FAMPO
Fayetteville Area Metropolitan Planning Organization
Congestion Management Element of the 2040 Metropolitan Transportation Plan

April 16, 2014
Continuing · Comprehensive · Cooperative · Transportation Planning
# TABLE OF CONTENTS

INTRODUCTION ...................................................................................................................................... 1

SECTION 1: THE PROCESS ................................................................................................................... 6

SECTION 2: IDENTIFYING CONGESTED AREAS AND ROADWAYS .................................................. 8

SECTION 3: STRATEGIES FOR RELIEVING CONGESTION .............................................................. 23

SECTION 4: CONGESTION MANAGEMENT AND FORT BRAGG FORCE PROTECTION .......... 29

SECTION 5: CONGESTION MANAGEMENT STRATEGIES FOR THE FAYETTEVILLE METROPOLITAN AREA ...................................................................................................................... 31

SECTION 6: INTELLIGENT TRANSPORTATION SYSTEM (ITS) ...................................................... 38

REFERENCES .......................................................................................................................................... 43
INTRODUCTION

When people hear the term “congestion,” thoughts of traffic jams, long waits, late arrivals, overheated vehicles, and overheated tempers abound. Public perception certainly is important when it comes to identifying areas in need of congestion management or mitigation. On the technical side, however, congestion is defined as ‘an imbalance between travel flow and capacity in a particular mode that increases travel time and cost, resulting in modifications to travel behavior.’ However it is defined, most people agree that traffic congestion is a real problem needing real solutions. The 2010 Census Bureau count revealed the population of the FAMPO Metropolitan Planning Area (MPA) to be 372,142 people. Clearly Congestion Management is as important as ever, and will be instrumental in our efforts to provide a well-balanced, multi-modal system of transportation for the people in our area.

Congestion Management is a highly complex concept involving many different aspects including (but not limited to) planning, engineering, information systems, and multi-modal forms of transportation. Ideally, successful congestion management plans result in an improvement of the relationship between land use, transportation, and air quality planning. Better relationships between the agencies that provide the services and those who use them are facilitated, and levels of service improve for all modes of transportation. But to do this, extensive data gathering, analysis, calculations, projections, and project requests must be made.

In 1994, the Fayetteville Urban Area Technical Coordinating Committee (TCC) appointed a Congestion Management Team to comply with ISTEA regulations. Composed of staff from the City of Fayetteville, NCDOT, Cumberland County Joint Planning Board, Fort Bragg, Pope Air Force Base, the Town of Hope Mills and the Town of Spring Lake, the main tasks of the team were to identify areas where congestion occurs or is likely to occur, identify the causes of the congestion, evaluate strategies for managing or mitigating the congestion, and develop a plan for implementation of the most effective strategies. In total, 36 corridors were evaluated through a developed congestion index, which resulted in ten priority corridors being selected. At the time, the most severe congestion occurred in the Cross Creek Mall area, and the majority of projects were focused in the relief of congestion near that location.

The Congestion Management Committee was reorganized to produce an updated Congestion Management Plan, which was approved in January 2004. The 2004 plan identified improvements that had been made around the Cross Creek Mall area, thus allowing more emphasis in other parts of the Metropolitan Area. The Plan was updated again in April 2009. Improvements are being made and plans to address the changes occurring in the area are continuous.

The purpose of this document is to reevaluate the priorities outlined in the April 2009 plan, incorporate new plans, studies, and improvements that have occurred, and will serve as the officially adopted Congestion Management Plan for all municipalities within FAMPO’s MPA.
Enactment of the Moving Ahead for Progress in the 21st Century Act (MAP-21) creates a streamlined performance based, and multimodal program to address the challenges to improve efficiency of freight movement. It represents a milestone for the U.S. economy – it provides needed funds and, more importantly, it transforms the policy and programmatic framework for investments to guide the growth and development of the country’s vital transportation infrastructure.

One of the national goals of Map 21 is freight movement and economic vitality—to improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development. Congestion management is an essential part of reaching this goal. Reducing and managing congestion along local truck routes allows for more efficient delivery and pick-up of freight to industries and merchandisers. While understanding freight traffic patterns are also a crucial component of congestion management.

MAP-21 includes a number of provisions designed to enhance freight movement in support of national goals. MAP-21 firmly establishes national leadership in improving the condition and performance of a National Freight Network by identifying the components of the network. It includes incentives to prioritize projects that advance freight performance targets. DOT, in consultation with partners and stakeholders, will develop a national freight strategic plan.

There is a growing awareness at the federal, state, metropolitan, and local levels of the importance of freight transportation. In addition, there is a corresponding push to link freight transportation to economic development. As a result, federal transportation agencies, state DOTs, MPOs, and business leaders are recognizing that effective freight movement is important to economic competitiveness and to the overall health and efficiency of the transportation system. To encourage this effort, MAP-21 established a policy to improve the condition and performance of the national freight network. The purpose of the policy is to provide a foundation for the United States to compete in the global economy and achieve goals related to economic competitiveness and efficiency, congestion, productivity, safety, security, and resilience of freight movement.

The state guidelines for Map-21 are not available because a plan has not been approved. FAMPO is unable to conduct a performance measures and target analysis until guidance from the state is made available. We will put forth every effort to ensure that this information is included in the plan at a later date. However, this plan update does demonstrate how our efforts and planning experiences accumulated in the last three years have helped develop the ground work for some solid performance measures in the future.
The Cumberland County 2030 Growth Vision Plan Policies and Actions finalized in September 2008 was a cooperative effort between all of the jurisdictions in Cumberland County, public agencies, and the community to devise a vision for the entire area. This Plan is the latest large scale comprehensive land use plan for our area. It continues to serve as a valuable tool in our efforts to preserve and enhance the environment in our planning process, and as a link between transportation and land use planning. The plan addressed seventeen vision statements:

1. A More Diversified Economy
2. Well Managed Growth
3. Infrastructure That Keeps Pace
4. A Balanced Transportation System
5. Community Oriented Schools
6. Expanded Parks & Recreation
7. Preserved Open Space & Rural Character
8. Quality Housing & Residential Development
9. Compatible Commercial Development & Services
10. Attractive Community Appearance & Image
11. A Healthy, Sustainable Environment
12. Vibrant Downtown Areas
13. The Cape Fear River, A Regional Asset
14. Public Safety Services Closer to the People
15. Senior Citizens Well Served
16. Intergovernmental Cooperation & Efficiency
17. An Active, Involved Citizenry

As part of Vision Numbers 2, 3, and 4, several policies were written to better address the local aspirations for keeping up with congestion and supporting a transportation system that is proactive in nature, and actions were formulated to achieve the policies:

Policy Area 2: Well-Managed Growth and Development

Not all land is equally suited for development. Development on land that is “high and dry” avoids future problems related to poor drainage and flooding. Development that is convenient to existing public facilities maximizes taxpayer investments and minimizes local government service costs. Consistent development standards result in more predictable and higher quality growth.

Policy 2.8: Regardless of location on the GROWTH STRATEGY MAP, new development should occur at DENSITIES APPROPRIATE FOR THE SITE. Density factors shall include whether the site is within an environmentally sensitive area, the type of sewage treatment available, the topography and drainage of the site, the capacity of transportation facilities serving the site, the proximity of the site to other existing services, and other relevant factors.
Policy Area 3: Infrastructure That Keeps Pace

*The location, timing and capacity of infrastructure such as roads, water and sewer utilities, schools, parks and drainage are among the most influential factors affecting growth and development. 2030 policies and actions suggest that local governments should become more proactive in using these features to direct growth and development intelligently and to protect taxpayer investments in these facilities.*

Action 3.2: Continue to support the Joint Cumberland County Transportation Plan; lobby for implementation of key transportation projects.

Policy Area 4: A Balanced Transportation System

*Transportation facilities are the essential corridors of commerce and mobility. 2030 policies call for an efficient system of streets and roads, improved mass transit services, as well as more sidewalks, trails and bicycling facilities. The policies also recognize that the way in which we choose to lay out new roads and developments can have a profound impact in reducing automobile dependency and traffic congestion.*

Policy 4.1: Opportunities to ENHANCE REGIONAL TRANSPORTATION CONNECTIONS between Fayetteville and other parts of the state and region shall be supported; such opportunities may include not only roadways but also COMMUTER RAIL PASSENGER SERVICE between Cumberland County and other metropolitan areas within the State.

Policy 4.2: The completion of the OUTER LOOP AROUND FAYETTEVILLE shall be supported as the highest priority highway improvement project in Cumberland County.

Policy 4.3: PEDESTRIAN AND BIKEWAY FACILITIES shall be encouraged as energy-efficient, healthful, and environmentally sound alternatives to the automobile. All future road construction and expansion within the region shall consider opportunities for bikeways and pedestrian ways within the project.

Policy 4.4: Local communities shall strive to make areas under their jurisdiction PEDESTRIAN-FRIENDLY THROUGH DEVELOPMENT STANDARDS AND PUBLIC IMPROVEMENTS.

Policy 4.5: As new neighborhoods are developed, at least two points of access/egress should be provided. The secondary access/egress may be gated with a breakaway wall but should allow for passage of pedestrians and bicyclists.

Policy 4.6: The mobility needs of all citizens shall be recognized through the provision of TRANSPORTATION ALTERNATIVES TO THE AUTOMOBILE. Local communities shall lobby the state and federal governments for pedestrian, bikeway and transit improvements proportionate to the large number of people benefited.
Policy 4.7: An AREA-WIDE BIKEWAY SYSTEM should be tied into the ALL-AMERICAN TRAIL.

Policy 4.8: The operational success of area-wide mass transit services shall be supported through the encouragement of compact, TRANSIT-SENSITIVE DEVELOPMENT PATTERNS. Higher intensity development shall be encouraged along prospective transit corridors, between municipalities and employment centers, Fort Bragg and other population centers.

Policy 4.9: ACCESS TO THE AREA’S MAJOR ROADWAYS shall be managed so as to preserve the intended purpose of the highway and to protect the investment of taxpayer dollars used to build the facility. Methods may include, for example, limited driveway access, minimum lot frontages, the use of service roads and parallel access roads, connections between adjoining parking lots, etc.

Policy 4.10: Opportunities to enhance air passenger service at FAYETTEVILLE REGIONAL AIRPORT shall be supported. Land uses such as industrial development, warehousing and distribution shall be the preferred development activities on lands influenced by airport impacts (e.g. noise and safety issues).

Actions for Vision 4: A Balanced Transportation System

Action 4.1: Re-examine the regional transportation plan in light of the impending dramatic growth of Fort Bragg due to BRAC and Army Modular Force. (The latest information on growth includes a net increase of 7,064 military, an associated 12,716 family member, 1,795 civilians and another 351 contract employees. For the past 26 years, Fort Bragg has been essentially a stable population with no growth.)

Action 4.2: Continue to support the currently adopted area-wide Bicycle and Pedestrian Plan. For more information visit www.fampo.org, click on Programs, then Bicycle and Pedestrian.

Action 4.3: In keeping with currently adopted Bicycle and Pedestrian Plan, include bike lanes as part of street construction standards. Apply these standards when appropriate and as may be consistent with the Bicycle and Pedestrian Plan.

Action 4.4: Reexamine area development standards to evaluate the need for improved pedestrian systems (sidewalks, greenways, etc.) in new residential developments.

Action 4.5: Seek funding sources, such as Enhancement Grants, to provide sidewalks and street furniture, lighting, etc. to improve pedestrian-oriented areas.

Action 4.6: Reexamine area development standards to require bus shelters or, at a minimum, bus pull offs in new higher density residential and commercial developments served by two or more bus routes.
Action 4.7: Seek funding sources to establish commuter-rail passenger service. (Fayetteville Metropolitan Planning Organization (FAMPO) and the RPO to lead.)

Action 4.8: Continue to support development standards that require parking lot connections and shared driveway access for commercial developments whenever possible.

SECTION 1: KEY TERMS AND CONSIDERATIONS OF THE CMP

Congestion Management Process
The Federal Highway Administration has laid out an 8 step process for Congestion Management:

1. Develop Congestion Management Objectives;
2. Identify Area of Application;
3. Define System or Network of Interest;
4. Develop Performance Measures;
5. Institute System Performance Monitoring Plan;
6. Identify and Evaluate Strategies;
7. Implement Selected Strategies and Manage Transportation System; and
8. Monitor Strategy Effectiveness

These 8 steps, or actions, provide a flexible framework for identifying congestion management objectives and developing effective strategies.

Volume to Capacity Ratio (V/C ratio)
This method incorporates a comparison of the volume (the number of vehicles utilizing the roadway in a time period) to the capacity of the roadway (the maximum achievable throughput of the facility). The level of congestion can be measured by establishing whether or not the roadway is functioning above or below an acceptable capacity, and to what extent.

Level of Service Indicators (LOS)
Closely related to V/C ratios are the Level of Service (LOS) indicators, which take V/C ratios a step further by making them more readily understandable by the general public and transportation decision makers, expressed as seconds of delay. Roadways are assigned a letter grade from A-F. An LOS value of ‘A’ indicates that a roadway user would not experience delay. An LOS value of ‘F’ indicates that user demand has exceeded available capacity of the road, a breakdown of facility operation has occurred, and users are likely to experience significant delay.

Travel Speed
There are many common traffic measurements that are derived from the basic traffic flow parameters—flow, density and speed. This aspect describes how these fundamental measures can be applied at the level of the roadway segment, a corridor and over an entire door-to-door trip.

User Perception
It is difficult to establish quantifiable measures of an abstract concept such as user perception. Nonetheless, it is important, as capacity alone does not accurately measure overall system
performance and user satisfaction. LOS indicators play an important role in establishing perception, whereas an LOS value of ‘A’ could mean a user perception of “excellent,” and an LOS value of ‘F’ could mean that the traffic operations of a roadway are completely unsatisfactory. Surveys are an effective tool in measuring user satisfaction. Establishing roadway preference by the users is also effective, as users will try to find a more acceptable alternative if a roadway operation level becomes unsatisfactory.

**Transit Utilization**

One such alternative for users to turn to when traffic congestion becomes unbearable is public transit. Public transportation is a viable means to link employment and shopping to residential neighborhoods within the urbanized area. Public transportation currently serves area hospitals, employment centers, and the major shopping centers. These are the activity centers that attract many of the trips generated within the region. Improved public transportation, service frequency and coverage would make this an attractive alternative to single occupancy automobiles. Also, when trips are moved to a high occupancy vehicle, fewer cars are contributing to traffic congestion and deteriorating air quality. Additionally, when used in conjunction with park and ride lots, transit could serve as a regional congestion mitigation strategy. Therefore, the role of public transportation encompasses congestion mitigation, improved air quality and an enhancement to economic development. Refer to alternative transportation methods on page 18 for more information.

**Accident Rates**

Accident rates are both a cause and effect of congestion. A roadway with high accident rates can experience higher congestion due to the increased number of delays caused by accidents. Conversely, a highly congested corridor can experience a higher accident rate due to high traffic volume. Although congestion is not the only factor contributing to the accident rate of a roadway, it most certainly does have some effect. Therefore, utilizing accident rates in establishing the most highly congested roadways adds one more aspect in the formula, thus making congested roadway selection more accurate.

Through these quantifiable measures the roadways that are currently in need of, or are most likely to become in need of congestion management planning, can be determined.

While major strides and enhancements have been made in the areas of highway safety within North Carolina, there is still room for improvement. In the past ten (10) years, over 15,000 people have lost their lives on North Carolina highways due to traffic crashes.

The Safety Plan addresses local and state trends in more detail.
SECTION 2: IDENTIFYING CONGESTED AREAS AND ROADWAYS

Congestion in the FAMPO region will be analyzed using tools such as Current and Projected ADT figures, Volume/Capacity Ratios, travel time, speed accident rates, and land use to evaluate corridors to determine the levels of congestion.

To determine the priority of a roadway, all roadways can be ranked by the following categories: Current V/C Ratio, Projected V/C Ratio, Accident Rate, Travel Time, Travel Speed, latest available ADT and/or a combination of the above.

Once these corridors are identified using these methodologies, congestion management strategies, such as roadway ITS projects can be developed to mitigate this congestion. By developing methodologies that can be applied to any area, such as access control, ITS strategies, and corridor preservation techniques, congestion management strategies can be applied to different routes as traffic patterns and congestion change due to development. For example, recent access revisions at Fort Bragg have significantly altered traffic patterns in and around the base, and Spring Lake, which required revisions to the originally identified congested corridors.

The congestion ranking for this document uses data included in the newly created FAMPO TransCAD Transportation model and will address a combination of the methods described above, noting that for this area the Modeled Level of Service was established as “E”, a level used in major metropolitan areas, with roads functioning almost to capacity. The maps in the following pages are a visual representation of preliminary data on the Model’s LOS for the base year, the horizon year, and the horizon year with MTP highway projects. Road improvements increase the LOS on highways. However, road projects are not enough, requiring a solid commitment to multi-modal solutions is also paramount in a comprehensive approach to congestion management.

The performance measures and strategies will conform to the lists provided in the Process and will be included in this document upon analysis.
Current Roadway Infrastructure
This map shows the roadway Level of Service based on the 2010 FAMPO Travel Demand Model and the FAMPO Population and Employment estimates.
FAMPO 2040 MTP Highway Map
2040 No Projects Level of Service

No future planned projects
This map shows the roadway Level of Service based on the 2010 FAMPO Travel Demand Model and the FAMPO Population and Employment estimates with no improvements or future projects applied.
FAMPO 2040 MTP Highway Map
All Improvements and Widening

This map shows all improvements that are included in the FAMPO model and that are anticipated to be completed by the horizon year (2040). These projects are what makes the difference between the previous map (2040 No Projects) and the next map (2040 MTP).
FAMPO 2040 MTP Level of Service

This map shows roadway Level Of Service based on 2040 FAMPO Travel Demand Model and on FAMPO Population and Employment Estimates with both fiscally constrained and identified improvements and projects needs applied.
SECTION 3: STRATEGIES FOR RELIEVING CONGESTION

The following elements are samples of tools useful in alleviating congestion throughout the planning area:

- **Street widening** - widening of a street from two to four lanes more than doubles the capacity of the street by providing additional maneuverability for traffic.

- **Intersection improvements** - increasing the turning radii, adding exclusive turn lanes, and channelizing movements can improve the capacity and safety of an existing intersection.

- **Continuous Green Through Lanes** – typically used at “T” intersections to allow at least one lane of a major road through a signalized intersection without stopping.

- **Improving vertical and horizontal alignment** - reduces the congestion caused by slow moving vehicles.

- **Eliminating roadside obstacles** - reduces side friction and improves a driver’s field of sight.

Operational strategies to improve street capacity include:

- **Control of Access** - a roadway with complete access control can often carry three times the traffic handled by a non-controlled access street with identical lane width and number.

- **Parking removal** - Increases capacity by providing additional street width for traffic flow and reducing friction to flow caused by parking and un-parking vehicles.

- **One-way operation** - The capacity of a street can sometimes be increased 20 -50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

- **Reversible lane** - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.

- **Signal phasing and coordination** - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

- **Travel Demand Management** - is another method used to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:
  
  - **Carpools** - Encourage people to form carpools and vanpools for journeys to work and other trip purposes. This reduces the number of vehicles on the roadway and raises the people carrying capability of the street system.
  
  - **Alternate mode** - Encourage the use of transit and bicycle modes.
  
  - **Work hours** - Encourage industries, businesses, and institutions to stagger work hours or establish variable work hours for employees. This will spread peak travel over a longer time period and thus reduce peak hour demand.
- **Land use** - Plan and encourage land use development or redevelopment in a more travel efficient manner.

**ROUNDABOUTS**

North Carolina has recently built over 200 roundabouts across the state-- not counting minor ones in subdivisions and shopping centers. Locally, roundabouts have been included in several high profile projects, including Ray Road in Harnett County and Glensford Drive in Fayetteville, which 4 and 3 roundabouts respectively.

Roundabouts are a proven safety solution that prevent and reduce the severity of intersection crashes. Roundabouts are designed to meet the needs of all road users—drivers, pedestrians, pedestrians with disabilities, and bicyclists. A roundabout eliminates some of the conflicting traffic, such as left turns, which cause crashes at traditional intersections. Because roundabout traffic enters or exits only through right turns, the occurrence of severe crashes is substantially reduced.

**How Roundabouts work**

In place of a red light or a stop sign to hold some drivers while others turn left or drive through the intersection, a roundabout pulls everybody into a circle.

When traffic is heavy, you pause at a yield sign until you can enter the counterclockwise flow. When the circle is clear, drivers on each street can move through the intersection without stopping.

It's a little slower than moving through a green light -- but a lot faster than stopping for a red one. That little slowdown is one reason roundabouts reduce crashes.
Super Streets

Freeways in urban areas routinely experience significant traffic congestion during several peak demand hours. Construction of additional freeway lanes could solve this problem, but because of economic, political, and social constraints, this is not always feasible. Diversion of short trips from freeways to arterial streets could help solve the problem without construction of new freeway lanes. However, such diversion will occur only if the traffic speed and capacity of selected urban arterial streets can be improved significantly. The regional arterial, or super street, is proposed as a class of facility that would have the continuity, speed, and capacity characteristics to attract short and medium-length trips. Through several research efforts, design and operational guidelines for regional arterial (super) streets have been developed. These are conceptually described and evaluated in terms of significance to the success of the regional arterial concept.

Benefits of incorporating design principles of superstreets in projects include:

- Decreased impacts for Right of Way
- Decreased conflict points leads to safer roads
- Increased capacity preserves corridor with minimal resources

**CONVENTIONAL INTERSECTION**

**SUPERSTREET**
**COMPLETE STREETS**
Complete Streets are designed to offer something for everyone including sidewalks, bike lanes, wide shoulders, plenty of crosswalks, refuge medians, special bus lanes, raised lanes, audible pedestrian signals, bus pull outs, and sidewalk bulb-outs. These streets encourage walking and bike riding and improve safety. Fiscally, they make better sense. It is a great item to have in the congestion management tool box.

Locally, Project U-4405 (Raeford Road) is the first major project being designed using NCDOT’s Recently Approved Complete Street Design Guidelines. The public hearing map can be found on NCDOT’s website.

---

**Results of Strategies**

**SAFETY IMPROVEMENTS**
As stated in the American Association of State Highway and Transportation Officials (AASHTO) and NCDOT’s Strategic Highway Safety Plan (SHSP), by applying the “Four E’s” principles in safety planning process, the number of fatalities and serious injuries in the FAMPO area should diminish. One of the current issues that may delay reaching state and national goal in crash rate reduction is the fact that Vehicle Miles Traveled (VMTs) are still increasing, even if at a lower rate than in previous years. Higher VMTs equal more opportunities for vehicular/modal conflicts. It becomes a necessity to review a variety of strategies to accomplish our goal to significantly reduce fatalities and severe injuries on our roads. Many forms of Transportation Demand Management (TDM) employed in Congestion Reduction and for Air Quality improvement can also be used in making our road system safer for all citizens.

Alternative transportation methods provide the means for people to reduce the use of single-occupancy vehicles, thus lowering the number of vehicles on the roadways, reducing VMTs,
traffic congestion and accident potential. The annual FAMPO Vehicle Occupancy Rate (VOR) report for 2013 shows that ridesharing is steady in this area, but that it still needs to improve. With a VOR rate of 1.06 for the Fort Bragg Survey area and 1.14 for the Central Business District Survey area, it is evident that carpooling should be increased, even if these numbers are still above the National average of 1.07. With the Nation in a recession and a hike in gasoline prices that occurred during the summer, the increase in use of alternate modes of transportation is becoming more of a reality. Transit usage in the nation has been steadily increasing, providing local transit agencies with the opportunity to expand their client base.

The Fayetteville Area System of Transit (F.A.S.T.) is the only form of public transportation currently available to the general public. It operates only within the municipal boundaries and offers limited service for the area making it a less attractive mode of transportation. A major upgrade of the entire system and service area should occur before this service could be considered a viable strategy in safety planning.

Other transportation methods include ridesharing and van-pooling which have a similar effect on VMTs as transit usage. Bicycle and pedestrian facilities can also decrease conflict between vehicles and pedestrian/non-motorized transport.

PERFORMANCE OF THE CURRENT AND FUTURE TRANSPORTATION SYSTEM WILL BE MEASURED BY A REDUCTION IN ROADWAY CONGESTION AND IMPROVEMENTS IN AIR QUALITY.

Other congestion management strategies that are been used include providing better traffic signalization and intersection improvements aimed at reducing delays on arterial streets; and, maintaining the flow of traffic with such programs as park-and-ride.

Pedestrian Improvements

The following are City of Fayetteville Pedestrian Improvement Projects:

- The city has improved the intersection of Hay St. at Woodside Ave. with the addition of signalized pedestrian crossings.

- The city has signalized Sycamore Diary Rd. at Legend Ave. (City has future plans to realign Legend Ave. with Skibo Rd.)

- Future intersection improvements to Langdon Street at Ramsey St.

- NC 210 (Murchison Rd.) FSU Pedestrian Improvements: Spot Safety Project
  NC 210 (Murchison Rd.) at US 401 (Pamalee Dr./Country Club Dr.): Project resulted from a pedestrian safety audit

- NC 53 (Cedar Creek), mid-block crossing: Project resulted from a pedestrian safety audit

Current/Future Projects:
• Owen Drive, pedestrian improvements (signalized crossings, city has future sidewalk planned in CIP)
• Grove St. Eastern Blvd., pedestrian improvements
• Big Cross Creek Greenway
• Raeford Road, pedestrian improvements

The following are NCDOT Projects:

**Pedestrian Improvements**

- NC 210 (Murchison Rd.) FSU Pedestrian Improvements: Spot Safety Project – Project has been completed. Installed a traffic signal with pedestrian signal heads.
- NC 210 (Murchison Rd.) at US 401 (Pamalee Dr./Country Club Dr.): Project resulted from a pedestrian safety audit – Project has been completed. Upgraded traffic signal and installed pedestrian crosswalks and pedestrian signal heads on all approaches.
- NC 53 (Cedar Creek), mid-block crossing. Project resulted from a pedestrian safety audit – Project has been completed. Installed a high-visibility, mid-block crosswalk with concrete median refuse island and advanced pedestrian signing.

**Current/Future Projects**

- Owen Drive, pedestrian improvements (signalized crossings, city has future sidewalk planned in CIP – Owen Drive (SR 1007) from I-95 Business/US 301 to Walter Reed Road. Construct a median and revise traffic signals at signalized intersections. (W-5514). Public meeting was held on Tuesday, December 10, 2013 at Massey Hill Recreation Center. Grove Street Eastern Blvd., pedestrian improvements – W-5335, work on project should begin the first of 2014. Awaiting completion of the bridge project over Cross Creek on Grove Street. Ramsey Street/Green Street to the Cape Fear River Bridge and I-95 Business/US 301 (North Eastern Boulevard), NC 210 to Person Street. Construct a raised median and provide upgraded pedestrian accommodations.
- U-4405 Raeford Road, median project.
- 11.2 Miles, 18.02 Km; Resurfacing NC 24, from I-95/US Business to SR 1006 (Clinton Road/Maxwell Road); NC 24-87, from Rowan Street to the US 401 Bypass. (R-5512, R-5513, 45465.3FS1, STP-0024(53)).
- 6.87 Miles, 11.06 Km; Paving, Signals, Signing Fayetteville Outer Loop – From east NC 210 (Murchison Road) to US 401. X-00022CC, 35196.3 FS22, NHF-0100(23).
SECTION 4: CONGESTION MANAGEMENT AND FORT BRAGG FORCE PROTECTION

Following the events of September 11, 2001, Fort Bragg has permanently restricted entry onto post. Successful mitigation of congestion in and around the Fort Bragg area will remain a dynamic process, continuously evolving as events and solutions arise.

The most recent major change to access to Fort Bragg for all non-Department of Defense (DoD) visitors occurred on November 15, 2013. Effective November 15, 2013, all non-DoD visitors operating a non-commercial vehicle must now proceed to the All-American Visitor Center located on All-American Freeway to be processed for a visitor pass. As part of this process, a National Criminal Information Center (NCIC) check will be conducted for all persons in each vehicle entering post. Non-DoD visitors will no longer be able to enter Fort Bragg by way of the Knox Street, Randolph Street or Longstreet Road Access Control Points without first obtaining an Automated Installation Entry (AIE) card or pass. Also beginning Nov. 15, 2013, all commercial vehicle operators are having to enter the Knox Street Truck Plaza to have their vehicle inspected and processed for an AIE pass. Checks will also be conducted for all persons in vehicles entering through the Truck Plaza.

The Longstreet ACP will remain a 24-hour alternate truck plaza as long as all personnel in the commercial vehicle have either a current AIE badge or pass. The Honeycutt Road ACP will accept commercial vehicle traffic from 9 p.m. until 5 a.m., Monday through Friday and 1 p.m. until 5 a.m., Saturday and Sunday as long as all personnel in the commercial vehicle have either a current AIE card or pass.

These processes will not affect Department of Defense personnel, Common Access Card holders, retirees, Family members, government contractors or personnel that all ready possess a current AIE card or pass from entering post in a non-commercial vehicle. Passes for non-DoD ID card holders can be obtained for up to 10 days; DoD-sponsored visitor passes are available for up to 30 days. Potential entrants must have valid government issued identification, valid vehicle registration and know their Social Security Number.

Some existing projects will offer relief for the Fort Bragg/Pope AAF area. The Fayetteville Outer Loop (TIP Projects X-2 and U-2519) will offer high-speed limited access to Fort Bragg/Pope AAF. NCDOT engineers are currently reevaluating the design of the interchanges on Fort Bragg to better accommodate altered traffic patterns at the controlled checkpoints. The Fort Bragg portion of the X-2 Project (from US 401 N to just west of NC 210) and project U-2519 are currently under construction. Intelligent Transportation System (ITS) elements have been included in the construction of the Outer Loop. The proposed ITS for the Outer Loop includes dynamic message signs and cameras, linked by fiber optic cables, to inform travelers of pertinent traffic information.
Project U-3423 (Bragg Blvd), which runs from US 401 Bypass (Skibo Road) to the proposed Outer Loop interchange, has improved the service of Bragg Boulevard as it approaches Fort Bragg. The most recent major checkpoint improvement is the $12 Million Chicken Road Access Control Point which is under construction. It is scheduled for completion in late Summer 2014. Fort Bragg’s desire to install a controlled checkpoint on Bragg Boulevard necessitated major alterations to the project, and the segment within the Fort Bragg boundary was deleted. In order to accommodate the expected traffic pattern change, a new TIP project (U-4444) was established on Murchison Road with the intention of diverting south-northbound through traffic away from Bragg Boulevard onto Murchison Road. This project will improve traffic flow for vehicles traveling north on NC 210, will ease the severe congestion at the convergence of NC 210/24/87 in Spring Lake, and will also increase post security by diverting through traffic away from sensitive areas of Fort Bragg. To further accommodate the expected traffic pattern changes, the widening project U-5101 connecting Shaw Road, Rosehill Road, and Stacey Weaver Drive will allow for better movement of traffic between Ramsey Street, Murchison Road and Bragg Boulevard.

Fort Bragg has improved several controlled checkpoint sites. The checkpoints are designed to operate efficiently under heavy traffic conditions. Additionally, all truck traffic entering Fort Bragg was directed to the entrance on Bragg Blvd and Knox St, and construction of an improved truck inspection plaza has been completed.

In an effort to decrease congestion, improve air quality, enhance safety and the quality of life for everyone working and living on the installation, Fort Bragg is also working on several other projects. For example, the Sustainable Installation Design Guide requires all new construction projects to have provisions for sidewalks and bike racks. Promoting walking and bicycling on post can help decrease the number of vehicles on the roads. Also, in June 2002 Fort Bragg instituted the Installation Shuttle Bus Program offering a free bus service around the post. Hundreds of soldiers take advantage of the service every month, which also contributes to decreasing the number of automobiles on the road.

Truck routes serving Fort Bragg have been realigned to reflect the new freight management pattern, and new ITS signs are scheduled to be installed to direct drivers of through movement onto alternate routes that bypass Fort Bragg. Great improvements have been made in and around Fort Bragg since the event that occurred on September 11, 2001, and as Fort Bragg solidifies its traffic control strategies, congestion management planning for the Fayetteville Metropolitan Area will ensure the most efficient and safe traffic flow possible.

The implementation of BRAC (2005 Defense Base Realignment Closure and Commission) at Ft. Bragg has been a tremendous task for the military and government officials. The result is that Pope Air Force Base has been closed and taken over by Fort Bragg. The Air Force Reserve has been assigned to this base. It has brought about significant changes to the local and surrounding communities as to how they relate to and work with Fort Bragg.
SECTION 5: CONGESTION MANAGEMENT STRATEGIES FOR THE FAYETTEVILLE METROPOLITAN AREA

CREATIVE INTERSECTION DESIGNS
In many instances, traditional intersection designs fall short of providing acceptable levels of service. Through creative intersection design, various engineering solutions offer new alternatives to old problems. There are many design proposals available, several of which have successfully been employed in other areas. Much of the congestion that occurs at intersections is due to left turning movements. Many unconventional designs attempt to reroute left turning movements, thus making the intersection flow more efficiently.

Several alternative designs are being considered which will introduce a presence of unconventional intersections in the Fayetteville Metropolitan Area. Continuous green through lanes are being considered on Robeson Street at the intersection of Village Drive. The T-intersection at Andrews Road and Ramsey Street is also being considered as a candidate for continuous green through lane design. An advance left turn design at the intersection of McPherson Church Road and Raeford Road is completed, and City Engineers have completed construction of a roundabout (traffic circle) at the intersection of Ray Avenue and Maiden Lane. This has helped to improve the appearance of the downtown area.

One alternative design that is proposed to be implemented as corridors around the area begin to become congested is directional crossovers to create “Super Streets”. These crossovers restrict left turning movements on side streets at intersections forcing motorist to make right turns and u-turns to access the opposing direction of the main lane. These types of intersection treatments reduce potential conflict points, therefore reducing potential accidents. They are also used as a strategy to provide additional capacity to congested corridors without requiring the widening at that roadway and all the necessary accommodations that are associated with that widening such as right-of-way acquisition or environmental impacts.

Another design that has been considered but is not currently planned for use in the Fayetteville area is the Center Turn Overpass (CTO). With this design, turning movements are elevated above the through lanes, effectively isolating left-turning movements so that they do not impede with oncoming traffic. Though creative, local officials and engineers did not support use of this design due to questionable design standards (such as steep inclines), and general unfamiliarity of the design, since there currently exist no functioning intersections utilizing the CTO.
ACCESS MANAGEMENT
Access management is the proactive management of access points to land parcels adjacent to all manner of roadways and the balance of mobility and access. Access management encompasses a set of techniques used to control access to highways, major arterials, and other roadways. These techniques include:

Access Spacing: increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion and improves air quality.

Driveway Spacing: Fewer driveways spaced further apart allows for more orderly merging of traffic and presents fewer challenges to drivers.

Safe Turning Lanes: dedicated left- and right-turn, indirect left-turns and U-turns, and roundabouts keep through-traffic flowing. Roundabouts represent an opportunity to reduce an intersection with many conflict or a severe crash history (T-bone crashes) to one that operates with fewer conflict points and less severe crashes (sideswipes) as they occur.

Median Treatments: two-way left-turn lanes and nontraversable, raised medians are examples of the most effective means to regulate access and reduce crashes.

Right-of-Way Management: as it pertains to R/W reservation for future widenings, good sight distance, access location, and other access-related issues.

DESIGNATED TRUCK ROUTES
The adoption of designated truck routes is an important step in establishing the most efficient traffic flow throughout the Fayetteville Metropolitan Area. By providing designated routes for freight movement, large vehicles are channeled away from residential, secondary, and collector streets, where adverse effects may occur. Such streets may not have been designed to accommodate large, heavy vehicle traffic.

The establishment of both local and through truck routes will efficiently guide the movement of truck freight through, around, and within the Fayetteville Metropolitan Area. It will also effectively address freight issues related to the closing of Fort Bragg. For additional information, see the Freight Plan.
Map 4: Truck Routes Map
ROADWAY IMPROVEMENTS
Roadway improvement is likely the most common approach to congestion management. As congestion levels increase along a corridor, roadway improvements help to provide for larger capacity and better traffic flow. The major road improvement categories include road widening projects, traffic flow revisions, signal phasing, new roadway construction, spot safety projects, bridge replacement or improvement, and intersection improvements. The Metropolitan Transportation Improvement Program (MTIP) is the local portion of the State TIP, which lists projects included in the highway program. There also exist city and division design and construct projects that are not included in the TIP.

Operations improvement at the intersection level includes the application of traffic signal design called “Dallas Phasing” which has been implemented at many intersections in Fayetteville. Dallas Phasing eliminates the potentially unsafe "yellow trap" situation by allowing a continued permissive left turn during the opposite approach lagging protected left-turn phase. Research has shown that this operation reduces delay and improves safety. Dallas Phasing is in successful and well-received operation throughout the area.

To review the recent and proposed City and Division Design and Construction Projects go to the following websites: ncdot.org and fampo.org

ALTERNATIVE TRANSPORTATION METHODS
Alternative transportation methods provide a means for people to reduce the need for single-occupancy vehicles, thus lowering the number of vehicles on the roadways, reducing traffic congestion, and improving air quality. Mass transit is available in many forms, however all types are not available in our area. Currently, the main form of mass transit serving the Fayetteville Metropolitan Area is the city-operated Fayetteville Area System of Transit (F.A.S.T.). This bus system currently operates throughout the city on a fixed-interval route system, and a proposal to expand to a countywide transit system is in place and is currently being updated. The service area is expanded when possible, such as Route 40 between Spring Lake and the Cross Creek Mall area.

Preliminary plans are also being considered for Park and Ride facilities at several locations in Cumberland County, which will act to increase the attractiveness of mass transit and make it a viable alternative for a larger audience.

Other alternative congestion management methods include ridesharing, van sharing, staggered work hours, and telecommuting. By encouraging carpooling, vehicle occupancy rates would increase, thus lowering the number of vehicles on the roadways, and lowering the amount of land necessary for vehicle parking. Staggering work hours does not reduce the actual number of vehicles on the roadways; however it does reduce negative effects of peak time traffic by distributing it over a longer period of time. Employers who allow telecommuting not only reduce the number of vehicles on the roadways and improve air quality, but also reduce travel costs for the employee in both time and dollars.
Map 5: Current Transit Map

Inset: Downtown Fayetteville
FAYETTEVILLE TRAIN OPERATIONS STUDY
Train-vehicle conflicts in the Central Business District prompted a study to be done on how to alleviate the congestion caused by the trains. The Fayetteville Train Operations Study was completed in March of 2008 by Gannett Fleming in association with Rail Safety Consultants for the North Carolina Department of Transportation Rail Division in cooperation with the City of Fayetteville. The purpose of the study was to document the deficiencies with the current rail operations in Fayetteville (including the problems of trains blocking various at-grade railroad/roadway crossings in the downtown and adjacent areas), and to recommend changes to improve the efficiencies of all three operating railroads and thereby also improve the automobile and pedestrian traffic flow in Fayetteville. Through SAFETEA-LU the City of Fayetteville was able to secure an earmark for $9,460,000 to implement recommendations made in the Fayetteville Train Operations Study. The required state and local match consists of 20%. The projects that are funded are listed in the State Transportation Improvement Program as P-4901 A, P-4901 B, and P-4901 C. Fayetteville is shown in figure A with all the rail lines that serve the area. Figure B shows the location of the downtown projects.

P-4901 A: Construct railroad connector track between CSX ‘A’ Line and ‘AE’ Line (Fort Bragg Spur). This connector track will provide direct south to northwest movement of Fort Bragg trains to eliminate crossings of streets by trains and associated blockages.

P-4901 B: Construct railroad connector track between CSX Williams St. yard lead and A&R Railroad. This connector track will provide direct east to northerly movement of trains to eliminate crossings of streets by trains and associated blockages by relocating switching operations.

P-4901 C: Capacity and rehabilitation improvements to railroad yards near Williams St. Railroad yards are to be improved to eliminate crossings of streets by trains and associated blockages by making railroad switching operations more efficient.
Map 6: Rail Projects Occurring in Downtown Fayetteville
SECTION 6: INTELLIGENT TRANSPORTATION SYSTEM (ITS)

ITS Strategic Deployment Plan Update

Over the past two decades, North Carolina has committed substantial resources to the deployment of intelligent transportation systems (ITS) to improve the safety and effectiveness of the state’s transportation network, providing increased mobility to all who use it. Advances in technology and operational approaches in ITS have led to great strides in the use of ITS solutions worldwide. Along with these improvements, the United States Department of Transportation (US DOT), through the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA), has refined and advanced the requirements and guidance surrounding ITS planning and implementation. These advancements, largely finalized over the past few years, represent a significant modification to the guidance and requirements that were in effect when the original FAMPO ITS Strategic Deployment Plan (SDP) was developed in 2001. The substantial build-out of the 2001 plan, in concert with the region’s maturity in ITS operations and deployment and the refined requirements landscape, warranted the need for a revised and more all-encompassing SDP.

Along with providing the FAMPO region with a comprehensive road map for implementing ITS, the updated SDP (completed in 2013) provides resources and templates that can be used by stakeholders in the region to support both planning for and implementation of ITS projects. The FAMPO Regional ITS SDP Update conforms not only to the latest federal standards, but also acknowledges the needs and requirements of the many regional, state, and federal agencies involved in the planning, implementation, operations, and maintenance of ITS deployments. This project expands the boundaries of a traditional SDP by providing its users specific processes and tools that have been tailored to augment and complement their current procedures for planning and deploying ITS.

The ITS SDP update effort used many of the outputs and products that were developed for the Triangle SDP Update, completed in 2010. Some of the new results and products of this SDP update include:

• Updated snapshot of ITS best practices across the country and internationally;
• Vision, goals, and objectives defined specifically for the FAMPO region;
• Gap assessment describing regional gaps that could be bridged by ITS solutions to address the region’s objectives;
• Regional ITS architecture that includes project level architectures;
• Multi-modal and regional list of projects for highway and transit as well as regional deployments;
• Evaluation and prioritization of the projects; and
• Guidance for linking and integrating ITS planning with transportation planning.

The importance of collaboration and coordination between agencies and between branches, units, and sections within NCDOT has long been recognized. Long-range planning typically involves groups of stakeholders who often represent different interests or jurisdictions involved in the planning process. The FAMPO Regional ITS SDP was developed through a partnership between
multiple agencies with a focus on developing tools and guidance that allow those agencies to implement and maintain ITS systems. For the FAMPO region, this effort involved input from a number of agencies at the local, regional, state, and federal levels. The Steering Committee, which is a subset of the stakeholder group, led the effort for the SDP Update. Existing practices from each of the participating agencies were integrated into a single regional approach to ITS planning that can be used as a model across the state. The structure of the SDP itself also was developed in a manner that allows stakeholders to easily maintain the components that are more dynamic, such as the regional ITS architecture and project evaluation matrix.

The FAMPO Regional SDP follows a needs-focused and value-delivered based approach to project development. Stakeholders in the FAMPO area collaborated for the development of the regional vision, goals, and objectives to drive the ITS needs of the region. These objectives were compared against an inventory of existing ITS deployments to derive a summary of needs, or gap assessment. The stakeholders were then able to develop a regional ITS architecture and identify a list of potential projects for the region. The result of the process is a comprehensive, prioritized list of projects rooted in the needs and consistent with the vision of the region.

The stakeholders were active participants in all phases of the SDP development. The agencies represented by the stakeholders cover multiple modes and stages of involvement with ITS (planning, design, and operations). Participation with the SDP development varied and included participation in meetings, data collection, input on needs and issues, and the review of key documentation. The following list includes the agencies that participated in the development. An asterisk (*) designates that the stakeholder was a member of the FAMPO ITS Strategic Plan Steering Committee.

• City of Fayetteville *
• Cumberland County *
• Fayetteville Area Metropolitan Planning Organization (FAMPO) *
• Fort Bragg *
• Federal Highway Administration (FHWA) *
• North Carolina Department of Transportation (NCDOT) *
• Fayetteville Area System Transit (FAST)
• Harnett County
• Hoke County
• North Carolina Division of Emergency Management

As part of the SDP update, the project steering committee engaged in a process to establish a vision, goals, and objectives that would be used to guide the development of the short, medium, and long term components of the SDP. These were developed through extensive interviews with regional stakeholders and review of the planning documents from the region and from throughout the state. The vision statement provides a unified guideline for validating future strategic decisions. Once the vision was defined, four goals and their associated performance measures were developed. While the goals are broad statements of what the region hopes to achieve, objectives are specific, achievable, measurable statements of what will be done to achieve goals within a defined time frame. For each objective, one or more performance measures were defined; performance measures are quantitative or qualitative characterizations of performance that are used to evaluate how well the objectives are being realized. The resulting
set of outputs was reviewed and revised by both the steering committee and a larger group of FAMPO stakeholders. The vision, goals, objectives and performance measures served as the basis for the development of a Gap Assessment and the definition of the Regional ITS Architecture that addresses the gaps. The full ITS Architecture Plan can be found on our website, www.fampo.org.

Non-motorized transportation

Congestion management must be multi-modal. Therefore, the inclusion of non-motorized transportation alternatives is an integral element. Currently, the Fayetteville Metropolitan Area has active Bicycle and Pedestrian Plans. These plans are being updated, and are routinely maintained to keep abreast of the changing needs of our area. Additionally, TIP projects E-3125 and E-4539 will provide new alternatives to motorized vehicle travel. Project E-3125 is a greenway bicycle facility from Mazerick Park to North Pearl Street, which was completed in 2003. Project E-4539, also known as the Cape Fear River Trail, is a phased project with Phase I, from Methodist College to Clark Park, is currently under construction. The long-term plan for E-4539 is to become the Fayetteville Area segment of the East Coast Greenway, and to eventually provide for a continuous bicycle trail from the Averasboro Battleground in the North southward to the Huske Lock and Dam on the Bladen County Line, with an additional trail along Cross Creek.

Municipalities are also involved in the promotion of non-vehicular modes of travel. The City of Fayetteville Traffic Engineering Department is developing a study to establish bicycle routes along neighborhood streets with ample right-of-way and existing pavement surfaces. The bicycle lanes would include road striping and signing along the proposed routes, and would require little or no additional construction. Additionally, the Town of Hope Mills exhibits a proactive approach to sidewalk construction by providing local match along roadways that are currently outside the Town Limits, but are within annexation plans.
Map 7. FAMPO ITS Device Map
Conclusion

Congestion has become a way of life for most people living in urbanized areas. Although great improvements have been made in the Fayetteville Metropolitan Area, congestion remains a constant and ever changing problem. As our area continues to grow, maintaining adequate transportation systems for the Fayetteville Metropolitan Area will become increasingly challenging. For this reason, this plan is intended to be dynamic, able to adapt to new challenges that will arise in the future.
REFERENCES


THIS PROJECT WAS PARTIALLY FUNDED BY GRANTS FROM
THE FEDERAL HIGHWAY ADMINISTRATION
AND
THE FEDERAL TRANSIT ADMINISTRATION

Congestion Management Plan written by the
Fayetteville Area Metropolitan Planning Organization

In cooperation with the
Citizens Advisory Committee,
Transportation Policy Board and the
Transportation Technical Coordinating Committee

Mr. Bobby McCormick, Principal Planner, FAMPO

This Congestion Management Plan was partially funded by grants

From

The Federal Highway Administration

And

The Federal Transit Administration
FAMPO
Fayetteville Area Metropolitan Planning Organization

Historic Courthouse
130 Gillespie Street
Fayetteville, NC 28301
fampo@co.cumberland.nc.us
Telephone: (910) 678-7614
Fax: (910) 678-7638
www.fampo.org