

REATS

Rock Hill - Fort Mill Area Transportation Study



Congestion Management Process November 27, 2019

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1. INTRODUCTION

1.1. Purpose

The Metropolitan Transportation Planning Process is made up of many components as well as federal and state requirements, all designed to ensure a useful, productive, and outcome-oriented planning process that will serve all users of the transportation system. One of the central elements of this type of work is the ability to actively monitor and recommend appropriate actions based on relevant operational data. The Congestion Management Process or CMP, is one of the principal tools utilized for producing sound decisions affecting a region's transportation system. With this in mind, the 2019 RFATS CMP update will focus on incorporating the latest requirements from the Fixing America's Surface Transportation (FAST) Act, as well as reflecting the latest planning and operational assumptions since the previous plan update was completed in 2011.

1.1.1. RFATS Technical Team

The CMP Update was completed with the support and guidance of the RFATS Technical Team, comprising representatives of:

- RFATS MPO;
- Lancaster County;
- York County;
- City of Rock Hill;
- City of Tega Cay;
- Town of Fort Mill;
- Catawba Indian Nation
- South Carolina Department of Transportation
- Federal Transit Administration; and the,
- Federal Highway Administration.

1.1.2. Report Layout

Following an overview of the Congestion Management Process in this chapter, the remainder of the report follows the organization and content of six sections prepared during the course of this update, namely:

- Section 1 – Introduction to the CMP Process
- Section 2 – Existing Multimodal System Conditions

- Section 3 – Performance Monitoring Guidelines and Selection
- Section 4 – Congestion Management Strategies
- Section 5 – Implementation Process
- Section 6 – Evaluation and Assessment

1.2. The Congestion Management Process

The Congestion Management Process is a continuous cycle of planning, implementation, operation and monitoring activities intended to help an MPO to:

- Identify congested locations;
- Determine the causes of congestion;
- Identify strategies that best address the causes and impacts of congestion; and
- Track and evaluate the impact of previously implemented congestion management strategies.

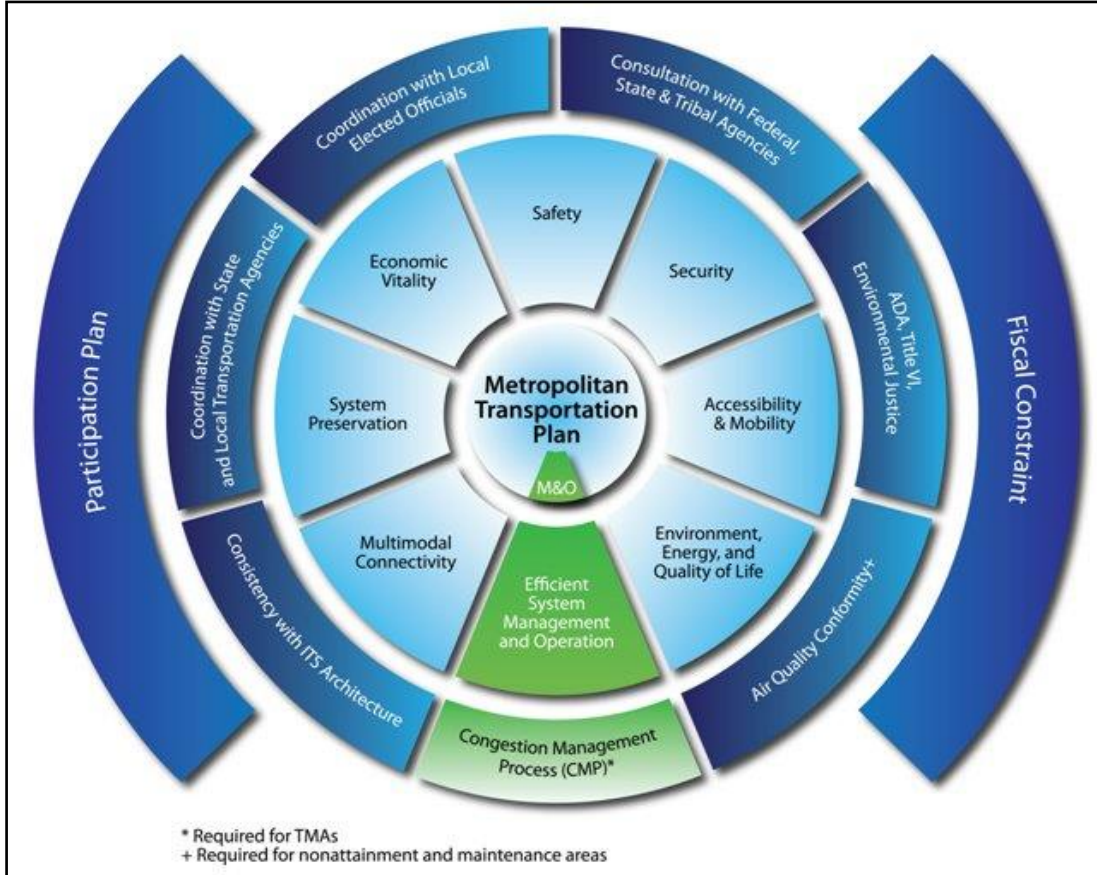
1.2.1. Metropolitan Planning Process

The Congestion Management Process is intended to be an integral part of the metropolitan planning process, rather than a stand-alone program or system. Furthermore, it advances the integration of transportation systems management and operations (M & O) into the metropolitan planning process. The integration of the CMP into the Metropolitan Planning Process is illustrated in **Figure 1-1**.

1.2.2. Maintenance and Operations

M & O is a vitally important approach to addressing both short-range and long-term transportation challenges, including congestion. It is an integrated approach that seeks to optimize the performance of existing infrastructure through the implementation of multimodal, intermodal, and often cross-jurisdictional systems, services and projects.

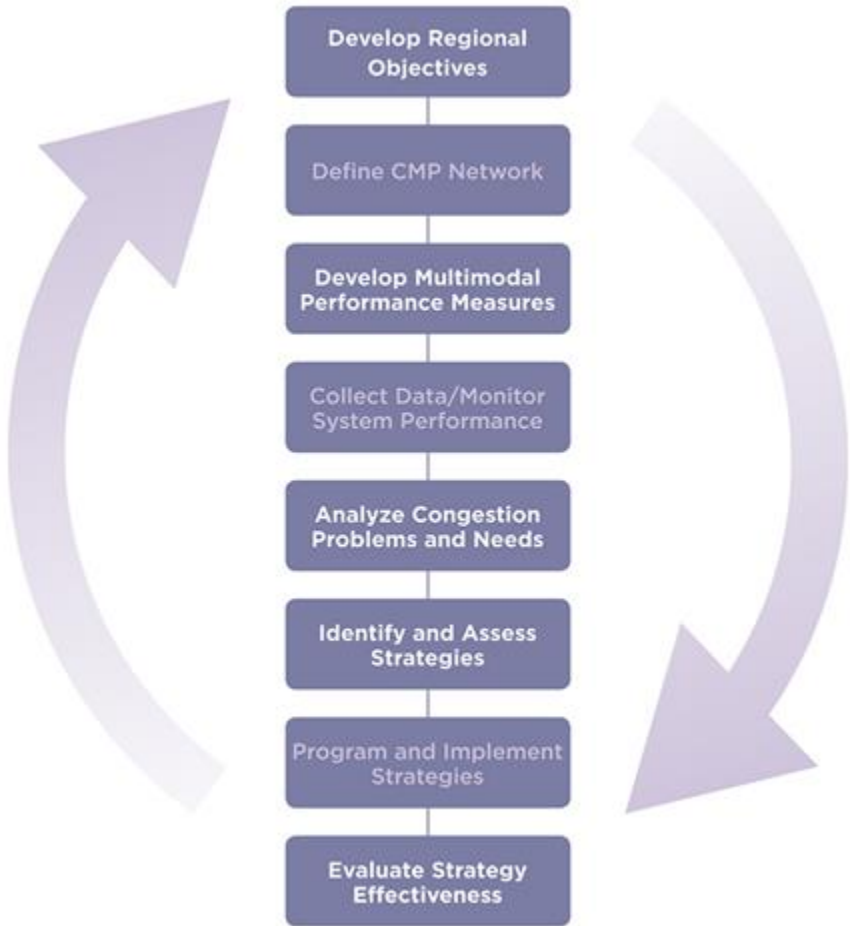
Figure 1-1: Components of the Metropolitan Planning Process



1.3. CMP Framework

The CMP may be considered as being made up of eight steps, as illustrated in **Figure 1-2**.

Figure 1-2: CMP Eight Steps



1.3.1. Develop Congestion Management Objectives

The RFATS 2045 Long-Range Transportation Plan (LRTP) identified the following overall goal for the LRTP¹:

“Develop a Plan that will provide safe, secure and reliable roadway travel through effective congestion management, expanded mobility choices and broad compatibility with area and regional plans beneficial to all transportation system users within the RFATS Planning Area.”

¹ Rock Hill – Fort Mill Area Transportation Study 2045 Long Range Transportation Plan, adopted June 23, 2017.

Table 1-1: RFATS 2045 LRTP Goals

GOAL: Provide Safe, Secure, Reliable Roadway Travel
Objectives
1) Protect public investment by maintaining the existing transportation system, including pavement, bridges, signal equipment and signs, transit vehicles and other transportation system components.
2) Provide a transportation system that enables reliable and efficient movement of passengers and freight to support the region’s economic productivity.
3) Improve transportation safety for both motorized and non-motorized users.
a) Reduce crashes at key intersections.
b) Reduce crashes involving pedestrians and bicyclists.
4) Improve transportation security and the system’s resiliency by developing an interconnected network that offers multiple routes and modes of travel.
5) Address visitor transportation needs through wayfinding, alternative modes in targeted areas, and other improvements.
Performance measures
<i>A. Crash statistics for York and Lancaster counties, based on the most recent five years of data available:</i>
• <i>Number of fatalities</i>
• <i>Rate of fatalities per 100 million vehicle-miles traveled</i>
• <i>Number of serious injuries</i>
• <i>Rate of serious injuries per 100 million vehicle-miles traveled</i>
• <i>Number of non-motorized user fatalities and serious injuries</i>

<i>B. Annual hours of delay in the RFATS region, as estimated by the regional travel demand model.</i>
GOAL: Manage Congestion
Objectives
1) Make improvements to fully utilize capacity on the existing road network before constructing new lanes or facilities.
2) Give priority to projects that implement the strategies in the RFATS Congestion Management Process, including operational improvements such as traffic signal timing.
3) Preserve traffic capacity on major corridors through quality development practices.
a) Require driveway access on collector or local streets, rather than arterial routes.
b) Increase the level of internal circulation within and between developments by designing more interconnected road networks.
Performance measures
<i>A. Travel time index for each corridor monitored through the RFATS Congestion Management Process (CMP).</i>
<i>B. Connectivity index of new developments in RFATS communities.</i>

1.3.2. System Definition

The RFATS CMP is intended to be multimodal in scope and address intermodal, transit, bicycle and pedestrian modes, as well as highways and freight movement. Since the 2011 CMP was completed, the MPO Boundary has been adjusted to include more of the western urbanized portion of York County, and the eastern urbanized portion of the panhandle of Lancaster County. The current geographic limits for the RFATS Planning Area are shown in **Figure 1-3**. Given these changes, a key component of the CMP – the Congestion Monitoring Network or CMN, has been updated to include the new incorporated areas referenced earlier. These roadways are referred to as CMP Corridors in **Section 3**.

One important element in identifying the CMN of the RFATS Planning Area is recognizing the complexity of the road network and how it functions operationally. Specifically, the road network connects the urban areas of Rock Hill, Tega Cay, Fort Mill and portions of York and

Lancaster counties to each other as well as connects to the wider transportation network that serves the Metrolina Region. As a point of reference, RFATS and the adjacent planning agencies within the Greater Charlotte Region are illustrated in **Figure 1-4**. Recognizing that over 50% of residents of the Greater Charlotte Region reside in one county and commute to another for work, the RFATS CMN accounts for significant inter-state travel via roadways that bridge the gaps between South Carolina and North Carolina.

1.3.3. Developing and Using Performance Measures

Performance measures can provide an effective means of communication both with members of the public and with appointed and elected officials. To be most effective, measures should be:

- Clear and easy to understand;
- Descriptive of existing conditions and suitable for predicting changes;
- Easily calculated and collected, with consistent results;
- Applicable to multiple modes; and
- Responsive to actions (improved facilities or policies) under the control of the MPO.

CMP performance measures should be derived from the vision, goals, and objectives established for the region during the metropolitan transportation planning process, such as those for the 2045 LRTP and should be transformed from goals into specific objectives as part of the Congestion Management Process. Performance measures established by SCDOT and RFATS since the 2045 LRTP was developed should also be incorporated, as discussed in Section 3.

1.3.4. Developing a Performance Monitoring Plan

In the past the availability, reliability and cost of data has been a major challenge for planners and system operators. However, recent advances in technologies and communications have allowed many data collection activities to be automated, and further significant advances are anticipated.

During the CMP Update, existing sources of data were identified; data was collected using two distinct methodologies and a Performance Monitoring Plan developed, as discussed in Section 6.

Figure 1-3: RFATS Planning Area

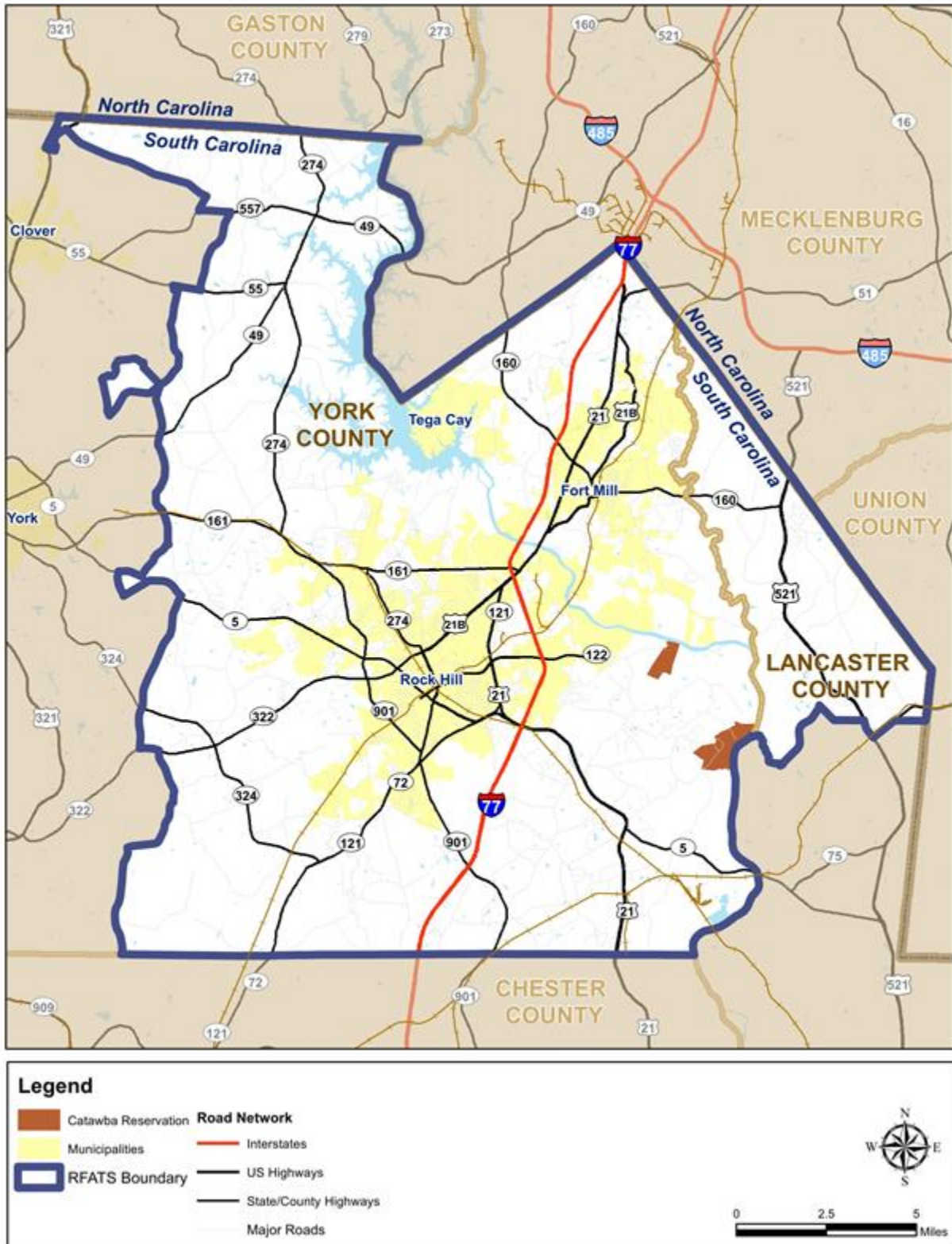
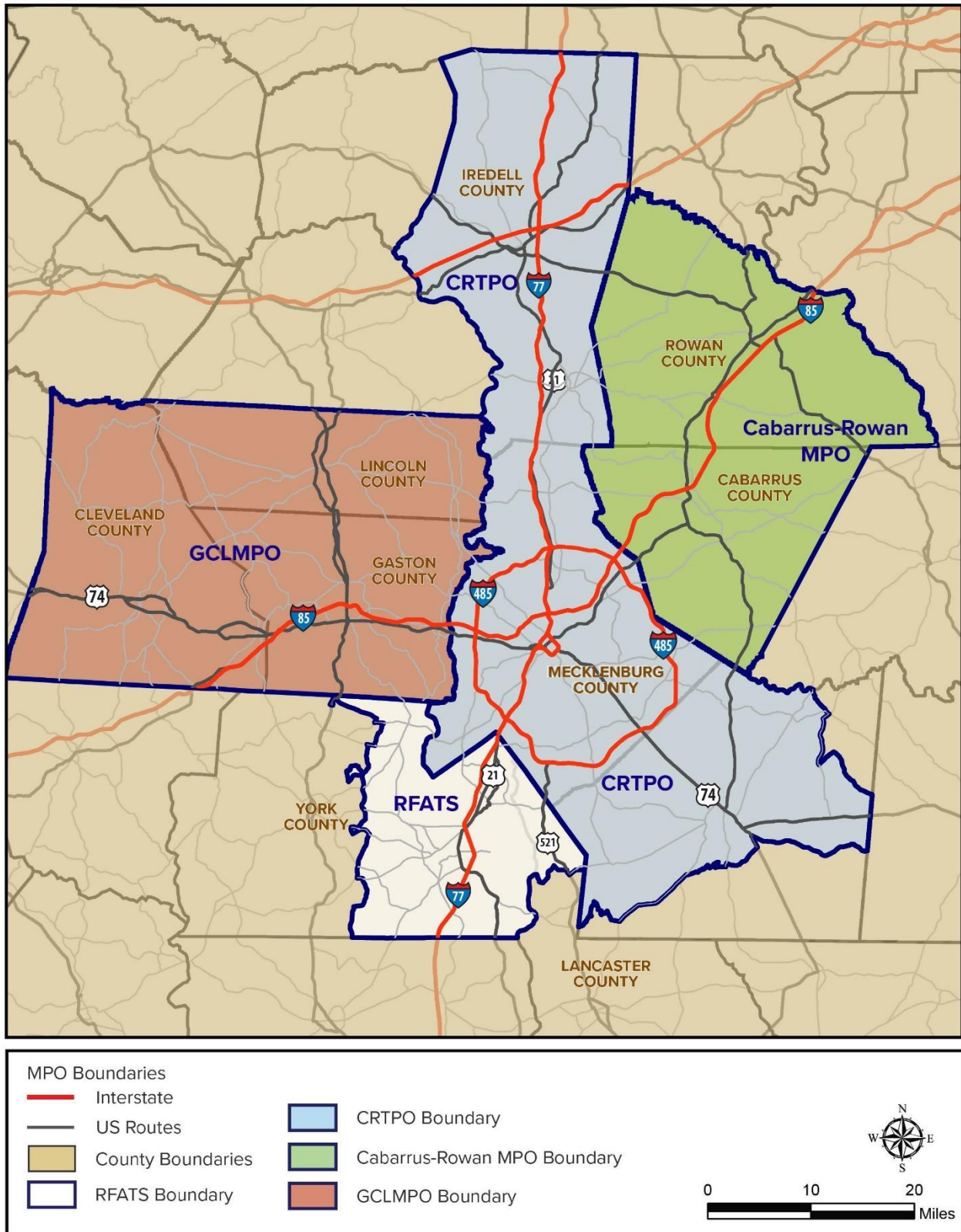


Figure 1-4: Metropolitan Planning Organizations of the Greater Charlotte Region



1.3.5. Identifying and Evaluating Strategies

Selection of appropriate performance measures, analytical tools, and available data enables the identification of congested locations. The most common type of congestion, recurring congestion, occurs repeatedly at the same locations and can often be traced to a specific cause, such as a bottleneck. Non-recurring congestion is less predictable and often the consequence of an accident that reduces capacity until the road is cleared. Available analysis tools range from sketch planning tools, the simplest and least costly, to microscopic simulation models, the most time consuming and costly.

One of the major products of this update is the set of CMP Operational and Policy Matrices. The rows of the matrix correspond to each type of congestion problem identified, while the columns identify potential operational and policy options (strategies). At the intersection of a row and column is a symbol or text indicating the potential impact of that specific option on that specific type of congestion / problem, as discussed in **Section 4**.

1.3.6. Implement Selected Strategies / Manage Systems

Following completion of this update, the Congestion Management Process will reflect the latest operating conditions as well as serve as a principal source of corridor and intersection specific improvements for programming consideration.

1.3.7. Monitoring Strategy Effectiveness

It is important to periodically evaluate the effectiveness of strategies identified in the CMP, using the selected performance measures. In assessing the degree to which the CMP strategies addressed the problems of congestion, it is also important to assess how well, and to what extent, the strategies were implemented and to consider factors that may have contributed to the success and/or limited progress of selected strategies or policies.

To achieve the above, it is important that the ongoing monitoring process should be able to isolate those marginal changes in system performance that may be associated with an implemented strategy.

Based on the results of the assessment process the CMP should be reviewed and appropriate adjustments made as necessary with respect to:

- Strategies considered;
- Performance measures used;
- Data collection; and / or
- Analytical tools and methods used.

It is only through such a periodic review that the CMP will be refined, improved, and keep pace with current practice. The need for periodic evaluation of the CMP is discussed in Section 6.

2. EXISTING MULTIMODAL SYSTEM CONDITIONS

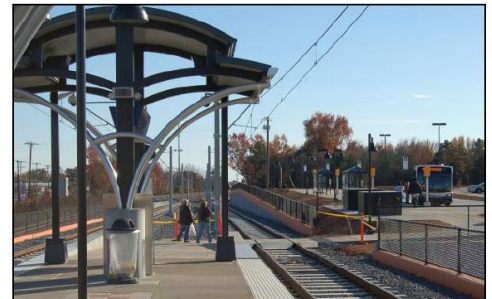
This section provides information on the RFATS Study Area addressing the following questions:

- Where are the critical congestion locations?
- What are the congestion and safety problems / issues in the planning area?

2.1. Previous Studies

2.1.1. RFATS 2045 LRTP

The RFATS 2045 Long Range Transportation Plan (LRTP) was completed in 2017 and approved on June 23, 2017. This planning document is a comprehensive assessment of area operating conditions, current and projected socio-economic data, growth corridors, federal and state planning requirements, as well as targeted information / guidance in key evaluation areas such as congestion management, freight, public transportation, safety and security, among many others. Fundamentally, the 2045 LRTP outlines identified transportation system needs and improvement options, ranks and prioritizes different project types, and completes an assessment of how the transportation network will function under different planning assumptions and operating variables. As a point of reference, it is important to note that the LRTP is an active planning document that is regularly updated every 4 years to ensure consistency with current operating conditions as well as properly take account of emerging patterns of travel demand.

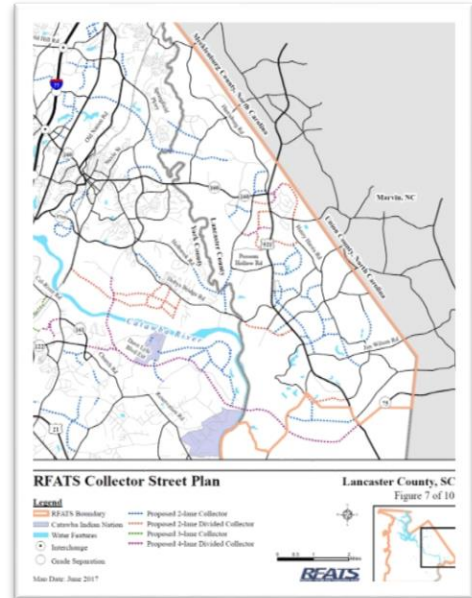


2.1.2. Recent Transportation Studies

Five recent area studies have analyzed the need for public transportation and improved operational efficiency of the existing transportation network serving the RFATS Planning Area, and a thorough review of these studies was conducted to extract pertinent data. The focus of the studies discussed below relate to the importance of collector streets and thoroughfare planning, the functionality / capacity of the I-77 corridor, system reliability for freight movement as well as how bicycle and pedestrian improvements influence overall system efficiency and effectiveness for all users of the transportation network.

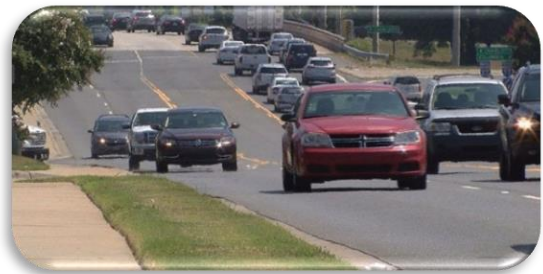
RFATS Collector Street Plan

In 2017, RFATS completed an MPO-wide Collector Street Plan, the first of its kind in the state of South Carolina. The purpose of this plan was to reduce long-term traffic congestion as additional development occurs in the RFATS Planning Area. The transportation system is made up of different types of roads that serve different functions, and collector roads are important links that help people move around more efficiently. Connectivity of the roadway network is essential to reducing congestion in the RFATS Planning Area. As the region continues to grow and develop further, it is important that these critical connection routes are a part of the effort to reduce congestion. This plan contains an analysis of the collector street network and notes existing deficiencies, but also identified locations where new desired connections should be positioned as future development occurs. Enhancing the collector street system will benefit the everyday experience of drivers within the RFATS Planning Area by expanding driving choices, providing alternate routes, and guiding the construction of a more fully developed network of interconnected streets.



York County Thoroughfare Plan

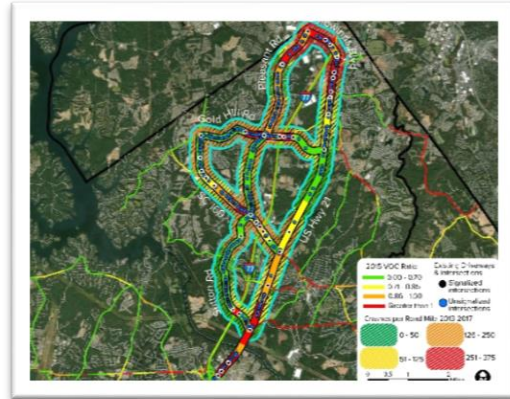
Soon after the adoption of the RFATS Collector Street Plan, York County planning officials initiated the York County Thoroughfare Plan (YCTP). This plan is currently being developed to serve as the long-range plan for major transportation facilities in York County. The YCTP will cover the entirety of the jurisdictional limits of York County which includes the urbanized area within the RFATS jurisdiction, the incorporated and urbanized areas of the municipalities, and the unincorporated and rural areas within York County. Like the RFATS Collector Street Plan, the Thoroughfare Plan will focus on the development of the roadway network and analyze how roadways function. In order to best address congestion in the region, this plan will provide an analysis regarding how roadways are used to reach destinations and the relation of roadways to surrounding land uses. Long-term recommendations will feature the implementation of proper design elements needed in a roadway. The recommendations contained in this plan will outline what operational or capacity improvements will best serve the everyday driver.



I-77 Corridor Analysis

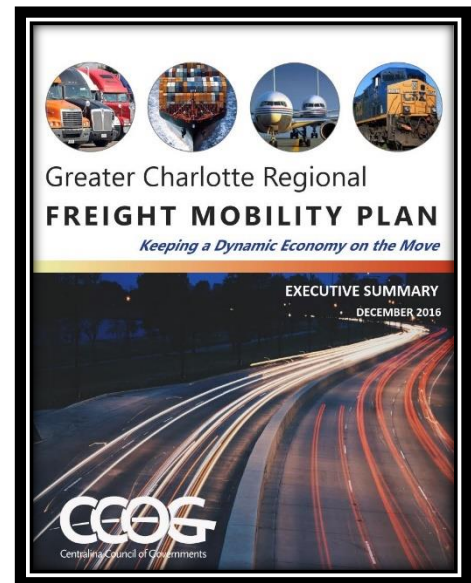
The recent RFATS I-77 Corridor Analysis completed by RFATS in 2019 explored existing conditions along the Interstate from the Celanese / Cherry Road Interchange up to the state line as well as included north – south movement along both US 21 and the Pleasant / Sutton Road corridor.

Specifically, this study analyzed land use and socio-economic data as well as operational variables such as corridor level of service, volume-to-capacity ratios, driveway density, accident history as well as the amount of available right-of-way for further capacity improvements. This work effort also included a comprehensive assessment of different types of improvement strategies and culminated in a series of recommendations based on a short, intermediate and longer term planning horizon. In terms of congestion management planning, this study provided valuable feedback regarding the important relationship between land use decisions and subsequent operating characteristics, particularly along critical convergence points like the I-77 Corridor.



Charlotte Regional Freight Mobility Plan

In 2016, RFATS coordinated with the Centralina Council of Governments to complete a Regional Freight Mobility Plan. The purpose of the plan was to provide the 14-county region across North and South Carolina with a thorough understanding of current and projected freight movement. The plan also identified opportunities, issues, and constrains important to the functionality of the freight network; and further identified specific strategies to improve the freight network reliability. By analyzing the choke points across the roadway network where freight movement is most congested, this plan helps to identify what strategies will best improve reliability for users. Passenger vehicles and freight trucks both coexist within the roadway network and therefore both impact one another in terms of congestion. In order to reduce overall congestion within the RFATS Planning Area, resolving issues for freight movement must be part of this equation.



RFATS Bicycle & Pedestrian Connectivity Plan

As development continues within the RFATS Planning Area, land uses will evolve and change and so will the way people travel within the region. Expanding the modal choices will become more of an important factor in reducing congestion within the region. This plan was developed in 2016 as an effort to identify a regional bicycle and pedestrian priority network and help to coordinate investments made locally that can expand connectivity at the regional level. The plan recognizes that walking, biking, and transit are valued transportation modes, priorities for investment, and integral to regional strategies for congestion reduction.



This plan provides an analysis of deficiencies within the network for bicycle and pedestrian facilities, strategies for improvement, and recommendations for projects along the major roadways within the RFATS Planning Area.

2.2. Congested Locations

Information on congested locations was gathered from a number of sources:

- RFATS Congestion Management Process (CMP), 2011;
- RFATS Technical Team;
- National Performance Management Research Data Set (NPMRDS)
- Metrolina Regional Model; and
- Annual Average Daily Traffic (AADT) volumes.

2.2.1. RFATS 2011 CMP Update

The RFATS 2011 Congestion Management Process or CMP identified congested corridors in the study area, as illustrated in **Figure 2-1**, using these three sources:

- RFATS Technical Team members;
- Travel time surveys; and
- 2005 Metrolina Model – V/C Data

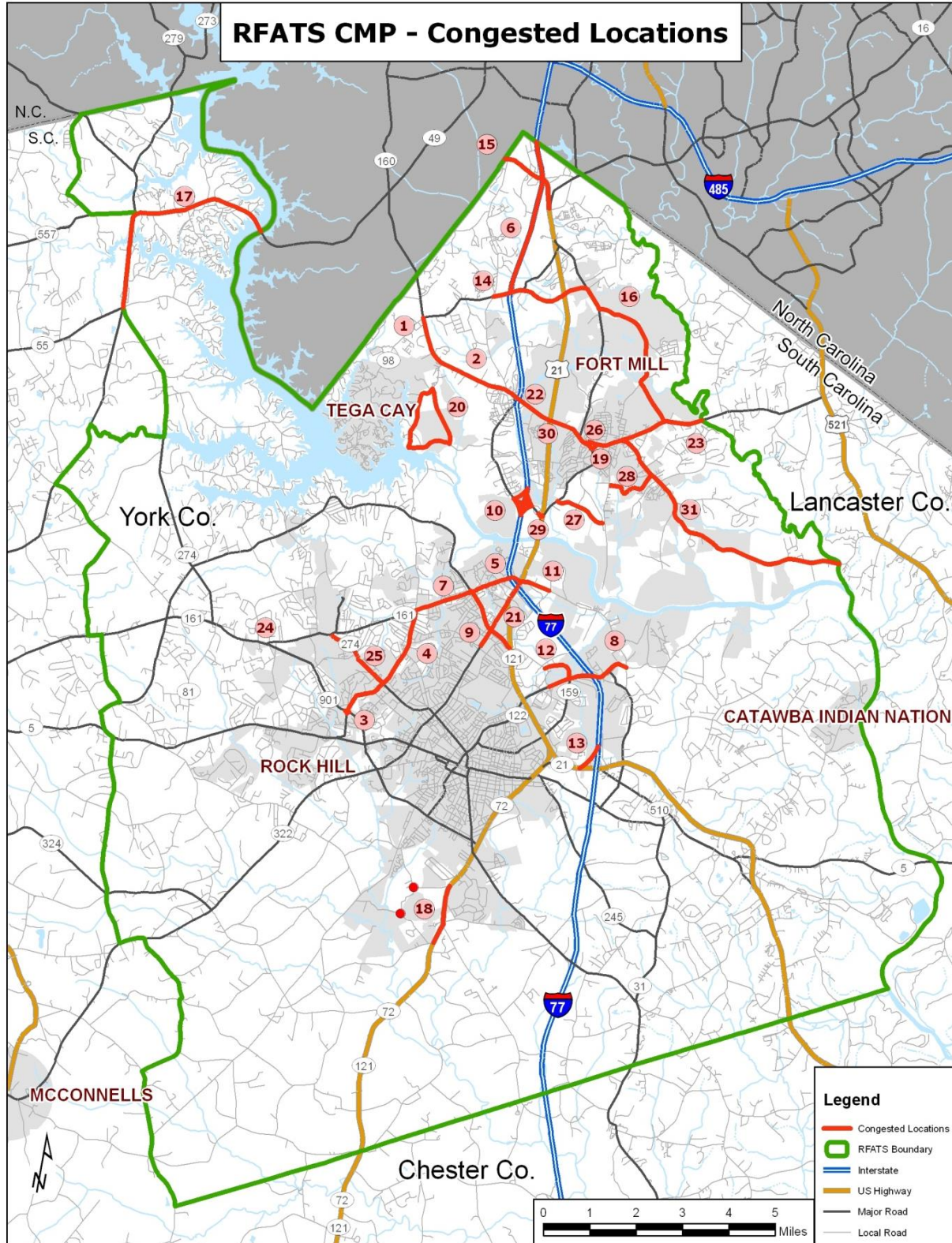
From this information, 31 CMP corridors were identified as having potential congestion issues at one or more locations along the corridor. The 2011 CMP corridors are also listed in **Table 2-1**.

Table 2-1: Listing of Identified Corridors from 2011 CMP

Ref #	Location	Description
1	Gold Hill Road / SC 160 ⁽¹⁾	Intersection
2	SC 160	Gold Hill Road to NC State Line, Stonecrest Boulevard to Sutton Road
3	Heckle Blvd (SC 901) north and south of Herlong Avenue	Tyson's Forest Drive to Herlong Village Drive (at Wendy's)
4	Herlong Avenue	Heckle Boulevard to Celanese Road
5	I-77 / SC 161 ⁽¹⁾	Exit 82C
6	I-77	Gold Hill Road to NC State Line
7	Celanese Rd	India Hook Road to US 21 (Cherry Road)
8	Dave Lyle Boulevard	Hood Center Drive to Red River Road
9	Mt. Gallant Rd	Anderson Road (US 21 BYP) to Celanese Road
10	I-77 / Sutton Road ⁽¹⁾	
11	Red River Road	Eden Terrace Road to Celanese Road
12	John Ross Parkway	Dave Lyle Boulevard to Mount Gallant Road
13	I-77 at US 21 (Anderson Rd) ⁽¹⁾	Exit 77 Southbound off-ramp backups
14	Gold Hill Road	Pleasant Road to I-77 interchange (Exit 88)
15	Carowinds Blvd from State Line to SC 21/SC 51 intersection	Includes I-77 ramps at Exit 90
16	Fort Mill Bypass (Springfield Parkway)	From I-77 to Tom Hall Road (SC 160)
17	SC 49 near Lake Wylie	Hwy 55 to NC State Line. Overlaps with 22.
18	SC 72 at Saluda Trail Middle School, specifically Saluda Road between Rawlsville Road and E Rambo Road, and the two intersections on Neely Road with Rawlsville Road and with E Robertson Road	
19	Main Street, Fort Mill	White Street to Tom Hall Street / SC 160
20	Dam Road, Gardendale Road, and New Gray Rock Road – south of Gold Hill Elementary and Middle Schools	
21	US 21 (Cherry Road) between Ebinport Road and Cel-River Rd	
22	SC 160 from US 21 BYP to Pleasant Road, incl. I-77 ramps at Exit 85 (overlaps #2)	
23	Tom Hall Rd (SC 160) from Dobys Bridge Road to Lancaster County Line (overlaps #2)	
24	Intersection of SC 901 and SC 161 ⁽¹⁾	Old York Road at Heckle Boulevard
25	Ebenezer Road between Herlong Avenue (India Hook Road) and Old York Road, Celanese Road	
26	Clebourne Street, Fort Mill	White Street to Main Street
27	Fort Mill Bypass, Fort Mill	Spratt Street to Brickyard Road
28	Fairway Drive, Fort Mill	Brickyard Road to Doby's Bridge Road
29	US 21 and Spratt Street/Sutton Rd ⁽¹⁾	Intersection
30	US 21 and Highway 160 ⁽¹⁾	Intersection
31	Doby's Bridge Road	Tom Hall Street to Lancaster County Line

Note:(1) Isolated intersection location. All other listings represent roadway corridors. As shown in Figure 2-1, only York County was included in the RFATS Boundary at the time that the 2011 CMP was completed.

Figure 2-1: 2011 CMP Congested Corridors



2.2.2. 2045 LRTP Update

The RFATS 2045 LRTP identified potential congested corridors in the study area as part of an update to the 2011 CMP, as illustrated in **Figure 2-2**, using these three sources:

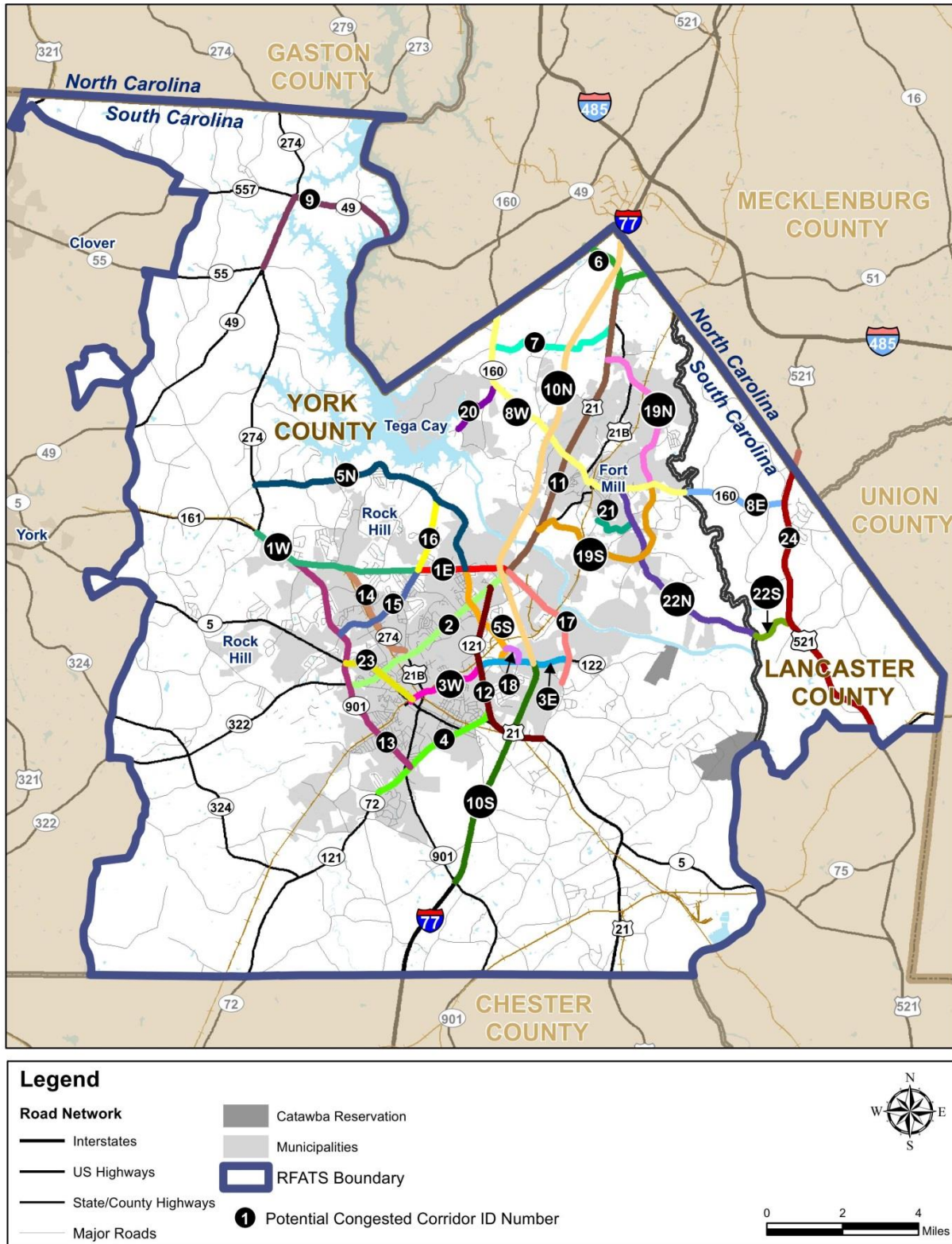
- RFATS Technical Team members;
- Travel time surveys; and
- 2015 Metrolina Model – V/C Data

From this information, 24 CMP corridors were identified as having potential congestion issues at one or more locations along the corridor. The CMP corridors identified in the 2045 LRTP are listed in **Table 2-2** and illustrated in **Figure 2-2**.

Table 2-2: Listing of 2045 LRTP Congested Corridors

ID	Corridor	From	To	Length (miles)
1W	Celanese Road	SC 274/Hands Mill Hwy	India Hook Road	4.56
1E	Celanese Road	India Hook Road	US 21/Cherry Road	2.41
2	Cherry Road	Heckle Boulevard	Celanese Road/Cel-River Road	5.24
3W	Dave Lyle Boulevard	W. Black Street	US 21 Bypass	2.19
3E	Dave Lyle Boulevard	US 21 Bypass	Cel-River Road/Red River Road	2.40
4	SC 72/Albright Road	Rawlsville Road	Springdale Road	3.69
5N	Mt. Gallant Road	SC 274/Hands Mill Highway	Celanese Road	7.58
5S	Mt. Gallant Road	Celanese Road	Dave Lyle Boulevard	2.88
6	US 21/Carowinds Boulevard	Pleasant Road	NC State Line	2.84
7	Gold Hill Rd	SC 160	US 21	5.53
8W	SC 160	NC State Line	York/Lancaster County Line	8.29
8E	SC 160	York/Lancaster County Line	US 521	2.72
9	SC 49	SC 55	NC State Line	4.90
10S	I-77 (south of Dave Lyle Boulevard)	SC 901	Dave Lyle Boulevard	6.20
10N	I-77 (north of Dave Lyle Boulevard)	Dave Lyle Boulevard	NC State Line	12.6
11	US 21 (north)	Celanese Road/Cel-River Road	SC 51/Carowinds Blvd	8.05
12	Anderson Road (SC 121)	Springdale Road	US 21/Cherry Road	5.07
13	Heckle Boulevard (SC 901)	Anderson Road/Saluda St	Celanese Road	6.62
14	Hands Mill Highway/Ebenezer Road	Oakland Avenue	Celanese Road	2.74
15	Herlong Avenue	Heckle Boulevard	Celanese Road	2.82
16	India Hook Road	Celanese Road	Mt. Gallant Road	1.97
17	Red River Road/Cel-River Road	Springdale Road	US 21/Cherry Road	3.61
18	John Ross Parkway	Dave Lyle Boulevard	Mt. Gallant Road	0.61
19N	Fort Mill Northern Bypass	SC 160	US 21	4.21
19S	Fort Mill Southern Bypass	US 21	SC 160	5.41
20	Dam Road	New Gray Rock Road	SC 160	1.66
21	Fairway Dr (Fort Mill)	Brickyard Road	Doby's Bridge Road	1.19
22N	Doby's Bridge Road (YC)	SC 160	Lancaster County Line	6.06
22S	Doby's Bridge Road (LC)	Lancaster County Line	US 521	1.19
23	W. Main Street/ SC 5	Dave Lyle Blvd	Heckle Blvd	2.09
24	US 521	Waxhaw Hwy/SC 75	North Carolina State Line	8.82

Figure 2-2: 2045 LRTP Congested Corridors



2.2.3. Technical Team Input

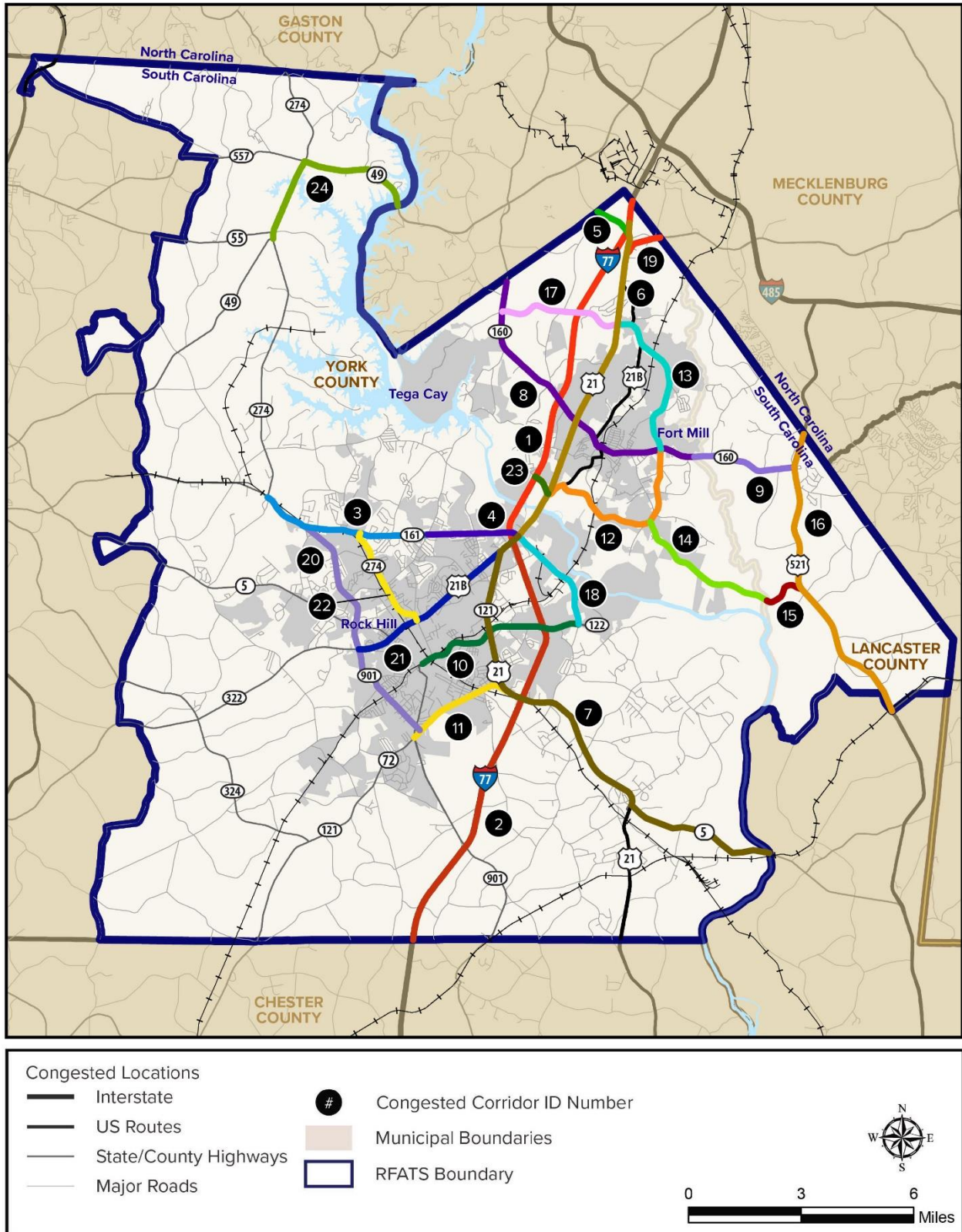
At a meeting held on May 2, 2019 members of the RFATS Technical Team reviewed the latest operational data to update congested corridors and site specific locations across the transportation network. A total of 24 routes (areas or intersections) were identified, as shown in **Figure 2-3** and listed in **Table 2-3**.

Technical Team members brought a wealth of knowledge not only about the history, physical condition and operational performance of the transportation facilities in their local area, but also about the sensitivities and issues critical to residents, business owners and other stakeholders. The areas of congestion identified by the Technical Team provided a valuable supplement to purely numerical methods, such as traffic volumes and travel demand model outputs, and serve to strengthen the sources and extent of information used in the Congestion Management Process.

Table 2-3: 2019 CMP Congestion Monitoring Network

ID	County	Route	Termini	Length (miles)
1	York	I-77 (north of US 21)	NC State Line to US 21	9.75
2	York	I-77 (south of US 21)	US 21 to York/Chester County Line	10
3	York	SC 161 (Old York Road/Celanese Road)	SC 274 to India Hook Road	2.07
4	York	SC 161 (Celanese Road)	India Hook Road to US 21	2.42
5	York	Carowinds Boulevard	NC State Line to US 21	1.05
6	York	US 21 (north of SC 161)	I-77 to SC 161	8.9
7	York	US 21 (south of SC 161)/SC 5	SC 161 to York/Lancaster County Line	9.7
8	York	SC 160	NC State Line to York/Lancaster County Line	9
9	Lancaster	SC 160	York/Lancaster County Line to US 521	2.73
10	York	Dave Lyle Boulevard	Main Street to Cel-River Road/Red River Road	5.74
11	York	SC 72/Albright Road	Mt. Holly Road to US 21	7.03
12	York	Fort Mill Bypass	US 21/Sutton Road to SC 160	5.41
13	York	Fort Mill Bypass	SC 160 to US 21/SC 460	4.21
14	York	Doby's Bridge Road	Fort Mill Bypass to York/Lancaster County Line	6.06
15	Lancaster	Doby's Bridge Road	York/Lancaster County Line to US 521	1.19
16	Lancaster	US 521	Waxhaw Highway to NC State Line	6.3
17	York	SC 460	SC 160 to US 21	3.3
18	York	Cel-River Road/Red River Road	Dave Lyle Boulevard to US 21/Cherry Road	3.61
19	York	SC 51	US 21 to NC State Line	1.0
20	York	SC 901 (Heckle Boulevard)	SC 161 to SC 72	6.62
21	York	Cherry Road	Cel-River Road/Red River Road to SC 901	5.24
22	York	SC 274 (Hands Mill Highway)	SC 161 to Cherry Road	2.74
23	York	Sutton Road	I-77 to US 21	0.59
24	York	SC 49 (Charlotte Highway)	NC State Line to SC 55	5.37

Figure 2-3: 2019 CMP Congestion Monitoring Network



2.2.4. Annual Average Daily Traffic

Annual Average Daily Traffic (AADT) volumes for 2018², are shown in **Figure 2-3**. Metrics such as traffic volumes provide a convenient and readily available measure of demand on the transportation network. SCDOT provides traffic count data for numerous locations on an annual basis. The traffic volumes collected by SCDOT are done so for individual segments along larger roadway corridors. This data source enables the identification of traffic growth patterns by time and by corridor in the RFATS area.

Interstate Traffic - As expected the highest traffic volumes in the study area are to be found on I-77, as shown in **Table 2-4**. Values ranged from 130,000 vehicles per day in the northernmost section south of the state line to 52,000 on the southernmost segment. The latter volume is slightly higher than the volume on the most heavily travelled non-interstate road, SC 161 between US 21 and Mt. Gallant Road, which has an AADT of 47,200.

As a point of reference, starting in 2018 SCDOT changed the way Interstate volumes were calculated between continuous count stations. SCDOT is now using the latest nationally recognized calculation method recommended by FHWA. This attributes to some significant changes in AADT volumes in 2018, including the counts for I-77 from Carowinds Blvd to the state line and I-77 from Cherry Road to Celanese Road.

Non-Interstate Corridors - The top 20 segments of non-interstate roads with the highest traffic volumes are listed in **Table 2-5**. The top 10 roadway corridors with the highest traffic volumes are listed in **Table 2-6**. This table also identifies the individual segments with the highest and lowest volumes along each corridor and the total number of segments in each corridor that are also included in **Table 2-5**, the list of top 20 segments of non-interstate roads with the highest traffic volumes.



Celanese Road

² AADT data provided by SCDOT

Figure 2-4: 2018 Annual Average Daily Traffic Volumes

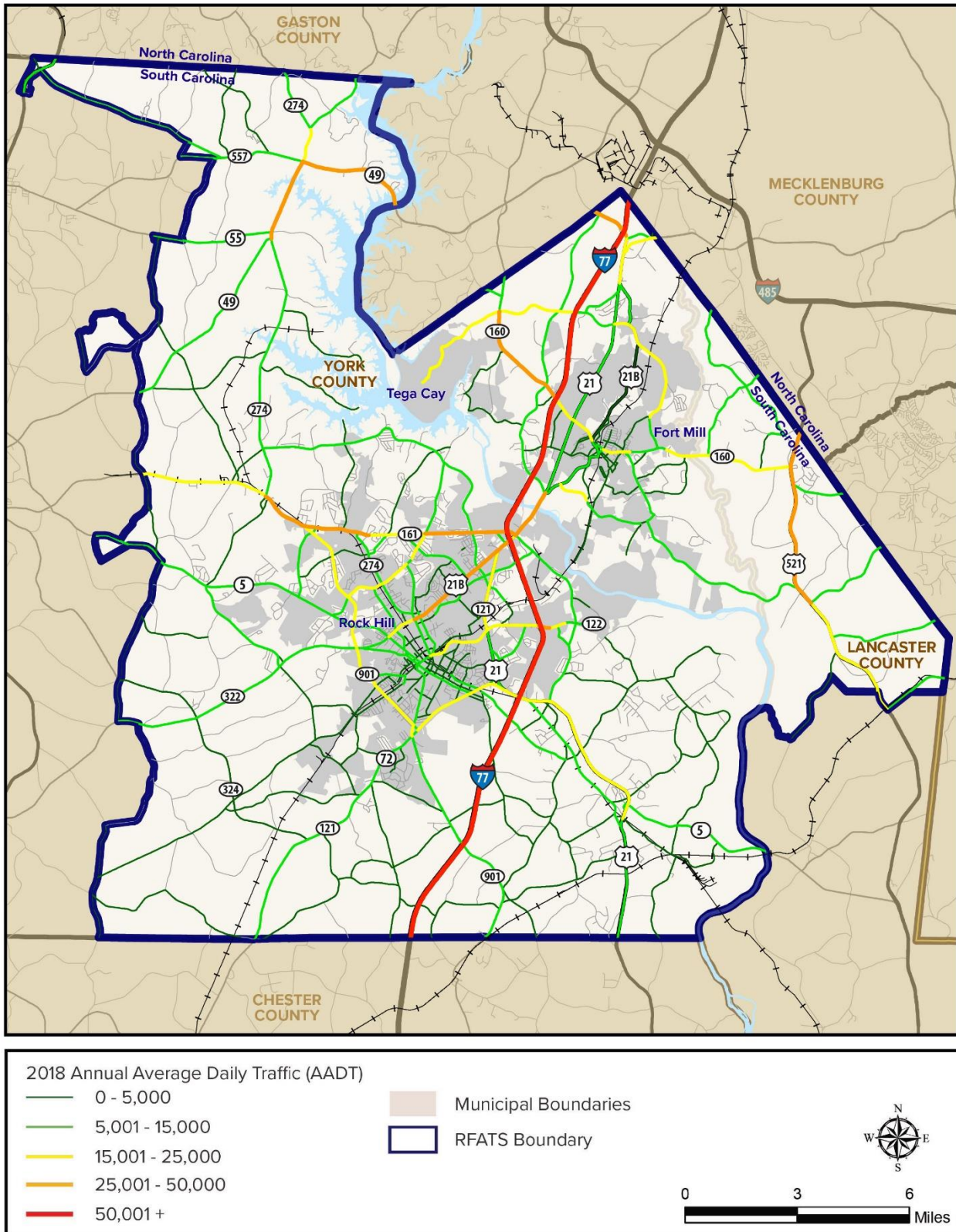


Table 2-4: Daily Traffic Volumes on I-77

Description of I-77 Segment		2014	2015	2016	2017	2018
Exit	Termini					
90	Carowinds Blvd. to North Carolina State Line	140,400	145,000	153,400	152,700	158,900
88	Gold Hill Rd to Carowinds Blvd.	110,800	114,100	122,000	119,400	130,400
85	SC 160 (Highway 160 W) to Gold Hill Rd.	103,400	106,400	114,300	112,900	121,300
83	Sutton Rd. S to SC 160	103,400	106,900	112,800	112,900	118,600
82	Celanese Rd. to Sutton Rd. S	106,100	109,300	113,300	114,700	118,400
81	US 21 (Cherry Rd.) to Celanese Rd.	76,800	79,700	83,000	85,800	90,700
79	Dave Lyle Blvd. to US 21 (Cherry Rd.)	78,100	80,200	83,900	88,300	89,300
77	US 21 (Anderson Rd.) to Dave Lyle Blvd.	61,400	63,700	66,600	72,300	71,800
75	Porter Rd. to US 21 (Anderson Rd.)	46,000	47,800	51,300	54,300	54,600
73	SC 901 (Mt. Holly Rd.) to Porter Rd.	44,900	47,000	50,100	53,100	54,200
Average I-77 AADT		87,130	90,010	95,070	96,640	100,820
Average Annual Growth Rate		4.85	3.31	5.62	1.65	4.33



I-77/Sutton Road

Table 2-5: 2018 Highest Non-Interstate Traffic Volumes

No.	County	Route	Segment Termini	2018 AADT	Facility Type
1	York	Celanese Rd	Mt. Gallant Rd. to US 21 (Cherry Rd.)	47,200	6-lanes
2	York	Celanese Rd	India Hook Rd. to Mt. Gallant Rd.	42,500	6-lanes
3	York	Carowinds Blvd.	North Carolina state line to US 21	39,900	4-lanes
4	Lancaster	US 521 (Charlotte Hwy)	SC 160 to North Carolina state line	38,900	4-lanes
5	York	Cherry Rd.	US 21 to I-77	37,500	6-lanes
6	York	Dave Lyle Blvd.	I-77 to Galleria Blvd.	37,300	5-lanes
7	York	SC 49 (Charlotte Hwy)	SC 274 (Charlotte Hwy) to North Carolina state line	33,800	5-lanes
8	York	SC 161 (Old York Rd.)	Celanese Rd. to Trexler Ln	30,800	4-lanes
9	York	SC 160	Gold Hill Rd to I-77	29,200	4-lanes
10	York	Cherry Rd.	Cedar Grove Ln to US 21 (Anderson Rd. N)	29,000	4-lanes
11	York	US 21 (Cherry Rd.)	Celanese Rd. to US 21 Bus (Spratt St)	28,700	4-lanes
12	York	SC 49 (Charlotte Hwy)	SC 274 (Hands Mill Hwy) to SC 274 (Charlotte Hwy)	28,300	5-lanes
13	York	Cherry Rd.	Dorchester St to Cedar Grove Ln	28,300	4-lanes
14	Lancaster	US 521 (Charlotte Hwy)	Shelley Mullis Rd to SC 160	27,700	4-lanes
15	York	Cherry Rd.	Oakland Ave to Dorchester S	27,200	4-lanes
16	York	SC 5 (Main St E)	Black St to SC 121 (Main St E)	24,400	4-lanes
17	York	Celanese Rd	Trexler Ln to India Hook Rd	24,100	4-lanes
18	York	US 21 (Anderson Rd S)	Springdale Rd E to I-77	23,400	4-lanes
19	York	US 21 (Cherry Rd.)	I-77 to Celanese Rd	23,200	4-lanes
20	York	Dave Lyle Blvd.	Galleria Blvd to Meeting Blvd	23,000	4-lanes

Table 2-6: 2018 Highest Traffic Corridors

No.	County	Corridor	2018 AADT		Segments in Top 20
			Maximum	Minimum	
1	York	I-77	130,400	52,000	N/A
2	York	Celanese Rd & Old York Rd (SC 161)	47,200	24,100	4
3	York	Carowinds Blvd	39,900	N/A	1
4	Lancaster	US 521	38,900	11,400	2
5	York	US 21 & SC 322 (Cherry Rd)	37,500	13,500	6
6	York	Dave Lyle Blvd	37,300	4,800	2
7	York	SC 49	33,800	1,100	2
8	York	SC 160	29,200	12,200	1
9	York	SC 5 (Main St E)	24,400	16,800	1
10	York	US 21 (Anderson Rd)	23,400	7,400	1

After the I-77 Interstate, the most heavily travelled corridors in the RFATS area in 2018 were:

- Celanese Road/Old York Rd (SC 161), between Hands Mill Hwy and Cherry Rd;
- Carowinds Boulevard from the state line to I-77; and
- Charlotte Highway (US 521) in Lancaster County from the state line to Shelley Mullis Rd.

All of these arterial corridors had sections with traffic volumes in excess of 38,000 vehicles per day.

Traffic Growth Since 2012 - Average traffic volumes on I-77 increased significantly with an average annual growth rate of 4.05 percent to 2016. Traffic volume growth slowed from 2016 through 2018. Data collection along I-77 up to 2018 was conducted through a method established by SCDOT that used continuous counting stations to calculate average traffic volumes. In 2018, SCDOT changed the method of calculating average traffic volumes along I-77 to follow the latest nationally recognized calculation method recommended by FHWA. The change in data collection results in a difference in the reported traffic growth along I-77 within certain segments, however the overall I-77 corridor continues to carry large volumes of traffic.

2.2.5. Metrolina Regional Model

The Metrolina Regional Travel Demand Model (MRTDM) projects travel demand across the regional transportation network. The MRTDM was developed utilizing a base year of 2015 with horizon years of 2025, 2035, and 2045 for the inclusion in the development of the 2045 LRTP. The following section describes the growth patterns from 2015 to 2045.

Projected Growth in Travel Demand - Travel demand in the RFATS area is projected to increase from 6,619,505 vehicle miles traveled (VMT) in 2015 to 9,614,951 VMT in 2045, which represents a 45 percent increase.

Figure 2-5 through **Figure 2-8**, show the A.M and P.M. peak volume to capacity (V/C) ratios estimated by the RTDM for base year (2015) and future year (2045) for the roads in the RFATS area.



SC 160

Figure 2-5: 2015 A.M. Peak V/C Ratios

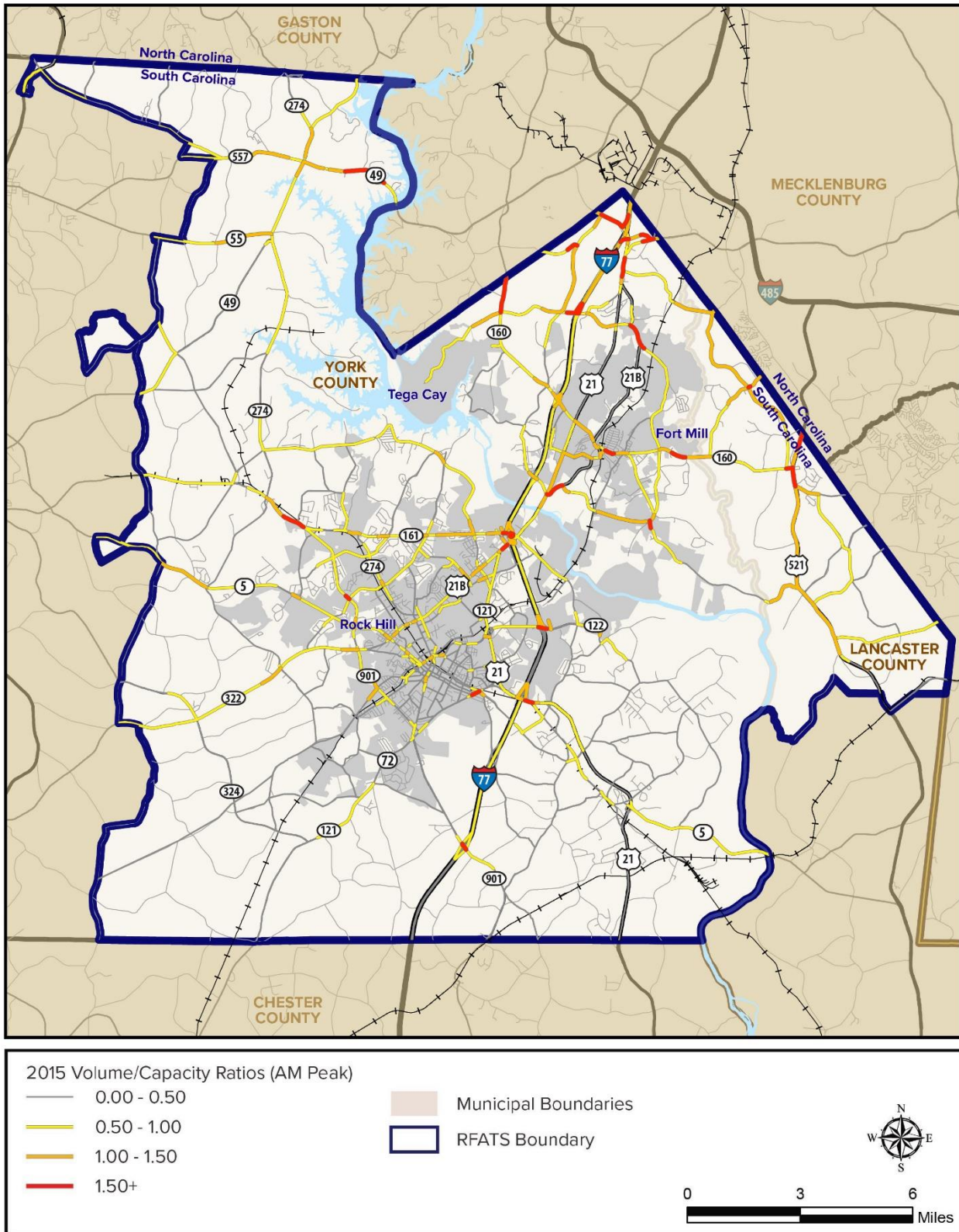


Figure 2-6: 2015 P.M. Peak V/C Ratios

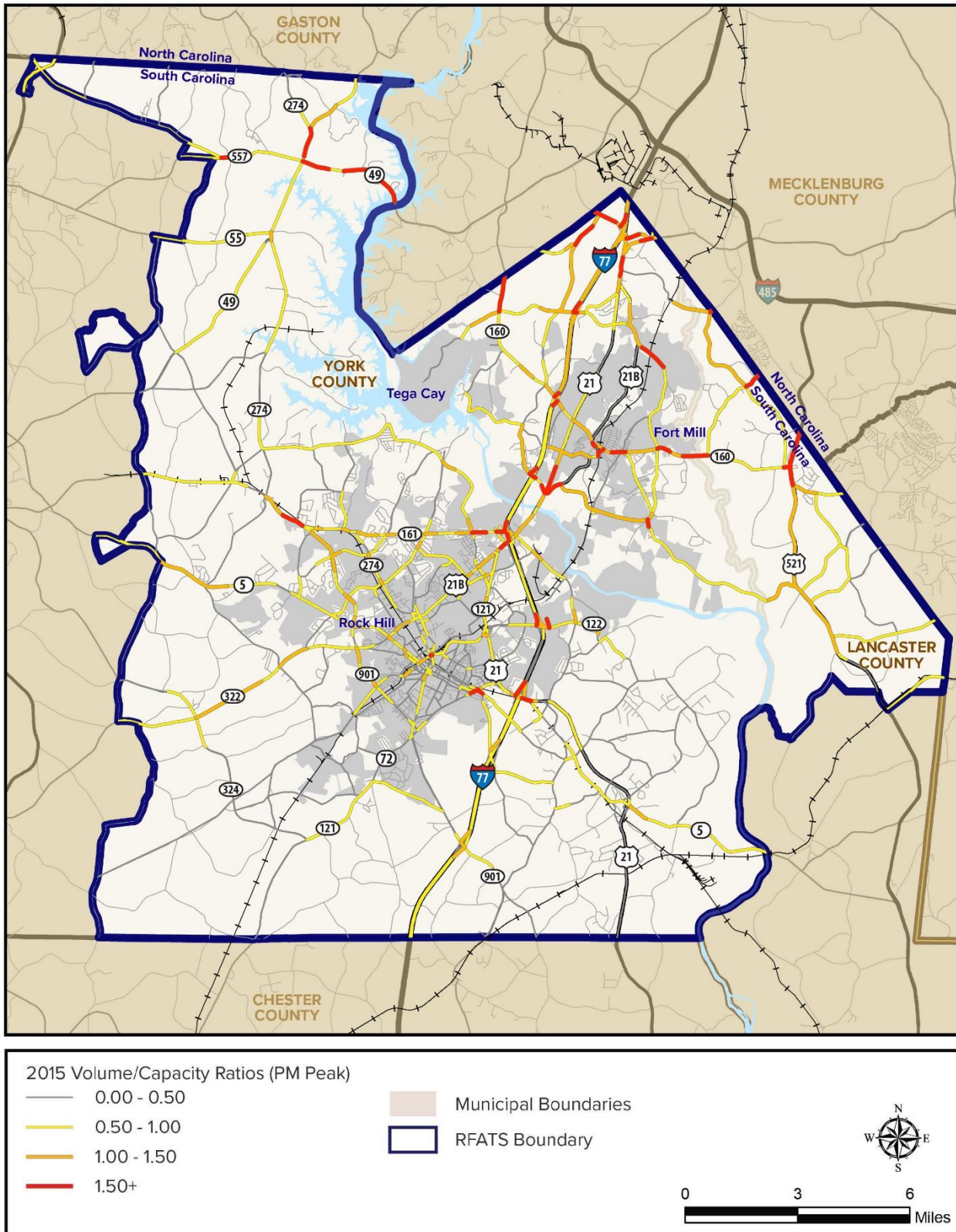


Figure 2-7: 2045 A.M. Peak V/C Ratios

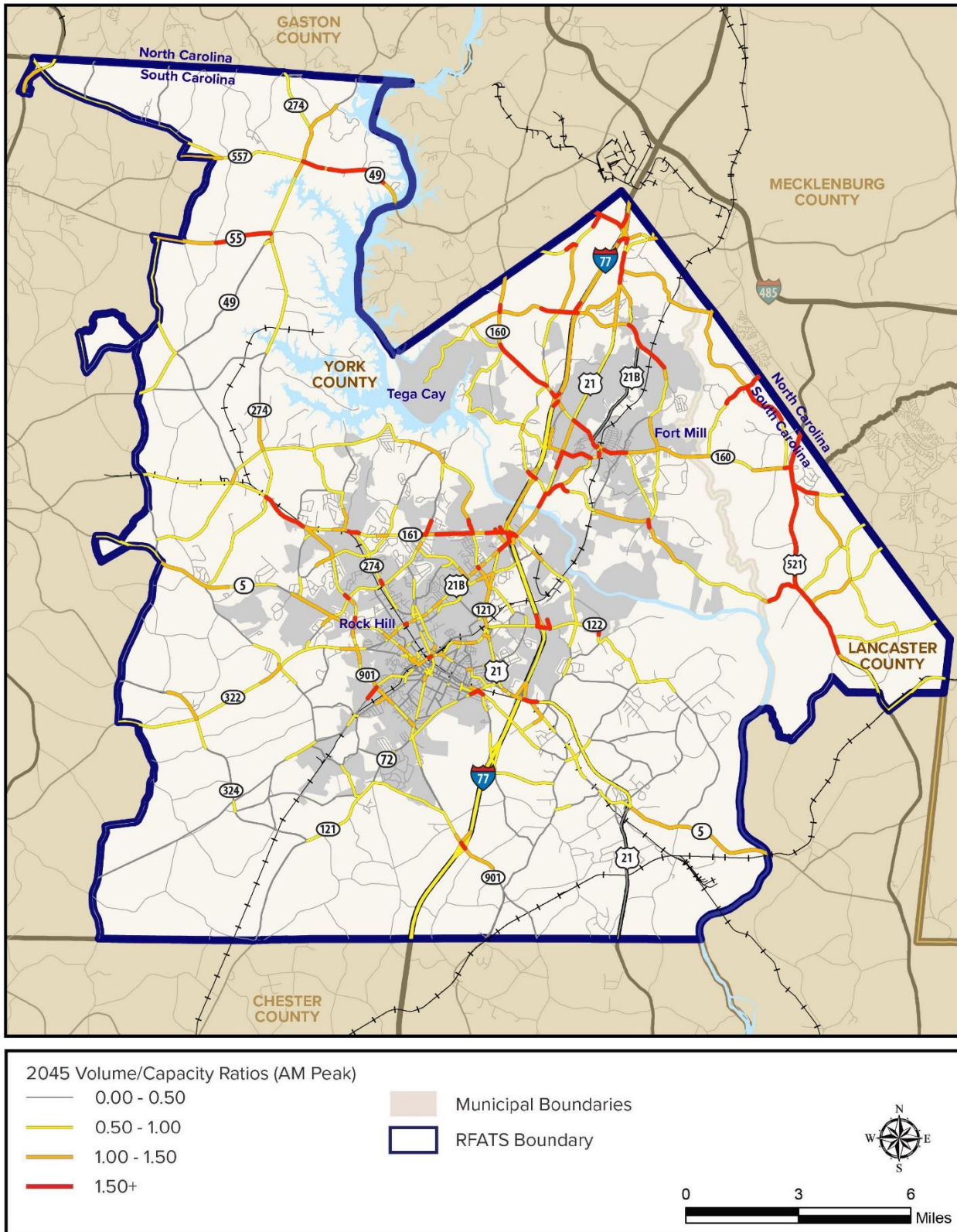
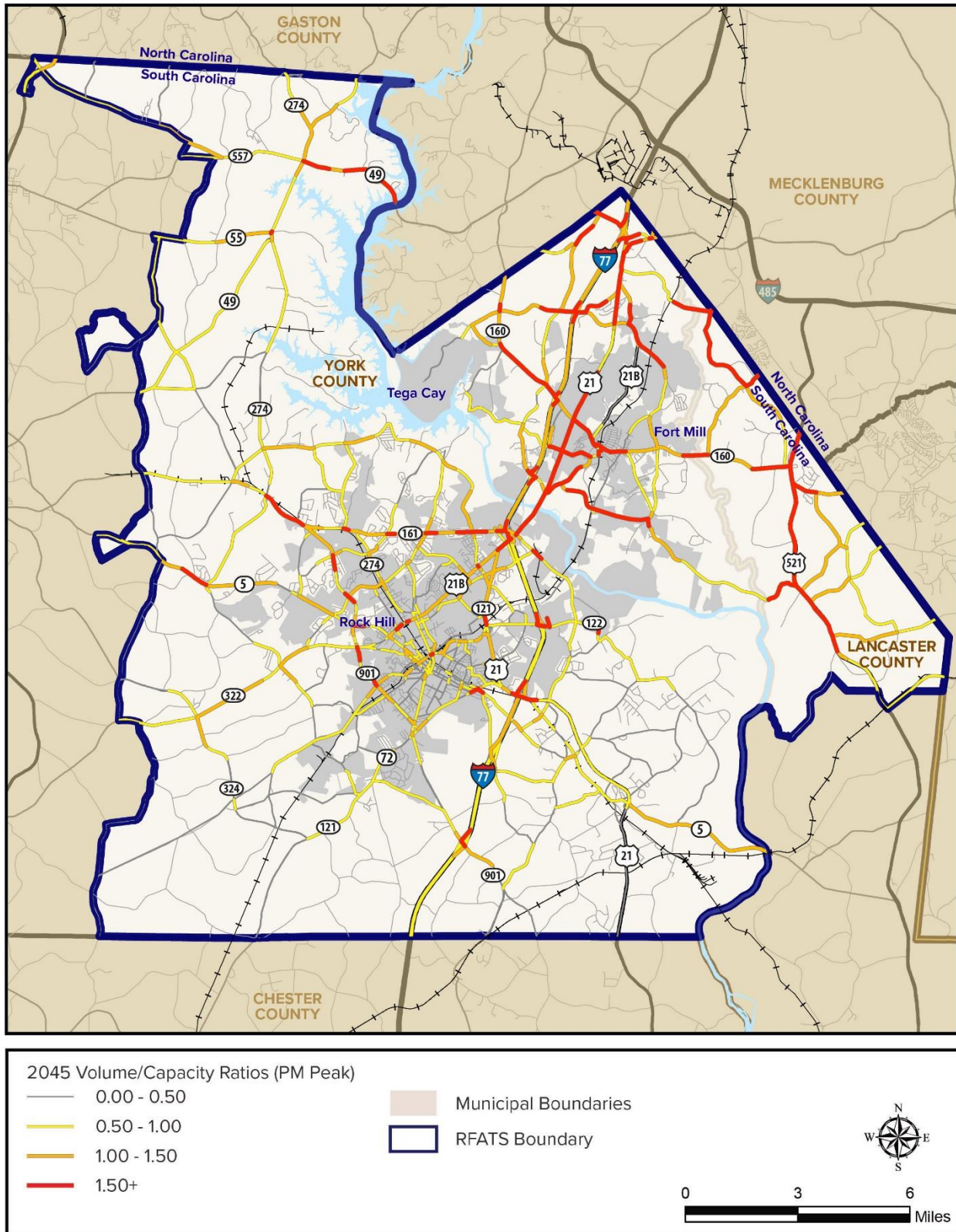


Figure 2-8: 2045 P.M. Peak V/C Ratios



The top ten roadways that the Metrolina Model projects to have high levels of congestion in the A.M. peak (high values of volume to capacity ratio), other than I-77, are listed in **Table 2-7** for the model base year 2015 and for 2045. The top ten roadways that the Metrolina Model projects to have high levels of congestion in the P.M. peak (high values of volume to capacity ratio), other than I-77, are listed in **Table 2-8** for the model base year 2015 and for 2045.

Table 2-7: Locations with High A.M. Peak V/C

2015 A.M. Peak Conditions				
No.	County	Road	Termini	Segment V/C Ratio
1	York	SC 51	From Andrew L Tucker Rd 0.29 miles west	1.95
2	York	US Hwy 21	From Central Carolinas Pkwy to Flint Hill Rd	1.95
3	York	Dobys Bridge Rd	South from Fort Mill Bypass for 0.19 miles	1.85
4	York	SC 49 (Charlotte Hwy)	From Hamiltons Ferry Rd to Heritage Dr	1.81
5	York	SC 160	North of intersection with Gold Hill Rd to NC State Line	1.79
6	York	Anderson Rd S	From I-77 N Ramp to just east of Lesslie Hwy	1.78
7	York	Springfield Pkwy	0.12 miles southeast of US 21 Hwy Bus	1.72
8	York	Springhill Farm Rd	0.32 miles northeast of intersection with SC 51	1.69
9	Lancaster	SC 160	Harrisburg Rd to US 521	1.65
10	York	Spratt St	US 21 to Fort Mill Bypass	1.65
2045 A.M. Peak Conditions				
No.	County	Road	Termini	Segment V/C Ratio
1	York	Dobys Bridge Rd	South from Fort Mill Pkwy for 0.19 miles	3.98
2	Lancaster	SC 160	Harrisburg Rd to US 521	3.28
3	York	Spratt St	US 21 to Fort Mill Bypass	3.11
4	York	Springfield Pkwy	0.12 miles southeast of US 21 Hwy Bus	2.66
5	York	US Hwy 21	Old Nation Rd to SC 51	2.65
6	York	US Hwy 21 Bus	Springfield Pkwy to Old Nation Rd	2.57
7	York	Harris St	US 21 to Spratt St	2.50
8	York	White St	US 21 to Old Nation Rd	2.50
9	Lancaster	US 521	North of Red Ventures Dr to Marvin Rd	2.44
10	York	Gold Hill Rd	From Knightsbridge Rd to I-77 N ramp	2.31

Source: Metrolina model output. Listing above excludes individual I-77 off-ramp links.

Table 2-8: Locations with High P.M. Peak V/C

2015 P.M. Peak Conditions				
No.	County	Road	Termini	Segment V/C Ratio
1	York	US Hwy 21	From Central Carolinas Pkwy to Flint Hill Rd	2.49
2	York	SC 51	From Andrew L Tucker Rd 0.29 miles west	2.45
3	York	SC 160	North of intersection with Gold Hill Rd to NC State Line	2.25
4	York	Gold Hill Rd	I-77 S ramp to I-77 N ramp	2.10
5	York	SC 49 (Charlotte Hwy)	From Hamiltons Ferry Rd to York / Lancaster County Line	2.07
6	York	Celanese Rd	Riverchase Blvd to I-77 Ramp	1.98
7	York	Galleria Blvd	Dave Lyle Blvd to Tabor Dr	1.95
8	York	Carowinds Blvd	Avenue of the Carolinas to NC State Line	1.91
9	York	Spratt St	US 21 to Fort Mill Bypass	1.81
10	Lancaster	US Hwy 521	0.9 miles south of State Line	1.75
2045 P.M. Peak Conditions				
No.	County	Road	Termini	Segment V/C Ratio
1	York	US Hwy 21	From Central Carolinas Pkwy to SC 51	3.10
2	York	Spratt St	US 21 to Fort Mill Bypass	3.10
3	York	Dobys Bridge Rd	South from Fort Mill Bypass for 0.19 miles	3.00
4	Lancaster	SC 160	Harrisburg Rd to US 521	2.93
5	York	Galleria Blvd	Dave Lyle Blvd to Tabor Dr	2.86
6	York	Gold Hill Rd	From Knightsbridge Rd to I-77 N ramp	2.74
7	York	White St	McCammon St to Skipper St	2.64
8	York	US Hwy 21 (Cherry Rd)	From Sutton Rd / Spratt St to Catawba River	2.63
9	Lancaster	US 521	North of Red Ventures Dr to Marvin Rd	2.61
10	York	SC 160	Just north of intersection with Gold Hill Rd	2.52

Source: Metrolina model output. Listing above excludes individual I-77 off-ramp links.



US 521

2.2.6. School Locations

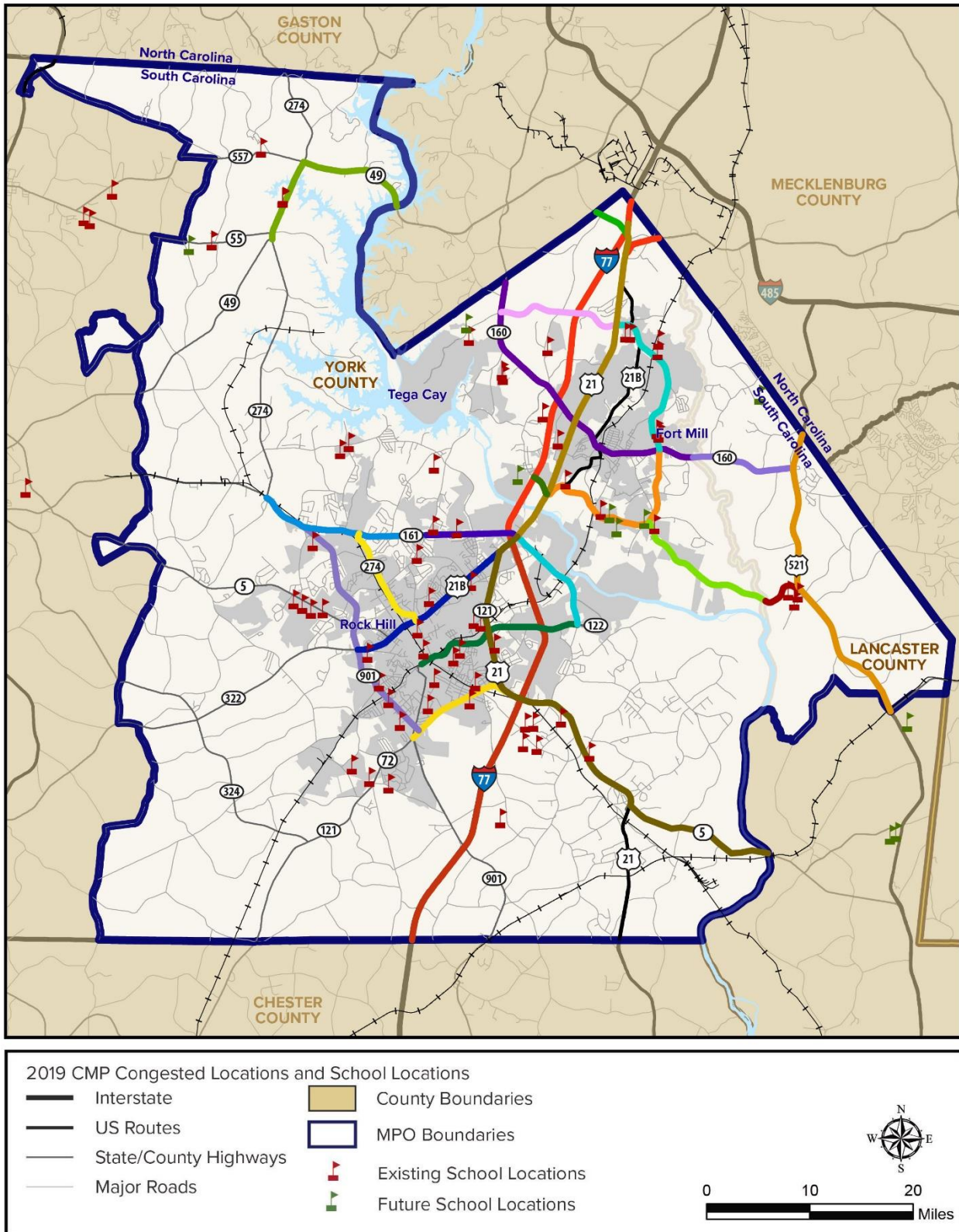
The RFATS Technical Team identified schools as additional locations of congestion, particularly at times when children are being dropped off or picked up. School locations in the RFATS study area are shown in **Figure 2-9** along with the previously identified congested corridors. As shown in the map, many of the schools in the RFATS region are located along the congested corridors identified by the RFATS technical team.

The need for improved transportation infrastructure near schools should be carefully considered and incorporated when developing plans to implement congestion management strategies, safety projects and other road improvement projects. These needs may include convenient and safe access for school busses and cars, turn lanes, vehicle storage areas, adequate parking, pedestrian crossings and sidewalks.



School Crosswalk

Figure 2-9: 2019 CMP Congested Monitoring Network and School Locations



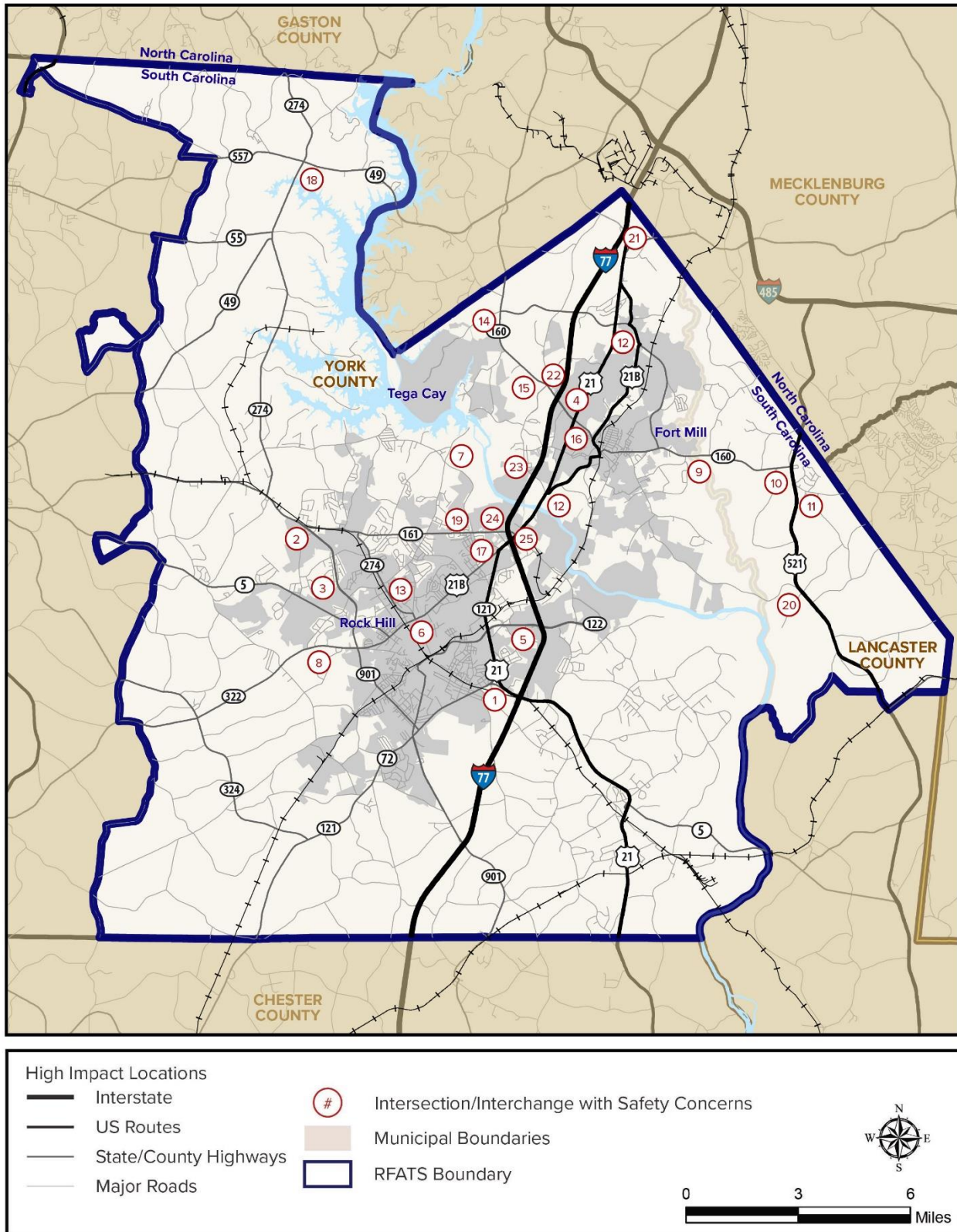
2.2.7. High Impact Locations

The RFATS Technical Team also identified intersections and interchanges in the region that when incidents occur, have a higher impact on overall network congestion. These locations were selected based on the operational characteristics of the roadways and the congestion that results because of incidents principally at the intersections. These locations are listed below in **Table 2-9** and shown in **Figure 2-10**. While this list of locations serves as a preliminary identification of priority areas for incident management, Section 3.6 of this report takes this input from the Technical Team and combines it with crash data provided by SCDOT to create a list of intersections where safety audits may be appropriate.

Table 2-9: High Impact Intersection/Interchange Locations

ID	County	Location	Description
1	York	SC 121 / SC 5 / US 21	Triangle of intersections formed by Anderson Road / Main Street / Cowan Road
2	York	SC 901 / SC 161	Old York Road at Heckle Blvd
3	York	Heckle Blvd (SC 901) north and south of Herlong Avenue	Specifically on Heckle Blvd (SC 901) from Rock Hill Fire Station to Wendy's Restaurant
4	York	SC 160 at Munn Road	Left turns into Baxter Development
5	York	SC 122	Dave Lyle Boulevard and Tinsley Way
6	York	S. Cherry Road (SC 322) and Oakland Avenue	Adjacent to Winthrop University
7	York	Intersection of Mt Gallant Road (S-195) and India Hook Road (S-30)	
8	York	SC 322, McConnells Hwy and S-561, Meadow Lakes Road	
9	York	SC 160 and S-242, Hensley Road	"T" intersection, 800' west of Sugar Creek
10	Lancaster	US 521 and SC 160	
11	Lancaster	US 521 and Marvin Road	
12	York	US 21 and Sutton Road/Banks St./ Fort Mill Bypass	
13	York	Herlong Avenue and Ebenezer Street Intersection	
14	York	SC 160 and Springfield Parkway/Fort Mill Bypass	
15	York	SC 160 and Pleasant Road/Sutton Road	
16	York	SC 160 and US 21	
17	York	Cherry Road and Mt. Gallant Road	
18	York	SC 274 and SC 49/Hwy 55	
19	York	Celanese Road and Mt. Gallant Road	
20	Lancaster	US 521 and Dobys Bridge Road	
21 - 25	York	Major I-77 Interchanges (Carowinds Blvd, SC 160, Sutton Road, Celanese Road, Cherry Road)	Part of interstate congestion; Operations at interchanges causes traffic to back-up on ramps

Figure 2-10: High Impact Intersection/Interchange Locations



3. PERFORMANCE MEASURE SELECTION AND MONITORING GUIDELINES

The Congestion Management Process is designed to support an objectives-based approach to congestion management that focuses on achieving desired system-based outcomes rather than responding to problems on an individual and reactive basis. The purpose of this section is to provide performance measure guidelines and to answer the questions:

- What performance measures should be used in the 2019 CMP to identify and monitor the extent of congestion?
- Which corridors in the RFATS area should be the focus of CMP activities in the next few years?

During the 2019 CMP update, RFATS’ 2045 LRTP congestion management goals were reviewed and additional CMP goals were recommended to encourage expanded mobility options and sustainable development in the region. This report also provides guidelines on performance measures to effectively monitor the performance of the RFATS transportation system in future years.

3.1. Congestion Management within the Overall Planning Process

The Congestion Management Process is one of the primary ways RFATS examines roadway operational and management strategies using an objectives-based approach. This informs the development of operational and demand management strategies and solutions to improve congested corridors and intersections. The recommended solutions are then incorporated into the broader MPO planning process. This planning process includes developing the MPO long range transportation plan while considering the federal planning factors identified by the FAST Act and previous legislation for use by MPO’s, and using this information to identify Transportation Improvement Program (TIP) projects.

Table 3-1: Federal Metropolitan Planning Factors

Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency
Increase the safety of the transportation system for motorized and non-motorized users
Increase the security of the transportation system for motorized and non-motorized users
Increase the accessibility and mobility of people and for freight
Protect and enhance the environment , promote energy conservation , and improve quality of life ; and promote consistency between transportation improvements and State and local planned growth and economic development patterns
Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight
Promote efficient system management and operations
Emphasize the preservation of the existing transportation system
Improve transportation system resiliency and reliability and reduce or mitigate storm water impacts on the surface transportation system.
Enhance travel and tourism .

3.1.1. CMP and LRTP Linkages

The intent of the Federal CMP requirement is to ensure that roadway congestion is examined, and identified improvements are developed as an integral part of the MPO transportation planning process. The CMP must be coordinated with regional planning efforts and programming processes. The CMP should identify potential congestion mitigation strategies, including specific improvements, that inform the LRTP and TIP planning processes.

3.1.2. CMP Goals

The RFATS 2045 Long Range Transportation Plan identified the following Congestion Management Process Goals:

- Make improvements to fully utilize capacity on the existing road network before constructing new lanes or facilities.
- Give priority to projects that implement the strategies in the RFATS Congestion Management Process, including operational improvements such as traffic signal timing.
- Preserve traffic capacity on major corridors through quality development practices.
 - Require driveway access on collector or local streets, rather than arterial routes.
 - Increase the level of internal circulation within and between developments by designing more interconnected road networks and collector streets.

It is recommended that the following CMP goals be added to encourage additional mobility options, encourage sustainable development, and improve air quality in the region:

- Provide additional mobility choices (i.e. bicycle, pedestrian, and transit) along congested corridors.
- Encourage and support sustainable development along congested corridors.
- Maintain and improve the natural environment through the implementation of transportation policies, programs, and projects that reduce vehicle emissions to improve regional air quality.

The 2019 CMP update is designed to strengthen the linkage between the CMP and the LRTP. The CMP should serve as a source for generating viable congestion management strategies and projects that advance to the LRTP planning process where further detailed examination will occur. After the CMP is adopted, the subsequent performance measures, data, and analysis should be the foundation for evaluating alternative improvement strategies along congested corridors and intersections. Once the evaluation is complete, it will assist in prioritizing projects identified in the fiscally constrained section of the LRTP.

3.2. Selection of Performance Measures

The purpose of identifying performance measures is twofold. First, performance measures provide both quantitative and qualitative tools that can be used to clearly and efficiently

communicate information on transportation system performance to members of the public, as well as appointed and elected officials. Consequently, it is desirable to use performance measures that can be understood by a non-technical audience and have a direct relationship to agreed goals, such as reducing congestion or improving air quality.

Second, performance measures can be assessed over time to indicate whether congestion management strategies are successful and are producing meaningful and / or desired outcomes. By monitoring performance and the outcomes from implemented improvement strategies, the quality of decision-making in the planning process can be improved and limited financial resources can be expended more wisely and effectively. The requirement for on-going assessment of the performance measures leads to the need to identify measures that are quantifiable, without placing a heavy burden on time, cost or training on RFATS staff.

The following guidelines are suggested for selecting performance measures to be used to evaluate RFATS transportation system congestion:

- Ensure measures are understandable by all intended audiences;
- Focus on outcome-oriented measures; and
- Use measures supported by existing data sources (to the extent possible).

3.2.1. Identifying Performance Measures

The Federal CMP requirements included in the FAST Act do not mandate specific performance measures that must be used in all planning areas. Rather, identifying appropriate performance measures for each planning area consistent with relevant infrastructure and operating characteristics should be utilized.

The following questions were considered to assist in identifying appropriate congestion management performance measures for this process:

1. Does the measure provide the ability to track roadway congestion for the region overall, as well as for individual transportation facilities?
2. Does the MPO have the ability and adequate funding to collect the data to track the measure on an on-going basis?
3. Can the measure relate the data to traveler perceptions in a readily understandable way?

Table 3-2: Selection of Performance Measures

Identified Performance Measure	Description	Question 1	Question 2	Question 3
Volume-to-Capacity Ratios	The ratio of traffic volume on a roadway to the overall capacity of the road.	✓	✓	✓
Corridor Level of Service	Represented as a score of A (best) to F (worst), that characterizes the operational conditions on a given roadway corridor. Typically based on several parameters such as V/C ratios, safety, travel speed, etc.	✓	✓	✓
Intersection Level of Service	Measured by the delay at signalized and unsignalized intersections.	✗	✗	✓
Travel Time Measures	Include data on travel time, speed, and average delay along roadway corridors, segments, or at intersections.	✓	✓	✓
Congestion Duration and Extent	Measures the length of time for which a roadway is congested, the location where the congestion is occurring, and the total amount of delay time experienced by drivers.	✓	✗	✓
Transit Travel Conditions	Includes two metrics relating to transit service: ridership and reliability.	✓	✓	✓
Safety	Measures the concentration and type of crashes along a roadway or at an intersection.	✓	✓	✓

3.2.2. Recommended Performance Measures

Measures recommended for consideration in the RFATS 2019 CMP update include the following:

- Volume / Capacity ratios (V/C ratios) – calculated using data from the Metrolina Regional Travel Demand Model (MRTDM);
- Travel times, speeds, and corridor Level of Service (LOS) – obtained through periodic travel time surveys – completed most recently as part of the 2045 LRTP update;
- Transit ridership and transit vehicle route reliability (on-time metrics) – provided by the Charlotte Area Transit System; and
- Safety – areas of safety concern were identified using crash data provided by the South Carolina Department of Transportation (SCDOT).

3.3. Volume to Capacity Ratios

The volume-to-capacity (V/C) ratio of a road segment is frequently used to evaluate congestion along the road by measuring the number of vehicles that travel along a segment in relation to its overall capacity. Existing traffic volume data is provided by SCDOT and this metric can also be projected for future years using traffic volume and capacity data from the TDM, both of which are described in more detail below.

SCDOT Traffic Volumes - SCDOT maintains a traffic counting program that records or estimates daily traffic volumes at approximately 12,000 locations throughout the state, including 447 in York County, 186 in Lancaster County and 334 within the RFATS area. While historical traffic counts are available for each year for many locations starting in 1987, SCDOT provides updated traffic count data for roadways on an annual basis for most the count locations, with some locations being updated every few years. Annual Average Daily Traffic (AADT) counts for the most recently available year can be obtained from the SCDOT website³. Traffic count locations within RFATS are shown in **Figure 3-1**.

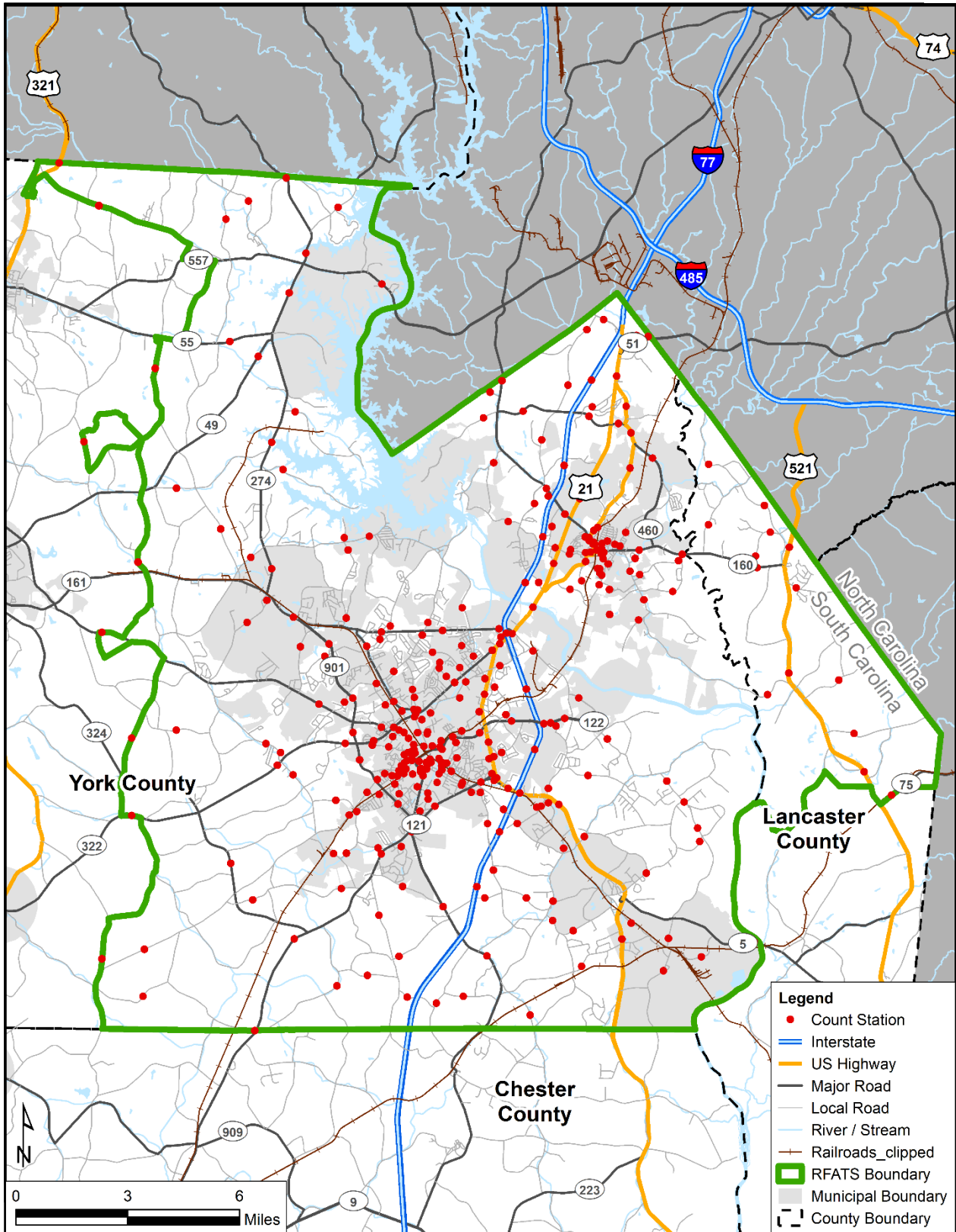
Metrolina Regional Travel Demand Model - For transportation planning purposes, the RFATS road network is modeled by the MRTDM – which is maintained by the Charlotte Department of Transportation and supported by NCDOT, SCDOT, area MPOs as well as other planning partners. The TDM uses inputs in the form of existing and historical transportation and socioeconomic data (such as traffic volumes and population), and combines it with information on development and planned roadway improvements to project operating conditions in future years. The most recent base year for which the model has been calibrated is 2015 and the future years for which projections are currently available include 2025, 2035, and 2045.

One of the key outputs from the TDM are V/C ratios for the roadway network in the RFATS region. V/C ratios produced by the TDM take the traffic volume of a given roadway segment in comparison to its capacity (lane miles) and provide a numerical “score” for the roadway segment that can be easily translated to the level of congestion. V/C ratios between 0.00 and 0.99 are generally representative of a roadway segment that isn’t experiencing frequently high levels of congestion. As the V/C ratio of a road approaches 1.00, the congestion level of the road also increases. A V/C ratio of 1.00 or greater means that the traffic volume on a segment has reached or exceeded the capacity of that segment. Roadway segments that experiences V/C ratios of 1.50 and higher likely suffer from frequent congestion and slow travel speeds.

While traffic volumes are an important metric for measuring existing roadway conditions and are an input for the TDM, V/C ratios were selected as a performance measure because they provide insight into existing and future congestion. V/C ratios are also produced for different times of day, allowing for specific analysis on peak-period congestion levels. Further information about the TDM output and the V/C ratios on the RFATS road network is provided in **Section 2.2.5** of this report and **Figure 2-6 through Figure 2-9** include maps of the 2015 and 2045 V/C ratios for A.M. and P.M. peak periods.

³ SCDOT AADT data are available from the following website: <https://www.scdot.org/travel/travel-trafficdata.aspx>

Figure 3-1: SCDOT 2018 Count Station Locations in RFATS Area



3.3.1. Recommended Use of V/C Ratios

As part of the congestion management process it is recommended V/C ratios are used as the primary metric for monitoring congestion levels on major roadways in the RFATS region. While traffic volumes in the form of AADT should be used as a measurement of existing roadway conditions and as an input for the TDM, V/C ratios provide insight on both existing corridor congestion and congestion forecasted for future years. As previously detailed, V/C ratios measure the level of traffic volume on a given corridor in comparison to that corridor's amount of capacity. The use of V/C ratios in monitoring congestion allows for the identification of corridors where demand is increasing, in the form of increased traffic volume, while capacity of the roadway remains unchanged. The congested corridors identified in this process are generally at or over capacity when analyzing their V/C ratios and thus must be assessed for possible improvements to disperse travel demand throughout the rest of the roadway network and alleviate congestion.

Annual Monitoring of Congestion Levels - The process of monitoring V/C ratio values is intended to facilitate the following:

- Measurement of changes in congestion along key corridors year over year to answer questions such as:
 - What corridors are the most congested?
 - Have the congestion levels on key roadways changed? And if so, what is the magnitude of the change?
- Comparison of V/C ratios with established benchmarks to trigger implementation or study of remedial actions.
- Identification of the fastest growing corridors by comparison of growth rates to help establish priorities for implementation of improvement projects or to study improvement options, such as travel demand management, introduction or enhancement of transit services, operational improvements or capacity expansion improvements.

While no specific V/C ratio target has been set as part of this process, the annual monitoring method detailed above should be used to focus improvement efforts on roadways with high V/C ratio levels. Strategies recommended to improve V/C ratios along the most congested corridors can be found in the following section and further detail about the evaluation and assessment of roadways using V/C ratios can be found in **Section 6**.

3.4. Travel Time Surveys

In operational evaluations of corridor performance, travel speed along a corridor is a commonly used measure and is the basis for calculating Level of Service for urban streets in the Highway Capacity Manual⁴. During the 2019 CMP Update, travel speed was utilized from the 2045 LRTP along twelve corridors in the RFATS Study Area by conducting travel time surveys.

3.4.1. Survey Routes

During the 2045 LRTP update, twelve corridors in the RFATS area were surveyed to determine the average travel time on each. These routes and their total length are provided below in **Table 3-3** and illustrated in **Figure 3-2**.

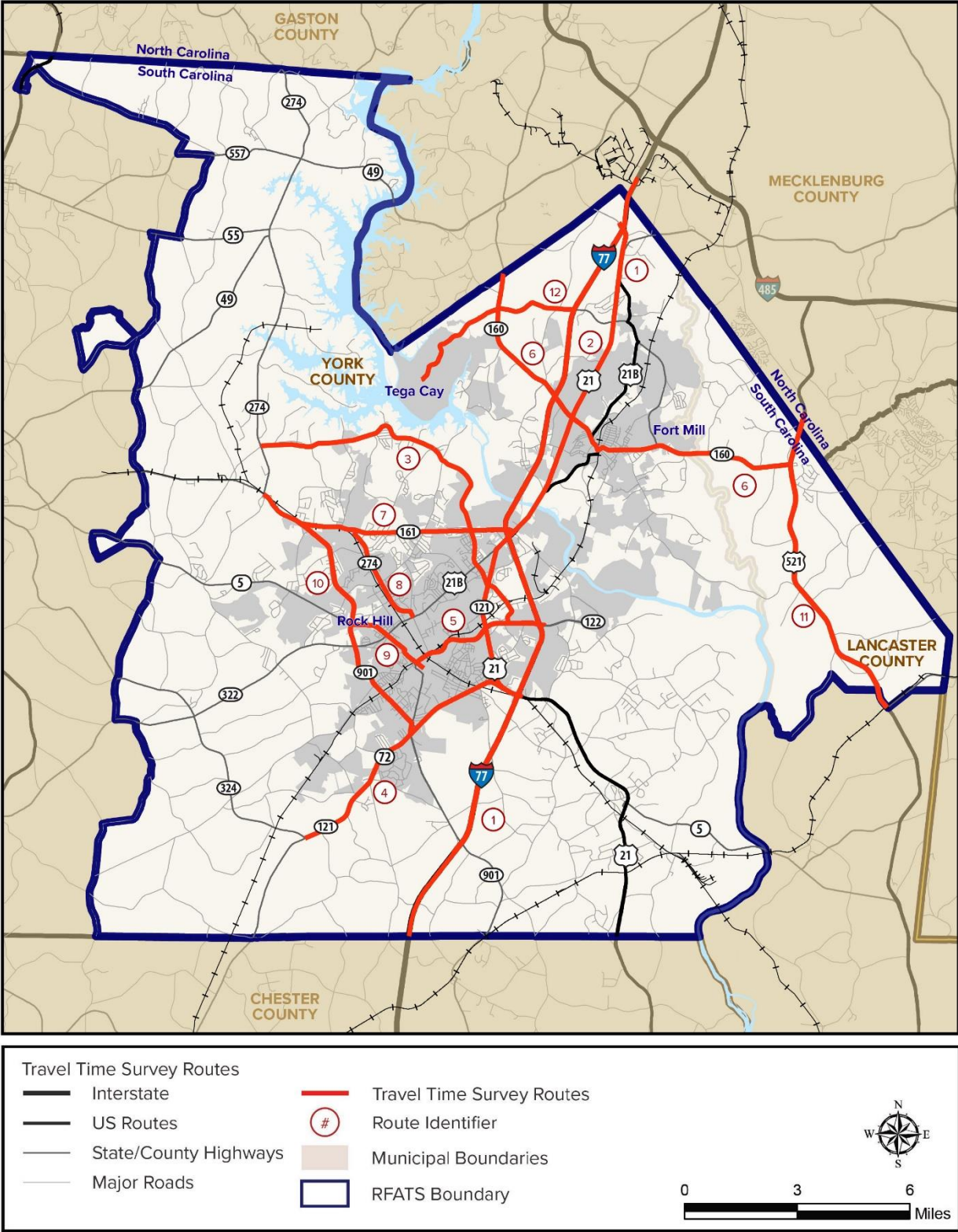
Table 3-3: Travel Time Survey Corridors

ID	Route	Begin	End	Length
1	I-77	Southern RFATS Boundary	SC/NC State Line	21.2
2	US 21	SC 5 (E. Main St) / I-77	I-77 (northern part of RFATS area)	13.8
3	Mt. Gallant Road	SC 274 (Hands Mill Hwy)	SC 122 (Dave Lyle Blvd)	10.7
4	SC 72 / SC 121	SC 324	US 21 (Anderson Rd)	7.0
5	SC 122 (Dave Lyle Boulevard)	SC 5 (W. Main St)	I-77	3.8
6	SC 160	SC/NC State Line	US 521 (Lancaster County)	11.0
7	SC 161 (Celanese Road)	SC 274 (Hands Mill Hwy)	US 21 (Cherry Rd)	7.0
8	SC 274 (Ebenezer Road)	SC 161 (Celanese Rd)	SC 322 (Cherry Rd)	3.0
9	SC 5 (Main Street)	SC 901 (Heckle Blvd)	SC 122 (Dave Lyle Blvd)	2.13
10	SC 901 (Heckle Boulevard)	SC 161	SC 121 (Albright Rd)	6.8
11	US 521	SC/NC State Line	Waxhaw Hwy	8.8
12	Gold Hill Rd	I-77	Tega Cay	5.13

Each corridor was surveyed on weekdays in 2016 during the morning peak period between 7:00 a.m. and 9:00 a.m. and during the evening peak period between 5:00 p.m. and 7:00 p.m. The routes listed in **Table 3-3** and shown below in **Figure 3-2** were surveyed for both travel directions to account for travel flow patterns at different times of day.

⁴ Highway Capacity Manual, Chapter 15, Urban Streets Methodology, Table 15-2. Transportation Research Board.

Figure 3-2: Travel Time Survey Routes



3.4.2. Travel Time Survey Results

At the completion of the travel time surveys, the average travel speed along each of the 12 corridors was determined. Using this data, the average time to travel along each route, in both directions, was calculated using the average speed and distance of the route. This information is summarized for each of the 12 surveyed corridors in **Table 3-5** and **Table 3-6**.

The data produced from the travel time surveys was also used to determine the LOS of each route. Illustrated in **Table 3-4**, the Highway Capacity Manual designates LOS standards for urban roads based on the roadway classification and free-flow travel speed.

Table 3-4: Urban Street LOS by Class

	Class I	Class II
Range of free-flow speeds (FFS)	45 to 55 mph	35 to 45 mph
Typical FFS	50 mph	40 mph
LOS	Average Travel Speed (mph)	
A	> 42	> 35
B	> 34 – 42	> 28 – 35
C	> 27 – 34	> 22 – 28
D	> 21 -27	> 17 – 22
E	> 16 – 21	> 13 – 17
F	≤ 16	≤ 13

Source: Highway Capacity manual, Chapter 15 – Urban Street Methodology, Exhibit 15-2, Transportation Research Board.

Table 3-5: Average Travel Speeds, Duration, and LOS for I-77 Corridor

Direction and Peak	Average Duration	Average Miles	Average MPH	Class	Urban Street LOS
Route 1: I-77					
Northbound in AM Peak	0:20:49	21.2	59.53	1	A
Southbound in AM Peak	0:17:24	21.2	66.55	1	A
Northbound in PM Peak	0:18:30	21.2	66.99	1	A
Southbound in PM Peak	0:18:00	21.2	64.33	1	A

While the LOS for the entire I-77 corridor currently experiences an LOS A given the results of the travel time survey, this is an average across the complete corridor and does not represent the congestion that occurs at peak travel times at vital locations along the corridor. Due to its unique position just south of the Charlotte urbanized area, a major employment center, the I-77 corridor in the RFATS planning area experiences high levels of traffic volumes during peak commuting times as people travel to and from work. Shown in the previous section in Figures 2-6 through 2-9, the I-77 corridor experiences significantly higher V/C ratios and related congestion during the A.M. and P.M. peak travel periods at key intersections/interchanges than anywhere else along the corridor. The areas of concerns include the stretch of interstate crossing the State line into North Carolina, the Gold Hill Road interchange, the SC 160 interchange, and the Celanese / Cherry Road interchange. These locations currently experience high levels of congestion during peak travel times and are forecasted to continue to experience congestion without intervention.

Table 3-6: Average Travel Speeds, Duration, and LOS for Non-Interstate Corridors

Direction and Peak	Average Duration	Average Miles	Average MPH	Class	Urban Street LOS
Route 2: US 21					
Northbound in AM Peak	0:24:11	13.8	28.44	2	C
Southbound in AM Peak	0:23:02	13.8	29.87	2	B
Northbound in PM Peak	0:22:01	13.8	31.22	2	B
Southbound in PM Peak	0:24:38	13.8	27.93	2	C
Route 3: Mt. Gallant Road					
Eastbound in AM Peak	0:22:24	10.7	28.66	2	B
Westbound in AM Peak	0:19:25	10.7	33.07	2	B
Eastbound in PM Peak	0:24:52	10.7	25.82	2	C
Westbound in PM Peak	0:27:57	10.7	22.97	2	C
Route 4: SC 72 / SC 121					
Northbound in AM Peak	0:11:39	7.0	36.06	2	A
Southbound in AM Peak	0:11:22	7.0	36.94	2	A
Northbound in PM Peak	0:11:54	7.0	35.31	2	B
Southbound in PM Peak	0:11:37	7.0	36.18	2	A
Route 5: SC 122 (Dave Lyle Boulevard)					
Eastbound in AM Peak	0:07:01	3.8	32.51	2	B
Westbound in AM Peak	0:06:55	3.8	32.96	2	B
Eastbound in PM Peak	0:07:43	3.8	29.53	2	B
Westbound in PM Peak	0:07:37	3.8	29.91	2	B
Route 6: SC 160					
Eastbound in AM Peak	0:25:48	11.0	25.59	2	C
Westbound in AM Peak	0:23:58	11.0	27.54	2	C
Eastbound in PM Peak	0:28:15	11.0	23.37	2	C
Westbound in PM Peak	0:26:57	11.0	24.49	2	C
Route 7: SC 161 (Celanese Road)					
Eastbound in AM Peak	0:14:06	7.0	29.77	2	B
Westbound in AM Peak	0:13:21	7.0	31.46	2	B
Eastbound in PM Peak	0:14:07	7.0	29.75	2	B
Westbound in PM Peak	0:15:53	7.0	26.44	2	C
Route 8: SC 274 (Ebenezer Road)					
Northbound in AM Peak	0:07:45	3.0	23.21	2	C
Southbound in AM Peak	0:07:06	3.0	25.34	2	C
Northbound in PM Peak	0:08:26	3.0	21.33	2	D
Southbound in PM Peak	0:07:04	3.0	25.50	2	C
Route 9: SC 5 (Main Street)					
Eastbound in AM Peak	0:05:04	2.13	25.24	2	C
Westbound in AM Peak	0:04:28	2.13	28.66	2	C
Eastbound in PM Peak	0:05:09	2.13	24.80	2	C
Westbound in PM Peak	0:04:38	2.13	27.61	2	C
Route 10: SC 901 (Heckle Boulevard)					
Northbound in AM Peak	0:13:11	6.8	30.93	2	B
Southbound in AM Peak	0:13:52	6.8	29.43	2	B
Northbound in PM Peak	0:13:42	6.8	29.80	2	B
Southbound in PM Peak	0:12:15	6.8	33.30	2	B

Table 3-6 (continued): Average Travel Speeds, Duration, and LOS for Non-Interstate Corridors

Direction and Peak	Average Duration	Average Miles	Average MPH	Class	Urban Street LOS
Route 11: US 521					
Northbound in AM Peak	0:15:08	8.8	34.91	2	B
Southbound in AM Peak	0:13:31	8.8	39.07	2	A
Northbound in PM Peak	0:13:34	8.8	38.91	2	A
Southbound in PM Peak	0:16:29	8.8	32.04	2	B
Route 12: Gold Hill Road					
Eastbound in AM Peak	0:10:50	5.13	28.41	2	C
Westbound in AM Peak	0:09:11	5.13	33.50	2	B
Eastbound in PM Peak	0:10:07	5.13	30.41	2	B
Westbound in PM Peak	0:10:53	5.13	28.28	2	C

As shown in **Table 3-6**, a majority of surveyed corridors experienced LOS of either B or C with one route, Route 8: SC 274 (Ebenezer Road) heading northbound during the PM peak hours, experiencing a LOS D.

3.4.3. Recommended Use of Travel Time Surveys

Using travel time surveys for this process allows for the assessment of key transportation corridors by measuring peak period travel speed and assigning a level-of-service (LOS) rating to routes based on Highway Capacity Manual (HCM) methodologies. Including the travel time surveys as a performance measure also allows for the prioritization of corridors for improvements based on the LOS rating that they receive.

While many of the surveyed corridors were determined to perform relatively well in terms of travel time and LOS, the recommended improvement strategies detailed in **Section 4** are intended to improve the LOS on corridors where it is low. When evaluating the implemented strategies intended to alleviate congestion, comparing future travel time surveys with those included as part of this update will help in determining the success of the implemented improvements. The process for evaluating travel time and LOS on the identified corridors is detailed in **Section 6**.

3.5. Transit Travel Condition Measures

Access to reliable and efficient transit plays a significant role in the amount of congestion impacting a roadway network as an increase in supply of alternative modes of transportation provides options for residents other than driving to make their daily trips. For transit travel to be a viable method for reducing congestion it must provide access to important destinations and activity centers and the service must be reliable so that it is competitive with automobile travel. Using transit ridership and reliability as performance measures helps identify the current quality and usage of the existing transit service and the ways in which it can be improved to help alleviate congestion.

3.5.1. Existing Transit Service

During the summer of 2019, the City of Rock Hill implemented a free, fixed-route bus system that operates four routes throughout the City using all electric buses that are also ADA compliant. Shown below in **Figure 3-3** through **Figure 3-7**, the four operating routes of the new system provide transit service to key corridors throughout Rock Hill.



MyRide Transit Service

Figure 3-3: Route 1 Downtown / Knowledge Park Loop

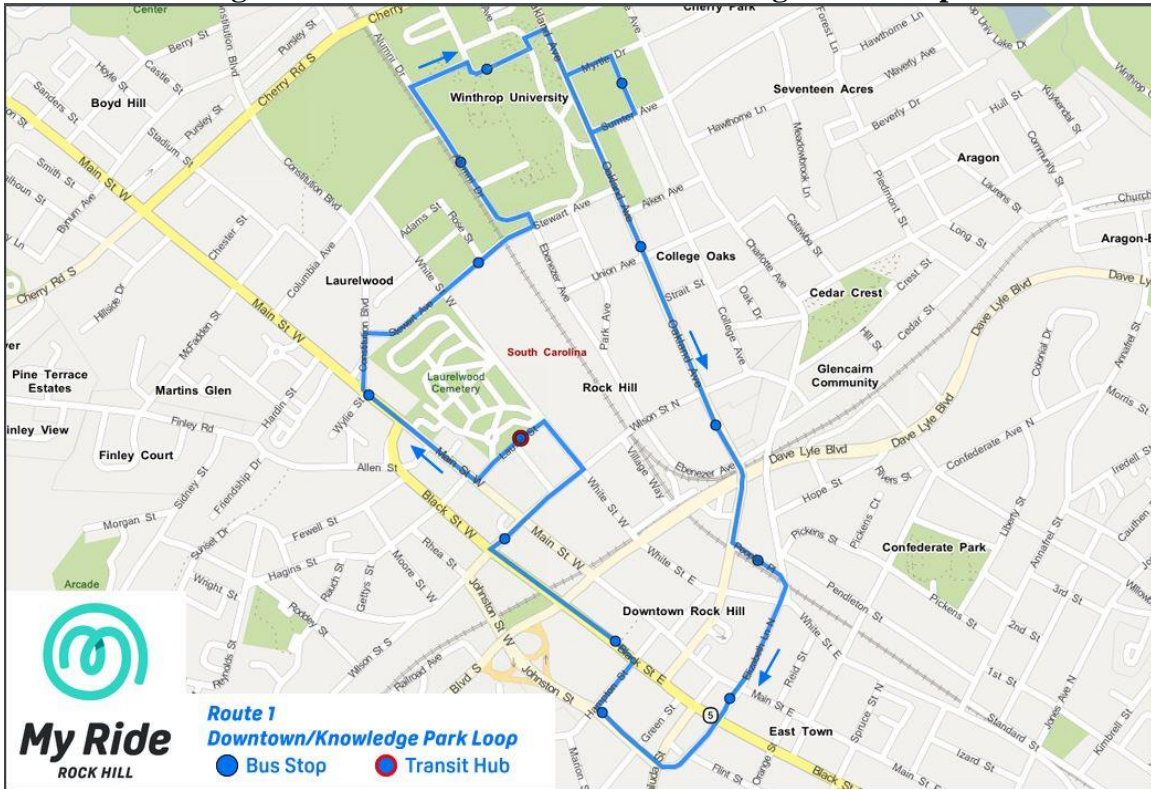


Figure 3-4: Route 2 Saluda / Heckle Loop

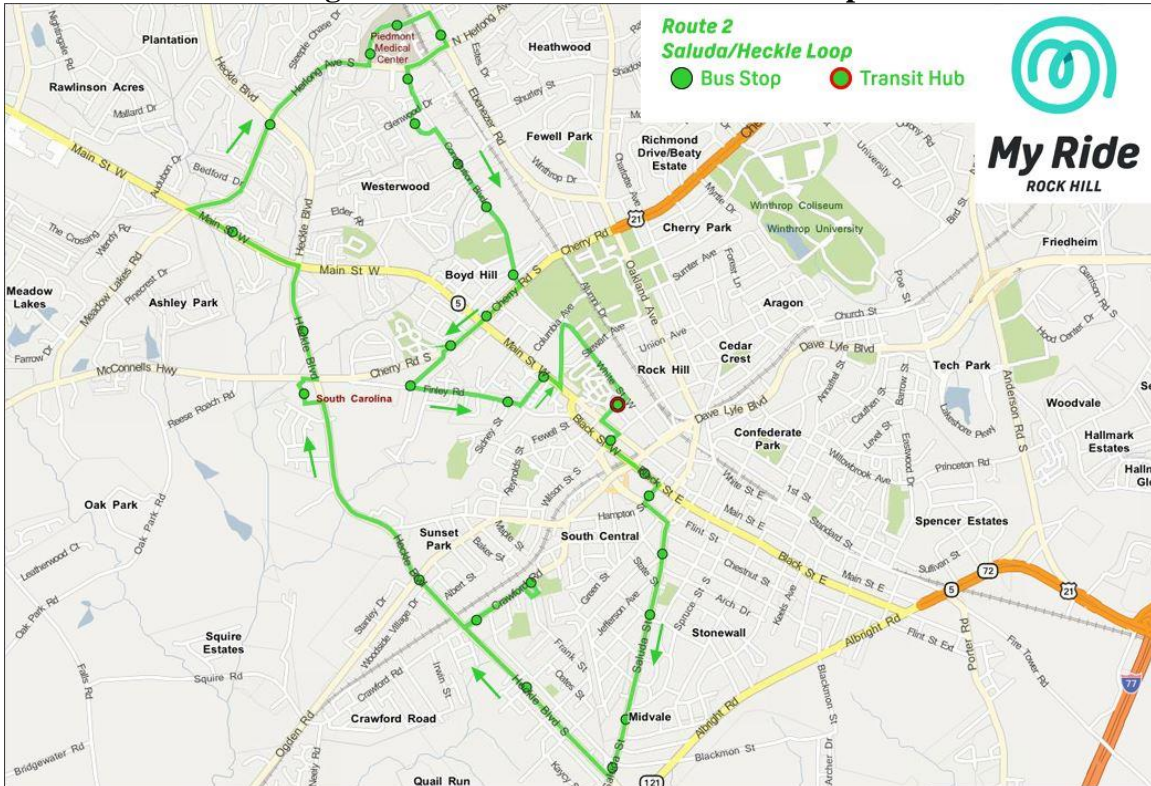


Figure 3-5: Route 3 Cherry / Riverwalk Line Outbound

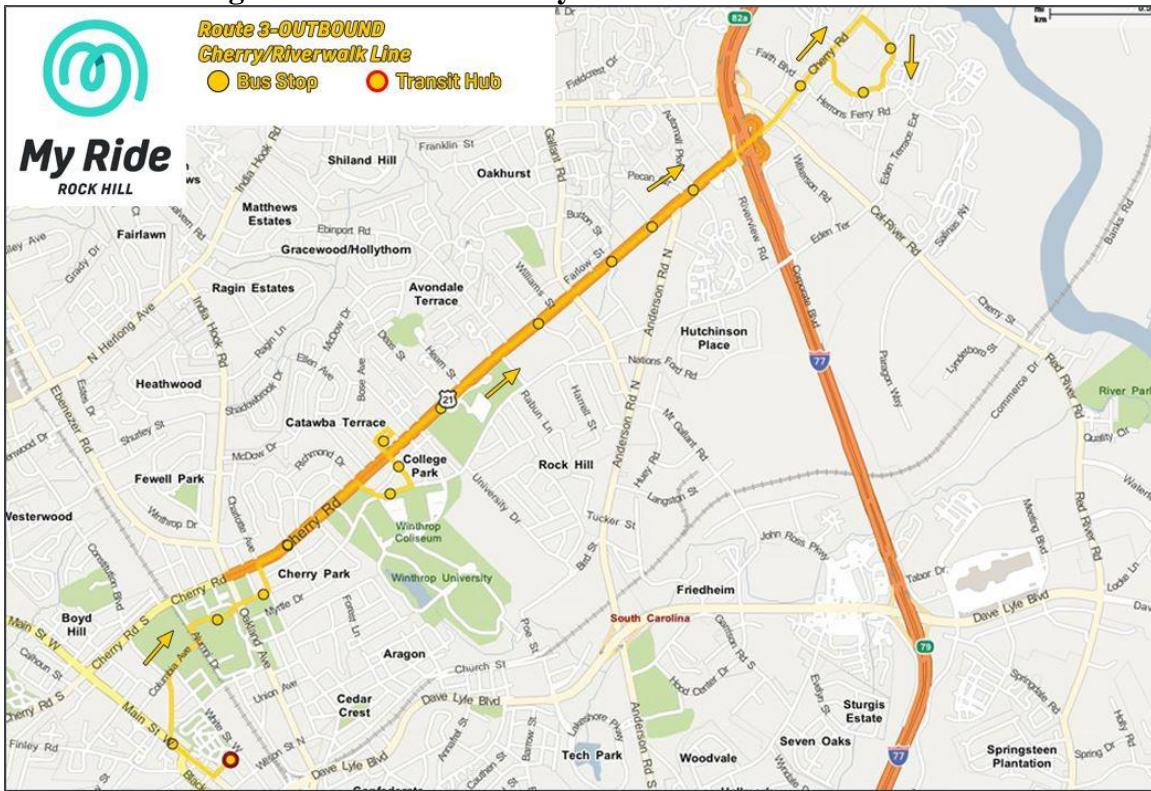


Figure 3-6: Route 3 Cherry / Riverwalk Line Inbound

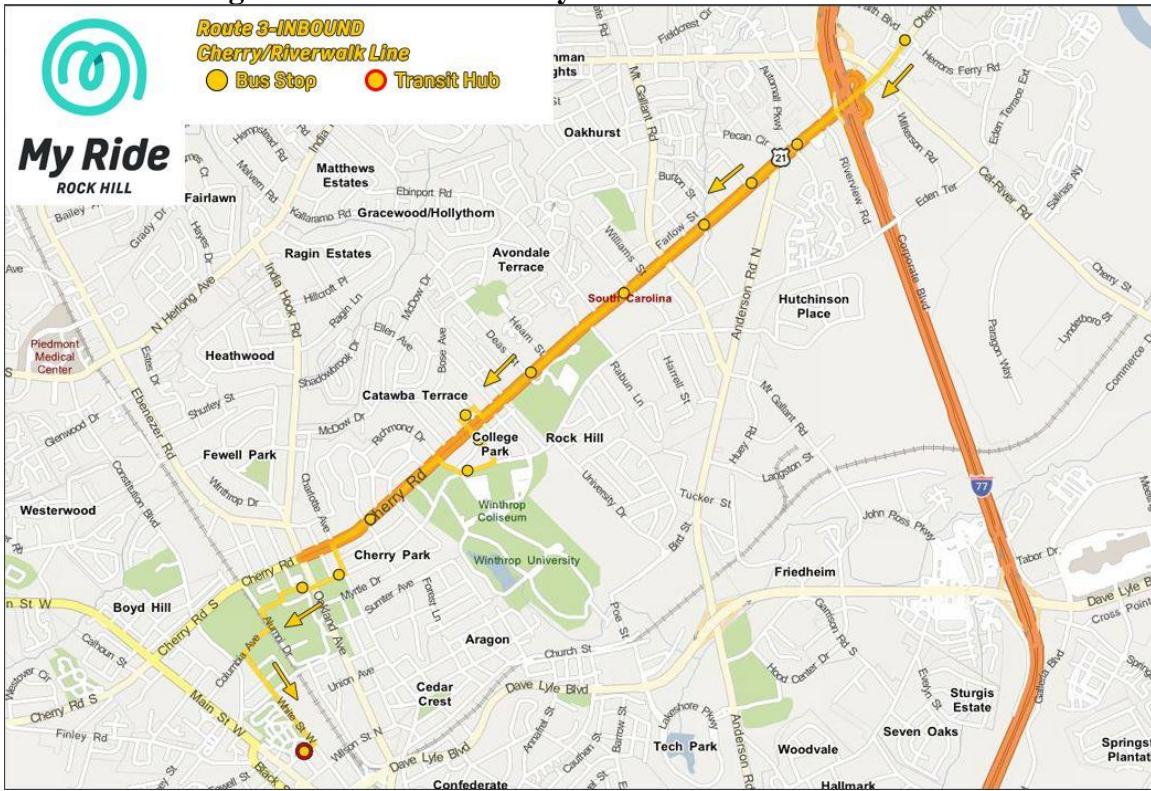
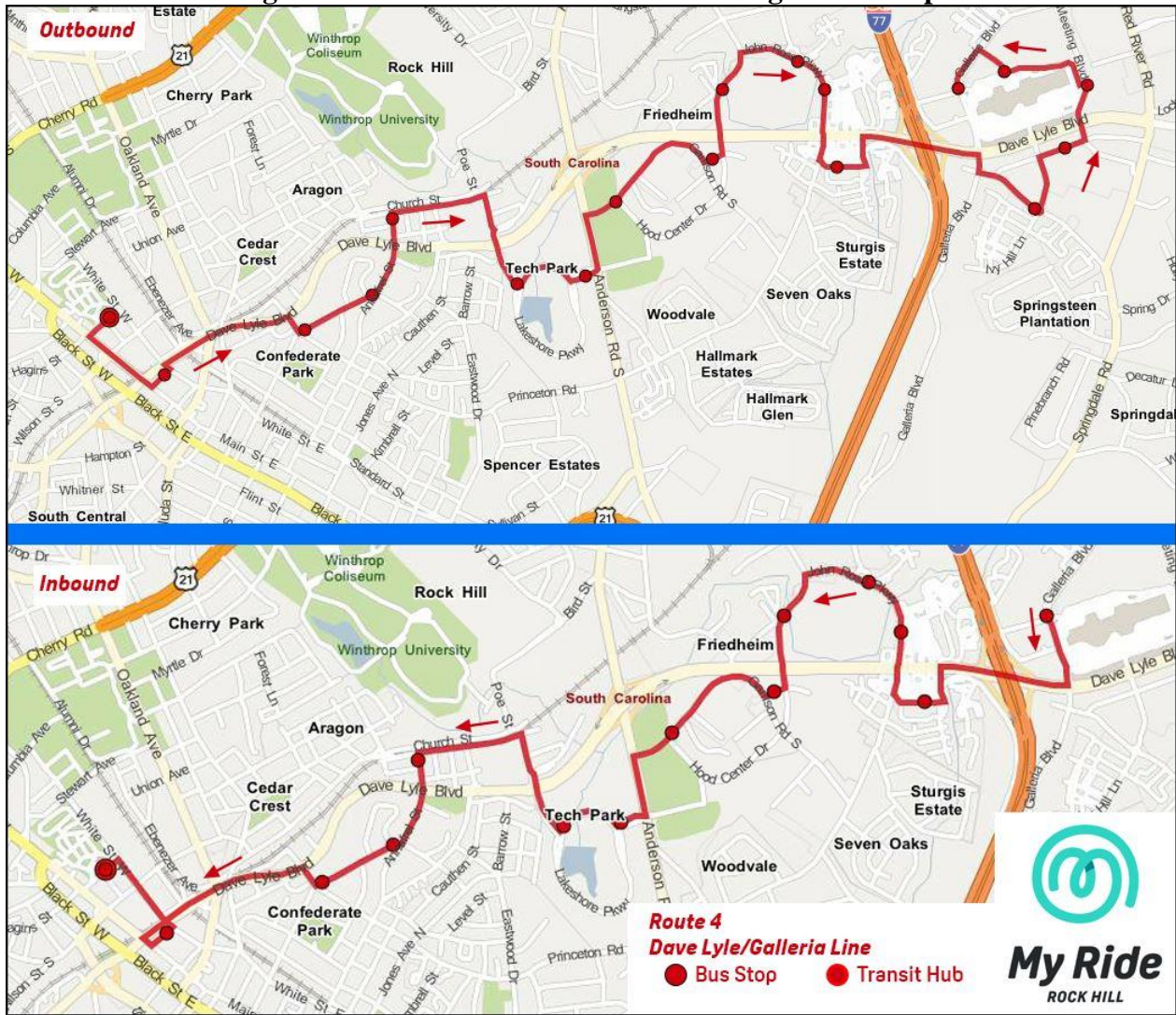


Figure 3-7: Route 1 Downtown / Knowledge Park Loop

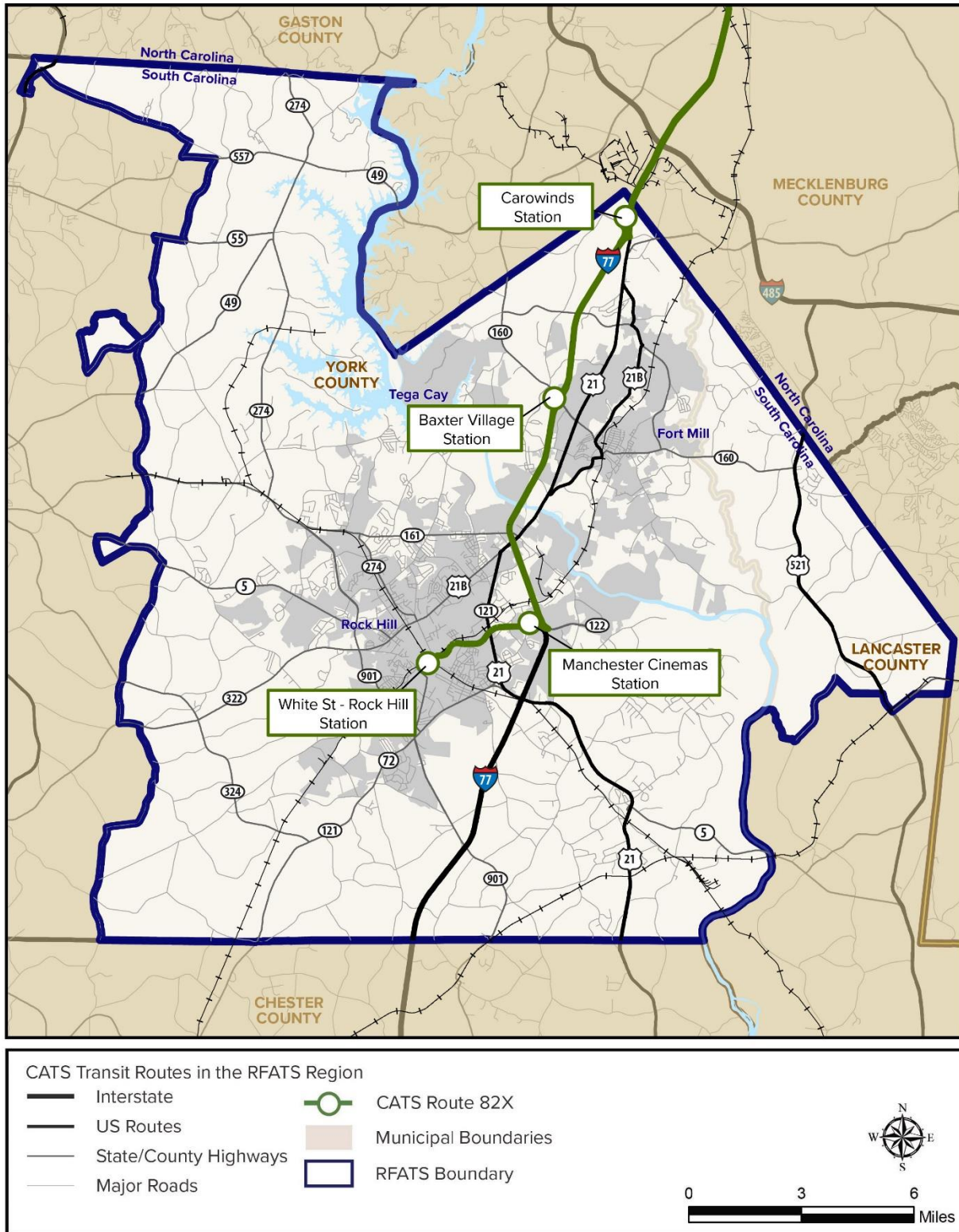


The primary transit service in the RFATS region is the Rock Hill express route 82X operated by CATS, shown below in **Figure 3-8**. This route provides service from Uptown Charlotte, the largest employment center in the area, to the RFATS region using the I-77 corridor. This route provides an alternative transportation method for residents of the RFATS area to commute to and from Uptown Charlotte.



CATS 82X

Figure 3-8: Rock Hill Express Route 82X



3.5.2. Transit Service Ridership and Reliability

For the existing transit service in the RFATS region, data on ridership and on-time performance (as a measure for service reliability) was used as the metric for the transit travel condition performance measure. While the fixed route service implemented by the City of Rock Hill started earlier this year, the service is still too new to gather data on ridership and on-time performance. Ridership and on-time performance data for the Rock Hill express route 82X was provided by CATS and is shown below in **Table 3-7**.

Table 3-7: Rock Hill Express Route 82X Performance Data

Year	Ridership	On-time Performance
2017	34,904	87.90%
2018	29,737	87.50%
2019	33,368	80.50%

As shown in the above table, ridership declined from fiscal year 2017 to 2018 despite the reliability of the service remaining strong. This shift in total ridership indicates a change in travel behavior by transit users previously using the service which in turn, results in a negative impact on overall roadway network congestion. The ridership data for 2019 shows a resurgence in users of the 82X express service from the previous year. At the end of the 2019 fiscal year, the total ridership on the service surpassed that from fiscal year 2018. This increase in ridership occurred even with a reduction in on-time performance from 2018 to 2019. The reduction in on-time performance from 87.5% in 2018 to 80.5% in 2019 was the result of an increased amount of construction in the Uptown Charlotte area. Evidenced by the increase in total ridership, even though the 80.5% performance rate for this year is below the 85% target set by CATS, the location of construction in Uptown Charlotte has little effect on the amount of ridership generated from the RFATS region given that it occurs towards the end of the route during its northbound trip.

3.5.3. Recommended Use of Transit Ridership and Reliability Data

Using ridership and reliability as the key data points for this measure allows for the assessment of the usage and efficiency of existing transit services in the RFATS region and relatedly, the travel behavior of residents in the RFATS area. The data associated with this performance measure should be monitored yearly using the process detailed in **Section 6** and the strategies outlined in the following section, **Section 4**, should be considered as further options to increase the usage and improve the reliability of the transit services available to RFATS residents.

3.6. Safety

While incorporating safety metrics as a performance measure and identifying strategies to improve roadway safety as part of this process will undoubtedly help to reduce the number of roadway incidents, it can also help alleviate congestion on the roadway network. Roadway safety is often measured using metrics such as crash frequency and crash rates along a corridor or at intersections. When incidents frequently occur along a roadway or at an intersection, particularly when the facility experiences high traffic volumes during peak periods, they can have significant impacts on the congestion experienced across the entire roadway network.

3.6.1. Intersection Crashes

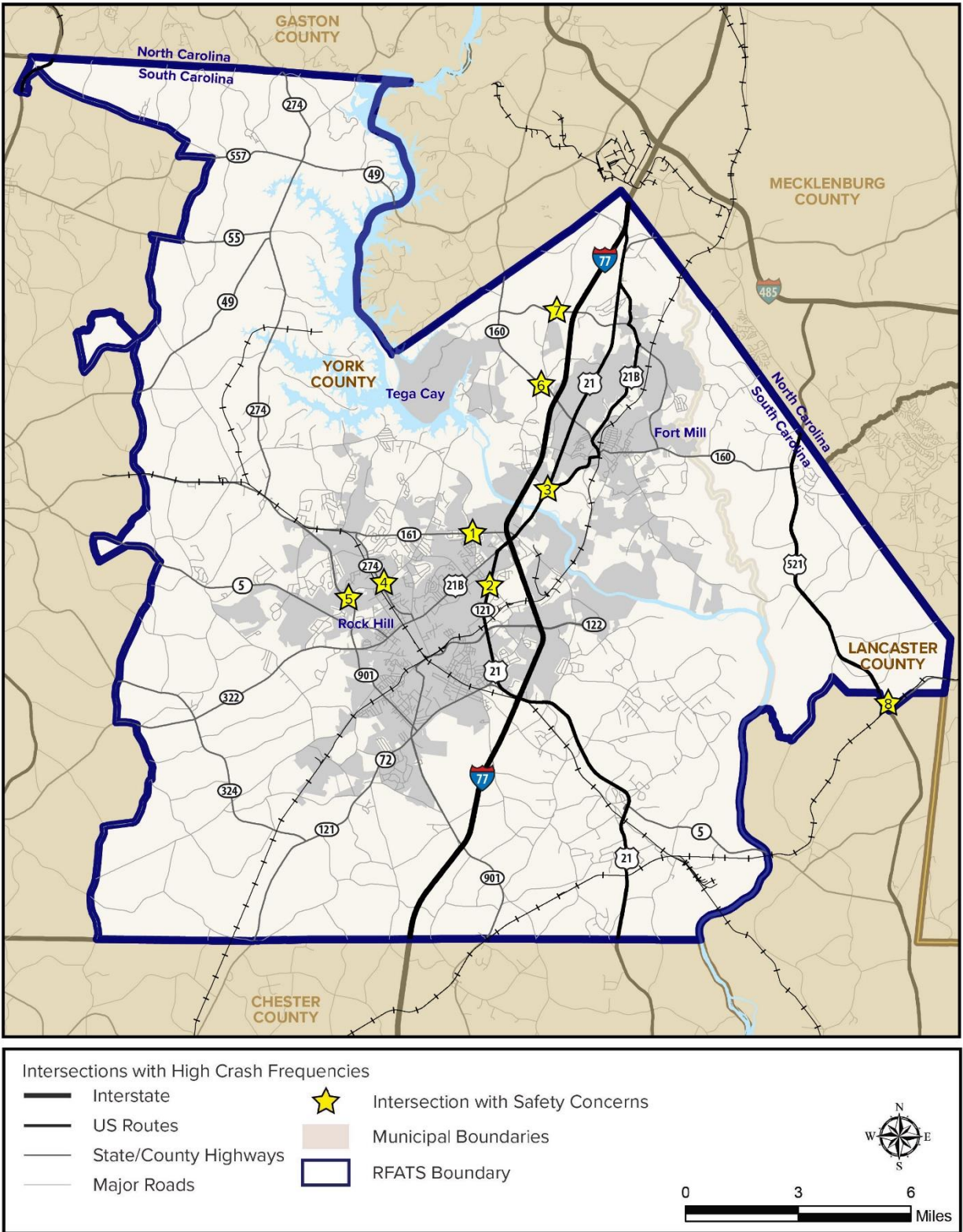
For this process, the primary safety metrics used for analysis included recent data on crash frequencies and crash rates at intersections throughout the RFATS area. Intersection crash data, provided by SCDOT for 2013 – 2017, was selected as the preferred safety metric because of the magnitude of impact that crashes at highly trafficked intersections can have on congestion.

Using crash rates and frequencies for intersections, provided by SCDOT, combined with input from the RFATS Technical Team, key intersections were identified for further analysis to determine if improvements may be advisable. Combining technical team input with crash rate and frequency data allows for the identification of high priority intersections that are contributing to congestion on the roadway network. More specifically, intersections that experience high traffic volumes and have high crash frequencies can cause significant increases to non-recurring congestion. This in turn has significant impact on the travel times and levels of congestion on the most used roads in the RFATS region. Shown below, **Table 3-8** and **Figure 3-9** represent the priority intersections in the RFATS area that experience relatively high crash frequencies and rates.

Table 3-8: Priority Intersections with Safety Concerns

ID	County	Intersection Location	2012 – 2016 Crash Rate	2013 – 2017 Crash Rate	Crash Rate Difference	2013 – 2017 Crash Frequency
1	York	Celanese / Mt. Gallant	1.708	1.851	+8.37%	37.8
2	York	Anderson / Mt. Gallant	3.109	2.627	-15.50%	31.6
3	York	US 21 / Sutton / Spratt	1.759	2.448	+39.17%	26
4	York	Ebenezer / Herlong	1.849	2.234	+20.82%	25.2
5	York	Heckle / Herlong	3.147	1.946	-38.16%	22.8
6	York	SC 160 / Pleasant Rd. / Sutton Rd.	1.586	1.619	+2.08%	21.8
7	York	Gold Hill / Pleasant	2.614	1.88	-28.08%	20
8	Lancaster	US 521 / Waxhaw Hwy	2.447	2.582	+5.52%	15.6

Figure 3-9: Priority Intersections with High Crash Frequencies



3.6.2. Recommended Use of Safety Data

The list of priority intersections that result from the safety analysis should be further analyzed for possible improvement projects to mitigate the number of incidents that occur at each location and the subsequent congestion that they cause. These priority locations should also be compared with the identified congested corridors, detailed in **Section 2**, to determine corridors and/or intersection locations that are most in need of improvement.

As a performance measure, it is also recommended that safety data in the form of intersection crash rates and frequencies should be used to analyze the success of implemented safety improvements and to also track the congestion at high volume intersections in the RFATS area. Intersection crash data for future years should be evaluated to determine if the locations identified in this process have improved as the result of implemented strategies. While **Section 4** below details safety improvement strategies that are intended to improve congestion across the network, **Section 6** details the evaluation and assessment of the identified performance measures.



US 21/Sutton Rd/Spratt St

4. CONGESTION MANAGEMENT STRATEGIES

A critical step in the CMP is to identify congestion mitigation strategies that are appropriate for the RFATS region. This section identifies these strategies and introduces a set of operational and policy matrices that provides potential investment or policy related actions associated with mitigating different causes of congestion. The report discusses current and potential congestion management strategies in three categories:

- Operations and Management Strategies;
- Travel Demand Management Strategies; and
- Physical Roadway Capacity Strategies.

For each congestion category, potential strategies are discussed and related to the problems or conditions where they may be most applicable.

4.1. Types of Congestion

As noted in Section 3, congestion is generally classified as either recurring or non-recurring. This subsection identifies different types of congestion under each classification, while the following subsection identifies potential strategies to help mitigate specific congestion types. The types of congestion include:

- Recurring Congestion causes:
 - Peak period travel
 - Freight movement
 - Intersection operations
 - Corridors with high travel demand
 - School related
 - Central Business District
 - Bottlenecks
- Non-Recurring Congestion causes:
 - Incident related
 - Special event traffic

4.2. Congestion Mitigation Strategies

The CMP is a tool that is used in the RFATS region to ensure that existing and new transportation facilities are effectively managed, operated, and maintained. There are many congestion management strategies that vary in terms of effectiveness, cost, complexity, and ease of implementation. Congested roadways and intersections must be properly examined to evaluate which congestion mitigation strategy will effectively improve the congestion related problem(s). The CMP identifies numerous congestion mitigation strategies that can individually or collectively improve the operational efficiency of the RFATS transportation system.

The FAST Act emphasizes preserving, maintaining, and improving existing roadway transportation infrastructure rather than investing in major infrastructure changes. Thus,

compatible congestion management strategies are those that enhance mobility, reduce traffic operations that result in congestion and manage regional travel demand. Suitable strategies have benefits for auto, transit, pedestrian, and bicycle usage.

The results of the CMP are used to develop project recommendations for the RFATS Transportation Improvement Program (TIP) and to provide viable strategies and policies for the congestion management element of the RFATS Long Range Transportation Plan. The following sections identify several proven congestion management strategies that can be used in the RFATS region.

4.2.1. Operations and Management Strategies

Enhancing the efficiency of the transportation system can be achieved by implementing operational and management (O&M) strategies. O&M strategies are designed to allow more effective management of the existing roadway facilities. O&M strategies can increase effective capacity without constructing additional general-purpose lanes.

The FAST Act and the planning rule outlined in 23 CFR 450 emphasize that O&M strategies that preserve the existing transportation system are the preferred method to manage congestion. O&M strategies are typically low cost, require minimal right-of-way, and can be constructed or implemented more quickly than other congestion management strategies.

O&M strategies fall into several categories, such as Access Management, Transportation Systems Management, Incident Management, and Intelligent Transportation Systems. Typical strategies include signal re-timing, signal coordination, and geometric improvements, which are implemented at a specific location or at the facility level. However, there are also operational strategies that are best implemented at the corridor and regional levels, such as ramp metering and constructing traffic control centers.

Access Management is defined as the management of vehicular operations into and out of land parcels along a given roadway. This includes the allowable number, location, and operational characteristics of both commercial driveways and entry / exit points for residential developments. Thus, access management strategies effectively seek to control one of the central variables influencing how efficiently and reliably a travel stream will operate – this is particularly important along corridors with higher levels of travel demand. Access management techniques that jurisdictions can utilize include:⁵

- **Access Spacing:** Increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality along heavily traveled corridors.
- **Driveway Spacing:** Driveways spaced further apart improves traffic flow and reduces merging conflict points along roadways.

⁵ U.S. DOT, Federal Highway Administration, Office of Operations

- **Safe Turning Lanes:** Dedicated left and right-turn, indirect left-turns, U-turns, and roundabouts keep through traffic flowing. Roundabouts represent an opportunity to reduce an intersection with many conflict points or a severe crash history (i.e., T-bone crashes, etc.) to one that operates with fewer conflict points and less severe crashes (for example, sideswipes) if they occur.
- **Median Treatments:** Two-way left-turn lanes (TWLTL) and non-traversable, raised medians are examples of effective methods to regulate access and reduce crashes on specific types of roadway facilities. The addition of two-way left-turn lanes are most successful as an access management technique when implemented on four-lane undivided corridors with large numbers of access points or driveways. It is an access management treatment that is typically cheaper than implementing medians and is proven to also be successful at improving safety along the roadway, specifically by reducing crashes associated with left turning movements.
- **Right-of-Way Management:** Preserving right-of-way for future capacity improvements, sight distance improvements, and other access-related improvements.

Access management strategies are typically effective where an arterial roadway is in or is serving an emerging growth area. Access management strategies may also be applied along existing developed corridors where lack of access control causes congestion and safety problems. Implementing access management strategies along existing developed corridors requires the support of local government officials, community leaders, and the highway owner to facilitate solutions acceptable to adjacent property owners. For access management strategies to be successful at minimizing the conflict points along a corridor and ultimately increase the roadway capacity and reduce the number of crashes that occur, jurisdictions must develop and implement access standards that balance the functional operation of the road system and property access. It is also an important component of access management to continuously improve the collector street network in the RFATS region so that roadway users can access key destinations using smaller roads other than the most heavily congested corridors. With this in mind, the implementation of the recommendations detailed in the 2017 RFATS Collector Street Plan is an effective congestion mitigation strategy that should be considered. All RFATS jurisdictions must coordinate access

management approaches and commit to implementing these solutions to reduce the possibility of areas annexing into another jurisdiction that do not support access management techniques.

While implementation strategies to control access are usually low cost in nature, they are still generally effective at improving roadway safety



Access Management Improvements @ Baxter Village

and efficiency. The strategies listed below are provided by the Federal Highway Administration and are an example of the different types of approaches to access management, whether it's through planning, regulatory, or design improvements that exist.

- Policy and Regulatory Strategies:
 - Enforceable regulations, codes, policies, directives, or guidelines issued by jurisdictions that have permit authority on land development and infrastructure improvements.
 - Combination of regulations on land development that address property access and an updated development review process that evaluates impacts that access points for new developments have on existing roadway operations.
- Good geometric design of transportation facilities
- Education efforts to increase understanding of access implications by business and property owners

Transportation Systems Management and Operations (TSMO) includes a broad set of strategies that work to optimize the efficiency and safety of the transportation system for all modes of travel. The TSMO approach to congestion mitigation seeks to identify operational improvements at the system level that enhance the capacity of transportation systems by using existing infrastructure more efficiently. Because TSMO strategies approach congestion issues at a system level, they must be coordinated with similar strategies across agencies and jurisdictions.

TSMO improvements are designed to enhance traffic flow and facilitate the efficient movement of vehicles and goods, which in turn improves air quality, safety, and overall system accessibility.

While TSMO strategies are intended to address congestion at the system level, implementing these improvements at the corridor level is an applicable and effective technique that can have a significant impact. Examples of TSMO strategies that are implementable at the corridor level include:

- Managed lanes such as high-occupancy vehicle/toll lanes
- Variable speed limits
- Changeable lane assignments
- Ramp metering
- Bicycle and pedestrian crossing improvements
- Adaptive traffic signals

Incident Management strategies are those that involve responding to roadway incidents (such as crashes), that may cause non-recurring congestion. Effective incident management strategies

are those that are successful at reducing the impacts to traffic flow that occur after an incident takes place. Incident management strategies include the following:

- Motorist assistance patrols
- Strategies to improve response times
- Strategies to reduce clearance times

For example, South Carolina DOT currently operates motorist assistance patrols that serve those traveling on I-77 between Mt. Holly Road (Exit 73) and Carowinds Boulevard (Exit 90), which is the last exit before entering North Carolina. SCDOT incident responders assist with traffic control and incident management, provide first aid until emergency services arrive, and assist in minor vehicle repairs (gas, flat tire, etc.).

Intelligent Transportation Systems (ITS) strategies use information technology to improve the functionality of the transportation system. ITS strategies integrate a variety of electronic technologies and advanced communication systems into transportation infrastructure to improve safety and mobility across a transportation network. ITS strategies include the following:

- Dynamic messaging signs
- Ramp metering
- Real time traveler information and rerouting systems
- Electronic commercial vehicle clearance and tolls

Currently SCDOT operates 32 traffic cameras along I-77 between Firetower Road and the North Carolina State line. Each camera can be accessed via the internet, which provides real time visual traffic information. Essentially, the information from the cameras is transmitted to SCDOT who will then update the dynamic message signs to alert drivers to the latest operating conditions on the interstate.

4.2.2. Travel Demand Management Strategies

Travel Demand Management (TDM) strategies aim to reduce travel demand by lessening the need for travel, increasing vehicle occupancy, increasing the use of alternative transportation modes, or shifting the timing of trips to periods outside of peak travel times. TDM strategies can improve system performance by reducing and / or re-distributing the demand for single occupancy vehicle (SOV) travel and can work towards alleviating congestion without adding lane capacity or constructing new facilities. TDM strategies are typically targeted to influence peak travel times by reducing either the number of total work trips or the number of SOV work trips taken during the most congested travel periods. Thus, TDM strategies can increase the efficiency of the transportation system by promoting alternative travel modes, such as ridesharing, vanpooling, transit, bicycling, and walking. FHWA also provides guidance on active demand management (ADM) strategies that fall under the umbrella of TDM approaches to mitigating congestion. ADM strategies are often similar to traditional TDM strategies in that they are intended to redistribute travel to more efficiently use the existing transportation network, but

they differ in that they also integrate information and new technology to manage demand. Examples of TDM strategies are described further below.

Increasing rideshare can be accomplished through strategies that encourage carpooling and vanpooling. Typically, ridesharing has minimal costs because it makes use of empty vehicle seats, and it is most suitable for employment oriented trips. Strategies to increase ridesharing include the following:

- Initiating and managing a Rideshare Program; consideration should also be given to dynamic ridesharing programs which uses smart phones and real-time data to provide a service that customers can use to arrange short-notice, on-demand shared rides.
- Constructing park-and-ride facilities in suburban areas
- Connecting public transportation routes to park-and-ride facilities
- Constructing High Occupancy Vehicle (HOV) lanes (also listed under Section 4.2.3), including dynamic HOV lanes that have qualifications that change based on real-time or anticipated travel conditions. For example, the hours of operation of as HOV lane or the number of occupants that must be in a car in a HOV lane can change in response to anticipated travel characteristics.

Alternative work time strategies try to reduce the number of commuters traveling at peak morning and afternoon periods. Developing strong, cooperative relationships with local businesses and employers is necessary to the process of identifying and implementing these approaches. Alternative work time strategies include the following:

- Allowing flexible in-office work hours
- Promoting telecommuting
- Constructing satellite offices
- Employee education programs about TDM practices

Alternative commute mode strategies encourage the use of public transportation or active modes, such as bicycling or walking to complete trips to places of employment or school. These strategies address congestion by increasing the attractiveness of travel modes other than the automobile for commuting to and from necessary destinations. Safe routes to school strategies are also included as alternative commute mode efforts as many students choose to walk or bike to school if the option is available. With presence of several secondary education institutions in the RFATS region, improvements to public transit can also be effective in capturing rides from college students. Specific strategies include the following:

- Constructing and/or enhancing bicycle paths or lanes, especially near transit stops and major employment areas
- Installing bicycle infrastructure such as storage racks at transit stops as well as near major employers

- Constructing and/or enhancing sidewalks, especially near transit stops and major employment areas
- Installing pedestrian signals, especially near transit stops
- Encouraging employers to support employees' use of these modes with incentives and amenities
- Implementing dynamic fare pricing on transit routes along congested corridors so that fares may be reduced as congestion increases, encouraging a switch from vehicular travel to transit
- Incorporating on-demand transit services with flexible routes and schedules

These strategies may be applied at the facility or corridor level. In addition to physical improvements, these strategies may also include policy measures, such as enacting a requirement that new or reconstructed roads include sidewalks. The RFATS Bicycle & Pedestrian Connectivity Plan (2016) contains a variety of recommendations for infrastructure and policy projects that would increase both safety and accessibility for all opting to utilize active modes.

Land use management strategies directly impact how the transportation system operates as well as influence how commuters select their travel mode. Typically, SOV travel is used when densities are low, land uses are separated, and transit services, bicycle facilities and pedestrian accommodations are limited. Integrating land use and transportation planning is essential to effectively managing growth and mitigating congestion by improving accessibility across the network. By coordinating land use planning and decisions with transportation planning, accessibility throughout the region is improved as residents can travel to places of interest using more than one option. As accessibility increases, residents of the RFATS region have more opportunities to choose alternative modes of transportation, thus reducing congestion on the road network.

While land use management strategies occur at the municipal and county level (independent of the MPO planning process), it is nonetheless important to emphasize that it is at this point where land use and transportation planning goals and efforts are best integrated at the front end of the decision-making process. With this in mind, it is recommended that in cooperation with the Long Range Transportation Plan and this CMP, that all jurisdictional members consider the following decision points as central to successful implementation of effective land use management strategies:

- Zoning codes and the development review process
- Future land use designations
- Urban design techniques that integrate land use planning, site planning, and landscaping with the transportation system

4.2.3. Physical Roadway Capacity Strategies

FHWA guidance on the congestion management process states that operations and demand management programs have been thoroughly considered and reviewed prior to the implementation of projects that are proposed to add general purpose lane capacity to a given corridor. Thus, if O&M and TDM strategies do not adequately mitigate congestion, then physical roadway capacity strategies should be carefully reviewed. Increasing roadway capacity is a common strategy for addressing recurring delay and congestion. Additional roadway capacity may be needed along congested corridors for several reasons including bottleneck removal, safety improvements, and economic development. However, increased roadway capacity is typically ineffective in addressing non-recurring congestion. Physical roadway capacity strategies include constructing the following improvements to mitigate congestion:

- Intersection turn lanes
- Roundabout intersections
- Acceleration / deceleration lanes
- Hill-climbing lanes
- Grade-separated railroad crossings
- Grade-separated intersections
- New or converted HOV lanes
- New SOV travel lanes (widening)
- New location roadways



Roundabout @ Constitution Blvd

4.3. Operational and Policy Matrices

Each congested facility on the RFATS CMP network should be evaluated to identify the types of congestion that it is currently impacted by and the strategies that have the potential for mitigating the specific types of congestion. To assist in identifying appropriate strategies, operational and policy matrices have been developed. **Table 4-1** through **Table 4-3** are matrices that show how O&M, TDM, and physical roadway capacity strategies can assist in mitigating different types of recurring and non-recurring congestion.

As shown below, the O&M, TDM, and physical roadway capacity strategies are rated based on their effectiveness in reducing specific congestion types. If a cell on one of the tables is empty, that means the particular strategy it is under is not appropriate for that type of congestion. As an example, freeway corridor congestion is listed as one of the types of congestion in **Table 4-1** and the strategy of implementing a new traffic signal has an empty cell for freeway related congestion because it would not be effective at mitigating congestion on freeway corridors. However, improved signage and ramp metering are two examples of O&M strategies that may

work towards mitigating freeway corridor congestion and they are both considered high in effectiveness.

While the types of congestion listed in the matrices below do not encompass the full universe of possible congestion types, they are representative of the types of congestion that commonly impact the transportation network in the RFATS region. Further detailed in Section 5, each congested corridor or priority intersection must be evaluated to determine the type of congestion impacting the facility before an appropriate strategy is selected.

Table 4-1: Operations and Management Strategies Matrix

	Key												
	Adaptive Traffic Signals	Traffic Signal Improvements	New Traffic Signal	Roadway Geometric Improvements	Ramp Metering	Improved Signage	Reversible Lanes	Turn Restrictions	Time of Day Restrictions / Lane Restrictions	Speed Reductions	Upgraded Traveler Information System	Access Management	Incident Detection and Management
Commuter Peak Period Congestion	Effective	Effective	Effective	Moderately Effective	Effective	Moderately Effective	Effective	Moderately Effective	Effective	Ineffective	Effective	Effective	Moderately Effective
Signalized Intersection Congestion	Effective	Effective	Ineffective	Moderately Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Ineffective	Ineffective	Moderately Effective	Ineffective
Unsignalized Intersection Congestion	Ineffective	Ineffective	Effective	Ineffective	Ineffective	Effective	Ineffective	Effective	Ineffective	Ineffective	Ineffective	Moderately Effective	Ineffective
Freeway Corridor Congestion	Ineffective	Ineffective	Ineffective	Moderately Effective	Effective	Effective	Ineffective	Ineffective	Effective	Moderately Effective	Effective	Ineffective	Effective
Non-freeway Corridor Congestion	Effective	Effective	Effective	Effective	Ineffective	Effective	Effective	Effective	Effective	Moderately Effective	Effective	Effective	Effective
School Related Congestion	Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Ineffective	Moderately Effective	Ineffective	Moderately Effective	Ineffective	Moderately Effective	Effective	Moderately Effective
Access Management Related Congestion	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Ineffective	Effective	Ineffective	Effective	Moderately Effective	Ineffective	Ineffective	Effective	Ineffective
Freight Related Congestion	Moderately Effective	Moderately Effective	Moderately Effective	Effective	Ineffective	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Ineffective	Ineffective	Ineffective	Ineffective
Incident Related Congestion	Moderately Effective	Moderately Effective	Ineffective	Effective	Ineffective	Effective	Ineffective	Effective	Effective	Effective	Effective	Effective	Effective
Special Event Related Congestion	Effective	Ineffective	Ineffective	Ineffective	Ineffective	Effective	Effective	Ineffective	Moderately Effective	Ineffective	Effective	Effective	Ineffective

Table 4-2: Travel Demand Management Strategies Matrix

	Strategies to Reduce Peak Period VMT					Policy Related Strategies		Transit Related Improvements					Bike / Ped Related Improvements	
	Rideshare Programs	Alternative Work Arrangements / Incentivized Telecommuting	Transit / Carpool Incentives	Parking Management/Fees	Guaranteed Ride Home Programs	Coordinated Transit and Land Use Policy	Increased Mixed-use and Transit-oriented Development	Exclusive Transit Lanes and Facilities	Transit Support Services (park-and-ride lots, transit centers, etc.)	Transit Service Improvements	Improved Transit Marketing / Information	Transit Fare Reductions	Improved Traffic operations for Transit	Bicycle Facilities (protected bike lanes, bike racks, etc.)
Commuter Peak Period Congestion	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Moderately Effective	Moderately Effective
Signalized Intersection Congestion	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Effective	Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective
Unsignalized Intersection Congestion	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Effective	Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective
Freeway Corridor Congestion	Effective	Effective	Effective	Effective	Effective	Moderately Effective	Moderately Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective
Non-freeway Corridor Congestion	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Effective	Moderately Effective	Moderately Effective
School Related Congestion	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Effective	Effective
Access Management Related Congestion	Ineffective	Ineffective	Ineffective	Moderately Effective	Ineffective	Effective	Effective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective
Freight Related Congestion	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective
Incident Related Congestion	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Ineffective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Effective	Effective
Special Event Related Congestion	Effective	Ineffective	Ineffective	Ineffective	Ineffective	Effective	Effective	Effective	Moderately Effective	Effective	Effective	Effective	Moderately Effective	Moderately Effective

Key

- Effective Strategy
- Moderately Effective Strategy
- Ineffective Strategy

Table 4-3: Physical Roadway Capacity Strategies Matrix

Key										
	Additional Through Lane Capacity	Additional Turn Lanes	Roundabout	Acceleration / Deceleration Lanes	Hill-climbing Lanes	Grade-separated Intersections	Grade-separated Rail Crossings	Rail Crossing Closures	New or Converted HOV Lanes	
Commuter Peak Period Congestion	Moderately Effective Strategy	Moderately Effective Strategy	Moderately Effective Strategy	Moderately Effective Strategy		Moderately Effective Strategy	Moderately Effective Strategy	Moderately Effective Strategy	Effective Strategy	
Signalized Intersection Congestion		Effective Strategy				Effective Strategy	Effective Strategy	Effective Strategy		
Unsignalized Intersection Congestion		Effective Strategy	Moderately Effective Strategy			Moderately Effective Strategy	Effective Strategy	Effective Strategy		
Freeway Corridor Congestion	Moderately Effective Strategy			Moderately Effective Strategy					Effective Strategy	
Non-freeway Corridor Congestion	Moderately Effective Strategy	Moderately Effective Strategy				Effective Strategy	Effective Strategy	Effective Strategy		
School Related Congestion										
Access Management Related Congestion		Effective Strategy								
Freight Related Congestion				Moderately Effective Strategy	Effective Strategy		Effective Strategy	Effective Strategy		
Incident Related Congestion										
Special Event Related Congestion										

4.4. Congestion Management Strategies Summary

The congestion mitigation strategies identified in the matrices above provide effective ways to mitigate different types of congestion. The matrices were used to identify viable 2019 CMP projects, which are presented in Section 5. The operation and policy matrices should also be used during the development of the RFATS LRTP and any other transportation planning study completed in the region. While all congestion mitigation strategies identified in the operation and policy matrices may not be appropriate to implement today in the RFATS region, it is important to note that as the region continues to grow, new and expanded strategies will need to be considered for implementation.

5. IMPLEMENTATION PROCESS

This section identifies specific congestion management strategies recommended for implementation in the RFATS region. Improvements are categorized based on their implementation timeframe: short-term (1 to 5 years); medium-term (6 to 10 years); or long term (more than 10 years). As a point of reference, the principal source of input for these recommendations include the RFATS Technical Committee, traffic count data and accident data from SCDOT, operational and capacity data from the Metrolina Regional Travel Demand Model as well as data collected from recently completed travel time surveys. From this information, an updated congestion monitoring network has been identified along 24 priority corridors. Additionally, project specific and policy recommendations have been developed to focus implementation activities on those points in the transportation network and planning process that warrant sustained attention.

Consistent with federal guidance on congestion management strategies and best practices, the recommended actions are specific, measurable, realistic, and time-bound. By structuring the project / policy recommendations in this way, it is expected that the timing and coordination of project implementation can be synchronized (as is practicable), to maximize the intended benefits from each recommended action.

Before recommending improvement projects as part of this process, the current RFATS Transportation Improvement Program (TIP) and 2045 LRTP documents were reviewed to determine those projects that are already underway or recommended for implementation. Both of these documents and the list of recommended projects they include can be found in **Appendix A: RFATS 2045 LRTP Appendix B: RFATS FY 2017 – 2022 TIP**. It was also a necessary step in the process to identify the different types of congestion that are currently impacting the congestion monitoring network (24 corridors) detailed in **Section 2, Table 2-3** and shown in **Figure 2-3**. In order to select the most appropriate strategy for each congested corridor, **Table 5-1** below details the type of congestion relevant to that corridor.

Table 5-1: Congestion Types along each Congested Corridor

Congested Corridor	Commuter Peak Period Congestion	Signalized Intersection Congestion	Unsignalized Intersection Congestion	Freeway Corridor Congestion	Non-freeway Corridor Congestion	School Related Congestion	Access Management Related Congestion	Freight Related Congestion
I-77 (north of US 21)	✓			✓				✓
I-77 (south of US 21)	✓			✓				✓
SC 161 (Old York Road/Celanese Road)	✓	✓			✓	✓	✓	
SC 161 (Celanese Road)	✓	✓			✓	✓	✓	✓
Carowinds Boulevard	✓	✓			✓		✓	✓
US 21 (north of SC 161)	✓	✓	✓		✓	✓	✓	✓
US 21 (south of SC 161)/SC 5	✓	✓	✓		✓	✓	✓	✓
SC 160 (York County)	✓	✓	✓		✓	✓	✓	
SC 160 (Lancaster County)	✓	✓	✓		✓		✓	
Dave Lyle Boulevard		✓	✓		✓	✓	✓	✓
SC 72/Albright Road			✓		✓	✓	✓	
Fort Mill Bypass (south of SC 160)	✓	✓	✓		✓	✓	✓	
Fort Mill Bypass (north of SC 160)	✓	✓	✓		✓	✓	✓	
Doby's Bridge Road (York County)	✓				✓	✓		
Doby's Bridge Road (Lancaster County)	✓	✓			✓	✓		
US 521	✓	✓			✓	✓	✓	✓
SC 460	✓	✓	✓		✓			
Cel-River Road/Red River Road	✓	✓			✓			
SC 51	✓	✓			✓			
SC 901 (Heckle Boulevard)	✓	✓			✓	✓		
Cherry Road	✓	✓	✓		✓	✓	✓	
SC 274 (Hands Mill Highway)		✓	✓		✓		✓	
Sutton Road	✓	✓			✓		✓	
SC 49 (Charlotte Highway)	✓	✓	✓		✓	✓	✓	

5.1. Operations and Management Improvements

Due to the importance of preserving the existing transportation system, Operational and Maintenance (O&M) strategies are the preferred method to manage congestion. O&M strategies are typically low cost, require minimal right-of-way, and can be implemented more quickly than other congestion management strategies.

Improvements recommended in this section are primarily focused on improving congestion through efficient transportation system management and operation. These recommendations are principally focused on three categories: intersection improvements and signal operations, safety audits, and access management.

5.1.1. Intersection Improvements and Signal Operations

The recommended projects in this subsection are intended to improve the efficiency of the existing road network without adding additional capacity. Before identifying possible projects across the RFATS network, projects recommended by previously completed documents were reviewed to determine what efforts are already being undertaken. The projects listed below in **Table 5-2** represent the projects along the identified congested corridors that are included in various transportation planning projects for the RFATS area, such as the 2045 LRTP. The projects listed below in **Table 5-3**, are new projects being recommended for implementations and were gathered using input from the RFATS Technical Team.

Table 5-2: Intersection Improvements and Signal Operations

Project Description
Traffic signal priority for express bus services on Dave Lyle Boulevard.
Review and update signal operations and timings at signals on SC 72 not addressed in the 2008 CMAQ Signal Timing Study
On SC 72/SC 5 realign Paddock Parkway to the east to develop a 4-way intersection with Lesslie Highway.
On SC 72/SC 5/US 21 reconstruct NB and SB separated legs of SC 121 into a single T intersection.
On SC 72 realign Oakdale road to Forest Road, as identified in South Pointe traffic study.
Intersection improvements at SC 49 and SC 274
Intersection improvements at Fort Mill Bypass and Sutton Road
Intersection improvements at SC 901 (Heckle Blvd) and Flint Hill Street
Intersection improvements at Celanese Road and US 21 (Cherry Road)
Intersection improvements at US 21 and Cannon Drive
Intersection improvements at US 21 and Benson Road
Intersection improvements at US 21 and Catawba Baptist Church entrance
Intersection improvements at US 21 and Springdale Road
Intersection realignment at US 21 (Anderson Road) and Cowan Farm
Interchange reconfiguration at SC 160 and I-77
Intersection improvements at US 521 and Marvin Road
Intersection improvements at SC 161 (Celanese Road) and India Hook Road
Adaptive traffic signals along Carowinds Blvd (already underway)
Adaptive traffic signals on SC 160 from the NC State Line to Pleasant Road as well as east of US 21 (already underway)

Table 5-3: Intersection Improvements and Signal Operations

Project Description	Timeframe
Intersection improvement analysis at Cherry Road and Mt. Gallant Road	Short
Intersection improvement analysis at US 21 and Sutton Road and Spratt Street	Short
Intersection improvement analysis at Marvin Road and Henry Harris Road	Short
Intersection improvement analysis at Mt. Gallant Road and Celanese Road	Short
Intersection improvement analysis at SC 160 and Pleasant Road and Sutton Road	Short
Intersection improvement analysis at SC 161 and Heckle Blvd	Short
Intersection improvement analysis at SC 160 and Dave Gibson Blvd	Short
Consideration of adaptive traffic signals along Cherry Road	Short
Consideration of adaptive traffic signals along Celanese Road	Short
Consideration of adaptive traffic signals along US 521	Short
Consideration of adaptive traffic signals along Dave Lyle Blvd	Short
Consideration of adaptive traffic signals along SC 460 (Gold Hill Road)	Short
Consideration of adaptive traffic signals along Albright Road	Short
Consideration of adaptive traffic signals along SC 160 West	Short
Consideration of adaptive traffic signals along SC 160 East	Short
Consideration of adaptive traffic signals along SC 49 (Charlotte Highway)	Short
Consideration of adaptive traffic signals along Fort Mill Bypass	Short

5.1.2. Conducting Safety Audits

Road Safety Audits (RSAs) entail field evaluations of locations with known or suspected safety issues. The intent of these audits is to identify the areas in the RFATS region with potential safety issues and to determine appropriate remedial measures to help reduce accident frequency and/or severity in the future. A typical audit involves several steps, such as:

- Obtain traffic and crash history data.
- Summarize data and develop crash diagrams
- Conduct a field review (attended by the consultant, regional state engineers, safety engineers from the state office, and local officials)
- Conduct a crash analysis to determine whether the location's crash rate exceeds the statewide average or critical crash rate (if it exceeds the critical crash rate, it can be concluded that there are causative factors that are correctable)
- Develop a set of recommendations to mitigate identified problems
- Estimate the cost of implementing the recommendations (potential recommendations may be evaluated and selected based on FHWA's Highway Safety Manual criteria, which assists in quantifying expected benefits)

Safety audits may be conducted by RFATS staff, consultants, or SCDOT's State Traffic Safety Engineer's office. The safety audits recommended as part of this process consist of intersection locations identified in **Section 3.6** and, more specifically, listed in **Table 3-8** and shown in **Figure 3-9**. These intersections, identified using crash data provided by SCDOT and input from

the RFATS technical team, represent the locations in the region where potential safety issues may arise and could be appropriate candidates for safety improvements. The intersection locations recommended for safety audits are:

- Celanese Road and Mt. Gallant Road
- Anderson Road and Mt. Gallant Road
- US 21 and Sutton Road / Spratt Street
- Ebenezer Road and Herlong Avenue
- Heckle Boulevard and Herlong Avenue
- SC 160 and Pleasant Road / Sutton Road
- SC 460 (Gold Hill Road) and Pleasant Road
- US 521 and Waxhaw Highway

5.1.3. Access Management Policies

As detailed in previous sections, a lack of effective access management policies implemented at the local level can greatly impact congestion levels across a region's entire roadway network, specifically along key corridors. As the region continues to grow at a rapid pace, it is important to consider improving access management strategies in key development areas. While specific access management policies will need to be implemented by the local jurisdictions within the RFATS region, RFATS must still play a role in working towards the implementation of effective access management strategies and coordinating the policy improvements implemented by each jurisdiction so that one locality does not appear to be more lenient than another. The primary access management policy recommendation resulting from this process is the incorporation of effective access management strategies into the planning, design, and approval processes for development and redevelopment in the jurisdictions across the region.

Supplemental to incorporating improved access management policies at the local level, specific consideration should be given to key growth areas and the congested corridors identified in this document. More specifically, it is recommended that access management reviews be conducted along the corridors listed below, a majority of



US 21

which have been identified as congested corridors, to identify additional opportunities to improve access management.

- US 21
- SC 460 (Gold Hill Road)
- Carowinds Boulevard
- SC 160
- Fort Mill Bypass
- Springfield Parkway
- Harrisburg Road
- US 521
- Celanese Road
- Cherry Road
- Heckle Boulevard
- Dave Lyle Boulevard
- Albright Road
- SC 49

5.2. Travel Demand Management Strategies

Travel Demand Management (TDM) strategies aim to reduce the need for travel, increase vehicle occupancy, increase use of alternative modes, or shift the timing of trips to periods outside of peak travel times. TDM strategies can improve system performance by reducing and / or re-distributing the demand for single occupancy vehicle (SOV) travel. These measures can also target peak travel times in order to reduce the number of SOV work trips taken during the most congested travel periods. Lastly, TDM strategies can increase the efficiency of the transportation system by promoting alternative travel modes, such as ridesharing, vanpooling, transit, bicycling, and walking.

The Travel Demand Management Strategies Matrix in **Section 4** includes 15 individual strategies, and it is suggested that initial efforts be focused on the following areas:

- Expanding rideshare programs;
- Encouraging large employers in the region to implement alternative work arrangements for its employees;
- Identifying areas compatible with Transit Oriented Development and Mixed-Use Development; and
- Improving transit throughout the region

5.2.1. Rideshare Initiatives

As discussed in **Section 4**, ridesharing efforts typically include vanpool or carpool services that are provided, coordinated, and promoted by a central organization. Currently, CATS serves as the organizer of the existing rideshare initiatives in the RFATS region. Over the next year,

greater coordination between CATS, local jurisdictions, and businesses is recommended to identify commute corridors along which successful ridesharing routes can be established.

Due to their success in other urbanized areas, the following initiatives to improve rideshare participation in the RFATS region should be considered:

- **Employer-Sponsored Carpools:** These programs provide incentives, such as cash payments, pre-tax transportation benefits, and preferential parking to employees who commute using alternative forms of transportation
- **Guaranteed Ride Home:** These programs reimburse vanpool or carpool participants when an emergency prevents them from using their carpool or vanpool to return home
- **Reduced parking minimums or increased parking costs in downtown areas:** This can encourage commuters to join rideshare programs
- **Park and Ride facilities:** These allow carpool and vanpool participants to meet at a central location. These facilities can also serve as potential transit stop locations in the future

Rideshare Implementation - Implementing and expanding rideshare initiatives can take several years, and it is recommended that CATS, local jurisdictions, and local businesses discuss the tasks necessary for success in the RFATS region. Each of these stakeholder groups can play a role in developing an effective program. Businesses leaders, for example, can tap into existing relationships and lines of communication with employees to promote existing ridesharing initiatives and gauge interest in future programs. These employers can also use commute match apps and programs to determine which employees live in the same areas; for regional programs, a broader match system can be put into place.

Rideshare Benefits - Commuters who participate in ridesharing initiatives decrease their weekly transportation costs and reduce wear and tear on personal vehicles. Employers also benefit from promoting ridesharing among employees, as they may be able to downsize workplace parking. If successful rideshare programs are developed and the number of SOVs on commuter routes is reduced, roadways in the RFATS region will become more efficient and travel times will be reduced for all travelers.

Rideshare Funding Sources - Specific highway funding programs, such as the Surface Transportation Block Grant Program (STBGP), National Highway System (NHS), and Congestion Mitigation and Air Quality (CMAQ) Improvement Program, fund ridesharing efforts as long as they meet the program's stated goals. Federal Transit Administration (FTA) funding, such as the Urbanized Area Formula Program Grant under section 5307 and the Formula Grants for Rural Areas under section 5311, support carpool and vanpool programs.⁶ County and city

⁶ Federal Highway Administration

funding sources and private businesses can also provide the capital necessary to develop and operate rideshare programs.

5.2.2. Alternative Work Arrangements

Over the next year, large employers in the area should be encouraged to reevaluate their existing work schedules and telecommuting policies. As discussed in **Section 4**, the purpose of alternative work arrangements is to adjust when employees arrive to and leave from work – as well as whether they work in a physical office at all. Rather than affecting *how* employees get to work, this type of TDM strategy focuses on alleviating congestion by allowing employees to commute to work outside peak period hours or to avoid commuting altogether. Alternative work arrangements can include the following:

- **Optional compressed work weeks** that allow employees to work 10 hour days four days a week, thus eliminating one day of travel to work
- **Flexible work schedules** that allow employees to arrive at work before 7:00 a.m. or after 9:30 a.m.
- **Telecommuting technologies** that allow employees to work from home one or more days a week

Implementation - Numerous employers in the RFATS region currently support flexible work schedules. An online survey could be developed to get an understanding of how these businesses are using flexible work schedules and to identify where improvements could be made. The appropriate departments within the local jurisdictions may be able to distribute the online survey and provide a forum in which to educate member businesses on the benefits of alternative work arrangements.

Benefits - Alternative work arrangements provide numerous benefits to the employer, employee, and the community. The following provides a summary of these benefits:⁷

- **Employer Benefits:** Enhanced retention and recruitment, extended hours of service for clients and customers, increased employee morale and performance, and reduced overhead costs
- **Employee Benefits:** Improved quality of life, reduced transportation costs and vehicle wear and tear
- **Community Benefits:** Less congestion on roadways during peak times and improved air quality

⁷ The Clean Air Campaign

Funding Sources - Alternative work arrangements are not possible or ideal for all businesses, however, most employers can implement some alternative work arrangements at minimal costs and do not need direct funding from outside sources.

RFATS staff could use a small portion of the annual MPO Planning funds to develop, circulate, and analyze an online survey to determine whether encouraging flexible work hours in the region could mitigate corridor congestion.

5.2.3. Land Use Management

As noted in **Section 4**, land use patterns directly influence how commuters select travel modes, which in turn affects how the greater transportation system operates. Because both land use and transportation planning decisions are made by the local jurisdictions in the RFATS region, integrating and coordinating their Comprehensive Land Use Plans and the RFATS Long Range Transportation Plan is integral to mitigating congestion.

Land Use Management Implementation - During the next Comprehensive Land Use Plan update for each of the jurisdictions in the RFATS region, areas that would support Transit Oriented Development and Mixed-Use Development should be identified, evaluated, and included in the adopted plan. Effort should also be given to coordinating the land use policies in the City of Rock Hill with their recent improvements to the public transit system, in an attempt to make usage of the new service more attractive.

Land Use Management Benefits - The benefits of Transit Oriented Development and Mixed-Use Development must be communicated to elected officials, local citizens, and private developers. Through the connection of land use and transportation planning and the implementation of effective TOD and Mixed-Use Development, areas can be created in the RFATS region that provide residents the ability to live, work, and play without regularly using an automobile. This connection of transportation and land use planning will reduce the use of SOVs and ultimately improve quality of life while reducing corridor congestion, as other modes (walking, biking, and transit) can be used more easily and frequently.

Funding Sources for Land Use Management - The cost of encouraging Transit Oriented Development and Mixed-Use Development is minimal to RFATS, and direct funding is not needed to endorse these land use management strategies.

5.2.4. Transit Improvements

In 2007, the Rock Hill-York County-Charlotte Rapid Transit Study analyzed existing transportation and land use conditions and recommended rapid transit service connections between Rock Hill-York County and the greater Charlotte region. More specifically, the study recommended implementing a Bus Rapid Transit (BRT) service along the US 21 corridor to connect to CATS' southern light rail line at I-485. This project was recommended to be implemented over four phases, which stretch from the short-term planning horizon of 2011-2012 to the long-term planning horizon of 2030 and beyond. To ensure the BRT service would have adequate ridership, the study also recommended an extensive feeder network of local and express buses to and from Fort Mill, Tega Cay, Pineville, Lancaster, and Chester. Implementing BRT

service along the US 21 corridor and developing a feeder system from local communities will help mitigate congestion in the RFATS area.

With the recent implementation of the fixed-route transit system by the City of Rock Hill, it is recommended that ridership data from the new service is analyzed as it becomes available to determine possible improvements that can be made.

5.2.5. TDM Projects and Policies

The strategies discussed above are all characterized as having both relatively low implementation costs and high levels of effectiveness in addressing commuter peak period congestion and other recurring congestion problems. Recommended TDM projects and policies for the CMP Update are listed in **Table 5-4**.

Table 5-4: Recommended Travel Demand Management Projects and Policies

Project Description	Timeframe
Continue planning for the BRT line on Cherry Road from downtown Rock Hill to the I-485 light rail station	Short
Continue planning for the BRT line on US 21 BYP from downtown Rock Hill to the I-485 light rail station	Short
If they have not done so already municipalities and other governmental agencies should adopt consistent access management standards that, at a minimum, meet the requirements of the latest SCDOT Access and Roadside Management Standards (ARMS), and subsequent updates.	Short
It is recommended that RFATS planning staff continue to work with their existing partners in the Rideshare Program, including Charlotte Area Transit System and SCDOT to improve the effectiveness of the existing program and park-and-ride facilities and to seek opportunities to expand the existing program.	Short
Alternative Work Arrangements: If not already in place, the formation of a Task Force should be considered to guide efforts to implement alternative work time strategies, consisting of representatives of local government, the Chamber of Commerce, major public and private employers in the area, and other business organizations.	Short
Given the recent desire for improved transit service in the RFATS region, it is recommended that during the next Comprehensive Land Use Plan update completed by any of jurisdictions within the RFATS region, areas that would support Transit Oriented Development and Mixed Use Development should be identified, evaluated, and included in the adopted plan.	Short

5.2.6. Bicycle / Pedestrian Facility Improvements

While the addition or improvement of existing bicycle and pedestrian facilities is unlikely to have a significant impact on peak period congestion, this strategy should still be considered in priority areas identified within the RFATS region. Bicycle and pedestrian related improvements have the ability to greatly impact both school and incident related congestion as well as enhance the attractiveness of transit usage. Given the recent implementation of a new transit service in the City of Rock Hill, bicycle and pedestrian related improvements that improve access to the new service will likely have a positive effect on transit ridership. Bicycle and pedestrian related improvements are also often lower in cost when compared to other roadway improvements and can be even more cost efficient if



implemented in conjunction with other planned roadway improvements such as resurfacing projects. The recommended bicycle and pedestrian improvement projects detailed in **Table 5-5** below were gathered from the RFATS Bicycle & Pedestrian Connectivity Plan completed in 2016 and reflect those corridors identified in Table 2-3.

Table 5-5: Recommended Bicycle and Pedestrian Related Improvements

Project Description
Shared-use path on US 21 from Sutton Road to Springfield Parkway
Shared-use path and sidewalk on Dave Lyle Boulevard from Gateway Boulevard to Apex Drive
Shared-use path on SC 160 (Fort Mill Hwy) from Southern Fort Mill Bypass to US 521
Shared-use path on US 521 from Potts Lane to Van Wyck Road
Intersection and crossing improvements at Cherry Road and Finley Road
Intersection and crossing improvements at Dave Lyle Boulevard and Mt. Gallant Road
Intersection and crossing improvements at Cherry Road and Deas Street
Intersection and crossing improvements at Dave Lyle Boulevard and Hampton Street
Bike lane and shared-use path on SC 160 from Dobys Bridge Road to US 21
Shared-use path on SC 49 (Charlotte Hwy) from Pole Branch Road to Buster Boyd Bridge
Shared-use path on Carowinds Boulevard from Pleasant Road to Regent Parkway
Bike lane and Sidewalk on Cel-river Road/Red River Road from Dave Lyle Boulevard to Paragon Way
Shared-use path on SC 274 (Hands Mill Hwy) from SC 557 to Mt. Gallant Road
Intersection and crossing improvements at Dobys Bridge Road at the entrance of Dobys Bridge Elementary School
Intersection and crossing improvements at Dobys Bridge Road and Southern Fort Mill Bypass
Intersection and crossing improvements at SC 901 (Heckle Blvd) and SC 5/W Main Street
Intersection and crossing improvements at Dobys Bridge Road and US 521
Shared-use path on SC 160 from Gold Hill Road to Stonecrest Boulevard
Shared-use path on Gold Hill Road from SC 160 to Pleasant Road
Shared-use path on US 21 from Regent Parkway to Springfield Parkway
Shared-use path on SC 160 from Pleasant Road to US 21
Shared-use path on Gold Hill Road from Pleasant Road to US 21
Shared-use path on Southern Fort Mill Bypass to Holbrook Road
Bike lane and sidewalk on Dobys Bridge Road from Southern Fort Mill Bypass to US 521
Intersection and crossing improvements at SC 160 and Carolina Place Dr (at Baxter Village)
Intersection and crossing improvements at Carowinds Boulevard and Pleasant Road

5.3. Physical Roadway Capacity Improvements

The final type of projects recommended as part of this process involve the addition of physical roadway capacity to the existing network. As described in previous sections, projects that add physical capacity to the roadway network should be considered for implementation only after all other possible improvement strategies on a corridor have been considered. Projects involving the addition of physical capacity to the RFATS road network recommended as part of this process are detailed in **Table 5-6** below and were largely gathered from the “unfunded needs” project list included in the RFATS 2045 LRTP.

Table 5-6: Recommended Physical Roadway Capacity Improvements

Project Description
Road widening on US 21 from SC 160 to Sutton Road
Road widening on Cel-river/Red River Road from Dave Lyle Boulevard to US 21 (Anderson Road)
Road widening on Fort Mill Parkway from SC 160 to I-77
Road widening on Dobys Bridge Road from Fort Mill Bypass to US 521
Road widening on SC 49 (Charlotte Hwy) from SC 274 to SC 557
Road widening on US 521 from Jim Wilson Road to NC State line

5.4. RFATS CMP Priorities

The identification of CMP priorities represents the output of the selected performance measures listed in **Section 3** (i.e., travel time surveys, volume-to-capacity ratios, travel transit conditions), as well as related studies and technical team input. These data sources provide operational and safety information that directly correlate with the reliability and efficiency of the existing transportation network as well as highlight emerging areas of congestion.

With that in mind, the performance of the identified congested corridors in regards to the selected performance measures was used in determining the priority of recommended projects. The congested corridors identified in this process and detailed previously in **Figure 2-3**, were evaluated based on their existing levels of traffic volume, the projected level of volume to capacity along the route, the LOS of the corridor based on travel time surveys, and the safety concerns associated with the corridor. Considering this evaluation, the strategies used to mitigate specific types of congestion, and the projects identified previously in this section,

Table 5-7 was developed to prioritize projects in the RFATS region that are vital to mitigating congestion. While this list is not all-encompassing and does not necessarily mean one project is more important than another, projects were assigned a priority based on ease of implementation and the potential impact on the overall network congestion that each one could have. This list also takes into account the guidance provided by FHWA that congestion strategies other than the addition of physical roadway capacity should be considered prior to the recommendation of adding lanes to a corridor.

As shown in

Table 5-7, the recommendations with the highest priority consist of policy based improvements and strategies involving further analysis. The recommended locations for safety audits and intersection improvement analyses were identified as areas of concern for incident related congestion on the RFATS network. The corridors identified for the consideration of implementing adaptive traffic signals include congested corridors identified throughout this process. The specific signal locations, phasing, and other characteristics will need to be determined on a corridor by corridor basis at the recommended locations. Finally, the corridors recommended to receive access management reviews were identified as congested corridors that are located within areas in the RFATS region that are rapidly growing or are expected to do so. The high priority recommendations detailed in

Table 5-7 can be expected to produce the most effective results when implemented in conjunction with supplemental geometric and operational improvements.

Table 5-7: Recommended CMP Projects

Project Description													
<p>Intersection Improvement Analyses – the following intersection locations were identified by the RFATS technical team as priority locations on the network with potential issues that may cause congestion. It is recommended that these locations undergo an intersection improvement analysis to correct any congestion causing issues:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">1. Cherry Road and Mt. Gallant Road</td> <td style="width: 50%;">5. SC 160 and Pleasant/Sutton</td> </tr> <tr> <td>2. US 21 and Sutton/Spratt Street</td> <td>6. SC 161 and Heckle Blvd</td> </tr> <tr> <td>3. Marvin Road and Henry Harris Road</td> <td>7. SC 160 and Dave Gibson Blvd</td> </tr> <tr> <td>4. Mt. Gallant Road and Celanese Road</td> <td></td> </tr> </table>		1. Cherry Road and Mt. Gallant Road	5. SC 160 and Pleasant/Sutton	2. US 21 and Sutton/Spratt Street	6. SC 161 and Heckle Blvd	3. Marvin Road and Henry Harris Road	7. SC 160 and Dave Gibson Blvd	4. Mt. Gallant Road and Celanese Road					
1. Cherry Road and Mt. Gallant Road	5. SC 160 and Pleasant/Sutton												
2. US 21 and Sutton/Spratt Street	6. SC 161 and Heckle Blvd												
3. Marvin Road and Henry Harris Road	7. SC 160 and Dave Gibson Blvd												
4. Mt. Gallant Road and Celanese Road													
<p>Adaptive traffic signals should be considered along the following corridors:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">• Cherry Road</td> <td style="width: 33%;">• Albright Road</td> <td style="width: 33%;">• SC 460 (Gold Hill Road)</td> </tr> <tr> <td>• Celanese Road</td> <td>• SC 160 West</td> <td>• SC 49 (Charlotte Hwy)</td> </tr> <tr> <td>• US 521</td> <td>• SC 160 East</td> <td>• Fort Mill Bypass</td> </tr> <tr> <td>• Dave Lyle Blvd</td> <td></td> <td></td> </tr> </table>		• Cherry Road	• Albright Road	• SC 460 (Gold Hill Road)	• Celanese Road	• SC 160 West	• SC 49 (Charlotte Hwy)	• US 521	• SC 160 East	• Fort Mill Bypass	• Dave Lyle Blvd		
• Cherry Road	• Albright Road	• SC 460 (Gold Hill Road)											
• Celanese Road	• SC 160 West	• SC 49 (Charlotte Hwy)											
• US 521	• SC 160 East	• Fort Mill Bypass											
• Dave Lyle Blvd													
<p>Access Management – throughout this process, improved access management policy throughout the entire RFATS region was identified as being an important tool in alleviating the existing congestion. While many access management policies will need to be implemented at the local level by the jurisdictions within RFATS, it is recommended that these localities incorporate improved access management policies into their development approval policies. Supplemental to improved access management policies implemented at the local level, it is also recommended that access management reviews be conducted along the corridors listed below to identify any additional opportunities to improve access management in priority areas:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">• US 21</td> <td style="width: 33%;">• US 521</td> <td style="width: 33%;">• Carowinds Blvd</td> </tr> <tr> <td>• SC 460</td> <td>• Cherry Road</td> <td>• Fort Mill Bypass</td> </tr> <tr> <td>• SC 160</td> <td>• Albright Road</td> <td>• Harrisburg Road</td> </tr> <tr> <td>• SC 49</td> <td>• Celanese Road</td> <td>• Dave Lyle Blvd</td> </tr> </table>		• US 21	• US 521	• Carowinds Blvd	• SC 460	• Cherry Road	• Fort Mill Bypass	• SC 160	• Albright Road	• Harrisburg Road	• SC 49	• Celanese Road	• Dave Lyle Blvd
• US 21	• US 521	• Carowinds Blvd											
• SC 460	• Cherry Road	• Fort Mill Bypass											
• SC 160	• Albright Road	• Harrisburg Road											
• SC 49	• Celanese Road	• Dave Lyle Blvd											
<p>Safety Audits – in an effort to improve safety and alleviate incident related congestion across RFATS network it is recommended that safety audits are completed at the following locations:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">• Celanese Road and Mt. Gallant Road</td> <td style="width: 50%;">• Heckle Blvd and Herlong Avenue</td> </tr> <tr> <td>• Anderson Road and Mt. Gallant Road</td> <td>• SC 160 and Pleasant Road / Sutton Road</td> </tr> <tr> <td>• US 521 and Waxhaw Hwy</td> <td>• SC 460 (Gold Hill Road) / and Pleasant Road</td> </tr> <tr> <td>• US 21 and Sutton Road / Spratt Street</td> <td>• Ebenezer Road and Herlong Avenue</td> </tr> </table>		• Celanese Road and Mt. Gallant Road	• Heckle Blvd and Herlong Avenue	• Anderson Road and Mt. Gallant Road	• SC 160 and Pleasant Road / Sutton Road	• US 521 and Waxhaw Hwy	• SC 460 (Gold Hill Road) / and Pleasant Road	• US 21 and Sutton Road / Spratt Street	• Ebenezer Road and Herlong Avenue				
• Celanese Road and Mt. Gallant Road	• Heckle Blvd and Herlong Avenue												
• Anderson Road and Mt. Gallant Road	• SC 160 and Pleasant Road / Sutton Road												
• US 521 and Waxhaw Hwy	• SC 460 (Gold Hill Road) / and Pleasant Road												
• US 21 and Sutton Road / Spratt Street	• Ebenezer Road and Herlong Avenue												
Road widening on SC 49 (Charlotte Hwy) from SC 274 to SC 557 (from 2045 LRTP Unfunded Needs Project List)													
Road widening on US 21 from SC 160 to Sutton Road (from 2045 LRTP Unfunded Needs Project List)													
Road widening on Cel-river/Red River Road from Dave Lyle Boulevard to US 21 (Anderson Road) (from 2045 LRTP Unfunded Needs Project List)													
Road widening on Fort Mill Parkway from SC 160 to I-77 (from 2045 LRTP Unfunded Needs Project List)													
Road widening on Dobys Bridge Road from Fort Mill Parkway to US 521 (from 2045 LRTP Unfunded Needs Project List)													
Road widening on US 521 from Jim Wilson Road to NC State line (from 2045 LRTP Unfunded Needs Project List)													

6. EVALUATION AND ASSESSMENT

6.1. The Congestion Management Process

6.1.1. Metropolitan Planning Process

The congestion management process is intended to be an integral part of the metropolitan planning process, and ongoing monitoring of the implemented strategies is essential to continuously improving transportation system management and operations. This 2019 CMP update includes recommended appropriate performance measures as well as baseline data to be used in subsequent years to evaluate progress and predict future conditions on the most heavily traveled corridors in the RFATS region.

This information is also critical to the process of periodically updating the RFATS' Long Range Transportation Plan (LRTP), which is the central planning document that lists transportation system needs and priorities for the region. Continuously monitoring congestion levels and analyzing emerging patterns of congestion is a fundamental part of long term transportation decision-making.

6.2. Monitoring CMP Impacts

6.2.1. Frequency of Monitoring

As discussed in **Section 3** of this report, the principal performance measures recommended for the RFATS CMP are V/C ratios from the Metrolina Travel Demand Model (TDM), Corridor LOS and Travel Time Surveys, and Safety. Transit Travel Condition measures are also recommended for ongoing monitoring; however, given the focused nature of existing transit (i.e., one express bus route providing weekday service from the Rock Hill area to Charlotte and the newly implemented local service in Rock Hill), the importance of these measures will likely increase over time as additional transit options / routes are introduced and data on the newly implemented service is gathered.

The Metrolina model is typically updated and recalibrated in tandem with periodic updates to the RFATS LRTP. Because the RFATS region is within an air quality non-attainment area, the LRTP must be updated every four years. However, as the CMP is a continuous planning effort, it is recommended that the latest output from the model be incorporated into ongoing CMP monitoring activities. This information can be used for project identification, selection, and prioritization that occurs between LRTP updates.

6.2.2. Selection of CMP Corridors for Monitoring

The V/C ratios from the Metrolina model should be monitored for all CMP corridors that are covered by the model's highway network. Due to the cost and time required to conduct travel time surveys, it is recommended that only a portion of CMP corridors be surveyed at a given time. Corridors should be selected based on the following criteria:

- Funds available for surveys (to determine the maximum number of corridors possible)
- Level of congestion (as determined by peak period V/C ratios from the latest Metrolina Model base year)
- Number of improvement projects or programs that have recently been implemented

6.2.3. Monitoring Procedures

Metrolina Model V/C Ratios - For transportation planning purposes, the RFATS road network is modeled by the Metrolina Model, which was developed for NCDOT. This model covers the Charlotte urban area as well as surrounding areas. The model is a source of V/C ratios for the model's base year and for each of the model's future forecast years.

Monitoring of CMP corridors using Metrolina Model V/C ratios involves the following:

- GIS map of CMP corridors
- Metrolina model assignment output files
- TransCad software

Using TransCad software, the CMP corridor map is overlaid with a model network to generate output specific to each corridor. This data may then be exported to a spreadsheet application to prepare summaries by corridor.

Travel Time Surveys - Travel time surveys are commonly used in the transportation planning and traffic management process. The procedures used to collect travel time data for the 2019 CMP Update were described in **Section 3**.

Depending on RFATS staff and budget availability, travel time surveys may be undertaken by RFATS staff, RFATS consultants, or firms specializing in data collection activities such as traffic counts and travel time surveys.

Safety Data – the crash rate and frequency data used during this update process was provided by SCDOT. This data is updated on an annual basis and the identified locations in the RFATS region with potential safety concerns should be monitored with the most up to date data as it becomes available.

6.2.4 Monitoring of Implemented Strategies

It is also recommended that staff actively monitor (i.e., through an annual review) the implementation status of recommended strategies such as geometric / signal improvements, access management policies (especially in high growth areas); and transportation demand management (TDM) strategies, such as rideshare initiatives. RFATS staff should also continue coordination with SCDOT regarding the completion of road safety audits at locations with possible safety issues.

This should be a continuous reviewing process for the RFATS Study Team and would ideally be incorporated into the evaluation of recommended projects for consistency with the recommendations in this CMP update. This process of tracking and documenting implemented strategies will result in an annual CMP Progress Report.

6.2.5 Integration into the overall RFATS Planning Process

The integration of the CMP into the greater RFATS planning process began with an evaluation of the existing transportation network and system performance within the RFATS area. This was accomplished using input from the RFATS Technical Team and the selected congestion management performance measures outlined in **Section 3**.

This process identified heavily congested corridors, locations with potential safety problems, and recommended project priorities. As illustrated in **Section 5**, there are three implementation time frames: short-term (1-5 years), intermediate (6-10 years), and long-term (10+ years). As the 2019 CMP generated several recommended congestion management projects, priorities and policies, this information will be used in the development of an unfunded needs list during the next LRTP update.

As the RFATS Study Area is a designated maintenance area for ground level ozone, it should be noted that Congestion Mitigation & Air Quality Improvement Funding (CMAQ) is available for implementing CMP priority projects. Depending on emerging circumstances and trends, RFATS may evaluate the current statewide ranking criteria to assess whether modifications are necessary to meet local CMP needs. Additionally, all federally funded projects that seek to add SOV capacity will need to go through a CMP evaluation / documentation process (as outlined in **Appendix C: CMP Documentation for SOV Capacity projects**) to determine whether additional SOV capacity enhancement is appropriate. It is also recommended that non-federally funded projects for which a federal decision document may be requested (i.e., NEPA, etc.) undergo a CMP evaluation / documentation review. This will assist in avoiding disruption to the implementation of a project should federal funding be channeled to the project at a later date.

APPENDICES

APPENDIX A: RFATS 2045 LRTP

2045 Long Range Transportation Plan



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Introduction

About this Plan

This document is the 2045 Long Range Transportation Plan (LRTP) for the urbanized areas of York and Lancaster counties, South Carolina. It has been prepared by the Rock Hill - Fort Mill Area Transportation Study (RFATS), which is the agency responsible for regional transportation planning in this area. Federal law requires the preparation of this plan, and also specifies issues which the plan must consider.

The plan is multi-modal, covering highways, public transportation, freight, bicycle and pedestrian travel, as well as aviation. It includes a financial plan for transportation expenditures to 2045, as well as a congestion management process. The plan also takes social and environmental considerations into account, along with public involvement during the course of its preparation.

About RFATS

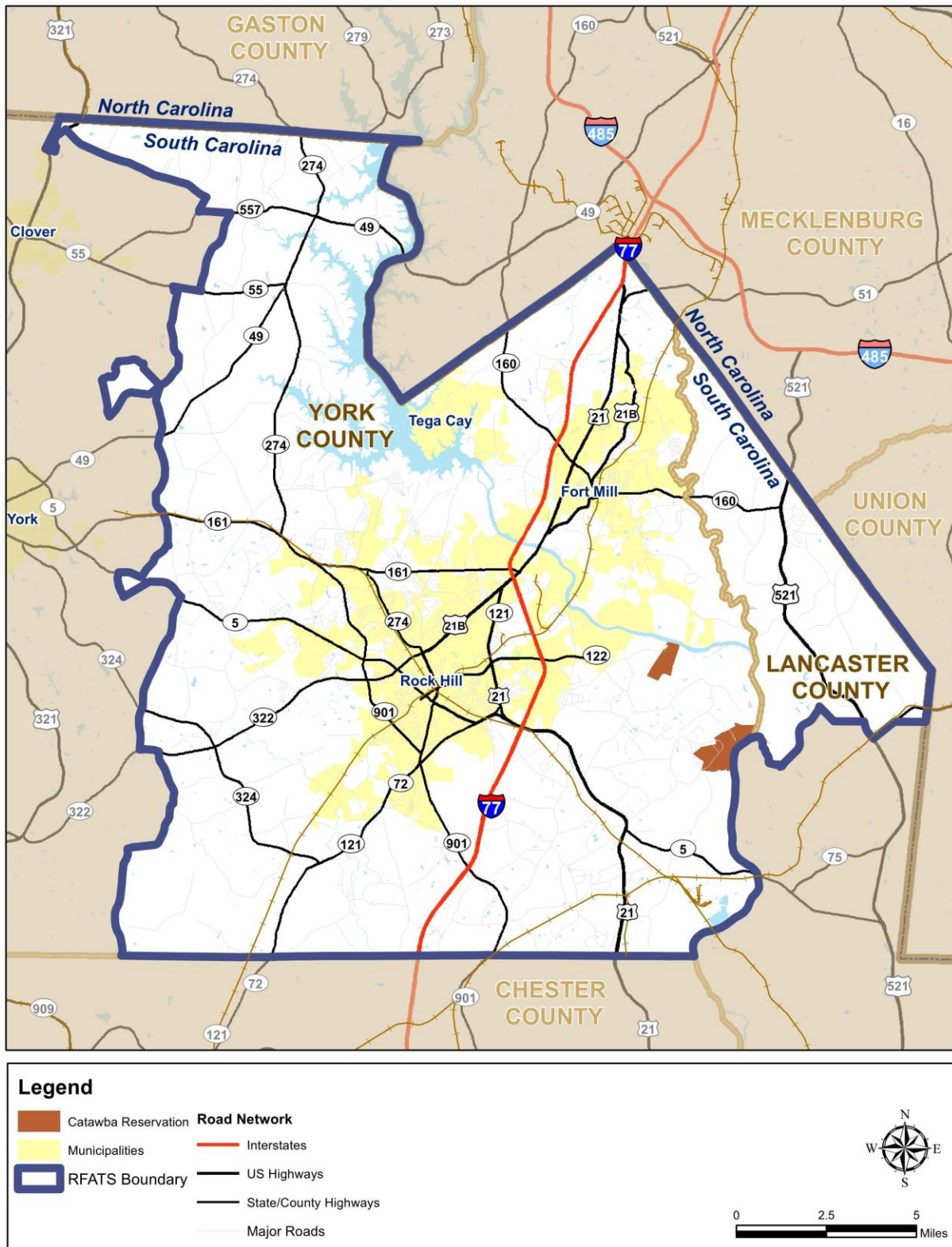
What is an MPO?

RFATS is a Metropolitan Planning Organization (MPO), one of more than 400 such agencies across the country that are responsible for regional transportation planning. In order to remain eligible for federal transportation funds, urbanized areas with a population of 50,000 or greater must maintain a formal metropolitan transportation planning process. The overall aim of these requirements is to ensure continuing, cooperative, and comprehensive transportation planning for urban areas, and MPOs are central to that process. Each MPO is responsible for short- and long-range transportation planning for its region, as well as the programming of all federal transportation funds spent within the area.

Figure 1.1 shows the boundary of the area for which RFATS is responsible. Member communities of RFATS include the cities of Rock Hill and Tega Cay, the Town of Fort Mill, the unincorporated urban areas of York and Lancaster counties, and the Catawba Indian Nation.



Figure 1.1: RFATS Planning Area



The RFATS Planning Area

As shown in **Figure 1.1**, the Interstate 77 corridor runs through the heart of the RFATS planning area. The largest city in the region, Rock Hill, is 20 miles south of Charlotte and approximately 65 miles north of Columbia. The U.S. Census Bureau estimates that Rock Hill is now the fifth-largest city in South Carolina.

Nearby, I-85 connects the area to Greenville (to the west) and Atlanta (to the southwest). A major international airport (Charlotte Douglas) and intermodal freight yard are located just north of the planning area on the western edge of Charlotte, NC. To the south, one of the east coast's major ports in Charleston can be accessed via highway links along I-77 and I-26. Freight rail facilities broadly parallel I-77 regionally and run through downtown Rock Hill. One of the state's major river systems, the Catawba, flows through the area as well.

As described above, the RFATS planning area includes the cities of Rock Hill and Tega Cay, the Town of Fort Mill, the Catawba Indian Nation, the eastern urbanized portion of York County as well as the panhandle of Lancaster County – which essentially runs from the state line along US 521 down to Hwy 75 (Waxhaw Hwy). The planning area also includes the communities of Lake Wylie, Newport, Bethel, Lesslie and Catawba.

Formal regional transportation planning in the RFATS area began in the early 1960s. At that time, the planning process principally focused only on the eastern urbanized portion of York County – which was essentially Rock Hill. Since this time, RFATS has grown in size and population – as of 2015, the planning area included a population well over 200,000. This growth has led to increasing pressure on many parts of the transportation system, and further growth is projected to continue for the duration of the LRTP through 2045 – though the next ten years are expected to be among the strongest.

RFATS Organizational Structure

The planning process is guided by the RFATS Policy Committee, comprised of 12 voting members who represent each of the region's local governments, the Catawba Indian Nation, the South Carolina Department of Transportation (SCDOT) Commission, as well as legislative representatives from the South Carolina House and Senate. The committee chair is selected annually on a rotating basis among local government members. The vice-chair also serves a one-year term and is selected by vote of the Policy Committee members.



Figure 1.2: RFATS Organizational Structure



The Technical Team includes staff from each of the municipalities, York and Lancaster counties, as well as SCDOT, the Federal Highway Administration, the Federal Transit Administration, the Catawba Regional Council of Governments, and the Catawba Indian Nation. The RFATS Administrator serves as chair of the Technical Team.

RFATS also maintains a standing Citizens Advisory Committee which reviews and provides input on the development of programs and projects within the region. Members include representatives from the six RFATS communities and at-large members who represent persons traditionally underserved by the transportation system.

The Transportation Planning Process and the LRTP

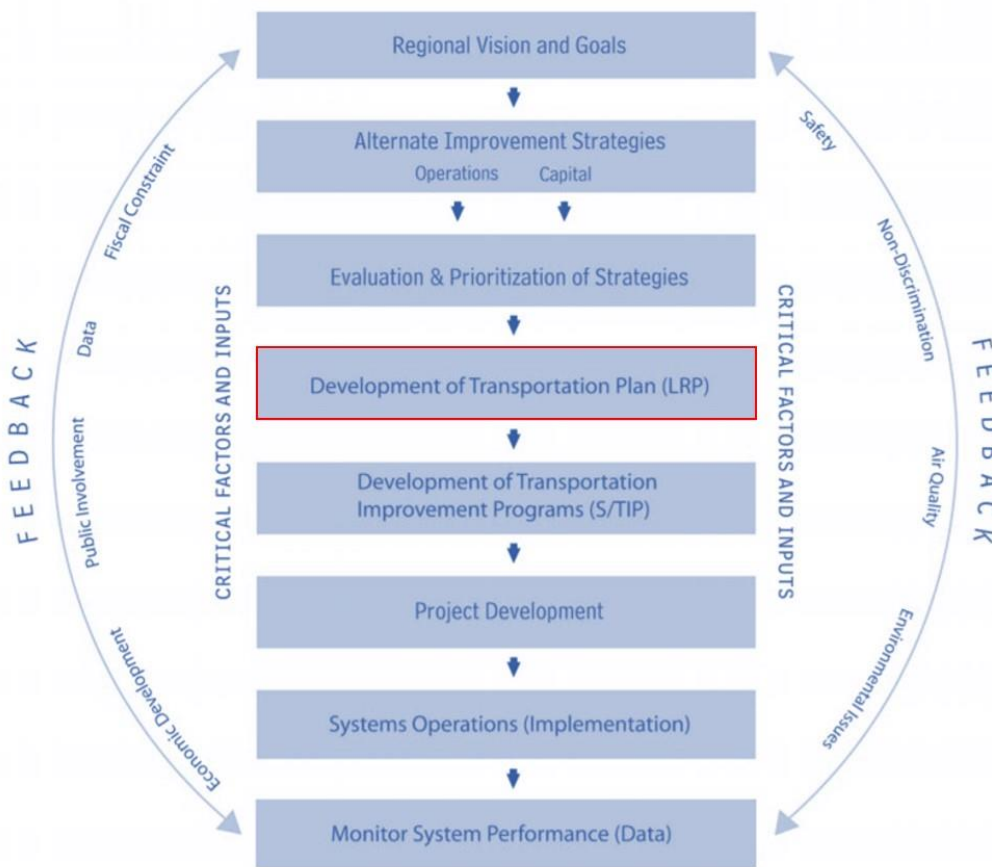
Figure 1.3 presents an overview of the major elements in the transportation planning process, including the development of the LRTP. As shown, the plan summarizes the priority “strategies” that have been identified to help meet regional transportation goals. These strategies include both capital projects and operations (such as roadway maintenance and public transit service). Once the long-range plan has been adopted, the near-term strategies receive funding for implementation by being included in the region’s Transportation Improvement Program, or TIP.

After a project has been included in the adopted TIP, the responsible agency may begin formal project development. This typically starts with confirming the purpose and need of the project, securing the necessary environmental agency approvals, and completing the design. If needed, right-of-way is then purchased and then construction begins. This process generally takes several years from planning to construction, particularly in the case of larger projects.

As the region implements strategies from the LRTP, RFATS will continue to monitor the performance of the area’s transportation system, as well as track the nature of transportation needs and demands.

The plan must be updated every four to five years. Any necessary changes in regional strategy can be made either through amending the current LRTP, or as part of the next plan update.

Figure 1.3 The Transportation Planning Process



From USDOT's *The Transportation Planning Process: Key Issues*

Public Participation Plan

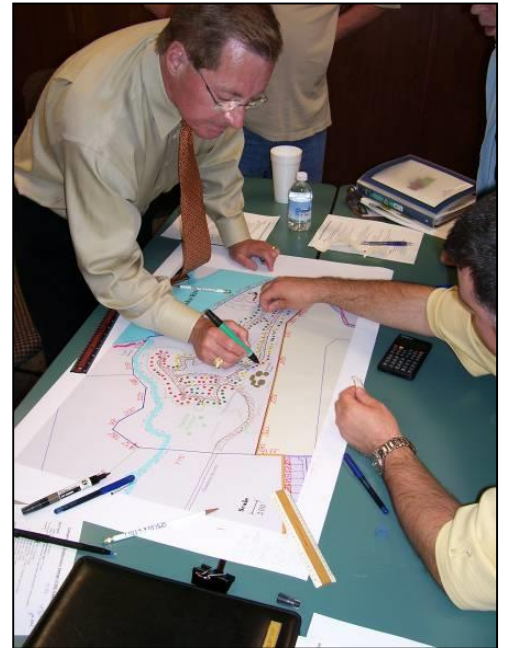
Since transportation plans and decisions affect travel costs and quality of life for every citizen of every community in the RFATS region, active public participation in the planning and decision-making process is critical to RFATS' goals and mission.

With this in mind, RFATS has established a Public Participation Plan which actively encourages the community to provide input into the transportation planning process. The plan is regularly reviewed for improvement opportunities, and was most recently updated in June 2016. One of the principal goals of the plan is to ensure that the planning process is open to all who would participate, including the following populations:

- Regional commuters to and from the urbanized areas of York and Lancaster counties to Charlotte.
- Local commuters within the urbanized areas of York and Lancaster counties and their population centers.
- Student populations from local colleges and universities.
- Elderly, disabled, minority, and disadvantaged residents.
- Commercial / industrial enterprise activity, including freight.
- All non-commuting travelers.

The type of transportation presently used by the majority of these populations is the single passenger automobile. Other groups currently use commercial trucks, limited express bus service to and from the Charlotte Transportation Center, demand response transit service, vanpool arrangements and some bicycle/pedestrian facilities.

Rapid development of the metropolitan area is generating growing traffic and other transportation demand that will require significant focus and supporting improvement planning in order to ensure the continued reliability of the transportation system for both people and goods movement. These conditions impact every community in the RFATS region. Continued prosperity and quality of life will require a substantial increase in local transportation investment and greater diversity in the planning and funding of different types of transportation improvements.



PUBLIC PARTICIPATION PLAN: VISION, GOALS & OBJECTIVES

The vision for public participation is that the public will be actively engaged in and receive information on the transportation planning and project development process in a convenient and timely manner. To this end, the following goals and policies have been established.

Goal I. To actively engage the public in the transportation planning process according to the policies contained in Federal and State law, as well as in the RFATS Public Participation Plan.

- A. RFATS will maintain a current database of contacts and/or interested parties that includes:
- Federal, state and local agencies responsible for planned growth, economic development, environmental protection, airport operations, freight movement, land use management, natural resources, and historic preservation
 - Elected officials
 - Local government staff
 - Transportation agencies (freight, port, airport, transit, etc.)
 - Organizations/agencies representing users of public transportation
 - Organizations/agencies representing those with special needs
 - Local media
 - Homeowners associations
 - Libraries (for review of public documents)
 - Interested members of the general public
- B. RFATS will, whenever feasible, electronically send meeting notices to all interested parties (RFATS Contact List and/or Targeted Group Mailing, etc.).
- C. RFATS will employ visualization techniques to illustrate transportation plans/projects. Examples of visualization techniques include charts, graphs and maps.

Goal II. RFATS shall keep the public informed of on-going transportation related activities on a continuous basis.

- A. RFATS will make publications and work products available to the public.
- B. RFATS staff will be available to provide general and project specific information at a central location during normal business hours and after hours when deemed appropriate and with reasonable notice.
- C. RFATS will maintain an accurate website with current transportation planning and project activity descriptions/summaries, including:
 - Updated list of Policy Committee members
 - Current schedule for RFATS meetings and events
 - Public display ads and notices
 - Copies of the Long Range Transportation Plan, Transportation Improvement Program, Unified Planning Work Program, Public Participation Plan, and other documents/studies
 - Opportunity for public comments
 - Interactive mapping (currently available via ArcGIS Online)
- D. RFATS will maintain and update social media accounts with current planning and project activity.

Goal III. RFATS shall encourage the participation of all citizens in the transportation planning process.

- A. RFATS uses its Public Participation Communications Venue matrix (**Figure 2.1**), which lists the stakeholder groups and communication media (both direct and indirect), to maximize the opportunity for the public to influence transportation/transit choices in the RFATS region.

Figure 2.1: RFATS Public Participation Communication Venues

	RFATS Citizens Advisory Committee	Community town hall meetings	Organization meetings	Newspapers including Latino, etc.	Websites	Newsletters (Neighborhood Empowerment, etc.)	Mass Media	Targeted Bulk Mailings	Public Facility Contact	Senior Centers	Personal Interviews	Public Events
Residents – General Public	•			•	•				•			•
Minority – Disadvantaged Citizens	•	•		•	•	•	•		•			
Housing Authorities	•	•	•		•			•				
Neighborhood Organizations	•	•	•	•	•				•			
Churches, Faith-Based Organizations	•	•		•	•				•			
ESL Groups	•	•							•			
Council on Aging – Special Needs	•	•		•	•				•	•		
Chamber of Commerce	•			•	•				•			
Economic Development Organizations	•			•	•				•			
Homebuilders Association	•			•	•				•			
Education Organizations	•				•	•	•		•			
Freight Movement (i.e. SC Trucking Association)											•	

Goal IV. RFATS will strive to improve public participation by continuously monitoring and evaluating the public participation techniques contained in this plan.

- A. The Public Participation Plan will be reviewed at least every three (3) years.

PUBLIC PARTICIPATION TECHNIQUES

An effective public participation process is ongoing, and characterized by techniques and procedures that enable citizens to become well informed. This section contains descriptions of public participation tools that RFATS currently uses and proposes to use in the future:

- Citizens Advisory Committee (CAC)
- Community Town Hall Meetings
- Consultation
- Legal Advertisements and Display Ads
- Brochure
- Surveys
- Direct Mailings / Postcards
- E-mail Notifications / Announcements
- Comment Forms
- Media / Press Releases
- Small Group / Public Meetings
- Personal Interviews
- Community Based Public Events / SC Visitors Center
- Title VI and Environmental Justice Outreach
- Visualization
- Social Media
- Responding to comments or questions (written, telephone, meetings)
- Comment Forms
- MPO and Local Government Websites

To support participation by persons with limited English proficiency, a translation tool is provided on the RFATS website which translates text on the webpages into more than 70 different languages, including Spanish. RFATS also works with the York County International Center to address other requests for translation.

Public Participation Activities for the 2045 LRTP

Stakeholder Outreach

Comprehensive outreach to all stakeholder groups was undertaken during the development of the 2045 LRTP, beginning in summer 2016 and concluding with the final public hearing at the May 19, 2017 Policy Committee meeting. A representative sample of those contacted includes the following:

- Local governments
- Federal Highway Administration
- Federal Transit Administration
- Environmental Protection Agency

- Freight providers, including rail companies
- Employers and York County Chamber of Commerce
- Transit agencies/providers
- South Carolina Department of Transportation
- South Carolina Department of Health and Environmental Control
- Transportation disadvantaged
- Educational institutions
- Bicycle/Pedestrian organizations

Community Meetings

Four community meetings were held in late summer/early fall 2016 in the City of Rock Hill, Town of Fort Mill/City of Tega Cay, panhandle of Lancaster County, and the Lake Wylie area to discuss the process for updating the LRTP and to seek input and information from all interested parties and stakeholders in identifying area transportation needs and priorities. Common themes from the meetings included the following:

Improvements to Existing Roadway System (e.g., Road Widening; Dedicated Turning Capacity)

- Sutton Road – should be widened to improve roadway efficiency
- India Hook Road – additional turning capacity needed
- US 521 – additional lanes and increased capacity from access roads
- NC 49 – need for an additional bridge crossing
- Increased turning capacity between access roads and Celanese Road
- Additional lanes on US 21
- Improvements to traffic signalization to smooth the flow of traffic



Public Transit Availability

- Extension of LYNX Blue Line, either to Carowinds or further into York County
- More direct bus routes into Charlotte with limited stops and increased hours of operation
- Expanded transportation choices that operate after regular working hours

Congestion Management (Priority Areas)

- Celanese Road Corridor
- SC 160
- SC 160 / Hensley
- NC 49
- Gold Hill Road / Access Points at I-77
- PM congestion noticeably worse than AM congestion

Accessibility and Transportation System Needs

- New Catawba River Bridge – additional system capacity needed to increase accessibility to surrounding areas and to address current and projected congestion levels
- Development of additional collector roads that provide relief to high traffic corridors and provide additional travel options between points

Bicycle & Pedestrian Improvements

- Growing expectation that bicycle and pedestrian infrastructure should be included in proposed roadway improvements
- Safety concerns regarding connectivity and accessibility to bicycle and pedestrian infrastructure

Growth Management and Planning

- Concerns about current road capacity being able to accommodate recent population and development growth
- Importance of anticipating the impacts of future growth, and planning transportation systems with adequate capacity to accommodate projected growth

Review of Comments and Development of Draft Project List

Staff assembled all of the information gathered during the public outreach process and reviewed this information with the Technical Team, CAC, and the Policy Committee during the initial stages of developing a draft project list.

RFATS Committees

RFATS has several committees that not only contribute directly to the policy-making process but also serve as a means of public and stakeholder involvement. The committees include:

Policy Committee – The primary function of the Policy Committee is to prioritize and plan for the transportation needs of the RFATS region. It is made up of elected officials from the cities of Rock Hill and Tega Cay, the Town of Fort Mill, York and Lancaster counties, a State Senate and House representative, the SCDOT Commissioner, as well as the Tribal Chief from the Catawba Indian Nation.

Technical Committee – The primary purpose of the Technical Team is to assist the Policy Committee in addressing more technically-oriented transportation questions and provide recommendations on various RFATS plans and programs. The Technical Team is composed of staff from each of the local communities within the RFATS region, as well as the Catawba Regional Council of Governments, SCDOT, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the SC Department of Health & Environmental Control (SCDHEC).

Citizen’s Advisory Committee (CAC) – The primary function of the CAC is to ensure that public participation is an active part of the planning process. A second important objective of the CAC is to seek out and consider the needs of those traditionally underserved by the existing transportation system. The Citizen’s Advisory Committee is composed of representatives of each of the RFATS municipalities as well as special needs, minority, and at-large members. This committee is established by the RFATS Bylaws and typically meets on a quarterly basis, or as needed.

Interagency Consultation Committee (IAC) – The primary purpose of the IAC is to promote cooperative coordination and review in ensuring that all transportation plans, programs and projects adopted by RFATS properly conform with the purpose of the State Implementation Plan (SIP) to meet the National Ambient Air Quality Standards in the RFATS region. The Interagency Consultation Committee includes staff representation from

RFATS, as well as SCDOT, FHWA, the Federal Transit Administration (FTA), the South Carolina Department of Health and Environmental Control (SCDHEC) and the Environmental Protection Agency (EPA).

RTP Adoption Process

The adoption process for the 2045 Long Range Transportation Plan involved a multi-stage evaluation and review effort that included Interagency Consultation with a variety of Federal and State partners. During the period from October 2016 through March 2017, the RFATS Technical Team and Citizen’s Advisory Committee thoroughly reviewed all three LRTP documents (Long Range Plan, Air Quality Conformity Report and Transportation Improvement Program) and provided additional comments.

On April 21, 2017, the RFATS Policy Committee granted preliminary approval of a public review draft and authorized a 30-day public comment period. Draft LRTP documents were then posted on the RFATS website as well as on the websites of all RFATS communities. Notice of the opportunity for public review was then published in the *Rock Hill Herald*, *Lake Wylie Pilot*, *Fort Mill Times* and *Carolina Gateway* (the general circulation newspapers for the area), providing information regarding the availability of the LRTP documents for public inspection as well as information on how to submit input for presentation to the Policy Committee prior to final approval.

On May 19, 2017 a public hearing was held at the Rock Hill Operations Center, where copies of the draft 2045 Long Range Transportation Plan, Air Quality Conformity Report and TIP were made available. At this hearing, RFATS staff presented a report on these documents and then invited public input and written comments. Comments addressed the desire for future high capacity transit along the US 21 corridor, support for safety-focused bicycle and pedestrian improvements, and the importance of considering geographic equity in selecting transportation projects. Following the public hearing, an RFATS Policy Committee meeting was held in which staff requested final approval and authorization to submit the 2045 LRTP to the U.S. Department of Transportation for further review and approval.

A Performance-Based Planning Framework

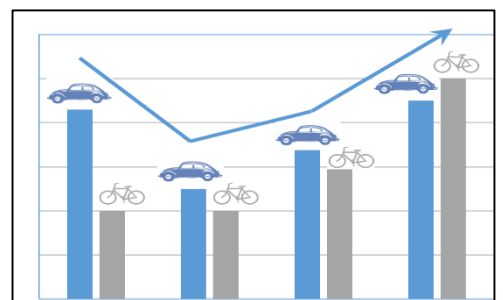
Moving Ahead for Progress in the 21st Century (MAP-21), the federal transportation authorization legislation passed in 2012, initiated a federal requirement for MPOs to incorporate the use of performance measures in their planning processes, including the LRTP. The current federal legislation – *Fixing America’s Surface Transportation* (FAST) Act, enacted in December 2015 – retains the same requirements.

Goals, Objectives and Performance Measures

The terms “goals” and “objectives” are used in many settings but have a very specific meaning in the planning profession. *Goals* are broad statements which tend to be qualitative or descriptive in nature, indicating a general direction for a plan. *Objectives* are intermediate steps that will be taken to reach a goal, and are more focused on specific actions. Goals typically have multiple objectives, each of which helps to define its intent and how the goal can be attained.

MPOs have always used goals and objectives in the development of their LRTPs and other planning activities. What is relatively new in some regions is the expanded use of *performance measures*. These help to further refine or “operationalize” objectives by providing a quantifiable way to track their progress. In long-range planning they are also used to compare current performance to the projected future.

Most MPOs already have some form of performance measurement in their LRTPs. These include common measures such as roadway level of service (a measure of how freely traffic is flowing) and volume to capacity ratio (which measures the volume of traffic relative to the number of roadway lanes). Regional travel demand models are used to generate these measures, along with the number of vehicle-miles traveled, vehicle-hours traveled, and vehicle-hours of delay. Several of these measures for the RFATS region are presented in Chapter 4, providing a comparison of how well the roadway system functions under current conditions versus the conditions that are expected by the year 2045. Proposed transportation improvements can then be evaluated in terms of how much they are expected to improve future system performance.



Performance targets can also be set to indicate the maximum or minimum value desired. For example, a city may aim to have sidewalks along at least 75% of its roads, or a transit system may set a target to have at least 90% of its buses arrive within 5 minutes of their scheduled time.

The 2045 LRTP includes performance measures that reflect the anticipated federal requirements for monitoring safety and air quality improvement, which are the measures applicable to the RFATS region based on preliminary federal guidance. These will be updated or amended if necessary after USDOT issues all final guidance to states and MPOs. SCDOT and RFATS will then work together to agree on specific target values.

Federal Planning Factors Included in the LRTP

Transportation investments that use federal funds – which includes a large portion of investments in the RFATS region – must be guided by a long range plan that addresses multiple modes of transportation and specific factors such as mobility, safety, and others. These factors, shown in **Figure 3.1**, have remained largely the same in federal legislation over the past decade.

Two additional planning factors were added by the FAST Act: first, considering the transportation system’s resiliency, i.e. its ability to withstand unexpected impacts, including stormwater impacts; and second, the ability of the transportation system to enhance travel and tourism.

Other laws that shape the LRTP include Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act of 1990, and the National Environmental Policy Act (NEPA) of 1969. Each of these laws in some way has an impact on the type, location, and design of transportation facilities and services contained in the LRTP.



Figure 3.1: Federal Metropolitan Planning Factors

Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency
Increase the safety of the transportation system for motorized and non-motorized users
Increase the security of the transportation system for motorized and non-motorized users
Increase the accessibility and mobility of people and for freight
Protect and enhance the environment , promote energy conservation , and improve quality of life ; and promote consistency between transportation improvements and State and local planned growth and economic development patterns
Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight
Promote efficient system management and operations
Emphasize the preservation of the existing transportation system
Improve transportation system resiliency and reliability and reduce or mitigate stormwater impacts on the surface transportation system.
Enhance travel and tourism .

L RTP Goals and Objectives

The goals of the 2045 LRTP, shown in **Figure 3.2**, incorporate the federal planning factors discussed above. Each goal is also accompanied by a set of objectives, many of which are oriented to key issues that have been identified through the analysis of transportation system needs and community input. **Figure 3.3** demonstrates the relationship between the goals and objectives of the 2045 LRTP and the federally required transportation planning factors.

Figure 3.2: Goals of the 2045 Long Range Transportation Plan

1	Provide Safe, Secure, Reliable Roadway Travel
2	Manage Congestion
3	Provide Mobility Choices
4	Promote Consistency of the LRTP with Other Regional Plans

Figure 3.3: Relationship of National FAST Planning Factors to 2045 LRTP Goals

FAST Planning Factor	2045 LRTP Goal(s)
Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency	1, 2
Increase the safety of the transportation system for motorized and non-motorized users	1, 3
Increase the security of the transportation system for motorized and non-motorized users	1, 4
Increase the accessibility and mobility of people and for freight	1, 2, 3
Protect and enhance the environment , promote energy conservation , and improve quality of life ; and promote consistency between transportation improvements and State and local planned growth and economic development patterns	2, 3, 4
Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight	1, 2, 3
Promote efficient system management and operations	1, 2
Emphasize the preservation of the existing transportation system	1, 4
Improve transportation system resiliency and reliability , and reduce or mitigate stormwater impacts on the surface transportation system	1, 2, 3, 4
Enhance travel and tourism	1, 3, 4

Below are specific objectives representing action steps to be taken to implement each goal of the 2045 LRTP. These objectives do not represent every possible action that could be taken; rather, they are focused to correspond to the issues most relevant to the RFATS region based on analysis, input and other local/regional plans.

Performance measures are also shown for a number of objectives. These may be monitored annually by RFATS and its partners, or at a minimum should be regularly reviewed each time the region updates its LRTP. The performance measures for safety are consistent with the new federal requirements for all MPOs.

Goal I. Provide Safe, Secure, Reliable Roadway Travel

Objectives

- 1) Protect public investment by maintaining the existing transportation system, including pavement, bridges, signal equipment and signs, transit vehicles and other transportation system components.
- 2) Provide a transportation system that enables reliable and efficient movement of passengers and freight to support the region's economic productivity.
- 3) Improve transportation safety for both motorized and non-motorized users.
 - a) Reduce crashes at key intersections.
 - b) Reduce crashes involving pedestrians and bicyclists.
- 4) Improve transportation security and the system's resiliency by developing an interconnected network that offers multiple routes and modes of travel.
- 5) Address visitor transportation needs through wayfinding, alternative modes in targeted areas, and other improvements.

Performance measures

- A. *Crash statistics for York and Lancaster counties, based on the most recent five years of data available:*
 - *Number of fatalities*
 - *Rate of fatalities per 100 million vehicle-miles traveled*
 - *Number of serious injuries*
 - *Rate of serious injuries per 100 million vehicle-miles traveled*
 - *Number of non-motorized user fatalities and serious injuries*
- B. *Annual hours of delay in the RFATS region, as estimated by the regional travel demand model.*

Goal II. Manage Congestion

Objectives

- 1) Make improvements to fully utilize capacity on the existing road network before constructing new lanes or facilities.
- 2) Give priority to projects that implement the strategies in the RFATS Congestion Management Process, including operational improvements such as traffic signal timing.
- 3) Preserve traffic capacity on major corridors through quality development practices.
 - a) Require driveway access on collector or local streets, rather than arterial routes.
 - b) Increase the level of internal circulation within and between developments by designing more interconnected road networks.

Performance measures

- A. *Travel time index for each corridor monitored through the RFATS Congestion Management Process (CMP).*
- B. *Connectivity index of new developments in RFATS communities.*

Goal III. Provide Mobility Choices

Objectives

- 1) Incorporate pedestrian and bicycle facilities in planned improvements to roads and corridors, including state and local maintenance and pavement marking projects.
- 2) Require developments to provide pedestrian and bicycle facilities and connections.
- 3) Make demand-response service and rideshare opportunities available to all citizens in the RFATS area.
- 4) Maintain and improve citizens' access to inter-city rail and bus systems.
- 5) Continue to pursue implementation of local fixed-route transit service for RFATS communities.
- 6) Promote a transportation system that includes equitable options for low-income and minority persons.

Performance measures

- A. *Percent of federal-aid roads within urban areas of RFATS that have sidewalks.*

Goal IV. Promote Consistency of the LRTP with Other Regional Plans**Objectives**

- 1) Implement strategies to improve regional air quality, including ridesharing, increasing trips made by alternative transportation, and improving traffic flow.
- 2) Implement the local land use policies needed to maximize the region's existing transportation investments and reach its long-term goals.
 - a) Encourage growth and redevelopment in existing urban areas.
 - b) Promote compact, walkable development patterns along the proposed future Bus Rapid Transit (BRT) corridor.
 - c) Reserve future rights-of-way needed for planned transportation projects, whether affected by public or private development.
- 3) Minimize environmental impacts of the transportation system.
 - a) Select, locate and design transportation system improvements so as to preserve and protect the area's natural features.
 - a) Encourage transportation projects that help mitigate the impacts of stormwater runoff.

Performance measures

- A. *Tons of NO_x (ozone) and volatile organic chemicals (VOCs) reduced by CMAQ-funded projects over a two-year and four-year period.*

Each of the transportation investments recommended in the LRTP contributes to the achievement of the goals and objectives outlined here. In many cases a proposed project or service will accomplish multiple goals and objectives. For example, expanding the sidewalk system expands the availability of transportation choices, it has environmental benefits, and it improves the safety of people walking to/from their destinations.

Introduction

This section describes the regional roadway network and the process used to model future roadway conditions based on projected growth in population and employment within and around the RFATS region. Roadways that are currently congested or are projected to be congested in future years are identified. Proposed roadway improvements to address anticipated congestion as well as other operational factors, have been developed and tested through a regional travel demand modeling process that takes account of operating conditions within RFATS as well as in adjacent areas – so that all sources of current and projected travel demand are properly considered. These resulting projects, along with proposed timeframes for their implementation, form the basis for the roadway portion of this plan.

Existing Conditions and Trends

The roadway system is the principal means of mobility and accessibility within the overall transportation system. An efficient roadway network provides for operational effectiveness, a strong foundation for regional economic competitiveness, and a good quality of life.

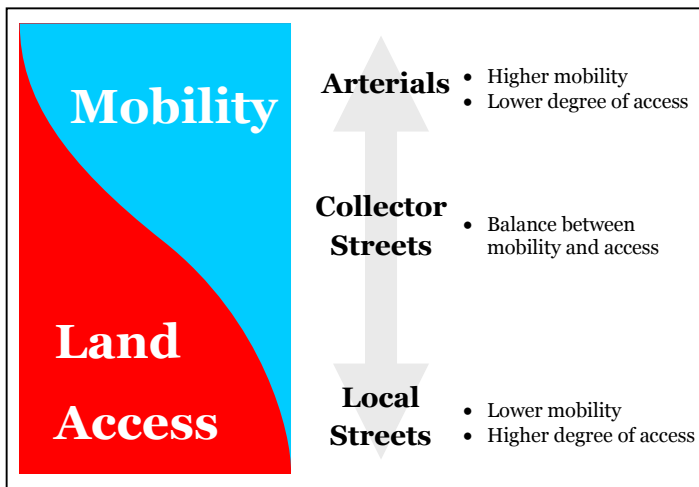
There are also important linkages between transportation and land use that should be highlighted. This was true in the 19th century when the area developed with the building of the railroad, and it remains true today, particularly in relation to the highway system. Land use patterns determine travel needs, and the demands ultimately placed upon the road network. The need for transportation improvements – whether road widenings, intersection modifications, or simply a more context-sensitive street design—often reflect changes in adjoining land uses. Roadways in turn have a significant influence on land use. Providing improved access to property often generates new development at that location, which in turn generates additional travel demand, and then additional development, and so on in a circular fashion.

The RFATS roadway system connects the urban areas of Rock Hill, Tega Cay, Fort Mill and portions of York and Lancaster counties to each other, connects the smaller communities within each urban area, and connects to the wider regional and national transportation networks. Interstate 77 and US 21 connect the RFATS region with Charlotte to the north, and with Columbia to the south.

Roadway Functional Classification

Roadways are divided into functional classifications that reflect the balance between their role in providing mobility and their role in providing access to land (see **Figure 4.1** below). Within urbanized areas, roadways are classified into four categories: principal arterials, minor arterials, collector streets, and local streets.

Figure 4.1: Framework for Roadway Classification



Principal arterials carry traffic into and out of the region. Principal arterials (including freeways and expressways) in the RFATS region include:

- I-77
- US 21
- US 521
- Celanese Road
- Gold Hill Road
- Dave Lyle Boulevard
- SC 160
- SC 5



Example of a principal arterial: Cherry Road in Rock Hill

Minor arterials connect with the principal arterials and provide access between smaller communities within the urban area. Minor arterials include:

- SC 274 (Hands Mill Highway),
- India Hook Road/Herlong Avenue.

Collector streets collect traffic from residential areas and channel it to the arterials. Examples of collector streets include:

- Dobys Bridge Road,
- Ebinport Road.

Local streets provide direct access to adjacent land. Most streets within residential subdivisions would be classified as local streets, although it is also important to have collector streets that provide connections within and between neighborhoods.



*Example of a collector street:
Main Street in Fort Mill*

Figure 4.2 shows the functional classifications for significant roadways in the RFATS region.

Traffic Conditions

Traffic Volumes

Generally, the higher the level of functional classification, the higher the volume of traffic that the roadway carries. **Figures 4.3** and **4.4** show the estimated annual average daily traffic (AADT) volumes in the RFATS region in the year 2015.

I-77 carries the highest number of vehicles per day, with volumes ranging from approximately 47,000 vehicles per day at the southern edge of the region to nearly 145,000 at the North Carolina border. Arterials with the highest traffic volumes include: Celanese Road, Gold Hill Road, Cherry Road, SC 160, Herlong Avenue, US 521, US 21, SC 49, and a segment of Dave Lyle Boulevard.

Figure 4.2: Roadway Functional Classifications

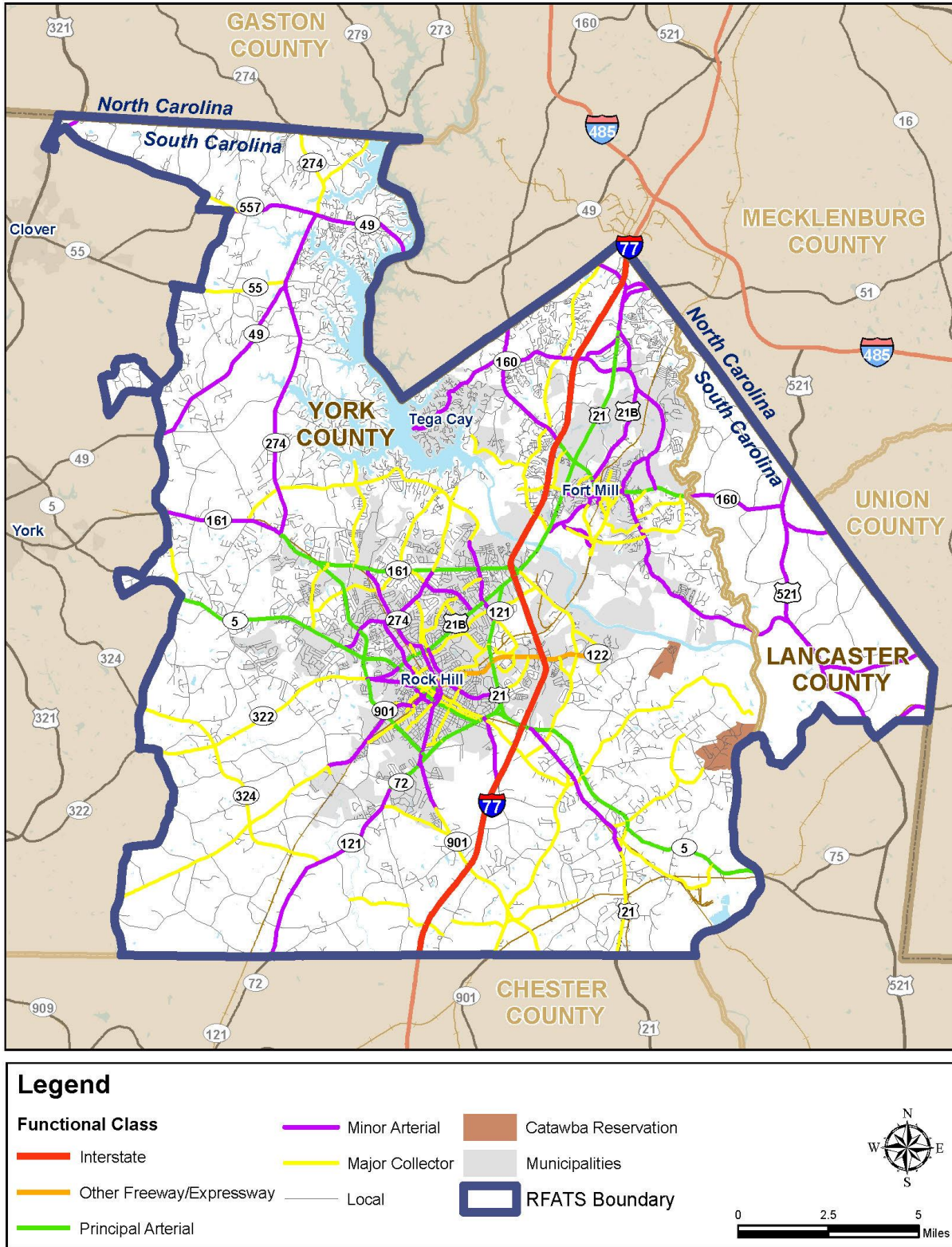


Figure 4.3: Average Annual Daily Traffic, 2015 (Region Overview)

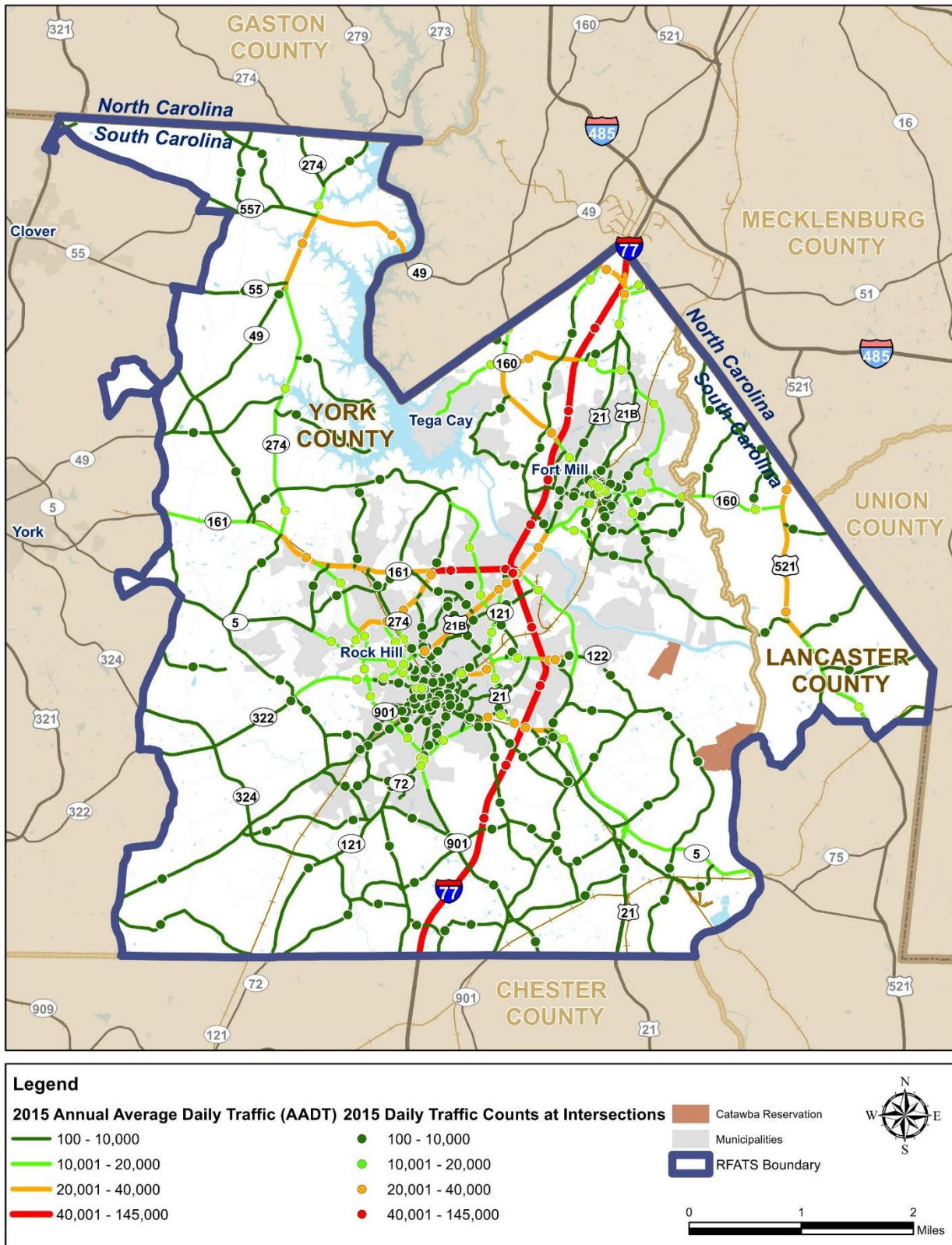
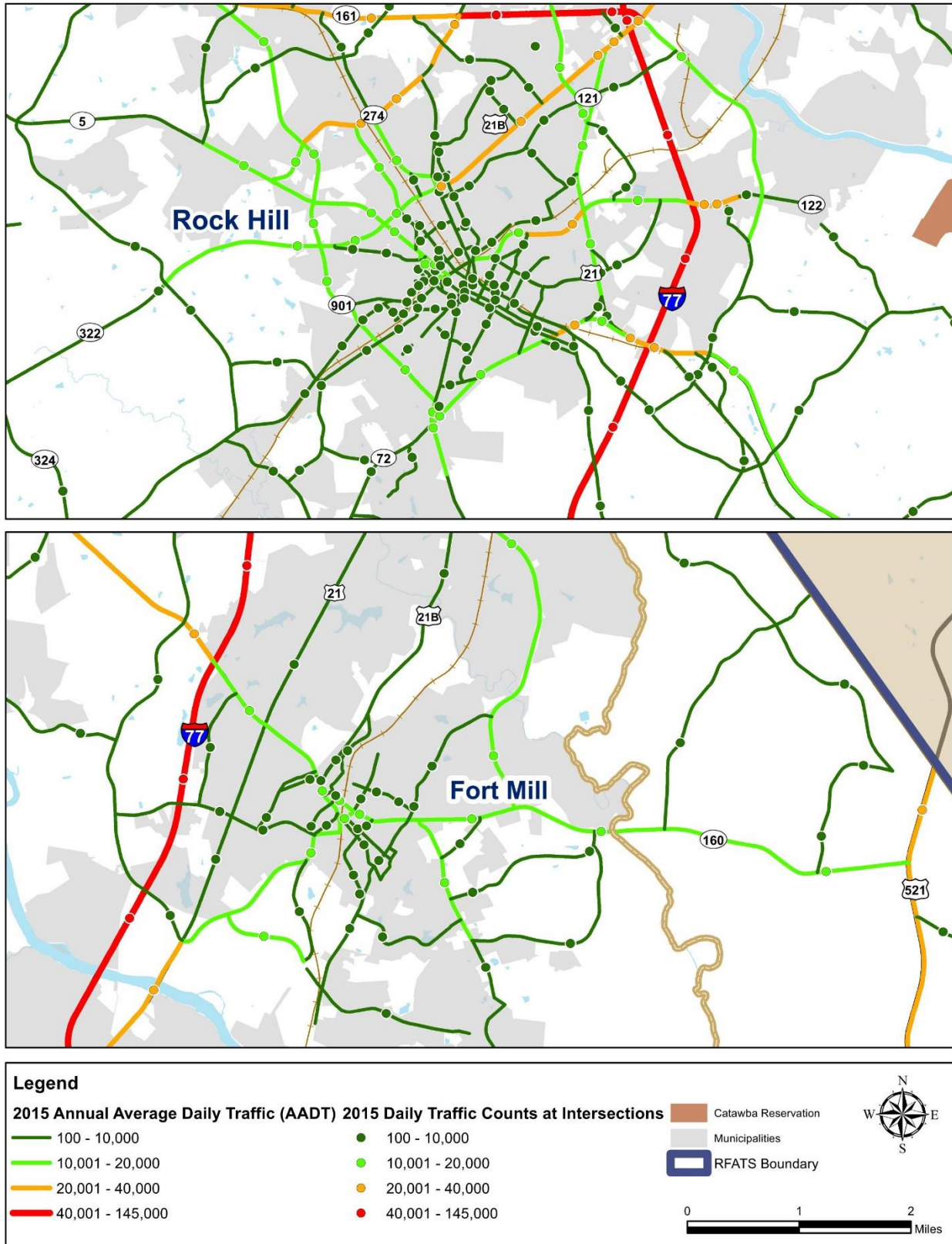


Figure 4.4: Average Annual Daily Traffic, 2015 (Rock Hill and Fort Mill areas)



Current and Future Traffic Conditions

Traffic flow along a given roadway is often presented in terms of volume-to-capacity ratio (i.e. the volume of traffic that the road is carrying compared to its maximum capacity). A roadway's capacity is based on its functional classification, number of lanes, posted speed limit, percent of truck traffic, and geometric characteristics. Volume-to-capacity thresholds vary by the functional class of the facility and whether it is classified as urban or rural.

Higher V/C ratios indicate there are a higher number of vehicles relative to the road's capacity. For example, a V/C ratio of 0.70 means that about 70 percent of the road's available capacity is being used. As the V/C ratio nears 1, it means that the traffic volume is almost equal to the maximum number of vehicles the road can carry. Locations that have high V/C ratios are therefore almost certain to be experiencing traffic congestion and delay.

The Metrolina Model was used to estimate traffic conditions on RFATS area roadways for a number of scenarios:

- **Existing Conditions** (Figure 4.5) This scenario uses a base year model calibrated to actual 2015 traffic data.
- **2045 Existing + Committed** (Figure 4.6) This scenario shows projected traffic conditions by the year 2045, if no further improvements are made other than the projects for which funding has been committed in the region's Transportation Improvement Program.
- **2045 LRTP** (Figure 4.7) This scenario shows projected traffic conditions by the year 2045, assuming the implementation of the projects included in this adopted long-range transportation plan.

All results reported here are for the PM peak period (3:30 to 6:30 PM), which shows the highest level of congestion during the 24-hour day that is modeled. It should therefore be noted that a route that appears congested in the following maps may only be congested at certain times of day.

In the Existing Conditions scenario, the arterial roads show the highest levels of congestion, especially in the areas with large retail developments near I-77. Significant PM peak congestion is also indicated along Fort Mill Highway and on I-77 itself, which is nearing capacity north of Sutton Road and already at capacity south of Mt. Holly Road (Exit 73).

Figure 4.5: Existing Traffic Conditions (2015)

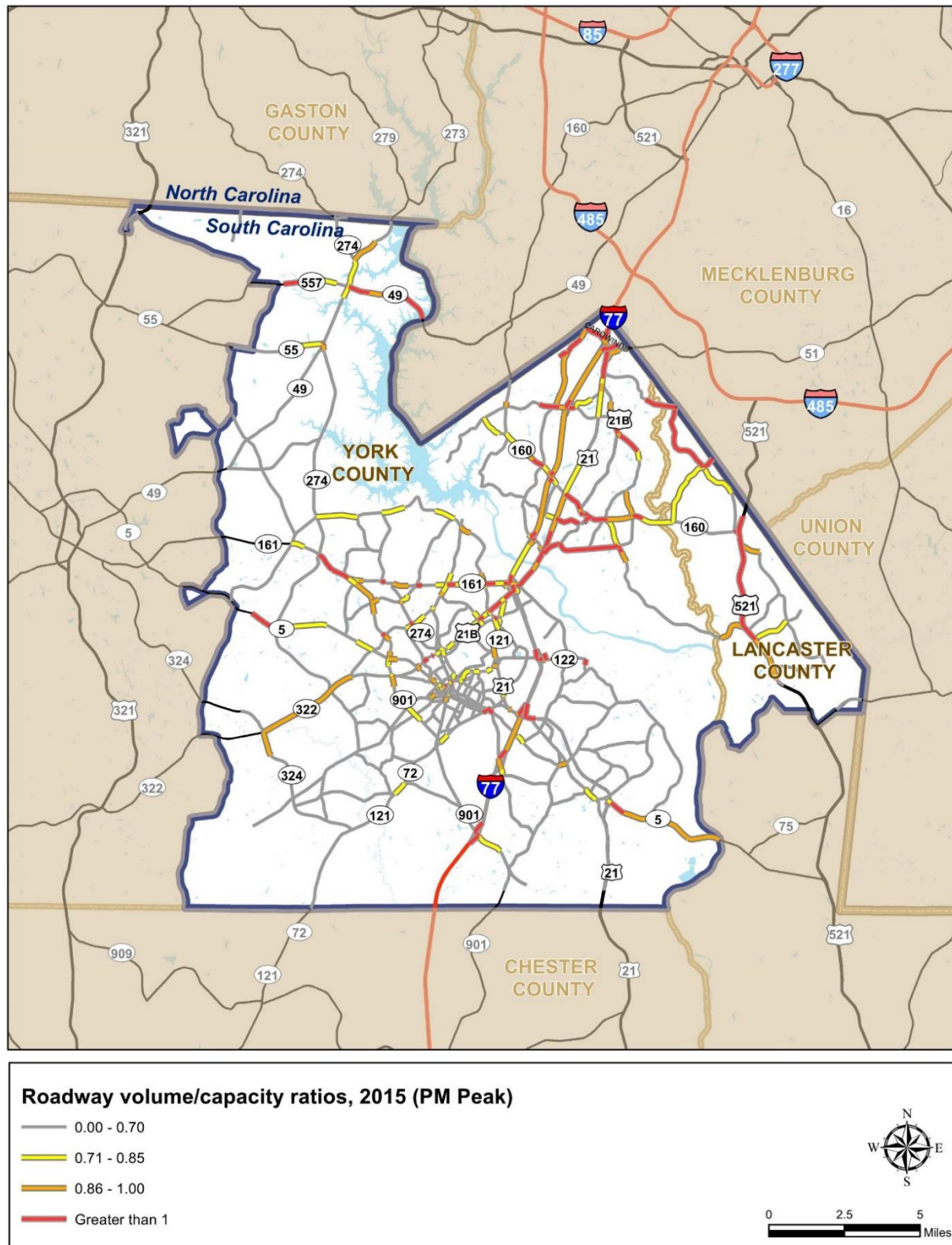


Figure 4.6: Projected Traffic Conditions, 2045 Existing + Committed Scenario

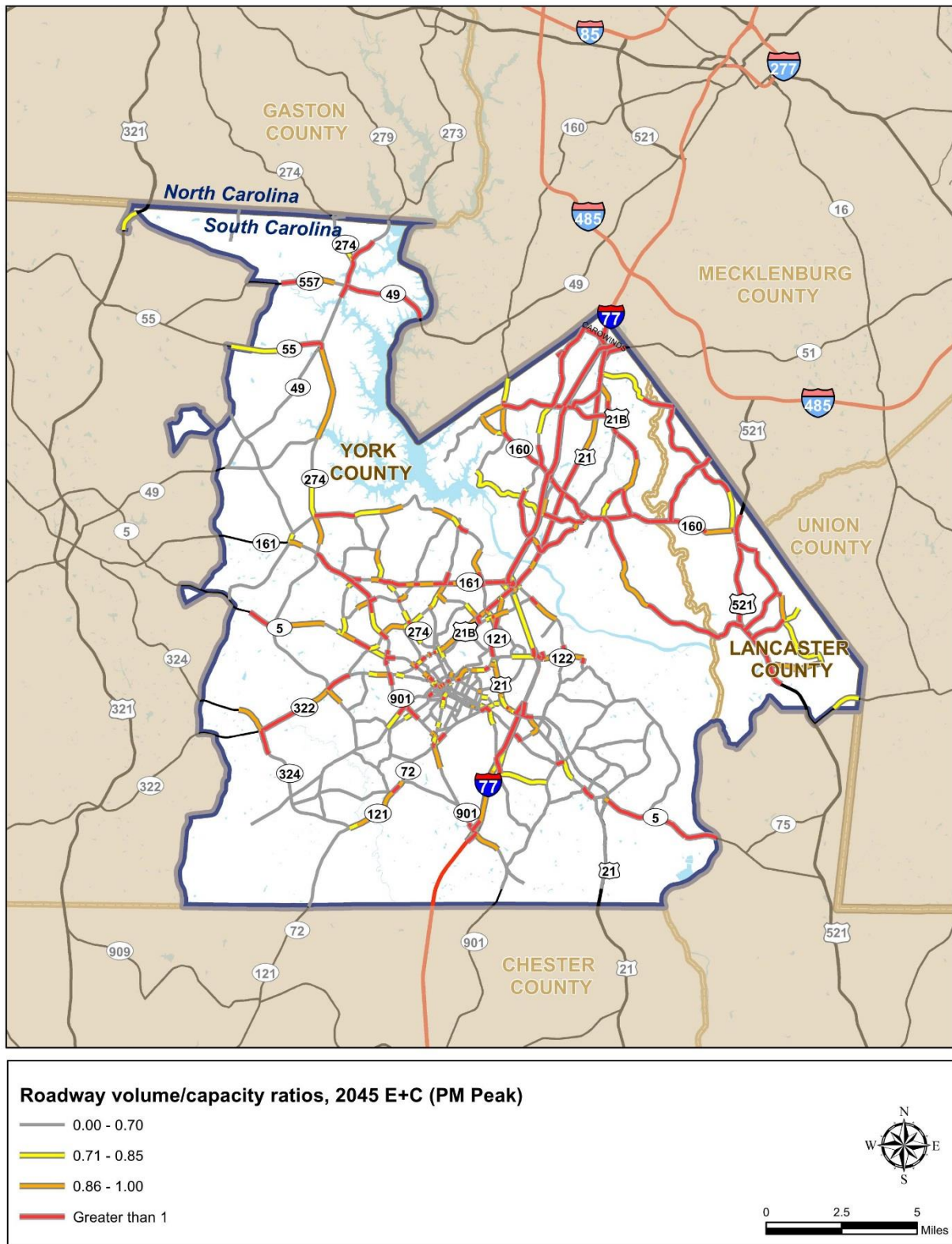
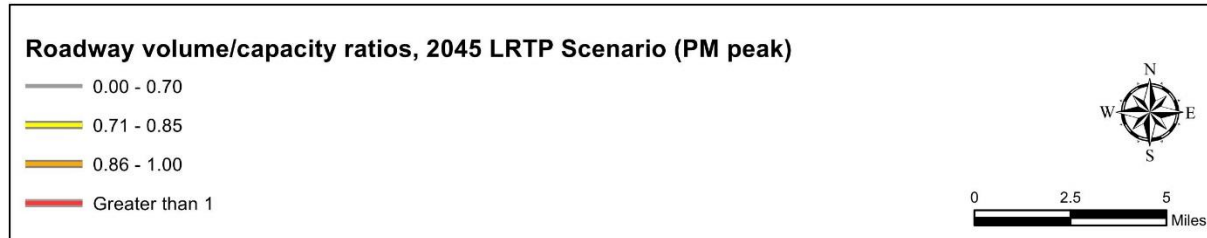
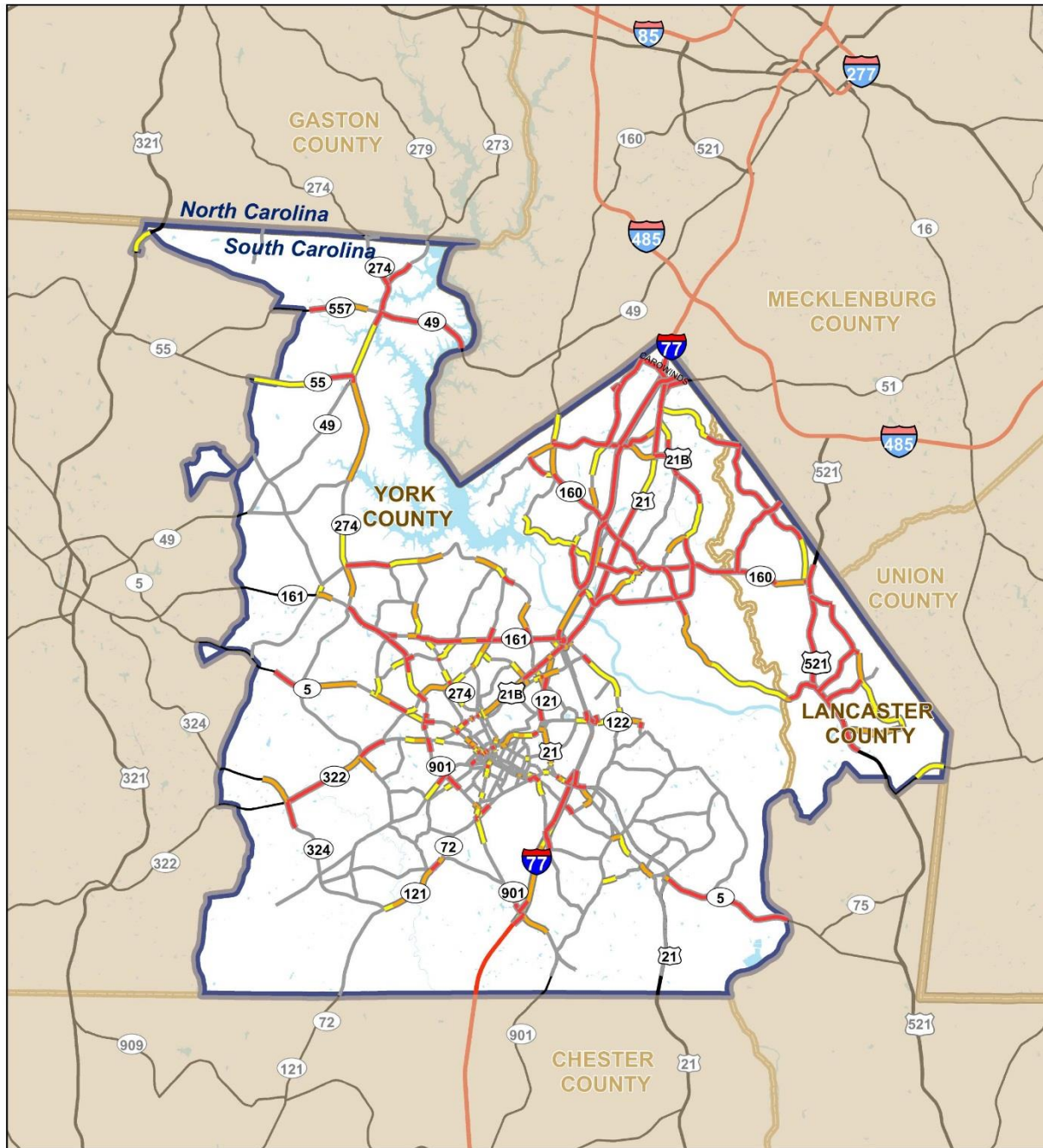


Figure 4.7: Projected Traffic Conditions With Implementation of 2045 LRTP



By the year 2045 – with implementation of the projects for which there is committed funding in the TIP – the model projects PM peak congestion for nearly every major road north of the Catawba River (see **Figure 4.6**). I-77 is expected to be over capacity both north and south of Rock Hill. Dobys Bridge Road, which is relatively uncongested under existing conditions, is projected for major delays for its entire length by 2045.

Traffic conditions are expected to improve somewhat with the implementation of the 2045 LRTP (**Figure 4.7**). It should be noted that with the focus on reconfiguring the interchanges at Exit 85 (SC 160 / I-77), at Exit 82 (Celanese & Cherry / I-77), and at Exit 77 (SC 5; US 21), the modeling displays don't fully reflect the benefits to be realized from these types of operational improvements given that they don't alter volume levels – even though the efficiency with which the demand levels are processed has been favorably impacted.

However, despite these significant investments along the I-77 Corridor in the 2045 LRTP, the majority of major roads are projected to continue to carry high demand levels under congested conditions, particularly during the peak periods. Drivers on Celanese Road, Hands Mill Highway (SC 274/279), Gold Hill Road, SC 160, US 521, and many other routes will continue to experience heavy traffic congestion. Delays on I-77 will likely become more frequent in both time and intensity if no other interstate improvements are undertaken between now and 2045.

In other words, even with the full use of available resources, traffic congestion is expected to become more challenging over time; and therefore, roadway capacity improvements (as important as they are), will need to be combined with a number of additional policies and operational strategies (such as more alternative routes, strengthening the collector street network, continued expansion of transit options, etc), in order to enable the transportation system to function in a safe, reliable and efficient manner. This is a challenge experienced in many part of the country, but particularly important in high growth environments like RFATS.

RFATS will also continue to monitor the potential impacts of autonomous vehicles, which are expected to improve and become more widely used in the short-term horizon. Such vehicles could dramatically affect safety, highway capacity, congestion management and traffic flow.

Project Selection Criteria

A number of factors were considered in selecting projects for the LRTP. In response to Act 114 (passed in 2007), SCDOT developed a set of ranking criteria, outlined in sections 57-1-370 and 57-1-460, for five types of projects:

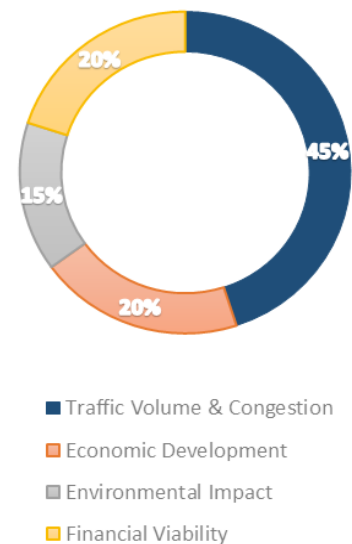
new locations, intersections, widenings, interstate mainline capacity, and interchanges.

In 2008, the RFATS Policy Committee endorsed SCDOT’s project criteria for its own use in the LRTP. The criteria are broken down and weighted based on the following factors:

For ranking **new location** projects:

- **Traffic volume and congestion (45%)**. Quantified by comparing the number of network hours of delay between build and no-build scenarios.
- **Economic Development (20%)**. Quantified based on an assessment of short-term, intermediate, and long-term development potential as a result of the proposed improvement.
- **Environmental Impact (15%)**. Quantified based on an assessment of potential impacts to natural, social, and cultural resources.
- **Financial Viability (20%)**. Quantified based on estimated project cost in comparison to the six-year Statewide Transportation Improvement Program (STIP) budget. Additional consideration is given to projects supplemented with local project funding and/or other federal and state funding.
- **Alternative Transportation Solutions**. Considered independently of ranking.
- **Consistency with Local Land Use Plans**. Considered independently of ranking. The official designation of a new location option as the project solution will be determined in the alternatives analysis within the environmental process.

Scoring New Location Projects

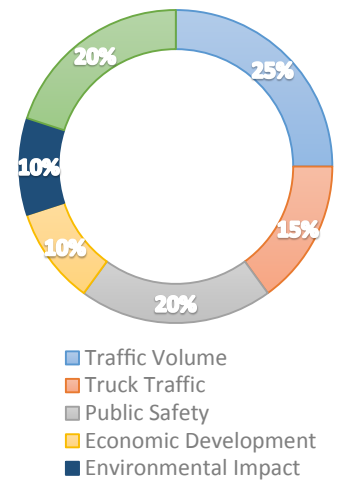


For ranking **intersection** projects:

- **Traffic Volume (25%)**. Quantified based on current traffic volumes.
- **Truck Traffic (15%)**. Quantified based on current volume and average daily truck traffic estimates.
- **Public Safety (20%)**. Quantified based on collision data.

- **Economic Development (10%).** Quantified based on short-term, intermediate, and long-term development potential as a result of the proposed improvement.
- **Environmental Impact (10%).** Quantified based on an assessment of potential impacts to natural, social, and cultural resources.
- **Traffic Status (20%).** Quantified based on an assessment of the intersection’s functionality and operational characteristics.
- **Financial Viability.** Considered independently of ranking.
- **Pavement Quality Index.** Considered independently of ranking.
- **Alternative Transportation Solutions.** Considered independently of ranking.
- **Consistency with Local Land Use Plans.** Considered independently of ranking.

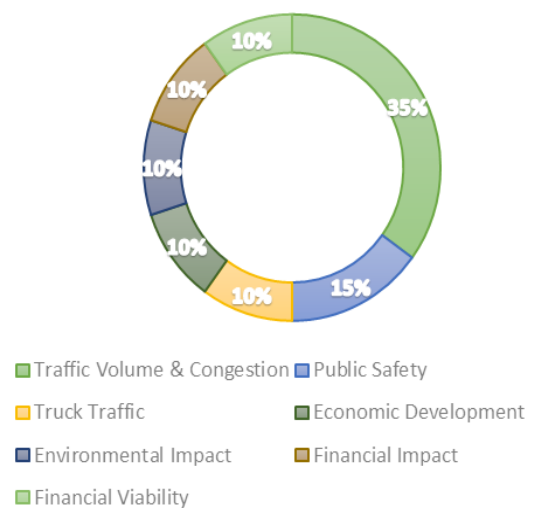
Scoring Intersection Projects



For ranking **widening** projects:

- **Traffic Volume and Congestion (35%).** Quantified based on current traffic volumes and the associated level-of-service condition.
- **Public Safety (15%).** Quantified based on collision data.
- **Pavement Quality Index (PQI) (10%).** Quantified based on pavement condition assessments.
- **Truck Traffic (10%).** Quantified based on current volume and average daily truck traffic estimates.
- **Economic Development (10%).** Quantified based on an assessment of short-term, intermediate, and long-term development potential as a result of the proposed improvement.
- **Environmental Impact (10%).** Quantified based on an assessment of potential impacts to natural, social, and cultural resources.

Scoring Widening Projects

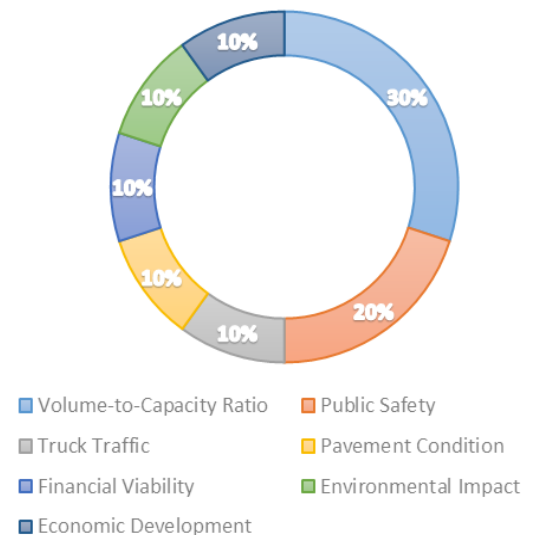


- **Financial Viability (10%).** Quantified based on estimated project cost in comparison to the six-year Statewide Transportation Improvement Program (STIP) budget. Additional consideration will be given to projects supplemented with local project funding and/or other federal and state funding.
- **Consistency with Local Land Use Plan** (for consideration only). Considered independently of the ranking process. A determination of consistency will be made during the long-range plan development process.
- **Alternative Transportation Solutions** (for consideration only). Considered independently of the ranking process. Transit propensity is evaluated based on surrounding population and employment characteristics to support transit service as a potential alternative or in addition to a proposed improvement.

For ranking **interstate mainline capacity** projects:

- **Volume-to-Capacity Ratio (30%).** The volume-to-capacity ratio (V/C) score is based on average annual daily traffic data and capacity thresholds consistent with the Highway Capacity Manual.
- **Public Safety (20%).** The safety score is based on an accident rate that is calculated by the total number of crashes within a given segment divided by the volume and multiplied by the number of years.
- **Truck Traffic (10%).** The truck score is based on historical truck classification data that is expressed as a percentage of total daily traffic. The truck percentage is multiplied by the average daily traffic to calculate the truck ADT. Truck ADT is used instead of truck percentage to give greater consideration to higher volume roads.
- **Pavement Condition (10%).** The pavement score is based on pavement management data collected using video and computer technology.
- **Financial Viability (10%).** The financial viability score is based on project cost in comparison to the six-year Statewide Transportation Improvement Program (STIP) budget.

Scoring Interstate Capacity Projects



- **Environmental Impact (10%).** The environmental impact score is based on an assessment of the project’s potential impacts to all known environmental, cultural and social resources.
- **Economic Development (10%).** The economic development score is provided by the South Carolina Department of Commerce and is based on an assessment of the project’s benefit to existing industrial/manufacturing development, as well as its proximity to existing infrastructure.

For ranking **interstate interchange** projects, 80 percent of the total weighted scoring is based on the following criteria, which are included in the Interstate Interchange Management System (IIMS):

- Passenger Vehicle Travel Time
- Truck Vehicle Travel Time
- Passenger Vehicle Delay
- Truck Vehicle Delay
- Passenger Vehicle Distance
- Truck Vehicle Distance
- Truck Vehicle Time
- Truck Detour Distance
- Design-Related Fatal Crashes
- Design-Related Personal Injury Crashes
- Design-Related Property Damage Crashes
- Other Fatal Crashes
- Other Personal Injury Crashes
- Other Property Damage Crashes

The remaining inputs include 10 percent from economic development and 10 percent from environmental impacts, similar to interstate mainline capacity projects.

2045 LRTP Projects

This section presents the major roadway projects to be implemented during the life of the 2045 Long Range Transportation Plan. The projects include road widenings and traffic flow improvements in and around heavily congested interchanges, as well as priority intersection locations.

The projects are presented below in two categories:

- **Federally Funded Projects**

Table 4.1 lists the projects that will be funded at least partly with federal sources. This includes projects selected for Guideshare funding allocated to RFATS, as well as statewide programmatic investments that SCDOT will make during the life of the plan. (For more detail on Guideshare and other funding sources, see Chapter 12.)

A map of the federally funded projects is provided in **Figure 4.8**.

- **Non-Federally Funded Projects**

Table 4.2 lists projects to be built with non-federal funding sources.

The primary funding source for these projects is the York County Local Option Sales Tax program (known as ‘Pennies for Progress’). The program was initiated by York County to provide citizens with a safer and more efficient roadway system. Projects were chosen by a Sales Tax Commission representing the citizens of York County, and were then approved by the voters. York County was the first county in South Carolina to pass this type of sales tax program to improve the road system. A benefit of this tax is that 99 cents of every sales tax dollar raised in York County stays in the County.

The first Pennies for Progress referendum was passed in 1997, with subsequent referendums passed in 2003 and 2011. Table 4.2 indicates the referendum in which each project was approved.

At the time this plan was developed, a fourth Pennies for Progress referendum was scheduled for the November 2017 ballot. However, the list of projects to be presented to voters had not been finalized. Table 4.2 therefore shows the projects which were anticipated to be on the referendum at the time of this plan’s adoption. The plan will be amended as appropriate if the final project list should reflect additional transportation projects within the RFATS Planning Area.

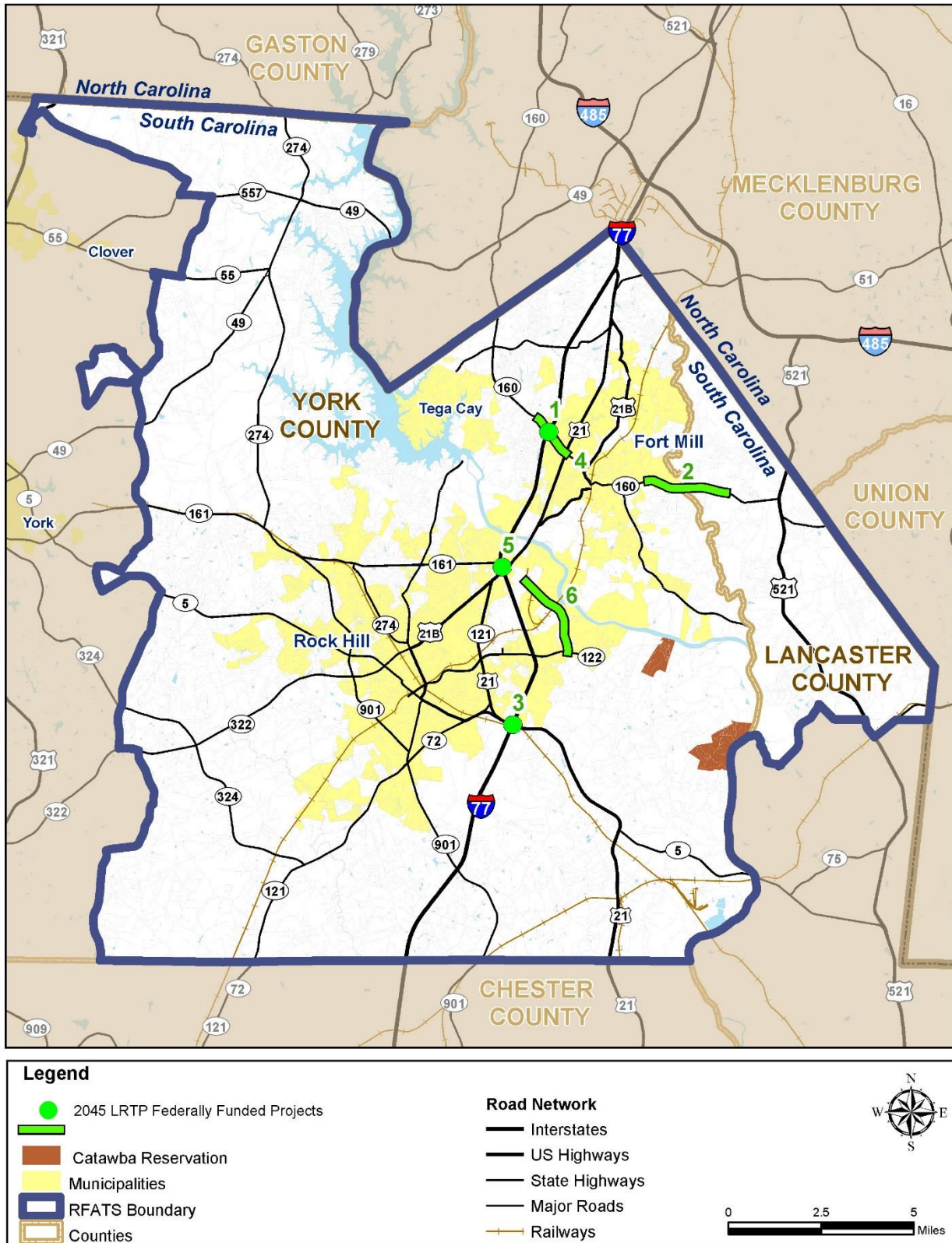
A map of the non-federally funded projects is provided in **Figure 4.9**.

Unfunded Needs are not part of the fiscally constrained LRTP, but are shown in **Table 4.3** to indicate other transportation needs identified during the development of this plan.

Table 4.1 – Federally Funded Projects in the 2045 LRTP

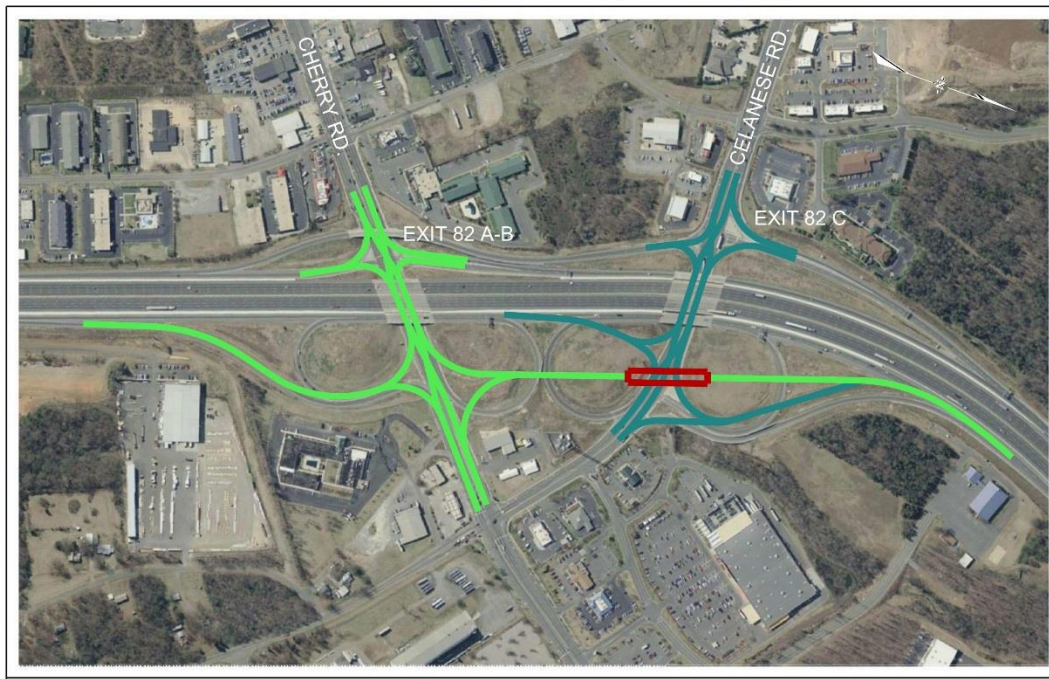
Project ID	Project Description	Funding Source	Cost (millions)	Length (miles)	Horizon Year
1	Improve I-77 Interchange at SC 160	Guideshare	\$24.8	-	2025
2	Widen SC 160 from Rosemont-McMillan to Springfield Parkway (SC 460) from 3 to 5 lanes	Guideshare	\$25.8	2.1	2035
3	Improve I-77 interchange at Anderson Road (SC 5/US 21)	Guideshare	\$5.2	-	2025
4	Widen SC 160 from 4 to 6 lanes from US 21 to Sutton Road	Guideshare	\$8.8		2025
5	Improve I-77 Interchange at Celanese Road (SC 161) and Cherry Road (US 21) (Exits 82 A, B & C)	Guideshare	\$62.1	-	2025
6	Widen Cel-River/Red River Road to 5 lanes from Eden Terrace (S-645) to Dave Lyle Boulevard (SC 122)	Guideshare	\$46.2	0.9	2025
-	System Improvement Projects (Bridge Replacements, Safety, Road Widening, Interstate Program)	FHWA, SCDOT	\$19.0	-	Throughout
-	CMAQ (Congestion Mitigation & Air Quality Improvement Program)	FHWA, SCDOT	\$5.2	-	Throughout
-	TAP (Transportation Alternatives Program)	FHWA, SCDOT, Local	\$4.0	-	Throughout
Total			\$201.1		

Figure 4.8 – Federally Funded Projects in the 2045 LRTP



The two projects shown below have also been submitted for potential funding through the State Infrastructure Bank (SIB). If SIB funds are awarded, RFATS will amend this plan to reflect this action.

Proposed Interchange Improvements for I-77 at Celanese and Cherry Rd (Exit 82 A,B,C)



Proposed Interchange Improvements for I-77 at SC 160



Table 4.2: Non-Federally Funded Projects in the 2045 LRTP

Project ID	Project Type	Route	Project Description	Horizon	Pennies Referendum	Cost (millions)
7	New Road	Tega Cay - Gold Hill Connector	Connect SC 160 and Gold Hill Road to provide a second access route from Tega Cay to SC 160	2025	2003	\$13.9
9	Road Widening	Ebinport Road (SC 904)	Widen from 2 to 3 lanes from Cherry Rd to India Hook	2025	2003	\$35.0
10	Road Widening	Mt Gallant Road	Widen from 2 to 3 lanes from Anderson Rd (US 21 Byp) to Dave Lyle Blvd (SC 122)	2025	2003	\$20.0
11	Road Widening	US 21 N and SC 51	Widen from 2 to 5 lanes with urban cross-section from Springfield Parkway to NC state line	2025	2011	\$43.7
12	Road Widening	SC 160	Widen to 5 lanes from Gold Hill Road to NC State Line	2025	2011	\$13.7
13	Interchange Modification	I-77 / Gold Hill Road (SC 460)	Gold Hill Road / I-77 interchange improvement	2025	2011	\$17.6
14	Road Widening	SC 160 East	Widen from 2 to 3 lanes from Fort Mill Northern Bypass to County Line	2025	2011	\$7.5
15	Intersection	Fort Mill Southern Bypass/Spratt St/ S Sutton Rd (SC 49)	Reconfigure intersection	2025	2011	\$8.7
16	Road Widening	Mt Gallant Road	Widen to 3 lanes from Celanese Rd (SC 161) to Twin Lakes Rd (SC 196)	2025	2011	\$32.5
17	Road Widening	Cel-River Road (SC 50)	Widen from 2 to 5 lanes from Cherry Road (US 21) to Eden Terrace (S-645)	2025	2011	\$17.5
18	Road Widening	Riverview Road	Widen from 2 to 3 lanes from Eden Terrace to Celanese	2025	2011	\$9.9

Table 4.2: Non-Federally Funded Projects in the 2045 LRTP (continued from previous page)

Project ID	Project Type	Route	Project Description	Horizon	Pennies Referendum	Cost (millions)
19	Bicycle/ Pedestrian, Safety	Cherry Road	Pedestrian safety improvements near Winthrop University	2025	2011	\$1.5
20	Intersection, Safety	Anderson Road (US 21) / Cowan Farm Road	Intersection Improvements at Anderson Road (US 21) / Cowan Farm Road	2025	2011	\$7.5
21	Bicycle/ Pedestrian	University Drive	University Drive Bike / Ped Improvements	2025	2011	\$1.2
22	Road Widening	SC 72 (Saluda Street)	Widen from 2 to 3 lanes from SC 901 to Rambo Road	2025	2011	\$26.2
23	Reconstruction, Safety	Paraham Road (S 46-54)	Add 3-foot paved shoulders on each side from SC 161 to SC 55	2025	2011	\$9.9
24	Road Widening	SC 557	Widen from 2 to 5 lanes from Kingsbury Road to SC 49	2025	2011	\$28.7
25	Road Widening	Hands Mill Highway (SC 274 / SC 279)	Widen to 3 lanes from Pole Branch Road to NC State Line	2025	2011	\$15.0
26	Road Widening	Hands Mill Highway (SC 274 / SC 279)	Widen to 5 lanes from Landing Pointe to Pole Branch Road	2025	2011	\$30.0
27	Road Widening	McConnell's Highway (SC 322)	Widen to 3 lanes from Heckle Blvd to Falls Road	2025	2011	\$18.5
28	Road Widening	US 21 N	Widen from 2 to 5 lanes from Sutton Rd- SC 160	2035	2017	\$48.4
29	Road Widening	US 21 N	Widen from 2 to 5 lanes from SC 160 to Springfield Parkway	2025	2017	\$44.3

Table 4.2: Non Federally-Funded Projects in the 2045 LRTP (continued from previous page)

Project ID	Project Type	Route	Project Description	Horizon	Pennies Referendum	
30	Road Widening	Sutton Rd	Widen from 2 lanes to 5 lanes from 6th Baxter to US 21	2035	2017	\$48.1
31	New Road	Zoar Road Extension	New facility from SC 160 to Gold Hill Road	2035	2017	\$12.5
32	Road Widening	Ebenezer Road	Widen from 2 to 3 lanes from Frank Gaston (Old Pointe) to SC 161 (Celanese Road)	2025	2017	\$22.0
34	Road Widening	Springhill Farm Rd	Widen from 2 to 5 lanes from US 21 to SC 51	2025	2017	\$8.1
35	Road Widening	Fort Mill Southern Parkway	Widen to 5 lanes from Holbrook to I-77	2025	2017	\$68.7
36	Road Widening	Fort Mill Southern Parkway	Widen to 5 lanes from SC 160 to Holbrook	2025	2017	\$24.1
Total						\$719.8

Figure 4.9: Non-Federally Funded Projects in the 2045 LRTP

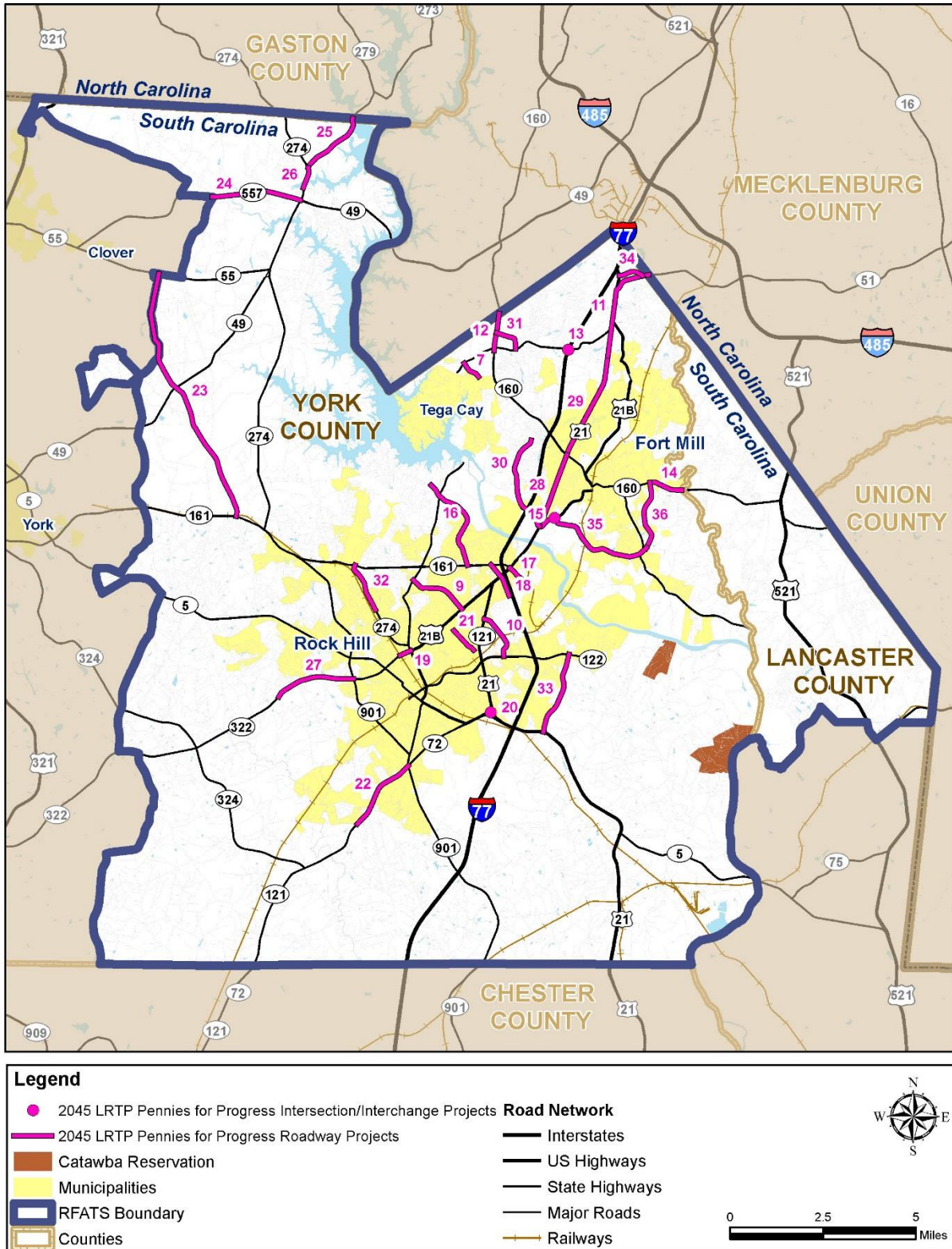


Table 4.3: Unfunded Needs

Route	Project Description
US 21	SC 160 to Fort Mill Northern Bypass/Springfield Parkway
McConnell's Highway	Widen to 3 lanes from Falls Road to Heckle Blvd
Fort Mill Southern Parkway	Widen to 5 lanes from Holbrook to I-77
Zoar Rd Extension	New 2 lane facility from Zoar Rd to Gold Hill Rd
Ebenezer Road	Widen to 3 lanes from Celanese to Old Pointe
Springfield Parkway	Springfield Parkway Bike / Ped Improvements
McConnell's Highway	Widen to 3 lanes from Falls Road to SC-324
SC-5 (West Main Street)	SC-5 (West Main Street) Bridge over Tools Fork Creek
S-81 (Adnah Church Road)	S-81 (Adnah Church Road) Bridge over Tools Fork Creek
White Street (Oakland Avenue to Dave Lyle Blvd)	White Street Pedestrian Safety Improvements
Columbia Avenue	Columbia Avenue Pedestrian Improvements
SC-72 (Saluda Road)	SC-72 (Saluda Road) Bridge over Stony Fork Creek
Red River Road-Cel River	Widen to 3 lanes from Dave Lyle (SC 122) to US 21 (S Anderson Rd)
Fort Mill Southern Parkway	Widen to 5 lanes from Holbrook to SC 160

Table 4.3: Unfunded Needs (continued from previous page)

Route	Project Description
India Hook Road	Widen to 5 lanes from Celanese to New Bridge
Sutton Road	Widen to 5 lanes from new bridge connection to US 21
East-West Bridge	New 5-lane bridge over Catawba River from Mt Gallant to Sutton
Fort Mill Northern Parkway	Widen to 5 lanes from SC160 to I-77
Pleasant Road	Widen to 3 lanes from Gold Hill Rd to SC 160
Possum Hollow Rd	Widen to 3 lanes from US 521 to SC 160
Marvin Road	Widen to 3 lanes from US 521 to Union County Line
John Ross Parkway	Widen to 4 lanes from Dave Lyle Blvd to Mt Gallant
US 21 North	Widen to 5 lanes from Sutton Rd to SC 160
Dobys Bridge Rd	Widen to 5 lanes from US 521 to York County line
Dobys Bridge Rd	Widen to 5 lanes from York County line to Fort Mill Southern Parkway
Dobys Bridge Rd	Widen to 3 lanes from SC 160 to Fort Mill Southern Parkway
Mt Gallant Road	Widen to 3 lanes from Twin Lakes Rd to Museum Rd
White Street (SC 160)	Widen to 3 lanes from US 21 to McCammon

Table 4.3: Unfunded Needs (continued from previous page)

Route	Project Description
SC-72 (Saluda Street)	Widen to 5 lanes from SC-901 to Rambo Road
Munn Road	Widen to 3 lanes from Harris St to FMHS
Springsteen Road	Widen to 3 lanes from Dave Lyle Blvd to US 21
SC 49	Widen to 7 lanes from SC 274 to SC 557
Harrisburg Road	Widen to 3 lanes from SC 160 to Mecklenburg County line
River Parkway	New 2 lane from Banks Rd to Dobys Bridge Rd
Mt Gallant Road	Widen to 3 lanes from Museum Rd to SC 274
Pleasant Road	Widen to 3 lanes from Gold Hill Rd to Carowinds Blvd
Eden Terrace Rd	Widen to 3 lanes from Anderson to Bradley
Ridge Road	Widen to 3 lanes from US 321 to SC 557
Whites Rd	Widen to 3 lanes from FMSP to JW Wilson
Barberville Rd	Widen to 3 lanes from SC 160 to Mecklenburg County line
Henry Harris Rd	Widen to 5 lanes from Marvin Rd to Jim Wilson Rd
Shelley Mullins Rd	Widen to 3 lanes from US 521 to Union County line
US 521	Widen to 7 lanes from Jim Wilson Rd to Mecklenburg County line

Catawba Indian Nation Transportation Plan

Catawba Indian Nation Projects

The Catawba Indian Nation coordinates transportation planning with RFATS and has a voting representative on the RFATS Policy Committee.

The tribe also participates in the Indian Reservation Road Inventory (IRR). This is a program addressing the transportation needs of tribes by providing funds for planning, design, construction, and maintenance activities. This program is jointly administered by the Federal Highway Administration's Federal Lands Highway Office and the Bureau of Indian Affairs (BIA).

Projects for the tribe are overseen by the Catawba Indian Nation Department of Transportation. Currently planned road projects include reconstruction of Wade Harris Road and John Brown Road, VA Cemetery Access, and the Passmore Road extension.

Introduction

Public safety is one of government's crucial responsibilities. In the context of transportation planning, the consideration of safety has evolved into two related but separate elements: *safety* and *security*. This chapter addresses both. Safety deals generally with the reduction of injury and death to users of the transportation system. Security is related to a region's ability to maintain mobility for its citizens, even in adverse conditions, both by protecting the transportation system against threats and by providing multiple options for managing travel demand and destination routing.

Safety

Federal legislation has established the Highway Safety Improvement Program as a core program tied to strategic safety planning and performance. The HSIP program is aimed at making significant progress in reducing highway fatalities. Additional programs target specific areas of concern, such as work zones, older drivers, and pedestrians, including children walking to school.

The HSIP program requires data-driven strategic highway safety planning, focusing on results. In fact, highway safety was one of the first areas in which federal requirements were issued for performance-based planning and programming. As mentioned in Chapter 3, state DOTs and MPOs are expected to coordinate in establishing targets and monitoring progress for these measures of highway safety:

- Number of fatalities
- Rate of fatalities per 100 million vehicle-miles traveled
- Number of serious injuries
- Rate of serious injuries per 100 million vehicle-miles traveled
- Number of non-motorized user fatalities and serious injuries

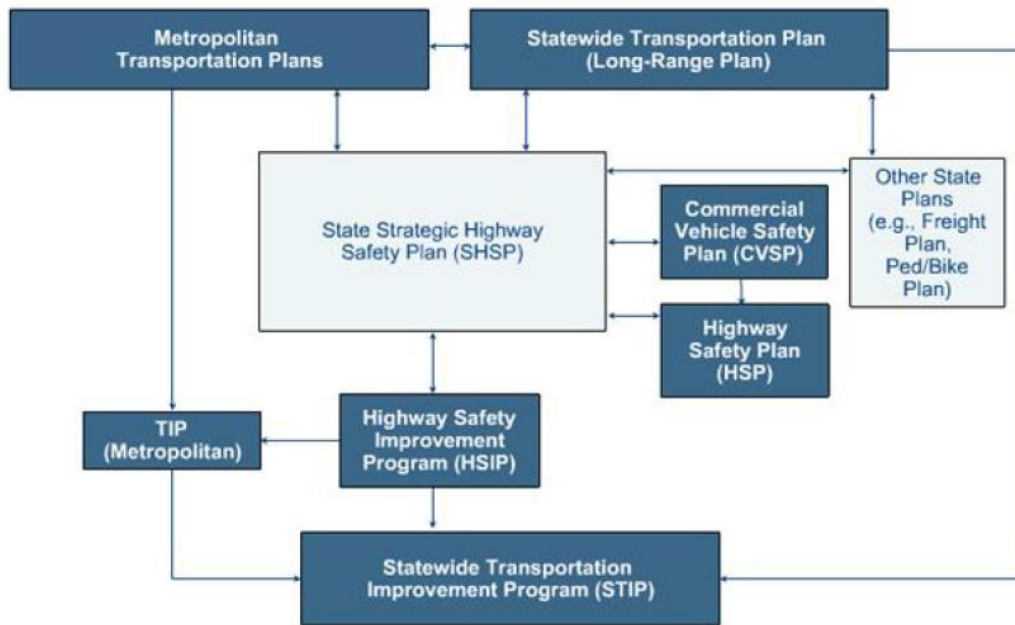
These measures are to be calculated based on the most recent five years of available crash data. As discussed below, SCDOT's state highway safety plan already incorporates most of the measures at the statewide level. RFATS will coordinate with SCDOT to ensure each measure is reported and tracked at the regional level as needed to meet state and federal requirements.

Framework for Safety Planning

The key planning process for highway safety in the RFATS area is the development of the statewide highway safety plan. The most recent edition was published in 2015 as *South Carolina's Strategic Highway Safety Plan*:

Target Zero. As **Figure 5.1** shows, the statewide highway safety plan provides the framework for SCDOT’s partner agencies and their planning documents, including RFATS and its LRTP.

Figure 5.1 - Relationship between the Highway Safety Plan and Other Plans



Source: South Carolina’s Strategic Highway Safety Plan: Target Zero (2015)

Statewide Conditions and Trends

Since South Carolina’s last *Strategic Highway Safety Plan: The Roadmap to Safety*, published in 2008, the state saw an overall reduction of 20.4% in roadway deaths between 2006 and 2012. However, significant work remains to be done, particularly since the state still has one of the highest traffic fatality rates in the country. To take its efforts to the next level, South Carolina developed and adopted its new *Strategic Highway Safety Plan: Target Zero* in 2015. Although its ultimate goal is to have zero traffic related fatalities occurring in South Carolina, the plan recognizes success will not occur overnight and will require long-term goals, strategies, and coordination to achieve.



Goals for 2015 through 2018 include:

- Reduce statewide traffic **fatalities** to a maximum of **575 persons** per year by 2018, with an annual reduction of 48 fatalities. (In comparison, traffic fatalities numbered 863 persons in 2012.)
- Reduce the statewide number of **fatal crashes** per 100 million vehicle miles travelled to 1.17. (This rate was 1.76 in 2012.)
- Reduce statewide number of **severe injuries** to 2,265 incidents per year by 2018. (Total severe injuries numbered 3,397 persons in 2012.)
- Reduce the statewide number of **severe injury crashes** per 100 million vehicle miles travelled to 4.63. (This number was 6.95 in 2012.)

Target Zero, in accordance with federal law, was developed collaboratively by a number of federal, state and local partners. SCDOT is the designated lead for the statewide implementation effort. RFATS participates in implementation by incorporating the relevant safety goals, priorities, countermeasures, and programs for the RFATS area into its own LRTP.

The four “E”s of safety were maintained as guiding principles in the development of *Target Zero*:

- Engineering
- Enforcement
- Education
- Emergency Medical Services (EMS)

Nine emphasis areas were selected by the Strategic Highway Safety Plan Steering Committee to concentrate efforts and monitor performance. Each of these emphasis areas has been identified as a leading cause of traffic fatalities in South Carolina and has its own goals for reduction of fatalities and severe injuries, along with associated objectives and strategies:

- **Roadway Departure;**
- **Unrestrained Motor Vehicle Occupants;**
- **Age-Related Crashes (Young Drivers: 19-24 years of age and Older Drivers: 65 or more years of age);**
- **Speed Related Crashes;**

- **Vulnerable Roadway Users (Motorcyclists, Pedestrians, Moped Operators and Bicyclists);**
- **Intersection and Other High-Risk Roadway Locations (Work Zones and Railroad Crossings);**
- **Impaired Driving;**
- **Commercial Motor Vehicle/Heavy Truck Crashes;**
- **Safety Data Collection Access, and Analysis.**

Regional Conditions and Trends

Fatal Crashes

The RFATS region experienced a total of 83 traffic-related fatalities during the period of 2011 to 2015, according to the Fatality Analysis Reporting System (FARS) maintained by the National Highway Traffic Safety Administration.

Based on the reported characteristics of these fatal crashes, the following *Target Zero* emphasis areas have been identified as having particular relevance to the RFATS region. Also shown below are potential strategies identified by *Target Zero* to reduce and/or mitigate each type of crash. RFATS and SCDOT officials should discuss the strategies most likely to be useful in the region, and which locations exhibit the greatest need based on crash data.

Roadway Departure

Almost 60 percent of the traffic deaths in South Carolina over the past five years resulted from vehicle roadway departure, also known as “run-off-road” crashes. This type of crash is more commonly seen in rural areas where pavement markings, lane and shoulder widths, and roadway lighting may not meet the same standards typically expected in urban locations. However, roadway departure was involved in more than half of the recent fatalities in the RFATS area, perhaps reflecting locations where growth is putting pressure on roadway facilities that have not been upgraded to meet the needs of increasing traffic levels.

Some of the strategies to help reduce roadway departure are relatively low-cost measures which can be incorporated during resurfacing projects. FHWA has been promoting “Safety Edge,” which several states have found effective in reducing roadway departure crashes on two-lane roads with unpaved shoulders. With this asphalt paving technique, the road pavement edge is



Safety Edge

tapered at a 30-degree angle instead of being left as a vertical drop-off. When a driver's wheel drops off the road, the gentler angle helps prevent the driver from losing control when steering back onto the roadway.

STRATEGIES

- Use centerline and edge line rumble strips in accordance with SCDOT policy
- Use "Safety Edge" where appropriate in repaving projects
- Identify opportunities to upgrade inadequate shoulders
- Educate drivers on proper recovery techniques



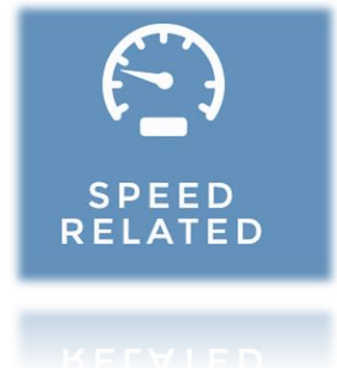
Speed-Related Crashes

Forty percent of recent fatalities in the RFATS area were related to speeding, which is somewhat higher than statewide levels. Although enforcement is the traditional approach to managing speeding, many communities are also beginning to look at the impact of roadway design on drivers' speeds. Traffic calming techniques on neighborhood streets can include narrowing lanes and introducing curves where there are long, straight sections of roadway.

Ironically, easing congestion can also reduce speeding in some circumstances. Law enforcement officials note that on some roadways, drivers tend to speed once they get past a significant bottleneck, presumably with the idea of catching up on lost time.

STRATEGIES

- High visibility enforcement at problem locations
- Use of roadway design to influence speed
- Timed, coordinated traffic signals to improve traffic flow, reduce red-light running, and manage speeds



Vulnerable Roadway Users

Pedestrians and bicyclists make up about 13 percent of traffic-related deaths in the RFATS region, on par with statewide levels. The majority of deaths are pedestrians; only two bicyclists in the RFATS area were killed between 2011 and 2015. Strategies to improve pedestrian and bicycle safety include expansion of the region’s network of sidewalks and bike facilities, as well as raising awareness of traffic laws among motorists and non-motorists. Local bicycle/pedestrian advocacy groups have helped to sponsor training for area law enforcement officers.

STRATEGIES

- Install separated facilities along corridors and at intersections where supported by crash analysis
- Consider pedestrian/cyclist safety and mobility during needs assessment for all projects
- Implement targeted enforcement campaigns for motorists and non-motorists. Educate officers on pedestrian laws.



ROADWAY NERBZ
AOLNEKARTE

Older Drivers

Nearly one in four traffic fatalities in the region is a driver 65 years or older, significantly higher than the statewide average of 16%. Physical changes to the transportation system, such as increasing visibility and improving legibility of signage, can help. Groups such as AARP may help to sponsor various training. Providing and publicizing public transit options is also important so that people feel they can relinquish driving without losing their participation in community life.

STRATEGIES

- Provide more protected left-turn signal phases at high-volume intersections, where supported by collision data
- Consider lighting and other engineering actions at locations where indicated by collision data
- Provide training to medical professionals and law enforcement for recognizing physical cognitive deficiencies that affect safe driving in older adults



KEVLED

Regional Safety Performance Measures

Although the Fatality Analysis Reporting System provides data on fatal crashes at the MPO level, information on crash rates and serious injuries is currently available to RFATS only at the county level. To provide consistency in reporting, York and Lancaster counties are therefore the basis for the performance data shown in **Table 5.1**. These numbers represent the average of the most recent available five years of crash data reported as of March 2017.

Table 5.1: RFATS Safety Performance Measures (2010-2014)

Measure	York County 5-Year Avg.	Lancaster County 5-Year Avg.
Number of fatalities	27	13
Rate of fatalities per 100 million vehicle miles traveled (VMT)	1.319	2.057
Number of serious injuries	1,915	766
Rate of serious injuries per 100 million VMT	91.669	113.200
Number of non-motorized user fatalities	4	1
Number of non-motorized user serious injuries	336	4

Sources: 2011-2014 fatalities and fatality rate from annual South Carolina Collision Fact Book. Non-motorized user fatalities from Federal Accident Reporting System. Non-motorized user serious injuries from Bike Walk RFATS plan.

Stakeholder Input

Safety issues were among the topics raised by stakeholders during the public involvement process for the LRTP. Comments focused on concern for bicycle and pedestrian safety, as well as the potential for traffic collisions due to congestion and the design of turning lanes on major arterial roads.

Security

Public awareness of security issues has been heightened as a result of recent disasters such as Hurricane Katrina and the terrorist attacks of September 11, 2001. Key considerations in transportation security include “hardening” critical infrastructure against both man-made and natural threats, and increasing the system’s resiliency, i.e. its ability to resume normal function quickly after a major impact. Resiliency can be improved through coordinated response – ranging from a pre-arranged plan to re-direct traffic to an agency’s streamlined procedures to allow rapid re-construction of a critical bridge. System resiliency can also be improved by ensuring “redundancy,” i.e. having multiple routes or more than one transportation mode to serve key destinations.

Roles in Transportation Security

Most states, regions and local governments have a dedicated department or agency that handles emergency planning and response. Transportation agencies such as SCDOT and RFATS play important supporting roles, as further described below.

The State Emergency Operations Plan is administered by the South Carolina Emergency Management Division, Office of the Adjutant General. Under the plan, SCDOT is responsible for the management of transportation assets and infrastructure during, or immediately following, a critical emergency or disaster incident. This function includes providing for coordinated plans, policies, and actions of state and local governments to ensure the access and safety of the public traveling on the transportation system during all hazards. Once the threat or hazard no longer exists, SCDOT performs prompt inspections of the transportation infrastructure and facilitates orderly re-entry into the area after an evacuation. Other missions may not involve evacuations, but are equally important. These may include responding to severe weather conditions, or re-routing traffic to protect travelers from hazardous material.

Hazards requiring action by SCDOT and partner agencies include hurricanes, winter storms, tornadoes, wildfires, dam failures, flooding, earthquakes, and national security emergencies. They also have responsibilities in incidents involving the potential release of hazardous materials, an issue which received additional attention from Congress in the latest reauthorization of surface transportation funds. As part of the FAST Act, a new grant program was created for training programs related to community preparedness and response to incidents involving hazardous materials.

Regional Conditions and Trends

One of the unique concerns for emergency response in the RFATS area is maintaining an evacuation plan for the area around the Catawba Nuclear Power Station, located on a peninsula in Lake Wylie. Most of the RFATS planning area is within a 10-mile radius of the station. Related security issues include transportation of hazardous materials as well as local evacuation routes to be used in case of an incident.

Planning and response for incidents involving the Catawba station are the responsibility of the York County Emergency Management Office. Many of the designated evacuation routes (**Figure 5.2**) are part of the road system for which RFATS has responsibility to plan and program funds. York County Emergency Management is therefore a critical partner in the RFATS planning process, to help identify routes or areas of the transportation network that may not be adequate for emergency use. RFATS should continue to give funding priority to improving SC 160, US 21 North, and other key routes designated in the Catawba station evacuation plan.

Resiliency

As new residential and commercial development continues, there is some risk that roads that were sufficient a decade ago will no longer have the capacity needed to quickly evacuate an increased number of residents and employees. However, local governments have considerable ability to improve the resiliency of the area's road network through their development policies, and the extent to which they follow the RFATS Collector Street Plan. As noted earlier, security is improved when a community has a more interconnected network; when one route is impacted by an incident, alternate routes are available. This is the reason that many communities require at least two entrances to large subdivisions: in dense areas, too many lives are at risk to rely on only one route for emergency responders to evacuate residents or reach them in case of disaster. The same concept holds true at a larger scale; a region is more secure with multiple connections among its major centers.

Non-Highway Modes

Transit security plans and training in the RFATS region are managed by the local operators (CATS and York County Council on Aging). Rock Hill/ York County Airport (Bryant Field) has its own emergency plan. Railroads must also perform comprehensive safety and security risk analyses to determine the safest routes for moving hazardous goods.

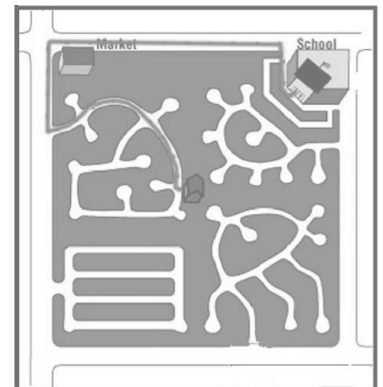
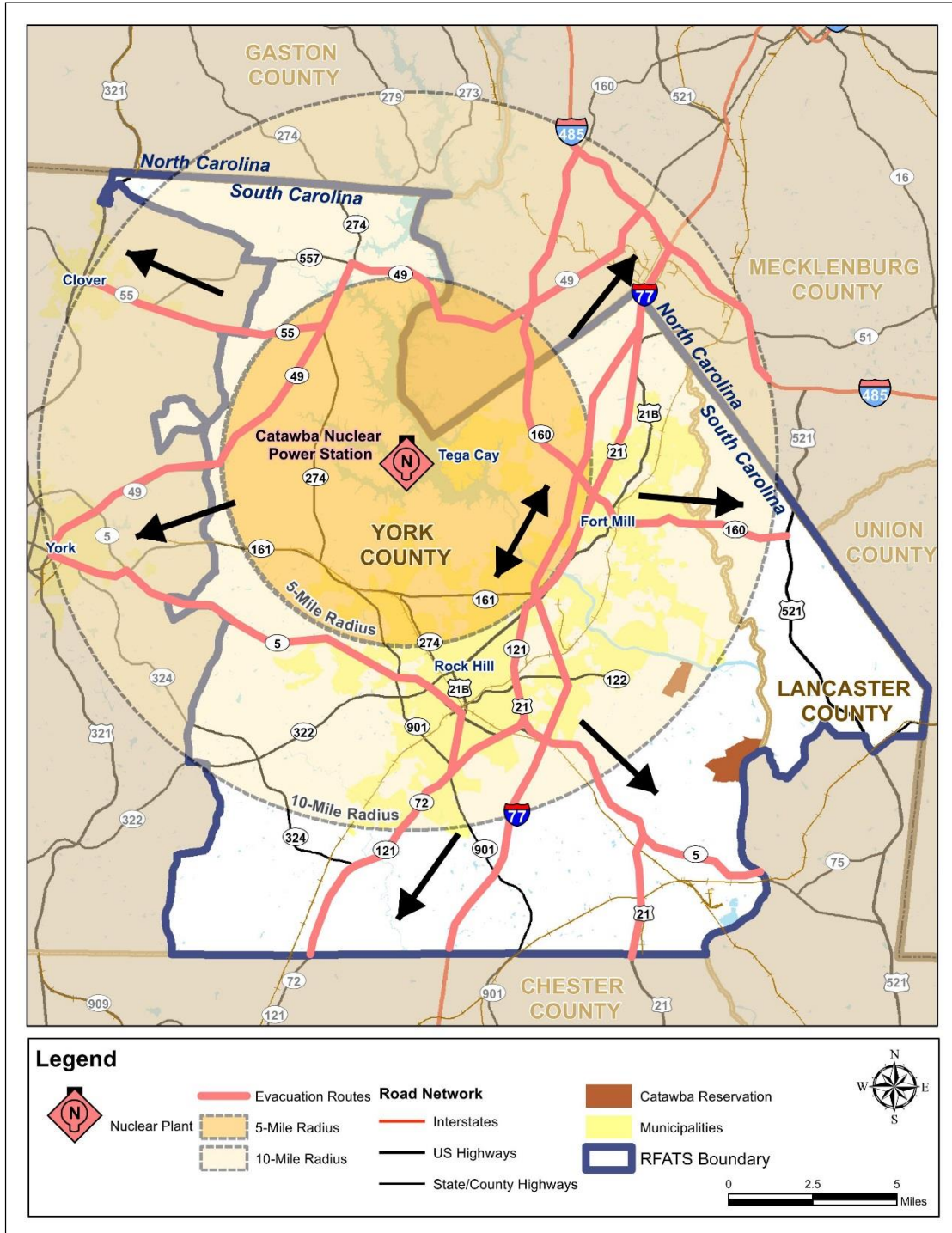


Figure 5.2 - Evacuation Routes from Catawba Nuclear Power Station



Sources: Duke Energy and York County Office of Emergency Management

Public transit is sometimes considered a more likely target for threats because of the concentration of people on vehicles and at stations. Each transit agency maintains security protocols and provides regular training for drivers and other staff. Most systems have also installed cameras and other security equipment such as automatic vehicle location (AVL) on their vehicles and at major facilities.

Public transit typically has a seat at the table for emergency planning because it offers critical resources to help emergency responders evacuate large numbers of people quickly from an area. Transit drivers also have a unique vantage point to help monitor area roadways and alert local officials to potential security concerns, since they are continually driving around the community's major routes. Many local transit agencies have implemented a version of the Federal Transit Administration's "Transit Watch" program, which encourages riders and drivers to report unattended packages or suspicious behavior.



Introduction

As described in Chapter 4, traffic volumes on RFATS area roadways are increasing along with the growing number of people who live and work in the region. Locally, drivers currently spend more than a third of their time in stop-and-go conditions, which is bad not only for regional air quality, but also for economic productivity. The monetary value of the time that RFATS area drivers spent in congested conditions in 2015 was an estimated \$11 million, based on data used by the Texas Transportation Institute.

Even with the road widening projects proposed in this plan, some roads in the RFATS network will still operate below acceptable levels of service. With appropriate federal and state funding support consistent with growth activity, the region could make additional road capacity improvements. However, in some locations the limiting factor is not just funding, but physical constraints that prevent the addition of new lanes. Therefore, the region will need to incorporate a broader range of mitigation strategies for managing congestion. This chapter outlines various tools that are available, and how progress is being tracked.

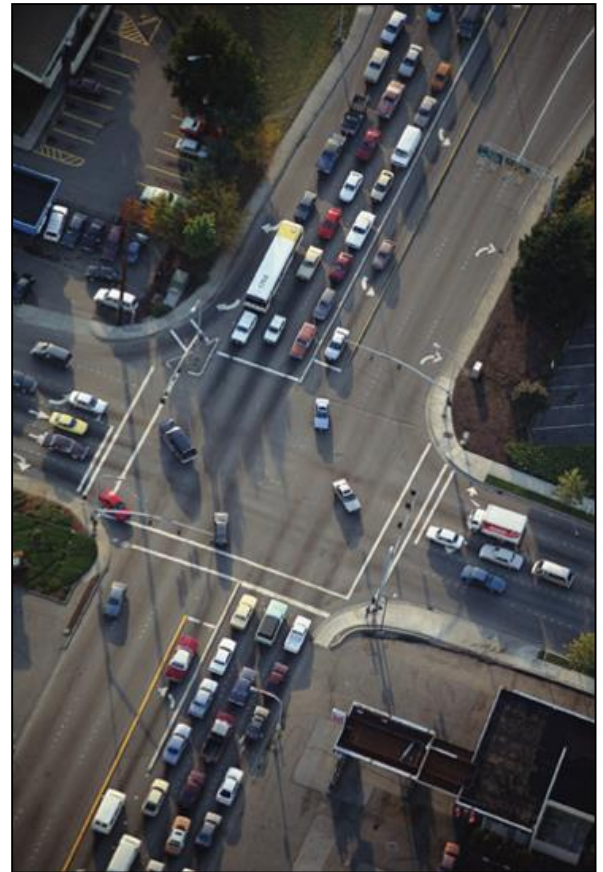
The Congestion Management Process

Federal law requires a Congestion Management Process (CMP) to be maintained and used in transportation planning for all urbanized areas with a population greater than 200,000. Although the RFATS study area itself does not fall within this category, RFATS is considered part of the larger Charlotte-Mecklenburg urbanized area, and is therefore required to have a CMP.

A CMP is a continuous cycle of transportation planning activities designed to provide decision-makers with better information about transportation system performance and the effectiveness of various strategies to deal with congestion.

A CMP has four main components:

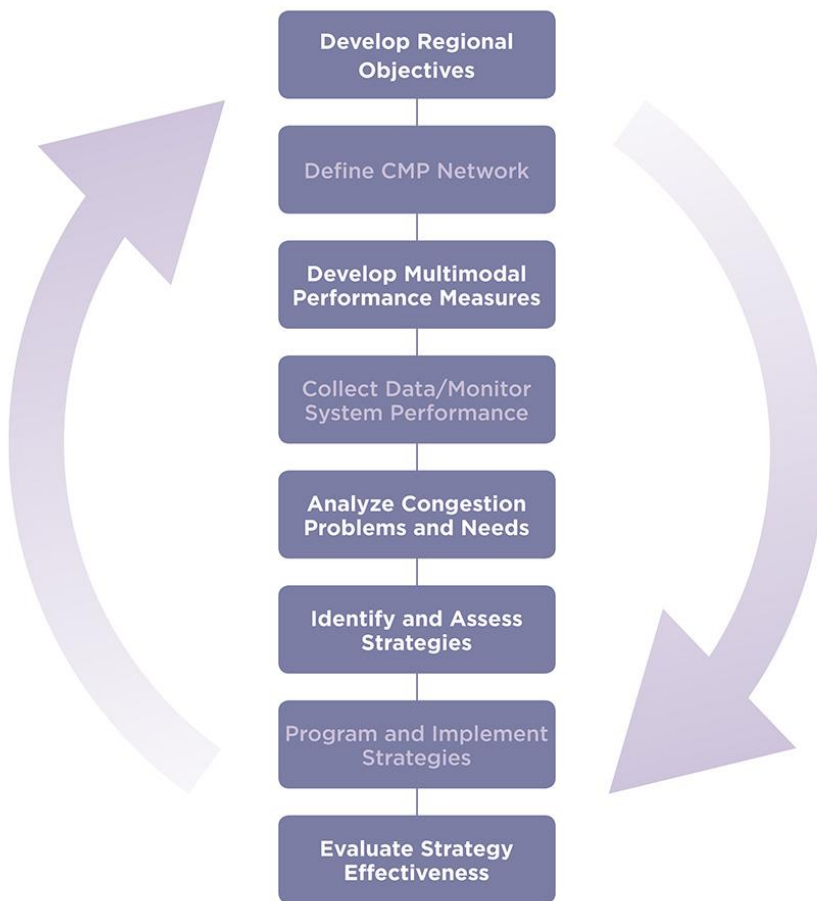
- Measurement and identification of congestion,



- A matrix of congestion mitigation strategies,
- Monitoring of effectiveness after implementation, and
- An orderly evaluation process.

Figure 6.1 shows these components, and highlights the fact that a CMP is not a one-time exercise but an ongoing process of planning, action and review. It is also a learning process. By monitoring the effectiveness of congestion mitigation strategies and evaluating their benefits in an orderly, consistent manner, planners and decision-makers can improve their ability to select the most cost-effective strategies appropriate to their specific local conditions and needs.

Figure 6.1 The Congestion Management Process



Source: FHWA, Congestion Management Process

Like other components of the LRTP, the CMP reflects regional objectives for congestion management that are drawn from the regional vision and goals, and are communicated through performance measures such as travel time and

delay. The CMP provides the framework for evaluating alternative strategies along RFATS' most congested corridors and intersections, in order to generate viable projects and programs for consideration in the LRTP.

Congestion Monitoring Network

The RFATS CMP identifies particular roadways where traffic operations are to be evaluated on a regular basis. This “congestion monitoring network” consists of core arterial roads such as Celanese Road, SC 160, Gold Hill Road, US 21, Mt. Gallant Road, SC 49, and Dave Lyle Blvd.

Corridors were selected for evaluation based on the focus areas identified by the CMP (**Figure 6.2**). These areas were highlighted for particular attention based on known development pressures, potential development opportunities, and current traffic conditions.

Since the development of the initial congestion management process, the RFATS region has expanded to include the panhandle of Lancaster County. Additional corridors and focus areas were therefore added to the network, including US 521 and SC 160 east from the York County line. The updated monitoring network is shown in **Figure 6.3** and **Table 6.1**.

Current average speeds and travel times were collected in 2016 for nine corridors distributed throughout the RFATS region. One newly available data source for travel speeds is the USDOT-sponsored National Performance Management Roadway Data System (NPMRDS). This dataset is compiled from various sources such as cell phone locations, in-vehicle navigation systems, and Global Positioning Systems (GPS) devices used by trucking companies. For the corridors where NPMRDS data is not available, travel speeds were manually surveyed using the floating car method.

The 2016 monitoring results suggest that intersection-related delay continues to be one of the most significant contributors to the peak-hour congestion experienced by area motorists. Since the NPMRDS data is based on corridor segments, other tools may be needed to properly assess congested conditions in the RFATS region. RFATS will continue to track federal guidance and resources on performance measurement, as well as the experience gained by other MPOs using the new datasets, to help design its next full CMP update.

Figure 6.2: CMP Focus Areas

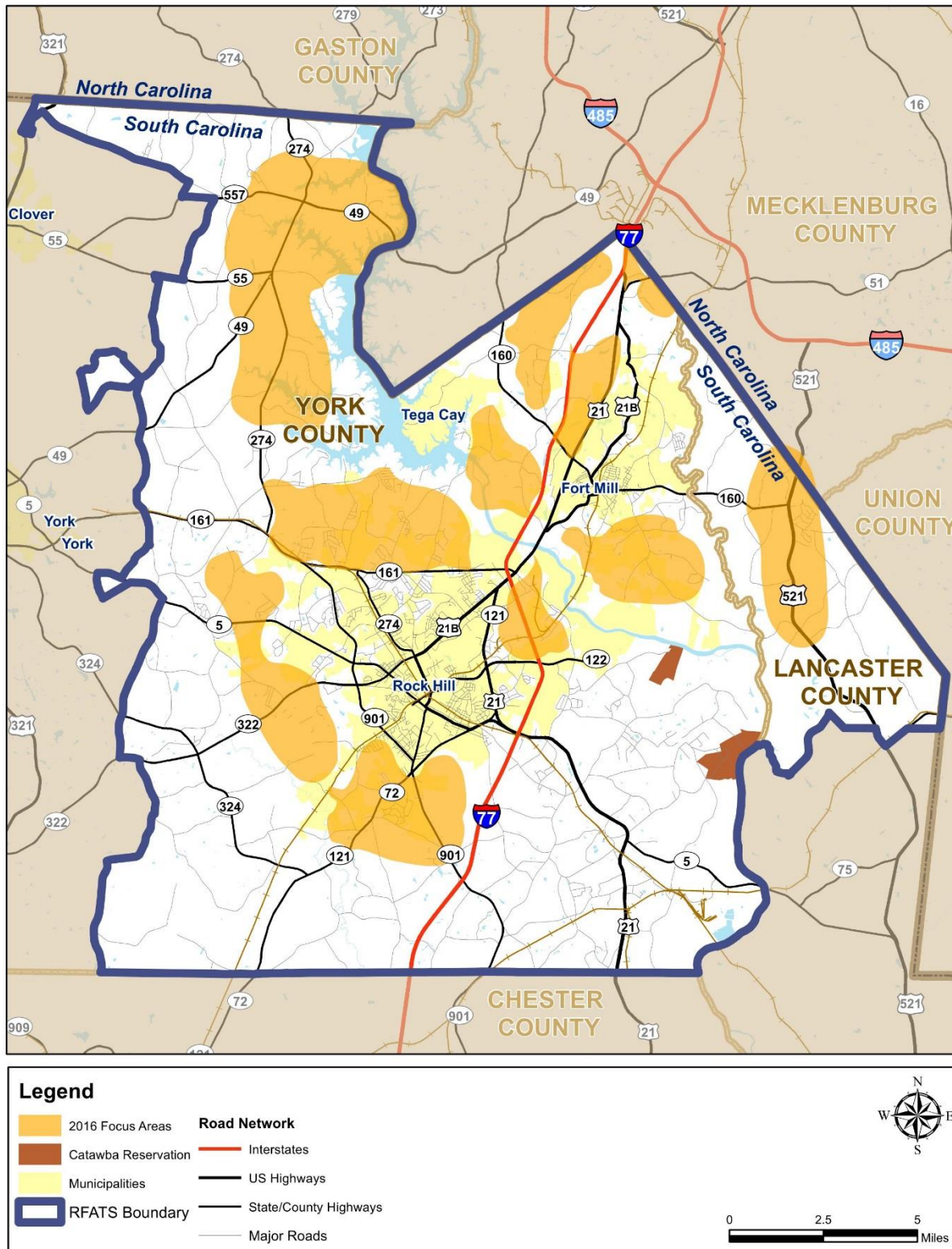


Figure 6.3: Congestion Monitoring Network

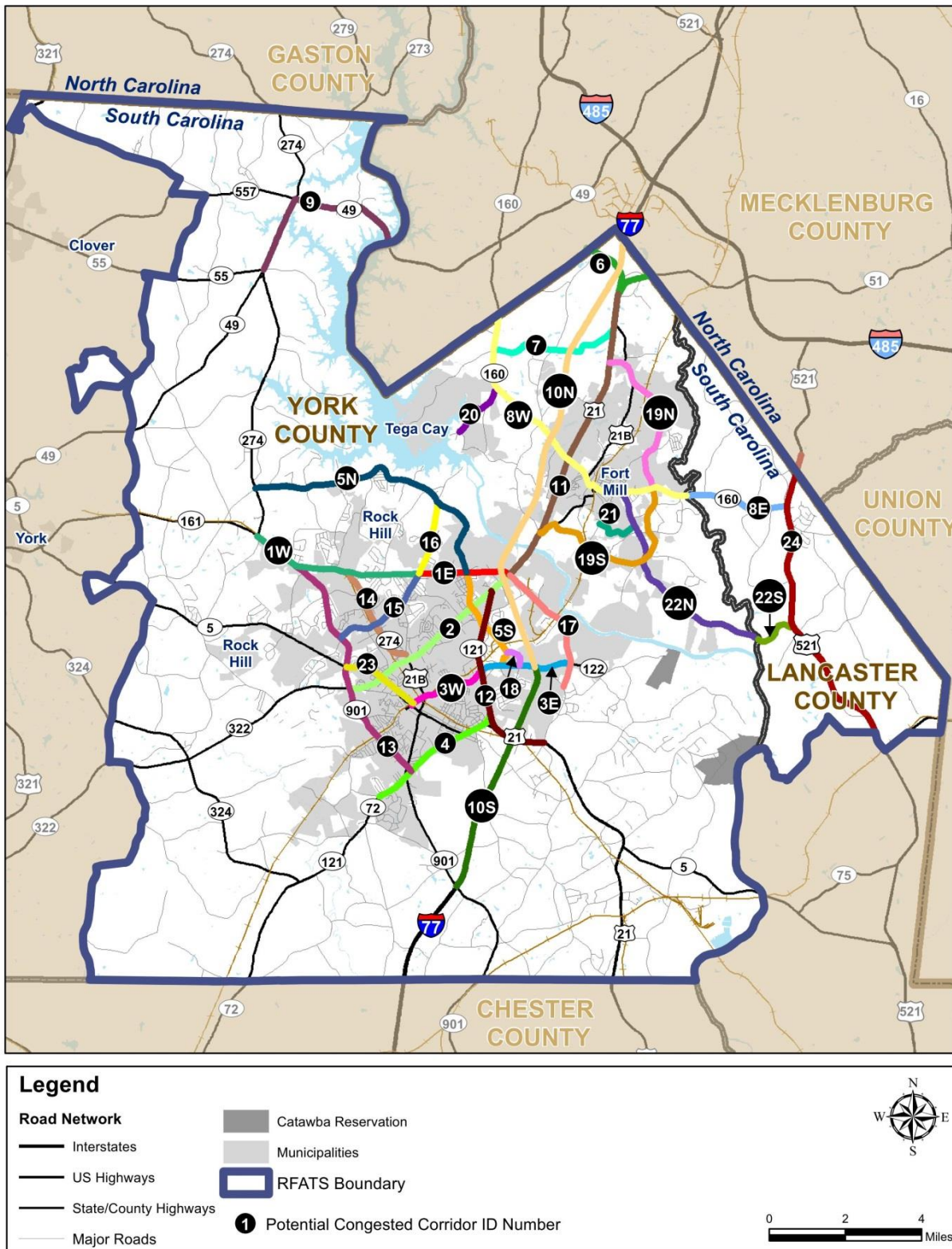


Table 6.1: Congestion Monitoring Network Routes

ID	Corridor	From	To	Miles
1W	Celanese Road	SC 274/Hands Mill Hwy	India Hook Road	4.56
1E	Celanese Road	India Hook Road	US 21/Cherry Road	2.41
2	Cherry Road	Heckle Blvd	Celanese Road/Cel-River Road	5.24
3W	Dave Lyle Blvd	W Black Street	US 21 Bypass	2.19
3E	Dave Lyle Blvd	US 21 Bypass	Cel-River/Red River Road	2.40
4	SC 72/Albright Road	Rawlsville Road	Springdale Road	3.69
5N	Mt Gallant Road	SC 274/Hands Mill Hwy	Celanese Road	7.58
5S	Mt Gallant Road	Celanese Road	Dave Lyle Blvd	2.88
6	US 21/Carowinds Blvd	Pleasant Road	NC State line	2.84
7	Gold Hill Road	SC 160	US 21	5.53
8W	SC 160	NC State Line	York/Lancaster Co Line	8.29
8E	SC 160	York/Lancaster Co Line	US 521	2.72
9	SC 49	SC 55	NC State line	4.90
10N	I-77 (north of Dave Lyle)	Dave Lyle Blvd	NC State line	12.6
10S	I-77 (south of Dave Lyle)	SC 901	Dave Lyle Blvd	6.20
11	US 21 (north)	Celanese/Cel-River Road	SC 51/Carowinds Blvd	8.05

(Continued on next page)

Table 6.1: Congestion Monitoring Network Routes (cont.)

ID	Corridor	From	To	Miles
12	Anderson Road (SC 121)	Springdale Road	US 21/Cherry Road	5.07
13	Heckle Blvd (SC 901)	Anderson Road/Saluda St	Celanese Road	6.62
14	Ebenezer Road/Hands Mill Hwy	Oakland Ave	Celanese Road	2.74
15	Herlong Ave	Heckle Blvd	Celanese Road	2.82
16	India Hook Road	Celanese Road	Mt Gallant Road	1.97
17	Cel-River/Red River Road	Springdale Road	US 21/Cherry Road	3.61
18	John Ross Pkwy	Dave Lyle Blvd	Mt Gallant Road	0.61
19N	Fort Mill Northern Pkwy	SC 160	US 21	4.21
19S	Fort Mill Southern Pkwy	US 21	SC 160	5.41
20	Dam Road	New Gray Rock Road	SC 160	1.66
21	Fairway Dr (FM)	Brickyard Road	Dobys Bridge Road	1.19
22N	Dobys Bridge Road (YC)	SC 160	Lancaster County line	6.06
22S	Dobys Bridge Road (LC)	Lancaster County line	US 521	1.19
23	W Main St (SC 5)	Dave Lyle Blvd	Heckle Blvd	2.09
24	US 521	Waxhaw Hwy (SC 75)	North Carolina State line	8.82

Congestion Management Strategies

Improving the operational efficiency of the RFATS transportation network relies on different approaches to managing system resources, user demand, and adjoining development patterns. Selecting the appropriate strategy (or strategies) is done through detailed evaluation of each congested roadway and intersection. **Figure 6.4** shows the range of tools available.

Figure 6.4: Congestion Management Strategies

Access Management

- Access spacing
- Driveway spacing
- Safe turning lanes
- Median treatments
- Right-of-way management

Transportation Systems Management

- Highway geometric improvements
- Traffic signal improvements
- Wayfinding and signage

Incident Management

- Motorist assistance patrols
- Strategies to improve response times
- Strategies to reduce clearance times

Intelligent Transportation Systems

- Ramp metering
- Traveler information and re-routing systems
- Electronic commercial vehicle clearance and tolls

Travel Demand Management

- Increased ridesharing, vanpooling
- Alternative work schedule
- Alternative commute mode

Access Management

Many communities are beginning to look more seriously at access management to control the growing congestion on their arterial roadways. Access management emphasizes the importance of maintaining each road's intended function. Roadways primarily intended to serve through-traffic – such as freeways and major arterial roads – offer only limited direct access to adjoining properties. This helps minimize the number of times that a driver must slow down because the vehicle ahead has either pulled out into the road or has braked to make a turn.

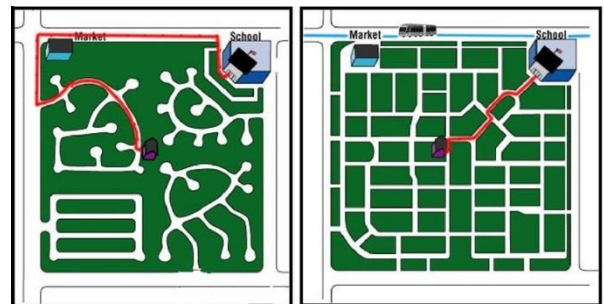
In contrast to arterials, local streets are intended primarily for access to adjoining property. Through-traffic flow is less important; in fact, most communities set low speed limits and even implement traffic calming measures on local streets.

Collector roads are intended to balance the needs of access and through-movement. They provide some access to adjoining property, although not as much as a local street. Their function is to “collect” traffic from multiple local streets and then connect either to an arterial road, or to another collector.

Some parts of the RFATS region have a very limited number of collector roads. This situation can contribute to congestion because drivers cannot make most of their trips without first getting onto an arterial road. Figure 6.4 shows the difference between a road network with a high number of connections, versus a network with many fewer route choices.

Access management can be carried out through roadway design, access permitting, subdivision or site plan review, and access management plans and regulations.

Figure 6.4: Network Connectivity



Travelers in the more highly connected road network (on the right) have more options to reach their destinations. Those using the network on the left must first drive to the arterial road that borders their neighborhood in order to reach other destinations.

Wayfinding

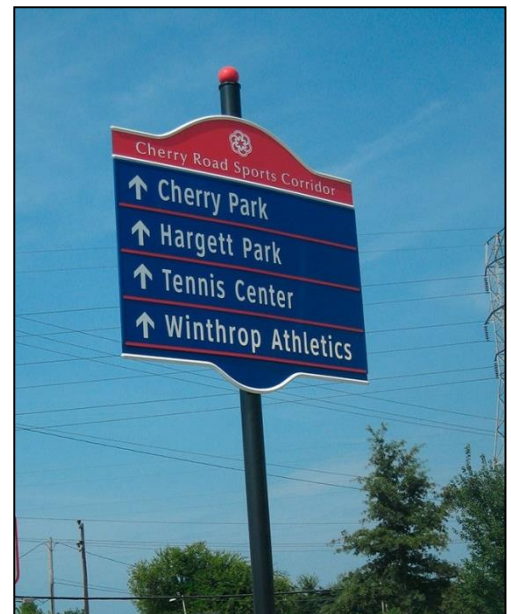
With the passage of the FAST Act, Congress directed metropolitan planning organizations to consider how their transportation systems support travel and tourism. Attracting visitors – perhaps even day trippers from the same region – has become a popular tactic for bolstering the economy in many communities. The impact on local transportation networks depends partly on the volume of visitors, but also on their timing and location relative to other local travel demands. Communities that work consciously to attract more visitor trips should give consideration to how those trips will interface with existing local traffic. For example, some communities downtowns are busy on weekdays but become silent once office workers go home on Friday afternoon. Hosting a Saturday farmers market draws traffic back to the downtown area at a time that does not compete with commuter traffic.

Wayfinding – using a system designed to guide drivers through a community – is an important part of creating a positive experience for visitors that will generate return visits.

Providing visual cues and easily recognizable symbols creates a sense of safety and security in an unfamiliar environment. Wayfinding can also be used to help mitigate the impact of heavy visitor travel on local movements, by directing visitors to use specific routes or facilities.

The RFATS region, already known as a family-friendly vacation destination thanks to Carowinds, is now also recognized as a premier host for youth sports tournaments. Visiting families can benefit from a wayfinding system to guide them to sports complexes, parking areas, shopping and other attractions they may wish to visit while they are in town. Likewise, local residents can benefit from a system that directs visitor traffic along a route that avoids a confusing intersection, a busy school zone, or a quiet neighborhood street.

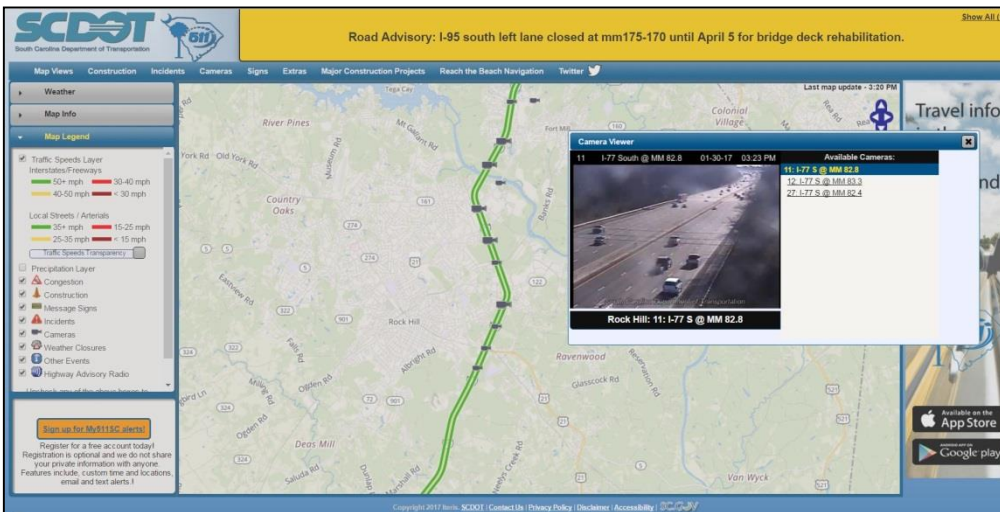
As an example, Rock Hill’s current wayfinding system seeks to orient visitors by identifying two primary corridors where most destinations are clustered: the Dave Lyle Gateway Corridor and the Cherry Road Sports Corridor. Further action to identify other key destinations, such as Riverwalk or the Anne Springs Complex, and link them with a comprehensive wayfinding system, could enhance travel throughout the region.



Incident Management

FHWA research has shown that more than 60 percent of congestion is non-recurring, as opposed to being linked with physical bottlenecks. Much of this non-recurring congestion is related to vehicle crashes or other incidents. Worse, the traffic delays caused by the initial incident often result in secondary collisions due to inattentive or “rubbernecking” drivers.

SCDOT, like many states, has put increased emphasis on detecting incidents early and clearing them quickly before they significantly impact travel or result in secondary crashes. The real-time traffic monitoring information is also being made available to the traveling public so that drivers can learn of potential delays and have the opportunity to plan alternative routes or travel at a different time.



Real-time Traffic Conditions

I-77 through the RFATS region is monitored with 31 video cameras and 46 radar speed detectors to alert operators when a slowdown is occurring. Cameras are also installed on US 21 at SC 160 and at the Catawba River bridge.

The resulting real-time traffic information is provided to the public on the SCDOT website (left) and via 511.

Incident management operations for the area are conducted by SCDOT from the District 4 Traffic Management Center (TMC), where camera and radar operators monitor traffic conditions.

The State Highway Emergency Program (SHEP) plays an important role in managing incidents and congestion on the I-77 corridor. Through this program, SCDOT helps maintain safe traffic flow by assisting with traffic control and incident response, and providing minor assistance to disabled vehicles. SHEP operates seven days a week along I-77 between Mt. Holly Road (Exit 73) and the North Carolina state line, primarily during daytime hours.

Regional Congestion Management Projects

Federal transportation legislation sets aside funds specifically intended for projects that reduce congestion and the air pollutants associated with stop-and-go traffic. The Congestion Mitigation & Air Quality Improvement program (CMAQ) has provided funding for a number of key projects in the RFATS region. These include:

- **SC 160 / Gold Hill Road Intersection Improvement Project.** This project has added a northbound through lane on SC 160 from Gold Hill Road to Zoar Road, as well as an southbound right turn lane on SC 160. Currently, northbound traffic on SC 160 must merge into a single through lane before reaching Gold Hill Road, which creates extensive traffic queues during peak driving times.
- **Carowinds Boulevard / Pleasant Road Intersection Improvement Project.** This project will extend the westbound left turn lane of Carowinds Boulevard and construct a dedicated right turn lane on Pleasant Road to provide additional storage for waiting vehicles.
- **US 521 / Marvin Road Intersection Improvement Project.** The purpose of this project is to relieve traffic congestion and improve operational capacity in and around the US 521/Marvin Road intersection. Potential improvements include adjustments to signal timing, additional turning lanes, and expanded storage capacity for turning vehicles.

Stakeholder Input

As described in the Public Involvement Element, stakeholders mentioned increased congestion and the need for improved traffic flow. Comments during the development of the LRTP indicated concern that the region's continued growth is resulting in mounting traffic delays, especially along many of the core arterial roads within the CMP focus areas (Figure 6.2).

Recommendations

- RFATS should continue to apply its Congestion Management Process, including:
 - Collection of vehicle travel time data annually, or at least biennially, on roads in the congestion monitoring network.
 - Before-and-after evaluation of congestion in corridors where improvements have been implemented.
 - Update of the CMP itself on a four-year cycle.
 - Collection of roadway network data (such as geometry and traffic volumes) in the expanded areas of the RFATS boundary as additional roads become regionally significant.
- As additional highly congested locations are identified through monitoring, continue to conduct the detailed studies necessary to recommend appropriate solutions/strategies.
- Implement Travel Demand Management Strategies that reduce the need for travel, increase vehicle occupancy, encourage alternative modes, and/or shift trips to off-peak travel times.
- Share information with local jurisdictions about ways to incorporate access management and network connectivity into their development regulations and reviews.

Introduction

Freight movement is a critical element of an advanced industrial economy, and the ease of freight movement is one component of a region's economic competitiveness for attracting and retaining heavy industry, manufacturing, warehousing and other light industrial functions.

This chapter provides the freight element of the RFATS 2045 Long Range Transportation Plan. It describes existing conditions and trends at the national level, at the statewide/regional level and within the RFATS area. It also summarizes findings and recommendations of the recently completed Greater Charlotte Regional Freight Mobility Plan, a planning effort in which RFATS has been an active participant.

Relevance to the Transportation System and the Plan

The FAST Act emphasizes the importance of freight and goods movement in regional transportation planning. Freight must be considered both in its own right and in terms of supporting an area's economic vitality and competitiveness. Building off provisions in MAP-21, the FAST Act continues to stress the importance of freight transportation at a national level through the development of a national freight network, a national multimodal freight policy and national freight strategic plan. The FAST Act also increases funding for freight projects through the formula-based National Highway Freight Program (NHFP), as well as the FASTLANE grant program (Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies).

In addition, the FAST Act requires major metropolitan areas to set performance targets that are consistent with the national performance measures for freight, identify and recommend improvements that meet those targets, and report progress on the freight system's performance. A detailed summary of the performance measures can be found in the Greater Charlotte Regional Freight Mobility Plan.

Existing Conditions and Trends

The RFATS area's relationship to the greater Charlotte region is a key factor influencing the demand and location of freight supportive industries and facilities. However, the RFATS region itself has strong highway and rail connections for freight, including a major north-south interstate connecting Charlotte and Columbia, and main lines of two Class I railroads. These

connections serve a wide range of industries, including distribution centers and automobile component manufacturers. The northern edge of the RFATS region includes light industrial developments along I-77 and is impacted by similar developments along I-485 near Pineville.

Regional Freight Planning

RFATS and other partnering agencies in the 14-county Greater Charlotte Bi-State Region recently sponsored a regional planning effort focused on meeting the current and future needs of freight transportation. The *Greater Charlotte Regional Freight Mobility Plan* (also developed in cooperation with North Carolina and South Carolina statewide transportation planning studies) is intended to:

- Identify ways to effectively and consistently address freight congestion and key bottlenecks;
- Identify freight links that will connect mobility to regional economic development goals; and
- Identify and prioritize improvements for reducing congestion, addressing bottlenecks, and increasing efficiency.

The regional freight mobility plan analyzes movements and commodities in terms of tonnage, mode, direction and quantity, using the 2011 TRANSEARCH dataset (**Figure 7.1**). TRANSEARCH data is developed by IHS Global Insight and is a comprehensive database of North American freight flows, compiled from more than a hundred industry, commodity, and proprietary data exchange sources. TRANSEARCH combines primary shipment data obtained from some of the nation's largest rail and truck freight carriers with information from public, commercial, and proprietary sources to generate a base year estimate of freight flows at the county level.

As of 2011, the latest data available, over 375 million tons of freight moved across South Carolina's freight network. The largest mode share (80 percent) was trucking, followed by rail at 18.7 percent.

Another source of data is the Federal Highway Administration's Freight Analysis Framework (FAF), which examines freight movements for each mode of transportation. Although the database is not detailed enough to give specific data for the RFATS area, it does provide data for the greater Charlotte region.

Figure 7.2 shows the region's top rail freight commodities by weight. The largest commodity transported was cereal grains at 41 percent of the state's tonnage, followed by coal at 30 percent.

Figure 7.1: State Freight Tonnage, by Direction (2011)

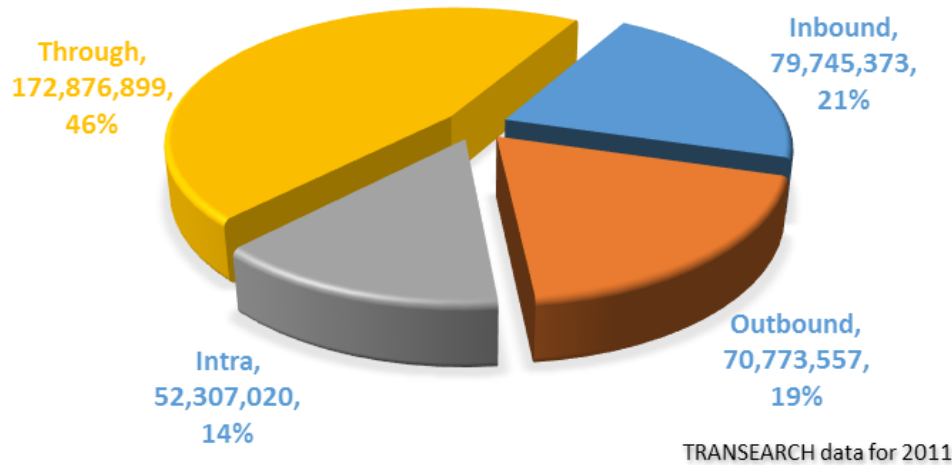
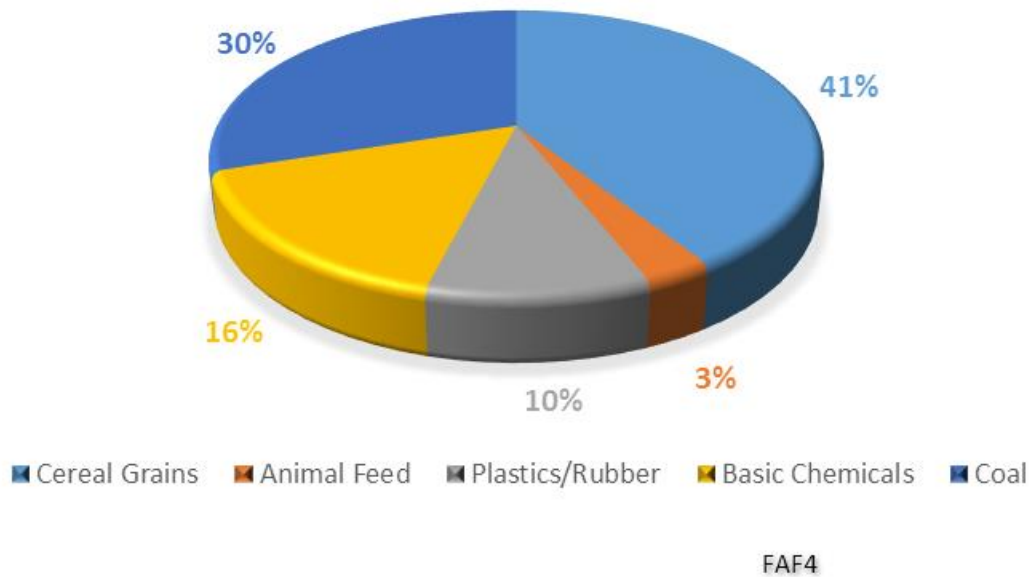


Figure 7.2: Top Commodities Shipped by Rail, by Weight



Figures 7.3 and 7.4 show the total value of regional freight shipments, inbound and outbound, by modal share. As shown, rail carries less than 5 percent of the value of freight, although it carries nearly 19 percent of freight by tonnage. As in other regions, rail tends to be the choice for shipping bulky, heavy goods while air is used for relatively high-value, time-sensitive freight.

Figure 7.3: Inbound Freight Value, by Modal Share

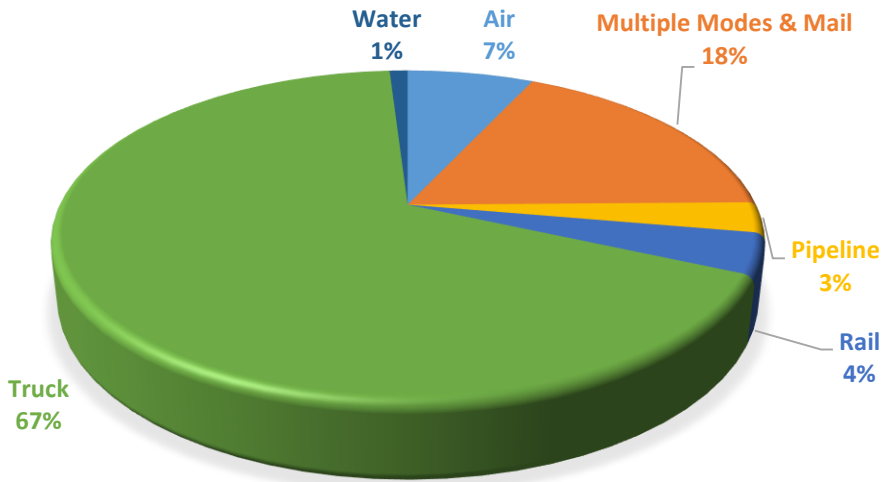
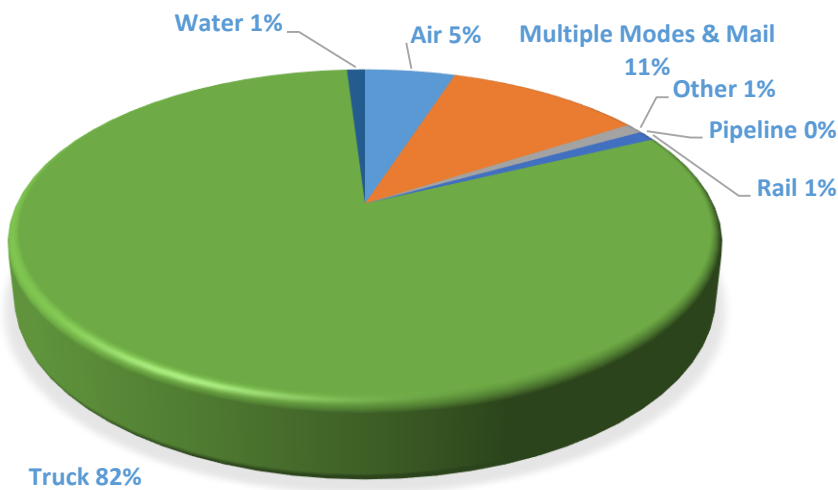


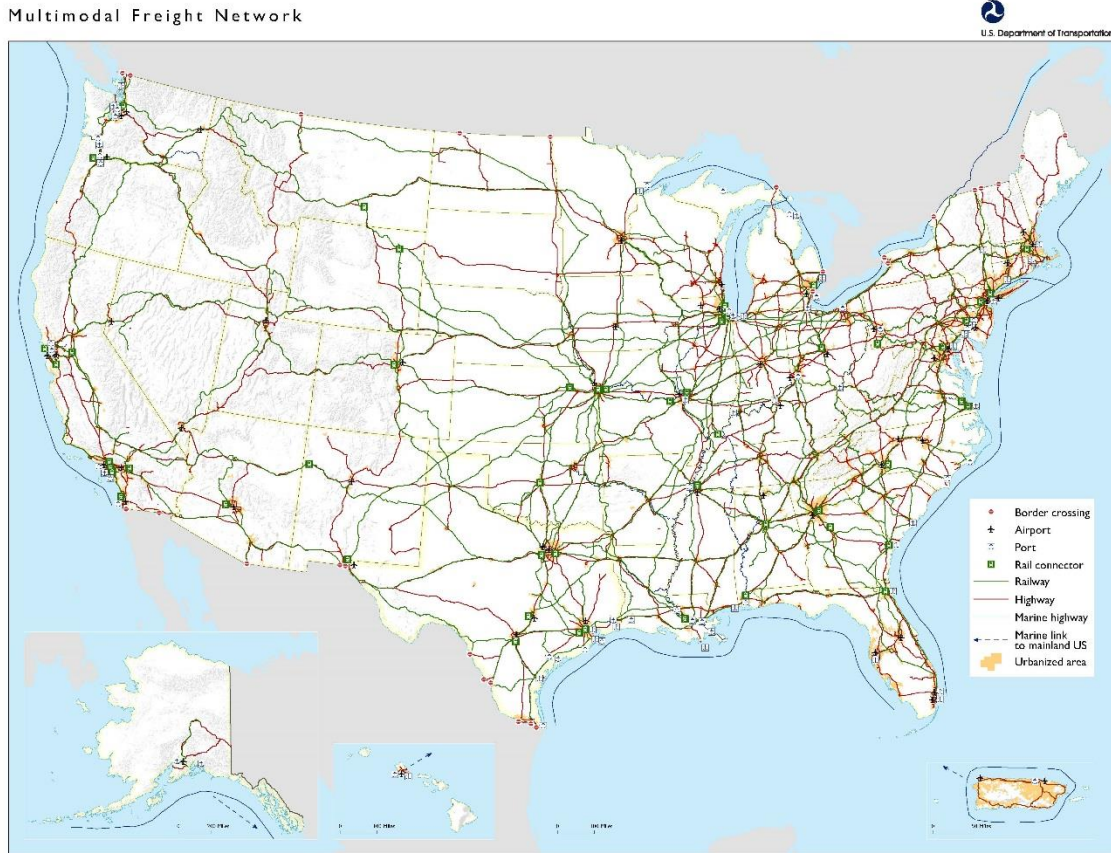
Figure 7.4: Outbound Freight Value, by Modal Share



Freight Strategic Network

The FAST Act directs federal resources and policies to improve freight movements on the nation’s transportation system. U.S. DOT has designated a Multimodal Freight Network (**Figure 7.5**) which classifies the critical infrastructure for moving goods across the country.

Figure 7.5: National Multimodal Freight Network



Note: For information on methodology used for feature selection in this map, please see U.S. Department of Transportation, National Freight Strategic Plan, Appendix D, 2015.

The new Greater Charlotte Regional Freight Mobility Plan also identifies a strategic freight network where improvements are recommended to be focused. Within the RFATS area, the key facilities include I-77, US 521, SC 5 and the Norfolk Southern and CSX rail lines.

Highway Freight

National Conditions and Trends

Highway goods movement has been consistently increasing nation-wide over the past decades. Truck movement transports over 70 percent of all tonnage

in the U.S. The current dominance of this mode results from access and availability. Due to the nature of changing development patterns during the 20th century, the majority of shippers no longer have direct connection to ports or rail.

Urban freeways and arterials continue to become increasingly congested since many states have a hard time improving vehicle capacity at the same rate. Trucks will be affected just as much as commuters, with implications for freight travel times and reliability. Nationally, issues of expanding capacity are increasingly being supplanted by a recognition that the existing highway network needs to be kept in a state of good repair and that existing funding streams may not be adequate, even without major capacity expansion.

Technological advancements in freight movement are being explored, ranging from vehicle-to-vehicle communication systems, vehicle-to-infrastructure communication systems, and autonomous freight trucks. These advancements could improve traffic congestion and safety, and reduce the cost of freight movement. Autonomous trucks could be operating by 2045.

Statewide and Regional Conditions and Trends

The port of Charleston is an important freight origin/destination for the state. However, the RFATS region also has close links to Charlotte and its intermodal terminals. CSX railroad operates a major rail-truck intermodal terminal in Charlotte, and Norfolk Southern relocated its Charlotte terminal to the Charlotte Douglas International Airport in December 2013, making the airport an air-rail-truck intermodal terminal.

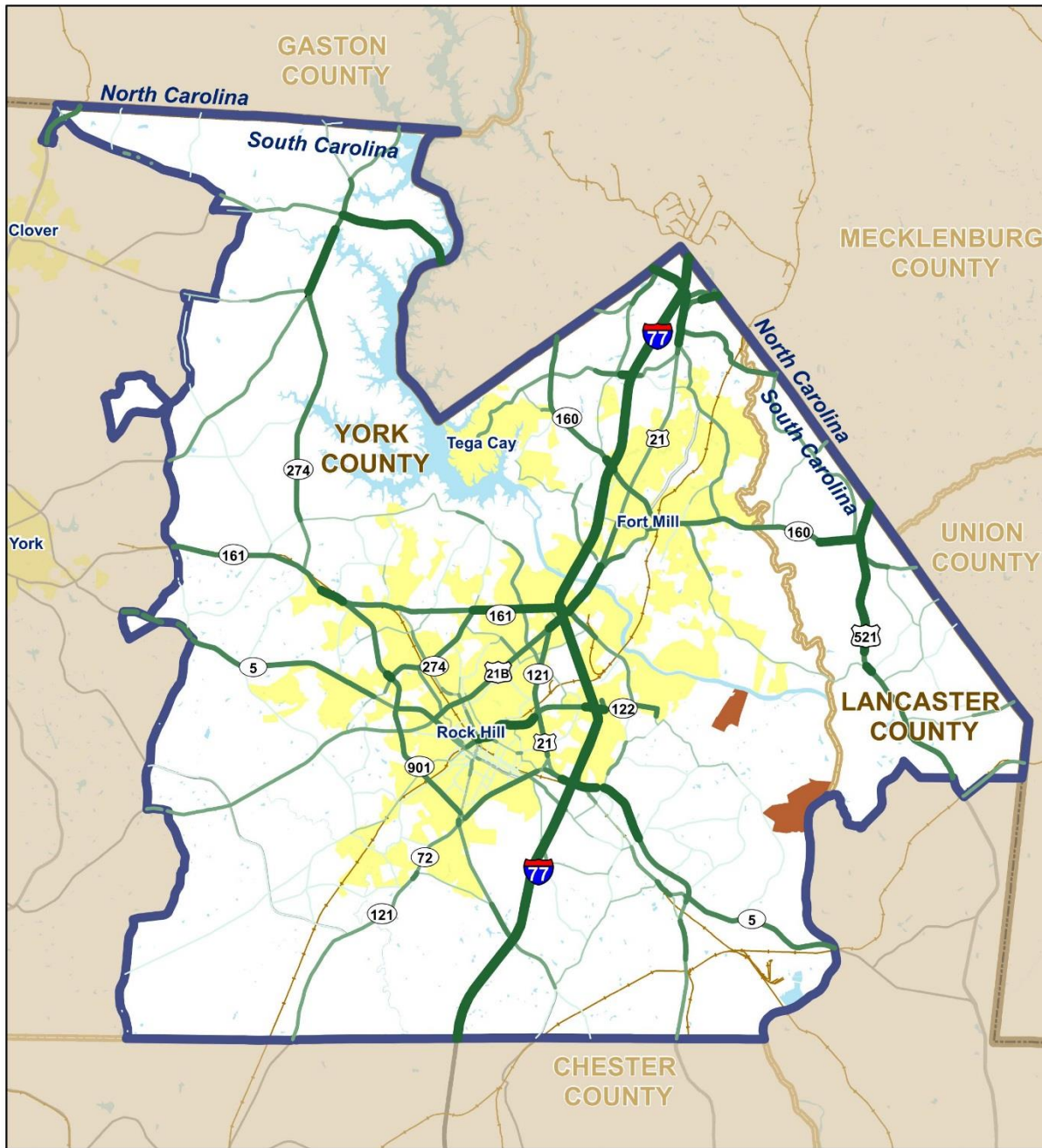
The state of South Carolina is also moving toward construction of a new intermodal facility in Dillon, in addition to the one currently located in Greer.

Conditions and Trends in the RFATS Region

Although I-77 carries the bulk of daily truck traffic, other roadways play a critical role to the movement of freight within RFATS; these include US 21, SC 5 and US 521. **Figure 7.6** shows routes within the region that carry higher daily volumes of truck traffic.

Identified truck bottlenecks within the RFATS area include the I-77 / US 21 interchange. It is also worth noting that just outside the RFATS planning area is one of the top 100 freight bottlenecks in the country: the I-77 at I-485 interchange. The prosperity of the RFATS region is strongly connected to the performance of its highway and rail access to the intermodal facilities in Charlotte. Existing and projected congestion on I-77 therefore represents a potential threat to the competitiveness of the RFATS area, as do bottlenecks that lie between area shippers within RFATS and their destinations.

Figure 7.6: Daily Truck Volumes on Area Roadways (2015)



Legend	
Total Daily Trucks	Catawba Reservation
Fewer than 500	Municipalities
501 - 1,000	RFATS Boundary
1,001 - 2,000	
2,001 - 4,000	
More than 4,000	

Source: Metrolina Regional Model

Rail Freight

National Conditions and Trends

The U.S. freight railroad industry is currently in a period of stability and growth following the major structural changes of the 1970s through the 1990s. The economic growth experienced in recent years has particularly benefited some freight flows, such as containers to and from the major ports, with the result that railroads have been adding or reinstating capacity on their main lines. Although there is a strong focus on unit trains (entire trains of a single commodity, such as coal or containers), the more traditional, smaller-scale traffic flows of single cars or small numbers of cars to/from local industries (carload freight) remains an important part of the industry.

Nationwide forecasts suggest that long-term economic growth will create demand for substantial additional capacity on the main rail corridors – and that the railroad industry will not be able to pay for all that capacity on its own. Public-private partnerships are therefore likely to be a key funding mechanism for achieving the necessary capacity, as shown in North Carolina where Norfolk Southern and NCDOT are investing more than \$540 million in double tracking between Raleigh and Charlotte. Railroads are increasingly open to partnerships that combine public funding of public benefits (principally reductions in truck traffic) with railroad funding of private benefits. In particular, states and municipalities are increasingly recognizing the public benefit of diverting truck traffic from highways to railroads. Not only does it free up capacity on the highways, but it reduces impacts to the roadway surface itself, thereby extending its service life.

Statewide and Regional Conditions and Trends

Multiple state agencies are involved in activities influencing freight rail movement. SCDOT's Statewide Freight Plan addresses rail freight issues along key corridors. The South Carolina Department of Commerce also has a Division of Public Railways which promotes economic development interests by providing freight rail access to new and existing industries. The division has the authority to acquire rail corridors that may be at risk of abandonment, or develop and construct new rail corridors.

As noted in SCDOT's Statewide Freight Plan, rail movements accounted for 70 million tons of freight, with through-state movements accounting for the largest directional movements. CSX Transportation handles the most tonnage through the state due to its larger rail network.

Over the past several years, multiple developments have either been completed or have been initiated that will greatly expand South Carolina's capacity and efficiency in accommodating freight rail movements:

- The Charleston Harbor is proposed to be deepened to accommodate larger ships that can now access the east coast due to the expansion of the Panama Canal. The project won congressional approval in December 2016 and is now awaiting federal funding.
- The Inland Port in Greer, opened in October 2013, connects directly to the Charleston Harbor and is served by rail.
- Plans are proceeding for the development of another inland port in Dillon.
- A new facility, the Navy Intermodal Container Transfer Terminal Facility (ICFT), is currently under construction in North Charleston. With the completion of the ICFT, no location in South Carolina would be more than 100 miles from an intermodal facility.

The RFATS region lies close to two major corridors that have been identified by railroads as potential partnership corridors. Both corridors are likely to involve increased capacity (additional tracks and/or improved signaling and speeds) as well as increasing clearances to allow double-stack container trains.

The **Norfolk Southern** (NS) main line through Blacksburg, west of the RFATS region, is part of its Crescent Corridor that runs from Washington, DC to New Orleans via Charlotte and Atlanta, paralleling I-85 and other congested routes. NS hopes to attract long-haul truck traffic on this corridor, which the railroad industry has historically not developed strongly. A major intermodal terminal was recently opened at Charlotte-Douglas International Airport as part of the corridor plan. **CSX's** National Gateway corridor includes an axis from the port of Wilmington to Charlotte. Both railroads are currently working with state and municipal governments to develop plans and funding for these corridors.

Conditions and Trends in the RFATS Region

Figure 7.7 shows railroads in the RFATS region. These include routes owned by both Norfolk Southern (NS) and CSX, the two major railroads in the eastern U.S., as well as the Lancaster and Chester (L & C) Railroad.

The NS secondary main line from Charlotte to Chester and Columbia (known as the 'R' line, part of NS Piedmont Division) passes through Fort Mill and Rock Hill, serving a number of industrial customers with a small switching yard in Rock Hill. SCDOT's *Rail Right-Of-Way Inventory* identifies this as a

potentially important line because it follows the SC 72 highway corridor, and its future appears to be secure. Although a single-track line, it has automatic block signaling and a relatively high density of traffic. Passing sidings exist at the Rock Hill yard and in Fort Mill.

The CSX line from Monroe (NC) to Chester passes through Catawba, as part of CSX's mainline axis from Hamlet (NC) to Atlanta and New Orleans. This line has centralized traffic control and a high traffic density, and its future also appears secure.

NS also operates a local line (the 'SB' line) that connects with the main 'R' line at Rock Hill, extending west to Tirzah and east to meet the CSX line at Catawba. Also serving Catawba is the independent Lancaster and Chester Railroad (L&C), a shortline (minor railroad).

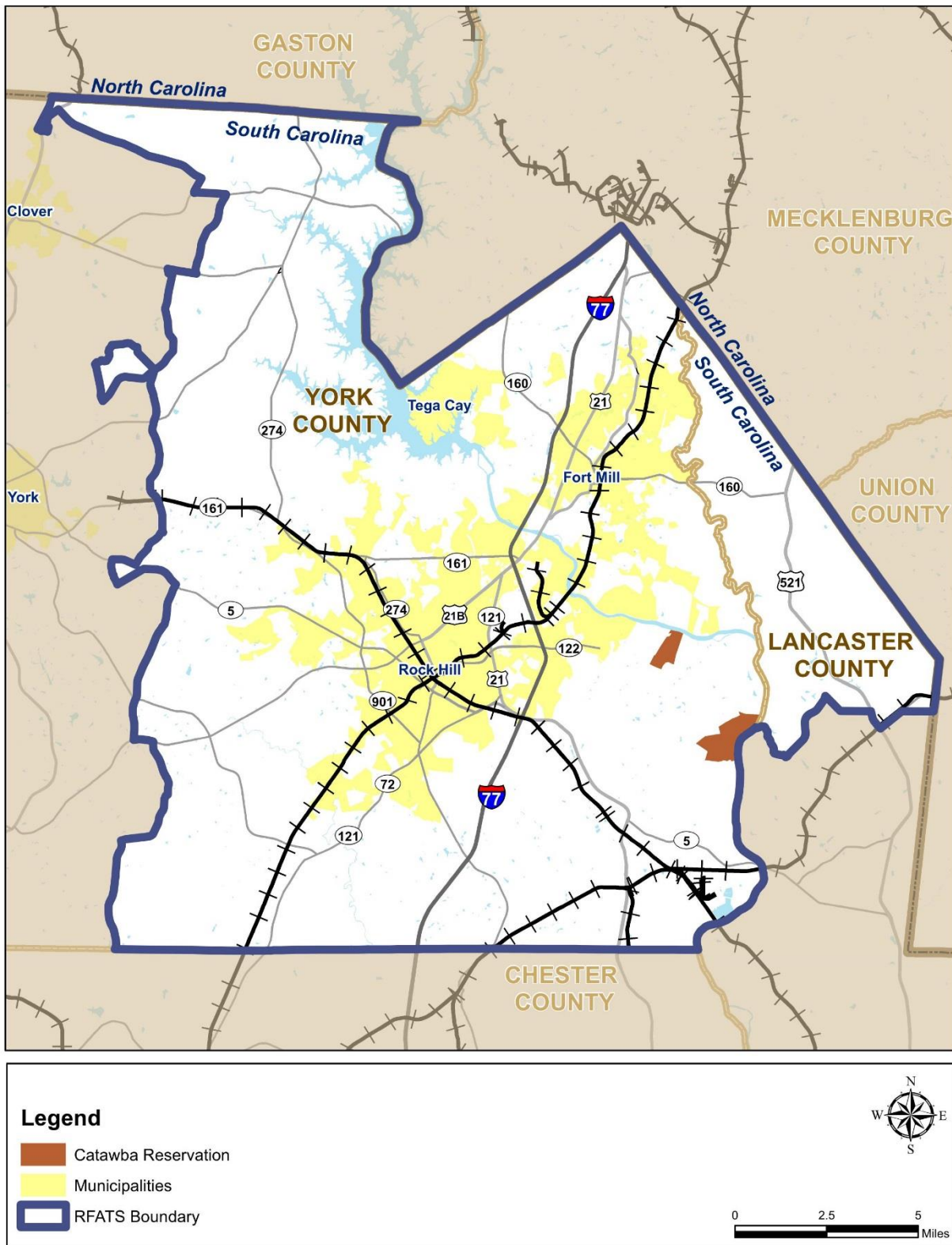
The rail lines within the RFATS region are not major inter-state corridors. Their future remains tied to the overall health of the railroad industry and to the decisions of individual customers along the route. Although the future of the two main lines through the RFATS region appears secure, the NS and L&C lines are, like any local routes, dependent on the presence of small numbers of individual customers, and changes in the industrial base can therefore easily affect those lines.

Highway-Rail Grade Crossings

The region includes a number of grade crossings where railroads and highways meet. Any future increase in train traffic may lead to additional congestion impacts on the highway network. In addition, grade crossings also represent a safety issue and have an impact on adjacent development. When individual crossings or entire corridors become busier, programs to upgrade, close or grade-separate the crossings are often introduced.

RFATS has funded a project to improve the efficient routing of area travel demand at / near several highway-railroad at-grade crossing points within downtown Rock Hill. The project includes a coordinated signal system and supporting electronic signage to alert drivers on preferred routing during train operations and related rail yard activities. Funding for this project came from the Congestion Mitigation and Air Quality Management (CMAQ) program.

Figure 7.7: Rail Corridors in the RFATS Region



Stakeholder Input

As part of the Greater Charlotte Regional Freight Mobility Plan, stakeholder meetings, steering committee meetings, and coordinating committee meetings were conducted, as well as establishment of a regional freight advisory committee. RFATS and the Catawba Regional Council of Governments participated in all levels of the stakeholder process. Many of the plan's goals were discussed along with identifying projects and policies that would form the framework for the prioritization of investments found in the Plan.

Summary and Recommendations

Regional freight-related discussions should continue to focus on these goals:

- Identify ways to effectively and consistently address freight congestion and key bottlenecks.
- Identify freight links that will connect mobility to regional economic development goals.
- Identify and prioritize improvements for reducing congestion, bottlenecks, and efficiency.
- Promote effective land uses to support freight mobility, economic development, and job growth.

Recommendations

The Greater Charlotte Regional Freight Mobility Plan recommends a congestion and safety improvement project be undertaken at the freight bottleneck location on US 21 near I-77, as referenced earlier. This project would help mitigate any adverse impacts to freight movement and freight related land use. Other recommendations include:

- Identify areas of needed truck parking and rest areas along the region's Strategic Freight Network.
- Prioritize projects designed to improve freight mobility and eliminate freight bottlenecks.
- Address and prioritize functionally obsolete and structurally deficient bridges on the region's Strategic Freight Network.
- Expand the use of Intelligent Transportation Systems, technology, and innovation to improve the flow of freight.

- Encourage alternative options such as Compressed Natural Gas (CNG)/Liquefied Natural Gas (LNG) for trucks, including fueling stations, and participate in the FAST Act's Alternative Fuel Corridors program.
- Use technological solutions to address truck parking such as real time parking availability, reservation systems, cashless payment, and navigation using smart phone technology.
- Continue to identify and close any first/last mile gaps near major intermodal centers and manufacturing hubs.
- Identify corridors where congestion may be significantly reduced through non-traditional improvements such as Intelligent Transportation Systems, managed lanes, or value pricing.
- Work with the Class I railroads and local stakeholders to develop programs and policies to improve operational efficiencies.
- Retain existing rail corridors and halt track removal.
- Create rail-focused business parks.
- Develop local transportation plans for areas adjacent to freight intermodal facilities.

Introduction

This chapter provides the public transportation element of the RFATS 2045 Long Range Transportation Plan (LRTP), covering local transit, inter-city bus services, and inter-city or commuter rail services.

In the past, providing convenient and reliable transit service within the RFATS region has faced a number of challenges:

- The population is broadly distributed across the RFATS region at relatively low densities. Transit, like other public services, is more cost-effective when it serves a higher number of residents per mile.
- Safe, comfortable transit use relies heavily on a network of sidewalks, safe street crossings, and lighting because most regular transit users walk or bike to and from a given stop.
- Transit efficiency is improved when the area's road system is relatively interconnected. This makes it easier to design streamlined bus routes that do not require turnarounds or back-tracking.

Each of the above issues is being addressed to some degree by recent RFATS and local planning efforts. Continued focus on improving these conditions will create the foundation for viable public transportation services for area residents, employees, students and visitors.

Existing Public Transportation Services

RFATS Region

The RFATS region does not currently have a fixed-route public transportation system that serves local community needs (although the City of Rock Hill is moving to implement a new local bus service, as discussed later in this chapter). There are, however, a number of available connections to Charlotte.

Existing transit services include:

- Express bus service between downtown Rock Hill and uptown Charlotte (operated by the Charlotte Area Transit System - CATS),
- CATS feeder bus services connecting to the CATS LYNX Blue Line Station (light rail),
- A vanpool program for commuting trips that either begin or end within the Charlotte urbanized area, and
- Demand-response transportation service for portions of the region.

These are described in more detail on the following pages.

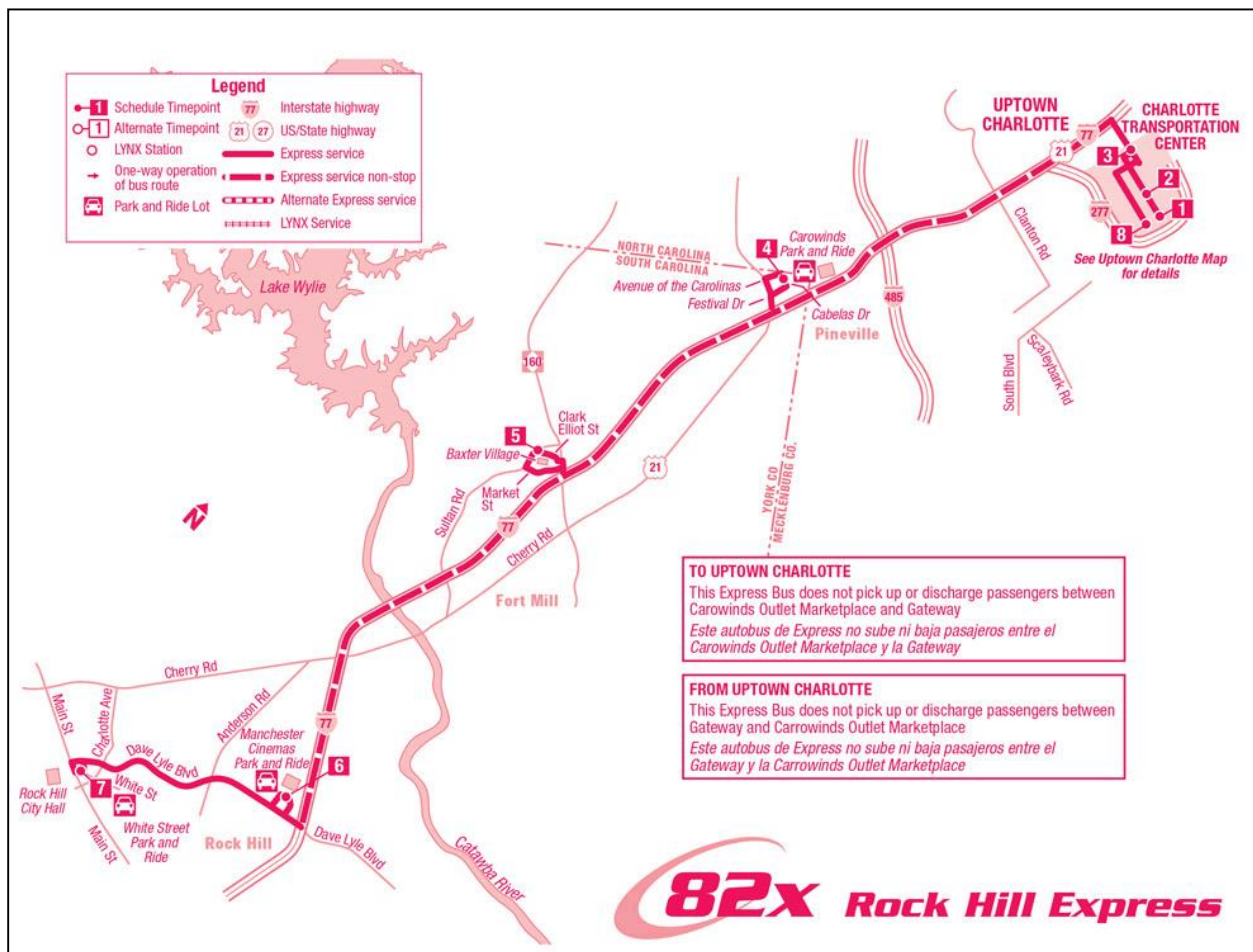
Charlotte Express Bus Service

The CATS 82X Express Bus Route runs at peak hours on weekdays, connecting uptown Charlotte with several stops in the RFATS Study Area (**Figure 8.1**):

- Rock Hill Park and Ride lot in downtown Rock Hill,
- Manchester Cinemas (a park-and-ride lot adjacent to I-77),
- Baxter Village in Fort Mill, and
- Carowinds/Cabela's.

This route provides service to area residents who commute to jobs in Charlotte and is funded through a cost-sharing arrangement between CATS and RFATS.

Figure 8.1 - CATS Express Bus Route 82X



82x Rock Hill Express - WEEKDAYS					
Inbound					
7	6	5	4	3	8
White Street Park and Ride	Manchester Cinemas	Baxter Village	Carowinds Park and Ride	Gateway on Trade	3rd & McDowell
5:40a	5:50a	6:04a	6:15a	6:33a	6:43a
6:10a	6:20a	6:34a	6:48a	7:12a	7:22a
6:30a	6:42a	6:57a	7:11a	7:42a	7:52a
7:00a	7:12a	7:27a	7:44a	8:15a	8:25a

82x Rock Hill Express - WEEKDAYS						
Outbound						
1	2	3	4	5	6	7
4th & McDowell	Charlotte Trans. Center	Gateway on Trade	Carowinds Park and Ride	Baxter Village	Manchester Cinemas	White Street Park and Ride
4:10p	4:15p	4:23p	4:52p	5:06p	5:19p	5:27p
4:40p	4:45p	4:53p	5:31p	5:45p	5:58p	6:06p
5:10p	5:15p	5:23p	6:01p	6:15p	6:28p	6:36p
5:45p	5:49p	5:55p	6:20p	6:32p	6:44p	6:52p

Source: CATS online schedules, August 2016

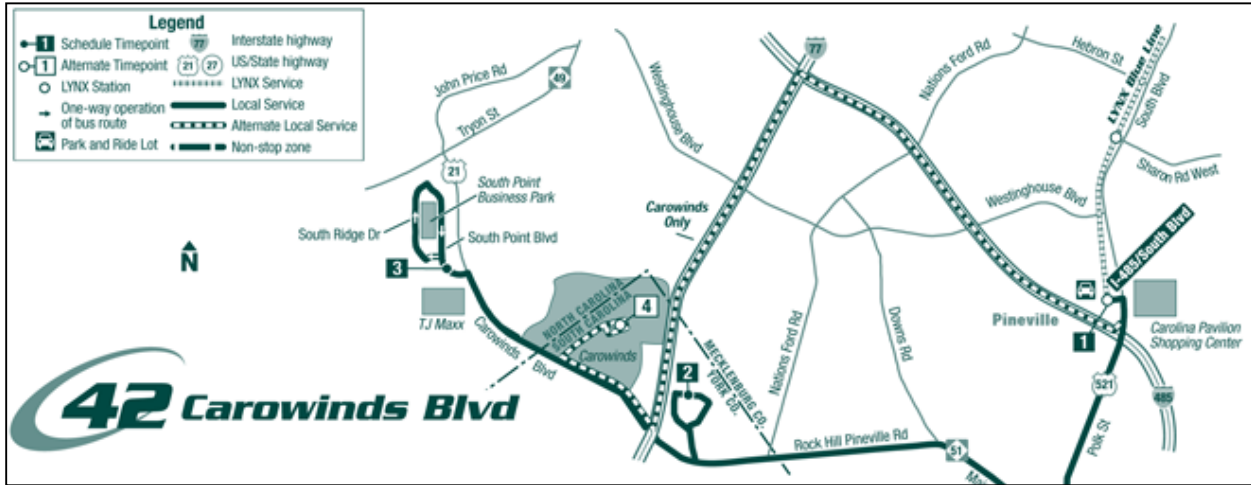
Recent MPO transit planning efforts have identified opportunities to expand the use of Route 82X with “reverse commuters.” Instead of running empty on its initial morning trip from Charlotte to the RFATS area to pick up riders, the bus might be able to transport Charlotte-area workers who are employed in the Kingsley Park area of Fort Mill. The same operation would occur in the late afternoon, transporting area residents home from Charlotte and then picking up Kingsley Park workers to carry them back to Charlotte. This arrangement could yield increased revenue for the 82X and help eliminate additional trips from area highways.

Lynx Blue Line Feeder Bus Route

The northern end of the RFATS region has a bus service connection to the Charlotte LYNX Blue Line light rail system. **(Figure 8.2)**. CATS Route 42 operates during weekday peak periods only from the I-485 light rail station to the Wells Fargo Home Mortgage office and South Point Business Park. It also provides service from the I-485 light rail station to the Carowinds amusement park. Service to Carowinds fluctuates based on park operating hours and is suspended when the park is closed during the off-season.



Figure 8.2 - CATS Bus Route 42



42 Carowinds - WEEKDAYS				
Inbound				
Stop	3	2	4	1
Southpoint Business Park	-----	-----	8:50a	9:10a
Wells Fargo	-----	-----	9:30a	9:50a
Carowinds Amusement Park	-----	-----	10:25a	10:45a
LYNX I-485 Station	-----	-----	3:20p	3:40p
	3:45p	3:59p	-----	4:13p
	-----	-----	4:25p	4:45p
	4:15p	4:31p	-----	4:49p
	-----	-----	5:10p	5:30p
	5:15p	5:31p	-----	5:49p
	-----	-----	5:55p	6:15p
	-----	-----	6:35p	6:55p
1	-----	-----	7:25p	7:45p
2	-----	-----	8:10p	8:30p
3	-----	-----	8:50p	9:10p
4	-----	-----	9:30p	9:50p
4	-----	-----	10:10p	10:25p
5	-----	-----	10:55p	11:10p

1 1=TRIP ONLY OPERATES WHEN PARK CLOSES AT 6 PM OR LATE
 2 2=TRIP ONLY OPERATES WHEN PARK CLOSES AT 7 PM OR LATE
 3 3=TRIP ONLY OPERATES WHEN PARK CLOSES AT 8 PM OR LATE
 4 4=TRIP ONLY OPERATES WHEN PARK CLOSES AT 9 PM OR LATE
 5 5=TRIP ONLY OPERATES WHEN PARK CLOSES AT 10 PM OR LATE

42 Carowinds - WEEKDAYS				
Outbound				
Stop	1	2	3	4
LYNX I-485 Station	6:30a	6:42a	6:52a	-----
Wells Fargo	6:45a	6:57a	7:07a	-----
Southpoint Business Park	7:18a	7:30a	7:40a	-----
Carowinds Amusement Park	8:30a	-----	-----	8:50a
	9:10a	-----	-----	9:30a
	10:05a	-----	-----	10:25a
	3:00p	-----	-----	3:20p
	4:05p	-----	-----	4:25p
	4:50p	-----	-----	5:10p
	5:35p	-----	-----	5:55p
	6:15p	-----	-----	6:35p
1	7:05p	-----	-----	7:25p
2	7:50p	-----	-----	8:10p
3	8:30p	-----	-----	8:50p
4	9:10p	-----	-----	9:30p
4	9:50p	-----	-----	10:10p
5	10:35p	-----	-----	10:55p

1 1=TRIP ONLY OPERATES WHEN PARK CLOSES AT 6 PM OR LATE
 2 2=TRIP ONLY OPERATES WHEN PARK CLOSES AT 7 PM OR LATE
 3 3=TRIP ONLY OPERATES WHEN PARK CLOSES AT 8 PM OR LATE
 4 4=TRIP ONLY OPERATES WHEN PARK CLOSES AT 9 PM OR LATE
 5 5=TRIP ONLY OPERATES WHEN PARK CLOSES AT 10 PM OR LATE

Source: CATS online schedules, August 2016

CATS Vanpool Program

CATS sponsors a vanpool program that makes vans and minivans available to commuters (generally 5 to 15) who wish to share rides to a common destination that is usually not served by regular CATS service. One vanpool member agrees to serve as driver; the other passengers pay a fare which CATS uses to help cover the cost of insurance, fuel, and maintenance. The RFATS area currently has a few vanpools operating to employment destinations such as Duke Energy.

The 2015 *RFATS Urbanized Area Transit Implementation Study* outlines potential steps for a “piggy-back” vanpool program which would provide another option to commuters whose origin and destination are both within the RFATS region. In cases where vanpools originate in northern York and Lancaster counties, vanpool costs not covered by the riders themselves could come from the portion of Charlotte Section 5307 urbanized area funds that are distributed to South Carolina.

York County Access

York County Access is a demand-response service providing public transportation for residents of rural York County and the Rock Hill Urbanized Area. It is a cooperative effort of York County and the City of Rock Hill, and is operated by the York County Council on Aging.

The service is available on weekdays between 6:00 AM and 6:00 PM. Rides must be scheduled two days in advance. The service is primarily for seniors, those with limited mobility, and clients of federal social programs. However, service to other riders is provided on a space-available basis as well.

It should be noted that Fort Mill and Tega Cay are not in the Rock Hill Urbanized Area or rural portions of York County, but the Charlotte Urbanized Area that extends across the state line. Due to funding policy restrictions, these residents therefore are not served by the York County Access system, or any other demand-response system, although there is both need and demand in these areas. The 2015 *Transit Implementation Study* finds that portions of Fort Mill score high on transit need, particularly those with high percentages of older adults, youth and low-income households. York County Access staff also report receiving regular requests for service from the Tega Cay/Fort Mill area.

Lancaster Area Ride Service (LARS)

Similar to York County Access, the Lancaster Area Ride Service, or LARS, operates Monday through Friday from 9:00am to 3:00pm on a rotational basis in different geographic areas of the county. This service is operated by the Lancaster County Council on Aging, in partnership with the South Carolina Department of Transportation and Lancaster County. This service provides a “dial-a-ride” option for residents who do not qualify for Medicaid, but do not have transportation alternatives needed for getting to medical appointments. As in the northern section of York County, portions of the panhandle are covered by the Charlotte Urbanized Area and currently govern federal funding availability, which will require resolution of funding eligibility issues in order to maintain consistent service to county residents on a longer

term basis. As noted earlier, SCDOT is currently providing funding assistance for a transitional period.

Inter-City Bus

Within the U.S., inter-city bus service has historically been provided mostly by Greyhound, its subsidiaries and its business partners. Together these services provide a nationwide city-to-city network, including stops at smaller locations that are not served by either air or rail. They are widely recognized as an affordable option for long-distance travel.

In the past few years, Greyhound has restructured many of its service patterns to concentrate on main flows and make fewer stops. Some smaller communities – including Rock Hill – have lost their inter-city transit connections as a result. The closest available service is now in the neighboring communities of Charlotte, NC and Spartanburg, SC.

Other companies such as Megabus have recently entered the Charlotte market, stimulating price competition. However, the only connections currently offered by Megabus from Charlotte are to Atlanta, Durham, Richmond, and Washington, D.C.

Inter-City / Commuter Rail

Inter-city passenger rail service is provided by Amtrak, an arm of the Federal government. Outside the northeastern U.S., the services fall into two kinds: long-distance services, often running once a day, and shorter-distance ‘corridor’ services, often with several trips per day and usually supported financially by states. Amtrak mostly operates over track owned by freight railroads (‘host’ railroads). Although Amtrak’s operations and expansion have been hampered by budget restrictions, there is increasing political recognition of inter-city rail’s potential contribution to energy independence, offering an alternative to highway congestion, and providing resilience in the event of disruption to civil aviation.



Most of South Carolina’s Amtrak service only serves the state incidentally, as trains pass through the state. The State makes no contribution to the capital or operating cost of the Amtrak service.

There are currently no passenger rail services within the RFATS region. The nearest Amtrak stations are Charlotte NC, Gastonia NC, Camden SC and Spartanburg SC. (In Charlotte, the station is due to be relocated to a new

downtown intermodal center within the next few years.) These stations are currently served by the following trains:

- *The Crescent* (serving Spartanburg, Gastonia and Charlotte) – a long-distance service between New York and New Orleans. One train each way, daily. Other key destinations en route include Atlanta, Georgia and Birmingham, Alabama. The schedule for this service is determined by the main points on the route, and so the timings at stations near the RFATS area can be inconvenient; currently the train calls at these stations during the late night/early morning in both directions.
- *The Silver Star* (serving Camden) – a long-distance service between New York and Miami. One train each way, daily. Other key destinations en route include Savannah and Orlando. The schedule for this service is determined by the main points on the route, and so the timings at stations near the RFATS area can be inconvenient; currently the train calls at these stations during the late night/early morning in both directions. (Additional services between New York and Florida operate through the eastern part of the state via Florence and Charleston.)
- *The Carolinian* (serving Charlotte) – a long-distance service between Charlotte and New York. One train each way, daily. This is potentially the most useful service for rail passengers living within the RFATS area, as it offers daytime service between Charlotte and the mid-Atlantic states. This train is supported financially by the North Carolina Department of Transportation (NCDOT).
- *The Piedmont* (serving Charlotte) – a short-distance (‘corridor’) service between Charlotte and Raleigh. This service is supported financially by NCDOT. There are currently three trains each way, daily. NCDOT plans to add a fourth frequency in 2017 and a fifth frequency by 2019.

Locally, Charlotte will remain the main access point for area residents to reach the inter-city rail network, at least in the near-term. There might be future opportunities to extend the *Piedmont* to Rock Hill along the Norfolk Southern track. This would require further study and would almost certainly involve upgraded infrastructure as part of any agreement with the railroad. It might also be possible to extend the *Carolinian* through Rock Hill to Columbia. As with the *Piedmont* extension, further studies would be required.

A step-change in inter-city rail service could come from the development of a national **high-speed passenger rail** (HSR) network, similar in scope to the interstate highway system, and similar in concept to the high-speed rail networks already in place in other advanced nations and being planned in California. One of the HSR corridors designated by the US Department of Transportation (USDOT) – the Southeast High Speed Rail Corridor – would serve Charlotte, potentially providing access to RFATS area residents.

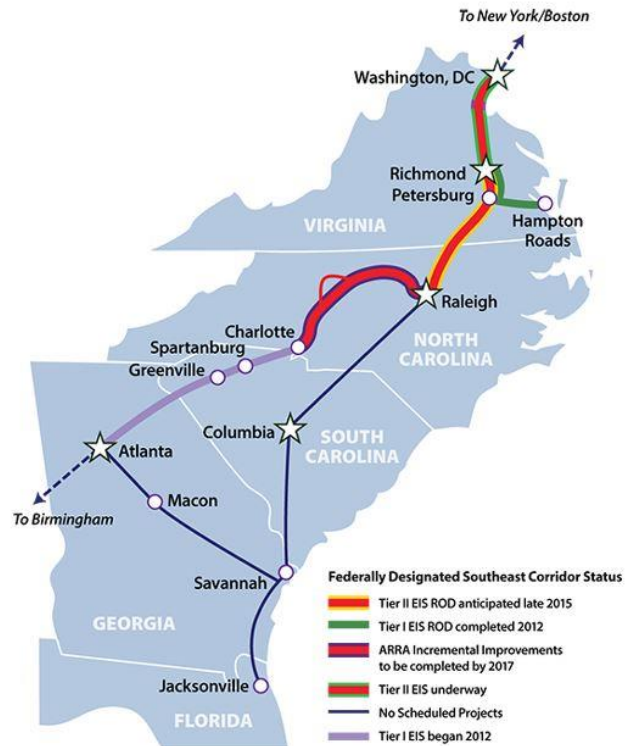
The Southeast HSR Corridor broadly shadows the Norfolk Southern (NS) main line and I-85. It was originally designated as running from Washington, DC through Richmond, VA and Raleigh, NC to Charlotte, NC with maximum speeds of 110 mph. It is part of an overall plan to extend service from the existing high speed rail on the Northeast Corridor (Boston, MA to Washington, DC) to points in the Southeast.

Extensions designated in 1998 included an extension from Charlotte through Spartanburg and Greenville, SC to Atlanta, GA and on through Macon, GA to Jacksonville, FL. It is this extended corridor that passes close to the RFATS region. There are no firm timelines for implementation on any segment.

Environmental studies for the Raleigh-Charlotte segment are complete and incremental improvements along this rail corridor are underway. These improvements, largely funded through the American Recovery and Reinvestment Act, are scheduled to be completed in 2017. The initial technical work suggested that high-speed service could be extended from Charlotte (Downtown) station to a new station (and servicing facility) at Charlotte-Douglas International Airport.

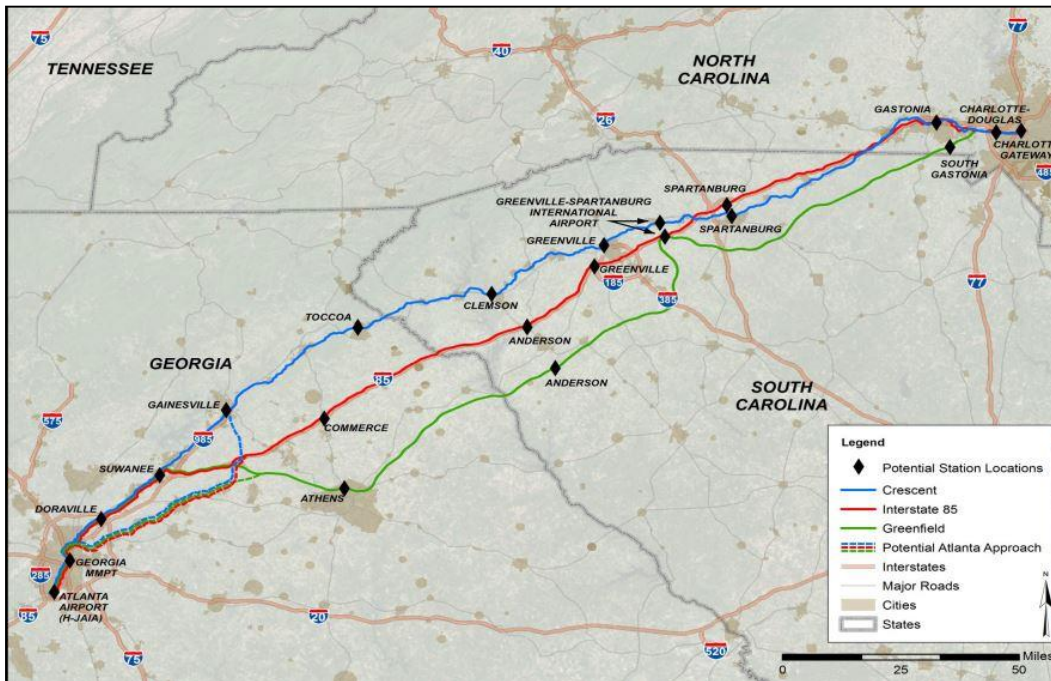
The proposed extension through South Carolina to Atlanta is now being analyzed through a Tier 1 Environmental Impact Statement (EIS), which analyzes potential route alternatives and station locations and is scheduled for completion in 2016. Three potential routes are being studied (**Figure 8.3**):

- The Norfolk Southern (NS) railroad corridor (also referred to as the Southern Crescent Corridor route);



- The I-85 corridor; and
- A “greenfield” corridor which offers the opportunity to define a fully grade-separated route alignment with optimal geometric characteristics for high-speed passenger rail service.

Figure 8.3: Potential High Speed Rail Routes from Charlotte to Atlanta



Source: *GDOT Project Facts Vol. 2, Atlanta to Charlotte Passenger Rail Corridor Investment Plan, Fall 2015.*

Although the two HSR alternatives that would link Rock Hill and Columbia were not carried forward into the current study, the SCDOT *State Rail Plan* notes there is interest in connecting Columbia to the expanding passenger rail network being developed in the Charlotte region.

Commuter rail services, which are intended to serve shorter distances within a major metropolitan area, have become increasingly common in recent years. There is now considerable experience in implementing these services on existing railroad corridors, in some cases shared with existing freight services. Typically these new services are operated by local or state agencies as a part of the regional transit system, rather than by Amtrak.

There are currently no active plans for commuter rail service to serve the RFATS region, although SCDOT’s *Statewide Transit Plan (2014)* does identify the Rock Hill to Charlotte corridor as having potential for commuter rail.

An interim option could be to create a bus rapid transit (BRT) link between Rock Hill and Charlotte, as previously studied by the MPO and described further below. The BRT service could ultimately be replaced or supplemented by commuter rail service as ridership grows.

Rock Hill-York County-Charlotte Bus Rapid Transit (BRT) Service

In 2007 the MPO completed a study of various alternatives to provide high-capacity transit service to and from Charlotte. The *Rock Hill-York County-Charlotte Rapid Transit Study* proposes a Bus Rapid Transit (BRT) line running from downtown Rock Hill via US-21 to the I-485 CATS LYNX Blue Line light rail station (**Figure 8.4**). The BRT line would operate partly on a dedicated bus-way and partly in general traffic.

Starting in downtown Rock Hill, buses would operate in mixed traffic along White Street to Winthrop University. White Street would be extended to Cherry Road, with a station at the intersection of the two streets. From there, buses would operate in a dedicated guide-way along Cherry Road within the existing right-of-way. In locations on Cherry Road where roadway expansion is constrained, buses will operate in the general-purpose lanes, using queue-jump lanes and traffic signal pre-emption to increase bus travel speeds.

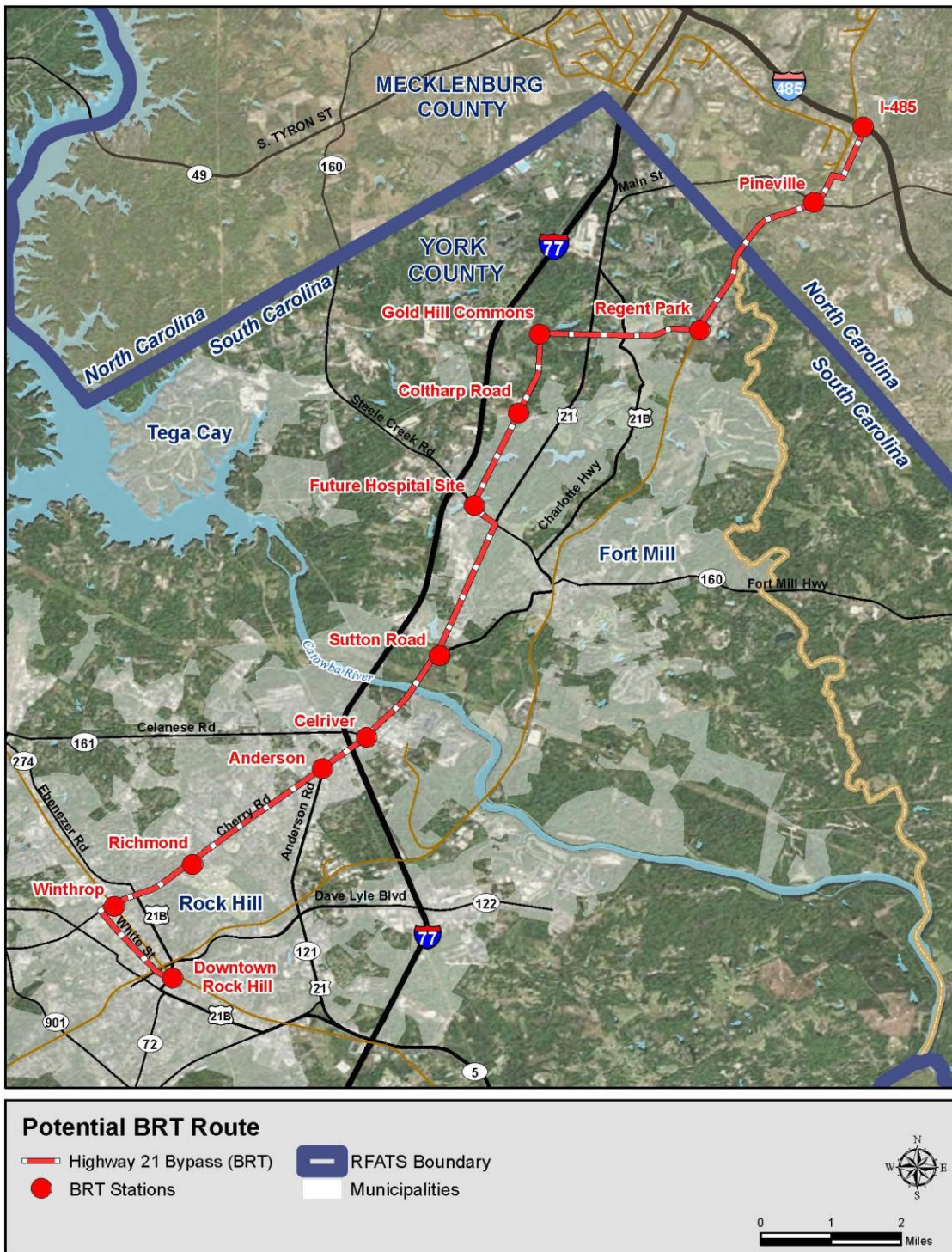
North of the Cherry Road / Anderson Road station, buses would operate in a dedicated guide-way along US-21 to SC-160 in Fort Mill. The service would then travel west a short distance on SC-160 to a new roadway, parallel to US-21 and I-77, extending from SC-160 to Gold Hill Road improving transit access in the Kingsley Park and former Knights Stadium areas.

The service would continue in mixed traffic along York Southern Road from Gold Hill Road toward the Norfolk Southern railroad corridor near Regent Parkway. Here, a dedicated two-lane guide-way would be built parallel to the railroad, extending north to Commerce Drive in Pineville. The service would then operate in mixed traffic along Commerce Drive and South Boulevard to the I-485 station on the CATS LYNX Blue Line.

The BRT scheme also includes a four-mile spur from the Cherry/Anderson station, along Anderson Road and Dave Lyle Boulevard to the Galleria Mall just east of I-77. The spur would have a dedicated two-lane guide-way.

The line would have service every 15 minutes at peak times and every 30 minutes at off-peak times. The hours of operation would match those of the Lynx Blue Line service.

Figure 8.4: Proposed Rock Hill-York County-Charlotte Bus Rapid Transit Service



Source: Rock Hill-York County-Charlotte Rapid Transit Study Locally Preferred Alternative Refined Screening Analysis Report, April 2007.

The study estimates the capital cost of the project between \$511 and 516 million. It recommends four phases of implementation:

- Phase 1: start-up phase with all-day limited-stop service connecting the RFATS Study Area with the I-485 light rail station.
- Phase 2: Addition of local bus service to Tega Cay and Fort Mill and new connections to Gold Hill Commons.
- Phase 3: Implement first stage of exclusive BRT right-of-way segments.
- Phase 4: Implementation of the remaining exclusive BRT right-of-way segments.

The study also recommends focusing on appropriate transit supportive land use and development regulations, connecting major corridor destinations, and preserving rights-of-way for the transit alignment where appropriate through new development areas. These land use recommendations mirror Charlotte's initiatives to make land use and zoning policy changes early in the transit development process in order to make transit projects more viable and competitive for federal funds.

Transit planning efforts by RFATS' partners have echoed the long-term goal of operating BRT along this corridor. Multiple elements of the 2014 SCDOT *Statewide Multimodal Plan* address the issue:

- The *State Transit Plan* identifies BRT as a premium transit need for the Rock Hill/York County to Charlotte, NC corridor. In a statewide survey, BRT was one of the top three responses when respondents were asked what would encourage them to use public transit.
- The *Catawba Regional Public Transit and Human Health Service Coordination Plan*, incorporated as part of the SCDOT Statewide Multimodal Plan, proposes the integration of intercity bus service to connect patrons from the Rock Hill area to high speed rail along the I-85 corridor in Charlotte.

Other Regional Express Services

Several other recommendations for express transit service are discussed in the region's *Transit Service Master Plan*. This planning document was adopted in conjunction with the 2007 *Rock Hill-York County-Charlotte Rapid Transit Study*, and summarized a range of transit service concepts that had been developed up to that point. Key proposals include:

- **82X Rock Hill Express:** After implementation of the US-21 BRT line, the existing Rock Hill express route would be re-designed to complement those operations.
- **Celanese Road Addition:** The *Rock Hill Urban Area Transit Implementation Plan* proposed an additional route for the 82X to connect north Rock Hill with Charlotte. The new route would serve the Celanese Road/SC-161 corridor in Rock Hill.
- **Chester and Lancaster to Rock Hill and Charlotte:** The *Needs and Potential for Coordination of Public Transit Services in the Catawba Region* study identified work trips from Chester and Lancaster to Rock Hill and Charlotte as a transit service need. The study recommended two express bus trips in the morning from both Chester and Lancaster to Center City Charlotte with an intermediate stop at a proposed transit center near Dave Lyle Boulevard and I-77. There would be two return trips from Charlotte in the afternoon, again with an intermediate stop in Rock Hill.
- **Lake Wylie to Charlotte:** York County Planning staff has discussed with CATS the operation of express bus service from Lake Wylie to Center City Charlotte along SC-49 and NC-49. The express route would begin near the intersection of SC-49 and SC-274 and operate during peak hours only.

Local Bus Service

In 2015, RFATS completed an *Urbanized Area Transit Implementation Study*. The report identifies areas with the highest potential transit demand as well as the characteristics necessary to support fixed-route transit service. Key elements of the assessment include analysis of demographic characteristics, evaluation of land use and transportation infrastructure, and identification of activity centers including major employers in the area.

The study also assessed existing transit services in the RFATS region, including the express bus route and demand response program. York County Access ridership data was analyzed to determine the utilization of existing services and to identify where passenger activity is highest.

The study recommends two fixed route services for implementation: one providing local service in the Rock Hill area, and the other serving the Tega Cay/Fort Mill area.

The routes originally recommended in the study for the Rock Hill area were further refined through additional input and analysis, resulting in the

decision to move forward with local bus service for the four routes shown in

Figure 8.5:

- A downtown circulator, anchored to the north and south by Winthrop University and Knowledge Park;
- Cherry Street, with service extending to the Riverwalk area;
- Dave Lyle Boulevard, with service extending to York Technical College and the Rock Hill Galleria Mall; and
- A Saluda Street/Hospital route which extends northward to Piedmont Medical Center and also provides access to destinations along Heckle Boulevard.

In February 2017, the Rock Hill City Council approved the submittal of the application to the Federal Transit Administration (FTA) necessary to launch the local bus system. The transit service – free to riders – is proposed to operate 14-15 hours per day, with three routes operating on 1-hour headways and the fourth on a 30-minute headway.

There are plans to offer a free smartphone-based application that will provide riders with real time information about the current location and expected arrival time for the next bus at their stop. Free WiFi is also planned onboard, along with outlets for charging phones. The proposed buses are to be electric buses, which supports RFATS goals for improving the regional air quality.

Procurement of buses is anticipated to begin in 2017, with fixed route service planned to begin in fall 2018. The City of Rock Hill will utilize FTA urbanized area (Section 5307) funds, local general funds, and contributions from partner agencies to purchase buses and operate the service.

The RFATS *Urbanized Area Transit Implementation* Study also identified potential fixed route bus service within the Tega Cay/Fort Mill area. **Figure 8.6** shows route options for serving the SC 160 Corridor:

- Route 6A: Efficiency-Focused Approach (more direct)
- Route 6B: Coverage-Focused Approach (less direct to provide easier access by pedestrians)
- Route 6C: Regional Connectivity-Focused Approach (less direct, extends into southern Charlotte)

Figure 8.5: Planned Local Bus Routes, Rock Hill Area

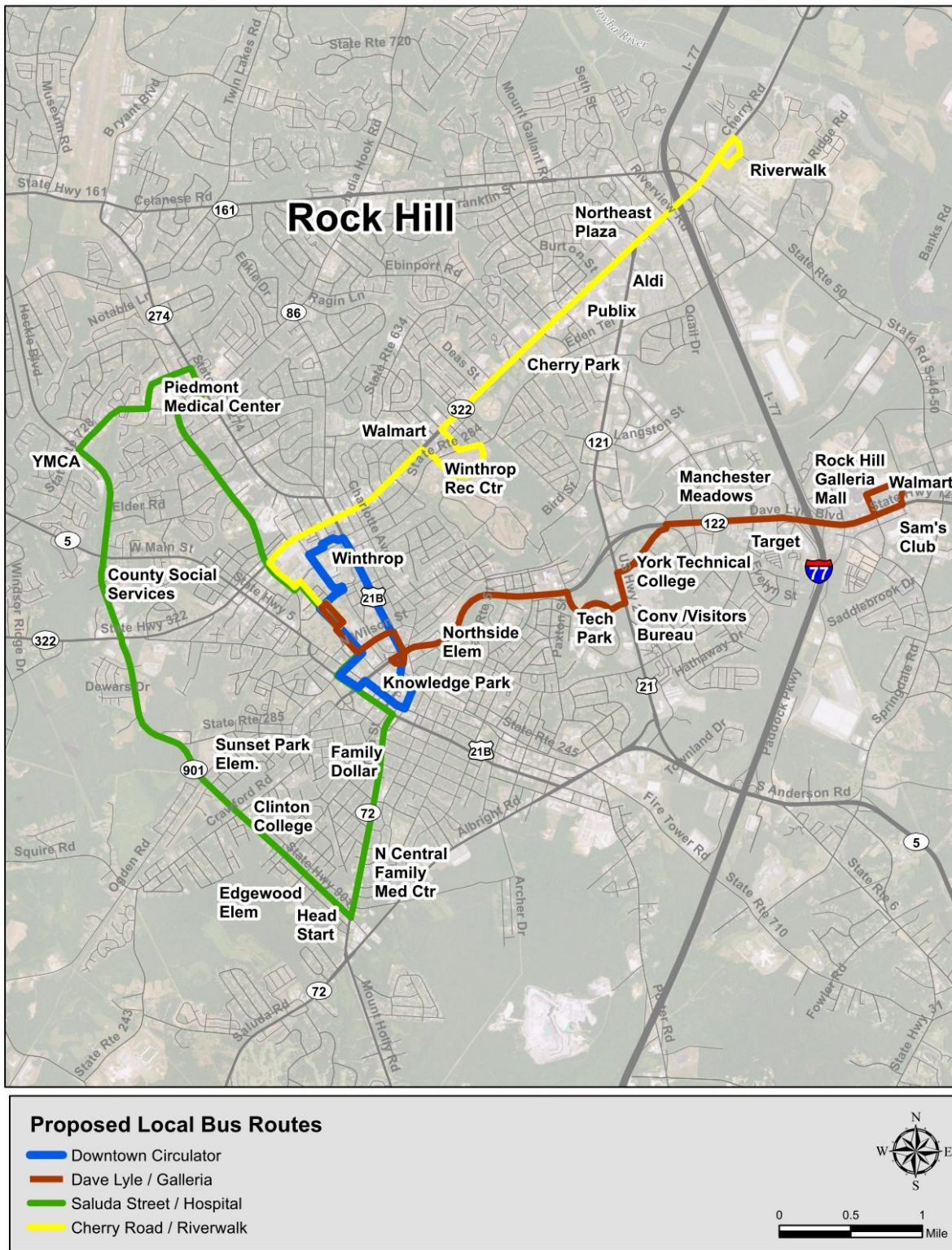
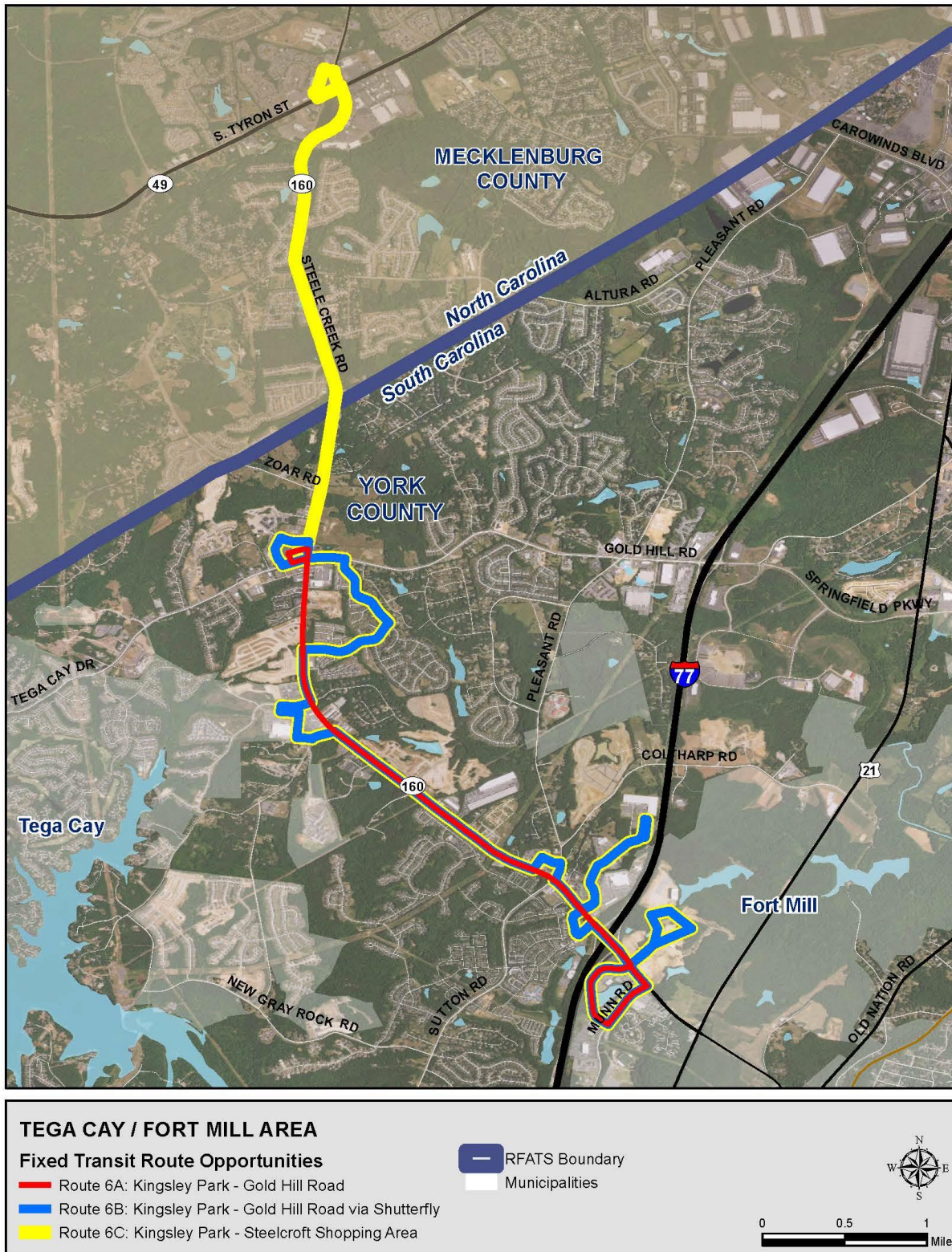


Figure 8.6: Potential Fixed Route Options, Fort Mill & Tega Cay Area



As noted earlier, the study also discusses opportunities to expand demand-response service so that it is available to all residents, including those in the Tega Cay/Fort Mill and Lancaster County panhandle areas.

Stakeholder Input

A number of comments were received from citizens regarding public transit needs. Multiple people commented that the LYNX should be extended into York County, at least to the Carowinds area. Others suggested modifications to the existing express bus service to improve travel times for commuters who want to go directly to and from uptown Charlotte. Interest was expressed in a service that would connect Rock Hill to the LYNX at times other than commuting hours, to allow participation in regional cultural activities. Others noted the importance of local transit service to provide access to jobs and educational opportunities.

Recommendations

- RFATS should continue to assist in interagency negotiations to ensure demand-response service is available in areas where current funding arrangements and boundaries have created gaps in service.
- The region should also pursue the options suggested in the *Transit Implementation Study* to make ridesharing programs available to commuters whose trips begin and end within the RFATS region. Ridesharing could help meet some trip needs for residents in areas where fixed-route public transportation is not yet available.
- RFATS should consider sponsoring efforts to raise local leaders' awareness of the role that public transportation and ridesharing play in economic prosperity. People with reliable access to transportation are better able to obtain – and maintain – employment, and workforce availability is important to the region's continued growth. Transit also plays an important role in quality of life, especially for people who do not, or cannot drive.
- RFATS and local jurisdictions should continue to explore opportunities for funding various elements of the *Transit Implementation Study* and the proposed BRT corridor. This should include considering whether, and to what extent, the flexible surface transportation funds (which have traditionally been seen as highway funds) could increasingly also be used for public transportation projects.

- RFATS and local jurisdictions should monitor the extent to which the region is implementing the conditions needed for successful public transportation: higher-density development, a safe sidewalk and bicycling network, and a more interconnected road system.

Introduction

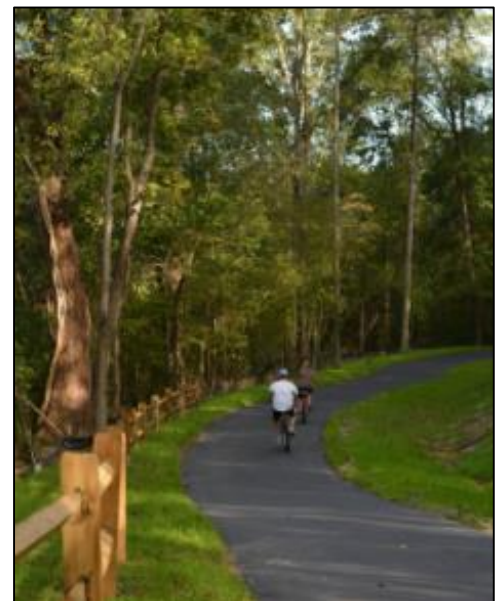
The benefits of cycling and walking are becoming more widely acknowledged in discussions about shaping the built environment. Taking trips by bike or on foot promotes good health, saves money, does not negatively impact the environment, and can even ease some of the traffic burden on roadways. More than half of daily trips are to destinations within a half-mile, generally considered a reasonable distance to travel on foot or bicycle. In addition, cycling and walking may be a necessary travel mode for children, persons with disabilities, some elderly persons, and those who cannot afford an automobile.

Road improvement projects that use federal funds are currently required to incorporate reasonable pedestrian and bicycle accommodations as part of their design and construction. This helps to address needs from this point forward. However, the RFATS region has previously experienced decades of auto-oriented development in which these requirements were not applied. It will take a focused effort to provide safe walking and cycling opportunities in areas where such facilities were not originally built.

Public support for such expenditures is growing, based on an understanding of the health and economic benefits as well as the enhanced quality of life in walkable, bicycle-friendly communities. In a survey conducted as part of the RFATS Bicycle / Pedestrian Connectivity Study during the summer of 2016, more than 90% of area respondents agreed that tax dollars spent on the transportation system should include pedestrian and bicycle investments.

This shift in local mindset has been reflected in the various programs and events in the RFATS area that aim to bring cycling and walking into the mainstream of transportation planning. Many of these efforts have already begun to produce a more multi-modal transportation system.

Since the City of **Rock Hill** first adopted its Trails and Greenways Master Plan in 2003, its trail network has grown from 11 miles to a total of 26 miles. Rock Hill has also earned designation as a bronze-level Bicycle Friendly Community, one of only six in the state.



Fort Mill's historic core has a grid pattern of streets that is supportive of cycling and walking. Its challenge is to continue connecting newer developments to the historic core and to community facilities. The Ann Close Springs Greenway is an award-winning private greenway system which is open to the public and serves as a green belt around the town.

Much of the development in **Tega Cay** dates from the 1970s and 1980s, a time when sidewalks were not always constructed in residential subdivisions. However, all new subdivisions are now required to have bicycle and pedestrian facilities, in keeping with the active lifestyle sought by many of those who are attracted to the lakeside community.

The RFATS Study Area expanded in 2013 to include the northern panhandle of **Lancaster County**. This eastern expansion extends the MPO boundary to places east of Sugar Creek and the Catawba River, including the rapidly developing area of Indian Land along the US Hwy 521 Corridor.

Recent plans suggest enhancing non-motorized access to the Catawba River as well as major parks, schools, and commercial nodes. Attention should be given to the design of facilities that cross local streams and rivers, including SC Hwy 5 (one of the only crossings of the Catawba River) and SC Hwy 160 (especially at the crossing of Sugar Creek). Multimodal design features that promote east-west connectivity will play an important part of the strategy to improve accessibility between York and Lancaster County destinations. The US 521/SC9 Corridor Study communicates a comprehensive multimodal strategy for the panhandle area of the county.

York County's one-cent sales tax program (Pennies for Progress) has been very effective in providing sidewalks in conjunction with most road improvements. The Pennies program has also funded a large number of small-scale sidewalk and bicycle-shoulder projects on existing streets, and the current program includes bicycle lanes in some locations. All road widening projects for the Pennies IV referendum will include sidewalks and 14-foot wide outside lanes, at a minimum.



The Regional Plan: *Bike Walk RFATS*

Although each of the local governments has some form of individual plan for bicycle and pedestrian facilities, RFATS has developed a plan identifying a regional priority network to better coordinate these investments to ensure an expanded range of connectivity and choice beyond individual boundaries. *Bike Walk RFATS* (2016) was developed through collaboration with York and Lancaster counties, the Catawba Indian Nation, City of Tega Cay, City of Rock Hill and the Town of Fort Mill, along with other key local and regional organizations that advocate for active forms of travel.

Figure 9.1: *Bike Walk RFATS* Vision Statement

Bike Walk RFATS envisions a region of **healthy, vibrant, and prosperous communities** that support residents' daily mobility and access needs efficiently and effectively. A **connected, convenient, and safe network** of sidewalks, shared-use paths, transit, and on-street bicycle connections **link people of all ages and abilities locally and across the region**. The network serves **residents, commuters, students, and visitors** alike. Walking, biking and transit are valued transportation modes, priorities for investment, and integral to regional strategies for congestion reduction, **improved air quality, and economic opportunity**.

The Five E's

To evaluate opportunities for the RFATS region to improve its support for walking and biking, a scorecard was used to rank the area's current standing on the "five E's": engineering, education, evaluation, enforcement, and encouragement. These are the issues that historically have been used to determine whether an area qualifies as a Walk-Friendly or Bicycle-Friendly Community. As shown in **Figure 9.2**, a sixth "E"—equity—has recently been incorporated into the process after planners became familiar with its use as a metric in the Safe Routes to School program.

Figure 9.2: The “E’s” in Community Assessment



Source: *Bike Walk RFATS*

Scorecards identified **enforcement** and **evaluation** as the RFATS region’s greatest strengths. Rock Hill and York County public safety officers have participated in training related to bicycle and pedestrian traffic laws, and some communities have bike patrol officers. The City of Rock Hill has targeted the enforcement of crosswalks and passed local ordinances addressing bicyclists’ right to the road. The area also has a number of bicycle/pedestrian and trail plans in place, along with an official task force that acts in an advisory role to planners and decision-makers.

Education and **encouragement** are areas where the region has made progress and should pursue additional activity, according to *Bike Walk RFATS*. Outreach activities are currently being conducted through local Safe Routes to Schools programs, National Bike Month, children’s bicycle rodeos, and similar events.



The region's lowest score was in **engineering**, largely due to the relative lack of a comprehensive sidewalk and bicycle network, and the policies that would help implement these facilities as part of future construction. As noted in the chapter introduction, road projects using federal funds are required to incorporate bicycle and pedestrian accommodations. However, there is not a consistent regional or local approach among RFATS jurisdictions to ensure that other road projects also incorporate non-motorized facilities.

Equity is an overarching issue that considers whether safe walking and biking access is available to people who may have no other choice but to walk or bike in unsafe conditions to meet their daily needs. These vulnerable populations can include seniors, children, non-white persons, low-income persons, those without access to a motor vehicle, and those who are linguistically isolated.

Recommended Bicycle and Pedestrian Projects

Bike Walk RFATS has identified both linear and “spot” improvements to create a safer and connected network for non-motorized travel within the region.

Identified improvements are based on a scoring system that considers factors such as:

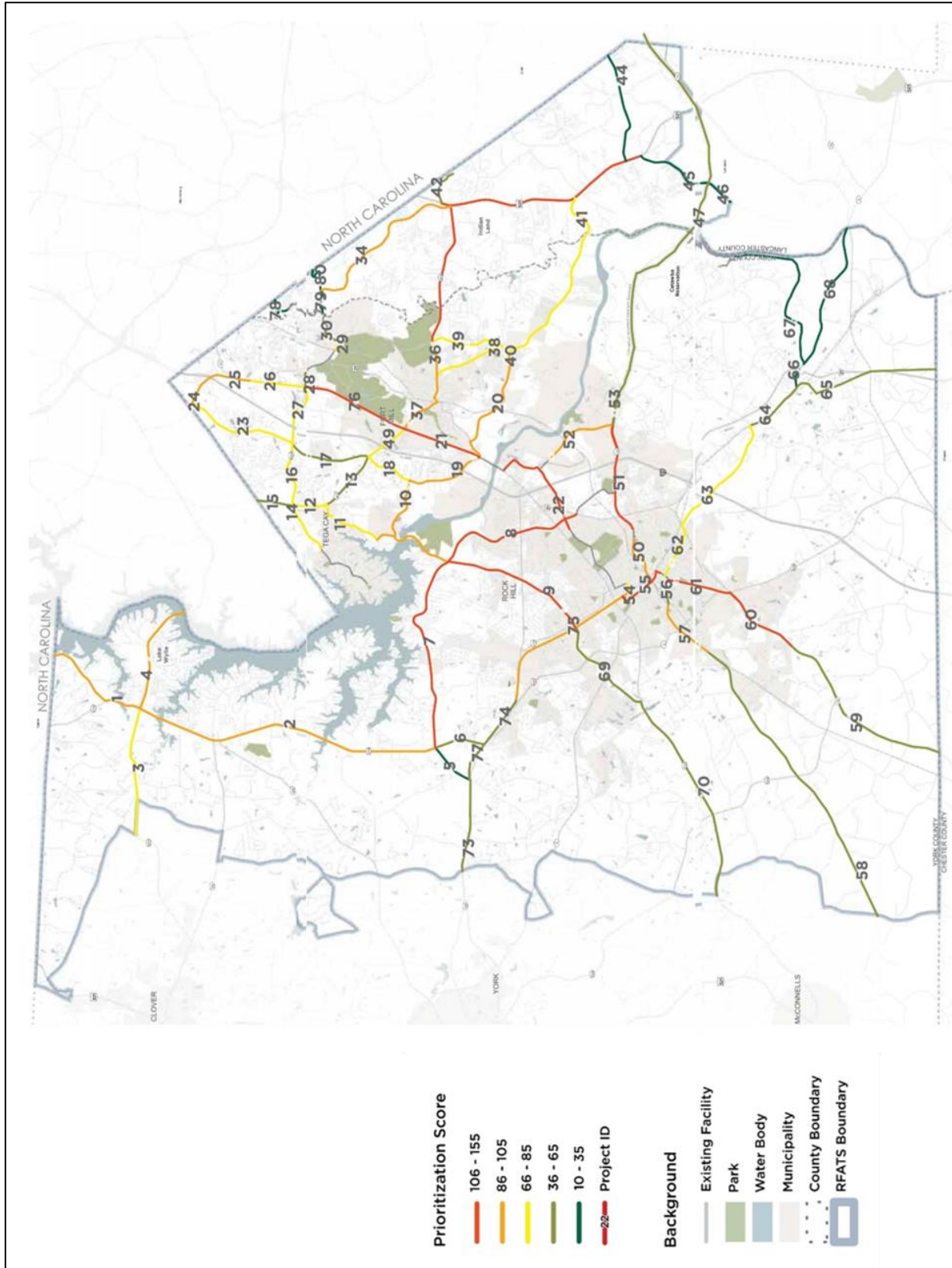
- Improving safety
- Opportunity to close a gap in existing bicycle and pedestrian infrastructure, and/or incorporate these facilities into upcoming road projects
- Proximity to regional attractions, downtowns, and local civic facilities
- Level of demand /need in the area
- Proximity to transit

Based on this evaluation, a regional priority network has been identified for making targeted investments over time.

Figures 9.2 and **9.3** show the location of recommended project improvements.

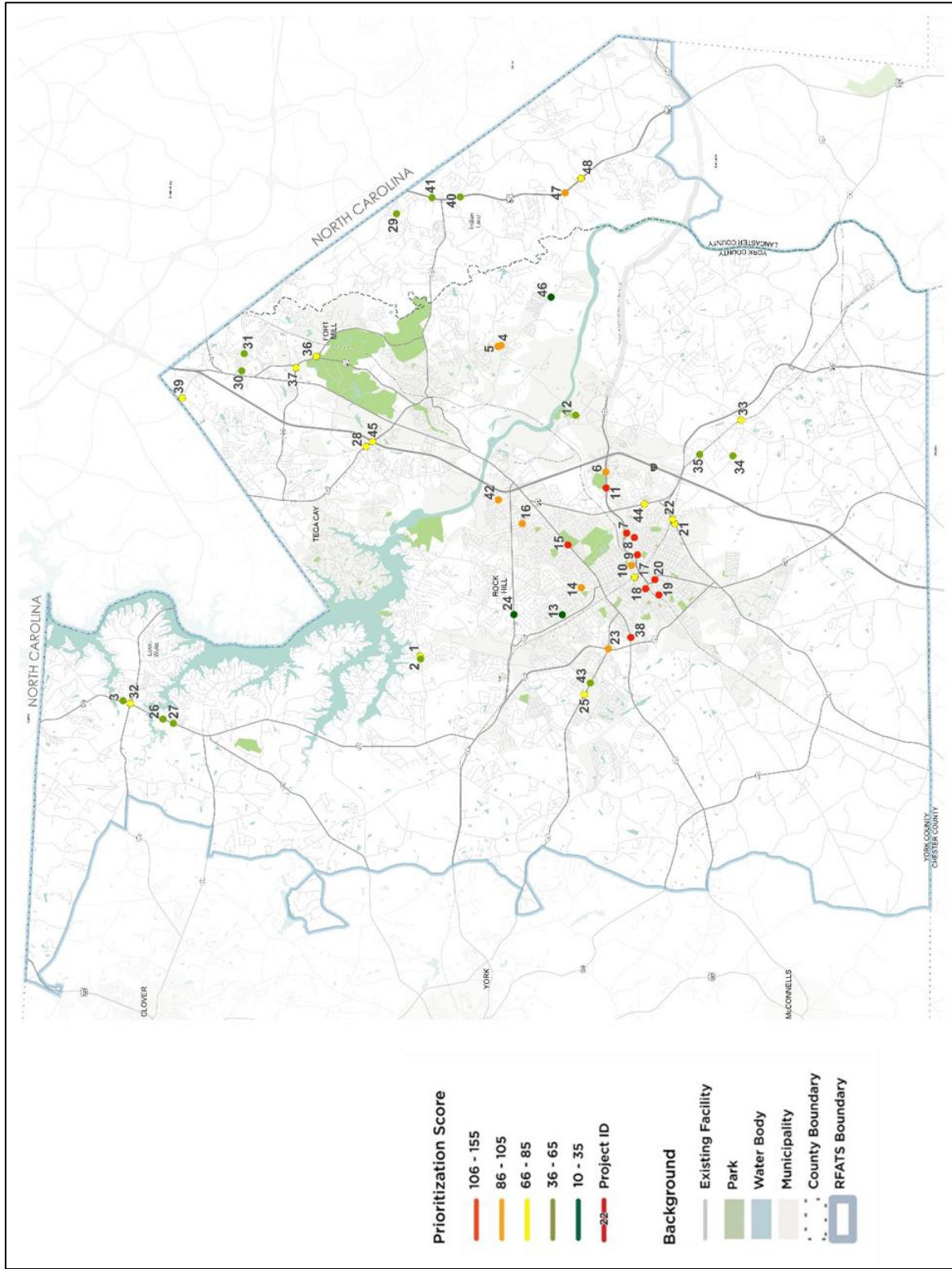
More detail for each project is provided in **Tables 9.1** and **9.2**.

Figure 9.2: Recommended Regional Bicycle/Pedestrian Network Projects



Source: Bike Walk RFATS (2016)

Figure 9.3: Recommended Bicycle/Pedestrian Spot Improvements



Source: Bike Walk RFATS (2016)

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
22	155	Eden Terrace Trail – Duncan’s Ferry Road at Riverwalk	Cherry Road	Nations Ford Road	Shared-Use Path (Bike Lane + Sidewalk west of Cel-River Road)	2.87	\$1,722,179
8	140	Mt Gallant Rd	India Hook Road	Celanese	Shared-Use Path + Sidewalk	2.3	\$3,189,040
			Celanese	Anderson Rd	Bike Lane (with Shared-Use Path from Eden Terrace to Anderson Rd)	1.28	
55	135	Columbia Av	White Street	Alumni Dr	Sharrows + Sidewalk	0.18	\$154,550
		White St E/W	Columbia Ave	Elizabeth Lane	Sharrows	1.11	
21	125	US 21	S Sutton Road	SC 160	Shared-Use Path	2.07	\$1,242,618
61	125	Saluda St	Albright Road	Heckle Boulevard	Bike Lane	0.38	\$55,234
		Saluda St	Heckle Boulevard	Johnston Street	Sharrows	1.26	
		N Elizabeth Ln	White Street	Main Street (End Of Existing Bike Lane)	Bike Lane	0.12	
76	125	US 21	Springfield Parkway	N White Street	Shared-Use Path	2.78	\$1,670,380
9	120	Herlong Av - India Hook Rd	Mt Gallant Road	Rail Trail	Shared-Use Path	3.86	\$2,315,989
7	115	Mt Gallant Rd	Hands Mill Highway	India Hook Road	Shared-Use Path	5.29	\$3,172,729
51	110	Dave Lyle Blvd	Gateway Boulevard	Apex Drive	Shared-Use Path + Sidewalk	2.87	\$3,843,504

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements (cont. from previous page)

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
60	110	Albright Rd - Saluda Rd/St	Mt Holly Road	Rambo Road	Shared-Use Path	2.25	\$1,350,523
35	105	Fort Mill Hwy	Harrisburg Road	Fort Mill Southern Bypass	Shared-Use Path	3.60	\$2,160,845
43	105	Charlotte Hwy (US 521)	Potts Lane	Dobys Bridge Rd	Shared-Use Path	3.46	\$2,076,988
48	105	Charlotte Hwy (US 521)	Dobys Bridge Rd	Van Wyck Rd	Shared-Use Path	2.06	\$1,236,636
10A	105	New Gray Rock Road	Dam Road	N Sutton Road	Bike Lane + Sidewalk	2.16	\$1,753,094
10B	105	India Hook Road	Mt Gallant Road	New Gray Rock Road	Shared-Use Path (with Trail Bridge)	1.76	\$7,057,046
37	105	TomHallSt	Dobys Bridge Road	Main Street	Bike Lane	0.61	\$1,428,237
		York SC 160 - White St N	Main Street	US21	Shared-Use Path	1.11	
		Main St	TomHall Street	White Street	Sharrows	0.15	
50	105	Jack White Trail - Northside Trail Ext	EWhiteSt	Iredell Street	Shared-Use Path	1.27	\$1,527,006
4	100	Charlotte Highway (SC 49)	Pole Branch Road	Buster Boyd Bridge	Shared-Use Path	3.25	\$1,948,835
20	100	Spratt St	US21	Fort Mill Parkway	Shared-Use Path+Bike Lane	0.46	\$1,970,314
		Brickyard Rd	Fort Mill Parkway	Dobys Bridge Road	Shared-Use Path	0.32	
		Whites Rd - Fort Mill Pkwy	Spratt Street	Holbrook Road	Shared-Use Path	2.45	
36	100	TomHall St	FortMill SouthernBypass	Dobys Bridge Road	Bike Lane	0.86	\$61,063

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements (cont. from previous page)

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
57	100	Ogden Rd	HeckleBoulevard	Squire Road	Sidewalk	1.08	\$916,400
		Ogden Rd - Friedheim Rd	Wilson Street	Squire Road	Bike Lane	1.65	
75	100	Ebenezer Rail Trail	RailTrail (NearBigOakLane)	DaveLyleBoulevard	Shared-Use Path	9.83	\$5,897,145
25	95	Carowinds Blvd	Pleasant Road	Regent Parkway	Shared-Use Path	1.86	\$1,114,581
52	95	Cel-RiverRd-RedRiverRd	DaveLyleBoulevard	Paragon Way (End Of Existing Bike Lane)	Bike Lane + Sidewalk	1.98	\$1,600,606
2	90	Hands Mill Hwy	SC557	Mt Gallant Road	Shared-Use Path	7.98	\$4,785,747
1	90	Pole Branch Rd - York SC 274 W	State Border	LandingPointeDr	Bike Lane + Sidewalk	2.27	\$2,235,795
		York SC 274 W	LandingPointeDr	SC557	Shared-Use Path + Sidewalk	0.54	
19	90	Sutton Rd S	New Gray Rock Rd	US 21	Bike Lane + Sidewalk	1.84	\$1,614,104
		Sutton Rd N	Sam Smith Rd	New Gray Rock Rd	Shared-Use Path + Sidewalk	0.09	
34	90	Harrisburg Rd	Carolina Thread Trail	Fort Mill Hwy	Shared-Use Path	4.50	\$2,697,827
14	85	Gold Hill Rd – Tega Cay Dr	End of sidepath near Shoreline Pkwy	SC 160	Bike Lane	1.36	\$96,721
18	85	Sutton Rd N	New Gray Rock Road	Willowbrook Drive	Shared-Use Path + Sidewalk	0.12	\$872,515
		Sutton Rd N - Market St	SC 160	New Gray Rock Road	Shared-Use Path	1.18	
38	85	Dobys Bridge Rd	Tom Hall Street	Fort Mill Southern Bypass	Shared-Use Path	1.86	\$1,117,258

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements (cont. from previous page)

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
54	85	Stewart Av	W. White Street	Oakland Avenue	Sharrows	0.38	\$6,019
63	85	Fire Tower Rd	E Main Street	Porter Road	Enhanced Shared Roadway + Sidewalk	0.12	\$2,476,438
		Fire Tower Rd	Porter Road	Castle Heights School	Bike Lane + Sidewalk	1.47	
		Fire Tower Rd - Neelys Creek Rd	Castle Heights School	Lesslie Highway	Shared-Use Path	1.68	
62	85	E Black St	S Elizabeth Ln	Albright Rd	Bike Lane	1.24	\$88,155
		Albright Rd – E Main St	E Black St	Firetower Rd	Shared-use Path + Sidewalk	0.23	\$309,090
11	80	Dam Rd	New Gray Rock Road	Stonecrest Boulevard	Bike Lane + Sidewalk	0.69	\$1,188,444
		Stonecrest Blvd	Dam Road	Hubert Graham Way	Bike Lane + Sidewalk	0.75	
		Stonecrest Blvd	Hubert Graham Way	SC 160	Bike Lane	0.26	
23	80	Pleasant Rd	Gold Hill Road	Carowinds Boulevard	Shared-Use Path	2.91	\$1,748,696
39	80	Tom Hall St To Holbrook Rd	Tom Hall Street	Holbrook Road	Bike Lane + Sidewalk	1.87	\$1,512,468
12	75	York SC 160	Gold Hill Road	Stonecrest Boulevard	Shared-Use Path	0.87	\$522,826
16	75	Gold Hill Rd	Highway 160	Pleasant Road	Shared-Use Path	1.68	\$1,006,601
26	75	Carowinds Blvd	Regent Parkway	Springfield Parkway	Shared-Use Path	1.39	\$834,268
49	75	York SC 160	Pleasant Road	US 21	Shared-Use Path	1.18	\$710,138
3	70	York SC 557 N	Charlotte Highway (SC 49)	Oakridge Road	Shared-Use Path	0.93	\$1,969,049
		York SC 557 N	Oakridge Road	Riddle Mill Road	Bike Lane + Sidewalk	1.11	
		York SC 557 N	Riddle Mill Road	Cross Road (RFATS Border)	Wide Paved Shoulder	1.29	

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements (cont. from previous page)

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
27	70	Springfield Pkwy – Gold Hill Rd	Pleasant Road	US 21	Shared-Use Path	1.49	\$891,526
29	70	Springfield Pkwy	Railroad	A O Jones Blvd	Shared-Use Path	0.24	\$144,467
40	70	Fort Mill Southern Bypass	Holbrook Road	Dobys Bridge Rd	Shared-Use Path	0.23	\$136,182
41	70	Dobys Bridge Road	Fort Mill Southern Bypass	US 521	Bike Lane + Sidewalk	5.09	\$4,120,228
17	65	Pleasant Rd	Gold Hill Road	SC 160	Shared-Use Path	2.10	\$1,258,363
28	60	Springfield Pkwy	US 21	Old Nation Road	Shared-Use Path	0.37	\$223,562
30	60	A.O. Jones Blvd	Springfield Parkway	Carolina Thread Trail - Nation Ford Greenway	Shared-Use Path	0.50	\$300,614
47	60	Dave Lyle Blvd Ext	Current end of Dave Lyle Blvd	End Of Dave Lyle Boulevard Ext	Shared-Use Path	10.88	\$6,530,519
53	60	Dave Lyle Blvd	Red River Road	Waterford Park Drive	Shared-Use Path + Sidewalk	1.22	\$1,284,072
70	60	McConnells Hwy	Meadow Lakes Road	RFATS Boundary	WidePavedShoulder	5.60	\$2,238,191
13	55	York SC 160	Stonecrest Boulevard	Sutton Road	Shared-Use Path	1.65	\$987,271
15	55	York SC 160	Gold Hill Road	State Border	WidePavedShoulder	0.94	\$375,249
24	55	Carowinds Blvd	Pleasant Road	State Border	Shared-Use Path	0.14	\$82,798
58	55	Ogden Rd	Squire Road	Falls Road	Bike Lane + Sidewalk	1.32	\$3,836,855
		Mobley Store Rd - Ogden Rd	Falls Road	RFATS Boundary	WidePavedShoulder	6.91	

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements (cont. from previous page)

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
59	55	Saluda Rd	Rambo Road	RFATS Boundary	WidePavedShoulder	5.00	\$2,000,906
69	55	Meadow Lakes Rd	McConnells Highway	W Main St	Bike Lane + Sidewalk	1.15	\$1,536,974
		Herlong Av S	W Main St	Heckle Boulevard	Bike Lane	0.66	
		Herlong Av S	Heckle Boulevard	Rail Trail	Shared-Use Path	0.93	
65	50	Rail Corridor - Lesslie Hwy - Ole Simpson - Utility Row	Planned Carolina Thread Trail - Old Friendship Trail	RFATS Boundary	Shared-Use Path	3.85	\$2,307,477
73	50	Ebenezer Rail Trail - Old York Rd	Mt Gallant Road	RFATS Boundary	Shared-Use Path	2.37	\$1,423,404
74	50	Ebenezer Rail Trail	Hands Mill Highway	Rail Trail (Near Big Oak Lane)	Shared-Use Path	1.46	\$875,456
77	50	Ebenezer Rail Trail	Mt Gallant Road	Hands Mill Highway	Shared-Use Path	1.04	\$622,491
6	45	Hands Mill Hwy	Mt Gallant Road	Old York Road	Shared-Use Path	1.29	\$775,116
42	45	Potts Lane	US 521	State Border	Shared-Use Path	0.94	\$564,479
64	40	Lesslie Hwy	Neelys Creek Road	Planned Carolina Thread Trail - Old Friendship Trail	Shared-Use Path	1.58	\$949,568
44	35	Jim Wilson Rd	US 521	State Border	Shared-Use Path	2.86	\$1,718,689
67	35	Catawba River Ext - Six Mile Creek - Turkey Ln	Turkey Lane	Existing Carolina Thread Trail - Catawba Indian Nation - Greenway Trail	Shared-Use Path	4.5	\$2,702,414

Table 9.1: Proposed Linear Bicycle and Pedestrian Improvements (cont. from previous page)

Project Id	Score	Project Name	Start	End	Proposed FacilityType	Miles	Est. Cost
5	30	Mt Gallant Rd	Hands Mill Highway	Old York Road	Shared-Use Path	1.24	\$742,430
45	30	Van Wyck Rd	US 521	Sun City Boulevard	Shared-Use Path	0.63	\$925,603
		Van Wyck Rd	Sun City Boulevard	W Rebound Road	Wide Paved Shoulder	1.37	
66	30	Old Friendship Road - SC 5	Old Friendship Road	Turkey Lane	Shared Use Path	0.72	\$434,114
78	25	Little Sugar Creek	Nations Ford Greenway	State Border	Shared-Use Path	0.75	\$449,292
46	20	Van Wyck Rd	Sun City Boulevard	W Rebound Road	Wide Paved Shoulder	0.76	\$304,129
68	15	SC 5	Turkey Lane	Catawba River	Wide Paved Shoulder	3.82	\$1,528,040
79	10	New Trail	Nations Ford Greenway	Harrisburg Road	Shared-Use Path	0.61	\$364,031
80	10	McAlpine Creek - New Trail	Harrisburg Road	State Border	Shared-Use Path	0.93	\$559,380

Table 9.2: Proposed Spot Bicycle/Pedestrian Improvements

Project ID	Score	Start	End
7	90	Iredell St	150 ft south of Montford Ave
8	90	Iredell St	Dunlap St
20	90	Hampton St	Johnston St
38	90	SC 322	Finley Road
9	85	N Confederate Ave	Willowbrook Ave
11	85	Mt Gallant Road	Dave Lyle Blvd
15	85	N Cherry Road	Deas Street
18	80	N Wilson St	W Johnston St
19	80	S Dave Lyle Blvd	Hampton St
16	70	Mt Gallant Road	Marett Blvd
4	65	Dobys Bridge Road	Dobys Bridge Elementary School
5	65	Ft Mill Southern Bypass	Dobys Bridge Road
10	65	Charlotte Ave	N Wilson St
14	65	India Hook Drive	Glendale Dr
6	60	Dave Lyle Blvd	John Ross Pkwy
23	60	Heckle Blvd	SC 5 W Main St
42	60	Lexington Commons Dr	Lexington Blvd
47	60	Dobys Bridge Road	US 521
17	50	N. Wilson Street	Railroad (near Ebenezer Ave)
22	50	Firetower Road	E Main Street
25	50	SC 5 (York Hwy)	Meadowlark Drive

Table 9.2: Proposed Spot Bicycle/Pedestrian Improvements

Project ID	Score	Start	End
28	50	SC 160	Carolina Place Dr (at Baxter Village)
33	50	Neelys Creek Road	Lesslie Hwy
36	50	US Bus 21 / Old Nation Rd	SC 460
39	50	Carowinds Blvd	Pleasant Road
44	50	Princeton Road	S Anderson Road
45	50	SC 160	I-77 Interchange
48	50	US 521 (Charlotte Hwy)	Shelley Mullis
1	45	Mt Gallant Road	Museum Road
21	45	Albright Road	E Main Street
2	40	Mt Gallant Road	Mt Gallant Elementary School
3	40	Landing Pointe Drive	SC 274
12	40	Red River Road	Carolina Thread Trail (at River Park)
26	40	SC 49	Marlin Drive
27	40	SC 49	Autumn Cove Drive
29	40	Harrisburg Road	Kariker Ct
34	40	Firetower Road	Edenvale Road
35	40	N Springdale Road	Lesslie Hwy
40	40	Charlotte Hwy (US 521)	Marvin Road
43	40	SC 5 (York Hwy)	The Crossing
30	35	Regent Pkwy	Township Drive
31	35	Regent Pkwy	Hadden Hall Blvd
41	35	Charlotte Hwy (US 521)	Potts Lane
13	30	Herlong Drive	Estes Drive
24	25	Twin Lakes Road	Celanese Road
46	25	Dobys Bridge Road	Kingston Way

Recommended Bicycle and Pedestrian Policies and Programs

BikeWalk RFATS recommends several policies and programs (**Table 9.3**) to strengthen the regional foundation for bicycle and pedestrian planning.

Table 9.3: “Top Ten” Priority Program and Policy Recommendations

Active Transportation Summit

- Host an annual, half- to full-day workshop for dialogue related to designing and building Complete Streets, local active transportation initiatives, and funding strategies.

Regional Safe Routes to School Coordination

- Develop a central repository of information about SRTS, from mapping, planning efforts, and funding
- Help jurisdictions build on lessons learned; provide local training to help schools understand the SRTS activities toolkit

Regional Active Transportation Safety Plan

- Develop an action plan that identifies crucial bike and pedestrian safety needs and develops clear actions to improve safety in the RFATS region.

Regional Bicycle & Pedestrian Count Program

- Provide training manuals to communities on how to conduct bicycle and pedestrian counts.
- Collaborate with local organizations to enlist volunteers to perform counts.
- Create funding incentives for communities to include permanent counters as part of implementing projects.

Region-wide User Maps and Guides

- Build on existing efforts to promote bicycling routes and promote outdoor recreational attractions (Velodrome, Game On, Riverwalk, Anne Springs Close Greenway and others)
- Develop publicly-distributed materials that describe safe and comfortable routes to local and visitor destinations.

Professional Training Opportunities

- Provide webinars, courses and other professional training opportunities to the region's city and county engineers, planners, police and other staff. Topics could include bike and ped design standards, funding opportunities, and interdepartmental coordination on bike/ped issues.

Adopt Regional Design Standards

- Promote adoption of the BikeWalk RFATS active transportation design guidelines by each local government in the RFATS region to promote consistency and efficient coordination of facilities.

Regional Complete Streets Policy

- Adopt a regional Complete Street policy to ensure all roadway users are considered in the planning, design, engineering and funding of capital projects.

Health and Equity-Based Project Prioritization

- Incorporate factors related to health and equity in the scoring and prioritization of RFATS projects.

Regional Target Zero Policy

- Support SCDOT efforts for the Target Zero Plan with a regional Vision Zero which targets the most dangerous corridors and crash hotspots for safety improvements.

Implementation

Funding for pedestrian and bicycle facilities can come from a variety of sources. Federal funds include Transportation Alternatives Program grants (formerly called transportation enhancements); safety funds for spot improvements such as pedestrian crossings; and Guideshare and CMAQ funds allocated to RFATS. Communities may also continue to use local and private funds to meet pedestrian and bicycle needs.

Federal and State Policies

Some of the proposed network and spot improvements can be built through the roadway projects included in the 2045 LRTP. In accordance with Federal Highway Administration requirements, bicycle/pedestrian facilities will be incorporated into all federally-funded projects in the RFATS area that reconstruct or widen a road. Similar policies exist at the state level, dating from 2003 when the SCDOT Commission directed that accommodating bicycles should be a routine part of the Department's planning, design, construction and operating activities.

SCDOT's 2014 Comprehensive Multimodal Long Range Transportation Plan recognizes cycling and walking as modes of transportation. The statewide plan notes that SCDOT works collaboratively with local jurisdictions to identify suitable bicycle improvements (such as shoulders or restriping with bike lanes) to incorporate in highway projects, as well as to identify funding for these projects. However, local support from MPOs, particularly in advance of the project design process, is seen as critical to implementing bicycle and pedestrian improvements. The responsibility is therefore on MPOs and municipalities to bring these issues to the table during project discussions.

Local Policies

Local policies are also an essential part of ensuring that the pedestrian and bicycle system expands as the area grows. As noted earlier, many of the area's less "walkable" communities were built at a time when local development regulations did not require sidewalks to be incorporated in new subdivisions or non-residential developments.

In addition, many of the region's important transportation projects are now constructed through locally-generated funds such as the Pennies for Progress program. By adopting Complete Streets design standards, all communities in the RFATS region can ensure that locally-funded transportation projects include facilities to allow safe travel by non-motorized users.

Introduction

Aviation is the fastest mode of transportation for traveling substantial distances. Commercial aviation allows citizens to travel to other states and internationally for business, personal business, or leisure. Commercial freight operations—including the major parcel companies—provide a means of delivering commercial goods across the nation.

General aviation supports business travel needs as well as providing for recreational flying. There are also important niche operations, such as medical helicopters.

Aviation activities also impact other aspects of the transportation system. For example, larger airports and their associated aviation-related businesses are significant generators of roadway travel demand, not only for air travelers but also for commercial vehicles as well as the commuting needs of airport employees.

The RFATS region benefits from close proximity to a major international airport and is fortunate also to have its own corporate/business airport. The region's challenge is to maximize the benefits of having these two complementary facilities.



Existing Facilities and Conditions

Charlotte Douglas International Airport

Although Charlotte Douglas International Airport (CLT) is located across the state line in North Carolina, the airport serves as the region's primary commercial airport, offering direct links to nationwide and international destinations. American Airlines uses Charlotte as a major hub for its domestic and international air travel operations.

Over the past ten years, CLT has experienced a 55 percent increase in passenger traffic. In 2015 it had become the nation's 8th busiest airport, with more than 22 million enplanements (passengers boarded).¹



¹ U.S. DOT Bureau of Transportation Statistics.

To meet its growing needs, CLT recently completed an airfield and terminal capacity enhancement study, which together form the airport’s master plan. This plan defines the future and long term airfield and terminal development and helps guide CLT’s construction and development through 2035.

Proposed improvements (shown in **Table 10.1**) include expansion of multiple concourses, terminal renovation and expansion, and addition of a fourth parallel runway.

Table 10.1: CLT Master Plan Projects

Proposed Improvement	Status
Elevated Roadway and Terminal Curb Front Improvements	Construction (Completion - Summer 2018)
Concourse A Expansion - Phase I	Design (Completion - Spring 2018)
East Terminal Expansion - Phase II	Design (Completion - Spring 2018)
Terminal Renovations	Design (Completion - Fall 2019)
Concourse E Expansion - Phase VIII	Design (Completion - Spring 2018)
Air Traffic Control Tower	Design
Terminal Lobby Expansion	Planning (Completion 2020)
Fourth Parallel Runway	Planning (Completion - Fall 2022)
Concourse A Expansion - Phase II	Planning (Completion - Spring 2022)
Concourse B Expansion	Planning (Completion - Spring 2026)
Concourse C Expansion	Planning (Completion - Spring 2024)

Rock Hill/York County Airport

Rock Hill/York County Airport is a publicly-owned, general aviation SCII classified airport located approximately four miles north of the center of Rock Hill and approximately 17 miles from Charlotte Douglas International Airport (**Figure 10.1**).

The airport operates a 5,500-foot runway and encompasses nearly 500 acres. According to FAA statistics, it had more than 150 based aircraft and 36,000 aircraft operations for the year 2015.

Day-to-day airport business is performed by SkyTech, which leases the facilities on the west side of the airport from the City. Operations include general aviation local aircraft operations, general aviation itinerant operations, and a small number of military operations. Ground transportation includes rental car agencies and taxi service.

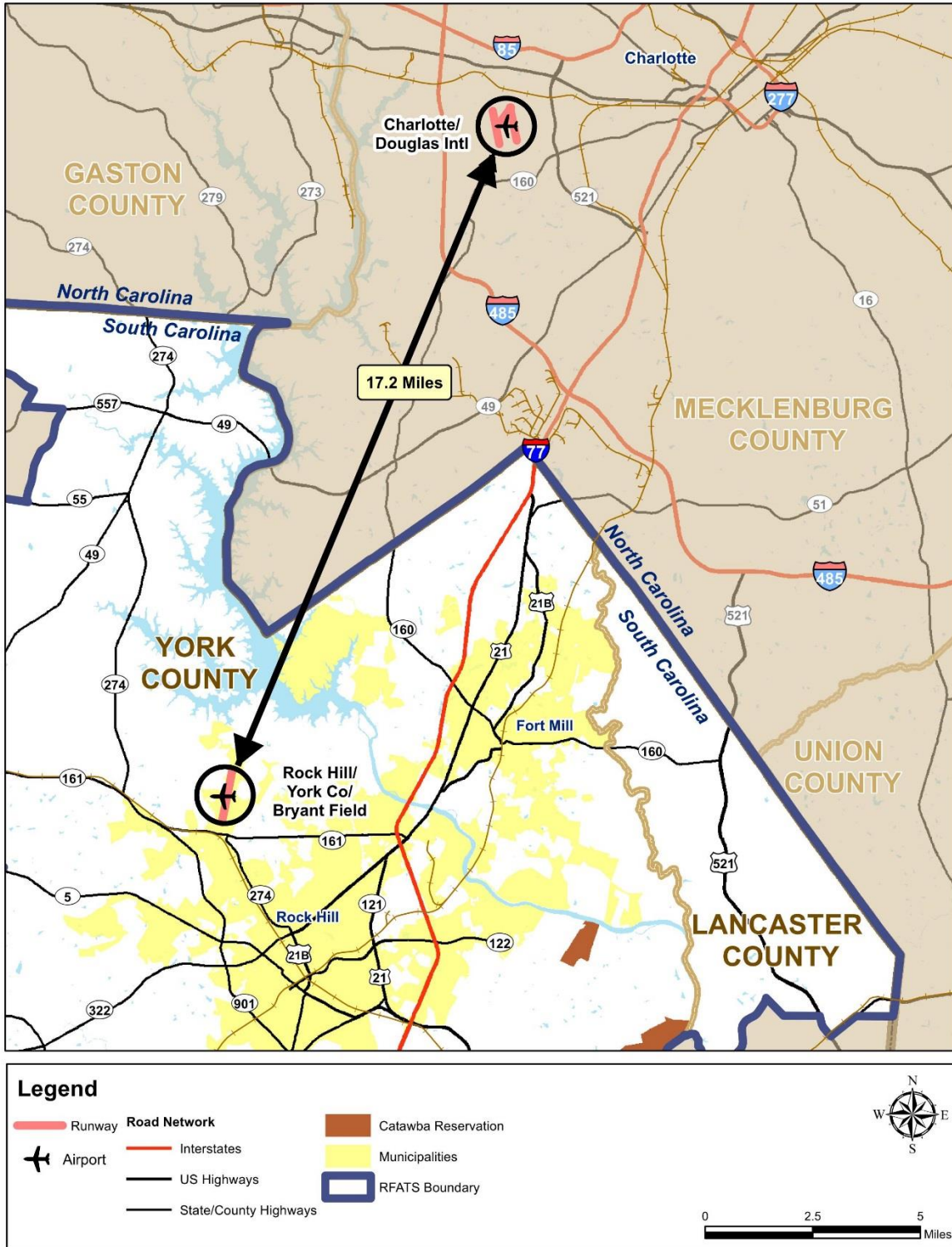
Development of an airport to serve the Rock Hill area was first initiated in 1956 with the creation of an Airport Commission. Under a management agreement between the City of Rock Hill and York County, the City remains the official sponsor of the airport, but both local governments contribute equally in funding. The Airport Commission makes recommendations to the City on the airport’s policies and operations as well as advising the City and County on planning matters and capital improvements.



The City and County have contracted with SkyTech to handle day to day management of the airport.



Figure 10.1 | Physical Relationship of Charlotte-Douglas International and Rock Hill-York County Airports



Rock Hill-York County Airport's SCII classification indicates that it ranks in the second category of a four-tier system of airports, classified according to level of activity and purpose. As explained in the South Carolina Airport Systems Plan (2008), the state's airports can be grouped into four categories:

- **Commercial Service Airports** (category SCI) are airports with scheduled services and at least 10,000 passenger boardings annually.
- **Corporate/Business Airports** (category SCII) are urban/multi-jurisdictional airports with a runway of at least 5,000 feet and full services. They are seen as having a high economic impact, and 30 to 50 percent of their activity is in corporate aviation. The Rock Hill-York County Airport falls into this category.
- **Business/Recreation Airports** (category SCIII) are rural airports with a runway of at least 3,600 feet and moderate economic impact.
- **Recreational/Local Service Airports** (category SCIV) are low-activity airports with a runway of less than 3,600 feet and limited facilities. They have a low economic impact and may have constraints to expansion.

Rock Hill-York County Airport is designated by the FAA as a "reliever" for Charlotte-Douglas International Airport. This indicates the potential to attract more general aviation users who wish to avoid the growing congestion at CLT, both in terms of airport activity and using the area highways to get to and from their landside destinations. Adding more hangar space is one of the prerequisites for attracting more users to Rock Hill-York County Airport, as further discussed below.



Aerial image of the Rock Hill/York County Airport with 5,500' runway

Other Aviation Facilities in the Region

In addition to its publicly-owned airport, the RFATS region includes one privately-owned heliport located at Piedmont Medical Center in Rock Hill.

Future Plans

Airport Master Plan for Rock Hill-York County Airport

Since its opening in 1960, Rock Hill-York County Airport facilities have expanded under the direction of a series of Master Plans, and with the help of a series of federal grants. The airport experienced particularly rapid growth during the 1970s and early 1980s, both in operations and the number of aircraft based there. Subsequent Master Plans in 1983, 1994, and 2003 included further development of the airport infrastructure.

The current Airport Layout Plan was completed in June 2016. Its goal is “to provide guidelines for future airport development which will satisfy aviation demand in a cost-effective, feasible manner, while resolving aviation, environmental, and socioeconomic issues of the community.”

Table 10.2 provides a summary of the forecasts for the Rock Hill – York County Airport throughout the 20-year Airport Layout Plan planning period. **Table 10.3** summarizes the airport’s facility requirements and lists the phases in which various facilities will be needed, as driven by demand.

Proposed improvements in the 20-year airport improvement program are categorized into one of three development phases:

- Phase I (2016-2021)
- Phase II (2022-2026)
- Phase III (2027-2035)

The airport is not projected to reach its capacity or volume service limits within the 20-year planning period. However, it is anticipated that the nature of the based aircraft will evolve to larger craft, requiring a longer runway and additional hangar space.

Table 10.2: Aviation Forecast Summary, Rock Hill-York County Airport

	2015 (Existing)		2016		2021		2026		2035	
	Forecast	TAF	Forecast	TAF	Forecast	TAF	Forecast	TAF	Forecast	TAF
BASED AIRCRAFT										
Single-Engine Piston	133		137		153		170		200	
Multi-Engine Piston	12		12		13		14		15	
Turboprop	0		0		2		3		5	
Jets	5		5		5		6		7	
Helicopters	2		2		3		3		5	
Total Based Aircraft	152	133	156	133	176	133	196	133	232	133
AIRCRAFT OPERATIONS										
GA Local	25,015	25,015	25,692	25,015	28,986	25,015	32,279	25,015	38,208	25,015
GA Itinerant	10,500	10,500	10,785	10,500	12,167	10,500	13,550	10,500	16,039	10,500
Air Taxi	400	400	410	400	463	400	516	400	610	400
Military	85	85	89	85	100	85	111	85	132	85
Total Operations	36,000	36,000	36,972	36,000	41,712	36,000	46,452	36,000	54,984	36,000
Operations per Based Aircraft	237	237	237	237	237	237	237	237	237	237
<small>Source: Federal Aviation Administration, "FAA APO Terminal Area Forecast Detail Report," <http://aspm.faa.gov/>, accessed January 14, 2015. Talbert, Bright & Ellington, Inc., January 2015.</small>										

Table 10.3: Facility Requirements Summary, Rock Hill-York County Airport

Facility	Existing	2016	Phase 1	Phase 2	Phase 3
			2021	2026	2035
Runway 02/20	5,500' x 100'	5,500' x 100'	6,555' x 100'	6,555' x 100'	6,555' x 100'
Taxiway	1 Full-Parallel	1 Full-Parallel	1 Full-Parallel	1 Full-Parallel	1 Full-Parallel
T-Hangar Units	97	130	149	165	194
Conventional Hangar (sf)	36,900 sf	66,100 sf	84,712 sf	100,859 sf	130,050 sf
Total Apron Area (sf)	410,650 sf	76,478 sf	88,654 sf	98,507 sf	116,766 sf
Terminal (sf)	7,366 sf	7,366 sf	8,679 sf	11,264 sf	12,829 sf
<small>Source: Talbert, Bright & Ellington, Inc., January 2015.</small>					

Introduction

This chapter outlines the growth trends and socioeconomic information used to project and evaluate future transportation needs. It also considers the social and environmental impacts of the recommended investments in the Long Range Transportation Plan, and discusses ways in which adverse impacts may be avoided or otherwise addressed.

Socio-Economic Information

Metrolina Model

To help understand the influence of development on transportation needs, the RFATS long range planning process is supported by the ongoing collection of socio-economic data and other forecast information. This data provides important inputs to the regional travel demand model, which encompasses RFATS as well as several other Metropolitan Planning Organizations in the greater Charlotte region.

The Metrolina Regional Travel Demand Model ('Metrolina model') is divided into Traffic Analysis Zones (TAZs) which represent the basic areas for forecasting. Based on the estimated population and employment in each Traffic Analysis Zone, the model estimates future travel demand between various parts of the RFATS area and greater region. The model outputs are in the form of "volume/capacity ratios" that help to identify facilities where future traffic volumes may exceed the operating capacity of a particular roadway.

Data and Sources

For the 2045 LRTP, RFATS staff updated current planning data such as housing, employment and school enrollment, and developed projections for the plan's "horizon years" of 2025, 2035, and 2045. Since trip-making characteristics vary by household size, income, and type of employment, information was collected at a level of detail sufficient to allow reasonable estimation of detailed trip purposes.



Table 11.1: Subcategories of Socio-Economic Data

Housing	Employment	School Enrollment
<ul style="list-style-type: none"> • Households • Population • Population in Households • Population in Group Quarters • Mean Household Income 	<ul style="list-style-type: none"> • Total Employment • Employment - Manufacturing, Industrial, Warehouse, Transportation, Communications, Utilities • Employment - Retail • Employment - Highway Retail • Low-Traffic Service Employment • High-Traffic Service Employment • Employment - Office & Government • Employment - Bank • Employment - Education 	<ul style="list-style-type: none"> • Students - Grades K-8 • Students - High School • Students - College

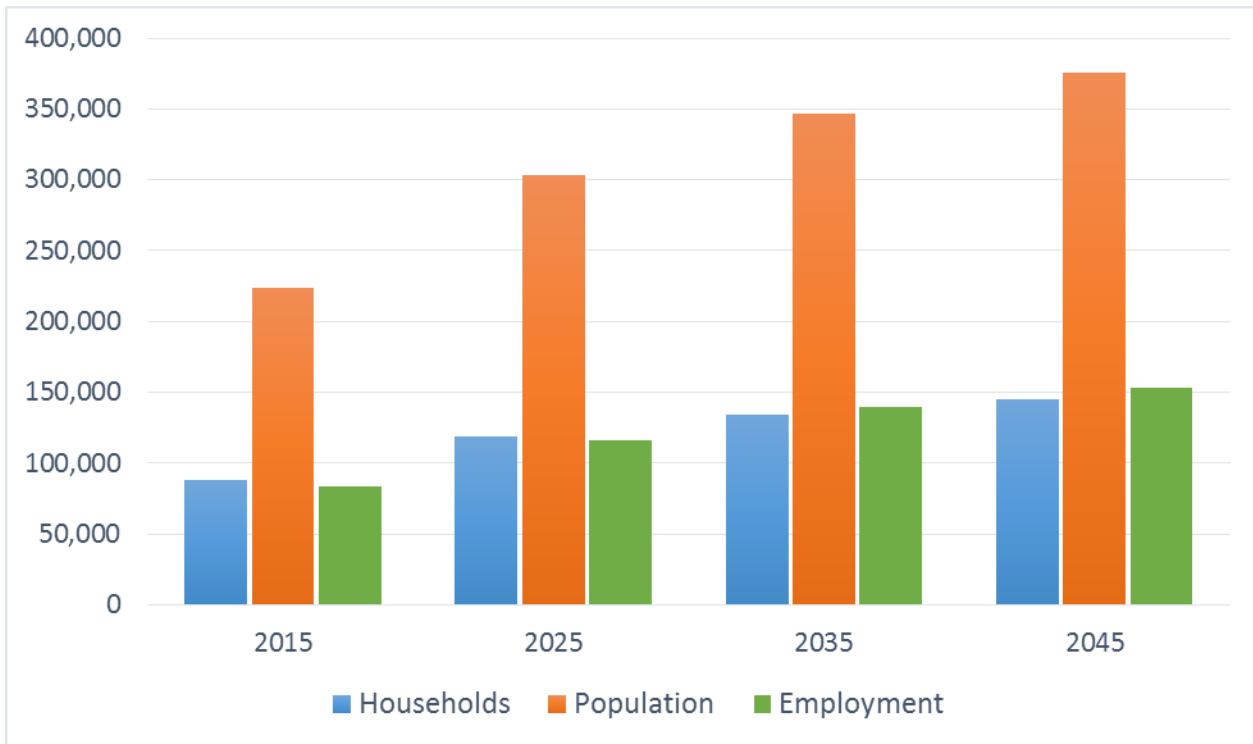
Socio-Economic Forecast

Table 11.2 summarizes the socio-economic data used in the Metrolina model for the RFATS region. Total population is expected to rise by more than 40 percent, from 233,386 in 2015 to 375,958 by the year 2045. Total regional employment is estimated to rise from 83,640 in 2015 to 152,805 in 2045, an increase of 45 percent. This is charted in **Figure 11.1**.

Table 11.2 – RFATS Area Population and Employment Forecasts

Year	Population	Employment
2015	223,386	83,640
2025	303,154	116,012
2035	346,224	139,316
2045	375,958	152,805

Figure 11.1 – RFATS Area Households, Population and Employment Forecasts



Reflects current and projected changes in population, employment, and number of households from 2015 through forecast year 2045.

Figure 11.2: 2015 Population by Traffic Analysis Zone

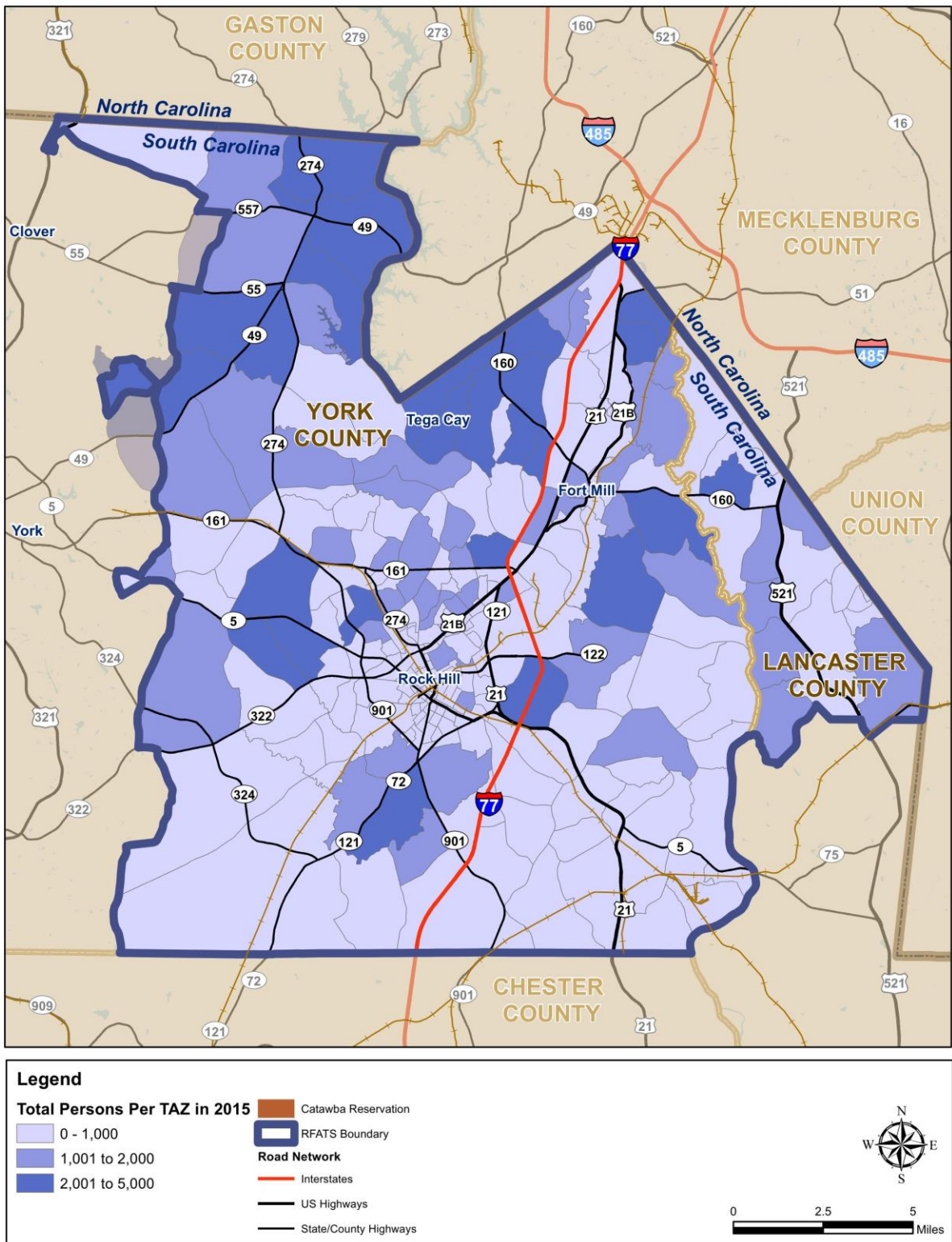


Figure 11.3: 2045 Projected Population by Traffic Analysis Zone

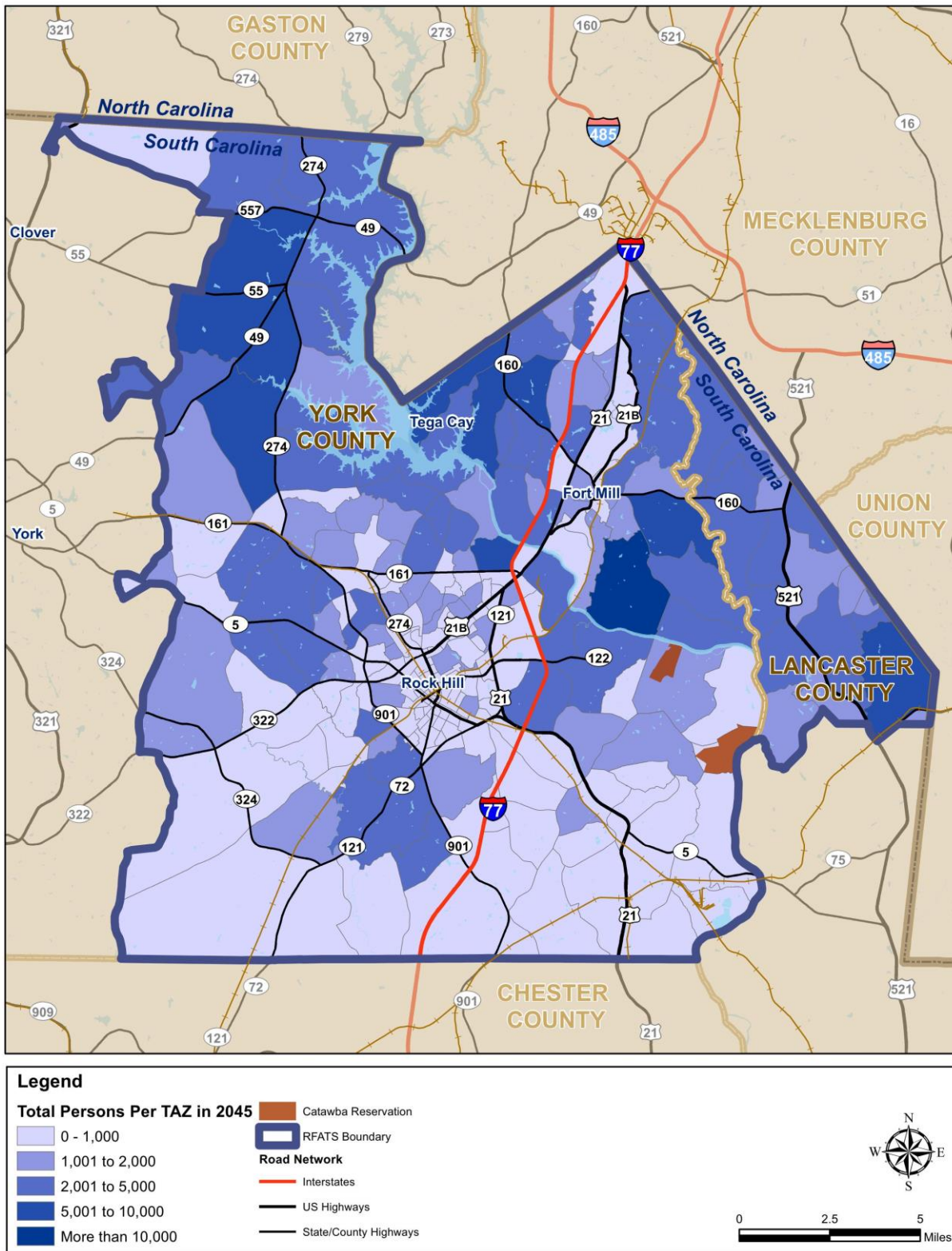


Figure 11.4: 2015 Employment by Traffic Analysis Zone

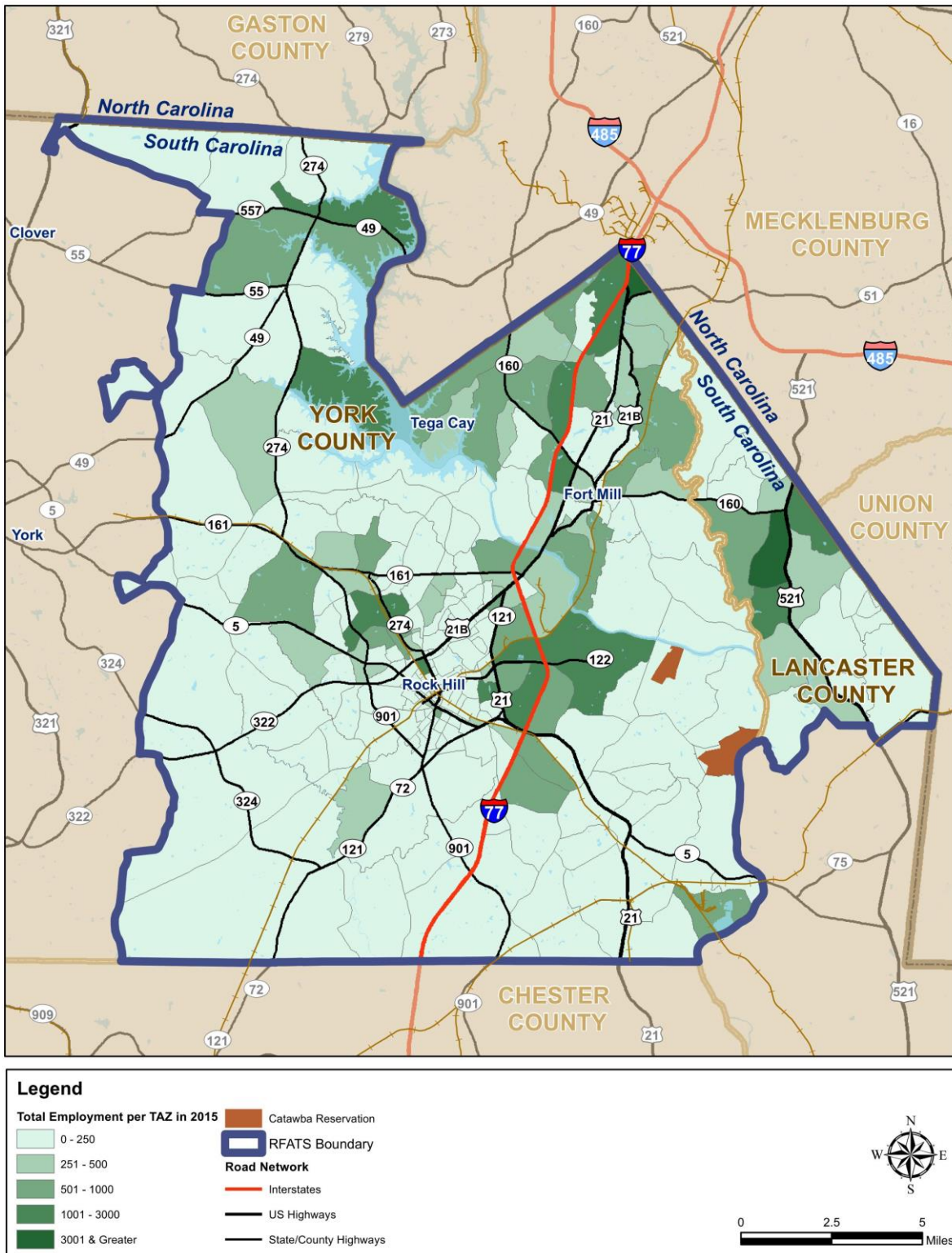
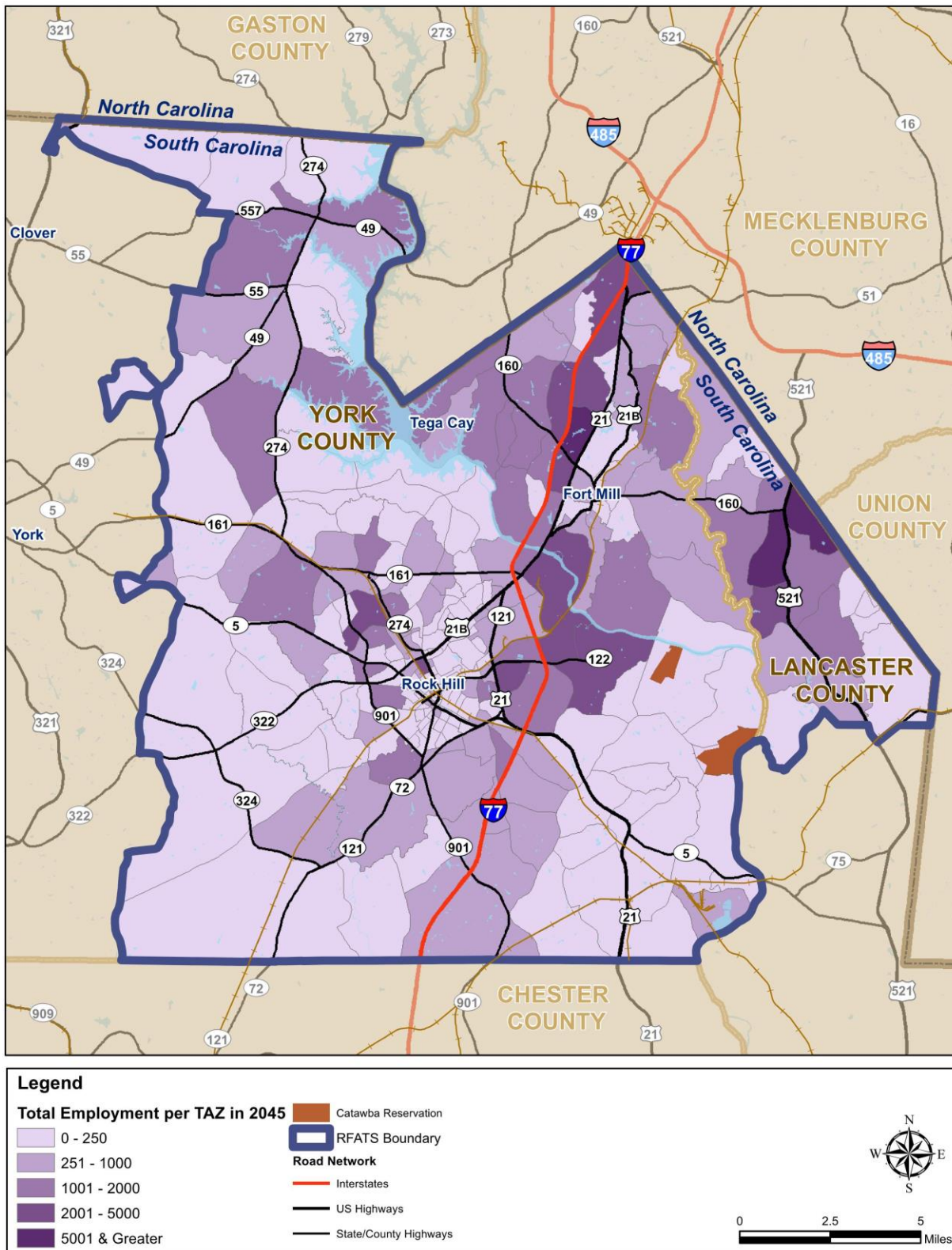


Figure 11.5: 2045 Projected Employment by Traffic Analysis Zone



Potential Impacts of the 2045 Plan

The 2045 LRTP includes projects that vary in scope from signalization, intersection improvements, minor and major reconstruction, to new corridors. This section identifies where projects may impact sensitive natural and/or cultural resources, discusses the potential types of impact, and outlines potential mitigation activities at the policy/strategy level.

This section also assesses the extent to which the 2045 LRTP fulfills the principles of the U.S. Executive Order on Environmental Justice. A geographic analysis is performed for proposed transportation investments to identify whether there could be disproportionate impacts on minority or low-income populations, either through direct effects or through the lack of transportation investment.

Environmental Screening and Mitigation

Federal legislation requires RFATS to consider potential impacts and planning-level strategies for mitigating those potential impacts. This section presents an overview of known environmentally sensitive areas in relation to the proposed projects and programs in the 2045 LRTP. This information can be used to assist in the project development process once a project has moved from the planning stage to the programming stage (e.g. the TIP) for project implementation.

Incorporating environmental considerations early in the transportation planning process helps to streamline project development by providing realistic assumptions about potential environmental considerations, impacts and costs.

As described in Chapter 4 (Roadways), one of the factors used to rank proposed transportation projects is the potential impact to environmental, social, and cultural resources. This includes identifying major environmental impacts that diminish a project's feasibility.

However, the screening is not intended as a replacement for a more thorough evaluation of each project as it progresses. Most projects will require a more detailed environmental assessment as the project enters the development phase. For example, an Advanced Project Planning Report has already been completed for the project to widen a 2.1 mile segment of the US 21 Bypass from Springfield Parkway to SC 51 in northeastern York County. Some of the other projects listed in the LRTP have also progressed beyond the design phase, in which case the necessary environmental reviews and approvals have already occurred.



Air Quality Impacts

One of the overarching environmental issues for transportation – not geographically specific to one area – is air quality. Vehicles that use fossil fuels produce certain chemical compounds that contribute to local air pollution. The amount of pollution generated by traffic typically increases with the number of miles being driven in the area and is also affected by driving conditions (e.g., extended idling and stop-and-go traffic are associated with higher levels of pollution).

The RFATS region was previously designated as a “non-attainment area” for ground level ozone back in 2004, along with a number of adjacent planning partners within the broader Metrolina region. Since this time, RFATS has implemented a series of targeted improvements to favorably impact air quality. In January 2016, EPA officially recognized these efforts and re-designated RFATS as a “maintenance area” for ground level ozone, indicating that while progress has been achieved, that continued monitoring will continue to apply to transportation programs and project activity. This is commonly referred to as transportation conformity – which means that RFATS will complete a comprehensive evaluation of its planned improvements to ensure that they will function in compliance with applicable air quality standards over the duration of the 2045 Long Range Transportation Plan. This is documented in the “Conformity Demonstration Report,” and is available from RFATS upon request.



Other Types of Impacts

Roadway projects generally have the most potential to produce adverse environmental impacts due to land clearing and grading, modification of natural drainage, increased stormwater runoff, and traffic. In addition, major roads can become barriers within communities, affecting the way residents live and interact. However, it is also possible that the absence of roadway investment in a community can have negative economic impacts.

Sidewalks and bicycle facilities generally have relatively low negative impacts because of their small cross-sections and greater flexibility to avoid problem areas. They often have very positive effects, especially in areas where many people do not have ready access to a vehicle, because they provide safe facilities to make trips on foot or by bicycle.

Transit improvements that only involve bus route and service expansions are expected to have minimal negative impacts. Fixed-guideway systems such as the proposed bus rapid transit service will potentially have more impacts and

will be evaluated in the same way as roadway projects. Generally, transit projects have a positive impact on the overall system by offering enhanced mode choice, increased accessibility and an option other than the single occupant vehicle.

Consultation with Resource Agencies

To prepare this planning-level screening, RFATS staff consulted the plans, data and other documents of various agencies responsible for resource management and development, including the South Carolina Department of Health & Environmental Control (DHEC); SC Department of Natural Resources (DNR); SC Department of Fish & Wildlife Services; SC Department of Archives and History; and the Environmental Protection Agency (EPA).

Items noted during this process included an environmental summary of natural resources and advisory guidance regarding identified endangered species within the study area. The draft LRTP was also sent to agency representatives to provide an opportunity for comments and additional information.

Natural and Cultural Resources

The planning area includes a variety of natural and cultural resources that should be considered when advancing proposed transportation projects.

The Catawba River corridor and Lake Wylie provide distinct natural habitats and scenic enjoyment to residents and visitors alike. The U.S. Fish and Wildlife Service does not identify any critical habitat within the area, but does indicate eight species of concern which may be present within the planning region:

- Carolina Heelsplitter clam (endangered)
- Northern Long-Eared Bat (threatened)
- Dwarf-Flowered Heartleaf plant (threatened)
- Little Amphianthus plant (threatened)
- Schweinitz's Sunflower plant (endangered)
- Michaux's Sumac plant (endangered)
- Smooth Coneflower plant (endangered)
- Black Spored Quillwort (endangered)



The area is also rich in cultural diversity with many historic and cultural resources that still endure today. Major cultural features include: parks,

several historic districts (including downtown Fort Mill and downtown Rock Hill), and numerous individual historic buildings.

The presence of the Catawba Indian Nation is also an important cultural factor. Today the Catawba Cultural Center, located on the Catawba Indian Reservation, presents tours and programs.

The Bethel community, in the northwest part of the RFATS planning area, is one of the oldest communities in York County, having developed around Bethel Presbyterian Church which was organized in 1764. Development around Lake Wylie is rapidly changing the rural character of the community. Although this community currently has no listings on the National Register of Historic Places, a 1992 inventory conducted by the South Carolina Department of Transportation identified a number of individual sites which are considered eligible for National Register nomination. Also in the area is Hill's Iron Works, on Highway 264 at Allison Creek, where weapons were produced during the Revolutionary War. The ore for the iron works was mined at nearby Nanny's Mountain, which is significant for that reason. This mountain has been purchased by York County for public recreation. Other cultural sites in the area include several individual sites that the 1992 inventory considered worthy of further investigation for local protection. There are also several abandoned cemeteries in the area.



Bethel Presbyterian Church
(Photo: Bill Fitzpatrick)

Rock Hill has many cultural resources. These include the Museum of York County, Winthrop University, York Technical College, Clinton Junior College, and a wide range of others such as the Rock Hill Telephone Company Museum, Cherry Park, and the relatively recent Center for the Arts. Within the City of Rock Hill or nearby, there are currently five historic districts, one historic complex and thirteen individual sites on the National Register. The 1992 survey recommended that additional sites and historic districts be added to the Register, and also listed other sites as being worthy of additional investigation. This area also includes a number of abandoned cemeteries.

The cultural resources in and around the town of Fort Mill and the City of Tega Cay reflect the recent rapid growth in these areas. In addition to neighborhood parks, Confederate Park serves as a town square for Fort Mill and includes monuments to both the Catawba Indians and soldiers who died in the Civil War. The Anne Springs Close Greenway, a protected natural area north of Fort Mill, includes several historically-significant buildings on its property. In Fort Mill itself, the National Register listings include the Downtown Historic District, the Unity Presbyterian Church Historic District, and a number of individual listings. The 1992 survey recommended adding

one additional listing and identified a number of other structures as worthy of further consideration.

Near Fort Mill, the prehistoric and historic site of Spratt's Bottom is located on the Catawba Valley floodplain. Nauvasee, the main village of the Catawbas, was located less than a mile to the south of Fort Mill. There are also several abandoned cemeteries in this area.

There are a number of historically significant sites within the panhandle of Lancaster County. These include:

- The Old Six Mile Creek Presbyterian Church and Cemetery (circa 1800), located near the intersection of US 521 and Six Mile Creek Road;
- Sumter's Camp at Clems Branch (circa 1780), located on Harrisburg Road near Barberville Road, a Revolutionary War site which is included in the National War Memorial Registry;
- Culp House (circa 1860), located on Harrisburg Road near the intersection of SC 160; and
- Chaney Tavern site (circa 1800), located near the northeast quadrant of the intersection of US 521 and SC 75.

Natural resources in the panhandle area include a branch of Twelve Mile Creek Trail located north of SC 75 which provides connection to the Twelve Mile Creek Greenway in Waxhaw, NC.

Analysis of Potential Resource Impacts

Figures 11.6 and **11.7** show the location of proposed projects in the 2045 LRTP in relation to known natural and cultural resources that may be sensitive to impacts.

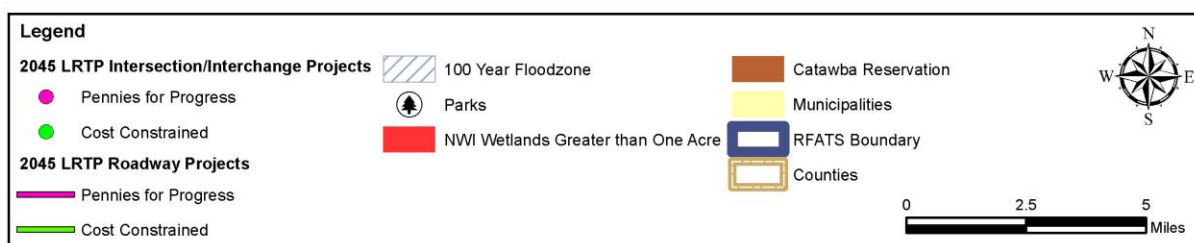
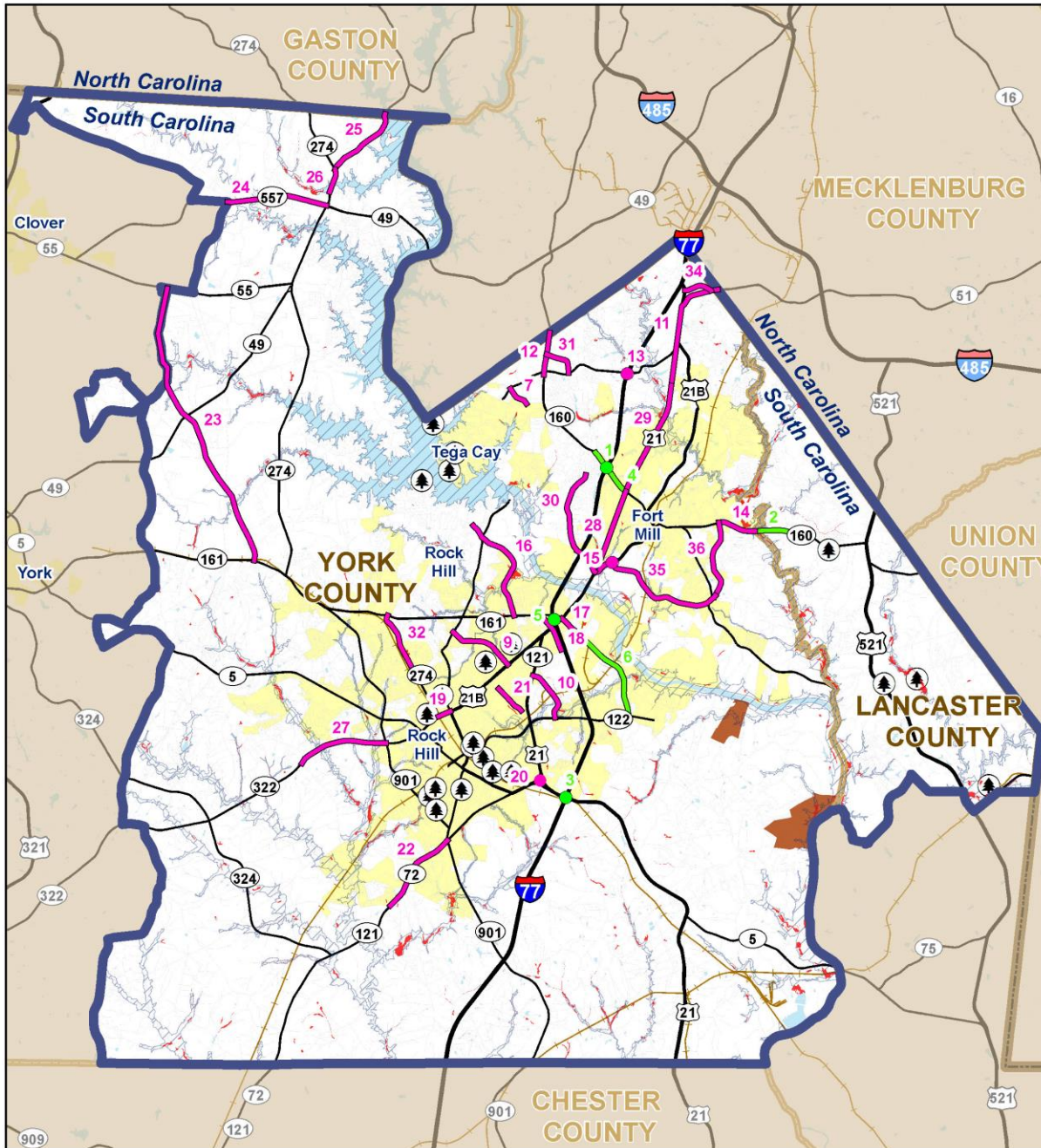
The screening identified only one project with potential cultural resource impacts: the proposed widening of Ebenezer Road from Celanese Road to Dr. Frank Gaston Boulevard (a Pennies for Progress project), which could potentially affect the Ebenezer Academy historic property.

Projects with potential impacts to natural resources (primarily floodplains and/or wetlands larger than one acre) are shown in **Table 11.3**.

Table 11.3: Projects with Potential Impacts to Natural Resources

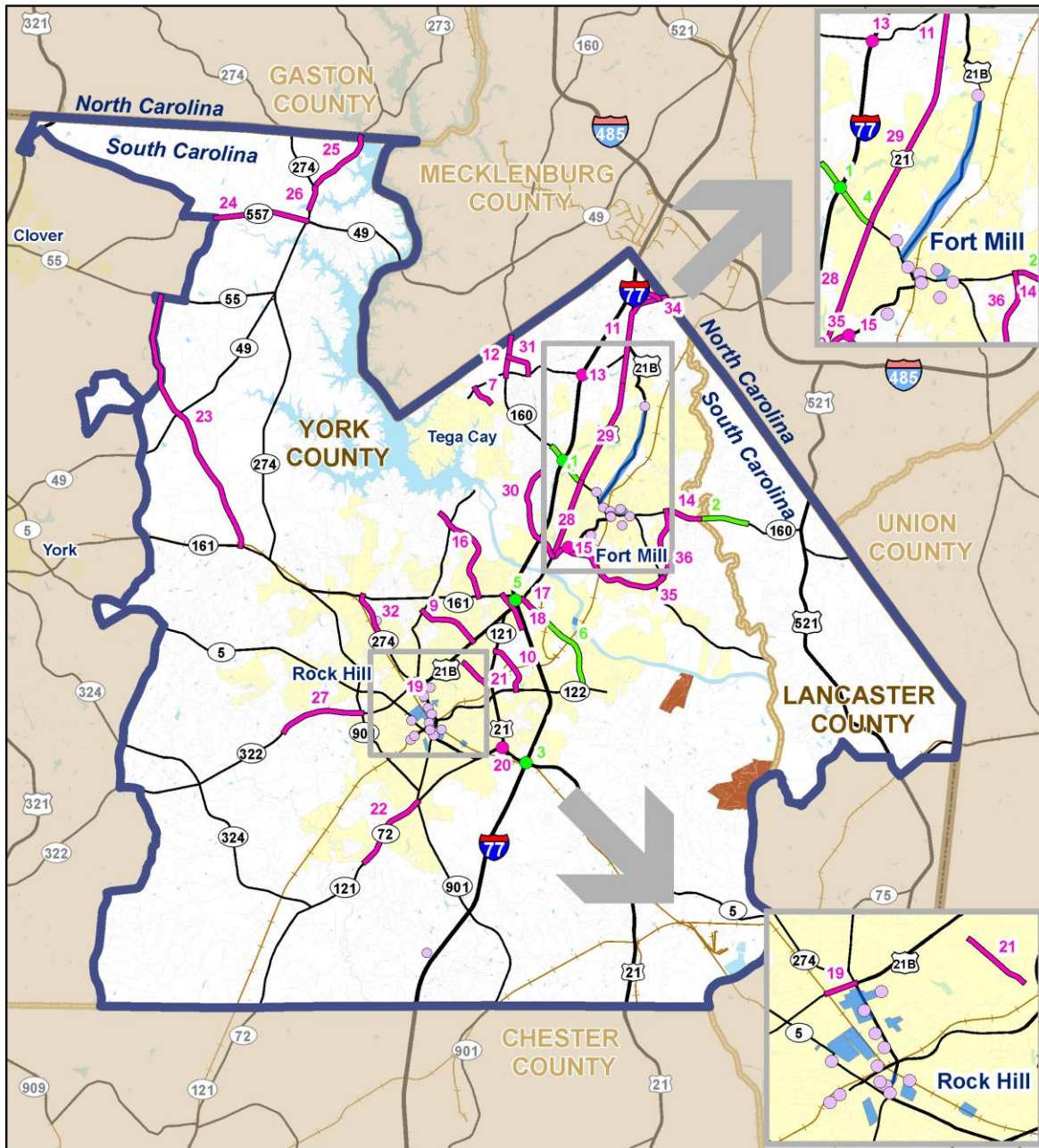
Proj ID	Route	Project Description
2	SC 160	Widen to 5 lanes from Rosemont Dr to Springfield Pkwy
6	Cel-River / Red River Road	Widen to 5 lanes from the Southern Eden Terrace Extension (S-645) to Dave Lyle Blvd (SC 122)
9	Ebinport Road (SC 904)	Widen from 2 to 3 lanes from Cherry Road to India Hook Road
10	Mt Gallant Road	Widen from 2 to 3 lanes from Anderson Road (US 21 Byp) to Dave Lyle Blvd (SC 122)
16	Mt Gallant Road	Widen to 3 lanes from Celanese Road (SC 161) to Twin Lakes Road (SC 196)
22	SC 72 (Saluda Street)	Widen from 2 to 3 lanes from SC 901 to Rambo Road
25	Hands Mill Highway (SC 274/SC 279)	Widen to 3 lanes from Pole Branch Road to NC State Line
26	Hands Mill Highway (SC 274/SC 279)	Widen to 5 lanes from Landing Pointe Dr to Pole Branch Road
27	McConnell's Highway (SC 322)	Widen to 3 lanes from Heckle Blvd to Falls Road
28	US 21 N	Widen from 2 to 5 lanes from Sutton Road to SC 160

Figure 11.6: 2045 LRTP Projects in Relation to Sensitive Natural Resources



Source: NWI, FEMA (data collected 8/2016), US Fish & Wildlife (2/2017)

Figure 11.7: 2045 LRTP Projects in Relation to Sensitive Cultural Resources



Legend

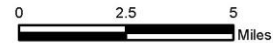
2045 LRTP Intersection/Interchange Projects

- Pennies for Progress
- Cost Constrained

2045 LRTP Roadway Projects

- Pennies for Progress
- Cost Constrained

- National Register of Historic Places (Sites)
- National Register of Historic Places (Districts/Complexes)
- Catawba Reservation
- Municipalities
- RFATS Boundary



Source: National Park Service National Register of Historic Places (data collected 08/2016)

Potential Mitigation Strategies

Mitigation measures aim to avoid or minimize a project's impact on the environment. These measures can include one or more of the following:

- Avoiding the impact altogether, by not implementing a project or a specific element of a project,
- Minimizing impacts, by limiting the degree or size of a project element,
- Rectifying the impact, by repairing, rehabilitating or restoring an environment that has been affected,
- Reducing or eliminating the impact over time, by preservation and maintenance operations during the life of the project, and
- Compensating for the impact by replacing or providing substitute natural resources or environments.

Not every project will require the same level of mitigation. All impacts on environmentally sensitive areas will be analyzed on a project by project basis to determine which mitigation strategies are appropriate.

Climate Change

Another area of environmental concern relates to the implications of the built environment on the earth's climate. There is general scientific consensus that the earth is experiencing a warming trend and that human-induced increases in atmospheric greenhouse gases (GHGs) are the leading cause. The combustion of fossil fuels is by far the biggest source of GHG emissions. In the United States, approximately 30 percent of GHG emissions are from transportation sources.

Because greenhouse gas emissions from transportation sources (fuel combustion and vehicle air conditioning systems) account for a large percentage of the nation's total GHG emissions, the transportation sector will likely play a large role in the ongoing discussion of GHG reduction goals.

Strategies to reduce transportation GHG emissions include:

- **Introduction of low-carbon fuels.** Alternative fuels are available that have lower carbon content and therefore generate fewer transportation GHG emissions. These alternative fuels include ethanol, biodiesel, natural gas, liquefied petroleum gas, low-carbon synthetic fuels (such as biomass-to-liquids), hydrogen, and electricity.

- **Increasing vehicle fuel efficiency.** GHG emissions can also be reduced by vehicle improvements that allow less fuel to be used per mile traveled. Fuel efficiency improvements include advanced engine and transmission designs, lighter-weight materials, improved aerodynamics, and reduced rolling resistance.
- **Improving transportation system efficiency.** This group of strategies seeks to improve the operation of the transportation system through reduced vehicle travel time, improved traffic flow, decreased idling, and other efficiency of operations – improvements that can also result in lower energy use and GHG emissions. The 2045 LRTP recommends continued implementation of projects to improve traffic flow through signal system upgrades and intersection modifications. Efficiency can also be improved by shifting travel to more efficient modes, where such shifts are practical in terms of price and convenience—such as passenger vehicle to bus, or truck to rail.
- **Reducing carbon-intensive travel activity.** This group of strategies seeks to influence travelers to shift to more efficient modes, increase vehicle occupancy, eliminate the need for some trips, or take other actions that reduce energy use and GHG emissions associated with personal travel. The 2045 LRTP proposes to increase the frequency and availability of public transit and continue to support ridesharing. Projects to improve and expand pedestrian and bicycle infrastructure will also provide more opportunities for sustainable travel.



Adaptation to Climate Change Impacts

Climate change is also likely to impact transportation infrastructure through the predicted increases in severe weather events and extreme temperatures. As a result, the LRTP has considered strategies to mitigate and adapt to these impacts as part of the planning process.

Based on current information and models, the climate change challenges most likely to impact transportation infrastructure are:

- Increases in very hot days and heat waves;
- Increases in Arctic temperatures;
- Increases in intense precipitation events; and
- Increases in hurricane intensity.

Although the RFATS region will not be directly affected by all of these challenges, its short-term and long-term transportation system needs will be affected by more intense and longer lasting heat waves, as well as increases in

the intensity of precipitation events. Both of these issues are further discussed below.

Managing Stormwater Impacts

With the passage of the FAST Act, Congress has directed that Long Range Transportation Plans consider how to reduce or mitigate stormwater impacts on surface transportation.

Rapid flooding can result when precipitation falls at an increased rate or quantity. This is particularly likely in urban areas where more of the earth's surface is paved, providing less opportunity for runoff to be absorbed. Numerous urban areas across the country are experiencing more frequent flooding and stormwater issues. Potential strategies to adapt to the stormwater impacts associated with increased flooding include:

- Restricting use of floodplains along rivers and creeks for open space, greenways and other purposes that can withstand periodic flooding.
- Installing real-time weather and hydrologic data monitoring equipment at area bridges, so that transportation agencies and emergency agencies are notified when they may need to check a particular location for flooding, scouring or other problems.
- Increasing the resources given to critical ongoing road maintenance activities such as street sweeping and clearing clogged storm drains. Such regular maintenance can help mitigate the risk of road closures or hazards from flooding.



Flooding on Dave Lyle Boulevard, May 2016
(Photo by Jeff Sochko, Special to The Herald)

Improving Resiliency to Other Transportation System Impacts

Intense heat is damaging to transportation infrastructure, causing kinks in steel rails, placing stress on bridge joints, and softening asphalt. On routes with a large percentage of heavy truck traffic, it is not uncommon to see the roadway become heavily rippled at the approaches to intersections, a type of damage generated from the force of braking trucks on hot asphalt. Sustained heat waves could result in the need for more frequent road maintenance.

Under the FAST Act, MPOs are charged with planning ways to make transportation infrastructure more resilient. This can involve large-scale efforts to rebuild a critical facility that could be impacted by climate change, or build a new road or bridge as an alternative to that facility. However, there

are also relatively small decisions that can be made by individual agencies to increase system resiliency as they replace or upgrade equipment.

For example, some traffic signals are activated by loop detectors. (These are metal loops, embedded in the pavement at an intersection, which are able to detect when a vehicle is located directly above them.) Loops embedded at intersections in an asphalt road can be easily damaged and broken on a hot day when the asphalt partially softens. If local temperatures become more extreme, the region could experience more frequent loop damage as the number of very hot days increases. Rather than continue to repair and replace the loops, some cities are choosing to change to video or radar detection.



Environmental Justice and Title VI

Environmental Justice (EJ) legislation originated in Title VI of the 1964 Civil Rights Act. This Act, and subsequent legislation, aims to ensure that services and benefits are fairly distributed to all people, regardless of race, national origin, or income, and that all people have access to meaningful participation.

Environmental Justice Executive Order (EO) 12898 calls for identifying and addressing disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority and low-income populations. This includes metropolitan transportation plans that use federal funds to accomplish their purposes.

A disproportionately high and adverse effect is one that is:

- Predominantly borne by a minority and/or low-income population; or
- Suffered by a minority and/or low-income population more severely or in greater magnitude than the adverse effect suffered by the non-protected population.

Disproportionately high and adverse effects are not determined solely by the size of the population, but rather the comparative effects on these populations in relation to either non-minority or higher income populations. In this EJ assessment, U.S. Census data was used to identify the demographics of the area in order to recognize potential “communities of concern.” Communities of concern are areas where the percentage of low-income households or minorities is greater than that of the entire MPO area.

It is important to note that the determination of what is disproportionately high and adverse human health or environmental effect is context dependent. All block groups/tracts include some members of protected populations, and

the approach used here is based simply on Census data and the proportion of protected populations that they contain. As each project enters the development process, additional local knowledge of individual neighborhoods should be used to identify potential communities of concern that might have been missed during this census-based analysis. RFATS has a Title VI program to ensure that regional transportation planning and programming activities are carried out in compliance with all relevant regulations and procedures.

Analysis

Minority Persons

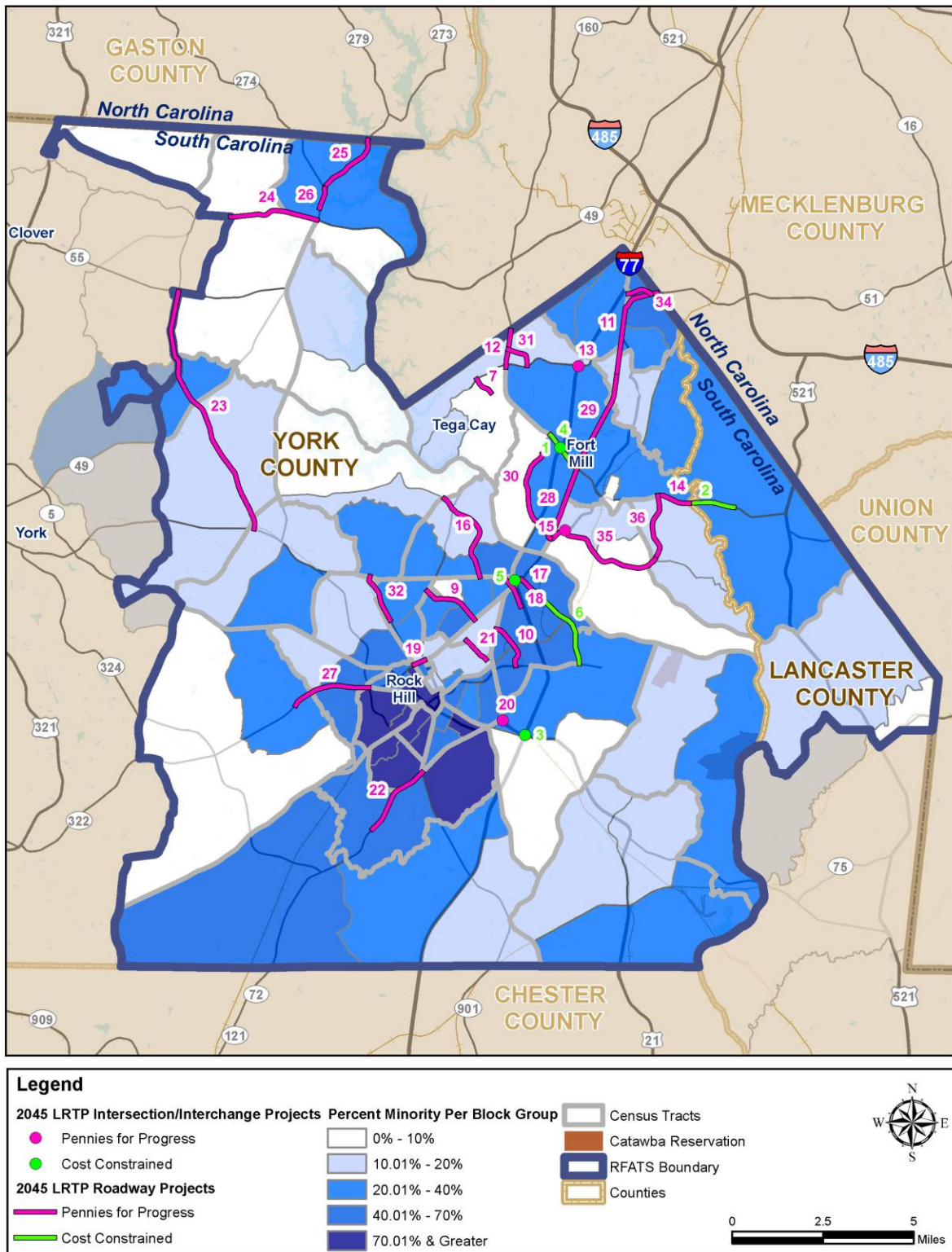
In this analysis, estimates of the minority population were obtained from census data based on two types of survey responses: (1) persons identifying themselves as African American, Asian American, American Indian and Alaskan Native, Native Hawaiian or Other Pacific Islander; and (2) persons identifying themselves as being of Hispanic or Latino origin. The two categories are not mutually exclusive.

Figure 11.8 shows the distribution of minority populations in the RFATS area, in relation to the locations of projects proposed by the 2045 LRTP. Listed below in **Table 11.4** are projects with potential impact, based on this analysis, to areas with a relatively high percentage of minority residents.

Table 11.4: Projects With Potential Impact on Minority Communities

Project ID	Route	Project Description
5	I-77 at Cherry & Celanese Rd	Interchange improvements at Exits 82 A, B, C
6	Cel-River / Red River Road	Widen to 5 lanes from the Southern Eden Terrace Extension (S-645) to Dave Lyle Blvd (SC 122)
10	Mt Gallant Road	Widen from 2 to 3 lanes from Anderson Rd (US 21 Byp) to Dave Lyle Blvd (SC 122)
11	US 21N and SC 51	Widen from 2 to 5 lanes from Springfield Pkwy to NC state line
18	Riverview Road	Widen from 2 to 3 lanes from Eden Terrace to Celanese Rd
19	US 21 (Cherry Street)	Pedestrian safety improvements near Winthrop University
22	SC 72 (Saluda Street)	Widen from 2 to 3 lanes from SC 901 to Rambo Rd
27	McConnell's Highway (SC 322)	Widen to 3 lanes from Heckle Blvd to Falls Rd
34	Springfield Farm Road	Widen from 2 to 5 lanes from US 21 to SC 51

Figure 11.8: 2045 LRTP Projects in Relation to Areas of Minority Residents



Low-Income Persons

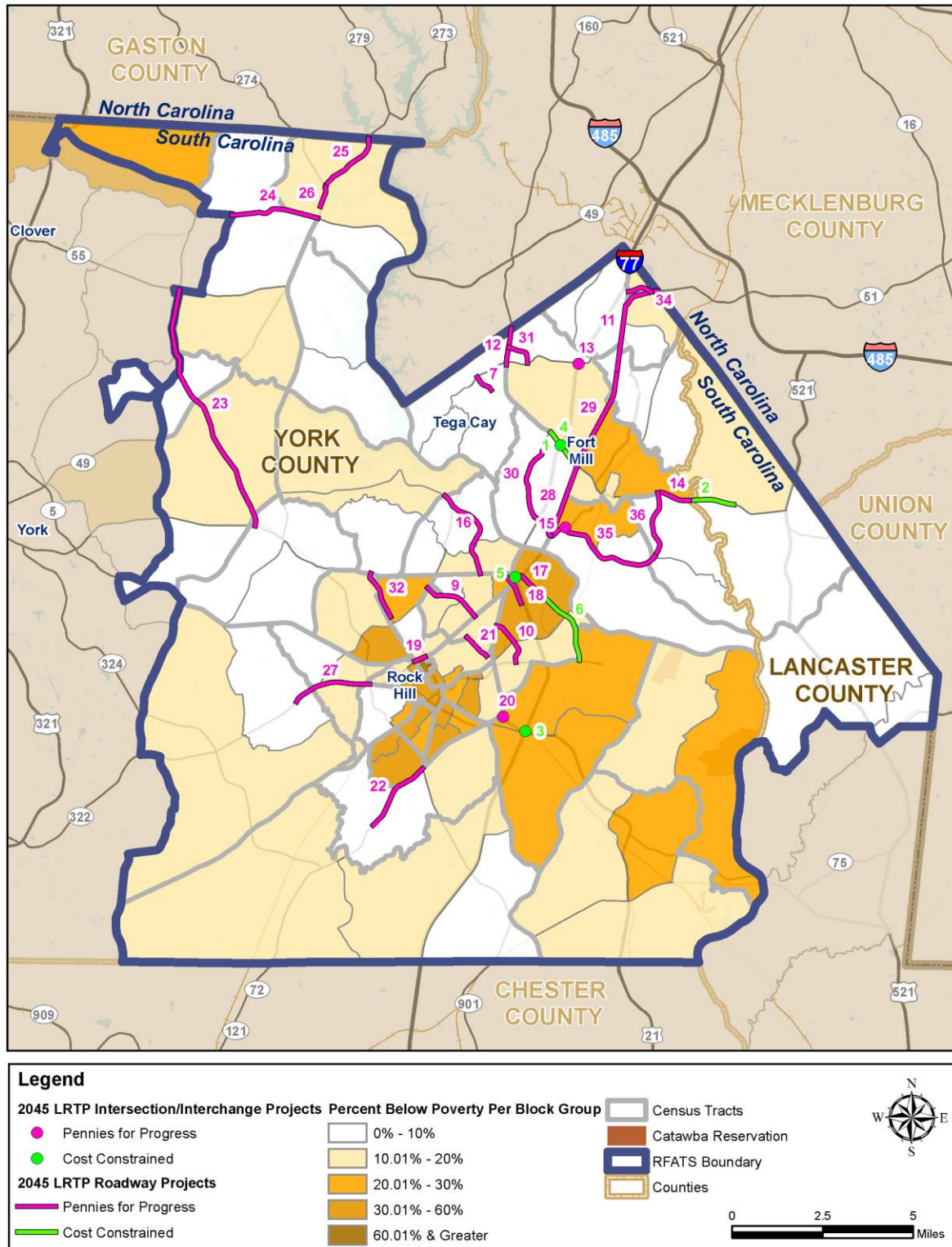
For purposes of this analysis, low-income persons are defined as those whose median household income is at or below the Department of Health and Human Services poverty guidelines. Although these guidelines are referenced in the EJ Executive Order as the standard, they are actually a simplified version of the U.S. Census Bureau’s poverty thresholds, on which this plan’s analysis is based. The Census Bureau’s determination of whether an individual is living at or below the poverty level uses a set of dollar value thresholds that vary by family size and composition.

Figure 11.9 shows the distribution of low-income populations in the RFATS area, in relation to the location of projects proposed and/or otherwise included in the 2045 LRTP (e.g., locally funded Pennies projects, etc). Listed below in **Table 11.5** are projects with potential impact, based on this analysis, to areas with a relatively high percentage of low-income residents.

Table 11.5: Projects With Potential Impact on Low-Income Persons

Project ID	Route	Project Description
5	I-77 at Cherry & Celanese Rd	Interchange improvements at Exits 82 A, B, C
10	Mt Gallant Road	Widen from 2 to 3 lanes from Anderson Road (US 21 Byp) to Dave Lyle Blvd (SC 122)
15	Intersection area: Ft Mill Southern Bypass, Spratt St, S. Sutton Rd (SC 49)	Intersection reconfiguration
18	Riverview Road	Widen from 2 to 3 lanes from Eden Terrace to Celanese Road
19	US 21 (Cherry Street)	Pedestrian safety improvements near Winthrop University
20	Anderson Road (US 21)/Cowan Farm Road	Intersection improvements
22	SC 72 (Saluda Street)	Widen from 2 to 3 lanes from SC 901 to Rambo Road
29	US 21 North	Widen from 2 to 5 lanes from SC 160 to Springfield Pkwy
33	Cel-River Road	Widen from Dave Lyle Blvd (SC 122) to Anderson Road
35	Fort Mill Southern Parkway	Widen from 2 to 5 lanes from I-77 to Holbrook Road

Figure 11.9: 2045 LRTP Projects in Relation to Areas of Low-Income Persons



Source: American Community Survey 5-Year (2009-2014)

Persons with Limited English Proficiency (LEP)

The U.S. Census Bureau defines a limited English-speaking household as “one in which no member 14 years old and over (1) speaks only English or (2) speaks a non-English language and speaks English ‘very well.’ In other words, all members 14 years old and over have at least some difficulty with English.”

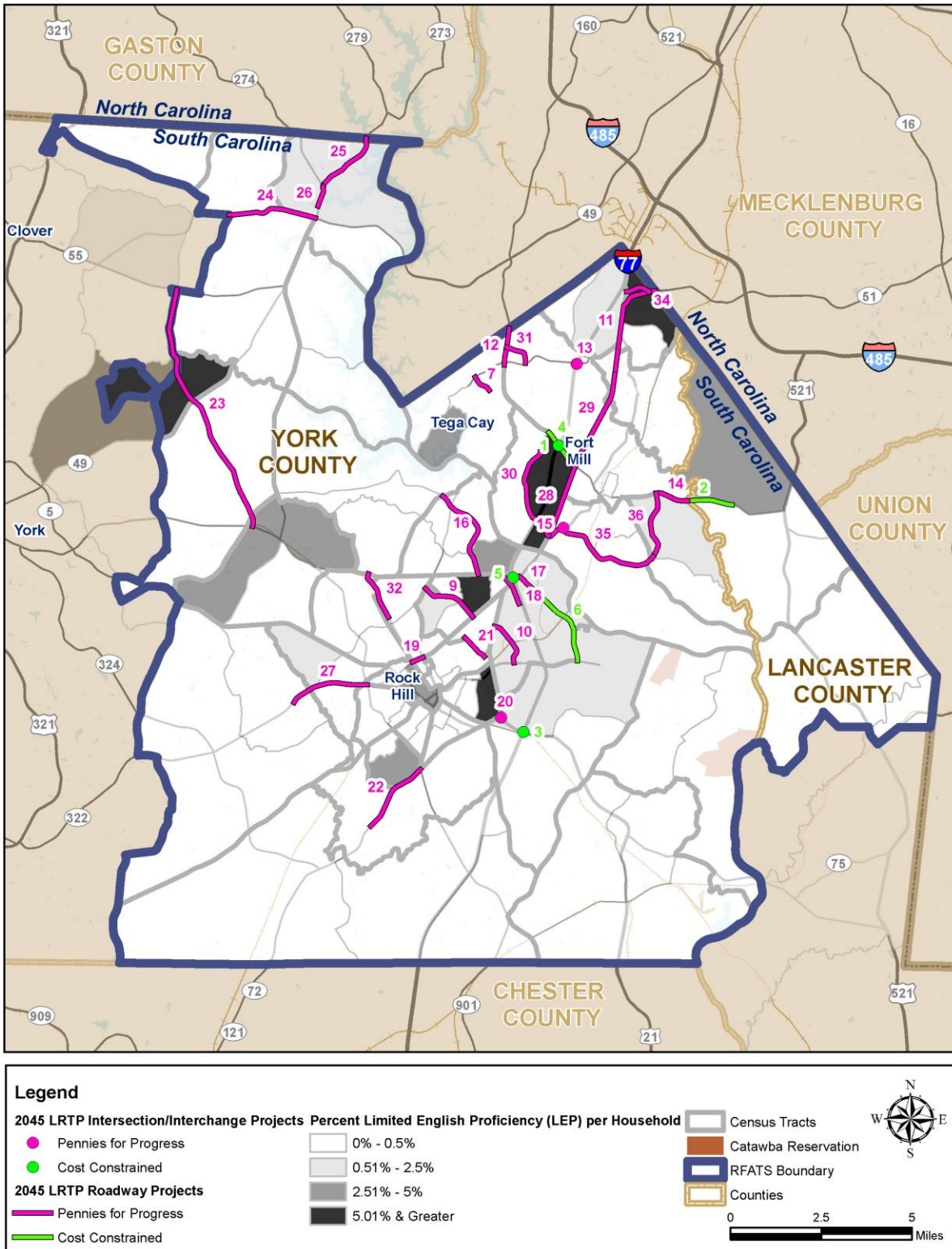
Given the low percentage of LEP households in the region, broad measures such as translating documents and providing interpreters for all of RFATS public meetings may not be warranted. However, a review of the data does show some locations where LEP households make up at least five percent of total households in a given census block. (See Figure 11.10.)

When projects are under development in these areas, it is particularly appropriate for public agencies to consider targeted outreach or having an interpreter at meetings. Table 11.6 lists those projects.

Table 11.6: Projects in Areas with High Percentage of LEP Households

Project ID	Route	Project Description
1	I-77 / SC 160	Interchange reconfiguration
4	SC 160	Widen to 6 lanes from US 21 to Sutton Road
9	Ebinport Road (SC 904)	Widen from 2 to 3 lanes from Cherry Road to India Hook Road
11	US 21 North and SC 51	Widen from 2 to 5 lanes from Springfield Pkwy to NC State Line
20	Anderson Road (US 21)/Cowan Farm Road	Intersection improvements
23	Paraham Road (S 46-54)	Add 3-foot paved shoulders from SC 161 to SC 55
28	US 21 North	Widen from 2 to 5 lanes from Sutton Road to SC 160
30	Sutton Road	Widen from 2 to 5 lanes from 6 th Baxter to US 21
34	Springfield Farm Road	Widen from 2 to 5 lanes from US 21 to SC 51
35	Fort Mill Southern Parkway	Widen from 2 to 5 lanes from I-77 to Holbrook Road

Figure 11.10: 2045 LRTP Projects in Relation to Areas of Persons with Limited English Proficiency



Source: American Community Survey 5-Year (2009-2014)

Introduction

The purpose of the Financial Plan is to demonstrate that the costs of proposed transportation improvements identified in the RFATS 2045 Long Range Transportation Plan are consistent with projected revenues. Transportation needs in most localities, if not all, far exceed the funding resources available. For this reason, federal legislation requires financial planning to be performed as a component of Long Range Transportation Plans. Plans must be “financially constrained,” meaning that the costs of proposed improvements do not exceed the projected revenue stream.

This chapter provides an overview of projected revenues and costs, applicable assumptions (e.g., projected implementation, inflationary assumptions, etc), and demonstrates that the proposed LRTP is fiscally constrained. Project costs have been developed at the planning level, and will likely change as a project enters the formal development process, when more information becomes available about right of way, utilities, and other factors. All project costs and assumptions provided should be re-evaluated in future plan updates.

Federal Funding Sources

Surface Transportation Block Grant Program (Guideshare)

Surface Transportation Block Grant (STBG) funds can be used for a broad range of transportation improvements including roadways, intersection upgrades, intelligent transportation system enhancements, transit, freight, as well as bicycle / pedestrian projects, among others.

A portion of the STBG funds distributed to the South Carolina Department of Transportation (SCDOT) are made available for transportation investments in the state’s 11 Metropolitan Planning Organizations (MPOs).

SCDOT sets aside funds each year and then distributes the money among the state’s Metropolitan Planning Organizations (urbanized areas) and Councils of Government (rural areas). The allocation formula is based on the population totals within the urban and rural areas and/or region. RFATS current annual allocation is approximately \$6.035 million dollars.

Projects Exempt from the SCDOT Guideshare

Certain projects are funded on a statewide basis through federal programs other than Guideshare. These include improvements on the Interstate Highway System, for which SCDOT takes the lead to identify and address system needs. Other projects in this category include bridge replacements,

resurfacing, safety and other statewide programs. Such projects are described in the RFATS Transportation Improvement Program as “exempt from Guideshare.”

Transportation Alternatives

With the passage of the FAST Act, the Transportation Alternatives Program (TAP) is now known simply as Transportation Alternatives (TA), and is considered a set-aside of the Surface Transportation Block Grant (STBG) program.

Regardless of the name change, the RFATS region continues to receive an annual allocation of TA funds from SCDOT to implement improvements to facilities for bicycles and pedestrians.

MPOs are now able to use up to 50% of sub-allocated TA funds for any STBG purpose so long as a competitive project selection process is maintained. This includes activities that would have been funded under the Safe Routes to School program (now rolled into TA). State DOTs and MPOs must now also produce annual reports detailing the applications for, and projects that received, TA funding.

Congestion Mitigation and Air Quality Improvement Funds

In 1990, Congress amended the Clean Air Act (CAA) to bolster America's efforts to attain the National Ambient Air Quality Standards (NAAQS). The amendments required further reductions in the amount of permissible tailpipe emissions, initiated more stringent control measures in areas that still failed to attain the NAAQS (nonattainment areas), and provided for a stronger, more rigorous linkage between transportation and air quality planning. In 1991, Congress adopted the Intermodal Surface Transportation Efficiency Act (ISTEA). This law authorized the Congestion Mitigation and Air Quality (CMAQ) program, and provided \$6.0 billion in funding for surface transportation and other related projects that contribute to air quality improvements and reduce congestion. The CAA amendments, ISTEA and the CMAQ program together were intended to realign the focus of transportation planning toward a more inclusive, environmentally-sensitive, and multimodal approach to addressing transportation problems.

The CMAQ program was reauthorized in 2015 under the FAST Act and provides funds that can be used by State DOTs, MPOs, and transit agencies for projects that reduce regulated air pollutants from transportation-related sources.

RFATS was designated by EPA as part of the Charlotte/Metrolina region's non-attainment area for ground-level ozone in 2004. Since this time, RFATS has made a series of targeted improvements at key "hot spots" throughout the transportation network that have yielded favorable results. In 2016 EPA officially reclassified RFATS as being in "attainment" for ground level ozone and changed its air quality status to a "maintenance area." With this designation RFATS will continue to receive CMAQ funding to make further improvements to strengthen regional air quality.

Typical projects that qualify for CMAQ funds include:

- Improved and/or expanded public transit options,
- Traffic flow improvements and high-occupancy vehicle lanes,
- Shared-ride services,
- Bicycle/pedestrian facilities, and
- Flexible work schedules.

State Funding Sources

State Infrastructure Bank

This institution provides financing for a wide variety of highway and transit projects through loans and credit enhancements. A State Infrastructure Bank is designed to complement the traditional Federal Aid highway and transit grants administered by SCDOT.

C-Funds

The C-Funds Program is a partnership between SCDOT and the forty-six counties of South Carolina. The program is intended to fund improvements of state and county roads, city streets, and other local transportation projects. These funds are derived from state gasoline tax revenue. Funding amounts are then distributed to each of the 46 counties based on a three-part formula. The formula allocates (1) one third of the C funds based on the ratio of the land area of the county to the land area of the state, (2) one third based on the ratio of the county population to the state population, and (3) one third based on the ratio of rural road mileage in the county to the rural road mileage in the state.

Local Funding Sources

Pennies for Progress

Pennies for Progress – more formally known as the York County Capital Projects Sales and Use Tax Program – was initiated by York County to provide its citizens with a safer and more efficient roadway system by supplementing other transportation funding sources.

Projects are chosen by a Sales Tax Commission representing the citizens of York County and then approved by York County voters. York County was the first in the State of South Carolina to pass this type of sales tax to improve the road system. A benefit of this tax is ninety-nine cents of every sales tax dollar raised in York County stays in York County.

Since its initial passage in 1997, this program has been twice renewed, in 2003 and again in 2011. In November 2017, a fourth round of the Pennies for Progress Program – including 9 new projects – will be presented to York County residents for a vote.

The following is a summary overview of the three programs:

	1997 Pennies for Progress	2003 Pennies for Progress	2011 Pennies for Progress
Referendum Passed	November 1997	November 2003	August 2011
Tax Expired	6 Years	No later than August 2011	April 2018
Budget	\$185,751,077	\$173,000,000	\$161,000,000
Number of Projects	14	25	14
Program Duration	1998 to 2009	2004 to 2013	2012 to 2018

Other Funding Sources

Private Funds

Since the previous LRTP was adopted, developers have directly completed several new road projects, as well as smaller scale location specific improvements (e.g., dedicated turn lanes, extension of storage capacity, etc.) at different points within the planning area as one component to mitigating

operational impacts associated with new development activity. As the region continues to experience elevated growth pressures, partnering with the development community will be a critical element to being able to proactively plan for needed collector roads, protecting future thoroughfare corridors, and securing necessary right-of-way to reduce long term traffic congestion and best address overall transportation network needs. To accomplish this outcome, it will take a cooperative effort between local planning staff, SCDOT planning staff, and the development community.

Public/Private Partnerships

One recent successful example of a public-private partnership (P3) is Rock Hill's Riverwalk Trail. Riverwalk is a \$600 million multi-use development along the Catawba River in Rock Hill, SC. The new development provides a multitude of publicly accessible amenities to Rock Hill residents. The City of Rock Hill provided funding for initial public improvements, including the Riverwalk Trail and the outdoor center, and provided creative financing tools for the developer. The developer provided guarantees of payment using the land as collateral and provided construction services.

The FAST Act also encourages State DOTs to test public-private partnerships (P3) by allowing State DOTs to establish a state office to aid in the design, implementation, and oversee P3s for projects that are eligible for Federal highway or transit funding.

Projected Revenues

Guideshare Funding

Table 12.1 identifies projected Guideshare revenue available to RFATS for implementation of the plan. Guideshare funding is projected to increase by roughly 25 percent following the release and incorporation of data from the 2020 Census (estimated for 2022). Longer term adjustments reflecting subsequent census changes will be incorporated in future LRTP plan updates.

Debt service shown in Table 12.1 is for SCDOT's "27 in 7" program, through which 27 years of road and bridge work were completed in 7 years. This innovative program uses future federal funds to retire state highway bonds. There were five separate bonding programs with one being dedicated to MPOs. The MPOs pay off that debt using future federal funds as shown in Table 12.1.

In addition to the requirement that long range plans must be fiscally constrained, they must also account for inflationary impacts. With this in mind, project costs are shown in year of expenditure or "YOE" dollars,

reflecting the fact that project costs will likely be higher for projects that will not be implemented until later in the plan.

Table 12.2 presents the current and funding year cost estimates of the roadway projects identified in the LRTP. Based on these estimates, projected revenues will be sufficient to fund the cost constrained projects of this plan.

Table 12.1: RFATS Guideshare Funding

Year	Guideshare	Debt Service	Available Funding
2017	\$6,035,144	\$1,233,797	\$4,801,347
2018	\$6,035,144	\$1,216,044	\$4,819,100
2019	\$6,035,144	\$1,198,408	\$4,836,736
2020	\$6,035,144	\$842,925	\$5,192,219
2021	\$6,035,144	\$844,262	\$5,190,219
2022	\$7,543,930	\$180,266	\$7,363,664
2023	\$7,543,930	\$180,253	\$7,363,677
2024	\$7,543,930	\$0	\$7,543,930
2025	\$7,543,930	\$0	\$7,543,930
2026	\$7,543,930	\$0	\$7,543,930
2027	\$7,543,930	\$0	\$7,543,930
2028	\$7,543,930	\$0	\$7,543,930
2029	\$7,543,930	\$0	\$7,543,930
2030	\$7,543,930	\$0	\$7,543,930
2031	\$7,543,930	\$0	\$7,543,930
2032	\$7,543,930	\$0	\$7,543,930
2033	\$7,543,930	\$0	\$7,543,930
2034	\$7,543,930	\$0	\$7,543,930
2035	\$7,543,930	\$0	\$7,543,930
2036	\$7,543,930	\$0	\$7,543,930
2037	\$7,543,930	\$0	\$7,543,930
2038	\$7,543,930	\$0	\$7,543,930
2039	\$7,543,930	\$0	\$7,543,930
2040	\$7,543,930	\$0	\$7,543,930
2041	\$7,543,930	\$0	\$7,543,930
2042	\$7,543,930	\$0	\$7,543,930
2043	\$7,543,930	\$0	\$7,543,930
2044	\$7,543,930	\$0	\$7,543,930
2045	\$7,543,930	\$0	\$7,543,930
Total	\$233,300,328	\$5,695,955	\$217,604,373

Table 12.2: RFATS Guideshare Projects

Project	Current Cost Estimate	Funding Year Cost Estimate
Roadway Widening		
Fort Mill Highway (SC-160) from Springfield Pkwy (SC 460) to Rosemont Drive/MacMillan Park Drive: Widen from 3 to 5 lanes	\$21,700,000	\$25,794,481
Cel-River / Red River Road (S-50) from the Southern Eden Terrace Extension (S-645) to Dave Lyle Boulevard (SC 122): Widen to 5 lanes	\$39,800,000	\$46,155,795
Fort Mill Highway (SC-160) from US 21 to Sutton Road: Widen to 6 lanes	\$7,600,000	\$8,813,670
Interchange Projects		
I-77 (Exit 82A, B and C)	\$49,700,000	\$62,068,490
I-77 and SC-160 Interchange	\$19,861,600	\$24,804,417
I-77 and Anderson Road (SC 5/US 21)	\$4,500,000	\$5,218,620
TOTAL	\$143,161,600	\$172,855,473

Federal & State Transit Funding

Transit funding for the RFATS area is provided by the Federal Transit Administration (FTA) and the South Carolina Department of Transportation (SCDOT), Office of Public Transit.

FTA Section 5307 Funding

The FTA administers the Section 5307 Urbanized Area Formula Program. Section 5307 provides funding for planning and capital items at 80% of their cost, and provides 50% of the net annual costs for transit operations. Funds are apportioned to urbanized areas using a formula based on population, population density, and other factors associated with transit service ridership.

These funds are apportioned annually and remain available for 6 fiscal years (the year of apportionment plus 5 additional years). The federal apportionment must be matched by state and local funds. Local matching funds can be cash or cash-equivalents, depending upon the expenditure. Non-cash shares, such as donations, volunteered services, or in-kind contributions, are eligible as local match only if formally documented.

Within the RFATS planning area, there are two 5307 funding allocations available for transit service planning and operations: one for the Rock Hill Urbanized Area, and one for the portion of the Charlotte Urbanized Area that extends into the northern section of the RFATS region. Listed in **Table 12.3** below are estimates of funding availability for each of these areas.

Table 12.3: FTA Section 5307 Transit Funding

Year	Allocations	
	Rock Hill UA	Charlotte UA
2017	\$1,247,387	\$153,410
2018	\$1,284,809	\$158,012
2019	\$1,323,353	\$162,753
2020	\$1,363,053	\$167,635
2021	\$1,403,945	\$172,664
2022	\$1,446,063	\$177,844
2023	\$1,489,445	\$183,180
2024	\$1,534,129	\$188,675
2025	\$1,580,153	\$194,335
2026	\$1,627,557	\$200,165
2027	\$1,676,384	\$206,170
2028	\$1,726,675	\$212,355
2029	\$1,778,476	\$218,726
2030	\$1,831,830	\$225,288
2031	\$1,886,785	\$232,046
2032	\$1,943,388	\$239,008
2033	\$2,001,690	\$246,178
2034	\$2,061,741	\$253,563
2035	\$2,123,593	\$261,170
2036	\$2,187,301	\$269,005
2037	\$2,252,920	\$277,076
2038	\$2,320,507	\$285,388
2039	\$2,390,122	\$293,949
2040	\$2,461,826	\$302,768
2041	\$2,535,681	\$311,851
2042	\$2,611,751	\$321,206
2043	\$2,690,104	\$330,843
2044	\$2,770,807	\$340,768
2045	\$2,853,931	\$350,991

As planned service is implemented within the northern section of the RFATS region, the Section 5307 funding allocation for the Charlotte Urbanized Area is expected to increase once demand response service is implemented.

SMTF Funding

State Mass Transit Funds (SMTF) are allocated by the South Carolina Department of Transportation to urbanized areas as a portion of the matching funds needed to access federal transit funding sources (e.g., 5307

funds, etc). Similar to the two 5307 allocations, there are two SMTF amounts for these same two areas. Eligible assistance categories include capital, administration, and operations. Essentially, these categories correspond to the federal program category which the SMTF funds are matching.

SMTF funds are generated from highway use taxes on motor vehicle fuel. As a general rule, this yields approximately \$6 million annually on a statewide basis. Funds are applied for through the Office of Public Transit at SCDOT.

Table 12.4 shows SMTF allocation amounts for the two urbanized areas.

Table 12.4: State Mass Transit Funds

Year	Allocations	
	Rock Hill UA	Charlotte UA
2017	\$136,863	\$113,667
2018	\$140,850	\$116,978
2019	\$144,952	\$120,385
2020	\$149,175	\$123,892
2021	\$153,520	\$127,501
2022	\$157,991	\$131,215
2023	\$162,593	\$135,037
2024	\$167,330	\$138,970
2025	\$172,204	\$143,018
2026	\$177,220	\$147,184
2027	\$182,382	\$151,471
2028	\$187,694	\$155,883
2029	\$193,161	\$160,424
2030	\$198,788	\$165,097
2031	\$204,578	\$169,906
2032	\$210,537	\$174,855
2033	\$216,670	\$179,948
2034	\$222,981	\$185,189
2035	\$229,476	\$190,584
2036	\$236,160	\$196,135
2037	\$243,039	\$201,848
2038	\$250,119	\$207,728
2039	\$257,404	\$213,778
2040	\$264,902	\$220,005
2041	\$272,618	\$226,414
2042	\$280,559	\$233,009
2043	\$288,731	\$239,796
2044	\$297,141	\$246,781
2045	\$305,796	\$253,969

Currently, there are two existing transit services: (1) CATS 82X Express Bus Route; and (2) York County Access Demand Response. A third service, initiation of a fixed route system in the Rock Hill Urbanized Area, is planned to begin operations in FY 18. Operational costs for these three services are listed below in **Table 12.5**. These costs are expected to grow with inflation (3.5% per year) throughout the life of the plan.

Table 12.5: Transit Operational Costs

Year	CATS	York County Access	Rock Hill Transit
2017	\$325,913	\$334,276	N/A
2018	\$337,320	\$345,976	\$790,004
2019	\$349,126	\$358,085	\$797,084
2020	\$361,346	\$370,618	\$613,122
2021	\$373,993	\$383,589	\$621,321
2022	\$387,082	\$397,015	\$653,683
2023	\$400,630	\$410,911	\$676,562
2024	\$414,652	\$425,292	\$700,242
2025	\$429,165	\$440,178	\$724,750
2026	\$444,186	\$455,584	\$750,116
2027	\$459,732	\$471,529	\$776,370
2028	\$475,823	\$488,033	\$803,543
2029	\$492,477	\$505,114	\$831,667
2030	\$509,714	\$522,793	\$860,776
2031	\$527,554	\$541,091	\$890,903
2032	\$546,018	\$560,029	\$922,084
2033	\$565,129	\$579,630	\$954,357
2034	\$584,908	\$599,917	\$987,760
2035	\$605,380	\$620,914	\$1,022,331
2036	\$626,568	\$642,646	\$1,058,113
2037	\$648,498	\$665,139	\$1,095,147
2038	\$671,195	\$688,419	\$1,133,477
2039	\$694,687	\$712,513	\$1,173,149
2040	\$719,001	\$737,451	\$1,214,209
2041	\$744,166	\$763,262	\$1,256,706
2042	\$770,212	\$789,976	\$1,300,691
2043	\$797,170	\$817,625	\$1,346,215
2044	\$825,071	\$846,242	\$1,393,333
2045	\$853,948	\$875,861	\$1,442,100

FTA Section 5309 Funding

In addition, the FTA administers the Section 5309 Fixed Guideway Capital Investment Grants (CIG) program. This program provides assistance for fixed-guideway projects such as new and expanded rapid rail, commuter rail, light rail, streetcars, bus rapid transit, ferries, and bus rapid transit projects that feature qualities of rail.

The CIG has four categories of potential eligible projects:

New Starts

- Eligible projects include the design and construction of new fixed-guideways or extensions to fixed guideways.
- Projects must have a minimum total estimated capital cost of \$300 million or be requesting \$100 million or more in project costs to be funded through CIG.
- CIG funds can make up no more than 60% of estimated project costs and total Federal funding can make up no more than 80% of estimated project costs.

Small Starts

- Eligible projects include design and construction of new fixed-guideway or extensions to fixed-guideways and the design and construction of corridor-based bus rapid transit projects operating in mixed traffic.
- Projects must have total estimated capital costs of less than \$300 million and be requesting less than \$100 million in CIG funds.
- CIG funds can make up no more than 80% of estimated project costs and total Federal funding can make up no more than 80% of estimated project costs.

Core Capacity

- Eligible projects include the design and construction of corridor-based investment in an existing fixed-guideway system that improves capacity at a minimum of 10% in a corridor that is at capacity or will be in five years.
- Funding thresholds remain the same as under MAP-21. Projects must have a total estimated cost of less than \$250 million and be requesting less than \$75 million in CIG funds.

- CIG funds can make up no more than 80% of estimated project costs and total Federal funding can make up no more than 80% of estimated project costs.

Programs of Interrelated Projects

- Eligible programs include two or more projects that have reasonable connectivity between them, and will have mostly overlapping construction timelines. Projects may include any of the eligible projects covered in New Starts, Small Starts, and/or Core Capacity.
- CIG funds can make up no more than 80% of estimated project costs and total Federal funding can make up no more than 80% of estimated project costs.

The FAST Act approves a pilot program to streamline the regulatory process for up to eight grants. Federal funds can comprise no more than 25% of estimated total project costs made up of Federal funds. Projects must also feature a public-private partnership funding component. In order for a fixed-guideway project to be recommended by the FTA to Congress for discretionary funding, it must receive favorable ratings on the following New Starts criteria:

- Level of mobility improvement provided by the project
- Extent to which land use policies are supportive of rapid transit
- Environmental benefits
- Congestion relief
- Cost effectiveness
- Economic development

The local project must receive a favorable rating on the above criteria in comparison to competing projects seeking federal funds throughout the country. Section 5309 funds must be matched by state and local funds. Local matching funds can be cash or cash-equivalent, depending upon the expenditure. Non-cash shares, such as donations, volunteered services, or in-kind contributions, are eligible as local match only if the value of each share is formally documented. Capital assistance grants made to local agencies are funded up to 80% of net project costs, unless the grant recipient requests a lower federal grant percentage.

Any public body is eligible to apply for Small Starts funds as long as it has the legal, technical, and financial capacity to carry out the project. If the grant applicant is not expected to be the project operator, the applicant must

demonstrate how the project will be operated and maintained and provide an executed agreement before a Project Construction Grant Agreement can be finalized.

In addition to the aforementioned cost and funding limits, a Small Starts bus project must be a corridor-based bus project with the following minimum elements:

- Substantial transit stations,
- Traffic signal priority/pre-emption, to the extent that there are traffic signals along the corridor,
- Branding of the proposed bus service, and
- Ten-minute peak/15-minute off-peak headways or better while operating at least 14 hours per weekday.

Since the enactment of MAP-21 legislation (and continued in the FAST Act), all projects seeking Section 5309 Capital Program funds must be evaluated and rated according to the criteria specified in law either as a New Starts project, a Small Starts project, or a Core Capacity project. (Prior to MAP-21, projects seeking less than \$25 million in Capital Investment Program funds had the option to claim exemption from evaluation and rating.)

As the existing roadway network continues to experience increasing congestion and a reduced level of service, the need for further discussion about the role and function of mass transit continues to increase as one of a range of important strategies for meeting current as well as projected demand levels within the RFATS region.

FTA Section 5310 Funding

FTA's Section 5310 program provides formula funding to states for the purpose of assisting private nonprofit groups in meeting the transportation needs of older adults and people with disabilities when the transportation service provided is unavailable, insufficient, or inappropriate to meeting these needs. Funds are apportioned based on each state's share of the population for these two groups. The program aims to improve mobility for seniors and individuals with disabilities by removing barriers to transportation service and expanding transportation mobility options. Listed below in **Table 12.6** are the Section 5310 allocation amounts.

Table 12.6: Section 5310 Funding

Year	Allocation
2017	\$21,650
2018	\$22,300
2019	\$22,968
2020	\$23,658
2021	\$24,367
2022	\$25,098
2023	\$25,851
2024	\$26,627
2025	\$27,426
2026	\$28,248
2027	\$29,096
2028	\$29,969
2029	\$30,868
2030	\$31,794
2031	\$32,748
2032	\$33,730
2033	\$34,742
2034	\$35,784
2035	\$36,858
2036	\$37,963
2037	\$39,102
2038	\$40,275
2039	\$41,484
2040	\$42,728
2041	\$44,010
2042	\$45,330
2043	\$46,690
2044	\$48,091
2045	\$49,534

Transportation Alternatives Funding

Per the FAST Act, the RFATS region continues to receive an annual allocation of Transportation Alternative (TA) funds from SCDOT to implement improvements to facilities for bicycles and pedestrians. MPOs are able to use up to 50% of sub-allocated TA funds to any Surface Transportation Block Grant purpose so long as a competitive project selection process is maintained. This includes activities that would have been funded under the

Safe Routes to School program (now rolled into TA). Listed below in **Table 12.7** are the TA allocation amounts.

Table 12.7: Transportation Alternatives Program Funding

Year	Allocation
2017	\$110,833
2018	\$114,158
2019	\$117,583
2020	\$121,110
2021	\$124,744
2022	\$128,486
2023	\$132,340
2024	\$136,311
2025	\$140,400
2026	\$144,612
2027	\$148,950
2028	\$153,419
2029	\$158,021
2030	\$162,762
2031	\$167,645
2032	\$172,674
2033	\$177,854
2034	\$183,190
2035	\$188,686
2036	\$194,346
2037	\$200,177
2038	\$206,182
2039	\$212,367
2040	\$218,739
2041	\$225,301
2042	\$232,060
2043	\$239,021
2044	\$246,192
2045	\$253,578

Congestion Mitigation and Air Quality (CMAQ) Program

The use of CMAQ funds is also a permissible source of transit start-up and initial operating funding to enhance area mobility and transportation system efficiency through the use of public transportation. Although a smaller source of funding, it can nonetheless be considered as one element of transitional

funding for further transit service development. Listed below in **Table 12.8** are the CMAQ allocation amounts.

Table 12.8: Congestion Mitigation and Air Quality Program Funding

Year	CMAQ
2017	\$2,630,000
2018	\$2,690,000
2019	\$2,760,000
2020	\$2,830,000
2021	\$2,900,000
2022	\$2,970,000
2023	\$3,050,000
2024	\$3,120,000
2025	\$3,200,000
2026	\$3,280,000
2027	\$3,360,000
2028	\$3,450,000
2029	\$3,530,000
2030	\$3,620,000
2031	\$3,710,000
2032	\$3,800,000
2033	\$3,900,000
2034	\$4,000,000
2035	\$4,100,000
2036	\$4,200,000
2037	\$4,300,000
2038	\$4,410,000
2039	\$4,520,000
2040	\$4,630,000
2041	\$4,750,000
2042	\$4,870,000
2043	\$4,990,000
2044	\$5,120,000
2045	\$5,240,000

State Infrastructure Bank

The South Carolina State Infrastructure Bank is an institution established to select and assist in financing major qualified projects by providing loans and other financial assistance to government units as well as private entities for constructing and improving highway and transportation facilities necessary for public purposes. These funds are potentially available for use in transit

projects. Transit projects are only eligible for capital expenditures for transit equipment and facilities. No transit projects have been funded through the SIB.

Summary and Recommendations

Summary of Key Points

- Transportation needs in most, if not all, localities far exceed the funding resources available.
- Revenue is provided through Federal, State and Local programs. Private partnerships are also an important potential resource for implementing transportation improvements.
- The costs presented are shown in “Year of Expenditure,” reflecting the probable impact of inflation.
- As shown by a review of projected revenues versus costs, the 2045 LRTP is a cost constrained plan.

Recommendations

- Assist York County in pursuing a fourth “Pennies for Progress” program;
- Develop plans, regulations, policies, and procedures to protect future thoroughfare and collector street corridors and require contributions from developers;
- Assist City of Rock Hill in operating a new fixed bus route system;
- Continue to monitor roadway congestion and evaluate mass transit opportunities;
- Continue the Capital Sales and Use Tax Program as a local funding source to leverage federal and state funds for road improvements;
- Continue to integrate new and/or improved pedestrian and bicycle facilities along with road improvements proposed in the “Pennies for Progress” program; and
- Assist York County in supporting the South Carolina State Infrastructure Bank (SIB) for funding the I-77 Corridor Interchange Project.

APPENDICES

**RESOLUTION ADOPTED BY THE ROCK HILL-FORT MILL AREA
TRANSPORTATION STUDY (RFATS) POLICY COMMITTEE APPROVING
THE 2045 LONG RANGE TRANSPORTATION PLAN UPDATE AND
TRANSPORTATION IMPROVEMENT PROGRAM**

WHEREAS, the Rock Hill-Fort Mill Area Transportation Study (RFATS), and the South Carolina Department of Transportation are actively involved in transportation planning for the Rock Hill-Fort Mill Study Area; and

WHEREAS, the Rock Hill-Fort Mill Study Area has developed the 2045 Long Range Transportation Plan and Transportation Improvement Program; and

WHEREAS, the RFATS Policy Committee is the duly recognized transportation decision making body for the 3-C transportation planning process in the Rock Hill-Fort Mill Study Area as required by 23 CFR Part 134; and

WHEREAS, the RFATS Technical Team and the Policy Committee have prepared the 2045 Long Range Transportation Plan and Transportation Improvement Program; and

WHEREAS, it is recognized that the proper movement of traffic within and through the Rock Hill-Fort Mill Study Area is a highly desirable element of the Long Range Transportation Plan for the orderly growth and development of the Study Area; and

WHEREAS, after the full study of the Long Range Transportation Plan and Transportation Improvement Program, the RFATS Policy Committee of the Rock Hill-Fort Mill Study Area agrees it to be in the best interests of the Study Area to adopt said Plan and Program; and

WHEREAS, the public has had the opportunity to review and comment on the Long Range Transportation Plan and Transportation Improvement Program through public meetings and document sharing.

NOW, THEREFORE, BE IT RESOLVED that members of the RFATS Policy Committee approve and endorse the 2045 Long Range Transportation Plan and 2017-2022 Transportation Improvement Program as prepared by the RFATS Technical Team and the South Carolina Department of Transportation on this 23rd day of June, 2017.

BE IT FURTHER RESOLVED that the RFATS Policy Committee authorizes the Chairman or Acting Chair to sign said Resolution on behalf of all the membership.

ATTEST:


David F. Hooper, Secretary

APPROVED:


A. Douglas Echols, Chairman

**RESOLUTION FINDING THE ROCK HILL-FORT MILL AREA
TRANSPORTATION STUDY (RFATS) 2045 LONG-RANGE
TRANSPORTATION PLAN AND TRANSPORTATION IMPROVEMENT
PROGRAM IN CONFORMITY WITH THE SOUTH CAROLINA STATE
IMPLEMENTATION PLAN FOR AIR QUALITY**

WHEREAS, the Policy Committee is the duly recognized decision making body of the 3-C transportation planning process for the Rock Hill-Fort Mill Area Transportation Study; and

WHEREAS, the RFATS 2045 Long Range Transportation Plan meets the planning requirements of 23 CFR Part 450.322; and

WHEREAS, the 2017-2022 Transportation Improvement Program is a subset of the 2045 Long Range Transportation Plan; and

WHEREAS, the United States Environmental Protection Agency (USEPA) designated RFATS as a maintenance area for ozone on December 11, 2015; and

WHEREAS, the transportation conformity analysis of the RFATS 2045 Long Range Transportation Plan is based on the most recent estimates of population, employment, travel, and congestion; and

WHEREAS, the RFATS 2045 Long Range Transportation Plan is financially constrained; and

WHEREAS, there are no transportation control measures in the South Carolina State Implementation Plan (SIP) that pertain to the RFATS area; and

WHEREAS, the most recent vehicle emissions model was used to prepare the quantitative emissions analysis dated March 7, 2017; and

WHEREAS, those projects and programs included in the RFATS 2045 Long Range Transportation Plan contribute to annual emissions reductions as shown by the quantitative emissions analysis dated March 7, 2017

NOW, THEREFORE BE IT RESOLVED, that the RFATS Policy Committee finds that the RFATS 2045 Long Range Transportation Plan and Transportation Improvement Program conform to the purpose of the South Carolina State Implementation Plan in accordance with the Clean Air Act as amended (CAAA), and the Fixing America's Surface Transportation Act (FAST Act) on this 23rd day of June, 2017.

BE IT FURTHER RESOLVED, that the RFATS Policy Committee authorizes the Chairman or Acting Chair to sign said Resolution on behalf of all the membership.

ATTEST:


David F. Hooper, Secretary

APPROVED:


A. Douglas Echols, Chairman

COMMENT	RESPONSE
<p>I am in full support of RFATS efforts to continue to do preparatory work in keeping the US 21 corridor available for light rail from Charlotte to be extended all the way to downtown Rock Hill.</p> <p>In projecting population growth for potential light rail commuters to Charlotte, I see the need for <i>continuing community education</i> about the need for future new transportation alternatives (to daily private auto use) to address already chronic I-77 northbound congestion from Hwy. 460 during peak rush hours (AM). I would hope then we could anticipate the day that “when you build light rail, people will come,” i.e. shift out of their cars.</p>	<p>The 2045 LRTP includes a number of policy recommendations to maintain the viability of the US 21 corridor for future high capacity transit service. These include access management along the route, encouraging higher intensity development in the areas within easy walking/biking distance, and promoting transit-supportive site design that emphasizes the pedestrian while also continuing to provide safe, convenient accommodation of vehicles. There are excellent opportunities for RFATS local jurisdictions to continue to incorporate these principles in their development review guidelines.</p>
<p>Lesslie Hwy is seriously lacking in safe foot/bike traffic options and I hear a man was hit and killed recently in that road.</p>	<p>Recommendations for improvements are shown on page 25 of the RFATS Bicycle/Pedestrian Connectivity Plan, available on the RFATS website. While the Connectivity Plan includes well over one hundred proposed project locations, the 2045 LRTP recommends focusing first on areas where safety is an issue, as you have described.</p>
<p>Lancaster County Panhandle residents are getting screwed! No federal or non-federally funded projects. Only “Unfunded Needs.” Look RFATS folks, you know Lancaster County is growing FASTER than YORK in the panhandle. You are royally playing favorites and leaving out Lancaster County completely. HOW CAN YOU NOT FEEL GUILTY! Come on, RT 160 from the County border to RT 521, and RT 521 Jim Wilson to NC Border NEED TO BE MOVED UP IN PRIORITY! Come drive these roads yourself. Your car counting data is already out of date. RT 160/RT 521 is just as bad if not worse than lots of intersections in York County, but you don’t give Lancaster Cty 2 cents. I can’t make it the 19th or I would be there in person.</p>	<p>The panhandle is indeed growing rapidly and the need for infrastructure improvements is very real. The plan does include federal funding targeted to some projects in the panhandle (SR 160 from the county line to US 521), although we understand that you would like to see more investment.</p> <p>The reason the plan includes a number of non-federally funded projects is because of the York County “Pennies for Progress” 1-cent sales tax dedicated to transportation improvements. If a similar source of funding becomes available for the panhandle, there are certainly worthy projects for those funds.</p>

**APPENDIX B: RFATS FY 2017 – 2022 TIP
FY 2017-2022**

**TRANSPORTATION
IMPROVEMENT PROGRAM
(TIP)**

FOR

**ROCK HILL – FORT MILL AREA
TRANSPORTATION STUDY**



**ADOPTED BY POLICY COMMITTEE
9-28-2018**

**RFATS ADMINISTRATIVE AGENT
PO BOX 11706, 155 JOHNSTON ST
ROCK HILL, SC 29731
RFATS@CITY OF ROCK HILL.COM
(803) 326-3890**

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List of Acronyms

FHWA	Federal Highway Administration	See Page 4
FTA	Federal Transit Administration	See Page 4
MPO	Metropolitan Planning Organization	See Page 4
RFATS	Rock Hill–Fort Mill Area Transportation Study	See Page 4
L RTP	Long Range Transportation Plan	See Page 4
TIP	Transportation Improvement Program	See Page 4
UPWP	Unified Planning Work Program	See Page 4
CAC	Citizens Advisory Committee	See Page 4
SIB	State Infrastructure Bank	See Page 6
TAP	Transportation Alternatives Program	See Page 6
CMAQ	Congestion Mitigation & Air Quality Improvement Program	See Page 6
VMT	Vehicles Miles Traveled	See Page 6
STIP	State Transportation Improvement Program	See Page 8
MAP–21	Moving Ahead for Progress in the 21 st Century Act	See Page 8
PBPP	Performance–Based Planning & Programming	See Page 8
FAST	Fixing America’s Surface Transportation Act	See Page 9
SHSP	Strategic Highway Safety Plan	See Page 9

TRANSPORTATION IMPROVEMENT PROGRAM
FOR FY 2017-2022

INTRODUCTION

The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) regulations require all urbanized areas with populations of 50,000 or greater to create a Metropolitan Planning Organization (MPO). Each MPO must then develop a cooperative, comprehensive and continuing transportation planning process in order to qualify for federal funding of transportation projects.

The three major work products developed by the Rock Hill-Fort Mill Area Transportation Study (RFATS) are a Long Range Transportation Plan (LRTP); a Transportation Improvement Program (TIP); and a Unified Planning Work Program (UPWP). Opportunities for public input are advertised and public comments are actively solicited for each of these planning documents.

The Rock Hill-Fort Mill Area Transportation Study (RFATS) FY 17-22 TIP outlines the planning objectives, priority status and funding source for all projects scheduled for construction over a five-year period. Specifically, the TIP lists the most immediate, financially constrained transportation projects slated for implementation within the RFATS Area.

ADOPTION PROCESS

The RFATS planning process is guided by a Policy Committee that is comprised of twelve (12) voting members from each of the following jurisdictions: City of Rock Hill, Town of Fort Mill, City of Tega Cay, Catawba Indian Nation, the eastern urbanized portion of York County and the panhandle of Lancaster County. The Policy Committee is the primary decision-making body that ultimately approves all transportation plans, projects and funding commitments.

There are two additional committees that participate in this process as well; the RFATS Technical Team and Citizen's Advisory Committee. The Technical Team is made up of city and county staff members along with representatives from SCDOT, FHWA, SCDHEC and the Catawba Council of Government. The Citizen's Advisory Committee

(CAC) includes eleven appointed members from each RFATS community as well as specific representatives on behalf of traditionally underserved populations. As the Transportation Improvement Program (TIP) is a multi-modal plan of highway, transit, bicycle, pedestrian and transportation enhancement projects, its adoption involves considerable review and consultation between the CAC, Study Team and Policy Committee to ensure that the projects within the TIP are consistent with the priorities identified in the Long Range Transportation Plan (LRTP).

The procedure for reviewing and ultimately adopting the TIP involves a multi-step process that includes staff evaluation, interagency coordination, public review and comments as well as the completion of a conformity analysis of the projects – that will determine whether the TIP is in compliance with the applicable air quality standards for the RFATS Area. Once all of these activities have been completed, the RFATS Policy Committee will then consider formal adoption.

It should be noted that TIP amendments are periodically made to incorporate additional projects once a funding source has been identified. Each time this action is sought, a 21-day public comment period will be held and a summary report will be presented to the Policy Committee for their review prior to amending the TIP. Additionally, it should be noted that the TIP is periodically updated, which is a more involved process; and as such, a 30-day public comment period is associated with this action.

PUBLIC ACCESS

Once the Policy Committee provides preliminary approval of a draft version of the TIP, a public comment period will be scheduled so that all interested parties and stakeholders can actively participate in the review and development process. Staff will then post a draft version of the TIP on the websites of all RFATS members (City of Rock Hill, City of Tega Cay, Town of Fort Mill, Catawba Indian Nation and York County), as well as place a newspaper advertisement announcing this opportunity to provide feedback and suggestions. It should be noted that RFATS staff will prepare a summary report of all written and oral comments received and present this information to the Policy Committee as a part of the overall planning process.

AMENDMENT PROCESS

The Transportation Improvement Program (TIP) is the primary document that reflects all regionally significant and federally funded transportation projects. And although it periodically undergoes a comprehensive update every 4 years – it is also amended and/or revised on a more frequent basis whenever a new project is added or a revision is requested in order to reflect changes in the funding of existing projects.

With this in mind, the process for amending the TIP involves staff evaluation, agency coordination, public review of the proposed action, and then approval by the MPO's Policy Committee. When these actions are completed, the amended document is then submitted to the South Carolina Department of Transportation for further evaluation and approval to be incorporated into the State Transportation Improvement Program.

It is important to note that not all changes to the TIP are approached in the same manner. For example, when a decision is made to commit new federal funds to support a project, it is treated as a TIP Amendment; and as such, is a more formal process that involves both staff evaluation and a public review period. These steps are established so that adequate time and opportunity is available to provide input as well as suggestions before such an action is finalized.

However, when a revision to the TIP is requested – which typically involves administrative and/or supporting programmatic changes, such actions are approached more as minor updates or corrections (i.e., changes in the schedule of a project; combining or separating phases of work to improve implementation, etc.). With this in mind, staff evaluation and coordination continues to be a part of this action, but a separate public review period is not generally involved, as this action was completed when funding was originally considered.

FUNDING/REVENUE SOURCES

RFATS projects are funded through a variety of federal, state and local transportation funding programs. Specific funding sources included in the TIP include:

Guideshare Funds – Funds for road improvements are allocated by SCDOT through the Guideshare Program. SCDOT sets aside funds each year and then distributes the money among the state’s Metropolitan Planning Organizations and Councils of Government. The allocation formula is based on the population totals and amount of vehicle miles traveled (VMT) in each area and/or region. RFATS annual apportionment is approximately \$6.035 million dollars.

Exempt Projects – Projects that are funded on a statewide basis through other federal programs are listed in the TIP as “Projects Exempt From Guideshare,” which means the projects are funded through other sources. Most of these projects are on the Interstate Highway System; SCDOT identifies and funds Interstate projects through a statewide system and the advises each MPO. Bridge replacement projects, resurfacing projects, safety projects and other statewide programs are also listed here.

State Infrastructure Bank – This institution provides financing for a wide variety of highway and transit projects through loans and credit enhancements. A State Infrastructure Bank is designed to complement the traditional Federal Aid Highway and transit grants administered by SCDOT.

Transportation Alternative(s) Projects – Funds that help expand transportation choices as well as improve the overall transportation system are supported through the Transportation Alternatives Program (TAP). The RFATS Study Area receives an annual allocation from SCDOT to implement improvements principally to pedestrian and bicycle facilities.

Congestion Mitigation & Air Quality Improvement Projects – Funds under this program are reserved for projects that reduce vehicle congestion and improve air quality. Typical projects include transit improvement, shared-ride services, traffic flow improvements, pedestrian and bicycle programs, and travel demand management strategies. In June 2004, the Environmental Protection Agency designated RFATS as being in non-attainment for ground level ozone, and thus became eligible to receive CMAQ funding.

York County One Cent Sales Tax Program (Pennies for Progress) – This program is a Capital Project Sales & Use Tax that was initiated by York County to provide funding for road widenings, sidewalk / bikeway, and intersection improvements. To date,

three funding rounds have been approved (1997, 2003, and 2011); total generated revenues are approximately \$400,324,535.00.

Federal Transit Administration – (FTA 5307 Program) This funding source is known as the Section 5307 Urban Area Formula Program which provides funding for planning, operating, and capital needs to support the provision of transit services. Funds under this program are apportioned annually and remain available for 4 fiscal years (the year of apportionment plus 3 additional years).

PROJECT RANKING PROCESS/CRITERIA (ACT 114)

In 2007, the South Carolina Legislature established a statewide project priority list for all federal aid projects proposed for inclusion in the State Transportation Improvement Program (STIP). It should be noted that all federally funded projects and/or categories of projects are required to be included in the STIP in order to be eligible for federal funds (Title 23 and Title 49, Chapter 53 of the United States Code).

As a part of this action, the State Highway Engineer developed a ranking process for applying uniform and objective criteria applicable to all projects, except State Infrastructure Bank, local option sales tax projects (Pennies for Progress Program) and projects funded solely by C-Funds (County Funds). This ranking process is designed to serve as a useful decision-making tool to improve the overall transportation planning process.

Specifically, there are nine (9) evaluation points each project (road widenings, intersection improvements and new alignments) must undergo prior to inclusion in the TIP: (1) financial liability; (2) public safety; (3) potential for economic development; (4) traffic volume and congestion; (5) truck traffic; (6) pavement quality index; (7) environmental impact; (8) alternative transportation solutions; (9) consistency with local land use.

PERFORMANCE-BASED PLANNING & PROGRAMMING

Performance-based planning and programming or “performance management” is a strategic approach that uses system generated information to make investment and policy decisions to achieve goals set for the multimodal transportation system in the

MPO Study Area. Specifically, Performance-Based Planning & Programming (PBPP), refers to the application of performance management as standard practice in the planning and programming decision-making process. The goal of PBPP is to ensure that transportation investment decisions – both long term planning and short term planning – are based on the ability to meet established performance goals. As a federal requirement, states will invest resources in projects to achieve individual performance targets that collectively will make progress toward established national goals. Like states, MPOs are also expected to make transportation investment decisions based on a performance-driven, outcome-based approach as well. With this in mind, the key planning documents of an MPO; specifically, the LRTP and this TIP, are required to reflect this same approach to the planning and decision-making process.

Through the federal rulemaking process, FHWA is requiring state DOTs and MPOs to monitor the transportation system using specific performance measures. These measures are reflective of the national goal areas outlined in MAP-21 and the FAST Act. The national goal areas include: Safety, Infrastructure Condition, and System Reliability. The RFATS Policy Committee has formally elected to accept and support the State of South Carolina's targets for these three goal areas for the current performance period.

SAFETY

The State of South Carolina has the highest fatality rate in the nation, it is 67% higher than the national rate and 40% higher than states in the southeast. Reducing the number of transportation-related collisions, injuries, and fatalities is SCDOT's highest priority as is making safety everyone's business.

The 2015 South Carolina Strategic Highway Safety Plan (SHSP) is the statewide plan that focuses on how to accomplish the vision of eliminating fatalities and reducing serious injuries on all public roads. The SHSP guides SCDOT, MPOs, COGs, and other safety partners in addressing safety and defines a framework for implementation activities to be carried out throughout the state. The South Carolina SHSP and the STIP both commit to a visionary performance target of zero deaths. The SCDOT Highway Safety Improvement Program (HSIP) annual report documents that statewide interim performance measures toward that zero deaths vision. The state will set targets advancing towards this goal over the next 20 years.

In 2017, SCDOT provided a safety workshop for the MPO with data specific to the MPO’s Study Area boundary. The workshop further examined the crash data just within the MPO area to provide some perspective on what safety problems the MPO is experiencing with the study area boundary. Potential focus areas for the MPO include Roadway Departures, Intersections, Access Management, and Non-Motorized Roadway Users. These areas could be influenced by MPO policy as a project moves through the planning, programming, and delivery process.

SCDOT is required to evaluate and report on safety targets for five required measures on an annual basis. These five measures for safety are Fatalities, Serious Injuries, Non-Motorized Fatalities and Serious Injuries, Rate of Fatalities per 100 Million VMT, and Rate of Serious Injuries per 100 Million VMT. The baseline and targets for these measures for both the state and the MPO are shown below.

SAFETY TARGET BASELINE (2015 - 2019 AVERAGE)

	Traffic Fatalities	Fatality Rate	Severe Injuries	Severe Injury Rate	Non-Motorized
SC Baseline	890.2	1.75	3194.4	6.30	376.4
SC Targets	988.0	1.79	2986.0	5.42	380.0
MPO Baseline	20.0	1.14	95.4	5.41	8.0

This TIP includes specific investment priorities that support all of the MPO’s goals including safety, using a prioritization and project selection process established previously in the LRTP. The MPO has long utilized a project ranking criteria that identifies and prioritizes projects aimed at improving transportation safety.

While all projects include consideration of safety in the design process, there are active and recently completed projects that are expected to favorably impact the targets in the current performance period. SCDOT has identified several safety projects to strengthen safety in the RFATS Study Area. Those projects include a Safety Improvement for I-77, spanning twenty-one miles (21), which is being undertaken to maintain and improve the safety and efficiency of the interstate system. The MPO has approved both TAP Funding and CMAQ Funding for multiple projects aimed at implementing pedestrian facilities near schools and a university, where pedestrian activity is highest. The MPO has coordinated closely with SCDOT to implement access management improvements, which reduce the opportunity for crashes at

intersections. It is also worth noting that there are ten (10) safety improvements funded by York County Pennies for Progress, which are expected to be completed during the current performance period.

Going forward, the project evaluation and prioritization process for the MPO will continue to use a data-driven strategy that considers stakeholder input to evaluate projects that have an anticipated effect of reducing both fatal and injury crashes. During the most recent update to the Congestion Management Process, eight (8) priority intersections were identified for consideration of future safety audits. These locations were identified using safety data provided by SCDOT, linking the planning process back to the performance management requirements. The goal of reducing fatal and serious injury crashes is linked to the TIP and the process used in prioritizing the projects is consistent with federal requirements. However, it should be noted that long-term safety performance for the MPO could be influenced by significant increases in VMT as the MPO continues to experience high growth rates in population and employment.

SYSTEM PERFORMANCE

The RFATS Study Area is a dynamic, high growth planning environment located south of Charlotte, NC. Given this operating atmosphere, RFATS is particularly focused on and committed to extracting the highest degree of operational efficiency from our principal arterial roadways and the interstate system. With this in mind, RFATS will seek to advance the efforts of the South Carolina Department of Transportation to continually improve the functional quality and reliability of infrastructure conditions.

SCDOT is required to evaluate and report on Infrastructure Conditions targets for three required measures. These include Interstate Pavement, Non-Interstate NHS Pavement, and Bridges. The baseline and targets for these measures for both the state and the MPO are shown in the table below.

Infrastructure Conditions: Baseline & Targets			
	Interstate Pavement	Non-Interstate NHS Pavement	Bridges
SCDOT Baseline	61.4% Good 1.7% Poor	10% Good 2.6% Poor	41.6% Good 4.2% Poor
2 Year Targets	N/A	14.9% Good	42.2% Good

		4.3% Poor	4% Poor
4 Year Targets	71% Good 3% Poor	21.1% Good 4.6% Poor	42.7% Good 6% Poor
MPO Baseline	96.7% Good 0.0% Poor	3.9% Good 7.7% Poor	23% Good 1.4% Poor

Based on SCDOT processes for selecting pavement improvement projects, the MPO anticipates improvements to the percentage in good condition and reductions to the percentage in poor condition on both the interstate and non-interstate NHS. While the condition of interstate pavement within the RFATS Study Area is favorably impacting both the two-year and four-year state targets, the condition of the non-interstate NHS pavement is currently outside both the two-year and four-year targets. SCDOT has identified two (2) resurfacing projects (US 21 BYP and Cherry Road) as well as funding allocated to pavement preservation treatments that extends the service life of good pavements. In addition, it is worth noting that there are several resurfacing projects that are being completed through York County Pennies for Progress that are expected to favorably impact both the two-year and four-year state targets for Non-Interstate NHS pavement.

Currently, the condition of bridges on the Interstate and Non-Interstate NHS within the RFATS Study Area is below both the two-year and four-year state targets. SCDOT and the MPO have approved six (6) non-interstate NHS bridge replacement projects and one (1) bridge rehab project in the STIP / TIP. SCDOT has also identified a bridge rehab project on the heavily trafficked I-77 bridge over the Catawba River. Based on the current project delivery schedule, all of these projects are expected to be complete within the current performance period and should favorably impact both the two-year and the four-year state targets. Conversely, approximately 75% of the bridge deck area within RFATS is considered to be in fair condition and normal bridge deterioration based on age and traffic usage could potentially impact the future performance condition of bridges rated in the poor category.

SCDOT is also required to evaluate and report on System & Freight targets for three required measures. These include Interstate Travel Time Reliability, Non-Interstate Travel Time Reliability, and Truck Travel Time Reliability. The baseline and targets for these measures for both the state and the MPO are shown in the table below.

System & Freight Reliability Targets			
	Travel Time Reliability (Interstate)	Travel Time Reliability (Non-Interstate NHS)	Truck Travel Time Reliability
SCDOT Baseline	94.8% Person miles traveled reliable	89.8% Person miles traveled reliable	1.34 TTTR Index
2 Year Targets	91.0% Person miles traveled reliable	N/A	1.36 TTTR Index
4 Year Targets	90.0% Person miles traveled reliable	81.0% Person miles traveled reliable	1.45 TTTR Index
MPO Baseline	88.3% Person miles traveled reliable	84.5% Person miles traveled reliable	1.40 TTTR Index

Travel time reliability on the Interstate within the RFATS Study Area is currently below the SCDOT baseline and is projected to be outside both the two-year and four-year state targets. Travel time reliability on the Non-Interstate NHS is currently below the SCDOT baseline and is projected to be outside the four-year state target. With the RFATS Study Area being such a dynamic and high growth planning environment, VMT is expected to increase as growth continues during the current performance period. Thus, VMT was a major consideration in establishing the future performance goals related to system reliability. It is worth noting that the statewide targets for both interstate and non-interstate reliability reflect declining performance for both Interstate and Non-Interstate reliability. Not only within the RFATS Study Area, but statewide reliability is projected to decrease as key areas of intensity are furthered by growth pressures.

In regards to the interstate in the RFATS Study Area, declining performance is not only attributed to increases in VMT but also limited operational and capacity improvements that are scheduled for completion within the four-year performance period. Most notably the segments along I-77 north of Exit 85 show high AM Travel

Time Reliability Ratios. Currently, RFATS has three (3) planned interchange improvements along the interstate, and only one (1) of these projects is scheduled for completion within the current performance period. The interchange at I-77 / Gold Hill Road is a project funded through both the MPO and York County Pennies for Progress. This improvement is anticipated to strengthen reliability along the interstate and favorably impact the four-year state target.

Declining performance on the Non-Interstate NHS is also attributed to increases in VMT, but at a much faster rate. This is despite significant improvements to capacity that are currently scheduled for completion during the current performance period. Specifically, only one such improvement that is funded by the MPO is expected to be complete within the four-year performance period. That project is the SC 160 Phase 2 Widening Project in Lancaster County, which is transitioning a two-lane highway to a four-lane divided highway. However, it is worth noting that there are five capacity improvements that are funded by York County Pennies for Progress which are anticipated for completion within the four-year performance period. Travel Time Reliability Ratios are especially high at key intersections in close proximity to I-77; hence why the MPO has targeted intersection improvements along major arterials such as Riverview / Riverchase. All of these improvements are expected to help further strengthen reliability along the Non-Interstate NHS and favorably impact the four-year target.

Truck Travel Time Reliability in the RFATS Study Area is currently above the SCDOT baseline but is projected to be outside of the four-year state target. Declining performance is anticipated for Truck Travel Time Reliability due to the same increases in VMT which are attributing to the declining performance in both Interstate and Non-Interstate Reliability. However, it is worth noting that the projects mentioned in the previous two paragraphs should provide benefits to overall traffic and therefore favorably impact the four-year state target.

PROJECT NARRATIVE(S)

GUIDESHARE PROJECTS: (Funds Available to RFATS)

1. SC-160 / I-77 Interchange Reconfiguration. This project is a traffic flow improvement effort that will include consideration of reconfiguring the

interchange to improve operational efficiency, particularly during AM and PM peak driving periods.

2. Exit 82A, 82B, 82C / I-77 Interchange Reconfiguration. This project is a traffic flow improvement effort that will include consideration of reconfiguring the interchange to improve operational efficiency, particularly during AM and PM peak driving periods.
3. SC-160 Phase 2 Widening Project. This project will widen an existing 2-lane rural roadway to 3-lanes from S-157 to Rosemont Drive / McMillan Park Drive and to the York County line at Sugar Creek. This project is an operational efficiency improvement effort with a project length of 1 mile. It should be noted that it is envisioned that this roadway will be widened to 5 lanes in subsequent years.
4. US 521 / Marvin Road Intersection Improvement Project. This project is a traffic flow improvement effort that will improve the operational efficiency of this intersection during AM and PM peak driving periods.
5. Carowinds / Pleasant Road Intersection. This project is a traffic flow improvement effort that will incorporate additional turning capacity as well as additional storage capacity. It should be noted that this project is the recipient of multiple sources of federal and state funding.
6. India Hook / Celanese Road Intersection. This project is a traffic flow improvement effort that will incorporate additional through movements and additional turning capacity. It should be noted that this project is the recipient from multiple sources of federal and state funding.
7. Riverview / Riverchase Intersection Improvement. This project is a multi-phase traffic flow improvement effort to increase the operational efficiency of Celanese Road near the intersections of Riverview & Riverchase Roads, by better balancing the distribution of traffic flow in this heavily congested section of just off the southbound ramp of I-77.
8. Dam Road Sidewalk Project. This project is a pedestrian enhancement effort that will improve pedestrian infrastructure along Dam Road and provide safe access to

Stonecrest Blvd. Specific improvements include a sidewalk and ADA accessibility improvements.

PROJECTS EXEMPT FROM GUIDESHARE

1. Riverview Road Extension. This project will provide additional north-south connectivity on the west side of I-77 as well as provide a parallel facility to Anderson Road. The project length is 1.0 mile and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.
2. Eden Terrace Extension. This project will provide additional connectivity on the east side of I-77 and serve new development. The project length is 1.0 mile and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.
3. Corporate Boulevard Connector. This project will provide additional connectivity on the east side of I-77 and serve new development. The project length is 1.25 miles and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.
4. Meeting Street / Galleria Boulevard Extension. This project provides additional connectivity on the east side of I-77 and serve new development. The project length is 1.25 miles and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.
5. Commerce / Galleria Connector. This project will provide additional connectivity on the east side of I-77 and serve new development. The project length is 0.25 miles and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.
6. Galleria Extension to US 21 Through Antrim. This project will provide additional connectivity on the east side of I-77 and serve new development. The project length is 0.50 miles and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.

7. Riverwalk Road Connector. This project will provide additional north-south connectivity on the east side of I-77 for future development. Includes three lane bridge over existing railroad tracks and intersection with Commerce Drive. The project length is 0.25 miles and is classified as non-exempt and regionally significant. This project underwent a conformity emissions analysis 04/2013.
8. US 321 Allison Creek. This project is a part of the Federal Bridge Replacement Program. SCDOT serves as the project manager. Construction is estimated to begin in early 2018.
9. S-46-654 (Church Road) Bridge over Burgis Creek. This project is a part of the Federal Bridge Replacement Program. SCDOT serves as the project manager. Construction is estimated to begin in spring 2018.
10. SC-274 Mill Creek. This project is part of the Federal Bridge Replacement Program. SCDOT serves as the project manager.
11. SC-72 Stony Fork Creek. This project is part of the Federal Bridge Replacement Program. SCDOT serves as the project manager. Construction is estimated to begin in 2019.
12. S-46-655 (Auten Road) Bridge over Fishing Creek. This project is a part of the Federal Bridge Replacement Program. SCDOT serves as the project manager. Construction is anticipated for completion in 2019.
13. SC-5 (West Main Street) Bridge over Tools Fork Creek. This project is a part of the Federal Bridge Replacement Program. SCDOT serves as the project manager. Construction is anticipated for completion in 2018.
14. S-46-50 (Red River Road) Bridge over Manchester Creek. This project is a part of the Federal Bridge Replacement Program. SCDOT serves as the project manager.
15. US 21 BUS Bridge over Steel Creek. This project is a part of the Federal Bridge Replacement Program. SCDOT serves as the project manager.

16. Safety Projects (P, R & C). This is a program activity undertaken by SCDOT to resurface and provide guardrail and other safety improvements to federal aid eligible roads.
17. I-77 Safety Improvements (Exit 60 to Exit 91). This is a project undertaken by SCDOT to maintain and improve the safety and efficiency of the interstate system.
18. S-31 (Neely Store Rd.) MP 4.65 to MP 5.40. This project is a part of the safety program undertaken by SCDOT to resurface and provide guardrail and other safety improvements to federal aid eligible roads.
19. Pavement Marking & Signing Projects. This is a program activity undertaken by SCDOT to maintain and improve the safety and efficiency of the transportation system.
20. ITS (Interstate). This is a program activity undertaken by SCDOT to add lanes to existing Interstate facilities as well as to provide necessary maintenance. This activity is primarily funded with NHS, STP and IM funds.
21. Incident Response Program. This is a program activity undertaken by SCDOT to provide traffic control and emergency assistance to motorists in the RFATS Area.
22. Catawba River Trail Extension Project. This is a project activity undertaken by the SC Parks, Recreation and Tourism program.
23. York County Culture & Heritage Commission Trail Project. This is a project activity undertaken by the SC Parks, Recreation and Tourism program.
24. Pavement Projects. This is a program activity undertaken by SCDOT to maintain and resurface federal aid eligible roads.

STATE INFRASTRUCTURE BANK PROJECTS

1. SC 161 / SC 122 Ext to US 521 (Lancaster County). This project is a multi-lane widening effort (5 lanes) to add roadway capacity and improve traffic operations. This project has undergone conformity emissions analysis with a projected horizon year of 2035.

TRANSPORTATION ALTERNATIVES PROJECTS

1. City of Rock Hill – White Street Pedestrian Safety Improvements. This project is a pedestrian safety improvement effort that involves the widening of sidewalks, installing new stamped crosswalks, as well as accessible ramps. Fundamentally, this project is designed to improve pedestrian visibility and clearly demarcate appropriate crossing points along this corridor.
2. City of Rock Hill – Poe / Quantz Connector Trail Project. This project is a pedestrian enhancement effort that will provide an important connection to trails and greenways. Specific improvements include a sidewalk, curb, and gutter to provide safe alternative transportation for area residents.
3. City of Rock Hill – Columbia Avenue Pedestrian Improvements Project. This project is a pedestrian enhancement effort that will improve pedestrian infrastructure along Columbia Avenue. Specific improvements include a sidewalk, ADA accessibility improvements, pedestrian lighting, and landscaping.
4. City of Tega Cay – Dam Road Sidewalk Project. This project is a pedestrian enhancement effort that will improve pedestrian infrastructure along Dam Road and provide safe access to Stonecrest Blvd. Specific improvements include a sidewalk and ADA accessibility improvements.
5. Lancaster County – River Road Sidewalk Project. This project is a pedestrian enhancement effort that will improve pedestrian infrastructure along River Road and provide safe access to Indian Land Middle School and Indian Land High School. Specific improvements include a sidewalk and ADA accessibility improvements.

CMAQ PROJECTS

1. City of Rock Hill – Downtown Traffic Management Project. This project is a traffic flow improvement effort that will reduce extensive idling of vehicles caused by train blockages in the downtown area. The project will utilize signal coordination and signage to route traffic to available grade-separated crossings.
2. SCDOT / City of Rock Hill – East White Street / SC 72 / Firetower Rd. This project is a traffic flow improvement effort that involves the construction of a left turn lane on the East White Street approach.
3. York County – SC 160 / Gold Hill Road / Zoar Road. This project is a traffic flow improvement effort involving the addition of turn lanes and the upgrading of the traffic signal controller.
4. City of Rock Hill – Riverview/Riverchase Intersection Improvement(s). This project is a multi-phase traffic flow improvement effort to increase the operational efficiency of Celanese Road near the intersections of Riverview & Riverchase Roads, by better balancing the distribution of traffic flow in this heavily congested section of just off the southbound ramp of I-77.
5. Town of Fort Mill – Nation Ford High School Pedestrian Connectivity Project. This project is designed to reduce the frequency of cold start vehicle trips by constructing pedestrian improvements that will enhance area safety, connectivity and functionality in and around Nations Ford High School.
6. York County – Heckle Blvd Sidewalk. This project involves sidewalk construction along Heckle Blvd between the Heckle Business Park, near the intersection of Herlong Avenue and SC 5. Essentially, this project will connect a gap between the existing and proposed sidewalk network.
7. Town of Fort Mill – Clebourne / N. White Street. This project is a traffic flow improvement effort that involves the incorporation of a dedicated right turn option from Clebourne onto N. White Street. Fundamentally, this project is designed to reduce traffic congestion caused by westbound traffic continuing from Tom Hall Street onto Clebourne and turning right onto N. White Street.

8. York County – Gold Hill Road Interchange Improvements. This project is a traffic flow improvement effort that will involve geometric changes to the interchange of Gold Hill Road / I-77 to reduce peak period traffic congestion .
9. Carowinds / Pleasant Road Intersection. This project is a traffic flow improvement effort that will incorporate additional turning capacity as well as additional storage capacity. It should be noted that this project is the recipient of multiple sources of federal and state funding.
10. India Hook / Celanese Road Intersection. This project is a traffic flow improvement effort that will incorporate additional through movements and additional turning capacity. It should be noted that this project is the recipient from multiple sources of federal and state funding.
11. SC 160 Adaptive Traffic Control Signals Project. This project is a traffic flow improvement effort that will optimize signal timing and coordination between Pleasant Road / Sutton Road and US 21.

LOCALLY FUNDED PROJECTS: (York County One Cent Capital Projects)

1. Mt Gallant Road (Dave Lyle Blvd to Anderson Road). This project involves the widening of an existing 2 lane road to 3 lanes; this action will improve operational efficiency in an area which has experienced significant increases in traffic levels. Project length is 1.3 miles and is classified as exempt.
2. SC 160 West (Gold Hill Road to NC State Line). This project will provide additional roadway capacity and improve traffic operations. Project length is 1.1 miles and is classified as exempt.
3. SC 274 / Pole Branch Road (SC 274 to NC State Line). This project will provide additional roadway capacity and improve traffic operations. Project length is 2.4 miles and is classified as exempt.
4. US 21 North Phase I & SC 51 (Springfield Pkwy to NC State Line). This project will widen an existing 2-lane rural roadway to a 5-lane urban roadway with curb and gutter that will provide additional roadway capacity and improve traffic operations. Project length is 3.0 miles and is classified as non-exempt

and regionally significant. This project underwent a conformity emissions analysis 04/2013.

5. Cel-River Road / Red River Road Phase I (Cherry Road to the Southern Eden Terrace Extension). This project will widen an existing 2-lane rural roadway to a 5-lane urban roadway with curb and gutter and sidewalk that will provide additional roadway capacity and improve traffic operations. Project length is 1.1 miles and is classified as non-exempt and regionally significant.
6. Gold Hill Road / I-77 Interchange Improvements. This project will reconfigure an existing Interstate Interchange that will improve the operational efficiency and safety for this highly congested interchange. Project length is 1.0 mile and is classified as exempt; in addition to the Pennies for Progress funding for this project there is also \$825,000.00 provided in CMAQ funding.
7. US 21 / Anderson / Cowan Farm. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 1.0 mile and is classified as exempt.
8. Cherry Road (Winthrop University Area). This project is a pedestrian safety project to help college students to safely access local businesses and residences adjacent to the campus. Project length is 1.0 mile and is classified as exempt.
9. Paraham Road (SC 55 to Celanese Road). This is a safety project that will add 3-foot paved shoulders to each travel lane of a medium to high volume corridor with a higher than normal rate of run-off-the-road crashes. Project length is 7.1 miles and is classified as exempt.
10. SC Fort Mill Southern Bypass / Spratt Street Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is .96 miles and is classified as exempt.
11. SC 160 East (Springfield Pkwy to Lancaster County Line). This project will provide additional roadway capacity and improve traffic operations. Project length is 0.75 miles and is classified as exempt.

12. Riverview Road (Eden Terrace to Celanese Road). This project will widen an existing 2-lane rural roadway to a 3-lane urban facility that will improve operational efficiency and pedestrian safety. Project length is 1.1 miles and is classified as exempt.
13. Mt. Gallant Road (SC 161 to Twin Lakes Road). This project will provide additional roadway capacity and improve traffic operations. Project length is 2.5 miles and is classified as exempt.
14. SC 72 (SC 901 to Rambo Road). This project will provide additional roadway capacity and improve traffic operations and drainage. Project length is 2.0 miles and is classified as exempt.
15. University Drive (Pedestrian Safety Improvement). This is a safety project that will add bicycle lanes and sidewalk to provide access for pedestrian and cyclist travel. Project length is 0.8 miles and is classified as exempt.
16. SC 49 / SC 274 / SC 557 Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.6 miles and is classified as exempt.
17. Flint Hill Street Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 1.1 miles and is classified as exempt.
18. Celanese Road / US 21 (Cherry Road) Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.4 miles and is classified as exempt.
19. US 21 / McAllister Road Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.

20. US 21 / Cannon Drive Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.
21. US 21 / Benson Road Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.
22. US 21 / Catawba Baptist Church Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.
23. US 21 / Hopewell PCA Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.
24. US 21 / Springdale Road Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.
25. Sutton Road / New Gray Rock Road Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.2 miles and is classified as exempt.
26. Sutton Road / Sam Smith Road Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.1 miles and is classified as exempt.
27. Sutton Road / Harris Road Intersection. This project is an intersection safety project that will improve safety at a high volume intersection. Project length is 0.2 miles and is classified as exempt.
28. SC 557 (Kingsbury Road to SC 49 / 274). This project will widen an existing 2-lane rural roadway to a 5-lane urban roadway with curb and gutter that will provide additional roadway capacity and improve traffic operations. Project length is 2.4 miles and is classified as non-exempt.

29. Neely Road (Robertson Road to Crawford Road). This project will widen an existing 2-lane roadway to a 3-lane roadway that will provide additional roadway capacity and improve traffic operations. Project length is 1.5 miles and is classified as non-exempt.
30. Cel- River Road / Red River Road Phase II. This project will widen an existing 2-lane rural roadway to a 5-lane urban roadway with bike lanes and sidewalk that will provide additional roadway capacity and improve traffic operations. Project length is 2.3 miles and is classified as non-exempt and regionally significant.
31. Fort Mill Southern Bypass (I-77 to Railroad Overpass). This project will widen an existing 2-lane rural roadway to a 5-lane urban roadway that will provide additional roadway capacity and improve traffic operations. Project length is 2.2 miles and is classified as non-exempt and regionally significant.
32. Hubert Graham Way Extension (Dry Run Road to Gold Hill Road). This project involves the construction of a new road connection that will provide access from the existing Hubert Graham Way to Gold Hill Road. Project length is 0.3 miles and is classified as exempt and regionally significant.
33. US 21 North (SC 160 to Springfield Parkway). This project will widen an existing 2-lane rural roadway to a 5-lane urban roadway that will provide additional roadway capacity and improve traffic operations. Project length is 2.8 miles and is classified as non-exempt and regionally significant.
34. York County Pennies for Progress Resurfacing Projects. This is a program activity undertaken by York County to maintain and improve the safety and efficiency of the transportation system.

FEDERAL TRANSIT ADMINISTRATION

1. York County Disabilities and Special Needs Board (Section 5310). This is a federally funded transportation assistance program. The York County Disabilities and Special Needs Board utilizes these funds to support capital purchases.

2. City of Rock Hill – Commuter Bus Services (Section 5307). This is a federally funded transportation assistance program. The City of Rock Hill utilizes these funds to support the CATS 82X Express Bus Service.
3. City of Rock Hill – Demand Response Program (Section 5307). This is a federally funded transportation assistance program. The City of Rock Hill utilizes these funds to support an on-demand transportation service (known as York County Access).
4. Rock Hill Urbanized Area Route Service (Section 5307). This is a federally funded transportation assistance program. The City of Rock Hill utilizes these funds to develop a fixed-route transit service.
5. York County Disabilities and Special Needs Board (Section 5310). This is a federally funded transportation assistance program. The York County DSNB utilizes these funds to support capital purchases.
6. City of Rock Hill – Initiation of Fixed Route Public Transit System. This is a program for improved transit which will assist with the start-up costs associated with the initiation of a fixed route public transit system.
7. Rock Hill Urbanized Area Fixed Route Service (Section 5339). This is a federally funded transportation assistance program. The City of Rock Hill utilizes these funds to develop a fixed-route transit service.

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APPENDIX C: CMP DOCUMENTATION FOR SOV CAPACITY PROJECTS



CONGESTION MANAGEMENT PROCESS: SINGLE OCCUPANT VEHICLE (SOV) CAPACITY PROJECTS

SAFETEA-LU legislation mandates that “in a TMA designated as a non-attainment area for ozone or carbon monoxide, federal funds may not be programmed for any project that will result in a significant increase in the carrying capacity for SOV’s, (i.e., a new general purpose highway on a new location or adding general purpose lanes, with the exception of safety improvements or the elimination of bottlenecks), unless the project is addressed through a Congestion Management Process.”

The legislation further requires that the congestion management process shall provide an appropriate analysis of all reasonable travel demand reduction and operational improvement strategies for the corridor in which a capacity increasing project is proposed. If an SOV project is warranted, then the CMP should identify the strategies to manage the corridor efficiently. For the RFATS CMP, the definition of a regionally significant capacity project is consistent with the definition used for the purposes of air quality conformity analysis.

Additionally, it is important to emphasize that all non-federally funded projects for which a federal decision document may be requested (i.e., NEPA, etc.), are strongly encouraged to undergo a CMP evaluation / documentation review as well – so as to avoid potential disruption to the implementation of a project should federal funding become part of a project’s funding source at a later date.



1. RFATS PROJECT SPONSOR	
2. CONTACT PERSON	
3. ADDRESS	
4. PHONE NUMBER FAX NUMBER	
5. EMAIL	
6. PROJECT NAME	
7. PROJECT LIMITS	
8. PROJECT DESCRIPTION [Attach additional sheets if necessary]	
9. WHAT ARE THE SOURCES OF PROJECT FUNDING?	<input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Local <input type="checkbox"/> Other (i.e., Developer Funded)
10. HOW READY IS THE PROJECT TO BE CONSTRUCTED?	
11. PROJECT COST ESTIMATE	<input type="checkbox"/> Preliminary Engineering <input type="checkbox"/> Right-of-Way <input type="checkbox"/> Construction <input type="checkbox"/> Total
12. WHAT IS THE ROADWAY'S FUNCTIONAL CLASSIFICATION	
13. WHAT IS THE CURRENT AADT?	
14. WHAT IS THE CURRENT LEVEL OF SERVICE DURING PEAK PERIODS?	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F

15. ALTERNATIVES TO SOV CAPACITY (OPM OPTIONS CONSIDERED / IMPLEMENTED)	<input type="checkbox"/> Access Management <input type="checkbox"/> Transportation Demand Mgmt <input type="checkbox"/> Signal Retiming <input type="checkbox"/> Intersection Improvement(s) <input type="checkbox"/> Operational Improvements to Parallel facilities
A. ACCESS MANAGMENT	
B. TDM	
C. SIGNAL RETIMING	
D. INTERSECTION IMPROVEMENT(S)	
E. OPERATIONAL IMPROVEMENTS TO PARALLEL FACILITIES	
16. WILL ALTERNATIVES PRODUCE DESIRED CONGESTION REDUCTION	<input type="checkbox"/> Yes <input type="checkbox"/> No
17. NEEDED FOLLOW-UP ACTIVITIES?	