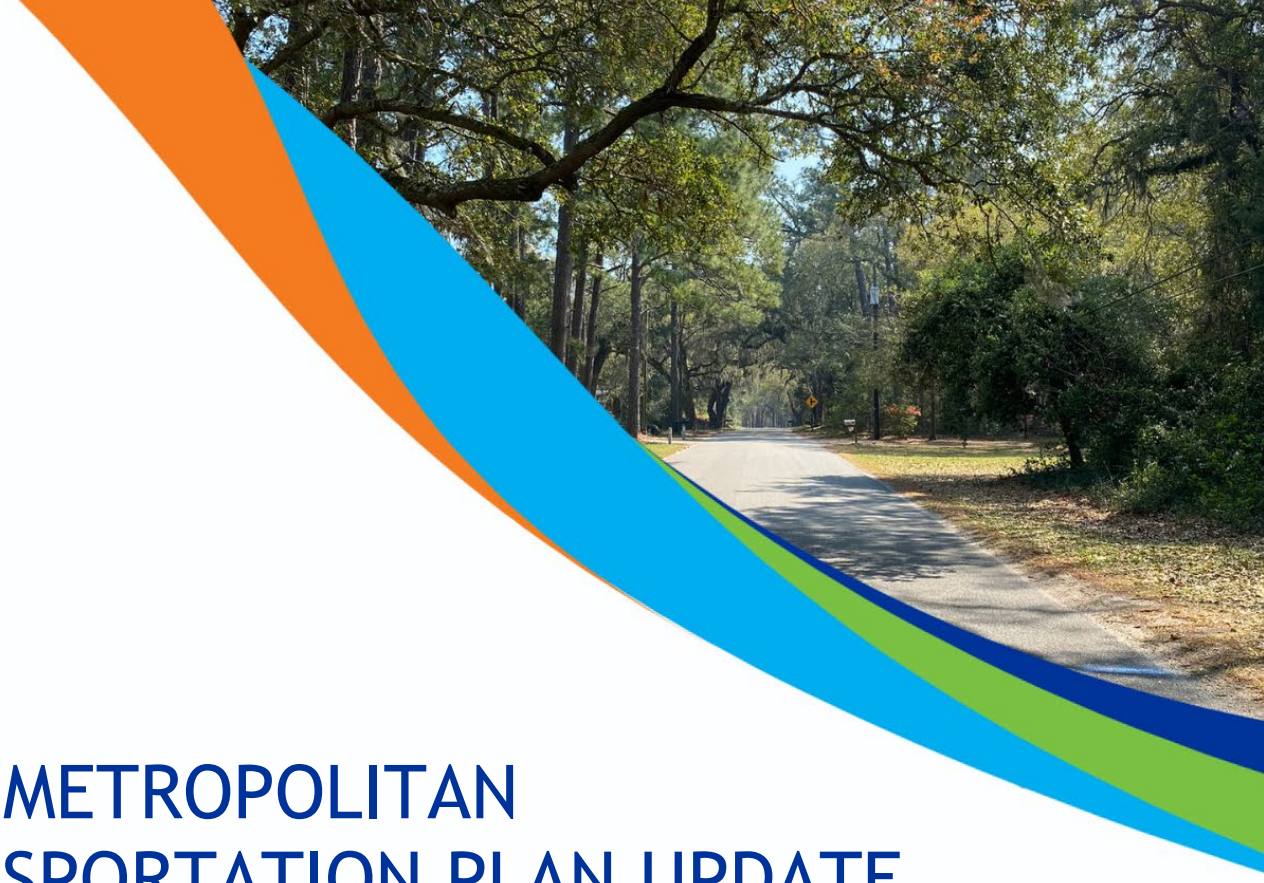

2045 METROPOLITAN TRANSPORTATION PLAN UPDATE

Appendix E: Existing Transportation Facilities and Demographic Conditions

Prepared for:

GSATS
The Grand Strand Area Transportation Study

Prepared by:

CDM Smith®

AUGUST 2023

GRAND STRAND AREA TRANSPORTATION STUDY
METROPOLITAN PLANNING ORGANIZATION

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INTRODUCTION

The purpose of this memorandum is to present the existing (2019) conditions and establish baseline conditions for the update of the Grand Strand Area Transportation Study (GSATS) Metropolitan Transportation Plan (MTP). The GSATS Travel Demand Model (TDM) is updated and calibrated with a 2019 base year. The GSATS 2045 TDM was calibrated using average annual daily traffic numbers collected from SCDOT and NCDOT, along with estimated land use data compiled by local planning staff.

This technical memorandum examines the existing (2019) conditions found in the GSATS study area. An understanding of existing conditions, trends, opportunities, and challenges is vital to planning for a transportation system that can meet the current and future needs of residents and visitors of the Grand Strand area. Transportation is both affected by and affects many aspects of modern society. Population growth, employment and economic trends, education, tourism, and land use are all key components of urbanized areas that a transportation system must be able to serve in providing mobility and access. This technical memorandum provides a brief analysis of key trends in the Grand Strand area. This summary will serve as a baseline to inform the MTP development process.

EXISTING (2019) STUDY METHODOLOGY

EXISTING (2019) TRAVEL DEMAND MODEL ESTIMATION

The GSATS Travel Demand Model has been updated and recalibrated as part of the MTP Update process. This update included the incorporation of 2019 daily traffic counts for the peak season and updated land use data for trip generation for all model years (2019, 2025, 2035, 2045). The following sections present the inputs and outputs of the 2019 base year which reflects 2019 existing conditions. The subsequent sections are organized into different inputs and outputs of the model including distribution patterns for vehicle trips, peak season daily traffic volumes from the traffic assignments, study area land use and demographics.

Trip Length Distribution

Within the travel demand model, trips are estimated in different categories. For this model, trips are grouped into origin and destination groups, allowing planners to understand the nature of auto travel in the region. These origin and destination pairs include: Internal to Internal (trips made completely within the GSATS region), External to Internal (outside the GSATS region to locations within the study area), Cruising Trips (visitor trips cruising without specific destinations), and External to External Trips (those passing completely through the study area without an internal destination). **Table 1** presents the average trip length in minutes and miles by trip purpose. The 2019 average trip for the GSATS study area is 12.3 minutes or 7.7 miles long. Intuitively, the through trips have the longest lengths followed by the external to internal vehicle trips because they originate and end outside the model area. These patterns inform planners of the estimated volume of travel demand visiting the region on a daily basis to access jobs, education, recreation and other services.

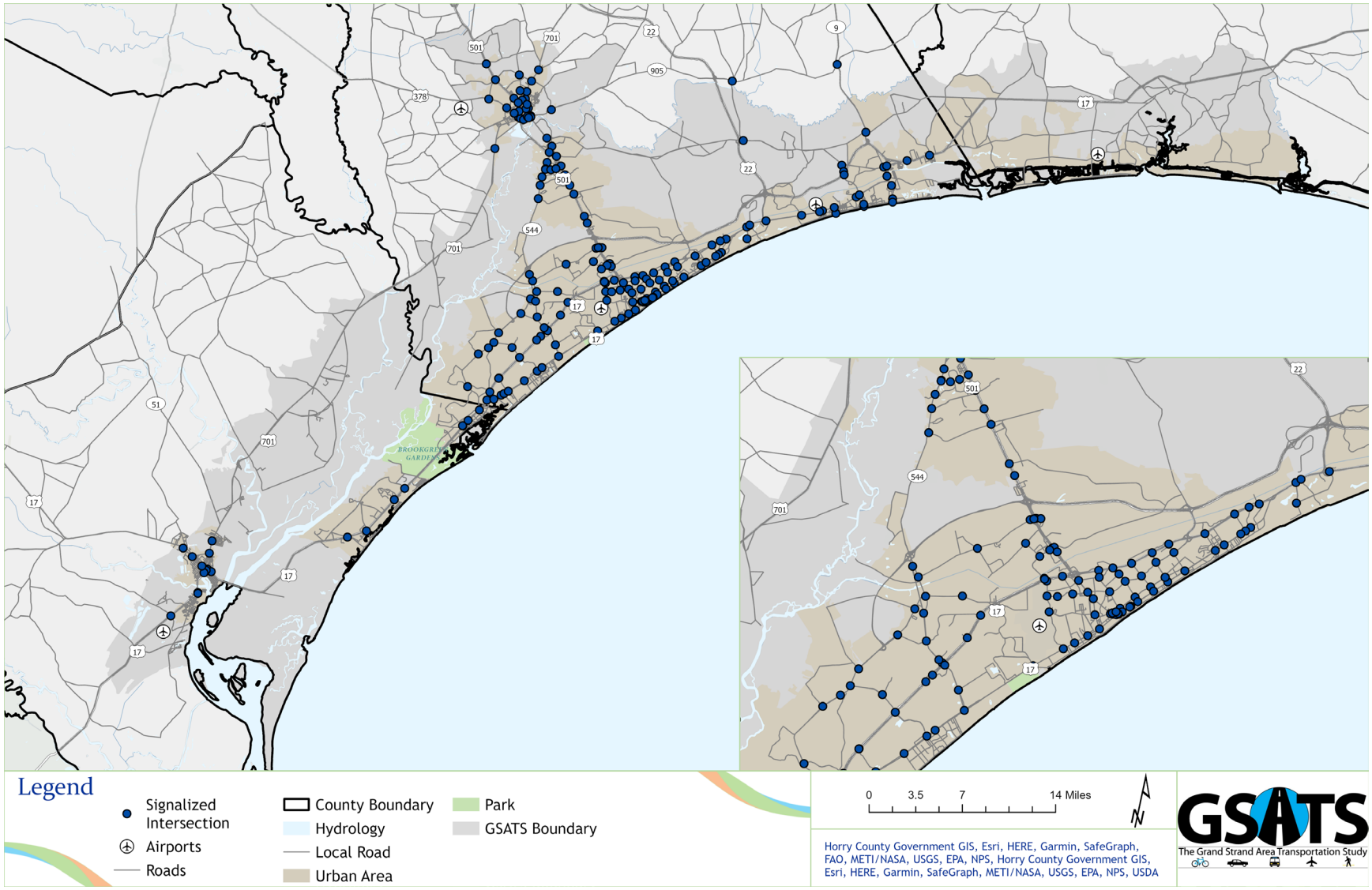
Table 1: Existing (2019) GSATS Average Trip Data

Modeled Trip Purpose	Average Trip Length in Minutes	Average Trip Length in Miles
Internal to Internal Trips	9.8	5.4
External to Internal Trips	50.0	38.9
Cruising Trips	5.6	2.3
External to External Trips	61.5	61.7
Average for All Trips	**12.3**	**7.7**

Traffic Operations

Traffic operations is an element of the model development that supports the estimation of intersection level of service (LOS) and overall performance of the study area roadway network. The presence of signals at intersections can impact the congestion level of roadways. The TDM estimates that congestion based on existing intersection geometry, capacity, demand (total traffic volume). The existing signalized intersection locations are illustrated in **Figure 2.**

Figure 1: Inventory of GSATS Existing Signalized Intersection Locations



STUDY AREA LAND USE & DEMOGRAPHIC CONDITIONS

Population and economic growth in the Grand Strand area continues to outpace the construction of transportation infrastructure. Recently released U.S. Census Bureau data revealed that Horry, Georgetown and Brunswick counties' growth continue as quality of life and livability features attract visitors, permanent residents, and businesses. According to the U.S. Census Bureau, the 2021 population of the Myrtle Beach-Conway-North Myrtle Beach, SC-NC Metropolitan Area was 509,794. This same area saw a 18% growth rate in the six years from 2015 to 2021 as shown in **Table 4.**[1]

Table 2: Myrtle Beach-Conway-North Myrtle Beach, SC-NC Metro Area Population Growth (2015 - 2021)

2015	2016	2017	2018	2019	2020	2021	Net Growth	% Change
431,672	447,964	464,242	481,751	497,405	491,582	509,794	78,122	18.1%

Source: FRED Economic Data

The high population growth experienced by the Myrtle Beach metro area is even more pronounced when compared with peer cities and the state averages for the same study period as shown in **Table 5**. Myrtle Beach has a higher growth rate than the Charleston, Savannah and Charlotte metro areas. In addition, the 18% growth rate is nearly triple the state averages for South and North Carolina at 6.07% and 5.27%, respectively. [1]

Table 3: Myrtle Beach, Peer Metro Areas and State Population Growth (2015 - 2021)

Geography	Net Growth	% Change
Myrtle Beach-Conway-North Myrtle Beach, SC-NC Metro Area	78,122	18.10%
Charleston-North Charleston, SC Metro Area	66,908	8.97%
Columbia, SC Metro Area	28,451	3.51%
Savannah, GA Metro Area	31,784	8.40%
Charlotte-Concord-Gastonia, NC-SC Metro Area	251,540	10.27%
South Carolina (Statewide)	297,260	6.07%
North Carolina (Statewide)	528,667	5.27%

Source: FRED Economic Data

While not part of the permanent population, an additional consideration for GSATS is the large volume of seasonal population that visits the area during the summer and winter

[1] *https://fred.stlouisfed.org/categories/30881*

months. The Myrtle Beach Chamber of Commerce estimates that in 2019 approximately 24 million people visited the area [2].

The growing resident population combined with high levels of seasonal visitors place high levels of demand on transportation infrastructure. One of the great challenges faced by the Grand Strand area over the life of this plan will be providing and maintaining adequate transportation infrastructure to meet demand while balancing the finite resources available to do so.

Demographic Trends

The following section provides the spatial context of where the afore mentioned growth has occurred across the GSATS study area. **Figure 3** shows the change in population density by Census block group from 2013 to 2021. The map shows the full range of population density change – from a few areas with less than five percent growth and others with growth of greater than 100 percent per block group. While the majority of the GSATS study area experienced growth the areas with the most pronounced growth include Little River and Myrtle Beach. The areas with less than five percent growth are found in Georgetown, Shallotte, and Sunset Beach.

Figure 4 provides a similar map measuring employment change at the census block level for the time period of 2013-2020 (census data for place of employment was only available through 2020). The map indicates employment growth throughout the GSASTS study area, with the highest increases occurring in Myrtle Beach, Conway, and Little River.

[2] https://issuu.com/myrtlebeachareavisitorinfo/docs/2020_annualreport

Figure 2: Population Percent Change (2013 – 2021)

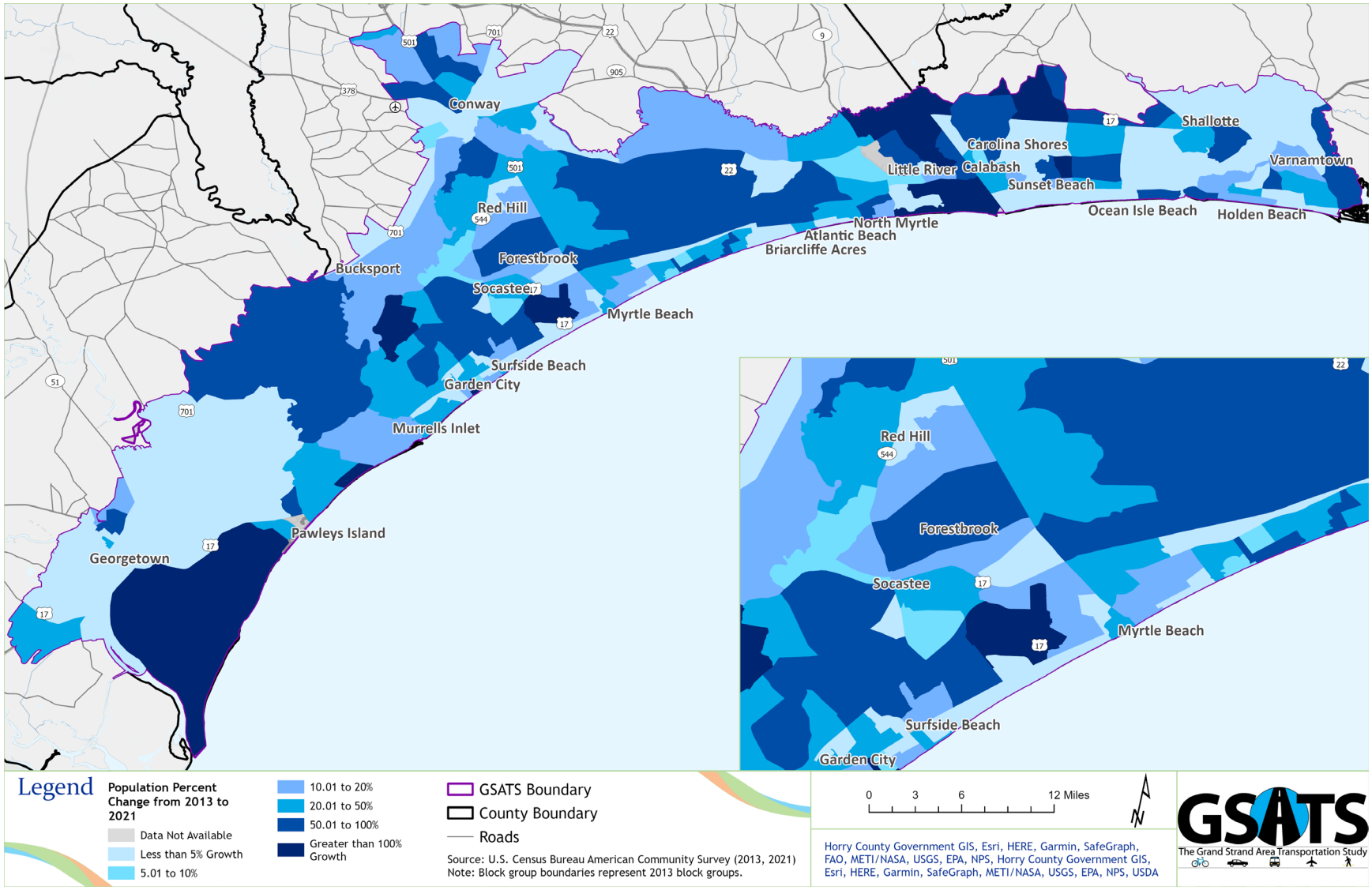
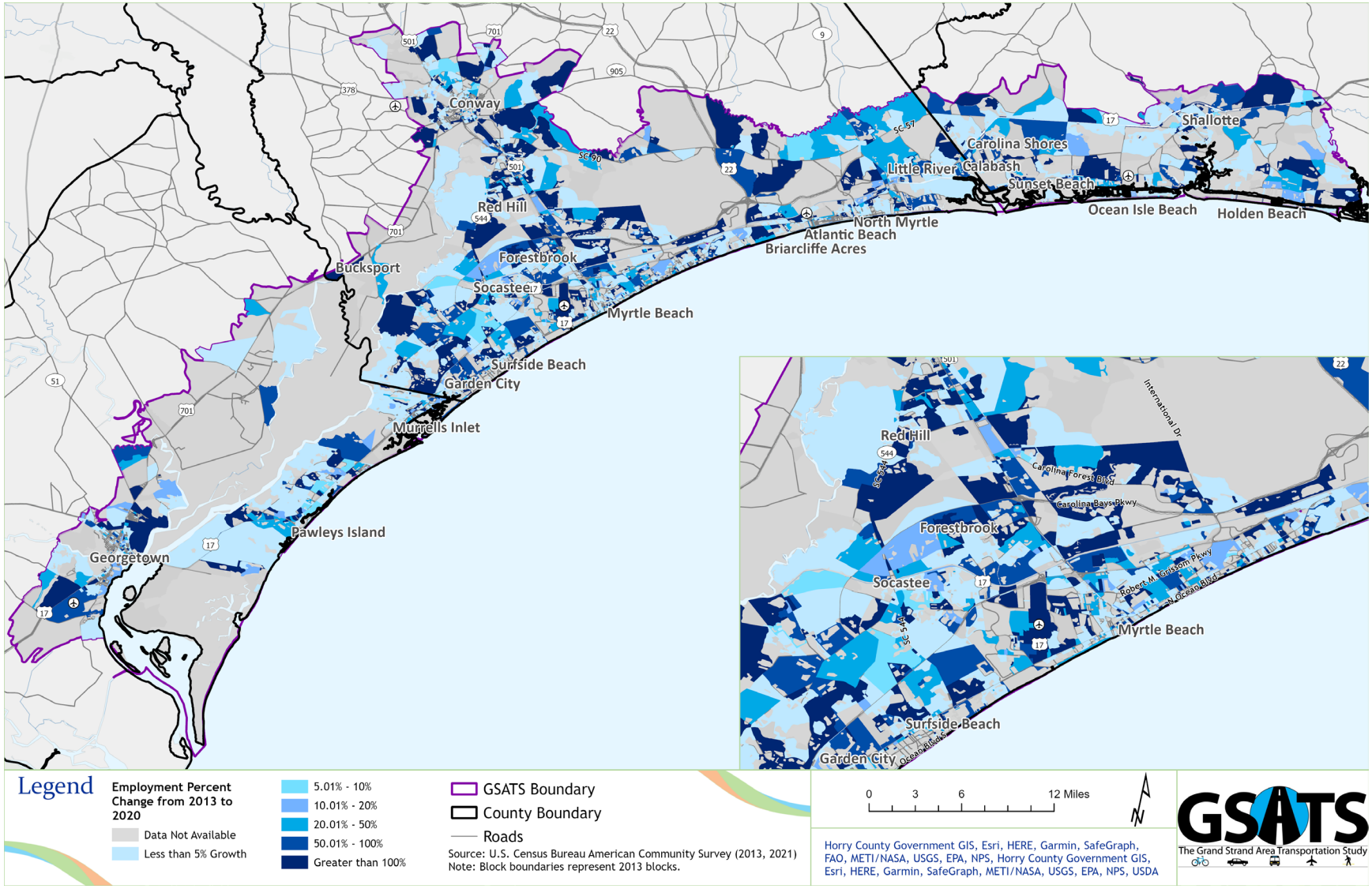


Figure 3: Employment Percent Change (2013 – 2020)



EXISTING (2019) CONDITIONS

The existing (2019) transportation system in the Grand Strand area provides area residents and visitors with the ability to travel for work, school, shopping, health care, and recreation. The efficiency with which these trips can be made determines the effectiveness of the current roadway network. A few major roadways that act as links between the various communities in the GSATS region dominate the network. While some existing mobility options such as bicycle lanes, sidewalks, and transit service are present in the region, increased accommodation is necessary for residents and tourists alike as travel demand increases. This creates challenges for cities, counties, and the states in the GSATS region as each must continue to manage their existing facilities while planning for anticipated growth.

CAPACITY ANALYSIS AND PERFORMANCE MEASURES

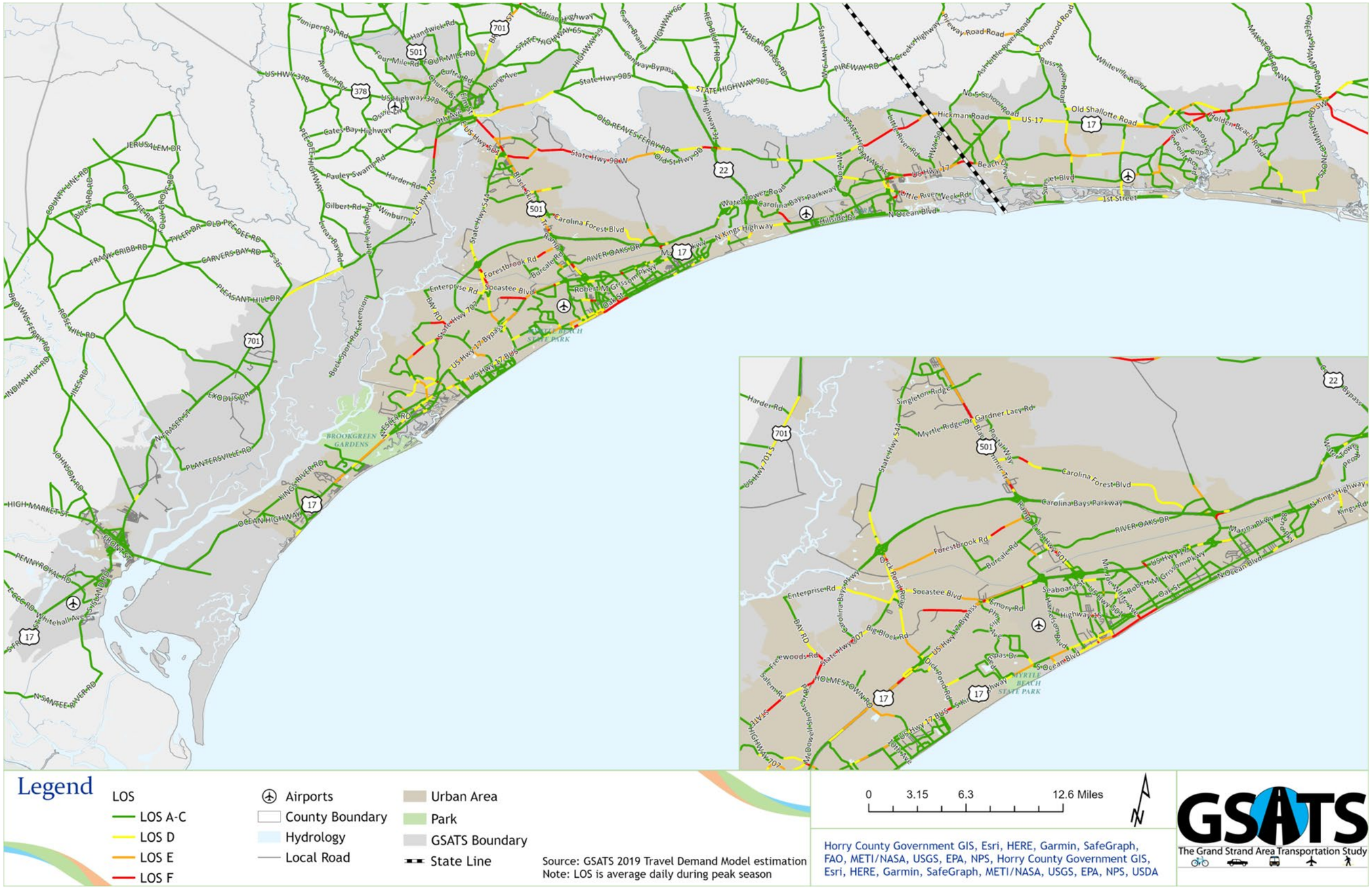
Stated in the *GSATS 2045 MTP Technical Memorandum: Level of Service Standards and Road Functional Classifications,* a LOS goal of D is proposed for this MTP update. Roadway LOS goals are used by GSATS to establish the desired operating conditions of the roadway network. The appropriate degree of congestion (or LOS) to be used in planning and designing highway improvements in the developed suburban and urban environment is determined by a variety of factors. These factors include the desires of motorists, adjacent land use type, development intensity, environmental factors, aesthetic and historic values. These factors must also be weighed against the financial resources available for infrastructure improvements.

Roadway Capacity

Roadway capacity is dependent on functional classification, the number of lanes, speed limits, and the presence of medians and intersections. The LOS criteria for roadway capacities are based on the thresholds established by the South Carolina Statewide Travel Demand Model (SCSWM). Roadway LOS is expressed as a ratio of the peak season peak hour traffic volume and the capacity of the roadway segment.

Existing conditions are quantified to understand the current operations of the roadways in the GSATS region. **Figure 5** provides the existing (2019) conditions peak season daily LOS results for key roadways.

Figure 4: Existing (2019) Conditions Peak Season Daily Roadway LOS



Out of the total 791 roadways analyzed in the existing TDM, 70 roadways (9%) operate at a LOS D or worse. Out of those 70 roadways, 32 operate at LOS D, 20 at LOS E, and 18 at LOS F. **Table 6** shows the segment LOS distribution for the entire GSATS network and between North Carolina and South Carolina. **Table 7** provides the roadways in the GSATS network that currently operate at a LOS D or worse.

Table 4: Existing (2019) Segment LOS Distribution Between NC and SC

	Total		NC		SC	
A	503	64%	39	8%	464	92%
B	115	15%	23	20%	92	80%
C	103	13%	24	23%	79	77%
D	32	4%	10	31%	22	69%
E	20	3%	5	25%	15	75%
F	18	2%	7	39%	11	61%
Total	791		108		683	

Table 5: Existing (2019) Segments with LOS D-F Conditions

Road Name | City	Functional Class	V/C	LOS	State
11th Avenue | Myrtle Beach	Undivided Minor Arterial	1.73	F	South Carolina
6th Avenue | North Myrtle Beach	Undivided Collector	1.02	D	South Carolina
Beach Drive | Calabash	Undivided Major Collector	1.12	D	North Carolina
Beach Drive | Ocean Isle Beach	Undivided Major Collector	1.44	F	North Carolina
Beaver Run Boulevard | Myrtle Beach	Undivided Collector	1.03	D	South Carolina
Brick Landing Road | Shallotte	Undivided Major Collector	1.53	F	North Carolina
Bridger Road | Shallotte	Divided Collector	1.25	E	North Carolina
Broad Street | Homewood	Undivided Minor Arterial	1.00	D	South Carolina
Broad Street | US 701 between Conway and Loris	Undivided Minor Arterial	1.07	D	South Carolina
Burgess Road | Murrells Inlet	Undivided Minor Arterial	1.31	E	South Carolina
Carolina Forest Boulevard | Carolina Forest	Divided Minor Arterial	1.06	D	South Carolina
Causeway Drive | Ocean Isle Beach	Undivided Collector	1.04	D	North Carolina
Dick Pond Road | Socastee	Undivided Minor Arterial	1.16	E	South Carolina
E Cox Ferry Road | Conway	Undivided Collector	1.41	F	South Carolina
E US Highway 501 | Carolina Forest	Divided Principal Arterial	1.19	E	South Carolina
E US Highway 501 | Conway	Divided Principal Arterial	1.17	E	South Carolina
E US Highway 501 | Red Hill	Divided Principal Arterial	1.40	F	South Carolina
Enterprise Road | Socastee	Undivided Collector	1.02	D	South Carolina
Forestbrook Road | Forestbrook	Undivided Collector	1.27	E	South Carolina
Fulford Avenue | Holden Beach	Undivided Major Collector	1.07	D	North Carolina
Gardner Lacy Road | Conway	Undivided Collector	1.10	D	South Carolina
Glenns Bay Road | Garden City	Divided Minor Arterial	1.18	E	South Carolina
Hickman Road | Carolina Shores	Major Collector	1.08	D	North Carolina

Hickman Road | Shallotte	Divided Major Collector	1.58	F	North Carolina
Highway 179 | Little River	Undivided Major Collector	1.53	F	South Carolina
Hill Street | North Myrtle Beach	Undivided Collector	1.43	F	South Carolina
Holden Beach Road | Shallotte	Major Collector	1.18	E	North Carolina
Loyola Drive | Myrtle Beach	Undivided Collector	1.10	D	South Carolina
Midway Road | Oak Island Beach	Undivided Collector/Local	1.68	F	North Carolina
N Kings Highway | Briarcliff Acres	Divided Principal Arterial	1.08	D	South Carolina
Ocean Highway | Murrells Inlet	Divided Principal Arterial	1.17	E	South Carolina
Ocean Isle Beach Road | Ocean Isle Beach	Undivided Major Collector	1.10	D	North Carolina
Old Georgetown Road | Ocean Isle Beach	Undivided Major Collector	1.22	E	North Carolina
Old Georgetown Road | Sunset Beach	Undivided Major Collector	1.02	D	North Carolina
Palmetto Point Boulevard | Socastee	Undivided Collector	1.56	F	South Carolina
Pireway Road | Longs	Undivided Major Collector	1.03	D	South Carolina
Powell Lane | Myrtle Beach	Undivided Collector	1.15	D	South Carolina
Queen Harbour Boulevard | Myrtle Beach	Undivided Collector	1.15	D	South Carolina
S Kings Highway | Myrtle Beach	Divided Principal Arterial	1.11	D	South Carolina
S Ocean Boulevard | Myrtle Beach	Undivided Minor Arterial	1.07	D	South Carolina
Sabbath Home Road | Holden Beach	Undivided Collector/Local	1.05	D	North Carolina
Seaside Road | Sunset Beach	Undivided Major Collector	1.03	D	North Carolina
Socastee Boulevard | Myrtle Beach	Undivided Minor Arterial	1.21	E	South Carolina
Socastee Boulevard | Socastee	Undivided Minor Arterial	1.01	D	South Carolina
Southport Supply Road | Bolivia	Major Collector	1.65	F	North Carolina
Southport Supply Road | Oak Island Beach	Divided Major Collector	1.78	F	North Carolina
Southport Supply Road | St. James	Major Collector	2.81	F	North Carolina
Springs Avenue | Pawleys Island	Undivided Collector	1.12	D	South Carolina
State Highway 544 | Socastee	Undivided Principal Arterial	1.03	D	South Carolina
State Highway 707 | Myrtle Beach	Undivided Minor Arterial	1.21	E	South Carolina
State Highway 707 | SC 707 between Socastee and Murrells Inlet	Undivided Minor Arterial	1.31	E	South Carolina
State Highway 90 | Conway	Undivided Minor Arterial	1.28	E	South Carolina
State Highway 90 | Little River	Undivided Minor Arterial	1.18	E	South Carolina
State Highway 90 | SC 90 between Conway and North Myrtle Beach	Undivided Minor Arterial	1.19	E	South Carolina
State Highway 905 | Conway	Undivided Minor Arterial	1.10	D	South Carolina
Us Highway 17 | Little River	Divided Principal Arterial	1.10	D	South Carolina
Us Highway 17 | Shallotte	Divided Principal Arterial	1.14	D	North Carolina
Us Highway 17 | US 17 from Carolina Shores to Shallotte	Divided Principal Arterial	1.00	D	North Carolina
Us Highway 17 Business | Shallotte	Divided Major Collector	1.22	E	North Carolina
Us Highway 17 Business | Surfside Beach	Divided Principal Arterial	1.10	D	South Carolina
Us Highway 17 Bypass | Garden City	Divided Principal Arterial	1.14	D	South Carolina
Us Highway 501 | Carolina Forest	Divided Principal Arterial	1.02	D	South Carolina
Us Highway 501 | Conway	Divided Principal Arterial	1.23	E	South Carolina
Us Highway 501 Business | Conway	Undivided Minor Arterial	1.52	F	South Carolina

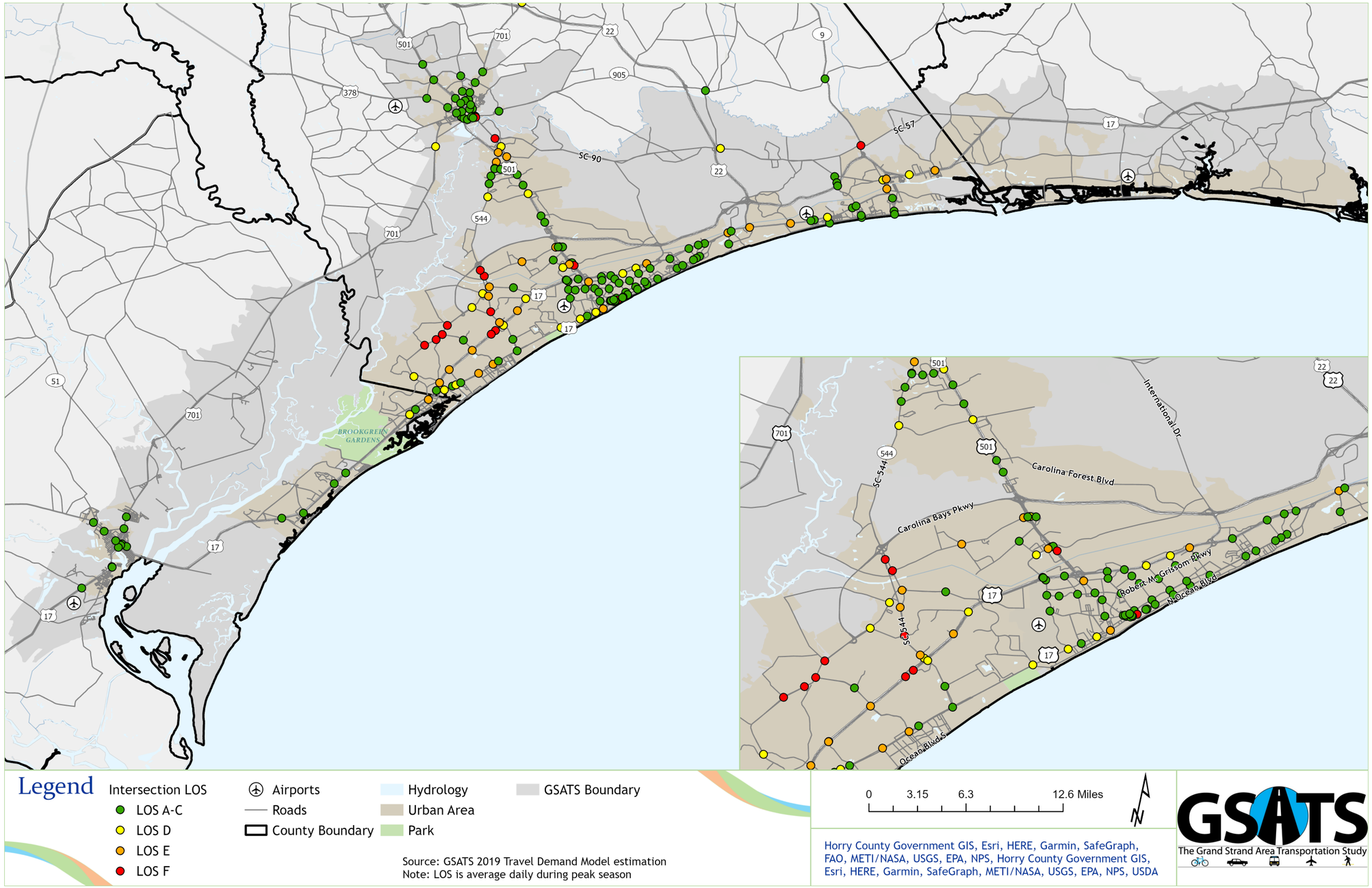
Us Highway 501 Business | Red Hill	Undivided Minor Arterial	1.35	F	South Carolina
Us Highway 701 | Loris	Divided Minor Arterial	1.24	E	South Carolina
Us Highway 701 | US 701 from Brunswick County Line to Loris	Undivided Minor Arterial	1.45	F	South Carolina
Village Road | Shallotte	Undivided Collector	1.30	E	North Carolina
Wampee Road | Little River	Undivided Collector	1.48	F	South Carolina
Wildair Circle | Conway	Undivided Minor Arterial	1.49	F	South Carolina

Intersection Capacity

A sketch level analysis was conducted using the GSATS model to determine intersection LOS. This involved using the V/C ratios on approach links for intersections with signals. The GSATS travel demand model calculates signal delay for intersections with signals and adds these delays to the travel time on the approach legs which is used in the traffic assignment. To remain consistent with roadway LOS criteria, the LOS thresholds are also applicable for intersection LOS.

Existing conditions are established to understand the current operation of the intersections in the GSATS region. **Figure 6** provides the existing (2019) conditions peak season daily LOS results for all (217) signalized intersections in the GSATS region.

Figure 5: Existing (2019) Conditions Intersection LOS



Out of the total 217 intersections analyzed in the existing TDM, 69 intersections operate at a LOS D or worse. Out of those 69 intersections, 28 operate at LOS D, 27 at LOS E, and 14 at LOS F. Table 8 provides the intersections in the GSATS network that currently operate at a LOS D or worse.

Table 6: Existing (2019) Intersections with LOS D-F Conditions

Main Roadway	Intersecting Roadway	V/C	LOS
US 501 Bus	SC 544	1.1	D
US 501	Seaboard St	1.22	E
U S501 On Ramp/Off Ramp	George Bishop Pkwy	1.28	E
Dick Pond Rd	Forestbrook Rd	1.51	F
SC 707	Salem Rd	1.46	F
SC 707	McDowell Shortcut Rd	1.53	F
SC 707	Bay Rd	1.93	F
US 701	Pitch Landing Rd	1.11	D
US 17	Esso Rd	1.32	E
US 17 On Ramp/Off Ramp	Glenns Bay Rd	1.3	E
US 17 Bus	Glenns Bay Rd	1.16	E
SC 707	Dick Pond Rd	1.24	E
SC 544	US 17 On Ramp/Off Ramp	1.07	D
SC 544	US 17 On Ramp/Off Ramp	1.12	D
SC 707	Holmestown Rd	1.53	F
SC 707	Enterprise Rd	1.14	D
SC 707	Big Block Rd	1.15	D
SC 544	Dick Pond Rd	1.19	E
SC 544	Big Block Rd	1.36	F
US 17	Palmetto Pointe Blvd	1.13	D
US 17 Bus	Farrow Pkwy	1.15	D
US 17 Bus	Harrelson Blvd	1.13	D
Forestbrook Rd	Whatuthink Rd	1.3	E
SC 544	Pine Hollow Rd	1.4	F
US 501	University Blvd	1.06	D
SC 544	Myrtle Ridge Dr	1.05	D
US 501	SC 544	1.31	E
SC 544	Founders Dr	1.2	E
US 501	Cox Ferry Rd	1.28	E
US 501	Gardner Lacy Rd	1.13	D
Forestbrook Rd	Fantasy Harbour Blvd	1.2	E
US 501	Waccamaw Blvd	1.37	F
US 501 On Ramp/Off Ramp	Dick Scobee Rd	1.02	D
US 501 Bus	SC 90	1.68	F
US 501	US 378	1.01	D
US 501 Bus	4th Ave	1.14	D
US 701	Adrian Hwy	1.01	D
US 17	Kings Rd	1.22	E
US 17 Bus	3rd Ave S	1.18	E
US 17 Bus	9th Ave S	1.1	D
US 17	Arundel Rd	1.04	D
US 17 Bus	11th Ave N	1.44	F
US 17	29th Ave N	1.11	D
US 17	48th Ave N	1.18	E

Main Roadway	Intersecting Roadway	V/C	LOS
US 17	Barefoot Resort Bridge Rd	1.29	E
US 17	Lake Arrowhead Rd	1.33	E
US 17	17th Ave	1.04	D
SC 90	Monaca Rd	1.11	D
SC 9	SC 57	1.41	F
Old Highway 17 N	Sea Mountain Hwy	1.24	E
SC 90	Sea Mountain Hwy	1.14	D
SC 9 On Ramp/Off Ramp	SC 90	1.22	E
US 17	Mineola Ave	1.28	E
US 17	Coquina Harbour Dr	1.15	D
US 17	Wachesaw Rd	1.09	D
US 17	SC 707	1.22	E
US 17 Bus	Inlet Square Dr	1.01	D
US 17 Bus	Atlantic Ave	1.1	D
US 17	Tournament Blvd	1.27	E
US 17	Indigo Club Dr	1.16	E
US 17	Indigo Club Dr	1.2	E
US 17 Bus	Melody Ln	1.17	E
Fantasy Harbour Blvd	George Bishop Pkwy	1.18	E
George Bishop Pkwy	Claypond Rd	1.1	D
SC 707	Tournament Blvd	1.14	D
US 17	Coventry Rd	1.38	F
SC 544	N Strand Pkwy	1.3	E
US 501 Bus	3rd Ave	1.5	F
US 17	Queens Harbour Blvd	1.44	F

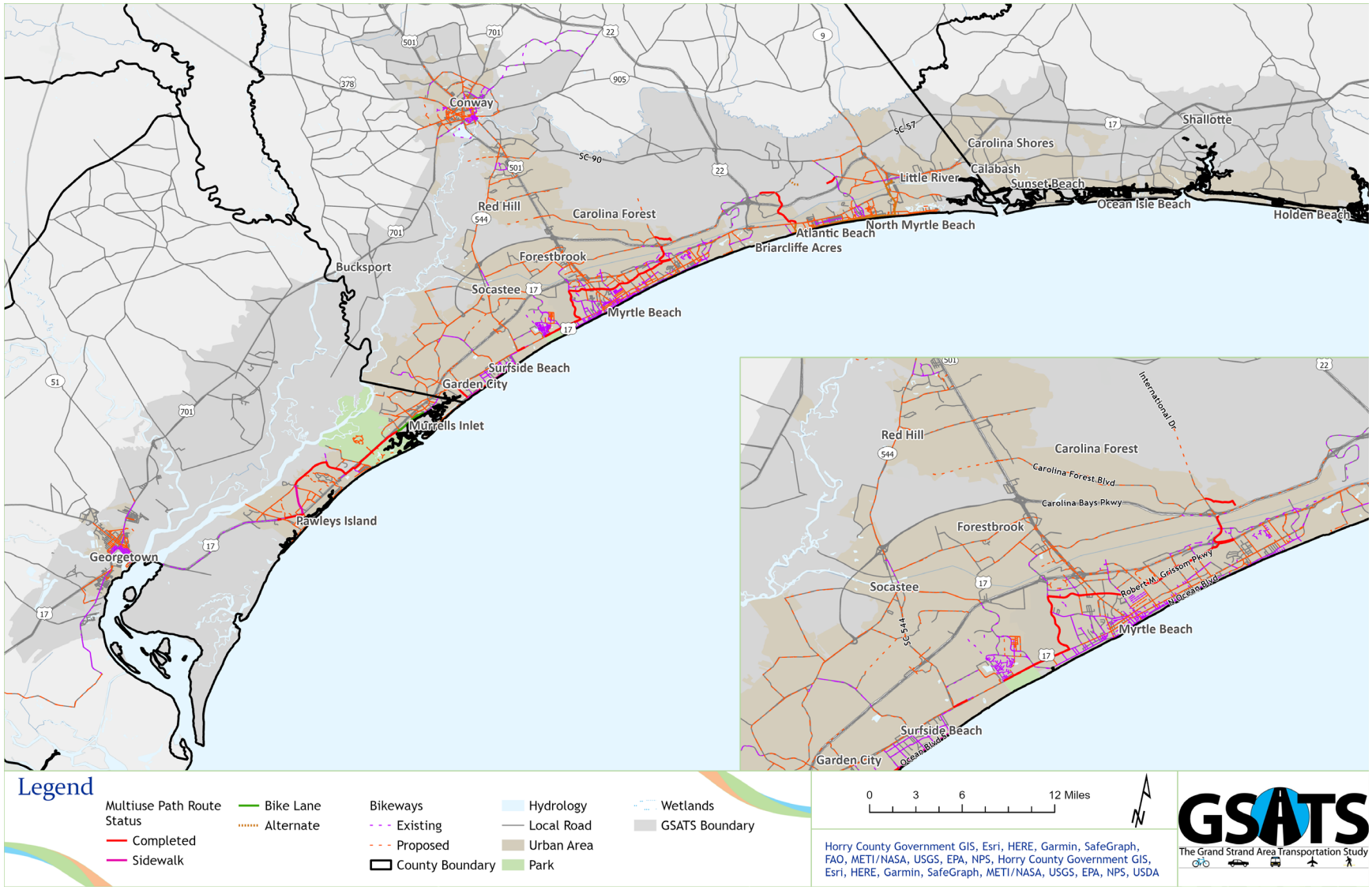
BICYCLE AND PEDESTRIAN FACILITIES

The GSATS region currently has a number of bike and pedestrian facilities throughout the jurisdictions of its member governments. The East Coast Greenway is a major bicycle and pedestrian facility that connects most of the GSATS region together.

The East Coast Greenway is a walking and biking route stretching 3,000 miles from Maine to Florida, connecting our nation's most populated corridor[3]. In South Carolina, the East Coast Greenway stays near the coast through the state's low country, bringing travelers through Myrtle Beach, Georgetown, Charleston, and Beaufort southbound to the Georgia border. Completed trails furthest north include the many trails of Myrtle Beach — the first East Coast Greenway city to complete all its off-road trails[4]. Once the remaining pieces of the East Coast Greenway are connected, this facility will continue to provide a significant active transportation connection and network for both bicyclists and pedestrians. **Figure 7** shows the existing facilities throughout the region.

[3] https://www.greenway.org/about/the-east-coast-greenway
[4] https://www.greenway.org/states/south-carolina

Figure 6: Existing (2019) GSATS Area Bicycle and Pedestrian Facilities

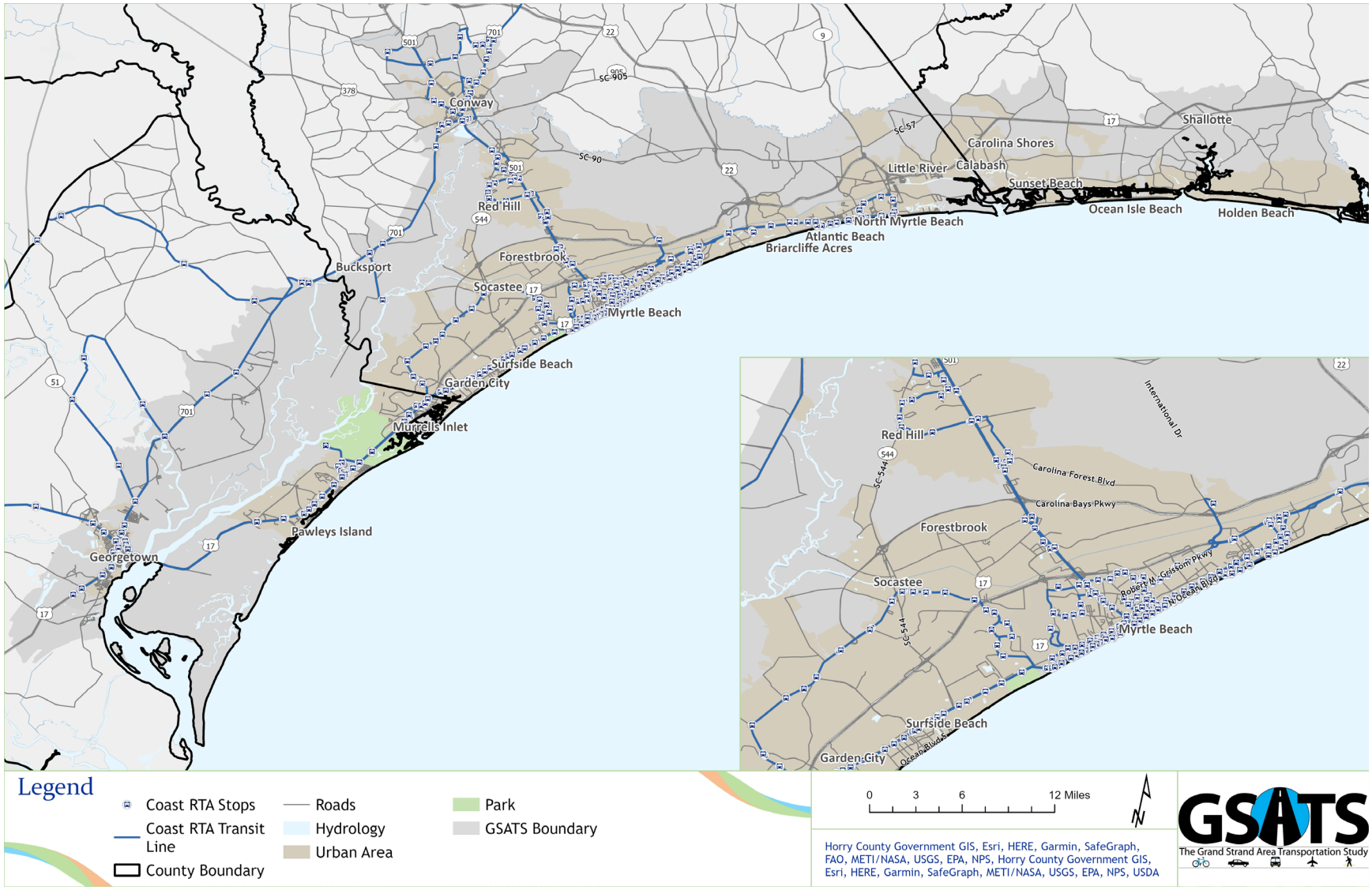


TRANSIT FACILITIES

Within the Grand Strand area, transit service provides transportation and mobility options for the residents each day. In addition to the residents of the Grand Strand area rely on these options, visitors and tourists represent a significant amount of the population during the peak tourist season. Access to jobs, medical care, shopping, recreational activities, needed services, and all other aspects of daily life are provided by these options. These needs increase tremendously during the peak tourist season and continue through the remaining off-peak season. As the area's population has grown, and continues to do so, convenient, and reliable transit service will become an even greater necessity.

The GSATS MPO anticipates the automobile to continue to be the dominant mode of transportation in the foreseeable future for the area, both in number of trips and the distance traveled. However, transit and other modes will continue to play an increasingly important and beneficial role in the overall transportation network. Supporting and encouraging transit and other modes will reduce congestion and air pollution in the area, as well as consumption of natural resources. **Figure 8** illustrates the existing transit system in the region. In addition to fixed route transit, Brunswick Transit System provide Dial-a-Ride programs. The transit data in the figure, reflects data received from the Waccamaw Regional COG, and is dated March 2, 2022.

Figure 7: Existing (2022) GSATS Area Public Transit Facilities



CONGESTION MANAGEMENT PROCESS AND PERFORMANCE MEASURES

The guiding principle behind the development and implementation of performance measures for MPOs is to provide a means to assess how the transportation system and/or the agency is functioning and operating. Performance measures help inform decision-making and create better accountability for efficient and effective program implementation. These are factors in establishing existing and forecast conditions analyses for both the MTP and the Congestion Management Process (CMP).

In addition to the capacity performance measures of LOS, the existing conditions evaluation will quantify congestion and reliability of the GSATS network with Travel Time Index (TTI) and Planning Time Index (PTI). These measures are both measures of travel time reliability and provide a different perspective of the levels of existing congestion, future congestion, and the proposed future improvements. According to FHWA, measures of travel time reliability better represent a commuter's experience [5]. By expanding beyond LOS and including TTI and PTI in this evaluation, the analyses and planning efforts are streamlined for GSATS personnel and review efforts of state and federal planning partners.

Travel Time Index (TTI)

The TTI quantifies congestion based on user experienced travel time for a given time interval. The TTI is defined as the ratio between the observed travel time to free flow travel time, which represents the percentage increase in travel time compared to free flow conditions. The formula for TTI is presented below:

$$TTI = \frac{\text{Observed Travel Time}}{\text{Free FLow Travel Time}}$$

For example, if under free flow conditions a trip takes 10 minutes, but during a congested time interval that trip takes 15 minutes, the TTI would be equal to 1.5. This TTI indicates that it took the traveler 50% longer than what it would have taken under the free flow conditions to complete the trip.

For purposes of this analysis TTI thresholds will follow guidance from the Federal Highway Administration (FHWA) [6]. This metric is used to quantify how frequently and how severely congested segments and paths in the study corridor are for the average peak season day.

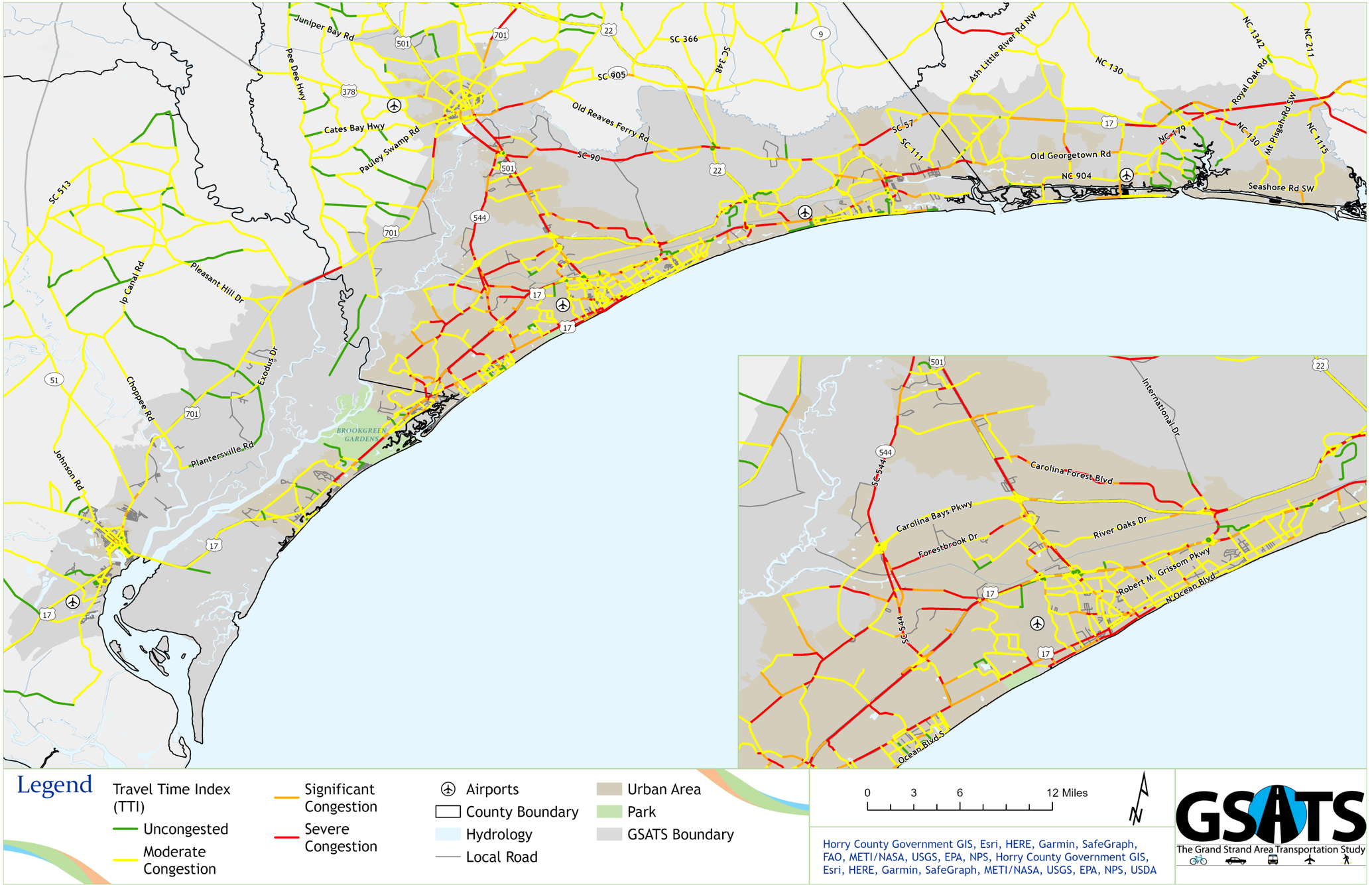
The peak period TTI can be used to describe the severity of congestion under the following:

- Uncongested: TTI≤1.0
- Moderate Congestion: 1.1<TTI≤1.5
- Significant Congestion: 1.5<TTI≤2.0
- Severe Congestion: TTI>2.0

[5] https://ops.fhwa.dot.gov/publications/tt_reliability/brochure/ttr_brochure.pdf
[6] https://www.fhwa.dot.gov/tpm/guidance/hif18040.pdf

These TTIs are calculated using the 2019 base year TDM estimated volumes as 'observed speeds' with free flow speeds calculated based on posted speeds. **Figure 9** reveals where existing congestion issues occur in the GSATS corridor by summarizing the peak season daily TTI. The most severely congested areas include Surfside Beach, Socastee, Myrtle Beach, Conway, North Myrtle Beach, Atlantic Beach, Little River, and Shallotte. The TTI reveals that congestion is typically worse during the peak season with vehicles encountering severe congestion (TTI > 2) along notable roadways including U.S. 17 through Garden City, Surfside Beach, Myrtle Beach, and North Myrtle Beach. U.S. 17 Bypass from Garden City to Myrtle Beach. Carolina Forest Boulevard, Forestbrook Drive, and S.C. 707 are current severely congested roadways in the Myrtle Beach area. Severe congestion spans almost the entire length of S.C. 544, U.S. 501, and Business U.S. 501. S.C. 90 and S.C. 905 experience severe levels of congestion from Conway to Old Reaves Ferry Road. Moving to the north, congestion begins to alleviate until the U.S. 17 and S.C. 9 interchanges in the Myrtle Beach area, previously mentioned. In North Carolina, severe congestion exists in Shallotte along N.C. 904 and previously mentioned, U.S. 17 from the Ocean Isle Beach Road area to N.C. 211.

Figure 8: Existing (2019) Conditions Peak Season Daily TTI



Planning Time Index (PTI)

The planning time index (PTI) describes how much total time a traveler would have to plan to ensure on-time arrival compared to free flow conditions for a given time period. When compared to an average TTI, the PTI can be an indicator of the reliability for a segment or path. PTI is another metric used to characterize travel time and is defined as the ratio of travel time (95th percentile) to the free flow travel time. This is particularly helpful when managing the expectations of travelers. It is often the case that the demand for capacity exceeds available funding, but travelers still expect some reliability in the transportation network for trip planning.

For purposes of this analysis PTI thresholds will follow guidance from the Federal Highway Administration (FHWA)[7]. This metric is used to quantify how frequently and how severely congested segments and paths in the study corridor are for the average peak season day.

The peak hour PTI can be used to describe the severity of congestion under the following:

- Uncongested: PTI≤1.0
- Moderate Congestion: 1.1<PTI≤1.5
- Significant Congestion: 1.5<PTI≤2.0
- Severe Congestion: PTI>2.0

Figure 10 reveals where existing reliability issues occur in the GSATS corridor. Roadways shaded red indicate severe congestion (PTI > 2), meaning it took vehicles over twice as long to complete their trip during the worst day of the peak season compared to free flow conditions. **O**ut of the total 791 roadways analyzed in the existing TDM, 643 roadways (81% of all roadways) operate at severe congestion. The congestion and reliability patterns indicate that vehicles in the GSATS region, traveling during peak times on these roadways, should plan for over double the travel time it would take to complete their trip during free-flow or off-peak times. **Table 9** shows the existing TDM PTI results for congestion for all roadways in the GSATS region and the percentage of these segments in North Carolina and South Carolina.

Table 7: Existing (2019) Conditions Peak Season Daily PTI

PTI District	Segments	% of all Segments	NC		SC	
Uncongested	26	3.3%	4	15%	22	85%
Moderate Congestion	28	3.5%	1	4%	27	96%
Significant Congestion	94	11.9%	7	7%	87	93%
Severe Congestion	643	81.3%	96	15%	547	85%
Total	791		108		683	

[7] https://www.fhwa.dot.gov/tpm/guidance/hif18040.pdf

Figure 9: Existing (2019) Conditions Peak Season Daily PTI