facilitates the movement of a wide variety of goods across several different modes. The following section provides an overview of the modes, direction, volume, and value of the goods traversing the Region. The Regional Freight Profile by tonnage and value was obtained from the Freight Analysis Framework Data Tabulation Tool\(^2\). An analysis of freight movements made via Road (Truck), Rail (Railroad), River (Waterway), Runway (Airport) and Other (Multiple-Mode Movements and Pipeline) reveals the Memphis FAF zone has a strong share of Roadway freight movement, accounting for 76 percent of freight moved within the zone. This equates to 113,826,761 Tons valued at $350 billion via truck. A summary of the data is provided in Table 2-1.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Tons</th>
<th>Percentage of Tonnage</th>
<th>Value</th>
<th>Percentage of Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway</td>
<td>113,826,761</td>
<td>76%</td>
<td>$348,984,095,531</td>
<td>83%</td>
</tr>
<tr>
<td>Rail</td>
<td>4,493,162</td>
<td>3%</td>
<td>$4,204,627,657</td>
<td>1%</td>
</tr>
<tr>
<td>River</td>
<td>7,488,603</td>
<td>5%</td>
<td>$84,092,553</td>
<td>0%</td>
</tr>
<tr>
<td>Runway</td>
<td>29,954</td>
<td>0%</td>
<td>$12,613,882,971</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>23,963,529</td>
<td>16%</td>
<td>$54,660,159,541</td>
<td>13%</td>
</tr>
<tr>
<td>Total</td>
<td>149,772,054</td>
<td>84%</td>
<td>$420,462,765,700</td>
<td>87%</td>
</tr>
</tbody>
</table>

Source: Freight Analysis Framework Data Tabulation Tool (FAF4)

An analysis of directional freight movements reveals the Memphis FAF zone has a strong and balanced share of inbound and outbound freight movement, accounting for 83 percent of the freight tons moved within the zone. This equates to 125,074,262 Tons valued at $376 billion via trade. A summary of data is provided in Table 2-2.

<table>
<thead>
<tr>
<th>Direction</th>
<th>Tons</th>
<th>Percentage of Tonnage</th>
<th>Value</th>
<th>Percentage of Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound</td>
<td>64,814,762</td>
<td>43%</td>
<td>$247,280,000,000</td>
<td>59%</td>
</tr>
<tr>
<td>Outbound</td>
<td>60,259,500</td>
<td>40%</td>
<td>$129,215,309,800</td>
<td>31%</td>
</tr>
<tr>
<td>Local</td>
<td>24,697,792</td>
<td>16%</td>
<td>$43,967,455,900</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>149,772,054</td>
<td>100%</td>
<td>$420,462,765,700</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Freight Analysis Framework Data Tabulation Tool (FAF4)

\(^1\) Memphis Infrastructure Plan (2010)
\(^2\) FAF4 2015 Data for the Memphis, TN-MS-AR CFS Area (TN Part)
2.2.1 Freight System Overview

The regional freight infrastructure is used to move goods in and out of the Greater Memphis region. Examining the Greater Memphis region’s freight movements provides insights into the corridors used by regional industries. Understanding the relationships between the Region and other parts of the country helps to define strengths and identify opportunities in trade. This section analyzes these relationships. Detailed tables of the tonnage and value information are available in Appendix 1.

Megaregions

Tonnage and value was also tabulated between Megaregions, as defined by America 2050³. Megaregions are defined as a large network of metropolitan regions that share several common characteristics such as environmental systems and topography, infrastructure systems, economic linkages, settlement and land use patterns and culture and history. Totaling over 70 percent of the nation’s freight, population, and capital, the eleven emerging megaregions identified by the Regional Plan Association⁴ include:

- Arizona Sun Corridor
- Cascadia
- Florida
- Front Range
- Great Lakes
- Gulf Coast
- Northeast
- Northern California
- Southern California
- Texas Triangle
- Piedmont Atlantic

Tonnage and value between each of the eleven megaregions by incoming freight and outgoing freight from the Memphis FAF zone reveals key findings by mode. In terms of tonnage, roadway and river are dominant, collecting almost 80 percent of the total freight movement within the Memphis FAF zone. This emphasizes the importance of intermodal connections near regional interstate facilities and port facilities along the Mississippi River. Aggregate freight value within the Region has shifted from river movement toward air. Typically, higher valued and lower weight freight items are shipped via air which has grown in recent times. Given Memphis International Airport’s position as a global air cargo center, air accounted for more than half of all freight value movements (55 percent). In terms of freight value, trucking holds a strong market share accounting for almost 40 percent of total value within the Memphis FAF zone. A summary of the data is provided in Table 2-3.

Table 2-3: Inbound and Outbound Modal Freight Summary between Megaregions and Memphis FAF Zone by Tonnage and Value

<table>
<thead>
<tr>
<th>Mode</th>
<th>Tonnage (Kilotons)</th>
<th>Percentage of Tonnage</th>
<th>Value (Millions of Dollars)</th>
<th>Percentage of Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway</td>
<td>6,521.80</td>
<td>46%</td>
<td>$45,127.10</td>
<td>39%</td>
</tr>
<tr>
<td>Rail</td>
<td>2,631.50</td>
<td>19%</td>
<td>$4,280.60</td>
<td>4%</td>
</tr>
<tr>
<td>River</td>
<td>4,610.50</td>
<td>33%</td>
<td>$3,472.40</td>
<td>3%</td>
</tr>
<tr>
<td>Runway</td>
<td>358.40</td>
<td>3%</td>
<td>$63,894.40</td>
<td>55%</td>
</tr>
<tr>
<td>Total</td>
<td>14,122.20</td>
<td>100%</td>
<td>$116,774.50</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Freight Analysis Framework Data Tabulation Tool (FAF4)

³ http://www.america2050.org/megaregions.html
⁴ http://www.rpa.org/
Gateway Cities
The Greater Memphis region is uniquely positioned on the fringes of several megaregions. In particular, the Region’s proximity to the Great Lakes, Piedmont and Gulf Coast megaregions is highly beneficial to the potential freight growth within the Region. As a comparison to the Greater Memphis region’s geographic position, fringe metropolitan areas known as Gateway Cities were analyzed to determine how they perform across multimodal freight networks. Given the similarities of freight characteristics between Gateway Cities and Memphis, analysis can be helpful in determining where regional freight relationships exist. The following is a list of the Gateway Cities analyzed for this Plan:

- Minneapolis, Minnesota
- Kansas City, Kansas
- Cincinnati, Ohio
- Louisville, Kentucky
- Nashville, Tennessee
- Tulsa, Oklahoma
- Oklahoma City, Oklahoma
- El Paso, Texas

Freight movement between each Gateway City was analyzed across four modes: Truck, Rail, Water, and Air. Aggregately among the Gateway Cities, roadway accounts for 93 percent of freight tonnage and 66 percent of freight value. As the dominant mode, roadway connections are critical for all Gateway Cities. Outside of the roadway, tonnage by rail, river and runway account for less than 8 percent. Values are slightly shifted away from roadway as runway accounts for roughly a third of all freight modes values. A summary of the data is provided in Table 2-4.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Tonnage (Kilotons)</th>
<th>Percentage of Tonnage</th>
<th>Value (Millions of Dollars)</th>
<th>Percentage of Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway</td>
<td>3,293.36</td>
<td>93%</td>
<td>$11,895.55</td>
<td>66%</td>
</tr>
<tr>
<td>Rail</td>
<td>160.10</td>
<td>5%</td>
<td>$119.68</td>
<td>1%</td>
</tr>
<tr>
<td>River</td>
<td>64.80</td>
<td>2%</td>
<td>$4.84</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Runway</td>
<td>33.00</td>
<td>&lt;1%</td>
<td>$6,049.39</td>
<td>33%</td>
</tr>
<tr>
<td>Total</td>
<td>3,551.26</td>
<td>100%</td>
<td>$18,069.46</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Freight Analysis Framework Data Tabulation Tool (FAF4)
Figure 2-2 illustrates total freight movement in kilotons between the Memphis FAF zone and the megaregions via all modes. This figure highlights several key relationships of goods moved between the Greater Memphis region and the megaregions. The Great Lakes and Gulf Coast Megaregions maintain a strong market share holding a 60 percent share of freight movement. Southern California and the Piedmont-Atlantic regions represent the largest share of east-west freight movement with a 20 percent market share.

Figure 2-2: Inbound and Outbound Freight Movement between Memphis FAF Zone and Megaregions by Tonnage
Figure 2-3 illustrates total freight movement by value between the Memphis FAF zone and the megaregions. With a total value of $116.8 billion, the Memphis FAF zone continues to be a key freight hub within the eleven megaregion locations. This figure highlights several key relationships of freight moved between the Greater Memphis region and the megaregions. While the Great Lakes (20 percent) and Southern California (16 percent) megaregions continue to represent strong share of freight movement, the Northeast region has emerged as strong freight partner holding 18 percent of the freight share between the Memphis FAF zone and all megaregions. By value, Piedmont-Atlantic and Cascadia regions represent a 19 percent share of the goods moved between the Memphis FAF zone and the megaregions.

Figure 2-3: Inbound and Outbound Freight Movement between Memphis FAF Zone and Megaregions by Value
Figure 2-4 illustrates total freight movement in kilotons between the Memphis FAF zone and the Gateway Cities by all modes. Several key relationships of freight moved between the Greater Memphis region and the Gateway Cities identifies strong ties between specific metropolitan areas. Cincinnati and Nashville are strong partners accounting for 68 percent the freight movement between the Memphis FAF zone and all Gateway Cities.

Figure 2-4: Inbound and Outbound Freight Movement between Memphis FAF Zone and Gateway Cities by Tonnage
Figure 2-5 illustrates total freight movement by value between the Memphis FAF zone and the Gateway Cities. With a total value of $18 billion, the Memphis FAF zone has strong ties with Gateway Cities. This figure highlights several key relationships of freight moved between the Greater Memphis region and Gateway Cities. Nashville and Cincinnati continue to represent the strongest share with 55 percent of the freight value. Minneapolis has emerged as strong freight partner with a 19 percent of the freight value share.

Figure 2-5: Inbound and Outbound Freight Movement between Memphis FAF zone and Gateway Cities by Value

As of 2015, the Greater Memphis region continues to have a consistent flow of freight movement via roadway with strong partnerships with Nashville and the Great Lakes region. Nashville, Cincinnati and the Gulf Coast Megaregion continue to exhibit a strong rail partnership with the Region. The Great Lakes, Southern California, and Florida region appear to be emerging markets for regional railroad business. Nashville roadway tonnage volumes appear to outpace those of other Gateway Cities, while the Gulf Coast and St Louis contribute to the largest share of river traffic. At its core, the Greater Memphis region appears to be a magnet for high value goods moved via roadway and runway.

Areas of opportunity appear in the Arizona Sun, Front Range, and Northern California regions where expedited freight movements may be challenged by geography, but may benefit from the Greater Memphis region extensive rail and runway infrastructure. A stronger relationship with the Piedmont- Atlantic region also seems possible through roadway and rail connections to Nashville and beyond. The Greater Memphis region continues
to have strong relationships with northern partners such as Minneapolis where roadway, river and runway connections can be leveraged with connections to the Great Lakes Megaregion.

### 2.2.2 Goods Movement Overview

The Greater Memphis region is an important cog within the United States multimodal freight network. Reviewing inbound and outbound movements among all freight modes provides a glimpse of the amount of each commodity moving in and out of the region. The percent of total freight movement was determined by tonnage and value for each commodity to provide a sense of impact. Understanding the commodity mix by tonnage and value can help the Region to identify key products required to support regional industries and the high value products they produce. Commodity tonnage and value figures are a reflection of the regional economy and how it utilizes its geographic location and transportation infrastructure to fit within the global supply chain. As of 2015, inbound and outbound commodities totaled 87.6 million tons valued at $242.0 billion.

Among all inbound and outbound freight modes, Coal n.e.c. is the dominant commodity by tonnage within the Greater Memphis region. At nearly 30 million tons and more than one-third of freight movements, coal demands significant intermodal freight infrastructure to accommodate shipping movements. Other Foodstuffs accounts for more than 8 percent of total in inbound-outbound freight tonnage, followed by Gasoline (5.4 percent) and Cereal Grains (5.3 percent). In total, the top ten commodities account for more than 75 percent of the total tonnage within the Greater Memphis region (66 million tons).

Commodity by value is led by Electronics at $44.1 billion or 18.2 percent of the regional total. Closely following electronics is Pharmaceuticals accounting for $37.5 billion or 15.5 percent of the Memphis FAF zone freight movement market share. Precision Instruments, Machinery and Motorized Vehicles followed all ranging between 6 to 9 percent of the Memphis market share by value. The top 10 commodities by value equals roughly 75 percent of total goods ($182.2 billion). Table 2-5 provides top ten commodities inbound and outbound by tonnage and value.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal-n.e.c.</td>
<td>29,849,289</td>
<td>34.1%</td>
<td>Electronics</td>
<td>$44,075,068,300</td>
<td>18.2%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>7,064,627</td>
<td>8.1%</td>
<td>Pharmaceuticals</td>
<td>$37,544,630,100</td>
<td>15.5%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>4,748,710</td>
<td>5.4%</td>
<td>Precision instruments</td>
<td>$21,870,198,700</td>
<td>9.0%</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>4,629,293</td>
<td>5.3%</td>
<td>Machinery</td>
<td>$16,317,364,800</td>
<td>6.7%</td>
</tr>
<tr>
<td>Nonmetal min. prods.</td>
<td>4,401,679</td>
<td>5.0%</td>
<td>Motorized vehicles</td>
<td>$14,409,903,000</td>
<td>6.0%</td>
</tr>
<tr>
<td>Gravel</td>
<td>4,399,506</td>
<td>5.0%</td>
<td>Transport equip.</td>
<td>$11,699,049,500</td>
<td>4.8%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>3,640,552</td>
<td>4.2%</td>
<td>Mixed freight</td>
<td>$10,279,547,200</td>
<td>4.2%</td>
</tr>
<tr>
<td>Other ag prods.</td>
<td>2,579,590</td>
<td>2.9%</td>
<td>Plastics/rubber</td>
<td>$10,195,714,100</td>
<td>4.2%</td>
</tr>
<tr>
<td>Base metals</td>
<td>2,407,117</td>
<td>2.7%</td>
<td>Misc. mfg. prods.</td>
<td>$7,898,673,000</td>
<td>3.3%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>2,191,818</td>
<td>2.5%</td>
<td>Textiles/leather</td>
<td>$7,882,355,500</td>
<td>3.3%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>65,912,182</strong></td>
<td><strong>75.2%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$182,172,504,200</strong></td>
<td><strong>75.3%</strong></td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td><strong>21,710,196</strong></td>
<td><strong>24.8%</strong></td>
<td><strong>Total All Other Goods</strong></td>
<td><strong>$59,862,518,600</strong></td>
<td><strong>24.7%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>87,622,377</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$242,035,022,800</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 2-6 provides top ten inbound commodities by tonnage and value. Inbound commodities are dominated by Coal-n.e.c. representing 31.2 percent or 14.1 million tons of the regional freight total. Cereal Grains and Gravel each account for 8 to 9 percent of inbound tonnage. By value, Electronics totals 21.6 percent or $27.8 billion of inbound freight across all modes. Pharmaceuticals are second among inbound commodities accounting for 13.0 percent of the total value. As of 2015, total inbound commodities totaled 45.3 million tons valued at $128.6 billion.

Table 2-6: Memphis FAF Zone Top Inbound Commodities for All Modes by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal-n.e.c.</td>
<td>14,141,733</td>
<td>31.2%</td>
<td>Electronics</td>
<td>$27,831,156,300</td>
<td>21.6%</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>3,966,371</td>
<td>8.8%</td>
<td>Pharmaceuticals</td>
<td>$16,762,814,800</td>
<td>13.0%</td>
</tr>
<tr>
<td>Gravel</td>
<td>3,615,009</td>
<td>8.0%</td>
<td>Precision instr.</td>
<td>$11,619,000,900</td>
<td>9.0%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>2,511,694</td>
<td>5.5%</td>
<td>Transport equip.</td>
<td>$10,192,697,500</td>
<td>7.9%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2,271,291</td>
<td>5.0%</td>
<td>Motorized vehicles</td>
<td>$10,185,585,600</td>
<td>7.9%</td>
</tr>
<tr>
<td>Motorized veh.</td>
<td>1,754,097</td>
<td>3.9%</td>
<td>Machinery</td>
<td>$9,376,339,500</td>
<td>7.3%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>1,616,212</td>
<td>3.6%</td>
<td>Misc. mfg. prods.</td>
<td>$5,056,192,100</td>
<td>3.9%</td>
</tr>
<tr>
<td>Waste/scrap</td>
<td>1,250,475</td>
<td>2.8%</td>
<td>Plastics/rubber</td>
<td>$4,908,419,100</td>
<td>3.8%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>1,237,742</td>
<td>2.7%</td>
<td>Mixed freight</td>
<td>$3,978,384,700</td>
<td>3.1%</td>
</tr>
<tr>
<td>Wood prods.</td>
<td>1,223,882</td>
<td>2.7%</td>
<td>Coal-n.e.c.</td>
<td>$3,544,073,900</td>
<td>2.8%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>33,588,506</strong></td>
<td><strong>74.1%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$103,454,644,400</strong></td>
<td><strong>80.4%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>45,314,666</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$128,636,793,100</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>


Table 2-7 provides top ten outbound commodities by tonnage and value. Outbound commodities are also dominated by Coal-n.e.c. representing 37.1 percent or 15.7 million tons of the regional freight total. Other Foodstuffs (10.8 percent) and Nonmetal Mineral Products (8.0 percent) account for sizable market share of outbound tonnage as well. By value, Pharmaceuticals totals 18.3 percent or $20.8 billion of outbound freight across all modes. At 14.3 percent of $16.2 billion, Electronics is second among outbound commodities. As of 2015, total outbound commodities totaled 42.3 million tons valued at $113.4 billion.

Table 2-7: Memphis FAF Zone Top Outbound Commodities for All Modes by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal-n.e.c.</td>
<td>13,718,322</td>
<td>37.1%</td>
<td>Electronics</td>
<td>$28,666,407,300</td>
<td>18.3%</td>
</tr>
<tr>
<td>Foodstuffs</td>
<td>3,966,371</td>
<td>10.8%</td>
<td>Pharmaceuticals</td>
<td>$18,412,814,800</td>
<td>11.8%</td>
</tr>
<tr>
<td>Gravel</td>
<td>3,615,009</td>
<td>9.9%</td>
<td>Precision instr.</td>
<td>$13,000,000,900</td>
<td>8.3%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>2,511,694</td>
<td>6.9%</td>
<td>Transport equip.</td>
<td>$10,926,975,500</td>
<td>6.9%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2,271,291</td>
<td>6.2%</td>
<td>Motorized vehicles</td>
<td>$10,185,585,600</td>
<td>6.3%</td>
</tr>
<tr>
<td>Motorized veh.</td>
<td>1,754,097</td>
<td>4.7%</td>
<td>Machinery</td>
<td>$9,376,339,500</td>
<td>4.7%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>1,616,212</td>
<td>4.5%</td>
<td>Misc. mfg. prods.</td>
<td>$5,056,192,100</td>
<td>3.2%</td>
</tr>
<tr>
<td>Waste/scrap</td>
<td>1,250,475</td>
<td>3.4%</td>
<td>Plastics/rubber</td>
<td>$4,908,419,100</td>
<td>3.2%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>1,237,742</td>
<td>3.3%</td>
<td>Mixed freight</td>
<td>$3,978,384,700</td>
<td>3.1%</td>
</tr>
<tr>
<td>Wood prods.</td>
<td>1,223,882</td>
<td>3.3%</td>
<td>Coal-n.e.c.</td>
<td>$3,544,073,900</td>
<td>2.8%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>33,588,506</strong></td>
<td><strong>74.1%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$103,454,644,400</strong></td>
<td><strong>80.4%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>45,314,666</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$128,636,793,100</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 2-7: Memphis FAF Zone Top Outbound Commodities for All Modes by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal-n.e.c.</td>
<td>15,707,557</td>
<td>37.1%</td>
<td>Pharmaceuticals</td>
<td>$20,781,815,300</td>
<td>18.3%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>4,552,933</td>
<td>10.8%</td>
<td>Electronics</td>
<td>$16,243,912,000</td>
<td>14.3%</td>
</tr>
<tr>
<td>Nonmetal min. prods.</td>
<td>3,395,229</td>
<td>8.0%</td>
<td>Precision instruments</td>
<td>$10,251,197,800</td>
<td>9.0%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2,477,419</td>
<td>5.9%</td>
<td>Machinery</td>
<td>$6,941,025,300</td>
<td>6.1%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>2,024,339</td>
<td>4.8%</td>
<td>Basic chemicals</td>
<td>$6,324,512,400</td>
<td>5.6%</td>
</tr>
<tr>
<td>Other ag prod.</td>
<td>1,551,399</td>
<td>3.7%</td>
<td>Mixed freight</td>
<td>$6,301,162,500</td>
<td>5.6%</td>
</tr>
<tr>
<td>Base metals</td>
<td>1,438,516</td>
<td>3.4%</td>
<td>Plastics/rubber</td>
<td>$5,287,295,000</td>
<td>4.7%</td>
</tr>
<tr>
<td>Animal feed</td>
<td>1,192,395</td>
<td>2.8%</td>
<td>Chemical prods.</td>
<td>$5,257,070,500</td>
<td>4.6%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>958,092</td>
<td>2.3%</td>
<td>Textiles/leather</td>
<td>$4,887,965,600</td>
<td>4.3%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>954,077</td>
<td>2.3%</td>
<td>Other foodstuffs</td>
<td>$4,884,129,200</td>
<td>4.3%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>34,251,956</td>
<td>81.0%</td>
<td><strong>Total Top 10</strong></td>
<td>$87,160,085,600</td>
<td>76.9%</td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td>8,055,756</td>
<td>19.0%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$26,238,144,100</td>
<td>23.1%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>42,307,711</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$113,398,229,700</td>
<td>100%</td>
</tr>
</tbody>
</table>


2.3 Near and Medium Term Trends

The Greater Memphis region is intricately connected to the nation's freight network and has exhibited strong relationships throughout the country. It has significantly more freight that originates and terminates in the region than other comparable metropolitan areas. In the short term, issues identified within the Tennessee Department of Transportation (TDOT) Statewide Multimodal Freight Plan\(^5\) and Mississippi Department of Transportation (MDOT) Statewide Freight Plan\(^6\), identify improvements to the Region’s freight system both regionally and locally. There are also external issues that may have a profound effect on Memphis freight such as: the modernization of the Panama Canal; the emergence of multi-modal freight movement; the proliferation of intermodal rail facilities; the decline in air freight, and the investment in Intelligent Transportation Systems (ITS).

2.3.1 Regional Studies Examining Freight Issues and Challenges

Both the Tennessee Statewide Multimodal Freight Plan and Mississippi Statewide Freight Plan were reviewed to identify needs and projects across all four modes of freight throughout the Greater Memphis region. Several high ranking key projects are included such as the Interstate 40/Interstate 81 Corridor Study, Interstate 69/Interstate 269 Construction and Completion, Crescent Corridor, Capital Needs of the Waterway Public Ports, Interstate 55 and Interstate 40 interchange Improvements, Third River Crossing, Memphis Freight Infrastructure Plan, Aerotropolis, Lamar Avenue (US 78) and Holmes Road improvements.

The Interstate 40/Interstate 81 Corridor

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\(^5\) [https://www.tn.gov/assets/entities/tdot/attachments/TN_Statewide Multimodal_Freight_Plan-web.pdf](https://www.tn.gov/assets/entities/tdot/attachments/TN_Statewide Multimodal_Freight_Plan-web.pdf)

The Interstate 40/Interstate 81 Corridor Study identified deficiencies and multimodal solutions to address problems along the corridor. High ranking key projects focused on truck climbing lanes between Memphis and Nashville, additional capacity through lane additions and widening and interchange reconfigurations along I-240 Memphis.

The Interstate 69/269
The Interstate 69/269 Construction and Completion is a multistate project traversing from the Michigan-Canada border to Indianapolis with a proposal to extend to the Texas-Mexico border within the Lower Rio Grande Valley. The corridor was designated as a High Priority Corridor of National Significance to trade between the United States, Canada and Mexico by the Federal Highway Administration (FHWA). The construction of the new interstate is especially important to Memphis because it provides for improvements along the I-240/I-55 Corridor along the west side of Memphis and provides a critical bypass (I-269) to the east side of Memphis from Millington, TN (State Route 385 Paul Barrett Parkway) to Hernando, MS (I-55/MS-304 Interchange). Also, the TN-385/I-269 Corridor Economic Development/Environmental Study, completed by Shelby County in 2013, examined opportunities for large scale economic development projects, and identified the environmentally sensitive areas of the Corridor. The Study also provided the municipalities and Chambers of Commerce with quantifiable research and data to identify marketable sites for development that they can then promote to strengthen relationships and lead to further collaboration on regional economic development strategies.

The Crescent Corridor
The Crescent Corridor is an investment initiative by Norfolk Southern (NS) to make improvements on 2,500 mile rail network, supporting freight movement from Memphis to New Jersey. These improvements include geometrics, capacity, signal technology, terminal expansion, and other system efficiencies. A $105 million, TIGER Grant was awarded to Norfolk Southern to build two new regional intermodal facilities in the Memphis and Birmingham areas. On July 1, 2012, NS shifted its domestic and premium intermodal services from the Forest Yard to the newly built 400 acre, six loading track facility in Rossville, Tennessee. The $112 million Rossville terminal is the first of four anchor facilities built to facilitate freight movement from Atlantic ports in New York and New Jersey to the Gulf Coast. The Crescent Corridor Initiative has met the Tennessee State Rail Plans expectation of reducing truck traffic and increasing high safety.

Inland Waterways
Phase II of the Tennessee Waterway Assessment Study identified capital needs for four of Tennessee’s public waterway ports. One of the four ports assessed is the Port of Memphis, located along the Mississippi River on the southwest boundary of Tennessee. The Port of Memphis is the 5th largest inland port in the United States with 62 terminals, handling 21 million tons of international and domestic freight. The Assessment called for capital need of $31 million to address five categories such as roadways, railroad access, dock facility improvements, dredging, and warehouse/storage facilities. In addition, the United States Department of Transportation identified the Mississippi River as a Marine Highway Corridor M-55. Marine Highway Corridors aim to fully integrate vessels and ports into the surface transportation system to ensure that reliable, regularly scheduled, competitive, and sustainable services are a routine choice for shippers.

Interstates
Most freight moving inbound and outbound from the Greater Memphis region uses one of the Region’s primary interstates: I-55 and I-40. The freight needs assessment identified several sections along these high volume thoroughfares requiring improvement. I-55 Crump ramp is generally regarded as a serious bottleneck for trucks accessing Memphis after crossing the Mississippi. The McLemore interchange to President’s Island was also identified as a congestion point. Confusion at the I-55 and I-40 West Memphis access points has called for
highway infrastructure improvements such as a third bridge over the Mississippi River, lane widenings, interchange improvements, and ITS improvements.

**Third River Crossing**
Over the past several years, TDOT has conducted broad studies to determine if a new Mississippi River bridge would be feasible in the Greater Memphis region. These studies collected preliminary data on the existing highway transportation system, natural environment and socio-economic characteristics of the area. The Southern Gateway, a multi-year environmental and planning process started in 2011, looked into developing an Environmental Impact Statement (EIS) – a document that outlined the anticipated costs, benefits and impacts of the improvement alternatives.

**Memphis Freight Infrastructure Plan**
The Memphis Freight and Infrastructure Plan was developed by the Memphis Greater Chamber in 2008 and 2009 to identify the capability and capacity of the freight infrastructure across a 16 county region and to recommend strategic projects to integrate the system with emerging global supply chains. The plan consists of a description of Memphis in the global supply chain, and infrastructure inventory and assessment. There are thirty recommendations from the plan, which include five key projects with strategic value to the region. The five key projects identified in the Memphis Freight and Infrastructure Plan are the Lamar Avenue corridor improvements, Holmes Road corridor improvements, I-40/I-55 Interchange modifications (West Memphis), construction of I-69/I-269, and construction of a third Mississippi River bridge crossing.

**Aerotropolis**
Completed in 2014, the Memphis Aerotropolis Airport City Master Plan is the result of a partnership between the U.S. Department of Housing and Urban Development (HUD) and the City of Memphis. The comprehensive plan provides background analysis, development strategies for specific sites, and an action plan for 50 square miles surrounding the Memphis International Airport. The plan contains a transportation element that provides policies, strategies, and concepts for improvement to the area’s transportation corridors, transit system, and alternative modes of transportation.

**Lamar Avenue (US 78)**
Lamar Avenue (US 78) is the region’s most significant and congested freight corridor, serving as a direct link to Birmingham, Alabama and locations beyond. The corridor supports most warehouses, BNSF intermodal facilities and local truck terminals. It is also the main arterial for air freight operations surrounding the airport. The needs assessments calls for physical geometric improvements such as grade-separated interchanges and the use of ITS to help improve safety and congestion along Lamar Corridor.

2.3.2 External Factors Affecting the Greater Memphis Region

The Greater Memphis region is well-positioned to continue gaining market share in the national and international supply chain industry. Freight assets within the Region include access to over 450 truck terminals, five Class I railroads, the fifth largest inland port in America, the world’s 2nd largest cargo airport and access to 19 intermodal freight terminals. Key external factors that may affect the Greater Memphis region’s continued growth include the following subjects:

**Panama Canal Expansion**
In June of 2016, The Panama Canal was re-opened for business. The project initially scheduled for opening in 2014, took nearly 10 years and $5 billion to complete. The modernization was a result of growing competition
from the Suez Canals and its ability to accept larger cargo ships. The canal expansion will now allow 1200 foot vessels dubbed “Panamax Ships” to traverse through the new locks. The expansion and modernization will now allow the larger Panamax ships that would normally stop at the Port of Los Angeles and Long Beach, to call on US Gulf and East Coast Ports directly from Asia. While much of the international container traffic would still come from the Los Angeles Ports, the Greater Memphis region may see a reduction in volume with the Panamax ships ability to go directly to Gulf and East Coast Ports. Conversely, the Region may see an increase in traffic from the Gulf Coast with the increase in calls from the larger Panamax ships to the Gulf Ports.

Modal Shifts
As a result of the global recession, national freight usage saw a shift from trucking and an increase in rail for cost efficiency. Intermodal rail has the potential to elevate the Greater Memphis region’s position in the global supply chain with each of the five Class I railroads making significant investments in rail intermodal infrastructure. This will continue to make the Region attractive as a freight hub. While intermodal movements may hurt long haul trucking, local trucking will continue to make the last-mile pick up and deliveries to end markets not accessible by rail.

Multimodal Shipping
Multimodal transport is the movement of goods under a single contract but by any combination of at least two modes (Road, Rail, River, or Air). The emergence of multimodal shipments could be a windfall for the Greater Memphis region with its abundance of warehousing and intermodal facilities as well as its ability the cross-dock, trans-load, consolidate, and reclassify shipments offers some efficiencies not available in other markets. Area firms have been industry leaders in multimodal shipping.

Fuel Prices & Costs
Fluctuations in fuel cost, the global recession, and security regulations have lead shippers to move toward less expensive but reliable modes. Air freight remains the mode of choice for time sensitive, supply chain critical, and high value freight items. FedEx Ground’s growth is an example of an air carrier managing service schedule and cost in a changing economic market.

Reshoring
In 2013, the Massachusetts Institute of Technology- Forum for Supply Chain Innovations published results from their 2012 survey on U.S. Re-Shoring. The results of the survey show that 34 percent of respondents stated that they are “considering” bringing manufacturing operations back to the United States, while only 15 percent of U.S. companies replied that they are “definitely” planning to resshore operations. Time-to-market and controlling cost were cited as the main reasons for reshoring. One third of the respondents opted not to respond, indicating that reshoring is a sensitive issue. The major reasons given were: time to market (74%); cost reduction (64 percent); product quality (62 percent); more control (57 percent); hidden supply chain cost (51 percent); and protect intellectual property (49 percent). The top issue respondents gave for considering reshoring efforts was U.S. government actions, cheaper fuel cost and rising Chinese labor cost. The results of the survey follow a trend of manufacturing moving closer to market demand. Reshoring will have a profound effect on freight markets, like the Greater Memphis region, which can deliver goods to the marketplace faster.

Container-on-Barge
Multiple studies on Greater Memphis regional freight have shown that expanding the river port system to provide the region with greater water access to world markets is a key growth opportunity. One promising freight concept is "container-on-barge," which is the transfer of international containers on and off barges traveling the Mississippi River to rail or truck. The International Port of Memphis currently has a container-on-
barge service operation. Improvements to the Upper Mississippi could expand container-on-barge service to St. Louis, Chicago, and Minneapolis.

**Intelligent Transportation System Technology**

ITS technologies are applied to roadway environment including infrastructure, vehicles and users, in traffic management, mobility management and interfaces with other modes of transport. Intelligent Transportation Systems vary in scope from automatic road enforcement; emergency vehicle notification systems; variable speed notification; collision avoidance systems; and dynamic traffic light sequencing. The data capture method can also vary from wireless communications; computational technologies; floating car data; and Sensor technology. Many of these technologies have been implemented throughout the Greater Memphis region along Interstate 55/40/240. Several studies have recommended the implementation of ITS along the Lamar (US 78), Holmes Road, and Popular Avenue (US 72) as a means for congestion relief and traffic safety.
2.4 Future Outcomes in 5 to 10 Years

A five to ten year trend analysis of Memphis FAF zone freight profile was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for the years 2020 and 2025. To compare growth across each mode, compound annual growth rate (CAGR) was generated across the four major freight modes, identifying compelling trends. For all modes in the Region, a modest growth of one percent is expected from 2015-2025. From 2015-2020, the Region is projected to remain strong in runway and rail freight with CAGR of 18 percent and three percent, respectively. River movement is projected to see slight gains. Despite the positive trends, a leveling off in roadway freight tonnage from 2020-2025 are expected. A summary of the data is provided in Table 2-8.

### Table 2-8: Memphis FAF Zone Modal 2015-2025 Compound Annual Growth Rate by Tonnage

<table>
<thead>
<tr>
<th>Mode</th>
<th>TONNAGE</th>
<th>COMPOUND ANNUAL GROWTH RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway</td>
<td>83,254</td>
<td>89,052</td>
</tr>
<tr>
<td>Rail</td>
<td>10,407</td>
<td>12,092</td>
</tr>
<tr>
<td>River</td>
<td>8,775</td>
<td>8,767</td>
</tr>
<tr>
<td>Runway</td>
<td>265</td>
<td>597</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>102,700</td>
<td>110,508</td>
</tr>
</tbody>
</table>


Additionally, a five to ten year trend analysis of Memphis FAF zone freight value was tabulated for the years 2020 and 2025. Similar to analysis of the tonnage trends, a comparison of CAGR was generated across the four major freight modes by value. For all modes in the Region, a growth of five percent is expected from 2015-2025. From 2015-2025, the Region is projected to remain strong in roadway and rail freight with CAGR of three percent and five percent, respectively. From 2015-2020, river freight values are projected to decrease by nine percent of existing production value. Air (Runway) movement is projected to see 11 percent gains from 2015 values. A summary of the data is provided in Table 2-9.

### Table 2-9: Memphis FAF Zone Modal 2015-2025 Compound Annual Growth Rate by Value

<table>
<thead>
<tr>
<th>Mode</th>
<th>VALUE</th>
<th>COMPOUND ANNUAL GROWTH RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway</td>
<td>$142,301,896</td>
<td>$162,906,441</td>
</tr>
<tr>
<td>Rail</td>
<td>$5,957,258</td>
<td>$8,164,247</td>
</tr>
<tr>
<td>River</td>
<td>$7,393,248</td>
<td>$4,532,413</td>
</tr>
<tr>
<td>Runway</td>
<td>$47,234,445</td>
<td>$105,441,957</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$202,886,847</td>
<td>$281,045,059</td>
</tr>
</tbody>
</table>

To compare the Greater Memphis region to regional piers, an additional analysis of five to ten year trends in freight tonnage was tabulated from the Freight Analysis Framework Data Tabulation Tool (FAF4) for the years 2020 and 2025. Similar to analysis of the tonnage trends, a comparison of CAGR was generated across the four major freight modes by tonnage. This analysis revealed that the Roadway would realize an average growth rate of 1.4 percent; Rail would experience an average growth of 2.6; and Runaway is projected to grow to 2.4 percent. Conversely, the River mode is projected to remain destressed with a flat growth rate. A summary of the data can be seen in Table 2-10.

Table 2-10: Gateway Cities 2015-2025 Compound Annual Growth Rate by Tonnage

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cincinnati, OH</td>
<td>0.4%</td>
<td>0.3%</td>
<td>0.3%</td>
<td>3.4%</td>
<td>2.6%</td>
<td>1.8%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.6%</td>
<td>4.5%</td>
<td>2.2%</td>
<td>16%</td>
<td>-2%</td>
<td>-18%</td>
</tr>
<tr>
<td>El Paso, TX</td>
<td>1.0%</td>
<td>1.1%</td>
<td>1.2%</td>
<td>4.5%</td>
<td>4.0%</td>
<td>3.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3.8%</td>
<td>4.1%</td>
<td>2.2%</td>
<td>16%</td>
<td>-2%</td>
<td>-18%</td>
</tr>
<tr>
<td>Kansas City, MO</td>
<td>2.2%</td>
<td>1.8%</td>
<td>1.4%</td>
<td>-1.5%</td>
<td>-1.4%</td>
<td>-1.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.5%</td>
<td>4.6%</td>
<td>2.3%</td>
<td>11%</td>
<td>-10%</td>
<td>-5%</td>
</tr>
<tr>
<td>Louisville, KY</td>
<td>4.4%</td>
<td>3.9%</td>
<td>3.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.0%</td>
<td>4.8%</td>
<td>2.2%</td>
<td>38%</td>
<td>89%</td>
<td>38%</td>
</tr>
<tr>
<td>Minneapolis-St. Paul, MN</td>
<td>1.8%</td>
<td>1.6%</td>
<td>1.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.6%</td>
<td>4.8%</td>
<td>2.5%</td>
<td>38%</td>
<td>89%</td>
<td>38%</td>
</tr>
<tr>
<td>Nashville, TN</td>
<td>1.4%</td>
<td>1.1%</td>
<td>0.7%</td>
<td>2.9%</td>
<td>2.8%</td>
<td>2.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>11%</td>
<td>-10%</td>
<td>-5%</td>
</tr>
<tr>
<td>Oklahoma City, OK</td>
<td>0.0%</td>
<td>-0.5%</td>
<td>-0.9%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.3%</td>
<td>5.3%</td>
<td>2.6%</td>
<td>89%</td>
<td>38%</td>
<td>1%</td>
</tr>
<tr>
<td>St. Louis, MO</td>
<td>2.0%</td>
<td>-5.8%</td>
<td>-13.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>11%</td>
<td>-10%</td>
<td>-5%</td>
</tr>
<tr>
<td>Tulsa, OK</td>
<td>4.4%</td>
<td>2.9%</td>
<td>1.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.5%</td>
<td>5.4%</td>
<td>2.6%</td>
<td>89%</td>
<td>38%</td>
<td>1%</td>
</tr>
<tr>
<td>Average Change</td>
<td>2.0%</td>
<td>1.8%</td>
<td>1.4%</td>
<td>3.6%</td>
<td>3.1%</td>
<td>2.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.8%</td>
<td>12.3%</td>
<td>2.4%</td>
<td>38%</td>
<td>89%</td>
<td>38%</td>
</tr>
</tbody>
</table>


Lastly, an analysis of five to ten year trends in freight value was also tabulated from the Freight Analysis Framework Data Tabulation Tool (FAF4) for the years 2020 and 2025. Similar to analysis of the Gateway City trends in tonnage, a comparison of CAGR was analyzed by value and reveals that Roadway is projecting an average growth of 2.2 percent; Rail would experience an average growth of 2.7 percent; and Runaway is projected to experience 2.6 percent growth. Continuing from the trends in tonnage, the River mode is projected to remain destressed with a flat growth rate. A summary of the data can be seen in Table 2-11.
Table 2-11: Gateway Cities 2015-2025 Compound Annual Growth Rate by Value

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cincinnati, OH</td>
<td>0.1%</td>
<td>0.0%</td>
<td>3.7%</td>
<td>2.8%</td>
<td>2.0%</td>
<td>0.0%</td>
<td>5.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>El Paso, TX</td>
<td>1.7%</td>
<td>1.7%</td>
<td>4.5%</td>
<td>4.0%</td>
<td>3.5%</td>
<td>0.0%</td>
<td>4.3%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Kansas City, MO</td>
<td>2.8%</td>
<td>2.2%</td>
<td>-1.5%</td>
<td>-1.4%</td>
<td>-1.3%</td>
<td>0.0%</td>
<td>5.1%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Louisville, KY</td>
<td>2.2%</td>
<td>2.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.4%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Minneapolis-St. Paul, MN</td>
<td>2.6%</td>
<td>2.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.7%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Nashville, TN</td>
<td>10.0%</td>
<td>6.8%</td>
<td>2.9%</td>
<td>2.8%</td>
<td>2.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Oklahoma City, OK</td>
<td>1.6%</td>
<td>1.7%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td>St. Louis, MO</td>
<td>5.9%</td>
<td>-7.6%</td>
<td>-19.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>20.6%</td>
</tr>
<tr>
<td>Tulsa, OK</td>
<td>3.5%</td>
<td>2.8%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.3%</td>
<td>5.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.4%</strong></td>
<td><strong>2.5%</strong></td>
<td><strong>3.7%</strong></td>
<td><strong>3.2%</strong></td>
<td><strong>2.7%</strong></td>
<td><strong>0.0%</strong></td>
<td><strong>5.2%</strong></td>
<td><strong>7.2%</strong></td>
</tr>
<tr>
<td>Memphis FAF Zone</td>
<td>0%</td>
<td>-6%</td>
<td>-12%</td>
<td>25%</td>
<td>8%</td>
<td>-6%</td>
<td>132%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Chapter 3 – Stakeholder Outreach

Greater Memphis Regional Freight Plan
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3.1  Regional Voice

Freight transportation affects each of the region’s stakeholders, yet often in different ways. Importantly, the Regional Freight Plan examined the ways in which the Plan would affect the region through a series of meetings and diverse venues to gather stakeholder perspectives about freight. Information was gathered from stakeholders representing industry, transportation facility managers and transportation providers regarding regional freight transportation patterns. The general public attended meetings and completed surveys to provide an insight related to freight travel patterns regionally and locally. Collectively, stakeholder meetings and survey input provide an additional perspective for current and future conditions related to the freight study.

3.1.1  Stakeholder Outreach Efforts

The stakeholder outreach meetings were developed through an active dialogue with the MPO members in a manner to review regional freight transportation within the Greater Memphis Region. Representatives from the public and private sector were included, reaching companies and individuals representing each of the transportation modes. Further, specific industrial sectors were contacted in order to identify their individual experiences and needs. The MPO has several ongoing advisory boards whose periodic contribution formed an informal advisory panel during the course of the study. These organizations include the following:

- Freight Advisory Committee (FAC)
- Planning and Land Use Advisory Committee (PLAC)
- Engineering and Technical Committee (ETC)
- Transportation Policy Board (TPB)

The MPO staff and project team met with these committees as part of the Regional MPO’s ongoing public outreach and engagement planning efforts. The meetings addressed work progress, to date, preliminary results and outcomes, near and longer term study objectives and further outreach plans. The meeting presentation materials were posted to the MPO website enabling a larger public audience to be reached.

3.1.2  Communicating Regional Priorities

A number of stakeholder meetings provided insight for the regional freight priorities. Based on feedback from freight stakeholders meetings and surveys, key takeaways from the discussions included the following feedback:

**Trucking and Transportation**
- Three of the American Transportation Research Institute (ATRI) top bottlenecks across the United States are found in Tennessee, the I-40 / I-240 interchange is one of those three
- Lamar Avenue is critical to adjacent industries and users, as well as the region as a whole
- The Crump Boulevard interchange is a critical example of the challenges from today’s and future traffic on the existing infrastructure
- Carriers and transportation consumers may find a role / purpose for more direct participation where outcomes and schedules can be identified
• Number of trucking firms has decreased over time
• Truck driver turnover has improved, usually requires an active management – labor platform
• Age and interstate driving – 18 versus 21, and when people make career choices
• Greater Memphis Area is becoming a logistics hub, more readily recognized
• Container on Barge is still struggling with the price
• Need to use a greater % of 24/7 operating capacity, Mallory congestion
• Potential pilot project in rail, part of the rail program recommendation
• Chassis ownership and maintenance, need to sort out
• Challenge, building the manufacturing connections
• Edge of needing more organizational capacity

Commercial and Industrial Development
• Local circulation is always critical
• 750,000 – 1,000,000 square foot buildings going up, some are speculative—there is that degree of interest, quick turnaround essential
• Proximity to transportation, even one site away can be too far
• Workforce, engagement, “drug free” becoming an essential metric – more for quality and safety, ahead of the “good versus evil” conversation
• Memphis as a “Hub”, 48 hour travel circle really matters – you can generally anticipate weather within that window
• More complete region, growth in the north and northwest, many advantages, less congestion
• Lamar Avenue really matters to everyone
• Workforce is larger than ever, goes to reliability and schedule – big part of industry locational decisions
• The connections across an arc from Birmingham to Virginia, Memphis matters
• More and more industries could be attracted
• Public transportation is a limit
• Potential for greater cooperation with Mississippi and Arkansas, may take more time

Surveys – Truckers and General Public
A survey generated for the general public regarding the freight trucking captured information related to challenges, travel patterns, and potential solutions seen by users and the travelling public. Nearly 700 comments were received over a one month period. The general public online questionnaire was open for the month of February 2017, on the MPO’s website. Targeted interviews were taken at two truck stops, to capture the industry’s “Man on the Street” perspective. The number of responses for both efforts is shown in Figure 3-1.
The public as a whole recognized that each mode of freight transportation is important for the region, as shown in Figure 3-2.

Based on comments, Memphis and Shelby County is considered a major transportation hub and improvements are needed to ensure more efficient transportation of freight. Over a two week period in February of 2017, the project team members collected surveys at 7 locations: TAG Truck Center, Summit Truck Group and Baity Diesel Truck Repair in Memphis, TN; Angel’s Truck Service and 10-4 Truck Service in Olive Branch, MS and Crossroads Truck Wash and Southern Tire Mart in West Memphis, AR. Three individual team members conducted in-person interviews with truckers and yielded 292 completed surveys. The team also consulted was the Tennessee Truckers Association who shared the survey with Association members for freight input by individuals who see truck freight operations nearly every day. Collectively, members of the trucking industry provided valuable
insights from their regular and active participation in moving freight. Two important highlights of the survey include the following two questions and responses:

What are some of the challenges truckers have driving in the region?

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
<th>Percentage of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck parking</td>
<td>239</td>
<td>81.9%</td>
</tr>
<tr>
<td>Road congestion</td>
<td>178</td>
<td>61.0%</td>
</tr>
<tr>
<td>Safety - accidents</td>
<td>110</td>
<td>37.7%</td>
</tr>
<tr>
<td>Incident clearance time issues</td>
<td>82</td>
<td>28.1%</td>
</tr>
<tr>
<td>Transportation costs</td>
<td>74</td>
<td>25.3%</td>
</tr>
<tr>
<td>Turning radius</td>
<td>67</td>
<td>23.0%</td>
</tr>
<tr>
<td>Information (related to weather, congestion, accident etc.)</td>
<td>65</td>
<td>22.3%</td>
</tr>
<tr>
<td>Regulations - work hours, truck load etc.</td>
<td>43</td>
<td>14.7%</td>
</tr>
<tr>
<td>Delay at delivery (inter modal)</td>
<td>43</td>
<td>14.7%</td>
</tr>
<tr>
<td>First mile/last mile connections</td>
<td>34</td>
<td>11.6%</td>
</tr>
<tr>
<td>Driver shortage</td>
<td>32</td>
<td>11.0%</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Source: 2017 Survey

What are some of the potential opportunities for solution to improve freight movement?

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
<th>Percentage of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better quality pavement</td>
<td>217</td>
<td>75.1%</td>
</tr>
<tr>
<td>More truck rest areas</td>
<td>214</td>
<td>74.1%</td>
</tr>
<tr>
<td>Getting information ahead of time (message signs on roads/highways)</td>
<td>136</td>
<td>47.1%</td>
</tr>
<tr>
<td>Rerouting options</td>
<td>119</td>
<td>41.2%</td>
</tr>
<tr>
<td>Reducing incident clearance time</td>
<td>94</td>
<td>32.5%</td>
</tr>
<tr>
<td>Automated systems at delivery or pick up (inter modal)</td>
<td>47</td>
<td>16.3%</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

Source: 2017 Survey

To boost awareness, a news release regarding the freight study was targeted to the general public. The survey was distributed to print and broadcast media within the region. The Commercial Appeal, Memphis Business Journal, WMC-TV Channel 5 and WPTY-TV Channel 24/30 ran stories on the survey. The two print publications requested interviews with project representatives for their articles. The team distributed the link to the survey to a local database of community leaders and individuals that have worked the MPO’s outreach efforts in the past, as well as City and Office of the Mayor in Memphis. Additionally the Office of the Mayor invited citizens to participate through the Office’s weekly newsletter. The survey link was shared via the MPO social media platforms and team member social media platforms. The public online tool yielded 404 completed surveys. Below is an example survey response highlighting the intersection of transportation and job creation.
How important do you think freight is for the local and regional economy in the Greater Memphis Area in terms of available jobs and job opportunities?

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
<th>Percentage of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very important</td>
<td>369</td>
<td>91.6%</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>32</td>
<td>7.9%</td>
</tr>
<tr>
<td>Not important</td>
<td>2</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

Source: 2017 Survey

**Private Industry**
The project team met with select industry representatives during the course of the study to capture the different perspectives of freight system users. Meetings were held with firms involved as transportation providers, industrial companies shipping and receiving freight in each of the transportation modes and industrial property developers. The freight transported by the industries contacted ranged from packages to bulk materials. The transportation functions and sectors were equally diverse, from warehousing and distribution to primary industries processing raw material resources. The information provided during the meetings covered specific topics, e.g., adequacy of an interchange or a roadway, the number of bridges across the Mississippi River, etc., to higher level conversation about the region’s workforce and global trading partners. The feedback received was integrated into the respective sections of the report as appropriate.
Chapter 4 – Workforce and Community

Greater Memphis Regional Freight Plan
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
4.1 Connecting Communities to Jobs

The connection of communities to jobs is a critical link to the overall economic health of the Greater Memphis region and beyond. The North American Industry Classification System (NAICS) defines industrial establishments based on the activities in which they are primarily engaged. Among these categories, five broader sub classifications begin to cluster related activities. The five sub classifications introduced are as follows:

- Basic Industries;
- Trade & Transportation;
- Professional Services;
- Retail & Transactions;
- Other Services.

As of 2014, the Memphis Metropolitan Statistical Area (MSA) totaled 560,195 primary jobs. Of this total, Professional Services covers nearly half of the MSA’s employment with 47.6 percent of the total. Retail & Transactions stands at 21.3 percent, followed by Trade & Transportation (16.2 percent), Basic Industries (12.3 percent) and Other Services (2.6 percent). In comparison to national averages, the Memphis MSA has a greater concentration of Trade & Transportation (8.4 percent market share gain relative to the national average) and Retail & Transactions employment (0.9 percent market share gain). As shown in Table 4-1, a breakdown of classifications within the United States, MSA and Regional Freight Areas by employment total is provided.

Table 4-1: Employment of United States, Greater Memphis Region, and Regional Freight Areas by Employment Classification

<table>
<thead>
<tr>
<th>Employment Classification</th>
<th>US Employment</th>
<th>MSA Employment</th>
<th>Regional Freight Area Employment</th>
<th>Percent of United States</th>
<th>Percent of MSA</th>
<th>Percent of Regional Freight Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Industries*</td>
<td>21,159,472</td>
<td>68,867</td>
<td>33,869</td>
<td>15.7%</td>
<td>12.3%</td>
<td>22.2%</td>
</tr>
<tr>
<td>Trade &amp; Transportation</td>
<td>10,539,605</td>
<td>90,737</td>
<td>65,719</td>
<td>7.8%</td>
<td>16.2%</td>
<td>43.0%</td>
</tr>
<tr>
<td>Professional Services</td>
<td>71,435,662</td>
<td>266,815</td>
<td>35,659</td>
<td>53.0%</td>
<td>47.6%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Retail &amp; Transactions</td>
<td>27,488,385</td>
<td>119,292</td>
<td>14,662</td>
<td>20.4%</td>
<td>21.3%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Other Services</td>
<td>4,277,952</td>
<td>14,484</td>
<td>2,814</td>
<td>3.2%</td>
<td>2.6%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Total</td>
<td>134,901,076</td>
<td>560,195</td>
<td>152,723</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: US Census on the Map (2014)

1 Basic Industries form a supersector of goods-producing industries. The five primary sectors included within Basic Industries are agriculture, mining, utilities, construction, and manufacturing. Each sector produces a final product in the form of natural resources, finished and semi-finished products, power, or infrastructure.
Regional Freight Areas were determined based on the clustering of Regional Freight Zones. In total, eight areas were determined: Airport-Lamar; Central; Mississippi; Northeast; River; Southeast; West Memphis Interstate; and West Memphis River. Freight Areas are displayed in Figure 4-1. Detailed descriptions of the Regional Freight Zones and Areas are available in Chapter 9 – Emerging Zone Development and Appendix 3. Aggregating these areas, concentrations of employment classifications within the Memphis freight areas vary in comparison to national and regional averages. With a market share of 43.0 percent or 65,719 employees, Trade & Transportation within Memphis Freight Areas far exceeds national and regional averages. Basic Industries is another employment classification within freight areas exceeding both national and regional averages 6.5 percent and 9.9 percent, respectively. Professional Services, Retail & Transactions and Other Services all have lower concentrations within the Regional Freight Areas than national and regional employment averages.
Within the identified Regional Freight Areas, 152,723 employees were among the employment classification sectors in 2014. This represents an increase of more than 10,000 employees since 2009, a Compound Annual Growth Rate (CAGR) of 1.4 percent. The largest employment center by freight area is Airport-Lamar, accounting for 92,557 employees in 2014 or 60.6 percent of the total among all freight areas. The Mississippi Freight Area holds the highest growth rate from 2009 to 2014 registering an 8.0 percent CAGR. Six of eight freight areas registered employment gains over the five year time period representing favorable economic conditions for businesses within the Memphis region. Table 4-2 and Figure 4-2 below provide an overview of employment trends from 2009 to 2014 among Regional Freight Areas.
Table 4-2: Total Employment Change by Regional Freight Area

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>87,995</td>
<td>92,557</td>
<td>1.0%</td>
<td>4,562</td>
</tr>
<tr>
<td>Central</td>
<td>10,836</td>
<td>10,257</td>
<td>-1.1%</td>
<td>-579</td>
</tr>
<tr>
<td>Mississippi</td>
<td>8,741</td>
<td>12,866</td>
<td>8.0%</td>
<td>4,125</td>
</tr>
<tr>
<td>Northeast</td>
<td>14,638</td>
<td>15,079</td>
<td>0.6%</td>
<td>441</td>
</tr>
<tr>
<td>River</td>
<td>8,513</td>
<td>9,492</td>
<td>2.2%</td>
<td>979</td>
</tr>
<tr>
<td>Southeast</td>
<td>6,440</td>
<td>6,872</td>
<td>1.3%</td>
<td>432</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>5,235</td>
<td>5,346</td>
<td>0.4%</td>
<td>111</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>321</td>
<td>254</td>
<td>-4.6%</td>
<td>-67</td>
</tr>
<tr>
<td>Total</td>
<td>142,719</td>
<td>152,723</td>
<td>1.4%</td>
<td>10,004</td>
</tr>
</tbody>
</table>

Source: US Census on the Map

4.1.1 Workforce Demographics

Important to the sustained development of an industrial area is the workforce behind the production. Demographics play a major role in determining the type of production possible within each Regional Freight Area. Educational attainment, age and income provide a background of workforce characteristics within each freight area. Industrial businesses rely on particular workforce skill sets to fulfill their production needs. Examining workforce characteristics within a Regional Freight Area, as well as employees that commute, a business can determine how employees complement their needs.
Given the concentration of Trade & Transportation and Basic Industries within the Regional Freight Areas, specific skills aligning with these job classifications are required by local businesses. Within the Trade & Transportation category, employees generally are required to adapt to new technologies and practice as the industry is constantly evolving. Sometimes, physical requirements are needed in warehousing positions related to the transportation industry. Other requirements may be linked to acquiring specific certifications, such as a Commercial Driver’s License (CDL) for delivery of goods. Basic Industries vary by location; however, they largely concern agriculture, construction, manufacturing, and utilities job classifications. Generally, these occupations require specific trade skills learned through various apprenticeship or training programs.

Depending on the specific business requirement, workforce demographics play a role in which area is best suited for a particular business. The following sections outline educational attainment, age and income demographics of each Regional Freight Area. Depending on the characteristics of the freight area, freight-related business may be more prone to relocate or expand knowing the demographics are aligned with business requirements.

Industrial companies, agencies and organizations located and operating within the Greater Memphis Region have recognized the need to address the potential imbalances that can arise between workforce skills and employer needs in the private and public sector. Several complementary efforts have been started and sustained within the region, fine-tuning the programs and projects as the actual experiences come back from the ongoing efforts. One cautionary note arises from the data collected. The different databases and granularity of data may make comparisons difficult. It may be more important to track measures over time from the same data sources in order to minimize the “drift” in comparing data sets.

The Greater Memphis Chamber completed a workforce study in 2009 that was timely in its examination near the end of the economic downturn experienced across the United States. The effort built upon industry’s increasing interest in finding a workforce capable of sustaining the industry’s performance over time. For some industries and firms, trained workers are as great a challenge as marketplace competition. A number of firms and their associations have been proactive in their efforts for the region. The Workforce Investment Network (WIN) has been formed to pool various program resources into one effective assessment of workforce challenges and solutions.

The Greater Memphis Alliance for a Competitive Workforce (GMACW) became a partnership across institutions, workforce and economic development agencies, as well as employers, to aid in filling an increasing gap between workforce skills and workplace needs. In 2013, the gap was measured to show that there were 18,000 unmet jobs in the Memphis region even while the unemployment rate stood at 9.1%. The GMACW closely examined economic sectors to see the details of the gap: Information Technology (IT), Architecture & Engineering (A&E), Heavy Equipment Technology (HET), Logistics/Warehousing, Medical Device Manufacturing, Advanced & General Manufacturing, and Finance, Insurance, & Business Services. In the 2016 GMACW study, underemployed and unemployed individuals were asked what kinds of training they might select, 33.3% chose Forklift Operator and 20.7% chose Light Manufacturing/ Assembly. Both of these areas are key to industry’s workforce needs and industrial success for freight movement in the region. An important part of the continued
improvement and proactive measures undertaken in the region is to continue measuring outcomes and adjust programs and outreach efforts as needed.

4.1.1.1 Educational Attainment

Workforce educational attainment is a pivotal area of importance when determining the abilities of workforce within an industrial area. Ideally, a range of skill sets is needed for employers to be able to fill a wide range of positions required to function as an industrial facility. Educational attainment and sustained efforts to stay current with the changing technology and processes are and will continue to increase regionally and nationally.

Workforce within the Regional Freight Areas with at least some college experience totals 62,375 employees (40.8 percent). Among all freight areas, 39,802 employees, or 26.1 percent, have completed high school (general educational development (GED) certificate). Less than high school education totals 16,734 employees (11.0 percent) among Regional Freight Areas. The Airport-Lamar Freight Area has the highest number of employees by educational attainment within each category. By percentage, Central Freight Area has the highest concentration of employees with a Bachelor’s or Advanced degree (1,784 workers or 17.4 percent) followed by River (1,549 workers or 16.3 percent) and Southeast (1,110 workers or 16.2 percent). Areas with the highest percentage of employees with less than high school include West Memphis Interstate (677 workers or 12.7 percent), Mississippi (1,556 workers or 12.1 percent) and West Memphis River (30 workers or 11.8 percent).

Table 4-3 and Table 4-4 outline workers educational attainment by each Memphis freight area as a percentage and total.

Table 4-3: Percentage of Worker Educational Attainment by Regional Freight Area

<table>
<thead>
<tr>
<th>Freight Area</th>
<th>Less than HS</th>
<th>HS</th>
<th>Some College/Associate’s</th>
<th>Bachelor’s or Advanced</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>11.0%</td>
<td>25.7%</td>
<td>25.7%</td>
<td>15.0%</td>
<td>22.6%</td>
</tr>
<tr>
<td>Central</td>
<td>11.1%</td>
<td>28.6%</td>
<td>26.2%</td>
<td>17.4%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Mississippi</td>
<td>12.1%</td>
<td>25.4%</td>
<td>24.4%</td>
<td>12.0%</td>
<td>26.1%</td>
</tr>
<tr>
<td>Northeast</td>
<td>9.0%</td>
<td>23.5%</td>
<td>26.3%</td>
<td>15.7%</td>
<td>25.5%</td>
</tr>
<tr>
<td>River</td>
<td>11.2%</td>
<td>30.2%</td>
<td>27.4%</td>
<td>16.3%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Southeast</td>
<td>10.3%</td>
<td>27.4%</td>
<td>27.2%</td>
<td>16.2%</td>
<td>18.9%</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>12.7%</td>
<td>26.7%</td>
<td>25.0%</td>
<td>13.3%</td>
<td>22.4%</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>11.8%</td>
<td>33.5%</td>
<td>29.5%</td>
<td>10.2%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Total</td>
<td>11.0%</td>
<td>26.1%</td>
<td>25.8%</td>
<td>15.0%</td>
<td>22.1%</td>
</tr>
</tbody>
</table>

Source: US Census on the Map (2014)

Note: A range of 15 to 30 percent of workers did not have educational attainment available.
Table 4-4: Employment Total of Worker Educational Attainment by Regional Freight Area

<table>
<thead>
<tr>
<th>Freight Area</th>
<th>Less than HS</th>
<th>HS</th>
<th>Some College/ Associate’s</th>
<th>Bachelor’s or Advanced</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>10,205</td>
<td>23,792</td>
<td>23,742</td>
<td>13,876</td>
<td>20,942</td>
</tr>
<tr>
<td>Central</td>
<td>1,139</td>
<td>2,935</td>
<td>2,686</td>
<td>1,784</td>
<td>1,713</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1,556</td>
<td>3,270</td>
<td>3,136</td>
<td>1,547</td>
<td>3,357</td>
</tr>
<tr>
<td>Northeast</td>
<td>1,359</td>
<td>3,547</td>
<td>3,959</td>
<td>2,368</td>
<td>3,846</td>
</tr>
<tr>
<td>River</td>
<td>1,059</td>
<td>2,867</td>
<td>2,597</td>
<td>1,549</td>
<td>1,420</td>
</tr>
<tr>
<td>Southeast</td>
<td>709</td>
<td>1,881</td>
<td>1,871</td>
<td>1,110</td>
<td>1,301</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>677</td>
<td>1,425</td>
<td>1,337</td>
<td>712</td>
<td>1,195</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>30</td>
<td>85</td>
<td>75</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16,734</strong></td>
<td><strong>39,802</strong></td>
<td><strong>39,403</strong></td>
<td><strong>22,972</strong></td>
<td><strong>33,812</strong></td>
</tr>
</tbody>
</table>

Source: US Census on the Map (2014)
Note: A range of 15 to 30 percent of workers did not have educational attainment available.

4.1.1.2 Age

Workforce age within the Regional Freight Areas is divided into three age bands: 29 and younger, 30 to 54 and 55 and older. As of 2014, employment among all freight areas includes 29 and younger age band totaling 33,812 workers (22.1 percent), 30 to 54 totaling 88,313 workers (57.8 percent) and 55 and older totaling 30,598 workers (20.0 percent) of the workforce. As the largest freight area in terms of employment age, the Airport-Lamar Freight Area closely follows the overall age band trend. The youngest freight area is Mississippi with 26.1 percent of the workforce aged 29 and younger. Following closely behind is the Northeast Freight Area with 25.5 percent of the workforce within the 29 and younger age band. The oldest average workforce is Central Freight Area with over 25 percent of workers 55 and older. River, Southeast and West Memphis Interstate Freight Areas follow with each having greater than 20 percent their workforce 55 or older.

Depending on the desired industry, a younger or older workforce can provide a competitive edge for local businesses. The key is to have a wide range of potential employees to cover all ranges of experience and skill sets. As a whole, Regional Freight Areas are closely on par with national and Greater Memphis regional averages, each falling with three percent of each age band market share.
Table 4-5 outlines workers age by each Regional Freight Area as a percentage and total.

### Table 4-5: Worker Age by Regional Freight Area

<table>
<thead>
<tr>
<th>Freight Area</th>
<th>Age 0-29</th>
<th></th>
<th>Age 30-54</th>
<th></th>
<th>Age 55+</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Workers</td>
<td>% of Area Total</td>
<td>Workers</td>
<td>% of Area Total</td>
<td>Workers</td>
<td>% of Area Total</td>
</tr>
<tr>
<td>Airport-Lamar</td>
<td>20,942</td>
<td>22.6%</td>
<td>53,408</td>
<td>57.7%</td>
<td>18,207</td>
<td>19.7%</td>
</tr>
<tr>
<td>Central</td>
<td>1,713</td>
<td>16.7%</td>
<td>5,958</td>
<td>58.1%</td>
<td>2,586</td>
<td>25.2%</td>
</tr>
<tr>
<td>Mississippi</td>
<td>3,357</td>
<td>26.1%</td>
<td>7,205</td>
<td>56.0%</td>
<td>2,304</td>
<td>17.9%</td>
</tr>
<tr>
<td>Northeast</td>
<td>3,846</td>
<td>25.5%</td>
<td>8,608</td>
<td>57.1%</td>
<td>2,625</td>
<td>17.4%</td>
</tr>
<tr>
<td>River</td>
<td>1,420</td>
<td>15.0%</td>
<td>5,887</td>
<td>62.0%</td>
<td>2,185</td>
<td>23.0%</td>
</tr>
<tr>
<td>Southeast</td>
<td>1,301</td>
<td>18.9%</td>
<td>4,003</td>
<td>58.3%</td>
<td>1,568</td>
<td>22.8%</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>1,195</td>
<td>22.4%</td>
<td>3,067</td>
<td>57.4%</td>
<td>1,084</td>
<td>20.3%</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>38</td>
<td>15.0%</td>
<td>177</td>
<td>69.7%</td>
<td>39</td>
<td>15.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33,812</strong></td>
<td><strong>22.1%</strong></td>
<td><strong>88,313</strong></td>
<td><strong>57.8%</strong></td>
<td><strong>30,598</strong></td>
<td><strong>20.0%</strong></td>
</tr>
</tbody>
</table>

Source: US Census on the Map (2014)

#### 4.1.1.3 Income

Workforce income within the Regional Freight Areas is divided into three annual income bands: less than $15,000, $15,001 to $39,999 and greater than $40,000. As of 2014, employment among all freight areas includes less than $15,000 totaling 30,924 workers (20.2 percent), $15,001 to 39,999 totaling 58,028 workers (38.0 percent) and greater than $40,000 totaling 63,771 workers (41.8 percent) of the workforce. The River Freight Area holds the highest average income per worker with 5,481 workers (57.7 percent) recording an annual income of greater than $40,000. Following the River Freight Area, Central (5,432 workers or 53.0 percent), Southeast (3,621 workers or 52.7 percent) and West Memphis River (132 workers or 52.0 percent) Freight Areas have the highest percentage of annual income greater than $40,000. Mississippi Freight Area holds the highest percentage of workers with an income less than $15,000 annually (3,569 workers or 27.7 percent).

Table 4-6 and Table 4-7 outline workers income by each Regional Freight Area as a percentage and total.

### Table 4-6: Percentage of Worker Income by Regional Freight Area

<table>
<thead>
<tr>
<th>Freight Area</th>
<th>≤$15,000</th>
<th>$15,001-$39,999</th>
<th>$40,000≤</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>20.9%</td>
<td>38.1%</td>
<td>40.9%</td>
</tr>
<tr>
<td>Central</td>
<td>15.5%</td>
<td>31.5%</td>
<td>53.0%</td>
</tr>
<tr>
<td>Mississippi</td>
<td>27.7%</td>
<td>46.3%</td>
<td>25.9%</td>
</tr>
<tr>
<td>Northeast</td>
<td>19.4%</td>
<td>39.3%</td>
<td>41.3%</td>
</tr>
<tr>
<td>River</td>
<td>11.5%</td>
<td>30.7%</td>
<td>57.7%</td>
</tr>
<tr>
<td>Southeast</td>
<td>16.7%</td>
<td>30.6%</td>
<td>52.7%</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>23.0%</td>
<td>46.2%</td>
<td>30.8%</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>3.1%</td>
<td>44.9%</td>
<td>52.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20.2%</strong></td>
<td><strong>38.0%</strong></td>
<td><strong>41.8%</strong></td>
</tr>
</tbody>
</table>

Source: US Census on the Map (2014)
Table 4-7: Employment Total of Worker Income by Regional Freight Area

<table>
<thead>
<tr>
<th>Freight Area</th>
<th>≤$15,000</th>
<th>$15,001-$39,999</th>
<th>$40,000+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>19,350</td>
<td>35,310</td>
<td>37,897</td>
</tr>
<tr>
<td>Central</td>
<td>1,590</td>
<td>3,235</td>
<td>5,432</td>
</tr>
<tr>
<td>Mississippi</td>
<td>3,569</td>
<td>5,963</td>
<td>3,334</td>
</tr>
<tr>
<td>Northeast</td>
<td>2,932</td>
<td>5,919</td>
<td>6,228</td>
</tr>
<tr>
<td>River</td>
<td>1,095</td>
<td>2,916</td>
<td>5,481</td>
</tr>
<tr>
<td>Southeast</td>
<td>1,150</td>
<td>2,101</td>
<td>3,621</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>1,230</td>
<td>2,470</td>
<td>1,646</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>8</td>
<td>114</td>
<td>132</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30,924</strong></td>
<td><strong>58,028</strong></td>
<td><strong>63,771</strong></td>
</tr>
</tbody>
</table>

Source: US Census on the Map (2014)

4.1.2 Workforce Sustainability

Workforce sustainability largely revolves around balancing the needs of the present industrial infrastructure, yet also preparing for future trends. Given the Region’s diverse industrial infrastructure, a wide range of workforce characteristics are required among the various industries. It is important to create a vision to set regional hiring expectations and align them with employers to address potential employment needs and skills.

Clear communication between educators, potential employees and employers helps fulfill workforce skill gaps. As technical needs within industries evolve, complimentary educational opportunities must follow economic trends. Often, skill gaps between technical trades can prevent well-paying positions from being fulfilled by qualified individuals. Using workforce demographic data, the Greater Memphis region must identify where employment gaps exist and work with employers to find suitable workforce solutions.

4.1.3 Workforce Accessibility

A large component in fulfilling workforce needs includes accessibility. Among the freight areas, a wide range of transportation opportunities exist. While most businesses are accessible via private vehicle, not all employees have direct access to a vehicle. A major priority to most employers is employee accessibility. If prospective employees do not have the means to get to work, the business may not be able to function to its highest ability.

To increase mobility and transportation choices for prospective employees, lines of communication between transportation providers and businesses must be open. While direct transit access to area employers is ideal, providing transit service to remote locations for employees is not a simple solution. Creative alternatives can be determined on a case-by-case basis through sustained communication between stakeholders and affected agencies. Figure 4-3 displays Memphis Area Transit Agency (MATA) transit routes in relation to Regional Industrial Areas. While most of the Regional Industrial Areas are well served, the outlying Areas lack mobility options for employees. Underserved Regional Freight Zones include those in Arkansas, Mississippi, and on in the I-269 corridor.
In addition to providing more transit options for employees, companies could make efforts to research and invest in travel demand management (TDM) strategies that provide mobility options both to and from the worksite. TDM, as defined by FHWA is, “a set of strategies aimed at reducing the demand for roadway travel, particularly in single occupancy vehicles. These strategies address a wide range of externalities associated with driving, including congestion, poor air quality, less livable communities, reduced public health, dependence on oil, reduced environmental health, and climate change and GHG emissions.” Not only used to help reduce congestion, but when used in coordination with other modes (e.g., transit), TDM strategies can provide a viable

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alternative to single occupant vehicular travel across the region. Currently, the Memphis Area Rideshare Program\(^3\), operated through the Shelby County Health Department’s Air Quality Improvement Branch, offer vanpool and guaranteed ride home services for interested employers. This strategy should be exercised in the Regional Freight Zones with high concentrations of employees.

4.1.4 Workforce and Social Justice

Social justice within the workforce is a concept Memphis MPO strives to take into account within all of its plans, studies and implementing actions. In order to stay on top of evolving social trends, the MPO continues to maintain detailed data collection, monitoring and analysis tools to assess the potential impacts to low-income and/or minority groups. Under Title VI of the Civil Rights Act of 1964, discrimination on the basis of race, color or national origin in any program or activity is prohibited. This concept applies to all workforces and must be strictly adhered to within the Memphis region and beyond. Outlined within Memphis MPO’s Title VI assessment in 2014, this concept is strictly enforced and applies directly to workforce requirements.

Figure 4-4 displays the relationship between Regional Industrial Areas and Environmental Justice (EJ) Communities in the Memphis MPO planning area. Environmental Justice (EJ) communities were identified by the Memphis MPO as areas with a higher than average portion of minority persons, low-income persons, and/or persons with Limited English proficiency (LEP). These areas are important to ensure equitable transportation access and solutions for all users.\(^4\) It is important that these communities are connected to the jobs in the Greater Memphis Region while mitigating the negative impacts associated with heavy industry.

\(^3\) [http://shelbyttnhealth.com/163/Memphis-Area-Rideshare-Program](http://shelbyttnhealth.com/163/Memphis-Area-Rideshare-Program)

\(^4\) Livability 2040, Memphis MPO
Figure 4-4: Memphis MPO Environmental Justice Communities and Regional Industrial Areas
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
5.1 Freeway / Arterial Connections

The Greater Memphis region has more than 4,800 centerline miles of roadways\(^1\). Every roadway is classified as one of the following:

- Freeway/Interstate
- Arterial
- Collector
- Local Road

A roadway’s classification is typically characterized by the trade-off between access and mobility. Local roads provide access to a driver’s final destination. Arterial roads are intended for mobility by providing for higher speeds over longer distances. Freeways/Interstates provide the highest level of service and are actually arterial roadways, but with controlled access. Connecting arterials and local roads are the collector roads, which serve moderate levels of both access and mobility.

Traffic counts are typically reported in terms of Annual Average Daily Traffic (AADT). AADT counts represent an estimate of the number of vehicles that cross a specific count location on an average day in the year. Vehicle Miles Traveled (VMT) expands on traffic counts to provide an estimate of usage by calculating the distance traveled by each vehicle counted. VMT estimates can be compiled to show highway usage by geography or roadway classification for a certain time period. VMT estimates are an indicator of the travel activity. Interstate, arterial, and collector roadway characteristics for the region were tabulated from the Memphis Urban Area Metropolitan Planning Organization’s Regional Travel Demand Model for the following counties in Arkansas, Mississippi and Tennessee in the urban area:

- Crittenden County, Arkansas
- Fayette, Shelby, and Tipton County, Tennessee
- DeSoto, Marshall, Tate, and Tunica County, Mississippi

Table 5-1 provides a breakdown of the mileage and traffic characteristics in the region. The estimates show that the regional roadway network currently handles approximately 32 million VMT each year. Interstate roads make up only 13.9 percent of the region’s roadway mileage, but carry 34.8 percent of all highway traffic. The vehicle demand per lane mile on interstate and freeway type facilities in the region is roughly three times higher per lane mile than arterial routes and over six times higher per lane mile than collector routes. Interstate and freeway facilities are clearly important transportation conveyances for moving people and freight in and through the region. When looking at truck traffic, 92.9 percent of Truck VMT is carried by Interstates and arterials.

\(^1\) Memphis MPO Travel Demand Model for the Metropolitan Statistical Area (MSA)
**Table 5-1: Regional Roadway Infrastructure and Use by Facility Type**

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Centerline Miles</th>
<th>Lane Miles</th>
<th>Vehicle Miles Traveled</th>
<th>Average Number of Lanes</th>
<th>VMT Per Lane Mile</th>
<th>Truck Vehicle Miles Traveled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate</td>
<td>255 (6.9%)</td>
<td>1,545 (13.9%)</td>
<td>11,121,037 (34.8%)</td>
<td>6.1</td>
<td>7,200</td>
<td>2,876,268 (43.4%)</td>
</tr>
<tr>
<td>Arterial</td>
<td>2,255 (60.9%)</td>
<td>6,992 (62.8%)</td>
<td>17,988,265 (56.2%)</td>
<td>3.1</td>
<td>2,573</td>
<td>3,286,821 (49.6%)</td>
</tr>
<tr>
<td>Collector</td>
<td>1,192 (32.2%)</td>
<td>2,597 (23.3%)</td>
<td>2,892,554 (9.0%)</td>
<td>2.2</td>
<td>1,114</td>
<td>459,690 (6.9%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,703</strong></td>
<td><strong>11,134</strong></td>
<td><strong>32,001,857</strong></td>
<td><strong>3.0</strong></td>
<td><strong>2,874</strong></td>
<td><strong>6,622,779</strong></td>
</tr>
</tbody>
</table>

Source: Memphis MPO Travel Demand Model

5.1.1 Strategic Freight Corridors

The truck traffic characteristics provided earlier in this chapter describe the importance of the Interstate and arterial roadways in the region. This section analyzes regional supply chains, network use, and Federal designations to identify the Greater Memphis region’s strategic freight corridors. These roadways are the most critical to the efficient movement of goods throughout the Region and support the national economy.

5.1.1.1 Supply Chains

For industries important to the Greater Memphis region’s economy, specific supply chains that drive freight-dependent aspects of the industries must be examined. Understanding the supply chains can be a first step towards specifying the type and location of transportation improvements that will be the most beneficial to target industries. The Regional Freight Profile of commodity mix was obtained from the Freight Analysis Framework Data Tabulation Tool. Reviewing top inbound and outbound commodities among roadway movements indicates the industries most important to the region. Percent of total freight movement was determined by tonnage and value to provide a sense of impact each commodity has within the Greater Memphis region. As of 2015, inbound and outbound commodities moving by trucks totaled 35.6 million tons valued at $107.2 billion for the Memphis FAF zone.

Commodities

Among roadway inbound and outbound freight modes, Other Foodstuffs and Nonmetal Mineral Products are the dominant commodities by tonnage within the Memphis FAF zone, at 8.5 million tons and almost one-fourth of truck movements. Other Foodstuffs includes processed foods and Nonmetal Mineral Products is mainly construction materials. Gasoline accounts for 7.8 percent of truck inbound-outbound freight tonnage, followed by commodities associated with manufacturing, especially within the automotive industry. In total, the top ten commodities account for more than 64.5 percent of the total tonnage within the Memphis FAF zone (22.9 million tons).

Commodity by value is led by Pharmaceuticals at $25.5 billion or 23.8 percent of the total. Following Pharmaceuticals is Motorized Vehicles, accounting for $10 billion or 9.4 percent of the Memphis FAF zone truck movement market share. Mixed Freight, Electronics, Plastics/Rubber, and Machinery followed all ranging

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2 FAF4 2015 Data for the Memphis, TN-MS-AR CFS Area (TN Part)
between 6 to 8 percent of the market share by value. The top 10 truck commodities by value equal 77.4 percent of total goods ($24.2 billion). Table 5-2 provides top ten Memphis FAF zone truck commodities inbound and outbound by tonnage and value.

Table 5-2: Memphis FAF Zone Top Inbound and Outbound Commodities for Roadway by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other foodstuffs</td>
<td>4,411,045</td>
<td>12.4%</td>
<td>Pharmaceuticals</td>
<td>$25,520,722,400</td>
<td>23.8%</td>
</tr>
<tr>
<td>Nonmetal min. prods.</td>
<td>4,112,131</td>
<td>11.6%</td>
<td>Motorized vehicles</td>
<td>$10,071,453,200</td>
<td>9.4%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2,779,524</td>
<td>7.8%</td>
<td>Mixed freight</td>
<td>$8,285,397,400</td>
<td>7.7%</td>
</tr>
<tr>
<td>Base metals</td>
<td>2,060,168</td>
<td>5.8%</td>
<td>Electronics</td>
<td>$8,280,492,600</td>
<td>7.7%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>1,950,632</td>
<td>5.5%</td>
<td>Plastics/rubber</td>
<td>$7,760,452,600</td>
<td>7.2%</td>
</tr>
<tr>
<td>Motorized vehicles</td>
<td>1,747,920</td>
<td>4.9%</td>
<td>Machinery</td>
<td>$6,784,838,300</td>
<td>6.3%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>1,651,449</td>
<td>4.6%</td>
<td>Chemical prods.</td>
<td>$5,459,890,800</td>
<td>5.1%</td>
</tr>
<tr>
<td>Mixed freight</td>
<td>1,602,163</td>
<td>4.5%</td>
<td>Other foodstuffs</td>
<td>$4,048,695,300</td>
<td>3.8%</td>
</tr>
<tr>
<td>Wood prod.</td>
<td>1,357,076</td>
<td>3.8%</td>
<td>Precision instr.</td>
<td>$4,042,761,900</td>
<td>3.8%</td>
</tr>
<tr>
<td>Waste/scrap</td>
<td>1,276,970</td>
<td>3.6%</td>
<td>Gasoline</td>
<td>$2,649,157,900</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>22,949,077</strong></td>
<td><strong>64.5%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$82,903,862,400</strong></td>
<td><strong>77.4%</strong></td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td><strong>12,632,981</strong></td>
<td><strong>35.5%</strong></td>
<td><strong>Total All Other Goods</strong></td>
<td><strong>$24,247,014,200</strong></td>
<td><strong>22.6%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>35,582,058</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$107,150,876,600</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>


Table 5-3 provides top ten Memphis FAF zone inbound truck commodities by tonnage and value. Inbound commodities are led by Motorized Vehicles representing 10.1 percent or 1.4 million tons of the roadway freight total. Other Foodstuffs, Wood Products, and Waste/Scrap each account for 7 to 9 percent of inbound tonnage. By value, Pharmaceuticals totals 21.2 percent or $10.9 billion of inbound freight. Motorized Vehicles and Electronics each account for 10 to 14 percent of inbound Memphis FAF zone value. As of 2015, inbound roadway commodities totaled 14.8 million tons valued at $51.5 billion.
Table 5-3: Memphis FAF Zone Top Inbound Commodities for Roadway by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorized vehicles</td>
<td>1,498,584</td>
<td>10.1%</td>
<td>Pharmaceuticals</td>
<td>$10,936,348,700</td>
<td>21.2%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>1,254,897</td>
<td>8.5%</td>
<td>Motorized vehicles</td>
<td>$7,013,377,200</td>
<td>13.6%</td>
</tr>
<tr>
<td>Wood prods.</td>
<td>1,086,031</td>
<td>7.3%</td>
<td>Electronics</td>
<td>$5,463,626,100</td>
<td>10.6%</td>
</tr>
<tr>
<td>Waste/scrap</td>
<td>1,074,873</td>
<td>7.3%</td>
<td>Plastics/rubber</td>
<td>$3,463,219,200</td>
<td>6.7%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>791,969</td>
<td>5.4%</td>
<td>Precision instruments</td>
<td>$3,316,168,600</td>
<td>6.4%</td>
</tr>
<tr>
<td>Base metals</td>
<td>767,757</td>
<td>5.2%</td>
<td>Machinery</td>
<td>$3,235,459,100</td>
<td>6.3%</td>
</tr>
<tr>
<td>Nonmetal min. prods.</td>
<td>725,735</td>
<td>4.9%</td>
<td>Mixed freight</td>
<td>$2,896,832,900</td>
<td>5.6%</td>
</tr>
<tr>
<td>Milled grain prods.</td>
<td>711,725</td>
<td>4.8%</td>
<td>Misc. mfg. prods.</td>
<td>$2,046,204,200</td>
<td>4.0%</td>
</tr>
<tr>
<td>Mixed freight</td>
<td>702,027</td>
<td>4.7%</td>
<td>Other foodstuffs</td>
<td>$1,555,326,100</td>
<td>3.0%</td>
</tr>
<tr>
<td>Other ag prods.</td>
<td>551,710</td>
<td>3.7%</td>
<td>Chemical prods.</td>
<td>$1,344,649,200</td>
<td>2.6%</td>
</tr>
<tr>
<td>Total Top 10</td>
<td>9,165,307</td>
<td>62.0%</td>
<td>Total Top 10</td>
<td>$41,271,211,300</td>
<td>80.1%</td>
</tr>
<tr>
<td>Total All Other Goods</td>
<td>5,618,289</td>
<td>38.0%</td>
<td>Total All Other Goods</td>
<td>$10,242,573,300</td>
<td>19.9%</td>
</tr>
<tr>
<td>Total All Goods</td>
<td>14,783,596</td>
<td>100%</td>
<td>Total All Goods</td>
<td>$51,513,784,600</td>
<td>100%</td>
</tr>
</tbody>
</table>


Table 5-4 provides top ten Memphis FAF zone outbound truck commodities by tonnage and value. Outbound commodities are led by Nonmetal Mineral Products (16.3 percent), Other Foodstuffs (15.2 percent) and Gasoline (11.9 percent). By value, commodities are dominated by Pharmaceuticals with 26.2 percent or $14.6 billion of outbound roadway freight. At 9.7 percent of $5.3 billion, Mixed freight is second among outbound commodities. As of 2015, roadway outbound commodities totaled 20.7 million tons valued at $55.6 billion for the Memphis FAF zone.

Table 5-4: Memphis FAF Zone Top Outbound Commodities for Roadway by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonmetal min. prods.</td>
<td>3,386,395</td>
<td>16.3%</td>
<td>Pharmaceuticals</td>
<td>$14,584,373,700</td>
<td>26.2%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>3,156,149</td>
<td>15.2%</td>
<td>Mixed freight</td>
<td>$5,388,564,500</td>
<td>9.7%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2,477,163</td>
<td>11.9%</td>
<td>Plastics/rubber</td>
<td>$4,297,233,400</td>
<td>7.7%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>1,543,776</td>
<td>7.4%</td>
<td>Chemical prods.</td>
<td>$4,115,241,600</td>
<td>7.4%</td>
</tr>
<tr>
<td>Base metals</td>
<td>1,292,411</td>
<td>6.2%</td>
<td>Machinery</td>
<td>$3,549,379,200</td>
<td>6.4%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>950,576</td>
<td>4.6%</td>
<td>Motorized vehicles</td>
<td>$3,058,076,000</td>
<td>5.5%</td>
</tr>
<tr>
<td>Mixed freight</td>
<td>900,136</td>
<td>4.3%</td>
<td>Electronics</td>
<td>$2,816,866,500</td>
<td>5.1%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>859,481</td>
<td>4.1%</td>
<td>Other foodstuffs</td>
<td>$2,493,369,200</td>
<td>4.5%</td>
</tr>
<tr>
<td>Chemical prods.</td>
<td>856,363</td>
<td>4.1%</td>
<td>Gasoline</td>
<td>$2,356,633,200</td>
<td>4.2%</td>
</tr>
<tr>
<td>Gravel</td>
<td>784,455</td>
<td>3.8%</td>
<td>Basic chemicals</td>
<td>$1,999,297,700</td>
<td>3.6%</td>
</tr>
<tr>
<td>Total Top 10</td>
<td>16,206,905</td>
<td>77.9%</td>
<td>Total Top 10</td>
<td>$44,659,035,000</td>
<td>80.3%</td>
</tr>
<tr>
<td>Total All Other Goods</td>
<td>4,591,558</td>
<td>22.1%</td>
<td>Total All Other Goods</td>
<td>$10,978,057,000</td>
<td>19.7%</td>
</tr>
<tr>
<td>Total All Goods</td>
<td>20,798,463</td>
<td>100%</td>
<td>Total All Goods</td>
<td>$55,637,092,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

Trading Partners
Examining the Greater Memphis region’s freight movements provides insights into the corridors used by regional industries. Summaries of both bulk and high value movements highlight the major corridors in which the Memphis area’s economy survives. At a high level, Figure 5-1 visualizes the major highway facility that would be used depending on geographic location.

Figure 5-1: Greater Memphis Region’s Freeway/Interstate Service Areas

The 2015 Freight Profile with Megaregions by tonnage was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Truck (Roadway). Tonnage was tabulated between all eleven megaregions and Memphis FAF zone by incoming and outgoing freight. Detailed tables of the tonnage and value information are available in Appendix 1. The top three roadway Megaregions by Kilotons are Great Lakes (1,655.8), Piedmont-Atlantic (1,307.3), and Southern California (984.7). Opportunity areas of growth include the Front Range (43.5), Cascadia (42.7), and Arizona Sun (28.1). See Figure 5-2.
Figure 5-2: Roadway Freight Movement between Memphis FAF Zone and Megaregions by Kilotons
Freight movement between Memphis FAF zone and eight Gateway Cities was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Truck (Roadway). The 2015 tonnage was tabulated by incoming and outgoing freight to reveal trends for freight movement. The top three roadway Gateway Cities by Kilotons were Nashville, TN. (1,547.7); Cincinnati, OH. (726.2); and St Louis, MO. (375.2). Opportunity areas of growth include the Oklahoma City, OK (126.6); El Paso, TX (74.4); and Tula, OK (31.9). See Figure 5-3.

Figure 5-3: Roadway Freight Movement between Memphis FAF Zone and Gateway Cities by Kilotons
The 2015 Freight Profile with Megaregions by value was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Truck (Roadway). Value was tabulated between all eleven megaregions and the Memphis FAF zone by incoming and outgoing freight. The top three roadway Megaregions by value in millions of dollars were Great Lakes ($10,798.5), and Southern California ($10,296.4), Northeast ($8,217.4). Opportunity areas for growth include the Cascadia ($655.3), Front Range ($367.9), and Arizona Sun ($310.8). See Figure 5-4.

Figure 5-4: Roadway Freight Movement between Memphis FAF Zone and Megaregions in Millions of Dollars
Freight movement between the Memphis FAF zone and eight Gateway Cities was also obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Truck (Roadway) freight Value. The 2015 value was tabulated by incoming and outgoing freight to reveal trends for freight Value in Millions of Dollars. The top three roadway Gateway Cities were Nashville, TN ($5,175.6); Cincinnati, OH ($2,832.7); and St Louis, MO ($1,391.6). Opportunity areas for growth include El Paso, TX ($372.3); Louisville, KY ($244.0); and Tulsa, OK ($116.9). See Figure 5-5.

5.1.1.2 Network and Through Traffic

A significant portion of freight movements in the Greater Memphis region is long-haul trucks simply passing through the region without stopping. According to the Memphis MPO’s Travel Demand Model, 75.7 percent of 2017 truck traffic in the Region is overhead trips. With origins and destinations outside the region, these trucks enter and exit the Memphis region from different legs of the regional Interstate network. Table 5-5 provides the number and percentage of through trucks in the Memphis region by their entry and exit facilities Figure 5-6 displays the predominant facilities used for the movement of trucks in the region. The I40/240 loop volumes for through movements are represented by a hexagon and are unknown. It is important for the Greater Memphis region to maximize the efficiency in which through trucks make these national movements while ensuring that it limits the negative effects to trips with local ends.
### Table 5-5: Truck Volume Percentage by Entry and Exit Pair for Through Trucks

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I-40 (1)</td>
<td>19.6%</td>
<td></td>
<td></td>
<td>1.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-40 (2)</td>
<td>19.2%</td>
<td>17.3%</td>
<td>5.6%</td>
<td>0.01%</td>
<td>0.5%</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td>I-55 (3)</td>
<td></td>
<td>16.5%</td>
<td>2.9%</td>
<td>0.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-55 (4)</td>
<td>0.5%</td>
<td>8.8%</td>
<td>2.0%</td>
<td>0.1%</td>
<td>0.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 78 (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.02%</td>
<td></td>
</tr>
<tr>
<td>US 61S (6)</td>
<td></td>
<td>0.6%</td>
<td>0.4%</td>
<td>0.1%</td>
<td>0.02%</td>
<td></td>
<td>0.1%</td>
</tr>
<tr>
<td>US 51N (7)</td>
<td></td>
<td>2.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td></td>
<td></td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Source: Memphis MPO Travel Demand Model

### Figure 5-6: Truck Volume Percentage by Entry and Exit Pair for Through Trucks
5.1.1.3  National Multimodal Freight Network

The National Multimodal Freight Network (NMFN), as specified under 49 U.S.C. 70103, aims to assist States in strategically directing resources toward improved system performance for the efficient movement of freight on the Network, inform freight transportation planning, assist in the prioritization of Federal investment, and assess and support Federal investments to achieve the national multimodal freight policy goals. The NMFN is comprised of the National Highway Freight Network (NHFN), railways, navigable waterways, pipelines, seaports, airports, and intermodal facilities necessary for the efficient and safe movement of freight in our country. The Fixing America’s Surface Transportation Act (FAST Act) directed the FHWA Administrator to establish a National Highway Freight Network (NHFN) to strategically direct Federal resources and policies toward improved performance of highway portions of the NMFN.

The NHFN includes the following subsystems of roadways:

- **Primary Highway Freight System (PHFS):** This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data. The network consists of 41,518 centerline miles, including 37,436 centerline miles of Interstate and 4,082 centerline miles of non-Interstate roads.

- **Other Interstate portions not on the PHFS:** These highways consist of the remaining portion of Interstate roads not included in the PHFS. These routes provide important continuity and access to freight transportation facilities. These portions amount to an estimated 9,511 centerline miles of Interstate, nationwide, and will fluctuate with additions and deletions to the Interstate Highway System.

- **Critical Urban Freight Corridors (CUFCs):** These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities.

- **Critical Rural Freight Corridors (CRFCs):** These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities.

Prior to designation of CRFCs and CUFCs, the NHFN consists of the PHFS and other Interstate portions not on the PHFS, for an estimated total of 51,029 centerline miles. The designated PHFS and other Interstate portions not on the PHFS are shown in Figure 5-7.
States and in certain cases, Metropolitan Planning Organizations (MPOs), are responsible for designating public roads for the CRFCs and CUFCs in accordance with section 1116 of the FAST Act. State designation of the CRFCs is limited to a maximum of 150 miles of highway or 20 percent of the PHFS mileage in the State, whichever is greater. State and MPO designation of the CUFC is limited to a maximum of 75 miles of highway or 10 percent of the PHFS mileage in the State, whichever is greater. Guidance in accordance with the FAST Act section 1116 will be developed to provide information on the identification, designation, and certification of these corridors.³

National Highway Freight Network in the Memphis MPO
The Memphis MPO, in cooperation with TDOT and MDOT, are responsible for designating public roads for the CUFCs in accordance with section 1116 of the FAST Act for the MPO portions of Tennessee and Mississippi. The West Memphis MPO, in cooperation with Arkansas State Highway and Transportation Department (ASHTD), will designate CUFCs for Arkansas. The CRFCs designations will be made by TDOT, MDOT, and ASHTD respectively.

³ https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm
The process of designating the CUFCs and CRFCs is currently underway. A map and listing of the final NHFN, including CUFCs and CRFCs, is included in Appendix 2.

5.1.2 Description of Truck Routing

The guidance of trucks throughout the region is essential for maximizing the efficiency of the roadway system. Navigation decisions can have significant consequences not only on the timely delivery of goods but also on the traffic operations, facility condition, and quality of life. Traditionally, highway signage has been used to direct drivers on the best way around a region and ultimately to their desired destination. Recently, the proliferation of navigation assistants (e.g. TomTom, Siri, Waze, Google Maps, etc.) has enabled drivers to customize their routes to accommodate for traffic conditions, mileage differences, and limiting the number of turns. Needs from different portions of an overall truck movements result in two routing scenarios: routing trucks through the region and routing trucks between local delivery sites and the interstate/freeway. Both scenarios are presented with different potential issues and benefits.

5.1.2.1 Routing Through the Region

Routing trucks through the region typically takes place on interstate and freeway facilities. Interstate signage aims to deliver simple and effective messaging for directional choices. Sometimes this can lead to insufficient information to make a decision. In the example below, it is unclear how a driver can get to I-40 West. Although I-40 is within close proximity, the configuration of interstates in this section of Memphis the signage does not provide the information needed.

Highway signage can play a crucial role in the operations of a facility. Advanced communication of the correct lane position and directional choice can be used to maximize operation efficiencies by manipulating volumes. As an example, I-65 and I-24 in Nashville flipped designations in 2004 to take advantage of the imbalances in traffic demand and roadway capacity. This change also resulted in the elimination of multiple lane shifts required for the predominant directional flows.
The prohibition of trucks on specific facilities can be used for a variety of reasons. It may be desired to not have trucks traverse a residential neighborhood, due to the noise, vibration, and perceived safety issues. In addition to quality of life issues, truck may not be allowed on facilities due to physical barriers. These barriers include horizontal clearances, vertical clearances, tight turning radii, and weight limits on bridges.

Routing between Local and Delivery Sites and Interstate / Freeway

Routing trucks from interstate and freeway facilities to the local delivery site requires a simple and consistent way to communicated how a driver can get to their final destination. Often, a driver is provided the interstate exit closest to their destination. It is common for drivers to rely on local street signage and/or navigation assistants to direct which turns to make. Local truck routes can be designated to better guide larger vehicles to major freight generators using a desired path. The return trip will usually be the same path in reverse although one way streets and turning prohibitions may require additional designations.

Designating local truck routes provides multiple benefits to a region. By communicating to drivers the preferred roadways for truck travel, truck routes can be supported and enhanced for truck traffic. Routes designated as truck routes can increase operational efficiency with signal timing, larger turning radii, wider lanes/shoulders, and reduces clearance issues. Additionally, the government sector can benefit from savings in maintenance by focusing pavement expenditures for heavy vehicles to those routes used most.

In the City of Memphis, both formal and informal truck route designations have occurred over time. The result is an inconsistent, misunderstood, and sometimes contradictory system of truck guidance. In 1980, The City of Memphis designated truck routes. Although these routes are likely still used for truck movements, the regional roadway network expansion and land uses changes have changed the needs of drivers in the region. An informal truck route designation has been developed throughout different sections of Memphis. The routes are signed with a black truck and circle on a white sign. Although it is unknown who created and posted these signs, it is evident that a need for truck routing is present. The shortfall of these informal signing of routes is the inconsistency of routes signed and the lack of cooperation with local and state agencies ultimately responsible for the roadway.
An example of signage inconsistency exists on I-240 North at exit 28. This exit is designated as a “Local Truck Route” by the Tennessee Department of Transportation. When exiting I-240 onto South Parkway, no local signage indicates which direction to go to get to the nearest industrial area. At first look, this exit appears to be mostly for the surrounding residential areas. The reasoning behind the local truck route designation is due to this exit being used for oversized vehicles that need to detour the railroad overpasses on I-55. This results in a large number of truck drivers navigating the city on local streets to get to their destination to accommodate the less frequent oversized drivers, which already follow a predetermined and approved route from TDOT.

5.1.2.3 Regional Freight Corridors

The Greater Memphis regional roadway network supports the movement of freight throughout the Region. Freight Corridors have been defined to identify facilities that are most critical to the Regional Industrial Areas and support of through movements. Detailed descriptions of the Regional Industrial Areas are available in
Chapter 9 – Emerging Zone Development and Appendix 3. The Freight Corridors have been classified, to indicate how each type functions to serve regional truck movements.

Freight Mobility Corridors are characterized by higher speed and less access. The function of Freight Mobility Corridors is to allow for longer distance freight deliveries such as through, inbound, and outbound movements. Freight Mobility Corridors are separated into Interstate and non-Interstate.

Freight Accessibility Corridors are characterized by lower speed and more access. The function of Freight Accessibility Corridors is to allow for freight deliveries to local industries such as internal, inbound, and outbound movements.

Freight Mobility and Accessibility Corridors are characterized by higher speed and more access. The function of Freight Mobility and Accessibility Corridors serves dual purposes allowing for freight deliveries to local industries such as internal, inbound, and outbound movements while also supporting higher speeds and longer distance freight deliveries. A summary of Regional Freight Corridors is provided in Table 5-6.

Table 5-6: Greater Memphis Regional Freight Corridors Overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Miles</th>
<th>Percentage of Regional Miles</th>
<th>Truck Vehicle Miles Traveled</th>
<th>Percentage of Regional Truck Vehicle Miles Traveled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Mobility Corridors</td>
<td>437.6</td>
<td>11.8%</td>
<td>3,731,918</td>
<td>48.4%</td>
</tr>
<tr>
<td>Freight Accessibility Corridors</td>
<td>117.5</td>
<td>3.2%</td>
<td>395,326</td>
<td>5.1%</td>
</tr>
<tr>
<td>Freight Mobility and Accessibility Corridors</td>
<td>30.7</td>
<td>0.8%</td>
<td>238,004</td>
<td>3.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>585.9</strong></td>
<td><strong>15.8%</strong></td>
<td><strong>4,365,248</strong></td>
<td><strong>56.6%</strong></td>
</tr>
</tbody>
</table>

Freight routes make up about 16% of the roadway miles, but close to 60% of the Truck Vehicle Miles Traveled. With the majority of truck volumes occurring on the defined Freight Corridors, emphasis should be given to these facilities when addressing freight improvements in the region. Furthermore, the differentiation in corridor type allows for targeted improvements based on desired outcomes (e.g. Through=Mobility and Local Business=Accessibility). Regional Freight Corridors in are identified in Table 5-7. Figure 5-8 displays the Regional Freight Corridors in relation to the Regional Industrial Areas they serve and the accessibility to Interstate/freeway facilities.
### Table 5-7: Greater Memphis Regional Freight Corridors

<table>
<thead>
<tr>
<th>Road Name</th>
<th>From</th>
<th>To</th>
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<th>Length (miles)</th>
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5.1.3 Truck Parking Capacity

Truck parking was identified as the biggest challenge to truck drivers in the Greater Memphis region, according to the Trucker Survey conducted as a part of this Plan. Federal policy and regulations have placed an emphasis on addressing the truck parking need across the United States. Comparing the regional inventory of currently identified parking facilities to identified needs at the state and national corridor level provides a starting point on where added capacity should be located.

5.1.3.1 Federal Truck Parking Related Policies

The United States Department of Transportation (USDOT) has created and enforces various laws and policies relating to the transportation of freight and goods to ensure the safety and security of all users of the transportation system. This section describes policies and laws created at the federal level that specifically address truck parking.

MAP-21 and Jason’s Law

Jason’s Law is named in honor of Jason Rivenburg. On March 4, 2009, Jason stopped for a delivery in Virginia and then headed toward a delivery destination in South Carolina. While only 12 miles from the delivery location, he needed to find parking to rest through the night as his arrival location was not yet open to receive deliveries. Jason did not have a safe place to park. Jason had learned from truckers familiar with the area that an abandoned gas station off of I-26 was a safe location to park and proceeded to park there for the night. Tragically, he was attacked and murdered at this location while he slept with his killer taking both his life and just $7.00 that he had in his wallet.

Since his death, Jason’s wife, Hope Rivenburg, has worked diligently to bring attention to the national truck parking shortage problem. Her efforts, along with those of countless family members, friends, and representatives from the trucking industry, helped to push forth legislation to focus national attention on the issue. After several versions of the Jason’s Law legislative language were brought to Congress, the legislative language described below was incorporated into Moving Ahead for Progress in the 21st Century Act (MAP-21). MAP-21 was signed into law on July 6, 2012 and provided funding for surface transportation programs in fiscal years 2013 and 2014.

Section 1401 of MAP-21, Jason’s Law, establishes a national priority for projects that address shortage of long-term parking for commercial motor vehicles on the National Highway System (NHS) to improve the safety of motorized and non-motorized users and for commercial motor vehicle operators. Jason’s Law also extended the eligibility of National Highway Performance Program (NHPP), Surface Transportation Block Grant Program (STBG), National Highway Freight Program (NHFP), National Highway Performance Program (NHPP), Congestion Mitigation and Air Quality (CMAQ), Highway Safety Improvement Program (HSIP), Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE), and Transportation Investment Generating Economic Recovery (TIGER) funds to truck parking projects. Under Jason’s Law, eligible projects may include:
• Constructing rest areas that include parking for commercial motor vehicles
• Constructing commercial motor vehicle parking facilities adjacent to commercial truck stops and travel plazas
• Opening existing facilities to commercial motor vehicle parking, including inspection and weigh stations and park and ride facilities
• Promoting the availability of publicly or privately provided commercial motor vehicle parking on the NHS using intelligent transportation systems and other means
• Making capital improvements to public commercial motor vehicle parking facilities currently closed on a seasonal basis to allow the facilities to remain open year-round
• Improving the geometric design of interchanges on the NHS to improve access to commercial motor vehicle parking facilities

Jason’s Law also requires all states to conduct an inventory of existing truck parking, assess the volume of commercial motor vehicles in the State, and measure the adequacy of commercial motor vehicle parking facilities in the state. The results of this evaluation must be made available to the public.

Jason’s Law Truck Parking Survey
Specifically, Jason’s Law requires the USDOT to conduct a survey and comparative assessment in consultation with relevant State motor carrier representatives to:

• Evaluate the capability of each state to provide adequate parking and rest facilities for commercial motor vehicles engaged in interstate transportation;
• Assess the volume of commercial motor vehicle traffic in each state; and
• Develop a system of metrics to measure the adequacy of commercial motor vehicle parking facilities in each state.

The USDOT is required to make the results of this work publicly available on a website and periodically update the survey. Even without the legislated requirements, the issue of truck parking has long been a priority for the USDOT and its operating administrations. Jason’s Law helps to advance a more comprehensive set of programs, efforts, and research to improve truck parking and provide States and Metropolitan Planning Organizations with resources to identify parking needs and to encourage improvements and investments. Results of this survey were released in 2013 and included the following findings:

• Thirty-nine percent of the drivers responding take one hour or longer to find parking.
• Drivers indicated that if parking was not found by mid-afternoon or early evening in either a rest area or private truck stop, the next suitable option is a well-lighted shopping area due to safety concerns. However, drivers stated they worried during their rest period they would be asked to leave or given a citation by law enforcement.
• Fifty-three percent of drivers regularly use a commercial truck stop for rest and 20 percent regularly use a rest area. Other options used regularly include shipper/receiver location (20 percent), on/off ramp (8 percent), abandoned lot/isolated area (10 percent), and behind a shopping center (11 percent).
Eighty-eight percent of drivers felt unsafe while parked during mandatory rest or waiting for pickup or delivery of a load over the past 12 months.

Thirty-six percent of respondents felt safer parked at a shipper and receiver location.

The Federal Highway Administration (FHWA) released updated Jason’s Law Truck Parking Survey Results and Comparative Analysis in August 2015 which confirmed that truck parking continues to be a major issue in the United States. The following themes represent the key categories of the survey findings:

Parking Capacity

- Most States report problems with truck parking shortages. Those States that did not report shortages were mostly rural (with the exception of Ohio).
- States report higher levels of shortages in public parking facilities than in private facilities.
- States with the highest numbers of spaces are clustered along major corridors with high truck volumes.
- When compared to key truck activity and usage indicators such as miles of the NHS, mileage of vehicle miles traveled (VMT), and millions of dollars in Gross Domestic Product, patterns emerge showing that there are high numbers of spaces relative to indicators, particularly in the east/north central region around the Chicago metropolitan area.
- Respondents reported experiencing shortages of spaces in the east/north central region despite the high number of spaces relative to activity.
- Analysis of States with the lowest ratio of parking to indicators reveals fewer spaces in the Northeast and Mid-Atlantic States.
- Drivers and logistics personnel reported most challenges with parking shortages in the Mid-Atlantic, as well as the east-north central area, New England, and the Southeast.
- Drivers and staff did report that they also viewed the east-north central area to have sufficient parking despite reported shortages. They also cited the Midwest and west-north central region, the Southeast, and the Southwestern States as having sufficient parking.
- As with the reports of shortages, drivers and staff made fewer reports of sufficient parking in the Mid-Atlantic and New England and Southeast and Pacific coast States. The top five corridors cited by drivers and staff as having shortages are I-95, I-40, I-80, I-10 and I-81.

Private Truck Stops Usage and Needs

- Private truck stop owners and operators report that most facilities have fewer than 100 spaces available.
- Most facilities report being at full capacity primarily during night hours, but some report being at capacity during daytime hours as well.
- Facilities are typically over capacity during the mid-week; however, some facilities report challenges throughout the entire week.

4 Federal Highway Administration and Department of Transportation. Jason’s Law Truck Parking Survey Results and Comparative Analysis. August 2015.
• Anecdotally, facilities indicated that they would like to add parking but have faced difficulties including lack of authority, zoning laws, lack of funding, and other expansion challenges.

Unofficial Parking Observances

• Almost half of the State DOTs reported unofficial and/or illegal parking on freeway interchange ramps and shoulders of highways. Similarly, State motor carrier safety officials also reported that most unofficial and or illegal parking occurs in these locations.
• Motor carrier safety officials reported that unofficial parking is mostly observed during night hours during weekdays. However, there were a number of reports on weekend days as well.
• Motor carrier safety officials reported observing unofficial parking consistently throughout the year with only a slight decline in winter months.

Driver Perceptions

• More than 75 percent of truck drivers and almost 66 percent of logistics personnel reported regularly experiencing problems with finding safe parking locations when rest was needed.
• Ninety percent reported struggling to find safe and available parking during night hours.
• Drivers and logistics personnel reported that the parking shortages were encountered mostly during the weekdays, but many reported weekend difficulties.
• Months of the year when problems occurred were generally consistent; however, the ATA drivers reported fewer problems during the summer months while their logistics personnel counterparts reported higher challenges during this time.

Hours of Service Regulations

Truck drivers must comply with the USDOT’s Federal Motor Carrier Safety Administration (FMCSA) mandated hours of service (HOS) regulations if they drive a commercial motor vehicle (CMV). The HOS Drivers Final Rule was published in the Federal Register on December 27, 2011. Effective date of the Final Rule was February 27, 2012, and the compliance date of remaining provisions was July 1, 2013. HOS regulations, as of June 2015, are as follows:

• 11-Hour Driving Limit: May drive a maximum of 11 hours after 10 consecutive hours off duty.
• 14-Hour Limit: May not drive beyond the 14th consecutive hour after coming on duty, following 10 consecutive hours off duty. Off-duty time does not extend the 14-hour period.
• Rest Breaks: May drive only if 8 hours or less have passed since end of driver’s last off-duty or sleeper berth period of at least 30 minutes.
• 60/70-Hour Limit: May not drive after 60/70 hours on duty in 7/8 consecutive days. A driver may restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty. The Consolidated and

5 https://www.fmcsa.dot.gov/regulations/hours-service/summary-hours-service-regulations
Further Continuing Appropriations Act of 2015 was enacted on December 16, 2014, suspending enforcement of requirements for use of the 34-hour restart.

The HOS regulations are strictly enforced and violations can include state and local law enforcement fines, civil penalties on a driver or carrier and downgrading of the carrier’s safety rating. To meet these regulations, commercial truck drivers need safe and convenient parking options along their route. To maximize travel time and distance, truckers often wait as long as possible to stop and rest. Without viable parking options, some truckers park wherever possible, including entrance ramps, exit ramps, vacant lots, and other convenient locations.

**Commercialization of Rest Areas**

The Code of Federal Regulations, Title 23 – Highways (Part 752), defines a safety rest area as “a roadside facility safely removed from the traveled way with parking and such facilities for the motorist deemed necessary for his rest, relaxation, comfort and information needs.” The Code defines information centers as “facilities located at safety rest areas which provide information of interest to the traveling public.” Federal-Aid Highway Law (U.S. Code 23, § 111) limits the commercialization of rest areas on the interstate highway system to only vending machines for the purpose of dispensing food, drink, or other articles the state determines are appropriate and desirable. Dispensing petroleum products or motor vehicle replacement parts are not allowed. Toll roads are exempt to these restrictions because they are not a part of the federally funded Interstate System.

**Transportation of Hazardous Materials**

Section 49 of the Code of Federal Regulations, Part 397, contains federal regulations for the transportation of hazardous materials. Trucks hauling materials deemed to be hazardous are subject to more stringent parking requirements. Trucks hauling hazardous materials may not be parked within five feet of the traveled portion of a public roadway or highway. In addition, these trucks are not permitted on private property, including truck stops, without consent from the private property manager who must be made aware of the hazardous materials being transported in the truck. These vehicles also must not be located within 300 feet of bridges, tunnels, dwelling units, offices, or areas where people assemble other than for brief periods when it is impractical to park in any other place.

**5.1.3.2 Regional Truck Parking**

A desktop review of regional truck parking capacity was performed in the Greater Memphis region. Represented are striped spaces available at truck stops, rest areas, and weigh stations. Informal spaces, such as empty lots and superstore parking lots were not included. Summarized in Table 5-8 and displayed in Figure 5-9. The largest concentration of spaces is located in West Memphis, Arkansas.

<table>
<thead>
<tr>
<th>Count</th>
<th>Truck Stops/ Travel Plazas</th>
<th>Rest Areas/ Weigh Stations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locations</td>
<td>28</td>
<td>15</td>
<td>44</td>
</tr>
<tr>
<td>Spaces</td>
<td>1,498</td>
<td>213</td>
<td>1,861</td>
</tr>
</tbody>
</table>
Although it is generally accepted that actual truck parking capacity exceeds the amounts shown, truck parking was identified as the biggest challenge for drivers surveyed in the region. In a recent survey of area truck drivers, 81.9 percent of respondents selected truck parking as their number one challenge. The perceived need for additional truck parking should be coordinated at the state and national corridor level as potential solutions may be addressed outside of the region. Potential solutions to truck parking that the Memphis MPO could advance include:

- Increasing spaces at existing public rest areas;
- Constructing new public rest areas;
- Engaging private truck stop owners to increase spaces; and
- Improving parking information with ITS.
5.2  Freight Demands and Bottlenecks

The efficient and reliable movement of goods throughout the Greater Memphis region is critical to the success of its industries. The ability of regional businesses to ship products without delay reduces costs and increases productivity. Continued improvement in the reduction of delay could attract potential new industries looking to locate in areas that maximize the throughput of freight. To effectively reduce delay, areas of freight activity must be identified. Analyzing facilities used by the identified freight activity areas leads to the identification of freight bottlenecks. Once bottlenecks are identified, mitigation strategies can be employed to reduce congestion's effect on delay. This section identifies the freight activity areas, regional network capacity, and demand on the regional network to determine bottlenecks which lead to the delay of freight movements in the Region. Additionally, potential congestion mitigation strategies are presented to address the identified bottlenecks.

5.2.1  Freight Activity Areas

Based on 2010 ATRI Origin and Destination Data, truck trip origins and destinations indicate high activity levels of freight activity. These trips are the basis for determining demand on the Memphis regional roadway network. Resulting from the ATRI dataset at a regional review, locations across the Memphis region identified as Freight Industrial Zones represent the freight activity areas most important to the Greater Memphis region. Detailed descriptions of the Regional Freight Zones are available in Chapter 9 – Emerging Zone Development and Appendix 3.

Figure 5-10 displays where the most truck activity is occurring. Areas with high amounts of truck trips occur in President’s Island, Pidgeon Industrial Park, Lamar Avenue area, and West Memphis.
Figure 5-10: Total Truck Trips (Origins and Destinations) by Traffic Analysis Zone
Figure 5-11 displays where the truck activity is most concentrated. Areas with high concentrations of truck trips occur on the southern loop of I-55 and I-240, Lamar Avenue corridor, and in West Memphis.

**Figure 5-11: Total Truck Trips Density (Origins and Destinations) by Traffic Analysis Zone**
5.2.2 Regional Roadway Capacity and Ability to Meet Demand

The 2017 volumes of single unit and combination unit trucks along the freight corridors in the region were obtained from the Memphis MPO’s Travel Demand Model. The volume of single unit trucks is generally higher on arterial and collector freight corridors near the Memphis International airport and Lamar Avenue corridor, while combination unit truck volumes are generally higher on the Interstate System. This is consistent with how these vehicles operate – single unit trucks making local trips for deliveries and combination-unit trucks making regional or national trips for long haul deliveries. Figure 5-12, Figure 5-13, and Figure 5-14 illustrate the daily volume of single unit trucks, combination unit trucks, and the total truck volume on freight corridors across the region.
Figure 5-12: Single-Unit Truck Volumes - Average Annual Daily Traffic (AADT)
Figure 5-13: Combination-Unit Truck Volumes - Average Annual Daily Traffic (AADT)
The Memphis MPO Travel Demand Model was used to estimate recurring travel delays experienced on freight corridors by single unit trucks, combination unit trucks, and all vehicles over the course of a typical weekday. Delays were summed by the morning, mid-day, evening, and off-peak periods by vehicle type by type of freight corridor across the region. Table 5-9 shows the hours of delay on a typical weekday on freight corridors in the region.
Table 5-9: Hours of Delay on Freight Corridors

<table>
<thead>
<tr>
<th>Corridor Type</th>
<th>Delay (hours)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single Unit Trucks</td>
<td>Combination Unit Trucks</td>
</tr>
<tr>
<td>Freight Corridor</td>
<td></td>
<td>2,904</td>
<td>12,927</td>
</tr>
<tr>
<td>Mobility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td></td>
<td>1,212</td>
<td>1,655</td>
</tr>
<tr>
<td>Mobility and Accessibility</td>
<td></td>
<td>586</td>
<td>1,173</td>
</tr>
<tr>
<td>All Other Corridors</td>
<td></td>
<td>5,886</td>
<td>7,815</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10,588</td>
<td>23,571</td>
</tr>
</tbody>
</table>

Bottlenecks are spots or point-specific locations in the roadway network that suffer recurring congestion and increased delay due to a constriction of traffic flow. While they can be defined along a short segment of a corridor, they are different from system-wide congestion or congestion along an entire corridor. Non-recurring bottlenecks associated with a random event often occur, but are not described explicitly here. As described in FHWA’s Localized Bottleneck Reduction Program (LBR), characteristics of bottlenecks are:

- A defined choke point or point of beginning
- A traffic queue upstream of the bottleneck
- Free flow traffic conditions downstream, and
- Traffic volumes that exceed the capacity of the choke point

Bottlenecks most often occur at points in the transportation system where motorists face points of decision, such as the divergence of two interstate routes, or some physical change in the roadway, such as a reduction in the number of lanes to pass under a bridge. Figure 5-15 displays known bottlenecks on the freight corridors across the regions. They were identified based on stakeholder interviews with the freight community, state and local roadway agencies, and previous studies and are listed below:

- Interstate 40 and Interstate 55 junctions in West Memphis
- Interstate 55 at Crump Road Interchange
- Interstate 240 at State Route 385
- Interstate 240 between I-55 and Airways Boulevard
- Interstate 40 at Interstate 240 East
- Lamar Avenue (US 78) at Winchester Road
- Lamar Avenue (US 78) at Shelby Drive
- Lamar Avenue (US 78) at Holmes Road
- State Route 385 at Kirby Parkway
- Goodman Road (MS 302) east of Airways Road
- Goodman Road (MS 302) at Hacks Cross Road
- Winchester Road at Perkins Road
- Byhalia Road between Winchester and Poplar Avenue
The Memphis MPO’ Congestion Management Process identifies bottleneck removal as an operation improvement strategy to reduce congestion through removal of physical constrictions that delay traffic, such as widening underpasses, providing lane continuity, or improving acceleration/deceleration at ramp interchanges. Other strategies are identified for removing bottlenecks found in FHWA’s Localized Bottleneck Reduction (LBR) Program include:

- Use of a shoulder as a peak-hour lane
- Re-stripe merge or diverge areas to better serve demand
• Reduce lane widths to add a travel and/or auxiliary lane
• Modify weaving areas - add a collector/distributor lane or similar
• Meter or close entrance ramps
• ITS Solutions to reduce approach speeds
• Improve traffic signal timing on arterials
• Use access management principles to clean up corridors
• Provide traffic diversion information
• Implement road pricing to bring supply in line with demand
• High occupancy vehicle (HOV) lanes

5.2.3 Potential Congestion Mitigation Strategies

Strategies to mitigate congestion on freight corridors in the region can be found in the Memphis MPO’s Congestion Management Process. The Congestion Management Process grouped over 40 strategies in ten distinct categories in a strategy toolbox. Strategies related to movement of freight movement in the region are listed below:

• Dedicated lanes (DL)
  o DL-1, High occupancy vehicle (HOV) and high occupancy toll (HOT)
  o DL-2, Grade crossing separations
• Freight Improvements (FR)
  o FR-1, Freight capacity improvements
    ▪ Freight rail
    ▪ Intermodal facilities
  o FR-2, Freight operations improvements/mobility programs
    ▪ Specialized truck-only lanes
    ▪ Improved weigh station efficiency
    ▪ Truck parking facilities
• Incident Management (IM)
  o IM-1, Freeway service patrols
• Intersection Improvements (NT)
  o NT-1, Interchange reconstruction
• Operational Improvements (OP)
  o OP-1, Access management
  o OP-2, Bottleneck removal
  o OP-9, Roadway condition information systems
  o OP-12, Traffic signal improvements
  o OP-14, Traveler information systems
• Land Use (LU)
  o LU-1, Complete streets
  o LU-2, Smart growth
- LU-3, Corridor management agreements
  - General Purpose Lanes (GP)
    - GP-1, New roadways and travel lanes

Other freight related mitigation strategies include encouraging off-hour deliveries and implementation of a truck routing systems.

### 5.3 Structural and Geometric Deficiencies

Trucks have a disproportionately high impact on capacity, maintenance of pavement, and safety of the roadway system compared to passenger cars due to their length, weight, and operating characteristics. Likewise, operational and geometric deficiencies have a disproportionately high impact on the safety and efficient movement of truck freight through the region. Figure 5-16 displays the locations of these deficiencies.
The Tennessee Department of Transportation (TDOT) maintains a listing of structurally deficient bridges across the region. In Fayette, Shelby, and Tipton Counties, there are 90 state and locally owned bridges that are classified as structurally deficient. Of these, 26 are posted with a weight limit. Eleven of the 90 are on the freight corridors identified as part of this study and are state owned. They include:

- TN-59 at I-40 in Fayette County
- Canada Road at I-40
- Jefferson Avenue at I-240
- Shady Grove Road at I-240
- Eastmoreland Avenue at I-240
- I-40 over the Mississippi River
- I-240 westbound at Airways Boulevard
- I-240 eastbound at the BNSF Railroad
- Danny Thomas (TN-3) just north of Watkins Street
- Poplar Avenue (TN-57) eastbound at I-240
- Getwell Road (TN-176) at Winchester Road

None of these state owned structurally deficient structures are posted with weight limits.

The Federal Highway Administration (FHWA) maintains a listing of structurally deficient bridges across the nation by County. In DeSoto, Marshall, Tate, and Tunica Counties, in Mississippi there are 70 bridges that are classified as structurally deficient. The Mississippi Department of Transportation (MDOT) maintains a listing of structurally deficient bridges across the region. In Tunica, Tate, and Marshall Counties, there are 14 bridges that are posted as weight restricted. There are no posted weight restricted bridges in DeSoto County. The weight restricted bridges include:

- MS-4 over White Oak Bayou
- MS-3 over Coldwater River
- MS-3 over Strayhorn Canal
- MS-4 over Cuffawa Creek
- MS-309 over Pigeon Roost Canal and its relief structures
- MS-309 over Byhalia Creek
- MS-313 over an unnamed stream in Hudsonville
- MS-4 over the Burlington Northern Railroad
- MS-178 over Spring Creek and its relief structures

None of the weight restricted bridges in Mississippi are on freight corridors identified as part of this study.

Vertical and horizontal clearances are critical for moving truck freight. The TDOT Roadway Design Guidelines state that guidance on horizontal and vertical clearance is as follows:

**Horizontal Clearance:**

*The minimum horizontal clearance for a bridge over a road shall be a distance equal to the width of shoulders plus ditches except that for bridges over federal aid systems shall be 30’-0” from the edge of the travel lane to any substructure. The minimum horizontal clearance for a bridge over a railroad shall be 25’-0” measured from the top of the rail elevation to any substructure or fill slope.*

**Vertical Clearance:**

The minimum vertical clearance of 14'-6” shall be provided across the full extent of the required horizontal clearance for bridges over local roads and 16'-6” over state routes and interstates. Multimodal or pedestrian bridges shall provide a minimum vertical clearance of 17'-6” over local routes, state routes, and interstates. For bridges over railroads, the minimum vertical clearance shall be 23'-6” above the top of rail, unless otherwise specified by the railroad.

Horizontal and vertical clearance issues are typical in the Memphis region on interstate and state routes constructed when the design guidelines provided for these facilities did not require the as much clearance. Locations of known deficient horizontal or vertical clearance issues in the region include:

- I-240 at westbound Poplar Avenue (TN-57)
- I-240 at Norfolk Southern Railroad (at Park Avenue)
- Danny Thomas Boulevard (TN-1) at TN-3
- Elvis Presley Boulevard (TN-3) at I-55
- I-55 at ICG Railroad (log mile 7.23)
- I-55 at ICG Railroad (log mile 7.25)
- I-55 at ICG Railroad (log mile 7.26)
- I-55 at TN-14
- I-55 at Union Pacific Railroad (log mile 10.44)
- I-55 at Union Pacific Railroad (log mile 10.84)
- Lamar Avenue (TN-4) at CNIC Railroad
- Lamar Avenue (TN-4) at Southern Avenue
- Lamar Avenue (TN-4) at CSX Railroad
- TN-64 (TN-15) at I-40

5.4 Strategies to Reduce the Effects of Non-recurring Congestion and Safety Incidents

Non-recurring congestion is a temporary isolated disruption that impedes traffic flow. This type of congestion is different than congestion that happens daily due to a restriction at a bottleneck or by traffic volumes that repeatedly exceed the carrying capacity of the roadway. Non-recurring congestion can be caused by crashes, disabled vehicles or debris in the roadway, work zones, adverse weather events, or planned special events.

Information from FHWA’s Office of Operations states that up to half of congestion is the result of these temporary disruptions in traffic flow. Non-recurring congestion can be more disruptive to motorists and freight carriers than recurring congestion because the delay caused by it is more likely to be unknown and cannot be planned prior to departure. Strategies to reduce the effects of non-recurring congestion are provided below with examples programs and projects:

- Traffic incident management programs
  - TDOT’s HELP Truck Program
- Special event traffic management programs
  - City of Memphis and FedEx Forum Traffic Control Plan
- Work zone traffic management
5.5 Safety and Incident Response

As described above, crashes can have a significant adverse impact to congestion and delay. To better understand the impact of crashes on freight corridors across the region, crash data for Shelby, Fayette, and Tipton Counties in Tennessee, and De Soto, Marshall, Tate, and Tunica Counties in Mississippi were obtained from the Tennessee Integrated Analysis Network (TITAN) database and from the Mississippi Department of Transportation, respectively for years 2013 through 2015. Crashes along the freight corridors in the region were tabulated.

Vehicle miles traveled (VMT) for the freight corridor routes were estimated from the base year Highway Performance Monitoring System (HPMS) data provided by TDOT and MDOT and were used to calculate an aggregate average crash rates by functional classification for the region. The actual crash rates were then compared to the Tennessee statewide average crash rates for the same facility types. The number of crashes on interstate, arterial, and collector freight corridors was 36,952. The daily VMT over those same segments of roadway was 32,001,857. The resulting crash rate is 1.05 crashes per million vehicle miles traveled compared to an aggregate statewide rate of 1.75 crashes per million vehicle miles traveled. Crash statistics are provided for each freight zone and freight area in Appendix 3.

Figure 5-17 illustrates the relative location and density of crashes in the region on the freight corridors. Across the region, crash densities ranged from 0 to 300 crashes per year per square mile for freight corridors.
To reduce the incidents of crashes and to mitigate the traffic impact of crashes when they occur, the following strategies can be used:

- Continuation and expansion of the Tennessee Traffic Incident Management (TIM),
- Expansion of the Tennessee HELP and Mississippi Incident Management Program
- Implementation of the respective State Highway Safety Performance Plan (HSPP)
- Strategic Highway Safety Improvement Program (HSIP)
- Implementation of the High Risk Rural Road Safety Program (HRRR)
- Implementation of the TDOT Work Zone Safety and Mobility (WZSM) Program
- Continuation of the respective state’s highway-railroad grade crossing safety program
- Development and maintenance of transportation safety performance measures for the region through the state and MPO.
Chapter 6 – Railroad Network

Greater Memphis Regional Freight Plan
# Greater Memphis Regional Freight Plan

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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
6.1 Freight Rail Network

There are five Class I railroads which operate within the Greater Memphis region: Union Pacific (UP), Norfolk Southern (NS), Burlington Northern Santa Fe (BNSF), CSX Transportation (CSX), and Canadian National (CN). Each of these railroads connects Memphis with other parts of the U.S. as shown in Figure 6-1. The eastern U.S. is connected to Memphis via CSX and NS, while the UP and BNSF connect the Greater Memphis region with points west of the Mississippi River. The rail line for the CN is aligned north-south between Chicago and New Orleans.

Figure 6-1: Freight Rail Connections with the Greater Memphis Region
At the regional level, the freight rail system closely mirrors the broader connections of the national network. CN traverses the region in a north-south direction, while CSX and NS connect to Memphis from the eastern side of Memphis. The BNSF and UP connect in from the west over the only two Mississippi River railroad bridges in Memphis.

According to the Memphis Regional Freight Infrastructure Plan, Class I’s own over 91% of the region’s rail network with 80% of it owned by CN, BNSF, and UP. The remainder of the network is owned by short-line railroads. Grenada Railway (GRYR) owns the Grenada line south of the Mississippi/Tennessee state line. RJ Corman (RJCK) owns several spurs that connect with BNSF’s Tennessee Yard.

CN is also the sole owner of rail lines entering and leaving Presidents Island and Pidgeon Industrial Park, two prominent commercial areas of Memphis. In addition, CN and CSX jointly operate the Memphis Gateway Terminal located in Pidgeon’s Industrial Park. Other operators maintain strong stake in the region, but often have to coordinate with CN for track agreements. The freight rail network in the region is shown in Figure 6-2.
The CN may have the most access and flexibility of these railroads with two routes through the region as well as numerous spurs. Most of the other railroads need to connect with the CN in order to connect with each other. Overall, together this network of rail routes connects Memphis with other U.S. Megaregions.

6.1.1 Corridors

Based on available Federal Railroad Administration (FRA) data, the main freight corridors in the Greater Memphis region include the CN lines to Presidents Island and Pidgeon Industrial Park, the NS main line heading east from the region, and the BNSF main line heading southeast from the region. Portions of the heavily utilized NS and BNSF lines parallel main roadway corridors: Poplar Avenue and Lamar Avenue, respectively. Figure 6-3
depicts the FRA train count data at crossings around the region. In July 2010, the Memphis Urban Area Metropolitan Planning Organization (MPO) conducted a study of the Poplar corridor to analyze the effects of rail-road at-grade crossings.

Figure 6-3: Freight Train Counts at Crossings Based on FRA Crossing Data

6.1.2 Terminals

Rail freight terminals are locations where rail freight can be loaded, unloaded, or transferred. Rail freight terminals can include classification yards, intermodal facilities, and transload facilities. Rail classification yards are locations where freight cars are stored, sorted, and assembled into trains according to their destination and
traffic. Intermodal rail terminals are facilities where large freight, generally in shipping containers, is transferred between rail and other modes.

There are five intermodal rail terminals within the Memphis region capable of container lifts, which are shown in Figure 6-4. Of these sites, the UP’s Marion Intermodal facility is located in Arkansas. The Memphis Intermodal Gateway, which is a joint facility between the CN and the CSX, is strategically located in Pidgeon Industrial Park within the International Port of Memphis. BNSF’s Memphis Intermodal Facility is adjacent to Lamar Avenue, which is a main freight corridor within the region. The NS located their Rossville Intermodal yard outside of Shelby County near the Mississippi border. The NS facility at Forrest Yard still operates but most container traffic is out of the Rossville facility. All of the intermodal rail facilities in the region operate 24 hours a day / seven days a week except for the CN/CSX Memphis Intermodal Gateway.

Figure 6-4: Intermodal Facilities

6.2 Bottlenecks

Within a freight rail network, bottlenecks can occur because of network, line, or yard capacity issues as well as because of delays at crossings (rail-rail or rail-highway). There are upwards of 500 highway-rail at-grade crossings within the Greater Memphis region. Figure 6-5 displays the roadway volumes for at-grade crossings throughout the Greater Memphis region. The Poplar Avenue (NS) and Lamar Avenue (BNSF) corridors experience high volumes of both trains and vehicles using the at-grade crossings. Depending on the number of trains per day and the length of trains, at-grade crossings can create delays for highway traffic including trucks carrying freight. The traffic flow is affected by the length of time for the crossing closure and the frequency of closure events as well as proximity to signalized intersections.
From a rail network capacity and bottleneck perspective, it appears that there is sufficient capacity for the existing freight demand. However, one location for a potential bottleneck is the Mississippi River. Currently, only two railroad bridges exist in the region. Displayed in Figure 6-6, one is operated by BNSF (Frisco Bridge) and the other by the UP (Harahan Bridge). In the event that one of these bridges becomes unusable, the rail network would be limited to only one Mississippi River crossing.
6.3 Connectivity to Other Regions

The Greater Memphis region’s rail infrastructure provided earlier in this chapter describe the local interactions and bottlenecks of the regional rail network. This section analyzes regional trading partners and commodities to identify how the Greater Memphis region fits in the national rail network. Understanding that fit helps identify the connections that are the most critical to the efficient movement of goods throughout the Region and support the national economy.

6.3.1 Trading Partners

Examining the Greater Memphis region’s freight movements provides insights into the corridors used by regional industries. Summaries of both bulk and high value movements highlight the major corridors in which the Region’s economy survives. The following figures and descriptions provide an overview of trading partners with the Memphis region. It is important to note that the FAF zone geography used in the figures does not represent UP’s operations in Arkansas.

The 2015 Freight Profile with Megaregions by tonnage was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Railroad (Rail). Tonnage was tabulated between all eleven megaregions and Memphis FAF zone by incoming and outgoing freight. Detailed tables of the tonnage and value information are available in Appendix 1. The top three rail Megaregions by Kilotons were Gulf Coast (1,272.1), Great Lakes (364.1), and Florida (344.2). An opportunity area of growth was the Arizona Sun Corridor (18.3). See Figure 6-7.
Figure 6-7: Rail Freight Movement between Memphis FAF Zone and Megaregions by Kilotons
Freight movement between the Memphis FAF zone and eight Gateway Cities was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Railroad (Rail). The 2015 tonnage was tabulated by incoming and outgoing freight to reveal trends for freight movement. The top three rail Gateway Cities by Kilotons were Nashville, TN (69.9); Cincinnati, OH (56.6); and Kansas City, MO (31.8). A growth opportunity was El Paso, TX (1.8). See Figure 6-8.

Figure 6-8: Rail Freight Movement between Memphis FAF Zone and Gateway Cities by Kilotons.
The 2015 Freight Profile with Megaregions by value was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Railroad (Rail). Value was tabulated between all eleven megaregions and Memphis FAF zone by incoming and outgoing freight. The top three rail Megaregions by value in millions of dollars were Southern California ($2,528.0), Great Lakes ($657.6), and Gulf Coast ($523.7). Opportunity areas for growth include the Piedmont-Atlantic ($6.3), Arizona Sun ($17.8), and Cascadia ($26.7). See Figure 6-9.

Figure 6-9: Rail Freight Movement between Memphis FAF Zone and Megaregions in Millions of Dollars
Freight movement between the Memphis FAF zone and eight Gateway Cities was also obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Railroad (Rail) freight Value. The 2015 value was tabulated by incoming and outgoing freight to reveal trends for freight Value in Millions of Dollars. The top three rail Gateway Cities were Cincinnati, OH ($84.1); Nashville, TN ($25.0); and Kansas City, MO ($9.1). A growth opportunity was El Paso, TX ($1.5). See Figure 6-10.

Figure 6-10: Rail Freight Movement between Memphis FAF Zone and Gateway Cities in Millions of Dollars
6.3.2 Commodities

Reviewing top inbound and outbound commodities among rail movements indicates the industries most important to the region. The Regional Freight Profile of commodity mix was obtained from the Freight Analysis Framework Data Tabulation Tool\(^1\). Percent of total freight movement was determined by tonnage and value to provide a sense of impact each commodity has within the Greater Memphis region. As of 2015, inbound and outbound commodities moving by rail totaled 9.1 million tons valued at $5.7 billion for the Memphis FAF zone.

Commodity by value is led by Other Foodstuffs at $1.1 billion or 20.5 percent of the regional total. Following Other Foodstuffs is Basic Chemicals, accounting for $1 billion or 18.2 percent, and Cereal Grains, at $807 million or 14.1 percent, of the rail movement market share. The top 10 rail commodities by value equal 82.4 percent of total goods ($5.7 billion). Cereal Grains dominates the share of commodities by tonnage with 38.7 percent, followed by Basic Chemicals and Other Foodstuffs at 18.1 and 16.8 percent respectively. The top 10 rail commodities by tonnage equal 92.9 percent of total goods (8.4 billion tons). Table 6-1 provides top ten Memphis FAF zone rail commodities inbound and outbound by tonnage and value.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal grains</td>
<td>3,537,606</td>
<td>38.7%</td>
<td>Other foodstuffs</td>
<td>$1,172,944,300</td>
<td>20.5%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>1,650,855</td>
<td>18.1%</td>
<td>Basic chemicals</td>
<td>$1,037,212,000</td>
<td>18.2%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>1,534,077</td>
<td>16.8%</td>
<td>Cereal grains</td>
<td>$807,135,700</td>
<td>14.1%</td>
</tr>
<tr>
<td>Gravel</td>
<td>661,464</td>
<td>7.2%</td>
<td>Base metals</td>
<td>$413,633,900</td>
<td>7.2%</td>
</tr>
<tr>
<td>Animal feed</td>
<td>284,149</td>
<td>3.1%</td>
<td>Motorized vehicles</td>
<td>$319,982,500</td>
<td>5.6%</td>
</tr>
<tr>
<td>Base metals</td>
<td>251,506</td>
<td>2.8%</td>
<td>Machinery</td>
<td>$231,698,400</td>
<td>4.1%</td>
</tr>
<tr>
<td>Newsprint/paper</td>
<td>174,309</td>
<td>1.9%</td>
<td>Mixed freight</td>
<td>$193,963,400</td>
<td>3.4%</td>
</tr>
<tr>
<td>Nonmetallic minerals</td>
<td>145,382</td>
<td>1.6%</td>
<td>Newsprint/paper</td>
<td>$184,706,800</td>
<td>3.2%</td>
</tr>
<tr>
<td>Other ag prods.</td>
<td>129,252</td>
<td>1.4%</td>
<td>Chemical prods.</td>
<td>$176,899,300</td>
<td>3.1%</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>116,415</td>
<td>1.3%</td>
<td>Other ag prods.</td>
<td>$167,467,000</td>
<td>2.9%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>8,485,015</strong></td>
<td><strong>92.9%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$4,705,643,300</strong></td>
<td><strong>82.4%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>648,851</strong></td>
<td><strong>7.1%</strong></td>
<td><strong>Total All Other Goods</strong></td>
<td><strong>$1,008,440,200</strong></td>
<td><strong>17.6%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>9,133,866</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$5,714,083,500</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>


Table 6-2 provides top ten inbound rail commodities by tonnage and value for the Memphis FAF zone. Over half of inbound rail commodities are by Cereal Grains, representing 3.5 million tons of the rail freight total which translates to 25.4 percent of the share for value. As of 2015, inbound roadway commodities totaled 6.8 million tons valued at $3.1 billion.

\(^1\) FAF4 2015 Data for the Memphis, TN-MS-AR CFS Area (TN Part)
### Table 6-2: Memphis FAF Zone Top Inbound Commodities for Rail by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal grains</td>
<td>3,510,520</td>
<td>51.4%</td>
<td>Cereal grains</td>
<td>$799,313,000</td>
<td>25.4%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>1,186,704</td>
<td>17.4%</td>
<td>Other foodstuffs</td>
<td>$601,213,200</td>
<td>19.1%</td>
</tr>
<tr>
<td>Gravel</td>
<td>661,423</td>
<td>9.7%</td>
<td>Basic chemicals</td>
<td>$372,000,400</td>
<td>11.8%</td>
</tr>
<tr>
<td>Other foodstuffs</td>
<td>552,915</td>
<td>8.1%</td>
<td>Base metals</td>
<td>$303,596,300</td>
<td>9.7%</td>
</tr>
<tr>
<td>Base metals</td>
<td>148,467</td>
<td>2.2%</td>
<td>Machinery</td>
<td>$219,370,800</td>
<td>7.0%</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>113,620</td>
<td>1.7%</td>
<td>Chemical prods.</td>
<td>$109,397,600</td>
<td>3.5%</td>
</tr>
<tr>
<td>Wood prods.</td>
<td>94,543</td>
<td>1.4%</td>
<td>Electronics</td>
<td>$92,481,300</td>
<td>2.9%</td>
</tr>
<tr>
<td>Nonmetallic minerals</td>
<td>87,411</td>
<td>1.3%</td>
<td>Plastics/rubber</td>
<td>$81,713,100</td>
<td>2.6%</td>
</tr>
<tr>
<td>Chemical prods.</td>
<td>81,293</td>
<td>1.2%</td>
<td>Coal</td>
<td>$72,707,800</td>
<td>2.3%</td>
</tr>
<tr>
<td>Waste/scrap</td>
<td>70,417</td>
<td>1.0%</td>
<td>Textiles/leather</td>
<td>$71,620,900</td>
<td>2.3%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>6,507,314</td>
<td>95.2%</td>
<td><strong>Total Top 10</strong></td>
<td>$2,723,414,400</td>
<td>86.7%</td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td>329,134</td>
<td>4.8%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$419,185,400</td>
<td>13.3%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>6,836,448</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$3,142,599,800</td>
<td>100%</td>
</tr>
</tbody>
</table>


Table 6-3 provides top ten outbound rail commodities by tonnage and value for the Memphis FAF zone. Outbound commodities’ tonnage is dominated by Other Foodstuffs (42.7 percent). Basic Chemicals account for 20.2 percent. By value, commodities are led by Basic Chemicals with 25.9 percent or $665 million of outbound rail freight and followed by Other Foodstuffs at 22.2 percent or $571 million. As of 2015, rail outbound commodities totaled 2.3 million tons valued at $2.5 billion.

### Table 6-3: Memphis FAF Zone Top Outbound Commodities for Rail by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other foodstuffs</td>
<td>981,162</td>
<td>42.7%</td>
<td>Basic chemicals</td>
<td>$665,211,600</td>
<td>25.9%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>464,150</td>
<td>20.2%</td>
<td>Other foodstuffs</td>
<td>$571,731,100</td>
<td>22.2%</td>
</tr>
<tr>
<td>Animal feed</td>
<td>247,207</td>
<td>10.8%</td>
<td>Motorized vehicles</td>
<td>$276,403,600</td>
<td>10.7%</td>
</tr>
<tr>
<td>Newsprint/paper</td>
<td>114,209</td>
<td>5.0%</td>
<td>Mixed freight</td>
<td>$189,896,900</td>
<td>7.4%</td>
</tr>
<tr>
<td>Base metals</td>
<td>103,039</td>
<td>4.5%</td>
<td>Other ag prods.</td>
<td>$137,596,800</td>
<td>5.4%</td>
</tr>
<tr>
<td>Other ag prods.</td>
<td>86,717</td>
<td>3.8%</td>
<td>Newsprint/paper</td>
<td>$132,761,100</td>
<td>5.2%</td>
</tr>
<tr>
<td>Metallic ores</td>
<td>63,462</td>
<td>2.8%</td>
<td>Base metals</td>
<td>$110,037,600</td>
<td>4.3%</td>
</tr>
<tr>
<td>Nonmetallic minerals</td>
<td>57,972</td>
<td>2.5%</td>
<td>Metallic ores</td>
<td>$93,515,500</td>
<td>3.6%</td>
</tr>
<tr>
<td>Motorized vehicles</td>
<td>33,517</td>
<td>1.5%</td>
<td>Animal feed</td>
<td>$81,678,600</td>
<td>3.2%</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>27,086</td>
<td>1.2%</td>
<td>Chemical prods.</td>
<td>$67,501,700</td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>2,178,520</td>
<td>94.8%</td>
<td><strong>Total Top 10</strong></td>
<td>$2,326,334,500</td>
<td>90.5%</td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td>118,898</td>
<td>5.2%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$245,149,200</td>
<td>9.5%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>2,297,418</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$2,571,483,700</td>
<td>100%</td>
</tr>
</tbody>
</table>

Freight moved by rail is typically a high weight good with low value and/or has low time sensitivity. Data obtained from the Freight Analysis Framework Data Tabulation Tool\(^2\) also provides other information on freight trends for the region. Memphis imports twice as much tonnage of freight as it exports to other regions. Whereas the value of the imported freight by rail is only slightly higher than the value of the exported freight (\$3.1 billion vs. \$2.5 billion). Basic chemicals and other foodstuffs are predominant commodities moved by rail into and out of Memphis. Cereal grains are one of the main commodities imported into Memphis via the rail network based on tonnage and value.

The FAF data also shows the primary markets trading with Memphis. As shown in Figure 6-11, the Memphis FAF zone exports most of its rail freight to Detroit, Savannah, Laredo and Nevada. With Chicago as a freight rail hub, it is not surprising that Illinois is the primary provider of freight to the Memphis FAF zone. New Orleans, which is the second largest exporter to the Memphis FAF zone, provides one-fifth the tonnage of Illinois.

Figure 6-11: Top Domestic Rail Freight Partners with Memphis FAF Zone

Volumes to connected networks could be increased with the Greater Memphis region through the additional rail-to-rail connections within the region. The enhanced connectivity would allow the region access to more locations on the respective Class I railroad networks. Such a change would benefit the Greater Memphis region’s supply chains by enabling capacity for more trains to, from, and through the region. Rail-to-rail connections would likely require additional rail lines to be developed that provide direct freight train movements between carriers. Right-of-way acquisition, connection location(s), railroad bridge resilience, and multimodal interfaces could be addressed in a railroad industry supported study.

\(^2\) FAF4 2015 Data for the Memphis, TN-MS-AR  CFS Area (TN Part)
Chapter 7 – Inland Waterways

Greater Memphis Regional Freight Plan

Memphis MPO
METROPOLITAN PLANNING ORGANIZATION
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
7.1 Existing Conditions: Infrastructure and Freight Movement

The Mississippi River watershed is the largest drainage system on the North American Continent. Large precipitation events, drought and runoff all have combined effects on the utilization of waterway freight movement. Silt build-up and water elevation are the two largest contributing factors to channel depth. These factors affect freight movements on the slack waters of the Mississippi River, such as Lake McKellar.

Figure 7-1: Navigable Waterways and Locks

Maintenance of navigable waterways (i.e. dredging) and waterway infrastructure (e.g. wingwalls) is important to the continued functionality of inland waterways. The United States Army Corps of Engineers (USACE) collects...
data on waterway infrastructure (e.g. locks, channel depth) and freight movements. They are also responsible for inspecting and maintaining this infrastructure. Figure 7-1 displays the USACE maintained rivers and locks used for waterborne freight movements. However, port or terminal operators may dredge their berths when necessary. Properly collecting and analyzing data with coordination of maintenance work is critical to port and terminal performance.

Within the Greater Memphis region, waterway infrastructure includes the International Port of Memphis, the Port of West Memphis, and other proprietary terminals. Displayed in Figure 7-2, few facilities are situated along the Mississippi River. However, most industrial sites and terminals are located and served on the slack waters of the Mississippi River. Table 7-1 lists the port facilities present in the Greater Memphis region.
<table>
<thead>
<tr>
<th>Port of Memphis</th>
<th>Lake McKeller</th>
<th>ADM GROWMARK RIVER SYSTEMS, MEMPHIS DOCK</th>
<th>Mile 5.5, right bank, Industrial Channel, approximately 250 feet below foot of Dock Street; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</th>
<th>Shipment of grain, grain by-products, and aggregate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>ADM RIVER PORT CORP., MEMPHIS DOCK</td>
<td>Mile 6.3, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of liquid-bulk commodities including ethanol and vegetable oils.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>AGRILIANCE, MEMPHIS TERMINAL DOCK</td>
<td>Mile 4.7, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt and shipment of agricultural liquid-bulk fertilizers.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>BARNHART CRANE &amp; RIGGING CO., MEMPHIS WHARF</td>
<td>Mile 2.4, right bank, Tennessee Chute; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt and shipment of heavy-lift items.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>BRENNTAG MID-SOUTH, MEMPHIS DOCK</td>
<td>Mile 2.9, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of petroleum products and chemicals.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>CARGILL AG HORIZONS, MEMPHIS TERMINAL ELEVATOR DOCK</td>
<td>Mile 5.4, right bank, Industrial Channel, approximately 800 feet below foot of Dock Street; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of grain.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>CARGILL NORTH AMERICAN SWEETNERS, MEMPHIS DOCKS</td>
<td>Mile 3.2, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of grain (corn); and shipment of feed products.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Cargill North American Sweetners, Memphis Grain Dock.</td>
<td>Mile 3.3, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Shipment of liquid sweeteners.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Cummings Marine Service, Memphis Fleet &quot;B&quot;.</td>
<td>Mile 5.7, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Mooring barges for fleeting.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>CUMMINGS MARINE SERVICE, MEMPHIS FLEET MOORINGS</td>
<td></td>
<td>Receipt and shipment of petroleum products, chemicals, and vegetable oils. (See Remarks.)</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Ergon, Memphis &quot;A&quot; Dock.</td>
<td>Mile 5.3, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of petroleum products, asphalt, miscellaneous chemicals, and vegetable oils; mooring midstream-fueling barge and handling marine supplies for ships stores; landing for water taxi.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Ergon, Memphis &quot;B&quot; Dock.</td>
<td>Mile 5.2, right bank, Industrial Channel; at mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of petroleum products, asphalt, miscellaneous chemicals, and vegetable oils; mooring midstream-fueling barge and handling marine supplies for ships stores; landing for water taxi.</td>
</tr>
<tr>
<td>Port</td>
<td>Waterway</td>
<td>Facility Name</td>
<td>Location</td>
<td>Purpose</td>
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</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Ergon, Memphis &quot;C&quot; Dock.</td>
<td>Mile 5.1, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt of petroleum products.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>ERGON, MEMPHIS DOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>FLEISCHMANN'S YEAST, MEMPHIS MOLASSES DOCK</td>
<td>Left bank, Riverport Harbor Channel, approximately 0.7 mile above mile 5.3, McKellar Lake; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt of molasses.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>GLOBAL MATERIALS SERVICES, MEMPHIS WHARF B</td>
<td>Mile 5.6, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of steel products. (See Remarks.)</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>HELM FERTILIZER TERMINAL, MEMPHIS DOCKS</td>
<td>Mile 6.0, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt of dry-bulk fertilizer including potash by barge.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Helm Fertilizer Terminal, Memphis Dry-Bulk Dock.</td>
<td>Mile 5.9, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt of anhydrous ammonia, nitrogen solution, and ammonium thiosulfate (ATS).</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>HOLCIM (US), MEMPHIS TERMINAL</td>
<td>Mile 4.9, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of cement.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>KINDER MORGAN BULK TERMINALS</td>
<td>Mile 6.5, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of conventional-and-containerized general cargo; steel and steel by-products; and liquid- and dry-bulk commodities including grain, fertilizer, ammonia, and caustic soda.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>LASH INTERMODAL TERMINAL CO. (LITCO), MEMPHIS DOCK</td>
<td>Left bank, Riverport Harbor Channel, approximately 1 mile above mile 5.3, McKellar Lake; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of heavy-lift items; and of general cargo via LASH barges.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>MARTIN MARIETTA AGGREGATES, MEMPHIS DOCK</td>
<td>Mile 4.1, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of limestone and coal; and handling materials and supplies.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>MEMPHIS CEMENT, MEMPHIS TERMINAL WHARF</td>
<td>Mile 4.0, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of cement.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>MEMPHIS DOCK AND FLEET MOORING</td>
<td>Mile 3.9, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Mooring floating drydock and company-owned floating equipment; mooring barges for fleeting.</td>
</tr>
<tr>
<td>Port</td>
<td>Waterway</td>
<td>Facility Name</td>
<td>Location</td>
<td>Purpose</td>
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</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>MEMPHIS MARINE SERVICE, TENNESSEE CHUTE FLEET MOORING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>PREMCOR A VALERO CO., MEMPHIS REFINERY DOCK</td>
<td>Mile 6.2, left bank, McKellar Lake, approximately 400 feet above mouth of Nonconnah Creek; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of petroleum products and chemicals; and loading midstream-fueling barges.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Premcor Refining Group, Memphis Refinery Lower Dock.</td>
<td>Mile 6.4, left bank, McKellar Lake, and above mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of petroleum products and caustic soda; loading midstream-fueling barges.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>Premcor Refining Group, Memphis Refinery Middle Dock.</td>
<td>Mile 6.8, left bank, at upper end of McKellar Lake; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of petroleum products.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>RAILWORKS WOOD PRODUCTS, MEMPHIS DOCK</td>
<td>Mile 5.8, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and occasional shipment of coal tar.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>RIVER CEMENT SALES CO., MEMPHIS TERMINAL DOCK</td>
<td>Mile 3.7, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of bulk cement by barge.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>SEMMATERIALS, MEMPHIS DOCK</td>
<td>Mile 6.2, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Receipt and shipment of asphalt.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>TENNESSEE VALLEY AUTHORITY AND THOMAS H ALLEN PLANT MEMPHIS WHARF</td>
<td>Mile 3.0, left bank, entrance to McKellar Lake Power Plant Slip; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of coal and fuel oil for plant consumption.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>TRUMBULL ASPHALT, MEMPHIS DOCK</td>
<td>Mile 4.4, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of asphalt.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>U.S. ARMY CORPS OF ENGINEERS, ENSLEY YARD, MEMPHIS WHARF</td>
<td>Mile 4.0, left bank, McKellar Lake; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Mooring government-owned floating equipment.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>VERTEX CHEMICAL CORP., MEMPHIS TERMINAL DOCK</td>
<td>Mile 2.8, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of caustic soda.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>W.M. BARR AND CO., MEMPHIS DOCK</td>
<td>Mile 5.2, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of chemical solvents.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>WEPFER MARINE, MCKELLAR LAKE FLEET MOORING</td>
<td>Miles 2.2-2.4, right bank, and miles 2.3-2.9, left bank, Tennessee Chute; mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Mooring barges for fleeting.</td>
</tr>
<tr>
<td>Port</td>
<td>Waterway</td>
<td>Facility Name</td>
<td>Location</td>
<td>Purpose</td>
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<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>WEPFER MARINE, MEMPHIS REPAIR YARD MOORING</td>
<td>Mile 3.5, right bank, Industrial Channel; and mile 725.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Mooring floating drydocks, towboats, and barges for repair; mooring company-owned floating equipment.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Lake McKeller</td>
<td>WILLIAM C. ELLIS, MEMPHIS MOORING</td>
<td>Mile 6.7, left bank, McKellar Lake; and mile 725.5 AHP, left bank, Mississippi River, Memphis TN.</td>
<td>Mooring company-owned floating equipment.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>AMERICAN COMMERCIAL TERMINALS, MEMPHIS DOCK</td>
<td>Mile 734.4 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt and shipment of liquid-bulk commodities including vegetable oils, chemicals, and petroleum products; receipt of waste oil; and fueling towboats and river-excursion vessels; mooring midstream-fueling barge. (See Remarks.)</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>Economy Boat Store, Memphis Dock.</td>
<td>Mile 734.5 AHP, left bank, Mississippi River, Memphis.</td>
<td>Mooring midstream-fueling barges; handling marine supplies; and fueling towboats.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>ECONOMY BOAT STORE, MEMPHIS DOCKS</td>
<td></td>
<td>Receipt of petroleum products.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>EXXONMOBIL, MEMPHIS TERMINAL DOCK</td>
<td>Mile 734.2 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of dry-bulk commodities including coal, salt, stone, potash, urea, ammonium sulfate, ores, pig iron, and steel products; and shipment of iron ore, scrap metal, and grain; mooring barges for fleeting.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>FULLEN DOCK AND WAREHOUSE, MEMPHIS WHARVES</td>
<td>Mile 740.5 AHP, left bank, Mississippi River, Memphis.</td>
<td></td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>GLOBAL MATERIALS SERVICES, WEST MEMPHIS DOCKS</td>
<td>Miles 734.1 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of gasoline and diesel fuel.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>LION OIL CO., MEMPHIS TERMINAL DOCK</td>
<td>Mile 739.0 AHP, left bank, Mississippi River, above mouth of Wolf River (New Channel).</td>
<td>Receipt of chemicals including ammonia, acetone, methylmethacrylate (MMA), and methanol.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Mississippi River</td>
<td>LUCY WOODSTOCK UTILITY TERMINAL, MEMPHIS DOCK</td>
<td>Mile 733.6 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of coal and stone.</td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Pidgeon Industrial Harbor</td>
<td>NUCOR STEEL MEMPHIS (CWIS 152146)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port of Memphis</td>
<td>Waterway</td>
<td>Facility Name</td>
<td>Location</td>
<td>Purpose</td>
</tr>
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</tr>
<tr>
<td>Wolf River Harbor</td>
<td>Port of Memphis</td>
<td>BUNGE CORP., MEMPHIS ELEVATOR DOCK</td>
<td>Mile 2.3, left bank, Wolf River, approximately 1.4 miles above Interstate Highway 40 Bridge; and mile 735.8 AHP, left bank, Mississippi River, Memphis.</td>
<td>Shipment of grain.</td>
</tr>
<tr>
<td>Wolf River Harbor</td>
<td>Port of Memphis</td>
<td>CARGILL AG HORIZONS, WOLF RIVER GRAIN ELEVATOR DOCK</td>
<td>Mile 2.8, left bank, Wolf River, approximately 1,500 feet below Wolf River Dam; and mile 735.8 AHP, left bank, Mississippi River, Memphis.</td>
<td>Shipment of grain.</td>
</tr>
<tr>
<td>Wolf River Harbor</td>
<td>Port of Memphis</td>
<td>LAFARGE NORTH AMERICA, MEMPHIS TERMINAL DOCK</td>
<td>Mile 1.9, left bank, Wolf River, approximately 1 mile above Interstate Highway 40 Bridge; and mile 735.8 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of bulk cement.</td>
</tr>
<tr>
<td>Wolf River Harbor</td>
<td>Port of Memphis</td>
<td>LONE STAR INDUSTRIES, MEMPHIS TERMINAL DOCK</td>
<td>Mile 0.9, left bank, Wolf River, below Interstate Highway 40 Bridge; and mile 735.8 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of bulk cement.</td>
</tr>
<tr>
<td>Wolf River Harbor</td>
<td>Port of Memphis</td>
<td>WESTWAY TERMINAL CO., MEMPHIS DOCK</td>
<td>Mile 2.7, left bank, approximately 2,000 feet below Wolf River Dam; and mile 735.8 AHP, left bank, Mississippi River, Memphis.</td>
<td>Receipt of molasses; and occasional receipt of vegetable oil.</td>
</tr>
<tr>
<td>Mississippi River</td>
<td>Port of West Memphis</td>
<td>APAC TENNESSEE, MEMPHIS TERMINAL DOCKS</td>
<td>Mile 730.0 AHP, right bank, Mississippi River, West Memphis.</td>
<td>Occasional receipt of crushed stone and sand.</td>
</tr>
<tr>
<td>Mississippi River</td>
<td>Port of West Memphis</td>
<td>APAC Tennessee, West Memphis Dock.</td>
<td>Mile 727.7 AHP, right bank, Mississippi River, West Memphis.</td>
<td>Receipt and shipment of general cargo, miscellaneous dry-bulk materials, and steel products; shipment of grain.</td>
</tr>
<tr>
<td>Mississippi River</td>
<td>Port of West Memphis</td>
<td>Global Materials Services, West Memphis Lower Dock.</td>
<td>Mile 727.8 AHP, right bank, Mississippi River, West Memphis.</td>
<td>Receipt and shipment of miscellaneous dry-bulk materials and general cargo. (See Remarks.)</td>
</tr>
<tr>
<td>Mississippi River</td>
<td>Port of West Memphis</td>
<td>Global Materials Services, West Memphis Upper Dock.</td>
<td>Mile 728.7 AHP, right bank, Mississippi River, West Memphis.</td>
<td>Receipt and shipment of petroleum products.</td>
</tr>
<tr>
<td>Port of West Memphis</td>
<td>Mississippi River</td>
<td>RICELAND FOODS, WEST MEMPHIS EXPORT TERMINAL DOCK</td>
<td>Mile 727.5 AHP, right bank, Mississippi River, West Memphis.</td>
<td>Shipment of grain and rice.</td>
</tr>
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</tr>
<tr>
<td>Port of West Memphis</td>
<td>Mississippi River</td>
<td>WARREN UNILUBE, WEST MEMPHIS DOCK</td>
<td>Mile 729.1 AHP, right bank, Mississippi River, West Memphis.</td>
<td>Receipt and shipment of petroleum products; receipt of lubricating oil and ethylene glycol.</td>
</tr>
</tbody>
</table>

7.1.1 Trading Partners

Examining the Greater Memphis region’s freight movements provides insights into the corridors used by regional industries. Summaries of both bulk and high value movements highlight partners with the Memphis region. It is important to note that the FAF zone geography used in the figures does not represent operations in Arkansas. Detailed tables of the tonnage and value information are available in Appendix 1.

The 2015 Freight Profile with Megaregions by tonnage was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Water (River). Tonnage was tabulated between all eleven megaregions and the Memphis FAF zone by incoming and outgoing freight. The top river Megaregion by Kilotons was Gulf Coast (4,602). Areas of opportunity for growth include the Great Lakes (8.1), and Northeast (.3). See Figure 7-3.

Figure 7-3: River Freight Movement between Memphis FAF Zone and Megaregions by Kilotons
Freight movement between the Memphis FAF zone and eight Gateway Cities was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Water (River). The 2015 tonnage was tabulated by incoming and outgoing freight to reveal trends for freight movement. The top river Gateway City by Kilotons was St. Louis, MO (64.8). A growth opportunity was Minneapolis, MN (.01). See Figure 7-4.

Figure 7-4: River Freight Movement between Memphis FAF Zone and Gateway Cities by Kilotons
The 2015 Freight Profile with Megaregions by value was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Water (River). Value was tabulated for the only three Megaregions and the Memphis FAF zone by incoming and outgoing river freight. The top river Megaregions by value in millions of dollars were Gulf Coast ($3,421.1) and Great Lakes ($38.9). An area of opportunity for growth was Northeast ($12.4). See Figure 7-5.

Figure 7-5: River Freight Movement between Memphis FAF Zone and Megaregions in Millions of Dollars
Freight movement between the Memphis FAF zone and eight Gateway Cities was also obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Water (River) freight Value. The 2015 value was tabulated by incoming and outgoing freight to reveal trends for freight Value in Millions of Dollars. The top river Gateway Cities was St. Louis, MO ($4.8). A growth opportunity was Minneapolis, MN ($0.01). See Figure 7-6.

Figure 7-6: River Freight Movement between Memphis FAF Zone and Gateway Cities in Millions of Dollars
7.1.2 Commodities

Reviewing top inbound and outbound commodities among river movements indicates the industries most important to the region. The Regional Freight Profile of commodity mix was obtained from the Freight Analysis Framework Data Tabulation Tool. Percent of total freight movement was determined by tonnage and value to provide a sense of impact each commodity has within the Greater Memphis region. As of 2015, inbound and outbound commodities moving by river totaled 7.7 million tons valued at $3.6 billion for the Memphis FAF zone.

Commodity by value is dominated by Gasoline at $1.8 billion with half of the regional total. Following Gasoline is Fuel Oils, accounting for $1 billion or 28.5 percent, and Other Agricultural Products, at $483 million or 13.5 percent, of the Memphis rail movement market share. The top 10 river commodities by value equals 99 percent of total goods ($3.6 billion). Gravel and Gasoline dominate the share of commodities by tonnage with 36.6 and 23.4 percent, respectively. The top 10 river commodities by tonnage equals 99.9 percent of total goods (7.7 million tons). Table 7-2 provides top ten river commodities inbound and outbound by tonnage and value for the Memphis FAF zone.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>2,822,763</td>
<td>36.6%</td>
<td>Gasoline</td>
<td>$1,792,852,500</td>
<td>50.0%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1,804,379</td>
<td>23.4%</td>
<td>Fuel oils</td>
<td>$1,022,747,900</td>
<td>28.5%</td>
</tr>
<tr>
<td>Other ag prods.</td>
<td>1,187,107</td>
<td>15.4%</td>
<td>Other ag prods.</td>
<td>$482,995,900</td>
<td>13.5%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>1,092,213</td>
<td>14.2%</td>
<td>Cereal grains</td>
<td>$120,320,000</td>
<td>3.4%</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>565,623</td>
<td>7.3%</td>
<td>Crude petroleum</td>
<td>$56,678,600</td>
<td>1.6%</td>
</tr>
<tr>
<td>Crude petroleum</td>
<td>98,389</td>
<td>1.3%</td>
<td>Fertilizers</td>
<td>$20,931,100</td>
<td>0.6%</td>
</tr>
<tr>
<td>Nonmetal min. prods.</td>
<td>64,856</td>
<td>0.8%</td>
<td>Base metals</td>
<td>$16,815,700</td>
<td>0.5%</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>40,795</td>
<td>0.5%</td>
<td>Gravel</td>
<td>$15,242,500</td>
<td>0.4%</td>
</tr>
<tr>
<td>Base metals</td>
<td>23,723</td>
<td>0.3%</td>
<td>Electronics</td>
<td>$9,294,900</td>
<td>0.3%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>1,876</td>
<td>0.0%</td>
<td>Pharmaceuticals</td>
<td>$9,059,300</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>7,701,723</strong></td>
<td><strong>99.9%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$3,546,938,400</strong></td>
<td><strong>99.0%</strong></td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td><strong>5,308</strong></td>
<td><strong>0.1%</strong></td>
<td><strong>Total All Other Goods</strong></td>
<td><strong>$36,314,400</strong></td>
<td><strong>1.0%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>7,707,031</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$3,583,252,800</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>


Table 7-3 provides top ten inbound river commodities by tonnage and value for the Memphis FAF zone. Gravel accounts for 46.7 percent of inbound tonnage but only represents 0.5 percent of inbound value. 29.9 percent of inbound river commodities are by Gasoline, representing 1.8 million tons of the river freight total. This translates to 60.1 percent of the share for value at $1.8 billion. As of 2015, inbound river commodities totaled 6 million tons valued at $2.9 billion.

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1 FAF4 2015 Data for the Memphis, TN-MS-AR CFS Area (TN Part)
### Table 7-3: Memphis FAF Zone Top Inbound Commodities for River by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>2,822,763</td>
<td>46.7%</td>
<td>Gasoline</td>
<td>$1,792,852,500</td>
<td>60.1%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1,804,379</td>
<td>29.9%</td>
<td>Fuel oils</td>
<td>$1,022,747,900</td>
<td>34.3%</td>
</tr>
<tr>
<td>Fuel oils</td>
<td>1,092,213</td>
<td>18.1%</td>
<td>Crude petroleum</td>
<td>$56,678,600</td>
<td>1.9%</td>
</tr>
<tr>
<td>Crude petroleum</td>
<td>98,389</td>
<td>1.6%</td>
<td>Fertilizers</td>
<td>$20,931,100</td>
<td>0.7%</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>87,979</td>
<td>1.5%</td>
<td>Cereal grains</td>
<td>$18,791,700</td>
<td>0.6%</td>
</tr>
<tr>
<td>Nonmetal min. prods.</td>
<td>64,856</td>
<td>1.1%</td>
<td>Base metals</td>
<td>$16,060,800</td>
<td>0.5%</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>40,795</td>
<td>0.7%</td>
<td>Gravel</td>
<td>$15,242,500</td>
<td>0.5%</td>
</tr>
<tr>
<td>Base metals</td>
<td>23,632</td>
<td>0.4%</td>
<td>Electronics</td>
<td>$9,198,200</td>
<td>0.3%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>1,802</td>
<td>0.0%</td>
<td>Machinery</td>
<td>$6,801,400</td>
<td>0.2%</td>
</tr>
<tr>
<td>Machinery</td>
<td>1,343</td>
<td>0.0%</td>
<td>Plastics/rubber</td>
<td>$6,796,900</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>6,038,150</td>
<td>99.9%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$2,966,101,600</td>
<td>99.4%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>6,041,830</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$2,984,577,200</td>
<td>100%</td>
</tr>
</tbody>
</table>


Table 7-4 provides top ten outbound river commodities by tonnage and value for the Memphis FAF zone. Outbound commodities dominated by Other Agricultural Products both in tonnage (71.3 percent) and value (80.7 percent). After Other Agricultural Products, Cereal Grains accounts for 28.7 percent of outbound tonnage and 17 percent of outbound value for river freight. As of 2015, river outbound commodities totaled 1.6 million tons valued at $598 million.

### Table 7-4: Memphis FAF Zone Top Outbound Commodities for River by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other ag prods.</td>
<td>1,187,107</td>
<td>71.3%</td>
<td>Other ag prods.</td>
<td>$482,995,900</td>
<td>80.7%</td>
</tr>
<tr>
<td>Cereal grains</td>
<td>477,644</td>
<td>28.7%</td>
<td>Cereal grains</td>
<td>$101,528,300</td>
<td>17.0%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>119</td>
<td>0.0%</td>
<td>Pharmaceuticals</td>
<td>$9,059,300</td>
<td>1.5%</td>
</tr>
<tr>
<td>Base metals</td>
<td>91</td>
<td>0.0%</td>
<td>Precision instruments</td>
<td>$2,016,900</td>
<td>0.3%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>75</td>
<td>0.0%</td>
<td>Base metals</td>
<td>$754,900</td>
<td>0.1%</td>
</tr>
<tr>
<td>Precision instruments</td>
<td>73</td>
<td>0.0%</td>
<td>Printed prods.</td>
<td>$534,500</td>
<td>0.1%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>37</td>
<td>0.0%</td>
<td>Machinery</td>
<td>$496,100</td>
<td>0.1%</td>
</tr>
<tr>
<td>Printed prods.</td>
<td>16</td>
<td>0.0%</td>
<td>Plastics/rubber</td>
<td>$455,100</td>
<td>0.1%</td>
</tr>
<tr>
<td>Nonmetallic minerals</td>
<td>11</td>
<td>0.0%</td>
<td>Basic chemicals</td>
<td>$399,500</td>
<td>0.1%</td>
</tr>
<tr>
<td>Machinery</td>
<td>6</td>
<td>0.0%</td>
<td>Motorized vehicles</td>
<td>$174,300</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>1,665,179</td>
<td>100.0%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$598,414,800</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>1,665,201</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$598,675,600</td>
<td>100%</td>
</tr>
</tbody>
</table>

7.1.3 Mississippi River Traffic

The USACE keeps track of the traffic information along the nation’s navigable waterways by segment and port. The Ohio River confluence with the Mississippi River to Baton Rouge, Louisiana forms a segment from mile 954 southward to mile 236. The Port of Memphis is located between mile 741.0 and 715.5 for the purposes of the river volume information. Figure 7-7 depicts the total receipts plus shipments plus intra segment movements of freight on the respective segments. The through traffic on the Mississippi River for the Ohio River to Baton Rouge segment ranges between 135.5 and 155.8 million tons over the same period.

Figure 7-7: Volume of Freight Movement on Mississippi River by Segment (2010-2014)

The Port of Memphis is a viable point of transfer for freight on and off the River. Displayed in Figure 7-8, the detail for the Port of Memphis receipts, shipments and intra-port movements indicates a recent growth in shipments while receipts have remained high for the calendar years 2010 through 2014.

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2 http://www.navigationdatacenter.us/index.htm
More than 150 million tons of freight moved along the Mississippi River in 2015 near or in the Greater Memphis region, according to the USACE. Figure 7-9 and Table 7-5 display the general waterway geography and directional amount of tonnage carried on the waterway. Roughly twice the amount of tonnage is moving downstream as opposed to upstream on the Mississippi River. The downstream freight traffic contains goods are generally destined for Louisiana ports.
Table 7-5: Directional Movement of Freight on Regional Inland Waterways by Tonnage

<table>
<thead>
<tr>
<th></th>
<th>South of Lake Mckellar</th>
<th>Lake Mckellar</th>
<th>Near Presidents Island</th>
<th>Wolf River</th>
<th>North of Wolf River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream Tons</td>
<td>46,684,132</td>
<td>3,680,911</td>
<td>46,899,738</td>
<td>53,233</td>
<td>47,026,450</td>
</tr>
<tr>
<td>Downstream Tons</td>
<td>110,536,415</td>
<td>2,710,535</td>
<td>111,962,240</td>
<td>485,117</td>
<td>112,451,695</td>
</tr>
</tbody>
</table>

In the upstream direction, the tonnage of materials shipped along the Mississippi River consists primarily of chemicals (36%), crude materials (31%), and manufactured goods (20%), as shown in Figure 7-10. In the downstream direction, farm products dominate at more than 50 percent of total downstream tonnage. Coal, petroleum products, and crude materials account for similar amounts of tonnage being shipped downstream (each are less than 15% of total tonnage).
The volume and type of freight moving on Lake McKellar provides some key insights into the contribution to inland waterways to freight movements in the Greater Memphis region. Much of the landside infrastructure is located along the slack waters on Presidents Island and Pidgeon Industrial Park. Figure 7-11 presents the upstream and downstream freight tonnage on Lake McKellar. Petroleum products dominate at nearly 40 percent of the total tonnage of freight, likely because of the presence of the large Valero refinery. Aside from petroleum products, farm products are the second largest volume of freight at over 1 million tons; most of which is transported out of the region.

Over 1.4 million tons of coal is moved into the region along Lake McKellar for the Tennessee Valley Authority’s (TVA) Allen Fossil Plant. It is situated on 500 Acres of land in Pidgeon Industrial Park with Lake McKellar access. TVA currently operates three coal-fired units that rely on a steady stream of imported coal from the north via the Mississippi River. However, all of their coal-fired units are expected to be retired in 2018 as the plant converts to a cleaner natural gas energy source. A significant decrease of coal tonnage moving through Lake McKellar is expected. However, this will increase Lake McKellar capacity for other commodities.

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3 Tennessee Valley Authority – Allen Fossil Plant
https://www.tva.gov/Energy/Our-Power-System/Coal/Allen-Fossil-Plant
Figure 7-11: Lake McKellar Commodities

**Petroleum Products**
- 2.4 Million Tons
- 67% Up Stream
- 33% Down Stream

**Coal**
- 1.4 Million Tons
- 100% Up Stream

**Farm Products**
- 1.1 Million Tons
- 94% Up Stream
- 6% Down Stream

**Chemicals**
- 0.8 Million Tons
- 97% Up Stream
- 3% Down Stream

**Manufactured Goods**
- 0.6 Million Tons
- 100% Up Stream

**Crude Materials**
- 0.1 Million Tons
- 65% Up Stream
- 35% Down Stream

Data Source: USACE - Waterway Network Commodity Data 2015
The slack waters of the Mississippi River also include less commercially dense commercial and industrial areas such as the Wolf River Harbor. Located on the north side of Memphis, this inland waterway contains legacy infrastructure (e.g. terminals) that is crucial to the direct industrial properties it serves, such as elevators for dry bulk. These properties may have a historical advantage even while adjacent land uses or transportation infrastructure changes. It is important to maintain those historical advantages while still managing future growth. The local waterfront access keeps the bulk transfer by vehicles off streets.

7.2 Landside Transportation Networks: Roadway, Railway, Pipelines

Freight activity on the water is inextricably linked to the landside transportation network. River port terminals and their connections to road, rail and pipeline modes are based on each industries individual scale and efficiency in freight movement. The complex network of roads, rail, and pipelines are necessary to move freight to and from the water. In general, the goods moved on the water are low-value, heavy commodities, whose delivery is not time-sensitive (e.g. coal). For these types of materials, the complementary landside transportation mode is generally rail for bulk or heavy materials. The Class I railroads serving the area include Union Pacific (UP), Norfolk Southern (NS), Burlington Northern Santa Fe (BNSF), CSX Transportation (CSX), and Canadian National (CN). The major waterfront activity centers of Presidents Island and Pidgeon Industrial Park are served directly only by CN as can be seen in Figure 7-12.
Waterway freight is the focus of this chapter. However, this section discusses other required modes for the first/last mile. Landside freight movement to both road and rail transit is essential to remain competitive. Both modes have inherent advantages and disadvantages. Roads are subject to congestion during peak hours, but can also maintain responsiveness to a tight schedule. Railroads are well suited for large distances and volumes, but don’t have nearly as an elaborate network as roadways. Because of this duality between market advantages and disadvantages, freight is able to remain competitive by checks and balances. For example, commodity owners will alter freight patterns based on real time price quotes and transit times. The competitive access to multiple modes of freight transit is what helps to make the Greater Memphis region attractive in the commodity industry. Is it important to help all transit modes grow simultaneously to remain competitive on the national and international scale.

**Pipelines**

Industrial facilities such as refineries and chemical plants are often well served by liquid bulk transfer from waterways to pipelines. At an industrial scale, pipelines fill a special use role for specific industries for the gas and liquid product users. Industrial pipelines are different from the trunk and the supply and distribution lines available for retail and residential users. Waterfront terminals may serve as a direct connection to plant pipelines for the transfer of bulk liquids, such as crude oil and anhydrous ammonia. The National Pipeline
Mapping System (NPMS)\(^4\) has county level maps available for gas and hazardous liquid pipelines across the United States. The portion of the map for Shelby County is included in Figure 7-13. Shelby County pipelines are depicted in this section, due to the higher density of pipelines. Other counties, with less dense infrastructure can be viewed individually on the NPMS maps. The Memphis region has 1,491.1 miles of pipeline.\(^5\)

Figure 7-13: Shelby County Pipeline Infrastructure

For industries, the pipelines often serve as a critical link in their use of material and resources. Many refineries are connected to crude oil pipelines as one route to receive crude oil into their facilities. The pipelines may also serve as a critical link in the supply and distribution chain to deliver finished products, such as pipelines to airports for the delivery of jet fuel from more remote storage tank farms.

Pipelines are often located within a dedicated or shared easement right of way that may be leased from other industries, transportation providers, state agencies and utilities. Each location carries some form of warning to surface land uses for the buried pipeline or easement designation.

\(^4\) [https://www.npms.phmsa.dot.gov/](https://www.npms.phmsa.dot.gov/)

\(^5\) Memphis Infrastructure Plan (2010)
Within the Greater Memphis region gas pipelines are used for distribution of energy producing natural gas and gas as a feedstock for use in the petrochemical industry. Finished petroleum product pipelines for jet fuel, diesel fuel and gasoline are used to bring dedicated volumes of products to users and distribution facilities such as the airport and West Memphis distribution terminal respectively.

### 7.3 International Port of Memphis

The International Port of Memphis is the 5th largest inland port in the United States based on total tonnage. As depicted in Figure 7-14, the port has a 15 mile wide reach which serves both the Tennessee and Arkansas side of the Mississippi River. Within its grasp are 66 water fronted facilities, 37 of which are terminals. The port is designated as a Port of Entry and Foreign Trade Zone. Imported commodities can enter the port directly from foreign nations to be inspected and cleared by U.S. Customs and Border Protection. The Port of Memphis’s Foreign Trade Zone status allows for duty-free import/export, storage, exhibition, assembly, manufacturing and processing.

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6 [http://portofmemphis.com/about/](http://portofmemphis.com/about/)

7 [http://portofmemphis.com/about/](http://portofmemphis.com/about/)
The contribution of the Greater Memphis regional economy due to the International Port of Memphis is shown in Figure 7-15. The majority of the economic impact and job creation in 2014 of the port (82% and 88% respectively) occur on the eastern side of the Mississippi in Memphis, TN, where most of the facilities are located.8

![Figure 7-15: International Port of Memphis Regional Impact (2014)](image)

Displaying in Figure 7-16, the International Port of Memphis on the Tennessee side, three separate slack water harbors exist - (1) Pidgeon Industrial, (2) Lake McKellar and (3) Wolf River Harbor.

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8 *The Economic Impact of the Port of Memphis*, 2014
7.3.1 President’s Island

Presidents Island is situated between the Mississippi River and Lake McKellar. A narrow isthmus on the northeastern corner links the Island to downtown Memphis. All waterfront facilities are located along the southeastern edge of the island to provide access to the slack water harbor of Lake McKellar. Hosting a large range of commercial inhabitants, Presidents Island is the largest waterway freight contributor to the Greater Memphis region economy. Providing $5.63 billion out of the $8.46 billion total economic contribution (or 66%) and the same two thirds contribution for employment at 13,200 direct and indirect jobs of total 20,100 jobs (see Figure 7-15).

7.3.2 Frank W. Pidgeon Industrial Area

Pidgeon Industrial Park is bordered by the Mississippi River on the west, Lake McKellar to the north, CN on the east and the Mississippi state line to the south. It is the most recently developed area at the International Port of Memphis and encompasses approximately 2,500 acres of land. Some notable inhabitants include Nucor Steel, TVA Allen Fossil Plant and the USACE Ensley Yard. The majority of undeveloped land within Pidgeon Industrial Park is under lease to agricultural interests. In late 2014, Electrolux, an appliance manufacturer, announced a 600-acre development in the southwest corner of Pidgeon Industrial Park.9 There is continual interest from the

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9 http://portofmemphis.com/projects/
private sector in the utilization of more acreage for commercial and industrial endeavors. As observed in Figure 7-15, the most recent (2014) combined economic impact for Pidgeon industrial park was $1.07 Billion with 3,500 direct and indirect jobs.\(^\text{10}\)

7.3.3 Port of West Memphis

The Port of West Memphis, in Arkansas is currently less developed than the Tennessee side of the river. Currently a handful of proprietary terminals loosely scatter the river’s edge. However, large organizations such as Kinder Morgan and Transammonia have constructed large scale distribution centers with port access. The depth of water along the Port of West Memphis is considerably deeper than the east side of the Mississippi River; allowing for significantly improved efficiency on the western side during periods of low water. The downside is that currents carry surface debris along the western edge of the Mississippi creating a nuisance for freight traffic. Combined with current and future intermodal improvements, the Port of West Memphis is positioning itself for future increases in freight capacity and revenue.

\(^{10}\) The Economic Impact of the Port of Memphis, 2014
7.4 Proprietary Terminals

The Valero and Cargill terminals are two of the largest proprietary terminals in the Memphis Region. Although they are officially considered to be part of the Port of Memphis, these proprietary terminals are the largest contributors to both imports and exports for the entire port. Figure 7-17 displays the location of proprietary terminals in the Port of Memphis.

Figure 7-17: Proprietary Terminals in the International Port of Memphis

7.4.1 Valero Memphis Refinery

The Valero Memphis Refinery has a total throughput capacity of 195,000\(^{11}\) barrels per day. Gasoline, diesel, jet fuel and petrochemicals are produced at this location. Many of the raw materials needed for production are received by barge via the site’s waterfront access.

7.4.2 Cargill

Cargill is an industry leader in the agricultural commodities sector and owns 69 acres of industrial land on Presidents Island with direct harbor access to Lake McKellar. Not only is their Presidents Island facility an

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\(^{11}\) Valero Refinery – Memphis
https://www.valero.com/en-us/Pages/Memphis.aspx
intermodal distribution hub, but it also serves as a manufacturing and processing plant. Cargill is expected to begin operations in a newly constructed facility on Presidents Island in late 2018. They are projecting to produce 20,000 tons in the first year while they slowly ramp up to 200,000 tons/year (full capacity) in addition to their current operations. This will make Cargill’s Memphis facility the world’s largest gas fermentation plant of their type.12

7.5 Emerging and Changing Trade Patterns

The inland waterways represent a freight transportation sector that was first developed as the only available technology to move greater distances before the emergence of roads and railroads. From the early 20th Century onward, the inland waterways have been developed with navigational and hydraulic control structures to efficiently move bulk cargoes, as well as add much needed capacity where one barge is the equivalent of 15 jumbo hopper railcars and 58 large semi-tractor trailers. More recently, as global supply chains have grown and diversified with more cargoes are being considered for movement by barge. Project cargoes and container on barge movements for specialty grains and agricultural products, plastic pellets and other bulk petrochemical products, and semi-finished and finished manufactured goods may now be met by the schedule reliability afforded by barge transport. The longer travel times can be offset by an “Inventory in motion” strategy where adequate river capacity can ultimately matter to the cargo owner / shipper.

7.5.1 Landside Bottlenecks

Large organizations shipping over a long distance on the landside can leverage the rail and roadway networks to increase efficiency. Both Presidents Island and Pidgeon Industrial park have convenient access to CN rail terminals, which may not allow for competition amongst rail carrier. From a roadway perspective, as local roadway congestion increases, so does the freight transit time and cost for businesses.

7.5.2 Navigational Structure Conditions

South of St. Louis, there are no locks and dams on the Mississippi River. This bodes well for Memphis as navigation structures can present large draw backs in efficiency during periods of non-operation since there is no way to bypass the structure. However, locks and dams d upstream of Memphis can have adverse effects on freight movement into and out of the region.

The Chain of Rocks Lock (also known as Lock & Dam 27) near St. Louis, Missouri is the southernmost lock and dam on the Mississippi River. It moves more freight than any other navigation structure on the Mississippi River.13 Under normal operation, this a non-concerning issue, but when the dam is non-operational, there is no possible means to bypass the lock on the waterway network, creating a vital choke point. In 2012, a protection cell along the channel split open, spilling tons of rock into the channel causing unsafe passage. More than 400 barges were stopped in transit and emergency measures were taken to resolve the issue.14

7.5.3 Waterway Network Capacity

The region’s waterway infrastructure capacity in the open channels is sufficient for the foreseeable future levels of freight movement. River levels at shore-side terminals fluctuate as a result of nationwide weather patterns.

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Periodically, low river levels are addressed by light loading of barges. High river levels also present difficulties in barge maneuverability. Due to the increase in extreme weather events, low and high water levels has the potential to effect river traffic with greater frequency.

Shore-side port capacity and infrastructure is influenced by both the water and land side facilities. Rail and road capacity will continue to influence the freight transfer process entering and leaving the inland waterway system. Reducing both marine and land-side congestion where it exists as well as providing additional capacity will require a balance between marine and landside transportation investments. Specific capacity projects and improvement locations will depend upon the anticipated freight movements and industries affected.
Chapter 8 – Air Cargo

Greater Memphis Regional Freight Plan
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
8.1 Regional Air Freight

Displayed in Figure 8-1, the Greater Memphis region has 9 public use airports for their respective flight operations, plus capable of providing air freight or reliever service:

- Memphis International Airport (MEM)
- General DeWitt Spain (M01)
- Millington Regional Jetport (NQA)
- Charles W. Baker (2M8)
- Olive Branch Airport (OLV)

- West Memphis Municipal Airport (AWM)
- Hernando Village Airpark, Inc (H75)
- Wolf River Airport (54M)
- Holly Springs-Marshall County (M41)

Figure 8-1: Public Use Airports in the Greater Memphis Region
Memphis International Airport (MEM) is the only qualified Federal Aviation Administration (FAA) All-Cargo Airport, with aircraft operations exclusively dedicated to the transport of cargo, in the region. The other airports in the Greater Memphis region carry incidental freight or smaller "high priority" items. These may include pharmaceuticals, organs, or replacement parts for industrial machinery. The Tennessee Department of Transportation maintains an airport directory which identifies key airport information.\(^1\) The FAA also maintains airport and runway data that is available for download.\(^2\)

### 8.2 Trading Partners

Examining the Greater Memphis region’s freight movements provides insights into the airports used by regional industries. Summaries of both bulk and high value movements highlight partners with the Memphis region. Detailed tables of the tonnage and value information are available in Appendix 1.

The 2015 Freight Profile with Megaregions by tonnage was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Air (Runway). Tonnage was tabulated between all eleven megaregions and Memphis FAF zone by incoming and outgoing freight. The top three runway Megaregions by Kilotons were Great Lakes (77.9), Northeast (70.6), and Texas Triangle (50.3). Opportunity areas of growth include the Arizona Sun (8.9), Front Range (5.0), and Gulf Coast (2.8). See Figure 8-2.

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1. [https://www.tdot.tn.gov/PublicDocuments/aeronautics/Airport-directory.pdf](https://www.tdot.tn.gov/PublicDocuments/aeronautics/Airport-directory.pdf)
2. [https://www.faa.gov/airports/airport_safety/airportdata_5010/](https://www.faa.gov/airports/airport_safety/airportdata_5010/)
Freight movement between the Memphis FAF zone and eight Gateway Cities was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Air (Runway). The 2015 tonnage was tabulated by incoming and outgoing freight to reveal patterns for freight movement. The top three Gateway Cities by runway Kilotons were Nashville, TN. (9.0); Minneapolis, MN. (6.9); and Louisville, KY (5.0). Opportunity areas of growth include the Oklahoma City, OK (2.1); Tula, OK (1.9); and El Paso, TX (.3). See Figure 8-3.

Figure 8-3: Runway Freight Movement between Memphis FAF Zone and Gateway Cities by Kilotons
The 2015 Memphis’ Freight Profile with Megaregions value was obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Air (Runway). Value was tabulated between all eleven megaregions and Memphis Metropolitan Service Area by incoming and outgoing freight. The top three Runways Megaregions by value in millions of dollars were Northeast ($12,408.6), Great Lakes ($12,148.6), and Cascadia ($9,936.0). Opportunity areas for growth include the Arizona Sun ($1,607.5), Front Range ($661.1), and Gulf Coast ($256.6). See Figure 8-4.

Figure 8-4: Runway Freight Movement between Memphis FAF Zone and Megaregions in Millions of Dollars
Freight movement between the Memphis FAF zone and eight Gateway Cities was also obtained from the Freight Analysis Framework Data Tabulation Tool (FAF4) for Air (Runway) freight Value. The 2015 value was tabulated by incoming and outgoing freight to reveal trends for freight Value in Millions of Dollars. The top three Gateway Cities by runway were Minneapolis, MN ($2,634.3); Nashville, TN ($1,477.6); and Louisville, KY ($586.8). Opportunity areas for growth include Tulsa, OK ($189.8); Oklahoma City, OK ($174.6); and El Paso, TX ($52.2). See Figure 8-5.

Figure 8-5: Runway Freight Movement between Memphis FAF Zone and Gateway Cities in Millions of Dollars
8.3 Commodities

Reviewing top inbound and outbound commodities among runway movements indicates the industries most important to the region. The Regional Freight Profile of commodity mix was obtained from the Freight Analysis Framework Data Tabulation Tool\(^3\). Percent of total freight movement was determined by tonnage and value to provide a sense of impact each commodity has within the Greater Memphis region. As of 2015, inbound and outbound commodities moving by runway totaled 468,882 tons valued at $81.9 billion for the Memphis FAF zone.

Commodity by tonnage and value is dominated by Electronics at 129,983 tons and $29.6 billion. This represents over one-fourth of commodities by weight and 36.3 percent of commodities by value for air cargo. As expected, other top air commodities include low weight and high value products. It is important to note that mail is not included in these numbers. Mail is responsible for a significant proportion of air cargo. The top 10 runway commodities by value equal 94.9 percent of total goods ($77.6 billion). The top 10 runway commodities by tonnage equal 84 percent of total goods (393,767 tons). Table 8-1 provides top ten Memphis runway commodities inbound and outbound by tonnage and value for the Memphis FAF zone.

Table 8-1: Memphis FAF Zone Top Inbound and Outbound Commodities for Runway by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics</td>
<td>129,983</td>
<td>27.7%</td>
<td>Electronics</td>
<td>$29,679,161,400</td>
<td>36.3%</td>
</tr>
<tr>
<td>Machinery</td>
<td>69,343</td>
<td>14.8%</td>
<td>Precision instruments</td>
<td>$14,762,994,100</td>
<td>18.0%</td>
</tr>
<tr>
<td>Precision instruments</td>
<td>50,833</td>
<td>10.8%</td>
<td>Transport equip.</td>
<td>$10,707,939,500</td>
<td>13.1%</td>
</tr>
<tr>
<td>Articles-base metal</td>
<td>35,197</td>
<td>7.5%</td>
<td>Machinery</td>
<td>$7,303,030,300</td>
<td>8.9%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>24,116</td>
<td>5.1%</td>
<td>Pharmaceuticals</td>
<td>$4,259,194,700</td>
<td>5.2%</td>
</tr>
<tr>
<td>Textiles/leather</td>
<td>22,797</td>
<td>4.9%</td>
<td>Basic chemicals</td>
<td>$3,975,572,000</td>
<td>4.9%</td>
</tr>
<tr>
<td>Motorized vehicles</td>
<td>18,499</td>
<td>3.9%</td>
<td>Misc. mfg. prods.</td>
<td>$3,451,884,100</td>
<td>4.2%</td>
</tr>
<tr>
<td>Chemical prods.</td>
<td>15,848</td>
<td>3.4%</td>
<td>Chemical prods.</td>
<td>$1,471,036,100</td>
<td>1.8%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>14,047</td>
<td>3.0%</td>
<td>Articles-base metal</td>
<td>$1,037,482,600</td>
<td>1.3%</td>
</tr>
<tr>
<td>Transport equip.</td>
<td>13,103</td>
<td>2.8%</td>
<td>Other foodstuffs</td>
<td>$1,031,641,700</td>
<td>1.3%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td><strong>393,767</strong></td>
<td><strong>84.0%</strong></td>
<td><strong>Total Top 10</strong></td>
<td><strong>$77,679,936,500</strong></td>
<td><strong>94.9%</strong></td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td><strong>75,115</strong></td>
<td><strong>16.0%</strong></td>
<td><strong>Total All Other Goods</strong></td>
<td><strong>$4,178,717,100</strong></td>
<td><strong>5.1%</strong></td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td><strong>468,882</strong></td>
<td><strong>100%</strong></td>
<td><strong>Total All Goods</strong></td>
<td><strong>$81,858,653,600</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>


Table 8-2 provides top ten inbound runway commodities by tonnage and value for the Memphis FAF zone. Electronics account for 30.1 percent of inbound tonnage and 36.8 percent of inbound value. As of 2015, inbound runway commodities totaled 254,643 tons valued at $46.9 billion.

---

\(^3\) FAF4 2015 Data for the Memphis, TN-MS-AR CFS Area (TN Part)
Table 8-2: Memphis FAF Zone Top Inbound Commodities for Runway by Tonnage and Value

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics</td>
<td>76,608</td>
<td>30.1%</td>
<td>Electronics</td>
<td>$17,259,827,000</td>
<td>36.8%</td>
</tr>
<tr>
<td>Machinery</td>
<td>33,898</td>
<td>13.3%</td>
<td>Transport equip.</td>
<td>$9,654,654,800</td>
<td>20.6%</td>
</tr>
<tr>
<td>Articles-base metal</td>
<td>23,817</td>
<td>9.4%</td>
<td>Precision instr.</td>
<td>$7,220,040,700</td>
<td>15.4%</td>
</tr>
<tr>
<td>Precision instr.</td>
<td>20,873</td>
<td>8.2%</td>
<td>Machinery</td>
<td>$4,539,173,800</td>
<td>9.7%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>12,543</td>
<td>4.9%</td>
<td>Pharmaceuticals</td>
<td>$2,795,179,200</td>
<td>6.0%</td>
</tr>
<tr>
<td>Textiles/leather</td>
<td>11,206</td>
<td>4.4%</td>
<td>Misc. mfg. prods.</td>
<td>$1,814,544,800</td>
<td>3.9%</td>
</tr>
<tr>
<td>Basic chemicals</td>
<td>11,107</td>
<td>4.4%</td>
<td>Chemical prod.</td>
<td>$663,739,600</td>
<td>1.4%</td>
</tr>
<tr>
<td>Chemical prod.</td>
<td>9,775</td>
<td>3.8%</td>
<td>Plastics/rubber</td>
<td>$586,135,900</td>
<td>1.2%</td>
</tr>
<tr>
<td>Transport equip.</td>
<td>9,014</td>
<td>3.5%</td>
<td>Articles-base metal</td>
<td>$517,066,300</td>
<td>1.1%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>7,283</td>
<td>2.9%</td>
<td>Basic chemicals</td>
<td>$384,610,200</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>216,124</td>
<td>84.9%</td>
<td><strong>Total Top 10</strong></td>
<td>$45,434,972,300</td>
<td>96.8%</td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td>38,520</td>
<td>15.1%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$1,503,970,700</td>
<td>3.2%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>254,643</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$46,938,943,000</td>
<td>100%</td>
</tr>
</tbody>
</table>


Table 8-3 provides top ten outbound runway commodities by tonnage and value for the Memphis FAF zone. Outbound commodities are also dominated by Electronics both in tonnage (24.9 percent) and value (35.6 percent). As of 2015, runway outbound commodities totaled 214,238 tons valued at $34.9 billion.

Table 8-3: Memphis FAF Zone Top Outbound Commodities for Runway by Tonnage

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Tons</th>
<th>Percent of Total</th>
<th>Commodity</th>
<th>Value</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics</td>
<td>53,375</td>
<td>24.9%</td>
<td>Electronics</td>
<td>$12,419,334,400</td>
<td>35.6%</td>
</tr>
<tr>
<td>Machinery</td>
<td>35,445</td>
<td>16.5%</td>
<td>Precision instr.</td>
<td>$7,542,953,400</td>
<td>21.6%</td>
</tr>
<tr>
<td>Precision instr.</td>
<td>29,960</td>
<td>14.0%</td>
<td>Basic chemicals</td>
<td>$3,590,961,800</td>
<td>10.3%</td>
</tr>
<tr>
<td>Motorized vehicles</td>
<td>13,366</td>
<td>6.2%</td>
<td>Machinery</td>
<td>$2,763,856,500</td>
<td>7.9%</td>
</tr>
<tr>
<td>Textiles/leather</td>
<td>11,591</td>
<td>5.4%</td>
<td>Misc. mfg. prods.</td>
<td>$1,637,339,300</td>
<td>4.7%</td>
</tr>
<tr>
<td>Plastics/rubber</td>
<td>11,574</td>
<td>5.4%</td>
<td>Pharmaceuticals</td>
<td>$1,464,015,500</td>
<td>4.2%</td>
</tr>
<tr>
<td>Articles-base metal</td>
<td>11,381</td>
<td>5.3%</td>
<td>Transport equip.</td>
<td>$1,053,284,700</td>
<td>3.0%</td>
</tr>
<tr>
<td>Misc. mfg. prods.</td>
<td>7,950</td>
<td>3.7%</td>
<td>Other foodstuffs</td>
<td>$990,130,700</td>
<td>2.8%</td>
</tr>
<tr>
<td>Furniture</td>
<td>6,862</td>
<td>3.2%</td>
<td>Chemical prod.</td>
<td>$807,296,500</td>
<td>2.3%</td>
</tr>
<tr>
<td>Chemical prod.</td>
<td>6,073</td>
<td>2.8%</td>
<td>Textiles/leather</td>
<td>$581,346,600</td>
<td>1.7%</td>
</tr>
<tr>
<td><strong>Total Top 10</strong></td>
<td>187,576</td>
<td>87.6%</td>
<td><strong>Total Top 10</strong></td>
<td>$32,850,519,400</td>
<td>94.1%</td>
</tr>
<tr>
<td><strong>Total All Other Goods</strong></td>
<td>26,662</td>
<td>12.4%</td>
<td><strong>Total All Other Goods</strong></td>
<td>$2,069,191,200</td>
<td>5.9%</td>
</tr>
<tr>
<td><strong>Total All Goods</strong></td>
<td>214,238</td>
<td>100%</td>
<td><strong>Total All Goods</strong></td>
<td>$34,919,710,600</td>
<td>100%</td>
</tr>
</tbody>
</table>

8.4 Air Cargo

The Memphis international Airport is an anchor as it pertains to freight in the Memphis area. According to the most recent data from the FAA and Airports Council International, the Memphis International Airport is ranked number one in the country and second in the world in tonnage of freight being moved\(^4\). The air cargo associated with the airport serves both domestic and international markets on a daily basis. The Memphis International Airport is located amongst many of the major freight corridors. Vehicles traveling to and from the North portions of the airport along Democrat use Plough Blvd or Tchulahoma Rd to connect to I-240 and to Democrat Rd. Additional roadways that boarder the airport include Airways Blvd on the west, Shelby Dr on the south, and Swinnea Rd on the east. Shelby Dr connects to I-55 to the west of the site. The freight corridors that are surrounding the airport are indicated in red in Figure 8-6. Through aerial observation it is noticeable that there are areas near the airport adjacent to the freight corridors that contain large warehouse buildings. The close proximity to the airport is advantageous to the freight moving companies because of the amount of cargo moved in and out of the airport on a daily basis. Located on the north side of the Airport is the FedEx super-hub and on the east side of the airfield is the location of UPS and other carriers.

\(^4\) http://www.aci.aero/Data-Centre/Annual-Traffic-Data/Cargo/2011-final
The Memphis International Airport is home to multiple freight airline companies including: FedEx Express (FedEx), United Parcel Service (UPS), Air Transport Int’l (previous Bax Global), and Mountain Air. In the 2016 Comprehensive Annual Financial Report for the Memphis-Shelby County Airport Authority 6 it was identified that 93.6% of the enplaned air cargo moving through Memphis is identified as domestic, and the remaining 6.4% as international freight. The total cargo from 2006-2015 which includes loaded, unloaded, and mail in metric tonnes is shown in the Figure 8-7.

---

As shown in Figure 8-7 there is a steady increase in air cargo moving in and out of the Memphis International Airport. FedEx is one of the major anchors to the air cargo industry at the airport. FedEx operates about 400 flights per day out of the region and handles more than 180,000 packages and 245,000 documents per hour at the Memphis hub. UPS has a location that contains a footprint of 293,000 square feet as of 2010 prior to its planned expansion that will total 424,000 square feet when completed. The additional expansion is anticipated to have the capability to sort 59,800 packages per hour. The 2010 Memphis Airport Master Plan projects that tonnage of freight moving through Memphis in 2027 will range from 5,091,372 to 6,907,669 in air cargo tonnes. The air cargo anticipated growth will require that both on-site and off-site growth is strategically planned to handle in influx in freight.

Due to the significance of the Memphis International Airport as a single point freight traffic origin/destination, the MPO through their plans, programs, and freight planning efforts need to complement airport’s master plan at a granular level to support their initiatives.

Chapter 9 – Emerging Zone Development

Greater Memphis Regional Freight Plan
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
9.1 Regional Industrial Areas

Throughout its history, industrial land has emerged in particular sections of the Greater Memphis region. The region’s land use includes 3,402 industrial buildings comprising 238 million square feet of industrial space.¹ The regional industries range in location based on their needs and access to resources and customers. They are geographically dispersed to take advantage of the surrounding infrastructure assets as well as proximity to trading partners. This study takes a scaled approach to depict how industrial development takes form. The initial building block is each individual industrial site. Freight Zones are locations where clusters of industrial sites form in a manner that share similar traits (industry type, infrastructure needs, building size). Freight Areas are groupings of Freight Zones by their locational proximity. Functional Freight Areas are groupings of Freight Zones, aggregated not by location but by the manner in which the zones share similar needs and trading patterns. Points of Interest are locations where industrial activity is likely to emerge based on local desires. Table 9-1 displays a summary of the relationship between freight geographies.

¹ CoStar Group, Inc. 2014
<table>
<thead>
<tr>
<th>Freight Areas</th>
<th>Freight Zones</th>
<th>Functional Freight Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>Airport</td>
<td>-</td>
</tr>
<tr>
<td>Airport-Lamar</td>
<td>Getwell</td>
<td>-</td>
</tr>
<tr>
<td>Airport-Lamar</td>
<td>Lamar South</td>
<td>-</td>
</tr>
<tr>
<td>Airport-Lamar</td>
<td>Millbranch Zone</td>
<td>-</td>
</tr>
<tr>
<td>Airport-Lamar</td>
<td>Stateline</td>
<td>-</td>
</tr>
<tr>
<td>Central</td>
<td>Depot</td>
<td>-</td>
</tr>
<tr>
<td>Central</td>
<td>Leewood</td>
<td>-</td>
</tr>
<tr>
<td>Central</td>
<td>New Chicago Industrial Zone</td>
<td>-</td>
</tr>
<tr>
<td>Central</td>
<td>Sargent Yard</td>
<td>-</td>
</tr>
<tr>
<td>Central</td>
<td>French Fort</td>
<td>River 55</td>
</tr>
<tr>
<td>Central</td>
<td>Mallory</td>
<td>River 55</td>
</tr>
<tr>
<td>Central</td>
<td>Riverside Industrial Development Zone</td>
<td>River 55</td>
</tr>
<tr>
<td>Central</td>
<td>South Memphis</td>
<td>River 55</td>
</tr>
<tr>
<td>Mississippi</td>
<td>DeSoto World Trade Center</td>
<td>-</td>
</tr>
<tr>
<td>Mississippi</td>
<td>Hernando</td>
<td>-</td>
</tr>
<tr>
<td>Mississippi</td>
<td>Hacks Cross</td>
<td>-</td>
</tr>
<tr>
<td>Mississippi</td>
<td>Olive Branch Zone</td>
<td>-</td>
</tr>
<tr>
<td>Northeast</td>
<td>Arlington</td>
<td>-</td>
</tr>
<tr>
<td>Northeast</td>
<td>Bartlett</td>
<td>-</td>
</tr>
<tr>
<td>Northeast</td>
<td>Millington</td>
<td>-</td>
</tr>
<tr>
<td>Northeast</td>
<td>Shelby Oaks</td>
<td>-</td>
</tr>
<tr>
<td>River</td>
<td>NWMS Mega Site</td>
<td>-</td>
</tr>
<tr>
<td>River</td>
<td>Pidgeon Industrial Park</td>
<td>River 55</td>
</tr>
<tr>
<td>River</td>
<td>President's Island</td>
<td>River 55</td>
</tr>
<tr>
<td>River</td>
<td>Rivergate</td>
<td>River 55</td>
</tr>
<tr>
<td>Southeast</td>
<td>Collierville</td>
<td>-</td>
</tr>
<tr>
<td>Southeast</td>
<td>Collierville/Piperton</td>
<td>-</td>
</tr>
<tr>
<td>Southeast</td>
<td>Rossville/Marshall</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>Interstate East</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>Interstate West</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>Marion Yard</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>Sunset</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>West Memphis</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>Oxbow</td>
<td>-</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>South Loop</td>
<td>-</td>
</tr>
</tbody>
</table>
9.1.1 Description of Industrial Areas

Based on the industrial clusters within the Greater Memphis region, the following freight areas, zones, and points of interest were included within the overall freight analysis. The legacy and place as a regional transportation center, first driven by the Mississippi River, has contributed to a number of industrial properties across the region.

9.1.1.1 Description of Freight Zones

Freight Zones are displayed in Figure 9-1. The 35 Freight Zones identified for this Plan include:

- Airport
- Arlington
- Bartlett
- Collierville
- Collierville/Piperton
- Depot
- DeSoto World Trade Center
- French Fort
- Getwell
- Hacks Cross
- Hernando
- Interstate East
- Interstate West
- Lamar South
- Leewood
- Mallory
- Marion Yard
- Millbranch Zone
- Millington
- New Chicago Industrial Zone
- NWMS Mega Site
- Olive Branch Zone
- Oxbow
- Pidgeon Industrial Park
- President’s Island
- Rivergate
- Riverside Industrial Development Zone
- Rossville/ Marshall
- Sargent Yard
- Shelby Oaks
- South Loop
- South Memphis
- Stateline
- Sunset
- West Memphis
Figure 9-1: Map of Regional Freight Zones

Legend

Industrial Freight Zones
- Airport
- Armitage
- Bartlett
- Collierville
- Collierville/ Piperton
- DeSoto World Trade Center
- Deer Park
- Daves
- Frayser
- Green Park
- Hernando
- Inkster
- Intake East
- Intake West
- Northgate
- New Chicago Industrial Zone
- Olive Branch Zone
- Oliver
- Pidgeon Industrial Park
- President's Island
- Rivergate
- Riverside Industrial Development Zone
- Riverwood
- Sargent Yard
- Shelby Oaks
- South Loop
- South Memphis
- Stateline
- Sunset
- West Memphis
- Points of Interest (POI)
Airport
The Airport Freight Zone is located southeast of downtown Memphis. It is generally bound by I-240 to the north, Airways Boulevard to the west, Lamar Avenue to the east, and East Shelby Drive to the south. North of I-240, west of Airways Boulevard, and east of Lamar Avenue is a mix of residential, commercial, and industrial land. South of East Shelby Drive is predominantly residential properties and vacant land. There are a number of transportation, supply chain, and warehousing operations to the east and southwest due to the proximity to the airport and the BNSF Railway hub. Within the Airport Freight Zone there are shipping firms such as FedEx Ship Center and UPS Customer Center. Just outside of the zone are a number of shipping and supply chain businesses such as Pilot Freight Services, Saia LTL Freight, and Swift Transportation Company. Major industries include FedEx, UPS, DHL, Toyota, Racing Head, Glaxo Smith Kline, and Boeing.

Arlington
The Arlington Freight Zone is located approximately 22 miles northeast of downtown Memphis in the town of Arlington. It is bound by US Highway 70 to the northwest, Winfield Dunn Parkway to the southwest, Milton Wilson Drive to the south, and Airline Road to the east. Northwest of US Highway 70 is primarily farm land, south and west is a mix of vacant land and residential, and east is a mix of residential and commercial land. Major sectors located within the Arlington Freight Zone include manufacturing (component of Basic Industries) and wholesale trade (component of Trade & Transportation). Major industries include Wright Medical, Rich Products, and Gerdau Ameristeel.

Bartlett
The Bartlett Freight Zone is located northeast of downtown Memphis. It is bound to the north by Ellis Road, to the west by the Burloe Bike Path, to the south by Stage Road, and to the east by North Germantown Road. The zone contains industrial and commercial properties throughout the zone, as well as St. Francis Hospital located in the southeast section of the zone. Major sectors within the Bartlett Freight Zone include Wholesale Trade (component of Trade & Transportation) and Retail Trade (component of Retail & Transactions). Major industries include Brother International, Kele, Varsity Spirit, and Designer Graphics.

Collierville
The Collierville Freight Zone is located southeast of downtown Memphis. It is bound to the North by Poplar Avenue (Highway 57) and to the East by Highway 72. To the south, Collierville is bound by Bill Morris Parkway (Highway 385) east of Highway 175, while the southern boundary west of Highway 175 is located slightly north of Winchester Boulevard. To the west, Collierville is bound by Highway 175 south of Winchester Boulevard, and bound by Shea Road north of Winchester Boulevard. Collierville contains a mixture of residential properties concentrated in the northwest section of the zone, commercial properties located along major corridors, and industrial and agricultural land located in the eastern section of the zone. Major sectors located within the zone include manufacturing (component of Basic Industries) and wholesale trade (component of Trade & Transportation). Major industries include Carrier, Pepsi, and Helena Chemical.

Collierville/Piperton
The Collierville-Piperton Freight Zone is located southeast of downtown Memphis. The zone is bound to the north by Poplar Avenue (Highway 57), to the east by Highway 196, to the south by Keough Road, and to the west
by Center Street south of Mulberry Street and Walnut Street north of Mulberry Street. The zone contains a mixture of residential properties spread across the zone, industrial properties, and commercial properties. Major sectors located within the zone include manufacturing (component of Basic Industries) and Retail Trade (component of Retail & Transactions). Major industries include J-Line Pump, Central Woodwork, AOC Resins, Nefab, and IPS.

**Depot**
The Depot Freight Zone is located to the southeast of downtown Memphis, in close proximity to the city center. The zone is bound to the south by Dunn Avenue west of Perry Road, Ball Road between Perry Road and Airways Boulevard, Dwight Road between Airways Boulevard and Pendleton Street, and Dunn Avenue east of Pendleton Street. To the east, the zone is bound by Jonah Avenue north of Kimball Avenue, Pendleton Avenue between Kimball Avenue and Dunn Avenue, Labelle Street between Dunn Avenue and Dwight Road, and Airways Boulevard south of Dwight Road. To the north, the zone is bound by Jonah Avenue east of Castalia Street, Dunn Avenue between Castalia Street and Airways Boulevard, and by the BNSF rail line west of Airways Boulevard. To the West, the zone is bound by the BNSF rail line north of Dunn Avenue and by Perry Road south of Dunn Avenue. The zone contains industrial properties across the zone, with residential properties concentrated in the eastern section of the zone. Major sectors in the Depot Freight Zone include Transportation & Warehousing (component of Trade & Transportation) and construction (component of Basic Industries). Major industries include Kellogg, Barnhart Crane, Allied Systems, and ABF Freight System.

**DeSoto World Trade Center**
The DeSoto Freight Zone is located south of downtown Memphis in the State of Mississippi. The zone has two main geographic partitions. The northern partition of the zone is bound to the north by Church Road, to the East by Swinea Road, to the South by East Star Landing Road, and to the West by Highway 51. The southern partition of the zone is bound to the north by East Star Landing Road, to the east by Interstate 69, to the south by Nesbit Road, and to the west by Gwynn Road. The zone contains a mixture of residential, commercial, and industrial properties as well as vacant land. Major sectors located within the zone include transportation & warehousing (component of Trade & Transportation) and wholesale trade (component of Trade & Transportation). Major industries include Nidec Motor, Con Air, FedEx, Greenlee, Kuhn + Nagel, Grainger, and Helen of Troy, plus new areas of development.

**French Fort**
The French Fort Freight Zone is located west of downtown Memphis, in close proximity to the city center. The zone is bound to the northeast by the Mississippi River, to the north by Highway 70, to the east by Interstate 55, to the southeast by the Jack Carley Causeway, and to the west by the isthmus leading to President’s Island. The zone contains a mixture of residential, industrial and commercial properties. The wholesale trade sector (component of Trade & Transportation) was the largest sector in the zone in 2014. Major industries include Exxon and Lion Oil.

**Getwell**
The Getwell Freight Zone is located southeast of downtown Memphis. The zone is generally bound to the south by East Shelby Drive and to the east by Hickory Hills Road. The zone is bound to the north by Winchester Road.
west of Outland Road, Cromwell Avenue between Outland Road and Cromwell’s intersection with Winchester Road, and by Flowering Peach Drive east of South Mendenhall Road. To the west, the zone is bound by Tchulahoma Road north of East Raines Road, Getwell Road between East Raines Road and Arnold Road, and by Tchulahoma Road south of Arnold Road. The zone includes residential, commercial and industrial properties throughout the zone. Major sectors in the zone include administrative & support services (component of Professional Services) and transportation & warehousing (component of Trade & Transportation). Major industries include International Paper, Nike, Ozark Motor Lines, Williams-Sonoma, Fred’s, Sharp, Sysco, Bryce, and Honeywell.

Hacks Cross
The Hacks Freight Zone is located southeast of downtown Memphis. The zone is bound to the north by Stateline Road, to the east by Forest Hill Irene Road, to the west by Alexander Road, and to the south by Highway 302 east of Hacks Cross Road and East Goodman Road west of Hacks Cross Road. The zone is part of an emerging I-269 corridor. The zone contains a mixture of residential, commercial and industrial properties. Major sectors in the zone include transportation & warehousing (component of Trade & Transportation) and manufacturing (component of Basic Industries). Major industries include Williams-Sonoma, Hamilton Beach, Milwaukee Tool, Mckesson, Five Below, Dollar Tree, View, and several third party logistics companies that are serving multiple clients through freight logistics facilities.

Hernando
The Hernando Freight Zone is located south of downtown Memphis in the State of Mississippi. The zone is generally bound by Vinson Road to the south, Highway 51 to the west, and Interstate 55 to the east. The northern boundary of the zone is Commerce Street east of Mt. Pleasant Road, Vaiden Drive between Mt. Pleasant Road and Wren Street, and Oak Grove Road west of Wren Street. The zone contains a mixture of residential, industrial, and commercial properties. Major sectors located within the zone include manufacturing (component of Basic Industries) and transportation & warehousing (component of Trade & Transportation). Major industries include Valvoline, RCL Components, UPS, DeSoto Produce, and National Tank.

Interstate East
The Interstate East Freight Zone is located west of downtown Memphis on the north side of West Memphis in the State of Arkansas. The zone contains two separate partitions that are not geographically connected. The eastern partition is generally bound by Mound City Road to the east and Union Pacific rail lines to the north and west. The eastern partition is bound to the south by a Union Pacific rail line east of South Loop Drive and Interstate 55 west of South Loop Drive. The western partition of the zone is generally bound by Interstate 40 to the southwest, Highway 63 to the west, and a Union Pacific rail line to the northeast. Additionally, the western partition includes Highway 77 north to Carter Drive, and south from the Union Pacific rail line. Major sectors in the zone include accommodation & food services (component of Retail & Transactions) and manufacturing (component of Basic Industries). Major industries include CFI, Automated Conveyor Systems, USA Truck, Delta Express, Allied Crawford, Kloeckner Metals, and a various truck services.

Interstate West
The Interstate West Freight Zone is located west of downtown Memphis and West Memphis in the State of
Arkansas. The zone is generally bound by Interstate 40 to the south and a Union Pacific rail line to the north. The zone is bound to the west by Masner Road south of Hino Boulevard and Kuhn Road north of Hino Boulevard. The zone is bound to the east by Sycamore Lake Drive. The zone includes primarily industrial and commercial properties with vacant land in several sections of the zone. The zone also includes the Union Pacific Railroad Marion Yard. Major sectors include manufacturing (component of Basic Industries) and transportation & warehousing (component of Trade & Transportation). Major industries include Family Dollar, FedEx, Robert Bosch Tool, and Hino Motors.

Lamar South
The Lamar South Freight Zone is located southeast of downtown Memphis. The zone is generally bound to the south by the Tennessee-Mississippi border, to the east by Crumpler Road, and to the north by Highway 175. The zone is bound to the east by Getwell Road north of Holmes Road and Tchulahoma Road south of Holmes Road. The zone contains primarily industrial and commercial properties, with some residential properties concentrated in the eastern portion of the zone. The area includes a number of industrial properties first developed in response to the emerging logistics centers serving the growth of the Airport and the BNSF Tennessee Railroad Yard. Major sectors in the zone include transportation & warehousing (component of Trade & Transportation) and wholesale trade (component of Trade & Transportation). Major industries include Technicolor, Jabil Circuit, Kroger, Distribution, Ozburn-Hessey, Comtrack, General Motors, Con-Way, US Foods, and Mckesson.

Leewood
The Leewood Yard Freight Zone is located northeast of downtown Memphis. The zone consists of two primary partitions. The norther partition is bound to the south and east by Jackson Avenue (Highway 14), by Hollywood Street to the west, and primarily by Chelsea Avenue to the north. Additionally, the northern partition includes the area bounded by Highway 14 to the east, a small waterway to the north, a CN rail line to the west, and Chelsea Avenue to the south. The southern partition is bound by Jackson Avenue (Highway 14) to the north, a CN rail line to the west, Summer Avenue (Highway 70) to the south, and Pope Street to the east. The zone includes residential, commercial and industrial properties. Major sectors in the zone include utilities (component of Basic Industries) and manufacturing (component of Basic Industries). Major industries include Merck & Co, Buckeye Technologies, PMC Biogenix, Seabrook Wallcoverings, and Conrad.

Mallory
The Mallory Freight Zone is located south of downtown Memphis. It is generally bound by East and West Mallory Avenue to the north, I-55/I-240 to the south, Paul R Lowry Road to the west, and CN’s Fulton line to the east. North of Mallory Avenue is generally residential, while south of Mallory is mostly industrial, commercial, and vacant/abandoned. Major industries include warehousing and distribution operations such as CN Supply Chain Solutions, Stellar Distribution Memphis, Memphis Compress, Riviana Foods, Inc., Producer’s Warehouse, and FedEx Ground.

Marion Yard
The Marion Freight Zone is located west of downtown Memphis in the State of Arkansas. The zone is bound to the east by Highway 147, to the north by the Union Pacific Rail Line, to the east by Kuhn Road, and to the south by Hino Boulevard. The zone includes agricultural land and industrial land concentrated in the northern section
Transportation & warehousing (component of Trade & Transportation) was the largest employment sector in the zone in 2014. Major industries include Smuckers, TransOne, and Union Pacific Railroad.

**Millbranch Zone**
The Millbranch Freight Zone is located southeast of downtown Memphis. The zone is bound by Interstate 240 to the north, Interstate 55 to the west, Winchester Road to the south, and Airways Boulevard to the east. The zone includes industrial, residential, and commercial properties. Major sectors in the zone include manufacturing (component of Basic Industries) and transportation & warehousing (component of Trade & Transportation). Major industries include Smith & Nephew, Swift Transportation, Medtronic, UPS, Old Dominion, and Saia.

**Millington**
The Millington Freight Zone is located northeast of downtown Memphis. The zone includes 2 partitions that are not geographically connected. The northern partition is located north of Navy Road, while the southern partition expands east and west from Highway 3. The zone contains residential, industrial and commercial property types. Major sectors in the zone include manufacturing (component of Basic Industries) and wholesale trade (component of Trade & Transportation). Major industries include Ingram Micro, DuPont, Pollution Control Industries, Arkema, and Indmar.

**New Chicago Industrial Zone**
The New Chicago Freight Zone is located north of downtown Memphis. The zone is bound to the west by 2nd Street and to the north by a tributary of the Mississippi River. The zone includes residential, industrial and commercial properties. The Zone boundaries approximately follow those of the EDGE Property site. Major sectors located in the zone include manufacturing (component of Basic Industries) and wholesale trade (component of Trade & Transportation). Major industries include Ingram Micro, DuPont, Pollution Control Industries, Arkema, and Indmar.

**NWMS Mega Site**
The NWMS Freight Zone is located south of downtown Memphis and is in the State of Mississippi. The zone is bounded by the Mississippi River to the west and primarily extends to Highway 304 to the east. The zone includes agricultural and vacant land, as well as some industrial properties. The zone did not have any dominant employment sectors present in 2014. Major industries are predominately farming.

**Olive Branch Zone**
The Olive Branch Freight Zone is located southeast of downtown Memphis in the State of Mississippi. The zone contains two geographic partitions. The northern partition is bounded by Goodman Road to the south, the BNSF rail line to the east, the State border between Tennessee and Mississippi to the North, and Highway 78 to the west. The southern partition is bounded by Highway 78 to the northeast, Cockrun Road to the east, College Road to the south, and Pleasant Hill Road to the west. The zone includes commercial, residential and industrial properties, as well as several plots of vacant land. Major sectors in the zone include retail trade (component of Retail & Transactions) and transportation & warehousing (component of Trade & Transportation). Major industries include Cardinal Health, US Xpress, Holland, Landau Uniforms, D&D Packaging, and FedEx Ground.
**Oxbow**

The Oxbow Freight Zone is located west of downtown Memphis in the State of Arkansas. The zone is bound to the south by the Mississippi River and to the east by the UP rail line. The zone primarily includes industrial properties. In 2014 there was not a dominant employment sector present in the zone. The sole industry in the Oxbow Freight Zone is BASF, which requires large volumes of water for chemical production.

**Pidgeon Industrial Park**

The Pidgeon Freight Zone is located south of downtown Memphis. Geographically, the zone encompasses parts of Arkansas and Tennessee that are adjacent to the Mississippi River directly north of the Mississippi-Tennessee border. The zone includes primarily industrial and vacant properties and is a key portion of the Port of Memphis. Major sectors located in the zone include manufacturing (component of Basic Industries) and construction (component of Basic Industries). Major industries include Nucor Steel, TVA Allen Fossil Plant, TE Maxon Treatment Plant, Electrolux, and CN/CSX.

**President's Island**

President’s Island Freight Zone is located west of downtown Memphis. Geographically, the zone includes President’s Island and the smaller Treasure Island located southeast of the main island. The zone primarily includes industrial properties or vacant land and is a key portion of the Port of Memphis. Major sectors located in the zone include transportation & warehousing (component of Trade & Transportation) and manufacturing (component of Basic Industries). Major industries include Cargill, CHS, WM Barr & Co, Ergon Marine & Industrial Supply, ADM, Energysolutions, Drexel, Kinder Morgan, and Glaxo Smith Klein.

**Rivergate**

The Rivergate Freight Zone is located south of downtown Memphis. Geographically, the zone is composed of 2 geographically separate partitions. The southern partition is generally bounded by Elvis Presley Boulevard in the east, Highway 14 in the west, and Interstate 240 in the north. The northern partition includes the territory between Peebles Road and Paul R. Lowery Road. The zone includes commercial, residential, and industrial properties. Major sectors in the zone include transportation & warehousing (component of Trade & Transportation) and administrative & support services (component of Professional Services). Major industries include YRC Freight, Roadway Express, FedEx, Valero, Mitsubishi Electric, and Rayloc.

**Riverside**

The Riverside Freight Zone is located south of downtown Memphis. The boundaries of this zone approximately follow the boundaries of the EDGE Property. The zone is generally bounded by Crump Boulevard in the north, the Jack Carley Causeway and Interstate 55 in the west, South Parkway in the south, and 3rd street to the east. The zone includes residential, industrial and commercial properties. Major sectors included in the zone include manufacturing (component of Basic Industries) and wholesale trade (component of Trade & Transportation). Major industries include Hershey, Budweiser, Alsco, Johnson Bryce, Recycle Solutions, UWT Logistics, and Schneider National.

**Rossville/Marshall**

The Rossville Freight Zone is located southeast of downtown Memphis located in both Tennessee and
Mississippi. The zone is geographically the farthest east zone and is centered on Highway 72. The zone extends as far north as Highway 57 and as far south as Highway 302. The zone includes industrial, commercial, and residential properties. Major industries within the zone include manufacturing (component of Basic Industries) and transportation & warehousing (component of Trade & Transportation). Major industries include Kellogg, Memphis Shades, and Norfolk Southern.

**Sargent Yard**
The Sargent Yard Freight Zone is located southeast of downtown Memphis, in close proximity to the city center. Geographically, the zone is bounded in the west by Bellevue Boulevard and in the south by South Parkway. The BNSF/NS railway forms the eastern border of the zone south of McLemore Avenue, after which point Lamar Avenue becomes the eastern border of the zone. The zone includes residential areas scattered throughout the zone, with industrial and commercial areas in between the residential areas. Major sectors in the zone include construction (component of Basic Industries) and transportation & warehousing (component of Trade & Transportation). Major industries include Salmon Co, Con Agra Foods, and Knight & Wilson.

**Shelby Oaks**
The Shelby Oaks Freight Zone is located northeast of downtown Memphis. Geographically, the zone consists of two partitions. The eastern partition bounded in the southeast by Interstate 40, in the west by Whitten Road, and in the north and east by Tulip Trail Drive. The western partition is bounded in the southeast by Interstate 40, in the west by Sycamore View Road, in the northwest by Highway 70, and in the northeast by Raleigh Lagrange Road. The zone consists of residential, industrial, and commercial properties. Major industries located in the zone include healthcare & social assistance (component of Professional Services) and administrative & support services (component of Professional Services). Major industries include Methodist Alliance Home Med, Advanced Services, Pfizer Logistics, and McLane Foodservice.

**South Loop**
The South Loop Freight Zone is located southwest of downtown Memphis in the State of Arkansas. Geographically, the zone is bounded by the Mississippi River in the east, Rainer Road in the north, and Waverly Road in the west. The zone contains industrial, agricultural, and vacant properties. Manufacturing (component of Basic Industries) was the dominant employment sector in the zone in 2014. Major industries include Consolidated Grain & Barge, Valero, Warren Unilube, Stateside Steel and Wire, and Bunge.

**South Memphis**
The South Memphis Freight Zone is located east of downtown Memphis, in close proximity to the city center. Geographically, the zone is bounded in the south by Mallory Avenue, in the east by Lauderdale Street, in the north by South Parkway, and in the west by CN rail line. The zone contains residential, industrial, and commercial properties. Major sectors located in the zone include manufacturing (component of Basic Industries) and retail trade (component of Retail & Transactions). Major industries include KIK Custom Products, Langston Co, Davis Valve, and Stovall Engineering.

**Stateline**
The Stateline Freight Zone is located southeast of downtown Memphis in the States of Tennessee and
Mississippi. Geographically, the zone is bound by Interstate 55 in the west and Tchulahoma Road in the east. Holmes Road forms the northern boundary of the zone, while the southern boundary is Rasco Road in between Airways Boulevard and Swinnea Road. The Zone is also influenced by the emergence of the I-69 and I-269 interstate roadway development. The zone includes residential, industrial, and commercial properties. Major sectors located within the zone include transportation & warehousing (component of Trade & Transportation) and wholesale trade (component of Trade & Transportation). Major industries include Patterson Warehouses, Old Dominion Freight Line, Siemens, Kimberly-Clark, PFS Web, Myers Tire Supply, Thomas & Betts, Vista Pro Automotive, Iron Mountain, and Whitmor.

Sunset
The Sunset Freight Zone is located northwest of downtown Memphis in the State of Arkansas. Geographically, the western boundary of the zone is Interstate 55, the northern boundary is James Mill Road, and the eastern boundary is McNeely Road/Cypress Avenue. John H. Johnson Boulevard serves as the southern boundary of the zone as far north as Powell Street, at which point Powell serves as the southern boundary for the zone until the BNSF rail line is reached. The zone contains industrial properties primarily. In 2014, the transportation & warehousing sector (component of Trade & Transportation) represented the largest sector by employment. The zone represents the transition to the largely rural and agricultural areas the further from West Memphis.

West Memphis
The West Memphis Freight Zone is located west of downtown Memphis in the State of Arkansas. Geographically, the zone is bound in the east by 7th Street and bound in the west by Woods Street north of Jackson Avenue and Avalon Street south of Jackson Avenue. The UP rail line serves as the southern boundary of the zone. The zone contains industrial, residential, and commercial properties. Major sectors located within the zone include transportation & warehousing (component of Trade & Transportation) and manufacturing (component of Basic Industries). Major industries include Georgia Pacific, Langston Companies, Consolidated Container, Century Hydraulics & Manufacturing, and Delta Mechanical Contractors.
9.1.1.2 **Description of Freight Areas**

The legacy and currently developing land use and transportation infrastructure in the Greater Memphis region have combined to form a unique combination of zones along shared transportation corridors. Freight Areas are displayed in Figure 9-2. The Freight Areas identified for this Plan include:

- Airport-Lamar
- Northeast
- Southeast
- Central
- Mississippi
- West Memphis Interstate
- River
- West Memphis River

![Figure 9-2: Map of Regional Freight Areas](image-url)
The Airport-Lamar Freight Area is located southeast of downtown Memphis. The freight zones that comprise the Airport-Lamar Freight Area vary in geographic location, yet have a common feature in the zones enable industrial supply chains to make use of the Region’s air, rail and road freight infrastructure interchangeably. The northernmost freight zones that make up the Freight Area are the Millbranch Freight Zone and Airport Freight Zone. The southernmost freight zones that make up the Freight Area are the Lamar South Freight Zone and Stateline Freight Zone. Additionally, the Millbranch Freight Zone is the westernmost Freight Zone in the Airport-Lamar Freight Area while Lamar South is the easternmost Freight Zone in the Airport-Lamar Freight Area.

Airport-Lamar was the largest Freight Area by employment count in 2014. Within the Freight Area, the Trade & Transportation sector dominated the job market with over 50% of the jobs for the Freight Area in 2014. The Airport-Lamar Freight Area is comprised of the following Freight Zones: Millbranch, Airport, Getwell, Lamar South, and Stateline.

Central
The Central Freight Area is located in the central region of the Memphis Urbanized Area. Freight zones within the Central Freight Area include Depot, French Fort, Leewood, Mallory, New Chicago, Riverside, Sargent Yard, and South Memphis. Although more widely scattered, the zones display similar features in linkages to legacy arterial roadways and local railroad service to individual sites. All freight zones are entirely located in Tennessee. Major freight trucking corridors include Interstate 55, Interstate 240, Interstate 40, US 78, US 51, and US 61. Just west of Sargent Yard and north of Depot lies Norfolk Southern’s Forrest Yard. French Fort and New Chicago are located along Mississippi River shipping routes. Land use within the Central Freight Area is primarily warehouse and industrial surrounded primarily by dense, urban neighborhoods. Given French Fort’s close proximity to Downtown Memphis, adjacent land use to the north is primarily zoned as urban downtown. In 2014, the Central Freight Area had the 3rd largest total employment count.

Mississippi
The Mississippi Freight Area is located south of downtown Memphis. Geographically, the Freight Zones that comprise the Mississippi Freight Area are located in the State of Mississippi. The existing I-55 and emerging I-69 and I-269 corridors is a dominant transportation feature for each zone. The northernmost Freight Zones in the Mississippi Freight Area are the Olive Branch Freight Zone and Hacks Cross Freight Zone. The southernmost Freight Zone in the Mississippi Freight Area is the Hernando Freight Zone. The easternmost Freight Zone in the Freight Area is Hacks Cross Freight Zone, while the westernmost Freight Zone in the Freight Area is the DeSoto Freight Zone. The Mississippi Freight Area was the 4th largest Freight Area by total employment count in 2014, and within the Freight Area the Trade & Transportation sector had a plurality of employment. The Mississippi Freight Area is comprised of the following Freight Zones: Hacks Cross, Olive Branch, DeSoto, and Hernando.

Northeast
The Northeast Freight Area is located to the northeast of downtown Memphis. Geographically, the Millington Freight Zone is the northernmost Freight Zone of the Freight Area, while Shelby Oaks is the southernmost Freight Zone. The Millington Freight Zone is also the westernmost Freight Zone within the Freight Area, while the Arlington Freight Zone is the easternmost Freight Zone of the Freight Area. The Northeast Freight Area was the 2nd largest Freight Area by total employment count in 2014, and within the Northeast Freight Area the
Professional Services sector had a plurality of employment. There are a number of large industrial sites in the overall area. Recent roadway improvements to Veterans Parkway have increased the access to industrial sites to remove trucks from local streets. The following zones comprise the Northeast Freight Area: Millington, Shelby Oaks, Arlington, and Bartlett.

River
The River Freight Area is located south of downtown Memphis and includes Freight Zones in Tennessee, Arkansas, and Mississippi. Geographically, the northernmost Freight Zone within the River Freight Area is President’s Island Freight Zone, while the southernmost Freight Zone is the NWMS Freight Zone. Additionally, the NWMS Freight Zone is also the westernmost Freight Zone of the Freight Area, while the easternmost Freight Zone of the Freight Area is the Rivergate Freight Zone. The River Freight Area was the 5th largest Freight Area by total employment count in 2014, and within the River Freight Area the Trade & Transportation sector had a plurality of employment (closely followed by Basic Industries). The following Freight Zones comprise the River Freight Area: NWMS, Pidgeon, President’s Island, and Rivergate.

Southeast
The Southeast Freight Area is located southeast of downtown Memphis. Geographically within the Freight Area, the Rossville Freight Zone is the northernmost, southernmost, and easternmost Freight Zone, while the Collierville Freight Zone is the westernmost Freight Zone. In 2014, the Southeast Freight Area was the 6th largest Freight Area by total employment count, and within the Freight Area the Basic Industries sector had a plurality of employment. The following Freight Zones comprise the Southeast Freight Area: Rossville, Collierville, and Collierville-Piperton.

West Memphis Interstate
The West Memphis Interstate Freight Area is located west of downtown Memphis and includes Freight Zones located in the State of Arkansas. Geographically, the northernmost Freight Zone in the West Memphis Interstate Freight Area is the Sunset Freight Zone, while the southernmost Freight Zone is the West Memphis Freight Zone. The westernmost Freight Zone in the Freight Area is Marion Yard, while the easternmost Freight Zone is Interstate East. The West Memphis Interstate Freight Area was the 7th largest Freight Area by total employment count in 2014, and within the Freight Area there was no clear employment sector that dominated the others. Basic Industries, Trade & Transportation, and Professional Services each closely mirrored one another. The following Freight Zones make up the West Memphis Interstate Freight Area: Interstate East, Interstate West, Marion Yard, Sunset, and West Memphis.

West Memphis River
The West Memphis River Freight Area is located southwest of downtown Memphis. Geographically the northernmost and easternmost Freight Zone in the Freight Area is Oxbow, while the South Loop Freight Zone in the southernmost and westernmost Freight Zone in the Area. In 2014, the West Memphis River Freight Area had the 8th largest total employment count, and within the Freight Area the Basic Industries employment sector had an absolute majority in employment. The two Freight Zones that comprise the West Memphis River Freight Area are Oxbow and South Loop. The area is rail served and has marine facilities located on the main channel of the Mississippi River.
9.1.1.3 Description of Functional Freight Areas

The River 55 Freight Area is located in the southern and western portion of the Greater Memphis region. Freight zones within the River 55 Freight Area include French Fort, Mallory, Pidgeon Industrial Park, President’s Island, Rivergate, and South Memphis. All freight zones are entirely located in Tennessee. Major freight trucking corridors include Interstate 55, Interstate 40, Interstate 240, US 61, US 70, and US 51. Freight rail operations in the freight zone include CN’s Harrison Yard within the Pidgeon Industrial Park. Proximity to the Mississippi River also plays a role within the River 55 Freight Area as four freight zones have direct access to the river: French Fort; Pidgeon Industrial Park; President’s Island; and Rivergate. Land use within the River 55 Freight Area is primarily warehouse and industrial. Large areas of protected open space exist near Mississippi River sites as preserved open space. The Port District is currently undertaking a Plan Update to examine additional port development.

9.1.1.4 Description of Freight Points of Interest

Freight Points of Interest (POI) are displayed in Figure 9-3. The Freight Points of Interest identified for this Plan include:

- Bartlett
- Brownsville TVA Megasite
- Byhalia
- Collierville
- Covington
- Fayette County
- Galloway
- Harvester
- Holly Springs (2 locations)

- Lakeland/Arlington
- Millington (2 locations)
- Oakland
- Piperton
- Red Banks
- SR 301
- Somerville
- Victoria
Figure 9-3: Map of Regional Freight Points of Interest
Bartlett
The Bartlett POI is located northeast of downtown Memphis near the Brunswick Road exit on TN-385/I-269. This area was identified as a conceptual development in Shelby County’s TN-385/I-269 Corridor Economic Development/Environmental Study. It is proposed to have around 397 acres of land to be used for manufacturing. Currently, this area is undeveloped and used for agricultural purposes.

Brownsville TVA Megasite
The Brownsville TVA Megasite POI is located northeast of downtown Memphis, in Haywood County, near the Stanton Road exit on I-40. This area was identified as a Certified Industrial Site by the Tennessee Department of Economic and Community Development (TNECD). It has around 140 acres of land to be used for industrial development and is ideally suited for a large manufacturing facility or distribution. Currently, this area is undeveloped and used for agricultural purposes.

Byhalia
The Byhalia POI is located southeast of downtown Memphis in Marshall County near the future I-269 exit on US 78/I-22. This area was identified as a potential industrial area in stakeholder meetings. The development, I-269 Logistics Center, is expected to provide 3.5 million square feet of space on a 328-acre site of Class A distribution and industrial space. Currently, this area has been developed by a few industries.

Collierville
The Collierville POI is located southeast of downtown Memphis near the US 72 and Bill Morris Parkway exits on TN-385/I-269. This area was identified as a conceptual development in Shelby County’s TN-385/I-269 Corridor Economic Development/Environmental Study. It is proposed to have around 147 acres of land to be used for manufacturing. Currently, this area has been developed by a few industries.

Covington
The Covington POI is located northeast of downtown Memphis near the Tipton/Lauderdale County line on US 51. This area was identified as an industrial area in stakeholder meetings. Currently, this area has been developed by a few industries and could be further expanded.

Fayette County
The Fayette County POI is located east of downtown Memphis near the Macon Road exit on TN-385/I-269. This area was identified as a conceptual development in Shelby County’s TN-385/I-269 Corridor Economic Development/Environmental Study. It is proposed to have around 641 acres of land to be used for manufacturing. Currently, this area is undeveloped and used for agricultural purposes.

Gallaway
The Gallaway POI is located northeast of downtown Memphis near the Gallaway on I-40. This area was identified as a potential industrial area in stakeholder meetings. Currently, this area is undeveloped and used for agricultural purposes.

Harvester
The Harvester POI is located north of downtown Memphis near Harvester Lane between US 51 and the
Mississippi River. This area was identified as an industrial area in stakeholder meetings. Currently, this area has been developed and currently used as an impound lot, but could be repurposed for freight uses.

**Holly Springs**
There are two POIs in Holly Springs, located southeast of downtown Memphis in Marshall County. One is near I-22 at the MS-7 exit. This area was identified as an industrial area in stakeholder meetings. The other one is near the intersection of MS-178 and MS-311. This area was identified as an industrial area in stakeholder meetings. Currently, both of these areas have been developed by a few industries, but could expand.

**Lakeland/Arlington**
The Lakeland/Arlington POI is located northeast of downtown Memphis near the Stewart Road exit on TN-385/I269. This area was identified as a conceptual development in Shelby County’s TN-385/I-269 Corridor Economic Development/Environmental Study. It is proposed to have around 175 acres of land to be used for manufacturing. Currently, this area is undeveloped and used for agricultural purposes.

**Millington**
There are two POIs located in the Millington area. They are located northeast of downtown Memphis near the Singleton Parkway exit on TN-385/I269 and near Big Creek Church Road near the Raleigh-Millington Road exit on TN-385/I269. These areas were identified as conceptual developments in Shelby County’s TN-385/I-269 Corridor Economic Development/Environmental Study. The Singleton Parkway conceptual development is proposed to have around 340 acres of land to be used for manufacturing and 523 acres of land to be used for Logistics. The Big Creek Church Road conceptual development is proposed to have around 222 acres of land to be used for manufacturing and 181 acres of land to be used for Logistics. Currently, these areas are undeveloped and used for agricultural purposes.

**Oakland**
The Oakland POI is located east of downtown Memphis in Fayette County on TN-194 at Industrial Park Road. This area was identified as an industrial area in stakeholder meetings. Currently, this area has been developed by a few industries and could be further expanded.

**Piperton**
The Piperton POI is located southeast of downtown Memphis near the US 72 exit on TN-385/I269. This area was identified as a conceptual development in Shelby County’s TN-385/I-269 Corridor Economic Development/Environmental Study. It is proposed to have around 433 acres of land to be used for logistics and warehousing. Currently, this area has been developed by a few industries.

**Red Banks**
The Red Banks POI is located southeast of downtown Memphis in Marshall County near the South Red Banks Road exit on I-22. This area was identified as a potential industrial area in stakeholder meetings. Currently, this area is undeveloped but anticipates potential development with its close proximity to the Rossville Intermodal Terminal and the future I-269.
SR 301
The SR 301 POI is located south of downtown Memphis in DeSoto County near the Star Landing Road exit on MS-301. This area was identified as a potential industrial area in stakeholder meetings. Currently, this area is undeveloped but anticipates potential development with its close proximity to the future I-269 and potential Northwest Mississippi Megasite.

Somerville
The Somerville POI is located east of downtown Memphis in Fayette County on US 64 near Ballpark Road. This area was identified as an industrial area in stakeholder meetings. Currently, this area has been developed by a few industries and could be further expanded.

Victoria
The Victoria POI is located southeast of downtown Memphis in Marshall County near the Victoria Road exit on I-22. This area was identified as a potential industrial area in stakeholder meetings. Currently, this area is undeveloped but anticipates potential development with its close proximity to the Rossville Intermodal Terminal and the future I-269.

9.1.2 Industrial Area Indicators

Several freight transportation, employment and industrial land use indicators were analyzed to capture the characteristics of each industrial geography and included in Appendix 3. The continuous monitoring of these indicators will identify how the zones and areas change over time. This section provides an overview of each indicator analyzed and any significant findings.

9.1.2.1 Infrastructure and Access

The Infrastructure and Access indicators look at freight moves in and out of a zone/area. This was captured by determining the Interstate/Freeway access points, presence of Freight Corridors, rail services, and distance to intermodal terminals. It also took into account any potential conflicts that may restrict accessibility, such as low bridges and vertical clearance limits, narrow lanes, rail-highway crossings and poor road surface. The most accessible areas were Central, River, and Airport-Lamar.

9.1.2.2 Truck Traffic

The Truck Traffic indicators look at the Freight Corridors in terms of congestion. Using the Memphis MPO Travel Demand Model, truck volumes are compared against areas of congestion, by peak period. Peak period congestion is determined by analyzing level of service. Level of service is a metric that describes the operational performance of a roadway segment. Depending on the facility type, operational performance can be measured in terms of speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. For this regional planning effort, level of service is defined by the ratio of the volume on the roadway to the roadway’s capacity. This volume to capacity ratio is indicative of the travel speeds and delays in travel time as identified the Regional Travel Demand Model (TDM). The Highway Capacity Manual defines six levels of service, LOS A through LOS F, with LOS A representing the shortest average delays and F representing the longest average delays. The Memphis MPO identifies A through D as acceptable and E and F as unacceptable.
Displayed in Figure 9-4, comparing truck volumes and peak period congestion, it is apparent that several patterns emerge. Areas on the periphery tend to have alternating AM/PM congestion, in line with commuting traffic. Areas closer to central Memphis tend to experience congestion during both AM and PM peak periods. Truck volumes are much higher on the southern loop and in the Lamar Avenue corridor. Increased East-West truck volumes emerge on arterial roads as well. The result of trucks navigating congested Freight Corridors during peak periods results in Truck Hours of Delay. Table 9-2, reveals the regional geographies that experience the most hours of truck delay. The increase in vehicular volumes is expected to be more than roadway capacity is added, coupled with an expected increase in truck volumes, the Truck Hours of Delay are also expected to
increase over time. Nearly eleven percent of truck delay on Freight Corridors occurs in the Airport-Lamar Freight Area.

Table 9-2: Truck Hours of Delay by Zone

<table>
<thead>
<tr>
<th>Freight Area</th>
<th>Truck Hours of Delay (per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport-Lamar</td>
<td>4,748.30</td>
</tr>
<tr>
<td>Northeast</td>
<td>397.00</td>
</tr>
<tr>
<td>Southeast</td>
<td>146.90</td>
</tr>
<tr>
<td>Central</td>
<td>799.30</td>
</tr>
<tr>
<td>Mississippi</td>
<td>333.20</td>
</tr>
<tr>
<td>West Memphis Interstate</td>
<td>445.20</td>
</tr>
<tr>
<td>West Memphis River</td>
<td>261.90</td>
</tr>
<tr>
<td>River</td>
<td>1,041.70</td>
</tr>
<tr>
<td>All Other Freight Corridors</td>
<td>35,668.30</td>
</tr>
<tr>
<td><strong>Total All Freight Corridors</strong></td>
<td><strong>43,841.90</strong></td>
</tr>
</tbody>
</table>

9.1.2.3 Travel Times

The Travel Times indicator looks at the mobility of each freight zone. The peak period travel times from the freight zones to the surrounding areas were estimated using the regional travel demand model. It was found that travel speeds are generally lower with more roadway congestion during the evening peak period. The base year pm peak period travel time bands are shown in 2 minute increments, showing how far trucks departing each zone can travel to during peak period travel times with normal recurring congestion in less than 20 minutes. Figure 9-5 displays 20 minute travel sheds for the zones during the PM peak periods. It is expected with more congestion that the travel time sheds for zones will decrease in size. The shrinking 20 minute travel contour mirrors the longer trip times between the same origin and destination.
9.1.2.4 Safety

The Safety indicator looks at the relative number of vehicular crashes of each freight zone. This indicator not only gauges the relative safety of roadways around the Freight Zones but also represents non-recurring congestion for queuing associated with lane closures. Crash data for Shelby County was obtained from the Tennessee Integrated Analysis Network (TITAN) database for years 2013 through 2015. Crashes along the freight corridors within each of the freight zones were tabulated. Vehicle miles traveled (VMT) for the freight corridor routes were estimated from the TDOT Highway Performance Management System (HPMS) database and used to calculate an aggregate average crash rates by functional classification for the entire freight area. The actual
crash rates were then compared to statewide average crash rates for the same facility types. An aggregate critical crash rate was also estimated by roadway function classification. Critical crash rates are rates that have been adjusted to remove elements of change and randomness in the data set. If the actual crash rate is higher than the critical crash rate, it is an indication that the location or area has a recognizably higher crash rate than the average. Crash data for Crittenden County was obtained from the Arkansas State Highway and Transportation Department (AHTD) for years 2012 through 2014. The information provided by AHTD did not contain information about specific crash locations within the county, so freight zone level statistics were not developed. Crashes at a countywide level were tabulated overall and for interstates routes in the county. Vehicle miles traveled (VMT) for roadways in Crittenden County were obtained from AHTD’s Highway Performance Monitoring System (HPMS) for the base year analysis. The actual crash rates were then compared to the Tennessee statewide average crash rates.

Figure 9-6 displays the Freight Corridors that experience high densities of crashes. The Interstate System, specifically around interchanges and exits, experience the highest crash densities. The I-55 and Goodman Road exit represents the single highest location. It is expected that with increases in vehicular volumes that crash densities will continue to rise. However, relative changes in the location of crash density may not change. Comparable data to support the graphic depicting Arkansas was not available.
Figure 9-6: Regional Relative Crash Density
9.1.2.5 Workforce

Workforce within the Greater Memphis region is classified by five sector classifications: Basic Industries; Trade & Transportation; Professional Services; Retail & Transactions; and Other Services. Analysis includes evaluation of trends among these classifications from 2009 to 2014. Provided below is an overview of workforce by freight area and freight functional area.

Airport-Lamar Freight Area
As of 2014, a total of 92,557 employees worked in the Airport-Lamar Freight Area. Between 2009 and 2014, the total level of employment in the Airport-Lamar Freight Area increased by 4,562 jobs, which equates to a 1.0% CAGR. The industry sectors that experienced an increase in employment between 2009 and 2014 include: Professional Services (7.5% CAGR) and Retail & Transactions (0.4% CAGR). The industry sectors that experienced decreases in employment between 2009 and 2014 include: Basic Industries (-0.8% CAGR), Trade & Transportation (-0.7% CAGR), and Other Services (-3.2% CAGR).

Central Freight Area
As of 2014, a total of 12,178 employees are located within the Central Freight Area. Since 2009, this total has decreased by 909 jobs, a -1.4% CAGR. From 2009 to 2014, industry sectors increasing employment include Other Services (6.7 % CAGR) and Trade & Transportation (1.3% CAGR). Industry sectors decreasing employment include Professional Services (-9.1%), Basic Industries (-1.7% CAGR), and Retail & Transactions (-1.1% CAGR).

Mississippi Freight Area
As of 2014, a total of 12,866 employees worked in the Mississippi Freight Area. Between 2009 and 2014, the total level of employment in the Mississippi Freight Area increased by 4,125, which equates to an 8.0% CAGR. The industry sectors that experienced an increase in employment between 2009 and 2014 include: Trade & Transportation (10.0% CAGR), Professional Services (8.5% CAGR), Retail & Transactions (14.6% CAGR), and Other Services (5.6% CAGR). The industry sector that experienced a decrease in employment between 2009 and 2014 was Basic Industries (-0.1% CAGR).

Northeast Freight Area
As of 2014, a total of 15,079 employees worked in the Northeast Freight Area. Between 2009 and 2014, the total level of employment in the Northeast Freight Area increased by 441, which equates to a 0.6% CAGR. The industry sectors that experienced an increase in employment between 2009 and 2014 include: Basic Industries (0.1% CAGR), Trade & Transportation (0.2% CAGR), Professional Services (2.2% CAGR). The industry sector that experienced a decrease in employment between 2009 and 2014 was Retail & Transactions (-1.5% CAGR).

River Freight Area
As of 2014, a total of 9,492 employees worked in the River Freight Area. Between 2009 and 2014, the total level of employment in the River Freight Area increased by 979, which equates to a 2.2% CAGR. The industry sectors that experienced an increase in employment between 2009 and 2014 include: Basic Industries (2.9% CAGR), Professional Services (14.1% CAGR), Retail & Transactions (3.6% CAGR), and Other Services (2.3% CAGR).
industry sector that experienced a decrease in employment between 2009 and 2014 was Trade & Transportation (-1.1% CAGR).

**Southeast Freight Area**
As of 2014, a total of 6,872 employees worked in the Southeast Freight Area. Between 2009 and 2014, the total level of employment in the Southeast Freight Area increased by 432, which equates to a 1.3% CAGR. The industry sectors that experienced an increase in employment between 2009 and 2014 include: Trade & Transportation (11.1% CAGR), Professional Services (3.1% CAGR), and Retail & Transactions (10.8% CAGR). The industry sectors that experienced decreases in employment between 2009 and 2014 includes: Basic Industries (-3.2% CAGR) and Other Services (-0.5% CAGR).

**West Memphis Interstate**
As of 2014, a total of 5,346 employees worked in the West Memphis Interstate Freight Area. Between 2009 and 2014, the total level of employment in the West Memphis Interstate Freight Area increased by 111, which equates to a 0.4% CAGR. The industry sectors that experienced an increase in employment between 2009 and 2014 include: Basic Industries (2.9% CAGR), Trade & Transportation (2.4% CAGR), and Other Services (3.2% CAGR). The industry sectors that experienced decreases in employment between 2009 and 2014 include: Professional Services (-0.2% CAGR) and Retail & Transactions (-5.3% CAGR).

**West Memphis River Freight Area**
As of 2014, a total of 234 employees worked in the West Memphis River Freight Area. Between 2009 and 2014, the total level of employment in the West Memphis River Freight Area decreased by 53, which equates to a -4.6% CAGR. The industry sectors that experienced decreases in employment between 2009 and 2014 include: Basic Industries (-4.0% CAGR), Trade & Transportation (-20.9% CAGR), and Retail & Transactions (-27.5% CAGR).

**River 55 Functional Freight Area**
As of 2014, a total of 12,226 employees are located within the River 55 Freight Area. Since 2009, this total has increased by 1,092 jobs, a 1.9% CAGR. From 2009 to 2014, all industry sectors increased employment: Other Services (5.0% CAGR); Basic Industries (3.1% CAGR); Retail & Transactions (3.6% CAGR); Trade & Transportation (0.8% CAGR); and Professional Services (0.8% CAGR). Employment totals from all sectors have gradually gained employment from 2009 to 2014. Transportation & Warehousing and Manufacturing sectors account for more than three-fourths of the total jobs within the River 55 Freight Area.
9.1.2.6  Land Use

The Land Use indicators look at the relationship of industrial zoned land to residential, mixed use, open space, and special use districts of each freight zone. This indicator also looks at the building footprints to determine how built-out a zone is. Figure 9-7 displays Shelby County zoning districts for Freight Zones. Monitoring the change in zoning designations and build out of Freight Zones over time can indicate the maturity of a Freight Zone in its development life-cycle. Comparable zoning information for the states of Mississippi and Arkansas was not available to extend the graphical representation.

Figure 9-7: Regional Freight Zone Land Use
9.1.2.7 Real Estate

Industrial real estate within the Greater Memphis region is dependent on a number of factors. Analysis includes evaluation of metrics such as industrial inventory, square footage, occupancy and net absorption. Net absorption is the aggregate effect of new building vacancy and occupancy in a given time period. Provided below is an overview of real estate by freight area and freight functional area.

Airport-Lamar Freight Area
Industrial space in the Airport-Lamar Freight Area experienced relatively little change between 2009 and 2014. Within the Airport-Lamar Freight Area, the total industrial building count and total industrial square footage decreased over the study period. In 2014 the total building count for Airport-Lamar was 940 decreased from 943, while the total square footage was 96,214,265 decreased from 96,262,013. Occupancy of industrial space increased over the study period from a rate of 85.3% to a rate of 86.6%. Net absorption oscillated between positive and negative levels over the study period, contributing to the occupancy trend for Airport-Lamar.

Central Freight Area
Industrial space within the Central Freight Area illustrates negative real estate trends. From 2009 to 2014, the freight areas have experienced a negative net absorption of -8.5 percent compound annual growth rate (CAGR). As of 2014, industrial inventory totaled 450 buildings containing more than 34 million square feet for an average building size of almost 76,000 SF. Despite overall negative trends over the past five years, 2014 has experienced improvement in comparison to 2009. Annual net absorption has decreased from 2009 (-2.0 million SF) to 2014 (-1.3 million SF). During this same period, occupancy has slightly increased (0.1 percent).

Mississippi Freight Area
Industrial space in the Mississippi Freight Area experienced notable change between 2009 and 2014. Within the Mississippi Freight Area, the total industrial building count and total industrial square footage increased over the study period. In 2014 the total building count for Mississippi was 238, increased from 228, while the total square footage was 30,490,178, increased from 24,324,897. Occupancy of industrial space increased over the study period from a rate of 89.5% to a rate of 91.1%. Net absorption oscillated between positive and negative levels over the study period, contributing to the occupancy trend for Mississippi.

Northeast Freight Area
Industrial space in the Northeast Freight Area experienced relatively little change between 2009 and 2014. Within the Northeast Freight Area, the total industrial building count and total industrial square footage remained unchanged over the study period. In 2014 the total building count for Northeast was 49 while the total square footage was 4,016,786. Occupancy of industrial space decreased over the study period from a rate of 93.1% to a rate of 92.6%. Net absorption oscillated between positive and negative levels over the study period, contributing to the occupancy trend for Northeast.

River Freight Area
Industrial space in the River Freight Area experienced relatively little change between 2009 and 2014. Within the River Freight Area, the total industrial building count and total industrial square footage increased over the study period. In 2014 the total building count for River was 195, increased from 194, while the total square
footage was 12,763,632 increased from 11,876,632. Occupancy of industrial space decreased over the study period from a rate of 90.5% to a rate of 89.1%. Net absorption oscillated between positive and negative levels over the study period, contributing to the occupancy trend for River.

**Southeast Freight Area**
Industrial space in the Southeast Freight Area experienced relatively little change between 2009 and 2014. Within the Southeast Freight Area, the total industrial building count and total industrial square footage increased over the study period. In 2014 the total building count for Southeast was 105, increased from 103, while the total square footage was 6,980,978, increased from 5,098,100. Occupancy of industrial space increased over the study period from a rate of 90.9% to a rate of 99.6%. Net absorption oscillated between positive and negative levels over the study period, contributing to the occupancy trend for Southeast.

**West Memphis Interstate**
Industrial space in the West Memphis Interstate Freight Area experienced relatively little change between 2009 and 2014. Within the West Memphis Interstate Freight Area, the total industrial building count and total industrial square footage remained unchanged over the study period. In 2014 the total building count for West Memphis Interstate was 88 while the total square footage was 2,871,120. Occupancy of industrial space decreased over the study period from a rate of 98.5% to a rate of 94.6%. Net absorption oscillated between positive and negative levels over the study period, contributing to the occupancy trend for West Memphis Interstate.

**West Memphis River Freight Area**
Industrial space in the West Memphis River Freight Area experienced relatively little change between 2009 and 2014. Within the West Memphis River Freight Area, the total industrial building count and total industrial square footage remained unchanged over the study period. In 2014 the total building count for West Memphis River was 6 while the total square footage was 443,102. Occupancy of industrial space decreased over the study period from a rate of 100.0% to a rate of 70.5%. Net absorption showed little change for the first 4 years of the study, and declined sharply in 2014, contributing to the occupancy trend for West Memphis River.

**River 55 Functional Freight Area**
Industrial space within the River 55 Freight Area illustrates somewhat negative real estate trends. From 2009 to 2014, the freight areas have experienced an average net absorption of -34,947 SF. As of 2014, industrial inventory totaled 284 buildings containing almost 22 million square feet for an average building size of roughly 75,000 SF. Building size is relatively smaller than the regional average as many River 55 zones are located in close proximity to the dense CBD where land is less readily available and developable than surrounding, less dense zones. Occupancy has slight increased from 2009 to 2014 (0.4 percent).

**9.1.2.8 Industrial Health**
Industrial health is primarily dependent on factors such as workforce, land use, and real estate characteristics. Provided below is an overview of industrial health by freight area and freight area.
Greater Memphis Regional Freight Plan

Airport-Lamar Freight Area
Industrial sector growth within Airport-Lamar employment and real estate metrics from 2009 to 2014 has generally remained positive indicating stable industrial health within the zone. With almost 100,000 industrial employees spread out over almost 100 million square feet of space, the Airport-Lamar Freight Area is a dominant industrial cluster within the Greater Memphis region. Employment trends have trended upward from 2009 to 2014 with Professional Services leading the way (over 7,000 jobs gained). Real estate inventory has remained constant over the five-year period. Absorption has averaged almost 250,000 square feet annually raising the occupancy rate from 85.3% in 2009 to 86.6% in 2014. Airport-Lamar zones primarily benefit from proximity to Memphis International Airport. Acting as a driver to the freight area, the airport and its cargo operations acts as a facilitator for many complimentary industrial businesses.

Central Freight Area
Industrial sector growth within Central Freight Area employment and real estate metrics from 2009 to 2014 has mixed results within the zone. Employment trends from 2009 to 2014 have increased and decreased pending results within each employment sector. Of the five sector classifications, two posted positive employment trends and three posted negative employment trends. Real estate metrics have largely remained constant over this period. Despite additions of industrial inventory, occupancy totals have remained constant. Central zones present industrial opportunities as proximity to major intermodal facilities and multimodal access infrastructure is a major asset for industrial operations. Despite this asset, land use challenges exist for industrial as developable parcels are at a premium given the proximity to the density of CBD.

Mississippi Freight Area
Industrial sector growth within Mississippi employment and real estate metrics from 2009 to 2014 has generally remained positive indicating stable industrial health within the zone. Employment within the area has experienced substantial growth, averaging an 8.0% annual growth rate from 2009 to 2014. All job classifications, with the exception of Basic Industries, have experience growth over the period. Real estate indicators are also pointing in a positive direction as inventory has substantially increased. Over 6 million square feet of industrial inventory was added within the area from 2009 to 2014. Annual absorption has averaged over 1.1 million over the period with an occupancy rate standing at 91.1% as of 2014. Mississippi zones present industrial opportunities as ample land opportunities exist within close proximity to major freight infrastructure such as Memphis International Airport and many major roadway and railway facilities.

Northeast Freight Area
Industrial sector growth within Northeast employment and real estate metrics from 2009 to 2014 has generally remained positive indicating stable industrial health within the zone. From 2009 to 2014, employment trends have trended upward with slightly positive employment gains in all sectors except Retail & Transactions (-1.5% CAGR). Aggregately, all job classifications over the period gained over 400 jobs. Despite the encouraging workforce indicators, real estate metrics have been relatively stagnant with no new inventory added to the area from 2009 to 2014. Occupancy remains at a high rate but experienced a slight dip moving from 93.1% in 2009 to 92.6% in 2014. Northeast zones present industrial opportunities largely due to large areas of developable parcels and easy roadway access via Interstate 40 and Interstate 269. Class I railway access (CSX and CN) is also
available in close proximity to many Northeast zones. Despite this asset, land use challenges exist for industrial as developable parcels are at a premium given the proximity to the density of CBD.

River Freight Area
Industrial sector growth within River employment and real estate metrics from 2009 to 2014 has generally remained positive indicating stable industrial health within the zone. From 2009 to 2014, employment trends have trended upward with positive employment gains in all sectors with the exception of Trade & Transportation (-1.1% CAGR). Professional Services and Basic Industries combined to account for a gain of over 1,100 jobs over the same time period. Real estate inventory has reflected this employment trend by adding almost 1 million square feet of industrial space. An average of almost 90,000 square feet of industrial space is being absorbed within the area on an annual basis. River zones present industrial opportunities as proximity to the Mississippi River and surroundings roadway and railway facilities supply intermodal potential. Despite this asset, land use challenges exist for industrial as developable parcels are sometimes unfeasible or costly given much of the land within the area is within a floodplain or open protected space.

Southeast Freight Area
Industrial sector growth within Southeast employment and real estate metrics from 2009 to 2014 has generally remained positive indicating stable industrial health within the zone. Employment trends have trended upward with positive employment gains in three of five sectors from 2009 to 2014. Trade & Transportation and Retail & Transactions have over 900 industrial jobs over the period while Basic Industries has lost more than 600 industrial jobs. The shift in workforce classifications has not negatively affected real estate indicators as almost 2 million square feet of inventory has been added from 2009 to 2014. Absorption has shot up to over 360,000 square feet annually equating to an occupancy increase from 90.9% percent in 2009 to 99.6% in 2014. Southeast zones present industrial opportunities as large, developable land opportunities exist in close proximity to major freight facilities such as Interstate 269, Bill Morris Parkway and the NS Rail Corridor.

West Memphis Interstate
Industrial sector growth within West Memphis Interstate employment and real estate metrics from 2009 to 2014 has generally remained steady as workforce characteristics and real estate indicators have remained relatively constant from 2009 to 2014. Of the five industrial employment sector classifications, three gained employment and two lost employment. From 2009 to 2014, real estate inventory remained constant while occupancy went down almost 4% as absorption averaged an annual loss of about 16,000 square feet of leased industrial space. While characteristics seem somewhat stagnant, there is reason to maintain a positive outlook as West Memphis Interstate’s location along two interstates (I-40 and I-55) and two Class I rail lines (BNSF and UP) is a major asset for potential industrial operations.

West Memphis River Freight Area
Industrial sector growth within West Memphis River employment and real estate metrics over from 2009 to 2014 has been stagnant with little activity occurring over that time period. Employment has trended downward with employment losses in all reporting sectors. Real estate inventory has remained constant with six industrial buildings totaling less than 500,000 square feet. West Memphis River zones present industrial opportunities as
proximity to major intermodal facilities and multimodal access infrastructure is a major asset for potential industrial operations.

**River 55 Functional Freight Area**

Industrial sector growth within River 55 employment and real estate metrics from 2009 to 2014 has generally remained positive indicating stable industrial health within the zone. Employment trends have trended upward with positive employment gains in all sectors from 2009 to 2014. Despite the encouraging workforce indicators, real estate metrics have been sluggish. Despite additions of industrial inventory, occupancy totals have remained constant. River 55 zones present industrial opportunities as proximity to major intermodal facilities and multimodal access infrastructure is a major asset for industrial operations. Despite this asset, land use challenges exist for industrial as developable parcels are at a premium given the proximity to the density of CBD.

### 9.2 Industrial Access to the Global Marketplace

The Greater Memphis region is well-positioned to capitalize on freight commodities moving throughout the global marketplace. Geographically, the Region’s location captures freight commodities moving to and from the global marketplace by air, rail, roadway and marine modes. The network of infrastructure across all modes within the Greater Memphis region, and the connections between modes, allows for freight commodities to gain access to worldwide markets. Regional assets such as the Port of Memphis, Memphis International Airport, local intermodal facilities, Class I rail corridors and a dense network of interstates and highways allow for the Region to capitalize on freight movements on a global scale.

The Greater Memphis region has always been connected to the global marketplace. Early industry and commodities included the agricultural products grown across the region and rural areas that could get to port and terminal facilities on the River for eventual shipment to international ports. The growth of railroads throughout the 1900s, and the air freight developments since 1973 at the Memphis Airport, have broadened that early footprint. The October 2012 article by Inbound Logistics gave further voice to the Region’s 4Rs “Rail, Runway, Roads, River” that combine the transportation modes with the global marketplace. Railroad corridors, such as the Crescent Corridor of the Norfolk Southern and the Southeastern Corridor of CSX, also serve to enhance the industrial connections to wider North American and global markets. The railroads complement the corridor designations with specific service classification trains for a focused operation, such as for intermodal and refrigerated trains.

Each of the Class I railroads have begun a more defined industrial development program in an effort to sustain industry’s ability to locate within rail served industrial sites. The BNSF, for example, has ten economic development metrics to evaluate a given site’s readiness for development. The program also seeks to reduce the risks to industries and developers, as well as provide a greater clarity to the overall schedule to establish rail service. Available and underutilized industrial sites in the region may be evaluated and assessed for their suitability to enter into a railroad’s industrial development program.

Using the River 55 Functional Freight Area as an example, it is easy to visualize global access freight potential. Waterway accessibility within River 55 includes direct access to the Mississippi River and Port of Memphis. This north-south freight thoroughfare allows for direct access south to New Orleans and beyond. Freight rail within
the River 55 area is also well-positioned as multiple Canadian Northern (CN) rail spurs grant access to large swaths of industrial locations within the area. Once commodities arrive or depart via railway, freight rail lines are able to disperse commodities primarily via east-west regional rail connections. Truck accessibility within River 55 area has eight Interstates 55 and 240 access points for trucks to make connections with intermodal facilities and local freight businesses within the area. Most notably, the CN/CSX – Gateway Facility is located within the River 55 area providing large-scale intermodal capabilities. Air accessibility largely revolves around proximity to the Memphis International Airport. River 55 is conveniently located within 10 miles of the airport, one of the world’s largest cargo freight hubs.

Other freight areas are widely accessible across multiple modes based on the wide network of local infrastructure facilities. Maintaining these intermodal freight connections is critically important to the overall economic health of the Greater Memphis region.

9.3 Future Traffic Impacts on Industrial Areas

The future traffic impacts on the region’s industrial areas primarily arise in two areas: roadway congestion and physical constraints. Increasing congestion affects the trip to the industrial area across the region, and may have localized effects such as the absence of turning lanes that limit commercial vehicles traversing intersections.

9.4 Rural

The FAST Act of 2015 raised the profile of rural development and the access to transportation infrastructure in a more formalized manner across the United States. State and federal programs had earlier programs while the Fast Act established program levels for an eligible number of roadway segment miles within individual states. One industrial area, the NWMS Mega Site and the MATA Site, just outside the MPO Planning area have a more prominent rural location effect than the other industrial areas within the project study area.
Chapter 10 – Environmental

Greater Memphis Regional Freight Plan
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10.1 Air Quality and Climate Change

The Clean Air Act (CAA) was created to monitor and regulate air emissions from stationary and mobile sources. In 1990, the CAA was amended to include language specifically aimed at protecting the ozone layer, reducing acid rain and toxic pollutants, improving visibility, and improving the overall quality of the air we breathe. Freight transportation is an indirect contributor to emissions from the indirect and mobile sources that may arise in freight movement.

The CAA also allowed EPA to introduce National Ambient Air Quality Standards (NAAQS) to protect public health and welfare, and to regulate emissions of hazardous air pollutants. Currently, EPA has identified six main pollutants, called “criteria” air pollutants, which have established NAAQS:

- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Dioxide (NO2)
- Ozone (O3)
- Particulate Matter (PM)
- Sulfur Dioxide (SO2)

Periodically, each standard is reviewed for its effectiveness and adjusted accordingly, based on new data and/or measurement technology. Furthermore, each state is responsible for developing state implementation plans (SIPs) that include methods and timelines to achieve or maintain these standards.

In 2009, EPA undertook a more formalized approach to the threat of climate change caused by greenhouse gas (GHG) emissions and their impact on the public. Greenhouse gases are gases that trap heat and make the planet warmer. Scientists theorize that a warmer planet promotes more intense storms, more frequent flooding, longer droughts, and larger, more severe wildfires. Average annual temperatures are estimated to increase as well across the earth’s various topographies.

A major contributor to GHG emissions comes from human activities like burning fossil fuels for electricity, heat, and transportation. To help counter this problem, EPA has made efforts under the CAA to limit GHG emissions and reduce the effects of climate change. For example, EPA and the National Highway and Traffic Safety Administration (NHTSA) recently released GHG emission standards and fuel economy standards for medium- and heavy-duty trucks for model years 2014-2018.

To combat the growing concern of diesel emissions, EPA’s National Clean Diesel Campaign\(^1\) provides national support and funding to help reduce the harmful emissions of diesel engines that operate within all freight categories including truck, rail, and water. Through the efforts of Clean Diesel Campaign, the Southeast Diesel Collaborative brings stakeholders from Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee together as a way to share information and foster long-standing public-private partnerships for the benefit of reducing diesel emissions. SmartWay\(^2\), another EPA initiative, was created to help companies advance supply chain sustainability through the use of three core programs: Partnerships, Collaboration, and Branding.

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\(^1\) [https://www.epa.gov/cleandiesel](https://www.epa.gov/cleandiesel)
\(^2\) [https://www.epa.gov/smartway/](https://www.epa.gov/smartway/)
10.1.1 Current Air Quality Status

The EPA Green Book\(^3\) provides detailed information about area NAAQS by designation, classifications, and nonattainment status. According to the latest Green Book statistics, (February 13, 2017), certain counties in the Greater Memphis region (Shelby (TN), DeSoto (MS), and Crittenden (AK) Counties) are currently classified as Maintenance under the following standards:

- 8-hour Ozone (2008 standard);
- Carbon Monoxide (1971 standard) – Shelby County only;

Two of the three pollutants mentioned above - Ozone (O\(_3\)) and Carbon Monoxide (CO) - are direct results of activities that burn fossil fuels, (i.e., cars, trucks, rail, ships, and airplanes) for energy and transportation.

10.1.2 Freight-Related Contributions to Air Quality

According to the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*\(^4\), the transportation sector - which includes the movement of people and goods by cars, trucks, trains, ships, airplanes, and other vehicles - was responsible for approximately 27% of greenhouse gas (GHG) emissions in 2015. Of that percentage, carbon dioxide (CO\(_2\)) is, by far, the most dominant greenhouse gas emitted in the transportation sector (82%). Methane is second with (10%).

EPA’s *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990-2014*\(^5\), Medium- and Heavy-Duty Trucks account for 23% of the transportation sector’s GHG emissions. Rail, Ships & Boats, and Aircraft account for about 12%.

**Trucks**

Trucks still remain the most dominant mode for freight movements, by weight, value, and ton-miles. In 2007 EPA introduced strict new caps on emissions of PM, NOx, and other pollutants for model year 2007 and later trucks. At the same time, it mandated the use of ultra-low sulfur diesel (ULSD) in heavy-duty trucks produced after 2007. This allowed for the use of more advanced pollution control technology in diesel engines – called “aftertreatments”. However, given the large amount of older vehicles on the road, and the slow rate of fleet turnover, the benefits from more advanced aftertreatments will not be recognized until many years from now. Poor vehicle maintenance also can also adversely affect truck emissions.

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\(^3\) [epa.gov/green-book](https://www.epa.gov/green-book)


\(^5\) [https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ONBL.pdf](https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ONBL.pdf)
Vessels and Ports
Marine diesels are classified by the EPA into three categories. For example, Category 3 engines are the very large engines used on oceangoing cargo vessels such as containerships. To help companies save money, the larger vessels typically burn a special type of diesel fuel – called bunker fuel - that contains high concentrations of sulfur. Category 1 and 2 marine diesel engines are similar to truck and locomotive engines and typically operate within the inland waterways. They generally burn cleaner fuel but do not have the same strict emission regulations of their on-road counterparts.

In addition to the ships themselves, much of the cargo handling equipment (e.g., cranes, forklifts, terminal tractors) for port operations are powered by the same diesel engines used in on-road vehicles. Even though many of these vehicles utilize clean-diesel technologies, (and many ports mandate the use of such technology), they still contribute to air quality issues around ports.

Because of this, EPA has developed a set of standards for marine engines of all sizes ranging from small tugboats to large, ocean-going ships; and has also adopted standards that cover the non-road heavy equipment used as port facilities.

Local private companies, like Ingram Barge, have also invested heavily in emission reduction strategies and operating equipment. In 2010, their efforts were recognized by the Southeast Diesel Collaborative and were presented the “Leadership Award” for retrofitting six of their towboats with diesel oxidation catalyst (DOC) units. This led to reductions in particulate emissions of about 40% and reductions in carbon monoxide and hydrocarbon emissions by over 60%.

Rail
Often argued as a clean alternative to trucks, (one train can pull an equivalent volume of 250 trucks), trains also emit about a third less emissions per ton/mile when compared to trucks. Like trucks, trains emit significant amounts of NOx and particulate matter. The problem is that emissions standards for locomotives lag behind those for trucks. There are also older locomotives still in use that predate basic regulations. This is due to in part to longer service lives of locomotives – usually around 30-40 years. So, older, less controlled models remain in use longer than trucks typically do, although engines are typically rebuilt every 600,000 to 1,000,000 miles.

Freight rail locomotives fall into two groups: 1) line-haul locomotives; and 2) switchyard locomotives. Line-haul locomotives are the more powerful engines that the railroads use to move large freight trains between major hubs. Switchyard locomotives are less powerful and are used to disassemble and reassemble trains by moving cars around at a rail yard. Line-haul operations, involve a greater proportion of operating time at high power levels, while locomotives engaged in switching operations typically spend most of their time at a lower power output, starting and stopping, or at idle. This tends to increase emissions for switchers, since frequent acceleration and deceleration requires more power than cruising at a constant speed. Railroads also tend to "sunset" older locomotives, that may also have a lower horsepower rating, by shifting them from line-haul duty

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6 https://southeastdiesel.org/portfolio/ingram-barge-company/
7 (Stodolsky, F. (2002). *Railroad and Locomotive Technology Roadmap*. Argonne National Laboratory, Center for Transportation Research, ANL/ESD/02-6)
to switchyard functions, meaning that rail yards (sometimes located in dense urban population centers) often end up with the oldest, most polluting locomotives; however, these locomotives are subject to updated engine-rebuild emissions standards when they go through major overhauls.

In addition, the rail freight industry is growing. This can be attributed to rising diesel fuel costs and a shortage of truck drivers. The U.S. Department of Transportation estimates that total rail freight tonnage will grow by 23 percent (0.7% annually) between 2015 and 2045. Furthermore, USDOT predicts the percentage of growth in rail freight by value will increase by 81 percent (2.0% annually) during that same time period.\(^8\)

### Air

Air cargo is a very small part of total freight movements in the United States, when measured by weight. This is because moving goods by air is very expensive. Generally, light, higher-value, more time-sensitive commodities move by air. But, despite being less than one percent of total freight tonnage in 2015, air cargo movements comprised four percent of total freight value that year, (FHWA, Freight Analysis Framework).

In addition, air cargo movements are expected to grow faster (in both tonnage and value) than any other mode. USDOT estimates over a 4 percent annual growth in air cargo tonnage and almost a 5 percent annual increase in cargo by value, (FHWA, Freight Analysis Framework). These substantial increases in growth will likely contribute more to air quality problems in the future, especially in large urban areas with major airports. Cargo and baggage handling equipment at airports primarily serve passenger aircraft, but also is a source of airport-related emissions.

It is difficult to isolate emissions specifically related to freight movements. One of the reasons for this is because a majority of air cargo is carried by commercial passenger aircrafts. According to a recent FHWA report, about 0.1 percent of NO\(_x\) and 0.2 percent of PM\(_{10}\) emissions come from air cargo operations on average.\(^9\) In larger cities, like Los Angeles, air cargo operations contribute a larger share of the NO\(_x\) and PM emissions. All jet aircraft (passenger and freight) emit a number of pollutants into the air, (e.g., VOCs, NO\(_x\), SO\(_2\), and CO). In that same FHWA report mentioned earlier, the impacts on ground-level ozone from aircraft operations occur below 3,000 feet (i.e., takeoffs and landings). Like locomotives, commercial jets have longer service lives; so technology improvements or new regulatory standards aimed at reducing emissions may not be recognized in the short term.

### 10.1.3 Potential Emission Reduction Strategies

The Federal Highway Administration’s (FHWA) Freight and Air Quality Handbook (2010) provides a list of technological and operational strategies aimed at reducing emissions associated with goods movement in the United States. The following is a list of some strategies being used across the country:

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\(^8\) Freight Analysis Framework (FAF4, 2015 Dataset)  
Technological Strategies

- **Exhaust Aftertreatments** - includes emission control devices that can be integrated into both new engines and retrofits. Some examples include Diesel Particulate Filters, Diesel Oxidation Catalysts, and Flow-Through Filters;
- **Repowering** - replacing an old engine with a newer, cleaner engine. This strategy would also include converting to an electric engine or even replacing the entire vehicle with a brand new vehicle;
- **Alternative Fuels** - provide cleaner-burning options for freight vehicles and equipment. Examples include Biofuels and Natural Gas;
- **Energy Efficiency** - have the advantage of reducing fuel costs, sometimes making them cost-neutral. Examples include hybrid-electric vehicles, improved vehicle aerodynamics, and vehicle weight reduction (i.e., steel to aluminum parts).

Operational Strategies

- **Anti-Idling** - reduce emissions by cutting down on idling time. Examples include Truck Stop Electrification / Auxiliary Power Units, Shore Power (a.k.a. Cold-Ironing), and Idling Limit Devices;
- **Congestion Mitigation** – limiting idling time due to congestion. Examples include signal coordination, Road / Rail grade separations, and Truck Only Lanes;
- **Operational Adjustments** – changing operating practices at freight generators. Strategies include speed reduction regulations, off-peak deliveries, and improved truck and port operations.

10.2 Noise Pollution

Another environmental concern in the freight industry is noise – which is traditionally defined by EPA as “unwanted or disturbing sound”. Sound becomes unwanted when it either interferes with normal activity, or negatively affects quality of life. Noise has also been linked to numerous health issues such as stress related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity.

A study conducted in the early to mid-1970’s estimated nearly half of the U.S. population (over 100 million people) lived in areas where noise exceeded a reasonable sound level of 55 decibels (dB). About 12 million people live in areas that exceed 70 dB.

Under the CAA, the EPA established the Office of Noise Abatement and Control (ONAC) to carry out investigations and studies on noise and its effect on the public health and welfare. However, in 1981 the Administration concluded that noise issues were best handled at the State and local level; so the ONAC was closed in 1983 and primary responsibility was transferred to State and local governments.

Shelby County’s Noise Ordinance (Sec. 24-368) contains noise provisions related to motorized vehicles (including trucks), mufflers, horns/warning devices, and trains; but does not specifically discuss freight-related activities. It is unclear at this time how often this ordinance is enforced.
10.2.1 Trucks

Noise from the motors and exhaust systems of large trucks provide the majority of highway noise. In addition, noise is produced from the interaction between tires and the roadway. In cities and dense urban areas, these noises can be exacerbated by narrow streets and tall buildings, producing a "canyon effect" where traffic noise reverberates. Noise complaints may be addressed through the use of engineering controls for sensitive receptor sites, such as schools and hospitals, should they be located at or near roadway and other freight transportation activities.

In a letter from Thomas Reinhart (Southwest Research Institute) to David Pritzker (Deputy General Counsel for the Administration Conference of the U.S.) back in 1991, Reinhart reported that his research determined the most common complaint about truck noise was related to problems caused by tampering with the mufflers of trucks using compression brakes.

10.2.1.1 Compression Brakes

Compression brake noise (also known as “Jake Brake” noise) has been a significant noise-related issue for several decades. When equipped and activated, compression brakes transfer a portion of the energy created by the truck’s engine straight to the exhaust system – allowing the truck to slow down without applying the brakes.

However, with the introduction of exhaust aftertreatments in 2010, compression brake noise have the potential to become less of an issue. Not only can exhaust aftertreatments improve air quality, they can also provide two potential benefits for compression brake noise. The first benefit is that these aftertreatment devices are very good at attenuating noise in the exhaust stream. The second benefit is that aftertreatment systems make tampering with the exhaust system a very complex engineering undertaking which few truck operators are likely to undertake. Reports indicate that as more trucks are equipped with aftertreatments, the issue of compression brake noise should fade away.

10.2.2 Aviation

The Federal Aviation Administration (FAA) is the primary agency responsible for providing direction and guidance nationwide in the assessment of noise impacts associated with civilian airports. Similar to FHWA guidance, the FAA releases periodic guidance called Advisory Circulars, (AC). One particular Circular, AC 36-3H (5/25/12) provides estimates on Airplane Noise Levels by Aircraft for both takeoff and approach. According to this circular, sound levels during takeoff range between 112.9 and 51.0 dBA, (depending on the weight of the plane at takeoff gross weight and the aircraft’s propulsion type). Approach sound levels range between 109.5 and 52.0 dBA. Approach noises are largely attributed to airframe noise (i.e., wings, flaps, and landing gear). To put these levels in perspective, 60 dBA is equivalent to restaurant conversations or an air conditioning unit 100 feet away. 110 dBA is equivalent to an auto horn from 3 feet away or live rock music. The current Greater Memphis region airports manage their noise impacts through their respective airport planning efforts.

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10.2.2.1 Aircraft Noise

Aircraft noise is regulated through international standards and applied to an aircraft when it is certified safe to fly. These standards require an aircraft meet or fall below designated noise levels. For civil jet aircraft, there are four stages identified, with Stage 1 being the loudest and Stage 4 being the quietest. New engine noise standards are periodically updated.

10.2.2.2 Federal Regulations

To counter the effect of excessive noise near airports, the FAA enacted the following regulations that deal with matters related to airport and aircraft noise:

10.2.2.3 14 CFR Part 150 (Airport Noise Compatibility Planning)

In 1981, the FAA established the Noise Compatibility Planning Process as a part of the Federal Aviation Regulations. This part describes the steps required by “public use airports” to prepare airport noise exposure maps (NEMs) and airport noise compatibility programs. The NEM is a graphic depiction of the noise exposure around an airport in existing and future (five-year) operational conditions. Components of these plans involve measuring noise at airports and surrounding areas, and determining exposure of individuals to noise resulting from the operations of an airport. Airports must update their NEMs when a change in a Day Night Sound Level (DNL) of 1.5 dB has occurred within a noise sensitive land use.

In 2014, the Memphis-Shelby County Airport Authority (MSCAA) updated the NEMs for Memphis International Airport to account for changes in aircraft operations and NextGen operational procedures. The NEM’s were approved by FAA in 2015.

10.2.2.4 14 CFR Part 161 (Notice and Approval of Airport Noise and Access Restrictions)

The FAA has undertaken a phase out of older, noisier civil aircraft, resulting in some stages of aircraft no longer being in the fleet. Currently within the contiguous US, civil jet aircraft over 75,000 pounds maximum take-off weight must meet Stage 3 and Stage 4 to fly. In addition, aircraft at or under 75,000 pounds maximum take-off weight must meet Stage 2, 3, or 4 to operate within the U.S. As of December 31, 2015, all civil jet aircraft, regardless of weight must meet Stage 3 or Stage 4 to fly within the contiguous United States. 14 CFR Part 161 utilizes this information and includes the following:

a) Notice requirements and procedures for airport operators implementing Stage 3 aircraft noise and access restrictions pursuant to agreements between airport operators and aircraft operators;
b) Analysis and notice requirements for airport operators proposing Stage 2 aircraft noise and access restrictions;
c) Notice, review, and approval requirements for airport operators proposing Stage 3 aircraft noise and access restrictions; and

d) Procedures for Federal Aviation Administration re-evaluation of agreements containing restrictions on Stage 3 aircraft operations and of aircraft noise and access restrictions affecting Stage 3 aircraft operations imposed by airport operators.
10.2.2.5 State Regulations

Most of the regulations imposed on aircraft and airport noise are developed and enforced controlled by FAA. Tennessee, however, does include some regulations related to noise. For example, Tenn. Code Ann. § 7-3-313 requires counties with metropolitan governments to establish airport noise mitigation programs to help reduce the impact of noise from airport operations on surrounding areas. Memphis is not considered a metropolitan government, so this particular law does not apply to the Memphis International Airport.

Tenn. Code Ann. § 42-4-117 requires any airport authority with major airline, air carrier, or air parcel hub operations to file their Part 150 document with both the Department of Environment and Conservation (TDEC) and TDOT. Research on state regulations of aircraft noise in Arkansas and Mississippi were unsuccessful.

10.2.2.6 Noise Reduction Strategies

On the ground, the airport may establish restrictive policies to minimize community noise exposure from the full power run-up (i.e., engine checks). The airport may require that run-ups only take place during certain hours to maintain quieter night time hours. In some cases, the full power run-up may be performed in a part of the airport that will minimally impact residents no matter what hour of the day.

Airports can also invest in Ground Run-Up Enclosures (GRE). A GRE is a roofless three-sided building, sized to handle the aircraft being inspected. The goal of a GRE is to give airlines the ability to perform the full power run-up without causing the great deal of associated noise. The walls of the GRE are both angled to direct the noise waves into the sky and made of a highly effective noise absorbent material. Ground Run-Up Enclosures aim to reduce noise by 20dB or 75%.

10.2.3 Rail

The noise from locomotive engines, horns and whistles, and switching and shunting operations, as well as the wheels to rail connections, in rail yards can impact neighboring communities and railroad workers. For example, rail car retarders can produce a high-frequency, high-level screech that can reach peak levels of 120 dB at a distance of 100 feet (EPA, 1974), which translates to levels as high as 138 or 140 dB near the source.

10.2.3.1 Noise Regulations

The Federal Rail Administration (FRA) Office of Safety is currently responsible for enforcing the Noise Control Act of 1972 as it relates to rail operations in the United States. The following is a list of current regulations, (appropriate for this study), used by FRA to govern railroad noise emissions:

**Line Haul and Yard Operations**

Noise emissions from railroad line haul and yard operations are regulated by two rules:

- 40 CFR Part 201 (Noise Emission Standards for Transportation Equipment; Interstate Rail Carriers) – primarily sets noise emission standards for: locomotive operations (under both stationary and moving conditions), rail car operations, retarders, car coupling operations, and locomotive load cell test stands; and

**Locomotive Horns (Audible Warning Devices)**
The sounds emitted by locomotive horns and other audible warning devices are regulated by two federal programs 49 CFR Part 229.129 (Railroad Locomotive Safety Standards: Locomotive Horn), and 49 CFR Part 222 (Use of Locomotive Horns at Public Highway-rail Grade Crossings). These rules set both minimum and maximum sound levels for locomotive and wayside horns, and describe the requirements and record keeping procedures of horn tests.

**Train Horn Rule (Part 222)**
Under normal conditions, the Train Horn Rule prohibits train engineers from sounding train horns until the train is between 15 and 20 seconds in advance of the crossing. If a train is traveling faster than 60 MPH, a train engineer must not sound the horn until the train is within one-quarter mile of the crossing – regardless of the 15-20 second rule. The Rule also provides exceptions for the engineer to sound the horn at 25 seconds if the engineer cannot accurately determine the train’s arrival at the grade crossing.

Train horns must be sounded in a standardized pattern of 2 long, 1 short, and 1 long blast. The pattern must be repeated or prolonged until the lead locomotive or lead cab car occupies the grade crossing. The rule does not stipulate the durations of long and short blasts. The range of sound levels for a train horn between 96 and 110 decibels.

**Quiet Zones**
Part 222 also provides the opportunity to mitigate the effects of train horn noise by establishing “quiet zones”. Quiet zones are typically established along segments (at least one-half mile long) of rail lines where there is a group of public highway-rail crossings near each other. In a quiet zone, railroads have been directed to cease the routine sounding of their horns when approaching each public highway-rail grade crossings. They are, however, allowed to use the horn in emergency situations or to comply with other Federal regulations or railroad operating rules. In lieu of horns, grade crossings within a quiet zone must have active crossing warning devices, advance warning lights, and bells.

**10.2.3.2 Possible Noise Reduction Strategies**
Various studies both in the U.S. and abroad, have studied various noise reduction strategies for rail operations. The following is a list of measures that can reduce the noise nuisance caused by passing trains:

- Rail Fasteners and Slab Tracks - Used to reduce vibration noise, particularly on bridges and viaducts;
- Noise Barriers – One of the most common forms of noise mitigation measure used on railways;
- Frequent Track Maintenance – Eliminates track roughness caused by cast-iron brake blocks;
- Synthetic Brake Blocks - Generate 7-8 dB less noise than cast-iron brake blocks by keeping the wheels smooth;
- Rail Dampers – Absorb vibrations and reduce noise by roughly 3 dB.
10.2.4 Waterways

Tenn. Code Ann. § 69-9-302 states “No person shall operate any vessel in or upon the waters of Tennessee in such a manner as to exceed 86 dBA measured at a distance of fifty feet (50’) from the vessel.” The location of towboats and their engines located within an enclosed powerplant, as well as operations within industrial terminals and ports, mitigates potential noise conflicts for the maritime sector.
Chapter 11 – Technology

Greater Memphis Regional Freight Plan
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Note - All maps in this document have been oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
On October 20, 2016, Anheuser-Busch successfully delivered 50,000 cans of Budweiser from a brewery in Fort Collins, Colorado to a warehouse in Colorado Springs about 120 miles away with help from Otto, Uber’s self-driving technology company. This marked the world’s first autonomous truck delivery. This also marks the beginning of how advanced technology will change the freight industry. Even though it is true that this form of transportation is still in its infant stages, it is reasonable to assume that some form of autonomous technology will become commonplace in the freight industry within the next 10 years – if not sooner. Other technologies are evolving as well, including platooned truck vehicles and smart roads for freight and passenger vehicles. The continued availability and extent of large data sources, many in nearly real time formats, continues to evolve as well. In each technology example, it will be important to maintain a uniform standard and common technological voice to preserve complete and robust communication and transfer of information. The following are technology trends that are currently evolving.

### 11.1 Autonomous Vehicles and Platooning

It will be years before vehicles have the ability to complete a voyage from start to finish without the need for any human interaction; but the technology is already being used in other industries. Advocates of automated vehicles equate this type of human interaction to how an airline pilot interacts with a plane. Pilots today must manually taxi to the runway and perform the takeoff and landing; but while in the air, a plane is primarily on autopilot. Truck automation works in the same way. Human drivers might manually “taxi” the truck to the freeway and place the vehicle on “autopilot” until it exits the freeway. This was the case during the monumental Budweiser delivery mentioned earlier. Prototype tests are planned and being undertaken across several jurisdictions as a temporary demonstration project.

One of the first steps in the journey towards autonomous trucks is a technique known as platooning. Platooning involves two or more trucks following each other at close distances as a way to save on fuel and vehicle costs. Each driver in the platoon still navigates the truck, but the engine and brakes on the following vehicles are wirelessly connected to the front truck, allowing the two vehicles to accelerate and decelerate in sync. In Tennessee, SB676 was passed on April 25, 2017, to reduce the required distance between traveling trucks to enable a pilot / test case to be undertaken.

It is also theorized that autonomous technology will make the roads safer. Automation proponents cite current Federal statistics that report 433,000 large trucks were involved in a crash in 2015; resulting in over 4,000 fatalities. In most cases, driver error was to blame, (FHWA, Fatality Analysis Reporting System (FARS) and National Motor Vehicle Crash Causation Survey (NMVCCS)). The National Highway Traffic Safety Administration (NHTSA) estimates that vehicles equipped with Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) technology could reduce the severity of up to 80 percent of non-impaired crashes, including crashes at intersections or while changing lanes. Automation opponents believe that a computer-driven vehicle will have difficulty using common sense when deciding between two undesirable outcomes. Airplanes on autopilot have a much less congested airspace to operate within than seen on freeways.
11.2 In-Cab Electronics

Car and truck manufacturers are already rolling out vehicles with advanced electronics that feature some level of automation. Most vehicles today are equipped with some, if not all, of the following features:

- Lane tracking
- Adaptive cruise control
- Automated braking
- Park assist & automated valet

Recently, the U.S. DOT instructed automakers and manufacturers to include Vehicle-To-Vehicle (V2V) technology in their new light vehicles, (NHTSA, 2016). The Federal Highway Administration is also expected to issue guidance on standardizing the “language” vehicles use to communicate with each other. This directive is expected to expand to heavy trucks in the future.

11.3 Private Sector Technology Development

The private sector is at the forefront of transportation technology. Companies like Google and Uber have received a lot of media attention for their efforts to advance connected and automated vehicle technology. Peloton, a start-up software company based in Mountain View, California, is expected to introduce platooning systems for commercial fleets by the third quarter of 2017. Truck manufacturers like Daimler, Volvo and Scania are also in the process of testing their platooning system technology.

Car companies are also introducing new technology as a way to reduce pollutant emissions. For example, Toyota recently announced a partnership with the Port of Los Angeles to test their hydrogen fuel system for heavy-duty trucks. Volvo recently announced all the models it introduces starting in 2019 will be either hybrids or powered solely by batteries.

11.4 TDOT’s Emerging Mobility Solutions Plan

TDOT is taking a pre-emptive approach to Connected and Automated Vehicle (CAV) technology. By the end of 2017, they will have completed an update to their Long Range Transportation Plan that includes an Emerging Mobility Solutions element to the Plan. The new section will focus on current trends in CAV and begin to set the foundation for the State’s future investment in infrastructure. In other words, the Emerging Mobility Solutions Plan will set a roadmap for how TDOT can integrate transformative and breakthrough technologies while, at the same time, meet the Department’s safety, environmental, and mobility goals. In a similar aspect, it will be important to have the systems remain resilient and resistive to errors and intrusions to the data and information systems. This project, which is still in its infant stages, will involve public and private stakeholder interviews, trends analysis, policy implications, and impacts on deployment and operations.

11.5 Legal Landscape

Since 2012, 41 states and Washington, D.C. have considered legislation related to autonomous vehicle technology. Thirteen states, including Tennessee, have currently passed some form of legislation. Several other states have decided to move forward with testing in the absence of enacted regulations, shown in Figure 11-1.
In Tennessee, there are currently 4 bills being considered in the House and Senate and one that has passed. In Arkansas, there is one that has been passed. Mississippi does not currently have enacted legislation for autonomous vehicles. Table 11-1 provides a short description and current status of each bill:
### Table 11-1: Current Autonomous Vehicle Legislation in the Memphis Region

<table>
<thead>
<tr>
<th>Bill Number</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB151 / HB381</td>
<td><strong>TN</strong>&lt;br&gt;Authorizes the operation of autonomous vehicles on the public roads of this state. <strong>Senate:</strong> Placed on Senate Finance, Ways &amp; Means Committee Calendar  <strong>House:</strong> Referred to Calendar &amp; Rules Committee</td>
</tr>
<tr>
<td>SB676 / HB751</td>
<td><strong>TN</strong>&lt;br&gt;Authorizes a person to operate a platoon on the streets and highways of this state after the person provides notification to the Department of Transportation and the Department of Safety. <strong>Signed by Governor</strong></td>
</tr>
<tr>
<td>SB1072 / HB1131</td>
<td><strong>TN</strong>&lt;br&gt;Authorizes autonomous vehicles to operate in the state without a human driver under certain conditions. <strong>Senate:</strong> Assigned to General Subcommittee of Senate Transportation and Safety Committee  <strong>House:</strong> Taken off Calendar of Transportation Subcommittee of Transportation Committee</td>
</tr>
<tr>
<td>SB513 / HB705</td>
<td><strong>TN</strong>&lt;br&gt;requires the department, no later than August 1, 2017, and by August 1 of each subsequent year, to report to the members of the house transportation committee and the senate transportation and safety committee of the general assembly the total number of traffic violations that involve motor vehicles operated by autonomous technology in each political subdivision of the state for the preceding fiscal year. <strong>Senate:</strong> Received from Senate. Held on House Desk  <strong>House:</strong> Placed on House Finance, Ways &amp; Means Subcommittee Calendar</td>
</tr>
<tr>
<td>SB252 / HB296</td>
<td><strong>TN</strong>&lt;br&gt;Allows an autonomous vehicle's certificate of registration to be available electronically instead of in the vehicle at all times, as required for conventionally operated motor vehicles. <strong>Senate:</strong> Assigned to General Subcommittee of Senate Transportation and Safety Committee  <strong>House:</strong> Assigned to Transportation Subcommittee</td>
</tr>
<tr>
<td>HB1754</td>
<td><strong>AR</strong>&lt;br&gt;Regulates the testing of vehicles with autonomous technology, relates to vehicles equipped with driver-assistive truck platooning systems. <strong>Signed by Governor (ACT 797)</strong></td>
</tr>
</tbody>
</table>

### 11.6 MPO’s Role

The first proposed platooning vehicle pilot projects have been identified for the more open and rural interstate roadway segments between major metropolitan areas, such as Nashville and Memphis. The Memphis MPO should make efforts to stay engaged with the Departments of Transportation in Arkansas, Mississippi, and Tennessee, and help facilitate discussions between the States as they related to connected and autonomous vehicle initiatives and the implementation impact for land use that supports truck operations. Furthermore, MPO staff should periodically track each state’s applicable CAV legislation and identify possible political “bottlenecks” early in the process that may hinder seamless integration across state borders. Lastly, the MPO should encourage the advancement of this technology by supporting any future pilot programs that incorporate regional freight movements.
Chapter 12 – Freight Performance Measures

Greater Memphis Regional Freight Plan
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Note - All maps in this document have be oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
12.1 Introduction

Freight mobility is critical for stakeholders and the emerging role of the Greater Memphis region as a hub city. Freight performance-based planning efforts can help identify, prioritize and fund the necessary projects to maintain and grow the regional and state economies, as well as restore and sustain the regional quality of life. Performance-based planning helps measure the effectiveness of local strategies and investments to achieve state and national freight goals.

The national freight transportation system is critical to the safe and efficient movement of goods which fuels our regional and national economies and supports our quality of life. Freight transportation is a complex web of systems which is decentralized and dynamic, involving public and private decision makers, across all modes of transportation, requiring continuous re-investment and maintenance. Investment in transportation infrastructure helps improve freight mobility which supports efficient supply chains and economic development.

Displayed in Figure 12-1, freight transportation demand is anticipated to grow by nearly 41% (1.2% CAGR) by the year 2045. This anticipated growth will outstrip the current capacity of the nation's highway, air, waterway, ports, pipelines, terminals and railway systems. Crippling levels of highway congestion and bottlenecks are deteriorating transit time reliability, increasing transportation costs, leading to the unintended consequences of higher inventory levels and changing distribution network strategies to try to improve supply chain reliability. In some instances, industries will reposition their plant and production facilities in order to avoid congestion.

Figure 12-1: US Freight Tonnage Growth 2015-2045

<table>
<thead>
<tr>
<th>Billion Tons</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2040</th>
<th>2045</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Energy Goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy Goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, FAF4

Strategic operational and investment strategies by governments at all levels will be necessary to maintain the freight system performance in order to compete with global markets. More than 90% of U.S. supply chains rely

---

1 Freight Analysis Framework (FAF4, 2015 Dataset)
on global suppliers and consumers. The Greater Memphis region is an important node on the I-40 and I-55 corridors, where I-40 is one of the top 25 freight corridors in the nation.²

A comprehensive, objective and consistent set of performance measures for the national freight transportation system is important for assessing the condition of the system, problem identification, and the prioritization of funds to resolve national, state and local transportation system problems. Increasing calls for transparency and accountability have led to a more formalized approach to performance measurement.

This chapter provides an overview of the Federal Guidance for performance measures and the State performance measures of Tennessee, Mississippi and Arkansas. These states directly impact freight in the Memphis MPO jurisdiction. MPO’s with bi-state jurisdiction and similar mode characteristics are highlighted to illustrate how these agencies are approaching the development of performance measures. Highlights include St. Louis, MO; Kansas City, KS; Cincinnati, OH; and Louisville, KY. Finally, recommendations for a performance measure framework for the Memphis MPO are provided.

### 12.2 Overview – Federal Guidance

The Moving Ahead for Progress in the 21st Century Act (MAP-21) transportation legislation, passed by Congress in 2012 requires metropolitan planning organizations (MPO’s) to measure and evaluate the performance of their transportation investments against specific federally required measures. The Fixing America's Surface Transportation (FAST) Act, passed in 2015, built upon the 2012 efforts and provided three rulemakings to further refine performance measures for safety, system performance, pavement and infrastructure condition, congestion and transit performance. On January 18, 2017 the third and final ruling was published to provide guidance for MPO’s to assess the performance of the interstate and non-interstate National Highway System (NHS) for the purpose of carrying out the National Highway Performance Program. The Program was designed to assess freight movement on the Interstate System and to assess traffic congestion on-road mobile source emissions for the purpose of carrying out the Congestion mitigation and Air Quality Improvement (CMAQ) program. This legislation is intended to establish new requirements for performance management to ensure the most efficient investment of Federal transportation funds. Performance management increases the accountability and transparency of the Federal-aid highway program and provides the framework to support improved investment decisions by focusing on performance outcomes for key national transportation goals such as:

1. **Safety** – to achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
2. **Infrastructure condition** – To maintain the highway infrastructure asset system in a state of good repair.
3. **Congestion reduction** – To achieve a significant reduction in congestion on the NHS.
4. **System reliability** – To improve the efficiency of the surface transportation system.
5. **Freight movement and economic vitality** – To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets and support regional economic development.
6. **Environmental sustainability** – To enhance the performance of the transportation system while protecting and enhancing the natural environment.
7. **Reduce project delivery delays** – To reduce project costs, promote jobs and the economy to expedite the movement of people and goods by accelerating project completion through eliminating delays in

the project development and delivery process including reducing regulatory burdens and improving agency work practices.

Standardization of these rules will provide for greater consistency in condition reporting and performance of the NHS, interstate freight movement and CMAQ traffic congestion and on-road mobile source emissions. The establishment of performance targets can then be aggregated at the national level to allow for comparison and transparency. Results can then be compared across the national network. Performance can be more readily tracked against goals as a result.

12.2.1 Performance Measurement

Federal rule making establishes the performance measure to assess freight movement on the Interstate roadways as the Percentage of the Interstate System Mileage providing for the Reliable Truck Travel Times or the Truck Travel Time Reliability (TTTR) Index. This establishes the freight reliability measure. The measure also uses the Travel Time Data Set of National Performance Management Research Data Set (NPMRDS), but unlike the level of travel time reliability (LOTTR), which uses a threshold to determine reliability; TTTR Index is expressed as an average for the entire applicable area.

This final rule also establishes a process for State Department of Transportations (DOT) and MPOs to develop and report performance targets and the process that FHWA will use to assess the progress State DOTs have made in achieving targets. State DOTs will be required to establish performance targets and assess performance in the MAP-21 performance areas. The Federal Highway Administration (FHWA) will assess their progress toward meeting goals. State DOTs that fail to meet or make significant progress toward targets in a biennial performance period will be required to document actions they will undertake to achieve their targets in the next biennial performance report.

FHWA is working to develop more sophisticated performance metrics and may issues updated rulemaking on performance measures related to multi-modal performance in the future, based on ongoing research in the Fall of 2018. FHWA recognizes that performance measure requirements will evolve over time based upon the introduction of new technologies, shifts in national priorities or improved approaches to measure investment performance. Table 12-1 provides a summary of Final Measures in the Third Performance Measure Final Rule.
Table 12-1: Federal Register Summary of Final Measures in the Third Performance Measure Final Rule

<table>
<thead>
<tr>
<th>Measure groups (program area)</th>
<th>Performance measures</th>
<th>Measure/target applicability</th>
<th>Metric data source &amp; collection frequency</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHPP</td>
<td>Percent of Person-Miles Traveled on the Interstate That Are Reliable</td>
<td>Mainline of the Interstate System within a State or each metropolitan planning area</td>
<td>All traffic/vehicles data in NPMRDS or Equivalent—every 15-minutes</td>
<td>Level of Travel Time Reliability (LOTTR).</td>
</tr>
<tr>
<td></td>
<td>Percent of Person-Miles Traveled on the Non-Interstate NHS That Are Reliable.</td>
<td>Mainline of the non-Interstate NHS within a State or each metropolitan planning area</td>
<td>All traffic/vehicles data in NPMRDS or Equivalent—every 15-minutes</td>
<td>Level of Travel Time Reliability (LOTTR).</td>
</tr>
<tr>
<td></td>
<td>Percent Change in CO2Emissions on the NHS Compared to the Calendar Year 2017 Level.</td>
<td>NHS within a State or each metropolitan planning area</td>
<td>Annual state total fuel sales data from Highway Statistics and VMT estimates on NHS and all public roads from HPMS</td>
<td>Annual Total Tailpipe CO2Emissions on the NHS.</td>
</tr>
<tr>
<td>Freight movement on the Interstate System measure (NHFP)</td>
<td>Truck Travel Time Reliability (TTTR) Index</td>
<td>Mainline of the Interstate System within a State or each metropolitan planning area</td>
<td>Truck data in NPMRDS or equivalent data set—every 15—minutes</td>
<td>TTTR Index.</td>
</tr>
</tbody>
</table>

Source: 82 FR 5970

FHWA proposes that State DOTs would calculate the Average Truck Speed metric for each reporting segment which would be derived from truck travel speeds contained in the NPMRDS travel time data set. FHWA’s proposed freight movement performance measures reflect a percentage of the system by length, and a specified level of performance. The Notice of Proposed Rulemaking (NPRM) proposed establishing the truck travel time reliability threshold at 1.5 to represent the level at which truck travel times become unreliable. This is predicated on the assumption that no truck travel time could be more than 50% longer than expected. Average truck speeds on the NPRM also assumes that truck travel speeds below 50 mph would be considered representative of congested conditions.

12.2.2 Performance Targets

The NPRM describes a process to be used by State DOTs and MPOs to establish quantifiable statewide performance targets to be achieved over a four year performance period. The first performance measurement period will start in 2018. Several factors can be considered in the establishment of these targets such as funding availability and local transportation priorities. By statutory requirement States must establish two and four year targets for the eight national performance measures within one year after the effective date of the rule. MPOs are required to establish targets by either supporting State DOT’s statewide target, or by defining a unique MPO target each time a State target is set. MPOs have an additional 180 day period after the State DOT establishes a target.

12.2.3 State DOT and MPO Reporting

State DOTs are required to report biennial NHS condition and performance reports to FHWA. FHWA proposed that States report a baseline condition and performance report at the beginning of each performance period.
supplemented with a midpoint and ending report. At the midpoint report, States would be allowed to adjust their four year target performance goals. MPOs would not be required to provide separate reporting.

The Memphis MPO planning jurisdiction covers all of Shelby County, Tennessee and DeSoto County, Mississippi and portions of Fayette County, Tennessee and Marshall County, Mississippi. Because this MPO straddles two states the development of freight performance measures must reflect the strategic planning efforts of both states.

### 12.3 State Performance Measures

FHWA has produced a map of the top 25 freight corridors across the country. The Greater Memphis region is part of the I-40 corridor which contains 999 segments between Knoxville, TN and Little Rock, AR. This corridor has the sixth fastest median speeds recorded at 63.46 mph in December of 2013. During the same time only 4% of the segments operated at less than 50 mph. The top 25 key freight corridors are noted in Figure 12-2 for all commodities. Other corridors may be important for select commodities and products, such as the I-44 corridor for automotive industry. Table 12-2 lists the corridors ranked by segment performance less than 50 miles per hour.

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Number of Segments</th>
<th>Average Speed (Weekdays) (24/7)</th>
<th>Median Speed</th>
<th>% Segments &lt; 50 MPH</th>
<th># Segments &lt; 50 MPH</th>
<th>Peak Weekday Average Speed</th>
<th>Nonpeak Weekday Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-95: Richmond to New Haven</td>
<td>954</td>
<td>54.09</td>
<td>54.09</td>
<td>22%</td>
<td>212</td>
<td>50.78</td>
<td>56.21</td>
</tr>
<tr>
<td>I-5: Medford, OR to Seattle</td>
<td>1016</td>
<td>55.12</td>
<td>56.91</td>
<td>13%</td>
<td>136</td>
<td>53.42</td>
<td>56.48</td>
</tr>
<tr>
<td>I-35: Laredo to Oklahoma City</td>
<td>1279</td>
<td>59.93</td>
<td>62.59</td>
<td>8%</td>
<td>108</td>
<td>58.49</td>
<td>60.97</td>
</tr>
<tr>
<td>I-75: Lexington to Detroit</td>
<td>668</td>
<td>59.72</td>
<td>61.62</td>
<td>8%</td>
<td>51</td>
<td>58.63</td>
<td>60.58</td>
</tr>
<tr>
<td>I-5/CA 99: Sacramento to Los Angeles</td>
<td>1289</td>
<td>56.31</td>
<td>58.11</td>
<td>8%</td>
<td>97</td>
<td>55.7</td>
<td>56.77</td>
</tr>
<tr>
<td>I-10: Los Angeles to Tucson</td>
<td>974</td>
<td>59.35</td>
<td>59.97</td>
<td>7%</td>
<td>73</td>
<td>58.16</td>
<td>60.24</td>
</tr>
<tr>
<td>I-65/I-24: Chattanooga to Nashville to Chicago</td>
<td>1160</td>
<td>60.4</td>
<td>62.25</td>
<td>6%</td>
<td>73</td>
<td>59.39</td>
<td>61.12</td>
</tr>
<tr>
<td>I-10: San Antonio to New Orleans</td>
<td>1076</td>
<td>62.03</td>
<td>64.42</td>
<td>5%</td>
<td>54</td>
<td>60.99</td>
<td>62.91</td>
</tr>
<tr>
<td>I-30: Little Rock to Dallas</td>
<td>642</td>
<td>62.1</td>
<td>64.04</td>
<td>4%</td>
<td>23</td>
<td>61.4</td>
<td>62.62</td>
</tr>
<tr>
<td>I-40: Knoxville to Little Rock</td>
<td>999</td>
<td>61.6</td>
<td>63.46</td>
<td>4%</td>
<td>42</td>
<td>61.09</td>
<td>62.02</td>
</tr>
<tr>
<td>I-78/I-76: New York to Pittsburgh</td>
<td>765</td>
<td>59.94</td>
<td>61.53</td>
<td>4%</td>
<td>31</td>
<td>58.99</td>
<td>60.52</td>
</tr>
<tr>
<td>I-75: Tampa to Knoxville</td>
<td>1340</td>
<td>62.29</td>
<td>64.08</td>
<td>3%</td>
<td>36</td>
<td>61.72</td>
<td>62.72</td>
</tr>
<tr>
<td>I-55/I-39/I-94: St. Louis to Minneapolis</td>
<td>1305</td>
<td>61.64</td>
<td>62.89</td>
<td>3%</td>
<td>42</td>
<td>61.23</td>
<td>62.02</td>
</tr>
<tr>
<td>I-80: New York to Cleveland</td>
<td>864</td>
<td>60.93</td>
<td>62.53</td>
<td>3%</td>
<td>23</td>
<td>60.38</td>
<td>61.33</td>
</tr>
<tr>
<td>I-95: Miami to I-26 (SC)</td>
<td>1156</td>
<td>62.39</td>
<td>62.39</td>
<td>3%</td>
<td>37</td>
<td>61.63</td>
<td>62.98</td>
</tr>
<tr>
<td>I-94: Chicago to Detroit</td>
<td>492</td>
<td>59.37</td>
<td>59.37</td>
<td>3%</td>
<td>15</td>
<td>58.99</td>
<td>59.72</td>
</tr>
<tr>
<td>I-40: Raleigh to Asheville</td>
<td>482</td>
<td>62.22</td>
<td>63.34</td>
<td>2%</td>
<td>10</td>
<td>61.63</td>
<td>62.63</td>
</tr>
<tr>
<td>I-70: Kansas City to Columbus</td>
<td>1314</td>
<td>61.74</td>
<td>63.12</td>
<td>2%</td>
<td>26</td>
<td>61.33</td>
<td>62.03</td>
</tr>
</tbody>
</table>
The Memphis MPO has jurisdiction across counties in Tennessee, Mississippi and coordination responsibilities with the State of Arkansas. The following section outlines freight performance measurement goals for each of the states which have direct influence over freight moving to, from and within Memphis.
12.3.1 Tennessee State Freight Performance Measurement

In the Tennessee Statewide Multimodal Freight Plan, leaders recognized that if you have performance measurement without strategic planning, it is possible to assess how quickly conditions are changing but not necessarily if the direction and magnitude of that change. If strategic planning is undertaken without performance measurement it is possible know the direction of change, but more of a challenge to measure progress and anticipate adjustments that may be necessary. The Tennessee Department of Transportation (TDOT) has added a component to the long range plan which seeks to incorporate multi-state freight movements and policies, programs and practices that effect the movement of freight in surrounding and peer states. Policy recommendations to improve the movement of freight through the state of Tennessee were based on peer review and stakeholder input. Future freight improvement strategies noted that could improve freight movement for all modes within the state include:

- Increased focus on freight corridors
- Expanded funding programs for modes supporting freight movement
- Establishment of a freight and logistics office within TDOT to advance freight planning and investments in Tennessee.
- Coordination of compatibility between freight-related land uses and the environment
- Continued development of freight-related data and planning tools

The TDOT Performance Measurement Framework provides a structured approach to the systematic assessment of progress and results of the state’s investments and project prioritization. Established in 2004, the framework identifies five key performance categories to enable a balanced assessment of organizational performance, including:

- **Customer** - focuses on overall customer service and satisfaction
- **Financial** - considers TDOT’s budget and funding information, returns on investments, and efforts to reduce or contain costs
- **Organizational Effectiveness** - focuses on effectiveness of key internal processes, use of innovative technology and management practices, productivity, and efficiency
- **Transportation System** - assesses the performance of the statewide transportation system with a focus on the operation, preservation, and maintenance of the system
- **Workforce** - focuses on the quality of the workplace environment and TDOT’s capability to achieve its mission and strategic direction
Table 12-3 illustrates the most recent Tennessee freight system performance measurement as a summary table.

### Table 12-3: TDOT Freight-Related Performance Measures

<table>
<thead>
<tr>
<th>Mode</th>
<th>Performance Measure</th>
</tr>
</thead>
</table>
| Road | • Traffic volumes (including truck volumes)  
      | • Highway crash data (including highway/rail at-grade crossing crash data)  
      | • Miles of Interstate Freeway Managed by ITS Infrastructure  
      | • Roadway and bridge condition data  
      | • Highway incident clearance data  
      | • Oversize, overweight or overlength permits  
| Rail | • Shortline Rail track miles and capacity rating  
     | • Rail yard and highway-rail crossing inspections  
| Air  | • Airports meeting design and safety criteria as well as federal approach standards  
     | • Airport pavement condition data  
     | • Percentage of business with 10 or more employees within 25 miles or 25 minutes of an airport with an instrument approach minimum of at least 400 feet and 1 mile.  
| Water| • Waterway performance measurement data is not collected by TDOT, but is available from other agencies (e.g. U.S. Army Corps of Engineers) |

Source: Tennessee Statewide Multimodal Freight Plan

In addition to these state freight performance measures Tennessee has adopted additional freight measures to track National Strategic Freight Goals, which are still in development and initial implementation. These measures were designed around TDOT’s access to required freight data. While each performance measure is listed under one of the six Freight Policy Goals, some apply to more than one of the goals:

1. Improve the contribution of the freight transportation system to economic efficiency, productivity and competitiveness.
   - **Tennessee share of national freight market**: measured as the value and tonnage of Tennessee exports as compared to all U.S. State exports.
   - **Freight Tonnage by mode**: measured by the total freight tonnage imported and exported from Tennessee and transported by each of the different modes.
   - **Cost of Congestion**: measured in millions of dollars lost due to trucks delayed on Tennessee roadways.

2. Reduce congestions on the freight transportation system
   - **Freight travel time reliability**: Defined as the percentage of combination truck vehicle miles traveled at speeds less than 45 miles per hour compared to all vehicle miles traveled on interstates.
   - **Freight travel time variability**: Defined as the 95th percentile travel time compared to the travel time during free flow conditions
   - **Queues at Waterway Locks**: Defined as the transit time it takes barges and other water vessels to traverse through locks on Tennessee rivers.
   - **Terminal Dwell Time**: Defined as the amount of time that loaded Class I rail cars spend in intermodal facilities waiting to depart.

3. Improve the safety, security and resilience of freight transportation system
• **Number of trucks parked in undesignated space:** The number of trucks parked on a ramp or undesignated space at a rest area.

• **Number of truck crashes:** This is defined as the number of crashes involving a truck along the National Highway System.

• **Number of railroad crashes:** This is defined as the number of crashes involving a train, whether at a highway/rail at-grade crossing or along the railroad system, and can include crashes that occur due to a variety of different factors.

• **Extent of rail system operating under positive train control:** Defined as the percentage of rail miles in Tennessee operating under positive train control.

4. **Improve the state of good repair of the freight transportation system**

• **National Ranking of State transportation Infrastructure:** Defined as Tennessee rank compared to all other states in the annual study conducted by the Consumer News and Business Channel.

• **Ratio of Overweight Trucks:** Defined as the ratio of overweight vehicles to the total number of vehicles weighted.

5. **Use advanced technology, performance management, innovation, competition and accountability in operating and maintaining the freight transportation system**

• **Geographic range of real-time freight travel information:** This is defined as the percentage of Tennessee’s geography included in TDOT’s SmartWay system.

• **Commercial vehicles utilizing electronic bypass technology at weigh stations (PrePass):** Defined as the percentage of commercial vehicles using PrePass Technology to bypass weigh stations. It should be noted that oversize/overweight vehicle must still pull into weigh stations in Tennessee.

6. **Reduce adverse environmental and community impacts of the freight transportation system**

• **Quiet Zones:** Defined as the number of quiet zones along freight rail lines within Tennessee.

### 12.3.2 Mississippi State Freight Performance Measures

At the state level Mississippi Department of Transportation (MDOT) is responsible for ensuring that federal and state requirements, policies and guidelines for transportation policy are reflected in the MDOT’s operations and long range plans. Mississippi recognizes that the federal government safety, security and environmental regulations constitute the rules in the State, followed by the Department of Transportation and other state, regional and local entities as well as all affected private businesses in Mississippi. In order to comply with federal rule making Mississippi developed the following seven transportation goals. Mississippi’s transportation goals identified in MULTIPLAN 2035 include:

1. Improve accessibility and mobility for Mississippi’s people, commerce and industry

2. Ensure high standards of safety in the transportation system

3. Maintain and preserve Mississippi’s transportation system

4. Ensure that transportation system development is sensitive to human and natural environmental concerns

5. Provide a transportation system that encourages and supports Mississippi’s economic development

6. Create effective transportation partnerships and cooperative processes that enhance awareness of the needs and benefits of the intermodal system

7. Provide a sound financial basis for the transportation system

The seven state transportation goals have been further defined by freight objectives and freight network performance measures as shown in Table 12-4.
<table>
<thead>
<tr>
<th>MULTIPLAN 2035 Goals (1)</th>
<th>MSFP Freight Goals</th>
<th>Freight Objectives</th>
<th>Freight Network Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic Development:</strong> Improve a transportation system that encourages and supports Mississippi's economic development</td>
<td>Improve economic benefits of the statewide freight network.</td>
<td>Improve public investment to facilitate freight system improvements that generate jobs and enhance MS's competitive position.</td>
<td>Statewide annual funds invested by MDOT for freight-related projects through its Multi-Modal Transportation Improvement Program.</td>
</tr>
<tr>
<td><strong>Accessibility and Mobility:</strong> Improve accessibility and mobility for Mississippi's people, commerce and industry</td>
<td>Improve reliability and reduce congestion on the priority freight corridors.</td>
<td>Provide reliable and predictable travel times along identified freight corridors by reducing time delays.</td>
<td>Annual hours of truck delay (AHTD) on the MFN Tier I and Tier II highway corridors. (3) For each corridor segment, AHTD = daily truck delay x 300</td>
</tr>
<tr>
<td><strong>Safety:</strong> Ensure high standards of safety in the transportation system</td>
<td>Protect the safety and security of freight infrastructure.</td>
<td>Reduce the number and rate of freight-movements related fatalities and injuries.</td>
<td>Statewide annual crashes, injuries, and fatalities involving heavy trucks. (4)</td>
</tr>
<tr>
<td><strong>Maintenance and Preservation:</strong> Maintain and preserve Mississippi's transportation system</td>
<td>Maintain the MS freight network infrastructure in a state of good repair.</td>
<td>Continuously improve infrastructure conditions that affect freight bottlenecks and reliability issues.</td>
<td>Percentage of the MFN highway pavement in good condition based on the International Roughness Index (IRI).</td>
</tr>
<tr>
<td><strong>Environmental Stewardship:</strong> Ensure that transportation system development is sensitive to Human and Natural Environmental Concerns</td>
<td>Protect and enhance the environment while enhancing the freight network performance.</td>
<td>Implement freight-specific environmental stewardship programs to reduce impact of freight movement on the state’s communities.</td>
<td>Statewide annual number of hazmat spills across the MFN. (4) (Future measure) Designated MS nonattainment areas for all criteria pollutants. (7)</td>
</tr>
</tbody>
</table>

(1) MULTIPLAN’s ‘Finance’ goal is not included due to its limited applicability for freight movements
(2) The methodology for calculating daily truck delay involves using the Mississippi Statewide Travel Demand Model to obtain the free flow speed and the congested speed as well as the number of trucks along the highway links that represent the MFN facilities. Daily truck delay is calculated as the difference between the free flow time for trucks and the congested travel time for trucks. Once the daily truck delay is calculated, it is multiplied by 300 to obtain the annual hours of truck delay (AHTD). AHTD can then be compared between competing scenario networks, including the “no-build” scenario.
(3) Referenced ‘Mississippi Freight Network’ is comprised of principal highways, railroad lines, ports and waterways, cargo airports, and associated intermodal distribution and warehousing facilities along and within identified Tier I and Tier II freight corridors.
(4) Performance Measure can also be applied to the MS Freight Network Tier I and Tier II corridors individually or collectively.
(5) Additional Performance Measures for rail and ports and waterways will be identified as part of the Statewide Rail Plan and Ports plans.
(7) Data and assessment to be provided by Mississippi Department of Environmental Quality (DEQ)
Source: Mississippi Statewide Freight Plan

12.3.3 Arkansas State Freight Performance Measures

The State freight performance measures are published in the Arkansas Long Range Intermodal Transportation Plan completed in March 2017. Arkansas Highway Transportation Department (AHTD) is new to performance measures and has identified data gaps and other challenges which can affect implementation. Federal requirements are a major driver for performance measures in Arkansas and are still emerging. Finally, there is a strong interest in advancing data driving decision making as part of the Long Range Intermodal Transportation Plan. Table 12-5 shows the AHTD performance measures established in the Arkansas Long Range Intermodal Transportation Plan (LRITP).

Table 12-5: AHTD LRITP Objectives and Performance Measures

<table>
<thead>
<tr>
<th>Goals</th>
<th>Objectives</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and Security</td>
<td>• Align safety goals with the goals of the AHTD Strategic Highway Safety Plan (SHSP). • Partner with the Arkansas State Police, local governments, and federal agencies to administer comprehensive traffic safety programs related to driver, roadway, and railroad crossing safety. • Partner with counties and local governments to provide training on low-cost safety applications for local roads. • Improve the resiliency of the transportation system to meet travel needs in response to extreme weather events. • Work with emergency management agencies to expand emergency communications infrastructure across the State. • Work with emergency management agencies to ensure efficient and coordinated responses to emergency and disaster events.</td>
<td>1. Fatalities on all public roads (5-year rolling average)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Fatalities/100M VMT (5-year rolling average)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Serious injuries on all public roads (5-year rolling average)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Serious injuries/100M VMT (5-year rolling average)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Non-motorized fatalities and serious injuries (5-year rolling average)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Roadway clearance time (RCT)</td>
</tr>
<tr>
<td>Infrastructure Condition - Bridge</td>
<td>• Enforce weight and size restrictions to protect roads and bridges. • Follow asset management principles to optimize preservation strategies on the SHS. • Identify potential freight corridors within which special attention is given to preempt commercial vehicle bottlenecks.</td>
<td>7. Percent of bridge deck area on NHS in good condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Percent of bridge deck area on NHS in poor condition</td>
</tr>
<tr>
<td>Infrastructure Condition - Pavement</td>
<td>• Enforce weight and size restrictions to protect roads and bridges. • Follow asset management principles to optimize preservation strategies on the SHS. • Improve ride quality on NHS roads.</td>
<td>9. Percent of pavement on Interstate in good condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Percent of pavement on non-Interstate NHS in good condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11. Percent of pavement on Interstate in poor condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12. Percent of pavement on non-Interstate NHS in poor condition</td>
</tr>
<tr>
<td>Mobility and System Reliability</td>
<td>• Provide predictable, reliable travel times. • Implement ITS strategies to inform and provide travelers with realtime information regarding weather conditions, travel times, emergencies, and delays.</td>
<td>13. Percent of person-miles traveled on the Interstate System that are reliable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14. Percent of person-miles traveled on the non-Interstate NHS that are reliable</td>
</tr>
</tbody>
</table>
• Use technology advances to improve system performance.
• Use output from MPOs’ congestion management systems to identify and address congested areas on the NHS.
• Work with partners to encourage travel demand management strategies to reduce traffic demand during peak hours.
• Support multimodal transportation alternatives and intermodal mobility.

15. Percent Change in tailpipe CO2 emissions on the NHS from the calendar year 2017

Economic Competitiveness- Freight and Accessibility

• Identify projects to address localized congestion and capacity needs.
• Identify key routes between Arkansas’ and external trading partners in need of long-term additional capacity.
• Collaborate with the Arkansas Economic Development Commission to identify projects that will improve the State’s economic competitiveness.

16. Percentage of the Interstate System Mileage providing for Reliable Truck Travel Times, or Truck Travel Time Reliability (TTTR) Index, (which is referred to as the Freight Reliability measure)

17. Year-to-year change in statewide average job accessibility (auto and transit)

Environmental Sustainability

• Support initiatives to reduce congestion and improve air quality.

18. Annual Hours of Peak-Hour Excessive Delay Per Capita (the PHED measure)

19. Percent of Non-SOV Travel where SOV stands for single-occupancy vehicle

20. Total Emissions Reduction

Multimodal Transportation System-Transit

• Support multimodal transportation alternatives and intermodal mobility.

21. Percent of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark (ULB)

Source: AHTD LRITP

12.4 Peer MPO Freight Performance Measures

The Memphis MPO is a unique MPO with multi-state jurisdiction and a rich mix of transportation assets including air, rail, water and highway networks. The MPO has identified several peer agencies which have similar multi-jurisdictional authority and diverse transportation assets. Four MPO’s were benchmarked to compare the development of freight performance measures, goals and objectives. Samples of Kansas City, St. Louis, Louisville and Cincinnati freight strategies are captured in this section. Table 12-6 shows how these corridors and respective MPO agency compare based on FHWA freight corridor performance measures.

Table 12-6: 2013 Top 25 Freight Corridor Performance Data

<table>
<thead>
<tr>
<th>Peer MPO</th>
<th>Corridor</th>
<th>Number of Segments</th>
<th>Average Speed (Weekdays) (24/7)</th>
<th>Median Speed</th>
<th>% Segments &lt; 50 MPH</th>
<th># Segments &lt; 50 MPH</th>
<th>Peak Weekday Average Speed</th>
<th>Nonpeak Weekday Average Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>OKI</td>
<td>I-75: Lexington to Detroit</td>
<td>668</td>
<td>59.72</td>
<td>61.62</td>
<td>8%</td>
<td>51</td>
<td>58.63</td>
<td>60.58</td>
</tr>
<tr>
<td>KIPDA</td>
<td>I-65/I-24: Chattanooga to Nashville to Chicago</td>
<td>1160</td>
<td>60.4</td>
<td>62.25</td>
<td>6%</td>
<td>73</td>
<td>59.39</td>
<td>61.12</td>
</tr>
<tr>
<td></td>
<td>I-40: Knoxville to Little Rock</td>
<td>999</td>
<td>61.6</td>
<td>63.46</td>
<td>4%</td>
<td>42</td>
<td>61.09</td>
<td>62.02</td>
</tr>
<tr>
<td>EWG</td>
<td>I-55/I-39/I-94: St. Louis to Minneapolis</td>
<td>1305</td>
<td>61.64</td>
<td>62.89</td>
<td>3%</td>
<td>42</td>
<td>61.23</td>
<td>62.02</td>
</tr>
<tr>
<td>MARC</td>
<td>I-70: Kansas City to Columbus</td>
<td>1314</td>
<td>61.74</td>
<td>63.12</td>
<td>2%</td>
<td>26</td>
<td>61.33</td>
<td>62.03</td>
</tr>
</tbody>
</table>

Source: https://ops.fhwa.dot.gov/freight/freight_analysis/perform_meas/fpmdata/top23tab13.htm
12.4.1 Kansas City (Mid-America Regional Council)

In 2015 Mid-America Regional Council (MARC) identified cross-cutting goals for the Kansas and Missouri bi-state region. Each performance measure corresponds to at least one national goal; some measures are applicable to more than one of the seven national goals. The goals will be measured with existing data sources. Freight performance measures are included within the cross-cutting goals. An example of bi-state data collection is shown for pavement conditions in Figure 12-3.

Figure 12-3: MARC Performance Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Data</th>
<th>Goal</th>
<th>Actual</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Kansas roads in poor condition</td>
<td>2014: 0.6 percent</td>
<td>↓</td>
<td>↓</td>
<td>-0.3%</td>
</tr>
<tr>
<td></td>
<td>2015: 0.3 percent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Missouri roads in not good condition</td>
<td>2014: 16.1 percent</td>
<td>↓</td>
<td>↓</td>
<td>-0.6%</td>
</tr>
<tr>
<td></td>
<td>2015: 15.3 percent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pavement conditions**

Accurate and timely data on pavement condition is used to assess system performance and deterioration, identify maintenance and reconstruction needs, and determine financial needs. The Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT) determine whether highway pavement is in acceptable condition.

- KDOT uses three different distinctions for pavement condition: good, fair, and poor. KDOT examines and rates the entire state's system of roads.
- MoDOT uses two distinctions to determine the pavement condition: good and not good. Missouri data measures the state's extensive highway network.

Both KDOT and MoDOT have established targets that they would like road pavement conditions to meet or exceed. KDOT strives to achieve a good pavement rating for 85 percent of its interstate and 80 percent of non-interstate roads. MoDOT aims for a good rating for 85 percent of its major highways.

Source: http://www.to2040.org/performance.aspx
12.4.2 St Louis (East-West Gateway Council of Governments)

The East-West Gateway Council of Governments (EWG) covers portions of Missouri and Illinois. The St. Louis area includes St. Louis City as the largest single metropolitan area, with urbanized development west to the Missouri River and across three Illinois counties on the east side of the Mississippi River.

The EWG have adopted goals for safety, infrastructure condition (both pavement and bridge), system reliability, environmental sustainability, transit, freight movement and economic vitality. Freight goals will be measured by the travel time reliability index. Figure 12-4 shows how EWG has developed measures to bridge minor differences between Missouri and Illinois.

![Figure 12-4: MARC Performance Measures in Alignment with Missouri and Illinois Statewide Goals](http://www.to2040.org/performance.aspx)

12.4.3 Louisville (The Kentuckiana Regional Planning and Development Agency)

The Kentuckiana Regional Planning and Development Agency (KIPDA) is a bi-state planning agency that covers a five county region in Kentucky and Indiana. The region is anchored by Louisville as the largest metropolitan city with Jeffersonville and New Albany on the Indiana side of the Ohio River.

State performance targets had not been developed at the time of this document. The regional performance measures were developed jointly by the planning agency and stakeholder involvement. KIPDA has adopted ten goals in support of performance based planning:

1. Improve public transit connectivity to identified community access clusters but not limited to high density employment, residential, retail or commerce centers and access to education.
2. Improve the connectivity of the pedestrian network
3. Improve connectivity of bicycle facilities
4. Increase safety for all users
5. Manage and reduce roadway congestion where applicable
6. Increase availability and efficiency of person based multi-modal operations
7. Maintain the existing transportation network in a state of good repair
8. Ensure timely and efficient movement of freight within, departing and entering the region
9. Influence positive economic impacts
10. Reduce and or improve negative environmental impacts including climate change.

The baselines, targets and goals were identified for seven areas which included transit, pedestrian, bike, safety, roadway, environmental and economic impacts. The area segment that most closely reflects freight performance is in the collection of roadway performance information.

KIPDA has developed a data collection plan. Half of the baseline measures have identified data sources for performance measurement purposes. Half of the baseline measures do not have current data sources and a plan has been identified to collect that data in the future. Collaboration is critical across multi-state agencies to be successful. A two year timeline has been established to acquire data to support these performance measures. Safety and transit measurements will be reviewed every two years, most of the freight, environmental and economic measurement data will be reviewed every four years. Figure 12-5 lists the KIPDA road performance measures, baselines, targets, and goals.

Figure 12-5: KIPDA Road Performance Measures

<table>
<thead>
<tr>
<th>PERFORMANCE MEASURE</th>
<th>BASELINE - CURRENT STATUS</th>
<th>PROPOSED TARGET</th>
<th>GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Maintain or improve LOS on freeway and interstate miles with LOS D or worse</td>
<td>50.80% of freeway and interstate miles were at LOS D, E, or F in 2012. 120 miles (out of 390 total miles) were congested</td>
<td>Maintain or improve LOS</td>
</tr>
<tr>
<td>R2</td>
<td>Maintain or Improve LOS on arterial miles with LOS D or worse</td>
<td>13.50% of arterial miles were at LOS D, E, or F in 2012. 104 miles (out of 799 total miles) were congested</td>
<td>Maintain or improve LOS</td>
</tr>
<tr>
<td>R3</td>
<td>Percentage of pavements in “Good” condition on the Interstate NHS System</td>
<td>TBD</td>
<td>Follow the states’ lead</td>
</tr>
<tr>
<td>R4</td>
<td>Percentage of pavements in “Good” condition on the Non- Interstate NHS system</td>
<td>TBD</td>
<td>Follow the states’ lead</td>
</tr>
<tr>
<td>R5</td>
<td>Percentage of pavements in “Poor” condition on the Interstate NHS System</td>
<td>TBD</td>
<td>Follow the states’ lead</td>
</tr>
<tr>
<td>R6</td>
<td>Percentage of pavements in “Poor” condition on the Non- Interstate NHS System</td>
<td>TBD</td>
<td>Follow the states’ lead</td>
</tr>
<tr>
<td>R7</td>
<td>Percentage of bridges on the NHS System that are in “Good” condition</td>
<td>TBD</td>
<td>Follow the states’ lead</td>
</tr>
<tr>
<td>R8</td>
<td>Percentage of bridges on the NHS System that are in “Poor” condition</td>
<td>TBD</td>
<td>Follow the states’ lead</td>
</tr>
<tr>
<td>R9</td>
<td>Maintain or Improve roadways on the KIPDA Freight Network at LOS D or worse</td>
<td>20.40% of KIPDA freight network were at LOS D, E, or F in 2012. 166.27 miles (out of 813.83 total miles) were congested</td>
<td>Maintain or improve LOS</td>
</tr>
<tr>
<td>R10</td>
<td>Number of locations on KIPDA Freight Network within 1.0 mile of freight cluster where roadway geometry and/or restrictions impede freight movement</td>
<td>TBD</td>
<td>Number of locations on the KIPDA Freight Network where roadway geometry impedes freight movement</td>
</tr>
</tbody>
</table>

Source: http://www.kipda.org/

12.4.4 Cincinnati (Ohio-Kentucky-Indiana Regional Council of Government)

The Ohio-Kentucky-Indiana Regional Council of Government (OKI) spans three states in the Cincinnati region. They have not yet posted freight performance measures but have outlined a project prioritization scoring framework for project selection purposes. Five areas have specific metrics for each of the following attributes:

- Planning – 55 points
- Transportation Factors Roadway projects – 45 points
• Transportation Factors Transit projects – 45 points
• Transportation Factors Bike and Pedestrian projects – 45 points
• Transportation Factors for non-roadway projects – 45 points

Planning factors include 55 points spread across the following aspects of project impact: including environmental justice, economic vitality, air quality and energy impacts, environmental impacts, local program prioritization, multimodal improvement and corridor benefits. Of note environmental justice is a unique measure not readily found in other MPO scoring frameworks. Freight factors are included in the Roadway project measurement evaluations, which assign points for safety, average daily traffic counts, travel time, level of service, freight and project feasibility. Project feasibility recognizes that some project have more support than others. Non-Roadway projects include rail and water projects, points are awarded based upon mode, congestion impact and safety.

12.4.5 Peer Practices – The Challenges and Opportunities of Performance-Based Planning

In 2015 a group of States and MPO’s was assembled to identify transportation planning capacity building strategies to meet performance based planning requirements hosted by the USDOT Federal Highway Administration, FHWA in Dimondale, Michigan. The workshop discussed the development and management of performance target based activities. Table 12-7 summarizes the challenges and opportunities for performance based planning efforts, which the Memphis MPO should consider in their target setting process.

<table>
<thead>
<tr>
<th>Planning Attribute</th>
<th>Challenges</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Culture</td>
<td>“How we have always done it”</td>
<td>Sell the process benefits</td>
</tr>
<tr>
<td>Project Selection</td>
<td>“Are we selecting the right projects?”</td>
<td>Connect plans with capital budget. Conduct regular performance reviews</td>
</tr>
<tr>
<td>Inter-Agency Coordination of competing priorities</td>
<td>Coordination of competing priorities</td>
<td>Better statewide project alignment</td>
</tr>
<tr>
<td>Data Availability</td>
<td>Sufficient access to data for performance measurement</td>
<td>Identify and strengthen inter-agency data collection and data sharing activities</td>
</tr>
<tr>
<td>Performance measurement communication</td>
<td>Determine format and detail for performance level reporting</td>
<td>Create simple, easy to communicate measures, which leverage existing resources</td>
</tr>
<tr>
<td>Performance report Time Intervals</td>
<td>Calibrate time horizons to reflect meaningful change</td>
<td>Set realistic goals to support strategic change</td>
</tr>
<tr>
<td>Resources</td>
<td>Staff and funding limitations to implement performance measures</td>
<td>Improved alignment of goals and objectives to make more effective use of limited resources</td>
</tr>
</tbody>
</table>

12.5 Memphis MPO Performance Measures

The Greater Memphis Region is made up of portions of the States of Tennessee and Mississippi for the MPO and Arkansas for the Metropolitan Statistical Area and influence the movement of freight across the three state area. Each affects the movement of freight and necessitates a balance within the Memphis MPO’s jurisdiction to develop unique performance measures. This decision should be part of the Regional and State Freight Advisory Committee agenda. Proposed MPO freight performance measures should follow the national freight performance measurement agenda and meld in the regional needs for specific performance measures. Freight performance data from multistate sources may become a limiting factor.
12.6 Summary and Recommendations

In consideration of the federal guidance for the development of performance measures, the Memphis MPO must develop performance measures which support the states of Tennessee and Mississippi. Memphis has the option to adopt the state measures or create their own set of performance measures to specifically manage freight investment impacts on performance levels on the national network. The majority of transportation assets, chokepoints and bottlenecks are in the State of Tennessee. Therefore alignment with the Tennessee performance measures should reflect this jurisdictional authority. The following recommendations are suggested to support the development of specific performance target’s to measure freight performance investment.

12.6.1 Recommendation 1 – Ensure Stakeholder Involvement

The Greater Memphis region has an impressive collection of transportation assets spanning each of the freight modes of transport. Freight nodes have different characteristics and freight generation potential. Freight nodes which consolidate or break down bulk shipments tend to create queuing and inventory management challenges that may require accommodation for oversize and overweight shipments. Rail and air cargo tends to create high demand near freight cut-off and arrival times. Land use strategies can help aggregate freight activities to concentrate freight movement in designated areas. Understanding how these transportation assets interact with the Primary Freight Network is a key component for selecting performance measures. Due to the unique and detailed aspects of freight movement, it is important to ensure all stakeholders engage and contribute to the freight forecasting and land use strategies. The Greater Memphis region contains:

Highways
- 840 miles of interstate and US designated highways

Airports
- 9 airports capable of supporting air freight
  - Memphis International Airport is the world’s 2nd largest cargo airport

Railroads
- Memphis is one of five U.S. cities served by 5 Class I railroads.

Waterways
- 5th largest inland port in the U.S.

Pipelines
- 1,200 miles of pipelines support natural gas and hazardous liquid transport

Intermodal Terminals
- 4 major rail intermodal terminals

Industrial Park Infrastructure
- 3,402 industrial buildings in the region total more than 238 million square feet.

---

3 Memphis Infrastructure Plan (2010)
12.6.2  Recommendation 2 – Address Freight Bottlenecks First

Five key congestion areas were documented in the Memphis Regional Infrastructure Plan (March 2010) which are connected to the Top 25 identified freight corridors. Federal performance measurement is anticipated to evaluate key segments of these interstates for performance improvement as part of the national program. Because of the freight asset density, this region is home to more interstate highway segments which operate below 50 miles per hour. Working with the states of Tennessee, Mississippi and Arkansas will be essential to ensure progress is achieved in congestion mitigation.

1) **Lamar Avenue Corridor Improvements**: Lamar Avenue (US 78) is one of the region's most significant, and most congested, freight corridors, serving as an arterial highway for both interstate and local freight. The roadway serves as a direct connection to Birmingham and Atlanta as well.

2) **Holmes Road Corridor Improvements**: Holmes Road runs east-west on the south side of the Memphis International Airport (MEM), beginning at U.S. Highway 61 and intersecting other major arterials including Lamar Avenue, as well as Interstate 55. This corridor has become an important east/west connection for freight with truck traffic estimated to constitute 20% of total vehicular traffic by 2026, according to the 2010 plan.

3) **Interstate 40/Interstate 55 Interchange**: Interstates 40 and 55 are important connectors to local freight generators in West Memphis (particularly the UP intermodal terminal in Marion, Arkansas, and several national trucking terminals) and critical components of the national Interstate network. Existing congestion and bottlenecks, in part attributable to the blended traffic movements of the two interstate roadways, necessitate consideration of potential modifications. Where these two interstates join in West Memphis, Arkansas, together with interchanges with local highways 77 and 191, is one of the region's most significant freight bottlenecks.

4) **Construction/Completion of I-69/I-269**: Interstate 69, dubbed the "NAFTA superhighway," will be a new north-south interstate between the Mexican and Canadian borders to address increased freight traffic associated with North American Free Trade Agreement (NAFTA). In Tennessee, the proposed Interstate would enter the state at Fulton, Kentucky, and continue southwest to Memphis, replacing and bypassing the existing U.S. Route 51, serving Union City, Dyersburg (where it will intersect Interstate 155), Ripley, Covington, and Millington. Currently, a 21-mile section of I-69 exists in the region, sharing its alignment with I-40, I-240, and I-55. I-269 is part of the larger I-69 system, and begins near the interchange of Interstate 55 and State Route 304 in Hernando, Mississippi, extending east, north and west to the intersection of US 51 and State Route 385 in Millington, Tennessee. The same connection links to I-69 north of Memphis. I-69 and I-269 offers the region improved national connectivity with Canada and Mexico and provides significant local benefits to the region. It increases highway accessibility and stimulates economic development in the largely rural Eastern Tennessee counties and provides greater highway access to eastern Shelby County and north Mississippi. More importantly, it helps alleviate congestion caused by through freight traffic by diverting this traffic around the city and away from central Memphis.

5) **Third Mississippi River Bridge Crossing**: The justification for a third river bridge has been documented by multiple agencies and has been extensively studied by the TDOT. The project is also identified by the Memphis and West Memphis MPO in their Long Range Transportation Plans. The analysis contained in the Memphis Regional Freight Infrastructure Plan conducted by the study supports the need for a third bridge, and recommends its construction upon completion of the Draft Environmental Impact Study.
12.6.3 Recommendation 3 – Develop a Regional Freight Data Warehouse

The tristate region draws from federal, state and regional data sources. In the expanding and complex arena for freight transportation data, it is timely to build a shared data repository for the region so that each state and regional authority has the same essential information to make freight investment decisions. The measures should provide predictive, diagnostic and reporting, thereby providing value to agency decision makers. Performance measures should be calculated monthly or at least quarterly to allow for informed course correction at mid-point adjustment periods.

12.6.4 Recommendation 4 – Strategic Alignment of Goals, Accountability and Communication

Few MPO’s have bi-state responsibilities. The Memphis MPO is somewhat unique with the voluntary participation by the West Memphis MPO. Working with each state, the Memphis MPO’s ability to facilitate a consensus on national performance targets will be essential. Measures should focus on items which are under the Memphis MPO’s span of authority with definable benefits to the respective geographies and stakeholders of the region. Measures should be easy to understand and communicate to external partners.
Chapter 13 – Greater Memphis Region as a Global Logistics Hub

Greater Memphis Regional Freight Plan
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Note - All maps in this document have be oriented with the top of the page indicating north. Additionally, the maps presented in this report serve as a graphical representation of the information described and are not readily drawn to scale.
13.1 Regional Goals and Desires Concept

The Greater Memphis region has developed a balanced strength in freight transportation modes as seen in measures of capacity and interconnectivity over the years. The Mississippi River has long provided tremendous capacity on the River to move products in both directions. Interstate roadways I-40 and I-55, major east-west and north-south corridors, are being complemented by the emerging I-69 roadway, dual ring roads in Tennessee and Mississippi with I-240 and I-269, and updated state highways and arterial roadways offering more connections for the global supply chains moving within and through the region. The roadways are readily aligned with the five Class I railroads in the region, as well as the airport with its globally competitive air freight hub and operations.

The Livability 2040 RTP for the Greater Memphis MPO Region formulated seven livability goals that spanned five key areas of freight transportation:

- **Infrastructure Condition** – maintain existing assets
- **Safety** – increase safety and security
- **Environmental Sustainability** – minimize adverse impacts and improve public health, advance corridor redevelopment
- **Economic Vitality/Freight Movement** – remain a global leader, improve multi-modal access
- **Congestion Reduction/System Reliability** – reduce travel delay

The goals aid in the allocation of project funding for the application of scarce resources. The allocation serves to maximize the benefits for the region where the changes in global supply chains, seen in the Greater Memphis region, can be by very dynamic and rapid.

13.2 Gap Analysis

The Livability 2040 RTP identified four key needs to be addressed by the Plan:

- Preservation of system performance
- Multimodal access to changing distributions of population and employment, in part a land use planning effort
- Multimodal expansion, including enhancements and connections
- Logistics and removing barriers to freight movement

Each of the modal evaluations in Chapters 5 through 8 of this document examined the respective mode’s individual and combined performance in moving freight through the region. The Mississippi River has significant capacity to move freight along the river, only constrained by the availability of towboats and barges. The marine movement is sometimes limited by the ability to move the tons on and off the water, quite possibly a landside question in infrastructure and operations.

The Lamar Avenue Corridor remains a priority project for the region. The corridor serves to connect major freight centers in the region, the Memphis International Airport and the railroad’s Sargent and Memphis Intermodal/Tennessee Yards with customers and transportation networks across the region. Lamar Avenue as US 78/I-22 connects the region to Birmingham and Atlanta. Additional projects and programs are discussed in Chapter 14 – Plan Alignment.
13.3 Strategies

The unifying strategy for the Greater Memphis region is being shaped from the sustained efforts across the region to understand the region's land use and economic development opportunities in relation to transportation and industry. The region's efforts have coincided well with similar efforts taking place in other states and countries to more fully identify the differences between freight transportation and other forms and purposes for travel. The unifying theme of the Greater Memphis region as a “Hub City” has emerged as a shared concept among different stakeholders who recognize the common elements for their different industries and transportation needs. The Commercial Appeal has carried the image, shown in Figure 13-1, as representative of this concept.

Figure 13-1: Hub City Logo

![Hub City Logo](http://www.commercialappeal.com)

The consensus around the Hub City concept enables each of the region's stakeholders to adapt the strategy to their particular freight transportation needs. Bulk transfer, storage and distribution facilities may balance marine, rail and roadway modes, being able to make use of each for the respective freight movement. Warehousing and distribution facilities may be more focused on the rail and road access provided within the region.

The logistics driven strategy is influenced by the physical freight transportation infrastructure in the region, its capacity and connectivity, as well as by the freight transportation system’s operation, its congestion, safety and reliability. Each segment and mode is an integral part of the region’s logistics infrastructure with a demonstrated value and measureable impact. The Lamar Avenue/US 78 arterial roadway segment within the region connects directly to the interstate roadways and the other local, collector and arterial roadways. It also connects land uses and high volume trip origins/destinations.
Chapter 14 – Plan Alignment

Greater Memphis Regional Freight Plan

Memphis MPO
METROPOLITAN PLANNING ORGANIZATION
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14.1 Introduction

This section describes the chapter’s purpose, outlines the approach to clustering projects for assessment, and provides an overview of project groupings.

14.1.1 Chapter Purpose

The purpose of this chapter is to assess the path forward and the plan’s alignment with ongoing work in the region and future conditions. This includes assessing various freight related projects currently underway or proposed for the Memphis MPO’s multimodal freight systems with a significant presence of road projects, as well as qualitatively evaluating the potential impacts these projects may have. Further, this section examines the benefits they may generate, and how these impacts and benefits align with the stated federal, state and regional goals and objectives for freight movement. This analysis will discuss:

- The approach for grouping the projects by corridor and type to allow for their assessment;
- An overview of those project groupings;
- An overview of the metrics against which those projects are assessed;
- The qualitative assessment of those project groupings including the identification of impacts and benefits that they may generate;
- The identification and analysis of potential funding sources for those projects; and
- Recommended program of works, potential policy, and prioritization of projects and initiatives Memphis MPO’s freight strategy.

14.1.2 Approach to Clustering Projects for Assessment

For the purpose of the economic assessment of freight projects – comprising those underway and those proposed, several hundred road, rail, and waterway infrastructure projects were identified from current state and regional transportation and freight studies produced by or for various state and regional agencies. These studies include:

- Memphis MPO, 2017-2020 Transportation Improvement Program (TIP)
- Memphis MPO - 2040 Livability RTP (Existing and Committed Projects, FY 2014 to 2017
- Transportation Improvement Program (TIP) Projects, Investment Priorities Projects, and Vision Projects);
- Tennessee Department of Transportation: Tennessee Statewide Multimodal Freight Plan
- Mississippi 2017-2020 Statewide Transportation Improvement Program, 2017-2020; and
- Mississippi State Freight Plan; and
- Projects identified within literature about the Tennessee IMPROVE Act.

Further context was drawn from older plans and studies, including:

- Memphis: America's Aerotropolis;
- TDOT Freight Infrastructure Intermodal Analysis; and
- Memphis Regional Freight Infrastructure Plan (for Greater Memphis Chamber).
This list of projects was then distilled to identify those pertaining to road projects (including those which interface with other modes of transportation) under the jurisdiction of the Memphis MPO, and whose completion would likely have an impact on inter- and intraregional freight movement. Further designation of projects including identifying those cited in the studies as of national or regional importance, those taking place within nationally identified strategic freight corridors, and those which are located in proximity to, or servicing, established freight generators or centers of economic activity within the Memphis MPO. This iterative process led to the grouping of freight related projects in the Memphis MPO into two main categories: by project type and by corridor. The latter set of project groupings emphasizes corridor improvements and development over spot improvements across the larger road network. In several instances, it can be seen that the full spectrum of projects types proposed within a corridor would need to be undertaken (for instance widening and interchange modifications on Lamar) to achieve sought after outcomes in corridor performance. A summary of the project groupings by each of these categories is shown below in Table 14-1.

<table>
<thead>
<tr>
<th>Grouping by Corridor</th>
<th>Grouping by Project Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate 40</td>
<td>Interstate Interchanges</td>
</tr>
<tr>
<td>Interstate 240</td>
<td>Construction and/or Widening of Interstates</td>
</tr>
<tr>
<td>Interstate 55</td>
<td>Widening and Interchange Improvements/Modifications on Non-Interstate Roads</td>
</tr>
<tr>
<td>Interstate 69</td>
<td>Improving Mobility around Memphis International Airport</td>
</tr>
<tr>
<td>Lamar Avenue/US78</td>
<td>Intelligent Transportation Systems (ITS)</td>
</tr>
<tr>
<td>Airways Boulevard</td>
<td></td>
</tr>
<tr>
<td>Winchester Road</td>
<td></td>
</tr>
<tr>
<td>Shelby Drive</td>
<td></td>
</tr>
<tr>
<td>Holmes Road</td>
<td></td>
</tr>
<tr>
<td>Poplar Avenue/US72/SR57</td>
<td></td>
</tr>
</tbody>
</table>

Under these groupings, the projects were then analyzed within the context of national, state and local assessment metrics.

14.1.3 Overview of Project Groupings

Projects identified during the review of freight focused planning, strategy and policy documents were grouped together under two categories – corridor and project type. The following is an overview of each of the project groupings, as identified in Table 14-1. Several of the corridors intersect with one another, and some projects contain multiple elements. As a result, there are several individual projects that appear in multiple groupings.
14.1.3.1 Project Grouping by Corridor

Interstate Corridors

There are four interstate corridors in the Memphis MPO identified by the Federal Department of Transportation as Primary Highway Freight System (PHFS) Routes. There are funding implications for freight corridors recognized as being part of the Nationally Highway Freight Network (NHFN), in that candidate projects on the network have a stronger chance of receiving federal freight funding under various programs (such as FASTLANE). More detail about NHFN and PHFS designations in the Memphis MPO planning area is available in Appendix 2 – National Highway Freight Network in the Memphis MPO Area. The four PHFS interstate corridors within the Memphis MPO are:

- Interstate 40;
- Interstate 240;
- Interstate 55; and
- Interstate 69.

Proposed projects within each of these corridors are presented in Figure 14-1 and listed in greater detail in Appendix 4.
Non-Interstate Corridors
Projects of significance pertaining to freight movement in the MPO that are not located on interstates were grouped into six non-interstate road and highway corridors. These six non-interstate corridors, some of which may be designated in the future by the Memphis MPO as Critical Urban Freight Corridors (as they feed into the PHFS), and are:

- Lamar Avenue/US78;
- Airways Boulevard;
- Winchester Road;
- Shelby Drive;
- Holmes Road; and
- Poplar Avenue/US72/SR57.
Proposed projects within each of these corridors are presented in Figure 14-2 and listed in greater detail in Appendix 4.

Figure 14-2: Non-Interstate Corridors Projects

14.1.3.2 Project Grouping by Type

In addition to being grouped geographically by freight corridors, projects were also grouped into project type. The project types are:

- Interstate Interchange Projects;
- Construction and/or Widening of Interstate Projects;
- Widening and Interchange Improvements/Modifications on Non-Interstate Roads Projects;
- Improving Freight Mobility around Memphis International Airport Projects; and
- Intelligent Transportation Systems Projects.
**Interstate Interchanges**

Projects comprising the construction, improvement or replacement of interchanges on the interstate have been proposed, or are under construction throughout the four Primary Highway Freight System (PHFS) Routes identified in Section 14.1.3.1 are presented in Figure 14-3 and listed in greater detail in **Appendix 4**.
Construction and/or Widening of Interstate
Projects comprising the construction of new, or widening of interstates have been proposed, or are under construction, throughout the four Primary Highway Freight System (PHFS) Routes identified in Section 14.1.3.1 are presented in Figure 14-4 and listed in greater detail in Appendix 4.

Figure 14-4: Construction and/or Widening of Interstate Projects
Widening and Interchange Improvements/Modifications on Non-Interstate Roads

Widening projects and the construction or improvement of interchanges on non-interstate roads in the Memphis MPO make up the largest component of all freight related road projects in the region. The majority of these widening projects within the MPO’s freight corridors are located south and southeast of the Memphis city center along critical non-interstate roads which feed into the region’s PHFS Interstate System. This grouping includes the construction of new non-interstate road extensions. These proposed widening and interchange improvement projects are presented in Figure 14-5 and listed in greater detail in Appendix 4.

Figure 14-5: Widening and Interchange Improvements/Modifications on Non-Interstate Roads Projects
Improving Freight Mobility around Memphis International Airport

Improving Freight Mobility to/from Memphis International Airport Projects

There are four projects proposed by various agencies for the Memphis MPO that directly address improving freight mobility to and from the Memphis International Airport and the adjacent air freight related areas. These proposed improvements are presented in Figure 14-6 and listed in greater detail in Appendix 4.

Figure 14-6: Improving Freight Mobility around Memphis International Airport Projects
Intelligent Transportation Systems (ITS)
There are three projects proposed by various agencies for the Memphis MPO that address the installation or upgrading of intelligent transportation systems on the region’s interstate and non-interstate roads. As a complement to ITS technologies, the increasing availability and volume of accurate, real time traffic data will continue to expand the use and analysis of the data to improve traffic operations in real time. These improvements are presented in Figure 14-7 and listed in greater detail in Appendix 4.
14.2 Assessment of Projects

This section describes the approach to assessing projects and metrics used. It also documents the potential impacts and a benefit generated by the proposed projects, and provides an assessment of benefits and impacts delivered by project groupings.

14.2.1 Approach to Assessing Projects

Groupings of projects were assessed qualitatively drawing upon quantitative data, where possible, to provide context to the issues and objectives that those project groupings, as well as individual projects within those groupings, seek to address.

Each of the project groupings have the objective of alleviating congestion and facilitating the more efficient movement of road freight, both intraregional as well as for through freight utilizing the region’s Interstate System and limited access roadways such as US 78.

14.2.2 Assessment Metrics

The metrics against which the groupings of projects were assessed were derived from the current federal, state and regional goals for freight policy\(^1\). While the stated goals or objectives from each of those agencies vary slightly in their wording, the sought-after outcomes for each in the following six categories closely correlate to one another.

- **Safety** – Increase the safety and security of the transportation systems for all users;
- **Congestion** – Reduce travel delay for people and goods;
- **State of Good Repair** – Maintain existing transportation assets and infrastructure;
- **Economic Competitiveness** – Ensure the region is well positioned to remain a leader in global logistics and freight movement. Improve multimodal access to community and employment resources;
- **Sustainability/Quality of Life** – Minimize adverse impacts of transportation investment on the (social, natural, historic environment and improve public health. Advance corridor and community redevelopment opportunities to improve economic development and quality of life, part of the region’s livability strategy; and
- **Resiliency** – Enable the Region’s freight transportation infrastructure to retain, recover and restore its physical and operational capacity following disruptive effects that may arise from natural and man-made conditions.

14.2.2.1 Safety

Projects that improve safety include road or interstate widening, interchange reconstruction, and ITS upgrades. By widening roads, drivers are given more room to safely maneuver where the addition of possible shoulders provides a safe place to pull off in the case of an emergency. In addition, redesigning and reconstructing

interchanges allows for correcting the geometry of the facilities as vehicles and traffic have changed which can improve sight distances for drivers and therefore reduce crashes. Corridors with improved traffic flows, either through additional capacity or coordinated signals, reduce the likelihood of rear-end collisions due to speed variations. Lastly, the provision of adequate truck parking, of particular concern in the Memphis MPO, can lead to safety improvement through reductions in driver fatigue and unsafe parking environment. The project types that will provide safety benefits include:

- Widening Lamar Avenue/US 78;
- Construction/Modifications of significant interchanges along Lamar Avenue;
- Widening of Holmes Road;
- Improving Interchanges on Interstates; and
- ITS.

14.2.2.2 Congestion and Capacity

The state’s dominant population centers are leading the state’s economic expansion and account for a disproportionate share of the state’s economy. Between April 2010 and July 2015, Tennessee’s population grew by 4.0 percent, City of Memphis by 0.6 percent, Nashville by 8.5 percent, Knoxville by 3.7 percent, and Chattanooga by 3.7 percent. The majority of the state’s growth has occurred in the other three major metropolitan areas beyond Memphis. Memphis has experienced not only nearly flat-line growth in population, but also slow growth in jobs after the housing downturn. In recent decades, Memphis has seen an out-migration of people and jobs, despite the attraction of favorable taxes and the low cost of living. Few industry sectors in the Memphis MSA have seen growth in recent years, including financial activities, leisure and hospitality, and transportation and utilities. Manufacturing is predicted to continue on the downward trend. Concurrently, there has been a pronounced uptick in the level of investment and new logistics, warehousing and distribution firms locating in Northern Mississippi in the southern part of the Memphis MPO. This has been driven both by incentives offered by the state government as well as substantially lower levels of road congestion under current conditions, particularly along the Lamar Avenue/US 78 corridor.

The cost of congestion is of concern as these metropolitan economies not only contain a quarter of the state’s population, but an even greater share of the state’s employment (74.2 percent in 2015), where delays and costs impose economic inefficiencies. When the state’s transportation infrastructure investments are not maintained, performance on those assets deteriorates contributing to decreased productivity, and tempering economic growth, because businesses must spend resources on mitigating rising operating costs instead of increasing wages and employment.

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2 Census State & County QuickFacts
4 Bureau of Economic Analysis tables CA30 and SA30 Regional Economic Profiles
Highway corridors connect the state’s economic centers to one another and major economic centers beyond the state’s borders, creating a vital travel alternative for shippers and passengers. The state’s major population centers are readily accessible to each other as well as other important metropolitan areas such as Louisville, KY, Birmingham, AL, St. Louis, MO, Dallas, TX, and Atlanta, GA. Major freight rail yards in Memphis MPO are operated by Norfolk Southern, BNSF, Union Pacific, Canadian National, and CSX. The rail lines connect the state’s population centers as well to national and international markets. The state’s rail network offers a relief to highway traffic by providing an alternative route for long-haul freight.

Rapid and concentrated economic expansion is straining highway networks that are approaching the end of their useful life and require expensive infrastructure improvements. Transportation budgets are stretched to maintain the existing assets in a state of good repair while building new capacity to support the state’s expansion. Added highway capacity through widening corridors would be particularly beneficial in the metropolitan areas of Tennessee, where much of the population is located and the highways which trucks use are already congested. Adding capacity to congested corridors provides for increased reliability of trip times for both trucks and autos by increasing average speeds. Moreover, the state has a number of freight-dependent industries that rely on the efficiency of the transportation network to access international markets through the Port of Memphis and the Memphis International Airport, as well as other domestic and international markets.

Reduced congestion and increased highway capacity within the metropolitan area provides the important benefit of increased accessibility and mobility for drivers, particularly those who have limited transportation options available. With reduced congestion, all roadway users will benefit from more reliable trip times, and disadvantaged populations will be able to better access locations outside of the cities and towns where they live, which benefits them by increasing their access to employment, educational, and recreational opportunities. The project groups that will reduce congestion include:

- Widening Lamar Avenue/US 78;
- Construction/Modifications of significant interchanges along Lamar Avenue;
- Widening of Holmes Road;
- Construction and Widening of I-69 and I-55;
- Improving Interchanges on Interstates;
- Improving mobility and accessibility around Memphis International Airport;
- Improving access to intermodal facilities; and
- ITS.

### 14.2.2.3 State of Good Repair

Projects that improve and restore deteriorating or aging infrastructure provide the benefit of bringing the facility back to a state of good repair. As some of the highways are nearing the end of their useful life, pavement deteriorates and results in potholes and other hazards that damage vehicles and have the potential to cause delays and contribute to crashes. In the extreme, the failure of a facility may cause property damage, loss of life, and bottlenecks for an extended duration. Reconstructing or resurfacing of interstates therefore avoids such
damages and costs to the region, and extends the useful life of the assets. The project groups that will bring a corridor into a state of good repair include:

- Interchanges at Lamar Avenue; and
- Improving Interchanges on Interstates.

14.2.2.4 Economic Competitiveness

Projects that improve the efficiency of shippers’ operations provide economic competitiveness benefits. These projects generally include those that improve capacity, increase the velocity of freight’s value and volume and reduce congestion, therefore saving travel times for shippers. The projects may also allow for a more seamless transition between modes, allowing for shippers to transfer products to a more efficient mode, such as from truck to rail, or from truck to airplane for time-sensitive cargoes.

An important impact of investments in freight infrastructure, particularly for shippers within such a large urban region as the Memphis MPO, is the opportunity for balancing growth in throughout the region. Investments in freight tend to be prioritized based on the locations of the Class I railroads, major airports, and interstates through the population centers, but investments in alleviating congestion and increasing capacity between interstates and major freight generators can ensure stable employment in areas of the MPO that have been experiencing declines in both jobs and economic activity. Without these connections, existing customers could be forced to relocate their facilities either within the state, to other states, or even internationally.

As a vital part of the supply chain and an economic driver for the state, Tennessee has had success in attracting and retaining highly-educated and skilled workers, which are necessary to attract high value-added and knowledge-based industries. The employees who take positions in the Memphis MPO are highly sought by industry and can readily obtain jobs in other states because of their education and skill. Quality of life, which includes an efficient transportation network, a clean environment, and access to recreational and leisure options, is an important factor in retaining skilled workers and the firms that recruit them. The ability of the state’s highway network to support lower costs of living and additional transportation options assists in attracting these highly-skilled employees, which in turn increases the economic strength and productivity of the region.

Young professionals, in particular, are part of the generation that has reversed the trend of suburban living and instead prefers city living, with the access to restaurants, shopping, and other entertainment that a downtown location offers. A survey of Millennials (born between 1982 and 2003) reported that this generation values access to a variety of transportation options while simultaneously aspiring to be less reliant on automobiles: over half (54 percent) would consider moving to another city if it had better options to get around. As a result, reductions in congestion and an increase in accessibility to all modes of transportation are becoming increasingly important for providing transportation options for these groups of young professionals that

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represent a growing share of the labor force. The project groups that will provide economic competitiveness benefits include:

- Widening Lamar Avenue/US 78;
- Interchanges at Lamar Avenue;
- Widening of Holmes Road;
- Construction and Widening of I-69 and I-55;
- Improving Interchanges on Interstates;
- Improving mobility around airport;
- Improving access to intermodal facilities; and
- ITS.

14.2.2.5 Sustainability and Quality of Life

Autos and trucks that idle in traffic congestion release pollutants into the atmosphere, causing impacts to areas immediately adjacent to the corridor as well as the larger global economy and environmental footprint. The pollutants associated with idling include carbon monoxide (CO), nitrogen oxide (NOx), volatile organic compounds (VOCs), particulate matter (PM2.5), and carbon dioxide (CO2) or greenhouse gas (GHG). The reduction in pollutants and emissions, as well the reduction of heightened levels of noise and vibration, improves the quality of life for residents and makes the state a more attractive, safer, and healthier place to live. The project groups that will provide sustainability and quality of life benefits include:

- Widening Lamar Avenue/US 78;
- Interchanges at Lamar Avenue;
- Widening of Holmes Road;
- Construction and Widening of I-69 and I-55;
- Improving Interchanges on Interstates;
- Improving mobility around airport;
- Improving access to intermodal facilities; and
- ITS.

14.2.2.6 Resiliency

Resiliency refers to the MPO’s freight transportation infrastructure ability to retain, recover and restore its physical and operational capacity following disruptive effects that may arise from natural and man-made conditions. Resilience is intrinsically linked to components of several of the other assessment metrics, namely: state of good repair, congestion, and economic competitiveness. Unlike sustainability, which aligns with the environmental, social and community benefits freight infrastructure will generate over time, resilience as a metric assesses the network reliability of a region’s freight systems and their ability to maintain, or return to, acceptable levels of performance in the face of, or following, major disruptions.

Resilience as a metric for gauging the performance of freight infrastructure and network systems is still a relatively nascent concept. However, following the passage of the FAST Act in 2015, agencies are now required
to take resiliency into consideration during their transportation planning processes, particularly in regard to addressing vulnerability of infrastructure and network performance to disruptions caused by climate change and extreme weather events.\textsuperscript{7}

Key factors to ensuring resiliency in transportation infrastructure are design and redundancy. Resiliency in design is represented by the manner in which the infrastructure has been engineered to withstand environmental conditions associated with extreme events. An example of this is the way in which a section of highway and the underlying earthworks have been designed and constructed to mitigate against flooding and overtopping during flood events. On the other hand, redundancy as related to resiliency of freight infrastructure is represented by having effective alternatives for freight movement through a region should one alternative be disrupted or experience closure. For the Memphis MPO, an example of this can be represented by the interstate loop – should there be a disruption to I-240 between the SR385 and US72 in the eastern aspect of the MPO, through road freight traffic can still traverse the MPO using the western aspect of the interstate loop (I-240/I-40).

Intelligent Transportation Systems play an important part in ensuring resiliency in freight transportation infrastructure in that ITS can: facilitate quicker emergency response times; allow for real time monitoring of infrastructure during and after extreme weather events; and coordinate and implement wayfinding of alternative routes during instances of disruption. Project types within the MPO which address resilience include:

- Construction and Widening of I-69 and I-55;
- Improving Interchanges on Interstates;
- Widening Lamar Avenue/US 78;
- Construction/Modifications of significant interchanges along Lamar Avenue;
- Widening of Holmes Road, Shelby Drive, and Poplar Avenue;
- Improving mobility around the airport; and
- ITS.

14.2.3 Potential Impacts and Benefits Generated by the Proposed Projects

Tennessee’s freight traffic has increased with the growing demands of its and the nation’s economy. As the state’s economy evolves with this growth, prioritizing and selecting the best suited modes of travel for the state’s key corridors is critical to fostering the state’s economic competitiveness over the long-term. Transportation infrastructure is an investment with a long life that plays an important role in shaping the state’s future economy. Careful and selective investments now have the potential to yield economic benefits for decades.

Previous sections have identified project groupings by type or corridor; the completion of each grouping of projects can provide benefits to not only the Memphis MPO, but nationally as well. Projects that provide

benefits on a national scale are well-situated to receive federal funding, while projects providing localized benefits are well-suited to receive funding from state or local jurisdictions.

The focus on these projects is to provide improved access on road systems in the Memphis MPO planning area that experience high volumes of truck traffic in congested areas. The completion of these projects would result in efficiency and safety improvements within, as well increased accessibility between, the region’s key freight corridors. These improvements are anticipated to result in further mobility, transportation capacity, congestion relief, environmental and economic benefits along these corridors. In the long term, major investments in these corridors will contribute to even greater benefits in the state’s core population areas, provide better access to intermodal facilities, mobility, and economic development opportunities to western Tennessee and the greater Memphis metropolitan region reaching into Mississippi and Arkansas.

The groupings of projects by type and by corridor can be grouped into four main categories which would positively impact the MPO and provide a multifaceted basket of benefits. The associated benefits for each category of project are described below and discussed in greater detail in the following sections:

- **Widening Projects**: projects that create capacity or improve existing corridors to a state of good repair aid in the reduction of congestion, resulting in safety, emissions, and travel time savings for users. Shippers also save when truck trips adhere to schedules and avoid delays from congestion. These types of projects benefit Tennessee’s economy by improving the connections between industries to the overall highway network, as well as improving the efficiency of freight travelling to and from major traffic generators in the region.
- **Interchange and Intersection Projects**: projects that reconstruct or improve interchanges and intersections along major freight corridors improve the efficiency of traffic flows in those corridors. Frequent congestion results from poor interchange or intersection geometry and capacity, creating bottlenecks in the network. Reconstruction of some facilities is necessary to bring them to a state of good repair. Improved interchange and intersection capacity can result in reduced congestion, improved safety, and reduced emissions. Connections to intermodal facilities may aid in diverting additional shipments from the state’s other highway corridors, thereby creating additional capacity for users elsewhere. Shippers also save through more reliable schedules.
- **Facility Access Improvements**: projects that provide new or upgraded access roads may result in higher truck speeds and/or more reliable shipping schedules, thereby reducing transit time for shipments, increasing capacity of the facility, and saving shipping costs. In addition, because of the potential to provide new access to industries or populations, these projects may result in increased accessibility between shippers and consumers. For projects connecting to rail facilities, this access can divert truck traffic from highways to rail, resulting in enhanced safety, reduced emissions and congestion, and pavement savings. Facility access improvements can be prioritized in part by the volumes and types of commodities carried on corridors and connectivity to major freight activity centers and networks.
- **ITS**: projects that improve the coordination of traffic signals through corridors improve the flow of traffic, reducing travel delays, emissions, and vehicle operating costs. Coordinated signals allow for faster average truck speeds, resulting in increased capacity and reliability for shipments. ITS will also address future technologies and processes, including platooning vehicles and higher levels of automation in freight movements, allowing for increased operational efficiency.
Existing freight networks contribute to economic impacts in Tennessee in the form of jobs, wages, income taxes, sales taxes, and economic development. Much of the freight handled in the Memphis MPO is by truck, but to the degree that freight that can be diverted to rail, these impacts are the result of savings in shipping costs (rail is cheaper than truck per ton-mile), pavement costs (i.e. wear and tear on roads), and congestion costs (travel time impacts for other vehicles based on the number of trucks on the road). In 2007, 41 million tons of freight was moved along Lamar Avenue, which represented approximately 10 percent of freight on the region’s interstates and highways. Such high volumes contribute to an already elevated level of congestion, with the corridor having typical volume to capacity ratios of 0.98 that are projected to reach near 2.0 by 2030 if no changes are made.9 Truck traffic on congested roads combined with inefficient intersections has resulted in truck-vehicle crashes and fatalities. In fact, from 2015 to time of writing there have been 16 fatalities from vehicle crashes on Lamar Avenue including six involving large trucks or buses.10 As a result, improvements to this corridor in particular would have a number of benefits.

In addition to the jobs and wages, the freight network generates broader social impacts including those related to reductions emissions and improvement in safety metrics. These broader social impacts are different from the direct impacts because they do not translate into spendable dollars in the Tennessee economy.

Beyond the direct jobs associated with freight industries, improvements to access and enhancements to the network support indirect jobs, increased volumes on the highway and rail networks, and can help support job creation, though there are other factors in the economy that also play a role.

14.2.4 Assessment of Benefits and Impacts Delivered by Major Project Groupings

This section describes the potential impacts and benefits that could result from project grouping implementation. It also identifies the anticipated timeline and funding need to implement.

14.2.4.1 Interstate Widenings and Interchange Construction/Modification Projects

The Interstate System is the lifeblood of the region’s road freight network, both for through traffic as well as for freight traffic originating or terminating at the MPO’s freight generating/handling facilities including: Port of Memphis, Memphis International Airport, its many intermodal facilities, and the diverse manufacturing, warehousing, and logistics facilities located across the MPO planning area. Widening of key sections of the Interstate System, coupled with development of new, or improvement of existing, interchanges will address issues around congestion, state of good repair, and safety.

Potential Impacts and Benefits
The proposed widening and interchange construction/improvement projects will increase the capacity of the region’s Interstate System thereby facilitating an alleviation of congestion leading to the more efficient flow of goods through, into, and out of the region. While much of the benefits associated with the alleviation of

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congestion will be capture in operational efficiencies of road freight passing through the region, efficiency gains will also be captured by road freight originating from or terminating at one of the region’s many freight generating centers. This alleviation of congestion through capacity increases will also improve safety through allowing for a potential higher degree of separation of freight and personal vehicles on the interstates.

**Timeline and Funding Requirements**
A total of 13 projects involving the widening and interchange construction/improvement in the region’s Interstate System have been proposed for the Memphis MPO in various state and regional plans. The estimated costs for delivering these 13 projects approximately $632M – approximately 30% of this funding has been committed to existing projects, with the majority of this committed funding allocated the I-40 flyover ramp at I-240 east of Memphis. An overview of the funding requirements and the timeline for the proposed completion dates of the widening and interchange projects on the MPO’s Interstate System are shown below in Table 14-2.

Table 14-2: Proposed Expenditure and Completion Dates, Interstate Widening and Interchange Construction/Improvement Projects, Memphis MPO

<table>
<thead>
<tr>
<th>Proposed Completion Date</th>
<th>Interchange</th>
<th>Widening</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$2017M</td>
<td>$2017M</td>
<td>$2017M</td>
</tr>
<tr>
<td>By 2020</td>
<td>190.3</td>
<td>16.1</td>
<td>206.4</td>
</tr>
<tr>
<td>By 2025</td>
<td>142.4</td>
<td>26.5</td>
<td>168.9</td>
</tr>
<tr>
<td>2040 and Beyond</td>
<td>78.4</td>
<td>138.4</td>
<td>216.8</td>
</tr>
<tr>
<td>Proposed Completion Date Not Stated</td>
<td>40.2</td>
<td>-</td>
<td>40.2</td>
</tr>
<tr>
<td>Total ($M)</td>
<td>451.3</td>
<td>181.0</td>
<td>632.3</td>
</tr>
</tbody>
</table>

Source: Memphis MPO, TDOT, MDOT

14.2.4.2 *Widening and Interchange Construction/Modification Projects on Non-Interstate Highways and Roads*

There are a variety of widening and interchange construction/improvement projects proposed for the non-interstate highways and roads within the Memphis MPO. Given the number of the proposed projects, as well as their geographical spread across the region, these have been assessed on a corridor basis.

**Widening and Interchange Construction/Modification Projects on Lamar Avenue (US 78)**
Lamar Avenue is the nerve center of the MPO’s freight systems, serving a key nexus for air, rail and road freight. In addition, much of the region’s warehousing and logistics industry, as well as a significant number of high value add manufacturing employers, is located in close proximity to the Lamar Avenue corridor. The corridor also experiences the most pronounced congestion in the region, with an estimated 30,000 freight vehicles experiencing delays along various parts of the corridor on a daily basis. This congestion not only generates significant time delays for freight logistics operators, including for trucks entering/departing from BNSF’s adjacent intermodal facility, but also acts a hindrance to the region’s potential to increase its economic competitiveness. Persistent congestion along Lamar Avenue has also likely been a key, if not primary, contributor to a decreased level of new private sector investment in the corridor over the past decade.

**Potential Impacts and Benefits**
Alleviating congestion through the improvement of interchanges and the widening of Lamar Avenue will in turn...
improve the economic competitiveness of this epicenter of the MPO’s multifaceted freight industry. It will also improve accessibility to/from midtown and downtown Memphis for those utilizing this corridor for commuting purposes. An easing of congestion of Lamar Avenue will lead to greater efficiency for freight vehicles entering/existing both Memphis International Airport and the BNSF Tennessee Yard thereby contributing to an improvement in those facilities’ overall operational efficiencies. Increasing the capacity on the Lamar Avenue corridor through road widening projects could accommodate future capacity expansion projects at key freight generators along or proximal to the corridor thereby contributing to the region’s economic development. The introduction of new interchanges at key congestion intersections will lead to a reduction in delays for freight vehicles, and thus reduced idling times. This will provide environmental benefits through a reduction in idling emissions.

**Timeline and Funding Requirements**

There are a total of 8 widening and interchange construction/modification projects underway or proposed for Lamar Avenue. The estimated cost of completing these projects is approximately $650M, with approximately a third of this proposed for projects to be completed by 2020, much of it for a new interchange at Winchester Blvd. It is noted that the widening projects along the corridor proposed for 2040 and beyond are located in the northern aspect of the corridor, away from the more pronounced areas of vehicular congestions south of Winchester Boulevard. An overview of the funding requirements and the timeline for the proposed completion dates of the widening and interchange projects on Lamar Avenue are shown below in Table 14-3.
Table 14-3: Proposed Expenditure and Completion Dates, Widening and Interchange Construction/Modification Projects, Lamar Avenue Corridor

<table>
<thead>
<tr>
<th>Proposed Completion Date</th>
<th>Interchange/Grade Separation</th>
<th>Widening</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$2017M</td>
<td>$2017M</td>
<td>$2017M</td>
</tr>
<tr>
<td>By 2020</td>
<td>152.7</td>
<td>44.0</td>
<td>196.7</td>
</tr>
<tr>
<td>By 2025</td>
<td>171.7</td>
<td></td>
<td>171.7</td>
</tr>
<tr>
<td>2040 and Beyond</td>
<td></td>
<td>133.9</td>
<td>133.9</td>
</tr>
<tr>
<td>Proposed Completion Date Not Stated</td>
<td>151.9</td>
<td>151.9</td>
<td></td>
</tr>
<tr>
<td>Total ($M)</td>
<td>476.3</td>
<td>177.9</td>
<td>654.2</td>
</tr>
</tbody>
</table>

Source: Memphis MPO, TDOT, MDOT

**Widening and Interchange Construction/Modification Projects on Key East-West Non-Interstate Highways and Roads**

Three arterial roads located in the southern aspect of the MPO – Holmes Road, Shelby Drive and Winchester Boulevard, serve as key facilitators of intraregional east-west movement of road freight (and non-freight vehicular) traffic. Each of these roads bisects the Lamar Avenue corridor, and each play a pivotal role in terms of accessibility to key freight generators and centers of economic activity along, or proximal to this corridor.

Approximately a third of the projects proposed, or underway, on these key arterial roads address the widening of Holmes Road to facilitate an increase in the capacity of goods movements between Lamar Avenue, Interstate 55, US61 and Interstate 269 (and the Rossville intermodal center). There are two interchange projects proposed for Winchester Road aimed at increasing multimodal accessibility to Memphis International Airport and alleviating congestion on the Lamar Avenue, respectively.

Of the projects proposed on Shelby Drive, one in particular – an extension of Shelby Drive to connect with the International Gateway at the Frank C. Pidgeon Industrial Park, would unlock a more efficient route for road freight accessing the Interstate System, particularly to the south and southeast, from the Port of Memphis.

Proposed projects across the breadth of Poplar Avenue (US78/SR57) in the Memphis will improve accessibility and freight mobility along this key arterial spanning the northern and central aspects of the Memphis MPO. Projects proposed along this corridor mostly comprise road widening, but also include the replacement of overhead bridges crossing the I-240.

**Potential Impacts and Benefits**

The widening of these three arterial roads will alleviate congestion and allow for more efficient east-west movement of freight vehicles between two interstates, Lamar Avenue corridor and the key freight generator, the Memphis International Airport and BNSF’s Tennessee Yard intermodal facility, as well as President’s Island and Pidgeon Industrial Park in the future. Accessibility to economic activity centers located along these roads will encourage increased investment around those centers, potentially encouraging the clusters of various aspects of the supply chain, thereby contributing to an improvement in the economic competitiveness of the region. The construction or modification of interchanges of these three roads with Lamar Avenue – entailing the grade separation of the latter, will reduce congestion on the Lamar Avenue corridor. Concurrently, these
intersection improvement projects will reduce bottlenecks currently experienced by freight traffic entering Lamar Avenue from these arterial roads.

The extension of the Shelby Drive to connect the southern aspect of the International Gateway at Frank C. Pidgeon Industrial Park will encourage economic development around that facility thereby increasing the economic competitiveness of the region as a whole.

Three of the proposed projects (two on Shelby Drive, one on Winchester) include grade separations at rail crossings. In addition to eliminating existing delays by vehicular traffic at these crossings, the grade separations will also generate safety benefits through the removal of potential interaction between rail traffic with vehicles, pedestrian, and cyclists.

**Timeline and Funding Requirements**

There are approximately 25 projects proposed for these four key east-west non-interstate corridors, with only one – a widening project on Holmes Road (between Lamar Ave and Malone Road), currently under construction. The estimated cost for completing these projects is more than $1M, with 60% of this expenditure attached to projects with a time horizon of completion beyond 2040 or which has not been specified. Approximately $175M in interchange improvements – including grade separations – are slated to be completed by 2020. An overview of the funding requirements and the timeline for the proposed completion dates of the widening and interchange projects on key east-west non-Interstate highways and roads are shown below in Table 14-4.

<table>
<thead>
<tr>
<th>Proposed Completion Date</th>
<th>Interchange/Grade Separation</th>
<th>Widening</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2017M</td>
<td>2017M</td>
<td>2017M</td>
</tr>
<tr>
<td>By 2020</td>
<td>152.7</td>
<td>N/A</td>
<td>152.7</td>
</tr>
<tr>
<td>By 2025</td>
<td>88.8</td>
<td>172.4</td>
<td>261.2</td>
</tr>
<tr>
<td>2040 and Beyond</td>
<td>95.4</td>
<td>293.2</td>
<td>388.6</td>
</tr>
<tr>
<td>Proposed Completion Date Not Stated</td>
<td>61.6</td>
<td>134.9</td>
<td>196.5</td>
</tr>
<tr>
<td><strong>Total ($M)</strong></td>
<td><strong>398.4</strong></td>
<td><strong>600.5</strong></td>
<td><strong>998.9</strong></td>
</tr>
</tbody>
</table>

Source: Memphis MPO, TDOT, MDOT

**Improving Mobility and Accessibility around the Memphis International Airport**

There are four projects proposed in the Memphis MPO by various agencies which would improve accessibility to the Memphis International Airport precinct, a major multimodal freight generating center, and whose Aerotropolis Masterplan a focal point of the MPO’s future economic development. All located along Airways Blvd, these projects address both freight and non-freight vehicular traffic as well as other modes including transit and active transportation.

**Potential Impacts and Benefits**

The largest of these projects is the reconstruction of the interchange at Airways Boulevard and I-240 which would facilitate greater accessibility for freight vehicles to the region’s Interstate System from the Memphis International Airport precinct. Grade separation of Airways Blvd and Winchester Rd, as part of multimodal...
improvements proposed for a section of the former, will alleviate congestion for both freight and non-freight along both of these key arterial roads, thereby improving the efficiency of freight movement to and from Memphis International Airport. Two widening projects along Airways Blvd north of Lamar Avenue will alleviate congestion and improve accessibility to the Memphis International Airport precinct from Midtown Memphis.

**Timeline and Funding Requirements**
The four proposed projects within the Memphis MPO which would have a positive impact on mobility around, and accessibility to, the Memphis International Airport and surrounding precinct. The estimated cost of completing these four projects is approximately $120M. Nearly three fourths of this expenditure is reflective of projects slated for completion by 2025. An overview of the funding requirements and the timeline for the proposed completion dates of the widening and interchange projects which improve mobility and accessibility around the Memphis International Airport are shown below in Table 14-5.

<table>
<thead>
<tr>
<th>Proposed Completion Date</th>
<th>Interchange/Grade Separation</th>
<th>Widening</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$2017M</td>
<td>$2017M</td>
<td>$2017M</td>
</tr>
<tr>
<td>By 2020</td>
<td>28.2</td>
<td>28.2</td>
<td></td>
</tr>
<tr>
<td>By 2025</td>
<td>67.3</td>
<td>67.3</td>
<td></td>
</tr>
<tr>
<td>2040 and Beyond</td>
<td></td>
<td>31.8</td>
<td>31.8</td>
</tr>
<tr>
<td>Proposed Completion Date Not Stated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total ($M)</td>
<td>95.5</td>
<td>31.8</td>
<td>127.2</td>
</tr>
</tbody>
</table>

Source: Memphis MPO, TDOT, MDOT

**Intelligent Transportation Systems**
The introduction to and/or upgrading of intelligent transportation systems (ITS) to the Memphis MPO’s road transport systems will facilitate the more efficient movement of freight vehicles and improve safety along the region’s freight corridors. There are three ITS projects proposed for the MPO: one along SR302 in Mississippi between the I-55 and US72, and two expansion projects along the I-269 corridor in the western aspect of the MPO.

**Potential Impacts and Benefits**
The completion of these ITS projects will improve freight efficiency, with the coordination of traffic signals improving the flow of traffic, reducing delays, emissions and vehicle operating costs. Coordinated signals will allow for faster average truck speeds, resulting in increased capacity and reliability for shipment originating from or bound for, or passing through, the MPO.

**Timeline and Funding Requirements**
The three proposed ITS projects within the Memphis MPO have an estimated completion cost of approximately $13M. The estimated cost of the only ITS project currently under construction, along SR302 in Mississippi, is not stated. It is noted that the two ITS projects proposed for the I-269 are from the TDOT Improve list of prospective projects and that no timeline for their completion has been estimated. An overview of the funding requirements and the timeline for the proposed completion dates of ITS projects are shown below in Table 14-6.
Table 14-6: Proposed Expenditure and Completion Dates, ITS Projects

<table>
<thead>
<tr>
<th>Proposed Completion Date</th>
<th>MS 302 (MS)</th>
<th>I-269 (TN)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>$2017M</td>
<td>$2017M</td>
<td>13.2</td>
</tr>
</tbody>
</table>

Source: Memphis MPO, TDOT, MDOT

The continued expansion of real-time traffic data from mobile and data logging sources will continue to aid in the design and active adaptation of traffic signals, operations and control.

14.3 Freight Funding and Programs

The largest singular challenge to the implementation of the Memphis MPO’s freight strategy is funding, a challenge across the state and nation. On its own, Shelby County (which makes up the bulk of the Memphis MPO) has a shortfall in funding of well over $1 billion for road infrastructure projects slated for development by 2030 as identified within its jurisdiction under the Livability 2040 RTP. More than a third of this funding gap is for proposed projects on, or which interface with, Lamar Avenue/US78.

As the State of Tennessee generally does not utilize debt financing for transportation infrastructure projects, the majority of funding is sourced from Federal and State agencies, with the origination of the bulk of this funding from the Federal Department of Transportation’s Surface Transportation Block Grant (STBG) and other formulaic allocations to the Tennessee Department of Transportation. Local funding can be significant, in certain instances comprising up to 90% of the proposed costs for specific projects. Additional funding may come from user fees, Federal discretionary grant programs (from DOT and other agencies), less commonly, from non-profit grant programs.

Tennessee has recently added an additional funding vehicle for the funding of transportation infrastructure improvements. The Improving Manufacturing, Public Roads and Opportunities for a Vibrant Economy (IMPROVE) Act, was passed in April 2017. The Act includes an increase to the gas tax with cuts to other taxes such as sales taxes on groceries and corporate taxes on manufacturing. The Act provides funding for nearly 1,000 of the state’s infrastructure projects like roads, bridges, and highways through the increase in the gas tax. In addition, cities were granted the authority to hold referendums on taxes for transit projects.11

Many of the freight improvement or development programs proposed the MPO and TDOT will provide, in addition to public benefits, substantial benefit to specific private sector entities, particularly the owners and operators of freight generating centers in the region. Accordingly, those private sector entities should play a significant role in the funding of those projects which will benefit their respective operations, as well as in the maintenance and operation of this infrastructure. The use of public private partnerships for the development of transportation infrastructure has been successfully used throughout the United States for projects that provide

public and private sector benefits. While not yet common in Tennessee and Mississippi, statutes enabling their use have been passed by both state’s legislatures.

Section 14.3.1 identifies and discusses a number of sources of federal funding programs which the Memphis MPO could potentially access for the variety of freight focused road infrastructure projects which it (and TDOT) has proposed for the region’s interstate, highway and road systems.

14.3.1 Potential Sources of Funding

The following sources of funding have been identified that the Memphis MPO could potentially access for the variety of freight focused road infrastructure projects which it (and TDOT) has proposed for the region’s interstate, highway and road system:

- Surface Transportation Block Grant (STBG);
- Transportation Investment Generating Economic Recovery Discretionary Grant Program (TIGER);
- Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies Discretionary Grant Program (FASTLANE);
- National Highway Freight Program (NHFP);
- Railway-Highway Crossings Program (set-aside from Highway Safety Improvement Program (HSIP));
- Public Works and Economic Adjustment Assistance Programs;
- Railroad Rehabilitation and Improvement Financing (RRIF);
- Congestion Mitigation and Air Quality (CMAQ);
- National Highway Performance Program (NHPP);
- FastTrack Infrastructure Development Program (FIDP); and
- Private Sector Contributions for those Projects Providing Significant Private Sector Benefit.

These funding programs are, at time of writing, authorized under the FAST Act and align with several of the Act’s overarching goals including: the facilitation of greater freight efficiency on the nation’s national significant freight network; safety improvements; and the generation of greater economic development opportunities through the provision of greater mobility and accessibility to key employment centers. Recent program developments, such as the Infrastructure for Rebuilding America (INFRA) discretionary grant program, as well as other transportation and infrastructure programs will continue to modify project and program eligibility and funding.

Appendix 5 provides an overview of the attributes of each funding program including, among others: level of authorized funding, typical award size, eligibility criteria and applicability to Memphis MPO road freight projects.
14.4 Recommended Strategies

This section presents the recommended strategies the Memphis MPO could use to improve freight operations in the region. It describes the potential work programs, policies and projects recommended for implementation.

14.4.1 Describe Potential Program(s) of Work

The progress of the work on the Regional Freight Study identified several candidate work programs and project categories that have the potential to benefit the region and aid in attracting, serving and retaining industry’s supply chains in the MPO. The study has enabled a coalescence of conditions and opportunities that may have been seen intermittently across the region previously but can now be more readily aggregated. These include:

- Improving arterial roadway-to–interstate traffic flows. The proximity of industrial sites in the region to one another, together with the closer spacing of arterial roadways intersecting along the interstate highway corridors may be contributing to a higher traffic flow impact upon congestion and safety. Implementing projects which will address and alleviate this congestion will deliver a basket of benefits. Examine the opportunity to pair the timing of arterial projects with proximal interstate projects which the arterial will feed;
- Providing a greater definition and coordination of freight movement on the region’s railroad network. Examine alternatives that may increase rail freight movement on the railroad network across the Greater Memphis region to increase velocity and capacity. Most metropolitan railroad networks demonstrate multiple railroad carrier connections. One or more railroad organizations may function as a terminal operator for single carrier rail lines which extend through the region and directly connect to other networks and regions. Several urban freight rail networks (such as those in Chicago and St. Louis) employ a network host(s) who coordinates through freight flows traversing the urban rail network; and
- Identifying and continuously improving on a “Smart” real time traffic management and wayfinding system. Implement planned, and examine opportunities for new, ITS upgrades which will assist with user decision making and the overall capacity management of the MPO’s road network. Nominate a state or regional agency to standardize wayfinding and signage for the MPO’s road network so as to facilitate more efficient freight movement.

14.4.2 Describe Potential Policies

The Memphis MPO, in collaboration with its peer organizations on a local, state and federal level, may be in a position to initiate, as well as collaborate on, various freight and overall transportation initiatives that will benefit the Region. These policies would seek to:

- Maximize the role of IT and its contribution to freight movement and the operational and infrastructure performance within the MPO, leveraging ongoing innovations and the continued expansion of data availability and sources;
- Establish a framework to analyze the traffic and congestion impacts from the combined I-40 / I-55 dual segment in West Memphis, Arkansas and the manner in which this can impact the MPO’s road freight network;
• Examine potential strategies and roles for the MPO’s key East-West arterials to reduce roadway congestion, encourage economic competitiveness, and improve safety on the MPO’s road network;
• Continue to implement complementary economic development policy which encourages and incentivizes private sector companies to locate within the MPO and take advantage of the competitive advantage which its multimodal freight network offers. This includes sustaining the Region’s ongoing and ground-breaking efforts to enhance the alignment of the Region’s workforce and workplaces; and
• Leverage TDOT’s and MDOT’s efforts and initiatives for transportation demand management (TDM) where applicable to the freight sector, with continued participation by private sector companies in regard to the potential diversion of road freight to rail. Enabling freight mode shifts that reduce roadway congestion can be an elusive goal (due to existing disparities between supply of and demand for road freight vehicles), but one that does hold the potential to reduce congestion, provide environmental benefits, and improve safety on the MPO’s roadways.

14.4.3 Prioritization of Projects/Programs/Initiatives

This section identifies and describes projects, programs, and initiatives recommended as priorities to meet the Memphis MPO’s freight goals and improve freight operations in the region.

14.4.3.1 Near Term Focus on Lamar Avenue (US 78)

Lamar Avenue between Winchester Road and the state line is the epicenter of the freight industry in the Memphis MPO. This corridor is the region’s freight nexus which serves Memphis International Airport, BNSF’s Tennessee Yard, hosts a significant portion of the region’s warehousing and logistics activity, and the several clusters of high value add economic activities which are located in close proximity. Projects identified in the MPO’s TIP and Livability 2040 RTP, as well as those identified by TDOT in its statewide freight plan, have a total estimated cost of more than half a billion dollar. The State and MPO’s inability to attain funding to address these gaps for Lamar Avenue (such as not being selected for award under 2016’s first round of the FASTLANE discretionary grant program) have led to delays with the implementation and construction of projects which aim to increase the capacity and efficiency of vehicular movement through road widening and the improvement/grade separation of interchanges with key east-west arterials roads feeding into Lamar Avenue from freight generating centers.

Completing the package of works slated for the Lamar Avenue/US 78 corridor between Winchester Road and Stateline Road continues to be the top priority in the region and it is recommended that the lion’s share of the MPO infrastructure funding over the near term be focused on addressing projects within this corridor. The completion of these projects will deliver a multifaceted basket of benefits to the Memphis MPO. Alleviating congestion through the improvement of interchanges and the widening of Lamar Avenue will in turn improve the economic competitiveness of this epicenter of the MPO’s multifaceted freight industry while also improving to/from midtown and downtown Memphis for those utilizing this corridor for commuting purposes. An easing of congestion of Lamar Avenue will lead to greater efficiency for freight vehicles entering/existing both Memphis International Airport and the BNSF Tennessee Yard thereby improving those facilities overall operational efficiencies. Less congestion and faster average speeds along this corridor will lead to a reduction in emissions
thereby generating environmental and sustainability benefits. The region should continue to monitor the results from completed projects in order to sustain the region’s benefits from investment.

14.4.3.2 Increase Capacity on Key East-West Routes

The intraregional connections between freight generators and its freight corridors will improve through a number of road widening and interchange construction/modification projects along the region’s key east-west arterial roads. The completion of projects along these arterial streets will also greatly benefit non-freight traffic through reduced congestion and greater accessibility. The gradual alleviation of congestion on these roads will complement capacity and efficiency enhancements in the MPO’s central freight nerve center (Memphis International Airport, Lamar Ave, BNSF Tennessee Yard intermodal facility), thereby stimulating economic development and improving the region’s economic competitiveness.

Those projects interfacing with Lamar Avenue and with an objective of alleviating congestion on this key freight corridor should take priority, ash should the interchange projects which address improved mobility and accessibility to the Memphis International Airport precinct. The Shelby Drive extension project connecting the southeastern aspect of the International Gateway intermodal facility to the surface road systems in Westwood can deliver a significant impact through the provision of more direct access to key freight corridors addressing southern and southeastern destinations.

14.4.3.3 Leverage Recent Private Sector Investment

The five Class I railroads which are present in Memphis have invested approximately half a billion dollars in their intermodal facilities scattered across the MPO over the past decade. These projects have been undertaken to increase their facilities’ capacity or, in the case of Norfolk Southern’s intermodal facility in Rossville, to be better positioned to service the growing number of distribution centers in Northern Mississippi. Increased economic activity at the region’s freight generating centers stimulates economic development along the supply the chain. Improving accessibility to these centers through reduced congestion on arterial freight corridors, as well as through interchange improvements at key chokepoints will benefit the region as a whole through allowing the facilities to achieve a higher capacity of throughput in line with their recent expansions.

14.4.3.4 Improve Signaling and ITS on Memphis MPO’s Freight Corridors

The introduction or upgrade to signaling and other forms of ITS allow for greater agility in traffic demand management with the overall objective of maintaining the efficient movement of traffic throughout the region’s road corridors. Other benefits an increased ITS footprint across the region’s road systems will deliver is quicker emergency response times, real time monitoring of assets, and data collection which can be used for a variety of analytical processes to assess, amongst other things, the overall performance of the transportation infrastructure. With innovation a constant necessity throughout the breadth of the freight industries, and with higher levels of automation being introduced across all modes of freight— including pilot road freight projects in the Memphis MPO, the acceptance and adoption of ITS technologies across the region’s freight corridors is inevitable.
14.4.3.5 Develop Strategy for Addressing Funding of Big Ticket Road Infrastructure Projects

The third crossing of the Mississippi River and the construction of the 65 mile section of the I-69 from Frayser to Dyersburg both have estimated costs above $1.5 billion. Under the current paradigm of funding and financing major transportation infrastructure projects in Tennessee, in which debt financing is not used, the eventual completion of these projects seems unlikely, particularly the third river crossing as this cannot be built piece meal over time. In the absence of debt financing through federal programs like TIFIA\(^\text{12}\) and GARVEE\(^\text{13}\) bonds, the MPO should consider engaging with private sector infrastructure developers and operators to explore the structuring of public private partnerships with the objective of substantially lessening the public funding requirements to realize the development of these significant infrastructure projects. Tennessee is one of 33 states that have enacted statutes that enable the use of various P3 approaches for the development of transportation infrastructure.\(^\text{14}\)

14.4.3.6 Address Provision of Additional Truck Parking

A recent survey of logistics operators in the Memphis MPO found that number one need in the region, as cited by truck drivers surveyed, was increasing the number of truck parking spaces in and around the MPO’s freight generating centers. An inadequate provision of safe truck parking can cause safety impacts including driver fatigue and antisocial behavior, both of which can lead to accidents, injuries and fatalities. It can also lead to operational inefficiencies with truck drivers having to endure longer distances between parking and the logistic activity center that they are servicing. It is recommended that future transportation and land use planning for, and around, freight generating centers in the MPO ensure that forecast truck parking requirements will be adequately provided and consistent with guidelines specified in the FHWA’s Jason’s Law.

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\(^{12}\) Transportation Infrastructure Finance and Innovation Act, which provides long term loan and loan guarantees for qualified projects of regional and national significance.

\(^{13}\) Grant Anticipation Revenue Vehicles, which enable States to pay debt service and other bond-related expenses with future Federal-aid highway funds