

Chapter 9 Congestion Management Process



A congested corridor under construction- Robert Willett, newsobserver.com

Introduction

The CR MPO is designated by the Federal Highway Administration as a Transportation Management Area (TMA). Under this designation, the CR MPO must maintain a Congestion Management Process (CMP) that will address the area's congested corridors. The CMP plays a key role in identifying strategies and projects that will assist in reducing congestion and improving air quality in the region.

Objective

The objective of the CR MPO CMP is to measure and manage congestion of the current and future transportation system through data collection, travel demand modeling, and highway capacity analysis.

Goals

The following goals are outlined in the MTP and the Prospectus and should be applicable to efforts to reduce congestion and implement the CMP.

Highway System Goal

Develop an efficient street and highway network for the Cabarrus-Rowan Urban Area

Congestion Management Goal

Develop a local thoroughfare system that minimizes traffic congestion and maximizes system preservation

Bicycle and Pedestrian Goal

Promote development of an integrated bicycle and pedestrian network

Environmental Goal

Develop a transportation system, which preserves and enhances the natural and built environments

Title VI Goal

Promote a transportation system that does not disproportionately impact minority and low-income populations.

Public Transportation Goal

Support efforts to improve mobility for Urban Area residents

Freight Goal

Develop a transportation system that encourages safe and secure movement of freight goods within and outside the Urban Area.

Process

The following steps should be followed in order to achieve the objective and meet the goals of the CRMPO CMP:

1. Define congestion for the existing transportation network;
2. Evaluation and monitoring of the operational performance of the transportation network;
3. Identification of congested corridors;
4. Evaluation and identification of appropriate strategies to alleviate congestion;
5. Implementation of appropriate congestion management or mobility enhancement strategies;
6. Evaluation of the effectiveness of implemented strategies.

Defining Congestion

Fortunately, the CR MPO has minimal congestion at best outside of the urban core in Cabarrus County. Congestion does increase on the periphery towards the Charlotte Metro area, but is primarily a function of peak hour work trips into and out of Mecklenburg County. Nonetheless, it is important to define and understand what is meant by congestion and impeded travel. The Transportation Research Board has defined congestion as “travel time or delay in excess of that normally incurred under light or free-flow travel conditions.” There are two types of congestion:

1. recurring congestion that tends to be concentrated into short time periods that are predictable in pattern of time, location, and duration such as “rush hour” and is caused from excessive traffic volumes resulting in reduced speed and flow rate within the system; and

2. non-recurring congestion caused by unforeseen incidents (road accidents, spills, and stalls) which affect driver behavior and can be less predictable.

The CMP will produce data related to both of these types of congestion. The Metrolina Regional Travel Demand Model produces volume to capacity ratios for peak hour travel i.e. “rush hour” in the AM and PM. NCDOT captures incidents and accidents through law enforcement reports of crashes. (It is estimated that 60 percent of traffic delay is caused by incidents in a typical urban area).

The CMP is *“a systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods to levels that meet state and local needs.”* The operative word in this phrase is systematic and a CMP must serve as a consistent ongoing evaluation of congestion and mobility to be completely effective.

Another important concept is the value or tolerance for some congestion within the urban area. Not all congestion is bad, particularly as it relates to influence on the shift in mode choice or transit attractiveness. Hence, the acceptable system performance may vary by transportation mode, time of day, or facility type. The CMP establishes criteria or parameters for locally acceptable standards of mobility in terms of travel time or delay.

These parameters set the framework for monitoring/tracking the progress of congestion from a system or corridor level, which is followed by strategies and actions to meet those standards.

Evaluation of Network Performance

One of the best tools at the MPO's disposal to evaluate the street network's performance is the Metrolina Regional Travel Demand Model. This Model includes a host of congestion measures for both the base year and future year(s).

The primary performance measure for congestion is the level of traffic volume versus the total capacity of the facility i.e. volume-to-capacity or v/c ratio. The v/c ratio provides an indication of whether the road or street is experiencing free flow travel or excess capacity or whether the road or street is deficient or congested with excess travel or vehicles. A v/c ratio of 1 or greater indicates that the travel demand volume exceeds the available capacity of the roadway and forced flow conditions will inevitably result. The Highway Capacity Manual defines congestion in terms of level of service (LOS) ranging from A to F. The v/c ratios in the Regional Travel Model would roughly equate to the following LOS levels:

Table 9-1 - Capacity and Level of Service

Level of Service	Volume to Capacity Ratio
LOS A	0 to 0.4
LOS B	0.4 to 0.6
LOS C	0.6 to 0.85
LOS D	0.85 to 1.1
LOS E	1.1 to 1.25
LOS F	> 1.25

Table 9-2 lists the congested corridors as recommended by MPO jurisdictions with several performance measures.

Appendix 9-1 provides a summary of 6 parameters to score the congested corridors using RITIS, MRM, Streetlight, and NCDOT Safety Scores.

Appendix 9-2 shows the AM and PM Peak Period 2023 Traffic Congestion and speeds for Cabarrus and Rowan Counties using RITIS data.

Strategies

The CRMPO has identified the following strategies for managing congestion along corridors in the transportation network. As the initial study only evaluated a relatively small sample of the thoroughfares in the network, only a few strategies were identified. As the CMP grows over time to become an integral process for the MTP and subsequent project planning, these strategies can grow into a more aggressive program with historical quantitative data to track their progress. One overall goal of the CMP will be to identify and measure strategies on corridors that consistently score at a LOS F (which is rare particularly in the northern half of the MPO area) and hopefully improve to a better level of service in the future.

Access Management

Manage access along major corridors with well-spaced driveways and connectivity between adjacent developments, and intersections designed to improve capacity and channel turning movements.

Intelligent Transportation Systems

Use of dynamic message signs to relay travel and roadway conditions to motorists on the interstate. Use of incident management to clear intersections and major roadways of congestion caused by accidents.

Roadway System Operational Improvements

Improve traffic signal coordination and intersection design to improve capacity and channel turning movements.

Public Transit Operational and Capital Improvements

Additional bus routes and parking space management to promote increased transit ridership.

Mass Transit Operational and Capital Improvements

Improve functional operation of regional express transit to the Charlotte urban core through evaluation of CCX and its connectivity to the end of the LYNX/Blue Line Extension. Evaluate connection between Salisbury Transit and Concord/Kannapolis Area Transit Bus Center. There are discussions of getting a connection from the Bus Center to the VA Hospital in Salisbury.

Highway Capacity

Addition of lanes, interchanges, or connecting facilities to the existing street network. **Non-motorized Transportation Improvements**

Addition of bike lanes, sidewalks, and greenways to supplement the street network.

Special Event Congestion

Developing innovative measures to address congestion due to recurring large scale special events (i.e. Lowe's Motor Speedway Races).

Implementation

Current CMP Strategies In Place

1. Concord Charlotte Express (CCX) Service
2. Incident Management Assistance Program (IMAP) – I-85
3. Dynamic Message Signs – I-85
4. NCDOT's Traveler Information Management System
5. CATS vanpool
6. Salisbury Transit System
7. Concord/Kannapolis Area Transit System
8. NCDOT and City of Salisbury Traffic Cameras www.salisburync.gov/trafficcams
9. Traffic signal coordination – City of Concord and City of Salisbury
10. Train station in Salisbury and Kannapolis for High Speed and Passenger Rail
11. Intersection improvements to Poplar Tent and US 29 - CMAQ
12. Intersection improvements to US 601 - CMAQ
13. Salisbury Traffic Signal System Upgrade - CMAQ

The implementation schedule will be spread across the horizon years of the Long Range Transportation Plan.

Short-term (0-8 years):

- TIP and MTP Project Selection consistency
- Optimization of traffic signal system
- Coordination of Concord/Kannapolis Transit (CKTS) with CCX schedule
- Opening of the permanent bus transfer facility in Concord/Kannapolis that will be accessible by rail
- TIP Project Development – bus, bicycle, and pedestrian facilities
- Public/private partnerships in the urbanized area
- Review parking standards for potential transit destinations
- Intersection improvements to Poplar Tent and Harris Road - STBGP
- Intersection improvements to US 601 and NC 3 - CMAQ
- Concord Traffic Signal System Central Improvements – CRP
- Express bus connections to regional rail system

Mid-term (9-18 years):

- Expansion of Concord/Kannapolis and Salisbury transit service to reach unserved areas
- Implementation of Regional ITS Program developed by NCDOT including surveillance cameras, changeable message signs, etc.
- Local government carpool and bus incentive program
- New Harrisburg Amtrak station

Long-term (19-28 years):

- Regional light rail or bus rapid transit connection to CATS Blue Line Extension
- High Occupancy Toll (HOT) Lanes on I-85
- Ramp Metering beyond Mecklenburg County

Table 9-2 - Congested Corridors and Recommended Performance Measures

Corridor Segment	Alternative Strategies	2055 Recommended Strategy	Implement Schedule
Branchview Dr. from Corban Ave N. to City Limits at I-85	Improved traffic signal coordination; intersection improvements; access management	Additional physical capacity; intersection improvements	Future Need identified in MPO Street Appendix
Brookwood Ave. NE from Church St. N to Branchview Dr.	Improved traffic signal coordination; intersection improvements; access management	Improved traffic signal coordination	Corridor Study completed by City of Concord
Cabarrus Ave. W from US Hwy 601 to US Hwy 29	Improved traffic signal coordination; intersection improvements; access management	Additional physical capacity; intersection improvements	Future Need identified in MPO Street Appendix
Cannon Blvd. From Concord City Limits to Rowan Co. Line	Improved traffic signal coordination; intersection improvements; access management; transit service	Improved traffic signal coordination	Future Need identified in MPO Street Appendix
NC 152 West from US 29 to Deal Road.	Improved traffic signal coordination; intersection improvements; access management	Additional physical capacity; intersection improvement	Future Need identified in MPO Street Appendix
Country Club Dr. NE from US Hwy 29 to Branchview Dr.	Improved traffic signal coordination; intersection improvements; access management	Improved traffic signal coordination; intersection improvements	Future Need identified in MPO Street Appendix
Dale Earnhardt Blvd. From Main St. to Cannon Blvd.	Improved traffic signal coordination; intersection improvements; access management	Improved traffic signal coordination; access management	Coordination to be studied and improved
NC Hwy 73 from Trinity Church Rd West to the City Limits	Improved traffic signal coordination; intersection improvements; access management	Additional physical capacity; intersection improvements	Access Management Study by NCDOT
I-85 from Concord Mills Blvd. To Rowan Co. Line	Special event transit service; access management at interchange ramps; express bus service; IMAP; ITS, ramp metering, managed lanes, flyover at exit 49	Additional physical capacity; access management at interchange ramps; IMAP; ITS	Funded TIP project
So. Main St. from Dale Earnhardt Blvd South to City Limits	Improved traffic signal coordination; intersection improvements; access management; transit service	Additional physical capacity; intersection improvements; access management; transit service	Future Need identified in MPO Street Appendix
US Hwy 601 from Miami Church Road to NC Hwy 49	Improved traffic signal coordination; intersection improvements; access management	Additional physical capacity; intersection improvements	Future Need identified in MPO Street Appendix
Jake Alexander Blvd. from Brenner Ave to Julian Rd.	Improved traffic signal coordination; intersection improvements; access management; transit service	Improved traffic signal coordination; intersection improvements; access management; transit service	Future Need identified in MPO Street Appendix

Evaluation and Time Frame

The evaluation of these strategies originated with the development of the 2035 LRTP. As most of these strategies are long term in nature, it will require most of the life of the 2055 MTP to complete them. Timing and financing are the primary obstacles to implementation. The state and federal governments do not provide

the necessary funding to appropriately address congestion on a comprehensive basis, nor have the local jurisdictions been able to adequately address concurrency of infrastructure with changes in land use. MPO and technical staff typically address congested hot spots in a piecemeal fashion as more high profile projects such as the interstate widening garners most of the attention. As funds become

available either through discretionary grants, private sector participation, or the development review process, the schedule for implementing particular strategies may be truncated or hastened. With the growing funding “gap” in the fiscally constrained part of this MTP, it will be very difficult to program surface transportation program (STP) funds to address these needs. In fact, the immediate future (10 plus years) for any federal or state funds allocated to the CR MPO will be tied to expensive projects like NC 73 and Poplar Tent Road, so it may take several iterations of the MTP before these projects become fiscally implementable projects.

Monitoring and Update

The CMP will require an ongoing program of data collection to identify and monitor system problems, identify system deficiencies, analyze alternative solutions, and measure the effectiveness of congestion management strategies and actions. This program can serve to inform the project

selection process by the MPO for the MTP and Metropolitan TIP. Projects with high congestion measures should intuitively rise to the top. I-85 is already the top priority of the MPO and serves as the critical link to the rest of the Metrolina Region.

The MPO will continue to evaluate congestion criteria and their effectiveness in conveying congestion levels and overall delay. MPO staff compiles information on intersections and travel delay. (As to be expected, several of the intersections overlap with the list of congested corridors.) To further analyze the congested corridors, the MPO will need to conduct more extensive performance measures such as travel time studies. The network will also be re-examined through subsequent accident data and Regional Model updates.

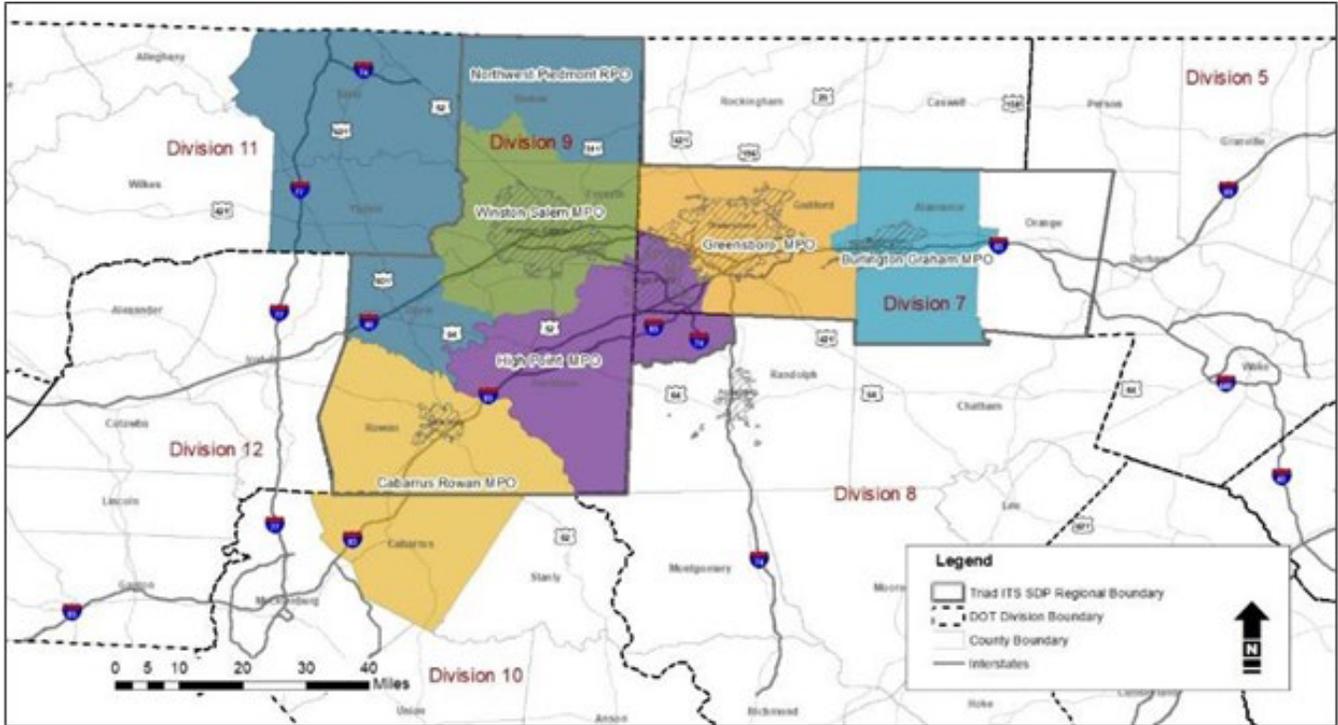


CK Rider Transit Service Bus

Triad Regional ITS Strategic Deployment Plan - Rowan

The Triad Regional ITS Strategic Deployment Plan (SDP) provided stakeholders with the tools to identify, prioritize, and implement projects that address regional needs. In addition, the SDP included the Triad Regional ITS Architecture which aligned with the National ITS Architecture Version 8.3. The SDP development defined regional goals for the Triad Region and applied the framework of a Capability Maturity Model (CMM) assessment to define gaps based on the existing conditions and the regional goals. Figure 9-1 presents the geographic and jurisdictional boundaries for the purposes of identifying stakeholders in the SDP development.

Figure 9-1 Strategic Development Plan Boundaries



A technology-agnostic project development strategy was applied to accommodate future fiscal budgets without committing to a specifically prescribed technology solution. The SDP recommended transit signal prioritization for Innes Street from Statesville Blvd to US 29, which would cost about \$500,000. A map of the Salisbury/Rowan projects considered for inclusion in the SDP is provided below:



For a copy of the Triad Regional ITS Strategic Deployment Plan document, contact the MPO office at (704) 791-0608.

Metrolina Regional ITS Strategic Deployment Plan - Cabarrus

The Metrolina Regional Intelligent Transportation Systems (ITS) Strategic Deployment Plan (SDP) completed in September 2024 is focused on assembling a multiagency strategy for investing in transportation technologies. The previous plan was completed in 2001 and documented the foundation of mid-1990's investments, which included the Metrolina Regional Traffic Management Center (MRTMC). Since the 2001 plan was completed, regional agencies have continued to invest in impactful technologies within their programs. As with the Triad ITS Plan, the Metrolina Regional ITS Strategic Deployment Plan provided stakeholders with the tools to identify, prioritize, and implement projects that address regional needs. The SDP development resulted in a vision statement, guiding principles, and applied the framework of a Capability Maturity Model (CMM) assessment to define gaps and needs based on the existing conditions and the resulting goals.

The vision statement was to Integrate technologies and Transportation Systems Management and Operations (TSMO) strategies that provide a safe

regional transportation system for the efficient movement of all people and goods. The guiding principles were to consider diversity and Inclusion when addressing all of the regional goals, and to consider potential impacts on public health when developing each project by integrating and emphasizing positive impacts and mitigating anticipated negative impacts. The five goals were to:

1. Invest in TSMO strategies that promote multi-modal transportation throughout the region;
2. Expand access to real-time information to enhance connectivity across the region by investing in technology that supports increased collaboration and improves overall mobility and trip efficiency;
3. Promote the use of technologies that support resiliency and environmental sustainability; ATS vanpool
4. Align with Vision Zero initiatives by leveraging TSMO strategies that increase the safety of the transportation system for all users; and
5. Invest in TSMO strategies that promote a transportation system that supports competitive economic sustainability.

Figure 9-2 Strategic Development Plan Boundaries

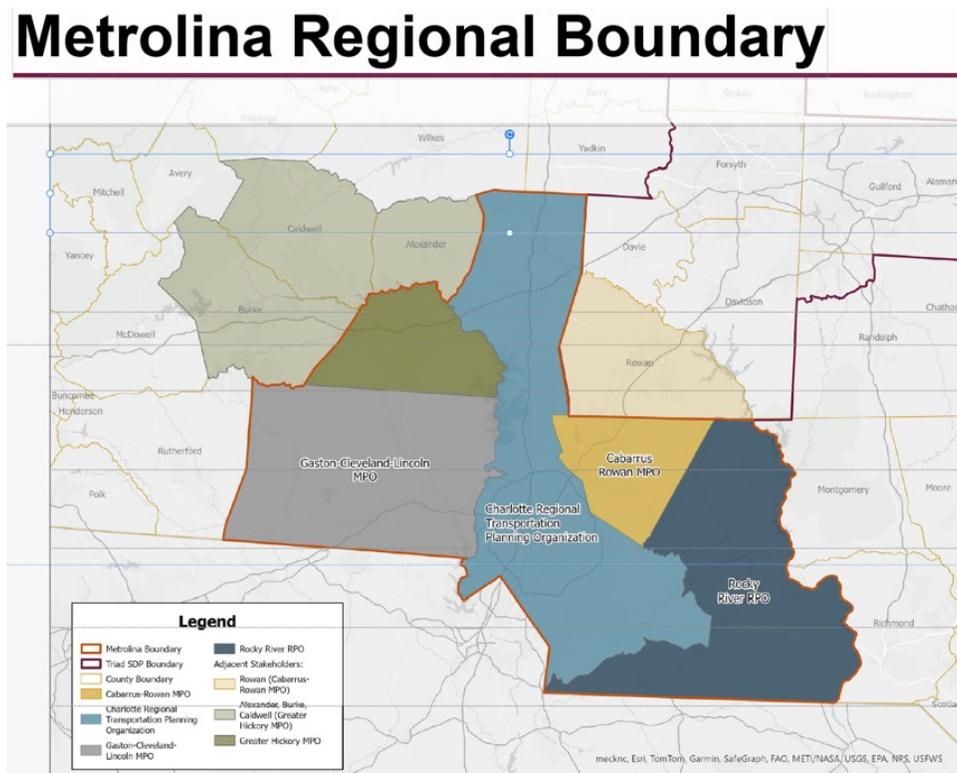


Figure 9-2 presents the geographic and jurisdictional boundaries for the purposes of identifying stakeholders in the SDP development.

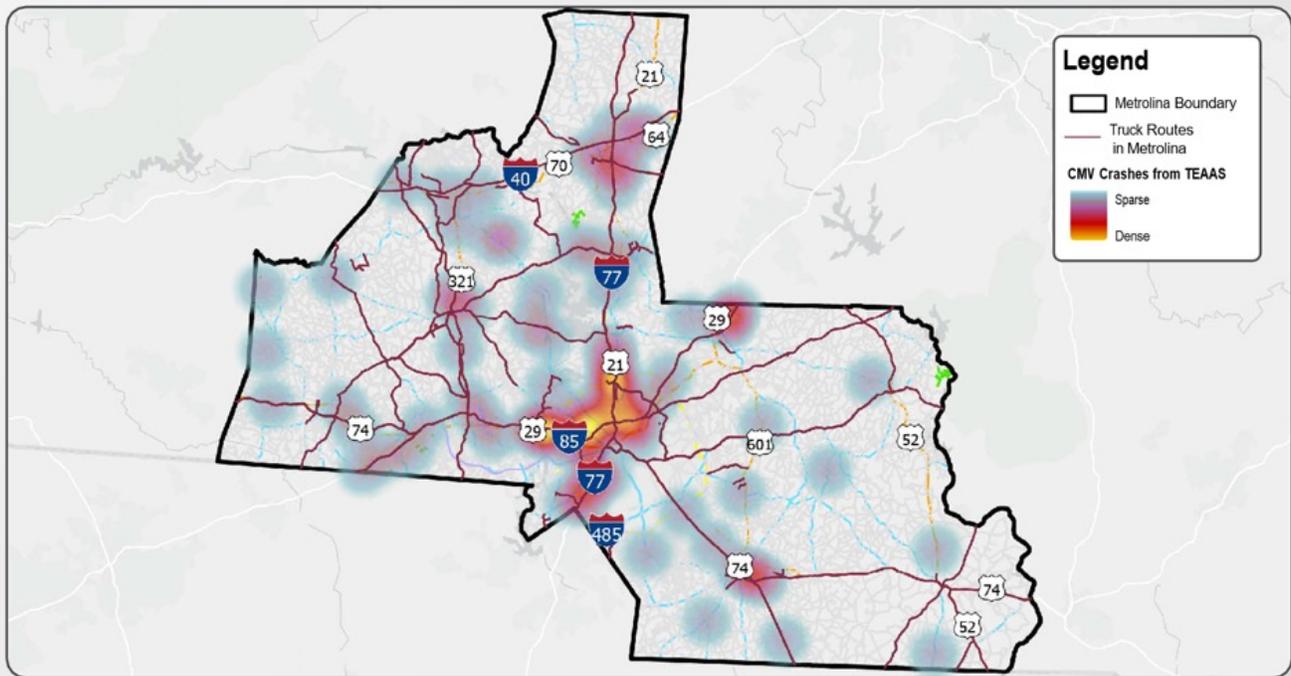
The project team led by Jeff Dale assembled a series of best practices to represent existing deployments representative of the strategies defined for the region. This process allowed the project team to focus on strategies that the Core Team felt aligned well with their regional needs and would also obtain regional support for implementation. (The City of Concord had representation on the Core Team). The draft list of strategies developed with the Core Team were compared to the best practice reviews and technology related recommendations made in existing plans the region is already considering.

The SDP provides the list of projects within two buckets as opposed to a project-by-project prioritization. This approach allows flexibility in assigning effort and resources to better leverage opportunities as they arise. The first tier of projects

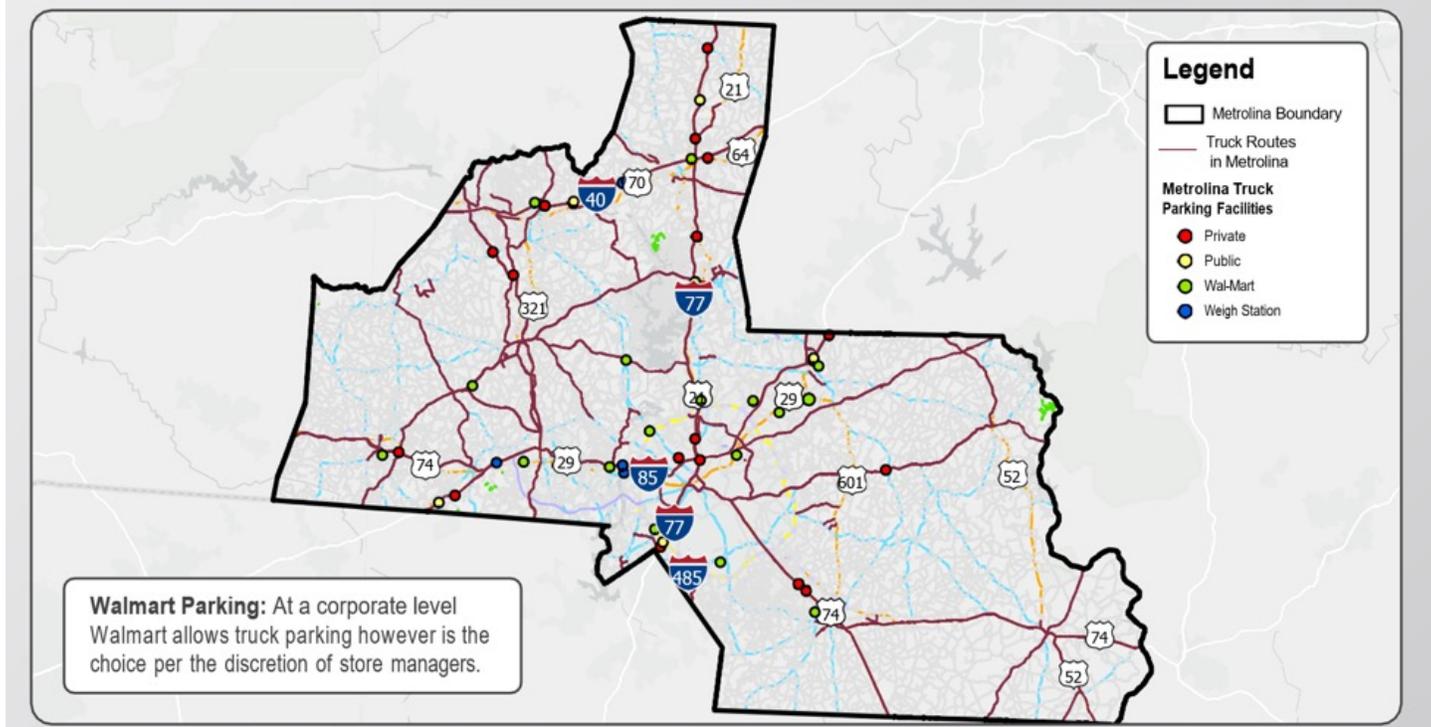
is identified as Jump Start Projects. This category includes projects that have a greater level of regional support, are more “shovel-ready”, and can become a reality if funding is identified. The second tier of projects are collected under the heading of Future Projects. These projects are connected to regional need, align with the vision and goals, but may be not as ready for implementation in the region for a variety of reasons.

Under the Jump Start Projects, jurisdictions in the CR MPO area are already implementing the following: Traffic Signal Priority and Regional ITS Task Force hosting. As for future projects, jurisdictions are considering the following: parking/curb management, emergency vehicle preemption, micro-mobility, and TSMP training.

Commercial Vehicle Crash Frequency Heat Map



Metrolina Region: Current Truck Parking Locations



The MPOs in the region can also support funding initiatives for ITS whether facilitating regional collaboration, adhering to federal requirements for planning purposes, or overseeing the distribution of certain funding sources. They do not conduct the activities specific to project implementation, but can often help secure funding, gain additional support, and advance projects forward. Some of the local agencies including the larger municipalities in the MPOs have dedicated funding to support project implementation and deployment. These agencies can partner with regional stakeholders and NCDOT to identify opportunities for shared funding methods including USDOT grants, State level grants, CMAQ, Advanced Transportation

Technologies and Innovative Mobility Deployment (ATTAIN), Congestion Relief Program and others.

The primary activities for MPOs under implementation are to: get involved with the Regional Task Force, champion the value of the regional data inventory, direct local agencies to project sheets so they can learn about priority projects, connect champions and allies from local agencies with regional projects where they can provide value and support project development, and integrate projects identified in the SDP within MPO planning efforts.