Institutional Framework for Integrated Transportation Planning

Revised Edition

A REPORT OF THE
TRANSPORTATION TASK FORCE
OF THE

URBAN CONSORTIUM
FOR TECHNOLOGY INITIATIVES

Supported by

U.S. DEPARTMENT OF TRANSPORTATION
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The Urban Consortium for Technology Initiatives was formed to pursue technological solutions to pressing urban problems. The Urban Consortium is a coalition of 37 major urban governments, 28 cities and 9 counties, with populations over 500,000. These 37 governments represent over 20% of the nation's population and have a combined purchasing power of over $25 billion.

Formed in 1974, the Urban Consortium represents a unified local government market for new technologies. The Consortium is organized to encourage public and private investment to develop new products or systems which will improve delivery of local public services and provide cost-effective solutions to urban problems. The Consortium also serves as a clearinghouse in the coordination and application of existing technology and information.

To achieve its goal, the Urban Consortium identifies the common needs of its members, establishes priorities, stimulates investment from Federal, private and other sources and then provides on-site technical assistance to assure that solutions will be applied. The work of the Consortium is focused through 10 task forces: Community and Economic Development; Criminal Justice; Environmental Services; Energy; Fire Safety and Disaster Preparedness; Health; Human Resources; Management, Finance and Personnel; Public Works and Public Utilities; and Transportation.

Public Technology, Inc. is the applied science and technology organization of the National League of Cities and the International City Management Association. It is a nonprofit, tax-exempt, public interest organization established in December 1971 by local governments and their public interest groups. Its purpose is to help local governments improve services and cut costs through practical use of applied science and technology. PTI sponsors the nation's largest local government cooperative research, development, and technology transfer program.

PTI's Board of Directors consists of the executive directors of the International City Management Association and the National League of Cities, plus city managers and elected officials from across the United States.

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Prepared by

PUBLIC TECHNOLOGY, INC.
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Washington, D.C. 20036

Secretariat
to the

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES

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PREFACE

This is one of ten bulletins in the third series of Information Bulletins produced by the Transportation Task Force of the Urban Consortium for Technology Initiatives. Each bulletin in this series addresses a priority transportation need identified by member jurisdictions of the Urban Consortium. The bulletins are prepared for the Transportation Task Force by the staff of Public Technology, Inc.

Five newly-identified transportation needs are covered in the third series of Information Bulletins:

- Air Quality Regulation and Measurement
- Airport Access
- Mass Transportation Energy Conservation and Contingency Planning
- Non-Federal Street and Highway Financing.
- Pedestrian Movement

Five Information Bulletins covering needs identified in previous years, are being updated:

- Accelerated Implementation Procedures
- Coordination of Paratransit with Conventional Transit
- Institutional Framework For Integrated Transportation Planning
- Neighborhood Traffic Controls
- Urban Goods Movement

The needs highlighted by Information Bulletins are selected in an annual process of needs identification used by the Urban Consortium. By focusing on the priority needs of member jurisdictions, the Consortium assures that resultant research and development efforts are responsive to local government problems.

Each bulletin provides a nontechnical overview, from the local government perspective, of issues and problems associated with each need. Current research efforts and approaches to the problem are identified. The bulletins are not an in-depth review of the state-of-the-art or the state-of-the-practice. Rather, they serve as an information base from which the Transportation Task Force selects topics that require a more substantial research effort.

The Information Bulletins are also useful to those, such as elected officials, for whom transportation is but one of many areas of concern.

The needs selection process used by the Urban Consortium is effective. Priority needs selections have been addressed by subsequent Transportation Task Force projects:

- A Manual for Planning and Implementing Priority Techniques for High Occupancy Vehicles (consisting of a Chief Executive's Report, Program Manager's Report, and Technical Guide) was developed to provide assistance to local governments in planning and implementing Preferential Treatment for buses and other high-occupancy vehicles.

- A National Conference on Transit Performance addressed the need for Transit System Productivity. The conference, held at Norfolk, Virginia, in September 1977, was attended by 200 government, industry, labor, and academic participants. As a follow-up to the Norfolk meeting, 5 Transit Actions regional meetings were held between January 1979 and May 1979. The product of these following meetings is a Transit Actions Workbook that features techniques currently being used to improve transit system performance and productivity.

- To facilitate the provision of Transportation for Elderly and Handicapped Persons, 6 documents were developed: one on local government approaches, a coordination guide, a planning checklist, an information sourcebook, a series of case studies, and a chief executive's summary.

- To help improve Center City Circulation two projects have been completed. A summary report on Center City Environment and Transportation: Local Government Solutions shows how seven cities used transportation and pedestrian improvements to help downtown revitalization. Another project, addressing the coordination of public transportation investments with real estate development, culminated in a national conference--The Joint

Development Marketplace, at Washington, D.C., in June 1978. The Marketplace was attended by over 600 persons, including exhibitors from 36 cities and counties and representatives of over 140 private development and financial organizations.

- Two documents relating to the need for Transportation Planning and Impact Forecasting Tools have been prepared: (1) A paper describing local transportation planning issues and concerns directed to the Urban Mass Transportation Administration and (2) A management-level document for local officials describing the tools available as a result of the Urban Mass Transportation research program and how these tools can be applied by local governments.

- To facilitate the dissemination of information on local experiences in Parking Management, a technical report describing the state-of-the-art is being prepared.

- A National Transit Pricing Forum was held at Virginia Beach, Virginia, in March 1979 to address the need for more information on Innovative Fares. Much of the Forum was directed to technical advances in areas of pricing research and practice. The proceedings of this conference are available.

Task Force information dissemination and technology sharing concerns are currently addressed by a series of SMD Briefs. These one-page reports provide up-to-date information about on-going UMTA Office of Service and Methods Demonstrations projects.

The support of the U.S. Department of Transportation's Technology Sharing Division in the Office of the Secretary, Federal Highway Administration, and Urban Mass Transportation Administration has been invaluable in the work of the Transportation Task Force of the Urban Consortium and the Public Technology, Inc. staff. The guidance offered by the Task Force members will continue to insure that the work of the staff will meet the urgent needs identified by members of the Urban Consortium for Technology Initiatives.

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Chapter I

ISSUES AND PROBLEMS

The history of transportation decision-making in the United States has been one of separate agencies responsible for separate modes of transportation. The concept of planning for integration of transportation systems has only recently been advanced. An ideal integrated transportation system is one where all modes, for all trip purposes, are coordinated on a geographic basis to improve goods and passenger movement, both for intracity and intercity travel. Existing transportation systems in most urban areas are not integrated. Indeed, most present transportation planning efforts fall far short of this goal of true integration of mode, purpose and geography. Existing fragmentation of jurisdictions and diffusion of implementation responsibilities at the local and regional levels make integrated transportation planning a goal to be achieved, rather than current reality.

This bulletin will focus on one aspect of integrated transportation planning where some progress has been made--that of integration of highway and transit planning. Recent guidelines[1] issued jointly by the Urban Mass Transportation Administration and the Federal Highway Administration have established a regulatory basis for the consideration of highway and transit together in developing short- and long-range transportation plans and programs. These guidelines go further than any previous efforts in mandating integrated transportation planning, both institutionally and technically.

A recent study by the Office of Technology Assessment (OTA), United States Congress[2] documented the need for integrated transportation planning and the deficiencies in current planning efforts. Major causes of the

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1. UMTA & FHWA. "Transportation Improvement Program." Federal Register, Vol. 40, No. 181, September 17, 1975, pp 42976-42984.

2. U.S. Congress, Office of Technology Assessment (OTA). An Assessment of Community Planning for Mass Transit. (10 volumes) Washington, D.C.: U.S. Government Printing Office, 1976. This comprehensive study began with a focus on the status of planning for mass transit in major metropolitan areas in the United States but was broadened to consider the many issues involved in integrated transportation planning.

problem were traced to the lack of modal integration in the following three critical areas:

- Institutional arrangements
- Technical planning process
- Funding

The technical state-of-the-art for integrated transportation planning is in its infancy. Recent and on-going research efforts[3] sponsored by the U.S. Department of Transportation are beginning to address this need. So far, the focus has been on integration of highway and transit between FHWA and UMTA. The Federal Aviation Administration and the Federal Railroad Administration and other agencies have not yet become full participants in some efforts to encourage integrated transportation planning. While recognizing the crucial need for better technical tools, this paper will focus on the institutional and funding aspects of developing integrated transportation systems. The following key issues will be addressed:

- Regulatory Background
- Institutional Issues and Problems
  - + Organizational Issues
  - + Legal Authority
  - + Funding
  - + Other Institutional Issues
- Technical Issues
- Future Directions

Chapter II provides sources of further information on current programs and research on these issues. Chapter III gives an annotated bibliography.

REGULATORY BACKGROUND

On September 17, 1975, the Urban Mass Transportation Administration and Federal Highway Administration issued joint regulations regarding the urban transportation planning process. The regulations provide that the governor of each state designate a Metropolitan Planning Organization (MPO) for each urbanized area in the state. The MPO "shall be the forum for cooperative decision-making by principal elected officials of general purpose local government" (Section 450.112) who are to have "adequate representation on the MPO" (Section 450.106).[4] It is "encouraged" but not required that the MPO also be the agency designated as the metropolitan

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3. See Chapter II, "Current Programs" section for information on on-going research and Chapter III, "Planning Tools" section for references to recent reports.

4. U.S. Department of Transportation. "Transportation Improvement Program." Federal Register, Vol. 40, No. 181, September 17, 1975, pp 42976-42984.

clearinghouse to meet the requirement of the federal Office of Management and Budget's Circular A-95.

The MPO is responsible for coordinating the preparation of the following:

1. A Prospectus and Unified Planning Work Program

2. The Transportation Plan

3. The Transportation Improvement Program

These three requirements apply to all urban areas seeking FHWA or UMTA assistance. The Prospectus and Unified Planning Work Program are oriented to the planning process and the Transportation Improvement Program is oriented to project implementation. Highway and transit modes are to be considered together.

1. A Prospectus and Unified Planning Work Program. The prospectus shall establish a "multi-year framework," describing policy issues, planning status and institutional arrangements which provide a context for the Unified Planning Program. The Unified Planning Work Program is to be an annual description of all urban transportation-related planning activities proposed for the next 1-2 years, regardless of source of funding. Documentation of planning activities being financed by Section 9, Grants for Technical Studies, the Urban Mass Transportation Act as amended, and Title 23-Highways of the United States Code, 23 U.S.C. 104(f) and 307(a), must also be given. (Section 950.114)

2. The Transportation Plan. This is composed of the long-range element and the transportation systems management element (TSM). The long-range element, which must be consistent with the area's long-range, comprehensive land use plan and areawide "social, economic, environmental, system performance and energy conservation" goals and objectives, is to be multimodal, anticipate long-term transportation needs and identify any major changes planned in transportation policy or facilities. The TSM element is to provide for short range transportation needs, focusing on "traffic engineering, public transportation, regulatory, pricing, management, operational and other improvements to the existing urban transportation system, not including new transportation facilities or major changes in existing facilities."[5] (Section 450.116)

3. The Transportation Improvement Program. This is to be "a staged, multi-year program of transportation improvements including an annual element." The TIP must cover all projects of the transportation plan that are scheduled for action during the program period (3-5 or more years with the annual element covering the first year), ordered by priority and staged with costs and funding sources identified. (Section 450.304, Section 450.308)

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5. Ibid., p 42978.

For those areas planning large scale capital investments in mass transportation projects, UMTA has published a federal policy on "Assistance for Major Urban Mass Transportation Investments"[1]. This policy statement mandates an alternatives analysis and final environmental impact statement by communities seeking capital assistance for major transit investments. Major mass transportation investments are defined as:

> any project which involves new construction or extension of a fixed guideway system (rapid rail, light rail, commuter rail, automated guideway transit) or a busway, except where such project is determined by the Administrator to be of importance as a demonstration of advanced technology.[6]

The alternatives analysis,which must occur in the context of a comprehensive transportation planning process,should consider a range of alternatives including TSM-type improvements. Federal support will be given only for those alternatives which:

> the analysis has demonstrated to be cost-effective, where effectiveness is measured by the degree to which an alternative meets the locality's transportation needs, promotes its social, economic, environmental and urban development goals, and supports national aims and objectives.[1]

INSTITUTIONAL ISSUES AND PROBLEMS

The previous section provides the regulatory background for consideration of the institutional issues and problems involved in integrated transportation planning. These institutional issues can be addressed under three major categories: Organization, Legal Authority and Funding. A variety of other institutional concerns are discussed at the end of this section.

Organizational Issues

One of the major institutional issues involves the role of the Metropolitan Planning Organization and its relationships to other state and local planning and operating agencies. Federal regulatory

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6. Urban Mass Transportation Administration, U.S. Department of Transportation. "Major Urban Mass Transportation Investments," Federal Register, Vol. 41, No. 185, September 22, 1976, pp 41512-41514.

and financial assistance policies mandate that the Metropolitan Planning Organization (MPO) play a critical role in the urban transportation planning process. Many local officials feel strongly that local control of the MPO is crucial. As a result, the MPO is frequently at the center of considerable controversy over its authority and activities.

Ideally, the MPO is in a position to coordinate the various elements of the transportation system to shape orderly development of the metropolitan area. In fact, its ability to actually carry this out is questionable. There are three major reasons for this divergence between the ideal and real: 1) "adequate " local representation to the MPO remains an issue which many feel should be resolved locally; 2) the MPO has no statutory authority to implement transportation or land use development plans; and 3) the MPO has no statutory authority to require the cooperation of state and local street and highway departments and transit authorities or agencies in implementing Transportation Systems Management(TSM) elements and other projects. These problem areas, which will be further explained below, are currently causing some transportation planners to question the MPO's ability to set and implement priorities for staged, orderly development of the transportation system.

It is difficult to speak of the typical MPO, since the operating arrangements and actual powers of the MPO vary considerably from one metropolitan area to another. Federal regulations provide that local elected officials of general purpose governments are to have "adequate representation" on the MPO. The type and extent of "adequate" representation however, remains an unresolved issue in some jurisdictions. The many questions in this area explain the reluctance on the part of many of the elected officials to cooperate fully with the MPO.

Legal Authority

Implementation of plans, particularly land use plans, has traditionally been a problem under existing political and statutory systems. This has been particularly true for regional bodies. As the Office of Technology Assessment's report points out, "Federal policy has supported the general objective of coordinating transit and land use by channeling transit fund applications through Metropolitan Planning Organizations. However these agencies have inadequate statutory authority to put development plans into effect."[7]

Control of land use is not the only area in which the authority of MPO's is suspect. Important questions have been raised with respect to the power of the MPO to achieve the cooperation of state and local highway and street departments and transit authorities or agencies in implementing Transportation Systems Management (TSM) projects.

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7. U.S. Congress, Office of Technology Assessment. An Assessment of Community Planning for Mass Transit. (10 volumes) Washington, D.C.: U.S. Government Printing Office, 1976.

The following characteristics of TSM projects and existing intergovernmental relationships account for some of these potential problems:

1. State and local traffic engineers can follow the letter of the TSM requirements, expediting general traffic flow, without ever specifically addressing transit system needs. In short, the transit element should be done by the transit agency.

2. The major influence of the MPO comes from its control over federal aid. A considerable portion of the local traffic engineer's activities falls outside federally-assisted programs.

3. Several types of TSM strategies, such as auto restraint and other vehicle disincentive actions, are politically unpopular at the local level.

Funding

Existing federal funding programs also contribute to the difficulties in achieving integrated transportation planning. Distribution of federal funds is divided along agency lines, by mode. For example, the Urban Mass Transportation Administration funds mass transit, the Federal Highway Administration funds highways and the Federal Aviation Administration funds airports. Funding is also divided by purpose, planning versus operation and maintenance, and under different sections of enabling legislation. Table 1 shows this division for highway and mass transit programs. While Table 1 gives an overview of both planning and operating assistance, this section will focus on the funds for planning assistance.

Although the September 17, 1975 joint UMTA/FHWA regulations combine the application procedure for highway and transit planning assistance, the funding is still administered separately, following slightly different criteria, as shown in Table 1. A more detailed description of the funding mechanisms for UMTA and FHWA planning assistance follows.

- Urban Mass Transportation Administration - Section 8, Grants for Technical Studies, Urban Mass Transportation Act of 1964, as amended, authorizes funds for planning mass transportation. In 1975, these Section 9* funds, which always go to state agencies and MPO's and never directly to local agencies, totalled $37,100,000. A preliminary allocation of the funds is first made by UMTA headquarters. This allocation involves policy decisions on the division of the available money among urbanized areas, states and special studies (such as the BART Impact Program and management efficiency studies). A large percentage of the Section 8 funds are administratively apportioned to the states on an annual basis. These funds have been used for such purposes as implementing the 16(b)(2) program which provides for capital assistance to nonprofit organizations which then supply transportation services to elderly and handicapped persons.

  Of the approximately thirty million dollars set aside for urbanized areas over 50,000, the money is allocated roughly by population, with those areas over one million receiving slightly more funds proportionately. Regional and metropolitan totals are communicated to UMTA regional representatives, who, because they are closer to the governments concerned and more aware of their needs, are given some leeway in adjusting allocations within the regional totals. Proposed intraregional funding allocations are then transmitted back to UMTA headquarters, where the final amounts are approved.

- Federal Highway Administration - As shown in Table 1, there are two major categories of planning assistance funds from FHWA: the Highway Planning and Research (HP&R) or "1½%" funds and "PL" funds. Highway Planning and Research (HP&R) funds go directly to the state transportation agency from the Highway Trust Fund. The state agency, in turn, allocates the money between planning and research and among state, metropolitan and non-metropolitan areas by agency. State highway departments earmark at least 1½%, and no more than 2%, of their annual apportionment for highway planning and research. The states then pool 4½% of their HP&R funds to support the National Cooperative Highway Research Program (NCHRP), a combined research effort of the American Association of State Highway and Transportation Officials (AASHTO), FHWA and the Transportation Research Board. A special AASHTO committee selects the research activities of the NCHRP; the research is to provide quick answers to concerns of state highway departments. These projects may relate to urban transportation needs but are often oriented toward state level concerns.

  *The purpose of Section 9 under the UMT Act of 1964 was transferred to Section 8 by the 1978 amendments.

TABLE 1

PLANNING AND PROGRAM FUNDS AVAILABLE TO URBAN AREAS FOR HIGHWAY AND MASS TRANSIT

PLANNING FUNDS

Source/Title	Apportionment	Amount	Recipient
HPR Funds - Section 307 of Title 23, Federal-Aid Highway Act	1½% of apportioned highway funds	Approximately $75 million a year	State highway departments who can make available to Metropolitan Planning Organization (MPO) or local government for transportation planning.
PL Funds - Section 104 of Title 23, Federal-Aid Highway Act	½% of funds authorized for highway purposes - apportioned to state on basis of population	Approximately $25 million	State highway departments that shall be made available by state to MPO
UMTA Planning funds - Section 8 of Urban Mass Transportation Act of 1964, as amended	Funds appropriated to UMTA for discretionary purposes - UMTA administratively apportions part of these funds to MPO in all urbanized areas for planning purposes. In addition, state receives apportionment for special purposes, e.g., transportation planning in non-urbanized areas	Urbanized area apportionment: FY 1978 and Prior $265.6 million FY 1979 $ 44.5 million FY 1980 est. $ 48.3 million State apportionment: FY 1978 and Prior $22.8 million FY 1979 $ 7.5 million FY 1980 est. $ 3.7 million	MPO, who prepares Unified Work Program - funds may be passed through to transit operating agency or local government

PROGRAM FUNDS

Source	Apportionment	Amount	Recipient	Purpose
FAUS - Federal Aid Urban System - Section 103 of Title 23, Federal - Aid Highway Act	Formula apportioned on the basis of urbanized population and earmarked for areas over 200,000 population	$800 million a year	State highway department projects must be approved by local officials speaking through MPO	Urban system street and highway projects or mass transit projects
Formula Grant Funds - Section 5 of Urban Mass Transportation Act	½ apportioned on the basis of population and ½ on the basis of population weighted by density	FY 1978 and Prior $1,958 million FY 1979 $1,134 million FY 1980 est. $1,405 million	Designated recipient in urbanized areas over 200,000 population; to the state for urbanized areas from 50,000 to 200,000	Mass transit, capital or operating purposes
Capital discretionary funds - Section 3 of Urban Mass Transportation Act	Not apportioned but available to any state or public body that wants to apply	FY 1978 and Prior $8,402 million FY 1979 $1,226 million FY 1980 est. $2,050 million	Any public body may apply	Mass transit, capital purposes

The other major category of FHWA planning assistance, PL funds, is authorized by Section 104(f), Federal-Aid Highway Act. This section provides that a percentage of all Federal-aid highway money must go for planning research. FHWA apportions the funds to each state based on the ratio of population in the urbanized areas of that state to the total urban population in all states. The state transportation agency reserves some of the PL funds for state-level activities but distributes the majority of the money to MPOs. While PL funds can go directly from the states to local agencies, this is not very common. The funds are distributed to the MPO "in accordance with a formula developed by each State and approved by the Secretary which shall consider, but not necessarily be limited to, population, status of planning, and metropolitan area transportation needs" as provided in the Federal-Aid Highway Act.

Other Issues

A major source of controversy regarding Metropolitan Planning Organizations (MPO) has been the allocation of federal planning funds among the member jurisdictions. Once the major federal, and in turn, state allocation decisions have been made, the MPO is informed of the total amount of planning assistance funds slated for its metropolitan area. A draft Unified Work Program (UWP) is then prepared by the MPO and submitted to FHWA and UMTA field personnel.[8] Once the draft UWP is approved, it is finalized and a formal application for funding, with all the documents required by the joint UMTA/FHWA planning regulations, is submitted by the MPO. Once the application is approved, all funds are provided to the MPO. The federal government does not directly control how the MPO distributes the funds, other than approving the UWP.

Many operating agencies and general purpose local governments have complained about what they feel is inadequate pass-through of federal funds by the MPOs and that a mandatory flow-through should exist. However, just as demands on those operating agencies have increased (e.g., the new emphasis on Transportation Systems Management-TSM), so have the demands on the resources of the MPO. The decline of funding levels under the HUD "701" planning program has necessitated that more federal transportation planning funds be used to support general planning, in addition to preparation of the Transportation Improvement Program and other required documents. New programs fostering carpools and vanpools have also been added to the demands on MPO resources. The MPOs must also take steps to involve private transportation operators in planning and developing special services for the elderly and handicapped.

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8. UMTA requires that Unified Work Programs for areas over one-half million population always be forwarded to UMTA headquarters.

In addition, there is evidence that the total amount of planning funds has been decreasing. Since PL funds have come to be distributed to the Metropolitan Planning Organization, the amount from the Highway Planning and Research funds has decreased as a result of state allocation decisions to use Highway Planning and Research funds for non-metropolitan areas. This has led to fewer total dollars available for use by the MPO. The reduction in available Highway Planning and Research dollars is also attributable to the fact that, as the interstate highway system nears completion, less money is available to states and metropolitan areas which had used some of that for planning.

Certain characteristics of existing fundings mechanisms also lead to problems. Several of these were highlighted in the recent study by the Office of Technology Assessments and while they are oriented toward transit subsidies through the Urban Mass Transportation Administration, the basic issues and concepts can be applied to most modes of transportation.[9]

- Inadequate Funding—A recent survey by the American Public Transit Association on capital expansion needs of transit systems in the United States indicated that a program of only limited expansion would still require $8 billion in new UMTA contract authority between FY 1977-81. Operating assistance needs are so great that eight of the ten major metropolitan areas sampled in this recent study by the Office of Technology Assessment used 100% of their Section 5 entitlements for this purpose. This is despite the 50/50 ratio of matching local funds/federal funds required for operating assistance versus 20/80 ratio for capital assistance under Section 5. The issue of inadequate funding is also pervasive in street and highway construction and maintenance programs.

- Stability of Funding—Local officials have found the yearly, discretionary apportionment of capital grant funds results in uncertainty of the federal commitment, and this has made it difficult at times to generate public support for major transit investments. Lack of guaranteed, stable funding also discourages the incremental development of this transit system, placing an emphasis on asking for as much as possible to assure system completion. Similar problems exist with street and highway projects.

- Long-range, Regional, Single-technology Planning—The availability of federal funding for capital purposes only, before Section 5, and the increase of the federal share to 80% of the total cost, have tended to bias planning in favor of capital-intensive projects like fixed-rail systems or bus fleet purchases. The necessity of the region-wide bond referenda to support the local share for these projects has also worked against incremental development, fostering a "something for everyone" mentality. As a result, many local officials see a need for more flexibility in use of the transit dollar.

- Funding Delays—Because of the discretionary, project-by-project nature of UMTA funding, the lack of delegation of authority to regional representatives to approve capital grants and the small central staff of UMTA, there have been long delays between submission

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9. U. S. Congress, Office of Technology Assessment. An Assessment of Community Planning for Mass Transit. Washington, D. C.: U. S. Government Printing Office, 1976.

of applications from localities and funding decisions by UMTA. UMTA has attempted to reduce delays by encouraging routine bus procurement from the area's Section 5 allotment; but even these allotments have been delayed for some areas. However, as indicated above, transit deficits have been so large, that there is little Section 5 money left for capital expansion. Similar delays in receipt of capital and operating funds from the Federal Highway Administration have also created problems and delays for state and local officials.

Other Institutional Concerns

The Office of Technology Assessment has identified several other major areas of institutional problems with respect to integrated transportation planning: fragmentation of authority and unsatisfactory citizen involvement.

The first problem, fragmentation, is visible on several levels. Highway and road planning and implementation of street improvements have traditionally been carried out by agencies totally separate from transit planning and implementation agencies. This separation exists from the federal through the local levels. The Federal Highway administration and Urban Mass Transportation Administration work through separate administrative structures. The Federal Highway Administration works through the states while the Urban Mass Transportation Administration interacts much more directly with local governments. Even at the local level, traffic and street planning authority is likely to be vested in an agency of the general purpose local government, while transit planning amd administration have tended to be done by a region-wide, quasi-independent transit authority. The lack of interagency cooperation which would provide an overall transportation system perspective has also had detrimental effects on planning for less well-entrenched modes such as suburban bikeways, walkways, paratransit and for modal interchange facilities.

Another issue involves the interrelationships among transportation planning and other community planning variables such as land use, air quality maintenance, areawide water quality management plans, housing, noise, energy and the many other concerns. Ideally, all community elements should be addressed in a comprehensive manner. In reality, separate agencies and funding sources for the various elements result in less than comprehensive plans. Some progress has been made in addressing these problems through interagency agreements.

Coordination between transportation plans and several other community elements has already been mandated by laws and regulations. For example, guidelines[1] have been promulgated to assure that highways constructed pursuant to Title 23, United States Code (Highway Act) are consistent with any approved implementation plan to meet air quality standards. The U.S. Department of Transportation and the U.S. Environmental Protection Agency have also issued, in July 1976, a "Joint Memorandum of Planning and Program Coordination" to improve coordination among transportation planning and water quality management planning efforts. Many similar agreements and

working relationships also exist at the local and state levels.

Interagency coordination is mandated by the amendments to the Clean Air Act of 1970. The law requires that each state submit a State Implementation Plan (SIP) which is a legally enforceable by EPA. The SIP must outline actions that will take to meet the minimum clean air standards. Transportation controls that will provide air quality benefits are a vital part of the SIP.

Planning the transportation control measures must be fully integrated with DOT's planning process. EPA and DOT released joint planning guidelines in June 1978 to integrate federal requirements for transportation and air quality planning.[10] The guidelines stress the importance of including air quality considerations in DOT's planning process and the transportation control measures to improve air quality be included in the Transportation Improvement Plan (an element of the SIP). The joint guidelines envision a process that will go beyond short-term tactics.

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10. Federal Highway Administration, U.S. DOT. "Air Quality Guidelines for Use in Federal-Aid Highway Programs". Federal Register, Vol. 39, No. 248, December 24, 1974, pp. 44441-44443

THE STATE'S ROLE IN TRANSPORTATION PLANNING

Until the early 1960s, transportation planning in urban areas usually meant highway planning. Highway planning was basically a State function, and plans often gave little consideration to the needs and preferences of local governments and citizens. Transit planning, as a public function, was virtually non-existent except in those urban areas with publicly-owned rapid transit systems. Little effort was made, even in these areas, to coordinate highway and transit plans.

As the role of both highway and transit networks in urban development and redevelopment came to be better recognized, and Federal aid became available for the construction, acquisition, and redevelopment of transit facilities, Federal, State, and local governments began to see a need for integrating highway and transit planning and balancing the planning input of State and urban governments. Transportation legislation since 1960 has encouraged the planning of transportation projects, either highway or transit, on a coordinated basis and with a greater degree of participation by local officials whose jurisdictions would be affected by such projects.

- The Housing Act of 1961 explicitly encouraged the planning of "coordinated transportation systems" as part of a comprehensive urban planning program and authorized the use of Federal planning funds[11] jointly with funds available for highway planning since 1934 under the Federal-aid highway program.

- Section 134 of the Federal-Aid Highway Act of 1962 required the inclusion of local views in the highway planning process:

  > ". . .the Secretary shall not approve under section 105 of this Title any programs for projects in any urbanized area of more than 50,000 population unless he finds that such projects are based on a continuing, comprehensive transportation planning process carried out cooperatively by States and local communities. . ."

- Two years later, the Congress enacted the Urban Mass Transportation Act of 1964, which included among other programs a capital grant program for local urban mass transportation systems. Section 4(a) of the 1964 Act made the provision of capital assistance contingent upon a finding that the facilities and equipment "are needed for carrying out a program. . .for a unified or officially coordinated urban transportation system as a part of the comprehensively planned development of the urban area. . ."

- To implement the Intergovernmental Cooperation Act of 1968, the Bureau of the Budget issued Circular A-95 in 1969, calling for the governor of each State to designate a clearinghouse organization at both the State and metropolitan levels to coordinate proposed Federal aid projects with the comprehensive local planning process.

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11. Section 701, Housing Act of 1954.

- The Federal-Aid Highway Act of 1970 strengthened the role of local involvement in planning in two ways:

  - Routes on the Federal-aid urban highway system were to be selected by local officials and State highway departments cooperatively.

  - Section 134 was amended to provide that "no highway project may be constructed in any urbanized area of 50,000 population or more unless the responsible local officials of such urban area...have been consulted and their views considered with respect to the corridor, the location and the design of the project."

- The Federal-Aid Highway Act of 1973 again amended section 134, to require that the local officials choose the highway projects.

- The Federal Highway Administration (FHWA) and the Urban Mass Transportation Administration (UMTA) took a major step in 1975 toward fulfilling the intent of the planning legislation of earlier years by issuing joint planning regulations that focused the responsibility for urban transportation planning in governor-appointed Metropolitan Planning Organizations (MPOs).[12] As discussed above,[13] these joint regulations require that MPOs develop transportation plans for their areas that incorporate highway and transit projects and represent the combined views of the local governments, the transit agencies affected, and State officials. The required plans consist of a Transportation Plan, including a long-range element and a Transportation System Management (TSM) element that identifies relatively low-cost improvements that increase the efficiency of existing transit and road systems, and a Transportation Improvement Program (TIP), a multi-year program with an annual element delineating transportation projects for which Federal funding will be sought in the current year. The Urban Mass Transportation Administration and FHWA review and approve these plans, on the basis of criteria that were made consistent between the two agencies in the 1975 regulations, as a prerequisite to the approval of UMTA and FHWA planning, capital, and operating projects.[14]

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12. 23 C.F.R. Part 450.

13. See p. 2 ff, above.

14. Ibid. Local transportation issues receiving greater attention in recent years, such as energy conservation, air quality, elderly and handicapped transportation, and the role of transportation in urban development, have augmented the MPOs role by making it the MPO's responsibility to see that these issues are addressed and the associated Federal regulations complied with in the planning process.

As a result of these moves toward more local participation in the transportation planning process, the State's role now consists of the following:

- The governor, in agreement with units of general purpose local government, designates the body that will be the MPO. The MPO is not intended to impinge on State (or local) authority but to "provide a forum for cooperative decision-making by principal elected officials of general purpose local government."[15]

- "The responsibilities for cooperatively carrying out transportation planning and programming shall be clearly identified" in agreements between the State, the MPO, operators of publicly-owned transportation services, and designated A-95 agencies where necessary.[16]

- The State allocates planning funds:[17]
  - Highway Planning and Research (HP&R) funds go directly to State transportation agencies for Statewide highway planning and metropolitan transportation planning.

  - Metropolitan Planning (PL) funds are allocated to a State on the basis of the ratio of the population of urban areas in that State to the total urban population in all States. It is then up to the State to determine a formula by which its allocation is divided among local MPOs. The formula must include some combination of population, status-of-planning, and local-need criteria. The PL funds were made available for section 134 planning only. A 1977 report to Congress from the Secretary of Transportation noted that availability of PL funds "stimulated an increase in the overall level of planning activity in urbanized areas."[18]

  - UMTA section 8 planning funds are apportioned directly to both State agencies and MPOs. Most of this money is spent by MPOs, which may pass some of it through to transit operators or cities.

- Local transit and elected officials initiate all non-highway public mass transit projects and urban system highway projects for inclusion in the annual element of the TIP. However, only State highway agencies may initiate the inclusion of urban extensions and interstate system projects.[19]

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15. 23 C.F.R. Part 450, sec. 450.104(b)

16. Ibid., sec. 450.108(a)-(d)

17. See pp. 6 ff, above.

18. U.S. Department of Transportation, Office of the Secretary, Urban System Study (Washington, D.C.: GPO, 1977) p. 52.

19. Inclusion of a project in the annual element of the TIP is a prerequisite to obtaining Federal approval and funding.

- State highway agencies have substantial control over approving the highway portion of the annual element of the TIP. After the MPO adopts the TIP, it must submit it to the Governor, the Urban Mass Transportation Administrator, and the Federal Highway Administrator. While the TIP is at the State level, and before it is sent to FHWA, the State highway agency must align the projects in the annual element with its own statewide program of projects. States have some discretion in this area:

  -- When the State does not concur in a project from the annual element and proposed to be implemented with Federal assistance under 23 U.S.C. 104(b)(6) (Federal-aid urban system) and 103(c)(4) (withdrawal of Interstate segments and substitution of public mass transportation projects[20]), "a statement describing the reasons for non-concurrence shall accompany the statewide program of projects" when it is submitted to the Federal Highway Administrator.[21]

  -- The State may include in its program of projects urban extensions and interstate system projects not included in the annual element as long as these projects "have already received Federal approval for right-of-way acquisition or Federal approval of physical construction or implementation where right-of-way acquisition was not previously Federally funded".[22] The States may only include these extra projects if they have solicited the views of the MPO on each of them and have indicated how the requirements of the section 134 planning process have been met.[23] Officials expressed concern during the development of the joint regulations that clauses such as these would give the States too much discretion and would counteract the purpose of the section 134 planning requirements. The stipulations that States solicit the views of MPO's, provide explanations for deleting projects, and demonstrate the concurrence of added projects with section 134 planning requirements are ways of ameliorating this concern.[24]

- The governor may, within 30 days of receiving the TIP from the MPO, make comments on the annual element projects proposed to be implemented under sections 3 and 5 of the Urban Mass Transportation Act and submit them to the Urban Mass Transportation Administrator for consideration.

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20. Highway projects substituted for Interstate withdrawal segments must appear in the annual element, but need not appear in the annual Statewide program of projects.

21. 23 C.F.R. Section 450.318(b)(1)

22. Ibid., Section 450.318(b)(3)(ii).

23. Ibid., Section 450.18(c)(1-2).

24. Some States have contested in court the authority of the Federal government to give the responsibility of developing the TIP to the MPOs. The courts have upheld the Department of Transportation's regulations. (Urban Consortium for Technology Initiatives, Transportation Task Force, Accelerated Implementation Procedures. Washington, D.C.: 1978, p. 12).

- The State can act in a supportive relationship, providing planning and forecasting tools as well as other resources, upon the request of local jurisdictions.

- State transportation agencies administer section 18 funds allocated to them from the Federal government for rural transportation projects. The State may use up to 15% of its allocation for administrative and technical assistance activities, which might include planning for such projects.

In theory, then, the legislation culminating in the 1975 joint regulations has provided a foundation for integrating the transportation planning elements, including the State and local perspectives. In practice, however, fragmentation still exists in some areas. This is reflected in:

- the often conflicting interests of State highway agencies and local jurisdictions, reinforced by the traditional State-Federal relationship under the highway program and the more direct local-Federal relationship under the urban mass transportation program.

- the fact that since States are not required to participate in the MPO planning process and yet still control some of the highway program funds, the MPO's in some jurisdictions may be carrying out a nominally integrated planning process while the States are ultimately controlling highway program decisions. The extent and impact of any fragmentation in the local planning process, however, can be assessed during the UMTA/FHWA Certification review conducted annually to evaluate the nature and quality of the local planning process and institutional relationships.

- the unwillingness of many public officials and agencies to allow others to take away or share some of their authority.

Such fragmentation may diminish if the cooperation at the Federal level represented by the joint planning regulations is mirrored by State and local transportation officials. Presently the State's role in transportation planning varies from State to State and is more dependent upon criteria such as the resources available at both the State and local levels, the State's economic status, its degree of urbanization, its administrative structures, and the propensity of its transportation officials to coordinate their planning efforts, than on any well-defined State planning role.

TECHNICAL ISSUES

There are a number of problems relating to integrated transportation planning which arise from the technical planning process itself. Some relate to institutional or funding issues as well. The lack of clearly articulated national goals with regard to urban transportation--how public transit or highway capacity should be provided, who should be served, how much money should be spent and how the funds should be collected--are overriding policy issues.

The Urban Mass Transportation Administration's alternatives analysis regulations help address the lack of consideration of a number of alternative transportation schemes. This lack is partly attributable to the institutional fragmentation--the choice has generally been viewed as highways versus transit. Decision-makers have clung to one transit option to avoid dilution of pro-transit support in the political arena.

Another obstacle to integrated transportation planning has been the lack of sufficient resources to resolve conflicts between or within modal alternatives once the long-range planning exercise is substantially completed. This has been suggested as an area where changes in federal regulations to provide for conflict resolution could make a significant contribution.

Some progress has been made in developing tools for the technical planning process. The Federal Highway Administration, while maintaining present elements of their computer modelling package, PLANPAC, is making all major updates and expansions compatible with the Urban Mass Transportation Administration's Urban Transportation Planning System (UTPS) in conjunction with UMTA's Planning Methodology and Technical Support Office. Through an extensive dissemination and training program on the Urban Transportation Planning System, there has been feedback from users which aids in the refinement and further development of the Urban Transportation Planning System's modules. Work is now underway to increase the usefulness of the Urban Transportation Planning System in integrated transportation planning, specifically with sketch planning, short-range, Transportation Systems Management issues. One of the major problems remains in correlating the long-range, sketch planning tools with the short-range, detailed planning tools. Several other models which merge highways and transit have been developed, and are listed in the "Planning Tools" section of the Annotated Bibliography, Chapter III.

A major deficiency in technical planning tools is the lack of knowledge and methods for considering and integrating pedestrian and bicycle facilities and services into the transportation planning process. The major issue with regard to bikeways and walkways is the development of criteria to allocate space among these and other modes. In the densely developed urban areas, there is a finite amount of space to be devoted to transportation. The fragmentation of authority, narrowness of alternative planning concepts, limitations on funding and all the other institutional, technical and financial problems mentioned above, contribute to the inability to coordinate and integrate all of the elements in the transportation system so that they complement instead of compete with one another.

FUTURE DIRECTIONS

The section on institutional issues given earlier discussed some of the problems with Metropolitan Planning Organizations as they are presently constituted. It is important to realize that few, if any of these problems, are inherent. Federal policy emphasizes the role of Metropolitan Planning Organizations in obtaining the cooperation of all metropolitan jurisdictions for transportation projects of regional importance. It is not, as some have charged, to abrogate the decision-making authority of general purpose local governments or to add another layer of bureaucracy. Original attempts to secure approval from each jurisdiction on an individual basis were unwieldy and the agreements in some cases were not considered binding by newly elected local administrations who had not participated in the original agreements. It became clear that a more formal decision-making structure was required--one that represented the local elected officials of general purpose governments acting together in a single body--the Metropolitan Planning Organization. Many of the currently perceived problems with the Metropolitan Planning Organization concept can be traced to the institutionalization of the Metropolitan Planning Organization. Many Metropolitan Planning Organizations have evolved into separate agencies with their own staffs, information base and perspective, distinct from that of its parts--local governments.

While some Metropolitan Planning Organizations may appear as if they have taken on lives of their own, local officials should not regard the Metropolitan Planning Organization as cast in concrete. The Metropolitan Planning Organization is designed to represent the entire urbanized area for area-wide planning of transportation improvements. A recent article[1] by Burke and Jamieson, suggests that local officials and local operating agency personnel sit down with the Metropolitan Planning Organization staff and identify those tasks which should be shared, establish the lead agency, the split of manpower resources and thus, the split of annual resources. The new joint Urban Mass Transportation Administration/ Federal Highway Administration regulations[25] provide a good occasion for this since "the regulations link the transportation planning process to the decision-making process in each urban area," and "require an agreement between the MPO and publicly owned operators of transportation services which specifies cooperative procedures for carrying out transportation planning and programming."[26] An outline of the activities which comprise the transportation planning process, identifying the lead agency and a percentage split for manpower and resource allocation for each activity is offered as a starting point for negotiations. For example, local agencies could be responsible for the detailed planning and receive the necessary resources from the MPO for these activities. The MPO, in turn, would be responsible for more general planning. However, any arrangements must be tailored to the needs and problems of each individual urban area. More communications among the various agencies are crucial to the success of any resulting arrangements.

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25. UMTA & FHWA. "Transportation Improvement Program." Federal Register, Vol. 40, No. 181, September 17, 1975, pp 42976-42984.

26. Burke, Fred B. and Jamieson, John R. "The Transit Operator's Role in Federally Funded Planning & Programming." Transit Journal, Vol. 2, No. 1, February 1976, pp 3-9.

Developing cooperative working arrangements between the Metropolitan Planning Organization and local agencies becomes critical as interest in the concept of a "single transportation trust fund" or the more limited approach of a consolidated transportation account continues to develop. The trend at the U.S. Department of Housing and Urban Development and other federal agencies of lumping categorical grant-in-aid programs into one block grant, with the priorities for its spending to be locally-determined, is being considered for transportation. Expressions of support for a consolidated or single approach to federal transportation programs have been made by individuals in some federal agencies, Congress and by selected state and local public officials. On the other hand, strong opposition to and expressions of fear of such an approach and support for the continuation of the modal categorical programs have been made by an equal number of leaders from Congress and state and local governments. The following paragraphs discuss some of the arguments from both points of view.

There are two basic points of view on how a single transportation fund or a consolidated transportation account could be administered. Some transportation officials, particularly those at the state and county level, feel that in view of the pre-existing, cooperative arrangements between the Federal Highway Administration and the states, present funds from Section 5, be combined with new federal funds and allocated directly to the states to be apportioned to their metropolitan areas. On the other hand, city officials point to the Federal-Aid Urban Systems program where only 40% of the available funds has been obligated over three years. They argue for the new federal funds to be combined with Section 5 funds but to be administered like the Section 5 program. Under this program, funds would be allocated directly to a recipient agency in the metropolitan area designated by the governor, with local concurrences through the A-95 process. The designated recipient would then parcel out the money to appropriate local agencies. For areas with populations under 200,000, funds would go directly to the state, with apportionment at the discretion of the governor.

There are a number of unresolved questions about the single trust fund or a consolidated transportation account besides the choice of an administrative mechanism. For example, should the funds come from general revenues, or should the Highway Trust Fund be changed to become a Transportation Trust Fund? When local officials decide to spend part (or all) of their apportionment on roads, should it be used only for arterials and feeders, as presently restricted by urban system requirements, or should all roads be eligible? Would transit be able to secure its current funding levels or would some currently available transit funds be diverted to publicly-popular (in some areas) highway maintenance and roadway improvements?

A consolidated transportation account or single trust fund would undeniably involve some major changes in the transportation planning process. On the short-term basis, both the Urban Mass Transportation Administration and the Federal Highway Administration have become more aware of the

need for modally-integrated planning as evidenced by the joint regulations. In addition, both the Urban Mass Transportation Administration's Service and Methods Demonstration Program and the Federal Highway Administration's Federally Coordinated Program of Highway Research and Development have placed much emphasis on integration. However, integrated transportation planning is a long way from full implementation.

Those who favor continuation of existing categorical grant-in-aid programs point to the special, and much needed, attention that such programs bring to the problem areas or needs which they cover. The loss of this special administrative and legislative attention to particular problems with resulting loss in funding levels is feared if a consolidated transportation account or single trust fund were implemented. There is also the belief that,operationally, categorical grants are more responsive to local needs, and that the consolidated transportation account or trust fund is proposed to ease the work of management and budget officials.

Current categorical grant programs have a long history. Working relationships among the various levels of government and administrative procedures have been long established for many of the programs. Many fear that the resulting upheaval in these existing institutional arrangements which are viewed as working well is not worth the alleged longer-term benefits of a consolidated transportation account or trust fund. The belief also exists that a consolidated transportation or trust fund account will result in fewer total dollars flowing to state and local governments than with existing categorical grant-in-aid programs.

There are many issues involving the concept of a single trust fund or consolidated transportation account. Valid arguments have been advanced for both sides. Much further discussion and study are needed before existing public policy is changed.

Chapter II

ALTERNATIVES ANALYSIS

The Urban Mass Transportation Administration's alternatives analysis process attempts to address all aspects of transportation problems by including relevant transit and transportation agencies in the planning process. This Chapter takes a closer look at results of the alternatives analyses, illustrating the process by examining the effect it has had on decisions regarding new rail systems.

Because building a subway (or similar transportation facility) might be the most expensive public works project ever undertaken by a city, the alternatives analysis planning process has found an appropriate application. Basically, the process involves assessing all reasonable transit alternatives prior to a commitment of funds from the Department of Transportation. This process was outlined in 1976 and was required for:

> any project which involves new construction or extension of a fixed guideway system (rapid rail, light rail, commuter rail, automated guideway transit)[27] or a busway, except where such project is determined by the UMTA Administrator to be of importance as a demonstration of advanced technology.

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27. Rapid rail consists of large-capacity cars, usually in 4 - 8 car trains which have short distances between stops, many of which serve downtown locations. The New York subway is a rapid rail system. Light rail is a new name for streetcars. Commuter rail is similar to rapid rail, except the trains are sometimes longer and generally link widely-spaced residential stations to the center city. Automated guideway transit, of which a downtown people mover is one type, is sometimes referred to as a horizontal elevator. It consists of small cars in short trains and is operated by a computer control system.

The alternatives analysis, which must occur in the context of a comprehensive transportation planning process, considers a range of alternatives including Transportation System Management (TSM)-type improvements.[28] Federal support will be given only for those alternatives which

> the analysis has demonstrated to be cost-effective, where effectiveness is measured by the degree to which an alternative meets the locality's transportation needs, promotes its social, economic, environmental and urban development goals, and supports national aims and objectives.[29]

Alternatives analysis has drawn the ire of many in the transit community who feel the burden is unwarranted. Correctly, they argue that the much more expensive highway program never required such detailed analysis, although it has recently been mandated for highways as well. The requirement is likely to stay, although another important group of guideway projects, the downtown people movers, is exempt because it is a so-called demonstration project.

The Fixed Guideway Controversy

There are several reasons why the regulations requiring alternatives analysis were promulgated for transit and not highways. Certainly important is the fact that interest in transit occurred well after the highway program had been in many citizen battles which resulted in greater public disclosure of likely impacts. In addition, the rail systems themselves are controversial. Powerful statements for and against rapid transit construction are easy to find. Virtually no system component has been spared a critic. The rail vs. no rail issue has been debated on the basis of economic development, capital cost, energy consumption, and environmental impact.

Economic Development

One benefit of a fixed guideway project may be the boost it gives to center city economic development. Here is a statement about impact of Toronto's new subway:

> This small investment (the original $67 million Younge Street subway) ignited a $10 billion

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28. TSM seeks to improve the whole transportation system through coordination and (primarily) low capital improvements.

29. Urban Mass Transportation Administration, U.S. Department of Transportation. "Major Urban Mass Transportation Investments," Federal Register, Vol. 41, No. 185, September 22, 1976, pp. 41512-41514.

> development explosion along the route from Front and York Streets to its northern terminal, Eglinton Avenue. The appraised value of all the land and facilities in Metropolitan Toronto is now $50 billion. $15 billion of this appreciation in physical value has been added in the last ten years and two-thirds of this is attributable to the existence of the Yonge Street Subway.[30]

While most agree this is an overstatement of the actual benefits, others are suggesting there are no economic development advantages associated with fixed guideway projects. One group studying the impacts of BART came to the following conclusion:

> The BART experience would indicate that, at least in the Bay Area, the introduction of rapid transit has not been a sufficient condition for increased economic development and growth. If the primary economic impact of an investment in transit results from the size of the expenditure, rather than the object of the expenditure, a better investment in a region's economic development might be another capital intensive program.[31]

Another study of BART stated:

> The Market Street area is the center of San Francisco's business district, but its importance was declining up to a few years ago. Before the advent of BART, the downtown was capturing only 30 percent of all office construction in the area; after BART, the rate is up to 60 percent. Market Street has become the most attractive area for new construction in the region.[32]

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30. Knight, Robert, "Land Use Impacts of Rapid Transit: Implications of Recent Experience," (Report no. DOT-TPI-10-77-29) Washington, D.C.: DeLeuw Cather, August 1977, p. 42.

31. Grefe, Richard, "The Regional Economic and Fiscal Impacts of BART," BART Impact Program. Paper read at American Society of Consulting Engineers in October 1977, p. 22, mimeographed.

32. Council on Environmental Quality, "Growth Shapers," Washington, D.C., May 1976, page 47.

Capital Costs

Some argue against rail systems on the basis of cost alone--they are tremendously expensive. BART cost about $1.6 million (about $22 million per mile); a recent Philadelphia extension--$40 million ($26 million per mile); and Wahsington Metro may top $7 billion ($70 million per mile). Others contend costs are only meaningful when compared to buidling highways, the non-transit alternative.[33] Recent experience has shown some urban freeways to be more costly. A two-mile extension of I-95 near the Philadelphia subway extension noted above cost $100 million per mile. The total capital investment over 15 years by the Port Authority of New York and New Jersey in its rail subsidiary, PATH, is $250 million-equivalent to but one mile of New York City's proposed Westway (freeway).

Energy Consumption

Energy efficiency is one of the greatest potential benefits of a rail transit system; the energy consumed to move a fully-loaded train one mile in the urban core is miniscule when compared to the energy needed to transport those same poeple in automobiles over the same distance. Recently, it has been shown that energy is saved not only for those riding transit, but for those driving as well, because reduced congestion on the streets greatly increases automobile miles per gallon.[34] Rail opponents, however, contend the energy consumed to build BART will never be offset by the energy savings of transporting passengers. Furthermore, ancillary costs like lighting and cooling stations, keeping track in good repair, and running escalators cut into energy savings substantially.

The three issues touched here; economic development, capital costs, and energy consumption, are merely representative of the case for and against rapid transit. After some inspection, it appears that much of the controversy centers on what a proposed system will accomplish as compared to the achievements of BART or other existing systems, rather than comparing the new system to other alternatives for meeting the same transit need.

The Need for a Planning Process

The impetus for alternatives analysis to help make decisions about new rail starts was founded in controversy, but became essential because of costs. While the Urban Mass Transportation Administration (UMTA) currently pays 80% of the bill to construct the system, a city's share, along

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33. Alternatives analysis requires that a rail alternative be compared to highways, as well as intermediate High Occupancy vehicle alternatives like exclusive right of ways for buses.

34. Peskin, Robert, and Joseph Schofer. "The Impacts of Urban Transportation and Land Use Policies on Transportation Energy Consumption, Report No. DOT-TST-77-85, April 1977, p.vi.

with the subsequent obligation to help subsidize the operation and maintenance, dictated careful consideration by all governmental levels before deciding to build.

With the enactment of the 1964 UMT Act, many cities which had plans to build major transportation facilities finally saw the opportunity to implement projects which had been held in abeyance for years due to an inability to locate financing.[35] Many other cities began to develop transportation plans which included a rail line.

Even with the infusion of capital monies provided in the 1970 Urban Mass Transportation Act, UMTA realized by 1972 that the sum of all locally-derived capital needs exceeded its ability to finance them through the foreseeable future. As a result, UMTA promulgated a set of "capital grant guidelines."

Capital Grant Guidelines

These guidelines outlined a planning process which was to precede an application for a major rail project. This planning process had to be comprehensive as to geography and transportation, consider potential environmental problems, and yield measures such as net project cost per passenger and per passenger mile. The products of this process were to include a fully-developed financing plan, an indication of attention paid to the possibility of affecting congestion through noncapital-intensive means, and a demonstration that the proposed project would be coordinated with other transit services. It was felt that this planning would result in only the very best projects being submitted to UMTA for funding.

The problem of mass transit needs outstripping available UMTA resources did not end with the establishment of these guidelines, nor was it really alleviated when Congress passed the National Mass Transportation Assistance Act of 1974. This Act, providing $12 billion in Federal assistance to urban areas through fiscal 1980 at a Federal participation rate of 80%, did not even match the approximately $17 billion that operators of existing systems said they needed for system modernization and expansion, let alone other needs.

The continuing controversy over BART, and other new systems along with UMTA's inability to meet the many claims on its expanding resources, underscored the need for an even more rigorous analytical means of allocating UMTA capital funds.

In 1974 local transit operators were also undergoing a resource crisis. Rapidly-inflating operating (fuel and labor) costs (borne exclusively at the local/State level at the time) led many local decision-makers to examine more closely the costs and benefits of all types of

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35. Some of the legislative history was adapted from an unpublished paper by Sam Zimmerman, Office of Planning, Urban Mass Transportation Administration, 1978.

service conditions. This scruntiny was most pronounced for the large investments in fixed guideway facilities because even the local share (20%) was prohibitively high when viewed in the context of limited available funds.

In an effort to address these local and national problems, UMTA investigated a number of resource allocation techniques. One technique considered was to develop a fixed national set of investment criteria for allocating capital funds. While this approach was straightforward and simple, it was concluded that it could not be uniformly applied as the exclusive determinant for project funding.

The technique chosen had to be flexible so that the unique characteristics of each local area could be accounted for, it had to assure that only the best projects emerged from the local planning process, and it had to provide the information necessary for UMTA to select the best possible investments in the country, within its total funding constraint. To achieve these goals, UMTA opted for the definition of a local process whose projects would be of value to both local and Federal decision-makers. This approach, first promulgated in the draft "Policy on Major Urban Mass Transportation Investments," published in August 1975, and finalized in September 1976, is the alternatives analysis process we know today.

And Finally, Alternatives Analysis

Alternatives analysis can be thought of as a process which requires transportation planners to make explicit the reasons for selecting one mode over another. A completed alternatives analysis which proposed a fixed guideway project would have to show, for example, that a bus on an exclusive right-of-way could not have satisfied the transit need just as well. If there is little difference in performance characterists between two competing modes (e.g., subway vs. streetcar, subway vs. bus) the analysis must show why the selected mode would have better nonperformance benefits such as lower cost, reduced energy consumption, or an incentive to economic development.

UMTA does not dictate local policy. A city is not required to choose the least expensive, or fastest, or most energy-efficient alternative, as long as the choice is consistent with local policy. UMTA does have the right, of course, to refuse to provide Federal funds, which it has done.

The BART Example

Many fixed guideway critics point to major problems faced by BART. But it is unfair to project failures of other rail systems on the basis of BART problems alone, especially since many of BART's supposed failures are because it does not do some things it was never designed to do when voted on back in 1962.

BART, for which the planning began in 1949, was the first rapid transit system built in the U.S. in over half a century. A great deal

has been learned from this experience. There are several important differences between BART and the new systems, most of which have been made explicit through alternatives analysis:

- BART is more like a commuter railroad than a rapid rail transit system. The primary difference is that BART links low density residential areas with a few stations in the Oakland and San Francisco business cores. Rapid rail systems are best suited to heavily-traveled routes. All of the new systems are short (7-20 miles) as opposed to BART (72 miles) and concentrated in the central business districts.

- Very little attempt was made to match individual modes to the transit situation in San Francisco. A fixed guideway system was the choice from the beginning, even though in retrospect express bus may have been a more appropriate mode in some areas.

- BART has never, and probably never will, operate at its design potential. There are too many hardware problems to meet the headways and operating standards established when the system was voted in by the public. Since the new systems rely on proven technology (some of which was "debugged" on BART), they should operate better.

- The secondary impacts of a fixed guideway system in a modern environment were not understood and, as a result, many opportunities for beneficial effects were missed. Careful consideration of land use and economic impacts of new systems have been conducted as part of the alternatives analysis (process).

- BART was *never* designed to do much of what critics now say it is not doing well. The system was never intended to improve downtown circulation or provide mobility for the poor. It was not necessarily supposed to save energy or improve the environment, neither of which was an issue when the decision was made. Consequently, much of the criticism is unwarranted.

Alternatives analysis does not constrain a local government to any specific mode choice. This is because every city has different characteristics related to transit ridership. Geography, residential and commercial densities, income, and current travel times are only a few of the important variables. No single variable can predict ridership equally well in two different cities. For example, the amount of office space in New Orleans is about the same as in Kansas City, but the former has four times greater percent workers using transit than the latter. Similarly, a fixed guideway may be the best solution for one city, and completely wrong for another of the same size. Recent publications have tried to generalize much on the basis of BART, without really considering the differences between cities.

The New Systems

Table I on the next page shows the fixed guideway activity in the United States. There are currently 15 cities which are considering long-range transportation major capital improvements--some of which may include a fixed guideway project--although most of the improvements are likely to be nonrail. All will complete alternatives analysis prior to final approval.

The information[36] in Table IX shows the length, cost, and projected ridership for the two new fixed guideway systems (BART and METRO) and for the proposed fixed guideway systems (Atlanta and Baltimore are under construction). The system for each new city is short. This reflects the cost and performance advantages of using fixed guideways only where there are heavy loads and heavy roadway congestion. Buses would be used as

TABLE IX

Rapid Transit Status in the United States by City

City	Fixed Rail System in Operation	Capital Grants for New System Approved	Through Alternatives Analysis	Alternatives Analysis Started
Atlanta		X		
Baltimore		X		
Boston	X		X*	
Buffalo		X		
Chicago	X			
Cincinnati				X
Cleveland	X			
Dade County (FL)		X		
Denver			X	
Detroit			X	
Honolulu			X	
Houston				X
Los Angeles			X	
Newark	X			
New Orleans	X			
New York City	X		X*	
Philadelphia	X			
Pittsburgh	X		X*	
Portland			X	
St. Louis			X	
San Diego				X
San Francisco	X			
Seattle				X
Washington	X			

* Major extension of existing system planned.

36. Because of different reporting years, the capital and operating costs are not directly comparable. Generally, dollar values for BART and Washington would be much higher if reported in today's inflated dollars.

feeders, delivering passengers from many neighborhoods to a few transit stations, as well as for routes in which the ridership could be adequately handled by buses.

TABLE IX

Rapid Transit System Comparisons

City	System Length (miles)	System Cost* (millions)	Daily Forecast Ridership	Rail Capital Cost Per Daily Rail Trip* (dollars)	Annual Operating and Maintenance Cost Per Daily Rider* (dollars)
San Francisco (BART)	72	$1,600	140,000	$11,400	$525
Washington (when complete)	101	7,000	1,092,000	6,400	346
Atlanta	14	1,000	110,000	8,000	145
Baltimore	8	850	83,000	10,000	118
Miami	20	840	145,000	5,780	115
Buffalo	6	340	60,000	5,500	85
Honolulu	14	580	163,000	3,750	86
Pittsburgh	10	250	50,000	5,000	N/A
Denver (Federal funding denied)	22	700	71,300	10,000	105

* See note in text. N/A = Not Available

The cost of the systems has decreased, but this just reflects the shorter lengths of the initial segments. Building transit, like everything else, has gotten more costly. This has caused a reassessment of every element. Atlanta, for example, decided not to install automated fare gates and instead uses the older-style turnstiles to cut costs.

The capital cost per daily passenger has fallen, reflecting the heavy passenger loads and high ridership carried in the downtown areas. Most of the new systems will be less than half as expensive as BART to build on a per passenger basis. This, even though building in urban areas where tunneling is often required, is far more expensive than above-ground construction.

The proposed systems will be less costly per passenger to operate and maintain than BART, again because of the heavier passenger loads on shorter systems. Table II shows a dramatic reduction in per passenger annual operating costs--from $525 for BART to less than $150 for the proposed projects. These are estimates, of course, as compared to actual

operating costs, but the differences remain substantial.

While the new systems will be less costly to build and operate per passenger, they are expected to do more today than just "reduce automobile congestion"--the stated goal of BART in 1962. When UMTA reviews the proposals, there are several important socioeconomic concerns, of which the three shown in Table III are most important. The ratings cannot be uniformly quantified--but they are a determining factor. Most systems can contribute to revitalizing the downtown core. Where there is a low rating, it is generally because the center cities like Honolulu and Miami have not experienced excessive deterioration.

Integrated planning has been used on this very trying effort to develop long-range transportation plans. The results seem to have been advantageous to all concerned. The proposed systems reflect a responsible approach to implementing fixed guideway facilities. Unlike BART, they are confined to the locations where the economies of high-capacity transit make sense. They will cost less than half as much to build and

TABLE III

Impacts of Rapid Transit By City

City	Urban Core Revitalization Potential	Potential for Inducing Positive Land Use Changes	Service to Transport Disadvantaged
San Francisco	Medium	Low	Low
Washington	Medium	Medium	Medium
Atlanta	Medium	Medium	Medium
Baltimore	High	Low	Medium
Miami	Medium	High	Medium
Buffalo	High	Low	Medium
Honolulu	Low	High	Medium
Pittsburgh	Medium	Low	Medium
Denver (Federal $ denied)	Low	Medium	Low

Source: Department of Transportation, Urban Mass Transportation Administration, Office of Planning, Working Paper, January, 1978.

only 25% as much to operate and maintain as a per passenger basis. Unlike BART, they all have some potential to improve the quality of the

center city environment (with the exception of Denver, a system which was denied funding by UMTA).

During the last ten years, UMTA's capital fund allocation process has evolved from an unstructured discretionary system, through promulgation of the capital grant guidelines, to the current alternatives analysis process. This evolution, and the products of alternatives analysis, seem to provide for better-informed decisions by both Federal and local officials regarding new rail starts, and transportation investments in general.

Chapter III

CONTACTS AND CURRENT PROGRAMS

CONTACTS

Responsibility for integrated planning at the federal level is shared by various offices in the Urban Mass Transportation Administration and Federal Highway Administration. The main address for these offices is:

- Department of Transportation
  Nassif Building
  400-7th Street, S.W.
  Washington, D.C. 20590

Please note that the code following each name is for identification and should be included in written correspondence. Program activities and contact persons are listed below:

Urban Mass Transportation Administration

- Office of Transportation Planning.
  Administers the Section 9 technical studies program and certifies that planning requirements for capital grant applications have been met. Contact: UMTA regional offices (see Table 2) and Charles H. Graves, Headquarters, UTP-20, DOT Room 9314E, (202) 426-2360.

  Develops planning methodology, including computer and non-computer based models; disseminates information and sponsors training courses on the Urban Transportation Planning System. Contact: Robert B. Dial, UTP-10, DOT Room 9311, (202) 426-9271.

- Office of Policy and Program Development.
  Develops policy and implementation guidelines in a number of areas relevant to integrated highway-transit planning: alternatives analysis, joint development/value capture, environmental impacts and para-transit. Contact: Lawrence Schulman, UPP-10, DOT Room 9311 (202) 426-4060.

- Office of Transportation Management and Demonstration.
  Conducts service demonstrations which have a modal integration component. Contact: Ronald Fisher, UPM-30, DOT Room 6412, (202) 426-4984.

Table V

UMTA FIELD OFFICES

Region I	Transportation Systems Center, Kendall Square, 55 Broadway, Cambridge, MA 02142, Tel: (617) 494-2055; FTS 837-2055.
Region II	Suite 1811, 26 Federal Plaza, New York, NY 10007, Tel: (212) 264-8162; FTS 264-8162.
Region III	Suite 1010, 434 Walnut Street, Philadelphia, PA 19106, Tel: (215) 597-8098; FTS 597- 8098.
Region IV	Suite 400, 1720 Peachtree Road, N.W., Atlanta, GA 30309; Tel: (404) 526-3948, FTS 285-3948.
Region V	Suite 1740, 300 S. Wacker Drive, Chicago, IL 60606, Tel: (312) 353-0100; FTS 353-0100.
Region VI	Suite 9A32, 819 Taylor Street, Fort Worth, TX 76102; Tel: (817) 334-3787; FTS 334-3787.
Region VII	Room 303, 6301 Rock Hill Road, Kansas City, MO 64131, Tel: (816) 926-5053, FTS 926-5053.
Region VIII	Suite 1822, Prudential Plaza, 1050 17th Street, Denver, CO 80202, Tel: (303) 837-3242; FTS 327-3242.
Region IX	Suite 620, Two Embarcadero Center, San Francisco, CA 94111, Tel: (415) 556-2884, FTS 556-2884.
Region X	Suite 3106, Federal Building, 915 Second Avenue, Seattle, WA 98174, Tel: (206) 442-4210, FTS 399-4210.
TTC	Transportation Test Center, UMTA Programs Director, Pueblo, CO 81001, Tel: (303) 545-5660, FTS 323-9341.

Federal Highway Administration

- Interagency Review Branch, Urban Planning Division, Office of Highway Planning.
  Oversees administration of planning assistance funds. Contact: Director of Office of Planning and Research in appropriate FHWA Regional Office (see Table 3).

- Technical Support Branch, Urban Planning Division, Office of Highway Planning.
  Maintains FHWA planning batteries PLANPAC and BACKPAC. Participates in development of modules for UTPS and does research into travel behavior. Contact: David Gendell, HHP-22, DOT Room 3233, (202) 426-0182.

- Transit and Traffic Engineering Branch, Urban Planning Division, Office of Highway Planning.
  Provides technical assistance on and promotion of TSM-type projects--carpools, vanpools and priority techniques for high-occupancy vehicles. Contact: Donald Morin, HHP-26, DOT Room 3303, (202) 426-0210.

  Sponsors, in cooperation with the Urban Mass Transportation Administration, several transportation training courses. Contact: UMTA (Table 2) and FHWA (Table 3) Regional Offices.

- National Highway Institute.
  Develops and sponsors training courses on many aspects of highway transportation. Courses on public transit, transportation management and several others are now being prepared. Contact: George Shrieves, HHI-2, DOT Room 4206, (202) 426-9141.

CURRENT PROGRAMS

Office of the Secretary

A research project, "Operating Multi-modal Urban Transportation Systems", has been completed by the Office of Policy, Plans and International Affairs, Office of the Secretary. The work is directed toward improving the coordination and integration among the several agencies and operators now responsible for operating the various elements in urban transportation systems and toward developing better methods to organize and operate multi-modal systems. Research was focused in the following five major areas:

1. Documents the state-of-the-art in currently operating multi-modal transportation systems.

2. Develops effective, efficient frameworks for institutional arrangements.

Table VI

FHWA REGIONAL OFFICES

Region I	Federal Bldg., Room 729, Clinton Ave. and North Pearl St., Albany, N.Y. 12207, Tel. FTS: 8-562-6476 (Connecticut, Main, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Puerto Rico and Virgin Islands)
Region III	Federal Office Building, 31 Hopkins Plaza, Baltimore, Maryland 21201, Tel. FTS: 8-922-2361 (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia)
Region IV	Suite 200, 1720 Peachtree Road, N.W., Atlanta, Georgia 30309, Tel. FTS: 8-285-5078 (Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Kentucky and Tennessee)
Region V	18209 Dixie Highway, Homewood, Illinois 60430, Tel. FTS: 8-380-6300 (Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin)
Region VI	819 Taylor Street, Forth Worth, Texas 76102, Tel. FTS: 8-334-3232 (Arkansas, Louisiana, New Mexico, Oklahoma and Texas)
Region VII	P.O. Box 19715, Kansas City, Missouri 64141, Street Address: 6301 Rockhill Road, Kansas City, Missouri 64131, Tel. FTS: 8-926-7563 (Iowa, Kansas, Missouri and Nebraska)
Region VIII	P.O. Box 25246, Building 40, Denver Federal Center, Denver, Colorado 80225, Tel. FTS: 8-234-4051 (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming)
Region IX	2 Embarcadero Center, Suite 530, San Francisco, California 94111, Tel. FTS: 8-556-3951 (Arizona, California, Hawaii* and Nevada)
Region X	Room 412, Mohawk Building, 222 S.W. Morrison Street, Portland, Oregon 97204, Tel. FTS: 8-423-2065 (Alaska, Idaho, Oregon and Washington)
Region XV	1000 North Glebe Road, Arlington, Virginia 22201, Tel. FTS: 8-557-9070
Region XIX	Regional Office, Region 19, Drawer "J", Balboa Heights, Canal Zone, Tel. FTS: 9-0**52-5415

*Hawaii includes American Samoa and Guam.
**To place call overseas areas, Dial 9 (from federal agencies) and 0 for overseas operator--provide operator with country, city and telephone number.

3. Explores the regulatory and legal problems likely to affect various institutional arrangements.

4. Explores political and institutional problems in creating and operating multi-modal systems and investigates strategies to overcome, ameliorate or prevent such problems.

5. Investigates means and incentives for coordination and integration of urban transportation systems and recommends strategies by which federal leadership can become involved in integration efforts.

The final report on this project is available. For further information, Contact: Edward Weiner, P-30, DOT Room 1309, (202) 426-4168.

Urban Mass Transportation Administration

The Urban Mass Transportation Administration and the Office of the Secretary are continuing the research investigations of the potential impacts of a range of integrated regional transportation networks in a variety of urban settings.[37] The procedures and models developed in Phase I will be extended, refined and applied in subsequent work. Evaluation methodologies will be developed. For further information, Contact: Ed Neigut, UTD-23, TRPT Room 6104A, (202) 426-8483.

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37. The four reports, two by Multisystems, Inc. and two by SYSTAN, Inc., from the first phase of this research are listed in the Bibliography under the subheading, "Local Applications of Integrated Planning".

Chapter IV

ANNOTATED BIBLIOGRAPHY

This bibliography was compiled primarily from sources included in the Transportation Research Information Services (TRIS) network of the U. S. Department of Transportation as edited and supplemented by the staff of Public Technology, Inc. Ongoing research projects which may be pertinent are also given. The title, location, project manager, sponsor and projected completion date are provided for these projects. This bibliography endeavors to give a sampling of the available literature rather than an exhaustive list of all sources of information on the topic.

GENERAL

Colcord, Jr., Frank C. Urban Transportation Decision-Making: Summary. Report for the U. S. Department of Transportation. Washington, D. C.: U. S. DOT, September 1974. (Report No. OST-TPI-76-02, I)

This is the summary report of a series of monographs describing the transportation decision process in ten major cities. The monographs cover the following metropolitan areas:

U. S.:	Miami-Dade County, Florida
	Atlanta, Georgia
	Minneapolis-St. Paul, Minnesota
	Seattle, Washington
Canada:	Montreal, Quebec
	Toronto, Ontario
Europe:	Manchester and Leeds, England
	Stockholm and Gothenburg, Sweden
	Hamburg, Germany
	Amsterdam, The Netherlands

The broad objective of these monographs is to describe the urban political and planning contexts within which urban transportation planning and programming take place. This summary presents the observations and conclusions derived from the individual studies which can be used in identifying and developing progressive transportation decision-making institutions.

Frye, F. F. Metropolitan Transportation Planning Seminars: Summary Report. Washington, D. C.: American Institute of Planners, 1971, (NTIS PB 208 700).

This report summarizes a series of seminars designed to secure a variety of local opinions on the transportation planning process. The individual city volumes summarize the seminars' formal papers, workshop sessions and discussion periods held during November and December 1970 and January 1971. Each was intended to evaluate the transportation planning process and to develop positive proposals to improve that process. The Summary Report abstracts the discussions, recommendations and findings of the six city seminars: Cleveland, Ohio; Indianapolis, Indiana; Denver, Colorado; San Jose, California; Hartford, Connecticut; and Miami, Florida.

Krzyczkowski, R., et al. Integration of Transit Systems: Summary; Vol. I--Concepts, Status and Criteria; Vol. II--Integrated European Transit Systems; Vol. III--Transit Integration in U.S. Urban Areas. Report for U. S. Department of Transportation. Santa Barbara, Ca: INTERPLAN Corp., 1973. (NTIS PB 241 269 for 4 volumes)

The summary volume contains the conclusions reached in the three main volumes of the report. The objective of the report is to assess the potential for interagency and inter-modal integration of transit systems in the U.S. urban areas by drawing on an analysis of the successful experience of European transit systems.

"Volume I--Concepts, Status and Criteria" (PB 241 270) documents the need for transit integration in U.S. urban areas, presents the conceptual and evaluative framework and reviews current transit integration efforts by federal, state and local governments. "Volume II--Integrated European Transit Systems" (PB 241 271) describes in detail, four major European transit systems (London, Hamburg, Paris and Munich), gives brief descriptions of six others and summarizes and appraises the applicability to U.S. transit systems of the techniques which have contributed to the success of these European systems. "Volume III--Transit Integration in U.S. Urban Areas" (PB 241 272) deals with the application of these techniques to Philadelphia, San Francisco and Seattle, to an archetypical smaller urban area, "Middletown" and makes a brief assessment of the potential for application in Baltimore, Cleveland, Los Angeles, Miami, New Orleans and San Diego. Extensive references are also provided.

National League of Cities. A Local Elected Offical's Guide to Federal Transportation Planning Regulations. Washington, D.C.: National League of Cities, August 1976.

This guide is designed to help local elected officials understand the federal transportation planning regulations and what their responsibilities are under them. An explanation of the "Transportation Improvement Program" issued September 17, 1975 in the Federal Register is given. The regulations themselves are also provided.

National League of Cities. The Federal-Aid Urban System Highway Program and the Cities: A Report to the U. S. Department of Transportation. Washington, D. C.: National League of Cities, August 1976.

This paper was submitted in response to a request from the Secretary of Transportation for information on the cities' experience with Section 134 planning process and the Federal-Aid Urban System highway program. The positions and comments contained in the paper are based on current National League of Cities' policy, a selective survey of member cities as well as a series of discussions with municipal officials over the past few years.

Quinby, J. D. Some Planning and Design Aspects of Rapid Transit. Washington, D. C.: Institute of Traffic Engineers, 1969.

The conditions and needs for rapid transit vary widely between different urban regions, different parts of these regions and at different stages of the area's development. The following relationships are discussed which have significance in selecting the proper rapid transit system: (1) the local urban surface transit system; (2) the regional highway and street system; and (3) super-regional or megalopolitan transportation considerations. Since usually both rapid and surface transit systems are planned to provide frequent service, especially during peak periods, the relative headways may not always be a dominant factor in planning coordination between rapid and surface transit physical facilities. The relative capital and operating costs of rapid and surface transit will strongly influence their economic viability. The planning interrelationships between rapid transit and the regional highway and street network are discussed. Coordinated highway-transit interchange stations, employing several access modes, should be compactly designed to minimize spatial requirements and in-station transfer time. Station layouts must provide adequate circulation, parking and other facilities required for flexible, multi-access service.

Real Estate Research Corporation. Center City Transportation Project: Institutional Strategies for Urban Transportation. Washington, D.C.: USDOT, 1970 (NTIS PB 198 602).

Center city planning and administrative institutions are examined for five major metropolitan areas: Pittsburgh, Denver, Dallas, Atlanta and Seattle. Institutional problems are analyzed in detail with reference to: (1) the philosophy of current transportation planning; (2) land use, environment and transportation; (3) planning , operation and implementation; (4) the geographic scale and levels of government; (5) current sources of financing; and (6) interrelationships in a multi-modal urban system. Several guidelines were developed for selecting and organizing institutional alternatives for institutional reform at all levels of government. Recommendations for center city management are discussed with reference to five specific transportation functions; auto diversion, people and goods distribution, pedestrian circulation and mobility for transit captives.

Sanders, D. B., T. A. Reyen and K. Bhatt. Characteristics of Urban Transportation Systems-A Handbook for Transportation Planners. Washington, D. C.: DeLeuw, Cather and Company, 1974. (NTIS PB 233 580/AS).

This report is a handbook to be used by transportation planners and urban specialists for estimating system parameters for conventional transportation technology. Three modes are evaluated: rail transit, local bus and bus rapid transit and highway systems. Each mode contains an assessment of the following seven selected supply parameters: (1) Speed-average and maximum; (2) capacity (service volume), vehicle and person; (3) operating cost (vehicle or source); (5) pollutant emission (vehicle or source); (6) capital cost-land, construction vehicle acquisition; and (7) accident frequency. Each mode has an analogous appendix section whereby these parameters are evaluated in further detail and for particular geographic areas. Two additional appendix sections contain all references used in the tables and figures and a general bibliography for further information.

Smith, W. S. Design Concepts in Urban Transportation Solutions. Paris, France: Organization for Economic Cooperation and Development, 1969.

The basic elements and possible results of planning and development of highways in full relation to the needs of the surrounding areas is reviewed. Past mistakes in freeway building have included disregard for other urban facilities and functions, lack of integration with rapid transit and lack of flexibility in design. Tangible benefits are expected from the planning and implementation of an efficient transportation system within the social, economic and aesthetic needs of the city. However, many important issues remain to be resolved, including: (1) legal title for airspace above a roadway or for space below; (2) enabling legislation as well as purchase, lease or easement rights; (3) funding, fiscal responsibility and cost-benefit relations; (4) location and relocation of urban residents; (5) operational aspects of roadways; and several other problems.

"Traffic Engineering in the Seventies." Institute of Highway Engineers Journal, Vol. 18, No. 1, January 1971, pp. 13-31.

Four papers from a symposium at Leeds University on April 21, 1970, are presented. C. G. Thirlwall's paper "Traffic in Towns-The Planning Approach" examines the components of a comprehensive urban transport plan within the overall development plan for a city and concludes that there is a need for integrated policies for highways, parking, public transport, town planning and traffic management. In "People and Priorities", O. J. Cox advocates that a balance be struck between accessibility, environmental standards and cost for the survival of the town as a center.

U.S. Congress, Office of Technology Assessment. An Assessment of Community Planning for Mass Transit; Vol. 1 - Summary and Vols. 2-10. - Individual case studies. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Congress, Office of Technology Assessment. An Assessment of Community Planning for Mass Transit: Vol. 11 - Technical Report and Vol. 12 - Bibliography. Springfield, Va. National Technical Information Service, 1976.

The primary objective of this project was to evaluate the process by which U.S. metropolitan areas make decisions about the development and modernization of rail transit systems. The study addressed the following basic issues:

- Barriers to intergovernmental communication
- Involvement of special interest groups
- Alternatives analysis in the planning process
- Funding problems and arrangements

The study focused on the planning of transit systems rather than broader transportation programs. Yet, because transit planning is closely related to other regional planning functions--the study takes account of these interrelationships. These reports are based on a review or transit planning and decision-making in the following nine metropolitan areas that have, or have been considering, rapid transit systems: Atlanta, Boston, Chicago, Denver, Los Angeles, Minneapolis-St. Paul, San Francisco, Seattle and Washington, D.C.

U.S. Department of Transportation. Urban System Study. Washington, D.C.: U.S. Government Printing Office, 1977.

The findings of a study of the various factors involved in the planning, selection, programming, and implementation of Federal-aid urban system routes are documented. The study analyzes these findings with regard to the types of organizations that are responsible for carrying out the process; the status of jurisdiction over roads on the Federal-aid urban system; programming responsibilities under local and State laws; and the authority for and capability of local units of government to carry out the necessary steps to process a highway project.

U.S. Department of Transportation, Office of Transportation Systems Analysis and Information. Evolution of Urban Transportation Planning. Washington, D.C.: U.S. DOT, 1979.

This document traces the evolution of urban transportation from the early highway planning activities to the 1975 planning guidelines issued by the Federal government for a joint highway - transit process.

LOCAL APPLICATIONS OF INTEGRATED PLANNING

Bennett, R. F. "Road Transport in a Rapid Transit System." Institute of Transport Journal, Vol. 32, No. 9, March 1968, pp. 333-44.

This article discusses the vital role of road transportation, both public and private, in a rapid transit system being planned for Manchester, England. The problems of integrating road and rail passenger transportation in large urban areas are reviewed. Choices must be made between preserving central city areas and permitting unrestrained use of the motor car. An outline is given of the Manchester Rapid Transit Study, parking policy, traffic management, bus services, commuter railways and what changes would be made in the system after rapid transit. Bus and car feeders to rapid transit stations and the use of segregated busways are contemplated.

Massachusetts Department of Public Works. Southeastern Massachusetts and Fall River Area Comprehensive Transportation and Arterial Study. Boston, Mass: Massachusetts Department of Public Works, 1969. (NTIS PB 189 146)

The study considered all forms of transportation. Recommendations were made for improvements to the limited access highway system and other types of highways and to the public transport system. The recommended transportation system improvements are based on forecasts of population and economic growth and land use changes developed by the local planning agencies. The report is a summary of the highlights and recommendations contained in four detailed reports for the Massachusetts Department of Public Works.

"New Transportation Design is Intended to Solve Traffic Woes of Chicago." Highway Research News, No. 45, September 1971, pp. 39-44.

In 1970, a Northeast transportation region embracing nine counties was established because of the inability of the various modes working individually to provide a satisfactory transportation network in the Chicago metropolitan area. The organization structure is project-rather than function-based, so as better to satisfy immediate highway objectives. The four major sections are development and planning, projects, operations and management services.

Pampel, F. Integration in Public Transport: Hamburg Transport Community. Hamburg, West Germany: Hamburg Transport Community, 1972. (Printed in English)

The Hamburg Transport Community was established in 1965 to coordinate transport operations which include subway, urban rail, tram and bus lines, and to integrate services. A joint fare system was introduced the following year. Public transport is no longer fragmented and services are broader. Planning is more efficient and can be better coordinated with regional planning. Competition has been eliminated, without hindering initiative on the part of the community members.

Voorhees, Alan M. and Associates, Inc. Transportation Planning in the Central Business District. McLean, Va: Alan M. Voorhees Associates, Inc., 1970. (NTIS PB 204 932)

The study area (Nashville) is examined with reference to its street system, traffic patterns, parking facilities, parking demand, transportation-user characteristics and truck activity. The city is served effectively by a public bus transit network. Although parking is sufficient to meet demands, existing facilities are often poorly located to serve major trip generators. Truck loading spaces are not sufficient to satisfy demand, and the report recommends expansion and enforcement of parking regulations to eliminate curbside loading operations.

Future developments are discussed with reference to land activity, parking supply, relocation of the central bus transfer center, construction of a metro center and completion of the interstate highway system. Three alternative policies for expanding center city parking facilities are also compared. Survey data was analyzed with reference to trip generation, traffic distribution, pedestrian travel and transit trips to yield a recommended transportation improvement plan.

PLANNING TOOLS

Bellomo, S.J., C.G. Turner and D.K. Johnston. "Modal Choice Model for Relating Demand to Investment." Highway Research Record #392. Washington, D.C.: Highway Research Board, 1972, pp 1-12.

The development of a macromodel for modal choice is presented. The model relates investment to transit supply, supply to level of service and level of service to demand. Land use activities are allocated on the basis of accessibility provided by both highway and transit systems. The generation of travel is sensitive to the level of service provided, and the distribution of trips is achieved by using weighted highway-transit skim trees and a standard gravity model.

In application, the model assumes a fixed level of highway supply and has as policy variables the absolute investment level in transit, the split of investment between bus or rail rapid transit and conventional bus transit, the transit fare, the split of service between peak and off-peak periods and the parking cost.

Manheim, M.L. and E.R. Ruiter. "Dodotrans I - A Decision Oriented Computer Language for Analysis of Multimode Transportation Systems." Highway Research Record #314. Washington, D.C.: Highway Research Board, 1970, pp 135-163.

The model described in this article is policy-sensitive in that it analyzes multimodal transportation systems; can test a wide range of options; can predict a wide range of impacts; finds equilibrium of supply and demand in the network explicitly; and contains supply, demand, equilibrium, resource requirements, demand equilibrium, resource requirements, demand shift, and evaluation capabilities. The evolutionary nature of Dodotrans is stressed. The model offers the following advantages as compared to existing methods: (1) It requires a minimal amount of travel information; (2) The objective function may be modified to reflect the values of the region under study; (3) The importance of different objectives on the final proposal may be tested; (4) The objective function provides a basis for making trade-offs between the allocation of resources to high-density areas where costs and benefits are high and low-density areas where costs and benefits are low; and (5) A general level of requirements, which will serve as a framework for development of more specific proposals, can be established early in the planning process.

Morlok, E.K., N.L. Nichan and R.F. Sullivan. A Multiple-Mode Transportation Network Design Model, Final Report. Evanston, Illinois: Northwestern University Transportation Center, 1969. (NTIS PB 197 278)

A description is given of the optimal multi-modal network operations model. The function of this model is essentially to accept as specified inputs, certain characteristics of the fixed network of the transportation system, including characteristics of the common carrier links. It then synthesizes an optimal plan of operation for the system, minimizing costs subject to achievement of the desired levels of effectiveness. The model internally predicts certain consequences of the actual choice variables, mainly related to the demand for transportation and the effect of changes in the transportation network upon the region served. Current estimates of unit costs and the sources of this cost information are outlined and explained.

Multisystems, Inc. Operational Implications of a Major Modal Diversion to Transit, A Macro-Analysis. Report No. DOT-TST-76-72. Washington, D.C.: U.S.DOT, April 1976.

This study examined the implications of dramatic increases in transit patronage on system structure and performance for medium-sized urban areas (800,000 population). Models were developed to examine the cost and service attributes of a variety of system components, including express bus, exclusive lane operation, subscription service, dial-a-ride, and several route-based feeder options. These models were applied in a regional context over a range of patronage assumptions to evaluate both the individual components and the synergisms resulting from various service combinations. The analysis provided insights into the structure of integrated transit systems and the expansion of these systems to serve increasing shares of urban travel.

Multisystems, Inc. The Evolution of Integrated Transit, Three Parables. Report for U.S.DOT, Contract No. DOT-TST-76T-4. Washington, D.C.: U.S. DOT, June 1976.

This study examines the implications of embarking on a ten-year strategy to implement a comprehensive, regional transit system integrated operationally, physically and institutionally for medium sized urban areas (800,000 population). Three levels of ridership response are assumed which affect system scale and operating policy decisions at biennial intervals. The operating cost and deficit implications of these three response parables are then traced to yield insight into the feasibility of an evolutionary strategy.

Peat, Marwick, Mitchell and Co. Improved Software for Short-Range Transportation Planning. UMTA Contract No. UT-50021. Projected completion for mid-1978. Contact: David Levinsohn, UTP-10, DOT Room 9307, (202) 426-9271, for more information.

Short-range planning is aimed at the analysis of system improvements that might be implemented within an approximate 0-5 year period. A multi-modal approach which emphasizes near-term operational and low capital policies to solve these problems must be taken. There is also a need to address, at a lower level, analytical methods that may be used within conventional modes for improvement of modal services. Both computerized and manual planning tools will be produced. A manual for smaller urban areas will be field-tested in the near future.

SYSTAN, Inc. Deployment Scenarios for Integrated Regional Transportation Networks. Report for U.S.DOT, Report No. DOT-TST-76T-7. Washington, D. C.: U.S.DOT, August 1976.

This report describes the cost and service implications of four alternative scenarios for the deployment of an integrated regional transportation system in a hypothetical, large urban city. The impacts of various levels of user acceptance on the cost and service characteristics of integrated systems are investigated parametrically. Although the results obtained are heavily dependent

on the size and population density of the study region, sensitivity analyses indicate the likely effect of varying certain key assumptions. For the selected study area, a limited incremental expansion of integrated transit service to certain suburbs currently unserved by transit appears possible, and the improvement of off-peak suburban service through the use of flexible-route systems appears desirable. Limited incremental expansion of integrated service holds the promise of reducing system deficits if guided by judicious planning and accompanied by service-related fare increases. In view of the large areas and low suburban population densities characterizing the study region, full coverage of the entire suburbs appears to be economically feasible only at reduced service frequencies.

SYSTAN, Inc. Macroanalysis of the Implications of Major Modal Shifts in Integrated Regional Transportation Networks. Report No. DOT-TST-76-65 for U.S.DOT. Washington, D. C.: U.S.DOT, April 1976.

This report describes a macroanalytic approach to the problem of analyzing changing travel patterns in an integrated, regionwide transportation network for large urban areas. Separate models of residential areas, transportation corridors and central business districts are combined in a modular representation of urban structure suitable for use in policy analysis and transportation planning. This analytic approach treats demand parametrically, has minimal data requirements and provides rapid insights into the impacts of alternative patterns of transit and automobile usage. Such impacts as travel time, user costs, congestion and energy consumption are examined explicitly. Application examples discuss the potential economies of scale available from major shifts in current transit usage patterns, tradeoffs between flexible-route and fixed-route systems and the potential benefits available from policies to reduce the effects of demand peaking.

Turner, A.K and R.D. Miles. "The GCARS System: A Computer-Assisted Method of Regional Route Location." Highway Research Record #48. Washington, D.C.: Highway Research Board, 1971, pp 1-15.

The Generalized Computer-Aided Route Selection (GCARS) System is designed to fulfill the need for improved regional planning methods. Computer-aided planning systems, such as GCARS, combine the engineer's judgment with the computer's data-handling and logical capabilities. This makes possible the rapid generation and objective assessment of larger numbers of alternative corridors with many conflicting locational factors.

Two bypass locations near a town of 60,000 population are examined in terms of earthwork, pavement construction, right-of-way acquisition cost, trip distributions and present road network. Experiments have shown that these techniques become increasingly attractive as the number of factors to be considered increases and when the engineer has interactive control of the process through a teletype or similar device.

Urban Mass Transportation Administration and Federal Highway Administration. Urban Transportation Planning System Introduction. Washington, D. C.: U.S.DOT, January 1976.

This document provides a first-level introduction to the "Urban Transportation Planning System" (UTPS). UTPS is a package of computer programs, attendant documentation, users' guides and manuals providing state-of-the-art methods for multimodal urban transportation planning. This introduction includes an overview of UTPS, a directory to UTPS and other basic sources of information concerning analytical methods used in transportation planning. It also contains information needed to install UTPS software at a user's computing facility.

Urban Mass Transportation Administration and Department of Transportation. Urban Transportation Planning System (UTPS) Reference Manual. Washington, D. C.: June 1975. (NTIS PB 246 187).

This document provides information on the function and use of the UTPS computer programs and is intended to be used as a concise reference when using UTPS. Its contents include system and program control statements, program writeup organization, software system description, data file formats, catalogued procedures and individual program writeups.

METROPOLITAN PLANNING ORGANIZATIONS

Advisory Commission on Intergovernmental Relations. Toward More Balanced Transportation: New Intergovernmental Proposals. A-49. Washington, D. C.: USGPO, 1974 (USGPO Stock No. 052-003-00106-3. $3.75).

The primary objective of this report was to answer three basic questions:

1. To what extent should regional transportation planning be linked more closely to comprehensive (multivalued) areawide (metropolitan and non-metropolitan regional) planning and specifically to project implementation activities (including finance, construction, management and regulation)?

2. To what extent are current practices achieving the goal of of stronger linkage?

3. To the extent that they are not, how could closer linkages between the functions of planning and implementation be developed?

To provide answers to these questions, this study undertook an in-depth examination of the broad issues of integrating transportation planning and implementation activities in both metropolitan and non-metropolitan areas.

Burke, Fred and John R. Jamieson. "The Transit Operator's Role in Federally Funded Planning and Programming." Transit Journal, Vol. 2, No. 1, February 1976, pp 3-9.

A brief review of the history of Metropolitan Planning Organizations (MPO). Allocations of labor and other resources between MPO's and local operating agencies for various transportation planning-related tasks are suggested.

PARKING

Ellis, R.H., et al. "Structuring a Systems Analysis of Parking," Highway Research Record #317. Washington, D.C.: Highway Research Board, 1970.

Analytical tools for evaluating alternative parking programs are relatively undeveloped. This paper suggests a framework for conducting a systems analysis of the parking or terminal system. The relationship between the analysis processes used to evaluate a parking system and highway and transit networks is first identified. It is suggested that a parking analysis should follow the application of the travel demand models but should precede assignments to the highway and transit networks.

The parking system simulation model, which simulates the operation of a given parking system for a given time-dependent parking demand, is a key component of the proposed framework. The parking allocation model, which at every time period allocates arriving vehicles to the available parking facilities, is the central element of the parking system simulation model.

Highway Research Board. Parking Principles. Special Report 125. Washington, D. C.: Highway Research Board, 1971.

In this publication, the Committee on Parking has attempted to view parking across the entire spectrum from the home to the centralized demands of major business centers. The report is a summary of parking principles, procedures and practices that have proven to be effective in handling parking and terminal problems.

Metropolitan Washington Council of Governments. Parking Management Policies and Auto Control Zones. Report No. DOT-OS-400045-1. Washington, D.C.: U.S. DOT, 1975.

This report examines the application of parking management programs in the National Capital Region as a strategy to achieve air quality standards in 1977. Implementation problems are examined from legal, institutional and administrative perspectives.

Three parking programs were sufficient to achieve air quality standards in 1977:

- Imposition of prevailing rates on free and low-cost parking plus a parking tax.
- Imposition of higher parking rates via rate regulation.
- Restraint on the number of long-term parking spaces in the core, introduction of long- and short-term parking quotas.

A fourth program involving a parking tax and permits for on-street residential parking permits achieved 90% of the required emissions reductions.

In a 1977 time-frame, implementation problems are less complex for programs involving the imposition of prevailing rates and residential permit systems; however, rate regulation or supply-restraint techniques pose serious implementation problems. A restructuring of the parking supply in the downtown core, preferably in conjunction with an auto control zone, offers exciting potential for reducing vehicle miles traveled in a five-ten year time frame.

The auto control zone section of the study focuses on plans for an F and G Streets pedestrian-oriented mall. A zone of this nature would produce immediate reductions in localized carbon monoxide pollution levels, and if combined with appropriate parking programs, could make a positive impact on regional hydro-carbon pollution.

Schulman, L.L. and W.R. Strout. "A Parking Study Through the Use of Origin-Destination Data," Highway Research Record #317. Washington, D.C.: Highway Research Board, 1970.

The traditional parking study has become so costly as to be prohibitive. A new procedure has been developed using origin-destination data to estimate downtown parking characteristics. This model can be used to analyze and evaluate alternative parking systems for both existing parking demand and projected parking demand. It can also be used independently to test alternative parking programs or as a tool within the urban transportation planning process to analyze and evaluate alternative transit, parking and highway systems.

FREIGHT

Dye, I. "The Interest of the U.S. Department of Transportation in Urban Goods Movement," Highway Research Board Special Report #120. Washington, D.C.: Highway Research Board, 1971.

The Office of the Secretary of Transportation has sought to determine the multimodal nature of the demand for transportation services on the basis of two categories: (1) origin and destination and

(2) people versus freight. One area very often neglected is that of the urban or intracity freight movement of goods. A better understanding of the interrelationships between urban goods movement and the environment in which they occur, the proper role of the U.S. DOT with respect to goods movement, gaps in knowledge and forecasting techniques and any policy changes are needed.

Fisher, Gordon P. "Goods Transportation in Urban Areas." Proceedings of the Engineering Foundation Conference, Berwick Academy, South Berwick, Maine. New York, New York: Engineering Foundation Conferences, February 1974.

A five-day conference to explore issues in urban goods movement was organized by representatives of the American Society of Civil Engineers, Highway Research Board, Institute of Traffic Engineers and the U. S. Department of Transportation. Five areas were studied and reported by Probe Groups: (1) urban goods movement considerations in urban transportation planning; (2) use of local regulatory and police power in facilitating goods movements; (3) freight terminal relocation; (4) issues in urban rail relocation; and (5) consolidation of pickup and delivery services. Each Probe Group report presents recommendations for action to improve urban goods movement.

Kearney Management Consultants. Urban Goods Movement Demonstration Project. Report for USDOT, UMTA, No. UMTA-IL-06-0030-71-1. Washington, D. C.: USDOT, December 1975. (NTIS PB 249 319)

The goal of this study was to assemble all available data and combine it with practical experience in urban goods movement and urban transportation planning to develop a more complete understanding of the problems encountered in urban goods movement. The report is divided into the following seven sections:

I. Urban goods in relation to the total transportation system.

II. Estimates of characteristics and amounts of transportation currently used to move goods in major cities.

III. Estimates of goods movement in terms of costs, congestion, energy consumption, air pollution, noise pollution and land use.

IV. Views on these impacts of several interest groups such as commuters, goods-haulers and others.

V. Attempts to isolate fundamental causes of goods movement problems.

VI. Nearly 100 possible solutions.

VII. Recommendations for further actions.

Appendicies - A - Glossary
B - Bibliography and Literature Abstracts
C - Distribution Logistics Analysis and Findings
D,E,F,G - Impact Analyses
U - Potential Solutions to Urban Goods Move Problems

Mayer, H. M. "Changing Urban Structure and Its Implications for Terminals and Pickup and Delivery Problems in Metropolitan Areas." Highway Research Board Special Report #120. Washington, D. C.: Highway Research Board, 1970, pp. 110-120.

Goods movement in urban areas is dominated by the motor truck and there is little prospect of any major technological change that would reduce the dominance of this vehicle in the foreseeable future. Transfer facilities at intermodal terminals constitute new foci of urban activity and new centers for the emerging highway networks. Planning future relationships among systems of freight transportation and the location of land uses must involve considerations of alternative patterns of movement to minimize the total volume of ton-miles generated.

WALKWAYS

Antoniou, J. "Planning for the Pedestrian-Access Networks." Official Architecture and Planning. Vol. 33, No. 6, 1970, pp. 510-26.

Future plans indicate that the next ten years are likely to witness a substantial increase in the provision of pedestrian access in urban areas. But without adequate knowledge of the implications involved, this progressive outlook in urban planning and design is likely to result in superficial gains only. The basic requirements in planning for pedestrians including both design and management aspects of networks, are examined. Some examples of planning "pedways" are discussed.

Bartholomaus, K. S. Pedestrian Movement - Selected References 1965-1972. Evanston, Illinois: Northwestern University, 1972.

The bibliography lists 250 selected references in the field of pedestrian movement. Each item contains complete bibliographic data and a brief description of its topical content. The entries are broken down into four principal categories: general research (including surveys, pedestrian flow, circulation in specific geographical areas and overall pedestrian systems); safety (including accidents and injuries to pedestrians, crosswalks and pedestrian-oriented traffic control devices, design of automobiles and streets to minimize pedestrian injury, educational programs in pedestrian safety and others); facilities (including pedestrian-vehicle separation through malls, pedestrian trafficways, sidewalks, moving walkways and other physical aids to convenience and comfort for

pedestrian movement); and mathematical models. The report is indexed by author and contains an address list of periodicals and publishers.

Federal Highway Administration. A Manual for Planning Pedestrian Facilities. (Implementation Package 74-5). Washington, D.C.: U.S. DOT, FHWA, June 1974.

This manual is intended to provide the engineer or planner with guidelines on planning a pedestrian facility. It has been carefully prepared to enumerate all of the factors that should be taken into consideration when determining the need for a facility.

The manual does not provide facility design specificiations; it addresses the planning and functional concepts, rather than the construction specificiation and engineering aspects of facility design. System warrants are not specifically addressed.

Fruin, John J. Pedestrian Planning and Design. New York, New York: Metropolitan Association of Urban Designers and Environmental Planners, Inc., 1971.

The intent of this book is to help fill the broad gap that exists in the planning and design of building and street spaces for comfortable and convenient human use. The objectives of pedestrian planning programs, study procedures and methods of plan implementation are illustrated. The design discussion is supplemented by illustrative examples.

The book establishes the importance of walking in urban design and the problems of pedestrians in today's cities. There is a brief insight into some of the human physiological and psychological factors that affect the planning and design of pedestrian spaces. The traffic and space characteristics of pedestrians are developed in sufficient detail for an understanding of pedestrian-traffic relationships. Supplementary written and pictorial descriptions of pedestrian traffic interactions at various human space occupancies provide a useful supplement for evaluating the environmental design quality of pedestrian building and street spaces.

Institute of Public Administration. Pedestrian Needs and Accommodations: A Study of Behavior and Perception. Report for FHWA, USDOT. Washington, D. C.: USDOT, January 1975.

This report documents a study of pedestrian behavior and perception to identify pedestrian needs and accommodations. The techniques used to study pedestrians included: (1) survey polls of pedestrians at different locations; (2) observation of pedestrians along their walking routes; and (3) photography to supplement the first two approaches. Taken collectively, these techniques determined actual pedestrian conditions.

The study of pedestrians produced two significant conclusions. The first is that pedestrians rarely express emphatic reaction to the walking environment. The second is that pedestrian behavior responds in characteristic ways to environmental conditions. These conclusions suggest the following action-oriented policies which are proposed in this report:

1. A leadership program of pedestrian improvements should be initiated to accommodate pedestrian needs, and to stimulate the environmental consciousness of pedestrians.

2. Offensive and inconvenient pedestrian conditions should be rectified.

3. A program of pedestrian improvements should be directed to the whole pedestrian network of a city.

4. Incentives should be given to the users of land adjacent to the pedestrian right-of-way to make pedestrian improvements.

Levinson, H. S. "Pedestrian Way Concepts and Case Studies." Highway Research Record #355. Washington, D. C.: Highway Research Board, 1971, pp. 69-89.

This paper describes pedestrian circulation concepts for the southwest employment area in Washington, D. C. and for downtown Seattle, Washington. These case studies indicate the importance of achieving pedestrian movement continuity, separating pedestrian and vehicle improvements and preserving pedestrian movement corridors.

Scott, W. G. and L. S. Kagan. A Comparison of Costs and Benefits of Facilities for Pedestrians. Washington, D. C.: Peat, Marwick, Mitchell and Co. and RTKL Associates, Inc., December 1973.

This report discusses the costs and benefits of facilities for improving pedestrian circulation, safety and environment. The report categorizes the various types of facilities and improvements for pedestrians in downtown areas and at-grade separation projects. A general framework for estimating total facility cost over time is developed and examples of costs are provided. The nature of pedestrian travel is examined as an aid to determining the requirements for and impacts of pedestrian facilities. The cost and benefits of facilities upon pedestrians, vehicles and abutting properties are examined.

BIKEWAYS

Federal Highway Administration, U.S. Department of Transportation. Safety and Locational Criteria for Bicycle Facilities User Manual, Vol. I - Bicycle Facility Locational Criteria. Report No. FHWA-RD-75-113. Washington, D. C.: USDOT, February 1976.

This manual is designed to enable users to make judgements on the need for, the location and form of bicycle facilities. The document offers an overview of the planning process and relevant locational criteria. In addition, a methodology for estimating potential bicycle activity is presented. An appendix which discusses the use of surveys in locational planning has also been included. Finally, a design solution for the provision of bikeway grades, based upon a consideration of physiological work capability, is described.

Federal Highway Administration, U.S. Department of Transportation. Safety and Locational Criteria for Bicycle Facilities User Manual Vol. II - Design and Safety Criteria. Report No. FHWA-RD-75-114. Washington, D. C.: USDOT, February 1976.

This manual is designed to assist a designer of bicycle facilities in providing a safe and effective environment for bicyclists, pedestrians and motor vehicle operators. The document discusses the bikeway design process and relates it to locational decisions. Route and right-of-way specifications are detailed. Various intersection treatments are presented. Signing and markings applicable to bikeways are also covered.

Hamill, J. P. and P. L. Wise. Planning for the Bicycle as a Form of Transportation. Washington, D. C.: Pan-Technology Consulting Corp., 1974.

The document is a bikeway systems planning manual for assisting public officials and bicycle enthusiast groups in designing and implementing safe and economical bikeways in the local community. Detailed guidelines for policy planning, functional planning and implementation planning are included. The manual is based on a comprehensive overview of the available literature on bikeway systems planning, and substantially reflects the state-of-the-art. The format of the manual is structured to provide users with a systematic and practical approach to the full range of issues to be addressed in planning and constructing a bikeway system.

Smith, Jr., Dan. Bikeways: State of the Art, 1974. Report No. FHWA-RD-74-56 to USDOT, FHWA. Washington, D. C.: Federal Highway Administration, July 1974.

The recent phenomenal growth of bicycling activity has been paralleled by accelerating concerns for increases in bike-involved accidents and demands for good recreational and utility-oriented facilities on which to ride. All jurisdictional levels have responded with enforcement, development of bikeway locational and design criteria and provision of physical facilities. Unfortunately, U. S. planners and designers were generally unprepared to deal with the bicycle, and programs were based largely on intuitive judgements, European experience and trial and error. Results of initial experiences in various localities are now becoming available. This "State of the Art" report focuses on planning and design practices employed to date, reviews their successes and failures, outlines practices which appear to contribute to bicycle facility utility and safety and identifies design pitfalls.

Transportation Research Board. "The Bicycle as a Transportation Mode," Transportation Research Record 570. Washington, D.C.: Transportation Research Board, 1976.

This is a compendium of nine papers prepared for the 53rd and 54th annual meetings of the Transportation Research Board. A range of issues surrounding the bicycle is addressed, including legislation, planning and design of facilities, establishing warrants for bicycle crossings, integrating the bicycle with other modes, citizen participation and others.

U.S. Department of Transportation, Federal Highway Administration. Bicycles and Pedestrian Facilities in the Federal-Aid Highway Program. Washington, D.C.: U.S. DOT, FHWA, 1974.

An instructive pamphlet describing the operation of FHWA's policy of permitting funding of bicycle and pedestrian facilities from the Federal-Aid highway program when conditions are favorable and a public need is served. The criteria and process for funding are described. A bibliography and a listing of FHWA division offices are given.

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