2045 Metropolitan Transportation Plan

Technical Report #4

Needs Assessment

Hattiesburg-Petal-Forrest-Lamar Metropolitan Planning Organization

DRAFT

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1.0 Introduction

This report discusses transportation needs for the Hattiesburg-Petal-Forrest-Lamar (HPFL) Metropolitan Planning Area (MPA). It is informed by the analysis in *Technical Report #2: Existing Conditions* and an assessment of future needs based on:

- current and forecasted trends,
- existing plans, and
- public and stakeholder involvement.

2.0 Special Considerations

Federal regulations require long-range transportation plans to consider resilience and tourism as they relate to transportation.

2.1 Resilience

In the context of this plan, "resilience" is the ability of transportation systems to withstand or recover from extreme or changing conditions and continue to provide reliable mobility and accessibility. The impacts of weather, natural disasters, or man-made events need to be considered in resiliency.

Regional Considerations

The HPFL Metropolitan Planning Organization (MPO) should carefully consider transportation resiliency needs related to the following regional issues:

- **High wind events:** The Hattiesburg MPA can experience severe thunderstorms that produce damaging winds. Additionally, there is a risk for tornadoes within the MPA as it is located in "Dixie Alley", an area of the Southern United States that is particularly vulnerable to tornadoes. Although the MPA is located inland from the Gulf of Mexico and Atlantic Ocean, tropical systems can still bring high winds to the MPA. These high wind events can affect transportation systems, such as debris blocking roadways.
- **Floods:** In the MPA, flooding hazards are typically flash flooding, river or small stream flooding, or flooding from tropical systems that pass through the MPA. Flooding can result in significant damage to transportation systems, such as roads being washed out by floodwaters.
- **Snow and Ice:** The MPA, like most of the Southeastern United States, does not usually experience significant winter weather. However, even a small amount of winter precipitation (snow and ice) can have a significant impact on the MPA's transportation system, such as road and bridge closures due to icy conditions. Most drivers will also be unfamiliar with driving in these conditions, increasing safety concerns.
- **Temperature Extremes:** The Hattiesburg MPA can experience both extremely high and extremely low temperatures at times. Both temperature extremes can affect transportation systems, such as extremely high temperatures affecting the integrity of pavement and extremely low temperatures resulting in road and bridge closures due to icy conditions.
- **Earthquakes:** Earthquakes can result in damages to transportation systems. However, the risk of earthquakes within the MPA is relatively low. According to the USGS, there were no reported

earthquakes in the MPA between 2014 and 2018[1]. Nonetheless, distant earthquakes, such as those that could occur in the New Madrid Seismic Zone, may still impact transportation systems within the MPA.

Resiliency Needs

Ensuring resiliency involves understanding hazards and identifying mitigation strategies. The MPO should continue to coordinate with local and regional hazard mitigation planners to proactively plan for a transportation system that is responsive to hazards. The MPO should also continue to advocate for best stormwater management practices and green infrastructure in the design of transportation projects.

Stormwater Mitigation

As an area grows and changes, its land use and infrastructure change with it. These changes affect how precipitation events, the product of which is stormwater, affect roadways, homes, runoff, ground water, and more. Stormwater can become ground water through runoff or evaporation. When stormwater becomes runoff, it ends up in nearby streams, rivers, or other water bodies as surface water.

The overall effect precipitation from a storm can have is heavily influenced by land use and development. Any change in these factors will change how stormwater behaves within the area. As areas develop, previously pervious areas, such as, grass, wetlands, and wooded areas, are replaced by impervious surfaces. Examples of developed impervious areas include new roadways, sidewalks and driveways in new subdivisions, and parking lots for shopping centers. The increase in impervious areas can significantly decrease the runoff time in an area, which can lead to an increase in flooding.

Significant rainfall in an urban area within a short amount of time can lead to flooding issues for a municipality. This flooding can damage property and create environmental and public health hazards by introducing contaminants into new areas. Without proper drainage and stormwater mitigation efforts, new transportation projects have the potential to exacerbate existing stormwater issues. With well-planned, coordinated efforts and using "green infrastructure" design, projects can create a more

[1] United States Geological Survey Search Earthquake Catalog

natural looking environment and decrease the chances of detrimental stormwater runoff issues. In fact, in some cases, stormwater drainage may even be improved.

Green Infrastructure

Green infrastructure is a cost-effective approach to managing weather events, while providing benefits to the community. When rain falls onto impervious areas, stormwater is forced to drain through gutters, storm sewers, and other collection systems. This runoff may collect trash, bacteria, and other pollutants from the urban environment and introduce them to the community at large, creating health risks. Green infrastructure uses vegetation, soils, and other elements to mimic a more natural environment, treating stormwater at its source and using the ground and plants as a filter to eliminate potential pollutants. With an increase in green space, the health benefits to a community are obvious.

A natural environment approach to development positively impacts a community's stormwater drainage system in several ways. It can mitigate flood risk by slowing runoff and reducing stormwater discharge. With less water to divert, the risk of flooding is lower. Green infrastructure may also decrease the size of the system needed. A smaller system would reduce the overall cost of materials, maintenance, and future repairs. Effective examples of Green Infrastructure, as seen below, include permeable pavements, bioswales or vegetative swales, green streets and alleys, and green parking. Green Infrastructure can also be applied to commercial buildings and residential homes, but when used as stormwater mitigation for transportation development, the health and cost benefits are certainly worth exploring for any community.

Figure 2.1: Green Infrastructure Examples

Source: https://www.epa.gov/green-infrastructure/what-green-infrastructure

Transportation Related Strategies

- During the project design, minimize impervious surfaces and alterations to natural landscapes.
- Promote the use of "green infrastructure" and other Low-Impact Development (LID) practices. Examples include the use of rain barrels, rain gardens, buffer strips, bioswales, and replacement of impervious surfaces on property with pervious materials such as gravel or permeable pavers.
- Adopt ordinances that include stormwater mitigation practices, including landscaping standards, tree preservation, and "green streets".
- Develop a Standard Urban Stormwater Mitigation Plan (SUSMP) at multiple levels; including state, region, and municipality. A SUSMP is a useful tool where municipalities put into writing, requirements for stormwater control measures for development, as well as, redevelopment. Incorporating LID practices into a SUSMP is an effective method of reducing a development's impact on its environment. Efforts should be made to coordinate these plans, even though multiple agencies would have them in place.

Additional Strategies

- Educate residents, business owners, elected officials, and developers on the impacts of stormwater and how they can assist with mitigation.
- Identify the areas most likely to flood during heavy storm events and prioritize mitigation efforts in that area and areas upstream from it.
- Adopt open space preservation plans, which will balance land use and local developments with preservation and conservation of the existing open space.
- Establish stormwater fees to support the funding of stormwater management projects and practices.
- Reduce the amount of impervious surfaces on residential, commercial, and public properties and offer incentives to encourage the change.

Existing Policies and Considerations

The State of Mississippi has a statewide Stormwater Management Plan that has been published through the Mississippi Department of Transportation (MDOT). Information about the plan can be found at:

http://sp.mdot.ms.gov/Environmental/Pages/Stormwater-Management-Plan.aspx

The City of Hattiesburg maintains a Stormwater Management Program, with information available at:

http://www.hattiesburgms.com/storm-water-management/

In addition to the above plans, Forrest and Lamar Counties both have a stormwater ordinance and monitor stormwater runoff within their jurisdictions.

The MPO should coordinate with all of the agencies above to ensure consistency in the plans and ordinances, as well as to create additional documents and policies necessary to mitigate stormwater impacts within the MPA. Additionally, the MPO should work with the City of Petal to create its own Stormwater Management Program or SUSMP.

2.2 Tourism

Tourism Overview

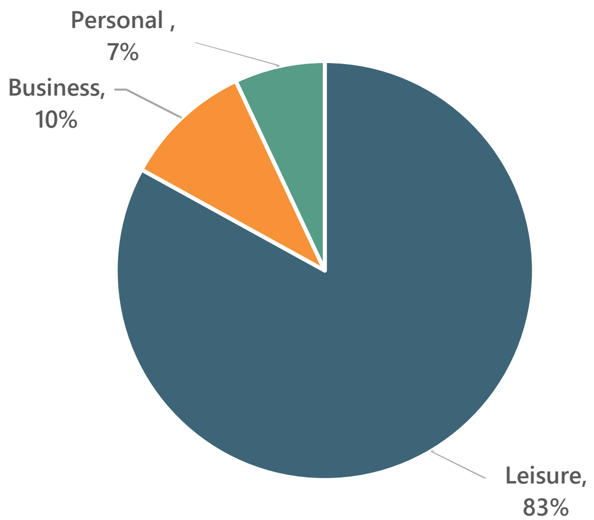
Tourism plays an increasingly important role in economies as jobs shift into the service and information sectors and as an expanding middle class travels more frequently.[2] According to the *2017 Mississippi Tourism Economic Impact Report* by Visit Mississippi, "Travel and tourism is one of Mississippi's largest export industries," creating $3 billion in 2017 from labor income. In 2017, 87,335 jobs, or 10.9 percent of all state jobs, were in direct travel and tourism fields. The state also collects property taxes from hotels, motels, restaurants, and casinos as well as motor vehicle rental taxes and gas taxes. Figure 2.2 shows that most visitors to Mississippi come for leisure. In 2017 visitors spent almost $5 billion in the state.

Hattiesburg is the third most visited city in Mississippi. The Hattiesburg Tourism Commission, working under the brand Visit Hattiesburg, published the following information about tourism in 2017 and 2018:

- 1.8 million people visited Hattiesburg in 2017 and spent $278 million
- Tourist spending increased to $292 million in 2018
- Tourism also generated $26 million in tax revenue in 2018

Additionally, the City of Hattiesburg recently passed a one (1) percent sales tax on hotels, motels, bars, and restaurants in order to fund recreation related projects. Robust tourism thus provides benefits even for residents who may not work directly in the tourism industry.

Figure 2.2: Purpose for Visiting Mississippi, 2017



Source: Visit Mississippi

[2] *OECD Tourism Trends and Policies*, 2018, Organisation for Economic Cooperation and Development

Transportation Options

Accessible transportation is an important part of getting tourists into and around the region. Interstate 59 (I-59) passes through the region and bisects West Hattiesburg from Hattiesburg. U.S. Highway 98 (US 98) runs perpendicular to I-59.

Although data is lacking on how tourists get into the region, the lack of a large commercial airport or frequent intercity public transportation suggests that most visitors drive into the region, and thus, have a vehicle available. However, some visitors likely do arrive by plane at Bobby L. Chain Municipal Airport or Hattiesburg-Laurel Regional airport or via intercity public transportation (e.g. Amtrak, Greyhound, etc.).

Once inside the region, visitors have many options for getting around. The region has rental car operators, fixed-route bus lines (Hub City Transit), a limited sidewalk and bicycle network, Additionally, the city is serviced by rideshare companies Uber and Lyft.

Lodging Options

While some visitors may stay with friends and family, many others require lodging. As of 2017, the region had about 3,000 rooms in hotels, motels, or bed and breakfasts, which is triple the number of rooms in 1990. Several short-term rental companies like Airbnb also operate in the area.

The two primary lodging hotspots are the area around the intersection of US 98 and I-59 and the area around the intersection of US 49 and I-59.

Tourism Attractions and Amenities

The Hattiesburg region offers a variety of family-friendly, cultural, and outdoor attractions. Table 2.1 shows some of the main tourist attractions in the region.

The University of Southern Mississippi attracts many visitors, especially families of students and during sports events. The region is also home to William Carey University, the Hattiesburg Zoo, historic downtowns, and natural activities like biking along the Longleaf Trace or boating in the Pinebelt Blueways. The region has increased its number of special events to attract tourists and benefit local businesses. Some highlights include the Mississippi Miss Hospitality Competition, the Hattiesburg Craft Beer Festival, Live at Five music concerts, and Hattiesburg Restaurant Week. Another strategy has been to increase conferences and sports tournaments.

Retail, restaurants, and bars also attract and support tourism. Retail hotspots in the region include the area along US 98 just west of I-59, the intersection of US 49 and US-11, in downtown Hattiesburg, in Petal, and by the University of Southern Mississippi. Restaurant and bar hotspots in the region include the US 98/Hardy Street corridor from near I-59 to US 49, the area around the intersection of US 49 and I-59, and the intersection of US 49 and US 11. There are also less dense hotspots in Petal and Downtown Hattiesburg.

Table 2.1: Greater Hattiesburg Tourism Attractions

Attraction Type	Name
University	University of Southern Mississippi
	William Carey University
Museums and Art Galleries	African American Military History Museum
	Hattiesburg Area Historical Society Museum
	Hattiesburg Arts Council Gallery
	Hattiesburg Cultural Center
	Historic Downtown Walking Tour
	Lauren Rogers Museum of Art
	Lucile Parker Gallery
	Mississippi Armed Forces Museum
	Oddfellows Gallery
	Sarah Gillespie Museum of Art
Parks and Outdoor Recreation	All-American Rose Garden
	Desoto National Forest
	Freedom Summer Trail
	Grand Paradise Water Park
	Hattiesburg Zoo
	High Ropes Adventure Course
	Larry Doleac Baseball & Tatum Park Softball Complex
	Little Black Creek Water Park
	Longleaf Trace
	Paul B Johnson State Park
	Peps Point Water Park & Campground
	Pinebelt Blueways
	Timberton Sportsplex
	Town Square Park
	UpDown Trampoline Park
Golf Clubs	Hattiesburg Country Club
	Okatoma Golf Club
	Pine Belt National Golf Club
	Pine Creek Golf Club
	Shadow Ridge Golf Club
	Timberton Golf Club
Theaters, Breweries, and Music Clubs	Hattiesburg Saenger Theater
	Southern Prohibition Brewery
	Southwest Theaters Turtle Creek 9
	Thirsty Hippo

Source: The Hattiesburg Tourism Commission; NSI

Tourism Transportation Needs

Many amenities and attractions are located near major roadways and are accessible by car. However, there are some ways that transportation improvements can improve mobility for tourism activity, including the following:

- **Wayfinding**: Wayfinding materials such as signs and electronic maps can help visitors easily find their way around the city and can be used for different modes of transportation.
- **Expanded Public Transportation**: There are many attractions located in Downtown Hattiesburg away from the hotel and restaurant clusters. The bus lines connect to this downtown historic area and to the key Intersections of US 98 and I-59 and at US 11 and US 49, but they do not extend to the Intersection of US 49 and I-59 where many hotels are located. Thus, transportation networks for tourists rely heavily upon access to a vehicle. While the historic downtown area has attractions and is very walkable, it may be hard to access from the hotel hotspots without a car. Additionally, restaurant and retail options are lacking in this area. Connecting Downtown to the major roadway intersections by transit can allow more guests to enjoy a walkable Downtown or to reach the amenities located by the highways.
- **Expanded Sidewalks and Bike Facilities**: Again, tourism amenities are difficult to access without a car. Improving and expanding sidewalks, bike lanes, and pathways in major tourist areas will improve visitor mobility and reduce the need for additional car traffic.
- **Special Event Transportation Management:** Major special events in the region (especially college sporting events) may require temporary solutions such as “contra-flow” traffic on local streets, road closures, detours, special wayfinding, supplemental parking, and shuttles.

3.0 Emerging Trends

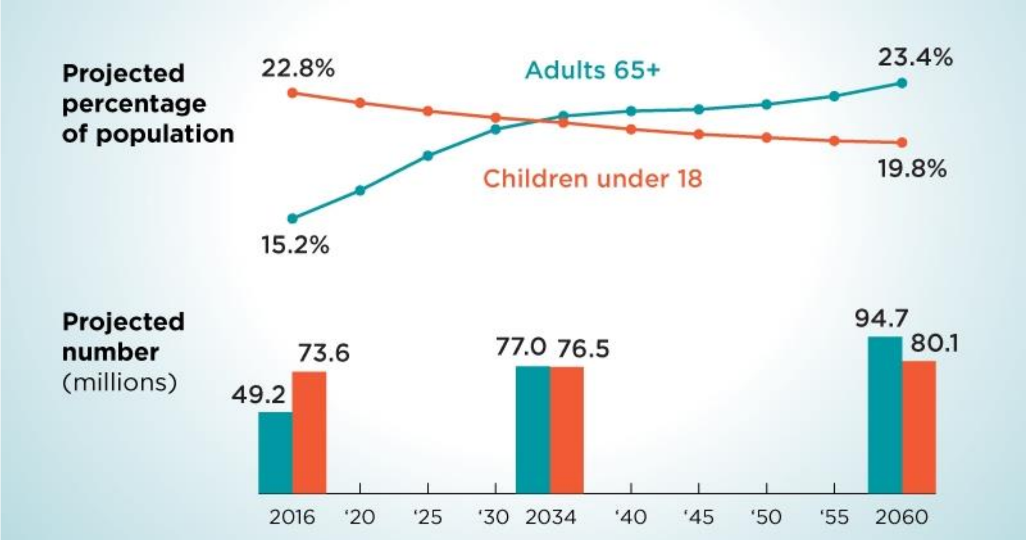
In recent years, travel patterns have changed dramatically due to demographic changes and technological advances. Many of these changes are part of longer-term trends, while others are newer, emerging trends.

3.1 Changing Demographics and Travel Patterns

An Aging Population

The population aged 65 or older will grow rapidly over the next 25 years, nearly doubling from 2012 to 2050.[3] This growth will increase the demand for alternatives to driving, especially for public transportation for people with limited mobility or disabilities.

Figure 3.1: Growth in Senior Population



Source: U.S. Census Bureau

[3] https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html

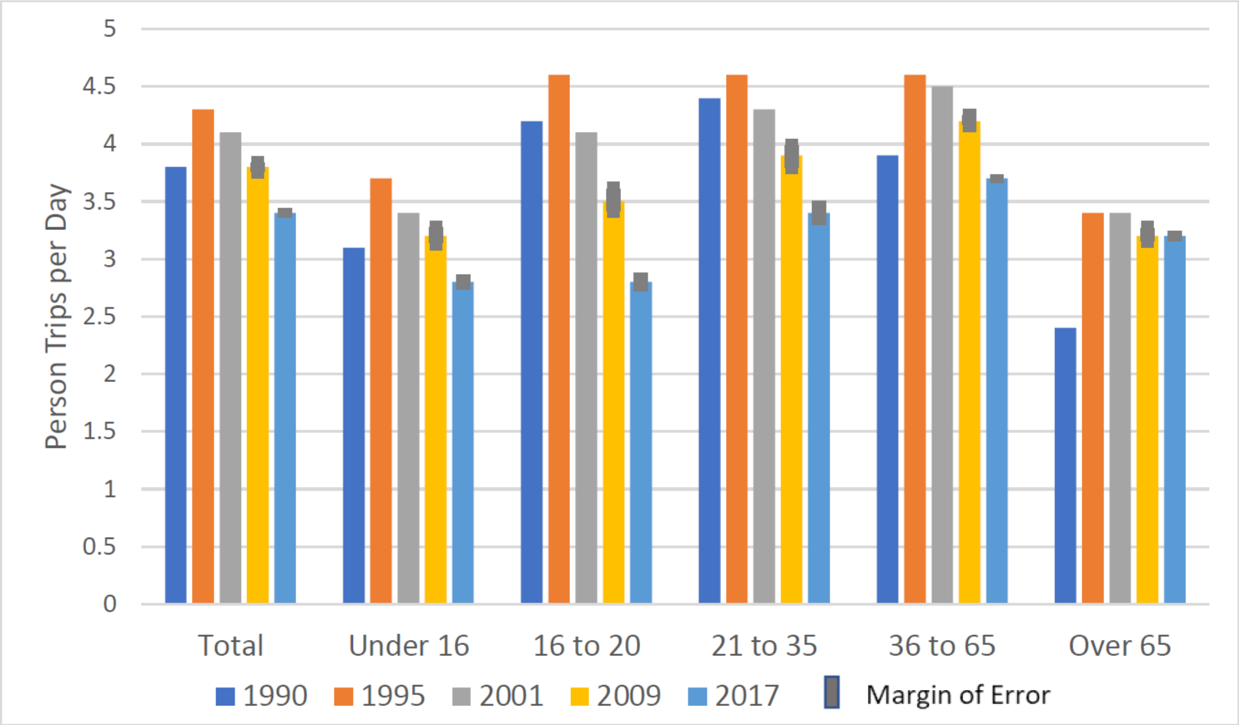
Most People are Traveling Less

> Except for people over age 65, all age groups are making fewer trips per day.

There are many factors driving this trend, including less face-to-face socializing, online shopping, and working from home.

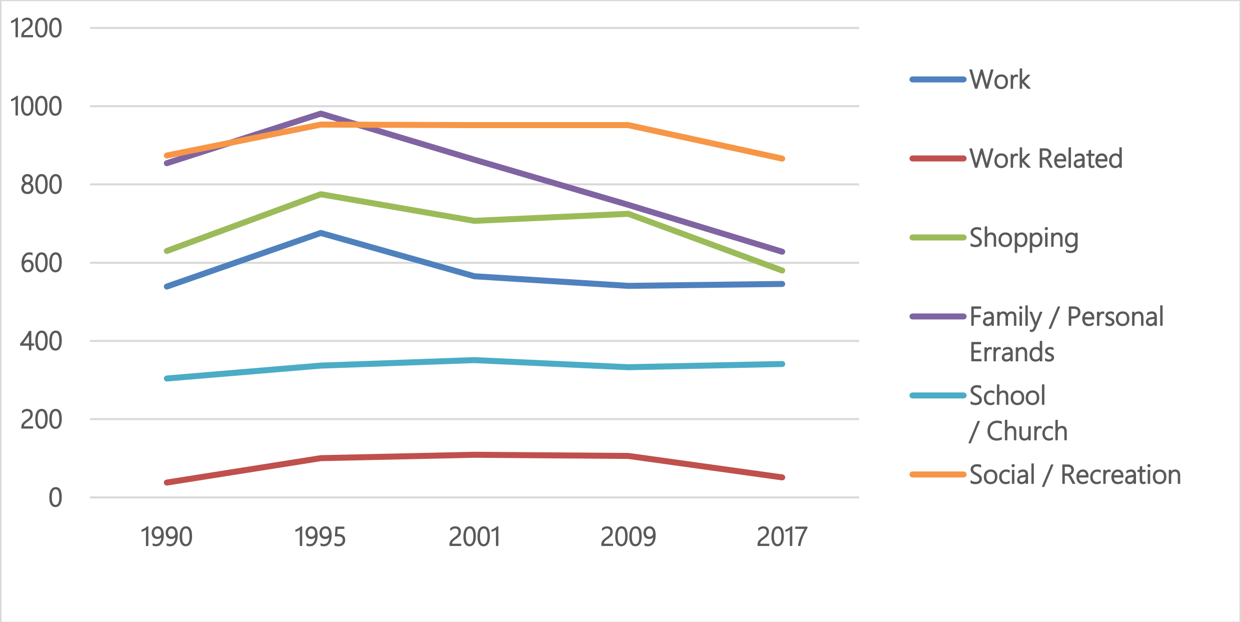
If this trend continues, travel demand may be noticeably impacted. Some major roadway projects may no longer be required and smaller improvements, such as intersection or turn lane improvements, may be sufficient for these needs.

Figure 3.2: Trends in the Average Daily Person Trips by Age



Source: 2017 National Household Travel Survey

Figure 3.3: Trends in the Average Annual Person Trips per Household by Trip Purpose



Source: 2017 National Household Travel Survey

3.2 Shared Mobility

People are increasingly interested in car-free or car-lite lifestyles. In the short-term, people are paying premiums for walkable and bikeable neighborhoods, and they are more frequently using ridehailing (Uber/Lyft) and shared mobility (car-sharing/bike-sharing) services. This could result in a long-term decrease in car ownership rates, increasing the need for investments in bicycle, pedestrian, transit, and other mobility options.

A major impetus for the change in travel behavior and reduced reliance on cars is the emergence of shared mobility options. Broadly defined, shared mobility options are transportation services and resources that are shared among users, either concurrently or one after another. They include:

- **Bike-sharing and Scooter-sharing (Micromobility)** – These can be dockless or dock/station-based systems where people rent bikes and scooters for short periods of time. Scooters are all electric while bikes may be electric or not. Examples include BCycle, Social Bicycles, Lime, Bird, and Jump.
- **Taxis -** Examples include Yellow Cab and Taxi Hattiesburg.
- Ridesharing/Ridehailing (Transportation Network Companies) - Examples include Uber, Lyft, and Via.
- **Car-Sharing** – This includes traditional car sharing, where you rent a company-owned vehicle and peer-to-peer car sharing services. Examples include Zipcar and Turo.
- **Public Transit and Microtransit** – Public transit is itself a form of shared mobility and is evolving to incorporate new mobility options like Microtransit.

Source: Corporate Knights

Micromobility

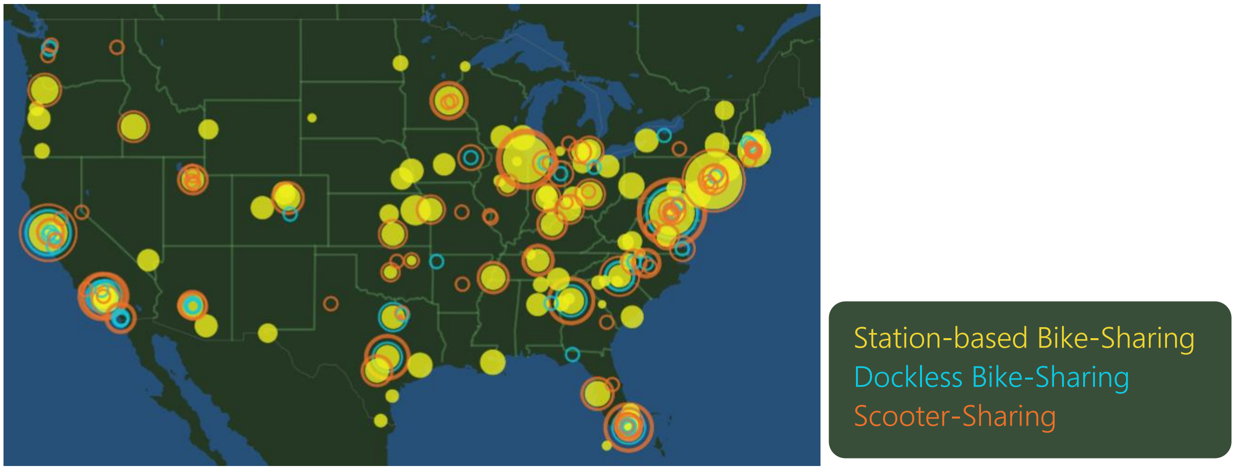
Bike-sharing and scooter-sharing, collectively referred to as micromobility options, are relatively new mobility options and continue to evolve. Modern, station-based bike-sharing emerged around 2010 and dominated the micromobility landscape from 2010 to 2016 until dockless bike-sharing systems emerged. Soon after, in late 2017, electric scooter-sharing emerged and overlapped much of the dockless bike-sharing market.

Today, most bike-sharing and scooter-sharing in the United States occurs in the major urban areas. However, these services are becoming more common in smaller urban areas and around major universities throughout the country.

Survey data from major U.S. cities shows the following micromobility trends[4]:

- People use micromobility services for a variety of trip purposes.
- People use micromobility to travel relatively short distances (one (1) to two (2) miles) for short durations (10 to 20 minutes). However, infrequent users of station-based bike-sharing services tend to make longer distance and duration trips.
- Regular users of station-based bike-sharing services are more likely to be traveling to/from work or to connect to transit. They are also more likely to have shorter trip durations and to have cheaper trips.
- People using scooter-sharing services are more likely to be riding for recreational or exercise reasons.

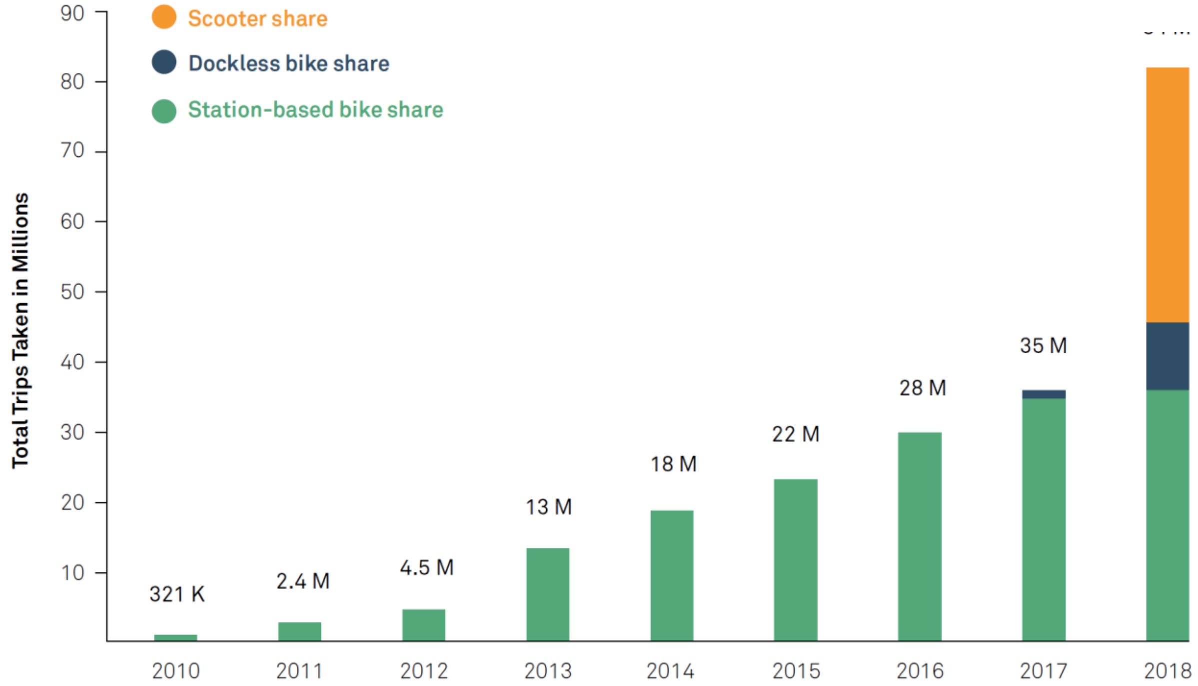
Figure 3.4: Public Bike-Sharing and Scooter-Sharing Systems in United States, 2019



Source: U.S. Department of Transportation, Bureau of Transportation Statistics

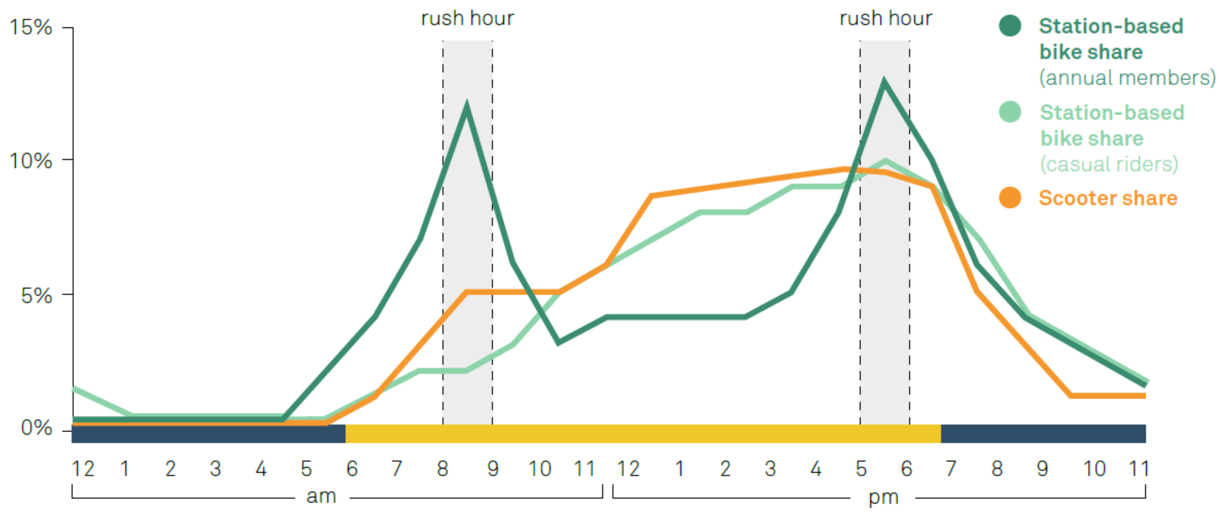
[4] https://nacto.org/wp-content/uploads/2019/04/NACTO_Shared-Micromobility-in-2018_Web.pdf

Figure 3.5: U.S. Micromobility Trips, 2010 to 2018



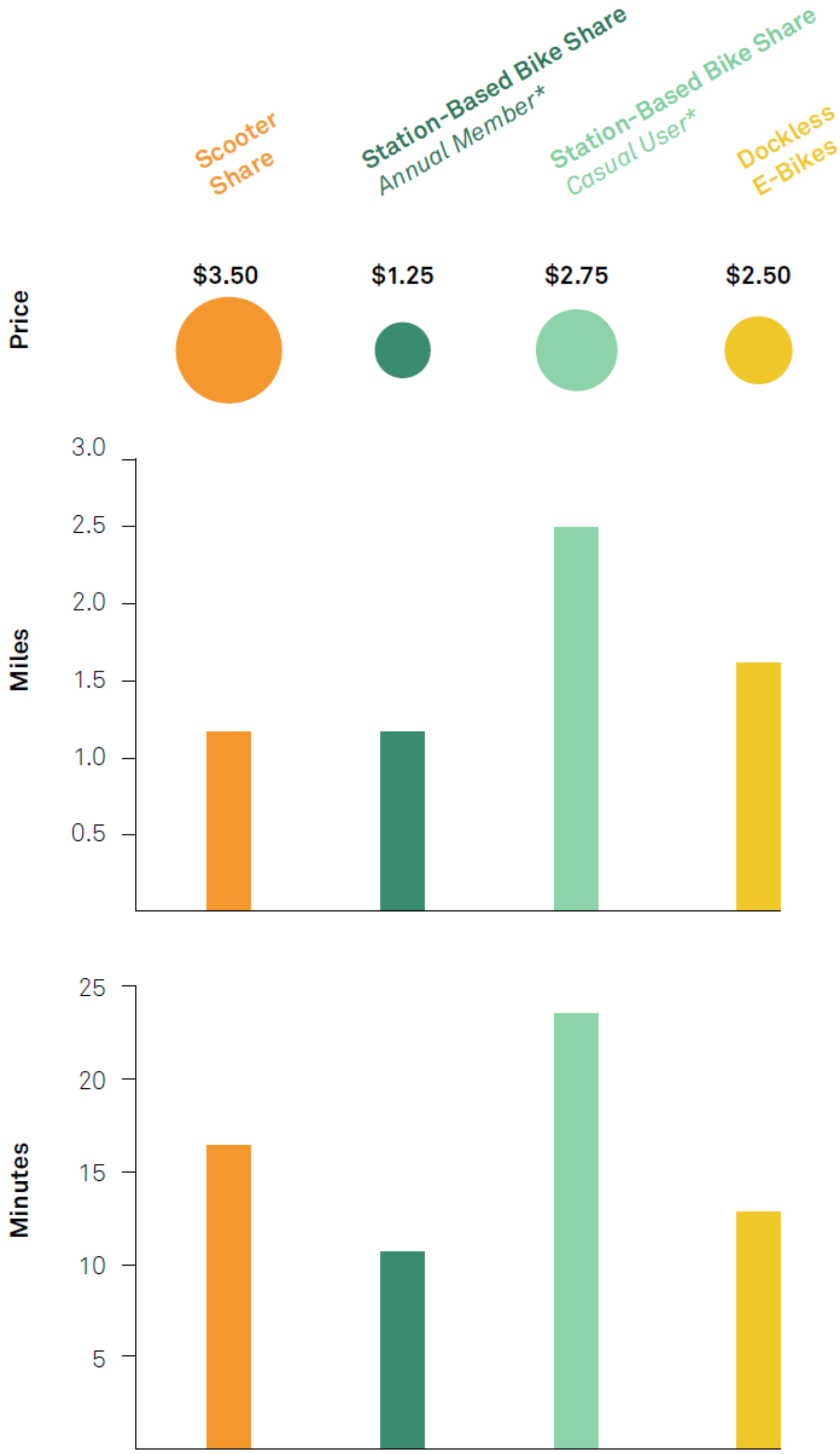
Source: NACTO

Figure 3.6: Average Micromobility Trips by Hour



Source: NACTO

Figure 3.7: Average Micromobility Trip Characteristics



Source: NACTO

Transportation Network Companies

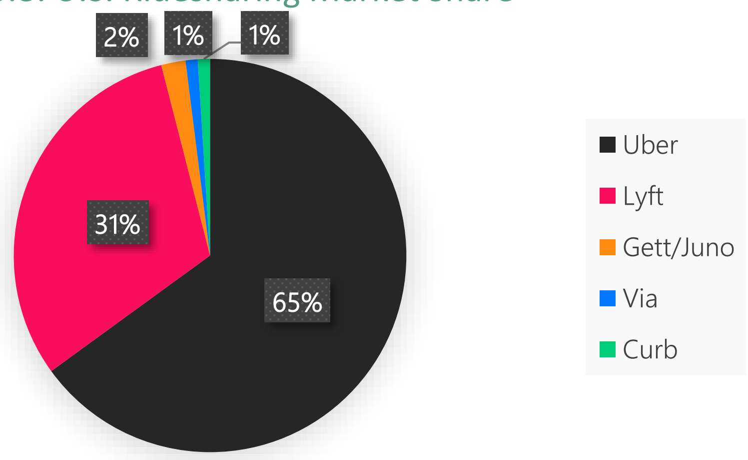
Ridehailing and ridesharing are the terms typically used to describe the services provided by Transportation Network Companies (TNCs) like Uber and Lyft. These TNCs emerged between 2010 and 2012 and have since grown rapidly, surpassing taxis in many metropolitan areas.

Today, TNCs are operating in most urban areas in the United States, including the Hattiesburg area. Outside of these urban areas though, service is limited or non-existent. And even with the growth into most urban areas, some TNC services are still limited to larger markets (e.g. UberPool and Lyft Shared for shared rides) or are being tested in certain markets (e.g. Uber Assist for people with disabilities).

While TNCs continue to evolve, research suggests the following TNC trends[5]:

- Trips are disproportionately work-related and social/recreational.
- Customers are predominantly affluent, well-educated, and tend to be younger.
- The market for TNC trips overlaps the market for transit service.
- People appear to use it as a replacement for transit when transit is unreliable or inconvenient, as a replacement for driving when parking is expensive or scarce, or to avoid drinking and driving.
- The heaviest TNC trip volumes occur in the late evening/early morning.
- Average trip lengths are around six (6) miles with a duration of 20-25 minutes.
- Trips in large, densely populated areas tend to be somewhat shorter and slower while trips in suburban and rural areas tend to be somewhat longer and faster.

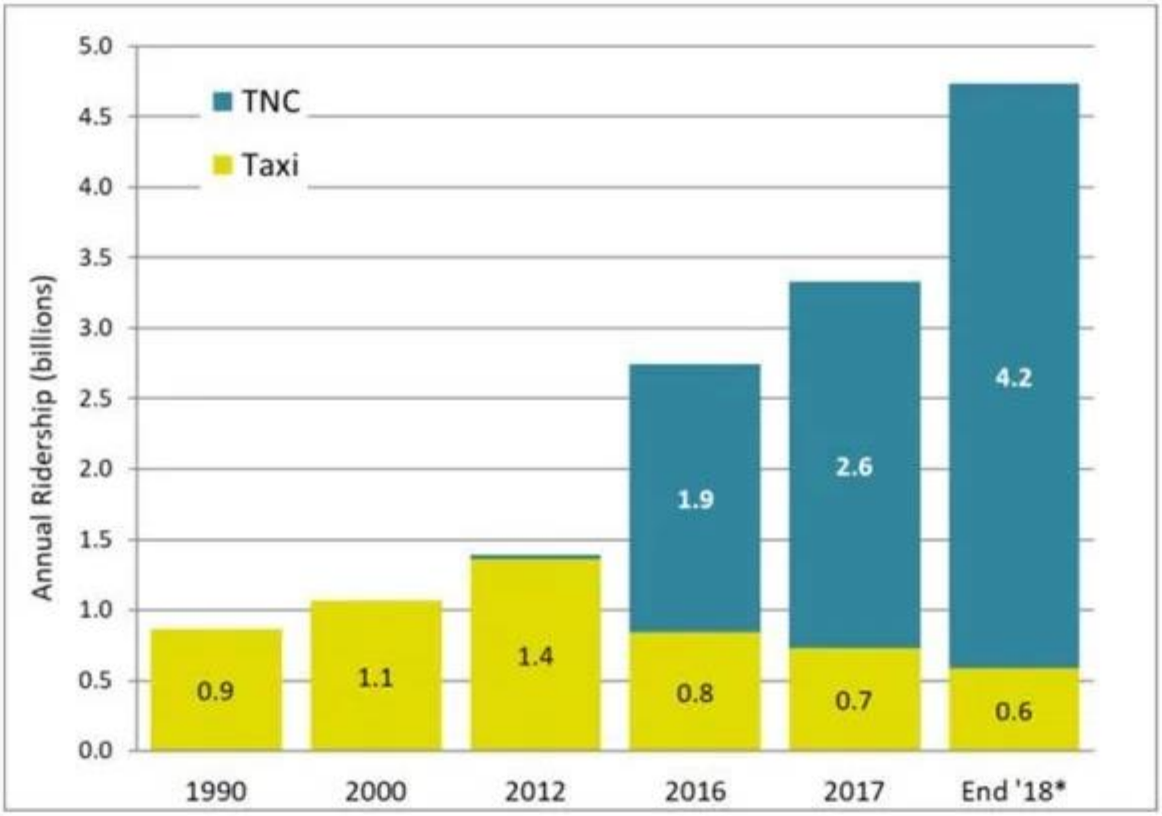
Figure 3.8: U.S. Ridesharing Market Share



Source: Edison Trends

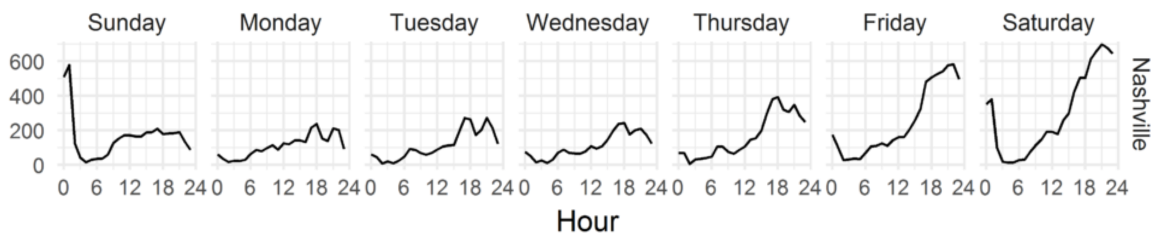
[5] http://www.schallerconsult.com/rideservices/automobility.htm

Figure 3.9: TNC and Taxi Ridership in the U.S., 1990 to 2018



Source: Schaller Consulting

Figure 3.10: TNC Ridership by Time of Day in Nashville



Source: TCRP RESEARCH REPORT 195: Broadening Understanding of the Interplay Among Public Transit, Shared Mobility, and Personal Automobiles

Car-Sharing

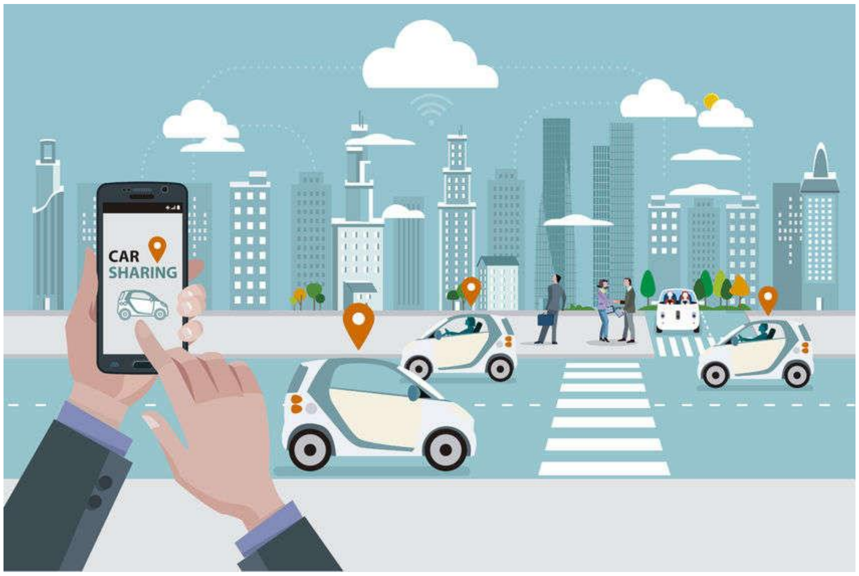
Car-sharing allows for people to conveniently live car-free or car-lite lifestyles and has been shown to increase walking and biking, reduce vehicle miles traveled, increase accessibility for formerly carless households, and reduce fuel consumption.[6]

Car-sharing has been around for decades and has continued to evolve in recent years. Today, there are three models of car-sharing:

- **Roundtrip car-sharing (as station-based car-sharing):** This accounts for the majority of all car-sharing activity. These services, such as Zipcar and Maven, serve a market for longer or day-trips, particularly where carrying supplies is a factor (such as shopping, moving, etc.). These car-share trips are typically calculated on a per hour or per day basis.
- **One-way car-sharing (free-floating car-sharing):** This allows members to pick up a vehicle at one location and drop it off at another location. These car-sharing operations, including car2go, ReachNow, and Gig, are typically calculated on a per minute basis.
- **Peer-to-Peer car-sharing (personal vehicle sharing):** This is characterized by short-term access to privately owned vehicles. An example of P2P car-sharing scheme is Turo.

Due to the varied car-sharing models, there are no typical usage patterns. Some car-sharing trips are short and local while others may be longer distance. Trips can be recurring or infrequent.

Outside of large urban areas, car-sharing is not that common. However, as connected and autonomous vehicles become more common, it is anticipated that car-sharing will become more widespread.



[6] https://www.planning.org/publications/report/9107556/

3.3 Connected and Autonomous Vehicles (CAV)

Today, most newer vehicles have some elements of both connected and autonomous vehicle technologies. These technologies are advancing rapidly and becoming more common.

Connected Vehicles

Connected vehicles are vehicles that use various communication technologies to exchange information with other cars, roadside infrastructure, and the Cloud.

Communication Types

- **V2I** • Vehicle to Infrastructure
- **V2V** • Vehicle to Vehicle
- **V2C** • Vehicle to Cloud
- **V2X** • Others

vs.

Autonomous Vehicles

Autonomous, or "self-driving" vehicles, are vehicles in which operation of the vehicle occurs with limited, if any, direct driver input.

Levels of Automation

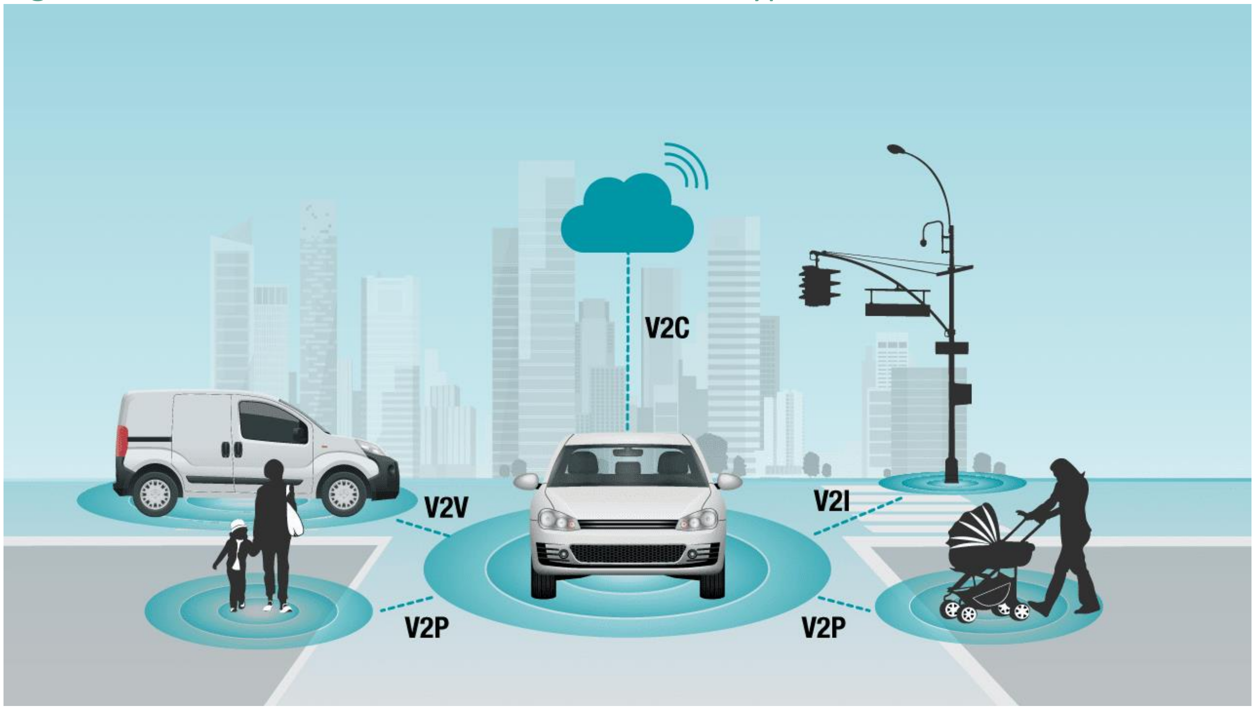
- **1** • Driver Assistance
- **2** • Partial Automation
- **3** • Conditional Automation
- **4** • High Automation
- **5** • Full Automation

Connected Vehicle Communication Types

Connected and autonomous vehicles use multiple communications technologies to share and receive information. These technologies are illustrated in Figure 3.11 and include:

- **V2I: Vehicle-to-Infrastructure** – Vehicle-to-infrastructure (V2I) communication is the two-way exchange of information between vehicles and traffic signals, lane markings and other smart road infrastructure via a wireless connection.
- **V2V: Vehicle-to-Vehicle** – Vehicle-to-vehicle (V2V) communication lets cars speak with one another directly and share information about their location, direction, speed, and braking/acceleration status.
- **V2N/V2C: Vehicle-to-Network/Cloud** – Vehicle-to-network (V2N) communication systems connect vehicles to cellular infrastructure and the cloud so drivers can take advantage of in-vehicle services like traffic updates and media streaming.
- **V2P: Vehicle-to-Pedestrian** – Vehicle-to-pedestrian (V2P) communication allows drivers, pedestrians, bicyclists, and motorcyclists to receive warnings to prevent collisions. Pedestrians receive alerts via smartphone applications or through connected wearable devices.
- **V2X: Vehicle-to-Everything** – Vehicle-to-everything (V2X) communication combines all of the above technologies. The idea behind this technology is that a vehicle with built-in electronics will be able to communicate in real-time with its surroundings.

Figure 3.11: Connected Vehicle Communication Types



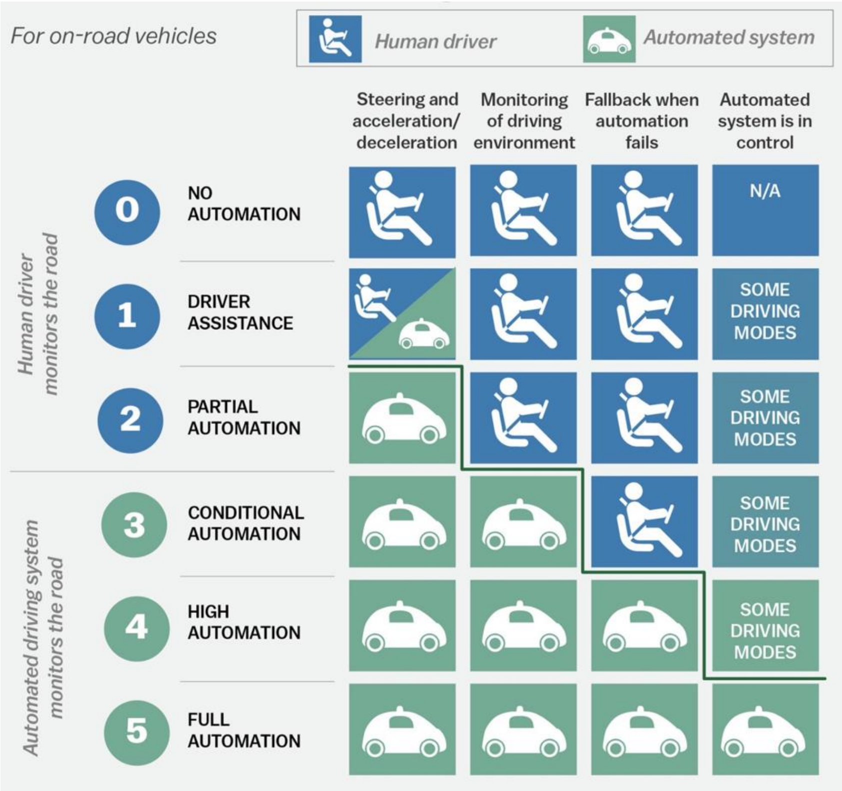
Source: Texas Instruments

Autonomous Vehicle Levels

According to the National Highway Traffic Safety Administration (NHTSA), there are five (5) levels of automation. These levels are illustrated in Figure 3.12 and include:

- **Level 1:** An Advanced Driver Assistance System (ADAS) can sometimes assist the human driver with steering or braking/accelerating, but not both simultaneously.
- **Level 2:** An Advanced Driver Assistance System (ADAS) can control both steering and braking/accelerating simultaneously under some circumstances. The human driver must continue to pay full attention at all times and perform the rest of the driving task.
- **Level 3:** An Automated Driving System (ADS) on the vehicle can perform all aspects of driving under some circumstances. In those circumstances, the human driver must be ready to take back control at any time when the ADS requests the human driver to do so.
- **Level 4:** An Automated Driving System (ADS) on the vehicle can perform all driving tasks and monitor the driving environment – essentially, do all the driving – in certain circumstances. The human need not pay attention in those circumstances.
- **Level 5:** An Automated Driving System (ADS) on the vehicle can do all the driving in all circumstances. The human occupants are just passengers.

Figure 3.12: Levels of Automation



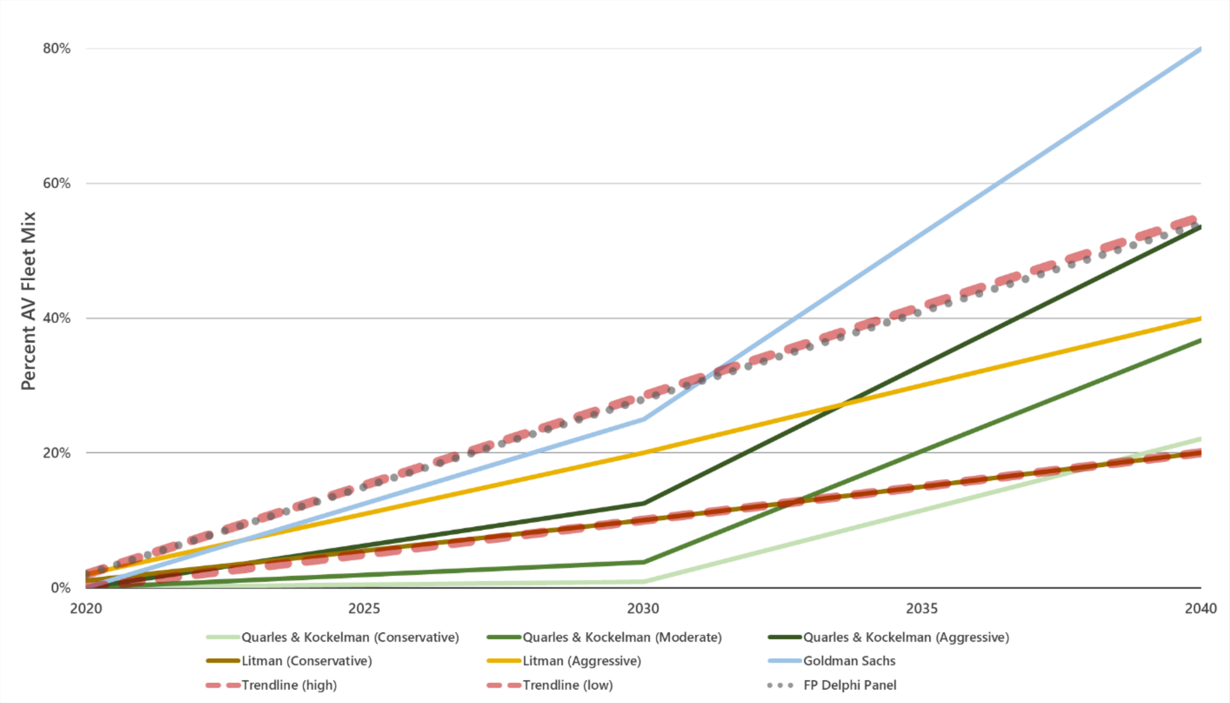
Source: SAE J3016 Levels of Automation (Photo from Vox)

Potential Timeline

While mid-level connected and autonomous vehicles are already on the market and traveling our roadways, there is uncertainty about the long-term future of these vehicles, especially Level 5, fully autonomous vehicles. However, over the past couple of years, some level of consensus has emerged about the timeline over the next 20 years. [7,8,9]

- Over the next five years, partially automated safety features will continue to improve and become less expensive. This includes features such as lane keeping assist, adaptive cruise control, traffic jam assist, and self-park.
- By 2025, fully automated safety features, such as a "highway autopilot," are anticipated to be on the market.
- By 2030, autonomous vehicles will continue to make up a small percentage of all vehicles on the road due to the large number of legacy vehicles and slow adoption rates resulting from higher initial costs, safety concerns, and unknown regulations.
- By 2040, autonomous vehicles are more common, accounting for 20-50% of all vehicles.

Figure 3.13: Potential Autonomous Vehicle Market Share, 2020 to 2040



Source: Fehr and Peers

[7] https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety
[8] http://library.rpa.org/pdf/RPA-New-Mobility-Autonomous-Vehicles-and-the-Region.pdf
[9] https://www.fehrandpeers.com/av-adoption/

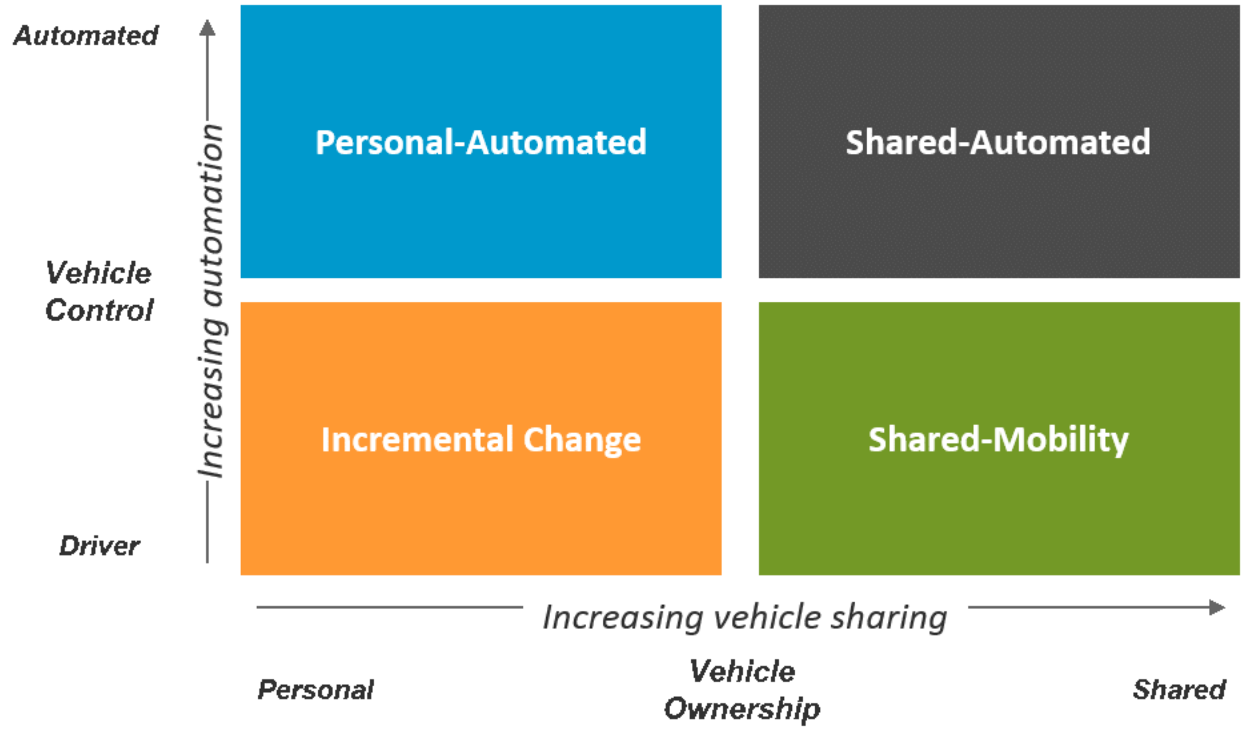
Potential Impacts

The development of connected and autonomous vehicles will change travel patterns, safety, and planning considerations. Ultimately, the actual impact of these vehicles will depend on how prevalent the technology is and the extent to which vehicles are privately owned or shared.

As shown in Figure 3.14, there are four (4) potential scenarios, each with unique implications for transportation planning.

- **Personal-Automated scenario**: vehicles are highly autonomous and mostly privately owned.
- **Shared-Automated scenario:** vehicles are highly autonomous and mostly shared.
- **Incremental Change scenario:** vehicles are not highly autonomous and are mostly privately owned.
- **Shared-Mobility scenario:** vehicles are not highly autonomous and are mostly shared.

Figure 3.14: Future Mobility Scenarios



Source: U.S. Department of Energy/Deloitte

Safety

In the long-term, CAV technology is anticipated to reduce human error and improve overall traffic safety. CAVs are capable of sensing and quickly reacting to the environment via:

- External sensors (ultrasonic sensors, cameras, radar, lidar, etc.)
- Connectivity to other vehicles
- GPS

These features allow the CAV to create a 360-degree visual of its surroundings and detect lane lines, other vehicles, road curves, pedestrians, buildings, and other obstacles. The sensor data is processed in the vehicle's central processing unit and allows it to react accordingly. As this technology becomes more common on the roadways, it should result in increased safety by removing human error as a crash factor. However, this can only be achieved when CAVs are in the majority on the road, if not the only vehicles in use.

CAV interactions with bicyclists and pedestrians is a major area of concern that still needs improvement. However, the use of CAV technologies can be applied at intersections by communicating with the traffic lights and crossing signals. This will result in increased safety for bicyclists, pedestrians, and those with mobility needs or disabilities.

Traffic

CAVs have the potential to improve overall traffic flow and reduce congestion, even as they may increase vehicle miles traveled. However, these benefits, such as increased roadway capacity from high-speed cars moving at closer distances (platooning), are achieved when CAV saturation is very high.

As a whole, CAVs are likely to increase driving, as measured by Vehicle Miles Traveled (VMT). This increase would come in part from people making longer and potentially more trips, due to the increased comfort of traveling by car. People could perform other tasks, such as working or entertainment, instead of driving and longer trips would become more bearable. The increase in VMT would also come from “dead head” mileage, or the time that vehicles are driving on the road without passengers, before and after picking up people.

Transit

CAV technology has the potential to drastically reduce the cost of operating transit in environments that are safe for autonomous transit. For many agencies, labor is their highest operating expense. While not all routes may be appropriate for autonomous transit, there may be opportunities to create dedicated lanes and infrastructure for autonomous transit and other vehicles. Even with some lines operating autonomously, costs can be lowered, and these savings can be used to increase and improve service.

From a reliability standpoint, connected vehicle technology can also improve on-time performance and travel times through applications like Transit Signal Priority (TSP) and dynamic dispatching. TSP is an application that provides priority to transit at signalized intersections and along arterial corridors. Dispatching and scheduling could be improved with dynamic, real-time information that more effectively and efficiently matches resources to demand.

Even with the potential improvements to transit operations, transit ridership could decrease if transportation network companies (e.g. Uber/Lyft) become competitively priced. This could be possible if autonomy allows these private transportation providers to eliminate drivers and reduce their operating costs.

Freight

Both delivery and long-haul freight look to be early adopters of CAV technology, reducing costs and improving safety and congestion.

Freight vehicles will also benefit from CAV technology by allowing them to travel in small groups, known as truck platooning. The use of CAV will safely decrease the amount of space between the platooning trucks thereby allowing consistent traffic flow. Platooning reduces congestion as vehicles travel at constant speed, with less stop-and-go, which results in fuel savings and reduces carbon dioxide emissions.

Land Use and Parking

Autonomous vehicles could dramatically reduce demand for parking, opening this space up for other uses. They may also require new curbside and parking considerations and encourage urban sprawl.

Autonomous vehicle technology has the potential to reduce the demand for parking in a few ways.

- Shared-Automated: If autonomous vehicles are mostly shared and not privately owned, there will be less need for parking as these vehicles will primarily move from dropping one passenger off to picking up or dropping off another passenger.
- Personal-Automated: If autonomous vehicles are mostly privately owned, it is also possible that they could return home or go to a shared parking facility that is not on site. In this scenario, some parking demand may simply shift from onsite parking to centralized parking.
- Smart Parking: Connected parking spaces allow communication from the parking lot to your vehicle, letting the vehicle know which spaces are available. This reduces the need for circling or idling in search of parking and improves parking management.

If parking demand is reduced, land use planners will need to consider repurposing parking areas. In urban areas, this could mean reallocating curb-side space for pedestrians while allowing for safe passage, pick-ups, drop-offs, and deliveries by AVs. In suburban areas, it could mean redeveloping large surface parking lots and revisiting parking requirements.

The benefits of CAV technology are also likely to make longer commutes more attractive and increase urban sprawl unless local land use policy and regulations discourage this technology.

Big Data for Planning

Connected vehicle technology may provide valuable historical and real-time travel data for transportation planning. Privacy concerns and private-public coordination issues may limit data availability, but this data could allow for very detailed planning for vehicles, pedestrians, and other modes. In addition to traffic data, it could provide valuable origin-destination data.

Furthermore, as CAV technologies continue to develop and be implemented, they can be used to refine regional or state travel demand models. This can be accomplished by:

- Providing additional data that can be used for the calibration of existing travel characteristics.
- Analyzing the data, in before and after method, to understand the effect of pricing strategies on path choice and route assignment.
- Potentially developing long-distance travel data in statewide models since CAVs are continuously connected.
- Potentially providing large amounts of data on commercial vehicles and truck movements to develop freight elements.
- Identifying recurring congestion locations within a region or state.
- Supporting emission modeling by assisting with the development of local input values instead of using MOVES defaults.

3.4 Electric and Alternative Fuel Vehicles

There has been growing interest and investment in alternative fuel vehicle technologies in recent years, especially for electric vehicles. This renewed interest has also included the transit and freight industries.

Alternative Fuel Vehicles (AFVs) are defined as vehicles that are substantially non-petroleum, yielding high-energy security and environmental benefits. These include fuels such as:

- electricity
- hybrid fuels
- hydrogen
- liquefied petroleum gas (propane)
- Compressed Natural Gas (CNG)
- Liquefied Natural Gas (LNG)
- 85% and 100% Methanol (M85 and M100)
- 85% and 95% Ethanol (E85 and E95) (not to be confused with the more universal E10 and E15 fuels which have lower concentrations of ethanol)

Existing Stock of AFVs

The number of AFVs in use across the county continues to increase due to federal policies that encourage and incentivize the manufacture, sale, and use of vehicles that use non-petroleum fuels. According to the 2019 U.S. Energy Information Administration's *Annual Energy Outlook*, the most popular alternative fuel sources today for cars and light-duty trucks in the U.S. are E85 (flex-fuel vehicles) and electricity (hybrid electric vehicles and plug-in electric vehicles).

The U.S. Department of Energy's Alternative Fuels Data Center locator shows that there are four (4) AFV stations in the MPA: three (3) electric stations one (1) propane station.

E85 85% Ethanol

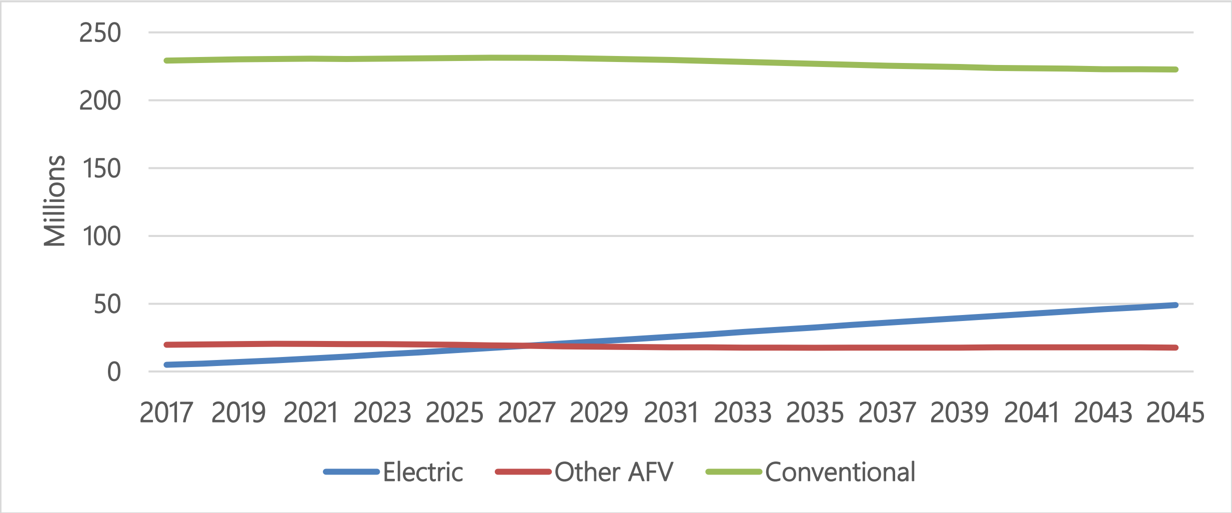
Growth Projections

Long-term projections for electric vehicle and other alternative fuels vary considerably. On the higher end, some projections estimate that electric vehicles will make up 30 percent of all cars in the United States by 2030.[10] The U.S. Energy Information Administration (USEIA) is more conservative, projecting that electric vehicles will make up approximately nine (9) percent of all light-duty vehicles by 2030 and approximately 17 percent by 2045. For freight vehicles, the USEIA projects only a two (2) percent market share for electric vehicles by 2045.

Outside of electric vehicles, which include full electric vehicles and hybrid electric vehicles powered by battery or fuel cell technology, the USEIA does not project other alternative fuels to grow significantly for light-duty vehicles. However, it does anticipate ethanol-flex fuel vehicles to grow significantly for light and medium freight vehicles.

In the United States, electric buses are becoming more common as transit agencies pursue long-term operations and maintenance savings in addition to environmental and rider benefits (less air and noise pollution). While electric buses have many challenges, upfront costs are anticipated to go down and utilization is likely to become more widespread. By 2030, it is anticipated that between 25% and 60% of new transit vehicles purchased will be electric.[11]

Figure 3.15: Light-Duty Vehicles on the Road by Fuel Type, 2017 to 2045



Source: U.S. Energy Information Administration, 2019 Annual Energy Outlook

[10] https://www.iea.org/publications/reports/globalevoutlook2019/

[11] https://www.reuters.com/article/us-transportation-buses-electric-analysi/u-s-transit-agencies-cautious-on-electric-buses-despite-bold-forecasts-idUSKBN1E60GS

Potential Impacts

Air Quality Improvement

Electric and other alternative fuel vehicles have the potential to drastically reduce automobile related emissions. While these fuels still have environmental impacts, they can reduce overall lifecycle emissions and reduce direct tailpipe emissions substantially.

Direct emissions are emitted through the tailpipe, through evaporation from the fuel system, and during the fueling process. Direct emissions include smog-forming pollutants (such as nitrogen oxides), other pollutants harmful to human health, and greenhouse gases (GHGs).

Infrastructure Needs

There may be a long-term need for public investment in vehicle charging stations to accommodate growth in electric vehicles.

Consumers and fleets considering Plug-in Hybrid Electric Vehicles (PHEVs) and all-electric vehicles (EVs) benefit from access to charging stations, also known as EVSE (Electric Vehicle Supply Equipment). For most drivers, this starts with charging at home or at fleet facilities. Charging stations at workplaces and public destinations may also bolster market acceptance.

Gas Tax Revenues

If adoption rates increase substantially, gas tax revenues will be impacted, and new user fees may need to be considered.

Because electric and other alternative fuel vehicles use less or no gasoline compared to their conventional counterparts, their operation does not generate as much revenue from a gas tax, which is one of the primary means that Mississippi uses to fund transportation projects. Because of this, many states have begun imposing fees on these vehicles to recoup lost transportation revenue.[12]

[12] http://www.ncsl.org/research/energy/new-fees-on-hybrid-and-electric-vehicles.aspx

4.0 Roadways and Bridges

4.1 Congestion Relief Needs

Given the population and employment growth forecasted to occur by 2045, the Travel Demand Model indicates that the number of person trips in the MPA will increase from 545,612 in 2018 to 757,868 in 2045. Most of the trip types grow by the same rate. However, home-based trips and those with both ends outside of the MPA are forecasted to grow at a faster rate. These changes are summarized in Table 4.1.

Table 4.1: Person Trips by Purpose, 2018 to 2045

Trip Purpose	2018	2045 (E+C)	Change	Percent Change
Home-Based Work	91,500	129,188	37,688	41.2%
Home-Based Other	198,203	280,607	82,404	41.6%
Non-Home Based	103,641	139,735	36,094	34.8%
Commercial Vehicle	34,374	45,870	11,496	33.4%
Truck	10,232	13,708	3,476	34.0%
Internal-External	93,810	129,132	35,322	37.7%
External-External	13,852	19,629	5,777	41.7%
Total	545,612	757,868	212,256	38.9%

38.9%

Growth in person trips in the MPA from 2018 to 2045

Notes: E+C is future scenario with only Existing and Committed transportation projects. Values do not include special generators.
Source: HPFL/MPO Travel Demand Model, NSI

Table 4.2 shows that if the transportation projects that currently have committed funding are constructed, the centerline miles of the roadway network will increase by less than one-half of a percent. The table also shows the forecast change in Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Vehicle Hours of Delay (VHD) if only those projects are constructed.

This data indicates that, by 2045, the VMT will increase by about 39 percent. However, during this same time period, the VHT will increase by over 56 percent, and the VHD will be more than double the current delay. These changes are the result of a large growth in person trips and comparatively slow growth of the roadway network.

Table 4.2: Travel Demand Impact of Growth and Existing and Committed Projects, 2018 to 2045

Centerline Miles of Roadways				
Classification	2018 (Existing)	2045 (E+C Projects)	Change	Percent Difference
Interstate	22.31	22.31	0.00	0.0%
Principal	61.79	61.79	0.00	0.0%
Minor Arterial	74.17	74.17	0.00	0.0%
Collector	179.92	180.17	0.25	0.1%
Total	338.19	338.44	0.25	0.1%
Daily Vehicle Miles Traveled (VMT)				
Classification	2018 (Existing)	2045 (E+C Projects)	Change	Percent Difference
Interstate	647,445	849,604	202,159	31.2%
Principal	1,233,425	1,636,887	403,463	32.7%
Minor Arterial	435,074	626,986	191,912	44.1%
Collector	447,381	721,775	274,394	61.3%
Total	2,763,325	3,835,252	1,071,927	38.8%
Daily Vehicle Hours Traveled (VHT)				
Classification	2018 (Existing)	2045 (E+C Projects)	Change	Percent Difference
Interstate	11,581	17,074	5,493	47.4%
Principal	29,739	44,557	14,818	49.8%
Minor Arterial	12,598	19,983	7,385	58.6%
Collector	11,831	21,052	9,221	77.9%
Total	65,748	102,666	36,917	56.1%
Daily Vehicle Hours of Delay (VHD)				
Classification	2018 (Existing)	2045 (E+C Projects)	Change	Percent Difference
Interstate	1,902	4,378	2,476	130.2%
Principal	5,744	12,921	7,177	125.0%
Minor Arterial	1,579	4,291	2,712	171.8%
Collector	1,241	4,019	2,778	223.9%
Total	10,466	25,610	15,144	144.7%

Note: E+C is future scenario with only Existing and Committed transportation projects.
Source: HPFL/MPO Travel Demand Model, NSI

> Currently, congestion is concentrated mostly near intersections in the MPA. By 2045, congestion is forecasted to become more widespread if only the E+C projects are implemented.

The number of roadway segments with a volume to capacity (V/C) ratio exceeding 1.0 would increase significantly by 2045, as shown in Table 4.3 and illustrated in Figure 4.1.

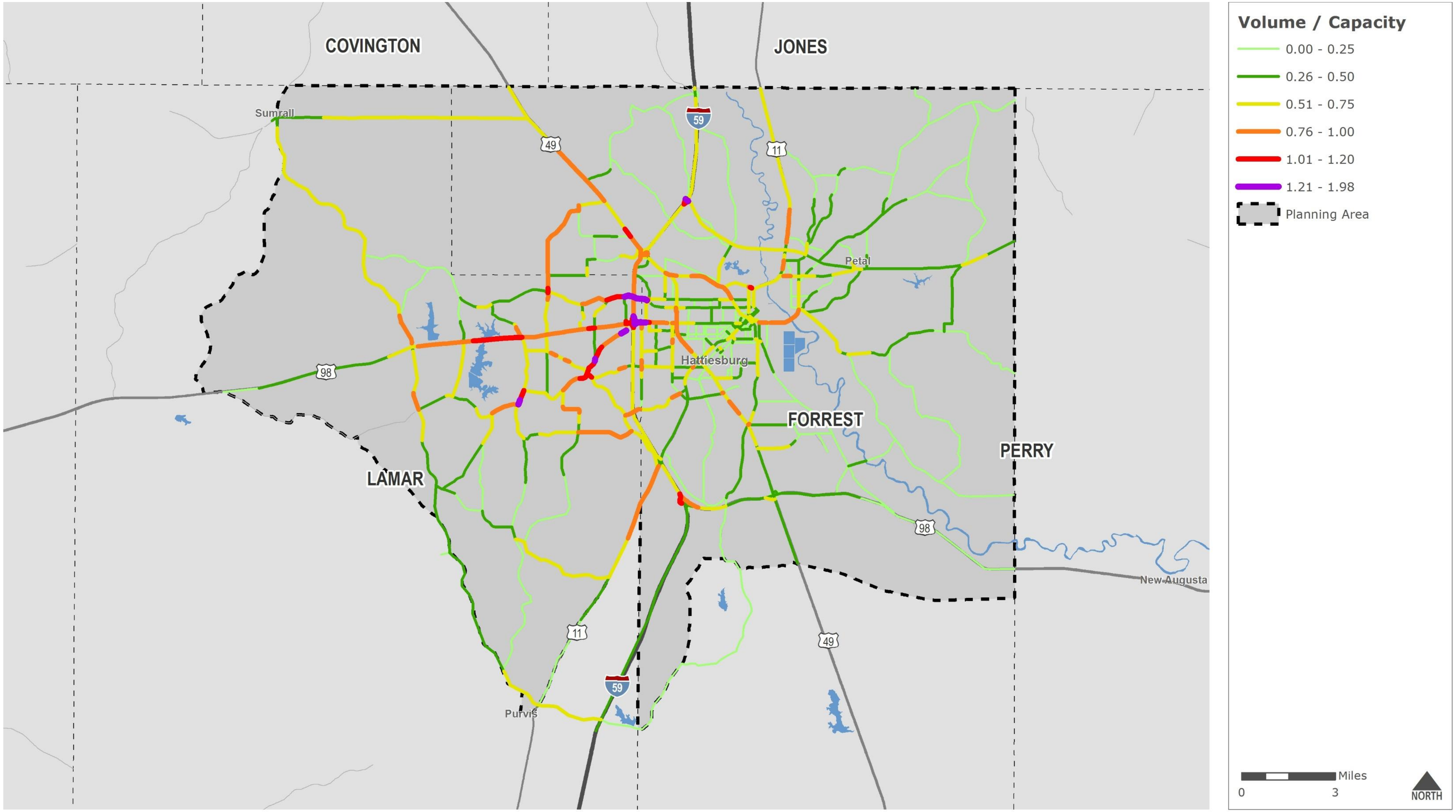
It is important to note that not all congested street and highway segments should be widened with additional through lanes or turning lanes. In urban settings, it may be more appropriate to consider ITS improvements or Travel Demand Management (TDM) strategies. Congestion may also be reduced by improving pedestrian, bicycle, and/or transit conditions that will encourage alternative means of transportation.

Table 4.3: Roadway Corridors with Volumes Exceeding Capacity, 2045

Roadway	Location	Length (miles)
I-59 NB Off Ramp	I-59 NB Evelyn Gandy Parkway (MS 42)	0.17
I-59 SB On Ramp	Eatonville Road to I-59 SB	0.17
I-59 NB Off Ramp	I-59 NB to Collector-Distributor Road	0.06
I-59 SB Off Ramp	I-59 SB to Hardy St (US 98)	0.21
I-59 SB On Ramp	Hardy St (US 98) to I-59	0.16
I-59 SB Off Ramp	I-59 to US 98 Bypass	0.34
Collector Distributor Road/ I-59 NB On Ramp	On Ramp to I-59	0.24
Collector-Distributor Road On Ramp	Hardy St. (US 98) to Collector-Distributor Road	0.12
US 98	West Lake Road to Old US 11/King Road	1.56
Hardy Street (US 98)	Lakewood Drive to Weathersby Road	0.19
Hardy Street (US 98)	Westover Drive to S 37th Avenue	0.75
US 49	Rawls Springs Loop Road to Blackwell Boulevard	0.29
Evelyn Gandy Parkway (MS 42)	I-59 SB Ramps to I-59 NB Ramps	0.11
Old MS 42	Mobile Street to Bouie Street (US 11)	0.17
W 4th Street	Weathersby Road to Beverly Hills Road	1.34
Jackson Road	W 4th Street to Melton Street	0.13
Old US 11	Old MS 24 to Oak Grove Road	0.49
Oak Grove Road	Friend Road to Tanglewood Drive	1.31
Oak Grove Road	0.18 mile west of Westover Drive to Westover Drive	0.18
Lincoln Road Extension	Sandy Run Road to Oak Grove Road	0.19
Westover Drive	Hardy Street (US 98) to Carlisle Drive	0.07

Source: HPFL/MPO Travel Demand Model

Figure 4.1: Future Roadway Congestion, 2045 (Existing+Committed)



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

Public and Stakeholder Input

During the public and stakeholder involvement process, respondents were asked to identify the roadways and intersections they felt were most congested. The most often identified of these location types are described below.

- US 98/Hardy St corridor, including intersections at:
- US 49
- 38th St
- 40th St
- I-59
- Westover Dr
- 4th St corridor, including:
- Intersection at Westover Dr

<u>Intersection and Corridor Recommendations</u>

Table 4.4 displays the locations identified through public involvement and engineering review, the observed issues, and recommendations to address the intersection needs.

Table 4.4: Recommended Intersection Improvement Projects

Location	Traffic Control Type	Observed Issues	Short-term Solution	Long-term Solution
I-59 and US 98	Interchange	Traffic backs up along the EB and WB approaches at ramp terminals	Adaptive Traffic Control System (ATCS) from Jackson Rd to US 49	Interchange reconfiguration of the I-59 SB Ramps; possible corridor study to find a solution along US 98 (Hardy Street)
Hardy St and 40th Ave	Signal	Traffic backs up along the WB approach	Adaptive Traffic Control System (ATCS) from Jackson Rd to US 49	Corridor Study
Hardy St and Westover Dr	Signal	Traffic backs up along the EB and WB approaches	Adaptive Traffic Control System (ATCS) from Jackson Rd to US 49	Corridor Study
Hardy St and 38th Ave	Signal	Traffic backs up along the EB and WB approaches	Adaptive Traffic Control System (ATCS) from Jackson Rd to US 49	Corridor Study
Evelyn Gandy Pkwy and I-59	Interchange	Traffic backs up along the I-59 SB off ramp and along the EB approach at NB terminal.	Intersection improvement study for interchange (Adding turn lanes and changing traffic control to signal/roundabout)	
4th St and Westover Dr	Signal	Traffic backs up along all approaches	Signal retiming	Intersection study for possible improvements such as innovative intersection designs
US 49 and I 59	Interchange	Traffic backs up along the WB approaches from US 49 and Classic Dr intersection to the I-59 SB terminal	Signal retiming at Central Plaza and Classic Dr	Access management along US 49 north and south of the interchange within congested areas
US 98 and Weathersby Rd	Signal	Traffic backs up along the EB approach	Adaptive Traffic Control System (ATCS) from Jackson Rd to US 49	Corridor Study

4.2 Maintenance Needs

Pavement Maintenance

While less than three (3) percent of the MPA's roadways have poor pavement conditions, these roadway segments could eventually experience maintenance needs that will lead to decreased safety or emergency roadway repairs, both of which can increase congestion. Figure 2.5 in *Technical Report #2: Existing Conditions* displays the pavement conditions of the NHS monitored roadways within the MPA. Particular attention should be given to:

- Old Hwy 42 from US 49 to US 11 (Bouie St)
- US 11 (Bouie St) from US 11 (Front St) to Old Hwy 42
- US 11 (W Pine St) from 7th Ave to US 11 (Bouie St)
- Old Hwy 42 from US 11 to MS 42 (Evelyn Gandy Pkwy)

These roadways have continuous lengths of poor pavement conditions as well as those in fair condition and should be a priority for roadway maintenance and repaving.

Bridge Maintenance

The existing conditions analysis revealed that there are currently nine (9) bridges in Poor condition within the MPA, none of which are on the National Highway System. Table 4.5 displays the MPA's bridges in Poor condition. Addressing the needs of these bridges will improve safety, reduce maintenance costs, and avoid future bridge shutdowns. Bridges are rated by the NBIS based on the conditions of the following categories:

- Decks
- Superstructure
- Substructure
- Stream Channel and Channel Protection

A bridge is considered to be in Poor condition if any of the above categories are rated "Poor".

Some of these deficient bridges may be improved via the Metropolitan Transportation Plan (MTP) through other transportation projects, such as a roadway widening. Other bridges could instead be improved through line item funding for operations and maintenance. The MPO and MDOT should prioritize these bridges for improvements as funding becomes available.

Table 4.5: Bridges in Poor Condition

Structure ID	Roadway	Feature Intersecting	Year Built
SA1800000000106	Broad Street	Gordons Creek	1937
SA1800000000116	12th Avenue	Gordons Creek	1980
SA1800000000122	Mcleod Street	Gordons Creek	1929
SA1800000000165	Barkley Road	Gillis Creek	1975
SA1800000000202	Campbell Scenic Dr	Mixon Creek	1970
SA1800000000215	Suggs Road	Branch Of Big Creek	1991
SA1800000000134	Roy Street	Burketts Creek	1979
SA1800000000217	A Smith Road	Big Creek	1982
SA1800000000142	Tipton Street	Branch Concrete V Ditch	1983

Source: National Bridge Inventory, 2018

4.3 Safety Needs

Within the MPA, over 25,000 crashes occurred between 2014 and 2018. During that timeframe, there were 78 fatal crashes and 64 life-threatening crashes. Another 4,895 crashes caused injuries or possible injuries.

The highest number of crashes in the MPA were rear-end collisions, followed by angle crashes, and sideswipes. Recommendations for reducing these most common types of crashes are outlined below.

As traffic continues to increase from 2018 to 2045, historical trends predict that the number of crashes will also increase.

Reducing Rear-End Collisions

The highest number of crashes in the MPA were rear-end collisions which can be attributed to a number of factors, such as:

- driver inattentiveness
- large turning volumes
- slippery pavement
- inadequate roadway lighting
- crossing pedestrians
- poor traffic signal visibility
- congestion
- inadequate signal timing, and/or
- an unwarranted signal

In general, the recommendations for reducing rear-end crashes include:

- Analyzing turning volumes to determine if a right-turn lane or left-turn lane is warranted. Providing a turning lane separates the turning vehicles from the through vehicles, preventing through vehicles from rear-ending turning vehicles. If a large right-turn volume exists, increasing the corner radius for right-turns is an option.
- Checking the pavement conditions. Rear-end collisions caused by slippery pavement can be reduced by lowering the speed limit with enforcement, providing overlay pavement, adequate drainage, groove pavement, or with the addition of a “Slippery When Wet” sign.
- Ensuring roadway lighting is sufficient for drivers to see the roadway and surroundings.
- Determining if there is a large amount of pedestrian traffic. Pedestrians crossing the roads may impede traffic and force drivers to stop suddenly. If crossing pedestrians are an issue, options include installing or improving crosswalk devices and providing pedestrian signal indications.

- Checking the visibility of the traffic signals at all approaches. In order to provide better visibility of the traffic signal, options include installing or improving warning signs, overhead signal heads, installing 12” signal lenses, visors, back plates, or relocating/adding signal heads.
- Verifying that the signal timing is adequate to serve the traffic volumes at the trouble intersections. Options include adjusting phase-change interval, providing or increasing a red-clearance interval, providing progression, and utilizing signal actuation with dilemma zone protection.
- Verifying that a signal is warranted at the given intersection.

Reducing Side Impact / Angle Crashes

Angle crashes were the second highest crash type within the MPA. These crashes can be caused by a number of factors, such as:

- restricted sight distance
- excessive speed
- inadequate roadway lighting
- poor traffic signal visibility
- inadequate signal timing
- inadequate advance warning signs
- running a red light
- large traffic volumes

In general, the recommendations for reducing side impact and angle collisions include:

- Verifying that the sight distance at all intersection approaches is not restricted. Options to alleviate restricted sight distance include removing the sight obstruction and/or installing or improving warning signs.
- Conducting speed studies to determine whether or not speed was a contributing factor. In order to reduce crashes caused by excessive speeding, the speed limit can be lowered with enforcement, the phase change interval can be adjusted, or rumble strips can be installed.
- Ensuring roadway lighting is sufficient for drivers to see the roadway and surrounding area.
- Checking the visibility of the traffic signal at all approaches. In order to provide better visibility of the traffic signal, options include installing or improving warning signs, overhead signal heads, installing 12” signal lenses, visors, back plates, and/or relocating or adding signal heads.
- Verifying that the signal timing is adequate to serve the traffic volumes. Options include adjusting phase change interval, providing or increasing a red-clearance interval, providing progression, and/or utilizing signal actuation with dilemma zone protection.
- Verifying that the intersection is designed to handle the traffic volume. If the traffic volumes are too large for the intersection’s capacity, options include adding a lane(s) and retiming the signal.

Reducing Sideswipes

The third highest type of crashes in the MPA were sideswipes which are caused by factors such as:

- excessive speed
- inadequate roadway lighting
- poor pavement markings
- large traffic volumes
- driver inattentiveness

The recommendations for reducing sideswipes include:

- Checking for proper signage around the intersection, especially if the roadway geometry may be confusing for the driver. Verify that all one-way streets are marked "One-Way" and "No Turn" signs are placed at appropriate locations.
- Verifying that pavement markings are visible during day and night hours.
- Verifying that the roadway geometry can be easily maneuvered by drivers.
- Evaluating left and right turning volumes to determine if a right turn and/or left turn lane is warranted.
- Ensuring roadway lighting is sufficient for drivers to see roadway and surroundings.
- Verifying that lanes are marked properly and provide turning and through movement directions on lanes as well as signage that indicates lane configurations. This will prevent cars from dangerously switching lanes at the last minute.

Reducing Other Collision Types

The remaining representative crash types can be attributed to incidents involving animals, backing up, bicycle/pedestrian encounters, fixed objects, head on collisions, jackknife, rollovers, running off the road, and vehicle defects. Recommendations for increasing the safety and reducing the number of crashes for these crash types include:

- Determining if the speed limit is too high or if vehicles in the area are traveling over the speed limit. Reducing the speed can reduce the severity of crashes and make drivers more attentive to their surroundings.
- Verifying the clearance intervals for all signalized intersection approaches and ensure that there is an all red clearance. For larger intersections, it is particularly important to have a long enough clearance interval for vehicles to safely make it through the intersection before the light turns red.
- Checking for proper intersection signage, especially if the roadway geometry may be confusing for the driver. Verify that all one-way streets are marked "One-Way" and "No Turn" signs are placed at appropriate locations.
- Verifying that pavement markings are visible during day and night hours.

- Verifying that the roadway geometry can be easily maneuvered by drivers.
- Evaluating left and right turning volumes to determine if a right turn and/or left turn lane is warranted.
- Ensuring roadway lighting is sufficient for drivers to see roadway and surroundings.
- Checking the visibility of the traffic signals from all approaches.
- Verifying that lanes are marked properly and provide turning and through movement directions, as well as signage that indicates lane configurations. This will prevent cars from dangerously switching lanes at the last minute and reduces crash potential.

High Crash Frequency and High Crash Rate Needs

Technical Report #2: Existing Conditions identified high crash frequency and high crash rate locations within the MPA. These locations were identified in Tables 2.5 through 2.9. Each of these segments or intersections experience either a large amount of crashes in general, or a large amount of crashes for the roadway volume it carries.

The locations listed in those tables, and also shown in Table 4.6, should be high priority locations for the MPO to address in order to reduce congestion and increase safety within the MPA. The scope of the MTP does provide for a detailed analysis of the locations, but safety studies can be conducted by the MPO's safety partners for each location to determine the best site-specific crash countermeasures that can be employed.

Table 4.6: High Crash Frequency or Crash Rate Locations in the MPA

Route	Location	Type	Issue
US 98 (Hardy St)	Weathersby Rd to Westover Dr	Segment	Crash Frequency
US 98 (Hardy St)	Cross Creek Pkwy to Weathersby Rd	Segment	Crash Frequency
Cross Creek Pkwy	W 4th St to US 98 (Hardy St)	Segment	Crash Frequency
US 98	Hegwood Rd/Jackson Rd to Cross Creek Pkwy	Segment	Crash Frequency
S 40th Ave	MS 198 (Hardy St) to 0.83 miles south	Segment	Crash Frequency
US 98	Cole Rd to Old US 11 /King Rd	Segment	Crash Frequency
MS 198 (Hardy St)	S 34th Ave to 0.28 miles east	Segment	Crash Frequency
MS 198 (Hardy St)	S 37th Ave to S 34th Ave	Segment	Crash Frequency
Westover Dr	US 98 (Hardy St) to Wildwood Cir	Segment	Crash Frequency
US 98	Old US 11 /King Rd to Hegwood Rd/Jackson Rd	Segment	Crash Frequency
I-59	0.73 miles north of US 98 / Hardy St (Exit 65) to US 98 / Hardy St (Exit 65)	Segment	Crash Frequency
US 98	MS 589 to Cole Rd	Segment	Crash Frequency
Hardy St	S 26th Ave to S 21st Ave	Segment	Crash Frequency
MS 42	Springfield Rd/Walnut Dr to 1.62 miles east	Segment	Crash Frequency
US 98	Old MS 24 to MS 589	Segment	Crash Frequency
MS 198 (Hardy St)	0.24 miles west to S 28th Ave	Segment	Crash Frequency
I-59	1.33 miles north of US 49 to US 49 (Exit 67B)	Segment	Crash Frequency
N 38th Ave	Mable St to MS 198 (Hardy St)	Segment	Crash Frequency
US 49 (MS 42)	Rawls Springs Loop Rd to Classic Dr	Segment	Crash Frequency
I-59	US 98 Bypass to Browns Bridge Rd	Segment	Crash Frequency
Westover Dr	US 98 (Hardy St) to Wildwood Cir	Segment	Crash Rate
Adeline St	W Scooba St to W Florence St	Segment	Crash Rate
S 21st Ave	Mamie St to 0.17 miles north	Segment	Crash Rate
Weathersby Dr	Hartfield Rd to US 98 (Hardy St)	Segment	Crash Rate
S 40th Ave	MS 198 (Hardy St) to 0.83 miles south	Segment	Crash Rate
Wisteria Dr	Country Club Rd to Wyatt Rd	Segment	Crash Rate
Adeline St	S 10th Ave to 6th Ave	Segment	Crash Rate
Westover Dr	Wildwood Cir to W 4th St	Segment	Crash Rate
JC Killingsworth Dr	Country Club Rd to Highland Ave	Segment	Crash Rate

Route	Location	Type	Issue
Old US 11	Lincoln Rd to US 98	Segment	Crash Rate
Lincoln Rd	Monterrey Ln to S 28th Ave	Segment	Crash Rate
S Westover Dr	Oak Grove Rd to US 98	Segment	Crash Rate
I-59	Northbound On-Ramp at US 11	Segment	Crash Rate
US 11 (Broadway Dr)	Lincoln Rd to US 49	Segment	Crash Rate
S 24th Ave	Adeline St to Mamie St	Segment	Crash Rate
S 28th Ave	0.12 miles south of Lincoln Rd to Lincoln Rd	Segment	Crash Rate
MS 198 (Hardy St)	S 37th Ave to S 34th Ave	Segment	Crash Rate
US 49	Northbound On-Ramp from US 11 Northbound	Segment	Crash Rate
Katie Ave	John St to Ronie St	Segment	Crash Rate
S 28th Ave	Arcadia St to 0.1 miles south of Mamie St	Segment	Crash Rate
US 98 (Hardy St)	Westover Dr	Intersection	Crash Frequency
US 49	MS 198 / Hardy St	Intersection	Crash Frequency
US 98 (Hardy St)	Weathersby Rd	Intersection	Crash Frequency
US 49 (MS 42)	Classic Dr	Intersection	Crash Frequency
MS 198 (Hardy St)	40th Ave	Intersection	Crash Frequency
MS 198 (Hardy St)	38th Ave	Intersection	Crash Frequency
US 98	Old US 11/King Rd	Intersection	Crash Frequency
US 98 (Hardy St)	Cross Creek Pkwy	Intersection	Crash Frequency
US 49	Cloverleaf Dr/Eddy St	Intersection	Crash Frequency
US 49	Mamie St	Intersection	Crash Frequency
US 98	MS 589	Intersection	Crash Frequency
US 98 (Hardy St) / MS 198 (Hardy St)	I-59 SB Ramps	Intersection	Crash Frequency
US 49	Westside Ave / W Pine St	Intersection	Crash Frequency
W 4th St	N 38th Ave	Intersection	Crash Frequency
US 98	Cole Rd	Intersection	Crash Frequency
US 49 (MS 42)	Peps Point Rd	Intersection	Crash Frequency
US 49	N 31st Ave	Intersection	Crash Frequency
US 98	Hedgwood Dr (Sandy Run Rd) / Jackson Rd	Intersection	Crash Frequency
US 49	Helveston Rd/Wisteria Dr	Intersection	Crash Frequency
Lincoln Rd	S 28th Ave	Intersection	Crash Frequency

Stakeholder and Public Input

During the public and stakeholder involvement process, respondents were asked to identify the roadways and intersections they perceived to have the most safety issues. The most often identified of these locations are described below.

- US 98/Hardy St corridor, including intersections at:
- US 49
- 40th Ave
- I-59
- Westover Dr
- Cross Creek Pkwy
- US 49, including the interchange at I-59
- Evelyn Gandy Pkwy

5.0 Freight

Freight needs vary by mode (truck, rail, air, water, and pipeline) and can include mobility, safety, and asset conditions. Freight projections indicate that commerce and trade will continue to grow throughout the MPA from 2018 to 2045, which will lead to an increase in freight traffic on the MPA freight network. This increase in freight traffic will lead to an increase in congestion and a degrading of the freight network. However, projects in the MPA that address freight needs can improve safety and economic competitiveness in the MPA.

5.1 Freight Truck Needs

This section summarizes future freight truck movement and needs. Freight projections indicate that the truck mode will have the largest increases in freight tonnage and value between 2018 and 2045. This will have an impact on the freight highway network; including an increase in truck traffic and congestion, worsening roadway pavement and bridge conditions, and an increased chance of heavy vehicle involved crashes. Although all roadways in the MPA will be impacted due to the increases in freight truck traffic, the roadways with the largest increases in freight truck traffic are on the Mississippi Freight Network (MFN) highways, which include:

- I-59 Tier I Picayune-Hattiesburg-Meridian Corridor
- US 49 Tier I Jackson-Hattiesburg-Gulfport Corridor
- US 98 Tier II McComb-Hattiesburg-Lucedale Corridor

Mobility

The FAF data can be used to understand the projected growth in freight truck commodity flows between 2016 and 2045. This projected growth will lead to an increase in freight truck traffic on MPA's roadways, resulting in an increase in roadway traffic congestion and subsequent decrease in travel time reliability.

Commodity Flow Growth

As shown in *Technical Report #2: Existing Conditions*, the truck mode accounts for nearly 80 percent of the freight truck tonnage and nearly 80 percent of freight value moved into, out of, and within the MPA in 2016. By 2045, the freight truck tonnage share is projected to slightly increase to 81 percent, while the freight truck value share is projected to decrease to 76 percent.

The changes in county ranks for freight truck commodity flows between 2016 and 2045 are summarized below:

- Forrest County is projected to decrease from 23rd to 32nd in Mississippi by truck freight tonnage and increase from 19th to 17th by truck freight value.
- Lamar County is projected to decrease from 58th to 62nd in Mississippi by truck freight tonnage and increase from 61st to 60th by truck freight value.

Table 5.1 shows the growth in freight tonnage and freight value for trucks in the MPA between 2016 and 2045, as projected by the Freight Analysis Framework (FAF).[13] The following observations emerge in the MPA:

- The inbound intrastate movement tonnage is projected to be the largest tonnage increase, increasing by approximately 1.7 million tons.
- The inbound interstate movement value is projected to be the largest value increase, increasing by approximately $1.9 billion.
- The intrastate tonnage increase (2.9 million tons) is projected to be greater than the interstate tonnage increase (1.6 million tons). However, the interstate freight value increase ($3.0 billion) is projected to be greater than the intrastate freight value increase ($1.3 billion).
- Inbound tonnage and freight value are projected to be greater (increases of 2.7 million tons and $2.6 billion) than outbound tonnage and freight value (increases of 1.7 million tons and $1.7 billion).
- Outbound tonnage percent growth is projected to be larger (increase of 72 percent) than inbound tonnage percent growth (increase of 64 percent).
- Between 2016 and 2045, the total truck tonnage is projected to increase by 67 percent, and the total truck freight value is projected to increase by 68 percent.

[13] A disaggregated version of the Freight Analysis Framework (FAF) database was used to get the data to the county level.

Table 5.1: Changes in Commodity Flows by Truck, 2016 to 2045

Direction	Tons (Thousand)				Value ($ million)			
	2016	2045	Change	Percent Change	2016	2045	Change	Percent Change
Inbound (Interstate)	1,776	2,807	1,031	58%	$2,244	$4,099	$1,855	83%
Inbound (Intrastate)	2,481	4,195	1,714	69%	$1,303	$2,064	$760	58%
Outbound (Interstate)	785	1,339	554	71%	$1,962	$3,146	$1,184	60%
Outbound (Intrastate)	1,629	2,802	1,173	72%	$858	$1,365	$507	59%
Within MPA	65	112	46	71%	$37	$61	$24	66%
Total	6,736	11,254	4,518	67%	$6,404	$10,734	$4,330	68%

Source: Freight Analysis Framework 4

Table 5.2 and Table 5.3 show the top ten (10) inbound and outbound domestic trading partners in the MPA by truck tonnage increases between 2016 and 2045, respectively. Most of the partners with the largest increases are either Mississippi counties or in states bordering Mississippi. The partner with the largest tonnage increase is the area of Louisiana that is outside the FAF designated metropolitan areas ("Rest of Louisiana").

Table 5.2: Top Inbound Truck Trading Partners with Largest Increases in Trading Activity with MPA

Rank	Trading Partner	Tons (Thousand)		Change	Percent Change
		2016	2045		
1	Rest of Louisiana	535	791	257	48%
2	Rest of Alabama	158	239	81	51%
3	Pike County, Mississippi	101	178	77	77%
4	Copiah County, Mississippi	91	160	69	76%
5	Memphis, Tennessee	166	233	67	40%
6	Jones County, Mississippi	104	169	65	62%
7	Lee County, Mississippi	64	123	58	91%
8	Scott County, Mississippi	72	130	58	80%
9	Rest of Texas	158	211	53	33%
10	New Orleans, Louisiana	104	154	50	48%

Source: Freight Analysis Framework 4 (FAF4)

Note: "Rest of Louisiana", "Rest of Alabama", and "Rest of Texas" refer to those areas of those states that are outside the FAF 4 designated metropolitan areas.

Table 5.3: Top Outbound Truck Trading Partners with Largest Increases in Trading Activity with MPA

Rank	Trading Partner	Tons (Thousand)		Change	Percent Change
		2016	2045		
1	Rest of Louisiana	119	235	116	98%
2	Hinds County, Mississippi	72	128	56	78%
3	Rest of Arkansas	73	128	55	76%
4	Rest of Alabama	69	121	52	76%
5	Harrison County, Mississippi	61	107	46	75%
6	Jones County, Mississippi	62	107	44	72%
7	Scott County, Mississippi	59	103	44	75%
8	Lee County, Mississippi	50	90	40	81%
9	Jackson County, Mississippi	49	88	39	80%
10	Rankin County, Mississippi	43	76	33	76%

Source: Freight Analysis Framework 4

Note: "Rest of Louisiana", "Rest of Arkansas", and "Rest of Alabama" refer to those areas of those states that are outside the FAF 4 designated metropolitan areas.

Table 5.4 and Table 5.5 show the top freight truck commodities by tonnage and value increases between 2016 and 2045, respectively. By tonnage, the largest increase is agricultural products. By value, the largest increase is motorized vehicles.

Table 5.4: Top Commodities by Truck Tonnage Increase

Rank	Commodity	Tons (thousand)		Change	Percent Change
		2016	2045		
1	Agricultural products	808	1,563	754	93%
2	Gravel	643	1,201	559	87%
3	Logs	1,112	1,599	486	44%
4	Cereal grains	601	946	345	58%
5	Coal n.e.c.	217	559	343	158%
6	Mon-metallic products	406	674	269	66%
7	Waste and scrap	306	554	248	81%
8	Other foodstuffs	350	578	228	65%
9	Wood products	286	409	123	43%
10	Motorized vehicles	193	305	112	58%

Source: Freight Analysis Framework 4

Table 5.5: Top Commodities by Truck Value Increase

Rank	Commodity	Value ($ million)		Change	Percent Change
		2016	2045		
1	Electronics	$475	$1,057	$582	122%
2	Motorized vehicles	$439	$917	$478	109%
3	Machinery	$408	$811	$403	99%
4	Mixed freight	$863	$1,188	$325	38%
5	Agricultural products	$278	$602	$324	117%
6	Other foodstuffs	$383	$668	$285	74%
7	Meat and seafood	$445	$702	$257	58%
8	Transportation equipment	$68	$278	$210	307%
9	Precision instruments	$79	$260	$181	229%
10	Pharmaceuticals	$130	$286	$156	120%

Source: Freight Analysis Framework 4

Roadway Capacity

Roadways that have the highest freight truck traffic in 2018 are shown in *Technical Report #2: Existing Conditions*. These roadways are expected to see an increase in truck traffic between 2018 and 2045. Figure 5.1 illustrates where growth in freight truck traffic is anticipated to be the highest while Figure 5.2 shows the estimated 2045 truck volumes on the MPA's roadway network. The roadways with the highest freight truck traffic growth between 2018 and 2045, as well as roadways with the highest truck traffic volume, are on the MFN. Other roadways that are projected to have the highest truck traffic volumes are on segments of MS 42 (Evelyn Gandy Parkway) and US 11.

The largest increases in freight truck traffic are on:

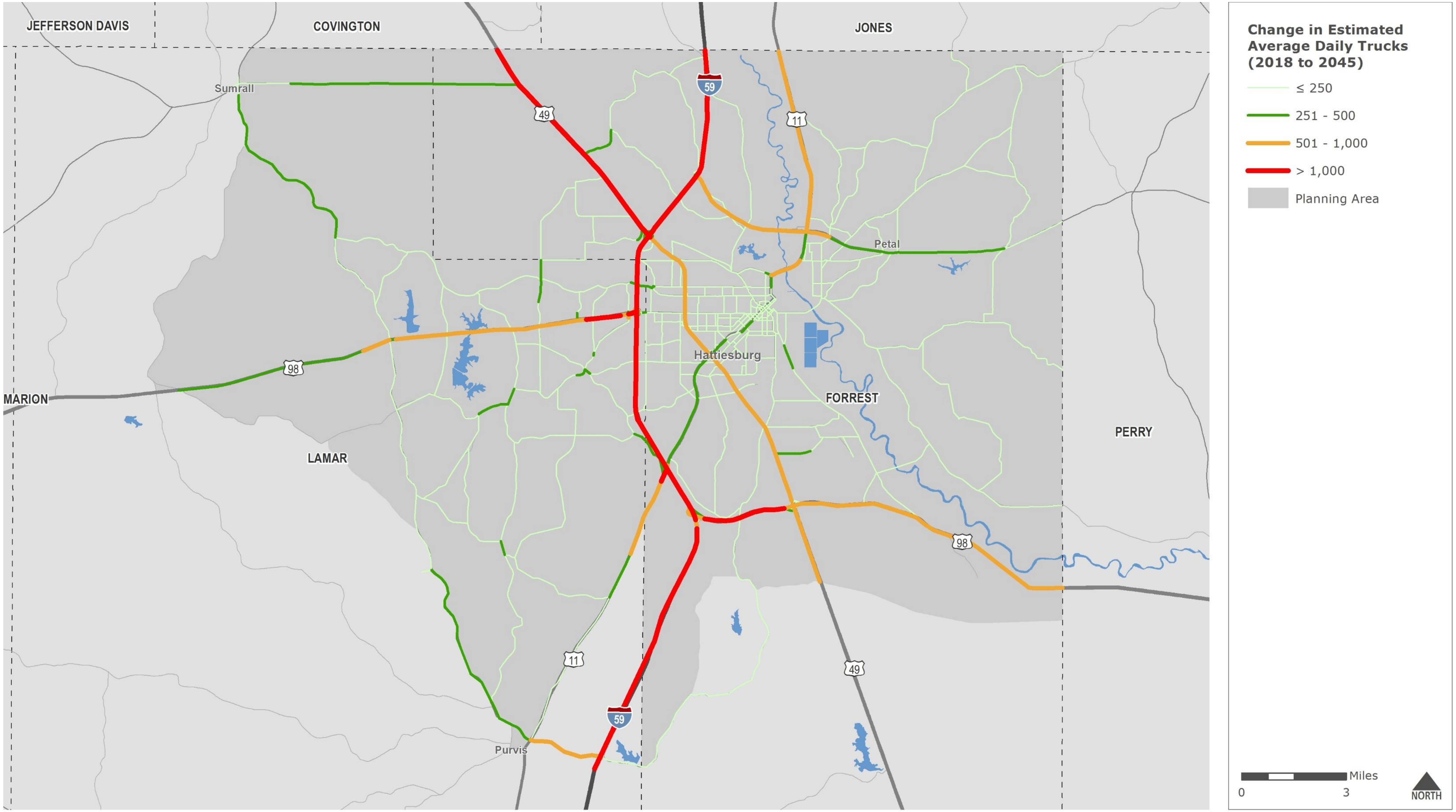
- I-59 through the entire MPA
- US 11 from Sullivan Kilrain Rd to I-59
- US 49 from I-59 to Covington County
- US 98/Hardy St from Lakewood Dr to I-59
- US 98 from I-59 to US 49

Figure 5.3 shows the roadway segments that accommodate a large number of daily truck trips (500 trucks or more) and experience peak period and/or daily congestion in the base year. These segments possess the greatest need for capacity/reliability improvements to improve future freight conditions in the short-term. Figure 5.4 displays the roadway segments that are anticipated to have greater than 500 truck trips per day and experience a volume to capacity ratio of 1.0 or greater.

<u>Reliability</u>

The Truck Travel Time Reliability (TTTR) index for Interstates in the MPA are summarized in *Technical Report #2: Existing Conditions*. Although future TTTR cannot be measured, the Interstates that currently include existing reliability issues are projected to experience more significant reliability issues in the future. Additionally, Interstates that may not currently experience reliability issues may experience future reliability issues as truck traffic volumes and congestion continue to increase.

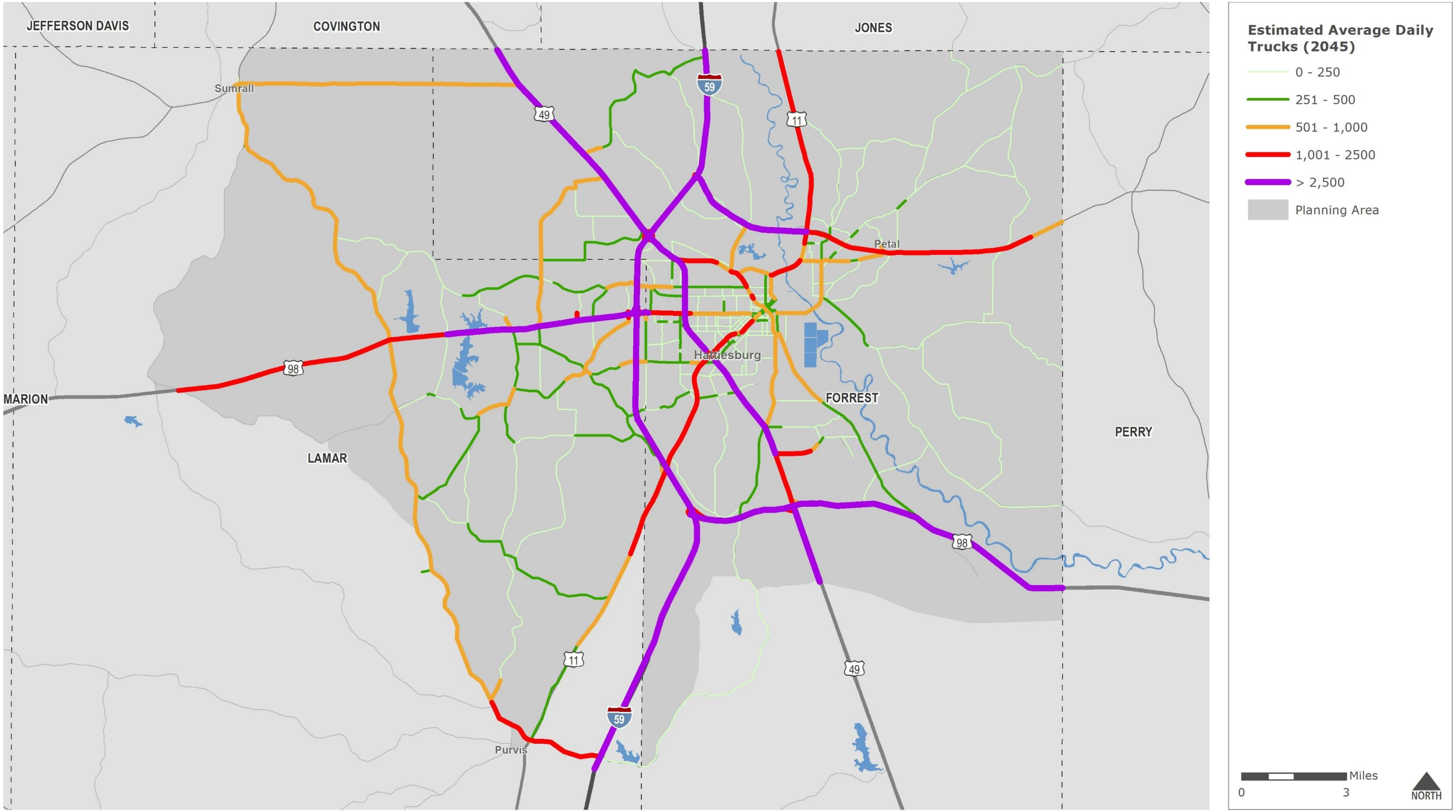
Figure 5.1: Freight Truck Growth, 2018 to 2045



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

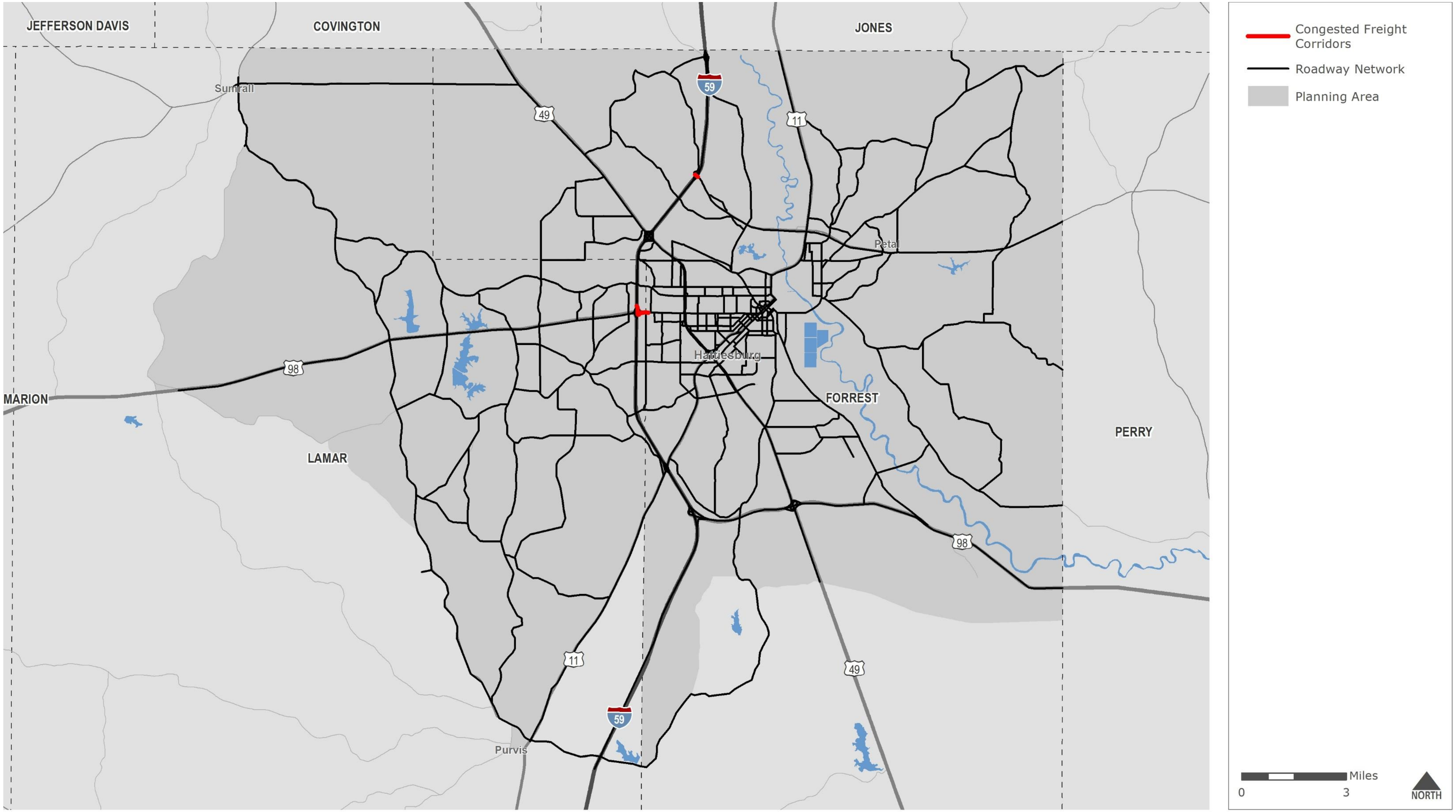
Figure 5.2: Freight Truck Traffic, 2045



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

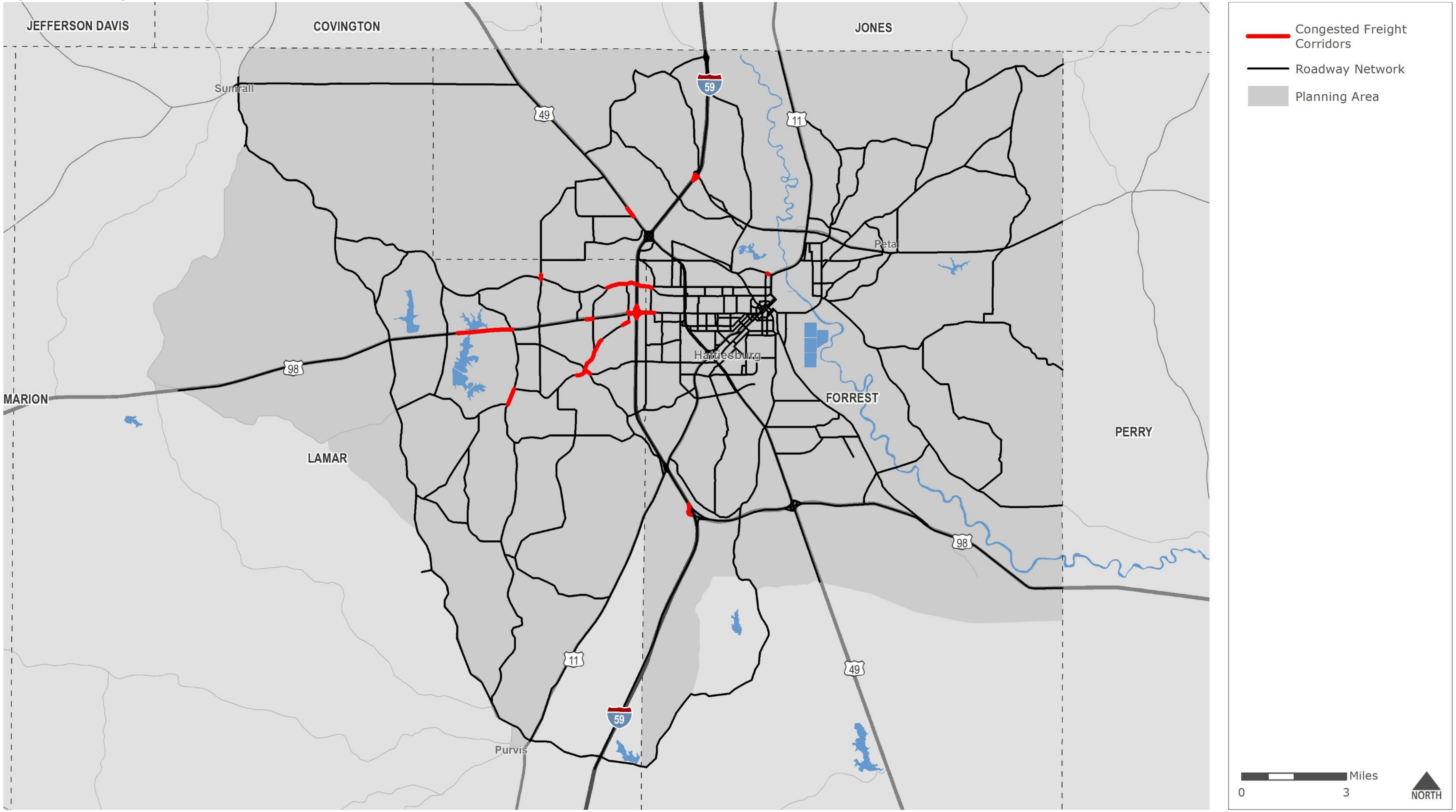
Figure 5.3: Congested Freight Truck Corridors, 2018



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

Figure 5.4: Congested Freight Truck Corridors, 2045



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

Non-Capacity Freight Truck Implications

Increases in freight truck traffic can adversely impact bridges, pavement, and safety. Those impacts can include, but are not limited to, increased vehicle wear and tear, increased operating costs, and an increased chance of heavy vehicle related crashes.

Bridge Condition

The existing bridge conditions are summarized in Section 2.6 of *Technical Report #2: Existing Conditions* and in Section 4.2 of this report. None of these bridges in "Poor" condition are on the MFN. However, the bridge conditions should be monitored to ensure that bridges can handle the increases in freight traffic.

Bridges that have vertical clearances can also have an impact on freight truck conditions since trucks must detour to avoid low vertical clearance bridges. There is also a risk of trucks striking low vertical clearance bridges, which can result in bridge and road closures, leading to an increase in freight operating costs. The *MDOT Bridge Design Manual* specifies that the minimum vertical clearance for bridges to be 16.5 feet.[14] There are currently 14 bridges in the MPA that have a vertical clearance of less than 16.5 feet, most of which are on MFN roadways.

Pavement Condition

Poor pavement conditions can result in increased wear and tear and operating costs for freight truck traffic. The existing pavement conditions are summarized in Section 2.5 of *Technical Report #2: Existing Conditions* and in Section 4.2 of this report. The MFN roadways in the MPA with "Poor" pavement conditions include US 49 between O'Ferral St and 0.21 miles north of Hardy St. Pavement conditions should be monitored to ensure that pavements can handle the increases in freight traffic.

Safety

The increases in truck traffic will potentially increase heavy vehicle crashes. All crashes can result in delays, and thus increased operating costs, for freight truck traffic. However, crashes involving heavy vehicles, especially those that involve hazardous chemicals, can result in extended delays. The heavy vehicle crashes are summarized in *Technical Report #2: Existing Conditions*. Two (2) intersections and three (3) segments experienced at least five (5) heavy vehicle crashes between 2014 and 2018; both intersections and all three (3) segments were on the MFN.

[14] Mississippi Department of Transportation Bridge Design Manual

5.2 Freight Rail Needs

This section summarizes future freight rail movement and needs. Freight projections indicate that the rail mode will have the third largest increase in freight tonnage and fifth largest increase in freight value between 2016 and 2045. This increase in freight rail commodity flows will lead to an increase in rail traffic on railroads. The majority of railroads in the MPA are on the MFN, which include the following Tier I and Tier II railroads:

- the Norfolk Southern Railroad (NS) Railroad paralleling I-59
- the Kansas City Southern (KCS) Railroad paralleling US 49 south of Hattiesburg
- the Canadian National (CN) Railroad paralleling US 49 north of Hattiesburg and US 98 east of Hattiesburg

Mobility

The FAF data can be used to understand the projected growth in freight rail commodity flows between 2016 and 2045. This growth in commodity flows, as well as the existing rail infrastructure, can have an impact on future railroad conditions.

Commodity Flow Growth

As shown in *Technical Report #2: Existing Conditions*, the rail mode accounts for nearly nine (9) percent of freight tonnage and 3.3 percent of freight value in the MPA in 2016. By 2045, the freight truck tonnage share is projected to decrease to approximately seven (7) percent, while the freight truck value share is projected to slightly decrease to 3.2 percent.

The changes in county ranks for freight rail commodity flows between 2016 and 2045 are summarized below:

- Forrest County is projected to remain at 11th in Mississippi by rail freight tonnage and decrease from 11th to 12th by rail freight value.
- Lamar County is projected to decrease from 28th to 47th in Mississippi by rail freight tonnage and remain at 51st by rail freight value.

Table 5.6 shows the growth in freight tonnage and freight value for rail in the MPA between 2016 and 2045, as projected by the Freight Analysis Framework (FAF). The following observations emerge in the MPA:

- The inbound interstate movement is projected to be the largest tonnage increase, increasing by approximately 143,000 tons.
- The outbound interstate movement is projected to be the largest value increase, increasing by $108 million.
- The interstate tonnage and value increases are projected to be greater (258,000 tons and $191 million) than the intrastate tonnage and value increases (15,000 tons and $3 million).
- The inbound tonnage increase is projected to be greater (increase of 152,000 tons) than outbound tonnage (increase of 117,000 tons).
- The outbound value increase is projected to be greater (increase of $108 million) than the inbound value increase (increase of $86 million).
- Between 2016 and 2045, the truck tonnage is projected to increase by 37 percent, and the truck freight value is projected to increase by 74 percent.

Table 5.6: Changes in Commodity Flows by Rail, 2016 to 2045

Direction	Tonnage				Value ($ million)			
	2016	2045	Change	Percent Change	2016	2045	Change	Percent Change
Inbound (Interstate)	510	652	143	28%	$139	$223	$84	61%
Inbound (Intrastate)	23	32	9	38%	$10	$12	$2	23%
Outbound (Interstate)	166	277	111	67%	$102	$209	$107	105%
Outbound (Intrastate)	26	32	6	23%	$12	$13	$1	9%
Within MPA	1	1	0	33%	$0	$0	$0	15%
Total	725	995	269	37%	$263	$458	$195	74%

Source: Freight Analysis Framework 4

Table 5.7 and Table 5.8 show the top ten (10) inbound and outbound domestic trading partners in the MPA by rail tonnage increases between 2016 and 2045, respectively. Most of these partners are located in the Southern or Midwestern United States.

Table 5.7: Top Inbound Rail Trading Partners with Largest Increases in Trading Activity with MPA

Rank	Trading Partner	Tons (Thousand)		Change	Percent Change
		2016	2045		
1	Rest of Illinois	156	217	62	40%
2	Rest of Iowa	26	56	30	114%
3	Rest of Tennessee	16	31	15	97%
4	Rest of Louisiana	22	38	15	69%
5	Rest of Alabama	24	37	13	51%
6	New Orleans, Louisiana	13	22	9	68%
7	Dallas-Fort Worth, Texas	4	10	6	167%
8	Baton Rouge, Louisiana	11	17	6	51%
9	Nashville, Tennessee	2	6	4	152%
10	Rest of Kansas	7	10	4	55%

Source: Freight Analysis Framework 4 (FAF4)

Note: "Rest of Illinois", "Rest of Iowa", "Rest of Tennessee", "Rest of Louisiana", "Rest of Alabama", and "Rest of Kansas" refer to those areas of those states that are outside the FAF 4 designated metropolitan areas.

Table 5.8: Top Outbound Rail Trading Partners with Largest Increases in Trading Activity with MPA

Rank	Trading Partner	Tons (Thousand)		Change	Percent Change
		2016	2045		
1	Detroit, Michigan	7	27	20	264%
2	Rest of Kentucky	11	27	17	159%
3	Rest of Georgia	11	18	6	55%
4	Rest of Arkansas	10	16	6	56%
5	Rest of Illinois	9	13	4	41%
6	Rest of Tennessee	2	5	3	166%
7	Memphis, Tennessee	1	3	2	278%
8	Rest of Missouri	2	3	1	66%
9	Chicago, Illinois	2	3	1	55%
10	Portland, Oregon	1	3	1	70%

Source: Freight Analysis Framework 4 (FAF4)

Note: "Rest of Kentucky", "Rest of Georgia", "Rest of Arkansas", "Rest of Illinois", "Rest of Tennessee", and "Rest of Missouri" refer to those areas of those states that are outside the FAF 4 designated metropolitan areas.

Table 5.9 and Table 5.10 show the top rail freight commodities by tonnage and value increases between 2016 and 2045, respectively. By tonnage, the largest increase is cereal grains. By value, the largest increase is motorized vehicles.

Table 5.9: Top Commodities by Rail Tonnage Increase

Rank	Commodity	Tons (thousand)		Change	Percent Change
		2016	2045		
1	Cereal grains	158	226	68	43%
2	Other foodstuffs	113	164	52	46%
3	Basic Chemicals	92	136	44	48%
4	Waste and scrap	29	66	37	127%
5	Fertilizers	24	46	21	88%
6	Non-metallic minerals	7	27	20	278%
7	Plastics and rubber	19	34	15	78%
8	Pulp, Newspaper, Paper, and Paperboard	75	87	13	17%
9	Transportation equipment	2	12	10	433%
10	Gravel and crushed stone	49	55	6	13%

Source: Freight Analysis Framework 4

Table 5.10: Top Commodities by Rail Value Increase

Rank	Commodity	Value ($ million)		Change	Percent Change
		2016	2045		
1	Motorized vehicles	$15	$54	$38	253%
2	Other foodstuffs	$50	$72	$22	45%
3	Basic Chemicals	$40	$61	$21	52%
4	Plastics and rubber	$23	$42	$19	80%
5	Cereal grains	$36	$51	$15	41%
6	Waste and scrap	$11	$24	$13	115%
7	Pulp, Newspaper, Paper, and Paperboard	$43	$52	$9	22%
8	Agricultural products	$5	$13	$9	182%
9	Meat, Poultry, Fish, and Seafood	$2	$10	$8	361%
10	Transportation equipment	$2	$8	$7	424%

Source: Freight Analysis Framework 4

Rail Capacity and Asset Management

Future rail capacity and needs can be measured in many ways. However, actual volumes and capacities are not known for all rail segments in the Hattiesburg MPA. This makes it difficult to forecast future capacity utilization rates and needs by segment.

The use of rail as a means of freight transportation is becoming a more popular alternative due to increasing roadway congestion. The *Mississippi Statewide Freight Plan* outline the future efforts anticipated by the State of Mississippi.

The elements that are assessed to determine physical rail capacity include the number of tracks (single track, double track, etc.), rail line operating speed, and terminal and yard capacity.

Number of tracks

Within the MPA, forty-eight (48) miles of railroad are single track while the remaining six (6) miles are double track. The primary areas with double track or greater are near railroad yards. Single track railroads limit the number of shipments on railroads since passing or overtaking can only take place in areas where there is a siding or double-track section for one train to pull over. In the MPA, this problem is exacerbated on the NS railroad that carries passenger rail service for Amtrak (*Crescent*) since passenger trains must adhere to a stricter schedule, and the difference between operating speeds for freight and passenger service is larger.

Rail Line Operating Speed

The average speed trains move on a corridor impacts capacity and effects the railroad's ability to move higher value, time-sensitive goods. The Mississippi Statewide Freight Plan (MSFP) recommends that all MFN Tier I main line tracks meet or exceed FRA Class 4 standards for freight (greater than 40 MPH). The MSFP also recommends that all MFN Tier II main line tracks meet or exceed FRA Class 3 standards for freight (greater than 25 MPH).

Table 5.11 displays the total railroad crossings by maximum speed. Figure 5.5 illustrates the operating speeds at each crossing within the MPA.

Table 5.11: Maximum Operating Speed at Railroad Crossings in the MPA, 2018

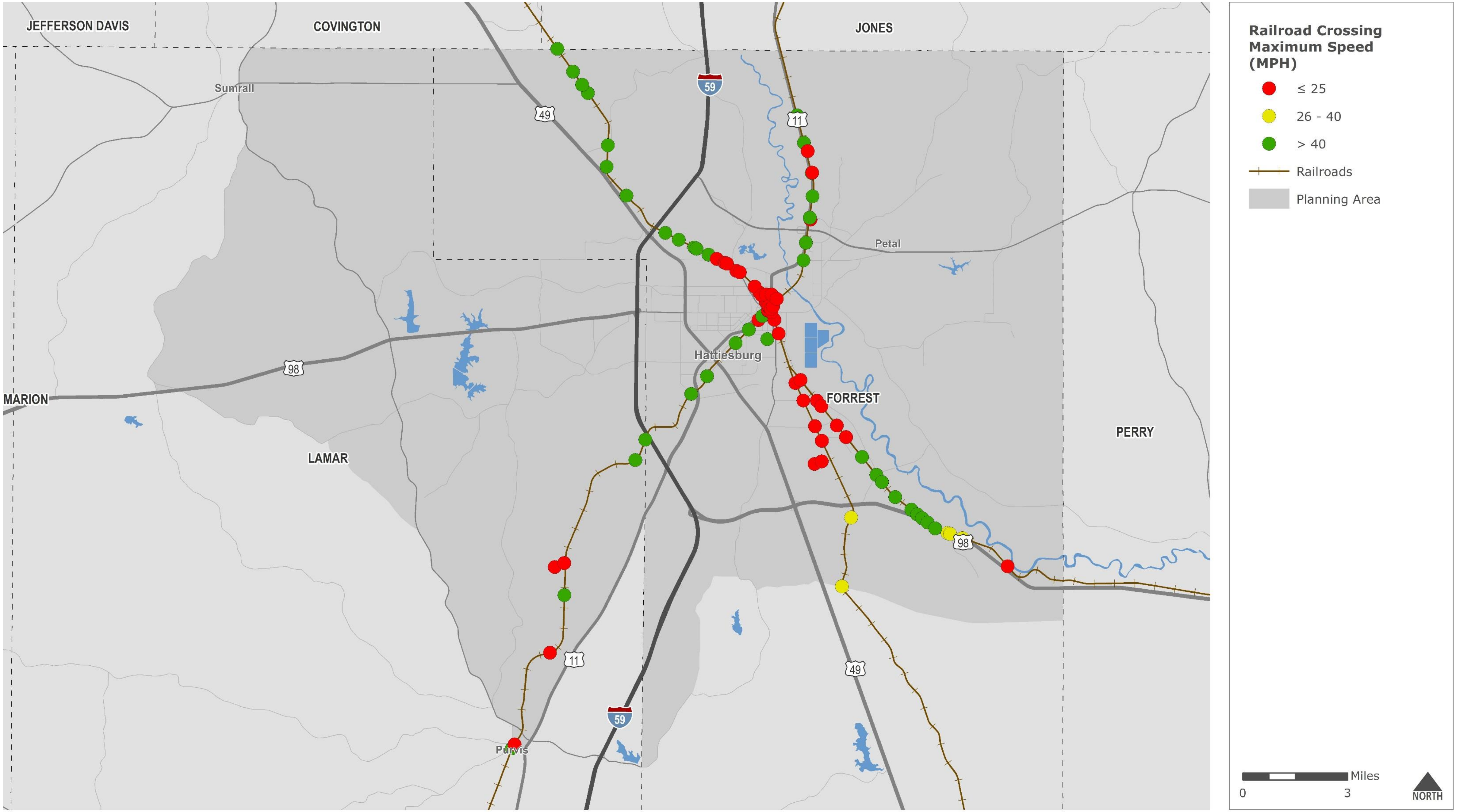
Maximum Operating Speed	Number	Percentage
Less than or equal to 25 MPH	44	50%
26 – 40 MPH	5	6%
Greater than 40 MPH	38	44%
Total	87	100%

Source: Federal Rail Administration

Terminal and yard capacity

Information on terminal and yard capacities were not available for the MPA.

Figure 5.5: Railroad Crossing Speeds



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

Rail assets can also have an impact on rail capacity. Rail assets include vertical clearances of railroad overpasses, railroad weight limits, and railroad traffic control and signaling.

Vertical clearances

With the projected increases in rail commodity flow traffic, removing height restrictions is a critical concern. The *MDOT Bridge Design Manual* has specified that the minimum vertical clearance for bridges crossing over railroads to be 23.5 feet.[14] This clearance allows for unrestricted access for all standard rail car configurations, including double-stacked intermodal cars and trilevel auto carriers. According to data from the NBI, there are three (3) bridges crossing over railroads in the MPA that had a vertical clearance that was less than 23.5 feet. All three (3) bridges are in "fair" condition. As the conditions of these bridges continue to degrade and become more in need of replacement, adequate vertical clearances need to be considered in any future bridge replacements.

Weight limits

Consistent railroad weight capacity is important to maintaining freight rail movement efficiency and cost advantage. Shippers on rail lines that cannot handle standard 286,000-pound gross carloads may either be forced to use trucks or to break loads inefficiently. The mainline railroads in the MPA accommodate the industry standard of 286,000 pounds. No information is available for branch lines off of the main lines.

Traffic control and signaling

A new traffic control system, Positive Train Control (PTC), is designed to automatically stop a train before certain incidents occur. The PTC systems are integrated command, control, communications, and information systems for controlling train movements with safety, security, precision, and efficiency. PTC must be designed to prevent the following:

- Train to train collisions
- Derailments caused by excessive speed
- Unauthorized movements by trains onto sections of track where maintenance activities are taking place
- Movement of a train through a track switch left in the wrong position

According to the *Mississippi State Rail Plan*, PTC will be required on the following MPA railroads:

- Any portions of the Norfolk Southern (NS), Kansas City Southern (KCS), and Canadian National (CN) main lines that carry poisonous inhalation hazard materials

The Rail Safety Improvement Act of 2008 (RSIA) mandated that PTC be implemented across a significant portion of the Nation's rail industry by December 31, 2015.[15] However, this deadline was extended from 2015 to December 31, 2018. As of Q4 2018, NS, KCS, and CN have completed PTC equipment on its locomotives and tracks.[16]

Safety

As shown in *Technical Report #2: Existing Conditions*, there were seven (7) crashes in the MPA that involved an automobile and a train between 2014 and 2018; one (1) crash resulted in a moderate injury. Also, there were no train derailments in the MPA between 2014 and 2018. In addition to injuries that can result from these safety issues, these incidents can result in significant delays for all road and rail users and increased operational costs for freight. The MPO should work with its local rail partners to improve railroad safety in the MPA.

Highway-Railroad Crossings

Technical Report #2: Existing Conditions shows that there are 51 public highway-rail grade crossings within the MPA. Slightly more than a quarter (13) of those crossings possess only passive warning devices. These include cross bucks, warning signs, regulatory signs, and pavement markings. Crossings with passive warning devices do not have active warning devices, which include flashing signals and gates. Among the locations that contain only passive warning devices, two (2) are on the MFN:

- NS Railroad at Main St in Hattiesburg
- NS Railroad at Mobile St in Hattiesburg

The MPA should work with its local rail partners to add active crossing devices to these locations to improve safety. Also, the City of Hattiesburg has been awarded a CRISI grant to build an overpass over one track near Downtown. This overpass will serve to promote an alternate route to the NS Railroad crossings at Main St and Mobile St and improve safety by reducing traffic at these crossings.

Section 202 of the Rail Safety Improvement Act of 2008 (RSIA08), Public Law 110-432 (H.R.2095 / S.1889), that was signed into law on October 16, 2008, required the U.S. Secretary of Transportation to identify the ten (10) States with the most highway-rail grade crossing collisions, on average, over the past three (3) years. Those states are required to develop state highway-rail grade crossing action plans.

Section 202 further states that the plans must identify specific solutions for improving safety at crossings, including highway-rail grade crossing closures or grade separations, and must focus on crossings that have experienced multiple collisions, or are at high risk for such collisions. Although

[15] https://railroads.dot.gov/train-control/ptc/positive-train-control-ptc-information-rd
[16] https://www.fra.dot.gov/app/ptc/Q4%20Oct.%201%E2%80%94Dec.%2031,%202018

Mississippi was not one of the ten states that was required to develop state highway-rail grade action plans. However, Mississippi was one of the states that was targeted in the National Highway Traffic Safety Administration's "Stop, Trains Can't" safety ad since one of the nation's most dangerous crossings during the last decade was in Mississippi.[17, 18]

Derailments

There were no derailments in the MPA between 2014 and 2018. Nonetheless, the rail partners should work to ensure that the rail infrastructure is in good condition.

[17] https://railroads.dot.gov/elibrary/fra-releases-list-railroad-crossings-most-incidents-over-last-decade
[18] https://www.transportation.gov/highlights/stop-trains-can%E2%80%99t-campaign-sends-strong-message-motorists-railroad-crossings

5.3 Air Network Needs

This section summarizes future air freight conditions. Although the amount of freight shipped by air is small, the commodities transported by air tend to be high-value and time-sensitive.

The air freight network is summarized in *Technical Report #2: Existing Conditions*. The only airport in the MPA is the Hattiesburg-Bobby L. Chain Municipal Airport. This Airport had 28 based aircraft and 123 daily aircraft operations. However, cargo data is not readily available at the Airport.

Capacity Needs

The FAF data can be used to understand the projected growth in freight air commodity flows between 2016 and 2045. This growth in commodity flows, as well as the existing air infrastructure, can have an impact on future airport conditions.

<u>Commodity Flow Growth</u>

As shown in *Technical Report #2: Existing Conditions*, the air mode accounts for approximately 0.03 percent of freight tonnage and approximately four (4) percent of freight value in the MPA in 2016. By 2045, the tonnage share of freight shipped by air is projected to increase to 0.1 percent of all freight in the MPA in 2045, and the value share of air freight is projected to increase to approximately 6.7 percent in 2045. The air tonnage is projected to increase by over 250 percent between 2016 and 2045, and the value of freight shipped by air is projected to increase by over 200 percent between 2016 and 2045.

The following trading partners with the largest increases in inbound and outbound air tonnage being traded with the MPA between 2016 and 2045 are:

<u>Inbound</u>

1. Massachusetts
2. California
3. Pennsylvania
4. South Carolina
5. Florida

<u>Outbound</u>

1. Pennsylvania
2. California
3. Florida
4. Texas
5. Kansas

Table 5.12 and Table 5.13 show the top air freight commodities by tonnage and value increases between 2016 and 2045, respectively. By tonnage and by value, the largest increase is electronics.

Table 5.12: Top Commodities by Air Tonnage Increase

Rank	Commodity	Tons (hundred)		Change	Percent Change
		2016	2045		
1	Electronics	6	34	28	264%
2	Precision instruments	9	25	16	182%
3	Machinery	2	5	3	391%
4	Transportation equipment	1	3	2	200%
5	Pharmaceutical products	0	2	2	355%
6	Furniture	0	2	2	507%
7	Base material	1	2	1	183%
8	Misc. manufactured products	0	1	1	72%
9	Plastics and rubber	0	1	1	234%
10	Textiles	0	1	1	288%

Source: Freight Analysis Framework 4

Table 5.13: Top Commodities by Air Value Increase

Rank	Commodity	Value ($ million)		Change	Percent Change
		2016	2045		
1	Electronics	$131	$479	$348	264%
2	Precision instruments	$92	$259	$167	182%
3	Transportation equipment	$38	$113	$75	200%
4	Machinery	$9	$44	$35	391%
5	Pharmaceutical products	$5	$21	$16	355%
6	Furniture	$3	$16	$14	507%
7	Base material	$2	$5	$3	183%
8	Motorized vehicles	$3	$5	$3	99%
9	Misc. manufactured products	$2	$4	$2	72%
10	Non-metallic minerals	$0	$2	$1	411%

Source: Freight Analysis Framework 4

<u>Airport Conditions</u>

Adequate airport runway conditions are important in handling large cargo planes; runway conditions include runway dimensions and pavement condition. The all-cargo carriers use planes such as Airbus (A310 and A320), Boeing (747, 757, and 767), and McDonell Douglas (MD 10 and MD 11) planes. These planes require several thousand feet of runway to land and take off. Additionally, the runway pavement needs to be able to handle the cargo planes' weight. Table 5.14 shows the runway information for the MPA's airports.

Table 5.14: MPA Airport Runway Information

Airport	Runway	Dimensions		Pavement Condition
		Length (feet)	Width (feet)	
Hattiesburg Bobby L Chain Municipal Airport	13/31	6,094	150	Good

Source: AirNav

Airport Projects

There is no information available for any planned updates for Bobby L. Chain Municipal Airport.

5.4 Waterway Network Needs

There are no major port facilities or navigable waterways within the MPA. However, US 49 provides access from the MPA to the Port of Gulfport on the Mississippi Gulf Coast.

5.5 Pipeline Network Needs

This section summarizes future freight pipeline commodity flow movement and needs. Freight projections indicate that the pipeline mode will have the second largest increase in freight tonnage and fourth largest increase in freight value between 2016 and 2045. As shown in *Technical Report #2: Existing Conditions*, the MPA's pipeline network currently consists of approximately 188 miles of pipelines; most of the pipelines by length are natural gas pipelines, and the remainder are hydrocarbon gas liquids, crude oil, and refined petroleum product pipelines.

Capacity

Although information on needs and pipeline conditions are not publicly available, the FAF data can be used to understand the projected growth in pipeline commodity flow between 2016 and 2045.

Commodity Flow Growth

The tonnage shipped by pipelines is projected to grow 61 percent between 2016 and 2045. The value of freight shipped by pipelines is projected to grow 52 percent between 2016 and 2045. The pipeline is projected to rank second in tonnage and fourth in value in 2045.

The area of Arkansas that is outside the FAF designated metropolitan areas ("Rest of Arkansas") is the trading partner with the projected largest inbound tonnage increase, and Corpus Christi, TX is the trading partner with the projected largest outbound tonnage increase. Coal n.e.c. is projected to be the commodity with the largest tonnage and value increase.

Pipeline Conditions and Needs

Pipelines are typically private investments, and pipeline needs and conditions are not publicly available. Nonetheless, pipelines provide additional freight capacity since they handle liquid bulk, such as crude oil and natural gas, that would need to use other surface transportation modes if pipelines did not carry these commodities.

6.0 Bicycle and Pedestrian

6.1 Infrastructure/Facility Needs

In 2015, the MPO adopted a **Pathways Master Plan** that lays out the bicycle and pedestrian infrastructure/facility needs in the region.

Proposed Pedestrian Priority Areas

For pedestrian facilities, the plan identified pedestrian priority areas where investments should be made to improve the pedestrian environment, including sidewalks, ADA ramps, crosswalks, etc.

Pedestrian priority areas are illustrated in Figure 6.2. These areas include the following:

- **Pedestrian Priority Corridors:** The Pedestrian Priority Corridors are the arterials, collectors, and major transit corridors within the MPA. For these corridors, a particular focus should be made on providing frequent and safe crossings, appropriate bus stop space and locations, and access to adjacent neighborhoods and businesses. A focus should also be made to coordinate infrastructure improvements with MDOT, Forrest and Lamar Counties, the Cities of Hattiesburg and Petal, as well as Hub City Transit. These corridors are maintained and served by multiple jurisdictions and agencies.
- **Pedestrian Priority Zones:** These zones are around schools, colleges, universities, and parks. Similar to priority corridors, Priority Pedestrian Zones have unique needs and should be a top priority when considering investments in pedestrian infrastructure. For these areas, a particular focus should be made on providing frequent and safe crossings as well as reducing vehicle speeds.

Proposed Bikeways and Shared Use Paths

For bicycle facilities, the plan recommends specific corridors for on-street bikeways and off-street shared use paths. It also recommends areas for mountain biking. The overall goal with the bikeways and shared-use path recommendations is to create a connected network of bikeways and paths that facilitate bicycling for transportation and recreation.

Recommended bikeways and shared use paths are illustrated in Figure 6.3.

There are several different types of bikeways recommended, based on their degree of separation from motor vehicle traffic, and these are illustrated in Figure 6.1. Mountain bike trail areas are also identified.

The shared-use path network includes a combination of trails, which are completely separate from the roadway, and sidepaths, which are parallel to the roadway.

Figure 6.1: On-Street Bikeway and Shared-Use Path Types

More Separation

Shared-Use Path
A Shared-Use Path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

Bike Lane
A portion of the roadway that has been designated by striping, signing, and marking for the preferential and exclusive use of bicyclists. Variations include buffered bike lanes and protected bike lanes, or “cycle tracks”.

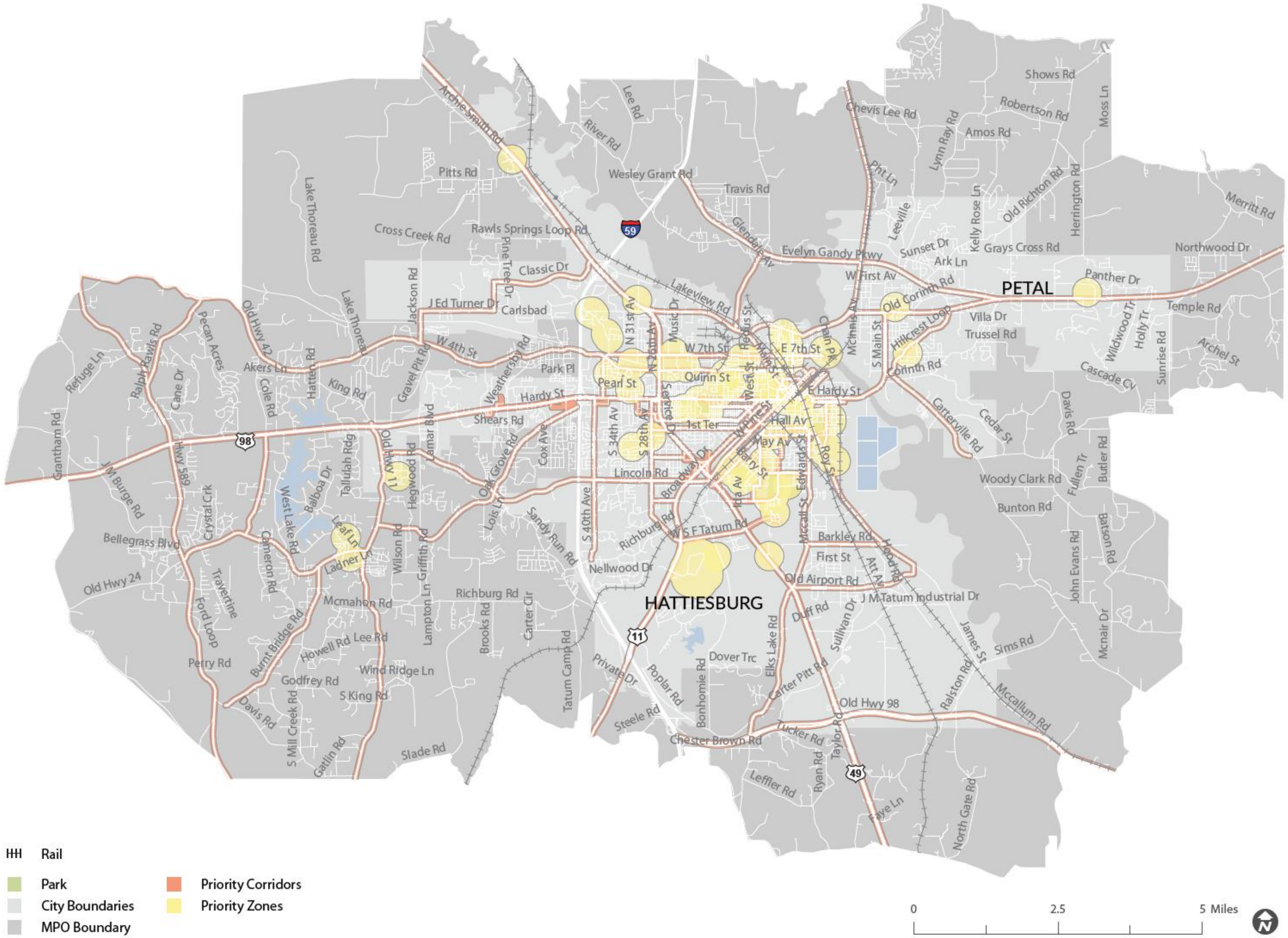
Bike Boulevard
Low-volume and low-speed street that has been optimized for bicycle travel through a combination of speed and volume management strategies, wayfinding signage, shared-lane markings, and major-minor intersection crossing treatments.

Shared Lanes “Sharrows”
A shared lane roadway is a general-purpose travel lane marked with shared lane markings, or “sharrows,” to encourage bicycle travel and proper positioning within the lane.

Bike Route
Bike routes along rural roadways can be signed along major recreational and bike touring routes. For roadways with higher speeds and volumes, wide shoulders can create space for bicyclists to ride outside of a travel lane.

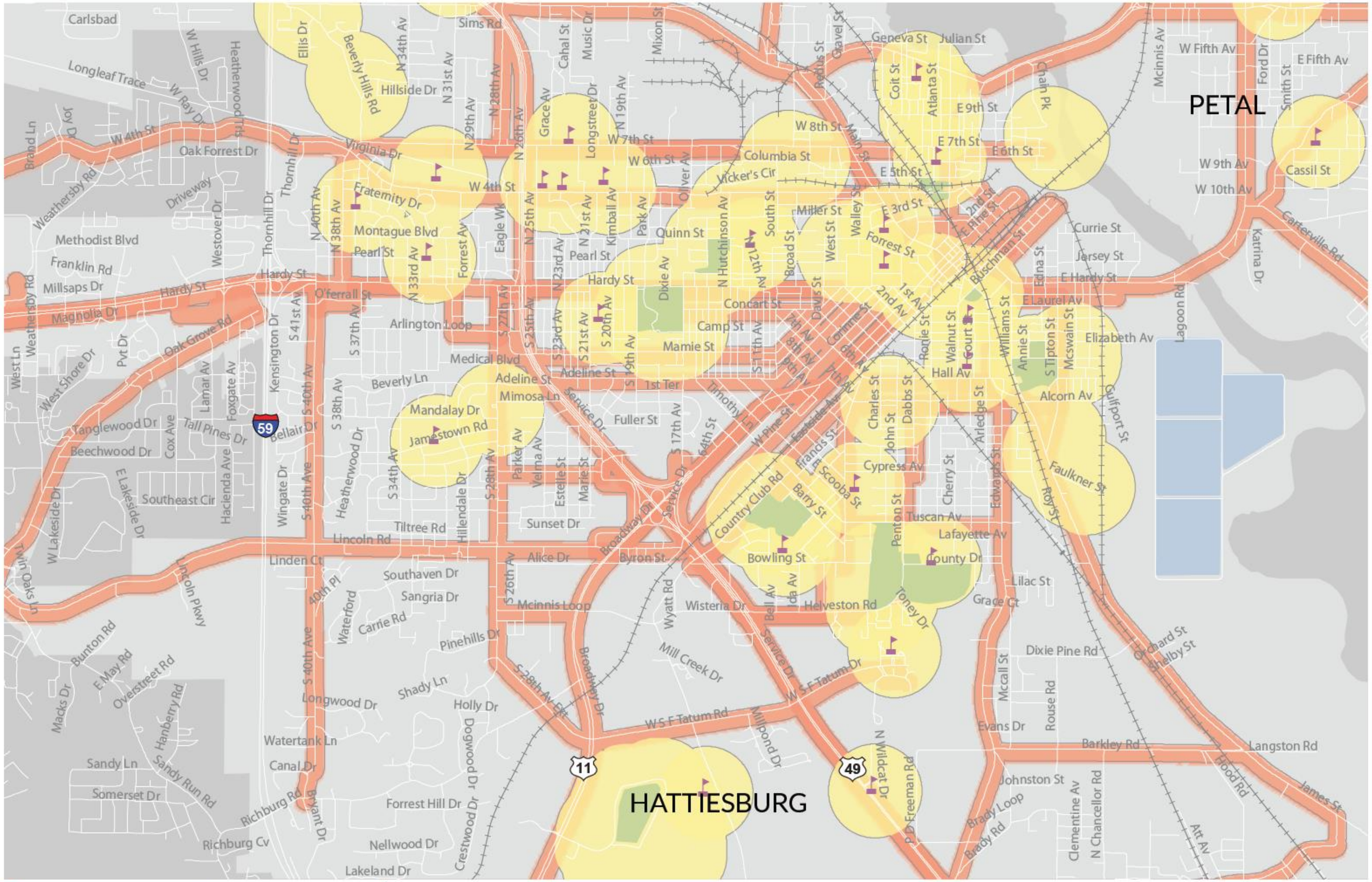
Less Separation

Figure 6.2: Proposed Pedestrian Priority Areas



Source: Hattiesburg-Petal-Forrest-Lamar MPO Pathways Master Plan, 2015

Figure 6.2 (zoom): Proposed Pedestrian Priority Areas

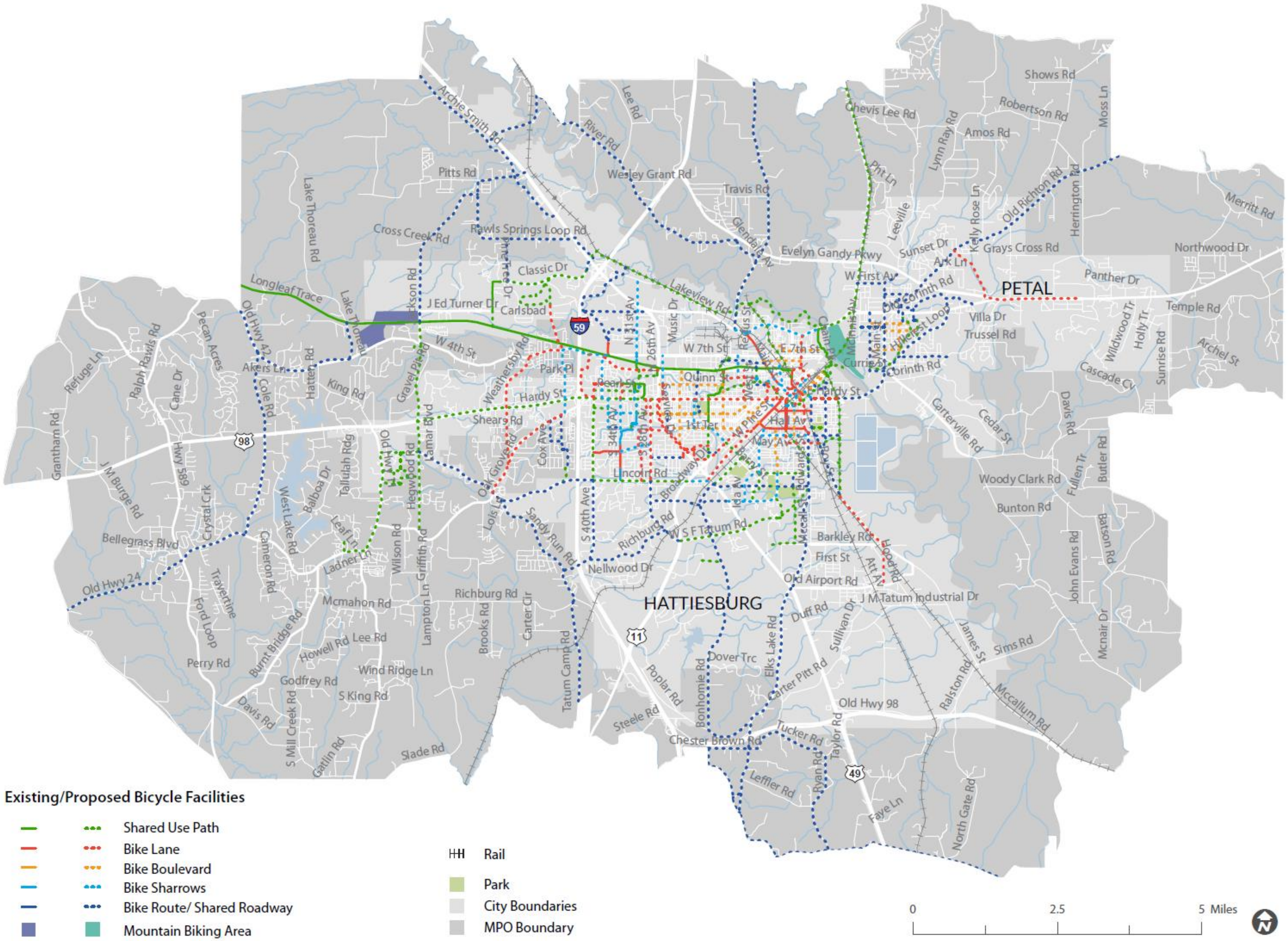


Priority Corridors
Priority Zones
Rail
Park
City Boundaries
MPO Boundary
School

0 — 1.6 Miles

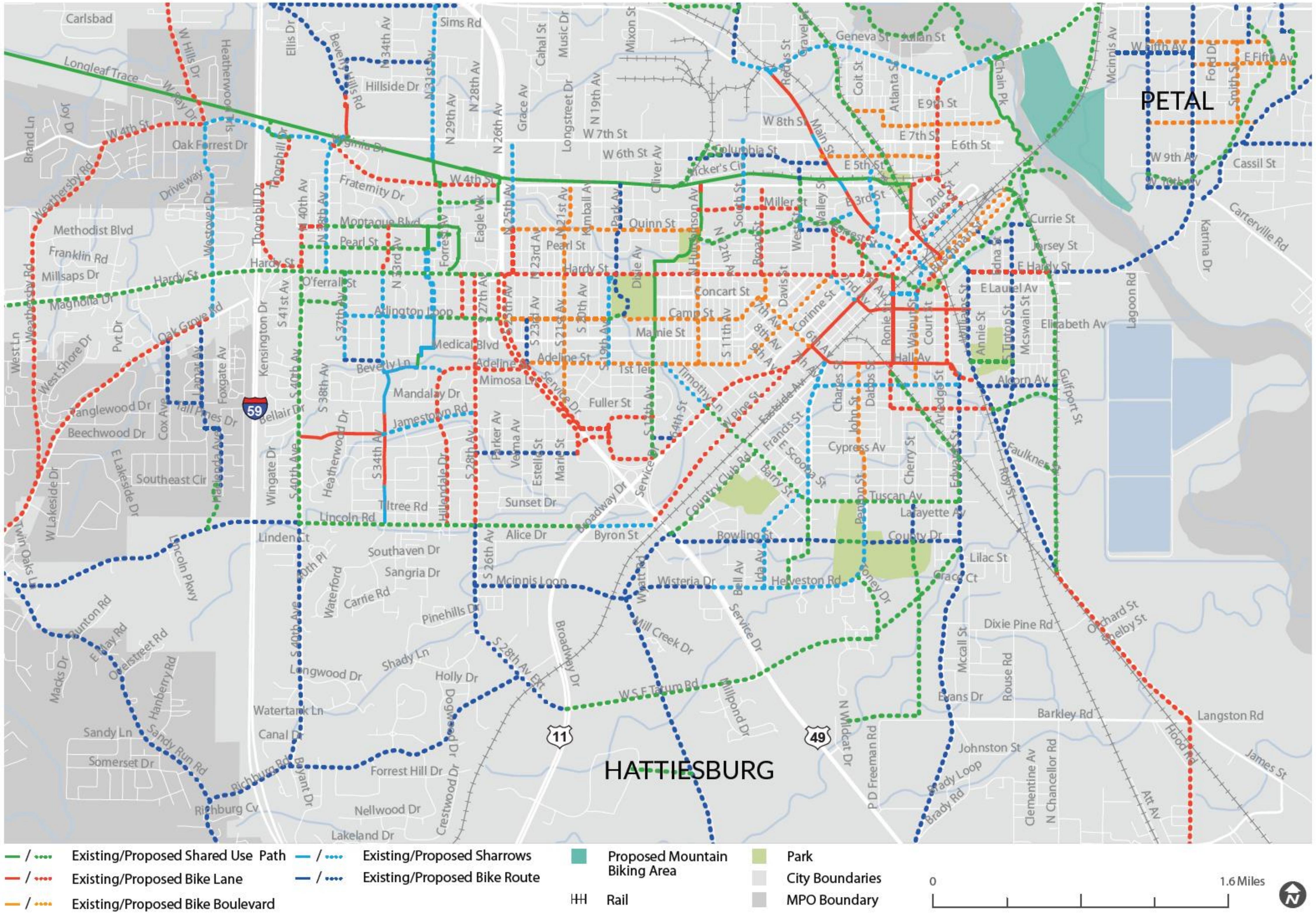
Source: Hattiesburg-Petal-Forrest-Lamar MPO Pathways Master Plan, 2015

Figure 6.3: Proposed Bikeways and Shared Use Paths



Source: Hattiesburg-Petal-Forrest-Lamar MPO Pathways Master Plan, 2015

Figure 6.3 (zoom): Proposed Bikeways and Shared Use Paths



Source: Hattiesburg-Petal-Forrest-Lamar MPO Pathways Master Plan, 2015

6.2 Maintenance Needs

Bicyclists and pedestrians are very sensitive to maintenance issues. Many bicycles lack suspension systems and they travel closer to the edges of roadways where pavement conditions deteriorate more rapidly, and debris may accumulate. Pedestrians are also more sensitive to pavement conditions, either on sidewalks, along crosswalks, or elsewhere. Furthermore, bicyclists and pedestrians are also highly sensitive to well-maintained signage, markings, and lighting due to their existing safety vulnerabilities.

Therefore, maintenance of existing bicycle and pedestrian facilities is necessary to keep facilities safe and attractive for users. This is true not only for maintaining smooth surfaces and ramps but also for signage, facility markings, lighting, and vegetation management.

While public input did not indicate a major need for improved maintenance, the MPO should work with local governments and agencies and MDOT to periodically assess maintenance needs for bicycling and pedestrian facilities in the region.

6.3 Safety and Security Needs

Based on available crash data, there are about ten (10) bicycle crashes per year in the MPO area, though there has only been one (1) bicycle-related fatality in the last five (5) years. There are more pedestrian crashes per year (about 35), which is common since pedestrian activity is typically higher than bicycle activity.

A potential area of concern is that there are approximately two (2) pedestrian-related fatalities each year in the MPO area. In order to better understand safety needs, the MPO should work with MDOT and local police departments to obtain detailed crash records for analysis, where feasible.

Public input and the MPO's Pathways Master Plan indicate a priority for improved bicycle and pedestrian safety. Specific safety issues of concern include the following:

- Make biking and walking safer for people of all ages and abilities;
- Improve safety at crossings;
- Improve safety for on-road cyclists, including markings and signage;
- Improve safety near schools, parks, and trails; and
- Improve training for public safety officials.

7.0 Public Transit

7.1 Service Needs

As documented in *Technical Report #2: Existing Conditions*, transit service in the region generally lags that of peer regions, though recent service improvements in 2018 may have narrowed the gap. This section discusses high-level service needs identified in the planning process.

Existing and Future Regional Transit Demand

Figure 7.1 shows existing demand for public transit in the region based on land use, demographic, and built environment conditions. Methodology details can be found in *Technical Report #2: Existing Conditions*. In addition to existing demand, future demand must also be considered. Figure 7.2 highlights areas forecasted to experience high rates of population and/or employment growth over the next 25 years. In these areas, there will be increased demand for public transit services.

In addition to identifying the concentration of high demand areas, travel flows should also be considered when assessing transit demand. Travel flows, which represent the "route" between trip origins and destinations, can help determine where transit should prioritize direct service or easy connections. Figure 7.3 shows travel flows between Traffic Analysis Districts in the region, for all trip purposes (e.g. work, shopping, school, etc.) and modes of transportation (driving, carpooling, transit, etc.).

Based on existing demand and travel flows, the following needs can be observed:

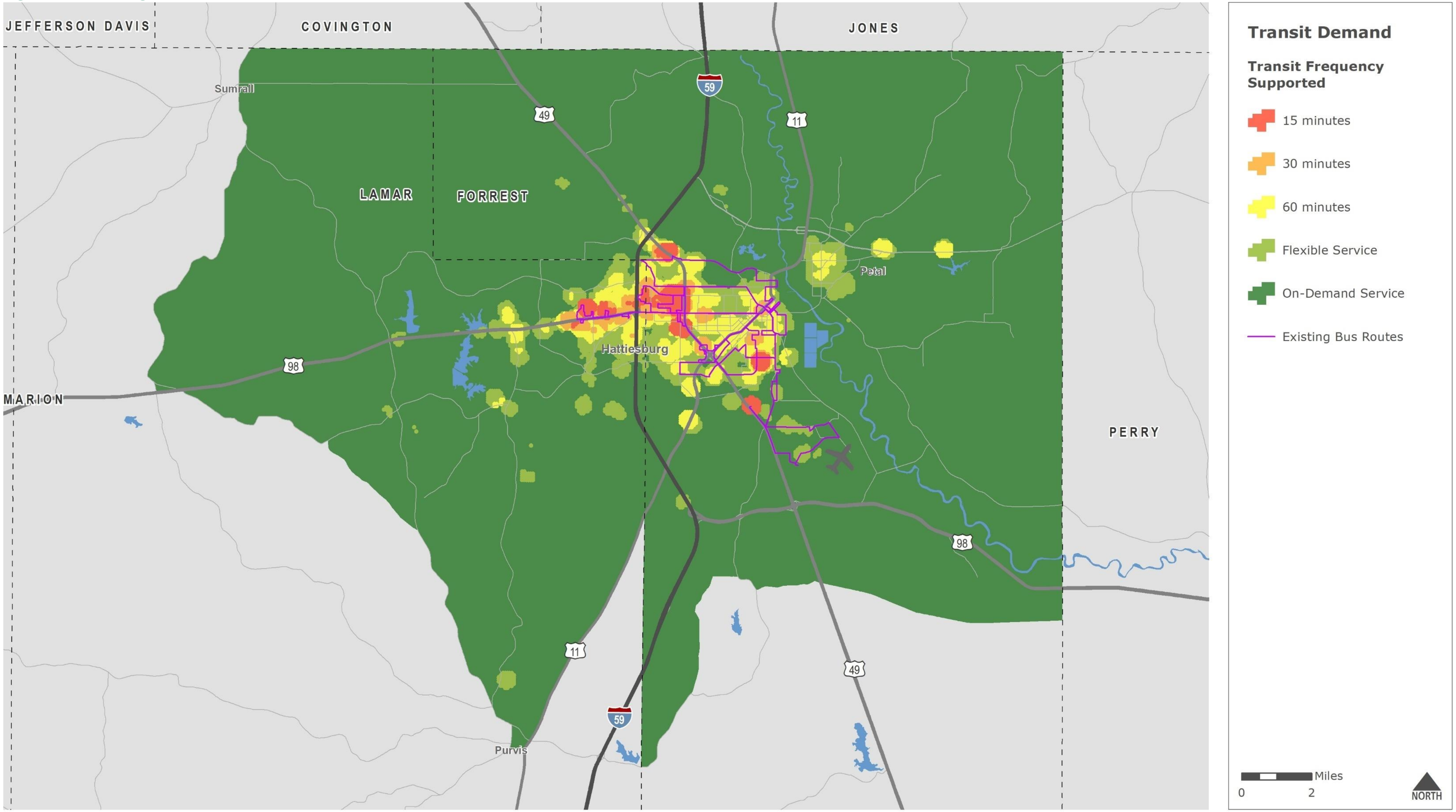
- The highest needs are near major commercial areas and higher education institutions.
- The area along US 98/Hardy Street from the Turtle Creek Mall area to the Hattiesburg Zoo area has the greatest overall demand for transit in the region. There is demand for both locally serving transit service (e.g. frequent service and/or circulator service) and service connecting to other districts/neighborhoods in the region. Demand in this area is anticipated to grow as well, as development continues over the next 25 years.
- Other concentrations of high demand include the intersection of US 49 and N 31st Ave and the area around William Carey University.
- There are also moderately high transit needs in established neighborhoods.
- There is moderate demand for many of the closer-in neighborhoods in Hattiesburg, West Hattiesburg, and Petal. However, given the lower overall demand and predominantly residential nature of these areas, much of the demand in these areas is likely for getting across town, as opposed to shorter, local transit trips. Demand is anticipated to growth in these areas over the next 25 years as they experience new development and redevelopment.

Public and Stakeholder Input

During outreach, the general public and stakeholders mentioned the need for better public transit. The following needs were most commonly mentioned:

- More frequent service;
- Expanding weekend and night service;
- Making the bus system easier to understand and use;
- Expanding and improving marketing for transit; and
- Introducing intercity transit service from the Gulf Coast to Jackson.

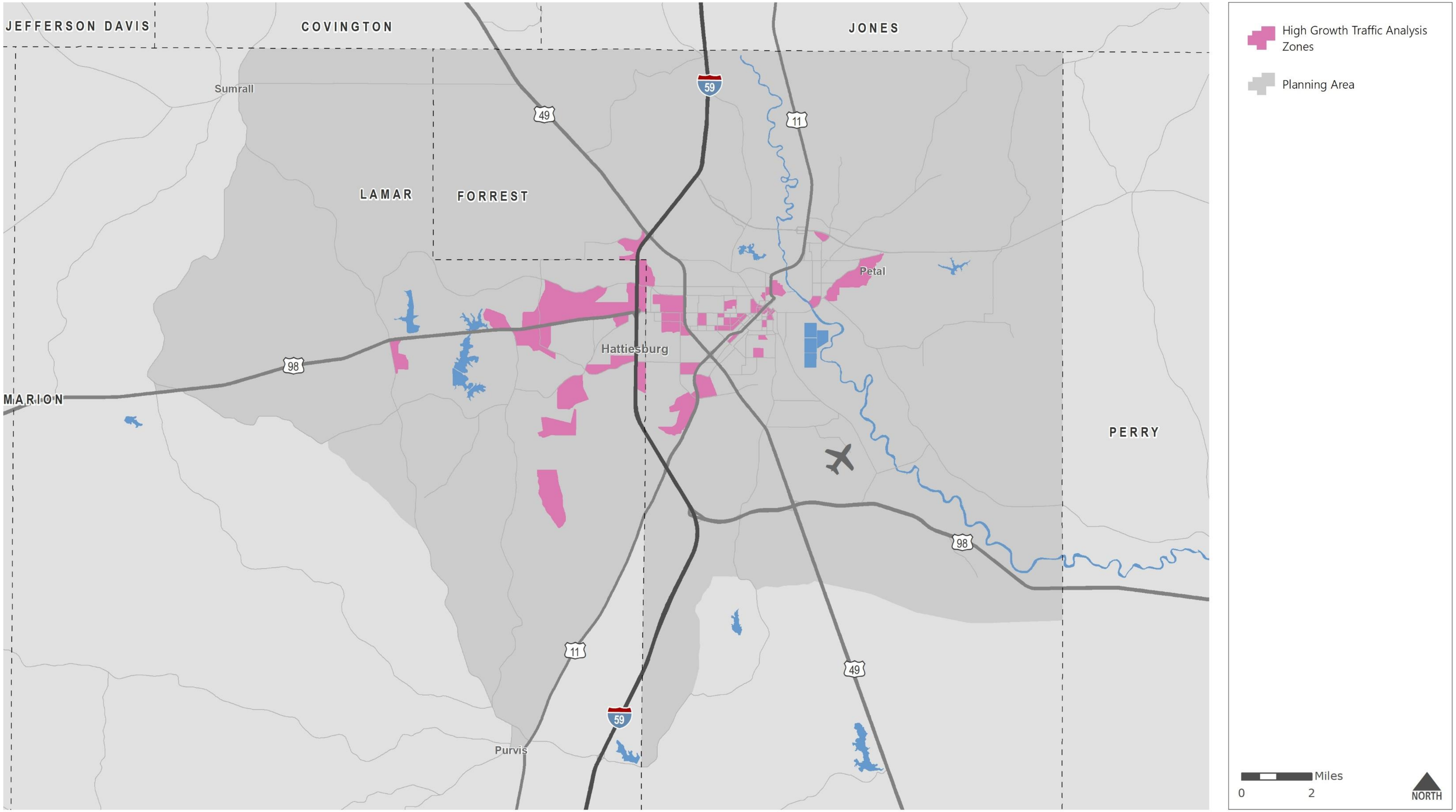
Figure 7.1: Existing Transit Demand



Data Sources: Neel-Schaffer

Disclaimer: This map is for planning purposes only.

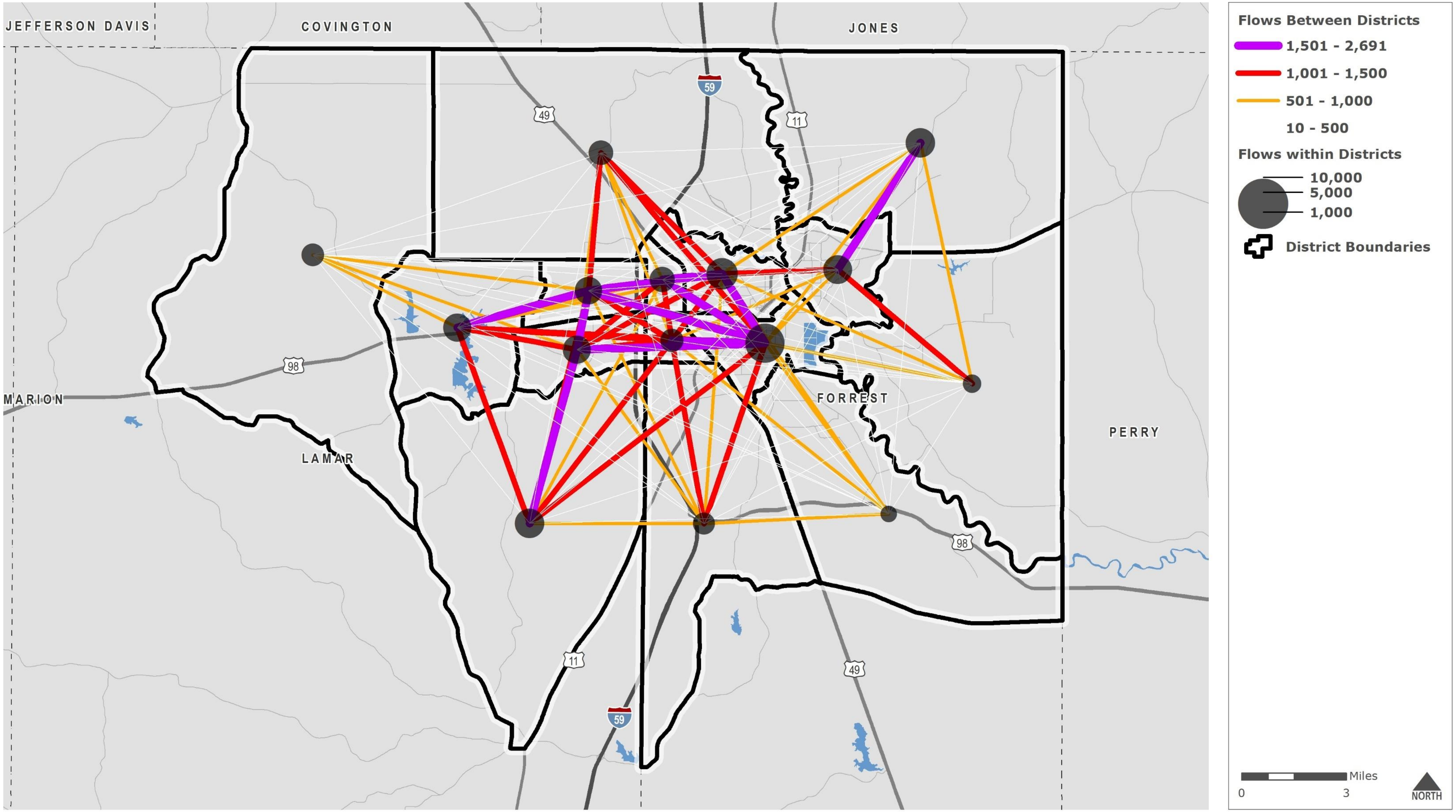
Figure 7.2: Future High Growth Areas



Data Sources: Neel-Schaffer

Disclaimer: This map is for planning purposes only.

Figure 7.3: Regional Travel Flows by District



Data Sources: Census Bureau; InfoUSA; MPO Staff; Neel-Schaffer

Disclaimer: This map is for planning purposes only.

7.2 Maintenance and Capital Needs

Maintaining Existing Assets

The existing fleet for Hub City Transit has many vehicles that are past their Useful Life Benchmark (ULB), as defined by their age and the default ULB established by the Federal Transit Administration. While actual vehicle lifespans may extend beyond the default ULB based on local roadway and environmental conditions, older vehicles will still need to be replaced on a regular basis over the next 25 years. Efforts should also be made to extend vehicle lifespans beyond their ULB through preventative maintenance.

Hub City Transit will need to carefully monitor the frequency of vehicle breakdowns and other road calls. It may become necessary to revisit standard operating procedures and develop a fleet management plan to more efficiently replace, refurbish, and maintain vehicles.

Maintenance of facilities should also be carefully monitored. The train depot facility is currently rated as being in an "adequate" state of repair, meaning that it has moderately deteriorated or defective components but has not exceeded its useful life.

New Assets

As Hub City Transit expands its services and upgrades its stop amenities, new capital assets will be required. Hub City Transit should ensure that the acquisition of these new assets is done in a sustainable manner so that they may be maintained in a state of good repair in the future.

7.3 Safety Needs

While no specific safety needs are identified, Hub City Transit has a lower rate of safety and security events than other urban transit systems in the state or country. In the last five years, it has only reported one (1) safety and security event. Although that event included a fatality, the transit vehicle's involvement in the safety event did not directly contribute to the fatality and was not at fault.

Hub City Transit should continue to measure and monitor its safety performance, per its standard operating procedures for operations and maintenance. This will ensure that any safety needs are identified and that mitigation measures are implemented as needed. It should also continue to develop an Agency Safety Plan in coordination with MDOT and implement recommendations from this plan.