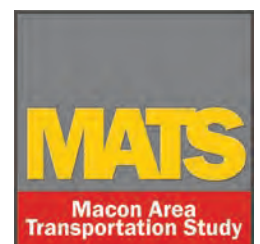


Freight Needs Assessment

Existing Conditions and Future Freight Movement

Chapter 4 Freight Network Performance



Introduction

Understanding the overall performance of the freight network is key to identifying needs and opportunities for improvement. This assessment looks at factors such as travel time reliability, congestion, and bottlenecks to identify places where freight traffic may not be as efficient as it could be or opportunities for improvement. Reliability is a key measure for freight and logistics companies. Being able to plan accurately for on-time arrivals, departures, pick-ups and drop-offs is critical to maintaining efficient operations, serving customers, and getting goods where they need to be.

To measure things like congestion, bottlenecks, and reliability of the network, the project team used several tools made available through the FHWA Office of Operations, the RITIS Probe Data Analytics (PDA) Suite, and others. The analysis in this section focuses on the highway freight network, including Interstate System, the NHS, NHFN, and STRAHNET. In the MATS planning area, these include I-16, I-75, I-475, portions of US 41, US 80, US 129, and SR 49 and SR 57.

Congestion and Reliability

Persistent traffic congestion can impede the mobility of freight vehicles and the reliability of commercial trips. Traffic congestion is a function of both functional classification of roads as well as the volume of traffic and the capacity of the road. Other factors, such as crashes or incidents that may cause bottlenecks, also affect congestion and reliability. This section highlights segments of the highway network where trucks regularly experience congestion and travel time delay.

Using data provided through FHWA's Freight Mobility Trends Analysis Tool, this section presents freight travel time and reliability statistics to help identify bottlenecks, sites of recurring delay, and segments of highway where travel is less predictable or reliable.

In 2022, within the MATS area, there were a total of 1,470 truck hours of delay per mile along 161 miles of roadway on the NHS. As shown in Figure 53, this value has remained relatively consistent

since 2020. Prior to 2020, a peak in hours of truck delay was seen in 2019, when the value exceeded 3,500 hours of delay.

The project team used these tools and database to help identify and rank freight bottlenecks by several mobility indicators within the MATS planning area. These indicators help to identify where mobility issues are occurring in the MATS region and identify areas that may need to be addressed or prioritized over others. For use in this project, FHWA provided data for the year 2022. The following sections provide an overview of several measures of congestion and reliability to help identify areas in need of improvement and potential priorities for implementation of already identified projects.

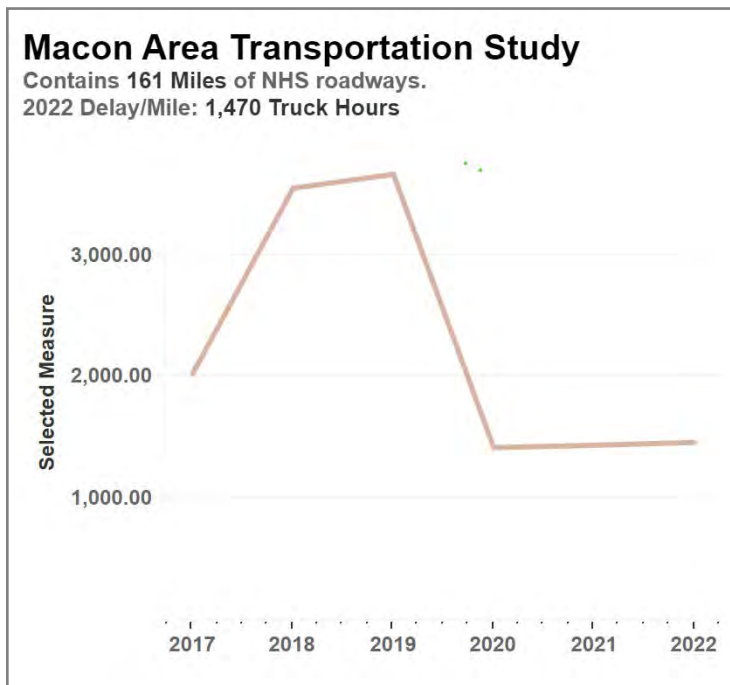


Figure 53. Truck Hours of Delay per Mile in 2022 in the MATS Planning Area.

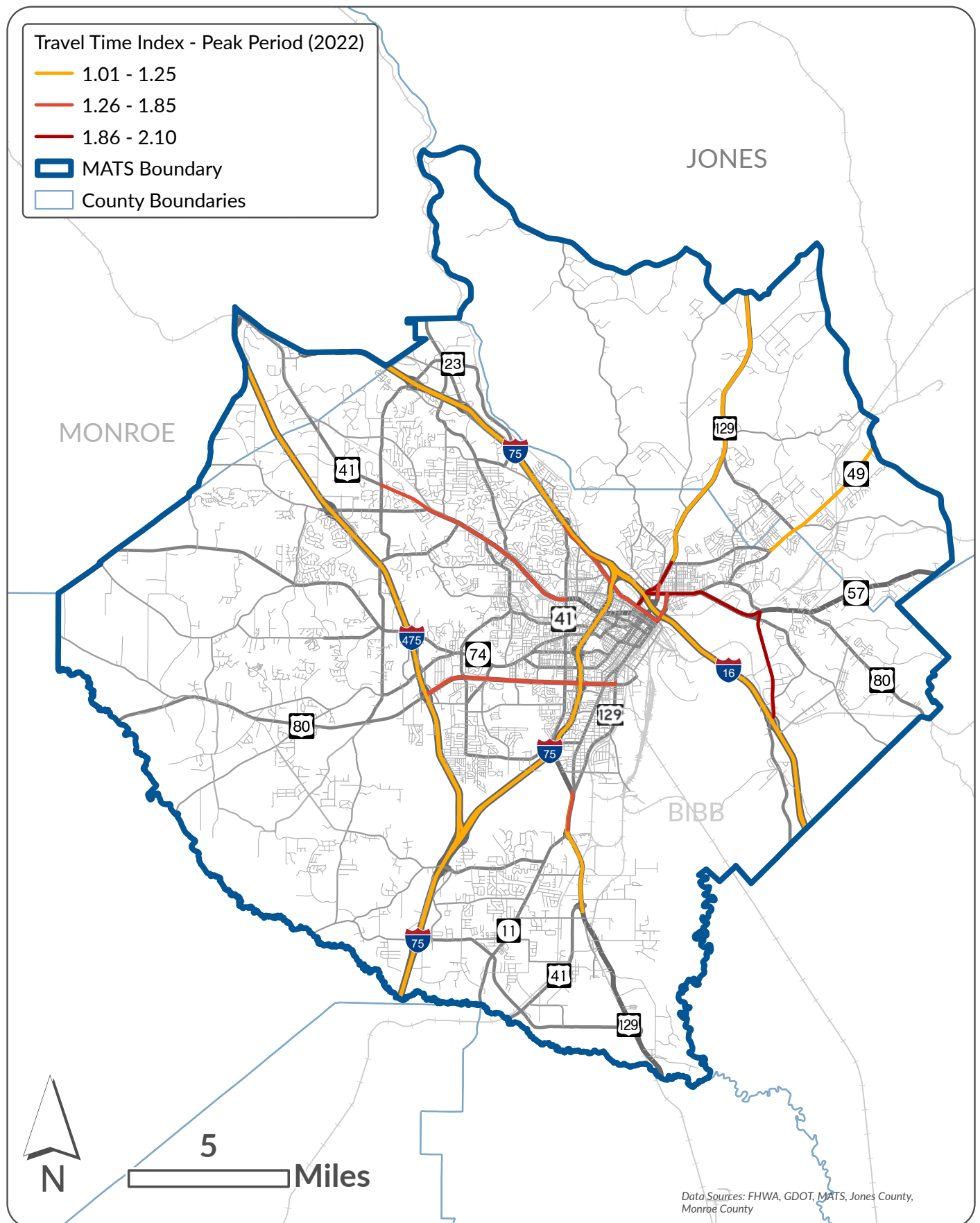


Figure 54. Travel Time Index (TTI) for Peak Period (2022) in MATS Planning Area

Travel Time Index

Figure 54 presents the peak period Travel Time Index (TTI) as found in the Freight Mobility Trends Tool. Travel Time Index is an indicator that compares the peak period mean travel time to the free flow travel time. This indicates the additional time required to make a trip along a roadway segment during peak hours as compared to times of lighter traffic. Locations with the highest TTI generally experience slower speeds, reflecting travel time delay.

In the MATS region, I-75, I-475 and I-16 have TTI values between 1.02 and 1.30. Higher TTI values are seen major routes such as US 80, US 41 between Pierce Avenue and Zebulon Road (it is slightly lower between Zebulon Road and Bass Road), and US 23 north of I-16. The highest TTI values are seen on US 129 between US 80 and US 23 downtown, US 23 from I-16 into downtown, and US 129 from Riverside Drive to Shurling Drive. Here, TTI values range from 1.47 to over 2.0. This means that drivers along these routes should anticipate a longer travel time during peak periods.

Truck Travel Time Reliability

Travel time reliability measures the extent of unexpected delay. Formally, FHWA defines it as: “the consistency or dependability in travel times, as measured from day-to-day and/or across different times of the day.”¹ Figure 55 (on the next page) presents the 2022 peak period Truck Travel Time Reliability Index (TTTR) as found in the Freight Mobility Trends Tool. This index is an indicator that divides the 95th percentile travel time by the 50th percentile travel time to gauge the reliability of truck travel. The locations with the highest TTTR generally experience slower speeds, reflecting travel time delay for trucks.

The trends seen for TTTR in the MATS region echo those observed for the travel time index. Major routes such as US 80, US 41 between Pierce Avenue and Zebulon Road, and US 23 north of I-16 have high TTTR values, or low reliability for truck travel. This means that these corridors are the least reliable or most unpredictable when it comes to the amount of time it usually takes to travel along them. US 129 extending northward into Jones County also has low truck travel reliability, with a value between 1.24 and 1.42. The highest TTTR values are seen on US 23/US 129 from US 80 northward to Pierce Avenue and US 41 from Zebulon Road to Bass Road. Here, the TTTR values fall between 1.50 and 1.70.

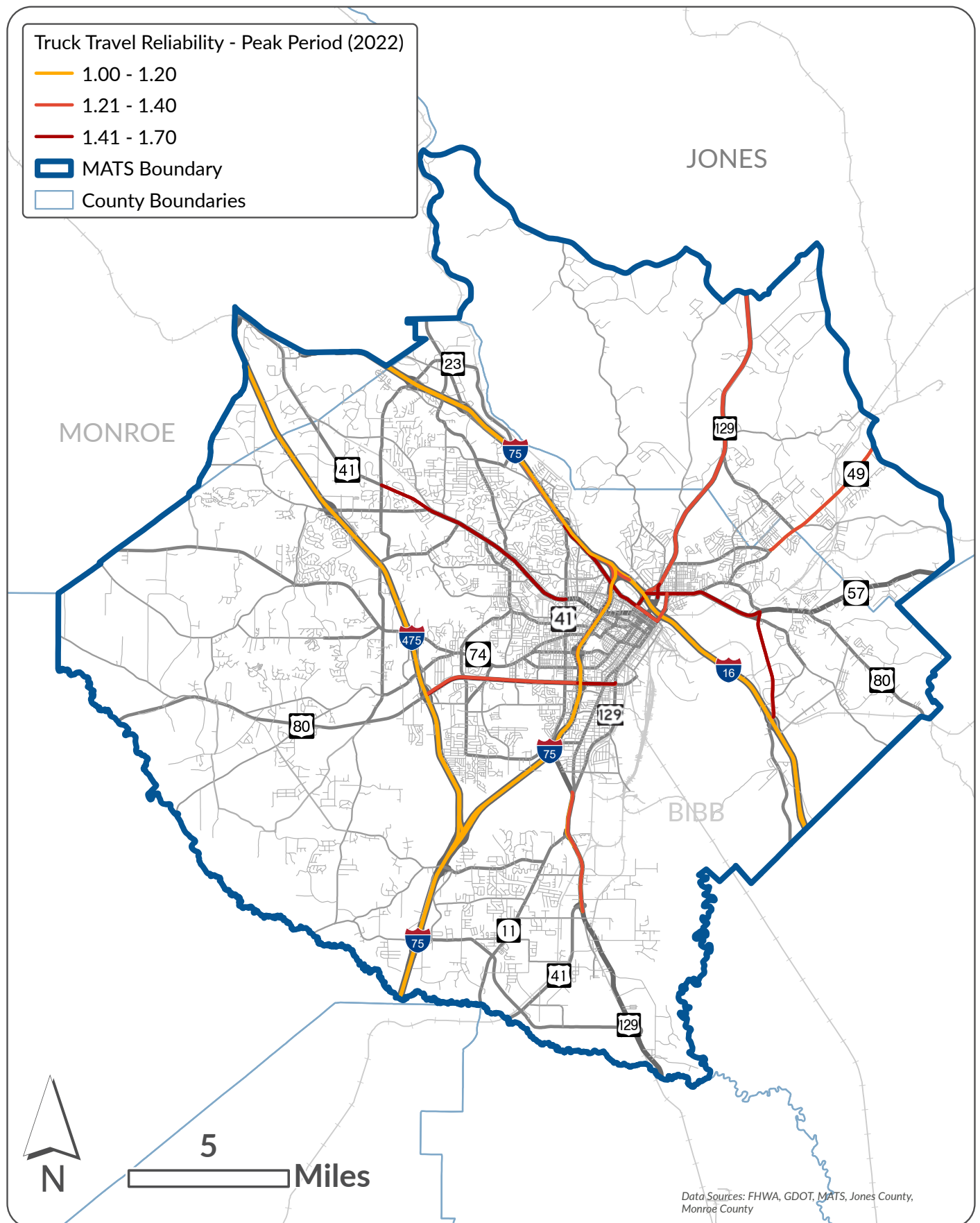


Figure 55. Travel Time Reliability Index (TTTR) for Peak Period in 2017 in MATS Planning Area

Buffer Index

The Buffer Index (BI) represents the extra time that motorists need to allow or plan for to arrive on-time for 95% of all trips. The buffer index is expressed as a percentage of the average travel time of a given trip. For example, a buffer index of 30 percent means that if a trip usually takes 40 minutes, a traveler should account for an additional twelve minutes ($40 \text{ minutes} \times 0.30$). These twelve extra minutes are referred to as the “buffer time;” the traveler should allow for a total of 52 minutes to arrive on time 95% of the time. This is an especially important metric for truck drivers carrying goods and commodities to and from destinations. Some origins and destinations have strict schedules during which truck drivers have appointments to pick up or drop off their goods. If corridors along their routes have high buffer index values, they are more likely to have to build in more time to meet their schedules. The formulation of the buffer index uses a 95th percentile travel time to represent a near-worst case scenario.²

Figure 56 (on the next page) presents the peak period BI for the year 2022 within the MATS region, as found in the Freight Mobility Trends Tool. The trends seen for BI echo those observed for the travel time and truck travel time reliability indices. Interstates 75, 475, and 16 consistently have BI values of 23 or below, meaning that travelers need to add 23% more travel time to ensure on-time arrival to their destinations. Unsurprisingly, the less reliable routes are the US highways and state routes through Macon. Many of these routes are characterized by a high number of signalized intersections and frequent driveways. For example, US 80 west of I-475, US 129 north of downtown into Jones County, US 41 between Pierce Avenue and Bass Road, US 41 south of I-75, and US 23/SR 87/Riverside Drive from Spring Street to Pierce Avenue have higher BI values, ranging up to 85. This means that travelers may need to plan for almost double their travel time estimates to reach destinations on-time using these highways. The highest BI values are seen on US 23 from downtown east and south to the I-16 interchange, US 129 north of I-16 to Shurling Drive, and US 80 east of I-75 to US 129/Broadway. Here the BI values approach or exceed 100.

Combined, these measures - TTI, TTTR, and BI - can paint a picture regarding the overall reliability and convenience of carrying freight and goods through an area. They can point to areas where additional capacity or operational improvements may be needed to improve reliability and make an area more attractive to freight and logistics companies shipping and receiving goods via the highway system. Travel characteristics of significant freight corridors in the MATS region are shown in Table 14.

Table 14. Reliability Metrics for Key Freight Corridors

Corridor	To/From	Length (miles)*	Avg Free-Flow Ref Speed	Travel Time Index	Buffer Index (%)
I-16	I-75 to MPO Border (Twiggs County)	8.6	57 mph	1.11	15.8
I-475	I-75 to MPO Border (Monroe County)	18.6	66 mph	1.02	4.3
I-75	MPO Border to Border (Monroe to Crawford Counties)	30.7	61 mph	1.07	11.8
US 41	Pierce Ave to Bass Rd	6.7	25 mph	1.48	85.5
US 41	Houston Ave to Houston Rd	1.0	51 mph	1.41	61.3
US 41/129	Houston Rd to Liberty Church Rd	2.2	60 mph	1.19	33.1
US 80	I-475 to I-75	4.2	24 mph	1.46	79.1
US 80	I-75 to US 129/Broadway	1.0	21 mph	1.51	75.8
US 23/129	US 80/Coliseum Dr to I-16	8.5	13 mph	2.03	108.7
US 23	Pierce Ave to 2nd St	2.9	30 mph	1.4	82.1
US 129	I-16 to Shurling Dr	1.2	19 mph	1.47	76.3

*Length represents total length one way

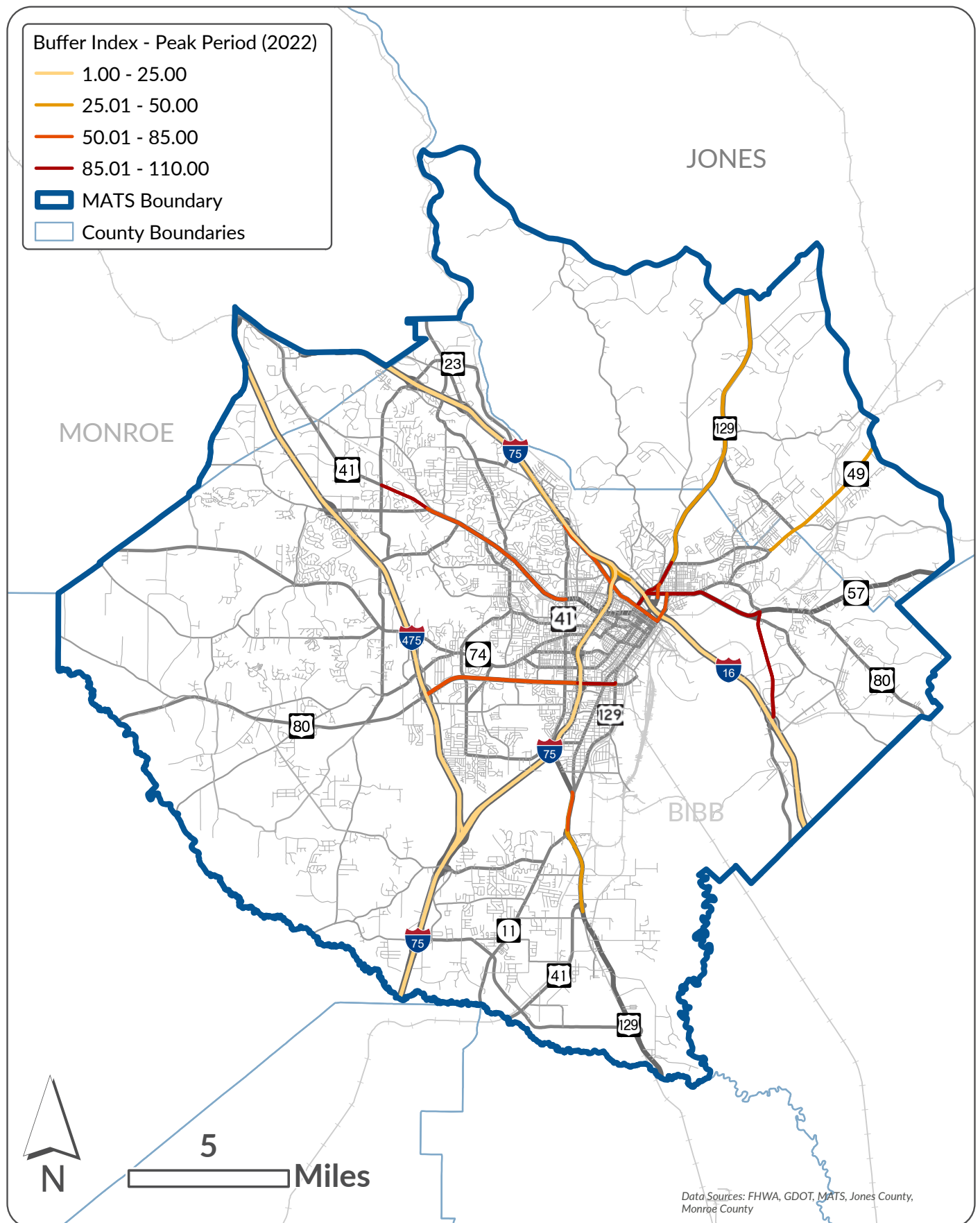


Figure 56. Buffer Index (BI) for Peak Period in 2017 in MATS Planning Area

Bottlenecks

Data from the RITIS Probe Data Analytics (PDA) Suite was used to determine roads with persistent bottlenecks. For the purposes of this analysis, the project team looked at two timeframes: March 2023 and the calendar year of 2023 (January 1, 2023 through December 31, 2023). Bottlenecks are ranked by the PDA suite by a measure they refer to as “total delay;” rather than a raw value of the delay measured purely in hours and minutes, it is a value calculated using a combination of free-flow travel time, observed travel time, AADT, and a day-of-the-week factor (a raw drop in speed weighted by vehicle miles traveled).³ The PDA suite uses HERE data for the state of Georgia; formerly NAVTEQ, this source includes data from sources such as mobile phones, navigation systems, and other portable devices. The team analyzed all road segments available in the platform for Jones, Macon-Bibb, and Monroe Counties and selected only bottleneck locations within the MATS region. In total, 630 road segments were analyzed across all types - interstates, US highways, state routes, parkways, frontage roads, etc. In total during the analysis period, there were more than 393 bottlenecks identified in the three counties.

Top Ten Bottlenecks

The top ten bottlenecks in the MATS region during 2023 are concentrated along interstate and US highways. It should be noted that during this time, the interchange at I-16 and I-75 was under construction, which perhaps exacerbated delays in this area; however, the interchange was identified as a priority for improvement due to its long history as a known location of significant congestion and delay.

The list of top bottlenecks for the month of March 2023 is very similar to that for the full year, with I-75 south at I-16 (Exit 165) topping both lists, followed by I-75 north at Sardis Church Road (Exit 153). Rounding out both lists were also locations along I-16 west at I-75, US 23 south at I-75, US 41 south at Tucker Road, and a few other locations. The top ten bottlenecks in the MATS region in 2023 are shown in Table 15. *(Note that I-75 S at Rumble Rd [Exit 59] just outside of the MATS MPO boundary north of I-475 would be on this list at the 8th position, but since it is just outside the study area, we left it off.)*

Table 15. Top Ten Bottlenecks in MATS Region During 2023

Rank	Head Location	Avg Max Length (miles)	Avg Daily Duration
1	I-75 S at I-16 (Exit 165)	2.55	1h 36m
2	I-75 N at Sardis Church Rd (Exit 153)	6.30	14m
3	I-16 W at U-75	1.03	1h 5m
4	US 23 S at I-75	0.89	3h 58m
5	US 129 S at US 23/SR 19/Spring St	0.72	4h 24m
6	US 23 S at I-75	1.46	45m
7	US 129 S at I-16/US 23/SR 19/Emery Hwy	0.53	3h 24m
8	US 80 E at I-16/James Gillis Memorial Hwy	0.29	8h 59m
9	US 41 S at Tucker Rd	1.46	3h 8m
10	US 23 N at US 129/SR 19/Spring St/Riverside Dr	0.74	3h 55m

I-75 S at I-16 (Exit 165)

The top-ranked bottleneck in the MATS region during 2023 is located on I-75 southbound at I-16 (Exit 165) in downtown Macon. It is shown in Figure 58. During the year-long analysis period, the bottleneck had an average maximum queue length of 2.55 miles, and the total cumulative duration of the bottleneck was 24 days and eight hours. The average speed along this segment ranged from 35 mph during peak congestion to upwards of 70 mph. There were more than 175 reported events during that period; these include construction work, obstructions, vehicle fires, and more. The majority of the congestion along this segment typically occurred between 11 AM and 3 or 4 PM at all times of year. More congestion appears to have occurred or been reported during spring and summer, generally between late February and early July.

The center represents the beginning of Jan 1, 2023 and the outer edge represents the end of Dec 31, 2023.

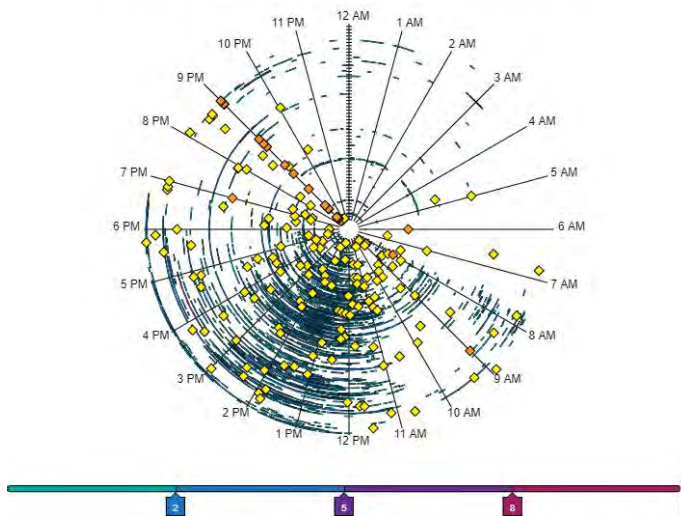


Figure 57. Time Spiral for 2023 Bottleneck at I-75 S at I-16

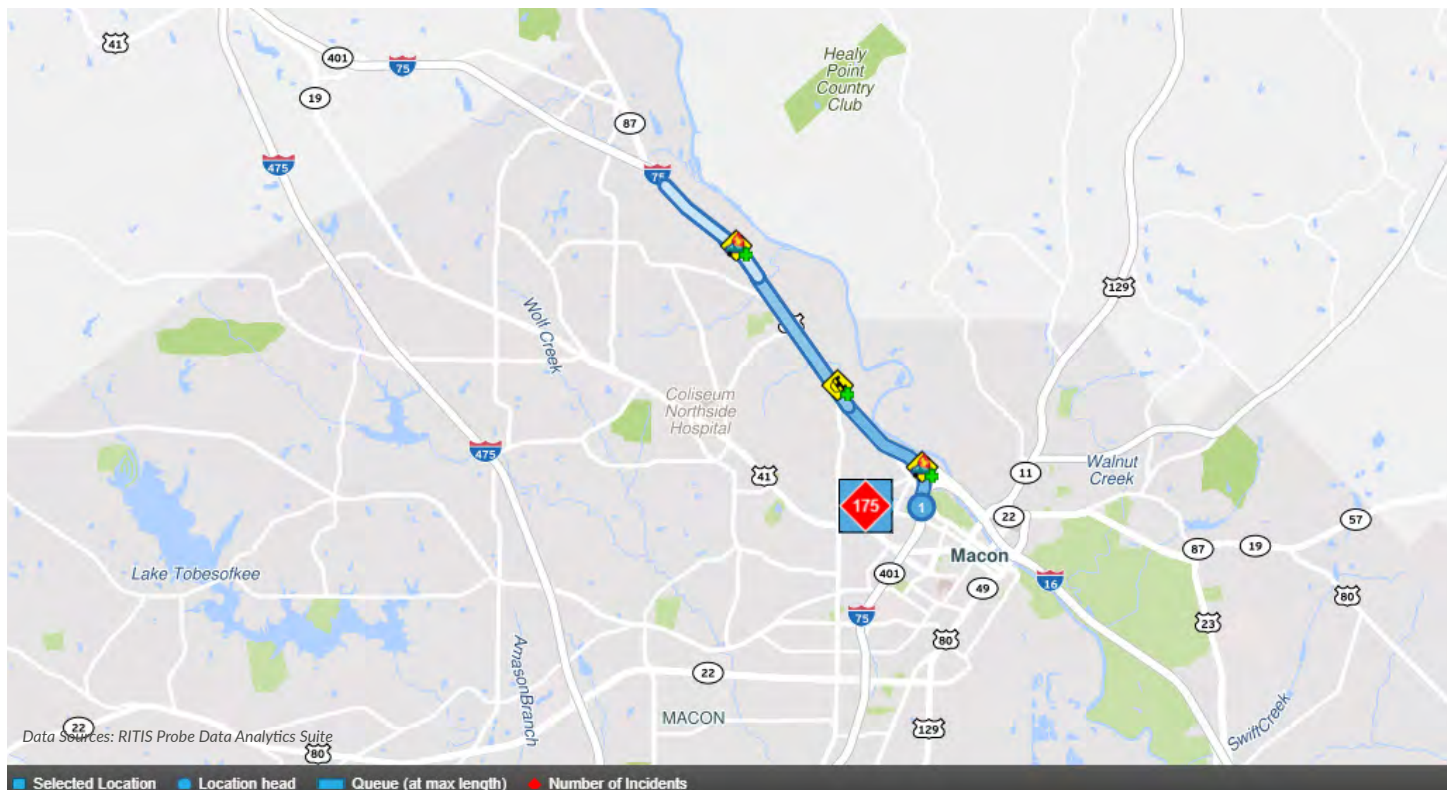


Figure 58. Top-Ranked Bottleneck: I-75 S at I-16

I-75 N at Sardis Church Road (Exit 153)

The next ranked bottleneck in 2023 was located on I-75 northbound at Sardis Church Road (Exit 153), as shown in Figure 60. This bottleneck had an average maximum length of 6.3 miles, queuing south of the MATS area into Warner Robins. It had an average daily duration of just 14 minutes; however, the total cumulative duration of the bottleneck over the year-long period was more than 3 days and 18 hours. Speeds along this segment were generally close to the speed limit, except during construction after 9 PM. During the analysis period, more than 538 incidents were reported. Reported incidents were primarily construction around 9 PM starting in the summer of 2023, but also included a variety of collisions, obstructions, vehicle fires, and others.

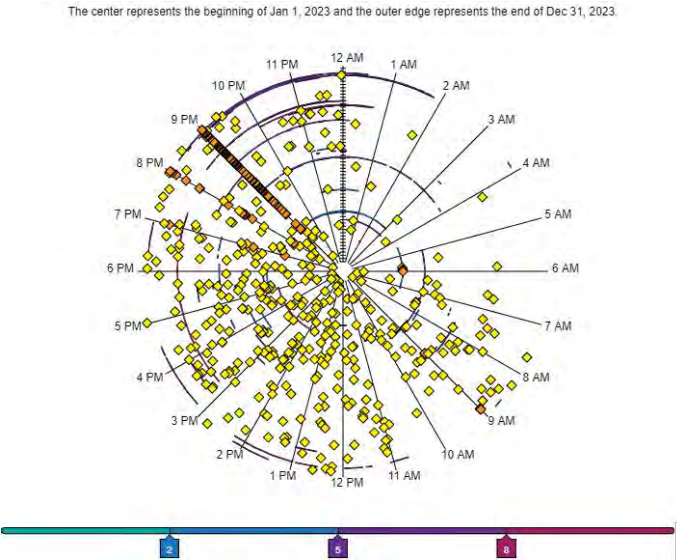


Figure 59. Time Spiral for 2024 Bottleneck at I-75 N at Sardis Church Road

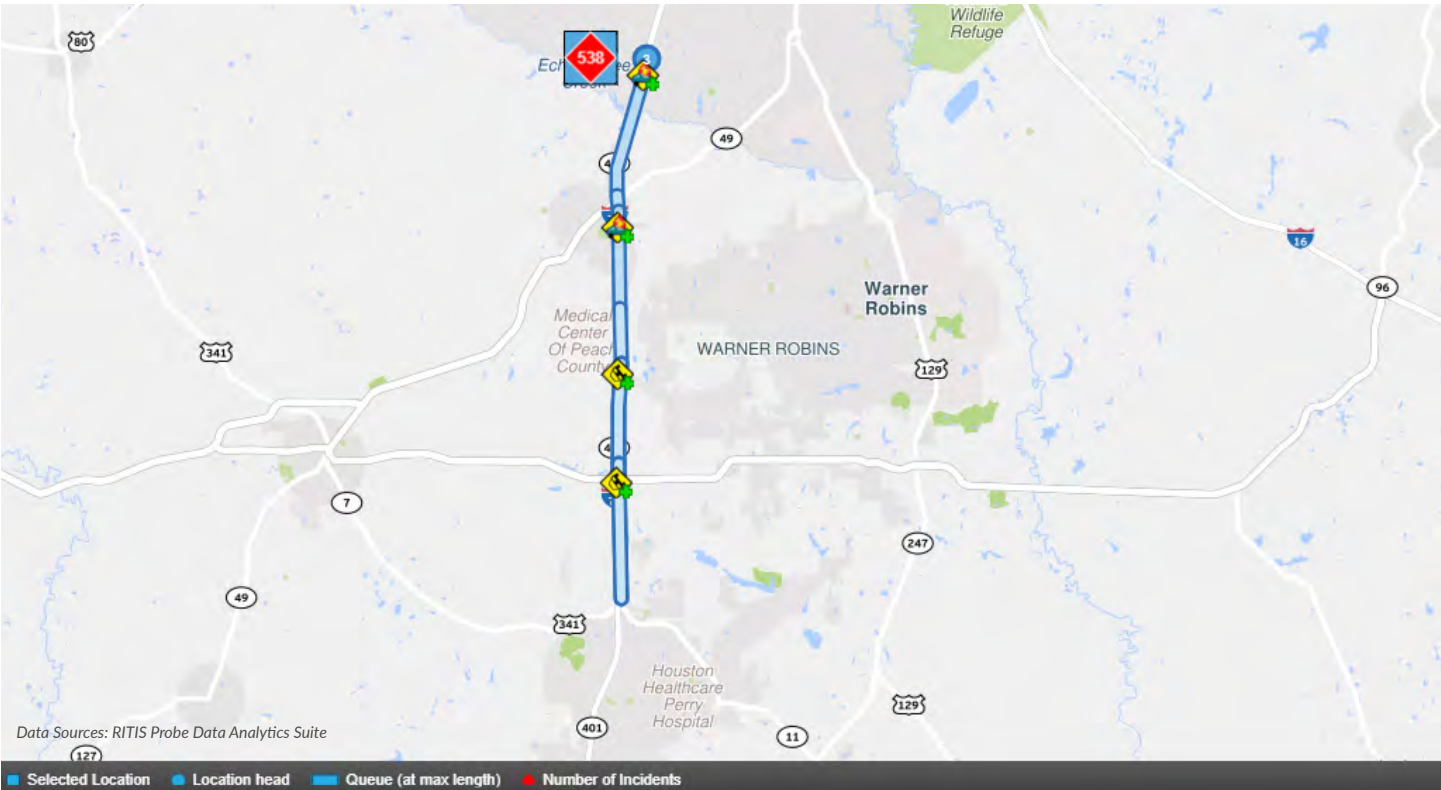


Figure 60. Second-Ranked Bottleneck: I-75 N at Sardis Church Road

Non-Interstate Bottlenecks

For comparison purposes, the project team also analyzed bottlenecks on non-interstate corridors throughout the MATS planning area to see how that list compared to the overall lists. Some of the same locations appear on the top ten list; however, removing interstate corridors did reveal several additional challenging locations throughout the study area with recurring bottlenecks. These include portions of US 80 at US 41/SR 247/Pio Nono Avenue, US 23 S at US 80/SR 87/Coliseum Drive, and US 23 N at SR 19 Spur/New Forsyth Road. These locations experienced bottlenecks that lasted for more than two hours per day on average. The bottleneck on US 80 at Pio Nono Avenue lasted a total of 107 days throughout the year, with nine reported incidents. The location on US 23 southbound at Coliseum Drive had a total duration of more than 147 days, with 22 reported incidents, and the location on US 23 northbound at New Forsyth Road had a total duration of 33 days with more than 48 reported incidents.

Table 16. Top Ten Non-Interstate Bottlenecks in MATS Region During 2023

Rank	Head Location	Avg Max Length (miles)	Avg Daily Duration
1	US 23 S at I-75 (near Exit 171)	0.89	3h 58m
2	US 129 S at US 23/SR 19/SR 49/Spring St	0.72	4h 24m
3	US 23 S at I-75 (near Exit 169)	1.46	45m
4	US 129 S at I-16/US 23/SR 19/Emery Hwy	0.53	3h 24m
5	US 80 E at I-16/James Gillis Memorial Hwy	0.29	8h 29m
6	US 41 at Tucker Rd	1.46	3h 8m
7	US 23 N at US 129/SR 19/Spring St/Riverside Dr	0.74	3h 55m
8	US 80 at US 41/SR 247/Pio Nono Ave	0.38	7h 6m
9	US 23 S at US 80/SR 87/Coliseum Dr	0.35	9h 40m
10	US 23 N at SR 19 Spur/New Forsyth Rd	0.86	2h 12m

Future Performance

While past conditions are not a foolproof indicator of future performance, identifying places where bottlenecks are present, where reliability on a road is not high, and where lots of additional travel time should be built in to trip planning can help identify segments of road where improvements are needed. To inform the potential needs for the MATS region, the project team looked first at the current regional travel demand model 2050 “Do Nothing” scenario as well as the patterns and overlap between segments with high TTI, TTTR, and BI values, and lower projected levels of service in the year 2050 (based on the statewide travel demand model do-nothing scenario).

Future Year Volume and Level of Service

To assess potential future conditions, the statewide travel demand model (GSTDM) 2050 “Do Nothing” scenario was used - this model essentially paints a picture of what conditions are likely to be in the year 2050 if no future changes or improvements are made. While it should not be interpreted as a precise prediction of future traffic volume, level of service, or truck traffic, it can be a useful comparison to current and recent past conditions, to measure potential changes and observe where traffic may be heavier or experience more congestion in the future.

As shown in Figure 61, the roads with the highest daily traffic volume in the year 2050 are likely to be the interstate highways, similar to conditions today. Overall, volumes are projected to increase by the year 2050. Portions of I-75 are projected to carry as much as 51,000 vehicles per day in the future if no improvements are made. This would represent a more than 20% increase over 2020 volumes (just over 40,000 vehicles per day). Similarly, some portions of I-475 could carry upwards of 46,000 vehicles per day, compared to just over 29,000 or 30,000 in 2020 - a potential increase of nearly 50% for certain segments. Other key corridors could also experience increases in overall daily traffic volume, including: portions of US 129 north of Macon-Bibb County - roughly 25-30% increase, Jeffersonville Road - roughly 10% increase, Emery Highway (US 80/US 23/US 129 Alt/SR 19) - a potential 11% increase, and Vineville Road (US 41/SR 19) - a potential 9 or 10% increase. More local roads, such as Mercer University Drive could see a 10 or 11% increase. It should be noted that these numbers represent what would happen without any future roadway projects; several projects are programmed and actively under way which will help address these projected increases in total traffic.

As a result of this anticipated future increase in daily traffic, there are corridors where the LOS would likely worsen by the year 2050 if no improvements are made between now and then. Notably, potential decline in LOS are visible on corridors such as I-475 north of US 80, portions of I-75 and US 23 near the Monroe County line, and I-16 east of downtown. Similarly, portions of Dixie Highway (US 41) west of Macon, Martin Luther King, Jr. Boulevard through downtown, and Mercer University Drive (SR 74) west of downtown Macon, especially in the vicinity of I-475.

The volume of trucks is projected to increase substantially along I-475 between 2020 and 2050, with daily truck volume increasing from roughly 6,000 trucks per day to upwards of 11,000 trucks per day. Likewise, Broadway (US 80/US 129) is also anticipated to experience a substantial increase in truck volume by 2050 - by as much as 50% along segments just south of Eisenhower Parkway. Some other local roads like Hartley Bridge Road are also expected to see an increase in truck traffic, although overall relatively low truck volume. Most other roads are projected to experience similar truck volumes in the future, with slight if any increases.

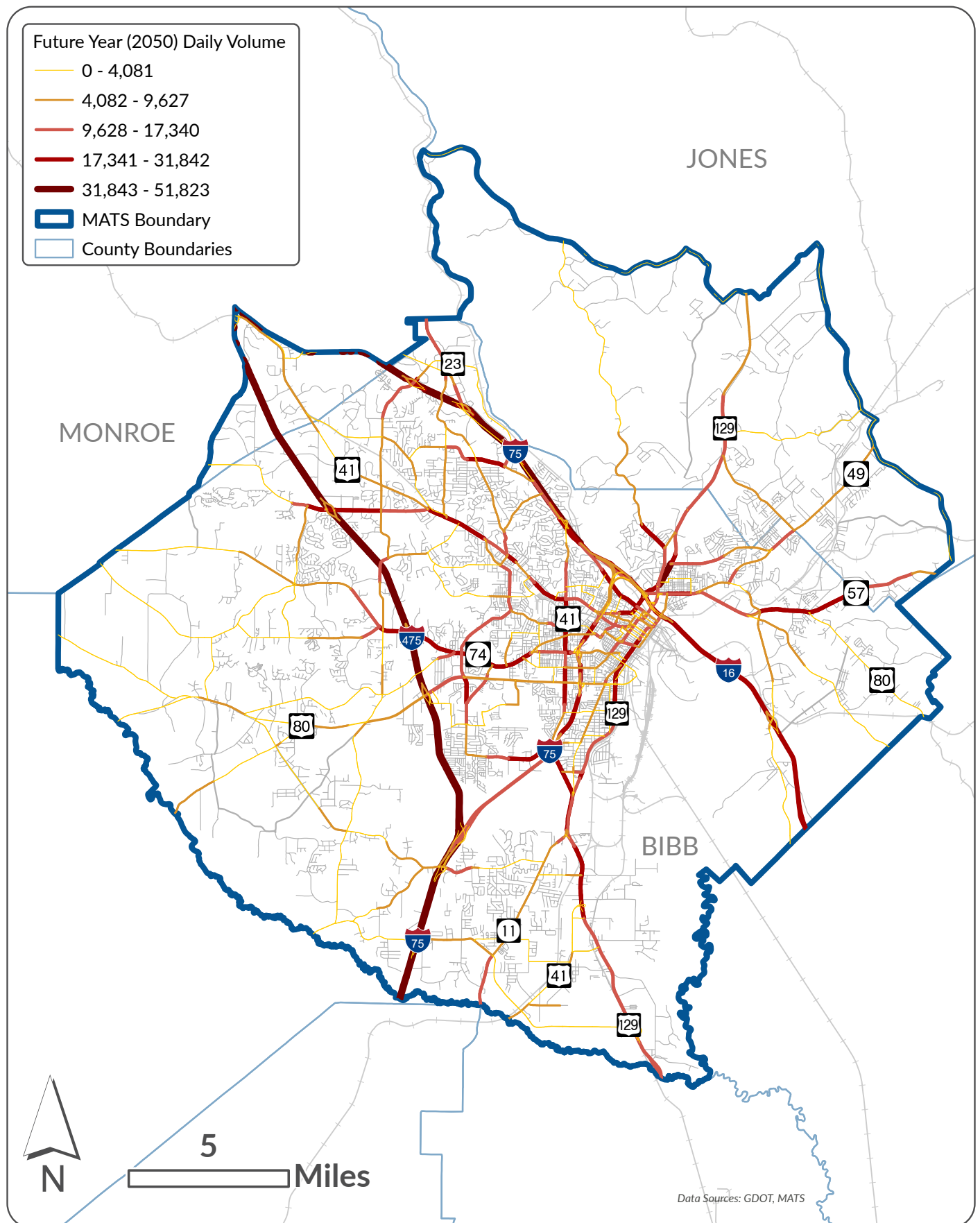


Figure 61. Future Year (2050) Traffic Volume in MATS Planning Area

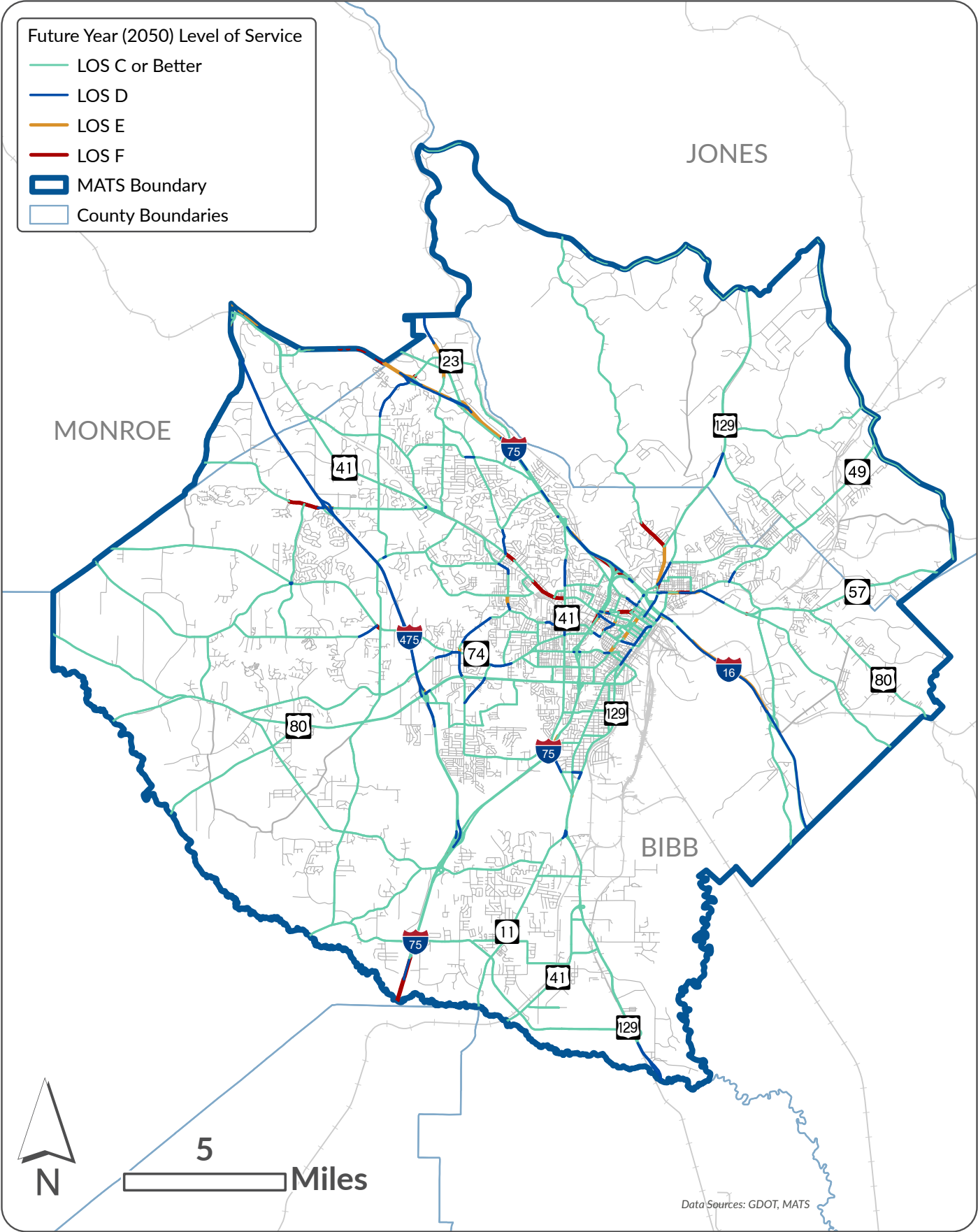


Figure 62. Future Year (2050) Level of Service in MATS Planning Area

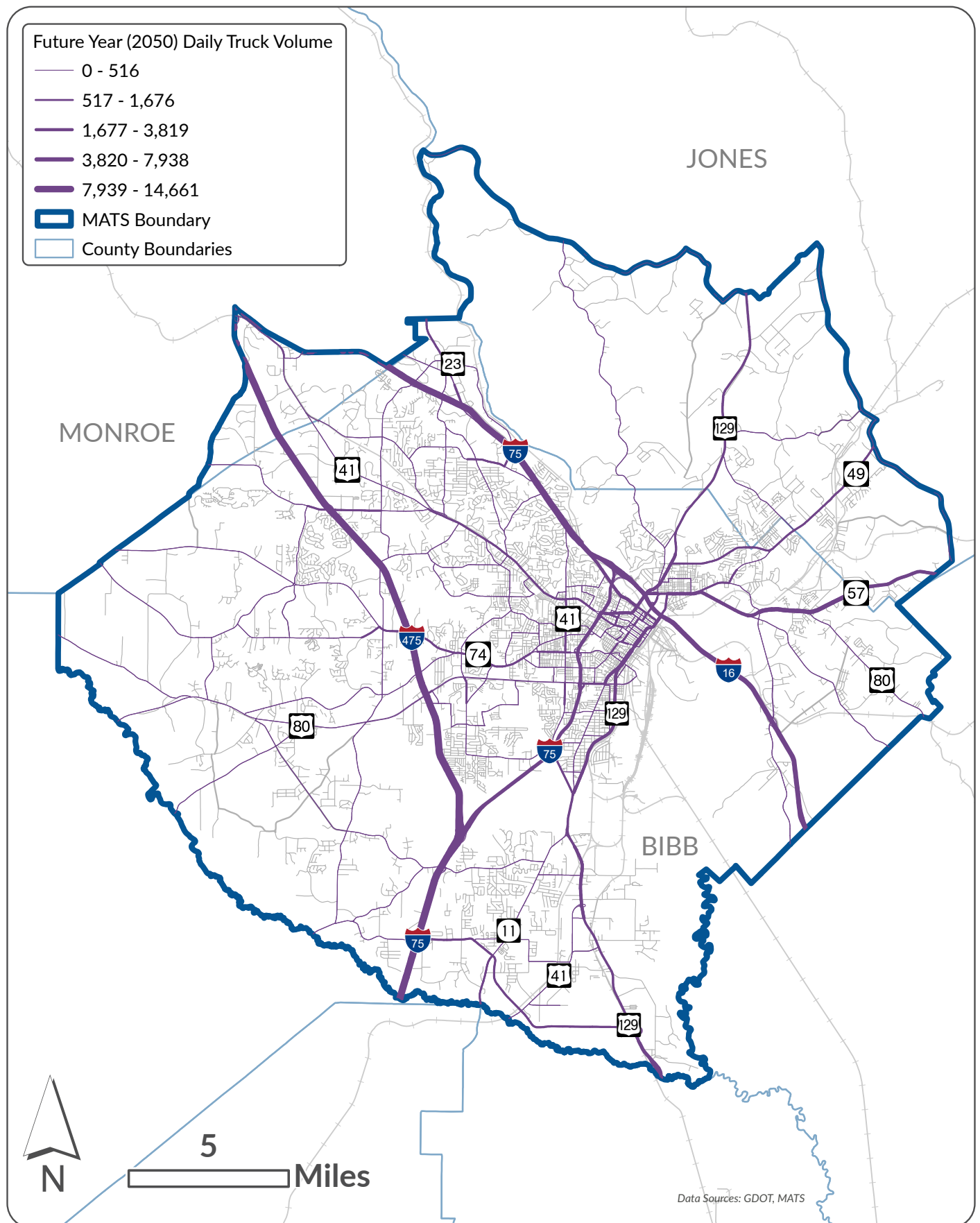


Figure 63. Future Year (2050) Daily Truck Volume in MATS Planning Area

Corridors that regularly exhibit low scores for TTI, TTTR, and BI include segments of US 41, portions of US 80, especially near the Ocmulgee River and between I-475 and I-75, as well as portions of US 23 between US 80 and I-75 and portions of US 129 north and south of Macon.

Data on anticipated future conditions was also reviewed in conjunction with projects identified in the Statewide Transportation Improvement Program (STIP) and the current (2024-2027) MATS TIP to help identify gaps where projects have not already been identified. The following three maps show projected future conditions in the year 2050 within the MATS planning area based on the approved STIP: projected total daily volume in Figure 64, projected daily truck volume in Figure 65, projected volume-to-capacity ratios in Figure 66.

With the implementation of projects in the current STIP, by the year 2050, it is anticipated that I-475 will be handling significantly more volume as compared to the year 2015. The same is largely true for portions of I-75 and I-16. Outside of interstate highways, the statewide travel demand model outputs indicate that roads such as SR 57 east of downtown along with several segments of US 129 - south of Macon near the airport, through downtown, and north of the river - and portions of US 41 between Pierce Avenue and Bass Road will experience increases in daily traffic volume.

Table 17. Future Year Daily Volume and V/C Ratio for Select Corridors

Corridor	Segment	Future Year (2050) Daily Volume ¹	V/C Ratio ¹
Montpelier Ave	Coleman Ave to US 41/SR 247	7,250	~0.3-0.6
Columbus Rd	US 41/SR 247 to SR 74	8,200	~0.55
SR 74/Mercer University Dr	Columbus Rd to Edna Pl	21,600-25,600	~0.66-0.79
SR 74/Mercer University Dr	Edna Pl to Log Cabin Dr	17,000-24,000	~0.55-0.74
SR 74/Mercer University Dr	Log Cabin Dr to I-475	20,000-26,000	~0.65-0.80
US 41	I-75 to Houston Ave	27,000-30,000	~0.55-0.75
US 41/US 129	Houston Ave to Houston Rd	17,500-17,575	~0.66
US 41	Houston Rd to US 129	25,100-25,650	~0.46-0.48
US 129	Barnes Ferry Rd to Russell Pkwy	12,500-13,100	~0.4-0.50
US 23/US 129 Alt/US 80/SR 540	Coliseum Dr to Jeffersonville Rd	15,700-19,400	~0.84-1.0
US 23/US 80/SR 87/SR 19	Jeffersonville Rd to Riggins Mill Rd	11,200-12,300	~0.63-0.69
US 80	Riggins Mill Rd to SR 57	11,700-12,400	~.60-.70
SR 57	US 80 to Bibb County Line	10,060-12,400	~.60-0.66

1. Estimates from 2050 Outputs of Georgia Statewide Travel Demand Model

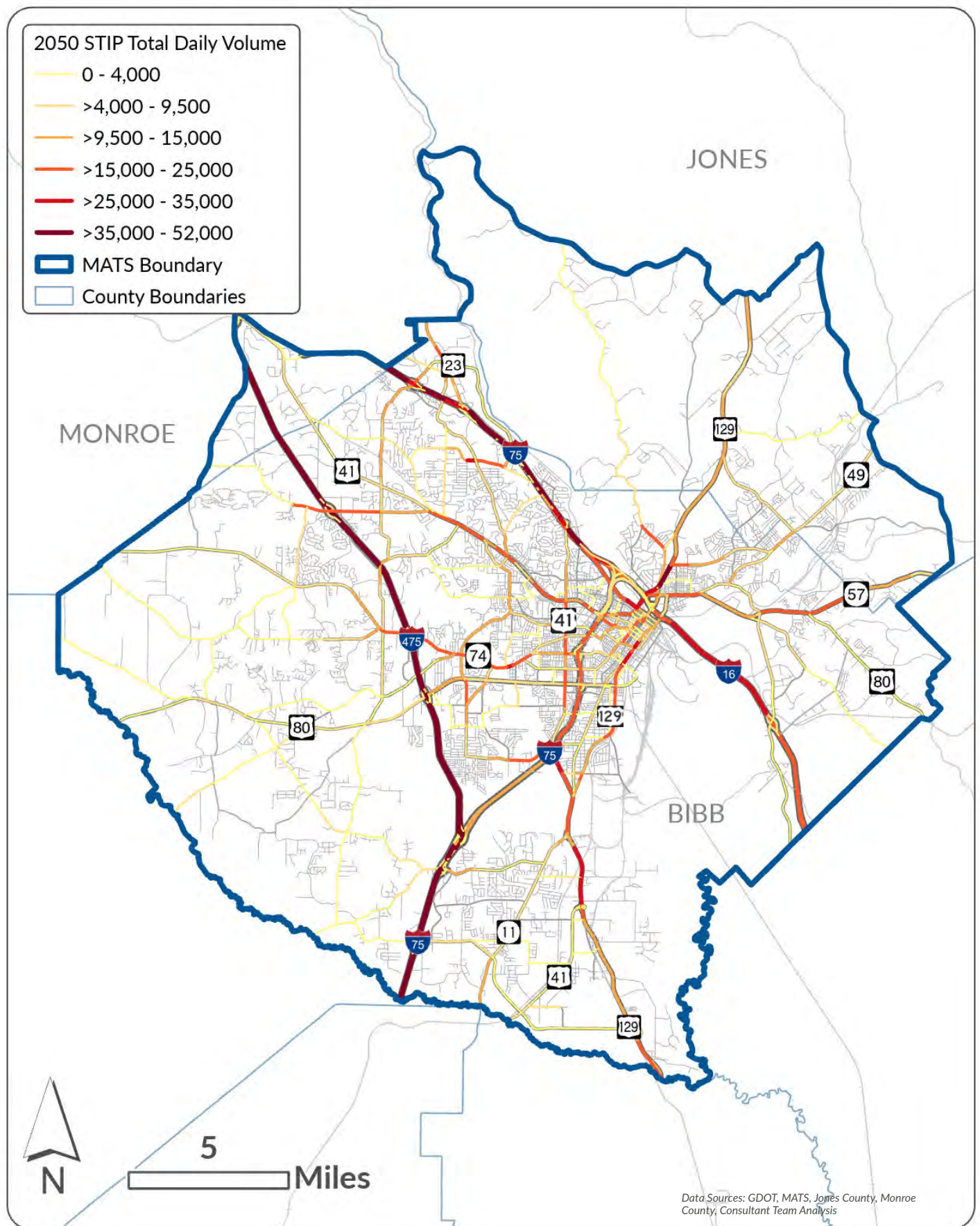


Figure 64. Projected Traffic Volume Based on 2050 STIP in MATS Planning Area

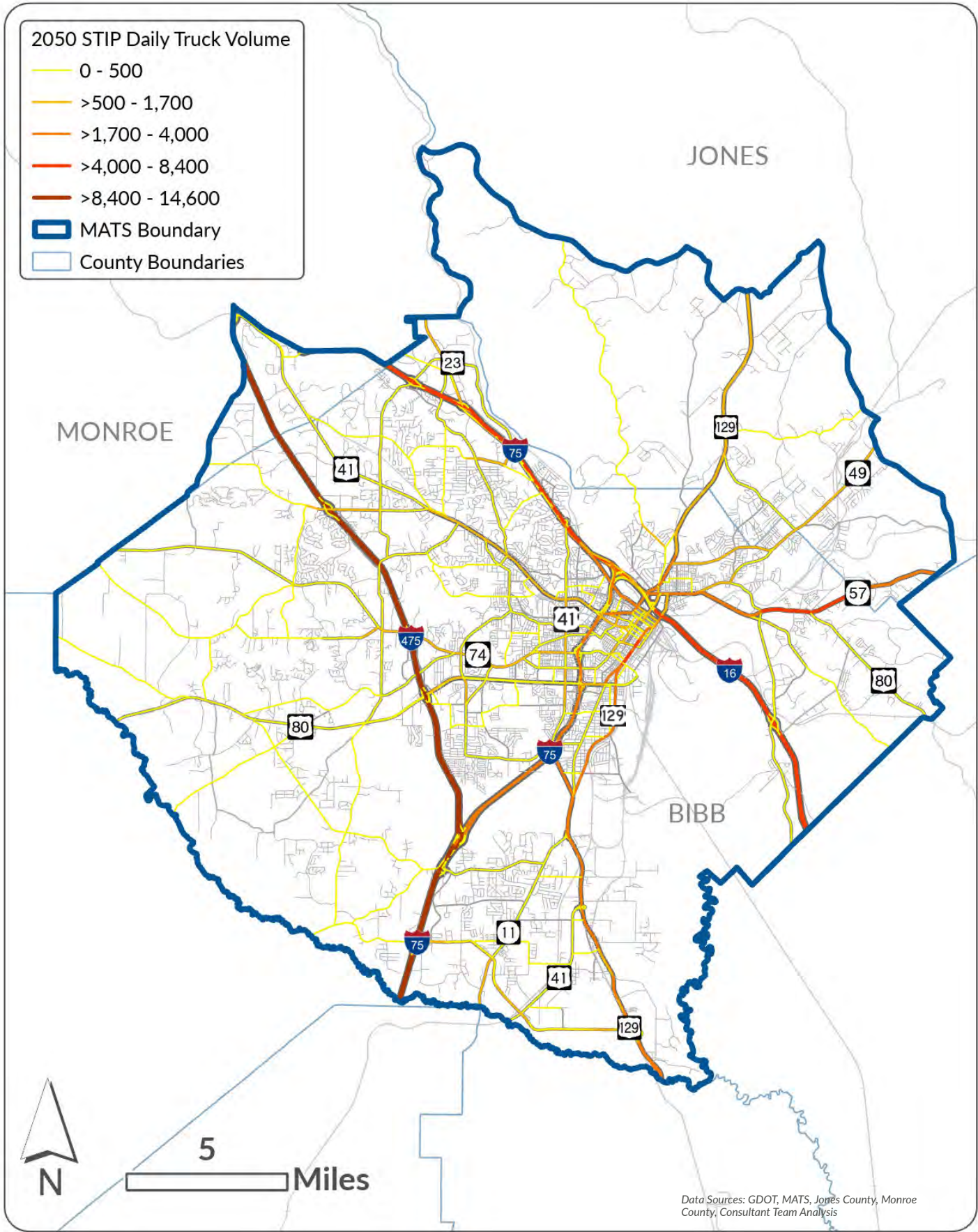


Figure 65. Projected Daily Truck Volume Based on 2050 STIP in MATS Planning Area

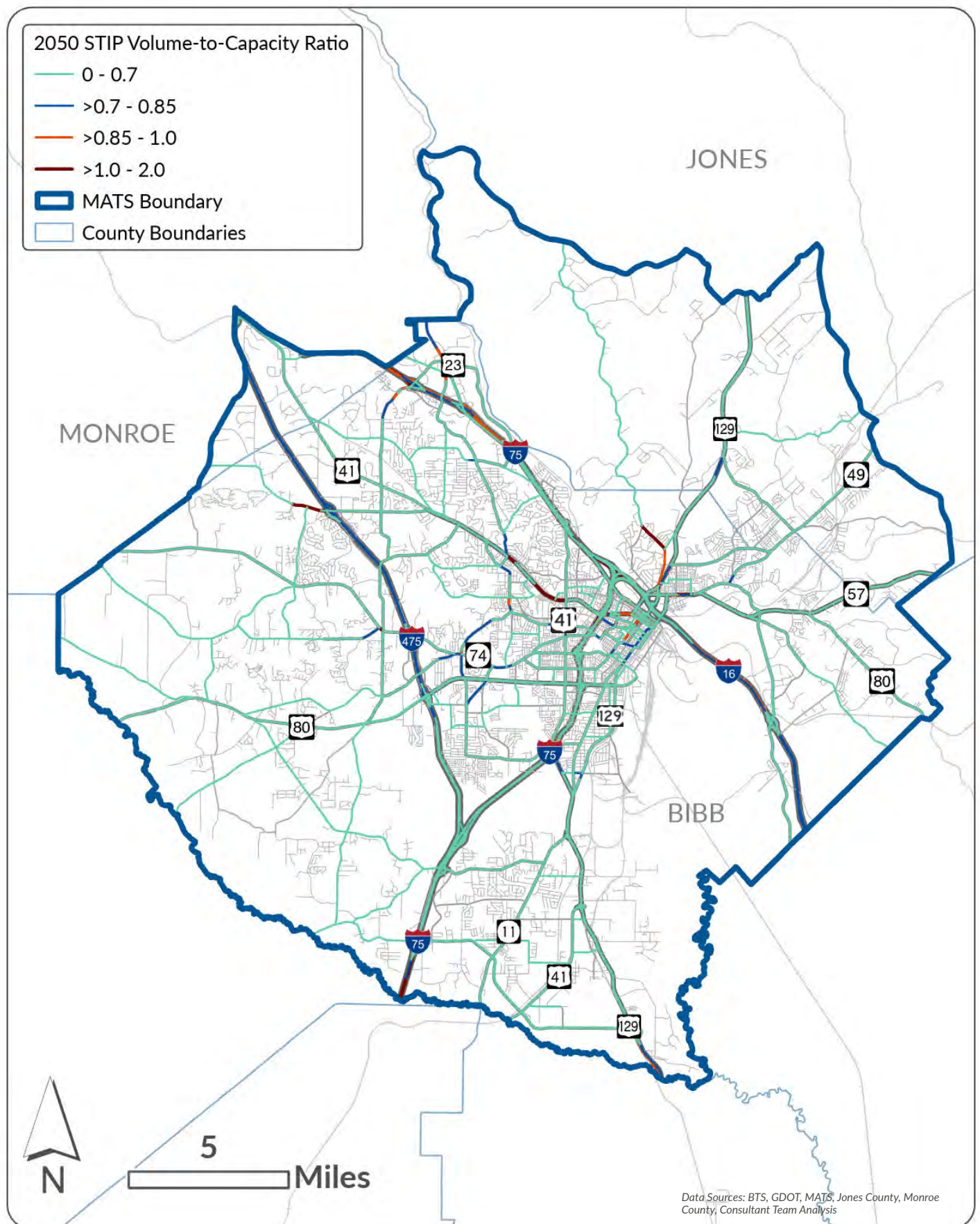


Figure 66. Projected Daily Volume-to-Capacity Ratios Based on 2050 STIP in MATS Planning Area

Comparing base year (2020) to future year (2050) volume based on the approved STIP along several designated freight routes and freight-intensive non-interstate corridors reveals anticipated increases on several road segments. Likewise, an examination of the projected volume-to-capacity for the year 2050 (shown in Figure 66) indicates some road segments that may warrant further analysis to identify specific needs and potential recommendations for improvement, especially along corridors or at intersections which have not already been identified for projects. Several segments of road are anticipated to be nearing or over capacity by 2050, even with projects approved in the STIP. Several of these roads are downtown which may make it more difficult to implement improvements outside of operational enhancements, however, several of them are also in close proximity to industrial areas, warehouses, and other freight intensive uses.

Examples of road segments anticipated to be nearing or over capacity by the year 2050 include:

- Portions of 1st Street downtown
- Bass Road south of I-75, mainly between the interstate and Kentucky Downs Drive
- Clinton Road / Upper River Road from 2nd Street to Woodland Drive
- US 129/Gray Highway north of 2nd Street to Shurling Drive
- US 23/US 129 Alt/US 80/Emery Highway from US 80/SR 540 to the split US 23 and US 80 at Riggins Mill Road
- US 41/Vineville Avenue between Pierce Avenue and Forest Hill Road
- Zebulon Road west of I-475

Several of these roads are also anticipated to continue to carry relatively high volumes of truck traffic (see Figure 65), indicating a need to examine them not only for general capacity and operational improvements, but also design that can accommodate medium- and heavy-duty trucks, tractor trailers, and other freight vehicles. In the downtown areas, it is important to balance design for larger vehicles with the need for maintaining and improving safety for people traveling via other modes, such as walking and bicycling. There is a growing body of best practices and design ideas for how to design to maintain and accommodate freight vehicles in increasingly multi-modal environments. Examples from the Atlanta area and other peer regions will be considered as the MATS 2050 Freight Plan continues.

Chapter 4 Endnotes

- 1 Federal Highway Administration. Office of Operations. (2017). *Travel Time Reliability: Making It There On Time, All the Time*. https://ops.fhwa.dot.gov/publications/tt_reliability/ttr_report.htm#WhatIsTTR
- 2 Ibid.
- 3 RITIS Probe Data Analytics Suite. Bottleneck Ranking. <https://pda.ritis.org/suite/help/>