



I-40 HIGH OCCUPANCY VEHICLE / CONGESTION MANAGEMENT STUDY PHASE I EXECUTIVE SUMMARY

May 2000



EXECUTIVE SUMMARY

The Need for Congestion Management

During the last few decades the Research Triangle region of North Carolina has experienced significant growth in both population and employment. While this growth has brought with it many benefits, it has also dramatically increased travel demand along the region's roadways, particularly the I-40 corridor (shown in Figure E1).

The population of the region is predicted to nearly double over the next 25 years. More and more transportation studies are concluding that even with significant investment in building new highways and improving existing ones, traffic congestion will continue to increase. Transportation officials recognize that the congestion forecasted for this region cannot be effectively managed by building additional highway lanes alone.

There is a growing awareness in the community that new approaches are needed to manage congestion. The focus is on providing reasonable mobility rather than attempting to serve the single-occupant vehicle. This study examines the use of managed facilities such as high occupancy vehicle (HOV) lanes as an alternative to the traditional highway improvement. The study also demonstrates the need for integrating the region's transportation facilities and services into a coordinated, multi-modal system that includes innovative transportation technologies.

Ideas and techniques to manage congestion are frequent topics of discussion among both the traveling public and local transportation officials. The need for an improved regional dialogue to address congestion and a public/private partnership to effectively plan and implement congestion management techniques is recognized.

The negative consequences of traffic congestion are being experienced throughout

the U.S. In the Research Triangle region, there is a sense of urgency to seize the opportunity to manage existing congestion before it results in federal transportation sanctions because of failure to meet the federal air quality standards. Once federal sanctions are imposed, the opportunity to plan and implement a coordinated congestion management program consistent with broader community goals is significantly compromised. The congestion management options that are available to a community under federal sanctions may limit certain types of transportation improvements and the opportunities for economic growth that depend on a good transportation system.

The I-40 High Occupancy Vehicle/ Congestion Management Study

Phase I of the I-40 High Occupancy Vehicle/Congestion Management Study was commissioned by the North Carolina Department of Transportation (NCDOT) to review a broad range of strategies for addressing congestion in the Research Triangle region and to identify those to be evaluated in greater detail in Phase II. This study is not intended to justify or eliminate the need for transportation improvements currently planned and programmed; rather, the purpose of the study is to find additional ways to maximize the transportation system investments already planned for this region.

The purpose of Phase II will be to develop a Congestion Management Plan with specific projects and actions that can be adopted and incorporated into the transportation plans and programs of the NCDOT, the region's two Metropolitan Planning Organizations (MPOs), and the Triangle Transit Authority (TTA). The results of Phase II are intended to provide a new transportation paradigm for the region; one that cuts across geographical, institutional, and modal boundaries.

Phase I of the study focused on I-40, the region's most important transportation artery, and on other major travel routes into the region's primary

activity center, the Research Triangle Park (RTP). While the study considered a broad approach to congestion management, particular attention was given to the potential for "managed" lanes to improve traffic mobility on I-40 and other major highways in Wake, Durham, and Orange Counties. Options evaluated include:

- High Occupancy Vehicle (HOV) lanes;
- High Occupancy Toll (HOT) lanes;
- Tolls, and;
- Express/Truck lanes

Just as importantly, Phase I, which was conducted over a six-month period, brought together many of the transportation leaders of the region. These leaders provided invaluable knowledge about the region's transportation issues, concerns, and ongoing planning efforts and directed the technical work of the consultants. The study also provided the opportunity for transportation professionals from around the region to work together on regional challenges that go beyond geographical and institutional boundaries and to consider the impact that other ongoing initiatives and studies could play in managing congestion.

Key Recommendations from Phase I

- Move forward with congestion management strategies that can be implemented to provide alternatives to single occupancy vehicular travel within the region. These include managed lanes (particularly high occupancy vehicle (HOV) lanes); transit system improvements (rail and regional bus); travel demand management (TDM) strategies and freeway management techniques including ramp metering, intelligent transportation systems (ITS) and transportation systems management (TSM).
- Strongly support recent public and private initiatives in ITS and TDM, which are essential elements of a congestion management program, and, along with transit initiatives, provide a solid foundation for strategies such as HOV lanes.
- Proceed with the transportation improvements currently planned and programmed in the NCDOT Transportation Improvement Program (TIP) and those identified in local agency plans and programs.
- Study short-term, geometric improvements to enhance the efficiency of I-40, including addressing the bottlenecks between I-540 and NC 147, and Wade Avenue and US 1.
- Establish a review process to ensure better coordination of ongoing transportation studies and projects in the region, including public involvement efforts.
- Establish an appropriate institutional framework for implementing an ongoing congestion management process.
- Study, promote and implement smart growth policies that support desired growth patterns, which can be effectively served by future transportation investments.
- Review current mechanisms and policies for funding transportation programs and identify new funding sources, which can provide financial resources for implementing congestion management strategies.
- Engage the public, in the broadest sense of the word, in developing future transportation strategies.

Major Findings of Phase I Study

The Phase I analysis demonstrates that it is not possible to eliminate traffic congestion in a rapidly urbanizing area. Congestion will continue to increase because of the rate of population and employment growth that is expected to continue over the next 25 years. This is consistent with experiences and study findings in other high growth regions around the country. Many of these regions are grappling with the same issues as the Triangle. There is no "silver bullet". One answer will not solve the problem.

However, while congestion in this region may not be eliminated, or significantly reduced, it can be "better-managed". There are many strategies that can be combined and coordinated to reduce the region's reliance on single occupancy vehicle travel. Some of these strategies can ensure a faster, more reliable trip time compared to travel in the frequently congested general use lanes. There are also strategies that can lessen the inevitable deterioration of level of service and mobility on the highway system.

The overall approach to managing congestion must be multi-faceted to achieve a cumulative and synergistic effect with noticeable, positive impacts. An example of a synergistic system using coordinated congestion management tools is an incentives program offered by employers to encourage ridesharing combined with HOV lanes to make ridesharing rapid and convenient. Each strategy (carpooling and HOV lanes) by itself would have limited impacts on congestion, but used in concert with each other and with multiple strategies, the impact is much greater.

Strategies Analyzed in Phase I and Recommended for Phase II

The strategies considered in the Phase I study range from moving traffic more efficiently, to reducing the demand for travel in single-

occupant vehicles, to eliminating the need to travel at all.

These strategies are:

- Traditional Capacity Improvements (adding more general-use lanes to the existing roadway system or building new roads)
- Managed Lanes (HOV, HOT, tolled, express)
- Transit System Improvements
- Intelligent Transportation Systems (ITS)
- Freeway Management (including ramp metering)
- Transportation Systems Management (TSM) (including efficiency-type improvements to arterial roads and freeways)
- Transportation Demand Management (TDM)

Several of these strategies are being examined in concurrent studies or are being implemented in the region. It is imperative that a unified approach be adopted to coordinate these various efforts on a region-wide scale. Phase II of this study will identify a unified approach to coordinating these strategies along the I-40 corridor and will serve as a model for other corridors in the region and state.

Table E1 summarizes the findings and recommendations of the Phase I study. The following recommendations are provided to guide Phase II of the study:

Traditional Capacity Improvements

The current fiscally constrained roadway plan, assumed in the Triangle regional model, was used to analyze 2025 traffic projections and operations. Although the population is projected to double between 1995 and 2025, the miles of major arterial and freeway lanes is planned to increase by only 48-percent. Therefore, construction of additional roadway lanes beyond those currently planned may be warranted. One key addition that should be investigated is the extension of NC 147 south to the Western Wake Freeway (known locally as the Triangle Parkway).

With the focus on congestion management strategies, this study did not examine in detail the construction of new roads or the improvement of existing roads. Opportunities may exist for funding new roads with tolls or other public/private funding strategies.

Managed Lanes

Based on the Phase I analysis, HOV lanes appear to be feasible in several freeway corridors. HOV facilities provide a reliable, faster travel time for carpools, vanpools, and transit vehicles, and therefore offer incentives for people to rideshare rather than drive alone. However, even an extensive HOV system will not substantially reduce congestion on I-40 under current or anticipated future conditions. A total of 100 miles of freeway was identified as having potential feasibility for HOV lanes (shown in Figure E2). The Phase II analysis will focus in greater detail on the potential phasing and viability of such a system on I-40.

Charging travelers to use roads (HOT lanes, toll roads, or congestion pricing) does not appear to be feasible for the foreseeable future. The Phase I study indicates that too few travelers would be willing to pay for a faster trip during high demand periods to warrant the construction or management of those type facilities. Forecasted travel conditions in the Triangle region will not be as severe as conditions in other regions where pricing has been effective. Although the HOT lanes could be incorporated as part of a phasing strategy for an HOV system, HOT lanes ideally should be barrier-separated. Barrier-separated facilities typically require greater initial capital investment than buffer-separated facilities.

Transit System Improvements

Improved transit is an essential element of a congestion management plan and, as such, ongoing efforts to enhance the regional transit system should be supported.

The transportation systems of almost all major metropolitan areas include an extensive transit system. As the Triangle region grows and opportunities to add more highway capacity become limited, transit, particularly fixed guideway (or rapid) transit, offers the ability to move more people without adversely impacting the performance of the regional transportation system. An HOV network can provide the backbone for a high-speed, regional express bus service. This network can be part of a bus rapid transit (BRT) system that includes busways (roadways or lanes that are used exclusively by buses) and buses operating in mixed traffic on streets in areas where the construction of HOV lanes or busways is infeasible or unreasonable. The TTA has identified a number of corridors where relatively high volumes of buses are projected in the future that coincide with corridors where HOV lanes are potentially feasible.

Intelligent Transportation Systems (ITS)

ITS can be very effective in improving travel conditions, providing options for travel, and informing travelers of what they can expect in their travel options as other urban areas in the U.S. have demonstrated. A statewide ITS study is underway in North Carolina, and implementation of its findings should be supported as an essential element of a comprehensive congestion management plan.

Freeway Management

Experiences of other urban areas in the U.S. have demonstrated that freeway management techniques that include a ramp metering system can reduce travel time on the freeway by 10 to 20 percent and crashes by 20 to 30 percent. Ramp metering at several locations on I-40 will be evaluated in Phase II of the study. HOV bypass lanes will be evaluated at the metered ramps to provide HOVs a travel time savings. Any additional freeway management elements identified in the statewide ITS plan should be included in the congestion management plan.

Transportation Systems Management (TSM)

Deficiencies at several interchanges are contributing to peak period delays on I-40. However, the section of I-40 between I-540 and NC 147 is one of the most serious bottlenecks. A detailed study is required to identify needed improvements that can be implemented in the short-term. These may include collector-distributor lanes and separate bus ramps to exit or enter the freeway from adjacent arterials.

A well-planned, efficient and managed arterial road system is a critical component of the roadway system of our area. The arterial system can provide alternative routes for freeway travelers in the event of an incident or accident, particularly when ITS information systems inform travelers of "real-time" freeway conditions. Arterial roads can also remove shorter distance trips from the freeways. Many of the region's arterials, particularly those leading into RTP, are over-capacity and/or are not operating efficiently. A range of low cost improvements should be considered for these arterials.

Transportation Demand Management (TDM)

TDM strategies can help to reduce the number of single-occupant vehicles traveling on I-40 to major employment centers. To be successful, TDM requires the participation of both the public and private sectors. Recently adopted programs in RTP and Durham County, as well long-term plans being developed at UNC-Chapel Hill, feature strategies that employers can implement to encourage their workforces to choose alternatives to driving alone. These have strong support of many employers and are typically very low cost options. HOV lanes and improved transit service would enhance the effectiveness of these strategies.

Strategies Eliminated from Further Study

Several strategies were eliminated from further analysis in Phase II. These are shown in Table E2, and include:

- Toll roads (Tolls can not be implemented on existing facilities. As stated earlier, this study did not focus on the construction of new roads, and a policy decision would be required to pursue toll roads in the region.)
- Truck lanes
- Express lanes
- Ramp restrictions or closures
- Congestion pricing

Results of Telephone Survey

As part of Phase I, a statistically valid telephone survey was conducted to collect and quantify the attitudes and opinions of the users of I-40. This data provides NCDOT and other transportation agencies with a better understanding of how travelers in the region perceive congestion and the problems that cause that congestion, including an indication of the depth and breadth of user frustration. Key findings are:

- The vast majority of commuters drive to and from work alone. Very few travel with other passengers and even fewer take public transportation.
- One-third of the commuters feel they encounter major delays on I-40 on more than 50 percent of their trips.
- Most I-40 users and commuters perceive traffic to be a major or moderate problem on Triangle area roads, especially on I-40 during morning and evening peak hours.
- Key contributing factors to traffic congestion on I-40 were perceived to be (in descending order of importance):
 - 3 The amount of traffic during peak travel hours;
 - 3 The lack of adequate public transit service;
 - 3 Poor or inconsiderate driving habits;

- 3 Unmanaged regional development and growth;
 - 3 The unavailability of reasonable alternative routes;
 - 3 Congestion and queuing on I-40 entrance and exit ramps;
 - 3 Crashes and mechanical breakdowns;
 - 3 Congestion on roads adjacent to I-40 exits and entrances; and
 - 3 Lack of coordination between various government agencies or departments on transportation improvements.
- Reactions to potential congestion management strategies were:
- 3 The majority indicates that a high priority should be assigned to providing commuter rail and connecting bus service along the I-40 corridor.
 - 3 Almost one-half believe that a high priority should be assigned to improving crash response and removal.
 - 3 While adding more highway lanes is also assigned a high priority, the HOV lanes for buses and cars with two or more occupants were considered to be as important as adding general purpose highway lanes.
- Other alternatives that were considered a high priority by one-third, and at least a moderate priority by two-thirds are:
- 3 Increase employer sponsored incentives to carpool and use public transit;
 - 3 Increase bus service along the I-40 corridor; and
 - 3 Improve signal timing at intersections adjacent to I-40 entrances and exits.
- Almost one-half of those interviewed expressed the opinion that toll lanes should not be implemented. Very few indicated they would use the toll lanes, even at a cost of only 25 cents per trip.
- Major Policy Issues
- Land Use
- Without a doubt the largest contributors to congestion in the Triangle region are the travel demand associated with the rate of growth in population and employment and current land development patterns. Often characterized as "sprawl", this type of growth results in more and longer automobile trips with little opportunity for efficient transit service. The impact of land use decisions on transportation are being examined by both MPOs as part of their long range transportation plan updates, by the Triangle J Council of Governments and a "smart growth" commission established by the General Assembly. It is widely known among land-use planning professionals that "high-growth" areas must have sustainable, comprehensive land-use plans. It is critical, however, that the transportation planning process is consistent with the adopted land-use plan.
- Transportation Funding
- The first phase of the HOV/CMS study indicates that the current mechanisms and policies governing the funding for transportation planning, construction, operations and maintenance should be analyzed and reformulated to better address congestion management. Most of the strategies that are being recommended for further evaluation are currently not funded. The cost of the simplest 100-mile HOV system being evaluated in Phase II would exceed \$1 billion. The cost of constructing the improvements included in the adopted 2025 transportation plans for the region are approximately \$7.3 billion (1999 dollars). The current sources of funds are not enough to maintain the planned level and anticipated schedule of transportation expenditures. Maintaining acceptable levels of mobility in the future will require new, alternative revenue sources at the state or local level (most likely both). A legislative transportation finance committee was recently established to report on funding needs and options for transportation improvements around the state.

Institutionalization

Transportation services in this region are planned, provided and managed by several transportation agencies. These agencies have either political, geographical or modal jurisdictions. Often, this has hampered transportation planning coordination and cooperation. Like any coordinated system with interdependent components, effective congestion management requires agreement on the program and clear assignment of implementation responsibilities. Therefore it is imperative that an appropriate institutional framework be established for implementing a congestion management process. Options for improving coordination between the two MPOs are currently being examined under a regionalism initiative sponsored by the North Carolina General Assembly.

Engaging the Public

Finally, the public, in the broadest sense of the word, must be engaged in developing transportation strategies, which will impact the general "quality of life" and the "livability" of the region. The business community as well as the general public are affected by the efficiency and quality of the transportation services provided by the public agencies. These individuals and companies must be informed about transportation issues and the options available. Their participation in developing the process goals, priorities, and plans for these systems is critical. Without their support, the implementation of new and possibly costly strategies will be difficult. Greater consistency in and coordination of ongoing public participation programs are necessary to improve the credibility of those responsible for transportation planning in this region.