CAMBRIDGE SYSTEMATICS

Central Missouri Multimodal Port Feasibility Study

Final Report

prepared for

Jefferson City Area Chamber of Commerce

prepared by

Cambridge Systematics, Inc.

with

Hanson Professional Services Inc.

June 2018

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report

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List of Acronyms

Acronym	Definition
AAPA	American Association of Port Authorities
ARRA	America Recovery and Reinvestment Act
BCA	Benefit-Cost Analysis
BFE	FEMA Base Flood Elevation
BLS	U.S. Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics, U.S. Department of Transportation
BUILD	Better Utilizing Investments to Leverage Development
CFS	Commodity Flow Survey
COB	Container-on-barge
CO_2	Carbon Dioxide
CTLC	Consolidated Terminals & Logistics Co.
DSL	Digital subscriber line
FAF	Freight Analysis Framework Version 4.4
FAST	Fixing America's Surface Transportation
FASTLANE	Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies
FEMA	Federal Emergency Management Agency
FEU	Forty foot-equivalent units
FHWA	Federal Highway Administration
FIRM	FEMA Flood Insurance Rate Map
FRA	Federal Railroad Administration
FRE	Freight Enhancement Program
FTZ	Foreign trade zone
FY	Fiscal Year
GRP	Gross regional product
HC	Hydrocarbon
HGL	Hydrocarbon gas liquid
INFRA	Infrastructure for Rebuilding America
LDB	Left Descending Bank
LQ	Location quotient
LTL	Less-than-truckload
MARAD	U.S. Maritime Administration
MoDOT	Missouri Department of Transportation

Acronym	Definition
MHTC	Missouri Highways and Transportation Commission
MVBS	Mount Vernon Barge Service
NASAAC	North America Special Aluminum Alloy Contract
NEPA	National Environmental Policy Act
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NOFO	Notice of Funding Opportunity
NO_x	Nitrogen Oxides
NPV	Net present value
OD	Origin-destination
OD/OW	Over-dimension/overweight
O&M	Operations & maintenance
PHFS	Primary Highway Freight System
PM	Particular Matter
P3	Public-Private Partnership
RDB	Right Descending Bank
Ro/Ro	Roll-on/roll-off
RRIF	Railroad Rehabilitation and Improvement Financing
SCC	Social Cost of Carbon
SCTG	Standard Classification of Transported Goods
SOGR	State of good repair
SO_x	Sulfur Dioxide
STAR	State Transportation Assistance Revolving (Fund)
SWOT	Strengths, weaknesses, opportunities, threats analysis
TEU	Twenty-Foot Equivalent Unit
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIGER	Transportation Investment Generating Economic Recovery
UA	Urbanized Area
UP	Union Pacific Railroad
U.S. DOT	U.S. Department of Transportation
USACE	U.S. Army Corps of Engineers
USFWS NWI	U.S. Fish & Wildlife Service National Wetlands Inventory

1.0 Introduction

The Jefferson City Area Chamber of Commerce, Callaway County, and Cole County funded this study to assess the feasibility of a multimodal port facility in central Missouri. The port would potentially have one or more barge terminals on the Missouri River to help spur economic development in central Missouri region. The purpose of the current study is to assess potential market demand for a river port in the region.

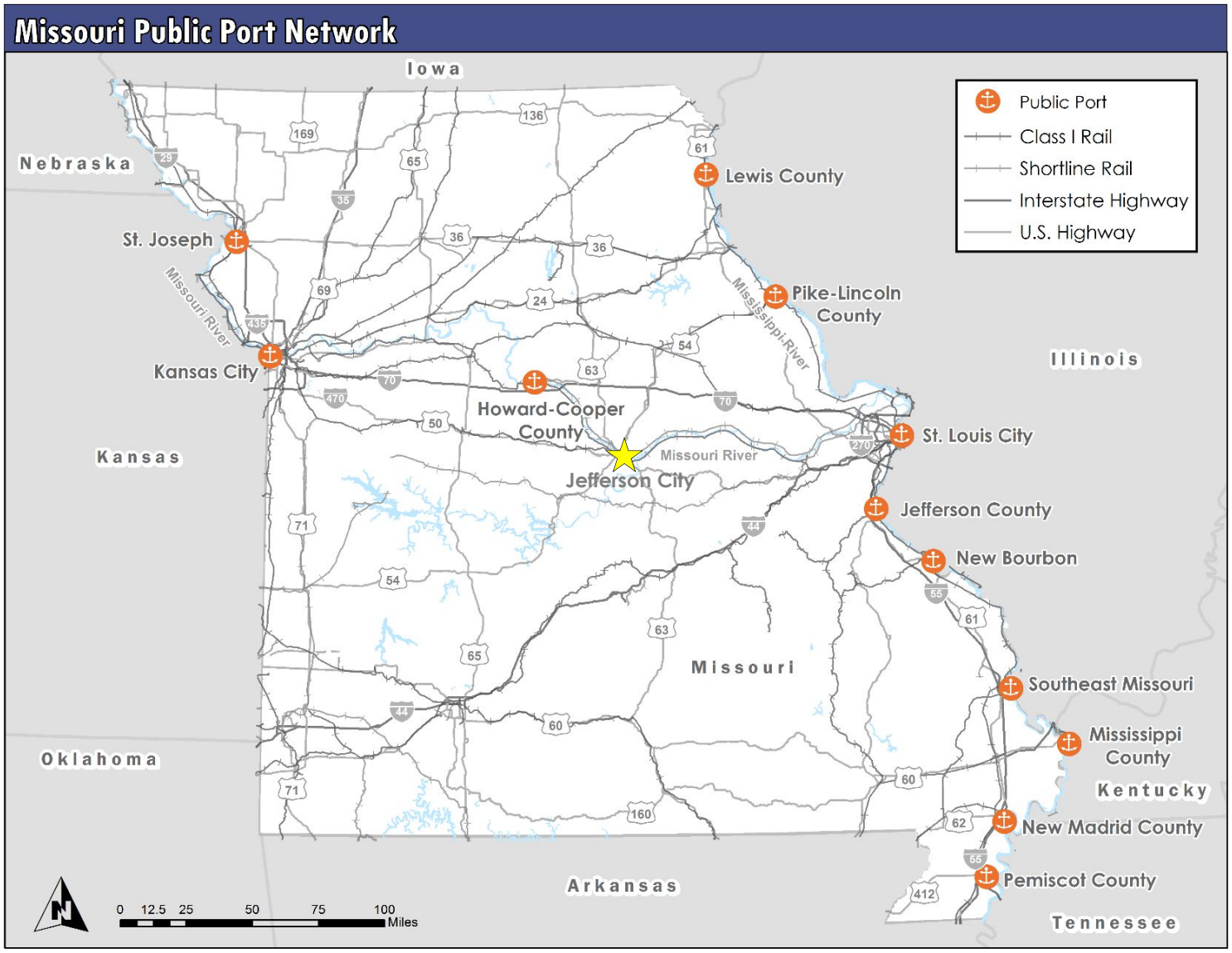
Marine transportation is critical to the health of Missouri's economy. As of 2013, Missouri's 1,030 inland waterway miles ranked 10th in the U.S. Barges traveling on the Mississippi River and Missouri River provide Missouri shippers with access to one of the most economical and environmentally-friendly transportation modes available. These waterways connect the state to the entire Mississippi River system and its tributaries, including the Ohio and Tennessee Rivers. They also provide connections to Gulf Coast ports such as New Orleans and Mobile, providing Missouri shippers with access to global markets. The flow of the Missouri River is managed by the U.S. Army Corps of Engineers (USACE) and controlled by dams upstream, with the nearest dam being located in Yankton, South Dakota. This river has an eight-month navigation season from April 1 to December 1 each year, though its season can be shortened by USACE due to unexpectedly low water levels. The Mississippi River flow is controlled by locks and dams north of St. Louis. The section of the river south of St. Louis is rarely closed by ice, allowing port facilities to operate year-round. There are currently 12 public ports in Missouri, as shown in Figure 1.1.

Nearly 4 million tons of freight was shipped through Missouri ports in 2016, an increase of 78 percent since 2011. The commodities flowing at Missouri ports in 2016 were valued at over $12 billion.[1] Missouri industries rely on the state's extensive port and waterway network to receive raw materials and to move goods to market. Missouri's crop production, mining, nonmetallic mineral product manufacturing, and transportation equipment manufacturing industries are notably dependent on waterborne transportation in order to bring goods to market. In addition, chemical manufacturing and primary metal manufacturing are notably dependent on waterborne transportation in order to receive goods for processing.

Missouri ports give the state's businesses a logistical advantage over other states without port access. Transporting freight by water is often the lowest cost method of transportation, which provides businesses an advantage in negotiating freight rates between rail, truck, and barge modes. Public investment in Missouri's port assets leads to private investments, which in turn creates economic opportunities in the short- and long-term.

[1] MoDOT Economic Impact Study for Public Ports (2017)

Figure 1.1 Missouri Public Port Network

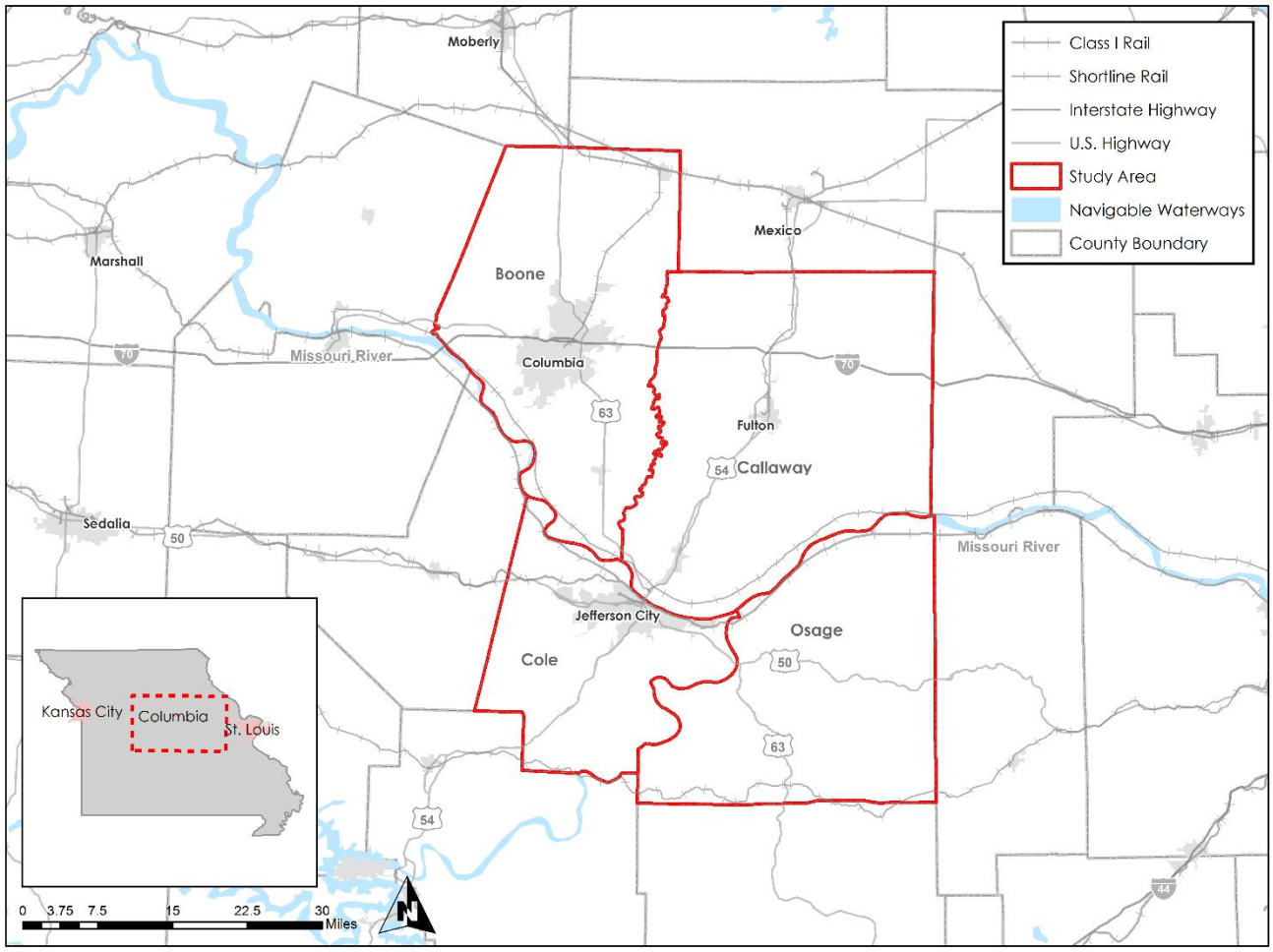


Source: MoDOT Economic Impact Study for Public Ports (2017); modified by Cambridge Systematics.

1.1 Study Overview and Objectives

The purpose of this study is to assess the market feasibility of logistics-based development opportunities, develop a conceptual site plan, conduct a benefit-cost analysis of the potential multimodal port site, and quantify the economic and fiscal impacts arising from the identified development opportunity. The study recommendations will also address community impacts and mitigation strategies, as well as realistic funding options for developing the port site. The study area for the potential multimodal port site includes Boone, Callaway, Cole, and Osage counties, as shown in Figure 1.2.

Figure 1.2 Study Area for Multimodal Port Facility



Data Source: U.S. DOT Bureau of Transportation Statistics.

The study team used a combination of interviews, research, analysis of commodity flow data, and economic modeling to accomplish these goals. The feasibility assessment was documented using the following steps:

- **Step 1 – Literature Review and Data Collection**: The study team reviewed previous studies including the Missouri State Freight Plan, Missouri DOT Economic Impact Study for Public Ports, Missouri River Freight Development Brochures, and Missouri River Freight Corridor Assessment and Development Plan. Local news sources and other online materials were used to inventory local development projects and transportation plans, as well as identify peer river ports and logistics facilities.

- **Step 2 – Stakeholder Interviews**: The study team conducted phone interviews with select shippers and motor carriers in the Jefferson City region to obtain qualitative and quantitative data about the markets that are being assessed from the study region. The final list of interviewees included potential port users in the following industries:
  - Industrial and commercial feathers;
  - Turf and sod;
  - Grain and soy production and processing;
  - Steel fabrication;
  - Pet food production; and
  - Production of cement and other construction materials.
- **Step 3 – Estimation of Market Potential**: The study team used a diversion model to estimate potential volumes for a new port and intermodal facility based on existing freight flows.
- **Step 4 – Identify Preferred Development Opportunity**: Based on the findings and lessons learned in previous steps, the study team identified the functional elements, characteristics, location, capacity, and extent of the intermodal facility needed in central Missouri. This step will help guide the development of specific development recommendations and identify potential impediments, challenges, and issues to be addressed. The study team also developed a conceptual site plan to identify major landside development components, including roadways, rail corridors, work areas, material handling corridors, and storage areas.
- **Step 5 – Benefit-Cost Analysis and Economic Impact Analysis**: This step monetizes the preferred development opportunity by quantifying the cost factors, benefit factors, and economic impacts. Cost factors include facility capital costs, maintenance costs, and operating costs. Benefit factors include operating benefits such as capacity, productivity, tax revenue, and wider economic development, safety, and environmental quality. Economic impacts will be expressed in terms of regional output, employment, and revenue creation and income.

The results of the study provide insight to the Jefferson City Area Chamber of Commerce, Callaway County, and Cole County to communicate the preferred development opportunity to the stakeholders, elected officials, local planners, and the general public.

1.2 Data Sources

Data sources used as part of this study include the following:

- **Freight Analysis Framework version 4 (FAF4) Database**. The Freight Analysis Framework (FAF), produced through a partnership between Bureau of Transportation Statistics (BTS) and Federal Highway Administration (FHWA), integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. 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 and value by regions (multi-county or state FAF zones) of origin and destination, a 2-digit Standard Classification of Transported Goods (SCTG) commodity type, and mode. Data are available for the base year of 2012, the recent years of 2013 – 2015, and forecasts from 2020 through 2045 in five-year intervals. FAF4 data was disaggregated to obtain truck, water, and rail flows at the county level for the State of Missouri.

- **U.S. Census Bureau Annual Estimates of the Resident Population** that includes current as well as historical estimates of residential population at the county, state, and national level.

- **U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages data** was used as a source of employment in key industries by county. The industry categories were assigned to one of two sectors: the goods-dependent sector and the services sector. In this way those industries that make the most use of freight transportation are analyzed separately.

- **Business establishment data**, which is collected and maintained by the Jefferson City Area Chamber of Commerce.

- **IMPLAN**, which is an economic input-output model for transportation planners that quantifies direct, indirect, and induced economic impacts. The direct economic impacts are estimated outside the economic model and translated into the necessary model inputs for IMPLAN. The indirect (resulting changes in industry-to-industry spending) and induced (resulting changes in household spending) benefits arising from the direct benefits are modeled using the regional IMPLAN model. IMPLAN generates estimates of the total economic benefits in terms of jobs, personal income, value added (gross regional product or GRP) and tax revenue. The IMPLAN online model acquired for this analysis covers the four-county study area comprised of Boone, Callaway, Cole, and Osage Counties in central Missouri.

1.3 Organization of the Report

The remainder of this report is organized as follows:

- **Section 2** evaluates critical freight transportation infrastructure in central Missouri, including highways, rail, waterways, pipelines, oil/gas, broadband, airports, and intermodal facilities;

- **Section 3** depicts the economic profile of the study area, including population demographics, employment, and an analysis of the region's freight-dependent industries;

- **Section 4** describes four logistics development case studies that are similar to the potential port facility in central Missouri, including the Port of Itawamba (Mississippi), Owensboro Riverport (Kentucky), the Port of Indiana – Mount Vernon (Indiana), and Hickman-Fulton County Riverport (Kentucky);

- **Section 5** profiles recent and planned transportation infrastructure projects in the central Missouri region;

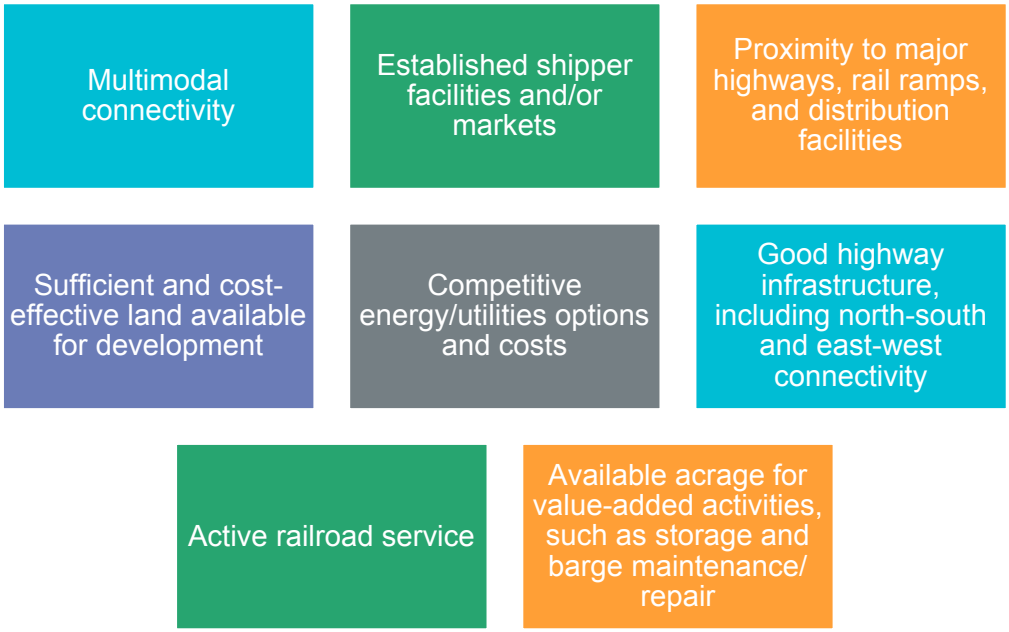
- **Section 6** provides an assessment of the region's overall strengths, weaknesses, opportunities and threats for attracting and retaining businesses and users of freight assets;

- **Section 7** provides the methodology, data and findings for the port market study. This includes examining existing freight flows and volumes as well as estimating the future potential demand for a port facility;

- **Section 8** presents the site plans for the potential port development site, provides a benefit-cost analysis for the preferred development opportunity, and discusses the economic and fiscal impacts of this opportunity; and
- **Section 9** discusses the conclusions of this study and recommendations for next steps.

2.0 Central Missouri Infrastructure Assets

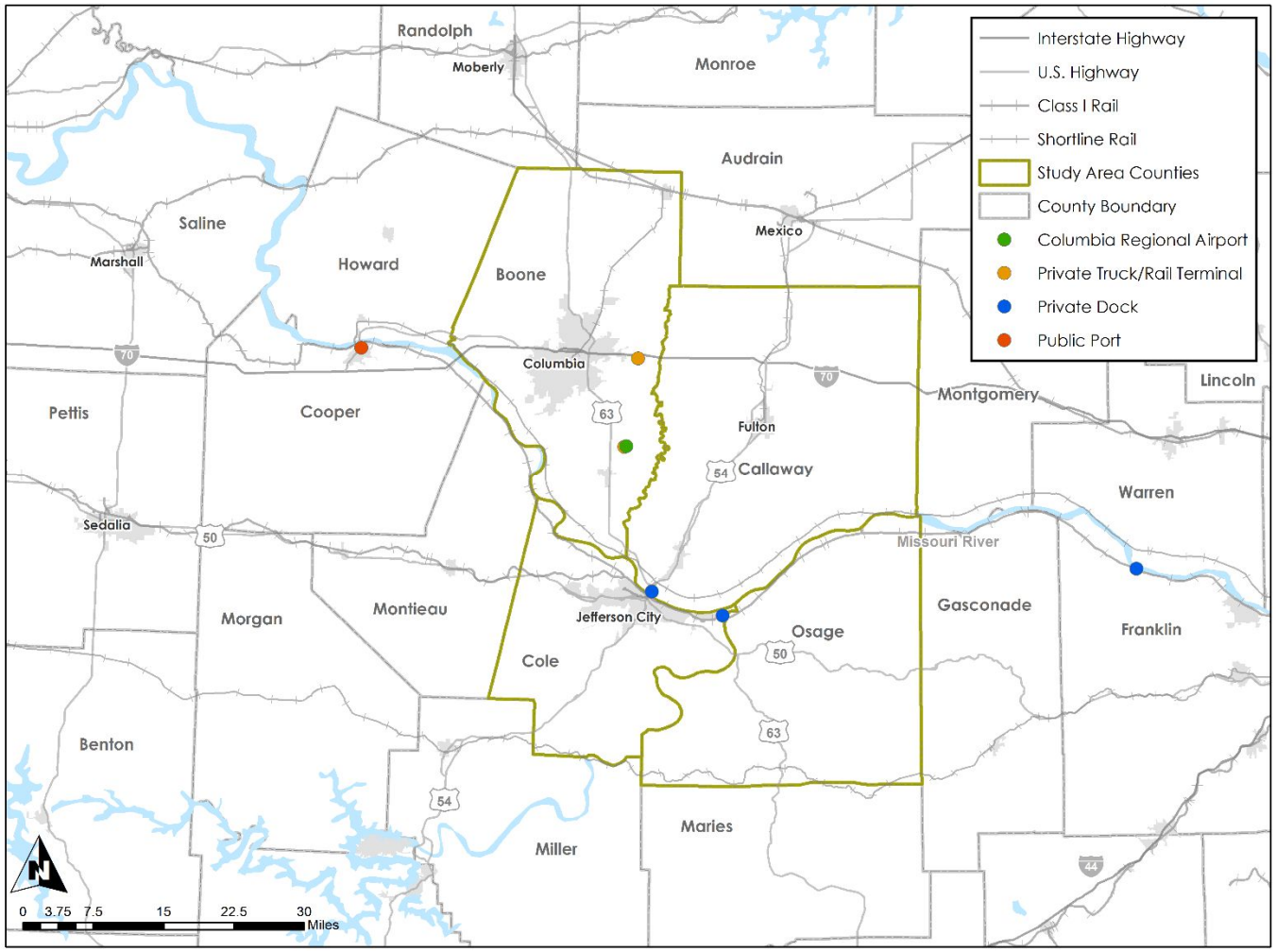
The ultimate success of a port facility in central Missouri in attracting users depends on its ability to add value in the supply chain. The following section inventories the physical infrastructure assets vital to economic development. There are many infrastructure factors that influence the final location decision of a port site, including:



Ports can provide the means to optimize transportation-related costs associated with supply chains. A strong transportation network – including access to the interstate highway system, rail facilities, and port operations – is critical for businesses seeking competitive advantages. It allows businesses to choose the appropriate modal alternatives for their logistics needs to be more competitive through a strong transportation network with multimodal capabilities and value-added services.

Central Missouri's infrastructure assets include highways, railroads, waterways, pipelines, oil and gas fields, broadband infrastructure, airports, and intermodal facilities. Figure 2.1 shows the transportation infrastructure in and around the four-county study area, which includes Boone, Callaway, Cole, and Osage Counties. The following sections detail each aspect of central Missouri's infrastructure, and discuss whether the assets are advantageous for a potential port facility in the region.

Figure 2.1 Central Missouri Transportation Infrastructure

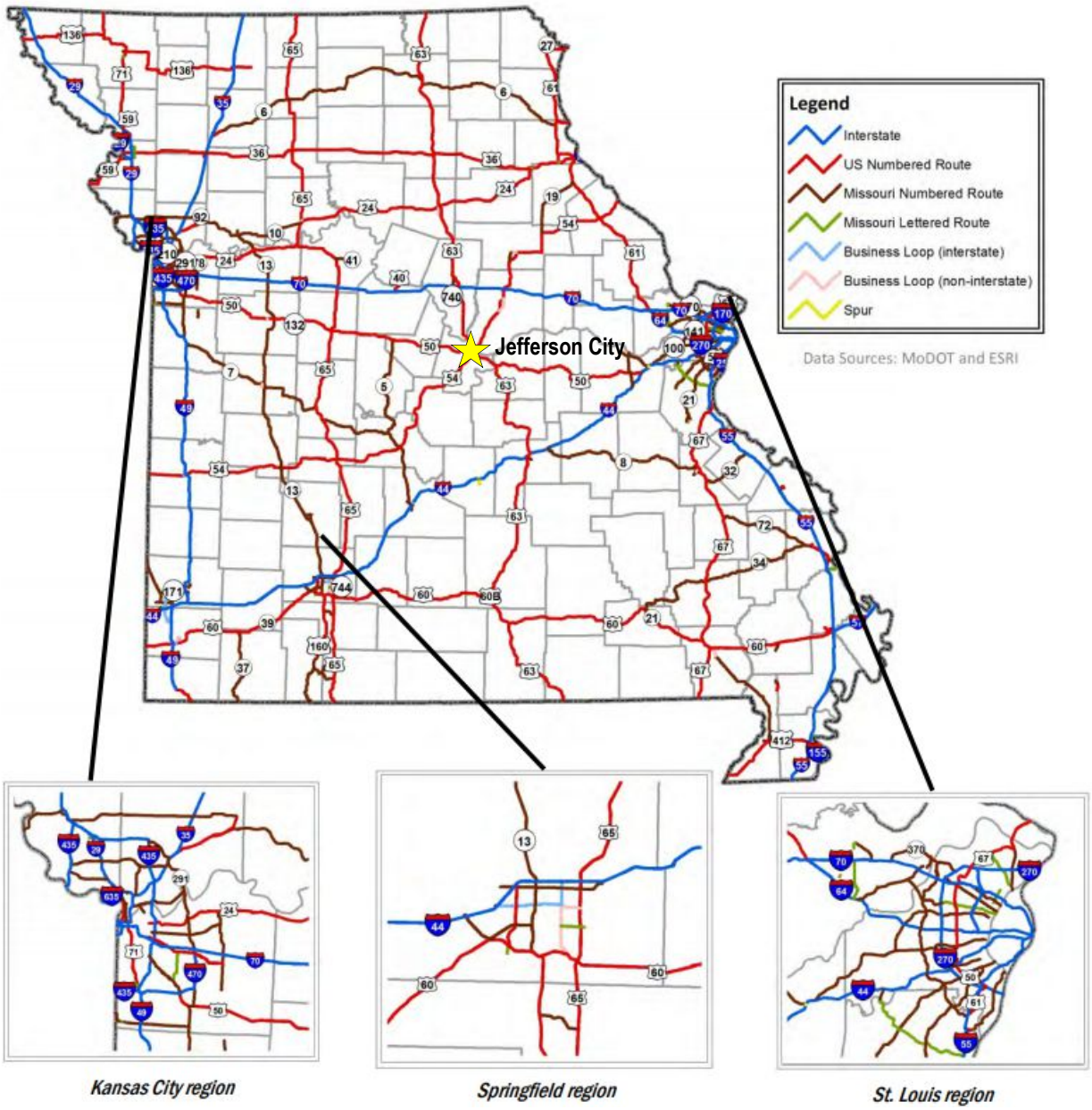


Data Source(s): U.S. Census, U.S. DOT Bureau of Transportation Statistics.

2.1 Highway Assets

Highways often provide the greatest flexibility and accessibility and are used for long-haul shipping as well as first- and last-mile trips. Missouri has the seventh largest state-owned highway system in the U.S. with 33,700 centerline miles of roadway. Missouri's major highways comprise just 20 percent of the State highway miles, but carry 80 percent of the system's traffic and the majority of the highway freight traffic. There are 18 Interstate Highways in Missouri, including nine main routes (such as I-70) and nine loop or spur routes (such as I-270). The more than 10,000 bridges that cross rivers, other highways, and valleys are also important elements of the highway system. Figure 2.2 shows the highway system throughout Missouri. I-70 is the only east-west interstate in the study area, and the nearest north-south interstates are located in St. Louis and Kansas City. This could be seen as a disadvantage for intermodal port operations. However, many U.S. highways connect central Missouri to the rest of the state and to neighboring states.

Figure 2.2 Missouri Highway System



Source(s): Missouri State Freight Plan; modified by Cambridge Systematics.

In the four-county study area, there are just over 1,230 miles of highways, as shown in Table 2.1 and Figure 2.1. The majority of roadways are classified as major collectors (69 percent). Only 50 miles, or four percent of total highways, are classified as Interstate Highways. This 50-mile segment of I-70 runs from St. Louis to Kansas City, crossing through northern Callaway County and mid-Boone County through Columbia, MO. Jefferson City is located just 30 miles south of I-70 via U.S. 54 and U.S. 63. Notably, U.S. 54 is a limited access 4-lane highway for most of that distance.

Table 2.1 Highways by Functional Class in Study Area

Roadway Type	Mileage	Percentage
Interstates	50.0	4%
Freeways/Expressways	53.4	4%
Other Principal Arterials	147.2	12%
Minor Arterials	130.0	11%
Major Collectors	850.9	69%
Total	**1,231.6**	**100%**

Source: NTAD, HPMS, 2016.

Table 2.2 presents the study area highways by ownership. Missouri Department of Transportation (MoDOT) controls 92 percent of the roadways, followed by city/municipal agencies (6 percent), and county agencies (one percent). Local governments also own roadways of functional class minor collector or lower, not listed in Table 2.1 and Table 2.2. For example, the City of Jefferson's Streets Division maintains and improves the more than 250 miles of roadway in the City. These additional local roads provide access to businesses and residences but are less efficient for moving goods over long distances.

Table 2.2 Highways by Ownership in Study Area

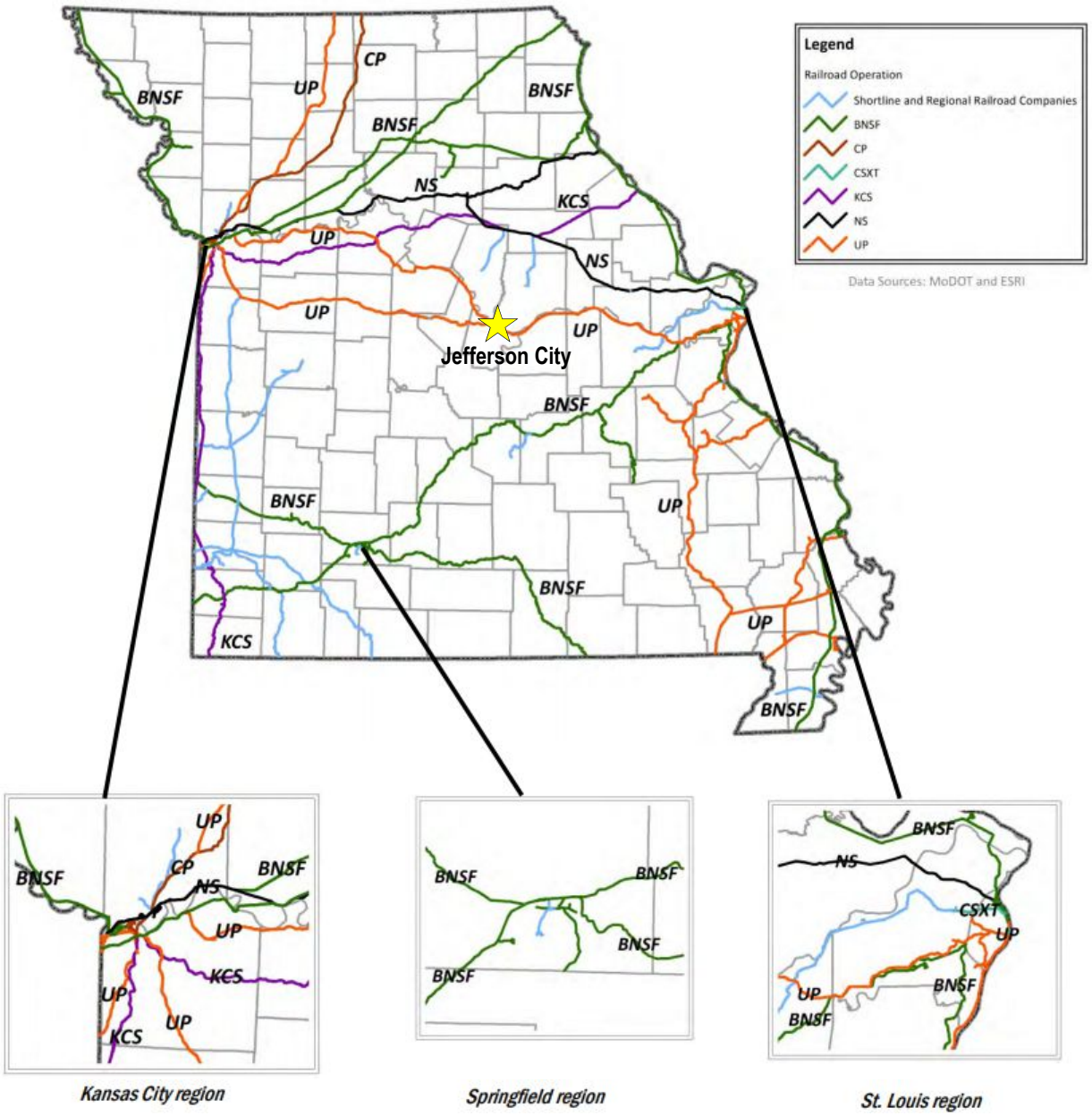
Roadway Type	Mileage	Percentage
State Highway Agency	1,137.8	92%
County	14.9	1%
City or Municipal	78.9	6%
Total	**1,231.6**	**100%**

Source: NTAD, HPMS, 2016.

2.2 Rail Assets

Rail has the benefit of being separated from highway congestion and operating on a fixed, dedicated guideway. Missouri has a significant freight rail infrastructure with six Class I freight railroads currently operating on 4,218 miles of main track rail lines, 2,500 miles of yard track, and approximately 5,697 public rail-highway crossings within the State. Railroads are categorized as Class I, II, or III depending on operating revenues. In 2012 dollars, a railroad with operating revenues greater than $433.21 million for at least three consecutive years is a Class I railroad. A railroad with revenues greater than $34.7 million but less than $433.22 million is a Class II railroad, commonly referred to as a "regional" railroad. A railroad not within the Class I or II categories is considered a Class III railroad, also known as a shortline. There are no Class II railroads operating in Missouri; however, five short line railroads serve Missouri. The short line railroads collectively own and operate 426 track miles, varying from the smallest with 33 track miles to the largest with 331 track miles. Figure 2.3 presents the rail transportation network and track ownership in Missouri.

Figure 2.3 Missouri Railroad Ownership



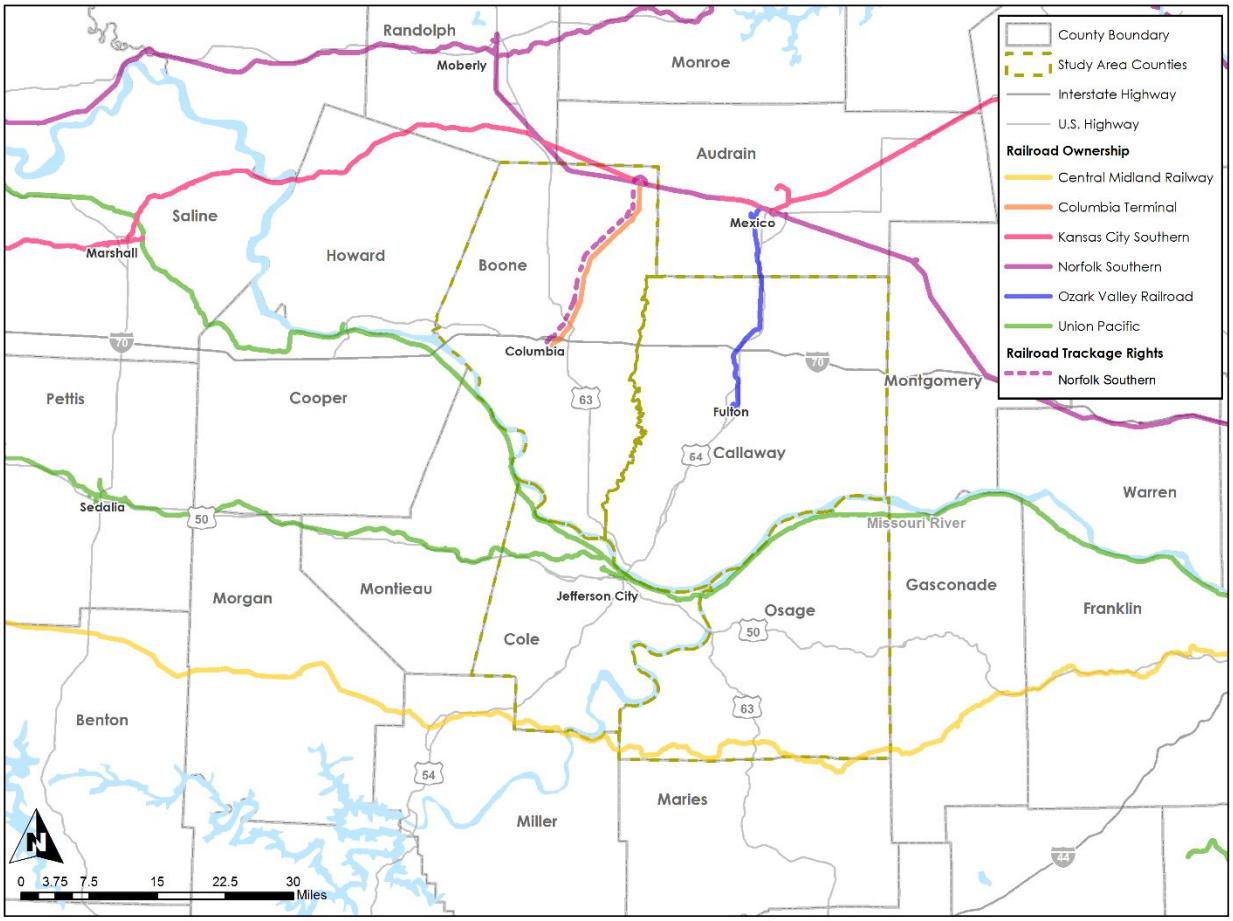
Source(s): Missouri State Freight Plan; modified by Cambridge Systematics.

There are six railroads located in central Missouri, as shown in Figure 2.4. The Union Pacific (UP) Railroad runs east-west along the Missouri River and bisects the study area. This Class I line provides the industrial park and other manufacturers in Jefferson City rail access to locations throughout the country for both raw materials and manufactured products. Two other Class I railroads, Kansas City Southern and Norfolk Southern, operate near the northern edge of Boone County and also run east-west in the region. Additionally, Norfolk Southern has trackage rights, or the ability to operate without ownership, on a north-south segment in Boone County which connects its rail line to Columbia.

Central Midland Railway is a shortline railroad that runs east-west near the southern boundaries of Cole and Osage Counties. Two shortlines provide north-south rail service in the region: the Columbia Terminal and

Ozark Valley Railroad. The Columbia Terminal shortline connects Columbia to two Class I railroads in Centralia, MO: Kansas City Southern and Norfolk Southern. Similarly, the Ozark Valley Railroad connects Fulton to Class I rail in Mexico, MO.

Figure 2.4 Study Area Railroad Network



Data Source(s): NTAD, North American Rail Lines, 2016.

Table 2.3 lists the mileage of each railroad in the study region. Class I railroads account for 57 percent of mileage, led by UP. Shortlines make up 43 percent of rail mileage in the four-county area with the Central Midland Railway making up nearly half shortline mileage.

Table 2.3 Railroad Mileage by Owner in Study Area

Roadway Type	Mileage	Percentage
Union Pacific (UP)	76.3	45%
Norfolk Southern (NS)	13.2	8%
Kansas City Southern Railway (KCS)	7.1	4%
Total Class I	*96.6*	*57%*
Central Midland Railway (CMR)	34.6	20%
Columbia Terminal Railroad (CT)	22.7	13%
Ozark Valley Railroad (OVRR)	16.6	10%
Total Shortline	*73.9*	*43%*
Total Railroad Mileage	**170.5**	**100%**

Source: NTAD, North American Rail Lines, 2016.

The rail assets in central Missouri provide the region an advantage in port location due to the opportunity for intermodal port-rail operations. The UP line along the Missouri River provides the only direct rail access, while other lines in the region could be accessed through the highway system. However, indirect rail access is more expensive than direct access due to the additional cost of hauling and transferring cargo. The study area is also within reasonable trucking distance of intermodal facilities in Kansas City, St. Louis, Omaha, and Memphis.

2.3 Waterway Infrastructure

Water modes are able to move large amounts goods in a cost-effective way. Missouri has two rivers supporting freight movement, containing a total of 1,050 miles of navigable rivers, as shown in Figure 1.1. The Missouri River forms the northwest border and bisects the state over the course of 550 miles. In addition, the Mississippi River marks the 500-mile eastern border between Missouri and Illinois, Kentucky, and Tennessee. The flow of the Missouri River is managed by the U.S. Army Corps of Engineers (USACE) and controlled by dams upstream, with the nearest dam being located in Yankton, South Dakota. This river has a navigation season up to eight months in length, from April 1 to December 1 each year. Approximately 53 miles of the Missouri River runs through the four-county study area. The Mississippi River flow is controlled by locks and dams north of St. Louis. The section of the river south of St. Louis is rarely closed by ice, allowing port facilities to operate year-round.

A total of 12 active public port authorities and more than 200 private river terminals can be found along Missouri's waterways. As shown in Figure 2.1, there are two private docks in the study area and a third private dock to the east of the study area. These docks are used to facilitate the transfer sand, gravel, and other aggregates from one mode to another. A public port to the west of the study area is on the Howard-Cooper County line near Boonville, MO (about 40 miles northwest of Jefferson City). The Howard-Cooper County Regional Port Authority is the only public facility between Kansas City and St. Louis and has facilities for storing grain, liquid chemicals, and additional dry storage facilities.

The presence of these facilities indicates regional activity in industries with demand for waterborne cargo movement. A Missouri River port in the study area would also be located where no locks obstruct the Missouri River between it and St. Louis or Kansas City, and only one lock on the Mississippi River between

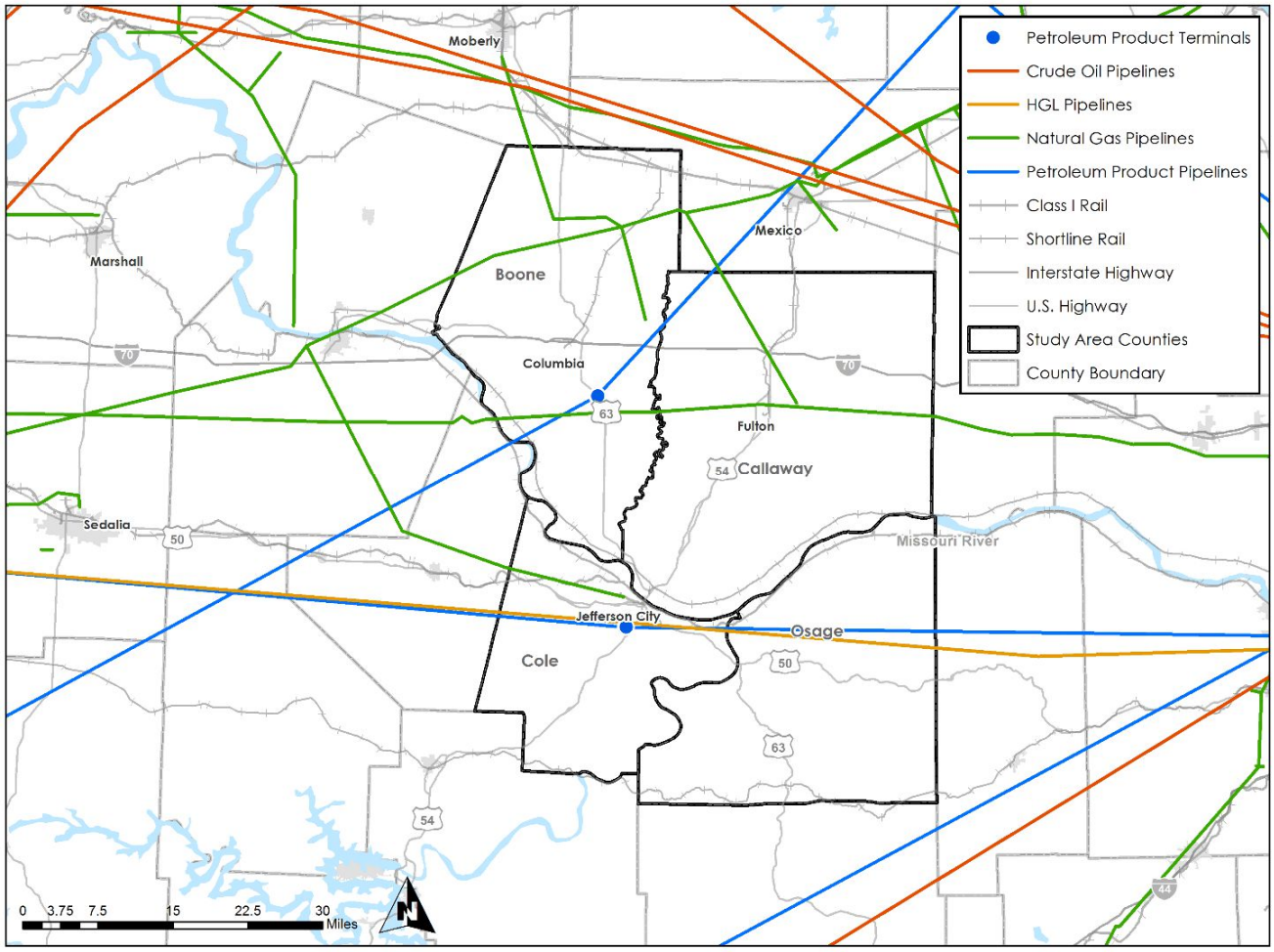
St. Louis and the Gulf of Mexico. This is advantageous in terms of providing reliable travel times and continuous movement of cargo. However, this is a potential disadvantage due to unregulated water flow during floods or droughts possibly interrupting shipping patterns. This disadvantage is mitigated by the U.S. Army Corps of Engineers for up to eight months each year, from the beginning of April to the end of November.[2]

2.4 Pipelines

Pipeline infrastructure is effective for moving fluid commodities (liquid or gas), enabling the continuous flow of fluids without congestion or bottlenecks on other modes. Pipelines in central Missouri primarily transport fluid commodities through the region and are shown in Figure 2.5. Crude oil pipelines through the region include a line from Wyoming to St. Louis and a segment of the Keystone Pipeline. A hydrocarbon gas liquid (HGL) pipeline is also located in the southern half of the study area and connects St. Louis to basins in the Texas Panhandle. Natural gas pipelines cross the region, running from Texas and Oklahoma to Michigan and from Wyoming to Ohio as well as serving customers in central Missouri. Finally, two petroleum product pipelines serve terminals south of Jefferson City and southeast of Columbia, MO. Natural gas and petroleum product pipelines have terminals near the Missouri River in Jefferson City, and could present an opportunity to transfer fluid commodities to waterborne modes.

[2] U.S. Army Corps of Engineers, Missouri River Navigation Season. http://www.nwd-mr.usace.army.mil/rcc/tenmost/tenmosth11.html

Figure 2.5 Study Area Pipeline and Terminal Infrastructure

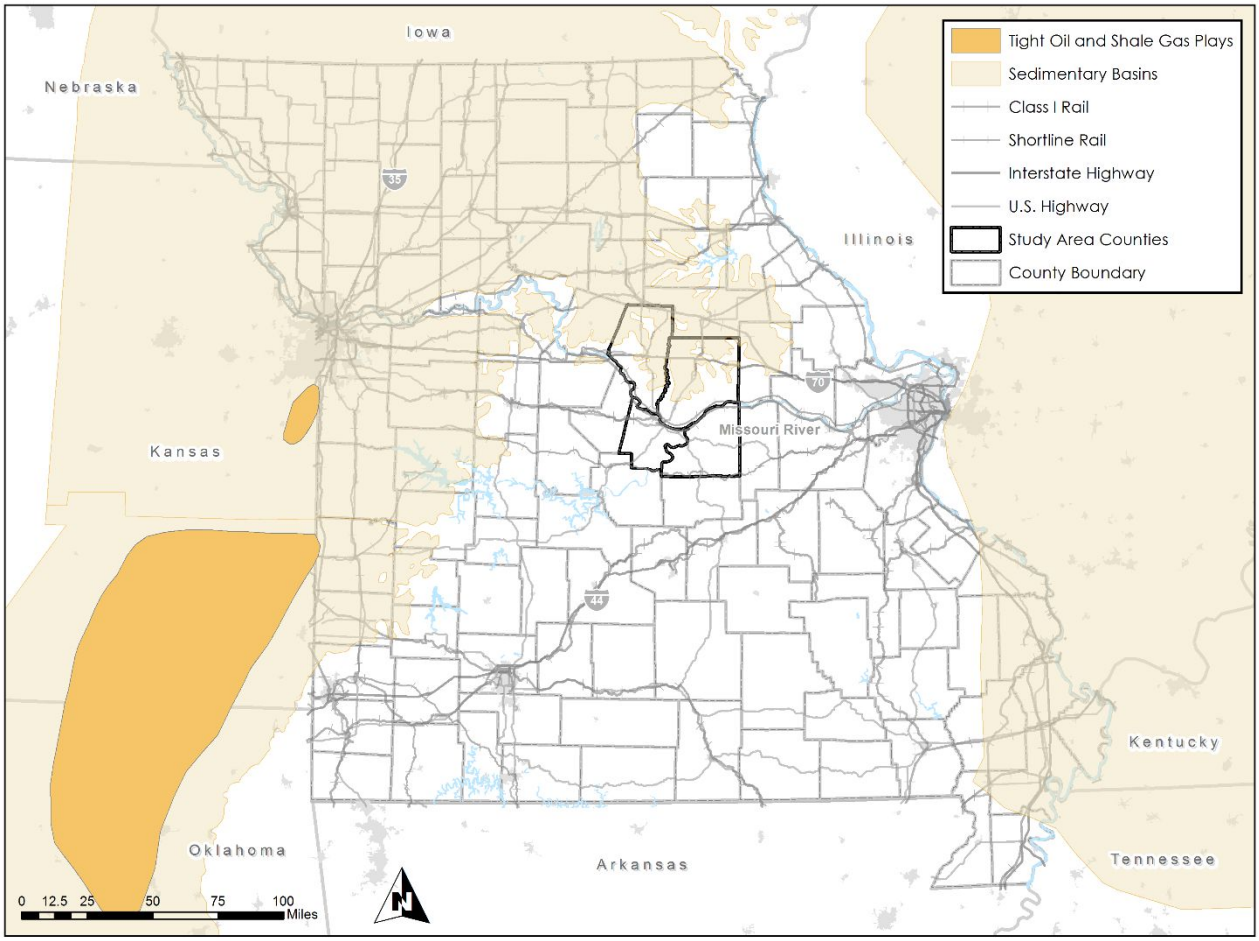


Source: U.S. Energy Information Administration, 2017

2.5 Oil & Gas Fields

Oil and gas fields can provide economic opportunity for a region, but they require significant transportation to and from the fields. In addition to moving oil and gas, heavy commodities such as water and sand are also needed for some extraction techniques including hydraulic fracturing. Missouri contains parts of the Cherokee Platform, Forest City, and Illinois sedimentary basins, and the Forest City basin extends into the northern half of the four-county study area. However, the plays in these basins are located almost entirely in neighboring states. As a result, oil and gas processing is not prevalent in central Missouri and the transportation network may not be impacted by extraction or refining activity. Figure 2.6 shows the locations of basins and plays in Missouri.

Figure 2.6 Oil and Gas Fields in Missouri



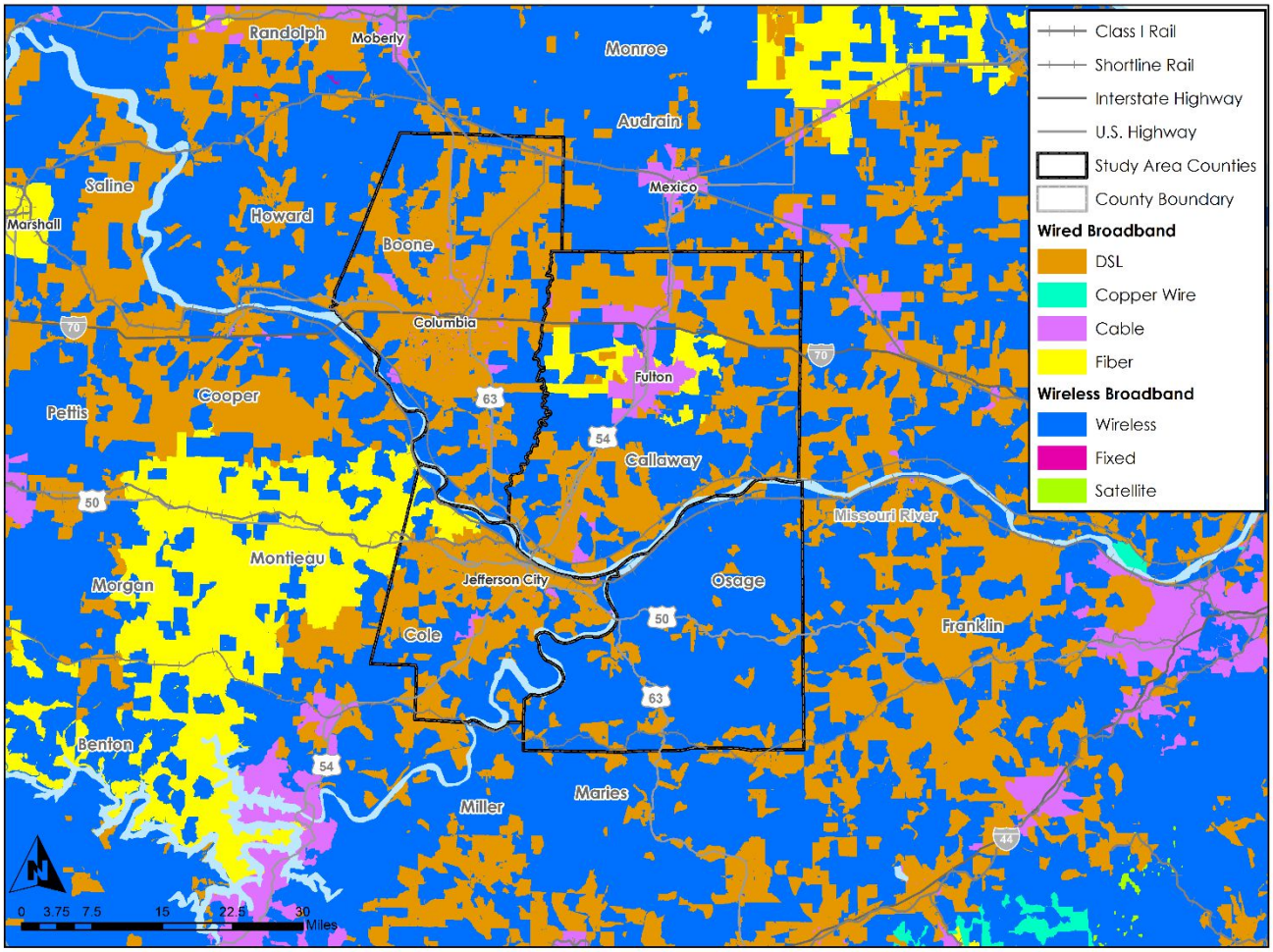
Source: U.S. Energy Information Administration, 2017

2.6 Broadband Infrastructure

Reliable broadband infrastructure is necessary to maintain communications, both internally and with customers, and to leverage many logistics technologies such as real-time goods tracking. The most common wired broadband service in central Missouri is through digital subscriber line (DSL). This service transmits digital signals over telephone lines. DSL broadband is available in most of Boone and Cole Counties and many parts of Callaway County. In Callaway County, the city of Fulton and its surrounding areas also have access to cable and fiber wired broadband. Osage County has limited wired connectivity. Where wired connectivity does not exist, wireless service can provide a connection. However, this type of broadband may be more expensive, have limitations on the amount of data that can be sent, have speed limitations, or provide lower reliability than wired alternatives.

As shown in Figure 2.7, much of the land fronting the Missouri River has access to DSL broadband, and some has access to fiber. This access is advantageous because development can occur more quickly and cheaply if infrastructure is already present. Osage County is the least suitable for development based on this factor.

Figure 2.7 Study Area Broadband Infrastructure



Source: BroadbandUSA, Cambridge Systematics

2.7 Airports

Air shipping is typically used for high-value or time-sensitive cargo. Three airports in Missouri are in the top 100 cargo airports nationwide, each within a three-hour drive of Jefferson City: Kansas City International, St. Louis Lambert International, and Springfield-Branson National. There is only one commercial service airport in central Missouri, Columbia Regional Airport, which has daily service to hubs in Chicago, Dallas-Fort Worth, and Denver. Additionally, Jefferson City Memorial Airport serves corporate and governmental flights, including military aircraft.

Proximity to a cargo airport could be advantageous if containerized consumer goods are transported by water to a distribution center for air transport. However, for many of the heavy or relatively low value commodities moved by barge or ship, air shipping is not economically feasible. Therefore, co-location of air and water cargo facilities may not provide an advantage or disadvantage.

2.8 Intermodal Facilities

Intermodal facilities are locations where goods are moved from one mode of transportation to another. There are 114 intermodal facilities in the state of Missouri, five of which are located in central Missouri. Table 2.4 lists the intermodal facilities located in the four-county study area. Three of these facilities are used to move goods between ports on the Missouri River and other modes. One intermodal facility in Columbia is a rail/truck intermodal facility, and another is a truck/truck transfer point for the United States Postal Service.

Table 2.4 Intermodal Facilities in Central Missouri

Type	Facilities
Port-Truck	• Jefferson City River Terminal Dock • Capital Sand Co. Jefferson City Lower Dock
Port-Truck-Rail	• MFA Agri-services Jefferson City
Truck-Rail	• YRC Freight Columbia, MO Terminal
Truck-Truck	• United States Postal Service, Columbia

Source: NTAD, Intermodal Facilities, 2017.

The truck-rail intermodal facility in Columbia is owned by YRC Freight, which specializes in the shipment of goods that do not fill an entire truck or container, known as less-than-truckload (LTL) shipping. The proximity of this intermodal shipping facility could be advantageous if potential port customers can leverage this type of service. The lack of public intermodal facilities is a disadvantage for port location, as facilities will need to be developed to increase customer choice in their supply chain optimization.

3.0 Economic and Industry Analysis

As population in a region grows and the economic nature of a region changes, the demands placed on the transportation infrastructure also change. This section discusses demographic and economic trends in the study area, along with employment and industry analysis across key industries. The data used in this analysis come from the following sources:

- U.S. Census Bureau Annual Estimates of the Resident Population that includes current as well as historical estimates of residential population at the county, state, and national level;
- U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages data was used as a source of employment in key industries by county; and
- Business establishment data from the Jefferson City Area Chamber of Commerce.

3.1 Study Area Economic Profile

The study area is composed of Boone, Callaway, Cole, and Osage Counties in central Missouri. This profile presents population and employment distribution and growth for the study area as well as its comparison with the state of Missouri.

3.1.1 Population Growth

Population growth is a key contributor to economic growth and transportation demand, as increases in population create demand for goods and services. In conjunction with the expanding demand for goods and services, population impacts the number of passenger and freight trips through the study area's transportation system.

Table 3.1 shows the population for each county in the study area as well as statewide from 2006 to 2016. Over this 10-year period, only Boone County experienced a higher growth rate (16 percent) compared to the state overall. Cole and Callaway Counties grew at the same rate as the state overall, while Osage County slightly decreased in population between 2006 and 2016. Population in the study area increased 10 percent over this period.

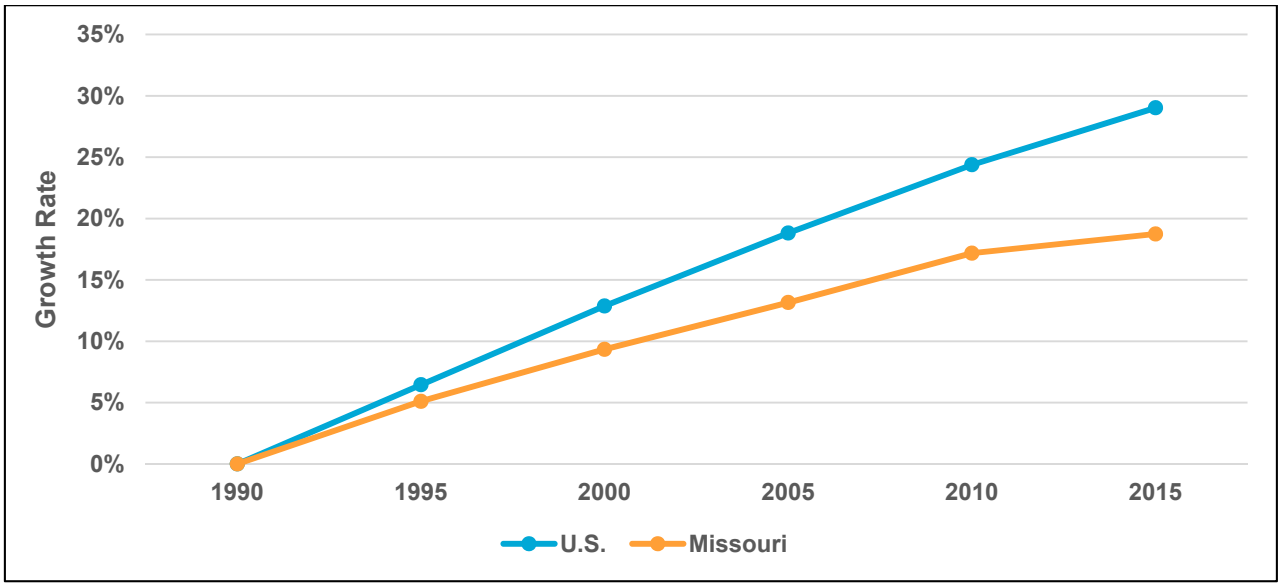
Table 3.1 Population in the Study Area and Missouri, 2006 to 2016

Geographic Region	2006 Population	2016 Population	Percent of Missouri 2016 Population	Total Growth Rate (2006-2016)
Boone County	152,784	176,594	3%	16%
Callaway County	43,118	45,078	1%	5%
Cole County	73,509	76,631	1%	4%
Osage County	13,687	13,664	< 1%	< 1%
Study area	**283,098**	**311,967**	**5%**	**10%**
Missouri	*5,842,704*	*6,093,000*	*100%*	*4%*

Source: U.S. Census Bureau

Between 1990 and 2015, Missouri's population growth rate has been consistently less than the national growth trend, as shown in Figure 3.1. By 2015, the difference between the U.S. and Missouri growth rates was 10 percent. However, Missouri's population increased 19 percent between 1990 and 2015, with the expectation that it will continue to increase in the following years.

Figure 3.1 Population Growth Rate in U.S. and Missouri since 1990 (1990-2015)



Source: U.S. Census Bureau

3.1.2 Employment Growth

One of the most tangible measures of a region's economic vitality is employment growth. Table 3.2 shows the employment and employment growth for the study area in 2006 and 2016 in comparison with Missouri. Similar to population growth, employment growth in the study area counties was relatively consistent with the national growth trends. Callaway, Cole, and Osage Counties grew modestly over the 10-year period, while Boone County employment grew 18 percent. Employment in the study area increased by 6 percent.

Table 3.2 Employment in the Study area and Missouri, 2006 to 2016

Geographic Region	2006 Employment	2016 Employment	Percent of Missouri 2016 Employment	Growth Rate 2006 to 2016
Boone County	81,771	92,461	3.4%	13%
Callaway County	14,345	14,323	0.5%	0%
Cole County	53,446	52,844	1.9%	-1%
Osage County	3,447	3,568	0.1%	4%
Study area	**153,009**	**163,196**	**5.9%**	**7%**
Missouri	*2,699,860*	*2,755,477*	*100.0%*	*2%*
U.S.	*133,833,834*	*141,870,066*	-	*6%*

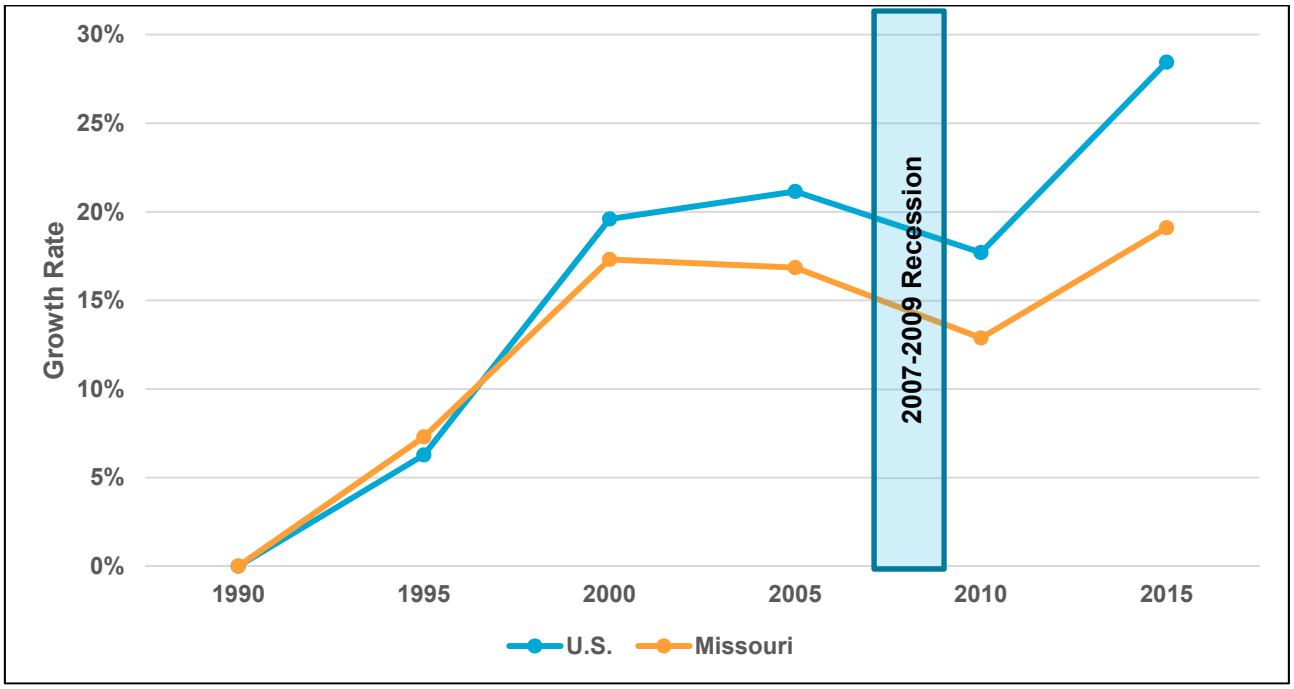
Source: U.S. Bureau of Labor Statistics.

Geographic Region	2006 Employment	2016 Employment	Percent of Missouri 2016 Employment	Growth Rate 2006 to 2016
Boone County	64,228	75,663	2.8%	18%
Callaway County	8,453	8,701	0.3%	3%
Cole County	47,755	50,075	1.8%	5%
Osage County	2,477	2,616	0.1%	6%
Study area	**122,913**	**137,055**	**5.0%**	12%
Missouri	*2,699,183*	*2,749,118*	*100.0%*	2%
U.S.	*133,833,834*	*141,870,066*	-	6%

Source: U.S. Bureau of Labor Statistics.

Since 1995, Missouri's employment growth rate has been consistently less than the national growth trend, as shown in Figure 3.2. Employment growth in both Missouri and the U.S. slowed from 2000 to 2010 due to the 2007-2009 recession. However, growth has spiked since 2010. Missouri's employment increased 19 percent between 1990 and 2015, with the expectation that it will continue to increase in the following years.

Figure 3.2 Employment Growth in U.S. and Missouri since 1990 (1990-2015)



Source: U.S. Bureau of Labor Statistics.

3.1.3 Top Employers

The study area is home to a variety of major employers in a number of different sectors. The State of Missouri is the top employer in the study area, located in state capital Jefferson City, MO, employing over 14,000 people. Boone County, which includes the city of Columbia, is home to several major institutions such as the University of Missouri, other major hospitals, and its large public school system, all of which are

significant employers in the region. Several major firms in the insurance sector, including Shelter Insurance and State Farm, are also located in Jefferson City and Columbia.

There are several notable employers in freight-dependent sectors in the study area. Scholastic, a multinational book publishing and distribution company, has a major manufacturing facility in Jefferson City that employs nearly 1,500 people. Other large-scale manufacturers include ABB, Inc. (semiconductor manufacturing), Unilever (personal care products manufacturing), DeLong's Inc. (steel fabricator), Diamond Pet Foods (pet food manufacturer), and Quaker Window Products (window and door manufacturer). Major retailers include Wal-Mart Supercenter, Hy-Vee Food Stores and Dollar General. In the utilities sector, the Ameren Missouri Callaway Nuclear Plant in Callaway County employs over 750 people. Table 3.3 presents the top employers in the study area by county.

Table 3.3 Top Employers in Study Area by County

Rank	Boone County	Callaway County	Cole County	Osage County
1	University of Missouri	Fulton State Hospital	State of Missouri	Quaker Windows & Doors
2	University Hospitals & Clinics	Ameren Missouri Callaway Nuclear Plant	Scholastic	State Technical College of Missouri
3	Columbia Public Schools	ABB Power T & D Company	Capital Region Medical Center	Diamond Pet Foods
4	Boone Hospital Center	Dollar General Distribution Center	Jefferson City Public Schools	Osage County Schools
5	City of Columbia	Callaway Community Hospital	St. Mary's Health Center	Elsevier Inc.
6	Shelter Insurance Companies	Callaway County	Central Bancompany	Play-Mor Trailers
7	U.S. Department of Veteran Affairs	City of Fulton	City of Jefferson	
8	MBS Textbook Exchange	Fulton Public School District	Walmart Supercenters	
9	Veterans United Home Loans	Fulton Reception & Diagnostic Center	Jefferson City Medical Group	
10	Columbia College	Golden Living - Pin Oaks	Lincoln University	

Source: Jefferson City Area Chamber of Commerce (2017)

3.2 Industry Analysis

This section analyzes the economic structure of a study area, in this case Missouri and its counties or subregions. Specifically, the analysis identifies those industries that are growing or in decline in terms of employment, with a special focus on those most affected by changes in freight efficiency.

In this study, industries are categorized as either a freight-dependent sector or a service sector. The freight-dependent sector is production-oriented while the service sector focuses on the provision of services. While freight is viewed as a factor of production in the goods sector, it is also viewed as a supply that facilitates business in the service sector. Although retail trade, wholesale trade, and transportation and warehousing are not production-oriented, these industries rely intensively on freight and are included as part of the freight-dependent sector. Table 3.4 presents the industries that are included in each sector.

Table 3.4 Freight-Dependent Industries and Service Industries

Goods (Freight) Dependent Sector Industries	Service Sector Industries
Agriculture, Forestry, Fishing and Hunting	Information
Mining, Quarrying, and Oil and Gas Extraction	Finance and Insurance
Utilities	Real Estate and Rental and Leasing
Construction	Professional and Technical Services
Manufacturing	Management of Companies and Enterprises
Wholesale Trade	Administrative and Waste Services
Retail Trade	Educational Services
Transportation and Warehousing	Health Care and Social Assistance
	Arts, Entertainment, and Recreation
	Accommodation and Food Services
	Other Services, Except Public Administration
	Public Administration

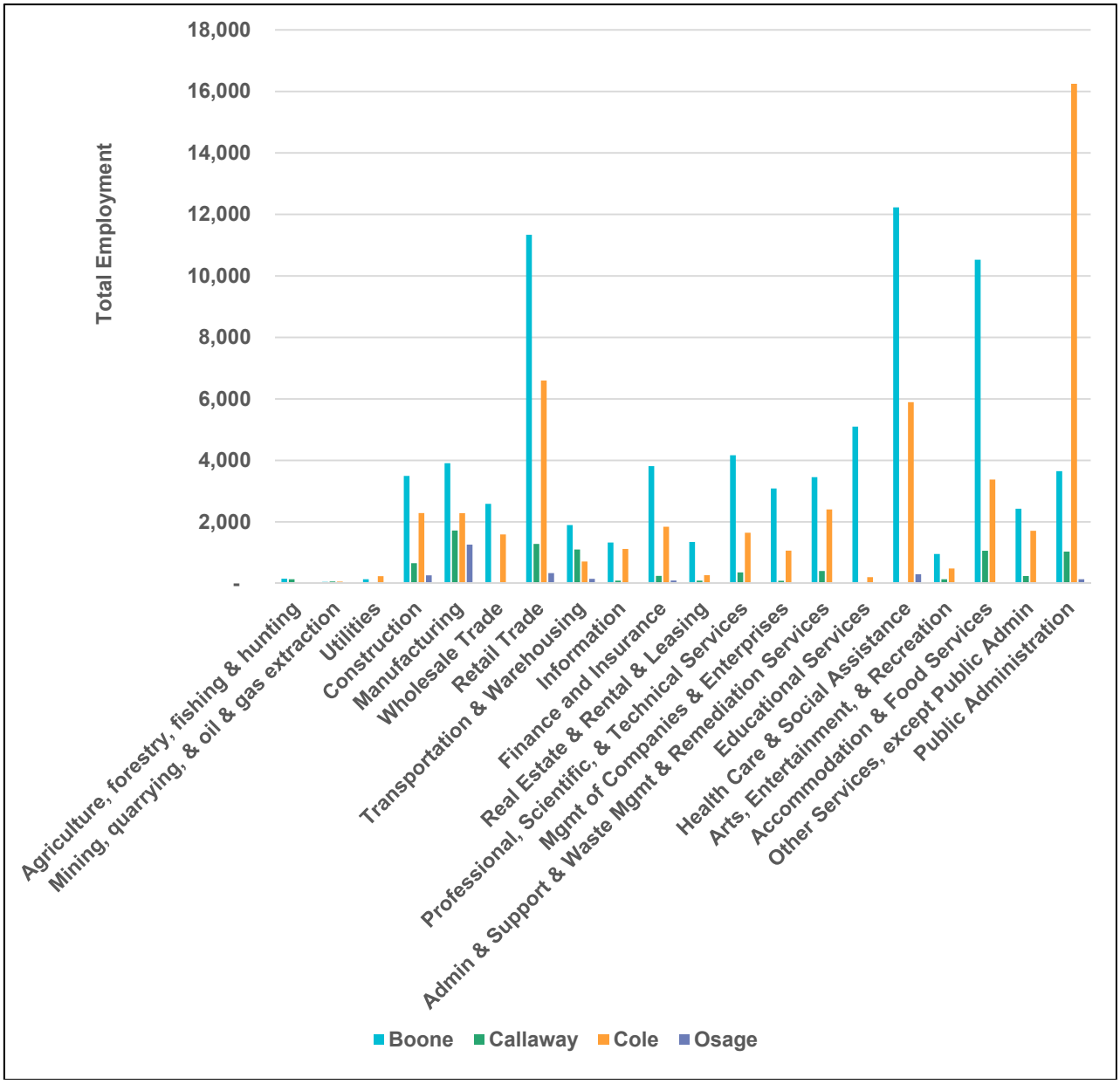
Source: Cambridge Systematics

3.2.1 Industry Mix

Employment in Missouri was approximately 2.7 million in 2016. Employment in the four-county study area was over 34,200. Boone County employed the most number of people (nearly 76,000), followed by Cole County (over 50,000), Callaway County (8,700), and Osage County (2,600). Figure 3.3 presents the industry mix for all four counties in 2016. Cole County, which includes state capital Jefferson City, has a high number of employees in public administration, in addition to retail trade and health care and social assistance. The top three highest employing sectors in Boone County include health care and social assistance, retail trade, and accommodation and food services.

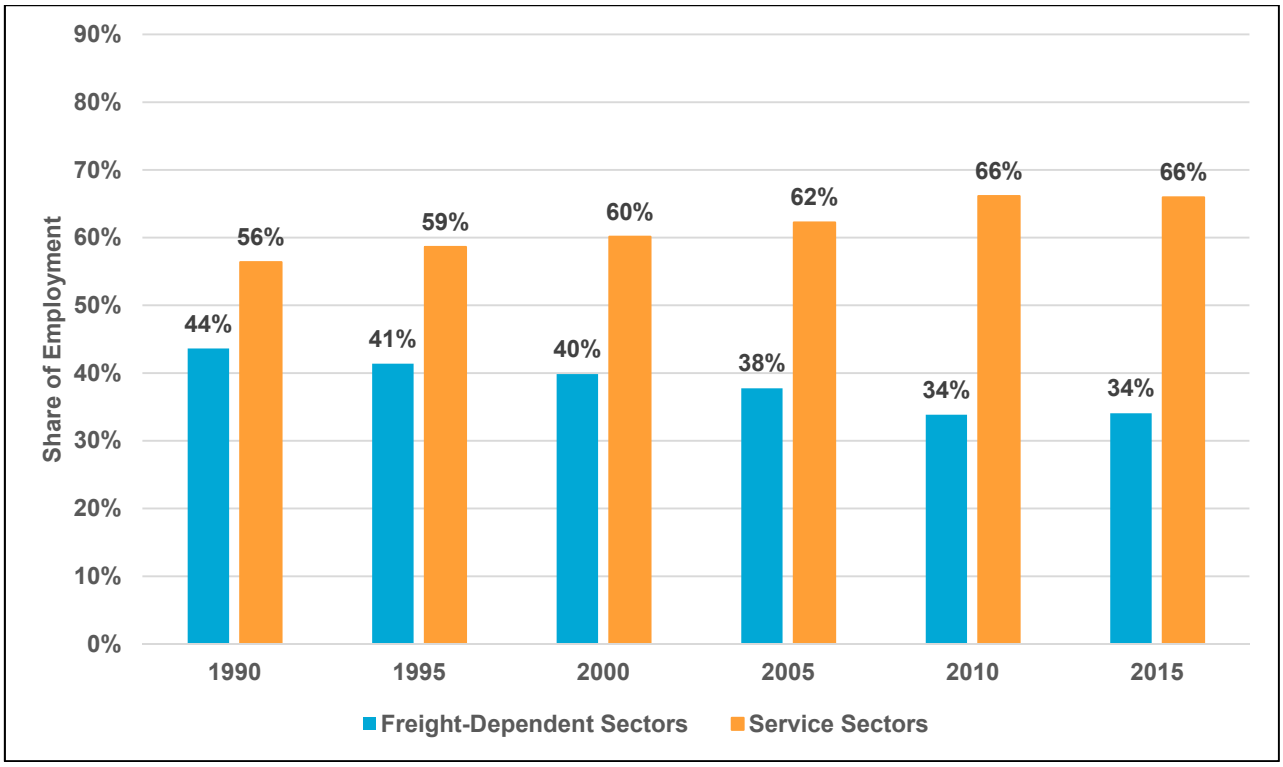
Statewide, the share of employment in the service sector has increased since 1990, as shown in Figure 3.4. Between 1990 and 2015, service sector employment has increased from 56 percent to 66 percent, while employment in freight-dependent sectors has decreased from 44 percent to 34 percent. Overall, Missouri has experienced a reduction of employment share in freight-dependent industries. The contraction of the freight-dependent sector in Missouri is in part due to national forces and in part due to a loss of regional competitiveness in some freight-dependent industries. However, Missouri had a slightly higher concentration of freight-dependent industries than the nation as a whole as recently as 2016 (35 percent compared to 34 percent).

Figure 3.3 Industry Mix of Employment in the Study Area, 2016



Source: U.S. Bureau of Labor Statistics, Quarterly Workforce Reports.

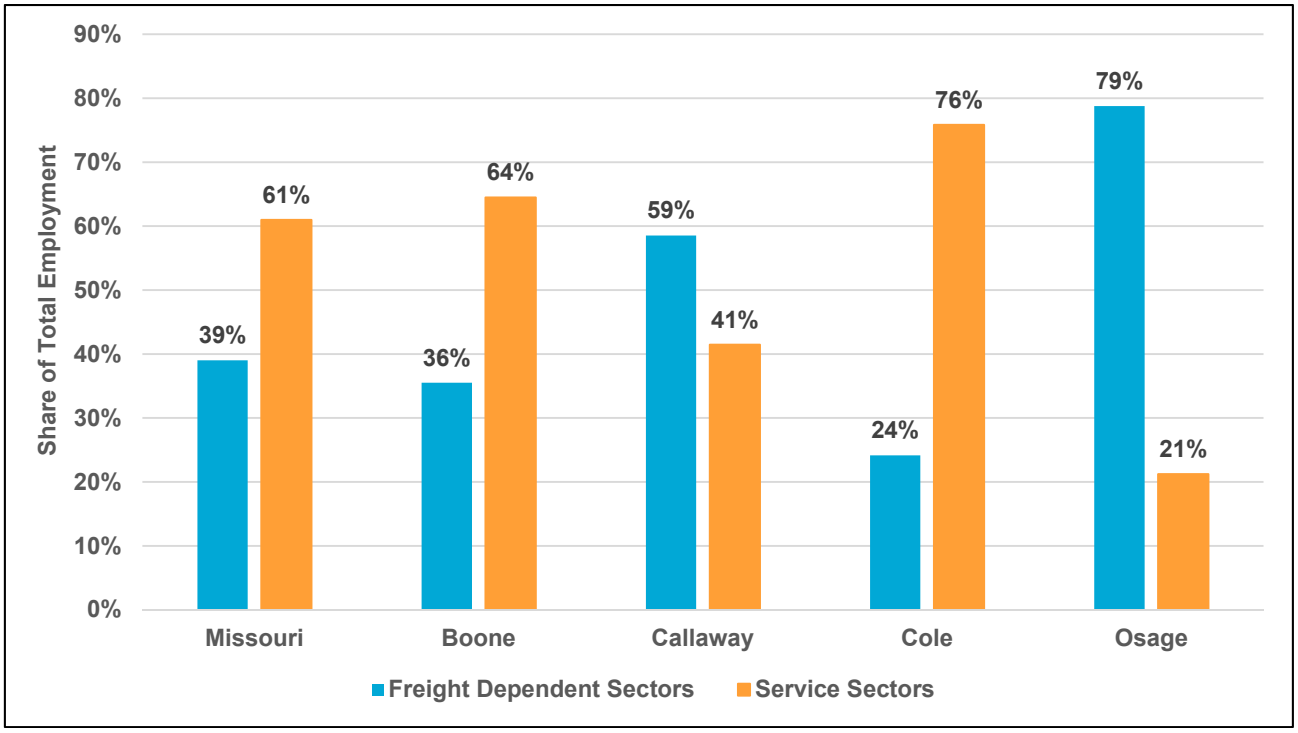
Figure 3.4 Freight-Dependent and Service Industries Employment in Missouri, 1990 to 2015



Source: U.S. Bureau of Labor Statistics, Quarterly Workforce Reports.

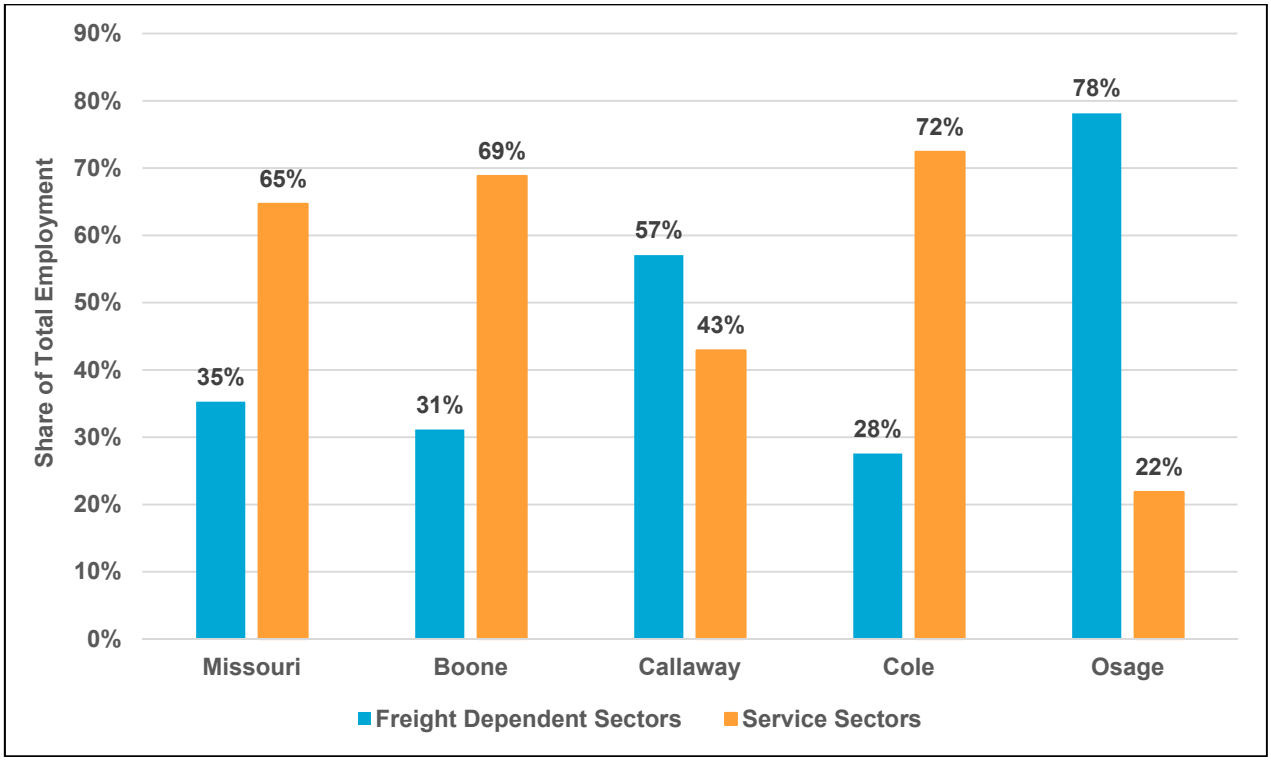
In the study area, the industry mix varies from county-to-county compared to the rest of Missouri. Figure 3.5 shows the share of employment in freight-dependent and service industries in 2006, while Figure 3.6 shows the share in 2016. Over this 10-year period, freight-dependent industry employment has decreased from 39 percent to 35 percent. Boone County also experienced a similar decrease over this period, from 36 percent to 31 percent. Callaway and Osage Counties have a significantly higher share of freight-dependent employment compared to service employment, with Osage County having the highest share of freight-dependent sector employment in the study area (78 percent in 2016). By contrast, Cole County has the lowest share of freight-dependent sector employment in the study area, though it has increased between 2006 and 2016 from 24 percent to 28 percent.

Figure 3.5 Freight-Dependent and Service Industries Employment, 2006



Source: U.S. Bureau of Labor Statistics, Quarterly Workforce Reports.

Figure 3.6 Freight-Dependent and Service Industries Employment, 2016



Source: U.S. Bureau of Labor Statistics, Quarterly Workforce Reports.

3.2.2 Freight-Dependent Industry Trends

In Missouri, 98 percent of employment in freight-dependent industries is made up of the five largest sectors. Figure 3.7 presents the top five freight-dependent industries by employment share in 2006, and Figure 3.8 shows the share in 2016. Retail trade is the largest industry within the freight-dependent sector, accounting for 11 percent of employment (down from 12 percent in 2006). Manufacturing is the second-largest industry, accounting for 10 percent of employment. The next three industries – construction, wholesale trade, and transportation and warehousing – comprise 39 percent of the state's freight-dependent industry employment.

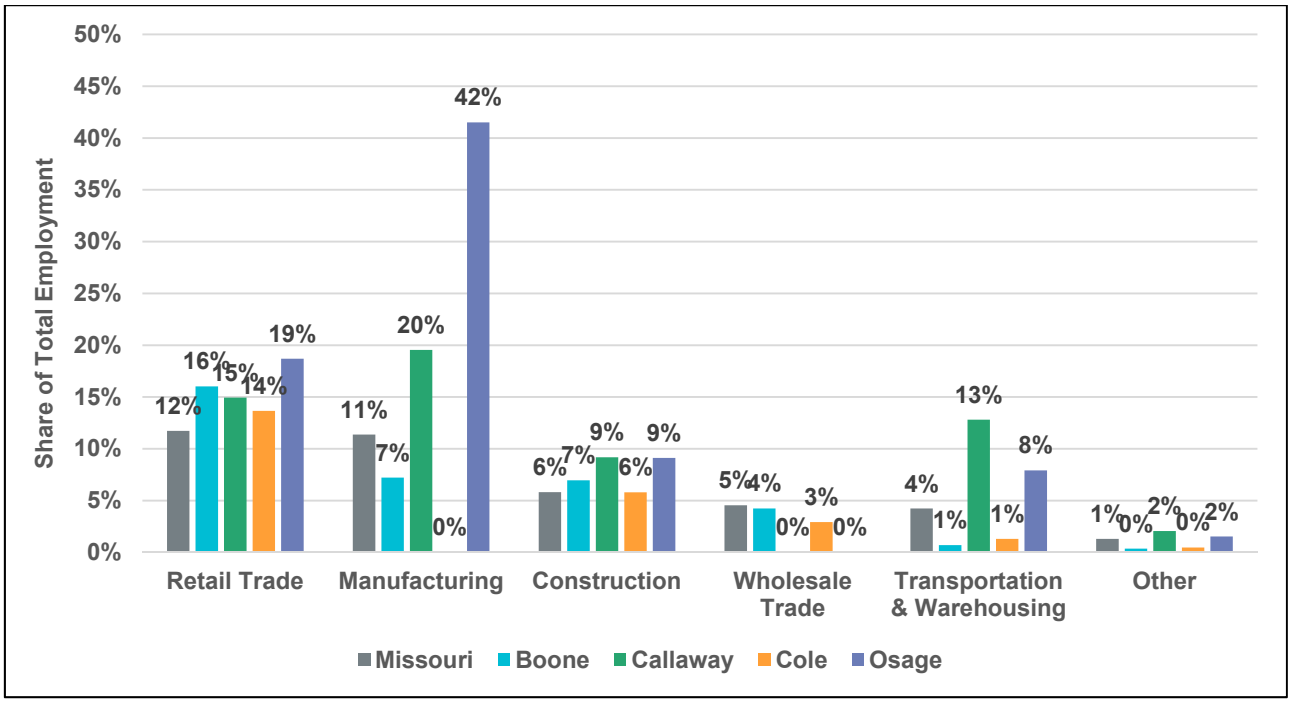
In Boone County, 99 percent of freight-dependent industry employment is made up of the five largest sectors. Retail trade is the largest industry within the freight-dependent sector, comprising 15 percent of employment. The second-largest industries, manufacturing and construction, each account for 5 percent of employment. The next two largest industries by employment (wholesale trade and transportation and warehousing) comprise 6 percent of employment within the freight dependent sector.

In Callaway County, 96 percent of freight-dependent industry employment is made up of the five largest sectors. Manufacturing is the largest industry within the freight-dependent sector, comprising 20 percent of employment. The second-largest industry, retail trade, accounts for 15 percent of employment. The remaining three largest industries by employment comprise 20 percent of employment within the freight dependent sector.

In Cole County, 98 percent of freight-dependent industry employment is made up of the five largest sectors. Retail trade is the largest industry within the freight-dependent sector, comprising 13 percent of employment. The second-largest industries, manufacturing and construction, each account for 5 percent of employment. The remaining two largest industries by employment comprise 5 percent of employment within the freight dependent sector.

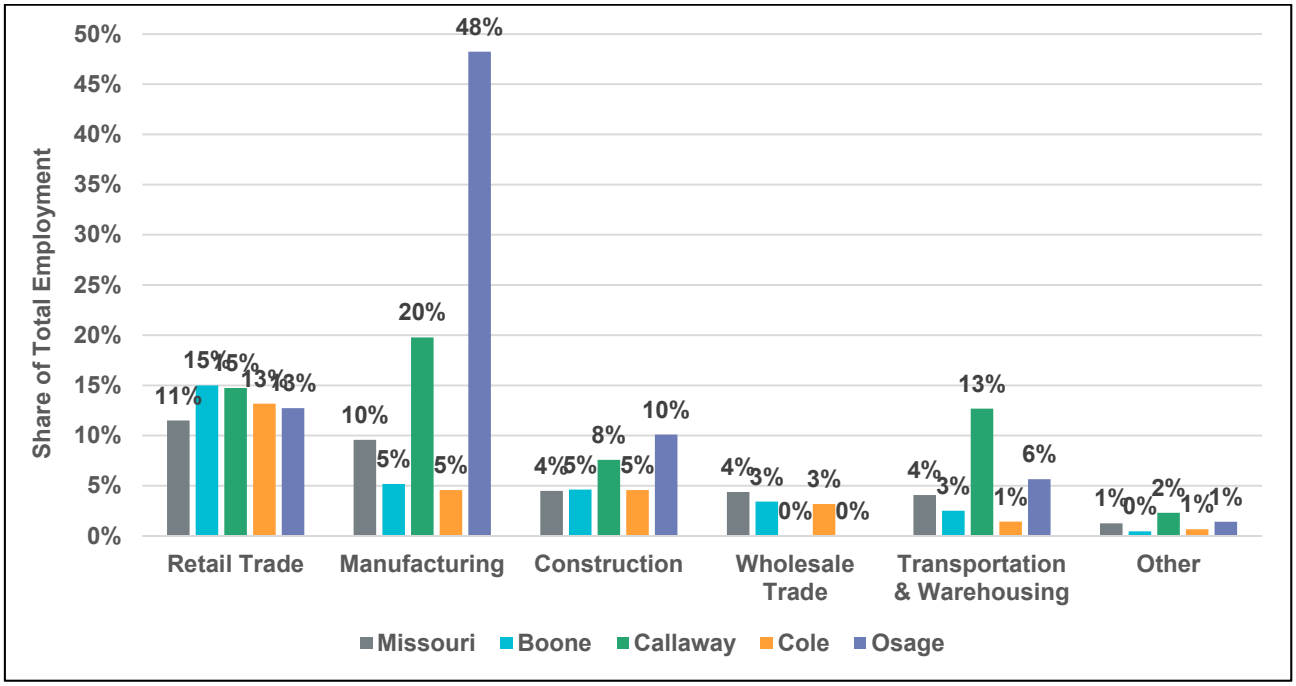
In Osage County, 98 percent of freight-dependent industry employment is made up of the five largest sectors. Manufacturing is by far the largest industry within the freight-dependent sector, comprising 48 percent of employment, which is up from 42 percent in 2006. The second-largest industry, retail trade, accounts for 13 percent of employment. The remaining three largest industries by employment comprise 16 percent of employment within the freight dependent sector.

Figure 3.7 Top 5 Freight-Dependent Industries by Share of Total Employment, 2006



Source: U.S. Bureau of Labor Statistics, Quarterly Workforce Reports.

Figure 3.8 Top 5 Freight-Dependent Industries by Share of Total Employment, 2016



Source: U.S. Bureau of Labor Statistics, Quarterly Workforce Reports.

3.2.3 Industry Employment Location Quotient

The location quotient (LQ) analysis describes the industry trends between 2006 and 2016. An LQ is used to quantify which industries in a region are concentrated when compared to the nation as a whole. The region's and nation's industries are compared by dividing the region's employment share within a particular industry by the nation's employment share in the same industry. If the LQ is greater than 1, the industry has a higher concentration in the region than the nation. Because of this, the region is able to export some of the industry's productivity after satisfying local demand. However, if the LQ is less than 1, the employment for that particular industry in the region is less than the average across the country. The industry cannot satisfy the demand within the region and must import the remaining goods and services. An LQ analysis has been conducted for the state of Missouri, as well as Boone, Callaway, Cole, and Osage Counties. The following sections discuss the LQ analysis results for freight-dependent industries. Based on the calculated LQ for each industry from 2006 to 2016, industries have been categorized as follows:

- **Specialized Industry**: an industry that is relatively prevalent in the region (LQ > 1) and has become more so over time (LQ is increasing);
- **Mature Industry**: an industry that is relatively prevalent (LQ > 1) but is becoming less so over time (LQ is decreasing);
- **Emerging Industry**: an industry that is relatively scarce in the region (LQ < 1) but has been growing more prevalent (LQ is increasing); and
- **Transforming Industry**: an industry that is relatively scarce (LQ < 1) and has become more so over time (LQ is decreasing).

Because the goods-dependent sector is particularly impacted by the freight system, the LQ analysis of the industries falling into this classification has particular importance in this report. Missouri has three specialized industries (i.e. increasing LQ greater than 1), which include manufacturing, retail trade, and wholesale trade. These industries have a higher share of employment compared to the national average and have grown over the ten-year period. Notably, employment in the agriculture, forestry, fishing and hunting sector is considered to be an emerging industry, as its LQ has increased by 4 percent during this period. Table 3.5 displays the LQ analysis results for freight dependent industries in Missouri at the state level, as well as for Boone, Callaway, Cole, and Osage Counties.

In Boone County, the top freight-dependent sectors are either specialized or mature with LQs above 1. Retail trade is considered to be a mature industry, with an LQ score (LQ = 1.1) that remained unchanged between 2006 and 2016. The rest of the County's industries have LQ scores less than 1, and are either classified as transforming or emerging. The transportation and warehousing and utilities sectors experienced a growth in LQ from 0 in 2006 to 0.49 and 0.38, respectively, and are classified as emerging. The remaining five industries are transforming, including agriculture, construction, manufacturing, mining, and wholesale trade.

In Callaway County, manufacturing is considered to be a specialized industry (LQ = 1.39), and experienced a 28 percent increase in employment share between 2006 and 2016. Agriculture is also a specialized industry, with an LQ of 1.07 after increasing by 95 percent since 2006. Two other emerging sectors have an LQ less than 1, but experienced growth during this same period. These sectors include construction and retail trade. Transportation and warehousing is a mature industry in Callaway County, but has the highest LQ of any freight-dependent sector (LQ = 2.16) in the County.

In Cole County, retail trade and utilities are specialized industries. The LQs for these industries have increased notably between 2006 and 2016, by 6 percent and 11 percent, respectively. The remaining freight-dependent industries all increased in employment share during this period, but are classified as emerging industries (i.e. LQ less than 1). These industries include agriculture, construction, manufacturing, mining, transportation and warehousing, and wholesale trade. Notably, agriculture, manufacturing, and mining sectors had an LQ of 0 in 2006, but increased in employment share by 2016.

Osage County has two specialized industries, construction and manufacturing. Its construction industry increased in employment share by 37 percent between 2006 and 2016, while its manufacturing industry increased by 44 percent to an LQ of 4.08, the highest share of employment in any industry in the four-county study area. Mining and transportation and warehousing are mature industries; while these industries have an LQ greater than 1, their share of employment has decreased by 35 percent and 30 percent, respectively. Although agriculture is an emerging industry, its employment share increased by 70 percent in the County to an LQ of 0.63.

Table 3.5 Location Quotient Analysis for Freight-Dependent Industries in Missouri, 2006-2016

Industry	Missouri			Boone			Callaway		
	2016 LQ	Change in LQ	LQ Category	2016 LQ	Change in LQ	LQ Category	2016 LQ	Change in LQ	LQ Category
Agriculture, forestry, fishing & hunting	0.51	4%	Emerging	0.19	-14%	Transforming	1.07	95%	Specialized
Construction	0.93	-3%	Transforming	0.77	-17%	Transforming	0.98	3%	Emerging
Manufacturing	1.1	2%	Specialized	0.49	-9%	Transforming	1.39	28%	Specialized
Mining, quarrying, and oil & gas extraction	0.33	-21%	Transforming	0.13	-35%	Transforming	1.03	-36%	Mature
Retail trade	1.03	1%	Specialized	1.1	0%	Mature	0.8	4%	Emerging
Transportation & warehousing	0.97	-8%	Transforming	0.49	N/A	Emerging	2.16	-1%	Mature
Utilities	1.09	0%	Mature	0.38	N/A	Emerging	0	N/A	N/A
Wholesale trade	1.06	3%	Specialized	0.68	-11%	Transforming	0	N/A	N/A

	Cole			Osage		
	2016 LQ	Change in LQ	LQ Category	2016 LQ	Change in LQ	2016 LQ
Agriculture, forestry, fishing & hunting	0.08	N/A	Emerging	0.63	70%	Emerging
Construction	0.92	1%	Emerging	1.57	37%	Specialized
Manufacturing	0.5	N/A	Emerging	4.08	44%	Specialized
Mining, quarrying, and oil & gas extraction	0.25	N/A	Emerging	1.1	-35%	Mature
Retail trade	1.12	6%	Specialized	0.84	-28%	Transforming
Transportation & warehousing	0.33	14%	Emerging	1.08	-30%	Mature
Utilities	1.14	11%	Specialized	0	N/A	N/A
Wholesale trade	0.73	24%	Emerging	0	N/A	N/A

Source: U.S. Bureau of Labor Statistics

3.2.4 Summary

The four-county study area – Boone, Callaway, Cole, and Osage Counties – has experienced a slight decline in freight-dependent sectors between 2006 and 2016 as a result of both national and regional trends. Retail trade and wholesale trade employment has decreased across the study area. However, certain freight-dependent sectors have maintained their employment share or grown in certain counties, including Callaway County's manufacturing, retail trade, and transportation and warehousing sectors, and Osage County's manufacturing and construction sectors.

4.0 Logistics Development Case Studies

Four case studies of logistics-based development on U.S. waterways were identified to highlight key features of successful river ports. Key commodities, surface transportation, transload and transfer equipment, storage facilities, and other port amenities are summarized for each of the following:

- Port of Itawamba, Mississippi
- Owensboro Riverport, Kentucky
- Port of Indiana-Mount Vernon
- Hickman-Fulton County Riverport, Kentucky

4.1 Port of Itawamba, Mississippi

Port Itawamba is located in Fulton, Mississippi, along the Tennessee-Tombigbee Waterway. Its key commodities are currently fabricated steel, bark and wood chips, and aggregates. The port is located within one mile of I-22 and MS 25, providing ready access to the highway network. The Mississippian Railway shortline connects the port to two Class I railroads as well. Intermodal transfer is enabled by an overhead bridge crane with a 60-ft. span and 60-ton lift capacity, an enclosed warehouse, a transload dock, and a roll-on/roll-off (Ro/Ro) ramp. Ro/Ro facilities are designed to accommodate wheeled cargo such as automobiles, trailers, or railcars by rolling them rather than lifting them onto or off of a vessel.

Port Itawamba has been serving customers for decades, but only recently has it begun container-on-barge (COB) service. The port, county, and local development corporation received a $1.7 million grant from the Federal Maritime Administration to implement marine highway service from Itawamba to Mobile, AL, in 2010.[3] Matching funds for the grant came from Itawamba County and the state of Mississippi. These funds were used to purchase container handling equipment and to make improvements at the port. In 2014, the Port Itawamba and a marine transportation company (SEACOR AMH) signed a three-year contract for the operation of the COB system as well as daily operations. It was later discovered that trailer chassis purchased with the grant funds did not meet the county's specifications and were more than twice the typical cost of this equipment.

Itawamba is targeting COB service as a central part of its growth plan, and furniture and backhauling are two COB opportunities for the port. The port estimates that COB from Mobile will be $150-$300 cheaper per container than intermodal rail from Los Angeles to Memphis with a dray move for the final leg. It also estimated that 125,000 forty foot-equivalent units (FEUs) within a 60 mile radius could be captured by COB. These estimates suggest that for some customers, shipping through the Gulf Coast could be more cost effective than the West Coast. Containers provide an opportunity to significantly diversify commodity types moved through a port as many types of goods can be containerized.

Key takeaways from Port Itawamba include:

[3] The Itawamba County Times, "Container-on-barge service begins at port," 2014. http://www.djournal.com/itawamba/news/itawamba-county/container-on-barge-service-begins-at-port/article_c8055743-953c-52f8-a5f4-06c53bf8652b.html

- Highway and rail access enable efficient transload and intermodal container operations;
- Container-on-barge service in interior locations can be cost-competitive with West Coast ports; and
- Equipment purchases should be made in consultation with the operator if possible to ensure quality and suitability of equipment for planned operations.

4.2 Owensboro Riverport, Kentucky

Owensboro Riverport is located in Owensboro, Kentucky, along the Ohio River. It began operations in 1976 and operated the same dock for nearly forty years. In 2013, the Port Authority Board authorized a $6.7 million contract for a new dock and $3 million for a new crane.[4] The new dock is located to better handle high water periods, and it is closer to storage facilities. Privatization of the port has been considered twice in recent years. The City Commission of Owensboro voted to study the possible sale and privatization of the Riverport in 2009. The study concluded that the port should remain publically owned. In 2014, a local private company made an offer to purchase the port, but the offer was rejected.

The Riverport specializes in metals, agribusiness, bulk transports, cargo, and warehousing. U.S. and state highways radiate from Owensboro, and the port is a 25-mile drive from I-69. The Owensboro Riverport is bisected by CSX Transportation, a Class I railroad, and also has a rail loop to accommodate rail staging and mobility. The port offers intermodal barge and transloading service with a range of equipment to support it, including cranes, various vehicles, truck lifts, and truck weighing. Its liquid tank farm has three tanks with 6 million gallons of capacity, and the site has capacity to house additional tanks. Bulk storage is also available at the Riverport for grain and other commodities.

Of the three warehouses at Owensboro Riverport, two have active Foreign Trade Zone (FTZ) space which are used for the London Metal Exchange's North America Special Aluminum Alloy Contract (NASAAC). FTZs are tax-advantaged zones that can make a site more competitive in attracting foreign customers. In an FTZ, foreign and domestic merchandise may be moved into zones for operations, storage, exhibition, assembly, manufacturing, and processing. While in the zone, merchandise is not subject to U.S. duty or excise tax, and goods may be exported free of duty and excise tax. If goods are imported to the U.S., the importer can choose to pay duties at the rate of either the original foreign materials or the finished product. A public or public-type entity (such as a port authority, economic development corporation, or non-profit) can apply to U.S. Customs and Border Protection for the creation of a new general-purpose zone. If approved, the public entity may also apply for expansions and subzones on behalf of interested companies. There are currently three FTZs in Missouri, operated by the St. Louis County Port Authority, the Springfield Airport, and the Greater Kansas City FTZ. The Greater Kansas City FTZ was the first non-profit to be an FTZ grantee.

Key takeaways from the Owensboro Riverport include:

- Reliable highway, rail, and barge service provides customers with flexibility to optimize transportation in their supply chain;
- Offering storage and warehousing in addition to material handling can make the site more attractive to potential customers; and

[4] 14 News, "Riverport Authority to build new dock," 2013.

- FTZs can attract foreign customers and domestic manufacturers due to cost-savings on import duties and excise tax as well as time and cost savings from co-location.

4.3 Port of Indiana – Mount Vernon

Ports of Indiana operates three public ports including one in Mount Vernon, Indiana, along the Ohio River. The port was initially funded by a $1 million grant from the Indiana General Assembly in 1971, and it opened in 1976. In 2010, a privately-funded ethanol facility was opened that is now operated by Valero. In the year following this investment, annual tonnage grew 12 percent from the previous year.[5] The Port of Indiana-Mount Vernon handles many agricultural commodities such as corn, soybeans, soybean meal, soybean oil, grain, and milo, and fertilizer. Coal, aggregates, steel, and heavy lift cargo are also major cargoes of the port. This diverse base of industries positions the port to handle seasonal or regional changes in industry. The Port of Indiana-Mount Vernon is located on State Road 62 and is approximately 20 miles from both I-64 and I-69. It has access to Evansville Western Railway, a shortline railroad, which interchanges to five Class I railroads.

Port of Indiana-Mount Vernon offers services in specialized cargo handling, general cargo handling, COB, and storage. A 60-ton dual-lift crane enables barge-rail-truck transloading and COB service, and public piers for transloading and heavy lift cargo are available. Consolidated Terminals & Logistics Co. (CTLC) provides general cargo handling and transportation services for both domestic and foreign shipments. Mount Vernon Barge Service (MVBS) provides bulk product handling at the port, and has access to high-speed material handlers for barge loading and unloading. The port offers storage for a variety of products, including a 53,000 square foot transit shed, a coal terminal, outdoor storage, and commodity specific terminals. Barge fleeting for up to 500 barges is located adjacent to the port, and storage for up to 200 railcars is available on-site. Six miles of on-port rail track also enable the staging of trains.

The Port of Indiana-Mount Vernon part of a designated FTZ (No. 177), which allows the port to offer benefits to businesses that import goods by delaying or reducing payments on certain products. It also allows business to better compete in global markets.

Key takeaways from Port of Indiana-Mount Vernon include:

- A diverse industry base can strengthen the economic position of the port by increasing resiliency against market changes;
- Shortline railroads can provide a connection to Class I railroads which operate nationwide; and
- Storage for both commodities and transportation equipment can increase the attractiveness of the site.

4.4 Hickman-Fulton County Riverport, Kentucky

The Hickman-Fulton County Riverport is located in Hickman, Kentucky on the Mississippi River. The port handles commodities from a variety of industries, including grain, wire rod, fertilizer, petroleum coke, zinc, aggregates and steel coils. Hickman is located near state highways in Kentucky and Tennessee, but it does not have nearby access to the interstate system. A shortline railroad, TennKen Railroad Company, provides a connection between the port and Class I rail service in Dyersburg, Tennessee. The Hickman-Fulton County

[5] Mount Vernon Democrat, “Mount Vernon port sees an increase in tonnage load,” 2012.

Riverport's location provides an advantage in waterborne shipping costs as no locks impede movement on the Mississippi River south of St. Louis.

The Riverport offers transfer and storage services on site. Grain is a major commodity due to the port's location in the center of a grain-producing area. Conveyors transport grain directly from storage to barges, reducing the cost of handling material between modes. General cargo conveyors are also available to offload other products such as coke or granular commodities to storage or to railcars. Transfer service is enabled by a 125-ton crane lift, forklifts, loaders, trailers, and trucks. Two warehouses of 18,000 sq. ft. and 10,000 sq. ft. as well as storage capacity of 2 million bushels are located at the Riverport. Additionally, land is available for outdoor storage or warehouse development.

The port has been open since 1978, and it has overcome maintenance challenges in recent years including limited funding for dredging and a year-long wait to replace a decommissioned crane for unloading barges. Continued port development is being pursued in the region by the Western Kentucky Alliance for a Vibrant Economy (WAVE), a four-county coalition. At a conference hosted by WAVE in late 2016, advocates for port-oriented development suggested wheat or hemp refining as an economic opportunity for a new port.[6]

Key takeaways from the Hickman-Fulton County Riverport include:

- Geographic concentration of an industry, such as grain production, enables ports to invest in specialized equipment and services;
- Undeveloped land at a port can be leased for outdoor storage until it is developed for a specific customer; and
- Advantages in water or rail shipping costs can overcome distance from major highways for certain commodities and customers.

[6] WKMS, "WAVE Mulling Opportunities and Paths for Future Riverport," 2016.

5.0 Recent and Planned Transportation Infrastructure Projects and Plans

This section describes the recent and planned infrastructure projects and transportation plans that may be relevant to the multimodal port facility. In developing a port site in the central Missouri region, it is important to identify any major changes to local roads, highways, bridges, freight-generating facilities, or other transportation infrastructure that may impact the outcome of the port facility. For example, a road or bridge widening project near the potential port site may help improve freight flow in and out of the facility, and could lead to more activity at the port. In addition, a planned construction project requiring steel, lumber, concrete, or other bulk materials could benefit from access to a port facility, but if the project restricts transportation access, it could negatively impact the port's development or operations. Documenting recent and planned transportation infrastructure projects is an important step in evaluating the short- and long-term feasibility of a port facility.

Table 5.1 presents a summary of the recent and planned infrastructure projects in the Jefferson City region. The majority of these projects have already been completed, with the exception of the Jefferson City East Capital Avenue Urban Renewal projects, the Tanner Road Bridge safety improvements, and the revitalization of abandoned former Truman Hotel property. However, these projects are not likely to impact development related to the multimodal port facility. The 2018 Transportation Improvement Program for Jefferson City includes a series of projects, including safety improvements along U.S. 54 in Cole, Miller, and Camden Counties. Some safety improvements may impact freight flow along the U.S. 54 corridor if major construction is required.

Table 5.1 Summary of Recent and Planned Projects and Plans

Project	Location	Description	Source
Route H bridge replacement	Over Davis Creek in Callaway County, approximately 4 miles west of U.S. 54 in Fulton, MO	Replace existing structure, expand width to 24 feet from 20 feet. Completed August 2017.	News Tribune[7]
U.S. 63 bridge widening	Over Katy Trail in Callaway County, approximately 4 miles north of Jefferson City, MO.	Replace deck on and widen the southbound U.S. 63 bridge. Completed September 2017.	News Tribune[8]
Route J/M bridge replacement	Over U.S. 50/63 in east Jefferson City, MO.	Bridge replacement. Construction began June 2017.	News Tribune[9]

[7] "Route H bridge replacement in Callaway County starts Monday". May 12, 2017. www.newstribune.com/news/story/story/2017/May/12/route-h-bridge-replacement-callaway-county-starts-monday/673741/

[8] "Works starts next week on U.S. 63 Bridge over Katy Trail". May 13, 2017. www.newstribune.com/news/story/story/2017/May/13/work-starts-next-week-us-63-bridge-over-katy-trail/673835/

[9] "Route J/M overpass near Taos to close June 2". News Tribune. May 26, 2017. www.newstribune.com/news/story/story/2017/May/26/route-jm-overpass-near-taos-close-june-2/675575/

Project	Location	Description	Source
Stadium roundabout construction	Intersection of Stadium Boulevard and Jefferson Street off U.S. 54 in southwest Jefferson City, MO.	Constructing dual-lane roundabout with a right-hand slip lane off the U.S. 54 exit ramp through Stadium to Christy Drive. The project also will widen Stadium back to the Trinity Lutheran Church driveway. Completed July 2017.	News Tribune[10]
Jefferson City East Capital Avenue Urban Renewal	East Capital Avenue in Jefferson City, MO, near the riverfront and the Capitol.	Infrastructure improvement projects, including sidewalks, curbs, gutters, lack of street lighting, and blighted properties. East Capital Avenue Urban Renewal Plan expected completion 2027.	News Tribune[11]
Lafayette Street Interchange Project	Interchange at U.S. 50 and Lafayette Street in Jefferson City, MO.	New interchange, addition of a lane in each direction on U.S. 50, replacement of three bridges along the corridor, construction of two new bridges, pavement reconstruction, and rehabilitation of Clark Avenue bridge. Completed fall 2016.	MoDOT[12]
Tanner Road Bridge safety improvements	Tanner Bridge Road from Route B to Grand Highland Subdivision in Cole County.	Fix sharp curves, clear trees and right of way for sight distance, and road widening in some sections. Construction scheduled to take place 2017-2018.	News Tribune[13]
Revitalization of abandoned former Truman Hotel property	Jefferson Street off U.S. 54 in south Jefferson City, MO in Cole County.	Revitalize the abandoned former Truman Hotel Property. Urban renewal plan with $50 million investment into restoring blighted area. Replace structure with two new hotels, a restaurant, and 20,000 square foot conference center. Expected completion fall 2018.	ABC News[14]; KRCG[15]
2018 Transportation Improvement Program for Jefferson City	Jefferson Street off U.S. 54 in south Jefferson City, MO in Cole County.	Includes scoping for safety improvements along U.S. 54 in Cole, Miller, and Camden counties; U.S. 50 outer road improvements; pavement and shoulder improvements on Route M; and pavement and shoulder improvements on Route C from Route 52 near Versailles to Jefferson City.	Jefferson City, MO[16]

[10] "Stadium roundabout construction starting". News Tribune. May 18, 2017. www.newstribune.com/news/story/story/2017/May/18/stadium-roundabout-construction-starting/674514/

[11] "Capitol Avenue infrastructure project likely in 2017". News Tribune. November 16, 2016. www.newstribune.com/news/local/story/2016/nov/16/capitol-avenue-infrastructure-project-likely-2017/649224/

[12] "Lafayette Street Interchange Project". MoDOT. www.modot.org/central/major_projects/LafayetteInterchange.htm

[13] "Tanner Bridge safety improvements OK'd". News Tribune. May 17, 2017. www.newstribune.com/news/story/story/2017/May/17/tanner-bridge-safety-improvements-okd/674350/

[14] "Jefferson City Council approves Truman Hotel urban renewal plan". ABC 17 News. February 20, 2017. www.abc17news.com/news/jefferson-city-council-approves-truman-hotel-urban-renewal-plan/348135430

[15] "Demolition crews tear down Truman Hotel". KRCG 13. March 23, 2017. http://krcgtv.com/news/local/demolition-crews-destroy-truman-hotel

[16] "Transportation Improvement Program". City of Jefferson, Missouri. www.jeffersoncitymo.gov/government/long_range_transportation_plan/transportation_improvement_program.php

6.0 SWOT Analysis

This section discusses the findings of the strengths, weaknesses, opportunities, and threats (SWOT) analysis. This approach is used in various industries for strategic decision-making. A SWOT analysis considers both internal factors (strengths and weaknesses) as well as external factors (opportunities and threats) to evaluate what an entity can and cannot control, what assists the entity in accomplishing its objectives, and what obstacles must be overcome to achieved desired results.

This SWOT analysis builds on the efforts in the previous sections to help evaluate the feasibility of a multimodal port facility. It considers the findings of the infrastructure asset review, economic and industry analysis, logistics development case study takeaways, and future transportation projects to determine whether these findings represent strengths, weaknesses, opportunities, and/or threats towards the potential port facility.

6.1 Overview

Growth in the global economy over the last two decades, combined with new manufacturing and business models, advances in information technology, and new marketing techniques, has increased the demand for efficient transportation services. Shippers are increasingly investing in cargo handling facilities and transportation infrastructure to handle the increasing freight needs and demands. These investments include additional warehousing, decentralized storage and distribution, and transfer facilities in and around port facilities. Public sector agencies are also prioritizing similar investments to spur economic development and support local businesses. The emergence of increased cargo handling investments highlights deficiencies in freight transportation that need to be mitigated. For Missouri, this mitigation includes:

- **Capacity and congestion.** Capacity issues appear to be the main driver of port development, since a system of port terminals increases the capacity on rivers and helps relieve highway congestion. Trucking tends to be sufficient in the initial phase of development for many shippers. However, issues such as congestion, energy consumption, and driver shortage, have resulted in increased cost of freight movement, leading to consideration of alternative modes.

- **Hinterland access.** Inland waterway transportation tends to serve inland locations rather than coastal regions. Through long distance transport corridors, river ports confer increased accessibility of these regions because of lower distribution costs and improved capacity.

- **Supply-chain management.** In addition to standard capacity and accessibility issues in the hinterland, a port can actively integrate within supply chain management practices. This takes many forms such as the agglomeration of freight modes, equipment depots, and logistical capabilities.

The ultimate success of a port facility in central Missouri in attracting users depends on its ability to add value in the supply chain. Ports can provide the means to optimize transportation-related costs associated with supply chains. While a facility has the potential to attract businesses providing additional auxiliary and value-added services, multimodal transfer facilities can be created and exist in absence of these additional developments. However, the port and distribution facilities by definition require the attraction and agglomeration of these value-added activities.

At cargo-handling facilities, a strong transportation network – including access to the interstate highway system, rail facilities, and port operations – is critical for businesses seeking competitive advantages. It allows businesses to choose the appropriate modal alternative(s) for their logistics needs. As supply chains become more complex, businesses look for ways to reduce the number of links in the chain and the number of times they have to transload their cargo by incorporating a variety of components at locations that are multimodal and provide integrated logistics opportunities. Overall, a port allows businesses to be more competitive through a strong transportation network with multimodal capabilities and value-added services.

While there are many factors that influence the final location decision of a port site, there are certain minimum requirements, including:

- Multimodal connectivity;
- Good highway infrastructure, including north-south and east-west connectivity;
- Active railroads;
- Established shipper facilities and/or markets;
- Available and cost-effective land;
- Local cooperation; and
- Competitive energy options and costs.

6.2 SWOT Findings

The four-county study area (Boone, Callaway, Cole, and Osage Counties) has access to multimodal freight transportation infrastructure that includes, highways, rail, waterways, and pipelines. These systems work together to support the region's freight-related industries across a number of different sectors and bring goods to consumers across the state. The study area has direct access to U.S. 54 and U.S. 63, both north-south routes, as well as U.S. 50, an east-west route. U.S. 54 also provides connectivity to I-70, which is approximately 30 miles north of Jefferson City. In addition, due to presence of UP rail lines around the state and the study area, there is rail access for moving bulk and intermodal goods if sufficient demand exists. Further, access to the Missouri River connects the study region to other inland waterways, including the Mississippi River.

As discussed in Chapter 3, population and employment trends are mixed, summarized as follows:

- Population in the study area increased 10 percent between 2006 and 2016, with especially high growth in Boone County;
- Employment growth in the study area was relatively consistent with the national growth trends. Cole, Callaway, and Osage Counties grew modestly over the 10-year period, while Boone County employment grew 13 percent. Overall, study area employment increased by 7 percent;
- Industry mix varies from county-to-county compared to the rest of Missouri. Overall, freight-dependent industry employment has decreased from 39 percent to 35 percent. Callaway and Osage Counties have a significantly higher share of freight-dependent employment compared to service employment, with

Osage County having the highest share of freight-dependent sector employment in the study area (78 percent in 2016). Cole County has the lowest share of freight-dependent sector employment in the study area; and

- Retail trade and manufacturing are the top two freight-dependent industry sectors in the study area:
  - In Boone County, retail trade is the largest industry within the freight-dependent sector, comprising 15 percent of employment. The second-largest industries, manufacturing and construction, each account for 5 percent of employment.
  - In Callaway County, manufacturing is the largest industry within the freight-dependent sector, comprising 20 percent of employment. The second-largest industry, retail trade, accounts for 15 percent of employment.
  - In Cole County, retail trade is the largest industry within the freight-dependent sector, comprising 13 percent of employment. The second-largest industries, manufacturing and construction, each account for 5 percent of employment.
  - In Osage County, manufacturing is by far the largest industry within the freight-dependent sector, comprising 48 percent of employment, which is up from 42 percent in 2006. The second-largest industry, retail trade, accounts for 13 percent of employment.
- In assessing industry employment between 2006 and 2016, Missouri has three specialized industries – manufacturing, retail trade, and wholesale trade – and one mature industry – utilities – compared to the nation as a whole. In the study area:
  - Boone County's retail trade sector is considered to be mature, while utilities and transportation and warehousing are emerging industries.
  - Callaway County's manufacturing and agriculture industries are specialized, while its mining and transportation and warehousing sectors are mature.
  - Cole County's retail trade and utilities sectors are specialized, while its six other freight-dependent industries are considered to be emerging.
  - Osage County has two specialized industries: construction and manufacturing. Construction employment share is significantly higher in the County compared to the nation as a whole. Mining and transportation and warehousing are classified as mature industries.

The logistics development case study evaluation also yielded several notable findings that will help guide the development of the potential multimodal port facility in central Missouri. These findings include:

- Reliable highway, rail, and barge service provides customers with flexibility to optimize transportation in their supply chain;
- Offering storage and warehousing in addition to material handling can make the site more attractive to potential customers;

- Foreign trade zones (FTZs) can attract foreign customers and domestic manufacturers due to cost-savings on import duties and excise tax as well as time and cost savings from co-location;
- A diverse industry base can strengthen the economic position of the port by increasing resiliency against market changes; and
- Geographic concentration of an industry, such as grain production, enables ports to invest in specialized equipment and services.

Considering the potential in existing freight assets, freight-dependent industries, successes of other peer facilities, and future development plans, the findings of the SWOT analysis for a multimodal port facility in central Missouri are shown in Table 6.1.

Table 6.1 Logistics-Based Development SWOT Analysis

Strengths	Weaknesses
• Access to Union Pacific (UP) rail infrastructure	• Lack of direct Interstate Highway access
• Access to U.S. 54, U.S. 50, and U.S. 63 for freight movement	• Limitations on site footprint
• Access to Missouri River, with connection to Mississippi River and other inland waterways	
• Potential state partner for south site	
• Strong private sector interest and potential funding partner	

Opportunities	Threats
• Smaller share of commodity movement by rail and water compared to trucks	• Existing established ports, including private docks, on Missouri River
• Access to Class I rail facilities	• Unpredictable water levels along Missouri River
• National truck driver shortage	• Variable navigation season length on Missouri River as determined by U.S. Army Corps of Engineers
	• Potential port users have variety of logistical needs

Source: Cambridge Systematics.

7.0 Port Market Analysis

This section builds on the previous data analysis to examine the potential demand for a port facility. Because new port facilities can draw from an expanded catchment area and to assess how much of the demand for a port facility is generated from a county that already has a port, the catchment area is expanded to include Boone, Callaway, Cole, and Osage Counties for the freight market assessment. This section discusses the primary data used and provides an overview of the commodity flows in the region, establishes the baseline for inbound and outbound demand and potential for modal shifts and presents the approach and findings for freight market assessment.

The data used in this analysis come from the following source:

- Freight Analysis Framework version 4 (FAF4) Database. The Freight Analysis Framework (FAF), produced through a partnership between Bureau of Transportation Statistics (BTS) and Federal Highway Administration (FHWA), integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. FAF4 data was disaggregated to obtain truck, water, and rail flows at the county level for the State of Missouri.

7.1 Commodity Flow Analysis

FAF4 data were used to analyze freight flows in Missouri. More than 20 million tons of goods moved to, from, or within the study area in 2012. Additionally, the area has direct access to I-70 which is a major corridor for through freight traffic. This section provides an overview of commodity flows by mode, top trading partners, and freight flows in the study area.

7.1.1 Commodity Flow by Mode

As indicated in Table 7.1, trucks carried approximately 500 million tons of goods in 2011, representing over 49 percent of the goods that were moved in Missouri from a tonnage perspective. Freight rail was the second-highest mode in terms of tonnage, moving 45 percent of the total tons, followed by waterways which moved around 5 percent of the total goods in the State. Air cargo is the smallest mode for moving freight with 70,000 tons moved in 2011.

In 2012, trucks carried approximately 14.4 million tons of goods to, from, or within the study area and was the primary mode of freight, accounting for over 72 percent of the freight moved in that year. Waterways accounted for 16.1 percent of freight movement, followed by rail freight accounting for 7.7 percent. Table 7.1 presents the dominant mode for movement of goods in the study area.

Table 7.1 Freight Movement by Mode and Tonnage

	Missouri (2011)		Study Area (2012)	
Mode	**Tonnage (Millions)**	**Percent of Total**	**Tonnage (Millions)**	**Percent of Total**
Truck	500.4	49.2%	14.4	72.1%
Rail	458.1	45.1%	1.5	7.7%
Water	49.9	4.9%	3.2	16.1%
Pipe	8.3	0.8	0.8	4.1
Air	0.07	< 0.1%	-	-
Total	**1,016.7**	**100.0%**	**20.0**	**100%**

Source: Transearch data (2011) and Freight Analysis Framework version 4.4 (FAF4).

7.1.2 Top Commodities

The top commodities moved in the study area (including outbound, inbound, and internal flows) are shown in Table 7.2. For 2012, it is estimated that over 5 million tons of gravel were transported in the study area, which accounts for 27 percent of the freight flow. The high volume of gravel transported in the study area is at least partially attributable to the annual USACE-issued permits for sand and gravel, which dictate how much of these products can be dredged from the Missouri River each year. As a result, there are several terminals along the Missouri River that are designed to offload dredged sand and gravel from barges, some of which are in the study area. Nonmetal mineral products comprised around 10 percent of the commodities carried in the study area. Cereal grains comprised around 8 percent of the commodities moved around in the study area. Due to the agriculture driven economy in the study area, most of the top commodities moved around were agricultural products.

Table 7.2 Top Commodities Moved in Study Area by Tonnage (in Thousands), 2012

Commodity	Other Modes	Rail	Truck	Water	Total	% of Grand Total
Gravel	258	77	3,623	1,448	5,406	27%
Nonmetal min. prods.	29	88	1,510	300	1,927	10%
Cereal grains	8	79	1,118	491	1,696	8%
Coal-n.e.c.	805	0	321	5	1,132	6%
Other foodstuffs	12	21	880	0	914	5%
Other ag prods.	67	44	747	3	861	4%
Mixed freight	4	0	789	0	793	4%
Fertilizers	16	65	625	46	752	4%
Basic chemicals	3	13	110	579	705	4%
Animal feed	2	12	672	0	685	3%
All Others	108	647	4,035	350	5,139	26%
Total	**1,312**	**1,046**	**14,430**	**3,222**	**20,010**	**100%**

Source: Freight Analysis Framework version 4.4 (FAF4).

Table 7.3 presents the estimated dollar value of commodities moved in the study area in 2012. Over $15 billion worth of commodities were moved from, to, or within the study area. Live poultry accounted for a large share of the value of commodities moved, followed by fiber and paper and pulpboard products, and miscellaneous field crops products.

Table 7.3 Top Commodities Moved in the Study Area by Value ($M), 2012

Commodity	Other Modes	Rail	Truck	Water	Total	Percent of Total
Live Poultry	85	2	2,400	0	2,487	16%
Fiber, Paper Or Pulpboard	12	30	1,296	0	1,338	9%
Misc. Field Crops	298	3	700	1	1,001	6%
Petroleum Refining Products	31	14	145	715	904	6%
Livestock	166	15	648	1	831	5%
Warehouse & Distribution Center	48	2	669	1	720	5%
Grain	386	3	265	0	654	4%
Primary Forest Materials	26	26	557	30	638	4%
Asphalt Coatings Or Felt	90	32	473	1	596	4%
Oil Kernels, Nuts Or Seeds	248	1	261	1	512	3%
Other-Total	704	192	4,748	383	6,026	38%
Total	**2,093**	**319**	**12,162**	**1,133**	**15,707**	**100%**

Source: Freight Analysis Framework version 4.4 (FAF4).

7.1.3 Top Trading Partners

Table 7.4 presents the top trading partners for the study area based on tonnage of commodities moved, broken down by state. In 2012, over 55 percent of the commodities by tonnage were carried within Missouri counties. Outside Missouri, Louisiana is the top trading partner, with over 7 percent of commodities by tonnage.

Table 7.4 Top Trading Partners for the Study Area by Tonnage, 2012

State	Total Tonnage	Percent of Total
Rest of Missouri	10,775	55%
Louisiana	1,371	7%
Texas	1,157	6%
Illinois	1,136	6%
Kansas	794	4%
Tennessee	701	4%
Arkansas	600	3%
Iowa	343	2%
Oklahoma	326	2%

Wyoming	316	2%
Other	2,078	11%
Total	**19,597**	**100%**

Source: Freight Analysis Framework version 4.4 (FAF4).

Table 7.5 presents the top trading partners for the study area based on the dollar value of commodities moved. In 2012, rest of Missouri counties was the top trading partner with 37 percent of the value of commodities moved, followed by Illinois with 9 percent of the value of commodities moved.

Table 7.5 Top Trading Partners for the Study Area by Value, 2012

BEA Region	Total (millions)	Percent of Total
Rest of Missouri	$5,730	37%
Illinois	$1,465	9%
Texas	$1,447	9%
Kansas	$935	6%
Arkansas	$554	4%
Iowa	$467	3%
California	$420	3%
Oklahoma	$336	2%
Indiana	$324	2%
Tennessee	$290	2%
Other	$3,563	23%
Total	**$15,531**	**100%**

Source: Freight Analysis Framework version 4.4 (FAF4).

7.2 Port Freight Market Analysis

A port is proposed to be built along Missouri River in order to support economic growth and facilitate the flow of goods in and out of the central Missouri region. A port has been preferred to a rail intermodal facility since building a new rail intermodal facility is not currently a viable option given the volume and nature of goods moving in the study area. Furthermore, a port facility can be incrementally constructed and therefore, eliminating the need for a large capital or land investment. Estimating the future demand for water cargo at the proposed port requires several steps that are detailed in the following sections.

7.2.1 Quantify Freight Flow Market

The goal of this step is to determine the share of freight moving by water at the national level. The port will attract bulk commodities that are transportable by barges (henceforth, barge-friendly commodities). While there may be interest in attracting container-on-barge traffic, market conditions at this location are not ideal, making this type of service more speculative. Consequently, a commodity filter is applied to exclude non-bulk commodity flows. To ensure excluding non-bulk commodities will not eliminate potential strong markets, a non-bulk commodity filter was developed and the market feasibility was run twice, once with the bulk

commodity filter and once with the non-bulk commodity filter. The comparison between the results from both analyses showed that there is little market opportunity for non-bulk commodities transported through the port. Section 7.3 details the results from the market study using bulk commodity and non-bulk commodity filter. Bulk commodities are displayed in Table 7.6 and non-bulk commodities are displayed in Table 7.7.

Next, each Origin-Destination (OD) pair in the data is assigned to a certain distance bin. The purpose of doing so is to differentiate between close markets where water is generally less competitive and far markets where water is more competitive. FAF4 was used to complete this step. The details of this step are as follows:

1. Select OD pairs between which the tonnage moved by water is greater than zero;
2. Apply the commodity filter in Table 7.6 (or Table 7.7 for analysis of non-bulk commodities);
3. Add mode filter, selecting Truck and Rail as the transportation mode;
4. Add distance-bin information to each OD pair. The distance-bin contains only two categories: OD distance < 500 miles, and OD distance >= 500 miles; and
5. Calculate mode share for each distance-bin category by aggregating tonnage and value on domestic mode and distance-bin. Table 7.8 shows the output of this step.

Table 7.6 Bulk Commodity Filters for Port Market Analysis

Commodity Group				
Cereal grains	Natural sands	Fertilizers and fertilizer materials	Paper or paperboard articles	Waste and scrap
Agricultural products except live animals, cereal grains, and forage products	Gravel and crushed stone	Chemical products and preparations n.e.c.	Textiles, leather, and articles	Articles of base metal
Animal feed and feed ingredients, cereal straw, and eggs and other products of animal origin n.e.c.	Non-metallic minerals n.e.c.	Logs and other wood in the rough	Base metal in primary or semi-finished forms and in finished basic shapes	Machinery
Milled grain products and preparations, and bakery products	Metallic ores	Products of petroleum refining n.e.c. and coal products	Wood products	Pulp, newsprint, paper, and paperboard
Monumental or building stone	Coal	Basic chemicals		

Source: Freight Analysis Framework (FAF) 4
Note: Not elsewhere classified = n.e.c.

Table 7.7 Non-Bulk Commodity Filters for Port Market Analysis

Commodity Group			
Alcoholic beverages	Meat/seafood	Nonmetal mineral products	Precision instruments
Electronics	Miscellaneous manufacturing products	Other foodstuffs	Printed products
Furniture	Mixed freight	Pharmaceuticals	Tobacco products
Live animals/fish	Motorized vehicles	Plastics/rubber	Transport equipment

Source: Freight Analysis Framework (FAF) 4

The mode shares shown in Table 7.8 are referred to as national benchmarks. National benchmarks represent the overall market share of truck, rail, and water for OD distances below 500 miles and above 500 miles. The assumption is that any mode's mature market share is equal to or greater than national benchmarks. For instance, if the distance between the study area and market A is less than 500 miles and the share of water flows between the study area and market A is 19 percent or more, then market A is considered mature and it is unlikely to get any stronger. Therefore, a new port in the study area would be challenged to generate any new water flows to market A. On the other hand, if the water share for market A is 15 percent, then a new port will generate new water flows until market A is mature. The next section illustrates the steps to calculate the share of different modes between the study area and the markets.

Table 7.8 National Benchmark Mode Share in the Freight Flow Market

Mode	Distance-bin (miles)	% of 2012 Tonnage
Rail	< 500	13%
Truck	< 500	68%
Water	< 500	19%
Rail	> 500	23%
Truck	> 500	36%
Water	> 500	41%

Source: Freight Analysis Framework (FAF) 4.4

7.2.2 Estimate Divertible Markets

In this step the mode share to/from the study area from/to each market is calculated. Coastal ports in the Gulf of Mexico like Mobile, New Orleans, Houston, Tampa, Beaumont, and Corpus Christi and cities such as Minneapolis, Chicago, Orlando, Miami, Louisville, Baton Rouge, Lake Charles, Nashville, Grand Rapids, Omaha, Memphis, and Milwaukee constitute the market in this study. FAF4 data was used to obtain commodity flows for truck and rail commodity flow information. Similar to the previous section, the commodity filter is applied to only consider flows with barge-friendly commodities. The distance-bin information is also added to each flow. The above-mentioned process can be summarized in the following steps:

1. Identify market study area counties: Boone, Callaway, Cole, and Osage;
2. Identify markets based on existing trading partners;
3. From FAF4 data, select flows from/to study area to/from markets for 2012, 2020, and 2045;
4. Apply commodity filter;
5. Apply distance-bin info to each flow; and
6. Calculate mode share between study area and each market by aggregating tonnage on distance-bin, market, and mode.

The next step is to compare the share of water to the national benchmark and decide if the market is either mature or has potential for the new port. If there is potential, then some of the cargo that is currently transported via truck or rail from (to) study area to (from) the market, could potentially be diverted to water through the port. Such flows are referred to as "diverted flows". Due to little current water flows in the study area, it was assumed that there is no commodity flow into and out of the study catchment area by water. Therefore, all the commodity flows into and out of the study area would be diverted from truck or rail if the port is built. The next section illustrates the necessary steps to calculate diverted flows.

7.2.3 Estimate Future Divertible Flows

To determine the future divertible flows, the current divertible flows have to be calculated. This represents the maximum potential traffic for a port in the region. Once the potential market for the diversion of existing flows are estimated, future years (2020 and 2045) market potential can be estimated. This process can be summarized as below:

- $If\ Water\ Share < National\ Benchmark, then$:
  - $Diverted\ Truck\ and\ Rail\ Flow = National\ Benchmark * (Rail\ Tons + Truck\ Tons)_{Current}$
  - $[Diverted\ Truck\ Flow = Diverted\ Truck\ and\ Rail\ Flow * \frac{Truck\ Tons}{Truck\ Tons + Rail\ Tons}]_{Current}$
  - $Future\ Diverted\ Truck\ and\ Rail\ Flow = National\ Benchmark * (Truck\ Tons + Rail\ Tons)_{Future}$
  - $[Diverted\ Truck\ Flow = Diverted\ Truck\ and\ Rail\ Flow * \frac{Truck\ Tons}{Truck\ Tons + Rail\ Tons}]_{Future}$

The potential for diverting rail flows is calculated similar to diverted truck flows. Moreover, if the water share is equal to or greater than the national benchmark, the market is mature and therefore, it is assumed that no additional traffic will be diverted to water. Since zero current water flows was assumed for the study catchment area, none of the markets is mature. When there is potential for the port, the diverted water flow is a positive value and diverted truck flow and diverted rail flow are negative. This means that truck and rail modes will lose some tonnage to the port.

7.3 Results

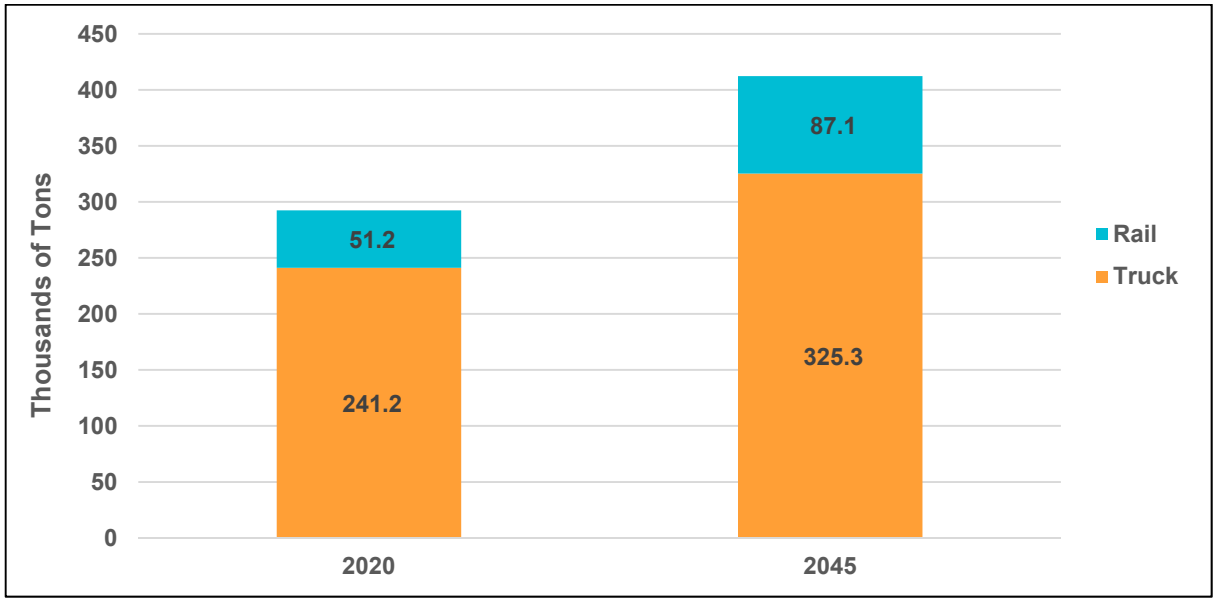
Overall the results show that there is a potential market for a port. Table 7.9 and Figure 7.1 show the future catchment market by mode for 2020 and 2045. In 2020 and 2045, over 292.4 kilo and 412.3 kilo tons of freight will flow into and out of the catchment area, respectively. Of this, over 82 percent will move by truck in 2020. A significant share will also move by rail (around 18 percent). By 2045, the share of truck and rail from the total freight flow into and out of the catchment area will be 79 and 21 percent, respectively. This becomes the base from which the potential port demand is derived.

Table 7.9 Catchment Area Potential Freight Demand by Mode

Year	Rail Tons (Thousands)	% Rail	Truck Tons (Thousands)	% Truck	Total Tons (Thousands)
2020	51.2	18%	241.2	82%	292.4
2045	87.1	21%	325.3	79%	412.3

Source: Cambridge Systematics analysis.

Figure 7.1 Total Future Catchment Area Freight Demand by Mode



Source: Cambridge Systematics analysis

The catchment area freight demand can be further examined based on origin and destinations pairs. Because water is more competitive at longer distances, the market is presented for OD pairs under 500 miles and those over 500 miles for existing flows in Table 7.10 and Table 7.11, respectively. Of the total existing freight flows in the study catchment area, about 62 percent of the tonnage is from OD pairs under 500 miles with Chicago, Omaha, and Memphis representing the largest potential markets. Furthermore, the majority of this traffic is currently traveling by truck indicating that travel times and reliability may be significant considerations in determining the modal choice for the move. Given the competitive value proposition of water for longer hauls combined by the lower emphasis on speed, the fact that such a

significant portion of the potential market is from relatively shorter distances traveling by truck will make it more challenging to attract sufficient volumes of traffic from existing flows.

For the longer haul markets, Minneapolis, Houston, and Baton Rouge represent the largest market potential. For the Baton Rouge flow, a significant amount (nearly 75 percent) is currently traveling by rail, making that traffic a better potential target from a distance and service requirement perspective. It should be noted that these tables represent total flows and must be screened based on barge friendly commodities to derive potential market demand for a port facility.

Table 7.10 Freight Flows for OD Pairs Under 500 Miles, 2012

Market	Tons (Thousands)	Value (M $)	Market Share (Tons)	Market Share (Value)
Chicago	**90**	**157**	**56%**	**61%**
Rail	11	5	12%	3%
Truck	80	152	88%	97%
Omaha	**31**	**16**	**19%**	**6%**
Truck	31	16	100%	100%
Memphis	**18**	**36**	**11%**	**14%**
Truck	18	36	100%	100%
Louisville	**13**	**20**	**8%**	**8%**
Truck	13	20	100%	100%
Nashville	**6**	**19**	**3%**	**7%**
Truck	6	19	100%	100%
Milwaukee	**4**	**11**	**2%**	**4%**
Truck	4	11	100%	100%
Grand Total	**162**	**260**	**100%**	**100%**

Source: Cambridge Systematics analysis

Table 7.11 Freight Flows for Origin-Destination Pairs Over 500 Miles, 2012

Market	Tons (Thousands)	Value (M $)	Market Share (Tons)	Market Share (Value)
Minneapolis	**31**	**47**	**31%**	**30%**
Rail	5	2	18%	5%
Truck	25	45	82%	95%
Houston	**18**	**46**	**19%**	**29%**
Rail	4	6	21%	14%
Truck	14	39	79%	86%
Baton Rouge	**14**	**6**	**14%**	**4%**
Rail	10	3	75%	53%
Truck	4	3	25%	47%
Mobile	**12**	**4**	**13%**	**2%**
Rail	9	1	75%	26%
Truck	3	3	25%	74%
New Orleans	**8**	**9**	**8%**	**6%**
Rail	5	3	65%	31%
Truck	3	6	35%	69%
Grand Rapids	**5**	**16**	**6%**	**10%**
Truck	5	16	100%	100%
Miami	**3**	**9**	**3%**	**6%**
Rail	0	1	15%	13%
Truck	2	8	85%	87%
Beaumont	**2**	**13**	**2%**	**8%**
Truck	2	13	100%	100%
Corpus Christi	**2**	**0**	**2%**	**0%**
Rail	2	0	100%	88%
Truck	0	0	0%	12%
Lake Charles	**1**	**3**	**1%**	**2%**
Rail	0	0	0%	0%
Truck	1	3	100%	100%
Tampa	**1**	**4**	**1%**	**2%**
Rail	0	0	1%	0%
Truck	1	4	99%	100%
Orlando	**0**	**1**	**0%**	**1%**
Truck	0	1	100%	100%
Grand Total	**97**	**156**	**100%**	**100%**

Source: Cambridge Systematics analysis.

Table 7.12 summarizes the 2020 potential demand by market and mode. Potential demand consists of two types of demand: baseline demand and diverted demand. Baseline demand is basically the FAF4 projected tonnage flow into and out of the catchment area. Therefore, baseline water demand refers to FAF4 projected tonnage flow into and out of the catchment area by water. It is important to note if the freight is already moving by water, capturing this traffic at a new port facility means it is being diverted away from an existing facility, such as Howard-Cooper County Port. Being too dependent on attracting existing water freight is not favorable as there are no net gains or benefits to the larger region and state. In this study, there is little baseline water demand the study catchment area and therefore, it was assumed that there is no baseline water demand. Diverted demand is the tonnage flow that is estimated to diverge from other modes to the mode of interest due to a new freight facility. In this study the new facility is a port and in turn, the mode of interest is water and the diversion happens from truck and rail to water. Since it was assumed that there is no baseline water demand, potential port demand consists of only diverted demand.

Table 7.12 Potential Demand in Tons by Market and Mode, 2020

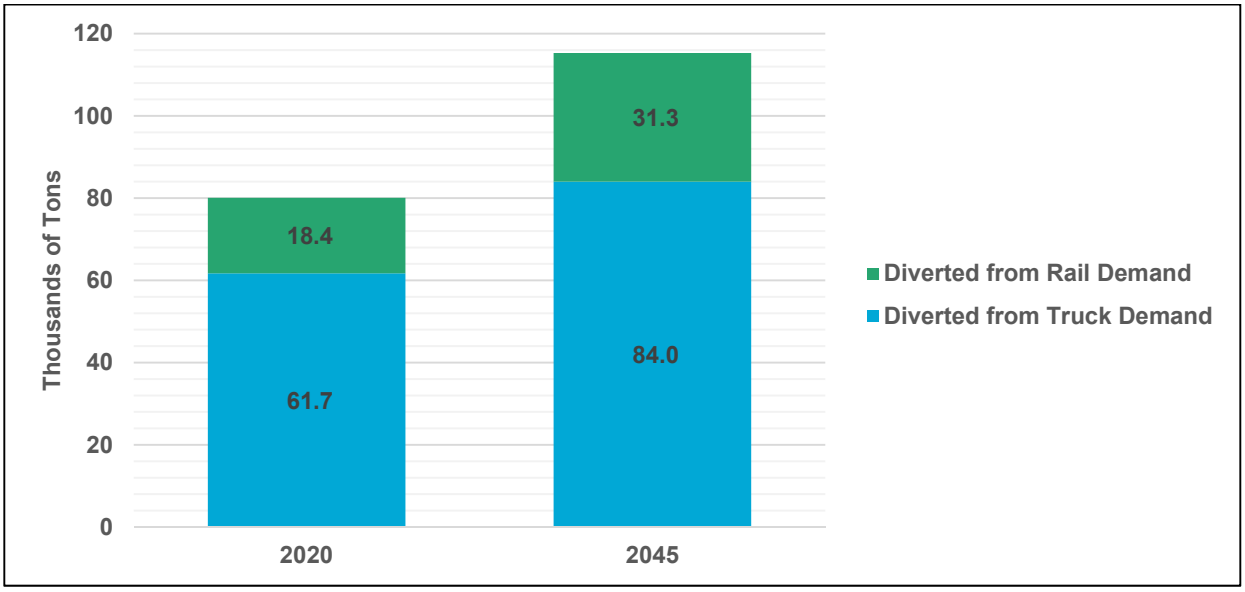
Market	Truck	Rail	Grand Total
< 500 miles			
Chicago	91.5	11.7	103.2
Omaha	33.3	-	33.3
Memphis	19.7	-	19.7
Louisville	14.5	-	14.5
Nashville	6.1	-	6.1
Milwaukee	4.3	-	4.3
Sub-Total	**169.5**	**11.7**	**181.1**
> 500 miles			
Minneapolis	28.6	7.4	36.0
Houston	17.9	7.7	25.6
Baton Rouge	3.2	12.1	15.2
Mobile	3.9	5.6	9.5
New Orleans	3.3	4.4	7.8
Grand Rapids	5.9	-	5.9
Beaumont	3.7	-	3.7
Miami	2.9	0.3	3.2
Corpus Christi	0.0	2.0	2.0
Lake Charles	1.2	-	1.2
Tampa	0.8	0.0	0.8
Sub-Total	**71.7**	**39.6**	**111.3**
Grand Total	**241.2**	**51.2**	**292.4**

Source: Cambridge Systematics analysis

Applying the barge friendly commodity filter to the overall demand yields the potential market for a new port facility in the region. Figure 7.2 presents the results for 2020 and 2040. In total, the maximum potential market for port traffic is about 80.1 kilo tons in 2020, of which 77 percent is diverted from truck and 23 percent from rail. By 2045, the maximum potential market for port traffic is expected to increase to 115.2 kilo tons, 73 percent of which accounts for commodities diverted from truck mode and the remaining 27 percent consists of commodity flows diverted from rail. In both 2020 and 2045, diversion from truck accounts for the

majority of maximum potential market for port traffic. Capturing the truck market could give rise to more benefits as it provides additional cost savings to businesses and relieves some of the traffic demand on the region's roadways, potentially leading to maintenance and highway user savings.

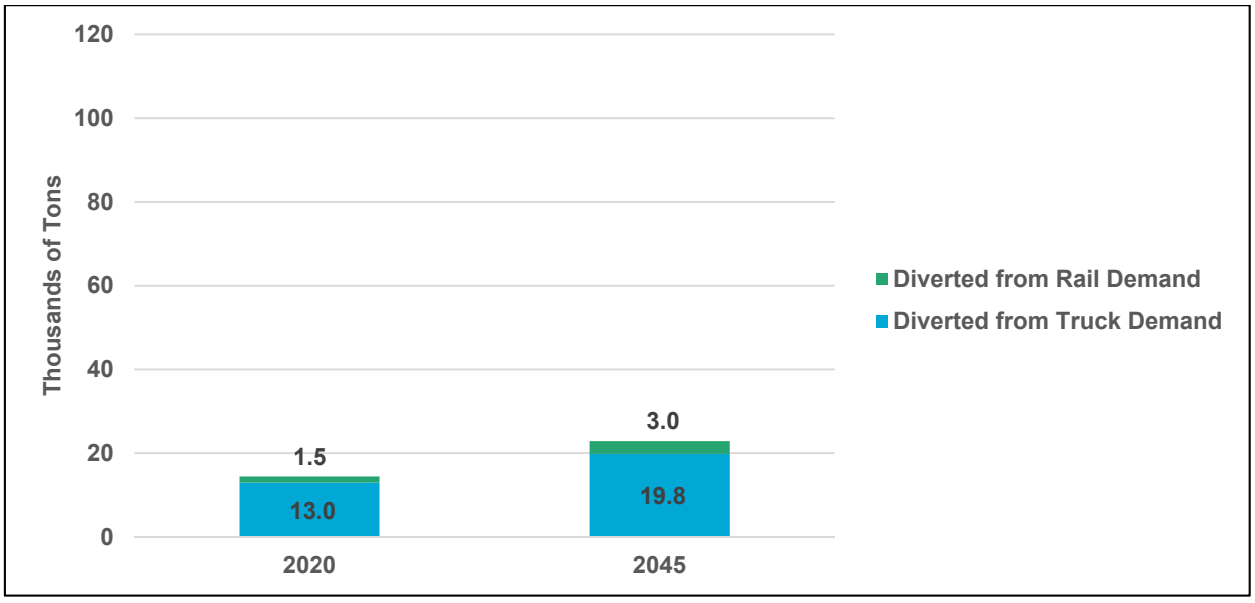
Figure 7.2 Potential Freight Demand for Port



Source: Cambridge Systematics analysis

Figure 7.3 displays diverted flows using non-bulk commodity filter. As it can be observed, diverted volumes are much lower compared to those of bulk commodities (Figure 7.2). Therefore, there is little potential for the port to attract non-bulk commodities.

Figure 7.3 Potential Freight Demand (Non-Bulk Commodities) for Port



Source: Cambridge Systematics analysis

Table 7.13 displays the potential port demand by bulk commodity for 2020 and 2045. The top commodity opportunities include base metal, basic chemicals, and milled grain products in 2020. By 2045, the top three commodity opportunities will consist of base metal, basic chemicals, and chemical products. Other strong potentials include fertilizers, animal feed, and coal.

In summary, a new port facility would need to capture a minimum of 30 to 40 percent of the potential market to be viable and self-sustaining. Given that only about 38 percent of the total market potential is with origin and destination greater than 500 miles, this means that the port would have to be competitive for shorter distance hauls which are more challenging.

Table 7.13 Potential Port Demand by Commodity (in Thousands of Tons)

Commodity	Diverted Rail and Truck to Water, 2020	Diverted Rail and Truck to Water, 2045
Base metal	16.5	22.6
Basic chemicals	7.9	13.7
Milled grain products	7.6	10.2
Chemical products	7.6	12.2
Fertilizers	6.3	6.6
Animal feed	4.9	5.7
Coal	4.0	10.2
Cereal grains	3.8	4.5
Paper	3.7	5.4
Articles of base metal	3.2	5.1
Machinery	3.1	5.0
Pulp, newsprint, paper, and paperboard	2.3	2.6
Waste and scrap	2.0	3.6
Agricultural products	2.0	2.2
Wood products	1.3	1.2
Gravel and crushed stone	1.2	1.3
Fuel oils	0.8	0.1
Non-metallic minerals n.e.c.	0.7	1.0
Products of petroleum	0.6	0.8
Logs	0.4	0.3
Textiles, leather, and articles	0.3	0.2
Natural sands	0.1	0.1
Metallic ores	0.0	0.7
Gasoline and aviation turbine fuel	0.0	0.0
Monumental or building stone	-	-
Total	**80.1**	**115.3**

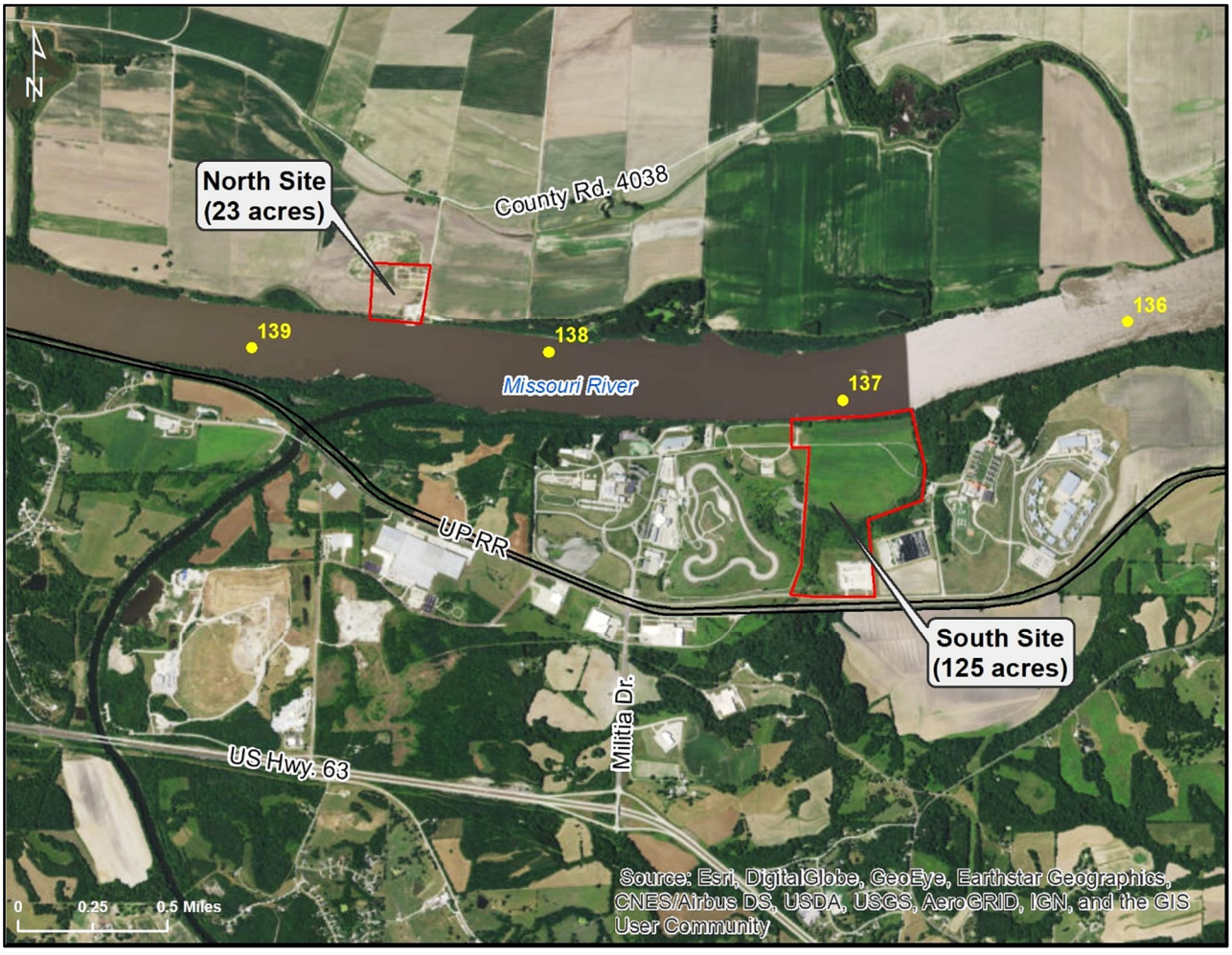
Source: Cambridge Systematics analysis

8.0 Potential Port Development Site Assessment

In coordination with the project stakeholders, the Jefferson City Area Chamber of Commerce identified two potential sites for investigation and feasibility study for development of a river terminal. One site is located on the south side of the Missouri River in Cole County, and the other site is located on the north side of the river in Callaway County.

The first site ("South Site") is located at about River Mile 137.0 (RM 137.0), Right Descending Bank (RDB), and is reported to be under control of the Missouri National Guard. As shown in Figure 8.1, the South Site is about 125 acres total, but a portion of that appears to be wetlands and another portion is currently used as a storage yard by the Missouri National Guard. The South Site also includes an existing concrete ramp that has the potential to be used for roll-on/roll-off (Ro/Ro) operations. Ro/Ro ramps are typically accessed by a deck barge that "noses up" to the ramp, facilitating large equipment and/or vehicles to be rolled on/off the barge to/from the ramp. Access to the site is generally via US Highway 63 and Militia Drive. Railroad tracks owned by Union Pacific (UP) Railroad traverse near the south side of the site.

Figure 8.1 Study Area Project Location



The second site ("North Site") is located at about RM 138.6, Left Descending Bank (LDB), and is owned by OCCI, Inc. As shown in Figure 8.1, the North Site is about 23 acres, and a portion of the site near the

riverfront, estimated at about 3 acres, is reported to be raised to a more "flood proof" elevation (assumed to be the 100-year flood elevation). The site has a series of three existing cell structures, each about 40 feet in diameter, that provide access to the riverfront and is likely used by the site owner as a dock structure. Access to the site is generally via State Route 94 (paved) or County Road 4038 (gravel). No readily accessible railroad infrastructure exists on the north side of the river that could provide rail access to the North Site.

8.1 Market and Commodity Information

The study team used market and commodity information during the development of the conceptual site plans for the two sites. The market information consisted of relatively high level Freight Analysis Framework (FAF4) commodity and tonnage data, as well as commodity information obtained through interviews with stakeholders and potential port users. The study team reviewed this market information and organized it by its freight movement direction (inbound versus outbound) and the general material handling requirements of the particular commodity involved. The general market information is summarized in Table 8.1. Note that the multipliers in the table correspond to the number of stakeholders that expressed interest in possibly utilizing a port facility in the Jefferson City area for that commodity.

Table 8.1 Summary of Market Information

Inbound (to Jefferson City Region)		
Dry Bulk	**Break Bulk**	**OD/OW**
Salt	Steel for Fabrication (x3)	Containers
Fertilizer	Rebar	
	Pet Food Stock (super sacks)	

Outbound (from Jefferson City Region)		
Dry Bulk	**OD/OW**	**Ro/Ro**
Wood Products	Fabricated Metal Products (x3)	National Guard
Grain (x5)	Containers (x3)	
Soybeans		

The most likely inbound commodities were divided into three categories: dry bulk, break bulk, and over-dimension/overweight (OD/OW). Similarly, the most likely outbound commodities were divided into three categories: dry bulk, OD/OW, and Ro/Ro. In general, dry bulk commodities are typically handled using conveyor systems, while break bulk commodities and OD/OW items are handled with cranes. Ro/Ro was explained above in the context of the existing ramp at the South Site. Dry bulk commodities are commonly transported via rail and barge, while break bulk, OD/OW, and Ro/Ro items are typically transported by truck and barge.

8.2 Description of Conceptual Site Plans

Typical commodity modes of transportation, material handling equipment requirements, land availability and characteristics, and existing assets were key parameters to initial conceptual site planning. The conceptual site plans are described and presented in the following sections.

8.2.1 Development Opportunity A: South Site Only

The development of Conceptual Site Plan A at the South Site assumes all port facility development will be located at a single site. In this scenario, all anticipated commodity types (e.g., dry bulk, OD/OW, break bulk, containers) will be handled at the South Site. In general, Conceptual Site Plan A is designed to accommodate dry bulk commodities inbound via truck or rail and outbound via barge. OD/OW, break bulk, and containers are planned to be inbound and/or outbound via barge and/or truck.

Conceptual Site Plan A is shown in Figure 8.2. A new access road will connect to No More Victims Road, approximately 3,300 feet east of the existing intersection with Militia Drive. In order to minimize potential impacts to wetlands, the access road generally parallels the existing creek, crossing it once. Based on information available from the US Fish & Wildlife Service (USFWS) National Wetlands Inventory (NWI), wetland impacts associated with the access road and rail spur (discussed below) may be on the order of 2 acres. The access road also provides for internal site circulation and does not require an at-grade roadway crossing of the proposed on-site rail infrastructure.

A proposed rail spur[17] connects to the UP Jefferson City Subdivision Mainline near the proposed access road connection to No More Victims Road. Designed to meet UP Industrial Lead Track standards, the rail spur provides access to a rail yard containing approximately 4,000 linear feet of railcar storage. Assuming an average railcar length of 65 feet, the rail yard could provide storage for about 60 railcars. A rail dump pit is proposed on the westernmost track of this rail yard; this dump pit would connect to the dry bulk storage area via a conveyor system.

The dry bulk storage area is located immediately west of the rail yard and adjacent to the Missouri River. This area includes a truck dump pit, which connects to the dry bulk storage area. A conveyor system is proposed to connect the dry bulk storage area to the in-water infrastructure, which facilitates barge loading/queuing operations and includes two dolphin structures and a cell structure. A discussion of barge fleeting is included later in this report.

A sheet pile dock structure is proposed west of the dry bulk storage area. The dock structure will allow a crane to load/offload OD/OW, break bulk, and containerized commodities to/from barges. The primary dock face is about 200 feet long, which will allow a crane to completely load/unload a barge without moving the barge. Dolphin structures are proposed adjacent to the dock to accommodate barge queuing. A temporary storage area is located just to the east of the dock, between the dock and the dry bulk storage area.

A relatively large parcel of land, approximately 23 acres, is located immediately south of the dock area. Due to its close proximity to the dock area, this parcel could be used for container storage or other future development that could benefit from the nearby dock. To the east of this parcel is a 19-acre parcel designated for future development. The eastern parcel has limited rail frontage, but both parcels have the potential to be used by an on-site tenant(s). Both parcels are located outside of the floodway limits (discussed further below), so construction of buildings and other infrastructure is likely to be permitted.

[17] The study team has made multiple attempts to obtain input from UPRR on the proposed rail spur and its connection(s) to the Jefferson City Subdivision Mainline adjacent to No More Victims Road. However, to date, the study team has not received a response from UPRR regarding our requests for site plan review and project discussion. The study team had also hoped to obtain information from UPRR about the potential track and railroad signal costs associated with the connection(s) to the Mainline. Lacking said information, the study team's estimated costs for rail-related infrastructure are based on recent similar industrial projects involving both UPRR and other Class I railroads.

Finally, an existing Ro/Ro ramp is located immediately west of the dock area. Access to this ramp and an associated temporary storage area is provided through internal site roadways. Limited maintenance and/or improvements to the Ro/Ro ramp may be required, depending on the intended use(s).

Based on a 2012 FEMA Flood Insurance Rate Map (FIRM), the floodway at the South Site encompasses the majority of the river frontage and extends about 400 feet south, away from the river. Moving east towards the creek, the floodway limits decrease and are closer to the river. The construction of buildings within the floodway limits is not likely to be permitted; thus, the dry bulk storage area is located just outside of the floodway limits. Further, based on survey information provided by the Jefferson City Area Chamber of Commerce, the average elevation at the site is about 540 feet (NGVD). Again, based on a 2012 FEMA FIRM, the 100-year flood elevation at the site is 552 feet (NAVD). Thus, a significant amount of fill may be required for site construction, depending on the extent of anticipated operating conditions.

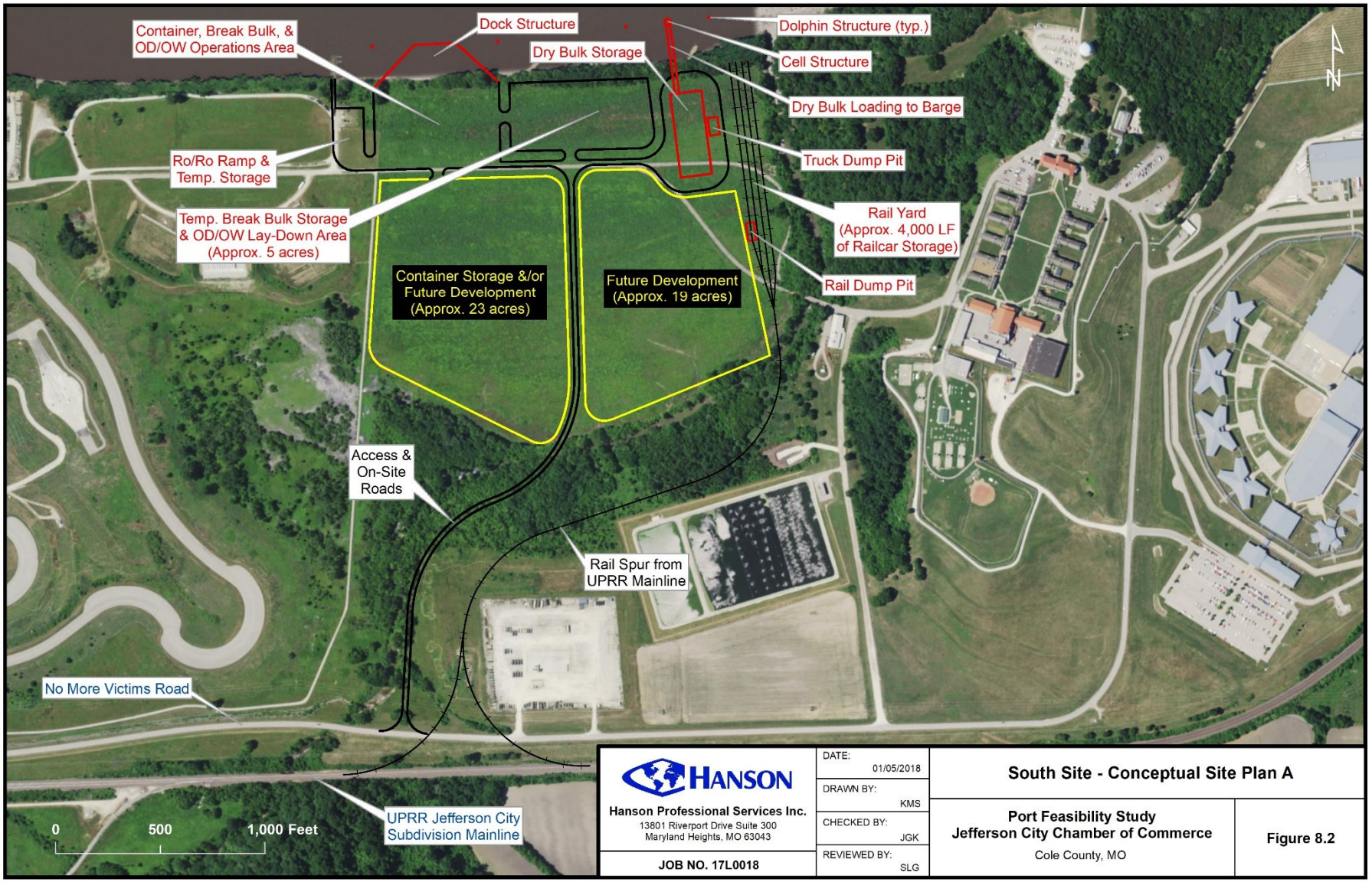
The opinion of probable construction costs for Conceptual Site Plan A is provided in Table 8.2. The total cost is anticipated to be about $54.8 million. Note, the fill required to raise the portion of the site designated for development (including future development) to the FEMA Base Flood Elevation (BFE) represents about one-third of the total cost, excluding the contingency.

Table 8.2 South Site Plan A – Opinion of Probable Construction Costs

Quantity	Unit	Description	Unit Cost	Total Cost
0.84	MILE	Access & Internal Roads (2-lane)	$1,825,000	$1,533,000
1,139,890	CY	Fill/Embankment	$14	$15,958,460
2	ACRE	Wetland Mitigation	$55,000	$110,000
4	EA	Tripod Mooring Dolphin	$65,000	$260,000
1	EA	Cell (20-30 ft. diameter)	$250,000	$250,000
1	LS	Dock (200 ft. sheet pile face)	$4,500,000	$4,500,000
1	EA	Gangway (approx. 300 ft.)	$75,000	$75,000
4,435	LF	Utility Service (electricity, water, sewer)	$150	$665,250
1	EA	Dry Bulk Storage (200K bushels)	$4,000,000	$4,000,000
1	EA	Truck Dump Pit	$550,000	$550,000
1	EA	Scales/Testing Equipment	$500,000	$500,000
900	LF	Conveyor System & Foundations	$2,000	$1,800,000
5	EA	Rail Switch (on-site)	$85,000	$425,000
1	EA	Rail Switch (mainline)	$300,000	$300,000
1.83	MILE	Rail/Track	$1,850,000	$3,385,500
1	EA	Rail Dump Pit	$550,000	$550,000
1	LS	Mobilization	6%	$2,091,733
1	LS	Engineering/Permitting/Surveying	14%	$5,173,552
1	LS	Contingency	30%	$12,638,248
			TOTAL	**$54,765,743**

Note: Costs are shown in 2018 Dollars. Fill/embankment quantity assumes existing average elevation of 540 feet and fill to FEMA BFE. Utilities assumed to be underground from beginning of access road.

Figure 8.2 South Site – Conceptual Site Plan A



8.2.2 Development Opportunity B: South Site and North Site

This section describes the two elements of Development Opportunity B, which includes both the North Site and South Site.

South Site – Conceptual Site Plan B

The potential development of Conceptual Site Plan B at the South Site assumes the overall port facility development will be split between two sites, in conjunction with the North Site (described in the next section). In this scenario, dry bulk commodities will be handled at the South Site using conveyor systems, while commodities typically moved by crane (e.g., OD/OW, break bulk, containers) will be handled at the North Site. Similar to South Site Plan A, dry bulk commodities are anticipated to be inbound via truck or rail and outbound via barge.

The South Site Conceptual Site Plan B is presented in Figure 8.3. A new access road will connect to No More Victims Road, approximately 2,800 feet east of the existing intersection with Militia Drive. Based on information available from the NWI, wetland impacts associated with the access road and rail spur (discussed below) may be on the order of 1 acre. The access road also provides for internal site circulation and does not require an at-grade roadway crossing of the proposed on-site rail infrastructure.

A proposed rail spur[18] connects to the UP Jefferson City Subdivision Mainline near the proposed access road connection to No More Victims Road. Designed to meet UP Industrial Lead Track standards, the rail spur provides access to a rail yard containing approximately 7,100 linear feet of railcar storage. Assuming an average railcar length of 65 feet, the rail yard could provide storage for about 105 railcars, roughly the same total length as a unit train[19]. A rail dump pit is proposed on the northernmost rail yard spur; this dump pit would connect to the dry bulk storage area via a conveyor system.

The dry bulk storage area is located immediately north of the rail yard and adjacent to the Missouri River. This area includes a truck dump pit, which connects to the dry bulk storage. A conveyor system is proposed to connect the dry bulk storage area to the in-water infrastructure, which facilitates barge loading/queuing operations and includes two dolphin structures and a cell structure. A discussion of barge fleeting is included later in this report.

Same as in Site Plan A, an existing Ro/Ro ramp is located in the northwest corner of the site. Access to this ramp and an associated temporary storage area is provided through internal site roadways. Limited maintenance and/or improvements to the Ro/Ro ramp may be required, depending on the intended use(s).

An 8-acre parcel of land, designated for future development, is located between the Ro/Ro ramp and the dry bulk storage area. However, this parcel is located within the floodway limits, so construction of buildings on this parcel is not likely to be permitted. Another parcel, approximately 39.5 acres, is located immediately south of the rail yard. Unlike the smaller, riverfront parcel, this large parcel is located outside of the floodway

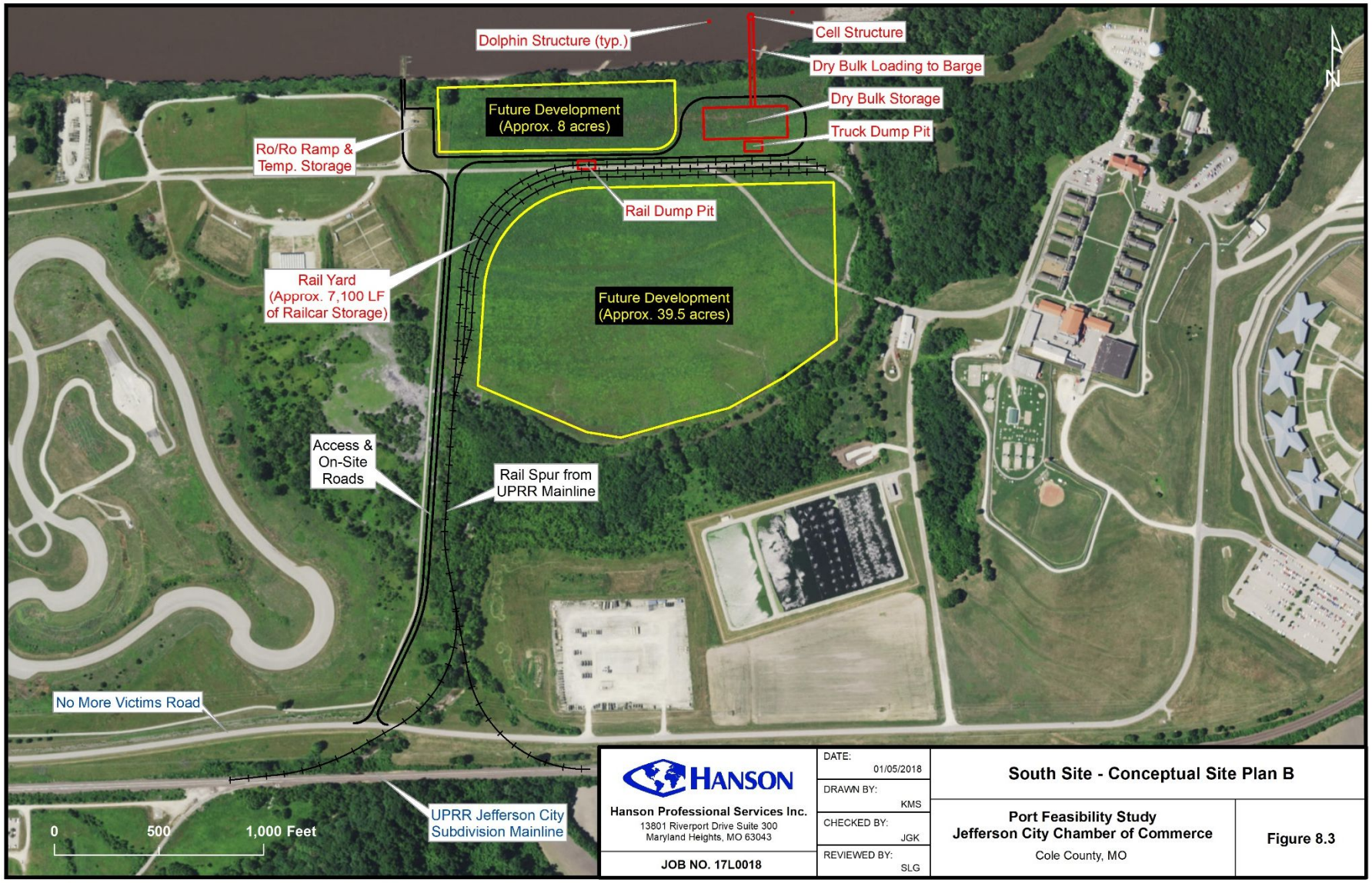
[18] The study team has made multiple attempts to obtain input from UP on the proposed rail spur and its connection(s) to the Jefferson City Subdivision Mainline adjacent to No More Victims Road. However, to date, the study team has not received a response from UP regarding our requests for site plan review and project discussion. The study team had also hoped to obtain information from UP about the potential track and railroad signal costs associated with the connection(s) to the Mainline. Lacking said information, the study team's estimated costs for rail-related infrastructure are based on recent similar industrial projects involving both UP and other Class I railroads.

[19] Note that unit trains are often used to carry large volumes of the same bulk commodity, such as grain or coal, from the same origin point to the same destination point.

limits, so it has the potential to be used by an on-site tenant(s). In addition, the large parcel has significant rail frontage that may benefit and/or attract an on-site tenant(s).

Finally, as described for Site Plan A above and due to existing site elevation, a significant amount of fill may be required for site construction, depending on the extent of anticipated operating conditions. The opinion of probable construction costs for the South Site Conceptual Site Plan B are discussed at the end of this section.

Figure 8.3 South Site – Conceptual Site Plan B

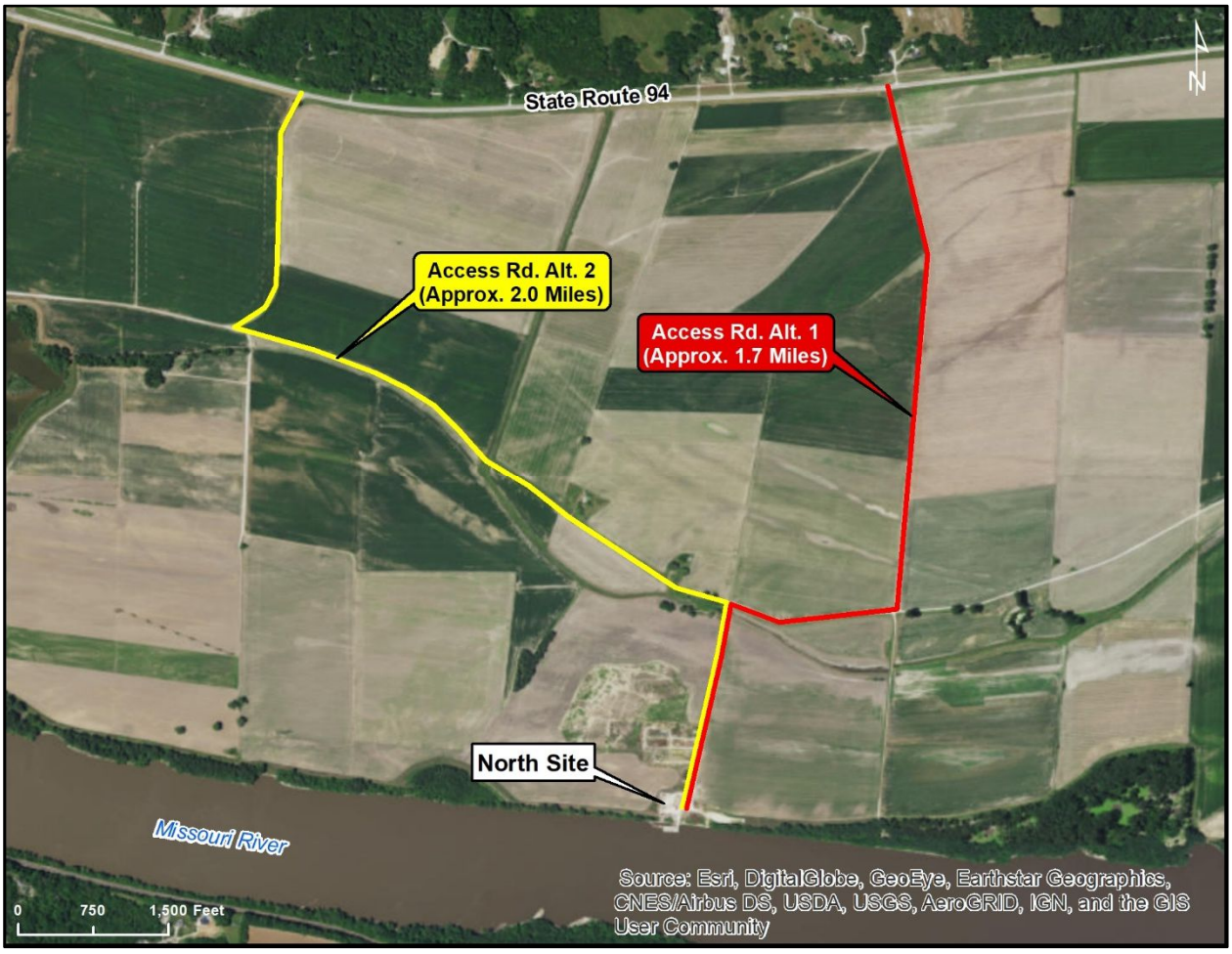


North Site – Conceptual Site Plan

The potential development of the North Site assumes the overall port facility development will be split between two sites, in conjunction with South Site Plan B (described in previous section). In this scenario, commodities typically handled by crane (e.g., OD/OW, break bulk, containers) will be handled at this site, and dry bulk commodities will be handled at the South Site. All commodities anticipated at the North Site will be inbound and/or outbound via barge and/or truck, as this site does not have feasible rail access due to lack of nearby rail infrastructure.

Two alternatives for site access from State Route 94 are shown in Figure 8.4. Both roads are currently gravel; in order to support the heavy truck loads anticipated at the North Site associated with OD/OW, break bulk, and containerized commodities, widening and reconstruction with reinforced concrete is recommended. Access Road Alternative 1 is preferred, since it is over a quarter-mile shorter distance to State Route 94 and will likely required one less drainage structure. Thus, the construction cost for access road Alternative 1 is anticipated to be lower.

Figure 8.4 North Site Access Road Alternatives



The North Site Conceptual Site Plan is presented in Figure 8.5. As shown, the improved access road will terminate at a cul-de-sac near the riverfront. This area will provide sufficient space for multiple trucks to

queue and turn around to exit the site without making a multi-point turn. A truck loading/unloading area is adjacent to the cul-de-sac, providing about 1 acre for truck-related operations.

An expanded dock and barge-related operations area is located at the riverfront. Expansion of the dock is recommended in order to allow a crane to access the entire length of a barge without having to move the barge until it is fully loaded/unloaded. This will provide for improved operational efficiency. Based on information available from the NWI, the area proposed for the expanded dock is classified as forested wetlands, so impacts associated with the expanded dock may be on the order of 1/2 acre.

An area for temporary break bulk storage and/or OD/OW lay-down, approximately 1 acre in size, is located immediately west of the truck loading/unloading area. The purpose of this area is to temporarily place these commodities when immediate transfer from barge to truck or truck to barge is not feasible. This temporary storage area, along with the truck loading/unloading area and the cul-de-sac described above, is reported to be elevated to a more “flood proof” elevation, assumed to be the 100-year flood elevation.

A container storage area is located immediately north of the truck loading/unloading and temporary storage areas. The container storage area is about 2 acres in size, which depending on equipment capabilities, provides storage for 250 to 300 containers 40 feet in length (or 500 to 600 Twenty-Foot Equivalent Units; TEUs).

Finally, a 4.5-acre area designated for future development and/or storage is shown as the westernmost portion of the conceptual site plan. A project stakeholder reported that additional land adjacent to the North Site may be available for expansion, if needed in the future.

Note, the portions of the conceptual site plan designated as future development, container storage, and temporary storage are currently used for agricultural purposes and appear to be at an elevation of about 540 feet (NGVD), based on readily available public information. For reference, the 100-year flood elevation at the site is about 553 feet (NAVD), based on a 2012 FEMA Flood Insurance Rate Map. Further, because the entire site is located within the floodway, construction of buildings is not likely to be permitted at the North Site.

The opinion of probable construction costs for the North Site Conceptual Site Plan are discussed in the following section.

Figure 8.5 North Site – Conceptual Site Plan

Combined Cost Estimate

The South Site opinion of probable construction costs for Conceptual Site Plan B is provided in Table 8.3. As shown, the total cost is anticipated to be about $45.8 million. The fill required to raise the portion of the site designated for development (including future development) to the FEMA BFE represents about one-third of the total cost.

Table 8.3 South Site Plan B – Opinion of Probable Construction Costs

Quantity	Unit	Description	Unit Cost	Total Cost
0.73	MILE	Access & Internal Roads (2-way)	$1,825,000	$1,332,250
1,139,809	CY	Fill/Embankment	$14	$15,958,460
1	ACRE	Wetland Mitigation	$55,000	$55,000
2	EA	Tripod Mooring Dolphin	$65,000	$130,000
1	EA	Cell (20-30 ft. diameter)	$250,000	$250,000
1	EA	Gangway (approx. 400 ft.)	$100,000	$100,000
3,854	LF	Utility Service (electricity, water, sewer)	$150	$578,100
1	EA	Dry Bulk Storage (200K bushels)	$4,000,000	$4,000,000
1	EA	Truck Dump Pit	$550,000	$550,000
1	EA	Scales/Testing Equipment	$500,000	$500,000
1,250	LF	Conveyor System & Foundations	$2,000	$2,500,000
4	EA	Rail Switch (on-site)	$85,000	$340,000
1	EA	Rail Switch (Mainline)	$300,000	$300,000
1.51	MILE	Rail/Track	$1,850,000	$2,793,500
1	EA	Rail Dump Pit	$550,000	$550,000
1	LS	Mobilization	5%	$1,496,866
1	LS	Engineering/Permitting/Surveying	12%	$3,772,101
1	LS	Contingency	30%	$10,561,883
			TOTAL	**$45,768,160**

Note: Costs are shown in 2018 Dollars. Fill/embankment quantity assumes existing average elevation of 540 feet and fill to FEMA BFE. Utilities assumed to be underground from beginning of access road.

The opinion of probable construction costs for the North Site Conceptual Site Plan is provided in Table 8.4. As shown, the total cost is anticipated to be about $13.7 million. Improvements to the relatively long access road represents about 23 percent of the total cost, and expansion of the existing dock accounts for about 25 percent of the total. Note, the utility service line item does not include sewer service, since the entire site is located within the floodway and construction of buildings is not likely to be permitted.

Table 8.4 North Site – Opinion of Probable Construction Costs

Quantity	Unit	Description	Unit Cost	Total Cost
1.70	MILE	Access & Internal Roads (2-way)	$1,825,000	$3,102,500
109,960	CY	Fill/Embankment	$14	$1,539,440
0.5	ACRE	Wetland Mitigation	$55,000	$27,500
1	LS	Expanded Dock (200 ft. sheet pile face)	$3,500,000	$3,500,000
2	EA	Tripod Mooring Dolphin	$65,000	$130,000
8,976	LF	Utility Service (electricity & water)	$105	$942,480
1	LS	Mobilization	4%	$369,677
1	LS	Engineering/Permitting/Surveying	10%	$961,160
1	LS	Contingency	30%	$3,171,827
			TOTAL	**$13,744,583**

Note: Costs are shown in 2018 Dollars. Fill/embankment quantity assumes existing average elevation of 540 feet and fill to FEMA BFE. Utilities assumed to be underground from beginning of access road.

The opinion of probable construction costs of developing both the South Site Conceptual Site Plan B and the North Site Conceptual Site Plan is approximately $59.9 million.

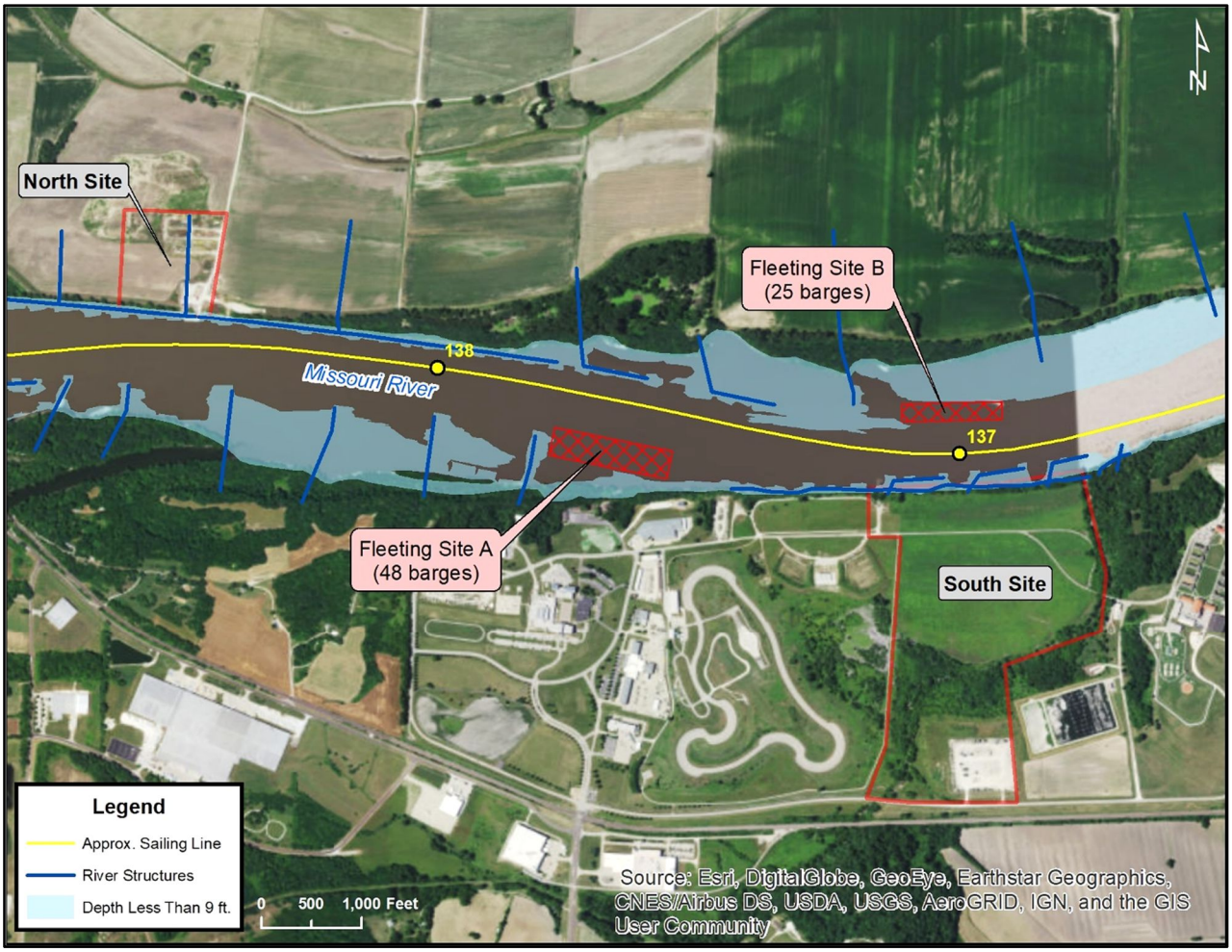
8.3 Barge Fleeting Analysis

The study team analyzed the Missouri River in the project vicinity to determine areas that have the potential to be used for barge fleeting. For reference, a barge fleeting area is a “parking lot” for barges on a river; a typical hopper barge is approximately 200 feet long and 35 feet wide. When searching for a barge fleeting area, river depths, the location’s proximity to the navigation channel, and the proximity to river structures (dikes and revetment) must be considered. The navigation channel is approximately 300 feet wide on this section of the Missouri River, and as shown in Figure 6, many river structures are located in the vicinity of the two sites.

Two potential barge fleeting sites were identified in the project vicinity. Fleeting Site A, located on the south side of the river, roughly half-way between the North Site and the South Site, is anticipated to provide fleeting for up to 48 barges. Fleeting Site B, located on the north side of the river, directly across the river from the South Site, is anticipated to accommodate up to 25 barges.

The most appropriate site for barge fleeting will depend on the selected site(s) for river terminal development and anticipated barge demand. However, the project stakeholders may consider acquiring USACE permits for both fleeting sites, as the cost to acquire permits for both sites will not increase significantly over that for a single site for barge fleeting.

Figure 8.6 Potential Barge Fleeting Locations



9.0 Benefit-Cost Analysis of Port Development Opportunities

This section describes the method used for estimating the benefits and life cycle costs of the potential port development opportunities in Central Missouri. A benefit-cost analysis quantifies the monetized dollar value of transportation system benefits and compares:

- Cost factors, including facility capital costs, facility maintenance costs, and operating costs; and
- Benefit and other impact factors, including operating benefits such as efficiency, capacity, safety, and environmental quality.

This analysis considers three project options:

- A “No-Build” option in which the proposed investments in a public port facility along the Missouri River in central Missouri do not occur.
- A “Development Opportunity A” option in which all port facility development is located at a single site: the South Site (Conceptual Site Plan A). In this scenario, all anticipated commodity types (e.g., dry bulk, OD/OW, break bulk, containers) will be handled at the South Site. Development Opportunity A is described in detail in Section 8.2.1.
- A “Development Opportunity B” option in which the overall port facility development is split between two sites: the South Site (Conceptual Site Plan B) and the North Site. In this scenario, dry bulk commodities will be handled at the South Site using conveyor systems, while commodities typically moved by crane (e.g., OD/OW, break bulk, containers) will be handled at the North Site. Development Opportunity B is described in detail in Section 8.2.2.

9.1 Port Development Opportunity Project Benefits

The project benefits resulting from either Development Opportunity A or Development Opportunity B are equal. This is because they are largely derived from the volume of tons diverted from truck and rail modes to barge, as described in Section 7.0, which represents the market potential for the port regardless of the specifics of the design. The project benefits are broken down into the following major categories, listed below and described in Table 9.1:

- Freight Transportation Costs Savings;
- Freight Emission Cost Savings;
- Safety Cost Savings;
- State of Good Repair (SOGR) Cost Savings; and
- Job Creation.

Table 9.1 Direct Benefits Resulting from Central Missouri Port Development

Benefit Category	Description
Freight Transportation Costs	This benefit category captures the cost savings from transporting goods via barge as opposed to truck carrier or railroad. The truck, rail, and barge operating costs are calculated by multiplying truck and rail ton-miles diverted to barge by their corresponding unit operating cost (in $/ton-mile), and the additional barge ton-miles (resulting from the diverted tonnage) by the corresponding unit operating cost (in $/ton-mile). The combined truck and rail operating costs minus the barge operating cost captures the net reduction in freight transportation cost from displacing heavy trucks and railcars.
Social Cost of Carbon (SCC) Emissions Cost Savings	This category of project benefits captures the net savings in carbon emission damage costs resulting from truck and rail ton-miles saved (or avoided) due to truck/rail to barge freight diversion.
Non-Carbon Emissions Cost Savings	This category of project benefits captures the net savings in non-carbon emissions (i.e. hydrocarbons, nitrogen oxides, and particulate matter) damage costs resulting from truck and rail ton-miles saved (or avoided) due to truck/rail to barge freight diversion.
Safety Cost Savings	This category of project benefits captures the net savings in traffic crash costs resulting from truck and rail ton-miles saved (or avoided) due to truck/rail to barge freight diversion.
State of Good Repair Cost Savings	This benefit category captures the net savings in pavement and rail track maintenance costs resulting from truck and rail ton miles saved (or avoided) due to truck/rail to barge freight diversion.

Increased barge activity is expected result once the project is completed, contributing to a reduction in cargo being shipped by truck and rail. This truck/rail-to-barge mode shift and improved rail/barge connectivity have the potential to generate the following direct benefits:

- **Freight Transportation Cost Savings** – Waterborne freight provides an impact to commodity access through the difference in transportation costs of shipping via barge rather than truck or rail.
- **Freight Environmental and Safety Impacts** - Less trucks and freight trains on the roadway and railways, respectively, has the potential to reduce truck and rail related emissions and improve highway and rail safety.
- **State of Good Repair of the Freight System Infrastructure** - Less trucks on the roadway reduces road wear and tear, which in turn, reduces highway maintenance cost and helps to achieve the state of good repair (SOGR) for pavement assets in the region.

The benefits of the potential port development project are calculated in 2016 dollars over a time horizon of 25 years, starting in 2020 and ceasing in 2045.

9.1.1 Freight Transportation Costs

This benefit category captures the cost savings from transporting goods via barge as opposed to truck carrier or railroad. The truck, rail, and barge operating costs are calculated by multiplying truck and rail ton-miles diverted to barge by their corresponding unit operating costs (i.e. $/truck ton-mile and $/rail ton-mile), and the additional barge ton-miles (resulting from the diverted tonnage) by the corresponding unit operating cost (i.e. $/barge ton-mile). The combined truck and rail operating costs minus the barge operating cost captures the

net reduction in freight transportation cost from displacing heavy trucks and railcars. The values and key inputs and sources used in estimation of this benefit category include:

- Truck tonnage diverted to water and rail tonnage diverted to water (Table 9.2)
- Freight transportation costs per ton-mile (Table 9.3)
- Average loaded U.S. railcar weight for selected commodities (Table 9.4)
- Truck payload factors by commodity (Table 9.5)

Table 9.2 Potential Freight Demand for Port

Year	Tonnage Diverted from Rail Demand (in Thousands)	Tonnage Diverted from Truck Demand (in Thousands)
2020	18.4	61.7
2045	31.3	84.0

Source: Cambridge Systematics analysis

Table 9.3 Freight Transportation Costs per Ton-Mile

Freight Mode	1995$	2016$
Road	$0.25	$0.394
Rail	$0.03	$0.047
Water	$0.01	$0.016
Air	$0.59	$0.929

Source: Adapted from R. Ballou (1998) Business Logistics Management, 4th Edition, Upper Saddle River, NJ: Prentice Hall.

Table 9.4 Average Loaded U.S. Railcar Weight for Selected Commodities: 1993 and 2003

Commodity Name	1993 Tons per Carload	2003 Tons per Carload
Farm products	90.1	93.0
Coal	100.5	111.4
Nonmetallic minerals	91.8	96.8
Food and kindred products	63.5	69.1
Chemicals and allied products	83.4	84.2
Transportation equipment	21.1	20.4
Miscellaneous mixed shipments	16.8	14.5

Source: 2003—AAR, Railroad Facts 2004 (Washington, DC: 2004), pp. 25 and 29. 1993—U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, calculations based on AAR, Railroad Ten-Year Trends 1990–1999 (Washington, DC: 2000).

Table 9.5 Truck Payload Factors by SAM Commodity Group

SAM Commodity Group	Commodity Name	Tons per Loaded Truck
1	Agriculture	16.88
2	Chemicals	20.21
3	Clay, Concrete, Glass	15.88
4	Coal	24.81
5	Consumer Manufacturing	17.85
6	Durable Manufacturing	15.55
7	Food	22.89
8	Lumber	25.50
9	Mining	23.01
10	Non-Durable Manufacturing	13.64
11	Nonmetallic Minerals	24.31
12	Paper	24.18
13	Petroleum	24.16
14	Primary Metal	24.91
15	Secondary & Misc. Mixed	19.62
	All Commodities	20.89

Source: SAM - Third Version (SAM-V3)

The metrics to measure net savings in freight transportation costs arising from a port development opportunity are the savings in freight transportation costs resulting from truck and rail tonnage shifting to barge. The estimation of this category of benefits involves the following steps:

- Estimation of the freight tonnage diverted from truck/rail to barge over the 2020-2045 timeframe. The tons diverted from truck/rail to barge in 2020 and 2045 (Table 9.2) are interpolated from the data provided for those two years to generate values for the intermittent years, assuming a linear growth over the analysis period.

- Estimation of the average annual ton-miles saved by multiplying the average annual tonnage diverted to truck by the average truck travel distance (665 miles) and the average annual tonnage diverted to rail by the average rail travel distance (779 miles) over the 25-year analysis period.

- Estimation of the avoided freight transportation costs by multiplying the average annual truck ton-miles and rail ton-miles saved by their corresponding unit freight transportation cost (Table 9.3) over the 25-year analysis period.

- Estimation of the additional freight transportation costs by multiplying the combined tonnage diverted from truck and rail to barge by the average barge travel distance (1,002 miles) and by the corresponding unit freight transportation cost (Table 9.3) over the 25-year analysis period.

- Estimation of the net savings in freight transportation costs by adding together the avoided freight transportation cost resulting from truck and rail cargo being shipped by barge (rather than by truck and

rail) and then, by subtracting the additional freight transportation costs resulting from cargo being shipped by barge over the 25-year analysis period.

Total net savings in freight transportation costs resulting from the port development project over the 25-year analysis period, summarized in Table 9.6, account for $475.8 million (in 2016$). This represents $151.9 million in benefits (in 7 percent discounted 2016 dollars) and $246.4 million in benefits (in 3 percent discounted 2016 dollars) over the 25-year analysis period. Note that freight transportation cost savings may decrease in a given year in the event of an extended drought or other cause of low channel depths on the Missouri River.

Table 9.6 Net Freight Transportation Cost Benefits Resulting from the Port Development Project

A	B	C	D	E
Year	Calendar Year	Net Freight Transportation Cost Savings (in 2016$)	NPV of Net Freight Transportation Cost Savings	
			3%	7%
			NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]
4	2020	$15,566,670	$13,830,785	$11,875,738
5	2021	$15,763,641	$13,597,855	$11,239,258
6	2022	$15,963,134	$13,368,874	$10,636,911
7	2023	$16,165,184	$13,143,774	$10,066,864
8	2024	$16,369,822	$12,922,489	$9,527,386
9	2025	$16,577,084	$12,704,955	$9,016,835
10	2026	$16,787,003	$12,491,107	$8,533,661
11	2027	$16,999,614	$12,280,883	$8,076,394
12	2028	$17,214,953	$12,074,222	$7,643,645
13	2029	$17,433,055	$11,871,062	$7,234,098
14	2030	$17,653,956	$11,671,344	$6,846,508
15	2031	$17,877,692	$11,475,010	$6,479,698
16	2032	$18,104,302	$11,282,003	$6,132,554
17	2033	$18,333,823	$11,092,265	$5,804,019
18	2034	$18,566,293	$10,905,741	$5,493,096
19	2035	$18,801,751	$10,722,376	$5,198,841
20	2036	$19,040,236	$10,542,117	$4,920,359
21	2037	$19,281,787	$10,364,911	$4,656,804
22	2038	$19,526,445	$10,190,705	$4,407,376
23	2039	$19,774,252	$10,019,450	$4,171,317
24	2040	$20,025,248	$9,851,095	$3,947,910
25	2041	$20,279,475	$9,685,590	$3,736,477
26	2042	$20,536,976	$9,522,887	$3,536,375
27	2043	$20,797,794	$9,362,939	$3,346,997
28	2044	$21,061,973	$9,205,699	$3,167,767
29	2045	$21,329,557	$9,051,120	$2,998,143
Totals =		**$475,831,721**	**$246,403,021**	**$151,909,272**

9.1.2 Freight Emissions Cost Savings

This category of project benefits captures the net savings in carbon emission damage costs resulting from truck and rail ton-miles saved (or avoided) due to truck/rail to barge freight diversion. The values and key inputs and sources used in the estimation of this benefit category include:

- Freight (truck and rail) emission rates (Table 9.7); and
- Unit emission damage costs for non-carbon and carbon emissions (Table 9.8 and Table 9.9, respectively).

It should be noted that the social cost of carbon (SCC) dioxide emissions increases annually and values for these emissions are to be discounted at a value of 3 percent rather than the 7 percent recommendation for all other non-carbon benefits or costs.

Table 9.7 Freight Emission Rates

Freight Mode	Emission Type (in Grams per Ton-Mile)			
	Hydrocarbons (HC)	Nitrogen Oxides (NOx)	Particular Matter (PM)	Carbon Dioxide (CO2)
Inland Towing (Inland Barge)	0.00940	0.20870	0.00560	15.62
Railroad	0.01280	0.28300	0.01075	21.19
Truck	0.08000	0.94000	0.05000	154.08

Note: HC = VOC for trucks

Source: *A Modal Comparison of Domestic Freight Transportation Effects on the General Public*. Prepared for U.S. Maritime Administration and National waterways Foundation. Prepared by the Texas Transportation Institute. January 2017.

Table 9.8 Non-Carbon Emission Damage Costs

Emission Type	Emission Damage Cost (in Grams per Mile)
HC	$1,872
NOx	$7,377
PM	$337,459

Note: HC = VOC for trucks

Source: U.S. DOT Benefit-Cost Analysis (BCA) Guidance for TIGER and INFRA Applications, Updated July 2017. Technical Support Document: *Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light Trucks (August 2012), page 922, Table VIII-16, "Economic Values Used for Benefits Computations (2010 dollars)", available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FRIA_2017-2025.pdf

Table 9.9 Social Cost of Carbon Emissions (3 Percent)

Year	3% SCC (Dollar per Metric Tons) in 2015 Dollar	Year	3% SCC (Dollar per Metric Tons) in 2015 Dollar
2020	47	**2033**	60
2021	47	**2034**	61
2022	49	**2035**	62
2023	50	**2036**	63
2024	51	**2037**	64
2025	52	**2038**	66
2026	53	**2039**	67
2027	54	**2040**	68
2028	55	**2041**	$69
2029	55	**2042**	$69
2030	57	**2043**	$70
2031	58	**2044**	$71
2032	59	**2045**	$72

Source: U.S. DOT Benefit-Cost Analysis (BCA) Resource Guide (November 2016). Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866 (May 2013; revised August 2016), page 25, Table A1 "Annual SCC Values: 2010-2050 (2007$/metric ton CO2);" values for 3% discount rate. Available at https://www.transportation.gov/fastlanegrants/bca-resource-guide.

The metric to measure environmental benefits arising from the port development project is the net savings in emission costs resulting from truck ton-miles and rail ton-miles saved (or avoided) due to the truck/rail-to-barge freight diversion. The estimation of this category involves the following steps:

- Estimation of the truck and rail emission damage costs saved due to truck/rail cargo diverted to barge. This is accomplished by multiplying the average annual truck ton-miles by the truck emission rates (Table 9.7), and the annual rail ton-miles by the rail emission rates (Table 9.7) for the major clean air pollutants, and then, by the corresponding emission damage costs (Table 9.8 and Table 9.9), over the 25-year analysis period. This estimation involves converting grams to short tons for the non-carbon emissions (i.e. hydrocarbons (HC), nitrogen oxides (NOx), and particulate matters (PM)) and grams to metric tons for of carbon dioxide (CO_2).

- Estimation of the additional barge emission damage costs by multiplying the additional average annual barge ton-miles by the barge emission rates (Table 9.7) for the major clean air pollutants, and then, by the corresponding emission damage costs (Table 9.8 and Table 9.9), over the 25-year analysis period. This estimation involves converting grams to short tons for the non-carbon emissions (HC, NOx, and PM) and grams to metric tons for of carbon dioxide (CO_2).

- Estimation of the annual net emission cost benefits by subtracting the additional annual barge emission costs from the avoided annual truck and rail emission costs and then, adding the net savings over the 25-year analysis period.

Total net savings in carbon emission costs resulting from the port development project over the 2020-2045 timeframe, summarized in Table 9.10, account for $46 million (in 2016 dollars).This represents $28 million in benefits (in 3 percent discounted 2016 dollars) over the 25-year analysis period.

Table 9.10 Social Cost of Carbon (SCC) Emissions Cost Savings Resulting from the Port Development Project

A	B	C	D
Year	Calendar Year	CO Emissions Damage Cost (3% SCC) (in 2016$)	NPV of SCC Emissions Saved/Wasted 3% NPV = [C/(1+3%)^A]
4	2020	$1,479,125	$1,314,184
5	2021	$1,498,958	$1,293,015
6	2022	$1,519,069	$1,272,197
7	2023	$1,539,462	$1,251,723
8	2024	$1,560,140	$1,231,589
9	2025	$1,581,109	$1,211,788
10	2026	$1,602,372	$1,192,315
11	2027	$1,623,934	$1,173,165
12	2028	$1,645,800	$1,154,331
13	2029	$1,667,973	$1,135,809
14	2030	$1,690,459	$1,117,593
15	2031	$1,713,262	$1,099,678
16	2032	$1,736,387	$1,082,059
17	2033	$1,759,838	$1,064,731
18	2034	$1,783,622	$1,047,690
19	2035	$1,807,742	$1,030,930
20	2036	$1,832,203	$1,014,446
21	2037	$1,857,011	$998,235
22	2038	$1,882,172	$982,291
23	2039	$1,907,690	$966,611
24	2040	$1,933,570	$951,188
25	2041	$1,959,819	$936,021
26	2042	$1,986,442	$921,103
27	2043	$2,013,444	$906,431
28	2044	$2,040,832	$892,000
29	2045	$2,068,610	$877,807
Totals =		**$45,691,047**	**$28,118,928**

Total net savings in non-carbon emission costs resulting from the port development project over the 2020-2045 timeframe, summarized in Table 9.11, account for $14.6 million (in 2016 dollars). This represents $4.8 million in benefits (in 7 percent discounted 2016 dollars) and $8.7 million in benefits (in 3 percent discounted 2016 dollars) over the 25-year analysis period.

Table 9.11 Non-Carbon Emissions Cost Savings Resulting from the Port Development Project

A	B	C	D	E
Year	Calendar Year	Non-Carbon Emissions Damage Cost (in 2016$)	NPV of Non-Carbon Emission Cost Saved/Wasted	
			3%	7%
			NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]
4	2020	$370,316	$329,021	$282,513
5	2021	$375,170	$323,625	$267,491
6	2022	$396,263	$331,864	$264,047
7	2023	$409,654	$333,086	$255,112
8	2024	$423,330	$334,181	$246,382
9	2025	$437,298	$335,152	$237,861
10	2026	$451,561	$336,004	$229,551
11	2027	$466,127	$336,740	$221,454
12	2028	$481,000	$337,364	$213,570
13	2029	$487,327	$331,846	$202,223
14	2030	$511,693	$338,289	$198,443
15	2031	$527,524	$338,598	$191,199
16	2032	$543,687	$338,808	$184,165
17	2033	$560,187	$338,922	$177,341
18	2034	$577,031	$338,945	$170,723
19	2035	$594,225	$338,878	$164,308
20	2036	$611,777	$338,726	$158,095
21	2037	$629,691	$338,490	$152,079
22	2038	$657,946	$343,377	$148,507
23	2039	$676,740	$342,899	$142,756
24	2040	$695,921	$342,347	$137,198
25	2041	$715,495	$341,724	$131,829
26	2042	$724,963	$336,161	$124,835
27	2043	$745,206	$335,484	$119,926
28	2044	$765,864	$334,741	$115,188
29	2045	$786,944	$333,937	$110,615
Totals =		**$14,622,939**	**$8,749,209**	**$4,847,411**

Total net savings in carbon and non-carbon emission costs resulting from the port development project over the 2020-2045 timeframe, summarized in Table 9.12, account for $60.3 million (in 2016 dollars). This represents $33 million in benefits (in 7 percent discounted 2016 dollars) and $37 million in benefits (in 3 percent discounted 2016 dollars) over the 25-year analysis period.

Table 9.12 Carbon and Non-Carbon Emissions Cost Savings Resulting from the Port Development Project

A	B	C	D	E
Year	Calendar Year	Carbon Emissions Damage Cost (in 2016$)	NPV of Emissions Saved	
			3%	7%
			NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]
4	2020	$1,849,442	$1,643,205	$1,596,696
5	2021	$1,874,128	$1,616,639	$1,560,506
6	2022	$1,915,332	$1,604,060	$1,536,243
7	2023	$1,949,116	$1,584,809	$1,506,835
8	2024	$1,983,471	$1,565,770	$1,477,971
9	2025	$2,018,407	$1,546,941	$1,449,649
10	2026	$2,053,934	$1,528,320	$1,421,866
11	2027	$2,090,062	$1,509,905	$1,394,618
12	2028	$2,126,800	$1,491,695	$1,367,901
13	2029	$2,155,300	$1,467,654	$1,338,032
14	2030	$2,202,152	$1,455,882	$1,316,036
15	2031	$2,240,786	$1,438,275	$1,290,877
16	2032	$2,280,073	$1,420,866	$1,266,224
17	2033	$2,320,025	$1,403,653	$1,242,072
18	2034	$2,360,652	$1,386,635	$1,218,412
19	2035	$2,401,967	$1,369,808	$1,195,238
20	2036	$2,443,980	$1,353,172	$1,172,541
21	2037	$2,486,703	$1,336,725	$1,150,314
22	2038	$2,540,118	$1,325,668	$1,130,798
23	2039	$2,584,430	$1,309,509	$1,109,367
24	2040	$2,629,491	$1,293,535	$1,088,387
25	2041	$2,675,314	$1,277,745	$1,067,850
26	2042	$2,711,405	$1,257,264	$1,045,938
27	2043	$2,758,651	$1,241,914	$1,026,357
28	2044	$2,806,696	$1,226,742	$1,007,188
29	2045	$2,855,554	$1,211,744	$988,422
Totals =		**$60,313,986**	**$36,868,137**	**$32,966,339**

9.1.3 Safety Cost Savings

This category of project benefits captures the net savings in traffic crash costs resulting from truck and rail ton-miles saved (or avoided) due to truck/rail to barge freight diversion. The values and key inputs and sources used in the estimation of this benefit category include:

- Fatality and injury accident rates by freight mode (Table 9.13)
- Average comprehensive costs of fatalities and injuries (Table 9.14)

Table 9.13 Fatality and Injury Statistics by Mode

Freight Mode	Annual Ton-Miles (millions)	Total Fatalities		Total Injuries	
		Average Annual*	Rate**	Average Annual*	Rate**
Barge	272,600	6	0.000022	6	0.000059
Rail	1,677,800	807	0.000481	7,962	0.004746
Truck	2,552,197	4452	0.001744	104,286	0.040861

Note: *14-year average; **Per Million Ton-Miles

Source: A Modal Comparison of Domestic Freight Transportation Effects on the General Public: 2001–2014, Center for Ports and Waterways, Texas A&M Transportation Institute, January 2017

Table 9.14 Average Comprehensive Cost of Fatalities and Injuries

Accidents Severity	Monetized Value (in 2016$)	Unit
Fatal Accident	$9,600,000	$/person
Accident Injured Severity Unknown	$174,000	$/person

Source: U.S. DOT Benefit-Cost Analysis (BCA) Guidance for TIGER and INFRA Applications, Updated July 2017. Technical Support Document: *Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses (2016),* available at https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis

The metric to measure safety benefits arising from the port development project is the net savings in accident costs resulting from truck/rail ton-miles saved (or avoided) due to the truck/rail-to-barge freight diversion. The estimation of this category involves the following steps:

- Estimation of the truck/rail accident costs saved due to truck/rail cargo diverted to barge. This is accomplished by multiplying the average annual truck ton-miles and rail ton-miles avoided by the corresponding fatality and injury rates for truck and rail modes (Table 9.13) and then, by the average comprehensive cost of fatalities and injuries (Table 9.14) over the 25-year analysis period.

- Estimation of the additional barge accident costs (due to truck/rail cargo diverted to barge) by multiplying the additional average annual barge ton-miles by the corresponding fatality and injury rates for the barge mode (Table 9.13) and then, by the average comprehensive cost of fatalities and injuries (Table 9.14) over the 25-year analysis period

- Estimation of the annual net safety benefits by subtracting the annual barge accident costs from the combined annual truck accident cost and rail accident cost avoided over the 25-year analysis period.

Table 9.15 shows the annual and total net accident cost savings, resulting from the port development opportunity, over the 25-year analysis period. These savings account for $35 million (in 2016 dollars). This represents $12.3 million in benefits (in 7 percent discounted 2016 dollars) and $21.5 million in benefits (in 3 percent discounted 2016 dollars) over the 25-year analysis period, as shown in Table 9.16.

Table 9.15 Net Accident Cost Savings Resulting from the Port Development Project

Year	Avoided Truck Accident Costs (2016$)	Avoided Rail Accident Costs (2016$)	Additional Barge Accident Costs (2016$)	Net Accident Cost Savings (in 2016$)
2020	$978,776	$78,015	$17,779	$1,039,013
2021	$990,942	$173,714	$18,036	$1,146,619
2022	$1,003,258	$177,440	$18,298	$1,162,400
2023	$1,015,728	$181,245	$18,564	$1,178,409
2024	$1,028,353	$185,132	$18,834	$1,194,651
2025	$1,041,134	$189,103	$19,108	$1,211,129
2026	$1,054,075	$193,159	$19,386	$1,227,847
2027	$1,067,176	$197,301	$19,669	$1,244,808
2028	$1,080,440	$201,533	$19,956	$1,262,016
2029	$1,093,869	$205,855	$20,248	$1,279,476
2030	$1,107,465	$210,270	$20,544	$1,297,191
2031	$1,121,230	$214,780	$20,845	$1,315,164
2032	$1,135,165	$219,386	$21,151	$1,333,401
2033	$1,149,275	$224,092	$21,461	$1,351,905
2034	$1,163,559	$228,898	$21,776	$1,370,680
2035	$1,178,021	$233,807	$22,097	$1,389,731
2036	$1,192,663	$238,821	$22,422	$1,409,062
2037	$1,207,487	$243,943	$22,752	$1,428,678
2038	$1,222,495	$249,175	$23,088	$1,448,582
2039	$1,237,689	$254,519	$23,429	$1,468,780
2040	$1,253,073	$259,978	$23,775	$1,489,276
2041	$1,268,647	$265,554	$24,127	$1,510,074
2042	$1,284,416	$271,249	$24,485	$1,531,180
2043	$1,300,380	$277,067	$24,848	$1,552,599
2044	$1,316,542	$283,009	$25,217	$1,574,335
2045	$1,332,906	$289,079	$25,591	$1,596,394
Total =	**$29,824,763**	**$5,746,126**	**$557,488**	**$35,013,401**

Table 9.16 Safety Cost Savings Resulting from the Port Development Project

A	B	C	D	E
Year	Calendar Year	Net Accident Cost Savings (in 2016$)	NPV of Reduced/Additional Traffic Crashes	
			3%	7%
			NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]
4	2020	$1,039,013	$923,149	$792,658
5	2021	$1,146,619	$989,084	$817,524
6	2022	$1,162,400	$973,492	$774,556
7	2023	$1,178,409	$958,155	$733,854
8	2024	$1,194,651	$943,069	$695,298
9	2025	$1,211,129	$928,230	$658,774
10	2026	$1,227,847	$913,633	$624,175
11	2027	$1,244,808	$899,276	$591,399
12	2028	$1,262,016	$885,153	$560,350
13	2029	$1,279,476	$871,261	$530,937
14	2030	$1,297,191	$857,596	$503,073
15	2031	$1,315,164	$844,154	$476,676
16	2032	$1,333,401	$830,931	$451,669
17	2033	$1,351,905	$817,925	$427,978
18	2034	$1,370,680	$805,130	$405,535
19	2035	$1,389,731	$792,544	$384,272
20	2036	$1,409,062	$780,164	$364,128
21	2037	$1,428,678	$767,985	$345,044
22	2038	$1,448,582	$756,004	$326,964
23	2039	$1,468,780	$744,219	$309,835
24	2040	$1,489,276	$732,625	$293,606
25	2041	$1,510,074	$721,220	$278,230
26	2042	$1,531,180	$710,000	$263,662
27	2043	$1,552,599	$698,963	$249,860
28	2044	$1,574,335	$688,105	$236,783
29	2045	$1,596,394	$677,424	$224,394
Totals =		**$35,013,401**	**$21,509,489**	**$12,321,236**

9.1.4 State of Good Repair Cost Savings

This benefit category captures the net savings in freight infrastructure maintenance costs resulting from truck and rail ton miles saved (or avoided) due to truck/rail-to-barge freight diversion.

This analysis uses the average external marginal costs for combined urban and rural highways provided by the Federal Highway Administration (FHWA)[20] which represent the additional spending (or saving) in all costs of maintaining pavements, including resurfacing and reconstruction, resulting from a unit increase/decrease in vehicle miles traveled (VMT) borne by public agencies responsible for highway maintenance. The estimated marginal external pavement costs are estimated at $0.1659 per unit increase or decrease in avoided truck VMT. In addition, this analysis uses the estimated track maintenance costs due to avoided rail traffic, which is $342 per million tons of traffic, according to Coal Slurry Pipeline and Unit Trains Systems. It is assumed that the avoided rail tonnage has no impact on the track maintenance cost per mile, due to its

[20] Addendum to the 1997 Federal Highway Cost Allocation Study Final Report, 2000. Table 13.

relatively small value. It is also assumed that the additional barge tonnage has no impact on waterway maintenance costs.

Table 9.17 summarizes the SOGR benefits resulting from the port development project. Savings in pavement maintenance costs generated by the project over the 25-year analysis account for $10 million (in 2016$), representing $3.2 million in benefits (in 7 percent discounted 2016 dollars) and $5.2 million in benefits (in 3 percent discounted 2016 dollars).

Table 9.17 State of Good Repair Cost Savings Resulting from the Port Development Project

A	B	C	D	E
Year	Calendar Year	Net Freight Transportation Cost Savings (in 2016$)	NPV of Net Freight Transportation Cost Savings	
			3%	7%
			NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]
4	2020	$328,619	$291,974	$250,702
5	2021	$332,699	$286,989	$237,210
6	2022	$336,830	$282,090	$224,444
7	2023	$341,012	$277,274	$212,365
8	2024	$345,246	$272,540	$200,936
9	2025	$349,533	$267,888	$190,123
10	2026	$353,872	$263,314	$179,891
11	2027	$358,266	$258,819	$170,210
12	2028	$362,714	$254,400	$161,049
13	2029	$367,217	$250,057	$152,382
14	2030	$371,777	$245,788	$144,181
15	2031	$376,393	$241,592	$136,422
16	2032	$381,066	$237,468	$129,080
17	2033	$385,797	$233,414	$122,134
18	2034	$390,587	$229,429	$115,561
19	2035	$395,437	$225,512	$109,342
20	2036	$400,346	$221,662	$103,457
21	2037	$405,317	$217,878	$97,889
22	2038	$410,349	$214,158	$92,621
23	2039	$415,444	$210,502	$87,637
24	2040	$420,602	$206,908	$82,920
25	2041	$425,824	$203,376	$78,458
26	2042	$431,111	$199,904	$74,235
27	2043	$436,464	$196,491	$70,240
28	2044	$441,883	$193,137	$66,460
29	2045	$447,369	$189,840	$62,884
Totals =		**$10,011,776**	**$5,189,657**	**$3,200,556**

9.1.5 Job Creation

The expenditure of public sector dollars is expected to create short-term jobs in the development and construction phase of the port development project. The benefit of increase in the job-years as a result of the project during development and construction is computed as a product of the undiscounted project cost and the value on government dollars spent to create a single job-year. The U.S. Department of Transportation

estimates that there are 13,000 short-term job-years created per one billion dollars of government investment (or $76,900 per job-year).[21] These benefits are not counted in the B/C calculation.

The proposed multimodal port is expected to create 712 job-years (Development Opportunity A) and 774 job-years (Development Opportunity B) due to project development and construction expenditures over the construction period and over 1,200 job-years (Development Opportunity A) and nearly 1,300 job-years (Development Opportunity B) due to project development, construction and maintenance expenditures over the 2-year construction period and the 25-years analysis period (Table 9.18).

Table 9.18 Job Creation Benefits of Development Opportunity A and Development Opportunity B

Job Creation	Development Opportunity A	Development Opportunity B
Increase in Short-Term Job-Years due to Project during Development and Construction	712 Job-Years	774 Job-Years
Increase in Short-Term Job-Years due to Project during Development, Construction, and Maintenance	1,210 Job-Years	1,281 Job-Years
Average # of Short-Term Jobs Created in a Year due to Project during Development and Construction	237 Jobs	258 Jobs

9.1.6 Total Monetized Benefits

Table 9.19 summarizes the monetized benefits (undiscounted and discounted) for each benefit category resulting from the project implementation over the 25-year analysis period. Total benefits account for $581.2 million (in 2016 dollars). This represents $200.4 million in benefits (in 7 percent discounted 2016 dollars) and nearly $310 million in benefits (in 3 percent discounted 2016 dollars) over the 25-year analysis period. Freight transportation cost savings represent by far the largest share of the monetized project benefits at 82 percent.

Table 9.19 Direct Benefits Resulting from Central Missouri Port Development

Benefit Category	In 2016 Dollars	Benefits (%)	Discounted at 3%	Discounted at 7%
Freight Transportation Cost Savings	$475,831,721	82%	$246,403,021	$151,909,272
Freight Emission Cost Savings	$60,313,986	10%	$36,868,137	$32,966,339
Safety Cost Savings	$35,013,401	6%	$21,509,489	$12,321,236
State of Good Repair Costs Savings	$10,011,776	2%	$5,189,657	$3,200,556
Total Benefits	**$581,170,884**	**100%**	**$309,970,305**	**$200,397,403**

[21] U.S. DOT Benefit-Cost Analysis (BCA) Resource Guide (November 2016) supplement to the 2016 Benefit-Cost Analysis Guidance for Grant Applicants.

9.2 Port Development Opportunity Project Costs

The estimated construction costs for Development Opportunity A are shown in Table 9.20 and the estimated construction costs for Development Opportunity B are shown in Table 9.21. Development Opportunity A is expected to cost $54.8 million and Development Opportunity B is expected to cost $59.5 million.

For Development Opportunity A, construction is assumed to begin in mid-2018 and end in mid-2020. Phased construction costs over the construction period are allocated as follows: 25 percent in 2018, 50 percent in 2019, and 25 percent in 2020. Table 9.22 presents the life cycle cost of Development Opportunity A.

For Development Opportunity B, construction on the North Side is expected to begin mid-2018 and end in mid-2019. This site is expected to take little time to develop, and is therefore expected to occur sooner. Phased construction costs for the North Side over the construction period are allocated as follows: 50 percent in 2018 and 50 percent in 2019. On the other hand, construction on the South Side is expected to begin mid-2018 and end in mid-2020 due to its largest size and scale of development. Phased construction costs for the South Side over the construction period are allocated as follows: 25 percent in 2018, 50 percent in 2019, and 25 percent in 2020. Table 9.23 shows the life cycle cost of Development Opportunity B.

Table 9.20 Development Opportunity A – Probable Construction Costs

Quantity	Unit	Description	Unit Cost	Total Cost
0.84	MILE	Access & Internal Roads (2-lane)	$1,825,000	$1,533,000
1,139,890	CY	Fill/Embankment	$14	$15,958,460
2	ACRE	Wetland Mitigation	$55,000	$110,000
4	EA	Tripod Mooring Dolphin	$65,000	$260,000
1	EA	Cell (20-30 ft. diameter)	$250,000	$250,000
1	LS	Dock (200 ft. sheet pile face)	$4,500,000	$4,500,000
1	EA	Gangway (approx. 300 ft.)	$75,000	$75,000
4,435	LF	Utility Service (electricity, water, sewer)	$150	$665,250
1	EA	Dry Bulk Storage (200K bushels)	$4,000,000	$4,000,000
1	EA	Truck Dump Pit	$550,000	$550,000
1	EA	Scales/Testing Equipment	$500,000	$500,000
900	LF	Conveyor System & Foundations	$2,000	$1,800,000
5	EA	Rail Switch (on-site)	$85,000	$425,000
1	EA	Rail Switch (mainline)	$300,000	$300,000
1.83	MILE	Rail/Track	$1,850,000	$3,385,500
1	EA	Rail Dump Pit	$550,000	$550,000
1	LS	Mobilization	6%	$2,091,733
1	LS	Engineering/Permitting/Surveying	14%	$5,173,552
1	LS	Contingency	30%	$12,638,248
			TOTAL	**$54,765,743**

Table 9.21 Development Opportunity B – Probable Construction Costs

Quantity	Unit	Description	Unit Cost	Total Cost
0.73	MILE	Access & Internal Roads (2-way)	$1,825,000	$1,332,250
1,139,809	CY	Fill/Embankment	$14	$15,958,460
1	ACRE	Wetland Mitigation	$55,000	$55,000
2	EA	Tripod Mooring Dolphin	$65,000	$130,000
1	EA	Cell (20-30 ft. diameter)	$250,000	$250,000
1	EA	Gangway (approx. 400 ft.)	$100,000	$100,000
3,854	LF	Utility Service (electricity, water, sewer)	$150	$578,100
1	EA	Dry Bulk Storage (200K bushels)	$4,000,000	$4,000,000
1	EA	Truck Dump Pit	$550,000	$550,000
1	EA	Scales/Testing Equipment	$500,000	$500,000
1,250	LF	Conveyor System & Foundations	$2,000	$2,500,000
4	EA	Rail Switch (on-site)	$85,000	$340,000
1	EA	Rail Switch (Mainline)	$300,000	$300,000
1.51	MILE	Rail/Track	$1,850,000	$2,793,500
1	EA	Rail Dump Pit	$550,000	$550,000
1	LS	Mobilization	5%	$1,496,866
1	LS	Engineering/Permitting/Surveying	12%	$3,772,101
1	LS	Contingency	30%	$10,561,883
			South Site Plan B TOTAL	**$45,768,160**
1.70	MILE	Access & Internal Roads (2-way)	$1,825,000	$3,102,500
109,960	CY	Fill/Embankment	$14	$1,539,440
0.5	ACRE	Wetland Mitigation	$55,000	$27,500
1	LS	Expanded Dock (200 ft. sheet pile face)	$3,500,000	$3,500,000
2	EA	Tripod Mooring Dolphin	$65,000	$130,000
8,976	LF	Utility Service (electricity & water)	$105	$942,480
1	LS	Mobilization	4%	$369,677
1	LS	Engineering/Permitting/Surveying	10%	$961,160
1	LS	Contingency	30%	$3,171,827
			North Site TOTAL	**$13,744,583**
			GRAND TOTAL	**$59,512,743**

Table 9.22 Development Opportunity A - Life Cycle Cost Analysis

A	B	C	D	E	F	G	H	I	J
Year	Calendar Year	Capital Costs (in 2015$)	O&M Costs (in 2015$)	NPV of Capital Costs		NPV of O&M Costs		NPV of Total Costs	
				3%	7%	3%	7%	3%	7%
				NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]	NPV = [D/(1+3%)^A]	NPV = [D/(1+7%)^A]	E + G	F + H
0	2018	$13,691,436	$0	$12,905,491	$11,958,630	$0	$0	$12,905,491	$11,958,630
1	2019	$27,382,872	$0	$25,059,206	$22,352,580	$0	$0	$25,059,206	$22,352,580
2	2020	$13,691,436	$750,000	$12,164,663	$10,445,131	$666,365	$572,171	$12,831,029	$11,017,302
3	2021	$0	$1,500,000	$0	$0	$1,293,913	$1,069,479	$1,293,913	$1,069,479
4	2022	$0	$1,500,000	$0	$0	$1,256,226	$999,513	$1,256,226	$999,513
5	2023	$0	$1,500,000	$0	$0	$1,219,637	$934,125	$1,219,637	$934,125
6	2024	$0	$1,500,000	$0	$0	$1,184,114	$873,014	$1,184,114	$873,014
7	2025	$0	$1,500,000	$0	$0	$1,149,625	$815,901	$1,149,625	$815,901
8	2026	$0	$1,500,000	$0	$0	$1,116,141	$762,524	$1,116,141	$762,524
9	2027	$0	$1,500,000	$0	$0	$1,083,632	$712,639	$1,083,632	$712,639
10	2028	$0	$1,500,000	$0	$0	$1,052,070	$666,018	$1,052,070	$666,018
11	2029	$0	$1,500,000	$0	$0	$1,021,427	$622,447	$1,021,427	$622,447
12	2030	$0	$1,500,000	$0	$0	$991,677	$581,726	$991,677	$581,726
13	2031	$0	$1,500,000	$0	$0	$962,793	$543,669	$962,793	$543,669
14	2032	$0	$1,500,000	$0	$0	$934,750	$508,102	$934,750	$508,102
15	2033	$0	$1,500,000	$0	$0	$907,525	$474,862	$907,525	$474,862
16	2034	$0	$1,500,000	$0	$0	$881,092	$443,796	$881,092	$443,796
17	2035	$0	$1,500,000	$0	$0	$855,429	$414,762	$855,429	$414,762
18	2036	$0	$1,500,000	$0	$0	$830,514	$387,629	$830,514	$387,629
19	2037	$0	$1,500,000	$0	$0	$806,324	$362,270	$806,324	$362,270
20	2038	$0	$1,500,000	$0	$0	$782,839	$338,570	$782,839	$338,570
21	2039	$0	$1,500,000	$0	$0	$760,038	$316,420	$760,038	$316,420
22	2040	$0	$1,500,000	$0	$0	$737,901	$295,720	$737,901	$295,720
23	2041	$0	$1,500,000	$0	$0	$716,408	$276,374	$716,408	$276,374
24	2042	$0	$1,500,000	$0	$0	$695,542	$258,293	$695,542	$258,293

A	B	C	D	E	F	G	H	I	J
Year	Calendar Year	Capital Costs (in 2015$)	O&M Costs (in 2015$)	NPV of Capital Costs		NPV of O&M Costs		NPV of Total Costs	
				3%	7%	3%	7%	3%	7%
				NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]	NPV = [D/(1+3%)^A]	NPV = [D/(1+7%)^A]	E + G	F + H
25	2043	$0	$1,500,000	$0	$0	$675,284	$241,396	$675,284	$241,396
26	2044	$0	$1,500,000	$0	$0	$655,615	$225,603	$655,615	$225,603
27	2045	$0	$1,500,000	$0	$0	$636,520	$210,844	$636,520	$210,844
Totals =		**$54,765,743**	**$38,250,000**	**$50,129,361**	**$44,756,341**	**$23,873,400**	**$13,907,866**	**$74,002,761**	**$58,664,207**

Table 9.23 Development Opportunity B - Life Cycle Cost Analysis

A	B	C	D	E	F	G	H	I	J
Year	Calendar Year	Capital Costs (in 2015$)	O&M Costs (in 2015$)	NPV of Capital Costs		NPV of O&M Costs		NPV of Total Costs	
				3%	7%	3%	7%	3%	7%
				NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]	NPV = [D/(1+3%)^A]	NPV = [D/(1+7%)^A]	E + G	F + H
0	2018	$18,314,332	$0	$18,314,332	$18,314,332	$0	$0	$18,314,332	$18,314,332
1	2019	$29,756,372	$0	$28,889,681	$27,809,693	$0	$0	$28,889,681	$27,809,693
2	2020	$11,442,040	$1,500,000	$10,785,220	$9,993,921	$1,413,894	$1,310,158	$12,199,114	$11,304,079
3	2021	$0	$1,500,000	$0	$0	$1,372,712	$1,224,447	$1,372,712	$1,224,447
4	2022	$0	$1,500,000	$0	$0	$1,332,731	$1,144,343	$1,332,731	$1,144,343
5	2023	$0	$1,500,000	$0	$0	$1,293,913	$1,069,479	$1,293,913	$1,069,479
6	2024	$0	$1,500,000	$0	$0	$1,256,226	$999,513	$1,256,226	$999,513
7	2025	$0	$1,500,000	$0	$0	$1,219,637	$934,125	$1,219,637	$934,125
8	2026	$0	$1,500,000	$0	$0	$1,184,114	$873,014	$1,184,114	$873,014
9	2027	$0	$1,500,000	$0	$0	$1,149,625	$815,901	$1,149,625	$815,901
10	2028	$0	$1,500,000	$0	$0	$1,116,141	$762,524	$1,116,141	$762,524
11	2029	$0	$1,500,000	$0	$0	$1,083,632	$712,639	$1,083,632	$712,639
12	2030	$0	$1,500,000	$0	$0	$1,052,070	$666,018	$1,052,070	$666,018
13	2031	$0	$1,500,000	$0	$0	$1,021,427	$622,447	$1,021,427	$622,447
14	2032	$0	$1,500,000	$0	$0	$991,677	$581,726	$991,677	$581,726
15	2033	$0	$1,500,000	$0	$0	$962,793	$543,669	$962,793	$543,669
16	2034	$0	$1,500,000	$0	$0	$934,750	$508,102	$934,750	$508,102
17	2035	$0	$1,500,000	$0	$0	$907,525	$474,862	$907,525	$474,862
18	2036	$0	$1,500,000	$0	$0	$881,092	$443,796	$881,092	$443,796
19	2037	$0	$1,500,000	$0	$0	$855,429	$414,762	$855,429	$414,762
20	2038	$0	$1,500,000	$0	$0	$830,514	$387,629	$830,514	$387,629
21	2039	$0	$1,500,000	$0	$0	$806,324	$362,270	$806,324	$362,270
22	2040	$0	$1,500,000	$0	$0	$782,839	$338,570	$782,839	$338,570
23	2041	$0	$1,500,000	$0	$0	$760,038	$316,420	$760,038	$316,420
24	2042	$0	$1,500,000	$0	$0	$737,901	$295,720	$737,901	$295,720

A	B	C	D	E	F	G	H	I	J
Year	Calendar Year	Capital Costs (in 2015$)	O&M Costs (in 2015$)	NPV of Capital Costs		NPV of O&M Costs		NPV of Total Costs	
				3%	7%	3%	7%	3%	7%
				NPV = [C/(1+3%)^A]	NPV = [C/(1+7%)^A]	NPV = [D/(1+3%)^A]	NPV = [D/(1+7%)^A]	E + G	F + H
25	2043	$0	$1,500,000	$0	$0	$716,408	$276,374	$716,408	$276,374
26	2044	$0	$1,500,000	$0	$0	$695,542	$258,293	$695,542	$258,293
27	2045	$0	$1,500,000	$0	$0	$675,284	$241,396	$675,284	$241,396
Totals =		**$59,512,743**	**$39,000,000**	**$57,989,233**	**$56,117,945**	**$26,034,237**	**$16,578,194**	**$84,023,469**	**$72,696,140**

9.3 Summary of Benefit-Cost Analysis Results

The analysis quantifies the expected economic benefits generated by the potential truck/rail-to-barge freight diversion in terms of reduced pavement maintenance cost and net reductions in freight operating costs, emissions and accidents arising from transporting goods via barge as opposed to truck or railroad carrier.

Table 9.24 summarizes the benefit-cost analysis findings for Development Opportunity A (South Site only). Annual costs and benefits are computed over the lifecycle of the project (25 years). As stated earlier, construction is expected to be completed by 2020, and benefits to begin accruing during the full operation of the project. The project has a benefit-cost ratio of 3.4 at a real discount rate of 7 percent and 4.2 at a real discount rate of 3 percent. These findings demonstrate that there are significant long-term economic benefits associated with the project.

Table 9.24 Summary of Benefit-Cost Analysis for Central Missouri Port Development Opportunity A (South Site Plan)

	In 2016$	Discounted at 3%	Discounted at 7%
Benefit-Cost Ratio = (B) / (C) =	6.2	4.2	3.4
Project Costs			
Capital Costs	$54,765,743	$50,129,361	$44,756,341
O&M Costs	$38,250,000	$23,873,400	$13,907,866
Total Costs (C) =	**$93,015,743**	**$74,002,761**	**$58,664,207**
Project Benefits			
Freight Transportation Cost Savings	$475,831,721	$246,403,021	$151,909,272
Social Cost of Carbon (SCC) Emission Cost Savings	$45,691,047	$28,118,928	$28,118,928
Non-Carbon Emission Cost Savings	$14,622,939	$8,749,209	$4,847,411
Safety Cost Savings	$35,013,401	$21,509,489	$12,321,236
State of Good Repair Cost Savings	$10,011,776	$5,189,657	$3,200,556
Total Benefits (B) =	**$581,170,884**	**$309,970,305**	**$200,397,403**

Source: Cambridge Systematics analysis.

Table 9.25 summarizes the benefit-cost analysis findings for Development Opportunity B (North Site and South Site). Annual costs and benefits are computed over the lifecycle of the project (25 years). Construction is expected to be completed by 2020 and benefits to be accrued during the full operation of the project. The project has a benefit-cost ratio of 2.8 at a real discount rate of 7 percent and 3.7 at a real discount rate of 3 percent. These findings demonstrate that there are significant long-term economic benefits associated with the project, though somewhat less than when compared to Development Opportunity A.

Table 9.25 Summary of Benefit-Cost Analysis for Central Missouri Port Development Opportunity B (North and South Site Plan)

	In 2016$	Discounted at 3%	Discounted at 7%
Benefit-Cost Ratio = (B) / (C) =	5.9	3.7	2.8
Project Costs			
Capital Costs	$59,512,743	$57,989,233	$56,117,945
O&M Costs	$39,000,000	$26,034,237	$16,578,194
Total Costs (C) =	**$98,512,743**	**$84,023,469**	**$72,696,140**
Project Benefits			
Freight Transportation Cost Savings	$475,831,721	$246,403,021	$151,909,272
Social Cost of Carbon (SCC) Emission Cost Savings	$45,691,047	$28,118,928	$28,118,928
Non-Carbon Emission Cost Savings	$14,622,939	$8,749,209	$4,847,411
Safety Cost Savings	$35,013,401	$21,509,489	$12,321,236
State of Good Repair Cost Savings	$10,011,776	$5,189,657	$3,200,556
Total Benefits (B) =	**$581,170,884**	**$309,970,305**	**$200,397,403**

Source: Cambridge Systematics analysis.

10.0 Economic Impact Analysis of Identified Development Opportunities

This section describes the method used for estimating the economic impact of the potential port development opportunities in central Missouri. The study area includes four counties – Boone, Callaway, Cole, and Osage Counties – in central Missouri. An economic impact analysis quantifies the effect of an event, or development opportunity, on the economy in a specified area or region. These opportunities include:

- "Development Opportunity A" in which all port facility development is located at a single site: the South Site. All anticipated commodity types (e.g., dry bulk, OD/OW, break bulk, containers) would be handled at the South Site. Development Opportunity A is described in detail in Section 8.2.1.

- "Development Opportunity B" in which the overall port facility development is split between two sites: the South Site and the North Site. Dry bulk commodities would be handled at the South Site using conveyor systems, while commodities typically moved by crane (e.g., OD/OW, break bulk, containers) would be handled at the North Site. Development Opportunity B is described in detail in Section 8.2.2.

This analysis uses the IMPLAN model[22], which is a commonly used economic input-output model for transportation planners that helps quantify economic impacts. The IMPLAN model acquired for this analysis covers the four-county study area in central Missouri. The direct economic impacts are estimated outside the economic model and translated into the necessary model inputs for IMPLAN. The indirect (resulting changes in industry-to-industry spending) and induced (resulting changes in household spending) benefits arising from the direct benefits are modeled using the regional IMPLAN model.

IMPLAN generates estimates of the total economic benefits in terms of jobs, personal income, value added (gross regional product or GRP) and tax revenue. Economic output, another measure of economic impact, quantifies the value of all sales of goods and services. It includes the sum of the final purchases and intermediate inputs and therefore double counts intermediate purchases. Value added, defined as economic output less intermediate inputs, focuses only on additional value of goods and services produced, and is therefore the preferred measure to report the economic impacts resulting from the proposed port development opportunities in central Missouri. Appendix A describes IMPLAN and related terminology in greater detail.

This section also discusses possible federal, state, local, and private partner funding opportunities to support the development of the central Missouri port project.

10.1 Economic Benefits Resulting from Development Opportunities A & B

This section discusses the potential economic benefits resulting from:

- Project spending on construction over the construction period, from 2018 to 2020;

- Project spending on operations and maintenance over the 25-year analysis period, from port opening year 2020 to horizon year 2045; and

[22] For more information on the IMPLAN economic model, please see www.implan.com.

- Reduced costs of conducting business in the region over the 25-year analysis period, from 2020 to 2045; and

- New business attraction to the study area as a result of the port development.

10.1.1 Economic Benefits Resulting from Project Spending on Construction

Economic impacts from the proposed multimodal port facility in central Missouri initially occur as a result of the actual construction of the project. Expenditures on construction are of economic value because infrastructure development disbursement increases the Gross Regional Product (GRP) and supports the creation and retention of construction related jobs and labor income.

The project construction expenditures serve as inputs into the regional IMPLAN Model for analyzing the economic impacts on the four-county study area which is the project primary impact area. In estimating the economic impacts resulting from investment spending on construction the following assumptions are made:

- Only expenditures on equipment, materials, site preparation activities, structures and professional services within the four-county study area results in economic impacts in the in the central Missouri region. Any spending beyond the four-county study area is considered expenditure leakages, and, consequently, have no economic value for the primary study area.

- Capital expenditure allocations are assumed to accrue proportionately to the industry share of output in the study area compared to the industry share of output at the national level. As such, this analysis utilized the output data available from IMPLAN for the study area and the U.S. to estimate the location quotient (LQ). The LQ assesses how concentrated the industries involved in the construction of the multimodal port facility are in the study area as compared to the nation.

- Construction expenditures are apportioned to the study area based on the allocation factors shown in Table 10.1.

- The total dollar amounts of construction expenditures are allocated to the selected IMPLAN industries according to expenditure breakdowns and allocation factors shown in Table 10.2 and Table 10.3 for Development Opportunity A and Development Opportunity B, respectively. The estimated dollar amounts expended in the study area are then inputted into the regional IMPLAN model as an Industry Change activity to measure the impact on the industries experiencing the change in production.

Table 10.1 Industry Output Concentration in the Study Area as Compared to the Nation

Location Quotient (LQ)	Industry Output Concentration in the Four-County Study Area Compared to the Nation	Allocation Factor
LQ ≤ 1.0	All local	1.00
1.0 < LQ ≤ 0.75	Mostly local	0.75
0.75 < LQ ≤ 0.5	Even split	0.50
0.50 < LQ ≤ 0.25	Mostly non-local	0.25
0.25 < LQ	All non-local	0.00

Table 10.2 Development Opportunity A – Allocation of Port Construction Costs to Study Area

Construction Activity	IMPLAN Industry Code	IMPLAN Industry Description	Total Cost ($2016)	LQ	Allocation Factor	Amount Expended in Study Area ($2016)
Access & Internal Roads (2-lane)	56	Construction of new highways and streets	$1,533,000	1.06	1	$1,533,000
Fill/Embankment	469	Landscape and horticultural services	$15,958,460	1.31	1	$15,958,460
Wetland Mitigation	469	Landscape and horticultural services	$110,000	1.31	1	$110,000
Tripod Mooring Dolphin	57	Construction of new commercial structures	$260,000	1.04	1	$260,000
Cell (20-30 ft. diameter)	57	Construction of new commercial structures	$250,000	1.04	1	$250,000
Dock (200 ft. sheet pile face)	57	Construction of new commercial structures	$4,500,000	1.04	1	$4,500,000
Gangway (approx. 300 ft.)	57	Construction of new commercial structures	$75,000	1.04	1	$75,000
Utility Service (electricity, water, sewer)	54	Construction of new power and communication structures	$665,250	0.98	0.75	$498,938
Dry Bulk Storage (200K bushels)	57	Construction of new commercial structures	$4,000,000	1.04	1	$4,000,000
Truck Dump Pit	57	Construction of new commercial structures	$550,000	1.04	1	$550,000
Scales/Testing Equipment	271	All other industrial machinery mfg	$500,000	0.18	0	$0
Conveyor System & Foundations	291	Construction of new commercial structures, including farm structures	$1,800,000	0.03	0	$0
Rail Switch (on-site)	409	Rail Transportation	$425,000	0.84	0.75	$318,750
Rail Switch (mainline)	409	Rail Transportation	$300,000	0.84	0.75	$225,000
Rail/Track	409	Rail Transportation	$3,385,500	0.84	0.75	$2,539,125
Rail Dump Pit	57	Construction of new commercial structures	$550,000	1.04	1	$550,000
Mobilization	N/A	N/A	$2,091,733	N/A	N/A	
Engineering/Permitting/Surveying	449	Architectural, engineering, and related services	$5,173,552	0.77	0.75	$3,880,164
Contingency	N/A	N/A	$12,638,248	N/A	N/A	
		Total	**$54,765,743**			
		Total without Contingency	**$40,035,762**			**$35,248,437**

Table 10.3 Development Opportunity B – Allocation of Port Construction Costs to Study Area

Construction Activity	IMPLAN Industry Code	IMPLAN Industry Description	Total Cost ($2016)	LQ	Allocation Factor	Amount Expended in Study Area ($2016)
Access & Internal Roads (2-way)	56	Construction of new highways and streets	$1,332,250	1.06	1	$1,332,250
Fill/Embankment	469	Landscape and horticultural services	$15,958,460	1.31	1	$15,958,460
Wetland Mitigation	469	Landscape and horticultural services	$55,000	1.31	1	$55,000
Tripod Mooring Dolphin	57	Construction of new commercial structures	$130,000	1.04	1	$130,000
Cell (20-30 ft. diameter)	57	Construction of new commercial structures	$250,000	1.04	1	$250,000
Gangway (approx. 400 ft.)	57	Construction of new commercial structures	$100,000	1.04	1	$100,000
Utility Service (electricity, water, sewer)	54	Construction of new power and communication structures	$578,100	0.98	0.75	$433,575
Dry Bulk Storage (200K bushels)	57	Construction of new commercial structures	$4,000,000	1.04	1	$4,000,000
Truck Dump Pit	57	Construction of new commercial structures	$550,000	1.04	1	$550,000
Scales/Testing Equipment	271	All other industrial machinery mfg.	$500,000	0.18	0	$0
Conveyor System & Foundations	291	Construction of new commercial structures	$2,500,000	0.03	0	$0
Rail Switch (on-site)	409	Rail Transportation	$340,000	0.84	0.75	$255,000
Rail Switch (Mainline)	409	Rail Transportation	$300,000	0.84	0.75	$225,000
Rail/Track	409	Rail Transportation	$2,793,500	0.84	0.75	$2,095,125
Rail Dump Pit	57	Construction of new commercial structures	$550,000	1.04	1	$550,000
Mobilization	N/A	N/A	$1,496,866	N/A	N/A	
Engineering/Permitting/Surveying	449	Architectural, engineering, and related services	$3,772,101	0.77	0.75	$2,829,076
Contingency	N/A	N/A	$10,561,883	N/A	N/A	
		South Site Plan B Total	**$45,768,160**			
		South Site Plan B Total Without Contingency	**$33,709,411**			**$28,763,486**
Access & Internal Roads (2-way)	56	Construction of new highways and streets	$3,102,500	1.06	1	$3,102,500
Fill/Embankment	469	Landscape and horticultural services	$1,539,440	1.31	1	$1,539,440
Wetland Mitigation	469	Landscape and horticultural services	$27,500	1.31	1	$27,500

Construction Activity	IMPLAN Industry Code	IMPLAN Industry Description	Total Cost ($2016)	LQ	Allocation Factor	Amount Expended in Study Area ($2016)
Expanded Dock (200 ft. sheet pile face)	57	Construction of new commercial structures	$3,500,000	1.04	1	$3,500,000
Tripod Mooring Dolphin	57	Construction of new commercial structures	$130,000	1.04	1	$130,000
Utility Service (electricity & water)	54	Construction of new power and communication structures	$942,480	0.98	0.75	$706,860
Mobilization	N/A	N/A	$369,677	N/A	N/A	
Engineering/Permitting/Surveying	449	Architectural, engineering, and related services	$961,160	0.77	0.75	$720,870
Contingency	N/A	N/A	$3,171,827	N/A	N/A	
		North Site Total	**$13,744,583**			
		North Site Total Without Contingency	**$10,203,080**			**$9,727,170**
		Grand Total	**$59,512,743**			
		Grand Total Without Contingency	**$43,912,491**			**$38,490,656**

Table 10.4 and Table 10.5 display the total (direct, indirect, and induced) effects on employment, labor income, GRP (or value added) and tax revenue resulting from the allocation of project construction spending in the four-county region for Development Opportunity A and Development Opportunity B, respectively.

Table 10.4 Development Opportunity A – Total Economic Benefits Resulting from Port Construction Expenditures, 2018 – 2020

Impact Type	Employment	Labor Income (Millions of 2016$)	GRP (Millions of 2016$)
Direct Effect	450	$14.5	$18.3
Indirect Effect	65	$2.9	$4.6
Induced Effect	105	$3.9	$7.3
Total Effect	**620**	**$21.3**	**$30.1**

Tax Revenue Type	Tax Revenue (Millions of 2016$)		
	Federal	State & Local	Total
Employee Compensation	$2.0	$0.1	$2.1
Proprietor Income	$0.1	$0.0	$0.1
Tax on Production and Imports	$0.2	$1.2	$1.4
Households	$1.4	$0.4	$1.8
Corporations	$0.6	$0.0	$0.6
Total Revenue	**$4.2**	**$1.8**	**$6.0**

Source: Outputs from the IMPLAN economic model for the four-county study area.

Table 10.5 Development Opportunity B – Total Economic Benefits Resulting from Port Construction Expenditures, 2018 – 2020

Impact Type	Employment	Labor Income (Millions of 2016$)	GRP (Millions of 2016$)
Direct Effect	490	$15.7	$19.6
Indirect Effect	70	$3.2	$5.1
Induced Effect	115	$4.3	$7.9
Total Effect	**675**	**$23.1**	**$32.6**

Tax Revenue Type	Tax Revenue (Millions of 2016$)		
	Federal	State & Local	Total
Employee Compensation	$2.1	$0.1	$2.2
Proprietor Income	$0.1	$0.0	$0.1
Tax on Production and Imports	$0.2	$1.3	$1.5
Households	$1.5	$0.5	$2.0
Corporations	$0.6	$0.0	$0.7
Total Revenue	**$4.6**	**$1.9**	**$6.5**

Source: Outputs from the IMPLAN economic model for the four-county study area.

10.1.2 Economic Benefits Resulting from Project Spending on Operations & Maintenance

Once the construction phase is completed, subsequent expenditures to operate and maintain the proposed multimodal port facility are required, which results in additional economic impacts for the study area. The following assumptions are made in estimating the economic impacts resulting from operations and maintenance (O&M) spending:

- Only O&M expenditures within the four-county study area results in economic impacts in the central Missouri region. Any spending beyond the four-county study area is considered expenditure leakages, and, consequently, have no economic value for the primary study area.

- O&M expenditure allocations are assumed to accrue proportionately to the industry share of output in the study area compared to the industry share of output. As such, this analysis utilized the output data available from IMPLAN for the study area and the U.S. to estimate the location quotient (LQ). The LQ assesses how concentrated the industries involved in the O&M of the multimodal port facility are in the study area as compared to the nation.

- O&M expenditures are apportioned to the study area based on the allocation factors in Table 10.6.

- The total dollar amounts of O&M expenditures are allocated to the selected IMPLAN industries according to expenditure breakdowns and allocation factors shown in Table 10.7 that apply to both Development Opportunity A and Development Opportunity B. Then, the estimated dollar amounts expended in the

study area are inputted into the regional IMPLAN model as an Industry Change activity to measure the impact on the industries experiencing the change in production.

Table 10.6 Development Opportunities A & B – Allocation of Port Operations and Maintenance Costs to the Study Area, 2020 – 2045

Description	IMPLAN Industry Code	IMPLAN Industry Description	Total Cost ($2016)	LQ	Allocation Factor	Amount Expended in Study Area ($2016)
Labor	414	Scenic and sightseeing transportation and support activities for transportation	$26,000,000	0.47	0.25	$6,500,000
Maintenance (Structures & Access Roads)	64	Maintenance and repair construction of nonresidential structures	$5,850,000	1.04	1	$5,850,000
	62	Maintenance and repair construction of nonresidential structures	$5,850,000	1.04	1	$5,850,000
Utilities	51	Water, sewage, and other systems	$1,300,000	1.64	1	$1,300,000
		Total	**$39,000,000**			**$19,500,000**

Table 10.7 displays the total (direct, indirect, and induced) effects on employment, labor income, GRP (or value added) and tax revenue from port O&M in the region, which applies to both Development Opportunity A and Development Opportunity B.

Table 10.7 Development Opportunities A & B – Total Economic Benefits Resulting from Port Operations and Maintenance Expenditures, 2020-2045

Impact Type	Employment	Labor Income (Millions of 2016$)	GRP (Millions of 2016$)
Direct Effect	605	$10.1	$11.4
Indirect Effect	55	$2.3	$3.5
Induced Effect	75	$2.8	$5.2
Total Effect	**735**	**$15.2**	**$20.0**

Tax Revenue Type	Tax Revenue (Millions of 2016$)		
	Federal	State & Local	Total
Employee Compensation	$1,393,870	$83,944	$1,477,814
Proprietor Income	$88,358	$0	$88,358
Tax on Production and Imports	$104,556	$763,396	$867,952
Households	$993,877	$315,634	$1,309,511
Corporations	$314,953	$22,235	$337,187

Total Revenue	**$2,895,614**	**$1,185,208**	**$4,080,822**

Source: Outputs from the IMPLAN economic model for the four-county study area.

10.1.3 Long-Term Economic Benefits Resulting from Reduced Costs of Conducting Business in the Region

As discussed in Section 9.1.1, the project is expected to generate freight transportation costs savings through the difference in transportation costs of shipping via barge rather than truck or rail, reduce truck and rail related emissions, improve highway and rail safety, and contribute to the good condition of the roadway infrastructure due to truck/rail-to-barge mode shift and improved rail/barge connectivity once the project is completed.

The long-term economic impacts generated by the proposed multimodal port facility are estimated by applying the monetized savings in freight transportation and safety costs as inputs into IMPLAN, as shown in Table 10.8. These savings are expected to reduce the cost of conducting business in the four-county region. Other benefits such as reduction in emission costs and payment maintenance expenditures have no multiplier effect in the regional economy and therefore, they are not input into the economic model.

The estimated reduced costs of conducting business in the study area are then input into the regional IMPLAN Model as an Industry Change activity to measure the impact on the industries experiencing the change in production.

Table 10.8 Central Missouri Port Development – IMPLAN Input Variables

Benefit Category	Economic Input	IMPLAN Input Variable
Savings in Freight Transportation Costs Safety Cost Savings	Reduced costs of conducting business accrue to individual industries based on: 1. the proportion of each respective industries' output share of total industry output in the study region; 2. the value of the transportation services each respective industry consumes in order to produce one dollar of output based on the Transportation Satellite Accounts (TSA) coefficients and the economic output by industry within the study region as reported by the IMPLAN model in the year 2016; and 3. the output elasticities with respect to freight (barge, truck and rail) costs for the good and service sectors.	Industry change in output

Table 10.9 presents the total (direct, indirect, and induced) effects on employment, labor income, GRP (or value added) and tax revenues yielded by the proposed multimodal port facility due to reduced cost of conducting business in the region over the 25-year analysis period. The proposed multimodal facility is expected to support nearly 4,400 jobs in the region. This would add nearly $183 million in labor income and generate about $300 million in GRP and 69 million in combined federal, state and local taxes.

Table 10.9 Development Opportunities A & B - Total Economic Benefits Resulting from Reduced Costs of Conducting Business in the Region, 2020 – 2045

Impact Type	Employment	Labor Income (Millions of 2016$)	GRP (Millions of 2016$)
Direct Effect	2,605	$111	$176
Indirect Effect	885	$38	$61
Induced Effect	895	$34	$62
Total Effect	**4,385**	**$183**	**$299**

Tax Revenue Type	Tax Revenue (Millions of 2016$)		
	Federal	State & Local	Total
Tax on Production and Imports	$3.2	$23.1	$26.3
Social Security Contributions	$18.0	$1.0	$19.0
Personal Income Tax	$12.0	$3.2	$15.2
Corporate Profits and Dividend Taxes	$7.1	$0.5	$7.6
Personal Sales and Property Taxes	N/A	$0.6	$0.6
Total Revenue	**$40.2**	**$28.4**	**$68.7**

Source: Outputs from the IMPLAN economic model for the four-county study area.

10.1.4 Economic Benefits Resulting from New Business Retention and Attraction

This economic impact analysis also provides measures of job creation and economic expansion for key industries in the study area. These measures are used to gain insight into the broader business retention and attraction impacts arising from reduced costs of conducting business in the region as a result of the proposed multimodal port in central Missouri. Specifically, these measures are intended to capture the economic activity generated by both the companies/firms located at the port as well as the businesses located outside the port that support the businesses located at the port. Some of the companies/firms in the central Missouri may be relocating at the port to take advantage of the operational benefits provided by the new barge service and storage areas for intermodal containers and bulk cargo, as well as to be better prepare to meet the growing demand for barge/intermodal containers in the future.

Table 10.10 exhibits the ten industry sectors experiencing the highest benefits in terms of job creation and the corresponding labor income and value added. The economic sectors most impacted by the proposed multimodal port facility in terms of job creation are wholesale and retail trade, restaurants, the non-education state government, and real estate. Benefits accruing to these industries are anticipated to account for 34 percent of total jobs, 30 percent of total labor income and 36 percent of total value added resulting from reduced costs of conducting business in the region over the 25-year analysis period.

The top ten industry sectors experiencing the highest benefits in terms of job creation are estimated to support 1,066 direct jobs, 168 indirect jobs, and 271 induced jobs in the four-study region, which results in a job multiplier of 1.4 (Table 10.15). The multiplier effect in the real estate sector is much larger than in the other nine sectors, while the lowest multiplier effect is associated with the economic activities of the state government.

Table 10.10 Labor Income and Value Added Accruing to the Top 10 Industries with Highest Employment Numbers due to Reduced Cost of Doing Business in the Region

Rank	IMPLAN Sector Code and Description	Employment	Labor Income (Millions of 2016$)	Value Added (Millions of 2016$)
1	395 - Wholesale trade	390	$25	$47
2	405 - Retail - General merchandise stores	185	$5	$7
3	407 - Retail - Nonstore retailers	140	$4	$13
4	400 - Retail - Food and beverage stores	140	$3	$5
5	501- Full-service restaurants	135	$2	$3
6	502 - Limited-service restaurants	125	$2	$5
7	531 - Employment and payroll of non-education state government	100	$7	$8
8	440 - Real estate	100	$1	$10
9	396 - Retail - Motor vehicle and parts dealers	100	$5	$8
10	406 - Retail - Miscellaneous store retailers	90	$2	$2
	Sub-Total	**1,505**	**$56**	**$108**
	Share of Total	34%	30%	36%
	Total	**4,385**	**$183**	**$299**

Source: Outputs from the IMPLAN economic model for the four-county study area.

Table 10.11 Top 10 Industries with Highest Employment Numbers due to Reduced Cost of Doing Business in the Region – Direct, Indirect and Induced Jobs and Job Multiplier

Rank	IMPLAN Sector Code and Description	Direct	Indirect	Induced	Total	Job Multiplier
1	395 - Wholesale trade	310	56	24	390	1.3
2	405 - Retail - General merchandise stores	147	4	34	185	1.3
3	407 - Retail - Nonstore retailers	121	3	16	140	1.2
4	400 - Retail - Food and beverage stores	111	1	28	140	1.3

Rank	IMPLAN Sector Code and Description	Direct	Indirect	Induced	Total	Job Multiplier
5	501- Full-service restaurants	63	18	54	135	2.1
6	502 - Limited-service restaurants	62	12	51	125	2.0
7	531 - Employment and payroll of non-education state government	100	0	0	100	1.0
8	440 - Real estate	2	62	36	100	50.0
9	396 - Retail - Motor vehicle and parts dealers	83	3	14	100	1.2
10	406 - Retail - Miscellaneous store retailers	67	9	14	90	1.3
	Sub-Total	**1,066**	**168**	**271**	**1,505**	1.4

Source: Outputs from the IMPLAN economic model for the four-county study area.

Table 10.12 reveals that the proposed port development opportunities in central Missouri would contribute to business retention and expansion of key industrial sectors in the region. Within the freight-dependent industries (Table 10.130), the multimodal port would create 655 new jobs in the retail trade sector (the largest freight-dependent sector in the study area) and 390 new jobs in the wholesale trade industry (the third-largest freight-dependent sector in the study area). Within the service industries (Table 10.14), the proposed multimodal port would also create 100 new jobs in the public administration sector (the largest service industry in the study area), 260 new jobs in the accommodation and food services industry (the third-largest service industry in the study area), and 100 new jobs in the real estate industry.

Table 10.12 Business Retention and Attraction Benefits Accruing to the Top 10 Industries with Highest Employment Numbers due to Reduced Cost of Doing Business in the Region, 2020 – 2045

NACIS 2-digit Code	Sector	2016 Employment	2016 Share (%)	Change, 2006-2016 (%)	Job Creation
42	Whole Sector	4,181	3%	1%	390
44-45	Retail Trade	19,553	14%	5%	655
72	Accommodation & Food Services	14,966	11%	21%	260
92	Public Administration	21,069	15%	-6%	100
53	Real Estate & Rental & Leasing	1,712	1%	2%	100
	Total	**61,481**	**45%**	4%	**1,505**

Source: Outputs from the IMPLAN economic model for the four-county study area.

Table 10.13 Employment in the Freight-Dependent Industries in the Four-County Study Area, 2016

NACIS 2-digit Code	Sector	Boone County	Callaway County	Cole County	Osage County	Four-County Region	Total (%)
44-45	Retail Trade	11,339	1,282	6,599	333	19,553	44%
31-33	Manufacturing	3,911	1,721	2,284	1,262	9,178	21%

NACIS 2-digit Code	Sector	Boone County	Callaway County	Cole County	Osage County	Four-County Region	Total (%)
23	Construction	3,494	659	2,290	264	6,707	15%
42	Wholesale Trade	2,589	-	1,592	-	4,181	9%
48-49	Transportation & Warehousing	1,896	1,104	714	148	3,862	9%
22	Utilities	136	-	234	-	370	1%
11	Agriculture, forestry, fishing & hunting	153	136	37	20	346	1%
21	Mining, quarrying, & oil & gas extraction	51	64	58	17	190	0.4%
	Total	**23,569**	**4,966**	**13,808**	**2,044**	**44,387**	**100%**

Source: U.S. Bureau of Labor Statistics.

Table 10.14 Employment in the Service Industries in the Four-County Study Area, 2016

NACIS 2-digit Code	Sector	Boone County	Callaway County	Cole County	Osage County	Four-County Region	Total (%)
92	Public Administration	3,650	1,035	16,247	137	21,069	23%
62	Health Care & Social Assistance	12,230	-	5,894	298	18,422	20%
72	Accommodation & Food Services	10,527	1,062	3,377	-	14,966	16%
56	Admin & Support & Waste Mgmt. & Remediation Services	3,455	401	2,408	32	6,296	7%
54	Professional, Scientific, & Technical Services	4,170	356	1,646	-	6,172	7%
52	Finance and Insurance	3,812	246	1,843	95	5,996	6%
61	Educational Services	5,098	-	204	-	5,302	6%
81	Other Services, except Public Admin	2,430	239	1,711	-	4,380	5%
55	Mgmt. of Companies & Enterprises	3,087	87	1,066	-	4,240	5%
51	Information	1,330	88	1,121	-	2,539	3%
53	Real Estate & Rental & Leasing	1,347	88	267	10	1,712	2%
71	Arts, Entertainment, & Recreation	958	133	483	-	1,574	2%
	Total	**52,094**	**3,735**	**36,267**	**572**	**92,668**	100%

Source: U.S. Bureau of Labor Statistics.

10.1.5 Total Economic Benefits

Table 10.15 summarizes the total economic benefits (including direct, indirect, and induced benefits) generated by Development Opportunity A. This opportunity is expected to support 5,740 new jobs in the region. This would add nearly $220 million in labor income and generate $349 million in GRP and $79 million in combined federal, state and local taxes.

Table 10.16 summarizes the total economic benefits (including direct, indirect, and induced benefits) generated by Development Opportunity B. This opportunity is expected to support nearly 5,800 new jobs which generate nearly $221 million in personal income and $352 million in GRP in the four-county region. In addition, this option would yield over $79 million in combined federal, state and local taxes.

Total economic impacts generated by port development opportunities A and B are in the same order of magnitude.

Table 10.15 Development Opportunity A - Summary of Total (Direct, Indirect and Induced) Economic Benefits, 2018-2045

Benefit Category	Jobs	Labor Income (Millions of 2016$)	GRP (Millions of 2016$)
Port Construction Expenditures	620	$21	$30
Port Operation and Maintenance Expenditures	735	$15	$20
Reduced Cost of Doing Business in the Region	4,385	$183	$299
Total =	**5,740**	**$220**	**$349**

Benefit Category	Tax Revenue (Millions of 2016$)		
	Federal	State	Total
Port Construction Expenditures	$4.2	$1.8	$6.0
Port Operation and Maintenance Expenditures	$2.9	$1.2	$4.1
Reduced Cost of Doing Business in the Region	$40.2	$28.4	$68.7
Total =	**$47.3**	**$31.4**	**$78.8**

Source: Outputs from the IMPLAN economic model for the four-county study area.

Table 10.16 Development Opportunity B - Summary of Total (Direct, Indirect and Induced) Economic Benefits, 2018-2045

Benefit Category	Jobs	Labor Income (Millions of 2016$)	GRP (Millions of 2016$)
Port Construction Expenditures	675	$23	$33
Port Operation and Maintenance Expenditures	735	$15	$20
Reduced Cost of Doing Business in the Region	4,385	$183	$299
Total =	**5,795**	**$221**	**$352**

Benefit Category	Tax Revenue (Millions of 2016$)		
	Federal	State	Total
Port Construction Expenditures	$4.6	$1.9	$6.5
Port Operation and Maintenance Expenditures	$2.9	$1.2	$4.1
Reduced Cost of Doing Business in the Region	$40.2	$28.4	$68.7
Total =	**$47.7**	**$31.6**	**$79.3**

Source: Outputs from the IMPLAN economic model for the four-county study area.

10.2 Funding Opportunities

This section presents a comprehensive inventory of potentially applicable Federal, state, and local funding sources for implementation of the proposed multimodal port facility in central Missouri. The inventory includes the latest available information on Federal transportation funding legislation and discretionary/competitive grant programs, state and local funding sources and public-private partnerships.

10.2.1 Better Utilizing Investments to Leverage Development Transportation Discretionary Grants Programs

On April 25, 2018, the U.S. Department of Transportation (U.S. DOT) published a Notice of Funding Opportunity (NOFO) to apply for $1.5 billion in discretionary grant funding through the Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants program. BUILD replaces the pre-existing Transportation Investment Generating Economic Recovery (TIGER) grant program. Table 10.17 is a side-by- side comparison of the merit criteria used in TIGER and BUILD. BUILD applications will be evaluated based on the following merit criteria: safety, economic competitiveness, quality of life, environmental protection, state of good repair, innovation, partnership, and additional non-Federal revenue for infrastructure investments. BUILD new criterion will evaluate local government activities to generate additional non-Federal revenue for transportation infrastructure.

Table 10.17 Comparison of the Merit Criteria used in TIGER and BUILD

TIGER	BUILD
Merit criteria ***Primary criteria*** • Safety • State of Good Repair • Economic Competitiveness • Environmental Sustainability • Quality of Life ***Secondary criteria*** • Innovation • Partnership ***Other criteria*** • Demonstrated Project Readiness • Project Costs and Benefits • Cost Sharing or Matching ***Additional considerations*** • Geographic diversity among recipients	**Merit criteria** • Safety • State of Good Repair • Economic Competitiveness • Environmental Protection • Quality of Life • Innovation • Partnership • Non-Federal Revenue for Transportation Infrastructure Investment ***Other criteria*** • Demonstrated Project Readiness • Project Costs and Benefits ***Additional considerations*** • Geographic diversity among recipients

Source: U.S. Department of Transportation (U.S. DOT), BUILD vs TIGER Fact Sheet. Available at https://www.transportation.gov/sites/dot.gov/files/docs/policy-initiatives/tiger/308656/build-vs-tiger-fact-sheet-042018-1049am.pdf

The Transportation Investment Generating Economic Recovery (TIGER) program, created by the U.S. Congress in 2009, allowed U.S. DOT to appropriate funds for transportation projects to improve the nation's highway, bridge, public transportation, rail, and port infrastructure. Over the nine rounds of TIGER grants, the U.S. DOT received more than 7,500 applications totaling nearly $146 billion in requests that far exceeded the grant funding available.[23] These nine rounds awarded four percent of applications, providing $5.6 billion in project funding to 399 capital construction projects.[24]

Eligible applicants for BUILD grants include state, local, and tribal governments (including U.S. territories), transit agencies, MPOs, and other public entities. Eligible projects for BUILD grants are capital projects that include, but are not limited to:

- Highway or bridge projects,
- Public transportation projects,
- Passenger and freight rail transportation projects,

[23] Estimated based on the awarded project lists and dollar amounts awarded in each round provided by the Federal Highway Administration (FHWA) at https://ops.fhwa.dot.gov/Freight/infrastructure/tiger/ and the U.S. DOT at https://www.transportation.gov/BUILDgrants/about

[24] Ibid

- Port infrastructure investments (including inland port infrastructure and land ports of entry),
- Intermodal projects, and
- Research, demonstration or pilot projects are eligible if they result in long-term, permanent surface transportation infrastructure that has independent utility.

The TIGER grant program had a strong focus on transformative projects and creating ladders of opportunity. Transformative projects include surface transportation investments that dramatically improve the status quo by providing significant and measurable improvements over existing conditions such as positive changes in economic development, safety, quality of life, environmental sustainability, or state of good repair. Ladders of Opportunity projects would be expected to increase connectivity to employment, education, and other essential services, support workforce development, or contribute to community revitalization, particularly for disadvantaged and undeserved groups such as minorities, low income populations, persons with disabilities, and elderly individuals.

The statutory requirements related to minimum grant amounts by project location are depicted in Table 10.18. The U.S. DOT plans to award a greater share of BUILD transportation funding to projects located in rural areas that meet well the merit criteria than to than to those in urban areas. The minimum and maximum project award sizes in FY 2018 BUILD are the same as in FY 2017 TIGER. For this round of BUILD, no more than $150 million can be awarded to a single State. BUILD eligible costs and project types are the same as in TIGER.

Table 10.18 Statutory Requirements of BUILD Grants

Project Location	Minimum Grant Amount	Federal Cost Share or Match
Urban Area	$5 million	Up to 80% of project costs
Rural Area	$1 million	Up to 100% of project costs

Source: U.S. Department of Transportation

Rural area means any area not within an Urbanized Area (UA), as defined by the U.S. Census Bureau. The project will be considered in a rural area if all or the majority of a project, determined by the geographic location(s) where the majority of project money is to be spent, is located in a rural area.

The U.S. Census Bureau defined an UA as an area that consists of densely settled territory that contains 50,000 or more people. While individual jurisdictions might have a population of fewer than 50,000, if they are included as part of an UA, they will be classified as urban for purposes of the TIGER grant program. Urban Clusters are rural areas for purposes of the TIGER grant program.

The funding awarded to port-related projects over the nine rounds of TIGER Grants is shown in Table 10.19.

Table 10.19 Sample of Port Related Projects Awarded TIGER Grants

TIGER Round (Year)	Total Grant Funding (Millions of USD)	Grant Funding Awarded to Port-Related Projects (Millions of USD)	Grant Funding Awarded to Port-Related Projects (%)	Year-to-Year Change
TIGER IX (2017)	$500	$72.7	14.5%	
TIGER VIII (2016)	$500	$61.8	12.4%	-15%
TIGER VII (2015)	$500	$45.0	9.0%	-27%
TIGER VI (2014)	$600	$74.4	12.4%	65%
TIGER V (2013)	$474	$63.0	13.3%	-15%
TIGER IV (2012)	$500	$68.0	13.6%	8%
TIGER III (2011)	$511	$65.4	12.8%	-4%
TIGER II (2010)	$600	$87.6	14.6%	34%
TIGER I (2009)	$1,498	$128.8	8.6%	47%

Source: U.S. Department of Transportation

A representative sample of TIGER grants awarded to port-related projects, such as port development or improvements projects, shown in Table 10.20 includes:

- The Southeast Automotive Gateway Project will converts an abandoned bulk handling facility at the Port of Mobile into a roll-on/roll-off mobile vehicle processing facility. The facility will be capable of handling automobiles, military vehicles, trucks, other rolling stock, and high/heavy cargos.
- The Mid-Atlantic Multi-Modal Transportation Hub Project will build state-of-the-art cargo-handling facilities at the Sparrows Point industrial facility in East Baltimore as part of a larger investment program to repurpose a former steel manufacturing site with marine service into a multimodal logistics hub. The project will renovate a 2,200-linear foot berth with activities including: installation of a full, new pile supported system; creation of recessed utility sections to allow transfer of liquid commodities; dredging of the turning basin; and general site improvements.
- The Little Rock Port Authority Growth Initiative will construct improvements to the slackwater harbor area, including a new dock with direct dock- to-rail capability; and adds rail storage.
- The Rehabilitation of “H” Wharf Project will reconstruct and expand a wharf built in 1948, including a new sheet pile bulkhead retaining wall and upgrades to an access road. The project also includes demolition of surface facilities and construction of additional structural components
- The Tenth Avenue Marine Terminal Modernization Project will remove obsolete transit sheds and construct a new laydown area for temporary equipment storage with on-dock rail improvements. The new terminal will provide operational space for multiple shippers who will benefit from enhanced productivity. The removal of transit sheds will improve the safety of oversized cargo movements by creating adequate space to handle modern cargos.
- The Port of Indiana-Jeffersonville Truck-to-Rail and Rail-to-Water Improvements Project will construct a double rail loop and rail-to-barge transfer facility with additional rail and turnouts. The project includes construction of a nearly mile-long rail siding extension that will allow rail carriers to deliver a 90-car unit train to the port. The project will also construct a truck-to-rail intermodal facility in the vicinity of

Connector Road to accommodate increasing truck traffic expected from the East End Bridge over the Ohio River.

Table 10.20 Sample of Port Related Projects Awarded TIGER Grants

Awarded Project	Project Sponsor	TIGER Round (Year)	Grant Funding
Southeast Automotive Gateway	Alabama State Port Authority, Alabama	TIGER IX (2017)	$12,700,000
Mid-Atlantic Multi-Modal Transportation Hub	Baltimore County, Maryland	TIGER IX (2017)	$20,000,000
Little Rock Port Authority Growth Initiative	Little Rock Port Authority	TIGER VIII (2016)	$6,185,400
Rehabilitation of “H” Wharf	Port of Authority of Guam	TIGER VIII (2016)	$10,000,000
Tenth Avenue Marine Terminal Modernization Project	San Diego Unified Port District	TIGER VII (2015)	$10,000,000
Port of Indiana-Jeffersonville Truck-to-Rail and Rail-to-Water Improvements	Ports of Indiana, Indiana	TIGER VII (2015)	$10,000,000

Source: U.S. Department of Transportation

10.2.2 Infrastructure for Rebuilding America Grant Program

The Fixing America’s Surface Transportation (FAST) Act established a National Highway Freight Program (NHFP), which identified formula funds for investments on the National Highway Freight Network (NHFN) with up to 10 percent available for non-highway projects. The NHFN includes the Primary Highway Freight System (PHFS), critical rural and urban freight corridors (as designated by the states and the MPOs) and the portions of the Interstate System not included in the PHFS. The development of a FAST Act compliant state freight plan is required for a state to obligate its NHFP funds. Table 10.21 shows the NHFP funding and the Missouri share.

Table 10.21 National Highway Freight Program Funding and Missouri Share

Fiscal Year	2016	2017	2018	2019	2020
National Authorization	$ 1.15 B	$ 1.10 B	$ 1.20 B	$ 1.35 B	$ 1.50 B
National Estimated Funding*	$ 1.14 B	$ 1.09 B	$ 1.19 B	$ 1.34 B	$ 1.49 B
Missouri Share	$ 28 M	$ 26 M	$ 29 M	$ 32 M	$ 36 M

Note: * Represents net amount after a portion of the authorized amount is set aside for metropolitan planning.

Source: U.S. Department of Transportation

Recent revisions to the FAST Act created the Infrastructure for Rebuilding America (INFRA) Grant Program (formerly known as FASTLANE). INFRA allows eligible applicants to apply for funding to complete projects that improve safety and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements. Approximately $1.5 billion are available for infrastructure grants for fiscal years 2017 and 2018. States can leverage their own dedicated transportation funding with these federal sources, as well as with other local, regional, and private-sector funding.

Eligible applicants for INFRA grants include state and local governments, tribal governments/consortiums, MPOs with a population of 200,000, public authorities (including port authorities) with a transportation function, federal land management agencies applying jointly with a State(s), and multi-State or multijurisdictional group of public entities.

The eligible projects under the INFRA grant program include:

- Highway freight projects on the NHFN,
- Highway or bridge projects on the National Highway System (NHS), including:
  - Projects that add Interstate System capacity to increase mobility,
  - Projects located in a national scenic area,
- Grade crossing or grade separation projects,
- Other freight projects that are:
  - Intermodal/rail freight project, or
  - Within the boundaries of a public or private freight rail, maritime (including ports) or intermodal facility.

Eligible project costs include development phase activities and construction activities. Development phase activities involve planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering, design work, and other pre-construction activities. Construction activities involve new construction, reconstruction, rehabilitation, property or equipment acquisition, environmental mitigation, construction contingencies, and operational improvements. Additional statutory requirements related to minimum project size and grant amounts are depicted in Table 10.22.

Table 10.22 Statutory Requirements of INFRA Grants

Project Location	Minimum Project Size*	Minimum Grant Amount	Cost Share**
Large Projects	The lesser of: • $100 million • 30 percent of State's FY 2015 apportionment, if project is located in one State • 50 percent of larger participating State's FY 2015 apportionment, if project located in more than one State	$25 million	Up to 60% INFRA grants Up to 80% total Federal
Small Projects	Doesn't meet large project minimum project size	$5 million	Up to 60% INFRA grants Up to 80% total Federal

Notes:

*Previously incurred expenses may count toward meeting minimum project size requirement if they are eligible project costs and were expended as part of the project for which the applicant seeks funding.
**Previously incurred expenses cannot count toward cost share.

Source: U.S. Department of Transportation

The selection criteria for the INFRA grants include:

- Support for national or regional economic vitality,
- Leveraging of federal funding,
- Potential for innovation, and
- Performance and accountability.

The criteria includes a revised set of merit criteria, reflecting the current Presidential Administration's policy priorities. The merit criteria used in INFRA overlaps with some of the criteria used in the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) grant process, these include: an emphasis on promoting economic growth, improving safety, and project readiness. However, many of the INFRA grant criteria are new, including an increased emphasis on innovation, technology, performance measurement and accountability, and leveraging federal funds. Appendix A provides a more detailed breakdown of the new merit criteria.

The following items relate to merit criteria in the INFRA grant that are new, or have been given greater emphasis than in the FASTLANE grant:

- ***Innovation in environmental review and permitting.*** The U.S. DOT is seeking to use INFRA grant projects to test innovative practices to expedite National Environmental Policy Act (NEPA) reviews.
- ***Support for innovative technologies, including autonomous vehicles.*** The U.S. DOT encourages INFRA grant recipients to support the deployment of advanced technologies, and they specifically note a preference for projects that "enhance the environment for automated vehicles", for example, by including road signage and design features that facilitate autonomous technologies.
- ***Innovative approaches to safety.*** The U.S. DOT is seeking projects that involve innovative approaches to improving road safety, whether those involve the physical design of the project or the use of advanced technologies. It should be noted that the emphasis is on innovation, not just the simple fact that a project has safety benefits.
- ***Performance and accountability.*** The U.S. DOT is encouraging applicants to hold themselves accountable to achieving specific outcomes, potentially by making some portion of the grant funds contingent on meeting certain project milestones and/or achieving specific transportation outcomes. The U.S. DOT intends to award INFRA funding to projects that will generate clear quantifiable results and that will advance the U.S. DOT's transportation policy goals.
- ***Leveraging federal funding.*** The U.S. DOT emphasizes the leveraging of federal funding, noting that the INFRA program will give priority consideration to projects that use all available non-Federal resources for development, construction, operations, and maintenance.
- ***Economic benefits beyond the benefit-cost analysis.*** The Notice of Funding Opportunity (NOFO) encourages applicants to describe economic impacts and other data-supported benefits that are not included in the benefit-cost analysis (BCA). This is an opportunity to show the potential short and long term economic benefits (i.e., job creation, labor income, gross regional product) resulting from project construction costs, project maintenance expenditures and travel efficiencies accruing to transportation

users. This is also an opportunity to leverage private-sector investment to support job growth, urban redevelopment, and workforce development.

A representative sample of FASTLANE grants awarded to port-related projects, such as port development or improvements projects, presented in Table 10.23 includes:

- The Cedar Rapids Logistics Park Project in Iowa will construct integrated facilities for a container intermodal terminal (35 acres), a rail-to-truck transload facility for bulk commodities, and a cross-dock facility (120,000 square feet) for consolidating and redistributing truck loads, as well as loading and unloading containers.
- The Maine Intermodal Port Productivity Project will provide infrastructure improvements at the Port of Portland consisting of removing existing maintenance facility and infill of the wharf, installing new mobile harbor crane and other cargo handling equipment, constructing a highway and rail crossing upgrade, and building a terminal operations and maintenance center.
- Port of Indiana - Burns Harbor: Enhanced Intermodal Facilities with Rail & Truck Marshalling Yards Project will provide a series of efficiency-enhancing improvements that will also allow the port to increase their cargo handling capacity. The upgrades includes the construction of a new 2.3-acre bulk berth facility, a truck-barge-truck conveyer system, a new west-side rail yard and a new rail connection that will connect the port's main terminal with the new rail yard, dockside improvements (retaining walls and paving), and construction of a truck marshaling yard.

Table 10.23 Sample of Port Related Projects Awarded FASTLANE Grants

Awarded Project	Project Sponsor	FASTLANE Fiscal Year	Grant Funding
Cedar Rapids Logistics Park	Iowa Department of Transportation	2016	$25,650,000
Maine Intermodal Port Productivity Project	Maine Department of Transportation	2016	$7,719,173
Burns Harbor: Enhanced Intermodal Facilities with Rail & Truck Marshalling Yards	Ports of Indiana, Indiana	2017	$9,850,000

Source: U.S. Department of Transportation

10.2.3 Transportation Infrastructure Finance and Innovation Act Program

The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. TIFIA credit assistance provides improved access to capital markets, flexible repayment terms, and potentially more favorable interest rates than can be found in private capital markets for similar instruments. TIFIA can help advance qualified large-scale projects that otherwise might be delayed or deferred because of size, complexity or uncertainty over the timing of revenues.

Projects eligible for federal assistance through existing transportation programs are eligible for the TIFIA credit program. These projects include:

- Highway projects; including intelligent transportation systems (ITS),
- International bridges and tunnels,
- Publicly-owned freight rail facilities,
- Private facilities providing public benefit for highway users,
- Intermodal freight transfer facilities, projects that provide access to such facilities, and
- Service improvements on the National Highway System.

Projects located within the boundary of a port terminal are also eligible to receive TIFIA credit assistance under certain conditions. The project must address surface transportation to facilitate direct intermodal interchange, transfer, and access into and out of the port. Construction and non-construction costs are eligible to be financed, including but not limited to planning, feasibility analysis, environmental review, permitting, and preliminary engineering and design work. Eligible projects must be included in the State Transportation Improvement Program (STIP) with a capital cost of at least $50 million. ITS projects have a $15 million eligibility requirement. TIFIA financing should attract public and private investment, result in a project proceeding earlier and/or more efficiently, and reduce use of federal grant assistance to the project.

10.2.4 Railroad Rehabilitation and Improvement Financing Program

The Railroad Rehabilitation and Improvement Financing (RRIF) Program was established in the 1998 Transportation Equity Act for the 21st Century and amended most recently by the FAST Act in 2016. The RRIF program authorizes the Federal Railroad Administration (FRA) Administrator to provide direct loans and loan guarantees for projects which:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops,
- Refinance outstanding debt incurred for the purposes listed above, and
- Develop or establish new intermodal or railroad facilities.

The FAST Act amended the program to clarify that pre-construction activities such as planning or design can be financed.

Up to $35 billion of financing is available, with at least $7 billion reserved for projects not on Class I railroads. Since 2002, 35 loan agreements totaling $5 billion have been executed (an average of $147 million per agreement). Financing can be provided for up to 100% of project costs with repayment periods of up to 35 years. Recipients benefit from interest rates that equal to the cost of borrowing to the government. The FAST Act also authorized the U.S. DOT to enter into Master Credit Agreements. These agreements include one or more loans to be made in the future on a program of related projects.

Railroads, state and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection are all eligible to borrow under RRIF. The FAST Act increased access to this program by extending eligibility to allow joint ventures with any type of eligible applicant.

Applications will be selected based on the following criteria:

- The statutory eligibility of the applicant and the project,
- The creditworthiness of the project, including the present and probable demand for rail services and a reasonable likelihood that the loan will be repaid on a timely basis,
- The extent to which the project will enhance safety,
- The significance of the project on a local, regional, or national level in terms of generating economic benefits and improving the railroad transportation system,
- The improvement to the environment that is expected to result directly or indirectly by the implementation of the project, and
- The improvement in service or capacity in the railroad transportation system or the reduction in service- or capacity-related problems that is expected to result directly or indirectly from the implementation of the project.

Priority will be given to projects that:

- Enhance public safety, including positive train control,
- Enhance the environment through energy efficiency and environmental quality improvements,
- Promote economic development and increase U.S. competitiveness in international markets,
- Are endorsed by applicable statewide planning documents,
- Preserve or enhance rail or intermodal service to small communities or rural areas,
- Enhance service and capacity in the national rail system, or
- Materially alleviate rail capacity problems.

10.2.5 Public-Private Partnerships in Missouri

A Public-Private Partnership (P3) is a contractual agreement between a public agency (federal, state or local) and a private entity for a long-term performance based approach to procure public infrastructure. The private entity assumes the major share of the risk in terms of financing, constructing and the performance of the project in return for the right to collect revenue from the project over a set period of time.

FHWA encourages the consideration of public-private partnerships (P3s) in the development of transportation improvements. Early involvement of the private sector can bring creativity, efficiency, and capital to address complex transportation problems facing State and local governments. The Center for Innovative Finance Support provides information and expertise in the use of different P3 approaches, and assistance in using tools including the SEP-15 program, private activity bonds (PABs), and the TIFIA Federal credit program to facilitate P3 projects. (https://www.fhwa.dot.gov/ipd/p3/default.aspx).

The matrix shows in Table 10.24 provides the Missouri' statutes that authorize 3P delivery methods for public infrastructure. This matrix does not include privatization legislation. In Missouri, the program has been used to maintain and expand transportation infrastructure as explained below.

Table 10.24 State of Missouri - P3 Legislation Matrix

Transportation									
Roadway/Bridges	Transit/Rail	Ports	Airports	Related Facilities	Energy	Social infrastructure	Water/Wastewater	Miscellaneous	Statute
	Yes	Yes	Yes	Yes					Missouri Public-Private Partnerships Transportation Act Mo. Rev. Stat. §§ 227.600 to 227.669

Source: State P3 Legislation Matrix, December 2017. Available at https://www.dbia.org/resource-center/p3-resources/Documents/p3_state_statute_report.pdf

The Missouri's "Safe & Sound" Bridge Improvement Program launched in late 2006 was intended for private sector partners to reconstruct or rehabilitate 802 bridges in poor condition across the state for 25 years. By late 2008, even with a preferred bidder selected, the program was cancelled. A few months later, the Missouri Highway and Transportation Commission selected a consortium to design and build 554 bridges under a public-bond funded design-build contract. These bonds, $487 million in total, will be retired with future federal funds.[25] Missouri enacted new P3 legislation in 2009 that expands the types of projects that may be allowed, but the state still requires preliminary approval by the legislative Joint Committee on Transportation Oversight and final approval by the voting public.

Legislation passed this year allows an innovative funding approach for the proposed Mississippi River crossing in downtown St. Louis that is in need of significant upgrades.[26] This legislation allows for a public-private partnership between the Missouri Highways and Transportation Commission (MHTC) and a private company to finance, build, maintain, and operate the new bridge through a long-term lease agreement. The current traffic on Poplar Street Bridge in St. Louis experiences 90 minutes of rush-hour congestion a day and the average delay is 10 minutes. By 2020 rush-hour congestion is expected to double to 3 hours, with the average delay increasing to 55 minutes, if no new highway capacity is added. The private company would get its investment back by charging tolls.

In the 2017 Missouri State Plan[27] fourteen strategic recommendations were developed to address the freight plan's goals. Program recommendations include developing public-private partnerships to support freight

25 InfraAmericas, Available at http://www.infra-deals.com/deals/316716/missouri-safe-and-sound-bridge-improvement-programme.thtml

[26]Missouri Department of Transportation, Law Will Allow Tolls On New St. Louis Bridge. Available at http://www.modot.org/expresslane/PPP.htm

[27] Missouri Department of Transportation (MoDOT), Missouri Freight Plan, November 2017. Available at http://www.modot.org/othertransportation/freight/FreightPlan.htm

infrastructure, terminals, and intermodal facilities improvements critical to the State that may not solely align with private investment criteria.

At the local level, the City of Grain Valley in Missouri provides a good example of the benefits of delivering transportation infrastructure through 3Ps. The city has experienced rapid population growth and significant demand for additional road capacity, particularly the I-70 Interchange into Grain Valley which is the city's main access route. The initial agreement between the state of Missouri and the City of Grain Valley was that the state would participate in the funding and construction of the interchange upgrade and related road improvements, as long as the City participated as well. The total cost of the project was estimated to be around $18.2 million with the state contributing nearly $10.7 million towards that cost while the City was left to fund the remaining $7.5 million within a defined period of time. Since the City contribution represented 61percent of the City's annual budget, the City's leadership initiated a detailed 3P with a developer interested in undertaking a retail project on one of the four corners of land along the interchange.

The partnership has used several economic development tools and leveraged joint resources to significantly reduce the gaps facing both the road infrastructure and the retail project. This particular partnership included the use of a community improvement district (CID); a neighborhood improvement district (NID); an area-wide tax increment financing plan (TIF); and more traditional resources from both the City and the developer. The results provided the City with an anticipated revenue stream for $6.1 million of its $7.5 million obligation, including a significant upfront amount paid by the developer through special assessments on his property. And, the developer, whose project costs were increased by this program, saw the financing/equity gap closed by the use of economic development incentives. Additional tools are being used by the City to further shrink the City's funding gap.

10.2.6 StrongPorts Program

The U.S. Maritime Administration (MARAD) has identified a need to assist ports and other transportation planning entities with support and toolkits to navigate the complex process of leveraging the funding sources necessary to implement major projects. In recognition of this need, MARAD developed the StrongPorts program to facilitate the planning, funding, and execution of port projects. While not a dedicated stream of funding for ports, support from MARAD and its publications can help ports develop projects that are financially salient and competitive for other federal and private funding opportunities.

MARAD's *Port Planning and Investment Toolkit* is a comprehensive guide to project development. This toolkit is the result of the collaboration of many organizations and published by MARAD and the American Association of Port Authorities (AAPA). The *Toolkit* provides guidance on the planning phase from initial data collection and stakeholder outreach, to quantifying existing conditions and needs, to forming a project and project alternatives for consideration. The *Toolkit* also provides guidance on determining the feasibility of a project including understanding the risk associated with the investment and comparing alternatives. Finally, the *Toolkit* discusses financing models and approaches, types of funding, information on debt and loan types, and a list of potential grant sources.

10.2.7 State Freight Enhancement Program

The MoDOT Freight Enhancement Program (FRE) aims to improve and maintain the high priority freight assets and corridors that are critical to the movement of freight into, out of, within, and through Missouri.[28] Eligible applicants include public, private and not-for-profit entities.

FRE funds must be used for transportation purposes other than highways and are limited to capital projects such as the construction of improvements or purchase of equipment that address one of the following four goals: safety, connectivity and mobility, economic development and major maintenance. Operating costs are not eligible. A minimum of 20 percent of the project's cost must come from sources other than FRE funding. A total of $1.0 million is available for this program and the maximum funding available for any one project is $0.5 million. Table 10.25 provides a representative sample of FER grants awarded since 2014.

Table 10.25 Freight Enhancement Program Awards

Fiscal Year	Project Sponsor	Project Description	Awarded Amount (USD)
2018	Pemiscot County Port Authority	Complete design and construction of a rail/truck transload facility to support existing and new committed customers at the port.	$500,000
2018	Pettis County	Design and construction of loop track and spur in Sedalia to support existing and new committed customer. In conjunction with City of Sedalia	$116,250
2018	City of Sedalia/Sedalia-Pettis County Community Service Corporation	Design and construction of loop track and spur in Sedalia to support existing and new committed customer. In conjunction with City of Sedalia	$383,750
2017	Agriservices	Install new conveyor and grain receiving pit for loading of additional barges.	$500,000
2017	COLT Rail	Construct auto car unloading ramp	$80,000
2017	City of St. Louis Port Authority	Construct staging and ladder track at Municipal River Terminal	$420,000
2016	SEMO Port	Install rail to connect the port's West Team Tracks to the main line	$220,600
2015	BNSF Railroad	Install rail switch to increase capacity.	$261,000
2015	City of St. Louis Port Authority	Rehabilitate dock at Municipal River Terminal	$389,000
2014	Jefferson County Port Authority	Construct dock improvements for committed tenant	$150,000
2014	Port KC	Rehabilitation of the existing rail year at Woodswether Terminal. Tasks include inspection and repair of the rail track and ballast.	$250,000
2014	Pemiscot County Port Authority	Extend port's rail spur to support committed tenant.	$300,000
2014	City of Springfield	Relocation of West Wye rail line to increase capacity and eliminate at grade crossings from high traffic areas. Funding is part of $3.2 million overall project.	$150,000

[28] Missouri Department of Transportation (MoDOT), Freight Enhancement Program. Available at http://www.modot.org/othertransportation/freight/documents/freightenhancementprojectsrfp.pdf

Source: Missouri Department of Transportation (MoDOT), Freight Enhancement Program. Available at http://www.modot.org/othertransportation/freight/documents/FreightEnhancementProgramAwards.pdf

10.2.8 State Transportation Assistance Revolving Fund

The State Transportation Assistance Revolving Fund (STAR Fund) was created by the Missouri General Assembly to assist in the planning, acquisition, development, and construction of non-highway transportation facilities and vehicles.29 The STAR Fund is a revolving loan program where loan payments and any interest earned go back into the fund for additional transportation projects.

The program was established in 1996 by Senate Bill 780, with an initial appropriation of $2.5 million in 1997. Provisions are contained in Section 226.191 of the Missouri Revised Statutes. The Missouri Highways and Transportation Commission administers the fund, which assists political subdivisions or not-for-profit organizations in the development of non-highway related transportation facilities.

The following types of projects are eligible for STAR loans: air, water, rail or mass transit facility construction; mass transit vehicles; vehicles for elderly or handicapped persons. Project proposals involving STAR financing are reviewed using the following evaluation criteria: transportation need, public benefit, timeliness of repayment, and financial feasibility.

10.2.9 MoDOT Administered Multimodal Program

Multimodal programs administered by MoDOT that provide funds to finance port-related projects are listed in Table 10.26. This table also includes fiscal year 2017 budget request as well as relevant program information.

Table 10.26 MoDOT Port-Related Multimodal Programs

Multimodal Program	
Port Authority Administrative Grants	• $600,000 from State Transportation Fund in FY 2017 Budget Request • Provided administrative or capital assistance to public ports • No local math required
State Road Fund Ferry Boat Operating Assistance	• $176,000 from State Road Fund in FY 2017 Budget Request (movable bridges) • This item is shown in the Maintenance category of Attachment • Provides operating assistance to Missouri's two public ferryboats
Port Capital Improvement Program	• $12.4M State General Revenue Funding for Capital improvement grants for public port facilities. Missouri General Revenue funding is subject to annual appropriation process as well as executive branch withholding of funds • 20% local match required

Source: MoDOT Administered Multimodal Programs, Fiscal Year 2017 Budget Request. June 15, 2016.

[29] Missouri Department of Transportation. A Guide to Financing Successful Partnerships with Missouri Department of Transportation State. Available at http://www.modot.org/services/community/documents/programguide.pdf

The Port Capital Improvement Program provides capital grants to public port authorities.[30] Grants assist ports with capital expenditures, such as dock construction, mooring dolphins, access improvements (e.g. rail connectors, road access improvements), utility extensions, and general site development. Grants require a 20 percent local match and are subject to audit. Individual port authority projects are selected by examining criteria such as type of project, benefits of project to the local community, previous history of each port, items relative to self-sufficiency, management capabilities, and opportunities for economic development.

Fiscal Year 1997 was the first year in which capital funds were appropriated under the port program when $1,500,000 was appropriated from the State Transportation Fund. In FY 2008 there was no funding for the program but in FY 2009 the program received $6,650,000 from General Revenue and the Missouri Highways and Transportation Commission (MHTC) allocated $4,500,000 from America Recovery and Reinvestment Act (ARRA) discretionary funds for port capital improvements. In FY 2014, the program received $3 million from General Revenue. In 2015, the Missouri Port Authority Association and MoDOT completed an assessment and prioritization of port infrastructure needs detailing more than $65 million in critical port capital improvement needs.[31] MoDOT Fiscal Year 2019 Capital Improvement Program includes $7.6 million to develop port infrastructure on Missouri's waterways and improve connections between transportation modes.[32]

[30] Missouri Department of Transportation. Available at http://modot.mo.gov/plansandprojects/stip2002-2006/STIP%20Book/Sec9Multimodal%20Operations.pdf

[31] Missouri Department of Transportation. Available at http://modot.mo.gov/plansandprojects/construction_program/STIP2015-2019/documents/Sec07Multimodal_002.pdf

[32] MoDOT Fiscal year 2019 Capital Improvements. Available at https://oa.mo.gov/sites/default/files/FY_2019_EB_Capital_Improvements.pdf

11.0 Trends, Key Findings, and Recommendations

11.1 Trends and Key Findings

- Favorable Benefit-Cost Analysis
- Strong Private Sector Interest, including potential funding partners
- Strong Existing Manufacturing industry in study area (2 counties)
- National truck driver shortage
- Small share of commodity movement by rail and water compared to trucks – opportunity for water modes

11.2 Recommendations

11.2.1 Establish the Jefferson City Regional Port Authority

Before the Jefferson City Chamber of Commerce, Callaway County, and Cole County can pursue either Development Opportunity, it is essential that they work with Missouri Department of Transportation (MoDOT) to form a regional port authority. Port authorities are permitted to "promote the general welfare, to promote development within the port district, to encourage private capital investment by fostering the creation of industrial facilities and industrial parks within the port district and to endeavor to increase the volume of commerce, and to promote the establishment of a foreign trade zone (FTZ) within the port districts".[33] This designation is essential for receiving capital and administrative funding from MoDOT. Port authorities also have the benefit of receiving technical assistance and representation in industrial and governmental circles from MoDOT.

Missouri Statute Chapter 68 states the following criteria to be evaluated as part of a port authority application[34]:

- The population of any city and/or county submitting the application;
- The desirability and economic feasibility of having more than a single port authority within the same geographic area;
- The technical and economic capability of participating cities and/or counties, as well as private interests, to plan and carry out port development within the proposed district;
- The amount of actual and potential river traffic that would make use of any facilities developed by a port authority;
- The potential economic impact on the immediate area from which the application originates; and

[33] Missouri Statue Chapter 68, Section 020. http://revisor.mo.gov/main/OneSection.aspx?section=68.020&bid=3241

[34] Missouri Statue Chapter 68, Section 010. http://revisor.mo.gov/main/OneSection.aspx?section=68.010&bid=3239&hl=

- The potential impact on the economic development of the entire state and how the proposed port authority's developmental activities relate to any state plans.

As a political subdivision of the State, port authorities in Missouri also have a number of additional powers related to planning, funding, and development. Some of the most beneficial powers include the right to[35]:

- Confer with any similar body created under laws of this or any other state for the purpose of adopting a comprehensive plan for the future development and improvement of its port districts;
- Consider and adopt detailed and comprehensive plans for future development and improvement of its port districts and to coordinate such plans with regional and state programs;
- Levy a sales and use tax or real property tax within the boundaries of the port district to be used towards port development projects;
- Acquire rights-of-way and property of any kind or nature within its port districts necessary for its purposes; and
- Accept gifts, grants, loans, or contributions from the federal government, state government, political subdivisions, municipalities, foundations, corporations, and other public or private agencies.

11.2.2 Connect with Economic Development Agencies

Central to most economic development strategies is the concept of developing, retaining, or attracting business activity that brings a flow of revenue into the community that in turn generate income and other jobs through economic multiplier effects. In this regard, Jefferson City Area Chamber of Commerce, Callaway County, and Cole County could work with state and regional economic development agencies to develop a targeted plan to attract businesses to the port. For instance, the proposed multimodal port could attract new businesses by providing “shared access to facilities” which separates the port from a standalone facility. Sharing could include services provided by shipping agents, brokers, shippers, and packing companies, as well as those related to support activities, e.g., administrative support and foodservices. Asset sharing would allow companies within the port to obtain economies of scale and these economies would position the port to compete for customers, tenants, and trade.

11.2.3 Form Partnership with National Guard

Work with them to determine potential funding points and develop site in a way that also suits their needs.

11.2.4 Establish Foreign Trade Zone

Manufacturers and logistics companies in central Missouri are part of global supply chains that require access to markets on both sides of the Missouri River, across the United States, and internationally. A Foreign Trade Zone (FTZ) in the proposed multimodal port could help attract foreign customers and domestic manufacturers due to cost-savings on import duties and excise tax, plus time and cost savings from co-location.

[35] Missouri Statue Chapter 68, Section 025. http://revisor.mo.gov/main/OneSection.aspx?section=68.025&bid=3242

11.2.5 Enhance the Region's Economic Environment

The proposed multimodal port would help to enhance the economic environment for traded and non-traded sector businesses in central Missouri by improving the cost of doing business in the region. The proposed multimodal port would support the continued expansion and growth of a number of strategic business sectors in the 4-county region. Traded sector businesses located at the proposed multimodal port would bring dollars into the 4-countty region and some of these funds will be spent in non-traded sector businesses. To strengthen and grow the region's economy, it is important to continue to enhance an environment that is supported for traded sector businesses which will foster a positive environment for existing businesses and overall economy activity in central Missouri.

11.2.6 Initial Screening of Revenue Options

This study provides an overview of existing and potential Federal, state, and local funding sources that would enable Jefferson City Area Chamber of Commerce, Callaway County, and Cole County to bring public and private money to advance the development of the proposed multimodal port in central Missouri.. The usual limited availability of public and private funding sources or lack of dedicated funding sources for port development projects require a thorough understanding of potential financing tools (e.g., the special challenges presented by structuring private-public financing partnerships), practical strategies for using available funds (e.g., developing partnerships within the local community), and innovative ways to allocate the costs equitably among the project's beneficiaries. To help determine what revenue options appear to be more "promising" to address the port facility funding needs, a screening of the identified alternative funding sources is recommended. The approach to screen and assess potential revenue mechanisms could include:

- Developing evaluation criteria;
- Evaluating the revenue options using the selected criteria; and
- Developing a shortlist of revenue mechanisms for more detailed study

Appendix A. The IMPLAN Economic Model

The IMPLAN economic model for the four-county study area composed of Boone, Callaway, Cole, and Osage Counties in central Missouri are used to estimate the direct, indirect, and induced effects arising from the public transit services provided by RTA today and the expected benefits that would come from future services based on planned investments.

The economic data for IMPLAN includes 536 industry sectors. IMPLAN Industry sectors are classified on the basis of the primary commodity or service produced. Corresponding data sets are also produced for each county within the study area, allowing analyses at the parish level and for geographic aggregations such as clusters of contiguous parishes.

The model applies multiplier effects to changes in final demand for each industry within the defined economic area, attributable to a change in expenditures in one or more industries. Multipliers estimate three components of total change in final demand within the defined area:

- **Direct impacts**: changes within the affected industry
- **Indirect impacts**: industry-to-industry interactions in response to altered demands of the directly impacted industry
- **Induced effects**: changes in household spending as total income and population adjust due to a direct industry impacts

The economic impacts, reported in terms of employment, labor income, gross regional product (GRP) and tax revenue, are defined as follows:

- **Employment** is the estimate of the number of jobs, full-time plus part-time, by place of work (full-time and part-time jobs are given equal weight) generated by the investment.
- **Labor Income** is a measure of wages and benefits associated with the additional employment generated by the investment.
- **Gross Regional Product (GRP)** also referred to as “value added” (economic output less intermediate inputs) captures the additional value created in the production process which includes employee compensation (labor income), proprietor income (i.e., payments received by self-employed individuals as income), other income types, and indirect business taxes.
- **Tax Revenue** is the increase in property and sales tax revenue for the local government, as well as changes in income tax revenues as and taxes on production and imports for the federal and state government, that are realized when local resident and business activity changes.