

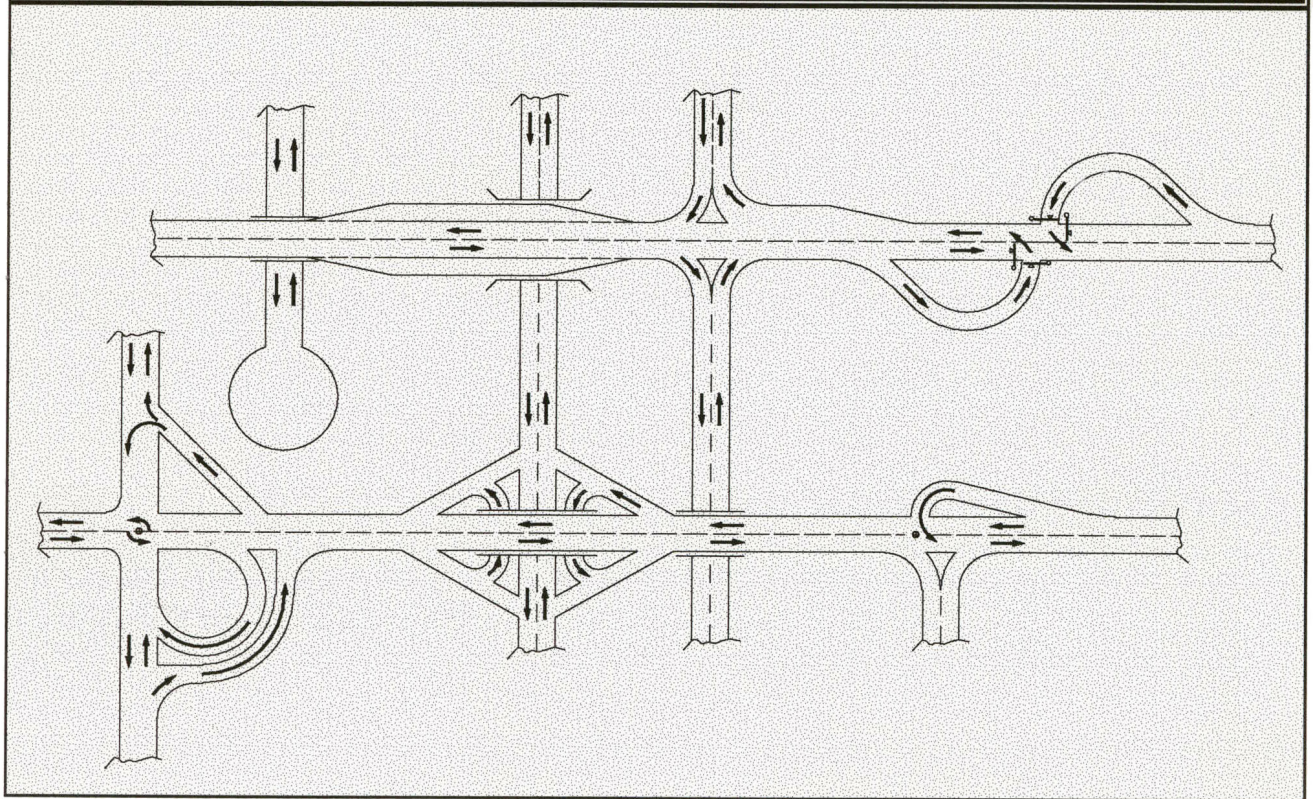
SUPERARTERIAL NETWORK STUDY

PROJECT NO. MPO-96-07



DADE COUNTY METROPOLITAN PLANNING ORGANIZATION

Technical Memorandum 1: Study Coordination



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Superarterial Network Study
Dade County Metropolitan Planning Organization
Project Number: E96-MPO-07

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1. INTRODUCTION

1.1 Study Purpose

As congestion increases on Dade County's arterials and freeways, the Metropolitan Planning Organization is looking for ways to maintain, and where possible, to improve mobility within the County. One way to improve mobility is to increase the traffic carrying capacity of existing roads by increasing vehicle throughput on these facilities. This can be accomplished by a variety of improvements in design, traffic engineering applications, and advances in technology, without extensive widening, major construction of new roadway links, or reconstruction of existing roadways. When these are applied to a major surface roadway, as opposed to an expressway, the result is often referred to as a "super street" or a "superarterial". It may be possible to develop a number of superarterials into a network to address growing local congestion, offer viable alternatives to expressways for lengthy, but still shorter than county-spanning trips, and to improve mobility for high numbers of daily Dade County drivers.

The Superarterial Network Study examines ways of alleviating congestion by focusing on the development of a network of super streets, based on the existing Countywide arterial system, but more widely spaced and strategically selected, to cover most of the developed and developing areas of Dade County. The study defines the guidelines for establishing this superarterial network and evaluates strategies to improve the mobility and/or increase the capacity of such network. These strategies are grouped in the following categories: operational improvement, travel demand management, high occupancy vehicles' strategies, intelligent transportation systems, and transportation system management among others. These techniques have been used in the past and are even now being studied and applied for implementation on different roads and roadway sections within the County. However, this study will attempt to offer a global and more unified and systematic approach to alleviate congestion within the urbanized area by developing a network of such facilities and approaching the congestion problem systematically across the entire County.

Throughout Dade County, arterials provide access to a mix of important commercial, industrial, and residential land uses, as well as servicing high volumes of work-trip commuter travel and midday traffic, which is not particularly commuter oriented, although it may be work-related travel. Intersection geometries, driveway locations and spacing, limited right-of-way, and general traffic characteristics are among the features of the County's major arterial system that

must be taken into account in developing the recommended improvements to alleviate congestion. The needs of the users of the arterial system, the complexity of the roadways themselves, and the special features of the County's arterial system, pose strong challenges to the development of a Superarterial Network. Effective treatments would preferably have low to moderate individual costs, short implementation times, and provide a tangible increase in capacity within available rights-of-way.

1.2 Goals and Objectives

The traditional approach has been, and to a large extent still remains, to focus on major capital investments for expressways or major transit guideways to create large capacity increases for moving goods and people. These mega-projects involve tremendously high capital investments over long periods of time, with traditional reliance on non-local funding that is becoming increasingly scarce as federal and state budgets shrink. In addition, major capacity improvements require significant real estate takings that are often expensive and usually disruptive to local communities.

The primary intent of the study is to determine the feasibility of implementing a countywide superarterial network. The study will explore a variety of alternative transportation and mobility enhancement opportunities on select major arterials, to provide other options to increase traffic throughput and manage travel growth within the County. The study will focus on the arterial system in the County and look at improvements that can be implemented in order to improve mobility or better manage its current and potential future levels of congestion. A Superarterial Network offers the possibility of moving more people and goods faster on existing facilities through implementation of low to moderate cost improvements in congested corridors. The following objectives have been identified for this study:

1. Develop criteria to identify arterials and areas to be included in the network.
2. Explore the development and implementation of a Superarterial Network by coordinating proposed arterial improvements for identified congested corridors or County subareas with those of adjacent and intersecting corridors or subareas, to ultimately encompass many of the dominant major surface arterials in the County.

3. Perform preliminary testing on a selected corridor or area, by applying identified strategies for alleviating congestion and projecting results which may be anticipated with implementation of superarterial concepts.
4. Develop a list of potential corridors and/or subareas to be further tested as possible demonstration projects
5. Develop recommendations regarding the applicability and acceptability of the Superarterial Network concept on a Countywide basis.

2. STUDY PROCESS

2.1 Previous Studies

In the past, Dade County, the Florida Department of Transportation, and other local agencies have sponsored numerous studies focusing on the development of operational improvements to solve localized congestion at intersections, corridors and subareas. Other studies have focused on state-of-the-art techniques in the areas of travel demand management and intelligent transportation systems. These former studies have usually been directed at specific areas, while the latter studies have for the most part focused on the major freeways and expressways. With the advent of ISTEA, the County initiated and continues to develop a series of transportation system management options through its Congestion Management Plan of which this study may be considered as an extension. The Congestion Management Plan (CMP) recognized that many programs already exist at the state and local levels to address traffic congestion and mobility. The plan has already identified a series of corridors with various levels of congestion and a proposed structure for the Mobility Management Process. The CMP also focuses on traffic projections and other future considerations in developing alternatives performance measures and introduced the concept of arterial investment studies.

2.2 Steering Committee

An important component of the study process was the creation of a Steering Committee to provide a framework for the participation of local and state agencies with jurisdiction over the arterial facilities in the analysis and decision-making stages.

The members of the Steering Committee (listed in Appendix A) represent a broad range of the local and regional technical staff of agencies with jurisdiction over transportation activities within Dade County. All work will be coordinated with local municipal agencies charged with roads or traffic operations where proposed improvements involve local streets within their jurisdiction, as well as state and county staff involved with arterial operations.

Draft technical memoranda describing activities of each task will be submitted to the members of the Steering Committee for their review and comments. These documents will be finalized

after being revised to address the concerns and ideas of the committee members. Meetings with the members will be held monthly for a maximum of six meetings. This will give the members an opportunity to review the direction of the study.

In addition to the Steering Committee meetings, three (3) presentations will be made to the Dade County Transportation Planning Council (TPC), one (1) to the Citizens Transportation Advisory Committee (CTAC), and one (1) to the Policy Committee of the MPO Board. These presentations will be to update the committees on the status of the study, and to gain approval of the findings and recommendations.

2.3 Study Development

In analyzing the potential for capacity improvement treatments on the congested corridors in Dade County, the Superarterial Network Study is the first of its kind. Past studies of arterials focused on single corridors and/or single intersections. The main purpose of this study is to identify a system of select arterials that would be linked and capable of providing much needed improved levels of mobility. This could be achieved by applying series of specific and moderately-scaled improvements. The study process, illustrated in Figure 1, was developed to meet the unique demands of this study and meet the goals and objectives previously stated.

A Technical Memorandum will be prepared at each major milestone of the study as follows:

Technical Memorandum 1: Study Coordination - This report will summarize the purpose of the study and give an overview of the study process.

Technical Memorandum 2: Literature Review - This report will summarize the results of a literature search undertaken to discover previously performed work related to the planning, developments, and implementation of operational improvements on major arterials, specifically focusing on efforts related to super streets or superarterials, and on superarterial networks. Research will be conducted for local, national and international examples.

Technical Memorandum 3: Data Collection - The purpose of this report will be to summarize the traffic characteristics within the County, travel patterns, and development growth. The information gathered in this phase will be used to select the roadways to be included in the superarterial network.

Technical Memorandum 4: Definition of Transportation Areas and Corridors -

Based on the information gathered during the literature search and the local data collection effort, a set of criteria will be developed to define the corridors and areas to be included in the network. Transportation areas are envisioned to approximate Traffic Analysis Districts in size, and a number of them may be expected to include intersecting superarterials and encompassing corridors as well. Technical Memorandum 4 will report the development and finalization of both the criteria and the areas and corridors considered.

Technical Memorandum 5: Definition of the County's Proposed Superarterial Network -

This report will define the study's proposal for the County's Superarterial network based on the findings documented in the previous reports.

Technical Memorandum 6: Identification of Strategies and Techniques -

This report will summarize the different strategies and techniques used to alleviate congestion and identify their relative advantages and disadvantages as well as the situations and locations where they may be applied.

Technical Memorandum 7: Preliminary Evaluation and Selection of Candidates for Further Testing -

A set of criteria and methods to measure mobility improvements, level of service improvements, and congestion reduction measures will be developed. Estimates of the cumulative impacts of different improvements applied simultaneously to a particular corridor or area will be developed. The evaluation methods will then be applied to selected corridor or area, and candidate corridors will be selected for further testing. This Technical Memorandum will document these activities.

Technical Memorandum 8: Estimation of Test Implementation Requirements -

Technical Memorandum 8 will report on the Action Plan that will be developed to test the application of the superarterial concept to major arterials within the selected corridors or subareas. The plan will include: defining the facility to be tested; developing a list of improvements proposed for implementation; developing the data collection needs; developing an implementation schedule and defining a test time span for the test implementation, defining criteria, standards, and measures to assess the results; and developing an estimate of the costs associated with the test implementation project. The plan will also include guidance on which local agency might be most appropriate to conduct the study, and potential sources of financing to fund the test project.

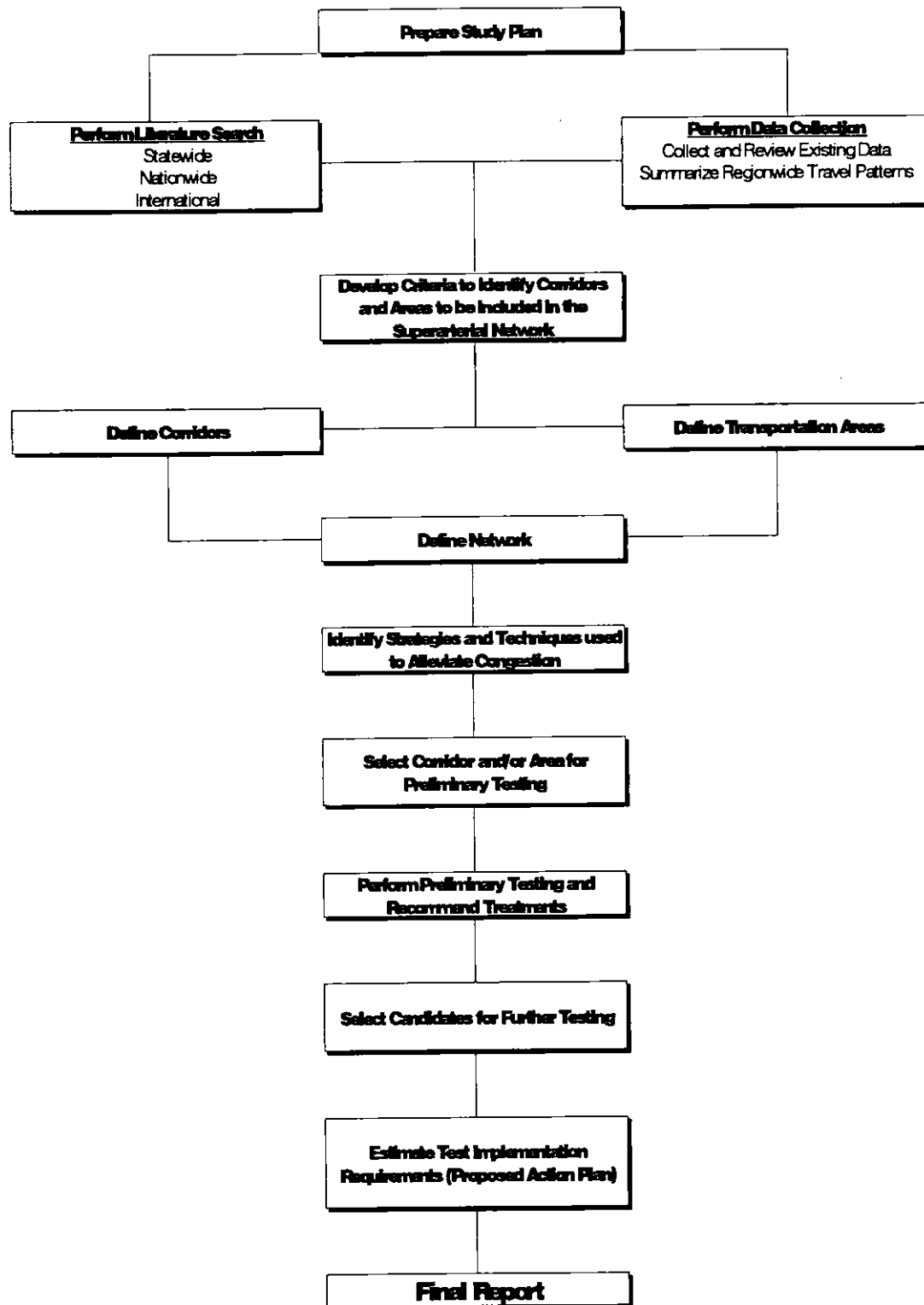
Technical Memorandum 9: Recommendations Developed - This report will summarize the findings of the previous tasks and include recommendations regarding the viability and reasonableness of pursuing the concept of instituting a countywide superarterial system.

Final Report: The Superarterial Network Study - The final report will be written to encompass all work performed during the course of the study. Final Report chapters will sequentially correspond to each Technical Memorandum described above; appendices will be incorporated as appropriate. Additionally, an Executive Summary, presenting a synopsis of the main points and findings of the study, suitable for independent circulation, will be developed and preface the report.

2.4 Study Coordination

Because of the numerous programs being studied and implemented through the County, a high level of coordination needs to be maintained throughout between the Metropolitan Planning Organization (MPO), Federal Department Of Transportation (FDOT), Metro Dade Transit Agency (MDTA), and Dade County Public Works Department (DCPWD). This study will identify a network and potential candidates for further demonstration projects. Because the superarterial network is one of the tools identified in the Mobility Management Process/Congestion Management System (MMP/CMS) and Florida regulations provide for the MPO as the lead agency regarding MMP/CMS matters, the MPO and its subcommittee would be the lead agency regarding implementation of the concept if viable. Cooperation between agencies is needed for successful implementation of the superarterial network because different agencies will have different responsibilities regarding policies, strategies, and improvements.

FIGURE 1: STUDY PROCESS



3. SUPERARTERIAL NETWORK

3.1 Concept Definition

The conceptual definition of a Superarterial Network is a system of urban area-wide arterial streets that are developed or improved to strongly emphasize the traffic movement function of the arterial facilities comprising the network. The arterials included in such a network are usually the backbone of the transportation system within an urban area, and provide access to major land uses, other arterials, and freeways. Because of their importance, these arterials are not only typically heavily traveled during peak hours, they are also usually heavily traveled throughout the day as well.

Roadways fall into a hierarchy based on their function and characteristics. The following is a definition of the different types of roadways including superarterials:

1. Freeway/Expressway - A facility with full control of access to give preference to through traffic (i.e., interstate and turnpike).
2. Superarterial - An arterial street developed to high design standards to strongly emphasize the traffic movement function of the arterial more so than the Primary Arterial.
3. Primary Arterial - A facility usually with a painted or physical median separating opposing traffic flows, carrying most of the long trips made within and through an urban area. These roads emphasize traffic movement rather than land use access and carry higher volumes than any facility except freeways and superarterials. Depending on the design standards used, primary arterials may infrequently qualify as superarterials, but are certainly the most viable candidates usually considered for conversion to superarterial status with implementation of appropriate modifications.
4. Secondary Arterials - Similar to a primary arterial, except with no painted or physical median barriers to separate opposing traffic flows, although these roadway will often incorporate much narrower double line striping to separate traffic flows. Secondary arterials generally have more signals per miles, with few if any frontage roads, serve less through traffic and more land access than primary arterials.

5. Collector - A street which gathers traffic from local neighborhoods and channels it to the arterial system. A small amount of through traffic can be carried on collector roads, but the system primarily provides access to abutting land by carrying local traffic between or within residential neighborhoods and commercial areas, or to roadways with more capacity.

3.2 Purpose and Need

Traffic data clearly indicate that congestion is an increasing problem in Dade County and undesirably low levels of service are continually experienced on major arterials. Demographic forecasts point to continued population and employment growth, and subsequent growth in travel indicates that congestion will not only continue to increase, but that its rate may be expected to accelerate. Between 1995 and 2020, the permanent resident population is expected to increase by 30 percent. With a current population close to 2 million people in Dade County; the area can expect more than half a million new people living in the urbanized area in the next 25 years, and a majority of them will become drivers.

The current Transportation Improvement Plan prepared by the Dade County Metropolitan Planning Organization shows that the local and state agencies are planning considerable improvements for the major expressways and travel corridors within the County. There is, however, a need to maximize the potential capacity of many of the existing major arterials in order to alleviate existing congestion in the region, and to be better prepared to manage continually increasing future traffic and congestion resulting from the area's ever-increasing growth.

As construction of new lanes on expressways and freeways and of new facilities becomes increasingly difficult and cost prohibitive, the arterial system will be called upon to carry a greater share of existing and projected future traffic demand. The expansion of the transit system alone will not solve the current traffic congestion. The spatial distribution of the County's activity, employment, and residential areas; the geography of growth; and the high proportion of individual and household automobile ownership tend to counteract transit initiatives. All these factors tend to promote automobile use that causes congestion of the roadways within the metropolitan area.

The following sections illustrate the need to develop a system of Superarterials based on the travel characteristics and the current state of the freeway system in Dade County.

3.2.1 Travel Characteristics

Travel characteristics have changed in the past decades and the Central Business District (CBD), commonly referred to as the Downtown area is no longer the single major destination or origin of peak hour trips. As developers are attracted to the relatively low land prices, and availability of large tracts of suburban land, major residential and employment centers have been created in the areas of Dade County beyond the urban core. These major activity centers, often referred to as "edge cities", resemble "mini" downtown areas, manifest significant impacts on virtually all the County's limited expressways and those arterials which serve both the major activity centers and the downtown. There is, therefore, a need to provide adequate capacity to not only efficiently move traffic within suburban areas, but also to utilize existing infrastructures within the already developed urban areas.

3.2.2 Freeway System

The freeway system is undoubtedly a major component of the transportation system in Dade County. Given the current vision of Dade's transportation future, this system is largely complete, having undergone and still undergoing major improvements to increase its capacity and efficiency. The few remaining socially and community acceptable potential missing links to the system may provide enhanced mobility in the future for developing areas, rather than relieve congestion within the developed areas. The current Transportation Improvement Plan and the Long Range Transportation Plan focus on rehabilitation of older freeways, capacity addition where feasible, and incorporation of multimodal facilities to the existing freeway system. Although needed, freeway improvements often carry with them very high construction costs, right-of-way constraints, potentially detrimental social impacts, and long planning and design periods. This points out the need to also develop a set of systematic, low to moderate cost improvements with relatively short implementation times on facilities other than freeways.

3.3 Opportunities

The success of a Superarterial Network is highly dependent on the applicability and potential benefits to a region. The following sections highlight why this concept could be applicable to Dade County and what potential benefits the region would gain from developing such a system.

3.3.1 Applicability

Arterial Grid Network

Dade County is a good candidate for developing a Superarterial network due to the almost complete grid system layout of its major arterials. An arterial grid system allows for continuous travel in a given direction, and usually provides reasonable capacity for a significant distance. While features other than continuity are important, continuity plays a major role in connecting major activity centers with each other throughout the County, and with the residential areas, from which much of the roadway traffic, and virtually all of the region's commuter travel, is originated. The few missing links needed to complete the grid system are affected and often seriously constrained by geographical and physical barriers such as bridges, other roadways, and waterways (the Miami River, the Intracoastal Waterway, and numerous canals).

Planning Process

Extensive work has been conducted to identify the major improvements and new roadways that will be needed in the next 20 years to handle most, but not all of the projected traffic demand. The Transportation Improvement Plan for 1996-1999 identifies major highway and arterial projects in excess of \$297 million. Approximately one third of these funds are for studies and improvements to expressways, with the remainder for arterial studies and related improvements.

The Long Range Transportation Plan (LRTP) has also identified in its "Needs" plan nearly 100 major capacity improvements that address the mobility needs of the communities within the metropolitan area. However, only 60 percent of these improvements can be implemented due to the lack of available funding. This results in the inability to provide for all the improvements needed to enhance mobility and reduce or alleviate congestion through the year 2015 within the urban area.

The Long Range Transportation Plan also identifies the need to provide for over 60 miles of exclusive right-of-way for priority transit service and approximately 40 miles of High Occupancy Vehicle (HOV) lanes along the major expressways. Very few projects involve construction of new highways, which is indicative of a matured urban area, and the LRTP has an urban area-wide focus on maximizing, and/or enhancing the potential of existing facilities.

The plans also stress the importance of non-motorized modes of transportation, such as bicycle and pedestrian facilities which are more heavily emphasized than in past plans. One and one-half percent of all eligible surface transportation funds have been reserved for non-motorized

modes of transportation, and a Comprehensive Bicycle/Pedestrian Planning Programs study has been incorporated into the Long Range Transportation Plan.

Special planning studies and initiatives are also included in the plan in order to identify ways of incorporating the latest technologies available, such as Intelligent Transportation Systems (ITS) and Intelligent Corridor Systems (ICS). Other projects such as the Congestion Management Study are included to identify a variety of strategies to deal with urban travel congestion. This Superarterial Study is an example of the latter.

Dependence on Single Occupant Vehicles

The latest data show that travel by private car accounts for more than 95 percent of the total urban travel in Dade County. This is reflective of the high number of private vehicles (1.2 million) which is expected to increase by 60 percent by the year 2015. The current ratio of cars per household is 2.6.

Numerous improvements to, and construction of, new transit elements are planned throughout the County. The addition of new bus routes, extension of the existing Metrorail, and the construction of a new East-West rail line are only a few of the projects that are planned to increase transit services and mobility within the County. However, transit alone will not solve the congestion problems in Dade County.

Approximately 75 percent of all travel is performed in vehicles with one or two persons. When it is realized that this average occupancy calculation includes transit vehicles - buses and trains - which typically carry 15 to 100 people (depending on mode and time of day), the exceptionally high use of single occupant vehicles becomes even more strikingly apparent. These statistics amply demonstrate that Dade County residents rely very heavily on their automobiles, and that highway-oriented mobility improvement planning needs to continue.

Congested Freeways

The freeways represent 17 percent of the total roadway lane-miles available in Dade County, based on the 1990 Miami travel demand model. This percentage carries approximately 33 percent of the daily County vehicle-miles traveled (VMT). These figures demonstrate the high demand placed on the existing freeway system. One of the benefits of a Superarterial Network is the potential to divert some freeway traffic onto the arterial system if the capacity and enhanced operating efficiencies are available on the arterials serving general travel patterns as the freeways.

Decentralization and Suburbanization of Business, Shopping and Cultural/Recreational Activities.

For the past decades, major activity centers have been developed outside the Downtown area creating a decentralization of the urban area activities away from the CBD. Preceding this phenomenon, major residential developments have also been built in the suburbs. These areas are served by numerous arterials providing access to both these major activity centers and the freeways leading to the Downtown area. These arterials would potentially become part of the Superarterial Network and appropriate improvements assigned to them.

3.3.2 Potential Benefits

Many short-term and long-term benefits can be achieved at relatively low to moderate costs and within a short time after implementation of improvements along the arterials considered for inclusion within the proposed superarterial network. A discussion of these potential benefits follows.

Higher Mobility

A Superarterial network has the potential of increasing mobility throughout the County by creating a region-wide system of linked major surface streets ("super streets") improved to provide better traffic flow. Higher mobility can be achieved by implementing selected capacity improvements (limited roadway widenings, intersection widenings, urban arterial interchanges), concerted applications of traffic management operational improvements (progressive signal synchronization, computer monitoring analysis and control), transportation demand management (TDM) strategies, Intelligent Transportation System (ITS) measures, bicycle and pedestrian facility improvements, and other improvements that would improve mobility on the arterials.

Impacts on Air Pollution

By improving the flow of traffic and alleviating congestion, a Superarterial network has a direct impact on travel speeds and therefore on air quality. Although in a mature area such as Dade County there would not be a sizable decrease in the level of pollution as a result of these improvements, they may stabilize and/or slow down the auto emissions and the rate of pollution.

Economic Impacts

Implementing a superarterial network should have a positive impact on the economy of Dade County. By increasing vehicle throughput and decreasing delay, a superarterial network may decrease fuel consumption and on the household level, incrementally allow travelers savings in auto operating costs. On a nationwide basis, implementation of a superarterial network has the potential to reduce energy use, to reduce dependency on foreign oil, thereby reducing the flow of US dollars out of the country, in turn reducing the US trade imbalance, and thus contribute to reducing the national debt.

Such a network may present the opportunity to decrease the amount of time spent driving, allowing more time for other activities, many of which will be consumer-oriented money-spending activities, thus also incrementally increasing local County economic activity in the aggregate.

A Superarterial network will increase mobility by allowing faster travel from origins to destinations. This also increases productivity of freight movement by shippers and suppliers, which in turn increases the economic potential of the County by allowing higher level of responsiveness to consumers, businesses, and commercial needs. An increase in the economic activity leads to a broader commercial base for the whole County and therefore greater wealth for the community. Businesses often move away from congested areas and are attracted to areas with adequate transportation network. People also tend to avoid working and shopping in highly congested areas. A County superarterial network can offer options for increasing consumer business viability, increased retention of existing business, and increased attraction for new business to locate here.

Reduced Delay

A major factor affecting typical arterial performance is the amount of delay experienced at intersections along the arterials. These delays can be reduced by improving signal timing, intersection geometry, and providing special treatment for transit vehicles and HOVs, all of which are part of the improvements envisioned for the arterials within the network. And as previously noted, reducing the highway delay can increase productivity for business and individuals, as well as for communities.

Decreased Collision Rate

Decreased collision rates are often a direct benefit of enhanced capacity because occurrences of collision-induced bottlenecks are reduced. Additionally, even some minor improvements

such as creation of left and right turn bays, better signal coordination, and creation of bus bays eliminate or reduce conflicts between vehicles which is a primary cause of collisions.

Better Use of Arterial System

The primary function of an arterial is to accommodate traffic movement. Many of the arterials in Dade County inefficiently function below standards because they have degraded into virtual major collector/distributor facilities due to the high numbers of access points to and from abutting land-uses and the high frequency of closely-spaced sites with individual driveways. The primary function of the arterial can be restored through implementation of an efficient Superarterial network aimed at managing access to land uses along the facilities, improving signal progression, managing transit vehicles and HOVs, and improving operations at intersections.

3.4 Potential Obstacles

Although many benefits can be gained from a superarterial network, there are a few obstacles to its implementation. Perhaps the most important is community acceptance of the proposed improvements to individual arterials to transform them into super streets even before considerations of linking them to establish a superarterial network are addressed. For example, it may be necessary to add a missing link in the arterial grid network to provide connectivity to a major activity center and improve level of service on an adjacent facility. However, the community may reject it if these improvements are seen as increasing traffic through a particular neighborhood. In other cases, business owners may be reluctant to consolidate their access points although it would improve mobility on the major arterial serving their business. A reduction or consolidation of access points might be perceived as negatively affecting their livelihood by reducing easy access to their individual business site. Indeed, In recent years, a number of neighborhoods within the County were successful in discontinuing some projects and blocking other on the brink of construction for a variety of reasons. It can be foreseen that localized community objections are a potential obstacle to the implementation of a superarterial network in Dade County.

Other major obstacles to implementing a superarterial network are availability of funding and the acquisition of rights-of-way. Although the improvements envisioned may be low to moderate costs and have minimal impacts to surrounding land uses, the level of congestion at some intersection may in some cases require extensive, albeit localized, improvements to more successfully manage traffic at that location. These improvements may require additional right-

of-way, which in developed urban areas is often rather expensive land with existing structure housing viable business, which may increase costs significantly. In a few instances, a localized major improvement may be the best recommendation for increasing arterial throughput, and may include significant, although localized, construction, which may also critically raise costs. For all transportation improvement projects considered, allocating scarce fiscal resources will always be a problem to be resolved. As with other programs designed to alleviate congestion the advancement of superarterials and the creation of a superarterial network must also wrestle with the allocation of funds to support development and implementation of the concept within the overall transportation system.

APPENDIX A

List of Steering Committee Members

List of Steering Committee Members

Frank Baron

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Metropolitan Dade County

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