DEVELOPMENT OF AN ARTERIAL CORRIDOR MANAGEMENT TRANSPORTATION STRATEGY FOR THE CAPITAL DISTRICT REGION

prepared by

CDTC Arterial Corridor Management Task Force
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(Though dated, this report contains information that remains valid and is frequently referenced by some Capital Region communities in reviewing site plans and by CDTC in preparing corridor plans. This document is being updated to reflect new information on access management practice, policy, and experience)

TABLE OF CONTENTS

Page

INTRODUCTION 1

THE NEED FOR ARTERIAL CORRIDOR MANAGEMENT PLANNING IN THE CAPITAL DISTRICT 2

Synthesis of Proposed Planning and Investment Principles 3
Planning Objectives of the Task Force 3
Review of Current Practice 4
Measuring Arterial Management Performance in the Capital District: Development of a Traffic Land Use Conflict Index 7
An Overview of Arterial Conflict in the Capital District 7

STATEMENT OF PROPOSED ACTIONS AND STRATEGIES 9

Performance and Cost 20

REFERENCES 25

ARTERIAL CORRIDOR MANAGEMENT TASK FORCE 27

INTRODUCTION

Arterial management has become a subject of growing importance for Capital District communities. Increasing vehicular traffic, new land development and redevelopment, and direct access from those developments to the region's arterial roadways, has been found to have a noticeable impact on the capacity, traffic flow, and public safety of arterial highways. Recent federal and state policy actions have placed increased emphasis on the importance of arterial corridor management. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 emphasizes a number of pro-active transportation planning issues, including preservation of corridors, integration of transportation and land use planning, and prevention of congestion. CDTC is exercising its ability under ISTEA to pursue these initiatives in a number of ways, including expanding transit and ridesharing opportunities, establishing a challenge grant program for employer-based demand management incentives, and requiring land use management as an integral part of any major addition to system capacity. These will be key elements of CDTC's congestion management system. Further, a recent policy paper prepared by the NYSDOT stresses that corridor congestion should be a shared responsibility and outlines a strategy for better coordination of transit, highway, and land use planning in New York State -- including consideration of appropriate access management actions.[1]

One objective of CDTC's Regional Transportation Plan, adopted in December 1993, is to assure land use and arterial management planning in major development corridors. Through CDTC's New Visions effort -- the comprehensive transportation planning process to ensure mobility, achieve intermodal integration, and enhance the Capital District's economic development potential -- arterial management and eight other subject areas have been considered by nine separate task forces. The Arterial Management Task Force was established to examine long-range (20 year) future forecasts of "null" conditions, examine the appropriate function of the region's arterial streets and highways for the long-range future of the metropolitan area, and craft policy and investment options that would support that function. The findings and recommendations of the task force were presented at a second "New Visions" conference held on December 12, 1995 for reaction by others not involved in the task force, and for integration into products of other working groups. By December 1996 a unified product is anticipated that sets long-range policy direction for transportation in the Capital District.

Task force membership included people with technical expertise in traffic engineering, transit operations, and land use planning. Efforts were made to insure that all affected constituencies were represented, including current CDTC Planning and Policy Committee members. Like the CDTC itself, the task force operated by consensus and focussed upon finding positions that others may also be asked to support. A list of task force members is set forth at the end of the report.

[1] *See NYSDOT's report Mobility in New York State: Issues and Opportunities, January, 1993.*

THE NEED FOR ARTERIAL CORRIDOR MANAGEMENT PLANNING IN THE CAPITAL DISTRICT REGION

Prior to the 1970's the "inner ring" of towns surrounding the cities of Albany, Troy, Schenectady, and Saratoga Springs was predominantly rural. These inner-ring communities were characterized by well-established suburban neighborhoods surrounded by widely scattered residential and commercial development. The roadsides of these communities contained farms, open land on the threshold of development, and occasional strips of single family homes and isolated grocery, farm supply stores, and various small businesses. This pattern is still evident in the hill towns of Albany County, and in the communities of northern Saratoga, southern and western Rensselaer, and western Schenectady counties. Under these conditions, the traffic impact of adding another residence or store along the road was hardly noticeable. Yet, parcel by parcel, house by house, entire stretches of roadside became totally developed. Often the process was hastened when a large subdivision, strip shopping center, or office building was constructed; but even then, when the opportunity to design a larger development occurred, the same solution was often chosen: use the arterial highway as a subdivision street because it is cheaper to do so than to build a new collector or local street. Such development practices became so common in the last twenty years that a belief emerged that there should virtually be unrestricted access to land along state and county-owned arterial and collector roadways.

The problem of incremental development along arterial and collector roadways was further compounded by the suburban employment and retail boom of the last decade. With the addition of daytime work force and shopping population, some Capital District suburbs have almost become indistinguishable from traditional urban centers, featuring a mosaic of places from office buildings and parks to shopping plazas, day-care facilities, restaurants, and health club facilities. As loosely organized strips of freestanding office buildings and retail complexes -- primarily designed for the automobile -- these "instant downtowns" have produced "instant congestion" on "farm-to-market" roadways that were never envisioned to carry heavy volumes of traffic. They are also, for all practical purposes, inaccessible to pedestrian and bicycle traffic, and are very difficult to serve with public transit. It is quite evident that every county in the region is experiencing this negative impact of roadside development on traffic circulation and arterial highway performance.

In the judgment of the Arterial Corridor Management Task Force, the problems created by unplanned or uncoordinated growth are serious enough that, if left unattended, could challenge mobility expectations valued so highly by Capital District residents. Traditionally, the response has been widening the existing roadway or building a new one, which can be costly and environmentally disruptive. An alternative approach argues for a coordinated land use/ transportation planning process that measures every decision against a clear, unified vision of the future -- a future that addresses the issues related not only to travel convenience, but also to public safety - for both vehicular and pedestrian traffic - community livability, and land use compatibility. This approach has the potential to save lives, reduce costs to motorists, and improve the operating efficiency of the region's transportation system, while postponing or

eliminating the need for major new highway construction or reconstruction.[1]

Synthesis of Proposed Planning and Investment Principles

The Arterial Corridor Management Task Force built its work around the fundamental principle that the arterial system serves as the basic foundation of the region's transportation system. Streets and highways in the region constitute a major public investment and must serve several important functions, including:

- Moving vehicular traffic
- Providing access to property
- Providing routes for pedestrian and bicycle traffic
- Serving major CDTA transit routes

The task force concluded that inadequate and ineffective management is partially responsible for the operational deterioration of many of the region's arterial roadways. The task force strongly believes that good arterial corridor management practices can enhance the multiple functions listed above and would as a result, improve safety, reduce travel delays, and postpone or eliminate major capital expenditures for highway capacity improvements.

Planning Objectives of the Arterial Management Task Force

Traffic and transportation engineers have developed many cost-effective ways to improve traffic flow along city streets, suburban roadways, and rural highways. National and local research has consistently demonstrated how good transportation design practice can safely and efficiently move people and goods. Research has proven that transportation systems management strategies that include relatively low cost actions like state-of-the art traffic signal systems, turn lanes, controls, and restrictions, and intersection channelization can work together to improve traffic flow through heavily travelled corridors and street networks.[2]

There is general consensus among transportation professionals, however, that in many cases these design and traffic engineering techniques alone have not been able to offset the effects of poorly located, haphazardly planned, or inadequately designed access to property. The cumulative increases in traffic placed on existing roadways by new development are often difficult to mitigate with traffic engineering actions alone. The inability to effectively apply design standards and to coordinate land use with transportation has led to the need for improved arterial planning and management. While the traditional goal of arterial management is to focus on actions to maintain or restore the through traffic function of arterial streets, the task force emphasized the importance to incorporate strategies that would benefit pedestrian and bicycle traffic as well. For the task force then, the principal concern of arterial management is to

[1] *U.S. Department of Transportation, Federal Highway Administration, First National Access Management Conference Proceedings, Vail Colorado, 1993.*

[2] *Transportation Research Board, NCHRP Report 81, Experiences in Transportation System Management, November 1981.*

minimize conflicts between traffic flow, pedestrians, and access to abutting property; improved linkage between land-use and transportation plans can be realized as well.

In response, the task force set the following objective:

> *CRAFT APPROPRIATE POLICY AND INVESTMENT STRATEGIES AND ACTIONS THAT WOULD SUPPORT THE MULTIPLE FUNCTIONS OF CAPITAL DISTRICT ARTERIAL STREETS AND HIGHWAYS.*

It is important to note that the task force's stated objective emphasizes that any action must address all functions of the region's arterial system. Improving highways for their traffic movement function is only part of the solution. In order to improve the "living environment", all functions must be attended to; that is, the public function of thoroughfare and the private function of property.

To achieve the stated objective, the task force pursued a two-phased approach that involved (1) the examination of nationwide arterial management practices and, (2) development of land use/traffic conflict index that would empirically define arterial conflict in the region and help verify or refine generic arterial management guidelines cited in the literature.

Review of Current Practice

The task force recognized the existence of a vast storehouse of information relating to virtually every aspect of arterial corridor management. The task force collected and reviewed more than 75 documents between December 1993 and August 1995. The research effort included computer literature searches, phone interviews, and site visits to selected state and local transportation agencies. The objective of the research effort was to determine how public agencies across the country manage and control access and to identify the strengths and weakness of these approaches. The investigation focussed on determining the extent that access management guidelines differ across regional and state boundaries and to what extent land use development is coordinated with access policies or programs. The research was conducted to establish an information platform on which to build an arterial management program for the Capital District.[3]

Some key findings related to current practice:

- Most public agencies apply some form of access control to their streets and highways. In New York State these controls typically take the form of highway design standards and driveway permit criteria. Traffic impact analyses are typically used to assure that development impacts are identified and mitigated. The provisions, standards, and procedures which represent the official policy of NYSDOT governing entrances to state highways is described in the report, *Policy and Standards for Entrances to State Highways,* prepared by the New York State Department of Transportation.

[3] *See references listed at the end of this report.*

- Most often, design criteria, driveway permit procedures, and traffic impact analysis requirements fall short of maintaining good levels-of-service along arterial corridors. Too often, traffic impact studies are done separately for individual projects and fail to consider cumulative impacts of nearby developments with multiple curb-cuts, intersections, and traffic signals. The broader system implications of an additional driveway or traffic signal are often overlooked. Emphasis on geometric "design standards" rather than "operational techniques" limits the opportunities for and effectiveness of many arterial management treatments.

- Transit, pedestrian, and bicycle actions are often absent from discussions concerning arterial management. Since commercial corridors evolved to accommodate the automobile, well-designed pedestrian amenities are virtually non-existent within the typical commercial roadway corridor. Even though some people do still walk, bike, and take transit, the importance of accommodating these groups and encouraging these types of travel are often overlooked.

- Current research and practices have not identified any clear method of establishing spacing standards for unsignalized driveways. For example, recommended driveway spacings for a typical 45 mph suburban roadway range from as short as 230 feet to as much as 860 feet; CDTC's current guidelines call for 670 feet between driveways and the state of Florida standards call for 440-660 foot spacings, depending on median treatment. On the other hand, traffic signal and arterial spacing requirements are better understood and more clearly defined in the literature and consistently applied.

- The State of Colorado's access management code was the first comprehensive program developed and apparently has withstood the test of time. It has served as a prototype for the States of New Jersey and Florida. All three programs specify spacing requirements for both signalized and unsignalized intersections. Access management programs in many other states mainly apply to rural state highways.

- A few local governments were found to have comprehensive access management policies and programs. For example, the cities of Orlando, Florida and Portland, Oregon have incorporated various access management principles in their comprehensive plans. The city of Orlando has adopted a comprehensive access classification and driveway spacing program modelled after Florida Department of Transportation standards. These two cities also have strong policies and standards relating to bicycle and pedestrian access.

- There is a sparseness of national data to support safety benefits of properly spaced driveways. Our task force has compiled sufficient data to draw conclusions related to arterial accident experience for various land-use conditions (urban vs rural; two-lane vs four-lane; commercial vs residential).

- There are no clear conclusions regarding the extent to which vehicle capacity of a roadway is eroded if too many curb-cuts are permitted. One opinion voiced argues that capacity is solely controlled by intersection capacity. Others disagree, noting that

capacity of suburban arterials in urban areas is also affected by midblock conditions. CDTC's work appears to support this latter condition.

- Many planners voice the opinion that some consolidation is better than the status quo. Even though an accident history related to a driveway or median opening may not be established, some states believe the existence of traffic conflicts themselves provide sufficient reasons to take action to prevent a serious problem from developing. The State of Florida has been somewhat successful in closing median openings in this regard.

- The State of Florida does not build new or widen existing arterials without a landscaped or paved median. They currently have no standards for providing median cuts but are currently working to establish them.

- A few states, like Wisconsin, have developed access management standards based on classification categories that relate function to facility type. A unique feature of the Wisconsin approach is that arterial level-of-service is commensurate with roadway type (i.e. principal arterials should provide better level-of-service than minor arterials). Because level-of-service is related to average speed, principal arterials are planned to have fewer driveways, traffic signals, and median openings compared to other less critical roadways.

- In the spirit of integrating transportation planning with land use planning, a few communities have recognized that effective access management requires both traffic and land use solutions. For example, the *Oregon Transportation Plan* explicitly encourages the development of regional and local land use plans that identify ways to avoid direct property access to state-owned highways. Closer to home, CDTC's Corridor Management Initiative is a challenge grant program to individual communities to help revise zoning ordinances and parking ordinances, create site design standards, and to adopt official maps to help carry out the land use half of the comprehensive planning commitment. CDTC participants fully support the program, viewing that protecting transportation function through pro-active corridor management work is far cheaper than rectifying mistakes at a later date.

Measuring Arterial Management Performance in the Capital District: Development of a Traffic/Land Use Conflict Index

The roadway network of a community is commonly defined in terms of a street hierarchy. This hierarchy describes the principal use and/or intended function of each road. Under the functional classification system, arterial streets primarily serve the through movement of traffic between communities. Local streets provide access to abutting land, such as in residential neighborhoods. Collector streets funnel traffic between the two, and usually serve a secondary land access function. When a street begins to serve more than its principal function, conflicts can occur.

The most notable conflict, from a quality of life perspective, concerns the intrusion of through traffic into residential areas. Traffic impacts can range from air quality to noise, visual and

safety concerns. The point at which traffic levels are perceived as a detriment to residential quality, however, is difficult to measure and depends on the expectations and past experience of each individual. Using objective criteria developed from a number of sources, and based on traffic volumes, roadway function, and land use characteristics, analysis of the highway network identified a number of areas along arterial and collector streets where traffic volumes are clearly in conflict with residential land use.

A second type of conflict which occurs in the region concerns access conflicts with commercial traffic along collector and arterial streets. Excess curb cuts and resulting driveway turn movements can act to interrupt traffic flow. A number of areas were identified along arterial highways where conflict exists between the primary function of the roadway as conveyor of through traffic, and access to adjoining parcels.

The CDTC staff, with the assistance of the task force, developed a performance measure to help assess traffic/land use conflict in the Capital District. Analogous to traffic level-of-service ratings, Level-of-Compatibility (LOC) ranges from "A", the most desirable, to "F" the least acceptable. Measures for both residential and commercial corridors were developed. Explanation of the calculation of the measure and summary of trends is set forth in the New Visions report, *Development of an Arterial Corridor Management Transportation Strategy for the Capital District Region: Land Use/Traffic Conflict Measurement and Trends, December 1995*.

An Overview of Arterial Conflict in the Capital District

Over 275 state and local arterials covering roughly 850 miles were surveyed during 1994. Based on conflict scores calculated for each arterial segment, it was found that the majority of arterial street mileage currently has little conflict between traffic levels and adjacent land use; it is expected, however, that the conflict will intensify and become more noticeable under 2015 travel conditions. For residential corridors, severe conflict (LOC D or E) is expected to affect about 140 miles of roadway in 2015 -- an increase of 75 percent over current conditions. For commercial corridors, a three fold increase in arterial mileage experiencing severe conflict is expected by 2015 -- an increase from 26 miles to about 85 miles. The largest proportion of arterial streets classified as severe is presently found in suburban towns, and is expected to remain that way in the future. Because traffic is forecast to grow more along state-owned arterials than those under local jurisdiction, more conflict will be found on those facilities. Furthermore, by 2015 it appears that there will be a substantial number of arterials in rural communities that will be exposed to significant traffic conflict, particularly along residential corridors.

SUMMARY OF PROPOSED TRANSPORTATION ACTIONS AND STRATEGIES

Based on the task force's research, detailed technical investigation of driveway spacing and safety, and generalized findings, six major actions are recommended by the task force. The actions are specific, but described in detail sufficient only to suggest the most appropriate treatments for the region and order-of-magnitude resource requirements. The actions stop short of dictating the details of geometric or transit facility design, which are appropriately the subject of more careful analysis by NYSDOT, CDTA, and local highway departments. The recommendations are consistent with the proposed planning and investment principles.

- **Endorse an Access Management Policy for a Priority Network of Arterial Streets and Highways**

1. Reinforce Street Hierarchy: Access to property should reinforce the roadway hierarchy in order to maintain traffic flow, preserve roadway capacity, and enhance safety. As a general rule, access to property should be from local streets or collector roads and not from the arterial itself. Traffic should flow to and from the arterial over collector roads and enter and exit the arterial at controlled intersections.

2. Driveway Spacing Guidelines for Commercial Corridors: Driveway spacing standards limit the number of curb-cuts on a roadway by encouraging a minimum separation distance between driveways. These guidelines would help reduce the potential for collisions as traffic enters or exits the arterial, encourage sharing of access for smaller parcels, and can even help improve community character by discouraging haphazard placement of driveways along corridors.

   There are many different ways to establish spacing guidelines. Traffic operational factors leading toward wider spacing of driveways include merging and weaving distances, stopping sight distances, acceleration rates, and storage distance for back-to-back left turns. Strict application of traffic engineering criteria may push spacing requirements of 500 feet or more. However, such spacings may be unacceptable for economic development in some suburban environments where development pressures opt for 200 to 300 foot spacings or less.

   The task force recommends that environmental setting and highway design be used in conjunction with roadway speed and volume to determine desired driveway spacing. The guidelines set forth in Table 1 suggest a reasonable balance between traffic engineering criteria and economic development demands. Comparison with other criteria is offered as a reference in Appendix A of the planning report.

3. Signal Spacing Guidelines: Preserving the quality of traffic flow and safety along public streets requires spacing of traffic signals that assures continuous, progressive movement. This normally entails relatively uniform spacing of signals at sufficient distances to travel at reasonable speeds. The spacing guidelines for signalized intersections summarized in Table 2 should achieve the objectives.

4. Adopt a Residential Street Standard: As cited earlier, the most notable conflict, from a quality of life perspective, concerns the intrusion of heavy traffic into residential areas. Using objective criteria developed from CDTC's regional highway system review, and based on current knowledge about the subject, suggested planning guidelines are summarized in Table 3.

- **Strengthen Land Use Planning and Coordination**

A critical factor to the success of preserving capacity along existing arterial highways involves the coordination of development along the roadway. How land owners adjoining arterial highways use or develop their property and gain access to the highway system has a direct impact on how well the highway user is served. Land use and access considerations are critical to a successful arterial management program. This action has three components:

1. Strengthen Municipal Planning: Municipal land use and zoning policies strongly influence the efficiency of the region's arterials and highways. Each community should embrace site designs that create a coordinated pattern of land use that limits access to major roadways, is transit friendly, and supports provision of pedestrian access. A well-planned corridor will have concentrations of development at specific centers and areas of free-flowing traffic between these centers. A coordinated pattern of land use and transportation can minimize turning movement conflict, improve automobile, transit, and pedestrian access to activity centers, and help prolong the life of the roadway.

2. Pursue Policies That Ensure Accommodation of Pedestrian, Transit, and Access Management Concerns in the Site Planning Review Process: Building on the existing SEQR process, promote a tiered review process that begins with an informal meeting and concept review and which promotes scoping and early public involvement.[5] The informal review would allow planners to advise the developer regarding information needed to process the application. This may include state, county, and local permit requirements and special consideration of the development site. The concept review provides the developer with early feedback on a proposal, before the site plan has been drafted.

3. Improve Agency Coordination: The task force recommends that prior to approval of residential subdivisions or commercial developments along arterial highways and major collector roads, NYSDOT, CDTC, county highway departments and local governments should cooperatively analyze the traffic impact of each proposal. The objective of the analysis would be to: (1) limit the number of vehicle conflict points; (2) separate vehicle conflict areas; (3) reduce vehicle deceleration requirements; and (4) remove turning vehicles and queues from the travel lanes. The implementation of roadway

[5] *New York's State Environmental Quality Review Act (SEQR) requires all levels of state and local government to assess the environmental, social, and economic impacts of actions that are determined to be significant. The SEQR process uses the Environmental Impact Statement process to examine ways to reduce or avoid adverse impacts related to a proposed action.*

access control that accomplishes these objectives at each new land development would serve to minimize traffic conflict, crashes, and delay.

- **Promote Alternatives to Automobile Travel**

Since commercial corridors in the region evolved to accommodate the automobile, it's not surprising that good pedestrian, bicycle, and transit amenities are not always available within the typical commercial corridor. Some people do still walk, bike, and take the bus, however, and the importance of accommodating these groups and encouraging these types of travel should not be overlooked.

1. Improve the Pedestrian and Bicycling Environment: This action calls for providing pedestrian linkages between adjacent parcels. Such linkages have been shown to encourage walking in place of driving. For example, the service road connection between Windsor Plaza and Computer Park West in the Wolf Road corridor provides access to nearly 100 walkers during the lunch hour that would otherwise have made the trip by car.

   This action also calls for provision of sidewalks along a much greater percentage of streets and highways than is the case today. It is also supportive of provision of bicycle accommodations along arterials either as part of routine highway reconstruction work or through stand-alone bicycle projects. (A more complete description of a priority bicycle network is contained in the New Visions report prepared by the Bicycle and Pedestrian Task Force.)

2. Routinely Consider Transit as an Integral Component of the Transportation System When Undertaking Site Development Review and Corridor Reconstruction: Too often, site design for new development or geometric design for highway construction projects is carried out with only passing consideration of the project's interface with public transit facilities and services. Much can be gained by simply raising the profile of this subject during the site design and project development process.

   At the individual development scale, if transit is available, the development proposal should afford or enhance access to the transit system. If not available, but the site is zoned for high intensity uses, then the site plan should not preclude the potential for future transit access. In general, transit service works best when it is considered as an integral part of the design and site plan. Post-development modifications are more costly, less effective, and in some cases, impossible to implement.

   Specifically, transit's ability to effectively serve new or existing markets can be improved significantly by:

   - Locating buildings closer to the street and relocating much of the

parking away from the street;

- Providing turning radii that meet bus requirements
- Locating bus stops and shelters in locations that are convenient to customers and integrating them into the architectural design of the development;
- Providing for bike racks or lockers at shelters on site, allowing for bike "park-and-ride" at these locations;
- Incorporating park-and-ride parking spaces into parking design to allow the site's use as a transit and carpool terminal;
- Providing safe and effective pedestrian movement from the street to the site and from building to building on site;
- Where needed, providing service roads or other connections to allow pedestrians, bikes, buses and other vehicles to pass from one site to an adjacent site without having to use the arterial highway.

While these actions are particularly suited to new retail locations, they are also applicable to commercial development and large residential development. It is also clear from recent activity in the Capital District that there will be frequent opportunities to redesign existing sites as they expand or change use.[4]

- **Explore the Possible Use of "Traffic Calming" Actions to Improve the Livability of Residential Arterial Corridors**

"Traffic calming" is a concept that seeks harmony between vehicular traffic and people. Calming traffic means lowering vehicle speeds and traffic volumes, usually through physical operational changes to the streets themselves. With lower speeds and less through traffic, the corridor's living environment becomes more hospitable to residents, pedestrians, and bicyclists.

Traffic calming initially started as a treatment for local streets. Gradually, the concept was widened to include residential street networks and even arterial roadways. The task force appreciates the benefit of traffic calming actions, but is concerned that poorly implemented actions could decrease the efficiency of the region's arterial roadways, possibly increasing traffic congestion in some corridors.

1. Incorporate Landscaping and Other Enhancement Techniques into Project Design: In addition to enhancing community appearance, incorporating generous amounts of green space and mature plantings can partially mitigate the severe traffic/land use conflict

[4] *A more complete articulation of opportunities to better integrate transit design into land development projects is contained in the New Visions Transit Futures Report.*

that currently exists (and is expected to worsen) along some of the region's more heavily travelled arterials. When employed effectively, landscape features can also help slow traffic through residential corridors, which will work to increase safety, particularly for pedestrians and bicyclists.

2. Explore the Judicious Use of Traffic Signals Along Corridors with Moderate to High Residential densities: This action calls for the use of traffic signals in certain residential corridors to improve the safety and efficient movement of traffic and pedestrians. Modeled after Western and Washington Avenues in the city of Albany, actuated traffic signals would be placed along an arterial to provide for progressive movement of traffic at a definite speed and interrupt traffic at regular intervals to permit pedestrians or other vehicles to cross. This action would be most appropriate for corridors carrying more than 15,000 vehicles per day but could also be considered in less travelled corridors. A properly designed circulation system that includes the judicious use of traffic signals can improve the safety, character, and overall liveability of residential corridors. A plan is being developed by the CDTC, town of Colonie, and Albany County for the Albany Shaker Road corridor between Wolf Road and Osborne Road.

- **Support Investment In Access Management Improvements And Other Actions That Promote Overall Objectives of Arterial Corridor Management**

A review of the transportation benefits and costs related to implementation of an arterial corridor management strategy for the region suggests a highly cost-effective program.

1. Support Investment in Access Management Improvement: The task force supports a policy that links federal, state, and local transportation investment to access management commitments. Already, NYSDOT Region 1 is requiring an access management plan from the town of East Greenbush prior to designing an infrastructure project that will include construction of a flush median. In some cases use of local transportation development districts, mitigation fees, and negotiated agreements can be used to implement access management arrangements.

2. Expand Local Road Network to Include Greater Use of Service Roads and Collector Streets: Frontage or service roads are currently located along Wolf Road, Washington Avenue Extension, NY 146 in Clifton Park, and parts of New Scotland Road to provide access to residential and commercial properties in these heavily traveled corridors. It would be appropriate to pursue additional use of this

arterial management technique in conjunction with land development. Adequate connections to the arterial system can also be provided through development of new collector facilities and/or continuous local streets. This arterial management technique should be pursued aggressively in corridors where land is available for cost-effective implementation.

3. Continue to be Supportive of Existing Transportation Improvement Program (TIP) and Congestion Management System (CMS) Actions: The Capital District has an inadequate spacing of arterials as a result of suburban development unaccompanied by highway investment. Currently programmed infrastructure and capacity improvements can help restore mobility function to major arterials. Preservation and improvement of major arterials will encourage through trips to avoid residential corridors.

- **Promote the development of access management plans for priority network arterials in cooperation with municipalities, the New York State Department of Transportation and county highway and planning departments.**

During 1990 CDTC carried out a pilot study on one arterial corridor -- NY 7 through Colonie and Niskayuna -- to define methods for maintaining through traffic functions on major highways challenged by local development. After completing traffic and land use inventories, traffic forecasts were prepared and alternative management actions, including signal coordination and consolidation; provision of transit and pedestrian accommodations; and mixed land use design were examined for applicability and effect. An access management strategy for Route 7 was developed and has the support of both NYSDOT and town officials. Similar plans have been prepared for the Wolf Road corridor in the town of Colonie and the West Avenue corridor in the City of Saratoga Springs. The West Avenue plan is more comprehensive because it also recommended zoning changes, established revised parking standards, and set site design guidelines.

Similar studies should be completed for other critical corridors. The task force agreed with other task force recommendations that the Central Avenue (Route 5) corridor should be elevated to a high priority for study because of freight service issues, numerous driveways, accidents and travel delay, as well as the fact that the CDTC *Fixed Guideway Study* identified this corridor as a possible candidate for light rail or other major transit investment. Special consideration should also be given to "transition" roads -- former "farm-to-market" roads that are low to moderate density and residential in nature, but zoned for higher densities than existing infrastructure can support.

- **Develop an Outreach Program that Promotes Access Management Principles and Concepts**

The task force agreed that an educational program should be developed that demonstrates the public safety and capacity linkages of arterial corridor land use decisions. The program would be aimed at neighborhood and community groups; planning boards; public works and safety officials; the development and business community, and other interested groups. This action has four components:

1. Distribute materials to local planning boards, highway agencies, community groups, developers, and others to promote use of access management techniques.

2. Sponsor periodic workshops similar to the one sponsored by the Arterial Management Task Force in May, 1995 to provide a forum not only for dissemination of tools and techniques, but also to encourage continuing dialogue between the local planning and development community, and regional and state transportation officials regarding access issues.

3. Foster continued communication and coordination between local and state transportation officials in addressing corridor and site-specific access issues to facilitate development of workable solutions.

4. Form a working group to build upon and advance the technical review and draft arterial management guidelines effort initiated by the Arterial Corridor Management Task Force. During Phase 2 of New Visions, the Arterial Corridor Management Task Force used a cooperative approach toward development of a draft set of arterial management guidelines. Through that exercise many additional areas requiring further detailed consideration were identified. Primary among them is the need to develop a set of guidelines that can adequately accommodate the differences in land use character encountered in various parts of the region. This group should also track progress on access management research and suggested standards currently being developed by the Transportation Research Board (TRB) at the national level.

Table 1

SUGGESTED MINIMUM COMMERCIAL DRIVEWAY SPACING GUIDELINES FOR CAPITAL DISTRICT ARTERIALS

	Minimum Commercial Driveway Spacing		
Roadway Type	Absolute	Acceptable	Desirable
Two-Lane, 30 mph 5,000 vpd	50 feet	50 feet	100 feet
Two-Lane, 35 mph 5,000-10,000 vpd	50 feet	100 feet	200 feet
Two-Lane, 35-40 mph 10,000-15,000 vpd	75 feet	150 feet	300 feet
Four-Lane, 40-45 mph 15,000-25,000 vpd	125 feet	250 feet	500 feet
Four-Lane, 40-45 mph 25,000-40,000 vpd	200 feet	400 feet	800 feet

1. *There are many different ways to establish spacing guidelines. Traffic operational factors leading toward wider spacing of driveways include merging and weaving distances, stopping sight distances, acceleration rates, and storage distance for opposing left turns. Strict application of traffic engineering criteria may push space requirements of 500 feet or more. However, such spacings may be unacceptable for economic development in some suburban environments where development pressures opt for 200 to 300 foot spacings.*

2. *The task force recommended that environmental setting and highway design be used in conjunction with speed and traffic volume to determine desired driveway spacing. The above guidelines suggest a reasonable balance between traffic engineering criteria and economic development demands. The thresholds corresponding to absolute, acceptable, and desirable spacing conditions were empirically derived from CDTC's regional highway system review. In general, absolute minimum spacing corresponds to LOC E conditions and would be acceptable for small developments that generate less than 15 peak hour vehicle trips. Acceptable and desirable minimum spacing corresponds to LOC D and C conditions, respectively. The higher the development trip generation, the greater the spacing between driveways.*

3. *Commercial driveway location and spacing guidelines are provided for regional arterials and major collectors, but can be applied to other surface roadways as well. Parcels with less than 100 feet of frontage may be provided a driveway, but in certain cases a shared driveway or alternative means of access may be desirable and should be aggressively investigated.*

4. *Requirements for minimum intersection or corner sight distance are tied to AASHTO and NYSDOT guidelines. In general, current engineering practice recommends that driveways be located away from an intersection's functional area, usually defined by the length of typical peak hour vehicle queues, or the length of turning lanes. At a minimum, a clearance of 85 feet should be provided for 30 mph operating speed and longer for higher speeds.*

Table 2

PROPOSED TRAFFIC SIGNAL SPACING GUIDELINES FOR MAJOR ARTERIAL STREETS AND HIGHWAYS

Posted Speed Limit (MPH)	Signal Spacing (Feet)
30	1,320 - 1,980
35	1,540 - 2,310
40	1,760 - 2,640
45	1,980 - 2,970

1. *The range in signal spacings shown above correspond to signal cycle lengths of between 60 and 90 seconds. Longer cycle lengths would require longer distances between signals.*

2. *For residential arterials where low operating speeds are desirable, signal spacing as short as 880 feet would be considered acceptable. When signals are added at these shorter spacings, they should be semi-actuated and coordinated to achieve good progression for the major traffic flow.*

Table 3

SERVICE VOLUME THRESHOLDS FOR TWO-LANE RESIDENTIAL SUBURBAN ROADWAY

Roadway Type	Maximum Service Volume
Arterials/Collectors	
w/out Abutting Residential Development	1,000 vphpl (one-way)
w/Abutting Residential Development	450-625 vphpl (one-way)
Local Subdivision Street	200 vph (two-way)

1. *For arterial and collector highways that are forced to serve both local access and through traffic functions, conflict can be identified when peak hour volumes approach 450-550 vph. This traffic level was derived using the critical gap of 6.5 seconds for unsignalized intersections recommended in Chapter 9 of the 1985 Highway Capacity Manual. Albany County Planning Board's residential design Standards and Performance Specifications recommends a threshold of 600 vph (2-way volume).*

2. *For local streets, a threshold of 200 vph is recommended. ITE and others have used similar levels of peak hour traffic as upper limits for residential street traffic volumes. In general, research suggests that local streets with peak-hour traffic volumes below 200 vph are generally considered by residents as possessing desirable neighborhood amenities with minimum physical danger, congestion, noise, vibration, dust, and air pollution.*

3. *If these thresholds cannot be met or retained, the quality of life along a residential arterial street should be enhanced through mitigating actions such as streetscaping, traffic diversion, and connecting streets to more evenly spread traffic over the street system.*

Performance and Cost of Recommended Arterial Management Actions

A summary of performance measures related to task force recommendations is presented in Tables 4 and 5. As shown in Table 6, the cost of implementing all recommended actions is estimated to range between $16 and $25 million. The cost-effectiveness of these actions were found to be overwhelming positive, with the direct benefits exceeding total planning, design, and public implementation costs by a factor of at least ten.

The benefits of task force recommendations are clear: traffic congestion on existing facilities is relieved, reducing or delaying the need for major reconstruction and widening in some locations. With the provision of necessary strategic improvements on existing facilities (TIP commitments), and incorporation of transit and ridesharing actions (recommended by the Transit Futures Task Force), this alternative would have the potential of accommodating projected 2015 traffic volumes on most surface arterial streets. Substantial reduction in crashes and improved emergency vehicle access would be additional benefits of this approach, as would system flexibility (as defined as resource capacity and provision of alternative routes). In contrast to conditions that would prevail under the status-quo, travelers in the year 2015 would have the opportunity to make different travel choices, and would experience generally smooth travel midblock and a reduction of midblock conflicts with driveways. By providing appropriate local and collector streets to support arterial function, the highway system would be more "complete" and street spacing more appropriate to the urban development in the region than is currently provided.

TABLE 4

QUALITATIVE SUMMARY OF THE CUMULATIVE IMPACT OF SUBSCRIBING TO ALL SEVEN ARTERIAL MANAGEMENT TASK FORCE RECOMMENDATIONS

CORE MEASURES		Cumulative Impact of Subscribing to All Seven Actions & Strategies	Notes
Transportation Services			
ACCESS	Availability of reasonable alternatives	√	1
	Provision of alt. with time advantage		
	Modal alternatives for freight	√	2
ACCESSIBILITY	Travel time by best mode	√√	3
CONGESTION	Excess hours of delay	X	4
FLEXIBILITY	Reserve capacity	√	5
	Non-highway emergency capacity		
	Corridor alternative during disruption	√	6
	Fixed capacity risk		
Resource Requirements			
SAFETY	Social costs of accidents	√√√	7
ENERGY	Total energy consumption	√	8
ECONOMIC COST	Government costs	√	9
	User and social costs	√√√	9
	Total user, gov't and social costs	√√√	9
External Effects			
AIR QUALITY	Daily emissions	√	10
	Attainment status	√	10
LAND USE	Amount of open space	✠	11
	Disruption of residences and businesses	✠	11
	Highway/land use compatibility index	√√√	12
	Support community quality of life	√	12
ENVIRONMENTAL	Sensitive areas impacted		
	Exposure to undesirable noise levels		
ECONOMIC	Overall support for economic health	√	13

√√√	Positive impact greater than 50%, relative to the null.
√√√	Positive impact between 20 and 50%.
√√	Positive impact between 10 and 20%.
√	Positive impact less than 10% or cannot be estimated.
	Neglible impact expected.
✠	Negative impact less than 10% or cannot be estimated.
✠✠	Negative impact between 10 and 20%
XXX	Negative impact between 20 and 50%.
XXXX	Negative impact greater than 50%, relative to the null.

Technical Notes for Table 4

1. *Site access to pedestrians, bicycles and transit would be improved as new development is accommodated.*

2. *Better site design will have noticeable benefits for freight movement by improving timeliness of deliveries.*

3. *One of the primary objectives is to increase travel speeds in critical corridors. Average speed is expected to increase by about five percent systemwide; an increase of 10-20 percent in individual corridors is possible.*

4. *Marginal impact. Fewer but better designed driveways reduce the conflict between turning and thru-traffic which would translate into reduced congestion. Savings may be offset by additional delay created by pedestrian signals at signalized and midblock locations. Excess delay could increase by about 2 percent.*

5. *Implementation of arterial management actions would provide increased ability to adapt to changes in travel demand by preserving peak hour capacity that would otherwise be consumed by development traffic. Use of non-auto modes provides for greater reserve capacity on the highway system. Implementing arterial management actions systemwide would result in 11 percent more capacity provided under 2015 trend conditions.*

6. *Construction of appropriate local and collector streets in arterial corridors would disperse automobile traffic and would provide alternative routes for emergency vehicles and thru traffic to mitigate congestion related to traffic incidents; and would allow transit to provide better coverage and more direct service.*

7. *Arterial street and highway safety would significantly improve over 2015 trend conditions. The task force estimated that the direct safety benefits of meeting access management standards would total at least $20 million annually (1,000 fewer crashes), exceeding annualized planning and construction costs by a factor of twenty. Areas of pedestrian and vehicle conflict where driveways meet sidewalks would be reduced substantially.*

8. *Effective access management translates into higher travel speeds, fewer traffic delays and, therefore less fuel consumption. The system impact of achieving access management standards in the region would be a reduction of about 8,000 gallons of motor fuel daily. Fewer auto trips related to improved pedestrian and transit access will contribute to a larger decrease in fuel consumption.*

9. *The cost of carrying out all seven recommended actions would total about $16-$25 million, representing a significant increase over current public and private investment in these kinds of actions. Addressing access management, signalization, and roadway function issues as part of the site planning process would have minimal impacts on implementation costs.*

10. *Improved traffic flow resulting from better traffic signalization practices, reduction in traffic conflicts, and additional walk and transit trips would reduce hydrocarbon and nitrogen oxide emissions. The actual emissions for the build condition would be lower than the modeled results shown in Table 5 because CDTC's air quality calculations using EPA's MOBILE5 does not reflect air quality benefits of reduced stop-and-go traffic expected under the plan.*

11. *Precise calculations are not available. Retrofitting existing developed corridors may require acquisition of taxable property, but is expected to be minimal. Comprehensive corridor plans would help identify opportunities for preserving open space valuable to the community.*

12. *Land use/traffic conflict along residential and commercial corridors would be noticeably reduced compared to 2015 trend conditions. Actions would result in a corresponding improvement in quality of life by fostering well-designed circulation systems that reinforce the character of commercial and former farm-to-market residential corridors.*

13. *Positive impact by demonstrating a strong commitment to congestion management through low-cost actions. Reduced conflict and increased travel speed in developed corridors would improve access to businesses located*

along arterial streets. Implementation of access management actions can help advance economic development goals by promoting more efficient use of land and transportation systems. Improved livability along residential corridors will encourage people to maintain single-family residences along an arterial, thereby maintaining property values and the community's residential tax base.

TABLE 5

SUMMARY OF SYSTEM PERFORMANCE MEASURES ATTENDANT TO IMPLEMENTATION OF RECOMMENDED ARTERIAL MANAGEMENT ACTIONS

CORE MEASURES		Trend 2015 Conditions With Current Commitments	2015 Conditions Arterial Management	Qualitative Summary Impact
Transportation Services				
ACCESSIBILITY	Travel time on the Surface Arterial Highway System (hours)			
	Region	63,200	60,390	□
	Inner Suburbs	30,240	28,035	□
	Travel Speed in a Typical Developed Corridor (mph) (Central Ave as an Example)	25	32	□□
CONGESTION	Corridor Peak Hour Excess Vehicle Delay (hours)			
	Region	6,015	5,890	□
	Inner Suburbs	2,990	2,730	□
	Intersection Excess Peak Hour Vehicle Delay (Region)	4,140	4,250	✠
FLEXIBILITY	Reserve capacity on the Surface Arterial System (PM Peak Hour Vehicle Miles of Capacity)	371,190	410,800	□□
Resource Requirements				
SAFETY	Number of Midblock Crashes	8,230	6,085	□□
	Estimated Annual Societal Cost of Midblock Transportation Crashes (Millions of Dollars, $M)	$339 M	$250 M	□□
	Estimated Annual Societal Costs of all Transportation Crashes ($M)	$1,065 M	$1,005 M	□
ENERGY	Daily Fuel Consumption (gallons)	719,105	711,800	□
ECONOMIC COSTS	Total Annual Planning & Direct Implementation Costs ($M)	$0.2 M	$0.8 - 1.5 M	XXX
	Estimated Annual Public Planning & Implementation Cost ($M)	$0.1 M	$0.2 - 0.4 M	XX
External Effects				
AIR QUALITY	Daily Hydrocarbon (HC) Emissions (kilograms)	17,640	17,650	
	Daily Nitrogen Oxide (NOx) Emissions (kilograms)	18,550	18,560	
LAND USE	Residential Use Traffic Conflict: Miles at LOC "E" or "F"	139	92	□□□
	Arterial Land Access Conflict: Miles at LOC "E" or "F"	77	45	□□□

TABLE 6

ESTIMATED COSTS RELATED TO IMPLEMENTATION OF RECOMMENDED TASK FORCE ACTIONS

Element	Total 20-Year Cost
Planning & Engineering	
CDTC Assistance to Communities	$1.0 - 1.2 M
Arterial Corridor Management Plans	0.4 - 0.6 M
Traffic Corridor Plans	0.3 - 0.5 M
Access Related Improvements	
Service Road Construction	$ 7.0 - 10.0 M
Signal System Improvements	1.8 - 3.0 M
Engineering & Design for Retrofit Corridors	1.3 - 3.5 M
Pedestrian and Transit Improvements	
Signal Upgrades/Crossings	$ 0.3 - 0.6 M
Transit Amenities Related to Site Development	0.5 - 1.0 M
Sidewalks	2.3 - 5.0 M
Streetscaping Improvements	$ 1.7 - 2.5 M
Total	$16.6 - 24.3 M

1. *The costs in this table are system level estimates that would be required to implement the seven recommended arterial management actions. These costs were estimated using system level costs derived from typical highway projects built to AASHTO standards and described in NYSDOT's Project Cost Estimation Process for Use in System Planning; recent cost experience for CDTA transit projects; local experience in sidewalk design and construction; CDTC project planning costs; and discussions with local realty firms and landscape architects regarding right-of-way and landscaping costs, respectively. These costs are exclusive of those required for site planning and design, site circulation and general roadway improvements, TIP commitments, and routine infrastructure repair.*

2. *Actual costs will be better defined as corridor specific actions are identified.*

3. *It is assumed that the public and private sectors would share responsibility. Incremental costs attendant to accommodating driveway and signal spacing, constructing local roads to complement the arterial system, and fostering well-designed circulation systems would be minimal if addressed during the land development process. Some costs to the business community will be offset by additional development opportunities created by more efficient use of land and transportation systems.*

Table 7

Additional Planning Guidelines Derived from Task Force Discussions that Capital Region Communities Should Consider in the Site Plan Review Process

- Where there are major housing or commercial developments along an arterial, a collector street should be provided to connect to the arterial. Access to individual homes, offices, or stores would then be provided by local streets running off the collector. In no case should individual homes in such developments have direct access to the arterial. In addition, the local street network in these developments should be laid out to provide eventual access to adjacent properties.

- Where large parcels are presented for subdivision into only a few lots, the developer should be required to file a long-range plan of development showing the future street network, and how the subdivided lots would fit into that network.

- Access to arterial roadways should be provided only if a traffic study demonstrates that such access is either necessary or beneficial to the overall circulation plan.

- The number of driveways required is a function of parcel size, site activity, and traffic volume. Minimizing the number of driveways per property frontage, limits the conflict area and provides turning drivers more time and distance to execute their maneuvers.

- If the opportunity exists to have a driveway on two or more different roadways, the driveway should be located on the lower class roadway. Provision of a restricted driveway on the arterial can be considered if sufficient corner clearances and driveway spacings consistent with task force guidelines can be achieved.

- Driveways should be located so they can provide opportunities for shared access with adjacent lands.

- On a local level, applicants for site plan approval with driveway connections to arterial or major collector routes should contact adjacent property owners to investigate the potential of consolidating driveways, which could become an approval condition. If such an agreement cannot be achieved then the Planning Board can request the applicant to provide an easement to adjacent parcels on the applicant's driveway. This easement would enable consolidation in the future.

- In general, current engineering practice recommends that driveways be located from an intersection's functional area, usually defined by the length of typical peak hour queues, or the length of turning lanes. Minimum clearance set forth in NYSDOT's *Policy and Standards for Entrances to State Highways* is established by the formula (2W + 15 feet) where W represents the width of the driveway. CDTC's draft arterial management guidelines suggest a minimum corner clearance of 80 feet, assuming a 30 mph operating speed and longer for higher speeds.

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