Gulf Regional Planning Commission

2050 Metropolitan Transportation Plan | GRPC MPO

Technical Report #2

State of Current Systems

September 2025

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Gulf Regional Planning Commission

2050 Metropolitan Transportation Plan

This Plan was prepared as a cooperative effort of the U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Mississippi Department of Transportation (MDOT), and local governments in partial fulfillment of requirements in Title 23 USC 134 and 135, amended by the IIJA, Sections 11201 and 11525, October 1, 2021. The contents of this document do not necessarily reflect the official views or policies of the USDOT.

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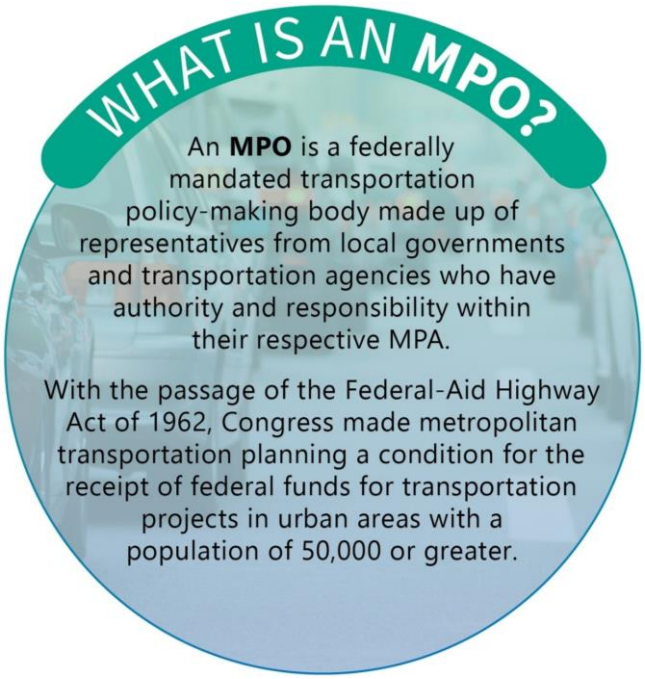
1.0 Introduction

As part of the statewide MULTIPLAN effort, the ***2050 Metropolitan Transportation Plan*** (MTP) replaces the 2045 MTP and serves as the long-range transportation plan for the Gulf Regional Planning Commission (GRPC) Metropolitan Planning Area (MPA). This State of the Current Systems Report provides updated data and analysis, includes an overview of the existing conditions, trends, and plans, and serves as the foundation for improvement recommendations to address identified transportation needs within the region.

The plan sets a regional vision and course of action for addressing the transportation needs of the MPA over the next twenty-five years.

1.1 Metropolitan Planning Organization Purpose and Primary Function

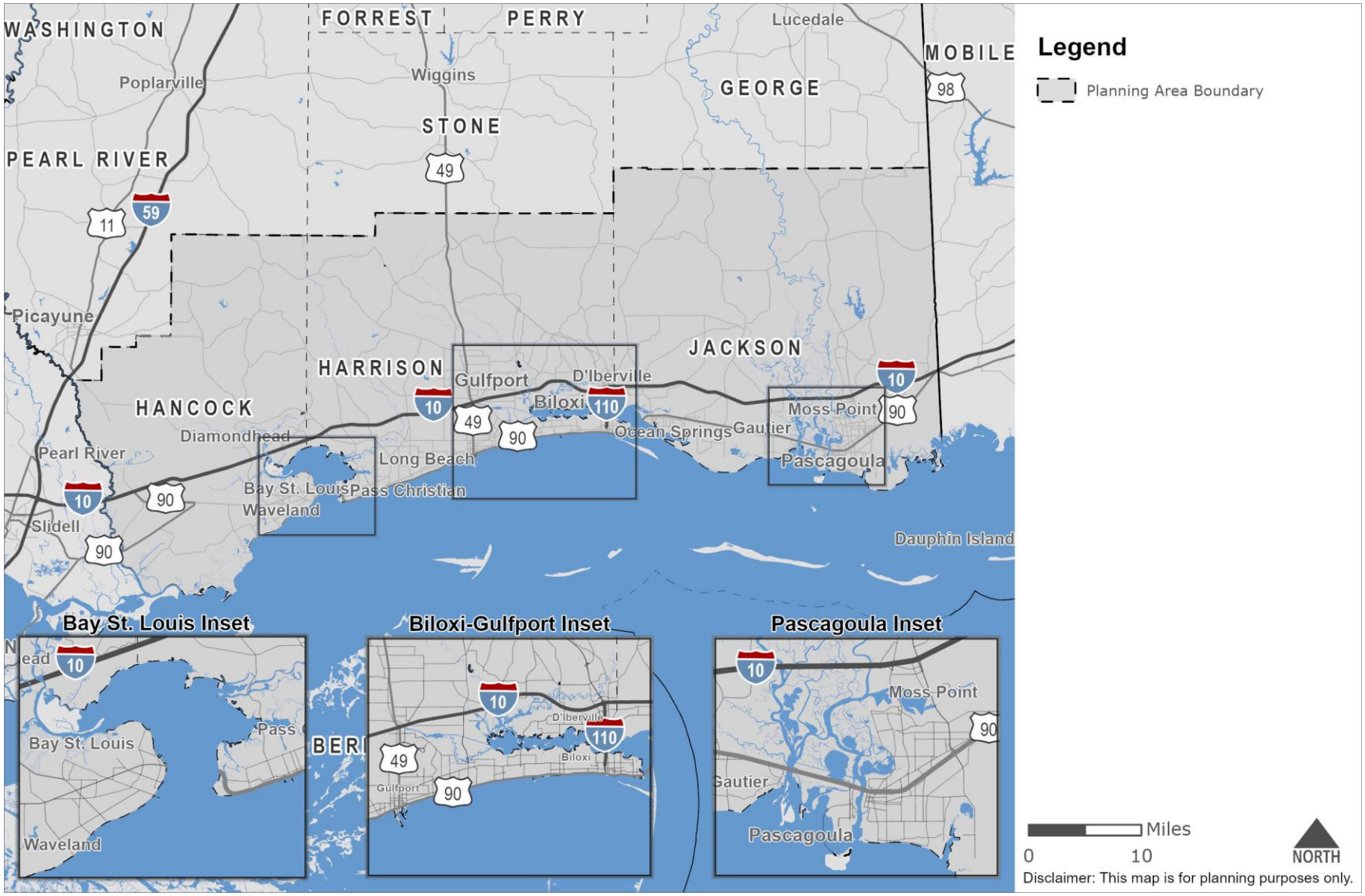


The GRPC serves as the Metropolitan Planning Organization (MPO) for the urbanized areas, and areas anticipated to be urbanized by the Year 2050, of Gulfport-Biloxi and Pascagoula-Moss Point. This includes the entirety of Hancock, Harrison, and Jackson Counties, shown in **Figure 1**.

The goal of GRPC MPO is to, "promote a safe, efficient and fiscally sound transportation system that serves the travel needs of coastal residents, businesses and visitors."[1] To meet this goal, the MPO incorporates both a performance-based and a continuing, cooperative, and comprehensive (3-C) planning approach within their transportation planning process. This ensures that MPO programs are meeting intended targets while meaningful coordination is conducted between MPOs, states, and public transit providers in urban areas.

[1] GRPC Overview | Gulf Regional Planning Commission

Figure 1.1: MTP 2050 Metropolitan Planning Area

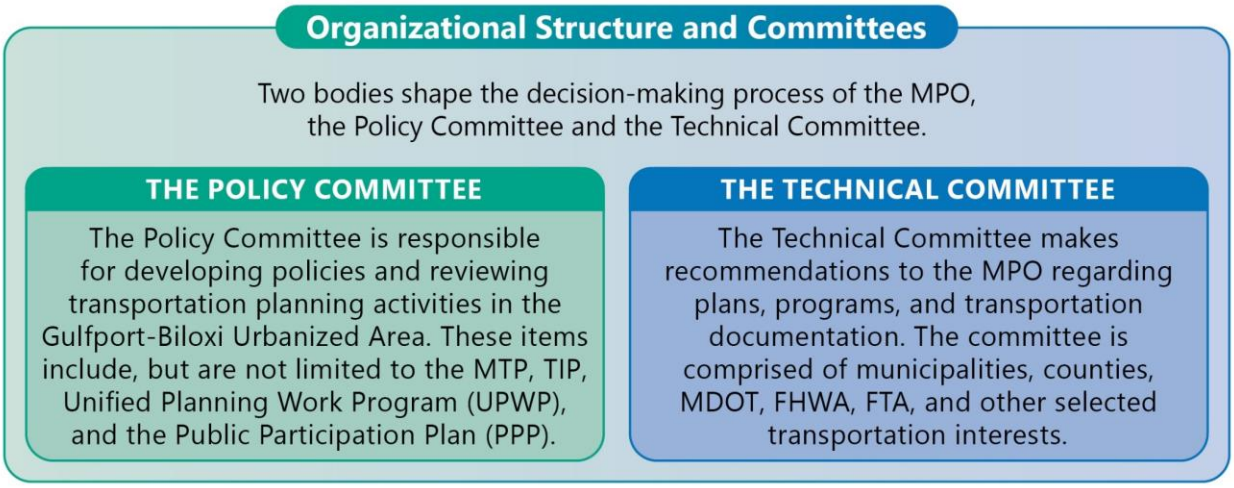


Source: GRPC, 2024

MPO Structure and Processes

Organizational Structure and Committees

The MPO has two committees, which meet quarterly and shape its decision-making process. These include the Policy Committee, which serves as the official decision-making body, and the Technical Committee, which provides recommendations to the MPO and is comprised of MPO employees and representatives of the Cities and Counties within the area.



More information about the MPO committees is available at About the MPO | Gulf Regional Planning Commission.

Performance-Based Planning Approach

Performance based planning and programming (PBPP) is the application of performance management to the long-range planning and programming process. PBPP uses data-derived indicators about the current and desired transportation system to determine how best to analyze and allocate limited funds, and evaluate program outcomes. This approach is utilized throughout the MTP, and key participants were included to represent different perspectives during plan development. These key participants include:

- Hancock, Harrison, and Jackson Counties
- The Cities of Gulfport, Biloxi, D'Iberville, Waveland, Bay St. Louis, Pass Christian, Long Beach, Ocean Springs, Gautier, Pascagoula, Diamondhead, and Moss Point, Mississippi
- Mississippi Department of Transportation (MDOT)
- The Federal Highway Administration (FHWA)
- The Federal Transit Administration (FTA)
- Other Stakeholders

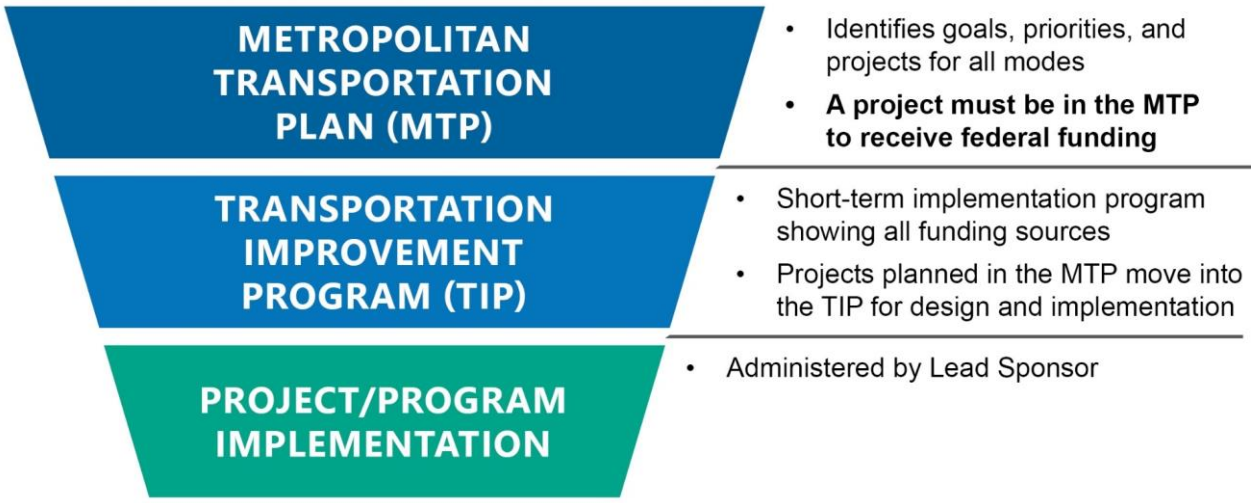
3-C Planning Process

The primary purpose of metropolitan transportation planning is to ensure transportation planning in urbanized areas is executed through a 3-C planning process. This ensures that transportation planning is:

1. based on the most current information,
2. reflects regional needs and priorities,
3. considers all modes of transportation, and
4. are consistent with statewide and other planning efforts.

1.2 The Metropolitan Transportation Plan

MTP adoption is the first step towards the implementation of any transportation project using federal funds and is also required for any regionally significant transportation project, regardless of funding source. Following the formal adoption of the plan, a project can be programmed in the Transportation Improvement Program (TIP), which is used to identify phases, funding sources, fiscal year(s) of implementation, and the estimated amount of funding to be used. This is illustrated below.



Federal Requirements

Federal requirements for transportation planning include regulations and policies from multiple federal agencies, including the FHWA, FTA, EPA, and other agencies as applicable. The requirements that directly relate to the transportation planning process and apply to the MTP are included in this section.

FHWA Requirements

The FHWA defines metropolitan transportation planning as:

> *"…the process of examining travel and transportation issues and needs in metropolitan areas. It includes a demographic analysis of the community in question, as well as an examination of travel patterns and trends. The planning process includes an analysis of alternatives to meet projected future demands, and for providing a safe and efficient transportation system that meets mobility while not creating adverse impacts to the environment."*[2]

Additionally, the MTP must provide for consideration and implementation of projects, strategies, and services that will address the following ten (10) planning factors, as defined in 23 CFR 450.206[3].

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
2. Increase the safety of the transportation system for motorized and non-motorized users.
3. Increase the security of the transportation system for motorized and non-motorized users.
4. Increase accessibility and mobility of people and freight.
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and encourage consistency between transportation improvements and state and local planned growth and economic development patterns.
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
7. Promote efficient system management and operation.
8. Emphasize the preservation of the existing transportation system.
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and
10. Enhance travel and tourism.

Federal law requires every MPO to prepare and update a transportation plan for its MPA.

[2] https://www.fhwa.dot.gov/planning/processes/metropolitan/

[3] https://www.ecfr.gov/current/title-23/section-450.206

EPA Requirements

Air quality standards are set by the U.S. Environmental Protection Agency (EPA) and are used to monitor and provide standards for air quality. This allows for air quality metrics to be measured against national standards. Areas which meet or exceed air quality standards are defined as attainment areas. Areas which fall below this standard are designated as either an air quality nonattainment or maintenance area and have additional reporting requirements.

Areas which are designated as non-attainment must update to their plans every four (4) years, as opposed to every five (5) years, and ensure that their MTP, TIP, and federally funded projects conform to the purpose of the State Implementation Plan (SIP). Additionally, some areas with pervasive poor air quality may be required to adopt specified control requirements.

While the region is currently in attainment for air quality standards, the EPA periodically updates their quality standards. A future update, or worsening pollution, could cause the MPO to become a non-attainment area. If this occurs, the MPO will be held to the stricter reporting and planning requirements until sufficient progress is made and air quality metrics meet or exceed EPA attainment standards.

Additional Requirements and Considerations

Urbanized areas with populations greater than 200,000 persons typically have more complex transportation systems, and associated challenges, than smaller regions. To address this, the FTA and FHWA designate these more populated regions as Transportation Management Areas (TMAs) and require them to complete additional planning responsibilities.

The major MTP-related requirement for TMAs is the development of a Congestion Management Process (CMP), which is intended to address congestion through a process that provides effective transportation system management and operations. A CMP is also based on cooperatively developed travel demand reduction and operational management strategies.

The CMP establishes a systematic method to identify and evaluate transportation improvement strategies, including operations and capital projects.

Projects and strategies from the CMP should be considered for inclusion in the MTP and, subsequently, the TIP. The CMP for this planning effort is included in *Technical Report #6: Congestion Management Process*.

1.3 Community Inclusion

The MPO's Public Participation Plan (PPP) specifies the way the MPO prevents discrimination and accommodates these populations and is available from the MPO.

Federal legislation and Executive Orders prohibit discrimination and/or exclusion from participation in any program or activity receiving federal financial assistance based on:

- Race
- Color
- National Origin
- Disability
- Income
- Limited-English Proficiency

Policies Guiding Community Inclusion

The following laws, policies, and Executive Orders (EO) guide equity activities in transportation planning efforts.

- **Title VI of the Civil Rights Act of 1964** ensures that no person is excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, or national origin.

- **The Rehabilitation Act of 1973** and the **Americans with Disabilities Act (ADA) of 1990** encourages the participation of people with disabilities in the development of transportation and paratransit plans and services.

- **Executive Order 13166: Improving Access to Services for Persons with Limited English Proficiency,** signed in 2000, requires federal agencies to examine the services they provide, identify any need for service to those with Limited English Proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them.

1.4 Plan Adoption and Amendment Process

The development of the MTP is a time-consuming process that requires a large amount of data and information. The process provides several opportunities for the general public and stakeholders within the area to participate in shaping the plan and determining its needs and priorities. *Technical Report #5: Plan Development* describes the activities undertaken to involve the public and stakeholders.

The plan process also includes a formal review of the draft document. The draft is provided to the general public and contains a 45-day public review and commenting

period. Following this stage, the comments are considered and addressed. The MPO will then endorse or adopt the plan for approval, where it is then sent to the appropriate federal agencies for determination of compliance with the federal planning requirements. Once it has been determined that the MTP is compliant, the plan becomes an approved document.

Additional information on the plan adoption process can be obtained from the MPO.

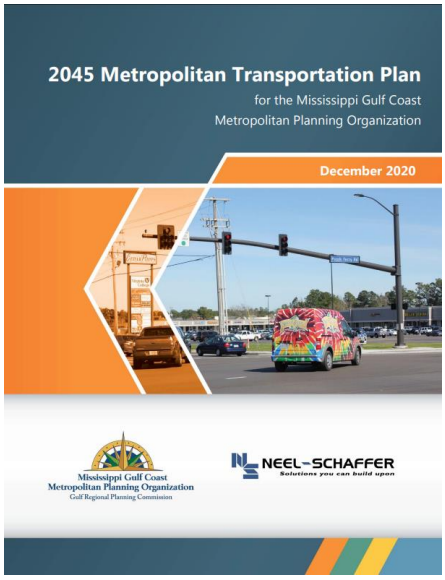
2.0 Existing Plan Review

Previous plans, studies, and related documents can influence the 2050 MTP and identified strategies. Though this chapter is not a comprehensive list of every plan or study conducted within the GRPC region, it does include an overview of the plans which are most likely to have the greatest impact on the MTP update.

2.1 MPO and Regional Plans and Policies

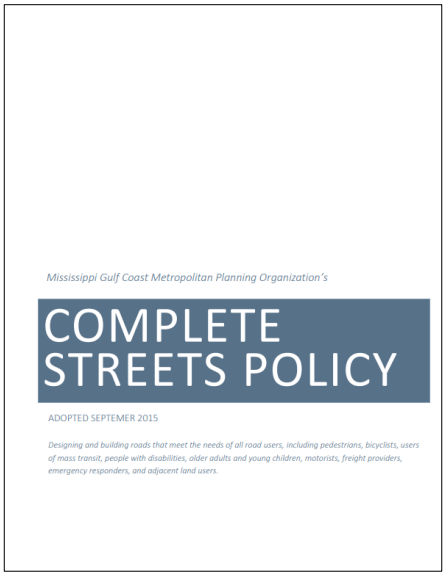
2045 Metropolitan Transportation Plan

The Metropolitan Transportation Plan (MTP)[4] is a critical product of the planning process, mandated for federal funding recipients. Developed and maintained by the GRPC and approved by the TPC, the 2045 MTP supersedes the previous 2035 and 2040 plans. The 2045 MTP outlines a vision and strategic direction for transportation investments to address future regional needs. Utilizing a transportation demand model, the plan forecasts traffic volumes and assesses projects aimed at enhancing regional mobility. It encompasses recommendations across all transportation modes, including transit, cycling, pedestrian access, and freight.



Complete Streets Policy

GRPC actively endorses and promotes complete streets policies, encouraging local governments to develop policies that accommodate all users in transportation planning. Successful implementation hinges on the ability of local jurisdictions to allocate necessary resources, including staff and funding. Increasingly, local authorities recognize the importance of integrating diverse user needs during project planning phases.

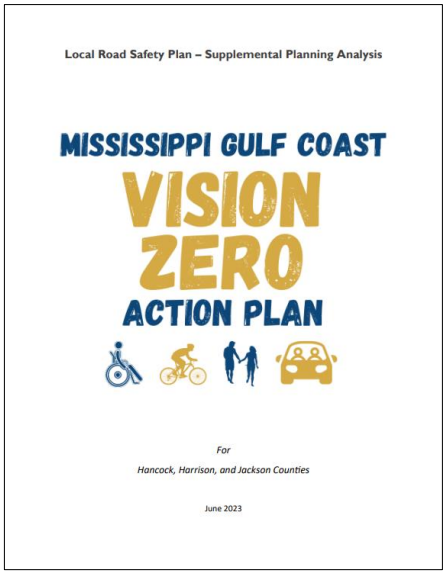


[4] https://grpc.com/mpo-programs/long-range-transportation-plan/

Gulf Coast MPO – Transportation Safety Program

Through its TIP Safety Group, GRPC funds projects aimed at enhancing safe mobility across all transportation modes on the Mississippi Gulf Coast. The Mississippi Gulf Coast MPO allocates a portion of its annual STBG funding specifically for safety-focused projects. Collaborating with MDOT and the FHWA, GRPC develops projects eligible for full federal funding as outlined in 23 U.S.C. 120 (c). Project selection is carried out by GRPC in coordination with local agencies, allowing for prompt initiation without necessitating TIP amendments.

Since 2019, GRPC has partnered with MDOT in a local road safety planning process, employing a consultant to analyze five years of crash data across Hancock, Harrison, and Jackson counties. This analysis identified emphasis areas for safety improvements. The Local Road Safety Plan (LRSP) process commenced with data analysis to pinpoint trends and concerns, leading to stakeholder engagement and the identification of countermeasures aimed at reducing future crashes.



A supplemental planning analysis has been completed to align the LRSP with the criteria for the Safe Streets and Roads for All (SS4A) Action Plan. This updated document, known as the Gulf Coast Vision Zero Safety Plan, consists of two parts: the LRSP and the Supplemental Planning Analysis, enabling the region to pursue Implementation Grants from the USDOT's SS4A program.

GRPC's Transportation Asset and Performance Management Program

GRPC's Transportation Asset and Performance Management Program establishes a systematic approach to decision-making, enhancing existing resource allocation procedures to achieve the desired outcomes. It includes goals, objectives, strategies, and performance measures aligned with the MPO planning factors outlined in 23 USC 134(h). This program informs focus areas and investment strategies for the TIP and other MPO decision-making processes.

GRPC uses both in-house and federal performance measures to assess completed projects and their progress towards regional goals.

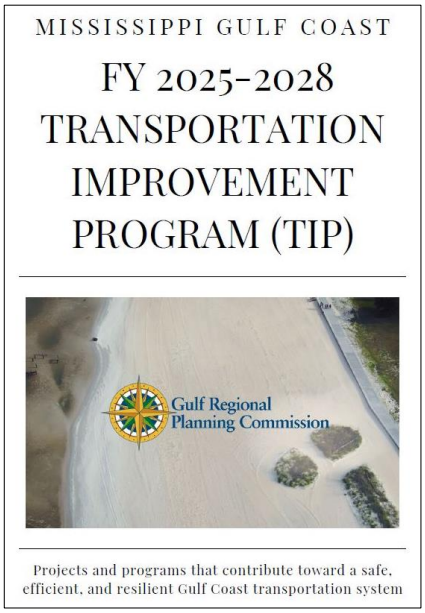
Unified Planning Work Program

The Unified Planning Work Program (UPWP) outlines the transportation studies and tasks that GRPC's MPO staff and member agencies will undertake to support regional transportation planning. It details project funding sources, schedules, and responsible agencies for each task or study. The MPO staff facilitates collaboration among governments, stakeholders, and residents to reaffirm the regional transportation vision, employing data and planning methodologies to develop and assess alternatives, policies, and processes for efficient resource allocation.

Transportation Improvement Program

The TIP serves as the short-range component of the planning process, covering a four-year project implementation period. It is incorporated into MDOT's State Transportation Improvement Program (STIP), which addresses statewide transportation needs.

The TIP is financially constrained, ensuring that programmed funds do not exceed anticipated funding availability. New TIPs are developed biennially through collaborative efforts involving local leaders, state officials, transit operators, federal agencies, and public input.



2.2 State and Federal Plans

A requirement of the MTP is consistency with other plans and process, including, but not limited to:

- the State's Strategic Highway Safety Plan (SHSP),
- the State Transportation Improvement Program (STIP),
- the statewide transportation planning process, and
- other safety and security plans.

Before any changes can be made to the MPO's TIP or Mississippi's STIP, they must be made in the MTP. Additionally, the MTP should also be developed to be consistent with the FTA's coordinated public transit human services transportation plan, the regional Intelligent Transportation Systems (ITS) architecture, and locally adopted planning documents.

3.0 Demographic Profile

Trends in demographic data can provide insight into how the MPA has historically grown and how it is expected to grow and change over time. This information supports long-range planning by helping to both identify current needs and anticipate future ones. Data within this section largely comes from the 2020 US Census, 2022 American Community Survey (ACS) 5-Year Estimates, and the Bureau of Labor Statistics.

3.1 Population

The Gulfport-Biloxi MPA has shown a steady increase in population. According to the 2020 Census, 416,259 people reside within the MPA. This shows an increase of 27,771 people, or by 7.1%, since the 2010 Census.

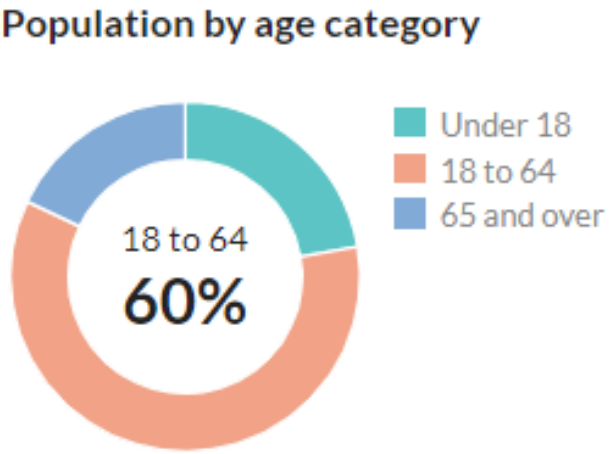
Age/Race

Within the Mississippi Gulf Coast region, more than half (51 percent) of the residents fall within the age group of 20-59 years old. This metric is important as it describes the people who are considered to be of working age. **Figure 3.1** expands this to display the age breakdowns of those under 18, over 64, and between 18-64 years of age within the MPA.

Additionally, as shown in **Figure 3.2**., 65% of residents within the MPA is identify as being White and just over 20% identify as being Black or African American.

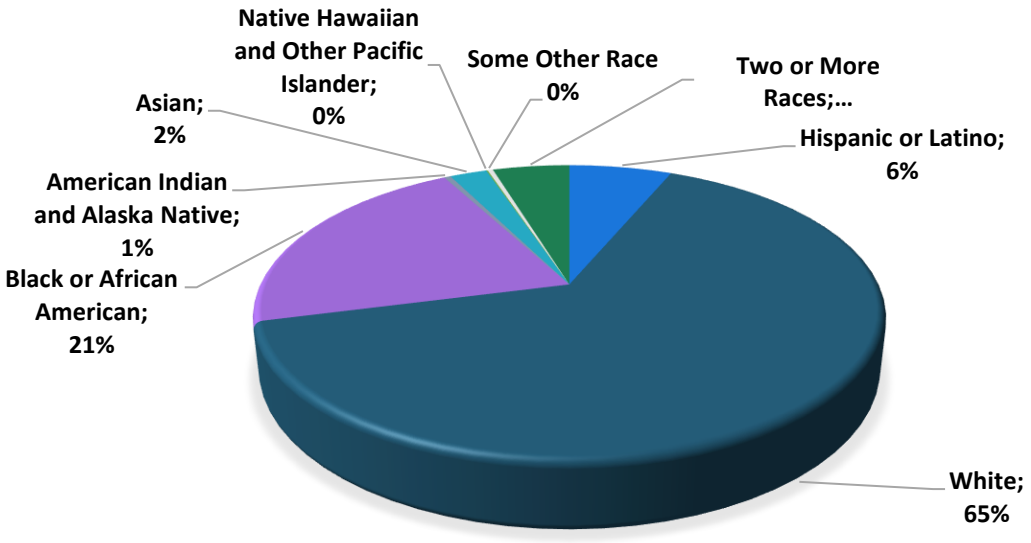
Household population data by County, which was used within the Travel Demand Model (TDM), is displayed in **Table 3.1**. Additional information about the TDM and its development can be found in *Technical Report #1: Model Development*.

Figure 3.1: Population by Age Category



Source: Census Reporter, Census profile: Gulfport-Biloxi , MS Metro Area 2022

Figure 3.2: Race Within the Gulfport-Biloxi MPA



Source: Census 2020

Table 3.1: Study Area Households and Population, 2022

Variable	Hancock County	Harrison County	Jackson County	Model Study Area Total
Dwelling Units	22,895	92,309	62,473	177,677
Occupied Dwelling Units	19,386	80,191	55,373	154,950
Household Population	45,744	204,496	142,487	392,727

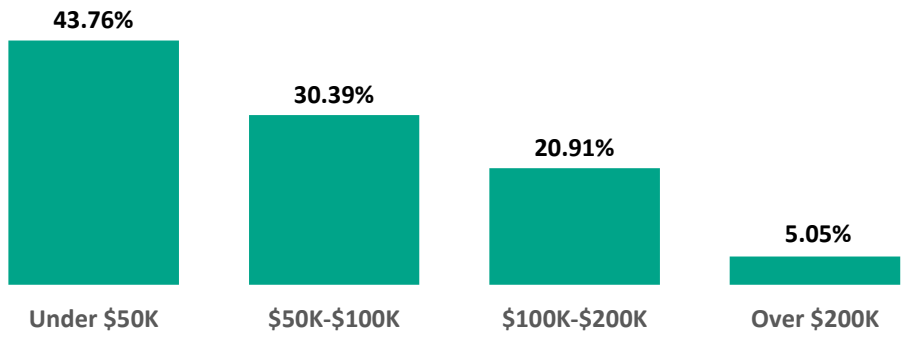
Source: Data USA, Gulfport-Biloxi , MS Metro Area 2022 ACS 5-Year Estimates

3.2 Home Ownership, Income, and Economics

The majority of persons residing within the MPA are homeowners, with 67% of households being owner-occupied. The highest density of renters is located in Harrison County, where 40% of residents rent their housing.

Of the region's households, almost forty-four (44) percent make less than $50,000 a year. **Figure 3.3** illustrates household income breakdowns for Hancock, Harrison, and Jackson Counties combined.

Figure 3.3: Household Income in the Gulfport-Biloxi MPA



Source: 2022 ACS 5-Year Estimates

3.3 Employment

In recent years, the Mississippi Gulf Coast area has seen a slight decline in regional employment. Common jobs throughout the study area include Educational Services, Health Care and Social Assistance (40,470 employees) and Arts, Entertainment, and Recreation, and Accommodation and Food Services (24,868 employees).

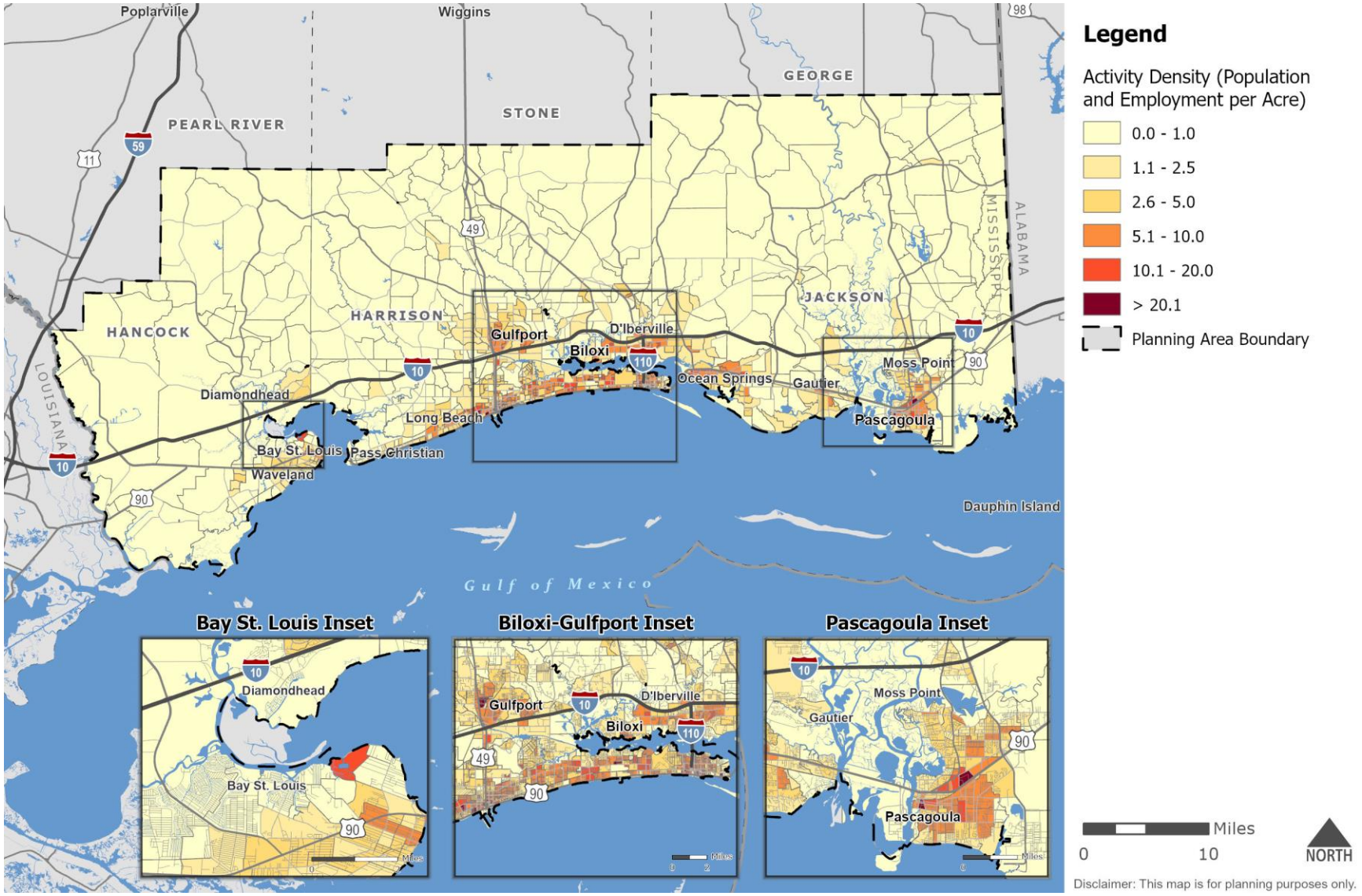
Employment data used within the Travel Demand Model, and information about the TDM and its development, can be found in *Technical Report #1: Model Development*.

3.4 Activity Density

An area's activity density the sum of its population and employment, divided by its physical area. This displays areas which may not have a significantly high population or employment density alone, but still generate significant activity overall. It also displays where mixed-use areas within the MPA exist. Shown in **Figure 3.4**, the greatest activity densities in the MPA are:

- Gulfport,
- Biloxi,
- Pascagoula, and
- Bay St. Louis.

Figure 3.4: MPA Activity Density



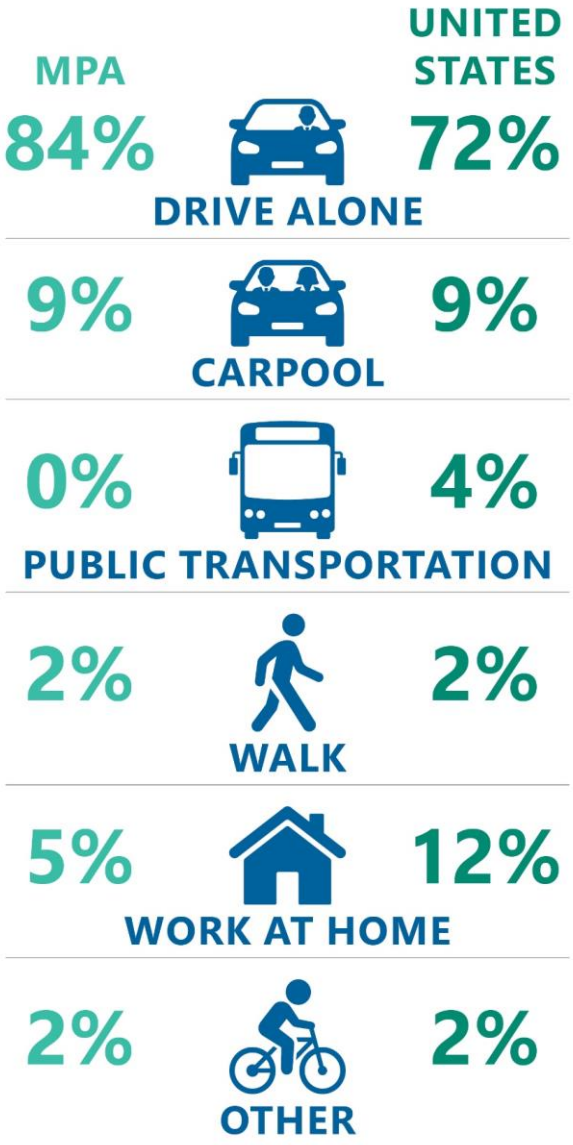
Source: U.S. Census Bureau, 2024; QCEW, 2024

3.5 Existing Travel Patterns

Commuting patterns can provide insight into overall travel patterns. Data obtained from the ACS 5-Year Estimates shows that the travel time to work is relatively short within the MPA. Virtually all workers reside in tracts that have mean commute times under 30 minutes.

As seen in **Figure 3.5**, over 80 percent of commuters in the MPA counties drove alone to work and less than 10 percent (8.8%) carpooled. Walking, biking, or using public transit to commute to work was uncommon.

Figure 3.5: Means of Transportation to Work



Source: *American Community Survey 2022 5-Year Estimates*

3.6 Housing and Transportation Affordability Index

The Housing and Transportation Affordability Index is a tool that uses the cost of housing and transportation to provide a comprehensive understanding of the affordability of a location. It does this by dividing housing and transportation costs by income, which illustrates the burden these expenses place on a typical household.

While housing alone is traditionally deemed affordable when consuming no more than 30 percent of income, the Housing and Transportation Affordability Index also incorporates transportation costs (15 percent), as this is usually a household's second-largest expense. The combined cost index offers an expanded view of affordability, which sets the benchmark at 45 percent of household income. Housing and transportation expenses that exceed this benchmark signify a lack of affordability and a larger financial burden on households.

County Overview

Hancock County

The average household in Hancock County spends over half, 54 percent, of their income on housing and transportation. Of this, 26 percent is spent on housing and 28 percent is spent on transportation. This means Hancock County exceeds the affordability value by nine percent.

Harrison County

The H&T Index indicates that the average household in Harrison County also spends nearly half, 48 percent, of their income on housing and transportation. Of this, 23 percent of the income is spent on housing and 25 percent is spent on transportation. This means Harrison County exceeds the affordability value by three percent.

Jackson County

The Index indicates that the average household in Jackson County also spends more than half of its income, 53 percent, on housing and transportation. The average household in Jackson County spends 26 percent on housing and 27 percent on transportation. This means Jackson County exceeds the affordability value by eight percent.

Regional Overview

When referencing the "regional typical household," the H&T Index considers the region as the Core-Based Statistical Area (CBSA) in which the specified block group is located. All three counties within the study area fall within the Gulfport-Buloxi CBSA.

A Core-Based Statistical Area (CBSA) is a U.S. geographic area defined by the Office of Budget and Management. These areas have a metropolitan center as their core and are used in regional analysis to describe certain trends which may go beyond traditional jurisdictional boundaries, such economic, population, and social trends.

[5]

[5] https://www.congress.gov/crs-product/IF12704#:~:text=Core%20Based%20Statistical%20Areas%20(CBSAs,with%20a%20population%20of%2050%2C000.

The Gulfport-Buloxi CBSA has a typical household income of $58,287. This was used as the regional threshold, meaning that the costs of housing and transportation would need to be equal or less than 45% of regional household income in order to be considered affordable. The following regional thresholds were rounded to the nearest dollar.

- Housing Affordability Threshold (30%) - $17,486
- Transportation Affordability Threshold (15%) - $8,743
- Combined Affordability Threshold (45%) - $26,229

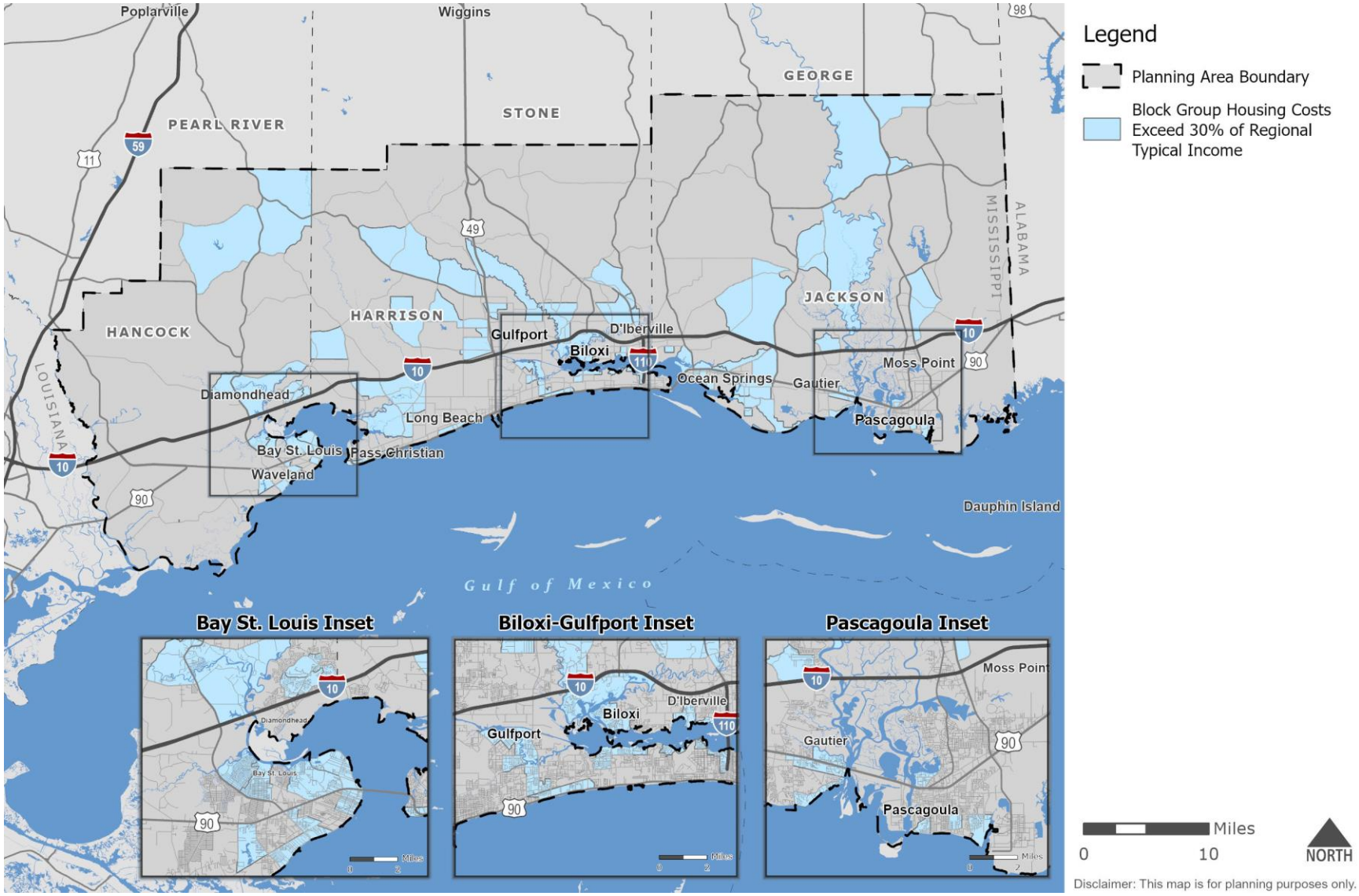
Nationally, the typical household income is $75,149. This was used as the national threshold, meaning that in order to be seen as affordable according to national levels, the costs of housing and transportation would need to be equal or less than 45% of the typical national household income. The following national thresholds were rounded to the nearest dollar.

- Housing Affordability Threshold (30%) - $22,545
- Transportation Affordability Threshold (15%) - $11,272
- Combined Affordability Threshold (45%) - $33,817

Figure 3.6 compares housing affordability based on the Regional Typical Household income, while **Figure 3.5** compares to the National Typical Household income. **Figure 3.8** and **Figure 3.9**, respectively, compare H&T affordability based on the Regional Typical Household income and the National Typical Household income when both housing and transportation are considered.

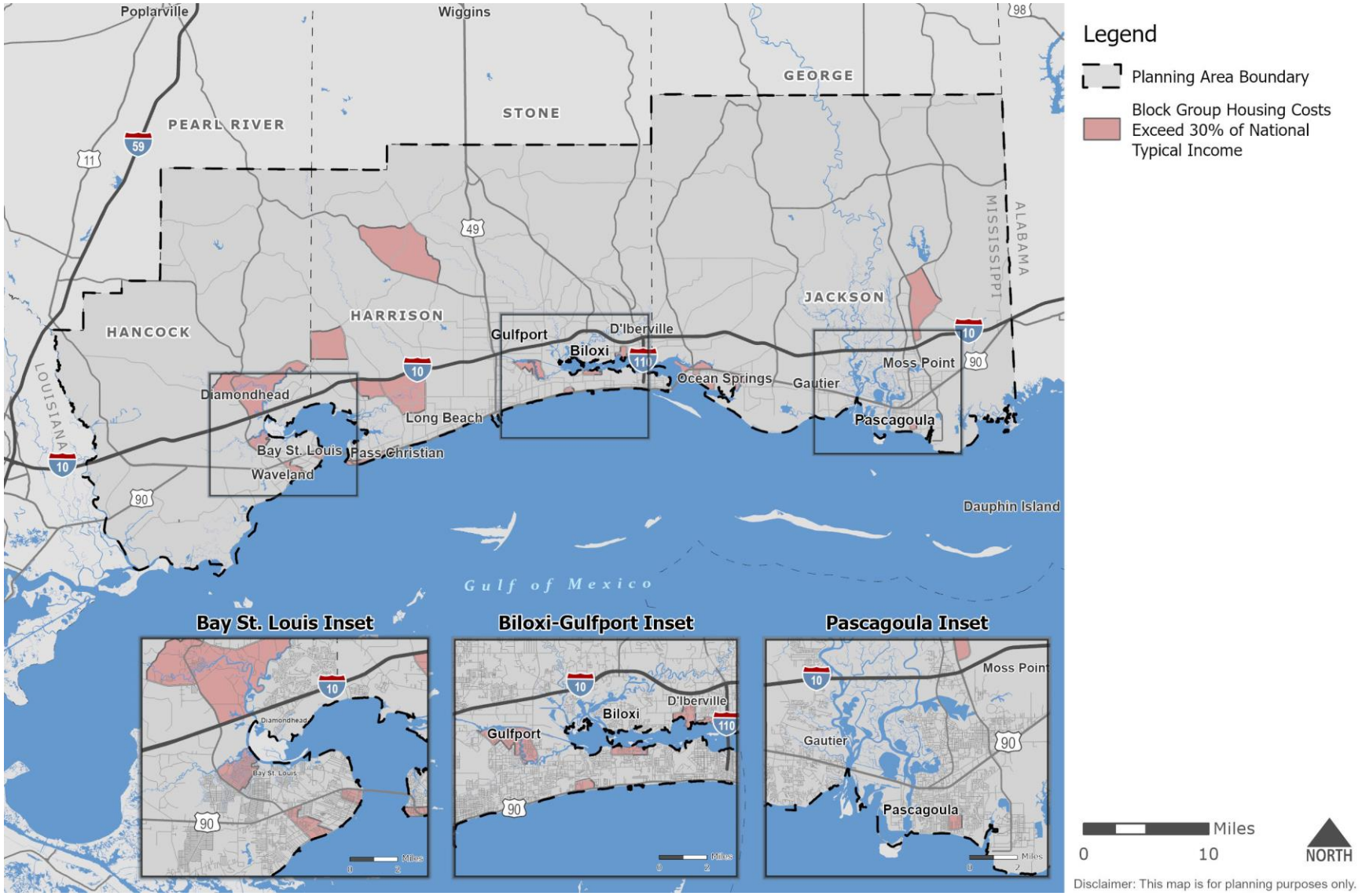
As the typical household income used for analysis comes from the regional and national data sets, it does not account for household income variability by jurisdiction. While income may vary across jurisdictional boundaries, this allows for costs to be compared to a single typical income metric, supporting affordability analysis.

Figure 3.6: Housing Affordability Compared to Regional Typical Household Income



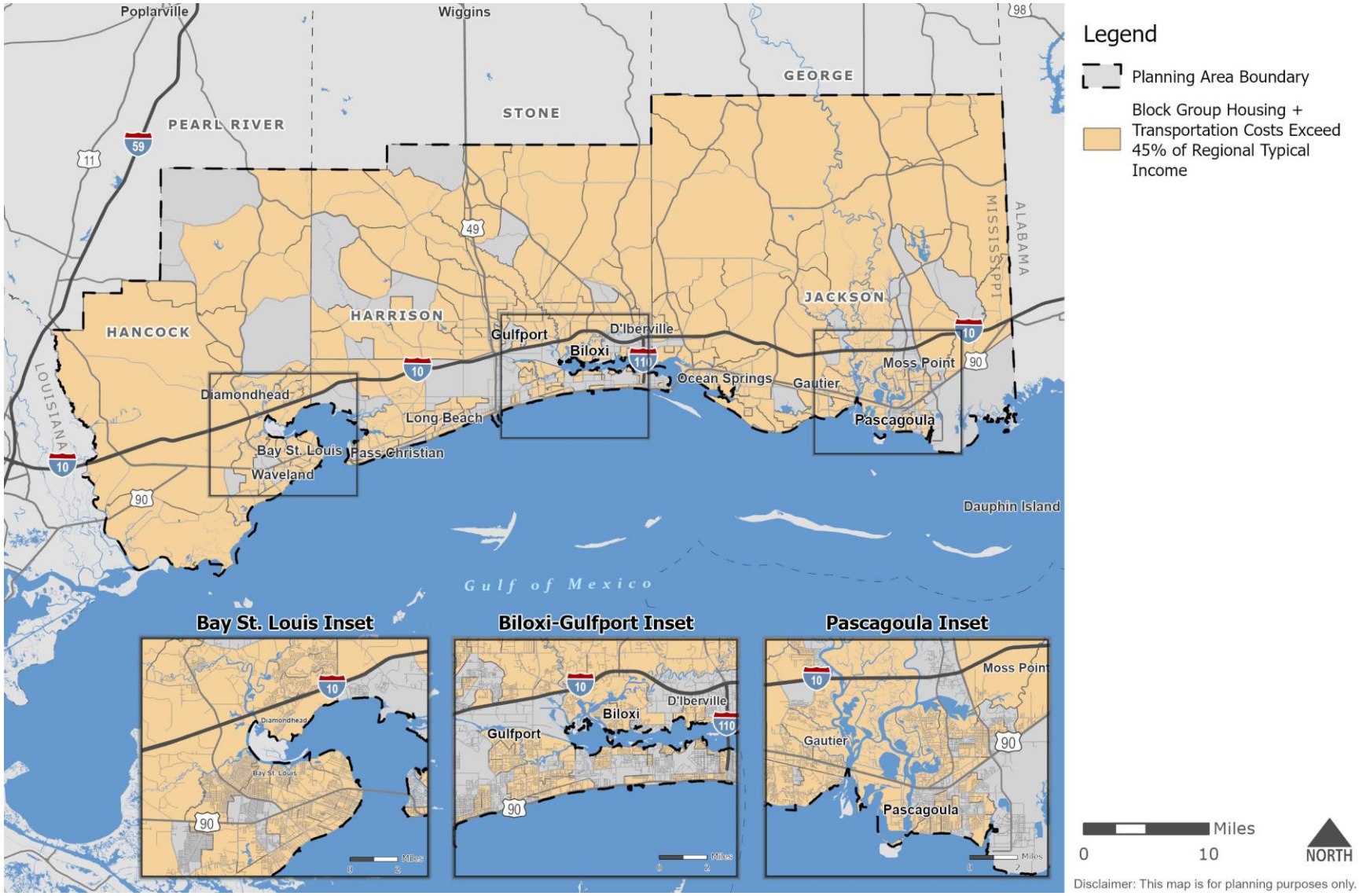
Source: H&T Affordability Index 2022

Figure 3.7: Housing Affordability Compared to National Typical Household Income



Source: H&T Affordability Index 2022

Figure 3.8: H&T Affordability Compared to Regional Typical Household Income



Source: H&T Affordability Index 2022

Figure 3.9: H&T Affordability Compared to National Typical Household Income

Source: H&T Affordability Index 2022

Transportation Costs

As shown above in the previous figures, the typical household in most MPA block groups spends more than 45 percent of their annual income on housing and transportation expenses. While housing costs are below the affordability index of 30 percent, 25 to 28 percent of household income is used on transportation costs. Additionally, the average household in each county within the MPO spends more on transportation than on housing. This suggests that transportation costs are driving down affordability in the region.

Table 3.2 displays the typical regional household costs within Hancock, Harrison, and Jackson counties. The GRPC MPO, Gulfport-Buloxi CBSA, and United States affordability metrics are included in the table for reference and comparison.

Table 3.2: Transportation Costs per Household

Area	Typical Income	Average Annual Cost			Total Average Annual Costs	
		Transit Only	Vehicle Payment	Fuel & Upkeep	Personal Vehicle Only	All Transportation
Hancock County	$58,287	$10	$12,249	$4,240	**$16,489**	**$16,499**
Harrison County	$58,287	$26	$11,148	$3,515	**$14,663**	**$14,689**
Jackson County	$58,287	$12	$11,990	$3,996	**$15,986**	**$15,997**
GRPC MPO	$58,287	$19	$11,588	$3,779	**$15,367**	**$15,386**
Gulfoport-Buloxi CBSA	$58,287	$19	$11,636	$3,808	**$15,444**	**$15,463**
United States	$75,149	-----	-----	-----	-----	**$12,295**

Source: Housing and Transportation Affordability Index 2022

*State of Mississippi average annual transportation costs per household were not included in this analysis as the Housing and Transportation Affordability Index no longer provides State-level comparative data within its most recent update.

Analysis Findings

In all three Counties, car ownership and maintenance alone exceed the 15 percent benchmark for transportation spending. High transportation costs can be attributed to the car-dependent means of travel within the region. Notably, the national annual transportation cost per household is $12,295; a value largely influenced by U.S. cities heavily reliant on public transit. Additionally, when considering personal vehicle costs before fuel and upkeep, each county surpasses the affordability benchmark of 15 percent on the cost of ownership alone.

In Jackson County, personal vehicle costs ($15,986) exceed 15 percent of regional typical household income. Additionally, Jackson County households average only 11 trips by transit a year, highlighting the inaccessibility of public transportation in the area.

While Hancock County shows slightly lower transportation costs, households in the county still spend 28 percent of their annual income ($16,499) on transportation. This is likely due to the county's low density, limited walkability, and low access to public transit services. Households within the county average nine transit trips annually.

Of the three counties within the MPA, Harrison County's households average the lowest annual transportation costs ($14,663). This can be tied to the county's improved access to transit, which is demonstrated by the typical household's average of 25 trips by transit per year. However, the cost of transportation is still unaffordable, consuming 27 percent of household income annually.

To reduce the cost of transportation on households, the MPO can coordinate with partners and other agencies to employ strategies to decrease the dependence on personal vehicles as the primary means of transportation. Alternatively, the region can provide additional investment in safer and more accessible public transport systems. Due to the region's low density, people tend to own more vehicles and travel further, increasing transportation costs per household and driving up the cost of living.

When planning land use and transportation projects, pedestrians, bicyclists, and transit users should be kept in mind. This includes placing emphasis on compact, multimodal neighborhoods. Additionally, in areas that suffer from high heat during summer months, design considerations can be made to provide passive cooling elements. This includes increasing shade, promoting airflow, and reducing the amount of heat absorbed through pavements at transit stop locations and along walking or biking paths to promote their continued use. These initiatives are essential to improving the affordability coverage throughout the counties that compose the Mississippi Gulf Coast MPA.

4.0 Roadways and Bridges

4.1 Introduction

84%
of households in the MPA commute by motor vehicle and drive alone.

The region's roadways and bridges are used by personal motor vehicles, public and private transportation providers, bicyclists, and freight trucks. These roadways can also be used to provide access to other transportation modes. This chapter discusses the general use of the MPA's roadways and bridges. The existing conditions for other modes of transportation are discussed in later chapters.

For households in urbanized areas, like the MPA, traveling by motor vehicle is the primary means of transportation. The most recent American Community Survey (ACS) 5-year estimates show that commuting by motor vehicle without carpooling is the most common form of commute within the MPA. As a result, most household travel is affected by the condition of the MPA's roadways and bridges.

4.2 The Roadway Network

Several federal and state highways serve the study area and comprise its main roadway network. The most significant of these include:

- I-10
- I-110
- US 49
- US 90
- MS 15
- MS 43
- MS 53
- MS 57
- MS 63
- MS 67
- MS 603
- MS 604
- MS 605
- MS 607
- MS 609
- MS 611
- MS 613
- MS 614
- MS 619

Roadways by Functional Classification

Each type of roadway serves a function in the overall roadway network. Roadways are divided into functional classes, shown in **Figure 4.1**, based on their intended balance of mobility (speed) and access to adjacent land. Their designs vary in accordance with this functional classification.

Figure 4.1: Roadway Functional Classifications

Interstate

- Divided highways with full access control and grade separations at all intersections.
- The controlled access character results in high lane capacities, three times greater than the individual lane capacities of urban arterials.

Principal Arterials

- Serve major activity centers, high traffic volume corridors and long trip demands.
- Carry high proportion of total urban travel on minimum of mileage.
- Interconnect and provide continuity for major rural corridors to accommodate trips entering and leaving urban area.
- Serve demand for intra-area travel between the central business district and outlying residential areas.
- Serve corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel.
- Connect all or nearly all urbanized areas and a large majority of urban areas with over 25,000 people.

Minor Arterials

- Interconnect and augment the higher-level arterials.
- Serve trips of moderate length at a somewhat lower level of travel mobility than principal arterials.
- Distribute traffic to smaller geographic areas than those served by higher-level arterials.
- Provide more land access than principal arterials without going into identifiable neighborhoods.
- Provide connections for collectors.
- Link cities and larger towns.
- Provide service that acts as a link between arterials and local roads.

Collectors

- Provide both land service and traffic movement functions.
- Serve as intermediate feeders between arterials and local streets and primarily accommodate short distance trips.
- Generally not continuous for any great length since they serve few through trips.

Local Streets

- Provide access to immediately adjacent land.
- Within the local street classification, three subclasses are established to indicate the type of area served: residential, industrial, and commercial.

In addition to the types of roadways listed, there can be additional variability in the individual categories. For example, collectors can be further subdivided into major and minor subclassifications. Major collectors describe roadways that carry low-medium traffic volumes and connect arterials and local streets. These roadways typically carry more volume and minor collectors. Minor collectors perform the same function as major collectors but carry less volume.

Table 4.1 summarizes the roadways within the MPA, including major and minor collectors, by both centerline and lane miles. **Figure 4.2** illustrates the functional classification of the MPA's roadways.

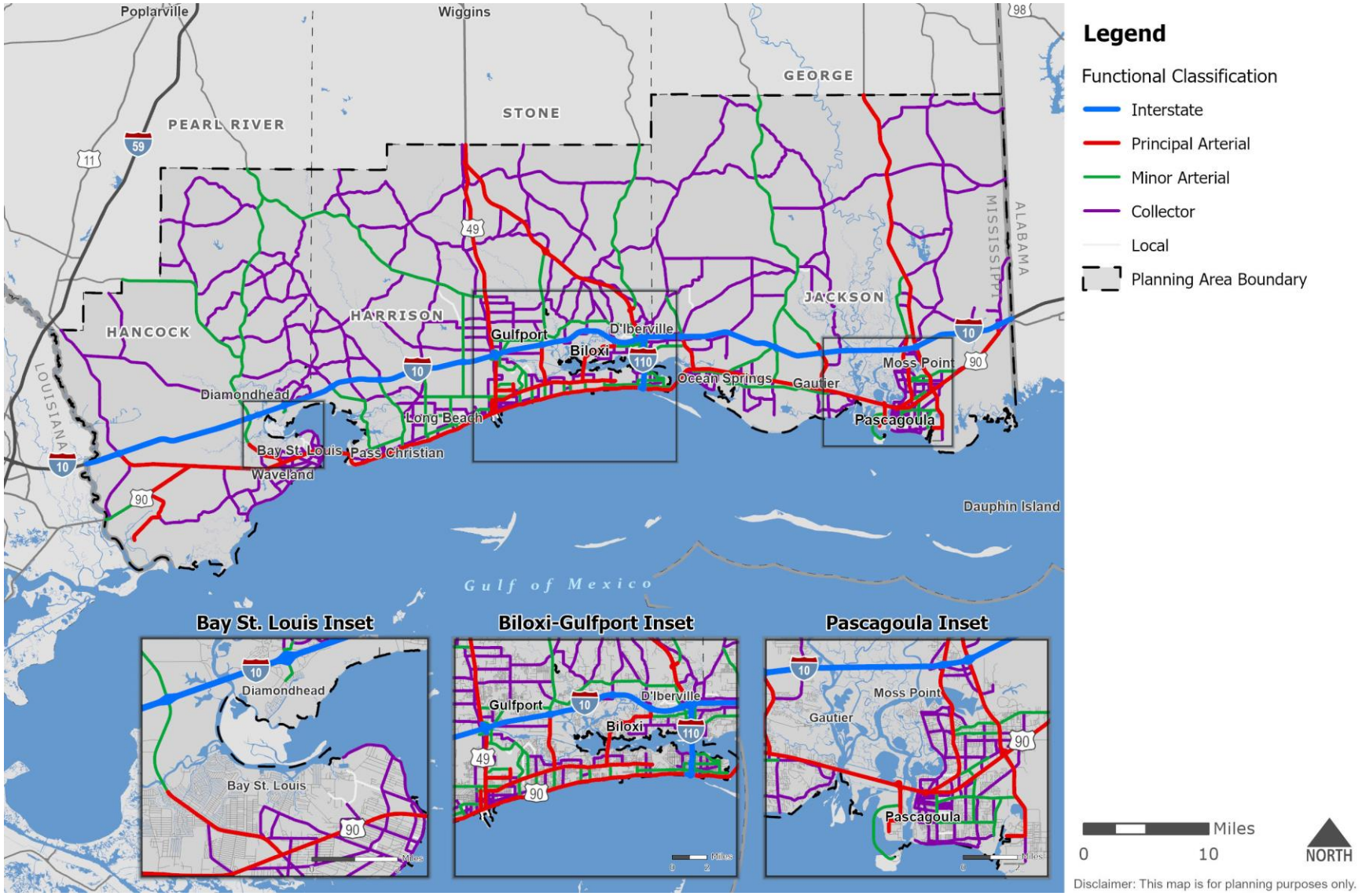
Table 4.1: Roadway Model Network Lane Mileage by Functional Class, 2022

Functional Classification	Centerline Miles		Lane Miles	
	Miles	Percent	Miles	Percent
Interstate	81.3	5.81%	196.6	5.74%
Principal Arterial	199.1	14.24%	805.4	23.53%
Minor Arterial	267.9	19.16%	633.1	18.50%
Major Collector	687.7	49.17%	1,461.6	42.71%
Minor Collector	136.7	9.77%	273.3	7.99%
Local	25.8	1.84%	52.5	1.53%
Total	**1,398.5**	**100.00%**	**3,422.5**	**100.00%**

Note: Centerline miles do not include ramps

Source: GRPC Travel Demand Model

Figure 4.2: Functional Classification of Roadways, 2022

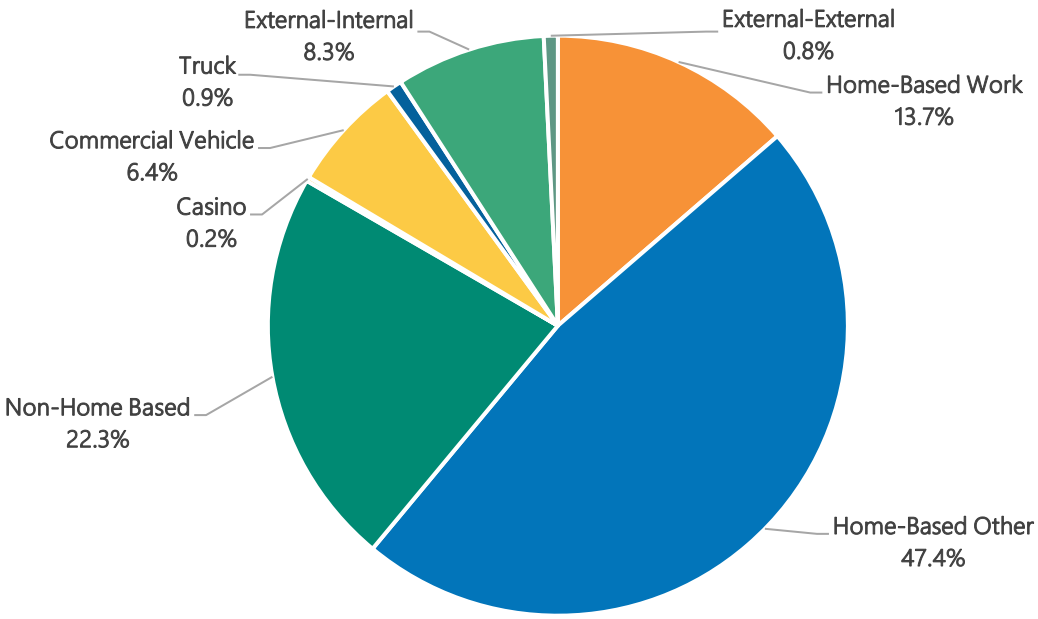


Source: MDOT, 2024; GRPC, 2024

4.3 Traffic and Congestion

Travel time data was fed into the MPO's Travel Demand Model to analyze the impact of traffic and congestion on roadways throughout the region. The number of daily trips estimated by the Travel Demand Model, by trip purpose, in 2022 is summarized below.

3,182,416
daily trips are made within the MPA.



External-external trips, also known as pass-through trips, made up less than 1 percent of vehicle trips within the MPO planning area. External-internal trips, where one leg of the trip either started or ended within the region, made up just over 8 percent of all trips. Internal commercial and freight vehicle trips (e.g., truck, taxi, etc.) account for about seven and a half percent of vehicle trips.

Table 4.2 displays how these trips are distributed onto the modeled transportation network. Approximately 22 percent of vehicles miles travelled, 15 percent of vehicle hours travelled, and 10 percent of vehicles hours of delay occur on I-10. However, nearly 70 percent of the delay is estimated to occur on the principal and minor arterials. This coincides with where the most vehicle miles and hours travelled occur. There is comparatively little delay estimated to occur on collectors and local roads.

Table 4.2: Roadway System Travel Characteristics, 2022

Functional Class	Daily Vehicle Miles Travelled (VMT)		Daily Vehicle Hours Travelled (VHT)		Daily Vehicle Hours of Delay (VHD)	
	Number	Percent	Number	Percent	Number	Percent
Interstate	4,602,356.6	37.77%	76,313.8	25.96%	2,571.1	16.96%
Principal Arterial	3,593,532.4	29.48%	82,289.7	27.99%	7,267.0	47.92%
Minor Arterial	1,486,087.8	12.19%	37,743.2	12.84%	2,473.0	16.31%
Major Collector	1,650,619.8	13.54%	45,101.8	15.34%	2,754.6	18.17%
Minor Collector	89,861.2	0.74%	2,515.2	0.86%	34.3	0.22%
Local	765,339.1	6.28%	50,004.2	17.01%	64.0	0.42%
Total	**12,187,796.9**	**100.00%**	**293,967.9**	**100.00%**	**15,164.0**	**100.00%**

Source: GRPC Travel Demand Model

Figure 4.3 displays the vehicular traffic in the MPA, which is greatest on:

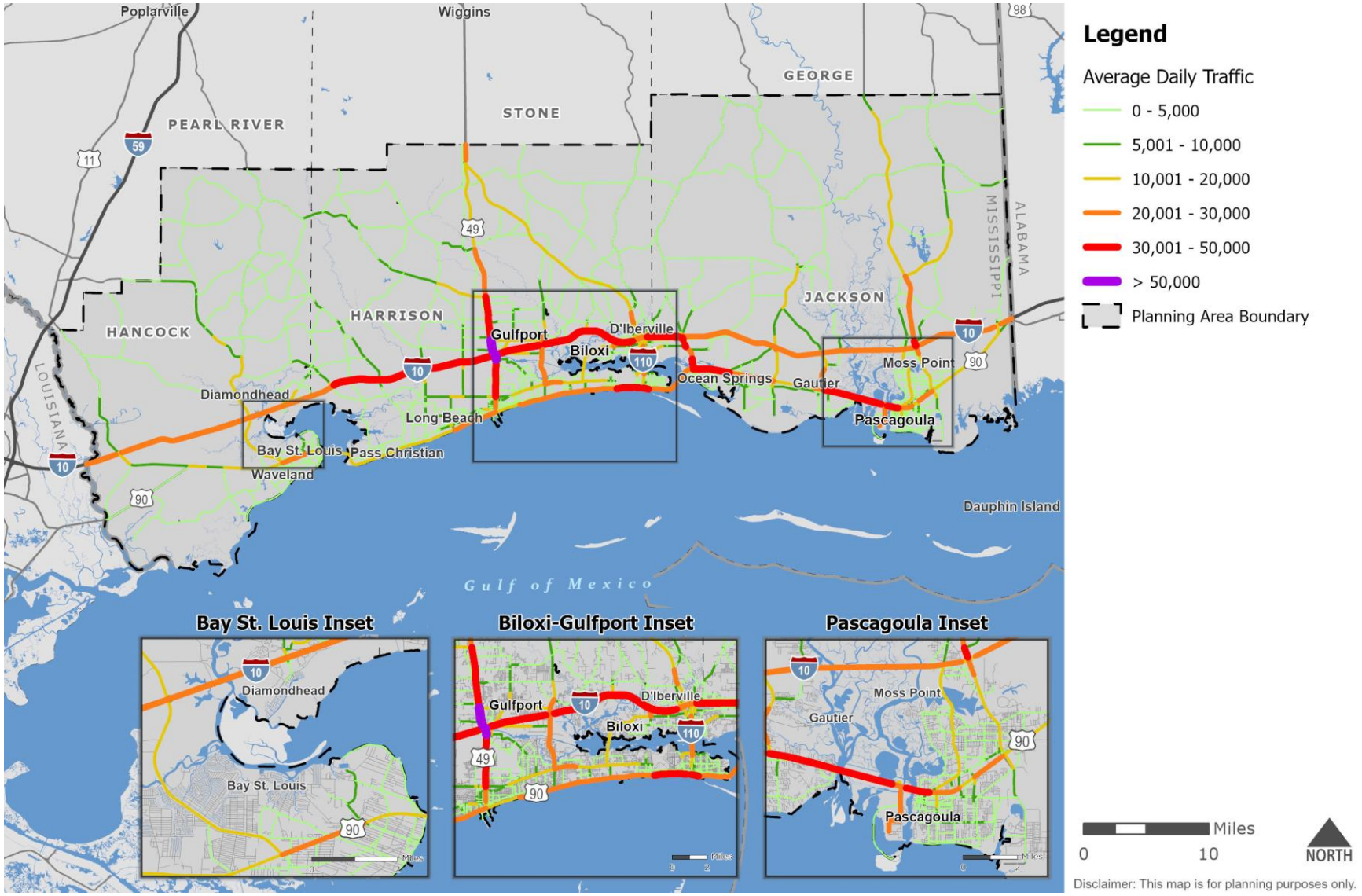
- I-10 from MS 43/MS 603 to MS 63
- I-110 over Back Bay of Biloxi
- US 49 from 22nd St to MS 53
- US 90 from Lewis Ave to 25th Ave
- US 90 from Beauvoir Rd to Main St
- US 90 from Oak St to Hanshaw Rd
- US 90 from Gautier Vancleave Rd to Telephone Rd
- MS 63 from I-10 to River Road
- MS 605 from East Pass Rd to Dedeaux Rd
- MS 609 from US 90 to I-10
- Entirety of Jerry St. Pe. Hwy
- Cedar Lake Rd from Medical Park Dr to I-10

These areas have estimated average daily volumes exceeding 25,000 vehicles.

Congestion occurs when the volume of traffic on a roadway is greater than the capacity for that roadway. To measure this, volume to capacity (V/C) ratios are used. These ratios compare the amount of traffic to the amount of capacity built into a roadway segment. A V/C ratio of greater than 1.0 signifies that the segment is overburdened with traffic, or that is experiences more traffic volume than the roadway capacity allows.

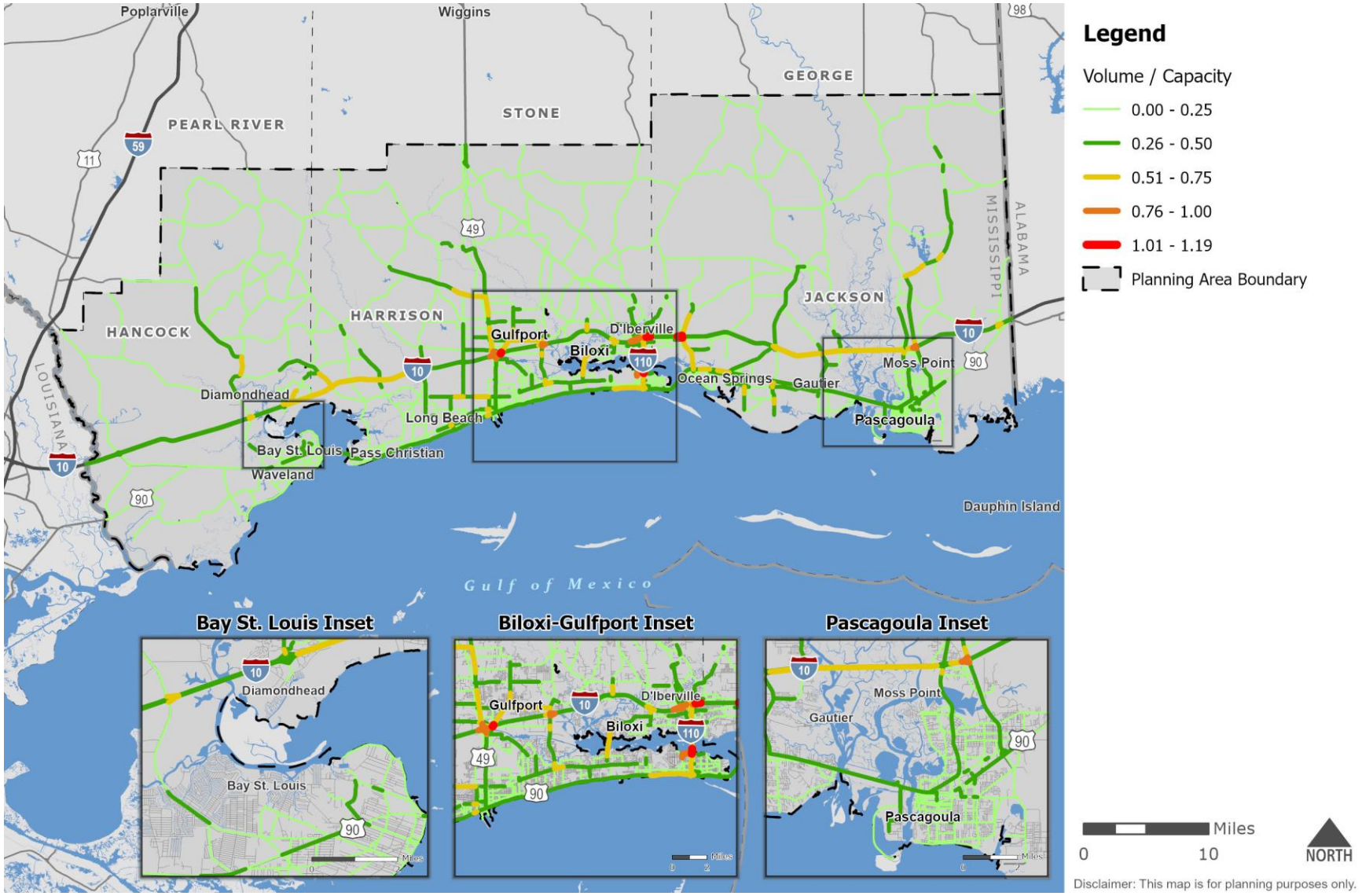
Figure 4.4 displays the volume to capacity (V/C) ratios for the major roadways in the MPA. Currently, there are two roadway segments in the MPA that experience a V/C ratio of 1.0 or greater, representing congested segments. **Table 4.3** displays those segments that experience a V/C ratio of 1.0 or greater. This suggests that peak period congestion is currently an issue in the MPA.

Figure 4.3: Average Daily Traffic on Roadways, 2022



Source: GRPC Travel Demand Model
Note: I-10 volumes may appear low as they are shown in a directional fashion, whereas other roadways are bi-directional. This is a function of the network's coding in the model.

Figure 4.4: Existing Roadway Congestion, 2022



Source: GRPC Travel Demand Model

Table 4.3: Roadway Corridors with Volumes Exceeding Capacity, 2022

Roadway	Segment	Length (miles)
I-10 W Off-Ramp	I-10 to ramp split near Lamey Brg Rd	0.15
I-10 E On-Ramp	Ramp split near Lamey Brg Rd to I-10	0.07
I-10 W On-Ramp	Washington Ave to I-10	0.36
I-10 E Off-Ramp	Washington Ave to I-10	0.31
I-110 S Off-Ramp	Bayview Ave to I-110	0.29
Three Rivers Rd	Seaway Rd to Crossroads Pkwy	0.09

Source: Houma-Thibodaux MPO Travel Demand Model

4.4 Roadway Reliability

Most of the region's roadways do not have daily volumes that exceed their daily capacities. However, as noted above, there are congestion issues at specific times, notably peak periods. Travel time reliability is a measure of how congested travel times compare to free-flow conditions. The Level of Travel Time Reliability (LOTTR) is defined as:

$$\text{Segment LOTTR} = \frac{\text{"Longer" 80th Percentile Travel Time}}{\text{"Normal" 50th Percentile Travel Time}}$$

Level of Travel Time Reliability data was collected in 15-minute segments during all time periods between 6 a.m. and 8 p.m. local time, with the worst levels being used to determine segment reliability. The most recent LOTTR data available, year 2023, was obtained from FHWA's National Performance Management Research Data Set (NPMRDS). Roadway segments with a LOTTR less than 1.5 are defined by the FHWA as reliable. **Figure 4.5** displays the LOTTR of the monitored segments within the MPA. Please note that the figure only displays the LOTTR value and does not reflect a value expressed in person-miles.

100.0%

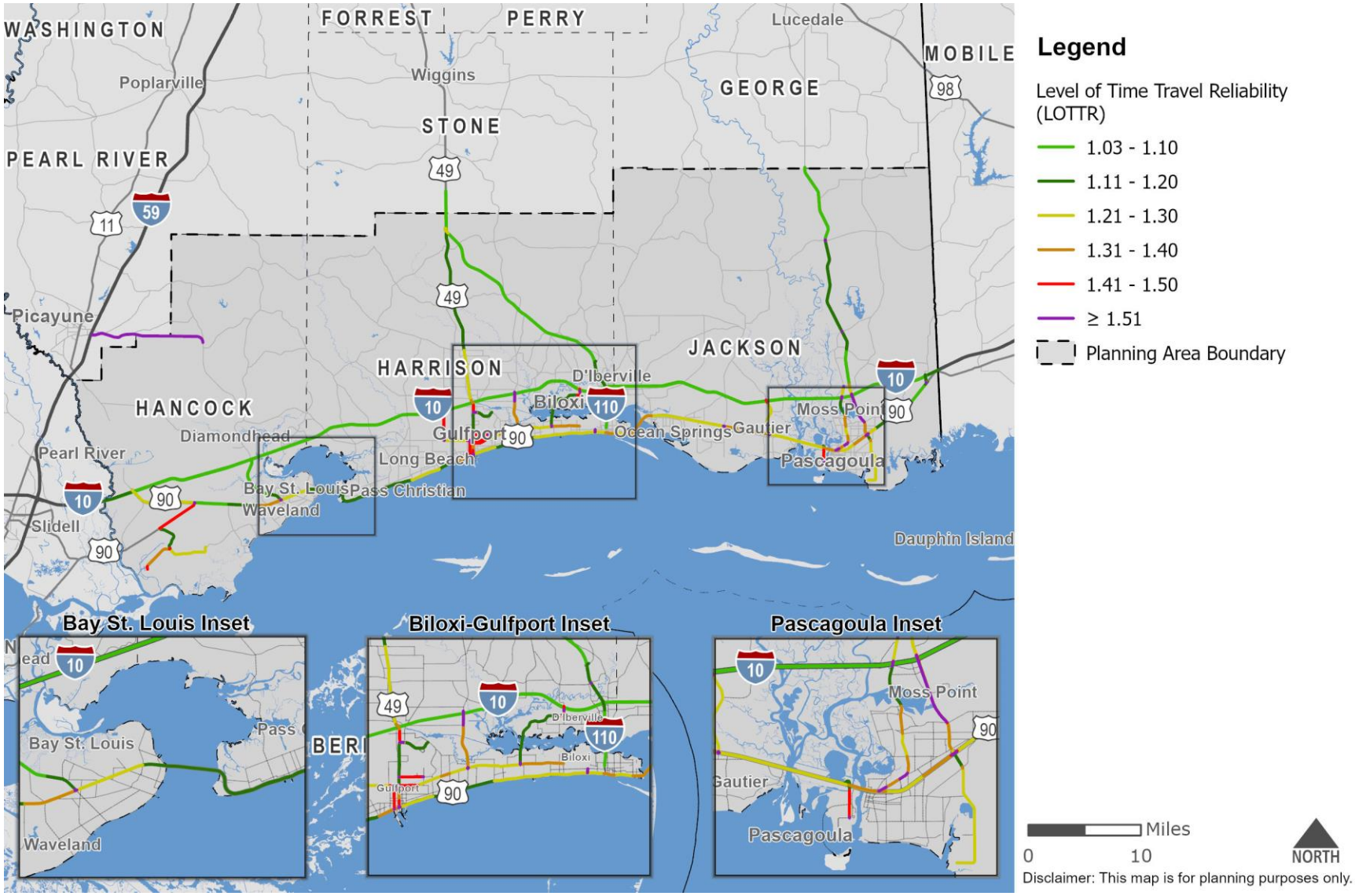
Interstate NPMRDS reported NHS person-miles travelled that are reliable.

97.4%

Non-Interstate NPMRDS reported NHS person-miles travelled that are reliable.

Within the MPA, all Interstate pavements are considered reliable. Within the MPA, non-Interstate National Highway System (NHS) roadways within the MPA are mostly reliable. Managing congestion on the MPA roadways, particularly through the application of the Congestion Management Process, will be necessary for the MPO to support the state target.

Figure 4.5: Level of Travel Time Reliability (LOTTR) on National Highway System (NHS) Routes, 2024



Source: NPMRDS, 2023 Conflation

4.5 Pavement Conditions

Maintaining sufficient pavement conditions ensures that roadways operate at their full capacity. Good pavement conditions provide roadways users with safe, comfortable travel experiences, while minimizing vehicle wear and tear.

Pavement condition ratings for the MPA's roadways were obtained from data submitted by the MDOT and found in the Highway Performance Monitoring System (HPMS). The HPMS is a national level highway information system that includes data on the extent, condition, performance, and use and operating characteristics of the nation's highways.

The HPMS data is a sample dataset collected across the entire federal-aid eligible system for interstate, arterial, and collector networks.

The HPMS pavement condition is based on the International Roughness Index (IRI), cracking, rutting, and faulting.

The MPA has better Interstate pavement conditions when compared to the State of Mississippi. Within the MPA, no interstate pavements are in Poor condition, however, more than half of the non-interstate National Highway System (NHS) pavements within the MPA are in Fair Condition, and nearly four percent are in Poor Condition.

Figure 4.6 illustrates the most recent pavement condition data for NHS roadways within the MPA.

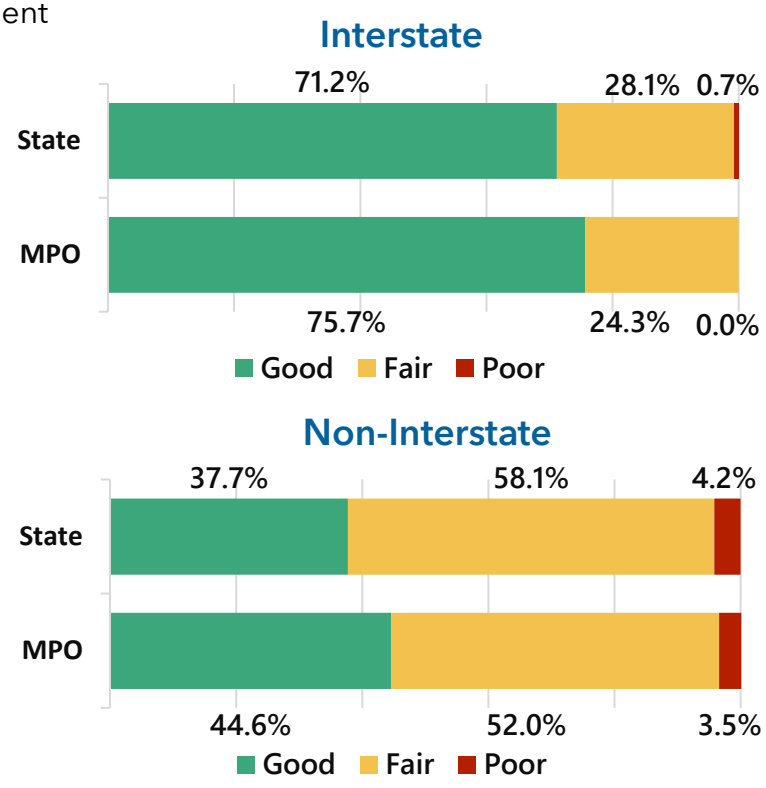
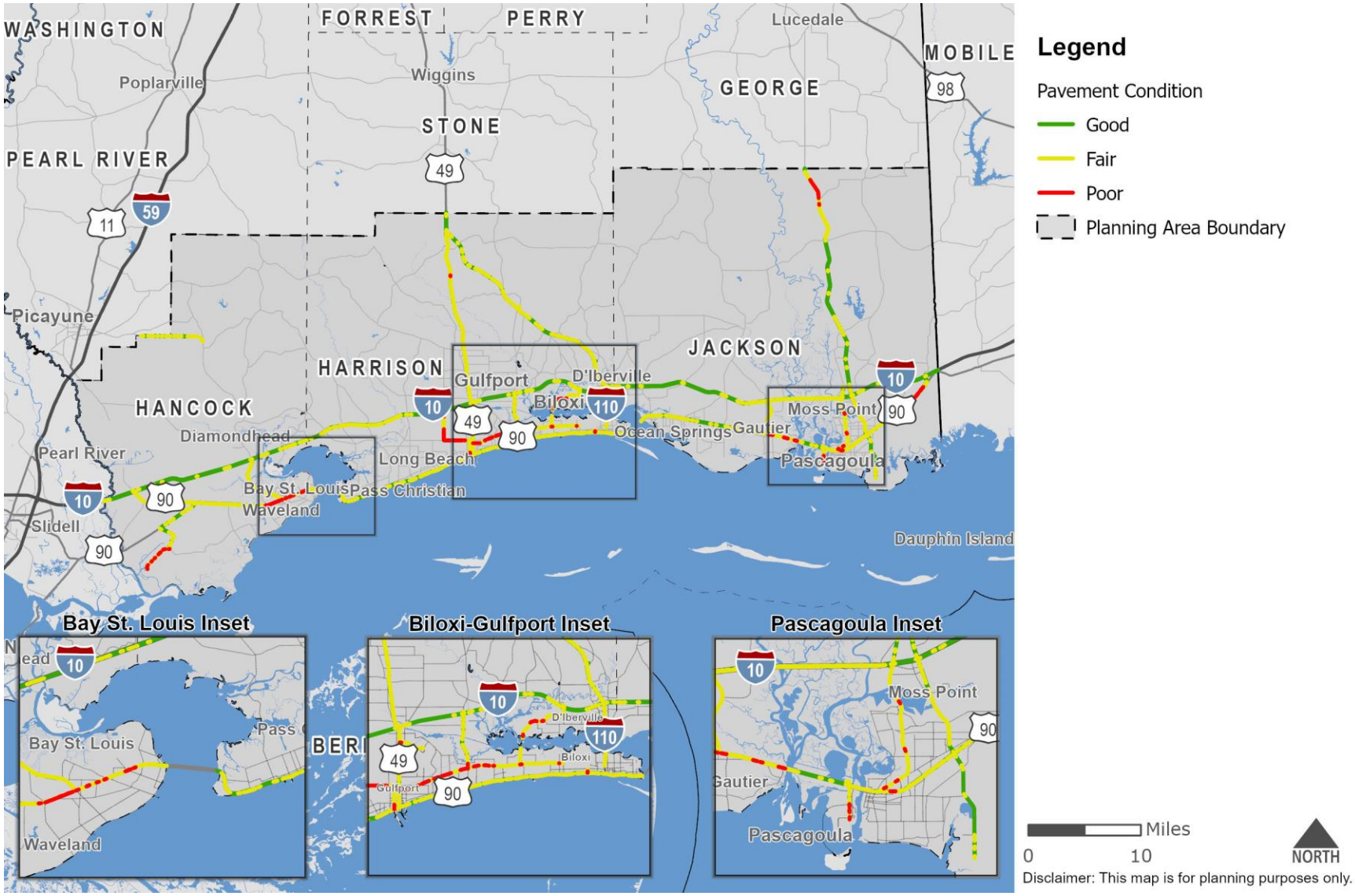


Figure 4.6: Roadway Pavement Conditions, 2024



Source: MDOT

4.6 Bridge Conditions

Bridges are a critical part of the overall transportation network. They must be maintained and upgraded as needed to ensure that they are not safety or environmental hazards, bottlenecks, or limitations to freight movement.

There are over 660 bridges within, or bordering, the MPA. Most of these cross waterways. However, bridges can also be structures that cross over other roadways and railroads.

Bridge Conditions and Scoring

The National Bridge Inventory (NBI) provides bridge conditions for all bridges in the United States with public roads passing above or below them. The NBI also defines bridges to include bridge-length culverts. The condition of the bridge is determined by the lowest rating of deck, superstructure, substructure, or culvert. If the lowest rating of these categories is greater than or equal to seven (7), the bridge is classified as good. If the score of the bridge is less than or equal to four (4), the classification is poor. The MTP uses data from the 2024 NBI, the most recent year available.

Figure 4.7 displays the condition of each bridge within the MPA. It should be noted that these include all bridges, not just those that are a part of the NHS.

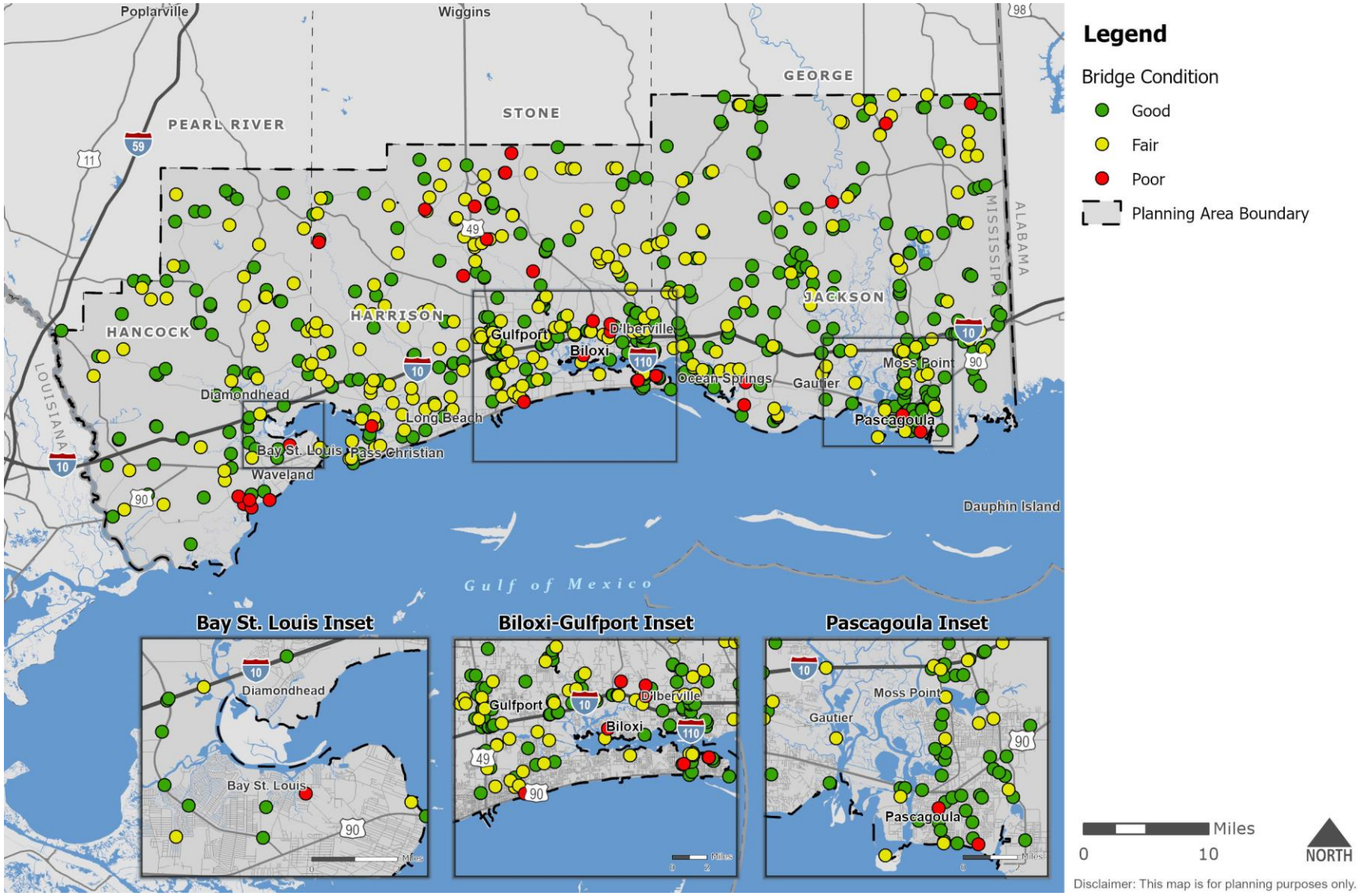
49.3%

NBI defined NHS Bridges **in Good Condition**

0.0%

NBI defined NHS Bridges **in Poor Condition**

Figure 4.7: Bridge Conditions in the MPA, 2024



Source: National Bridge Inventory

4.7 Safety

The MTP safety analysis focused on gathering and analyzing available safety data and identifying hazardous locations. Due to the limited scope of this study, location-specific recommendations for the identified hazardous locations have not been developed.

Disclaimer:
"This correspondence and the information contained herein is prepared solely for the purpose of identifying, evaluating, and planning safety improvements on public roads which may be implemented utilizing federal aid highway funds; and is therefore exempt from discovery or admission into evidence pursuant to 23 U.S.C. 407"

Supporting Documents

Highway Safety Improvement Program (HSIP)

The Infrastructure Investment and Jobs Act (IIJA) requires each state to maintain an annually updated Highway Safety Improvement Program (HSIP). The HSIP must include the FHWA performance measures for roadway safety and the development of a Strategic Highway Safety Plan (SHSP). The required safety performance measures, state targets, and the MPA'S existing performance are discussed in *Technical Report #3: Transportation Performance Management*.

Strategic Highway Safety Plan (SHSP)

A Strategic Highway Safety Plan (SHSP) is a statewide coordinated safety plan developed and maintained by each state to identify strategies to reduce fatalities along all state highways and public roads.

The Mississippi SHSP, updated in 2024[6], outlines the framework for change and helps strengthen collaboration among Mississippi's traffic safety community. Its components offer perspective on where the state stands in its pursuit of its Toward Zero Deaths vision and identify objectives and strategies that support future success.

[6] https://mdot.ms.gov/portal/strategic_highway_safety_plan

The 2024 SHSP focuses on five of the most prevalent emphasis areas that contribute to deaths and suspected serious injuries. These emphasis areas, which account for **91.8 percent** of all fatal and serious injury crashes in Mississippi during the SHSP's data analysis period (2020 – 2022), include:

- Unbelted Occupants
- Lane Departures
- Impaired Driving
- Intersections
- Young Drivers

To help the State achieve it's safety goals, Mississippi adopted an approach that aims to address safety concerns from four different perspectives. These, also called the "Four Es" of traffic safety, are described below.

Mississippi's approach to continuous safety improvements has opened opportunities for involvement and partnerships among the "Four Es" of traffic safety.

Education	• Those who support, develop, and execute safety education programs.
Emergency Medical Services	• Those who respond to roadside crashes, provide emergency medical services, and work to improve emergency medical response and transport.
Enforcement	• Those who enforce traffic safety laws and collect crash data.
Engineering	• Those who analyze crash data and identify, recommend, and implement solutions that improve the safety performance of the transportation infrastructure.

Crash Impacts

According to the Fatality Analysis Reporting System (FARS) data, from 2018 through 2022, an average of 39,588 people across the United States were killed annually as a result of a roadway collision. Every crash, regardless of the severity, costs money and time in damages, emergency services, and delays. These costs affect both governments and taxpayers. One goal of the MTP process is to improve travel safety by reducing the risk of crashes on the roadways. The first step toward meeting this goal was accomplished by analyzing the data and determining the most hazardous locations in the MPA.

The crash records used in the analysis were obtained from the Mississippi Department of Transportation (MDOT) database, which included all reported crashes from 2019 through 2023.

The crash records include:

1. **Severity**
2. **Location**
3. **Alcohol involvement**
4. **Vehicle type**
5. **Type of day**
6. **Roadway surface condition**
7. **Collision type**

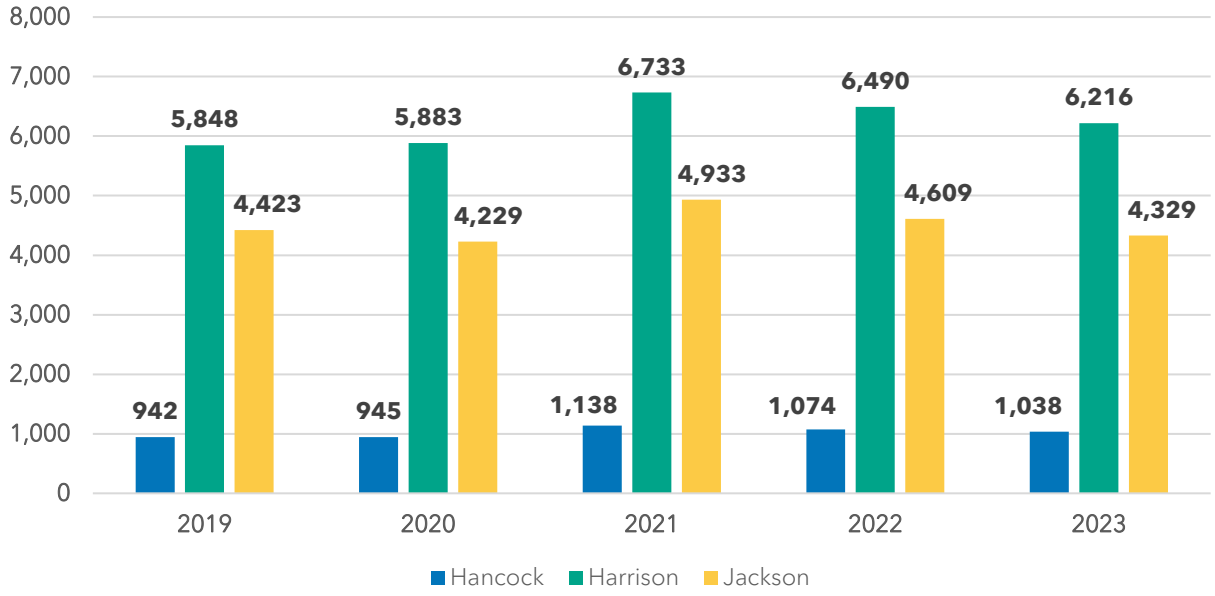
MPA Crash Trends

This section discusses the observed trends regarding all crashes that occurred within the MPA during the analysis period.

Crashes by Year

From 2019 through 2023, a total of 58,830 crashes occurred within the MPA. **Figure 4.8** displays the total number of crashes within the MPA by year and by county.

Figure 4.8: MPA Crashes by Year and County, 2019 – 2023



Source: MDOT, 2024

Crash Severity

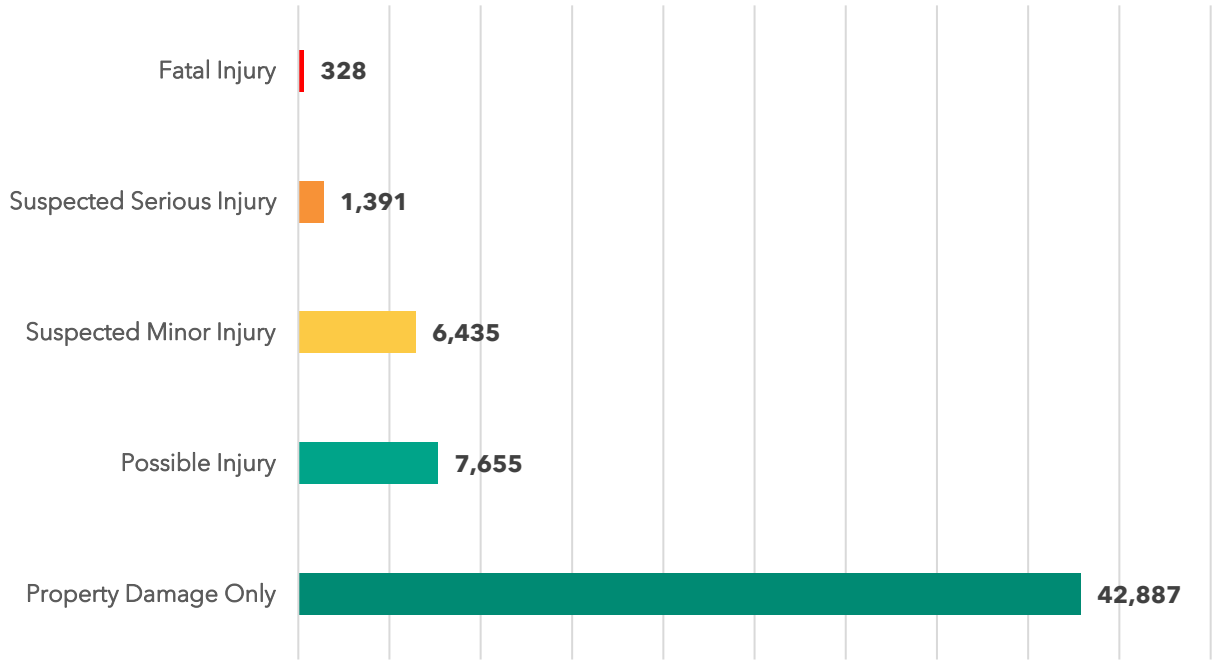
Crash severity reveals the extent to which crashes in the MPA pose a safety risk to roadway users. Within the MPA, 328 fatal and 1,391 serious injury or suspected serious injury crashes occurred during the analysis period. Approximately 2.9 percent of the total crashes resulted in a fatality or serious injury. **Figure 4.9** displays the severity of the fatal/injury crashes within the MPA.

72.9% of crashes resulted in Property Damage Only.

The number of "Suspected serious injury" crashes significantly increased from September 2019 onwards due to a revised definition of what constitutes a serious injury. The new definition, created to conform with the new criteria definitions set forth in the National Highway Traffic Safety Administration's Model Minimum Crash Criteria (MMUCC), 4th edition, was broadened to include injuries such as:

- Severe lacerations;
- Significant blood loss;
- Broken or distorted extremities;
- Crush injuries;
- Significant burns;
- Unconsciousness;
- Paralysis; and/or
- Suspected skull, chest, or abdominal injuries (excluding bruises or minor lacerations).

Figure 4.9: Severity of Fatal and Injury Crashes, 2019 – 2023



Source: MDOT, 2024

Driving Under the Influence (DUI) Crashes

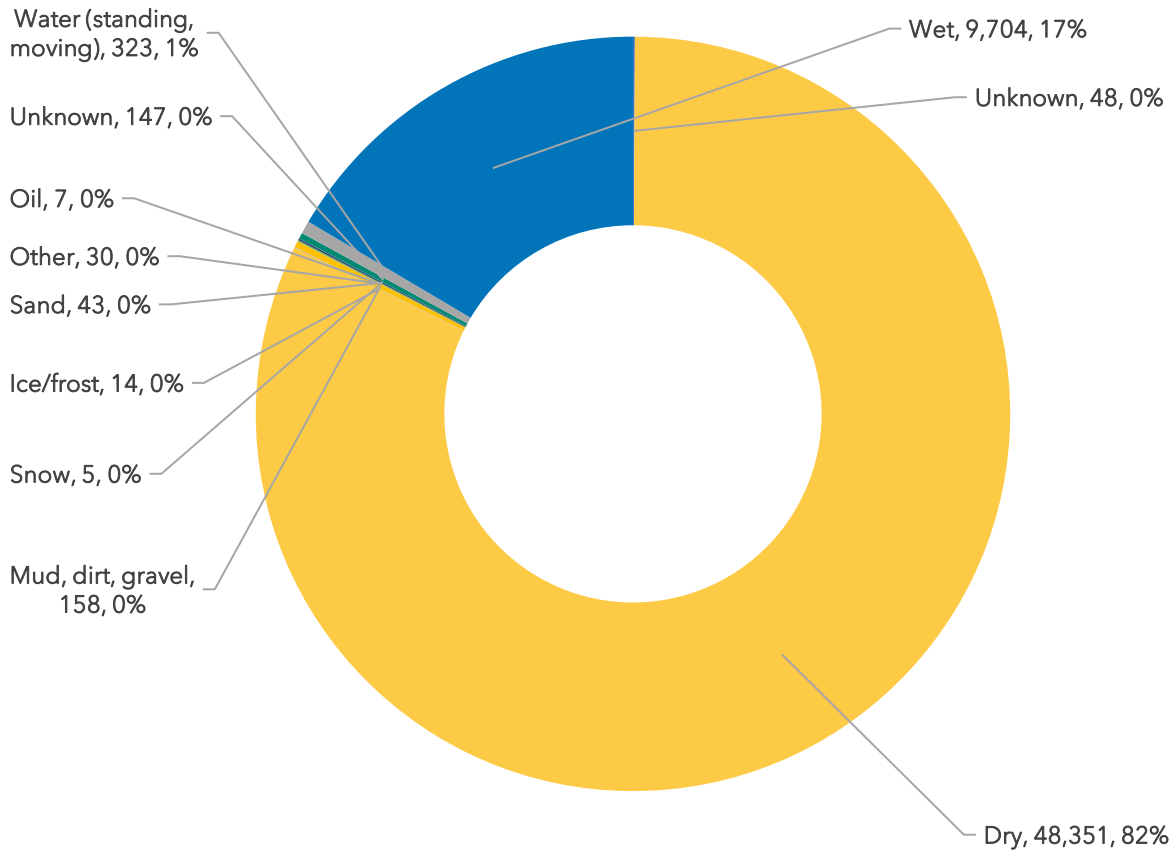
From 2019 through 2023, 2,465 crashes involved drivers under the influence of a substance (i.e., alcohol, drugs, etc.). This resulted in just more than four (4) percent of the crashes within the MPA.

DUI-related crashes accounted for 21 percent of fatal crashes within the area.

Roadway Surface Condition

The roadway surface can contribute to a crash when it experiences adverse conditions such as rain, oil, debris, or other sources. These conditions temporarily reduce the safety of the roadway. However, nearly 82 percent of the study area crashes occurred during dry conditions which means the roadway surface condition was not a contributing factor in most crashes. The distribution of crashes by surface condition is displayed in **Figure 4.10**.

Figure 4.10: Crashes by Roadway Surface Condition, 2019 – 2023



Source: MDOT, 2024

Crash Times

Identifying when crashes occur can assist with developing countermeasures for crashes affected by lighting, congestion, or other factors. Nearly five (5) percent occurred during the morning commute from 7:00 AM to 8:00 AM. The lunch peak from 12:00 PM to 1:00 PM experienced nearly seven percent of the daily crashes. However, the largest percentage of crashes during the day occurred from 3:00 PM to 4:00 PM, accounting for nearly nine percent of the crashes within the MPA. The hour in which the crashes occurred is displayed in **Figure 4.11**.

Collision Type

This study also considered collision types that occurred. **Figure 4.12** displays the crashes by collision type. The most common collision types were rear end [slow or stop, turn] (33 percent), angle (17 percent), and sideswipe (13 percent).

Figure 4.11: Crashes by Hour, 2019 – 2023

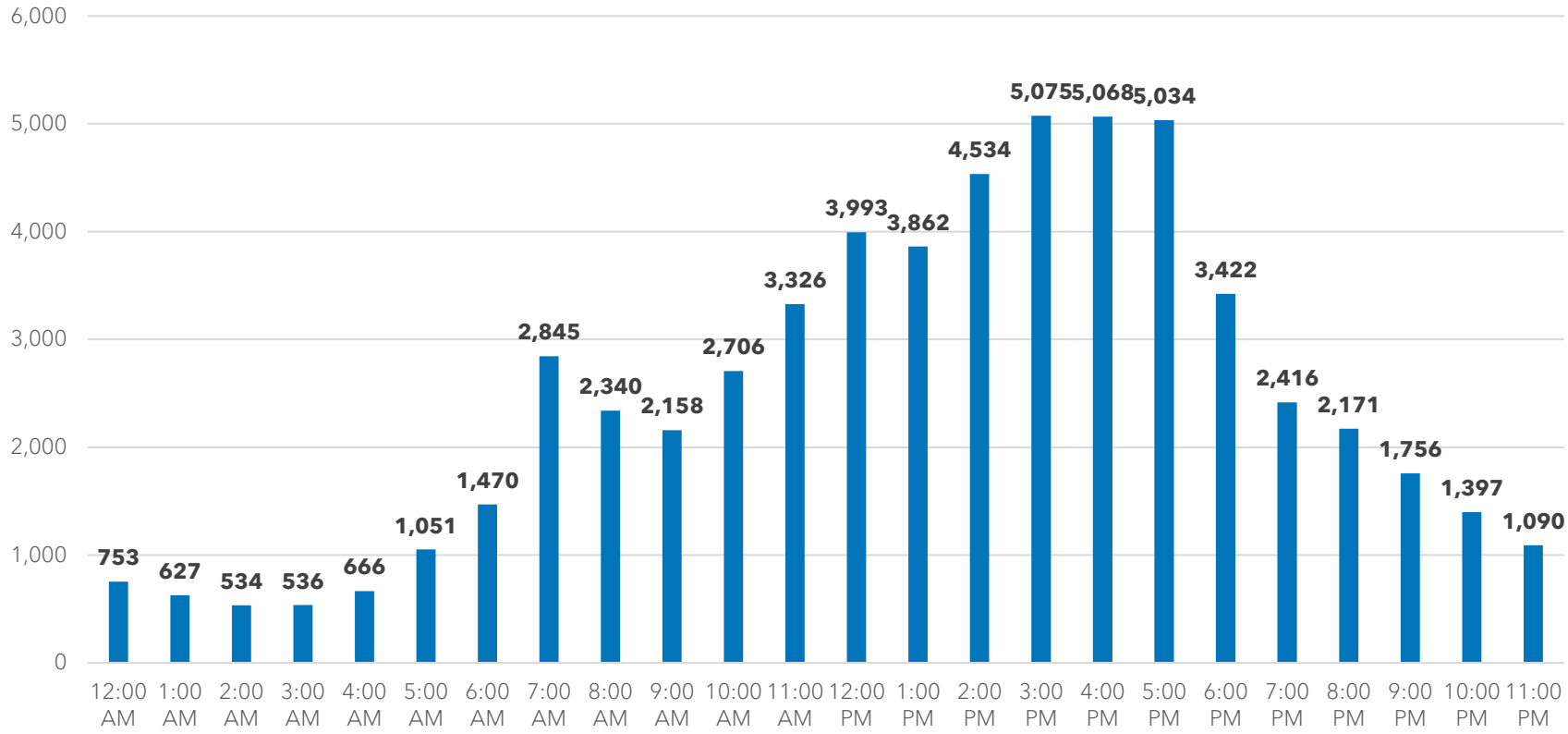
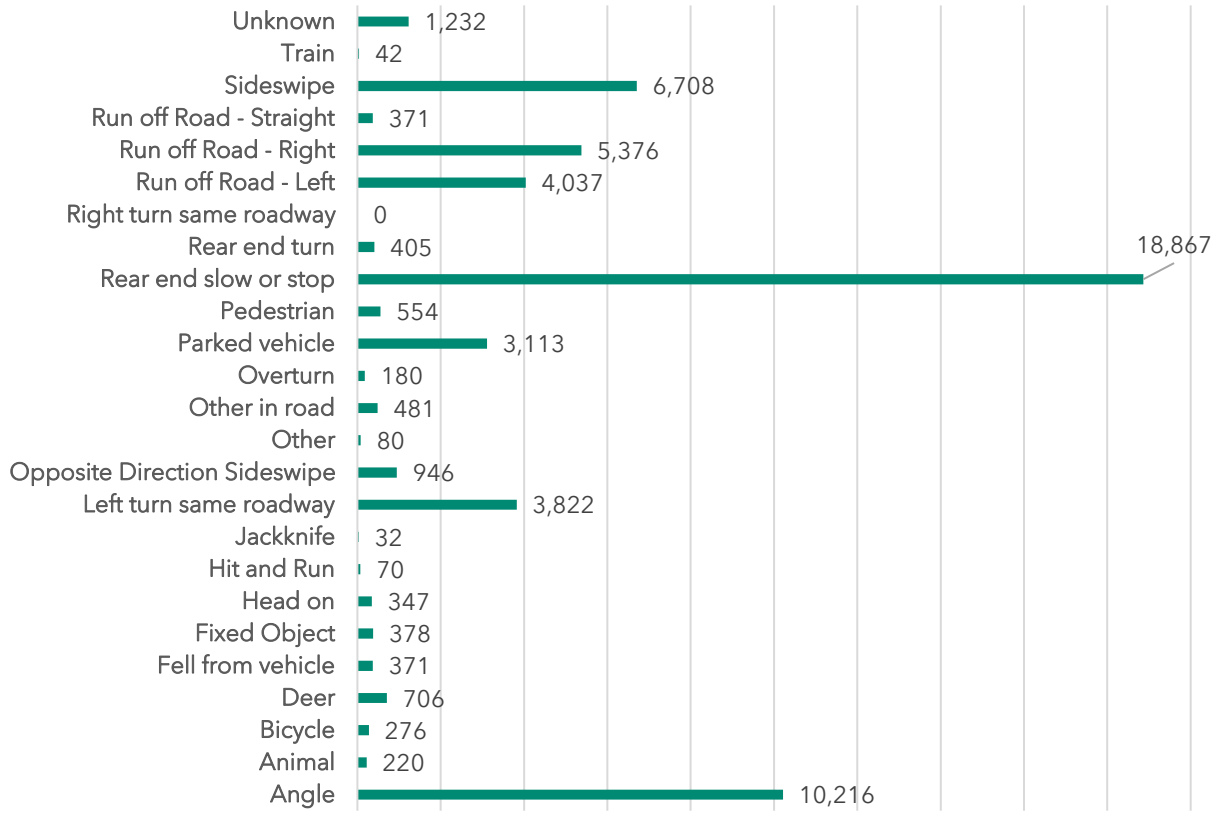


Figure 4.12: Crashes by Collision Type, 2019 – 2023



Source: MDOT, 2024

Crash Locations

As the nature of this study is only to identify trends, it did not attempt to conduct analysis for specific solutions. However, locations that experience the highest crash frequencies or rates were identified. For this, the following definitions were used:

- **Crash frequencies** reflect how often crashes occur at a given location and are expressed in crashes per year.
- **Crash rates** reflect the number of crashes compared to the traffic volumes that a roadway experiences and are expressed as crashes per million vehicle miles traveled for roadway segments.
- **Intersection crash rates** are expressed as crashes per million vehicles entering the intersection.

The hazardous locations shown in this report are not a ranking of these locations but rather a list developed for informational purposes.

Segment Crashes

For this study, roadway segments are defined in two ways:

- A roadway link between two significant roadways.
- A roadway link between a significant roadway and a specific distance from that point.

Crashes on segments can occur due to roadway design, pavement condition, lighting, or other factors. A segment identified in this analysis should be further analyzed in additional studies to determine what contributes to the high crash frequency and/or crash rate it experiences. These studies should also be used to develop site-specific countermeasures.

Crash Frequencies

Table 4.4 displays the roadway segments in the MPA that have the highest crash frequencies. These locations are shown in **Figure 4.13**.

Crash Rates

Crash rates for the study area were based on the roadway network layer and existing year (2022) volumes obtained from the GRPC Base Travel Demand Model (TDM). The length of each segment and the corresponding daily traffic volumes from the TDM are used in the crash rate equation.

8.6%
of all MPO planning area crashes occur on the top 20 crash frequency segments.

The segment crash rate equation is:

$$Segment\ Crash\ Rate = \frac{N \times 10^6}{365 \times AADT \times L}$$

Where

Segment Crash Rate – crashes per million vehicle miles traveled

N – segment average annual crash frequency

AADT – segment annual average daily traffic based on the Base TDM

L – segment length (in miles)

Table 4.5 displays the roadway segments in the MPA that have the highest crash rates. These locations are shown in **Figure 4.14**.

Table 4.4: Top Crash Frequency Segments and Severity, 2019 – 2023

Segment	Length (miles)	Total Crashes	Annual Average Crash Frequency
MS 605 (Cowan Road/Lorraine Road) between Magnolia Street and Seaway Road	2.23	441	88.2
US 49 between Orange Grove Road/5th Street and O'neal Road	1.21	430	86.0
Dedeaux Road between Three Rivers Road and MS 605	2.64	350	70.0
US 49 between Airport Road and Creosote Road	0.52	338	67.6
I-10 Eastbound between Gautier Vancleave Road On-Ramp and MS 613 Off-Ramp	6.05	285	57.0
Pass Road between MS 605 (Cowan Road) and Anniston Avenue	0.52	264	52.8
US 90 (Bienville Boulevard) between Hanley Road and Guilford Road/Ocean Springs Road	0.77	249	49.8
I-10 Westbound between MS 613 On-Ramp and Gautier Vancleave Road Off-Ramp	6.17	243	48.6
US 90 between Ladnier Road and Oak Street	2.08	225	45.0
Dedeaux Road between US 49 and Klein Road	0.77	220	44.0
I-10 Westbound between Shriners Boulevard On-Ramp and MS 605 Off-Ramp	3.35	219	43.8
US 90 (Beach Boulevard) between Beauvoir Road and Veterans Avenue	1.54	212	42.4
I-10 between Louisiana State Line and MS 607	4.98	211	42.2
US 90 (Bienville Boulevard) between MS 609 (Washington Avenue) and Vermont Avenue/Martin Luther King Jr Avenue	0.53	205	41.0
I-10 Westbound between MS 43/MS 603 On-Ramp and MS 607 Off-Ramp	10.42	200	40.0
Pass Road between Anniston Avenue and Debuys Road	1.02	199	39.8
I-10 Westbound between Franklin Creek Road On-Ramp and MS 63 Off-Ramp	6.28	193	38.6
MS 609 (Washington Avenue) between US 90 (Bienville Boulevard) and Cambridge Boulevard	1.11	191	38.2
Jerry St Pe Highway between Port of Pascagoula and USS Vicksburg Way	1.37	180	36.0
I-110 Southbound between Rodriguez Street On-Ramp and Bayview Avenue	0.71	179	35.8

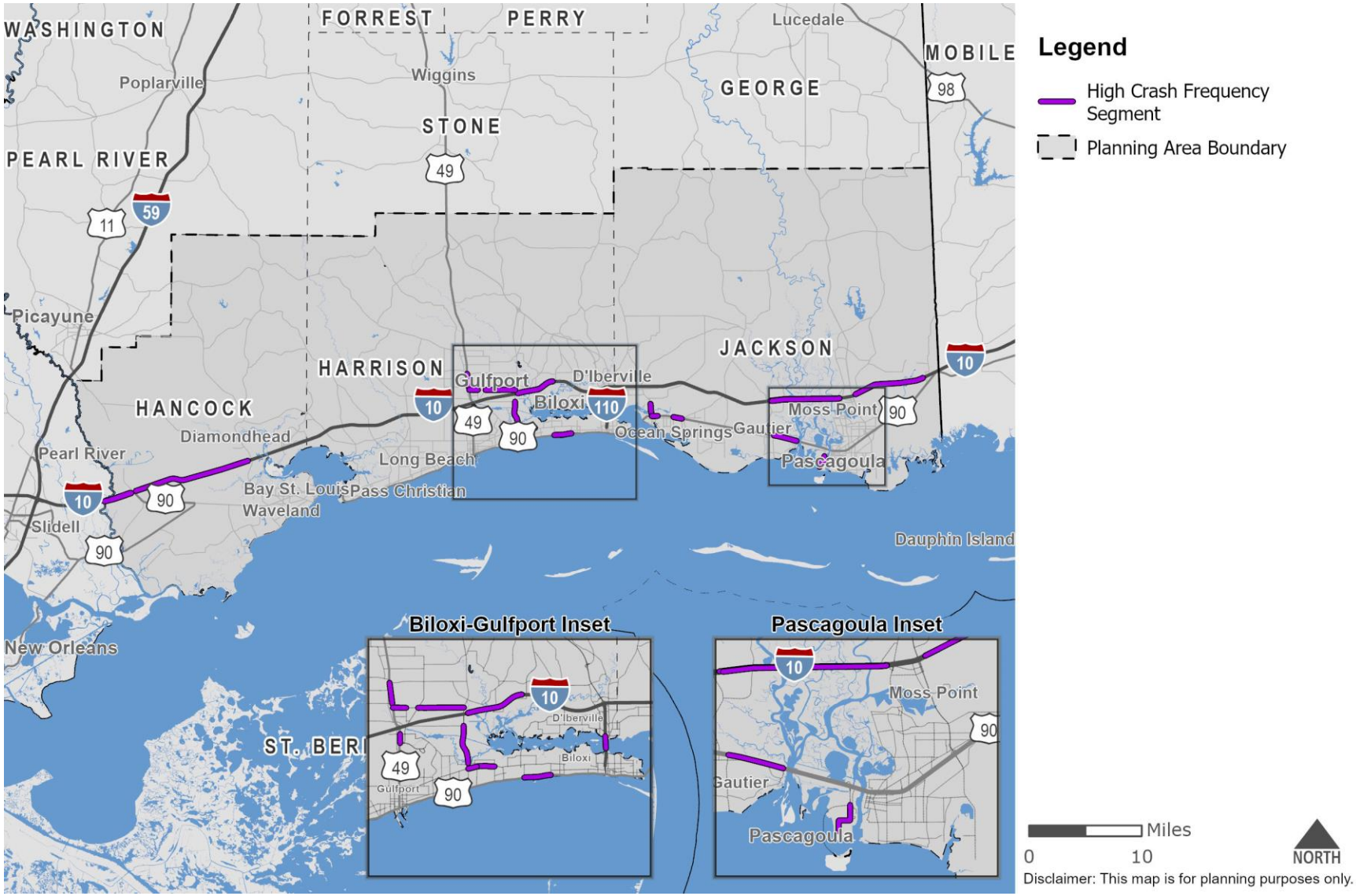
Source: MDOT, 2024

Table 4.5: Top Crash Rate Segments, 2019 – 2023

Segment	Length (miles)	Total Crashes	Annual Average Crash Frequency	ADT	Crash Rate
Community Road between US 49 and Klein Road	0.70	79	15.8	666	93.25
Gautier Vancleave Road between Old Spanish Trail and US 90	0.25	11	2.2	530	45.56
33rd Avenue between US 90 (West Beach Boulevard) and 15th Street	0.43	27	5.4	872	39.45
Government Street between Washington Avenue and Pershing Avenue	0.33	81	16.2	3,639	37.31
Creosote Road between Arkansas Avenue and US 49	0.19	60	12.0	6,573	26.78
Macphelah Road between Jefferson Avenue and Frederick Street	0.61	21	4.2	706	26.59
20th Avenue between 19th Street and 22nd Street	0.22	7	1.4	651	26.38
23rd Avenue between 17th Street and 19th Street	0.15	5	1.0	767	24.37
Jackson Avenue between Pascagoula Street and Market Street	0.49	24	4.8	1,139	23.65
25th Street between US 49 (25th Avenue) and 23rd Avenue	0.17	43	8.6	6,455	21.54
Eden Street/Nathan Hale Avenue between Old Mobile Avenue and Chicot Road	0.77	16	3.2	586	19.42
East Railroad Street between Platt Avenue and 22nd Street	0.86	21	4.2	721	18.64
30th Avenue between US 90 (West Beach Boulevard) and 13th Street	0.20	21	4.2	3,068	18.55
Chicot Road between Nathan Hale Avenue and US 90 (Denny Avenue)	0.15	52	10.4	10,729	18.27
Main Street between South 2nd Street and North Beach Boulevard	0.20	5	1.0	775	17.46
Frederick Street between 2nd Street and Canal Street	0.43	13	2.6	949	17.42
Martin Luther King Boulevard between 2nd Street and MS 63	0.57	19	3.8	1,050	17.27
Macphelah Road between Shortcut Road and Jefferson Avenue	0.53	12	2.4	715	17.23
Courthouse Road between South Railroad Street and Pass Road	0.83	115	23.0	4,584	16.55
Three Rivers Road between Airport Road and Creosote Road	0.53	56	11.2	3,784	15.24

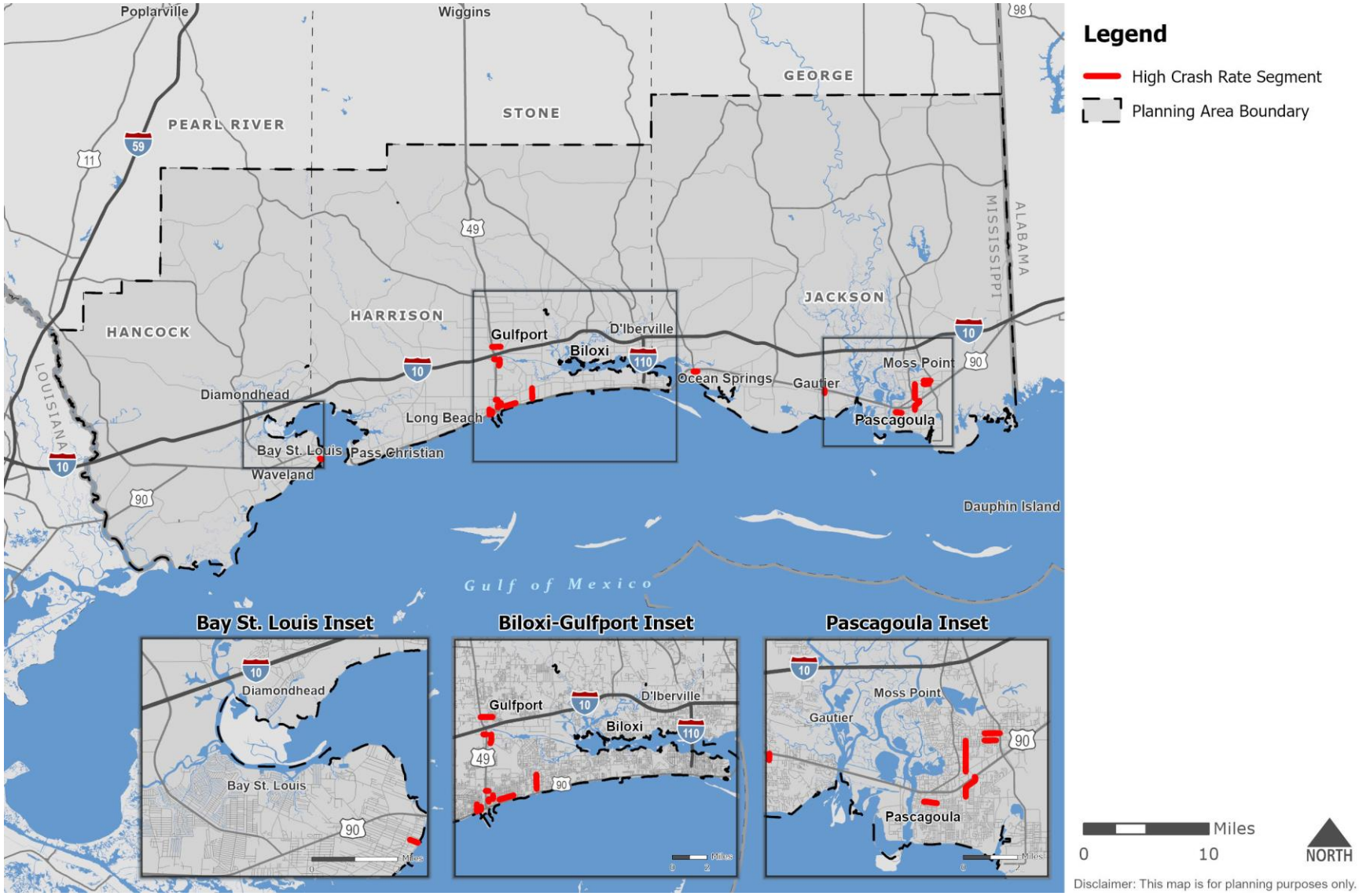
Source: MDOT, 2024

Figure 4.13: High Crash Frequency Segments, 2019 – 2023



Source: MDOT, 2024

Figure 4.14: High Crash Rate Segments, 2019 – 2023



Source: MDOT, 2024

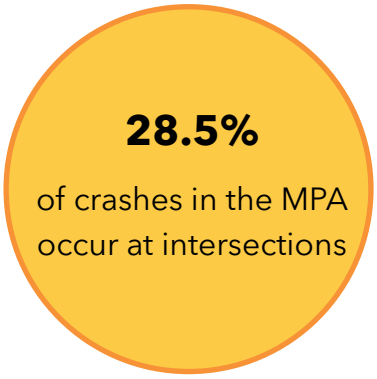
Intersection Crashes

There were nearly 16,788 intersection crashes in the study area from 2019 to 2023.

Crash Frequencies

Table 4.6 shows the 20 intersections in the MPA with the highest crash frequency and **Table 4.7** lists the collision types that occurred at these intersections. The locations of these high crash frequency locations are displayed in **Figure 4.15**.

Additional studies should be conducted on these intersections to identify the cause of the crashes and how to reduce the severity and types of crashes they experience.



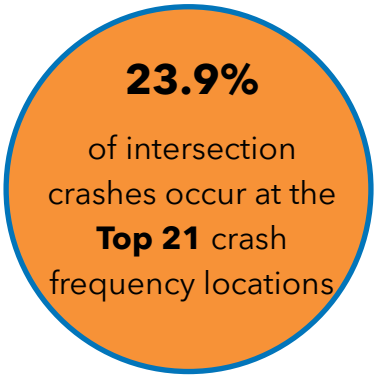


Table 4.6: Top Crash Frequency Intersections by Severity, 2019 – 2023

Intersection	Total Crashes	Annual Average Crash Frequency
MS 605 (Cowan Road) at Pass Road	343	68.6
US 49 at Creosote Road	339	67.8
US 49 at Crossroads Parkway	327	65.4
US 90 (Bienville Boulevard) at MS 609 (Washington Avenue)	297	59.4
US 49 at Dedeaux Road	239	47.8
US 49 at Community Road	208	41.6
US 49 (25th Avenue) at 28th Street	187	37.4
MS 605 (Lorraine Road) at I-10 Westbound	187	37.4
US 90 (Denny Avenue) at Chicot Road	184	36.8
US 49 at MS 53/North Swan Road	182	36.4
US 90 at MS 57	156	31.2
US 49 (25th Avenue) at 25th Street/Pass Road	153	30.6
MS 605 (Lorraine Road) at Seaway Road	153	30.6
US 49 at Airport Road	152	30.4
US 90 (Denny Avenue) at Hospital Road	136	27.2
MS 605 at Dedeaux Road	133	26.6
US 90 (Denny Avenue) at MS 613 (Market Street)	129	25.8
MS 605 at John Ross Road	129	25.8
US 90 (Bienville Boulevard) at Hanshaw Road	127	25.4
MS 609 (Washington Avenue) at Big Ridge Road/Money Farm Road	126	25.2

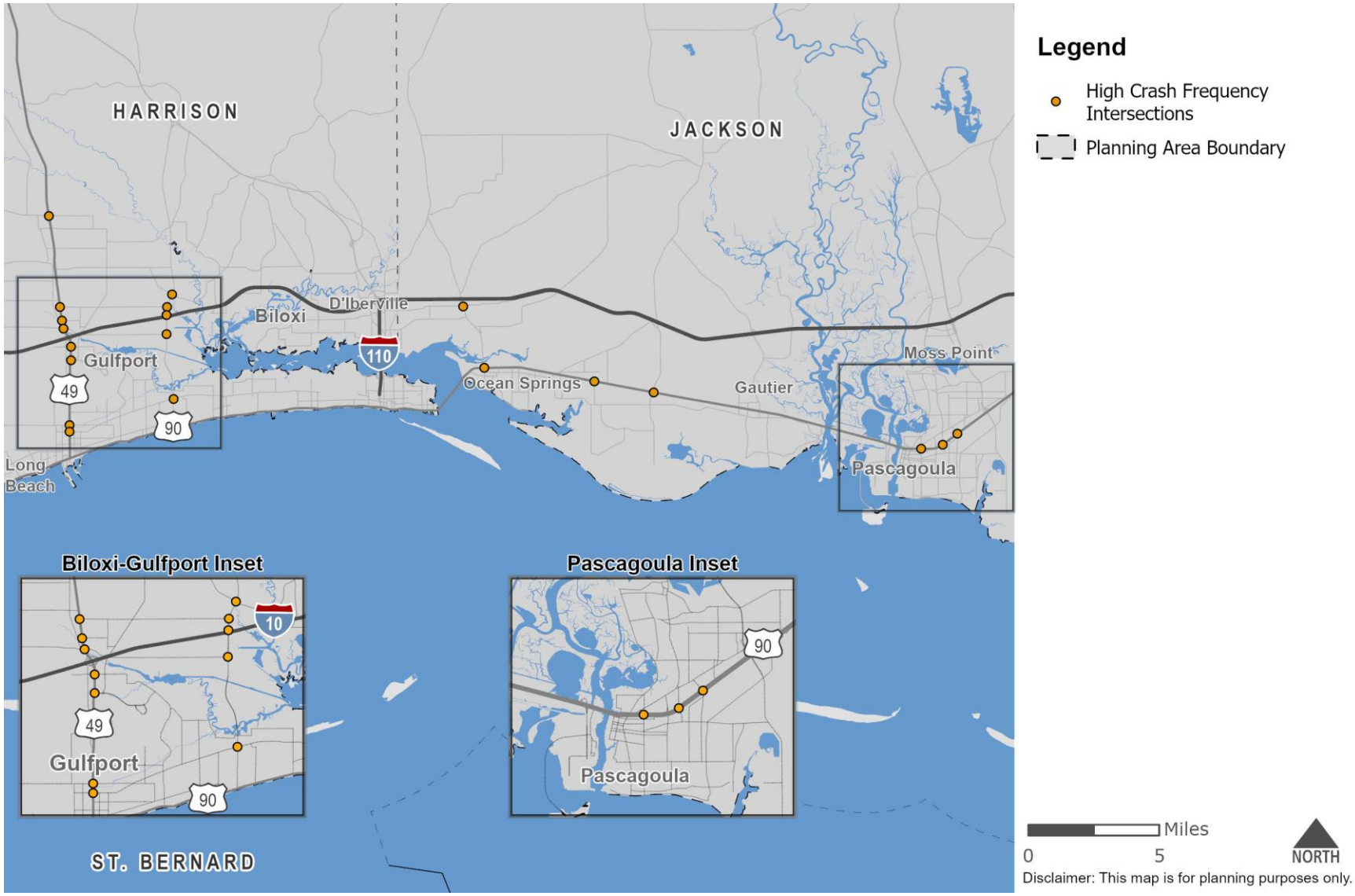
Source: MDOT, 2024

Table 4.7: Top Crash Frequency Intersections by Collison Type, 2019 – 2023

Intersection	Total Crashes	Annual Average Crash Frequency	Angle	Animal or Deer	Bicycle or Pedestrian	Fell from Vehicle	Fixed Object	Head on	Hit and Run	Jack-knife	Left Turn or Right Turn	Other in Road	Other or Unknown	Over-turn	Parked Vehicle	Rear End	Run Off Road	Side-swipe	Train
MS 605 (Cowan Road) at Pass Road	343	68.6	11	0	0	0	0	1	0	0	6	0	0	0	0	296	1	28	0
US 49 at Creosote Road	339	67.8	31	0	1	0	0	0	0	0	11	0	0	0	0	257	3	36	0
US 49 at Crossroads Parkway	327	65.4	30	0	0	1	0	0	0	0	14	0	0	1	0	223	0	58	0
US 90 (Bienville Boulevard) at MS 609 (Washington Avenue)	297	59.4	21	0	0	0	0	1	0	0	36	0	0	0	0	205	3	31	0
US 49 at Dedeaux Road	239	47.8	10	0	0	0	0	0	0	0	13	0	0	0	0	199	2	15	0
US 49 at Community Road	208	41.6	18	0	0	0	0	0	0	0	47	0	0	0	0	120	2	21	0
US 49 (25th Avenue) at 28th Street	187	37.4	17	0	6	0	0	1	0	0	70	0	0	0	0	68	1	24	0
MS 605 (Lorraine Road) at I-10 Westbound	187	37.4	12	0	0	0	0	0	0	0	30	0	0	0	0	134	0	11	0
US 90 (Denny Avenue) at Chicot Road	184	36.8	39	0	0	0	0	1	0	0	26	0	0	0	0	81	4	31	2
US 49 at MS 53/North Swan Road	182	36.4	13	0	0	0	0	0	0	0	9	0	1	0	0	150	1	8	0
US 90 at MS 57	156	31.2	8	0	0	0	0	0	0	0	12	0	0	1	0	125	3	7	0
US 49 (25th Avenue) at 25th Street/Pass Road	153	30.6	25	0	2	0	0	0	0	0	37	0	0	0	0	62	0	27	0
MS 605 (Lorraine Road) at Seaway Road	153	30.6	2	0	0	1	0	0	0	0	13	0	1	0	0	126	0	10	0
US 49 at Airport Road	152	30.4	9	0	1	0	0	0	0	0	6	0	0	0	0	110	5	21	0
US 90 (Denny Avenue) at Hospital Road	136	27.2	19	0	2	0	0	0	0	0	25	1	0	1	1	71	1	15	0
MS 605 at Dedeaux Road	133	26.6	7	0	0	0	0	0	0	0	12	0	0	0	0	107	0	7	0
US 90 (Denny Avenue) at MS 613 (Market Street)	129	25.8	26	0	2	1	0	0	0	0	18	0	0	0	2	66	0	14	0
MS 605 at John Ross Road	129	25.8	6	0	0	0	0	0	0	0	44	0	0	1	0	72	2	4	0
US 90 (Bienville Boulevard) at Hanshaw Road	127	25.4	19	0	0	0	0	0	0	0	32	0	0	0	0	66	2	8	0
MS 609 (Washington Avenue) at Big Ridge Road/Money Farm Road	126	25.2	24	0	0	1	0	1	0	0	28	0	0	0	0	63	1	8	0

Source: MDOT, 2024

Figure 4.15: High Crash Frequency Intersections, 2019 – 2023



Source: MDOT, 2024

4.8 Security

While safety and security are closely related, they are differentiated by the cause of the harm from which the transportation system and its users are being protected. Safety encompasses the prevention of unintentional harm to system users or their property. Security concerns include natural disasters such as hurricanes, earthquakes, or extreme weather, as well as the prevention, management, and response to intentional harm to the transportation system or its users.

Examples of intentional harm to transportation networks include:

- **theft or dismemberment of elements of the transportation infrastructure,**
- **assault on users of the system,**
- **acts of violence, and**
- **large-scale attacks/terrorism intended to completely disrupt the movement of people and goods.**

MPO Role in Security

The MPO's main role in planning for security is to coordinate with its partner agencies. This coordination effort helps to increase security measures related to **prevention**, **protection**, **response**, and **recovery** efforts. Relevant partner agencies include:

- emergency management officials
- police and sheriff's departments
- fire departments
- first responders

Prevention

When discussing security, prevention refers to efforts to limit access to resources that may be compromised or efforts to increase surveillance. Examples of prevention measures include:

- access control systems
- Closed Circuit Television (CCTV) systems
- security alarms
- fencing
- locks
- architectural barrier.

Protection

High vulnerability risk facilities should have additional design measures considered. These measures would mitigate potential security risks, should they occur. Protection efforts could also include law enforcement where necessary.

Response

Redundancy of transportation facilities should be encouraged in capital project planning. This assists in emergency evacuations or detours should a particular segment of the transportation network become unavailable, such as during a hurricane or other emergency. The use of Intelligent Transportation Systems (ITS) to control traffic signals and other controls also assists in responding to security.

Recovery

Transportation decision-makers should be familiar with both short-term and long-term recovery plans for the MPA. This includes everything from evacuations to restoring local businesses and neighborhoods.

Key Security Participants

As stated previously, the MPO coordinates with relevant agencies and is in a support role when responding to security events and concerns. The MPO can serve as a medium of communication between the various agencies involved. Some of the key agencies and organizations include:

State of Mississippi - Home - MEMA

Hancock County - Emergency Management

Harrison County - EMA/Homeland Security

Jackson County - Office of Emergency Services

Strategic Highway Network (STRAHNET)

The Strategic Highway Network (STRAHNET) is a portion of the NHS considered vital to the nation's strategic defense. Currently 61,000 miles of roadway, including all interstate routes, make up the STRAHNET. Additionally, this network links military installations with roadways that provide for the mobility of strategic military assets. FHWA reviews the network periodically to update STRAHNET corridors as needed.

Within the MPA, there are several STRAHNET roadways. As such, these roadways require additional considerations and needs such as, maintaining roadway pavements and bridges in a State of Good Repair, prioritizing maintenance, and providing congestion management. Multiple roadways within the MPA have the STRAHNET designation. Among these roadways are I-10 and I-110, as well as:

- US 49 from 28th St to I-10
- 28th St from Canal Rd to US 49
- Canal Rd from 28th St to I-10
- US 90 from White Ave to I-110
- White Ave/Larcher Blvd from US 90 to W Howard Ave

5.0 Freight

5.1 Introduction

The movement of freight throughout the MPA affects both the regional and national economy. The region is a major generator of freight, as well as a distribution and processing center for many goods. It is home to many freight facilities including class I railroads, major highways, and the Ports of Gulfport, Pascagoula, and Bienville.

This chapter provides an overview of freight facilities using big data sets such as the Freight Analysis Framework (FAF). It also uses data from existing plans and data.

5.2 Supporting Plans and Goals

Federal

Increasingly, federal legislation has provided incentives for states to focus on freight transportation investments. The provisions embodied in the 2021 Infrastructure Investment and Jobs Act (IIJA) established new dedicated freight programs and funding sources, intended to address freight needs that produce public benefits.

National Freight Goals

Per current transportation legislation, there are ten (10) National Multimodal Freight Policy Goals. These are:

1. *Identify infrastructure improvements, policies, and operational innovations that–*
    a. *Strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States.*
    b. *Reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network.*
    c. *Increase productivity, particularly for domestic industries and businesses that create high-value jobs.*
2. *Improve the safety, security, efficiency, and resiliency of multimodal freight transportation.*
3. *Achieve and maintain a state of good repair on the National Multimodal Freight Network.*
4. *Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network.*

5. *Improve the economic efficiency and productivity of the National Multimodal Freight Network.*
6. *Improve the reliability of freight transportation.*
7. *Improve the short- and long-distance movement of goods that –*
    a. *Travel across rural areas between population centers.*
    b. *Travel between rural areas and population centers.*
    c. *Travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network.*
8. *Improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity.*
9. *Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network.*
10. *Pursue the goals described in this subsection in a manner that is not burdensome to State and local governments.*

State

The *Mississippi Statewide Freight Plan*[7] is Mississippi's statewide comprehensive freight plan and was most recently updated in 2022. Freight transportation, including air, water, road, and rail systems, is a critical part of economic development, job creation, and global growth for the state of Mississippi. Efficient movement of goods to, from, and through Mississippi is also closely linked with manufacturing, which supports jobs throughout the state.

The purpose of Mississippi's Freight Plan is threefold:

1. **Define strategic goals for the Mississippi freight system.**
2. **Establish a strategy to achieve freight-related goals that align with MDOT's guiding principles**
3. **Fulfill the requirements of the FAST Act and subsequent IIJA.**

[7] https://mdot.ms.gov/documents/Planning/Plan/MS%20Freight%20Plan/MS%20Statewide%20Freight%20Plan%202022.pdf

Due to the heavy reliance of the state's economy on freight transportation, MDOT recognizes the importance of planning, designing, constructing, and maintaining freight related projects to sustain mobility and accessibility for the future growth of the state's population and industries.

Data obtained from FHWA's FAF was used to establish general trends in freight movement. As the FAF does not contain readily available data at the study area level, state level data was used. The method of transporting by tonnage of freight moved is shown in **Table 5.1**.

Table 5.1: Means of Transporting Freight Originating in Mississippi, 2023

Mode	Thousand Tons	Percent
Truck	124,627	41.00%
Rail	7,843	2.60%
Water	14,931	4.90%
Air (including truck-air)	18	0.00%
Multiple modes & mail	7,119	2.30%
Pipeline	149,352	49.10%
Other and unknown	31	0.10%
Total (All Modes)	**303,920**	**100.00%**

Source: Freight Analysis Framework 5

5.3 Trucking

Freight Networks

Within the MPA, I-10 and a portion of Canal Road that connects to the Port of Gulfport are part of the National Highway Freight Network (NHFN)[8]. Those highways, as well as I-110 within the MPA, are part of the National Multimodal Freight Network (NMFN)[9]. In addition to the National Highway and Multimodal Freight Networks, MDOT identified US 49 as a Tier I connector in the MFN. The detailed freight network can be found in Mississippi's freight plan.

Intermodal Corridors

The MPA contains both intermodal connectors and intermodal terminal facilities as listed in **Table 5.2** and **Table 5.3.**, respectively. Intermodal connectors include

[8] https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm

[9] https://www.transportation.gov/freight-infrastructure-and-policy/NMFN

corridors that have been identified as being part of national or state freight networks and that connect intermodal facilities. National and state-designated freight corridors within the MPA, as well as intermodal facilities, are displayed in **Figure 5.1.**

Table 5.2: Intermodal Connectors within the MPA

Intermodal Description	Corridor(s)
US 49 and Airport Rd / 34th Street in Gulfport connecting I-10 to Gulfport-Biloxi International Airport	I-10 and US 49
To Port of Pascagoula (east) via US 90: south on MS 611	I-10
To Port of Gulfport from I-10 via US 90: south on Port Access Road	I-10 and US 49
To Port of Gulfport from I-10 via US 90: West Pier Gate to 27th Avenue	I-10 and US 49
To Port of Bienville from I-10 via US 90/MS 607, southwest on US 90, south on Ansley Rd	I-10
To Port of Pascagoula (west) via US 90: south on MS 617 to MS 619, east on River Edge Rd	I-10

Source: FHWA

Table 5.3: Intermodal Terminal Facilities for Trucks

Name	Modes Served	City
Port of Gulfport	Truck - Port - Rail	Gulfport
Port of Pascagoula	Truck - Port - Rail	Pascagoula
Gulfport-Biloxi	Air & Truck	Gulfport
USPS-PDC-PDF	Truck & Truck	Gulfport

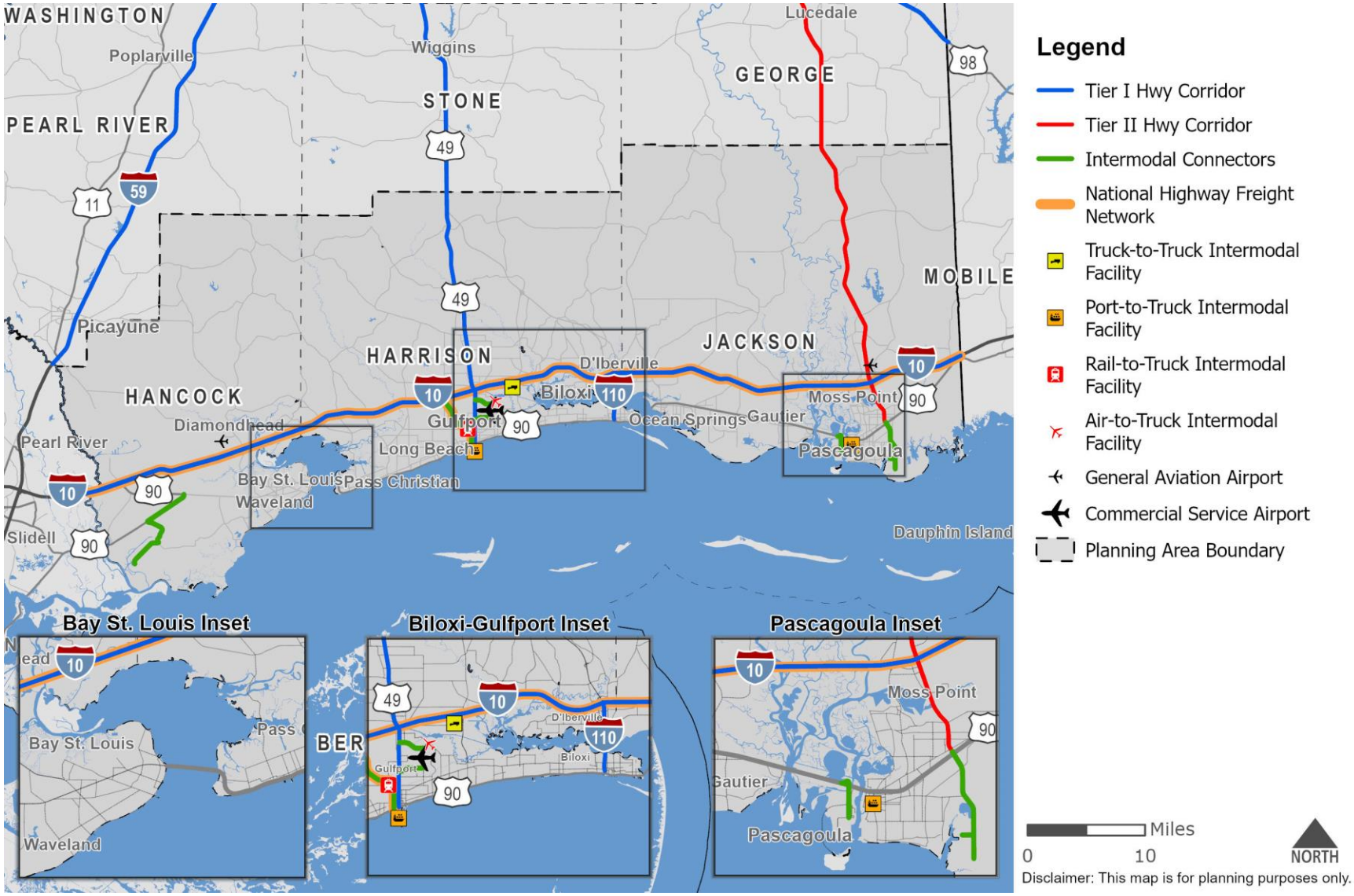
Source: FHWA

Volumes and Commodity Flows

To better understand the MPA's freight needs, the TDM's daily truck volumes were used to estimate volumes. As illustrated in **Figure 5.2,** the greatest truck volumes are experienced on:

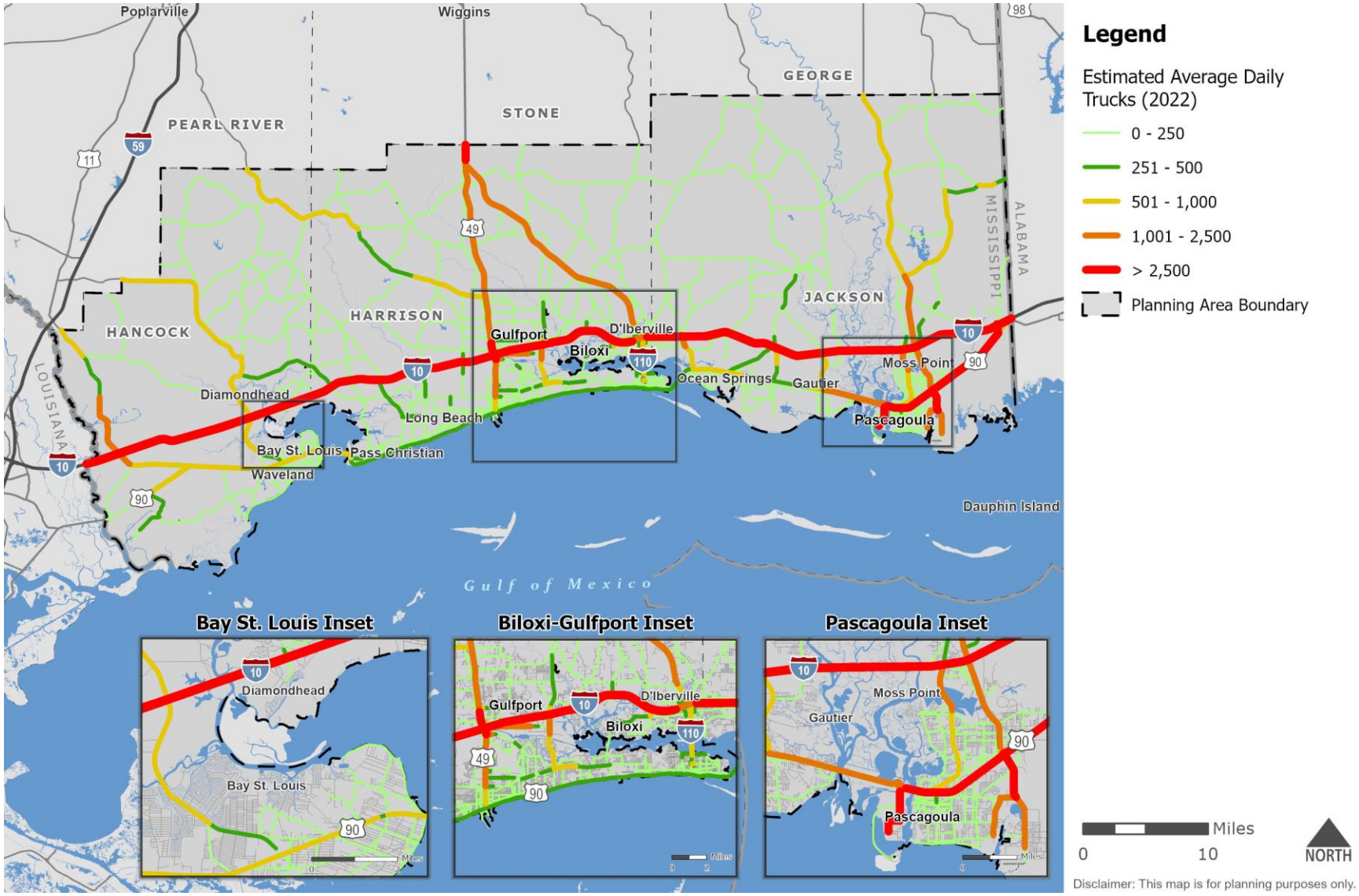
- Entirety of I-10
- US 49 from Creosote Rd to Entrance of Gulfport Behavioral Health System
- US 49 from interchange of Biloxi-D'Iberville Scenic Expressway to Harrison/Stone County Line
- US 90 from interchange of MS 619 to I-10 interchange
- MS 611 from Orchard Rd to US 90 Interchange
- Entirety of Jerry St. Pe. Hwy

Figure 5.1: Freight Truck Network and Facilities



Source: NTAD, USOT, MDOT

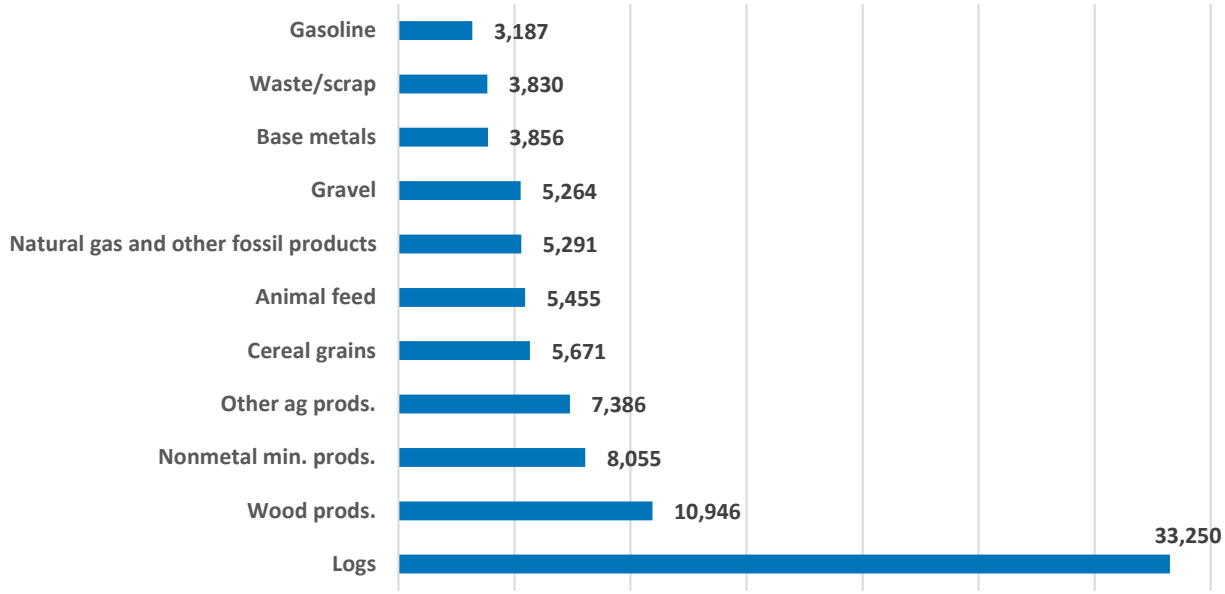
Figure 5.2: Freight Truck Traffic, 2022



Source: GRPC TD

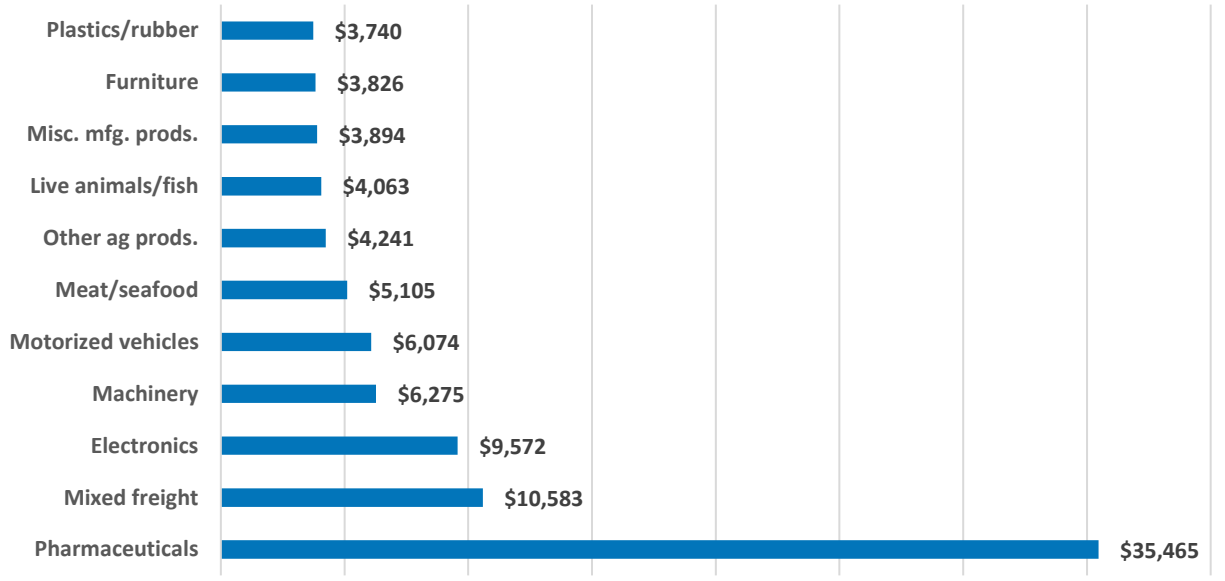
Figure 5.3 and **Figure 5.4** show the top commodities shipped via truck by total tonnage and value, respectively. Logs are the top truck commodity by tonnage, and mixed freight and pharmaceuticals are the top truck commodity by value.

Figure 5.3: Top Commodities by Truck Tonnage (Thousand Tons), 2023



Source: Freight Analysis Framework 5

Figure 5.4: Top Truck Commodities by Value (Million Dollars), 2023



Source: Freight Analysis Framework 5

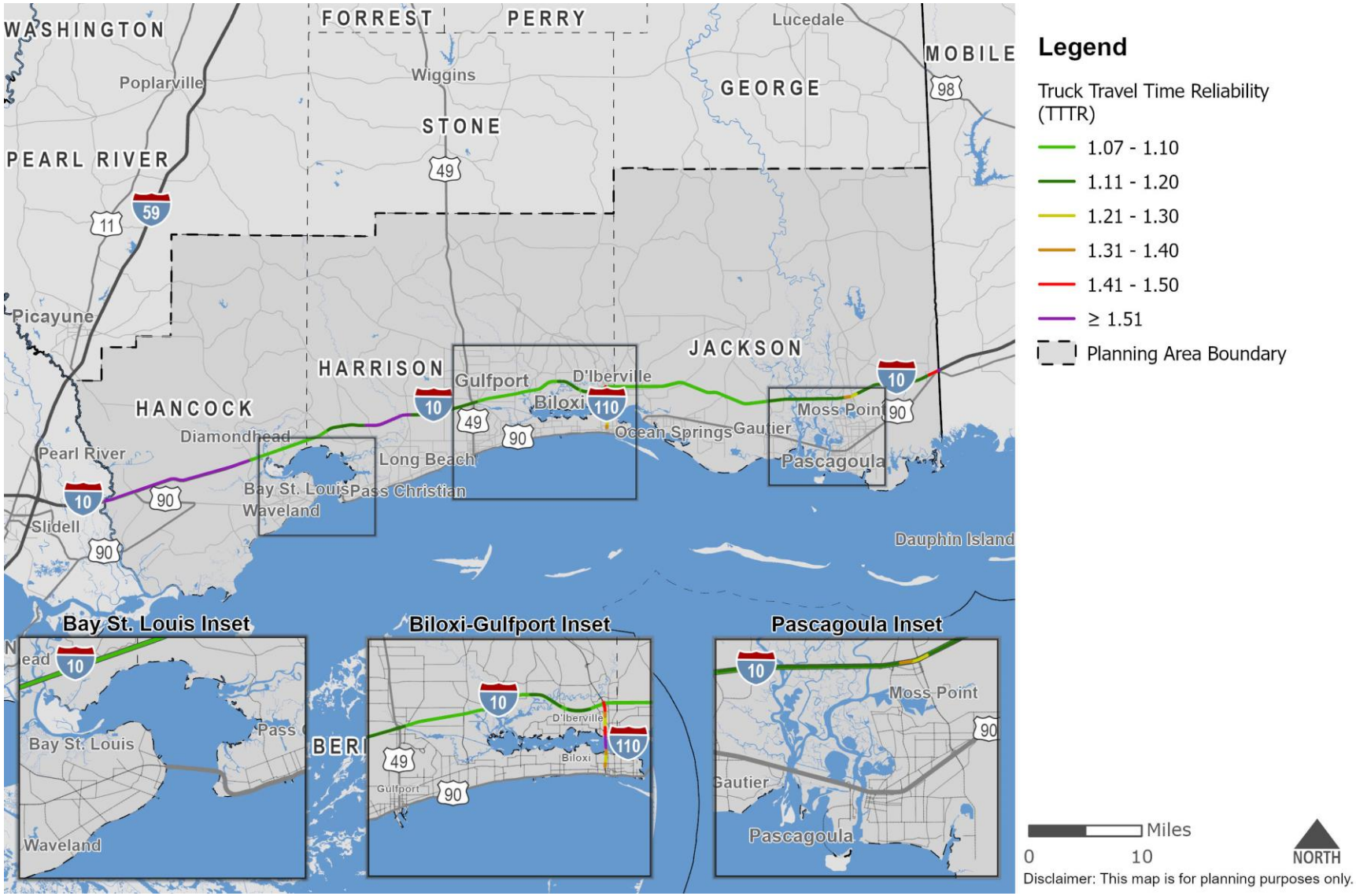
Truck Travel Time Reliability

The FHWA has established a freight performance measure to capture truck travel time reliability on the MPA's Interstate highway system: the Truck Travel Time Reliability (TTTR) index[10] . For this index, a rating of 1 is the lowest possible rating and would signify that there is no delay. Higher scores, especially those over 1.5, signify less reliability and greater delay. **Figure 5.5** displays this index rating for all Interstate routes in the MPO planning area.

The overall 2024 TTTR within the MPA is 1.3, with the highest score and greatest delay being on I-10 in Hancock County. The state's freight performance measures, and the MPO's progress towards them, are discussed in *Technical Report #3: Transportation Performance Management*.

[10] https://www.fhwa.dot.gov/tpm/rule/pm3/freight.pdf

Figure 5.5: Truck Travel Time Reliability, 2024

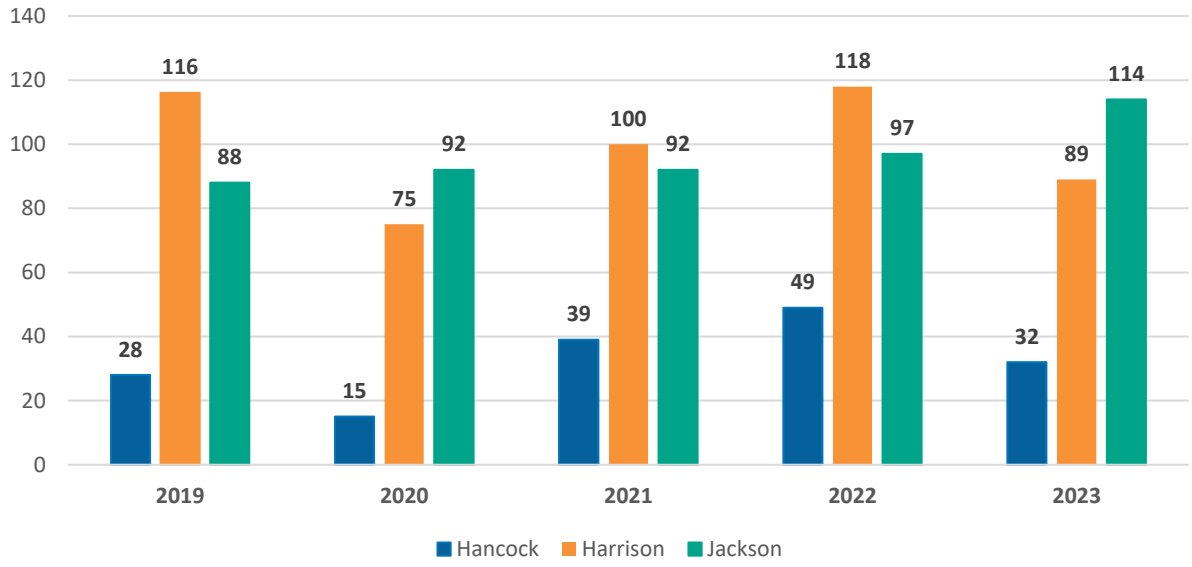


Source: NPMRDS

Safety

Crashes involving heavy vehicles were analyzed using crash records from 2019 to 2023 obtained from MDOT. A total of 1,145 crashes involving heavy vehicles occurred within the Gulf Coast MPA during the five-year study period. **Figure 5.6** shows the number of heavy vehicle crashes by county during the study period.

Figure 5.6: Heavy Vehicle Crashes by Year by County, 2019 - 2023



Source: MDOT

Bottleneck Segments and Truck Freight Network

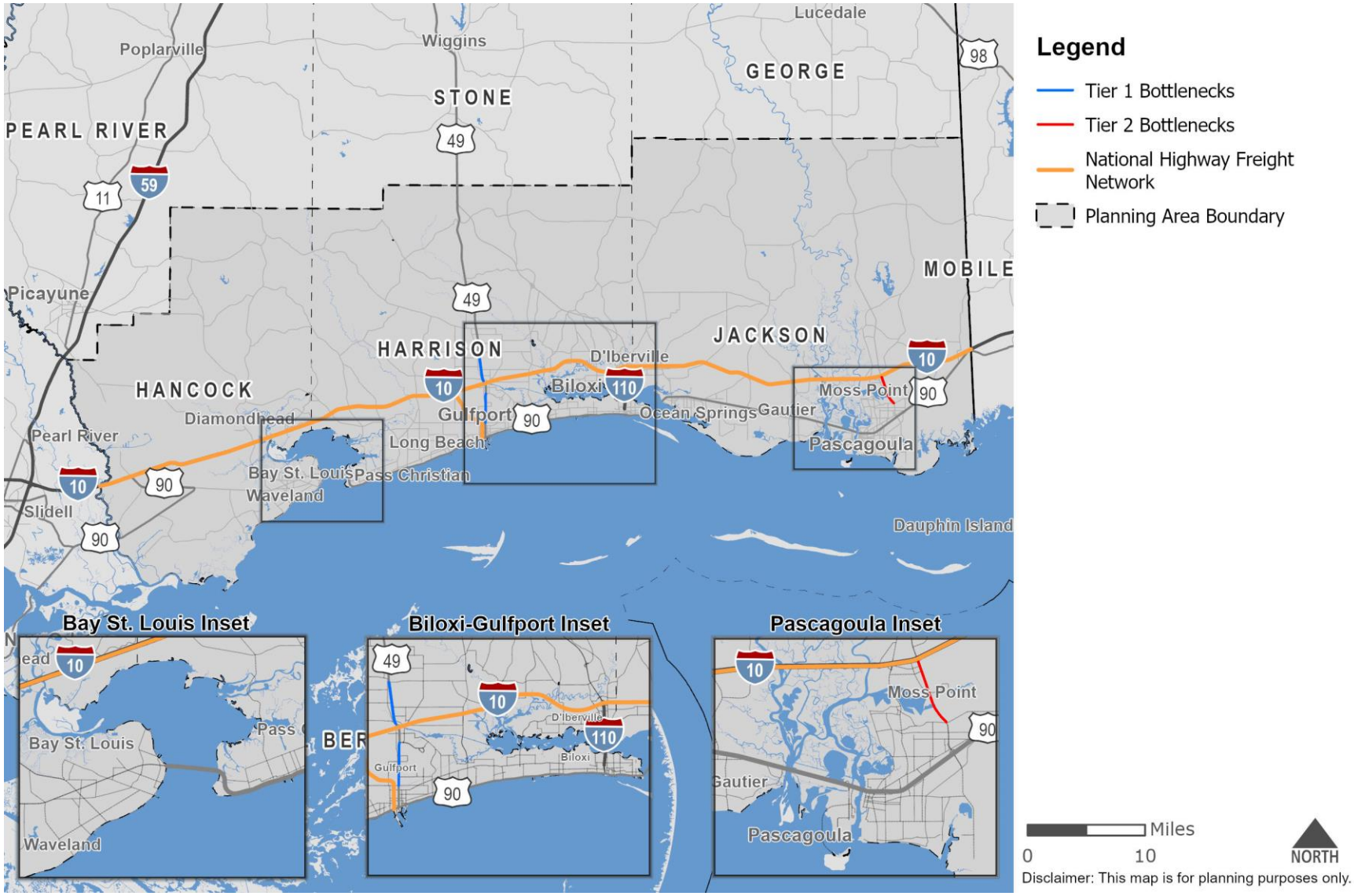
Bottlenecks are disruptions of vehicular traffic, which can be the result of several conditions on the roadways. Though the conditions causing the bottlenecks may differ, they each reduce the safety, mobility, and reliability of the roadway network.

Common locations for bottlenecks include:

- Reduction of Lanes
- Weaving Areas
- Freeway On-Ramps and Exit Ramps
- Freeway-to-Freeway Interchanges
- Changes in Highway Alignment
- Tunnels and Underpasses
- Narrow Lanes or Lack of Shoulders
- Traffic Control Devices (Traffic Signals

Figure 5.7 displays the Top 20 Bottleneck segments that overlap the state freight network within the MPA.

Figure 5.7: Bottleneck Segments and Truck Freight Network



Source: RITIS Bottleneck Jacksong Tool, 2024

5.4 Railways

The MPA has approximately 170 miles of railroads, most of which are Class I railroads that are Tier I corridors in the MFN. The significant freight railroads within the MPA are summarized in **Table 5.4**.

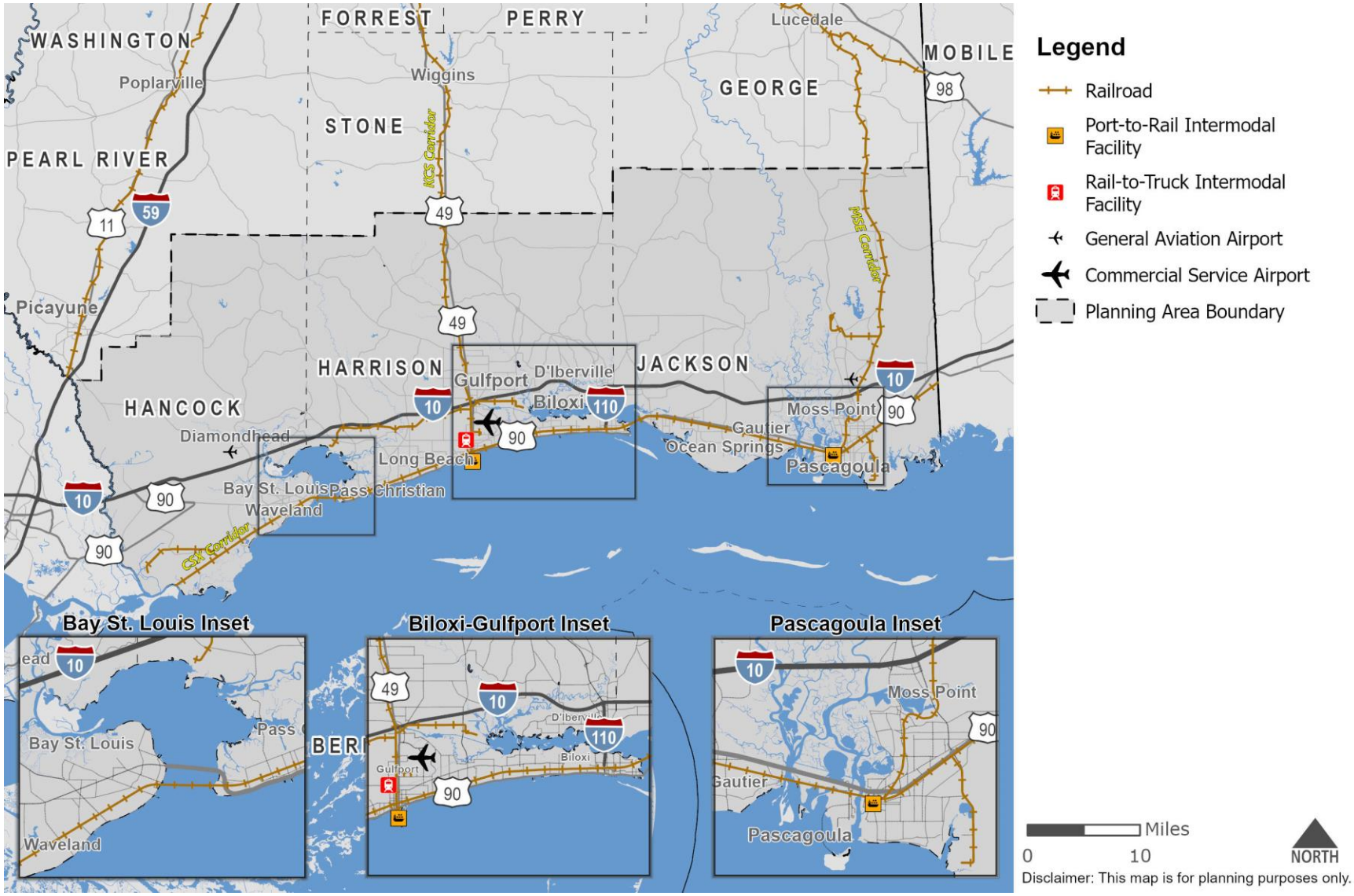
Although the National Primary Freight Network (NPFN) does not include railroads, the railroads within the MPA are part of the NMFN. **Figure 5.8** displays the MPA's railroads and MFN corridors.

Table 5.4: Significant Freight Rail Corridors in the MPA

Railroad	Abbreviation	Description
Kansas City Southern	KCS	The Kansas City Southern Railroad, running alongside the I-20 corridor, is part of the Tier I MS Gulf Coast MPO Rail Corridor.
Canadian Northern	CN	The Canadian Northern Railroad, running alongside the I-55 corridor, is part of the Tier I MS Gulf Coast MPO Rail Corridor.

Source: Mississippi Statewide Freight Plan, 2022

Figure 5.8: Freight Rail Network and Facilities



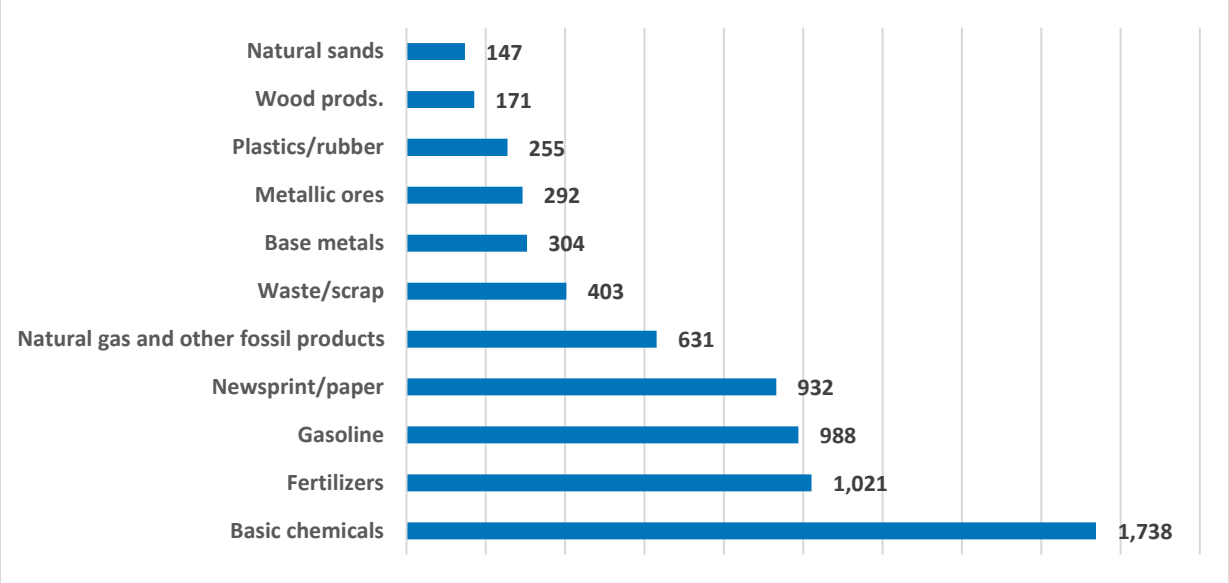
Source: NTAD, USDOT, MDOT

Commodity Flows

As shown in **Table 5.3**, less than three percent of freight tonnage that originated in Mississippi in 2023 was transported by rail.

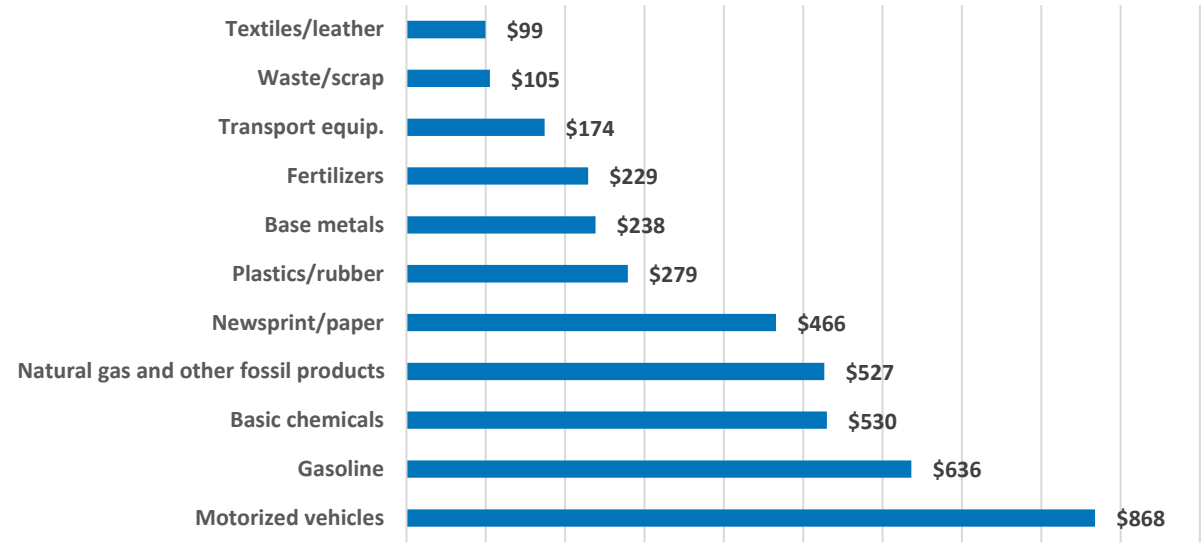
Figure 5.9 and **Figure 5.10** show the top commodities by total weight and value, respectively, that are carried on the MPA's rail system. The top commodity by tonnage is basic chemicals, and the top commodity by value is motorized vehicles.

Figure 5.9: Top Commodities by Freight Rail Tonnage (Thousand Tons), 2023



Source: Freight Analysis Framework 5

Figure 5.10: Top Rail Commodities by Value (Million Dollars), 2023



Source: Freight Analysis Framework 5

Rail Safety

From 2019 through 2023, there were seven crashes involving an automobile and a train. According to the Federal Rail Administration (FRA), beyond the rail-automobile crashes, there were no additional reported train incidents in the MPA from 2019 to 2023.

To avoid collisions, warning/control devices are required at highway-railroad grade crossings. Warning devices are either passive or active.

- **Passive devices** include crossbucks, yield or stop signs, and pavement markings.
- **Active devices** include flashing lights, bells, and gates, in addition to most passive warning devices.

Table 5.5 shows the breakdown of the MPA's public at-grade highway-railroad crossings.

Table 5.5: MPA Public At-Grade Highway-Railroad Crossings

Crossing Type	Number	Percentage
Active (Flashing lights and gates)	202	56.6%
Active (Flashing lights, no gates)	35	9.8%
Passive (Crossbucks and Stop/Yield Signs Only)	34	9.5%
Passive (Crossbucks Only)	86	24.1%
Total	**357**	**100.0%**

Source: FRA, 2024

5.5 Additional Freight Considerations

Air Cargo

Historically, only a small amount of freight is typically shipped by air. However, the commodities transported this way tend to be high-value and time sensitive. Also, airports tend to serve as distribution and manufacturing hubs.

The Gulf Coast MPA has three public airports:

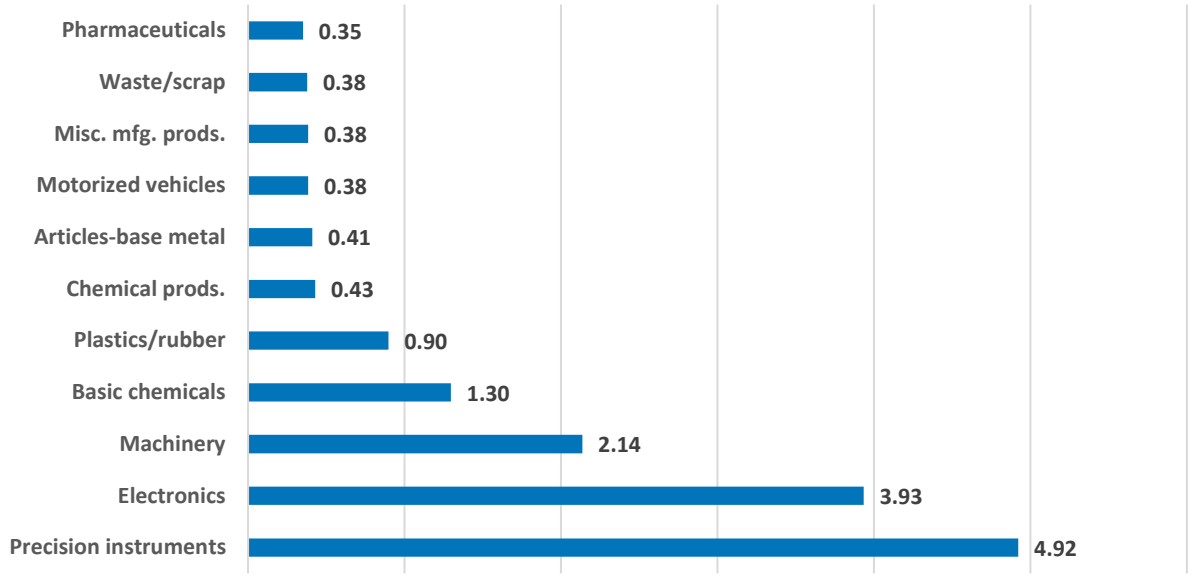
- Stennis International Airport in Kiln,
- Gulfport-Biloxi International Airport in Gulfport, and
- Trent Lott International Airport in Moss Point.

The Gulfport-Biloxi International Airport contains one (1) intermodal facility: Gulfport-Biloxi International Airport. This facility services air and truck modes. The Gulfport-Biloxi International Airport features a 40,000 square foot cargo facility.

Commodity Flows

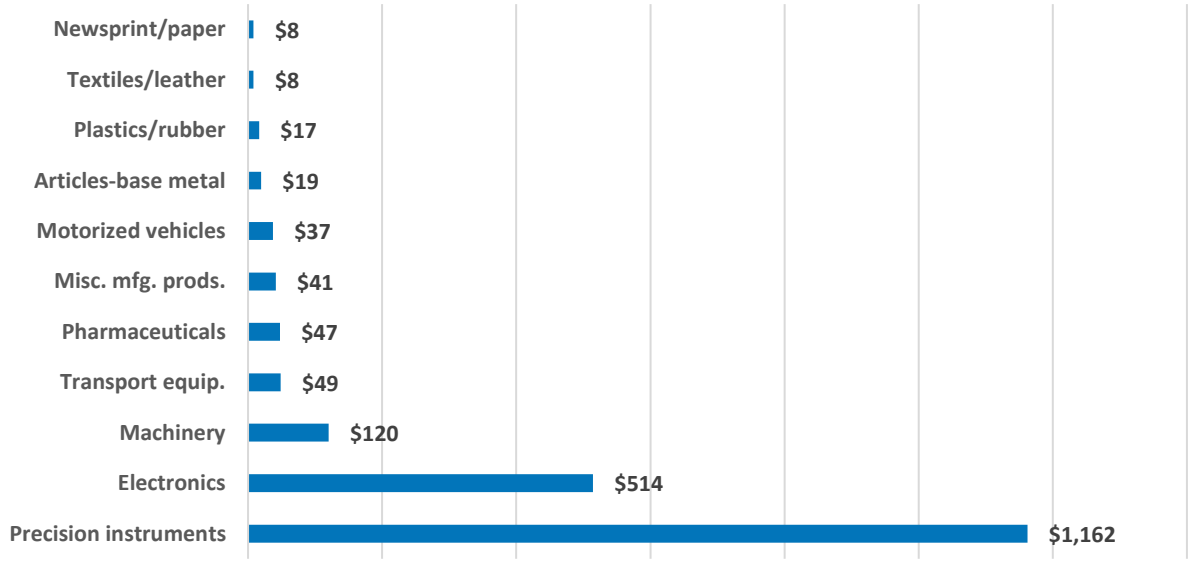
As previously mentioned, goods that are shipped by air tend to be high-value and time-sensitive. According to the FAF, the top air commodity by both tonnage and value is precision instruments. **Figure 5.11** and **Figure 5.12** show the top commodities shipped via air by tonnage and by value, respectively.

Figure 5.11: Top Air Commodities by Tonnage (Thousand Tons), 2023



Source: Freight Analysis Framework 5

Figure 5.12: Top Air Commodities by Value (Million Dollars), 2023



Source: Freight Analysis Framework 5

Waterway Network

There are four port facilities within the MPA, which provide valuable connections to national and international markets. A description of the ports is provided in **Table 5.6**.

Table 5.6: Gulf Coast Port Facilities

Facility	Description
Port Bienville	• Shallow draft port and industrial park located in Bay St Louis, MS • Channel depth of 12 feet and over 600,000 square feet of warehouse and dock space • Connects to I-10 via US 90 and MS 607 and to the CSX Railroad via the Short line Port Bienville Railroad • Facilities include a 100-ton Manitowac crawler crane and heavy lift services and a 3600-acre industrial park
Port of Gulfport	• State-owned port located in Gulfport, MS • Channel depth of 36 feet and over 5,000,000 square feet of warehouse and dock space • Connects to I-10 vis US 49 and US 90 and to the KCS Railroad • Two terminals: East Pier and West Pier • Facilities include 6,000 feet of berthing space, 110 acres of open storage space, 400,000 sq. ft. of covered warehouse space, RO-RO ramp, and two 100-ton capacity mobile harbor cranes
Biloxi Port Division	• Local port located in Biloxi, MS • Channel depth of 12 feet and 20,000 square feet of warehouse and dock space • Served by I-10, I-110, US 90, and MS 609 • Facilities include two commercial docks and two recreational marinas • Primarily caters to the recreational boating industry • The seafood industry is the only commercial activity at the port

Facility	Description
Port of Pascagoula	• Located in Pascagoula, MS • Channel depth of 42 feet and nearly 2,000,000 square feet of warehouse and dock • Connects to I-10 and US 90 via MS 63 and MS 613 and to the CSX and MSE Railroads • Mississippi's largest port by freight weight • Facilities include two harbors with public and private terminals and three industrial parks

All four ports are located along the Mississippi Sound, which is a component of the Gulf Intracoastal Waterway (GIWW). The GIWW is part of the USDOT Marine Administration's (MARAD) Marine Highway Program[11] and has been designated Marine Highway 10 (M-10).

The Port of Gulfport and the Port of Pascagoula are part of the NMFN. Additionally, the Gulf Intracoastal Waterway and the waterways that connect the Port of Gulfport and the Port of Pascagoula to Marine Highway 10 (M-10) are part of the NMFN.

Commodity Flows

Commodity data, tonnage, and operations information about the ports are not readily available.

Pipeline Network

Mississippi's pipeline network consists of natural gas and other fossil products, crude petroleum, and gasoline pipelines. By length, most pipelines are natural gas. **Figure 5.13** details the pipeline length by commodity carried, while **Figure 5.14** displays the commodities by tonnage. **Figure 5.15** shows the MPA's pipeline network.

[11] https://www.maritime.dot.gov/

Figure 5.13: Pipeline Commodity by Length (in miles), 2023

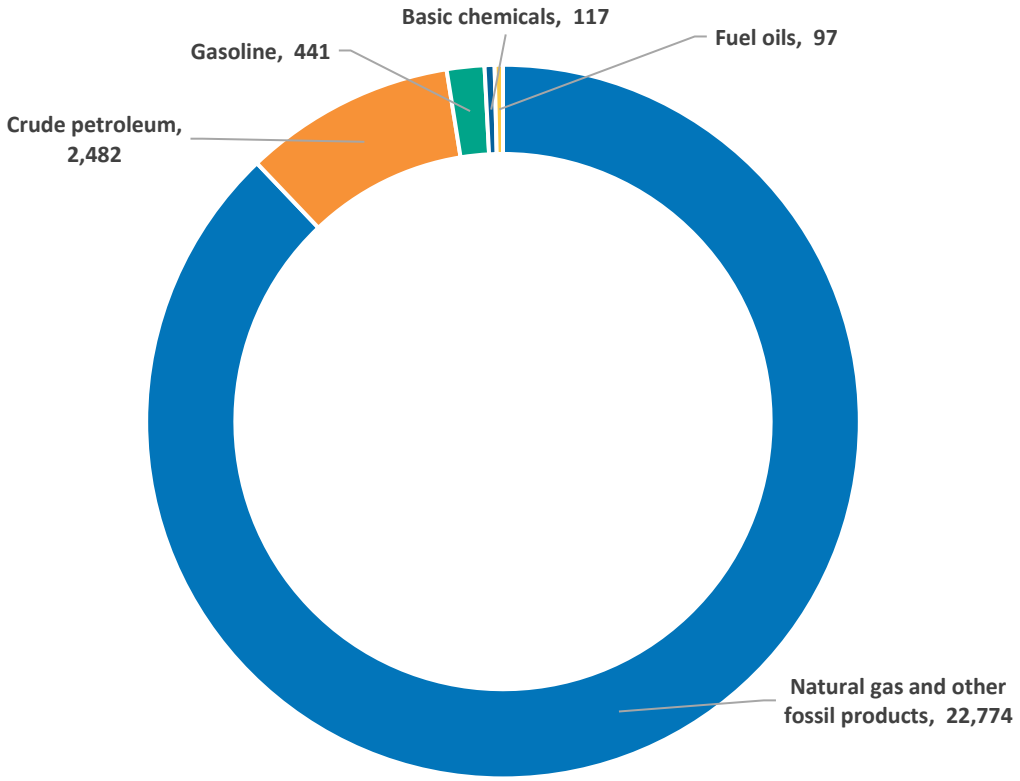
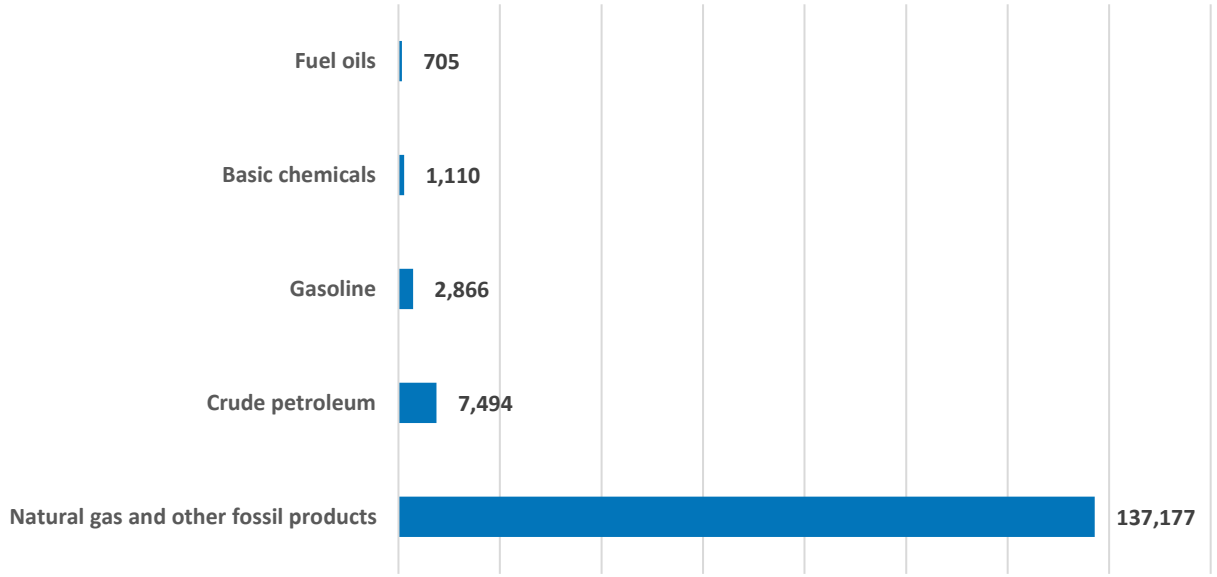
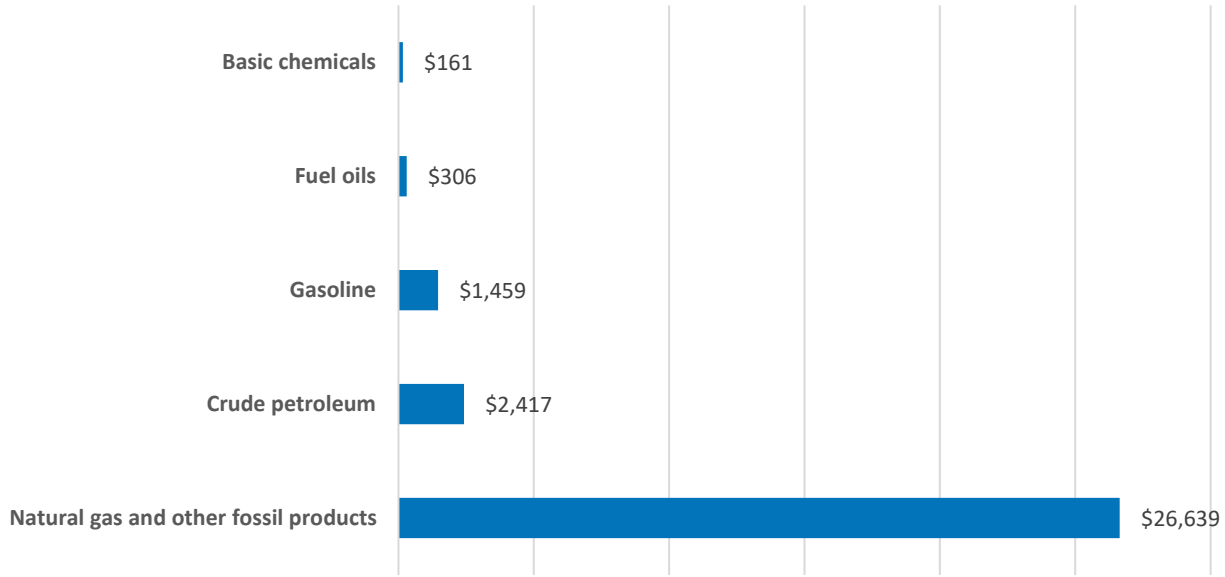


Figure 5.14: Pipeline Commodities by Tonnage (Thousand Tons), 2023



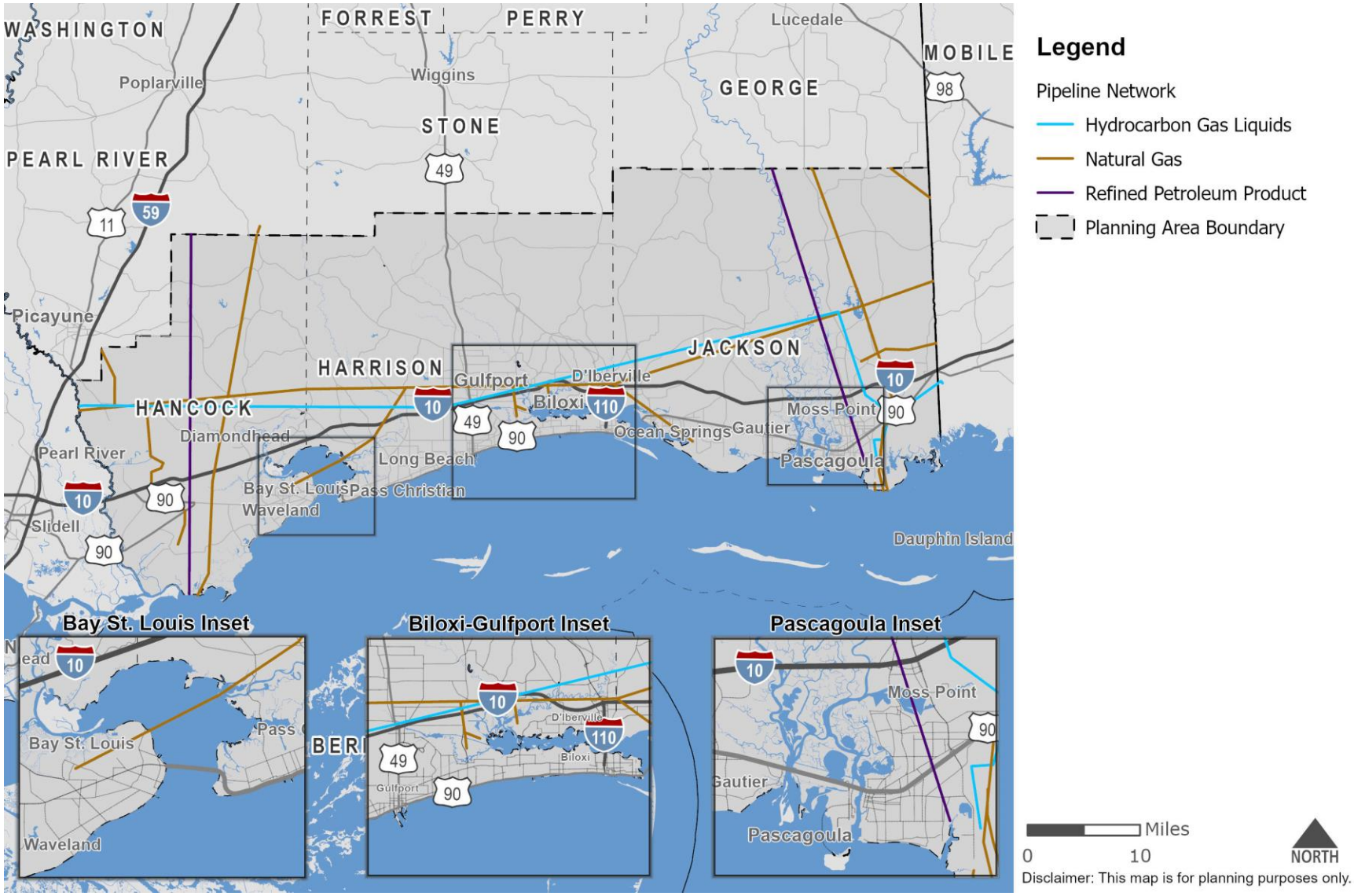
Source: Freight Analysis Framework 5

Figure 5.15: Pipeline Commodities by Value (Million Dollars), 2023



Source: Freight Analysis Framework 5

Figure 5.16: MPO Pipeline Network



Source: ESRI

6.0 Public Transportation

6.1 Public Transit

Public transportation services in the MPA play a key role in providing the community with access to the places they need to go, particularly for transit-dependent populations. Transit is a link to jobs and opportunities, connecting people to schools, health care, and their communities. Additionally, public transit has significant benefits for the entire community as it can increase local business access to skilled workers, reduce congestion and emissions, and foster walkable communities.

There are three (3) primary transit usage patterns, which are:

- **Occasional riders** who take transit once in a while.
- **Commuters** who take transit regulary but only for work.
- **All-purpose riders** who take transit regulary for multiple reasons.

The goal is to engineer a transit system that encourages the creation of "all-purpose riders" by improving transit services, rather than being useful only to the traditional "captive riders". To do this, emphasis is placed on increasing the core system's strength and reliability to make the system more attractive to everyone. This can be achieved by:

- Fostering reliable, frequent service
- Increasing walkability
- Increasing frequency
- Travel time improvements

It is important to note that riders in all three of the usage patterns previously mentioned will supplement their use of the transit system with other modes of transportation, including using ride-sharing services, walking, cycling, or using an automobile, when there are barriers or inefficiencies that discourage the use of transit systems.

Without a good, reliable transit system, even those riders who often use transit out of necessity will find alternative transportation when possible.

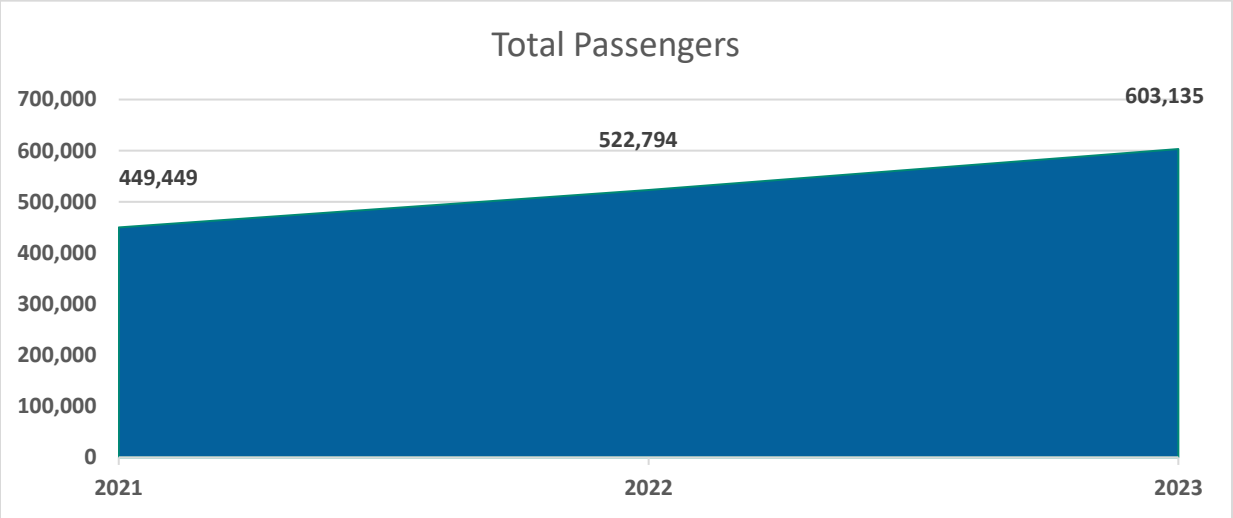
6.2 Local Public Transit Providers

Within the Mississippi Gulf Coast area, the Coast Transit Authority (CTA) provides scheduled fixed-route and paratransit services. Information on the services provided, such as fares, specific routes, service areas, and changes in the service map or routes, can be found on the CTA website (https://www.coasttransit.com).

Ridership Trends

To understand existing ridership trends, three years of data were used to analyze post-covid CTA ridership levels. This, shown in **Figure 7.1**, illustrates an average ridership of around 525,126 passengers per year from 2021 through 2023.

Figure 6.1: CTA Transit System Annual Ridership, 2021-2023



6.3 Transportation Network Companies

Transportation Network Companies (TNCs) are private companies that match passengers with vehicles, often through websites or mobile apps. These, also referred to as ride-hailing services. The largest of these service providers, Uber and Lyft, currently both operate within the MP.

While these services are not public transit, TNCs are increasingly partnering with the public sector to test new ways to provide public, or subsidized, transportation. Though pilot programs are still evolving, many focus on providing trips for people with disabilities, or in areas or times of low demand.

In addition to TNCs, Greyhound and FLIXBUS operate within the MPO, with a bus stop located in Biloxi. Although Amtrak does not currently operate in the region, a train route from New Orleans, Louisiana to Mobile, Alabama is restarting in 2025. Future stops on this route will include Bay St. Louis, Gulfport, Biloxi, and Pascagoula.

6.4 Fixed-Route Regional Peer Comparison

Peer comparison analysis is a tool that allows regions to compare their services to those of other regions with similar conditions. Ideally, the peer group has elements in common with the transit system studied, such as population, types of services offered, and geographical location (state or region). Since this is a regional long-range transportation plan, the criteria to select peer systems differs from the typical criteria used by transit agencies, as the focus is on the MPA versus an agency service area.

Peer Selection Methodology

The Urban Integrated National Transit Database (iNTD), provided by the Florida Department of Transportation (FDOT), uses data from the National Transit Database (NTD) and the 2023 American Community Survey, to identify urban transit systems across the United States which are most like one another. Criteria used to identify peer systems are:

- The presence of rail/heavy rail
- Service area population
- Total revenue miles
- Percent college students
- Population growth rate
- Percent low income
- Total operating budget
- Population density
- State capital
- Annual delay (hours) per traveler, freeway lane miles per capita
- Percent of service that is demand response

Based on this criteria, **Table 6.1** shows the four (4) most similar U.S. urban transit systems. Peer selection analysis uses NTD data, with exception to population, which uses iNTD due to data conflation issues. The module data is shown in **Table 6.2**.

Table 6.1: Selected Peer Regions

Region	Urban Fixed Route System
Danbury, CT	Housatonic Area Regional Transit (HARTransit)
Green Bay, WI	City of Green Bay (Green Bay METRO)
Montgomery, AL	City of Montgomery (theM)
Pensacola, FL	Portage Area Regional Transportation Authority (PARTA)

Source: iNTD 2023

Table 6.2: Peer Fixed Route Systems Trends, 2023

Indicator	Danbury, CT	Green Bay, WI	Montgomery, AL	Pensacola, FL	Peer Average	Gulfport, MS
Service Area Population	154,855	179,907	205,764	241,661	195,547	124,940
Service Area Square Miles	124	62	135	189	128	80
Service Area Population Density	1,249	2,902	1,524	1,279	1,739	1,562
Boardings	538,750	758,383	407,450	781,415	621,500	603,135
Revenue Miles	923,770	657,256	1,230,741	1,199,581	1,002,837	779,715
Revenue Hours	65,332	45,338	76,431	91,711	69,703	68,354
Annual Operating Expense	$6,285,067	$5,020,249	$6,372,670	$10,114,732	$6,948,180	$5,544,356
Passenger Fare Revenue	$444,936	$571,923	$332,314	$979,049	$582,056	$604,223
Vehicles operated in Maximum	46	30	32	45	38	20
Operating Expense per Boarding	$11.67	$6.62	$15.64	$12.94	$11.72	$9.19
Operating Expense per Vehicle Revenue Mile	$6.80	$7.64	$5.18	$8.43	$7.01	$7.11
Operating Expense per Vehicle Revenue Hour	$106.30	$114.79	$85.06	$114.25	$105.10	$94.59
Farebox Recovery Rate (%)	7.08	11.39	5.21	9.68	8.34	10.9
Average Fare	$0.83	$0.75	$0.82	$1.25	$0.91	$1.00
Vehicle Miles per Capita	6.81	3.65	6.04	5.16	5.42	6.61
Vehicle Hours per Capita	2.37	3.97	2.69	2.64	2.92	1.83
Boarding per Capita	3.48	4.22	1.98	3.23	3.23	4.83
Boardings per Revenue Mile	0.58	1.15	0.33	0.65	0.68	0.77
Boardings per Revenue Hour	9.11	17.34	5.44	8.83	10.18	10.29

Source: Urban iNTD, NTD

Peer Comparison Findings

The findings in **Table 6.2** provide relevant transit operations information for all fixed-route, urban transit services operating in the selected peer regions. A summary of analysis and key observations from this comparison are included below.

Service Area Population:

- Gulf Coast serves 36 percent fewer people a 38 percent smaller area compared to its peers.
- The Gulf Coast area's population density is slightly lower than peer areas.
- This results in an efficiency and cost-effectiveness on par with its peers when related to service area size and population.

Service Supply and Usage

- Gulf Coast has three percent fewer riders (603K vs. 621K) and operates two percent fewer hours than its peers.
- Gulf Coast also operates just over 22 percent fewer miles (780K vs. 1M) than its peers.
- Gulf Coast also achieves higher boardings per capita (4.83 vs. 3.23), boardings per revenue mile (0.77 vs. 0.68), and boardings per revenue hour (10.29 vs. 10.18), indicating efficient utilization of resources.

Financials

- Gulf Coast's annual operating expense is lower ($5,5M vs. $6,9M) when compared to its peers.
- It also has a lower operating expense per boarding ($9.19 vs. $11.72) and per revenue hour ($94.59 vs. $105.10).
- However, the Gulf Coast expense per vehicle revenue mile is slightly higher ($7.11 vs. $7.01) than its peers.
- In general, the Gulf Coast is more financially efficient when compared to its peer regions.

Fare Revenue and Recovery

- Gulf Coast collects more passenger fare revenue ($604K vs. $582K) and has a higher farebox recovery rate (10.9% vs. 8.34%), indicating better cost recovery through fares.
- However, the average fare is also slightly higher in the Gulf Coast area when compared to its peers ($1.00 vs. $0.91).

Key Takeaways

- Gulf Coast's transit system demonstrates cost efficiency and effective resource utilization compared to peers, despite serving a smaller population and area.
- Its higher farebox recovery rate, boardings per capita, and boardings per revenue mile/hour suggest better performance in terms of ridership and financial sustainability.
- Opportunities for improvement include increasing vehicle operational hours per capita to expand service availability while maintaining its high efficiency.

Additional analysis for transit gaps, and potential solutions to those gaps and the existing services, are discussed in *Technical Report #4: Needs Assessment*.

7.0 Bicycle and Pedestrian

7.1 Classification of Bicycle and Pedestrian Facilities

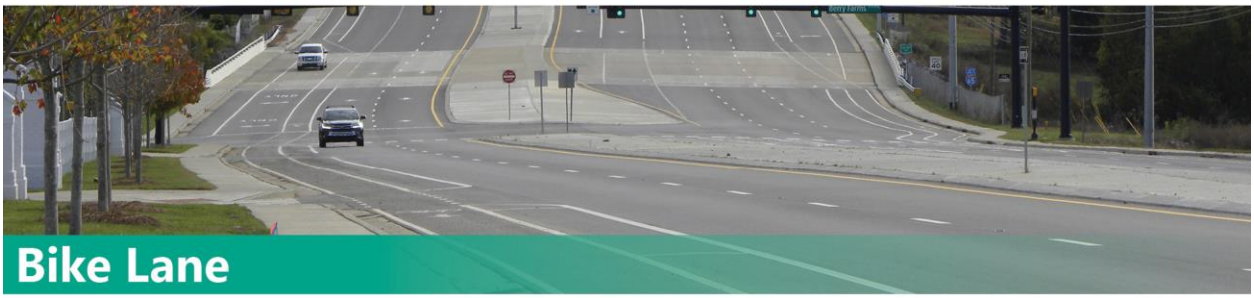
The bicycle and pedestrian facilities in the Gulfport-Biloxi MPA are grouped into five (5) classifications: Shared Use Path, Bike Lane, Bikeable Shoulder, Bike Route, and Sidewalk. While each facility type is used to improve accessibility for the travelling public, they provide different functionalities and meet varying needs. Classifying and addressing bicycle and pedestrian facilities separately helps to reduce confusion and convey what networks are suited for bicyclists, pedestrians, or both users.

A brief explanation of these classifications is included in **Figure 7.1**.

Figure 7.1: Bicycle and Pedestrian Facility Type

Shared Use Path

- Physically separated from motorized vehicular traffic by open space, buffer or barrier.
- Typically, between 8 to 10 feet wide.
- Used by bicyclists, pedestrians, skaters, users of wheeled mobility devices and other non-motorized device users.



Bike Lane

- Portion of a roadway designated by striping, pavement markings and signage for the exclusive use of bicyclists.
- Located on both sides of a roadway and typically between 4 to 6 feet in width.
- Each lane is one way. Bicyclists travel in the same direction as motor vehicles.
- Lanes may be delineated between a travel lane and on street parking, curbs or the edge of pavement.
- Though they may be used by pedestrians, bike lanes are designed for the preferential use of bicyclists.

Bikeable Shoulder

- Functions similarly to bike lanes. Bikeable shoulders are delineated by using existing striping from the outermost vehicle lane to the edge of the shoulder.
- Located on both sides of a roadway. Should provide a minimum of four (4) feet of space for bicyclists from the outermost travel lane to the edge of the pavement.
- Each shoulder is one way with bicyclists traveling in the same direction as motor vehicles.
- Though they may be used by pedestrians, bikeable shoulders are designed for the preferential use of bicyclists

Bike Route

- Both bicyclists and motorists use roadways travel lanes.
- No striping delineating a portion of the roadway is set aside for bicyclists.
- Identified with appropriate directional and informational markers which read "Bike Route" or "Share the Road."
- It is recommended that any roadway classified as a bike route should have a minimum width of 14 feet, but be less than 16 feet, from striped center line.
- Routes are used by bicyclists. Pedestrians may use bike routes if there are no other alternatives; however, it is not recommended due to safety concerns.

Sidewalk

- Physically separated from motorized vehicular traffic by open space, buffer or barrier.
- Typically located within public right of way.
- Minimum width recommended by AASHTO and FHWA is 5 feet. Preferred width, to improve pedestrian mobility, is 6 feet.
- Should be continuous, unobstructed and located on both sides of a roadway.
- Mainly used by pedestrians. Bicycle usage should be kept to a minimum.

7.2 Existing Inventory

The MPO's existing bicycle and pedestrian facilities network consists of over 394 miles of bike routes, sidewalks and shared pathways scattered throughout the MPO on functionally classified roadways and within local neighborhoods.

Sidewalks

Most sidewalks are more predominant in the areas south of I-10 and in the older parts of the cities, as is common with coastal cities due in part to their age. Due to local ordinances within the region, new sidewalks must be considered with future subdivision development. This has led to new sidewalk infrastructure in the North Gulfport area and some areas in North Biloxi as these areas continue to develop.

Bike Facilities

Bike facilities have improved over the last five years and there is consistent coverage in most of the cities within the MPO, but a great number of the routes still utilized are not up to design standards and not officially designated routes. Additionally, some bike facilities within the MPA are part of larger biking corridors.

The Adventure Cycling Association is working to establish resolutions recognizing the Southern Tier Route in an effort to make it a safer and more inclusive bicycling environment. This route, which includes portions of bike facilities within the MPA, is part of the Adventure Cycling Association's national corridor plan and runs from San Diego, California, to St. Augustine, Florida.

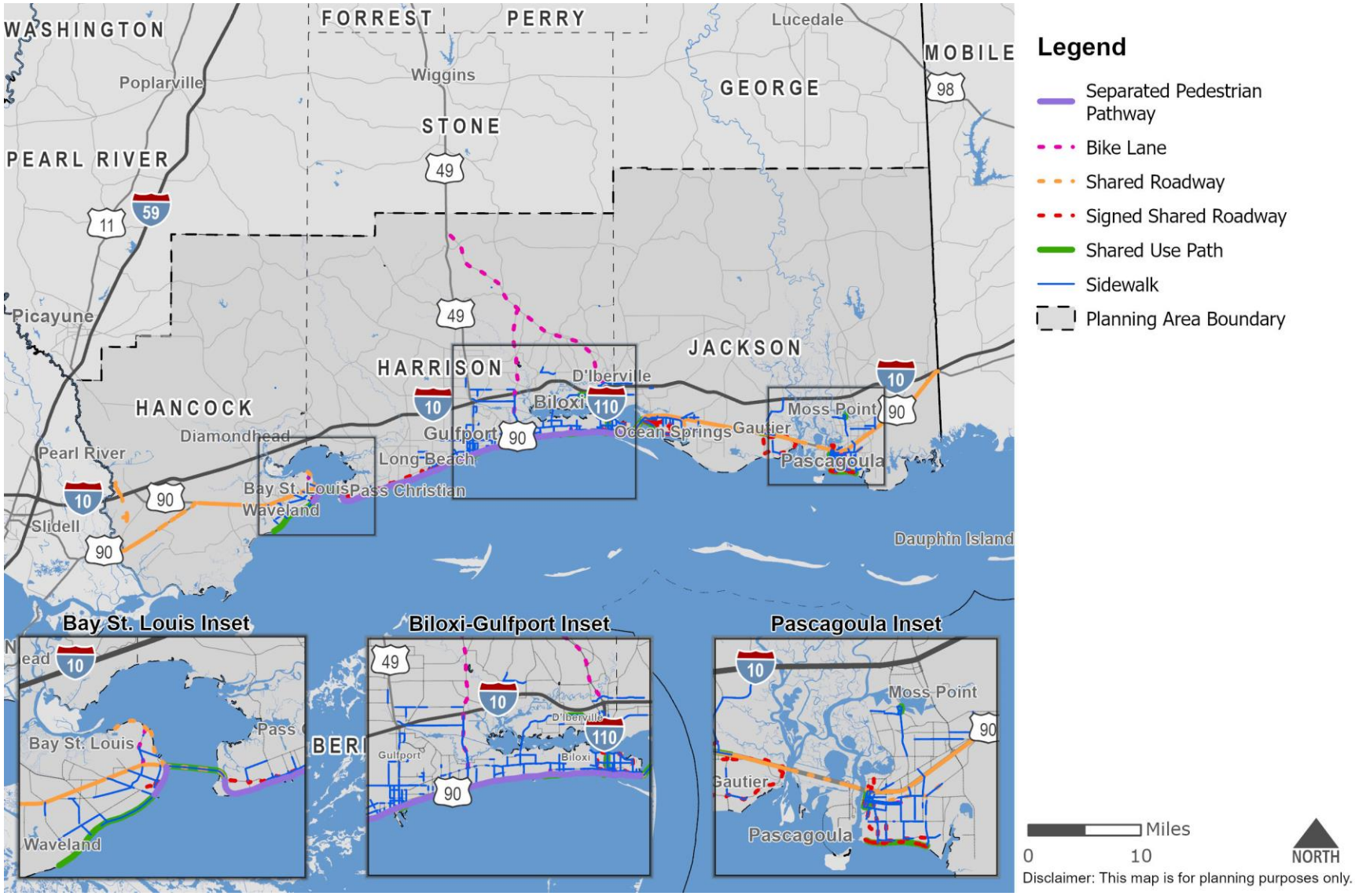
Source: Adventure Cycling Association

Within the MPA, the route coexists with existing routes alongside Highway 90 in Hancock County, through the cities of Bay St. Louis, Gulfport, Pascagoula, and exiting the state at the Franklin Creek Community.

In addition to the national route, the Gulf Coast Bicycle Club has many local bike routes used to navigate the entirety of the Gulf Coast. Currently, none of these routes have been signed.

An inventory of existing bicycle and pedestrian facilities is depicted in **Figure 7.2**.

Figure 7.2: Existing Bicycle and Pedestrian Facilities Within the MPA



Source: GRPC

Upcoming Bike and Pedestrian Projects

Two notable pedestrian projects are expected to be completed in the next two years. These are:

- A new pedestrian walkway along U.S. 49 from Turkey Creek to just north of Creosote Road, in the Turkey Creek Historic District, and
- An additional 1.25 miles of sidewalk in North Biloxi on Woolmarket Road.

7.3 Existing Bicycle and Pedestrian Plans

Several existing plans, codes, and ordinances exist that address the cycling and pedestrian needs of the state, region, and individual communities within the MPA. An overview of these are included in this section.

State Plans

MDOT's Mississippi Bicycle and Pedestrian Program

The program is dedicated to providing a safe transportation network for bicyclists and pedestrians. The website[12] includes links to safety tips, local and national bicycle and pedestrian resources, and potential funding sources.

Nature Based Tourism Plan for Coastal Mississippi

The *Nature Based Tourism Plan for Coastal Mississippi*[13] details several goals for trails, blueways, and greenways. It encourages improvements to signage and design standards for pedestrian trails and bicycle lanes, advocates for making the existing network safer and more attractive, and includes goals to create a more connected network that incorporates popular destinations. Key recommendations from this plan include:

- improving/removing the gaps in the existing trail network,
- enhancing bicycle and pedestrian infrastructure,
- widening bike lanes,
- considering more bike sharing options,
- creating clearer roadway markings, and
- providing safer crossings.

[12] https://mdot.ms.gov/portal/bikeped

[13] https://msgulfcoastheritage.ms.gov/wp-content/uploads/2020/09/TourismBook.pdf

John Paul Frerer Bicycle Safety Act

The John Paul Frerer Bicycle Safety Act[14], enacted in 2010, provides additional protection for cyclists within the State of Mississippi by providing guidelines that both motorists and bicyclists must adhere to. Some laws that were established by this act include:

- Motorists being required to leave a minimum space of three feet between the vehicle and the bicycle when passing.
- Harassment, taunting, or maliciously throwing an object at or in the direction of any person riding a bicycle were made unlawful.
- Motor vehicle operators are not allowed to block the bicycle lane to oncoming bicycle traffic and are required to yield to a bicyclist in the bicycle lane before entering or crossing the lane.
- The operator of a motor vehicle may only pass a bicycle traveling in the same direction in a no-passing zone if it is safe to do so.

Regional Plans

GRPC Emphasis Area Bicycle and Pedestrian (2024)

GRPC partnered with MDOT to develop and complete a Local Road Safety Plan. Through this partnership, crash data was analyzed across Hancock, Harrison, and Jackson counties. The data highlighted areas with higher bicycle and pedestrian crash events, which were noted as areas of safety concern.

GRPC's Complete Streets Policy (2023)

GRPC actively endorses and promotes complete streets policies, encouraging local governments to develop policies that accommodate all users in transportation planning. Successful implementation hinges on the ability of local jurisdictions to allocate necessary resources, including staff and funding. Increasingly, local authorities recognize the importance of integrating diverse user needs during project planning phases.

GRPC's Safe Routes to Schools

Infrastructure- and non-infrastructure related projects in the vicinity of schools are designed to increase awareness, safety, access, and improve the overall ability for students to walk and bike to school.

[14] https://billstatus.ls.state.ms.us/documents/2010/pdf/SB/3000-3099/SB3014SG.pdf

GRPC's Active Community Study Mississippi Gulf Coast (March 2020)

This report provides a framework for identifying and prioritizing focus areas to improve active communities. It emphasizes a network of safe individual pathways connecting important destinations in each Gulf Coast community within the MPA.

GRPC MTP 2045 (December 2020)

GRPC partnered with MDOT to complete the previous MTP for the area. It addresses the non-motorized system's existing needs, safety issues, and regional gap areas.

Nature Based Tourism Plan for Coastal Mississippi (2016)

This plan identifies many of the natural resources that exist within the region and highlights sustainability, and potential blueways, greenways, and bike paths.

Local Plans

Bay St. Louis 2045 (2023)

This plan envisions improved mobility and connectivity for pedestrians and cyclists with an emphasis on connecting Bay St. Louis's recreational assets.

Harrison County Active Living Initiative (June 2022)

The *Harrison County Active Living Initiative* provides a long-term vision and specific action steps for a more active, healthy, and livable county. The planning process involved asking key stakeholders to envision what could encourage residents to be more active every day, which guides the specific network and policy recommendations in the initiative.

City of D'Iberville Sidewalk and Pedestrian Study (December 2020)

The *D'Iberville Sidewalk and Pedestrian Study* seeks to improve walkability along the primary corridors in the Old Town District that connect the historic town center to D'Iberville Middle School and apartment developments to the north, businesses and neighborhoods to the west, and the bayfront to the south.

Diamondhead Master Plan (2020)

This plan encourages mixed use development, pedestrian and bicycle pathways, greenspace and multiuse sidewalks within Diamondhead.

Jackson County Bicycle, Pedestrian, and Trails Master Plan (November 2018)

This countywide bicycle, pedestrian, and trails plan seeks to increase access to walking and biking, improve safety, promote economic development, expand education, and strengthen modal connections.

City of Pascagoula Complete Streets Policy (2010)

The City of Pascagoula adopted a Complete Streets Policy in 2010 with the aim to reduce vehicular trips, increase energy efficiency, and encourage the safe and convenient use of walking and bicycling as a practical mode of transportation throughout the City[15]. This policy requires that, where applicable and as funding is available, bicycle and pedestrian infrastructure should be included with new roadway construction and existing roadway reconstruction or resurfacing.

City of Long Beach Sidewalk Ordinance

The City of Long Beach has a sidewalk ordinance that requires subdivision developments to address pedestrian access along roadways as part of the construction of their building or facility, especially when pedestrian destinations, such as schools, parks, or residential communities, are nearby. This was amended in 2024 to give the option of a fee-in-lieu of construction for the sidewalk if a variance request is accepted by the planning commission.

7.4 Bicycle and Pedestrian Groups

Several groups within the MPA act as representation for local residents, stakeholders, statewide agencies, and national organizations to participate in the plan development process, or to promote bicycle and pedestrian awareness and facility enhancement. These groups include:

- Gulf Coast Bike Club
- Gulf Coast Heritage Trails Partnership
- Mississippi NICA
- Biloxi Bike Works
- AARP

Additionally, the Gulf Coast Heritage Trail Partnership is a non-profit organization that advocates for safe and connected coast-wide bicycle and pedestrian facilities. They specifically promote a network of mobility between schools, neighborhoods, businesses and unique cultural and scenic blueways and greenways to encourage the biking and walking of the scenic, historic, and natural areas of the Mississippi Gulf Coast.

7.5 Safety

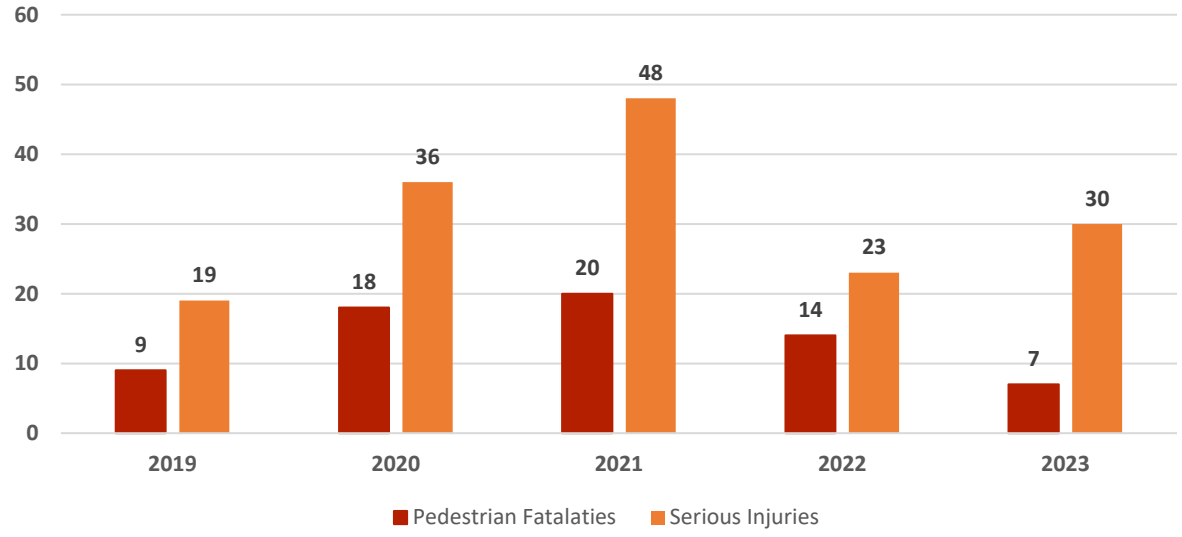
The IIJA requires MPOs and State DOTs to work collectively to examine performance data and establish targets for national performance goals focused on improving the

[15] https://www.bikewalkmississippi.org/_files/ugd/636d0d_52a5d6df937041f7b8adf65a61e67d5b.pdf

overall transportation system. The first goal, safety, requires State DOTs and MPOs to set targets for five safety-related performance measures and report progress toward their achievement annually. Each performance measure focuses on achieving a significant reduction in traffic fatalities and serious injuries on all public roads, including a measure that focuses on reducing these outcomes specifically for non-motorized users of the transportation system.

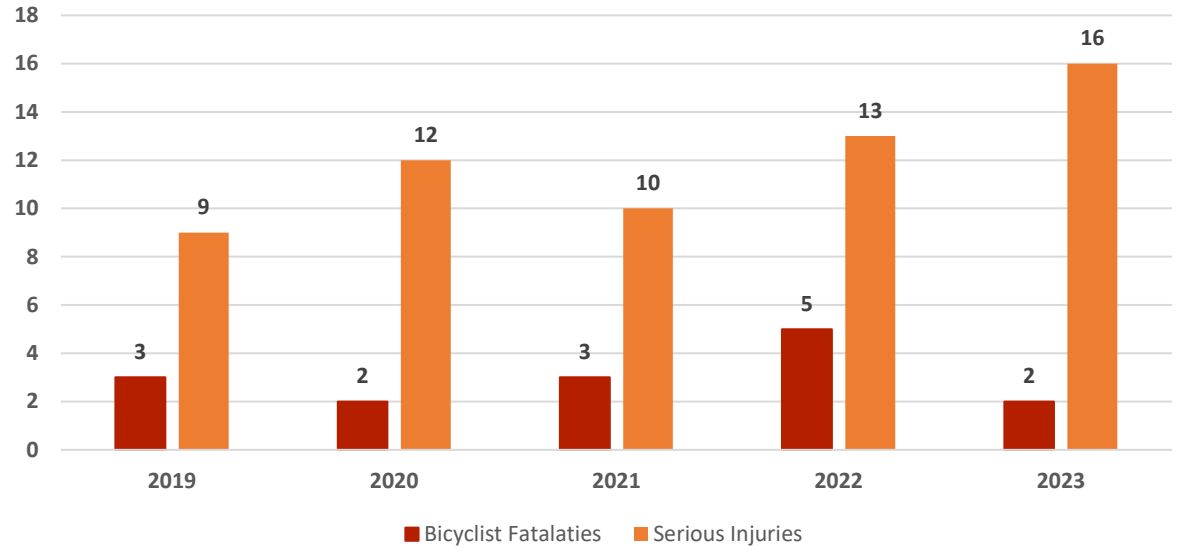
As shown in **Figure 7.3** and **Figure 7.4**, between 2019 and 2023, there were 68 pedestrians and 15 bicyclists killed as a result of roadway crashes within the MPA. During that same span, there were 156 pedestrians and 60 bicyclists involved in crashes that resulted in serious injuries.

Figure 7.3: Pedestrian Fatalities and Serious Injuries



Source: MDOT, 2024

Figure 7.4: Bicyclist Fatalities and Serious Injuries



Source: MDOT, 2024

7.6 Carbon Reduction Program and Complete Streets

As part of the IIJA, the Carbon Reduction Program (CRP)[16] was created for the purposes of reducing transportation emissions.

To meet this need, emphasis areas were identified, which contain guidance on both different project types and elements within individual projects that should be considered to support nationwide carbon reduction goals. Within the scope of the MTP, the Mississippi Carbon Reduction Strategy, which aligns with the Federal Carbon Reduction Program, and guidance on Complete Streets, an identified emphasis area, are most impactful for planning considerations.

According to the FWHA,

"Transportation accounts for half of urban air pollution and 70 percent of U.S. oil consumption, resulting in the United States sending over $90 billion abroad to pay for petroleum imports in 2015. Better, more efficient transportation reduces pollution and puts money back into the American economy".

[16] INFORMATION: Carbon Reduction Program (CRP) Implementation Guidance (dot.gov)

Mississippi Carbon Reduction Strategy

MDOT developed a Carbon Reduction Strategy that aligns with federal requirements and guidance, while addressing the unique context and transportation needs of Mississippi, to support carbon reduction efforts throughout the State. The development of this document included input from GRPC, as well as other Mississippi MPOs, and resulted in the identification of five strategies that can be funded through the federal Carbon Reduction Program. These are[17]:

1. Transportation Technology
2. Congestion Management and Mitigation
3. Active Transportation and VMT Reduction
4. Energy Efficient and Green Construction Processes
5. Freight Efficiency

In addition to these projects, focus areas that may be funded by the State or MPO were also identified and include:

- Streetlight Upgrades
- Zero Emission Vehicle Infrastructure
- Zero Emission Vehicle Fleet Conversion
- Signal Upgrades and Enhanced Intersections
- Bicycle and Pedestrian Facilities
- Intelligent Transportation Systems

Additional information about MDOT's Carbon Reduction Strategy can be found within the plan on the MDOT webpage at https://www.mdot.ms.gov.

Complete Streets

Complete Streets is a design philosophy that provides both motorized and non-motorized transportation users with multiple, safe travel options along a roadway. Complete streets may include facilities designed that both physically share routes or those that use parallel, separated infrastructure. This design process allows those who prefer to walk and bicycle to have a safer and more comfortable experience, while still having access to mobility and the ability to conduct their business. The use of complete streets would enhance travel throughout the region by providing users with multiple options of travel, reducing roadway congestion, and increasing safety.

[17] https://mdot.ms.gov/documents/Planning/Plan/2023%20MS%20Carbon%20Reduction%20Plan.pdf

7.7 Latent Demand Scoring

As part of the MTP, a Latent Demand Scoring (LDS) was conducted to determine the locations within the MPA that people are most likely to use or want bicycle and pedestrian facilities. This analysis was based on various socioeconomic factors and the number and types of popular destinations within the MPA.

The LDS used the following categories, with the maximum possible score for each category shown in parentheses.

- **Age (10)**: Vulnerable populations who may be unable to use a vehicle. This is measured as persons per acre under the age of 18 and over the age of 65.
- **Popular Destinations (15)**: Areas with a high density of popular destinations where people might want to travel to. These could include, but are not limited to, religious facilities, schools, grocery stores, etc.
- **Intersections (20)**: Areas with high density of roadway intersections. A higher density of intersections could indicate a suitable environment for biking and walking, while providing connectivity to the larger transportation system.
- **Zero-Vehicle Households (25)**: Households per acre with no vehicles. These households typically indicate low-income persons who are more likely to bike, walk, or access the transit system.
- **Population and Employment (30)**: Areas of high general activity density. This shows not only where people live but where they work and undertake activities that may not necessarily be included in the popular destinations even though they are places people need or want to access.

The analysis was conducted at the block level to provide the most granular level of analysis available using 2020 Census data. These scores were then reviewed to determine where the greatest latent demand, or needs, for bike/ped facilities exist.

LDS Analysis Results

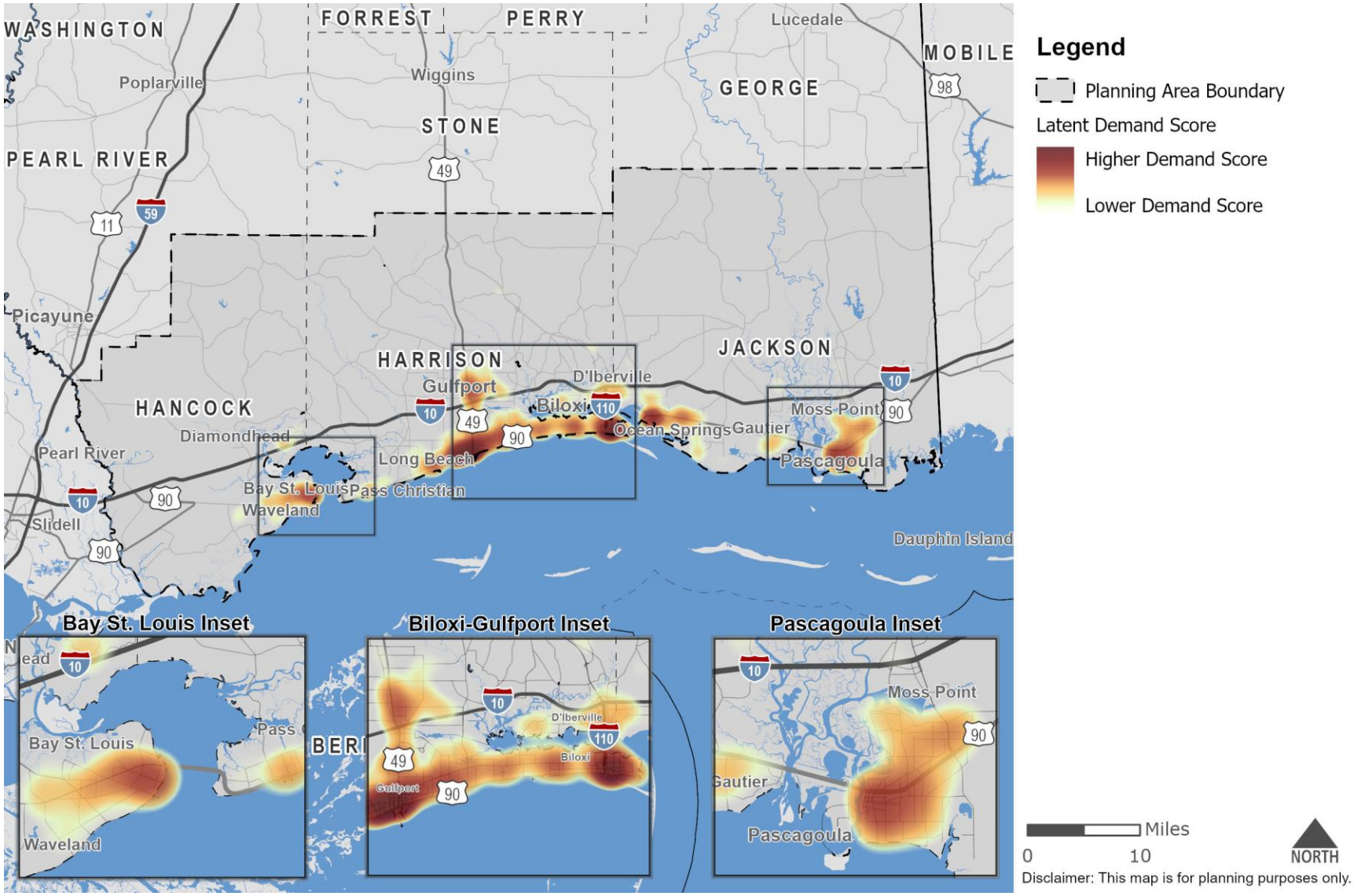
Within the MPA, the largest areas of demand are within the urban cores of Gulfport and Biloxi, often where there is the greatest population density, access to jobs, and available bike and pedestrian infrastructure. However, there are also relatively high demand locations in the downtown areas of Ocean Springs, Pascagoula, and Bay St. Louis. This can be attributed to:

- Strong employment center and abundant residential spaces in Pascagoula, and
- Well-developed downtown shopping and attractions, popular destinations, and a pedestrian-friendly environment in Ocean Springs and Bay St. Louis.

While there is less latent demand around D'iberville, Moss Point, and North Gulfport, these communities are beginning to develop the attractions that lead to bicycle and pedestrian demand. Analysis results, represented via a heat map, are illustrated in **Figure 7.5**.

Within the MPA, almost all bicycle and pedestrian demand is within the urban core and the larger communities. The bicycle and pedestrian infrastructure inventory, discussed previously, details the location of existing facilities within the MPO. Discrepancies between demand and available inventory are known as needs gaps. Needs gaps that present in high-demand areas signify where there may be a greater safety concern, as bicyclists and pedestrians may continue their route despite the lack of adequate infrastructure or facilities. The gap analysis of the non-motorized system is discussed further in *Technical Report #4: Needs Assessment*.

Figure 7.5: Latent Demand Scoring Results



Source: NSI, 2024

8.0 ITS and Emerging Technologies

Transportation Systems Management and Operations (TSMO) refers to a set of strategies aimed at maximizing the efficiency and safety of transportation systems. It encompasses a variety of tools and technologies designed to improve traffic flow, reduce congestion, and enhance the overall travel experience. TSMO is essential for managing the complexities of modern transportation networks, allowing agencies to respond swiftly to incidents, disseminate real-time information to travelers, and optimize infrastructure use.

In Mississippi, MDOT leads TSMO initiatives along with local partners, such as the GRPC, to ensure a safe and efficient transportation network. Through the deployment of Intelligent Transportation Systems (ITS), MDOT and the MPO leverage technologies such as Traffic Management Centers (TMC), Closed-Circuit Television (CCTV) cameras, and Dynamic Message Signs (DMS) to monitor and manage traffic conditions effectively. These efforts are complemented by collaborations with local agencies, emergency services, and other stakeholders to create a unified approach to traffic management.

By utilizing advanced data analytics and proactive management techniques, TSMO helps to minimize travel delays, reduce emissions, and improve the overall quality of life for residents.

The impact of TSMO within the MPA is significant, as it not only enhances the safety and efficiency of roadways but also supports the state's economic growth and environmental sustainability goals.

8.1 Existing Conditions

GRPC has established a robust inventory of transportation management systems that play a critical role in enhancing traffic operations and safety throughout the state. This inventory encompasses various technologies and strategies essential for real-time monitoring, traveler information dissemination, and traffic safety management. These systems can be organized into four distinct categories:

- Traffic Operations and Safety Management
- Traveler Information Systems
- Commercial Vehicle Operations
- Emerging Technologies

Table 8.1 outlines the specific systems included within each category.

Table 8.1: Transportation Management Systems Inventory

Category	Systems
Traffic Operations and Safety Management	1. Transportation Management Centers 2. Communication Infrastructure 3. Traffic Signals 4. Closed-Circuit Television Cameras 5. Vehicle Detection Systems 6. Road Weather Information Systems 7. Smart Work Zones
Traveler Information Systems	1. Dynamic Message Signs 2. Highway Advisory Radio 3. MDOT Traffic Web Application
Commercial Vehicle Operations	1. Weigh-in-Motion Systems 2. Electronic Clearance Systems
Emerging Technologies	1. Electric Vehicles 2. Connected Vehicles 3. Autonomous Vehicles

Traffic Operations and Safety Management

Traffic operations and safety management are essential for ensuring the smooth functioning of the transportation network. This set of technologies and strategies focuses on monitoring traffic conditions, managing congestion, detecting hazardous situations, and responding effectively to incidents. Within the MPA, the following exist for traffic operations and safety management:

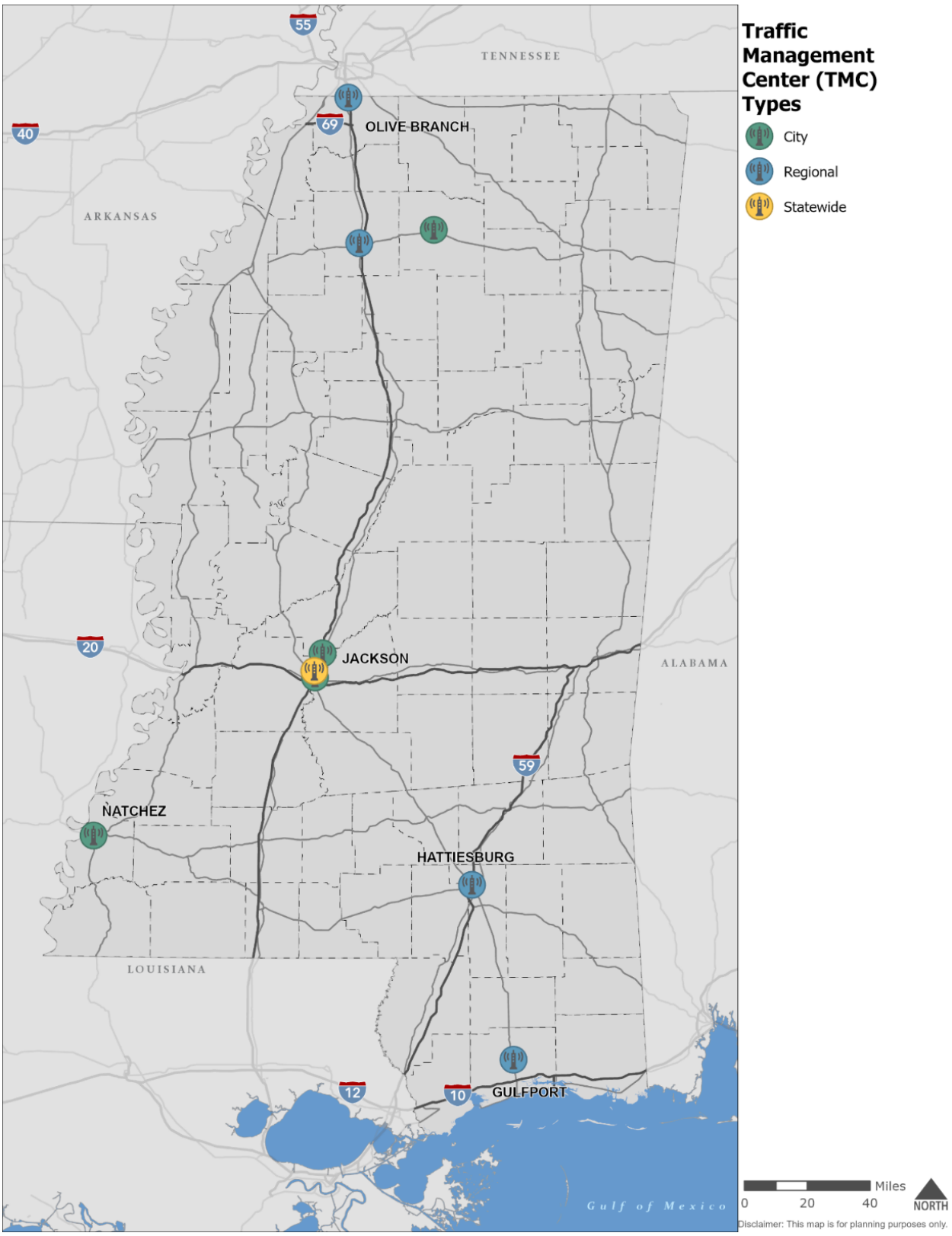
Traffic Management Centers

Traffic Management Centers (TMCs) are specialized facilities that serve as central hubs for surface transportation systems. A regional TMC is located within the MPA in Saucier.

The primary function of TMCs is to enhance roadway safety and alleviate congestion by monitoring traffic and road conditions, providing incident detection and verification, coordinating incident response activities, disseminating information, and managing traffic through signal adjustments and implementing detour routes as needed.

Figure 8.1 details the location of TMC facilities and their type within the State of Mississippi.

Figure 8.1: Locations of TMC Facilities



Source: MDOT, Special Provision No. 907-659-1, 2017

Communication Infrastructure

Communication infrastructure is a critical component of TSMO, as it facilitates real-time data exchange between the regional TMC and ITS devices operating in the area. This connectivity enables efficient traffic monitoring, incident detection, information dissemination, and adaptive control of traffic signals and other roadside devices. The state relies on two primary communication methods: **fiber optics** and **cellular modems**[18].

Fiber optics provides high-speed data transmission with significantly higher bandwidth and faster data transmission rates than other communication options. This makes it more reliable for critical functions like streaming high-definition video for real-time traffic monitoring and transferring large volumes of data from Vehicle Detection System (VDS) devices.

Cellular networks are used in areas where fiber optics are not currently deployed to bridge the gap and extend coverage. Many of Mississippi's ITS devices use cellular connections to transmit data from remote or rural locations to the TMCs. While cellular communication provides essential coverage, it offers lower bandwidth compared to fiber optics and may occasionally face reliability issues, especially in areas with poor network signals.

Traffic Signals

Traffic signals are a fundamental component of TSMO. They play a critical role in ensuring the efficient movement of vehicles and pedestrians, enhancing road safety, and managing congestion on the state's roadways. These signals are managed by various agencies based on their location:

- MDOT manages traffic signals located on state roads.
- County Agencies manage traffic signals located on county roads within their jurisdiction.
- City Agencies manage traffic signals within their limits that are not situated on state or county roads.

Effective traffic signal management in the MPA depends significantly on close collaboration with MDOT. This collaborative approach helps optimize traffic flow

[18] https://mdot.ms.gov/documents/Traffic%20Engineering/Manuals/MDOT%20ITS%20Design%20Manual.pdf

across jurisdictional boundaries, reducing delays and enhancing safety for all road users.

Closed-Circuit Television Cameras

CCTVs are a major component of the ITS system providing real-time surveillance of the roadway network within the MPA. As of 2024, GRPC's traffic management system consists of 54 CCTV cameras[19] mostly deployed at key locations on I-10 and state highways in and around Pascagoula. These cameras are used to[20]:

- Detect incident and verify location and type of incident.
- Determine appropriate responses to an unplanned event or incident.
- Monitor incident response and clearance.
- Monitor traffic conditions and congestion on mainlines and ramps.
- Monitor and operate traffic signals.
- Detect vehicle breakdowns, debris on the road, and unauthorized vehicles in restricted areas.
- Verify DMS message and readability.
- Observe localized weather and other hazardous conditions along the roadway.
- Monitor assets.

The widespread installation of these cameras provides extensive coverage, playing a significant role in alleviating congestion and enhancing safety on roadways within the GRPC MPA.

Vehicle Detection Systems

The use of VDS is predominantly located on arterial roadways and Interstates. The four most common VDS deployments include[21]:

- **Radar Detection Systems (RDS):** RDS detect vehicles and measure key traffic parameters such as speed, volume, and vehicle classification across multiple lanes. They provide continuous, real-time data on traffic conditions, making it

[19] https://www.mdottraffic.com/default.aspx?showMain=true

[20] https://mdot.ms.gov/documents/Traffic%20Engineering/Manuals/MDOT%20ITS%20Design%20Manual.pdf

[21] https://mdot.ms.gov/documents/Traffic%20Engineering/Manuals/MDOT%20ITS%20Design%20Manual.pdf

well-suited for incident detection, traffic flow monitoring, and planning initiatives.

- **Bluetooth Detection Systems (BDS):** BDS gathers travel time and origin-destination information by detecting Bluetooth-enabled devices within passing vehicles. Although not all vehicles are detected, BDS provides reliable travel time estimates, supporting applications such as corridor management and future connected vehicle (CV) technologies.
- **Video Vehicle Detection Systems (VVDS):** VVDS utilize cameras mounted above or beside the roadway to monitor specific zones within travel lanes. The system processes video images to identify vehicle presence, speed, volume, and classification. Video detection is particularly effective for real-time traffic management, including detecting wrong-way drivers and monitoring intersections for turning and lane-changing activities.
- **Loop Detection Systems (LDS):** Loop detectors are installed beneath the roadway surface and use electromagnetic fields to detect vehicles passing over them. These detectors capture information on vehicle presence, count, speed, and occupancy, making them ideal for lane-by-lane traffic monitoring.

Road Weather Information Systems

A Roadway Weather Information System (RWIS) is a network of sensors that collects and transmits essential weather data, including pavement and sub-surface temperatures, wind speed and direction, air temperature, visibility, precipitation, and humidity.

Smart Work Zones

MDOT employs Smart Work Zone systems[22] to enhance traffic safety and efficiency in work zone areas. These systems feature a variety of applications, including:

- queue detection,
- speed monitoring,
- travel time information, and
- alerts for construction equipment.

By strategically deploying other ITS technologies around work zones, MDOT collects and analyzes real-time traffic data. This data is used for disseminating important travel

[22] https://GRPC.org/images/transportation/Intelligent-Transportation-Systems-Architecture/Central-Mississippi-ITS-Architecture-Plan-Update.pdf

information to drivers, such as updates on lane closures, delays, speed advisories, and alternate routes. This, in turn, empowers drivers to plan their routes effectively, avoid delays, and navigate safely through and around work zones.

Traveler Information Systems

Traveler Information Systems play a vital role in providing real-time information to motorists, enhancing their ability to make informed travel decisions, helping improve safety and reduce delays on the highways. This section provides an overview of the three primary traveler information systems available by GRPC, which are: **dynamic message signs**, **highway advisory radio**, and the **MDOT traffic web application**.

Dynamic message signs are roadway signs equipped with electronic displays that allow dynamic adjustment of messages or graphics to be presented to roadway users. These devices are primarily implemented at key decision points along major corridors such as Interstates and arterial roadways. As of 2024, there are 14 DMSs deployed across the GRPC MPA[23].

Highway advisory radio stations serve as an essential communication tool for providing information to the traveling public via AM, FM, and/or CB radio technologies. The primary objective of HAR stations is to disseminate traffic and safety-related information, enabling travelers to make informed decisions about their intended routes and destinations.

The **MDOT traffic web application** is an integral part of GRPC's Traveler Information Systems, serving as a crucial resource for drivers by delivering comprehensive, real-time insights into traffic conditions and road safety. This application consolidates critical information into a single, user-friendly platform, empowering users to make informed choices about their travel routes. With its detailed map interface, the app allows users to access a variety of essential elements, including:

- alerts,
- cancelled alerts,
- road closures,
- road work locations,
- cameras,
- message signs,
- rest areas,
- welcome centers,
- posted bridges, and
- a traffic congestion map

Commercial Vehicle Operations

[23] https://www.mdottraffic.com/default.aspx?showMain=true

Commercial Vehicle Operations are crucial for maintaining efficient freight movement across the transportation network within the MPA. This can include optimizing the flow of commercial traffic through various initiatives, including Weigh-in-Motion Systems and Electronic Clearance Systems. These efforts help ensure compliance with regulations, reduce congestion, and enhance the safety of both commercial and passenger vehicles on the road.

Weigh-in-Motion and Electronic Clearance Systems

GRPC employs Weigh-in-Motion (WIM) systems across its MDOT weigh stations[24] to enhance commercial vehicle weight enforcement capabilities throughout the state. These WIM systems consist of concealed scales embedded beneath the highway surface. As trucks pass over these scales at highway speeds, a computer system quickly calculates crucial information, including the vehicle's weight, height, and axle count.

WIM systems help reduce congestion, enhance road safety, extend the lifespan of infrastructure, and facilitate accurate data collection for enforcement and transportation planning purposes.

When a truck complies with legal and permitted limits, an LED indicator on the transponder installed in the vehicle, or a message displayed on a DMS, informs the driver that they can proceed without stopping at the scales. Conversely, if a truck exceeds the predetermined restrictions, an indicator or message directs the driver to a nearby stationary weigh station for further inspection. This allows for trucks that comply to be electronically cleared without stopping, further improving freight mobility.

By identifying overweight vehicles without impeding traffic, these systems help reduce congestion, enhance road safety, extend the lifespan of infrastructure, and facilitate accurate data collection for enforcement and transportation planning purposes.

8.2 Emerging Technologies

Emerging technologies represent the forefront of innovation in transportation management, providing new solutions to enhance the efficiency and safety of the transportation network. These technologies have the potential to address the

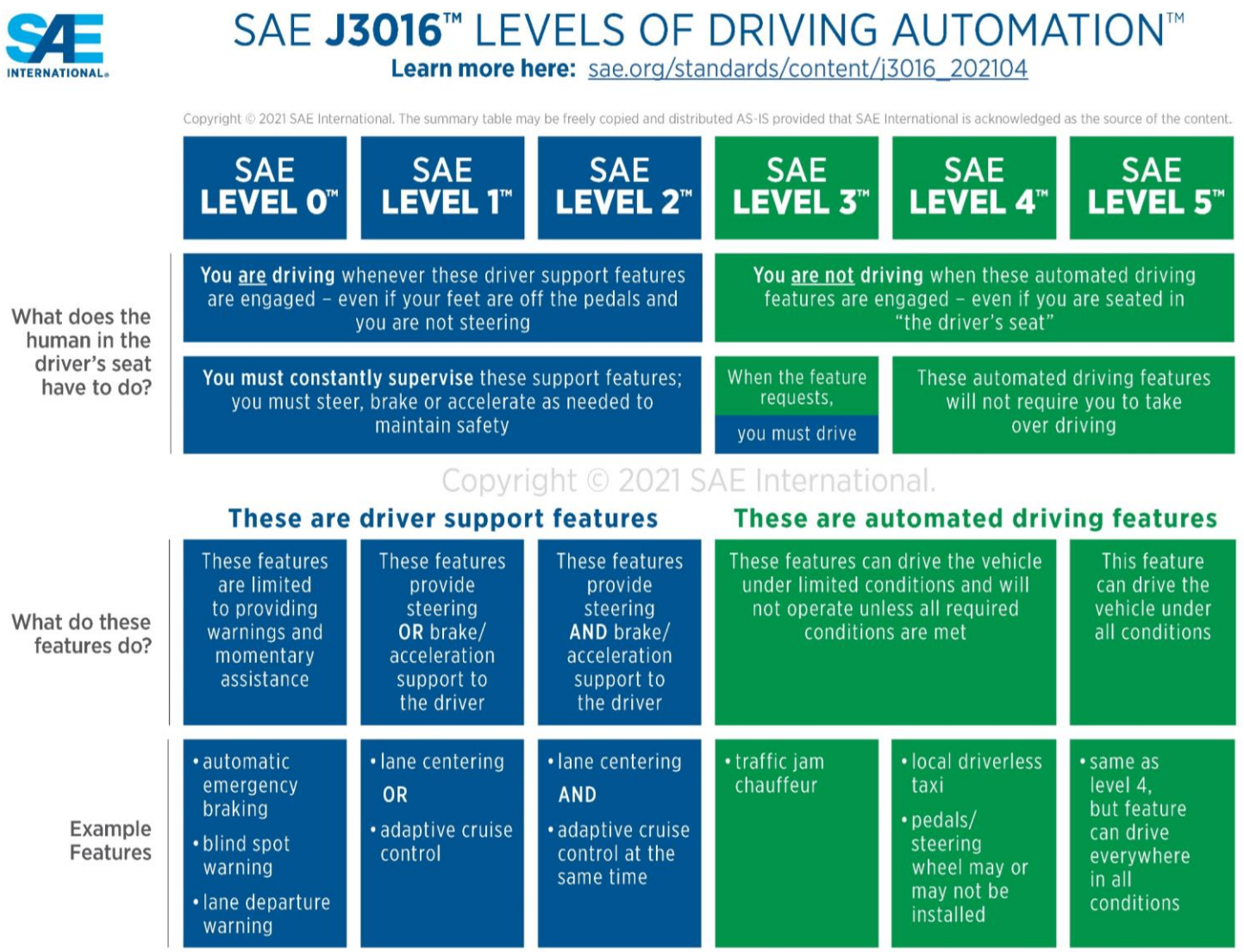
[24] https://GRPC.org/images/transportation/Intelligent-Transportation-Systems-Architecture/Central-Mississippi-ITS-Architecture-Plan-Update.pdf

resulting impacts from trends that increase or alter how goods move, such as an increase in freight volume or in the severity of existing challenges, or the creation of new challenges. Understanding both trends and upcoming technologies is important for identifying potential operational solutions to the region's mobility needs.

Connected and Autonomous Vehicles

The Society of Automation Engineers' automation levels classification scheme is the industry standard in terms of measuring the degree of automation in a vehicle, as shown in **Figure 8.2**. Levels one (1) through three (3) include Advanced Driver Assistance Systems (ADAS), which consist of features such as blind spot monitoring, lane centering, and adaptive cruise control. Levels four (4) and five (5) have Automated Driving Systems (ADS) and are more commonly referred to as autonomous vehicles (AVs).

Figure 8.2: Society of Automotive Engineers (SAE) Automation Levels



Source: Society of Automotive Engineers

Investments in CAV technology have been made at the federal, state, and regional level. At the federal level, USDOT has funded the Ann Arbor Connected Vehicle Environment, Connected Vehicle Pilots Program, and the Advanced Transportation and Congestion Management Technologies Deployment Program to advance vehicle communications technologies.[25] USDOT also released its *Federal Automated Vehicle Policy in 2016, the Automated Driving Systems 2.0: Vision for Safety* in 2017, and *Preparing for the Future of Transportation: Automated Vehicle 3.0* in 2018, which provides more detailed guidance and best practices in terms of testing and deployment of automated technologies.

The Test Tracking Tool, put together by the National Highway Traffic Safety Administration (NHTSA), has become a helpful resource for tracking deployments.

CAVs for Passenger Transport

Autonomous vehicle (AV) technology has been increasingly applied in personal motor vehicles. This technology allows vehicles to navigate the environment around them using LiDAR or RADAR, as well as various external cameras and sensors. CAVs, with varying levels of automation and connectivity, are being designed, tested, and/or utilized for passenger transport in multiple ways, including with **personal vehicles**, **rideshare**, **autonomous shuttle**, and **shared AV applications**. Additionally, **AV testing** is ongoing and aims to bring fully autonomous vehicles onto public roadways.

- **Personal-Vehicle AV** - Several vehicle manufacturers have developed Level 2 partial automation systems that are available to consumers. These systems control steering and acceleration; however, drivers must be prepared to take control of driving.
- **Rideshare AV** - Many AV testing efforts are also centered around ride-hail or ridesharing applications, allowing vehicles to be used as an additional mode of transportation to move larger volumes of people.
- **Autonomous Shuttles** - Autonomous shuttles are AVs designed for lower-speed, specific routes. These types of vehicles, also referred to as specialized transit, are different in that they are built without a traditional driver's seat and operate at lower speeds, usually under 25 mph. As such, they can be ideal for

[25] https://www.transportation.gov/sites/dot.gov/files/docs/policy-initiatives/automated-vehicles/320711/preparing-future-transportation-automated-vehicle-30.pdf

servicing urban corridors or providing first or last mile connections to larger transportation systems.

- **Shared AV Applications** - Shared AV applications tend to focus on providing mobility solutions through ridesharing vehicles or autonomous shuttles. However, it is important to note that AV technology has the potential to improve traditional public transportation vehicles as well. For instance, some companies have explored autonomous transit buses.
- **AV Testing** – True AVs are still being tested in controlled testbed facilities and on public roadways across the country. One prominent example within the U.S. is the University of Michigan's Mcity, which features more than 25 partners across both the private and public sector leading in AV testing.

CAVs for Freight Transport

While much attention on CAV technology has focused on passenger cars and the movement of people, an increasing number of trucks are utilizing these technologies for freight transport. 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. Potential benefits include reduced labor and fuel costs, reduced driver stress, fewer accidents, reduced congestion, and lower carbon emissions.

On a per-mile basis, labor and fuel are the two highest operational costs for the trucking industry. Autonomous trucks would significantly reduce both costs.

Another motivating factor behind the emerging trend of autonomous trucks is that it provides the ability for fleet operators to deploy trucks in platoons. Truck platoons use vehicle-to-vehicle communications along with AV control technology to electronically "tether" tractor-trailers together in a convoy formation, allowing for greater fuel efficiency and cost savings. Other connected vehicle enhancements allow for the vehicle to communicate with roadside infrastructure to improve vehicle operation, safety and mobility, and impacts to the environment.

Personal Delivery Devices (PDD) and Unmanned Aerial Systems (UAS)

PDD are smaller, lower-speed vehicles focused on the last-mile delivery of vehicles. Due to their size, they can navigate complex environments and operate on the road, bike lanes, or sidewalks.

Unmanned Aerial Systems (UAS), colloquially known as drones, can also be considered a personal delivery device, utilizing airspace for faster last-mile delivery.

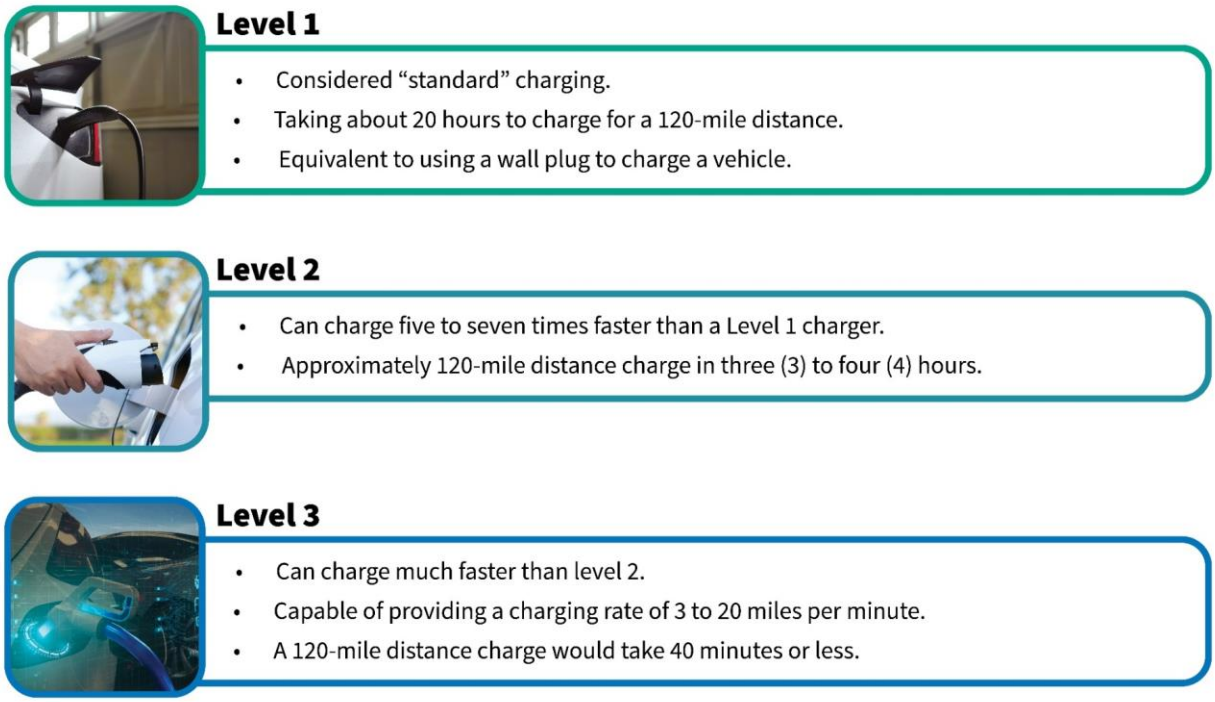
Although large companies have invested in UAS programs, testing continues to largely occur in the public sector. Examples include the Ohio Unmanned Aircraft Systems Center and the Lone Star UAS Center of Excellence and Innovation in Texas.

Vehicle Electrification

Advances in battery and fuel cell technology have allowed for the development of electric vehicles (EVs) for both passenger and freight use, with the main advantage to these vehicles is their generally lower operating and fuel costs.

While numerous vehicle manufacturers have launched EVs into the U.S. market, these vehicles require widely available charging infrastructure, such as charging stations, to be effective. This has prompted both federal and state governments to prioritize electric vehicle infrastructure investments. The locations and types of EV charging stations within Mississippi are depicted in **Figure 8.2**. As of 2024, GRPC has 28 public charging stations, including[26] 24 stations with level 2 charging and 4 stations with DC Fast Charging (Level 3).Currently, three levels of electric charging exist[27]:

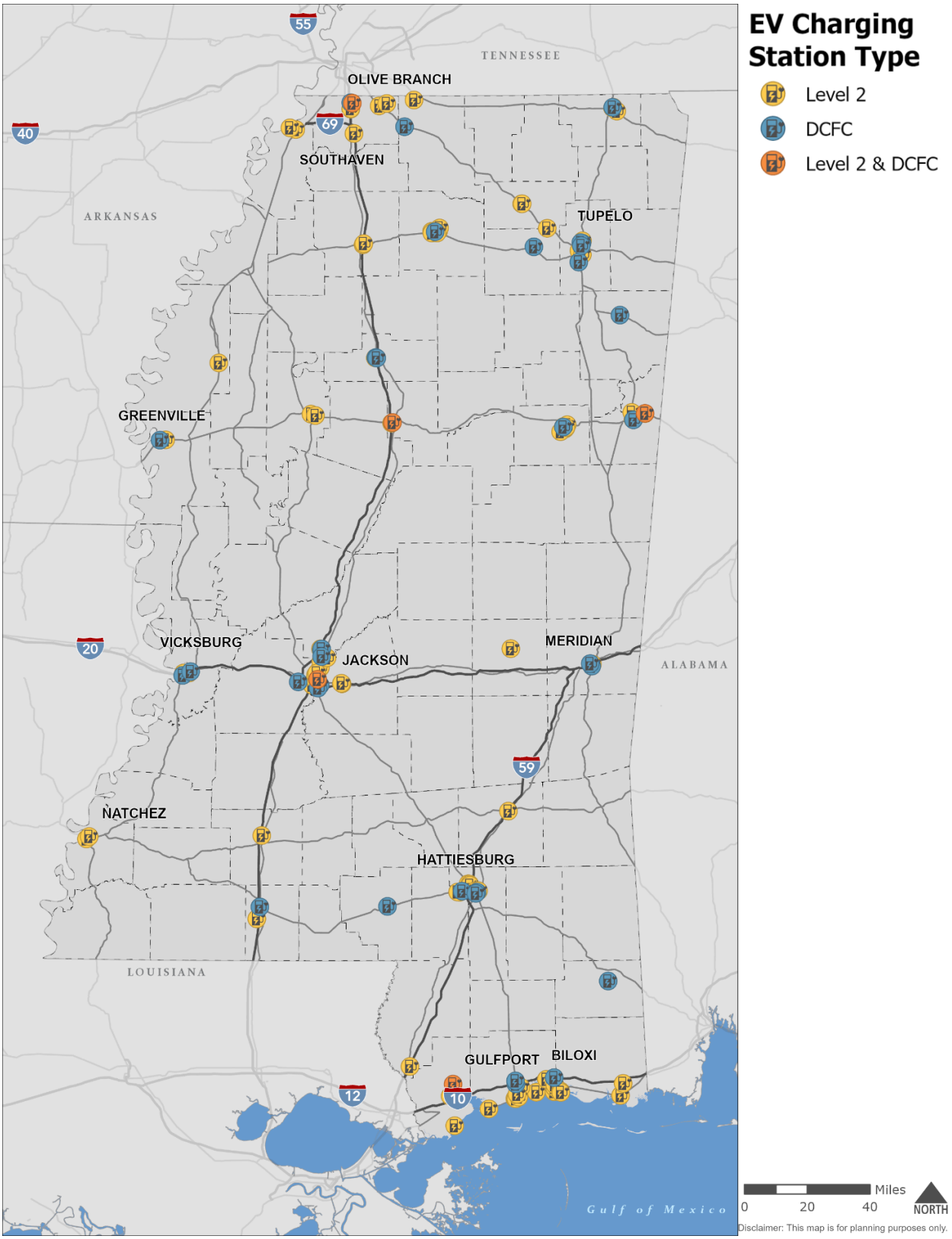
Figure 8.2: Levels of Electric Charging

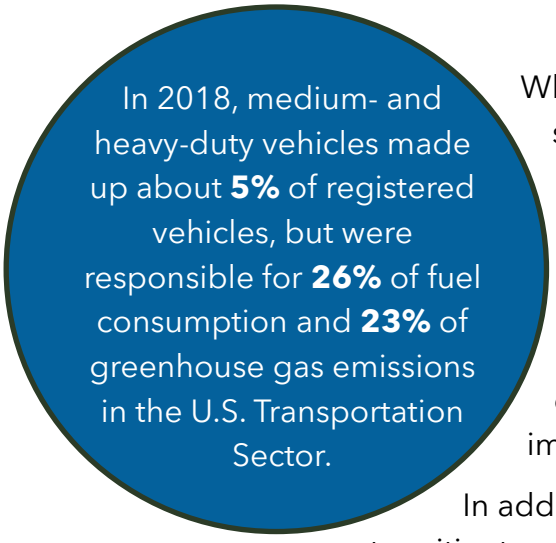


[26] https://afdc.energy.gov/stations#/analyze?region=US-MS&tab=fuel&fuel=ELEC&ev_levels=dc_fast

[27] Level 1, Level 2, or Level 3? EV Chargers Explained

Figure 8.3: Locations of EV Charging Stations





Source: FHWA; EPA

While passenger cars have generated the majority share of EVs, electric trucks are seen as vital to reducing emissions and the environmental impact of the transportation sector. Electrification would also help to address important public health challenges through the reduction of airborne pollutants, such as tailpipe emissions, known to cause adverse health impacts.

In addition to the ability of freight vehicle electrification to mitigate negative impacts, potential fuel cost savings is also a motivating factor. Behind driver wages, fuel typically represents the second highest cost to motor carriers (about 24 percent of total cost) on a per mile basis.[28] Historically, electricity prices have been lower and more stable than gasoline and diesel prices, offering the opportunity for an industry characterized by tight profit margins to achieve considerable cost savings. As a result of these potential benefits to electrification, several operators of private and for-profit fleets have made investments in achieving electric and zero-emission fleets.[29]

Despite the potential for electrification to generate personal and industry cost savings and positive environmental and transportation equity impacts, it is not without its challenges. Some of the key barriers to vehicle electrification include[30]:

- **Higher Upfront Vehicle Costs** is perceived as one of the largest barriers to freight electrification. Besides batteries, which are the most expensive component of an electric vehicle, other parts and components such as electric motors are also costly compared to their diesel and gasoline equivalents. 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.

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

[29] Ronan, D., "Trucking Industry Making Strides Toward Electrification," Transport Topics, March 11, 2021, https://www.ttnews.com/articles/trucking-industry-making-strides-toward-electrification.

[30] https://www.electrificationcoalition.org/wp-content/uploads/2020/11/Electrifying-Freight-Pathways-to-Accelerating-the-Transition.pdf.

- **Costly and Complex Charging Infrastructure Processes** is another of the largest barriers to deploying an electric fleet. 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.[31] The process, known as dynamic charging, could reduce the cost of charging infrastructure.
- **Commercial and Industrial Electricity Rate Structures** could greatly reduce the financial savings of electricity over diesel or gasoline. While electricity charging costs in the U.S. are, on average, comparatively lower than diesel fueling costs,[32] 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** may make fleet operators and users resistant to electrify their fleets/vehicles until they can be assured that timely repairs can be made to their vehicles to protect against extended periods of downtime.
- **Concerns with Grid Resiliency** surmise that without significant investments in utility upgrades to current grid infrastructure, local grid networks may be pushed beyond their current distribution capacity. This can create disruptions to services or a slowdown of electrification efforts. Evaluating the need for increasing grid distribution capacity is therefore essential to providing sufficient reliability to support a fully electrified transportation system.

[31] Hodari, D., "These Companies Want to Charge Your Electric Vehicle as You Drive," Wall Street Journal, January 18, 2021.

[32] "Fuel Prices." Alternative Fuels Data Center: Fuel Prices, U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's Vehicle Technologies Office, afdc.energy.gov/fuels/prices.html.