GREATER HICKORY METROPOLITAN
PLANNING ORGANIZATION

Congestion Management Process

Procedures and Responsibilities
Report

The Congestion Management Process – Procedures and Responsibilities Report was adopted by the Greater Hickory MPO Transportation Advisory Committee on

Introduction

The Congestion Management Process (CMP) is a systematic approach, required by Federal law, to managing new and existing transportation systems for relieving congestion and maximizing the safety and mobility of people and goods. This Procedures and Responsibilities Report describes how the CMP will be implemented and used on a continuing basis to comply with federal requirements. It will include congestion management objectives; the monitored coverage area and networks; performance measures; performance monitoring plan; identification & evaluation strategies, and implementation & management.

Background

Legislative

Adopted in 2016, the Fixing America's Surface Transportation (FAST) Act requires that Transportation Management Areas (urban areas over 200,000 populations) shall address congestion through a management process of safe, reliable, effective, and integrated operation of the multimodal transportation system and applied travel-demand strategies. FAST is the Federal authorization of funding for surface transportation programs for highways, highway safety, and transit.

The Congestion Management Process evolved from the Congestion Management System (CMS), which was required by previous surface transportation authorization laws: the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the Transportation Equity Act for the 21st Century (TEA-
21) of 1998, and the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) of 2005. CMS became CMP with the prior transportation authorization law, the Moving Ahead for Progress in the 21st Century (MAP-21) of 2012. The CMP differs from the CMS primarily in mandating the incorporation of CMP within metropolitan transportation planning, rather than as a stand-alone program or system. The CMS has been described as a "7 Step" process, but the CMP is an "8 Step" process with the addition of a new "first step – Develop Congestion Management Objectives."

Requirements

Federal rules define congestion as "the level at which transportation system performance is no longer acceptable due to traffic interference. The level of system performance deemed acceptable by State and local officials may vary by type of transportation facility, geographic location (metropolitan area or subarea, rural area), and/or time of day."

An effective CMP is defined as "a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to the levels that meet State and local needs. The CMP results in consideration and implementation of strategies that provide the most efficient and effective use of existing and future transportation systems."

A CMP will provide planners, policy makers and the public with a clearer understanding of congestion problems and the most cost-effective means for addressing them. In order to accomplish this mission, USDOT recommends that the following key elements be part of a CMP:

- Congestion management objectives
- Identification of the CMP coverage area
- Transportation system definition, including modes and network
- Performance measures
- Performance monitoring plan
- Identification and evaluation of strategies
- Monitoring of strategy effectiveness
- Implementation and management

The Greater Hickory MPO has four (4) objectives that were considered in the development of the CMP:

1. Satisfy Federal requirements;
2. Consider travel-demand strategies and effective-management operations when identifying and recommending capacity-expansion projects;
3. Remain flexible to meet the changing needs of the region; and
4. Avoid being overly complex or cumbersome.

CMP Steps

The CMP is a process; therefore, the CMP steps form a feedback loop. The CMP will continually be revised based on findings from the monitoring process and from other planning efforts.

The primary focus areas of the CMP are summarized in the following steps:

1. Develop Performance Measures: Performance measures are determined through a cooperative effort. The measures are used in all steps of the process. In this step, guidelines are also identified for determining congestion in terms of extent, intensity, duration and congestion- based ranking.
2. Collect and Analyze Data: A coordinated data collection program is to be established, using existing data sources when possible.
3. Quantify Performance, Identify and Evaluate Alternatives: Develop data summaries, graphics, and maps that quantify the performance of the system based on previously defined measures and associated data analysis. Expected benefits of the congestion management strategies are identified and evaluated based on the established performance measures.
4. Select Projects: Appropriate improvement strategies are selected. Consideration should be given to demand management, traffic operational improvements, public transportation improvements, Intelligent Transportation Systems (ITS) improvements, and where necessary, additional system capacity. Implementation schedules and responsibilities are to be identified.
5. Monitor Improvements: Compare before and after conditions using performance measures. Learn from the results and apply the appropriate findings to subsequent projects.

Basis for Analysis

Defining Congestion

Federal regulations (23 C.F.R. § 500.109) define congestion as…"the level at which transportation system performance is no longer acceptable due to traffic interference. The level of system performance deemed acceptable by State and local officials may vary by type of transportation facility, geographic location (metropolitan area or subarea, rural area), and/or time of day."

There are two primary types of congestion – recurring and non-recurring. "Recurring" congestion tends to be concentrated into short time periods, such as "rush hours" and is usually caused from excessive traffic volumes resulting in reduced speed and flow rates with the system. Bottlenecks, seasonal traffic, long-term construction also cause recurring congestion. "Non-recurring" congestion is caused from unforeseen incidents like accidents, disabled vehicles, special events, weather, etc. that affect the driver behavior to a considerable extent.

Existing Conditions Overview

The urban area experiences both recurring and non-recurring traffic congestion on the street and highway system. Most of the recurring congestion occurs during the morning (7-9 am) and afternoon peak hours (4-6 pm) and in some select spots during lunchtime (11 am to 1:30 pm). Historically, congestion has been measured within the Greater Hickory urban area as a volume-to-capacity ratio.

CMP Elements

Operations Objectives

Objectives

CMP objectives should be consistent with regional goals and plans. To develop the congestion management objectives, the list of 2045 MTP goals, objectives, and policies were reviewed for the application to the CMP.

MTP Objectives

The following are goals selected from the GHMPO 2045 Metropolitan Transportation Plan, where each objective has a direct correlation to mitigating congestion.

- A safe, comprehensive, efficient and fiscally responsible transportation system that allows the movement of people and goods within and through the GHMPO Planning Area.
- A multi-modal transportation system that allows trip-making choices including walking, bicycling, transit, rail and air.
- A sustainable, attractive transportation system that supports local land use policies and maintains mobility.
- A transportation system that gives equitable transportation options to low income and minority neighborhoods and improves the quality of life of all residents of the GHMPO Planning Area.
- A transportation system that protects the environment and neighborhoods.

CMP Objectives

- Improve accessibility and mobility for people and freight.
- Maintain productivity and efficiency of transportation facilities.
- Identify and implement transportation safety enhancements.
- Increase transit service to reduce dependency on single occupant auto travel.
- Increase bicycle and pedestrian facilities to promote the use of non-motorized modes.

Congestion Study Area

Geographic Coverage

The Greater Hickory Metropolitan Planning Organization (GHMPO) is located in the foothills of western North Carolina about 30 miles north of Gastonia, 50 miles northwest of Charlotte, 70 miles west of Winston-Salem and 75 miles east of Asheville. The GHMPO is responsible for transportation planning in the municipalities of Brookford, Cajah's Mountain, Catawba, Cedar Rock, Claremont, Connelly Springs, Conover, Drexel, Gamewell, Glen Alpine, Granite Falls, Hickory, Hildebran, Hudson, Lenoir, Long View, Maiden, Morganton, Newton, Rhodhiss, Rutherford College, Sawmills and Valdese; and the Counties of Alexander, Burke, Caldwell, and Catawba. The geographic coverage of CMP is the same as GHMPO's planning boundary and is shown in Map 1 found in the Appendix.

Table 1: Top 25 GHMPO Bottleneck Locations: Calendar Year 2016

Top 25 GHMPO Bottleneck Locations: Calendar Year 2016	
Rank	**Head Location (approximate)**
1	US-70 E @ SR-1476/FAIRGROVE CHURCH RD
2	US-70 W @ LENOIR RHYNE BLVD/8TH STREET DR
3	US-64 E @ NC-18/GREEN ST/STERLING ST
4	US-64 W @ US-70 BUS/W UNION ST
5	US-321 N @ 2ND AVE
6	US-64 W @ US-70/US-64 BUS/W FLEMING DR
7	US-70 W @ US-321 BUS
8	US-64 W @ I-40 (MORGANTON)
9	US-64 E @ US-64 BUS/KIRKSEY DR/SANFORD DR
10	NC-90 W @ SR-1110/LILEDOUN RD
11	NC-90 E @ NC-16/3RD ST
12	US-321 S @ 2ND AVE
13	NC-18 S @ I-40/BUSH DR
14	NC-16 N @ NC-90/W MAIN AVE
15	US-70 W @ US-64 BUS/BURKEMONT AVE
16	NC-10 E @ SR-1003/MURRAYS MILL RD
17	US-64 E @ US-321/BLOWING ROCK BLVD
18	US-70 E @ US-70/E UNION ST
19	NC-18 N @ US-70/FLEMING DR
20	US-70 E @ NC-127/S CENTER ST
21	US-64 E @ US-70/US-64 BUS/W FLEMING DR
22	US-70 E @ LENOIR RHYNE BLVD/8TH STREET DR
23	US-70 E @ NC-18/S STERLING ST
24	NC-18 N @ US-70 BUS/US-64 BUS/MEETING ST/UNION ST
25	NC-10 W @ US-321 BUS/WEST E ST

Source: Probe Data Analytics Suite; RITIS, 2018.

Transportation Modes

GHMPO staff reviewed several modes of transportation that are found in the Greater Hickory area. These modes include: automobile, public transportation, bicycle, pedestrian, rail transportation, and for- hire passenger transportation. GHMPO concluded that the only mode of transportation that needed examination for the CMP plan is the automobile. This conclusion is based both on observation and information provided by the American Community Survey which results from 2007-2011 found that 94.8% of respondents in the Greater Hickory area commuted to work using a private automobile. The remaining available transportation modes may be considered for future congestion analysis reports.

Roadway Network

The next important step in defining the CMP elements is determining the primary roadway network. In an effort to keep the roadway system simple, the CMP analysis process will only analyze roadways, depending on data availability, defined as *Minor Arterial* and above on the Federal Functional Classification System. This approach will also apply to intersection analysis unless a special circumstance demands that smaller roadways are also included. These classifications follows information provided by NCDOT and follows the accepted Federal Functional Classification System.

A map of the current roadway and highway system is found on Map 2 in the Appendix. Feedback from stakeholders, the technical steering committee, and public will be included in any discussions regarding expanding the CMP network.

Performance Measures

The GHMPO planning staff reviewed several potential performance measures. A list was compiled and submitted before the Long Range Transportation Planning committee for comments or suggestions.

Many performance measures have the potential to provide useful information that would assist in mitigating congestion. Some are most useful in certain area types, and some are most useful at certain levels of analysis. The selection of performance measures should consider a) availability of data from existing sources, b) the applicability of those measures in quantifying system performance, and c) the ability of the performance measure to identify future system deficiencies. Experience gained in collecting and reporting the data will allow for future improvements, additions, or revisions of the performance measures.

Federal performance measures for transit, the highway system, and safety have been established as part of the federal performance management initiative. Table 2 and Table 3 federal measures are directly applicable to congestion management and are evaluated annually.

Table 2: Highway System Performance Measures

National Goal Area	Rulemaking Category	Performance Measure
Congestion Reduction	System Performance	Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita on the National Highway System (NHS)
		Percent of Non-Single Occupancy Vehicle (SOV) Travel

Source: https://www.fhwa.dot.gov/tpm/about/regulations.cfm

Table 3: NHS Pavement Condition, NHS Bridge Condition, Travel Time Reliability, and Freight Reliability Performance Measures

Performance Measure	2 Year Target 1/1/2018-12/31/2019	4 Year Target 1/1/2018-12/31/2021
Interstate Level of Travel Time Reliability	80.00%	75.00%
Non-Interstate NHS Level of Travel Time Reliability		70.00%
Interstate Truck Travel Time Reliability	1.65	1.7

Potential Performance Measures

The GHMPO staff reviewed several possible performance measures based on data availability. The possible performance measures that were considered:

Congestion Intensity

- Volume-to-capacity ratio (V/C) for a segment
- Level of Service (LOS), for a segment or intersection
- Travel speed
- Average time delay (the difference between travel time and acceptable or free-flow travel time)
- Travel time index (ratio of peak-period to non-peak-period travel time)
- User Delay Cost Analysis

Congestion Duration

- Hours of travel per day at V/C ratio over 1.0
- Intersection Bottleneck Rankings
- Hours of travel per day at LOS E or worse

Transit Travel Conditions

- Transit on-time performance

Availability or Service Level of Modes

- Sidewalks
- Bicycle lanes or paths
- Pedestrian features
- High-frequency bus service

Performance Measures

GHMPO staff decided set of performance measures that will assist in measuring both reoccurring congestion and non-reoccurring congestion. The following information in Tables 4 and 5 demonstrate the connection between the CMP objectives and performance measures.

Table 4: Current Performance Measures

CMP Objective	Measurement	Performance Measure	Data Source	Desired Trend
Improve accessibility and mobility for people and freight.	Congestion Intensity & Duration	Travel Time Index & Intersection Bottleneck Rankings	VPP Suite (RITIS)	Downward (or steady)
Identify and implement transportation safety enhancements.	Reliability	Crash Rate	NCDOT/local	Downward

Table 5: Future Performance Measures

CMP Objective	Measurement	Performance Measure	Data Source	Desired Trend
Maintain productivity and efficiency of transportation facilities.	Congestion Intensity	User Delay Cost Analysis	VPP Suite (RITIS)	Downward
Increase transit service to reduce dependency on single occupant auto travel.	Multimodal Availability	Transit Ridership Count/Transit Miles Traveled	Greenway Transit	Upward
Increase bicycle and pedestrian facilities to promote the use of non-motorized modes.	Multimodal Availability	Sidewalk and Bicycle Facility Centerline Miles	Local Governments	Upward

GHMPO Performance Goals

Federally mandated rules associated with performance management have also been released, which include requirements for MPOs, State DOTs, and transit agencies to establish performance targets and goals. While the GHMPO plan to adopt all performance measures and targets released by FHWA, FTA, and NCDOT, the following were identified as being GHMPO's greatest need areas:

- Public Transit
- Bicycle and Pedestrian
- Environmental Justice and Title VI
- Environmental Stewardship
- Public Outreach
- Economic Development
- Highways

The target need areas were determined based on TAC/TCC input and input from the Performance Measures Committee. Collaboration with representatives from each county within GHMPO planning area, NCDOT, and GHMPO established goals for each category. Tables 6 through Table 9 include goals directly applicable to congestion management initiatives. Some categories were not applicable to congestion management.

Table 6: Local Goals for Public Transit

Performance Goal	Metric
Expand public transit into all four counties	Number of submitted grant applications and additional identified funding sources; additional public transportation service routes in the region
Encourage greater public transit access to Census Tracts with high Title VI and Environmental Justice Concentration areas	Identify high needs areas and assess transit routes accordingly
Increased Greenway Transit ridership	Vehicle Miles Traveled (VMT); Unlinked Passenger Trips (UPT)
Encourage mixed-use communities centered around public transportation	Create a list of possible locations and criteria for transit-oriented developments
Promote using public transit in the region	Attend festivals and other events in the region targeting potential ridership; increase in passenger miles traveled (PMT) and unlinked passenger trips (UPT)

Table 7: Local Goals for Bicyclists and Pedestrians

Performance Goal	Metric
Increase sidewalk/greenway connectivity	Identify gaps in existing networks; identify potential new greenway segments; encourage project applications to a variety of funding sources; number and location of successful project applications
Increase bicycle and pedestrian facilities to high Title VI and Environmental Justice concentration areas	Complete assessment of bicycle and pedestrian need in Title VI and Environmental Justice areas in the region; LAPP applications
Encourage bicycling mode share	American Community Survey data on bicycling to work
Encourage new bicycle and pedestrian project applications and evaluate success rate	Number of applications submitted through LAPP, SPOT and CMAQ; notify local governments of additional identified funding sources

Table 8: Local Goals for Economic Development

Performance Goal	Metric
Promote transportation projects that provide a link to major nodes (central business districts, shopping centers, parks, hospitals, or major employers)	List of updated viable transportation projects and identification of linkage projects; provide points in SPOT for projects that promote regional economic development
Use public transit assets to encourage economic development	Encourage Transit Oriented Developments in plans

Table 9: Local Goals for Highways

Performance Goal	Metric
Identify/analyze congested areas and times in the region	NCDOT's PDAS/RITIS data/Travel Demand Model
Identify gaps in the highway network on routes to prime locations	List of updated viable transportation projects; identify list of prime locations (schools, parks, major employers, hospitals, etc.)
Encourage transportation projects that upgrade mobility	Projects submitted; estimated travel time savings through the travel demand model

Reoccurring Congestion

Travel Time Index

Performance Goal: Travel Time Index no higher than 1.10 for a 6 month period during the morning (7 to 9 am) and afternoon peak hours (4 to 6 pm).

The Travel Time Index (TTI) is the ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. Travel time represented as a percentage of the ideal travel time (Travel Time / Free-flow Travel Time).

Intersection Bottleneck Rankings

Performance Goal: No more than five (5) intersections with an Impact Factor greater than 1,000 for a quarter.

With the re-occurring congestion the area roadway network experiences at intersections, GHMPO staff chose to use The Vehicle Probe Project (VPP) Suite's Bottleneck Ranking as a another means to measure congestion. The identification of intersection bottlenecks will provide a

data-driven monitoring of re- occurring congestion which will keep the GHMPO staff informed of potential problem areas. According to the VPP Suite:

> *"Bottleneck conditions are determined by comparing the current reported speed to the reference speed for each segment of road. Reference speed values are provided to us for each segment and represent the 85th percentile observed speed for all time periods with a maximum value of 65 mph. If the reported speed falls below 60% of the reference, the road segment is flagged as a potential bottleneck. If the reported speed stays below 60%*
> *for five minutes, the segment is confirmed as a bottleneck location. Adjacent road segments meeting this condition are joined together to form the bottleneck queue."*

Bottleneck rankings are determined through calculating and ranking an Impact Factor (impact factor = average duration in minutes *x* average max length *x* number of occurrences).

Non-reoccurring Congestion

Crash Data

Performance Goal: The 10 most hazardous locations will be ranked by crash severity/frequency. Locations ranked high will be flagged for future safety measure reviews.

Identifying crashes will assist in detecting areas in the transportation system that experience non- recurring congestion. The crash measurement will consist of the total number of crashes at a certain location per a particular unit of time and note their severity. Crash data will be obtained annually from either NCDOT or local law enforcement sources. Data that originates from NCDOT comes in either tabular or geocoded formats.

Data Collection and Monitoring

The data collected should include Average Annual Daily Traffic Volumes (AADTS) counts, intersection bottleneck data, roadway and intersection capacity data, along with travel time and speed data as needed. This data, along with any future data, will be collected on a biennial basis or as the data becomes available.

Collection

Data Sources

Identifying existing data sources and databases that may be used as part of a performance monitoring system is important to maximize the utilization of available resources and to develop a cost-effective data collection program. The existing data sources identified for potential data collection efforts are shown in Table 10.

Table 10: Data Sources and Hierarchy

Data Type	Source	Primary	Secondary
Travel Time	RITIS / Vehicle Probe Project Suite	X	
	Traffic.com		X
	NCDOT Operations Center	X	
	MPO Data Collection		X
	Municipal Data Collection	X	
Intersection Bottlenecks	Vehicle Probe Project Suite	X	
Traffic Counts	NCDOT Count Program	X	
	MPO Data Collection		X
	Municipal Data Collection	X	
Bike/Ped Counts & Survey	Volunteer Data Collection	X	
	MPO Data Collection	X	
Transit Ridership & Survey	Greenway Public Transportation	X	
Crash Rate & Severity	NCDOT TEAAS	X	

Data Management

Integration and coordination of the data collection activities will create data management issues and responsibilities. Currently, there is no existing data management system used by the GHMPO. In regards to measuring congestion, the GHMPO will develop an appropriate data management system that can be used for data management activities in addition for analysis and presentation purposes. Once the analysis is completed, tables and maps of links, corridors, or the entire system can be generated to provide spatial and temporal contexts for the discussion of congestion and mobility.

Congestion Analysis

Data Analysis

To describe congestion conditions and trends system-wide, the data will be analyzed and the following outputs will be summarized using tables, graphs, or maps:

- Recurring congestion performance measures: Travel time index, user delay cost analysis, and intersection bottleneck rankings
- Nonrecurring congestion performance measure: High crash intersections by crash rate, the number of crashes, and incident severity

Data Reporting

The main product of measuring congestion will be a GHMPO Congestion Analysis Report produced biennially or as-needed based on current conditions. This report will summarize the performance of the region's transportation system and how the MPO is meeting or moving towards the CMP objectives. The initial GHMPO Congestion Analysis Report will provide a baseline with successive reports providing the actual measurements.

Mitigation Strategies

After the causes of congestion have been identified and evaluated, specific improvement strategies will be identified. During the identification of appropriate improvement strategies, the following contributing factors that affect the feasibility of the strategies should be assessed:

- Estimated cost
- Right-of-way availability
- Technology infrastructure
- Environmental and social constraints.
- Environmental Justice Analysis will be conducted in the assessment of environmental and social constraints. This analysis will prove to ensure that the candidate improvement strategy will not impact negatively minority and low-income populations.

Identification of Strategies

There are three classes of congestion management strategies: Demand Management, Operational Management, and Capital Intensive Improvement.

Table 11: Potential Congestion Strategies

Demand Management	Operational Management	Capital Intensive
Transit Operational Improvements	Traffic Operational	Lane Additions
Transportation Demand	Access Management	Road Extensions
HOV Strategies	Incident Management	Transit Capital Improvements
Non-motorized modes	Intelligent Transportation	

Table 12: Congestion Strategies for the GHMPO

Building New Capacity	Improve mobility for Other Modes of Transportation
• New Streets and Highways • Street and Highway Widening	• Bicycle Lanes, Trails, and Greenways • Sidewalk/Pedestrian Facilities • Freight
Public Transportation Options	**Traffic Operational Improvements**
• Increase Greenway Transit Regular Route Services • Ridesharing and Vanpooling • Park and Ride Lots	• Safety Improvement Program • Traffic Signal Coordination • Signal/Intersection Improvements • Special Event Traffic Management • Construction Traffic Management
Access Management & Land Development	**Intelligent Transportation Systems**
• Driveway Permitting/Plan Review • Street Connectivity • Street and Parking Standards • Mixed Use Developments • Site Plan Review • Subdivision Requirements	• Hire Mobility Manager for Transit System • Variable Message Signs • Incident Management • Traffic Surveillance Camera System (CCTV)

II

Implementation Strategies

Highway Improvements		
Strategy	***Congestion Impacts***	***Analysis Method***
Increase number of lanes without highway widening.	Increase capacity	Volume/Capacity ratio analysis
Geometric design improvements.	Increase mobility; reduce congestion by improving bottlenecks; increase traffic flow and improve safety	Intersection LOS, Delay Studies, Accident Diagrams
HOV Lanes	Reduce regional Vehicles Miles Traveled (VMT); reduce regional trips; increase vehicle occupancy; improve travel times; increase transit use and improve bus travel times.	Future Regional Travel Model
Highway widening by adding lanes.	Increase capacity; reduce congestion.	Regional Travel Model

Transit Operations Improvements		
Strategy	***Congestion Impacts***	***Analysis Method***
Increase Bus Route Coverage or Frequencies	Increase transit ridership; decrease travel time; reduce daily VMT.	On board surveys
Greenway Transit	Reduce regional VMT; reduce congestion.	Future Regional Travel Model Evaluation
Vanpool	Reduce congestion; reduce daily VMT.	Future Regional Travel Model Evaluation
Implementing Rail/Bus Rapid Transit	Reduce daily VMT.	Future Regional Travel Model Evaluation
Park and Ride Lots	Reduce regional VMT; increase mobility and transit efficiency.	Future Regional Travel Model Evaluation

Bicycle and Pedestrian Strategies		
Strategy	***Congestion Impacts***	***Analysis Method***
Designate Bicycle Lanes on Local Roads	Increase mobility and access; increase non-motorized mode shares; separate slow moving bicycles from motorized vehicles; reduce incidents.	Customer Satisfaction Survey
Designate Greenways and Side Paths on Exclusive Non-Motorized Rights-of-way	Increase mobility and access; increase non-motorized mode shares; separate slow moving bicycles from motorized vehicles; reduce incidents.	Customer Satisfaction Survey
New Sidewalks	Increase mobility and access; increase non-motorized mode shares; reduce incidents.	Customer Satisfaction Survey
Improved Bicycle Facilities at Transit Stations and Other Trip Destinations	Increase mode share; reduce motorized vehicle congestion on access routes.	Customer Satisfaction Survey
Improved Safety of Existing Bicycle and Pedestrian Facilities	Increase non-motorized mode share; Reduce incidents.	Bicycle and Pedestrian Counts

Freight Management Strategies		
Strategy	***Congestion Impacts***	***Analysis Method***
Truck Crash Data Analysis	Reduce congestion by addressing facility deficiencies that may have caused crashes.	Use crash data provided by NCDOT Traffic Records Branch and law enforcement crash reports.
Percentage of Trucks Along Corridors	Reduce congestion by addressing facility deficiencies that may have an impact on capacity.	Use traffic counting devices along corridors.

Traffic Operational Improvement Strategies		
Strategy	***Congestion Impacts***	***Analysis Method***
Safety Improvement Program	Reduces nonrecurring congestion incidents	Review for reduction on number of accidents
Traffic Signal Coordination	Improves travel time; reduces the number of stops; reduce VMT by vehicle miles per day depending on program	Travel time studies, Delay Studies
Traffic Signal Improvements and Intersection Improvements	Improves travel time; reduces incidents	Delay Studies, Intersection LOS
Special Event Traffic Management	Improves travel time; reduces incidents and delay; some peak-period travel shift	Annual survey of major events
Construction Traffic Management	Improves travel time; reduces incidents and delay; some peak-period travel shift	Customer Survey

Intelligent Transportation Systems (ITS) Strategies		
Strategy	***Congestion Impacts***	***Analysis Method***
Mobility Manager	Reduce travel times and delay; some peak-period travel and mode shift	ITS Deployment Analysis System
Variable Message Signage	Reduces accident delay; reduces travel time; some peak period travel shift	ITS Deployment Analysis System
Incident Management	Reduces accident delay	Average Clearance times
Traffic Surveillance Camera Monitoring	Reduces accident delay; improves signal system trouble shooting turnaround time	ITS Deployment Analysis System

Access Management Strategies		
Strategy	***Congestion Impacts***	***Analysis Method***
Collector Street Plan	Reduces congestion; improves connectivity; disperses traffic	Site Plan Review
Left Turn Restrictions, Curb Cut and Driveway Permit Process	Increased capacity and efficiency; improved mobility; improved travel times and reduced delay for through traffic; reduced incidents	Site Plan Review; plan review
Reduced Parking Standards	Increase transit and non-motorized mode share	Site Plan Review; plan review
Street Connectivity	Improves connectivity; disperses traffic; reduces congestion	Site Plan Review; Subdivision Review

Land Development Strategies		
Strategy	***Congestion Impacts***	***Analysis Method***
Mixed Use and Pedestrian- Oriented	Increase walk trips; decrease VMT; decrease vehicle hours of travel	Site Plan Review; Regional Travel
Infill and Densification	Increase mode share trips; reduce vehicle trips; decrease VMT per household	Site Plan Review; Regional Travel
Subdivision Requirements	Improves efficient circulation patterns; reduces congestion	Site Plan Review; Subdivision Review; Regional Travel Model
Street Design for Efficient Traffic Flow	Improves vehicle and pedestrian circulation	Site Plan Review; Subdivision Review; Regional Travel Model