

10. TRANSPORTATION SYSTEMS MANAGEMENT

INTRODUCTION

Transportation Systems Management (TSM) is the process of optimizing the existing transportation system and infrastructure. TSM focuses on enhancing the existing infrastructure to increase roadway capacities, integrate transportation and land use planning and reduce congestion within the Wilmington Urban Area. TSM strategies include optimizing signal timing and operations, geometric design, intersection modifications, access management, and bicycle and pedestrian planning initiatives.

The *Cape Fear Commutes 2035 Transportation Plan* recommends the creation of a Regional Transportation Commission to plan, design, operate and maintain transportation infrastructure improvements for the tri-county region that includes Brunswick, New Hanover and Pender Counties. The Regional Transportation Commission would also be responsible for implementing the recommendations outlined below in the TSM section.

RECOMMENDATIONS

Traffic Signal Timing Optimization

Traffic signals function in different patterns that include pre-timed, semi-actuated, actuated or actuated-coordinated.

- Pre-timed signals have a pre-described timing for each movement and cannot be modified.
- Semi-actuated signal have established green times for some movements and have an opportunity for additional timing that can be allocated to some movements. This actuation is dependent upon the vehicle detection for specific movements of the intersection.
- Actuated signals all have a form of detection. The green time is allocated to each movement based on the signal timing and vehicle detection at each of the intersections.
- Actuated-coordinated signals function as fully actuated signals and are coordinated with adjacent intersections to improve mobility and traffic flow along the corridor. These coordinated systems help the progression of traffic along the corridors and help to efficiently and effectively move traffic throughout the community.

The traffic signal timing optimization is to adjust the signal timings to enhance the capacity of the roadway intersections and corridors. This is a very cost effective way to improve traffic flow throughout the community.

The City of Wilmington and North Carolina Department of Transportation recently completed the upgrade of the traffic signal system in the City of Wilmington. This included upgrading 210 signals throughout the City of Wilmington and New Hanover County from a combination of various signal configurations to one cohesive integrated system. This included replacement of all intersection control equipment, installation of over 60 miles of fiber optic cable, addition of wireless communication units, upgrade of 11 traffic monitoring cameras and installation of an additional 21 cameras. Some traffic signals in the unincorporated areas of New Hanover County and all signals in

Pender and Brunswick Counties are operated and maintained by the North Carolina Department of Transportation and are not part of this upgrade.

The *Cape Fear Commutes 2035 Transportation Plan* recommends that all new traffic signals within the Wilmington Urban Area be connected to and coordinated with the City of Wilmington's traffic signal system. Where possible, these signals should be constructed as actuated-coordinated to efficiently and effectively utilize the resources available to improve traffic flow throughout the system. The *Cape Fear Commutes 2035 Transportation Plan* recommends that each traffic signal within the Wilmington Urban Area be studied periodically for seasonal variation and to determine the appropriate signal timing. Timings should be changed periodically to accommodate the changes in traffic volumes at the intersections.

The intent of this strategy is to synchronize all of the traffic signals within the Wilmington Urban Area in an effort to improve mobility and safety throughout the community which also reducing greenhouse emissions. The synchronization of these signals will improve roadway capacity and reduce delay at the intersections and improve the level of service along each corridor.

Vehicle Detectors Repair/Replacement

The vehicle detectors are an important element in the function of an efficient traffic signal system. The devices are installed in the roadway at signalized intersections to initiate a signals response to a vehicle. These devices serve as indicator loops that are placed in the travel lanes within the pavement. Other vehicle detection devices include video cameras that provide pixel sensitizing. These detection devices improve the efficiency of the intersections by optimizing the signal timing lengths based on the traffic at the intersection and allow for more "green" time to be allocated to the priority movements. The use of these devices can have a significant impact on mobility and traffic flow along entire corridors within the Wilmington Urban Area.

The *Cape Fear Commutes 2035 Transportation Plan* recommends that as roadways are constructed, widened or resurfaced, the Wilmington MPO coordinate with the City of Wilmington and North Carolina Department of Transportation to fund and implement loop detectors at all signalized intersections. As new signals are installed, the plan recommends coordination with the City of Wilmington and North Carolina Department of Transportation to install traffic cameras where appropriate.

This strategy will help to ensure that the intersections are functioning appropriately and help to improve efficiency at the signalized intersections. The installation of new loops with the construction, widening or resurfacing will reduce costs and improve efficiency.

Additional Turn Lanes

Turn lanes can be installed at signalized and un-signalized intersections to improve efficiency. The construction of turn lanes will help to improve the operating condition of the intersection by providing additional capacity. The installation of these turn lanes at unsignalized intersections and along roadway corridors are designed to help to remove the turning vehicles from the through lanes. Properly designed turn lanes can help to minimize delays and improve traffic flow. The appropriate length of a turn lane often depends on the existing and anticipated turning volumes during the peak

hour. Access management plays an important role in determining the appropriate locations and lengths for right and left turn lanes.

The *Cape Fear Commutes 2035 Transportation Plan* recommends the study and, where appropriate, the construction of right- and left-turn lanes to reduce delay and improve mobility at signalized and unsignalized intersections and along roadway corridors. The plan recommends funding from the municipalities and North Carolina Department of Transportation be allocated for the construction of these turn lane improvements. The *Cape Fear Commutes 2035 Transportation Plan* recommends that as land development occurs, the local municipalities and counties work with the WMPO to develop appropriate access management strategies and appropriate turn lane storage lengths to accommodate the developments. The land developers should be required to contribute funding for the construction of the required improvements through the land development process.

Care should be taken when designing turn lanes not to negatively impact the pedestrian realm and disrupt existing or planned bicycle facilities. When feasible, it is recommended that channelized right-turn lanes be used to minimize the crossing distance for pedestrians. It is also recommended that corner radii at intersections be constructed to accommodate the most common vehicle, not the “worst case scenario.” Large corner radii increase the speed of turning vehicles and endanger pedestrians traveling along a roadway corridor. Pedestrian refuge islands should also be considered when adding dual left-turn lanes at an intersection.

Pavement Markings

The installation of pavement markings is intended to provide information to roadway users utilizing the roadway. These markings can be installed in addition to or to supplement signs and traffic signals. These marking are used to delineate bicycle lanes, crosswalks, school zones, stop control, and edges of travel lanes.

The *Cape Fear Commutes 2035 Transportation Plan* recommends the evaluation of pavement markings on an annual basis to determine the need for re-installation of the markings. As development and/or redevelopment occur, each proposal should be reviewed to determine the appropriate pavement markings for installation. The plan recommends the installation of pavement markings using thermoplastic as opposed to paint to provide guidance and information to the roadway users that include bicyclists, pedestrians and motorists. This strategy could also reduce delay by providing motorists with additional time to make decisions about their route choices.

Variable/Dynamic Message Signs

The use of variable message signs (VMS) is an important traffic control device that can provide real-time information to motorists. VMSs are either located on a fixed structure or on trailers which can be moved easily throughout the community. VMSs convey information to travelers regarding incidents that occur frequently (i.e. bridge opening) or unusual driving conditions (i.e. accident information, construction or maintenance, speed reduction, wet pavement, lane closures, speed limits, event notifications, etc.). VMSs are an important element of an Intelligent Transportation Systems (ITS) which is aimed to provide motorists information to alleviate congestion during peak periods and to alert drivers to avoid certain congested areas.

The *Cape Fear Commutes 2035 Transportation Plan* recommends the WMPO utilize variable message boards to convey frequent and unusual driving conditions to motorists. The WMPO should work with the North Carolina Department of Transportation to implement an area wide ITS plan and system for the region. The WMPO should work cooperatively with the North Carolina Department of Transportation to evaluate potential locations for the installation of stationary devices. The WMPO and North Carolina Department of Transportation should utilize movable VMSs to provide information on construction or maintenance, speed reduction, wet pavement, lane closures, speed limits, event notifications, safety messages, and amber alerts.

The North Carolina Department of Transportation currently disseminates information using VMSs and Highway Advisory Radio. Additionally, NCDOT developed and implemented a 511 system in 2004 that disseminates information over the telephone. The WMPO should work collaboratively with the North Carolina Department of Transportation to introduce and utilize new technologies as they become available to provide roadway users with real-time travel information.

This strategy will help to improve mobility by providing information to motorists in an effort to avoid congested areas.

Sign and Lighting Upgrade

The installation of improved signage and lighting can enhance the safety for drivers, bicyclists and pedestrians. These improvements can provide wayfinding assistance and directions to important features (police stations, fire station, parks, etc.), improve visibility and enhance the streetscape of particular corridors. The use of improved signage and lighting creates a safe and attractive environment for all users.

The Wilmington City Council adopted the *Wilmington Signage Plan* in February 2009 that will serve as a guide for the installation of wayfinding signage throughout the city. The *Wilmington Signage Plan* is a result of the need for consistent, uniform signage standards, as indicated in the *Vision 2020 Plan* and the *Cape Fear Historic Byway Corridor Management Plan*.^{*} The plan provides recommendations for vehicular and pedestrian wayfinding. This program will serve to provide direction to important city features.

The *Cape Fear Commutes 2035 Transportation Plan* recommends implementation of the *Wilmington Signage Plan*. The WMPO and North Carolina Department of Transportation should review the current signage program for the Wilmington Urban Area to determine any modifications that provide improved information to the traveler. The WMPO and North Carolina Department of Transportation should review the signs and streetlight details to determine potential enhancements with the construction of roadway, bicycle and pedestrian projects.

This strategy will help to improve mobility and safety and enhance aesthetics. It will provide a means of communicating information to residents and visitors on important community features. The improved street lighting will improve the safety of bicyclists, pedestrians and motorists.

Access Management

Access Management (AM) is a set of techniques state and local governments can utilize to control access to major arterials, minor arterials, collector streets and other roadways. The benefits of access

management include improved movement of traffic, reduced crashes, and fewer vehicle conflicts.** Access management usually addresses the location and number of driveways, median openings, street connections, interconnectivity, etc. Good access management can improve traffic flow, safety and promote the safe and efficient utilization of the transportation network. Access management techniques include:

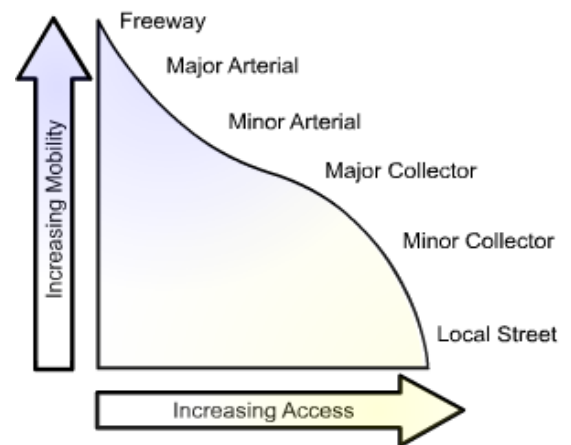
- **Access Spacing:** increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality for heavily traveled corridors.
- **Driveway Spacing:** Fewer driveways spaced further apart allows for more orderly merging of traffic and presents fewer conflicts for 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 points or a severe crash history (t-bone crashes) to one that operates with fewer conflict points and less severe crashes (sideswipes) if they occur.
- **Median Treatments:** raised medians are examples of some of the most effective means to regulate access and reduce crashes.
- **Right-of-Way Management:** as it pertains to right of way reservation for future widenings, good sight distance, access location, and other access-related. ***

Access management can be accomplished through regulations, codes, guidelines, policies, and directives by NCDOT and the local municipalities; through the land development regulations; development review, etc. Access management can enhance capacity and level of service, improve traffic flow, reduce vehicles conflicts and improve safety.

Given the development patterns in the Wilmington Urban Area, there are significant challenges with access management. Most challenges occur along the major commercial corridors. A strategy for reducing the number of conflict points is the installation of median treatments. This is often met with opposition from commercial property owners because it limits access to their businesses. Another opportunity to improve access management is to provide cross-access between adjacent parcels. This cross-access eliminates the need to utilize a major transportation corridor to access an adjacent property. An example of poor access management is the Go Gas and Andy's Cheese Steaks on US 17 in Hampstead. Interconnectivity between the parking lots would reduce the need to access US 17 to interact between the two properties. The WMPO aims to improve connectivity and access management throughout the Wilmington Urban Area.

The *Cape Fear Commutes 2035 Transportation Plan* recommends the WMPO complete access management plans for the major corridors within the WMPO planning area boundary. These plans should promote effective access management and interconnectivity. As properties develop and/or

Figure 1. Functional Classification Access and Mobility



Courtesy of FHWA

redevelop, local member jurisdictions should follow the access management plans and require those properties to construct connections to the adjacent properties.

This strategy will help to improve mobility and safety along the major corridors within the WMPO for all users.

Streetscape Improvements

Streetscape enhancement projects are typically constructed on roadways to improve the aesthetics of the corridor. These enhancements can include brick pavers, sidewalks, bulb-outs, decorative lighting, decorative traffic signals, medians, landscaping, benches, signage and other aesthetic improvements. These improvements can improve the mobility and safety of bicyclists, pedestrians and motorists and also spur redevelopment and a renewed interest from property owners that can increase the tax base of the region. The construction of bulb-outs can reduce the required crossing distance for pedestrian, medians reduce the number of conflict points and signage help to better direct the travelers throughout the community. Streetscape enhancements bring together several of the TDM and TSM strategies into one cohesive plan.

The *Cape Fear Commutes 2035 Transportation Plan* evaluated projects that were key to the community fabric and established criteria to rank projects that have an impact on the Quality of Life. These Quality of Life Roadway Projects aimed to enhance the urban design, mainly through streetscape enhancements. The plan studied 35 Quality of Life Roadway Projects within the Wilmington Urban Area. The funded Quality of Life Roadway Projects are included on Pages 21-22 of the report.

Motorist Assistance Program

Whether it is from a flat tire, a blown head gasket or another problem with your vehicle, breaking down on the side of the road is never fun. Determining who to call can also be an issue. The *Cape Fear Commutes 2035 Transportation Plan* recommends the installation of signage on major corridors that notify the public of a number for reporting non-emergency assistance. This hotline would be answered by an operator who takes necessary information from motorists. This information is then relayed to the necessary police agency to provide assistance in this time of need. The Regional Transportation Commission could staff this operation and utilize a towing service to remove the vehicle from the roadway.

The plan also recommends the creation of a Motorist Assistance Program (MAP) to assist motorists and remove disabled vehicles from the roadway in the time of need. This strategy will improve mobility and reduce congestion by providing assistance for disable vehicles and removing the vehicles from the roadway more efficiently.

Standardize Speed Limits

The functional classification of roadways is the process of grouping public streets and highways into classes according to their character and intended function. The functional classification reflects a balancing act between land accessibility and mobility. Figure 10.2 represents the relationship between the functional classification and land accessibility and mobility. Typically streets are classified as arterials, collectors or local streets.

Table 1. Description of Functional Classification

Functional System	Services Provided
Arterial	Provides the highest level of service at the greatest speed for the longest uninterrupted distance, with some degree of access control.
Collector	Provides a less highly developed level of service at a lower speed for shorter distances by collecting traffic from local roads and connecting them with arterials.
Local	Consists of all roads not defined as arterials or collectors; primarily provides access to land with little or no through movement.

Source: AASHTO Greenbook

The *Cape Fear Commutes 2035 Transportation Plan* recommends the WMPO and North Carolina Department of Transportation work collaboratively to standardize speed limits based on the functional classification of a roadway and the adjacent population and employment density along a roadway. Speed limits on limited access highway (i.e. Wilmington Bypass, Martin Luther King, Jr. Parkway) should be based on the design speed and/or the 85th percentile speed.

Table 2. Recommended Speed Limits

Roadway Functional Classification	CBD & Urban Core (High Density)	Traditional Suburban (Medium Density)	Automobile-oriented Suburban (Low Density)
Local	25 MPH	25MPH	25MPH
Collector	25MPH	35MPH	35MPH
Arterial	25MPH	35MPH	45MPH
Limited-access Highway	85 th Percentile	85 th Percentile	85 th Percentile

Sources:

*Wilmington Signage Plan

** http://ops.fhwa.dot.gov/access_mgmt/index.htm

***http://ops.fhwa.dot.gov/access_mgmt/what_is_accsmgmt.htm