TECHNICAL REPORT 4

Needs Assessment

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South Central Planning & Development Commission

In consultation with

NEEL-SCHAFFER

Solutions you can build upon

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1.0 Introduction

This report discusses transportation needs for the Houma-Thibodaux Metropolitan Planning Area. It is informed by the analysis of existing conditions in Technical Report 2 and an assessment of future needs based on current 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 in the region. When transportation systems become disrupted, so do the day-to-day activities that make the community function. That is why it is important transportation systems can quickly bounce back from natural and man-made events.

Regional Considerations

The Houma-Thibodaux Metropolitan Planning Area should carefully consider transportation resiliency needs related to the following regional issues:

- High wind events: The Houma-Thibodaux MPA spends half of each year under threat of hurricanes and tropical storms that can cause extreme damage to the whole area. Being located near the mouth of the Gulf of Mexico, these tropical systems can bring high wind events that can affect transportation systems, such as debris blocking roadways and bridge/road failure.
- 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. Roadways located in floodways are both more likely to suffer the damaging effects of inundation and more likely to affect the natural flow of water in times of flooding.
- Snow and Ice: The MPA, like most of the Deep South, 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 roads and bridges being closed due to icy conditions.
- Man-made fires: During hunting season, the risk for man-made fires increases. The MPA is located in proximity to several marsh and forests. During various hunting seasons, hunters set fires to the marsh or forest land to drive out animals. This can present a risk for the MPA when conditions are dry and these fires get out of control. The impacts to transportation systems can include road closures close to the wildfires.
- Temperature Extremes: The MPA can experience both extremely high and extremely low temperatures. 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.

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.

Planning for improved access to basic needs and economic opportunity enhances individual community members' ability to minimize risk, and a robust transportation system provides multiple evacuation options when necessary. Physical infrastructure can also be designed to mitigate routine hazards, withstand extreme events, and recover more quickly. Three main ways to evaluate resiliency needs is looking at the roadways accessibility, connectivity, and land suitability.

Flood zones, sea water rise, subsidence, and other similar factors should be addressed for all infrastructure and projects that are funded through DOTD and the MPO. When improving infrastructure, structures should be evaluated to meet the regulations by the local entity and, when necessary, elevated to help reduce road failure in case of a disaster. Resiliency as a requirement in ranking and funding projects is crucial to improving the safety and accessibility for all citizens and business.

Figure 2.1: Green Infrastructure Examples

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

Figure 2.2: Local Examples of Roadway Infrastructure with Resilient Countermeasures

Old LA 1 (foreground) and new, elevated LA 1 during Tropical Storm Ike, 2008. Photo courtesy of LA 1 Coalition.

LA 1 flooding during Tropical Storm Bill, 2003. Photo courtesy of LA 1 Coalition.

Savanne Road flooding during Spring 2019. Levees were installed on the roadway shoulders in an effort to reduce flooding.

2.2 Tourism

Leisure and tourism trips are an important consideration in transportation planning. The MPA, made up of Assumption, Lafourche, and Terrebonne parishes, has been branded as "Cajun Country" by the Louisiana Dept. of Culture, Recreation, and Tourism. The area had 10.4 million domestic visitors in 2018, spending $253.1 million in the area's hotels, restaurants, and retail establishments, generating $32.4 million in state and local taxes. The tourism industry employs approximately 3,600 individuals in the three MPA parishes. [1]

Major Attractions and Tourist Areas

According to area tourist commissions within the MPA, the major tourist attractions are related to Mardi Gras and other fairs and festivals, charter fishing and swamp tours, museums and the arts, golfing, and Nicholls State University. Nicholls State University in particular creates unique tourism opportunities in the region as prospective students, parents, and alumni visit the area for sporting and other special events, such as the Manning Passing Camp.

Table 2.1 lists some of the major attractions and festivals in the region. In addition to those listed, there are numerous unlisted swamp tours, charter fishing, boat launches, fishing camps, and RV parks that are also popular attractions.

Figure 2.2 maps various tourism-related businesses in the region including tour operators, hotel and other accommodations, and various restaurants.

Arriving and Departing the Region

Given the lack of commercial air service at area airports, most visitors to the region arrive by driving or by inter-city transportation.

- The major gateway for driving in the region is US 90.
- Greyhound service is available to Houma, Thibodaux, and Raceland.
- Amtrak's *Sunset Limited* provides service to the Schriever train station.

Traveling Within the Region

Once visitors have arrived to the region, they have several options for traveling around. These options include:

[1] https://www.crt.state.la.us/Assets/Tourism/research/documents/2018-2019/Louisiana Parishes Spending Report 2018 Rev.pdf

- Driving: Visitors can use their personal vehicle or rent a car from any of several car rental companies in the area.
- Transit: Visitors may use the Good Earth Transit service to access many shopping, dining, and cultural locations in the urban area.
- Taxis and Transportation Network Companies: Traditional taxis, Uber, and Lyft are available in the region.
- Tour Bus: Visitors also have the option of traveling via tour buses as a group or as individuals.
- Scenic Byways and Motorcycle Routes: There are several designated scenic byways and a motorcycle loop through the MPA. Figures 2.2 illustrates these facilities.

Tourism Needs

There are many potential strategies to enhance and encourage tourism within the MPA, including the following:

- **Wayfinding:** Even with the prevalence of smartphones and navigation technology, visitors to the region may require wayfinding assistance in some areas. This is especially true near gateways and major points of interests.
- **Special Event Transportation Management:** Major special events in the region require temporary solutions such as road closures and detours. Special wayfinding, supplemental parking, and shuttles would be beneficial during these events.
- **Expanded Sidewalks, Bike Facilities, and Paddle trails:** Many visitors to the region may not have a car at their disposal. Improving and expanding sidewalks, bike lanes, and pathways in major tourist areas will improve visitor mobility and reduce the need for additional car traffic. Expanding bicycle facilities and utilizing the area's natural waterways and canals, such as Bayou Terrebonne and Bayou Lafourche, to develop a paddle trail network would also enhance transportation and become an attraction of its own.
- **Expanded Public Transportation:** Again, many visitors to the region may not have a car at their disposal. Right now, public transportation is primarily focused on residents, students, and workers, with little to no service to areas in the more rural parts of the region where many charter fishing and swamps tours are located. Modernizing the system service with better rider information would be a benefit to visitors and locals as well.

Beyond these strategies, the MPO should continue to coordinate with tourism stakeholders to stay abreast of their needs.

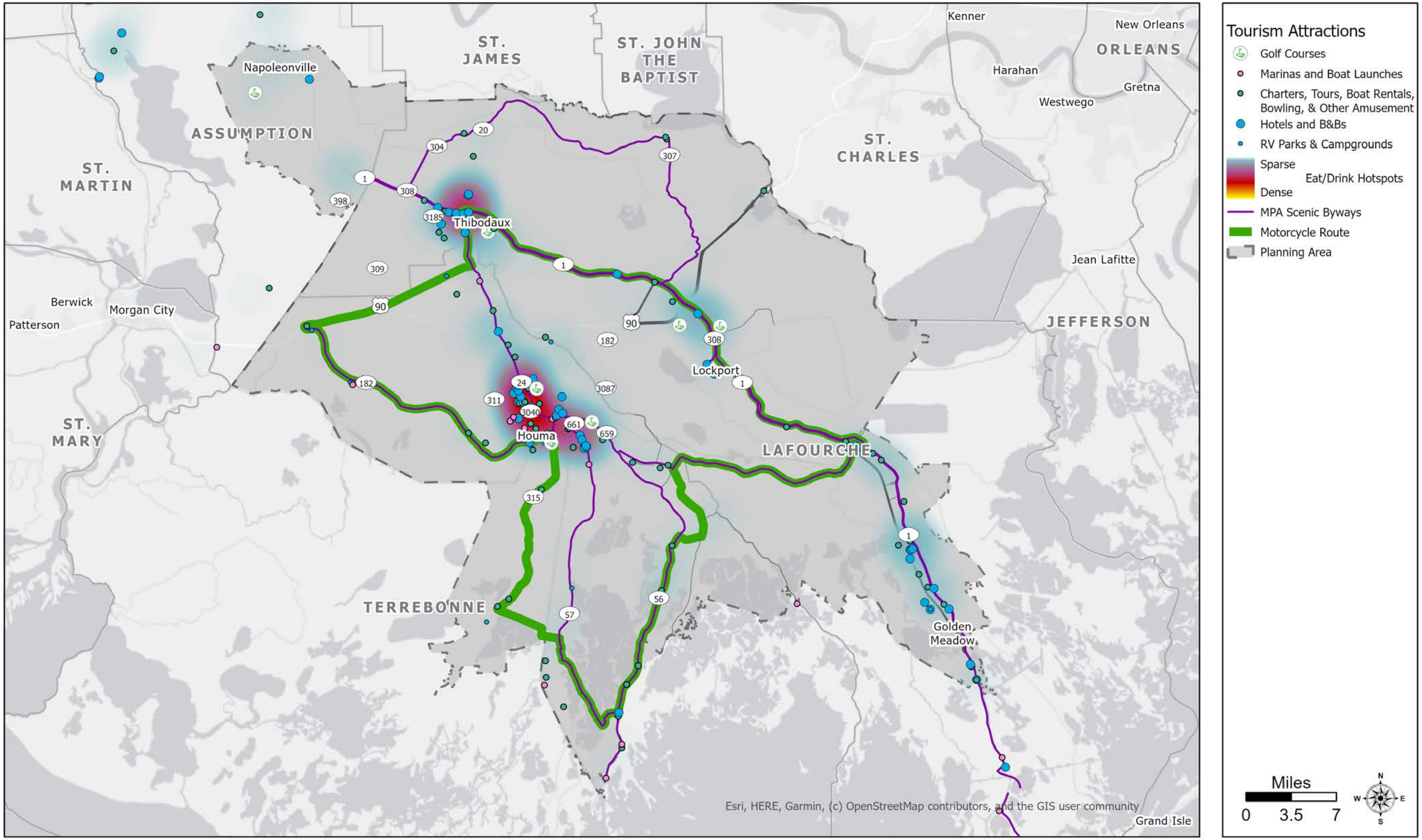
Table 2.1: Major Tourist Destinations and Events

Destination Type	Name
University	Chef John Folse Culinary Institute
	Guidry Stadium
	Chauvin Sculpture Garden & Nicholls State University Art Studio
	Louisiana Universities Marine Consortium
Museums, Arts, & Culture	Ardoyne Plantation
	Bayou Country Children's Museum
	Bayou Lafourche Folk Life & Heritage Museum
	Bayou Playhouse
	Bayou Terrebonne Distillers
	Bayou Terrebonne Water Life Museum
	Center for Traditional Louisiana Boat Building
	Chine's Cajun Net Shop
	Finding Our Roots African American Museum
	First American Casualty of World War II Memorial
	Golden Meadow Library Historical Center
	Historic Downtown Houma
	Holy Mary Shrine
	Jean Lafitte National Historical Park & Preserve Wetlands Acadian
	Lafourche Live Oak Tour
	Laurel Valley Village & Sugar Plantation
	Le Petit Theatre de Terrebonne
	Lockport Elevated Wetlands Boardwalk
	Regional Military Museum
	Residence Plantation
	South Lafourche Veteran's Memorial
	Southdown Plantation & Terrebonne Museum
	St. John's Episcopal Church & Historical Cemetery
	St. Joseph Co-Cathedral Church
	Terrebonne Folk Life Culture Center
	United Houma Nation Settlement School Museum
Outdoors Sports & Recreation	Bayou Country Club Golf Course
	Bayouside Golf Course
	Ellendale Country Club
	LaTour Golf Club
	Leeville Fishing Pier
	Tideland Golf & Country Club
Nature Area	Marguerite Moffett Audubon Sanctuary
	Pointe-Aux-Chenes Wildlife Management Area

Destination Type	Name
	Mandalay National Wildlife Refuge
Mardi Gras	Approximately 30 parades annually in the weeks leading up to Lent
Fairs and Festivals	Ala Bayou Terrebonne Christmas Boat Parade
	Annual Chauvin Folk Art Festival
	Annual Southern Louisiana Boat Show
	Annual Taste of Louisiana
	Bateau De Bois Festival
	Bayou Beer Fest
	Beethoven 250 at Nicholls State University
	Best of the Bayou Festival
	Big Band Bash
	Big Boy's Main Street Cook Off
	Cajun Christmas Parade
	Cajun Heritage Festival
	Choctaw Firemen's Fair
	Cleopatra Fishing Rodeo
	Dularge Fishing Rodeo
	Fall Pops Concert
	French Food Festival
	Gheens Bon Mange' Festival
	Independence Day Parade, Fireworks, Beauty Pageant and Bike Race
	Krewe of Terreanians Fishing Rodeo
	La Fete Des Vieux Temps
	Let Freedom Ring Festival
	Lockport Food Festival
	Louisiana Gumbo Festival
	Mud Bug Boil Off
	Oilman’s Fishing Invitational
	Rougarou Festival
	Southdown Marketplace Arts and Crafts Festival
	St. Patrick's Day on the Bayou
	Stomp'n on da Bayou
	TaWaSi Antiques and Vintage Show
	Terrebonne Sportsman League Fishing Rodeo
	Thibodaux Firemen's Fair
	Thibodeauxville Fall Festival
	Voice of the Wetlands Festival

Source: https://houmatravel.com; https://www.lacajunbayou.com/

Figure 2.2: Major Tourist Destinations and Areas



Data Sources: SCPDC, Infogroup, LADOTD, https://houmatravel.com; https://www.lacajunbayou.com/

Disclaimer: This map is for planning purposes only.

3.0 Emerging Trends

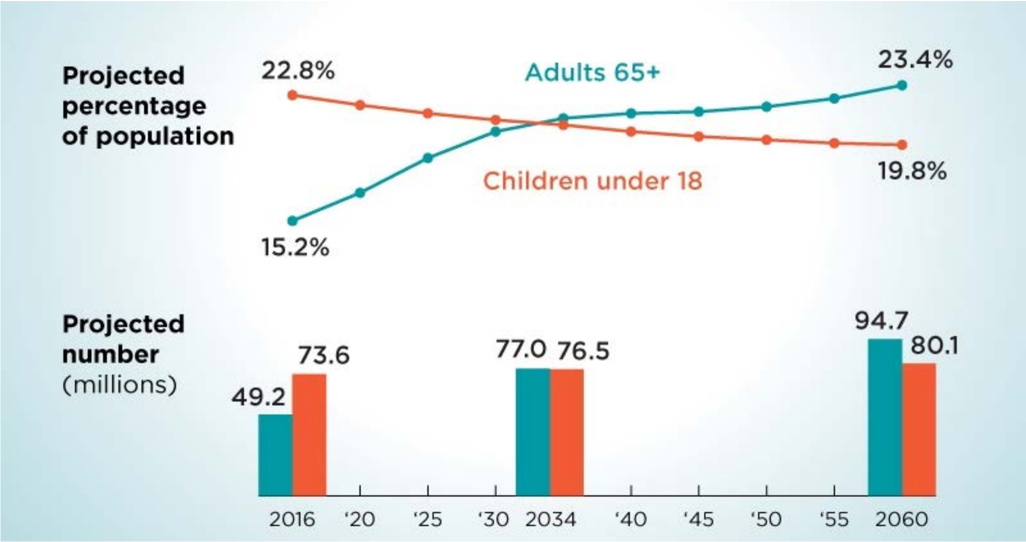
In recent years, travel patterns have changed dramatically due to demographic changes and technological advances. Many of these changes are part of longer-term trends and others are newer, emerging trends.

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.[2] 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

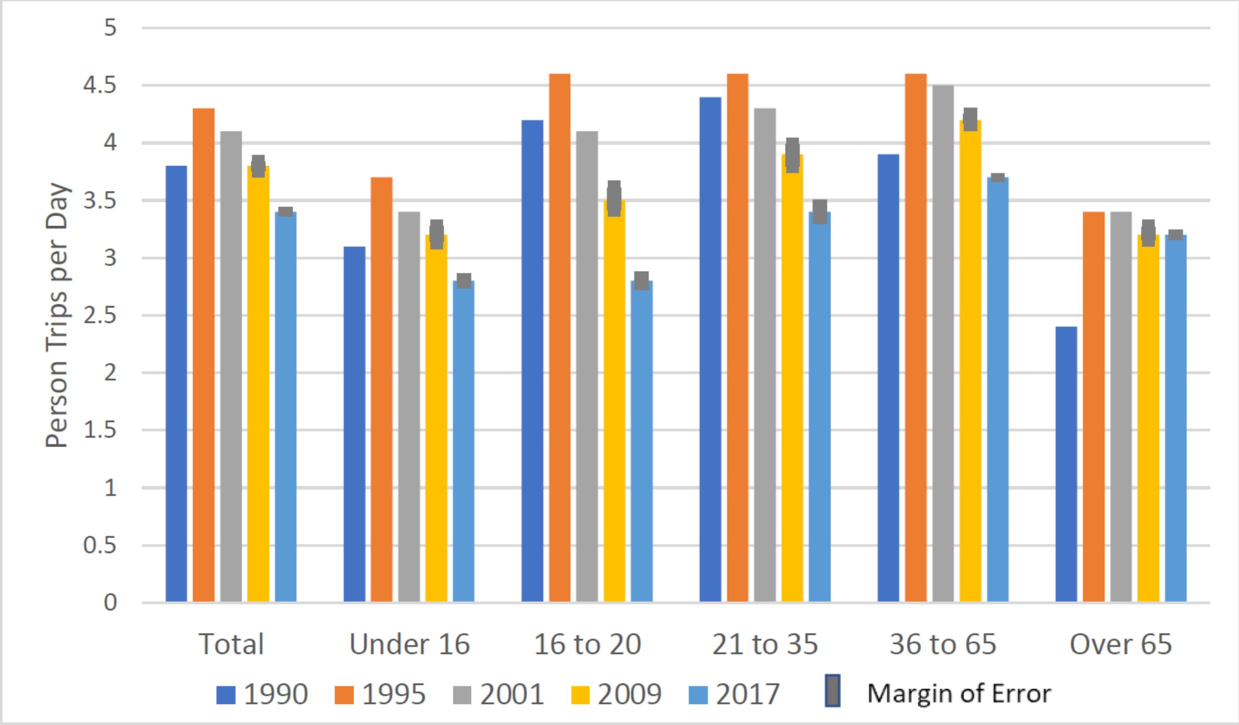
Most People Are Traveling Less

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.

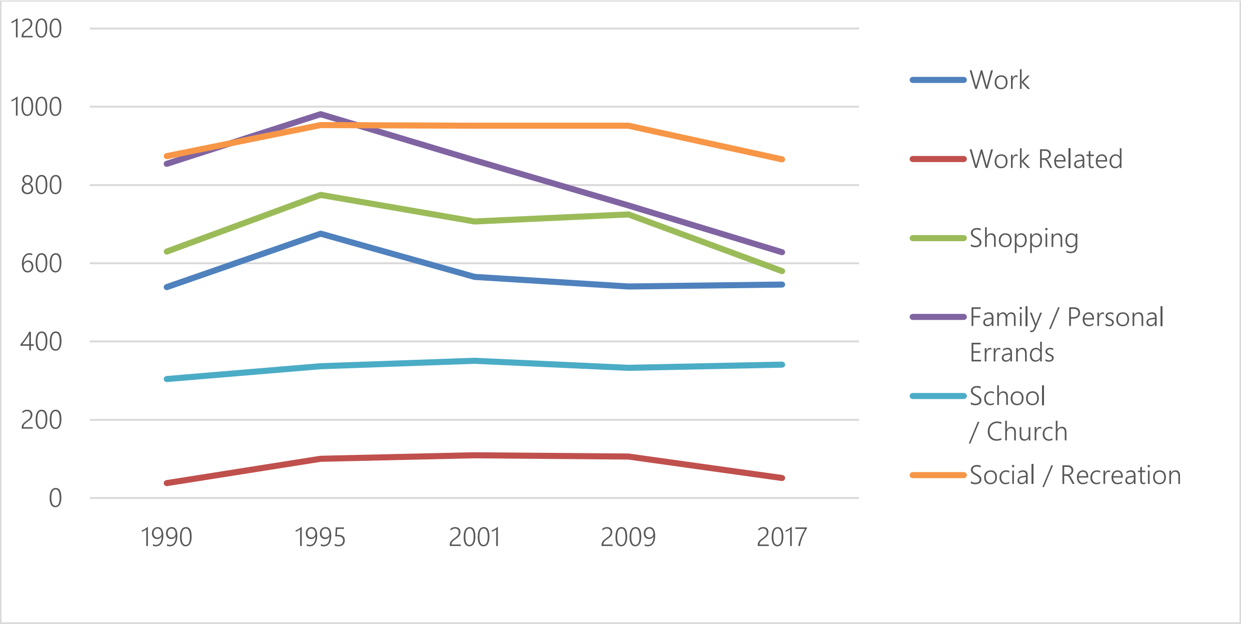
[2] https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html

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 more frequently using ridehailing (Uber/Lyft) and shared mobility (car-sharing/bike-sharing) services. In the long-term, car ownership rates could decrease, 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 the following:

- **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 Bicycle, Social Bicycles, Lime, Bird, and Jump.
- **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.

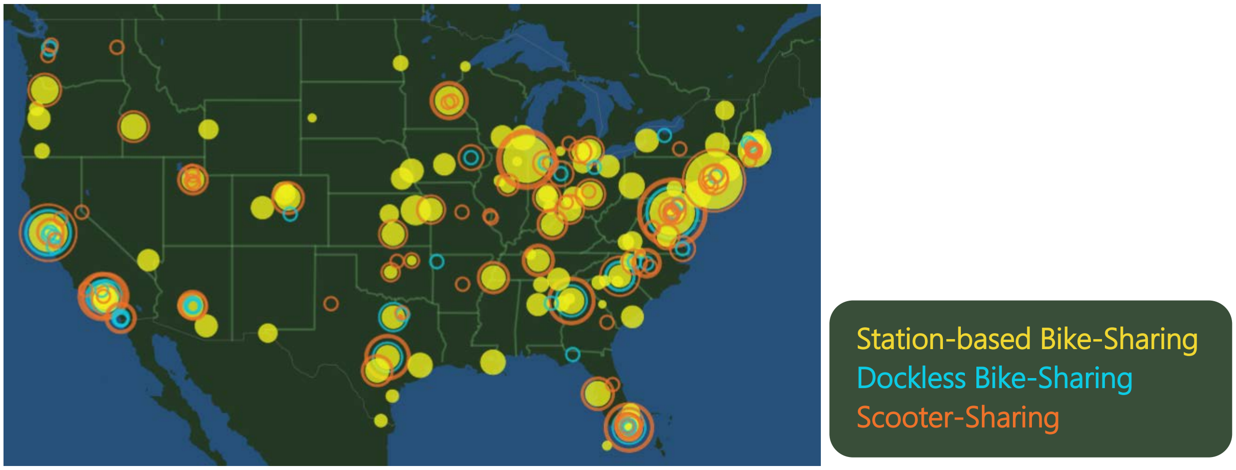
Today, most bike-sharing and scooter-sharing in the United States occurs in the major urban areas. However, these services are becoming more common in smaller urban areas and around major universities throughout the country.

Survey data from major U.S. cities shows the following micromobility trends[3]:

- People use micromobility services for a variety of trip purposes.
- People use micromobility to travel relatively short distances (1-2 miles) for short durations (10-20 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.

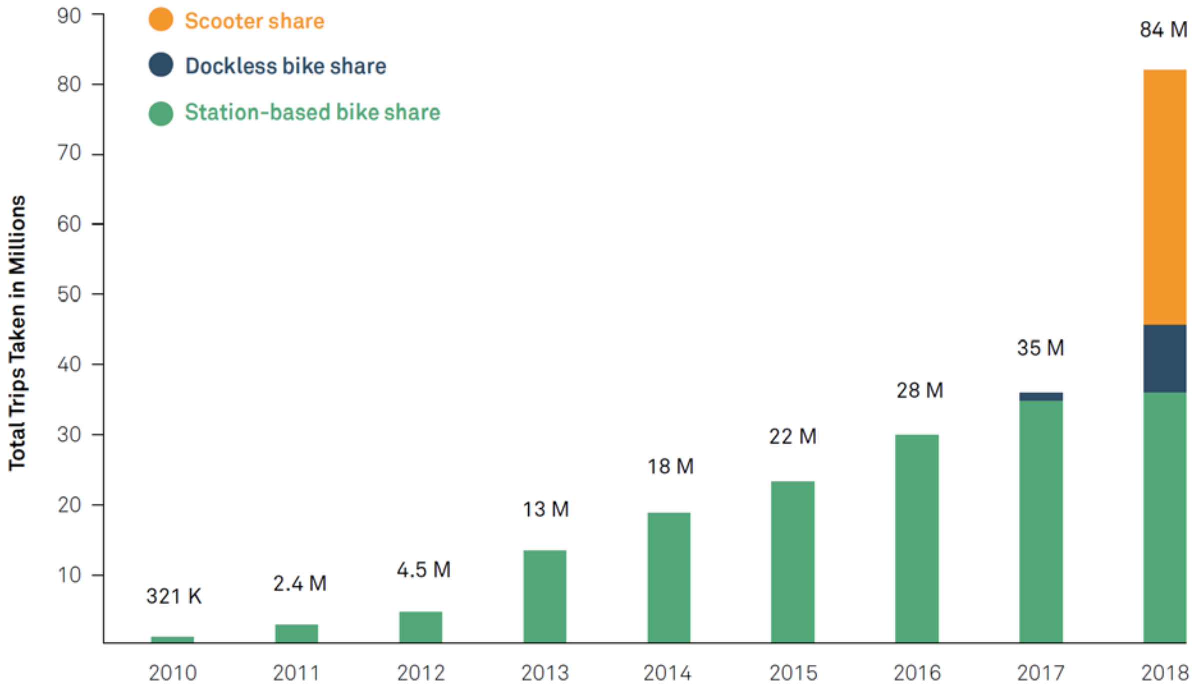
[3] https://nacto.org/wp-content/uploads/2019/04/NACTO_Shared-Micromobility-in-2018_Web.pdf

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



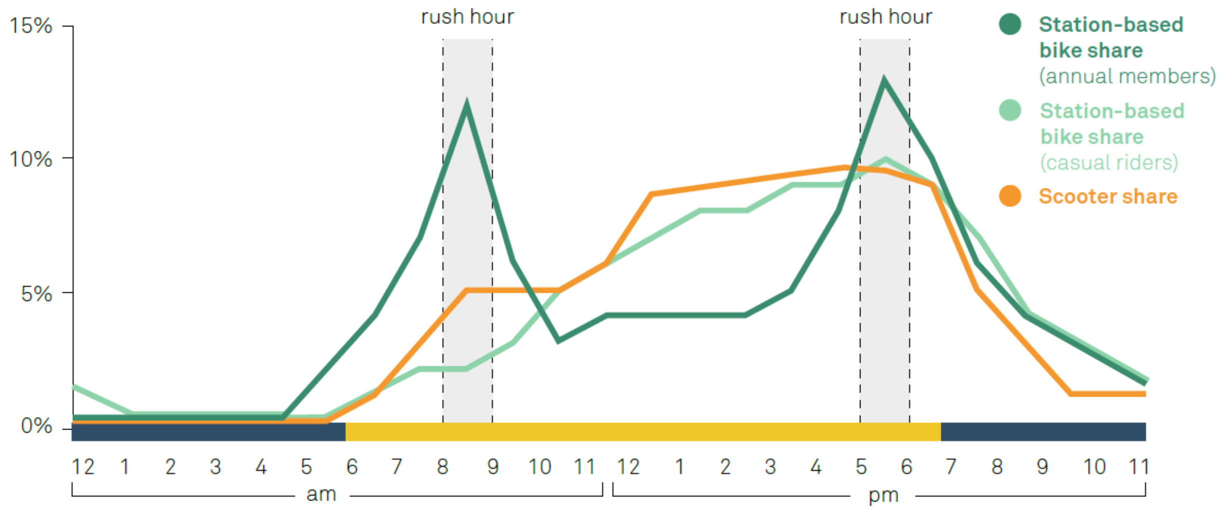
Source: U.S. Department of Transportation, Bureau of Transportation Statistics

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



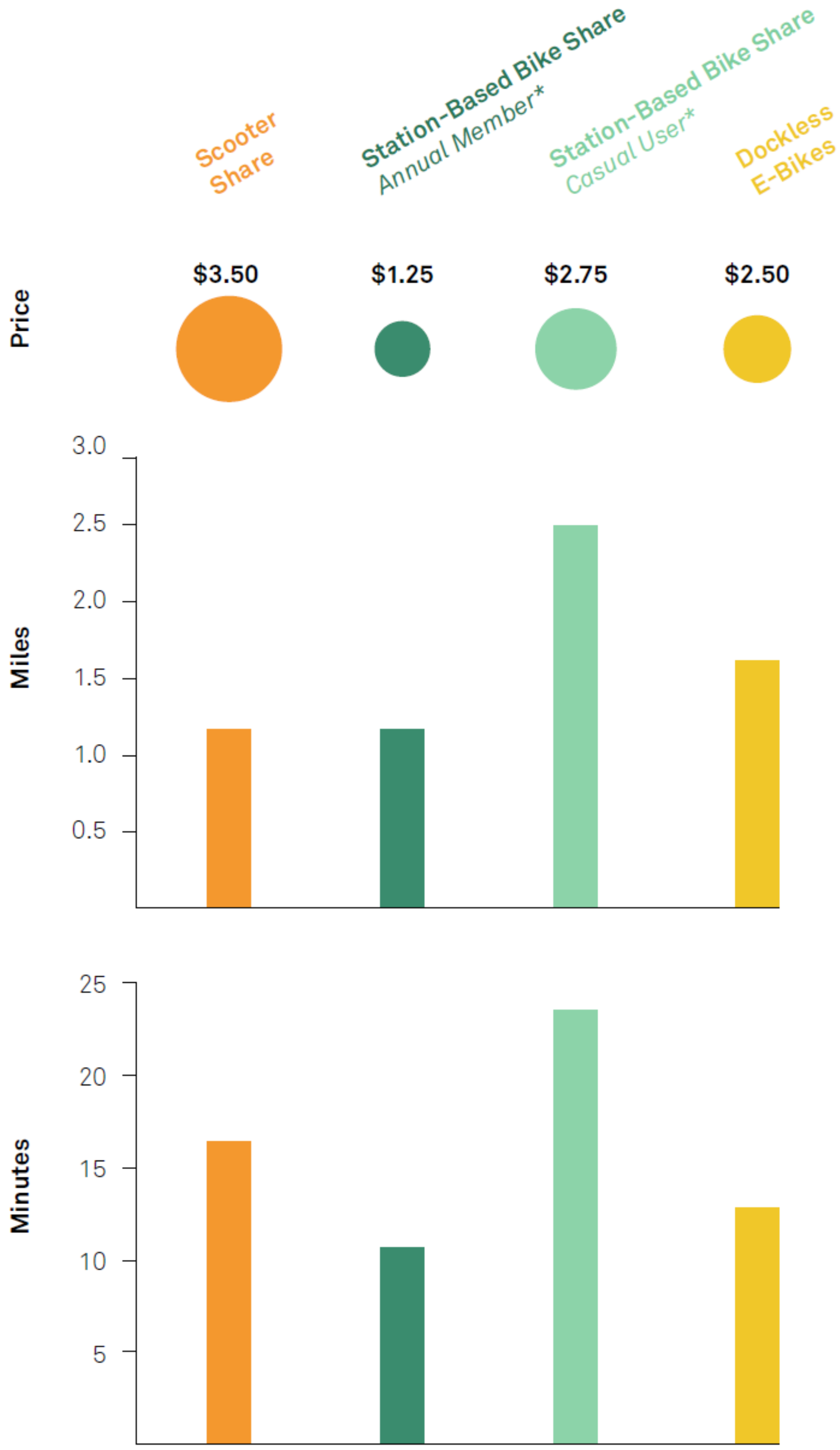
Source: NACTO

Figure 3.6: Average Micromobility Trips by Hour



Source: NACTO

Figure 3.7: Average Micromobility Trip Characteristics



Source: NACTO

Transportation Network Companies

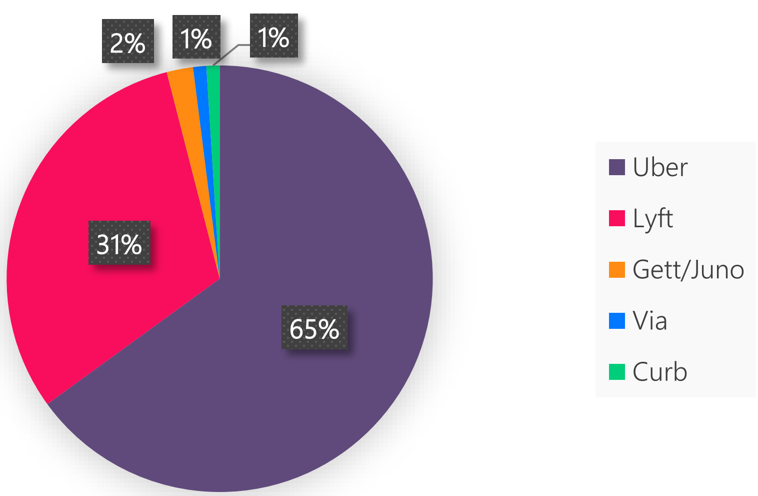
Ridehailing and ridesharing are the terms typically used to describe the services provided by Transportation Network Companies (TNCs) like Uber and Lyft. These TNCs emerged between 2010 and 2012 and have since grown rapidly, surpassing taxis in many metropolitan areas.

Today, TNCs are operating in most urban areas in the United States, including the Houma-Thibodaux 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[4]:

- Trips are disproportionately work-related and social/recreational.
- Customers are predominantly affluent, well-educated and skew 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 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.

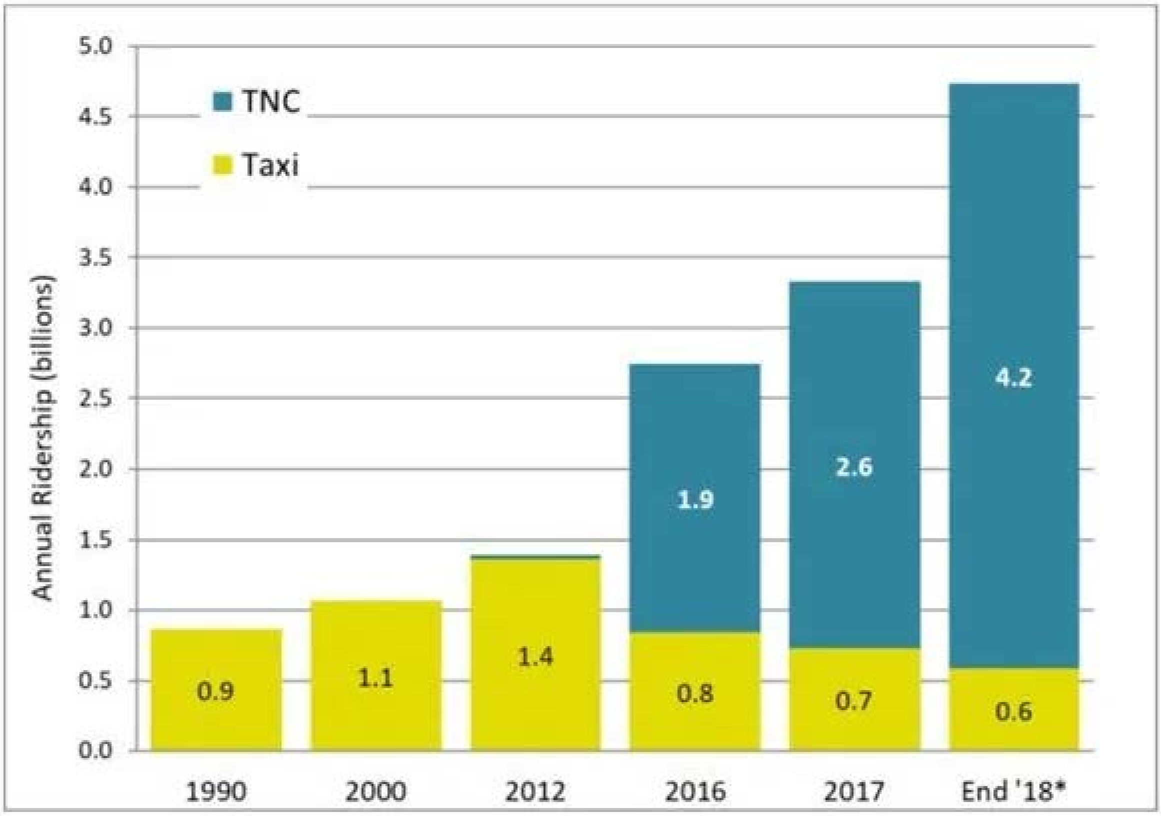
Figure 3.8: U.S. Ridesharing Market Share



Source: Edison Trends

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

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



Source: Schaller Consulting

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.[5]

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.

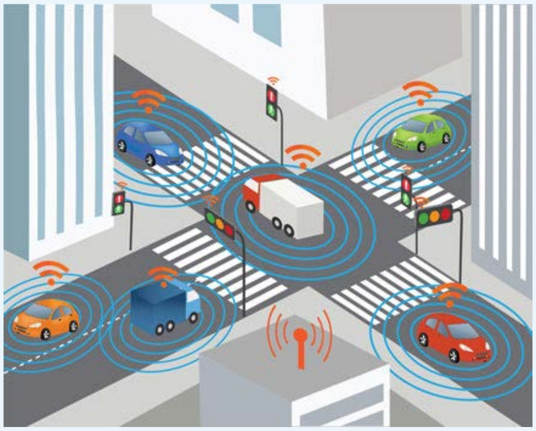
Outside of large urban areas, car-sharing is not that common. However, as connected and autonomous vehicles become more common, it is anticipated that car-sharing will become more widespread.

[5] 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

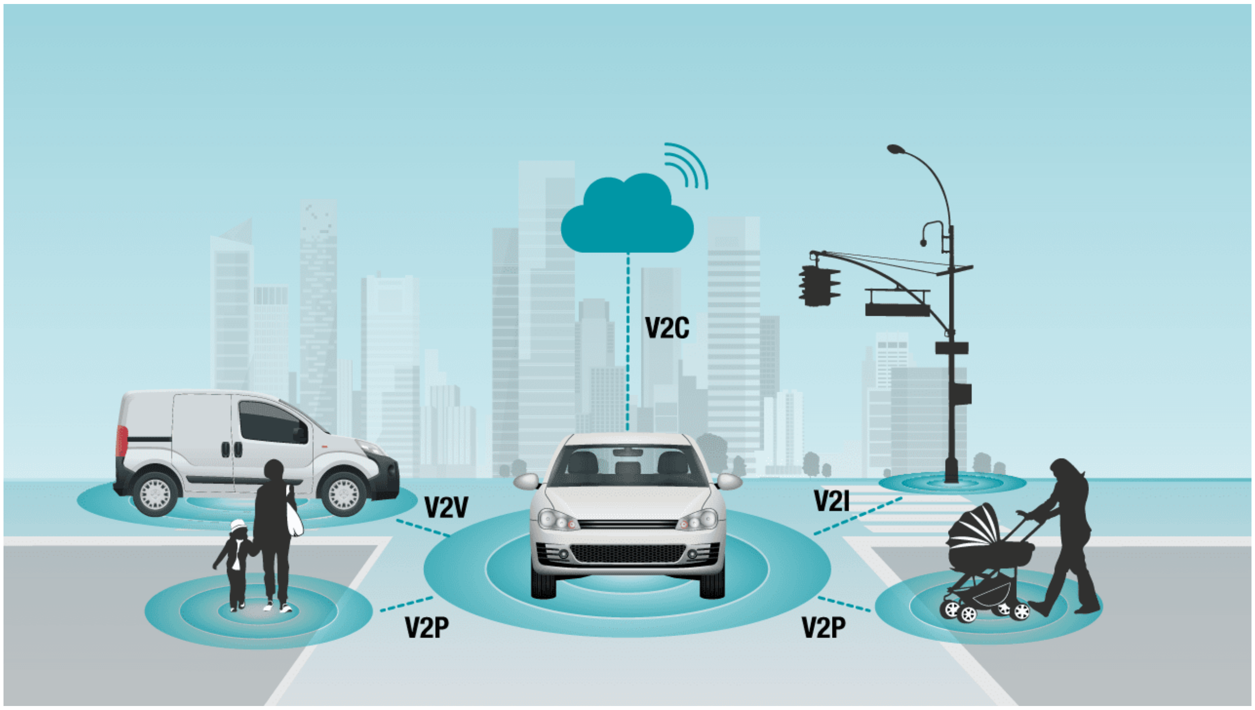
- **1** • Driver Assistance
- **2** • Partial Automation
- **3** • Conditional Automation
- **4** • High Automation
- **5** • Full Automation

Connected Vehicle Communication Types

Connected and autonomous vehicles use multiple communications technologies to share and receive information. These technologies are illustrated in Figure 3.10 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 3.10: Connected Vehicle Communication Types



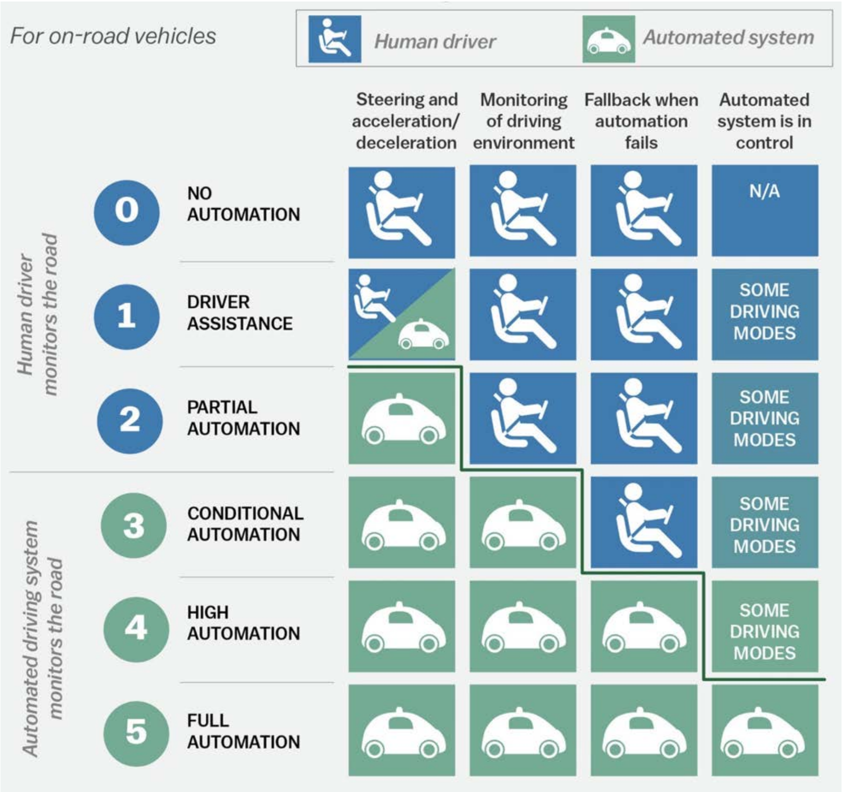
Source: Texas Instruments

Autonomous Vehicle Levels

According to the National Highway Traffic Safety Administration (NHTSA), there are five levels of automation. These levels are illustrated in Figure 3.11 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 3.11: Levels of Automation



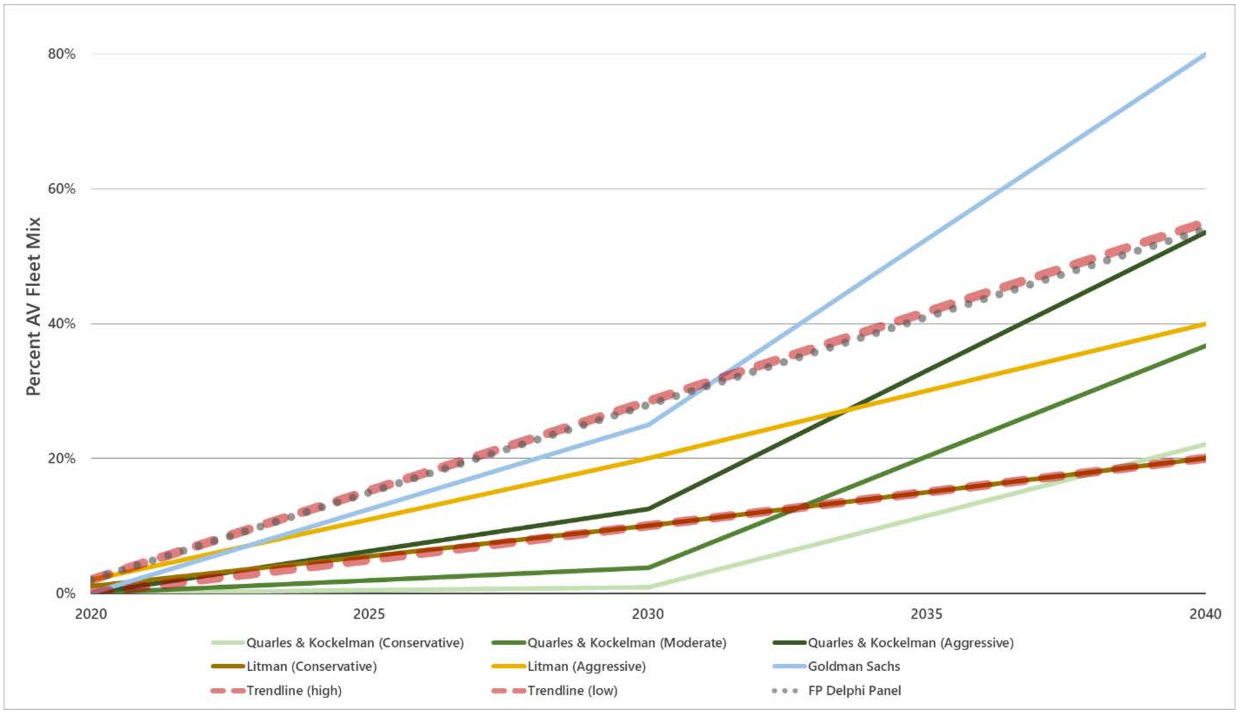
Source: SAE J3016 Levels of Automation (Photo from Vox)

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. [6,7,8]

- 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.
- Through 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 3.12: Potential Autonomous Vehicle Market Share, 2020 to 2040



Source: Fehr and Peers

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

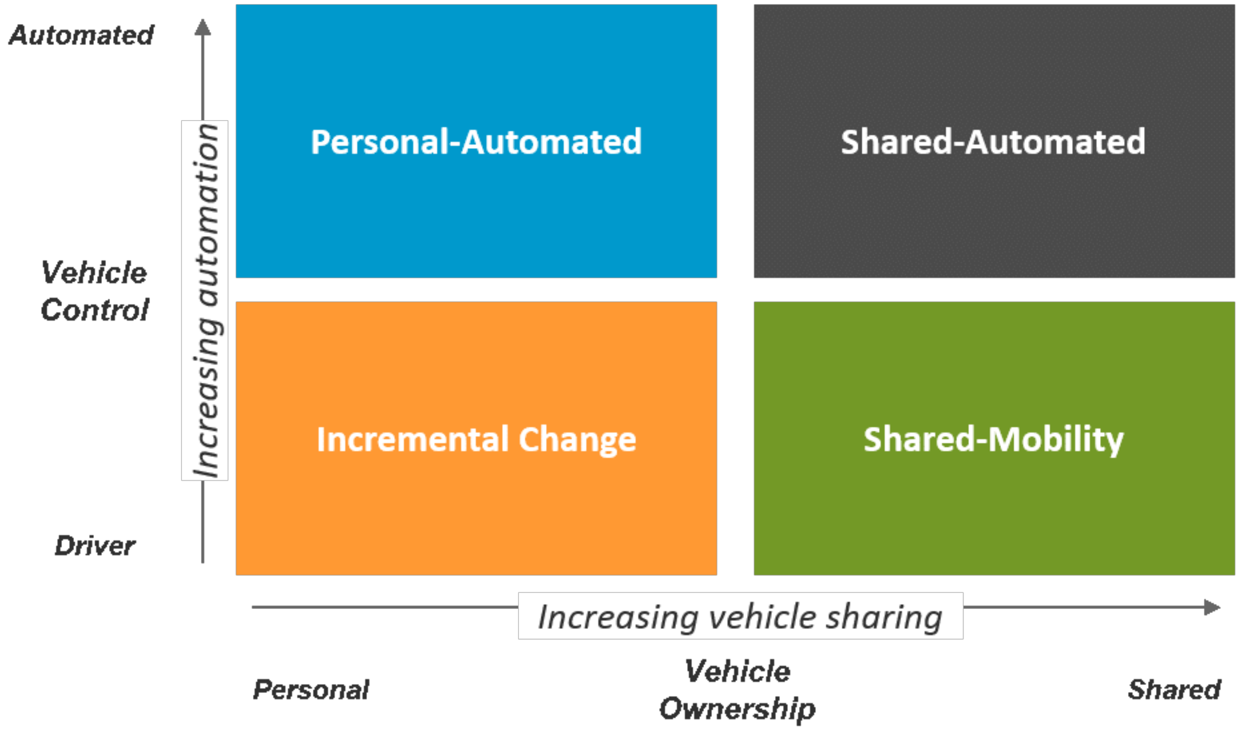
Potential Impacts

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 3.13, there are four 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 3.13: Future Mobility Scenarios



Source: U.S. Department of Energy/Deloitte

Safety Impacts

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.

<u>Freight</u>

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.

<u>Land Use and Parking</u>

Autonomous vehicles could dramatically reduce demand for parking, opening this space up for other uses. They may also require new curb-side 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.

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 country 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 three (3) AFV stations in the MPA: one (1) electric station, one (1) liquefied natural gas station, and one (1) propane station.

E85 85% Ethanol

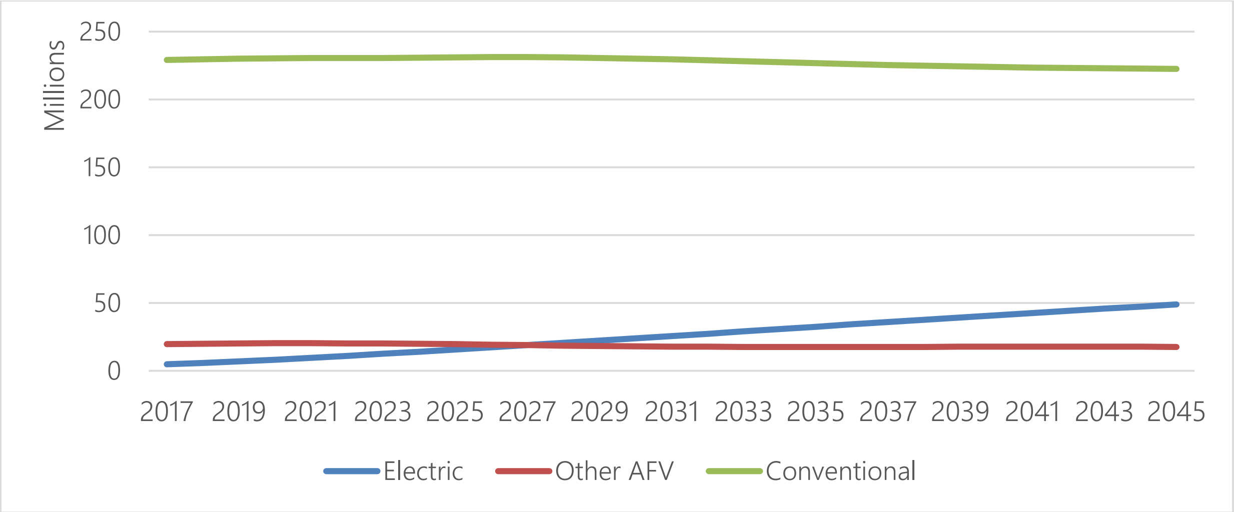
Growth Projections

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.[9] The U.S. Energy Information Administration (USEIA) is more conservative, projecting that electric vehicles will make up approximately nine percent of all light-duty vehicles by 2030 and approximately 17 percent by 2045. For freight vehicles, the USEIA projects only a two 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.[10]

Figure 3.14: Light-Duty Vehicles on the Road by Fuel Type, 2017 to 2045



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

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

[10] 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 Louisiana uses to fund transportation projects. Because of this, many states have begun imposing fees on these vehicles to recoup lost transportation revenue.[11]

[11] 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 vehicle trips in the MPA will go from 518,289 in 2018 to 682,267 in 2045. Trips with one or both ends outside of the MPA are forecasted to grow at a much higher rate than trips originating and ending inside the MPA. These changes are summarized in Table 4.1.

31.64%

Growth in vehicle trips in the MPA from 2018 to 2045

Table 4.1: Vehicle Trips by Purpose, 2015 to 2045

Trip Purpose	2015	2045 (E+C)	Change	Percent Change
Home-Based Work	106,995	124,578	17,583	16.43%
Home-Based Other	144,749	168,515	23,766	16.42%
Non-Home Based	90,936	108,665	17,729	19.50%
Truck and Taxi	88,463	108,968	20,505	23.18%
Internal-External	81,758	161,700	79,942	97.78%
External-External	5,388	9,841	4,452	82.63%
Total	**518,289**	**682,267**	**163,978**	**31.64%**

Notes: E+C is future scenario with only Existing and Committed transportation projects. Values do not include special generators.

Source: HTMPO 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 0.16 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 48 percent. However, during this same time period, the VHT will increase by 65 percent, and the VHD will increase by nearly two and a half (2.5) times current delay. These changes are the result of a large growth in vehicle trips and comparatively slow growth of the roadway network

Table 4.2: Impact of Growth and Existing and Committed Projects, 2015 to 2045

Centerline Miles of Roadways				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Expressway	88.63	88.63	0.00	0.0%
Principal Arterial	63.14	63.14	0.00	0.0%
Minor Arterial	289.67	289.67	0.00	0.00%
Major Collector	179	180.22	1.22	0.68%
Minor Collector	159.67	159.67	0.00	0.00%
Total	**780.11**	**781.33**	**1.22**	**0.16%**
Daily Vehicle Miles Traveled (VMT)				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Expressway	903,583	1,382,854	479,271	53.04%
Principal Arterial	948,218	1,415,374	467,156	49.27%
Minor Arterial	2,418,698	3,356,718	938,020	38.78%
Major Collector	652,090	1,068,463	416,373	63.85%
Minor Collector	283,960	456,910	172,950	60.91%
Total	**5,206,549**	**7,680,319**	**2,473,770**	**47.51%**
Daily Vehicle Hours Traveled (VHT)				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Expressway	14,435	25,807	11,372	78.78%
Principal Arterial	23,181	40,067	16,886	72.84%
Minor Arterial	54,181	82,935	28,754	53.07%
Major Collector	15,381	28,630	13,249	86.14%
Minor Collector	6,462	10,582	4,120	63.75%
Total	**113,640**	**188,020**	**74,380**	**65.45%**
Daily Vehicle Hours of Delay (VHD)				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Expressway	1,223	5,537	4,314	352.71%
Principal Arterial	3,070	11,361	8,291	270.06%
Minor Arterial	6,122	16,797	10,675	174.36%
Major Collector	1,287	5,932	4,645	360.94%
Minor Collector	209	683	474	226.65%
Total	**11,911**	**40,309**	**28,398**	**238.42%**

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

Currently, there are only two links in the MPA with VOC > 1. By 2045, congestion is forecast 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 by 2045, as shown in Table 4.3 and illustrated in Figure 4.1.

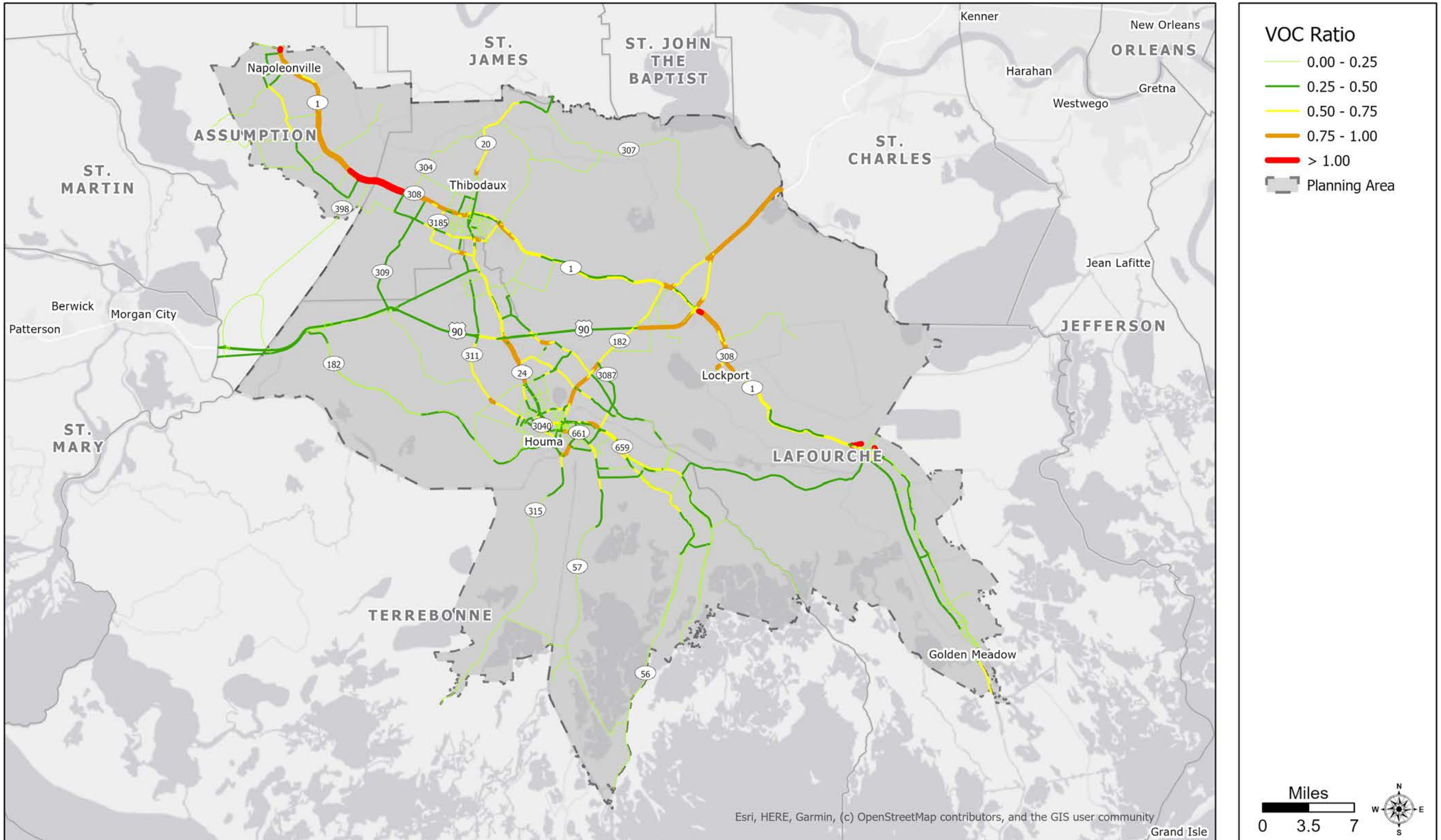
It is important to note that not all congested street and highway segments should be widened with additional through lanes or turning lanes. In urban settings, it may be more appropriate to consider ITS improvements or Travel Demand Management (TDM) strategies. Congestion may also be reduced by improving 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)
LA 57 (Grand Caillou Rd)	South of James Road	0.04
US 90 Ramps	At LA 182 in Raceland	0.86
LA 308	Labadieville Bridge to LA 304	4.48
LA 3040	Houma Tunnel	0.19
LA 308	T-Bois Bridge to East Main Street, including ICWW Bridge	1.97
LA 1	LA 398 to Morvant Plantation	3.20
LA 1	North of LA 402	0.12
LA 1	South of US 90	0.21

Source: HTMPO Travel Demand Model

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



Data Sources: HTMPO 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.

- LA 3040 (Martin Luther King Blvd.), including:
    - Intersection of LA 3040 and LA 24 (Main St. and Park Ave.)
    - Intersection of LA 3040 and Hollywood Road
    - Intersections at various businesses
- LA 311 Corridor, including
    - Intersections of LA 311 and Savanne Road
    - Intersection of LA 311 and Equity Blvd.
    - Intersection of LA 311 and Hollywood Road
    - Intersection of LA 311 and St. Charles Street
- LA 308 through Thibodaux, including
    - Intersection of LA 308 and the Canal Street Bridge
    - Intersection of LA 308 and St. Patrick Street
    - Intersection of LA 308 and LA 3185
- LA 1 at the Canal Street Bridge
- LA 20 at LA 648 (Percy Brown)
- LA 3185 at Main Project
- LA 182 at LA 316

4.2 Maintenance Needs

Pavement Maintenance

Approximately four (4) percent of the MPA's non-Interstate NHS 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 the Existing Conditions Analysis displays the pavement conditions in the MPA.

Since the collection of this data, pavement projects have been completed along the segments of US 90 and LA 20. Of the remaining roadways with poor condition, LA 3040 between Hollywood Road and LA 57 has the most segments listed in Poor condition. The roadway experiences a volume of 25,000 to 35,000 vehicles in the base year, which will increase in the future, making this location a priority for roadway reconstruction or resurfacing.

Bridge Maintenance

The existing conditions analysis revealed that there are currently thirty-three (33) bridges in Poor condition within the MPA; nineteen (19) of which are on the National Highway System. Table 4.4 displays the MPA's bridges in Poor condition, sorted by their sufficiency ratings, which contribute to the National Bridge Inspection Standards (NBIS) ratings. 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 their decks, superstructure, substructure, and 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 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 LADOTD should prioritize these bridges for improvements as funding becomes available.

Table 4.4: Worst Performing Bridges in Poor Condition by Sufficiency Rating

DOTD Name	Roadway	Feature Intersection	Year Built	Unofficial Sufficiency Rating
1212	LA 648	Drain Canal	1959	4
3590	LA 660	Bayou Terrebonne	1961	4
930	LA 1	Co Canal Lockport	1959	5
1090	LA 308	Valentine Canal	1964	5
1040	LA 308	Scully Canal	1954	5
3440	LA 56	Robinson Canal	1966	6
200863	Valentine Bridge	Lafourche Bayou	1969	7.1
3450	LA 56	Boudreaux Canal	1959	8.5
200768	Southdown Mandalay Rd	Hanson Canal	1965	11.5
200858	Caroll St	Black Bayou	1945	13.1
3180	LA 3197	Houma Canal	1938	13.6
1304	LA 655	Bayou Lafourche	1940	15.9
1032	LA 308	Lebreton Canal	1963	16.4
200836	Hamillton St	Forty Arpent Canal	1960	17.7
1280	LA 653	Bayou Dumar	1960	18.5
3390	LA 315	Falgout Canal	1964	19
1100	LA 308	Drainage Canal	1965	20.3

920	LA 1	Intracoastal Canl	1961	21.7
3220	LA 24	Co. Canal (Bourg)	1951	22
20165	Savanne Rd	Hanson Canal	1967	26.6
200821	Hummingbird Dr	Hollywood Canal	1968	32.3
200793	Woodlawn Ranch Rd	Bayou Grand Caillou	1980	34.2
20146	Oakridge Park	Canal	1981	36.8
200791	Mandalay Bridge	Black Bayou	1969	37.4
204060	LA 182	Bayou Terrebonne	1968	38.5
51650	LA 1010	Bayou Lafourche	1954	38.6
1165	LA 3087	Hollywood Canal	1988	42.3
1160	LA 3087	Hollywood Canal	1988	42.3
200815	Grand Caillou Rd	Platt Bayou	1978	42.5
1030	LA 308	Bayou Lafourche	1970	45.1
200765	Deadwood Rd	Chacahoula Canal	2011	47
20120	Elgin St	Bayou Terrebonne	1965	68.7
20336	Hollywood Rd	Drain Canal	1965	73

4.3 Safety Needs

Within the Houma-Thibodaux MPA, a total of 29,907 crashes occurred between 2014 and 2018[1]. During that timeframe, there were 208 fatalities and 97 suspected serious injuries.

5.18%

Crashes involving alcohol.

The highest number of crashes in the MPA were rear-end collisions, followed by side impact / 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:

- Analyze 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.
- Ensure roadway lighting is sufficient for drivers to see the roadway and surroundings.
- Determine 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.
- Check 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.
- Verify 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.
- Verify that a signal is warranted at the given intersection.

Reducing Side Impact / Angle Crashes

Side impact and 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, and/or

- large traffic volumes

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

- Verify 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.
- Conduct 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.
- Ensure roadway lighting is sufficient for drivers to see the roadway and surrounding area.
- Check 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.
- Verify 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.
- Verify 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 Non-Collision

The third highest type of crashes in the MPA were non-collisions, which are typically vehicles running of the roadway and striking a tree, culvert, or other fixed object. These are caused by factors such as:

- distracted driving
- driver fatigue and drowsiness
- poor traction between vehicles and road surfaces
- poor visibility
- inadequate road design/maintenance
- poor delineation

The recommendations for reducing non-collision crashes include:

- Installation of rumble strips/stripes to alert drowsy and/or distracted drivers or to alert drivers to the lane limits when conditions such as rain; fog or dust reduce driver visibility.

- Conduct horizontal curve analysis to determine high potential for safety improvement locations to implement proven safety countermeasure(s), such as High Friction Surface Treatments (HFST).
- Consider lane widening and/or safety edge in locations with pavement edge drop-offs.
- Create a Clear Zone to increase the likelihood that a roadway departure results in a safe recovery rather than a crash, and mitigate the severity of crashes that do occur.
- Remove, reduce, and/or delineate roadside hazards.
- Evaluate lighting, signage and pavement markings of the roadway to determine if upgrades are needed.
- Evaluate potential issues with sight distance.
- Improve alignment/grade of roadway.
- Improve drainage to eliminate water on roadways.
- Installation of barriers and bridge rails where warranted.

Reducing Sideswipes

The fourth 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:

- Check 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.
- Verify that pavement markings are visible during day and night hours.
- Verify that the roadway geometry can be easily maneuvered by drivers.
- Evaluate left and right turning volumes to determine if a right turn and/or left turn lane is warranted.
- Ensure roadway lighting is sufficient for drivers to see roadway and surroundings.
- Verify 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, head on collisions, jackknife, rollovers, and vehicle defects. Recommendations for increasing the safety and reducing the number of crashes for these crash types include:

- Determine 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.
- Verify 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.
- Check 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.
- Verify that pavement markings are visible during day and night hours.
- Verify that the roadway geometry can be easily maneuvered by drivers.
- Evaluate left and right turning volumes to determine if a right turn and/or left turn lane is warranted.
- Ensure roadway lighting is sufficient for drivers to see roadway and surroundings.
- Check the visibility of the traffic signals from all approaches.
- Verify 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.

Public and Stakeholder Input

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

<u>Intersection Recommendations</u>

The intersection of Percy Brown (LA 648) and Acadia Rd. is located to the southeast of Thibodaux near the Terrebonne Parish boundary. The intersection is currently controlled by a stop sign on Acadia Road. During the public involvement process, several comments were received that recommended a roundabout at this location. The MPO and the City of Thibodaux are currently developing a Stage 0 Feasibility Study at this location for intersection improvements, including the possibility of a roundabout.

The intersections of LA 3185 at LA 1 and LA 308 experienced a higher number of crashes from 2014 and 2018, totaling 132 with approximately 33% resulting in injury. While there were no fatalities involved in the crashes at these particular intersections, it is recommended that the MPO work with LADOTD to conduct a safety analysis in an effort to be proactive in developing location-specific countermeasures.

The intersection of Bayou Blue Road (LA 316) and Bayou Gardens opened in 2017. It is located in a low-density but highly traveled area. Since 2017 there have been 11 crashes at the intersection with no fatalities and 15 injuries. These crashes were rear-end (3), right-angle (3), left turn (3), non-collision (1) and other (1). Due to the number of comments and the high number of crashes since the intersection has been opened, it is recommended that the MPO work with LADOTD to conduct a safety analysis for this particular intersection to develop location-specific countermeasures.

Corridor Recommendations

Martin Luther King Blvd., LA 3040, was identified by the public as a top corridor with safety concerns. This four-lane road, divided by a continuous turn lane, is the MPA's heaviest-used roadway and one of Terrebonne Parish's major commercial corridor. Its heavy traffic volumes and high speeds, combined with multiple intersections, result in a high number of crashes, mostly at or near intersections. DOTD is currently conducting a corridor specific safety study for this route.

LA 308 throughout the study area was also identified during the public involvement process as a top corridor with safety concerns. This roadway travels northeast to southwest along the eastern bank of Bayou Lafourche, paralleling LA 1 on the western bank. While LA 1 has wider shoulders and travels through more developed areas such as downtown Napoleonville, downtown Thibodaux, Lockport, and Golden Meadow, LA 308 tends to be more rural in nature and does not have shoulders. In addition, as it follows Bayou Lafourche, it has may winding curves. The reconstruction of LA 308 to straighten and add shoulders has been a priority for the MPO for many years, though funding remains an issue. It is recommended that the MPO continues to work with LA DOTD to conduct safety analyses and identify areas for improvement along the roadway.

[1] Crash information was obtained from LA DOTD's Crash 3 database.

5.0 Freight

5.1 Freight Truck Needs

Forecast Growth

The Freight Analysis Framework forecasts growth in freight throughout the U.S. Tables 5.1

Table 5.1 shows the change in truck freight tonnage in Louisiana between 2018 and 2045. Figure 5.2 shows the changes in the means of transporting freight originating in Louisiana from 2018 through 2045 for each mode, ranked by kiloton. Figure 5.3 shows the changes in the means of transporting freight with destinations within Louisiana from 2018 through 2045 for each mode, ranked by kiloton.

The following observations emerge from the FAF data:

- The most used mode for freight both originating in and with destinations in Louisiana in 2018 was pipeline. This is expected to change to trucks which is forecast to increase by 78% and 80%, respectively, in 2045.
- The growth in inbound and outbound truck freight is expected to be approximately equal.
- The percentage of freight moved by water in Louisiana is expected to be nearly the same for both 2018 and 2045. Truck, Rail, Pipeline, Air, Multiple Modes & Mail are all expected to grow by at least 35%. Other and Unknown modes are expected to decrease by nearly 70%.

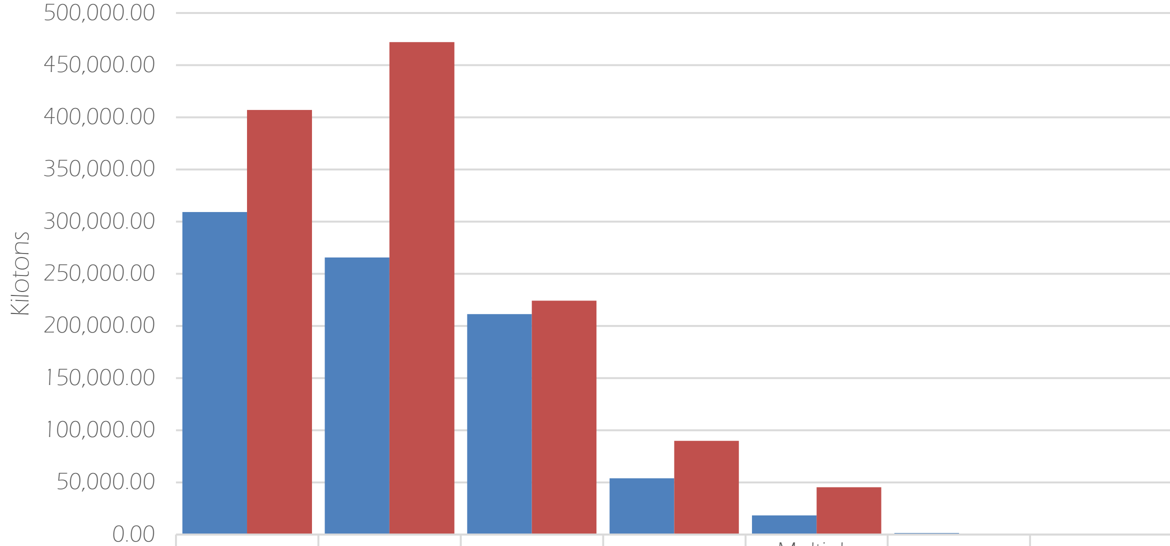
Figure 5.3 shows the estimated 2045 truck volumes on the MPA's roadway network.

Table 5.1: Louisiana Freight Truck Tonnage, 2018 to 2045

	2018	2045	% Change
Exports	55,732.49	85,571.85	53.5%
Imports	47,003.08	75,763.80	61.2%
Intrastate	209,865.18	386,287.58	84.1%

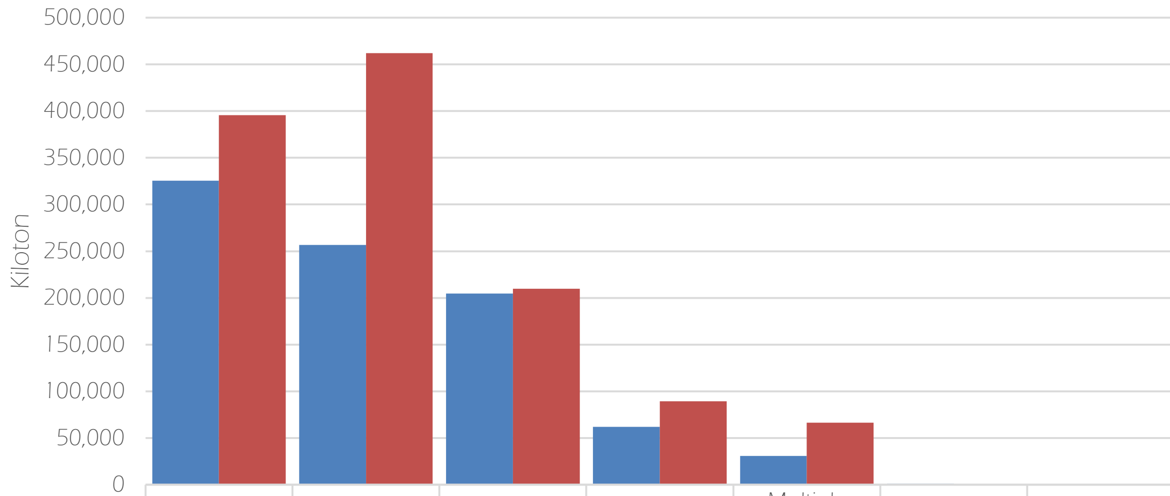
Source: Freight Analysis Framework

Figure 5.1: Means of Transporting Freight Originating in Louisiana, 2018 to 2045



	Pipeline	Truck	Water	Rail	Multiple modes & mail	Other and unknown	Air (include truck-air)
2018	309,236.66	265,597.67	211,175.85	53,858.39	18,358.43	1,291.19	19.47
2045	406,854.53	471,859.43	224,064.23	89,841.37	45,319.15	417.38	89.75

Figure 5.2: Means of Transporting Freight with Destination in Louisiana, 2018 to 2045



	Pipeline	Truck	Water	Rail	Multiple modes & mail	Other and unknown	Air (include truck-air)
2018	325,653	256,868	204,642	61,949	30,746	1,182	24
2045	395,730	462,051	209,924	89,257	66,395	84	81

2018 2045

Roadway Capacity and Reliability

One method to address freight truck travel time reliability is through ITS improvements. Beyond ITS improvements, traditional capacity improvements can alleviate congestion-related delay.

Figure 5.4 shows the roadway segments that will be congested by 2045. Each of these segments is also a truck route and is projected to accommodate a large number of daily truck trips (500 trucks or more) by 2045, though many also are currently experiencing that same volume now. These segments possess the greatest need for capacity/reliability improvements to improve future freight conditions in the short-term. Figure 5.5 displays the roadway segments that are anticipated to have greater than 500 truck trips per day and experience a LOS of F in the year 2045.

<u>System Weakness</u>

Throughout the planning process, the following has been identified as system weaknesses.

General lack of a safe and reliable North-South connector. In general, trucks destined for the northern markets, such as Baton Rouge or industrial areas along the Mississippi River, must use the two-lane facilities of either LA 20, LA 1, or LA 308. All are long, winding, rural roads that each traverse a series of small communities. These routes are prone to delay by crashes, school buses, garbage trucks, and other conflicting traffic patterns common to such roadways and communities.

Lack of Interstate access. The MPA is the only metropolitan area in Louisiana without direct access to the Interstate system. US 90 has been ungraded to Interstate standards through most of the study area, except in a portion of eastern Lafourche Parish. US 90 has been designated as a part of the future I-49 corridor. In its current configuration, the road is not limited access.

Safety issues along LA 3235. Trucks using the four-lane facility LA 3235 come into contact with many commercial and residential users who also travel the roadway. There have been a number of highly publicized crashes and fatalities. Communities located along this route frequently cite the safety of the roadway as their primary concern.

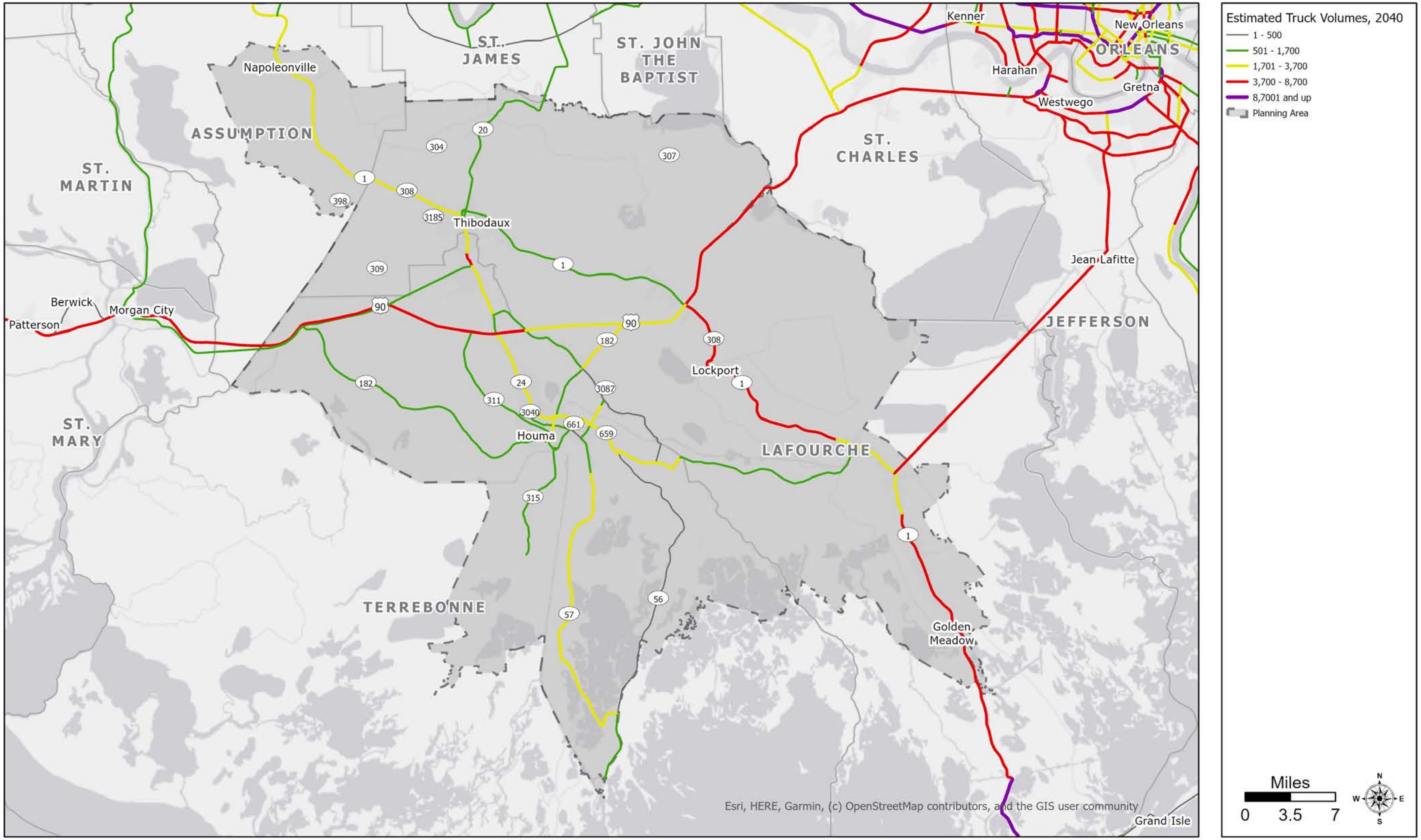
Difficulty crossing the Intracoastal Waterway. While this is a problem in both Terrebonne and Lafourche Parishes, the issue is more frequently raised in Terrebonne Parish. The industrial areas along Industrial Boulevard and Grand Calliou Road are dependent on the Houma Navigational Canal Bridge, which is frequently closed to vehicular traffic to allow passage of marine vessels or for repairs.

Lack of connection between the South Lafourche Airport and Port Fourchon. Stakeholders identified a need to connect Airport Road to LA 3235 via a bridge and new roadway. Recently, Lafourche Parish was awarded a BUILD Grant for the construction of this roadway.

LA 1 flooding issues between Port Fourchon and US 90. The LA 1 Coalition has been working for many years to elevate and relocate the most vulnerable portions of LA 1, located outside of the leveed area of Lafourche Parish and also outside of the MPO study area. The Coalition is partnering with DOTD for application to the 2020 round of INFRA grants. This project is listed in the 2015 Statewide Transportation Plan as megaproject #8a.

Lack of a truck operational plan for downtown areas. LA 24 is frequented by many large trucks, yet also serves as Main Street in downtown Houma. Stakeholders have indicated that large trucks using this roadway disrupt quality of life and provide difficult obstacles to bicycle and pedestrian traffic. In addition, vibrations from the trucks can damage older, historic buildings.

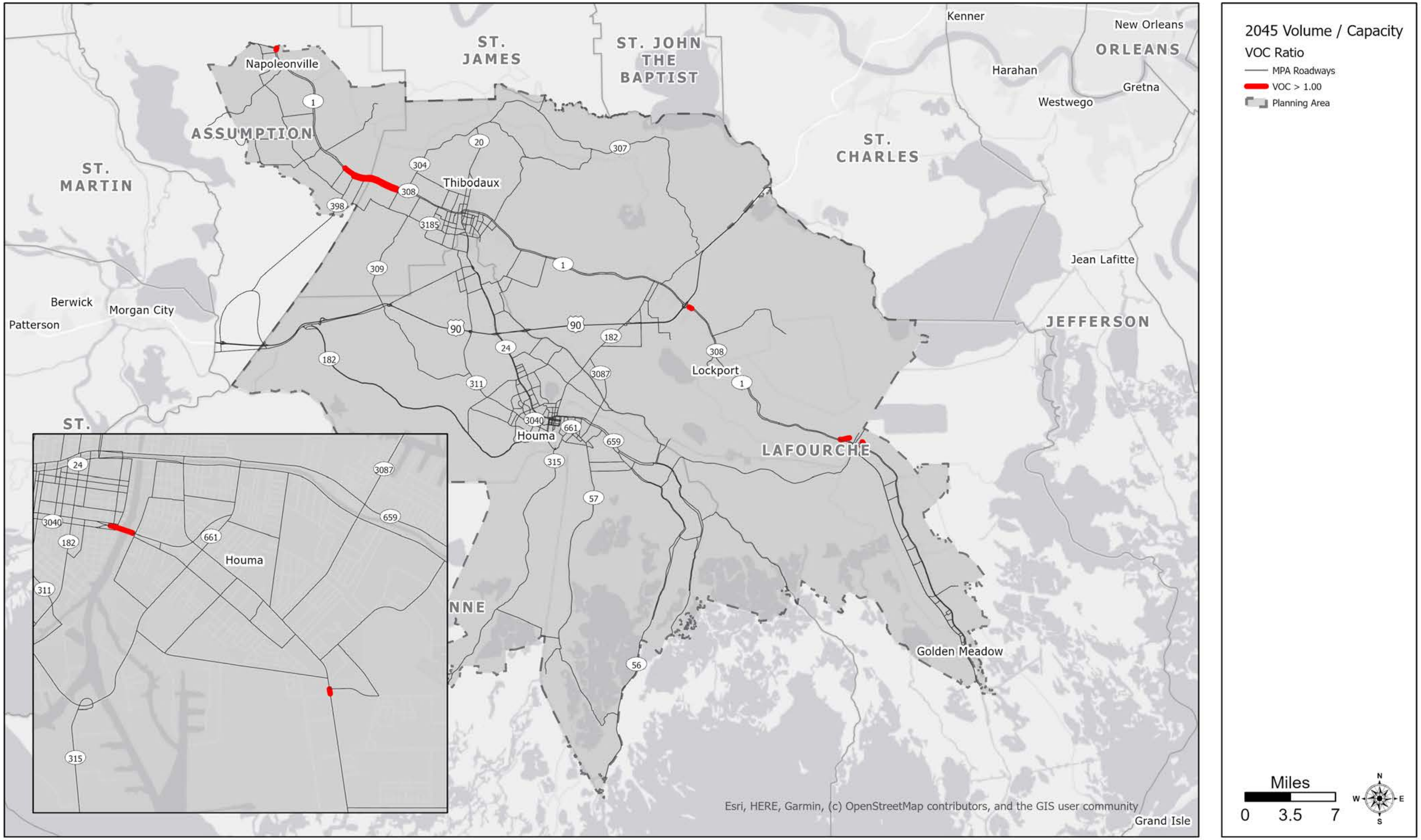
Figure 5.3: Freight Truck Traffic, 2045



Data Source: Freight Analysis Framework

Disclaimer: This map is for planning purposes only.

Figure 5.4: Congested Freight Corridors, 2045



Data Sources: HTMPO Travel Demand Model

Disclaimer: This map is for planning purposes only.

5.2 Freight Rail Needs

According to the FAF, the freight ton-mileage transported by rail in Louisiana is projected to increase by approximately 40 percent from 2018 to 2045.

Future rail capacity and related needs can be measured in many ways. However, as actual volumes and capacities are not known for all rail segments in the Houma MPA; it is not possible to forecast future capacity utilization rates and needs by segment. The use of rails as a means of freight transportation is becoming a more popular alternative due to increasing roadway congestion. The *Louisiana State Rail Plan* outlines the future efforts anticipated by LADOTD[12].

System Weaknesses

Through the planning process, the following system weaknesses were identified by stakeholders.

Lack of rail access. Both Port Fourchon and the Port of Terrebonne identified lack of rail access as a weakness affecting the ability to expand operations.

Lack of publically available data. In general, there is a lack of publicly available data for rail freight movements in the region.

[12] http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Marine_Rail/Misc Documents/2015 Louisiana Rail Plan.pdf

Rail Capacity

The following elements are typically assessed to determine physical rail capacity:

Vertical Clearances	• Information on vertical clearance of railroad overpasses was not available for this plan for the Houma MPA.
Weight Limits	• BNSF accommodates the industry standard of 286,000 pounds (286k). LDRR supports up to 263k.
Number of Tracks	• The majority of the approximately 52 miles of railroad in the MPA are single track.
Traffic Control and Signaling	• Information on trafficcontrol and signaling were not available for this plan for the Houma MPA.
Terminal and Yard Capacity	• Information on terminal and yard capacities were not available for this plan for the Houma MPA.
Rail Line Operating Speed	• The average speed that trains move on a corridor impacts capacity and affects railroad's ability to move higher value, time-sensitive goods.

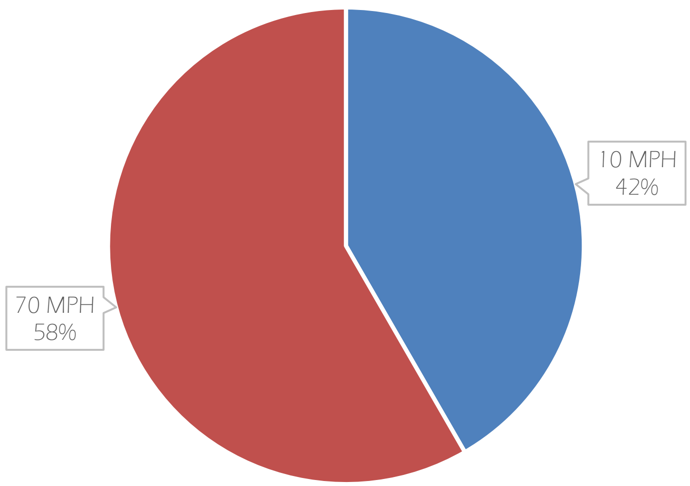
Highway-Railroad Crossings

Of the 12 public highway-rail grade crossings within the MPA, one (1) crossing only has passive warning devices (cross bucks, warning signs, regulatory signs, and pavement markings). This crossing is not on a roadway that is classified as a minor arterial or above.

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 16th, 2008, required the U.S. Secretary of Transportation to identify the ten States with the most highway-rail grade crossing collisions, on average, over the past three (3) years, and to require those States to develop State highway-rail grade crossing action plans. Section 202 further provided that these 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. The State of Louisiana was identified as one of the ten states with the most highway-rail grade crossing collisions between 2006 and 2008. As a result, LADOTD developed the State Highway-Rail Grade Crossing Action Plan[13]. A proposed rule published by the Federal Railroad Administration on Nov. 7, 2019 is proposing requiring the state to update that plan.

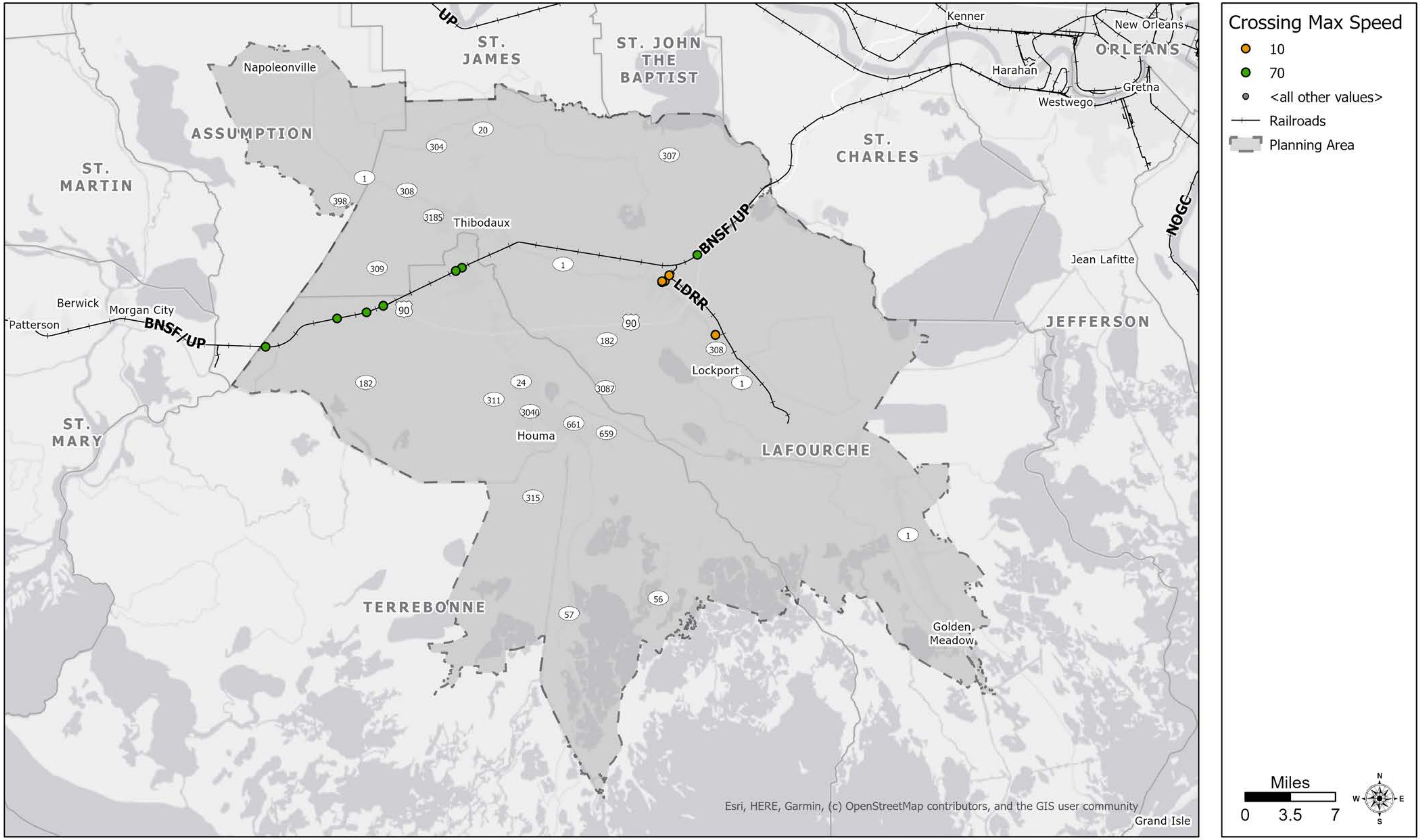
Figure 5.6 breaks down the maximum speed for the 41 railroad crossings in the MPA. Figure 5.7 illustrates the operating speeds at each crossing within the MPA.

Figure 5.6: Maximum Operating Speed at Railroad Crossings in the MPA



[13] https://safety.fhwa.dot.gov/hsip/xings/docs/la-sap.pdf

Figure 5.7: Railroad At-Grade Crossing Speeds



Data Source: Freight Analysis Framework

Disclaimer: This map is for planning purposes only.

5.3 Freight Air Needs

According to the FAF data, the freight ton-mileage transported by air in Louisiana is projected to increase by approximately 42.9 percent from 2018 to 2045. The ton-mileage shipped by air is expected to be approximately 8 percent of all ton-mileage in Louisiana.

According to the FAF data, the freight ton-mileage transported by air in Louisiana is projected to increase by approximately 42.9 percent from 2018 to 2045. The ton-mileage shipped by air is expected to be approximately 8 percent of all ton-mileage in Louisiana.

According to information from DOTD, the Houma-Terrebonne Airport is one of five airports in the state that will exceed 60% of its demand/capacity ratio by 2043. At such point, FAA guidelines suggest planning should begin to address future congestion issues.

5.4 Freight Water Needs

According to the FAF data, the freight ton-mileage transported by water in Louisiana is projected to increase by approximately 6 percent from 2018 to 2045. The ton-mileage shipped by water is expected to be about fifteen (15) percent of all ton-mileage in Louisiana.

In general, the following system weaknesses have been identified through the planning process.

Inadequate erosion control along the Gulf Intracoastal Waterway leads to an increase in dredging requirements. Barge wakes create safety and quality of life concerns for communities.

Siltation in the Houma Navigational Canal impedes access to the Terrebonne Port. Inadequate channel depth to fully service the offshore oil industry. According to DOTD's *Louisiana's Marine Transportation System* published 2016, a feasibility study with the goal of retaining business industries in Terrebonne Parish while also providing an environmental benefit with the use of dredged materials was scheduled to be submitted to the Assistant Secretary of the Army for Civil Works in January 2017. The estimated cost range for construction was $189 million for an 18 foot dredged depth to $215 million for a 20 foot dredged depth with a cost-benefit ratio of 5.30 and 1.19, respectively.

5.5 Freight Pipeline Needs

According to the FAF data, the freight ton-mileage transported by pipeline in Louisiana is projected to increase approximately 3 percent from 2018 to 2045.

The MPO has no available information on any planned pipeline projects within the MPA.

6.0 Bicycle and Pedestrian

6.1 Infrastructure/Facility Needs

Existing and Future Gaps

Figure 6.1 shows Sidewalk ADA compliance along State Highways. Priority should be given to upgrading existing facilities to be ADA compliant in areas with high pedestrian demand.

Figure 6.2 shows a network analysis along state highways with bicycle level of service and demand. Priority should be given to improvements on roadways with a low level of service and high or moderate demand.

Public and Stakeholder Input

During outreach, the public and stakeholders frequently mentioned the following locations for better walking and biking conditions.

- Terrebonne
  - Valhi Blvd
  - LA 311 at Civic Center/Lafayette Street
  - LA 3040 / MLK
  - Houma Downtown
- Thibodaux
  - Parish Road/Acadian Road West
  - Forty Arpent
  - Downtown Thibodaux
  - Menard Street
  - Talbot Ave
  - Audubon
  - Percy Brown at Acadia

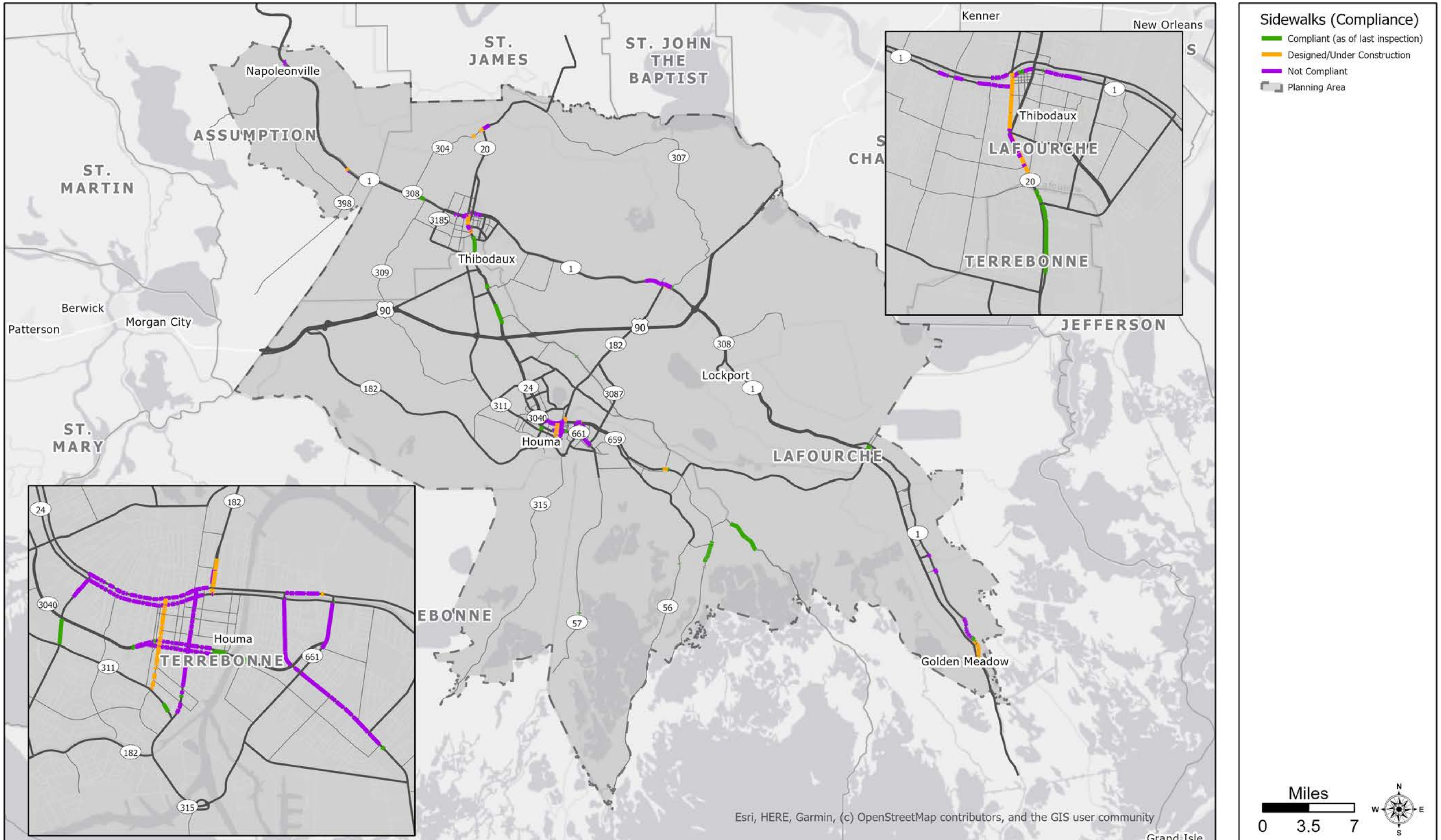
Existing Plans

In 2013, the MPO adopted a regional bicycle and pedestrian plan that identified projects along roadways throughout the Metropolitan Planning Area. Its focus was on improving the bicycle and pedestrian levels of service in areas of high demand. The plan is currently being updated with an emphasis on safety and crash countermeasures.

6.2 Safety Needs

Based on available crash data, there are about 34 bicycle crashes per year in the planning area, with about 1 fatality a year. There are more pedestrian crashes per year (about 51), which is common since pedestrian activity is typically higher than bicycle activity. There are about 6.5 pedestrian fatalities each year. These numbers have led to the MPA having one of the highest per-capita instances of pedestrian fatalities in the state, second to Monroe. According to Smart Growth America, the MPA has a "Pedestrian Danger Index" of 237, with a state average of 125 and a national average of 55.3. It is recommended, therefore, that priority for improvements be given to routes with a high instance of bicycle and pedestrian crashes.

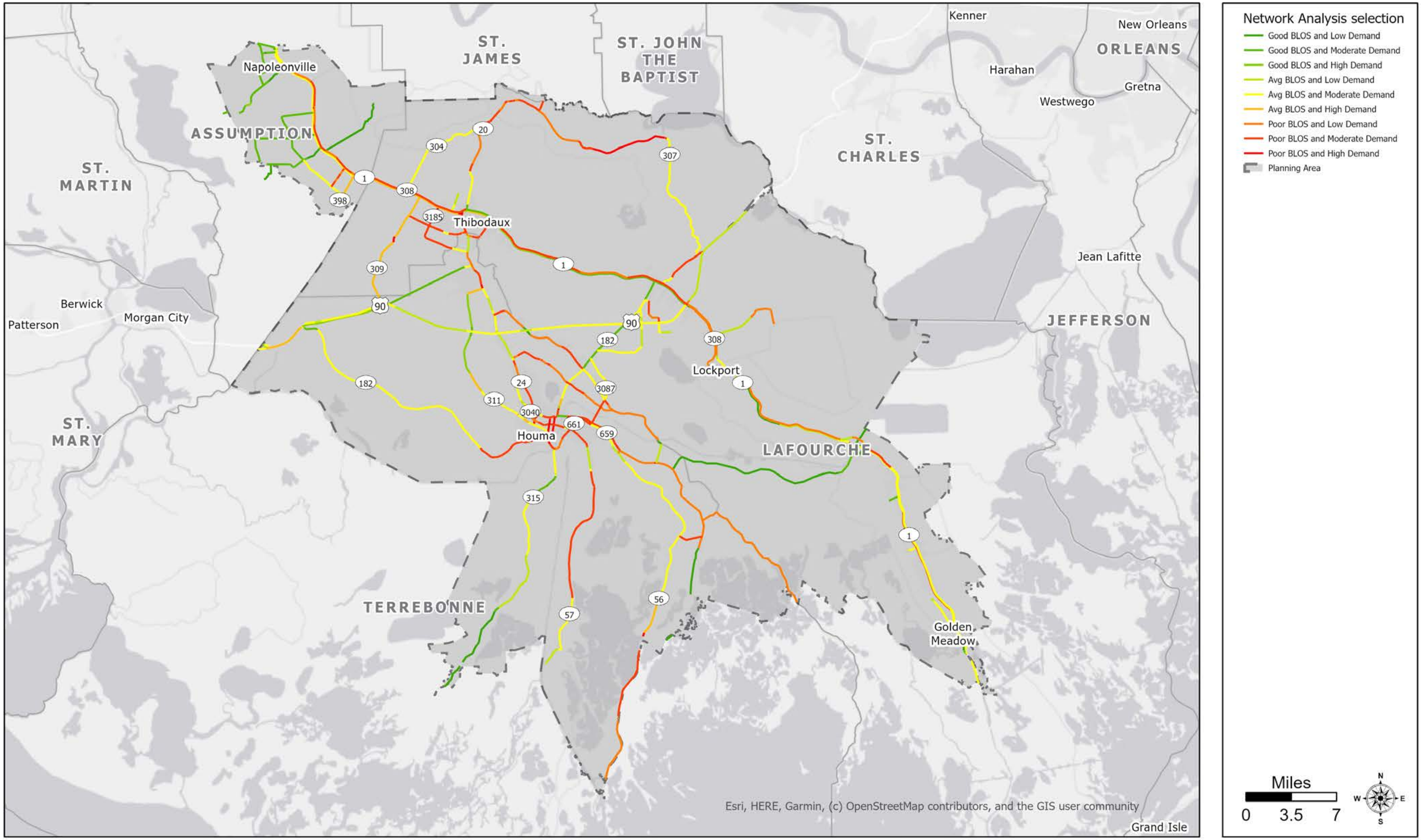
Figure 6.1: Sidewalk ADA Compliance



Data Source: LADOTD

Disclaimer: This map is for planning purposes only.

Figure 6.2: Bicycle Network Analysis



Data Source: LADOTD

Disclaimer: This map is for planning purposes only.

7.0 Public Transit

7.1 Service Needs

The existing transit service for the area is discussed in Technical Report 2. The MPO should continue to work with area stakeholders to improve and expand transit service throughout the MPA.

Public and Stakeholder Input

During the public outreach for the plan, the highest rated strategy for improving the MPAs transit service was modernizing the transit system, which includes using cell phone and computer technology to provide better information to riders.

Some of the most common requested transit needs include developing a fixed route service in Lafourche and Terrebonne that connect with Good Earth Transit. Also, in Terrebonne Parish an issue that came up frequently was providing transportation to university and job training centers for recent high school graduates who do not have a car.

Existing Plans

Coordinated Human Services Transportation Plan

The Coordinated Human Services Transportation Plan for Assumption, Lafourche, St. James, and Terrebonne parishes identified the following needs along with actions or recommendations from the plan.

- Inventory of resources
  - A resource list of vendors has been developed. This list needs to be updated and current.
- Inventory of services provided by transit agencies
  - The list is provided online at the Louisiana DOTD Public Transportation website under its “Louisiana Transit Resources Guide.”
- Formation of a coordinating working group
  - The Regional Transit Committee meets quarterly to share information and improve coordination efforts. Special meetings are sometimes held in between for guest presentations and trainings.
- Identification of lead agency
  - SCPDC is the lead agency for coordinating the South Central CHSTP.
- Dispatch program training (CRAFT from LADOTD)
  - CRAFT was never put into use by DOTD. The providers now use STTARS.

- Input of data into regional database for GIS analysis
  - SCPDC maintains a regional database and has access to Good Earth Transit data. In the future, SCPDC expects to be able to access the rest of the transit provider's data through STTARS and can update into GIS analysis.
- Identification of methodologies
  - The original plan was developed in a series of meetings with the providers of the region. In the future, SCPDC will be acquiring an online survey/data analysis tool that can be used to provide a complete update to this plan obtaining much broader public input.
- Development of surveys for collection of needs
  - SCPDC has developed a survey and used it in 2018 to collect information and needs from each provider. This experience will lead to future surveys/questionnaires that will lead to better information collection.
  - SCPDC plans to acquire a program that will allow it to quickly and easily collect and analyze public surveys. It is hoped this tool can be used in future CHSTP updates.
- Collection of needs data
  - See above. Results of surveys and access to transit data for the region's rural providers will allow SCPDC to improve its GIS analysis.
- Development of a list of all transit agencies
  - This has been done.
- Accessibility of data to all agencies and clients
  - Once the STTARS information is available, better information sharing between agencies and the general public can be made.
- Resource guide on LADOTD website
  - The guide was updated in July 2018
- Standardization of customer surveys
  - No update as yet. State agencies are working together in order to streamline some of these processes and combine survey/information forms.
- MOUs – Memorandums of Understanding between agencies
  - The Lafourche Parish COA, ARC, and Special Education District No 1 have a letter of agreement to coordinate services for elderly and disabled as licensing agreements and operational procedures allow.
- Centralized maintenance facility
  - This is still a need often expressed but one that will take some time to organize and build.
- Transfer stations

    - There are several areas where two or more transit operators meet and riders could change services. SCPDC is particularly interested in promoting this exchange in Thibodaux at the Nicholls State University/Thibodaux Regional Medical center area, which is served by multiple operators including St. James Transit, Assumption and Lafourche Councils on Aging, Good Earth and Thibodaux Transit.
- Covered shelters
    - SCPDC has been discussing acquisition of additional bus shelters along the Good Earth/Thibodaux routes, which have access to urbanized funds for shelters. There are currently no capital funds available for rural shelters.
- Identification of transfer points
    - As mentioned above, the most logical point for an attempt at creating a transfer station/point would be in the area of Nicholls State University and the Thibodaux Regional Medical Center. Other transfer points are possible at locations where rural and urban operators meet, in particular Fletcher Community College in Gray and Chabert Medical Center in Houma. However, the logistics of actually doing so is difficult since most rural services are based on appointments, therefore while possible, not practical. Because Assumption COA and St. James Transit run regularly scheduled shuttle style services to the Thibodaux area, the likelihood of successful transfers is greater.
- School bus shelters
    - This needs further discussion and action.
- Research insurance policies
    - The state has undertaken a look into the potential to create regional insurance cooperatives. However, there are many problems with this due to the differing needs of transit providers. There needs to be more discussions and work on this with assistance from the state and insurance industry experts.

Lafourche Transit Feasibility Study

SCPDC developed a transit feasibility study at the request of Lafourche Parish in 2017. In the public outreach for that plan, the following needed transit services were identified:

- Service to vital services such as higher education facilities, major retail areas, and medical centers
- Connections to Thibodaux, Houma, and larger urban areas in Jefferson and Orleans parishes
- Connections along LA 1 or LA 308 from Thibodaux to Golden Meadow

Capital Needs

Good Earth Transit (GET), the provider for Terrebonne Parish and the City of Thibodaux, has developed a Transit Asset Management Plan that it updates annually. Currently, no vehicles are past their useful benchmark life. GET's vehicle inventory is listed in Table 7.1, and investment strategy is listed in Table 7.2.

Table 7.1: Good Earth Transit Inventory

Category	Class	Name	ID/Serial No.	Age (Yrs)	Value	ULB (Yrs)	Past ULB
Rolling Stock	HD Bus	601G	15GGE2719B10	8	$332,934	15	No
Rolling Stock	HD Bus	602G	15GGE2710B10	8	$332,934	15	No
Rolling Stock	HD Bus	603G	15GGE2712B10	8	$332,934	15	No
Rolling Stock	HD Bus	604G	15GGE2714B10	8	$332,934	15	No
Rolling Stock	HD Bus	609	15GGB2712810	11	$303,288	15	No
Rolling Stock	HD Bus	610	15GGB2714810	11	$303,288	15	No
Rolling Stock	HD Bus	611	15GGB2716810	11	$303,288	15	No
Rolling Stock	HD Bus	612	15GGB2718810	11	$303,288	15	No
Rolling Stock	HD Bus	613	15GGB2718810	11	$303,288	15	No
Rolling Stock	HD Bus	614	15GGB2710710	11	$303,288	15	No
Rolling Stock	HD Bus	615	15GGB2714810	11	$303,288	15	No
Rolling Stock	HD Bus	616	15GGB2716810	11	$303,288	15	No
Rolling Stock	12-2 Bus	625	1FDFE4FS8KDC1	1	$65,267	5	No
Rolling Stock	12-2 Bus	624	1FDFE4FS3KDC1	1	$65,267	5	No
Rolling Stock	12-2 Bus	637	1FDFE4FS9KDC1	1	$65,267	5	No
Rolling Stock	12-2 Bus	638	1FDFE4FS9KDC1	1	$65,267	5	No
Rolling Stock	12-2 Bus	639	1FDFE4FS6KDC1	1	$65,267	5	No

Source: Good Earth Transit, Transit Asset Management Plan, 2019

Table 7.2: Good Earth Transit Investment Strategies

Asset Category/Class	Overhaul Strategy
HD Bus	Overhaul of engines and transmissions are solely done on an as needed basis. We do not set specific time or mileage for overhaul of these components.
Cutaway Bus	No overhaul strategy, we do not typically overhaul this type of equipment. We replace these units before overhauls are needed.
Service Vehicle	No overhaul strategy, we do not typically overhaul this type of equipment. We replace these units before overhauls are needed.
Asset Category/Class	**Disposal Strategy**
All Equipment	All equipment including revenue and service vehicles are liquidated by surplus auction sale.
Asset Category/Class	**Acquisition and Renewal Strategy**
Cutaway Bus	Cutaway buses will be replaced by units acquired from the Statewide contract for FTA buses when possible. Good Earth Transit will no longer use Diesel buses due to emission control problems. We will procure either gasoline or propane vehicles in the near future, until other fuel options become available. We will also focus on procuring low floor designs due to minimize lift issues and to have alternative means to operate ramp or lift in case of failure.

7.3 Safety Needs

GET 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.

7.4 Travel Demand Management

The MPO should continue to work with transit providers and other interested parties in implementing carpool and vanpool that fill gaps in the public transportation system.