TECHNICAL REPORT 4

Needs Assessment

Draft February 2020

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Solutions you can build upon

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1.0 Introduction

This report discusses transportation needs for the Auburn-Opelika 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. Impacts of weather, other natural events, or man-made events need to be considered in resiliency.

Regional Considerations

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

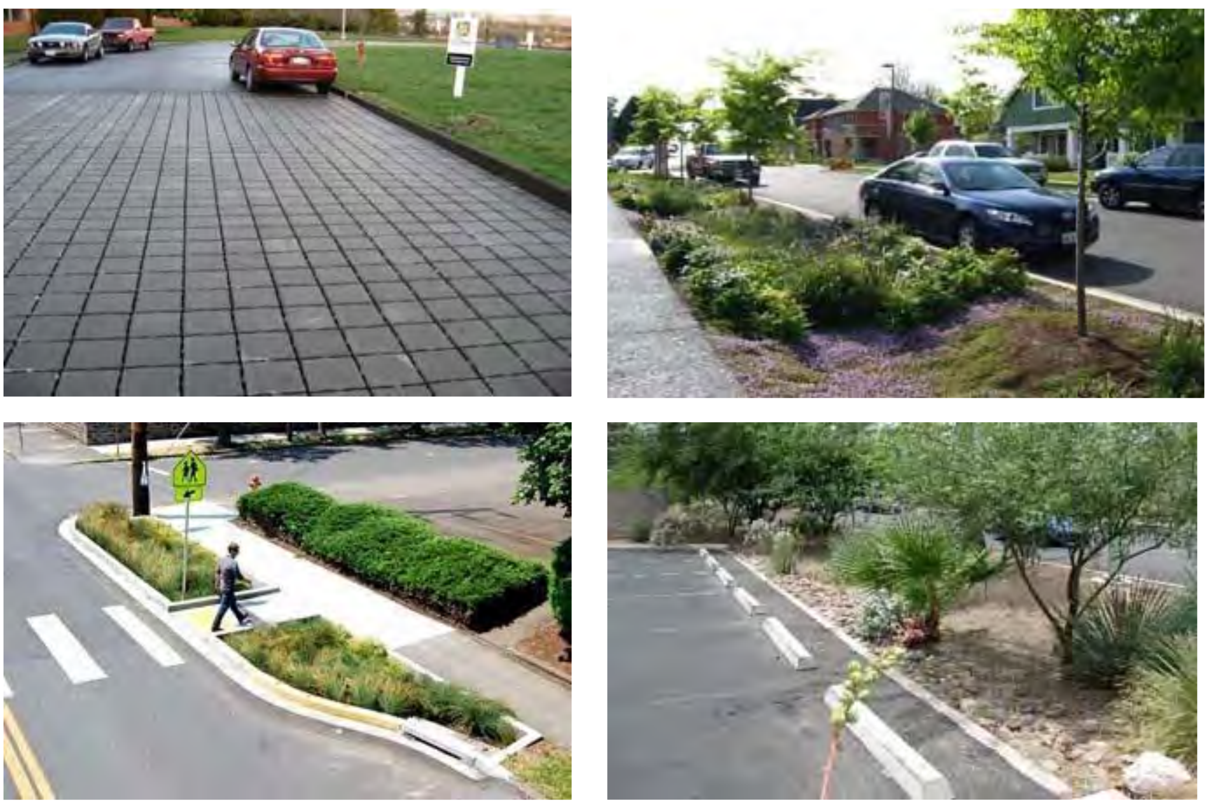
- High wind events: The Auburn MPA can experience severe thunderstorms that produce damaging winds. Additionally, there is a risk for tornadoes within the MPA as it is located in “Dixie Alley”, an area of the Southern United States that is particularly vulnerable to tornadoes. Although the MPA is located well 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 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.
- Wildfires: During extremely dry conditions, the risk for wildfires increases. The Auburn MPA is located in proximity to several forests, which can present a risk for the MPA when wildfires occur. The impacts to transportation systems can include road closures close to the wildfires.
- Temperature Extremes: The Auburn 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.

- Earthquakes: Earthquakes can result in damages to transportation systems. There are several faults that run through the MPA. However, the risk of earthquakes within the MPA is relatively low, and there has not been a reported earthquake within the Auburn MPA since at least 1886. 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.

Figure 2.1: Green Infrastructure Examples



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

2.2 Tourism

Leisure and tourism trips are an important consideration in transportation planning. While Lee County is not one of the top 5 tourist destinations in the state of Alabama based on the number of annual visitors, there are still many attractions in the area and tourism is an important part of the overall economy.

In 2018, visitors to the county spent $438 million in the area’s hotels, restaurants, and retail establishments, representing a 12% increase over the previous year. The tourism industry also employed 6,500 individuals in Lee County, about 3 percent of all jobs. [1]

Major Attractions and Tourist Areas

According to the Auburn Opelika Tourism Bureau, the major tourist attractions are related to Auburn University, museums and the arts, golfing, parks, and agritourism. Auburn 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.

Figure 2.2 maps the major tourist destinations listed by the Auburn-Opelika Tourism Bureau. It also shows the location of hotel and other accommodations as well as the major activity centers for shopping, eating, and drinking. Most hotels and other accommodations are located near interstate exits, Downtown Auburn, or near the Auburn Mall. The major activity centers for shopping, eating and drinking are Downtown Auburn, The Auburn Mall, Tiger Town Shopping Center, and S. College Street around Longleaf Drive.

Arriving and Departing the Region

Given the lack of commercial air service at the Auburn University Regional Airport, most visitors to the region arrive by driving or by inter-city transportation.

- The major gateways for driving in the region are I-85 and US 280.
- Greyhound service is available from Opelika to destinations such as Mobile, Birmingham, Atlanta, New Orleans and places in between.
- There are 15 daily shuttle trips between Auburn, Opelika, and Atlanta's Hartsfield-Jackson International Airport via Groome Transportation. There are also other private providers that connect to nearby airports upon request.

[1] https://tourism.alabama.gov/content/uploads/FY2018EconomicImpactonline.pdf

Traveling Within the Region

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

- Walking and biking: There are many sidewalks, bike lanes, and multi-use paths in the region that visitors could use to reach their destinations.
- Driving: Visitors can rent a car from any of the several car rental companies in the 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.

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 (especially college football game days) require temporary solutions such as "contra-flow" traffic on local streets, road closures, detours, special wayfinding, supplemental parking, and shuttles.
- **Expanded Sidewalks and Bike Facilities:** 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.
- **Expanded Public Transportation:** Again, many visitors to the region may not have a car at their disposal. Right now, public transportation is limited to residents, students, and workers. Expanding transit to be open to visitors could improve mobility for visitors. Introducing fixed route service would provide another option and benefit locals as well.

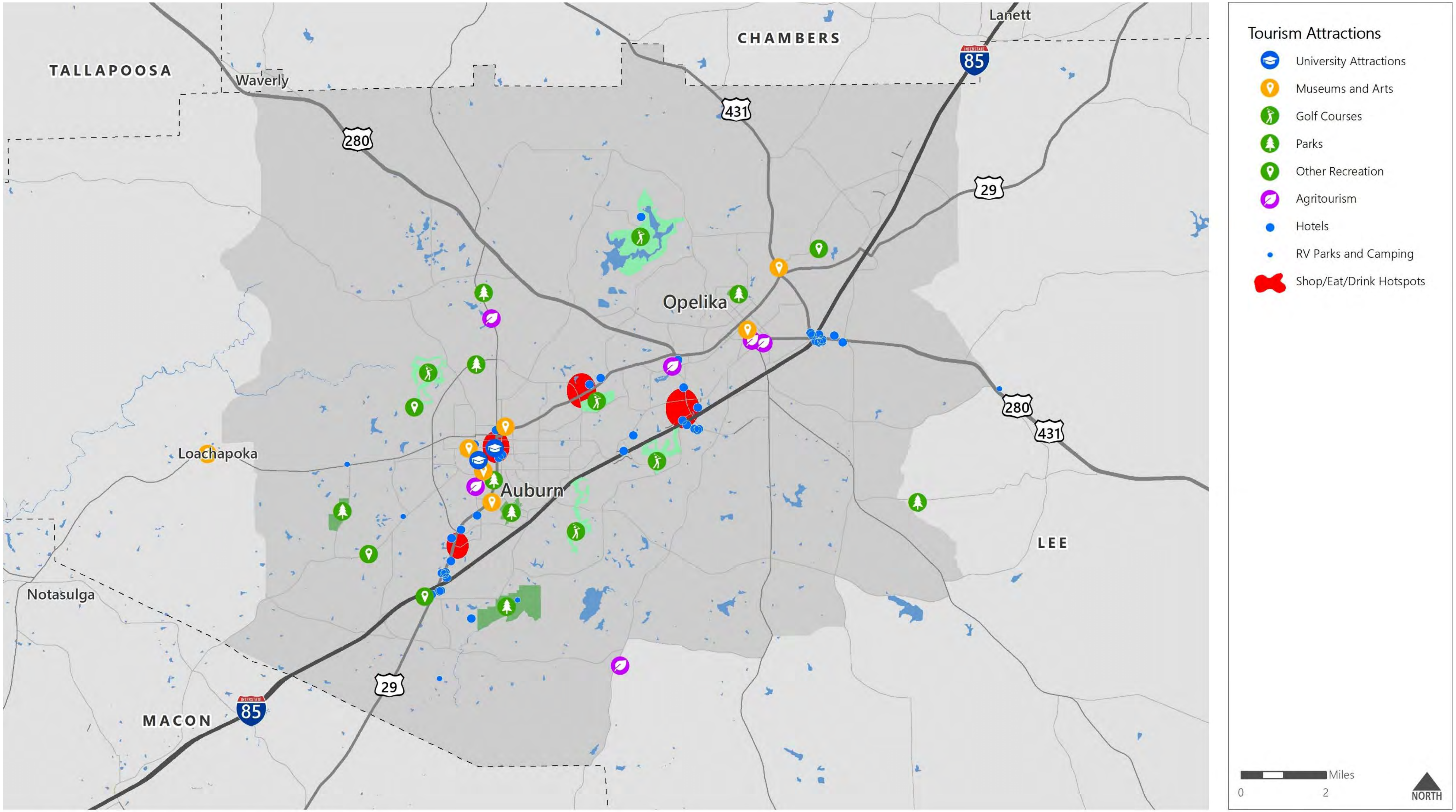
Beyond these strategies, the MPO should continue to coordinate with tourism stakeholders to stay abreast of their needs.

Table 2.1: Major Tourist Destinations

Destination Type	Name
University	Toomer's Corner
	Jordan Hare Stadium
Museums and Arts	Jule Collins Smith Museum of Fine Art at Auburn University
	Jan Dempsey Community Arts Center
	Museum of East Alabama
	Gogue Performing Arts Center
	Opelika Performing Arts Center
	Telfair Peet Theatre
Golf Courses	Robert Trent Jones Golf Trail at Grand National
	The Auburn University Club
	Indian Pines Golf Course
	Saugahatchee Country Club
	Moore's Mill Golf Club
Parks	Chewacla State Park
	Kreher Preserve & Nature Center
	Donald E. Davis Arboretum
	Kiesel Park
	Hickory Dickory Park
	Town Creek Park
	Opelika Municipal Park
	Spring Villa Park
Other Places to Play	Pioneer Park
	Auburn Softball Complex
	Opelika Sportsplex and Aquatics Center
	Yarbrough Tennis Center
	Auburn Soccer Complex
Agritourism	The Fisheries Learning Center (AU)
	Hornsby Farms
	Randle Farms
	Hodges Winery
	Opelika Grows
	The Market at Ag Heritage Park
	Whippoorwill Vineyards
	Opelika Farmers Market
	Parkway Farmers Market

Source: Auburn Opelika Tourism Bureau

Figure 2.2: Major Tourist Destinations and Areas



Data Sources: Auburn-Opelika Tourism, InfoGroup, Neel-Schaffer, Inc.

Disclaimer: This map is for planning purposes only.

3.0 Emerging Trends

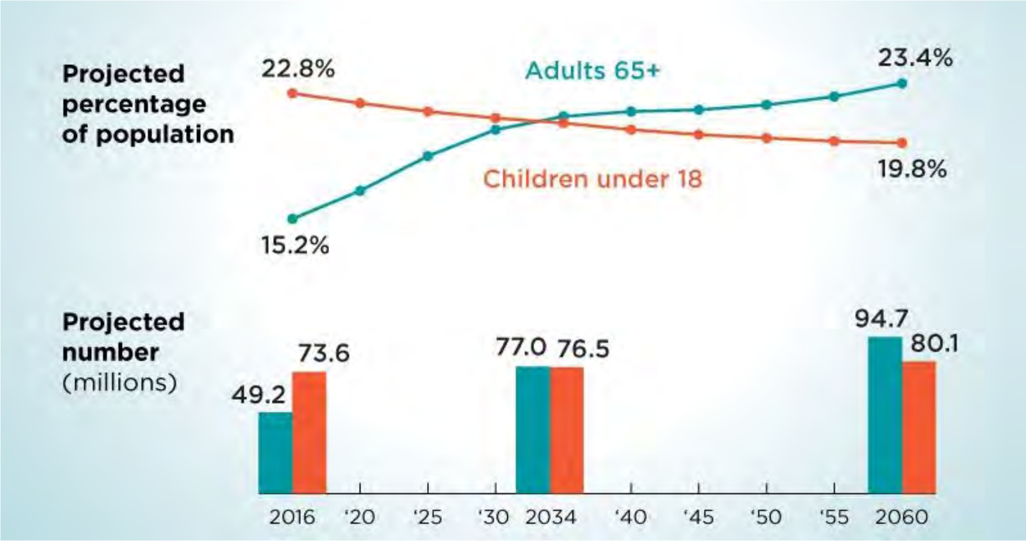
In recent years, travel patterns have changed dramatically due to demographic changes and technological advances. Many of these changes are part of longer-term trends and others are newer, emerging trends.

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

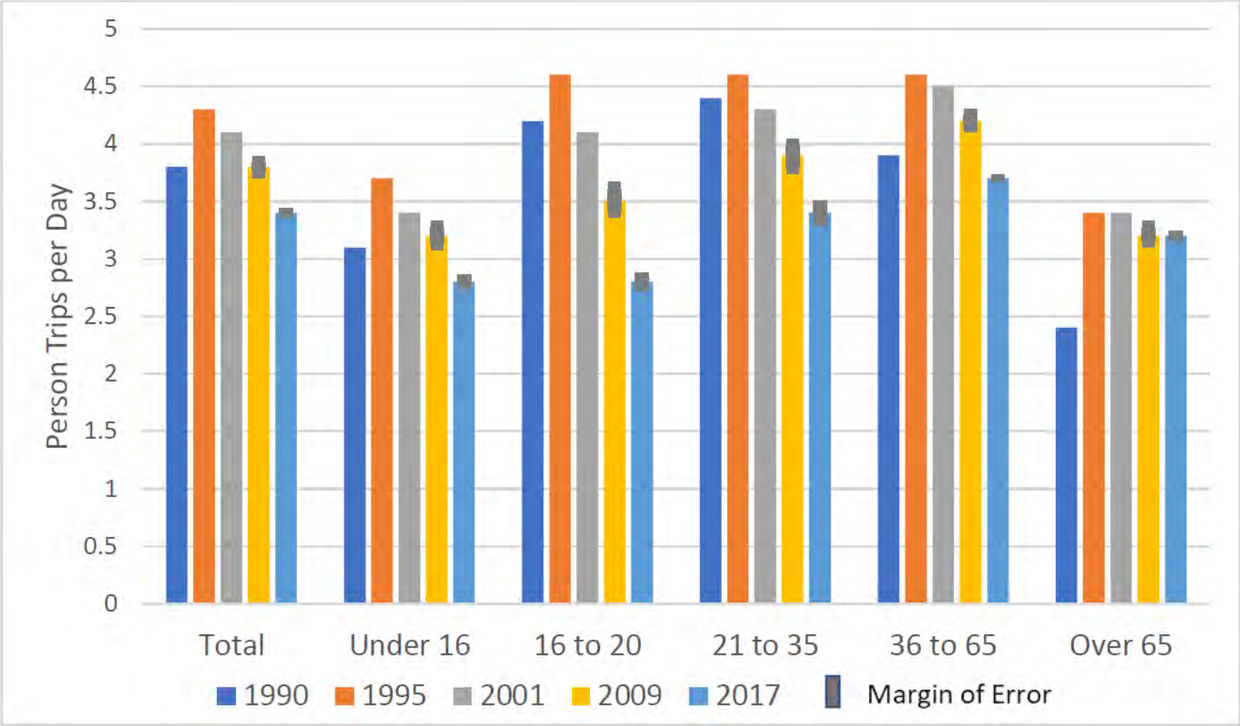
Most People are Traveling Less

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.

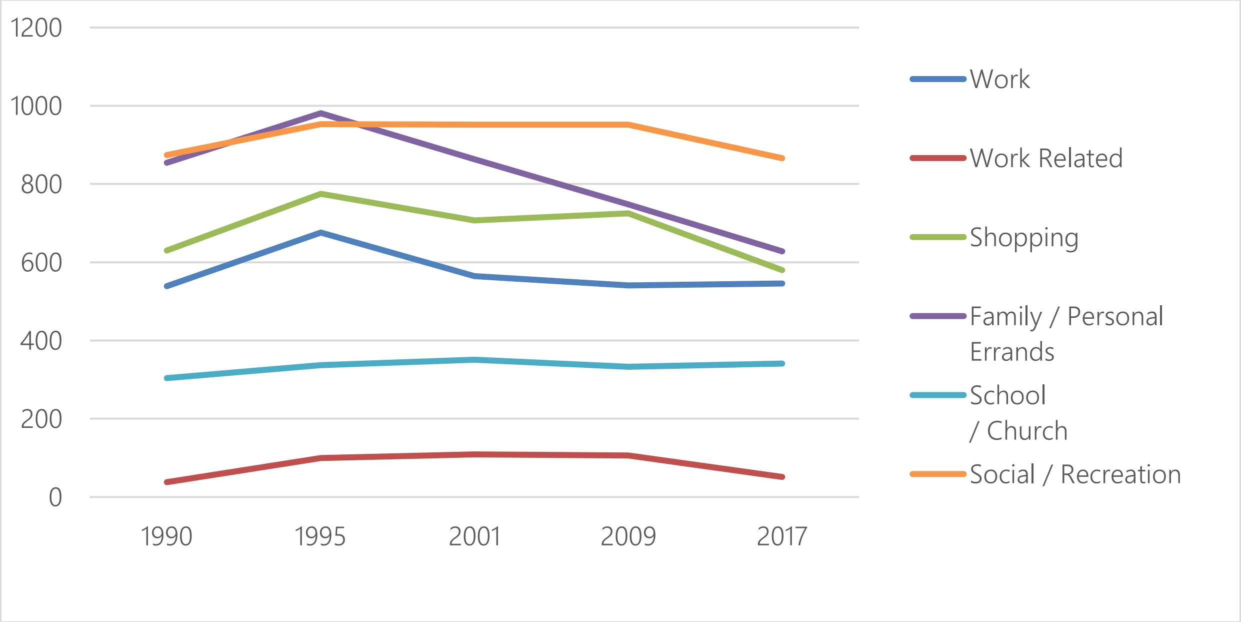
[2] https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html

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 Bcycle, 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

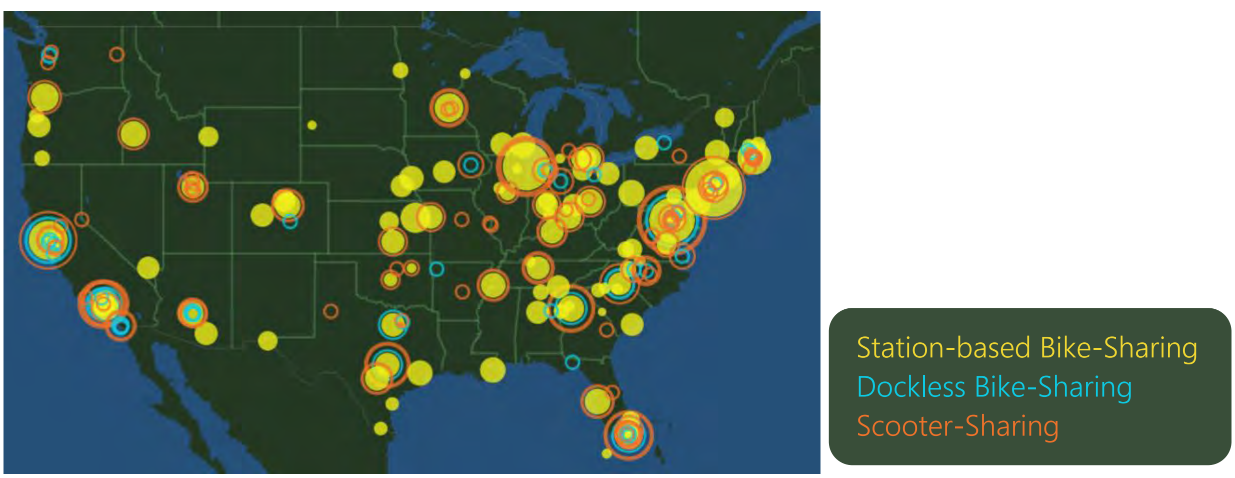
Bike-sharing and scooter-sharing, collectively referred to as micromobility options, are relatively new mobility options and continue to evolve. Modern, station-based bike-sharing emerged around 2010 and dominated the micromobility landscape from 2010 to 2016 until dockless bike-sharing systems emerged. 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.

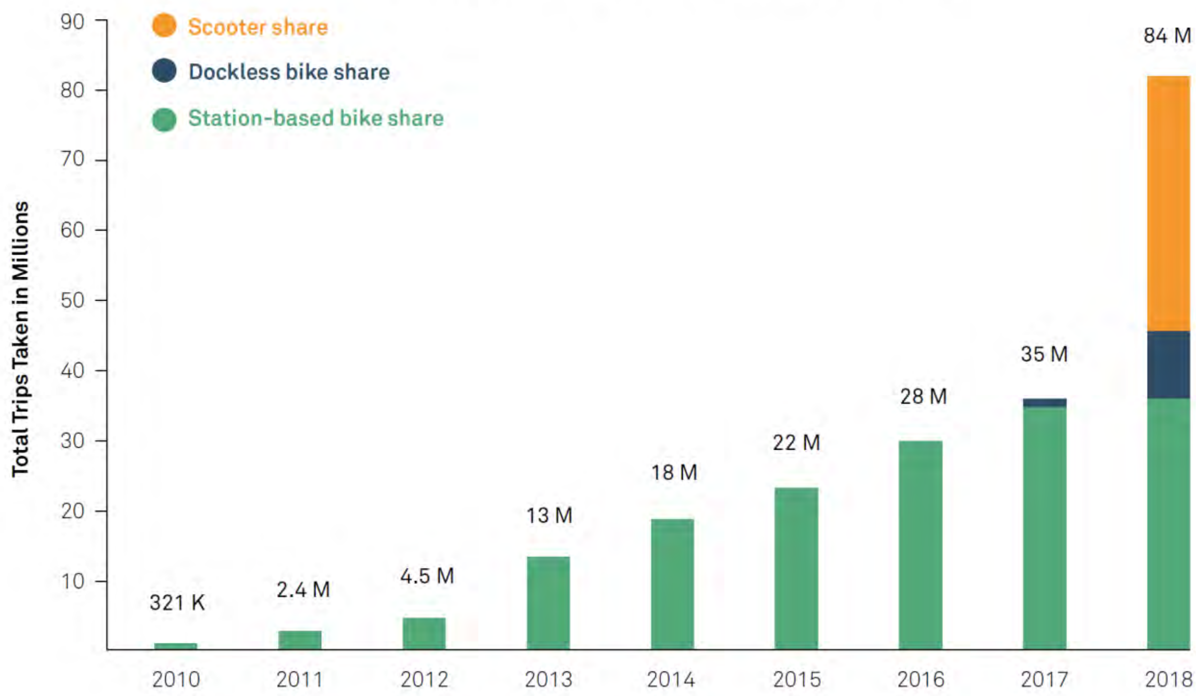
Figure 3.4: Public Bike-Sharing and Scooter-Sharing Systems in United States, 2019



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

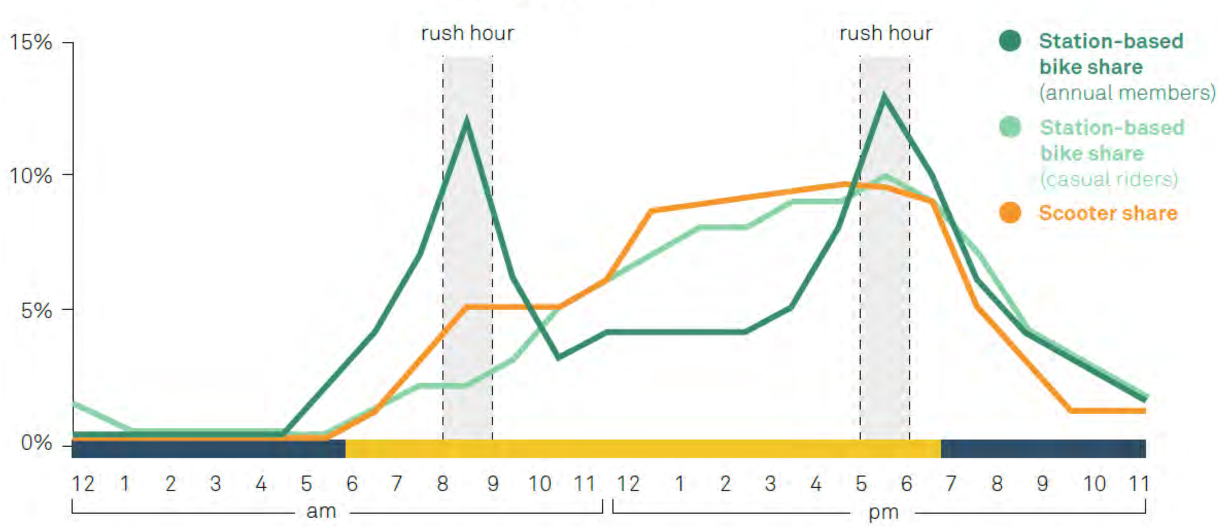
[3] https://nacto.org/wp-content/uploads/2019/04/NACTO_Shared-Micromobility-in-2018_Web.pdf

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



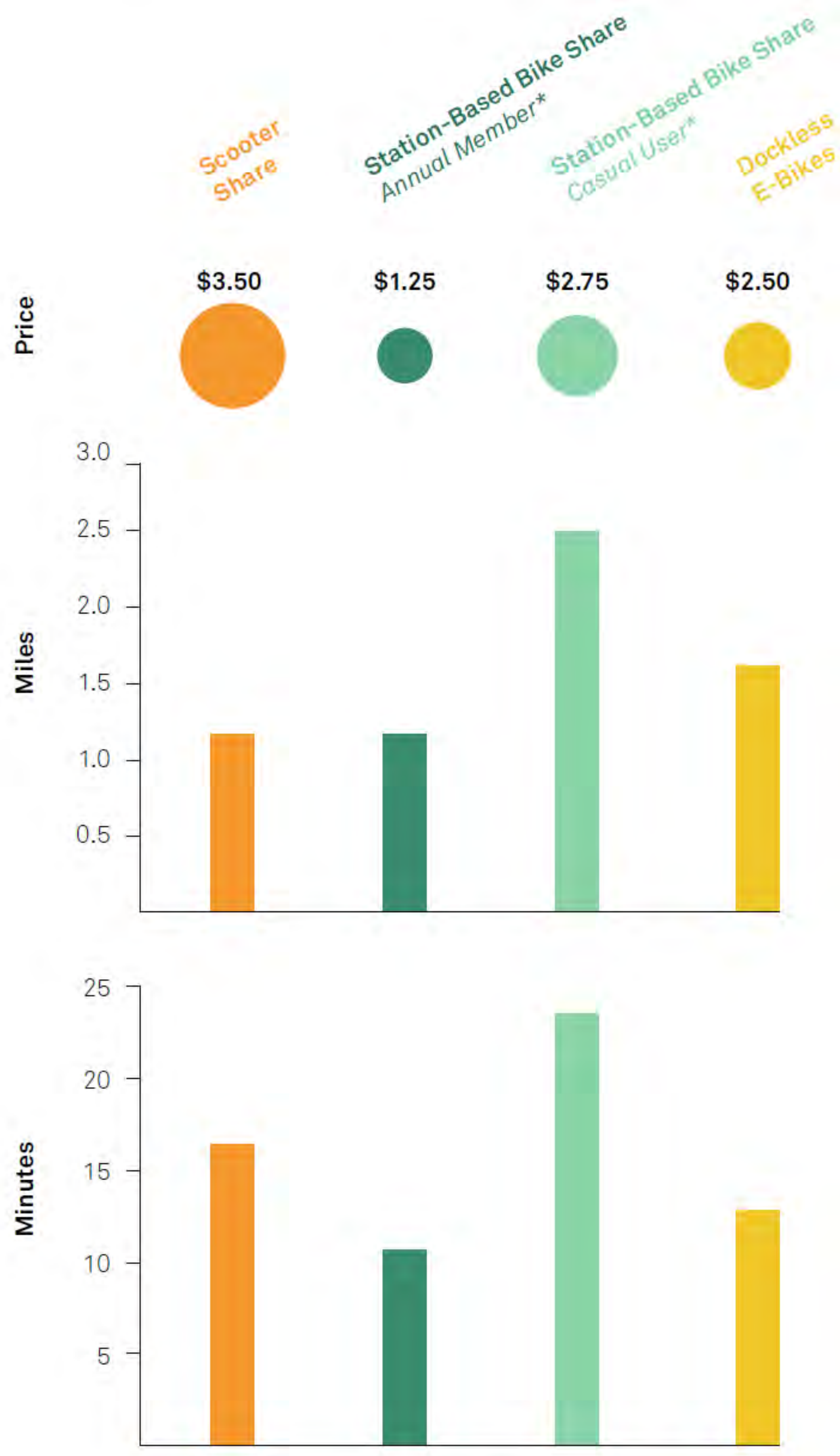
Source: NACTO

Figure 3.6: Average Micromobility Trips by Hour



Source: NACTO

Figure 3.7: Average Micromobility Trip Characteristics



Source: NACTO

Transportation Network Companies

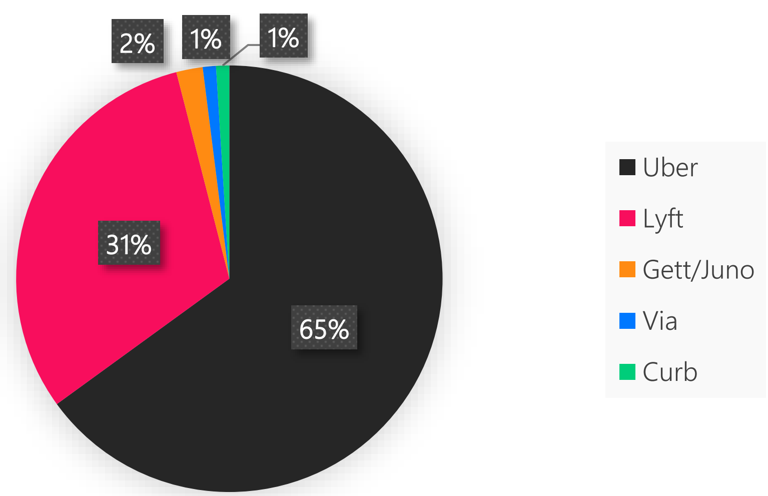
Ridehailing and ridesharing are the terms typically used to describe the services provided by Transportation Network Companies (TNCs) like Uber and Lyft. These TNCs emerged between 2010 and 2012 and have since grown rapidly, surpassing taxis in many metropolitan areas.

Today, TNCs are operating in most urban areas in the United States, including the Auburn-Opelika 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



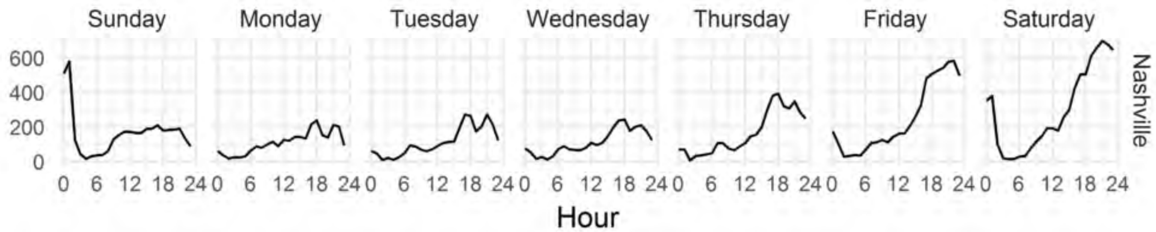
Source: Edison Trends

[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

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.[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.

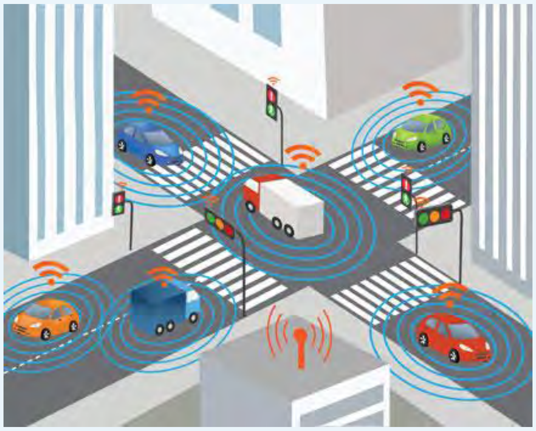
Outside of large urban areas, car-sharing is not that common. However, as connected and autonomous vehicles become more common, it is anticipated that car-sharing will become more widespread.

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

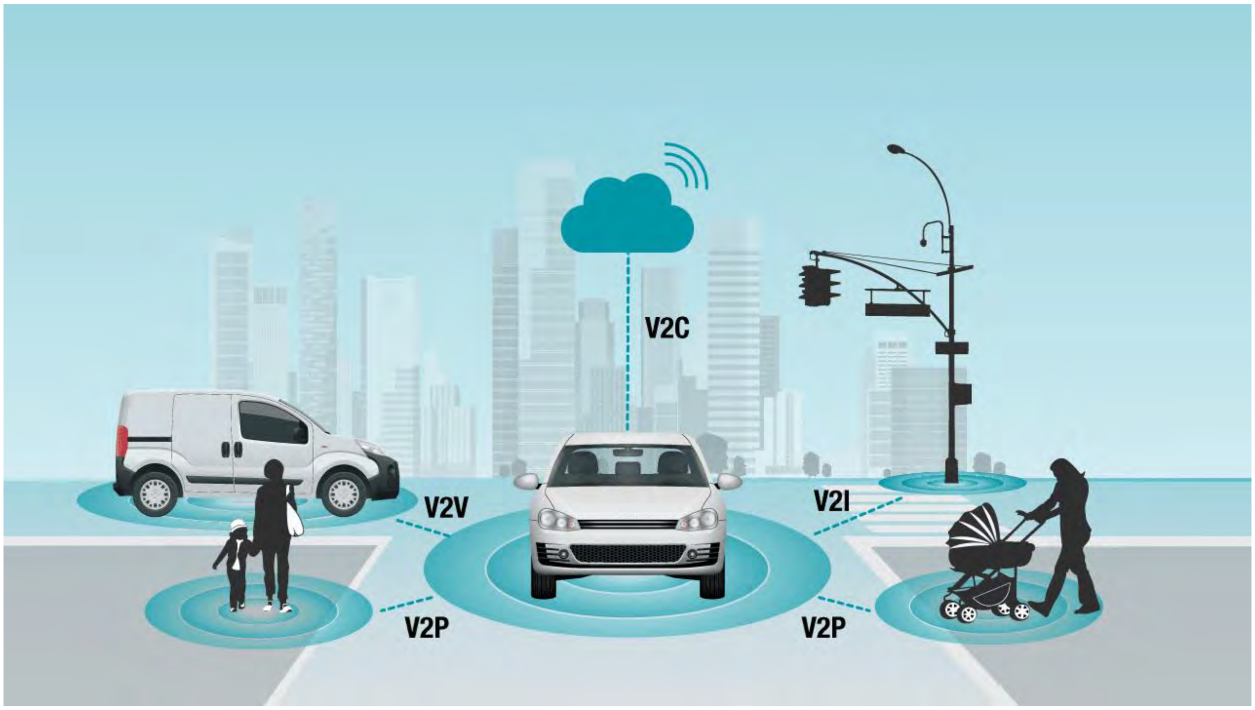
- **1** • Driver Assistance
- **2** • Partial Automation
- **3** • Conditional Automation
- **4** • High Automation
- **5** • Full Automation

Connected Vehicle Communication Types

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



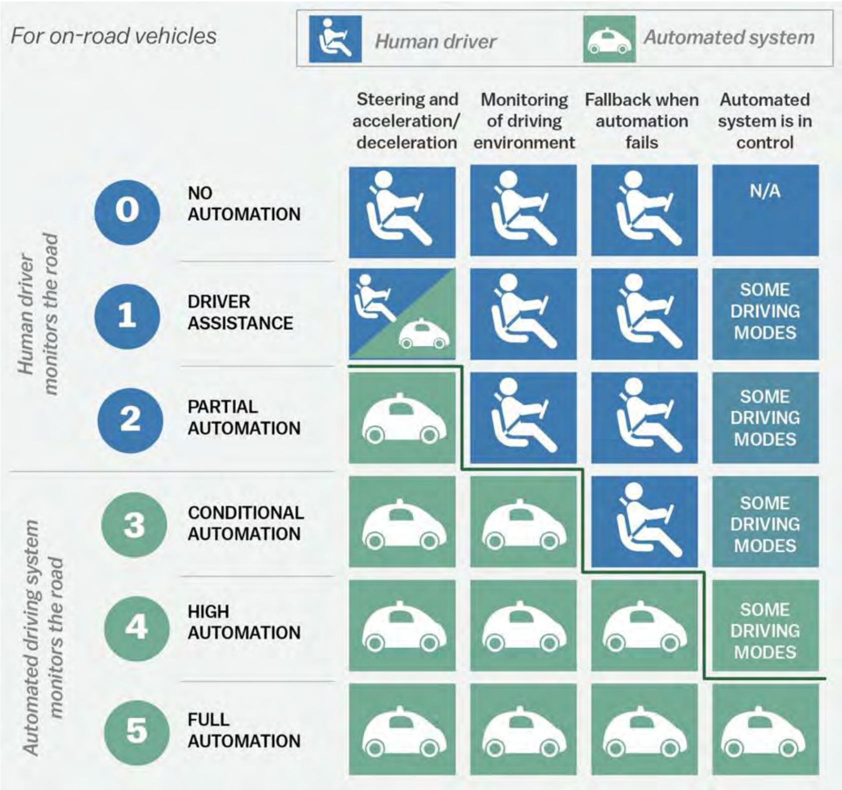
Source: Texas Instruments

Autonomous Vehicle Levels

According to the National Highway Traffic Safety Administration (NHTSA), there are five 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



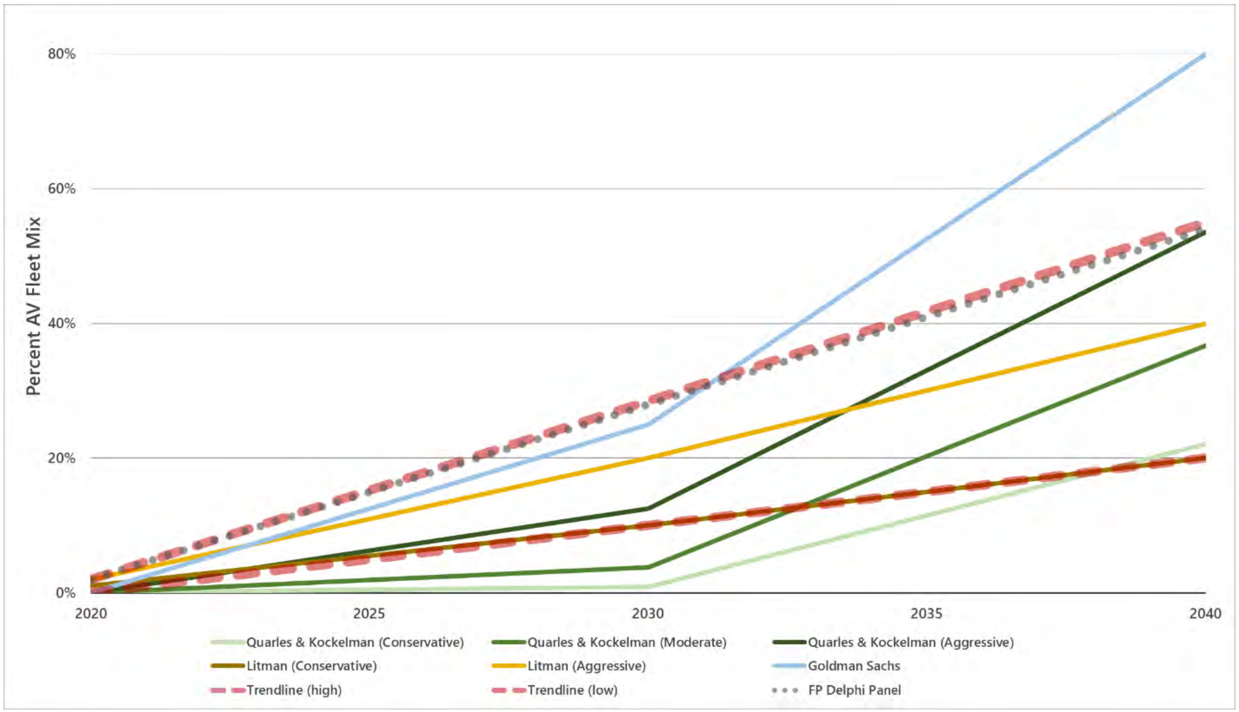
Source: SAE J3016 Levels of Automation (Photo from Vox)

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.[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 3.13: Potential Autonomous Vehicle Market Share, 2020 to 2040



Source: Fehr and Peers

[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/

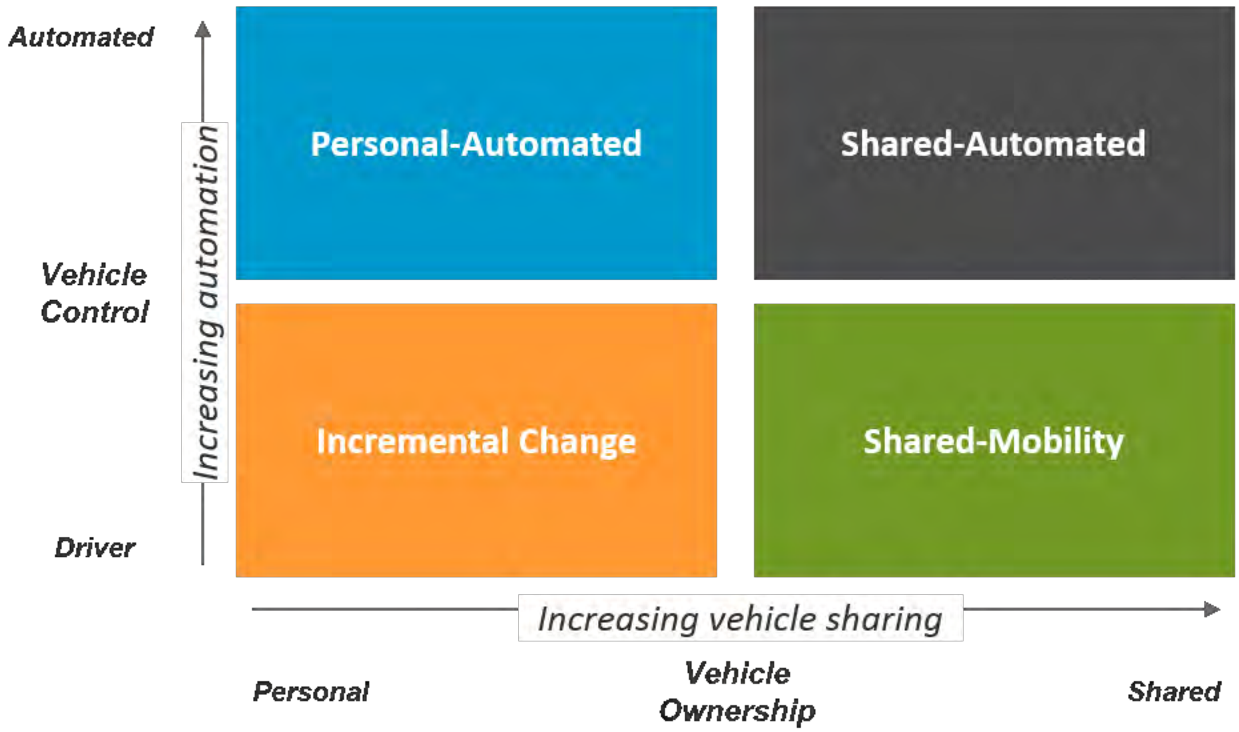
Potential Impacts

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 3.14, 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 3.14: 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.

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 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.

<u>Big Data for Planning</u>

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 seven (7) AFV stations in the MPA: four (4) electric stations, two (2) ethanol stations, and one (1) propane station.

E85 85% Ethanol

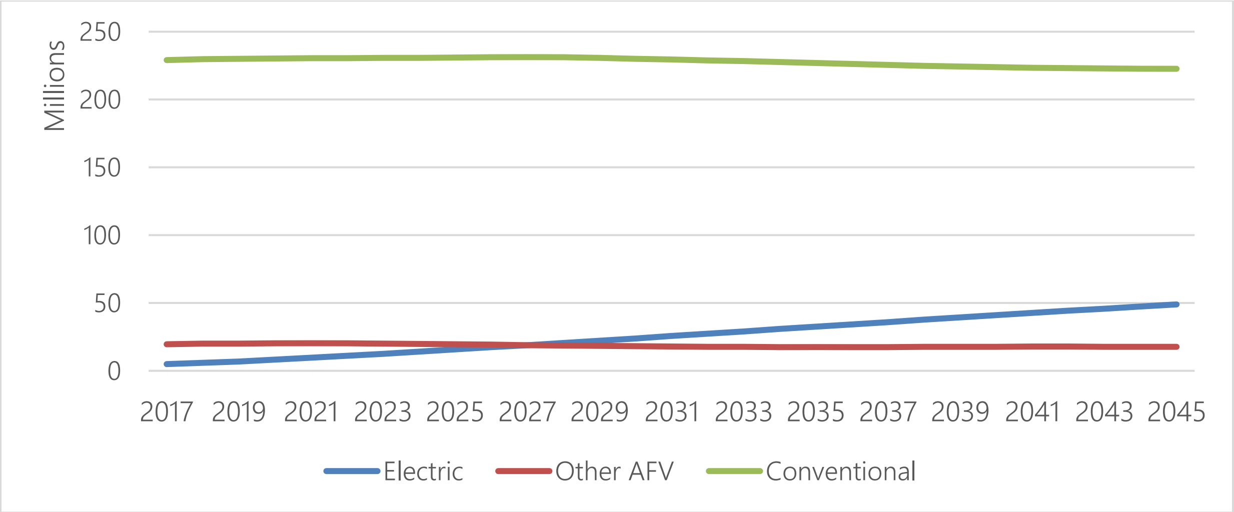
Growth Projections

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 3.15: 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 Alabama uses to fund transportation projects. Because of this, many states have begun imposing fees on these vehicles to recoup lost transportation revenue.[11] In 2019, Alabama passed legislation requiring electric and hybrid cars to pay annual fees.

[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 406,375 in 2015 to 675,904 in 2045. Most of the trip types grow by the same rate. However, trips with one or both ends outside of the MPA are forecasted to grow at a lower rate. These changes are summarized in Table 4.1.

66.3%

Growth in vehicle trips in the MPA from 2015 to 2045

Table 4.1: Vehicle Trips by Purpose, 2015 to 2045

Trip Purpose	2015	2045 (E+C)	Change	Percent Change
Home-Based Work	52,759	93,993	41,234	78.2%
Home-Based Other	134,741	234,078	99,337	73.7%
Non-Home Based	67,593	114,451	46,858	69.3%
Truck and Taxi	37,411	66,650	29,239	78.2%
Internal-External	78,353	116,076	37,723	48.1%
External-External	33,503	50,657	17,154	51.2%
Total	406,375	675,904	269,529	66.3%

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

Source: AOMPO 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 0.5 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 68 percent. However, during this same time period, the VHT will more than double, and the VHD will be more than six (6) times current delay. These changes are the result of a large growth in vehicle trips and comparatively slow growth of the roadway network. During the public survey, congestion reduction on the roadway network was identified as the top priority for residents and workers. This results in a high emphasis placed on congestion reduction during the project scoring process of the LRTP. Projects that will help reduce the large increase in the VHD from 2015 to 2045 therefore receive a higher score.

Table 4.2: Travel Demand 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
Interstate	21.77	21.77	0.00	0.0%
Principal	45.62	45.62	0.00	0.0%
Minor Arterial	100.89	102.01	1.22	1.2%
Collector	143.51	143.85	0.34	0.2%
Total	311.79	313.25	1.46	0.5%
Daily Vehicle Miles Traveled (VMT)				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Interstate	955,511	1,327,113	371,602	38.9%
Principal	664,414	994,771	330,357	49.7%
Minor Arterial	738,315	1,333,515	595,200	80.6%
Collector	368,863	933,531	564,668	153.1%
Total	2,727,104	4,588,931	1,861,826	68.3%
Daily Vehicle Hours Traveled (VHT)				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Interstate	17,181	34,248	17,067	99.3%
Principal	14,879	30,707	15,828	106.4%
Minor Arterial	18,868	44,254	25,386	134.5%
Collector	8,939	26,364	17,425	194.9%
Total	59,867	135,572	75,706	126.5%
Daily Vehicle Hours of Delay (VHD)				
Classification	2015 (Base)	2045 (E+C Projects)	Change	Percent Difference
Interstate	2,447	13,859	11,412	466.3%
Principal	1,869	11,433	9,565	511.9%
Minor Arterial	1,103	11,857	10,755	975.4%
Collector	96	3,598	3,502	3,638.3%
Total	5,515	40,748	35,233	638.9%

Note: E+C is future scenario with only Existing and Committed transportation projects.

Source: AOMPO Travel Demand Model, NSI

Currently, congestion is concentrated mostly near intersections in the MPA. 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 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.

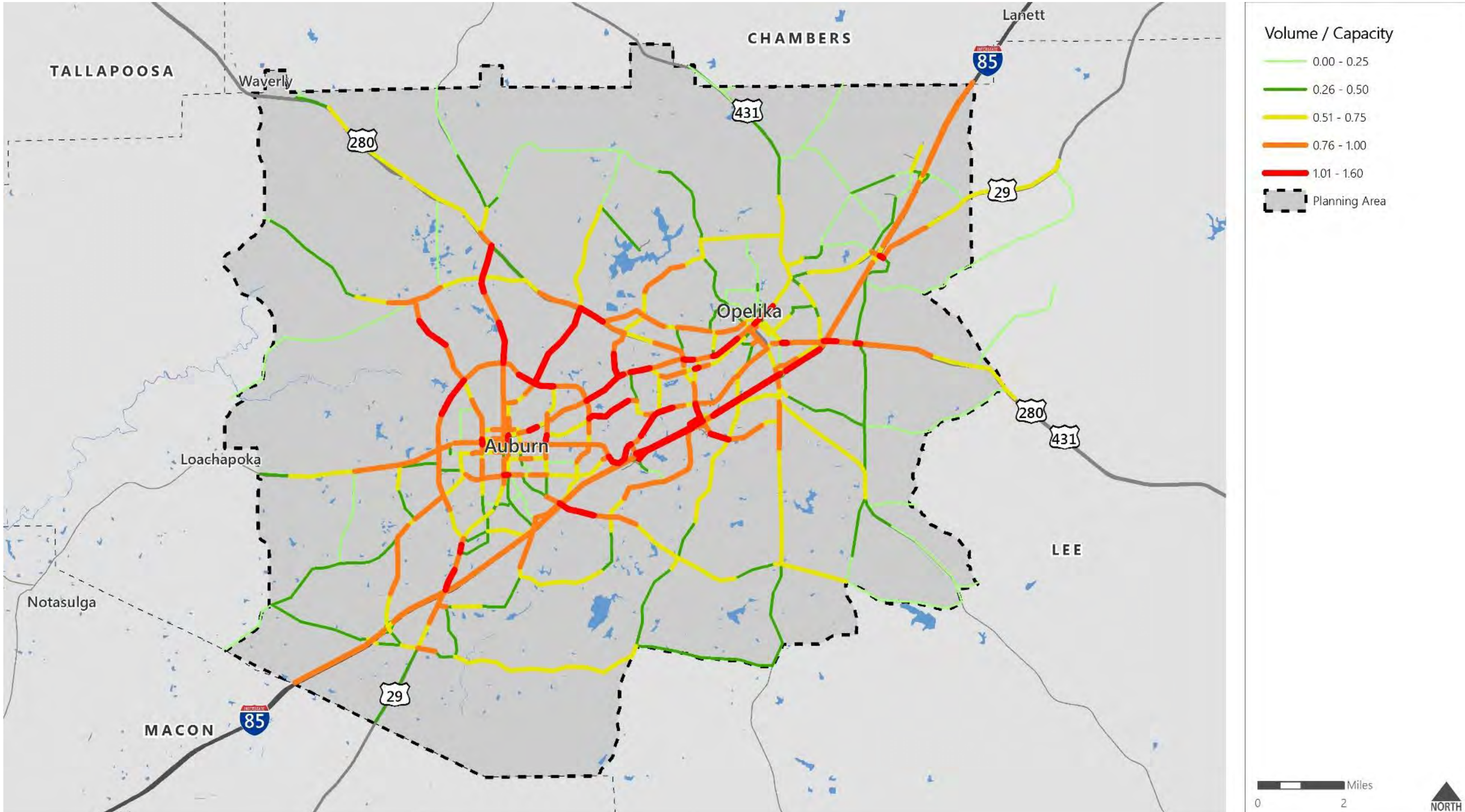
Table 4.3: Roadway Corridors with Volumes Exceeding Capacity, 2045

Roadway	Location	Length (miles)
I-85 Eastbound	Bent Creek Road On-Ramp to US 280 Off-Ramp	4.69
I-85 Westbound	Bent Creek Road Off-Ramp to Geneva Street On-Ramp	3.54
I-85 EB On-Ramp	@ Bent Creek Road	0.26
US 280	Grand National Parkway to Waverly Parkway	0.60
Gateway Drive (US 280)	Frederick Road to I-85 WB Ramps	0.35
US 280	I-85 WB Ramps to S Uniroyal Road	0.86
US 29	I-85 EB Ramps to N Uniroyal Road	0.09
SR 14	Pitts Street to 0.21 miles east of Pitts Street	0.21
Opelika Road (SR 14)	E University Drive to Midway Drive	1.13
Opelika Road (SR 14)	Airport Road to N 30th Street	0.47
Pepperell Parkway (SR 15)	Gateway Drive (US 280) to E Thomason Circle	0.23
2nd Avenue (SR 15)	Pleasant Drive to 14th Street N	0.71

Roadway	Location	Length (miles)
2nd Avenue (SR 15)	N 8th Street to N 6th Street	0.18
Samford Avenue (SR 15)	N 3rd Street to Plum Avenue	0.20
Columbus Parkway (SR 38)	S 6th Street to 0.12 miles east of S 6th Street	0.12
S College Street (SR 147)	I-85 WB Ramps to E University Drive	1.25
Shug Jordan Parkway (SR 147)	Ware Drive to N Donahue Drive	0.95
N College Street (SR 147)	E University Drive to 0.18 miles south of Tivoli Village Drive	0.97
N College Street (SR 147)	0.33 miles south of Farmville Road to US 280	1.11
Shelton Mill Road (CR 97)	E University Drive to US 280	2.08
N Donahue Drive (CR 82)	Miracle Road to Crescent Boulevard	0.85
N Donahue Drive	W Glenn Avenue to W Drake Avenue	0.33
E Glenn Avenue	E Samford Avenue to Mike Hubbard Boulevard	0.88
Country Club Road	E University Drive to Dorsey Street	1.05
Gateway Drive	Capps Road to CR 54 E	0.43
E University Drive	0.42 miles west of Shelton Mill Road to N Dean Road	0.87
Moores Mill Road	E University Drive to Stoneridge Drive	0.53
1st Avenue	Thomason Drive to N 20th Street	0.10
Veterans Parkway	Pepperell Parkway to Midway Drive	0.55
E Samford Avenue	S College Street (SR 15) to S Gay Street	0.10
N Gay Street	Mitcham Avenue to Opelika Road	0.11
Frederick Road	Indian Hill Road to 0.08 miles east of Corporate Park Drive	1.04

Source: AOMPO 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.

- Gateway Drive Corridor, including:
    - Intersection of Gateway Dr and Frederick Rd
    - Tiger Town area
- Downtown Auburn, including:
    - Intersection of S College St and Samford Ave
    - Intersection of S College St and Magnolia Ave
    - Intersection of N College St and Glenn Ave
    - Intersection of N Gay St and Glenn Ave
- Opelika Road, including:
    - Intersection of Opelika Rd and N Dean Rd
    - Intersection of Opelika Rd and E University Dr

City of Auburn Traffic Study

As noted in the Existing Conditions Analysis, Opelika Road at E University Drive was identified in a recent Comprehensive City-Wide Traffic Study for a signal coordination project, with seven (7) signals on the corridor selected for coordination. The limits of the project include both the congested Opelika Road segments listed in Table 4.3.

It should be noted that several more corridors and intersections identified in the comprehensive traffic study are anticipated to become congested by 2045. The recommendations listed in the traffic study along those corridors should be implemented as funding becomes available.

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 the Existing Conditions Analysis displays the pavement conditions in the MPA. However, the majority of SR 14 (2nd Avenue) in Opelika from N 13th Street to Plum Avenue is in Poor condition. The roadway experiences a volume of 15,000 to 17,000 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 seven (7) bridges in Poor condition within the MPA; four (4) 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 LRTP 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 ALDOT should prioritize these bridges for improvements as funding becomes available.

It should be noted that a federal grant was recently awarded for the purposes of replacing six bridges in the Opelika area. These bridges are those on I-85 at Long Street and I-85 at SR 51. This grant covers all three of the I-85 bridges listed in Table 4.4; however, the grant does not cover the full amount of the project, meaning that additional funding will be needed to complete the project.

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

Alabama ID	Roadway	Feature Intersecting	Year Built	Sufficiency Rating
OCO1014 410000092Z00	Lee Rd 14	Choclafaula Creek	1930	21.8
OAL0051 410112.83600	SR 51	Robinson Creek Tributary	1939	32.3
OAL0038 410107.36100	US 280	First Avenue	1996	36.2
OIN0085 410059.582+1	I-85	Long Street	1959	62.1
OMU0004 410000M03100	Ogletree Rd	Moores Mill Creek	1970	62.9
OIN0085 410060.666-1	I-85	SR 51	1959	70.0
OIN0085 410059.582-1	I-85	Long Street	1959	73.6

4.3 Safety Needs

Within the Auburn-Opelika MPA, a total of 18,588 crashes occurred between 2014 and 2018[1]. During that timeframe, there were 46 fatal crashes and 351 crashes with incapacitating injuries. Another 3,087 crashes caused non-incapacitating injuries or possible injuries.

3.17%

Crashes involving alcohol and/or drugs

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 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:

- 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, 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:

- 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.

Intersection Recommendations

The intersection of North College Street (AL-147) and Farmville Road (SR-72) is located to the north of Auburn approximately 0.75 miles south of US-280 along AL-147. The intersection is currently controlled by a yellow flashing light on North College Street and a red flashing light on Farmville Road. Since AL-147 is the primary route between Auburn and US-280, this intersection experiences heavy traffic often traveling at high speeds. During the public involvement process, several comments were received that recommended a roundabout at this location. A feasibility study has been conducted at this location and ALDOT is planning to advance the project in early 2020. The LRTP supports a roundabout feasibility study and its construction if it will result in safety improvements.

The intersection of Frederick Road and Gateway Drive (US-280) is located in a heavily congested area approximately 0.5 miles north of I-85 Exit 58 in Opelika. Both roads approach the signalized intersection with 7 lanes. Through traffic on US-280 mixes with local traffic going to the Tiger Town shopping center, Lowe's Home Improvement, and numerous other businesses and restaurants near this intersection. Due to the heavy traffic volumes and large number of crashes at this intersection, a safety study is recommended at this location.

Corridor Recommendations

Shug Jordan Parkway was identified by the public as a top corridor with safety concerns. This four-lane road comprises the west half of a loop road that bypasses downtown Auburn. Its heavy traffic volumes and high speeds, combined with multiple intersections, result in a high number of crashes, mostly at or near intersections. A corridor specific safety study is recommended for this route.

Glenn Avenue was also identified during the public involvement process as a top corridor with safety concerns. It is an east-west arterial that bisects Auburn. Most of the road has four through lanes with separate center turn lanes and a 45 MPH speed limit. Glenn Avenue has numerous intersections leading to residential neighborhoods and commercial sites. An access management study, especially in the section closest to downtown Auburn, might help reduce crashes along this route to improve safety.

City of Auburn Traffic Study

The City of Auburn has recently conducted a Comprehensive City-Wide Traffic Study. This study identified areas with bicycle and pedestrian safety risks throughout the City and recommended improving conditions along high-risk roadways. The LRTP recommends that the improvements identified in the Comprehensive City-Wide Traffic Study are implemented.

[1] Crash information was obtained from the Critical Analysis Reporting Environment (CARE), a data analysis software package that is maintained by the Center for Advanced Public Safety in Alabama.

5.0 Freight

5.1 Freight Truck Needs

Forecast Growth

Figure 5.1 shows the projected growth in freight tonnage for trucks in Alabama from 2012 to 2045. This data was obtained from the Freight Analysis Framework (FAF).

Table 5.1 shows the change in truck freight tonnage in Lee County between 2012 and 2045. Figure 5.2 shows the changes in the means of transporting freight originating in Alabama from 2012 through 2045 for each mode, ranked by ton-mile.

The following observations emerge from the FAF data:

- The total freight truck tonnage in Alabama is expected to increase by 76 percent between 2012 and 2045. However, for Lee County, the total freight truck tonnage is expected to increase by 87 percent between 2012 and 2045.
- The growth in inbound and outbound truck freight is expected to be approximately equal. However, the growth in through truck freight is expected to be greater than the growth in intrastate truck freight.
- The percentage of freight moved by truck in Alabama is expected to be nearly the same for both 2012 and 2045. The Water, Air, Multiple Modes & Mail, and Other and Unknown modes are expected to see a greater increase in growth than the Pipeline and Rail modes.

Figure 5.3 illustrates where growth in freight truck traffic is anticipated to be the highest. Figure 5.4 shows the estimated 2045 truck volumes on the MPA's roadway network.

Table 5.1: Lee County Freight Truck Tonnage, 2012 to 2045

	2012	2045
Kilotons of Truck Freight	3,980	7,479
Percent of State Total	1.39%	1.48%
County Rank within the State of Alabama	25th	24th

Figure 5.1: Truck Freight Tonnage in Alabama, 2012 to 2045

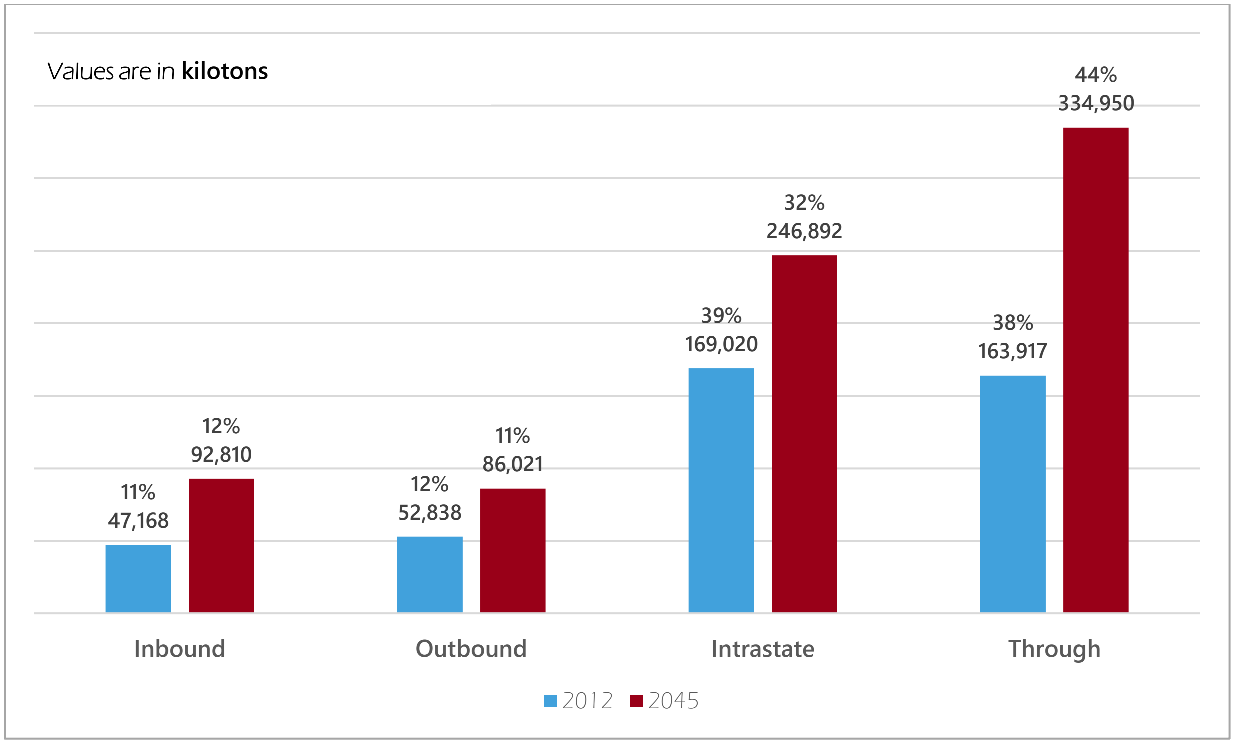
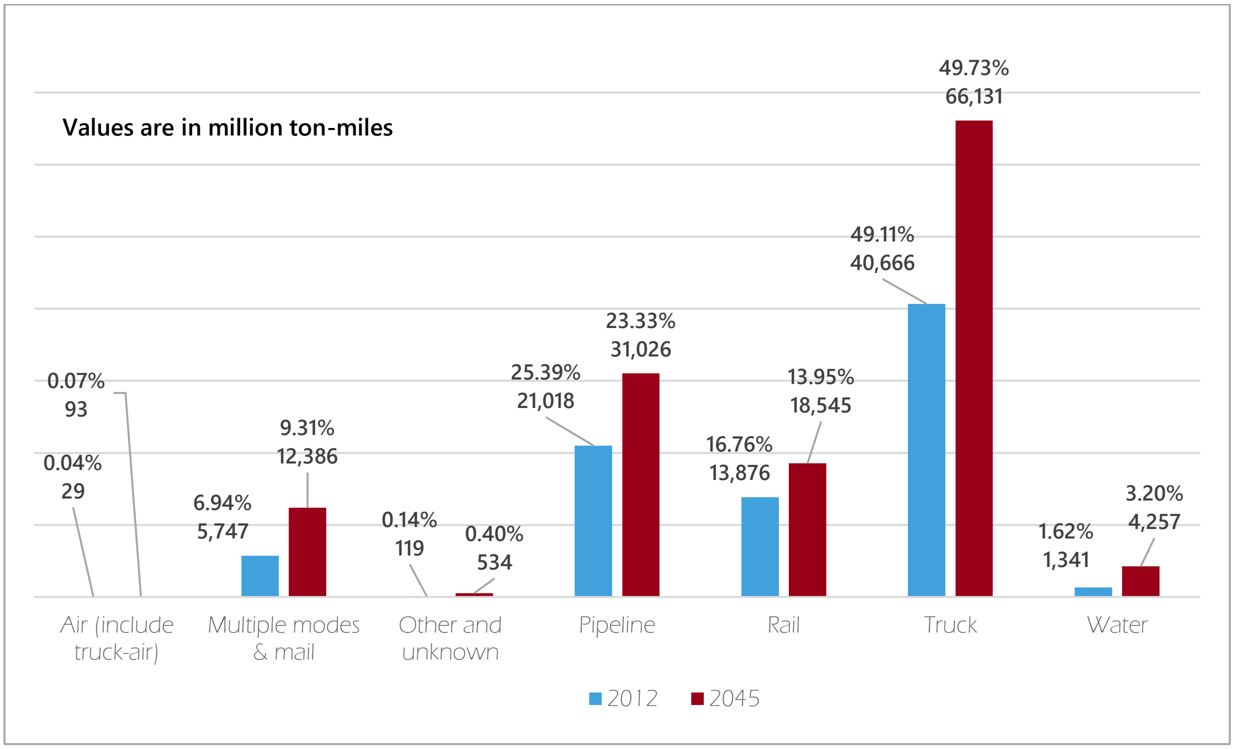


Figure 5.2: Means of Transporting Freight Originating in Alabama, 2012 to 2045

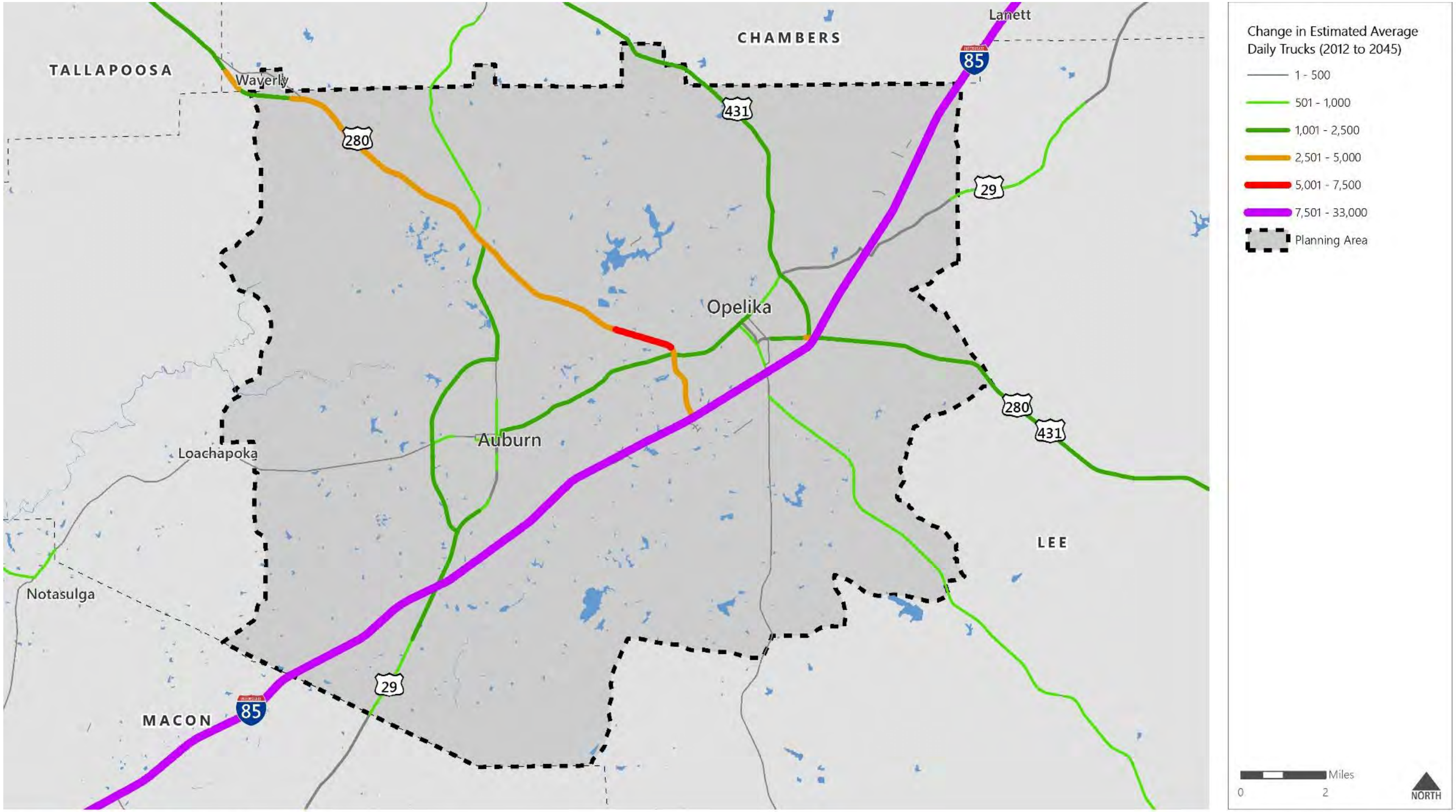


Roadway Capacity and Reliability

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 5.5 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 5.6 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.

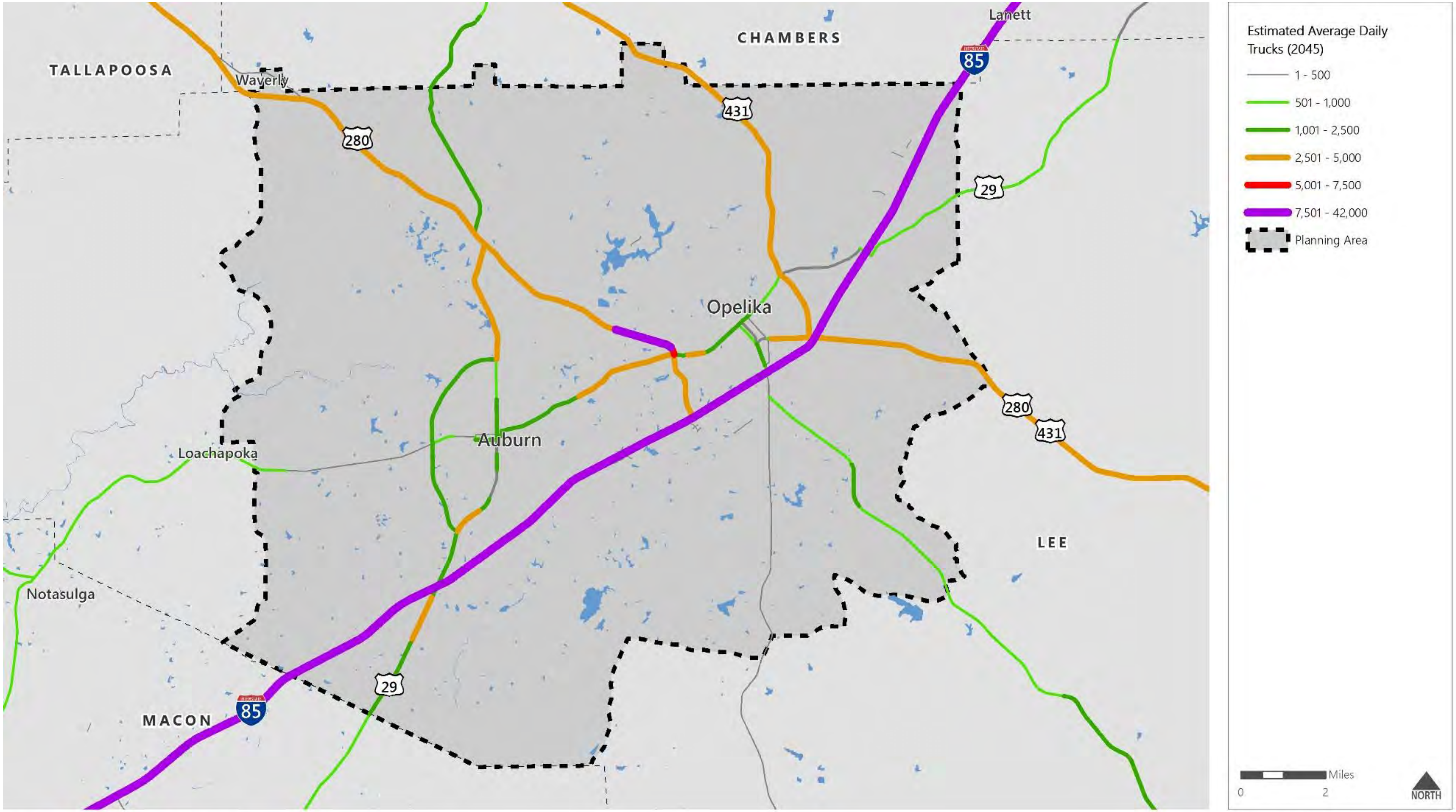
Figure 5.3: Freight Truck Growth, 2012 to 2045



Data Sources: Freight Analysis Framework

Disclaimer: This map is for planning purposes only.

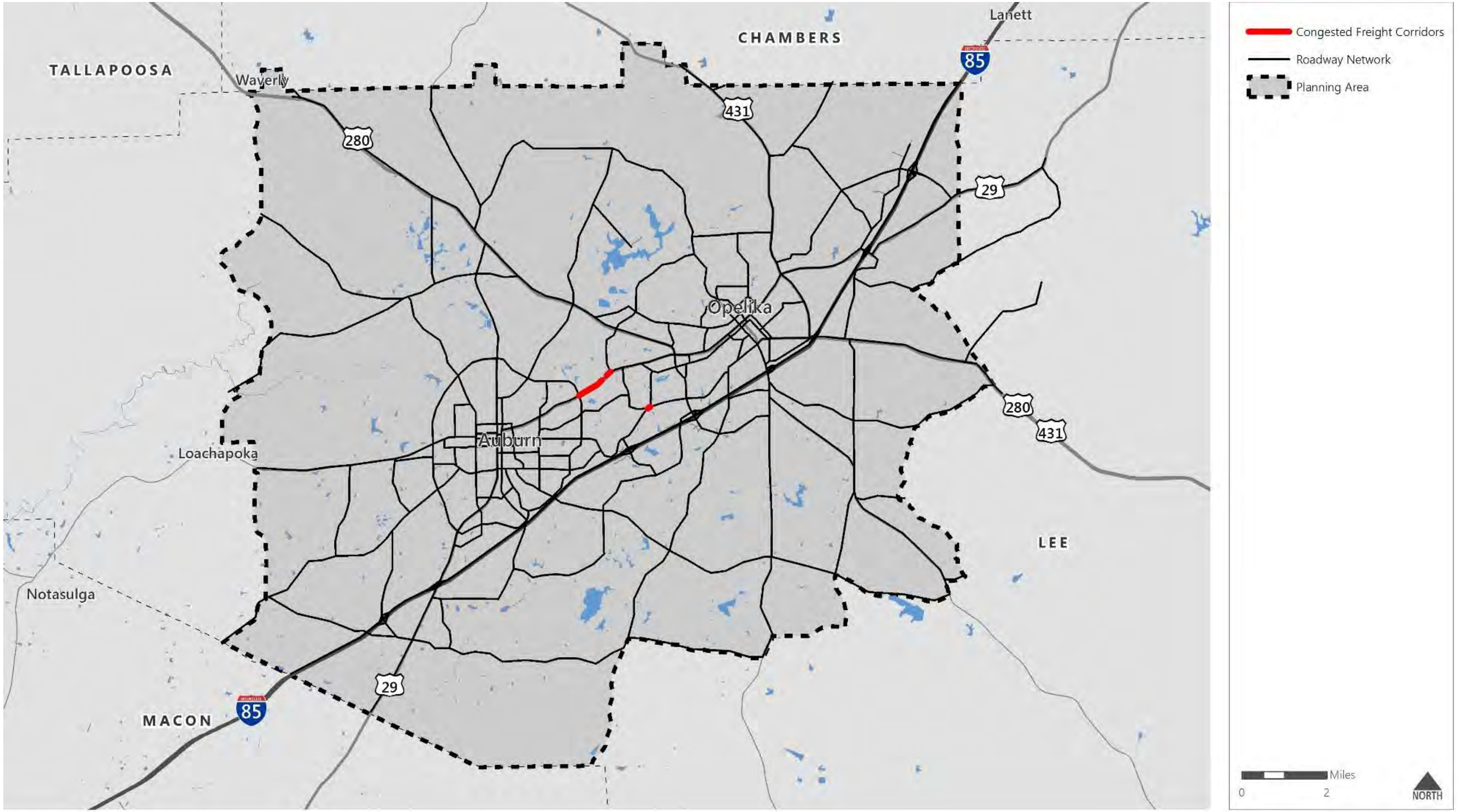
Figure 5.4: Freight Truck Traffic, 2045



Data Sources: Freight Analysis Framework

Disclaimer: This map is for planning purposes only.

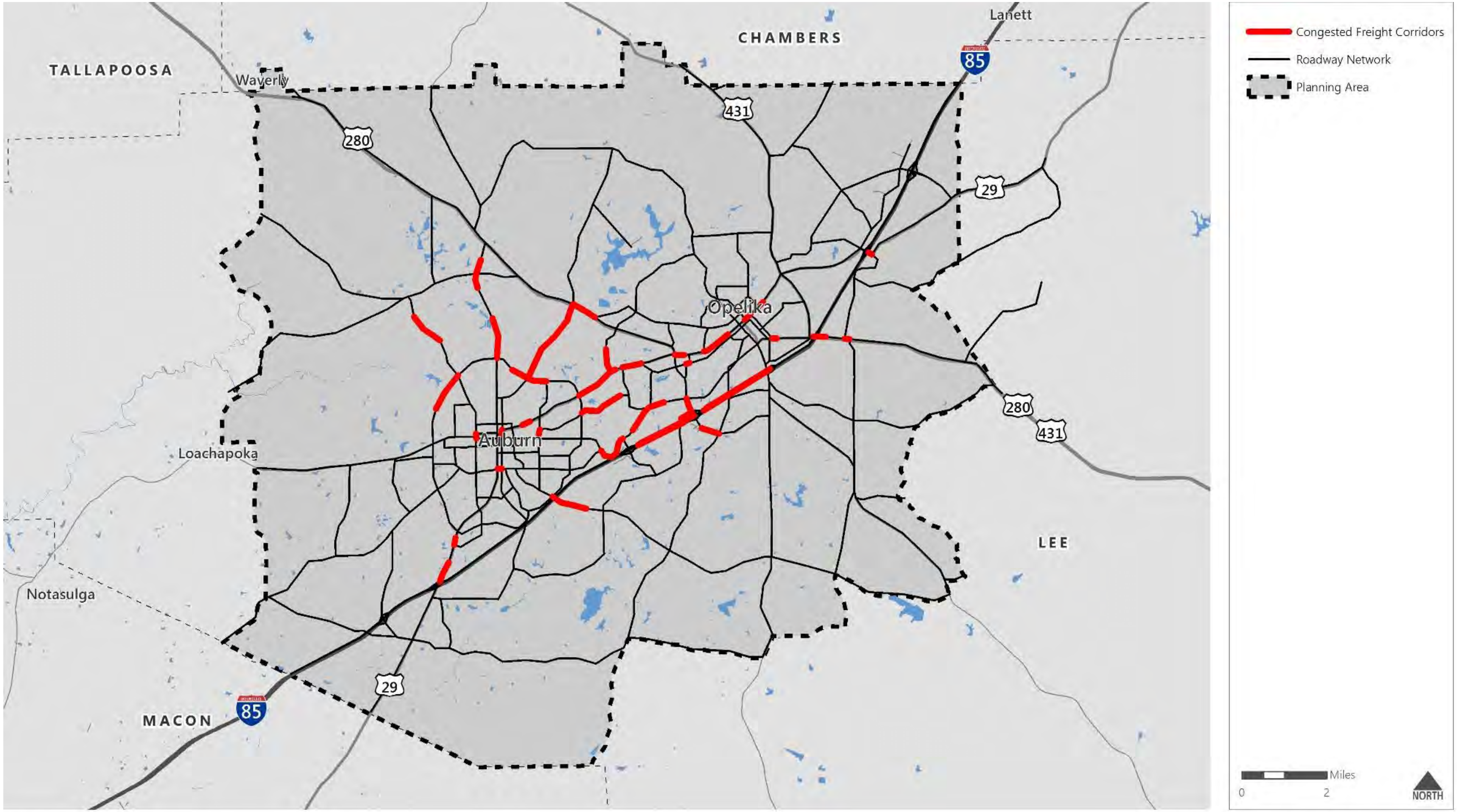
Figure 5.5: Congested Freight Corridors, 2012



Data Sources: Travel Demand Model

Disclaimer: This map is for planning purposes only.

Figure 5.6: Congested Freight Corridors, 2045



Data Sources: 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 Alabama is projected to increase by approximately 34 percent from 2012 to 2045.

Future rail capacity and related needs can be measured in many ways. However, actual volumes and capacities are not known for all rail segments in the Auburn 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 *Alabama Rail Plan* outlines the future efforts anticipated by ALDOT[12].

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 Auburn MPA.

Weight Limits
- The CSX Transportation and Norfolk Southern Railroads accommodate the industry standard of 286,000 pounds (286k). No information is available for branch lines from the main lines.

Number of Tracks
- The majority of the approximately 38 miles of railroad in the MPA are single track.

Traffic Control and Signaling
- Railroads in the Auburn MPA that utlize signaling as a form of traffic control use one of the following
  - Manual: allows maximum speeds of 49 to 59 miles per hour
  - Automatic Block Signals: allows maximum speeds of up to 80 miles per hour
  - Centralized Train Control: considerable capacity improvements over ABS

Terminal and Yard Capacity
- Information on terminal and yard capacities were not available for this plan for the Auburn 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.

[12] https://www.dot.state.al.us/dsweb/divTed/Rail/pdf/RailPlanFINAL.pdf

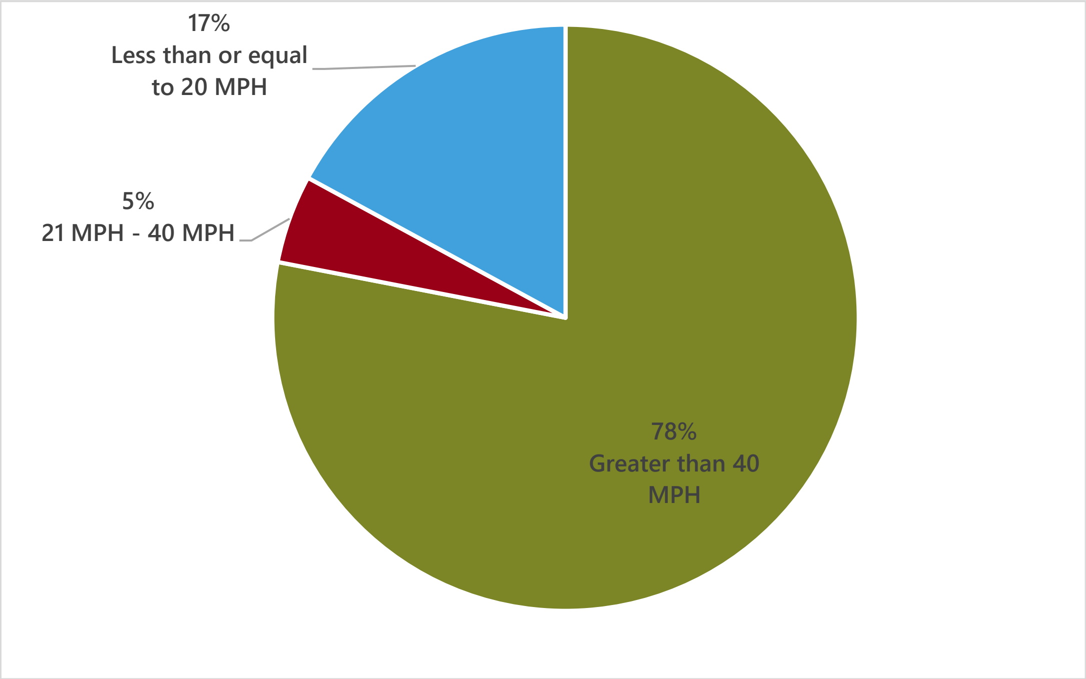
Highway-Railroad Crossings

Of the 35 public highway-rail grade crossings within the MPA, four (4) crossings only have passive warning devices (cross bucks, warning signs, regulatory signs, and pavement markings). None of these crossings are at 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 Alabama was identified as one of the ten states with the most highway-rail grade crossing collisions between 2006 and 2008. As a result, ALDOT developed the State Highway-Rail Grade Crossing Action Plan[13].

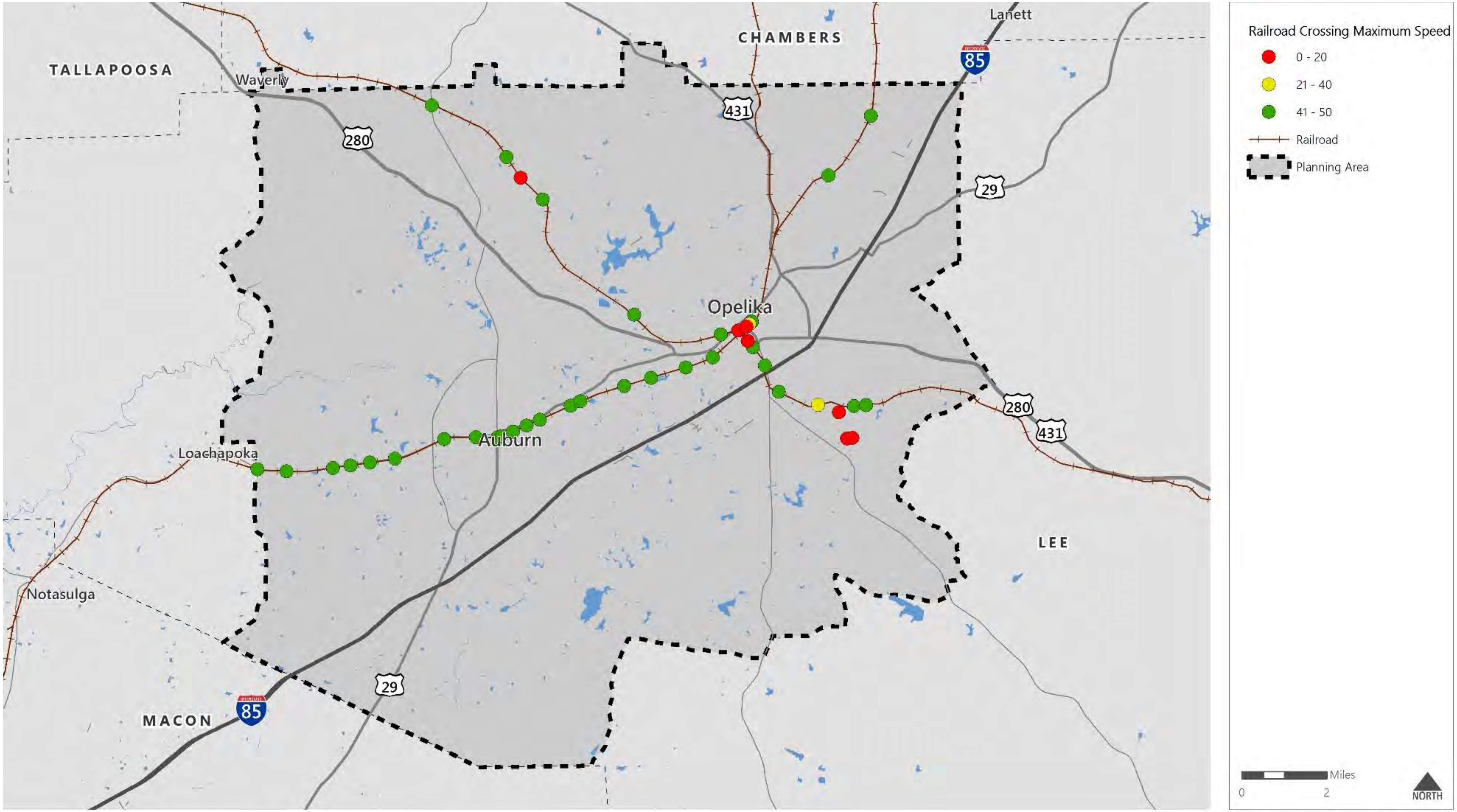
Figure 5.7 breaks down the maximum speed for the 41 railroad crossings in the MPA. Figure 5.8 illustrates the operating speeds at each crossing within the MPA.

Figure 5.7: Maximum Operating Speed at Railroad Crossings in the MPA



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

Figure 5.8: Railroad Crossing Speeds



Data Sources: Federal Rail Administration

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 Alabama is projected to increase by approximately 320 percent from 2012 to 2045. However, the ton-mileage shipped by air is expected to be less than 0.1 percent of all ton-mileage in Alabama.

According to the FAF data, the freight ton-mileage transported by air in Alabama is projected to increase by approximately 320 percent from 2012 to 2045. However, the ton-mileage shipped by air is expected to be less than 0.1 percent of all ton-mileage in Alabama.

Currently, the Auburn University Regional Airport has no commercial service flights. The current Capital Improvement Plan for Auburn University Regional Airport was completed in October 2012.

5.4 Freight Water Needs

According to the FAF data, the freight ton-mileage transported by water in Alabama is projected to increase by 317 percent from 2012 to 2045. However, the ton-mileage shipped by water is expected to be about three (3) percent of all ton-mileage in Alabama.

There are no major port facilities or navigable waterways within the MPA. However, the roadways within the MPA (e.g. I-85 and US 280) and the CSX and NS Railroads provide access to and from the river ports in Montgomery and Phenix City and the seaports along the Gulf of Mexico and Atlantic Ocean. The growth in freight traffic to and from these ports can lead to an increase in freight traffic on the roadways and railroads within the MPA.

5.5 Freight Pipeline Needs

According to the FAF data, the freight ton-mileage transported by pipeline in Alabama is projected to increase approximately 48 percent from 2012 to 2045.

The two pipeline operators within the MPA, Enterprise Products and Southern Natural Gas Company, do not have any information on any planned projects within the MPA.

6.0 Bicycle and Pedestrian

6.1 Infrastructure/Facility Needs

Existing and Future Gaps

Figure 6.1 and Figure 6.2 show existing bicycle facilities and pedestrian facilities. Figure 6.3 shows existing demand for biking and walking based on land use, demographic, and built environment conditions. Methodology details can be found in Technical Report 2: Existing Conditions.

Figure 6.4 shows how bicycle and pedestrian demand may change in the future based on anticipated growth in the region. While it is difficult to forecast exactly how growth will impact demand, we can make some observations based on areas where new growth will noticeably change the population and employment density.

Based on the existing facilities and both existing and future demand, several major “gaps” emerge between demand and supply. These gaps are shown in Table 6.1.

Table 6.1: Major Bicycle and Pedestrian Gap Areas

Gap Area	Pedestrian or Bicycle
Downtown Opelika	Bicycle
Opelika Rd/Pepperell Pkwy/2nd Ave Corridor from Auburn to Opelika	Bicycle
Northwestern Auburn (within inner loop)	Bicycle
Tiger Town Shopping Center area	Bicycle and Pedestrian
Northeastern Auburn (within inner loop)	Bicycle and Pedestrian
Carver-Jeter area in Opelika	Bicycle and Pedestrian
East Alabama Medical Center area	Bicycle and Pedestrian

Public and Stakeholder Input

During outreach, the public and stakeholders frequently mentioned the need for better walking and biking conditions. While there were no specific improvements that were frequently mentioned, the following types of input were the most common:

- Create more bike lanes and off-street paths
- Construct a bike route connecting downtown Opelika and downtown Auburn
- Build more sidewalks in Opelika
- Improve safety at crossings

- Enhance pedestrian infrastructure in downtown Auburn
- Create paths that extend beyond campus and can connect to neighborhoods
- Improve safety for on-road cyclists
- Increase nighttime lighting for pedestrians and cyclists

Existing Plans

In 2016, 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. Projects from this plan are considered in project prioritization for the LRTP.

The City of Auburn has recently conducted a Comprehensive City-Wide Traffic Study that included a bicycle and pedestrian component. High-priority bike and pedestrian projects were identified, with a focus on safety, connectivity, and access. These projects represent real needs and are considered in project prioritization for the LRTP.

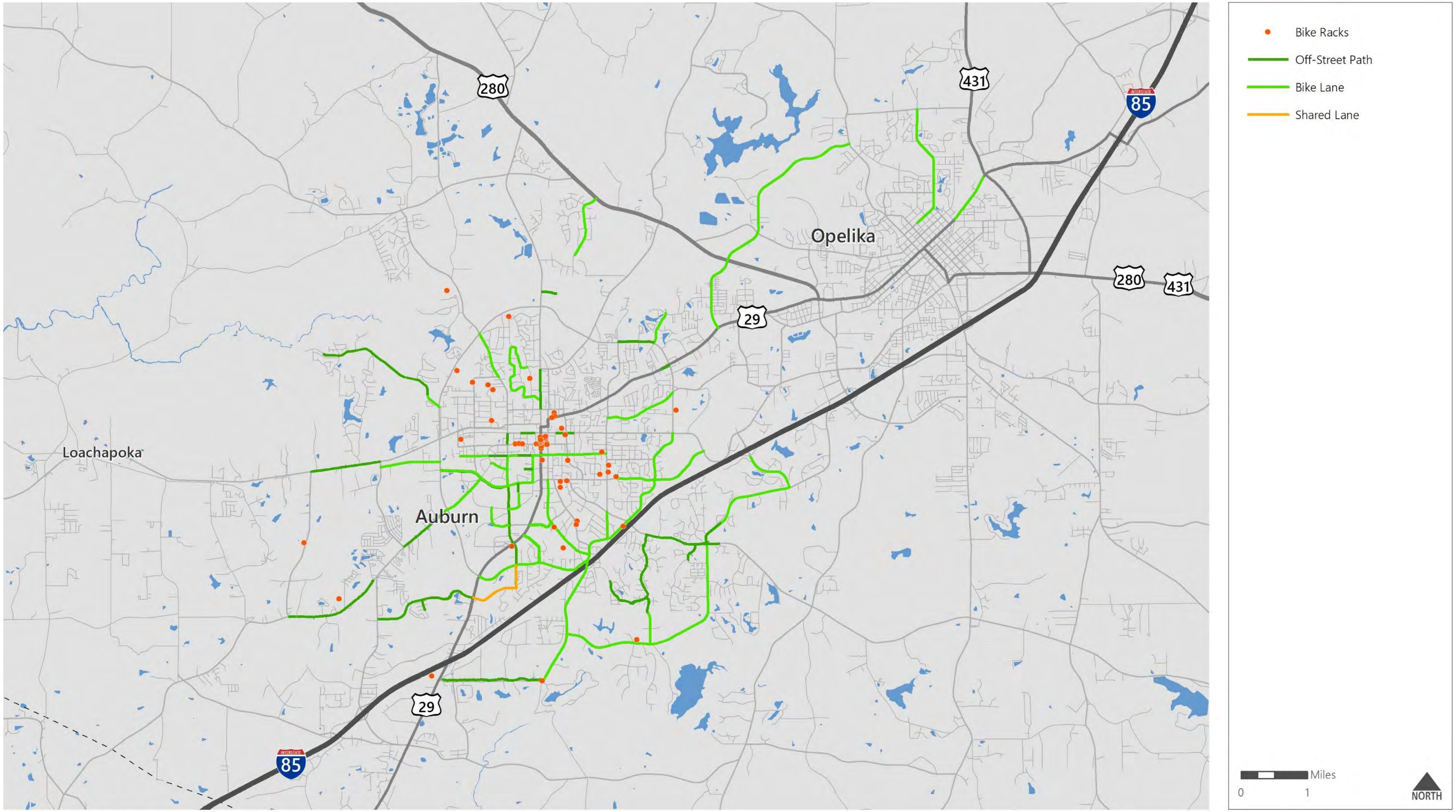
6.2 Safety Needs

Based on available crash data, there are about 12 bicycle crashes per year in the planning area, though none have been fatal in recent years. There are more pedestrian crashes per year (about 17), which is common since pedestrian activity is typically higher than bicycle activity. However, a potential area of concern is that approximately 2 of these 17 pedestrian crashes each year is fatal. In order to better understand safety needs, the MPO should work with ALDOT and local police departments to obtain detailed crash records for analysis, where feasible.

Public input indicated a priority for improved bicycle and pedestrian safety. Specific safety issues of concern that were mentioned include the following:

- Improve safety at crossings
- Improve safety for on-road cyclists
- Increase nighttime lighting for pedestrians and cyclists
- Ensure cyclists follow rules of the road
- Construct pedestrian bridges over busy roads

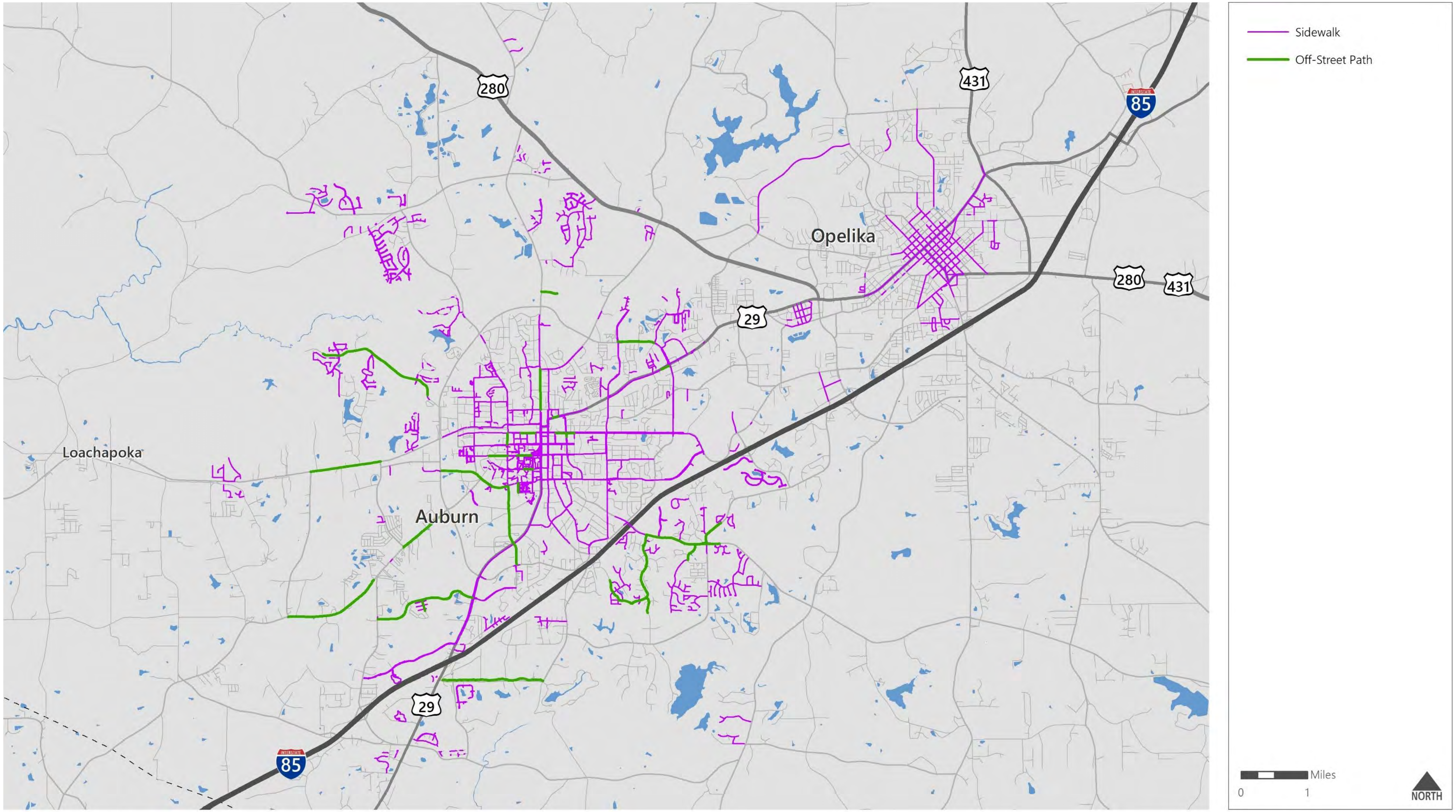
Figure 6.1: Existing Bicycle Facilities



Data Sources: LRCOG; City of Auburn; City of Opelika

Disclaimer: This map is for planning purposes only.

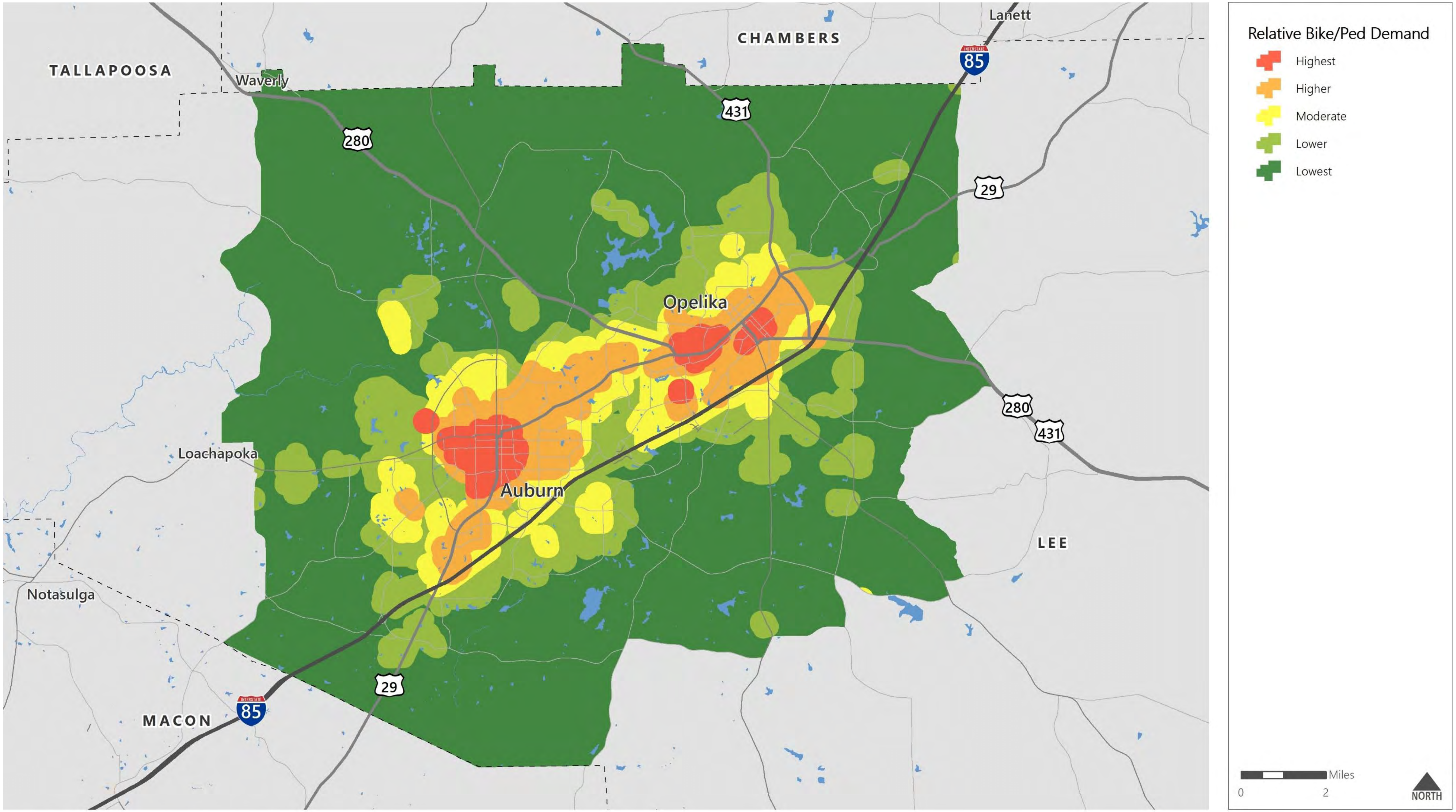
Figure 6.2: Existing Pedestrian Facilities



Data Sources: LRCOG; City of Auburn; City of Opelika

Disclaimer: This map is for planning purposes only.

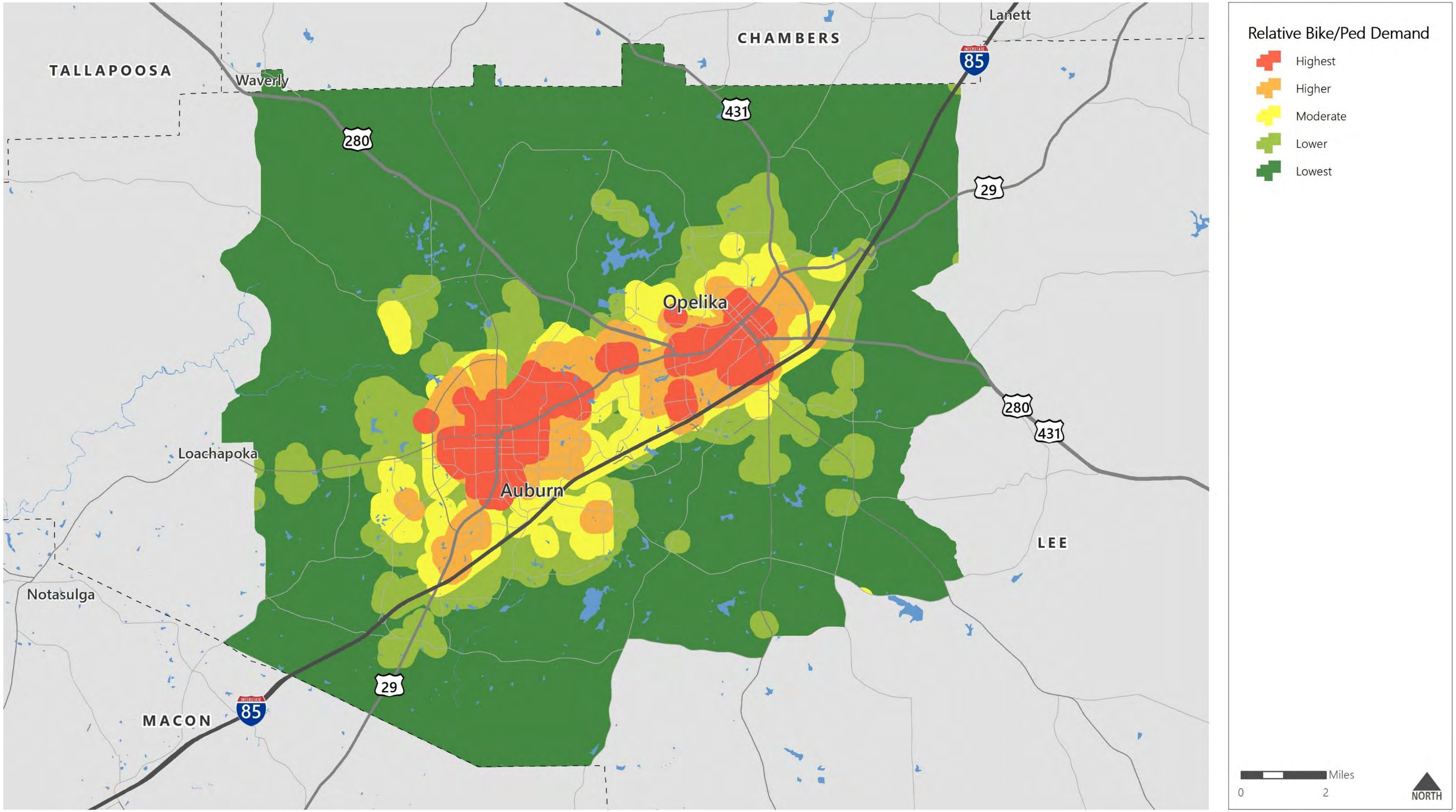
Figure 6.3: Existing Bicycle and Pedestrian Demand



Data Sources: Census Bureau, InfoGroup, Neel-Schaffer, Inc.

Disclaimer: This map is for planning purposes only.

Figure 6.4: Future Bicycle and Pedestrian Demand



Data Sources: Census Bureau, InfoGroup, Neel-Schaffer, Inc.

Disclaimer: This map is for planning purposes only.

7.0 Public Transit

7.1 Service Needs

Existing and Future 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.

Figure 7.2 shows how future growth could impact transit demand in the region. While it is difficult to forecast exactly how growth will impact demand, we can make some observations based on areas where new growth will noticeably change the population and employment density.

Currently, the only transit service available to the public is a demand-response, dial-a-ride system. Even without future growth, there is existing unmet demand for fixed or deviated-fixed route public transit, or transit that serves specific stops on a regular schedule. The following areas could be served by a fixed route or deviated fixed route service with frequencies/headways of every 60 minutes or better:

- The area around Downtown Auburn and Auburn University
- The Opelika Rd/Pepperell Pkwy/2nd Ave/Samford Ave Corridor
- Downtown Opelika
- Tiger Town
- Carver/Jeter area in Opelika
- S. College St Corridor from I-85 to E University Ave
- The eastern half of Auburn within the inner loop

The MPO should further study the feasibility and implementation requirements for introducing a fixed route or deviated fixed route system to the urbanized area.

Public and Stakeholder Input

During outreach, the public and stakeholders frequently mentioned the need for better public transit. While there were no specific improvements that were frequently mentioned, the following types of input were the most common:

- Create reliable public transit in the Auburn area beyond campus transportation and demand-service vans

- Provide transit between Auburn University, downtown Opelika, hospitals, and Tiger Town Shopping Center
- Provide transit that provides access for low-income and disabled users to jobs, drugstores, malls, and medical centers

Existing Plans

The Human Services Coordinated Transportation Plan for Lee and Russell counties identified the following needs:

- Maintain current transit services in Lee and Russell counties.
- Maintain current contracts and coordination efforts.
- Expand current transit services.
- Establish and support additional transportation providers through traditional and non-traditional options.
- Provide a deviated route system that will service retail and business corridors in the metropolitan areas.
- Continue to expand our Mobility Management program by applying for grant funds through state and federal programs (i.e. 5307 and 5311, etc.)
- Across the region, increase and expand access and transportation opportunities for various target groups (elderly, disabled, low income) attempting to access and utilize various social service delivery agencies, job training and educational facilities, etc.
- Across the region, increase, expand or provide access to "out of region" health care facilities for aging, disabled or wounded veterans.
- Constantly monitor the needs addressed in Section 6 of this plan and determine if and when incremental changes can be executed that will allow for superior access to public and social transportation for residents as well as greater flexibilities and resources for transit and transportation providers.
- Support efforts and strategies for combining or leveraging grant and other funding sources to expand transportation services.
- Develop policies/procedures for resource-sharing among transportation providers and users.
- Acquire additional agencies and clients to participate in the JARC program.
- Increase Outreach and Awareness for transportation options in the region.

7.2 Capital Needs

The existing fleet for Lee Russell Public Transit (LRPT) 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.

LRPT 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. While no facility data was reported by LRPT, this may change as new Transit Asset Management (TAM) reporting requirements evolve over the next 2 years.

Table 7.1: LRPT Vehicle Conditions

Vehicle Type	Useful Life Benchmark (ULB)	Total Vehicles	Vehicles Exceeding ULB	% Exceeding ULB
Van	4 years	17	15	88%
Small Buses (17-21 passengers)	5 years	10	6	60%
Small Buses (24-27 passengers)	7 years	4	1	25%
Full Size Bus (28+ passengers)	10 years	4	4	100%
Overall	n/a	35	26	74%

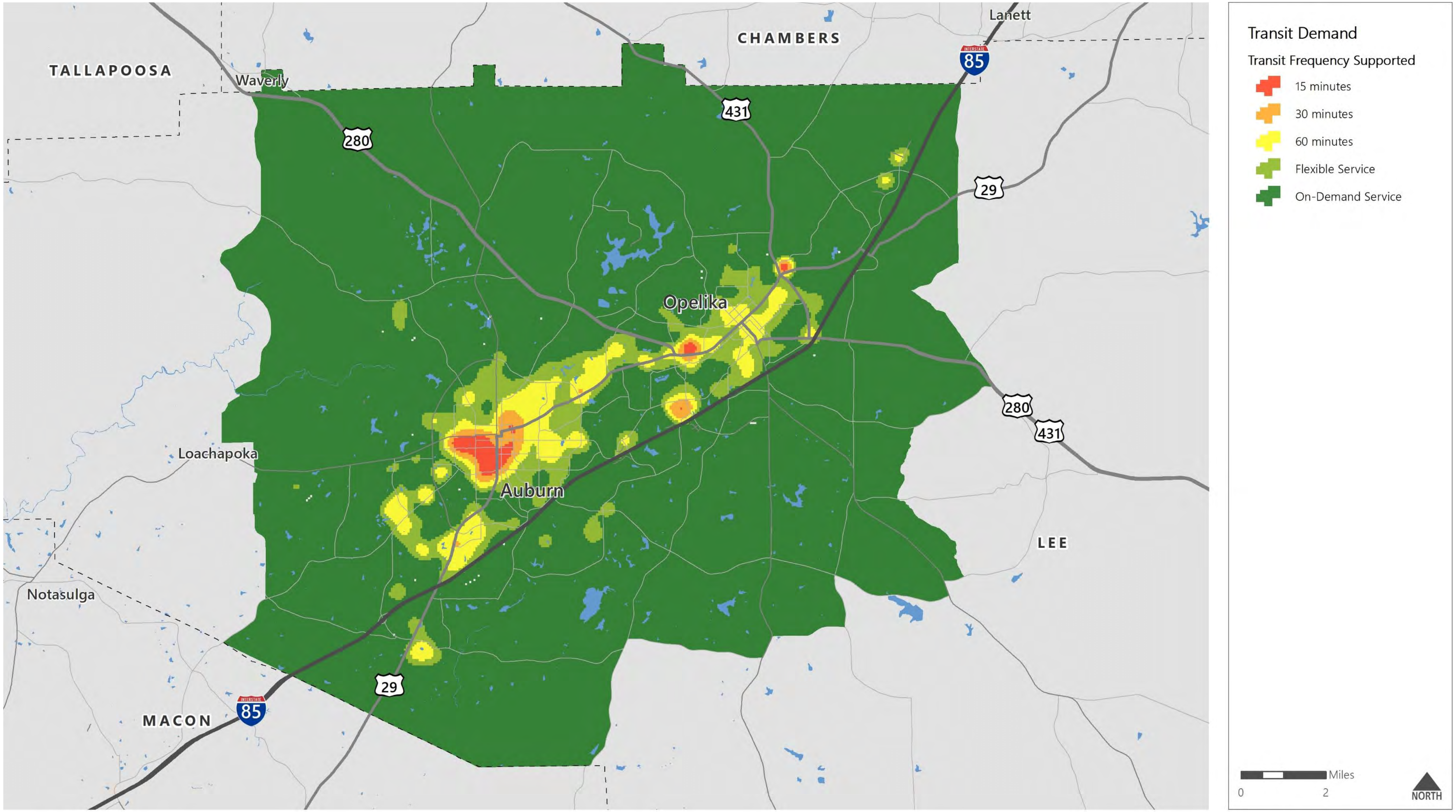
Source: ALDOT Group-Sponsored Transit Asset Management Plan, 2018

7.3 Safety Needs

While no specific safety needs are identified, LRPT has a higher rate of safety and security events than the state or nation as a whole. However, its overall number of these events is low, averaging between one and two per year, and its incidence of events resulting in injuries or fatalities is below state and national averages.

LRPT 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.

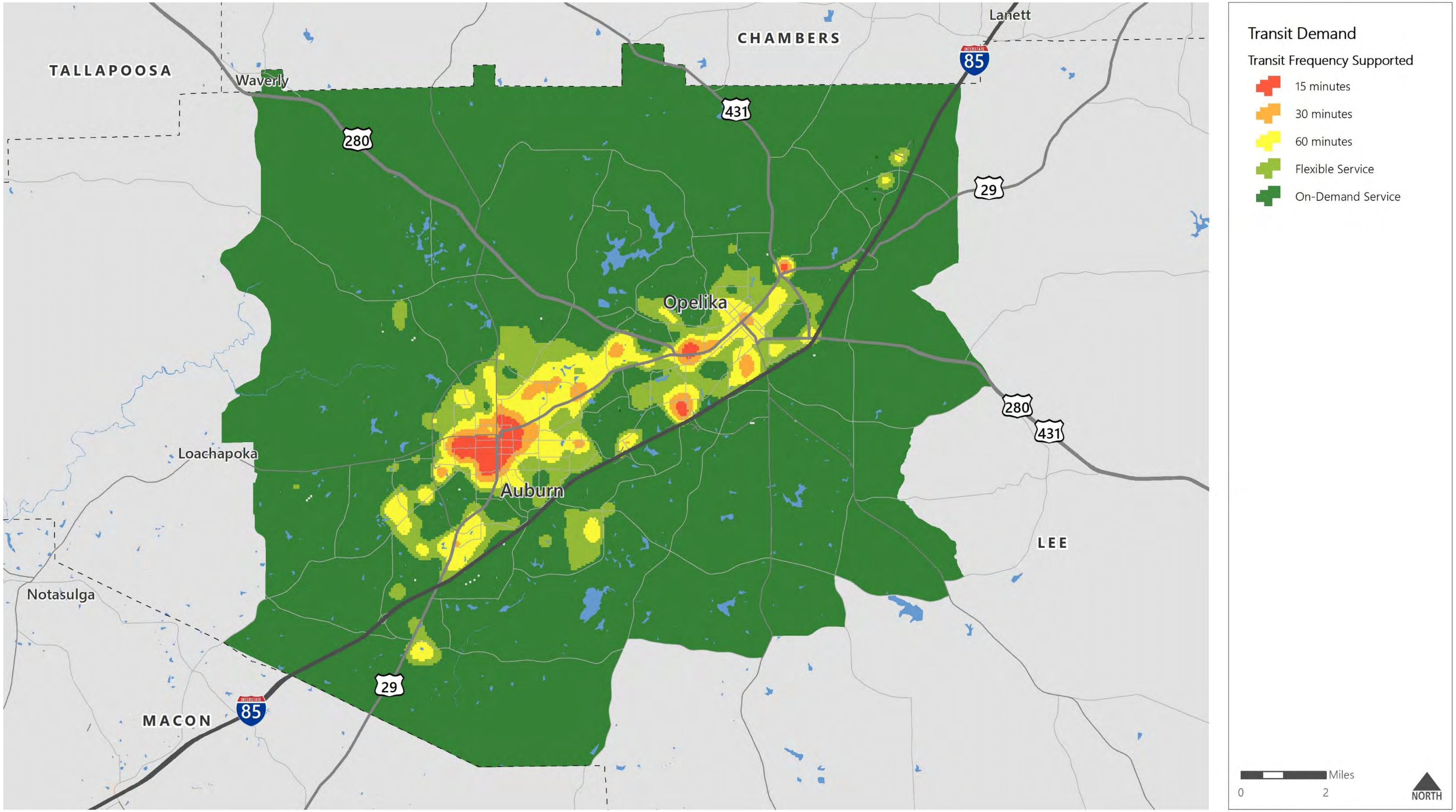
Figure 7.1: Existing Transit Demand



Data Sources: Neel-Schaffer, Inc.

Disclaimer: This map is for planning purposes only.

Figure 7.2: Future Transit Demand



Data Sources: Neel-Schaffer, Inc.

Disclaimer: This map is for planning purposes only.