Capital Area Metropolitan Planning Organization

Congestion Management Process

The Capital Area MPO Congestion Management Process is an integral component of the Capital Area MPO 2035 Long Range Transportation Plan as adopted by the Transportation Advisory Committee on May 20, 2009. The Congestion Management Process was adopted by the Transportation Advisory Committee on June 16, 2010.

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NORTH CAROLINA CAPITAL AREA METROPOLITAN PLANNING ORGANIZATION
CONGESTION MANAGEMENT PLAN

Overview

Forbes Magazine in 2009 has ranked the Raleigh area as the nation's number one area for the Best Places for Businesses and Careers. The magazine has ranked the Raleigh area as number one for the third year in a row based on strong job growth, low business costs, and a highly educated workforce. Current forecasts suggest that much of that growth will continue. With this continued growth come additional transportation challenges. The recently adopted 2035 Long Range Transportation Plan for the Triangle states, "More commuters are traveling longer distances, and the single-occupant automobile continues to dominate how we travel. And although we tend to focus on commuter travel, travel for such purposes as school, business, shopping, and social engagements constitute increasing shares of travel. These characteristics have produced increasing demands on our transportation network, which in terms of "vehicle miles traveled" and other demand measures is experiencing a growth rate that is much greater than that of our population. The consequences have been traffic congestion, increasing transportation infrastructure costs, and further pressure on our air, water, open space, and other environmental qualities. The quality of life, which attracts the professional and skilled workers and business investment to our region, may ultimately become threatened by the consequences of our growth and inadequate transportation infrastructure".

Traffic Congestion is a major concern of our region. The level of traffic congestion experienced by the motoring public on a daily basis has a key impact on people's quality of life. The single-occupant vehicle continues to dominate how we travel and more commuters are travelling longer distances. Although the focus has been on commuter travel, business, school, social engagements, and shopping constitute increasing shares of travel. Ultimately, these expanded characteristics have caused further strain on the regions' transportation network. The objective of the Capital Area MPO Congestion Management Plan is to measure and manage congestion of the current and future transportation system through data collection, highway performance analysis, and travel demand modeling. There are goals outlined in the 2035 Long Range Transportation Plan www.campo-nc.us/LRTP/2035/lrtp_section_download_page.html and should be applicable to efforts to reduce congestion and implement the Congestion Management Process.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century (TEA 21) Established the Congestion Management System as a necessary part of the transportation planning process. The approval of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Bill in 2005 continued the requirement but now refers to it as the Congestion Management Process (CMP). The change in name reflects an ongoing process or assessment of the system. As per the regulation of the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) it is required that at Transportation Management Areas (TMA), urbanized areas with a population greater than 200,000 develop and implement a CMP. SAFETEA-LU regulations state the CMP should result in multi-modal system performance measures and strategies that can be reflected in a Long Range Transportation Plan and within the

Transportation Improvement Plan (TIP). The US Bureau of the Census has designated the Raleigh Urban Area as a TMA. This report will be the first CMP for the Raleigh urban area.

Objective

The objective of the Capital Area MPO Congestion Management Plan is to measure and manage congestion of the current and future transportation system through data collection, travel demand modeling, transit analysis, and highway performance analysis.

Areas of Application

The three "M's" of a Congestion Management Plan as shown in Diagram 1 are:

- Supply Management - Where improvements or operational changes are made to the existing transportation system to increase capacity. Supply management strategies include intersection improvements, signal timing improvements, new and improved transit service, special purpose lanes, various practices of Intelligent Transportation Systems (ITS), and roadway widening.
- Demand Management – Demand management strategies are intended to influence the intensity and timing of the demand placed on our transportation system. Such strategies include offering commuter one or more alternative transportation modes or services, providing incentives to travel during non-peak travel times, congestion pricing, variable parking rates, and incorporating growth management policies into local development issues.
- Land Use Management – Exercising control over the trip generating characteristics of eh land use can be used to make the resulting demand consistent with the existing transportation infrastructure and desired level of service.

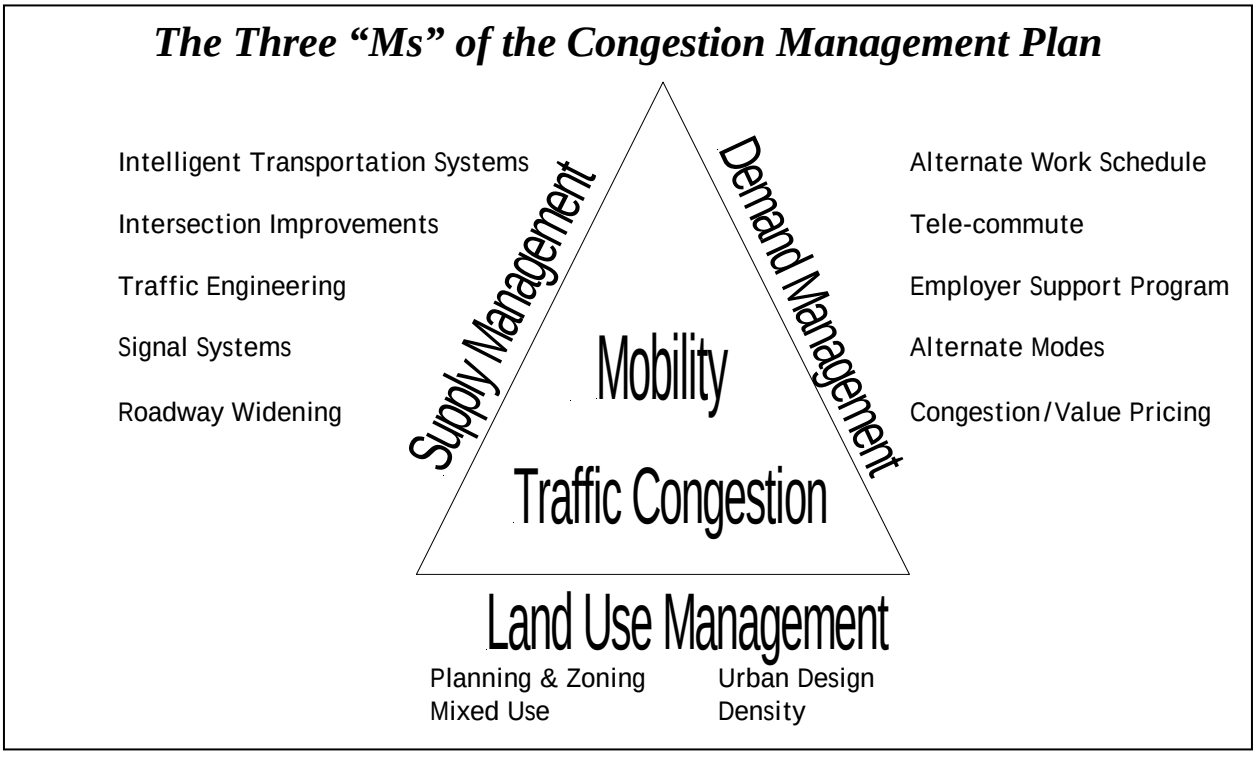


Diagram 1

Current Conditions

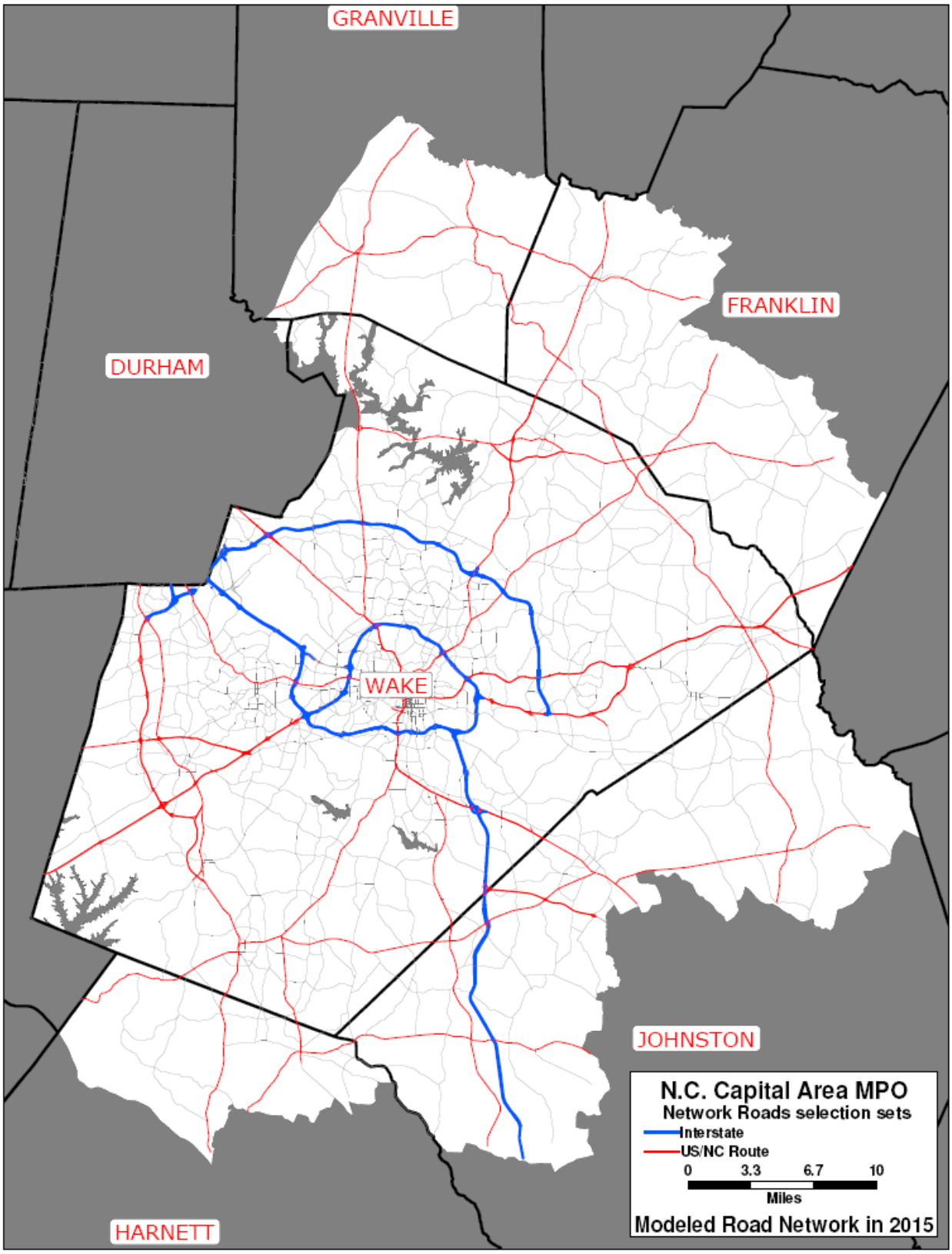
Identify System Network of Interest

Roadway Network

Only roads that are within the Capital Area MPO roadway network, as well as the Triangle Regional Model were identified as the area of application for the Congestion Management Process (CMP). The network selected for application includes 2404 lane miles of roads in the base year (2005). Table 1 below identifies the number of lane miles by road functional classification that exists within the Capital Area MPO as of 2005. By the future year of 2035 the lane miles of roadway are expected to increase within the regional network to 3485. Map 1 shows the roadways that are included in the Capital Area MPO CMP analysis network as based on the Triangle Regional Model.

2005	
Federal Functional Classification	**Lane Miles**
Rural Interstate	111
Rural Principal Arterial	95
Rural Minor Arterial	79
Urban Interstate	355
Urban Freeway/Expressway	139
Urban Principal Arterial	639
Urban Minor Arterial	986
Grand Total	**2404**

Table 1


GRANVILLE
FRANKLIN
DURHAM
WAKE
JOHNSTON
HARNETT
N.C. Capital Area MPO
Network Roads selection sets
Interstate
US/NC Route
0
3.3
6.7
10
Miles
Modeled Road Network in 2015

Map 1

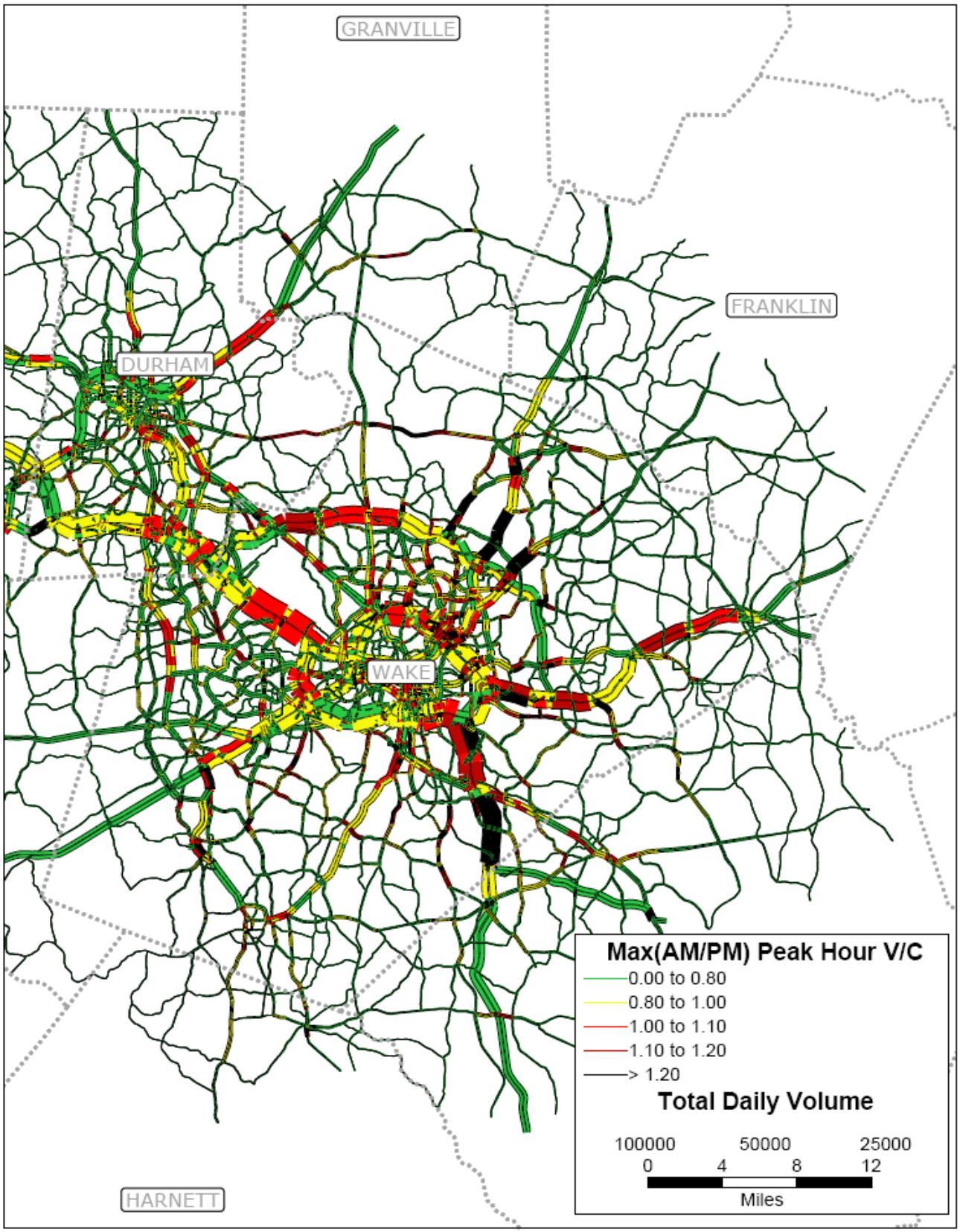
Volume to Capacity (of V/C) Ratio

The volume to capacity ration, or V/C ration, is an effective methodology for determining the functioning level of an individual road segment. A V/C ration of less than one indicates a road segment that has capacity available for additional traffic. A V/C ratio greater than one indicates a road segment in which demand is greater that the capacity available. Generally a V/C ration less that one indicates consistent, although possibly slower than desired traffic operations, while a V/C ration greater than one implies stop-and-go, or highly impeded traffic conditions. In order to provide a complete picture of the Congestion Management Plan (CMP) networks V/C ratios were divided into four categories as shown below.

Volume to Capacity Ratio Category Definitions

V/C Category	Volume to Capacity Ratio
1	Less than 0.80
2	Between 0.80 and 1.0
3	Between 1.0 and 1.2
4	Greater than 1.2

The 2005 V/C indicates that the majority of the roadways in the Capital Area MPO network operate at acceptable levels. The majority of the roadways in the region will continue to operate at acceptable levels in 2015 and beyond. However, there are roads within the region that have and will continue to experience chronic congestion problems. Map 2, titled "Capital Area MPO 2015 V/C Map" illustrates projected V/C along the Capital Area's roadway network as of 2015. Over time, the Congestion Management Process will use "delay" as the preferred measure of performance instead of V/C Ratio. Staffs from both FHWA and NCDOT are working to identify better performance measures as a component of the Congestion Management Process.



Capital Area MPO 2015 V/C Map

VOR Count

The Capital Area Metropolitan Planning Organization has conducted an annual (except for the Years 2003 and 2008) Vehicle Occupancy Ratio survey (VOR) for downtown Raleigh since 1974. The information gathered is used to develop baseline data for future transit and travel demand initiatives. Small changes to VOR can translate to major changes in congestion predictions and the need for capital improvements.

The downtown VOR surveys are conducted using the four stations located at key outbound intersections along the four compass points that lead out of the central business district. The specific intersections are 1) at McDowell St. and Lane St. on the North 2) at South Saunders St. and Maywood Dr. on the South, 3) at New Bern Ave. and King Charles Dr. on the East, and 4) at Western Blvd. and Avent Ferry Rd. on the West.

In collecting the data, pick-up trucks and vans are surveyed as a part of the study. Children, but not babies were counted. Trucks, buses and motorcycles were noted in the survey, but there was no attempt to adjust the VOR for these vehicles. The results over time (as shown in Chart 1) show that VORs in downtown Raleigh is hovering around an average of 1.19 persons per vehicle respectively.

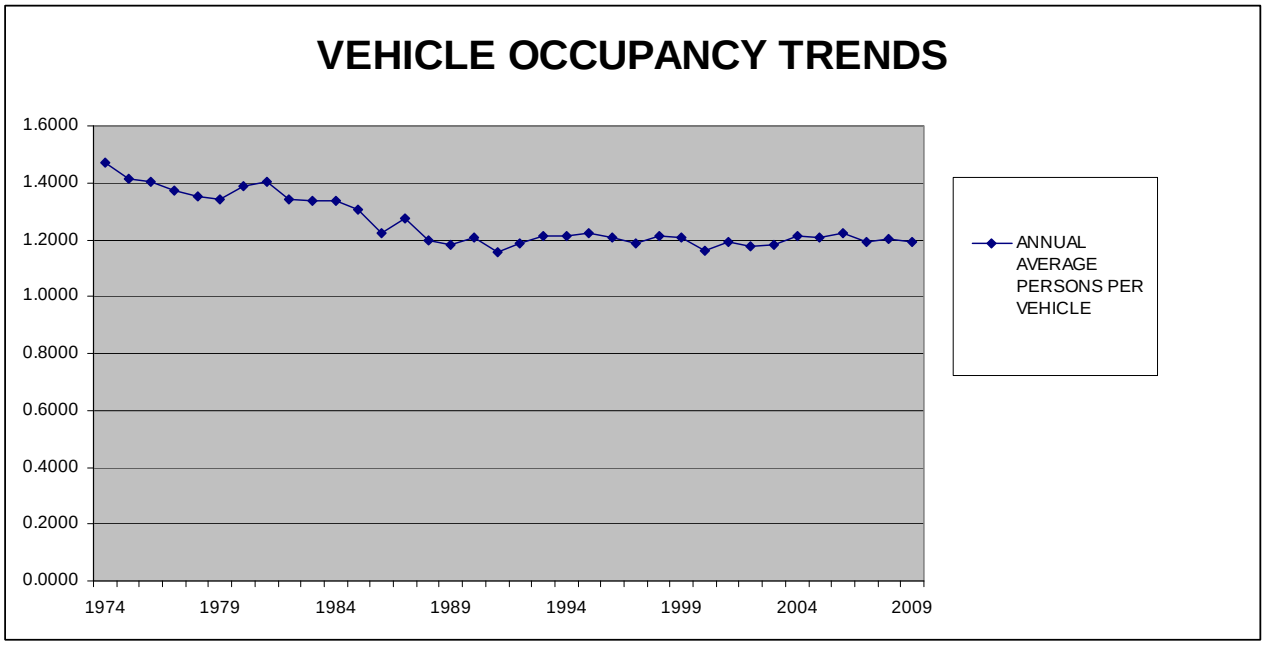


Chart 1

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Travel Time Study

A Travel Time Study helps monitor the performance of the roadway system, and observes trends in automobile travel time, delay and congestion during peak travel periods for the Capital Area MPO. The Capital Area MPO staff will periodically conduct travel speed and delay studies of the roadway network. Vehicle speeds, elapsed travel time, and duration and frequency of delays paint a picture of how traffic moves on the region's corridors, and identifies congestion problems on corridor segments. Travel Time Studies to be conducted for the Capital Area MPO include the following major corridors:

1. US 1 between US 1A and I-540
2. NC 50 between NC 56 and I-540
3. US 64 between Chatham County line and US 1 interchange
4. US 64 between I-440 and US 64/US 264
5. US 401 between NC 55 West (in Fuquay-Varina and US 70 (in Garner)
6. I-40 between I-440 and I-95
7. I-40 between Research Triangle Park and I-440
8. NC 55 between US 1 and NC 42
9. US 401 between Ligon Mill Road and NC 98
10. I-540 between I-40 and US 1

Public Transportation and Parking

Public Transportation in the Capital Area MPO is operated by the following agencies: (1) Capital Area Transit (CAT), (2) Triangle Transit (TT), (3) the Town of Cary's Service (or C-Trans), (4) North Carolina State University (NCSU) Wolfline bus service; (5) Wake Coordinated Transportation Service, (6) Johnston County Area Transit System, and (7) Kerr Area Rural Transportation System. Capital Area Transit, Triangle Transit, C-Trans, and NCSU's Wolfline bus service offer extensive fixed route bus service on a daily basis within the Capital Area (ridership data is shown in Table 2); whereas Wake Coordinated Transportation Service, Johnston County Area Transit System, and Kerr Area Rural Transportation System mainly serves as general public transportation in the non-urbanized areas of their specific counties. The latter agencies (often called "Para-transit" agencies) provide human service transportation to patrons that are eligible for federal public assistance programs such as Medicaid, Public Health, Mental, Work First, and other programs. Statistics for the Para-transit agencies are shown as Table 3 on the next page.

Agency	Capital Area Transit	Town of Cary	Town of Cary	Triangle Transit	Triangle Transit	Triangle Transit	NCSU Transportation
Mode	Motorbus	Demand Response	Motorbus	Motorbus	Demand Response	Van Pool	Motorbus
Service Area Square Miles	125	50	50	1525	1525	1525	9
Service Area Population	347,729	107,973	107,973	1,002,876	1,002,876	1,002,876	40,000
Passenger Miles FY 2008	17,807,981	380,682	525,964	10,586,495	383,278	13,975,931	3,498,389
Unlinked Passenger Trips FY 2008	4,567,679	41,745	82,829	939,297	17,181	469,872	1,868,791
Average Trip Length FY 2008	3.9	9.1	6.3	11.3	22.3	29.7	1.9
Fares FY 2008	$2,286,224	$57,317	$45,208	$1,037,942	$173,095	$704,919	$3,073,467
Operating Expenses FY 2008	$15,134,098	$1,659,392	$1,241,936	$9,573,180	$948,196	$2,080,197	$4,282,075
Average Fares per Trip FY 2008	$0.50	$1.40	$0.50	$1.11	$10.07	$1.50	$1.60

Table 2

Furthermore, the City of Raleigh is heavily invested in providing parking and a high level of customer services for a growing central business population. That investment puts Raleigh in a good position to promote the overall health of downtown businesses and to support broader development goals. As a result, the City of Raleigh conducted a parking study as a part of its "Parking and Transportation Master Plan Report" in 2008. Although the study and report focus primarily on parking, they do consider the increasing importance of alternative travel modes, including transit, as the City grows. The Raleigh Central Business District contains a total of 8,811 parking spaces, of which 7,511 are located in facilities that offer public parking. The Report noted that there are specific problems that are currently impacting access to Downtown Raleigh. If the problems are not addressed, they will increasingly affect downtown businesses and impede growth. Of concern are the lack of management controls on the on-street parking supply and the lack of availability of public parking in privately owned facilities. Solving these problems will require a multi-faceted approach. Implementation of the recommendations in the Report will change the dynamics of Downtown parking, improving access, and better position the City to meet the challenges of growth. One of the recommendations currently being implemented by the City of Raleigh is the On-Street Parking initiative. The initiative will be evaluated by the City for its impact upon downtown parking.

	WCTS	JCATS	Harnett	KARTS
trips per day	439	379	384	654
AM service hours	21.5	48.5	47.5	80.5
trips per AM peak	49.5	201	186	226.8
AM % of daily	11.3%	53%	48.5%	34.7%
PM service hours	78.8	10.8	16	42.25
trips per PM peak	165.4	43.5	63	193
PM % of daily	37.7%	11.5%	16.4%	29.5%

Table 3

Bicycle and Pedestrian

Provisions for bicycle and pedestrian modes of travel are important elements of the transportation system for the Capital Area MPO. The local communities of Creedmoor, Holly Springs, Raleigh, Rolesville, Wake Forest and Wendell have adopted or are in the process of adopting bicycle and/or pedestrian plans. The recently adopted 2035 Long Range Transportation Plan recommends an extensive development of the bicycle and pedestrian network in order to meet the region's future needs.

The Capital Area MPO adopted its original Bicycle and Pedestrian Plan in 2003. The goals of the Bicycle and Pedestrian Plan are:

- To ensure compliance with Federal regulations and requirements of state and local authorities;
- To make travel by bicycling and walking efficient and viable by ensuring connections to usable venues by bicyclists and pedestrians.
- To promote the transportation benefits of bicycle and pedestrian travel, including improvements to air quality and health; and

Reaching those goals has required the region to embrace a new paradigm regarding bicycle and pedestrian transportation, which is called "Universal Access". Universal Access is defined as not restricting bicycle and pedestrian movement or access when attempting to travel to retail, commercial, and institutional destination. Universal Access applies to experienced bicycle riders who commonly navigate roadways, as well as novice and recreational bicycle riders who may limit their bicycle movements through areas of lesser conflicts. Universal Access espouses the use of the public road system as the primary means of bicycle and pedestrian transportation, and includes all roadway classification with the exception of fully-controlled access corridors.

The seven major policy statements for the Bicycle and Pedestrian Plan are:

Policy I. Establish Bicycle & Pedestrian Access as a Fundamental Means of Travel in Regional Transportation Planning
Policy II. Implement Bicycle & Pedestrian-Friendly Elements with Existing and Future Land Use, Travel Demand Management and Clear Air Policies
Policy III. Identify all Potential Funding Opportunities to Implement Bicycle and Pedestrian Transportation
Policy IV. Encourage Safe and Efficient Bicycle\Pedestrian Travel
Policy V. Promote an Integrated, Seamless, Interconnected Transportation Network through Bicycle & Pedestrian Planning
Policy VI. Promote and implement education and encouragement plans aimed at youth, motorists, and sedentary populations
Policy VII. Promote education and law enforcement

Transportation System Management

A well-planned, cost-effective transportation system management strategy can improve mobility on existing systems for transportation users in metropolitan regions. Because of the burden on the transportation system, maximizing the usefulness and effectiveness of existing facilities and services is essential, even in those situations where new capacity is available. Transportation System Management is the application of construction, operational, and or institutional actions to make the most productive and cost-effective use of existing transportation facilities and services. Examples of Transportation System Management include: channelization, directional turn lanes, one-way streets, reversible traffic lanes, intersection widening, bus turnout bays, improved signings, pavement markings, and traffic control systems. Examples of this include the traffic control systems in the communities of Raleigh and Cary.
The City of Raleigh and the Town of Cary currently operate their own signal systems. The City of Raleigh's computerized traffic signal system controls 500 traffic signals throughout the corporate limits. The City of Raleigh is in the first phase of a $28 million traffic signal system overhaul; with $21 million coming from the Department of Transportation and $7 million from the city, engineers are planning to upgrade 585 intersections using 200 miles of fiber optic cable. The new signal system, to be completed in 2011, will synchronize traffic lights across the city and should save motorists an average of 5 percent travel time.

The Town of Cary's Advanced Traffic Management System (ATMS) is one of the most advanced in North Carolina. Traffic signal timing plans along Cary's main corridors are helping motorists realize shorter travel times to their destinations. Dynamic message signs have been set up at gateways into town to warn motorists of accidents or congested areas. Citizens can also tune into traffic images before leaving home to choose the best routes, and will soon be able to go to the Town's Web site for real-time traffic information. The features for Cary's Advance Traffic Management system include:

- 80 miles of new fiber optic cable (integrated with existing signal software)
- 23 closed circuit TV cameras at key intersections
- Advance Traveler System with 12 dynamic message signs
- Fiber optic connections to fire stations, parks and other Town facilities
- Approximately 150 state-of-the-art traffic signal controller devices

Travel Demand Management

In 2006-2007, the Triangle Transit Authority brought together the other Triangle organizations that were currently working on and/or funding Transportation Demand Management (TDM) projects with the goal of creating a long-term plan for improving TDM efforts. The result was the Triangle Region 7-Year Long Range Travel Demand Management Plan. This plan called for, among other things, the two Metropolitan Planning Organizations (the Capital Area MPO and the Durham-Chapel Hill-Carrboro MPO) and the NC Department of Transportation to pool their funds and have a competitive call for TDM projects. The Triangle J COG is charged with staffing this effort on behalf of the funding organizations; and developed the Transportation Demand Management Program to coordinate and evaluate regional TDM activities, including efforts by numerous partners to reduce traffic and air pollution by promoting commute alternatives such as mass transit, carpooling, biking, telework, flexible hours, and vanpooling. To ensure the most efficient use of resources and to be able to track progress, the Triangle J COG is taking

the lead in coordinating funding for marketing activities and then evaluating the effectiveness of these projects.

For the 2008/2009 fiscal year, Triangle J COG created and released a Request for Proposals (RFP) for TDM services in the triangle region. The application process allocated funding for local service providers, a single regional service provider, and funding for single-year special projects or pilot programs. North Carolina State University (NCSU), the University of North Carolina at Chapel Hill (UNC), the Town of Chapel Hill, and the Durham-Wake Counties Research & Production Service District (SmartCommute@rtp), were awarded grant funding to provide TDM services in their respective 'hotspots'. Triangle Transit received funding from all three categories to provide local TDM services in Durham and Raleigh Central Business District hotspots, and the North Raleigh hotspot; to provide services to all 'hotspots' as a regional entity; and to implement a special Individualized Marketing project in the Town of Wake Forest.

During 2008-2009 a regional TDM Brand known as 'GoTriangle' was established to better allow commuters to identify and use alternative transit options. Successful outreach by local and regional TDM service providers included over 70 events promoting alternative commute options with over 26,000 participants across the triangle. In addition, over 20,000 commuters were surveyed and more than 400 individual businesses received TDM marketing and outreach to promote alternative commute options for their employees. Triangle J COG is currently working with the Center for Transportation and the Environment (CTE) to evaluate this and other data collected during 2008-2009 to establish Vehicle Miles Traveled (VMT) reduction estimates from the regional program.

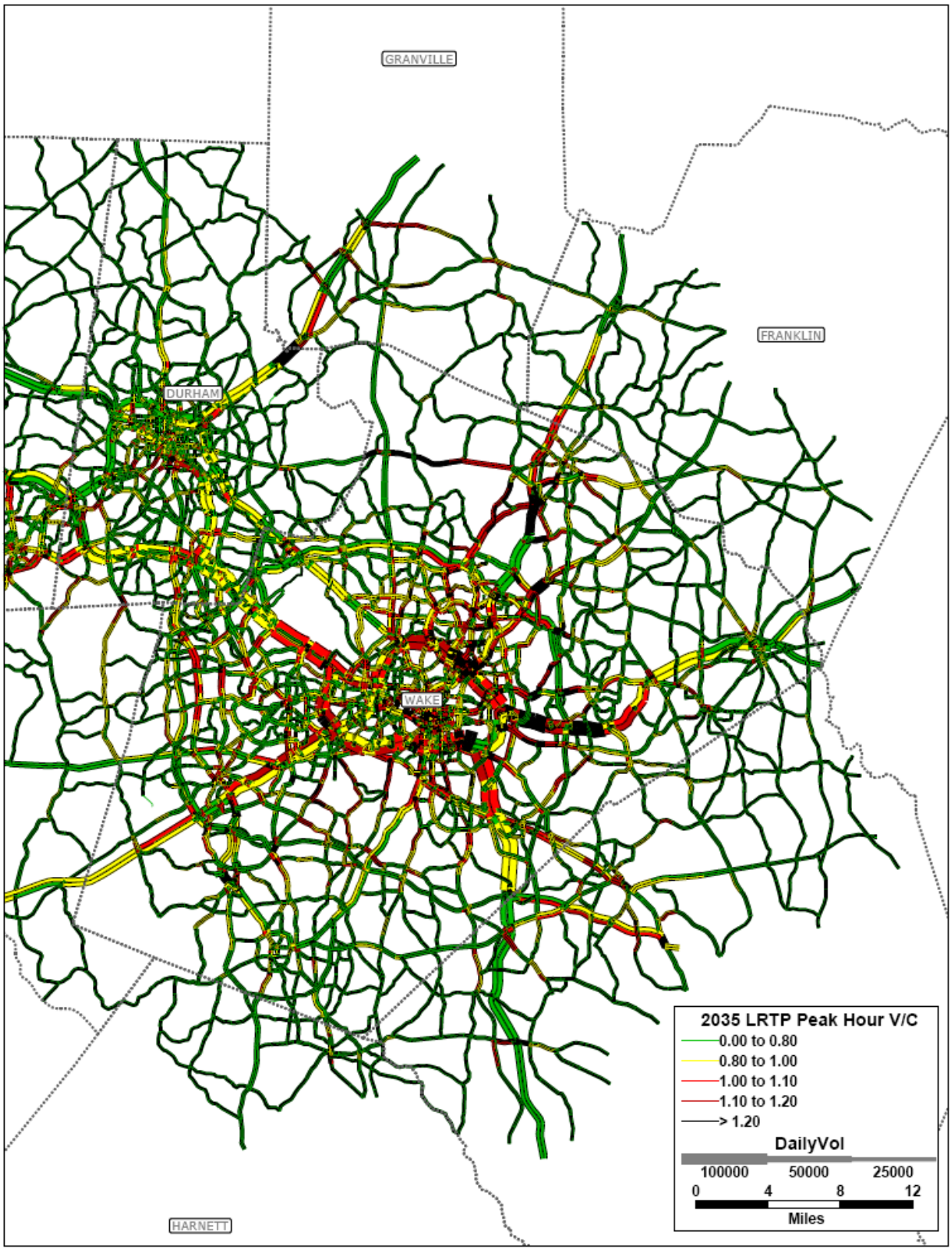
The City of Raleigh, Wake Technical Community College and North Carolina Central University were added to the regional 'GoTriangle' TDM effort during the current 2009-2010 fiscal year. These partners are implementing TDM outreach programs in their respective 'hotspots' while working with existing service providers across the triangle to implement TDM outreach strategies with proven success.

Performance Measures and Performance System Monitoring Plan

Performance Goals

The map on the next page illustrates maximum peak hour V/C for the Triangle Region by the Year 2035. This map presents a challenge to the region's management of expected congestion, it economic prowess, and ultimately, its high quality of life. The development of objectives, goals, and performance measures are a key step in the Congestion Management Process. Objectives describe in broad terms what the region wants to accomplish, focused on outcomes. Goals are specific steps to accomplish an objective; and include outcome oriented measures. Objectives should be stated in such a way that performance measures can be derived from the objectives. Performance measures provide metrics that can be used at a regional level to track systemwide performance or at the corridor, roadway, or intersection level to identify deficiencies within the system and successfulness of the implemented strategies. The measures identified will be monitored continuously and summarized during future updates to the Congestion Management Process.

The objectives, goals, and measures were developed by Capital Area MPO staff. Capital Area MPO staff conducted an outreach to various Capital Area MPO stakeholders to review the objectives, goals, and measures. The outreach allowed stakeholders to verify if the goal was appropriate; and if the identified data was currently being collected or will be collected in the future. The data for the Congestion Management Process will be collected on an annual basis. Tasks associated with Congestion Management Process will be programmed annually within the Capital Area MPO Unified Planning Work Program. Map 6 on the next page illustrates the projected V/C ratio for the overall region by 2035. This projection presents a challenge to current and future planners within the region


GRANVILLE
FRANKLIN
DURHAM
WAKE
HARNETT
2035 LRTP Peak Hour V/C
0.00 to 0.80
0.80 to 1.00
1.00 to 1.10
1.10 to 1.20
> 1.20
DailyVol
100000
50000
25000
0
4
8
12
Miles

Map 6

Roadway

Two objectives, along with goals and measures, have been identified for the roadway element and are shown below.

I. Objective: Sustainability
   1. Goal: Maintain existing freeways, interstates, (future) toll facilities, principal arterials, minor arterials, collectors, and intersections.
      a. Measure Percentage miles of freeways, interstates, (future) toll facilities, principal arterials, minor arterials, and intersections that have increase in lane miles or expanded intersection capacity
      b. Measure reduction in delay or travel time

II. Objective: Mobility
   1. Goal: Reduce Congestion so that by 2015
      a. Monitor and Measure percentage miles with V/C ratio > 1.0 by functional class
      b. Monitor and Measure Peak Hour (am/pm) V/C ratio
      c. Monitor and Measure Average peak period travel speed by functional class
      d. Monitor and Measure percentage lane-miles by V/C ratio,
      e. Measure VOR Counts
      f. Measure Incident Management occurrences

   Note: V/C ratios will be phased out over time, with "Delay" becoming the preferred measurement

The data will be collected from NCDOT's Maintenance Division, local governments, and the Capital Area MPO.

Public Transportation

Public Transportation has two objectives identified for measurement so that by 2015

I. Objective: Improve Mobility
   1. Goal: Increase ridership opportunities.
      a. Measure number of riders
      b. Measure total route miles
      c. Measure average weekday boardings
      d. Track occupancy for existing and new Park-n-Ride lots

II. Objective: Reliability and Sustainability so that by 2015….
   1. Goal: Adherence to Schedule
      a. Measure percent average headway variance for all routes
      b. Percentage on time arrival
   1. Goal: Maintain Operations and Maintenance so that by 2015….
      a. Measure Vehicle Operating Hours for all routes

The data will be collected from Capital Area Transit, C-Trans, NCSU's Transportation Department, Triangle Transit, Wake Coordinated Transportation Services, Johnston County Area Transit Service, Harnett County Transit, and Kerr Area Rural Transit Service.

Bicycle and Pedestrian

Two objectives, along with goals and measures, have been identified for the bicycle and pedestrian element and are shown below.

I. Objective: Improve Mobility
   1. Goal: Increase multimodal opportunities.
      a. Measure percentage miles of arterials with cycling accommodations
      b. Measure percentage miles of arterials with sidewalks on (1) one and/or (2) both sides.
      c. Tracking transportation mode share of walking, cycling, motoring, mass transit, etc. for utilitarian trips, starting with work, school, and shopping

II. Objective: Safety
   a. Goal: Reduce crashes for bicyclists and pedestrians on roadways
      a. Measure percentage of bicycle related accidents
      b. Measure percentage of pedestrian related accidents

The data will be collected from NCDOT, local agencies, and the Capital Area MPO.

Travel Demand Management

Three objectives, along with goals and measures, have been identified for the Travel Demand Management element and are shown below.

I. Objective: Reduce System Demand
   A. Goal: Achieving an initial threshold of a 25% reduction in the increase VMT by 2015
      a. Measure Percentage shift of single occupant vehicle usage to other travel modes
      b. VMT

II. Objective: Outreach
   A. Goal: Support for Existing Customers
      a. Measure percent of retained Employers in Ridesharing Program
      b. Measure percent of enlisted employers in Best Workplaces for Commuters Program
   B. Goal: New Employer Recruitment
      1. Measure recruitment of TDM incentive program participants in newly established Transportation Management Areas

III. Objective: Integration
   a. Goal: Long Range Planning Support

a. Measure percentage transit capacity or reduction in Vehicle Miles Traveled (VMT).

The data will be collected from NCDOT, the Triangle J Council of Governments, and Triangle Transit.

Relationship to the Triangle Regional ITS Strategic Deployment Plan

The Research Triangle Regional Intelligent Transportation Systems (ITS) Architecture is a roadmap for transportation systems integration in the Research Triangle Region, North Carolina, for the next 25 years. The initial version of the Triangle Regional ITS Architecture was created in 2001. This update is a result of thorough and extensive regional input gathered through a series of interviews with important federal, state, and local agencies; a review of existing documents; and from comments collected from a meeting and workshop on August 17 and August 18, 2009, respectively. The Triangle Regional ITS Architecture documents how the region envisions that each agency's systems will work together in the future and how sharing of information and resources will help provide a safer, more efficient, and more effective transportation system for travelers and commuters in the region. The architecture is an important new tool that will be used by:

- Planning agencies to incorporate integration opportunities and operational needs into the transportation planning process;
- Operating and implementing agencies to recognize and implement transportation integration opportunities in the Region; and
- Other organizations and individuals that use the transportation system in the Region.

The architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time. Another objective to be derived from the update is the "Mainstreaming/Integration) of ITS into the regional planning process in accordance with FHWA Register 23 CFR Parts 450 and 500 and FTA 49 CFR Part 613. ITS is currently integrated into the Capital Area MPO's 2035 Long Range Transportation Plan as a section in the document where ITS projects may be identified (system-wide or incorporated with another project); and in the Metropolitan Transportation Improvement Program as a specific project. The proposed process would integrate existing plans and processes by linking them together as shown in Diagram 2 on the next page.


Metropolitan Transportation Improvement Program
Comprehensive Transportation Plan
ITS Strategic Deployment Plan
Air Quality Conformity
Planning Process
Congestion Management Process
Transit Urban Application/ Technology Plan
Long Range Transportation Plan
Triangle Regional Model

Diagram 2

Implementing Strategies and Monitoring Effectiveness

While the elements above are essential to a Congestion Management Process, additional policy strategies are recommended for application within the Capital Area MPO. The following strategies can be applied and implemented upon adoption of the Capital Area MPO Congestion Management Process and be monitored for effectiveness in future years:

- Annually fund Congestion Management Planning within the Unified Planning Work Program, as well as perform a "Status of the System Report" every two years
- Coordinate the Capital Area MPO Congestion Management Process with the Durham-Chapel Hill-Carrboro MPO's Congestion Management Process, and involve input from the adjourning Rural Planning Organizations as needed
- Creating and maintaining a performance matrix and LOS standards for project prioritization
- Conduct an annual "Call" for projects based on performance measures as established through data collection
- Create a Congestion Management Process Stakeholder group that would consist of local planning staff, representatives of the area's freight community, emergency management community, the area's public school systems, and NCDOT staff.

  The stakeholder group would be tasked with working with staff on

  I. developing the Congestion Management Process for Plans and projects
  II. developing tasks for future Unified Planning Work Programs for the Congestion Management Process
  III. prepare and present the "Status of the System Report" for preparation to the TCC and TAC
  IV. provide input in the development of future long range transportation plans
  V. coordinate tasks with existing and future Council of Planning groups

A RESOLUTION TO ADOPT THE CAPITAL AREA MPO CONGESTION MANAGEMENT PLAN

A motion was made by **Mayor Jones** and seconded by **Mayor Sears** for adoption of the following resolution, and upon being put to a vote was duly adopted by unanimous vote of the N.C. Capital Area Metropolitan Planning Organization's Transportation Advisory Committee.

WHEREAS, the Transportation Advisory Committee of the N.C. Capital Area Metropolitan Planning Organization (MPO) is responsible for conducting transportation planning in a continuous, cooperative, and comprehensive (3-C) manner in accordance with 23 U.S.C. and 49 U.S.C. 1607; and

WHEREAS, the Transportation Advisory Committee of the N.C. Capital Area Metropolitan Planning Organization (MPO) is responsible for approving transportation plans and programs that direct the expenditure of all State and federal transportation funds in the region; and,

WHEREAS, the Congestion Management Plan must identify a process to evaluate and address congestion for the multimodal transportation system; and

WHEREAS, the Congestion Management Plan should result in multimodal system performance measures and strategies that can be reflected in the Long Range Transportation Plan and the Metropolitan Transportation Improvement Plan; and

WHEREAS, the Congestion Management Plan should identify a monitoring plan to evaluate the performance of the multimodal transportation system; and

NOW THEREFORE, be it resolved by the Capital Area MPO Transportation Advisory Committee, that the Congestion Management Plan be adopted for the Capital Area Metropolitan Planning Organization on this the 16th day of June, 2010

Adopted this the 16th day of June, 2010

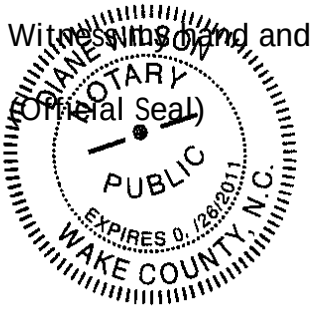
Joe Bryan, Chair
Transportation Advisory Committee

Ed Johnson, Capital Area MPO Director
Transportation Advisory Committee Clerk

County of Wake
State of North Carolina

I, Diane Wilson, a Notary Public for said County and State, do hereby certify that Joe Bryan personally known to me by his presence appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and official seal, the 16th day of June 2010.



(Official Seal)

Diane Wilson, Notary Public

Notary Public
My commission expires January 26, 2011.

APPENDICES

Congestion Management Process

CMP Toolbox

Technical
Memorandum
March 10, 2010

Congestion Management Process
CMP Toolbox

One of the components of the Congestion Management Process for the Capital Area MPO will be a toolbox of potential congestion reduction and mobility strategies. The idea behind this toolbox is to encourage ways to deal with congestion and mobility problems beyond traditional through-lane capacity projects. As the CMP is implemented local municipalities and agencies will use this toolbox as a starting point when considering alternative solutions to be evaluated.

We envision that when cities and agencies find themselves considering roadway capacity projects, that they would use the toolbox like a checklist. They would consider each item in the toolbox in turn, and determine whether a tool had a reasonable potential for providing benefit to the corridor or study area in question. If a tool shows promise, it can be evaluated in detail using the regional model and applicable post-processing methods. If a tool does not make sense, a brief explanation of why it is not appropriate would be provided.

The CMP toolbox of strategies is presented using the following categories:

1. Highway Projects

2. Transit Projects

3. Bicycle and Pedestrian Projects

4. Transportation Demand Management (TDM) Strategies

5. Intelligent Transportation Process (ITS) and Transportation Process Management (TSM) Strategies

6. Access Management Strategies

7. Land Development Strategies

8. Parking Management Strategies

For each of the projects and strategies we have identified their potential for congestion reduction, implementation cost and schedule, and analysis method. The congestion reduction impacts are defined by indicators such as the potential reduction of single occupant vehicles (SOV), improved travel times, and reduced delay.

The implementation costs and schedules consider design and maintenance costs, inter-jurisdictional agreements, and implementation timing over short-term (one to five years), medium-term (five to 10 years), and long-term (over 10 years). The implementation costs and schedules presented in each section are based on information prepared by the Institute of Transportation Engineers (ITE) and Cambridge Systematics, Inc.

In identifying analysis methods we identified the tools needed to evaluate the congestion reduction potential of each strategy or project. The methods include the TDM Evaluation Model, the ITS Deployment Analysis Process (IDAS), and the Triangle Regional Model which form the analytical foundation for the CAPITAL AREA MPO CMP.

Highway Projects

Table 1 presents the potential highway infrastructure projects that may be applicable for the Capital Area MPO. The regional travel model will be the primary analysis tool to assess the transportation impacts. The TDM Evaluation Model and IDAS can also be applied to evaluate HOV lanes.

Transit Projects

Transit services and infrastructure projects have traditionally been implemented in regions to provide an alternative to automobile travel potentially reducing peak-period congestion and improving mobility and accessibility for commuters. Table 2 presents the transit projects that may be applicable for the Capital Area MPO. These projects tend to reduce systemwide VMT in relatively small increments but do improve corridor and systemwide accessibility, improve roadway travel times, and decrease congestion on the roadway system.

Bicycle and Pedestrian Projects

Non-motorized modes of transportation, such as biking and walking, are often overlooked by transportation professionals. Investments in these modes can increase safety and mobility in a cost-efficient manner, while providing a zero-emission alternative to motorized modes. The strategies listed in Table 3 can be implemented in the Capital Area MPO with relatively little cost, but tend to have local rather than systemwide impacts. The effectiveness of an investment in non-motorized travel depends heavily on coordination with local land use policies and connections with other modes, such as transit, for longer distance travel. Safety and aesthetics should also be emphasized in the design of bicycle and pedestrian facilities in order to increase their attractiveness.

TDM Strategies

Transportation demand management (TDM) strategies are used to reduce travel during the peak, commute period. They are also used to help agencies meet air quality conformity standards, and are intended to provide ways to provide congestion relief/mobility improvements without high cost infrastructure projects. Table 4 presents the TDM strategies that may be applicable for the Capital Area MPO. These strategies can potentially build upon current ITS initiatives being implemented in the Capital Area MPO such as the Triangle Transit Rideshare program.

ITS and TSM Strategies

Intelligent transportation system (ITS) and transportation system management (TSM) strategies have traditionally focused on improving the operation of the transportation system without major capital investment and cost. While ITS strategies may be costly compared to more traditional TSM strategies, their relative congestion-reduction impacts can be significant. Table 5 presents the ITS and TSM strategies that may be applicable for the Capital

Area MPO. The strategies identified in Table 5 can build upon current ITS initiatives such as the ATMS system and the various traffic signal coordination systems.

Access Management Strategies

Access management is a broad concept that can include everything from curb cut restrictions on local arterials to minimum interchange spacing on freeways. Restricting turning movements on local arterials can reduce accidents and prevent turning vehicles from impeding traffic flow. Similarly, eliminating merge points and weaving sections at freeway interchanges increases the capacity of the facility. The access management strategies listed in Table 6 are applicable to the Capital Area MPO, and can be used in either the modification or original design of a facility.

Land Development Strategies

Land development strategies have been used in some areas to manage transportation demand on the system, and to help agencies meet air quality conformity standards. Land development strategies can include limits on the amount and location of development until certain service standards are met, or policies that encourage development patterns better served by public transportation and non-motorized modes. Table 7 presents the land development strategies that may be applicable for Capital Area MPO.

Parking Management Strategies

Parking management is most often used to decrease automobile trips for both work and non-work purposes, although in the context of enforcement it may also be used to improve traffic flow. Often, policies implemented by local governments and directed towards the private sector must be accompanied by incentives in order to ensure their effectiveness. Several strategies applicable to Capital Area MPO are presented in Table 8.

Table 1. Potential Highway Strategies for the CMP Toolbox

Strategies/Projects	Congestion and Mobility Benefits	Implementation Costs and other Impacts	Implementation Timeframe	Analysis Method
1b. Geometric Design Improvements This includes widening to provide *shoulders*, additional turn lanes at intersections, improved sight lines, auxiliary lanes to improve merging and diverging.	• Increase mobility • Reduce congestion by improving bottlenecks • Increase traffic flow and improve safety	• Costs vary by type of design	• Short-term: • 1 to 5 years	• Regional Travel Model
1c. HOV Lanes This increase corridor capacity while at the same time provides an incentive for single-occupant drivers to shift to ridesharing. These lanes are most effective as part of a comprehensive effort to encourage HOVs, including publicity, outreach, park-and-ride lots, and rideshare matching services.	• Reduce Regional VMT • Reduce regional trips • Increase vehicle occupancy • Improve travel times • Increase transit use and improve bus travel times	• HOV, separate ROW costs • HOV, barrier separated costs • HOV, contraflow costs • Annual operations and enforcement • Can create environmental and community impacts	• Medium-term: • 5 to 10 years • (includes planning, engineering, and implementation)	• Regional Travel Model • TDM Evaluation Model • IDAS
1d. Super Street Arterials This involves converting existing major arterials with signalized intersections into "super streets" based on North Carolina design standards.	• Increase capacity • Improve mobility	• Construction and engineering substantial for grade separation • Maintenance variable based on area	• Medium-term: • 5 to 10 years • (includes planning, engineering, and implementation)	• Regional Travel Model
1e. Highway Widening by Adding Lanes This is the traditional way to deal with congestion	• Increase capacity, reducing congestion in the short term • Long-term effects on congestion depend on local conditions	• Costs vary by type of highway constructed; in dense urban areas van be very expensive • Can create environmental and community impacts	• Long-term: • 10 or more years (includes planning, engineering, and implementation)	• Regional Travel Model

Source: Cambridge Systematics, Inc. and ITE, A Toolbox for Alleviation Traffic Congestion.

Table 2. Potential Transit Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
2a. Reducing Transit Fares This encourages additional transit use, to the extent that high fares are a real barrier to transit.	• Reduce daily VMT • Reduce congestion • Increase ridership	• Lost in revenue per rider • Capital costs per passenger trip • Operating costs per passenger trip • Operating subsidies needed to replace lost fare revenue • Alternative financial arrangements need to be negotiated with donor agencies	• Short-term: Less than one year	• Regional Travel Model • TDM Evaluation Model
2b. Increasing Bus Route Coverage or frequencies This provides better accessibility to transit to a greater share of the population. Increasing frequency makes transit more attractive to use.	• Increase transit ridership • Decrease travel time • Reduce daily VMT	• Capital costs per passenger trip • Operating costs per trip • New bus purchases likely	• Short-term: 1 to 5 years (includes planning, engineering, and construction)	• TDM Evaluation Model • Regional Travel Model
2c. Implementing Park-and-Ride Lots These can be used in conjunction with HOV lanes and/or express bus services. They are particularly helpful for encouraging HOV use for longer distance commute trips.	• Reduce Regional VMT (up to 0.1 percent) • Increase mobility and transit efficiency	• Structure costs for transit stations	• Medium-term: 5 to 10 years (includes planning, engineering, and implementation)	• TDM Evaluation Model • Regional Travel Model
2d. Implementing Rail Transit This best serves dense urban centers where travelers can walk to their destinations. Rail transit from suburban areas can sometimes be enhanced by providing park-and-ride lots.	• Reduce daily VMT	• Capital costs per passenger • New systems require large upfront capital outlays and ongoing sources of operating subsidies, I addition to funds that may be obtained from federal sources, under increasingly tight competition.	• Long-term: 10 or more years (includes planning, engineering, and implementation)	• Regional Travel Model

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 3. Potential Bicycle and Pedestrian Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
3a. New Sidewalks and Designated Bicycle Lanes on Local Streets Enhancing the visibility of bicycle and pedestrian facilities increases the perception of safety. In many cases, bike lanes can be added to existing roadways through restriping.	• Increase mobility and access • Increase non-motorized mode shares • Separate slow-moving bicycles from motorized vehicles • Reduce incidents	• Design and construction costs for paving, striping, signals, and signing • ROW costs if widening necessary • Bicycle lanes may require improvements to roadway shoulders to ensure acceptable pavement quality	• Short-term: 1 to 5 years (includes planning, engineering, and construction)	• TDM Evaluation Model
3b. Improved Bicycle Facilities at Transit Stations and Other Trip Destinations. Bicycle racks and bike lockers at transit stations and other trip destinations increase security. Additional amenities such as locker rooms with showers at workplaces provide further incentives for using bicycles.	• Increase bicycle mode share • Reduce motorized vehicle congestion and access routes	• Capital and maintenance costs for bicycle racks and lockers, locker rooms	• Short-term: 1 to 5 years (includes planning, engineering, and construction)	• TDM Evaluation Model
3c. Design Guidelines for Pedestrian-Oriented Development Maximum block lengths, building setback restrictions, and streetscape enhancements are examples of design guidelines that can be codified in zoning ordinance to encourage pedestrian activity.	• Increase pedestrian mode share • Discourage motor vehicle use for short trips • Reduce VMT emissions	• Capital costs largely borne by private sector; developer incentives may be necessary • Public sector may be responsible for some capital and/ or maintenance costs associated with right-of-way improvements • Ordinance development and enforcement costs	• Short-term: 1 to 5 years	• TDM Evaluation Model • Regional Travel Model
3d. Improved Safety of Existing Bicycle and Pedestrian Facilities. Maintaining lighting, signage, striping, traffic control devices, and pavement quality, and installing curb cuts, curb extensions, median refuges, and raised cross-walks can increase bicycle and pedestrian safety.	• Increase non-motorized mode share • Reduce incidents	• Increased monitoring and maintenance costs • Capital costs of sidewalk improvements and additional traffic control devises	• Short-term: 1 to 5 years	• TDM Evaluation Model • Regional Travel Model

Table 3 (cont'd). Potential Bicycle and Pedestrian Strategies for the CMP Toolbox (continued)

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
3e. Exclusive Non-Motorized Rights-of-Way Abandoned rail rights-of-way and existing parkland can b used for medium-to-long distance bike trails, improving safety and reducing travel times.	• Increase mobility • Increase non-motorized mode shares • Reduce congestion on nearby roads • separate slow-moving bicycles from motorized vehicles • Reduce incidents	• ROW costs • Construction and Engineering Costs • Maintenance Costs	• Medium-term: 5 to 10 years (includes planning, engineering, and construction)	• TDM Evaluation Model • Regional Travel Model

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 4. Potential TDM Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
4a. Alternative Work Hours This allows workers to arrive and leave work outside of the traditional commute period. It can be on a scheduled basis or a true flex-time arrangement.	• Reduce peak-period VMT • Improve travel time among participants	• No capital costs • Agency costs for outreach and publicity • Employer costs associated with accommodating alternative work schedules	• Employer-based Short-term: 1 to 5 year	• TDM Evaluation Model • Regional Travel Model
4b. Telecommuting This involves employees to work at home or regional telecommute center instead of going into the office. They might do this all the time, or only one or more days per week.	• Reduce VMT • Reduce SOV trips	• First-year implementation costs for private-sector (per employee for equipment) • Second-year costs tend to decline	• Employer-based Short-term: 1 to 5 years	• TDM Evaluation Model • Regional Travel Model
4c. Ridesharing This typically arranged/encouraged through employers or transportation management agencies (TMA), which provides ride-matching services.	• Reduce VMT • Reduce SOV trips	• First-year implementation costs for private-sector (per employee for equipment) • Second-year costs tend to decline	• Employer-based Short-term: 1 to 5 years	• TDM Evaluation Model • Regional Travel Model

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 5. Potential ITS and TSM Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
5a. Traffic Signal Coordination This improves traffic flow and reduces emissions by minimizing stops on arterial streets	• Improve travel time • Reduce the number of stops • Reduce daily VMT by vehicle miles per day, depending on program	• O&M costs per signal • Signalized intersections per mile costs variable	• Short-term: • 1 to 5 years	• IDAS • Regional Travel Model
5b. Freeway Incident Detection and Management Process This is an effective way to alleviate non-recurring congestion. Systems typically include video monitoring, dispatch systems, and sometimes roving service patrol vehicles.	• Reduce accident delay • Reduce travel time	• Capital costs variable and substantial • Annual operating and maintenance costs	• Medium-to Long-term: likely 10 years or more	• IDAS • Regional Travel Model
5c. Ramp Metering This allows freeways to operate at their optimal flow rates, thereby speeding travel and reducing collisions.	• Decrease travel time • Decrease accidents • Improve traffic flow on major facilities	• O&M costs • Significant costs associated with enhancements to centralized control system • Capital costs	• Medium-term: 5 to 10 years	• IDAS • Regional Travel Model
5d. Highway/ Advanced Traveler Information Systems These systems provide travelers with real-time information that can be used to make trip and route choice decisions. ATIS provides an extensive amount of data to travelers, such as real time speed estimates on the web or over wireless devices, and transit vehicle schedule progress.	• Reduce travel times and delay • Some peak period travel shift	• Design and implementation costs variable • Operation and maintenance costs variable	• Medium-term: 5 to 10 years	• IDAS • Regional Travel Model

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 6. Potential Access Management Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
6a. Left Turn Restrictions; Curb Cut and Driveway Restrictions Turning vehicles can impede traffic flow and are more likely to be involved in crashes.	• Increased capacity, efficiency on arterials • Improved mobility on facility • Improved travel times and reduced delay for through traffic • Fewer incidents	• Implementation and maintenance costs vary; range from new signage and striping to more costly permanent median barriers and curbs.	• Short-term: 1 to 5 years (including planning, engineering, and implementation)	• Localized Analysis
6b. Turn lanes and New or Relocated Driveways and Exit Ramps In some situations, increasing or modifying access to a property can be more beneficial than reducing access.	• Increase capacity efficiency • Improved mobility and safety on facility • Improved travel times and reduced delay for all traffic	• Additional right-of-way costs • Design, construction, and maintenance costs	• Short-term: 1 to 5 years (including planning, engineering, and implementation)	• Localized Analysis
6c. Interchange Modifications Conversion of a full cloverleaf interchange to a partial cloverleaf, for example, reduces weaving sections on a freeway.	• See 6b • Fewer incidents due to fewer conflict points	• Design and construction costs	• Short term: 1 to 5 years (including planning, engineering, and implementation)	• IDAS • Regional Travel Model • Would need to code ramps
6d. Minimum Intersection/ Interchange Spacing Reduces number of conflict points and merging areas, which in turn reduces incidents and delay.	• See 6c	• Part of design costs for new facilities and reconstruction projects	• Medium-term: 5 to 10 years (including planning, engineering, and implementation)	• Local

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 6 (cont'd). Potential Access Management Strategies for the CMP Toolbox

6e. Frontage Roads and Collector-Distributor Roads Frontage roads can be used to direct local traffic to major intersections on both super arterials and freeways. Collector-Distributor roads are used to separate exiting, merging, and weaving traffic from through traffic at closely-spaced interchanges.	• See 6c	• Additional right-of-way costs • Design, construction, and maintenance costs	• Medium-term: 5 to 10 years (including planning, engineering, and implementation)	• IDAS • Regional Travel Model • Would need more network detail

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 7. Potential Land Use Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	• Implementation Timeframe	Analysis Method
7a. Mixed-Use Development This allows many trips to be made without automobiles. People can walk to restaurants and services rather than use their vehicles.	• Increase walk trips • Decrease SOV trips • Decrease in VMT • Decrease vehicle hours of travel	• Public costs to set up and monitor appropriate ordinances • Economic incentives used to encourage developer buy-in	• Long-term: 10 or more years	• Regional Travel Model • TDM Evaluation Model
7b. Infill and Densification This takes advantage of infrastructure that already exists, rather than building new infrastructure on the fringes of the urban area.	• Decrease SOV • Increase transit, walk, and bicycle • Doubling density decreases VMT per household • Medium/high vehicle trip reductions	• Public costs to set up and monitor appropriate ordinances • Economic incentives used to encourage developer buy-in	• Long-term: 10 or more years	• Regional Travel Model • TDM Evaluation Model
7c. Transit-Oriented Development This clusters housing units and/or businesses near transit stations in walkable communities.	• Decrease SOV share • Shift carpool to transit • Increase transit trips • Decrease VMT • Decrease in vehicle trips	• Public costs to set up and monitor appropriate ordinances • Economic incentives used to encourage developer buy-in	• Long-term: 10 or more years	• Regional Travel Model • TDM Evaluation Model
7d. Transportation Impact Analysis This is an evaluation tool for proposed developments, and assists planners in making major land use decisions.	• Increase bicycle, pedestrian, and transit trips • Decrease SOV Trips •	• Public costs to set up and monitor appropriate ordinances • Economic incentives used to encourage developer buy-in	• Varies	• Regional Travel Model

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.

Table 8. Potential Parking Management Strategies for the CMP Toolbox

Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
8a. On-Street Parking and Standing Restrictions Enforcement of existing regulations can substantially improve traffic flow in urban areas. Peak-period parking prohibitions can free up extra general purpose travel lanes or special bus or HOV "diamond" lanes.	• Increase peak-period capacity • Reduce travel time and congestion on arterials • Increase HOV and bus mode shares	• Design, construction, and maintenance costs for signage and striping • Rigid enforcement of parking restrictions	• Short-term: 1 to 5 years (including planning, engineering, and implementation)	• IDAS • Regional Travel Model
8b. Employer/Landlord Parking Agreements Employers can negotiate leases so that they pay only for then umber of spaces used by employees. In turn, employers can pass along parking savings by purchasing transit passes or reimbursing non-driving employees with the cash equivalent of a parking space.	• Reduce work VMT • Increase non-auto mode shares	• Economic incentives used to encourage employer and landlord buy-in	• Metropolitan and Employer-based • Short-term: 1 to 5 years	• TDM Evaluation Model
8c. Preferential or Free Parking for HOVs This provides an incentive for workers to carpool.	• Reduce work VMT • Increase vehicle Occupancy	• Relatively low costs, primarily borne by the private sector, include signing, striping, and administrative costs	• Metropolitan and Employer-based • Short term: 1 to 5 years	• TCM Evaluation Model
8d. Location-Specific Parking Ordinances Parking requirements can be adjusted for factors such as availability of transit, a mix of land uses, or pedestrian-oriented development that may reduce the need for on-site parking. This encourages transit-oriented and mixed-use development.	• Reduce VMT • Increase transit and non-motorized mode shares	• Economic incentives used to encourage developer buy-in	• Long-term: 10 or more years	• Regional Travel Model • TDM Evaluation Model

Sources: Cambridge Systematics, Inc. and ITE, a Toolbox for Alleviating Traffic Congestion.