DEVELOPING EFFECTIVE CONGESTION MANAGEMENT SYSTEMS: FOUR CASE STUDIES

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EFFECTIVE APPROACHES TO CONGESTION MANAGEMENT

Federal Highway Administration • Federal Transit Administration

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U.S. Department of Transportation

Developing Effective Congestion Management Systems: Four Case Studies

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Final Report
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Developing Effective Congestion Management Systems

-- FOREWORD --

Included here are case study reports written by four metropolitan planning organizations: *Capital District Transportation Committee (CDTC), Metropolitan Washington Council of Governments (MWCOG), North Central Texas Council of Governments (NCTCOG), and Puget Sound Regional Council (PSRC).* The reports chronicle early congestion management system (CMS) development and implementation experiences in the four metropolitan areas. The case studies are part of the U.S. Department of Transportation's technology transfer program, and are sponsored by the Federal Highway Administration's Metropolitan Planning Division.

The reports are intended to increase professional knowledge of those working to develop, implement, and sustain congestion mitigation and mobility enhancement activities. Examples of practice are presented which have potential application to any number of local, regional, or statewide performance-based planning initiatives. The reports vary in discussion from the technical and institutional, to the planning process in general.

Chosen for the variety of approaches they represent, these cases are presented as examples for practice.

The information presented is particularly relevant to metropolitan planning organization (MPO) and state department of transportation (DOT) staff working with congestion management systems -- one of the six management systems outlined in the *Intermodal Surface Transportation Efficiency Act* (ISTEA) of 1991.

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CAPITAL DISTRICT (ALBANY, NY)
CASE STUDY
CONGESTION MANAGEMENT SYSTEM DEVELOPMENT

Task 1 Final Report
April 7, 1995

CAPITAL DISTRICT (ALBANY, NY) CASE STUDY
CONGESTION MANAGEMENT SYSTEM DEVELOPMENT

CONTEXT

Development Patterns

The metropolitan area surrounding Albany, NY is a multi-centered region with low and moderate density development. The metropolitan statistical area includes six counties and has a population of approximately 900,000. Four counties (Albany, Rensselaer, Saratoga and Schenectady) contain nearly 90% of that population and provide a traditional metropolitan service boundary for the regional transit operator (Capital District Transportation Authority), regional planning board (Capital District Regional Planning Commission) and regional transportation planning agency (Capital District Transportation Committee). The Capital District Transportation Committee (CDTC) is the designated Metropolitan Planning Organization (MPO) for purposes of fulfilling federal transportation law.

Urban development in the Capital District has its origins in the largely independent development of its four central cities -- Albany, Troy, Schenectady and Saratoga Springs. The triangle formed by Albany, Troy and Schenectady provided ample room between cities for suburban development through the 1960's and 1970's. Radial suburban development has been modest in all directions except to the north, along I-87 (the Adirondack Northway) into Saratoga County. Saratoga County has had among the most rapid growth rates in New York over the past two decades.

The resulting urban development is scattered. Albany, as the largest municipality, houses barely 100,000 residents. Ten other cities or towns have at least 20,000 residents. There are several city and suburban employment centers with employment of 3,000 to 15,000 each. Only the Albany central business district, with approximately 40,000 employees, is a major downtown trip destination.

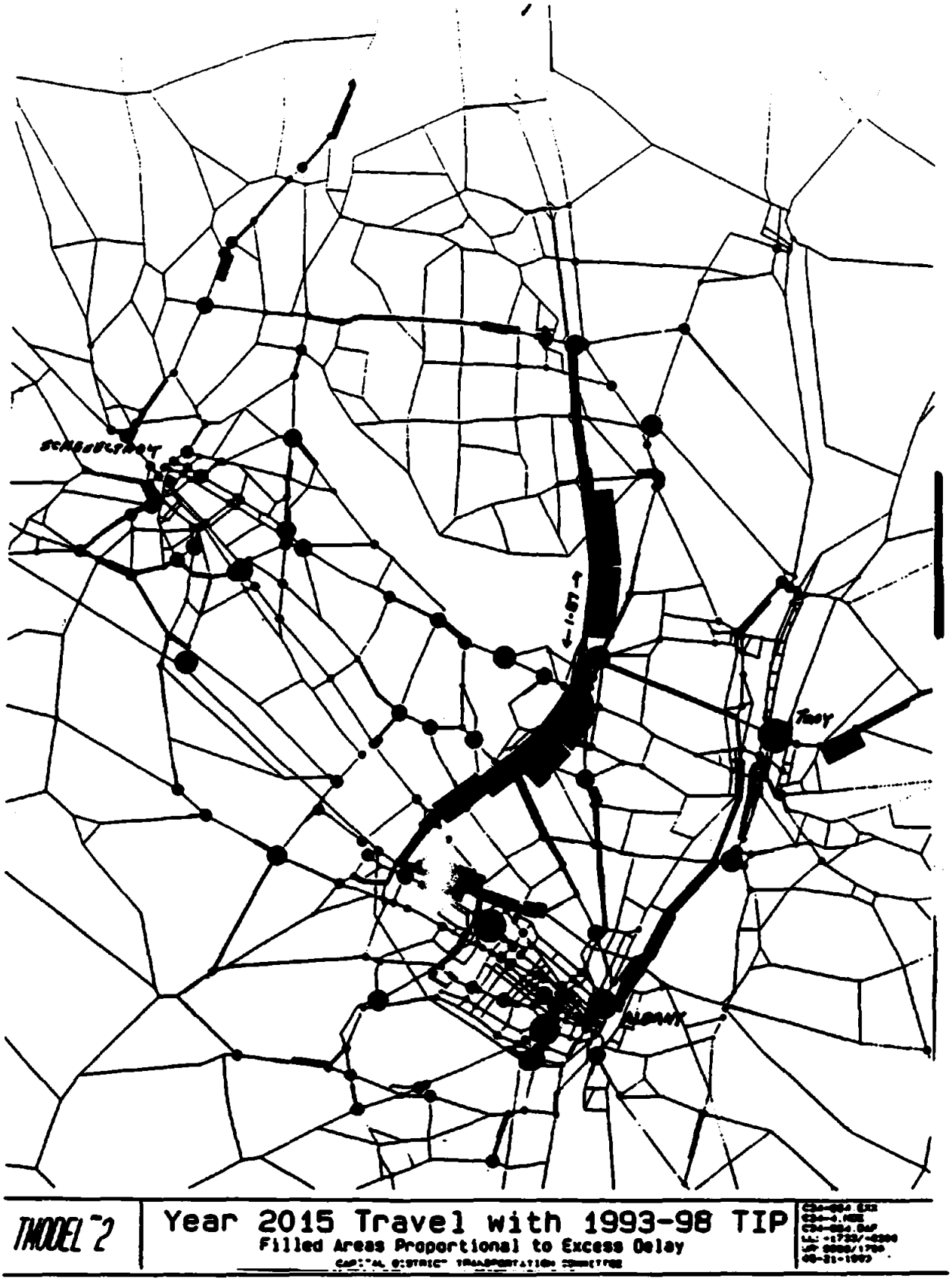
Growing amounts of congestion are evident in the Capital District today, but current congestion does not represent a major threat to economic vitality or to the overall quality of life for residents. Congestion is generally confined to intersection delay, midblock delay on certain two-lane suburban arterials, and limited, erratic, but increasingly-frequent breakdowns of freeway flow. Highway congestion faced by transit vehicles is found in the same locations listed above. Highway congestion experienced by freight transportation parallels that experienced by auto users. Congestion *caused* by deliveries and other freight transportation is not a major concern.

The congestion *threat* to the Capital District is related to CDTC's identification in 1990 of prospects for a near-tripling of unacceptable delay by the year 2000, as a result of projected development, income and vehicle ownership growth and shifts in the geographic distribution of activity increasingly

toward suburban and exurban areas. A particular concern regards developing congestion on I-87 (the Adirondack Northway) which extends from the heart of the Albany-Schenectady-Troy urban triangle up through the suburban area of Saratoga County. This is the strongest growth corridor in the metropolitan area and has experienced growth in Average Annual Daily Traffic from 35,000 vehicles per day (at the Saratoga County border) in 1980 to 90,000 today. Peak hour in-bound traffic volumes already exceed 6,000 vehicles on the three southbound lanes, which is the theoretical capacity of the facility.

CDTC has been very active in congestion management and mitigation strategies for the past several years. A public-private highway financing policy was established in 1989. Definition of congestion and prioritization of congestion corridors was completed in 1990. Ten-year forecasts of congestion and examination of the cost-effectiveness of alternative actions were completed by 1991. Systems management actions were assessed for over 400 intersections and regional demand management strategies were evaluated. Park-and-ride transit markets were prioritized and lot locations identified. A ridesharing program was initiated and routine examination of its effectiveness conducted. Sub-area and corridor studies have been conducted in the highest priority corridors through contractual agreements with local governments. Mitigation fees are being collected from private development.

As a result, CDTC was in a favorable position to react to the planning requirements and the increased federal funding authorizations made possible by the ISTEA legislation. The five-year Transportation Improvement Program (TIP) adopted in 1993 drew heavily from CDTC's ten-year plan which, in turn, drew heavily from CDTC's congestion management emphasis. The primary TIP commitments and their current status are discussed in Appendix 1. The TIP is expected to cut regional congestion in half but leave a number of unanswered congestion avoidance and congestion mitigation questions for the post-2000 period. *(See Figure 1 representing projected year-2015 congestion remaining on the regional highway system after taking credit for highway, transit and demand management actions in the current Transportation Improvement Program. The most significant remaining congestion is shown in the Northway corridor.)* Overall, implementation success since TIP adoption can be described as slow and methodical.



TMODEL 2

Year 2015 Travel with 1993-98 TIP

Filled Areas Proportional to Excess Delay

CAPITAL DISTRICT TRANSPORTATION COMMITTEE

MPO Structure

CDTC and its sister agencies across the state are creatures of federal law. They exist primarily to satisfy the federal requirements for cooperative decision-making regarding metropolitan transportation plans and programs and their influence is rooted in control of federal transportation funds. CDTC's five year TIP includes over $500,000,000 in federal highway and transit projects. MPOs in New York operate on the unique principle of action by consensus -- with consensus generally defined as "unanimity of all affected parties". Most of these MPOs, like CDTC, have their origins in the mid-1960's and have historically included the state, counties, cities, regional planning boards and principal transit operators as voting members. CDTC currently has seventeen elected officials as members, along with the New York State Department of Transportation Commissioner, representatives of the Capital District Regional Planning Commission, Capital District Transportation Authority and New York State Thruway Authority. One Saratoga County position is currently held by a local developer.

CDTC's consensus process has generally worked to produce agreement rather than stalemate. It puts an automatic pressure upon the process to be equitable and politically realistic. This pressure will serve both as a challenge (in examining new ideas) and a protection in CDTC's serious pursuit of its next-generation long range plan and in its development of a Congestion Management System.

PLANNING APPROACH

A Metropolitan Planning Organization implementing the provisions of the ISTEA is faced with the challenge of finding good structures that provide for the following:

1. **Outreach**. The intent of the ISTEA is for better and earlier involvement of interested parties in the planning process. The quality of the decisions made by the MPO is directly related to the quality of the involvement of such non-traditional participants as trucking firms and railroads, environmental and community groups, developers and universities. Access to the process must be provided at appropriate times; if access is poorly timed or ineffective, then valuable contributions to the decision process can be lost.

2. **Information**. Plans and programs require a solid information base. Particularly given the competing needs that vie for limited funding, it is imperative that MPOs have access to basic data regarding the condition of systems and the impact of those conditions on users and the general public. Objective information can go a long way to establishing common ground among parties with opposing perspectives.

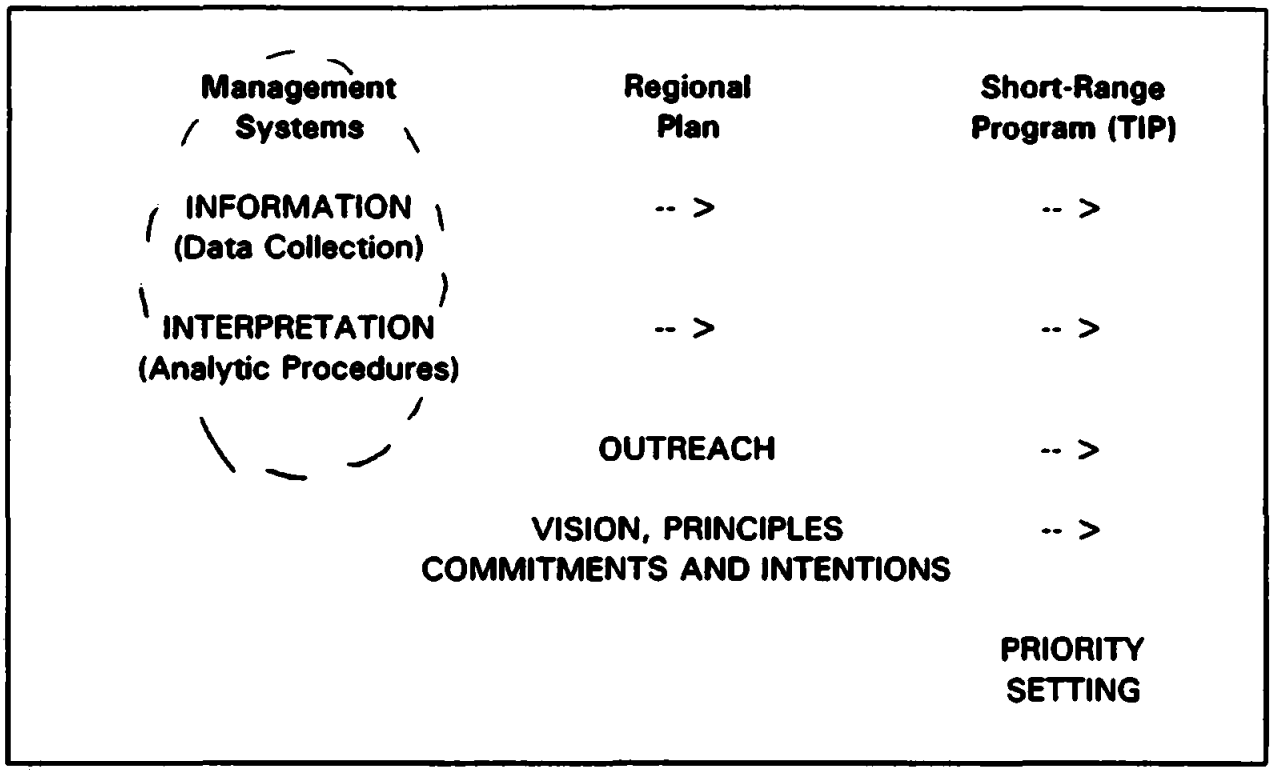
3. **Vision**. Choices cannot be made in a vacuum. Each transportation investment or policy contributes to creating an environment that is either helpful or hurtful to the economic health, natural environment and quality of life experienced by residents of the area. A broad vision for the transportation system shapes individual decisions. An objective dialogue about competing visions for the future can perhaps resolve conflicts -- or at least clarify the differences that remain.

4. **Analytic Procedures**. Good information implies the presence of good interpretation. How do we know when congestion is too great, for example? Can we isolate the effect of congestion on freight? Can we develop standards for performance of the system?

5. **Priority setting**. The ISTEA provides immense flexibility to the states and MPOs in directing available federal funds toward a wide range of purposes. Effective decisions require good structures for clearly articulating the costs and benefits of alternative actions. The structure must make the wisest use of available technical tools (calculation of emissions reductions due to a transit project, for example) and also account for the fact that all costs and benefits cannot be quantified (the "quality of life" benefit to a community from building a truck bypass route, for example).

There have been many representations of the relationships among the regional plan, the Transportation Improvement Program and the management systems. Figure 2 represents the structure that best describes the focused approach that CDTC perceived would be appropriate for implementing the ISTEA requirements. In this structure, the management systems ensure appropriate data collection and interpretation; the plan focuses on outreach, visioning and

Figure 2 CDTC's Initial Perspective on the Aspects of the MPO Planning Process



establishing principles; and the programming process concentrates on priority setting for implementation of the actions that derive from various sources.

In practice, the various components -- management systems, the plan, and the TIP -- are not so easily differentiated. The "interpretation" shown in Figure 2 for the management systems cannot be viewed in isolation from the fundamental visioning and principle-setting exercises of the plan development. *Indeed, CDTC's extensive efforts in developing its "New Visions" next-generation regional transportation plan indicates that the flow of policy from the plan to the data collection process is as important, perhaps more important than the flow of information from the management systems to the plan.* As a result, CDTC's Congestion Management System documentation, once a formal system is in place by October, 1995, will discuss the plan development and program development processes as much as it will discuss data collection and congestion measures.

Further, TIP project implementation over the past twelve months has led to greater attention toward better incorporation of project design activities into the overall structure. NYSDOT project designers need to be more fully exposed to the decision process that led to programming the project; this is essential if these designers are going to be sensitive to the multiple objectives (congestion relief, access management, demand management bike and pedestrian accommodation, aesthetic treatment)

of the kinds of capital projects that derive from an integrated planning process. To that end, NYSDOT Region 1 has increased the involvement of the localities and the CDTC staff in what had been largely an internal-NYSDOT effort to scope and design federal-aid highway projects.

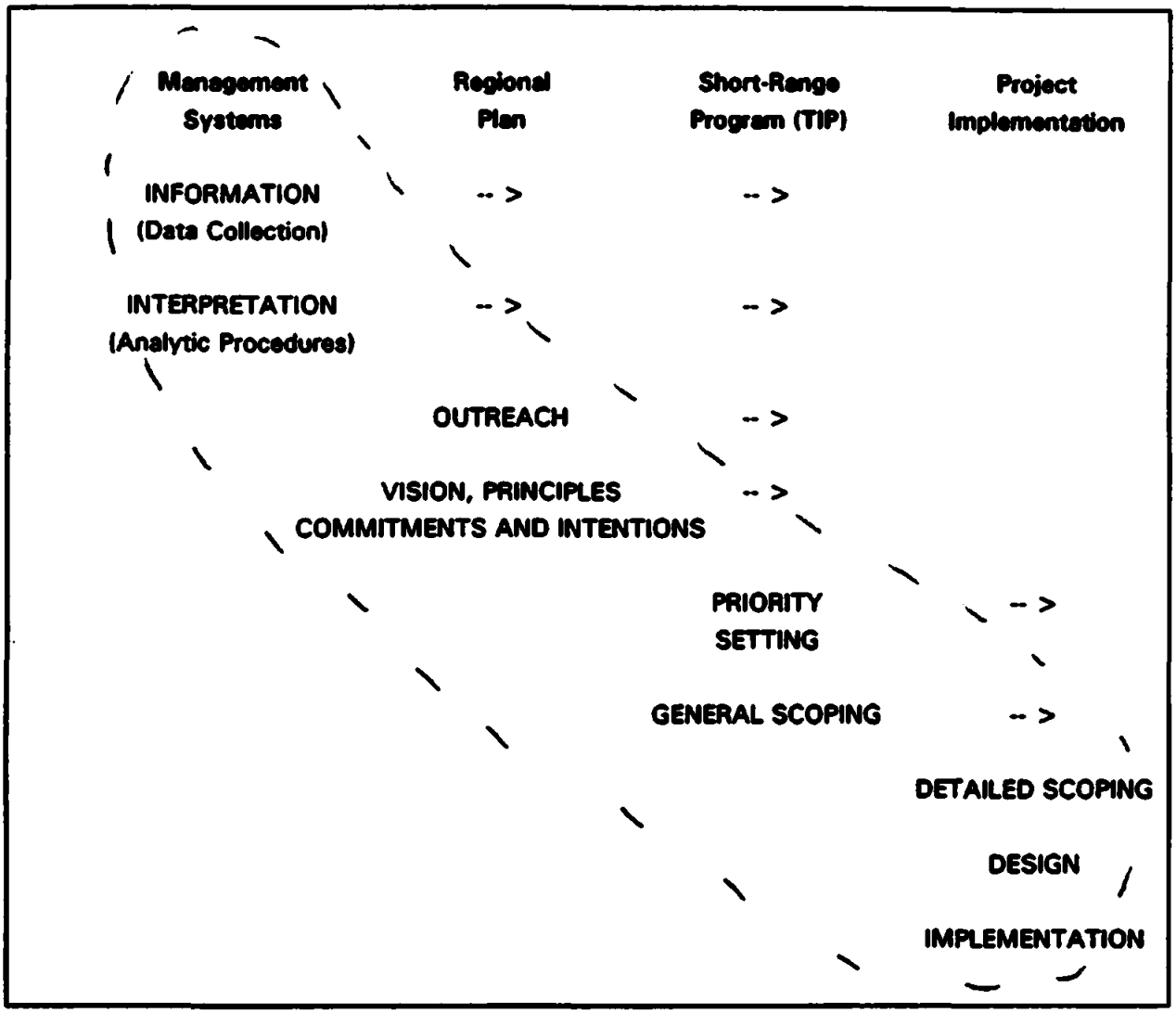
Through this evolving practice, CDTC's perception of an effective integration of management systems with other aspects of the planning is better described through Figure 3.

Figure 3 is intended to indicate that the management systems are the most logical location for data collection and basic interpretation of system performance. This information then feeds the plan development and short range programming process. The the most appropriate location for outreach is during the regional transportation plan development; outreach in the TIP process is important, but is most valuable only if the basic dialogue has occurred regarding the underlying vision, principles, commitments and intentions of the metropolitan area. As a result, CDTC's Congestion Management System will describe principles, visioning, priority setting and scoping processes as well as the data collection and interpretation processes.

It should be noted that the broad visioning exercise contained in the regional transportation plan development cannot and should not be limited to subjects of the management systems. Issues such as metropolitan land use policy (for example, urban reinvestment philosophy or the conscious acceptance of congestion to minimize urban sprawl) and public transportation access policy (such as providing transit service to all areas above a certain density) are not clearly captured by the management systems if they are not directly designed to address congestion, safety, infrastructure condition or other management system subjects.

Figure 3

CDTC's Revised Perspective on the Aspects of the MPO Planning Process



A WORK IN PROGRESS

The remainder of the paper describes the case study -- a work in progress -- of the Capital District of New York that attempts to implement the structured approach represented in Figure 3. As mentioned earlier, CDTC was well positioned to respond to the demands of the ISTEA. The local-state cooperative process was sufficiently healthy and technical procedures were sufficiently robust to allow CDTC to build quickly upon its previous successes.

Progress in plan development and program development are described with respect to techniques used to integrate various issues. The Congestion Management System development progress is described is greater detail.

Plan Development

CDTC circulated a draft ten-year mobility plan in 1990. Upon passage of the ISTEA, the plan was expanded, widely circulated and revised. Formal adoption was completed in December, 1993.

As drafted, the regional plan focuses on committed actions over the next ten years. It acknowledges that they are largely incremental (transit park-and-ride lots, traffic management actions, demand management actions, limited highway widenings) and will be insufficient alone to meet the transportation needs of the area over a 25-year horizon. The plan states the current, ten-year "vision" for the region. For congestion management, commitments to a regional incident detection and freeway and arterial management system are among the significant commitments of the ten-year plan. Among the strategic system improvements are commitments to elimination of five one-to-two mile bottlenecks, construction of 2,000 park-and-ride spaces and major access improvements to the Albany County Airport.

The ten-year plan uses performance measures such as projected energy consumption, the number of congested corridors and ridership on transit to demonstrate that a bigger vision and more significant commitments are required to meet long-range needs. As a result, even prior to completion of the ten-year plan, CDTC launched a major cooperative effort to produce a long-range plan.

The long-range plan effort, entitled "New Visions" is explicitly designed to fit the structure shown in Figure 3. That is, it embraces the concept of outreach at the ground floor of the process. CDTC has established contact with over 500 "stakeholders" and has been working for over eighteen months with nine task forces composed of over 100 committed business leaders, environmental advocates, freight operators and users, state and local government leaders, interested residents and other stakeholders.

The nine task forces cover the following subjects:

1. Urban Issues
2. Transit Futures
3. Expressway Management
4. Arterial Corridor Management
5. Highway and Bridge Infrastructure
6. Bicycle and Pedestrian Travel
7. Goods Movement
8. Demographics and Land Use Futures
9. Special Transportation Needs

These task forces capture the subjects of the management systems, but clearly go beyond the letter of the management systems regulations into the broad range of subjects cited under the ISTEA metropolitan planning regulations.

The effort began in June, 1993 and is expected to produce the next-generation regional transportation plan within the three-year timeframe established by the ISTEA. Over 100 individuals serve on task forces which are meeting monthly or bimonthly.

A key feature of New Visions is that each task force is required to address public safety, land use, environmental impact, resource efficiency, equity and justice in its deliberations.

The task forces spent six months identifying current and projected (year 2015) conditions, policy issues and candidate actions. One hundred thirty individuals attended a full-day conference held in December, 1993 to review "white papers" produced by the task forces and provide direction to phase two (currently underway).

The current phase two effort has stretched from January, 1994 through March, 1995 in order to continue the extensive, comprehensive discussions and to undertake technical work to support the task force discussions and continue the consensus-building process. It is important to remember that CDTC was uniquely positioned to undertake such an effort -- intergovernmental relationships were sound, staff technical capability and credibility was high, and a short-term agenda was clear and well-funded. As a result, CDTC entered the challenging process of outreach and visioning from a position of strength.

Given that, it is very important to report that the process is working well but taking much longer (in calendar time) and requiring much greater staff support than originally expected. The original target date for adoption of the New Visions plan was spring, 1995. After completion of phase 1 and the December, 1993 conference, it became clear that the New Visions agenda had grown so large (with full support of both CDTC's traditional and new participants) that completion was re-scheduled to December, 1995. One major task initiated in the New Visions effort was a full-scale systems analysis of the potential for light rail, commuter rail or busway applications. With the time required

for consultant selection, this critical path item could not be completed until early 1995. With that, the schedule for the entire process shifted to an February, 1996 completion. Recently, after NYSDOT's request that CDTC fit an annual TIP update (which had not been anticipated) into the staff work program in the spring of 1995, the completion date shifted to June, 1996. Extending the time line for the process was not a particular concern to the traditional participants; newer participants are generally sufficiently pleased with progress that they have expressed no concern with the length of the effort.

Task force discussions have continued at a pace that varies with the task force; the most active have been the urban issues, expressway management, bicycle and pedestrian, and demographic and land use futures task forces. These groups have met frequently, formed subcommittees and have repeatedly raised and pursued controversial subjects. The transit task force, highway and bridge infrastructure and arterial management task forces have proceeded in an orderly, but less-frequent basis. The special transportation needs task force has been comfortable in meeting infrequently, just as often as necessary to meet overall schedule requirements.

The ultimate product will be a clear statement of vision, explicit presentation of principles, a refinement of the commitments made in the ten-year plan and a statement of specific intentions (build this, avoid that, etc.). An initial statement of congestion management principles was incorporated into the plan and also into early versions of the Congestion Management System Concept Plan. This format has been followed by the task forces, who have each suggested a series of planning and investment principles. The principles -- if adopted as part of the CDTC action on the next-generation, New Visions regional transportation plan -- would serve as the guiding concepts used to *screen* proposed actions. If an action is clearly incompatible with an adopted principle, it will not be evaluated for technical merit. Draft principles are included in this report as Appendix 2.)

In addition to the principles, the task forces have been working individually and jointly on performance measures. The joint effort has produced a series of "Core Performance Measures" which describe measurable items covering a range of transportation system performance indications. In addition, the task forces individually have developed supplemental performance measures intended for use in measuring transportation system performance in greater detail for particular subjects. For example, public cost per transit rider served is a supplemental measure of transit performance while the core measures focus on overall transit access, system energy consumption and cost, etc.

Integration of all subjects into a single vision for the region is the goal of the New Visions exercise. This integration is best represented by the core performance measures that are being developed and refined in conjunction with each of the nine task forces. (See Figure 4.) These performance measures consciously focus attention on those measures that are most relevant to the community as a whole. Through the broad dialogue a set of measures is emerging that is elegant in its brevity and also innovative in its comprehensiveness.

These performance measures will not produce a next-generation transportation plan that emphasizes travel time to the exclusion of other issues. Instead, use of this list of measures provides for an informed discussion of such wide ranging actions as fixed guideway transit options, transfers of jurisdiction of highway between local and state government, programs to eliminate vertical and horizontal obstructions to truck traffic and standards for driveway spacing on arterials. Each of these actions and others will be measured based on its contribution to the core measures shown in Figure 4.

A key aspect of the New Visions process is how it fosters consideration of tradeoffs. The use of common performance measures and the simultaneous investigation of multiple, related subjects through separate task forces has been very helpful.

As a prime example of the value of this approach, a key issue faced by the New Visions effort is the appropriate long-term treatment of growing congestion in the Northway corridor. In a traditional process, the investigation would take a straight-forward approach: forecast land use and traffic in the corridor; determine future congestion levels; examine system management, demand management, highway widening and transit solutions. Invariably, one solution or another would dominate the discussion. In the New Visions process, the Northway issue has been examined simultaneously from at least four perspectives -- each to a comparable level of detail.

The Expressway Management Task Force and the CDTC staff have worked with NYSDOT Region 1 on the traditional traffic forecasting and examination of alternative highway treatments (express lanes, High Occupancy Vehicle lanes, and so forth). At the same time, the Transit Futures Task Force has worked with the staff and consultants to examine (in detail) transit actions ranging from a busway to light rail along the Northway, from commuter rail in parallel corridors to broad highway pricing strategies. Further, the Urban Issues task force has discussed at length the question of whether accommodating traffic on the Northway (as a suburban accommodation) is at odds with actions to promote economic health in the older urban areas. Finally, the Demographic and Land Use Futures Task Force has worked with the staff on a land use model to examine potential land use
shifts that would be caused by either letting congestion grow in the corridor, or converseley eliminating congestion in the corridor.

Figure 4

CORE SYSTEM PERFORMANCE MEASURES *(discussion draft, revision 4)*

Transportation Service	
Access:	What travel alternatives exist? *(Measure: Pct. of person trips within a defined non-auto (walk, bike, transit) to auto difference[1]; pct. of person trips with a travel time advantage for non-drive-alone modes (including carpools); number or percentage of major freight movements with modal alternatives[2])*
Accessibility:	How much time does travel take? *(Measures: travel time between representative locations, including major intermodal facilities; peak vs. non-peak, by quickest mode)*
Congestion:	What is the level of exposure to traffic congestion? *(Measures: hours of excess delay: recurring, non-recurring by mode [auto, transit, freight, bike, pedestrian] per unit of travel][3])*
Flexibility:	Can the system respond to unexpected conditions? *(Measures: reserve capacity on system[4]; pct. of person trips that could be accommodated by modes other than auto in an emergency[5]; number of corridors with reasonable alternatives during closure or disruption[6]; amount of risk associated with fixed capacity investment[7])*
Resource Requirements	
Safety:	What are the safety costs associated with transportation? *(Measure: estimated societal cost of transport. accidents)*
Energy:	How much energy is consumed in providing, maintaining and using the transportation system? *(Measure: equivalent BTUs/day for transp. capital, maintenance, operation and use)*
Economic Cost:	How much does the transportation system and its use cost, in addition to safety and energy costs? *(Measures: annualized capital, maintenance, operating and [monetary] user costs for transp. system; value of commercial time in travel)*
External Effects	
Air Quality:	What is the effect of the transportation system on air quality? *(Measures: daily emission levels (HC and NOx); air quality attainment status)*
Land Use:	How does the transportation system affect land use? *(Measures: amount of open space; dislocation of existing residences and businesses; land use - transportation compatibility index[8]; community character index[9])*
Environmental:	How does the transportation system affect key environmental features? *(Measures: impacts on sensitive areas [wetlands, parklands, historic areas, archaeological sites, etc.); noise exposure index[10]])*
Economic:	How does the transportation system support the economic health of the region? *(Measures: narrative discussion of economic-activity supporting or constraining features of transportation system)*

Figure 4 (cont'd.)

Footnotes

1 Suggested maximum acceptable time difference is approximately 15 minutes; up to 20 minutes for longer trips; values may be summarized by sub-region (central cities, inner suburbs, outer suburbs, small cities and villages, rural areas).

2 While choice of mode for freight movement is largely decided by cost factors, availability of alternative modes is a measure of access.

3 Person hours used for all values except for truck traffic, for which vehicle hours is more relevant.

4 Reserve capacity is defined by corridor and is modally-weighted.

5 Maximum value derived from access value (see footnote 1), further constrained by non-auto system capacity (bus capacity, etc.).

6 Reasonable alternatives for personal travel during closure or disruption of a highway facility would include transit (if on a separate right-of-way) or parallel highway facilities; reasonable alternatives for freight primarily include parallel highway facilities within a few miles' distance. Modal alternatives for freight are best captured under access measures (see footnote 1.)

7 Risk is defined as the "opportunity cost" of over-investing or under-investing in a capital project if projections of conditions prove incorrect. Examples would include loss of rights-of-way that become needed in the future; construction of fixed highway or transit capacity predicated on future demand that does not materialize; construction of facilities at conservative scales that turn out to be under-sized.

8 Index is primarily based on levels of traffic or other transportation intrusion in residential areas, defined as daily traffic divided by average residential driveway spacing. Also includes a measure of compatibility between arterial function and local access function, defined as daily traffic divided by average commercial driveway spacing.

9 Index under development. Would be a quantitative or qualitative measure of consistency between future levels of activity in and character of a community and the general levels of activity and type of character desired by the community. That is, a degradation of activity in the city of Schenectady would represent a decline in the "community character index".

10 Index is primarily based on product of dB_a and number of households in areas in which dB_a exceeds accepted thresholds.

This set of parallel investigations has been very helpful in generating a healthy discussion of the many issues surrounding this important issues. The technical and policy information resulting from the parallel work will ultimately make an informed decision easier and more well-reasoned than possible through the traditional approach.

Specific Products through January, 1995

The New Visions effort has generated a significant number of tangible planning products, mostly in conjunction with the phase two task force work in 1994. The product is particularly significant in light of the fact that the CDTC staff totals only eleven individuals (including administrative and support staff) and is involved not only with the New Visions effort but also with a regional ridesharing program, traffic forecasting support of NYSDOT project development work, site impact and mitigation fee calculations with the town of Colonie, and several sub-area and corridor studies.

As part of the phase two effort, the following have been completed (by CDTC staff, except where noted):

1. Developed, calibrated and applied a land use pivot model and used the model in testing the impacts of transportation and actions and tax policies on regional settlement patterns.

2. Developed, calibrated and applied a transit mode choice model which is sensitive to urban design and pricing issues and used the model in examining a wide range of fixed guideway transit actions.

3. Adapted highway modeling techniques to calculate bike-auto compatibilities and estimate trips served by bike improvements.

4. Developed level-of-compatibility indices for arterial/land use conflict, collected driveway spacing information on the arterial system and produced summary results.

5. Completed an inventory of grade crossing and other freight conflict measures (vertical and horizontal clearance problems, weight restrictions, etc.).

6. Developed, calibrated and applied a comprehensive highway infrastructure repair model to state, non-state federal-aid and non-federal aid roads to estimate the costs of alternative repair strategies and jurisdictional realignments.
7. Developed an approach to estimating travel safety benefits of improvements of roads to state design standards.

8. Completed a survey of over 100 truckers and shippers to confirm the goods movement task force's perspectives on critical freight system issues, deficiencies and priority actions.

9. Developed and adopted new public participation procedures.

10. Drafted arterial management guidelines and driveway spacing standards.

11. Drafted a regional priority bicycle network and prepared cost estimates of implementation of FHWA design standards on this network.

12. Documented demographic and transportation service differences among subregions (cities, inner suburbs, villages, outer suburbs) toward a "community character" measure.

13. Drafted a regional expressway incident management plan.

14. Completed an evaluation of highway-oriented actions possible on the I-87 corridor. (This is a NYSDOT activity.)

15. Developed a draft of an Intelligent Transportation System plan for the region.

16. Completed vehicle occupancy counts at screenlines, cordon lines and river crossings and continued manual intersection count efforts as needed.

Working relationships with other key parties has been maintained and enhanced through the process. Transit authority staff and board members participate alongside NYSDOT staff, local government staff, environmental advocates, business community representatives and others in the transit futures task force, for example, and have felt comfortable exploring major transit investment decisions in this open setting. Similarly, NYSDOT staff have been active in all the task forces and have contributed greatly to the credibility of the process. Local governments have been particularly active in the demographic and land use futures, urban issues and arterial management task forces. Non traditional participants ranging from Conrail to bike groups to the local police agencies have provided volumes of experience and new perspectives to the process.

To date, the process continues to be a success. Key choices are being highlighted with objective information on their potential effects; consensus positions are being discovered.

Next Steps

New Visions: Appendix 3 provides an outline of the material being packaged to conclude phase two. Currently, the expectation is to wrap up task force technical work in March. Task forces (essentially the staff on behalf of the task forces) will complete stand-alone technical documents as appropriate to document their technical work and policy analysis. Much of the supplemental performance measures, detailed analysis and draft plans will be contained in these documents.

In addition, the principles and actions produced by the task forces will be made available for compilation. Key CDTC staff members will work during the summer (in parallel with the TIP update) to knit the task force products into a single document. The single document will seek to highlight the apparent subjects for which there appears to be broad agreement ground (for example, better accommodation of bicyclists and pedestrians), summarize findings which set the limits on choices (for example, findings that indicate that there are the range of actions will not significantly alter regional settlement patterns), and highlight the clear choices that must be made.

Work to date indicates that there will be a wide range of issues for which there is agreement; for these, the remaining questions focus upon priority and funding. There will be a few key issues for which broader discussion is required before a choice can be made. These include treatment of capacity constraints on I-87 (highway widening, HOV implementation, fixed guideway transit or demand management only?), the related question of transit policy in general, policy on infrastructure repair (improve to standards across the entire federal-aid system or only selectively? transfer jurisdiction to accomplish the work?) and emphasis on urban re-investment (a major priority for investment?). The conclusion of each of these policy discussions has great bearing on the attitude toward and priority of congestion actions in the regional plan.

The combined phase two report will place emphasis on the performance measures by showing values for each of the core measures for three reference scenarios: base year, year 2015 null, and year 2015 conditions after completion of existing commitments. Itemized discussions of actions will carry information about the source of the action (which task force), its status (whether recommended or simply a candidate action with no firm task force recommendation), its cost and its expected effect on the core performance measures. To the extent that citing its effect on supplemental measures is meaningful, these values will also be included. The intent is to focus policy discussion back to the questions of "what does this action contribute?" and "what does it cost?"

Current expectations are that the combined phase two report will be prepared along with workshop tools for a major conference in October, 1995. The conference will be held in conjunction with a meeting of CDTC's policy board in order to assure that CDTC's elected officials gain a fuller knowledge of the New Visions effort and take greater ownership of the public policy debate that will ensue during phase three.

(By October 1, the combined report and the supplemental technical reports as listed in Appendix 3 will be available. The conference will not be held until later in the month.)

Phase three will use multiple venues to pursue the dialogue with the broader public, in addition to task force participants. A pilot effort to engage others in the process will take place March 1; on that date a half-day freight roundtable will take place dealing with the products of the goods movement task force. Over 300 freight sector individuals have been invited. The roundtable process is one method that will be used in phase three to gain reaction to the comprehensive set of choices laid out in the combined phase two materials.

Regarding formal preparation of CDTC's Congestion Management System by October 1, activities between February and October will go beyond the New Visions effort to focus on the key items listed in CDTC's October, 1994 CMS Work Plan. These are:

1. **Fleshing Out Data Collection Requirements**: The draft CDTC CMS includes an expanded data collection effort. (See pages 20-22 of the working draft.) The CMS calls for continued intersection counts, improved transfer of transit data to the formal CMS data base, routine vehicle occupancy counts, and regular household travel surveys among other items. CDTC must estimate the cost of each of these items and confirm the value of collecting each item.

The final draft of the CMS will include a firmer commitment to data collection, description of responsibilities, and estimates of costs.

2. **Incorporating ATMS Features**: The Capital District Advanced Traffic Management System (ATMS) is a major commitment in CDTC's TIP. Implementation of the ATMS will involve a method (yet to be defined) for regular or continuous feedback of traffic volume and flow information to a central operations center. This may involve communications via telephone lines, radio transmissions, video monitors and/or satellite surveillance. *By October 1995, the CDTC CMS will reference the ATMS in the context of the New Visions' draft Intelligent Transportation System Plan, but will not be able to define the specific technology that will be used to feed real time information into the CMS data base. This will be defined as the ATMS project develops.*

3. **Confirming the Value of Enhanced Performance Measures**: The draft Capital District CMS includes descriptions of many additional congestion measures. (See pages 13-19 of the working draft.) CDTC must measure these items and review the value of the measures -- some measures may prove to add little knowledge to the information provided in other measures. The list of measures will be refined for the final draft CMS.

4. **Exploring the Relationship between Peak Hour and Annual Excess Delay**: The draft Capital District CMS builds upon CDTC's experience with peak hour delay and expansion to estimates of daily delay. Understanding of the relationship between routine (recurring) delay and incident-related (non-recurring) delay is weak. Further, NYSDOT has indicated that the state CMS will use measures of *annual* delay.

CDTC staff has already explored the relationship of recurring and non-recurring delay for purposes of the New Visions work. CDTC will work with NYSDOT to explore this issue further in coming months. The final CMS may or may not make inroads into better defining the methods to be used to estimate annual delay, including non-recurring delay.

5. **Incorporating the Flavor of the "New Visions" Performance Measures**: CDTC's New Visions effort for the next-generation RTP has produced a set of core performance measures that include many non-traditional items.

The congestion measures in the draft CMS will be compared to the New Visions measures to ensure that the thrust of the congestion management approach in the next RTP is captured in the CMS.

6. **Describing the Use of Geographic Information Systems**: NYSDOT is currently implementing a statewide Geographic Information System (GIS). At NYSDOT's request, CDTC will serve as a pilot for implementing this GIS at the MPO level. Many congestion-related data bases, including CDTC's STEP model products, will be incorporated into the GIS.

Implementation of this GIS has been delayed; distribution of software to CDTC is now expected in March, 1995. During the interim, the regional approach has broadened to include a joint effort among NYSDOT, CDTC, the Capital District Regional Planning Commission (CDRPC) and the Capital District Transportation Authority (CDTA). The joint project will include incorporation not only of NYSDOT highway and traffic data but also CDTC's traffic forecasts, CDRPC's demographic data and CDTA's transit route information. As part of the effort, CDRPC will contract to receive detailed land use information through satellite imagery.

By October, CDTC will be able to describe how the GIS system will be used in the future as a key display and analytical tool. GIS will also serve as a mechanism to improve public access to congestion information.

7. **Expanding the Discussion of Decision Processes**: CDTC has made significant use of its existing CMS in corridor and community planning, plan development and programming. The CMS information base and analytical tools are used in project development as well..

As noted earlier, progress has been made recently in bringing the design process and the planning process closer together. In the final draft, CDTC will expand discussion of the processes used to ensure consideration of congestion management at planning, programming, project development and operational levels.

APPENDIX 1.

STATUS OF CONGESTION MANAGEMENT ACTIONS IN THE TRANSPORTATION IMPROVEMENT PROGRAM

Among the congestion management actions included in CDTC's five-year Transportation Improvement Program are the following:

1. **Regional Travel Demand Management (TDM) Initiative**: A $5.6 M five-year project has been established to allow for a financial partnership with employers in providing transit, ridesharing and trip reduction incentives to employees. *Since established in 1993, there has been little progress in implementing this effort; federal funding limitations on use of highway funds for transit operating assistance and limitations on use of funds to support private sector activities has stymied implementation to date. The NYSDOT regional office has assumed the lead in implementation.*

2. **Regional Corridor Management Initiative**: An 80/20 challenge grant program to municipalities to undertake necessary land use and regulatory efforts to implement new site design, arterial management, zoning and planned development district and public-private financing regulations. The project is funded at $100,000 per year. Implementation of this effort has taken a slight turn from original intentions as well. *The cumbersome administrative practices required to establish separate agreements between NYSDOT and each community wishing to undertake such small-scale work has resulted in no drawdowns on the setaside. Instead, NYSDOT has voluntarily offered to include a community-directed consultant effort for corridor management as a project phase in a wide range of highway projects, including those which are primarily highway repair in nature. This has resulted in initiation of studies in several communities and a significant increase in NYSDOT-community communication on land use issues. The setaside has been kept in the TIP in case any community does wish to pursue a stand-alone study.*

3. **Regional Advanced Traffic Management System (ATMS):** This project will include signal coordination on major arterials, traffic surveillance and incident detection on expressways and the use of motorist advisories and alternative signal timing plans to facilitate flow during major incidents. The $20 M - $30 M project will also incorporate advanced transit management and communication aspects. *NYSDOT expects to execute a consultant contract for the design of this project in the immediate future. Further, CDTC has agreed to draw down $200,000 of the ATMS budget to fund a NY State Police position at the NYSDOT regional office for purposes of design of a pilot freeway incident management plan for I-87 (the Northway). This activity*

derived from ongoing discussions among participants in the CDTC's New Visions Expressway Management Task Force. (See task force progress discussion below.)

4. **Regional Park and Ride Lot Construction:** CDTA is currently advancing six transit park-and-ride lots (Brunswick, Rotterdam, Latham, State Office Campus, Schodack and Guilderland). An additional six buses to operate new express service from these lots are also funded. Further, a total of $2.0 M has been reserved for construction of carpool/transit park-and-ride lots, primarily along the Northway (I-87). *NYSDOT is advancing the first of these at I-87 Exit 8, establishing a precedent (at least for this region of New York) of state ownership and development of a combined carpool and transit park-and-ride lot.*

5. **Transit Service During Construction**: A $1.0 M project has been established to provide for supplemental transit services during periods of highway work over the next five years. *This has been deployed in the context of several projects during the past two years.*

6. **Bikeway Construction:** Two bikeways are included in the TIP, both based upon local land use plans. One includes a direct connection to a CDTA park-and-ride lot in the town of Bethlehem; the other provides connections to a new town center in Niskayuna. *Development is moving slowly on these; a number of additional bike transportation improvements have been funded with STP Enhancement funds as well.*

7. **Public-Private Financing:** Several projects are included in the TIP with the requirement for significant (50%) private funding through development mitigation fees or transportation development district fees. The total private funding required in the TIP will amount to $20 M -$30 M over the next five to ten years. *The largest location for deployment of public-private financing is with a series of projects in the area of the Albany County Airport. These projects are advancing through the NYSDOT design while private funds and private construction continues.*

8. **Strategic Highway Improvements:** The TIP includes commitments to highway and bridge improvements (widenings or relocations of roads to more appropriate alignments) in several locations. These projects are directed at the highest priority congestion corridors in the region. These projects are associated with land use management, transit service and demand management strategies and have been staged to avoid undesirable diversions. Project development activities will include further consideration of all non-construction options. *Current activities are limited to initial phases of environmental analysis and scoping; construction is still five years or more away.*

The expected result of these actions is a reduction in year-2000 congestion in the Capital District by one-half, from levels that would be present without the actions. While this result is significant, these commitments will not generate sufficient congestion prevention or mitigation to avoid a significant deterioration in service levels and quality of life in the post-2000 period. Congestion (as measured by hours of "excess delay") will triple between 1990 and 2015 even with the successful implementation of the projects included in the Transportation Improvement Program. This is a primary reason for the major effort being exerted by over 100 individuals participating in the New Visions process leading to the next-generation long range plan.

APPENDIX 2.

PLANNING AND INVESTMENT PRINCIPLES

The Planning and Investment Principles articulated to date by New Visions Task Forces are presented below A summary of the main points is also available. These principles are intentionally broad and not focussed on specific actions. Wording was crafted to lead to convergence rather than divergence of opinion among New Visions participants, the general public, and elected officials. Cost-effective actions should derive from these principles. These principles will be re-organized to better reflect overlap and points of consensus between task forces in the coming months. No priority order is implied in this listing.

CONGESTION MANAGEMENT PRINCIPLES *(Adopted in 12/93)*

1. *Management of demand is preferable to accommodation of single-occupant vehicle demand growth.* All things equal, actions that shift demand from single occupant vehicles to other modes, shift travel to uncongested periods of the day or reduce the need for travel are preferred over actions that accommodate the desire to travel without constraints. Demand management actions have both a spillover and a cumulative effect not present with physical actions. Demand management actions taken to relieve congestion in one corridor spill benefits over to other corridors by simultaneously moderating demand in those corridors, as well. Over a period of time, a cumulative benefit comes from the development of a critical mass of transit usage to support higher level transit service, from creating momentum for voluntary accommodation of pedestrian and bicyclists in new development design, or from establishing acceptance for innovative work schedules and telecommuting. These benefits are not present in actions that accommodate unconstrained single-occupant auto travel.

2. *Cost-effective operational actions are preferable to physical highway capacity expansion.* Historic financial constraints and categorical funding programs have perhaps provided resources more readily for capital investment than for continuous operational improvements. In the Capital District, a third of the 400 intersections analyzed by CDTC staff over the past four years had congested conditions that would respond to low cost signal timing and lane striping changes. Where applicable, these operational actions are many times more cost-effective than physical expansion.

3. *Land use management is critical to the protection of transportation system investment.* Development in the Capital District in coming years is expected to add significant traffic pressures along existing two-lane and four-lane arterials. Unconstrained development is likely to add to the number of driveways serving isolated developments. This will result in a deterioration in the through capacity and operating speed of these arterials, will aggravate the existing difficulty in effectively serving suburban development with transit and will frustrate any attempts to create safe

travel opportunities for pedestrians and bicyclists. It will also frustrate efforts at efficient goods movement and local delivery. Without careful treatment, the land available for development along these arterials can support an amount of development that will far exceed the ability of these roads to handle through traffic (which is their primary function), local land access and effective accommodation of transit, bicycle and pedestrian modes.

4. *Capital projects designed to provide significant physical highway capacity expansion are appropriate congestion management actions only under certain conditions.*[1] These are the following:

   a. "Critical" levels of congestion are currently present or are expected to be present under short-range (no greater than ten year) forecasts;

   b. Demand management (including appropriate application of non-auto actions) and operational actions are not expected to reduce congestion from "critical" levels;

   c. Demand management (including appropriate application of non-auto actions) and operational actions are incorporated into the design of the physical expansion to minimize expansion requirements and maximize the service life of the improvement;

   d. New development and/or existing trip generators contribute appropriately to the cost of the action (including the demand management and other non-construction aspects);

   e. A land use management program or agreement exists to provide reasonable assurance that the new capacity created will be effectively managed and preserved;[1] and,

   f. The expansion is considered to be consistent with regional, county and local land use and development plans.

   Projects primarily intended to serve through traffic or designed to serve statewide purposes are not subject to these criteria.

5. *Significant physical highway capacity additions carried out in the context of major infrastructure renewal are appropriate only under certain conditions.* In cases such as the replacement of a bridge, long-lasting decisions about capacity expansion often must be reached long before critical congestion levels are reached and before local demand management actions are in place. In order

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[1] Capacity projects primarily intended to serve statewide goals are not addressed by this land use management criterion.

to assure consistency of these decisions with the overall Congestion Management System, it is necessary to revise traditional design policies and procedures. Traditionally, facilities have been designed sufficient to accommodate projected demand at acceptable levels-of-service throughout the physical design life of the facility. For a bridge structure, for example, this involves designing to accommodate traffic projections for a date thirty years beyond the expected date of completion of the project. Variance from this policy has been granted primarily in situations in which there are practical impediments to full accommodation of future demand.

The revised design approach reaches a determination of facility design through a risk assessment (tradeoff analysis) that focuses on the opportunity cost of selecting alternative designs.

Assuming that it is a given that an infrastructure project is a priority at a given location, the risk assessment focuses on several factors:

a. Incremental costs and benefits of designs which add capacity to accommodate future traffic, relative to less-accommodating designs;

b. The projected amount of time that will lapse before a given design with greater capacity would be expected to have annual benefits sufficient to return an incremental benefit/cost ratio comparable to other *capacity* projects included in the TIP;

c. The additional expense involved in providing the incremental capacity at that later date, rather than during the initial project;

d. The degree of uncertainty present regarding future demand forecasts; and,

e. The compatibility of the additional capacity with regional, county and local land use plans.

In these cases, capacity expansions can be considered consistent with the congestion management system under the following conditions:

a. The risk assessment indicates that, even with effective operational and demand management actions, critical congestion is likely to occur at the location;

b. The combination of time lapse until a competitive incremental benefit/cost ratio is reached and the additional expense of providing the capacity later points to doing the work now;

c. The capacity expansion is compatible with regional, county and local land use plans.

In all cases, the desirability of the expansion must be fairly clear before the investment is made.

6. *Incident management is essential to effective congestion management.* While most congestion management actions are directed at recurring congestion, congested corridors experience significant "non-recurring" congestion due to accidents, vehicle breakdowns and similar incidents. This experience is most severely felt on limited access, high speed facilities operating at very high traffic densities. Minor incidents can generate significant delays. Effective incident detection and management can save as much time and operating cost as major investments in physical expansion.

7. *Corridor protection and official street mapping are necessary to preserve options.* Long-range congestion management must include protection of corridors for possible future transportation use. This includes protection of options for future provision of sidewalks, bicycle paths, transit connections, service roads and/or new collector or arterial highways. Opportunities for protection are presented in the context of development approval, transportation project design, in conjunction with utility right-of-way creation or revision and during review of proposed abandonment of transportation facilities (such as a rail line.) Official action, through land acquisition or street mapping are minimal at present, and expanded use of these tools must be considered. Not all congestion management actions can be implemented immediately; options for future action must be preserved whenever possible. A risk assessment must be conducted to determine the merit of preserving a particular corridor.

URBAN ISSUES *(Final Draft)*

1. *Strong central places are engines that drive regional economic growth. Economically successful regions are healthy primarily because they are efficiently organized. Transportation investments are a tool that can be used to strengthen the region's core.* There are tremendous advantages to strengthening the Capital District's urban areas. The necessary transportation, water, sewer, and other infrastructure is already present -- thus reducing the cost of development. Transportation investments geared towards creating more livable, walkable urban places will provide choice in the marketplace, allowing for increased diversity to flourish and the region as a whole to prosper.

2. *Urban environments have advantages that allow for the development of livable communities. Transportation investment priority should continue to discourage highway capacity expansions, and, where possible, assist in urban revitalization.* Adopted congestion management principles that require system management, demand management, and transit improvements prior to highway capacity expansion are important in preserving existing urban activity. The possibility of fixed guideway transit and high speed intercity rail connections, in particular, should be advanced as tools to aid urban revitalization through system design and station location.

3. A *partnership between local government and transportation providers, such as NYSDOT and CDTA will have multiple benefits.* Issues such as appropriate design standards in project implementation, stretching limited state and federal transportation dollars, and linking land use

approvals to transportation improvements are all more likely to reach satisfactory resolution if addressed through a mutually respectful and beneficial partnership.

4. *Transit, cycling, and walking are used more heavily in urban areas.* There are numerous low-cost ways that these modes can be encouraged -- essentially, we need to plan and build all of our capital projects as if the pedestrian, bicyclist, and transit rider exist and have legitimate needs. Design features such as bus stops/shelters, medians on major arterials, crosswalks and pedestrian-actuated signals at intersections should be integral to urban project design -- not extras. Intentionally "slow" streets in residential areas have merit and can contribute to urban "livability". Maintenance considerations and money for ongoing maintenance also must be included as enhanced pedestrian and bicycle systems are developed.

5. *Cities currently shoulder an unequal proportion of the region's special needs populations, poor people, and households without cars. The social function of the provision of transit and transportation services should be explicitly recognized and taken into account in transportation funding decisions.* In addition, the drain that the provision of social service places on urban areas lessens the amount of money available in municipal budgets for basic maintenance and rehabilitation of the transportation infrastructure.

6. *Transportation improvements must be designed to improve neighborhood integrity.* Historically, many major transportation investments have been disruptive to neighborhood cohesion. There is an opportunity to use transportation improvements to bring neighborhoods together -- to increase owner-occupancy, to provide increased accessibility, and to enhance community values.

7. *Neighborhood-based local planning efforts are important to the success of an overall regional plan that emphasizes livable communities.* Regional transportation plans are implemented by other agencies -- NYSDOT, CDTA, and local governments. It is important that the principles and "paradigm shifts" that the regional transportation plan advances be based upon and reinforced with local participation in planning efforts and project development activities. Through a convergence of "bottoms up" and "top down" shifts in our thinking about the transportation/land use connection, mutually beneficial solutions to regional and local problems will be able to be achieved.

INFRASTRUCTURE REPAIR AND RENEWAL *(Final Draft)*

1. *CDTC is committed to the maintenance, repair and renewal of the existing highway and bridge system in a manner that protects and enhances rideability, public safety and accessibility while minimizing overall costs of providing and using the system.* Appropriate investment in repair and renewal of existing facilities is a higher priority than investment in expanded capacity.

2. *Funding for appropriate repair and renewal will be based on the function and condition of the facility.* All principal arterials and other major facilities in the Capital District are vital to the economic life of the region, regardless of whether they are currently owned by a city, town or the state.

3. *Geometric standards (lane and shoulder width, provision of bike lanes and sidewalks, transit accommodations, vertical and horizontal alignment, clearances, etc.) and design processes will be based on the function and location of the facility and the type of repair.* Greater latitude in fitting the process and geometry to the needs is critical to providing highway and bridge infrastructure in a cost-effective manner.

4. *Significant physical highway capacity additions carried out in the context of major infrastructure renewal are appropriate only under certain conditions.* The revised design approach reaches a determination of facility design through a risk assessment that focuses on the opportunity cost of selecting alternative designs. In all cases, the desirability of the expansion must be fairly clear before the investment is made. (The risk assessment approach is discussed in greater detail in CDTC's adopted Congestion Management Principles.)

BICYCLE AND PEDESTRIAN ISSUES *(Final Draft)*

OVERALL THEME: Encouraging bicycle and pedestrian travel is the most socially, economically and environmentally responsible approach we can take to improving the performance of our transportation system.

1. *Cycling and walking should be recognized as equal partners with motor vehicles in the transportation system; project development should facilitate expansion of cycling and walking in the system.* In the Capital District, more people commute to work by bicycle or on foot than by using transit. Aside from sidewalks in the downtown areas and a small number of paths or bike lanes, this is without any direct investment in bicycle or pedestrian infrastructure. Investments in new bicycle and pedestrian facilities will tap the *latent* demand for travel via these modes, encouraging people who would travel these ways "if it was safe" to do so.

2. *Better accommodation of cycling and walking will enhance mobility for Capital District residents with the fewest travel choices.* Many Capital District residents either choose not to or cannot afford to own a car. Not providing reasonable opportunities for bicycle or pedestrian travel limits their mobility by making them dependent on transit schedules (and coverage), taxis or friends. In addition, bicycle and pedestrian accommodations can eliminate the dependence on cars in suburban areas where subdivision designs and the local street networks combine to effectively require car travel for all trip purposes.

3. *Better accommodation of cycling and walking can enhance transit use by making it more accessible.* People are willing to travel on foot for a short distance to bus stops. However, this willingness is reduced when the trip to or from the bus stop is uncomfortable. Wide, paved shoulders and/or sidewalks connecting residential areas to bus routes will make bus travel more attractive. Cyclists would be more inclined to bike to bus stops if there were safe shoulders or bike lanes as well as (a) secure bike storage facilities at the stops and/or (b) bike racks on the buses.

4. *Possible bicycle/pedestrian-related improvements should be considered from the perspective of developing a system -- not just based on whether a particular facility is currently used.* As was observed at the first New Visions conference, "bicyclists (and pedestrians) are not stupid." If they feel that a facility is not comfortable or safe, they will not use it. Still, this facility might be along a potentially well-used bicycle/pedestrian travel route. We should look to remedy the *barriers* to bicycle and pedestrian use along facilities which would combine to form very attractive routes for both local and regional travel.

5. *Barriers to bicycle and pedestrian travel can often be removed quickly and inexpensively.* Whether by smoothing over a rough shoulder with some blacktop or by re-timing a traffic signal to allow pedestrians (and wheelchairs) adequate time to cross a busy intersection, bicycle and pedestrian accommodations are often low cost, particularly when compared to even the simplest roadway project. Both as "add-ons" to existing highway projects and as free-standing efforts, we should be finding ways to quickly remove some of the main barriers to these modes of travel.

6. *Cyclists and pedestrians are vulnerable to travel surface conditions and motor vehicles; maintenance practices should insulate them from danger.* Bicycle and pedestrian facilities should be maintained to a higher standard than motor vehicle facilities typically are. Broken glass, snow, ice, and rough surfaces are common hazards; more frequent sweeping, plowing, rehabilitation (repaving) and other practices should be the rule in maintaining the facilities we have and any new facilities developed in the future.

   Along with proper maintenance of bicycle and pedestrian facilities, we need to heighten motorist awareness of cyclists and pedestrians. Crosswalks and bike lanes should be clearly signed and marked. Pedestrian phases at busy intersections (and near transit stops) would provide additional protection. Separate bicycle stop lines at intersections would increase visibility along with giving cyclists a chance to "pull away" ahead of turning vehicles.

SPECIAL TRANSPORTATION NEEDS *(Final Draft)*

1. *Better utilization of existing vehicles/programs is preferable to capital expansion.* Adding more buses to the transit fleet and/or adding more STAR vehicles is not the answer to accommodating increased demand for special transportation service. A wealth of transportation inventory is owned and operated by area human service agencies; much of it is underutilized. A "plan" to integrate the services offered by these agencies and those offered by CDTA should be developed and followed. If it is determined that there is still a transportation shortfall, even with coordination, then vehicles should be added to the fleet.

2. *The ability of a disabled person to independently select transportation mode and time of travel is preferable to travel arranged by an agency or transit authority.* The Americans with Disabilities Act (ADA) of 1990 stresses the importance of independence and mainstreaming. Mobility disabled persons should be encouraged to use the fixed route transit system to the extent possible. Increased investment in mobility training will aid in the transition from dependence on paratransit transportation service to fixed route service.

3. *Pedestrian initiatives should address the mobility impaired and elderly population.* Creation of crosswalks and incorporating walk phases into signal timing plans at the busiest Capital District intersections will not necessarily accommodate the elderly or mobility impaired user. Curb cuts must be made available. Adequate crossing time must be given to pedestrians at crosswalks; standards should be set so that a mobility impaired individual can easily cross in the time allotted to the walk phase. It should be noted that the New York State *Manual on Uniform Traffic Control Devices* (MUTCD) provides both mandatory and permissive warrants for pedestrian signal timing. The New York State Department of Transportation (NYSDOT) has adopted a policy that when applying these warrants, consideration should be given to any *significant concentrations* of young, elderly or mobility impaired pedestrians using the site. As more mobility impaired persons are mainstreamed with regard to public transportation (as per the ADA), and as our population ages, the words "significant concentrations" should be dropped from NYSDOT's policy statement.

4. *Locating facilities that provide services to the elderly and disabled population in downtown areas and along major corridors is preferable to locating them in suburban and/or rural areas away from major roadways and fixed transit routes.* As the population matures, the number of facilities providing services to the elderly and mobility impaired elderly will likely increase. Also, the State's emphasis on de-institutionalization will create additional "day program" facilities for the mentally disabled. The provision of transportation for these groups will become a major issue. As facilities are built, it is essential that they be located in places where transit is easily accessible and in places that are conducive to walk trips.

5. *The New York State Department of Transportation and local transportation departments should begin to enhance sign reflectivity and letter sizes to accommodate the needs of the older user.* By 2015, over one fifth of the population will be age 60 and above. The older persons of 2015 will have grown up in a period when use of the automobile was a part of everyday life. These older people will tend to remain in the suburbs and have high expectations about driving and mobility. At the same time, older persons, because of their age will experience visual problems related to depth perception, visual field, visual acuity and glare sensitivity. Preliminary research by the federal government suggests that improving sign reflectivity, increasing letter heights on signs and improvements in stopping sight distances goes a long way in accommodating the needs of the older driver while allowing them to maintain their independence and mobility.

GOODS MOVEMENT *(Final Draft)*

1. *Goods movement is an integral part of economic well being of the Capital District. As such, all transportation capital and operating projects will consider the impact on goods movement in their planning, design, and implementation.* The Task Force has identified a priority system for improvement where addressing current deficiencies will significantly impact goods movement and improve system performance.

   EXAMPLES:

   - Bridge projects - clearances and load limits if significant truck travel
   - Arterial corridor management - site design, service roads, and driveway spacing and location policies consideration of freight deliveries
   - Rail transit and bike trail initiatives - shared use of freight lines
   - Pavement reconstruction - amount of truck use as design consideration for turning radii, pavement thickness, etc...
   - Mobility/congestion relief - impact specifically considered
   - IVHS - Commercial applications and impacts

2. *There are four primary freight facilities in the Capital District: Port of Albany/Kenwood Yards, Albany County Airport, Selkirk Rail Yards, and the Thruway/Interstate System. There are also a number of secondary facilities. Maintaining the health and improving the efficiency of these existing facilities is a priority.* Project eligibility under the Intermodal Surface Transportation Efficiency Act (ISTEA) somewhat limits the extent of influence that the CDTC can have on internal intermodal facility efficiency. There are three arenas where our influence is greatest. They are:
   a) Surface access to intermodal facilities;

b) System safety issues; and
c) air quality improvement initiatives.

CDTC should concentrate its planning activities and capital investments in these three areas.

3. *Historically, the private sector has provided an efficient goods movement system. Public sector goods movement activities should be approached as partnership opportunities.* This is particularly true in the area of technological innovation.

ARTERIAL CORRIDOR MANAGEMENT *(Almost Final Draft)*

1. *The transportation system of the Capital District should be maintained and developed as an important part of the region's attractiveness.* The Capital District is in competition with other regions. Transportation is a basic resource that enhances the region's competitive position. Protecting the economic base requires that the transportation system "works": that good connections are provided between and within regional centers, and that the region has a reputation for being accessible. The existing transportation system should be maintained and developed into an effective multimodal system. As congestion and transportation problems become major issues in many metropolitan areas around the nation, the Capital District should protect and strengthen its transportation system as a marketable asset.

2. *The arterial street and highway system should continue to serve as the basic foundation of the area's surface transportation system.* The arterial highway system is primarily intended to move traffic; and while it also provides service to adjacent properties, such service should be a secondary function of these highways. Improving highways for their traffic movement function should only be part of any solution. In order to improve the area's living environment, all functions must be attended to by balancing the rights of property owners for access with the need to protect arterial function and community safety by eliminating or avoiding traffic conflicts. In addition, any solution should acknowledge that the dual functions of the highway are not always compatible.

3. *Land use management is critical to the protection of transportation system investment. Failure to carefully consider land use impacts in the transportation system could lead to premature breakdown of arterial function in critical corridors.* Development in the Capital District in coming years is expected to add significant traffic pressures along existing two-lane and four-lane arterials. Without careful treatment, the land available for development along these arterials can support an amount of development that will far exceed the ability of these roads to handle through traffic (which is their primary function), local land access and effective accommodation of transit, bicycle and pedestrian modes. Transportation function should be protected through pro-active corridor management work that fosters efficient corridor settlement patterns and embraces site

design that limit access to highways, are transit friendly, and support provision of pedestrian access.

4. *Rather than impairing private interests, the arterial corridor management planning process places them in concern.* The region's economy cannot afford to allow private investments in land development to be impaired by obsolescence of the highway facilities on which they depend. The objectives of planning in connection with arterial highways is to design facilities which will adequately serve the traffic needs of the highway system while guiding surrounding land uses so that these highway facilities become forces which stabilize rather than jeopardize private capital investment in this region. Development opportunities should be embraced when access, transit, and pedestrian issues are properly addressed. When proper planning occurs, the conflict with arterial function is minimized.

5. *Guidelines that evolve from recommended arterial management actions must be flexible enough to deal with the Capital District's various roadway types and the specific land use patterns surrounding them. The particular needs of urban centers, which may involve traffic calming for pedestrian and parking purposes, should be able to be accommodated under a workable set of guidelines.* If any arterial management program is to work, it should be developed in such a manner as to be suitable for different design, land use, and traffic conditions. To impose the same guidelines on an urban arterial that may be applicable to a high-speed rural facility may lead to loss of valuable economic development, but more often, it leads to arbitrary exceptions which, in the course of time, may weaken the program.

6. *Development of arterial corridor management guidelines should build upon current good design practice.* Guidelines should be developed within the existing regulatory and policy framework which includes NYSDOT's *Policy and Standards for Entrances to State Highways*, county and local highway law, and CDTC's "Standards/Criteria for Highway System Evaluation Recommended for Use in Regional and Community Transportation Studies" and CDTC's *Regional Highway System Review*. Guidelines should be crafted for use in conjunction with existing land use and zoning control mechanisms such as site plan review and subdivision regulations.

7. *Public transit, sidewalks, and bicycle facilities should be routinely considered as part of the transportation infrastructure.* Increased opportunities for public transit use and walking as alternatives to auto travel can reduce congestion and conflict levels along Capital District arterials. Transit service works best when it is considered as an integral part of roadway design as well as development and site plans.

DEMOGRAPHIC, LAND USE AND GROWTH FUTURES *(Almost Final Draft)*

1. *Transportation investments should preserve and enhance the Capital District's existing urban form, infrastructure, and quality of place.* The Capital District already has many unique attributes that other regions strive for:

   - The region is a collection of communities that work together and that possess a livable, community scale.
   - The region is multi-centered with the most intensive suburban development in the center of the region rather than at the fringe. Suburban and urban areas are interdependent.
   - Traditional transit corridors link urban centers.
   - The region's modest growth rate is a strength because it affords the time and the opportunity to put in place plans and policies that encourage growth in harmony with the region's objectives.
   - The region is endowed with a diversity of parks, a relative abundance of open space and a wealth of recreation and tourism attractions.

   (Urban form refers to the pattern of buildings, spaces and transportation networks that make up an urbanized region).

2. *Transportation investments should encourage residential and commercial development to locate within an Urban Service Area defined for the Capital District.* This urban service area can be generally defined as the urbanized area in Albany, Rensselaer and Schenectady Counties and the Saratoga Sewer District in Saratoga County. This urban service area may be extended to include areas which already have infrastructure in place; but further study will be necessary to define the boundaries. Adequate space exists within this urban service area to accommodate the growth foreseen for the Capital District, especially if opportunities for infill and redevelopment are taken advantage of.

3. *Transportation investments should not encourage development in environmentally sensitive areas. Open space should be preserved.* Development should be discouraged in environmentally sensitive areas both within and outside the urban service area. Open space should be viewed as a valuable resource throughout the region. By encouraging development within the urban service area, a significant portion of the sensitive lands found within the four county Capital District region will most likely be protected.

4. *Transportation investments should encourage community scale, mixed use development in locations with pedestrian access and transit in both suburban and urban centers.* When residential development occurs far from arterials or when the separation between residential and

commercial development is too great, accessibility is limited to the auto only. When development occurs close to arterials with a mix of complementary uses, people are given access to alternative modes, for example walking, biking, and transit, as well as the automobile. Transportation investments should provide pedestrian enhancements and provide for transit centers in high density urban and suburban corridors.

5. *Design of street layout and location of complementary uses can and should create a pedestrian scale and provide access to other modes without compromising the attractiveness of development.* The Capital District is rich in traditional, walkable neighborhoods. Pedestrian connections between land uses should be encouraged in the design standards for new subdivisions and new commercial centers. Consistent with community design goals, pedestrian and bicycle enhancements to existing subdivisions and activity centers should be encouraged. Transportation investments should provide for pedestrian or bicycle paths connecting subdivisions to each other and to activity centers.

6. *Transportation and land use plans should provide a framework that facilitates predictable development.* By engaging in a coordinated land use/transportation planning process a community can weigh development decisions against its articulated vision of the future. Knowledge of existing transportation facilities and how they interact with land use and other infrastructure needs will lend predictability to the development process. Such predictability is important for public and private investment decisions. Transportation and land use plans should consider both local and regional impacts.

7. *The transportation system of the Capital District should be maintained and developed as an important part of the region's attractiveness.* The Capital District is in competition with other regions. Transportation is a basic resource that enhances the region's competitive position. Protecting the economic base requires that the transportation system "works": that connections are well provided between and within regional centers, and that the region has a reputation for being accessible. The existing transportation system should be maintained and developed into an effective multimodal system. As congestion and transportation problems become major issues in many metropolitan areas around the nation, the Capital District should protect and strengthen its transportation system as a marketable asset.

8. *Transportation investments should be supportive of urban reinvestment in city centers and along urban corridors.* The economic competitiveness of the Capital Region depends upon its city centers to serve as core areas for business, government, education, health care, culture and entertainment. There are eight cities in the Capital District and various important urban corridors; these include the four central cities of Albany, Schenectady, Troy, and Saratoga Springs and radial arterials like Route 5 and Route 20. Failure to attract and support development in the city centers and urban corridors will contribute to further loss of activity in these areas and additional decentralization. Transportation investments supportive of growth and redevelopment in city

centers and urban corridors should be made to promote the efficient use of land and existing infrastructure. Furthermore, state numbered highways and other facilities serving regional needs within city limits should have equal access to state and federal transportation funding.

9. *Transportation investments should be sensitive to the natural and physical landscape of rural areas and should not encourage urban or suburban type development in those areas. Rural features such as hamlets, villages, farmland, and open space should be preserved.* Transportation investments designed to address access and circulation issues should be sensitive to the particular characteristics of the affected area. Factors such as agricultural districts or lands, existing zoning and development patterns, and historic, scenic, and open space preservation issues should be considered to assure that improvements will be harmonious with the surrounding landscape. Transportation investments should not encourage development in areas lacking adequate provision of public water and sewer services, or at low densities outside the urban service area. Such development often renders rural roads insufficient, subsequently raising expectations for higher design standards on these roads that require inordinate investment.

TRANSIT FUTURES *(Final Draft)*

1. *Transit service is expected to serve four different objectives in the Capital District: to contribute to congestion management, air quality and energy savings; to offer an alternative travel mode to reduce dependence on the auto; to provide essential mobility for those who do not operate a private vehicle; and, to serve as a tool to support regional and local land use policies.* These separate roles have differing demands on resource requirements and differing implications for service design.

2. *The value of public investment in transit facilities and services must be considered in relation to these multiple objectives.* Comparison of transit investment with other alternative uses of public resources, including other transportation investments, must fairly examine costs and benefits to transit users and non-users. Congestion management benefits accrue primarily to auto users, for example, while emissions reductions are a broad social benefit and alternative mobility is a targeted benefit.

3. *Transit facilities and services can be an essential element of the social, economic and cultural fabric of a metropolitan region if supportive policies and investments are in place.* The role of transit in a community is related not only to specific transit investment decisions but also to policies and decisions related to the provision of employer parking, design and density of new development and treatment of the pedestrian environment. Actions in these areas must work in concert with transit system design in order to allow transit to provide a significant contribution to the metropolitan area.

4. *In particular, the success of transit service is tied to accommodation of the pedestrian.* While there are growth markets for park-and-ride services and for bike-transit connections, transit services usually provide the middle leg of trip with the "walk mode" at each end of the trip. Unless the pedestrian is successfully accommodated in his or her attempts to travel quickly, safely and conveniently to and from the transit service, there can be little success in maintaining or expanding the contribution of transit to the community.

EXPRESSWAY MANAGEMENT *(Final Draft)*

1. *Maintaining traffic flows on Capital District expressways is critical for both economic and social reasons.* The Capital District's economic competitiveness is in large part rooted in the use of its expressway system both for exclusively over-the-road freight movement and to connect with air, boat and rail shippers. In addition, the expressway system is heavily used for commuting and general circulation within the region. It enhances the region's quality of life by providing access to a wide range of local activities and to those of other regions.

2. *The Capital District's expressway "system" is more than just a network of highways: technology and human resources are critical to its effectiveness.*

   The complete system includes those traffic monitoring and control technologies which facilitate maintenance of traffic flows, as well as the staffs of those transportation, police, fire, and medical service agencies which maintain traffic mobility or safety. The system should involve the following activities or functions:

   * monitoring traffic and weather conditions
   * controlling traffic
   * communicating and coordinating among agencies
   * responding appropriately to incidents
   * informing travelers of conditions

3. *To make this expanded system as effective as possible, it is critical that future transportation investments support development of non-highway elements in the local and public service agencies of the Capital District.*
4. *Investments in traffic management, particularly related to construction and incidents should also be seen as investments in the safety of the highway system.*

5. *Proper management of the expressway system must also include management of arterial feeders and receivers which connect the expressways to the remainder of the roadway network.* Expressways are not entities unto themselves, and access to and from arterials

cannot be considered a "given." Making optimal use of the expressway system requires elimination of difficulties in connecting to/from local land uses.

6. *Major capital projects must have a plan for operating budgets for the life of the project.*

APPENDIX 3.

SKETCH DRAFT OUTLINE -- NEW VISIONS PHASE 2 PRODUCTS

EXECUTIVE SUMMARY

10 to 20 page total, mass reproduction, consider newsletter or even newspaper ad format, focused on broad areas of agreement and fundamental policy choices

The New Visions process (including who is CDTC and what can we do)
Where we are (current conditions)
Where we are going (trends and current commitments)
Broad Areas of Agreement
- Bikes, Walkability
- Arterial Corridor Management
- Urban Reinvestment?
- Others to be determined

Major choices
- Infrastructure treatment
- Northway
- Transit Future

How to Get More Information/More Involved
How to Provide Input to Us

MAIN DOCUMENT

150-200 page range, distribution to major interested parties, includes summary technical information, maps, and charts, for both the broad areas of agreement and the fundamental policy choices, but not the detail.

Task forces not(?) expected to provide unified papers, just their five pieces (principles, supplemental performance measures, performance objectives, action/strategies, performance results, initial resource estimates). JPP/CON/KEY responsibility to pull it all together.

Background on process, existing commitments, connection to other plans, programs, ...

"The Vision"
- Describe broad areas of agreement and the fundamental choices -- unifying themes
- Pull together a single statement or
- AN ALTERNATIVE: State we don't have a unified vision -- that's what phase 3 is all about??

Issues addressed
- Condensed version of Phase 1 reports?

Planning and Investment Principles
- Synthesis into a unified set
- Relationship to five overriding factors
- How do they relate to performance measures, objectives, action plan?

Performance Measures
- Concept of core measures
- Summary table - matrix of base, trend, trend with current commitments
- Detail shunted to appendix or technical report
- Supplemental measures summarized, detail in appendix or technical report

Recommended Actions/Strategies
- Use of menu (model will be forthcoming) ACTION, PERFORMANCE MEASURES IMPACTED, COSTS
- Will need to be organized for presentation so focus is on big questions.

Next Steps
- How to provide input
- Additional reports available
- Phase 3 description

TECHNICAL REPORTS (BY SUBJECT AREA)

No limit on length for these products where the level of detail warrants full documentation here instead of in the main document. Given the variety, a consistent outline is less important, but some guidance should be provided.

Regional Bike Plan
- Network
- Pedestrian warrants
- Pilot projects elaboration

Regional Expressway Incident Management Plan

Intelligent Transportation System Strategic Plan

Fixed Guideway Investigation

Arterial Corridor Management Guidelines

Goods Movement Detail

Infrastructure Modeling

Land Use Model - Scenario Documentation

Northway Study

CONGESTION MANAGEMENT SYSTEM CASE STUDY OF THE WASHINGTON REGION

TASK 1 REPORT: ACTIVITIES TO DATE

METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
NATIONAL CAPITAL REGION TRANSPORTATION PLANNING BOARD

April 28, 1995

I. EXECUTIVE SUMMARY

The objective of this project is to develop an improved understanding of the technical and institutional issues related to the development, implementation, and operation of ISTEA Congestion Management Systems (CMS). Metropolitan Washington was one of four geographic areas from around the country selected by the Federal Highway Administration (FHWA) to provide case study research on various aspects of CMSs.

The two focus areas being studied in the Washington region project are data management and regional performance measures/indicators. Data management is important because ISTEA and the CMS regulations require analysis of data of a timeliness and degree of precision much greater than in the past. The intermodal accent of ISTEA requires looking at heterogeneous data from a variety of sources (highway agencies, transit agencies, private sector concerns, and many others), and putting these data together in a usable format. Regional performance measures/indicators are important to study again because of the "putting together" emphasis of ISTEA--putting together comparisons of different modes, of combinations of congestion management strategies, of understanding the spillover effects of instituting a pinpoint solution to surrounding areas.

This paper discusses the history, background, and activities to date in the Washington region regarding data management and the selection of performance measures/indicators. The paper goes on to provide some comments to other CMS or transportation planners on what these practitioners might be able to learn from the Washington experience.

II. BACKGROUND AND OBJECTIVES

A. Objectives of the Case Study

The objective of this project is to develop an improved understanding of the technical and institutional issues related to the development, implementation, and operation of ISTEA Congestion Management Systems (CMS). Thorough research and documentation of COG/TPB's CMS development efforts will result in information that may then be disseminated to other developers of CMSs. Metropolitan Washington was one of four geographic areas selected by the Federal Highway Administration (FHWA) to provide case study research on various aspects of CMSs. The other study areas selected were the Albany, New York, Dallas-Fort Worth, Texas, and Seattle, Washington metropolitan areas.

B. Description of the Two Focus Areas

1. Data Management

How should data for a CMS be managed on a regional level? COG/TPB has an ongoing project to develop a Regional Transportation Data Clearinghouse, housing many types of systems usage data collected by COG/TPB and its member agencies. This case study extends this project to examine how this fledgling clearinghouse can be best formatted, developed, and implemented, considering both the utility on the data in general and how the data may be integrated into the regional GIS-T, and how others may learn from this experience. The CMS will be one of the driving forces to compile a master data set that will support a variety of regional planning activities, including travel forecasting and air quality analysis. Additional issues include display of data, truth in data, frequency of updates, and creating compatibility among heterogeneous sets of data needed not only for the CMS, but also for the PTMS and IMS.

2. Performance Measures/Indicators

The second focus area concerns performance measures/indicators to be utilized on a regionwide or corridor basis. It is imperative to find a cost-efficient method of collecting and interpreting congestion data on the region's transportation system. Traditional methods of determining congestion tend to focus only at a local scale such as a single intersection or interchange. These methods depend on large amounts of detailed data, the collection of which for regionwide analysis would exceed regional budgets available for such purposes. Therefore, of particular interest are performance measures/indicators that are applicable at the regional or subarea level as opposed to those that are geared to intersection or corridor performance, and performance measures/indicators

that are not overly "data-hungry". Also important would be linking available transportation data for multiple modes of travel to identified performance measures/indicators, and investigating which measures/indicators are appropriate for evaluating regional mobility and congestion management strategies. This case study will research more efficient ways of determining the location and severity of congestion in the region, and ways of evaluating the impact of congestion management strategies from a regional and subarea perspective.

C. Institutional and Geographic Context: COG/TPB and the CMS Task Force

1. COG and the Washington Region

The Washington metropolitan area includes the District of Columbia as well as portions of the States of Maryland and Virginia. The Metropolitan Washington Council of Governments is composed of 17 local governments, including the District of Columbia, seven surrounding counties, and a number of municipalities. The population of the member jurisdictions was estimated to total over 3.9 million in 1995, and is expected to grow by 30% to over 5.1 million by 2020. The total employment of the member jurisdictions was estimated to total over 2.5 million in 1995, and is expected to grow by 40% to 3.6 million by 2020.

2. Committee Structure and Relationship among Planning Activities

The designated Metropolitan Planning Organization (MPO) for the region is the **National Capital Region Transportation Planning Board (TPB)** of the Metropolitan Washington Council of Governments (COG). The TPB is charged with producing long range transportation plans and (shorter-range) transportation improvement programs (TIPs) for the region. The TPB is composed of representatives of State, County, and local government agencies, transit providers, and other interested agencies.

The TPB is advised by a standing **Technical Committee** for transportation. The Technical Committee oversees the details of the transportation planning and engineering studies and efforts required to support the region's transportation decision making processes. The TPB is also advised by a Program Committee and a Citizens Advisory Committee.

The TPB Technical Committee, in turn, has a number of standing subcommittees focusing on particular aspects of the transportation planning process. These subcommittees include ones covering aviation, bicycling, ridesharing, traffic mitigation, travel forecasting, and travel monitoring issues. There are also *ad hoc* or special groups focusing on telecommuting, transit, transportation management associations, and other interest areas as needed.

In response to the ISTEA requirements, the Technical Committee created the *ad hoc* **CMS Task Force.** The CMS Task Force was created to study and respond to the Federal management systems requirements, and provide recommendations to the Technical Committee on how to address these requirements. The CMS Task Force included representatives from several of the other (standing) subcommittees. The CMS Task Force's efforts culminated in the production of the *CMS Work Plan for the Washington Region*, approved by the TPB on September 21, 1994, and forwarded for incorporation into the States' management systems designs.

Some of COG/TPB's aforementioned standing subcommittees also have had further roles in the development of the regional CMS. The **Traffic Mitigation Subcommittee** has guided development of transportation control measures (TCMs) to help the region attain air quality goals. This Subcommittee's expertise on TCMs will be applicable in exploring congestion management strategies, because of similarities in the strategies themselves as well as in the analytical techniques used to analyze the strategies. The **Travel Forecasting Subcommittee** has provided guidance on travel modeling and its data needs. The **Travel Monitoring Subcommittee** has guided the region's travel monitoring program, which is described below.

3. Interstate and Interagency Coordination

The COG/TPB MPO planning area falls into the District of Columbia and portions of the States of Maryland and Virginia. Although the District of Columbia is not a state, it has numerous "statewide" responsibilities under federal law much like the 50 states; for example, statewide ISTEA management systems, statewide highway data reporting, and the like. Thus, whereas most MPOs coordinate with only a single state government (e.g., state transportation agency), COG/TPB must coordinate with three state governments.

All agencies with a statutory requirement or interest in the management systems were invited to participate on the CMS Task Force, including local governments, citizens, the States, the District of Columbia, and the Washington Metropolitan Area Transit Authority (WMATA). The Task Force has helped maintain communication among parties as the several management systems have been developed.

COG/TPB staff have also be advisors and participants in the States' efforts to develop statewide management systems and Major Investment Studies.

4. Division of Responsibilities

The following division of responsibilities among the involved parties was approved as part of the *CMS Work Plan for the Washington Region.*

a. Responsibilities of Member Local Governments, Agencies and Transit Providers

Local agencies and transit providers have been asked to provide travel monitoring data they may collect to the Regional Transportation Data Clearinghouse for incorporation into regional CMS analyses. These local agencies are also participants in the process of which CMS strategies shall be recommended for implementation, and, in some cases, will be the implementing agencies of those strategies.

b. Responsibilities of the States

The States are responsible for: routine transportation system usage data collection/management, particularly hourly directional volumes for all principal arterial and freeway links; congestion management technical analysis outside the metropolitan area; travel demand forecasting for corridors between metropolitan areas; statewide identification of strategies; and any detailed facility-level analysis necessary on State-owned facilities.

In addition, the States have statutory requirements to develop and implement the six ISTEA management systems, including incorporation of the region's CMS results into those systems. Also, the States will implement their Traffic Monitoring Systems for Highways (TMS/Hs), and are asked to share information gathered in these systems with the regional CMS.

c. Responsibilities of COG/TPB

COG/TPB is responsible for

(1) Travel monitoring for the CMS:

(a) Collection of speed and vehicle occupancy data;

(b) Other transportation systems usage data collection and studies as resources allow;

(c) Means of collecting these data include aerial surveys, manual counting, floating car travel time runs, and other methods.

(2) Creation and maintenance of a Regional Transportation Data Clearinghouse:

(a) Compilation of available travel monitoring data from the region's member agencies:

Highway data routinely collected by member agencies;

Data produced by local jurisdictions and transit providers.

(b) Maintenance of this system on a computerized Geographic Information System for Transportation (GIS-T) platform.

(3) Travel forecasting and CMS analysis activities:

(a) Regional travel forecasting in support of the regional long range plan, and corridor summaries for the metropolitan area;

(b) Identification and quantitative and qualitative analyses of strategies to alleviate congestion, and for publishing the results of those analyses. Congestion management

technical analysis for corridors in the metropolitan area;

(c) Reporting on the effectiveness of previously implemented strategies;

(d) Regional congestion summaries;

(e) Identification of congestion "hot spots" and activity centers.

(4) Providing ample opportunities for public involvement in regional congestion management.

COG/TPB is not an implementing agency of transportation projects, with the current exception of the regional Ridesharing program. The products of COG/TPB efforts shall remain regional long range plans and TIPs. COG/TPB will not create an IMS or a PTMS at the regional level; rather, the freight movement, intermodal, and public transportation data and issues that the States may choose to treat in their IMSs and PTMSs will be coordinated at the regional level with the CMS and the Regional Transportation Data Clearinghouse.

D. How the *CMS Work Plan for the Washington Region* was Produced

The CMS Task Force held (for the most part) monthly meetings, beginning July 26, 1993, to put together a CMS work plan for the region. The Task Force spent several months reviewing federal legislation, guidance, and examples of work from around the country, and presenting and discussing their findings with other COG/TPB committees. The Task Force started the production of a plan by identifying a list of 15 major issues to be addressed. These issues were:

1. Guiding statement for a regional CMS;

2. Reconnaissance of current congestion management activities in the region;

3. Definition of the system to be managed;

4. Data for the CMS, both current conditions and future forecasts;

5. Performance measures/indicators and data analysis - measures/indicators to use, standards/targets to meet, how often to repeat and compare analyses;

6. Roles of agencies;

7. Public participation;

8. Identification, evaluation, and selection of strategies, both generally and when single occupant vehicle (SOV) capacity was being considered;

9. Modeling capabilities and issues;

10. Mission and longevity of the CMS Task Force as a committee;

11. Relationship of the CMS to the other Management Systems;

12. Incorporation of the CMS into the overall regional planning process;

13. Interpreting "managing congestion" and "acceptable congestion levels" in the context of the Washington region;

14. Implementation and implementation deadlines;

15. Interim CMS requirements.

From research on these 15 issues, a draft *CMS Work Plan for the Washington Region* was developed in spring 1994. The Task Force guided revisions of this document through final approval of the work plan by the TPB on September 21, 1994. Since that time, the CMS Task Force has been working in conjunction with the Traffic Mitigation Subcommittee on implementing the CMS.

III. DEVELOPING AND EXPANDING MANAGEMENT OF REGIONAL TRANSPORTATION DATA

A. History and Background of Regional Data Management and the Travel Monitoring Program

1. Objectives and History

COG/TPB has had a longstanding element of its annual Unified Planning Work Program (UPWP) to collect and compile usage information for the region's transportation network. This began as systems performance monitoring for the region, to track the performance of the region's transportation facilities through time. Two of the main objectives of this monitoring program have been to support the transportation decision making of the region's officials and to update and calibrate the region's travel forecasting computer models. With the advent of ISTEA, these purposes continued, but with additional requirements; namely, (1) systems usage monitoring for the CMS, and (2) more detailed information for upgrades of regional travel forecasting computer models. The fact that a regional monitoring program was already in existence provided a head start for the Washington region regarding ISTEA requirements; the region was able to explore enhancing the existing system as opposed to creating anew. The Travel Monitoring Program, in conjunction with the Regional Transportation Data Clearinghouse project described below, will provide the basis for regional CMS analysis.

Of the many types of data that would be useful or important for the CMS or other regional planning analysis, some are seen as minimum basic necessities. They are:

- Traffic volumes, preferably by direction and by time of day (at least for a statistically expandable sample of the region's highways);
- Traffic speeds (average running speeds), convertible to travel time and delay;
- Traffic density, usually measured by passenger car equivalents per lane per mile, density being a primary definer of congestion in the *Highway Capacity Manual*, particularly for limited access highways;
- Vehicle classifications to help determine the proportion of automobiles, trucks, buses, etc., in the traffic mix;
- Vehicle occupancy, important because of ISTEA's emphasis on reducing reliance on single occupant vehicles and to monitor person travel as opposed to or in addition to only vehicle travel; and

-- Transit ridership or modal shares, again to reflect total person travel in addition to vehicle travel.

Obtaining these data constitutes the thrust of the travel monitoring activities described below. COG/TPB's Travel Monitoring Program is meant to supplement data already collected by others or available from other sources (such as state transportation agencies). COG/TPB typically collects information on traffic speeds and vehicle occupancy. COG/TPB occasionally collects information on traffic volumes, vehicle classifications, and transit ridership, but generally relies on state and local transportation agency data for these. Recently, COG/TPB has collected information on traffic density for freeways in the region, and is embarking on a more detailed travel monitoring program of speed and travel time data collection (aimed at making forecasting models more robust) in projects described below.

2. Summary of Recent Travel Monitoring Activities

a. Aerial Surveys

The Washington region has used aerial photography to monitor traffic density on the region's limited-access highways. In fiscal years 1993 through 1995, COG/TPB has contracted with Skycomp, Inc. to conduct a systematic aerial study of congestion on the region's freeways. For this effort, Skycomp surveyed the region's approximately 285 miles of freeway in the following situations:

-- During morning and evening rush hours, to determine the existence and extent of peak period congestion;

-- At off-peak times of the day, to determine the existence and extent of off-peak congestion;

-- Near construction zones, to determine their impact on congestion; and

-- Subsequent to crashes or other highway incidents, to determine the impact of incidents on congestion.

In the past, COG/TPB used floating car or other ground-based techniques to monitor congestion on the Capital Beltway and certain other major roads in the region. By comparison, the aerial technique offers several advantages. First, the survey provided a uniform way to gauge performance for each part of a freeway system operated by different agencies (the highways of the District of Columbia, Maryland, Virginia, as well as the National Park Service-controlled parkways). Second, it was comprehensive: Virtually the entire freeway system was covered. Finally, the technique was relatively inexpensive, costing $70,000 for all data collection and analysis for the peak hour study

performed in F.Y. 1993, and similar amounts in the other years. Aerial surveying is not a new technique, but recent advances in camera and film-developing technologies have made projects like these feasible and affordable. An added benefit was that a library of more than 20,000 photographs taken for the survey can be used for detailed analyses of traffic problems by the various agencies in charge of the region's freeways. COG/TPB hopes to repeat these aerial surveys in the future on a three-year cycle.

In conjunction with the information collected aerially, the Travel Monitoring program will be analyzing accident data on the freeway system and developing a regional freeway accident database to gauge the impact of accidents on congestion over time. In addition, the aerial data are being analyzed, along with speed information (from the many permanently-installed automatic traffic recorder devices in the region) and traffic counts, in order to investigate the relationships between speed, volume, and density. Speed, and its conversion into travel time and delay, will be a primary indicator on a regionwide and corridor basis of congestion.

As a part of this CMS case study, it is proposed to perform a limited amount of additional aerial photography to help determine average running speeds on limited access highways, and the relationship between this running speed and the traffic density on the facility.

Note that aerial surveys measuring density have provided a straightforward approach to estimating travel time and congestion on limited access highways, but have not yet been applied to arterial highways (with intersections and traffic signals) in the Washington region. Thus arterial highways are addressed in the speed and delay studies described below.

b. Speed and Delay Studies

From time to time, COG/TPB has performed travel time surveys (runs) by means of the floating car technique. These runs have helped calibrate regional travel forecasting models. COG/TPB has also experimented with license plate matching techniques to determine travel times on segments of roadways. However, these techniques did not address the need to have travel speeds for a large number of the region's arterial highways at a reasonable cost. Thus COG/TPB and its consultant are pursuing a speeds modeling approach similar to that being explored in an NCHRP study at the Texas Transportation Institute. This study involves using any travel time surveys (runs) and other speed data already available to create and calibrate a statistical predictive model. This model would estimate travel time as a function of link characteristics for arterial highway sections for both current and projected future traffic conditions. The methodology would utilize a combination of traffic volumes, signal densities, and other variables to estimate the travel times and speeds on the region's arterials. This would be the complement of the aerial surveys on freeways, helping determine delay on arterial highways.

COG/TPB intends to use the arterial speeds model described above as a way to gauge travel time and congestion on the region's arterial highways. However, because this model is still in the developmental stage, COG/TPB is relying for the time being on the output of the regional travel forecasting model chain (MINUTP software) to estimate speed and delay (both current and future conditions) on the region's arterial highways.

c. Cordon Counts

COG/TPB's cordon count program originated from the desire to assess the impact of the construction of the region's Metrorail system, starting in the late 1960's. Thus a cordon line around the central business district (core) was determined by the point at which there were more destinations (alightings from transit buses) than origins (loadings onto transit buses). In later years, two additional cordon counts were added to the program, which COG/TPB performs on a three-year cycle. In year 1, vehicle counts, classification, and occupancy are taken on facilities that cross the region's core cordon. In year 2, the cordon line used is the Capital Beltway (I-95/I-495), which circles the region; counts are taken on all major facilities crossing the Beltway. In year 3, COG/TPB collects information for persons and vehicles going into or coming out of a designated set of suburban employment sites. These cordon counts help calibrate regional travel forecasting computer models, and provide an opportunity for trend analysis.

d. Travel Surveys

(1) Home Interview Surveys

There is a need to obtain information about the travel characteristics of particular travels or particular households in the region. This information feeds regional travel modeling activities, supplementing other sources of information such as ground counts and the U.S. Census. Like most metropolitan areas, the Washington region finds such comprehensive telephone or mail-back household travel surveys useful, but very expensive to perform; thus they are conducted only rarely. COG/TPB conducted a telephone home interview survey in 1994, in part to help upgrade regional travel models. The survey helps provide information on such important determinants of travel as household demographics, income, employment destinations, and number of vehicles available.

(2) External Surveys

Whereas most travel monitoring activities look at travel within the Washington region, there is also a need to understand travel in the region that has origins and/or destination outside the region. These

are characterized as external-to-internal (X-I), internal-to-external (I-X), or external-to-external (X-X) trips, collectively referred to as "external" trips. Stopping traffic and interviewing drivers in order to obtain origin-destination information, as is sometimes done in rural or low-traffic-volume situations, is not feasible on the high-speed, high-traffic-volume Interstates and similar facilities crossing the Washington region boundary. In addition, these external trips, in comparison to internal trips, are difficult to model and forecast.

External surveys are done only at rare intervals, but one was performed in 1994 in conjunction with an expansion of the geographic area covered by COG/TPB's travel forecasting computer model chain. COG/TPB staff designed a survey questionnaire, performed two-way full vehicle occupancy and classification counts, and undertook a license plate-matching survey. This involved collecting license plate numbers on vehicles passing through designated stations on the region's boundary, obtaining license plate matching information from the respective state motor vehicle administrative agencies, and then mailing an origin-destination mail-back survey questionnaire to the owners of the identified vehicles. Data are intended to be used to calibrate regional models, but are available for use in the CMS and the Regional Transportation Data Clearinghouse.

(3) Other Surveys Identified as Needed

A number of other types of travel surveys have been done on rare occasion or will be done in the future as time and resources allow. For example, there are various types of truck or freight movement surveys. ISTEA and the management systems place a renewed emphasis on the consideration of truck and freight movement in metropolitan planning, but few such studies have been done in the region since the early 1970's. Historically, freight movement might have been seen as less of a priority issue in the office-oriented Washington region as opposed to more industrialized or port-based metropolitan areas around the country. However, the CMS Task Force acknowledged the importance of understanding the relationship between goods movement and congestion, and expressed commitment to "keep the issue on the table"--to continue research and to develop ways to address goods movement. Of particular interest are delivery trucks with frequent stops in urban areas, and freight generation at airports.

By contrast, visitor and tourist travel is a much more significant component of the region's travel than it would be for other metropolitan areas. Taxi movement is a related issue, and is significant for portions of the region. These have proven difficult to reflect and forecast in regional travel models. Visitor, tourist, and taxi surveys to update previous efforts (done in the 1960's and 1970's) are under consideration.

Finally, there is an identified need to understand more about what are called "special generators" in the region. Travel models usually simulate "typical" land uses that produce and attract trips, such as offices, retail development, and households. It is trickier to characterize travel patterns associated

with unique or unusual land uses, such as hospitals, universities, military facilities, and major national tourist attractions. A survey of such developments has been proposed to help improve the regional modeling of same.

e. Other Travel Monitoring Efforts

COG/TPB undertakes a variety of other travel monitoring projects as financial resources allow. Some of the activities planned in coming years include parking cost studies, HOV lane usage counts, and park-and-ride lot usage summaries.

In addition, the operating and implementing agencies of the Washington region gather systems usage data for a variety of purposes. Data from these sources are being compiled in the Regional Transportation Data Clearinghouse project described below.

Travel monitoring in the context of the CMS must be of a size and scale that is logistically achievable, within resource constraints, and based on information already on hand, routinely collected, or expected to be collected. COG/TPB does not envision the availability of resources to expand travel monitoring activities over current levels.

B. History and Genesis of the Regional Transportation Data Clearinghouse

The initial discussions of a regional clearinghouse were under the auspices of the Travel Forecasting Subcommittee, and actually involved keeping track of a variety of regional travel forecasts. Later the idea was added to house historical data in some sort of clearinghouse for the service of COG travel forecasting activities, and for state and local planning and operations use. From there, the idea of a Regional Transportation Data Clearinghouse has grown and evolved. Ultimately, it is desired that the Regional Transportation Data Clearinghouse contain multi-modal transportation system usage data, both historical and future forecast, for a wide variety of the region's transportation facilities.

It is intended to implement the Regional Transportation Data Clearinghouse on COG's Geographic Information System (GIS). To date, this GIS and an associated relational database management system are not completely operational. Progress to date in the Regional Transportation Data Clearinghouse has included researching and compiling available historical highway usage data from around the region.

1. Relationship to the CMS

When CMS requirements came to light, it became apparent that the Regional Transportation Data Clearinghouse could provide an excellent basis for data inputs into CMS analysis, the CMS having

a direct reliance on transportation systems usage data. It is also intended that the CMS share the platform and display capabilities of the COG/TPB GIS, and that their definitions on this GIS be completely compatible.

2. Relationship to Other Regional Planning Activities

The Regional Transportation Data Clearinghouse has a strong relationship to one of its originally intended purposes, providing/obtaining information to/from regional travel forecasting modeling activities. ISTEA and the Clean Air Act have increased needs and expectations of the regional model chain to be more accurate, and to do that at a higher level of detail. Such models are "data-hungry", necessitating timely and detailed data.

Similar but performed using a separate model set are analyses of transportation control measures (TCMs) for emissions reductions. These models will also benefit for data compiled in the Regional Transportation Data Clearinghouse, and can provide data to the Clearinghouse on emissions impacts of a number of proposed projects, actions, or congestion management strategies.

COG/TPB also hopes to share information from and to the Intermodal Management Systems (IMSs), Public Transportation Management Systems (PTMS), and Major Investment Studies (MISs) of member agencies.

3. How the Regional Transportation Data Clearinghouse May Help Tie Together the CMS and Other Activities

The Regional Transportation Data Clearinghouse will provide an improved medium of communication among various regional planning activities, both longstanding activities and newer activities. The existence of a common base of data for all regional planning activities helps provide comparability among the products of those activities. A Clearinghouse implemented on a GIS facilitates the sharing of both input and output information of various planning activities: long-range travel forecasting, short range congestion management analysis, air quality planning/emissions reduction strategies, Major Investment Studies, and so forth. The GIS also will help provide ways to display and explain data to the boards and committees of the region's decision makers. Finally, the Regional Transportation Data Clearinghouse provides a forum within which to examine current data availability and practices, and assess in a systematic fashion changes or improvements that might be needed to data availability and practices.

C. Activities to Date and Current Results of the Regional Transportation Data Clearinghouse Project and Other Data Management Efforts

COG/TPB's Regional Transportation Data Clearinghouse project has yielded significant useful and usable data over its three-year life. However, the experience in putting together the Clearinghouse has resulted in a number of issues and complications worth noting.

COG/TPB staff has worked with the transportation agencies of the region to obtain the data these agencies routinely collect, or already have on hand. Staff has concentrated on getting data from those agencies for the following types of highways: freeways, limited-access National Park Service parkways, toll facilities, and other principal arterials. Data covers years from 1986 to the present. In addition to average daily traffic counts (AADTs or AAWTs), COG/TPB has sought other demand information including peak hour directional volumes, vehicle occupancy, and vehicle classification counts. COG/TPB also has assembled information on roadway characteristics, including number of lanes, interchanges, signalized intersections, variable message signs, truck weigh stations, toll plazas, automatic traffic recorder locations, National Highway System (NHS) status, and political boundary information. Some, but not all of the desired information of this type was found to be available. COG/TPB has stored the data in personal computer (PC-compatible) files (Lotus 1-2-3 .WK1 format) in preparation for entry into COG/TPB's GIS. Because of delays in the development and implementation of the GIS, these data have not yet been able to be entered into the GIS.

One of the central ideas of the Regional Transportation Data Clearinghouse was that the transportation agencies of the Washington region were already collecting and compiling large volumes of transportation systems usage data, so these data could be easily obtained by COG/TPB. However, numerous difficulties were encountered with this approach. It should be noted for the record that the personnel of these transportation agencies were amiable and cooperative, but ultimately were not always able to overcome the following functional issues.

The region's transportation agencies had less complete data on hand than was hoped, with budget cutbacks often cited as a reason. These agencies relied on PC-compatible electronic storage and transfer of data less often than expected, necessitating a great deal of COG/TPB staff effort to go to member agency offices, obtain hard copies of transportation data, and then spend time keypunching the data for use in the Clearinghouse. In a few cases, the institutional or functional ability to retrieve or transmit data expediently from mainframe computers had been lost by the agency. Data from before 1986 were almost never available. The agencies' staffs' oral descriptions of activities and procedures were not necessarily consistent with the written descriptions of how their systems were supposed to work "in theory". Automatic Traffic Recorders (ATRs) were expected to be a useful source of data, yet many ATRs were permanently out of order, often due to weather damage, repaving, or reconstruction projects.

COG/TPB found the representatives of our member agencies to be friendly and willing to help, but ultimately these representatives did not have the decision making power or resources to agree to some sort of automatic arrangement with the Regional Transportation Data Clearinghouse. They either did not understand how to or could not authorize provision of data in electronic or automatic

form. Additionally, COG/TPB did encounter some link-level data that seemed to be "sensitive" in nature (e.g., low confidence in the data when examined at fine levels of precision), and there was reluctance to release that data.

Other issues identified as important for the Regional Transportation Data Clearinghouse are display and presentation of data, "truth-in-data", and creating compatibility among data types. COG/TPB has just begun to scratch the surface of these issues. Lacking a GIS, presentation of data has been on Lotus 1-2-3-style tables, and on pen plotter output from the MINUTP model. Committees and even the technicians have not found these to be as user-friendly as they would like.

The issue of "raw" versus "adjusted" data is relevant for truth-in-data and compatibility among data types. Typically, volume counts are smoothed or factored to account for such things as day of the week or month of the year the count was taken, conversion factors for multi-axle vehicles into passenger car equivalents, and other adjustments or averaging. Documentation on how each agency handled these topics was less readily available than might be expected. If less was known about how particular data were factored or smoothed, it was difficult to know how that data compared to other agencies' data. Indeed, national standards and the Highway Capacity Manual ensure some comparability, but even these standards are left open to interpretation when applied to "real world" situations. In summary, data are still useful and usable for analysis, but they have to be viewed with some judgment about comparing different data sources.

D. This Year's Regional Transportation Data Clearinghouse, GIS, and Travel Monitoring Activities

1. This Year's Regional Transportation Data Clearinghouse and GIS Activities

This year, COG/TPB will continue the development and implementation of the Regional Transportation Data Clearinghouse on the GIS. Activities include:

- Formatting and transferring data into the GIS's relational database management system, ongoing throughout the year as data are obtained;
- Creating a base network on the GIS, defined using Census TIGER files and existing computer model networks on MINUTP, expected to be completed in summer 1995;
- Work with the transportation agencies of the region to mutually define data needs, formats, and access to that data, likely ongoing throughout this year and future years.

2. This Year's Travel Monitoring Activities

This year, as described above, COG/TPB proposes to perform a limited amount of additional aerial photography to help determine average running speeds on limited access highways, and the relationship between this running speed and the traffic density on the facility. COG/TPB is also continuing its cycle of cordon counts, performing counts at the Beltway cordon line this year. This year's cordon count will also feature additional sites counted for bicycle usage; it was recommended to look for bicycles on roads with low traffic volumes, roads that have not been counted in previous studies because of their lack of regionally significant commuter traffic. COG/TPB is also looking at vehicle occupancy on one of the region's high occupancy vehicle (HOV) facilities, I-66, in conjunction with a test case change of the facility from HOV-3 (three persons per vehicle minimum) to HOV-2 (two persons per vehicle minimum). Completion is targeted for fall 1995.

E. Comments to Other Practitioners Based on the Washington Experience to Date

1. Maintaining a Regional Travel Monitoring Program

A regional travel monitoring program will help support the implementation of a CMS for a metropolitan area, by providing data useful for assessing current and future congested conditions. Information on such programs are discussed extensively in the literature and federal guidance on the CMS, and will not be repeated here. However, the following are some points to consider based on the metropolitan Washington experience.

Many of the transportation agencies of the Washington region have stressed their preference for little or no additional data collection activities over and above historical levels. Therefore, it makes sense to use the existing data collection as effectively as possible. If it has not already done so, the MPO should develop an understanding of the data collection activities already undertaken by the region's transportation agencies. Review the locations and extent of the counts already taken. The states' Highway Performance Monitoring System (HPMS) locations and counts are often cited as a good data source. The HPMS "universe", or location reference files, might aid in determining or defining a network of facilities to be included or studied in the CMS. The monitoring system should produce results that are compatible with and usable by not only the CMS, but also the other management systems.

Defining the facilities to be studied in the CMS is another key activity. Ideally, an MPO might like to look at all facilities in the region comprehensively, but, in reality, must prioritize its studies to the most important facilities or areas because of time and budget constraints. In defining what is to be studied in the CMS, consider whether there are adequate existing data for the location or facility, as well as the location or facility's functional importance for the region (e.g., functional classification, traffic loads, connectivity, economic importance, etc.). Note that the process of defining facilities for the CMS has been both a technical process and a political process. It was important that the CMS would include and treat as priorities those locations that were most important in the eyes of the public

and local elected officials.

Understanding the above items (that is, understanding what locations or facilities are important and knowing where data sources are already adequate) helps in determining other key steps that need to be taken in the process. First, the MPO could consider the types and locations of data collection activities that the MPO itself might have to undertake. For example, COG/TPB frequently performs its own vehicle occupancy counts, because this information is not generally available from other sources. Second, understanding these items can help the MPO provide feedback to the transportation agencies of the region on the types and locations of data collection they may want to undertake, perhaps in substitution for some of the current or previous types or locations. Finally, overall, MPOs will find this information important to prioritize their CMS activities, including travel monitoring, because of budgetary and time constraints.

2. Identifying and Prioritizing Data Needs

COG/TPB is looking to test its approach to both the CMS and the Regional Transportation Data Clearinghouse through the use of prototype locations. The experience that led to this approach is explained below. The concept is to create a skeleton network for the CMS and the Clearinghouse, starting the process with a manageable number of study locations, and then expand as skills and experience improve.

The original approach to COG/TPB's Regional Transportation Data Clearinghouse was that the transportation agencies of the region would transmit any and all data to COG/TPB, probably in some kind of electronic format, and COG/TPB would find a way to house it in the Clearinghouse. In theory, this would provide the most robust data set available for regional planning purposes, since all data collected in the region would be available. These data would be augmented with those data COG/TPB collects in its own travel monitoring program, as well as COG/TPB's travel forecasts from its own regional model chain. Anecdotally, this approach has been referred to as, "If you've got data, send it in."

Ultimately, however, this approach has not yielded particularly good results. The data that were already "out there" were not collected for the purpose of regional planning or a CMS, so, not surprisingly, they do not always fit into these new uses without some "cleaning up". COG/TPB could continue with this approach, but it is likely to continue to be exceptionally time- and resource-inefficient because (1) the data that come in this way need a lot of work before they are in a usable format for the CMS and other regional planning purposes, and (2) MPO staff may be spending time cleaning up data sets without regard to whether those particular data were at all important to or useful for the regional planning process.

The alternative COG/TPB is now exploring is to first define, in conjunction with our member

agencies, what particular facilities or geographic areas we are most interested in studying, and then request only those particular data from the region's transportation agencies. The technical committee or equivalent of an MPO would agree on the locations that traffic volumes and other systems usage data are most needed to the CMS and other regional planning activities and modeling. This list of locations would not be an arbitrary invention; rather, choices should be based as much as possible on where their member agencies want to collect data, or where they already collect data, or on the designated HPMS locations. These meetings also could be used as forums to gain buy-in from participants (such as the state transportation agency) on collecting and providing data expressly for or compatible with the regional planning process.

In COG/TPB's case, the TPB, TPB Technical Committee, and subcommittees could determine the locations and types of usage data needed for regional planning purposes (e.g., CMS corridors), and then ask member agencies to provide the data. If they have the data on hand, they can simply transmit what is needed. If they do not have the necessary data on hand, they may elect to go out and collect the necessary data, or propose an alternative response to the need. If the MPO has a high level of buy-in from the member agencies' planners or engineers, it may achieve a greater level of success than under the original approach to the Regional Transportation Data Clearinghouse because of the increased attention from those personnel. Furthermore, it is assumed that agencies' data collection arms would be more likely to be able to respond to the request of their own agency's planners than to an external request coming from COG/TPB; the influence of the agencies' planners or engineers would be important in getting the data collected and transmitted. This approach is flexible, because each agency can decide for itself how it wants to respond to the regional planning needs. Also, this would allow the MPO to "start small" by concentrating on a minimum set of strategic corridors of interest (for example, CMS corridors), learn about each others' needs and processes, and expand from there to wider geographic coverage in future years.

3. Establishing a Regional Transportation Data Clearinghouse

Perhaps one of the key issues in developing a CMS is that if data bases are to be used on the scale contemplated for a CMS, these data bases must be managed. Sufficient time and resources need to be allocated to a number of management tasks: identifying data needs, establishing contacts with the appropriate data collection/storage people within the region's transportation agencies, reviewing/cleaning up data, translating data from the format of submission into a format consistent with the MPO's, tabulating "metadata" (data about data; e.g., what year the data were collected, methodology used, personnel involved, etc.), and many other activities.

COG/TPB is establishing its Regional Transportation Data Clearinghouse on a GIS; implementation of such a system without a GIS seems less feasible. The ultimate goal is still automatic electronic transfer (in a format compatible with our needs) of all data collected or compiled by member agencies.

IV ESTABLISHING AND TESTING REGIONAL PERFORMANCE MEASURES/INDICATORS

A. History and Background of Regional Performance Measures/Indicators

A performance measure or indicator is a means to gauge and understand the usage of a transportation facility, or the characteristics of particular travelers and their trips. The performance measure/indicator may refer to a particular location or "link" of the transportation system. It may refer to the experience of a traveler on a trip between a particular origin and a particular destination. It may summarize all trips or trip makers between a particular origin and destination pair. Or it may describe the operation of one mode of transportation versus another.

The federal regulations for the management systems state that

> *"[p]arameters shall be defined that will provide a measure of the extent of congestion and permit the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods."* ("Management and Monitoring Systems; Interim Final Rule", Federal Register, Vol. 58, No. 229, § 500.105(g), Page 63476.)

The fields of transportation planning and engineering traditionally have used mode-specific performance measures/indicators to gauge conditions on the system. These include motor vehicle-specific measures such as traffic volumes, capacities, and traffic level-of-service calculations, as well as transit-specific measures such as peak loading points. The challenge in the context of the CMS is to expand beyond these mode-specific performance measures (though they still do have a role in gauging system performance) and utilize measures/indicators that will have meaning across modes. This is important because of the need to gauge the effectiveness of multi-modal congestion reduction and mobility enhancement strategies.

The Washington region has relied historically on traditional transportation performance measures/indicators, concentrating on measuring, describing, and forecasting motor vehicle movement, with some attempts at reflecting other modes or multi-modal comparisons. The choice of using these traditional indicators had evolved over the years to meet the needs of the time. The *Highway Capacity Manual* and standard traffic engineering practices were followed.

The choice of performance measures/indicators used up to the present has been dictated by two major factors. The first factor is that the types of data that have been collected and are available for analysis have been perpetuated over time, and are oriented to gauging the performance of a particular mode of transportation. Thus the MPO tends to use performance measures/indicators based on traffic volumes and facility capacity. The second factor is that of the computer models available for travel forecasting. These models have concentrated on traditional performance measures/indicators.

Thus, historically, travel monitoring reporting procedures have relied on traffic volumes, vehicle classification, vehicle occupancy, transit ridership reports, and speed.

COG/TPB staff has adopted the practice of using the term "performance measure/indicator" for what federal regulations call a "performance measure". The reason is that the use of the word "measure" led to confusion of whether it signified "measurement" (e.g., hours of delay) or if it meant "an action taken as a means to an end" (as in a "transportation control measure" action to reduce traffic, such as a parking restriction). Thus the word "indicator" has been added in an attempt to clarify that the meaning intended was that of measurement or gauging. "Measure of evaluation" is another alternative term sometimes used.

B. Process Used to Identify Performance Measures/Indicators and Analysis Approach for the Washington Region CMS

1. Identification Process

The CMS Task Force undertook discussion of CMS performance measures/indicators because of the emphasis in federal CMS guidance on measures/indicators. The efforts at the beginning of the process involved a literature search and brainstorming process. Early access to draft materials from an FHWA instructional course on the CMS helped in developing an array of possible performance measures/indicators to consider. The CMS Task Force worked with these draft lists, adding, deleting, and changing to suit the needs of the Washington region. This culminated in a stratified list of CMS performance measures/indicators; however, this process was long, involving a lot of debates and detours along the way.

Early in the process, the CMS Task Force was already aware of the gap between the unimodal, locally focused performance measures/indicators available and the multi-modal, wide-area scope desired for the CMS. There were other dilemmas that also set the tone of the discussion. These were:

-- Can the particular performance measure/indicator (or the data needed to feed it) be forecast by known tools and capabilities?

-- Traditional congestion indicators tended to be precise in scale, addressing a particular link or intersection on the transportation system, yet modeling or forecasting capabilities tended to be rough in scale, forecasting at best at a regional or subregional scale.

-- The choice of certain performance measures/indicators may lead or bias the investigator toward only certain kinds of solutions, and eliminate others that may actually be worthy. This

was a particular concern expressed by elected officials on the Transportation Planning Board.

-- The CMS tries to have a vague layman's term, "congestion", applied to a technical process. Congestion could be characterized by crowdedness, by delay, or by decreases in traffic speeds, but, conversely, crowdedness, delay, and slowing are not necessarily congestion.

Delay sounded the most promising as a congestion measure/indicator, but required designation of an "optimum" travel time or speed (free-flow conditions) to gauge against, this optimum being debatable for numerous reasons. On the positive side, people, vehicles, and goods can all experience free-flow travel. But does free-flow include stopping at traffic signals or not? Does it include the realistic reflection of travel significantly above the speed limit? And one direction's free-flow conditions may create delay in the cross-direction.

Level-of-service was perhaps the most promising alternative to using delay. It has been used frequently in the past, and there is a level of understanding and buy-in from regional decision makers and from the public. Level-of-service, however, has some well-known drawbacks, including not being multi-modal. Level-of-service also has limitations in that so many locations in the Washington region are at level-of-service F, there would have to be a way of distinguishing among varying severities of F.

The solution proposed and adopted instead was to choose a whole list of indicators, and apply them where and when relevant. The drawback of a long list of performance measures/indicators, however, was that it could be unwieldy. This led to a desire to group, stratify, or classify the list to make it more understandable. This was helpful, yet any attempt at stratifying (and its was tried in several different ways) left some dissatisfaction, because any summarization was inevitably a compromise solution with some advantages and some disadvantages. The current thinking classifies the performance measures/indicators into "direct" or raw data, directly measurable from the transportation system; "calculated" data, which can only be determined by some manipulation of the direct data; and performance measures/indicators held from use for further research, but kept on the table.

2. Multi-Tiered Approach to CMS Analysis

As mentioned above, COG/TPB faced the dilemma of trying to address pinpoint congestion problems with regional-scope travel forecasting and analysis tools. Also, there was the concern of pinpointing a congestion problem, and somehow removing the bottleneck without regard that it might just relocate the congestion problem downstream or over to a parallel facility. Thus there was a desire to adopt an analysis method that could account for side effects such as these. The CMS Task Force suggested a multi-tiered approach to analysis. The tiers would be: regionwide, corridors, and activity centers or specific pinpoint locations. Each tier has data and analysis tools relevant to it.

First, COG/TPB will look regionwide for instances of congestion. In fact, the aerial surveys have already completed this for limited access highways. COG/TPB is supplementing this for the time being with output from the regional travel forecasting MINUTP model to address arterial highways.

A second tier was that the CMS Task Force anticipated strategically important or known congested locations and classified them into a series of nineteen (19) corridors. In this instance, the term "corridor" is being loosely applied to some defined subset of the region's facilities, sharing a geographic area (not necessarily linear), the facilities being related to one another in that a situation on one frequently affects the others. The corridor approach is intended to provide scopes of study for analyses of congestion management strategies, with an ability to account for spillover or side effects.

Finally, what are deemed "activity centers" will be treated as special cases in the CMS. These activity centers are generally the nodes of highly urbanized portions of the region, and feature travel and congestion problems that are not necessarily linear or directional in nature. These call for a separate style of analysis. Furthermore, a congested "hot spot", which may or may not be located in an activity center, calls for the same kind of spot analysis.

3. Regional Scan of Congestion

Congestion occurs in two major forms. One is the phenomenon of the bottleneck, which is a point where capacity or throughput on the transportation facility, as approached in the direction of the traveler, significantly decreases, causing some form of queuing. The other form of congestion may be termed "systemic"; that is, not associated with one point on a facility, but rather where demand exceeds supply throughout the length of a transportation facility, causing widespread congestion. It is generally thought that the bottleneck phenomenon is far more common than the systemic phenomenon. However, it is also true that bottlenecks may have underlying systemic causes.

COG/TPB in its CMS is charged with finding where congestion does or will occur on the region's

transportation facilities. This process must understand both the bottlenecks around the region and the systemic causes that may be behind them. COG/TPB has taken a multi-faceted approach to finding the congestion.

First to consider was the professional knowledge and experience of the region's elected officials, transportation professionals, and other public officials. The knowledge of these professionals help established a core of corridors for the CMS. These corridors have as their backbones some of the strategically most important transportation facilities of the region, both highway and transit, as well as associated facilities that have important relationships to these backbones. Managing these important facilities will be key to mitigation congestion in the region. COG/TPB designated a set of nineteen (19) corridors in preparation of the *CMS Work Plan for the Washington Region.*

Second to consider was the body of knowledge from the region's travel monitoring programs. This information includes traffic counts, travel times, vehicle occupancy, vehicle density, volume-to-capacity ratio, and transit ridership. The CMS Task Force has expressed its preference for analyses to be based on actual data to the extent possible, so COG/TPB has worked to improve its compilation, understanding, and dissemination of these data. To date, however, the CMS Task Force has been at the stage of investigating ways of compiling, formatting, and analyzing data, with only limited analysis done based on these data.

A third approach to determining the existence and extent of congestion is to look at the outputs of the regional travel forecasting computer model chain. COG/TPB has put much effort over the years to base its modeling chain on the best available background information on transportation system usage, land use, auto ownership, and other input characteristics. The model chain can give estimates of many of the performance measures/indicators of congestion. The model will be the main source of information about future year or forecast congestion. Currently it also is serving as the source of information on congestion on the region's arterial highways.

COG/TPB is putting together a regional scan of congestion based on the model outputs mentioned above (covering arterial highways), and on results of the aerial survey projects, in combination with other available data, for the region's limited access highways. This regional scan of congestion will highlight locations of suspected congestion problems. This identification process can be double-checked against the corridors identified in the CMS Work Plan, perhaps with some changes to corridor definitions recommended. Then COG/TPB will proceed with the task of analyzing strategies to relieve the identified congestion.

4. Characterization of Performance Measures/Indicators

The following CMS performance measures/indicators were identified in the *CMS Work Plan for the Washington Region*, approved by the National Capital Region Transportation Planning Board on September 21, 1994, or were added subsequently by the CMS Task Force. A more detailed description of these performance measures/indicators appears in Appendix A.

First are what are characterized as "data for direct assessment of current (or future background) conditions. These data are pieces of information that can be directly measured from observation of the transportation system, and are the basis for many of the other performance measures/indicators. In addition, these data may be outputs of an analysis process in some cases, but are distinct from most of the other performance measures/indicators because they are stand-alone, observable from the transportation system. The CMS Task Force has identified the following performance measures/indicators as being the most vital direct indicators:

1. Traffic volumes;
2. Facility capacity;
3. Speed;
4. Vehicle density;
5. Vehicle classification;
6. Vehicle occupancy;
7. Transit ridership.

Other performance measures/indicators are important for gauging existing or projected conditions in comparison to what is feasible, desired, theoretically possible, and the like. These are termed "calculated performance measures/indicators for congestion assessment. They are not necessarily directly measured from observation of the transportation system but rather are the products of manipulations of other data or of computer models. The CMS Task Force has identified the following performance measures/indicators in this category:

8. Volume-to-capacity ratio;
9. Level of service;
10. Person miles of travel/vehicle miles of travel;
11. Travel time by mode;
12. Person hours of travel/vehicle hours of travel;
13. Truck hours of travel;
14. Person hours of delay/vehicle hours of delay;
15. Modal shares;
16. Safety considerations;
17. Vehicle trips;

18. Emissions reduction benefits.

A third set of performance measures/indicators are distinguished by the fact that they require further research before use in the CMS. These are:

19. Bicycle usage and pedestrian counts;
20. Number of congested intersections;
21. Hours per day of congestion;
22. Percent person miles of travel by congestion level;
23. Percent delay;
24. Number and average duration of incidents;
25. Truck and freight movement involvement with congestion;
26. Percent of person miles of travel by transit load factor;
27. Person volume-to-person capacity ratio.

The two main aspects of the research necessary on these performance measures/indicators are first, finding appropriate sources of data to supply these indicators. This is the case for bicycle usage and pedestrian counts, number of congested intersections, number and average duration of incidents, and truck and freight movement involvement with congestion. The second aspect of research necessary is developing methodologies with which to determine, report, or apply these indicators. This is the case for hours per day of congestion, percent person miles of travel by congestion level, percent delay, percent of person miles of travel by transit load factor, person volume-to-person capacity ratio.

5. Initial Experiments with Data Reporting

a. Display of Data

COG/TPB has utilized a number of tools to report transportation system usage and congestion in the region to committees. Most commonly used so far has been arraying information on spreadsheets. This allows the side-by-side comparison of raw data with calculations, and manipulations of the data requested by the committees. Spreadsheets have been used with mixed results; the many factors and variables of interest in the CMS, as well as the many geographic locations of analysis even in one corridor, make for unwieldy matrices.

Thus COG/TPB desires to turn to map-based displays of data. The GIS is a natural home for this, but the agency's GIS was not developed to a point so far where it could be used for this purpose. The GIS will start producing maps later this year, and is expected to become the ultimate display tool of the CMS and the data that support it.

Two alternatives have been explored so far, in the meantime before full implementation of the GIS. First is to hand-draw information on maps, which is limited because it takes so much time. Second, for data that are contained in the MINUTP model chain, COG/TPB has the capability of plotting sketch maps on a pen plotter. Color changes and bandwidth plots can help illustrate the location of congestion problems as well as any patterns that might occur in a series of congestion problems. These plots have shown congestion problems in the region to be widespread and scattered, rather than isolated or concentrated in a certain area. The patterns observed were of a few congested linear corridors and many scattered bottlenecks of congestion. However, MINUTP plots are not as clear, detailed, or user-friendly as GIS maps potentially could be.

b. Performance Measures/Indicators Utilized

COG/TPB is still at the beginning of developing an improved modeling process to meet the needs of the CMS. Thus COG/TPB has relied so far on fairly traditional performance measures/indicators to examine congestion, because those are the ones that our current tools support.

COG/TPB has used its regional travel forecasting model chain to identify links in the transportation system that are anticipated in 1996 (a year for which model output was already available) to exhibit the following characteristics:

- Delay, calculated using the difference between free-flow speed as assumed in the model and estimated congested speed (speeds converted to travel times); the model determine vehicle hours of delay; person hours of delay could be determined where and when vehicle occupancy is known;

- Number of links in the system with volume-to-capacity ratio greater than or equal to 1.6, with a volume-to-capacity ratio of 1.0 set to be level-of-service "C";

- Mileage of the congested links;

- Total miles of congested links for ranges of vehicle hours of delay;

- Vehicle delay per mile of congested link.

The most recent (as of this writing) description of the region scan of congestion has been attached as Appendix B.

Distribution of the initial attempts at a regional scan of congestion fostered lengthy discussion on how best to portray the data, with no conclusion reached as of yet. Some participants want to see delay and other information on a mileage basis, others want it related to person movement. Many display

issues remain to be resolved.

C. This Year's Upcoming Activities Related to Performance Measures/Indicators

1. Continuation of the Regional Scan of Congestion

As described in the previous section, the CMS Task Force will continue working with data available from previous studies and activities to build a picture of congestion in the Washington region. Staff will investigate various display formats as well as determine the efficacy of identified performance measures/indicators in describing congestion and comparing congested locations.

2. Examination of CMS Corridors

COG/TPB will continue putting together analysis structures for the identified CMS corridors. The CMS Task Force and its superior committees have identified some priority corridors that require timely analysis because of impending projects or major, high profile associated issues. The corridors identified so far as priorities are: the Capital Beltway (I-95/I-495), including the Woodrow Wilson Bridge over the Potomac River; US 50 (New York Avenue) in the District of Columbia; and the Maryland 4 corridor from Washington, D.C. to Prince Frederick, Maryland. It is expected that other priority corridors will be identified over the course of the year, eventually growing to cover all 19 identified corridors.

The Capital Beltway is often said to be the single most important highway in the Washington region. It experiences serious congestion on almost a daily basis. The Woodrow Wilson Bridge, which is on (a part of) the Capital Beltway, is a drawbridge that may be the single most problematic link in the region's transportation system regarding congestion. Furthermore, traffic volumes on the Woodrow Wilson bridge far exceed what it was designed to handle, and the bridge may experience structural difficulties in the not-too-distant future. Thus it is a priority for CMS analysis.

US 50/New York Avenue is a congested radially oriented arterial highway in the District of Columbia and Maryland, leading from downtown Washington to Annapolis, Maryland and points east. In addition, the New York Avenue corridor offers opportunities for economic development, so improvements in the corridor are a priority for the District of Columbia.

The Maryland 4/Pennsylvania Avenue corridor from Washington to Prince Frederick offers a suburban or exurban contrast to the other priority corridors. It connects Washington to growing areas of central and southern Maryland. The corridor also offers a variety of facility types from urban arterial to suburban arterial to suburban/rural limited access highway.

3. Examination and Documentation of CMS Analytical Techniques and Their Relationship to Performance Measures/Indicators

One of the activities identified in the CMS Work Plan was to inventory and document the array of analytical techniques available for use in the CMS. Such a study will serve two purposes. First, it will serve as a guidance document of techniques that future analysts might use for CMS studies. Second, it will serve as a critique of current analysis capabilities, perhaps fostering discussion of what improvements could be made.

The analytical techniques available and the performance measures/indicators used are intertwined. In the process, COG/TPB will learn how workable certain performance measures/indicators are, how easily they are understood, and how straightforward they are in portraying results accurately.

4. Production of a CMS Annual Report

The *CMS Work Plan for the Washington Region* states that the results of the year's CMS activities will be compiled into a CMS Annual Report. This report will be distributed in a number of fashions. First, it is envisioned that the report and the results therein will be incorporated into the given year's long range plan and/or Transportation Improvement Program (TIP) revision or update. Second, the CMS Annual Report will be forwarded directly to the District of Columbia and to the States of Maryland and Virginia, for incorporation into those Statewide Congestion Management Systems. These Statewide CMSs are then submitted for review to the U.S. Department of Transportation, as required by Federal regulations. Third, the CMS Annual Report will be available upon request as a reference document. Citizens, regional decision makers, and other interested parties will be able to utilize information in the report in their activities.

Four major components are envisioned for the CMS Annual Report. First is a review and assessment of overall system conditions. This will provide background information and context for the CMS analyses. Second will be the identification of congested locations in the region. Third will be the reporting of the results of the CMS strategies identified and analyzed for subsequent or future implementation, and the recommendations based on those results. A fourth major component that will be included in CMS Annual Reports in future fiscal years will be an assessment of the effectiveness of CMS strategies previously implemented (post-implementation monitoring).

The schedule of production of the CMS Annual Report is to prepare a draft in early summer 1995, with committee review during the summer. The target date of adoption of the CMS Annual Report by the Transportation Planning Board is September 1995.

5. Production of the FHWA CMS Case Study Of the Washington Region Task 2 Report

COG/TPB will continue work on the CMS Case Study for the Federal Highway Administration (FHWA). This will culminate in the production of the "Task 2" report. With respect to the focus areas, the Task 2 report will document changes to plans outlined in the Task 1 report, experiences with CMS implementation and in working to meet the October 1, 1995 deadline, and other pertinent details.

The schedule of production of the Case Study Task 2 Report is to document processes as they occur during spring 1995, prepare a draft in early summer 1995, with committee review during the summer. The target date for completion is late September 1995.

D. Comments to Other Practitioners Based on the Washington Experience to Date

The experience of the Washington region so far is that participants have tended to support a broad-based list of performance measures/indicators for the CMS. They emphasized keeping tried-and-true mode-specific indicators such as volume-to-capacity ratio and transit peak load factors, and added to them indicators that may begin to address intermodalism, such as delay and person hours of travel. Participants stressed the importance of the indicators being useful and understandable. Attempts at complicated indicators were vetoed; simpler ones were favored.

Performance measures/indicators chosen had to relate to those used in other segments of the regional planning process, particularly the travel forecasting modeling and air quality conformity determination processes. Data availability was also a paramount issue. There is little use in stressing the use of performance measures/indicators where there are no data available to the MPO to back them up. This emphasizes the need for the MPO to assess its data availability situation, and to address it in a strategic way. COG/TPB's CMS Task Force did not "define away" issues that could not be immediately resolved. Rather, they took the approach of advancing the CMS design and implementation while simultaneously acknowledging the need for improvements. Therefore, the suggestion here is to keep issues "on the table" (e.g., freight movement, person movement, new data sources, etc.) even if the region knows it has no way to address that issue at this time.

COG/TPB's experience has seemed to affirm the national CMS literature's tendency to recommend travel time-based and delay-based congestion indicators. These are viewed in the context of numerous other performance measures/indicators as mentioned above, but hold the key to assessing congestion in the region. Travel time and delay can be applied multi-modally. They can be interpreted (how much delay can be tolerated) given urban, suburban, or rural surroundings. And they appear to be more straightforward to model and forecast than some other performance measures/indicators considered.

APPENDIX A

SUMMARY LIST OF CMS PERFORMANCE MEASURES/INDICATORS/DATA ITEMS

The following CMS performance measures/indicators were identified in the *CMS Work Plan for the Washington Region*, approved by the National Capital Region Transportation Planning Board on September 21, 1994, except those indicated by an asterisk (*), which are additions subsequently suggested by the CMS Task Force.

A. Data for Direct Assessment of Current (or Future Background) Conditions:

1. Traffic volumes
2. Facility capacity
3. Speed
4. Vehicle density
5. Vehicle classification*
6. Vehicle occupancy
7. Transit ridership

B. Calculated Performance Measures/Indicators for Congestion Assessment

8. Volume-to-capacity ratio
9. Level of service
10. Person miles of travel/vehicle miles of travel
11. Travel time by mode
12. Person hours of travel/vehicle hours of travel
13. Truck hours of travel
14. Person hours of delay/vehicle hours of delay
15. Modal shares
16. Safety considerations
17. Vehicle trips
18. Emissions reduction benefits

C. Performance Measures/Indicators Requiring Further Research Before Use in the CMS

19. Bicycle usage and pedestrian counts*
20. Number of congested intersections
21. Hours per day of congestion

Continued...

22. Percent person miles of travel by congestion level
23. Percent delay
24. Number and average duration of incidents
25. Truck and freight movement involvement with congestion*
26. Percent of person miles of travel by transit load factor
27. Person volume-to-person capacity ratio

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
	DATA FOR DIRECT ASSESSMENT OF CURRENT (OR FUTURE BACKGROUND) CONDITIONS					
	Traffic Volumes	The number of vehicles crossing a certain point, usually expressed for an average weekday.	Applicable in corridors or spot locations. Of interest in the assessment of most CMS strategies. Might be used in the comparison of corridors.	Widely available, but there are issues regarding lack of counts by direction or by time period/peak, adequacy of the number of locations counted, and adjusting for changes in methodology from jurisdiction to jurisdiction. Reliability of reported volumes from factored traffic counts or forecasts using validated models have debatable reliability.	Being compiled in the Data Clearinghouse.	
2.	Facility Capacity	For highways, capacity is expressed in terms of the number of passenger car equivalents that can pass over a certain point in an hour, given the geometric characteristics and environment of the highway. For transit facilities, capacity will be expressed in the number of passengers who can be accommodated in a given period of time.	Applicable in corridors or spot locations. Of interest in the assessment of most CMS strategies.	Available for highways, transit will take some research.	Being compiled in the Data Clearinghouse for highways; transit is still to be addressed.	

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
3.	Speed	Average running speed of motor vehicles traversing a section of roadway.	Applicable in corridors or spot locations. Of interest in the assessment of most CMS strategies.	Some good data in hand, but it may not be enough to provide comprehensive coverage for a regionwide CMS. F.Y. 1995 UPWP consultant effort (BMI model) will develop the relationship between density and speed for freeways, though this effort is behind schedule.	(1) Some information from miscellaneous speed/travel time studies; (2) Some information can be deduced for Aerial Surveys; (3) The BMI model, to the extent it can be used; (4) Can be derived from the MinUTP model, although this is not a favored method. (5) Spot speed studies from ATRs.	The CMS will adopt a technical definition of speed; there may be some confusion to the layman because of layman's definitions of speed.
4.	Vehicle Density	Density is described as passenger-car-equivalents per lane per mile.	Applicable in specific locations for freeways only, not for arterial (non-limited access) roadways. Of interest for the following highway-oriented CMS strategies such as traffic operations and HOV.	We have suitable information for freeways. Density as a measure is not usable for arterial highways, except in the case of multi-lane, divided, high-speed highways with signal spacing greater than two miles.	Aerial Surveys.	Most useful for limited access highways. Density is not a good measure/indicator for arterials because of signals.
5.	Vehicle Classification	The proportion of traffic passing a given point that are passenger cars, truck, buses, or other vehicle types.	Applicable in spot locations. Of interest in the assessment of most CMS strategies. Might be used in the comparison of corridors.	Available for a limited number of locations and facilities.	Cordon counts performed by COG/TPB (Metro core, Beltway, and suburban employment center counts); HOV facility counts in Northern Virginia; miscellaneous locations on an ad hoc basis.	The percentage of trucks in the mix of traffic helps assess freight movement.
6.	Vehicle Occupancy	The average number of persons per motor vehicle for a given location for a given period of time.	Applicable on a regionwide, corridor, or spot location basis. Of interest in the assessment of most CMS strategies. Might be used in the comparison of corridors.	We have this information in a limited number of locations, and from the Census for journey-to-work trips only. Must apply assumptions to facilities or corridors where we have no direct information.	Cordon counts; Census	

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
7.	Transit Ridership	The average daily volumes of passengers on given transit lines or facilities.	Applicable on a corridor basis. Of interest in the assessment of the following CMS strategies: TDM, HOV, Transit, Congestion Pricing, Growth Management, and IVHS/APTS. Might be used in the comparison of corridors.	Widely available from transit agencies, but there are some issues about comparing transit data and highway data.	Intended to be compiled into the Data Clearinghouse from transit agencies.	Staff is behind schedule in exploring or assessing transit data for the CMS.
	CALCULATED PERFORMANCE MEASURES/INDICATORS FOR CONGESTION ASSESSMENT					
8.	Volume-to-Capacity Ratio	The ratio of demand flow rate to a given level of vehicle capacity for a roadway.	Applicable on a corridor or spot location basis. Of interest in the assessment of most CMS strategies. Might be used in the comparison of corridors.	Calculable from available highway data.	Intended to be based on data compiled in the Data Clearinghouse.	A traditional staple measure of transportation analysis. Useful, but comes under some criticism because of being vehicle-oriented.
9.	Level of Service	Level of service is a rating of the quality of service provided by a roadway under a given set of operating conditions. A roadway is classified by a letter grade "A" (meaning least congested) through "F" (meaning most congested). The letter grade is based on a set of volume, capacity, time, and density indicators specified in traffic engineering manuals.	Applicable on a corridor or spot location basis. Of interest in the assessment of most CMS strategies. Might be used in the comparison of corridors.	Calculable from available highway data.	Intended to be based on data compiled in the Data Clearinghouse.	A traditional staple measure of transportation analysis. Useful, but comes under some criticism because: (1) it is vehicle-oriented instead of multi-modal; (2) experience in California of using level of service as the major performance measure of a CMS tended to encourage sprawling land use development at the expense of transit-friendly and pedestrian-friendly land development; and (3) level of service as defined in the *Highway Capacity Manual* is difficult to forecast for arterials.

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
10.	Person Miles of Travel/Vehicle Miles of Travel	The sum of all miles of travel by all vehicles for a given area or facility for a given period of time, factored by the vehicle occupancy to gauge person movement.	Applicable on a regionwide basis and (perhaps) on a corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Calculable based on available sources.	Available from regional model and HPMS.	
11.	Travel Time by Mode	This is the time elapsed for a particular vehicle trip or person trip from origin to destination. This can refer to a trip table or to the beginning and end points of a facility or corridor. It is intended to cover at least auto driver and transit modes, and perhaps other modes if warranted in particular cases.	Applicable on a corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	It is intended to develop a method to display travel time by mode on the GIS, but there have been delays in GIS development. Using reported times from MinUTP is a fallback position.	Travel time studies; transit schedules; MinUTP. Travel time for autos is available for 1988 on arterials, 1993 for some arterials in Montgomery County, and for 1990 on the Capital Beltway.	If speed can be determined from densities, travel time can be obtained for freeway travel.
12.	Person Hours of Travel/Vehicle Hours of Travel	Person Hours of Travel are the cumulative number of vehicle hours of travel in a given location multiplied by the occupancy of those vehicles.	Applicable on a regionwide or corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Based on the extent we have traffic volumes, vehicle occupancies, and vehicle speeds. May have enough information for overall regional assessment, but perhaps not detailed enough for subarea studies.	Noted under listings for traffic volumes, vehicle occupancies, and speeds.	
13.	Truck Hours of Travel	Similar to person hours and vehicle hours, it is the cumulative number of hours of travel by trucks for a given location or corridor.	Applicable on a regionwide or corridor basis. Of interest in the assessment of most CMS strategies. Available data are not detailed enough to compare corridors.	Some data available on vehicle mix; may be lacking in specificity. Again, may have enough information for overall regional assessment, but perhaps not detailed enough for subarea studies.	Cordon counts; vehicle classification counts; COG/TPB truck survey; HPMS.	

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
14.	Person Hours of Delay/Vehicle Hours of Delay	Delay is the increased travel time experienced by a person or vehicle because of circumstances that impede the desirable movement of traffic; difference between travel time under congested conditions and travel time under non-congested conditions.	Applicable on a regionwide, corridor, or spot location basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Dependent upon the availability of all the input parameters.	Must be based on a number of factors and assumptions.	
15.	Modal Shares	Modal shares indicate the apportioning of person trips among possible transportation modes: single-occupant vehicle (SOV), high-occupancy vehicle (HOV), transit, non-motorized, or other modes of transportation.	Applicable on a regionwide and (perhaps) corridor basis. Of interest in the assessment of the following CMS strategies: TDM, Traffic Operations, HOV, Transit, Nontraditional Modes, Congestion Pricing, Growth Management, and IVHS/APTS. Might be used to compare corridors.	Can be produced from regional model or from travel monitoring data, but must be based on numerous assumptions.	Data Clearinghouse; Model.	
16.	Safety Considerations	Empirical or sketch planning evaluation of safety or hazard issues in a given congestion situation or in consideration of potential congestion management strategies.	Applicable on a corridor or spot location basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Professional judgment available to assess current and potential situations.	Members and participants of COG/TPB and its committees.	
17.	Vehicle Trips	The number of motor vehicle trips from a given origin to a given destination, which may be stratified by mode, purpose, time period, vehicle type, or other classifications.	Applicable on a regionwide basis. Of interest in the assessment of most CMS strategies.	Available from models. Factored from survey data.	Factored from household survey, Census, or other data.	Production of origin-destination trip tables is a key step in traditional transportation modeling.

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
18.	Emissions Reductions Benefits	Reductions in pollution emissions based on reductions in vehicle miles of travel or vehicle trips.	Applicable on a regionwide or spot location basis. Of interest in the assessment of most CMS strategies.	Calculable through available models, although some assumptions are subject to debate.	COG/TPB conformity analyses; CMAQ analyses; TCM model.	

PERFORMANCE MEASURES/INDICATORS REQUIRING FURTHER RESEARCH BEFORE USE IN THE CMS

19.	Bicycle Usage and Pedestrian Counts	Could be either the bicycle and pedestrian mix on general facilities, or the usage of exclusive bicycle/pedestrian facilities.	Applicable on a corridor or spot location basis. Of interest in the assessment of the following CMS strategies: TDM, Nontraditional Modes, Growth Management.	A severely limited number of counts are available in various formats.	Counts compiled by the Regional Bicycle Technical Subcommittee.	
20.	Number of Congested Intersections	For a corridor, this will give an indication of the extent and severity of congestion.	Applicable on a corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Uncertain	Traffic volumes/Data Clearinghouse; regional model; traffic operations models (e.g., TRANSYT-7F, NETSIM).	The operational models produce better quality results, but require significantly more person hours and data for analyses.
21.	Hours Per Day of Congestion	This performance measure will directly address the need to gauge the extent of congestion on the transportation system. It is still to be determined what performance measure will constitute congestion or congested conditions.	Applicable on a regionwide, corridor, and spot location basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Uncertain	Uncertain	This indicator is dependent upon having travel volumes by time of day. The Data Clearinghouse research has shown shortcomings in the availability of time-of-day data. COG/TPB peak hour modeling capabilities are still under development.

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
22.	Percent Person Miles of Travel by Congestion Level	This will allow comparison of the extent of congestion among CMS locations. It is still to be determined what performance measure will constitute congestion/congested conditions; e.g., percent delay, level of service, or another factor.	Applicable on a regionwide and (perhaps) corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Uncertain	Uncertain	Staff has not yet addressed this issue.
23.	Percent Delay	Percent delay is the total delay (usually in minutes) divided by a designated threshold (meaning expected, ideal, or free-flow) travel time. For example, a percent delay of 25% would mean that travel time on a certain segment of the transportation system is taking 25% longer than it should or could under non-congested conditions.	Applicable on a corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Same as delay (above).	Must be based on a number of factors and assumptions.	
24.	Number and Average Duration of Incidents	Incidents could be accidents, crashes, special events, infrastructure or equipment failures, or other unusual circumstances that lead to a one-time-only or occasional increase in traveler delay.	Applicable on a regionwide, corridor, or spot location basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors or spot locations.	Under development in the COG/TPB F.Y. 1995 UPWP.	Maryland Accident Reporting System (MARS); George Mason University and Virginia Tech research; other incident databases to be explored.	Data are usually a year old, and include only reported incidents.

	DATA ITEM	DEFINITION	APPLICABILITY	AVAILABILITY STATUS	SOURCES	COMMENTS
25.	Truck and Freight Movement Involvement with Congestion	The impact of truck and freight movement on traffic and congestion, and the impact of congestion on truck and freight movement.	Applicable regionwide, in corridors, or in spot locations. Of interest in the assessment of most CMS strategies.	Uncertain	Little freight movement data are compiled in the region. Freight movers are said to compile such information, but are said to be reluctant to share that data for proprietary and competitive reasons.	
26.	Percent of Person Miles of Travel by Transit Load Factor	This is the transit analog of highway congestion as described by level of service. The load factor indicates the crowdedness of the transit vehicles, thus this measure will give an overall indication of the crowdedness of the portion of the transportation system under consideration.	Applicable on a corridor basis. Of interest in the assessment of the following CMS strategies: TDM, HOV, Transit, Congestion Pricing. Might be used to compare corridors.	Uncertain	Uncertain	Staff has not yet addressed this issue.
27.	Person Volume/Person Capacity Ratio	This ratio is used to develop a level of service for transportation corridors taking the sum of automobile and transit capacities (assuming theoretical occupancy and load factors). Levels of service are then determined with reference to volume-to-capacity standards.	Applicable on a corridor basis. Of interest in the assessment of most CMS strategies. Might be used to compare corridors.	Data are available or calculable, but assumptions on which to base person-capacity are subject to debate.	Data Clearinghouse	See Transit Ridership, Facility Capacities, and Vehicle Occupancy.

APPENDIX B

Metropolitan Washington Council of Governments
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Washington, D.C. 2002-4226
(202) 962-3200

MEMORANDUM

March 13, 1995

TO: Traffic Mitigation Subcommittee/CMS Task Force

FROM: Mark Radovic
Transportation Planner

SUBJECT: Regional Scan of Arterial Congestion

The following attached tables represent 1996 simulated travel on major and principal arterials in the region. The data was derived from COGs modelling process which represents average weekday travel and then factored to represent only P.M. peak period travel (4:00 P.M. to 6:00 P.M.). This work was performed as part of COGs conformity analysis. During the assignment process the V/C ratio was capped at 1.6, this means that the vehicle trips beyond this ratio were shifted to the following hour (*V/C Ratio for Level of Service "C" is approximately 1.0*). The number of congested major and principal arterials with a V/C ratio of 1.6 or greater during the P.M. peak period was 1,060 congested links totalling 457.35 miles. The delay was calculated by the following formula:

$$\text{DELAY} = \frac{\text{DISTANCE}}{\text{CONGESTED SPEED}} - \frac{\text{DISTANCE}}{\text{FREEFLOW SPEED}}$$

The average delay per mile for the region was calculated as 1.49. The vehicle hours of delay (VHD) was calculated by multiplying the delay by the volume, the total vehicle hours of delay for the region was 37,526. This was then calculated on a per mile basis which averaged 82.05 VHD per mile.

1996 HIGHWAY NETWORK - P.M. PEAK PERIOD (4pm - 6pm)
MAJOR AND PRINCIPAL ARTERIALS WITH A V/C RATIO >= 1.6

TABLE 1: TOTAL NUMBER OF CONGESTED LINKS

TABLE OF JUR BY DELAY

JUR(JURISDICTION) DELAY

FREQUENCY	0.0-0.5 MINUTES	0.5-1.0 MINUTES	1.0-1.5 MINUTES	1.5-2.0 MINUTES	2.0-2.5 MINUTES	2.5- + MINUTES	TOTAL
D.C.	74	22	8	3	1	0	108
MONTGOMERY	69	72	36	4	2	1	184
PRINCE GEORGE'S	67	84	39	7	3	1	201
ARLINGTON	13	5	4	0	0	0	22
ALEXANDRIA	33	8	0	0	0	0	41
FAIRFAX	205	152	77	20	2	0	456
LOUDOUN	2	7	2	1	0	1	13
PRINCE WILLIAM	8	15	4	0	0	0	27
FREDERICK	3	0	3	2	0	0	8
TOTAL	474	365	173	37	8	3	1060

REGIONAL SCAN OF ARTERIAL CONGESTION
1996 HIGHWAY NETWORK - P.M. PEAK PERIOD (4pm - 6pm)
MAJOR AND PRINCIPAL ARTERIALS WITH A V/C RATIO >= 1.6

TABLE 2: TOTAL NUMBER OF CONGESTED LINKS
FOR RANGES OF VEHICLE HOURS OF DELAY

TABLE OF JUR BY VHD

JUR(JURISDICTION) VHD

FREQUENCY	0 - 10 hours	10 - 20 hours	20 - 30 hours	30 - 40 hours	40 - 50 hours	50 - 60 hours	60 - 70 hours	70 - 80 hours	80 + hours	TOTAL
D.C.	40	29	9	10	7	3	2	2	6	108
MONTGOMERY	14	35	39	25	27	7	9	12	16	184
PRINCE GEORGE'S	32	26	25	32	29	13	17	6	21	201
ARLINGTON	11	2	3	5	0	0	0	0	1	22
ALEXANDRIA	1	16	3	15	2	0	2	1	1	41
FAIRFAX	53	102	97	71	49	23	14	14	33	456
LOUDOUN	0	1	2	2	2	1	3	1	1	13
PRINCE WILLIAM	2	4	4	3	3	4	6	1	0	27
FREDERICK	3	0	0	1	0	2	0	0	2	8
TOTAL	156	215	182	164	119	53	53	37	81	1060

REGIONAL SCAN OF ARTERIAL CONGESTION
1996 HIGHWAY NETWORK - PEAK PERIOD (4pm - 6pm)
MAJOR AND PRINCIPAL ARTERIALS WITH A V/C RATIO >= 1.6

TABLE 3: TOTAL MILES OF CONGESTED LINKS BY RANGES OF DELAY

	DELAY						
	0.0-0.5 MINUTES	0.5-1.0 MINUTES	1.0-1.5 MINUTES	1.5-2.0 MINUTES	2.0-2.5 MINUTES	2.5- + MINUTES	ALL
	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE
JURISDICTION	SUM	SUM	SUM	SUM	SUM	SUM	SUM
D.C.	5.05	5.64	3.21	1.97	0.80		16.67
MONTGOMERY	14.76	36.12	30.45	4.75	4.15	2.40	92.63
PRINCE GEORGE'S	12.23	36.98	30.96	7.55	4.20	2.10	94.02
ARLINGTON	1.22	1.46	1.60	.	.	.	4.28
ALEXANDRIA	5.08	2.82	.	.	.	.	7.90
FAIRFAX	41.24	72.69	66.06	23.23	3.10	.	206.32
LOUDOUN	0.80	4.70	2.20	1.76	.	2.35	11.81
PRINCE WILLIAM	2.05	9.65	5.06	.	.	.	16.76
FREDERICK	0.40	.	3.56	3.00	.	.	6.96
ALL	82.83	170.06	143.10	42.26	12.25	6.85	457.35

REGIONAL SCAN OF ARTERIAL CONGESTION
1996 P.M. PEAK PERIOD HIGHWAY NETWORK (4pm - 6pm)
MAJOR AND PRINIPAL ARTERIALS WITH A V/C RATIO >= 1.6

TABLE 4: TOTAL MILES OF CONGESTED LINKS
FOR RANGES OF VEHICLE HOURS OF DELAY

	VHD						
	0 - 20 hours	20 - 40 hours	40 - 60 hours	60 - 80 hours	80 - 100 hours	100 + hours	ALL
	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE	LINK DISTANCE
	SUM	SUM	SUM	SUM	SUM	SUM	SUM
JURISDICTION							
D.C.	4.66	4.44	3.00	2.04	0.91	1.62	16.67
MONTGOMERY	10.82	31.50	25.11	11.73	6.39	7.08	92.63
PRINCE GEORGE'S	11.83	24.27	24.05	16.93	6.98	9.96	94.02
ARLINGTON	1.22	2.66	.	.	.	0.40	4.28
ALEXANDRIA	2.03	3.69	0.54	1.28	.	0.36	7.90
FAIRFAX	31.74	77.29	49.86	18.49	12.44	16.50	206.32
LOUDOUN	0.49	2.16	2.85	3.96	2.35	.	11.81
PRINCE WILLIAM	1.75	3.35	6.76	4.90	.	.	16.76
FREDERICK	0.40	1.00	2.56	.	.	3.00	6.96
ALL	64.94	150.36	114.73	59.33	29.07	38.92	457.35

TABLE 5: TOTAL VEHICLE HOURS OF DELAY

Jurisdiction	Vehicle Hours of Delay
D.C.	2734.2
MONTGOMERY	7314.3
PRINCE GEORGE'S	8141.2
ARLINGTON	497.1
ALEXANDRIA	1194.1
FAIRFAX	15509.0
LOUDOUN	631.3
PRINCE WILLIAM	1066.9
FREDERICK	437.7
	37525.8

TABLE 6: DELAY PER MILE AND VEHICLE HOURS OF DELAY PER MILE

Jurisdiction	Delay Per Mile (minutes)	Vehicle Hours of Delay Per Mile
D.C.	2.80735	164.020
MONTGOMERY	1.37361	78.963
PRINCE GEORGE'S	1.55162	86.590
ARLINGTON	2.70738	116.137
ALEXANDRIA	1.92956	151.157
FAIRFAX	1.41953	75.170
LOUDOUN	1.13826	53.459
PRINCE WILLIAM	1.15204	63.655
FREDERICK	1.09056	62.886

REGIONAL AVERAGE: DELAY PER MILE = 1.49 & VHD PER MILE = 82.05

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility		Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
VA	A	I-495	1	only	IL	5	Braddock Rd	6	Little River Tpk	1.63	4.0	a.m.	1.28	5.07%	70	25	1,773	2.3	261	329
VA	A	I-495	1	only	IL	5	Braddock Rd	6	Little River Tpk	1.63	4.0	a.m.	1.28	5.07%	65	25	1,618	1.9	225	276
VA	A	I-495	1	only	IL	6	Little River Tpk	7	Gallows Rd	1.29	4.0	a.m.	1.28	5.07%	80	21	1,691	2.4	264	323
VA	A	I-495	1	only	IL	6	Little River Tpk	7	Gallows Rd	1.29	4.0	a.m.	1.28	5.07%	75	23	1,731	2.1	236	289
VA	A	I-495	1	only	IL	7	Gallows Rd	8	Arlington Blvd	0.80	4.0	a.m.	1.28	5.07%	65	28	1,818	0.9	110	134
VA	A	I-495	1	only	IL	7	Gallows Rd	8	Arlington Blvd	0.80	4.0	a.m.	1.28	5.07%	60	31	1,861	0.8	92	112
VA	A	I-495	1	only	IL	8	Arlington Blvd	9	I-66	1.36	4.2	a.m.	1.28	5.07%	70	25	1,773	1.9	230	281
VA	A	I-495	1	only	IL	8	Arlington Blvd	9	I-66	1.36	4.2	a.m.	1.28	5.07%	60	29	1,931	0.8	103	126
VA	A	I-495	1	only	IL	9	I-66	10	Leesburg Pike	1.59	4.0	a.m.	1.28	3.32%	50	39	1,931	0.9	115	143
VA	A	I-495	1	only	IL	9	I-66	10	Leesburg Pike	1.59	4.0	a.m.	1.28	3.32%	40	49	1,944	0.4	51	63
VA	A	I-495	1	only	IL	13	Georgetown Pike	14	GWMP	0.87	4.0	a.m.	1.28	3.32%	45	43	1,948	0.3	45	56
MD	A	I-495	1	only	IL	14	GWMP	41	Clara Barton Pkwy	0.66	4.0	p.m.	1.28	2.39%	55	35	1,909	0.5	63	79
MD	A	I-495	1	only	IL	14	GWMP	41	Clara Barton Pkwy	0.66	4.0	p.m.	1.28	2.39%	40	49	1,944	0.2	21	27
MD	A	I-495	1	only	IL	41	Clara Barton Pkwy	39	River Rd	1.91	4.0	p.m.	1.28	2.39%	90	18	1,629	4.6	481	604
MD	A	I-495	1	only	IL	41	Clara Barton Pkwy	39	River Rd	1.91	4.0	p.m.	1.28	2.39%	60	31	1,861	1.8	223	280
MD	A	I-495	1	only	IL	39	River Rd	36	I-270 Western Spur	1.46	4.0	p.m.	1.28	2.39%	85	17	1,585	3.0	299	601
MD	A	I-495	1	only	IL	39	River Rd	36	I-270 Western Spur	1.46	4.0	p.m.	1.28	2.39%	85	17	1,585	3.0	300	601
MD	A	I-495	1	only	IL	39	River Rd	36	I-270 Western Spur	1.46	4.0	p.m.	1.28	2.39%	55	35	1,909	1.1	138	173
MD	A	I-495	1	only	IL	36	Old Georgetown Rd	34	I-270 Eastern Spur	0.98	2.4	p.m.	1.28	2.93%	45	43	1,948	0.4	30	38
MD	A	I-495	1	only	IL	34	I-270 Eastern Spur	33	Connecticut Ave	1.52	4.0	p.m.	1.28	2.93%	85	19	1,655	3.2	347	434
MD	A	I-495	1	only	IL	34	I-270 Eastern Spur	33	Connecticut Ave	1.52	4.0	a.m.	1.28	5.00%	45	43	1,948	0.6	77	96
MD	A	I-495	1	only	IL	34	I-270 Eastern Spur	33	Connecticut Ave	1.52	4.0	p.m.	1.28	2.93%	50	39	1,931	0.9	110	137
MD	A	I-495	1	only	IL	34	I-270 Eastern Spur	33	Connecticut Ave	1.52	4.0	a.m.	1.28	5.00%	40	49	1,944	0.4	48	59
MD	A	I-495	1	only	IL	33	Connecticut Ave	31	Georgia Ave	2.14	4.0	p.m.	1.28	2.93%	60	39	1,931	1.2	155	194
MD	A	I-495	1	only	IL	33	Connecticut Ave	31	Georgia Ave	2.14	4.0	p.m.	1.28	2.93%	60	31	1,861	2.0	250	312
MD	A	I-495	1	only	IL	31	Georgia Ave	30	Colesville Rd	1.40	4.0	p.m.	1.28	2.93%	45	43	1,948	0.6	72	90
MD	A	I-495	1	only	IL	31	Georgia Ave	30	Colesville Rd	1.40	4.0	p.m.	1.28	2.93%	40	49	1,944	0.3	45	56
MD	A	I-495	1	only	IL	30	Colesville Rd	29	University Blvd	0.61	4.0	p.m.	1.28	2.93%	65	28	1,810	0.7	84	105
MD	A	I-495	1	only	IL	30	Colesville Rd	29	University Blvd	0.61	4.0	p.m.	1.28	2.93%	60	31	1,861	0.6	71	88
MD	A	I-495	1	only	IL	29	University Blvd	28	New Hampshire Ave	1.67	4.0	p.m.	1.28	2.93%	60	31	1,861	1.5	183	229
MD	A	I-495	1	only	IL	29	University Blvd	28	New Hampshire Ave	1.67	4.0	p.m.	1.28	2.93%	50	39	1,931	0.9	114	142
MD	A	I-495	1	only	IL	28	New Hampshire Ave	27	I-95	1.27	4.0	p.m.	1.28	2.93%	40	49	1,944	0.3	41	51
MD	A	I-495	1	only	IL	25	US 1	23	Kenilworth Ave	2.14	4.1	a.m.	1.28	7.10%	40	49	1,944	0.5	69	84
MD	A	I-495	1	only	IL	4	St Barnabas Rd	3	Indian Head Hwy	1.52	4.0	a.m.	1.28	7.10%	40	49	1,944	0.4	48	58

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
MD	A	I-495	1	only	IL	3	Indian Head Hwy	2	I-295	1.09	3.4	a.m.	1.29	7.10%	66	29	1,818	1.3	126	163
MD	A	I-495	1	only	IL	3	Indian Head Hwy	2	I-295	1.09	3.4	a.m.	1.29	7.10%	45	43	1,946	0.4	47	67
MD	A	I-495	1	only	IL	3	Indian Head Hwy	2	I-295	1.09	3.4	a.m.	1.29	7.10%	100	15	1,648	3.1	267	324
MD	A	I-495	1	only	IL	2	I-295	1	US 1	2.01	3.0	a.m.	1.29	6.19%	50	39	1,931	1.1	109	132
MD	A	I-495	1	only	IL	2	I-295	1	US 1	2.01	3.0	a.m.	1.29	6.19%	40	49	1,944	0.5	49	59
MD	A	I-495	1	only	IL	2	I-295	1	US 1	2.01	3.0	a.m.	1.29	6.19%	70	26	1,773	2.8	241	294
VA	A	I-495	1	only	OL	2	Telegraph Rd	1	US 1	1.33	3.0	p.m.	1.29	4.95%	76	23	1,731	2.1	231	284
VA	A	I-495	1	only	OL	5	Braddock Rd	4	Shirley Hwy	2.77	4.0	p.m.	1.29	2.66%	40	49	1,944	0.7	89	111
VA	A	I-495	1	only	OL	8	Arlington Blvd	7	Gallows Rd	0.99	4.0	p.m.	1.29	2.66%	40	49	1,944	0.2	25	32
VA	A	I-495	1	only	OL	8	Arlington Blvd	7	Gallows Rd	0.99	4.0	p.m.	1.29	2.66%	40	49	1,944	0.2	25	32
VA	A	I-495	1	only	OL	9	I-66	8	Arlington Blvd	1.31	4.4	p.m.	1.29	2.66%	45	43	1,948	0.6	74	93
VA	A	I-495	1	only	OL	10	Leesburg Pike	9	I-66	1.74	4.0	p.m.	1.29	2.39%	45	43	1,948	0.7	90	113
VA	A	I-495	1	only	OL	13	Georgetown Pike	12	VA 267	1.82	4.0	p.m.	1.29	2.39%	45	43	1,948	0.7	94	118
VA	A	I-495	1	only	OL	13	Georgetown Pike	12	VA 267	1.82	4.0	p.m.	1.29	2.39%	45	43	1,948	0.7	94	118
VA	A	I-495	1	only	OL	14	GWMP	13	Georgetown Pike	0.87	4.0	p.m.	1.29	2.39%	45	43	1,948	0.3	45	56
MD	A	I-495	1	only	OL	33	Connecticut Ave	34	I-270 Eastern Spur	1.62	4.0	a.m.	1.29	6.60%	40	49	1,944	0.4	49	59
MD	A	I-495	1	only	OL	33	Connecticut Ave	34	I-270 Eastern Spur	1.62	4.0	p.m.	1.29	2.93%	70	26	1,773	2.1	246	307
MD	A	I-495	1	only	OL	33	Connecticut Ave	34	I-270 Eastern Spur	1.62	4.0	p.m.	1.29	2.93%	70	26	1,773	2.1	246	307
MD	A	I-495	1	only	OL	31	Georgia Ave	33	Connecticut Ave	2.14	4.0	a.m.	1.29	6.60%	45	43	1,948	0.9	109	134
MD	A	I-495	1	only	OL	31	Georgia Ave	33	Connecticut Ave	2.14	4.0	p.m.	1.29	2.93%	45	43	1,948	0.9	110	136
MD	A	I-495	1	only	OL	31	Georgia Ave	33	Connecticut Ave	2.14	4.0	p.m.	1.29	2.93%	55	35	1,900	1.6	202	252
MD	A	I-495	1	only	OL	30	Colesville Rd	31	Georgia Ave	1.40	4.0	p.m.	1.29	2.93%	40	49	1,944	0.3	46	56
MD	A	I-495	1	only	OL	30	Colesville Rd	31	Georgia Ave	1.40	4.0	a.m.	1.29	6.60%	45	43	1,948	0.6	72	88
MD	A	I-495	1	only	OL	30	Colesville Rd	31	Georgia Ave	1.40	4.0	p.m.	1.29	2.93%	40	49	1,944	0.3	46	56
MD	A	I-495	1	only	OL	30	Colesville Rd	31	Georgia Ave	1.40	4.0	a.m.	1.29	6.60%	70	26	1,773	1.9	225	276
MD	A	I-495	1	only	OL	30	Colesville Rd	31	Georgia Ave	1.40	4.0	a.m.	1.29	6.60%	70	26	1,773	1.9	225	276
MD	A	I-495	1	only	OL	29	University Blvd	30	Colesville Rd	0.61	4.0	a.m.	1.29	6.60%	65	28	1,818	0.7	84	103
MD	A	I-495	1	only	OL	29	University Blvd	30	Colesville Rd	0.61	4.0	a.m.	1.29	6.60%	40	49	1,944	0.2	19	24
MD	A	I-495	1	only	OL	29	University Blvd	30	Colesville Rd	0.61	4.0	a.m.	1.29	6.60%	70	26	1,773	0.8	97	119
MD	A	I-495	1	only	OL	28	New Hampshire Ave	29	University Blvd	1.67	4.0	a.m.	1.29	6.60%	70	26	1,773	2.2	282	346
MD	A	I-495	1	only	OL	28	New Hampshire Ave	29	University Blvd	1.67	4.0	a.m.	1.29	6.60%	40	49	1,944	0.4	50	61
MD	A	I-495	1	only	OL	28	New Hampshire Ave	29	University Blvd	1.67	4.0	a.m.	1.29	6.60%	75	23	1,731	2.5	288	353

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
MD	A	I-495	1 only	OL	27	I-95	28	New Hampshire Ave	1.27	4.0	a.m.	1.28	6.60%	65	28	1,618	1.5	175	216
MD	A	I-495	1 only	OL	27	I-95	28	New Hampshire Ave	1.27	4.0	a.m.	1.28	6.60%	90	19	1,620	3.0	316	388
MD	A	I-495	1 only	OL	27	I-95	28	New Hampshire Ave	1.27	4.0	a.m.	1.28	6.60%	90	18	1,620	3.0	316	388
MD	A	I-495	1 only	OL	25	US 1	27	I-95	1.31	4.0	a.m.	1.28	7.10%	40	49	1,944	0.3	41	50
MD	A	I-495	1 only	OL	25	US 1	27	I-95	1.31	4.0	a.m.	1.28	7.10%	75	23	1,731	2.1	238	289
MD	A	I-495	1 only	OL	25	US 1	27	I-95	1.31	4.0	a.m.	1.28	7.10%	80	31	1,861	1.2	160	182
MD	A	I-495	1 only	OL	1	US 1	2	I-295	2.01	3.0	p.m.	1.28	4.95%	55	35	1,900	1.5	141	174
MD	A	I-495	1 only	OL	1	US 1	2	I-295	2.01	3.0	p.m.	1.28	4.95%	40	49	1,944	0.5	48	59
VA	B	I-95	1 only	NB	156	Dale Blvd	158	Horner Road	1.99	3.0	a.m.	1.49	2.50%	60	29	1,931	1.1	106	158
VA	B	I-95	1 only	NB	156	Dale Blvd	158	Horner Road	1.99	3.0	a.m.	1.49	2.50%	60	29	1,931	1.1	106	158
VA	B	I-95	1 only	NB	158	Horner Road	160	Gordon Blvd	1.99	3.0	a.m.	1.49	2.50%	80	31	1,861	1.9	174	255
VA	B	I-95	1 only	NB	158	Horner Road	160	Gordon Blvd	1.99	3.0	a.m.	1.49	2.50%	85	19	1,655	4.2	342	501
VA	B	I-95	1 only	NB	160	Gordon Blvd	161	Furnace Rd	0.91	3.0	a.m.	1.49	2.50%	45	43	1,948	0.4	35	52
VA	B	I-95	1 only	NB	160	Gordon Blvd	161	Furnace Rd	0.91	3.0	a.m.	1.49	2.50%	55	35	1,900	0.7	64	94
VA	B	I-95	1 only	NB	163	Lorton Rd	166	Backlick Rd	2.96	4.0	a.m.	1.49	2.50%	40	49	1,944	0.7	92	134
VA	B	I-95	1 only	NB	163	Lorton Rd	166	Backlick Rd	2.96	4.0	a.m.	1.49	2.50%	40	49	1,944	0.7	92	134
VA	B	I-95	1 conv	NB	169	Franconia Rd	170	Capital Beltway	0.81	4.0	a.m.	1.22	3.40%	60	30	1,931	0.5	71	84
VA	B	I-95	1 conv	NB	169	Franconia Rd	170	Capital Beltway	0.81	4.0	a.m.	1.22	3.40%	60	31	1,861	0.8	114	136
VA	B	I-395	1 conv	NB	1	Capital Beltway	2	Edsall Rd	0.91	3.7	a.m.	1.22	3.40%	80	21	1,691	1.7	174	207
VA	B	I-395	1 conv	NB	1	Capital Beltway	2	Edsall Rd	0.91	3.7	a.m.	1.22	3.40%	95	19	1,655	1.9	192	229
VA	B	I-395	1 conv	NB	2	Edsall Rd	3	Little River Tpk	1.67	3.1	a.m.	1.09	3.40%	86	28	1,818	1.9	168	191
VA	B	I-395	1 conv	NB	2	Edsall Rd	3	Little River Tpk	1.67	3.1	a.m.	1.09	3.40%	85	19	1,655	3.5	295	316
VA	B	I-395	1 conv	NB	3	Little River Tpk	4	Seminary Rd	1.65	3.0	a.m.	1.09	3.40%	45	43	1,948	0.7	64	68
VA	B	I-395	1 conv	NB	3	Little River Tpk	4	Seminary Rd	1.65	3.0	a.m.	1.09	3.40%	85	19	1,655	3.5	283	301
VA	B	I-395	1 conv	NB	3	Little River Tpk	4	Seminary Rd	1.65	3.0	a.m.	1.09	3.40%	80	21	1,691	3.1	255	272
VA	B	I-395	1 conv	NB	4	Seminary Rd	5	King St	0.89	3.0	a.m.	1.09	3.40%	65	28	1,818	1.0	93	99
VA	B	I-395	1 conv	NB	4	Seminary Rd	5	King St	0.89	3.0	a.m.	1.09	3.40%	90	18	1,620	2.1	167	178
VA	B	I-395	1 conv	NB	4	Seminary Rd	5	King St	0.89	3.0	a.m.	1.09	3.40%	45	43	1,948	0.4	34	37
VA	B	I-395	1 conv	NB	5	King St	7	Glebe Rd	1.31	3.7	a.m.	1.12	3.40%	45	43	1,948	0.6	62	66
VA	B	I-395	1 conv	NB	5	King St	7	Glebe Rd	1.31	3.7	a.m.	1.12	3.40%	65	28	1,818	1.5	169	184
VA	B	I-395	1 conv	NB	7	Glebe Rd	8	Washington Blvd	1.38	3.0	a.m.	1.12	3.40%	55	35	1,900	1.0	127	139

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
VA	B	I-395	1 conv	NB	7	Glebe Rd	8	Washington Blvd	1.38	3.0	a.m.	1.12	3.40%	40	49	1,944	0.3	43	47
VA	B	I-395	1 conv	NB	7	Glebe Rd	8	Washington Blvd	1.38	3.0	a.m.	1.12	3.40%	40	49	1,944	0.3	43	47
VA	B	I-395	1 conv	NB	8	Washington Blvd	9	Jefferson Davis Hwy	0.97	3.0	a.m.	1.12	3.40%	56	35	1,900	0.7	68	75
VA	B	I-395	1 conv	NB	8	Washington Blvd	9	Jefferson Davis Hwy	0.97	3.0	a.m.	1.12	3.40%	50	39	1,931	0.6	52	57
VA	B	I-395	1 conv	NB	9	Jefferson Davis Hwy	11	GWMP	0.59	3.0	a.m.	1.12	3.40%	100	16	1,548	1.7	130	142
VA	B	I-395	1 conv	NB	9	Jefferson Davis Hwy	11	GWMP	0.59	3.0	a.m.	1.12	3.40%	95	17	1,606	1.5	120	131
DC	B	I-395	1 conv	NB	11	GWMP	12	14th St	0.59	3.0	a.m.	1.12	3.40%	60	31	1,861	0.6	67	73
DC	B	I-395	1 conv	NB	11	GWMP	12	14th St	0.59	3.0	a.m.	1.12	3.40%	65	28	1,818	0.7	80	87
DC	B	I-395	1 conv	NB	11	GWMP	12	14th St	0.59	3.0	a.m.	1.12	3.40%	50	39	1,931	0.3	41	45
DC	B	I-395	1 only	NB	12	14th St, SW	13	12th St, SW	0.59	3.2	a.m.	1.67	1.03%	60	31	1,861	0.6	65	86
DC	B	I-395	1 only	NB	12	14th St, SW	13	12th St, SW	0.59	3.2	p.m.	1.67	1.03%	45	43	1,948	0.2	24	39
DC	B	I-395	1 only	NB	12	14th St, SW	13	12th St, SW	0.59	3.2	a.m.	1.67	1.03%	65	28	1,818	0.7	86	103
DC	B	I-395	1 only	NB	12	14th St, SW	13	12th St, SW	0.59	3.2	p.m.	1.67	1.03%	75	23	1,731	0.9	97	136
DC	B	I-395	1 only	NB	12	14th St, SW	13	12th St, SW	0.59	3.2	a.m.	1.67	1.03%	80	21	1,691	1.1	90	162
DC	B	I-395	1 only	NB	13	12th St, SW	14	4th St, SW	0.49	3.0	p.m.	1.67	1.03%	45	43	1,948	0.2	19	30
DC	B	I-395	1 only	NB	13	12th St, SW	14	4th St, SW	0.49	3.0	p.m.	1.67	1.03%	40	49	1,944	0.1	12	19
DC	B	I-395	1 only	NB	13	12th St, SW	14	4th St, SW	0.49	3.0	a.m.	1.67	1.03%	80	21	1,691	0.9	77	120
DC	B	I-395	1 only	NB	13	12th St, SW	14	4th St, SW	0.49	3.0	a.m.	1.67	1.03%	40	49	1,944	0.1	12	19
DC	B	I-395	1 only	NB	14	4th St, SW	16	11th St, SE	1.38	3.0	p.m.	1.67	1.03%	50	39	1,931	0.6	91	141
DC	B	I-395	1 only	NB	14	4th St, SW	16	11th St, SE	1.38	3.0	p.m.	1.67	1.03%	50	39	1,931	0.6	91	141
DC	B	I-295	1 only	NB	16	11th St, SE	17	Barney Cir	0.66	2.1	p.m.	1.67	1.03%	105	14	1,502	2.1	111	174
DC	B	I-295	1 only	NB	16	11th St, SE	17	Barney Cir	0.66	2.1	p.m.	1.67	1.03%	40	49	1,944	0.2	11	17
DC	B	I-295	1 only	NB	16	11th St, SE	17	Barney Cir	0.66	2.1	p.m.	1.67	1.03%	110	13	1,444	2.4	120	187
VA	B	I-395	2 hov	NB	9	Jefferson Davis Hwy	11	GWMP	0.59	2.0	a.m.	3.13	0.33%	80	18	1,620	1.4	74	232
VA	B	I-395	2 hov	NB	9	Jefferson Davis Hwy	11	GWMP	0.59	2.0	a.m.	3.13	0.33%	80	21	1,691	1.1	61	191
DC	B	I-395	2 hov	NB	11	GWMP	12	14th St	0.53	2.0	a.m.	3.13	0.33%	75	23	1,731	0.9	49	154
DC	B	I-395	2 hov	NB	11	GWMP	12	14th St	0.53	2.0	a.m.	3.13	0.33%	85	19	1,665	1.1	61	191
DC	B	I-395	2 hov	NB	11	GWMP	12	14th St	0.53	2.0	a.m.	3.13	0.33%	40	49	1,944	0.1	9	27
VA	B	I-95	1 only	SB	161	Furnace Rd	160	Gordon Blvd	0.87	3.0	p.m.	1.73	1.49%	45	43	1,948	0.3	34	59
VA	B	I-95	1 only	SB	161	Furnace Rd	160	Gordon Blvd	0.87	3.0	p.m.	1.73	1.49%	60	29	1,931	0.5	48	81
VA	B	I-95	1 only	SB	160	Lorton Rd	161	Furnace Rd	2.25	3.0	p.m.	1.73	1.49%	55	36	1,900	1.7	200	346

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility		Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
VA	B	I-95	1	only	SB	163	Lorton Rd	161	Furnace Rd	2.25	3.0	p.m.	1.73	1.49%	70	25	1,773	3.1	368	612
VA	B	I-95	1	only	SB	163	Lorton Rd	161	Furnace Rd	2.25	3.0	p.m.	1.73	1.49%	60	31	1,861	2.1	267	441
VA	B	I-95	1	only	SB	166	Backlick Rd	163	Lorton Rd	2.66	4.0	p.m.	1.73	1.49%	45	43	1,948	1.1	148	264
VA	B	I-95	1	only	SB	166	Backlick Rd	163	Lorton Rd	2.66	4.0	p.m.	1.73	1.49%	75	23	1,731	4.6	530	908
VA	B	I-95	1	only	SB	166	Backlick Rd	163	Lorton Rd	2.66	4.0	p.m.	1.73	1.49%	55	35	1,900	2.1	271	464
VA	B	I-95	1	only	SB	169	Franconia Rd	166	Backlick Rd	2.67	3.5	p.m.	1.73	1.49%	70	25	1,773	3.7	290	661
VA	B	I-95	1	only	SB	169	Franconia Rd	166	Backlick Rd	2.67	3.5	p.m.	1.73	1.49%	55	35	1,900	2.0	221	379
VA	B	I-95	1	conv	SB	170	Capital Beltway	169	Franconia Rd	0.91	3.5	p.m.	1.28	2.07%	75	23	1,731	1.3	136	171
VA	B	I-95	1	conv	SB	170	Capital Beltway	169	Franconia Rd	0.91	3.5	p.m.	1.28	2.07%	40	40	1,944	0.2	24	30
VA	B	I-95	1	conv	SB	170	Capital Beltway	169	Franconia Rd	0.91	3.5	p.m.	1.28	2.07%	60	31	1,861	0.8	96	108
VA	B	I-395	1	conv	SB	2	Edsall Rd	1	Capital Beltway	0.91	3.7	p.m.	1.28	2.07%	55	35	1,900	0.7	79	100
VA	B	I-395	1	conv	SB	2	Edsall Rd	1	Capital Beltway	0.91	3.7	p.m.	1.28	2.07%	55	35	1,900	0.7	79	100
VA	B	I-395	1	conv	SB	3	Little River Tpk	2	Edsall Rd	1.67	3.1	p.m.	1.24	2.07%	50	30	1,931	0.9	94	116
VA	B	I-395	1	conv	SB	4	Seminary Rd	3	Little River Tpk	1.65	2.9	p.m.	1.24	2.07%	80	21	1,691	3.1	333	499
VA	B	I-395	1	conv	SB	4	Seminary Rd	3	Little River Tpk	1.65	2.9	p.m.	1.24	2.07%	80	21	1,691	3.1	333	499
VA	B	I-395	1	conv	SB	5	King St	4	Seminary Rd	0.89	4.0	p.m.	1.24	2.07%	45	43	1,948	0.4	48	56
VA	B	I-395	1	conv	SB	5	King St	4	Seminary Rd	0.89	4.0	p.m.	1.24	2.07%	45	43	1,948	0.4	48	56
VA	B	I-395	1	conv	SB	7	Glebe Rd	5	King St	1.31	3.6	p.m.	1.18	2.07%	45	43	1,948	0.6	61	71
VA	B	I-395	1	conv	SB	7	Glebe Rd	5	King St	1.31	3.6	p.m.	1.18	2.07%	45	43	1,948	0.6	61	71
VA	B	I-395	1	conv	SB	8	Washington Blvd	7	Glebe Rd	1.38	3.6	p.m.	1.18	2.07%	75	23	1,731	2.2	230	268
VA	B	I-395	1	conv	SB	8	Washington Blvd	7	Glebe Rd	1.38	3.6	p.m.	1.18	2.07%	40	40	1,944	0.3	40	46
VA	B	I-395	1	conv	SB	8	Washington Blvd	7	Glebe Rd	1.38	3.6	p.m.	1.18	2.07%	55	35	1,900	1.0	118	137
DC	B	I-395	1	conv	SB	12	14th St	11	GWMP	0.60	4.0	p.m.	1.18	2.07%	40	40	1,944	0.1	19	22
DC	B	I-395	1	conv	SB	12	14th St	11	GWMP	0.60	4.0	p.m.	1.18	2.07%	65	28	1,818	0.7	82	95
DC	B	I-395	1	conv	SB	12	14th St	11	GWMP	0.60	4.0	p.m.	1.18	2.07%	55	35	1,900	0.4	56	65
DC	B	I-395	1	only	SB	13	12th St, SW	12	14th St, SW	0.59	2.0	a.m.	1.48	0.94%	55	35	1,900	0.4	39	53
DC	B	I-395	1	only	SB	13	12th St, SW	12	14th St, SW	0.59	2.0	p.m.	1.48	0.94%	65	28	1,818	0.7	53	79
DC	B	I-395	1	only	SB	13	12th St, SW	12	14th St, SW	0.59	2.0	a.m.	1.48	0.94%	75	23	1,731	0.9	71	104
DC	B	I-395	1	only	SB	13	12th St, SW	12	14th St, SW	0.59	2.0	p.m.	1.48	0.94%	95	17	1,586	1.5	105	154
DC	B	I-395	1	only	SB	13	12th St, SW	12	14th St, SW	0.59	2.0	p.m.	1.48	0.94%	95	17	1,586	1.5	105	154
DC	B	I-395	1	only	SB	14	4th St, SW	13	12th St, SW	0.49	3.0	p.m.	1.48	0.94%	70	25	1,773	0.7	60	89
DC	B	I-395	1	only	SB	14	4th St, SW	13	12th St, SW	0.49	3.0	a.m.	1.48	0.94%	45	43	1,948	0.2	19	28
DC	B	I-395	1	only	SB	14	4th St, SW	13	12th St, SW	0.49	3.0	p.m.	1.48	0.94%	40	40	1,944	0.1	12	17
DC	B	I-395	1	only	SB	14	4th St, SW	13	12th St, SW	0.49	3.0	p.m.	1.48	0.94%	70	25	1,773	0.7	60	89

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility		Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
DC	B	I-395	1	only	SB	14	4th St, SW	13	12th St, SW	0.49	3.0	a.m.	1.48	0.94%	40	49	1,944	0.1	12	17
VA	B	I-395	2	hov	SB	2	Edsall Rd	1	Capital Beltway	0.91	2.0	p.m.	2.66	0.34%	65	36	1,900	0.7	43	123
VA	B	I-395	2	hov	SB	5	King St	4	Seminary Rd	0.89	2.0	p.m.	3.00	0.34%	40	49	1,944	0.3	14	53
VA	B	I-395	2	hov	SB	8	Washington Blvd	7	Glebe Rd	1.30	2.0	p.m.	3.37	0.34%	40	49	1,944	0.3	22	76
DC	B	I-395	2	hov	SB	12	14th St	11	GWMP	0.63	2.0	p.m.	3.37	0.34%	40	49	1,944	0.1	9	29
VA	C	I-66	1	only	EB	47	VA 234	52	Lee Hwy	4.64	2.0	a.m.	1.26	4.90%	45	43	1,948	1.9	119	143
VA	C	I-66	1	only	EB	52	Lee Hwy	53	VA 29	1.04	2.0	a.m.	1.26	4.90%	85	19	1,666	2.2	118	143
VA	C	I-66	1	only	EB	53	VA 29	55	Fairfax County Pkwy	2.41	2.0	a.m.	1.26	4.90%	70	25	1,773	3.3	193	234
VA	C	I-66	1	only	EB	53	VA 29	56	Fairfax County Pkwy	2.41	2.0	a.m.	1.26	4.90%	45	43	1,948	1.0	62	74
VA	C	I-66	1	only	EB	56	Fairfax County Pkwy	57	US 50	2.23	2.0	a.m.	1.26	4.90%	40	49	1,944	0.6	36	43
VA	C	I-66	1	hov	EB	57	US 50	60	VA 123	2.66	1.0	a.m.	1.90	1.70%	40	49	1,944	0.5	17	31
VA	C	I-66	1	hov	EB	62	Nutley St	64	Capital Beltway	2.39	1.0	a.m.	1.96	0.54%	70	25	1,773	3.3	97	199
VA	C	I-66	1	hov	EB	62	Nutley St	64	Capital Beltway	2.39	1.0	a.m.	1.96	0.54%	85	20	1,818	2.8	84	163
VA	C	I-66	1	hov	EB	62	Nutley St	64	Capital Beltway	2.39	1.0	a.m.	1.96	0.54%	40	49	1,944	0.6	19	37
VA	C	I-66	1	only	EB	66	Leesburg Pike	67	VA 267	0.76	2.0	a.m.	2.24	0.00%	40	49	1,944	0.2	13	28
VA	C	I-66	1	only	EB	67	VA 267	68	Westmoreland St	1.08	3.0	a.m.	2.24	0.00%	65	20	1,818	1.3	114	256
VA	C	I-66	1	only	EB	67	VA 267	68	Westmoreland St	1.08	3.0	p.m.			80					
VA	C	I-66	1	only	EB	67	VA 267	68	Westmoreland St	1.08	3.0	p.m.			65					
VA	C	I-66	1	only	EB	68	Westmoreland St	69	Sycamore St	0.66	2.0	p.m.			45					
VA	C	I-66	1	only	EB	68	Westmoreland St	69	Sycamore St	0.66	2.0	p.m.			60					
VA	C	I-66	1	only	EB	68	Westmoreland St	69	Sycamore St	0.66	2.0	a.m.	2.24	0.00%	50	38	1,931	0.4	34	76
VA	C	I-66	1	only	EB	69	Sycamore St	71	W George Mason Dr	1.93	2.0	a.m.	2.24	0.00%	50	39	1,931	1.1	71	159
VA	C	I-66	1	only	EB	69	Sycamore St	71	W George Mason Dr	1.93	2.0	p.m.			60					
VA	C	I-66	1	only	EB	69	Sycamore St	71	W George Mason Dr	1.93	2.0	p.m.			55					
DC	C	I-66	1	only	EB	75	Arlington Blvd	76	Rock Creek Pkwy	0.69	2.0	a.m.	2.24	0.00%	45	43	1,948	0.3	25	56
DC	C	I-66	1	only	EB	75	Arlington Blvd	76	Rock Creek Pkwy	0.69	2.0	a.m.	2.24	0.00%	65	35	1,900	0.5	45	102
VA	C	I-66	1	only	WB	52	Lee Hwy	47	VA 234	4.64	2.0	p.m.	1.28	3.62%	40	49	1,944	1.2	74	93
VA	C	I-66	1	only	WB	52	Lee Hwy	47	VA 234	4.64	2.0	p.m.	1.28	3.62%	40	49	1,944	1.2	74	93

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From	From	Exit To	To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
VA	C	I-66	1 only	WB	53	VA 28	52	Lee Hwy	1.04	2.0	p.m.	1.20	3.52%	40	49	1,944	0.3	17	21
VA	C	I-66	1 only	WB	53	VA 28	52	Lee Hwy	1.04	2.0	p.m.	1.20	3.52%	40	49	1,944	0.3	17	21
VA	C	I-66	1 only	WB	55	Fairfax County Pkwy	53	VA 28	2.41	2.0	p.m.	1.20	3.52%	45	43	1,948	1.0	62	77
VA	C	I-66	1 only	WB	56	Fairfax County Pkwy	53	VA 28	2.41	2.0	p.m.	1.20	3.52%	60	38	1,931	1.4	87	109
VA	C	I-66	1 only	WB	57	US 50	56	Fairfax County Pkwy	2.23	2.0	p.m.	1.20	3.52%	65	20	1,818	2.6	166	194
VA	C	I-66	1 only	WB	57	US 50	55	Fairfax County Pkwy	2.23	2.0	p.m.	1.20	3.52%	55	35	1,906	1.7	106	131
VA	C	I-66	1 hov	WB	60	VA 123	57	US 50	2.66	1.0	p.m.	1.17	3.97%	60	31	1,861	2.0	61	69
VA	C	I-66	1 hov	WB	60	VA 123	57	US 50	2.66	1.0	p.m.	1.17	3.97%	50	39	1,931	1.2	38	43
VA	C	I-66	1 only	WB	71 W	George Mason Dr	69	Sycamore St	1.93	2.0	p.m.	3.29	0.00%	60	39	1,931	1.1	71	232
VA	C	I-66	1 only	WB	72	Lee Hwy	71 W	George Mason Dr	1.69	2.0	p.m.	3.29	0.00%	80	31	1,861	1.6	99	327
VA	C	I-66	1 only	WB	73	Key Bridge	72	Lee Hwy	1.44	2.0	p.m.	3.29	0.00%	65	20	1,818	1.7	101	333
DC	C	I-66	1 only	WB	76	Rock Creek Pkwy	75	Arlington Blvd	0.68	3.4	p.m.	3.29	0.00%	50	39	1,931	0.4	42	139
VA	D	VA 267	1 toll	EB	4	Wiehle Ave	5	Hunter Mill Rd	1.44	3.0	a.m.			40					
VA	D	VA 267	1 toll	EB	5	Hunter Mill Rd	6	Trap Rd	2.66	3.0	a.m.			45					
VA	D	VA 267	1 toll	EB	5	Hunter Mill Rd	6	Trap Rd	2.66	3.0	a.m.			40					
VA	D	VA 267	1 toll	EB	6	Trap Rd	7	Leesburg Pike	1.23	3.0	a.m.			40					
VA	D	VA 267	1 toll	EB	7	Leesburg Pike	8	Spring Hill Rd	0.72	3.0	a.m.			110					
VA	D	VA 267	1 toll	EB	8	Spring Hill Rd	9	Capital Beltway	1.10	2.6	a.m.			50					
VA	D	VA 267	1 toll	WB	8	Spring Hill Rd	7	Leesburg Pike	0.72	3.0	p.m.			55					
VA	D	VA 267	1 toll	WB	8	Spring Hill Rd	7	Leesburg Pike	0.72	3.0	p.m.			40					
US--VA	E	GWMP	1 only	EB		na	Chain Bridge Rd		na	Spout Run	3.30	2.0	a.m.	1.20	0.00%	60	31	1,861	3.1	194	233
US--VA	E	GWMP	1 only	EB		na	Chain Bridge Rd		na	Spout Run	3.30	2.0	a.m.	1.20	0.00%	55	35	1,900	2.6	167	188
US--VA	E	GWMP	1 only	EB		na	Chain Bridge Rd		na	Spout Run	3.30	2.0	a.m.	1.20	0.00%	90	18	1,620	7.7	418	501
US--VA	E	GWMP	1 only	WB		na	Roosevelt Bridge		na	Spout Run	1.96	2.0	p.m.	1.20	0.00%	60	31	1,861	1.9	116	140

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From		From	Exit To		To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
US--VA	E	GWMP	1	only	WB		na Roosevelt Bridge		na	Spout Run	1.95	2.0	p.m.	1.30	0.00%	40	49	1,944	0.6	32	41
MD	F	I-270	1	spur-W	NB	0	W Capital Beltway	1	W	Democracy Blvd	0.76	2.0	p.m.	1.27	2.66%	75	23	1,731	1.2	70	87
MD	F	I-270	1	spur-W	NB	0	W Capital Beltway	1	W	Democracy Blvd	0.76	2.0	p.m.	1.27	2.66%	105	14	1,502	2.4	121	150
MD	F	I-270	1	spur-W	NB	0	W Capital Beltway	1	W	Democracy Blvd	0.76	2.0	a.m.	1.27	4.41%	40	49	1,944	0.2	12	15
MD	F	I-270	1	spur-W	NB	0	W Capital Beltway	1	W	Democracy Blvd	0.76	2.0	a.m.	1.27	4.41%	55	35	1,909	0.6	36	44
MD	F	I-270	1	spur-W	NB	0	W Capital Beltway	1	W	Democracy Blvd	0.76	2.0	p.m.	1.27	2.66%	110	13	1,444	2.7	130	162
MD	F	I-270	1	spur-W	NB	1	W Democracy Blvd	2		I-270 Split	0.89	2.2	p.m.	1.27	2.66%	80	21	1,691	1.6	101	126
MD	F	I-270	1	spur-W	NB	1	W Democracy Blvd	2		I-270 Split	0.89	2.2	p.m.	1.27	2.66%	60	31	1,861	0.8	57	71
MD	F	I-270	1	spur-W	NB	1	W Democracy Blvd	2		I-270 Split	0.89	2.2	p.m.	1.27	2.66%	75	23	1,731	1.4	90	113
MD	F	I-270	1	spur-W	SB	1	W Democracy Blvd	0	W	Capital Beltway	0.76	2.0	p.m.	1.27	2.66%	60	31	1,861	0.7	44	55
MD	F	I-270	1	spur-W	SB	1	W Democracy Blvd	0	W	Capital Beltway	0.76	2.0	p.m.	1.27	2.66%	40	49	1,944	0.2	12	15
MD	F	I-270	1	spur-W	SB	1	W Democracy Blvd	0	W	Capital Beltway	0.76	2.0	a.m.	1.27	4.41%	70	25	1,773	1.0	61	76
MD	F	I-270	1	spur-W	SB	1	W Democracy Blvd	0	W	Capital Beltway	0.76	2.0	a.m.	1.27	4.41%	65	28	1,818	0.9	52	65
MD	F	I-270	1	spur-W	SB	1	W Democracy Blvd	0	W	Capital Beltway	0.76	2.0	a.m.	1.27	4.41%	50	39	1,931	0.4	27	34
MD	F	I-270	1	spur-W	SB	2		I-270 Split	1	W	Democracy Blvd	0.89	2.4	a.m.	1.27	4.41%	75	23	1,731	1.4	98	121
MD	F	I-270	1	spur-W	SB	2		I-270 Split	1	W	Democracy Blvd	0.89	2.4	a.m.	1.27	4.41%	95	19	1,665	1.9	122	150
MD	F	I-270	1	spur-W	SB	2		I-270 Split	1	W	Democracy Blvd	0.89	2.4	a.m.	1.27	4.41%	95	19	1,665	1.9	122	150
MD	G	I-270	1	spur-E	NB	0	E Capital Beltway	1	E	Old Georgetown Rd	1.57	2.0	p.m.	1.27	2.66%	40	49	1,944	0.4	25	31
MD	G	I-270	1	spur-E	NB	0	E Capital Beltway	1	E	Old Georgetown Rd	1.57	2.0	p.m.	1.27	2.66%	70	25	1,773	2.2	127	159
MD	G	I-270	1	spur-E	NB	0	E Capital Beltway	1	E	Old Georgetown Rd	1.57	2.0	p.m.	1.27	2.66%	55	26	1,900	1.2	74	92
MD	G	I-270	1	spur-E	NB	1	E Old Georgetown Rd	2		I-270 Split	1.19	2.2	p.m.	1.27	2.66%	45	43	1,948	0.5	34	42
MD	G	I-270	1	spur-E	NB	1	E Old Georgetown Rd	2		I-270 Split	1.19	2.2	p.m.	1.27	2.66%	55	35	1,900	0.9	62	77
MD	G	I-270	1	only	NB	11	Quince Orchard Rd	13		Middlebrook Rd	2.44	4.0	p.m.	1.27	2.66%	50	39	1,931	1.4	177	221
MD	G	I-270	1	only	NB	13	Middlebrook Rd	16		MD 118	0.76	3.0	p.m.	1.27	2.66%	60	30	1,931	0.4	41	51
MD	G	I-270	1	only	NB	13	Middlebrook Rd	16		MD 118	0.76	3.0	p.m.	1.27	2.66%	80	21	1,891	1.4	118	147
MD	G	I-270	1	only	NB	16	MD 118	18		Clarksburg Rd	3.56	3.0	p.m.	1.27	2.66%	50	39	1,931	2.0	129	161

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From		From	Exit To		To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
MD	G	I-270	1	only	NB	16		MD 118	18		Clarksburg Rd	3.66	2.0	p.m.	1.27	2.66%	60	31	1,961	3.4	208	269
MD	G	I-270	1	spur-E	SB	1	E	Old Georgetown Rd	0	E	Capital Beltway	1.44	2.0	a.m.	1.27	4.41%	40	49	1,944	0.4	23	28
MD	G	I-270	1	spur-E	SB	1	E	Old Georgetown Rd	0	E	Capital Beltway	1.44	2.0	a.m.	1.27	4.41%	50	39	1,931	0.8	52	64
MD	G	I-270	1	spur-E	SB	2		I-270 Split	1	E	Old Georgetown Rd	1.21	2.0	a.m.	1.27	4.41%	45	43	1,948	0.6	45	56
MD	G	I-270	1	spur-E	SB	2		I-270 Split	1	E	Old Georgetown Rd	1.21	2.0	a.m.	1.27	4.41%	55	35	1,900	0.9	62	102
MD	G	I-270	1	only	SB	4		Montrose Rd	2		I-270 Split	1.33	5.3	a.m.	1.27	4.41%	65	29	1,816	1.5	243	300
MD	G	I-270	1	only	SB	4		Montrose Rd	2		I-270 Split	1.33	5.3	a.m.	1.27	4.41%	70	26	1,773	1.8	283	349
MD	G	I-270	1	main	SB	5		Great Falls Road	4		Montrose Rd	1.38	4.0	a.m.	1.27	4.41%	40	49	1,944	0.3	44	54
MD	G	I-270	1	main	SB	5		Great Falls Road	4		Montrose Rd	1.38	4.0	a.m.	1.27	4.41%	45	43	1,948	0.6	71	87
MD	G	I-270	1	only	SB	16		Clarksburg Rd	15		MD 118	3.66	2.1	a.m.	1.27	4.41%	45	43	1,948	1.4	96	118
MD	G	I-270	1	only	SB	16		Clarksburg Rd	15		MD 118	3.66	2.1	a.m.	1.27	4.41%	40	49	1,944	0.8	60	73
MD	G	I-270	1	only	SB	22		Old Hundred Rd	18		Clarksburg Rd	3.79	2.0	a.m.	1.27	4.41%	60	31	1,961	3.6	220	271
MD	G	I-270	1	only	SB	22		Old Hundred Rd	18		Clarksburg Rd	3.79	2.0	a.m.	1.27	4.41%	45	43	1,948	1.5	97	120
MD	G	I-270	1	only	SB	22		Old Hundred Rd	18		Clarksburg Rd	3.79	2.0	a.m.	1.27	4.41%	40	49	1,944	0.9	60	74
MD	G	I-270	1	only	SB	26		Fingerboard Rd	22		Old Hundred Rd	3.66	2.0	a.m.	1.27	4.41%	50	39	1,931	2.1	132	162
MD	G	I-270	1	only	SB	26		Fingerboard Rd	22		Old Hundred Rd	3.66	2.0	a.m.	1.27	4.41%	50	39	1,931	2.1	132	162
MD	G	I-270	1	only	SB	31		Buckeystown Pike	26		Fingerboard Rd	5.00	2.0	a.m.	1.27	4.41%	40	49	1,944	1.3	80	99
MD	G	I-270	1	only	SB	33		I-70	31		Buckeystown Pike	1.33	3.0	a.m.	1.27	4.41%	50	39	1,931	0.8	48	59
MD	G	I-270	2	local	SB	5		Great Falls Road	4		Montrose Rd	1.38	2.0	a.m.	1.27	4.41%	40	49	1,944	0.3	22	27
MD	G	I-270	2	local	SB	5		Great Falls Road	4		Montrose Rd	1.38	2.0	a.m.	1.27	4.41%	45	43	1,948	0.6	35	44
MD	G	I-270	2	local	SB	6		Darnestown Rd	5		Great Falls Road	0.96	2.0	a.m.	1.27	4.41%	40	49	1,944	0.2	16	19
MD	G	I-270	2	local	SB	6		Darnestown Rd	5		Great Falls Road	0.96	2.0	a.m.	1.27	4.41%	50	39	1,931	0.6	35	44
MD	H	I-95	1	only	SB	29		Powder Mill Rd	27		Capital Beltway	1.84	4.0	a.m.			50					
MD	H	I-95	1	only	SB	33		Sandy Spring Rd	29		Powder Mill Rd	4.07	4.0	a.m.			40					
DC	I	I-295	1	only	NB		ea	Capital Beltway		ea	Laboratory Rd	2.03	2.0	a.m.	1.18	2.65%	65	28	1,818	2.4	141	184

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility	Dir	Exit From		From	Exit To		To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/hr)	Person Hours of Delay (hr/hr)
DC	I	I-295	1	only	NB		ne	Capitol Beltway		ne	Laboratory Rd	2.03	2.0	a.m.	1.18	2.65%	55	38	1,900	1.5	86	111
DC	I	I-295	1	only	NB		ne	Capitol Beltway		ne	Laboratory Rd	2.03	2.0	a.m.	1.18	2.65%	40	49	1,944	0.5	32	38
DC	I	I-295	1	only	NB		ne	Laboratory Rd		ne	Portland St	1.67	2.2	a.m.	1.18	2.65%	40	49	1,944	0.4	29	34
DC	I	I-295	1	only	NB		ne	Laboratory Rd		ne	Portland St	1.67	2.2	a.m.	1.18	2.65%	46	43	1,948	0.7	47	56
DC	I	I-295	1	only	NB		ne	Portland St		ne	Suitland Pkwy	1.34	2.0	a.m.	1.18	2.65%	55	36	1,900	1.0	95	110
DC	I	I-295	1	only	NB		ne	Portland St		ne	Suitland Pkwy	1.34	2.0	a.m.	1.18	2.65%	65	28	1,818	1.6	141	163
DC	I	I-295	1	only	NB		ne	Suitland Pkwy		ne	11th St Bridge	0.81	2.0	a.m.	1.18	2.65%	70	25	1,773	1.1	92	107
DC	I	I-295	1	only	NB		ne	Suitland Pkwy		ne	11th St Bridge	0.81	2.0	a.m.	1.18	2.65%	60	31	1,861	0.8	67	77
DC	I	DC 295	1	only	NB		ne	Pennsylvania Ave		ne	Benning Rd	1.88	2.3	p.m.	1.31	1.42%	40	49	1,944	0.5	36	46
DC	I	DC 295	1	only	NB		ne	Benning Rd		ne	US 50	1.95	3.0	p.m.	1.31	1.42%	65	28	1,818	2.3	205	266
DC	I	DC 295	1	only	NB		ne	Benning Rd		ne	US 50	1.95	3.0	p.m.	1.31	1.42%	60	31	1,861	1.9	171	223
US--MD	I	BWP	1	only	NB		ne	Annapolis Rd		ne	MD 410	1.63	2.0	p.m.	1.40	0.00%	40	49	1,944	0.4	26	37
US--MD	I	BWP	1	only	NB		ne	Capitol Beltway		ne	NASA	1.89	2.0	p.m.	1.40	0.00%	50	39	1,931	0.9	68	81
US--MD	I	BWP	1	only	NB		ne	NASA		ne	Powder Mill Rd	1.95	2.0	p.m.	1.40	0.00%	45	43	1,948	0.8	61	71
US--MD	I	BWP	1	only	NB		ne	NASA		ne	Powder Mill Rd	1.95	2.0	p.m.	1.40	0.00%	50	39	1,931	1.1	71	100
US--MD	I	BWP	1	only	NB		ne	Powder Mill Rd		ne	MD 197	1.66	2.0	p.m.	1.40	0.00%	45	43	1,948	0.7	48	68
US--MD	I	BWP	1	only	NB		ne	Powder Mill Rd		ne	MD 197	1.94	2.0	p.m.	1.40	0.00%	40	49	1,944	0.5	30	42
DC	I	I-295	1	only	SB		ne	Laboratory Rd		ne	Capitol Beltway	2.03	2.0	p.m.	1.31	1.42%	50	39	1,931	1.2	74	96
DC	I	I-295	1	only	SB		ne	Laboratory Rd		ne	Capitol Beltway	2.03	2.0	p.m.	1.31	1.42%	45	43	1,948	0.8	52	68
DC	I	I-295	1	only	SB		ne	Portland St		ne	Laboratory Rd	1.67	2.0	p.m.	1.31	1.42%	65	28	1,818	1.9	117	151
DC	I	I-295	1	only	SB		ne	Portland St		ne	Laboratory Rd	1.67	2.0	p.m.	1.31	1.42%	65	28	1,818	1.9	117	151
DC	I	DC 295	1	only	SB		ne	Benning Rd		ne	Pennsylvania Ave	1.88	2.2	a.m.	1.18	2.65%	40	49	1,944	0.5	33	38
DC	I	DC 295	1	only	SB		ne	Benning Rd		ne	Pennsylvania Ave	1.88	2.2	a.m.	1.18	2.65%	45	43	1,948	0.8	53	62
DC	I	DC 295	1	only	SB		ne	Benning Rd		ne	Pennsylvania Ave	1.88	2.2	a.m.	1.18	2.65%	40	49	1,944	0.5	33	38
US--MD	I	BWP	1	only	SB		ne	Annapolis Rd		ne	US 50	1.76	2.0	a.m.	1.23	0.00%	60	31	1,861	1.7	145	179
US--MD	I	BWP	1	only	SB		ne	Annapolis Rd		ne	US 50	1.76	2.0	a.m.	1.23	0.00%	40	49	1,944	0.4	40	49
US--MD	I	BWP	1	only	SB		ne	MD 410		ne	Annapolis Rd	1.61	2.0	a.m.	1.23	0.00%	40	49	1,944	0.4	26	32
US--MD	I	BWP	1	only	SB		ne	MD 410		ne	Annapolis Rd	1.61	2.0	a.m.	1.23	0.00%	45	43	1,948	0.6	42	52
US--MD	I	BWP	1	only	SB		ne	Capitol Beltway		ne	MD 410	2.33	2.0	a.m.	1.23	0.00%	40	49	1,944	0.6	36	46
US--MD	I	BWP	1	only	SB		ne	MD 197		ne	Powder Mill Rd	1.66	2.0	a.m.	1.23	0.00%	50	39	1,931	1.1	68	83
US--MD	I	BWP	1	only	SB		ne	MD 197		ne	Powder Mill Rd	1.66	2.0	a.m.	1.23	0.00%	40	49	1,944	0.6	30	37
US--MD	I	BWP	1	only	SB		ne	Patuxent River		ne	MD 197	0.81	2.0	a.m.	1.23	0.00%	40	49	1,944	0.2	13	16

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ESTIMATED CONGESTION ON SELECTED FREEWAY SEGMENTS

State	Flight Path	Facility	Subfacility		Dir	Exit From		From	Exit To		To	Length (mi)	Analysis Lanes	Period	Auto Occupancy	Percent Truck	Observed Density (VE/mi/ln)	Speed (MPH)	Volume (VE/hr/ln)	Delay (min/VE)	Vehicle Hours of Delay (hr/mi)	Person Hours of Delay (hr/hr)
MD	J	US 50	1	only	WB		ns	Landover Rd		ns	B-W Pkwy	2.23	3.0	a.m.	1.20	3.34%	75	23	1,731	3.6	206	241
MD	J	US 50	1	only	WB		ns	Landover Rd		ns	B-W Pkwy	2.23	2.0	a.m.	1.20	3.34%	80	21	1,691	4.1	231	271
MD	J	US 50	1	only	WB		ns	MD 410		ns	Landover Rd	1.26	2.4	a.m.	1.20	3.34%	40	49	1,944	0.3	24	28

DEVELOPING AN EFFECTIVE CONGESTION MANAGEMENT SYSTEM - REPORT 1

DALLAS/FORT WORTH, TEXAS

April 1995

Transportation Department
North Central Texas Council Of Governments

TABLE OF CONTENTS

I. TRANSPORTATION CHALLENGES IN NORTH CENTRAL TEXAS

TRAFFIC CONGESTION: A GROWING PROBLEM

With the Dallas-Fort Worth urban area as its center, the North Central Texas region plays an important role in the State of Texas, as well as the entire southwestern United States. The region provides critical air and ground transportation hubs for the movement of people and goods throughout the United States and internationally. Locally, these transportation systems support many high technology manufacturers and telecommunications firms, large retail and wholesale distribution centers, and a healthy convention and tourism industry.

Over four million people reside in the 16-county area, and population is expected to increase by 32 percent over the next 20 years. This growth follows an even higher population increase (64 percent) over the last two decades. Exhibit I-1 displays historical and projected population and employment trends in the region. Trends established following World War II, and expressed so dramatically in this region in the 1970s and 1980s, will continue through the year 2010, though at a more stable pace.[1]

Nearly 90 percent of the population and employment in North Central Texas is located in the Metropolitan Area, shown in Exhibit I-2. Urban activity in this area is supported by various ground transportation systems, including:

* 570 centerline miles of freeways,
* 1,775 miles of principal and minor arterials,
* Dallas Area Rapid Transit (DART) bus system, and
* Fort Worth Transportation Authority (the T) bus system.

In addition, DART is constructing a 20-mile Light Rail Starter System, expected to be completed by 1997, and a 34-mile commuter rail system, RAILTRAN, is scheduled to link the Dallas and Fort Worth Central Business Districts by 1998. Forty miles of immediate-action high occupancy vehicle lanes are being constructed by TxDOT in cooperation with DART.

These systems will help alleviate a growing traffic congestion problem in the Metroplex. The rapid growth of the Dallas-Fort Worth region in the past decade has led to increasing transportation problems. A favorable business environment, tax advantages, warm climate, and available land continue to attract many businesses to the region. While growth has many benefits, the recent rate of growth has urbanized land so quickly and has so overloaded the transportation system that available financial resources to improve transportation have not kept pace. In the decade of the 1980s, travel in the region increased at three times the rate of roadway construction, and the effects are evident now in increased traffic congestion and delay, and substandard air quality.

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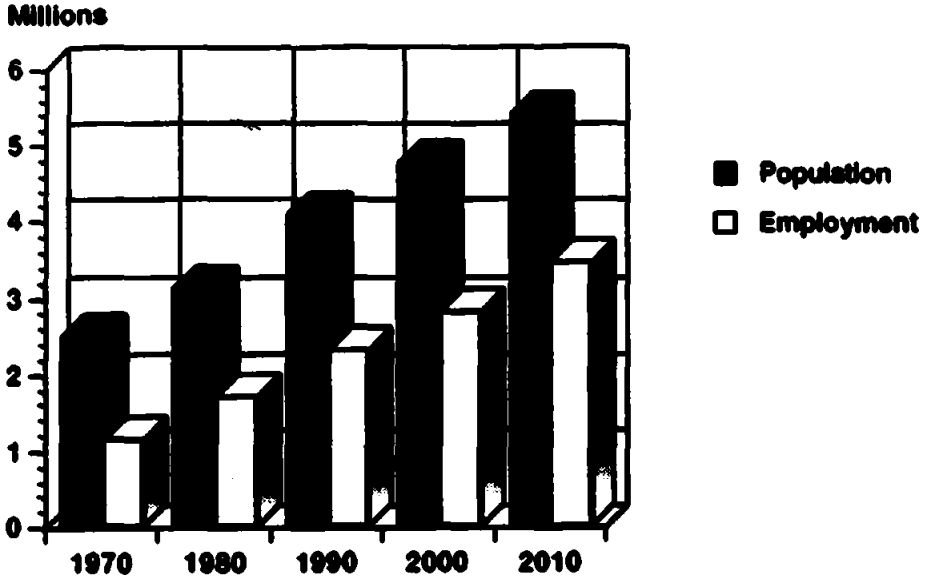
[1]North Central Texas Regional Profile - 1990 to 2010; North Central Texas Council of Governments, Department of Research and Information Services; Arlington, Texas; Summer 1994.

EXHIBIT I-1

NORTH CENTRAL TEXAS CHANGES IN POPULATION AND EMPLOYMENT, 1970-2010



CMS: A MANAGEMENT SOLUTION

The Congestion Management System (CMS) seeks a "management" solution to a growing traffic problem by targeting resources to operational management and travel demand reduction strategies. Although major capital investments are needed to meet the growing travel demand, the CMS also develops lower cost strategies which complement the capital intensive recommendations. The result is more efficient and effective transportation systems, increased mobility, and a leveraging of resources.

Integrating a management approach into the provision of transportation services and infrastructure is a challenge. Traditional modeling and decision-making systems are biased to the evaluation and implementation of capacity improvements. Tempering these systems with a congestion management approach not only offers opportunities for stretching transportation resources, it is at the heart of the Intermodal Surface Transportation Efficiency Act's metropolitan planning legislation.

This report attempts to document this region's congestion management system efforts to date and outline the direction being taken in the future. This report focuses on the cooperative efforts among local governments and between private agencies which are necessary for incorporating CMS into the planning and programming of transportation projects. In particular, it will focus on the participants and procedures which facilitate institutional cooperation between local governments and industry involved in the process.

EXHIBIT I-2

TRANSPORTATION MANAGEMENT AREA WITHIN THE NCTCOG REGION

II. INTEGRATING THE CMS INTO TRANSPORTATION PLANNING AND PROGRAMMING

An important consideration in implementing an effective Congestion Management System (CMS) is its integration into the total transportation planning and programming processes. Indeed, this is a critical element in the development and implementation of all management systems, to ensure that sound investment in transportation systems is made, both now and in the future. The planning process envisioned in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) is a dynamic activity which effectively integrates current operational and preservation considerations with longer term mobility, environmental, and development concerns.[2] The Dallas-Fort Worth Metropolitan Planning Organization (MPO) seeks to implement a management system which is fully integrated into transportation decision making in this region. Exhibit II-1 shows the relationship of the CMS to five broad Metropolitan Planning Organization functions. Through the tasks outlined in the CMS Work Plan, a "management philosophy" is integrated into all aspects of transportation planning and programming. In the sections which follow, each of these categories are featured, and an overview of work to be done is provided from the Dallas-Fort Worth Regional CMS Work Plan.

DEVELOPING AND MAINTAINING THE TRANSPORTATION PLAN

The Dallas-Fort Worth Regional Congestion Management System consists of a Congestion Management Plan, which makes an initial assessment of congested conditions, identifies areas and facilities to be targeted for a congestion reduction effort, and develops regional strategies for mitigating traffic congestion. The Plan is an element of Mobility 2010 Plan Update: The Regional Transportation Plan for North Central Texas, and will be updated at least every three years, in conjunction with the Plan Update. The Plan and the CMS, which were adopted by the Regional Transportation Council in October 1993, outline policies and direct resources for mitigating congestion on a regional, system-planning level. The plan also establishes a Congestion Management Program, which is an ongoing program of monitoring congestion levels on the targeted systems, developing corridor-level travel demand reduction and system management strategies designed to provide congestion relief, and evaluating implemented projects to assess their effectiveness.

To support the Regional Transportation Plan, an annual report on regional traffic congestion will be published, which will identify congested areas, systems and facilities, and describe regional and subarea trends regarding congestion. This "State of the Region" report will be provided to the Regional Transportation Council, Texas Department of Transportation (TxDOT) District Offices in

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[2] Statewide Planning; Metropolitan Planning Final Rules; Federal Highway Administration and Federal Transit Administration. Washington, D.C.: 1993.

EXHIBIT II-1
RELATIONSHIP OF THE CMS TO OTHER MPO FUNCTIONS[3]

MPO Transportation Planning and Programming Activities	Congestion Management System Goals
Develop and Maintain the Regional Transportation Plan	Provide a regional assessment of traffic congestion conditions and trends which can be used in the Plan Update process. Develop regional strategies for enhancing system efficiency and effectiveness, include in the Metropolitan Transportation Plan. Evaluate the effectiveness of implemented strategies.
Develop and Implement the Transportation Improvement Program	Provide a regional assessment of traffic congestion conditions and trends which will provide guidance to programming activities. Monitor the status of adopted strategies from planning through implementation.
Participate in Major Investment Studies/ Corridor Studies	Develop corridor- and subarea-level strategies to enhance system effectiveness. During SOV studies, conduct an analysis of TSM and TDM strategies.
Conduct Transportation-Related Air Quality Planning to Support SIP	Ensure that the development of strategies is coordinated with the development of TCMs. Evaluate the effectiveness of implemented strategies.
Provide Support to Member Governments, Related Agencies and the Public	Provide information to support other state management systems. Provide information for travel model calibration/ refinement. Publish and distribute information on system performance via newsletters or other media. Research state-of-the-practice strategies for managing traffic congestion.

[3]Congestion Management System Work Plan for the Dallas-Fort Worth Area; NCTCOG; October 1994.

Dallas and Fort Worth, local transportation authorities, and local governments in the region. It will be published prior to plan updates, facilitating the integration of congestion management with plan development. As part of the plan update process, regional strategies are developed to reduce traffic congestion and improve air quality. Exhibit II-2 graphically depicts the relationship between the CMS and the Regional Transportation Plan.

Measure of Effectiveness studies are performed on selected implemented projects. These before-and-after studies seek to quantify the benefits of various congestion mitigation and air quality projects. Products consist of a series of technical memoranda which can be appended to the CMS. and will provide decision makers with valuable information for future project selection and development. Selected Measure of Effectiveness studies begin annually as projects are nearing implementation, and completed when projects are finished.

DEVELOPING AND IMPLEMENTING THE TRANSPORTATION IMPROVEMENT PROGRAM

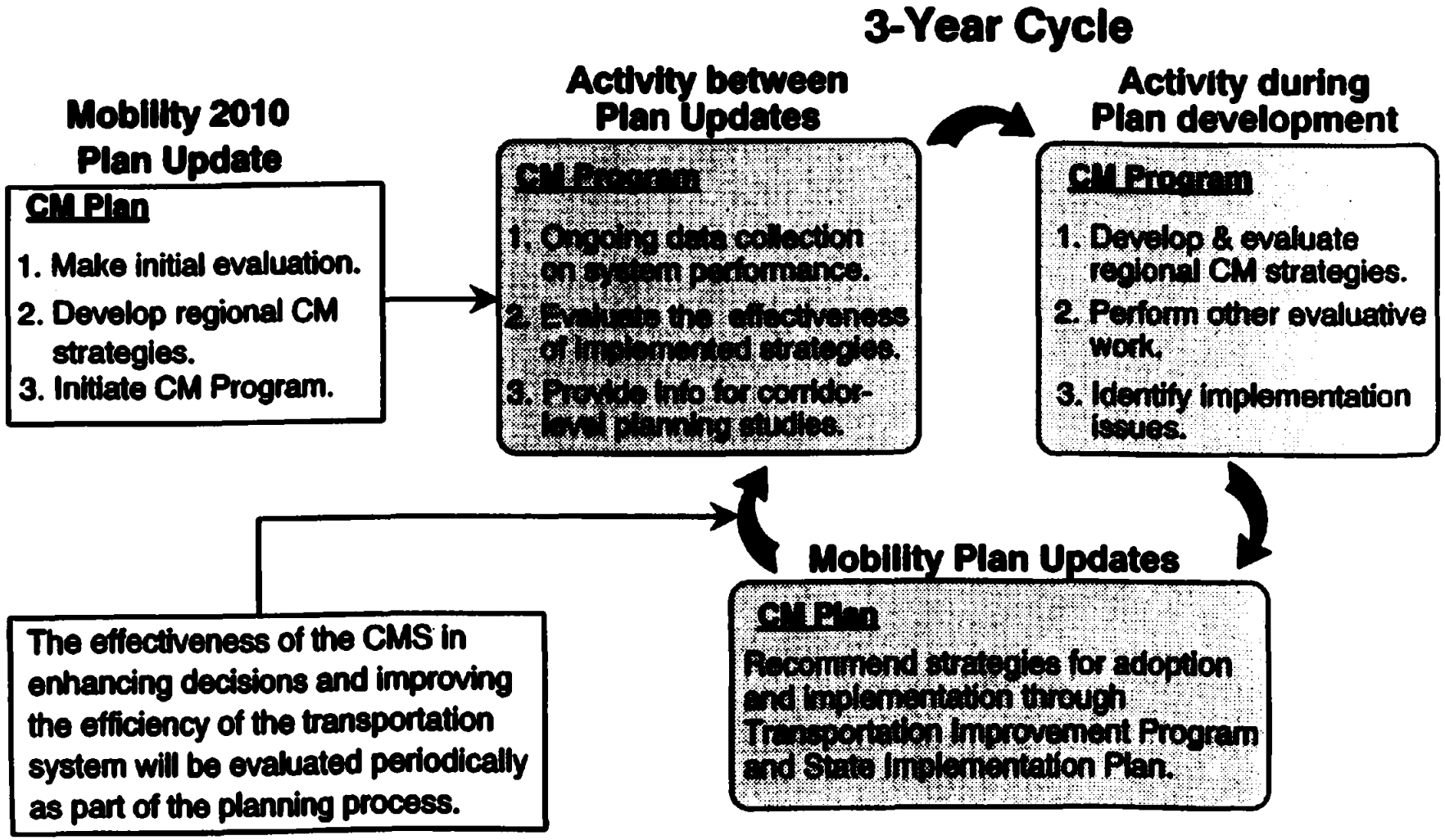
With passage of ISTEA, the North Central Texas Council of Governments (NCTCOG), as the Metropolitan Planning Organization (MPO) for the Dallas-Fort Worth Metropolitan Area and the Denton and Lewisville Urbanized Areas, was assigned project-level programming responsibilities for 1) Surface Transportation Program-Metropolitan Mobility (STP-MM) funds in the urbanized area, 2) Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds in the Dallas-Fort Worth ozone nonattainment area, and 3) Transit Section 9 Program funds in the urbanized area. NCTCOG selected these projects in consultation with TxDOT and the transportation authorities. In addition, those projects selected by TxDOT as part of the National Highway System (NHS) also required the endorsement of the MPO prior to inclusion in the Transportation Improvement Program.

The 1993 Transportation Improvement Program (TIP), the first metropolitan TIP in North Central Texas prepared under ISTEA, was developed over a four-month period through the cooperative efforts of NCTCOG, local governments, transit authorities, and TxDOT with additional input by the public. The initial selection process was guided by the Regional Transportation Council's Intermodal Project Programming Policy for 1992. The 1995 TIP represents the culmination of a continuing process to refine and prioritize the projects included in the 1993 and 1994 TIPs in addition to the programming of additional CMAQ projects received in response to a call for projects for the 1995 TIP.

Project selection for STP-MM, CMAQ, and Transit Section 9 was based on a fully competitive process, with emphasis on public and local elected officials' involvement. Further, the selection of projects for funding centered on the development of a technically based project selection and evaluation process which ensured that the most cost-effective projects were selected when balanced against additional criteria deemed important to the region including reducing traffic congestion and

EXHIBIT II-2

INTEGRATION OF THE CMS INTO THE REGIONAL TRANSPORTATION PLAN



enhancing air quality, financial commitment, and intermodalism. Finally, the TIP was set forward with the requirement that projects included in the TIP could be funded based on current available sources of revenue from the various program funding sources.

The Transportation Improvement Program was developed and reviewed by technical and policy committees. Technical advice was provided by the Surface Transportation Technical Committee and the Travel Demand Management Committee. Members of these committees are lead technical personnel from local governments, TxDOT, and transit providers in the North Central Texas region. These committees played a key role in the development of the criteria used to evaluate and select projects included in the TIP and the project evaluation process.

They also guided the refinement of programmed projects which, in turn, provided the input for the TIP.

The 1993 TIP was initially developed in conjunction with three subcommittees of the Regional Transportation Council, consisting of 68 elected officials and representatives from TxDOT, DART, and FWTA. Subcommittee members were appointed by local governments representing three subregions: eastern, northern, and western. The RTC Program Subcommittees provided policy-level direction for the evaluation and selection of projects and for forwarding recommendations regarding projects to be included in the 1993 TIP to the Regional Transportation Council for consideration. The subcommittee structure has been formalized in a recent update of the RTC Bylaws and will maintain a permanent role in the continuing TIP process.

Two other initiatives are currently underway which will support timely implementation of transportation projects in the region. The first is an initiative by Dallas County, in which they retain a program management consultant to support the county in the management of their Congestion Mitigation and Air Quality Intersections Improvement Program projects through development, design, and construction phases. The total program encompasses some 1,200 intersections for signalization improvements and 300 intersections for geometric improvements. The overall scope will reflect a significant cooperative working relationship among Dallas County, 18 cities, TxDOT, FHWA and NCTCOG.[4]

The City of Dallas is drafting legislation which would ease implementation of off-system transportation projects in urban areas. Under this proposal, urbanized areas with a population of over 200,000 would be allowed to design and construct local off-system transportation projects with ISTEA funds utilizing a "Certification Acceptance Program." Projects would be built to American Association of State Highway and Transportation Officials guidelines, and TxDOT would provide oversight supervision on all projects. Passage of this legislation will result in faster construction of

[4]TexITE News; Volume 40, Number 2; Institute of Transportation Engineers, Texas Section; Dallas, Texas; Fall, 1994.

transportation projects and lower cost, without sacrificing industry construction standards.

The Congestion Management System will support development and implementation of the Transportation Improvement Program through the following: The "State of the Region" report mentioned previously will be useful in making programming decisions in the region by aiding in the development of project selection criteria which promote cost-effective strategies for mitigating traffic congestion. To facilitate project implementation, an information system is maintained of all recommended and implemented congestion management projects, cross-referenced by type, projected year of implementation, and implementing agency. Information includes anticipated benefits and costs and project location. This database is updated continually as project status changes. An information system of this type ensures the integration of the CMS with the implementation of the Regional Transportation Plan.

PARTICIPATION IN MAJOR INVESTMENT STUDIES/CORRIDOR STUDIES

A Major Investment Study (MIS) is undertaken in all corridors where new or expanded roadways or fixed guideway facilities are identified in the Regional Transportation Plan. Exhibit II-3 shows the relationship of the CMS and MIS to the system-planning process, including programming, financial planning and air quality conformity analysis. Major Investment Studies are considered to be refinements of the Plan and will, when appropriate, serve as the analyses of demand reduction and operational management strategies required for projects which will increase single-occupant vehicle (SOV) capacity.

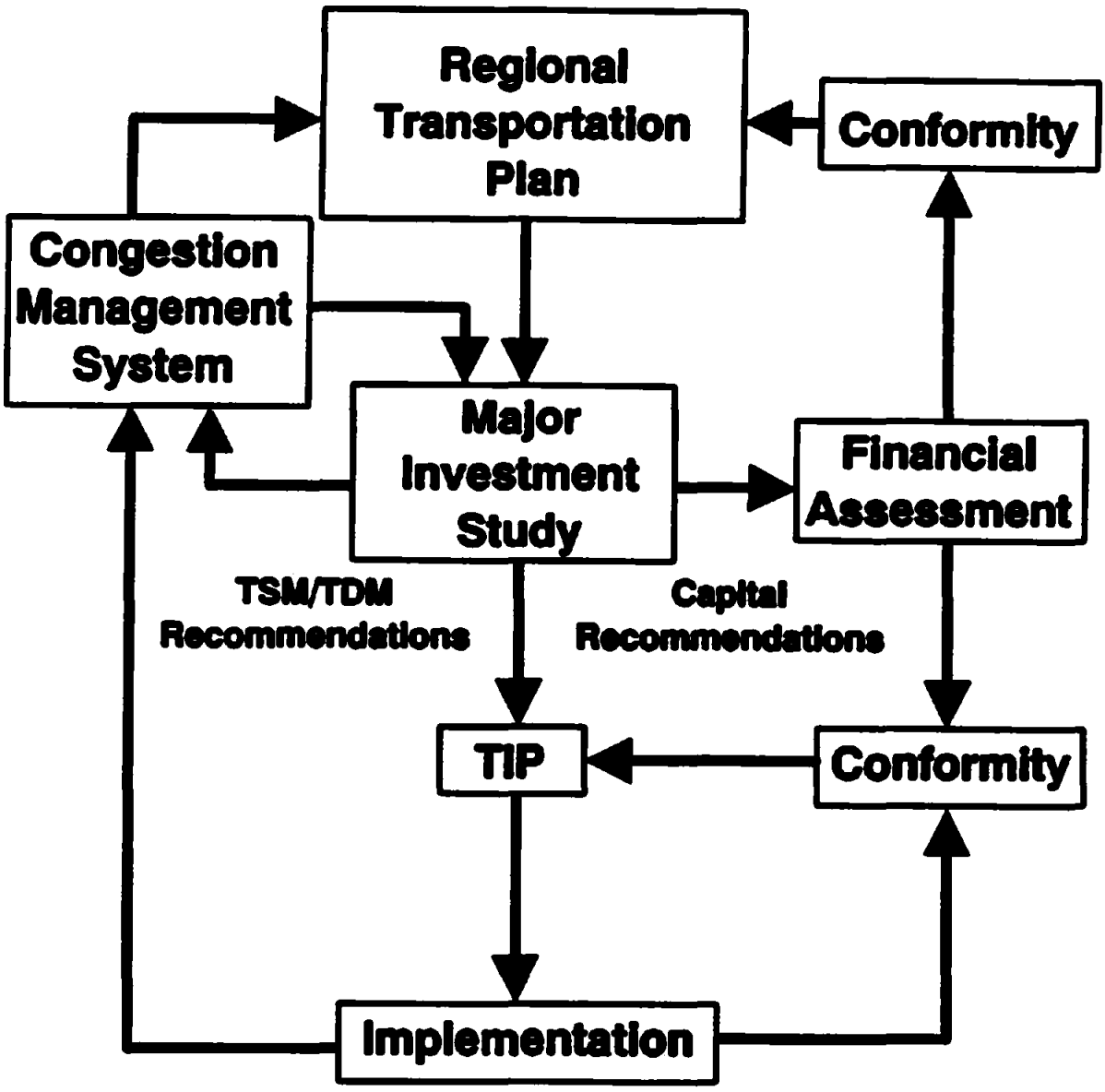
The Congestion Management System (CMS) has a role in all Major Investment Studies which are conducted in the region. An analysis is conducted of expected benefits and costs for transportation system management (TSM) and travel demand management (TDM) strategies to be considered in these corridors, and strategies are identified for incorporation into the Major Transportation Investment facility. Additional congestion management strategies are then evaluated for their application in the MIS corridor. Additional congestion mitigation strategies selected as a result of the Major Investment Study analyses will be considered for inclusion in the regional Congestion Management Plan. If the recommendations of the Major Investment Study include additional single-occupant vehicle capacity, an SOV capacity analysis will be prepared which documents the need for the additional capacity in the corridor.

CONDUCTING TRANSPORTATION-RELATED AIR QUALITY PLANNING

Several of the programs outlined above support the air quality program outlined in Texas' State Implementation Plan. As part of the regional transportation planning and programming process, regional strategies are developed to reduce traffic congestion and improve air quality. Initial efforts

EXHIBIT II-3

SYSTEM PLANNING/ CMS/MIS INTEGRATION



focus on the development and implementation of regional corridor management and travel demand management programs. Other work done as part of the Unified Planning Work Program provides opportunities for development of regional strategies which will enhance the movement of people and goods in the region and improve air quality. The Measure of Effectiveness studies mentioned above seek to quantify the benefits of various congestion mitigation and air quality projects. Also, the TIP project tracking system ensures the integration of the CMS with the implementation of air quality Transportation Control Measures in the State Implementation Plan.

PROVIDING SUPPORT TO MEMBER GOVERNMENTS, RELATED AGENCIES, AND THE PUBLIC

As other state management systems are developed and implemented, information on regional traffic congestion; congested areas, systems, and facilities; and regional congestion trends will be integrated with the Pavement Management System (PMS), Bridge Management System (BMS), Safety Management System (SMS), Public Transportation Management System (PTMS), and the Intermodal Management System (IMS).

The information from the CMS will be useful for calibrating and refining the Dallas-Fort Worth Regional Travel Model. Information can be provided on speeds, travel times, and the location and effects of nonrecurring congestion. As state of the practice evolves in the measurement and management of recurring and nonrecurring traffic congestion, the CMS will seek to incorporate new and innovative techniques into the planning, design, and construction of the metropolitan transportation system. Information regarding state-of-the-practice strategies for mitigating congestion will be provided to local governments and transportation agencies via LocalMotion or other newsletters.

III. PARTNERS IN CONGESTION MANAGEMENT

The Dallas-Fort Worth area was the country's top market for employment gains in 1994, adding 92,500 jobs in a wide range of industries.[5] The region promises to be one of the country's most rapidly expanding employment centers through the year 2000, and economic development programs abound throughout the region. The North Central Texas Council of Governments (NCTCOG) has served as the Metropolitan Planning Organization for the Dallas-Fort Worth region since 1974. In addition, NCTCOG was designated in 1993 as the MPO for the Denton and Lewisville urbanized areas. NCTCOG is an association of 219 public members, including 157 cities, 16 counties, and 46 school and special districts. No less than 50 local governments are located in the Metropolitan Area. This diversity creates special challenges to regional transportation planning and programming. Meeting those challenges is the job of the Regional Transportation Council.

REGIONAL TRANSPORTATION COUNCIL

The Regional Transportation Council (RTC) is the transportation policy body for the Dallas-Fort Worth Metropolitan Area and the Denton and Lewisville urbanized areas. Membership on the RTC is provided by local governments in the Metropolitan Area, either by direct membership or by representation. Exhibit III-1 lists the local governments and public agencies represented on the Council, and the RTC roster is included in Appendix A. All members of the RTC are elected officials except the two transportation authority representatives, the Texas Department of Transportation District Engineers, and the representative of the Texas Turnpike Authority.

The Regional Transportation Council meets on a monthly basis, but subcommittee meetings are conducted on a more frequent basis, as needed. Average RTC attendance in 1994 was 23 members, plus 46 other individuals attending.

Several subcommittees assist the Regional Transportation Council in conducting its business. These subcommittees are made up of RTC members and meet to examine policy positions and prioritize a variety of congestion management and other transportation initiatives. Some examples of standing and ad hoc subcommittees are below:

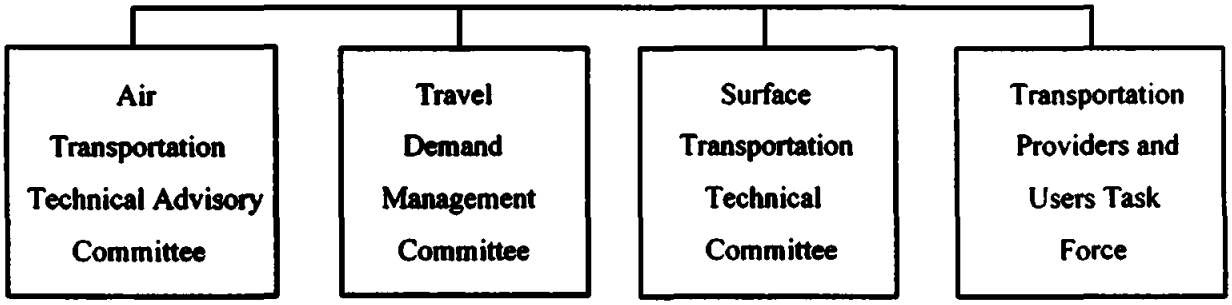
- Regional Corridor Management - Standing Subcommittee
- Regional Travel Demand Management - Standing Subcommittee
- Toll Road Implementation - Standing Subcommittee
- Transportation Implementation - Standing Subcommittee
- Mobility 2010 Finance - Standing Subcommittee

[5] Dallas Morning News; February 8, 1995

EXHIBIT III-1

REGIONAL TRANSPORTATION COUNCIL

Representing	Number of Members
Dallas County	2
Tarrant County	2
Collin County	1
Denton County	1
Ellis County, Ennis, and Waxahachie	1
Johnson County, Burleson, and Cleburne	1
Cities of Dallas and University Park	6
Cities of Fort Worth, Benbrook, Forest Hill, and White Settlement	3
City of Arlington	1
Cities of Carrollton and Farmers Branch	1
City of Denton	1 (Urbanized area)
Cities of Garland, Rowlett, and Rockwall County	1
Cities of Grand Prairie and Mansfield	1
Cities of Irving and Coppell	1
Cities of Mesquite and Balch Springs	1
Cities of Plano, Allen, and McKinney	1
Cities of Richardson and Addison	1
Cities of Haltom City, Keller, Watauga, and North Richland Hills	1
Cities of Bedford, Euless, Hurst, Colleyville, and Grapevine	1
Cities of Lewisville, The Colony, and Flower Mound	1 (Urbanized area)
Cities of Duncanville, DeSoto, Lancaster, and Cedar Hill	1
District Engineer, Dallas District TxDOT	1
District Engineer, Fort Worth District TxDOT	1
Eastern Subregion Transportation Authority	1
Western Subregion Transportation Authority	1
Texas Turnpike Authority	1
TOTAL	**35**



- Congestion Pricing - Ad Hoc Subcommittee
- I.H. 35 Corridor Improvements - Ad Hoc Subcommittee
- Nominating and Bylaws - Ad Hoc Subcommittee

The Regional Transportation Council (RTC) adopted the Congestion Management System in October of 1993 as part of Mobility 2010 Plan Update: The Regional Transportation Plan for North Central Texas. The CMS is a dynamic decision-making tool, integrated with the transportation planning process and responsive to changing traffic conditions and trends. The Congestion Management System adopted by the RTC makes an initial assessment of congestion, identifies congested areas and systems, develops regional strategies, and targets resources toward the implementation of those strategies. As the Congestion Management System was being developed, the RTC met regularly to provide direction to the process.

Regular meetings and workshops were conducted over a nine-month period with the RTC and its committees.

TECHNICAL COMMITTEES

The RTC is assisted by four technical committees, which provide technical advice and review for the transportation planning process. The Surface Transportation Technical Committee (STTC) is made up of 54 staff personnel nominated[6] by their respective governments or agencies, and include City and County Transportation Directors, Directors of Public Works, and Transportation Engineers and Planners. The Surface Transportation Technical Committee roster is included in Appendix A. The membership of STTC includes at least one member from each jurisdiction and agency represented on the RTC, which fosters communication between the policy and technical aspects of transportation planning and programming.[7] Average attendance in 1994 was 32 members, plus 25 other individuals attending. This committee is an integral part of congestion management planning and programming in the region, and all matters regarding transportation system management come before this committee, including the development of CMS strategies in major investment corridors. The Travel Demand Management Committee (TDMC) promotes travel demand management activities and advises the RTC in all matters involving TDM in the 16-county region. The committee, which meets monthly, is a public/private partnership which promotes the development of a regional, integrated, balanced travel demand management program which relieves traffic congestion and reduces air pollution. During development of the CMS, this committee met regularly with STTC to give

[6]All of the Regional Transportation Council's committee members are appointed by the Executive Board of the North Central Texas Council of Governments.

[7]The minutes and attendance roster of all Surface Transportation Technical Committee meetings are provided each month to the Regional Transportation Council.

technical direction to the Plan Update and the CMS. Members of the TDMC are management-level professionals from local governments, agencies, and companies. The current Travel Demand Management Committee roster is included in Appendix A. Average attendance in 1994 was 14 members, plus 5 other individuals attending.

Two additional technical committees support the Regional Transportation Council. The Air Transportation Technical Advisory Committee meets as needed to provide technical expertise and review for the general aviation system planning process to the RTC. The general aviation system is the system of airports and heliports in the region which provides for general aviation and air cargo activity. The Transportation Providers and Users Task Force is a new group currently being organized. Membership will be sought from transportation providers and other groups who are not traditionally a part of the region's transportation planning and programming activities. In an effort to respond to ISTEA's call for greater public input, this group is being formed to provide valuable input from area citizens and multimodal interests. The result will be a more efficient and effective transportation system, and better integration of transportation modes.

Through the Regional Transportation Council and its committees and subcommittees, the congestion management system is being developed to increase the efficiency of this region's transportation system. Extensive work has been done recently by the Council and the Travel Demand Management Committee to develop a Regional Travel Demand Management Program for the area which combines public and private resources in encouraging carpooling, vanpooling, telecommuting and transit subsidy programs. Businesses in and around the urban area are provided with incentives to ridesharing, and the tools to implement programs in their organizations. The RTC and the Surface Transportation Technical Committee has produced a Regional Corridor Management Program which focuses on reducing traffic congestion caused by incidents and accidents. The program has identified critical gaps in Intelligent Transportation System infrastructure and in major and minor incident management programs currently being implemented. Working closely with representatives from the Texas Department of Transportation and cities in the region, several immediate-action strategies have been identified, which will complement the long-range corridor management planning being done in the area.

IV. BUILDING PARTNERSHIPS THROUGH COMMUNICATION

The passage of ISTEA marked a significant change in the law directing metropolitan transportation planning. ISTEA strengthens planning requirements and gives local elected officials more control over the destiny of their region. With this comes a greater responsibility to foster involvement from all aspects of the community. To effectively plan for and implement a transportation system which meets the needs and desires of its users, the public must participate in every step of the process.[8]

PUBLIC INVOLVEMENT PROCEDURES

Written notice of Regional Transportation Council (RTC) and technical committee meetings, accompanied by an agenda, are transmitted to members at least 72 hours prior to meetings. For RTC meetings, this information is also transmitted to major news media in the region, and council member attendance is confirmed by telephone. The agendas for RTC and Committee meetings are amplified and include a summary of each specific action and information item to be covered. A sample RTC agenda is included as Appendix B. All meetings are "open" as defined in Article 6252-17, Vernon's Annotated Civil Statutes.

North Central Texas Council of Governments' (NCTCOG) public involvement procedures for regional transportation planning, approved by the RTC in 1994, outline a proactive process for keeping the public apprised of transportation plans and programs, and for soliciting comments and input from all who desire to participate. In response to the requirements of ISTEA and the metropolitan planning rules, NCTCOG follows a public involvement process which includes the following components:[9]

- **Regular Public Meetings** - These are held prior to RTC approval of the Transportation Improvement Program (TIP), the Regional Transportation Plan, and the Unified Planning Work Program (UPWP).
- **Supplemental Public Meetings** - These are held prior to major TIP, UPWP, and Transportation Plan amendments.
- **Open Meetings** - Regional Transportation Council, Surface Transportation Technical Committee, Travel Demand Management Committee, Transportation Providers and Users Task Force, and Bicycle/Pedestrian Task Force meetings are held as open meetings as defined in Article 6252-

[8]Transportation Public Involvement Process; North Central Texas Council of Governments, June 1994.
[9]Ibid.

17, Vernon's Annotated Civil Statutes.

- **Government Applications Review Committee Meetings** - These meetings provide a forum for the review of applications for various federal and state programs as part of the Texas Review and Comment System.
- **Additional Public Information** - Additional information is available on a day-to-day basis through NCTCOG's Transportation Department and Public Affairs Department

A complete copy of the public involvement procedures developed by NCTCOG's Transportation Department is included as Appendix C. The procedures outline the transportation planning elements which trigger public involvement meetings, meeting dates, and comment periods for system-level transportation planning and programming. As transportation planning becomes more refined in corridor-level major investment studies, the level of public involvement required intensifies, and guidelines are being drafted at this time to ensure adequate and timely public input and review. One initiative currently under review is a mail-back public input survey for use in major investment studies. The survey, displayed in Exhibit IV-1, can be used in public participation meetings to aid in the identification of corridor transportation problems.

Public involvement is also fostered through staff presentations to local governments and to private sector organizations, including professional associations, neighborhood groups, civic clubs, and many others. When possible, meetings are held in conjunction with Texas Department of Transportation (TxDOT) public meetings in order to offer a comprehensive presentation of transportation planning, programming, design, and construction activities underway in the region. Recently, the MPO staffed a booth at a day-long TxDOT public meeting and answered many questions regarding transportation initiatives in the region.

NEWSLETTERS

NCTCOG's Public Affairs department produces and distributes a newsletter, titled Your Region, which explains and highlights NCTCOG activities, services, training opportunities, and special projects, including congestion management and other transportation-related activities. A copy of a recent Your Region, which is distributed to over 5,000 agencies and individuals, is provided in Appendix D.

The Transportation Department, in addition to providing articles in Your Region, also publishes LocalMotion, a monthly progress report provided to the Regional Transportation Council, and the

EXHIBIT IV-1
TRAFFIC IMPROVEMENT SUGGESTIONS

SUBMITTED BY:	**DATE:**
ORGANIZATION:	
ADDRESS:	
DAY PHONE: **FAX #:**	
PROBLEM DESCRIPTION:	**LOCATION DESCRIPTION:**
	Intersection/Address:
	City:
	SKETCH (If applicable)
ACTION SUGGESTED (If any):	
	(Indicate North if known)
	For Office Use Only
	Date Received:
	Routed To:
	Action:

Follow directions on other side to create envelope for mailing.

Surface Transportation Technical Committee (STTC). The newsletter features planning work underway, lists RTC and STTC attendance rosters, and highlights upcoming planning projects and events. A copy of LocalMotion is provided in Appendix D. Both newsletters are used to report on progress in the development of the congestion management system, and make good tools to inform and educate the general public about congestion mitigation activities underway in the region.

NCTCOG TRAINING SEMINARS

The North Central Texas Council of Governments regularly offers transportation training seminars to local governments and planning agency staff. The training seminars provide guidance and instruction in areas such as street and traffic signal maintenance, thoroughfare planning, geographic information systems, congestion management techniques, and any other transportation topics requested by local government staff. Emphasis is currently being placed on the training of public and private sector Employee Transportation Coordinators and Travel Demand Management training for local government staff in order to assist with the region's total congestion management program.[10]

PUBLIC OUTREACH THROUGH VIDEO

Two videos have been produced by NCTCOG to increase public awareness of traffic congestion and air quality issues in the region. The first, titled Your Future Is In The Air - A Message to Business Leaders in the Metroplex, is aimed at Chief Executive Officers (CEOs) in the region. In the video, CEO focus groups are used to explain the region's air quality nonattainment status and encourage other business leaders to establish Employee Trip Reduction programs, offer carpool and vanpool support to their employees, and subsidize transit passes for their employees, all initiatives that are called for in the region's Congestion Management Plan.

The second video, Your Future Is In The Air - A Message to Residents of North Central Texas, was developed as a companion to the first and targets a wide audience, including public sector employers, neighborhood groups, students, and the general public. It explains the relationship between travel and traffic congestion trends and air quality degradation, highlights public and private sector initiatives underway to mitigate traffic congestion and enhance air quality, and suggests ways residents can lower emissions on high pollution days.

The videos have been distributed widely and are being used by transportation authorities, local governments, businesses and schools to educate people about traffic congestion and air quality issues, and how transportation initiatives underway can help alleviate problems. The public sector video has been reproduced on high quality 3/4" tape and is being shown on local cable channels. Each video is approximately 12 minutes in length and was written and produced with professional video

[10]1994-95 Unified Planning Work Program for Regional Transportation Planning; North Central Texas Council of Governments, October 1994.

production personnel and equipment. A third video is planned, which will be developed as part of a regional incident management program, to help mitigate traffic congestion during traffic accidents and incidents. Using media such as these provides an effective way to educate the public and private sectors on transportation-related issues and building consensus on transportation programs and projects in the region.

REGIONAL TRANSPORTATION INFORMATION SYSTEM

The North Central Texas Council of Governments is currently implementing a computer access link to its communication and information services. All NCTCOG members and associated agencies are allowed free access to the system. Other users are considered on an individual basis. The initial system is a simple ASCII-based dial-up system which includes the following information:

- Transportation Improvement Program project tracking information
- Monthly calendar and progress reports
- Bulletins/news/publications
- Committee mailings, rosters, minutes

The system is being implemented as of this writing. Future capabilities of the system will include graphical user interface, uploading and downloading of files, and Internet access. It is viewed as another way to strengthen the communication necesary for effective planning.

BUILDING PUBLIC/PRIVATE CONGESTION MANAGEMENT PARTNERSHIPS

The Metropolitan Planning Organization provides technical information and regular updates on RTC activities to the Dallas Regional Mobility Coalition. The Coalition is made up of representatives of local governments who work to increase transportation investment in the Dallas area. The Dallas Regional Mobility Coalition monitors project implementation in the Dallas area and legislative actions affecting transportation policies, resources, and agencies. Recently, the Coalition commissioned a survey of public sector employers to determine the effectiveness of employee trip reduction programs. In a related project, NCTCOG produced a prototype public sector employee trip reduction program. The document is designed to guide public agencies in tailoring programs to meet the needs of their particular entity, and includes the following strategies:[11]

- carpooling/vanpooling
- subscription transit service/buspooling

[11]Employer Trip Reduction Strategies for Public Sector Employers; North Central Texas Council of Governments, Transportation Department; June 1994

- alternative work hours
- bicycling/walking
- parking management/preferential parking
- public transit

MPO staff serve as a technical liaison to the North Texas Commission, which is a public/private, membership-supported organization which seeks to enhance the area's economy by facilitating regional cooperation and action. The Commission has established a North Texas Regional Transportation Task Force to develop business support for transportation; to inform regional businesses of the critical needs and importance of the Metroplex surface transportation system; and to provide strong, unified private-sector support for the programs, projects, and funding requirements of NCTCOG's Regional Transportation Plan.[12] In addition, a North Texas Commission RAILTRAN Task Force is working for the implementation of the new RAILTRAN commuter rail line.

In another public/private initiative, the North Texas Commission has recently teamed up with NCTCOG, the Fort Worth Chamber, the Greater Dallas Chamber, Dallas Area Rapid Transit and the Fort Worth Transportation Authority to form the North Texas Clean Air Coalition. The Coalition is helping to implement a series of voluntary travel demand reduction measures to help the region reach its air quality goals. The Coalition is attempting to involve all elements of the community in cleaning up the air - businesses, the news media, government, education, and the public. The North Central Texas Council of Governments has taken a lead role in the establishment of this partnership and continues to support the Coalition by providing staff and office resources.

The Clean Air Coalition is the umbrella organization which will oversee the implementation of the Regional Travel Demand Management program. Staff will be hired to develop public and private trip reduction programs, including telecommuting, car and van pooling, guaranteed ride home programs, and transit pass subsidies. These congestion management strategies are proposed in the Congestion Management System, and public understanding and acceptance of them is growing.

Recently, the Richardson Telecom Corridor Clean Air Coalition has formed to join the regional travel demand management effort. Among its goals are to: (1) promote employee awareness of the ozone problem; (2) interact with local and state governments in the implementation of travel demand reduction programs; and 3) assist in the development of mass transit. The group, located in the Dallas urban area, is encouraging companies to adopt employee trip reduction programs which reduce home-based work trips by 25 percent. Efforts like these are critical in the implementation of the travel demand management aspects of congestion management, and more are being encouraged.

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[12]North Texas Commission Accomplishments, 10/93-9/94; North Texas Commission; DFW Airport, Texas.

V. EXPECTED ROLE OF THIS PROJECT

The goal of this project is to document the cooperative efforts among local governments and between private agencies which are necessary for incorporating CMS into the planning and programming of transportation projects. In addition to focusing on participants and procedures which facilitate institutional cooperation between local governments and industry involved in the congestion management and transportation planning processes, the following initiatives are part of this project.

CONGESTION MANAGEMENT SYSTEM WORKING GROUP

A group has been formed which will provide guidance to staff in the developing of performance measures, defining of congested networks and systems, outlining data collection responsibilities, advancing regional- and corridor-level TSM and TDM strategies, and other CMS-related tasks. The group is made up of STTC and TDM members, as well as other staff-level personnel. The working group meets as needed and is used to help generate ideas/solutions for CMS development. As CMS work plan tasks are addressed, this group has been very helpful as a "brainstorming" team to explore issues which can be addressed before they reach the technical and policy review bodies. A roster of the CMS Working Group is included in Appendix E.

TRANSPORTATION PROVIDERS AND USERS TASK FORCE

This group is being formed to provide valuable citizen input into transportation planning and programming activities at NCTCOG. The membership will be made up of intermodal transportation providers and others not traditionally included in the regional transportation planning process. It is expected that this task force will be especially helpful in defining congestion in new and useful ways. The "State of the Region" report, which is one of the expected products of the CMS, will seek to describe and define traffic congestion and travel trends for the non-technical reader. The Transportation Providers and Users Task Force will bring a layman's perspective to reports and newsletters of this nature, in addition to generating multimodal solutions to unique congestion problems.

MOBILITY MANAGEMENT NEWSLETTER

This newsletter will complement NCTCOG's other publications by providing information on transportation issues and initiatives, traffic congestion trends, and projects underway to provide mobility and alleviate congestion. The newsletter will be distributed widely and be oriented to the general public. NCTCOG has found that educational and informational tools of this type can go a long way toward building public support.

REGIONAL CORRIDOR MANAGEMENT VIDEO

A third video will be produced to support regional traffic management initiatives on freeways and arterials. Public agencies have expressed the need for education and training to aid in mitigating congestion problems associated with nonrecurring incidents. This video will be part of a public relations effort to increase drivers' understanding of how to report and respond to traffic incidents and accidents.

REGIONAL TRAFFIC MANAGEMENT FORUM

Area traffic management teams meet monthly to identify transportation system problems and develop low-cost solutions. The types of problems addressed include freeway bottlenecks, special events planning, effects of highway construction, and safety issues. The information and idea exchange has proven very valuable and generate cost-effective solutions. A regional traffic management forum is planned which will assemble traffic engineers, transportation planners, emergency response personnel, law enforcement, hazardous materials handlers, and others in the region who deal with incidents on the transportation system. This project is in the conceptual stage at this writing, and further research will help to provide direction regarding the specific goals to be accomplished in this forum.

VI. CONCLUSION

Through the efforts and initiatives outlined in this report, the North Central Texas Council of Governments is attempting to incorporate a "congestion management philosophy" into all aspects of planning and programming. Strong communication and information dissemination systems are in place, but efforts are underway to connect with individuals, agencies and groups which are not currently being reached. The Council of Governments has long had an informed, active policy body in the Regional Transportation Council, and they continue to provide the leadership necessary to solve difficult, complex transportation problems. Through new outreach mechanisms like interagency coalitions, seminars and forums, and video presentations, NCTCOG hopes to enhance public participation in the provision of transportation systems and services in the Dallas-Fort Worth region.

APPENDIX A:

REGIONAL TRANSPORTATION COUNCIL
AND COMMITTEE ROSTERS

Regional Transportation Council

Chairman
Commissioner
Dallas County

Vice Chairman
Councilmember
City of Hurst

Secretary
Councilmember
City of Dallas

Councilmember
City of Fort Worth

Mayor
City of Farmers Branch

Councilmember
City of Plano

Commissioner
Ellis County

Mayor
City of North Richland Hills

Councilmember
City of Dallas

Executive Director
Texas Turnpike Authority

Commissioner
Tarrant County

Commissioner
Johnson County

Commissioner
Collin County

District Engineer
TxDOT, Fort Worth District

Mayor Pro Tem
City of Mesquite

Representative
Fort Worth Transportation Authority

District Engineer
TxDOT, Dallas District

Councilmember
City of Grand Prairie

Mayor
Town of Flower Mound

Mayor Pro Tem
City of Arlington

Commissioner
Dallas County

Councilmember
City of Dallas

Councilmember
City of Denton

County Judge
Denton County

Councilmember
City of Richardson

Councilmember
City of Irving

Councilmember
City of University Park

Representative
Dallas Area Rapid Transit

Mayor
City of Cedar Hill

Councilmember
City of Fort Worth

Councilmember
City of Garland

Councilmember
City of Dallas

County Judge
Tarrant County

Mayor Pro Tem
City of Fort Worth

Vacant
Cities of Dallas and University Park

SURFACE TRANSPORTATION TECHNICAL COMMITTEE

RAILTRAN Manager
City of Fort Worth

Traffic Engineer
City of Farmers Branch

District Traffic Engineer
TxDOT, Fort Worth District

Manager of Development
Fort Worth Transportation Authority

Transportation Planner
Fort Worth Transportation Authority

Planner II
TNRCC

Director of Public Works
Town of Addison

Transportation Planner
TxDOT, Austin

Community Development Manager
City of Irving

Traffic Engineer
City of Mesquite

Director of Transportation
Planning and Development
TxDOT, Dallas District

Senior Manager
of Governmental Relations
Dallas Area Rapid Transit

Manager of Intergovernmental
Programs
City of Dallas

Assistant Director of Transportation
City of Dallas

Assistant Director of Transportation
City of Garland

City Engineer
City of Denton

City Traffic Engineer
City of Fort Worth

Senior Transportation Planner
Dallas County

Director of Public Works
Collin County

City Engineer, City of Waxahachie
Ellis County

Director of Engineering
City of Lewisville

Assistant Director
of Traffic and Transportation
City of Irving

Councilmember
City of Bedford

Director of Transportation
Planning and Development
TxDOT, Fort Worth District

Town Engineer
Town of Flower Mound

Executive Director
Texas Turnpike Authority

Director of Public Works
City of Grapevine

Director of Transportation
City of Richardson

Director of Public Works
Denton County

Assistant to the City Manager
City of Dallas

City Engineer
City of Euless

Director of Transportation Services
City of Grand Prairie

Director of Public Works
City of DeSoto

Director of Transportation
Tarrant County

Surface Transportation Technical Committee (Continued)

Assistant Director of Capital Improvements
City of Arlington

Government Affairs Officer
Tarrant County

Director of Planning and Growth Management
City of Fort Worth

Manager of HOV Programs
Dallas Area Rapid Transit

Director of Planning and Economic Development
City of Haltom City

Assistant Director of Transportation Planning
Dallas County

Director of Transportation
TxDOT, Dallas District

Transportation Planner
City of Garland

Director of Public Works
City of Duncanville

Director of Public Works
City of University Park

Assistant Director of Transportation
City of Arlington

Technical Services Engineer
City of Hurst

Director of Transportation
City of Carrollton

Transportation Planning Division
TxDOT, Austin

Director of Public Works
Johnson County

Transportation Engineer
City of Plano

Director of Economic Development
City of North Richland Hills

Deputy Director of Transportation and Public Works
City of Fort Worth

Road Administrator
Rockwall County

Regional Planning Engineer
TxDOT, Regional Planning Office

TRAVEL DEMAND MANAGEMENT COMMITTEE

Catherine Simpson, Chairman
Employer Service Administrator
Fort Worth Transportation Authority, the T

Marcos Fernandez, P.E., Vice Chairman
Transportation Planner
City of Plano

Sandra Wesch-Schulze, Secretary
Design Engineer/District Bicycle Coord.
TxDOT, Dallas District

Pauline Bloyd
Public Transportation Specialist
TxDOT, Fort Worth District

Katherine Collins
Program Administrator
Mobile Source - TNRCC

Pat Currin
Manager of Transportation
Texas Instruments

Allen Curry
Manager Governmental Relations
Greater Dallas Chamber of Commerce

Miguel Del Valle
Programs Manager
Central Dallas Association

Teri Echols
Senior Communications Coordinator
North Texas Clean Air Coalition

Cliff Franklin
Mobility Coordinator
North Central Texas Mobility Task Force

David A. Griffin
Executive Director
Dallas Regional Mobility Coalition

Linda Kenney
Employee Transportation Coordinator
City of Richardson

Lisa McMillan
Economic Development Coordinator
Tarrant County

Tony Mendoza
Manager of Commuter Services
Dallas Area Rapid Transit

Donna Parker
Vice President and Chief Admin. Officer
Fort Worth Chamber of Commerce

Richard Peterson
Transportation Planning Director
Dallas County

John T. Roach
Engineering Technician
City of Farmers Branch

Larry Sack
Director Office Administration
General Services Administration

Sue Scanlan
Special Transit Manager
City of Arlington

Scott Sopchak
Planning Assistant
TxDOT, Fort Worth

Brenda Stefka
Land Use Specialist
TxDOT, RPO

Joe Tague
Building Operations Services
JC Penney Company

AIR TRANSPORTATION TECHNICAL ADVISORY COMMITTEE

City Manager
City of McKinney

Airport Manager
City of Arlington

Aircraft Owners and Pilots
Association

Director of Public Works
Town of Addison

Director of Aviation
Love Field

Navy-Det.1
Carswell Air Reserve Base

Executive Director
DFW International Airport

Airport Manager
City of Mesquite

Manager, Planning & Programming
Texas Department of Aviation

Citizen Representative

Airport Planning Specialist
Federal Aviation Administration

Citizen Representative

Airport Manager
Grand Prairie Municipal Airport

Metroplex Helicopter Association

Greenville Airport Advisory Board

Airport Manager
Fort Worth Spinks Airport

Airport Manager
Denton Municipal Airport

Mayor Pro Tem
City of Mineral Wells

APPENDIX B:

SAMPLE REGIONAL TRANSPORTATION COUNCIL AGENDA

AGENDA

REGIONAL TRANSPORTATION COUNCIL
April 13, 1995
Transportation Board Room
North Central Texas Council of Governments

8:15 to 9:00 RTC Mobility 2010 Finance Subcommittee (Morris Parrish, Dick Bode, Tommy Brown, Bob Hampton, Armando Hernandez, Jack Miller, John Murphy, Phil Ritter, Chris Rose, Robert Stimson, Tom Vandergriff, Virginia Nell Webber)

9:00 Full Business Agenda

1. Minutes: The minutes of the February 9, 1995, meeting are included as Reference Item 1. Approval of the minutes will be requested.

2. Policy Background and Orientation to Today's Agenda (Possible Action) (15 Minutes): The RTC Mobility 2010 Finance Subcommittee is scheduled to meet at 8:15 a.m. prior to the full meeting of the Regional Transportation Council. The issues being discussed include the role of the RTC with regard to advocacy, standard language for MPO Statements for the Texas Transportation Commission (Reference Item 5), and a request from the National Association of Regional Councils (NARC) for local elected officials to adopt resolutions in support of taking transportation trust funds off-budget. A copy of the request is included as Reference Item 2. Subcommittee Chairman Morris Parrish and Michael Morris will report on the Subcommittee's discussions. A draft resolution regarding the NARC request may be presented for RTC consideration as part of this item pending the Subcommittee's recommendation. In addition, RTC Chairman Jim Jackson and Michael will brief the RTC on the recent Legislative Dinner and meeting with Governor George Bush as well as the North Central Texas delegation appearance before the Texas Transportation Commission on March 30. Michael will also summarize the purpose of today's meeting and provide background information on the following agenda items.

3. Transportation Improvement Program (Action) (15 Minutes): The North Central Texas Council of Governments (NCTCOG) staff continues to work in cooperation with staff members of the Texas Department of Transportation (TxDOT), transit authorities, local governments, and others to refine and implement the projects in the 1995 Transportation Improvement Program (TIP). Critical to the success of this effort are the TIP modification process and the monitoring of projects contained in the TIP and the State Implementation Plan (SIP). Regional Transportation Council (RTC) members are asked to encourage their local government staffs to complete the information needed for the TIP monitoring effort. This will enable NCTCOG to monitor SIP commitments and will provide important information for the development of the 1996 TIP.

   Reference Item 3.1 contains four TIP modifications that require RTC action to proceed. Reference Item 3.2 contains several administrative amendments to the 1995 TIP, which are provided for information. The last administrative amendment (Modification Number 95-69) in Reference Item 3.2 modifies the Eastern Subregion Transit Section 3 Program

to accommodate the Livable Communities Initiative. All potential Section 3 projects must be contained in the TIP as a prerequisite to application for those funds. NCTCOG, as the Metropolitan Planning Organization, has been asked to sponsor the Initiative, which provides connections from the DART transit system to the pedestrian network in downtown Dallas. A resolution authorizing the application is contained in Reference Item 3.3 and will be presented for RTC consideration.

The TIP identifies several projects as Principal Arterial Street System (PASS) and Metro PASS. In January, the Texas Transportation Commission adopted deadlines associated with the development and implementation of these projects. NCTCOG staff has inventoried all of these projects in Reference Item 3.4 and determined which are subject to the deadlines and face possible cancellation. Local governments may want to contact their TxDOT representative regarding the status of these projects.

Updated Surface Transportation Program--Metropolitan Mobility and Congestion Mitigation and Air Quality Improvement Program spreadsheets will be handed out at the meeting. The revised conformity analysis for the I.H. 30 project in eastern Dallas County has been forwarded to State and federal reviewing agencies. Copies will be available at the meeting. Everett Bacon will present these items, the monitoring effort for transportation control measures, and the 1996 TIP development schedule.

4. Section 16 Program (Action) (10 Minutes): As we previously stated in the March 2, 1995, letter to the Regional Transportation Council, two issues have arisen in regard to the selection of projects for the Section 16 Program. First, the Collin County Committee on Aging had originally been disqualified due to the submittal of their application after the January 2 deadline. NCTCOG and TxDOT staff reviewed receipts of delivery and learned that Collin County did send their application to TxDOT before the deadline. Second, TxDOT District staff learned that any surplus money originally allocated to the rural areas could be transferred to the urban program in the corresponding subregion. This action has allowed NCTCOG to reprogram the funds originally recommended to Collin County Committee on Aging without eliminating other projects that received funds as a result of Collin County being disqualified. Additionally, funds released from the Rural Program in the Fort Worth District allowed one van to be programmed to Trinity Terrace. Reference Item 4 contains the revised project funding summaries for the Dallas and Fort Worth Districts respectively. The Regional Transportation Council approved the projects for inclusion in the Transportation Improvement Program prior to the infusion of surplus rural funds into the Urban Program. Edward Owens will summarize this information and request final RTC approval of these additional funding allocations at the meeting.

5. MPO Statements Concerning Transportation Projects Being Presented to the TxDOT Transportation Commission (Possible Action) (10 Minutes): Following discussion in February by the RTC regarding projects from the Midlothian area to be presented to the Transportation Commission, Donna Halstead requested that the RTC address the need to develop a policy regarding the appropriate statements the RTC should make on transportation projects. These statements are being presented to the Transportation Commission for funding by delegations from North Central Texas. In response to this request, the RTC Finance Subcommittee will meet prior to the RTC meeting to address this issue. Attached as Reference Item 5.1 is an MPO Statement

regarding I.H. 35E which staff prepared in response to the DeSoto/Lancaster delegation's request as part of their presentation to the Commission on March 30. Reference Item 5.2 is a draft MPO Statement for RTC consideration regarding U.S. 77 which is being presented to the Commission in May by a delegation from Waxahachie. This statement may change pending discussion by the RTC Finance Subcommittee. Dan Kessler will present this item for possible action by the RTC.

6. 1995-96 Unified Planning Work Program (Information) (5 Minutes): Work has begun on the development of the 1995-96 Unified Planning Work Program for Regional Transportation Planning. Dan Kessler will present background information and a schedule for development of this document at the meeting. In addition, six planning projects were submitted to the Texas Department of Transportation for funding as part of the General Transportation Planning Fund (GTPF) Program. A copy of the application for each of these projects is provided in Reference Item 6.

7. Mobility 2020/DART Service Plan (Information) (15 Minutes): The mayors of Dallas Area Rapid Transit's member cities have requested that NCTCOG staff review the DART System Plan. All components of the Plan will be reviewed for their cost effectiveness. At the direction of the NCTCOG Executive Board, staff is conducting this review and preparing for a preliminary presentation to the mayors and DART members on April 20. Michael Morris will provide an overview of this effort to the RTC at the meeting.

8. Regional Corridor Management (Information) (10 Minutes): The Regional Corridor Management Subcommittee of the Surface Transportation Technical Committee met on Tuesday, March 21, 1995, to discuss projects for inclusion in the Regional Corridor Management element of the Transportation Improvement Program (TIP). Staff is currently working with the Subcommittee and project sponsors to refine submitted projects. Dan Rocha will brief the Council on the status of the Regional Corridor Management Program.

9. Transportation Information System (Information) (10 Minutes): The Transportation Department is working in cooperation with the Research and Information Services Department to develop an on-line transportation information system. Our goal is to have a dial-up access system in place through which member agencies and other interested parties can share and exchange information electronically. The initial phase of this project, the implementation of a simple dial-up bulletin board system which will include access to TIP files, is nearly complete. Michael Copeland will give a status report on this process and provide information about using the system. Additional information is included as Reference Item 9.

10. Progress Reports (Information): Progress reports are provided as Reference Item 10 on the following activities:

    - Texas Transportation Commission
    - Clean Cities Program
    - 1994-95 Unified Planning Work Program - Report on Project Completions and New Project Beginnings
    - Congestion Management System Performance Measures
    - Regional Travel Demand Management

- MPO-CEO Newsclipping
- RTC Attendance
- STTC Minutes and Attendance
- NCTCOG 1994 Annual Report
- Upcoming Events

11. Other Business (Old or New): This item provides an opportunity for members to bring items of interest before the group.

12. Next Meeting: The next meeting of the Council is scheduled for May 11, 1995, at 9 a.m. in the NCTCOG Transportation Board Room.

APPENDIX C:

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
TRANSPORTATION DEPARTMENT
PUBLIC INVOLVEMENT PROCEDURES

THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS'
TRANSPORTATION PUBLIC INVOLVEMENT PROCESS
(Effective June 1, 1994)

THE NEED FOR PUBLIC INVOLVEMENT

Transportation has been one of the most dominant influences over the development of modern society. It influences our lives on a daily basis. Our choices of where to live and work, and our recreational and social activities are all based to some degree on the characteristics of our transportation system. Over the past century, little has impacted many of the social and economic phenomena of our region as our transportation system has. Certainly, the decision-making process concerning this system which affects the lives of million of people on a daily basis, warrants the input of the audience it is designed to help–the public. To effectively plan for and implement transportation projects which meet the needs and desires of its users, the users must participate in every step of the process.

For many years, the public has only been involved in the decision-making process for major transportation projects as implementation was near or when formal public hearings were held as a result of environmental regulations. As a result, many projects have been needlessly delayed or stopped altogether, due to legal action taken by citizen and business groups.

PUBLIC INVOLVEMENT REQUIREMENTS

Prior to passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), there were no formal public involvement procedures for metropolitan transportation planning. However, all technical committee meetings and Regional Transportation Council meetings were open to the public, and meeting notices were mailed to several hundred interested parties. A concerted effort to contact private sector and government interests was achieved. In addition, local government hearings were held prior to the adoption of the Regional Transportation Plan and Transportation Involvement Program (TIP).

With the passage of ISTEA in 1991, came requirements for public involvement as part of the metropolitan transportation planning process. Specifically, ISTEA requires that "...each metropolitan planning organization shall provide citizens, affected public agencies, representatives of transportation agency employees, private providers of transportation and other interested parties with a reasonable opportunity to comment..." on the transportation plan and TIP. When the final rules for metropolitan transportation planning were issued, they contained additional guidelines in 23 CFR 450.316(b)(1). Eleven requirements are specified and are summarized in Appendix A, along with NCTCOG's response as to how the requirement will be met.

PUBLIC INVOLVEMENT COMPONENTS

In response to the requirements of ISTEA and the final metropolitan transportation rules, NCTCOG has developed a public involvement process which include five components as described below:

Regular public meetings which will occur prior to RTC approval of the TIP, the Regional Transportation Plan, and the Unified Planning Work Program (UPWP).

Supplemental public meetings which will occur prior to major TIP, UPWP, and Transportation Plan amendments.

Open meetings of NCTCOG's Regional Transportation Council (RTC), Surface Transportation Technical Committee (STTC), Travel Demand Management Committee (TDMC), the Transportation Providers and Users Task Force (TPUTF) and the Bicycle/Pedestrian Task Force.

NCTCOG's Government Applications Review Committee Meetings (GARC) which provide a forum for the review of applications for various federal and State programs as part of the Texas Review and Comment System (TRACS).

Additional public information is available on a day-to-day basis through NCTCOG's Transportation Department and Public Affairs Department.

- The following table contains details concerning each component of the public involvement process:

PUBLIC INVOLVEMENT COMPONENT	MEETING DATE	COMMENT PERIOD	ADDITIONAL COMMENTS
Public Meetings Transportation Improvement Program (including Air Quality Conformity)	At least 30 days prior to RTC approval	10 days	All public comments received on the TIP and Transportation Plan will be included in the documentation of the TIP and Transportation Plan. Whenever possible, all public meetings will be held concurrently as separate agenda items in the same meeting. Whenever possible, the Texas Department of Transportation's public meetings on the Project Development Plan will be held in conjunction with one of these meetings, most likely the TIP meeting. Each round of public meetings will consist of a series of three meetings at various locations around the region. A summary of all public comments, oral and written, will be provided to the RTC and technical committees.
Regional Transportation Plan (including Air Quality Conformity)	At least 90 and 30 days prior to RTC approval	10 days following each	
Unified Planning Work Program	Annually, in conjunction with one of the meetings above, at least 30 days prior to RTC approval	10 days	
Public Involvement Process	Annually, in conjunction with one of the meetings above (if changes reducing public involvement are proposed), at least 30 days prior to RTC approval	45 days	

PUBLIC INVOLVEMENT COMPONENT	MEETING DATE	COMMENT PERIOD	ADDITIONAL COMMENTS
Supplemental Public Meetings Major TIP Amendments	15-30 days prior to RTC approval	10 days	Supplemental public meetings will only be held when necessary. Major TIP amendments include those which are not covered by the RTC's administrative amendment policy (see Appendix B). A single, centrally located meeting will be held.
Regional Transportation Plan Amendments	15-30 days prior to RTC approval	10 days	
Unified Planning Work Program Amendments	15-30 days prior to RTC approval	10 days	
Open Meetings Regional Transportation Council	Regular meeting on second Thursday of each month	N/A	Administrative amendments to the TIP and other items not specifically requiring public involvement will be presented and discussed at the RTC and technical committee meetings.
Surface Transportation Technical Committee	Regular meeting on fourth Friday of each month	N/A	
Travel Demand Management Committee	Regular meeting on third Wednesday of each month	N/A	
Transportation Providers and Users Task Force	Regular meeting scheduled to be determined	N/A	A portion of the TPUTF will be dedicated to public involvement TPUTF minutes will be provided to RTC, STTC, and TDMC for review and consideration.
Bicycle/Pedestrian Task Force	Regular meeting on last Wednesday of each month	N/A	
Government Applications Review Committee Meetings	Regular meeting on second Friday of each month	N/A	Various federal and State programs are reviewed for regional consistency under the Texas Review and Comment System.

PUBLIC INVOLVEMENT COMPONENT	MEETING DATE	COMMENT PERIOD	ADDITIONAL COMMENTS
Additional Public Information			
Technical Assistance	Provided daily	N/A	All requests for technical assistance and presentations should be coordinated through NCTCOG staff.
Staff Presentations	As requested	N/A	
Publications			Publications are available by contacting NCTCOG's Public Affairs Department
Local Motion, Your Region	Published monthly	N/A	
Transportation Annual Report	Published periodically	N/A	
Technical and Final Reports	Published periodically	N/A	
All-Ways Update	Published Quarterly	N/A	
Inside Environmental Resources	Published monthly	N/A	

NOTIFICATION OF PUBLIC INVOLVEMENT ACTIVITIES

All public meeting notices will be sent to selected newspapers, as necessary to ensure regional coverage, local public entities, chambers of commerce (including minority chambers), and the Texas Register. In addition, NCTCOG will maintain a comprehensive mailing list containing the names of individuals and organizations who wish to be contacted prior to all public meetings. To be included on the mailing list, please submit the attached Public Notification form.

For additional information on the North Central Texas Council of Governments' Transportation Public Involvement Process, contact NCTCOG's Transportation Department

North Central Texas Council of Governments
P. O. Box 5888
Arlington, Texas 76005-5888

(817) 695-9240 metro
FAX (817) 640-3028 metro

PUBLIC NOTIFICATION
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
TRANSPORTATION DEPARTMENT

Please add my name to the Public Notification list:

Name: _____

Title: _____

Agency: _____

Address: _____

_____

Phone: _____

Please mail or fax to:

Transportation Department
North Central Texas Council of Governments
P.O. Box 5888
Arlington, TX 76005-5888
Fax (817) 640-3028

Appendix A
Summary of Public Involvement Requirements
23 CFR 450.316 (b)(1)

REQUIREMENT	NCTCOG RESPONSE
(i) Development of Public Involvement Process	Three public meetings to be held January 31 February 1, and February 2, 1994 with a 45-day written comment period following the final public meeting.
(ii) Provide timely information on transportation issues	Information will be disseminated through NCTCOG's publications, reports, regular public meetings, supplemental public meetings, and open meetings.
(iii) Provide reasonable public access to technical and policy information	Public and open meetings are held by the Regional Transportation Council, Surface Transportation Technical Committee, Travel Demand Management Committee, Transportation Providers and Users Task Force, and the Government Applications Review Committee; other technical assistance is provided as requested.
(iv) Facilitate public involvement in development of Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP)	Public meetings will be held during development of the TIP and RTP as well as upon proposal of any major amendments to these documents.
(v) Public comments to be considered as an integral part of planning process	All public comments will be reviewed and considered by the RTC and Technical Committees.
(vi) Seek out and consider needs of the historically underserved	A comprehensive mailing list will be developed and maintained. Inclusion on mailing list will be by written request. A Transportation Providers and Users Task Force will be created.
(vii)Public comments will be part of the final RTP and TIP	Public comments received on the TIP and the RTP shall be included in documentation of the TIP and the RTP.
(viii) Revisions to the TIP or RTP based on public comments will be made available to the public	If the TIP or RTP requires revisions, an additional public meeting will be scheduled.
(ix) Review of Public Involvement Process (PIP)	NCTCOG will review its PIP annually in conjunction with RTP and TIP meetings. If modified in a more restrictive fashion, a 45-day comment period will be held following the meeting.
(x) Federal Highway Administration/Federal Transit Administration review of Public Involvement Process	NCTCOG's PIP will be transmitted to FHWA and FTA and published as part of the RTP and the TIP. Minutes, comments, and responses of all public meetings will be transmitted to the appropriate FHWA and FTA officials.
(xi) Coordination with Statewide Public Involvement Process	Whenever possible, public meetings will be coordinated with the Texas Department of Transportation's Project Development Plan process.

APPENDIX B
Transportation Improvement Program
Administrative Amendment Policy

The 1994 Transportation Improvement Program list of projects is constrained against available resources for each of the nine years of the Program. Therefore, all projects in Year 1 are of equal high priority. Since the Program is balanced to available resources, cost overruns would result in the potential of high priority projects being delayed into Year 2. Several other types of actions result in the need to have a dynamic TIP monitoring program. Such items as cost underruns, local governments unable to meet local match requirements, lawsuits, delays in right-of-way or utility clearances, and local governments not endorsing either federal environmental or state design requirements and wishing to pursue the project with local funds are additional examples of potential changes that could occur as a result of TIP implementation.

The current policy of the RTC is higher scored projects will be implemented first only if early construction is feasible and funding caps are not violated. Therefore, changes listed above could lead to projects being expedited or delayed. Diligent monitoring with frequent regular briefings to the Regional Transportation Council is essential. The following RTC policy permits administrative amendments by the NCTCOG Director of Transportation between regularly scheduled RTC meetings:

Project included in the first three years of the TIP Roadway Section and Transit Section may be amended by the RTC at any time. Revisions are usually first submitted for review by the Surface Transportation Technical Committee or the Travel Demand Management Committee. The Technical Committees recommended a position on each revision to the RTC and the Government Applications Review Committee. The RTC acts on the Committees' recommendations. GARC considers the Technical Committee recommendations and recommends action for the NCTCOG Executive Board.

An amendment can be submitted directly to the RTC to preclude the normal review processing sequence if rapid turnaround is important. If the project is approved by the RTC, it is submitted to GARC for TRACS review and then to the Executive Board for final action.

The TIP is intended to be a current and accurate listing of transportation projects proposed for federal funding. This document is used by federal agencies to assure that local governments support projects for which federal funding has been requested. Timely revisions to the TIP are important to avoid funding delays. The RTC has endorsed the following amendment policy.

Administrative amendments are permitted:

- For up to 20 percent of any project up to $3,000,000 and
- For up to 15 percent of any project over $3,000,000

Administrative amendments would not be permitted in the following situations:

- Adding a previously unprogrammed project
- Completely eliminating or deleting a project
- Substantially changing the nature of a project

It may be necessary to change the priority of a project under cost overrun conditions. However, federal law only allows priorities to change during the course of the fiscal year for projects listed in the first three years of the TIP. Furthermore, TxDOT would first permit higher spending for the MPO from TxDOT funding caps. All efforts would be made to fund any cost overruns through existing TIP surplus before delaying other projects. Both STTC and the RTC would be notified of an administration amendment at their next meeting.

APPENDIX D:

NCTCOG PUBLICATIONS -
YOUR REGION, LOCALMOTION

Your Region
North Central Texas Council of Governments
Vol.28/Aug-Sept1994/Nos.8,9

Understanding Transportation Planning and Air Quality Conformity

In the first part of the decade, Congress recognized and legislated a linkage between **clean air goals** and **transportation projects.** The first piece of legislation enacted was the *Clean Air Act Amendments of 1990* (CAAA) and the second was the *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA), the federal government's highway and mass transit funding mechanism. When the Clean Air legislation became law, the Dallas-Fort Worth area was designated as a "moderate" nonattainment area for ozone. As required by the Act, the State of Texas must submit an air quality *State Implementation Plan* (SIP) which documents how emissions will be reduced and the ozone standard achieved. The Clean Air Act Amendments mandate that transportation planning be consistent with the SIP. This ensures that federal transportation actions are consistent with the State Implementation Plan for achieving good air quality.

To complement the requirements that transportation projects assist in improving air quality, these pieces of legislation did two major things. First, the Clean Air Act required that federally funded transportation projects scheduled for implementation through a coordinated planning process must demonstrate that they will help to **reduce ozone pollutant levels** by being subjected to a rigorous conformity analysis. And, ISTEA created a **new funding category** called "Congestion Management/Air Quality" (CMAQ). In this region, CMAQ funds can be used *only* inside the nonattainment area (Collin, Dallas, Denton, and Tarrant counties). These funds must be spent on projects such as intersection improvements, traffic signal improvements, high occupancy vehicle lanes, travel demand management programs, and bicycle/pedestrian facilities so that vehicle miles of travel, congestion, and motor idling times can be reduced.

NCTCOG, as the Metropolitan Planning Organization (MPO) for regional transportation planning, is conducting an **air quality conformity analysis** of the *1995 Transportation Improvement Program* (TIP) and *Mobility 2010*, the Regional Transportation Plan. Both must "pass" the following **three tests:**

1. volatile organic compound (VOC) emission budget test,
2. nitrogen oxide (NOx) build vs. no build test, and
3. timely implementation of transportation control measures.

Regarding conformity test number one, the *State Implementation Plan* establishes a **VOC "budget"** that sets the maximum amount allowable for the Dallas-Fort Worth nonattainment area. The VOC budget test is performed by comparing the mobile source emissions that will result from implementation of the TIP and Regional Transportation Plan with the emissions budget in the State Implementation Plan.

The **NOx test** (conformity test number two) differs from the VOC test in that NOx emissions that will result from the implementation of the TIP and Metropolitan Transportation Plan must be lower than the NOx emissions without implementation. The transportation control measures in the State Plan target VOC emissions

(see CONFORMITY on next page)

(CONFORMITY continued)

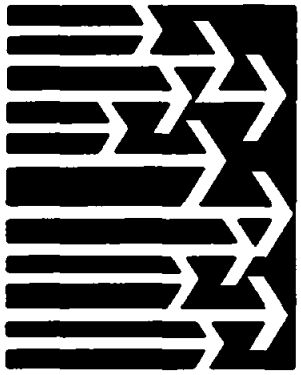
which may have negative impacts on NOx emissions. NOx and VOC emissions are precursors to the formation of ozone. The Texas Natural Resource Conservation Commission (TNRCC), as the author of the State Implementation Plan, has studied the relationship between these two emissions and determined that NOx reductions are not required for attainment of the ozone standard in this region. Therefore, TNRCC has filed a request for an NOx waiver with the U.S. Environmental Protection Agency.

Finally, the third conformity "test" is assurance that the transportation control measures specified in the State Implementation Plan will be **accomplished on schedule** through implementation of this region's Regional Transportation Plan and the Transportation Improvement Program (the primary funding mechanism for the control measures).

It is very important that this region's transportation documents pass the air quality conformity tests so that future federal and state transportation improvement projects in this area may proceed and meaningful emission reductions can be achieved.

For more information, call **Ken Kirkpatrick** in NCTCOG's Transportation Department, (817) 695-9280

NCTCOG Continues To Collect Travel Survey Data



Workplace Surveys Conducted in September, October, November

In conjunction with the Texas Department of Transportation (TxDOT), NCTCOG will be conducting **workplace travel surveys** in the Dallas-Fort Worth Metropolitan Area during September, October, and November this year. The surveys will provide important travel characteristics of employees and visitors at approximately 300 randomly selected establishments in a 5;000 square-mile area, consisting of all of Collin, Dallas, Denton, Rockwall, and Tarrant Counties, and portions of Ellis, Johnson, Kaufman, and Parker Counties. The information collected from these surveys will help NCTCOG, TxDOT, and local agencies in planning future transportation improvements for the area.

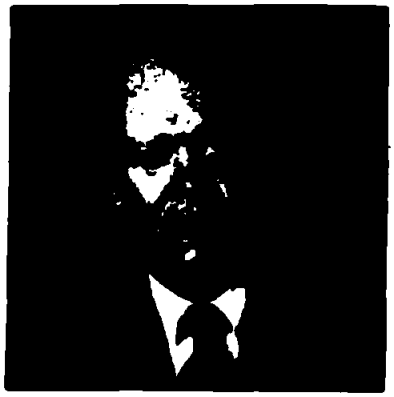
The random sample of approximately **300 workplaces** (stratified by business type and number of employees) was obtained from a Dun & Bradstreet database that lists 29,000 employers in the Metroplex that have ten or more employees at a specific physical location. Once a sample has been selected and the address information verified by telephone, a letter describing the survey will be mailed to the Chief Executive Officer, business owner, or other responsible person. About a week later, this individual will be called to gain approval for NCTCOG to conduct a one-day survey during normal weekday hours of operation. With the permission of the employer, survey forms will be completed by employees on the same day that some of the visitors entering the establishment are interviewed.

These surveys are part of a two-year **regional travel survey program** that is paid for through state and federal transportation planning funds. Other surveys include roadside travel surveys, household surveys, and transit surveys, and are necessary for planners and engineers at the local and state levels to better understand traffic and transit flows, congestion levels, and other aspects of the trips people make every day. This information is a key step in planning and providing for a more efficient transportation system in the Metroplex.

Although considerable information will be collected, NCTCOG will take extreme care to see that individual traveler data and employer data is kept confidential. Only **aggregate summaries** will be used to document current travel characteristics, forecast travel needs, and plan for future transportation improvements in theDallas-Fort Worth area.

The last time a workplace travel survey was conducted by NCTCOG was in 1984. Those employers who are contacted through the random sampling process are encouraged to cooperate and participate in this important 1994 update. For more information about the workplace surveys, call **Ken Cervenka**, Principal Transportation Engineer, in NCTCOG's Transportation Department, (817) 695-9240.

Meet Your Board



Ron Harmon, Johnson County Commissioner, is serving his first term as a director on NCTCOG's 1994-95 Executive Board.

Mr. Harmon, senior commissioner in Johnson County, is running unopposed in the upcoming election for his third 4-year term. He is former vice president of the Burleson Area Chamber of Commerce and of the American Cutting Horse Association. He is coordinator of Johnson County's 9-1-1 Program, and a member of a steering committee working to provide extended area metro telephone services across the state. He is a member of NCTCOG's 9-1-1 Regional Advisory Committee and chairs its Public Information & Training Subcommittee. He is Johnson County's representative to the Regional Transportation Council and serves on NCTCOG's Regional Automated Fingerprint Identification System Review Committee.

Mr. Harmon is former city manager of Burleson and assistant city manager of Odessa, and managed Craftool Company, a division of Tandycrafts. He attended the University of Central Oklahoma on a football scholarship and is a tournament racquetball player. He and his wife, Paula, have five children.

Jack Miller, Councilmember, Denton, is serving his first term as a director on NCTCOG's 1994-95 Executive Board.

Mr. Miller is a second-term at-large councilmember in Denton. He is past chairman of the Denton Chamber of Commerce. He has served as president of the Denton Rotary Club, Denton Personnel Association, Denton Community Theatre, and Ann's Haven Hospice. He is a past general campaign chair of the Denton County United Way. He chairs NCTCOG's Private Industry Council and is Denton's representative on the Regional Transportation Council

Mr. Miller, is president of Jack D. Miller & Associates, Inc. - a human resource consulting organization. Active in human resource and general management for more than 30 years, he has also taught undergraduate and graduate human resource courses as an adjunct professor at Texas Woman's University in Denton.

Mr. Miller holds a bachelor's degree in psychology and a master's degree in counseling from the University of North Texas, as well as a Masters of Business Administration from the University of Chicago.

Tom Vandergriff, County Judge, Tarrant County, is a director on NCTCOG's 1994-95 Executive Board. This is not Mr. Vandergriff's first term — he was the founding president of NCTCOG in 1967 while he was Mayor of Arlington

Arlington had less than 8,000 people when Mr. Vandergriff began his 26 years as mayor. He was involved with elevation of the University of Texas at Arlington to senior college status, construction of DFW International Airport, and the rise of this region's tourism industry, having worked for the location in Arlington of Six Flags Over Texas, Wet 'n Wild, and major league baseball.

While serving as a U.S. Congressman, Mr. Vandergriff received a National Service Award presented by the Texas Association of Home Health Agencies. He was also honored by the American College of Emergency Physicians as their "Legislator of the Year."

Mr. Vandergriff served on a White House Commission on Urban Problems, was the first chairman of the Texas Advisory Commission on Intergovernmental Relations, and served as the initial chairman of the Fort Worth and Tarrant County Convention Center.

YOUR REGION IN ACTION

During the August 17 meeting ***Richard "Dick" Lewis,*** *(l) retired Building Official, Fort Worth, and* ***L. A. Murr,*** *(middle), retired electrical contractor, receive "certificates of appreciation" for their service on NCTCOG's Regional Code Coordinating Committee by Chairman* ***Charles Clawson,*** *Director of Community Development, Arlington.*

Representatives from the ***City of Cedar Hill*** *(upper photograph) and* ***Tarrant County*** *(photograph, right) interact with students enrolled in NCTCOG's Urban Fellowship and Transportation Fellowship Programs during an August 5, 1994 "Job Fair" in NCTCOG's offices. This first-ever, one-day event involving 30 local governments across the region brings together students and potential employers offering internship and full-time positions.*

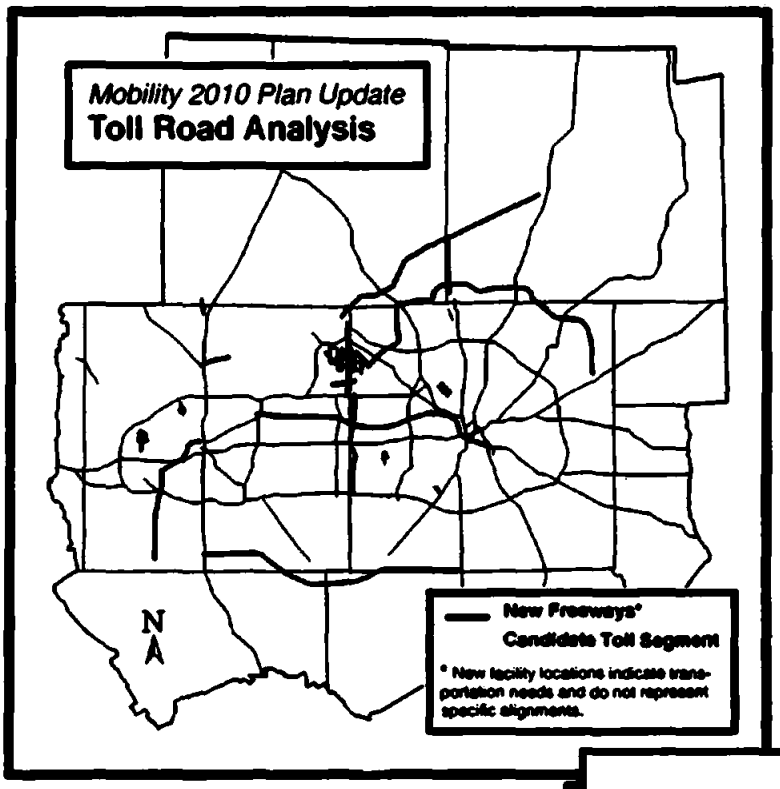
D.4

During the July 14, 1994 meeting of the Regional Transportation Council (RTC), several guests join in celebrating 20 years of NCTCOG serving as the "Metropolitan Planning Organization" for regional transportation planning including (back, l-r) Ed Galligan, RTC Chairman, 1991-92; Jim Jackson, RTC Chairman, 1993-present; Tom Vandergriff, Steering Committee Chairman, 1974-76; and (seated, l-r) Dan Matkin, Regional Transportation Policy Advisory Committee Chairman, 1976-78; Art Martin, RTC Chairman, 1992-93; and Bill Pitstick, NCTCOG Executive Director, 1966-92.

NCTCOG Completes Technical Analysis of Potential Toll Roads

NCTCOG's Transportation Department recently completed a technical analysis of **potential toll roads** for the Dallas-Fort Worth area. This effort is in response to the financial shortfall identified in NCTCOG's *Mobility 2010 Plan Update*. Both the Regional Transportation Council and the Texas Transportation Commission have endorsed policies that require all future freeways to be studied as potential toll roads. The ability to stretch federal transportation dollars that are returned to the states is becoming increasingly important. Many areas of the country, including Dallas, have already recognized the benefits of building transportation facilities with user fees. The Dallas North Tollway is an excellent example of the potential for toll road development in North Central Texas.

NCTCOG's analysis, produced in cooperation with the Texas Turnpike Authority (TTA) and the Texas Department of Transportation (TxDOT), has identified **future transportation facilities** considered the best technical candidates for alternative financing through the use of tolls. The analysis has resulted in a short list of candidate toll road projects which will require additional study before any project could be carried through to construction.



When traditional public funding may be insufficient, tolls are being considered as an alternative financing source for *new construction only*. Toll revenue financing is not being considered for conversion of existing free roads.

In July, the Regional Transportation Council adopted a resolution with the following points:

- develop a short list of potential toll roads for additional study;
- send short list to the Texas Turnpike Authority for consideration;
- TTA, TxDOT, and NCTCOG should prioritize the list;
- TxDOT should report on its ability to construct these projects as freeways;
- NCTCOG will assist TTA in further study;
- a toll road option will continue to be considered on a project until the RTC removes it from the short list.

The next step in this process is additional, thorough technical review of the short-listed projects by the Texas Turnpike Authority, as the implementing agency. For more information call **Michael Copeland** in NCTCOG's Transportation Department, (817) 695-9240.

Potential Toll Road Projects

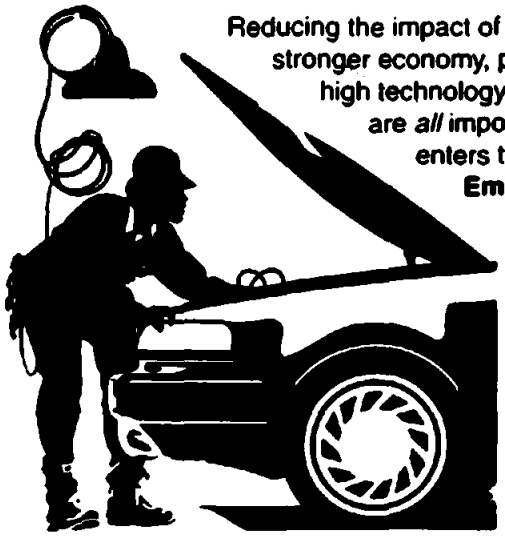
New Freeways on New Right-of-Way:

1. **West Fork Trinity: I.H.820 to Trinity Parkway**
2. **Trinity Pkwy/Santa Fe Bypass: I.H.35E to U.S.175, Trinity Pkwy to I.H.30**
3. **S.H.190: I.H.35E to I.H.30**
4. **Super Connector: I.H.35E to I.H.635**
5. **S.H.161: I.H.635 to Belt Line**
6. **S.H.121 (freeway lanes): International Parkway to F.M.2281**
7. **S.H.121 Extension (SW Freeway): I.H.35W to Sycamore School Road**
8. **DFW East-West Connector: S.H.360 to S.H.161**

Express Lanes:

9. **I.H.635: I.H.35E to U.S.75**
10. **I.H.35E: F.M.407 to I.H.635**

Alternative Fuels Job Training Promotes Cleaner Air



Reducing the impact of defense cuts, building a stronger economy, providing well-trained workers in high technology jobs, and creating cleaner air are *all* important as North Central Texas enters the next century. NCTCOG's **Employment & Training Program** and its Title III Service Providers for Dislocated Workers are participating in a project that is the first of its kind in the nation. In a collaborative effort with the Texas Railroad Commission and the Texas Employment Commission, this innovative program will assist public and private fleets in the conversion from gasoline and diesel fuel to cleaner burning alternatives.

The Railroad Commission's LP Gas & Alternative Fuels Research and Education Division will provide **training** in *Alternative Fuels*, including how to **convert vehicles** to the cleaner burning fuels. The training will provide private industry, the state, cities, and other local governments with well-trained workers who understand the safe use of fuels such as compressed natural gas and liquefied propane gas. The training also will address engine operations, emissions, fuel systems, and a variety of safety considerations. Two federal grants from the Department of Labor and theDepartment of Energy are funding the program.

The Railroad Commission believes that by the turn of the century, 10,000 to 15,000 **new jobs** will be created to convert public and private fleet vehicles to alternative fuels. These jobs will be created, in part, as a result of *Senate Bill 740* which mandates fleet conversions for school districts, state agencies and, state transit authorities.The Bill also impacts local governments, by requiring the conversion of city transportation fleets and some private fleets in 21 counties located in areas designated as "non-attainment" for meeting national air quality standards.

Over the next 10 months, approximately 300 workers laid off by the defense industry will be trained as "experts" in alternative fuels technology in order to meet the demands of this emerging occupation. The program goal is to have enough **certified alternative fuels employees** to meet any upcoming federal requirements.

Upon completion, the trainees will be prepared to work for companies, governmental organizations, and school districts either in **mechanical or managerial roles** within fleet management. All alternative fuels courses will incorporate the latest technology with "hands-on" and computer-assisted training in actual conversion, drivability, and emissions testing. Both Dallas and Fort Worth have sites for this initial phase of training. The first 4-6 hour classes began August 22, and new classes start every six weeks.

Each of this region's six Private Industry Councils (Collin County, Dallas County, Dallas, Tarrant County, Fort Worth, and NCTCOG serving the other 13 counties) has been allotted an equal number of enrollment slots. Approximately 20 classes will convert current fleet vehicles for alternative fuels and existing fleet owners may provide vehicles to the training classes for conversion (converted vehicles are returned upon course completion).For more information, call **Julio Torres** or **Lee Ann Ausec**, Employment & Training Program, NCTCOG Department of Human Services, (817) 695-9180 (metro).

D.7

NEW ★★★★ Bloodborne Pathogens Course

Bloodborne pathogens are pathogenic microorganisms present in human blood that can cause disease. These pathogens include but are not limited to Hepatitis B Virus and Human Immunodeficiency Virus (HIV).

Local government employees in animal control, health & safety services, emergency medical, law enforcement, or solid waste and wastewater treatment potentially could be exposed.

Several cities in the region now require specialized training. To meet this need, NCTCOG's **Regional Training Center** offers *Bloodborne Pathogens Awarness & Control*. The course, taught at local government sites at special discounted rates can be tailored to meet specific needs.

For more information, call **Vesta Spitsnaugle** in NCTCOG's Regional Training Center, (817) 640-8251.

CALENDAR
NCTCOG Committes

October

4 JTPA Subcontractors Training, 9:30 am

5 Storm Water Quality Subcommittee, 1:30 pm

6 Urban Fellowship Seminar, 8:30 am

Water Resources Council, 10:00 am

12 Air Quality Advisory Committee, 1:30 pm

13 Urban Fellowship Seminar, 8:30 am

Travel Demand Mgmt. Committee & Surface Transportation Technical Committees, 9:00 am

City Managers Advisory Committee I, 9:00 am

13 City Managers Advisory Committee II, 1:30 pm

Resource Conservation Council, 1:00 pm

14 Government Applications Review Committee, 10:00 am

Trinity River Flood Management Task Force, 1:30 pm

# # #

CALENDAR
Regional Training Center

October

3- *Unit III: Groundwater,* 8:00-5:00
5 (first 2 days), 8:00-noon (3rd day), $90/person

5 *Managing Conflict,* 8:30-12:30 pm, $90/person

6 *Attitude Works,* 8:30-4:30 pm, $70/person

10- *Unit II: Wastewater Treatment*
12 *Process,* 8:00-5L:00 (first 2 days), 8:00-noon (3rd day), $[illegible]/person

12 *Dealing with Opposite Thinkers,* 9:00-4:00 pm, $90/person

13 *Recognizing Substance Abuse in the Workplace,* 8:30-12:30 pm, $55/person

For more information, call NCTCOG's Regional Training Center at (817) 640-8251 (metro).

Your Region is available without cost. Inquiries and suggestions should be addressed to NCTCOG's office at the address below, or by calling (817) 640-3300. In compliance with ADA and other applicable laws, this publication can be made available in alternate formats upon request.

North Central Texas Council of Governments
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Arlington, Texas 76005-5888

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LOCAL MOTION

Regional Transportation Planning Progress Reports APRIL 1995

TEXAS TRANSPORTATION COMMISSION

The Texas Transportation Commission met on Thursday, March 30, 1995, in Austin. At that meeting, two delegations from our region appeared before the Commission. The first delegation was comprised of regional representatives from various cities, counties, and private enterprises who presented the long-range transportation needs and critical funding issues facing the North Central Texas region. Details regarding the presentation will be provided during Reference Item 2 at the meeting. The second delegation, from the Cities of DeSoto and Lancaster, presented information supporting the expedition of the freeway widening and interchange improvements scheduled for I.H. 35E from Parkerville Road to I.H. 20 in south Dallas County. In other action, the Commission authorized the allocation of Federal Transit Administration Section 16 funds.

CLEAN CITIES PROGRAM

The Clean Cities Program is a partnership program between local governments, State agencies, businesses, industry, and the federal government that is designed to promote the implementation of alternative fuels and alternative fuel vehicles. This program will help communities comply with regulations mandated by federal legislation such as the Clean Air Act and Energy Policy Act, as well as State legislation regarding alternative fuel implementation. The local stakeholders will be working together to tailor the Clean Cities Program's objectives, choices of fuels, and support systems according to this region's needs and resources. The Dallas-Fort Worth Regional Clean Cities Technical Coalition is being formed to provide technical review, support, and administration to perform the basic work for the Clean Cities Program. A logical division of contact is specified by having the North Texas Commission administer to private sector contacts while NCTCOG administers to public agencies. NCTCOG will act as the single point of contact for the Clean Cities Program.

The U.S. Department of Energy (USDOE) has given the Dallas-Fort Worth area the highest priority level for expanding the use of alternative fuel vehicles by the federal fleets in this region. The designation plan prepared by NCTCOG for the Dallas-Fort Worth Regional Clean Cities Program was forwarded to the USDOE on March 30, 1995, for their review. A ceremony for signing a memorandum of understanding is anticipated by the end of May, pending USDOE approval of the designation plan. A Signature Committee, composed of elected officials and business leaders, will demonstrate the local commitment to the Clean Cities Program through the signing of the memorandum of understanding. Those officials that have not already committed to participate in the signing ceremony are requested to contact Wesley Beckham, Senior Transportation Engineer, NCTCOG's Clean Cities Coordinator.

1994-95 UNIFIED PLANNING WORK PROGRAM - REPORT ON PROJECT COMPLETIONS AND NEW PROJECT BEGINNINGS

Each month as work is being completed on tasks of the Unified Planning Work Program (UPWP), staff is making available to the technical committees and the Regional Transportation Council copies of documents which are prepared as part of each project. The following technical reports are now available from work completed during the first two quarters of the fiscal year.

UPWP Task 3.09 FWTA Management Studies - Service Analysis and Development Plan

This study was conducted by LKC Consulting Services. The goal of the Service Analysis and Development Plan for the Fort Worth Transportation Authority (the T) was to report objectively on the T's current productivity and to recommend methods for serving new transit markets. The study consisted of analyzing the performance of current fixed-route service, identifying route and service design standards, developing a performance monitoring system, and detailing enhanced service concepts to target new markets. The final report is available for distribution.

UPWP Task 3.10 DART Management Studies - DART Fixed-Route Service Review

DART has a number of major capital projects underway that will affect the future delivery of fixed-route services. These facilities include the light rail transit (LRT) starter system, commuter rail system, Central Business District (CBD) transfer center, high occupancy vehicle (HOV) lanes, and additional transit centers outside of the CBD. The firm of Booz-Allen & Hamilton Inc. was selected to assist DART planning efforts in assessing the overall bus system performance; refining the bus/LRT feeder plan to develop a bus interface; planning for a new commuter rail service, including estimation of cost impacts; assessing the need for additional crosstown service; and filling in any gaps in the existing grid network. Also included in this effort was the development of a CBD Transfer Center Plan, including assignment of bus routes to either the East or West Transfer Centers, routing changes, and berthing assignments. The consultant examined DART's privatization strategy, including evaluation of potential operating cost savings from a facility for contract operations and contracting additional routes. Copies of the final report and executive summary are available from NCTCOG.

UPWP Task 5.01 Highway Pavement of Federal Aid Highways - Pavement Management Systems Report

A new technical publication is available which was developed through UPWP Element 5.01, Highway Pavement of Federal Aid Highways. The report is titled Pavement Management Systems Evaluation Report: Recommended Specifications for Network-Level Pavement Management Systems for North Central Texas. The Pavement Management Task Force, representing local public works officials, NCTCOG staff, TxDOT Districts, and consultants has provided oversight of the pavement management project and report. This report provides general guidelines for cities that currently do not use a pavement management system and for those cities interested in improving their own pavement management process to meet the

Pavement Management System requirements established by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The report includes a description of recommended network-level system components, examples of other systems in use around the country, and a summary of existing systems being used in the region.

UPWP Task 5.04 Traffic Congestion - Regional Park-and-Ride Evaluation

This study documents various park-and-ride demand estimation techniques to determine ridership at potential park-and-ride facilities. Results from these techniques were compared to observed data collected at existing park-and-ride facilities. This study also presents a set of criteria for the selection of new park-and-ride locations. A number of potential sites were analyzed using benefit/cost analyses to determine their effectiveness in improving mobility.

UPWP Task 5.04.5 Intelligent Transportation Systems Communication Overview for Traffic Control

This study, conducted by Carter & Burgess Inc., a local consultant, was completed in two stages. The first stage included the researching of different communication technologies available for traffic signal controls. The second included the study of technology alternatives for connecting the Legacy Park area traffic signal controls with the Main Control Center using state-of-the-art communication technologies such as fiber optics, spread spectrum radio, and digital video. The final report is currently available for distribution.

The following is a report on projects in the UPWP which are underway or have recently begun:

UPWP Task 3.08 Air Quality Public Information - The North Texas Clean Air Coalition Public Awareness Campaign

A request for proposal (RFP) for consultant assistance to develop a public awareness campaign for the North Texas Clean Air Coalition has been issued. The goal of the program is to educate and inform Dallas-Fort Worth area residents of air quality issues. The campaign includes the promotion of the Ozone Alert Program and alternative commute options. Media relations, development of advertising materials, and coordination of promotional events are several of the tasks outline in the RFP.

UPWP Task 3.09 Fort Worth Transportation Authority Management Studies - Boarding and Alighting Survey

As part of Unified Planning Work Program 3.09, the Fort Worth Transportation Authority has requested assistance from NCTCOG to conduct a systemwide boarding and alighting survey for the T. Trip specific, stop specific, and time-point specific data will be collected to analyze existing service and establish a more effective delivery of services. On March 17, 1995, LKC Consulting Services was selected from five consultant proposals to conduct the project. All data collection is scheduled to occur prior to the end of May 1995.

UPWP Task 3.09 Fort Worth Transportation Authority Management Studies - Transit Service Schedule Analysis and Development Study

The North Central Texas Council of Governments (NCTCOG) and the Fort Worth Transportation Authority (the T) have contracted the services of LKC Consulting Services to conduct a systemwide schedule analysis and development study. The results of the study will be used to improve the T's ability to meet the growing needs of the communities it serves. The study is expected to be completed in six months.

UPWP Task 3.10 DART Management Studies - Rideshare Database Update

A Request for Proposal to conduct an assessment of DART's ride share database was mailed to consultants in March. The purpose of the study is to provide technical assistance to update their current rideshare database. An ongoing process to ensure quality information to provide reliable car and van pool match lists is required. Proposals are due in the NCTCOG office by 5 p.m., April 13, 1995.

UPWP Task 3.11 Mobility Project Evaluation, Selection, and Prioritization Methodology

Work has begun on this project. The consulting firm of Kimley-Horn and Associates was selected to develop a methodology that can be used by local governments and transit agencies to technically evaluate mobility enhancing projects. This methodology will merge the traditional project evaluation criteria with less traditional criteria involving social, economic, and environmental concerns in a format that can be easily used on commercially available software. A project review committee comprised of Surface Transportation Technical Committee members is now forming to review and comment on the system as it is being developed.

UPWP Task 3.12 Regional Travel Survey - Household Survey

Phase One of the Dallas-Fort Worth Household Travel Survey is nearing completion. As part of an extensive pilot test of alternative survey procedures, over 1,200 randomly selected households in the Metroplex have been asked to fill out one-day or two-day activity/travel diaries for every member of the household. Although some additional households may be asked to participate during the May-August period, the main survey of several thousand households will occur primarily from late August to mid-October 1995. Applied Management & Planning Group (AMPG), based in Los Angeles, California, is the prime contractor for this project.

UPWP Task 6.13 -Thoroughfare Planning and Design Guidelines

As part of the Regional Thoroughfare Plan completed in September 1994, NCTCOG has been working on the development of typical design parameters or standards. The intent of this effort is to assist local engineers and planners with general design guidelines. Kimley-Horn & Associates is under contract to perform the work as part of our consultants on retainer

program. The effort is being guided by a subcommittee of the Surface Transportation Technical Committee. This subcommittee reviewed and commented on a draft document in February. Based on these comments and staff feedback, the consultant is finalizing the document. The guidelines will be provided to STTC for comments in May. The RTC will be asked to take action on the guidelines in June.

CONGESTION MANAGEMENT SYSTEM PERFORMANCE MEASURES

The Congestion Management System (CMS) calls for the refinement of performance measures which are used to identify and measure traffic congestion in the region. Refinement of the CMS performance measures will facilitate the development of multimodal congestion management strategies which can address recurring and nonrecurring congestion and aid in evaluating implemented strategies. Staff is currently reviewing the goals of the CMS and requesting input regarding the selection of performance measures to meet those goals.

REGIONAL TRAVEL DEMAND MANAGEMENT

Implementation of the Regional Travel Demand Management Program has begun. Tarrant County companies are being contacted by the Fort Worth Transportation Authority and the Fort Worth Chamber of Commerce. An Ozone Alert kick-off event scheduled for Tarrant County will be held on April 12, 1995, in downtown Fort Worth.

In Dallas, Collin, and Denton Counties, Dallas Area Rapid Transit, the North Texas Commission, and the Greater Dallas Chamber of Commerce are contacting major employers to promote alternative commute options. A regional media event for the Ozone Alert Program is scheduled for April 25, 1995. Plans for other regional events are planned in Denton, Collin, and Dallas Counties.

MPO-CEO NEWSCLIPPING

The North Central Texas Council of Governments, in cooperation with the Fort Worth Chamber of Commerce, the Greater Dallas Chamber of Commerce, and the North Texas Commission, has formed a coalition of businesses and citizens to address transportation and air quality challenges across the region. An article from the publication "Mobility Partners" is included as Attachment 10.1 and provides information on the North Texas Clean Air Coalition.

RTC ATTENDANCE

As required by the Regional Transportation Council (RTC) Bylaws, the RTC attendance is provided as Attachment 10.2.

STTC MINUTES AND ATTENDANCE

Agency attendance at the February 24, 1995, and the March 24, 1995, meetings and the minutes of the January 20, 1995, and the February 24, 1995, meetings are contained in Attachment 10.3.

NCTCOG 1994 ANNUAL REPORT

The North Central Texas Council of Governments' (NCTCOG) 1994 Annual Report is now available. A copy of the report is attached for RTC members.

UPCOMING EVENTS

--Regional Travel Demand Management
--Alternative Fuels

APPENDIX E:

Congestion Management System
Working Group Roster

Congestion Management System Case Study Working Group

Purpose - to assist in the development of the Dallas-Fort Worth regional CMS, as outlined in the CMS Work Plan. Members will be asked to provide guidance to staff in the development of performance measures, definition of congested networks and systems, outline data collection responsibilities, advance regional and corridor-level TSM and TDM strategies, and other CMS-related tasks. Members will monitor their involvement with these activities and document time spent supporting the development and implementation of the CMS as a fulfillment of our in-kind contribution to the FHWA case study project.

Meetings - as needed, but probably monthly, at least through September 1995. Meetings will usually be held on the **third Friday of each month** (after STTC meetings), at **11 am**. The first meeting will be held on **December 16, 1994**.

Congestion Management System Working Group

Name, Title	Organization
Transportation Planner	Fort Worth Tranportation Authority
Traffic Network Engineer	TxDOT - RPO
Transportation Planner	Dallas County
Dir of Transportation Operations	TxDOT - Fort Worth District
Mobility Coordinator	North Central Mobility Task Force
Transportation Planner	NCTCOG
Assistant Dir of Transportation	NCTCOG
Mgr of HOV Programs	Dallas Area Rapid Transit
Transportation Planner	NCTCOG
Dir of Transportation Operations	TxDOT - Dallas District
Urban Planning Assistant	TxDOT - Fort Worth District
District Bicycle Coordinator	TxDOT - Dallas District
Dir of Economic Development	City of North Richland Hills

CONGESTION MANAGEMENT SYSTEM DEVELOPMENT PROGRAM FOR THE CENTRAL PUGET SOUND REGION

Final Mid-Term Report

June 1995

Puget Sound Regional Council
1011 Western Avenue, Suite 500
Seattle, Washington 98104

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ACKNOWLEDGMENTS

Funding for this report was provided in part by PSRC member jurisdictions, grants from the U.S. Department of Transportation, Federal Highway Administration and Washington State Department of Transportation.

The Puget Sound Regional Council would also like to acknowledge the support of the Congestion Management System Subcommittee of the Regional Project Evaluation Project Committee.

CONGESTION MANAGEMENT SYSTEM DEVELOPMENT PROGRAM FOR THE CENTRAL PUGET SOUND REGION

Final FHWA Grant Mid-Term Report

I. BACKGROUND

The Puget Sound region, expected to grow from 1.4 million residents in 1990 to 2.7 million by 2020, is one of the fastest growing regions in the U.S. While the City of Seattle is its largest city, recent trends and forecasts show that future population and employment growth is moving to the outlying areas. Urban centers, such as Tacoma, Bellevue and Everett, are expected to absorb an increased share of jobs and households in the coming years. And, like other urban areas across the country, the Puget Sound region will experience a higher growth in vehicle miles traveled relative to its population and employment growth.

During the past several years, public responses to surveys and polls identify traffic congestion as one of the region's top concerns. However, because of the region's natural beauty and the high cost of surface transportation infrastructure, the region's citizens have also expressed opinions that new highway construction in the future will most likely be limited. Therefore, the region will have to develop innovative and cost-effective ways to manage its congestion.

The CMS is coordinated with the long-range transportation planning policies and is an element of the region's long range metropolitan transportation plan (MTP), which provides the framework for the development of a management system that proposes to use advanced technology in a cost effective manner to meet federal, state and regional regulations and policies. In September 1994, the Puget Sound Regional Council adopted a Congestion Management System (CMS) Work Plan which begins to address its citizens concerns about traffic congestion.

The CMS acknowledges federal policies that include those contained within the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 which focuses on implementing transportation investments that encourage greater person movement over vehicle movement. The CMS also has strong links to improving air quality, as articulated in the Clean Air Act Amendments of 1991. Transportation Control Measures, or TCMs are acknowledged as high priority investments in the CMS regulations. Further, CMS strategies must meet federal air quality requirements in order to be implemented. While the region submitted SIPs that do not contain TCMs -- the region has shown attainment without TCMs -- these strategies could be important during the coming maintenance periods, once the region is redesignated as attainment by the EPA.

The Central Puget Sound Region's CMS will also be guided by a planning framework that is consistent with state growth management legislation. The Washington State Growth Management Act (GMA) provides direction for the region in that the MTP must be based on city and county comprehensive plans and policies. These plans and policies have been based on the framework established in VISION 2020, the region's growth and transportation strategy. VISION 2020 states that growth should be targeted in urban centers and the corridors that

connect them. The access to centers and the corridors connecting them will be provided by a high capacity transportation system. The MTP also emphasizes investments that maximize the existing transportation system, manage travel demand, support transit and pedestrian-oriented land use patterns and provide expanded capacity that offers greater mobility options.

The CMS is intended to be an integral part of the transportation decision making process for many years to come. It will provide much needed information to help the region meet its growth needs and to limit environmental impacts caused by the regional transportation system. To ensure that the region has the information it needs to make informed investment decisions, the CMS will need to be developed based on measures that address regional policies and objectives. In the Puget Sound region, travel time performance has been selected as the fundamental measure for CMS monitoring purposes. Travel time was selected as the most appropriate measure to compare performance across modes such as transit, vanpools and carpools, freight and goods, and potentially nonmotorized forms of travel.

The PSRC is investigating the use of advanced technology options to collect modal data for monitoring travel time. The region is currently developing projects and programs that will collect traffic volumes, lane occupancy rates, vehicle speed and other important measures of value to transportation providers. Described in the following report are potential applications for gathering travel time data and the methods PSRC is currently investigating to gather data for CMS performance monitoring purposes. The report then continues with a discussion on the region's progress in terms of incorporating elements of the CMS into the regional planning and programming processes. Finally, the report closes with a summary schedule of key CMS activities that will be addressed in the coming months.

II. CMS DEVELOPMENT PROGRAM OVERSIGHT STRUCTURE

Figure 1 provides an overview of the structure of decision-making at the Puget Sound Regional Council and a framework for the development and implementation of the Congestion Management System. Oversight of the development of the CMS, being based fundamentally on VISION 2020 multicounty planning policies and the Metropolitan Transportation Plan, begins with the General Assembly of the Puget Sound Regional Council. Major growth and transportation policy amendments as well as metropolitan transportation plan amendments are addressed periodically by the General Assembly. The General Assembly is made up of all member city and county elected officials within the central Puget Sound region, commissioners from the three member ports (Port of Everett, Port of Seattle, and Port of Tacoma), and representatives of the two state agencies that are members of the Regional Council. The Assembly elects a new president and vice president of the Regional Council and delegates month-to-month decisions to the Executive Board.

Members of the Executive Board are appointed by their General Assembly constituents to represent the member governments. The Board meets monthly, and carries out delegated powers and responsibilities between meetings of the General Assembly.

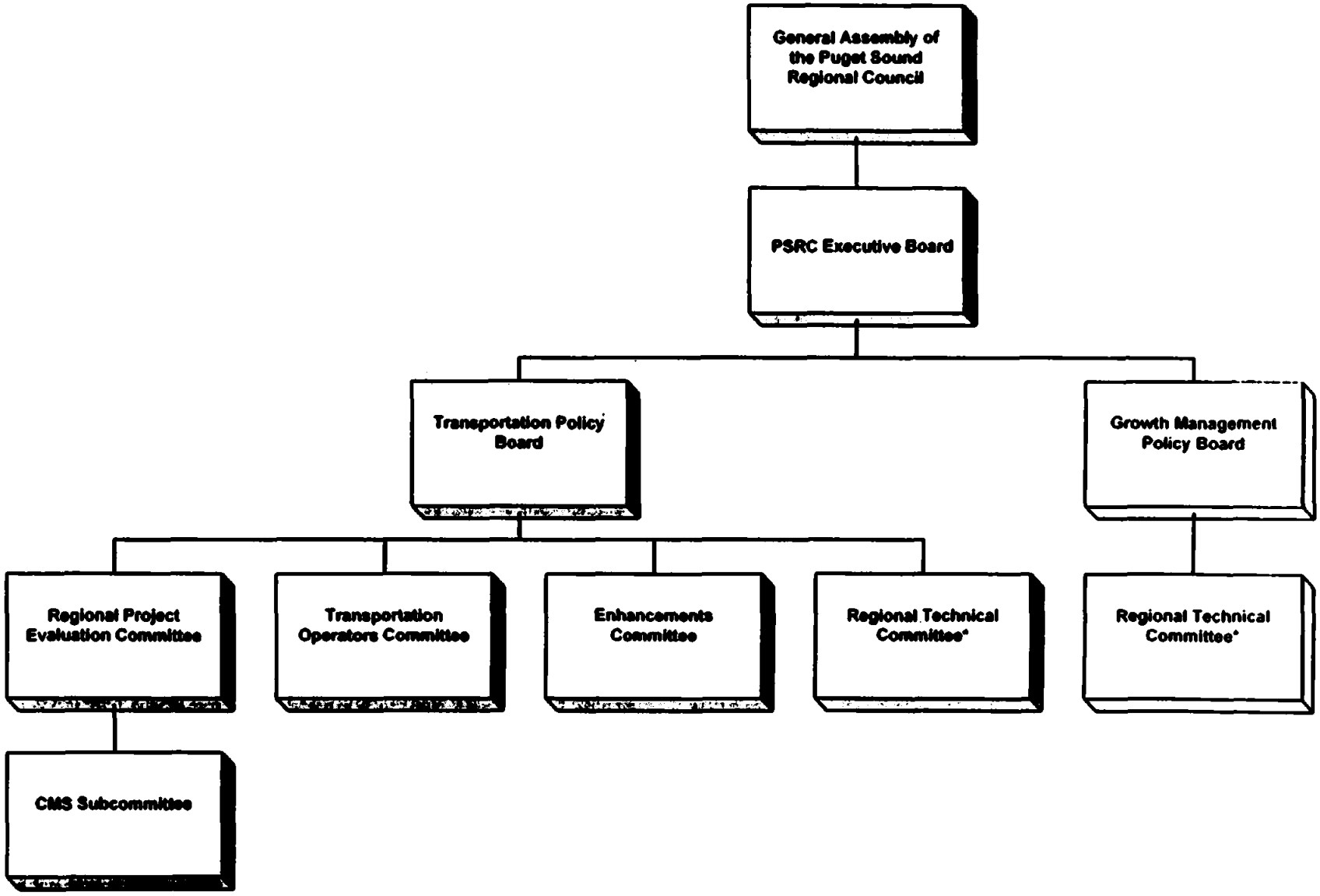
The Transportation Policy Board (TPB), makes all major transportation recommendations to the Executive Board. The TPB is made up of elected officials from local cities and counties, and representatives of the port districts and the Washington State Department of Transportation as well as advisory members representing citizen groups, and environmental and business interests.

The CMS Work Plan for the central Puget Sound region was developed primarily through the oversight of the CMS Subcommittee of the PSRC's Regional Project Evaluation Committee (RPEC). The RPEC is made up of city and county public works and planning directors, transit agency planners, the Ports, and representatives of the Washington State Department of Transportation including the Washington State Ferries. The RPEC also receives input from nonmotorized interests and freight and goods interests. The CMS Subcommittee representatives were either RPEC members or appointees of RPEC members. In the future, transportation recommendations on policy and projects (including CMS strategies) will be developed through the RPEC. These decisions will be forwarded to the TPB, and on to the Executive Board. Generally, decisions reached by the Executive Board are forwarded to the state for formal adoption (e.g., regional transportation improvement program amendments, submission of CMS Work Plans, etc.)

Other committees at the Regional Council also have an indirect role in the CMS program. The Transportation Operators Committee (TOC), which represents the local and state transit and ferry interests, will receive regular updates on the development of the CMS. The TOC will be asked to provide guidance on transit issues as they are raised through the CMS process. The Transportation Enhancements Committee, a joint government staff and citizens group committee, is responsible for providing the Regional Council with advice on transportation policy and programming decisions as they relate to transportation enhancements as defined by

Figure 1

PSRC Organization Chart - Decision Making Framework for the CMS



* Can report to both policy boards.

the Intermodal Surface Transportation Efficiency Act. The Regional Technical Committee, which oversees the development of the Regional Council's socioeconomic and travel demand databases as well as other technical applications, will provide guidance in the development of data collection systems development as well as potential refinements to the CMS performance monitoring system. Finally, because transportation infrastructure significantly affects land use development, regular reports coming out of the CMS will be provided to the Growth Management Policy Board to address potential growth management policy modifications.

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III. POLICY FRAMEWORK

The Congestion Management System for the Puget Sound region is based on adopted multicounty transportation policies that form the overall regional transportation strategy of VISION 2020, the region's long-range growth and transportation framework. These policies provide the direction for regional decision-makers when they must propose planning decisions (MTP) and near-term transportation investments (TIP). The following provides a description of the VISION 2020 concept. A list of the adopted VISION 2020/MTP mulitcounty planning policies are found in Appendix A.

VISION 2020, adopted in 1990, is the long-range growth management, economic and transportation strategy for the central Puget Sound region encompassing King, Kitsap, Pierce and Snohomish counties. The strategy is intended to locate growth within defined urban areas, creating compact communities with growth focused in centers. This strategy is designed to foster a greater mix of land uses, a more complete and efficient network of streets and other public rights-of-way, and, in general, support an urban environment which is amenable to walking, biking and using transit. VISION 2020 aims to preserve rural areas through low-density residential living maintained by rural levels of service and location of employment, housing, and services in cities and towns in rural areas. It represents a major public policy commitment to managed growth and the efficient provision of public services and facilities, particularly transportation investments that emphasize transit, ridesharing, demand management and the maintenance of current facilities.

The adoption of VISION 2020 in 1990 preceded the enactment of changes in federal transportation policy and the adoption of state growth management legislation. Adoption of the Growth Management Act in 1990 and its amendments in 1991 and 1994 resulted in a new round of local, countywide, and regional planning throughout King, Pierce, Kitsap, and Snohomish counties. ISTEA and the 1990 Clean Air Act Amendments mandated development of the MTP as a more detailed plan than the transportation component contained in the original 1990 VISION 2020 document. For these reasons, as well as the continued challenge of handling projected growth, VISION 2020 has been updated and has incorporated the MTP as the transportation component of VISION 2020. The 1995 VISION 2020 Update now provides a more detailed integrated growth, economic and transportation strategy that clarifies the regional vision and refines the multicounty planning policies. This strategy includes integrating recently completed local and countywide plans into the updated VISION 2020 to ensure that the regional vision is consistent with and reflects emerging growth management plans of the region's cities and counties. Most importantly, the VISION 2020 Update includes specific strategies and actions to implement the regional vision and monitor its progress.

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III. METROPOLITAN TRANSPORTATION PLAN

The 1995 Metropolitan Transportation Plan (MTP) is a detailed, long-range plan for future investments in the central Puget Sound region's transportation system (see Figure 2). The MTP responds both to legislative mandates and to regional concerns of pressing transportation problems. In doing so, the MTP builds on VISION 2020, as adopted in 1990 and amended in 1993 and 1995. VISION 2020 serves as the region's integrated long-range growth management, economic and transportation strategy. The 1995 MTP represents the first step in an ongoing regional planning and implementation process. Because the MTP must be updated at least every three years, its implementation and further refinement will continue a collaborative partnership of all major transportation system users, including local jurisdictions, environmental organizations, freight and goods operators, citizen groups and other public and private organizations.

The basic building blocks for the MTP are city, county and transit agency plans, adopted multicounty and countywide planning policies, and the Washington State Department of Transportation (WSDOT) Multimodal and Transportation System plans. The MTP includes both short-term and long-term activities and encourages partnerships among governments, as well as between the public and private sectors.

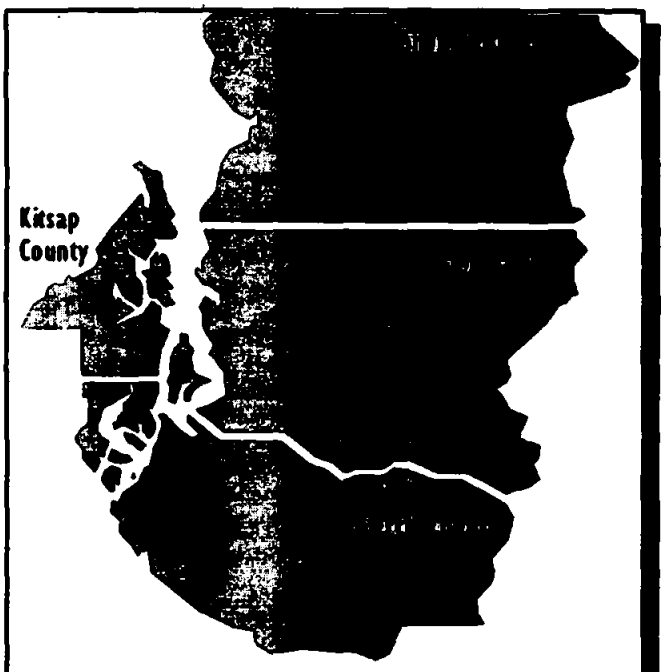


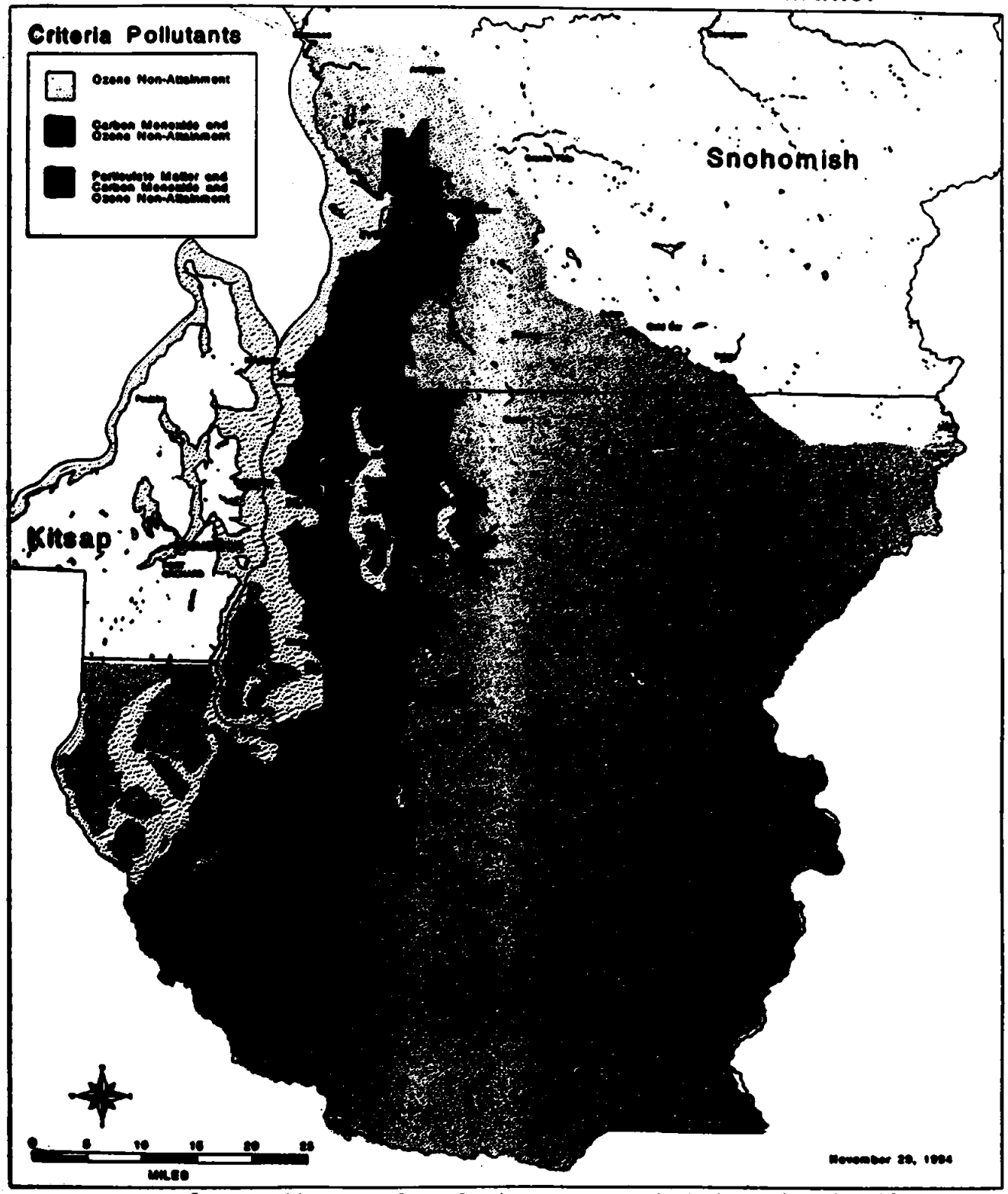
Figure 2
The Central Puget Sound Region

The MTP responds to federal mandates contained in the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) and 1990 Clean Air Act Amendments. As shown in Figure 3, the Puget Sound region is in nonattainment of the National Ambient Air Quality Standards for carbon monoxide, ozone and particulate matter. The MTP must show consistency with State Implementation Plans by showing that projects and programs contained with it do not violate federal air quality standards. The plan also explicitly defines long-term transportation strategies, opportunities and proposed investments for the Metropolitan Transportation System of King, Kitsap, Pierce and Snohomish counties. Additionally, the MTP responds to the state's Growth Management Act which requires long-range development plans prepared by cities and counties to be balanced with the transportation infrastructure that can support such development and be compatible with the VISION 2020 growth and transportation strategies. For state planning purposes, the MTP is the region's *Regional Transportation Plan* and meets requirements governing Regional Transportation Plans in RCW 47.80.

Figure 3

Designated Non-Attainment Areas For Criteria Pollutants

Carbon Monoxide, Ozone and Particulate Matter



The region currently invests approximately $1.4 billion annually just to maintain the region's transportation network of about 16,000 miles of roads and over 2,000 public transit buses serving 90 park-and-ride lots and 27 transit centers throughout the region, not to mention our unique marine transportation system with a fleet of over 15 ferry boats linking diverse parts of the region through 13 ferry terminals. While these *public* expenditures equate to nearly $500 per person per year, individuals and businesses also annually invest many times more than this amount on their own *private* transportation expenditures.

As all levels of government search for funding for competing demands, an overall blueprint is needed to guide public investment of transportation dollars to ensure maximum benefit to the region. In addition, many aspects of our lives are influenced by the type of transportation system available and the nature of its operation. Access and mobility are important to our personal lives, to the economic health of the region, and to the overall quality of life.

With its adoption by the Puget Sound Regional Council's General Assembly in May 1995, the MTP becomes the central Puget Sound region's first comprehensive statement of long-range transportation planning objectives and actions providing an integrated response to the mandates of the federal Intermodal Surface Transportation Efficiency Act (ISTEA), the federal 1990 Clean Air Act Amendments, and the State of Washington's Growth Management Act.

As an overall blueprint to guide the region's long-term transportation investments, the MTP incorporates local comprehensive planning activities and, over time, will provide users of the region's Metropolitan Transportation System with greater transportation options and improved intermodal connections.

The Metropolitan Transportation Plan incorporates the Congestion Management System as an integral part of the regional transportation planning process. As shown in Figure 4, the CMS is designed to identify the appropriate strategies that will be part of the planning and programming updates to the MTP. The CMS will identify strategies and potential policy modifications in the MTP in future updates. It is anticipated that based on recommendations coming from the CMS, policy refinements or phasing of regionally significant transportation projects and programs in the MTP could take place as soon as 1998 when the MTP is scheduled to be updated. The final CMS report to be published later this Fall will provide more details on the metropolitan planning process.

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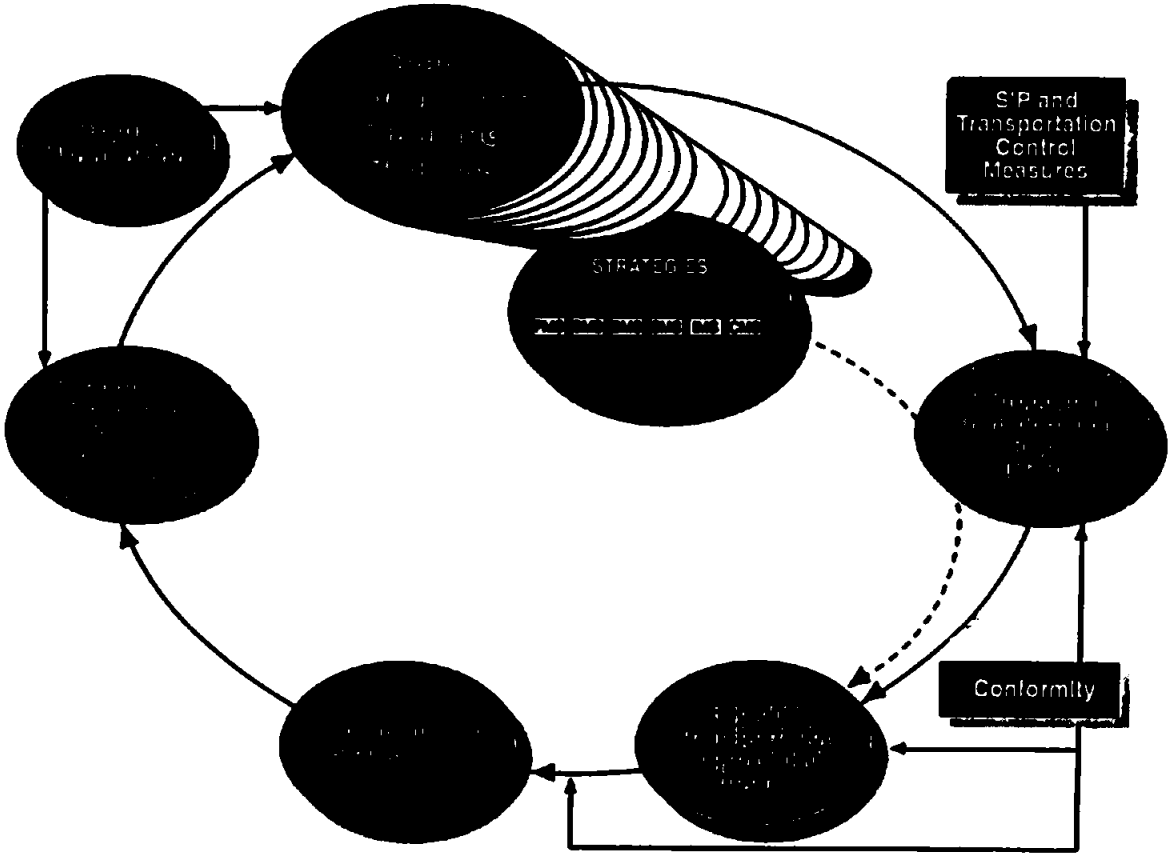
[1]1995 Metropolitan Transportation Plan: The Transportation Element of VISION 2020, the Region's Adopted Growth and Transportation Strategy.

Figure 4

CMS REGIONAL PLANNING PROCESS RELATIONSHIP



Congestion Management System
Development Program for the Central Puget Sound Region

V. TRANSPORTATION IMPROVEMENT PROGRAM

The Transportation Improvement Program is the implementation action of the Metropolitan Transportation Plan. The following describes background on the regional project selection process for transportation projects seeking ISTEA funds as well as other important regionally significant non-federally funded projects.

Under the federal Intermodal Surface Transportation Efficiency Act (ISTEA), the Puget Sound Regional Council is responsible for approving the programming and maintenance of the region's three-year Transportation Improvement Program (TIP). The Regional Council is also required to have a documented process approved by its policy board which provides guidelines and criteria for how proposed transportation projects can become eligible for inclusion in the Regional TIP. The Regional Council, this year, refined its project selection process to now reflect stronger and more direct policy support for implementation of recently adopted Metropolitan Transportation Plan and local city and county comprehensive plans by promoting and guiding coordinated regional and countywide programming activities for scarce federal ISTEA funds that are regionally managed.

A document was prepared that provided a policy framework to help guide the Regional Council in its task to manage, administer and approve projects to be programmed and selected under the three ***regionally managed*** federal funding programs referred to as the Surface Transportation Program (STP), the Congestion Management and Air Quality (CMAQ) Program, and the Federal Transit Administration (FTA) Program.

At a minimum, a Regional TIP document must contain all federally funded transportation projects that are approved to be undertaken in the four-county region over the next three-year period (1996-98). For projects to be included for approval in the Regional Council's TIP this September 1995 -- the scheduled date for Executive Board action -- the Regional Council must find that all such projects are consistent with the Metropolitan Transportation Plan (scheduled for adoption in April '95) and that they meet regional air quality testing requirements to assure the region maintains clean air standards.

The TIP must contain all projects that are approved for "state managed" and "regionally managed" federal funding programs. Each federal funding program typically has unique requirements to be met. For example, projects may fit any number of distinct program funding categories if they can demonstrate the ability to improve air quality, or perhaps be for specific improvements on an interstate or national highway, or be a bridge improvement project, or be demonstrating transit improvements to meet requirements of the Americans with Disabilities Act (ADA). In spite of ISTEA's well advertised *flexibility*, there are still a fair number of programmatic "strings" that go with specific funding sources.

Priority consideration was given to any projects proposed within these four categories which most directly support either or both of the following emphasis areas:

- Improved mobility within the hierarchy of designated centers (including commercial & industrial centers) or along major corridors connecting such centers.

- Projects that can demonstrate that they contribute to sustaining or encouraging continued economic vitality for the region.

Further project selection criteria addressed the following issues:

1. Does the project improve system performance? Performance can be measured in a variety of ways, such as congestion levels for highway projects, or ridership per hour for transit. Who benefits from the improvement should be identified.

2. Does the project reduce reliance on single-occupant vehicles?

3. Does the project help sustain and promote economic vitality through improved mobility for people or freight and goods?

4. Does the project improve or provide multimodal or intermodal access to ports, airports, or centers?

5. Does the project support air quality goals? VMT and emissions reductions are required by federal law for CMAQ funded projects.

6. How does the project support GMA/VISION 2020/comprehensive plans?

7. Does the project provide greater system efficiencies or effectiveness? This may include considering improved connectivity with other elements of the transportation system or within the same system elements for improved person throughput. Examples: completion of the state HOV system; identifying missing roadway links; creating improved multimodal connections between bus, rail, ferry and pedestrian elements.

Additional refined criteria were developed for the second stage of the regional project review process which potential high priority regional projects must address. These regional project criteria were refined with consideration for the below list of policy emphasis areas that are examples taken from ISTEA and the MTP:

1. Maintenance & Preservation: a basic ISTEA goal for investing federal funds is to preserve the existing system (this refers to the multimodal Metropolitan Transportation System defined in the MTP).

2. Traffic Congestion: federal regulations require that priority funding be considered for projects or programs that address traffic congestion problems related to the region's Congestion Management System (CMS -- another ISTEA requirement).

3. Safety: Identify and solve safety problems on the existing transportation system.

4. Efficiency: Increase efficiency of the existing system.

5. Accessibility: Provide improved access to the transportation system, such as intermodal/multimodal access to ports, transit centers.

6. Connectivity: Provide connectivity of the existing system and provide intermodal connectivity.

7. Reliability and Convenience: Provide competitive time advantages, improve predictability of service and schedules, etc.

8. Environmental Benefits: energy conservation, air quality emissions reductions.

9. Cost/Affordibility: Refine classic cost-benefit approaches to begin to develop required least cost planning methodology (applicable in July 1996).

The Regional Council is currently developing its FY 1996-98 Transportation Improvement Program. The TIP is scheduled to be adopted by the region in September of this year. The final CMS report will have more details on the programming processes and development schedule. In the final report the following issues will be addressed:

- How the short-range and long-range performance monitoring schemes support planning and program decision-making?

- To what extent will the CMS affect program decisions?

- How will programming decisions be affected by the VISION 2020/MTP performance monitoring system, especially a broader transportation monitoring system (beyond traffic congestion)?

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VI. PERFORMANCE MONITORING ELEMENT

Performance measures are the central element of any CMS. According to federal requirements, performance measures will provide the basis for identifying the extent, severity and specific locations of congestion on a systemwide basis. This information can be used to track changes in congestion over time, identify potential congestion causes and provide information to decision-makers and the public.

Two-Phased Approach

A short and a long-range approach to monitor congestion on the CMS network was recommended. The monitoring of performance is important in that it focuses on areas of high congestion that need mitigation strategies by any number of multimodal solutions. VISION 2020 and the countywide planning policies emphasize strategies that favor movement of persons and goods over vehicles. It was recommended that the region adopt an approach to performance monitoring strategies that supports these policies. Travel time is a performance measure that supports these policies and can be applied to more reliably measure the performance of not only automobiles but also transit, carpools, vanpools, and trucks. By supplementing travel time data with vehicle counts and average vehicle occupancy information, performance of effective mobility for person travel can be measured.

Travel time monitoring systems are now emerging in the region; however, they are not yet complete enough to meet the CMS requirements. The region is therefore recommending a two-phased approach. The initial performance monitoring system will focus on a vehicle-based strategy, since that data is readily available and can be used to transition to a travel time strategy. The volume-to-capacity ratio (v/c) approach (based on traffic counts) will be transitioned to the travel-time based approach as soon as feasible (estimated date for the transition is 1996). The initial data collection effort for the CMS network will also include, to the extent available, other data related to the identified NHS network such as:

- Transit operation and passenger volumes in the corridors
- Freight & goods movement (relative volumes and delays)
- Average vehicle occupancy
- Other potential data (accidents, weather conditions, etc.)

Under Phase 2, approximately 1996 and beyond, the CMS performance monitoring system will be fully transitioned to a travel time framework. The measuring of travel time will be done through the use of Automatic Vehicle Identification (AVI) technology. The AVI systems approach is currently being implemented by two transit agencies (Metro and Community Transit), and there is interest by other transit agencies as well. The AVI technology can be applied to all forms of surface transportation so that multimodal travel times can be obtained for SOVs, trucks, and even bicycles. It is anticipated that some of this data will also be beneficial in making regional

recommendations to WSDOT regarding issues being addressed in the state's required safety management system.

Volume-to-Capacity Ratio

Volume-to-capacity ratios have been recommended for the initial performance measurement for the CMS, transitioning to the preferred travel time measurement in the future. The volume to capacity ratio (v/c) approach is a more conventional level of service measure which equates roadway demand to supply. Demand is expressed by roadway volume and supply is expressed as the carrying capacity of a roadway. This measurement provides a simple ratio of demand to supply. Information can be collected and evaluated that alerts transportation providers when traffic mitigation measures should be considered. For example, when v/c is 0.5, then the roadway is functioning at half of its capacity and no mitigation is necessary. When v/c nears 1.0, the roadway is reaching capacity and mitigation measures or other management techniques may need to be implemented.

In the past, exceeding a volume to capacity ratio of 0.5 (level of service C) was considered a capacity deficiency. But today a v/c ratio of 0.9 (level of service E) is considered a more appropriate threshold due to a greater awareness of environmental issues, limited financial resources and because systems operations begin to deteriorate at this level. The recommended approach in the near term to identify the Region's most congested areas is to use the volume to capacity ratio of 0.9 or level of service E or greater. Approximately 25 segments of the CMS roadway network throughout the region were identified using this approach, and these will be studied throughout the year.

Using p.m. peak hour volumes, areas where the v/c ratio exceeds 0.90 (LOS "E") are identified. Those areas exceeding a 0.90 v/c ratio are then categorized according to the length of time that the 0.90 v/c ratio is surpassed. These time categories that the v/c ratio is greater than 0.90 are greater than 5 hours, 4 to 5 hours, and 3 to 4 hour.

These categories create a hierarchy of congestion levels that allow the most congested areas to be addressed first. Consequently, the CMS subcommittee determined that the congested areas of concern are those areas where the v/c ratio is greater than 0.90 for more than 5 hours. The areas where the v/c ratio exceeds 0.90 for 5 or fewer hours can be addressed after mitigating strategies have been established for the more severely congested areas. The use of the v/c ratio will be applied to the proposed regional National Highway System (NHS) roadway segments.

In Phase 1, the CMS performance measure will include all of the regional auto ferry routes. The auto ferry performance measure utilizes measures of capacity and delay for general purpose vehicles. The ferry performance measure is based on a draft level-of-service (LOS) standard for ferry service. The level of service standard was developed through the work of the WSF in cooperation with regional land use and transportation committees operating in the Puget Sound region and the Olympic and Kitsap Peninsulas.
Similar to measuring roadway congestion, the ferry performance measure is based on a volume-to-capacity (v/c) ratio. The v/c ratio expresses traffic volumes in terms of a facility's capacity to

handle that traffic. In the case of ferries, v/c ratios are derived by dividing general purpose vehicle traffic volumes on a particular route by the carrying capacity of the vessel(s) assigned to that route. The v/c ratio can be calculated for a single sailing, a number of sailings, for specific time periods or an entire ferry operating day. Likewise, ferry routes can be measured singly or in groups.

Two types of data are needed for the ferry performance measure calculation: route capacity and traffic volumes. Route capacity is the vehicular capacity of vessels assigned to the route. This data is readily available from the Washington State Ferries (WSF). Traffic volume data can be collected using a method that portrays a *typical* vehicular travel experience, i.e. the 85th percentile calculation.[2] By using the 85th percentile calculation, vehicle arrival data at terminals is recorded at 5-minute intervals through peak periods.

Ferry riders typically think of congestion in terms of delay, or, the extra waiting time experienced at the terminal when they could not board the ferry because it was at capacity. The v/c ratio is then expressed as the number of boat wait(s) typically experienced before one can board the boat on a particular route, within defined time periods.

Ferry mobility is expressed as the number of boat waits as established from terminal to terminal. These recommendations are based on traffic volumes and ferry capacities typical of the month of May and measured during the evening peak period. The performance measure is targeted towards "non-preferential" vehicles boarding the ferries. Non-preferential vehicles are defined as single occupant vehicles and all other vehicles without carpool registration with WSF.

The ferry system carries many types of travel -- foot passengers, bicycles, buses, freight and automobiles. Among the various modes of travel on the ferry system, the WSF has established loading policies for registered vanpools, carpools, or other high occupancy vehicles (HOV) vehicles, as well as non-motorized traffic. The WSF guarantees priority loading for HOVs, effectively providing them with a "0 boat wait." Bicycles, motorcycles and foot-passengers will also have a "boat wait of 0." Loading policies for freight and goods are currently being considered. Weekday freight and goods movement have a recommended 0, or no boat wait, westbound between 5 AM and 2 PM and eastbound between 9 AM and 3 PM on two designated freight routes: Seattle/Bremerton and Edmonds/Kingston.

Ferry Data Collection Plan and Reporting Procedure. The number of boat waits per route for modes of travel with established performance standards will be collected by the WSF. Currently, the WSF anticipates using forecasted trip data on an annual basis, and collecting data at ferry terminals approximately every five years. The number of boat waits per route for modes of travel

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The 85th percentile concept in traffic engineering is a statistical procedure used to determine facility performance calculations at a typical - but not the full spectrum - of travel experience on that facility. The 85th percentile is the 85th division among 100 equal divisions of a complete range of travel experiences. The idea is to exclude "extreme" experiences from performance measures. As applied to ferries, the V/C ratios experienced on a sailing or a number of sailings are arrayed, and the 85th division selected as the typical experience.

with established mobility standards will be reported by WSF to the Regional Council for congestion management system purposes.

Second Phase Performance Measures

Travel Time Performance Measure. Congestion to the traveler is delay caused by stopped or slowly moving vehicles on the highway, road and street system. While volume/capacity and level of service calculations are intended to quantitatively estimate the congestion perceived by the traveler, measuring travel time, speed, and delay more accurately represents congestion from the traveler's perspective. Mobility, the efficient movement of people and goods, with an emphasis on options and accessibility is a major policy of VISION 2020. Travel time can be used to measure mode options and accessibility in both absolute and relative terms. Travel time is recommended as the preferred congestion performance measure, however, collecting this data will take several years. Therefore, travel time is the long-term performance measure of choice. The following paragraphs describe its use and the intended data collection program.

Travel Time Usage. Congestion is experienced by, and should be measured for, all modes, including single occupant passenger vehicles (SOV's), high occupancy vehicles (HOV's), transit, ferries, bicycles, pedestrians, and various classifications of freight modes.

Travel time will be used as a unit of measure to compare the effect of congestion between modes. There are a number of advantages to choosing travel time as a measure of effectiveness. Travel time allows for consistent measurements. These measures are relatively reliable in that a measurement can be taken for the same route or within the same geographic area over time. Comparisons will indicate the effectiveness of congestion strategies over time. Travel time is also a measurement which is applicable to all modes of travel, including autos, trucks, transit, carpools, vanpools, and bicycles. Consequently, travel time comparisons can be made across various modes of travel as well as within modes. Finally, since travel time is affected by land use and transportation decision, it can be used to determine if the region is achieving its growth management and transportation goals.

Figure 5 identifies potential travel time measures that could be used in the Puget Sound region's congestion management system. It is important to note the various geographical areas of measurement. Because both the Washington State Growth Management Act and VISION 2020 call for new growth in households and employment to be directed inside urban growth areas (UGAs) and centers of concentrated development, these specific geographic areas are emphasized. Efficient and effective transportation is important in centers and the UGA, where it can be most difficult to achieve. If travel delay is minimized in these areas, increased development will be supported there. The Congestion Management Work Plan would be

Figure 5

Potential Travel Time Performance Measures	Application
Improvement in competitive travel time for non-SOV modes relative to SOV	Region Centers Balance of UGA Outside UGA Corridors
Percent of households which have non-SOV travel options within 15 minutes	Region Centers Compact Communities Within balance of UGA Outside of UGA
Percent/amount of delay experienced in each geographic category experienced by the following modes: • SOV • HOV • Transit • Auto Ferries • Passenger Ferries • Bicycles • Trucks • Freight Rail	Region Centers Balance of UGA Outside UGA Corridors

supportive of the regional and state growth management goals through this application of travel time.

Data Collection Technique. In the short term, only a limited number of methodologies are available for collecting travel time and delay information. In the Puget Sound region, the WSDOT may be able to use its existing Surveillance, Control, and Driver Information System (SC&DI) to gather travel time and delay information on portions of the freeway system, but for most other roadways, manual data collection or model generated estimates will be needed.[3] For this reason, travel time is proposed as a long-term strategy.

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4. Mark Hallenbeck, "Recommended Congestion Monitoring Options for WSDOT", Washington State Transportation Center, September 1993, p. 8

The proposed long-term congestion monitoring system would obtain access to a variety of data that are currently, or will be, collected by freeway, arterial, and transit operational control systems. The recommended long-term program would incorporate data from the existing SC&DI systems, as well as data that will become available when the North Seattle Advanced Traffic Management System (NSATMS) and automatic vehicle identification- (AVI) based bus signal priority projects become operational. Travel time performance information would come from the transit signal priority equipment. This system will use AVI readers and vehicles tags to identify buses as they approach signalized intersections. By measuring the distance between specific AVI readers (intersections) and comparing the time each bus (or other tagged vehicle) passes each reader, it will be possible to determine the travel time between readers. By monitoring these travel times over the course of the day and the course of the year, the CMS would identify absolute and relative travel times.[4]

The overall intent is to link the transit priority hardware with the NSATMS and to use that data in the CMS program. Both the NSATMS and the CMS program will benefit from this arrangement. The CMS program will have current information on travel time, and the NSATMS would obtain data necessary for analyzing the effectiveness of the integrated control hardware's signal coordination capabilities. [5]

In order to make the NSATM system compatible with the CMS program some adjustments to NSATM would be necessary. The necessary revisions are listed below.

- Provide communications capabilities to signals with signal prioritization hardware in the NSATMS geographic areas (this includes both communications devices such as modems and facilities such as telephone lines or cellular telephone access).

- Purchase extra AVI tags for non-transit vehicles.

- Build data storage, retrieval, and access capabilities into the NSATMS database.

- Write software to compute travel times from the collected data[6].

Additional equipment that complements these systems will need to be purchased and installed to expand the geographic coverage of the systems. The portion of the AVI system currently funded is designed to validate the equipment and methodology. It provides limited coverage in two corridors. Expansion of the CMS data collection effort is anticipated to come primarily from the individual operating agencies' efforts to improve and expand their operational control systems.

Ibid., p. 34.

Ibid. page 41

Ibid. page 39

The recommended data collecting technique is as follows:

(1995 - 1996)

- Use existing freeway SC&DI systems to provide freeway performance information in the form of travel time and delay to supplement and validate Regional Council model estimates.

- Use data available through the NSATMS project (as well as similar projects if this concept is expanded) to provide urban arterial travel time and delay to supplement and validate Regional Council model estimates.

ITS Backbone

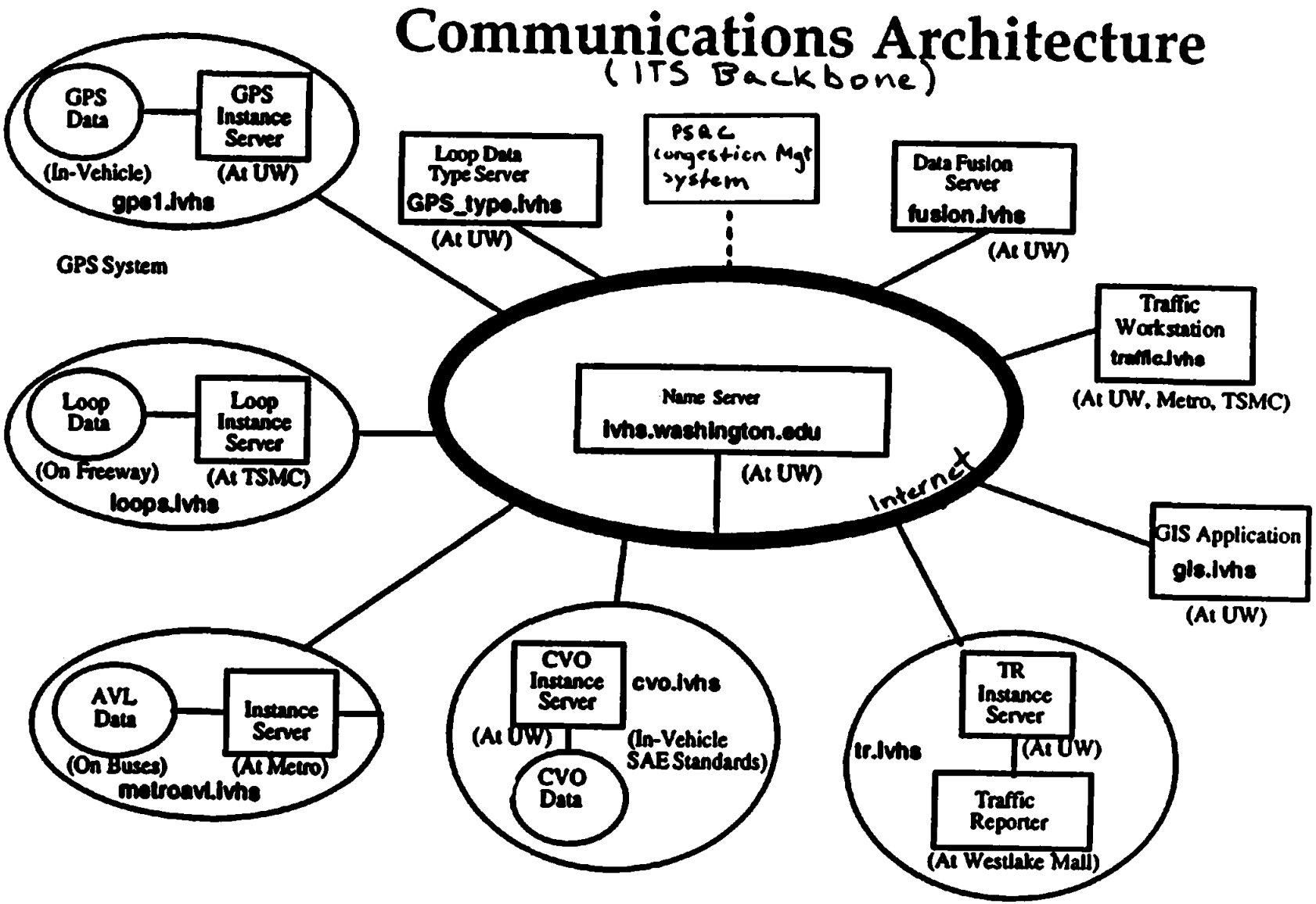
One of the unique features of the Puget Sound region's CMS is the application of Intelligent Transportation Systems technology in data collection, especially for monitoring multimodal travel time performance. It is no secret that data collection can be time consuming and expensive. Traditional data collection techniques such as vehicle occupancy studies, origin-destination surveys and transit on-board surveys can be cost prohibitive to many areas. Unless the CMS data collection is included as part of an existing data collection effort, it will be difficult for states and region's to justify the expense for a such a system. The CMS for the Puget Sound region is designed to "piggy back" on other data collection efforts currently underway. Since data collected for other applications is now becoming available, with a little bit of effort, it can be relatively inexpensive to capture data for CMS purposes.

One key effort, known as the Intelligent Transportation System (ITS) Backbone Project, is to link the data collection systems through one communication pipeline. This project will provide data collection linkages with local and regional agencies and the state WSDOT. The project, developed in cooperation with the University of Washington, the City of Seattle, and the Washington State Department of Transportation, will provide connections among jurisdictions and agencies through the Internet.

As shown in Figure 6, data produced by an agency can be accessed by any or all members that have access to the Internet. For travel times, automobile, and potentially truck traffic, could be obtained from the WSDOT through its traffic loop detector system. Transit vehicle travel time could be obtained through a transit agency automatic vehicle identification system. Most data for travel modes could theoretically be collected and distributed through the ITS Backbone. The project will provide an opportunity to provide data collection linkages to the regional CMS.

As shown in the Figure, by attaching to the Internet, the Regional Council will have immediate access to the various data collection activities mentioned above. Once the data is collected from the various sources, the server at the Regional Council that is attached to the Internet would house specific information that could be manipulated through various computer program algorithms to produce final CMS travel time reports for CMS reporting purposes. Another

Figure 6



benefit of the system would be that other local, state and federal agencies would have access to the PSRC CMS data simply by having access to the Internet or through the PSRC's Bulletin Board System (BBS).

This Fall, the Regional Council, (pending receipt of a Federal Highway Administration grant), will undertake a project to develop the first linkages to collecting real-time data from an off-site source. The project would provide the computer hardware and software required to the ITS Backbone, described above. The project would link to one data site such as the North Seattle Advanced Traffic Management System, develop a CMS "home page" for access by internal and external planners and provide the necessary procedures to implement communication links into the future.

Data such as vehicle counts and speeds could be gathered from a source (e.g., WSDOT loop detectors) and "pulled" into the CMS server located at the PSRC through the ITS Backbone system. The data could then be manipulated through a series of algorithms to develop CMS output needed for CMS reports. In addition, this summarized information could be used by others for non-CMS applications such as transit route planning, freight and goods scheduling or long range land use and transportation planning purposes.

If all goes well during the above demonstration project, the PSRC will seek linkages to other data collection sites. To develop the additional CMS linkages to the ITS Backbone, the PSRC is seeking FY 1997-98 federal ISTEA funds. The project, known as the Multimodal Data Integration Project for the Regional Congestion Management System, would extend the initial data collection systems concept developed through the ITS Backbone demonstration project to other data sources. The project would also support staff in providing enhancements to the overall CMS program, especially the performance monitoring element. Some of the specific activities would include the development of:

- Communication protocols to access data,
- Interlocal agreements to access and use data, and
- System support and training for staff and other activities.

Freight Travel

Freight travel differs significantly from general purpose, person oriented travel. Rather than focusing on trip generation, distribution, and assignment, freight travel is focused on economic changes and the impact of economic changes on goods production and delivery.

As part of the metropolitan transportation planning process, the Regional Council has developed a strong working relationship with the freight community through its Roundtable, a working coalition of private sector freight representatives and public sector transportation providers. The Regional Council is working in conjunction with the Roundtable to develop performance criteria

for the region's freight activity. Developing these measures is a long-term goal, but the Regional Council expects this process and its products to be applicable to the CMS.

Four criteria are currently under consideration; safety, cycle time, cost and reliability. At this time, however, the recommendation for the preferred measure focuses on percent delay in freight travel. A report discussing these potential measures is expected to be available in the fall.

Criteria and Application. The process of working with the freight community is considered to be the first step in developing freight related congestion measures. Because of the necessary discussion and research, developing the performance criteria and the congestion measures is a long term process.

While the details of measuring reliability are still being developed, the current definition of the concept focuses on reducing the percent of delays experienced by major truck and rail movement between selected regional origins and destinations. Some additional issues raised include identifying critical freight movement for study and measurement; establishing a consistent methodology and/or survey process for determining if freight is arriving within schedule; and determining key origin and destination points and routes for freight travel. For this CMS, percent of delays is the recommended measurement. This measurement would be applied initially to segments on the CMS network, although the measure may be extended to areas or corridors, as identified by the freight community.

Other Applicable CMS Data Sources

The CMS Subcommittee recognized that additional data is available in the region and ideally should be considered as part of the CMS. These data can provide assistance to decision makers in the selection and evaluation of CMS strategies. While the focus of CMS performance and congestion relief strategies will initially be based on the measures previously discussed, the region may decide to formally adopt some of the performance measures described in the following paragraphs at a future date.

Nonrecurring Congestion .

Nonrecurring congestion refers to congestion that occurs on an irregular basis often arising from events which occur separately from the daily commute-related congestion. The causes of nonrecurring congestion can be divided into two categories: incidents and special events. Incidents includes accidents, distractions, and vehicle breakdowns which reduce traffic flow. Special events are activities such as sports events, musical concerts, and community fairs. These events generate large volumes of travel with a single destination. While occurring at irregular intervals, special events are often well planned events, and the traffic impacts often can be anticipated.

Including nonrecurring congestion in the CMS was initially considered in the Proposed Rule for CMS but was not directly mentioned in the Interim Final Rule. Nonetheless, the Federal Highway

Administration expects incident related congestion to be addressed in the CMS because incidents often cause a large portion of congestion.

The development of a special events congestion measurement may be considered even though special event related congestion is not required to be in the CMS. The measurement of congestion caused by special events is expected to be a travel time or delay measurement which will be coordinated with the travel time or delay measurement for the overall transportation system.

Incident Management[7]. Incidents are defined as any event that impedes traffic flow. Examples of incidents includes accidents, vehicle breakdowns and spills. Incidents, in contrast to daily commute congestion, are random and unpredictable: neither their timing or their location can be anticipated. One research group estimates that in 1984 58 percent of the total hours of delay was caused by freeway incidents. The percentage of delay caused by freeway incidents is expected to increase to as much as 70 percent by the year 2000. Incident related congestion can also be measured by travel time. In fact, WSDOT has already begun collecting data on traffic delays caused by incidents through its Incident Management Program. The goal of the program is to "facilitate the efficient clearance of incident sites".[8]

WSDOT personnel, trained and equipped for resolving traffic incidents, are on call 24 hours a day to respond to incidents that typically close one or more lanes of traffic for one or more hours on any state route in their region. The Incident Response Team (IRT) are notified by the Washington State Patrol (WSP) who determine if the IRT is needed. For those incidents addressed by the IRT, the IRT maintains data on the incident, including information on the date and time of the incident, how long the road was closed, and the time that all lanes were reopened. This program can be used as a source for measuring congestion caused by incidents.

The data on the length of time of road closure being collected by the IRT program provides a direct measure of congestion caused by incidents. Working with WSDOT and the IRT program, the Regional Council can monitor changes in the congestion due to incidents. Vehicle hours of delay and an estimated cost of delay can be calculated because data on the duration of the incident, the number of lanes blocked, and the traffic volume at the time of the incident is already being gathered.

However, the IRT program has several issues that must be addressed in order to be fully applicable to the CMS data needs. First, the WSDOT regions do not correspond with the Regional Council's jurisdictional boundaries. The Puget Sound Regional Council consists of King, Kitsap, Pierce and Snohomish counties. King and Snohomish counties are in the WSDOT

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7 This section is derived directly from the draft report, Incident Management Background, produced by University of Washington, TRAC.

8 ibid

Northwestern Region, while Kitsap and Pierce counties are in the Olympic Region. To develop an incident based CMS program, data would have to be collected from both the Northwestern and the Olympic Peninsulas. The data specific to the region would then have to be culled from the data of the two larger regions.

Secondly, the IRT efforts are focused on the urban areas because the majority of accidents occur in urban areas. While this may be the most efficient use of resources, this focus on urban areas does mean that incident data is more sketchy in rural areas. The Northwestern and Olympic Regions are divided into subareas that are contingent with the WSDOT maintenance areas. At least one IRT is available for each maintenance area in the urban regions. Lastly, the IRT is also limited to state routes, while the current Regional Council CMS program considers the entire NHS system.

Over time, however, these issues will be resolved and the IRT may be able to identify a full range of incidents throughout the NHS system. In the meantime, the data and information provided by the IRT program can provide the Regional Council with useful supplemental information for managing congestion.

Special Events. Since travel time is the preferred measure of congestion in the long term, congestion arising from special events can also be measured in terms of travel time. The precise measurement of the time or delay based measure related to special events will be developed in conjunction with the measure of travel time for the overall system.

In the short term, the Regional Council can carry out background research and begin to develop a database that can focus on several issues, as outlined below.

- the definition of special events
- which special events warrant congestion management
- the location of the relevant special events
- the transportation system serving the special event locations
- existing special event mitigation efforts
- current criteria for establishing special event mitigation

By identifying and understanding these definitions and components of congestion related to special events, the travel time analysis can be more effectively applied.

Other measures, as appropriate, can also be considered for the Phase II program as follows:

Non-Motorized Facilities Coverage

This measure will attempt to gauge the availability of non-motorized facilities. The primary focus is on bicycle facilities although it is recognized that measures of pedestrian facilities are also desirable. Three bicycle oriented data elements are defined; miles of bike paths, transit coaches accessible to bicycles, and the number of available bicycle storage lockers or racks. This measure would be used during the second phase. The following supplemental information can be collected during Phase 1.

HOV/Transit Service Coverage. This measure is simply an inventory of HOV lanes available to support transit, vanpools and carpools. Three data elements are identified to measure HOV/Transit Service Coverage. They include: total HOV miles on the CMS network, number of transit routes utilizing these HOV lanes, and total vehicles traveling in HOV lanes.

Transit Frequencies in Major Corridors on CMS Network. This measure is designed to estimate the frequency of transit service through designated major corridors. This measure will be limited to transit coach service.

Park & Ride Lot Inventory. This is an inventory of the total number of parking spaces in park and ride lots related to the CMS network.

Park & Ride Usage
This indicator measures the use of park & ride facilities by periodically counting the number of cars parked in each facility. This measure should also be expressed as a ratio of total parking spaces.

TDM Program Coverage. This measure is designed to gauge the availability of employer programs to promote reductions in commute trip travel. The measure is expressed in two ratios: employees covered by the Commute Trip Reduction (CTR) program to total employees and CTR participating employees to total employees. These two ratios will gauge program penetration in both the region and within employers.

In-Vehicle Travel Time. This indicator gauges the relative on board travel times of various transportation choices such as transit, and other forms of HOV or non motorized travel. A ratio is proposed using SOV travel time as the denominator to each of the non SOV modes. Data currently available from the Regional Council's travel panel may allow calculation of these ratios. The data may require supplementation with transit on board travel surveys. Further investigation is necessary.

Total Travel Time. This indicator forecasts the total travel time from origin to destination for each non SOV travel mode. It is recognized that multiple travel modes may be utilized in a trip and that wait and transfer time will be measured. The measure is expressed as a ratio to SOV trip time for the same segment. Ratio calculations should be feasible with data from the Regional Council travel panel but further investigation is necessary.

Transit Schedule Adherence
This indicator attempts to gauge the effectiveness of transit in providing a reliable service. Although it is widely agreed that reliability of scheduled service is a key factor to transit usage, it is also agreed that a common measure of reliability has not been identified. Future work should address this measure.

Person Throughput. This indicator measures effectiveness of a transportation facility or service and can be particularly effective in measuring congestion. This indicator could also be useful in assessing the adequacy of system capacity and could be a valuable guide to investment decisions. Measurement of this indicator must occur with models as it cannot be easily accomplished with manual methods and field data.

CMS Performance Monitoring Network

The focus of the CMS performance monitoring system will ultimately be on the proposed Metropolitan Transportation System (MTS). The MTS includes both transportation facilities and services which provide regionally significant travel opportunities to facilitate access to locations and activities crucial to the social or economic health of the central Puget Sound region. The MTS can be viewed as a planning tool used to identify regional transportation problems, develop regional solutions, define the transportation network required for regional air quality analyses and serve as a focus for required state, regional and local transportation system performance monitoring, particularly congestion monitoring for the CMS. The MTS is intended to be an evolving regional system that will periodically be updated as projects and programs are advanced for the purposes of improving its performance or adding capacity. Figure 7 describes the existing highway element of the MTS, which will ultimately be primary network for performance monitoring of the CMS.

In the interim (the next two to three years), the CMS performance monitoring network will be the proposed National Highway System facilities and that state ferry routes. Figure 8 shows the initial CMS network for performance monitoring purposes. Of the NHS and ferry routes, the initial monitoring efforts will be focused on the approximately 25 most congested segments. A description of these segments can be found in the CMS Work Plan, Metropolitan Transportation Plan Background Report #13.

The focus of CMS strategies may or may not apply directly to the CMS network. The focus of the strategies are to improve person mobility in a subarea or along a transportation corridor. The CMS network will be used to inform the region is transportation strategies implemented regionwide, in a subarea, or in a transportation corridor are effective. More work is to be done later this Fall to better understand how performance measures will be applied to planning subareas or in corridors. The performance measures described above will be refined to ensure that planners will be able to credibly assess the performance of potential CMS strategies. Also to be developed later this year will be a process to add facilities to the initial CMS network for monitoring purposes.

Figure 7

Metropolitan Transportation System

Freeway, Other State Highway, Arterial, and Ferry Components - Existing System

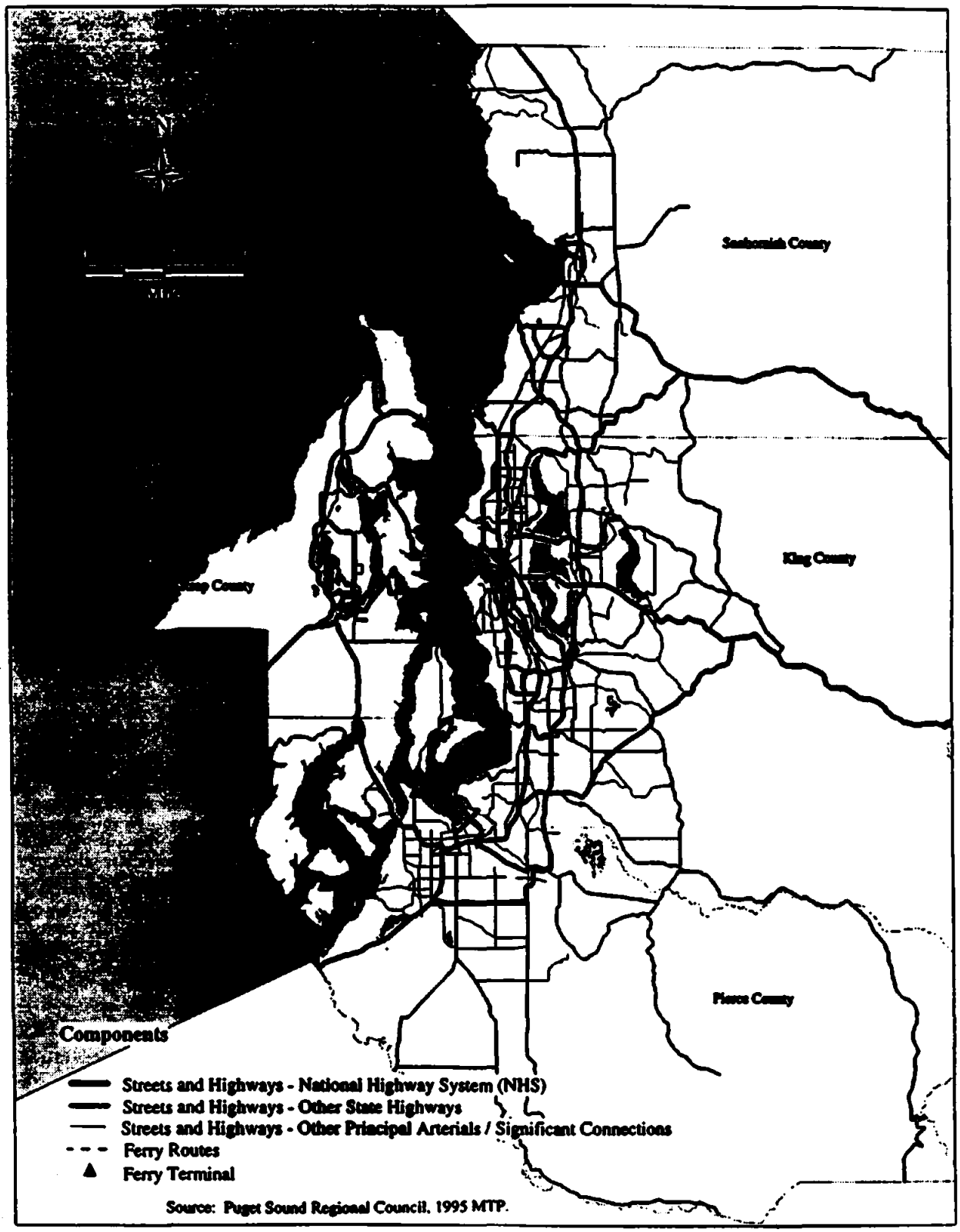
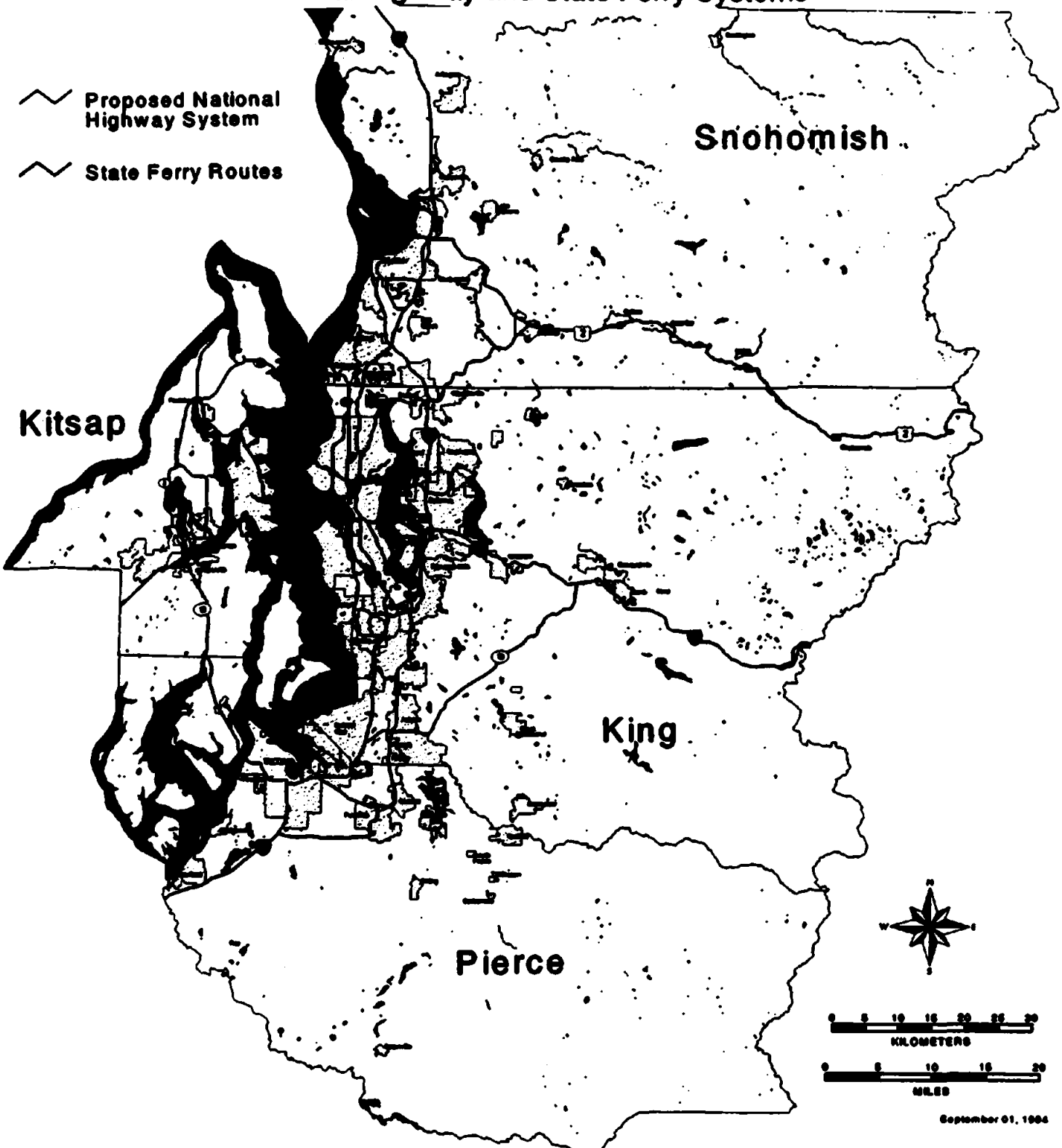


Figure 8

Initial Congestion Management System

National Highway and State Ferry Systems



VII. THE NEXT STEPS

To provide more detail to the CMS Work Plan and to develop a better CMS implementation scheme, the Regional Council has solicited the services of the Seattle office of JHK and Associates. The consultant is assisting staff in refining the CMS Work Plan by focusing on two primary areas: (1) to further develop its performance monitoring system framework, including, but not limited to how the region will transition from a volume/capacity ratio system to one based fundamentally on travel time through the use of Intelligent Transportation Systems technology; and (2) to develop a congestion management strategy evaluation process, including, but not limited to, the evaluation of single occupant vehicle (SOV) expansion projects. The consultant will be on board through the rest of the year and into 1996.

Staff has prepared a refined implementation schedule that leads to full CMS implementation by October 1, 1995. This schedule has been submitted to the state Department of Transportation as well as the regional FHWA office. A schedule for addressing the following CMS elements is attached.

- CMS Data Collection
- SOV Expansion Projects
- CMS Network Evaluation/Strategy Evaluation
- TIP Priority Funding Process
- Metropolitan Transportation Plan

The following describes the key milestones that will be addressed as part of the CMS Development Program for the Puget Sound region. Highest priority will be given to the development of procedures for meeting single-occupant vehicle expansion requirements of the CMS in Transportation Management Areas that are in nonattainment of federal air quality standards.

CMS IMPLEMENTATION SCHEDULE

<u>CMS Data Collection</u>

- 1990 and most recent (1994,95) daily and peak hour vehicle counts for CMS network deficient segments: **Spring-Fall 1995**
- 1990 and most recent (1994,95) daily and peak hour vehicle counts for remaining CMS network segments: **Spring-Fall 1995**
- Auto/Passenger and Passenger Only Vehicle and passenger volumes: **Spring 1995**
- Transit route coverage in CMS Network corridor:

- Type of service (local, express)
- Frequency
- Ridership

DATE: **Summer/Fall 1995**

- Initial CMS System Performance Report: **Spring 1996**

SOV Expansion Projects

- Identification of candidate projects: **Winter 1995**

- Data Collection

  - o 1990 and most recent (1994,95) daily and peak hour vehicle counts for SOV Expansion projects not on CMS network: **Fall 1995**
  - o Transit route coverage in CMS Network corridor:
    - Type of service (local, express)
    - Frequency
    - Ridership

  DATE: **Fall/Winter 1995**

CMS Network Evaluation/Strategy Evaluation

- Identification of potential strategies for implementation: **Beginning Early 1996**

- Phasing of project/program implementation
  Some project and program improvements have been identified in draft Metropolitan Transportation Plan and Transportation Improvement Program. Full CMS strategy implementation will occur during the next phase of the MTP and TIP refinements (see below).

- Strategy effectiveness evaluation: Frequency of CMS strategy effectiveness evaluations will be determined in the Fall of 1995.

TIP Priority Funding Process

- Policy Framework Refinements based on CMS: **Fall 1996**

- Project Selection Criteria refinements based on CMS: **Winter 1997**

- FY 1998-2000 TIP Project Selection (TIP Adoption): **Fall 1997**

Metropolitan Transportation Plan

- Policy Modifications based on CMS: **Spring 1998**
- MTP Project Identification and Phasing based on CMS Begins: **Summer 1998**

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APPENDIX A

Vision 2020 Multicounty Framework Policies

APPENDIX A

VISION 2020 Multicounty Framework Policies

Urban Growth Areas:

RG-1 Locate development in urban growth areas to conserve natural resources and enable efficient provision of services and facilities. Within urban growth areas, focus growth in compact communities and centers in a manner that uses land efficiently, provides parks and recreation areas, is pedestrian-oriented, and helps strengthen communities. Connect and serve urban communities with an efficient, transit-oriented, multi-modal transportation system.

Contiguous and Orderly Development:

RC-2 Coordinate provision of necessary public facilities and services to support development and to implement local and regional growth planning objectives. Provide public facilities and services in a manner that is efficient, cost-effective, and conserves resources. Emphasize interjurisdictional planning to coordinate plans and implementation activities and to achieve consistency.

Regional Capital Facilities:

RF-3 Strategically locate public facilities and amenities in a manner that adequately considers alternatives to new facilities (including demand management), implements regional growth planning objectives, maximizes public benefit, and minimizes and mitigates adverse impacts.

Housing:

RH-4 Provide a variety of choices in housing types to meet the needs of all segments of the population. Achieve and sustain an adequate supply of low-income, moderate-income and special needs housing located throughout the region.

Rural Areas:

RR-5 Preserve the character of identified rural areas by protecting and enhancing the natural environment, open space and recreational opportunities, and scenic and historic areas; support small-scale farming and forestry uses; permitting low-density residential living and cluster development maintained by rural levels of service. Promote cities and towns in rural areas as locations for employment, mix of housing types, urban services and cultural activities.

Open Space, Resource Protection and Critical Areas:

RO-6 Use rural and urban open space to separate and delineate urban areas and to create a permanent regional greenspace network. Protect critical areas, conserve natural resources, and preserve lands and resources of regional significance.

Economics:

RE-7 Foster economic opportunity and stability, promote economic well-being, and encourage economic vitality and family wage jobs while managing growth. Support effective and efficient mobility for people, freight, and goods that is consistent with the region's growth and transportation strategy. Maintain region-wide information about past and present economic performance. Assess future economic conditions that could affect the central Puget Sound region.

Transportation:

RT-8 Develop a transportation system that emphasizes accessibility, includes a variety of mobility options, and enables the efficient movement of people, goods and freight, and information.

Multicounty Transportation Policies

Optimize and Manage the Use of Transportation Facilities and Services

RT-8.1 Develop and maintain efficient, balanced, multi-modal transportation systems which provide connections between urban centers and link centers with surrounding communities by:

a. Offering a variety of options to single-occupant vehicle travel;
b. Facilitating convenient connections and transfers between travel modes;
c. Promoting transportation and land use improvements that support localized trip-making between and within communities;
d. Supporting the efficient movement of freight and goods.

RT-8.2 Promote convenient intermodal connections between all elements of the regional transit system (bus, rail, ferry, air) to achieve a seamless travel network which incorporates easy bike and pedestrian access.

RT-8.3 Maintain and preserve the existing urban and rural transportation systems in a safe and usable state. Give high priority to preservation and rehabilitation projects which increase effective multimodal and intermodal accessibility, and serve to enhance historic, scenic, recreational and/or cultural resources.

RT-8.4 Maximize multimodal access to marine ferry routes through:

a. Coordinated connections to land-based transit service;
b. Safe and convenient bicycle and pedestrian linkages;
c. Preferential access for high-occupancy vehicles, and freight and goods movement on designated routes.

RT-8.5 Encourage public and private sector partnerships to identify freight mobility improvements which provide access to centers and regional facilities, and

facilitate convenient intermodal transfers between marine, rail, highway and air freight activities, to and through the region.

RT-8.6 Promote efficient multimodal access to interregional transportation facilities such as airports, seaports, and inter-city rail stations.

RT-8.7 Where increased roadway capacity is warranted to support safe and efficient travel through rural areas, appropriate rural zoning and strong commitments to access management should be in place prior to authorizing such capacity expansion in order to prevent unplanned growth in rural areas.

RT-8.8 Support transportation system management activities, such as ramp metering, signalization improvements, and transit priority treatments, to achieve maximum efficiency of the current system without adding major new infrastructure.

RT-8.9 Develop and periodically update regional transportation system performance standards to assist in the development of level-of-service standards for state owned and/or operated transportation facilities which seek to assure effective coordination and mutual benefit between local and state transportation systems.

RT-8.10 Support the retrofit of existing roadways and other transportation facilities to control and reduce noise, polluting runoff and barriers to fish passage.

Manage Travel Demand Addressing Traffic Congestion and Environmental Objectives

RT-8.11 Promote demand management and education programs that shift travel demand to non-single occupant vehicle travel modes and to off-peak travel periods, and reduce the need for new capital investments in surface, marine and air transportation.

RT-8.12 Support transportation system management programs, services, and facility enhancements which improve transit's ability to compete with single-occupant vehicle travel times.

RT-8.13 Regional, major corridor, and urban center goals should be established reflecting regional policy intent to achieve increased proportional travel by transit, high-occupancy vehicle, and nonmotorized travel modes to achieve reduced dependence on single-occupant vehicle travel, with the greatest proportional increases in urban centers. Such goals should be set for 5- to 10-year periods and periodically updated in consultation with local jurisdictions, transit agencies and WSDOT.

RT-8.14 Emphasize transportation investments that provide alternatives to single-occupant vehicle travel to and within urban centers and along corridors connecting centers.

RT-8.15 Develop a public dialogue and seek broad public support for implementation of

transportation pricing strategies which can reduce subsidies for less efficient travel and manage travel demand. Pricing strategies are intended to assist in achieving growth management and economic development goals and policies, and should also support objectives for energy conservation, air quality improvement and congestion management.

RT-8.16 Support opportunities to use advanced transportation and information technologies which demonstrate support for regional growth and transportation strategies.

Focus Transportation Investments Supporting Transit and Pedestrian-Oriented Land Use Patterns

RT-8.17 Integrate land use and transportation solutions that offer the best opportunity to reduce air pollution, conserve energy, and protect the natural environment.

RT-8.18 Investments in transportation facilities and services should support compact, pedestrian-oriented land use development throughout urban communities, and encourage growth in urban areas, especially in centers.

RT-8.19 Promote transportation improvements that support the redevelopment of lower-density, auto-dominated arterials to become more pedestrian and transit compatible urban transportation corridors.

RT-8.20 Encourage a mix of land uses and densities at major transit access points to meet passenger needs and offer an opportunity to reduce vehicle trips.

RT-8.21 Promote the development of local street patterns and pedestrian routes that provide access to transit services within convenient walking distance of homes, jobs, schools, stores, and other activity areas.

RT-8.22 Support the establishment of high capacity transit stations that advance regional growth objectives by:

a. Maximizing opportunities to walk, bike or take short transit trips to access regional transit stations;
b. Locating stations within urban centers and at sites supporting development of concentrated urban corridors;
c. Providing direct, frequent and convenient regional transit service between urban centers; and
d. Providing system access to urban areas in a manner that does not induce development in rural areas.

RT-8.23 Regional high capacity transit station area guidelines should be developed by the Puget Sound Regional Council in cooperation with the Regional Transit Authority, WSDOT, local transit agencies, and local jurisdictions to establish regionally consistent expectations of appropriate development in the vicinity of high capacity transit stations (including rail, major bus, and ferry) that best

support and assure effective utilization of the regional transit system.

RT-8.24 The regional high capacity transit station area guidelines should be addressed by the Regional Transit Authority, transit agencies and WSDOT in conducting planning activity through interlocal agreements to be developed with local jurisdictions for station area planning. Such planning shall set forth conditions for development and access around high capacity transit stations. Consistency with transit station area guidelines, in conjunction with other regional policies, should be addressed in developing the regional transit system within corridors.

RT-8.25 Local jurisdictions that are or will be directly served by the high capacity transit system identified in the Metropolitan Transportation Plan should develop specific station area plans as part of their comprehensive planning efforts that provide for development, services and facilities sufficient to support efficient transit service commensurate with the regional investment in transit. Local station area plans should be consistent with regional high capacity transit station area guidelines, and at a minimum address land use and density, transit-supportive development regulations, urban design, parking, and nonmotorized and motorized access.

Expand Transportation Capacity Offering Greater Mobility Options

RT-8.26 Upon potential achievement of broad public support, regional transportation pricing strategies should be considered as a method to assist in financing the costs for development, maintenance and operation of the regional multimodal transportation system in order to reflect a more direct relationship between transportation system costs and benefits.

RT-8.27 Promote an interconnected system of high-occupancy vehicle lanes on limited access freeways that provides options for ridesharing and facilitates local and express transit services connecting centers and communities. Assure safe and effective operation of the HOV system at intended design speed for transit vehicles while also enabling the region to assure attainment and maintenance of federal and state air quality standards.

RT-8.28 Support the design and development of components of the regional high-occupancy vehicle (HOV) system which improve transit access and travel time relative to single-occupant vehicle travel.

RT-8.29 Promote and support the development of arterial HOV lanes and other transit priority treatments in urban areas to facilitate reliable transit and HOV operations.

RT-8.30 Promote and assist in coordinated development and operation of higher speed intercity rail corridor services and facilities connecting the Puget Sound region with effective interregional and interstate transportation mobility which may reduce highway and air travel demands in such corridors.

RT-8.31 Support effective management and preservation of existing regional air

transportation capacity and ensure that future air transportation capacity and phasing of existing airport facilities needs are addressed in cooperation with responsible agencies. Coordinate this effort with long-range comprehensive planning of land use, surface transportation facilities for effective access, and development of financing strategies.

RT-8.32 Ensure adequate capacity to serve cross-sound travel demands that focuses on foot-passenger travel and freight and goods movement. Promote convenient connections for foot-passengers to the regional transit network.

RT-8.33 Develop a regionally coordinated network of facilities for pedestrians and bicycles which provides effective local mobility, accessibility to transit and ferry services and connections to and between centers.

RT-8.34 Support the development of roadways when they are needed to provide more efficient connections for a comprehensive road network to move people and goods when such roads will not cause the region to exceed air quality standards.

RT-8.35 Support appropriate development of freight access improvements for greater reliability and efficiency in the movement of freight and goods. Such improvements may include but are not limited to consideration of exclusive freight access facilities and/or preferential freight access where appropriate.

RT-8.36 Transportation investments in major facilities and services should maximize transportation system continuity and be phased to support regional economic development and growth management objectives.

RT-8.37 Improve intermodal connections between high capacity transit stations, (including ferry terminals, rail stations, and bus centers), major transfer points, and the communities they serve, primarily through more frequent and convenient transit service.

RT-8.38 Support opportunities to redevelop the road system as multi-modal public facilities which accommodate the needs of pedestrians, cyclists, transit, high-occupancy vehicles, automobiles, and trucks.

RT-8.39 Develop a high-capacity transit system along congested corridors that connects urban centers with frequent service sufficient to serve both community and regional needs.

RT-8.40 Encourage, when possible, the use of local labor when building regional transportation systems and components which could generate new economic and employment opportunities.

APPENDIX B

ISTEA's 15 Planning Factors Federal Metropolitan Planning and Program Development Requirements

APPENDIX B

ISTEA's 15 Planning Factors
Federal Metropolitan Planning and Program Development Requirements

ISTEA was passed by Congress and signed into law with the intent to broaden and strengthen the ability of urbanized areas to link their comprehensive planning programs to funding decisions on transportation projects. The law states:

> It is in the national interest to encourage and promote the development of transportation systems embracing various modes of transportation in a manner which will efficiently maximize mobility of people and goods within and through urbanized areas and minimize transportation-related fuel consumption and air pollution. To accomplish this objective, metropolitan planning organizations, in cooperation with the State, shall develop transportation plans and programs for urbanized areas of the State. Such plans and programs shall provide for the development of transportation facilities (including pedestrian walkways and bicycle transportation facilities) which will function as an intermodal transportation system for the State, the metropolitan areas, and the Nation. The process for developing such plans and programs shall provide for consideration of all modes of transportation and shall be continuing, cooperative, and comprehensive to the degree appropriate, based on the complexity of the transportation problems.

In developing regional transportation plans and improvement programs to carry out this mandate, ISTEA requires that each regional/metropolitan planning organization consider at least the following *15 factors*:

1. *Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation facilities more efficiently.*

2. *The consistency of transportation planning with applicable Federal, State, and local energy conservation programs, goals, and objectives.*

3. *The need to relieve congestion and prevent congestion from occurring where it does not yet occur.*

4. *The likely effect of transportation policy decisions on land use and development and the consistency of transportation plans and programs with the provisions of all applicable short- and long-term land use and development plans.*

5. *The programming of expenditures on transportation enhancement activities.*

6. *The effects of all transportation projects to be undertaken within the metropolitan area, without regard to whether such projects are publicly funded.*

7. *International border crossings and access to ports, airports, intermodal transportation*

facilities, major freight distribution routes, national parks, recreation areas, monuments and historic sites, and military installations.

8. *The need for connectivity of roads within the metropolitan area with roads outside the metropolitan area.*

9. *The transportation needs identified through use of the management systems required to be developed under ISTEA (six management systems must be developed and in place by the State, in cooperation with regional planning agencies, not later than December 31, 1994).*

10. *Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way which may be needed for future transportation corridors and identification of those corridors for which action is most needed to prevent destruction or loss.*

11. *Methods to enhance the efficient movement of freight.*

12. *The use of life-cycle costs in the design and engineering of bridges, tunnels, or pavement.*

13. *The overall social, economic, energy, and environmental effects of transportation decisions.*

14. *Methods to expand and enhance transit services and to increase the use of such services.*

15. *Capital investments that would result in increased security in transit systems.*

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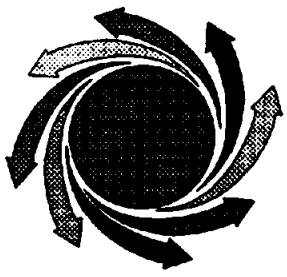

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