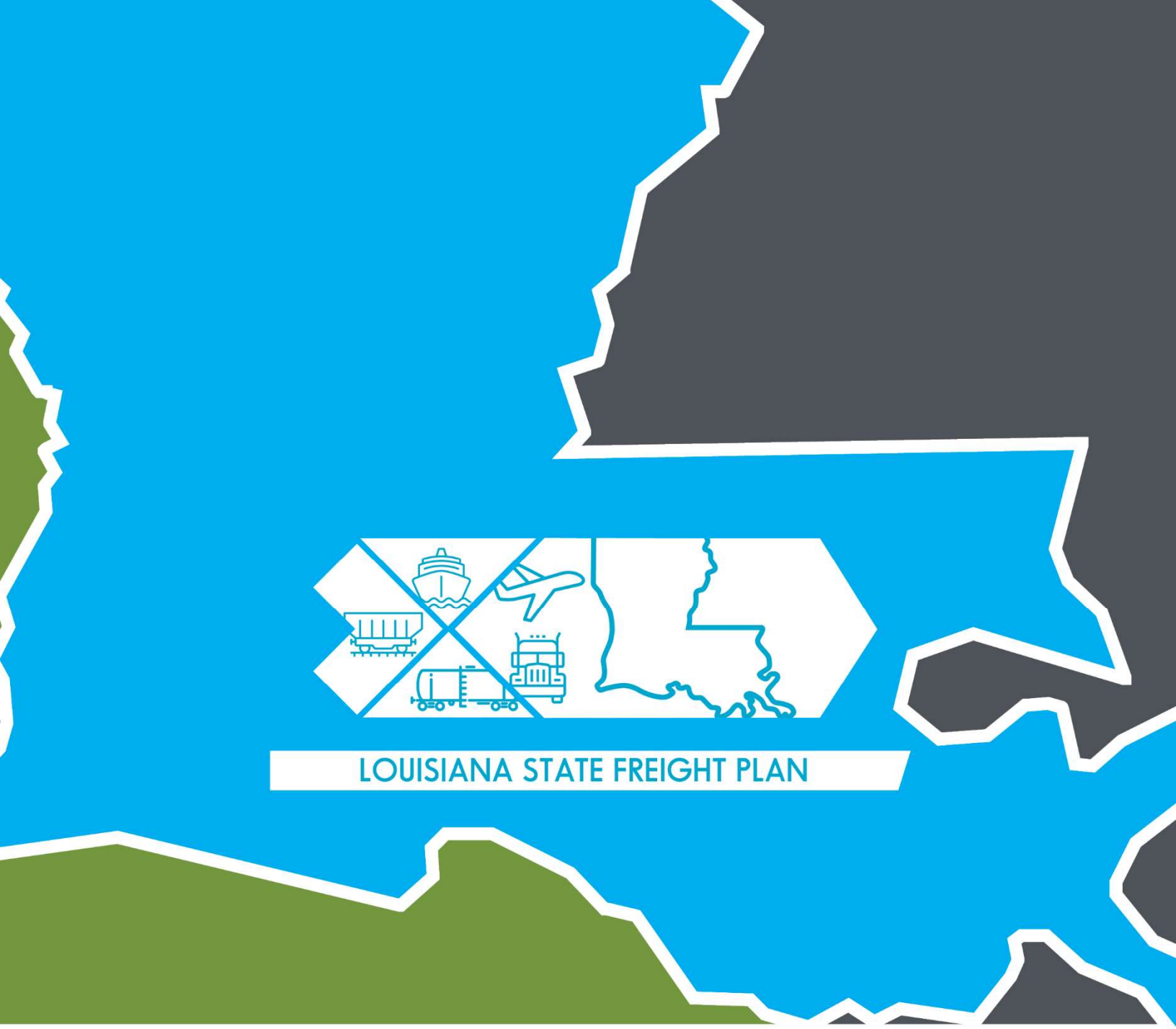


2024 Louisiana State Freight Plan

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Table of Contents

List of Figures

List of Tables

Figure 1: Port of New Orleans

Louisiana's Multimodal Statewide Freight Overview

The movement of goods is vital to every Louisiana resident, business, and visitor. Louisiana has a vast multimodal freight system that plays a pivotal role in statewide, national, and global trade and commerce. The Louisiana State Freight Plan provides the state with a blueprint for facilitating continued economic growth through a comprehensive, multimodal strategy for ensuring the safe, efficient, resilient, and equitable movement of goods necessary to support the State's growing population and essential supply chains.

This first section introduces Louisiana's State Freight Plan. **Chapter 1** discusses the approach, methods, and data sources and demonstrates how the Plan meets Federal requirements. It also describes Louisiana's freight vision, goals, and objectives and demonstrates how this Plan supports the national freight goals, Louisiana's Department of Transportation and Development (DOTD) mission, and other planning efforts in the State.

Chapter 1: Louisiana's State Freight Plan Overview

The Louisiana State Freight Plan (SFP) is designed to support the development of the Louisiana Statewide Transportation Plan (LSTP) by taking a detailed look at freight mobility across Louisiana. The plan was also designed to support the National Freight Strategic Plan, as well as the goals of the National Multimodal Freight Policy and National Highway Freight Program. The SFP serves as the keystone document for future investment and agency-wide planning and programming activities in freight-supportive infrastructure across Louisiana. The plan is designed to tell Louisiana's freight story and outline a plan for the future. It is divided into four key sections supported by seven chapters that dive deeper into each technical area. A series of technical memoranda provide behind-the-scenes details on the plan's development (Figure 2). **The 2024 Louisiana State Freight Plan was formally approved by the Federal Highway Adminstration (FHWA) on August 7, 2024.** The plan was developed using a 2050 planning horizon year.

Figure 2: Telling Louisiana's Freight Story: The Louisiana State Freight Plan

LOUISIANA'S STATE FREIGHT PLAN

Chapter 1: Louisiana's Multimodal Statewide Freight Overview provides an overview of the Louisiana multimodal freight transportation system, the purpose of the SFP and its goals.

LOUISIANA'S FREIGHT STORY TODAY

Chapter 2: Louisiana's Multimodal Freight Network identifies the Louisiana Multimodal Freight Network and its existing conditions.

Chapter 3: Freight Transportation and Louisiana's Economy is an analysis of Louisiana's role in the supply chain, including a deep dive into freight generators and the Louisiana Multimodal Freight Network plays in supporting freight mobility.

THE FUTURE OF FREIGHT IN LOUISIANA

Chapter 4: Future Freight Transportation Demand in Louisiana leaps forward, projecting what freight will look like and its impact statewide.

Chapter 5: Freight Trends identifies future trends that are likely to provide challenges and opportunities for Louisiana's freight community.

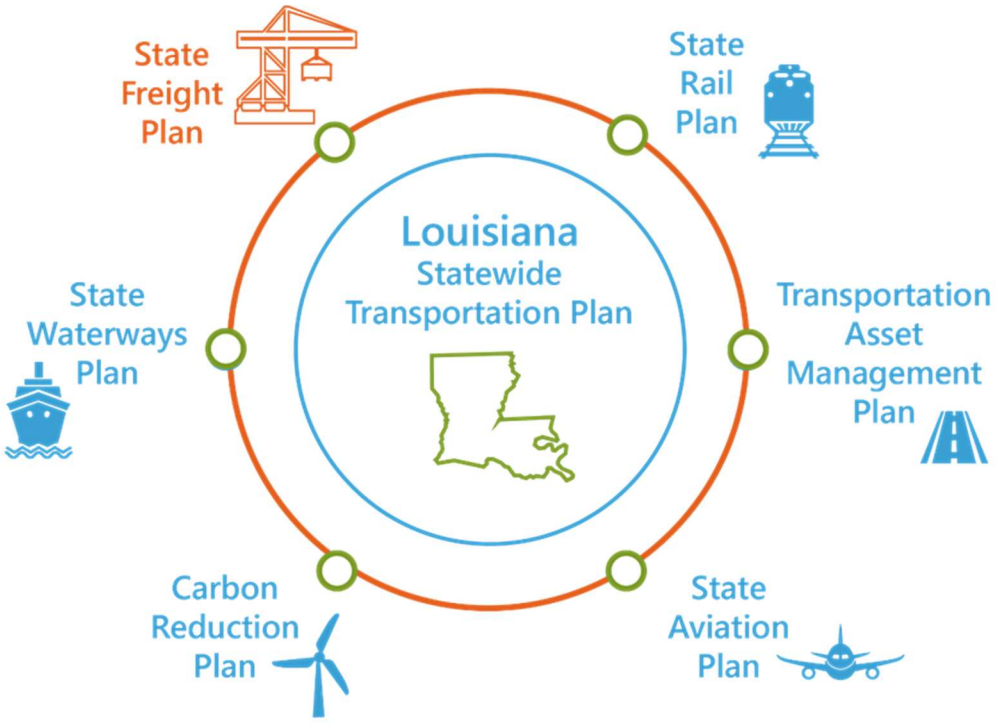
DELIVERING LOUISIANA'S MULTIMODAL FREIGHT VISION

Chapter 6: Addressing Louisiana's Multimodal Freight Transportation Needs, Challenges and Opportunities outlines a series of recommendations designed to position Louisiana to capture future opportunities and overcome the challenges of an increasingly complex and uncertain global marketplace.

Chapter 7: Multimodal Freight Investment Implementation Plan details DOTD investments that address Louisiana Multimodal Freight Network needs identified during the SFP process. This fiscally constrained Freight Investment Plan will also include an "unconstrained" list of freight needs that are currently unfunded.

It is important to recognize that the SFP is just one piece of the larger Louisiana Department of Transportation and Development's (DOTD) family of freight and transportation-related plans (Figure 3). The SFP leverages the lessons learned from each plan to ensure that the complete set of plans represents an integrated approach to improve freight, mobility, and trade in Louisiana. Most notably, the SFP is designed to help the State meet its overarching transportation goals in the LSTP. Concurrent with the SFP update, the LSTP and most of the state's modal plans are also being updated.

Figure 3: DOTD Family of Plans



The SFP lays out a strategy for advancing Louisiana's economy through a series of long-, medium-, and short-term recommendations. These recommendations include not only projects but also changes to policies and other initiatives that DOTD and its partners can use to improve freight mobility. The recommendations (outlined in Chapters 6 and 7) were developed through a deliberate process that evaluated the State's multimodal freight network, economy, supply chains, future needs, and, most importantly, public opinion as ascertained through stakeholder involvement at every step.

1.1 Defining a Path Forward – SFP Goals and Objectives

DOTD's first step in developing this SFP was to define a desired future. Keeping this in mind, the LSTP and SFP develop a joint vision for the future of Louisiana's multimodal transportation system (Figure 4). Visions are broad intentions that guide agencies and communities forward.

Figure 4: State Transportation Plan & State Freight Plan Joint Vision

From that vision, a series of freight planning goals and objectives were created for the SFP to guide the development, and eventual implementation, of that planning initiative (Figure 5). However, the goals and objectives of the 2024 SFP provide a strategic framework to support the State's vision of its future freight network. It also shares a desired level of performance across the many systems that freight interacts with, e.g., rail, maritime, aviation, highway, etc. A key part of freight planning is the development of goals and objectives that form the core of the SFP. In coordination with the other modal plans and with input from the Louisiana Freight Advisory Committee (FAC), these goals focus on improving freight mobility while supporting the LSTP and the State Rail Plan (SRP) goals.

The SRP, and generally rail infrastructure, support a large percentage of freight movement in Louisiana, justifying why this plan is called out specifically and why a plethora of the SRP's goals are connected to freight (see Appendix A for details on how the SFP goals align with these important initiatives).

Figure 5: SFP Goals and Objectives

Economic Competitiveness and Efficiency
Improve the freight transportation system for better economic efficiency, productivity, and competitiveness.

- *Improve freight-related congestion, reliability, and overall system efficiency*
- *Identify strategies to address freight system bottlenecks/constraints*
- *Improve freight network access and multimodal connectivity*
- *Improve access to freight generators, including energy activity areas and freight-dependent industries*

Safety
Improve freight transportation system safety.

- *Reduce the commercial vehicle crash rate – specifically crashes that result in fatalities or injuries.*
- *Work internally and with the private sector to provide adequate truck parking availability*
- *Assist modal partners in achieving safe aviation, port, rail, and waterway performance*

Security
Improve the security of the freight transportation system.

- *Support the Louisiana State Police as they secure and protect critical infrastructure*
- *Develop truck parking strategies to help support cargo security*
- *Consider cybersecurity when planning future ITS investments*

Resiliency
Improve the ability of the freight system to rebound from natural and man-made disruptions.

- *Harden infrastructure and mitigate disruptions of the freight system*
- *Minimize the "time to return to normal" following a freight network disruption.*
- *Assist emergency management partners in preparing for natural and man-made disasters*

Infrastructure Preservation and Maintenance
Improve and maintain the freight transportation system to ensure a state of good repair.

- *Keep Louisiana's state highway pavement, bridges, and other highways assets in good condition, with particular attention to facilities frequently used by heavy vehicles and hazardous material shipments*
- *Assist modal partners in achieving state-of-good-repair for aviation, port, rail, pipeline, and navigable waterway infrastructure*

Performance and Accountability
Use innovative technology and operational strategies to improve safety and freight system performance.

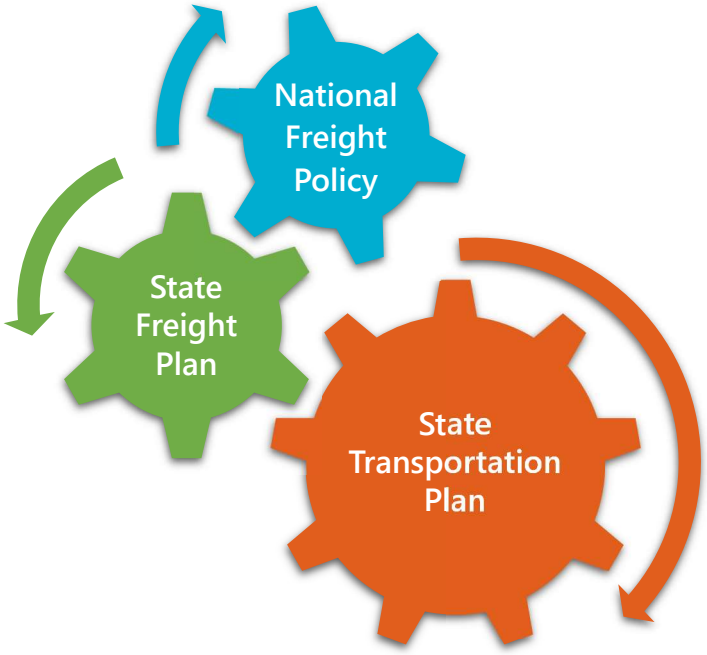
- *Explore the use of technology to address congestion and truck parking challenges on the National Freight Highway Network*
- *Address multimodal challenges and improve modal connectivity*

Environmental Stewardship
Reduce adverse environmental and community impacts of the freight system, including local air pollution, flooding/stormwater runoff, and wildlife habitat loss.

- *Build upon past success in reducing the environmental impacts of building, maintaining, and operating Louisiana's transportation system*
- *Work with communities and local governments to address the unintended impacts of freight movement on the environment and vulnerable users and populations.*
- *Reduce the impact of freight movement on nearby communities and the environment*

The SFP goals and objectives must also be aligned to support the National Freight Strategic Plan and the Federal freight planning goals outlined in the National Multimodal Freight Policy and the National Highway Freight Program (Figure 6).

Figure 6: The SFP, the State Transportation Plan, and National Efforts



1.2 Developing a Data-Driven, Stakeholder-Informed Plan

Freight planning integrates publicly owned infrastructure (highways, ports, airports), privately owned infrastructure (railroads, pipelines), and privately owned conveyance vehicles (trucks, trains, aircraft, barges, ships). Freight stakeholders are the ultimate users of freight infrastructure and are directly affected by the outcomes of this plan.

Understanding this, DOTD developed a plan approach that combines technical data analysis with outreach to freight stakeholders. The data analysis included using indicators from multiple sources to identify the assets most critical to freight movements, the barriers and needs to efficient freight movements on the freight system, and what unmet needs remain on the network given currently planned investments. This analysis provides critical information shared with stakeholders to help guide investment decisions and final plan recommendations.

The stakeholder outreach strategy included interviews, site visits, visioning, and regional sessions (in partnership with the LSTP). Most notable was the FAC's role in developing the SFP. The group met five times (both virtually and in person) to provide input throughout the plan's development. Their work provided feedback and validation to the plan's significant waypoints, including the project's goals and objectives, multimodal network identification, freight profile, needs assessment, recommendations, and the plan itself.

Further discussion on the SFP's stakeholder outreach approach and results can be found in the DOTD Stakeholder Outreach and Engagement Memorandum. In the meantime, DOTD would like to extend deep gratitude to the following stakeholders and organizations for serving on FAC (Figure 7).

Figure 7: The Louisiana Freight Advisory Committee

Figure 8: Container-on-Barge

Louisiana's Freight Story Today

In Louisiana, a multimodal freight transportation network (that includes truck, rail, air, water, and pipeline transportation) provides shipping alternatives for all types of commodities produced or consumed in the State. Louisiana also is home to a large petrochemical industry. Efficient transportation services are necessary to keep companies competitive in regional, national, and global economies. Notable consumer markets, fueled in part by the State's large tourism industry, drive the demand for goods shipped from other states and countries.

Chapter 2 defines the Louisiana Multimodal Freight Network (LMFN), the part of the transportation system most important to moving freight in the State, and explores the overall system's performance. Chapter 3 provides an overview of freight's economic impacts on Louisiana and takes a deeper dive into how the freight system supports Louisiana's individual freight industries.

Chapter 2: Louisiana's Multimodal Freight Network

Louisiana's multimodal network—highways, freight rail, maritime, air cargo, and pipelines—all play a critical role in supporting the State's economy and the economies of the Southern and Midwestern United States. This chapter explores the current state of Louisiana's multimodal freight system and defines the Louisiana Multimodal Freight Network (LMFN).

2.1 Highways

Highways are critical in nearly every freight movement. They transport the largest share of goods, serve as first- and last-mile connections, and affect every part of the State's economy. They are a vital link between production centers, distribution hubs, markets, and consumers across the state and beyond.

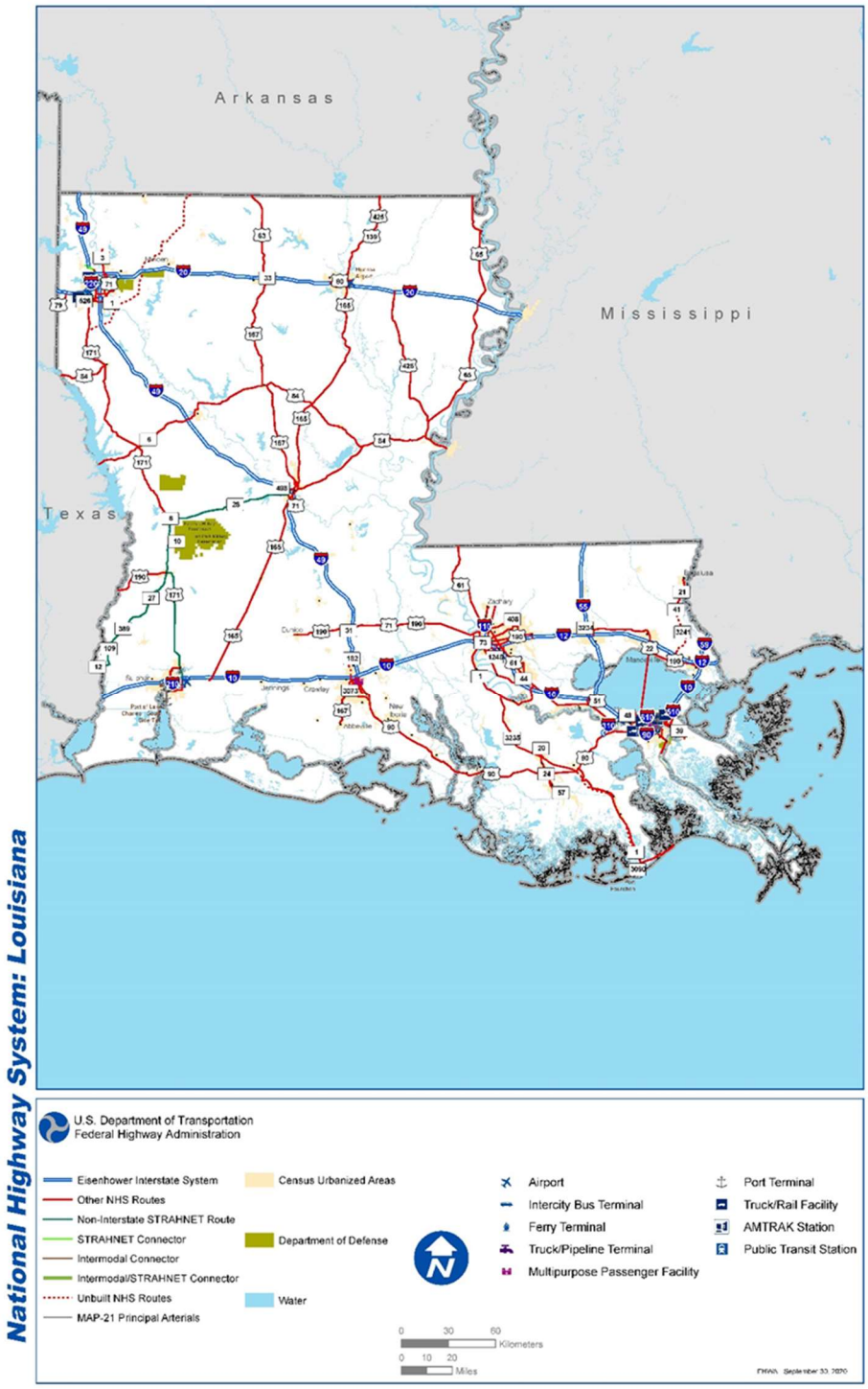
Truck drivers travel over five billion miles annually on Louisiana's 60,000 centerline miles of public roadways. Of those road miles, 16,000 are overseen by DOTD. In 2021, over 331 million tons of freight worth over $392 billion moved on Louisiana's highways. Understanding this system's components and performance is paramount for efficient resource allocation, infrastructure planning, and policy development.

Several Interstates span Louisiana, including I-10, which travels east-west in the south from Texas to Mississippi and connects Lake Charles with Baton Rouge and New Orleans; I-12, which travels north of Lake Pontchartrain from Slidell and connects with I-10 in Baton Rouge; I-20, which travels east-west in the north and connects Shreveport with Jackson, Mississippi; and I-49 which travels diagonally from the Arkansas border in the northwest corner of the state to Lafayette.

USDOT Highway Networks

The National Highway System (NHS) consists of roadways important to the nation's economy, defense, and mobility. It includes the following subsystems: Interstates, principal arterials, strategic highway network (STRAHNET), major strategic highway network connectors, and intermodal connectors. Louisiana has 3,173 miles of NHS, including 945 miles of Interstates, 1,390 miles of US Highways, 691 miles of State Highways, and 147 miles of other roadways. Figure 9 shows the NHS in Louisiana. Of these roadways, STRAHNET (National Defense Highways) is comprised of 196 miles of roads in addition to the 945 miles of Interstates.

Figure 9: National Highway System



Source: Federal Highway Administration (FHWA) (n.d.)

The NHS includes the designation of Intermodal Connectors, roads leading to major intermodal facilities where different modes of transportation intersect, and certain facilities where large volumes of freight are exchanged. Table 1 shows Louisiana's 21 freight NHS intermodal facilities, including eight airports, eight port terminals, and five truck/rail facilities.

Table 1: NHS Freight Intermodal Facilities in Louisiana

Facility ID	Facility	Intermodal Facility Type	NHS Connector Description
LA2A	Baton Rouge Metropolitan Airport	Airport	Jackie Cochran Dr to Sally Ride Ave/Amelia Earhart Rd. to Veterans Memorial Boulevard to I-110
LA25A	Chennault International Airport	Airport	Served by an Existing NHS route
LA13R	CNIC -- New Orleans Terminal	Truck/Rail Facility	Same connector as the Port of New Orleans -- Mississippi River Terminal (LA19P)
LA15R	CSX - New Orleans Terminal	Truck/Rail Facility	Alvar St, Almonaster Ave, and Jourdan Rd
LA1A	England Industrial Airpark	Airport	LA 3054 (LA 496 to LA 28)
LA1A	England Industrial Airpark	Airport	Airbase Rd. (LA 498 Entrance to I-49)
LA12R	KCS - Metairie Terminal	Truck/Rail Facility	Labarre Rd. (Terminal to US 61)
LA27R	KCS - Deramus Yard	Truck/Rail Facility	LA 173 (Terminal to I-220)
LA24A	Monroe Airport	Airport	Served by an Existing NHS route
LA9A	New Orleans International Airport	Airport	Airport Rd. (Entrance to Veterans Memorial Blvd), Veterans Memorial Blvd (Airport Rd. to LA 49)
LA9A	New Orleans International Airport	Airport	Crofton Rd. (Entrance to US 61)
LA26P	Port Fourchon	Port Terminal	Fourchon Rd (Waterfront to Chevron Canal), LA 3090 (Chevron Canal to LA 1)
LA3P	Port of Baton Rouge	Port Terminal	Served by an Existing NHS route
LA7P	Port of Lake Charles - Bulk Terminal	Port Terminal	Coke Plant Rd. to Bayou D'Inde to LA 108 to I-10

Facility ID	Facility	Intermodal Facility Type	NHS Connector Description
LA6P	Port of Lake Charles - City Docks	Port Terminal	Marine St. (Terminal to W. Sallier St), New Access Rd (W. Sallier St to Prien Lake Rd), LA 1138-2
LA8P	Port of Lake Charles - South Side Terminal	Port Terminal	LA 38 to Nelson Rd (LA 1138) to I-210
LA16P	Port of New Orleans - France Road Terminal	Port Terminal	Served by an Existing NHS route
LA17P	Port of New Orleans - Jourdan Road Terminal	Port Terminal	Jourdan Rd. (Terminal to Almonaster Rd.)
LA19P	Port of New Orleans - Miss. River Terminal	Port Terminal	Felicity St (Terminal to Religious St), Religious St (Felicity St.to Euterpe St.), Tchoupitoulas St (Felecity St. to US 90)
LA22A	Shreveport Regional Airport	Airport	Monkhouse Rd. (Terminal to I-20)
LA23R	Union Pacific - Reisor Terminal	Truck/Rail Facility	LA 526 (Terminal to I-20)

Source: Federal Highway Administration (2020)

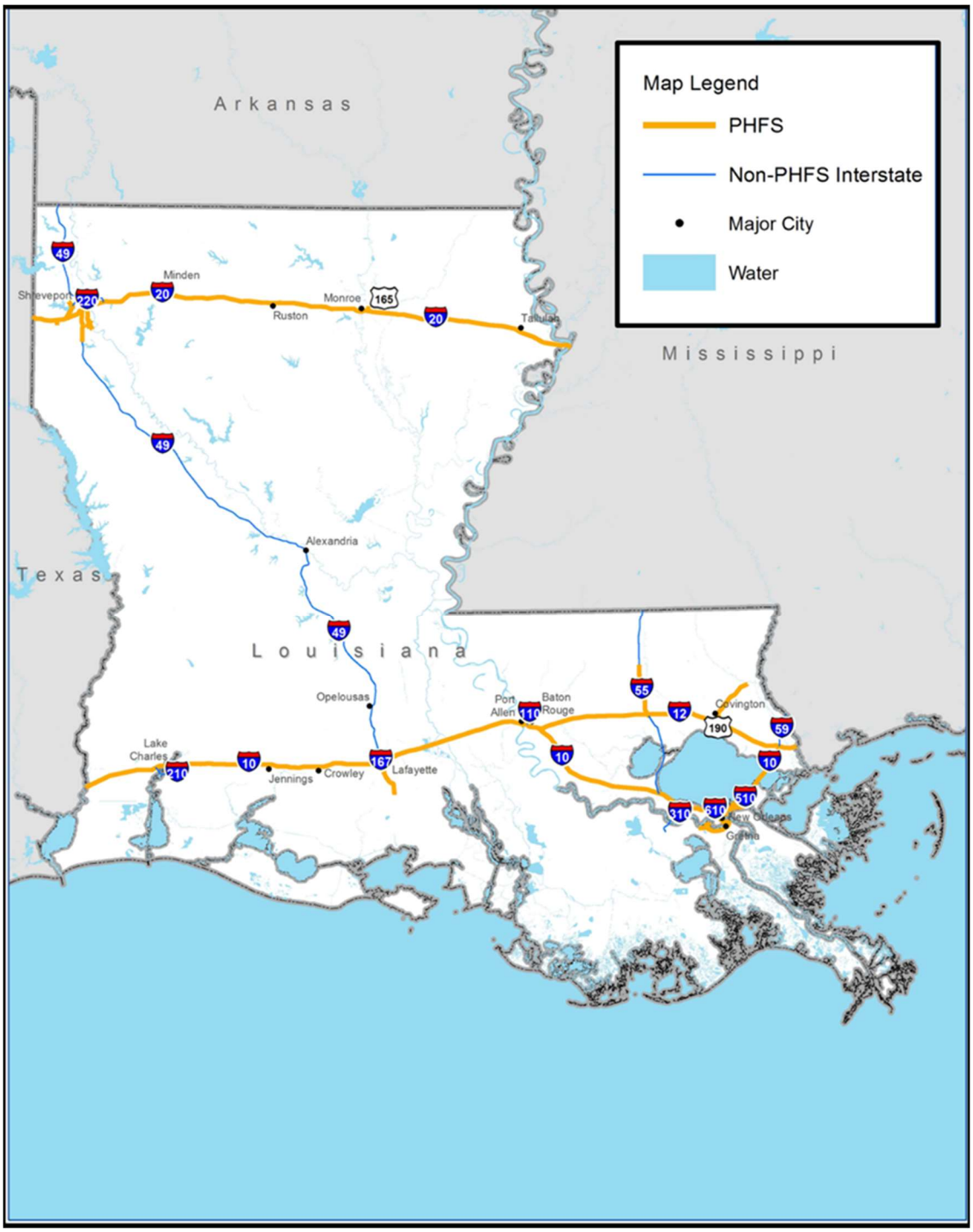
In 2015, the Fixing America's Surface Transportation (FAST) Act (and the subsequent Infrastructure Investment and Jobs Act (IIJA)) created the National Highway Freight Network (NHFN) consisting of four subsystems of roadways:

- **PRIMARY HIGHWAY FREIGHT SYSTEM (PHFS):** A network of roadways identified as the most critical highway portions of the US freight transportation system. Most of the PHFS consists of Interstates, with 11 percent consisting of other high-trafficked roadways and intermodal connectors. Most of the east-west Interstates in Louisiana, including I-20, I-12, and I-10, are on the PHFS. In total, Louisiana has 679 miles of PHFS roads.
- **OTHER INTERSTATE PORTIONS NOT ON THE PHFS:** The remaining Interstates not part of the PHFS include portions of I-49, I-220, I-210, I-110, I-55, I-310, I-510, and I-59. This subsystem totals 337 miles of roadway.
- **CRITICAL RURAL FREIGHT CORRIDORS (CRFCS):** These are designated public roads outside urbanized areas that provide access and connection to the PHFS and Interstate network for important ports, public transportation facilities, or other intermodal freight facilities. Louisiana has not yet designated any CRFCs.
- **CRITICAL URBAN FREIGHT CORRIDORS (CUFCS):** These are similar to CRFCs but are located within urbanized areas. In an urbanized area with a population of 500,000 or more individuals, the MPO, in consultation with the State, may designate a CUFC. In an

urbanized area with a population of less than 500,000 individuals, the State, in consultation with the MPO, may designate a CUFC. Louisiana has not yet designated any CUFCs.

National Highway Freight Program (NHFP) funds may be obligated to routes and projects along these four subsystems of roadways. Louisiana can designate up to 300 miles of CRFCs and 150 miles of CUFCs to increase the maximum possible extent of the NHFN in Louisiana to 1,466 miles. Figure 10 shows a map of the National Highway Freight Network in Louisiana in May 2023.

Figure 10: National Highway Freight Network



Source: Federal Highway Administration (2023)

2.2 Trucks

Truck Volumes

Truck volumes are generally highest on the Interstates, which is true in Louisiana. The east-west corridors of I-10 and I-20 have typically higher truck volumes than the north-south corridor of I-49. The Annual Average Daily Truck Traffic (AADTT) on Interstates is exceptionally high in major urban areas, such as I-10 and I-610 in New Orleans, I-10 in Baton Rouge, and I-49 in Shreveport. Portions of several non-Interstate roadways have high truck volumes equivalent to what is seen on Interstates, such as LA 3132 in Shreveport and the Lake Pontchartrain Causeway (N. Causeway Blvd) north of New Orleans. One way to compare the traffic demand on different roadways is to calculate the length weighted AADTT, which provides a weighted average AADTT for an entire roadway corridor. Table 2 summarizes the top 10 corridors in terms of truck volume based on the length-weighted AADTT for the entire roadway segment.

Table 2: Highest Truck Volume Routes in Louisiana

Route Name	Total Centerline Miles	Length-Weighted AADTT	Brief Description of Location
I-610*	5	10,699	I-610 is located in New Orleans
LA 3152	4.1	8,726	The route is located in Jefferson Parish. It runs in a north-south direction and intersects with I-10.
I-210	13	8,577	I-210 is located in Calcasieu Parish.
I-10*	294	8,276	I-10 passes through the southern part of Louisiana
N Causeway Blvd*	3	7,929	Boulevard is located in Jefferson Parish. It runs in a north-south direction and intersects with I-10.
I-12*	77	7,178	I-12 travels from Baton Rouge along the north side of Lake Pontchartrain.
LA 3132	10.3	6,763	The route is located in Caddo Parish and intersects with I-49.
LA 3021	1.8	6,745	The route is located in Orleans Parish. It runs in a north-south direction and intersects with I-10 and I-610.
I-310*	12	6,439	I-310 west of New Orleans within St. Charles Parish and intersects with I-10
I-220*	13	4,764	I-220 is located in Caddo Parish and Bossier Parish

Source: DOTD (2021)

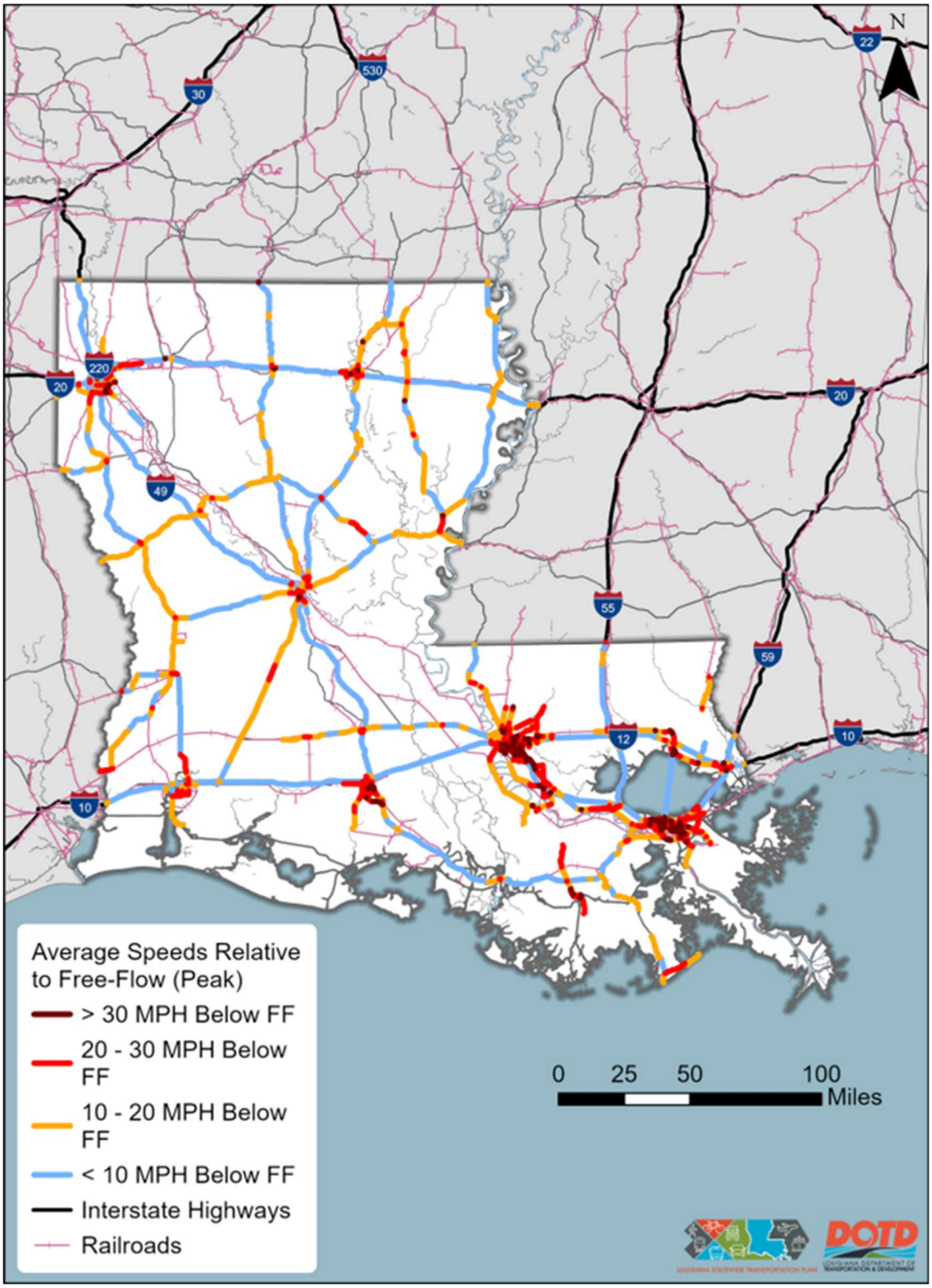
Note: Starred routes (*) are part of the PHFS. Truck volumes are not available on all roadways, including but not limited to I-59.

Truck Speed

One measure of freight roadway performance is truck speed. Measured truck speeds are compared to "free flow" (FF) reference speeds, which are assumed to be the speed of trucks along a particular segment if there is no congestion and a minimal number of other vehicles. A segment can be considered "more congested" if a typical truck's speed is 10 miles per hour less than the free-flow speed. Compared to about 90 percent of Interstate mileage within 10 MPH of free-flow speeds, non-interstates average between 35 and 45 percent. One of the reasons for this is that most of these roads are not access controlled; infrastructure such as traffic signals and curb cuts (especially in urban areas) introduce delays on these roads that Interstates do not experience.

Figure 11 shows average truck speeds relative to free-flow speeds on the roadways included in the Louisiana National Performance Management Research Data Set (NPMRDS) roadways for the AM and PM peaks. Blue roads are the "best-performing" roads and operate the closest to free-flow conditions, while red roads tend to have average speeds below free-flow and are "worse-performing." Urban areas have lower speeds than rural areas. This intuitively makes sense, as urban areas generally have more traffic, especially during peak hours.

Figure 11: Average Truck Speeds During Peak Hours, 2022



Source: National Performance Management Research Data Set, 2022; analysis by Cambridge Systematics (2023)

Reliability

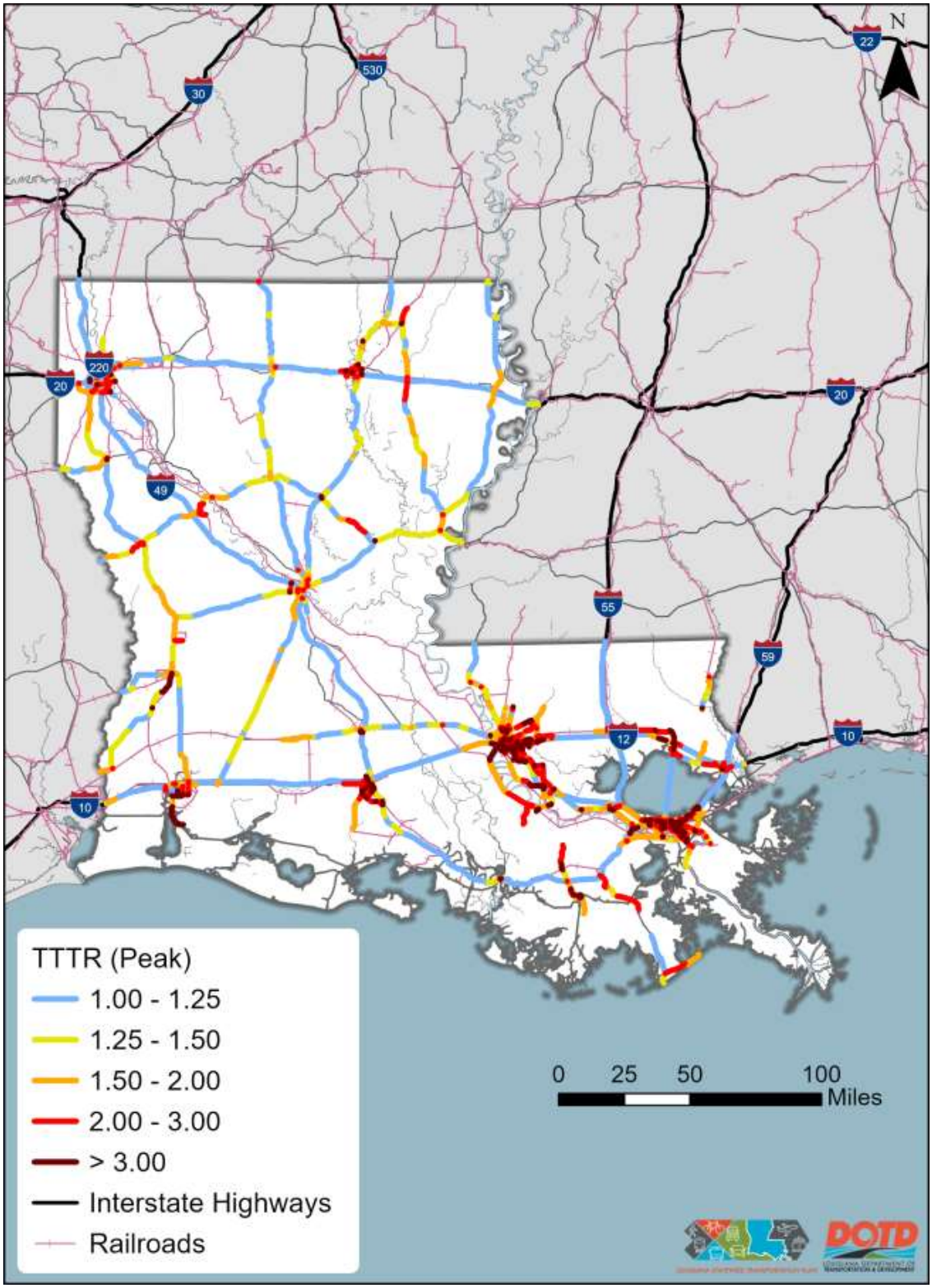
Trucking operations are generally more concerned about reliability than overall congestion/delay. Congestion can be accounted for in a truck's routing/schedule, but unreliable transportation systems require truck drivers/schedulers to build extra time for the unknown as a "buffer." This can result in unproductive costs to the trucking company and, ultimately, the consumer. The Planning Time Index (PTI) is used to measure reliability. PTI is the ratio of the 95th-percentile truck travel time divided by the 50th-percentile (also known as the median) truck travel time over a roadway segment. The more significant the difference between the travel times, the higher the Truck Travel Time Reliability (TTTR), and the less reliable that stretch of road is during a specific period. For example, a TTTR of two means that peak travel times could be twice as long as the median travel time. In general, a TTTR of over 1.50 is considered unreliable.[1]

Figure 12 and Figure 13 show maps of TTTR during the peak periods and off-peak periods, respectively. TTTR during the off-peak period has been provided as a comparison point for when roadways experience less congestion. Blue roads are the most reliable, whereas red roads are worse performing and have the most unpredictable travel times. Roads in dark red have TTTRs over three times as long as the median travel time. Urban areas such as New Orleans, Baton Rouge, Lafayette, and Shreveport generally have more unreliable roads with higher TTTR values than rural areas. For example, most roads in downtown Baton Rouge and New Orleans are unreliable during peak periods. A few rural areas with higher maximum TTTR values and are therefore more unreliable are:

- US 425 south of I-20 (TTTR between 2.00 – 3.00)
- US 165 north of Mer Rouge (TTTR between 2.00 – 3.00)
- US 84 near Jena (TTTR between 2.00 – 3.00)
- LA-27 south of DeRidder (TTTR over 3.00)
- Rural roads southwest of New Orleans on either side of US 90, including LA 1 leading to Port Fourchon, and LA 24 in Thibodaux and Houma (TTTR over 2.00)

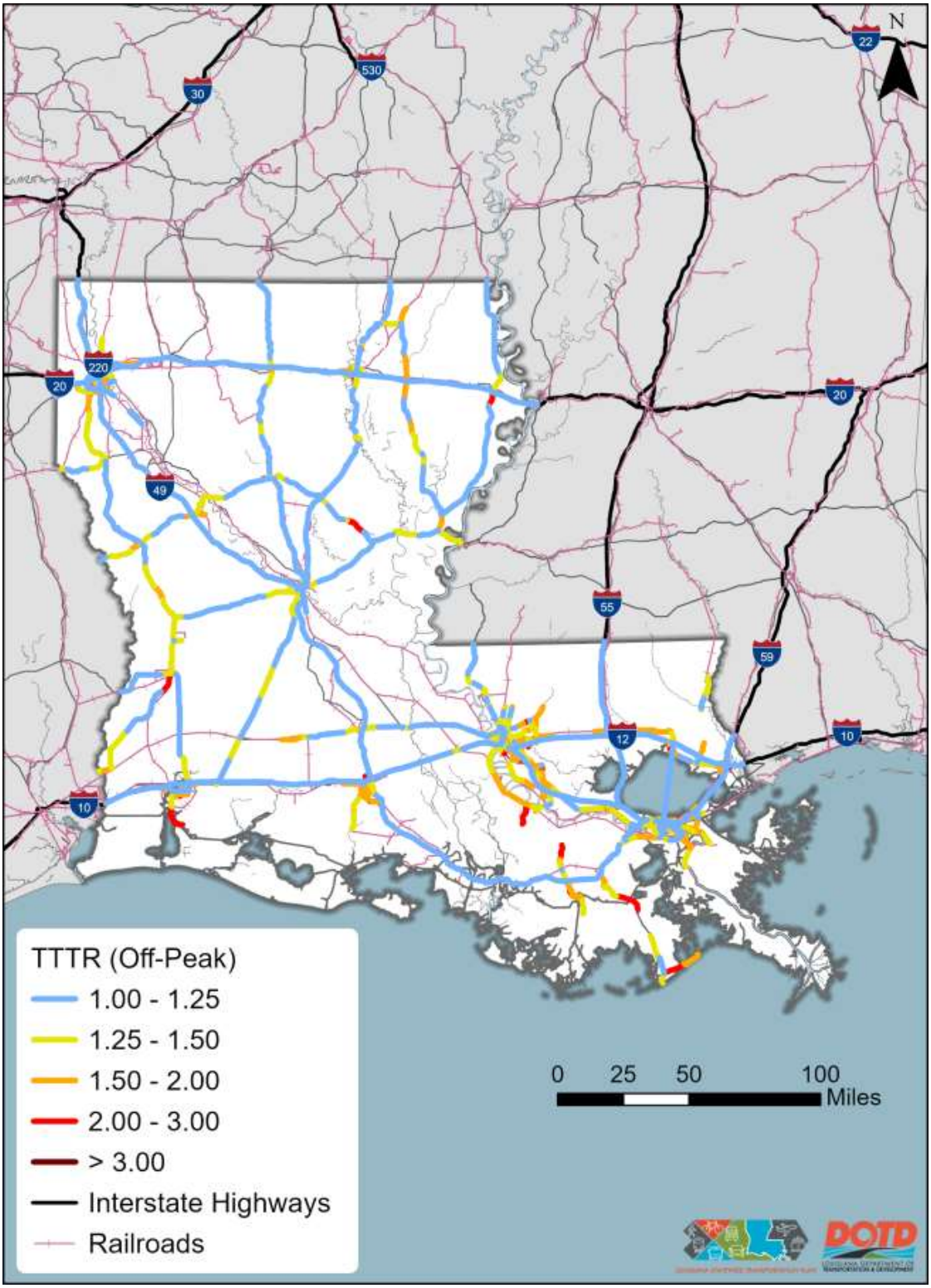
[1] Chen, Zhen and Fan, Wei David. International Journal of Transportation Science and Technology. "Analyzing travel time distribution based on different travel time reliability patterns using probe vehicle data". Available at https://www.sciencedirect.com/science/article/pii/S2046043019301121#b0135. Accessed May 2023.

Figure 12: Truck Travel Time Reliability During AM and PM Peak Hours, 2022



Source: National Performance Management Research Data Set, 2022; analysis by Cambridge Systematics (2023)

Figure 13: Truck Travel Time Reliability During Off-Peak Hours, 2022



Source: National Performance Management Research Data Set, 2022; analysis by Cambridge Systematics (2023)

Bottlenecks

Truck bottlenecks are roadways where many trucks experience significant delays and congestion. The Federal Highway Administration (FHWA) Freight Mobility Trends tool identified Louisiana's top ten worst bottleneck segments based on delay per mile listed in Table 3.[2] Nine of the worst bottlenecks are along I-10 between New Orleans and Baton Rouge, with the remaining bottleneck on I-12 in Baton Rouge.

Table 3: Top 10 Louisiana Truck Bottlenecks

#	Road	Location	Length (Miles)	AADTT	Delay per Mile	Congestion Cost
1	I-10	New Orleans Westbound from Exit 234C to 236B	1.5	10,163	46,104	$4.5M
2	I-10	Baton Rouge Westbound from Horace Wilkinson Bridge to Exit 160	5.7	11,755	41,561	$15.3M
3	I-10	Baton Rouge Westbound from Exit 153 to Horace Wilkinson Bridge	2.2	5,480	41,011	$5.7M
4	I-10	Baton Rouge Eastbound from Exit 160 to Horace Wilkinson Bridge	6.6	11,198	38,657	$16.4M
5	I-10	New Orleans Eastbound from Exit 223 to 225	2.1	9,512	36,330	$5.0M
6	I-10	New Orleans Eastbound from Exit 234C to 236B	1.3	10,619	31,687	$2.6M
7	I-10	New Orleans Eastbound from Airline Dr. to Exit 234	1.7	11,589	29,795	$3.3M
8	I-12	Baton Rouge Eastbound from I-10 to Exit 2	3.1	10,921	29,498	$6.0M
9	I-10	New Orleans Eastbound from Exit 236 to 238	2.5	10,163	22,962	$3.6M
10	I-10	New Orleans Westbound from Exit 236B to Airline Drive	2.3	11,299	22,301	$3.3M

Source: FHWA Bottleneck Analysis Tool (2023)

The American Transportation Research Institute (ATRI) also develops a nationwide truck bottleneck analysis using its extensive freight truck GPS database each year. The analysis utilizes vehicle time, data, and speed information to project truck volumes and congestion measures for locations nationwide.[3] The most recent version of this report, published in 2023,

[2] FHWA Bottleneck Analysis Tool. Available at https://explore.dot.gov/t/FHWA/views/FHWAFMMBottlenecks5_1/StateBottlenecks?%3Aembed=y&%3Aiid=2&%3AisGuestRedirectFromVizportal=y. Accessed May 2023.

[3] American Transportation Research Institute. Available at https://truckingresearch.org/wp-content/uploads/2023/02/ATRI-2023-Top-Truck-Bottleneck-Methodology-02-2023.pdf. Accessed May 2023.

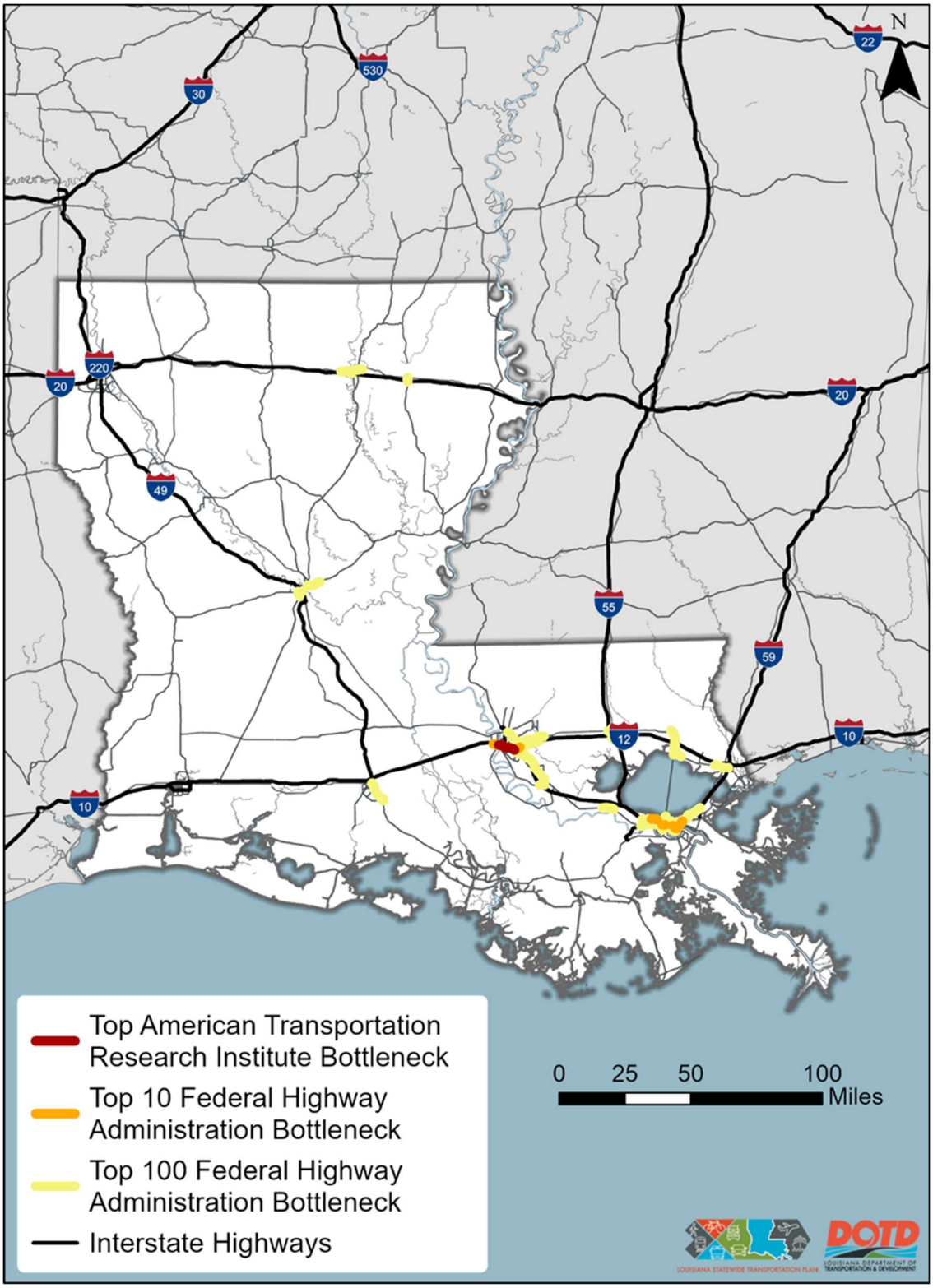
includes one location identified in Louisiana as one of the top 100 locations in the United States.[4] The location is around the I-10 and I-110 interchange in Baton Rouge and includes the Horace Wilkinson Bridge across the Mississippi River. This corresponds to roadway #2 in Table 3. The west side of this bottleneck connects to the Port of Greater Baton Rouge. An aerial photo of this bottleneck is seen in Figure 14 and mapped in Figure 15. Generally, the ATRI analysis aligns with the FHWA's tool, showing the areas around Baton Rouge and New Orleans as the worst areas in the state for truck bottlenecks.

Figure 14: I-10 & I-110 ATRI Freight Bottleneck

Source: Google Maps (2023)

[4] American Transportation Research Institute. Available at https://truckingresearch.org/wp-content/uploads/2023/02/ATRI-2023-Top-Truck-Bottlenecks-Executive-Summary.pdf. Accessed May 2023.

Figure 15: Top Truck Bottlenecks in Louisiana



Source: FHWA Bottleneck Analysis Tool, 2023; American Transportation Research Institute (2023)

Safety

Between 2017 and 2021, Louisiana had approximately 49,207 truck-involved crashes, averaging just over 9,800 crashes yearly.[5] As Table 4 shows that from 2017 to 2021, the total number of truck-involved crashes fluctuated. The fewest crashes happened in 2020, likely due to fewer vehicles on the road during the COVID-19 pandemic, and the highest number of crashes occurred in 2021. While the total number of truck-involved crashes fluctuated, the injury rate, defined as crashes involving fatal, suspected serious, suspected minor, or possible injuries, remained relatively stable, with roughly one-quarter of crashes resulting in an injury.

Table 4: Truck-Involved Crashes by Severity, 2017 – 2021

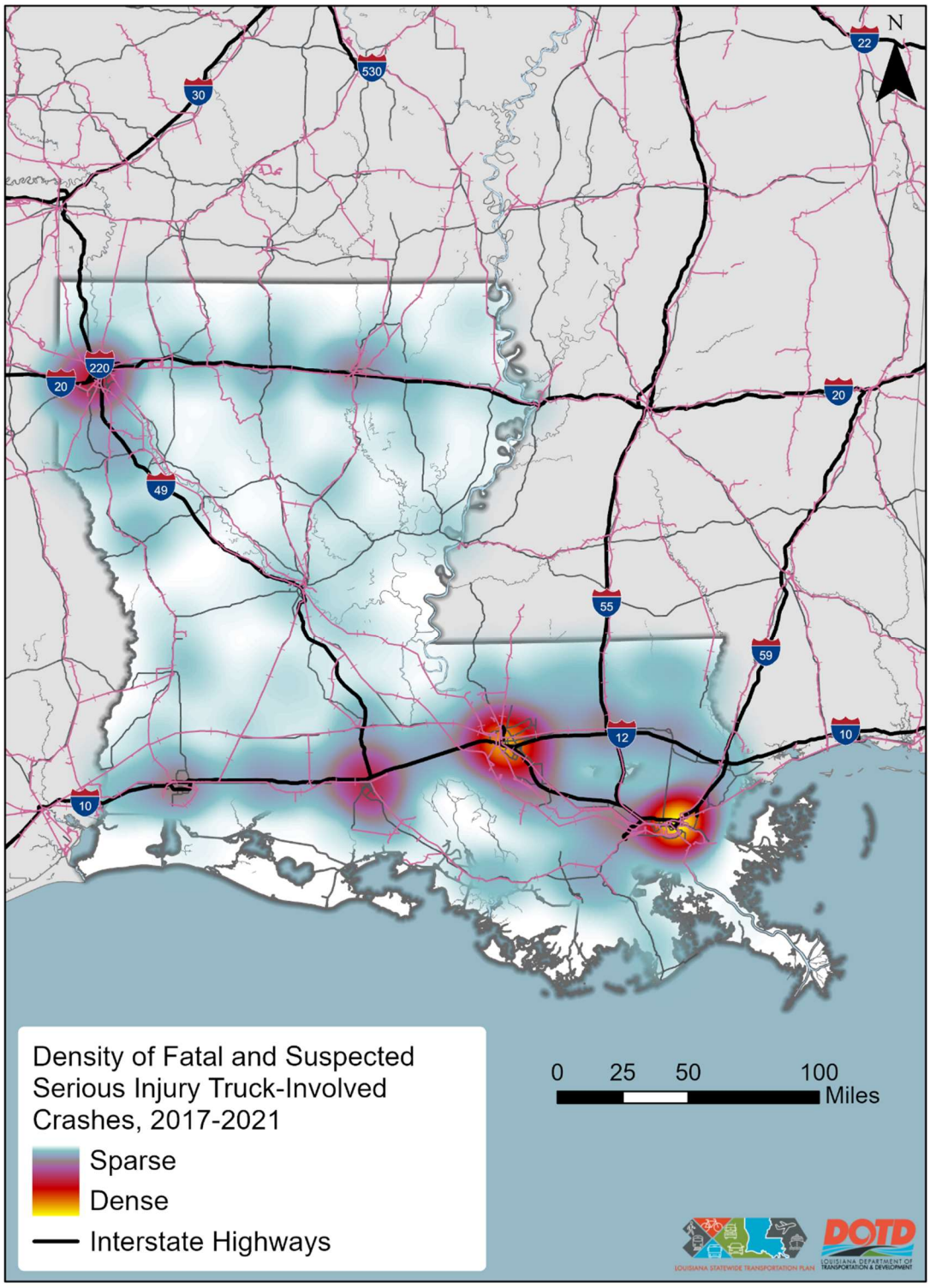
Severity	2017	2018	2019	2020	2021	Annual Average
Fatal Injury (K)	96	93	102	85	121	**99**
Suspected Serious Injury (A)	69	66	77	71	73	**71**
Suspected Minor Injury (B)	511	525	503	470	566	**515**
Possible Injury (C)	1,994	1,960	1,788	1,643	1,981	**1,873**
Total Truck Involved Crashes	**10,067**	**10,122**	**9,717**	**8,685**	**10,616**	**9,841**
Injury Rate	**26.5%**	**26.1%**	**25.4%**	**26.1%**	**25.8%**	**26.0%**

Source: DOTD Crash Database (2017 – 2021)

The major highway corridors, especially in urban areas, saw the highest number of truck-involved crashes. Figure 16 shows a heat map of the concentration of fatal and suspected serious injury truck-involved crashes. Between 2017 and 2021, both major urban areas of Baton Rouge and New Orleans had similar numbers of suspected serious injury truck-involved crashes, while the Baton Rouge area had more fatal injury truck-involved crashes than New Orleans.

[5] In this plan, a truck-involved crash is defined as a crash involving one or more vehicles of the following vehicle types: a single-unit truck with two axles, a single-unit truck with three or more axles, a truck/trailer, a truck/tractor, a tractor semi-trailer, and a truck-double. This may differ from other definitions of a truck-involved crash, such as those reported to the Federal Motor Carrier Safety Administration. Additionally, this document and the information contained herein, is prepared for the purpose of identifying, evaluating, and planning safety improvements on public roads, which may be implemented utilizing federal aid highway funds. This information shall not be subject to discovery or admitted into evidence in Federal or State court pursuant to 23 U.S.C. 407.

Figure 16: Fatal and Suspected Serious Injury Truck-Involved Crashes, 2017 – 2021



Source: DOTD Crash Database (2017 – 2021)

Truck Parking

Truck parking facilities are essential to the highway network. They provide drivers with safe, authorized locations to park and meet Federal regulations for hours-of-service, rest breaks, or staging ahead of delivery or pick-up. Figure 17 provides an example of truck parking critical to enhancing safety, as fatigued drivers present safety hazards to themselves and the traveling public.

2019 Jason's Law Results for Louisiana

- 26-33% of truck drivers reported having difficulties finding parking
- Top 5 state for truck parking based on spots per 100 miles of NHS roadway
- One of the highest-ranked states based on the ratio of spaces to truck VMT.

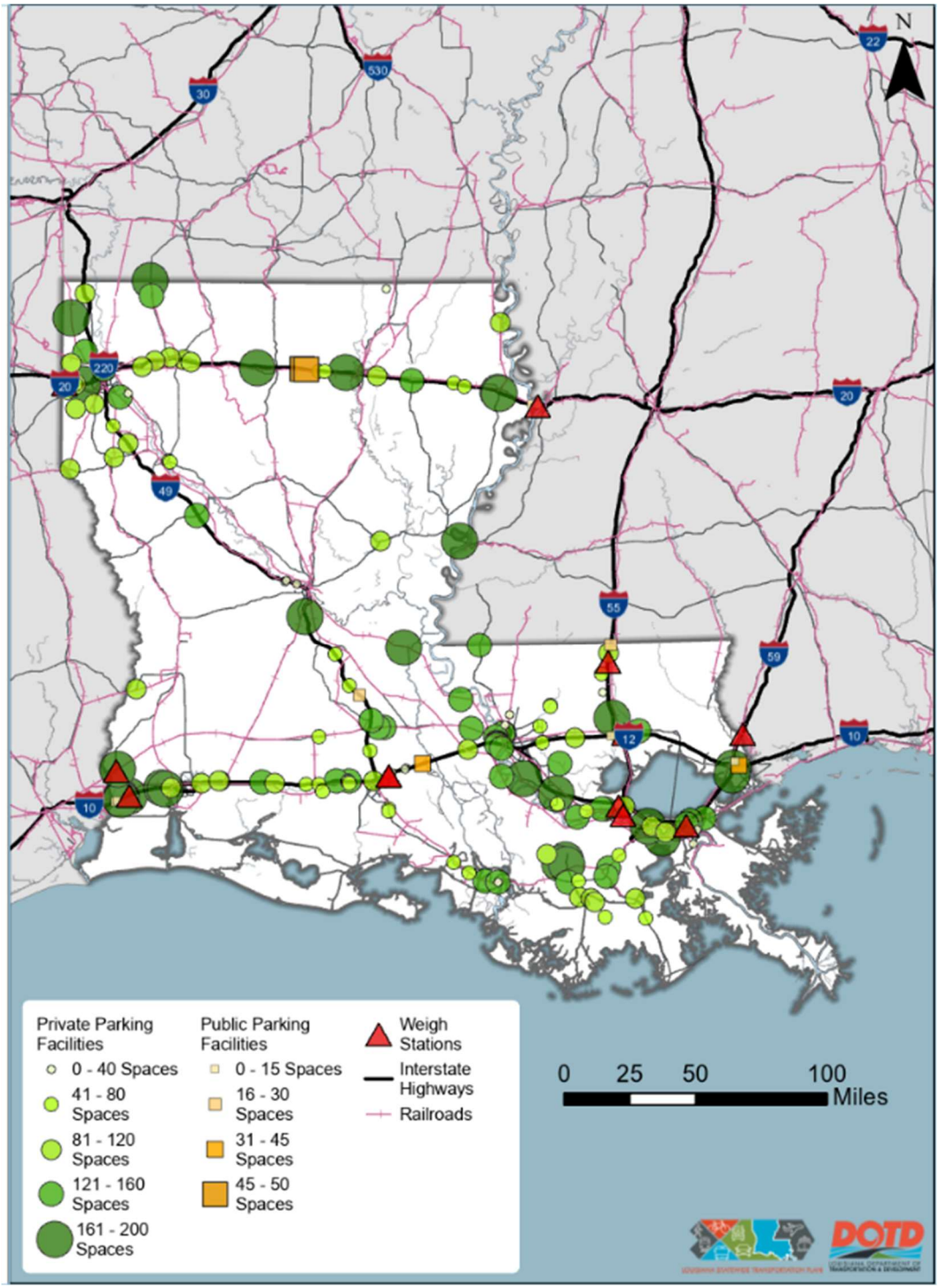
Of the 189 truck parking facilities in Louisiana (Figure 18), 21 are public, with an estimated 380 parking spaces, and 168 are private, with an estimated 7,200 parking spaces. Most public facilities are located along the major Interstates, specifically, I-10 and I-20, which run east-west across the northern and southern portions of the state, with only one facility located on the north-south corridor of I-49. Private facilities are more evenly distributed within the state but have many locations on I-10 and I-20. Private truck parking facilities are also located along the north-south corridor of I-49 and in the southern portion of the state near Houma and New Orleans.

DOTD utilized truck travel pattern data to analyze demand at the 21 public facilities. Of these sites, 11 are at or above capacity during peak hour truck parking demand (midnight – 3 AM), and three are near capacity (Figure 19).

Figure 17: Privately provided truck parking in Port Barre along Highway 190

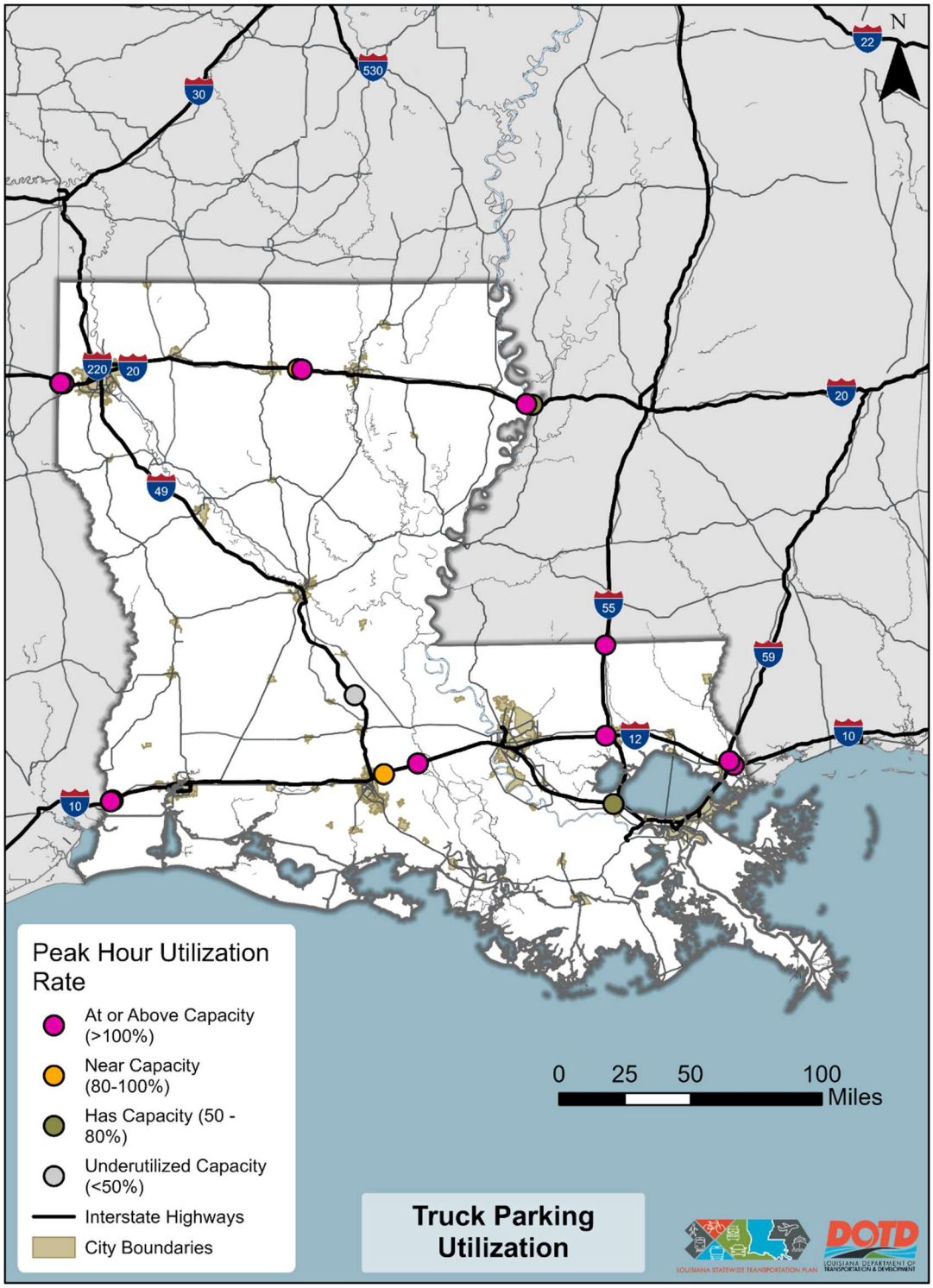
Source: Cambridge Systematics

Figure 18: Truck Parking Capacity



Source: FHWA Jason's Law 2015 and 2019 submittals; Allstays sites validated in Google Maps; weigh stations from DOTD. Note: Weigh stations have been included in this figure because, although they do not have authorized parking, they can provide additional spaces when necessary.

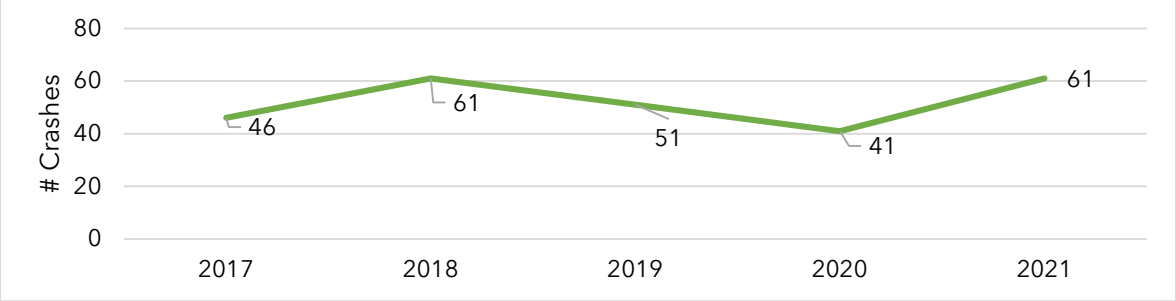
Figure 19: Truck Parking Utilization at Public Facilities



Source: Streetlight (n.d.)

Having sufficient truck parking spaces is essential to safety. From 2017 to 2021, 2,245 crashes were classified as parked crashes and involved trucks, a five-year average of 449 crashes yearly. Of these, 260 crashes happened within 50 feet of interstates, and 9 of those crashes resulted in fatal injuries. Figure 20 shows the trend of these crashes between 2017 and 2021. These crashes increased significantly in 2021, representing a 49 percent increase from 2020, and a five-year average of 52 crashes yearly. The analysis of truck parking-related crashes (and safety throughout the SFP) was developed in close coordination with the DOTD Safety Section.

Figure 20: Trend of Crashes Classified as Parked Crashes and Involving Trucks Near Interstates, 2017 – 2021



Source: DOTD Crash Database (2017 – 2021)

The shortage of adequate truck parking in Louisiana has been a persistent issue for many years, particularly along major trucking routes such as I-10, I-12, and I-20. Several factors contribute to the State's truck parking shortage, including increased freight traffic, limited space at rest areas and truck stops, and local regulations restricting truck parking in certain areas. To address this issue, DOTD has been working with FHWA and other stakeholders to develop strategies to improve truck parking availability in the state. Some of these strategies include:

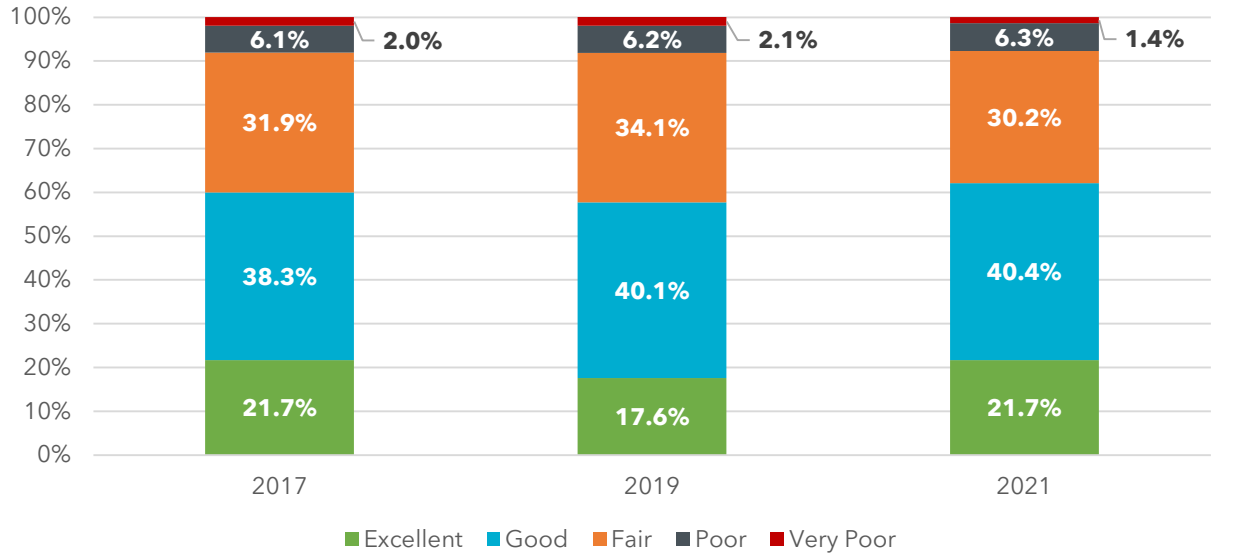
- **EXPANDING EXISTING REST AREAS:** DOTD has been working to expand existing rest areas to provide additional truck parking spaces, including on I-10 and I-20, I-49, I-55, and I-59.
- **BUILDING NEW REST AREAS:** DOTD has also been working to identify and acquire land for new rest areas along major trucking routes.
- **DEVELOPING PUBLIC-PRIVATE PARTNERSHIPS:** DOTD has been exploring the potential for public-private partnerships to develop new/expanded truck stops and rest areas. For example, other states have provided additional parking adjacent to truck stops through public-private partnerships.
- **PROVIDING REAL-TIME PARKING INFORMATION:** DOTD is evaluating the feasibility of joining the I-10 Truck Parking Availability System multi-state coalition.
- **SUPPORTING TRUCK PARKING LEGISLATION:** DOTD has supported State and Federal legislation, including the Truck Parking Safety Improvement Act, to improve truck parking availability.

Pavement and Bridge Conditions

Pavement and bridge conditions are important to analyze, as poorly maintained roads can cause crashes, delays, or rerouting of truck deliveries throughout the state, especially on highly traveled roads. Additionally, trucks significantly impact deteriorating pavement and bridge conditions due to their heavier loads.

Understanding the intersection between truck freight mobility and pavement condition is vital for efficient freight movement throughout the state. DOTD analyzes the condition of its assets as part of its updates to its Transportation Asset Management Plan and State Transportation Plan, and that data is incorporated into the Freight Plan. Figure 21 shows the system-level condition of the roadway subsystems (under the jurisdiction of DOTD). Between 2017 and 2021, 92 percent of roadway mileage was consistently rated in fair condition or higher.

Figure 21: Condition of DOTD Pavement



Source: DOTD (2023)

Based on the National Bridge Inventory (NBI), a standardized nationwide source of bridge information from the FHWA, there are 12,733 bridges in Louisiana, of which 3,038 are on the NHS. The NBI rates bridges by their various features on a 1-9 scale, including deck, superstructure, and substructure. Of the bridges on the NHS, 46 percent are in good condition, while another 49 percent are in fair condition, and 4.5 percent (138) are in poor condition. Bridges rated "poor" are not considered to be in immediate danger but show signs of deterioration, meaning maintenance is needed to prevent further damage and road restrictions.

2.3 Freight Railroads

Rail Network

A critical aspect of the Louisiana Multimodal Freight Network is the State's 2,557 track miles of privately owned and operated rail. Railroads active in the state range from national rail carriers (Class I railroads) to 16 smaller Short Line railroads. Six of the seven Class I railroads operate in Louisiana. The Surface Transportation Board categorizes rail carriers into three classes: Class I, Class II, and Class III. The classes are based on the carrier's annual operating revenues. Current thresholds establish Class I carriers as carriers earning revenue greater than $1.032 billion.[6]

Short Line railroads connect industrial shippers to the national Class I rail network, provide rail car storage, and other yard operations such as building trains and dispatching goods and raw materials to their final destinations. This critical work occurs primarily on inherited tracks deemed unprofitable by larger rail carriers. As a result, much of Louisiana's Short Line infrastructure suffered from years of delayed maintenance before changing hands. Because of this, some Short Lines struggle to maintain a state of good repair of track and support infrastructure. Beyond ensuring rail infrastructure is reliable and safe for operation, some Short Line railroads are considering track expansion and improved yard capacity to respond to customers' needs. Railroad owners are shown in Figure 23.

Rail Crossings

There are more than 5,000 at-grade crossings in Louisiana. Approximately 55 percent, or 2,767 crossings, are on public roadways. In 2020, the most recent full-year data set from the Federal Railroad Administration (FRA), there were 81 highway-rail crossing incidents in Louisiana. Of these, 37 incidents resulted in injury, with one life lost.[7] Two locations of particular concern are crossings 303221R on LA 67 and Choctaw Drive in Baton Rouge (Figure 22), and 725759B (off Weinberger Road) in St Bernard Parish, the site of three crashes each in 2021.

[6] Surface Transportation Board, Economic Data webpage: https://www.stb.gov/reports-data/economic-data/

[7] Federal Railroad Administration, Highway/Rail Grade Crossing Incidents webpage: https://railroads.dot.gov/accident-and-incident-reporting/highwayrail-grade-crossing-incidents/highwayrail-grade-crossing (accessed April 2023)

Figure 22: The grade crossing at LA 67 and Choctaw Drive in Baton Rouge is ranked first in Louisiana in terms of collision frequency

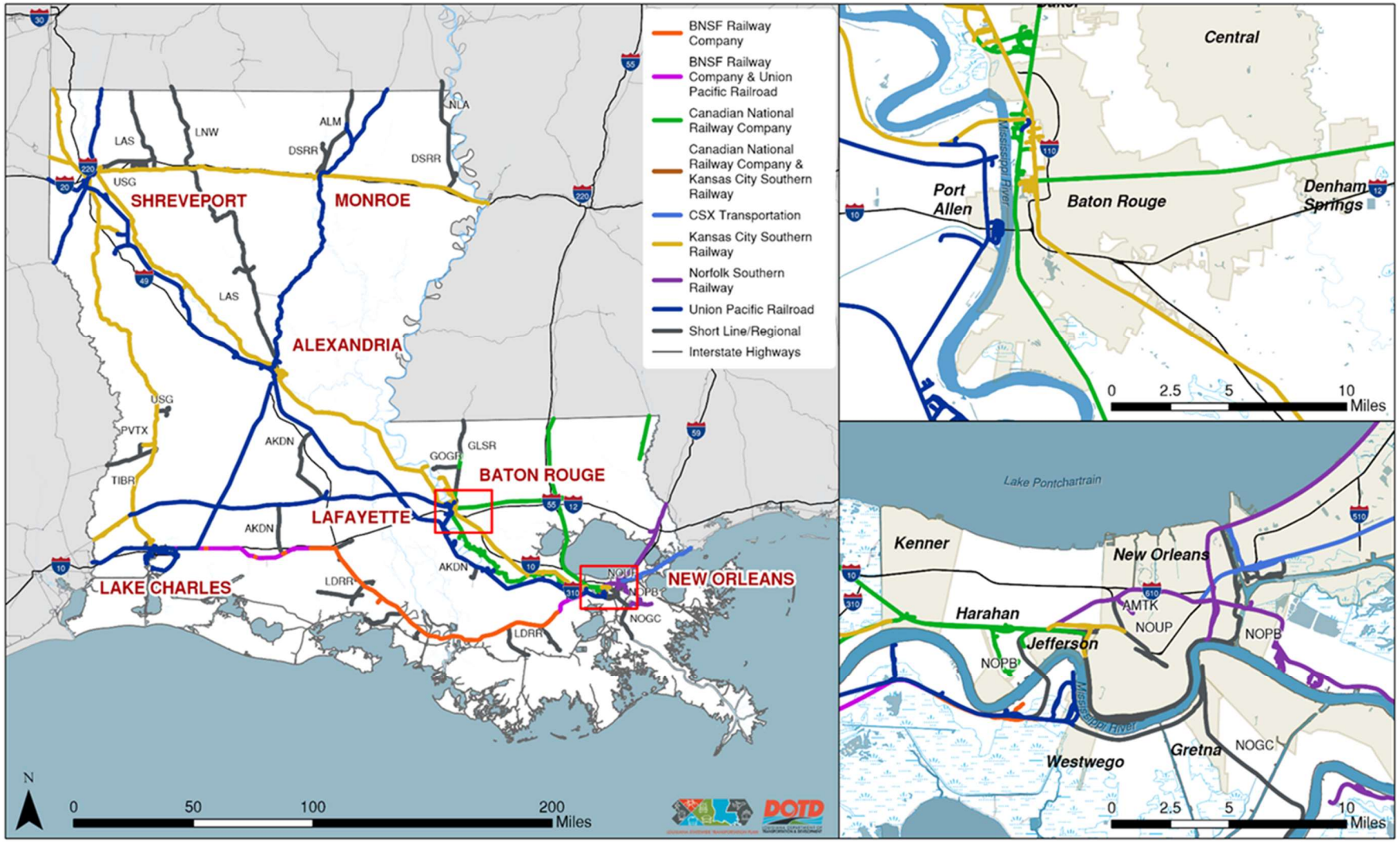
Source: Cambridge Systematics

DOTD rail safety-related activities are conducted within the Rail Safety Unit organized under the Project Development Division within the Office of Engineering. Recent and active grade separation projects in Louisiana include:

- LA 1 new bridge at DOW Spur crossing – West Baton Rouge Parish
- LA 3213 Gramercy Bridge over UPRR – St. James Parish
- LA 397 new bridge at UPRR - Calcasieu Parish
- LA 3105 underpass at Canadian Pacific Kansas City (CPKC) south of I-20 - Bossier Parish
- LA 34 bridge over CPKC – Ouachita Parish

DOTD actively pursues these projects, which are at varying stages of development and dependent upon funding for completion.

Figure 23: Louisiana Rail System



Source: DOTD

Weight Limitations

The Class I railroads adopted a 286,000-pound (286K lb.) car weight limit standard in 1995. Previously, the standard was 263,000 pounds. While the Class I railroads have upgraded and actively maintained their rail to handle the current limit, Short Line railroads have struggled to match their capacities. Approximately 550 miles of short-line track in Louisiana cannot handle 286K lb. rail cars. There are several contributing factors to this situation:

- Some lines were designed to lower weight standards based on projected needs.
- Track infrastructure has been downgraded due to safety concerns caused by aging components.
- Aging bridges may limit an otherwise 286K lb. corridor from handling standard-weight rail cars.

Load restrictions, particularly on infrastructure downgraded because of structural deficiencies, limit the efficiency and economic competitiveness of the rail corridors. Imposed weight restrictions require rerouting carloads exceeding the allowable weight or underloading of railcars. Such redirecting often results in freight traveling indirect routes, increasing the total miles traveled. This equates to longer and more costly travel times, undermining the State's economic competitiveness.

One solution to load restrictions is light loading, the practice of underfilling rail cars to remain below imposed limits. Light loading also decreases rail efficiency and increases shippers' costs. As such, the potential long-term consequence of light loading is a loss of rail service to small, often rural industries that rely on the Short Line railroads to connect to the Class I network. Figure 24 details the track mileage owned by Short Line railroads in the state that do not currently support 286K lb. loads.

Figure 24: Weight Restricted Track

Source: DOTD

Rail Bottlenecks

Bottlenecks are physical or operational constraints that limit rail traffic flow and can have repercussions across the network. Causes of rail bottlenecks include congestion caused by having a single track where a double-track configuration is more adequate, a stalled train on a single-track corridor, broken signals, or a lack of proper equipment at intermodal facilities.

Bottlenecks increase travel times, add costs, and shift freight to less efficient transportation modes. Issues in the rail network can profoundly impact the regional transportation system, including increased highway traffic caused by trucks replacing rail shipments and at-grade crossing blockages. However, these impacts are broader than transportation, as inefficient rail service may spur industries to relocate outside the state.

In the 2020 DOTD Rail Plan, the only mainline capacity constraint noted was the New Orleans Rail Gateway, the fourth largest US rail gateway supporting the operations of six Class I railroads and three Amtrak intercity passenger routes. In addition to these national rail carriers, the New Orleans Public Belt Railroad operates rail lines and support facilities to accommodate the interchange of goods between Class I railroads. In addition to being a busy interchange point, aging infrastructure and modal conflicts impact freight rail operations. Factors detrimental to freight rail include a lack of grade separation, limited water crossings, and the dense urban development of the area.

While the private sector owns and operates the freight rail network, DOTD and its partners are active participants in improving the rail network to strengthen the State's economic competitiveness through planning and investment programs, including:

SHORT LINE INFRASTRUCTURE INVESTMENT PROGRAM: The Short Line Infrastructure Investment Program was created to achieve DOTD's goal of improving the state's short line railroad infrastructure to ensure its ability to handle heavy-weight carloadings. This program was created to "maintain efficient rail service on the rail network and to implement recommendations in the Louisiana Freight Mobility Plan." (RS 48.388.1(A)(2))

The first two projects funded under this program were announced in late 2022 and received $1.5 million in grants, including:

- NOPB Transloading Industrial Park in New Orleans East.
- LAS Track, rail, and bridge upgrades between Hodge and Gibsland.

- **NEW ORLEANS RAIL GATEWAY (NORG):** Proposed improvements in the New Orleans region would improve the fluidity, reliability, and capacity of rail services for efficient freight interchange. Concerns over rail congestion in the New Orleans area date back to 1975 when DOTD published the first study analyzing how best to alleviate railroad-community conflicts. Since then, the NORG has been a focus of several initiatives, including, most recently, the Avondale PEL study described below.
- **LA 23 NEW ORLEANS AND GULF COAST RAILWAY RELOCATION PROJECT:** New Orleans Regional Planning Commission (NORPC) and the FRA conducted an Environmental Assessment (EA) for the relocation of New Orleans and Gulf Coast (NOGC)

infrastructure in densely populated areas of Jefferson and Plaquemines Parishes. This project aims to improve safety and mobility by reducing at-grade crossings. The EA resulted in a finding that there was no significant impact (FONSI) determination. Construction funding is currently being sought to implement the project.

- **AVONDALE PEL STUDY:** DOTD, in coordination with FRA, FHWA, the NORPC, and the railroads operating in the New Orleans metropolitan area, is conducting a Planning and Environmental Linkages (PEL) study to evaluate the feasibility of closing the Union Pacific (UP) and Burlington Northern Santa Fe (BNSF) roadway-rail at-grade crossings at Live Oak Boulevard, Willswood Lane, George Street, and Avondale Garden Road and replacing them with one, or more, grade separations.

2.4 Maritime

DOTD Policy Guidance on Maritime Decision-making

LA Administrative Code Title 56 describes the process for prioritizing projects in the Louisiana Port Construction and Development Priority Program.

DOTD recently completed the Louisiana Waterways State Transportation Plan (Waterways Plan). The plan provides a framework for planners and decision-makers to proactively prepare for the impacts of long-term economic shifts on the transportation network and near-term shifts in modal needs. The Waterways Plan was designed to complement and inform the LSTP and – by virtue – the SFP. By layering these two plans, DOTD can identify potential multimodal freight mobility issues and create strategies and programs to alleviate these challenges through multimodal solutions. As such, this leverages the work undertaken for the Waterways Plan.

In 2018, 238.7 million tons of waterborne freight, valued at $59 billion, was transported on the Louisiana Inland Waterway system. This tonnage represents the equivalent of six million 40-ton trucks, which means avoided congestion, emissions, and additional wear and tear on the Louisiana highway infrastructure.

Louisiana's 14,500-mile waterway system and ports connect freight from the Great Plains and Midwest with the international marketplace. The Mississippi River serves as the backbone for the nation's waterborne commerce; as such, Louisiana's five ports on the vital shipping lane comprise the largest port complex in the world. Louisiana's 32 ports handle over 25 percent of US waterborne commerce. The Louisiana Inland Waterway System carries over 60 percent of the nation's grain and 20 percent of its coal shipments. Waterborne commerce in Louisiana is a critical component of the transportation system. The Waterways Plan estimated that one in five jobs in the state is connected to the maritime industry, underscoring its fundamental importance to regional economies.

Ports

The Port Association of Louisiana classifies ports into three overarching categories. Figure 25 displays each port type while Table 5 provides information on how the specific ports support the Louisiana economy.

Louisiana International Terminal

The Port of New Orleans is developing a new major container terminal project: the Louisiana International Terminal. This $1.8 billion project is currently undergoing environmental review and has received funding commitments from the Port of New Orleans, the Louisiana Legislature, private sector partners, and recent USDOT MEGA and INFRA grants.

Figure 25: Louisiana's Ports

Source: Ports Association of Louisiana, https://www.portsoflouisiana.org/port-locations

Table 5: The Important Roles of Louisiana Ports

Type	Port	Details
Deep Draft Ports – Support Global Trade	Port of South Louisiana	Ranks #1 in the US for Most Tons of Cargo Transported Imports/Exports: Nearly 300 Million Tons Annually
	Port of Lake Charles	Center for LNG Operations $70 Billion Natural Gas Related Industrial Development
	St. Bernard Port	Ships 36% of the Nation's Ferro Alloys Home to one of the Nation's Only ISO Tank Cleaning Facilities
	Plaquemines Port	Slated to Construct a 20 Million Metric Tons LNG Export Facility; Over 55 Million Tons of Grain, Petrochemicals, Crude Oil, & Coal Transit the Port Annually
	Port of Greater Baton Rouge	Largest Grain Elevator on the Mississippi River Moves 11% of Louisiana's Grain Existing & Expanding Petrochemical Industrial Facilities Container-on-Barge Services (Marine Highway Facilities)
	Port of New Orleans	1 million TEU Capacity Only Port Served by All Six Class I Railroads 2 Cruise Ship Terminals
Coastal Ports – Enable Energy Industry	Ports of Terrebonne, Morgan City, Vermilion, West St. Mary & Iberia	Oil & Gas Industry Fabrication and Supply Base
	Port of West Calcasieu	Anchors GIWW - Enables Shallow Water Maritime Transportation from Texas to Florida
	Port Fourchon	Services 90% of All Deep-Water Rigs in the Gulf of Mexico Services 50% of All Shallow Water Rigs in the Gulf of Mexico
Inland Ports – Drive Local Economies	Lake Providence	Largest Tonnage of Inland Ports for Agricultural Products Fastest Growing Inland Port in the US

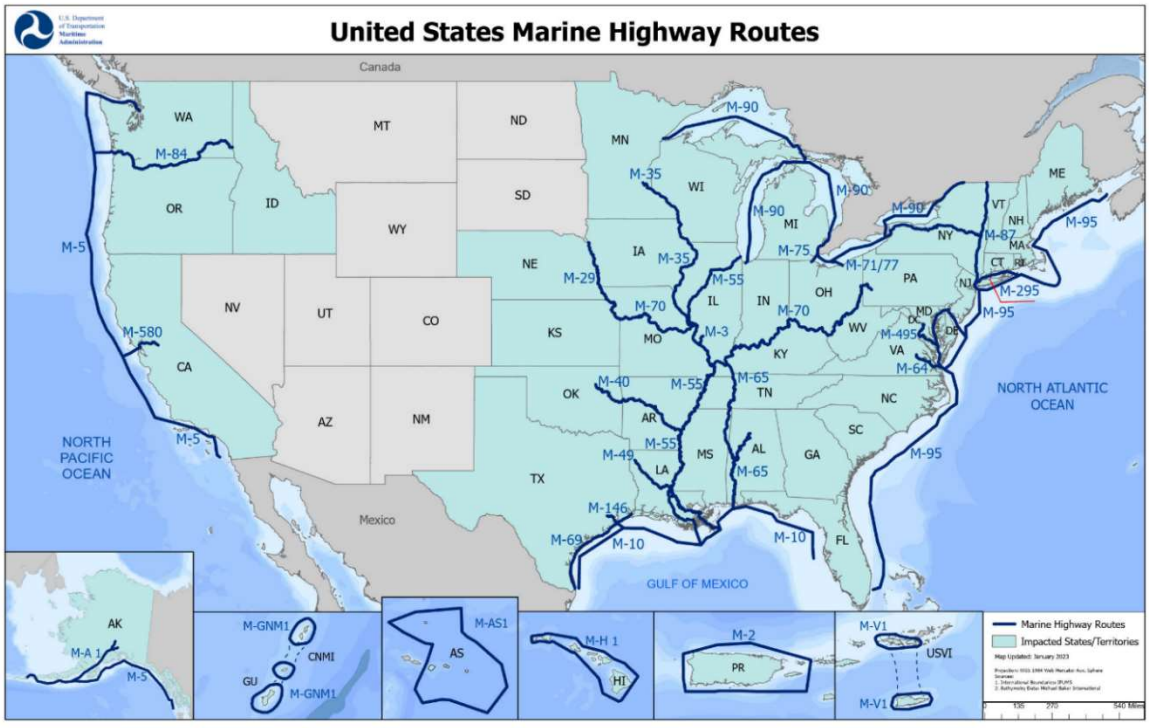
Type	Port	Details
	Central Louisiana Regional Port	Transports Military Equipment Significant Bulk Fertilizer Facilities
	Port of Caddo-Bossier	Over 1,000 Employees with more than 20 Companies Drives Industrial Growth in North Louisiana
	Port of Krotz Springs	Over 300 Employees with a Refinery

Source: Louisiana Association of Ports

Marine Highways

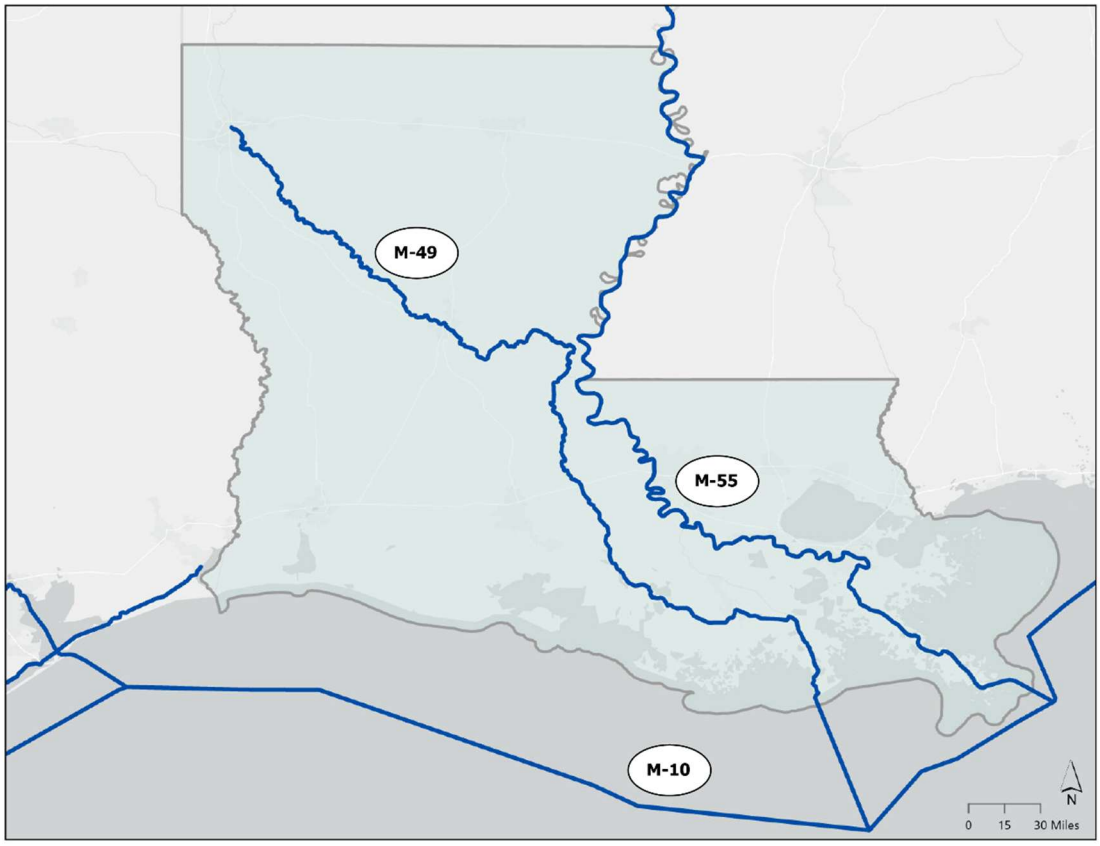
In 2008, the US Maritime Administration (MARAD) developed a program to raise awareness and (potentially) fund projects to shift freight from highways to the underutilized maritime system. The Marine Highway system currently includes 29 "Marine Highway Routes" that serve as extensions of the surface transportation system (Figure 26). The US Secretary of Transportation designates each all-water route and offers relief to landside corridors suffering from traffic congestion, excessive air emissions, or other environmental challenges. The following sections describe the three MARAD Marine Highways that service Louisiana (Figure 27).

Figure 26: United States Marine Highway Routes



Source: US Maritime Administration (MARAD) (n.d.)

Figure 27: Louisiana's Marine Highway Routes



Source: Cambridge Systematics

MARINE HIGHWAY 10 (M-10): stretches across the Gulf of Mexico and the Gulf Intracoastal Waterway and connects commercial navigation channels, ports, and harbors. It connects to the M-49 Route at Morgan City, Louisiana, the M-65 Route in Mobile, Alabama, and the M-55 in New Orleans, Louisiana. The M-10 Route parallels the US Gulf Coast, accommodating considerable east-west freight. The National I-10 Freight Study shows that 400 miles of the Interstate are already operating at an unacceptable level of service. M-10 traffic is expected to grow significantly by 2025. Fortunately, the extensive network of coastal, intracoastal, and inland waterways along this Route can relieve the existing and projected travel delays. However, numerous maritime operations are already along this Interstate, with a small percentage carrying containerized or roll-on/roll-off freight. According to MARAD, these existing limited services demonstrate that marine highway operations on M -10 are possible. In addition, large volumes of hazardous materials move along this Route, which, if transported by water, could improve safety and security.

MARINE HIGHWAY 49 (M-49): includes the Atchafalaya River and the J. Bennett Johnson Waterway, and connects commercial navigation channels, ports, and harbors. It extends from southeast to northwest Louisiana. It starts at Shreveport in the northwest, and the last port served is Port Fourchon in the southeast along US 90 and I-49. It connects to the M-10 Route at Morgan City. This route serves four South Louisiana ports, including Port Fourchon, Port of

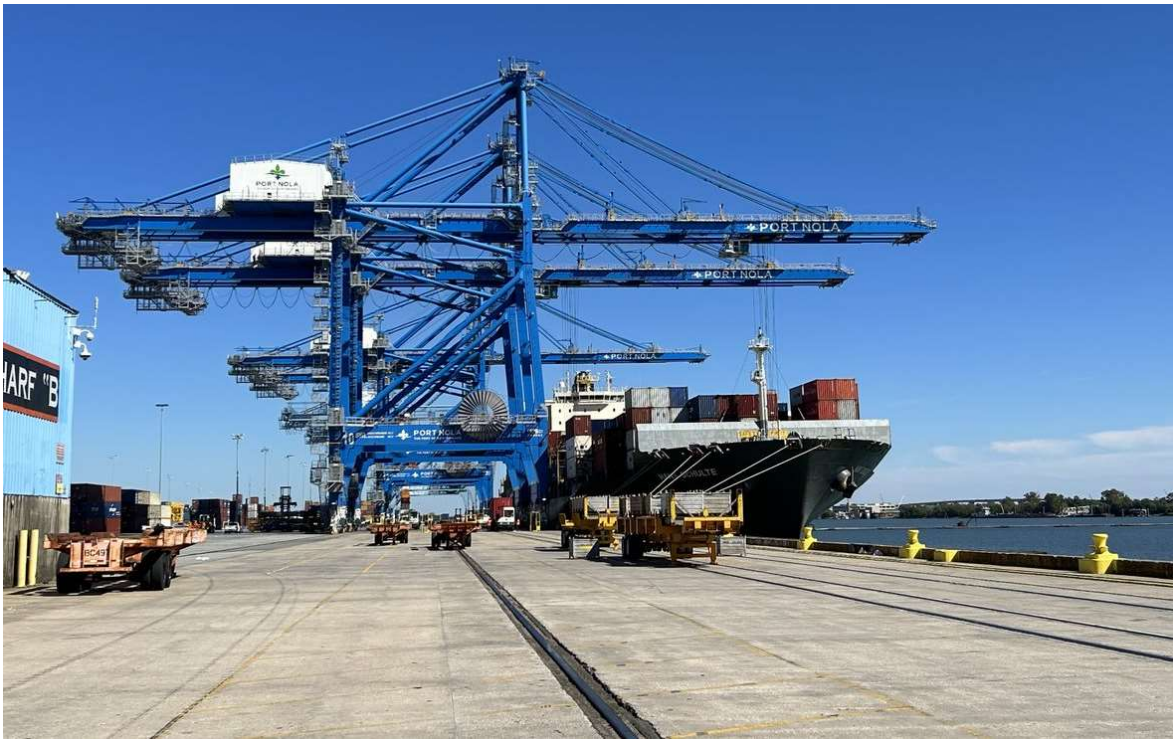
West St. Mary, Morgan City, and the Terrebonne Port Commission (Houma), transporting significant volumes of freight along the landside route. A more efficient freight distribution system could have significant benefits to the region.

MARINE HIGHWAY 55 (M-55): includes the Mississippi and Illinois Rivers from New Orleans, Louisiana, via St. Louis, Missouri, to Chicago, Illinois, through Louisiana, Mississippi, Arkansas, Tennessee, Missouri, and Illinois. It connects to the M-90 Route at Chicago, the M-40 Route at Napoleon, Arkansas, crosses the M-70 Route at St. Louis, Missouri, and meets the M-10 Route at New Orleans, Louisiana.

Sixty percent of all US grain exports move on the Mississippi River, and the largest port in the United States (by tonnage) is located on the Mississippi at LaPlace, Louisiana. The Port of New Orleans (Figure 28) has a capacity of over 1 million twenty-foot equivalent units (TEUs), most moving inland by truck and rail. The Port is the nation's only deep-water port with access to all six Class I freight railroads. The Port is also investing significantly in the new Louisiana International Terminal in St. Bernard Parish. The $1.5 billion container facility on the Lower Mississippi River will serve larger vessels coming online in the container industry. Without a terminal downriver from the Crescent City Connection Bridge, Louisiana stands to lose to competing ports along the Gulf.

The USDOT indicates that I-55 is plagued with significant freight truck bottlenecks at several points along its route, including the metropolitan areas of Chicago, St. Louis, Baton Rouge, and New Orleans. These bottlenecks cause millions of hours of truck delay each year. M-55 could serve as a critical relief valve for continued freight growth on I-55 and to improve resiliency/redundancy along this important corridor.

Figure 28: The Port of New Orleans is a gateway for containerized cargo



Source: Cambridge Systematics

2.5 Air Cargo

Air cargo represents the movement of freight and mail by air. Major US air cargo industry participants include integrated express carriers like FedEx and UPS, passenger airlines with cargo operations, and dedicated cargo carriers like Atlas Air and Kalitta Air. Like commercial airline passenger service, air cargo service is driven by demand and carrier decisions. The size of air cargo operations at an airport can vary drastically from large international freight hubs to a weekly flight on a small piston aircraft at a general aviation airport.

DOTD Policy Guidance on Aviation Decision-making

Louisiana Administrative Code Title 70 describes the Airport Construction and Development Priority Program.

In the two decades before the COVID-19 pandemic, total air cargo volumes in the US declined due to industry changes such as increased jet fuel costs, market maturity, increased security regulations, market saturation, and substitution of improved ground efficiency. However, air freight has emerged as an efficient and cost-effective alternative for shipping bulk orders to regional hubs due primarily to retailers like Amazon's development of mega-scale warehousing distribution centers. These retailers then use innovative last-mile freight mobility distribution strategies to deliver products. In 2020 and again in 2021, US domestic air cargo hit its highest volumes, fueled by strong demand for domestic e-commerce.

According to the Bureau of Transportation Statistics (BTS), domestic revenue ton-miles for air cargo were up 23 percent in 2021 from 2019. Dedicated air cargo airlines experienced healthy growth during the pandemic as locked-down consumers turned to e-commerce to fulfill wants and needs. Additionally, when passenger airlines reduced their schedule (cutting aircraft cargo capacity), air cargo airlines expanded their capacity to meet this demand.

Air cargo activity depends mainly on an airport's available facilities to accommodate air cargo operators and the businesses in the area that rely on shipping via air. The benefit of air cargo to a local economy includes additional jobs, wages, and economic activity. Air cargo is often used for high-value, time-sensitive goods and requires fast and efficient transportation to meet market demands. This can include shipments of a variety of goods, such as:

- High-value and time-sensitive goods: These include electronics, pharmaceuticals, medical equipment, and perishable goods such as fresh produce and flowers.
- E-commerce goods: With the rise of online shopping, there has been an increase in the shipping of small packages and parcels by air, including clothing, accessories, and other consumer goods.
- Industrial equipment and machinery: Large and heavy equipment, such as engines, turbines, and other machinery parts, is often transported by air to minimize downtime and ensure timely delivery.
- Automotive parts: Air cargo is often used to transport automotive parts and components, such as engines, tires, and brakes, to ensure just-in-time delivery to assembly plants.
- Fashion and luxury goods: High-end fashion items, luxury goods, and jewelry are often shipped by air due to their high value and the need to ensure timely delivery.

In Louisiana, eight airports accommodated air cargo shipments in 2021. Nearly 246.9 million pounds of air freight and mail were enplaned and deplaned in the state in 2021 (Table 6). Three airports accommodated the majority of the air cargo. Over 60 percent of the State's domestic air cargo was shipped and received at Louis Armstrong New Orleans International Airport. Shreveport Regional Airport accounted for 25 percent of the State's domestic air cargo, while Lafayette Regional Airport accounted for 14 percent in 2021. Louis Armstrong New Orleans International also accommodated a small amount of international air cargo in 2021.

Table 6: 2021 Total Domestic Air Cargo at Louisiana Airports (in lbs.)

Airport	Enplaned Freight	Enplaned Mail	Deplaned Freight	Deplaned Mail	Total
Louis Armstrong New Orleans International	55,559,505	5,447,840	82,617,965	5,646,233	149,271,543
Shreveport Regional	24,233,947	5,792	36,513,147	2,925	60,755,811
Lafayette Regional	12,205,404	58,900	23,236,507	58,898	35,559,709
Monroe Regional	481	3	1,116,571	0	1,117,055
Alexandria International Airport	26,610	829	45,328	829	73,596
Acadiana Regional	29,995	0	35,429	0	65,424
Baton Rouge Metropolitan / Ryan Field	8,441	1,101	13,748	1,101	24,391
Lake Charles Regional	782	0	1,881	1	2,664
				Total (in lbs.)	**246,870,193**

Source: BTS, T-100 Domestic Segment (All Carriers)

A variety of airlines provide air cargo transport in the state. Integrated express carriers FedEx and UPS were the largest providers of air freight movements. The carriers and facilities at the largest cargo airports in the state include the following:

- At Louis Armstrong New Orleans International, FedEx carried over 50 percent, and UPS flew 26 percent of the airport's freight and mail in 2021. DHL, Sun Country, Southwest, Delta, and American were also key air cargo service providers. The airport has a large cargo shipping center on airport property that supports plane-to-trucking connections. The on-airport air cargo center includes 15 buildings that house a variety of air cargo transport companies and ground freight forwarders.
- At Shreveport Regional Airport, the Shreveport Airport Authority owns two air cargo buildings in the certified industrial park known as Air Cargo West. The facility provides state-of-the-art air cargo capabilities with nearly 56,000 square feet available in two buildings. Tenants for the buildings include FedEx, UPS, Mountain Air Cargo, and Worldwide Flight Services.
- Lafayette Regional Airport completed an air cargo facility for FedEx and UPS, the largest air cargo carriers in the market, in 2016.

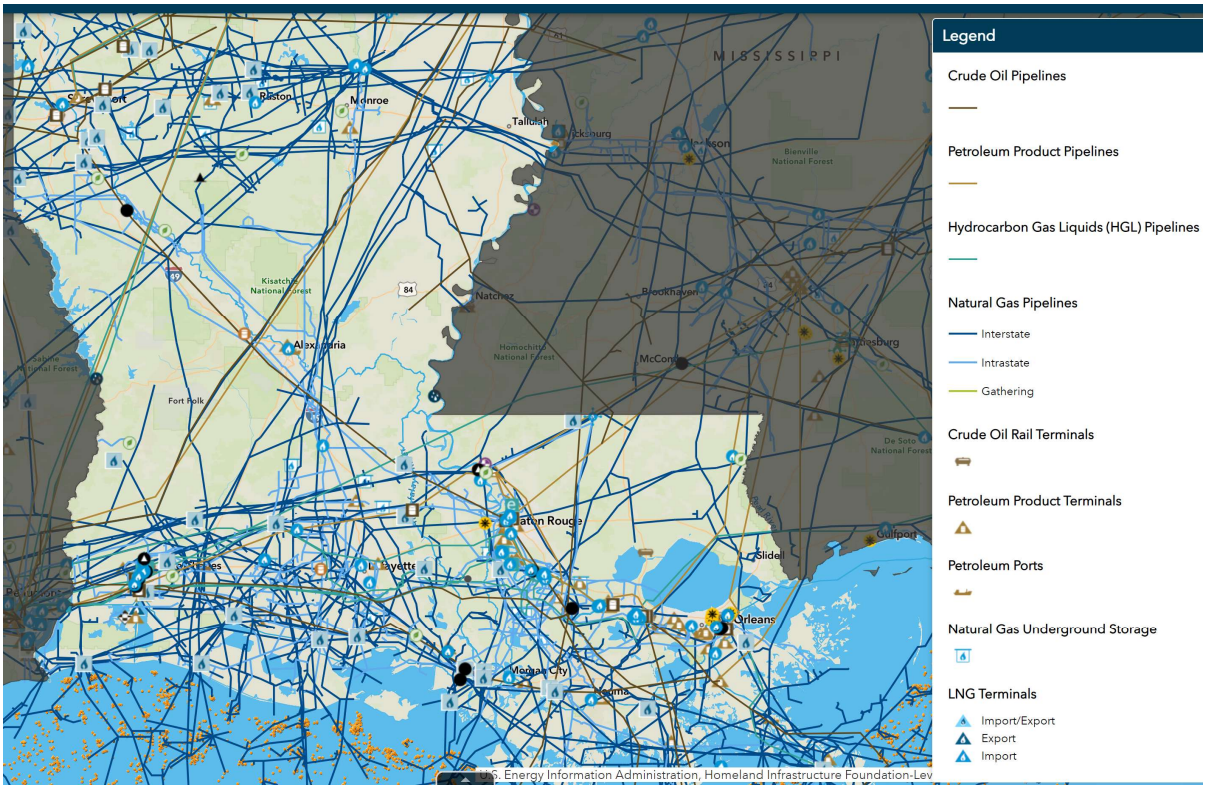
- Chennault International Airport completed the construction of a $4 million air cargo pass-through facility in 2022 and continues to invest in new underground infrastructure to spur air cargo development.
- Construction of new privately developed air cargo facilities within the Baton Rouge Aviation Business Park began in late 2022. The site will have runway access to the Baton Rouge Metro Airport.

2.6 Pipelines

Pipelines are the primary mode for transporting raw and processed crude oil and natural gas products. According to the Louisiana Department of Natural Resources, Louisiana has approximately 50,000 miles of pipeline (Figure 29). The network, spanning land and coastal geographies, consists of crude oil, petroleum products, hydrocarbon gas liquids (HGL), and liquefied natural gas (LNG) pipelines. It continues to grow as new pipeline segments are approved by the Louisiana Department of Natural Resources and the Federal Energy Regulatory Commission (FERC). Most of Louisiana's pipeline mileage comes from natural gas pipelines (interstate, intrastate, and gathering systems). It is most prominent in the 19 parishes near the Gulf of Mexico and significant oil and gas production areas. A large concentration of pipelines can also be found in northwestern Louisiana to support the Haynesville Shale natural gas formation.

The pipeline network supports on-shore and off-shore oil and gas extraction and processing sites, storage facilities and terminals, and production/refining facilities. This includes three import terminals: Lake Charles, Energy Bridge (a natural gas deepwater port located in the Gulf of Mexico, approximately 120 miles off the coast of Louisiana), and Sabine Pass. The pipelines importing the LNG from these locations have a daily capacity of 5,200 million cubic feet. The Henry Hub, located in Erath, is the point of connection for nine interstate and four intrastate pipelines that provide access to markets throughout the US. Henry Hub is also used as the pricing point for natural gas futures trading on the New York Mercantile Exchange. Off-shore production accounts for 95 percent of the State's energy production. As a result, water-landside pipeline connections are critical to the State's energy economy.

Figure 29: Louisiana Pipeline Network



Source: US Energy Information Administration

The Louisiana Offshore Oil Port (LOOP) was intentionally designed to be capable of offloading deep-draft tankers. The port consists of three offshore staging areas that empty crude tankers and a marine terminal on land. The onshore oil storage facility (Clovelly) is located 25 miles inland and is connected to the port complex by a 48-inch diameter pipeline. This facility is an interim holding area before crude is delivered via connecting pipelines to refineries on the Gulf Coast and the Midwest. Three pipelines connect the onshore storage facility to refineries in Louisiana and along the Gulf Coast. LOOP also operates the 53-mile LOCAP pipeline that connects LOOP to the Capline Pipeline at St. James. This consists of a 40-inch pipeline transporting crude oil to several Midwest refineries.

According to the Energy Information Administration, Louisiana ranks 3rd in the US in natural gas production, with over 3.41 billion cubic feet produced. This accounts for 10 percent of all domestic production and represents a 45 percent increase since 2014.[8] In 2020, Louisiana received 4 trillion cubic feet of natural gas and delivered 5.3 trillion cubic feet. Approximately 40 percent of the natural gas that enters Louisiana comes from Texas, and nearly 20 percent comes from Mississippi. Another 15 percent of the natural gas that enters the state arrives onshore from federal leases in the Gulf of Mexico. In comparison, 14 percent of the natural gas

[8] https://www.eia.gov/tools/faqs/faq.php?id=46&t=8

enters from Arkansas, and 6 percent enters via a pipeline transporting Marcellus/Utica shale gas from Ohio.[9]

By measure of crude oil production, Louisiana ranks 9th in the US, producing 36 million barrels in 2022. This represents a decrease of approximately 33 percent since 2014. Overall, the decline is part of a more significant trend of declining statewide crude oil production, which has been in place since the 1980s. Despite this drop in crude oil production, Louisiana ranks 2nd in the US in operating total and refinery capacity. This dichotomy can be attributed to multiple factors:

- Overall, US crude oil production dropped between 1980 and 2008. Following 2008, domestic crude oil production began to increase significantly through 2019. Most of this increase came from Texas (notably within the Permian Basin of West Texas) and North Dakota due to the realization of hydraulic fracking as a commercially viable method of extracting crude oil from underground reserves.[10] Conversely, statewide oil production has declined due to declining crude oil prices, exhausting statewide reserves, and cheaper production costs elsewhere. Between 1980 and 2000, crude oil prices held a strong downtrend, impacting nationwide and state production due to reduced extraction profitability. At the same time, statewide crude oil reserves, primarily located in Louisiana's southern coastal parishes, have gradually become depleted, making it more profitable to search for new sources of crude oil rather than invest additional resources to extract the remaining limited amounts of the commodity. Although northern Louisiana has benefitted from the hydraulic fracking boom, local increases in crude oil production have not offset declines across the southern coastal parishes.
- Although statewide crude oil production has declined, these figures don't consider Outer Continental Shelf (OCS) offshore oil extraction in the Gulf of Mexico, adjacent to the coast of Louisiana. Despite challenges, including the failure of the Deepwater Horizon drilling rig, OCS oil production has remained steady. Louisiana's petrochemical refining capacity, established in the 1970s, has steadily risen due to increasing domestic and global demand for refined petrochemical products. Louisiana's refinery capacity has continued to grow due to its well-established infrastructure and the State's geographic location, given its proximity to extraction sites and the presence of the Mississippi River and critical ports as shipping links.

Infrastructure Condition

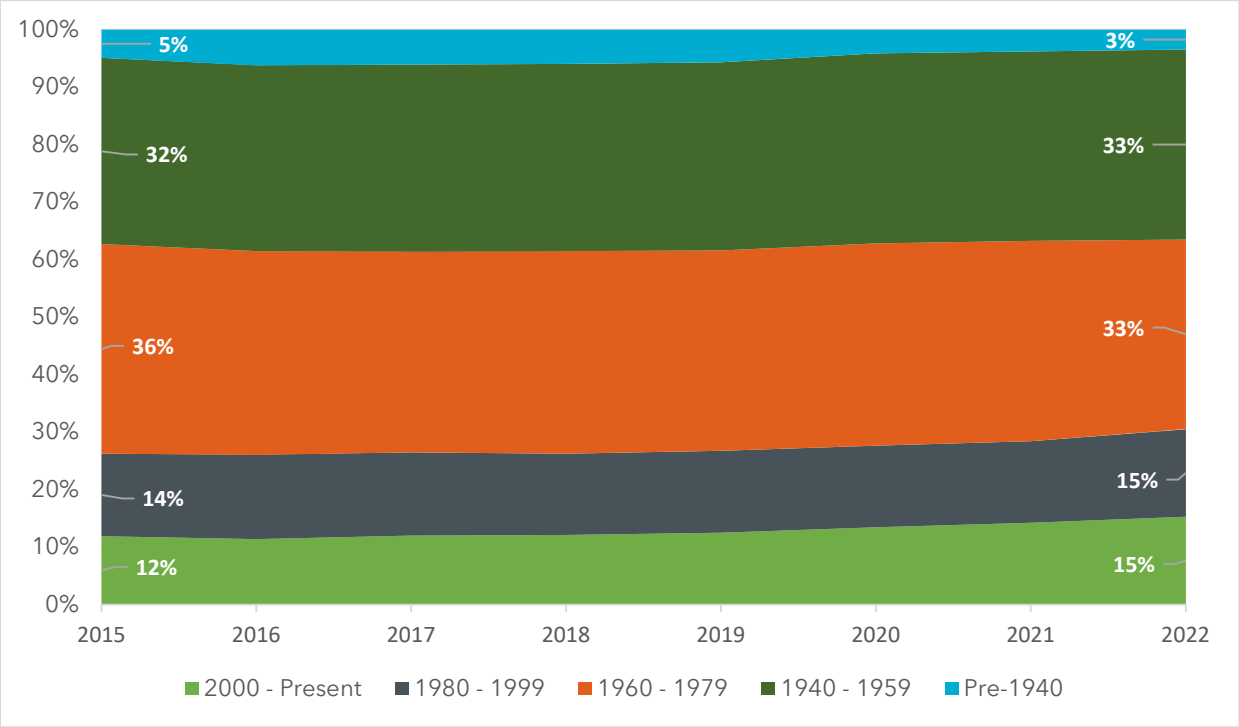
Pipelines in Louisiana and across the US are operated by private sector energy and extraction firms, with the Pipeline and Hazardous Materials Safety Administration (PHMSA) responsible for developing, issuing, and enforcing related safety regulations. As a result, pipeline infrastructure conditions are managed and maintained by these firms, including ExxonMobil, ConocoPhillips, and Marathon Petroleum. For security reasons, specific details on pipeline conditions and maintenance needs are unavailable to the general public. However, pipeline age, disseminated

[9] https://www.eia.gov/state/analysis.php?sid=LA#:~:text=Among%20its%20many%20productive%20formations,US%20natural%20gas%2Dproducing%20regions.
[10] https://www.dallasfed.org/research/economics/2019/0820

by PHMSA, is a proxy for overall infrastructure conditions and needs. This is because older pipelines are more susceptible to disruptions and safety incidents.

Figure 30 and Figure 31 break down the Louisiana gas transmission and hazardous liquid[11] pipeline networks by decade of initial installation. As of 2022, approximately 36 percent of gas transmission and 21 percent of hazardous liquid pipelines in Louisiana were installed before 1960, indicating an age of at least 62 years for these components. Since 2015, the proportion of both types of pipelines installed before 1960 has decreased slightly due to the decommissioning and replacement of older pipelines and the construction of entirely new pipeline segments. Correspondingly, the proportion of pipelines constructed after 2000 has increased from 12 percent to 15 percent for gas transmission pipelines and from 16 percent to 20 percent for hazardous liquid pipelines.

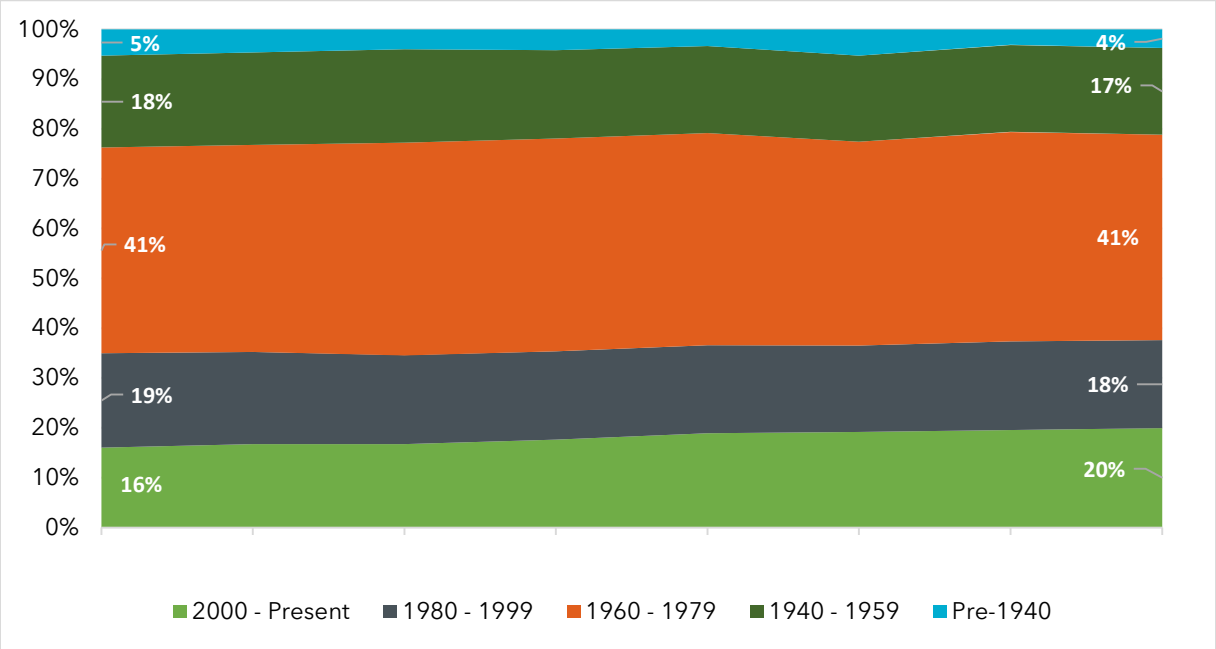
Figure 30: Louisiana Gas Transmission Pipeline by Decade of Installation



Source: Pipeline and Hazardous Materials Safety Administration

[11] Includes crude oil, Highly Volatile Liquids (HVLs), flammable liquids, toxic liquids, refined petroleum products, biofuels, and liquid carbon dioxide.

Figure 31: Louisiana Hazardous Liquid Pipeline by Decade of Installation



Source: Pipeline and Hazardous Materials Safety Administration

The PHMSA establishes national pipeline policy, sets and enforces standards, educates, and conducts research to prevent incidents. In partnership with the Louisiana Department of Natural Resources, the agency tracks safety incidents in the State.

Over the past ten years, Louisiana has averaged 41 pipeline incidents per year; 23 of the 41 are considered "significant," meaning it resulted in a fatality, in-patient hospitalization, incurred over $50,000 costs (in 1983 dollars), highly volatile liquid releases of 5 barrels or more or other liquid releases of 50 barrels or more, or liquid releases resulting in an unintentional fire or explosion. Of those significant incidents, Louisiana averages one serious incident yearly, resulting in death or an in-patient hospitalization. As Figure 32 illustrates that cyber security concerning freight infrastructure is crucial for safety and system resiliency.

Figure 32: Importance of Cyber Security – 2021 Colonial Pipeline Incident

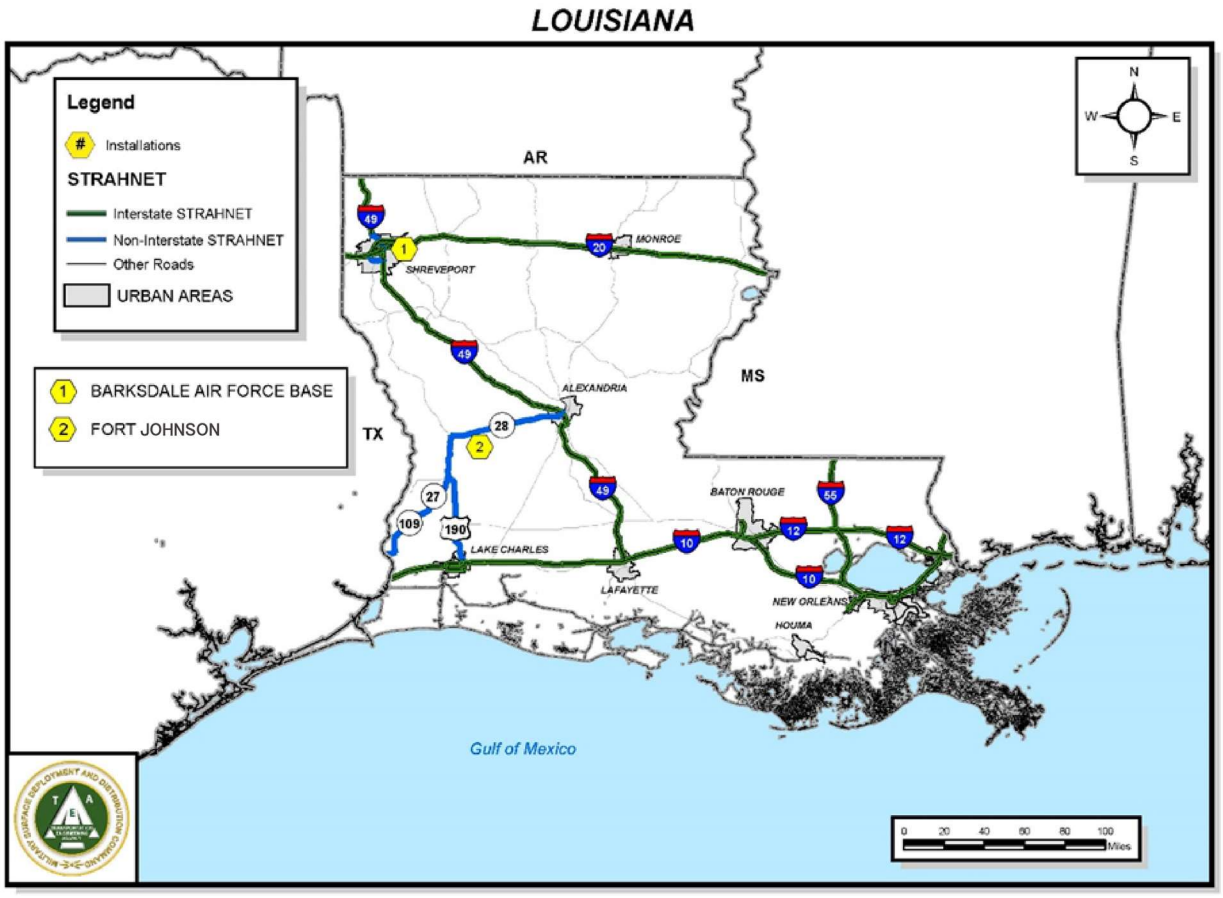
In 2021, the Colonial Pipeline, which carries gasoline, diesel, and jet fuel from Texas to New York, was the victim of a ransomware cyberattack that resulted in the pipeline halting all pipeline operations to contain the attack. The pipeline carried 45 percent of all fuel consumed on the east coast, resulting in fuel shortages and a nationally declared state of emergency. After 6 days, the Colonial Pipeline restarted its operations, and three days later, its operations returned to normal.

2.7 Military Freight

The US military has a significant presence in Louisiana. The State's military installations host and support all branches of the Department of Defense: Army, Air Force, Navy, Marine Corps, Coast Guard, and their respective reserve and national guard units. As such, the US military depends on the Louisiana Multimodal Freight Network to move cargo to support the installations and deploy personnel and equipment for national defense.

To meet this vital need, the Strategic Highway Network (STRAHNET) and the Strategic Rail Network (STRACNET) were developed by the Department of Defense in coordination with FHWA. The STRAHNET and STRACNET – networks of highways and rail lines – provide military freight mobility routes to respond to global and national events (Figure 33 and Figure 34).

Figure 33: Louisiana's Strategic Highway Network (STRAHNET)



Source: Federal Highway Administration (n.d.)

Figure 34: Strategic Rail Network (STRACNET)

Source: Federal Highway Administration (n.d.)

The State's military installations (Table 7) serve as major freight generators and consumer markets, requiring connectivity to the freight transportation system. Complicated supply chains are necessary to efficiently and reliably provide logistics support to these military sites. Immense amounts of fuel, food, ammunition, maintenance, equipment and materials, and medical supplies are critical to maintaining units in a combat-ready posture. Transportation infrastructure – including highways, rail, inland waterways, and air cargo – is essential to supporting these supply chains and deploying units.

In general, most military installations are located in the central to southern regions of the state, with only two in the northern part along I-20. Regarding freight movement, in 2021, more than 20 thousand tons worth $500 million of military and defense commodities were transported to, from, and within the state by all modes. The State's military and defense supply chains rely intensively on the highway network, with nearly all of the related freight tonnage and value being carried on the highway network within the state.

Non-interstate segments of the STRAHNET include portions of LA 27, LA 28, LA 109, and US 190. Although these State and US Highways do not carry as much freight tonnage as the Interstates (Figure 35), they are critical to Fort Johnson (formerly known as Fort Polk) and an

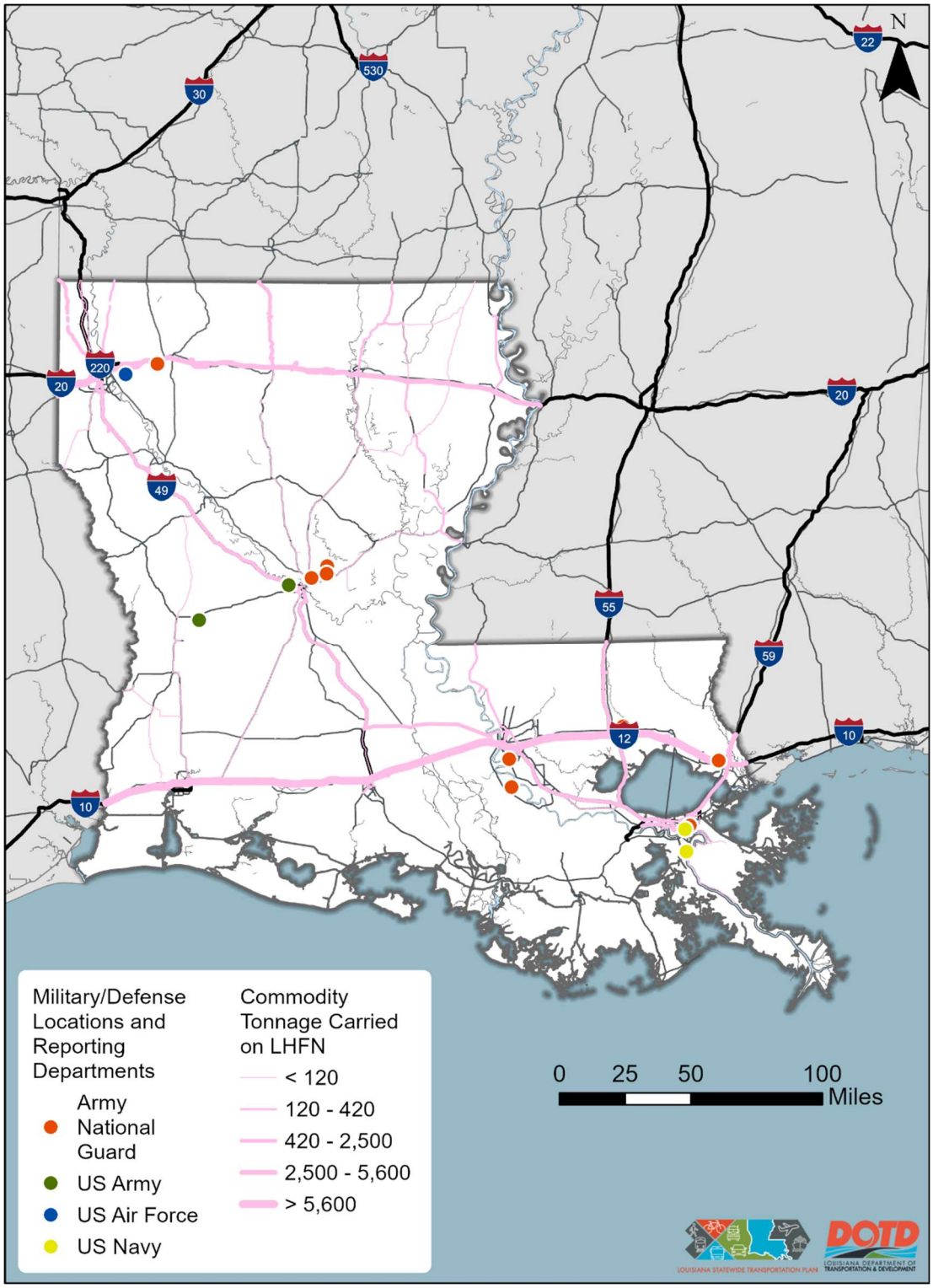
army installation in Leesville, Vernon Parish, which is located further from Interstates compared to other military facilities.

Table 7: Louisiana's Major Military Facilities

Branch	Facility	Details
Air Force	Barksdale AFB	2nd Bomb Wing, which is equipped with about 44 B-52 bombers
Army	Fort Johnson (Formerly Polk)	Joint Readiness Training Center (JRTC), the 3rd Brigade Combat Team, 10th Mountain Division, 115th Combat Support Hospital, US Army Garrison and Bayne-Jones Army Community Hospital.
Army	England Airpark	Because of its proximity to Fort Johnson, the military uses England Airpark to conduct training exercises or deploy and return troops and equipment.
Army Reserve	377th Theater Sustainment Command	The 377th Theater Sustainment Command has a dual mission of supporting global requirements and assisting with major disaster recovery efforts.
Navy	Naval Air Station Joint Reserve Base (Belle Chasse)	The base supports two Naval Air Reserve Squadrons, two Marine Forces Reserve units, a Coast Guard Air Station, a Louisiana Air National Guard fighter wing, an Army Reserve unit, a Fleet Readiness Center, a Navy Reserve Operational Support Center, and other support units.
Navy	Naval Information Warfare Center New Orleans	One of three DoD Component Enterprise data centers focused on IT warfare
Marines	Marine Forces Support Facility New Orleans	Home to the Marine Forces Reserve and Marine Forces South. In addition, the facility houses the headquarters elements of the 4th Marine Division, 4th Marine Aircraft Wing, 4th Marine Logistics Group, and the Force Headquarters Group.
Coast Guard	US Coast Guard 8th District	Headquartered in New Orleans, the 8th Coast Guard District is responsible for US Coast Guard operations spanning 26 states, including the Gulf of Mexico coastline from Florida to Mexico, the adjacent offshore waters and outer continental shelf, as well as the inland waterways of the Mississippi, Ohio, Missouri, Illinois, and Tennessee River systems.
National Guard	Air and Army National Guard	Louisiana Army National Guard has 67 armories in 63 communities throughout Louisiana. The main component of the Louisiana Air National Guard is stationed at the Naval Air Station Joint Reserve Base (Belle Chasse).

Source: U.S. Department of Defense

Figure 35: Military Installations and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

According to FHWA, a state DOT's role during a major deployment or national emergency is to meet the military and public's highway operational needs. This is best accomplished with early coordination between DOTD, FHWA, and the Military Surface Deployment and Distribution Command Transportation Engineering Agency (SDDC TEA).

While the Global War on Terror officially ended in 2021, the national build-up for Operation Iraqi Freedom increased shipments from military installations to seaports by almost 30 percent. Consequently, national truck volumes, on average, increased by 15 percent. States home to DoD Power Projection Platforms – like Fort Johnson – saw significantly more growth and congestion levels.[12]

2.8 Louisiana Multimodal Freight Network

The 2024 Louisiana Multimodal Freight Network includes the complete freight rail, maritime, pipeline, and air cargo systems (and their respective facilities). However, for highways, the freight planning process identified which DOTD highways directly support Louisiana's supply chains versus roads that primarily serve passenger mobility. This network redesignates the one identified in the 2018 SFP.

The Louisiana Highway Freight Network (LHFN) was established using a process that starts with data analysis of freight movements on Louisiana's highways and then incorporates stakeholder feedback to designate the most critical State-maintained highway assets for freight. This section will document the methodology of the data analysis and discuss the results of the final LHFN.

The data analysis to designate the LHFN is completed using data that reflects the roadways' surrounding economic conditions, the characteristics of how goods are moving, their connection to critical supply chains, and how they impact providing access to broader markets through connections with other modes. To do this, roadways are analyzed according to four criteria, listed below, and each criterion was weighted based on its significance to achieve the State's freight goals:

ECONOMIC COMPETITIVENESS: This criterion assesses transportation-related activities related to economic growth and freight employment. It contributed 20 percent to the overall network score computation.

GOODS MOVEMENT: Assesses facilities' impact on goods transportation based on truck volumes, truck vehicle miles traveled (VMT), freight tonnage and value, and potential freight tonnage and value growth. This criterion contributed 30 percent to the overall network score computation.

STRATEGIC SUPPLY CHAINS: Assesses the highway network's significance in supporting crucial freight-intensive industries and global supply chains. Seven freight-intensive industries are defined here, including:

- Advanced Manufacturing

[12] FHWA, Coordinating Military Deployments on Roads and Highways: A Guide for Local Agencies, Page 4.

- Military/Defense
- Agriculture, Food Processing and Distribution
- Forestry and Wood Products
- Chemicals, Plastics, and Rubber
- Energy / Green Energy
- Distribution / Logistics

This criterion contributed 25 percent to the overall network score computation.

MARKET ACCESS AND CONNECTIVITY: This criterion assesses intermodal and trading partner connectivity through proximity to intermodal connectors, high-diversity market gateways (marine port terminals), and market gateways (truck, rail, airport, and inland port terminals). It contributed 25 percent to the overall network score computation.

These four criteria are evaluated using nineteen different metrics listed in Table 8. Based on these metrics, scores were calculated for each criterion, which were then weighted as described above to calculate a total Freight Network Identification (FNI) score.

Table 8: Metrics Used to Score Highway Network for Designation

Criteria	Metric	Data Source	Calculation
Economic Competitiveness (20%)	Population growth	U.S. Census (2010 / 2022)	The growth rate of the parish from 2010 to 2022 compared to the statewide growth rate.
	Workforce size	U.S. Census (2022)	Census tract workforce size compared to tract population relative to state average.
	Freight Employment Intensity	U.S. Census (2022)	Employment in freight-intensive sectors vs state average.
	Connection to military facilities	Department of Defense (2022)	Whether the roadway connects with a military facility
Goods Movement (30%)	Annual truck volume	Transearch (2021)	Annual truck units on Louisiana roads
	Annual truck vehicle miles traveled (VMT)	Transearch (2021)	Annual truck VMT on Louisiana roads

Criteria	Metric	Data Source	Calculation
	Truck VMT by lane mile	Transearch (2021) / DOTD	Annual truck VMT per lane mile on Louisiana roads
	Total tonnage (2021)	Transearch (2021)	Annual tonnage of commodities on Louisiana roads
	Total value (2021)	Transearch (2021)	Annual value of commodities on Louisiana roads
	Tonnage growth (2021 – 2050)	Transearch (2021)	Percent of tonnage growth between 2021 and 2050
	Value growth (2021 – 2050)	Transearch (2021)	Percent of value growth between 2021 and 2050
Strategic Supply Chain (25%)	Number of key supply chains	Claritas (2022)	Several supply chains (from 0 to 7) served within 1 mile of the roadway.
	Number of businesses in key supply chains	Claritas (2022)	Number of key supply chain establishments within 1 mile of the roadway
	Size of businesses in key supply chains	Claritas (2022)	Number of employees working at key supply chain establishments within 1 mile of the roadway
	Tonnage of commodities associated with key supply chains	Transearch (2021)	Tonnage of commodities related to key supply chains
	Value of commodities associated with key supply chains	Transearch (2021)	Value of commodities related to supply chains
Market Access and Connectivity (25%)	Intermodal connectivity	National Transportation Atlas Database (2023)	Whether the roadway is within 1 mile of an intermodal connector
	Market access	National Transportation Atlas Database (2023)	Measures Truck Travel Times (TTT) from inland port terminals (truck, rail, and airport)

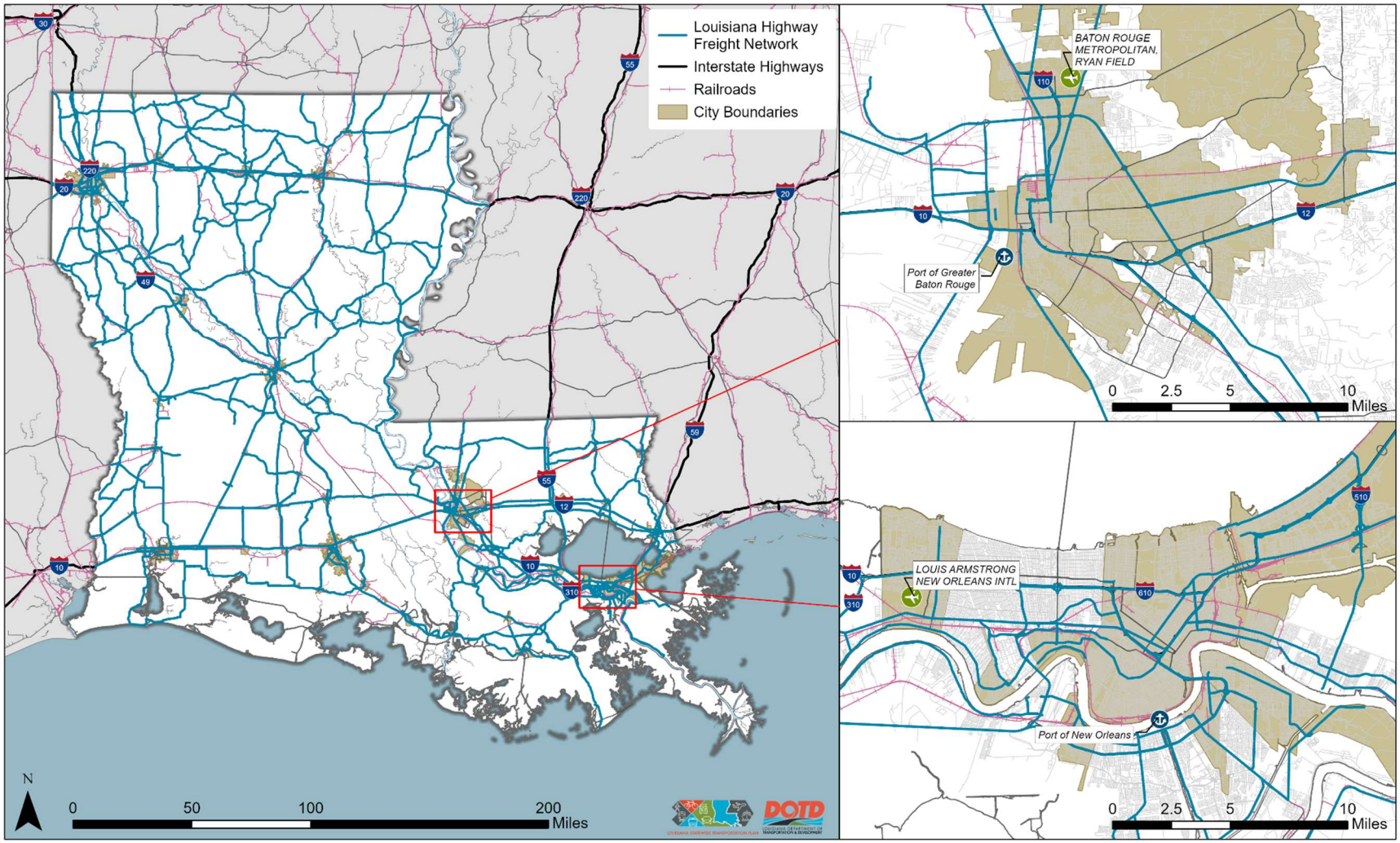
Criteria	Metric	Data Source	Calculation
	High-diversity market access	National Transportation Atlas Database (2023)	Measures TTT from marine port terminals.

Following the score calculation, a draft LHFN was identified based on the highway segments that scored above average on the network identification. This draft network was shared with the Louisiana Freight Advisory Committee (FAC) and Louisiana's Metropolitan Planning Organizations using an ArcGIS online map that displayed the draft network and criteria results. These stakeholders submitted 91 comments, highlighting roadways that should be removed or added based on local planning considerations and industry expertise. These comments were considered when DOTD approved the final LHFN.

Figure 36 shows the final Louisiana Highway Freight Network. It comprises 6,470 miles of the most critical highways to freight movement, including the State's Interstates, and 2,859 of 3,172 miles (90 percent) of the State's National Highway System. It connects with many major intermodal terminals, including the Port of New Orleans, Port of Greater Baton Rouge, Port Fourchon, and the Louis Armstrong New Orleans International Airport, as well as military bases, including Fort Johnson and Barksdale Air Force Base. The LHFN serves as a vital network of roads for moving goods throughout the state.

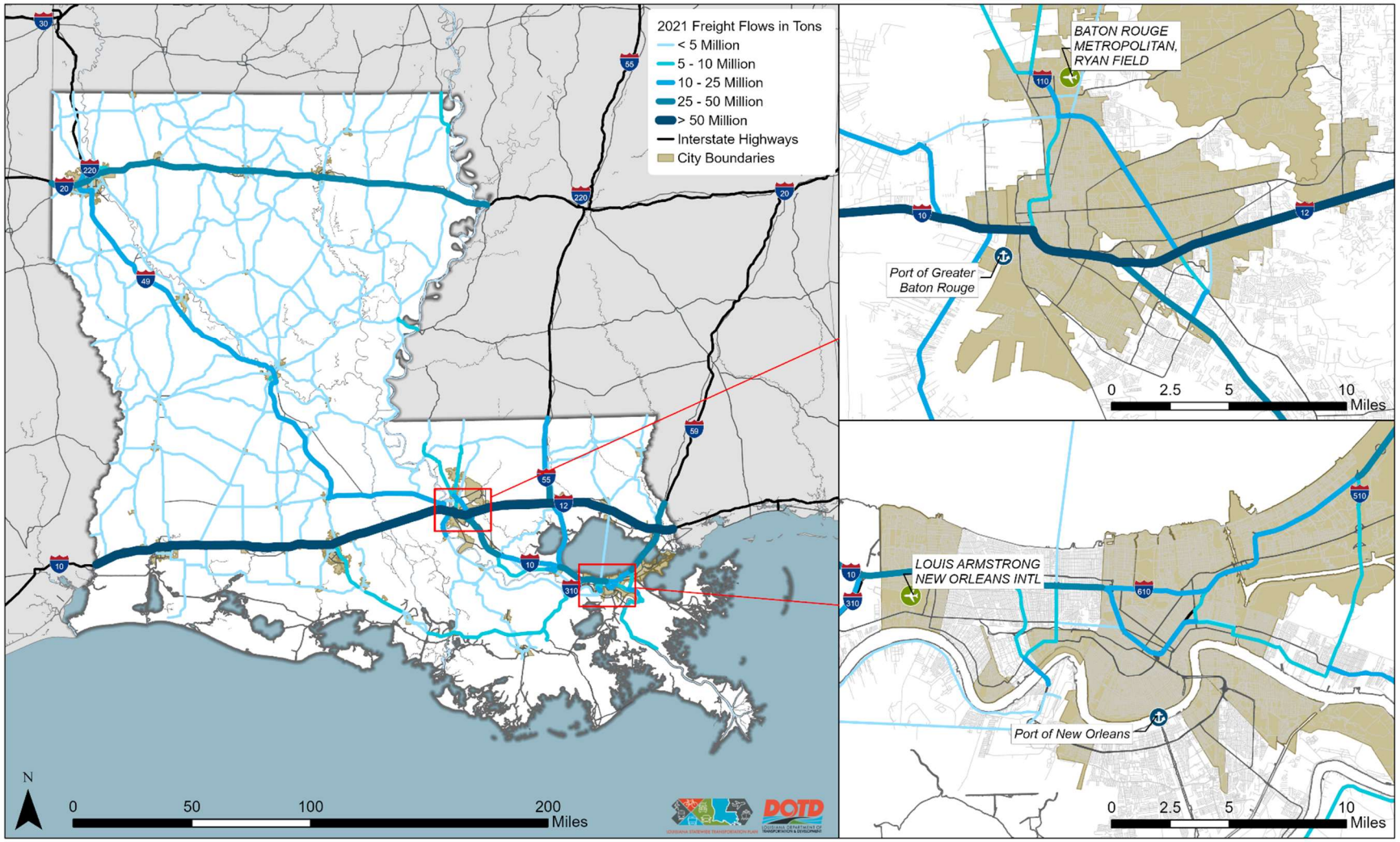
Figure 37 and Figure 38 show freight movement on Louisiana's highways by tons and value, respectively, in 2021. I-10 and I-20 carry the most freight by both tons and value, and I-49 and I-55 are the north-south Interstates with the highest freight movement. US 90 and LA 39 are important non-Interstate routes connecting port facilities in the southern part of the state, south of New Orleans and Lafayette. Additionally, US 190 links I-49 in Opelousas and Baton Rouge and sees a high freight volume.

Figure 36: Louisiana Highway Freight Network



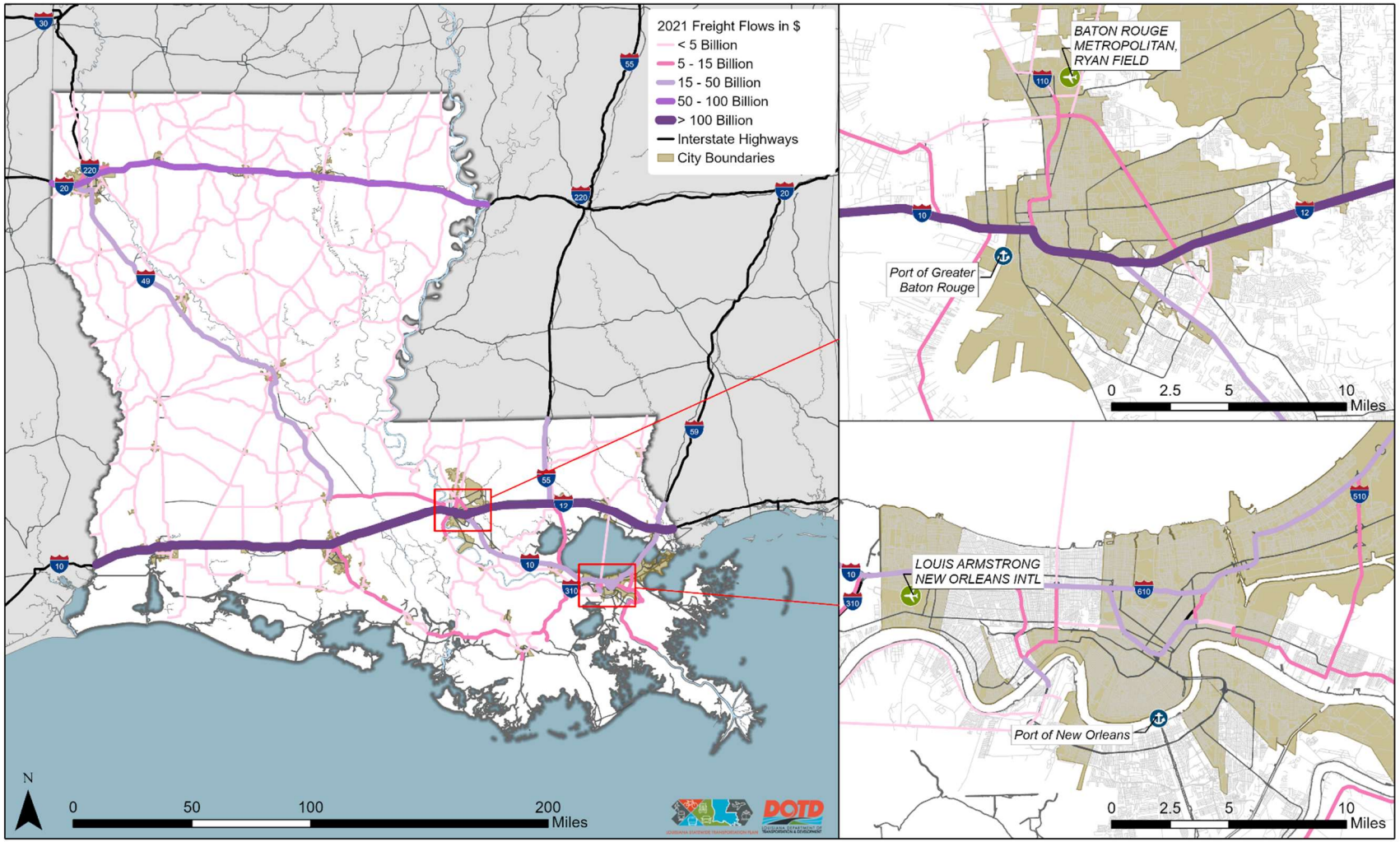
Source: Network Designation analysis by Cambridge Systematics, freight flows using S&P Global Transearch Database

Figure 37: Freight Movement in Louisiana by Tons, 2021



Source: Network Designation analysis by Cambridge Systematics, freight flows using S&P Global Transearch Database

Figure 38: Freight Flows in Louisiana by Value, 2021



Source: Network Designation analysis by Cambridge Systematics, freight flows using S&P Global Transearch Database

Chapter 3: Freight Transportation and Louisiana's Economy

The Louisiana multimodal freight transportation system is critical to the State's economic vitality. It enables the movement of hundreds of millions of tons of freight annually and employs hundreds of thousands of Louisianans in freight transportation and handling industries.

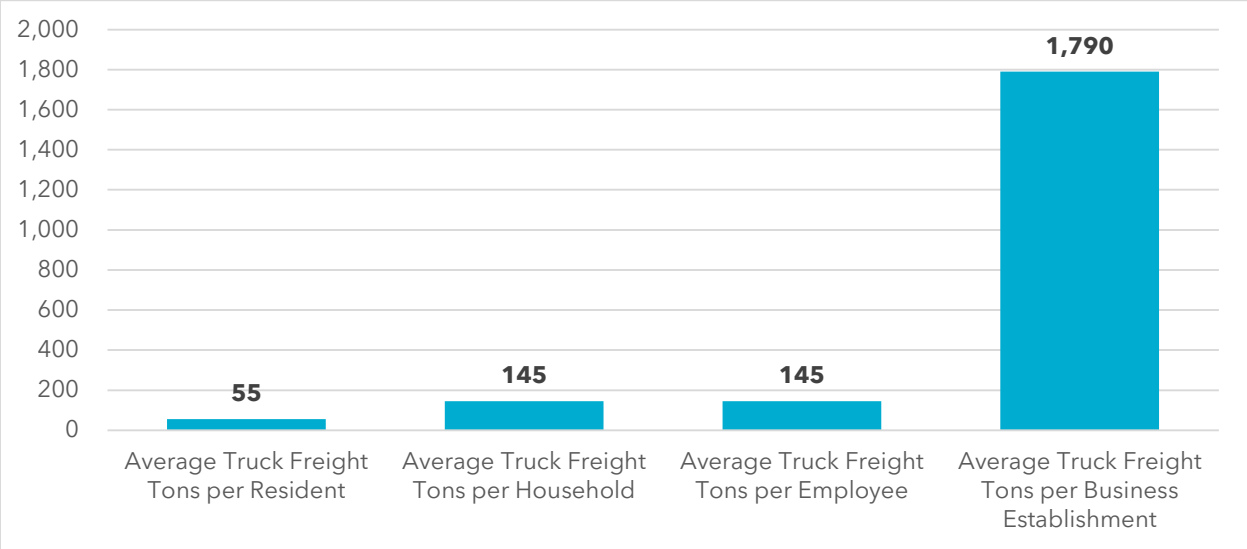
Louisiana's geographic location, multimodal freight transportation system, and population give the State a competitive advantage for transportation businesses and the markets they serve. Population in the State is expected to grow to 5,157,499 residents by 2050, representing an increase of 9 percent from 2021.[13] Employment in the State is expected to increase at a faster rate than population or 29 percent, from 1,785,042 employees in 2021 to 2,307,634 employees by 2050.[14] The expected employment growth in Louisiana alone suggests a need for further expansions of freight capacity to keep pace with demand for goods and services.

In Louisiana, freight shipped to, from, and within the State totaled 605 million tons in 2021. On average, 130 tons of freight per resident, 350 tons of freight per household, 335 tons of freight per employee, and 4,230 tons of freight per business establishment were shipped inbound, outbound, and within the State in 2021.

Freight shipped to, from, and within the State by truck totaled 256 million tons in 2021. This equates, on average, to 55 tons of truck freight per resident, 145 tons of truck freight per household, 145 tons of truck freight per employee, and 1,790 tons of truck freight per business establishment in the State in 2021 (Figure 39). The maximum legal gross weight of any combination of commercial vehicles in Louisiana is 83,400 pounds on Interstate Highways and 88,000 pounds on Non-Interstate Highways. Assuming trucks transport, on average, 80,000 pounds (40 tons) of cargo, this equates to 1.5 trucks per resident, 3.5 trucks per household, 3.5 trucks per employee, and 45 trucks per business establishment annually (Figure 40).

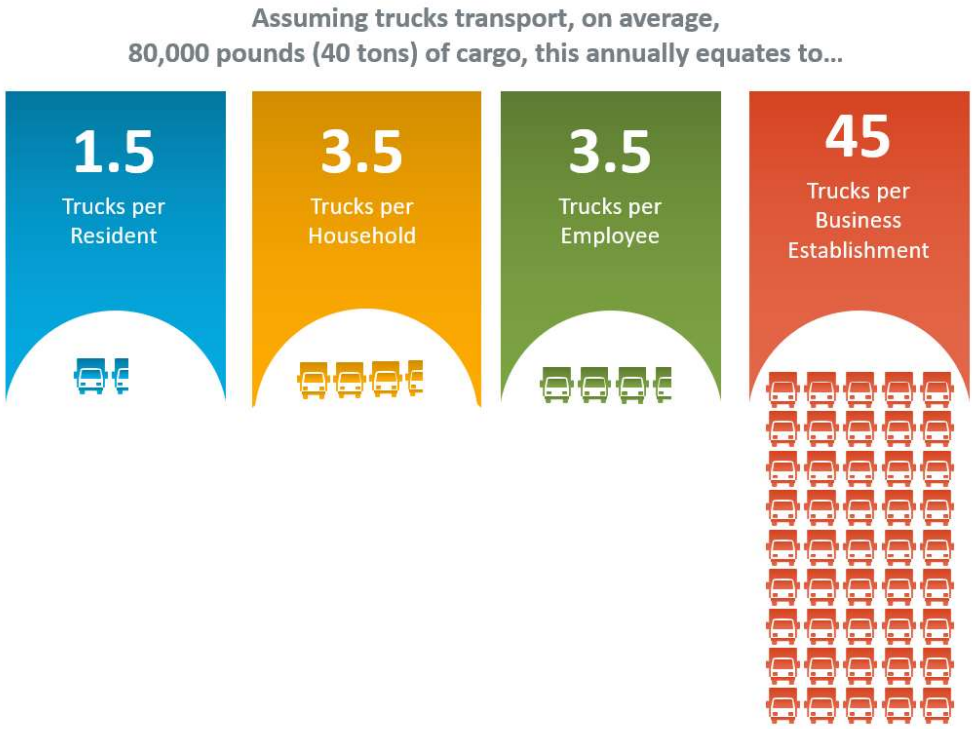
[13] Louisiana Statewide Travel Demand Model.
[14] Louisiana Statewide Travel Demand Model.

Figure 39: Average Truck Freight Tonnage per Louisiana Resident, Household, Employee, and Business Establishment in 2021



Source: Cambridge Systematics analysis based on the freight data from the S&P Global Transearch Database and the Surface Transportation Board's Waybill Database for Louisiana, population and employment data in the Louisiana Statewide Freight Model, household data from the U.S. Census Bureau, 2019 American Community Survey 5-year Estimates, and business establishment data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW).

Figure 40: Comparison between Freight Truck Tonnage per Louisiana Resident, Household, Employee, and Business Establishment in 2021



Source: Analysis by Cambridge Systematics

The average tonnage to be shipped inbound, outbound, and within the State by all freight modes per Louisiana resident is forecast to grow from 130 tons in 2021 to 150 tons in 2050 (or a 15 percent increase). The average freight tonnage to be shipped inbound, outbound, and within the State by truck per Louisiana resident is forecast to grow from 55 tons in 2021 to 65 tons in 2050 (or an 18 percent increase). This positive trend is a reflection of the increased purchasing power of Louisiana's residents over time and an indication that the State's economy continues to grow and depend on the daily delivery of goods shipped through the State's multimodal network of highways, waterways and ports, pipelines, railroads, airports, and warehousing and storage facilities. The average tonnage to be shipped inbound, outbound, and within the State by truck per Louisiana employee is forecast to increase from 145 tons in 2021 to 150 tons in 2050 (or a 3 percent increase). This suggests that the continued advancement in automation of freight transport and handling industries will make these industries more efficient and productive over time, allowing them to move and handle more goods per employee, which in turn leads to cost savings for these industries that can be passed on to customers in the form of lower prices.

The economic contribution of freight transportation and cargo handling goes beyond businesses that provide for-hire services. In addition to activities generated by freight truck, rail,

pipeline, water, and air transportation, other activities included in freight transportation are in-house truck transportation carried out by businesses in which transportation is not the main economic activity (such as grocery stores or waste collection), self-employed individuals in the trucking and courier industry, United States Postal Service (USPS), for-hire warehousing and storage, wholesale, and other cargo handling activities. To estimate the economic contribution of freight transportation and handling industries in Louisiana, a broad definition of the industries transporting and handling freight is utilized.

The direct jobs and wages generated by the freight transportation and handling industries in Louisiana in 2021 contributed $10.7 million in wages and $22.4 billion in Gross State Product (GSP) to the economy of the State (Table 9). These direct contributions equate to 8 percent of total employment, 11 percent of total wages, and 9 percent of total GSP in the State in 2021.

Table 9: Direct Economic Contribution of the Freight Transportation and Handling Industries in Louisiana in 2021

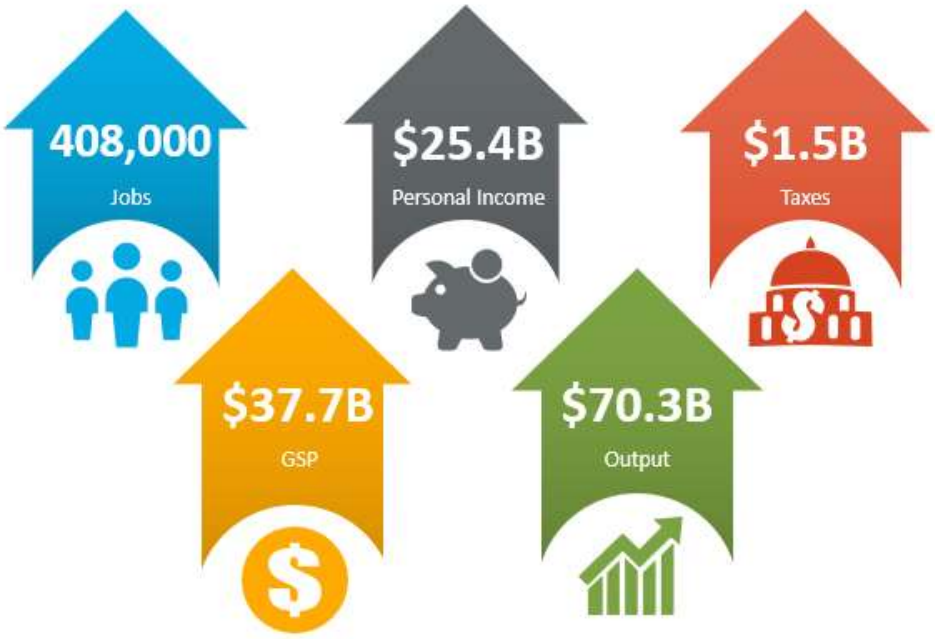
Industry	Employment (Jobs)	Wages (Millions of 2021$)	GSP (Millions of 2021$)
Truck Transportation	49,320	$4,572	$6,959
Wholesale Trade (Merchant Wholesalers)	28,219	$1,998	$6,377
Couriers and Messengers	27,162	$607	$2,948
Support Activities for Transportation	13,830	$1,039	$1,501
Warehousing and Storage	9,409	$570	$784
U.S. Postal Service	8,095	$509	$878
Water Transportation	7,370	$660	$1,209
Rail Transportation	2,600	$332	$686
Pipeline Transportation	2,364	$257	$874
Air Transportation	1,503	$143	$298
Total Direct Impacts	**149,872**	**$10,688**	**$22,514**
All Industries in Louisiana	1,816,296	$97,785	$263,163
Share of Total Direct Impacts	8%	11%	9%

Sources: Bureau of Labor Statistics; Quarterly Census of Employment and Wages (QCEW); Bureau of Economic Analysis; Association of American Railroads; Gross Domestic Product by Industry for Louisiana, Regional Economic Accounts; and U.S. Census Bureau, Non-Employer Statistics.

Figure 41 summarizes the total (direct, indirect, and induced) economic impacts of the direct jobs and wages generated by the freight transportation and handling industries in Louisiana in

2021. The industries support 408,000 million jobs, which adds close to $25.4 billion in personal income and leads to $37.7 billion in value added (or GSP) and $70.3 billion in output. This yields $1.5 billion in taxes.

Figure 41: Total (Direct, Indirect, and Induced) Economic Contribution of the Freight Transportation and Handling Industries in Louisiana in 2021



Source: Modeling outputs from REMI TranSight with Tax-PI model for Louisiana and Cambridge Systematics Analysis. To perform the analysis, the total number of direct jobs and wages in the freight transportation and handling industries was used as the reference for the calculation of the total (combined direct, indirect, and induced) economic impacts in terms of employment, personal income, value added (or GSP), output, and taxes.

3.1 Economic Impacts of Specific Freight Activities

Truck Freight Transportation and Handling Economic Impacts

In Louisiana, trucking is the predominant mode for freight movement, carrying the most freight tonnage of any mode. Trucks provide the first and last-mile connection to rail facilities, water ports, inland ports, airports, warehouses, and distribution centers and serve long-haul trips destined throughout the State and beyond. Petroleum and coal products, nonmetallic minerals, chemical products, farm products, food products, lumber, waste, clay, and pulp products are major commodities by tonnage moved by truck in Louisiana.[15] As Louisiana's largest freight transportation and handling industry by number of

[15] Cambridge Systematics analysis based on the freight data from the S&P Global Transearch Database for Louisiana.

jobs, trucking economic impacts totaled 133,110 jobs and $9.4 billion in personal income in 2021. Truck freight transportation and handling activities generated $10.5 billion in GSP and $20.2 billion in output, resulting in a tax revenue impact of $534 million to various local and state governments in Louisiana in 2021.

Wholesale Trade Economic Impacts

Wholesale trade is critical for selling Louisiana merchandise and the outputs from various other industries, such as agriculture, mining, and manufacturing. Both durable goods, such as computers and home appliances, and nondurable goods, such as food products and clothing, are processed through wholesalers. As the second largest freight transportation and handling industry in Louisiana by number of jobs, wholesale trade supported 84,310 jobs in 2021, resulting in $5.4 billion in personal income and generating $11.2 billion in GSP, $18.8 billion in output, and $318 million in local and state taxes in the State.

Couriers and Messengers, and US Postal Service Economic Impacts

Couriers, messengers, and the US Postal Service handle the local or intercity movement of parcels and documents. These goods are articles one person can handle without special equipment. These services include the collection, pick-up, and delivery of such articles. In 2021, the couriers, messengers, and US Postal Service industry supported nearly 51,000 jobs. These jobs resulted in about $2.0 billion in personal income and generated $2.3 billion in GSP, almost $4.1 billion in output, and $114 million in local and state taxes within the State.

Waterborne Freight Transportation and Handling Economic Impacts

Louisiana's ports and waterways are of state, national, and international importance. Louisiana ranks second in the nation in waterborne tonnage. The Port of South Louisiana, Port of New Orleans, and Port of Greater Baton Rouge are among the top ten leading ports in the US by waterborne tonnage.[16] Louisiana's extensive ports and waterways system are significant for Louisiana businesses and households, playing a critical role in the State's economy. Ports link Louisiana businesses with domestic and international markets via the two largest waterway corridors in the nation, the Mississippi River and the Gulf Intracoastal Waterway (GIWW). These ports offer various services and accommodate commodities from grains and farm products to support the fishing and petroleum industries. Major commodities shipped through Louisiana's ports and waterways (based on tonnage) include petroleum and coal products, farm products, chemicals products, crude oil and natural gas, nonmetallic minerals, food products, primary metal products, coal, and metallic ores.[17] In 2021, the provision and use of waterborne transportation in Louisiana yielded total economic

[16] U.S. Army Corps of Engineers Digital Library. Waterborne tonnage for principal U.S. ports and all 50 states and U.S. territories; Waterborne tonnages for domestic, foreign, imports, exports and intra-state waterborne traffic.

[17] Cambridge Systematics analysis based on the freight data from the S&P Global Transearch Database for Louisiana.

impacts of 37,460 jobs, $2.1 billion in personal income, $3.4 billion in GSP, $8.7 billion in output, and $121 million in local and state taxes.

Support Activities for Freight Transportation

Support activities for freight transportation include all services related to transportation operations, whether by air, rail, water, or road. These jobs include aircraft mechanics, service technicians, freight dispatchers, laborers, and material movers. In 2021, the economic impacts of the support activities industry totaled 35,560 jobs and $2.2 billion in personal income, contributing $3.5 billion in GSP and $6.3 billion in output. Support activities for freight transportation generated an estimated $129 million in local and state taxes.

Pipeline Freight Transportation and Handling Economic Impacts

Louisiana is the nation's second-largest producer of natural gas and third-largest producer of crude oil among the 50 states. Louisiana's pipelines are critical to moving crude oil, natural gas, refined petroleum, mineral ores, and other energy-related products. In 2021, the economic impacts of Louisiana's pipelines totaled 23,575 jobs and $1.5 billion in personal income, contributing $2.6 billion in GSP and $4.3 billion in output. Pipelines generated an estimated $91 million in local and state taxes.

Warehousing and Storage Economic Impacts

Warehousing and storage facilities include rental, leasing, and managing facilities that handle finished goods. In 2021, warehousing and storage supported over 20,800 jobs. These jobs generated about $1.3 billion in personal income, $2 billion in GSP, $3.6 billion in output, and $72 million in tax revenue for various local and state governments.

Rail Freight Transportation and Handling Economic Impacts

Rail is critical to delivering numerous commodities and is especially important for long-distance and interstate movements. Additionally, intermodal rail often provides an alternative corridor to a congested roadway system. Rail provides access to key gateways, such as coastal and inland ports, and critical freight generators in the energy and agricultural sectors. Major commodities by tonnage transported by rail in Louisiana include chemical products, food products, farm products, primary metal products, nonmetallic minerals, transportation equipment, pulp products, petroleum and coal products, clay, and lumber products.[18] In 2021, rail-related economic impacts in Louisiana totaled 16,025 jobs, $1.1 billion in personal income, $1.7 billion in GSP, and $3.2 billion in output. The rail industry yielded an additional tax impact of $64 million to various local and state governments.

[18] Cambridge Systematics analysis based on the freight data from the S&P Global Transearch Database and the Surface Transportation Board's Waybill Database for Louisiana.

Air Freight Transportation and Handling Economic Impacts

Cargo airlines carry the smallest tonnage of freight but transport the highest value and most time-sensitive goods, providing a critical service to the State's businesses. Louisiana airports ship or receive a significant amount of high-value manufactured goods used in industrial and commercial applications. These high-value shipments, including missile/space vehicle parts, radio/TV transmitting equipment, and other electronic equipment, represent more than a third of the total air freight value coming into Louisiana.[19] In 2021, Louisiana air freight service providers, users, and related activities supported nearly 5,765 jobs. People earned $382 million in personal income and generated $591 million in GSP, almost $1.2 billion in output, and $22 million in local and state taxes in the State.

3.2 Louisiana Supply Chains

Supply chains describe the movement of goods from raw materials into products that touch multiple firms from creation to final sale and use. In particular, this section looks at seven key supply chains:

ADVANCED MANUFACTURING: Manufactured goods ranging from textiles to advanced machinery and computer equipment.

AGRICULTURE, FOOD PROCESSING, AND DISTRIBUTION: Food-related items from farm products to processed foods.

FORESTRY AND WOOD PRODUCTS: Wood-based materials, including forest resources and finished products like furniture.

CHEMICALS, PLASTICS, AND RUBBER: Chemical products used in various industries, from agriculture to medicine.

ENERGY AND GREEN ENERGY: Commodities and businesses associated with energy production, including alternative fuels that do not produce greenhouse gas emissions.

DISTRIBUTION AND LOGISTICS: Goods transported to and from warehouses and distribution centers.

The following sections describe these supply chains in more detail, including major employers, commodities associated with these businesses, and the distribution of the movement of goods for these supply chains throughout the state.

Advanced Manufacturing

The Advanced Manufacturing supply chain focuses on commodities associated with some of the most critical consumer goods, including textiles, apparel, metals, machinery, and transportation equipment. Their importance ranges from improving computing and

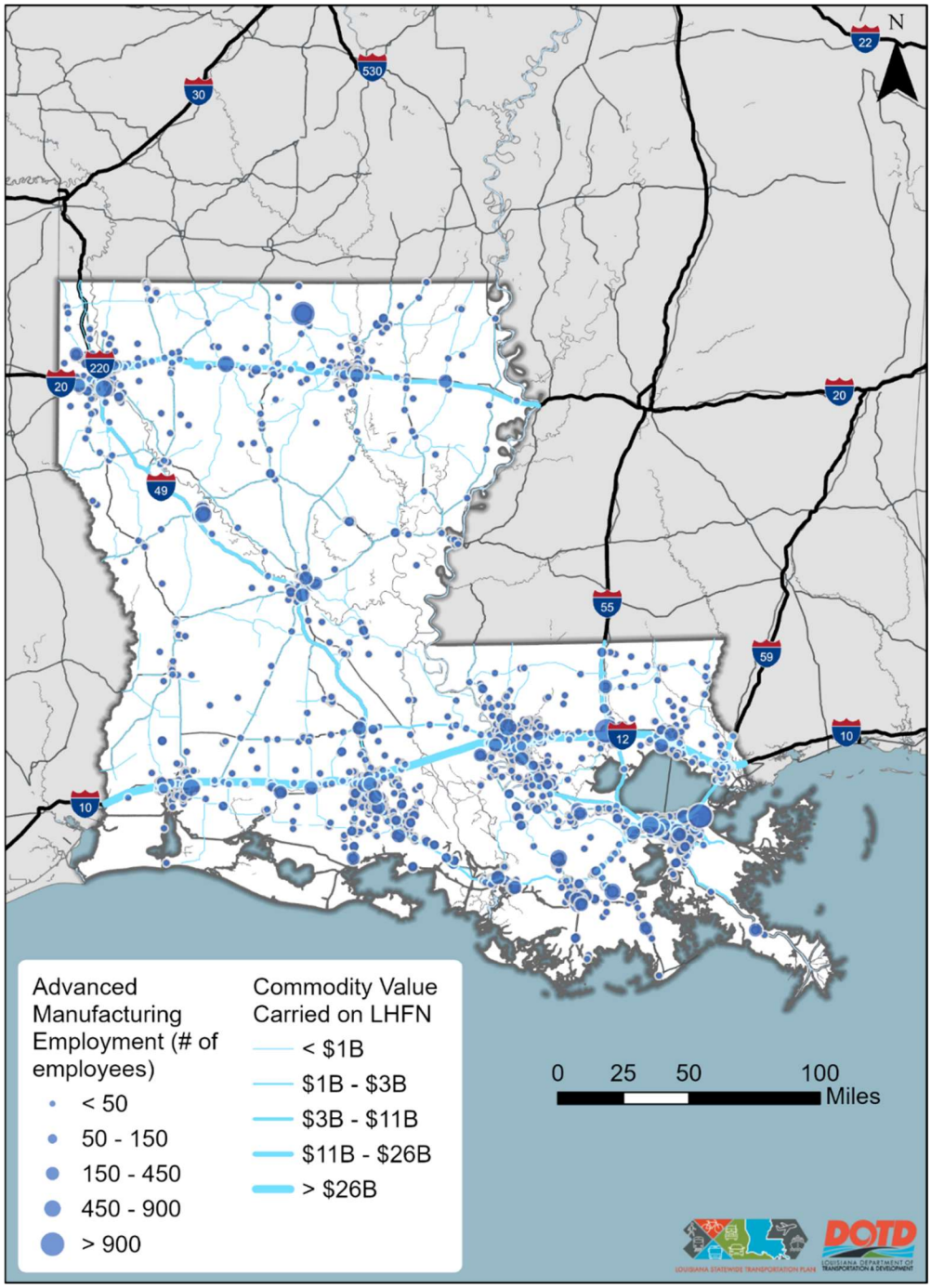
[19] Louisiana Department of Transportation and Development (DOTD). 2015 Louisiana Statewide Transportation Plan Update.

technological advancement to providing products to consumers and improving medical and surgical procedures.

According to the SFP's commodity flow analysis, Louisiana is home to over 3,000 major advanced manufacturing businesses employing over 70,000 people. Some major employers include Lockheed Martin, Foster Farms, Sanderson Farms, Alliance Compressors, and Pilgrim's Pride. In 2021, Louisiana saw over 10 million tons of Advanced Manufacturing goods worth $115 billion move into, out of, and within the state.

Figure 42 shows the distribution of Advanced Manufacturing businesses and highway commodities throughout the state. These businesses are spread throughout the state, and the LHFN plays a critical role in moving the commodities associated with these enterprises. Highways are critical to this supply chain, moving 9.7 million tons worth $106 billion, or over 90 percent of all commodities by mode.

Figure 42: Advanced Manufacturing Businesses and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

Agriculture, Food Processing and Distribution

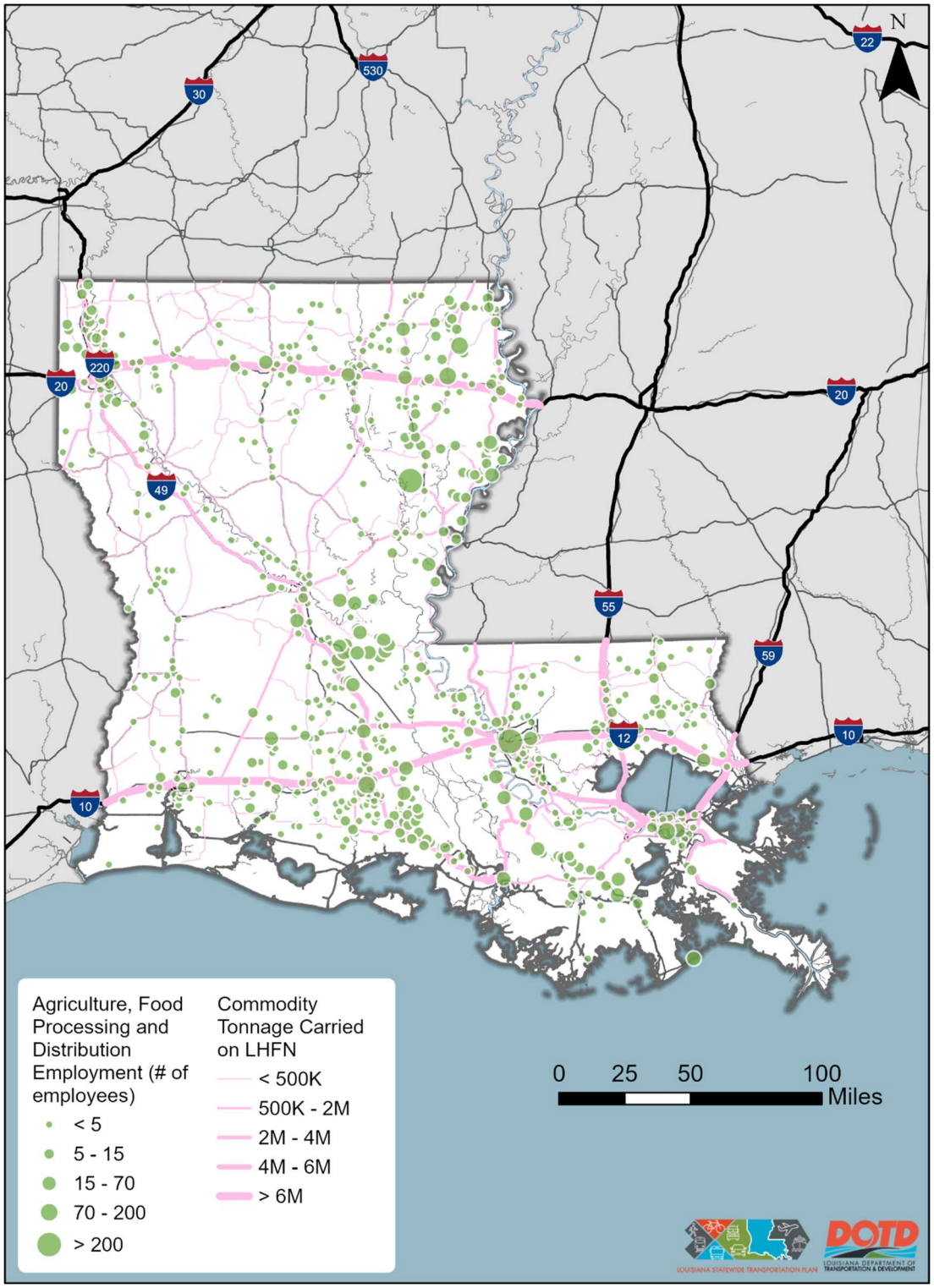
Agriculture, food processing, and distribution supply chains cover food-related items, including farm products, seafood, processed foods, and pet food. This supply chain is crucial in meeting domestic food needs and facilitating international trade. The New Orleans Port Region stands out as a predominant hub for waterborne agricultural trade, handling over one-third of the agricultural products exported by the United States to other nations.[20]

More than 1,000 agriculture and food processing businesses in Louisiana provide job positions for over 6,000 employees. Most companies in this industry are relatively small in terms of employment. Only five of the businesses have more than 100 employees. According to the LA Department of Agriculture & Forestry, the leading representatives within the industry are Wisner Minnow Hatchery, a catfish producer in Wisner, and Borden Dairy Company of Louisiana in Lafayette, a leading dairy company in the Midwest. In general, approximately $85 billion in agriculture, food processing, and distribution goods moved on the multimodal freight network in the state.

The highway network plays a critical role in goods movement in this industry. In 2021, trucks moved $59 billion of goods, making up about 70 percent of all transportation modes. Figure 43 shows the distribution of agriculture, food processing, and distribution businesses in Louisiana. Half of the companies are located within one mile of the LHFN, potentially enhancing the efficiency of goods transportation.

[20] https://www.ams.usda.gov/sites/default/files/media/Port%20Profiles%20Entire%20Pub.pdf

Figure 43: Agriculture, Food Processing, and Distribution Businesses and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

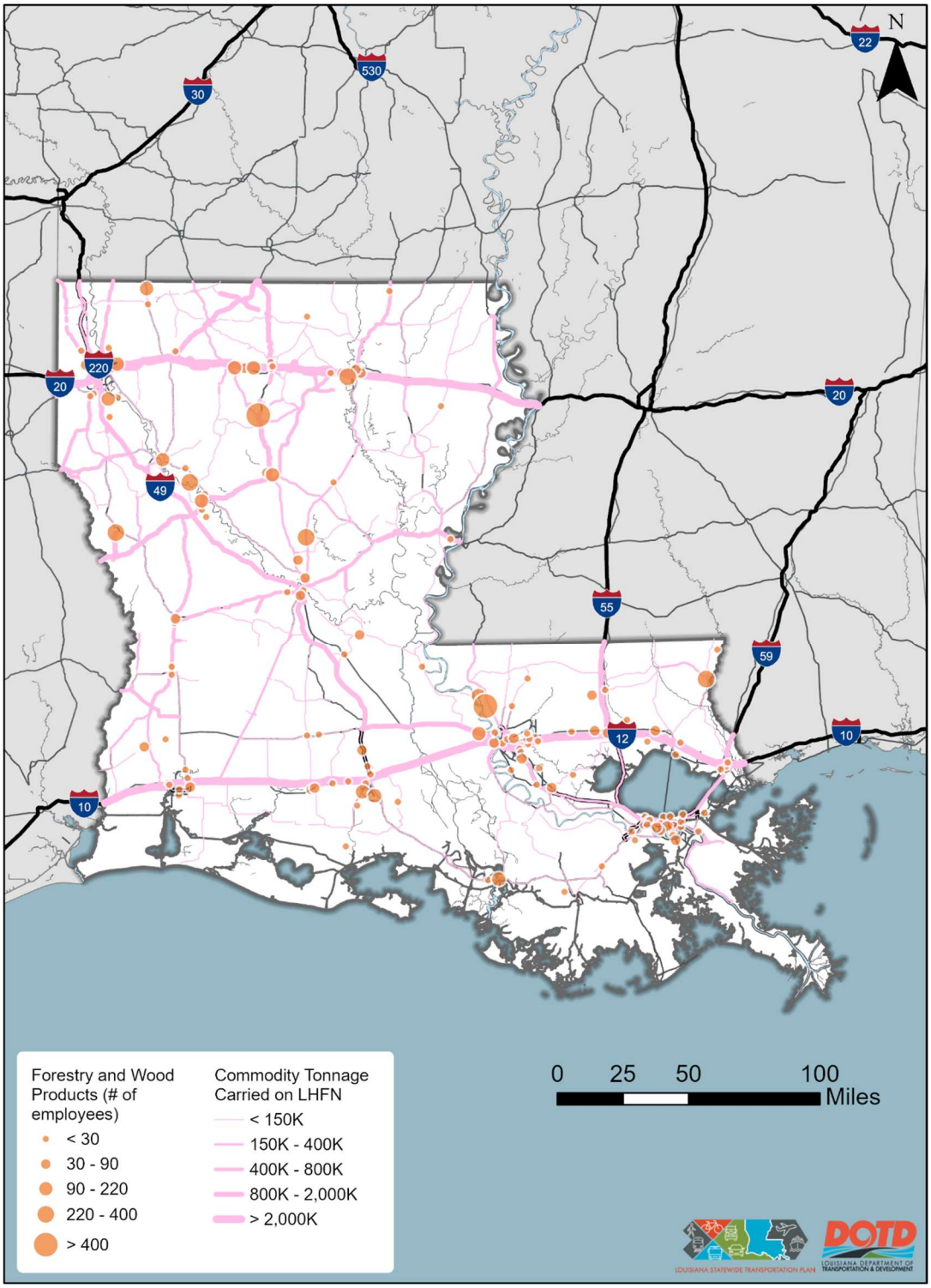
Forestry and Wood Products

The forestry and wood products supply chain revolves around producing and transporting various wood-based materials. These include raw materials like bark and primary forest resources as well as finished wood products, including furniture such as cabinets and containers. These commodities are indispensable to the construction sector, supporting house and infrastructure renovation and construction.

Within Louisiana, there are 225 businesses engaged in forestry and wood products, with over 28 percent specializing in millwork manufacturing. These businesses have contributed more than 9,500 jobs to the State's workforce, with leading employers including the sawmill manufacturing company Georgia-Pacific LLC and the boxes-paper manufacturer West Rock. While millwork manufacturing firms make up a sizable portion of this industry, most have fewer than 50 employees, and nearly all are locally operated enterprises. According to the SFP's commodity flow analysis, by value, more than $11 billion in forestry and wood products were imported to, exported from, or moved within the state.

Figure 44 highlights the spatial distribution of Louisiana Forestry and Wood Products businesses. The southern part of the state, especially areas adjacent to the coastal region, has a higher concentration of businesses, whereas the larger enterprises are predominantly in the northern part. The highway network is critical for goods movement within the forestry and wood products supply chain. It moved a substantial cargo of nearly 20 million tons worth $11 billion. This mode of transportation accounted for 99 percent of tonnage and value for all modes, underscoring the dominant and crucial role of highways in facilitating the movement of goods within this supply chain.

Figure 44: Forestry and Wood Products Businesses and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

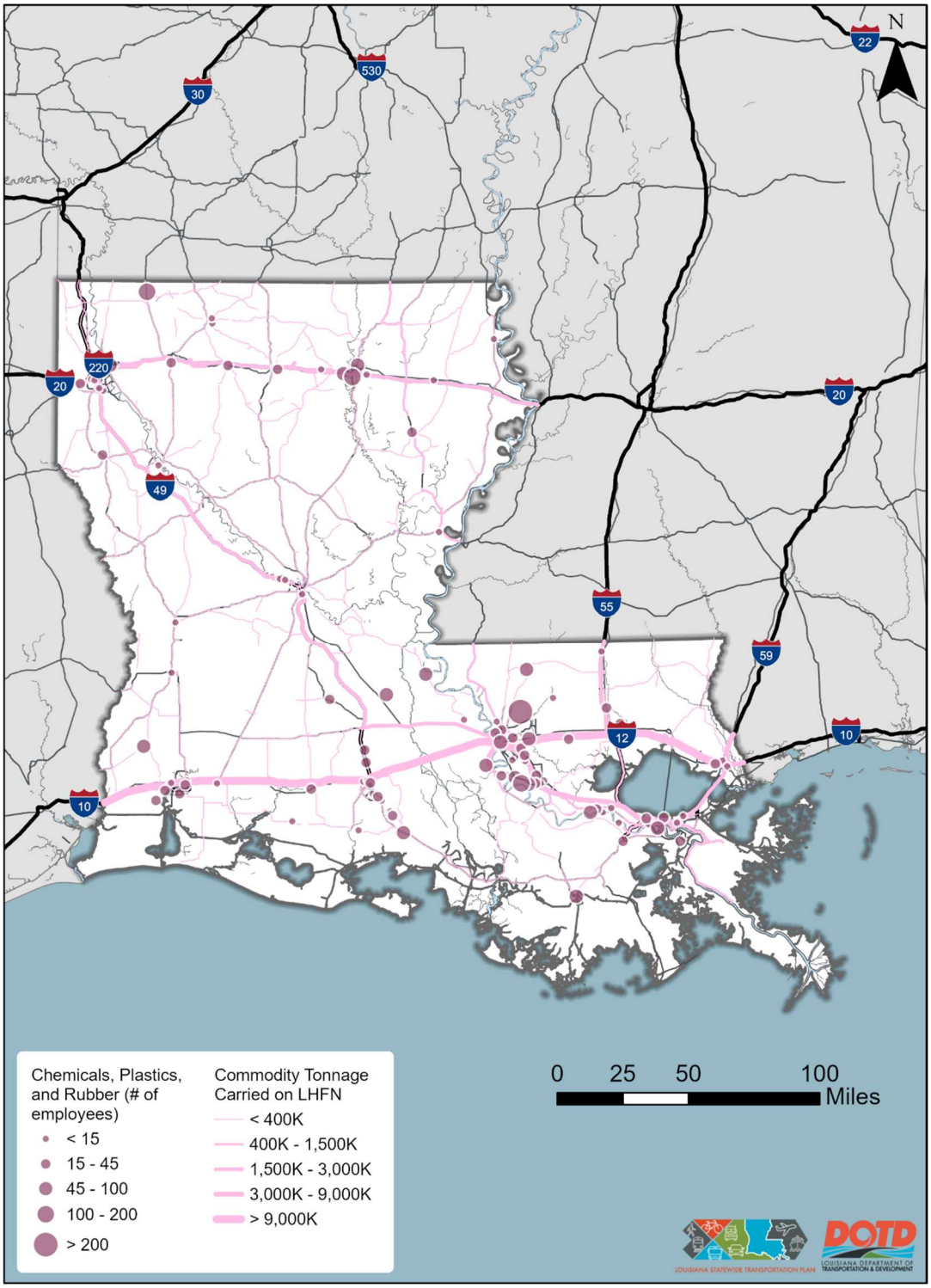
Chemicals, Plastics, and Rubber

Chemicals, plastics, and rubber commodities are essential in multiple industries. For instance, dyes and pigments play crucial roles in creative sectors; agricultural chemicals and fertilizers are essential for enhancing agricultural productivity; tires, inner tubes, and rubber are vital components in the automotive industry; and drugs are necessary in the medical field.

Louisiana's 130 chemical, plastic, and rubber businesses employ nearly 3,600 people. The leading employers are Trade Construction, a plastic fabricating company; Red Ball Oxygen, a gas supplier; and Continental Structural Plastics, a plastic model manufacturer. These three companies provide 25 percent of the total employment.

In 2021, Louisiana saw the movement of more than 83 million tons of chemicals, plastics, and rubber goods, with a total value of nearly $11 billion. Almost 50 percent of this supply chain's tons and 55 percent of its value were transported via the highway system. Figure 45 displays the distribution of chemicals, plastics, and rubber businesses. As depicted in the figure, the southeastern part of the state, including cities like Baton Rouge and New Iberia, has a relatively high concentration of businesses in this supply chain. Additionally, in the northern part of the state, Shreveport also has a significant clustering of businesses.

Figure 45: Chemicals, Plastics, and Rubber Businesses and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

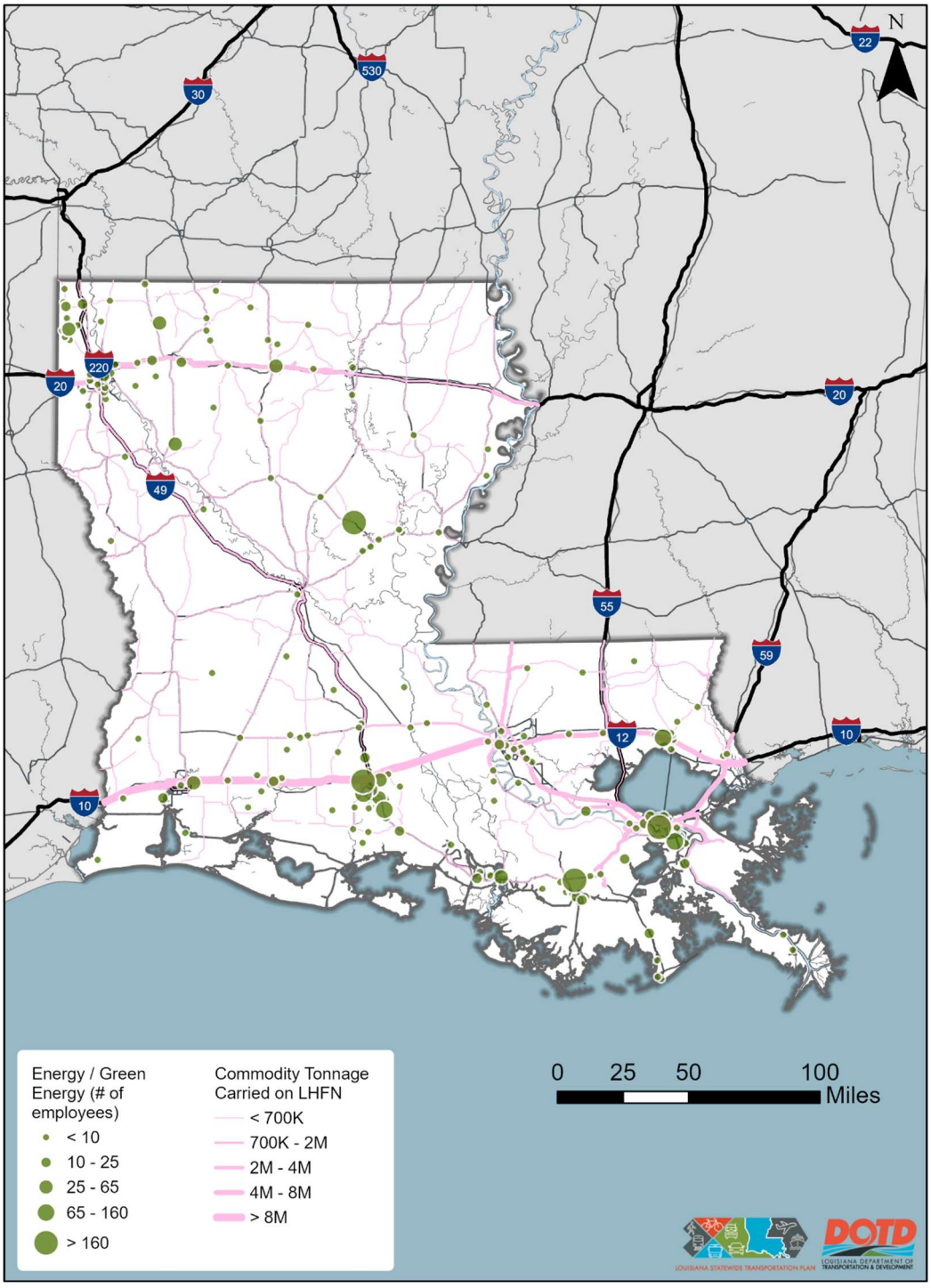
Energy and Green Energy

As one of the prominent energy-producing states in the United States, Louisiana relies on the multimodal freight system to transport energy and green energy-related commodities. The leading goods, including crude oil, coal, and petroleum, are distributed nationwide to meet energy demands. Different metallic ores are also a fundamental part of the green energy supply chain, making up essential materials for producing batteries and other inputs to electric vehicles and alternative fuel sources.

Louisiana hosts 351 energy-related businesses, collectively providing nearly 3,800 employment opportunities within the state. A substantial majority, over 85 percent, of these businesses are involved in oil and gas production. The leading companies in terms of local employment are the oilfield services company Schlumberger, the petroleum management and operating company Fluor Federal Petroleum Operations, and the privately owned oil producer Justiss Oil Company, Inc. Louisiana witnessed the movement of nearly 180 million tons of energy and green energy products with a value exceeding $117 billion. In 2021, approximately 66 million tons of energy products were transported on the highway network, totaling $38 billion.

Similar to the distribution of chemical, plastics, and rubber businesses, the central part of Louisiana has only a few energy and green energy businesses. As shown in Figure 46, most large companies are situated south of I-10 near the Gulf Coast, while the northeastern part of the state exhibits a higher concentration of small businesses. At the city level, Shreveport has the highest number of companies; however, the size of the businesses is relatively small, and none of these companies exceeds 20 employees. Lafayette has the second-highest number of energy and green energy businesses.

Figure 46: Energy and Green Energy Businesses and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

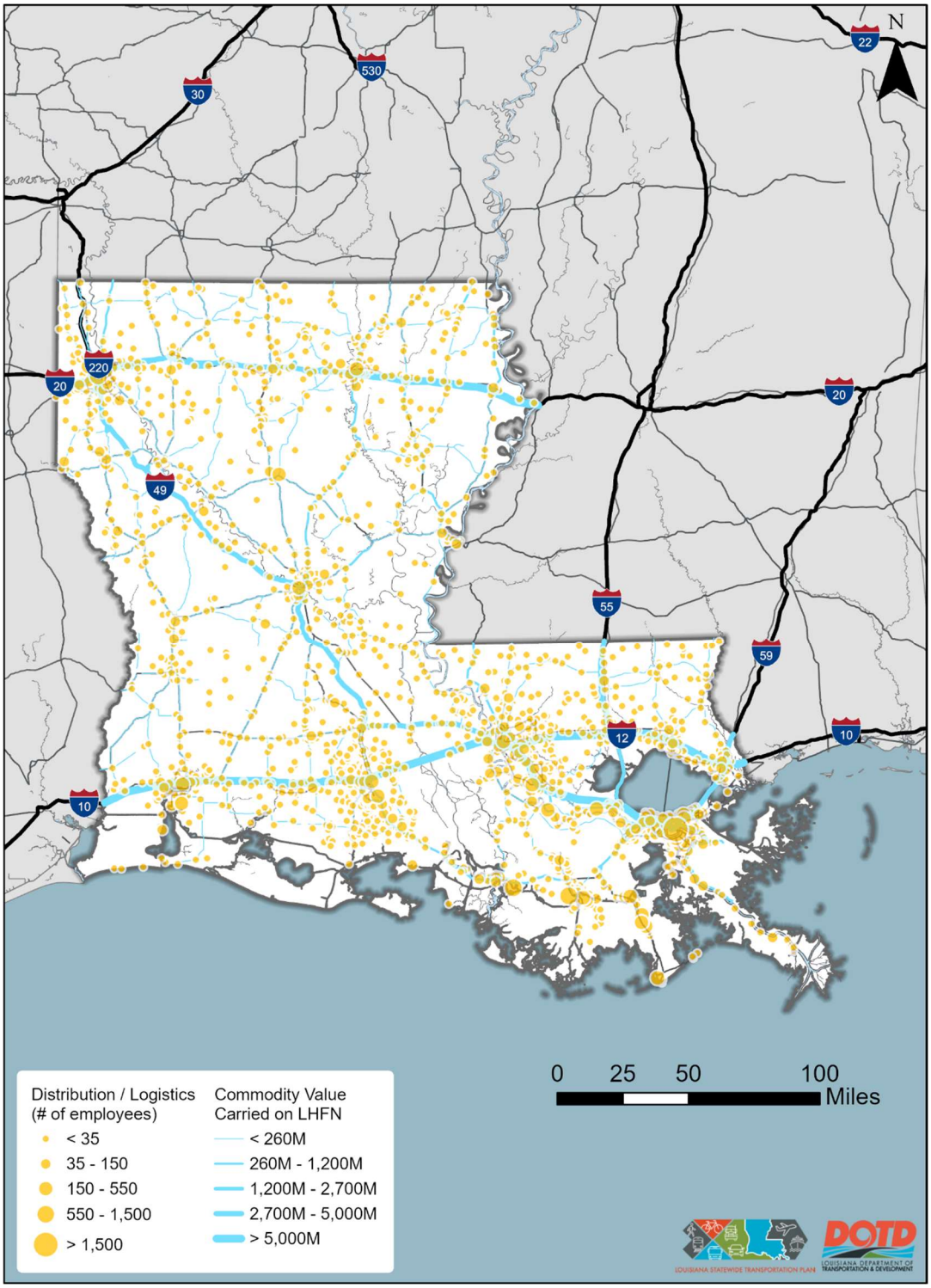
Distribution and Logistics

Distribution and logistics supply chains mainly focus on secondary traffic, which refers to transporting goods between warehouses and stores, not directly from manufacturers. The commodities tracked as part of this supply chain include those to and from warehouses, distribution centers, and intermodal drayage. Tracking this supply chain is critical for understanding the demand for consumer goods and e-commerce.

Louisiana hosts over 5,000 distribution and logistics businesses, contributing to the creation of more than 63,000 jobs. The leading business types in this sector include trucking, post offices, transportation, and wrecker services. The USPS in New Orleans, the water transportation services company Tidewater Marine LLC in Amelia, and the heavy hauling trucking company Highland Transportation are the leading companies with the most employees. Each of these businesses provides more than 1,000 job opportunities within the state, particularly the USPS in New Orleans, which has created 4,000 jobs. More than 24 million tons of distribution and logistics commodities were transported within, into, and out of Louisiana, generating a commodity value of nearly $41 billion in 2021. By definition, all of these commodities were transported via the roadway network in 2021.

Figure 47 shows the locations and number of employees for each distribution and logistics business in Louisiana. These businesses are widely distributed across the state, with more than 70 percent located within five miles of the critical freight corridors.

Figure 47: Distribution and Logistics Businesses and Commodities on Louisiana Highways



Source: S&P Global Transearch (2021); Claritas (2023); analysis by Cambridge Systematics

Figure 48: Truck Parking

The Future of Freight in Louisiana

The previous section examined current freight transportation demand and performance in Louisiana. For the state to maintain a competitive advantage in freight-intensive industries, it must understand future demand for the multimodal freight network.

Chapter 4 provides an overview of the forecast for future freight movements, providing insights into how freight transportation will continue to support the State's economy. **Chapter 5** expands on the forecasts by examining the global trends that will impact Louisiana's future freight system.

Chapter 4: Future Freight Transportation Demand in Louisiana

Assessing Louisiana's freight system's needs requires understanding future freight demand and the factors that shape the current environment. This chapter presents existing and projected future freight demand for Louisiana. It also provides insight into modal dependence, route choice, equipment, and service needs of the State's businesses. This forecast provides a "baseline" against which future demand for goods movement can be considered and thus reflects current macroeconomic trends and the trends in logistics, distribution, and sourcing within the freight-generating economic sectors.

The following sections provide the top ten high-level key takeaways (in no particular order) from a much larger and more detailed commodity flow analysis. The results of the larger analysis are available in the Commodity Flow Technical Memorandum.

The primary sources for this analysis were as follows:

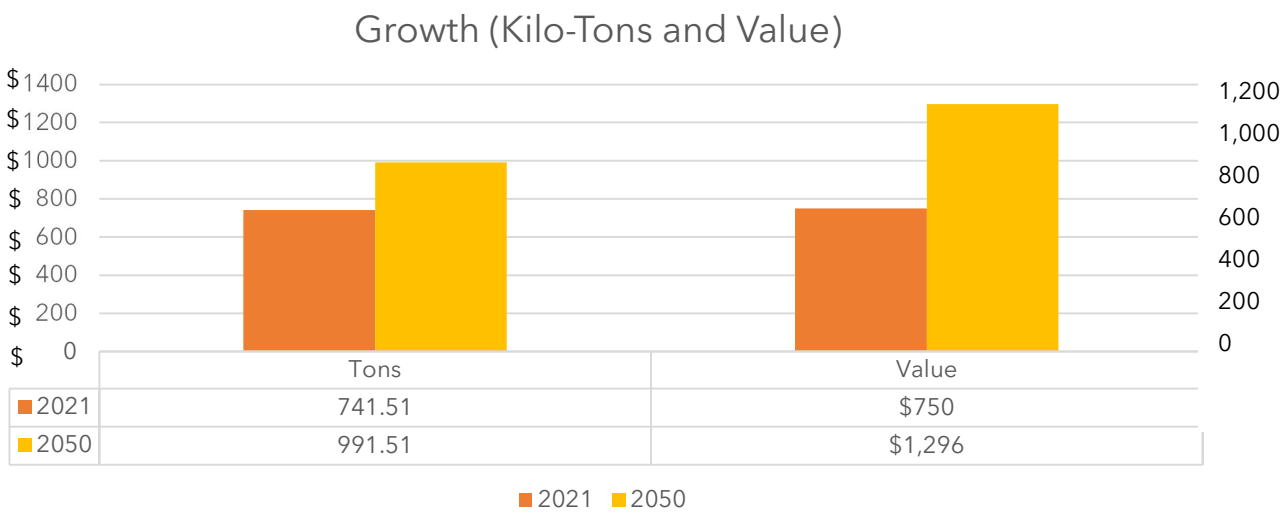
2021-2050 TRANSEARCH: Updated annually, S&P Global's Transearch reports freight movements on a county-to-county basis in the US and trade with Canada and Mexico. Reflecting a carrier perspective, key attributes include market-to-market flow data, commodity type classified using the 4-digit level Standard Transportation Commodity Code (STCC), transportation mode, equipment type, and volume reported in units, tons, and value. Also included with Transearch is a forecast of freight volumes through 2050 based on S&P's macroeconomic forecast.

2021 CARLOAD WAYBILL SAMPLE FOR LOUISIANA: The Association of American Railroads collects a stratified sample of carload waybills annually for the Surface Transportation Board from railroads that terminated at least 4,500 carloads each year for each of the previous three years, or that move five percent or more of any State's total rail traffic. DOTD's consultant utilized the confidential version of the Waybill Sample, which includes detailed shipment data, including origin county, destination county, 7-digit level STCC commodity type, equipment type, and tonnage. This data formed the basis for the base year (2021) freight rail traffic.

4.1 Overall Freight Flows

By 2050, the freight value moved in Louisiana will grow much faster than its tonnage – 73 percent versus 34 percent (Figure 49). Driving these changes, value is projected to grow faster than tonnage driven by advanced manufacturing (machinery, electrical equipment, and instruments/photo equipment/optical equipment in particular).

Figure 49: Future Freight Growth in Louisiana



4.2 Directional Flows

When looking at commodity flows across all modes, outbound and through trade will grow faster than intrastate and inbound flows (Figure 50 and Figure 51). This makes sense due to Louisiana's role as a global trade center for the southern and midwestern US and a key transportation gateway between the U.S. southeast and southwest.

Figure 50: Directional Flows (by Value)

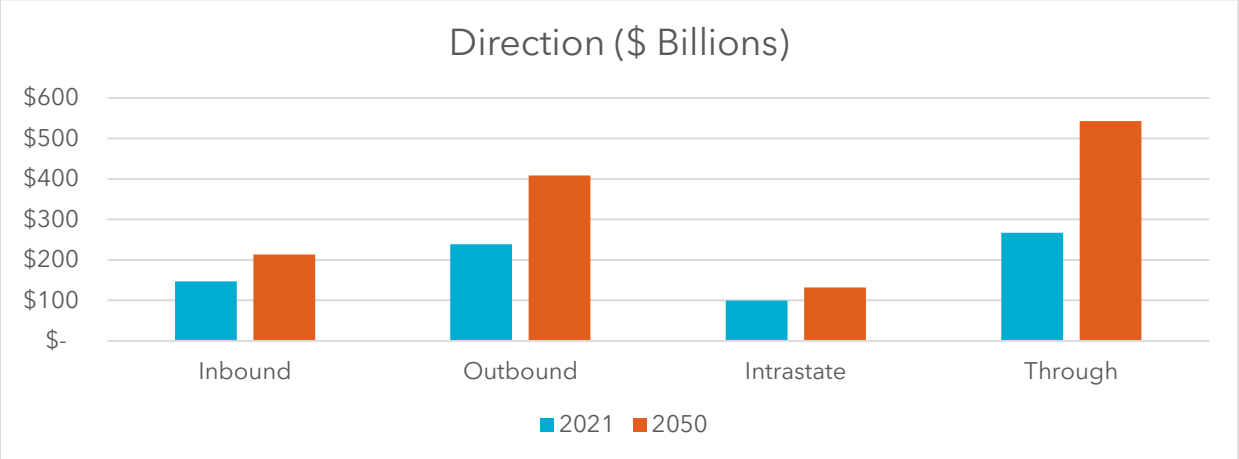
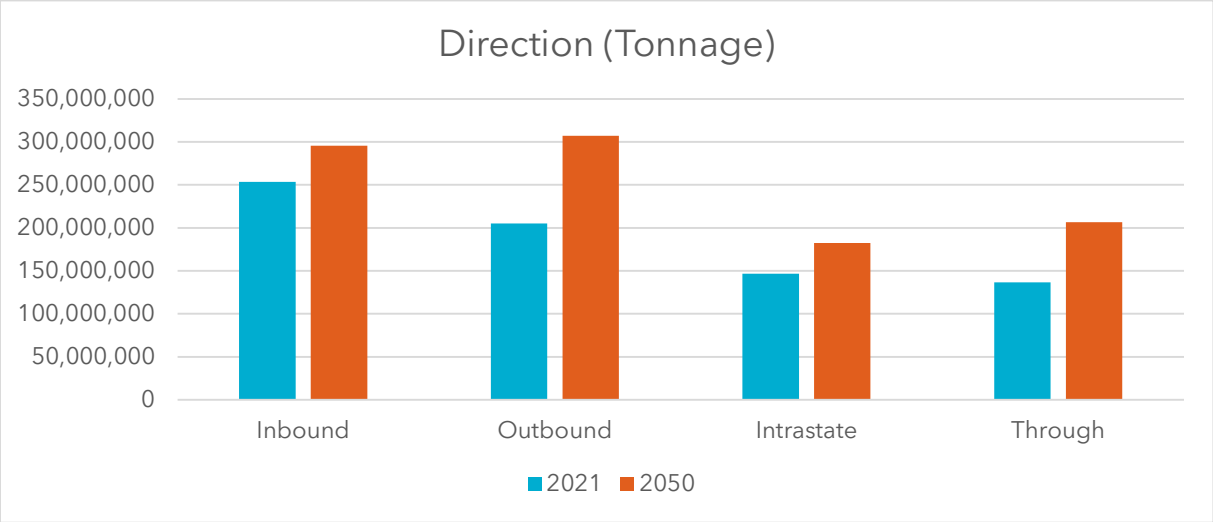


Figure 51: Directional Flows (by tonnage)



4.3 Drivers of Growth

The S&P forecast suggests that there will be a big decrease in the shipments of coal and petroleum products. However, a significant amount of that loss is offset by gains in advanced manufacturing and the chemical industry. The production of chemicals, which has historically led manufacturing growth in Louisiana since the 1980s, is anticipated to maintain this role on a tonnage as well as value basis into the foreseeable future, with volume increasing by 188 million tons through 2050 (Figure 52).

Figure 52: Future Economic Drivers

Advanced Manufacturing

- ↑ 24 million tons, $263 billion

Chemical/allied products

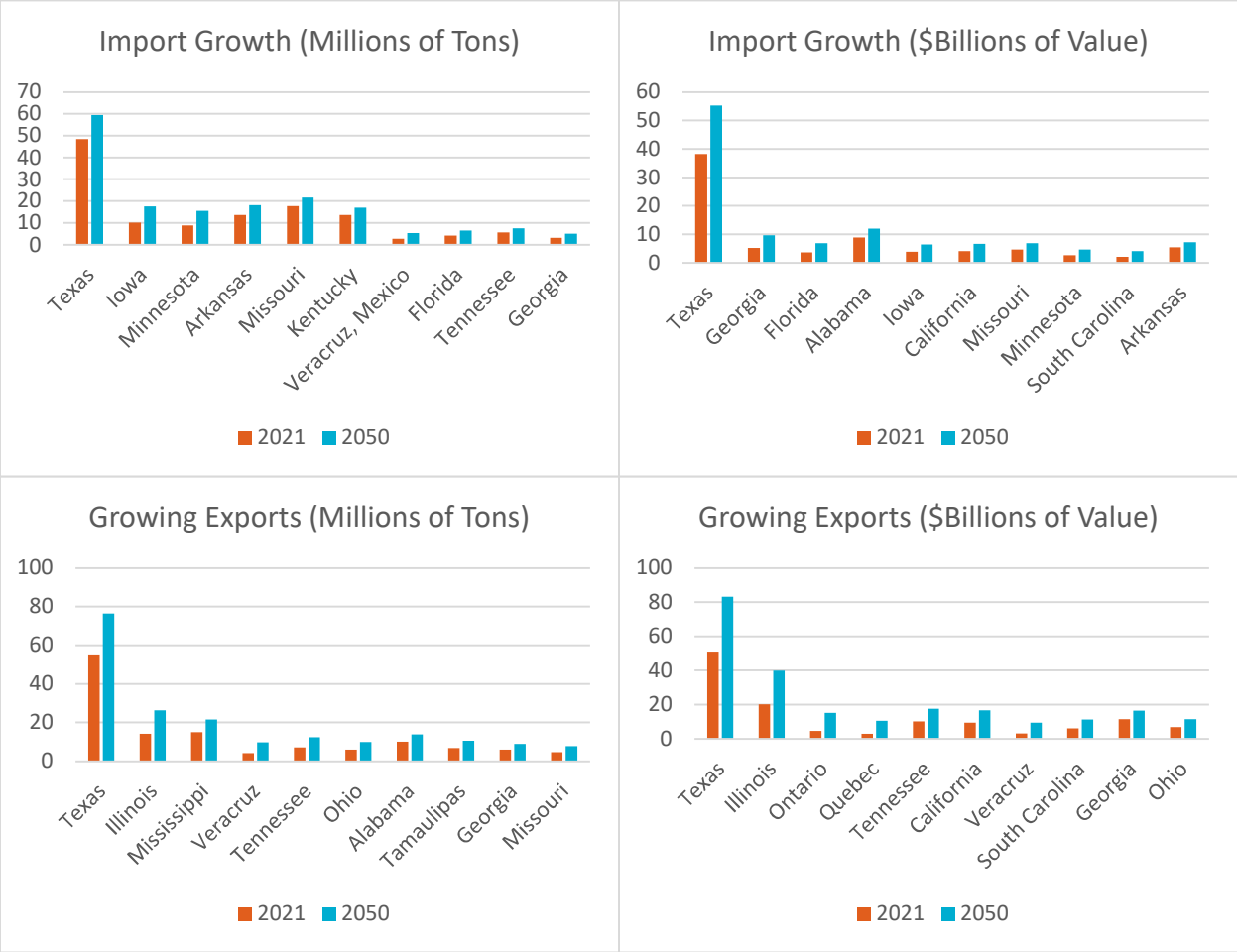
- ↑ 97 million tons, $147 billion

4.4 Imports and Exports

The State's largest trading partners are its neighbors. In particular, Texas is Louisiana's largest trading partner - for both inbound and outbound freight. The size of Texas' economy, proximity, and close association with key industries, particularly energy production and chemicals, make this a logical connection both in terms of tonnage and value (Figure 53).

In addition, Louisiana serves as an important transportation hub for upper midwestern states (Iowa, Missouri, Minnesota, Illinois). The role of inland waterway flows through Louisiana cannot be understated, as it acts as a key hub for transporting non-perishable agricultural products such as soybeans and grain to international trading partners.

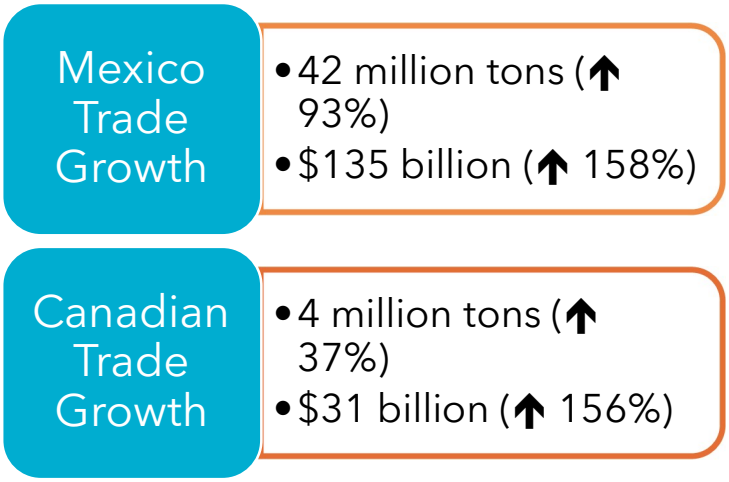
Figure 53: Louisiana Imports and Exports



4.5 United States-Mexico-Canada Trade Agreement (USMCA) Activities

Some large flows between Mexico and Louisiana are grain shipments and petroleum refining products to Veracruz and Tamaulipas, Mexico. These are transported by water. These flows are likely with the Port of Veracruz and Port of Altamira. As Figure 54 shows that oil commodities to Mexico are expected to grow between 2021 and 2050, contrasting the stateside trend.

Figure 54: USMCA Trade Growth



A significant forecasted increase in trade with Canada (in terms of value) in "Freight All Kinds" shipped, especially by air cargo. Canada is also an important trading partner for crude petroleum or natural gas by carload rail.

4.6 Mode Split

Carload rail is forecasted to grow faster than water, and truck is predicted to decrease in mode share as well (Figure 55). The growth in carload rail (relative to trucking) results from larger trends that are not specific to Louisiana. For the most part, Louisiana's trucking market is very diverse. However, it is important to note that the energy industry supports a significant part of that market (Figure 56). Coal shipments are expected to drop significantly on the rail side, but carload shipments are forecasted to make up more than the difference.

While carload rail is forecasted to grow faster than waterway freight, it is important to note that this does not mean waterway freight will not continue to be a dominant player (Figure 57). Some commodities that are forecasted to grow rapidly and may replace coal shipments include chemical or allied products (forecasted to grow 79 percent from 40 million tons to 72 million tons), food or kindred products (forecasted to grow 68 percent from 11 million tons to 18 million tons), and machinery (forecasted to grow by 252 percent from 400k tons to 1.4 million tons).

Figure 55: Louisiana Mode Split

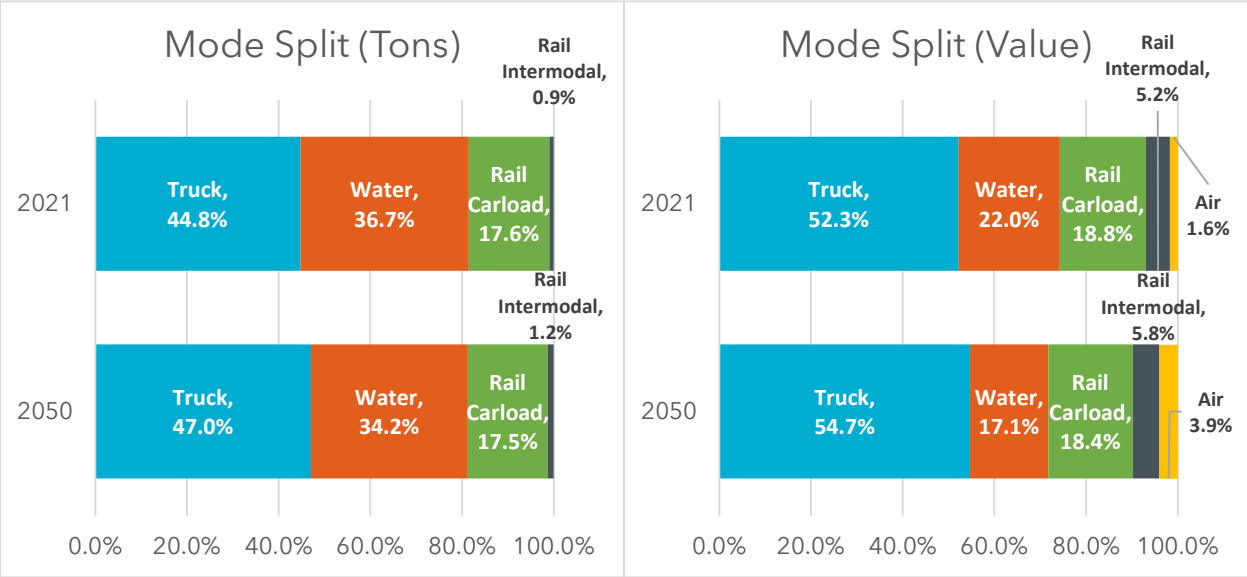


Figure 56: Trucking Commodity Types

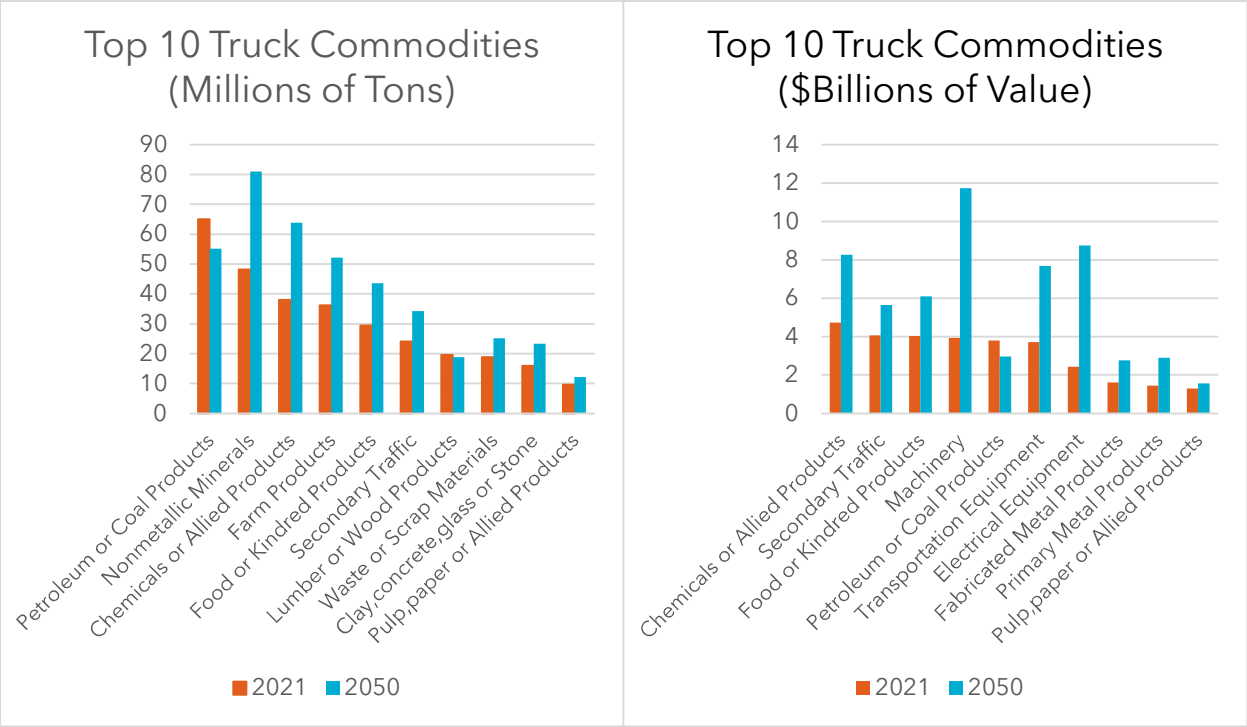
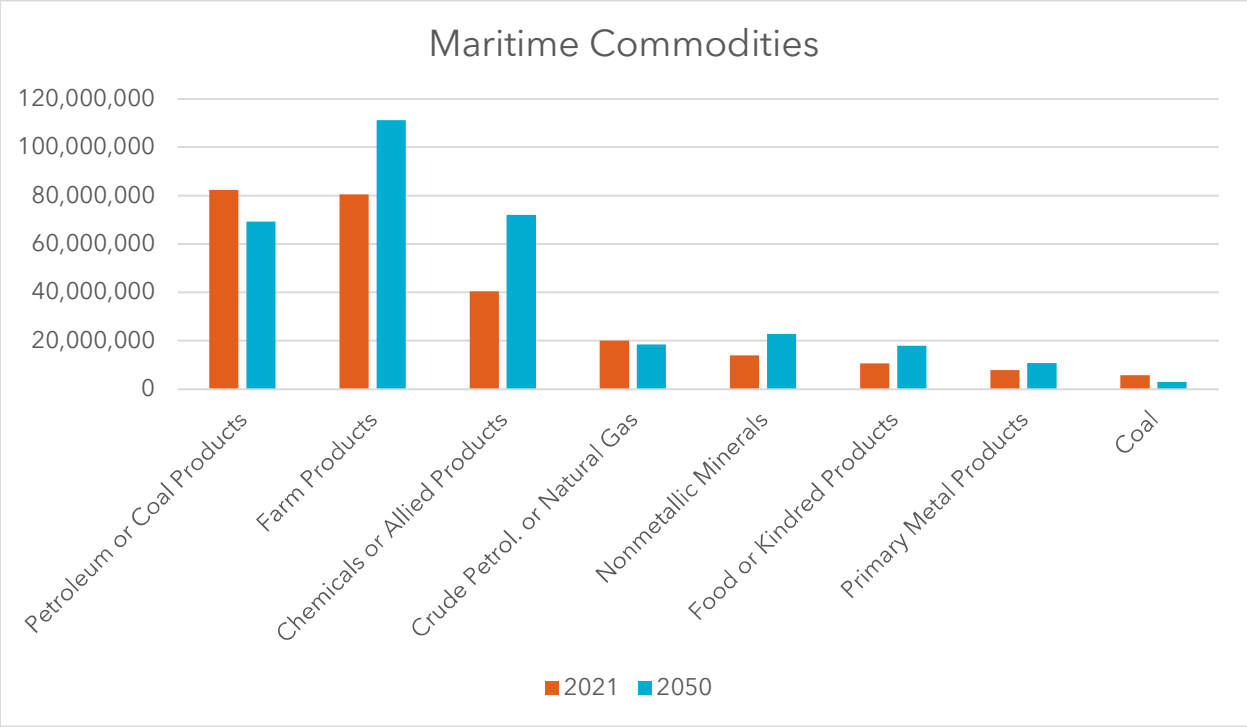


Figure 57: Maritime Commodity Forecasts (by tonnage)



Chapter 5: Future Trends

Several current and emerging trends (e.g., emerging freight modes, recent technologies, and energy production and use changes) may impact future demand for freight transportation and how freight vehicles operate on Louisiana's multimodal freight network. Understanding these trends is critical to developing strategies for Louisiana's future.

5.1 Protecting Wildlife

The Louisiana Department of Transportation and Development (DOTD) has a long history of protecting wildlife and building multi-agency coalitions to overcome significant wildlife issues. Most notably, the Louisiana black bear was removed from protection under the Endangered Species Act in part due to efforts undertaken by DOTD and their federal partners at the US Fish and Wildlife Service (USFWS).

Figure 58: USFWS and DOTD installed bear crossing signs along US 90 (future I-49) from Calumet to Berwick, LA (Source: FHWA)

Source: FHWA

Working together, the partnership focused on minimizing transportation's impact on the Louisiana black bear's habitat. Notable examples of projects, including bear crossings (Figure 58), are given below.

POINTE COUPEE PARISH: DOTD used global positioning systems to document the location of large cypress trees to determine highway alignments that minimize the impact on trees that could serve as dens.

JOHN JAMES AUDUBON BRIDGE: While designing/constructing the second longest cable-stayed bridge in the Western Hemisphere, DOTD included ten culvert underpasses and nearly 18,000 feet of elevated roadway to cross wetlands, provide hydraulic passage, conserve habitat for the Louisiana black bear, and meet its mobility requirements. Working with their federal partners at USFWS, DOTD actively managed the bridge's construction to ensure its impact on bears was limited.

INTERSTATE 49 EXTENSION (NEW ORLEANS TO LAFAYETTE): As the state upgraded an existing US Highway to Interstate standards, DOTD integrated bear culverts and underpasses to ensure the bears had access to their natural habitat near the Atchafalaya River[21]

Today, DOTD's commitment to protecting wildlife has never been stronger. During the development of any major project, DOTD evaluates its impacts on both the natural and human environment. As mentioned above, wildlife crossings have successfully protected wildlife and

[21] https://highways.dot.gov/public-roads/julyaugust-2003/solutions-sunbelt

habitat in Louisiana. As various projects have gone through the NEPA process, these crossings have been added as an enhancement feature or as a result of a permit condition.

5.2 Climate Change and Resiliency

The 2022 Louisiana Climate Action Plan highlights that "Louisiana is among the most vulnerable states in the United States to the impact of climate change. The impacts to people in Louisiana today include direct physical, mental, and financial tolls from extreme weather and indirect impacts to social systems and infrastructure struggling to cope with the increasing prevalence and severity of natural disasters."

Louisiana Climate Action Plan Vision:

Reduce GHG emissions to limit the impacts of climate change that harm the state's natural and cultural heritage while adapting to maintain Louisiana's position as a world leader in energy, industry, agriculture, and transportation.

-Executive Order JBE 2020-18

Warmer temperatures will bring increased and more intense tropical storms, flooding, and droughts. Flooding, droughts, and low water levels on navigable waterways can shut down barge traffic. Severe weather can impact and wash out highway and railroad facilities. Addressing the root cause of climate change presents an opportunity for Louisiana to build on existing strengths and maintain competitiveness. Since transportation accounts for 19 percent of Louisiana's CO_2 emissions from fossil fuel combustion (the most significant contributor to overall CO_2 emissions in Louisiana is Industry), State and national trends toward reducing greenhouse gas emissions (GHG) will impact the State's freight system.

The Louisiana Climate Action Plan identifies several strategies that are relevant to the SFP, including:

- Expand the availability and reduce socio-economic and geographic barriers to low- and zero-emission passenger vehicles and supporting infrastructure
- Prepare for the expanded availability of alternative fuels for waterborne transport, medium and heavy-duty vehicles, and aviation
- Implement targeted pilot projects to accelerate the transition of medium- and heavy-duty vehicles to low- and zero-emission vehicles
- Promote opportunities to reduce vehicle miles traveled
- Explore short-term opportunities and incentives to increase efficiency of freight transport
- Create a statewide authority to provide guidance for resilient local land-use practices
- Evaluate the climate impacts of major state-funded transportation projects

Collaboration across states will be critical for addressing the challenges of climate change and supply chain disruptions. Outside of direct climate change impacts and freight network disruptions to Louisiana, indirect effects and disruptions are also important considerations.

Freight does not stop at political boundaries; freight movement in Louisiana can be impacted by climate change and freight network disruptions in other areas of the nation. Multi-state coalitions such as the Institute for Trade and Transportation Studies (ITTS), a coalition of southeastern state DOTs (of which Louisiana is a member), are an important avenue for tackling climate change and resiliency issues that cross state lines.

Funding will also be essential to addressing the challenges of climate change and supply chain disruptions.

- In 2022, the Inflation Reduction Act established several programs to increase resiliency. Specifically, the Neighborhood Access and Equity Grant Program supports resiliency-related transportation projects and plans to protect against flooding, extreme heat, and more.
- The Infrastructure Investment and Jobs (IIJA) Act of November 2021 authorized multiple new formula and discretionary transportation funding programs, including the Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Program.
- The PROTECT Program provides formula and discretionary funds via a competitive grant program. It funds projects that address the climate crisis by improving the resilience of the surface transportation system, including highways, public transportation, ports, and intercity passenger rail.

The following subsections address the potential impacts of climate change on elements of Louisiana's freight network.

Bridges

Louisiana has over 12,000 bridges. As such, unplanned bridge closures or restrictions can significantly inhibit freight mobility. This is especially true in rural areas where a single bridge could provide critical access to a major freight facility or generator. The forestry industry highlighted this issue as a major concern.

Figure 59: Bayou Ramous Bridge Strike

Source: NTSB

Bridge limitations particularly impact oversized and overweight trucks. One stakeholder highlighted that their overweight shipments are forced to use the Bayou Ramous Bridge (LA 182), which is temporarily restricted to one lane after a barge strike (Figure 59). While US 90 would be an alternative for most trucks, it is restricted for oversized and overweight loads because it is on the National Truck Network.

Movable Bridges

Inland towboat and barge traffic along the Gulf Intracoastal Waterway (GIWW) was severely impacted recently by the mechanical failure of two pontoon bridges east of the Calcasieu Lock, specifically the Black Bayou Bridge and the Grand Lake Bridge. The Black Bayou and the Grand Lake bridges are within 7 miles of each other, and their recent, simultaneous unplanned closures required DOTD to conduct alternating, forced manual openings to accommodate the needs of the local communities to maintain mobility for emergencies, as well as commuter access, while concurrently balancing the needs of the maritime supply chain. Repairs to the bridges were delayed due to their age and lack of off-the-shelf replacement parts – which required a machine shop to custom fabricate components.

Disruption of inland barge transportation isolates the nation's petrochemical epicenters in western Louisiana and Texas from the Mississippi River system. In this case, the crude oil needed to supply a major Louisiana refinery was delayed, leaving the facility on the verge of shutting down due to a lack of feedstock.

Figure 60: St. Claude Moveable Bridge

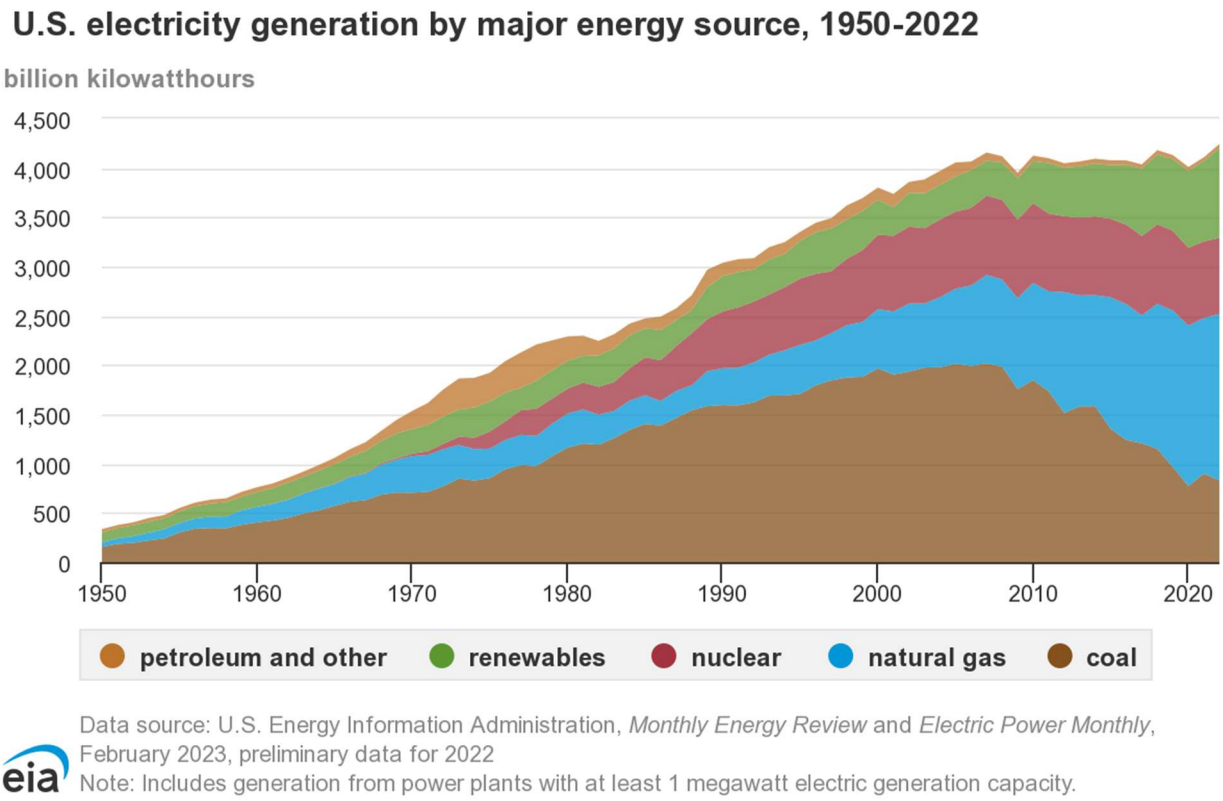
Source: Cambridge Systematics

According to stakeholders, this situation could have been much worse had it occurred a few months later during Hurricane Ida. A considerable number of inland towing vessels may not have been able to make it to a safe haven, greatly increasing the risk of death and injury to the crews on board as well as the likelihood of an environmental release involving hazardous materials, placing local communities and the environment at greater risk. The local communities served by these bridges and the marine industry share a common concern regarding the resiliency of these bridges to facilitate effective maritime and shoreside storm evacuation on demand when needed. Maritime stakeholders also expressed concerns about the availability of bridge operators during the recovery phase from past tropical storm events. An example of this type of bridge is featured in Figure 60.

Energy

The US has experienced a substantial increase in energy produced from renewable sources (Figure 61). Since about 1988, the total share of coal-generated electricity has steadily declined. Renewable energy sources have grown from about 9 to 21 percent of electricity produced since 1988. The US is the second largest producer of renewable energy in the world.

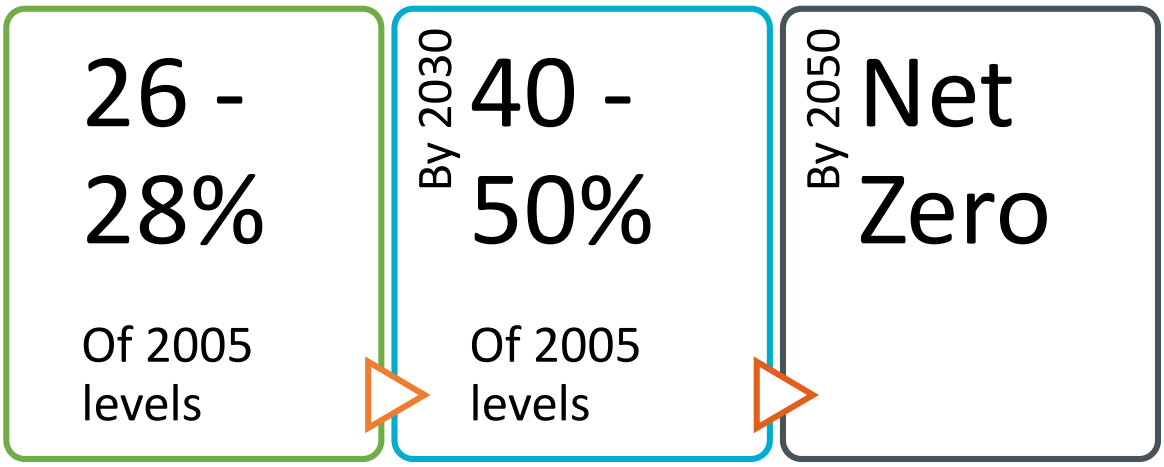
Figure 61: US Electricity Generation by Source



Source: U.S. Energy Information Administration, Monthly Energy Review (2023)

Transportation is a significant contributor to GHG emissions. How the industry meets GHG emissions reduction goals must be considered in long-range freight transportation planning. For example, using alternative fuels for freight vehicles may require fueling them at different locations and frequencies than today. As outlined in the 2022 Louisiana Climate Action Plan, the State has set a goal to have net zero GHG emissions by 2050 (Figure 62).

Figure 62: Louisiana's GHG Emissions Reduction Goals



Source: Climate Initiatives Task Force, Louisiana Climate Action Plan (February 2022)

To achieve that goal, climate actions and strategies centered on transportation are essential to the State's overall plan of action. The 2022 Louisiana Climate Action Plan outlined five strategies and 23 actions that focus on changes to transportation and the built environment to help Louisiana achieve its GHG emissions reduction goals. One defined strategy that is particularly relevant for freight is to "accelerate adoption and accessibility of low- and zero-emission vehicles and fuels." Furthermore, two action items under this strategy are for the State to (1) prepare for the expanded availability of alternative fuels for waterborne transport, medium- and heavy-duty vehicles, and aviation; (2) implement targeted pilot projects to accelerate the transition of medium- and heavy-duty vehicles to low- and zero-emission vehicles. Freight plays a central role in both of these action items as the research and development of pilot projects for low- and zero-emission freight vehicles (e.g., electricity, hydrogen) were explicitly called for in the plan.

Offshore Wind

Louisiana has been, and plans to continue being, a key driver in energy produced from renewable sources. The State aims to make 5GW of offshore wind a reality by 2035, with multiple initiatives starting at Louisiana State University, the University of New Orleans, and within the private sector to establish offshore wind energy hubs.[22,23] This will create thousands of new jobs and uses for existing freight facilities – especially ports. Outside of being an ideal location for wind, there is less opposition to wind turbines in Louisiana, as the nearshore is already occupied by oil and gas installations.[24]

[22] https://gov.louisiana.gov/index.cfm/newsroom/detail/4300
[23] https://www.uno.edu/news/2022-08-08/uno-launches-louisiana-wind-energy-hub-uno
[24] https://www.reuters.com/business/energy/louisiana-poised-spearhead-offshore-wind-gulf-mexico-2023-07-26/

5.3 Supply Chain Disruptions

Supply chain disruptions are external incidents that interfere with a supply chain's operations. Causes include severe weather, natural events, pandemics, cyber-attacks, labor issues, and global conflict. As companies look to reduce risk, several long-term changes are underway, including nearshoring supply chains – reducing the distance between key supply chain nodes – and increased carrying inventory. While many disruptions are beyond DOTD's span of control, investments in transportation system resiliency, emergency response, and reliability can help mitigate business risk.

5.4 Nearsourcing

In response to increasing global uncertainty, companies are beginning to reshore and shift their supply chains to reduce their risk exposure and maintain a consistent level of service to their customers. AT Kearny (a global management consulting firm) developed an index to track the manufacturing shift back to the US from low-cost countries (LCC) in Asia.[25] A Louisiana example is the nearshoring of some of John Deere's manufacturing operations in 2022.[26]

Before the COVID-19 pandemic, the index reported that manufacturers were increasing their reliance on LLCs. However, corporate attitudes and strategies have changed. In their 2021 report, 78 percent of the executives answered "maybe" or "yes" when asked about reshoring, and in the 2022 report, 92 percent responded maybe or yes. Most notably, 79 percent of executives (with Chinese manufacturing operations) have moved some of their operations back to the US or plan to do so in the next three years.

AT Kearney has identified five factors driving the move to reshore manufacturing: delivery lead times, logistics costs, quality of goods, labor cost/availability, and reduced carbon footprint. In addition, CEOs noted they had been pushed by employees, board members, industry organizations, friends, and economic development officials to reshore their operations.

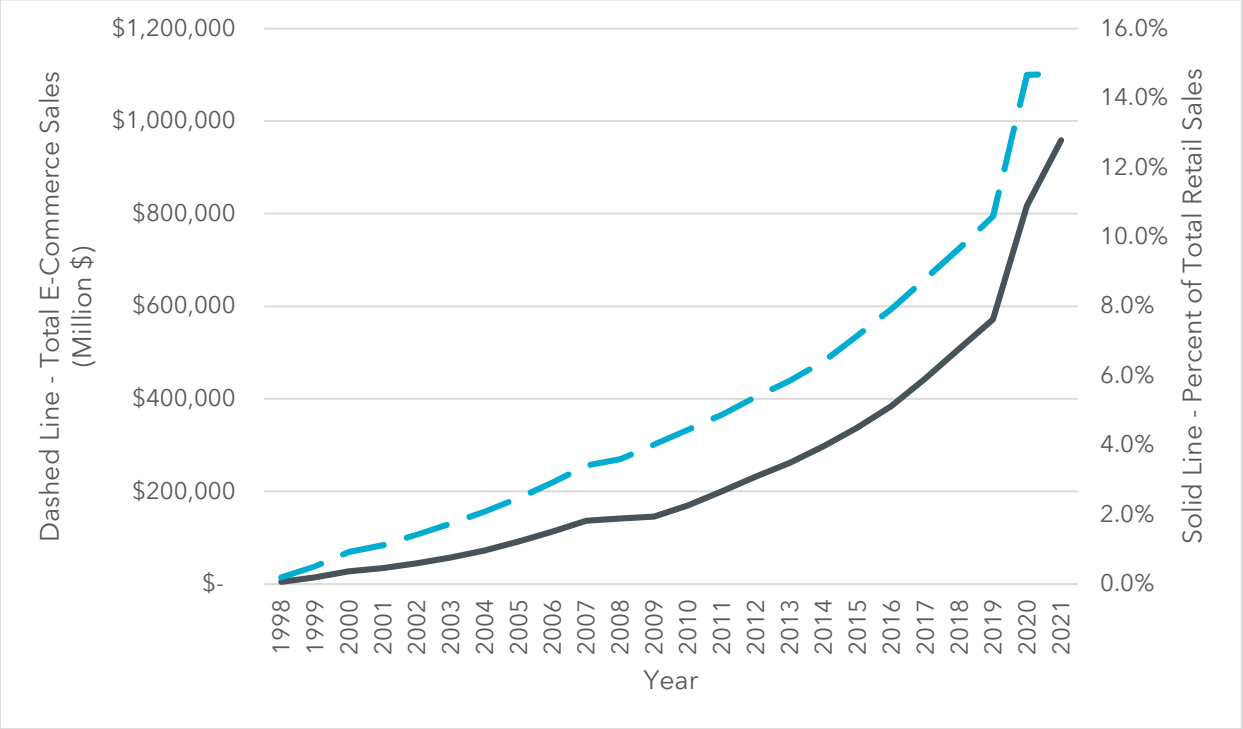
E-Commerce

E-commerce is a business-to-consumer (B2C) and business-to-business (B2B) sales strategy that leverages digital platforms instead of brick-and-mortar marketplaces. E-commerce increased from about 0.2 percent of total retail activity in 1998 to approximately 14.7 percent of total retail sales, over $958 billion, in 2021 (Figure 63).[27] The recent growth in e-commerce demand was accelerated over the short term by the COVID-19 pandemic, evident in the US Census Bureau's e-commerce sales data. Shelter-in-place orders in the US began late in the first quarter of 2020, with California issuing the first order in the US on March 19, 2020.[28] There was

[25] This survey was focused on reshoring from China, not global reshoring. This is an example to highlight the growing interest in reshoring and its potential.
[26] Industry Week, Schneider, Deere Investing $76M in Reshoring Projects https://www.industryweek.com/leadership/companies-executives/article/21252741/schneider-deere-investing-76m-in-reshoring-projects
[27] US Census Bureau, "Estimated Annual US Retail Trade Sales – Total and E-Commerce: 1998-2021," Annual Retail Trade Survey: 2021.
[28] Executive Department, State of California, Executive Order N-33-20, https://www.gov.ca.gov/wp-content/uploads/2020/03/3.19.20-attested-EO-N-33-20-COVID-19-HEALTH-ORDER.pdf.

a sharp increase in e-commerce retail sales as a percentage of total retail sales in 2020, increasing from approximately $571.7 billion in 2019 (about 10.6 percent of total retail sales) to over $817 billion in 2020 (about 14.7 percent of total retail sales). E-commerce sales continued to rise through 2021, but their share of total retail sales remained constant at 14.7 percent.

Figure 63: Annual US E-Commerce Retail Trade Sales, 1998-2021



Source: U.S. Census Bureau, Annual Retail Trade Survey

Increased e-commerce activity has the potential to increase truck volumes on Louisiana highways. More significant truck volumes can have a corresponding effect on safety and can result in wear and tear to the State's roads and bridges. Louisiana's metropolitan regions are centers of e-commerce demand and may be impacted by retailers' and shippers' desire for distribution facilities. As a result, there will be increased competition for land between e-commerce, residential, commercial, and legacy industrial land uses in these areas.

5.5 Technology

The intersection of technology innovation and transportation continues to influence freight movement. Technology advancements can address freight transportation needs and issues, support future growth in freight volume and flow, improve freight mobility across all modes in terms of safety, efficiency, and reliability, and foster increased economic growth through reduced transportation costs and enhanced productivity.

Autonomous/Connected Vehicles

Automated Vehicles (AVs) are designed to operate with minimal or no human intervention, using advanced technologies such as sensors, cameras, and artificial intelligence to navigate the roadways. Avs hold the promise of delivering significant positive impacts across various areas of the transportation system:

- Safety. AVs have the potential to significantly reduce traffic accidents and fatalities by reducing human error, which is a leading cause of crashes.
- Efficiency. AVs and traffic infrastructure can communicate with each other, leading to more efficient traffic flow. They can maintain consistent speeds and follow optimal routes, reducing stop-and-go traffic and congestion.
- Accessibility. AVs can provide mobility solutions for seniors and people with disabilities and expand transportation options for underrepresented communities.
- Environmental Sustainability. The efficient operation of AVs can reduce fuel consumption and emissions, contributing to environmental sustainability goals and reduced carbon footprints.

Louisiana has adopted legislation and formulated policies and guidelines to enable controlled testing and operations of AVs within the state. These regulations address the operation criteria, accident reporting guidelines, and considerations for remote drivers and teleoperation systems in autonomous commercial motor vehicles. Additionally, these guidelines outline specific exceptions for low-speed autonomous vehicles and establish clear rules for platoon operations within the state. As a result, Gatik, a Silicon Valley-based company, is already using automated box trucks to deliver Walmart's goods within the City of New Orleans.

As AV technology evolves, Louisiana must adapt and refine its legislation and policies and maintain high-quality road infrastructure to guarantee AVs' safe and efficient operation on its roads.

Connected vehicle (CV) technology utilizes short-range communications (commonly referred to as V2X or vehicle-to-everything) to sense what other travelers are doing and to identify potential hazards. Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) allow vehicles to know each other's location. An increasing number of trucks use connected and autonomous technologies, including sensors, communications, and/or processing software for steering and braking assistance. Due to ongoing industry challenges to attract new drivers and the continued need to improve safety, the benefits of greater vehicle automation to the trucking industry are substantial. The Society of Automotive Engineers' automation levels classification scheme is the industry standard for measuring the degree of automation in a vehicle (Table 10).

Currently, there are no viable commercial systems for fully autonomous trucks. The highest level of truck automation commercially available is "advanced driver assistance" (Level 1). Partial and conditional automation are in the pre-commercial stage, and high and full automation are in research and development and are not likely to be available over the medium term. Advanced driver assistance systems (ADAS) are commercially available for

trucks. ADAS enhances the safety, efficiency, and experience of driving by automating real-time functions traditionally performed by the driver. They use a variety of internal and external sensors (such as GPS, video, radar, and LIDAR) to inform drivers about navigation and potential conflicts. Examples of ADAS include electronic stability control (ESC) and roll stability control (RSC), which use real-time information such as weight, speed, acceleration, and steering to detect the potential for a vehicle rollover or loss of steering control; forward collision warning (FCW) systems which provide a warning to the driver if the distance or time to the lead vehicle falls below a certain threshold; and autonomous emergency braking (AEB) which allows the vehicle to brake independently of the driver to avoid or mitigate an imminent rear-end collision. ADAS forms the foundation of autonomy and represents a significant advance in vehicle safety even without full autonomy. Multiple studies done by USDOT and others have found these technologies to effectively reduce truck crashes. [29,30,31,32]

Though fully connected and automated trucks may not be considered an emerging trend, the enabling technologies are an emerging trend that will impact how goods are moved across Louisiana and throughout the nation.

Table 10: Society of Automotive Engineers (SAE) Automation Levels

Level	Title	Description
0	No Automation	Zero autonomy: the driver performs all driving tasks.
1	Driver Assistance	The driver controls the vehicle, but the vehicle design may include some driving assist features.
2	Partial Automation	The vehicle has combined automated functions, like acceleration and steering, but the driver must be ready to take control of the vehicle at all times with notice.
3	Conditional Automation	Driver is a necessity but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.
4	High Automation	The vehicle is capable of performing all driving functions under certain conditions, and the driver may have the option to control it.
5	Full Automation	The vehicle is capable of performing all driving functions under all conditions, and the driver may have the option to control it.

Source: Society of Automotive Engineers.

[29] Hickman, J. et al., "Onboard Safety Systems Effectiveness Evaluation Final Report," Federal Motor Carrier Safety Administration, FMCSA-RRT-12-012, 2013, https://rosap.ntl.bts.gov/view/dot/10.
[30] Woodroofe, J. et al., "Safety Benefits of Stability Control Systems for Tractor-Semitrailers," National Highway Traffic Safety Administration, DOT HS 811 205, 2009, https://deepblue.lib.umich.edu/handle/2027.42/64283.
[31] Federal Motor Carrier Safety Administration, "Benefit-Cost Analyses of Onboard Safety Systems," Tech Brief, FMCSA-RRT-09-023, February 2009
[32] National Transportation Safety Board, "The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes," 2015, https://www.ntsb.gov/safety/safety-studies/Documents/SIR1501.pdf.

Besides safety, fuel cost savings and greater operational efficiencies are primary motivating factors for equipping trucks with connected and automated technologies. In particular, fleet operators that can deploy trucks in platoons can potentially realize these benefits. Truck platoons use V2V communications and autonomous vehicle control technology to electronically "tether" tractor-trailers together in a convoy formation.[33] These vehicles automatically maintain a set, close distance between each other while connected (about 20 to 75 feet).[34] The truck at the head of the platoon acts as the leader, with the trailing vehicles reacting and changing in its movement. Platooning can decrease the aerodynamic drag on the following vehicle(s), generating estimated fuel savings of up to nearly 5 percent for the lead truck and almost 10 percent for trailing trucks.[35] It can yield labor cost savings if humans do not operate the following trucks in the convoy but are tethered to a lead truck with a human driver.

Commercial Vehicle Electrification

While passenger cars have generated the most sales of electric vehicles, electric trucks are seen as vital to reducing business costs and the overall environmental impact of the transportation sector. For example, fuel typically represents the second highest cost to motor carriers (about 24 percent of total cost), behind driver wages, on a per-mile basis.[36] Historically, electricity prices have been lower and more stable than gasoline and diesel prices. Thus, electricity offers the opportunity for an industry characterized by tight profit margins to achieve considerable cost savings. In addition, studies have estimated that the total cost of ownership of battery electric day cab tractors is lower than their diesel counterparts over the long term. [37] Day cabs for regional operations (i.e., an operating range of 250 to 300 miles) are expected to be the first application for electric trucks.

Besides the ability of freight vehicle electrification to reduce business costs, the potential to mitigate the negative externalities attributed to goods movement is a motivating factor. For example, trucks significantly contribute to GHG emissions, and electrification would help achieve national and State GHG emissions reduction goals. [38] Electrification would also help to address a vital transportation equity challenge related to public health. Respiratory diseases attributed to tailpipe emissions disproportionately affect disadvantaged communities due to

---

[33] European Automobile Manufacturers Association, https://www.acea.be/uploads/publications/Platooning_roadmap.pdf.

[34] Lammert, M., Duran, A., Diez, J., Burton, K. et al., "Effect of Platooning on Fuel Consumption of Class 8 Vehicles Over a Range of Speeds, Following Distances, and Mass," SAE Int. J. Commer. Veh. 7(2):2014, doi:10.4271/2014-01-2438

[35] Ibid.

[36] American Transportation Research Institute, Operational Costs of Trucking, 2019.

[37] Phadke, A. et al., "Why Regional and Long-Haul Trucks are Primed for Electrification Now," March 2021, Lawrence Berkeley National Laboratory, https://eta-publications.lbl.gov/sites/default/files/updated_5_final_ehdv_report_033121.pdf.

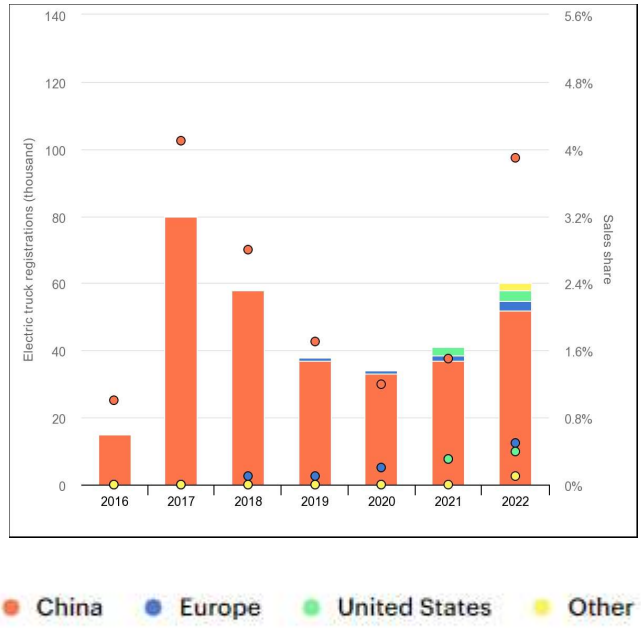
[38] United States Environmental Protection Agency, "Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2020," https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.
Washington DC, 2021. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019.

their proximity to major highways, rail yards, trucking terminals, and other freight-intensive land uses.[39]

Despite the potential for electrification to generate industry cost savings and positive environmental and transportation equity impacts, it is not without its challenges. The low market penetration of electric freight vehicles evidences this. Only 3,100 electric medium- and heavy-duty vehicles are estimated to have been sold in the US in 2022 (Figure 64).[40]

As part of the Louisiana State Plan for Electric Vehicle Infrastructure Deployment, DOTD nominated all its Interstate highways as EV corridors. To build out the statewide EV charging network, interstate highways should be prioritized since freight movement by truck in Louisiana relies heavily on the Interstate Highway System. I-10, I-12, and I-20 provide much of the east-west movement for truck traffic, while I-49, I-55, and I-59 facilitate north-south truck freight movements. Interstate loops and spurs are also in several of the State's metropolitan areas. In Louisiana, trucking accounts for approximately 58 percent of the tonnage moved in, out, and through the state (excluding pipelines).

Figure 64: Electric Truck Registrations (Orange Bars) and Sales Share by Region (Points), 2015-2022



Source: International Energy Agency, Global EV Outlook 2023: Catching Up with Climate Ambitions.

[39] American Lung Association, American Lung Association Energy Policy Development: Transportation Background Document, 2015, www.lung.org/getmedia/10333ba7-8f6f-472e-8392-1388cd5fd754/transportation-backgrounder.pdf.pdf.
[40] International Energy Agency, Global EV Outlook 2023: Catching Up with Climate Ambitions, https://www.iea.org/.

Recently, DOTD developed a Louisiana State Plan for Electric Vehicle Infrastructure Deployment, which details the State's approach to deploying public charging infrastructure that provides convenient, accessible, reliable, and equitable electric vehicle charging throughout the state. The Louisiana State Plan for Electric Vehicle Infrastructure Deployment details the State's proposed approach to implementing the NEVI formula program funding. It includes a summary of the State's electric vehicle and charging infrastructure deployment, an initial analysis of potential charging station locations to meet program requirements, and a two-phased deployment strategy for (1) meeting the basic requirements of the Federal Highway Administration Alternative Fuel Corridors Program while focusing on areas with high demand and (2) building resiliency, redundancy, and overall coverage of the charging network once the basic requirements have been met. The second phase will help add redundancy for long-distance travel but will also provide a more widely distributed network of charging for intrastate and local travel. However, there are some key barriers to heavy-duty vehicle electrification, including the following:[41]

HIGHER UPFRONT VEHICLE COSTS: The high vehicle purchase price is perceived as one of the largest barriers to freight electrification. Electric trucks may cost as much as 3.5 times the average cost of a diesel truck.[42] Batteries are the most expensive component of an electric vehicle, accounting for a significant portion of the upfront cost. High upfront costs particularly impact smaller carriers and owner-operators, as they are not likely to have the capital or confirmed client demand to invest in electric vehicles.

COSTLY AND COMPLEX CHARGING INFRASTRUCTURE PROCESSES: The planning and installing electric vehicle infrastructure is one of the most significant barriers to deploying an electric truck fleet. Electric vehicle charging stations vary in the speed (and subsequently cost) with which they can fully charge a vehicle. Aside from selecting and purchasing the stations, motor carriers must deal with the complexity and cost associated with siting, planning, commercial utility interconnection requirements, construction permitting, and final installation. To address this barrier, some automotive, utility, and infrastructure companies are testing technology that allows electric vehicles to charge while in motion via under-road pads that wirelessly transmit electricity to receivers mounted underneath vehicles or using overhead wires.[43] The process, known as dynamic charging, could reduce the cost of charging infrastructure for motor carriers if they could rely on a publicly available energy source to supplement their investments.

[41] Electrification Coalition, Electrifying Freight: Pathways to Accelerating the Transition, https://www.electrificationcoalition.org/wp-content/uploads/2020/11/Electrifying-Freight-Pathways-to-Accelerating-the-Transition.pdf.
[42] This estimate is based on 2018 average capital costs for heavy-duty diesel and electric trucks presented in the 2019 California Air Resources Board "Advanced Clean Trucks Total Cost of Ownership Discussion Document: Preliminary Draft for Comment" report.
[43] Hodari, D., "These Companies Want to Charge Your Electric Vehicle as You Drive," Wall Street Journal, January 18, 2021.

COMMERCIAL AND INDUSTRIAL ELECTRICITY RATE STRUCTURES: On average, electricity charging costs in the US are much lower than comparative diesel fueling costs.[44] However, the combination of substantial electricity demand requirements, limited downtime to charge larger class vehicles, and utility market rate structures can significantly reduce the financial savings of electricity over diesel. Heavy-duty vehicles must be able to charge at reasonably priced rates that meet their operational needs. Without greater flexibility in rate structures, it may be financially challenging for fleet operators to consider electrifying their fleets.

LIMITED AVAILABILITY OF CERTIFIED SERVICE CENTERS AND TECHNICIANS: Without certified facilities and technicians, many fleet operators may resist electrifying their fleets until they can be assured that timely repairs can be made to protect against extended downtime. Commercial vehicle fleets have demanding operational requirements that require close monitoring to ensure optimal operational efficiency and minimal disruptions to fleet operations. While diesel trucks have an extensive network of competent and knowledgeable service centers and technicians to support their operation, this is not true for heavy-duty electric vehicles.

CONCERNS WITH GRID RESILIENCY: As electric truck fleets become more common, there is concern that local grid networks may be pushed beyond their current distribution capacity without significant investments in utility upgrades to existing grid infrastructure. This can create disruptions to services or a slowdown of fleet electrification efforts. Electric trucks have high electrical demand requirements, and their widespread deployment would result in significant electricity demand. Evaluating the need for increasing grid distribution capacity is essential to providing sufficient reliability to support a fully electrified freight transportation system.

Intelligent Transportation Systems/ Transportation System Management and Operations

Multiple intelligent transportation system (ITS) technologies may be applied to freight mobility. These include smart roadside and virtual weigh-in-motion (WIM) applications that allow for wireless roadside inspections, automated electronic clearance at roadside check facilities, and automated commercial vehicle safety inspections at roadside check locations. Examples of ITS technologies that are particularly relevant for freight include the following:

ARTIFICIAL INTELLIGENCE: "Artificial intelligence' means a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments."[45] Artificial intelligence (AI) describes a machine's ability to mimic human actions or cognitive functions, such as problem-solving or maintaining a conversation.[46] Various AI technologies have already been deployed for Transportation Systems Management and Operations (TSMO) applications, including incident detection, ramp metering, and traffic prediction. For example, the Nevada, Florida, and Iowa DOTs have begun deploying neural network technologies for incident detection using video image analysis and

[44] "Fuel Prices." Alternative Fuels Data Center: Fuel Prices, US Department of Energy's Office of Energy Efficiency and Renewable Energy's Vehicle Technologies Office, afdc.energy.gov/fuels/prices.html.
[45] National Artificial Intelligence Act of 2020, 15 U.S.C. 119 §9401.
[46] Federal Highway Administration, *Raising Awareness of Artificial Intelligence for Transportation Systems Management and Operations: Final Report*, December 2019, FHWA-HOP-19-052.

traffic prediction. Delaware DOT has piloted several AI applications for traffic congestion and incident prediction. As AI technologies mature and become less costly, AI applications in TSMO will continue to expand.

DYNAMIC ROUTE GUIDANCE: This ITS application provides advanced route planning and guidance responsive to current conditions. It includes technologies incorporating real-time traffic and roadway conditions, allowing drivers to make re-routing decisions to a more optimal route. The INRIX AI Traffic tool is an example of dynamic route guidance. It detects changes in road conditions and alerts drivers instantaneously via a mobile application. This application can inform drivers about slowdowns, incidents, and weather conditions, allowing them to make dynamic routing decisions.

FREIGHT SIGNAL PRIORITY: This application provides traffic signal priority for freight vehicles to reduce delays, increase travel time reliability, and improve safety at intersections. It includes V2I technologies that allow freight vehicle onboard equipment to communicate with traffic signal control equipment to extend green phases or other actions to enhance freight mobility and overall transportation safety. Examples of this technology have been implemented in Washington State, California, and North Dakota.

COMMERCIAL VEHICLE PARKING: This ITS application provides parking information to motor carriers pre-trip and en route. It is commonly called a Truck Parking Information Management System (TPIMS). Parking availability information is collected from truck parking areas using closed-circuit television (CCTV) cameras, in-ground sensors, above-ground radar, or side laser scanners. The raw data is processed and supplied to fleet managers, commercial vehicle operators' mobile devices, dynamic message signs (DMS) on the roadway, or directly to in-vehicle systems. The Florida DOT's Truck Parking Availability System (TPAS) is an example of this ITS application. The FDOT TPAS uses CCTV, microwave vehicle detection, and in-ground sensors in the truck spaces at interstate rest areas, welcome centers, and weigh stations to monitor the number of available truck parking spaces. That information informs drivers of truck parking availability using the State's FL511 website and mobile application, third-party mobile applications, and roadside DMS.

SMART WORK ZONES: Any construction on or adjacent to a major freight corridor has the potential to limit freight mobility. This ITS application manages work zones by controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using field devices such as DMS, Highway Advisory Radio (HAR), and gates and barriers. Information on work zone speeds and delays is provided to the motorists before entering the work zones. In addition, this application can warn personnel within a work zone about potential hazards, such as a vehicle moving in a manner that appears to create an unsafe condition (e.g., driving at high speed or entering the work zone).

Figure 65: Trucks play a key role in delivering Louisiana's freight future

Delivering Louisiana's Multimodal Freight Vision

DOTD can improve the efficiency and reliability of freight movement in and through Louisiana by identifying, prioritizing, and implementing freight improvement projects, programs, and policies. These three types of solutions combine to create a strategy based on the goals of the State Freight Plan, stakeholder-identified needs and solutions, and analysis of the Louisiana Freight Network. The final section of the plan focuses on recommendations, strategies, and implementation.

Chapter 6 provides an overview of the freight systems' needs and specific implementation strategies to mitigate today's freight challenges and prepare for a prosperous future. The strategies are designed to be led by DOTD and/or their partners and focus on infrastructure investments, policies, programs, and partnerships. **Chapter 7** furthers that idea and outlines the State's fiscally constrained Freight Investment Plan.

Chapter 6: Addressing Louisiana's Multimodal Freight Transportation Needs, Challenges, and Opportunities

This chapter will provide an overview of the needs and challenges of Louisiana's multimodal freight network. Given the importance of freight to the Louisiana economy, it is critical for this plan to examine where there are deficiencies in the network that add costs to freight movements. This includes a particular focus on identifying barriers to efficient freight movements on the LHFN, the roadways most critical to freight, including safety, condition, reliability, and design barriers. It will then highlight the most significant unfunded highway needs along these categories. Next, this section will summarize the needs of other freight modes covered in previous chapters of this SFP. Finally, this section will conclude with a freight action plan for actions that DOTD is taking to address these needs and grow the Louisiana economy.

6.1 Highway Needs

This section identifies needs on the Louisiana Highway Freight Network (LHFN). As described in Section 2.8, the LHFN is a designated network of state-maintained roadways deemed most critical to freight movement in Louisiana and is part of the Louisiana Multimodal Freight Network. Highway needs include issues or situations that create barriers to efficient movements of freight on the LHFN. Needs are identified and analyzed across five categories:

SAFETY NEEDS: Safety is DOTD's number one priority, and ensuring that goods are moved safely is critical to the department's long-range planning efforts. This category of needs looks at both the concentration of crashes along the system and the crash rate per hundred million truck vehicle miles traveled (HMTVMT).[47] Roadways with a high number and/or rate of crashes, especially crashes that result in fatal or suspected serious injuries, have high safety need scores.

RELIABILITY NEEDS: Another priority is to improve freight-related congestion, reliability, and overall system efficiency. Segments of the roadway network where many trucks experience recurrent and non-recurrent congestion indicate congestion/reliability needs.

ASSET MANAGEMENT NEEDS: A third key goal of DOTD and this plan is improving and maintaining the State's highway pavement, bridges, and other assets in a state of good repair. Poor pavement and/or bridge condition scores indicate that investment is needed to improve the maintenance of those assets.

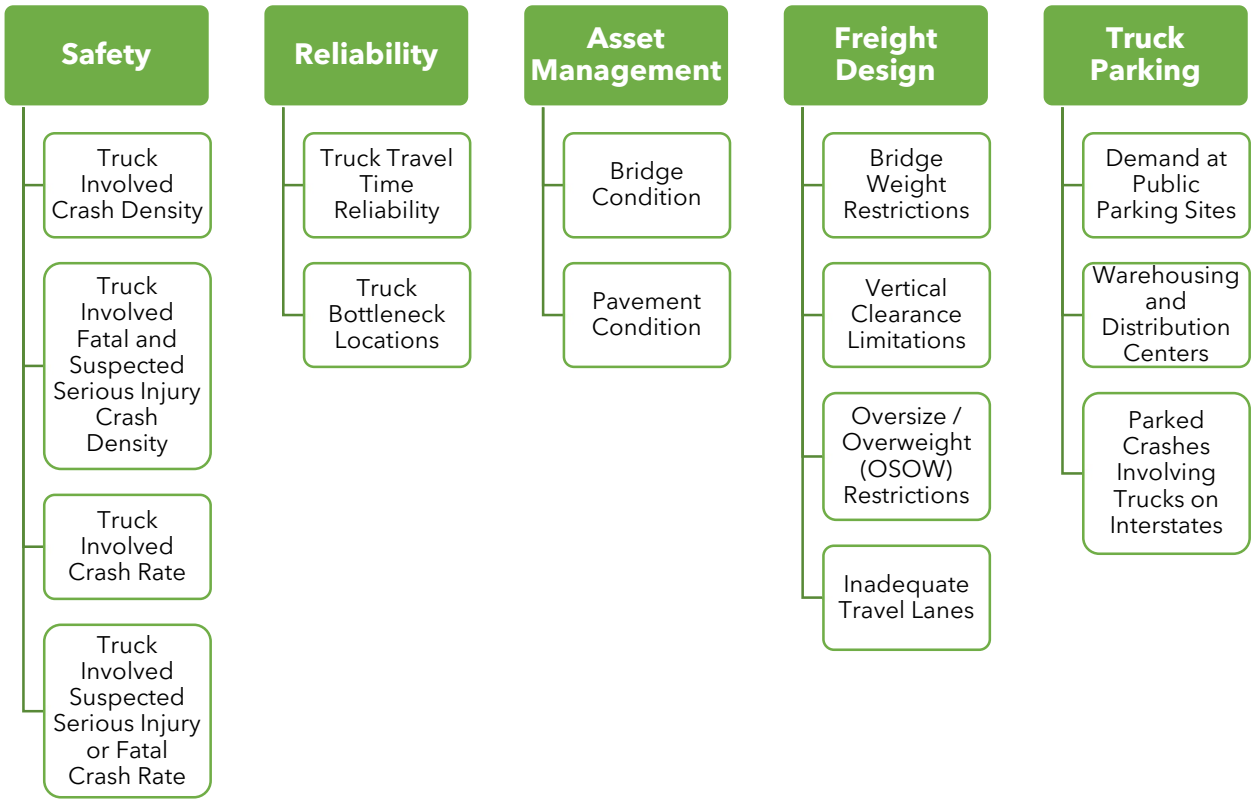
FREIGHT DESIGN NEEDS: Freight design needs focus on the infrastructure limitations, such as height, width, and weight limits, that can prevent direct truck access and reduce the efficiency of the highway system. This set of needs also scores areas where infrastructure limitations prevent the movement of oversized overweight loads.

[47] Crashes included in the analysis of Safety Needs were limited to those where trucks were the first or second vehicle listed in the crash report.

TRUCK PARKING NEEDS: Inadequate truck parking in the places and at the times truck drivers need to use it can lead to undesignated parking and fatigue issues among drivers. Poor evaluation scores in this category indicate a need to improve truck parking availability.

Needs were identified through a detailed data assessment that used multiple data sources to identify needs in each category and then score the significance of those needs. Figure 66 depicts the metrics for each category, and more details about scoring are provided in Appendix B.

Figure 66: 2021 Louisiana Highway Needs Assessment Metrics



The individual need category scores are aggregated to create the Combined Freight Needs Score, a composite score that identifies areas with deficiencies in multiple categories. Figure 67 depicts the general methodology of creating the Combined Freight Needs Score. From the high, medium, and low scores in each needs category, an area is assigned 2, 1, or 0 points, respectively, which are summed across all categories to create the Combined Freight Needs Score that can range from 0 to 10.

Figure 67: Louisiana Highway Needs Assessment: Combined Freight Needs Score Calculation

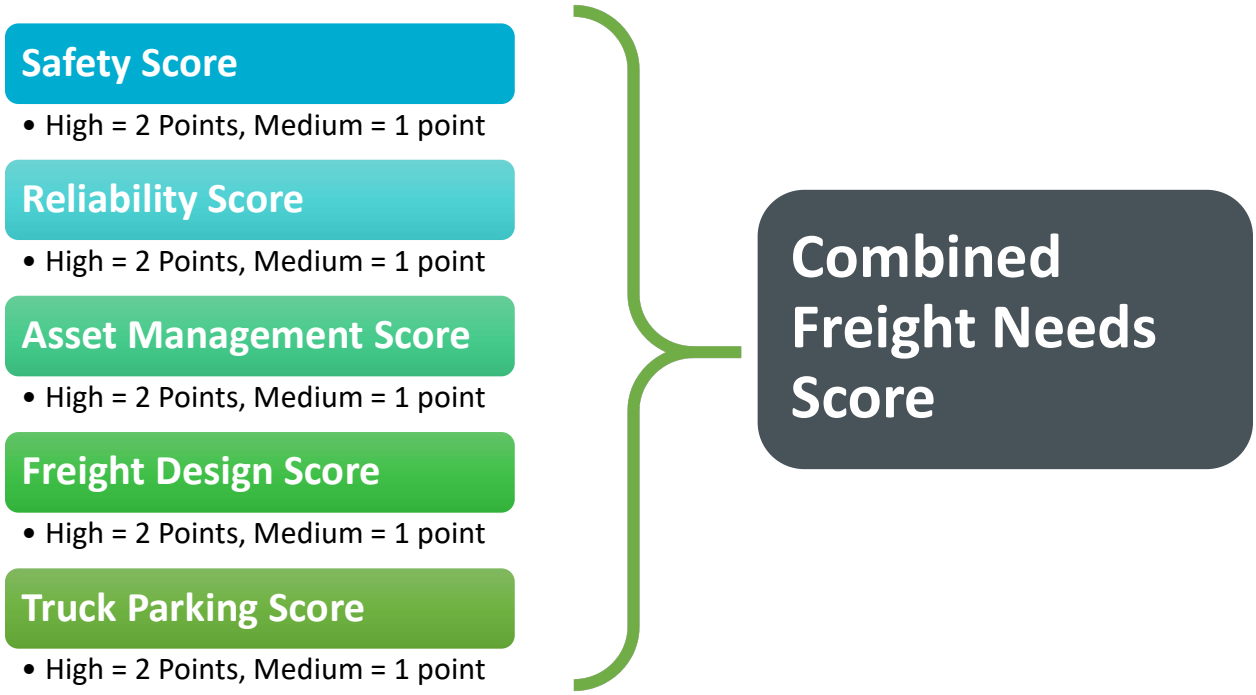
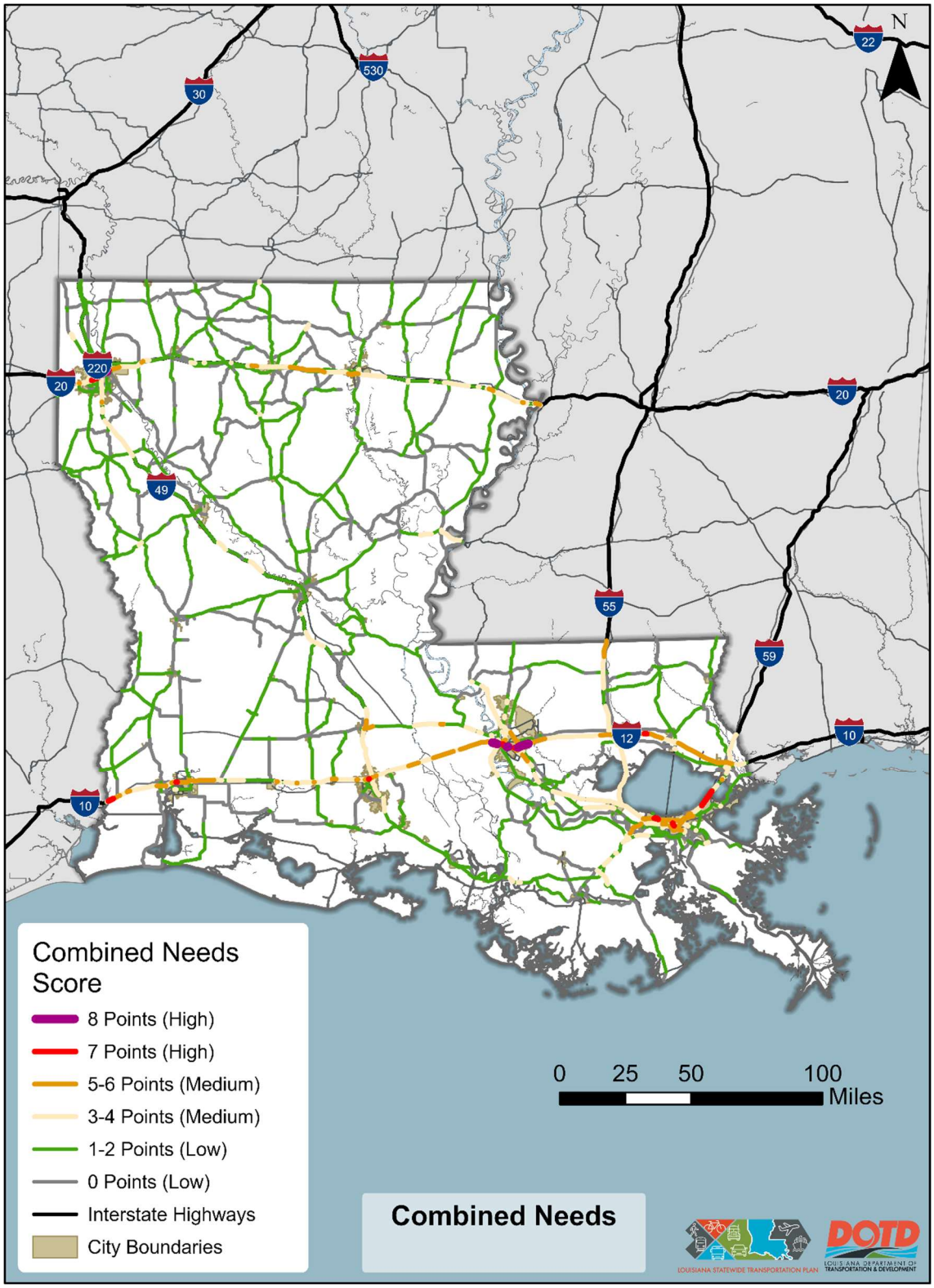


Figure 68 shows the Combined Freight Needs Score on the LHFN. Within the results, no roadway segment scores higher than an 8. Segments with scores between 7-8 are categorized as high, 3 – 6 as medium, and 0 – 2 as low. Table 11 shows the highest scoring corridors, defined as those with a score of 7 or higher, and the individual high needs categories that contributed to the score.

Figure 68: Combined Freight Needs Score on the LHFN



Source: Needs assessment score analysis by Cambridge Systematics, 2023

Table 11: Top Combined Needs Corridors

Roadway	Location	Combined Score	High Needs Categories
I-10	West Baton Rouge from LA 415 across the Horace Wilkinson Bridge to College Dr	8	Safety, Reliability, Truck Parking
I-12	East Baton Rouge from LA 73 (Exit 1C) to Millerville Rd	8	Safety, Reliability, Truck Parking
I-20	Shreveport approximately from Monkhouse Dr across the Red River to Old Minden Rd	8	Safety, Asset Management, Truck Parking
I-10	From the Louisiana – Texas border to Steward Rd	7	Safety, Reliability, Asset Management
I-10	Lake Charles at the intersection with LA 378	7	Safety, Asset Management,
I-10	Lafayette at the intersection with LA 182	7	Safety, Truck Parking
I-10	West New Orleans, approximately from Powers Blvd to Veterans Blvd	7	Safety, Reliability, Asset Management
Pontchartrain Expressway	New Orleans, approximately from Metairie Rd to Carrollton Ave	7	Safety, Reliability
I-10	East New Orleans from Paris Rd to US 11	7	Safety, Asset Management, Truck Parking
I-12	The crossing of Tangipahoa River near LA 445 east of Hammond	7	Reliability, Asset Management, Truck Parking
I-12	From Firetower Rd to the crossing of Bedico Creek near the border of Tangipahoa Parish and St Tammany Parish	7	Reliability, Asset Management, Truck Parking

This analysis resulted in a separate Needs Assessment Technical Memorandum that details the highway system's barriers and needs. Additionally, the overall results are presented in Appendix B.

Unfunded Highway Needs

Identifying needs is just the first step. It is important to compare the identified needs against DOTD's programmed transportation projects to be completed over the next few years to identify gaps or areas of need that are not currently being addressed.

The Louisiana Highway Priority Program has over 350 projects programmed on the LHFN (Figure 70). These projects were compared with the segments with a Combined Freight Needs Score of 5 or greater to identify which needs were at least partially being met by programmed projects. This aimed to determine the State's most significant (and unfunded) highway freight needs.

The highest-ranked unfunded highway freight needs, which do not currently have any projects associated with them, are illustrated in Figure *70* and Table 12. These unfunded needs present an opportunity to identify potential projects for future funding consideration.

Figure 69: DOTD Programmed Projects on the LHFN

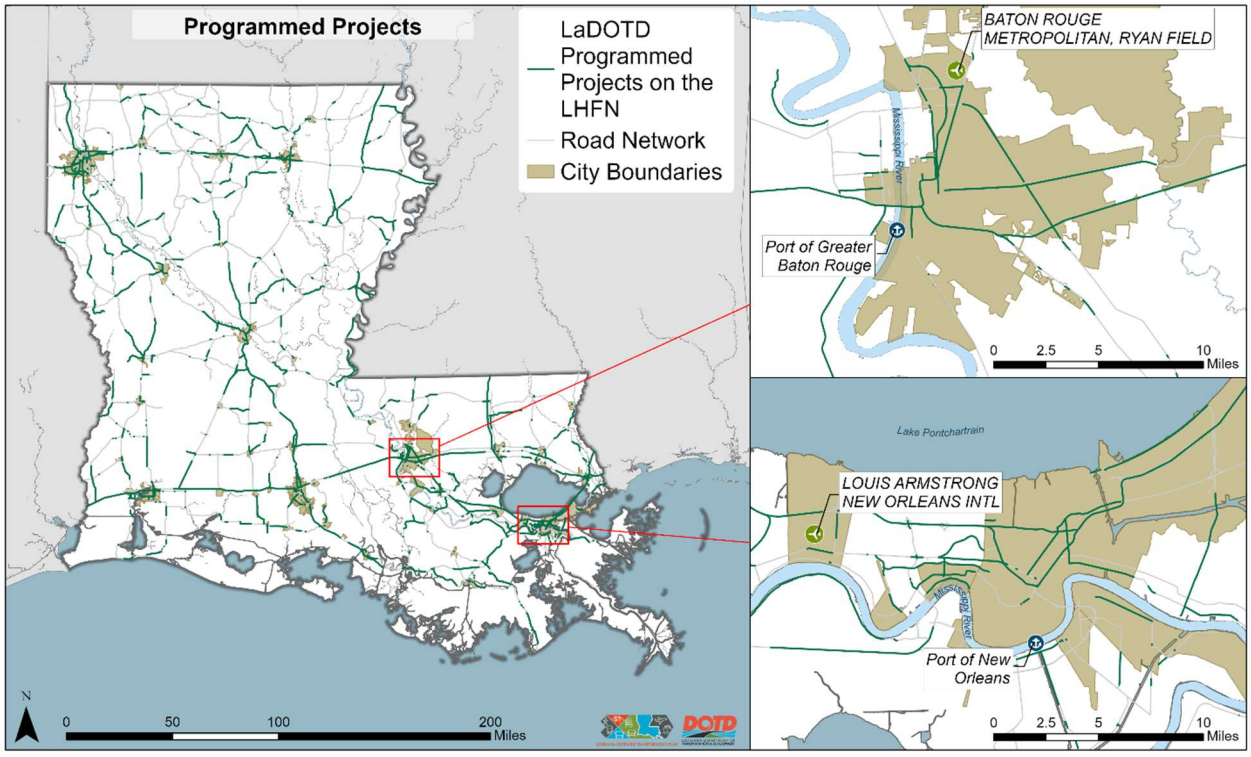
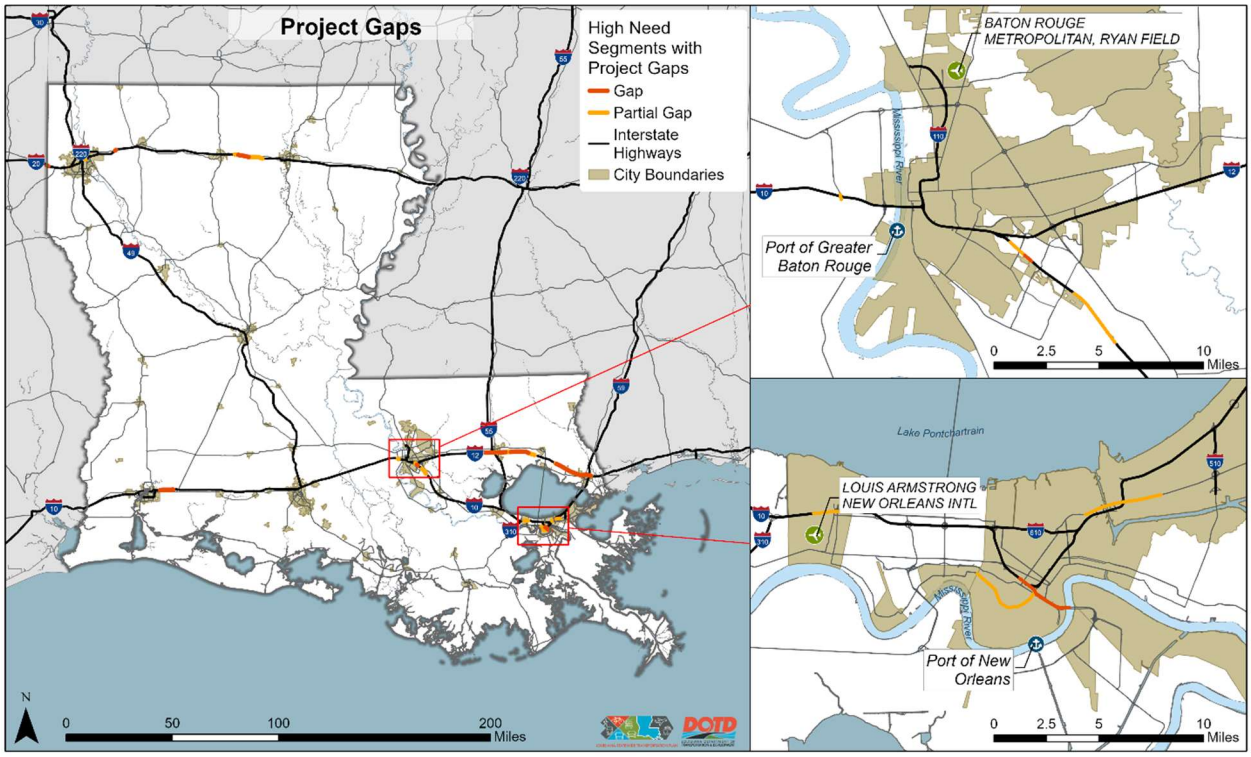


Table 12: Highest Ranked Unfunded Highway Freight Needs

Road	Parish	Start	End	Combined Score
I-12	Tangipahoa & St. Tammany	Tangipahoa West Border	LA 1077	7
I-12	St. Tammany	LA 1088	N. Military Road	6
I-20	Lincoln & Ouachita	Pipes Road	Britton Road	6
I-20	Caddo	State Border	Mile Point 1	6
I-20	Bossier	LA 164	Clarke Bayou	6
I-10	East Baton Rouge	I-12 Junction	LA 42	6
US 90	Orleans	Old Gentilly Road	Gentilly Road	6
I-10	Jefferson	Tupelo Street	Airport Access Road	6
I-10/US 90	Orleans	S Dupre St	Crescent City Connection	5
I-10	Calcasieu	Pujol Road	Hardy Street	5
US 90	Orleans	Monticello Avenue	I-10 Junction	5

Figure 70: Highest Ranked Unfunded Highway Freight Needs



6.2 Freight Railroad Needs

Louisiana's rail network is vital to the national freight and passenger rail system. The statewide rail system consists of 3,667 route miles. Railroads active in the state range from national rail carriers (Class I railroads) to small local railroads. All six Class I railroads operate in Louisiana. These national rail carriers are joined by 16 short-line railroads, which provide an array of functions necessary to connect industries across the state to suppliers and customers across North America.

The Louisiana State Rail Plan includes a deep analysis of Louisiana's freight rail needs – including maintenance issues that were identified in partnership with DOTD's private sector freight rail partners.

Rail Funding

As most railroads operate as private business entities, many routine upgrades and improvements occur without local, state, or federal support. Large projects with distinct public benefits, such as eliminating unsafe conditions or relieving congestion on a major freight route, may receive funding assistance.

Rail Crossings

There are more than 200,000 at-grade crossings in the United States, with 5,074 in Louisiana. 2,767 of these crossings are on public roadways. Urban and rural areas across Louisiana have at-grade crossings, also known as highway-rail crossings, where roads and rail infrastructure cross each other at the same grade or level. High-population areas with high volumes of rail and road traffic can necessitate grade-separated crossings where the rail corridor is sunken (underpass) or raised above (overpass) roadways.

Beyond exposing the public to freight rail traffic, at-grade crossings disrupt other modes of travel. Crossings occupied by trains cannot be crossed, which may lead to backups along roadways. Resultant congestion and lengthened travel times impact emergency vehicle response times and serve as an economic detriment to local economies.

Railroad Weight Limitations (286k lb. Rail)

In 1995, the Class I railroads adopted a 286,000-pound (286k lb.) rail care standard. Previously, the car weight limit standard was 263,000 pounds. While the Class I railroads have upgraded and actively maintained their rail to handle the 286k lb. railcar standard, Short Line railroads have struggled to keep up. In Louisiana, approximately 550 miles of track cannot handle 286k lb. rail cars.

Load restrictions, particularly on infrastructure downgraded because of structural deficiencies, limit the efficiency and economic competitiveness of the rail corridors. Imposed weight restrictions require the rerouting of carloads exceeding the allowable weight. Such redirecting often results in freight traveling indirect routes, increasing the total miles traveled. This equates to longer and more costly travel times, undermining the state's economic competitiveness.

One solution to load restrictions is light loading, the practice of underfilling rail cars to remain below imposed limits. Light loading also decreases rail efficiency and increases costs borne by

shippers and rail carriers alike. As such, the potential long-term consequence of light loading is a loss of rail service to small, often rural industries that rely on the Short Line railroads to connect to the Class I network.

Bottlenecks

Bottlenecks are physical or operational constraints that limit the rail traffic flow. Chokepoints located at critical junctures can have repercussions across the network. Causes of rail bottlenecks include congestion caused by having a single track where a double-track configuration is more adequate, a stalled train on a single-track corridor, broken signals, or a lack of proper equipment at intermodal facilities.

Bottlenecks increase travel times, added costs, and freight shifting to less efficient transportation modes. Issues in the rail network can profoundly impact the regional transportation system, including increased highway traffic caused by trucks replacing rail shipments and at-grade crossing blockages. However, these impacts are broader than transportation, as inefficient rail service may spur industries to relocate outside the state. Three major initiatives underway to address significant bottlenecks include:

NEW ORLEANS RAIL GATEWAY: Proposed improvements in the New Orleans region would improve the fluidity, reliability, and capacity of rail services for efficient freight interchange. Concerns over rail congestion in the New Orleans area date back to 1975 when DOTD published the first study analyzing how best to alleviate railroad-community conflicts. Since then, the NORG has been a focus of several initiatives, including, most recently, the Avondale PEL study described below.

LA 23 NEW ORLEANS AND GULF COAST RAILWAY RELOCATION PROJECT: NORPC and the FRA conducted an Environmental Assessment (EA) to relocate New Orleans and Gulf Coast (NOGC) infrastructure in densely populated Jefferson Parish and Plaquemines Parish areas. This project aims to improve safety and mobility by reducing at-grade crossings. The EA resulted in a finding of no significant impact (FONSI) determination. Construction funding is currently being sought to implement the project.

AVONDALE PEL STUDY: DOTD, in coordination with FRA, FHWA, the NORPC, and the railroads operating in the New Orleans metropolitan area, is conducting a Planning and Environmental Linkages (PEL) study to evaluate the feasibility of closing the Union Pacific (UP) and Burlington Northern Santa Fe (BNSF) roadway-rail at-grade crossings at Live Oak Boulevard, Willswood Lane, George Street, and Avondale Garden Road and replacing them with one, or more, grade separations.

6.3 Air Cargo Needs

The air cargo industry faces several challenges, including inflation, staffing shortages, the rising cost of fuel, and the need for infrastructure improvements. However, the outlook for the long-term growth of both global and U.S. air cargo is positive as job growth and demand for e-commerce continue.

Emerging technologies such as drones, automation, and blockchain have the potential to revolutionize the air cargo industry and make it more efficient and secure. Air cargo operators are beginning to rely on more environmentally friendly operations using sustainable aviation fuel. Reducing emissions will continue to rise in importance, and carriers and forwarders must adapt and find ways to make operations more sustainable.

In Louisiana, the most significant issues facing future air cargo operations include the following:

COMMERCIAL TRUCKING ACCESS TO AIRPORTS: Constricted trucking corridors between several Louisiana airports and highways currently hinder increased air cargo operations in the state. One example is the I-210 off-ramp and narrow roadways near the Chennault International Airport, which present a challenge for trucks to navigate. The road network and restricted corridors near Acadiana Regional Airport are also difficult for trucks to navigate. Access improvements for trucking to and from airports in Louisiana are critical.

IMPROVED INSTRUMENT LANDING SYSTEM (ILS) APPROACHES FOR ADVERSE WEATHER: Other than Louis Armstrong New Orleans International, which has a Category III ILS system, several airports should consider improving their ILS approach capabilities to allow lower decision height and visibility minimums when landing an aircraft. Improving these instrument approaches allows aircraft to land at the cargo airport destination instead of having to divert to an airport experiencing better weather conditions, thus causing delays and impacting just-in-time delivery.

6.4 Maritime Freight Needs

The total economic impact of the waterborne commerce labor market is equivalent to more than $14.4 billion in labor income, $40.7 billion in value-added, and $125.5 billion in output (or sales). However, significant opportunities exist to take even greater advantage of enhancing waterborne transportation than is currently being achieved, which has cascading economic impacts on waterway transportation-related businesses at both the regional and local levels.

Dredging

There is a general need for dredging and waterway maintenance at smaller ports along the coast and in the interior of Louisiana. The recent Louisiana Waterways State Transportation Plan surveyed the state's ports and found that the greatest weakness or threat to the port is channel depth and stabilizing their banks against erosion. Similar problems were not reported by larger ports, except for Lake Charles Harbor and Terminal District, which constantly needs to maintain its navigational channel connecting it to the Gulf. Dredging challenges are not limited to the Mississippi River and Louisiana's five deep-water ports. Many ports that reported a need for dredging are situated in waterways that are offshoot channels or tributaries connecting to major waterways. For example, the Abbeville Harbor and Terminal District sits on the Vermilion River, which connects to the nearby Intracoastal Waterway. In the state's interior, the ports of Caddo-Bossier and Natchitoches Parish reported that the nine-foot draft of the Red River was a limiting factor in the economic growth of the ports.

Reliability Issues

The inland shallow draft network's connectivity provides a significant opportunity for trans-shipment to shallow draft for further distribution and deeper penetration into the Louisiana Inland Waterways system. However, stakeholder inputs characterized Louisiana's intracoastal and inland waterways as not "a reliable means of transporting goods," a perspective supported by economic studies and data analysis. As such, the waterways should, at a minimum, be predictably maintained at authorized depths, as they provide numerous economic and recreational opportunities to the local and regional economy.

Concentrated growth

Louisiana waterways saw freight growth from 2003 to 2019. However, this growth was not seen in all ports but was focused on larger ports that could improve infrastructure and adapt to market changes. The largest increase in volume was found along the coast, specifically in the Lake Charles section of the Calcasieu River. The waterways with the greatest volume decline were in smaller coastal channels and waterways. This would suggest that cargo volumes are becoming more concentrated in larger ports, and smaller ports are losing market share.

Ports such as New Orleans, Lake Charles, and the Port of Plaquemines experienced growth or consistent volumes between 2010 and 2018. These ports have had the advantage of consistent improvement projects, established new infrastructure, and allowed for different types of cargo to be brought into the port. A key difference between ports like larger ports and smaller regional ports is the diversity of cargo being moved through them.

Waterway Maintenance

The Louisiana Waterways State Transportation Plan's survey identified a general need for dredging and waterway maintenance in Louisiana's deep-water ports, smaller ports along the coast, and in the interior of Louisiana. Many ports responded to the survey, saying that the greatest weakness or threat to the port is channel depth and stabilizing their banks against erosion.

Mother Nature

Droughts or flooding events highly impact the inland waterway system. If water levels get too low, access to ports and some waterways can be affected. Similarly, major floods can cause challenges with shipping lanes and debris. Additionally, Louisiana's geographic location makes it susceptible to hurricanes that can cause major damage to port facilities.

Improving Coordination

Most of Louisiana's waterborne tonnage is reported through its individual ports. By increasing focus on the improved integration of systemwide solutions to waterway throughput efficiencies, it will be possible to develop strategies to mitigate waterway congestion throughout Louisiana's transportation network. Similarly, there should be an open dialogue regarding the issues concerning waterways. As witnessed by the recent severe and extreme weather events and the global COVID-19 pandemic, promoting active communications with waterway system stakeholders will keep DOTD abreast of current conditions and enable improved dynamic responses to these micro and macro challenges to the overall transportation system.

Impact of Liquefied Natural Gas

St. James, Calcasieu, and Cameron Parishes are at the center of significant expansion of industrial facilities. In southwest Louisiana, liquefied natural gas plant development dominates industrial expansion. The Calcasieu Ship Channel (CSC) is a 68-mile long, deep-draft commercial waterway in southwest Louisiana, from Lake Charles into the Gulf of Mexico. Beginning in the 1920s, the CSC was channelized by straightening, widening, and deepening the Calcasieu River to its current dimensions of 400 ft wide by 40 ft deep. For the LNG and other industries along the waterway, a draft of 40 to 42 feet is preferred to handle Panamax vessels fully laden, reducing cost per delivered ton and, therefore, more competitive in relative markets.

6.5 Pipelines

Pipelines in Louisiana and across the US are operated by private sector energy and extraction firms, with the Pipeline and Hazardous Materials Safety Administration (PHMSA) responsible for developing, issuing, and enforcing related safety regulations. As a result, pipeline infrastructure conditions are managed and maintained by these firms, including ExxonMobil, ConocoPhillips, and Marathon Petroleum.

Pipeline Age

As of 2022, approximately 36 percent of gas transmission and 21 percent of hazardous liquid pipelines in Louisiana were installed before 1960, indicating an age of at least 62 years for these components. Since 2015, the proportion of both types of pipelines installed before 1960 has decreased slightly due to the decommissioning and replacement of older pipelines and the construction of entirely new pipeline segments. Correspondingly, the proportion of pipelines constructed after 2000 has increased from 12 percent to 15 percent for gas transmission pipelines and from 16 percent to 20 percent for hazardous liquid pipelines.

Pipeline Incidents

Over the past ten years, Louisiana has averaged 41 pipeline incidents per year; 23 of the 41 are considered "significant," that resulted in a fatality, in-patient hospitalization, incurred over $50,000 costs (in 1983 dollars), highly volatile liquid releases of 5 barrels or more or other liquid releases of 50 barrels or more, or liquid releases resulting in an unintentional fire or explosion. Of those significant incidents, Louisiana averages one serious incident yearly, resulting in death or an in-patient hospitalization.

Cybersecurity

Cybersecurity in relation to freight infrastructure is crucial for safety and system resiliency. In 2021, the Colonial Pipeline, which carries gasoline, diesel, and jet fuel from Texas to New York, was the victim of a ransomware cyberattack that resulted in the pipeline halting all pipeline operations to contain the attack. The pipeline carried 45 percent of all fuel consumed on the East Coast, resulting in fuel shortages and a nationally declared state of emergency. After six days, the Colonial Pipeline restarted its operations, and three days later, its operations returned to normal.

6.6 Freight Action Plan

The Freight Action Plan outlines the next steps for DOTD and their public and private sector partners as they work together to improve freight mobility in Louisiana. It delivers a set of actions needed to advance freight performance in Louisiana.

The Freight Advisory Committee played a significant role in developing the Freight Action Plan. Over a series of meetings, the committee reviewed the plan's needs and outreach results to craft the Action Plan's recommendations.

Eight overarching principles (Figure 71) inspire the Action Plan's recommendations to improve freight mobility and the quality of life for Louisianans by supporting the SFP goals. The Action Plan's recommendations are organized according to the SFP goal. Through this connection, DOTD can ensure that the SFP supports and is aligned with the State Transportation Plan, regional plans, and Federal freight policies/guidance. Each action item listed includes the timeframe (short 1-5 years, medium 6-10, long 10+), priority (within the timeframe), the relative cost of the initiative, complexity, and what role DOTD has in each action (Table 13). A DOTD lead strategy indicates that DOTD would be the implementing agency. A partner role indicates that DOTD would be a key participant in the implementation but would do it in partnership with another entity. A DOTD-supported role indicates that DOTD would not actively lead implementation but could support it through a variety of efforts. Effectively, it is a guide for implementation that can be regularly updated, and it serves as a tool for monitoring progress and fostering continued collaboration.

Figure 71: Freight Action Plan – Guiding Principles

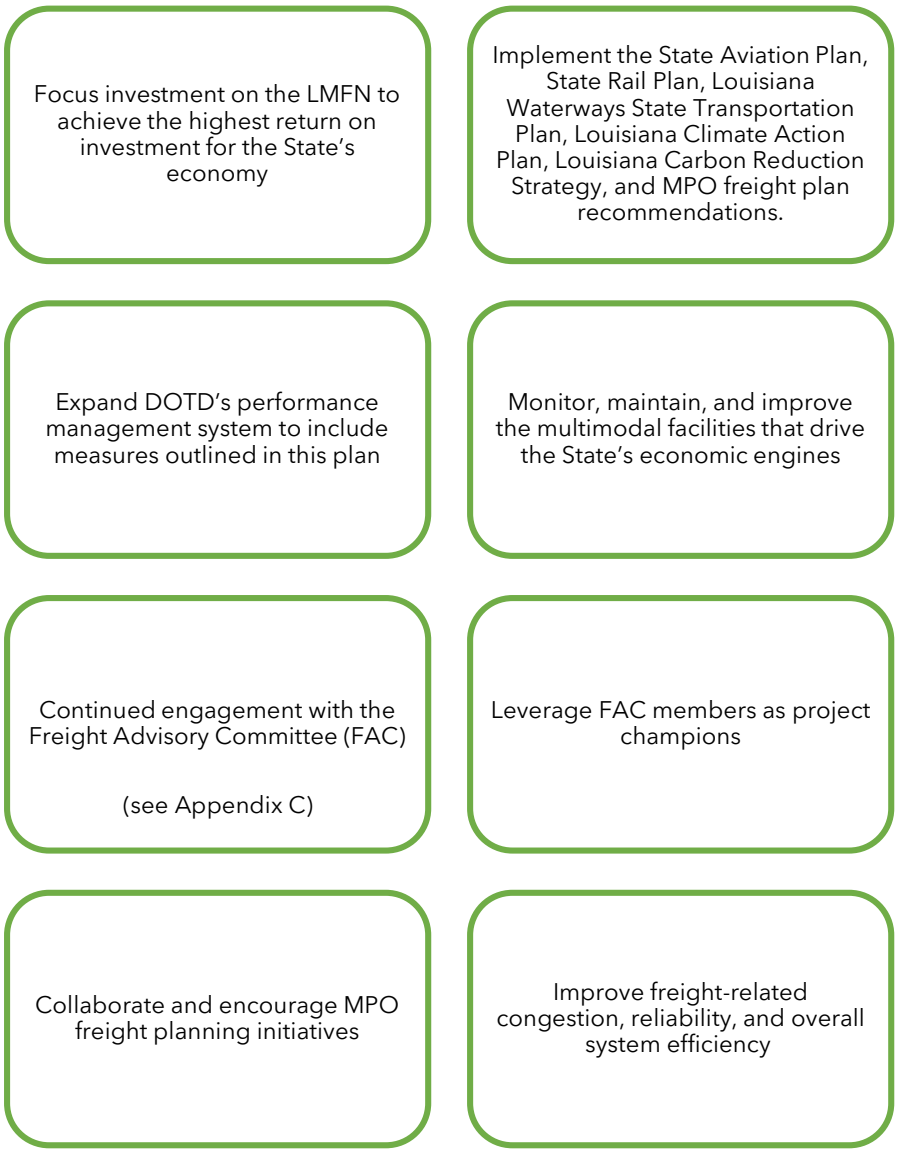


Table 13: Freight Action Plan

Timeframe	Priority	Description	Mode(s)	DOTD Role	Cost	Complexity
On-going	High	Support multi-state coordination of improvements along the Mississippi River corridor and tributaries.	Maritime	Support	$	High
On-going	High	Support rural economic development opportunities by improving multimodal options and connectivity.	All modes	Lead	$	Medium
On-going	High	Focus transportation investments on projects that retain or expand economic development in Louisiana.	All modes	Lead	$	Medium
On-going	High	Continued DOTD/LED collaboration to leverage Louisiana's transportation assets for economic development.	All modes	Partner	$	Low
On-going	High	Explore opportunities to deepen shipping channels and diversify Louisiana's maritime marketplace.	Maritime	Support	$$$	Medium
On-going	Medium	Explore "bypass" routes, usage incentives, technology, and the role of land use in freight mobility.	Highway, Maritime	Support	$$	High
On-going	Medium	Work with private sector partners to develop new and improved multimodal freight facilities – including intermodal facilities that can serve advanced manufacturing and port growth.	Rail, Highway, Maritime, Aviation	Support	$	High
On-going	Low	Explore the benefits and impacts of e-commerce and innovative freight delivery vehicles – like drones, robots, and electric vehicles – on urban and rural communities.	Highway	Support	$	Low
Short	High	Develop operational strategies to provide near-term relief at highly ranked highway freight bottlenecks.	Highway	Lead	$$	High
Short	High	Work with maritime partners to identify specific projects (both inside and outside the fence) that could improve Louisiana's ability to support the energy industry.	Maritime	Support	$$$	High
Short	High	Develop a list of roads that serve the timber industry	Highway	Support	$	Low
Short	High	Reduce congestion through operational strategies like DOTD's Motorist Assistance Patrol (MAP) service.	Highway	Lead	$$	Low
Short	High	Continued engagement with the timber industry to improve short-term transportation issues.	Highway	Partner	$	Low
Short	Medium	Develop TSMO and other operational management improvements to improve reliability and reduce delays on major freight corridors leading to manufacturing centers.	Highway	Lead	$$	Medium
Short	Medium	Ensure that Maintenance of Traffic (MOT) plans on the LMFN consider freight movement.	Highway	Lead	$	Medium

Timeframe	Priority	Description	Mode(s)	DOTD Role	Cost	Complexity
Short	Medium	Develop a process to identify maritime bottlenecks and vulnerabilities.	Maritime	Partner	$	Medium
Short	Medium	Support land use policies near the Port of New Orleans and other key maritime connectivity points.	Maritime	Support	$	Medium
Short	Medium	Engage with the airports to create funding strategies for air cargo facilities -including increased runway lengths, hangers, and ILS approaches.	Aviation	Partner	$$	Low
Short	Low	Increase rural access to e-commerce.	All modes	Support	$	Low
Short	Low	Where appropriate, assist agency partners as they develop workforce development strategies – this could include DOTD being a convenor to discuss workforce mobility or other transportation-focused issues.	All modes	Support	$	Low
Medium	High	Create long-term funding and implementation strategies to address significant multimodal freight bottlenecks.	All modes	Partner (depending on mode)	$$$$	High
Medium	High	Improve multimodal connectivity nodes to lower the transportation and societal costs of conveying freight.	Rail, Highway, Maritime, Aviation	Lead	$$$	High
Medium	High	Improve last-mile connections – including roadways, railroad sidings, rail spurs, and channel depth.	Rail, Highway, Maritime, Aviation	Partner (depending on mode)	$$$	High
Medium	High	Improve New Orleans Rail Gateway capacity constraints.	Rail	Support	$$$$	High
Medium	Medium	Improve access to (and around) air cargo facilities.	Highway, Aviation, Rail	Partner	$$$	Medium
Medium	Low	Upgrade short line rail facilities to the 286,000-pound rail standard – where it makes sense.	Rail	Support	$$$$	Medium
On-going	High	Explore opportunities to partner, incentivize, and support private-sector truck parking investment.	Highway	Lead	$	Medium
On-going	High	Address grade crossing challenges	Rail	Partner	$$	High
On-going	High	Actively pursue discretionary grant opportunities to expand truck parking.	Highway	Lead	$	Low
On-going	Medium	Partner with modal partners to develop strategies to address non-highway freight movement safety hotspots.	Rail, Maritime	Support	$$	Low

Timeframe	Priority	Description	Mode(s)	DOTD Role	Cost	Complexity
Short	High	Conduct a truck parking study.	Highway	Lead	$	Low
Short	High	Ensure commercial vehicles are considered in future STP and SHSP updates.	Highway	Lead	$	Low
Short	High	Include freight partners in future DOTD safety initiatives.	All modes	Lead	$	Low
Short	Medium	Explore opportunities to join multistate initiatives like the I-10 Truck Parking Availability System (TPAS).	Highway	Lead	$$$	Medium
Medium	High	Work to increase truck parking capacity – especially on I-10, I-12, and I-20, and near major freight centers.	Highway	Lead	$$$$	High
On-going	High	Support the Louisiana State Police, the Governor's Office of Homeland Security & Emergency Management, and their federal partners as they secure and protect critical infrastructure.	All modes	Support	$	Low
On-going	High	Increase cybersecurity considerations when planning future ITS investments.	All modes	Lead	$	Low
On-going	High	Support the Louisiana State Police in their efforts to protect critical infrastructure with the Louisiana State Analytical and Fusion Exchange (LA-SAFE).	All modes	Support	$	Low
On-going	High	Work with agency partners to mitigate hazards associated with hazardous materials – particularly spills – on the multimodal freight network.	All modes	Support	$$	Medium
Short	Medium	Evaluate the security along hazardous material corridors – for highway, maritime, and rail.	Highway, Maritime, Rail	Partner	$	Medium
Short	Low	Evaluate cargo security measures that could be taken at truck parking facilities.	Highway	Support	$	Low
Short	Low	Explore opportunities to improve lighting on ramps where unauthorized truck parking frequently occurs.	Highway	Partner	$$	Low
On-going	High	Develop mitigation strategies to address vulnerabilities – both man-made and weather-related – on the LMFN.	All modes	Lead	$$	Medium
On-going	High	Harden infrastructure that is susceptible to man-made risks.	All modes	Lead	$$$	High
On-going	High	Continue working with emergency management partners to prepare, respond, and recover from major events.	All modes	Support	$	Low
On-going	High	Continue coordination with the State of Mississippi to execute the Southeast Louisiana Evacuation Plan.	All modes	Partner	$	Low
On-going	High	Engage in ongoing efforts by the Louisiana Sheriffs' Emergency Task Force, FEMA, and the Governor's Office of Homeland Security & Emergency Management to leverage DOTD assets–	All Rail, Highway, Maritime, Aviation	Partner	$	Medium

Timeframe	Priority	Description	Mode(s)	DOTD Role	Cost	Complexity
		like rest stops—to temporarily pre-position supplies during an event's recovery phase.				
On-going	High	Actively monitor and improve movable bridges that pose a risk to both maritime and shoreside evacuations and mobility – including Black Bayou, Grand Lake, LA 75 and LA 77 pontoon swing bridges, and the Judge Seeber - Claiborne Avenue Bridge.	Maritime	Lead	$$	Medium
On-going	Medium	Minimize and document the "time to return to normal" following an LMFN disruption.	All modes	Lead	$	Low
On-going	Medium	Use technology to monitor bridges on the LMFN whose closure would result in long detours.	Maritime, Highway	Lead	$	Low
Short	High	Develop alternative routing (including mode shifts) for corridors unusually susceptible to extreme weather.	Highway, Maritime, Rail	Lead	$$	Medium
Short	High	Cross-train DOTD's Emergency Operations Center – Emergency Support Function 1 staff to understand freight considerations during an event.	All modes	Lead	$	Low
Short	High	Explore opportunities to create alternative evacuation routes that rely on movable bridges to ensure maritime and road facilities can be used concurrently during an emergency.	Maritime, Highway	Support	$	Medium
Short	Medium	Continue to develop and update alternative routing plans focused on LMFN with a higher-than-average rate of unplanned, long-duration closures.	Rail, Highway, Maritime, Aviation	Lead	$	Low
Short	Medium	Broaden the distribution and means of distribution for DOTD's Highway Trouble Board.	Highway	Lead	$	Low
Short	Medium	Deploy air draft monitors on key bridges.	Maritime, Highway	Lead	$$	Medium
On-going	High	Actively monitor pavement and bridge conditions on the LMFN.	Highway, Maritime	Lead	$	Low
On-going	High	Explore technology and policy changes to improve and automate commercial vehicle enforcement.	Highway	Lead	$	Medium
On-going	Medium	Help short line railroads explore discretionary infrastructure funding opportunities.	Rail	Support	$	Low
On-going	Medium	Assist multimodal partners in achieving a state-of-good-repair.	All modes	Support	$	Low
Short	High	Improve bridges at risk of closure or weight restrictions on the LMFN – especially those that would result in excessive detours.	Maritime, Highway	Lead	$$$	High
Short	Medium	Explore opportunities to improve the design of facilities that carry OSOW loads (pavement, etc.).	Highway	Lead	$	Medium

Timeframe	Priority	Description	Mode(s)	DOTD Role	Cost	Complexity
Medium	High	Strategically consider improvements where OSOW restrictions result in overly circuitous routing of loads.	Highway	Lead	$$$	High
Medium	High	Improve the design of LMFN OSOW facilities.	Highway	Lead	$	Medium
Medium	High	Increase/maintain maritime channel depth and limit bank erosion.	Maritime	Support	$$$$	High
On-going	High	Continue DOTD's successful work to reduce impacts on wildlife movement and habitat during the design and construction of freight projects.	All modes	Lead	$$	Low
On-going	High	Work with communities to address the unintended impacts of freight movement on the environment, neighborhoods, and disproportionately impacted populations.	All modes	Support	$$	Medium
On-going	High	Engage with the Louisiana DNR and USACE to limit saltwater encroachment's impact on infrastructure.	All modes	Support	$$	High
On-going	Medium	Coordinate with agency partners who administer programs that address wildlife impacts, air pollution, and greenhouse gas emissions to continuously enhance how these considerations are included in the freight planning process, project development, and construction.	All modes	Lead	$	Medium
On-going	High	Continue to consider flooding risk and stormwater run-off when designing and constructing new freight projects.	All modes	Lead	$$	Medium
On-going	High	Work with agency partners to address coastal erosion risks to the Gulf Intercoastal Canal.	Maritime	Support	$	High
On-going	Medium	Support agency partners as they research the efficacy of alternative fuels to decarbonize heavy vehicles – Aligning with Louisiana Climate Action Plan's: Strategy 4/ Actions 4.1 and Strategy 5/ Action 5.1, 5.2, 5.5,	All modes	Support	$	Medium
On-going	Medium	Leverage federal funding to build the infrastructure required to facilitate a full range of energy options for private-sector freight and state-owned heavy vehicles. – Aligning with Louisiana Climate Action Plan's: Strategy 9/ Actions 9.3, 9.4 and Strategy 10/ Action 10.5.	All modes	Support	$	Medium
On-going	Medium	Explore long-distance passenger trips mode shifts to help alleviate freight bottlenecks. – Aligning with Louisiana Climate Action Plan's: Strategy 11/ Actions 11.1, 11.2, 11.3 and Strategy 12/ Action 12.3.	Rail, Highway, Maritime, Aviation	Support	$	Medium

Timeframe	Priority	Description	Mode(s)	DOTD Role	Cost	Complexity
Short	Medium	Develop a strategy to engage with diversified fueling options.	All modes	Lead	$	Low
Short	High	Consider climate impacts in the DOTD freight planning process. - Aligning with Louisiana Climate Action Plan's: Strategy 12/ Action 12.4.	All modes	Lead	$	Low
Medium	Medium	Identify and pursue pilot projects to decarbonize DOTD heavy vehicles –Aligning with Louisiana Climate Action Plan's: Strategy 9/ Actions 9.3, 9.4 and Strategy 10/ Actions 10.1, 10.5.	All modes	Lead	$$	Medium

Chapter 7: Multimodal Freight Investment Implementation Plan

The fiscally constrained DOTD Freight Investment Plan (FIP) applies funding from the National Highway Freight Program (NHFP) for Fiscal Year 2024-2032 to ten projects that address freight mobility challenges and on the National Highway Freight Network. These projects, listed in Table 14 and displayed in Figure 72, were highly ranked by the SFP's needs assessment and validated by the Louisiana Freight Advisory Committee. Table 15 presents the state's proposed National Highway Freight Program Funds apportionment by year.

With the passage of the IIJA/BIL, the forecast period for a freight plan was extended from five to eight years. All projects listed in the FIP are listed in the Statewide Transportation Improvement Program (STIP) or the Highway Priority Program.

The Highway Priority Program describes the process for prioritizing highway projects. This program includes a requirement that it, "increases accessibility for people, goods, and services." (RS 48.229.1(A)(4))

DOTD understands that law and that FHWA intends the Freight Investment Plan to be a living document. With this understanding, the projects and funding amounts listed are subject to future SFP and Highway Priority Program processes. DOTD will use state dollars as matching funds.

Table 14: Freight Investment Plan

Project Number	Project Description	NHFP to Be Obligated	Other Federal Sources	State Match	Total Cost
H.012174*	JEFF DAV PL-I-49 (OGFC/SLAB REPAIR)	$33,154,865	NHFP* $23,853,704 NHPP $31,664,828	$8,549,798	$97,223,195
H.012083	I-10: CALCASIEU RIVER BRIDGE INT REPAIRS	$15,636,960		$1,737,440	$17,374,400
H.015308	I-49: PONT DES MOUTON - ST LANDRY P/L	$18,885,690		$2,098,410	$20,984,100
H.012622	I-12:LIVINGSTON PAR APPROACH SLAB REP P3	$15,678,810		$1,742,090	$17,420,900
H.012587	I-10: W END OF BR 290 - W END OF LA 415	$15,190,650		$1,687,850	$16,878,500
H.010319	I-110: NORTH ST. - PLANK RD.	$60,367,769		$6,707,531	$67,075,300
H.000445	US 190: UPRR OVERPASS NEAR OPELOUSAS	$23,596,160		$5,899,040	$29,495,200
H.012169	I-10: IBERVILLE P/L - W END OF BR 290	$19,983,150		$2,220,350	$22,203,500
H.011627	I-20: BIENVILLE P/L - 0.71 MILE W LA 149	$14,825,250		$1,647,250	$16,472,500
H.014064	I-10: FRANKLIN AVE - I-510	$6,020,292	NHPP $2,979,708	$1,000,000	$10,000,000
	Totals:	**$223,339,596**	**$58,498,240**	**$33,289,759**	**$315,127,595**

*H.012174 based on actual bids received; "Other Federal Sources" amount includes $23,853,704 in previously authorized NHFP

Table 15: Anticipated NHFP Obligations by FFY

Anticipated Year of Obligation	Project Number	Project Description	Anticipated NHFP Obligation	Remaining NHFP Available for Obligation
2023 - 2024	H.012174*	JEFF DAV PL-I-49 (OGFC/SLAB REPAIR)	$31,309,470	$0
2024 - 2025	H.012174*	JEFF DAV PL-I-49 (OGFC/SLAB REPAIR)	$1,845,395	$23,984,953
	H.012083	I-10: CALCASIEU RIVER BRIDGE INT REPAIRS	$15,636,960	$8,347,993
	H.015308	I-49: PONT DES MOUTON - ST LANDRY P/L	$8,347,993	$0
2025 - 2026	H.015308	I-49: PONT DES MOUTON - ST LANDRY P/L	$10,537,697	$15,809,258
	H.012622	I-12:LIVINGSTON PAR APPROACH SLAB REP P3	$15,678,810	$130,448
	H.012587	I-10: W END OF BR 290 - W END OF LA 415	$130,448	$0
2026 - 2027	H.012587	I-10: W END OF BR 290 - W END OF LA 415	$15,060,202	$11,813,692
	H.010319	I-110: NORTH ST. - PLANK RD.	$11,813,692	$0
2027 -2028	H.010319	I-110: NORTH ST. - PLANK RD.	$27,411,372	$0
2028 -2029	H.010319	I-110: NORTH ST. - PLANK RD.	$21,142,705	$6,816,894
	H.000445	US 190: UPRR OVERPASS NEAR OPELOUSAS	$6,816,894	$0
2029 -2030	H.000445	US 190: UPRR OVERPASS NEAR OPELOUSAS	$16,779,266	$11,739,525
	H.012169	I-10: IBERVILLE P/L - W END OF BR 290	$11,739,525	$0
2030 -2031	H.012169	I-10: IBERVILLE P/L - W END OF BR 290	$8,243,625	$20,845,542
	H.011627	I-20: BIENVILLE P/L - 0.71 MILE W LA 149	$14,825,250	$6,020,292
	H.014064	I-10: FRANKLIN AVE - I-510	$6,020,292	$0
		Total NHFP Anticipated to be Obligated:	**$223,339,596**	

*Starting NHFP balance of $31,309,470 includes FFY 2023-2024 NHFP Apportionment and FFY 2022-2023 NHFP carryover (see Table 16).

Table 16: National Highway Freight Program Apportionment

Federal FY	Apportionment	Source	Notes
2022 - 2023	$6,492,076	IIJA	Remaining in FY22-23 to be obligated
2023 - 2024	$24,817,394	IIJA	
2024 - 2025	$25,830,348	IIJA	
2025 - 2026	$26,346,955	IIJA	
2026 - 2027	$26,873,894	estimated at (+) 2%	
2027 - 2028	$27,411,372	estimated at (+) 2%	
2028 - 2029	$27,959,599	estimated at (+) 2%	
2029 - 2030	$28,518,791	estimated at (+) 2%	
2030 - 2031	$29,089,167	estimated at (+) 2%	
Total NHFP:	**$223,339,596**		

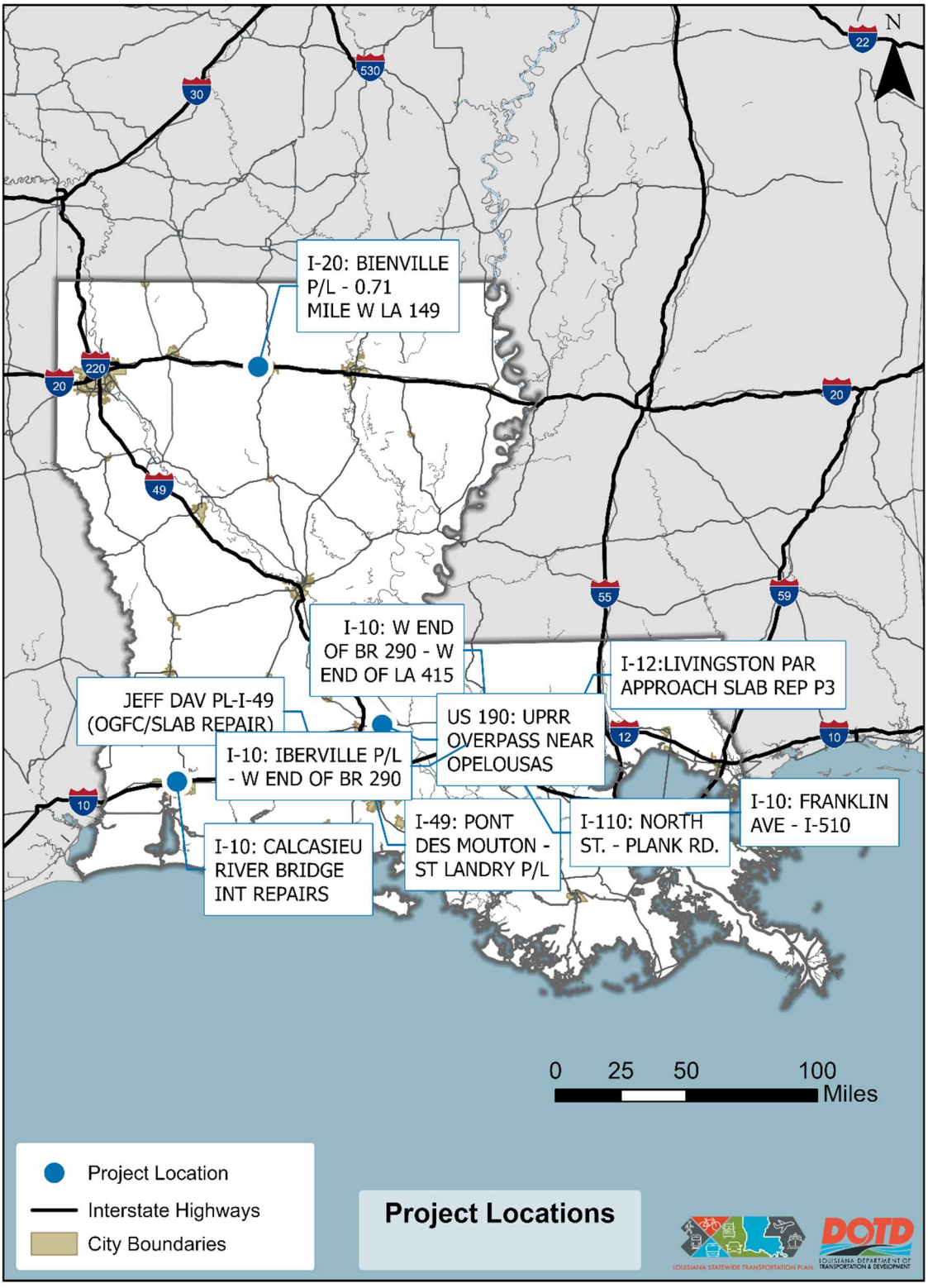


Figure 72: Freight Investment Plan Project Locations

Appendix A: State Freight Plan Goal Alignment

A.1 State Transportation Plan Goals

Table 17: State Freight Plan and State Transportation Plan Goal Alignment

	STP Goals					
	Preservation	Safety	Economic Competitiveness	Community Development and Enhancement	Environmental Sustainability	Resilience
State Freight Plan Goals						
Improve the freight transportation system for better economic efficiency, productivity, and competitiveness.			✓	✓		
Improve freight transportation system safety.		✓		✓		
Improve the security of the freight transportation system.	✓	✓			✓	
Improve the ability of the freight system to rebound from natural and man-made disruptions.	✓	✓	✓	✓	✓	✓
Improve and maintain the freight transportation system to ensure a state of good repair.	✓	✓				✓
Reduce adverse environmental and community impacts of the freight system, including local air pollution, flooding/stormwater runoff, and wildlife habitat loss.		✓		✓	✓	✓
Use innovative technology and operational strategies to improve safety and freight system performance.			✓	✓	✓	

A.2 National Multimodal Freight Policy Goals – 49 USC 70101(b)

Table 18: State Freight Plan and National Freight Policy Goal Alignment

	National Freight Policy Goals									
	Identify Improvements, Policies, and Innovations	Safety, Security, Resiliency	State of Good Repair	Advanced Technology	Economic Efficiency/ Productivity	Reliability	Improve Freight Mobility	Multi-State Planning	Environmental	Not burdensome
State Freight Plan Goals										
Improve the freight transportation system for better economic efficiency, productivity, and competitiveness.	✓				✓	✓	✓	✓	✓	✓
Improve freight transportation system safety.	✓	✓				✓	✓			
Improve the security of the freight transportation system.	✓	✓			✓		✓			✓
Improve the ability of the freight system to rebound from natural and man-made disruptions.	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Improve and maintain the freight transportation system to ensure a state of good repair.	✓		✓		✓	✓	✓		✓	✓
Reduce adverse environmental and community impacts of the freight system, including local air pollution, flooding/stormwater runoff, and wildlife habitat loss.	✓	✓			✓				✓	
Use innovative technology and operational strategies to improve safety and freight system performance.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

A.3 National Highway Freight Program Goals – 23 USC 167(b)

Table 19: State Freight Plan and Highway Freight Program Goal Alignment

	Highway Freight Program Goals						
	Infrastructure & Operational Improvements	**Safety, Security, Resiliency**	**State of Good Repair**	**Advanced Technology**	**Network Efficiency & Productivity**	**Multi-State Coordination**	**Environmental**
State Freight Plan Goals							
Improve the freight transportation system for better economic efficiency, productivity, and competitiveness.	✓	✓	✓	✓	✓	✓	✓
Improve freight transportation system safety.	✓	✓	✓	✓	✓		✓
Improve the security of the freight transportation system.	✓	✓	✓	✓	✓	✓	✓
Improve the ability of the freight system to rebound from natural and man-made disruptions.	✓	✓	✓		✓	✓	✓
Improve and maintain the freight transportation system to ensure a state of good repair.	✓	✓	✓	✓	✓		✓
Reduce adverse environmental and community impacts of the freight system, including local air pollution, flooding/stormwater runoff, and wildlife habitat loss.	✓	✓	✓		✓		✓
Use innovative technology and operational strategies to improve safety and freight system performance.	✓	✓	✓	✓	✓	✓	✓

Appendix B: Statewide Roadway Needs

This section will provide additional detail on the data assessment used to identify and score needs on the LHFN, as discussed in Highway Needs (Section 6.1). This analysis starts with roadway segments on the LHFN as the base unit of analysis. Each segment includes data for a broad set of roadway characteristics, with additional data (i.e., crash data, measurements of reliability, etc.) joined to the roadway segments using Geographic Information Systems (GIS) software. This data was used to calculate the score for each category of needs using between two and four key metrics listed in Table 20.

Generally, this analysis involves using data to identify areas with freight needs or deficiencies. Then, within those flagged areas, the need amount is quantified into a score for each metric, where higher point values indicate a higher need. For each metric, all roadways receive at least one point, with the highest percentile of roadways receiving full points and the lowest percentile roadways receiving the least number of points. Roadways not flagged for a particular metric receive a zero for that score.

Additionally, the scores for each metric are calculated for urban and rural roadways independent of each other. The distinction between urban and rural roadways is important because the two roadway designations typically serve freight traffic differently, and many of the scores would be at risk of skewing toward one type of roadway. All metrics within a given need category are summed into a composite score, and high/medium/low need determinations are calculated from the distribution of scores in that category.

Figures 73 through Figure 77 show the results for safety, reliability, asset management, freight design, and truck parking needs on the LHFN. More detailed information about these results is provided in the Needs Assessment Technical Memorandum.

Table 20: Needs Assessment Metrics and Scoring Criteria

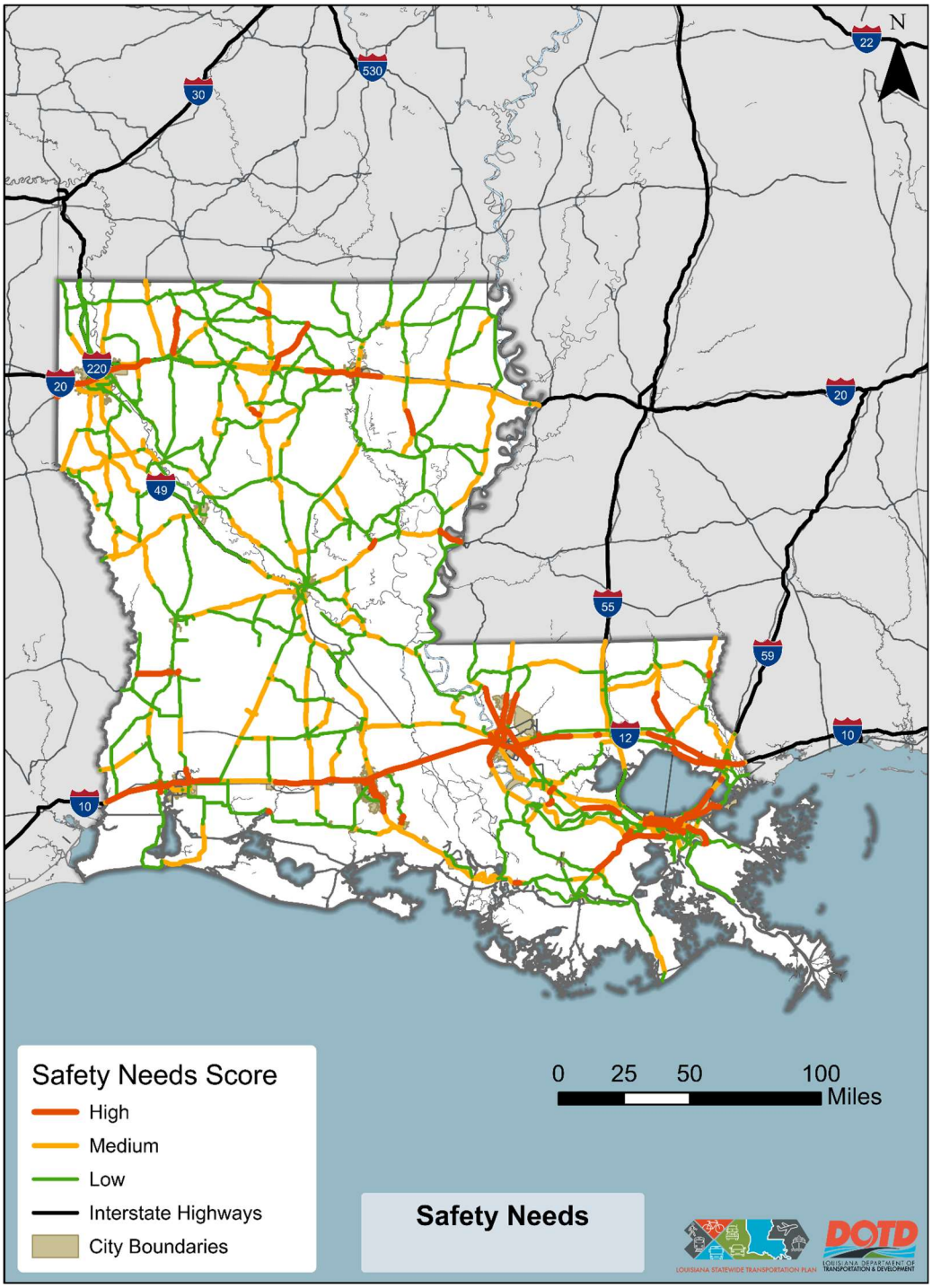
Needs Category	Metric	Description	Scoring	Data Source(s)
Safety[48]	Truck Involved Crash Density	Scores the absolute number of truck-involved crashes	Dynamically scored the number of truck-involved crashes per mile. *Total possible points: 4*	DOTD Crash Database (2017 – 2021 five-year average)
	Truck Involved Fatal and Suspected Serious Injury Crash Density	Scores the absolute number of suspected serious or fatal injury truck-involved crashes	Dynamically scored the number of crashes per mile of suspected serious or fatal injury truck-involved crashes. *Total possible points: 4*	DOTD Crash Database (2017 – 2021 five-year average)
	Truck-Involved Crash Rate	Scores the truck-involved crash rate per million truck miles traveled (Truck VMT)	Dynamically scored by overall truck-involved crash rate per 100 million truck miles traveled. *Total possible points: 4*	DOTD Crash Database (2017 – 2021 five-year average)
	Truck-Involved Suspected Serious Injury or Fatality Crash Rate	Scores the truck-involved suspected serious or fatal injury crash rate per million Truck VMT	Dynamically scored by suspected serious or fatal injury truck-involved crash rate per 100 million truck miles traveled. *Total possible points: 4*	DOTD Crash Database (2017 – 2021 five-year average)
Reliability	Truck Travel Time Reliability	Scores roadways that are unreliable based on the Truck Travel Time Reliability (TTTR)	Flag roadways with a TTTR > 2.0 or > 1.5 on Interstates Dynamically scored the flagged roadways based on truck volumes. *Total possible points: 4*	National Performance Management Research Data Set (2022)
	Bottleneck Locations	Scores roads identified as truck bottlenecks by the FHWA	Scored 4 points to the top 10 FHWA bottlenecks and the ATRI bottleneck. Scored 2 points to the top 11-100 FHWA bottlenecks.	ATRI; FHWA

[48] Crashes included in the analysis of Safety Needs were limited to those where trucks were the first or second vehicle listed in the crash report.

Needs Category	Metric	Description	Scoring	Data Source(s)
		Freight Mobility Tool or the American Transportation Research Institute (ATRI).	*Total possible points: 4*	
Asset Management	Bridge Condition	Scores bridges in poor condition where truck volumes are likely to worsen the condition.	Flagged segments containing a bridge where any component is in poor condition. Dynamically scored the roadways based on truck volumes. *Total possible points: 4*	National Bridge Inventory (2022)
	Pavement Condition	Scores poor pavement condition roadways where truck volumes are likely to worsen the condition.	Flagged segments where pavement condition is poor. Dynamically scored the roadways based on truck volumes. *Total possible points: 4*	DOTD (2023)
Freight Design	Bridge Weight Restrictions	Scores roadways with a posted load limit bridge	Flag roadways with a posted load limit Dynamically scored the roadways based on the FNI score. *Total possible points: 4*	National Bridge Inventory (2022)
	Vertical Clearance Limitations	Scores roadways with a vertical clearance of less than 16 feet.	Flag roadways with a vertical clearance limit of less than 16 feet. Dynamically scored the roadways based on the FNI score. *Total possible points: 4*	National Bridge Inventory (2022)
	OSOW Restrictions	Scores roadways with restrictions below the FHWA's recommended thresholds for	Flag roadways with a permanent OSOW restriction Dynamically scored the roadways based on the FNI score. *Total possible points: 4*	DOTD OSOW Restriction Data (2023)

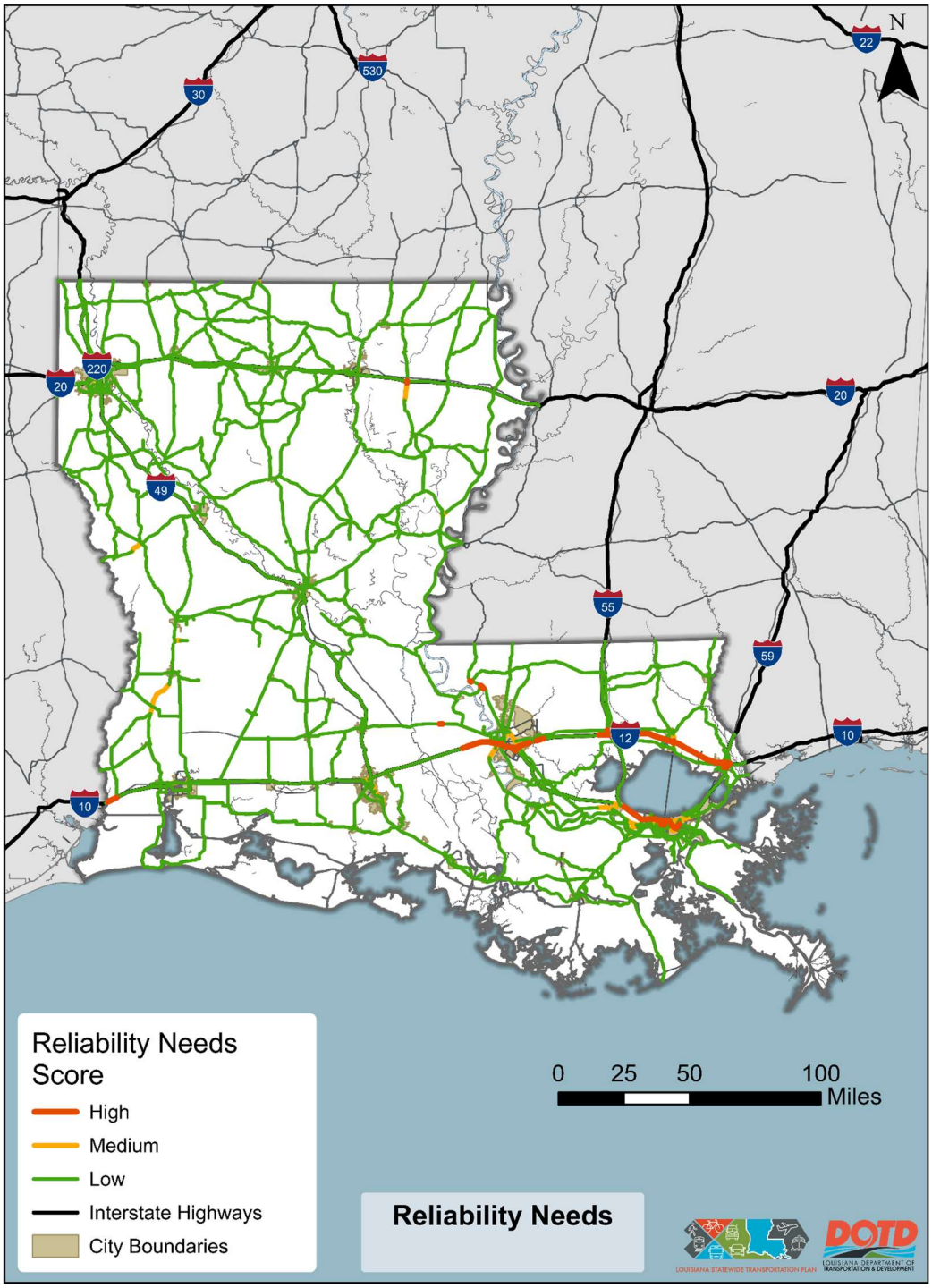
Needs Category	Metric	Description	Scoring	Data Source(s)
		OSOW auto-permitting.		
	Inadequate Travel Lanes	Scores roadways where the lane width is less than 11 feet.	Flag roadways with a lane width less than 11 feet Dynamically scored the roadways based on the FNI score. *Total possible points: 4*	DOTD (2023)
Truck Parking	Demand at Public Parking Sites	Scores whether public truck parking sites are at or above capacity based on the number of trucks relative to the truck parking supply at peak hours between 12 AM and 3 AM.	At or above capacity (> 100%) = 3 points Near capacity (80-100%) = 2 points Have capacity (50-80%) = 1 point *Total possible points: 3*	Streetlight (2022 yearly average)
	Warehouse and Distribution Centers	Scores the number of warehousing and distribution establishments within 2 miles of Interstates segments.	Dynamically scored the number of warehousing and distribution establishments within 2 miles of Interstates segments. *Total possible points: 3*	Claritas (2022)
	Parked Crashes Involving Trucks on Interstates	Scores truck-involved crashes that are classified as parked vehicle crashes on Interstates.	Dynamically scored the number of truck-involved crashes per mile that are classified as parked vehicle crashes on Interstates. Fatal injury crashes are given four times the weight. *Total possible points: 3*	DOTD Crash Database (2017 – 2021 five-year average)

Figure 73: Safety Needs



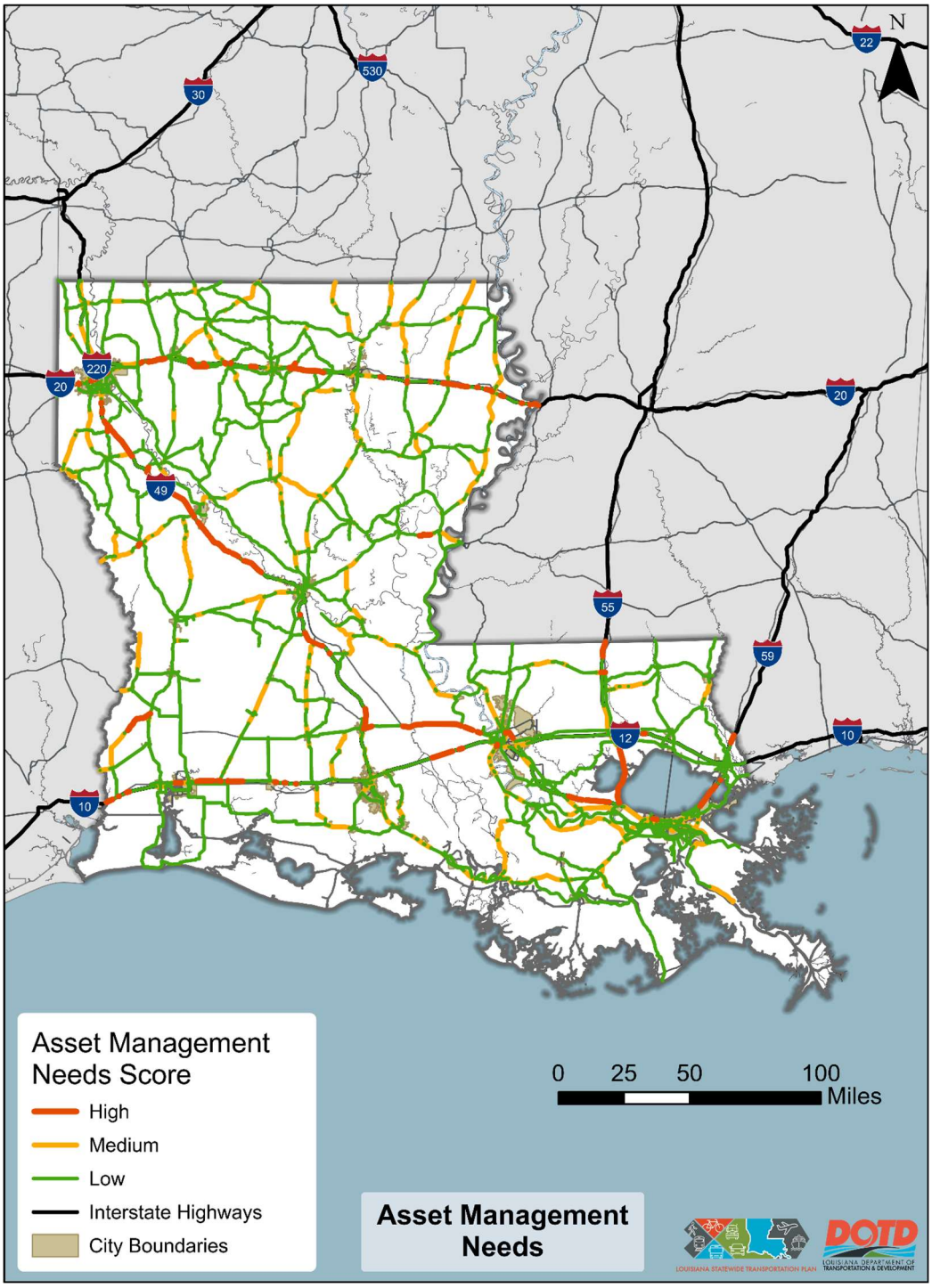
Source: Needs assessment score analysis by Cambridge Systematics (2023)

Figure 74: Reliability Needs Score



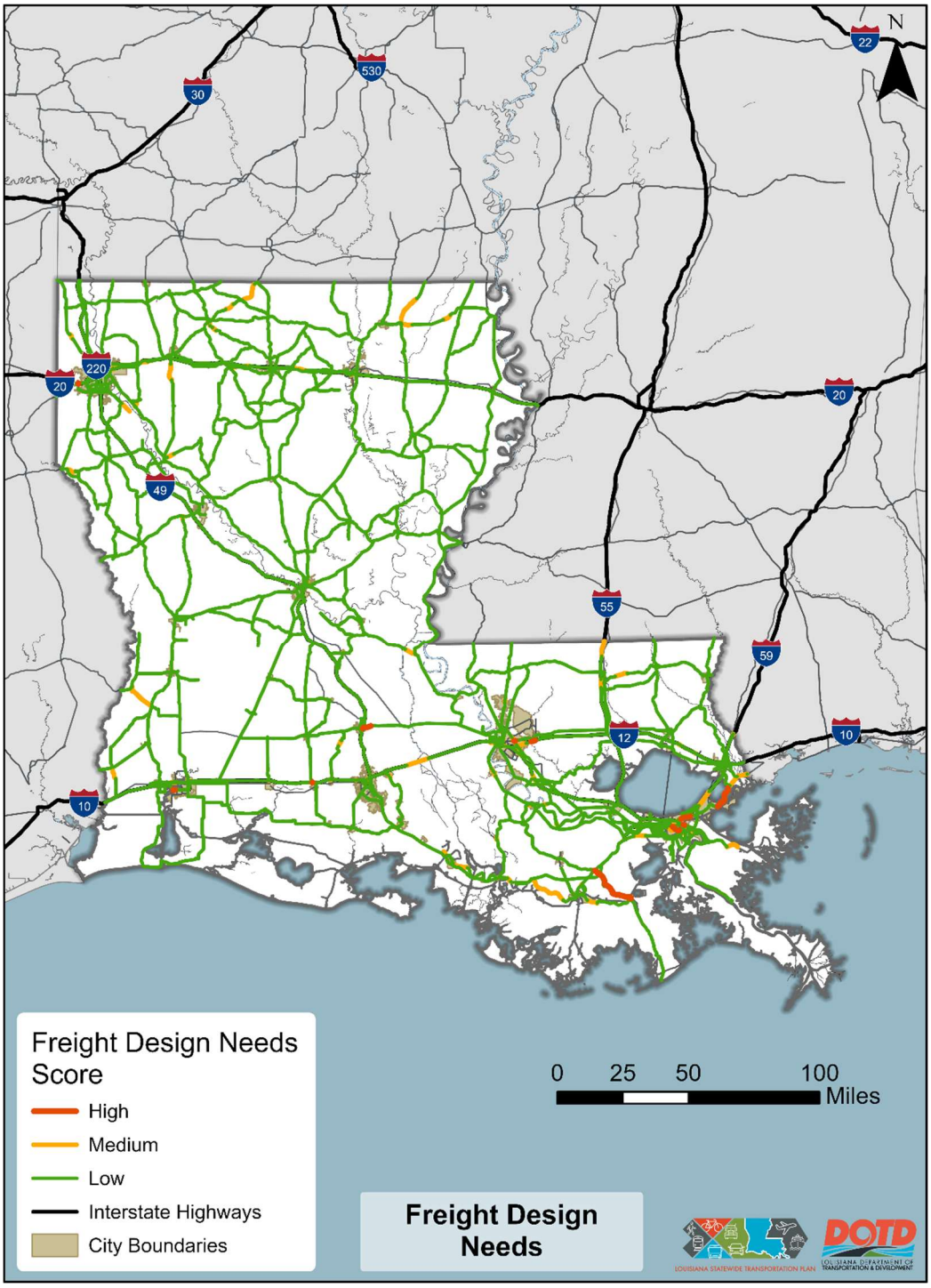
Source: Needs assessment score analysis by Cambridge Systematics (2023)

Figure 75: Asset Management Needs



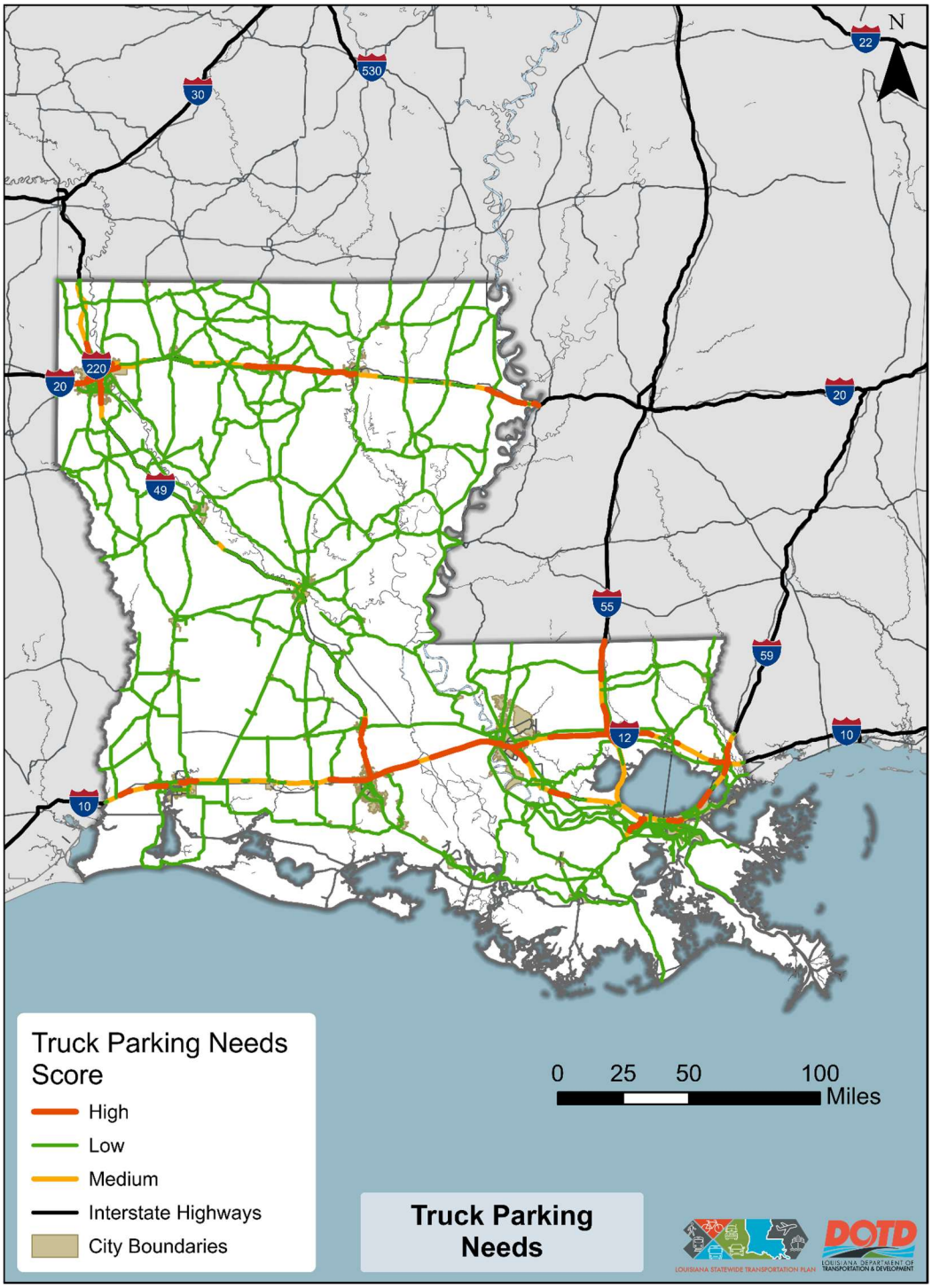
Source: Needs assessment score analysis by Cambridge Systematics (2023)

Figure 76: Freight Design Needs



Source: Needs assessment score analysis by Cambridge Systematics (2023)

Figure 77: Truck Parking Needs



Source: Needs assessment score analysis by Cambridge Systematics (2023)

Appendix C: Performance Measures

The SFP defined goals and objectives that support the Louisiana STP and the federal freight planning goals. To achieve these goals, it is important to develop performance measures to track progress, but also to increase communication and share progress with the Freight Advisory Committee and other freight stakeholders. Internal to DOTD, performance measures can serve three specific purposes:

- **PLANNING**: Performance measures can be used to evaluate proposed projects and scenarios to gauge their effectiveness in achieving the goals. These high-level metrics can create an evaluation of alternatives.
- **IMPLEMENTATION**: Performance measures can be used to emphasize the goals within the policy development, budgeting, programming, and project selection processes. For example, the measures might assist decision-makers in the project selection process by providing metrics about their potential effectiveness.
- **ACCOUNTABILITY**: Performance measures can facilitate tracking and reporting DOTD's progress in achieving the SFP's goals, supporting accountability for plan implementation and results.

Performance measures can help achieve a plan but should not be considered a grade. These measures must be applied to something within DOTD's control—otherwise, a performance measure has no value. It only presents a risk of DOTD being held accountable for results they cannot influence. The potential measures and indicators listed below are tied to available quantitative information. They are intended to guide future investment decisions and can also be used to assess implementation progress. Indicators are important data points to monitor the status of the freight system; however, they are outside of the direct influence of DOTD. DOTD will further define the performance measures and indicators in forthcoming planning activities.

Table 21: Freight Performance Measures and Indicators

SFP Goal	Potential Measures	Potential Indicators
Economic Competitiveness and Efficiency	• LHFN Reliability (TTRI) • LHFN Delay (Congestion) • LHFN Average Truck Speed • Cost of Highway Bottlenecks (FHWA Tool)	• Truck Volumes • Truck Volumes as a % of VMT • Shortline 286k mileage • Air Cargo Tonnage or Value • Pipeline shipments • Rail tonnage
Safety	• CMV Crash Rate • CMV Fatal and Suspected Serious Injury Crash Rate • Parked truck crashes • Railroad grade crossing crash rate	• Age of Pipelines by type • Pipeline incidents • Number of Truck Parking Spaces
Security	• N/A	• Cargo Theft Information (FBI Data)
Resiliency	• Unplanned closures of moveable bridges (time)	• Lock and Dam Conditions • Time to return to normal following a major weather event
Infrastructure Preservation and Maintenance	• Pavement Condition on NHS • Bridge Condition on NHS	N/A
Environmental Stewardship	• MPO Air Quality Ratings • Truck CO2 emissions per mile on interstate highways • Truck/Active Transportation Crashes	• Mode shift
Performance and Accountability	• DOTD LMFN expenditures/systemwide expenditures • Annual performance measure updates	• DOTD LMFN expenditures