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.

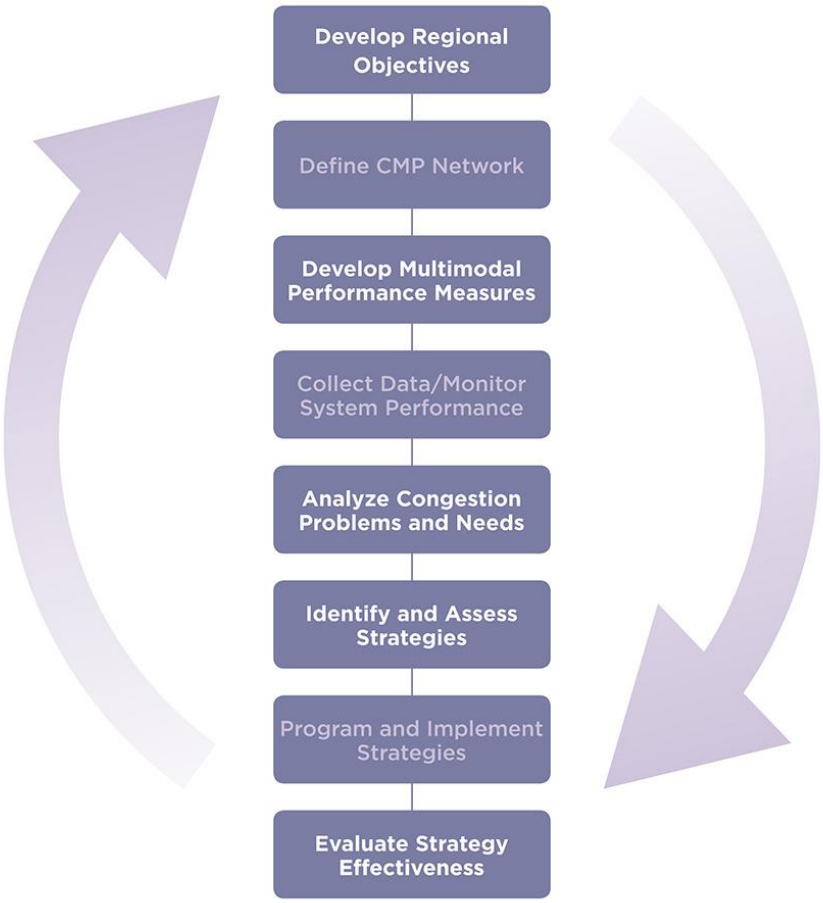
A CMP is a continuous cycle of transportation planning activities designed to provide decision-makers with better information about transportation system performance and the effectiveness of various strategies to deal with congestion. A CMP has four main components:

- 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

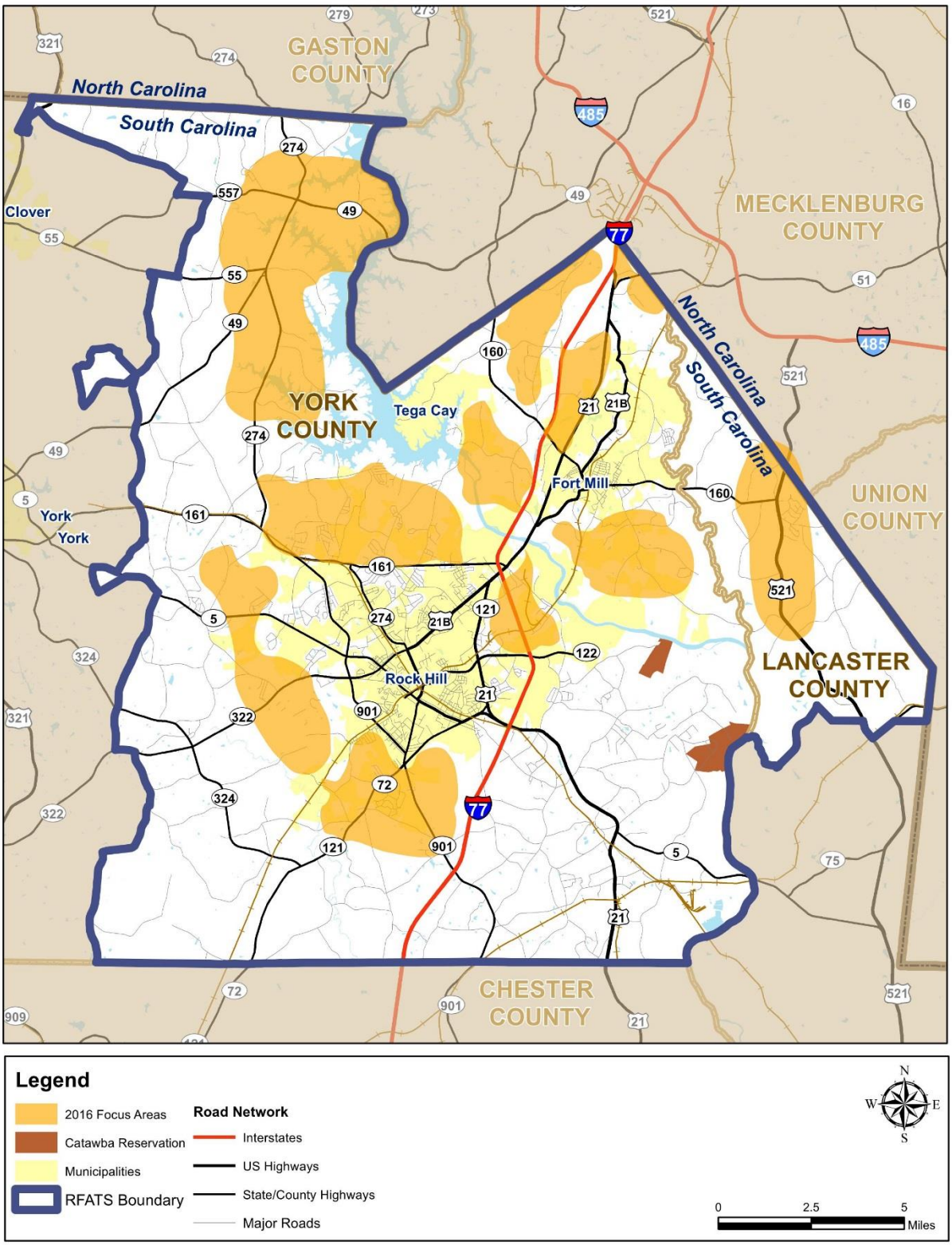


Figure 6.3: Congestion Monitoring Network

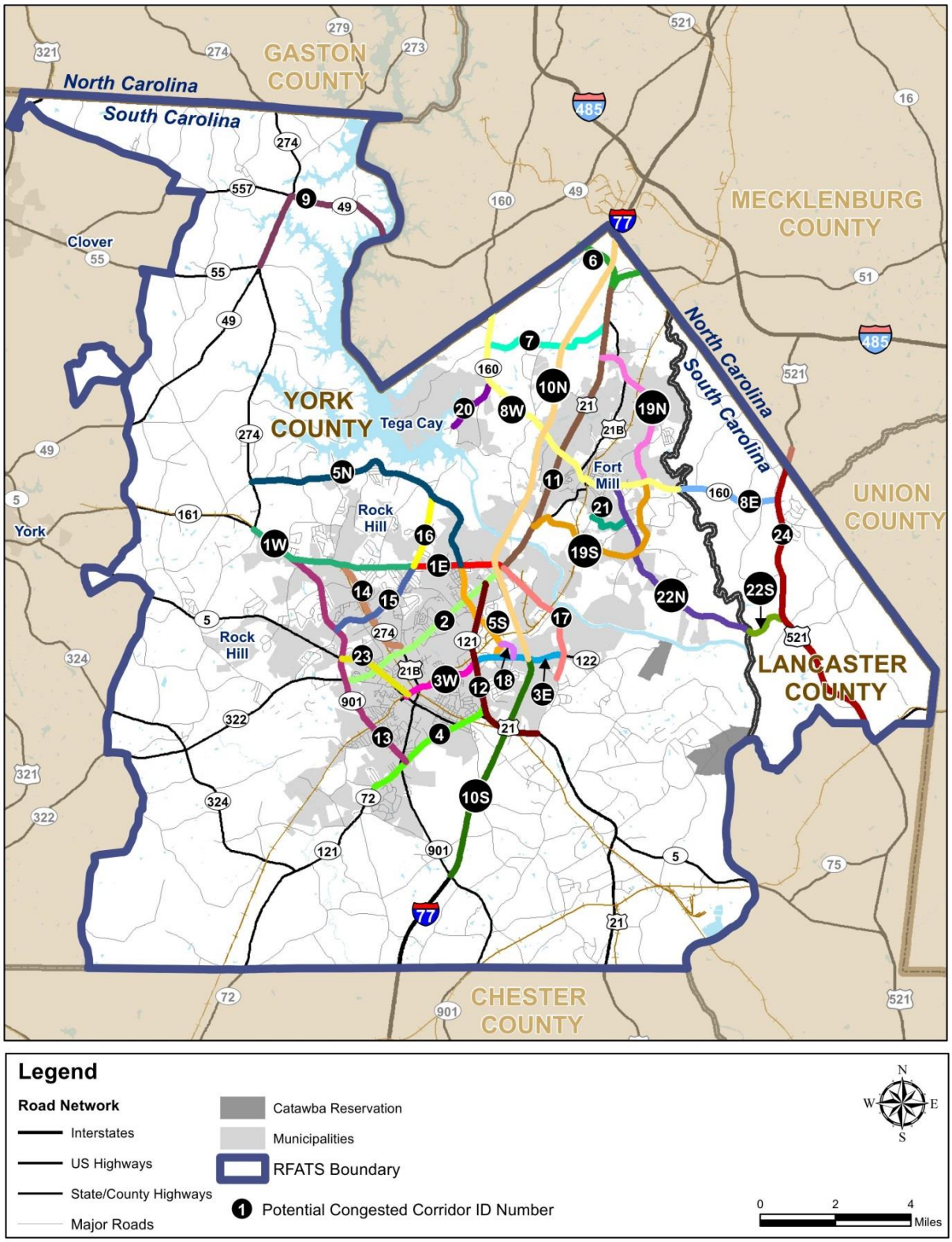


Table 6.1: Congestion Monitoring Network Routes

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.

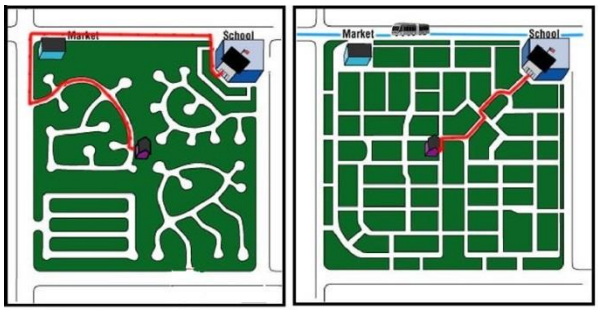
In contrast to arterials, local streets are intended primarily for access to adjoining property. Through-traffic flow is less important; in fact, most communities set low speed limits and even implement traffic calming measures on local streets.

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.

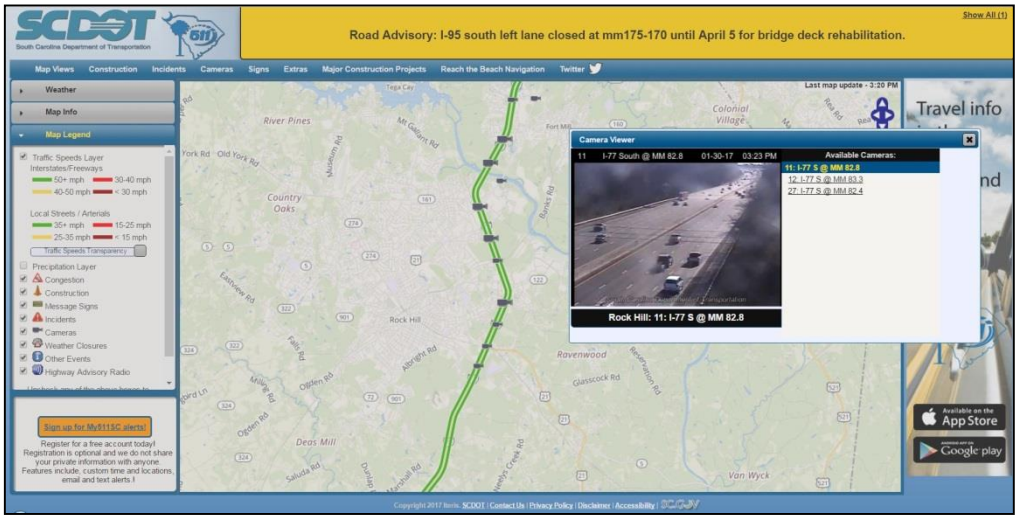
The RFATS region, already known as a family-friendly vacation destination thanks to Carowinds, is now also recognized as a premier host for youth sports tournaments. Visiting families can benefit from a wayfinding system to guide them to sports complexes, parking areas, shopping and other attractions 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.