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# Integration of Transit System

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# Integration of Transit System

## **Abstract**

The objective of this report is to assess the potential for interagency and intermodal integration of transit systems in u.s. urban areas, drawing on an analysis of the successful experience of European systems. Vol. 1 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. Vol. 2 describes in detail four major European transit systems (London, Hamburg, Paris, and Munich); give brief descriptions of six others (Newcastle upon Tyne, Edinburgh, Stockholm, Gothenburg, Copenhagen, and Oslo); and summarizes and appraises the applicability to U.S. transit systems of techniques which have contributed to the success of these European systems. Vol. 3 deals with the application of these techniques to three major U.S. cities (Philadelphia, San Francisco, and Seattle) and to an archetypal smaller urban area, "Middletown." The report is summarized in the fourth volume. Appendices include contacts in u.s. cities, UMTA study grants, and questionnaire forms. Approximately 150 references are listed at the ends of individual sections and in a bibliography in the summary volume.

## **Keywords**

urban transit, transit integration

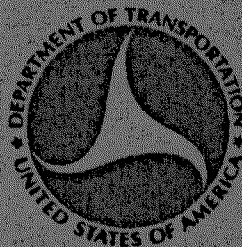
## **Disciplines**

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# INTEGRATION OF TRANSIT SYSTEMS

## VOLUME 3

### Transit Integration in U. S. Urban Areas



June 1973

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## DISCLAIMER

The contents of the report reflect the views of INTERPLAN Corporation, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or any policy of the Department of Transportation, nor do they constitute a standard, specification, or regulation.

NOTE: As originally conceived, this study was a program design study conducted for the Office of Research, Development and Demonstration of the Urban Mass Transportation Administration during the period between September 1972 and June 1973. Its intent was to provide UMTA with a three-year plan for a coordinated research, development and demonstration program in transit systems integration. Before the study was completed, however, UMTA program reorientation affected the original intended purpose of the study as a basis for demonstration program planning.

This report, therefore, should not be viewed as describing the beginning of a Government program. Rather, it represents the first broad overview and directed research on transit integration undertaken in the U.S. It is intended that discussion of the concepts advanced will contribute to the search for better ways of solving the problems of urban mass transportation.

## PREFACE

This is the third volume of a four volume report whose objective is to assess the potential for interagency and intermodal integration of transit system operations in U.S. urban areas, drawing on an analysis of the successful experience of European transit systems. The four volumes are:

- Volume 1: Concepts, Status and Criteria
- Volume 2: Integrated European Transit Systems
- Volume 3: Transit Integration in U.S. Urban Areas
- Summary Volume

The first volume documents the need for transit integration in U.S. urban areas, presents the conceptual and evaluative framework, and reviews current transit integration efforts on the part of Federal, state, and local governments.

The second volume describes in detail four major European transit systems (London, Hamburg, Paris, and Munich); gives brief descriptions of six others (Newcastle upon Tyne, England; Edinburgh, Scotland; Stockholm and Gothenburg, Sweden; Copenhagen, Denmark; and Oslo, Norway); and summarizes and appraises the applicability to U.S. transit systems of specific techniques which have contributed to the success of these European systems.

This third volume deals with the application of these techniques to three major metropolitan areas (Philadelphia, San Francisco, and Seattle) and to an archetypal small urban area, "Middletown." The report is summarized in the fourth volume.

Throughout the report, information sources referred to in the text are listed at the end of individual sections. Acknowledgements are given as appropriate in the introductions to each volume.

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## SECTION 1 INTRODUCTION

### STUDY OBJECTIVES

The integration of urban public transit operations is more advanced in European metropolitan areas than in major American cities, where, for a variety of reasons, a multitude of independent operators is more the rule than the exception. Integrated European transit systems are generally held to provide better service and draw more ridership than American systems.

The three-fold purpose of this report, prepared as an UMTA program design study to aid in assessing the feasibility, the local need, and the potential benefits of integration demonstration projects, is to:

1. Identify the need for transit integration in major U.S. metropolitan areas;
2. Identify European solutions to transit integration problems;
3. Analyze the applicability of European approaches to U.S. public transit systems and suggest specific applications.

Each of these topics is the subject for one of the three numbered study volumes (the fourth volume is a summary).

In order to accomplish the third of the above objectives, this volume describes the selection process followed to arrive at the three cities for which specific integration approaches are proposed (Philadelphia, San Francisco, and Seattle); describes and suggests integration approaches for a hypothetical smaller urban area, "Middletown"; and presents an exhaustive checklist or scorecard of specific integration items, filled out according to suggestions made for each of the three cities and Middletown. The reader is referred to the introduction to Volume 1 for a brief discussion of the major concepts of transit integration, the sequence of execution of the study as a whole, and other background material.

At the direction of the UMTA Project Manager, the report is written with a triple readership in mind:



1. The staff of UMTA;
2. The managements and planning staffs of the 1,100 transit operating companies in the United States;
3. The planning staffs of local and regional agencies concerned with urban transportation.

Each of these three groups will find some parts of the report to be elementary and very familiar. It should be borne in mind that such material was included for the benefit of readers whose work constrains them from being conversant with the broad scope of the subject, but who also wish to acquire this broad background so as to participate more fully in UMTA's future transit integration program.

This report is the first broad overview of transit integration ever undertaken in the United States. Some of the views and suggested solutions may be found to be controversial. INTERPLAN believes that the report will largely serve its purpose if it initiates further work on the subject and stimulates all professionals—transit operators and planners alike—to contribute to the search for better ways of solving the many problems of urban mass transportation.

## BACKGROUND FOR THIS VOLUME

### Major U.S. Metropolitan Areas Surveyed

Thirty Standard Metropolitan Statistical Areas were surveyed for their potential for transit integration. These 30 areas account for an estimated 80 percent of all public transit patronage. They include all metropolitan areas of over one million population and two additional areas where local interest in being included in the study was expressed by UMTA. On the basis of information obtained through a literature search, from written response to INTERPLAN's inquiries, and from field trips, these 30 cities were narrowed down to three for which specific integration approaches were suggested. In broad outline, the selection process was carried out by the following steps:

- Thirty major metropolitan areas initially investigated were selected from the 243 Standard Metropolitan Statistical Areas (SMSAs) defined by the U.S. Bureau of the Census primarily on the basis of size.
- Seventeen of these 30 areas were selected for closer examination on the basis of apparent need for transit integration and interest in participating in the study.

- Nine of the 17 SMSAs were selected for field investigation on the basis of population size, location and ease of access to necessary information.
- Three of the nine SMSAs were finally selected to serve as examples of the application of European integration techniques on the basis of size, location, and their potential for different approaches to achieving transit integration.

The 17 cities are listed below and shown in Figure 1.

Three selected for integration examples:

1. Philadelphia
2. San Francisco
3. Seattle

Six more investigated; profiles prepared:

4. Baltimore
5. Cleveland
6. Los Angeles
7. Miami
8. New Orleans
9. San Diego

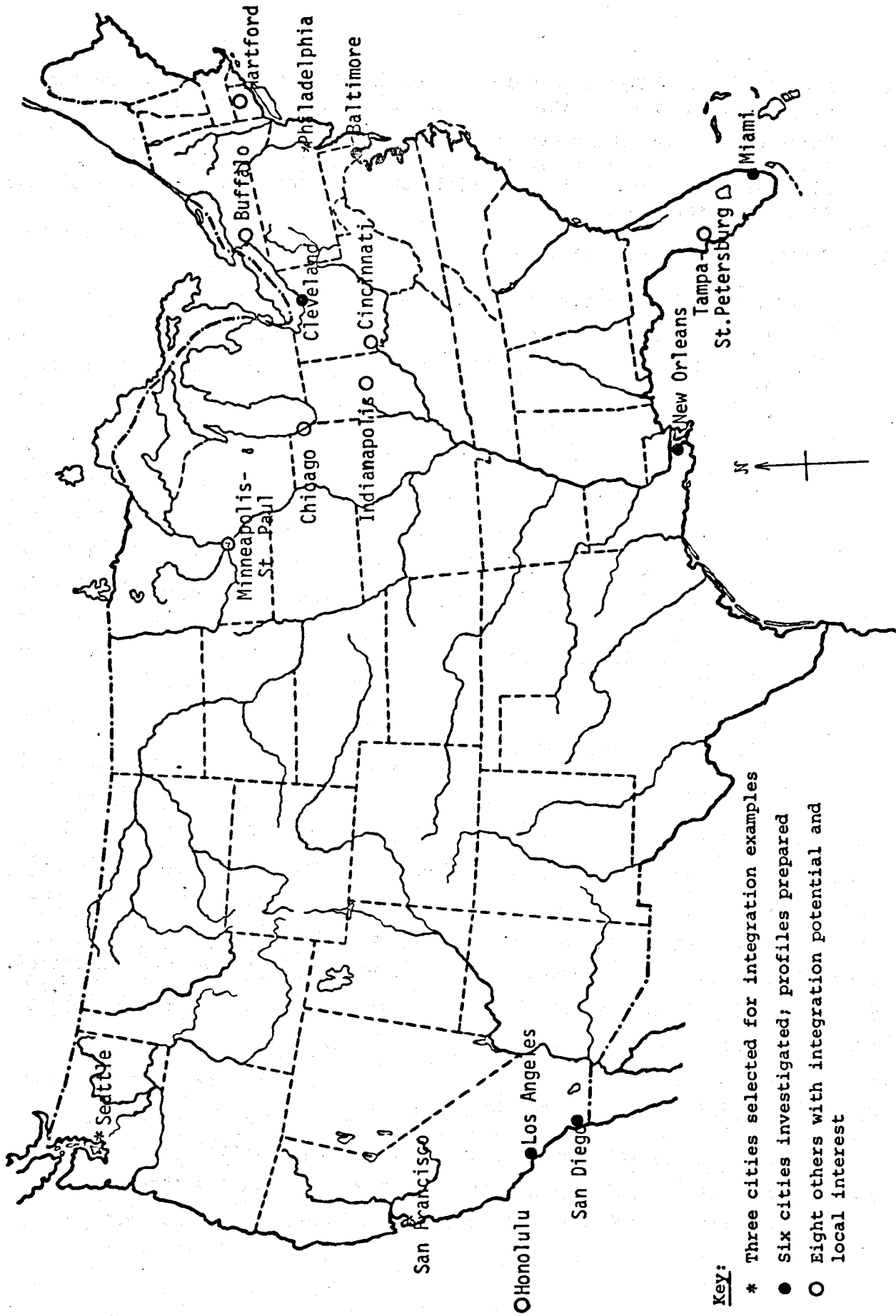
Eight others with integration potential and local interest:

10. Chicago
11. Minneapolis-St. Paul
12. Cincinnati
13. Buffalo
14. Indianapolis
15. Tampa-St. Petersburg
16. Hartford
17. Honolulu

With the exception of Hartford and Honolulu, the 30 cities examined all have populations exceeding one million. In order to provide an example of how transit integration applies to the needs of a smaller urban area and how such an area might approach transit integration, a "typical" small city, "Middletown," is examined in the same way as the three in-depth cities. Such an "average" city is described and suggestions are made for the application of relevant integration measures.

### Examples of Different European Approaches

The U.S. cities selected as examples for the application of European methodologies of transit integration offer the potential for three major approaches. UMTA can draw comparisons between these three different



**Key:**

- \* Three cities selected for integration examples
- Six cities investigated; profiles prepared
- Eight others with integration potential and local interest

Figure 1. Map of the United States, showing 17 cities investigated.

approaches in considering the type of RD&D program it should pursue. The approaches suggested are:

1. A series of specific operational and physical integration activities for one city in which a degree of institutional integration has been achieved.
2. An institutional arrangement patterned after the Hamburg and Munich Transit Federations where one of the partners operates a statewide rather than an urban service.
3. A plan along the line of the organization of the London Transport Executive (or RATP in Paris) for combining public transit agencies into a single integrated agency.

The first approach applies to both Philadelphia, where institutional integration is close to realization following a series of acquisitions by one public agency (SEPTA), and Middletown, where institutional integration of transit is of little consequence because there is only one bus company. In Philadelphia, four mini-projects are suggested: an honor fare system, restructuring of fares, network integration, and an integrated public information system. In Middletown, the proposed emphasis would be on para-transit, walking, and biking and transit's interfaces with these modes. Route and schedule restructuring, an auto-free zone, a pedestrian mall, and a special "package" bus to serve shoppers are also suggested.

Both the second and third approaches to institutional integration are considered in the context of transit operations in the San Francisco Bay region. It is suggested that both merger and federation would have a place in the long-range realization of an integrated regional transportation system.

The federation approach is felt to be most applicable to transit operations in the Puget Sound region (Seattle), with a specific suggestion to integrate bus and ferry service. The application of the federation approach is also reviewed in the Philadelphia discussion as an eventual goal of transit integration activities.

In all cases, discussion of the most appropriate solution to an area's institutional integration problems is followed up by further suggestions on operational and physical measures.

## Checklist of Integration Activities

In order to facilitate the comparison of the integration activities suggested for the four representative cities, INTERPLAN prepared a highly detailed, exhaustive, eleven-page checklist of all imaginable activities which might be part of a city's transit integration program, categorized as being institutional, operational, or physical and according to the organizations which would be involved (operators only, government agencies and local businesses). A completed checklist is given for each of the four cities. The checklist is also designed to be useful as a source of ideas and as a worksheet for cities interested in designing their own transit integration programs.

## ACKNOWLEDGEMENTS

INTERPLAN is grateful to the many transit, city and regional planning, and other officials and professionals who responded to the many written and personal inquiries necessary in gathering information on transit operations in U.S. cities. The names of those to whom thanks are due are listed by city in Appendix A.

Consultants and staff members largely responsible for material contained in individual sections of this volume are:

- Dr. Vukan R. Vuchic - Philadelphia
- Ms. Roberta Remak - San Francisco, Seattle
- Ms. Elizabeth St. John - Middletown

## ORGANIZATION OF THIS VOLUME

Section 2 describes the procedure by which INTERPLAN selected representative areas for investigation from the 243 Standard Metropolitan Statistical Areas in the United States. It describes the initial investigation of 30 major metropolitan areas and the further investigation of 17 of these areas by means of literature search, questionnaires, wish lists, and field investigations. It then reviews the final selection of three areas where different European approaches to integration could be applied.

Section 3 contains profiles, including an assessment of the potential for transit integration, for six cities: Baltimore, Cleveland, Los Angeles, Miami, New Orleans, and San Diego.

Sections 4, 5, 6, and 7 present suggested programs for transit integration in the three areas selected: Philadelphia, San Francisco and Seattle, and in a typical smaller city, "Middletown". The discussion within each section includes a description of area characteristics and existing public transit services and a review of local transportation planning and efforts at transit integration, and outlines a program to be undertaken to integrate the area's public transit services.

Appendix A lists contacts established by INTERPLAN in U.S. cities during the course of the study. Appendix B is a list of the 243 SMSAs and their populations in 1970. Appendix C reproduces the questionnaire and wish list used. Appendix D describes items on the integration checklist. Appendix E reproduces the State of California Act establishing the Metropolitan Transit Commission.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be clearly documented and verified. The second section covers the process of reconciling accounts, ensuring that all entries are balanced and consistent. This involves comparing the company's records with bank statements and other external sources. The final part of the document provides a summary of the findings and offers recommendations for improving the accounting process. It suggests implementing stricter controls and regular audits to prevent errors and ensure the integrity of the financial data.

The following table provides a detailed breakdown of the financial data for the period under review. Each row represents a different category of expenditure or income, with columns for the amount in dollars and cents. The total amount is calculated at the end of each section. The data shows a significant increase in certain areas, which may be due to seasonal fluctuations or changes in business operations. It is important to note that all amounts are in US dollars unless otherwise specified. The document also includes a list of the individuals or entities involved in the transactions, along with their respective roles. This information is crucial for understanding the context of the financial data and for identifying any potential areas of concern or interest.

## SECTION 2

### SELECTION OF REPRESENTATIVE METROPOLITAN AREAS

#### SUMMARY OF THE SELECTION PROCESS

In broad outline, the selection process was carried out by the following steps:

- Thirty major metropolitan areas initially investigated were selected from the 243 Standard Metropolitan Statistical Areas (SMSAs) defined by the U.S. Bureau of the Census primarily on the basis of size.
- Seventeen of these 30 areas were selected for closer examination on the basis of apparent need for transit integration and interest in participating in the study.
- Nine of the 17 SMSAs were selected for field investigation on the basis of population size, location and ease of access to necessary information.
- Three of the nine SMSAs were finally selected to serve as examples of the application of European integration techniques on the basis of size, location, and their potential for different approaches to achieving transit integration.

#### INITIAL INVESTIGATION OF 30 METROPOLITAN AREAS

##### Selection of Areas

The U.S. Bureau of the Census has designated 243 Standard Metropolitan Statistical Areas throughout the United States on the following basis (quoted from Source 1):

"Except in the New England States, a standard metropolitan statistical area is a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more, or 'twin cities' with a combined population of at least 50,000. In addition to the county or counties containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are socially and economically integrated with the central city.... In the New England States, SMSAs consist of towns and cities instead of counties. Each SMSA must include at



least one central city, and the complete title of an SMSA identifies the central city or cities."

A complete listing of the 243 SMSAs is provided in Appendix B.

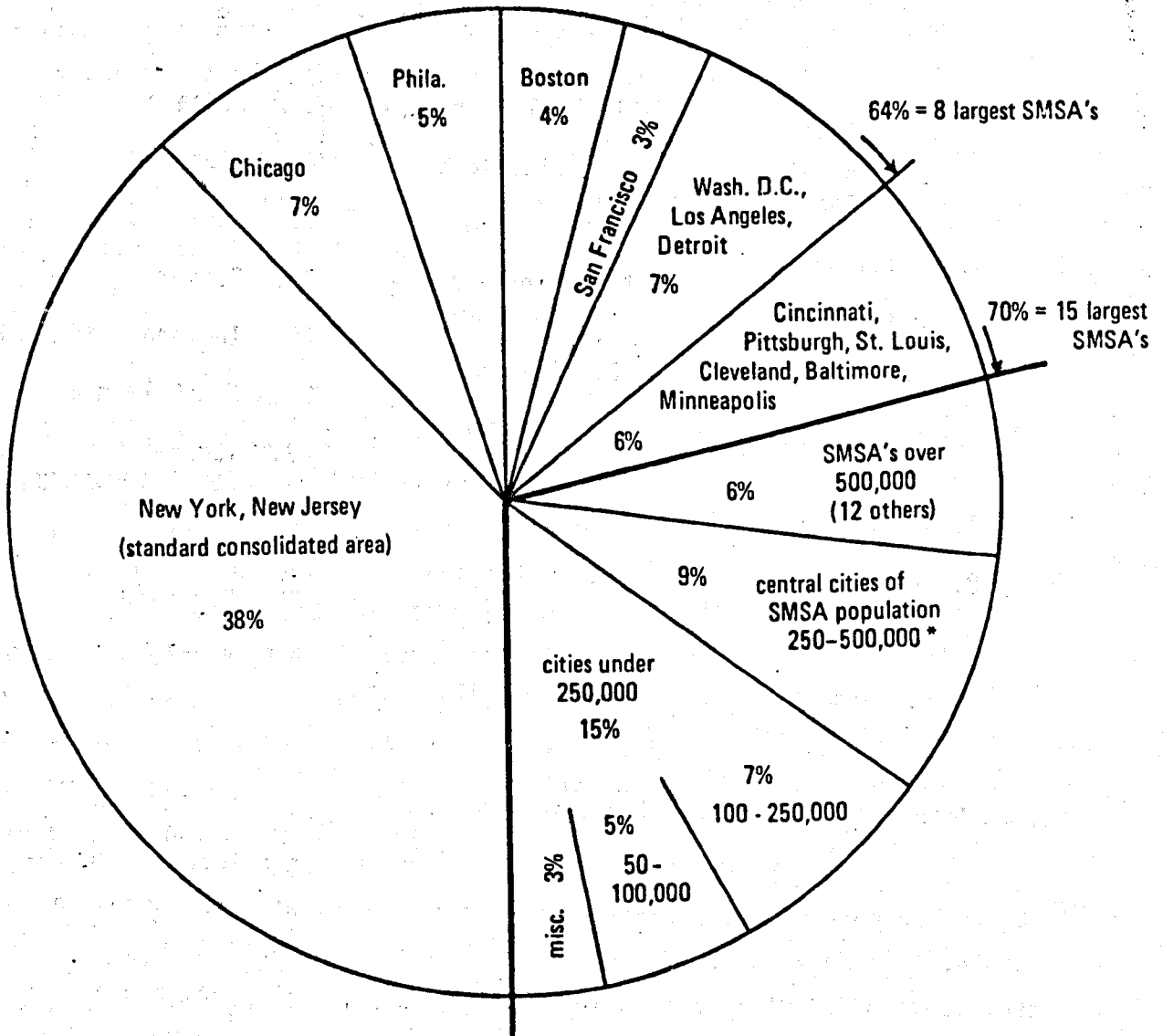
In an analysis of the relation of transit patronage to population size (Source 2), it was found that 70 percent of the total transit ridership in the United States is concentrated in the 15 largest SMSAs (see Figure 2). In cities within SMSAs of less than 500,000, no substantial transit patronage exists. Therefore, INTERPLAN decided to limit its investigation to the 33 metropolitan areas with population of one million or more, in which an estimated 80 percent of all U.S. public transit patronage is concentrated.

Further investigation revealed that five of the 33 SMSAs were included in the transportation planning regions of a larger, neighboring metropolitan area. These were the SMSAs of Newark and Paterson-Clifton-Passaic, New Jersey, which were included in the Tri-State transportation plans centered around New York City; the SMSAs of Anaheim-Santa Ana-Garden Grove and San Bernardino-Riverside-Ontario, California, included in the regional planning of the Southern California Area Governments centered around Los Angeles; and the SMSA of San Jose, California, which is a part of the nine-county San Francisco Bay Region and included in the planning area of the Metropolitan Transportation Commission.

Two other metropolitan areas were added to the list of those to be investigated: Honolulu and Hartford. Local transportation authorities expressed to UMTA their special interest in the study, so INTERPLAN extended its investigation to cover these two areas, even though their populations, 664,000 and 629,000 respectively, fell below the one million cut-off point. Table 1 lists the 30 SMSAs, in order of population size, that were the objects of INTERPLAN's further investigation.\*

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\* The results of the investigation of these 30 SMSAs described in this section are summarized in Table 7 on page 39.



\* NOTE: There is no substantial transit patronage outside of the central cities of SMSA's under 500,000

Figure 2. Percentage breakdown of revenue transit passengers by SMSAs. (Includes bus, rapid transit, and railroad commutation.)

Taken from Source 2.

Table 1. SMSAs investigated by INTERPLAN for potential for integration.

1. New York	11. Baltimore	21. Buffalo
2. Los Angeles- Long Beach	12. Cleveland	22. Miami
3. Chicago	13. Houston	23. Kansas City
4. Philadelphia	14. Minneapolis- St. Paul	24. Denver
5. Detroit	15. Dallas	25. Indianapolis
6. San Francisco- Oakland	16. Seattle- Everett	26. New Orleans
7. Washington, D.C.	17. Milwaukee	27. Tampa- St. Petersburg
8. Boston	18. Atlanta	28. Portland
9. Pittsburgh	19. Cincinnati	29. Hartford
10. St. Louis	20. San Diego	30. Honolulu

#### Methodology of the Initial Investigation

To each SMSA listed in Table 1 INTERPLAN sent a letter describing the purpose of our investigation and the information we hoped to obtain. Accompanying the letter were a copy of INTERPLAN's work statement, a detailed description of INTERPLAN's work plan, and a summary of the status of public transportation in selected metropolitan areas that had been prepared from data we already had on hand from earlier studies. The letters were addressed to agencies in each of these areas with responsibility for overall transportation planning or for public transit planning. In most cases, specific individuals were designated, many of whom had worked with INTERPLAN on previous transportation studies.

All but three of the areas responded (Boston, Pittsburgh and Houston were the non-respondents). Some provided only limited information, but the majority replied with lengthy descriptions of their

current transit operations, transportation plans, and needs for integration. Many expressed the desire to participate further in the study and hoped that they might be selected as demonstration areas.

On the basis of this information and other material previously obtained by INTERPLAN, an evaluation was made of the potential for integration in the 30 SMSAs.

## Findings

**NATIONWIDE POTENTIAL FOR TRANSIT INTEGRATION.** The survey revealed that of the 30 metropolitan areas studied, only three, Houston, Dallas and Hartford, have no current or future needs for transit integration. Each is served by a single bus system. Four other areas, St. Louis, Atlanta, Kansas City and Honolulu, are also served by single bus systems, but will need to integrate these with the rail rapid transit systems they are planning to construct. Rail rapid transit is also being planned in eight other metropolitan areas: Pittsburgh, Baltimore, Minneapolis-St. Paul, Seattle-Everett, San Diego, Buffalo, New Orleans, and Tampa-St. Petersburg. Not only will integration of these new systems be necessary in the future, but each of these SMSAs has immediate need for integration of their existing systems.

There is a greater need for interagency integration than for intermodal integration. In 23 of the SMSAs, transit service is provided by more than one operator, but in ten of these areas, the only mode involved is bus. Immediate needs for intermodal integration exist in only 14 SMSAs, and future needs will be experienced in three others only when rail rapid transit is constructed.

Table 2 shows the potential for transit integration in the 30 metropolitan areas surveyed.

Table 2. Potential for transit integration in 30 SMSAs.

Metropolitan Area or Planning Region	Type		Timing	
	Inter- Modal	Inter- Agency	Immediate	Future
1. New York	X	X	X	
2. Los Angeles		X	X	
3. Chicago	X	X	X	
4. Philadelphia	X	X	X	
5. Detroit	X	X	X	
6. San Francisco - Oakland	X	X	X	
7. Washington, D. C.	X	X	X	
8. Boston	X	X	X	
9. Pittsburg	X	X	X	X
10. St. Louis	X			X
11. Baltimore		X	X	X
12. Cleveland	X	X	X	
13. Houston				
14. Minneapolis-St. Paul		X	X	X
15. Dallas				
16. Seattle-Everett	X	X	X	X
17. Milwaukee		X	X	
18. Atlanta	X			X
19. Cincinnati	X	X		
20. San Diego		X	X	X
21. Buffalo		X	X	X
22. Miami		X	X	
23. Kansas City	X			X
24. Denver		X	X	
25. Indianapolis		X	X	
26. New Orleans	X	X	X	X
27. Tampa-St. Petersburg	X	X	X	X
28. Portland		X	X	
29. Hartford				
30. Honolulu	X			X
Total	17	23	22	12

THE FIVE LARGEST SMSAs. New York (11.6 million), Los Angeles (7 million), Chicago (7 million), Philadelphia (4.8 million), and Detroit (4.2 million) are the five largest SMSAs in America. The respective numbers of transit agencies in these five areas are 39, 32, 28, 12 and 8. All of these cities recognized that they had problems of transit integration; they expressed interest in participating in this study and sent us pertinent literature. In fact, three of these cities have been involved in earlier integration-related studies. According to HUD and UMTA listings (Sources 3 and 4), the 12 studies shown in Table 3 have been completed or are in progress.

New York. Integration problems in the Tri-State Region (Connecticut, New Jersey, and New York) are the most complex in the nation. Figure 3 shows the interrelationships of the 39 existing transit planning and operating agencies. As Table 3 shows, some \$7 million has been spent so far on integration-related studies in the Tri-State Region. The net impact of these studies, with respect to integration, appears to be relatively modest so far. In reply to INTERPLAN's letter, Mr. John E. Mahoney, the Director of the Public Transportation Division of the Tri-State Planning Commission gave the following description of initial attempts at integration (Source 5):

"Numerous timid first steps come to mind such as 1) single fare suburban fares [from] New Jersey to Manhattan (RRS-buses-PATH), 2) single fares on the NYCTA (subway-surface-MABSTOA). Single fares between local bus systems and suburban railroads would appear to be a 'must' if bus feeder service is ever to become a practical reality."

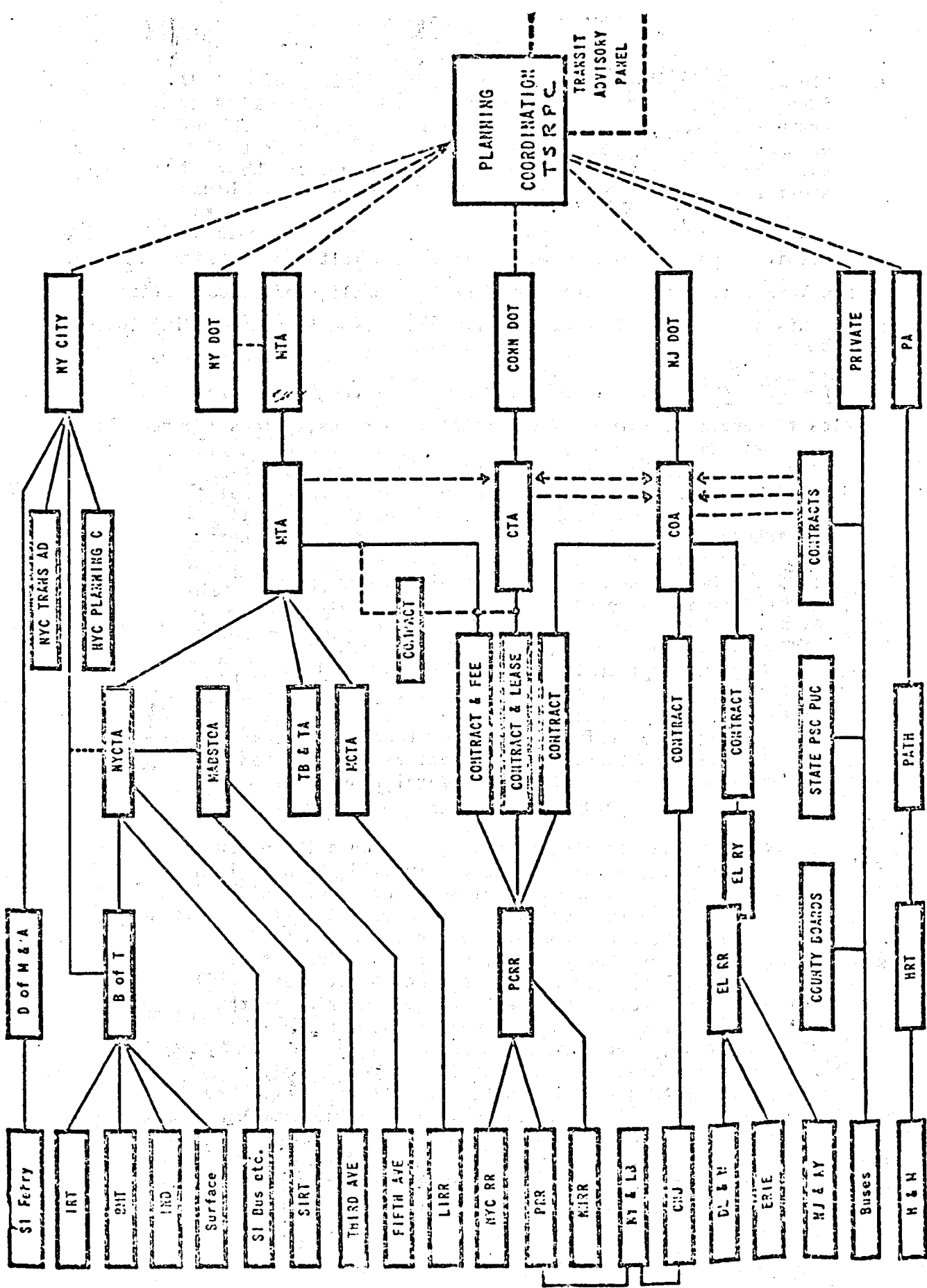
In the same letter, Mr. Mahoney communicated his agency's interest in an integration demonstration, as follows:

"We are most interested in the integration concept. It has been, and continues to be, a part of our work program in regional systems planning. Our interest is primarily directed toward the single ticket approach as exemplified by the Hamburg operation. That system would seem to minimize some of the institutional problems. It also has the potential of rationalizing the system by means of user choices of minimum paths."

Table 3. Completed and ongoing studies in 3 of the 5 largest SMSAs.

SMSA	Number	Name	Total Cost	Federal Commitment	Local Commitment
New York	NY-MTD-11	Bus Feeder Service in a Suburban Area	\$ 270,562	\$ 180,375	\$ 98,187
	INT-MTD-7	Feeder Bus Service	148,740	99,160	49,580
	INT-MTD-5	Improving Commuter Train Service	1,815,338	1,210,225	605,113
	NY-MTD-5	Increasing the Capacity of Commuter Transit Facilities	4,778,000	3,185,000	1,593,000
	INT-MTD-1	Park-and-Ride Rail Commuter Station	242,825	161,883	80,942
<b>Totals</b>			\$ 7,255,465	\$ 4,836,643	\$ 2,418,822
Chicago	ILL-MTD-5	Connecting Passageway Between Commuter and Rapid Rail Transit Lines	\$ 595,750	\$ 397,186	\$ 198,564
	ILL-MTD-1	The "Skokie Swift" Express Rail Transit from Suburb to City	523,835	349,217	174,608
	ILL-UTG-1	Extension of Englewood Rapid Transit to New Terminal with Bus Parking Facilities	6,736,755	4,526,066	2,210,689
	ILL-UTG-3	Remodeling of Clinton-Lake "L" Station--Connection with C&NW Railway Station	433,000	288,666	144,334
	ILL-T9-2	Suburban Feeder Bus Service	71,000	47,400	23,600
<b>Totals</b>			\$ 8,360,330	\$ 5,608,535	\$ 2,751,795
Philadelphia	PA-MTD-1	Commuter Railroad Service Improvements	4,674,300	3,116,200	1,558,100
	PA-MTD-8	Small Car Fleets for Transportation within Downtown Areas	1,462,039	1,430,125	31,914
<b>Totals</b>			\$ 6,136,339	\$ 4,546,325	\$ 1,590,014
<b>GRAND TOTAL</b>			\$ 21,752,134	\$ 14,991,503	\$ 6,760,631

Taken from Sources 3 and 4.



"The institutional and organizational complexities involved in systems planning for the Tri-State Region are great."  
 Taken from Source 5.

Figure 3. Transit agencies in the Tri-State Region.



"In my opinion there is a meaningful possibility of integrating the surface, rapid transit, bus and rail systems in the New York area. I would qualify this to emphasize that such integration would have to be at the fare box level and not the institutional level in the short range."

Despite this positive response, INTERPLAN felt that integration of New York's transit agencies would be too complicated to do justice to in this study, and New York was eliminated from further examination.

Los Angeles. The Director of Planning of the City of Los Angeles responded to INTERPLAN's initial inquiry as follows (Source 6):

"We have not achieved the kind of integration you are talking about, but I feel steps are being taken in that direction. Through the leadership of the City Council and its Ad Hoc Rapid Transit Committee, with the support of a technical committee composed of General Managers appointed by the Mayor, I feel we are making progress. Some of the steps being taken are as follows:

- "1. Insistence by the City Council that there be a joint application to UMTA by SCRTD and Los Angeles for a Technical Grant to develop the specifics for the first phase of a rapid transit system to be funded by money that will become available through a state act as a local share to which would be added federal grants for capital development.
- "2. Citywide planning in Los Angeles on a 15 and 20 year basis and planning for individual communities which deal with the integration of rapid transit with secondary feeder transportation systems, retention of the bus system to feed into these two systems, and the development of pedestrian overpass systems on an integrated basis. Work with the Parking Commission in the City of Los Angeles on peripheral parking facilities, particularly in the downtown area fed by the secondary transportation system (people movers) integrated to the overall planning. The proposals for downtown will be available after April 5, 1972.

"We have yet to tackle the integration of parking fee structures in relation to the other transportation systems, but

there is a major effort in the City to relate street system planning with bus facilities, particularly in the new San Bernardino Express Bus system in the median of that freeway going from the Union Station to El Monte.... I am quite confident that the City would be pleased to work with you on your information research and certainly would want to gain from your studies on how we might do our own transportation more effectively."

Pointing out that integration problems in Los Angeles are inter-agency rather than intermodal in nature, the general manager of the Southern California Rapid Transit District commented (Source 7):

"In reviewing your letter, I note repeated reference to intermodal integration of transit systems. Strictly speaking, our area does not have such a problem, for our public transportation is limited to one mode, the bus. The problem in the Southern California Rapid Transit District area is one of interagency integration. Within our general service area there is one other transit district, ten municipally owned transit systems and approximately twenty privately owned transit companies. We are studying the problem of interagency cooperation in connection with the development of a Transit Improvement and Coordination Plan and Program. This project was undertaken by Southern California Association of Governments under the auspices of a technical study grant from UMTA.

"...the Southern California Rapid Transit District would be happy to participate in such a project."

Under the expanded scope of the project, INTERPLAN studied Los Angeles in greater depth, as explained later in this section.

Chicago. Transit integration problems in the Chicago SMSA are so politically, financially, organizationally, and technically involved that effective solutions could be realized only with special long-range efforts to secure the cooperation of local authorities. The magnitude of the task is illustrated in a letter to INTERPLAN from Mr. Gerald Leonard, Secretary to the Chairman of Chicago's Transit Carriers Coordinating Committee (Source 8). The 28 members

of this committee represent transit interests ranging from the Chicago Transit Authority to relatively minor private companies serving suburban areas. Mr. Leonard's letter indicated full support of INTERPLAN's study, and is quoted below:

"This letter, like my call to you yesterday afternoon, is to confirm our intent to participate in your efforts with the Urban Mass Transportation Administration to assess the potential for intermodal integration of the transit system, in this case, in the Chicago region.

"The Transit Carriers Coordinating Committee is a common effort of the 28 public and private mass transportation operators in the two-state Chicago region which meets each month to discuss common problems and seek means to offer a better service to the public through coordinated effort. The Chicago Area Transportation Study will assist the T.C.C.C. in compiling the information you request as a part of their data bank or efforts currently underway.

"We hope to learn of your progress in this effort and trust that the Committee and CATS can be of assistance to you."

In response to this letter, INTERPLAN initiated further study of the Chicago area and sent a request for further information to Mr. Leonard. No reply has yet been received.

Philadelphia. Philadelphia, with a population of 4.8 million, is a large and complex metropolitan area. Interagency integration has been initiated in the form of cooperation among three transit operations (SEPTA, the Penn-Central Railroad, and the Port Authority), involving a number of facets of intermodal integration. In Philadelphia there are simultaneously the very worst and the very best elements of the transit industry that can be found anywhere in the world, and the potential for enlightened integration is among the highest in the country. In addition, excellent access to information on local transit operations was available through one of INTERPLAN's consultants. For these reasons, INTERPLAN decided to study Philadelphia in depth.

Detroit. Detroit, the world's automobile capital, has inter-agency integration problems but no intermodal problems. Thomas Lipscomb, General Manager of the Southeastern Michigan Transportation Authority, has this to say about transit in Detroit (Source 9):

"My understanding of your project's needs leads me to believe that Detroit, with two small rail commuter services accounting for less than 1/10 of one percent of all bus trips, would not be as strong a candidate for your selection as would the other cities on your list. The prime problem in this region affecting public transportation systems, besides lack of adequate funds, is the uncoordinated operation of six bus companies (including the municipally owned DSR).

"Our Authority was created out of recognition of the need for one unified, coordinated transit system serving the residents of Southeastern Michigan. This goal was reaffirmed...in [a] report to us prepared under an UMTA Technical Studies Grant in 1969, MICH-T9-1. Currently, [consultants] are under contract to us as part of another UMTA-funded grant, MICH-T9-7, to prepare a detailed operating plan and strategy for the immediate and long-term periods after acquisition of the bus carriers, a goal we expect to implement in the near future.

"There is no doubt in our minds that only through a coordinated regional transit system, one which will allow rational policy guidelines for service and capital improvements to be carried out, can a halt be made in the declining use of public transit in Southeastern Michigan....

"The major changes since [1969] have been predictable—reduced riding volumes (DSR is now under 100 million annual rides), increased costs, and, in one instance, the private carrier called it quits. Thus we now own and operate the buses and routes of Lake Shore Coach Lines, Incorporated, purchased in 1971 through an UMTA Capital Grant. Also, the City of Pontiac is operating a reduced bus system (5 new GM-33 Passenger air-conditioned buses), and Short Way Lines of Toledo, Ohio, is operating over Northville's routes. Finally, approximately 150 new air-conditioned buses were placed in service, primarily on the DSR, about the first of this year."

INTERPLAN concluded from the above letter and from examination of reports enclosed with it (Source 10) that public transit in Detroit is of relatively less significance than in many other cities. The potential for transit improvements through integration is no greater than for most other cities, and those integration problems which do exist are being studied in depth locally by recognized transportation consultants. It was decided to eliminate Detroit from further investigation.

SMSAs WITH 2 TO 4 MILLION POPULATION. There are seven SMSAs whose populations fall between 2 and 4 million. In descending order of population they are San Francisco-Oakland (3.1 million), Washington, D.C. (2.9 million), Boston (2.8 million), Pittsburgh (2.4 million), St. Louis (2.4 million), Baltimore (2.1 million), and Cleveland (2.1 million).

San Francisco. The San Francisco-Bay Region is of special interest to a study of transit integration. A completely new rail rapid transit system began service on the first completed portion of its lines in September 1972. The remaining portions now under construction and scheduled for initiation within the following year will provide rapid transit connections between the area's two major population centers, San Francisco and Oakland.\* Transit specialists throughout the world are eager to see the results of this system, which has combined the very best American management and planning acumen (\$25.4 million was spent on studies) with American equipment (the total cost of BART is of the order of \$1.4 billion).

Institutionally, San Francisco's essential problem is to coordinate the operations of BART with those two local surface transit operations--AC Transit's buses and Muni's buses, streetcars, cable cars, and trolley buses. Extensive studies of how integration of these operations should be carried out have been made and others are still in progress. INTERPLAN believes that developments in San Francisco

\*The second and third legs of the network were opened in January 1973 and May 1973, with the final service leg due to open in September 1973.

are of critical interest to a study of transit integration in the United States. Therefore, detailed study has been made of this area.

Washington, D.C. Those who know the Nation's Capital realize that the benefits of coordinating the existing services of D.C. Transit System and suburban Virginia lines would be very great indeed. Their integration, in turn, with the new METRO rapid transit system currently under construction would bring even greater benefits to this important urban center. In response to INTERPLAN's initial inquiry to the Washington Metropolitan Area Transit Authority, its planning director, Mr. William Herman, replied (Source 11):

"Our Authority has recently commenced a two-year study to investigate this interface problem in detail for the Washington Metropolitan area. Our transit technical study is part of a larger transportation improvement program for the Washington area being carried out in a unified way by a number of related agencies....

"The end product of our transit study will result in detailed proposals and recommendations for the improvement and integration of transit facilities. Thus, as your study is limited to the selection of three cities, we feel that it would be a duplication of effort and an unnecessary expenditure of limited resources for your study program to include Washington, D.C."

This area was, therefore, eliminated from further investigation by INTERPLAN. We will, of course, be very much interested in the results of the Washington study. We believe that many lessons learned in the Capital can be applied to other urban areas.\*

Boston. Two serious obstacles would confront any transit integration attempts in Boston. First, since 33 different transit agencies operate here, the sheer number of operators creates a tremendous problem in coordination. The second obstacle is a political structure which is not geared toward efficient centralized planning. These factors were considered sufficiently prohibitive to exclude Boston from an in-depth study at this time. The magnitude and difficulty of

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\*In January and February 1973, WMATA acquired all four area bus lines to complete full institutional integration of Washington's transit operations (WMATA is also building METRO). The takeovers were made possible by a 2/3 UMTA grant approved in January.

Boston's problems are comparable to those of New York and Chicago. The fact that INTERPLAN's preliminary inquiry has not yet been answered reinforces the decision not to study the Boston area any further. This does not imply that there is no potential for integration. Quite to the contrary, the long-run potential is very great, largely because the present separate systems could provide significantly improved services if effective integration were achieved.

Pittsburgh. Only one bus agency operates in Pittsburgh, along with two relatively minor commuter rail operations, and institutional integration of the urban transit system is close to complete. Pittsburgh failed to answer INTERPLAN's initial inquiry, and it was therefore decided to eliminate the area from further study.

St. Louis. The state of institutional integration in St. Louis is well summarized in a letter received from the Executive Director of the Bi-State Agency (Missouri-Illinois Metropolitan District), in response to INTERPLAN's initial inquiry (Source 12):

"Based on our understanding of [INTERPLAN's] letter, the status of transit operating progress and the present status of planning in the St. Louis Metropolitan Area, it appears that we have progressed beyond the requirements of your work statement which is evident by the following:

- "a) At the request of local political leadership the W.C. Gilman Company, in 1957, undertook a study of all private mass transportation systems operating in the Missouri portion of the St. Louis Metropolitan Area, and recommended a consolidation which would integrate all of the private mass transit systems existing at that time. Subsequently, in 1961, at the request of the local political leadership, the Bi-State Development Agency completed a supplement to the 1957 Gilman study in order to include the Illinois portion of the St. Louis Metropolitan Area, and a recommended consolidation and a complete integration of private mass transit systems existing at that time in the Bi-State Development Agency area of responsibility. After detailed appraisal and further studies,

the Agency concluded satisfactory arrangements for the purchase of existing transit facilities to form the Bi-State Transit System in the fall of 1962. The Bi-State Transit System began operations on April 1, 1963.

"b) At the request of local political leadership, the Bi-State Development Agency accomplished the recently completed St. Louis Metropolitan Area Rapid Transit Feasibility Study—Long-Range Program, published in August, 1971, which established the feasibility of a rail-like rapid transit system for the St. Louis Metropolitan Area, that is fully integrated with future 1990 highway network planning, available existing commuter railroad facilities, existing airport facilities, and the existing mass transit system.

"c) Although your study list indicates that there is another Agency operating surface transit systems in the St. Louis Metropolitan Area, we feel that it would be beneficial to point out that the Gulf Transport Company ceased operations in 1970.

"In light of the above and our understanding of your scope of study it appears that the St. Louis Metropolitan Area would not be a candidate for your future studies."

Baltimore. Although Baltimore has nine operating bus systems, 90 percent of the transit traffic is carried by the Metropolitan Transit Authority (MTA). MTA is in the process of acquiring the remaining small independent, privately owned systems so that by 1975 the urban transportation system will be fully integrated institutionally. By that time, however, the rail rapid transit may be under construction, and the problem of intermodal integration will have to be faced. Thus Baltimore will be a prime candidate for the application of experience in Philadelphia and San Francisco. At present, Baltimore is a most suitable metropolitan area for experimenting with remedial methods for the deficiencies typical of U.S. transit systems. MTA is a large, efficient and well-run organization; it is on the verge of breaking even financially. The local authorities and the management of MTA are open-minded and willing to experiment.



Cleveland. There are in Cleveland two independent rapid rail systems, one operated by the Cleveland Transit System (CTS) and the other by the Shaker Heights Rapid Transit. They serve two separate traffic corridors fed by the CTS bus lines. While many passengers must use both systems to complete a trip (70 percent of airport riders on the CTS rail originate their trip on the Shaker Heights system), and the two rail systems share the same terminal building in the center of the city, there are no transfer or terminal interchange facilities of any kind between the two lines. Neither are there transfers among the CTS, Shaker Heights Rapid, and bus lines of the five local transit companies serving the suburban areas of Cleveland.\* All operators provide inadequate information on services to the public, although there are excellent bus-stop signs for the loop line of the CTS in the CBD, and they use flat fare systems, which renders any meaningful integration of fares impossible. Forced by local laws to support themselves from fare box revenues, operators are caught in the vicious circle of deteriorating service and decreasing revenues.

INTERPLAN believes that, potentially, the possibilities of transit integration in Cleveland are among the highest in the country. The same feeling has been expressed by Mr. David N. Goss, Director, Research & Planning of the CTS (Source 13):

"I think it is fair to say that Cleveland would offer a tremendous challenge to your program since at the present time there is no institutional arrangement to achieve the type of transit integration that you are talking about.

"The area offers a unique opportunity for testing out new transit integration concepts in a very complex environment. In addition, such a program would be a timely supplemental activity to the UMTA technical study that would be in progress simultaneously.

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\* There is an interchange and transfer at the Campus Station, for the benefit of students.

"UMTA technical study grant will be funded in May--for approximately an 18-month period--which has as one of its objectives to institute a coordinated transit system in the seven-county area (includes both Cleveland and Akron)."

SMSAs WITH 1 TO 2 MILLION POPULATION. Sixteen of the 30 metropolitan areas initially investigated had populations of less than 2 million. Their apparent needs for integration ranged from very great to little or none. Four areas, Houston (2.0 million), Dallas (1.6 million), Atlanta (1.4 million), and Kansas City (1.3 million), were each served by single bus systems and presented no immediate potential for integration. Atlanta and Kansas City, however, both have plans to construct rail rapid transit systems and will need to integrate these with their existing systems in the future.

Houston. Houston failed to reply to the initial inquiry. However, since INTERPLAN was able to learn that "the bus system is operated by a private company, National City Lines, which took over the system in 1966 after the former ownership went into receivership," (Source 14), no further follow-up was made.

Dallas. Dallas is an automobile-oriented city where streets occupy 27 percent of the 930-acre central city area, grade-level parking lots cover 15 percent, and parking garages are built on 3 percent of central city land. Table 4, reproduced from an Arthur D. Little study of Dallas (Source 15), lists needed improvements and benefits which would result from Dallas' proposed Goods Distribution, Terminal, and Transitway projects. Among those listed, improvements and benefits such as provision for modal interchange, an improved relationship with a regional transportation plan, and reduction of confusion and conflicts are closely related to operational integration.

Dallas provides a good example of how transit problems persist even after institutional integration has been accomplished. Representatives of the Dallas Transit System responded to INTERPLAN's initial inquiry as follows (Source 16):

Table 4. Evaluation of potential for transportation improvements in Dallas.

	Goods Distribution Project	Terminal Project	Transitway Project
<b>1. Transportation System Improvements</b>			
a. Improve downtown circulation	X	X	X
b. Provide for separation of travel modes	X		X
c. Provide for modal interchange		X	
d. Relate to regional transportation		X	X
e. Adaptability to phased development	X	X	X
f. Adaptability to incremental funding	X	X	X
g. Considered in an existing integrated transportation plan	X	X	X
<b>2. System User Benefits</b>			
a. Reduction of travel time	X		X
b. Provide for convenience and ease of access	X	X	X
c. Reduction of confusion and conflicts	X	X	X
d. Reduction of operating costs	X		
<b>3. Environmental Impact</b>			
a. Contribute to a quality urban environment	X	X	
b. Promote more efficient use of downtown land	X	X	
c. Stimulate joint development		X	

Taken from Source 15.

"In answer to your questions: (1) There have been no studies of transit integration completed to our knowledge, because of the one transit operation. (2) For the most part, the Arthur D. Little, Central City Transportation Project report on Dallas, is applicable."

Atlanta. The general manager of the Metropolitan Atlanta Rapid Transit Authority (MARTA) wrote to INTERPLAN as follows (Source 17):

"On February 17, 1972, the Metropolitan Atlanta Rapid Transit Authority purchased the Atlanta Transit System and made it the Operating Division of the Authority. MARTA was created by the legislature of the State of Georgia in 1965 as a public agency to provide public transportation services in the five-county metropolitan region.... Under our program, therefore, we have designed a completely integrated system and, also, MARTA will be the only significant public transportation operator in the region.

"Since we already have an integrated system in the Atlanta region, it is doubtful that we could contribute to your study effort as a host city."

Kansas City. Kansas City's Area Transportation Authority (ATA) recently integrated all city transportation systems. An ATA representative wrote to INTERPLAN that (Source 18):

"...the present transit system operation in the Kansas City Area Transportation District, a seven county, bi-state district, is a fully integrated system.

"All independent and private operations in the District were acquired by the Kansas City Area Transportation Authority. There is no other local mass transit operation here so on that basis I don't believe that Kansas City would be a prime candidate for the type of study which you will make."

Three other areas, Milwaukee (1.4 million), Denver (1.2 million) and Portland (1.0 million), indicated that they did not wish to participate in the study.

Milwaukee. The Milwaukee County Department of Transportation replied to INTERPLAN's initial letter as follows (Source 19):

"Our problem here is not one which concerns a lack of transit system integration. Rather, it is more a case of rising fares and decreasing ridership which eventually results in a curtailment of transit service.

"Hence, we feel there are many areas with more acute problems as they relate to integrating transit systems."

Denver. The Denver Regional Council of Government indicated that (Source 20):

"We are presently involved in continuing, comprehensive, and cooperative transportation planning at the Council of Governments in cooperation with the Regional Transportation District and the Colorado Division of Highways.

"I am sorry we cannot be of more assistance to you at the present time."

Portland. The general manager of the Tri-County Metropolitan Transportation District stated (Source 21):

"Under the sponsorship of the Columbia Region Association of Governments, with financial assistance from Tri-Met and Urban Mass Transportation Administration... [we are carrying out] a Regional Transit Planning Study in three interrelated parts as follows:

Part I - Development of a plan for the immediate implementation of improved bus service in the Portland-Vancouver metropolitan area

Part II - Development of a master transit plan adequate to serve the 1990 needs of residents of the Portland-Vancouver metropolitan area

Part III - Performance of a feasibility study for a multi-mode transportation terminal in downtown Portland

"Because this current study will give comprehensive coverage of transit systems within the Portland-Vancouver Metropolitan Area, it does not appear that this area

would be a logical choice for the demonstration project you describe."

The remaining nine areas appeared to have significant potential for transit integration. Due to pressures of time and to budget limitations, INTERPLAN was not able to give all of these areas equal attention. Those that were studied in depth were Seattle (1.4 million), San Diego (1.4 million), Miami (1.3 million), and New Orleans (1.0 million). Detailed reports on the existing transit systems, transportation planning, and potential for integration for the last three mentioned, as well as for Baltimore, Cleveland, and Los Angeles, are presented in Section 3. Section 6 is devoted to an even more detailed analysis of Seattle and recommendation for integration actions.

The SMSAs of Minneapolis-St. Paul (1.8 million), Cincinnati (1.4 million), Buffalo (1.3 million), Indianapolis (1.1 million), and Tampa-St. Petersburg (1.0 million) also present immediate potential for transit integration. Their needs are described briefly below.

Minneapolis-St. Paul. The Twin Cities Area Metropolitan Transit Commission describes its area's needs for integration as follows (Source 22):\*

"The MTC has encountered certain problems in providing suitable interfaces between MTC.- provided services and services provided by private operators. Where interfaces between public and private fares, routes, and schedules have not been satisfactorily resolved, we are continuing to try to reach agreed-upon solutions.

"We are also concerned with proper interface between transit modes in our long-range transit planning."

Cincinnati. This area is served by a single bus operation. The planning authority and the local bus operator have considered the problems of integration and have already carried out some related studies.

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\*In a letter dated February 20, 1973, Mr. Jamieson indicated renewed interest in INTERPLAN's study and reported the adoption of a Transit Development Program which "puts together various technologies through staged development and balanced financing from various transit and highway funding programs."

The city would be interested in further efforts in this direction and offered to serve as a demonstration site.

Buffalo. Buffalo is currently planning for the construction of rail rapid transit, but there are serious funding difficulties at the city and state levels. Recently, the voters turned down a proposed bond issue for rapid transit.

The two important authorities in Buffalo are the Niagara Frontier Authority, which controls the airport, docks and shipping facilities, and the City Transportation Authority, which is now planning to acquire all buses in the city.

Highways are under the authority of the Department of Transportation of the State of New York. Relations between the New York Department of Transportation and Buffalo are remarkably strained.

Indianapolis. Mr. M. Carroll, Director of the City of Indianapolis, stated the interests and plans of this area as follows (Source 23):

"With the current progressive downtown rebuilding program the City of Indianapolis is undertaking and the recently authorized acquisition of Union Station for transportation and other purposes, we are looking for a transportation center which will efficiently 'mix' all modes in a well-designed environment. Union Station has the potential for such an experiment. Transportation modes currently under study include: automobile; rail rapid transit; bus rapid transit; downtown distribution jitney system and a second level pedestrian walkway system.

"We do not have any single study on transit mode integration per se. However, the following studies collectively lead in that direction. A joint land development project has been proposed and adopted by the Marion County Transportation Council for the North Leg of the Inner Loop Freeway. Park 'n' Ride facilities were proposed for the bus rapid transit system developed by the Indianapolis Regional Transportation and Development Study. A combined jitney and pedestrian walkway system was developed by a local urban design firm for the Central Business District. A demonstration of dual-mode vehicle has been tested. A rail rapid transit link

between Union Station and Weir Cook Airport is currently under investigation.

"We believe that inter-modal transfers at a convenient point such as Union Station will work. Downtown Indianapolis will stand to benefit substantially from such a transit integration demonstration project as described in your work statement."

Tampa-St. Petersburg. The Tampa Bay Regional Planning Council reports (Source 24):

"Tampa Transit, which was previously a privately operated franchise system, has now been acquired by the City of Tampa and is a public system. Clearwater Transit, which is currently a privately operated franchise system, is to be purchased in the near future by the Central Pinellas Transit Authority under an UMTA grant received for this purpose, as well as to acquire additional bus equipment to initiate improved bus service in that area."

Three studies have recently been initiated to evaluate transit needs in three subregions, and these will be coordinated into a "consolidated region-wide short-range transit improvement program."

SMSAs WITH LESS THAN ONE MILLION POPULATION. Because of their special interest in this study, the areas of Hartford (0.7 million) and Honolulu (0.6 million) were included even though they fell below the population cut-off point. The following sections briefly describe their potential for transit integration.

Hartford. The Connecticut Department of Transportation, which indicated its interest to UMTA in having Hartford included in the study, told INTERPLAN that (Source 25):

"The most critical problem today is the lack of working Transit Districts. The Districts have the capability of integrating transit operations since, due to recent legislation, the Transit Districts have many of the regulatory powers of the Public Utilities Commission. A Transit District exists in Hartford, but it is resisting a financial commitment that Connecticut DOT feels is necessary for a politically balanced organization."



"The State is strongly encouraging the formation of more Transit Districts. Through cooperation among the Transit Districts, the Regional Planning Agency, the municipalities, and the State Department of Transportation, a more integrated transit system is anticipated."

No response was received from Hartford itself. INTERPLAN believes that the problem of the Connecticut DOT deserves UMTA attention, but this problem falls outside the purpore of the present study.

Honolulu. The Department of Traffic of the City and County of Honolulu reported that it has completed the acquisition of the city bus company, Honolulu Rapid Transit Company, and two suburban carriers, thus achieving institutional integration of transit services in this metropolitan area.

The city has plans to construct a rail rapid transit system, making it a prime candidate for intermodal integration. UMTA has already recognized this potential by awarding an \$87,800 grant "for initial planning, budgeting, and preparation enabling Honolulu to become a demonstration city in the UMTA Intermodal Integration Program." (Passenger Transport, April 27, 1973).

## FURTHER INVESTIGATION OF 17 METROPOLITAN AREAS

### Areas Selected for Study

On the basis of the initial investigation of 30 SMSAs, INTERPLAN selected for further study 17 SMSAs where there was felt to be immediate potential for transit integration and where the cooperation of local transit agencies and operators essential to the study could be expected. Table 5 lists these areas and shows their distribution with regard to population size and geographical location.

### Methodology

Four methods were used to develop further information about the integration needs of these 17 SMSAs:

1. Literature search and review of data supplied by local agencies
2. Questionnaires

Table 5. Seventeen SMSAs selected for further study.

	Location
<b>Over 4 Million Population</b>	
1. Los Angeles	West Coast
2. Chicago	Midwest
3. Philadelphia	East Coast
<b>2-4 Million Population</b>	
4. San Francisco-Oakland	West Coast
5. Baltimore	East Coast
6. Cleveland	Midwest
<b>1-2 Million Population</b>	
7. Minneapolis-St. Paul	Midwest
8. Seattle-Everett	Northwest
9. Cincinnati	Midwest
10. San Diego	West Coast
11. Buffalo	Northeast
12. Miami	South
13. Indianapolis	Midwest
14. New Orleans	South
15. Tampa-St. Petersburg	South
<b>Less Than One Million Population</b>	
16. Hartford	Northeast
17. Honolulu	Pacific

3. Wish lists

4. Field investigation in selected SMSAs.

LITERATURE SEARCH. A complete listing of the literature examined will be included in the bibliography, to be presented in the final report. In addition to printed literature, the numerous letters written to INTERPLAN in response to its preliminary and specific inquiries serve as an important source of information. Where appropriate and applicable, quotations from these letters are given in the text. As discussed above, these letters formed the primary data base for INTERPLAN's decisions concerning which SMSAs should be studied further. Most of the important letters and source documents are included in the sources cited in this report, listed at the end of each section.

QUESTIONNAIRES. A questionnaire was designed to supplement INTERPLAN's information on 17 SMSAs showing interest in transit integration. A copy of this questionnaire is included in Appendix C. Recipients of the questionnaire generally fell into one of the following categories:

1. The head of a city or area planning department, or an individual previously contacted by INTERPLAN who works within that department.
2. The head of a city or area transportation planning department or an individual previously contacted by INTERPLAN who works within that department.
3. The field representative of the U.S. DOT as designated by UMTA's Technical Studies Personnel, where applicable.
4. The head, director of research, or field representative of the State DOT, where applicable.
5. The head of a transit company within an area, and/or the chief of planning.
6. The area specialist in the Technical Studies Section of UMTA.

Four major topics were covered in the questionnaire:

1. The city and its transportation region
2. Urban transportation
3. Existing public transit
4. Potential for transit integration

Before mailing copies of the questionnaire to the various planning agencies and transit operators, INTERPLAN's staff used data available from literature and previous communications to answer as many questions as possible for each area. The partially completed questionnaires were then duplicated and sent out to the 17 areas. This preliminary completion of questions by the study team was meant to relieve respondents from reviewing data, both statistical and textual, which had previously been made available to INTERPLAN. This was explained in the questionnaire's formal cover letter.

In spite of INTERPLAN's assistance in answering the questions, most respondents were slow in returning completed questionnaires. Some never responded, despite prior assurances during the preliminary inquiry phase that they would be happy to do so. Others clearly could not find time to do justice to the questionnaire.

The responses to these questionnaires have been tabulated and the findings organized for use in future more detailed studies.

**WISH LISTS.** In addition to the questionnaire, a wish list was mailed to the heads of all transit companies in the 17 SMSAs surveyed. A copy of the wish list is included in Appendix C. Its purpose was to elicit local opinions on the priority of improvements in local transit operations, as well as suggestions on the specific basic needs of the transportation region.

As in the case of the questionnaires, wish list respondents were slow in returning the completed forms, and many failed to reply at all. In analyzing those responses which were received, it is essential to note that answers were likely to be carefully expressed since respondents were aware that their views would be transmitted to UMTA. This phenomenon manifested itself in the toning down of statements, or in the ignoring of questions which were politically controversial at the local or federal level.

The responses on the wish lists have also been tabulated for use in future studies.

**FIELD INVESTIGATIONS.** Nine SMSAs were selected for field investigation, since time and cost limitations did not permit members of the study team to visit all 17 of the areas showing immediate potential for transit integration. Three criteria were used in the selection: population size, location, and familiarity with the area on the part of INTERPLAN staff and consultants. Prior knowledge of transit operations and of plans derived from other transportation studies was particularly helpful, as well as previous contacts with key personnel in local transit planning and operating agencies. Table 6 lists the nine SMSAs visited for field investigation and shows their distribution in population size and geographical location.

Table 6. Nine SMSAs selected for field investigations.

	Geographical Location
<b>Population Over 4 Million</b> 1. Los Angeles 2. Philadelphia	West Coast East Coast
<b>Population Between 2-4 Million</b> 3. San Francisco 4. Baltimore 5. Cleveland	West Coast East Coast Midwest
<b>Population Less Than 2 Million</b> 6. Seattle 7. San Diego 8. Miami 9. New Orleans	Northwest West Coast South South

For each of the nine SMSAs visited, a profile was prepared. These profiles are concise summaries of data on the central city and its transportation region, transportation planning in the area, existing public transit, and the current state of transit integration. Profiles for the metropolitan areas of Baltimore, Cleveland, Los Angeles, Miami, New Orleans, and San Diego are included in Section 3, while more detailed profiles for Philadelphia, San Francisco, and Seattle are presented in Sections 4, 5, and 6 respectively, along with proposed demonstration projects for those three areas.

A summary of INTERPLAN's investigation of the 30 major metropolitan areas is presented in Table 7.

## SELECTION OF THREE REPRESENTATIVE AREAS

### Criteria for Selection

Philadelphia, San Francisco, and Seattle were selected to serve as representative U.S. urban areas to which European approaches to transit

Table 7. Summary of INTERPLAN's investigation of 30 major metropolitan areas.

Rank in 1970	Standard Metropolitan Statistical Area	1970 Population (1,000)	Public Transit Systems in Operation						Total Systems	Letter of Inquiry Sent	Reply Received	Questionnaires Sent	Field Investigation	Need and Potential for Integration	Evaluation of Potential for Demonstration
			Systems in Planning Stage	Other	Ferry	Commuter Rail	Bus	Rail Rapid Transit							
A. SMSA's with population of 1,000,000 and over:															
1	New York, N.Y. (Tri-State)	11,572	39	4	31	4	11	x	Fare-box level integration only is possible in the short run.	No	No	Greatest in the USA.	Problems too complex for feasible demonstration at this stage.		
2	Los Angeles—Long Beach, Ca.	7,032	32		32			x	Wants interagency cooperation.	Yes	Yes	Very great, especially in the field of public-private transportation.	Problem too complex for demonstration at this stage.		
3	Chicago, Ill.	6,979	28	1	18	9		x	Interest of Transit Carriers Coordinating Committee.	Yes	No	Second greatest potential after N.Y.	Potentially very great.		
4	Philadelphia, Pa.—N.J.	4,818	12	2	8	2		x	Strong interest.	Yes	Yes	Very great.	Good potential for operational demonstration		
5	Detroit, Mich.	4,200	8		6	2		x	Integration studies under way. No interest at this time.	No	No	It is likely to be great.	Not at this time.		
6	San Francisco—Oakland, Ca.	3,110	17	1	13	1	2	x	Needs integration. Some studies under way.	Yes	Yes	Great. May be achieved earlier than in N.Y. and Chicago—under local study.	Good potential for London-type merger.		
7	Washington, D.C.—Md.—Va.	2,861	7	1*	4	2		x	Integration studies under way. No interest now.	No	No	Great. Could be achieved relatively quickly.	Not at this time.		
8	Boston, Mass.	2,754	33	1	30	2		x	No response.	No	No	Very great potential.	Not sufficient local interest.		
9	Pittsburgh, Pa.	2,401	4	1	1	2		x	No response.	No	No	All services integrated under Port Authority.	Not sufficient local interest.		
10	St. Louis, Mo.—Ill.	2,363	1		1			x	Integration achieved. No interest.	No	No	Possible for operational and technical integration with para-public.	Not sufficient local interest.		
11	Baltimore, Md.	2,071	3		3			x	Strong interest.	Yes	Yes	Great for operational and technical integration with para-public.	Good long-range potential.		
12	Cleveland, Ohio	2,064	8	2	6			x	Interest of local operators and planners.	Yes	Yes	Great at institutional, operational and technical levels.	Expect large T-9 grant to study integration. Demonstration not needed.		
13	Houston, Texas	1,985	1		1			x	No response.	No	No	Possible for operational and technical improvements.	Not sufficient local interest.		

Table 7. (cont'd)

Public Transit Systems  
in Operation

Rank in 1970	Standard Metropolitan Area	1970 Population (1,000)	Total Systems	Rail Rapid Transit	Bus	Commuter Rail	Ferry	Other	Systems in Planning Stage	Letter of Inquiry Sent	Reply Received	Questionnaires Sent	Field Investigation	Need and Potential for Integration	Evaluation of Potential for Demonstration
14	Newark, N.J.	1,857	(Included in New York)						RRT	x	Integration being studied.	Yes	No	Under local study.	Not at this time.
15	Minneapolis—St. Paul, Minn.	1,814	6	6							Only one operator.	No	No	Possible for operational and technical improvements.	Not at this time.
16	Dallas, Texas	1,556	1	1	5	6			RRT	x	Needs integration of ferry with urban and suburban buses.	Yes	Yes	Great, including integration with para and private modes.	Good potential for Hamburg-type association.
17	Seattle—Everett, Wash.	1,422	12	1					RRT	x		No	No	Not studied. Possible needs for operational and technical improvements.	Not at this time.
18	Anaheim—Santa Ana—Garden Grove, Ca.	1,420	(Included in Los Angeles—Long Beach)									No	No	Not studied. Possible needs for operational and technical improvements.	Not at this time.
19	Milwaukee, Wis.	1,404	2	2						x	Not interested in integration at present.	No	No	Because of MARTA likely to be great.	Not at this time.
20	Atlanta, Ga.	1,390	1	1					RRT	x	Fully integrated bus-rail system achieved.	No	No	May be significant for physical integration.	No information received as yet.
21	Cincinnati, Ohio—Ky.—Ind.	1,385	1	1						x	City is interested.	Yes	No		
22	Paterson—Clifton—Passaic, N.J.	1,359	(Included in New York)												
23	San Diego, Ca.	1,358	4	4					RRT	x	Interest in integrating proposed RRT system with bus.	Yes	Yes	Very great, especially in the field of public-para-private transportation.	Needed later when RRT system is developed.
24	Buffalo, N.Y.	1,349	4	4	4				RRT	x	Strong interest.	Yes	No	Likely to be great.	Good long-range potential for demonstration.
25	Miami, Fla.	1,268	4	4	4					x	Needs integration. Studies under way. Strong interest.	Yes	Yes	Especially great for public-para-private integration with special reference to airport access.	Good long-range potential for demonstration.
26	Kansas City, Mo.—Kansas	1,254	1	1					RRT	x	Integration already achieved.	No	No	Possible for operational and technical improvements.	Not at this time.
27	Denver, Colo.	1,228	4	4						x	Transit study now under way.	No	No	Likely need for operational and technical improvements.	Not at this time.

Table 7. (cont'd)

Rank in 1970	Standard Metropolitan Statistical Area	1970 Population (1,000)	Public Transit Systems in Operation						Reply Received	Questionnaires Sent	Field Investigation	Need and Potential for Integration	Evaluation of Potential for Demonstration
			Total Systems	Rail Rapid Transit	Bus	Commuter Rail	Ferry	Other					
28	San Bernardino—Riverside—Ontario, Ca.	1,143	(included in Los Angeles)					Long Beach					
29	Indianapolis, Ind.	1,110	6					x Needs integration. Interested.	Yes	No	May be significant.	More information needed.	
30	San Jose, Cal.	1,065	(included in San Francisco)					Oakland	Yes	Yes	Great for integration of public-para-private modes.	Good long-range potential.	
31	New Orleans, La.	1,046	6	4	4	2		x Needs integration. Interested.	Yes	No	Significant, including over-the-water modes.	Good long-range potential.	
32	Tampa—St. Petersburg, Fla.	1,013	4	4				x Integration achieved through merger of principal systems.	No	No	Possible for operational and technical improvements.	Not at this time.	
33	Portland, Ore.—Washington	1,009	3	3				x Strong interest of CONN-DOT to integrate transit districts statewide.	Yes	No	Need for statewide operational and technical integration.	Statewide problem needs assistance under other UMTA programs.	
36	Hartford, Conn.	664	1	1				x Strong interest.	Yes	No	May be significant.	Further investigation needed.	
53	Honolulu, Hawaii	629	1	1									

a. Smaller SMSA's of special interest:

\*Under construction.



integration could be applied. Four criteria were used. The most important was that each area provided an opportunity to apply different European methodologies for achieving integration. The second criterion was that each area should present problems in both intermodal and interagency integration. The last two criteria were that each should represent a different population size group among the major SMSAs, and that so far as possible they should be located in different parts of the United States. Table 8 shows how the three representative areas meet these criteria.

Table 8. Rating of three representative cities by four selection criteria.

Area	Type of European Approach to Integration	Type of Integration Potential		Location and Population
		Inter-Modal	Inter-Agency	
Philadelphia	Specific techniques for operational integration	X	X	Eastern Central 4.8 million
San Francisco	Open choice between London (Paris) or Hamburg (Munich) examples of institutional and operational integration	X	X	West Coast 3.1 million
Seattle	Hamburg example of institutional integration	X	X	Pacific Northwest 1.4 million

The emphasis in the remainder of this volume on San Francisco, Philadelphia and Seattle does not imply that valuable demonstrations cannot be undertaken in other urban areas. Table 7 (page 39) shows that several other cities have high potential for such demonstrations. Table 23 of Volume 1 shows that these cities include Baltimore, New Orleans, Cleveland, Miami, Tampa, Honolulu, Atlanta, and Washington, D.C. While INTERPLAN believes that the three cities analytically selected have, at present, the highest potential for success, it must be recognized that the transit scene is in a state of flux, changing with every additional UMTA capital

or RD&D grant (as in Honolulu) completed technical study (as in Cleveland), or change in local transit management personnel. INTERPLAN recommends that in its centralized planning of transit integration demonstrations, UMTA bear in mind the potential of cities with high integration potential other than the three emphasized in this report.

TYPE OF EUROPEAN APPROACH TO INTEGRATION. A proposed approach to transit integration is outlined in Sections 4-6 for each of the three areas, incorporating some of the successful features of current public transit operations in the ten European cities described in Volume 2, particularly London, Hamburg, Paris, and Munich. In Philadelphia, where a certain degree of institutional integration has already been achieved, a series of specific activities in operational integration is proposed. For San Francisco it is suggested that three public transit agencies with overlapping taxing jurisdictions should be combined into a single transit district, adopting certain organizational and operating characteristics of London Transport or Paris RATP to the local situation, and/or that a transit federation based on the Hamburg and Munich models be formed. For the Puget Sound Region it is suggested that a transit association be formed among several operators, including a state agency, a metropolitan government agency, and several private companies, to provide integrated intermodal service between the City of Seattle and residential areas across Puget Sound. Experience of the Hamburg and Munich Transit Federations in coordinating the transit operations of different levels of government as well as private companies has been drawn upon to suggest an appropriate division of functions between the central body and individual agency members.

In addition to outlining the possible integration approach, the section devoted to each urban area includes the following background information:

- A description of geographical features, population distribution and growth, regional economy and local political setting as they affect the development of transportation.
- A review of local efforts in transportation planning.
- A description of existing public transit services.
- An evaluation of prior and current attempts to achieve transit integration.

The choice of European approach to integration for the three cities is based on the applicability of that approach to that city, independent of superficial similarities between the American city and the city or cities in Europe where that approach has been followed. Nonetheless it is tempting to note such similarities. San Francisco, for example, is often referred to as the Paris of the U.S. because of a certain similarity in character, partly explainable by the numerous hills on which both cities are built and the natural beauty of their settings. San Francisco's new BART rail system is comparable to Paris' new regional express rail network (RER). On the other hand, the relations of BART, Muni streetcars, and SP commuter trains bear some resemblance to that among the streetcars and U- and S-Bahn in Hamburg and Munich prior to the federations' formations. Philadelphia bears some topographical, architectural, and configurational resemblance to London. While Hamburg is a larger city than Seattle, and the River Elbe is considerably narrower than Puget Sound, the two cities' industrial bases are not dissimilar (shipping, fishing, precise metal working) and both depend on regular ferry service.

#### TYPE OF INTEGRATION POTENTIAL.

Intermodal. All three cities present high potential for intermodal integration. Both Philadelphia and San Francisco are served by commuter and light rail, subway, streetcar, trolley and bus. Both areas are also in good position to experiment with solutions to the problems created by transit operations which cross municipal, county, and, in the case of Philadelphia, state lines. While Seattle does not presently have a rapid rail system, a demonstration which involves its ferry system will throw light on the interface problems between a bus mode and a high-density "corridor" mode.

Interagency. With regard to interagency integration potential, the greatest progress has been made in Philadelphia. A demonstration there which would concentrate on operational and physical (technical) problems could therefore be a good example of what can be achieved when many but not all institutional problems have been solved.

In Seattle, unification of two operators under Metro, approved by voters in September 1972 and operational since January 1, 1973, goes a long way toward meeting the requirements of institutional unity.\* Metro's willingness to cooperate with the state-operated ferry system also augurs well for the future of further institutional integration.

In San Francisco interagency integration is least advanced and therefore the potential is the greatest. While reaching an agreement will not be easy, the situation is considerably less complicated than in New York, Chicago or Boston. Also, the advent of BART has created pressure to coordinate its services with those of Muni, AC Transit and other operators in the Bay Area. The able leadership of the Metropolitan Transport Commission is a valuable asset in local efforts toward interagency integration.

#### Applicability of Experience to Other U.S. Cities

Philadelphia is a good example of a larger, older East Coast city. Its experience should be transferable to such cities as New York, Chicago, Washington, and Boston. Within the climate of the "Eastern establishment," this experience should be more easily digestible in these and other Eastern and Central cities than lessons coming directly from Europe or the West Coast.

San Francisco combines the elements of a pre-auto city and a rapidly growing West Coast metropolis. On the one hand a demonstration there would tend to confirm or disprove lessons from Philadelphia; on the other, it would shed light on problems associated with automobile-oriented cities such as Los Angeles, Detroit, Houston, and San Diego. Its location on the West Coast and its cosmopolitan nature, and the newness of its rapid rail system may provide a blend of wisdom, charm, and experience which would be particularly appreciated by cities within the West Coast sphere of influence.

Seattle, in the still pioneering Northwest, and with a population of only 1.5 million, would produce experience relevant to other not-so-large cities

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\*In March 1973 UMTA made a \$1 million grant available to Seattle to acquire one 91-bus fleet and other assets, and to refurbish 200 buses.

such as Minneapolis, Buffalo, Denver, Portland and Honolulu. Furthermore, because of its readiness to integrate, and the relative simplicity of its transit problems, Seattle could well act as a prototype of the Hamburg Transit Federation model in the U.S. From UMTA's point of view, Seattle could well serve as a model laboratory where all three ingredients of transit integration — institutional, operational and physical — could be tested, separately and jointly, under conditions of relative simplicity and in a climate of local willingness, competence, and relatively healthy transit operations. If a Seattle federation experiment were successful, then the more difficult cases of New York, Chicago and Boston could be tackled with more confidence.

#### TRANSIT INTEGRATION IN A SMALL URBAN AREA: MIDDLETOWN

There are 243 Standard Metropolitan Statistical Areas (SMSAs) in the United States. Of these, INTERPLAN was able to examine, albeit superficially, the thirty largest; within the scope of this study, only nine could be studied in some depth. It follows that more than 200 SMSAs were overlooked. While the most serious difficulties with public transportation in the U.S. occur in the 30 largest urban areas, UMTA's legal responsibility extends to all SMSAs and also to smaller "urban areas". INTERPLAN therefore felt that this study would be incomplete without an attempt to examine the problems and potential solutions in medium-sized and small cities.

Obviously an individual approach to every SMSA was not feasible. Therefore INTERPLAN examined in some depth the problems of public and para-transit in one city and verified its findings on the basis of more superficial surveys of a few other small cities. The composite picture which emerged was labeled "Middletown".

On the basis of the above work, an outline of a transport integration demonstration in Middletown was prepared. The demonstration is described in Section 7, which also contains a description of Middletown's transportation system. While some readers may recognize certain similar features in their own cities, two disclaimers are important:

1. Middletown is an unscientifically assembled composite of an "average" American medium/small city. It may still retain some "un-average" characteristics.
2. No true portrait of any specific city was intended. Any similarities to actual individuals, city institutions, transportation systems, or historical events is purely accidental.

While the Middletown example should give UMTA an idea of the type of demonstration(s) which may be conducted in small urban areas, it should be clear that the requirements and potential will be different in each individual city. On the basis of its work on Middletown, however, INTERPLAN believes that no significant deviations from the suggested demonstration plan should be expected.

### CHECKLIST OF TRANSIT INTEGRATION ACTIVITIES

In order to provide a single format for recording transit integration activities in the three U.S. cities and Middletown, INTERPLAN compiled a listing of integration activities. The major headings of this list are given in Table 9; the complete listing is given in Table 10 at the end of this section. A lengthy commentary covering individual items is provided in Appendix D.

The activities in the list are arranged by institutional, operational, and physical categories.\* They are further grouped according to the kinds of organizations which must cooperate to implement them (government agencies, operators, local businesses), and the status of the technology required (new or proven). Individual activities in the list may be mutually exclusive, such as flat fare or zonal fare systems, or they may be complementary, such as the various sources of financing indicated.

Most of the activities listed are those recommended for application. It was necessary, however, to include other items in order to use the list to fully describe the existing range of activities. These other items are starred in the list. They include undesirable items, such as token or cash fares and traffic control without bus priority; and items indicating lack of activity, such as no coordinating organization, no auto use policy, and no parking policy.

\*Definition and discussion of the concepts of institutional, operational, and physical transit integration can be found in Volume 1, Section 3, pp.27-47.

Table 9. Summary of categories of transit integration activities.

## INSTITUTIONAL

### Operator and City/County/State Planning Coordination

- Set up Regional Planning Coordinating Organization
- Requirements for Successful Demonstrations
- Set up Single Transportation Transit Planning Authority

### Operator/Operator Coordination

- Set up Coordinating Structure for Intra-region Public transit
- Set up Coordinating Structure for Out-of-region/Intercity Transportation

### Transit/Para-Transit Operator Coordination

- Set up Coordinating Structure

### Public Transit Financing Arrangements

- Sources for Financing Capital Investment Other Than Rolling Stock
- Sources for Financing Rolling Stock and Buses
- Sources for Financing Operating Costs

## OPERATIONAL

### Activities Requiring Coordination with City/County/State Agencies

- Auto Parking Policy in Major Activity Centers
- Auto Use Restriction Policy
- Traffic Management in Support of Public Transit

### Activities Requiring Coordination with Government Agencies and Local Businesses

- Changing Transit Demand Characteristics

### Activities Requiring Operator Coordination

- Basic System-wide Fare Structure
- Supplementary Policies on Fare Structure
- Fare Collection Procedures
- Coordinated Routes
- Coordinated Schedules
- Public Information System

## PHYSICAL AND TECHNICAL

### Activities Requiring New Technology and Coordination with Government Agencies

- Automated Operations

### Activities Requiring New Technology Which Can Be Adopted Directly By Operator(s)

- Automated Operations

### Activities Requiring Proven Technology and Coordination with Government Agencies

- Facility Provision

### Activities Requiring Proven Technology Which Can Be Accomplished By The Operator(s)

- Facility Provision
- Vehicle Acquisition
- Equipment to Aid Operations
- Operators' Pooling Agreements

Table 10 is set up to be used in evaluating existing and proposed transit integration activities in the four cities treated in this volume, and a completed version of the table is given at the end of each of the sections on these cities. The four columns across from the activities list are provided for indicating that (1) the activity is already in effect; (2) that it is proposed; (3) that it is not applicable; or (4) that it may eventually be applicable. Where both (1) and (3) are marked, present activity has been evaluated as inadequate or in need for improvement or revision (e.g., area transportation policy in Philadelphia). Different symbols have been used in these columns in the checklists filled out for the four cities to indicate that the activities are areawide or that they apply only to part of the system. Other column headings or special symbols could be devised if the listing were used for a different purpose.

The exhaustive nature of the listing is intended to make it useful both as a source of ideas and as a stimulus to further suggestions. For this reason, space is left at the end of the three major sections (institutional, operation, physical) for additional items not already included in the listing.

INTERPLAN feels that this checklist can be valuable in a number of ways beyond its use in this report:

- As a source of ideas for transit planners and operators;
- As a worksheet to be used during the planning and negotiating process;
- As a means of recording a final transit integration program or program proposal;
- As a means of recording programs of several cities on the same list for purposes of comparison.

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17. Letter to INTERPLAN from Alan F. Kiepper, General Manager, Metropolitan Atlanta Rapid Transit Authority, May 23, 1972.
18. Letter to INTERPLAN from P.S. Jenison, Director of Planning and Research, Kansas City Area Transportation Authority, February 22, 1972.

19. Letter to INTERPLAN from E. R. Vogel, Traffic and Transit Engineer, Transportation Division, Department of Public Works, Milwaukee County, May 9, 1972.
20. Letter to INTERPLAN from David A. Pampu, Chief Planner, Denver Regional Council of Governments, April 20, 1972.
21. Letter to INTERPLAN from Thomas S. King, General Manager, Tri County Metropolitan Transportation District of Oregon, March 24, 1972.
22. Letter to INTERPLAN from John R. Jamieson, Director of Transit Development, Twin Cities Area Metropolitan Transit Commission, December 21, 1971.
23. Letter to INTERPLAN from Michael A. Carroll, Director, Department of Metropolitan Development, City of Indianapolis, May 10, 1972.
24. Letter to INTERPLAN from Scott D. Wilson, Chief Regional Planner, Tampa Bay Regional Planning Council, March 8, 1972.
25. Letter to INTERPLAN from F.E. Coleman, Chief, Transportation Planning, Department of Transportation, State of Connecticut, August 3, 1972.

Table 10. Checklist of transit integration activities.

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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INSTITUTIONAL

OPERATOR AND CITY/COUNTY/STATE PLANNING COORDINATION:

Set up Regional Planning Coordinating Organization

Legislated county/area commission for all regional planning				
Formally constituted and appointed independent committee				
Ad hoc coordinating regional planning committee with effective financial support and power to make recommendations				
*No coordinating agency for all regional planning				

Requirements for Successful Demonstrations

Thorough area trip demand study				
Formulate area transportation policy including goals for public transit				
Redefine public transportation region (e.g. extend transit district boundaries, etc.				

Set up Single Transportation/Transit Planning Authority

Agency responsible for planning and financing all regional transportation activity				
Agency responsible for overall planning, licensing and financing of all regional public transportation				
Transit district or single publicly owned operator handles public transit planning				
*No single public transit planning authority (individual operators or their associations handle public transit planning under either open competition or area franchise).				

OPERATOR/OPERATOR COORDINATION

Set up Coordinating Structure for Intra-Region Public Transit

Single regional operator for all public transit (by merger or transit district legislation)				
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\*All unstarred items are recommended integration activities. Starred items are included to complete the coverage of the list for evaluating existing program status.

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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One major operator, several smaller ones			
Transit federation			
Transit community (separate agreements for joint tariff on routes, coordinated routes and schedules, some pooling)			
Tariff association (joint tariff and revenue distribution agreements)			
Route and schedule coordination agreements			
*No regional coordinating organization			

Set up Coordinating Structure for Inter-City Transportation

Out-of-region operator participation in intra-regional coordinating organization			
Coordinating committee of operators			
Coordinating agreements between individual operators (e.g. airport or airlines, Greyhound and transit district)			
Responsibility allocated internally within intra-area operator(s) for planning coordination with out-of-region/intercity demand			
*No comprehensive approach to considering out-of-region trips			

TRANSIT/PARA-TRANSIT OPERATOR COORDINATION

Set up Coordinating Structure

Para-transit operator participating in intra-regional coordinating organization			
Coordinating committee of operators			
Coordinating agreements between individual operator(s)			
*No coordinating organization			

PUBLIC TRANSIT FINANCING ARRANGEMENTS

Sources for Financing Capital Investment Other Than Rolling Stock

Revenue from fares			
Bond issue			

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Stock issue				
National loans				
Other debentures				
State grants				
National grants				
Specially designated local tolls				
Specially designated local sales taxes				
Specially designated local property taxes				
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes				
Parking and park-and-ride fees				
Revenue from other services, e.g. leases of land and air rights, advertising				
Leasing arrangements (transfer to operating costs)				

Sources for Financing Rolling Stock and Buses

Revenue from fares				
Bond issue				
State loans				
Federal loans				
Other debentures				
State grants				
Federal grants				
Specially designated local tolls				
Specially designated local sales taxes				
Specially designated local property taxes				
Specially designated local other charges or taxes				
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes				
Equipment trust funds				
Revenue from other services				
Leasing arrangements (transfer to operating costs)				

Sources for Financing Operating Costs

Revenue from fares				
Specially designated local tolls				

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Specially designated local sales taxes			
Specially designated local property taxes			
Specially designated state tax other than license or fuel taxes			
State motor vehicle operator licensing fees			
State motor fuel taxes			
Revenue from other service			

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please describe)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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OPERATIONAL

ACTIVITIES REQUIRING COORDINATION WITH CITY/COUNTY/STATE AGENCIES

Auto Parking Policy in Major Activity Centers

Control of parking by higher charges				
Control of parking by graduated charges by distance from CBD or major activity center				
Control of parking by time of day restrictions				
Control of parking by street space restrictions				
Control of parking by open lot space restrictions				
Control of parking by in-building space restrictions				
Encourage short-term parking and discourage long-term parking				
*No significant parking policy				

Auto Use Restriction Policy

User charges, taxes, tolls, road pricing, etc.				
Restriction of auto use by zone (auto-free areas)				
Restriction of auto use by time (auto-free areas); supplementary licensing, etc.)				
Restriction of automobile flow by traffic restraint schemes				
*No policy on auto use				

Traffic Management in Support of Public Transit

Total centralized traffic control within major activity centers				
Signal synchronization				
Bus priority system at signals				
One-way streets planned for transit flow				
Reserved lanes for auto and bus use by time of day				
Reserved lanes for car pool and bus use by time of day				
Reserved lanes on city streets for bus only use by time of day				
Reserved lanes on city streets for bus only use all day				
Reserved streets for bus only use				
Reserved streets for minibus use and pedestrians				

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Bus stop locations chosen for transit and vehicle flow improvement				
Offstreet docks for landing/unloading				
Parking restrictions to aid transit flow				
Exclusive freeway lanes				
Reserved bus ramps for freeway entry and exit				
*No consideration by local authority of impact of motor vehicle flow on public transit				

ACTIVITIES REQUIRING COORDINATION WITH GOVERNMENT AGENCIES AND LOCAL BUSINESSES

Changing Transit Demand Characteristics

Staggered work hours				
Sliding work hour system (flexitime)				
Encourage extended shopping hours				
Encourage multi-use development of major activity areas (office, shops, entertainment, apartments)				
Encourage public transit user shopping trip orientation among merchants				

ACTIVITIES REQUIRING OPERATOR COORDINATION

Basic System-wide Fare Structure

Zonal fare system				
Distance-graduated fare system (or time-on-system related)				
*Fare set by number of transfers				
*Flat fare system				
*Nominal fare system				
*Free fare system (no fare)				
Unlimited number of free transfers between routes of single mode only (restricted by time:				
interoperator				
intraoperator				
Unlimited number of intermodal free transfers:				
interoperator				
intraoperator				



Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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OPERATIONAL (continued)

Limited number of free transfers between routes of single mode:				
interoperator				
intraoperator				
Limited number of intermodal free transfers:				
interoperator				
intraoperator				
*No free transfers				

Supplementary Policies on Fare Structure

Special rates for socio-economic groups				
Special rates by time of day (off-peak, night)				
Special rates by area of city (e.g. flat rate in CBD)				
Special rates by part of week (e.g. Sunday)				
Special rates by type of trip (e.g. tourist)				
Daily system passes				
Intermodal single trip combination passes				
Seasonal passes				
Free return trip in off-peak hours				
*No supplementary policy on fares				

Fare Collection Procedures†

*Token system				
Scrip system (tickets)				
*Cash system				
*Exact fare system				
Pass system (including commuter rail)				
Honor system (including commuter rail)				
Tickets sold on vehicles: Buses				
Light Rail				
Tickets sold off-vehicles: Buses				
Light Rail				
Automated machines on or off vehicles (including commuter rail)				
Driver collects fare				
Conductor collects fare				
*No fare				

†Excludes commuter rail except as noted



OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Intermodal (with commuter rail) connection schedule coordination				
Rider oriented headways (reduced to no more than 15-20 minutes)				
Rider oriented schedule times (easily memorized)				
Out-of-region/intercity demand schedule coordination with airport				
Out-of-region/intercity demand schedule coordination with mainline railroad service				
Out-of-region/intercity demand schedule coordination with buses (Greyhound)				
Extend service times (into night hours)				

Public Information System

Produced easily understandable and available system-wide schedules with routes, route maps and fares				
Schedule information at bus stops				
Route maps at most stops				
Route maps on vehicles				
Labeling of stops and vehicles				
Public relations program				
System-wide information near fare collection areas				
System-wide information on rapid transit train platform				
Clearly labeled information areas in stations				
Multi-lingual information provision				

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please Describe)

PHYSICAL AND TECHNICAL

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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ACTIVITIES REQUIRING NEW TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Automated Operations

Computerized traffic control with bus locator				
Freeway ramp metering				
*Computerized traffic control, no transit priority				
Bus priority control equipment				

ACTIVITIES REQUIRING NEW TECHNOLOGY WHICH CAN BE ADOPTED BY OPERATOR(S)

Automated Operations

Automatic train operation				
Dial-a-ride				
Bus operation control with bus locator and radio communication				

ACTIVITIES REQUIRING PROVEN TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Facility Provision

Grade-separated busways				
New and converted park-and-ride lots				
Park, ride, and shop lots near the CBD				
Pedestrian walks (sidewalks) and bicycle paths				
Extension of pedestrian malls				
Off-street loading/unloading docks				
Grade-separated pedestrian crossing				

ACTIVITIES REQUIRING PROVEN TECHNOLOGY WHICH CAN BE ACCOMPLISHED BY THE OPERATOR(S)

Facility Provision

Intermodal terminals				
Pedestrian facilities (escalators, moving sidewalks) in terminals				
Bus shelters				
Benches at bus stops				
Bike locks at bus stops				



SECTION 3  
 PROFILES OF SIX METROPOLITAN AREAS

BALTIMORE

The City and Its Transportation Region

Baltimore, with a city population of 895,000 and an SMSA of 1,580,000, is the fourteenth largest urbanized area in the United States. It is an important center, located between Philadelphia and Washington, on the north-east transportation corridor. The city population density is 12,000 per square mile. The metropolitan area is located on an arm of the Chesapeake Bay, and has 80 square miles of land and 13 square miles of water. Its harbor is the third largest in the United States. The area includes Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties, as well as Baltimore City. The projected population growth is shown in Table 11.

Table 11. Projected population growth in the Baltimore region, 1965-1985.

	1965	1985	Increase 1965-1985	
			Number	Percent
Baltimore City	918,000	1,020,200	102,200	11
Anne Arundel County	254,600	534,300	279,700	110
Baltimore County	550,800	1,078,100	527,300	96
Carroll County	59,800	90,000	30,200	51
Harford County	96,300	168,000	71,700	74
Howard County	53,000	205,400	152,400	288
<b>TOTAL</b>	<b>1,932,500</b>	<b>3,096,000</b>	<b>1,163,500</b>	<b>60</b>

Taken from Source 1.

While the table indicates hopes for slow growth in the city, the decennial census revealed that the city had lost 45,000 residents between 1960 and 1970. In the same period, some 13,000 jobs disappeared, mostly in steel and other manufacturing. The relatively small net loss of 45,000 persons masked a drastic change in the social, racial, and economic make-up of the city's population. There was a net loss of 113,000 whites and a net gain of 102,000 blacks. The greatest decline occurred in the white,

age 25-44 group, that part of the population which had previously contributed most in terms of income, productivity, and municipal tax revenue. Offsetting this loss has been an increase in the very young, the very old, and the black those parts of the population which, at this point in time, are least likely to be contributing to the municipal revenues and most likely to require public services. In 1970, 16.6 percent of the city was over 64 and 46.4 percent was black.

Fourteen percent of the city residents of Baltimore are living below the poverty level, even though the median family income is \$8032 in the city and \$9594 in the SMSA. The economic bases for the area center about its harbor as well as steel and shipbuilding.

Information on routing is learned from the Center City Transportation Study (Source 2):

"The one major focus of all trips in the Baltimore area is the Baltimore CBD, which accounts for about 9 percent of all trips within the Baltimore study area of the 1962 State Roads Commission study, known as BMATS. Of all public transit trips in 1962, 26 percent were CBD oriented. These trips were generally generated from the northeast and northwest areas of Baltimore City. Non-CBD oriented transit trips are also concentrated in the west, northwest and northeast. Truck routes in general are oriented around the center city area, with the exception of the port and inner harbor areas. Other than these areas, and an area to the south, it appears that truck routes are provided over streets which insure maximum traffic flow to all vehicles."

For automobile users, curb parking is limited to 1000 spaces while off-street parking has 17,200 places. Typical parking rates in the CBD are \$.65 for the first hour, and \$.30 for each additional hour to a daily maximum of \$1.85. The monthly rate averages \$30.00. Park-and-ride facilities are in operation for bus users from east and west Baltimore.

### Transportation Planning

Regional transportation planning in Baltimore has involved a number of key groups: the Greater Baltimore Committee; the Baltimore Regional

Planning Council; the Baltimore City Department of Planning; and the Governor's Mass Transit Steering Committee. This last group faded out of existence because of the State Legislature's creation of the State Department of Transportation and the new Metropolitan Transit Authority (MTA). Currently all transit planning and operations in the Baltimore area are done by the MTA. Source 2 discusses the creation of the first MTA:

"The first MTA was created by the Maryland State Legislature in 1961, the original concept having evolved in the Greater Baltimore Committee, and having won the support of the city administration. (The Baltimore and Washington metropolitan areas are the most urbanized and most heavily populated areas in Maryland, and it should be noted therefore that their representatives have a lot of weight in the legislature.) The Enabling Act of 1961 gave the MTA these powers: regulation of fares, routes, schedules and other services of private transit companies within its jurisdiction; development of an overall mass transportation plan for the area; acquisition under certain conditions, and operation of private transit companies; entrance into agreements with transportation districts to acquire, build, or operate a transportation system; acquisition of property by eminent domain under certain conditions, and contracting with private companies to operate transportation systems. The principal underlying purpose of the act was to buy the Baltimore Transit Company, which the City could not afford to buy, and other transit companies serving the region. The conclusion had already been reached that transit as a privately operated service-for-profit was no longer economically viable. The MTA had powers similar to those of a regulatory agency, but it had no power to tax, and it did not acquire the Baltimore Transit Company."

In 1964, the MTA contracted with Parsons, Brinkerhoff, Quade and Douglas to conduct a two-phase study for a metropolitan rapid transit system. The results of the study were rejected by the MTA, and no recommendations were implemented. In the spring of 1967, the Governor's Mass Transit Steering Committee was formed. They commissioned, Daniel, Mann, Johnson and Mendenhall/Kaiser to do a transportation study. This study recommended a six-legged combined rapid transit and feeder bus system. The plan was basically acceptable. In May 1972, when a representative of INTERPLAN visited the City Department of Planning, the rail rapid transit system was in the stage of engineering design. Financial problems, including federal participation, did not appear to be resolved.



## Public Transit

The Metropolitan Transit Authority, under the management of ATE, Management and Service Company, is the major transportation company in the area. It primarily serves Baltimore City, but also extends into Baltimore County on several routes and provides 94 percent of all bus ridership service in the area, the remainder being supplied by four small companies. Until 1970, the MTA was in private hands under the name of the Baltimore Transit Company (BTC). Prior to the takeover, 25 percent of its stock was owned by the National City Lines, a large transit system holding company. Its objective was a short-term return on investment. Financial failure led to its subsequent buy-out by the city.\*

Transit ridership increased from a total of 99,366,263 in 1960 to 100,452,207 in 1970. Peak period requires three times as many vehicles as are used during base periods. Of the total number of riders on the MTA, 85 percent can be considered captive in that they do not drive or own an automobile.

According to Source 2:

"Major industrial areas, governmental agencies, the CBD, and residential communities are linked to one another and adequately covered by transit routes. Low income, high density residential centers appear to be well-served with service provided to major employment and industrial centers. Fringe areas extending into Baltimore County are served by the MTA system. Several outlying communities are served by the MTA as well as the suburban carriers which penetrate into the communities adjacent to Baltimore County. Most of the industrial areas now being built are beyond the Baltimore beltway.

"All lines except one, which enters the Baltimore center city and the CBD, are through routes. (Only one route entering the CBD is not a through route.) There are a number of crosstown routes which never enter the CBD at all but run completely within the center city. There are also crosstown routes which do not come within the center city. Crosstown routes account for about 25 percent of all CBD routes. About one-half of the crosstown routes are not self-supporting, while one or two are some of the heaviest lines.

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\* It is INTERPLAN's understanding that in 1971 and 1972, the MTA has been financially solvent, although the amount of profit, if any, depends to some extent on the way the company's present accounting system is interpreted. The ridership is increasing. Since the city took over the operations, the annual growth was said to be between 3 and 5 percent.

"Most of the crosstown routes wrap around two or three sides of the CBD forming a square. Some of these follow old street-car routes, or routes dating back even earlier. Narrow streets funnel out from the CBD in a starfish-like pattern.

"The suburban companies either serve the CBD directly or feed into the MTA system at the edges of Baltimore City. For riders who must change carriers to complete a trip, no inter-line transfer privilege is permitted, and they are required to pay a double fare. The lines are not scheduled for such transfers, and thus multi-carrier service is poor.

"The only use of park-and-ride exists in connection with an express service provided by the McMahon Transportation Company, from the Towson suburban community north of Baltimore to the CBD. This service was initiated as a MD-MTD-1 Federally funded demonstration project. It has been very successfully increasing ridership 63 percent in one year. It is now profitably operated by McMahon without subsidy.

"Demonstration project MD-MTD-3 was approved in July 1968 for execution by the MTA. This grant was to take inner city residents to outlying industrial areas not served by the BTC and is still in operation. The MTA, which technically went out of existence on June 1, 1969, gave the administration of the grant to the Baltimore City Department of Transit and Traffic. Currently this project is not paying for itself, but has created many new jobs for inner city residents. For this reason officials in the Department of Transit and Traffic feel it has been successful. One problem associated with this project is communication to potential users. Recently civil rights groups have been helping educate the residents on the availability of the service."

## Potential for Transit Integration

Unquestionably, when the rail rapid transit becomes operational, inter-modal integration will be most meaningful and rewarding. At the present time, the following three tasks occupy the management of the MTA: First, merger and takeover activities must be completed. Until 1970, there were nine small independent operators in addition to the BTC. Since then, most have been absorbed by the MTA and, according to Mr. Norman D. Hall, MTA Director of Operations, it is only a matter of time until the MTA has a monopoly of all local (bus) operations.\* Second, the internal efficiency of the MTA must be

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\*By May 1973, MTA had succeeded in acquiring six of the local bus operators (McMahon Transportation Co., Suburban Lines, Dundalk Bus Co., Ruxton Bus Lines, Baltimore & Annapolis Bus Co., and Lake Shore Bus Lines).

improved. Better utilization of equipment is an important goal, as well as enactment of the one-way "transit-only" street concept for morning and evening peak periods. The third task is the demonstration of express bus service between Annapolis and Baltimore after the private company now operating this route is absorbed by the MTA.

In the words of the writers of Source 2:

"Baltimore has come a long way toward planning and designing an effective mass transit system that is related to the growth and future of the region. This will have to include coordinated planning with the Washington area transportation agency, if and when that proves possible, since the two regions are growing closer together, and some areas, Anne Arundel and Howard Counties particularly, will be part of both metropolitan areas. The new community of Columbia in Howard County, for example, is mid-way between Baltimore and Washington and related to both.

"The implementation of the transit system will depend upon both the adequacy of the financing plan which the MTA evolves, the willingness of the people in the region to support and pay their share, and the willingness of the Federal government to share in the cost of the system.

"The important and encouraging thing about Baltimore, in addition to the fact that it has a transportation system planned, is that its business and political and planning leadership is enthusiastic about implementation and willing to back it with the public. Transit has a high priority in the area even though, as in so many other cities, Baltimore has many other difficult problems to cope with."

The recent consolidation of all transport functions within the State DOT has been an important first step. The second step was the formation of a consolidated transportation plan comprising all the activities connected with the harbor, highways, Baltimore (Friendship) Airport, as well as transit functions. Transit may be the greatest beneficiary of the plan.

## CLEVELAND

### The City and Its Transportation Region

The Northeast Ohio Areawide Coordinating Agency is the areawide review and planning agency for the seven-county transportation planning area surrounding Cleveland. This area includes three Metropolitan Statis-

tical Areas: Cleveland (including Lake, Geauga, Cuyahoga and Medina Counties with a total population of 2,064,194), Akron (including Summit and Portage Counties with a total population of 679,239), and Lorain-Elyria (Lorain County with a population of 256,843). The eighth largest city in the United States with a population of 750,903, Cleveland is the center of the greatest amount of transportational planning and innovation in the area.

A moderate growth rate characterizes the Cleveland area. While the Cleveland SMSA has increased in population from 1,909,483 to 2,064,194 between 1960 and 1970, the decrease in population from 876,053 in 1960 to 750,903 in 1970 in the City of Cleveland indicates a trend of population movement away from the center city. Roughly 30 percent of the population is under 16, and 10 percent over 64. Population density within the central city is 9893 persons per square mile in an area of 759 square miles. Within the SMSA, density is 1359 persons per square mile in an area of 1519 square miles.

21 Cities (Source 3) describes Cleveland's economy as steel-oriented, resulting from its location as an intersection for coal and iron ore shipments. The median income for the city is \$9107 and for the SMSA is \$11,407. Many of the industrial plants are in the suburbs, thus creating an intense transportation problem for inner city residents, dependent upon public transportation and reliant upon work at these outlying plants.

Downtown parking rates are typically \$.80 for the first hour, \$.50 for each additional hour, with a \$2.50 daily maximum and \$20 monthly rate. Unlike most cities, transit ridership has increased in the City of Cleveland between 1960 and 1970, although in the area as a whole riders have decreased from 1,117,561 to 1,074,525. Fifty-two percent of the trips occur between the peak hours of 7-9 a.m. and 4-6 p.m. Both park-and-ride and kiss-and-ride lots exist in Cleveland. Some CBD parking lots are privately owned and regulated, while others are municipal.

### Transportation Planning

The Cleveland Transit System (CTS) is the principal transit organization. Franchised to a private company operating entirely from the farebox,

it is currently suffering a decrease in ridership as well as severe service cutbacks, especially on weekend routes. Controlled by the Transit Board (a group appointed by the mayor), the CTS is the focus of an effort to create a regional transit system.

Transportation planning is facilitated by several communitywide government organizations. The Northeast Ohio Area Coordinating Agency (NOACA), mentioned in Section 2, is one review and planning agency. However, it is a relatively ineffective agency, in search of new leadership. Representatives of various transit companies in the area have recently established an Areawide Mass Transit Subcommittee (a part of NOACA) serving as a forum for problems concerning the coordinated planning and operations of transit already existing independently. Much of the initiative for the transportation projects now underway in the center city is the result of the Cleveland Transportation Action Program. Its action orientation is directed toward development of improved processes for the movement of people and goods in the center city.

### Public Transit

The CTS operates both bus and rail rapid transit services. The rail rapid system has recently opened a new, highly successful extension to the airport. In addition to the CTS, seven other major transit systems exist in the seven-county area which operate buses only. Five of these are public; two are private. An estimated 52 percent of people entering the CBD do so by public transit.

### Potential for Transit Integration

Passengers fear integration. This fear stems from a belief that an integrated system will be followed by service deterioration and fare increases. Loss of local control is construed by them to be a means whereby suburban revenues are used for offsetting inner-city revenue losses, thus unduly taxing the commuter.

The public tends to evaluate transit systems solely on farebox revenue. Passengers tend to be service-oriented, demanding both a high level of com-

fort and frequent service, even though patronage is not regular. This creates either financial burdens if their demands are met, or public dissatisfaction if companies operate within reasonable financial constraints.

Agencies see other impediments to integration. The regional agency has little power to raise funds to subsidize integration activities. With no financial incentive for operators to initiate integration, it will be an extremely slow process to achieve it.

Operators are concerned with the issue of control if integration is achieved. Furthermore, since employees of the different transit companies receive a variety of different wages and benefits, integration would require a considerable expenditure by some of the transit companies in order to raise employees' rates of pay to uniform level. However, interest in innovations by all transit companies, especially the CTS, is presently on an upswing.

A recent technical studies grant from UMTA is a current advantage. Its approval should enable the seven-county area to create a coordinated system. To quote a representative of the CTS in answer to INTERPLAN's questionnaire (Source 4):

"Ideally, the many transit operations that presently exist in the region should be combined into one unified system. However, politically this will not happen for a long time if ever. Therefore, at best, we must strive for a truly coordinated system, involving several operating entities, operating under a single umbrella authority."\*

## LOS ANGELES

### The City and Its Transportation Region

The City of Los Angeles, with a 1970 population of 2,813,000 people, is the heart of a metropolitan region that is often considered to extend over 38,528 square miles, six counties, and eight SMSA's, and to contain over 10 million people. The City of Los Angeles is, however, only one of 77 incorporated cities in the County of Los Angeles and 106 cities in the

\*A February 14, 1973 letter from David Goss, Project Manager, 5 County Transit Study, reiterates that "very little effective transit coordination can be achieved in the Cleveland area until a subsidized area-wide authority becomes a reality." He also reports that a task force of the Study has identified implementation of an area-wide information system as a top priority activity that is both doable—given present conditions—and highly visible to the public."

region, although it comprises 41 percent of Los Angeles County's total population. The region's population center is clearly the County of Los Angeles, with a 1970 population of 7,030,000 or 70 percent of the region's total. Orange County is located directly to the south, Ventura County to the North, and Imperial, Riverside and San Bernardino Counties to the Southeast.

Los Angeles is an automobile-oriented city with a modal split of less than 2 percent. The entire Los Angeles region has developed along radial corridors, represented now by busy and congested freeways. This radial development, coupled with increasing dependence on the automobile and disperse employment concentrations, led to the consequent development of many economic nuclei throughout the region. Orange County, for example, once considered only a "bedroom" community for Los Angeles, has so greatly developed its economic and industrial potential that today less than 20 percent of all Orange County residents commute to Los Angeles County for work. Consequently, Orange County ceased to be a part of the Los Angeles-Long Beach SMSA in the 1970 census.

The development of this large number of economic nuclei throughout the region has meant that the Los Angeles CBD has little taxing power and it is currently one of the smallest large-city central cores in America. There have been some recent attempts by both government and private industry to redevelop both business and residential areas in the central city, and there are indications that there has been a slight reversal of the downward economic trend. However, the kinds of economic activity that generally are found in downtown areas such as insurance, banking and commercial establishments are lacking in the Los Angeles region. Los Angeles is considerably underrepresented as a company headquarters city. Even government agencies, often the mainstay of downtown areas, are being decentralized in the Los Angeles region to better serve the increasingly dispersed population.

As residential and work places became dispersed with respect to the Los Angeles center city, they became dispersed with respect to one another. Workers found their homes and jobs randomly separated. These scattered trip generation centers have led to a growing cross-town commuter travel pattern which is poorly served by the existing radial freeways and extremely difficult

to serve with conventional transit service. In addition, the fragmented nature of the governmental planning authority, coupled with severely limited transit franchises, make solving such an area-wide travel problem complicated and difficult.

Heavy manufacturing, including automobiles and airplanes, is a major economic activity in the Los Angeles region as a whole. In addition the region depends heavily on the construction and building trades, aerospace and defense industries, educational services and, surprisingly, agricultural industries. The film and movie industry, once a significant economic factor in the Los Angeles region, has been declining drastically in the last ten years. An economic study undertaken for the Southern California Association of Governments (SCAG), the regional planning agency, predicted that between 1970 and 2000, the aerospace and defense industries will also decline in economic importance to the Los Angeles region. In general, economic activity in the Los Angeles region appears to be shifting toward a more service-oriented base as the region tends to specialize in labor-intensive rather than land-intensive activities.

Different subregions in the Los Angeles area have different economic bases, and because these differences may separate each county from Los Angeles County even more distinctly in the future they are important to keep in mind. Three counties currently have small populations and relatively small industrial bases and studies estimate they will keep their essential residential character in the future. Imperial County (to the southeast) is now, and projections indicate will remain, an essentially agricultural area with only moderate population growth predicted for the next 30 years. San Bernardino (to the east) is essentially a residential community with some light industry and a moderate agricultural base. Predictions are that this county too will remain a residential area with some industrial growth accompanied by a corresponding decline in the relative importance of agriculture to the economic structure of the county. Overall growth in San Bernardino County, in general, is restricted by a desert-like climate and severe air pollution. Riverside County (to the southeast) is tied closely to San Bernardino County and reflects essentially the same residential growth pattern. Projections are that this county will also maintain its current residential life-style and



that industrial development will be marginal at best, growth being projected for the service industries only.

Two counties in the Los Angeles region, however, Orange and Ventura, have experienced significant population and economic growth and projections indicate continued growth. Orange County, originally a lower-middle-class residential community, has been the major recipient of the urban-economic dispersion pressures in the Los Angeles region. Orange County (to the south) is currently dependent on the aerospace industry and light manufacturing, but predictions are that these industries will decline in relative terms as the county continues to become more self-sustained, developing sizeable service industries and retail and commercial trade. Predictions are that Ventura County (to the north) will experience comparable growth, as it too benefits from industrial migration from the Los Angeles area. Ventura's economy is largely industrial and service and is expected to become more diversified as the county becomes economically self-sufficient.

### Transportation Planning

Transportation planning in the Los Angeles region began with the 1950 establishment of the Metropolitan Transportation Engineering Board (MTEB), which is composed of county road commissioners, city engineers, public works directors and city managers. Over the years the MTEB has been instrumental in bringing about better coordination of freeway planning and development in Southern California. In 1960 in an effort to coordinate highway planning and transit planning, the Los Angeles Regional Transportation Study (LARTS) was formed. Members of LARTS, in addition to a technical staff, are appointed by the SCAG president and represent city road departments, city public works and traffic departments, airports, transit operators, city and county planning departments, and the state highway department. LARTS has been integrated into SCAG as one of the technical transportation committees reporting to an overall Comprehensive Transportation Planning Committee. LARTS is a continuing effort to gather data and provide projected figures for land-use population and trip demand for several future stages in the development of the region.

The Comprehensive Transportation Planning Committee was formed by SCAG in 1970 to provide for the integration of highway and transit planning with

operational development necessary for a proper regional comprehensive planning process as well as to meet state and federal program requirements. SCAG itself is a voluntary association established by over 100 cities in all six counties in the region under the California Joint Exercise of Powers Act. SCAG's activities are funded by membership assessments on per-capita basis with federal assistance. SCAG has nine policy committees, one of which is the Transportation Planning Committee, dealing with various regional problems. Several of these policy committees are supported by technical committees. Each policy committee, in cooperation with the relevant public agencies and the technical committee, is required to prepare an operations plan which is approved by the SCAG Executive Committee.

One of SCAG's activities in coordination with the Southern California Rapid Transit District (SCRTD) is the development of a regional program for the coordination of existing public transportation services. This activity is funded by an UMTA Section 9 grant as part of the regional comprehensive planning program. SCAG is also working closely with the SCRTD on the latter's exclusive express busway to be built on the present San Bernardino Freeway between El Monte (to the east) and Los Angeles. The District is undertaking this as a five-year demonstration project in cooperation with UMTA, the Bureau of Public Roads, the State of California Division of Highways, the Southern Pacific RR, and the Cities of Los Angeles and El Monte.

SCAG is also involved in a major UMTA-funded study of travel corridors in the Los Angeles region, with emphasis on the Los Angeles-Orange county flow. This alternate corridor study is being conducted with the active cooperation of the SCRTD and the Orange County Transit District, both of whom are conducting complementary studies. This study is also actively coordinated with the San Diego Comprehensive Planning Organization corridor study, also assisted by a Section 9 Technical Studies Grant.

#### Potential for Public Transit

The major means of transportation in the Los Angeles region is the car. The modal split ranges from 2 percent in Los Angeles County to under 0.1 percent in Ventura County. Highway development, while extensive, has not been able to keep pace with urban travel demands and many freeways are heavily congested for most daylight hours.

The bus is the only public transit mode in the Los Angeles region. While bus service is provided by 14 municipal carriers, two special districts, and 13 private carriers (see Table 12), the major operation is

Table 12. Transit operators in the Los Angeles region.

County	Public Operators	Private Operators
Los Angeles	Southern California Rapid Transit District City of Commerce Bus Lines Culver City Municipal Bus Lines Gardena Municipal Bus Lines Long Beach Public Trans.Co. Montebello Municipal Bus Lines Pomona Valley Municipal Transit System Santa Monica Municipal Bus Lines Torrance Transit System	Greyhound Bus Lines San Pedro Transit Lines Antelope Valley Bus Company
Orange	Laguna Beach Municipal Transit Line Santa Ana Transit Corporation Long Beach Public Trans. Company (SCRTD) Orange County Transit District	South Coast Transit Company Pink Bus Line Town Tours, Inc. San Clemente Stage Lines Golden West Stage Lines
Riverside	(SCRTD)	California Bus Line Desert Transit of Palm Springs Twentynine Palms State Lines Hemet Bus Line
San Bernardino	San Bernardino Municipal Transit System (SCRTD)	(Twentynine Palms Stage Line) Western Trail
Ventura	Oxnard Municipal Transit Lines Ventura Transit Lines	
Imperial	No transit operations	

the SCRTD, carrying about 82 percent of all daily transit passengers in the region. Most of the municipal operations provide service in well-defined communities and the SCRTD acts as the regional carrier providing service between these communities.

The current operations and service area of the SCRTD is the result of both its history and its legislative mandate. The SCRTD's predecessor, the Metropolitan Transit Authority (MTA) was formed in 1958 by the public acquisition of two large private systems; the MTA continued to operate all the lines of the former operators. In 1961 and again in 1962 the MTA took over private operators in other parts of the county and continued to operate the majority of lines they had run. In 1964 the SCRTD was formed with a state legislative mandate to act as the regional transportation agency in the Los Angeles basin; its mandate strictly prescribed its activities with regard to existing public and private transit operators. As long as the SCRTD only ran buses it was not to provide any competition to existing routes or services of any operators; this ban on competition did not extend to rail rapid transit facilities. Since its formation date the SCRTD has taken over several operators in Los Angeles, Riverside, Orange and San Bernardino counties. Because the SCRTD continued to operate the majority of the original operators' lines, it began to provide some line services into other Counties beside Los Angeles. Today the service it provides in Riverside, Orange and San Bernardino Counties is largely the continuation of past services of operations acquired by the SCRTD. The numerous other operators in these and Los Angeles Counties have continued operations because the SCRTD cannot legally provide competitive services. However, from time to time these operators request the SCRTD to purchase their operations; in the last 18 months the SCRTD has purchased or taken over three additional operators.

Today the SCRTD runs 1511 buses over 192,000 miles daily or 59,000,000 vehicle miles annually. The SCRTD provides 74 percent of the total route mileage provided by public operators in the five counties with transit service, and carries 74 percent of the revenue passengers, a total of 141,983,000 annually. Of the approximately 2700 route miles provided by the SCRTD, approximately 2400 or 88 percent are in Los Angeles County.

In Los Angeles County several municipal operators are large enough to be significant. The City of Santa Monica operates a 113-vehicle bus system covering 90 route miles, more than two-thirds of which are outside the city's boundaries. The SCRTD and the Santa Monica lines share a terminal at Pico and Rimpaw through an arrangement made more than 40 years ago. The Santa Monica lines run parallel to the SCRTD lines on major arteries, sharing bus

stops, but other than these short stretches there is little duplication of service. In southern Los Angeles County, bordering Orange County, the City of Long Beach operates a 103-vehicle bus system covering 172 route miles in Los Angeles County and 3 route miles in Orange County. The SCRTD shares local operating rights with the Long Beach Public Transportation Company on a major arterial in the City of Long Beach, but because of different headways, there is little significant competition between the two operations. Also, in southern Los Angeles County two municipal operators, Gardena Municipal Bus Lines and the Torrance Transit System, operate express service from their respective communities into the Los Angeles CBD over routes served by SCRTD. Local service in these areas is provided by the SCRTD, but again there is little real competition. A 1966 study showed that less than 2 percent of all transit riders in Los Angeles County transfer from one operator's lines to another and most operators do not see interline transfers as a significant problem.

A significant development in regional transportation service was the July 1971 formation of the Orange County Transit District (OCTD) which coincides with the County of Orange. OCTD does not operate transit services at this time; however, sometime in the immediate future it will take over services now operated by the Santa Ana Municipal Bus Lines and make contract arrangements with South Coast Transit, a private operator. Since SCRTD will continue to operate significant service to and from Orange County, the OCTD has already begun active cooperation with SCRTD. OCTD views its purpose as providing a good local service while the SCRTD provides intra-regional service.

In the spring of 1972 the SCRTD began the operation of a downtown mini-bus service, with natural-gas fueled vehicles purchased with the aid of an UMTA Capital Grant. Operational costs are subsidized by the City of Los Angeles, the County of Los Angeles, and the Los Angeles Community Redevelopment Agency.

#### Potential for Transit Integration

In 1971 all public transit operators in the six-county regional area formed the Transit Advisory Committee, under the aegis of the regional

planning agency, SCAG. This Transit Advisory Committee was an outgrowth of a previous organization limited to Los Angeles County, the Los Angeles County Section of the California Association of Publicly Owned Transit Systems (CAPOTS). The Transit Advisory Committee, which meets UMTA requirements, acts as a forum for the regular coordination of planning, improvement and specific operational problems of the member transit systems.

Traditional forms of coordination are either unwelcomed by the smaller operators or have already been tried. For example, the Transit Advisory Committee often serves as a clearinghouse for technical and maintenance ideas, as well as for difficult-to-find parts, to aid the smaller transit operators in the region. On the other hand, the smaller operators are unanimously against sharing maintenance or garage facilities with the SCRTD for a variety of reasons ranging from different maintenance schedules and routines to fear that the lower paid drivers of the smaller operations will become too dissatisfied after talking with SCRTD drivers. An interesting note is that smaller operators all reported that the buses of their lines were not interchangeable with SCRTD buses because seat configurations were different, while the SCRTD reported that all buses were, indeed, interchangeable.

Most of this illustrates the underlying fear and jealousy with which local operators in the Los Angeles region view the SCRTD. Much of the fear is fueled by the nearly annual SCRTD take-over of one or more municipal bus systems in the region, which leads most operators to visualize the SCRTD gobbling up all smaller operators on its way to regional control. In many ways both the SCRTD and the smaller operators view the Federal Capital Grants Program, now coupled with California Senate Bill 325 money (a sales tax on gasoline to help support public transit), as standing between the smaller systems and the SCRTD. The SCRTD views UMTA money as a means to keep unprofitable and inefficient systems in operation. The smaller operations attribute many of their rising labor costs to the SCRTD's less than successful attempts at dealing with its own labor troubles. (The SCRTD workers are currently represented by three separate labor unions. Threat of a strike is currently looming, eased only by a "cooling-off" period invoked by the Governor.)

Transfer problems have become less severe with the SCRTD's take-over and continued operation of the two systems in the Mexican-American and black

communities. As mentioned previously, interline transfers involve only 1.5 percent of all daily passengers. Fares are the same on most systems that interface directly with the SCRTD (with the exception of the Santa Monica line, which is cheaper) and thus do not provide significant problems to transit users.

The SCRTD currently maintains a 24-hour telephone information service, with 24 operators and three supervisors handling over 7000 daily phone requests for information. SCAG has estimated that at a cost of roughly one-third more than current SCRTD operational costs, a system could be devised which would be able to provide the region with telephone information on all transit operators. The SCRTD is interested in such a regional transit information system but disagrees on both the cost and the practicability of handling such a system manually. The District has separately requested UMTA assistance to test a computer-aided information system but funding has not been received.

Within the next decade, Los Angeles may become a multimodal city. Voters have turned down the SCRTD's bond issue to finance the construction of a rail rapid transit system. However, the availability of SB 325 gasoline sales tax money may mean that voter approval will not be required for construction of at least part of a rapid rail system in the Los Angeles region. The SCRTD, which is forbidden to compete with other existing bus operations, may well become a deadly competitor to small or marginal operations by instituting a major line-haul rapid transit system. On the other hand, the SCRTD may well need the services of local operators as collectors or feeders to major stations along the line route.

Any transit integration or coordination project will have to deal directly with the feelings of the smaller transit operators towards the SCRTD and will have to actively guarantee the integrity of all systems regardless of size. Any project which appears to favor the SCRTD will not be well received. So, for example, a relatively straightforward proposal for the SCRTD and the Long Beach Municipal Bus Lines to share maintenance facilities in Long Beach where both systems have garages 2.5 miles apart was met with the Long Beach System's contention that SCRTD buses would always get preferential treatment and that all buses would have to follow the SCRTD's maintenance schedule.

## MIAMI

### The City and Its Transportation Region.

Miami, the metropolis of southeastern Florida, is the transportation and business hub of Greater Miami and the administrative and political center of Dade County. The city is the second largest in the South; the region, the second fastest growing in the South. Dade County coincides with the SMSA of Miami, and its 1970 census population was 1,267,742. The City of Miami population was 334,859. Density within the SMSA was 621 persons per square mile within its 2042 square mile area; density within the city was 9763 persons per square mile within a 34.3 square mile area. In the City of Miami, 25.2 percent of the population is 16 or younger, while 14.5 percent is over 64.

Economic bases in Miami extend beyond the stereotyped tourist economy which in actuality represents less than 10 percent of the SMSA's net income. Airline-related work as well as light and service industry make up a sizeable portion of the economy. Median family income in the SMSA is \$9241 with 10.9 percent of the population living below the poverty level.

Source 3 discusses center city Miami in some detail:

"Center city Miami had little new construction through the mid-1960s and declined in importance relative to the metropolitan region. To change this situation, a Downtown Development Authority was created and given the power to levy a .5 mill tax, the revenues from which could be used for planning purposes. Already under development are a Government Center complex and a shopping mall with a transitway. A plan has been developed for a Transportation Center serving as a multi-modal terminal point and studies have been done for high density housing. Just south of the downtown core, a new hotel-apartment-office complex is beginning to bring the Miami Beach style of living to center city Miami.

"Adjacent to center city, the Model Cities agency has developed plans for a mini-bus system serving community needs. Plans call for the operation to be run by a nonprofit corporation based in the Model Cities areas.

"Miami adopted a commission-manager plan of government in 1921, but since 1957 some municipal functions have been taken over by a county-wide government with broad powers over municipal affairs. This metropolitan government could absorb the municipalities. Otherwise, since Miami is completely surrounded by



incorporated areas that show no interest in annexation, any integration with the central city is difficult. The county board of commissioners, known as the Metro Commission, is made up of nine members elected by the county as a whole. One of the members is elected as mayor and is permanent chairman. The Commission appoints the county manager and directs policy.

"Center city Miami lies on the edge of Biscayne Bay, with the North-South Expressway to the west linking center city to the region. Across the Bay and facing the Atlantic beaches is the ocean front hotel development of Miami Beach. The two are separate entities whose planning and development are coordinated at the county level. Metropolitan Dade County was the first area in the country to initiate a metro form of government and, in part, the step was a response to the decentralized nature of the functional development of Miami."

### Transportation Planning

Traffic and transportation planning is done by Metro, while planning for the CBD is done by the Downtown Development Authority and the City Planning Department (urban design and zoning). The basis for transportation planning is the Miami Urban Area Transportation Study (MUATS), a joint effort of Metropolitan Dade County and the state in cooperation with HUD and the Federal Highway Administration. MUATS, begun in 1964, called for the following basic projects (1) a rapid transit system using elevated rail cars on a loop that would include downtown Miami, the International Airport, and the hotel and apartment row along the ocean in Miami Beach; (2) six new expressways and three tollways controlled by computers, and a widening of 25 miles of existing expressways; and (3) eight express streets with flyovers at major intersections. The estimated cost of the ground transportation projects was \$1.5 billion by 1985. In 1969, the Metro Commission approved a federally supported study designed to improve capacity and increase safety of present roads in the county.

As a step toward implementing the public transportation facets of that program, the county commissioned a technical analysis to determine the feasibility of specific elements of the improved public transit plan proposed in the MUATS study. The results of the study (Source 5) were released in the summer of 1971. The report examines the types of transit vehicles and systems which will be available in the immediate future, and identifies those which will be appropriate for Dade County. Based on requirements developed

in this and earlier reports, the range of alternative vehicle systems is narrowed, and defined in sufficient detail to estimate capital and operating costs; these will be presented in a subsequent interim report. In addition, recommendations for facilities to maintain and store the transit vehicles are included.

The priority projects are as follows:

1. Fringe parking study.
2. Transportation and planning studies specific to downtown.
3. Determination of how existing transportation system could better serve the needs of the Model Cities.
4. Implementation of changes in transportation system recommended by study suggested in number 1.

Through the establishment of the Metropolitan Transit Authority, the Metropolitan Dade County Board of County Commissioners has developed the framework for a unified and officially coordinated public transportation system in the metropolitan area. The Transit Authority, by ordinance, has the power to develop "comprehensive over-all plans and programs for securing and establishing for all of Metropolitan Dade County, an efficient, economical, unified, coordinated, and rapid mass transportation system, and make recommendations to the county commission for effectuating such plan and program." (Source 6).

## Public Transit

Ninety-three percent of the metropolitan transit services in Miami is provided by the publicly owned Dade County Metropolitan Transit Authority (MTA). According to the Simpson and Curtin report (Source 5), MTA has a fleet of 379 buses, of which 197 are air-conditioned. The report also notes that "there is adequate bus equipment to protect present operating schedules, which require the assignment of 310 coaches during weekday morning peaks. All of the buses are diesel units manufactured by General Motors. This results in a high degree of desirable standardization—all active buses of a single manufacturer with 85 percent concen-

trated in two models." The central depot, servicing and administration facilities are among the best visited by INTERPLAN on either side of the Atlantic.

MTA operates 50 routes on a planned headway of 30 to 60 minutes. Some 50 million passengers are carried annually for approximately 14,500,000 passenger miles. Ridership has been falling for several years but was said to have increased by some 5 percent during the last year. The fixed fare is 30 cents. At this fare level the gross annual income is \$12 million, while the total expenditure approximates \$14 million. The deficit of approximately 2 cents over the 30-cent fare is covered by local taxes.

The Coral Gables Municipal System provides both a local service to residents of Coral Gables and a connection to the Miami CBD. The system has an inventory of 60 buses. There is a free transfer arrangement at a few points between the MTA and the Coral Gables System.

The publicly owned Broward County Transportation Authority was recently created from a combination of the old Broward County Transportation Authority and the South Broward Transit Authority. The integration resulted in the formation of a unified transit system. Local and some express services are supplied by roughly 60 buses. The daily mileage is 70,000 and the deficit on the operation is approximately 15 percent of the gross revenue. The headways vary between 20 minutes and 2 hours. Day-to-day operations are in the hands of a private management company, which receives, as a fee, 6 percent of the total revenue.

There are four interchange points with free transfers between the BCTA and the MTA systems for travelers from Fort Lauderdale and its adjoining communities in the Broward County to Dade County. The system is described in detail in the Simpson and Curtin report (Source 7).

A large local tour operator, the Gray Line, retains a franchise to operate a route along the ocean front in Miami Beach and into Miami's CBD. The route is operated with 10 buses, in direct competition to MTA lines which run along the same, highly lucrative, route. INTERPLAN was informed by MTA that the Gray Line coordinates its schedule with those of MTA so that their bus precedes that of MTA. Since the Gray Line fare is 25 cents (versus 30 cents on MTA) a classical form of traffic pirating is taking place.

## Potential for Transit Integration

There are currently three potential areas for transport integration in the Miami area: (1) institutional consolidation of several transit operators in the area, (2) physical and operational coordination of transit operators, (3) broad coordination of private, para and public transportation systems, including the traffic to and from the Miami International Airport. When the rail rapid transit, as outlined in the Simpson and Curtin report (Source 5), is constructed, there will be a great need for truly intermodal integration.

**INSTITUTIONAL CONSOLIDATION.** It is possible to envision some degree of institutional consolidation among the Miami-based MTA, the Broward County Transportation Authority, and the Coral Gables Municipal System. While no complete merger is likely, all three companies realize that they are in a position to increase patronage and decrease operating costs through application of institutional integration.

**PHYSICAL AND OPERATIONAL INTEGRATION.** None of the existing systems presently offers an outstanding service, in spite of recent large capital investments into vehicles and facilities. The MTA is by far the largest local operator and approaches the position of a monopolist of public transit. It has a model servicing facility at its depot which could provide maintenance and servicing functions for other operators, especially since it has a surplus capacity for such functions. Such an approach could lead to the standardization of the entire fleet of buses throughout the area with resultant economies of spare parts inventories and specialized repair shops.

There does not seem much doubt that several routes (both MTA and private lines) could operate with shorter headways, since there appears to be a surplus of MTA buses. Once headways are reasonable and are adhered to, coordination of schedules between operators, especially at transfer points, will become possible. Such coordination may, in turn, have serious impact on the success of park-and-ride systems which are now in the planning stage.

**BROAD COORDINATION.** The first attempt at the broad coordination of private and public systems is the proposed demonstration along I-95. "The High-occupancy Vehicle Priority System" in the I-95/N.W. 7th Avenue corridor

is a park-and-ride system which comprises new parking lots at the north end of the corridor, and the use of express buses on "bus-only" lanes. These lanes will be added to those existing on I-95.

An opportunity for intermodal integration will arise when over-the-water transportation systems along the Biscayne Bay become operational. While at the northern end many passengers are expected to park their cars, appropriate bus connections will have to be organized at the CBD terminal.

## NEW ORLEANS

### The City and Its Transportation Region

For two and a half centuries, the Mississippi River has been the mainstay of New Orleans. The SMSA surrounding the City is made up of Jefferson, Orleans, St. Bernard and St. Tammany parishes whose combined population equals 1,045,809. The city population has decreased from 627,525 in 1960 to 593,471 in 1970. The SMSA, on the other hand, has grown from 907,123 in 1960 to its present population. Growth away from the central city has been the current trend. In the city, roughly 22 percent of the population is under 16, and 11 percent over 64. The corresponding figures for the SMSA are 35 percent and 8 percent. Within the central city, density is 3011 people per square mile in the 197 square miles, while in the SMSA, population density is 542 persons per square mile in the 1967 square mile area.

Harbor activities and a huge service-oriented center form the economic base in an SMSA whose median income is \$8670. Major highways and railroads follow the general orientation of the Mississippi River as it runs from west to east through the metropolitan area. The development of transportation systems has also been influenced by a keen sense of historical preservation as well as irregular street patterns following the river.

At the present time, a park-paddle and park-ride study is being completed, the results of which may greatly influence parking conditions in New Orleans. Current CBD parking capacity allows for 24,000 off-street parking spaces and 1500 curbside meters. Rates in the CBD are typically \$.75 for the first hour, \$.25 for each additional hour with a daily \$1.75 maximum and a \$25.00 monthly rate. These rates and controls are regulated by parking lot owners.

## Transportation Planning

As late as September, 1970, transportation planning was so poor in New Orleans that the following summary could be written in Source 3:

"With a center city containing many historic buildings, New Orleans faces unique problems in creating a center city transportation system. Preservationists in 1969 were successful in stopping a highway that would have run parallel to the waterfront along the Vieux Carré. Much of the controversy over transportation stems from the lack of a comprehensive transportation plan related to development goals and social issues. The choice must be made between concentration of functions in the center city, or dispersal to outlying areas. Originally, public transportation was to have been a major part of the Regional Planning Commission study. With responsibility for public transportation not clearly defined, the emphasis of the Commission has been shifted to housing."

Completion of TRANSIT 90 (Source 8), a Transit Development Program for the SMSA, in May 1972, marked the beginning of New Orleans' first regional transportation plan. Some excerpts from this study follow:

"The five-year Program [suggests] an improvement of network service in higher density areas, introduction of radial station-to-station express service which will be complemented by suburban and overnight dial bus service, and introduction of a circulation system using small buses in the Central Business District.

"The areawide system, as affected by the programmed improvements, will have a vehicular capital cost of some \$22 million over the five years including the cyclical replacement of the existing fleet. The annual operating cost in the fifth year should approach \$43 million. The total system ridership is anticipated to increase by 9 percent by the fifth year. This increase is predicated on the maintenance of existing ridership in the urban areas as a result of system improvements and an increase of approximately 250 percent in suburban areas as a result of the introduction of dial bus and express service.

"The system-wide planning, programming, fund raising, coordination of Parish Transportation Departments, and other functions granted at the pleasure of the Parish Governments, would reside in a Regional Transportation Commission, created under State Enabling Legislation concerning interparish agreements."

Currently, the major agencies of government involved in transportation planning include the Regional Planning Commission, City Planning Commission, Utilities Department, and New Orleans Public Service, Inc. (NOPSI).

## Public Transit

NOPSI is the major transit company in the area, privately owned, and operating 465 buses. Two small private companies operate about 30 buses each without subsidy. These are Westside Transit Lines and Louisiana Transit Co. The fourth, and only other, company in the area is Keener Loop, a publicly owned two-bus company operating within the City of Kenner. The latter three bus companies provide services from the outlying parishes to the CBD.

Thirty percent of the trip to New Orleans' strongly centralized CBD are now made by public transit. Total annual transit rides in the city have decreased between 1960 and 1970 from 164.1 million to 124.1 million. The current annual number of transit rides in the service area is 133 million, or 139 rides per capita. During the peak period, 17.4 percent of the total passenger trips are made.

NOPSI is the local operating arm of the Middle South Utilities System. It loses approximately \$7.5 million annually (gross revenue is \$18 million; total expenses \$20 million), but maintains a very low basic fare of 15 cents. The deficit is covered by the NOPSI revenues on the sale of electricity and gas. Since the total annual revenue of NOPSI is approximately \$100 million, the local price of electricity and gas is about 10 percent more than it would be without the cheap and generally efficient transit system.

NOPSI operates 35 local and 6 express buses for peak hour services. Fare on express services is 20 cents. Most of these services operate at reasonable headways of 15 to 30 minutes, and the lines run radially to outlying districts. Not all parts of the city receive equally good service. As is normal in this type of operation, 10 lines account for 70 percent of the total revenue, and cross-subsidization between lines is a well-established practice. The buses of NOPSI are in good condition; most are air-conditioned and new. The capital investment of about \$14 million was made without the participation of UMTA.

## Potential for Transit Integration

The City of New Orleans conducted a number of studies in response to some of their problems. The following problems were examined:

1. The utilization of 18 vacant areas of river-adjointing sites in the CBD for an intermodal transportation center: water, rail, bus, rapid transit, and automobile.
2. Park-and-ride system.
3. Park-and-paddle system for an over-the-water mode.
4. People Mover for the CBD.
5. Minibus and street-closing system in the CBD.
6. No-bus ordinance for the Vieux Carré.
7. Dial-a-bus and/or bus on existing rails.

Today, New Orleans is too small to support a rail rapid transit system, but its downtown streets are already overcrowded by automobiles, and Louisiana's expanding network of freeways brings more and more automobiles to the city. The existence of only two bridges across the Mississippi causes severe congestion during the peak-hour traffic.

## SAN DIEGO

### The City and Its Transportation Region

The City of San Diego is the urban center of San Diego County, which is one of the few single-county transportation regions in California. The county is bounded by the ocean on the west, a large military reservation, Orange and Riverside Counties on the north, Mexico on the south, and the Mojave Desert and Imperial County on the east. Although the western part of the county is temperate and attractive, much of the eastern part of the county is arid desert with extreme topography. Consequently, over 95 percent of the county's population of 1,357,854 live in the western third of the region, and comprehensive planning efforts are limited to the western half of the county.

In addition to the City of San Diego there are 13 incorporated cities in the county as well as several military installations. The City of San Diego with a 1970 population of 696,769 constitutes 42 percent of the county's population while another 23 percent of the county's inhabitants live in unincorporated areas. Generally development has been scattered



throughout the western portion of the San Diego region, aided by the large network of congestion-free highways. Concentrated urban areas are scattered throughout the western region, usually around each incorporated city. San Diego is a large county (4255 square miles) and even though development has concentrated in the western third of that area, population densities are relatively low; the overall county density is only 319 people per square mile (slightly misleading given the large amount of uninhabited land) but population density for the City of San Diego is 2181 people per square mile, phenomenally low for such a large American city.

San Diego is a major resort and tourist town, as well as a center for light manufacturing, defense research and other economic activities in the San Diego region. As a result of the low population density and scattered development, the San Diego CBD has traditionally been small, comprising only one census tract. Recently CBD growth has increased to about 3 percent annually and the central city has grown tremendously in the last 10 years. This accelerated growth has been encouraged by several downtown business and community groups who are actively involved in promoting continued growth. There is increasing conflict between those who wish to continue to encourage and promote further economic growth in San Diego and those who wish to maintain the community at its current level of low-density development.

The automobile is supreme in San Diego and the construction of freeways in the county has kept pace with the overall San Diego growth rate. As a result, 1970 auto travel times in the San Diego region were shorter than those in 1960. Even in peak hours, traffic moves well on all freeways, further enhancing the inherent attractiveness of the auto. Moreover transit travel times are exceedingly poor due to extreme congestion on CBD streets, scattered residential developments, and rough topography in residential areas. Transit system speeds average only 12 mph, making a transit trip two to three times longer than a comparable auto trip. Consequently, the daily modal split in the San Diego region is approximately 1.5 percent.

Current freeways bypass the CBD and downtown area but proposed freeways will bisect these growing commercial areas. Increased traffic congestion will undoubtedly lengthen transit times still further, but will also lengthen auto travel times. This fact has led some transit proponents to argue that down-

town transit will become inherently more attractive as auto travel times and congestion increase.

## Transportation Planning

Transportation planning efforts in the San Diego region began with a 1952 origin and destination study undertaken by the California Division of Highways with financing by the Bureau of Public Roads. The study's major purpose was to identify travel patterns and trip characteristics in the region. In 1954 staff members from the city and county planning and highway departments coordinated their efforts in a team called the San Diego Metropolitan Area Transportation Technical Coordinating Committee. This cooperative approach received wide publicity and in 1956 San Diego was selected as one of seven "pilot cities" for special transportation studies by the National Committee on Urban Transportation. Thus by 1958, the San Diego region had a full set of surveys and forecasts, one of the first areas in the country to do so.

In 1962, Title 23 of the Highway Assistance Act required that all regions seeking financial assistance have a continuing, comprehensive transportation program by July 1, 1965 or they would cease to be eligible for further federal highway funding. The California State Legislature passed enabling legislation allowing a voluntary association of governments in every metropolitan region to carry out this transportation planning program and so, late in 1963, the County of San Diego, the 13 cities in the county, the Unified Port District, and the State Division of Highways entered into a voluntary Joint Powers Agreement for the purpose of coordinating transportation planning and remaining eligible for federal highway funds. The membership of the major committees formed under this agreement was largely the same as had served under the old Technical Coordinating Committee formed in 1954.

In 1965 the Planning Commission of the County of San Diego began work on a regional general plan and applied to the U.S. Housing and Home Finance Agency (HHFA), now part of HUD, for assistance via an Urban Planning "701" Grant. HHFA informed the county that a regional general plan must be coordinated with the overall regional planning program. Accordingly, the county requested the Technical Coordinating Committee of the Joint Powers Agreement

to serve as the transportation arm of the regional general plan program. In addition, the county informed the Technical Coordinating Committee that a detailed study design, coordinating the efforts of the regional general plan soon to be undertaken by the county and the regional transportation study to be performed by the Technical Committee itself, was necessary both for sound planning and to meet HHFA and BRR regulations. Subsequently the firm of Barton-Ashman Associates was retained in March of 1966 by the county with Technical Committee approval to prepare that study design. The report was completed in September of 1966 and the design was formally adopted by the Comprehensive Planning Organization (CPO) (discussed below) in April of 1967.

In 1966 a second Joint Powers Agreement was signed among the same parties to provide an overall planning approach for the region and the Comprehensive Planning Organization (CPO) was formed. CPO was staffed largely by county personnel but its management, advisory and policy committees consisted of elected city representatives, city managers, planning directors, and highway department personnel as well as some county officials. CPO is, at this writing, a voluntary association and not a level of government; it cannot tax, hire staff, or apply directly for federal grants. CPO is financially supported by direct contributions and staffed by personnel loans from the member governmental units.

At the time CPO was in its formative stages and prior to its adoption of the Barton-Ashman study design, a group of private companies, including Ford Motor Company and Philco-Ford Corporation began to meet with San Diego City officials to discuss the possibility of an industrywide competition to develop a regional transportation system for the San Diego area. The private firms agreed to finance the bulk of the first phase of this mammoth project which came to be called Transportation Requirements and Implementation Program (TRIP) and the City and the County both agreed to contribute personnel and some financing. Finally the CPO's policy committee agreed to make the TRIP project part of its transportation planning program.

The first Joint Powers Agreement was formed in 1963 largely for the purpose of keeping San Diego eligible for federal highway assistance. Whether or not the Technical Coordinating Committee did any comprehensive transportation planning is unknown, but the responsibility for overall regional planning

clearly remained with the county. The TRIP program was largely an effort of the City of San Diego, initiated while ignoring transportation planning being done by the county. When the first phase of TRIP was completed in 1967 both the county and the CPO refused to adopt the report or to apply for the necessary federal funding to continue with the second phase of the project. At the same time, Barton-Aschman completed its study design of transportation integration and regional general planning for San Diego County, a plan largely uncoordinated with the first phase TRIP effort. The TRIP plan lay dormant until 1969, when, because of increased federal pressure (via the passage of the 1968 Intergovernmental Cooperation Act and subsequent Office of Management and Budget [OMB] procedural requirements), and increased effort at local cooperation, the CPO became the recipient of both HUD "701" and UMTA Section 9 funding. Then Barton-Aschman was hired to coordinate the first phase of the TRIP report with their own earlier study design prepared for the county. The outcome was a general planning work program for CPO. Thus, many of the studies recommended by both the TRIP consultants and Barton-Aschman have been or are currently being undertaken by CPO staff or consultants as part of their overall regional planning activities.

One of the CPO's jobs was the development of a 10-year transit improvement plan. Such an activity was required by UMTA in 1967 as a condition for full two-third's financing of the city's acquisition of the San Diego Transit System. The transit development plan and program was carried out by Alan M. Voorhees and Associates and completed in June of 1970, whereupon the city was certified as meeting UMTA planning requirements and received the final one-sixth of the total project grant. The CPO also undertook a comprehensive transit survey of ridership and trip characteristics for all transit operators in the San Diego region. This report, completed in March 1970, was done by the CPO staff itself.

### Public Transit

Transit service in the San Diego region is provided by one major carrier and three smaller carriers. The major carrier is the San Diego Transit Corporation (SDTC), a public corporation totally owned by the City of San Diego and carrying 85 percent of the region's daily passengers. SDTC became a pub-

lic entity in July 1967, when San Diego city voters authorized the acquisition of the privately owned San Diego Transit System through a federal grant with the one-third local contribution derived from a new property tax levy. The acquisition was made possible by the 1967 HUD capital grant (under the UMT Act of 1964), covering two-thirds of the total acquisition cost, or an original grant of \$3,506,000, later raised to \$5,268,000.

San Diego Transit currently serves the City of San Diego and six incorporated cities in the southern part of the county, with each city paying a proportionate share of the system's operating deficiency. For the first 3 years of its existence as a public entity, San Diego Transit provided service to the smaller cities at no charge, with all operating deficits offset by the San Diego City residents' property tax. San Diego taxpayers were understandably disgruntled, and 2 years ago, after an extensive on-board passenger survey, the SDTC inaugurated a system of charging the smaller cities for the difference between revenues originating in each city and operating costs in that city. This system is believed to be unique in the United States, for, unlike the MBTA in Boston, each city requests a given level of service and each city can change that request yearly to meet its own budgetary constraints independent of other cities' requests.

SDTC currently operates 228 buses over 404 miles of mixed traffic routes carrying 56,000 daily riders and averaging 7,587,000 passenger miles annually. Much of the fleet is new, and its acquisition was made possible by two UMTA capital grants. Almost all of the fleet is now equipped with two-way radios, another improvement made possible through UMTA grants.

Before the 1967 public acquisition of the San Diego bus system, ridership was falling by about 6 percent annually. After public acquisition, the transit system bought new air-conditioned buses, increased routes and services, decreased headways, and began a marketing and information campaign. These measures apparently stimulated some new ridership while maintaining the existing ridership and overall system patronage began to grow. In May and June of 1970 there was a six-week strike, which led to an immediate 26 percent drop in ridership which was never recovered. Probably more damaging than the strike alone was the drastic increase in fares which the management chose to institute at the end of the strike, raising the basic fare from 30¢ to 40¢, one of the

highest in the country. As a result of the declining revenues, SDTC operated at a deficit of \$2.7 million in fiscal year 1972 with \$1.14 million met by the San Diego property tax.\*

The Oceanside Transportation System is the second largest operation in the San Diego region. Owned and operated by the north-county City of Oceanside, it also serves the Cities of Carlsbad and Escondido, but its real business comes from transporting military personnel to and from the Camp Pendleton Marine Base. Recently, Oceanside attempted to establish a proportional subsidy system, similar to the SDTC arrangement, with the other cities it serves. This plan, however, was rejected by those cities, largely because the Oceanside system is still showing a profit due to its heavy Camp Pendleton business. The Oceanside Transportation System currently operates 31 buses (21 of which are new) over 4 routes (161 route miles) carrying 5000 passengers daily.

Western Greyhound Line, the cross-country, intercity company provides limited local transit service in the San Diego region. First, its Los Angeles-San Diego lines make several stops in the county and a small number of San Diego residents ride from one San Diego stop to another. Second, Greyhound maintains a fleet of 18 transit buses which carry approximately 3400 daily passengers between San Diego and the U.S./Mexican Border at San Ysidro. This last activity is the only significant intercity service provided by Greyhound.

The City of Chula Vista in the southern part of the county inaugurated local bus service (in addition to the service provided by SDTC) in March of 1970. Four buses are operated on three loop routes by the Aztec Bus Lines, a privately owned company which receives a direct subsidy from the City of Chula Vista to cover the difference between operating costs and revenues. The local Chula Vista lines carry approximately 1300 passengers per week.

A very small family owned company, the San Diego Economy Line, runs one or two routes from a residential suburb to downtown San Diego and San Ysidro. Six trips are made daily on each route, totaling approximately 300 passengers daily. The original 1967 UMTA grant to the City of San Diego

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\*As a result of a subsequent fare cut to 25¢ and the introduction of a \$10/month Saverpass, SDTC ridership reached all-time highs in May 1973: nearly 50,000 passengers in the week of April 28-May 4, a 73 percent increase over the same week last year.

to acquire the San Diego Transit System made provisions for the total acquisition of this operation as well, but the SDTC still has been unable to make satisfactory arrangements with the current owners.

### Potential for Transit Integration

Representatives of all of the transit operations in the San Diego region as well as representatives of the 13 city and the county governments have formed a Transit Coordination Committee as recently requested by UMTA as a requirement for such systems to be eligible for UMTA financial assistance. While this committee has been meeting regularly, no joint-fare, transfer privileges, or cooperative scheduling has been arranged among systems to date.

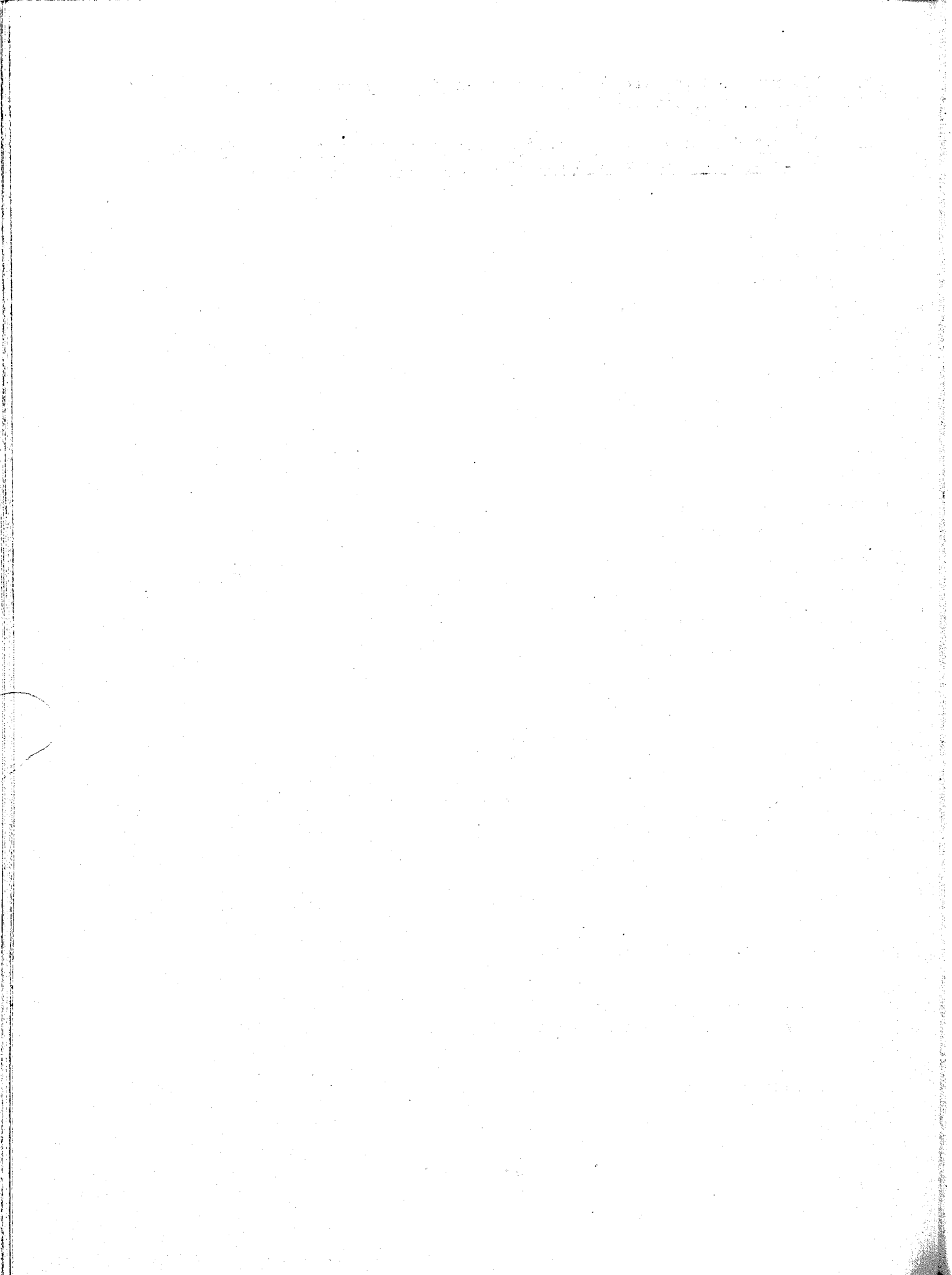
The 1969 Transit Survey conducted by CPO found that all of the local operations were providing adequate transit service in their respective service areas but that the lack of joint fares and transfer privileges among San Diego Transit, the Chula Vista Lines, and San Diego Economy Lines was of some difficulty to patrons. However, coordination between the two major systems, San Diego Transit and Oceanside Transportation was not considered because routes of the two systems did not come closer than 18 miles to one another.

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## SECTION 4

### PHILADELPHIA AND THE DELAWARE VALLEY REGION

#### THE CITY AND ITS TRANSPORTATION REGION

Located centrally in the Northeast Corridor, Philadelphia lies on the Delaware River, some 60 miles west of the Atlantic coast. The city, founded in 1682 by William Penn, is in the Commonwealth of Pennsylvania, but its metropolitan area includes large portions of New Jersey, centered around the city of Camden on the east, and bounds the State of Delaware on the south. The Delaware River constitutes a major physical barrier between the city and its New Jersey suburbs: in the central area of the region only three highways and one railroad bridge span the river: the Benjamin Franklin, Walt Whitman, and Tacony-Palmyra Bridges, and the Penn Central Railroad Bridge. Two additional highway bridges (Chester and Pennsauken) are under construction.

A major governmental reorganization in the area took place in 1854 when the city of Philadelphia merged with 28 surrounding cities and townships, consolidating the whole county of Philadelphia. However, similar consolidations have not kept pace with the rapid growth of the area since that time. Today the metropolitan area (SMSA) includes eight counties with a total of nine cities, 132 boroughs and 199 townships. This multiplicity of local governments clearly presents major problems in coordination of planning in the area that have been only partially overcome by the formation of regional agencies such as the Delaware Valley Regional Planning Commission (DVRPC), the Southeastern Pennsylvania Transportation Authority (SEPTA) because of competition and poor cooperation and because their jurisdiction and control over implementation are not broad enough.

With a population of 1,950,000 in the city and 4,849,000 (1971 estimates) in the metropolitan area, Philadelphia ranks fourth among U.S. cities. The areas of the city of the metropolitan area are 130 and 3,575 square miles, average population densities being 15,000 and 1,355 persons per square mile, respectively.

As in most other metropolitan areas in the country, the population is growing in the suburban sections (11 percent between 1960 and 1970) while it is declining in the city (-2.6 percent for the same period). It is significant to note, however, that this population shift was slower during the 1960's than in the 1950's. The last decade was also recorded as the first decade in 100 years during which the population in the central area of the city increased.

Philadelphia is a major center of business, finance and culture, and its history goes back to the birth of the nation. It is also the largest fresh water port in the world with an annual tonnage of 54 million. Of 2,148,000 civilians employed, the largest number work in manufacturing (513,000), followed by services, retailing, banking and insurance, wholesaling, and transportation and utilities.

Citizens of Philadelphia take pride in their city, although they are often critical of its politics and bureaucratic sluggishness. This pride has been demonstrated by the high demand for renovated center city apartments. Efforts to improve public transit have the wholehearted support of the press and various official and voluntary organizations. One group, the Passenger Service Improvement Corporation, is active in improving commuter railroads. Another, the Pennsylvania Economy League, has published a paper called, "Long-Term Financing of Public Transportation in Southeastern Pennsylvania." The Chamber of Commerce has projects connected with public transportation, and there is also a number of citizen action groups such as the Transportation Action Group (TAG). However, despite this support, improvements in transit have lagged far behind the needs of the city during recent decades.

#### TRANSPORTATION PLANNING

Although the City of Philadelphia has always taken an active interest in transportation and has made significant efforts to improve public transportation, such as construction of subways, purchase of vehicles, and subsidies of services, its overall transportation policy favors the automobile over public transit in ways typical of many U. S. cities. For example:

- There has been insufficient allocation of funds for the improvement of rapid transit lines in the central area.

- Surface transit is given no priority on city streets.
- The city requires that new buildings provide parking facilities, but requires no contribution for transit services.
- Parking validation exists in some stores, but not transit validation.
- Parking rates are not controlled to discourage the use of private automobiles in downtown areas. For example, most private parking facilities charge a 90¢ minimum, \$1.25 for all day, and, in the CBD there is a \$1.50 minimum charge with an all-day rate near \$2.25. Short-term parkers are discouraged by this rate structure. While municipal parking garages average a flat charge of 15¢ an hour and have a greater turnover, there are too few of them, and the rate structure still does not sufficiently discourage commuters.

There are numerous other policies and practices which often hurt not only transit bus also automobile users. For example, the quoted parking rates discourage short-term parking, thus making business travel (as opposed to work, school or recreational travel), which largely depends on the auto, expensive and inconvenient.

As in most other cities, it is becoming recognized in Philadelphia that the policies which have led to the present transit crisis cannot be followed any longer and that reappraisal and drastic improvement must be undertaken in the near future. Recognition of this need has begun to bring constructive action from public bodies at different levels, aimed at careful planning and major improvement of the total transit system. The transit situation in the Philadelphia metropolitan area is a subject of interest not only to the local operating agencies, the planning commission and the city, but also to the governors of the two states. For instance, when a financial crisis led to a request to raise fares from 35 to 40-45¢, the Governor convinced the Pennsylvania Legislature to provide a form of subsidy known as "purchase of service" in order to maintain the 35¢ fare.

Recently the board of SEPTA adopted a \$1.37 billion, six-year capital improvement program. Such a large expenditure should result in a modernization of public transit on a different order of magnitude from efforts undertaken in the recent past. The funding for this program, however, has yet to be secured from various sources.

## PUBLIC TRANSIT

The basic transit system, which was developed during the period of construction of high-quality transit facilities prior to 1930, consists of two major rapid transit lines. These have recently been complemented by a third, the newly constructed Lindenwold Line, and a very well developed network of commuter railroad lines leading out of the city to the southwest, northwest, north and northeast. The Philadelphia urban rapid transit system is better than these in all but three or four other cities in the United States. Nonetheless, it is inadequate for the city's needs, particularly with respect to area coverage. While commuter rail systems serve the suburbs, service in the inner city is insufficient. Compounding this problem are those arising from use of old equipment and dilapidated stations.

The main public transit carrier in the area is the Southeastern Pennsylvania Transportation Authority (SEPTA), which recently purchased two private companies, the Philadelphia Transportation Company or PTC, now known as the City Division of SEPTA (acquired in 1968), and the Philadelphia Suburban Transportation Company, now known as the Red Arrow Division (acquired in 1970). SEPTA now carries over 75 percent of all weekday transit passengers in the metropolitan area. In addition to SEPTA, however, there are four other major transit operators and some eleven minor companies operating small bus fleets, mostly in suburban areas. The major agencies are:

Penn Central Railroad. Operates six commuter railroad lines, all originating at Suburban Station (at City Hall) and radiating into different lines west of the 30th Street Station.

Reading Railroad. Operates seven commuter railroad lines from the Reading Terminal, a short distance east of City Hall. Plans to connect the two stub-end terminals by a four-track tunnel may materialize in the near future. The connection would considerably improve the distribution of passengers in the CBD and result in increased operational efficiency of both systems.

Port Authority Transit Corporation. Operates the 14.5 mile-long Lindenwold Line from the city center to the southeastern New Jersey suburbs.

Transport of New Jersey, formerly Public Service Coordinated Transport. Serves Southern New Jersey, operating a number of lines from the New Jersey counties into the center city of Philadelphia.

Other transit operators include Schuylkill Valley Lines, Auch Interborough Transit Company, Philboro Company and several others. Basic data on the five major operators are given in Table 13.

Philadelphia's park-and-ride system is reasonably well developed. There are approximately 22,500 spaces in all facilities in the area, and they are generally well utilized. Nearly all park-and-ride facilities are at the stations of rail systems (suburban railroads, Lindenwold Line and SEPTA rail lines) and are provided and maintained by the operators. With the exception of those of the Lindenwold Line, however, the size, capacity and condition of these facilities could stand considerable improvement. Many are unpaved and unlit. There is scarcely any public information made available about them. To make matters worse, one cannot even find a train schedule once one has managed to find one of the parking lots. It is hoped that the comprehensive study of parking in the city, including park-and-ride facilities, which has recently been undertaken by the DVRPC, will recognize these deficiencies and recommend corrective action.

During the period of transit development and modernization prior to 1930, the Philadelphia transit system was one of the best in the country. Such efforts ceased about 40 years ago, however, and the system has not only failed to keep pace with the development of the city and its surroundings, but has deteriorated considerably. With the exception of the Lindenwold Line, the rapid transit system has not been significantly expanded during the last 40 years. Coverage of the city's area by rapid transit is inadequate; the whole system consists of two lines going through the city center (Market-Frankfort and Broad Street lines) and a short spur line (Ridge Avenue). Surface services have suffered greatly from increased traffic congestion, permission of parking along streets utilized by transit vehicles, the fact that stop lights are out of phase with new speed limits, and the nearly complete lack of traffic regulation and enforcement during recent years. Surface service is very irregular and buses average no better than 6-8 mph.

Another significant problem which has intensified particularly over the last several years is crime and vandalism. SEPTA estimated that the Broad Street Subway alone has lost 20,000 daily passengers in recent years because of frequent crime incidents and dilapidated stations. The cost of repairs

Table 13. Transit agencies in the Philadelphia Metropolitan Area.

Transit Agency	Type	Prim. Service Area	Modes Operated	No. of Routes	Miles of Route/Dou- ble Track	No. of Vehicles	Weekday Passengers
1. SEPTA — City Division	Public Authority	City, Suburbs	Rapid Transit Streetcars Trolleybuses Buses	3 13 5 81	24 78 21 965	500 424 132 1,485	197,000 126,000 32,000 445,000
1a. SEPTA — Red Arrow Division	Public Authority	Delaware Co.	Light Rail Buses	3 28	25 275	58 193	21,000 47,000
2. Penn Central	Priv., Lease to SEP.	SW, NW & N Sub- urbs	Commuter RR	6	63	263	76,000
3. Reading	Priv., Lease to SEP.	N. Suburbs	Commuter RR	7	-70	170	51,000
4. Port Auth. Tran. Co.	Public Authority	S. New Jersey	RT	1	14	75	40,000
5. Transport of N.J.	Private	New Jersey	Buses	19	410	221	30,000
6. Other Com- panies	Private	Suburbs	Buses	81	862	277	56,000
TOTALS: Approx. 16 agencies	3 Public 2 Semi-Public 11 Private		Commuter RR RT Other Rail Trolleybuses Buses	13 4 16 5 209	133 38 103 21 2,512	433 575 482 132 2,176	127,000 237,000 147,000 32,000 578,000
Taken from Source 1.				247	2,807	3,798	1,121,000

from vandalism has exceeded \$800,000 per year. In contrast, Cologne, Germany, has recently reported as a "major problem" that the cost of vandalism in that city's transit system will reach an equivalent of \$20,000 in 1972.

A number of improvements to the transit system have been undertaken in recent years. Three hundred replacement buses are currently being delivered and an equipment order to completely replace pre-war commuter rail equipment is scheduled to arrive between 1974 and 1975. Lines are being extended, particularly into the suburbs. The Broad Street Subway has undergone the most recent extension. Some stations have been renovated, despite SEPTA's discouragement when they thoroughly cleaned and painted all stations immediately after their takeover, only to have a wave of vandalism and graffiti destroy their efforts. Within a few months, station conditions were worse than ever before. These improvements have not been sufficient to offset the decline in public transit ridership due to decreased patronage, increasing costs, and other negative external impacts. Consequently, the system presently offers service which is in many respects not so good as it was several decades ago, and certainly far less adequate and efficient than the service offered in European cities with modern transit systems.

Statistics on the travel habits of Philadelphians graphically illustrate the extent of this decline. With 845,000 passenger cars, the average number of persons per car in the City of Philadelphia was 2.3 in 1970; in 1960 it was 4.2. The transit riding habits of city residents are indicated by figures, based on SEPTA passengers only, of approximately 125 rides a year per capita, down from 150 rides a year per capita in 1960. Both these figures are still relatively high for a U. S. city of the size, character and population density of Philadelphia. However, the corresponding figures for Hamburg, Germany, are approximately half again as high. Transit ridership statistics for the period 1956-1970 in Philadelphia are shown in Table 14.

Since the population of Philadelphia in 1960 was considerably larger than that of Hamburg in 1970 (the city by some 10 percent, metropolitan area by 90 percent) and population density in the city was more than two times as great (15,000 versus 6,400), it would appear that the much higher transit ridership in Hamburg is due principally to the much higher quality of its public transit.



Table 14. Transit ridership in Philadelphia.

<u>Year</u>	<u>Annual Passengers (millions)</u>	<u>Year</u>	<u>Annual Passengers (millions)</u>
1956	371	1963	271*
1957	359	1964	289
1958	343	1965	279
1959	334	1966	282
1960	328	1967	277
1961	316	1968	281
1962	309	1969	266
		1970	254

\*Sudden drop due to 19-day transit strike.

Taken from Source 2.

#### PRESENT STATE OF INTEGRATION

The basic integration of the City Division of SEPTA's system is to some degree satisfactory: there are transfers between all lines which intersect; the base fare is 35¢ and transfers cost another 5¢. There are a number of transferring stations, and transfers at common points are considered in scheduling as much as physically possible. The network of lines, however, is not well integrated and there is some duplication of services and less than optimal utilization of the rail systems.

The Red Arrow Division of SEPTA is for all practical purposes, particularly as far as the passengers are concerned, as separate from the other SEPTA services as it was when the two operations were under different ownership. Since there are no transfers between the two divisions and flat fares are used on all lines of the City Division of SEPTA, passengers traveling some six miles to the west must pay a total fare of 70¢, while those traveling some 15 miles to the northeast must pay, including one transfer, only 40¢ (see Figure 4). It is obvious that more integration between these two divisions within SEPTA itself is needed.

The Penn Central and Reading Railroads, although independent private companies, have been in close contact with both the City of Philadelphia and SEPTA for a decade. The arrangement has been that SEPTA purchases commuter service from the railroads and thus prescribes exact schedules and levels of

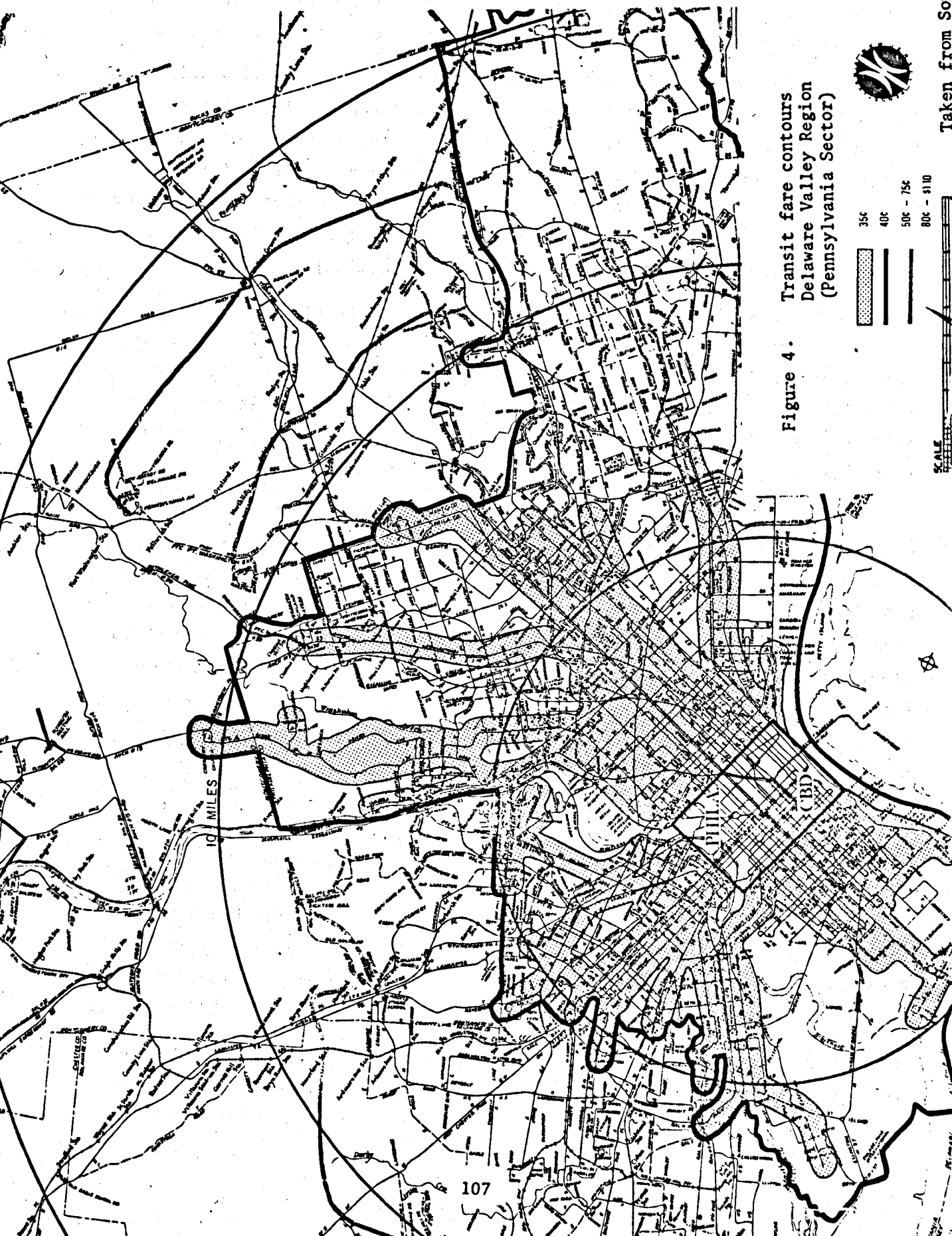


Figure 4. Transit fare contours Delaware Valley Region (Pennsylvania Sector)



Taken from Source 3.

service on the commuter lines. This integration was completed with the 1972 SEPTA take-over of the commuter passenger services of these two railroads.

There are a number of feeder bus lines to commuter railroad stations for which transfer arrangements already exist (see Figure 5). These lines provide very useful services, but overall integration is not yet satisfactory. For example, in the city center there are no transfers between the railroads and SEPTA. This is a particularly serious problem since each of the two railroads terminates in the city and thus serves only a few points (Penn Central, two stations; Reading, one station).

The Lindenwold Line is operated by the Delaware River Port Authority, an agency completely independent of SEPTA. Satisfactory transfer arrangements (joint stations with transfer facilities, transfer fares, etc.) do exist between the line and several of SEPTA's lines, although it cannot be said that the two systems are completely integrated. For example, neither system includes the other in its information program.

Transport of New Jersey, Southern Division, currently operates buses in New Jersey portions of the Philadelphia metropolitan area, including the radial lines from those areas into the center city of Philadelphia. This system is completely independent of all other transit systems in the area; it allows no transfers to SEPTA, and it is not coordinated in any way with the Lindenwold Line.\* This has been resulting in a wasteful duplication of services which hurts both Transport of New Jersey and the Lindenwold Line while inconveniencing the passengers who must pay separate fares and get information on routes, schedules and fares from separate sources.

Among the smaller bus lines, which operate primarily in individual suburban areas, there is virtually no coordination with either SEPTA or any other system.

In review, while it is clear that there has been considerable effort to integrate various services, it has been more incidental than systematic. Transfers and coordination of service are provided between individual routes, rather than on an area-wide basis. A public transit rider in Philadelphia

\*In November 1972, TNJ began restructuring its route network to provide feeder service to the Lindenwold Line.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION  
 FARE COORDINATION  
 BETWEEN  
 COMMUTER RAILROADS AND SURFACE TRANSIT  
 DVRPC REGION

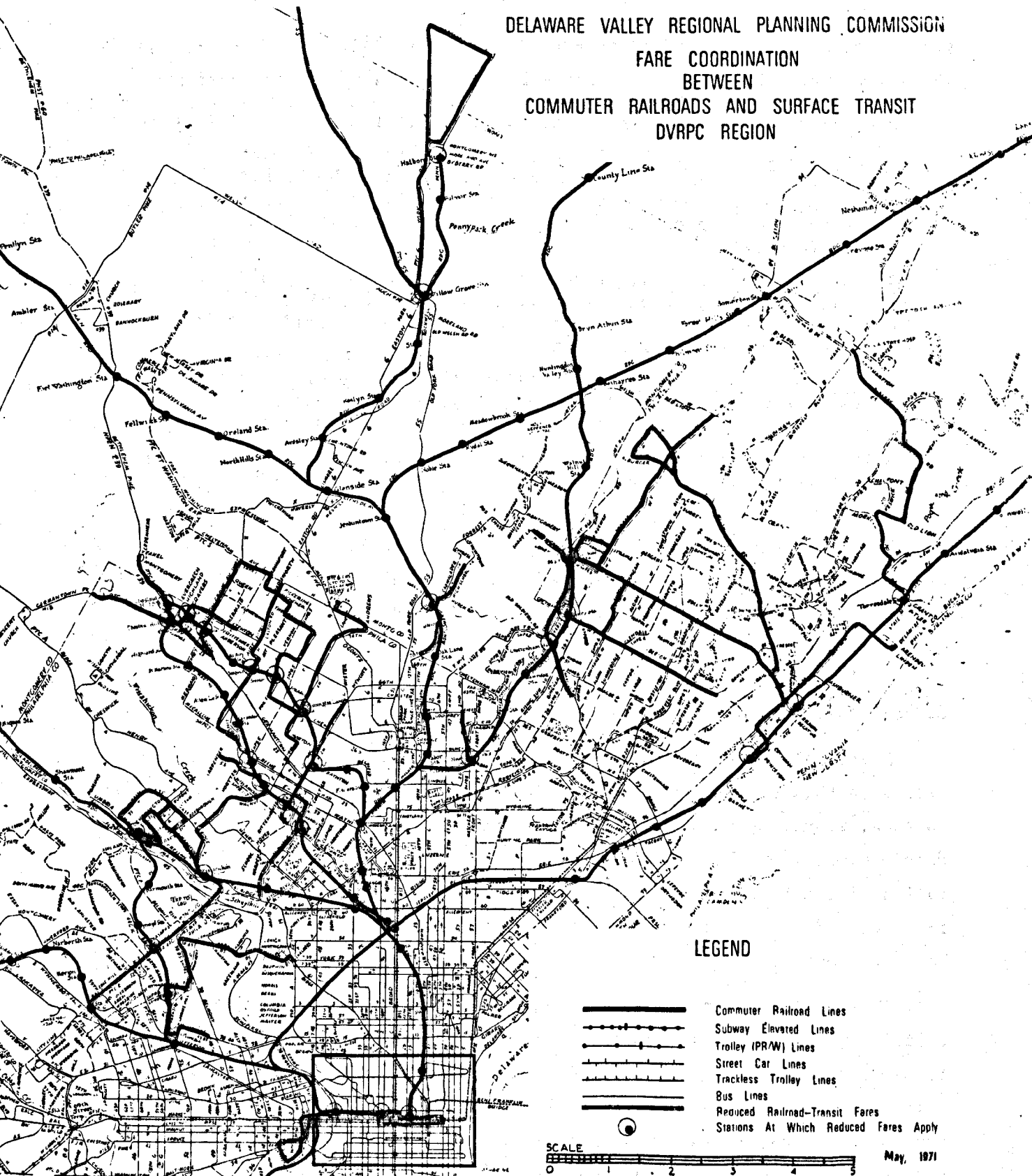


Figure 5. Existing coordination of fares in Philadelphia.  
 Taken from Source 3.

today does not have a unified service available to him; rather, he is expected to have or collect on his own information about each agency's services.

Present deficiencies in integration fall into four basic categories:

Intra-agency, intramodal. Examples are the absence of joint fares between the Norristown Light Rail Line and the Market Street Subway and between buses of the City Division and Red Arrow Division of SEPTA, all of which meet at the 69th Street Terminal.

Intra-agency, intermodal. Examples are duplication of rapid transit service by parallel bus lines and the failure to indicate bus routes which provide feeder service to rapid transit lines on some transit route maps.

Interagency, intramodal. Examples are the absence of arrangements between Transport of New Jersey and SEPTA buses; and between the lines of Penn Central and Reading Suburban Railroads.

Interagency, intermodal. Examples are the lack of coordination between commuter railroads, rapid transit, and many bus lines.

These examples indicate that despite considerable efforts and rather significant results in coordinating services, introducing transfer arrangements, and merging of companies, Philadelphia still offers textbook examples of inadequate integration of transit services.

#### CURRENT INTEGRATION EFFORTS

Nearly all current transit problems in Philadelphia, as in most other cities in this country, can be traced to several decades of financial difficulties, resulting in a lack of adequate facilities and sufficient, up-to-date equipment and highly qualified personnel. The whole system has fallen victim to the vicious circle of decreasing patronage, decreasing revenue, and deteriorating service. It can recover only with significant help from outside.

The problems which exist are recognized by many professionals and public officials, and there is increased awareness of the importance of modern public transportation to the economic and social progress of the city. Recent years have seen a significant efforts to improve public transportation through various measures, including steps toward integration of the several systems and services. The most significant step has been the acquisition of the pri-

vate PTC and the Red Arrow systems by SEPTA, a public agency. In 1972, SEPTA will probably take over the commuter services of both Penn Central and Reading railroads. With this acquisition these four major transit systems will be organizationally unified and real integration can begin. Interagency integration must still be affected among SEPTA, Transport of New Jersey and several minor operators.

Integration of SEPTA with PATCO has already been achieved, in the sense that passengers have limited transfers between the two lines, but further developments may be complicated by the west extension of the Lindenwold Line. While this extension is highly desirable in terms of increased efficiency of the whole rapid transit network in the city, it will increase the interaction of the two systems. At this stage, it is premature to discuss what kinds of arrangements might be proposed.

Coordination of Transport of New Jersey bus services with the Lindenwold Line is a logical and highly desirable measure that should provide for greater efficiencies in operation as well as improve services for passengers. Over the summer of 1972, the New Jersey Legislature approved the funds needed to support the operation of TNJ buses as feeders to the Lindenwold Line, rather than as a competing service. In operation since November 1972, this new system provides for transfers between the two lines.

Prospects for integration of services of Transport of New Jersey with those of SEPTA in the City of Philadelphia are presently quite remote; there is no major attempt underway to study this problem. This illustrates how jurisdictional separations, especially at the state level, operate as barriers to integration, even where there are no physical obstacles to be overcome. In this case, the Delaware River has adequate bridges and does not represent a physical barrier to integration, but as a state boundary it represents a political one.

There are at present a number of proposals for achieving integration between SEPTA and TNJ. Among these are: that SEPTA be expanded and take over the Lindenwold Line; that an agency be created to operate transit, airport,

and bridge facilities in the Region; and that a bi- or tri- state agency be created to operate all transit. None of these proposals has advanced very far, but the latest steps toward interagency integration (SEPTA's takeover of commuter railroads; the coordination of the Lindenwold Line with TNJ) diminish the importance of this problem.

## OBSTACLES TO EFFECTIVE INTEGRATION

Philadelphia's transit system will require extensive upgrading in quality and quantity in order to derive full benefits from any further integration efforts. Three examples are given below to illustrate this point:

Example 1. The whole City Division of SEPTA operates on the basis of a flat fare of 35 cents. This fare discourages use of the system for short trips and consequently results in lower revenues. The flat fare allows little flexibility in intermodal transfer arrangements, introduction of special policies with respect to individual modes, or optimum deployment of different types of services. The system has never been changed partly because flat fares are easy to collect, partly because they are a tradition, and partly because the technical and operational means of introduction of other types of fare collection are not well known to the carriers.

Example 2. Some of the systems, such as SEPTA's Red Arrow Division, do not have a map which shows all lines. Thus even the most determined passenger can never fully use even this single division unless he undertakes on his own to find out about each individual line. No integration is needed to eliminate this deficiency; it is a simple matter of drawing up a complete map, printing and distributing it.

Example 3. One existing effort towards integration is the provision of shuttle bus lines at a very low (15¢) fare which connect major stations to specific destinations. An example of such service is bus line D-1, operating from the 30th Street Station to the Civic Center, Hospital Complex and University of Pennsylvania. Running time on this line amounts to only 7-10 minutes each way. The distance is so short that the line can be useful only if it offers frequent service. However, this line operates at headways of 24, 22, 10, 23, 25 and 27 minutes without any regularity and with extremely long layover times at the terminal. Information about this line can be

obtained only on the shuttle bus itself. Therefore, despite the fact that this service could potentially attract a significant number of riders, it probably does not carry more than 30-50 percent of its potential ridership.

These examples reveal the kind of improvements which are essential to achieving full benefits from integration. This does not, however, by any means imply that efforts to integrate all transit services should be delayed until all systems operate perfectly. Recognizing that integration is a lengthy, complex organizational process, work to upgrade present systems should accompany preparations for integration. The unifying goal of this two-pronged effort should be the creation of a total system of public transportation throughout the metropolitan area such as has been created in Hamburg or could be created by improving the quality of service in those U. S. cities where institutional integration of transit systems has been achieved.

Allowing some generalization in order to get an overview, one can identify four major obstacles to integration of transit in the Philadelphia metropolitan area.

1. Lack of Funds. The financial situation of nearly all transit agencies in the area is such that not only are major expansions and improvements impossible, but even changes which would require relatively moderate investments and which would yield very good returns cannot be undertaken.

At the time of SEPTA's takeover of the Philadelphia Transportation Company the PTC claimed to be operating without a deficit. This claim was misleading, however, since the PTC had failed to maintain many of its facilities. Thus when SEPTA began operations, the system was actually operating in the red. A costly comprehensive maintenance program and the financial burden of increasing labor costs forced SEPTA to consider a fare increase from 35¢ to 45¢, prevented only by a \$26 million subsidy approved by the state legislature.

Suburban railroads are running with deficits of \$6-9 million a year. Up until now, two-thirds of this deficit has been absorbed by the city and state through SEPTA, and the rest has been assumed by the railroad companies. With the imminence of SEPTA's takeover of these commuter services, the state legislature is now trying to resolve plans for future subsidies.



Some significant steps toward integration could be affected through relatively little investment, such as introducing facilities for graduated fares and extending information system. The transit operators presently cannot finance even these improvements.

2. Lack of Management Skills. Many of the existing inadequacies of public transit operation are the result of failure of management to collect and maintain inventories and performance records, to keep up with new techniques, and to evaluate their own services, identify weaknesses, and institute corrective measures. Even greater management skills are required to operate a complex multi-agency, multi-modal transportation system. It is essential that the quality of management be improved as a part of a total effort to achieve transit integration.

3. Organizational problems. It is only natural to expect that organizational problems will be a major focus of integration planning. Each agency is interested in maintaining or expanding its own domain of jurisdiction and in preserving its financial status. Even local governments have this attitude: for example, the States of New Jersey and Delaware are not anxious to get involved in financing SEPTA, which is based in the State of Pennsylvania. Furthermore, the labor unions can be expected to have their own requirements. In general, there is bound to be a certain degree of resistance to cooperation due to the narrow interests of individual parties and their disregard for the overall needs of the public and the development of the region. Unfortunately, this attitude is often displayed not only by private companies and labor unions, but also by public agencies.

4. Lack of leadership. Even if there were no obstacles to integration, leadership is required to provide the initiative and the driving force for the introduction of such changes. At the present time there is no organization which is in such a position. If this role were assumed by one of the existing agencies, one might expect that its peer organizations would express even more resistance to cooperation.

#### OVERCOMING THE OBSTACLES

One may ask whether it is realistic to select Philadelphia, with all its problems, as one of the areas for demonstration of transit integration. The answer to this question is strongly positive for two reasons. First, there

are certainly many cities in which integration would be simpler and could be achieved with less effort, but where it would result in much lower, if at all tangible, benefits. Integration of two competing routes belonging to two bus companies in a small town, for example, would be relatively easy to achieve, but such a demonstration project could have only a limited impact. On the other hand, the complex situation in Philadelphia, if satisfactorily resolved, could potentially be one of the best demonstration projects undertaken in transit integration so far. Secondly, the problems described above appear to have a reasonably good chance for solution, particularly at this time. Approaches to overcoming these obstacles are outlined below.

1. Finances. Both Pennsylvania and New Jersey are already providing both capital and operating financial aid to their transit agencies. Indications are that both states would be willing to consider increasing their financial commitment if they could expect not simply to maintain existing service (as is the case with the purchase of service agreements), but to make a significant improvement in the regional transit system as a whole. However, it would be more logical and effective for the main initiative in financial improvements and the organizational initiative to come from UMTA.

2. Professional competence. Difficulties in substantially upgrading professional competence within the agencies could be overcome if financial means were found for additional professional positions and use were made of consultants.

3. Organizational problems. Although organizational problems are still very serious, the situation has begun to change for the better. Indications are that the only major private operator, Transport of New Jersey, may be willing to cooperate with public agencies if a financially satisfactory arrangement is found; the public organizations such as SEPTA and PATCO may be induced to take a more positive attitude toward integration through pressure from high public officials and financial inducements from UMTA.

Naturally, the success of the organizational solution depends on the method of integration selected. Although the type of organization which would be optimal for this purpose requires considerable deeper study, it seems clear at this time that a total merger of all transit agencies would

be infeasible and unadvisable in the foreseeable future. There are good reasons, as mentioned above, for not merging PATCO with SEPTA, and any move to take over Transport of New Jersey would be a lengthy operation at best. The most practical—and probably the only—way to overcome organizational resistance would be to find a way of protecting the existing rights and financial positions of individual agencies. This could be achieved through the formation of a transit federation, since the preservation of the independence of individual operators and their financial status is the basic concept behind federation.

4. Leadership. Conversations with various high-level government and transit agency officials over the course of this project have clearly revealed that the great majority of these officials are highly interested and very willing to work toward transit integration. Their attitudes, combined with the personal interest shown by the two governors and support from UMTA, could create the necessary impetus for the creation of an integrated transit system. UMTA's initiative in organizing a demonstration project should, however, remain the major force in organizing available leadership.

#### PROPOSED APPROACHES TO INTEGRATION\*

Philadelphia appears to offer a number of possibilities for limited attempts toward integration, possibly through demonstration projects, which can be worked out well within the existing legal and organization structure. Four mini-projects, covering an honor fare system, integration and graduation of fares, network integration, and an integrated public information system are suggested below for considerations within the SEPTA system. Local attitudes towards integration and timing considerations are also reviewed. Finally, steps towards establishing an area-wide transit federation in Philadelphia along the lines of the Hamburg Transit Federation are presented as a long-range solution which will consolidate and extend these partial approaches.

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\*The checklist of transit integration activities for Philadelphia is given at the end of the section.

## Integration Efforts Feasible Within SEPTA

**HONOR FARE SYSTEM.** The honor fare system is superior to any other fare collection system under the present conditions of rising labor costs and need for sophisticated graduated fare structures. It is the only system which allows adequate fare collection on all types of services, not only at major stations, but also in vehicles, and which involves neither extremely sophisticated and expensive equipment nor excessive labor. The effectiveness of this system is testified to by the fact that most progressive European transit systems have adopted it. Gothenburg, Hamburg, Frankfurt, Cologne, Stuttgart, and Rotterdam have initiated honor fare systems, along with most other cities in The Netherlands, Scandinavia, and Switzerland. These European systems have had excellent results; there have been relatively few problems in accustoming the public to the system. Public acceptance has been high, a tremendous amount of manpower has been saved, and no substantial increase in cheating has occurred. While most cities need to increase the fine for riding without a ticket, on the whole, the system has been overwhelmingly successful.

Introduction of such a system in U.S. cities would be a substantial change from the existing fare collection methods, and would require careful preparation. In Philadelphia, not all lines would be suitable for introduction of this system. The Broad Street subway, for example, would be a poor choice. On the basis of its history of high vandalism rates, one could expect all kinds of abuses and extreme difficulties in enforcing the honor fare system. On the other hand, the commuter railroads are well-suited for such a system. The current commuter ridership is drawn from a socioeconomic class which would respond well to the system, and there is no rush or extreme congestion in these trains.

Currently, tickets for commuter rail travel are sold both at the stations and by conductors. During hours when stations are open, there is a 10¢ surcharge on tickets purchased from a conductor. Tickets are collected as the conductor walks through the cars, and he has nothing but his memory to assist him in identifying non-paying riders. In addition to his ticket collection duties, the conductor is expected to announce station stops, open and close doors on both sides of the train, assist entering and exiting passengers, and intervene in any emergencies.

The central problem on commuter railroads is the extremely inefficient use of the labor force. Commuter railroads in Philadelphia are presently operated by a driver, a trainman, and one conductor for about every two cars. Thus a single car operating on a Sunday requires a crew of three men. A ten-car train usually requires a crew of seven men. While crew size is subject to union contracts, some reduction of crew would be possible within the existing contract. At present, this large a crew is still considered to be required for ticket collection, despite extremely high operating costs during the morning and evening peaks. Most of the crew's duties take very little time and some, such as those of the flagman, have become obsolete. It is no longer necessary for conductors to stand at the door to assist entering and exiting passengers, for example. These inefficient labor practices contribute to the deficits which must be covered by public funds.

Philadelphia has already shown interest in the problem of fare collection on its commuter rail systems. In 1966, SEPTA contracted with Batelle Memorial Institute of Columbus, Ohio, to study this problem. The two-section system of fare collection suggested by the study was complicated and unsatisfactory from the point of view of implementation. It was recommended that on sections of the line closest to the city there would be a closed barrier system through which ticket collection could be carried out before passengers board the train. Then, as the train proceeds away from the city conductors would board the trains at certain points, remaining on to collect fares all the way to the outermost terminals. SEPTA authorities were quite unhappy with the study and never pursued these recommendations.

The delays prior to the takeover of the Penn Central and Reading Lines by SEPTA in October 1972 discouraged investigation of fare collection practices by the railroads. The takeover, originally scheduled for July 1972, was delayed because of SEPTA's requests for adequate funds to operate and improve the existing commuter services. Now that SEPTA is in control, cooperation to initiate an honor fare system should be good.

The suggested demonstration recommends installation of ticket-issuing machines in all major stations and on at least one car of each train. In

addition, there would be small, box-like, easily installable ticket canceling machines by every door on train cars. Passengers would buy tickets either over the counter in stations or from the automatic ticket machines. Cancellation would take only 2 to 3 seconds when the passenger walks into the car. From time to time, there would be spot checks, and those passengers discovered riding without a valid ticket would have to pay a penalty 10 to 20 times the value of the ticket required.

The new cars on order to completely replace existing commuter cars will have some features necessary for this plan. They will be equipped with a public address system, which will eliminate the need for the conductor to announce station stops. A reduced crew would be retained only for opening and closing the doors and to be on hand for emergencies.

A University of Pennsylvania team has studied the problem of fare collection on commuter railroads and reviewed several alternative systems. The study, which has not been released yet, found that the introduction of an honor fare system would be fully feasible and would result in very substantial savings in operating costs as well as in increased efficiency of operations. The initial costs of introducing the necessary vending machines, public information, etc., would not be high, and would be recovered in operating cost savings in a short period of time. Furthermore, it is expected that commuter rail patrons will be highly responsive to this system.

The introduction of an honor system on commuter railroads would also be convenient because of the present separation of rail from other modes of transit. Thus the difference in fare collection systems would not present any problems to transferring riders. Since the commuter lines are separately operated, the system could be tried on one line and later expanded to other lines. The outcome of such an experiment would permit analysis of the feasibility of applying an honor system to transit lines which are more crowded and have a more diverse ridership.

**FARE GRADUATION AND INTEGRATION.** In a city the size of Philadelphia it is highly advantageous to have a graduated fare system. Although flat fares are simple and convenient for users, they usually cause heavy loss of short-distance riders, and consequently loss in revenue to the transit agency. Although SEPTA made a study of graduated fares several years ago, it was decided that time to postpone any major change.

Philadelphia would be an excellent city for testing various approaches to graduated fares, such as zonal fares, broadly graduated fares without transfer privileges, small steps of graduation with transfers, and different types of transfer arrangements. Several different systems of fare collection could be explored, including personnel-supervised and automated types. Due to the large size of the total system, testing of different fares and collection methods should be first done on one segment of the system and if proven feasible extended to the rest of the system.

Once fares are graduated, the problem of transfers between lines, particularly between the Red Arrow and City Divisions, would become easier to solve, and passengers would no longer have to pay double fares. However, allowing transfers between the Red Arrow and City Divisions as provided elsewhere in the city would result in a substantial reduction of revenues to SEPTA. This change would therefore have to be supported either by an overall fare increase or by external funds. It would therefore be necessary to arrange for financial support in connection with any revision of SEPTA's fare structure.

**NETWORK INTEGRATION.** A significant step toward integration would be made if SEPTA's network was analyzed and modified to provide coordinated services. The benefits of network integration would be in the form of reduced requirements for rolling stock and lower operating costs, as well as better transit service on the city's most important lines.

**INTEGRATED INFORMATION SYSTEM.** At present, a passenger on SEPTA finds it difficult to locate a map of the total system and schedules for the several lines although maps of important lines sell for 35¢. If he wants to continue his trip by a different system, he must obtain this information elsewhere. There is no central information service and no way for a passenger to get complete information on transit services in the Philadelphia area. While SEPTA has a limited telephone information service, the number is hard to find, and information on non-SEPTA services is minimal. One can find bus stops only by looking for a "No Parking: Bus Stop" sign. A project to provide integrated information about transit services throughout the entire Philadelphia metropolitan area could be carried out in the following steps:

1. Acquaint all agencies with the purpose and scope of the project and with the potential benefits they would derive from it.
2. Collect all data necessary for the information system as well as the desires of individual agencies with respect to the presentation of information on their services.
3. Prepare a map of the area, showing all routes. Schedule information would take the form of an information booklet, with format to be determined by interagency agreement, with individual brochures provided for each route.
4. Select a method of information distribution. This would include sale of the maps, booklets and brochures to individual agencies at cost. The printing of maps showing lines of all agencies should be only slightly more expensive than printing of maps for a single agency. Discounts for larger quantities might even balance this out, and individual agencies would have a more useful publication for much the same cost as for producing their own system maps.
5. Establish a procedure for continuous updating and publishing of new material. This would include establishment of some systematic exchange of information among agencies and an allocation of responsibility, probably within the largest agency, to be responsible for this updating.

If the project shows that the new, integrated information system requires no additional expenditure on the part of the cooperating operators, it would probably be continued on a permanent basis.

#### Local Attitudes Towards Integration

When interviewed by a member of the study team, both the commissioner and assistant commissioner of transportation for the State of New Jersey, as well as the deputy secretary for area and local transportation and the director of the Bureau of Mass Transit Systems for the Pennsylvania Department of Transportation, showed interest and gave assurances of cooperation in integration attempts in Philadelphia.\* The director of the Delaware Valley Regional Planning Commission also agreed that integration could be extremely useful, and anticipated the cooperation of this agency.

In an interview following the agreement to coordinate the Lindenwold Line with TNJ buses, at a time when SEPTA's takeover of commuter railroads was close to realization, SEPTA's chairman of the board expressed the

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\* Individuals contacted are listed in Appendix A.



opinion that institutional integration of transit operations in the Delaware Valley Region is no longer a critical problem. He has rejected various ideas for integration of transit agencies with the Port Authority, Airport Authority, or similar agencies, on the valid argument that these agencies have entirely different interests and skills than those required in public transportation. The chairman did, however, express interest in steps toward integration within SEPTA.

Most encouraging was the lively interest of the project leader for SEPTA's planning study, who is also the assistant general manager for planning and development, and of his colleague, the manager of planning and marketing research for SEPTA. These two men expressed interest in initiating the miniprojects discussed earlier, and suggested considering a project integrating suburban transit services with the existing system. This would entail transfer agreements among all operators, opening new lines in suburban areas, and introduction of coordinated suburban feeder services and an honor fare system.

All in all, Philadelphia transit authorities were interested in and responsive to INTERPLAN's suggestions for implementation of integration techniques.

### Timing

At the present time SEPTA is about to initiate the \$1.5 million Master Plan Program, a major planning study which covers several aspects of the approaches to integration listed above. The study will include an analysis of graduated fares, for example. Any proposed demonstration should be carefully coordinated with this study, which is scheduled for completion within 22 months. It has been funded and awaits only the Department of Transportation's approval of consultants. Since the honor payment concept and other proposed steps toward integration are not being directly considered within SEPTA's present planning study, detailed planning for these projects could be undertaken immediately. Since SEPTA's cooperation is essential in any introduction of a new concept, the interest expressed by its officials is encouraging.

## LONG-RANGE FEASIBILITY OF AN INTEGRATED TRANSIT AUTHORITY

Each project described above would affect one area of transit operations and could produce significant results and major improvements. The complete solution to transit integration in Philadelphia can be achieved only through a more systematic integration of transit services in the area, requiring greater effort but promising more significant results.

The ideal solution for integration of transit in the Philadelphia area—total merger of all agencies—is not possible at this time without mass recognition and enabling legislation. Therefore, some other cooperative arrangement which would still lead to integration of services and assure the realization of benefits to both passengers and operators is required. The federation concept developed in Hamburg is flexible enough to be applied to the complex situation existing in Philadelphia, providing that adequate preparation is made and the formula for revenue redistribution is carefully worked out.

A good argument can be made that Lindenwold Line should be included in the same operating agency as other transit facilities in the metropolitan area. However, the Lindenwold Line is currently financed and operated under vastly superior conditions to SEPTA's system, and it appears likely that a total merger of this kind would result in a deterioration of the excellent service provided by the Lindenwold Line rather than in an improvement of SEPTA's services. Thus, such integration does not appear to be practical at all under present organization and financial conditions.

Several top-level executives of governmental agencies and planning bodies concerned with public transportation have been asked to comment on this idea. Since most of the agencies are public and are receiving financial support from municipal, state and federal governments, government executives are expected to play an important role in any reorganization of transit. All contacted persons showed an active interest in the idea and expressed positive attitudes towards it. Some doubts were expressed about the readiness of the major organizations to cooperate. It was also commented that several important events of recent months (65-day-long bus strike in New Jersey, negotiations for take-over of commuter railroads by

SEPTA) might affect any major reorganizations, though it is expected that the takeover of the railroads will be resolved in the immediate future.

Some specific problems which would have to be solved are:

1. The Philadelphia metropolitan area extends into two states, which creates legal difficulties.
2. Some agencies are public, others are private; some are exclusively in the transit business, others have transit as only one of their activities.
3. Financial support to different agencies comes from different sources.
4. Labor union arrangements vary from one organization to another.

While these and other problems are certainly extremely complex, there do not appear to be any insurmountable obstacles. Hamburg faced similar difficulties ten years ago and was able to resolve them after five years of negotiations. In Philadelphia bi-state compacts have already been used for setting up similar organizations requiring interstate cooperation. It is difficult to assess whether the situation is more or less complex than it was in Hamburg. The most crucial difference is that all operating agencies, with the exception of DRPA's Lindenwold Line, are in a much more critical financial situation and offer a much lower level of service than any company in Hamburg prior to the formation of the Federation. On the other hand, Philadelphia might be able to obtain federal assistance, both professional and financial, in founding a transit federation.

While the basic form of the federation as devised in Hamburg can be applied, the distribution of functions between the federation and its partners might well require reformulation. The concentration of transit planning in the federation's hands, for example, and its relationship with the regional planning agency would be issues requiring study. The scarcity of qualified professional manpower in transit planning is a factor which favors centralized planning. The revenue distribution formula would also have to be modified because of different cost conditions.

Recommended steps towards founding a federation are:

1. Discuss in detail the concept and preliminary design of the federation with each potential partner. Allow the potential partners time to review the proposal and give their reactions.

2. Check the legal implications of the federation with particular emphasis on the roles of the two state governments and municipal authorities, working closely with the respective government officials.
3. Draw up the organizational structure of the federation and the distribution of functions, and devise the revenue distribution formula. This step will require the most detailed and time-consuming effort, since all potential problems will have to be faced and all operational details worked out.
4. Based on the agreements prepared in (3), formulate legal documents, obtain passage of necessary legislation, and obtain formal signatures from partners.

Both Pennsylvania and New Jersey are actively interested in the resolution of the public transportation problems in the Philadelphia area. The Governor of the Commonwealth of Pennsylvania and Governor of the State of New Jersey have directed their Secretaries of Transportation to look into this problem. Federal assistance in this effort would be well received by local agencies and would provide a strong incentive for cooperation by potential federation partners.

#### SOURCES

1. Urban Public Transportation in Delaware Valley, a report of the Public Transportation Committee, Regional Transportation Council, Greater Philadelphia Chamber of Commerce, 1972.
2. Bulletin Almanac 1972, published by The Evening Bulletin, 1972.
3. 'Statement Describing Region's Compliance with Requirements of U.S. Department of Housing and Urban Development, U.S. Department of Transportation for Two-Thirds Federal Funding of Transit Projects', Delaware Valley Regional Planning Commission, 1971.

Table 15. Checklist of Transit Integration Activities: Philadelphia Region.

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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INSTITUTIONAL

OPERATOR AND CITY/COUNTY/STATE PLANNING COORDINATION:

Set up Regional Planning Coordinating Organization

Legislated county/area commission for all regional planning	x <sup>1</sup>			
Formally constituted and appointed independent committee			x	
Ad hoc coordinating regional planning committee with effective financial support and power to make recommendations			x	
*No coordinating agency for all regional planning			x	

Requirements for Successful Demonstrations

Thorough area trip demand study	x			
Formulate area transportation policy including goals for public transit	x	x <sup>1</sup>		
Redefine public transportation region (e.g. extend transit district boundaries, etc.)	x			

Set up Single Transportation/Transit Planning Authority

Agency responsible for planning and financing all regional transportation activity				x
Agency responsible for overall planning, licensing and financing of all regional public transportation		x		
Transit district or single publicly owned operator handles public transit planning	s			x
*No single public transit planning authority (individual operators or their associations handle public transit planning under either open competition or area franchise).			x	

OPERATOR/OPERATOR COORDINATION

Set up Coordinating Structure for Intra-Region Public Transit

Single regional operator for all public transit (by merger or transit district legislation)				x
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\*All unstarred items are recommended integration activities. Starred items are included to complete the coverage of the list for evaluating existing program status.

<sup>1</sup>Revision needed.

x: Status for whole region, all operators.  
s: Status for part of region, some operators.

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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One major operator, several smaller ones	x		
Transit federation		x	
Transit community (separate agreements for joint tariff on routes, coordinated routes and schedules, some pooling)	s		
Tariff association (joint tariff and revenue distribution agreements)	s		
Route and schedule coordination agreements	s		
*No regional coordinating organization			x

Set up Coordinating Structure for Inter-City Transportation

Out-of-region operator participation in intra-regional coordinating organization				x
Coordinating committee of operators				x
Coordinating agreements between individual operators (e.g. airport or airlines, Greyhound and transit district)				x
Responsibility allocated internally within intra-area operator(s) for planning coordination with out-of-region/intercity demand				x
*No comprehensive approach to considering out-of-region trips	x			

TRANSIT/PARA-TRANSIT OPERATOR COORDINATION

Set up Coordinating Structure

Para-transit operator participating in intra-regional coordinating organization				x
Coordinating committee of operators				x
Coordinating agreements between individual operator(s)				x
*No coordinating organization	x			

PUBLIC TRANSIT FINANCING ARRANGEMENTS

Sources for Financing Capital Investment Other Than Rolling Stock

Revenue from fares				
Bond issue	x			

INSTITUTIONAL (continued)

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
Stock issue				
National loans				
Other debentures				
State grants	X			
National grants	X			
Specially designated local tolls				
Specially designated local sales taxes				
Specially designated local property taxes				
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes				
Parking and park-and-ride fees				
Revenue from other services, e.g. leases of land and air rights, advertising	S			
Leasing arrangements (transfer to operating costs)	X			

Sources for Financing Rolling Stock and Buses

Revenue from fares				
Bond issue	X			
State loans				
Federal loans				
Other debentures				
State grants	X			
Federal grants	X			
Specially designated local tolls				
Specially designated local sales taxes				
Specially designated local property taxes				
Specially designated local other charges or taxes				
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes				
Equipment trust funds				
Revenue from other services	S			
Leasing arrangements (transfer to operating costs)	X			

Sources for Financing Operating Costs

Revenue from fares	X			
Specially designated local tolls				

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Specially designated local sales taxes			
Specially designated local property taxes			
Specially designated state tax other than license or fuel taxes			
State motor vehicle operator licensing fees			
State motor fuel taxes			
Revenue from other service			

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please describe)

General City and State Subsidies (from general fund)

x



Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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### OPERATIONAL

#### ACTIVITIES REQUIRING COORDINATION WITH CITY/COUNTY/ STATE AGENCIES

##### Auto Parking Policy in Major Activity Centers

Control of parking by higher charges				X
Control of parking by graduated charges by distance from CBD or major activity center				X
Control of parking by time of day restrictions				X
Control of parking by street space restrictions	S			X
Control of parking by open lot space restrictions				X
Control of parking by in-building space restrictions				X
Encourage short-term parking and discourage long-term parking				X
*No significant parking policy	X			

##### Auto Use Restriction Policy

User charges, taxes, tolls, road pricing, etc.				X
Restriction of auto use by zone (auto-free areas)				X
Restriction of auto use by time (auto-free areas); supplementary licensing, etc.)				X
Restriction of automobile flow by traffic restraint schemes				X
*No policy on auto use	X			

##### Traffic Management in Support of Public Transit

Total centralized traffic control within major activity centers				X
Signal synchronization		X		
Bus priority system at signals	S			X
One-way streets planned for transit flow	S			X
Reserved lanes for auto and bus use by time of day		X		
Reserved lanes for car pool and bus use by time of day				X
Reserved lanes on city streets for bus only use by time of day		X		
Reserved lanes on city streets for bus only use all day				X
Reserved streets for bus only use				X
Reserved streets for minibus use and pedestrians		X		

OPERATIONAL (continued)

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
Bus stop locations chosen for transit and vehicle flow improvement				X
Offstreet docks for landing/unloading				X
Parking restrictions to aid transit flow	S			X
Exclusive freeway lanes				X
Reserved bus ramps for freeway entry and exit				X
*No consideration by local authority of impact of motor vehicle flow on public transit	X			

ACTIVITIES REQUIRING COORDINATION WITH GOVERNMENT AGENCIES AND LOCAL BUSINESSES

Changing Transit Demand Characteristics

Staggered work hours	X			
Sliding work hour system (flexitime)	X			
Encourage extended shopping hours		X		
Encourage multi-use development of major activity areas (office, shops, entertainment, apartments)				X
Encourage public transit user shopping trip orientation among merchants				X

ACTIVITIES REQUIRING OPERATOR COORDINATION

Basic System-wide Fare Structure

Zonal fare system	S	X		
Distance-graduated fare system (or time-on-system related)		X		
*Fare set by number of transfers	X			
*Flat fare system	S			
*Nominal fare system			X	
*Free fare system (no fare)			X	
Unlimited number of free transfers between routes of single mode only (restricted by time:				
interoperator				X
intraoperator				X
Unlimited number of intermodal free transfers:				
interoperator				X
intraoperator				X

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Limited number of free transfers between routes of single mode:	interoperator	X		
	intraoperator	X		
Limited number of intermodal free transfers:	interoperator			X
	intraoperator			X
*No free transfers		X		

Supplementary Policies on Fare Structure

Special rates for socio-economic groups	X			
Special rates by time of day (off-peak, night)	S			
Special rates by area of city (e.g. flat rate in CBD)		X		
Special rates by part of week (e.g. Sunday)	S			
Special rates by type of trip (e.g. tourist)				X
Daily system passes				X
Intermodal single trip combination passes				X
Seasonal passes				X
Free return trip in off-peak hours				X
*No supplementary policy on fares	S			

Fare Collection Procedures†

*Token system			X	
Scrip system (tickets)		X		
*Cash system	X			
*Exact fare system	X			
Pass system (including commuter rail)				X
Honor system (including commuter rail)		X		
Tickets sold on vehicles: Buses				X
Light Rail			X	
Tickets sold off-vehicles: Buses				X
Light Rail			X	
Automated machines on or off vehicles (including commuter rail)	S	X		X
Driver collects fare	X			
Conductor collects fare			X	
*No fare			X	

†Excludes commuter rail except as noted



OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Intermodal (with commuter rail) connection schedule coordination		X		
Rider oriented headways (reduced to no more than 15-20 minutes)	S	X		
Rider oriented schedule times (easily memorized)		X		
Out-of-region/intercity demand schedule coordination with airport	S		X	
Out-of-region/intercity demand schedule coordination with mainline railroad service			X	
Out-of-region/intercity demand schedule coordination with buses (Greyhound)				X
Extend service times (into night hours)	X			

Public Information System

Produced easily understandable and available system-wide schedules with routes, route maps and fares	S	X		
Schedule information at bus stops		X		
Route maps at most stops		X		
Route maps on vehicles		X		
Labeling of stops and vehicles		X		
Public relations program		X		
System-wide information near fare collection areas		X		
System-wide information on rapid transit train platform		X		
Clearly labeled information areas in stations		X		
Multi-lingual information provision				

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please Describe)

PHYSICAL AND TECHNICAL

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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ACTIVITIES REQUIRING NEW TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Automated Operations

Computerized traffic control with bus locator				X
Freeway ramp metering				X
*Computerized traffic control, no transit priority				X
Bus priority control equipment				X

ACTIVITIES REQUIRING NEW TECHNOLOGY WHICH CAN BE ADOPTED BY OPERATOR(S)

Automated Operations

Automatic train operation	S			X
Dial-a-ride	S			X
Bus operation control with bus locator and radio communication				X

ACTIVITIES REQUIRING PROVEN TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Facility Provision

Grade-separated busways			X	
New and converted park-and-ride lots		X		
Park, ride, and shop lots near the CBD		X		
Pedestrian walks (sidewalks) and bicycle paths		X		
Extension of pedestrian malls		X		
Off-street loading/unloading docks				X
Grade-separated pedestrian crossing	S	X		

ACTIVITIES REQUIRING PROVEN TECHNOLOGY WHICH CAN BE ACCOMPLISHED BY THE OPERATOR(S)

Facility Provision

Intermodal terminals	S	X		
Pedestrian facilities (escalators, moving sidewalks) in terminals	S	X		
Bus shelters	S	X		
Benches at bus stops	X			
Bike locks at bus stops		X		



## SECTION 5 SAN FRANCISCO BAY AREA

### SUMMARY OF PROPOSED APPROACH TO INTEGRATION

The San Francisco Bay Area presents a unique potential for a long-range, multifaceted pilot program in the development of an integrated regional transportation system. Such a program would include not only the coordination of public transit services through mechanisms such as federation or merger, but also the interrelation of public transit with para-transit and private transportation of people and goods throughout the area.

There is strong public interest throughout the Bay Area in attacking problems of congestion, air pollution and wasteful use of land through the promotion of mass transit and achieving an optimum balance between public and private modes of transportation. A regional agency, the Metropolitan Transportation Commission, has recently been created to coordinate transportation planning throughout the nine-county area and is already engaged, with the assistance of UMTA grants, in specific tasks of planning for the integration of public transit. The area has developed a new regional rail rapid transit system, and some local transit authorities have already taken the initiative in experiments with parking taxes, reserved bus lanes and reduced bridge tolls for vehicles carrying more than two passengers. Intermodal transfers between the Bay Area Rapid Transit and feeder bus service have implemented, and interagency use of an underground rail tunnel in San Francisco is planned.

At the present time transit service in the region is provided by 20 major public agencies and privately-owned companies, while traffic regulation, parking control, and provision of bridges, highways, and other roadways involve over 100 separate state and local agencies. Integrating all these concerns into a single region-wide transportation system can only be accomplished through a long-term, imaginative effort. Similar fragmentation of transportation responsibilities exists in all major metropolitan areas, and a successful pilot program in the San Francisco Bay Region could point the way to the solution of the nation's public transit and transportation problems.



Two specific approaches are outlined here that could contribute to the long-range realization of an integrated regional transportation system. These are focused on the coordination of public transit through changes in the institutional make-up of existing transit operations. The first presents a plan for a federation of independent public agencies and companies, based on the example of the Hamburg and Munich Verkersverbund (HVV and MVV). The second proposes a merger between three of the major public transit agencies into a single three-county district, based on the example of the London Transport Executive. Each is discussed in the context of local geographical, economic and political conditions and past and current efforts toward developing and coordinating public transit in the Bay Area.

The proposed approaches are not mutually exclusive. Not only is it possible to accommodate a merger of three separate systems within the larger framework of the transit federation, but it is also possible that the total membership of the federation may eventually be absorbed into a single regionwide transit agency.

## THE CITY AND ITS TRANSPORTATION REGION

San Francisco is the major urban center of the nine counties which surround San Francisco Bay.\* The city is located at the tip of a peninsula separating the bay from the Pacific Ocean and occupies only 43 square miles (see Figure 6). The total population of the nine-county area in 1970 was 4,628,119, of which 15 percent, or 715,674, live in San Francisco itself.

Until the completion of the Oakland Bay Bridge in 1936 and the Golden Gate Bridge in 1937, San Francisco's only land access was through San Mateo

\*The U.S. Bureau of the Census defines the San Francisco-Oakland Standard Metropolitan Statistical Area (SMSA) as covering only five counties. The county of Santa Clara is a separate SMSA centered around the City of San Jose, the counties of Napa and Solano make up the Vallejo-Napa SMSA, and Sonoma County is Santa Rosa SMSA. However, the regional planning body, the Association of Bay Area Governments (ABAG), and the Metropolitan Transportation Commission (MTC) treat the entire nine counties as a single planning area. The later definition seems to be the more appropriate for this study of transit integration.

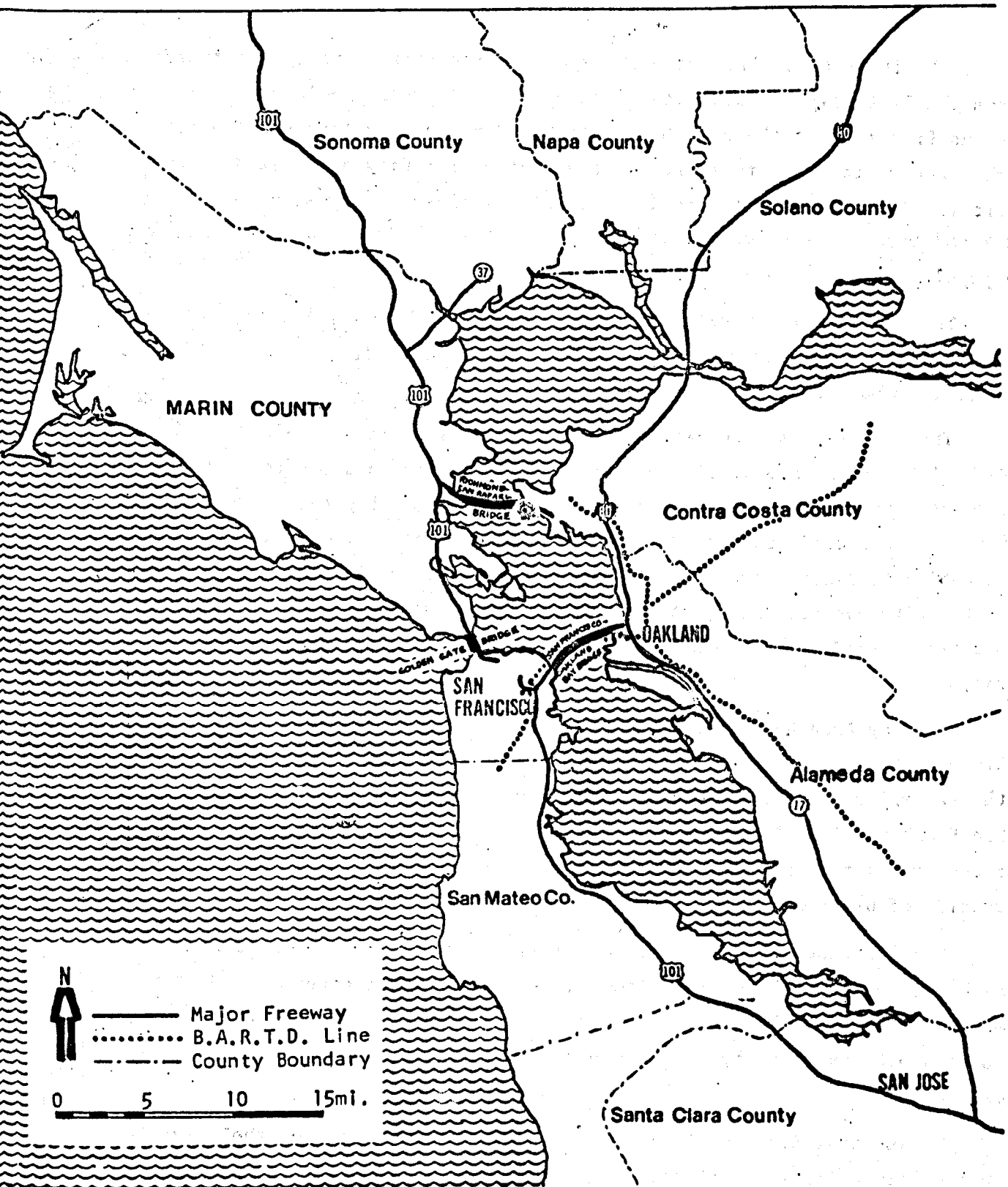


Figure 6. San Francisco Bay Area, showing major freeways and BART lines.  
 Taken from Source 19.

County to the south. The two bridges opened the city to vehicular traffic from the East Bay and the northern counties. The relative inaccessibility of San Francisco to the East Bay contributed to the development of another urban center to serve that part of the region—the City of Oakland. More directly in reach of transcontinental railway lines than was San Francisco, Oakland became the major railroad center in the Bay Area. It currently has a population of 361,561.

The second largest city in the region is San Jose, with a population of 445,779, which lies at the extreme southern tip of the bay about 50 miles from both San Francisco and Oakland.

The Bay Area is a complex of steep mountains, valleys and waterways. Much of San Francisco itself consists of hills, some so steep that steps are cut into the sidewalks. San Francisco's famous cable cars were brought into use to provide public transit over these routes where no other form of public transportation was feasible. In general, commercial development in the city has been restricted to the valleys, leaving the hills as scattered residential areas separated by commercial areas of different sizes.

The Bay Area has grown rapidly since the beginning of World War II. Since 1950, however, population growth has taken place entirely outside of the two major cities. In fact, in the ten years prior to the 1970 census, San Francisco lost 36,000 residents while Oakland lost nearly 10,000. All recent population projections for the area anticipate a continued increase outside of urban centers.

San Francisco is the principal headquarters city on the West Coast. Banking, insurance, commerce, and tourism are of major economic importance. Manufacturing, on the other hand, has decreased steadily since World War II and has been replaced by office employment. Government is an important source of new jobs.

The Central Business District of San Francisco is one of the largest in the United States, with an estimated 22 million square feet of office space and 12,000 hotel rooms (Source 1). CBD employment was estimated at

282,000 in 1965—53 percent of the city total (Source 2). No decline in CBD employment is expected, but it is anticipated that the number of high status white collar jobs in the area will grow.

Median family income and educational attainment in the Bay Area are among the highest in the nation, as might be expected from the large percentage of jobs in management, education and government. In contrast to most metropolitan areas of the East and Midwest, however, median income and years of education are nearly as high in the central city as in the metropolitan area as a whole. San Francisco continues to hold middle- and high-income residents against the flight to the suburbs (Source 3).

The Bay Area is also unusual in that the majority of the black population of the metropolitan area is not concentrated in the central city, but is located in and around manufacturing areas, primarily Oakland and Berkeley. In addition to the black who make up 9 percent of the Bay Area population, another 4 percent are Oriental—a large number of whom live in San Francisco—and 3 percent are Mexican Americans (Source 4).

San Francisco has a unique form of government due to its dual status as both city and county. It has an 11-man board of supervisors, elected at large on a nonpartisan basis, as well as an elected mayor. A chief administrative officer is appointed for life by the mayor with the consent of the supervisors. There are numerous boards and commissions which set policy for administrative departments and special purpose agencies.

Four of the largest Bay Area counties—Alameda, Contra Costa, San Mateo, and Santa Clara—are "charter counties" having considerable latitude to determine their form of government and the functions that will be performed. The State of California "Lakewood Plan" permits such counties to provide services to incorporated cities under contracts, as well as serving the unincorporated areas. The counties are governed by boards of supervisors, and the larger have county managers.

The nine counties of the Bay Area contain 91 cities. The city manager plan operates in most of the larger ones (see Table 16).

Politics in California is not strongly oriented toward political parties. Working against party cohesiveness is a strong regionalism. Local

Table 16. Population of Bay Area counties and cities over 50,000 in 1970.

SAN FRANCISCO-OAKLAND SMSA		3,109,519
<i>Alameda County</i>	1,073,184	
Alameda	70,968	
Berkeley	116,716	
Fremont	99,665*	
Hayward	93,004*	
Oakland	361,561	
San Leandro	68,698	
<i>Contra Costa County</i>	558,389	
Concord	85,164	
Richmond	79,043	
<i>Marin County</i>	206,038	
<i>San Francisco City and County</i>	715,674	
<i>San Mateo County</i>	556,234	
Daly City	66,922	
Redwood City	55,686	
San Mateo	78,991	
SAN JOSE SMSA		1,064,714
<i>Santa Clara County</i>	1,064,714	
Mountain View	51,092	
Palo Alto	55,966	
San Jose	445,779	
Santa Clara	87,717	
Sunnyvale	95,408	
SANTA ROSA SMSA		204,885
<i>Sonoma County</i>	204,885	
Santa Rosa	50,006	
VALLEJO-NAPA SMSA		249,081
<i>Napa County</i>	79,140	
<i>Solano County</i>	169,941	
Vallejo	66,733	
TOTAL — 9 COUNTIES		4,628,199

\*Urban part

Taken from Source 4.

elections in California are nonpartisan, which makes it difficult to maintain viable party organizations at the local level, and many issues that in other states would be decided by the legislature are put to a popular vote in these nonpartisan elections.

In the Bay Area political issues are given wide coverage in the local press and other media. The large numbers of affluent and articulate private citizens, particularly in San Francisco, and the relative weakness of local political party organization produce a political climate in which citizen groups are a significant force. In recent years these citizen groups have been devoted primarily to the protection and enhancement of the area's natural and historical environment and to promoting growth that supports rather than detracts from the quality of life in and around San Francisco.

## REGIONAL TRANSPORTATION PLANNING

### Bay Area Rapid Transit Commission

In 1951 the California Legislature created the Bay Area Rapid Transit Commission at the request of local leaders to study long-range rapid transit problems in the nine Bay Area counties. The commission was composed of representatives appointed by county boards of supervisors, the Governor, and the State Director of Public Works. In 1957, following the study phase, the commission was replaced by a 5-county Bay Area Rapid Transit District, which was given authority to plan, construct and operate a rail rapid transit system in the region. Two of the five counties withdrew from participation in the BART District, and in 1961 voters in the three remaining counties — Alameda, Contra Costa and San Francisco — approved a \$792 million bond issue to begin planning and construction of the BART system.

### Association of Bay Area Governments

In 1961 the California Legislature authorized the formation of a regional planning organization in the Bay Area, which formalized the status of a group that had been established locally the previous year as a forum in which local officials could discuss common problems. Membership consists of a mayor or councilman from each city and a supervisor from each county. In 1962, however, the Association of Bay Area Governments (ABAG) voted to assume the responsi-

bility of comprehensive planning — including transportation planning — for the region. Eight of the nine Bay Area counties\* and 84 of the area's 91 cities are currently members. ABAG has no authority over local governments in the region, but influences local planning and development through its role as the federally designated clearing house for the Bay Area. It not only reviews and comments on local applications for federal assistance programs, but also evaluates all federal development projects in the Bay Area for environmental impact (Source 5).

### Bay Area Transportation Study Commission

In 1963 the State legislature created the Bay Area Transportation Study Commission (BATSC) and gave it the responsibility to prepare a comprehensive regional transportation plan for the nine counties, including recommendations on implementation. Membership in this commission included representatives not only from local government, but also from ABAG, three local transit districts, both houses of the State legislature, the California State Transportation Agency and Department of Finance, and two Federal agencies — the Bureau of Public Roads and the Department of Housing and Urban Development. In addition, seven Bay Area residents were appointed at large by the Governor.

The commission engaged a staff of some 70 people, expended \$5.9 million over a period of six years, and in 1969 published the Bay Area Transportation Report (Source 6). Rather than recommending a single regional transportation plan, the report presented three alternative networks of differing degrees of highway and rapid transit development, with projections of the probable impact of each option. The commission felt handicapped by the lack of a comprehensive regional plan with clearly stated land use objectives that a transportation system should be designed to serve. (It was not until 1970 that ABAG completed such a plan—a year after the BATSC study was over and the commission subsequently disbanded.)

Among the BATSC recommendations, however, were the diversion of highway funds to general transportation uses, major expansion of BART, and the creation of a permanent Metropolitan Transportation Commission.

\* Solano County is not a member.

## Regional Transportation Planning Committee

When BATSC was phased out in 1969 and the State legislature failed to act on the commission's recommendation to create the Metropolitan Transportation Commission, the Bay Area was left without a continuing transportation planning program. Since Federal law requires a region to maintain such an activity to be eligible for Federal assistance, ABAG came to an agreement with the California State Department of Business and Transportation to create the Regional Transportation Planning Committee (RTPC). This organization was insufficiently funded and existed for only a year. Its only significance was that it placed ABAG in the position of taking a major role in regional transportation planning. The Regional Plan 1970:1990 (Source 7), published during the existence of the RTPC, includes strong recommendations to downgrade highway development and improve public transportation: "the number of vehicles in cities needs to be greatly reduced by the provision of other transportation alternatives."

## Metropolitan Transportation Commission

In the fall of 1970 the State legislature finally established the MTC that had been recommended in the Bay Area Transportation Report (Source 6), authorizing it to take over from ABAG all functions relative to transportation.\* This agency now has the authority to conduct regional transportation studies, to review and approve local applications for federal assistance for planning and developing transportation services, and to assist in efforts to integrate service among local operators of public transit.

The Metropolitan Transportation Commission is authorized by California legislation under Title 7.1 to "provide comprehensive regional transportation planning for the region comprised of the City and County of San Francisco and the counties of Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano and Sonoma." Its principal task is to prepare a regional transportation plan covering major highways, transbay bridges and mass transit systems for adoption by June 30, 1973 (Source 14).

After adoption of the plan MTC will have the authority to approve or disapprove the construction of transbay bridges, construction and operation

\*The enabling legislation is given in Appendix E, "Metropolitan Transportation Commission Act."



of multicounty mass transit on exclusive rights-of-way, and construction of State highways within the region.\* Prior to adoption the commission can exercise no control over these activities.

MTC is concerned with the entire spectrum of transportation—public and private—but its existing authority is limited to the function of planning. The commission has no authority to operate public transit systems, nor to acquire facilities and equipment. Nor can the commission exercise any control over the balance of public and private transportation by setting fares, routes and schedules for transit systems, regulating bridge tolls and parking rates for automobiles, or designating exclusive lanes for buses.

It is regrettably common practice in the United States—and not only with respect to transportation—to isolate the planning functions from the regulating or operating authority that can translate plans into action. A combined planning and operations efforts produces better performance from both elements, since planners are then more acutely aware of operational problems and share in the responsibility for the results of their recommendations, and operators must consider the broad, long-run impacts of their day-to-day decisions.

There is, however, a specific provision in the existing legislation that anticipates an extended role for MTC:

"66522. The commission shall merge with or otherwise join any multifunctional regional government organization, if it has transportation planning responsibilities, within one year of the creation of such an organization."

There is also some indication that among the many options now being studied to determine MTC's future function in the development of a regionwide integrated transportation system, is one of a public utility, concerned with the operation as well as planning for public transit services.

MTC is currently engaged in preparing the regional transportation plan required by the end of June 1973. Just prior to the beginning of this year the Commission began to make public its preliminary proposals for the goals and policies that will serve as a framework for the transportation plan. Of particular concern to this report are three specific policies to im-

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\*Exception is made for the completion of the Interstate System and where there is an overriding statewide interest in the construction of a particular highway.

prove the effectiveness of mass transit through coordination, integration and merger of existing services (Source 22).

"Policy 40: Encourage efficient, convenient and economical interface among different transportation modes and strive for safe, comfortable and attractive facilities at principal transfer locations.

"Policy 41: Strive for the eventual complete integration of schedules, services, and fares among principal transit systems.

"Policy 42: Encourage the merger of existing transit districts into larger entities and discourage the proliferation of new small transit districts, unless demonstrated to be the only means of achieving a special transportation need."

Early in 1972 UMTA authorized a technical studies grant to MTC in the amount of \$2 million in matching funds, on a 2/3 federal - 1/3 local basis, to carry out transportation studies in the Bay Area. Of the eleven studies now under way, six are directed toward planning and engineering extensions of BART into additional parts of the region, three are concerned with the improvement of local transit systems in San Jose, Santa Rosa and Vallejo, and two are directed toward coordinating BART services with those of the Alameda-Contra Costa Transit District in the East Bay and the San Francisco Municipal Railway.

Another important function of the Commission is to distribute funds made available by the California Transportation Act of 1971 (SB 325) from county sales tax revenues. The state collects these taxes acting for the counties. Where more than one transit service operates within the county, MTC has the task of allocating these funds among the operators, as, for example, County of San Francisco funds between BART, Muni and the Golden Gate Authority.

The Metropolitan Transportation Commission has become a significant political body in the relatively short time since it was created by the State Legislature. Its development over the past year in particular has been notable, when its professional staff grew more than five-fold, and it moved out of a deliberate

"low-profile" stance. As mentioned above, increased funds made available through large UMTA study grants and through higher tax revenues have contributed importantly to MTC's new situation.

## PUBLIC TRANSIT

The focal point of public transit in the Bay Area is the Central Business District of San Francisco. It is estimated that in 1965 nearly 900,000 people entered and left the CBD every weekday, over one-quarter by means of public transit systems (Source 3). Travel from three transportation subregions in the Bay Area converges on San Francisco: the East Bay, the Northern Counties, and the Peninsula. The data available on intraregional travel are incomplete, but what exists indicated that movement is dominated by commuters to downtown San Francisco. According to the Golden Gate Bridge, Highway and Transportation District, for example, of the 34,000 persons currently traveling daily from the Northern Counties to other subregions, 32,000 cross the Golden Gate Bridge into San Francisco, while only 2,000 cross the Richmond-San Rafael Bridge into the East Bay. According to the Northern California Transit Demonstration Project report, more East Bay public transit users in 1967 traveled to San Francisco than to the Oakland CBD—27,000 compared to 23,000 (Source 2).

The responsibility for providing public transit in the Bay Area rests primarily on four public agencies: the Bay Area Rapid Transit District, the Alameda-Contra Costa Transit District, the Golden Gate Bridge, Highway and Transportation District, and the San Francisco Municipal Railway. Fifteen other public agencies and privately-owned companies serve the region, and two new transit agencies are preparing to provide service. (See Table 17.)

### Bay Area Rapid Transit District

In October 1972 the first segment of the BART rail rapid transit system was put into operation connecting downtown Oakland to communities in Alameda County as far south as Fremont. Service northwards to Richmond began in January 1973, bringing into operation the entire north-south half of the X-shaped system. The east-west half is scheduled to open in two more stages: eastward from Oakland to Concord in May 1973,\* and westward to down-

\*Service was initiated May 21, 1973.

Table 17. Major Public transit services in the San Francisco Bay Area.

Operator	Area Served	Type of Ownership	Vehicles	
			Type	Number
1. San Francisco Municipal Railway	City of San Francisco plus some lines into San Mateo County	Public (City)	Bus Trolley-Bus Streetcar Cable Car	548 333 105 39
2. Bay Area Rapid Transit District	Alameda and Contra Costa Counties	Public (Special District - P.U.C. Code Div. 10, Pt. 2.)	Rail Rapid Transit Cars	105
3. Alameda-Contra Costa Transit District	Alameda and Contra Costa Counties	Public (Special District - P.U.C. Code Div. 10, Pt. 1)	Bus	781
4. Golden Gate Bridge, Highway and Transit District	Marin County to San Francisco	Public (Special District - P.U.C. Code Div. 10, Pt. 3)	Bus Ferry	183 1
5. Peerless Stages, Inc.	Alameda County to Santa Cruz	Private (Corporation)	Bus	39
6. Greyhound Lines - West	East Bay and Peninsula to San Francisco	Private (Corporation - Greyhound Lines, Inc.)	Bus	307
7. Santa Clara County Transit District	Santa Clara County	Public (Special District - P.U.C. Code Div. 10, Pt. 12)	Bus	50
8. Southern Pacific Railway	San Jose to San Francisco (Peninsula)	Private (Corporation)	Commuter Rail	102 (44 trains per weekday)
9. Menlo Park Municipal Transit	Menlo Park	Public (City)	Minibus	Not yet in service

Table 17 (continued)

Operator	Area Served	Type of Ownership	Vehicles	
			Type	Number
10. Redwood City Municipal Transit	Redwood City	Public (City - Managed by private company)	Minibus	5
11. San Mateo Lines	San Mateo	Public (City - Managed by private company)	Bus	5
12. C&C Transit	Pacifica	Private	Jitney	5
13. Harbor Carriers, Inc.	Marin County (Tiburon and Angel Island) to San Francisco	Private (Corporation DBA Red and White Fleet)	Ferry	2
14. Santa Rosa Municipal Transit	Santa Rosa	Public (City)	Bus Jitney	6 2
15. Vallejo Transit Lines	Vallejo	Public (City)	Bus	10
16. Vaca Valley Bus Line	Vacaville, Fairfield, Travis AFB	Private (single owner)	Bus	14
17. Holmes City Lines	Napa and Vicinity	Private (single owner)	Bus	2
18. San Francisco Jitney Owners Associations	San Francisco	Private (Association)	Jitney	117
19. Peninsula Charter Lines	Reverse Commute San Francisco to Palo Alto	Private (Commute Club Service)	Bus	15
20. Northgate Transit Company	Daly City and South San Francisco	Private	Bus	16

town San Francisco and Daly City in September 1973. Figure 7 shows the alignment of the 75-mile BART system through the three-county area and the service areas of other transit systems. BART service will eventually be extended to other points in the area.

Numbers of weekday passenger trips projected for the system by 1975 are (Source 21):

San Francisco local trips	48,133
Transbay trips	88,958
East Bay local trips	<u>54,059</u>
TOTAL	191,150

Maximum capacity of each track is 28,800 seated passengers per hour. Trains will run at top speeds of 80 miles per hour, averaging 45 miles per hour including 20-second station stops. At peak periods headways will be as short as 90 seconds.

Fares are graduated, ranging from a base of 30¢ up to a maximum one-way fare of \$1.25. Ticket sales and collection are automated. Multiple-ride tickets of up to \$20.00 are available, as well as a 75 percent discount for children and senior citizens.

Park-and-ride lots are located at all suburban stations with a total capacity for 16,000 cars. Kiss-and-ride zones and bus loading zones are provided, as well as bicycle storage facilities.

The BART cars have been designed on a gauge of 5'6", and have air conditioning, sound-proofing, tinted glass, carpeting, wide seats and package storage to provide a quiet, comfortable ride for 72 seated passengers per car. A total of 350 such cars, at an average cost of \$300,000 apiece, are currently on order to have been delivered to serve the three-county area (Source 3).

BART plans to provide bus feeder service in Contra Costa County to communities outside of AC Transit's district boundaries, although it is expected that actual operation of the service will be carried out under contract by AC Transit.

The Bay Area Rapid Transit District is a special transit district operated under the authority of the State of California Public Utilities Commission Code, Division 10, Part 2.

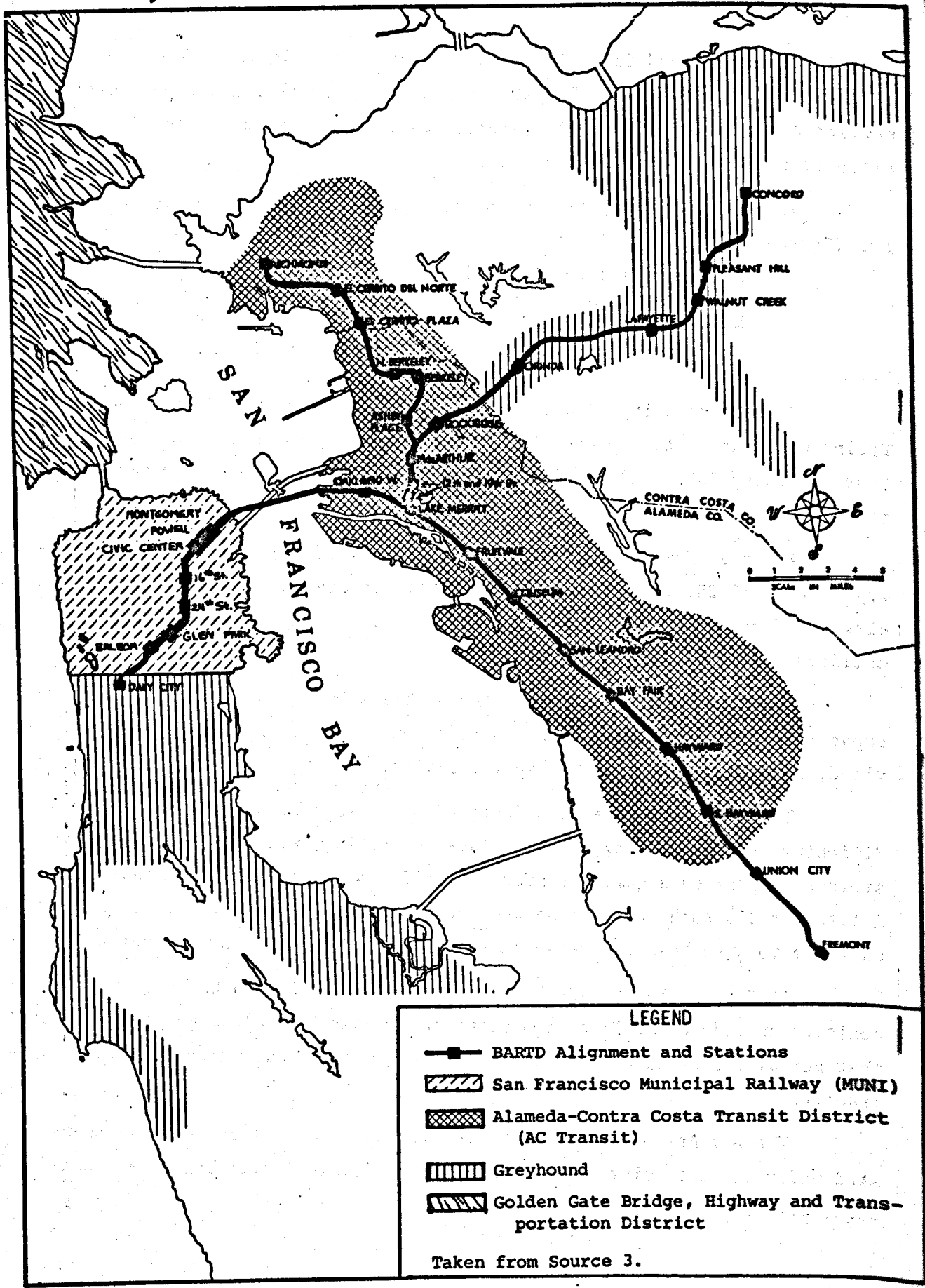


Figure 7. Transit services in the San Francisco Bay Area.

BART legislation permits it to serve all counties of the San Francisco Bay Area upon approval of the voters in the separate counties, but at present such approval has been obtained from only three counties — Alameda, Contra Costa and San Francisco. BART is authorized by Section 29010 to plan, construct and operate an "interurban mass rapid transit system." In carrying out these functions it may acquire property through exercise of eminent domain, if necessary, and may enter into contracts with agencies of all levels of government and private companies, incur bonded indebtedness, and tax property within its district to support its activities.

Contrary to generally held opinion, BART is not restricted from collecting taxes to cover operating costs, although limits on maximum annual revenue that can be derived from this source were estimated by the NCDP study to be less than \$1 million (Source 2). Section 29123 states:

"The tax rate for taxes levied in any fiscal year for all district purposes other than taxes levied pursuant to Section 29121 [i.e., bond interest, principal and sinking fund], shall not exceed five cents (\$0.05) on each one hundred dollars (\$100) of assessed valuation of taxable property within the district, except the tax rate for the first year of levy may include an additional amount sufficient to repay temporary borrowing incurred pursuant to Article 5 of Chapter 8 of this part. Taxes levied pursuant to this section for maintenance and operation of rapid transit facilities shall be supplementary to the revenues derived from such facilities and shall be limited to actual requirements".

BART is enjoined from interfering with existing transit facilities by Section 29037, as follows:

"The district shall not interfere with or exercise any control over any transit facilities now or hereafter owned and operated wholly or partly within the district by any city or public agency, unless by consent of such city or public agency and upon such terms as are mutually agreed upon between the board and such city or public agency."

However, the district is permitted by Section 29035 to:

"operate such feeder bus lines and other feeder services as necessary."

Finally, under Section 28957:

"The district may be merged into or consolidated with any other public agency which may be established by law upon such terms as the board of directors shall specify in a



resolution to be submitted to the electors of the district for approval...In the event of merger or consolidation, the servicing entity or the consolidated entity shall succeed to all the powers, duties, purposes, responsibilities, liabilities, and jurisdiction now or hereafter vested by law in the district."

No changes in BART's existing legislation would appear to be necessary to permit that agency to participate in a transit integration program based on federation or merger.

### Alameda-Contra Costa Transit District

Since 1960 public transportation in Alameda and Contra-Costa Counties has been provided by the Alameda-Contra Costa Transit District, known locally as AC Transit. This agency operates a fleet of 781 buses on 112 routes throughout the service area shown in Figure 7, carrying over 50 million revenue passengers annually (Source 9). Of these, 14.4 million travel to downtown San Francisco across the Oakland Bay Bridge.

The service is well thought of by its users. Vehicles are maintained in good condition. Approximately two-thirds are new "Transit Liners", 60 of which were purchased in 1972. Service along major routes is frequent, and headways seldom exceed thirty minutes. Average travel speed is 16.6 miles per hour (Source 10). The Transbay Terminal in San Francisco is located at First and Mission, close to the financial district.

Public information is better handled than is common for transit services in the United States. Schedules are posted at major transfer shelters and are available from bus drivers. Bus stops are clearly designated and indicate the numbers and destinations of buses routed by each stop. At certain locations direct telephone communication to a central information switchboard is available. Bus drivers are uniformly pleasant and helpful.

The basic fare within the East Bay is 25 cents; transbay fare is 55 cents. The transbay route operates at close to break-even, while other routes incur heavier losses. AC Transit runs an annual deficit of approximately \$9 million, which is covered by taxes assessed on property within the service area.

AC Transit is also a special transit district of the State of California and operates under the provisions of the State P.U.C. Code, Division 10, Part 1. The District legislative authority to expand its service area throughout the

the two counties to the extent that the desire to join the district is expressed by a vote of the residents in the individual communities. At present, however, the service area runs only between Hayward and Richmond through the heavily populated communities on the bay side of Alameda and Contra-Costa Counties. Several other communities outside the district are served by Greyhound.

The proposed feeder bus service recently announced by BART will serve areas outside of AC Transit's current district boundaries, but it will, in fact, be operated by AC Transit under contract with BART. Since BART is already authorized to provide feeder service to its rapid transit system, this arrangement permits AC Transit to serve these areas without obtaining the vote of local residents that would legally extend its own district.

Like BART, AC Transit is authorized to plan for and operate transit facilities, to acquire and dispose of property, to incur indebtedness, and levy taxes to pay its debts and cover its operating costs over its fare box receipts. It has the power to enter into contracts and cooperate the State in the acquisition and construction of transit facilities. AC Transit is specifically permitted to "enter into agreements for joint use of property, through routes, joint fares, transfer of passengers, or pooling." Unlike BART, however, it has no authority to be merged or consolidated with another public agency. Thus residents of those parts of Alameda and Contra Costa Counties within the AC Transit District are taxed by both AC Transit and BART.

### San Francisco Municipal Railway

The San Francisco Municipal Railway, known locally as "Muni", operates all intracity transit services (except jitneys) under the direction of San Francisco Public Utilities Commission. It carries about 130 million revenue passengers per year on 37 bus lines, 11 trolley coach routes and five street-car and three cable car lines. Muni operates over 1000 vehicles, including 548 buses, 333 trolley buses, 105 streetcars and 39 cable cars (Source 2). The fare is 25 cents anywhere within the city with transfers permitted between all modes.

In 1969, 1970 and 1971, Muni's annual deficits have reached \$17.4 million, \$18.2 million and \$22.8 million, respectively. In spite of a program of re-

placement and rehabilitation, much of the stock is still old and in poor condition. The system is overloaded during peak periods.

Pocket schedules are not provided, and drivers are not always able to provide accurate information about routes other than their own. Long-time residents of the city learn that there is a map of the entire system in the public telephone directory; strangers to the city seldom discover it, and if they happen to, can carry it with them only by tearing it out of the phone book. Recently Muni published an attractive route map for tourists. Distribution, however, appears to be limited to the Visitors Bureau; no copies could be located at downtown hotels or airline offices.

Coverage of the city by public transit is, however, excellent. There are few places even within residential areas that are not within easy walking distance of one or another of the four modes. Service in the downtown area is frequent. As in other large cities, average travel speeds are low, ranging from less than five miles per hour on the cable cars to only a little better than 10 miles per hour on buses and streetcars.

Muni is administered by the San Francisco Public Utilities Commission as a unit of the city government. Major policy decisions regarding changes in routes, fares, equipment and tax subsidy are subject to approval by the board of supervisors. Under the Charter of the City and County of San Francisco, the Public Utilities Commission is charged with responsibility for construction, maintenance, operation and control of the San Francisco Municipal Railway. The charter provides that in the event the commission and the mayor propose a budget for the system in which expenses will exceed projected revenues, such a budget must be approved by a vote of two-thirds of all members of the board of supervisors. If this is done, the board of supervisors must also appropriate the funds necessary to provide for the deficiency.

For a number of years, it has been the policy of the City and County of San Francisco to meet a portion of the cost of the transit system from taxes in order to keep fares at a reasonable level and maximize the use of the system. While deficits in meeting operating costs can be recovered from tax funds, there is a specific limitation in the charter dealing with capital expenditures. Deficits incurred for new equipment,

lines or other facilities can be treated in the same manner as operating deficits, provided the amount is not greater than three-quarters of a cent on each one hundred dollars valuation of property assessed in and subject to taxation by the City-County government. This amount is insufficient for Muni's capital needs. Whenever tax support is required for capital costs exceeding this, the charter requires that such financing be accomplished by the sale of bonds, which requires submission of the question to the electorate. This means that any substantial purchase of new equipment for the Muni requires approval of a bond issue by a two-thirds vote.

In the face of the failure to gain public support for bond issues to finance the purchase of new equipment, the city government approved the establishment of a non-profit corporation, the San Francisco Railway Improvement Corporation. This organization borrows funds from private investment houses under guarantee by the city, to be repaid out of general city tax revenues. The corporation purchases new equipment and leases it to the city; as vehicles are paid for they become the property of the city.

#### Golden Gate Bridge, Highway and Transportation District

This public agency is also a special district operating under provisions of the State of California P.U.C. Code, Division 10, Part 3. Its transportation responsibilities involve the entire range of both public and private modes. It maintains the Golden Gate Bridge and regulates its use by all public and private carriers, automobiles, bicycles and even pedestrians. It operates public transit services from Marin County to San Francisco by bus and ferry. It is also responsible for the planning and development of roads, bicycle paths and public transit services and facilities throughout the entire district, which extends from the San Francisco end of the Golden Gate Bridge through the counties of Marin, Sonoma, Napa, Mendocino and Del Norte to the California-Oregon border.\*

The Golden Gate bus system now operates 183 new attractive buses providing local service within Marin County and over-the-bridge service to San Francisco.

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\*The latter two counties are not within the 9-county transportation planning region.

The latter pick up and deliver passengers at specially-marked stops along a route that includes the Civic Center, major retail areas and the financial district, but do not carry passengers between points within San Francisco. In addition to the regularly-routed service, three commuter club buses carry Marin County subscribers to the U.C. Medical Center in San Francisco.

Golden Gate also provides ferry service from Sausalito to San Francisco. Ten round trips are made on weekdays by a passenger carrier that arrives and departs from the Ferry Building in San Francisco, located at the foot of Market Street within walking distance of the financial district and major retail stores.

Approximately 21,500 passengers use the bus system on an average weekday, while the use of ferries ranges from 1,500 per weekday in winter to 4,000 in summer.

Local bus fares in Marin County are 25 cents, while over-the-bridge bus service and the ferry service are both 75 cents for a one-way trip. Special reduced fares are available to children, students and senior citizens. A "Convenience Ticket" can be purchased prior to boarding either the bus or ferry for 50 cents in place of the regular 75-cent fare. Transfers between bus and ferry are permitted.

In its efforts to divert commuters from private cars to other means of transportation, the district makes it easy for a passenger to switch to bus or ferry by honoring the same commuter tickets he uses for crossing the bridge in his own car. The program (parts of which are still in the developmental stage) includes local bus pickup to ferry terminals, free parking lots with shuttle bus service, and bicycle racks both at terminals and on board the ferry. When bad weather causes cancellation of ferry service, the feeder buses display flags saying "No ferry today," and become over-the-bridge commuter buses. Receipts from bridge tolls subsidize both transit services.

The Golden Gate District provides an excellent example of integration of the total transportation spectrum—multimodal public transit and private vehicles—under a single authority.

## Other San Francisco Transit Services

San Francisco is served by four other transit services of importance to commuters. These are the Southern Pacific Railway, Greyhound Lines-West, Harbor Carriers, Incorporated, and the San Francisco Jitney Owners Association.

The Southern Pacific Railway runs a commuter service from San Jose to San Francisco carrying, for the most part, executives from the affluent Peninsula communities of Burlingame, San Mateo, San Carlos, Belmont and Atherton to offices in the CBD. The Southern Pacific depot is located at Third and Townsend Streets, nearly a mile from the CBD. The commuter service is used by some 12,000 passengers on an average workday. The Southern Pacific claims an annual loss of \$1 million in operating the service.

Greyhound Lines-West serves the Peninsula, as well as communities in the northeast portion of Contra Costa County in the East Bay (see Figure 7). Until recently the company provided a similar service in Marin County, which ended when the Golden Gate District took over the responsibility of providing public transit in that area. Greyhound finds that it loses money on local bus service and needs to subsidize these out of profits from its longer runs. It would probably welcome any move that would relieve it of the responsibility to maintain these unprofitable transit services.

The Greyhound depot in San Francisco is located on Seventh Street between Market and Mission Streets within the CBD, although at some distance from the core of the financial and retail center. Greyhound routes from the East Bay, however, bring commuters to the Transbay Terminal used by AC Transit, located adjacent to the financial district.

The Red and White Fleet, operated by Harbor Carriers, Incorporated, provides weekday commuter ferry service between Tiburon in Marin County and San Francisco. Three morning runs from Tiburon arrive in San Francisco at the Ferry Terminal, located at the foot of Market Street within walking distance of the financial district and major retail stores. Three return trips are made in the evening. One reverse-commute run leaves San Francisco for Tiburon in the morning and another return trip is provided in the evening. Two passenger ferries are used for this service.

The Red and White Fleet also operates off-peak runs, as well as charter services and sightseeing cruises. Most of these operate from Fisherman's Wharf in San Francisco. Off-peak and weekend services are also provided to Angle Island and Berkeley.

An important element of public transportation in San Francisco, although not strictly speaking a mass transit operation, is the jitney service that has existed since 1915. Today there are 117 jitneys, all owned or leased from owners who belong to the Jitney Owner's Association. Jitneys are run on a 4-minute headway during rush hours and 10-minute headways during off-peak hours along one of two routes—Mission Street or Third Street. Most of the 10-mile Mission Street route passes through the city's major business and commercial area, while the 4-mile Third Street route extends from Civic Center to Hunter's Point, a black ghetto. Fares range between 20 cents and 30 cents depending on the distance traveled.

San Francisco controls the number of jitneys by limiting available licenses to 117. These licenses are issued by the police department. A new driver can obtain a license only by purchasing one from another driver who wants to sell it. The going rate is now between \$2,500 and \$3,000. Drivers work for themselves within operating rules and regulations set by the police department and the Jitney Owner's Association. Members pay a small fee to cover the services of an Association dispatcher (Sources 11 and 12).

## PRIOR AND CURRENT INTEGRATION EFFORTS

### Bay Area Transportation Report

In 1963 ABAG and the three local transit districts—BART, AC Transit and Golden Gate—cooperated with local State and Federal governments in the Bay Area's first attempt at comprehensive regional transportation planning. As described more fully above in the section on Transportation Planning, the report (Source 6) focused on the broad issue of highway versus rapid transit development. While no attempt was made to detail the integration of the several public transit services, the study provided a framework within which subsequent plans were developed for the coordination of routes, fares and schedules.

## Northern California Demonstration Project

In 1965 the Department of Housing and Urban Development provided a demonstration grant (Cal MTD-5 and Cal MTD-6) covering two-thirds of a \$498,000 study for the purpose of planning the coordination of BART, AC Transit and Muni services. The study, carried out by Simpson & Curtain, was published in October 1965 as Final Report of Northern California Demonstration Project: Coordinated Transit for the San Francisco Bay Area — Now to 1975 (Source 2).

The report analyzed existing transit systems and patronage and projected future travel needs, equipment needs, passenger revenues, and operating results. It proposed a specific new configuration of routes for both Muni and AC Transit, a fare structure, and three alternative collection systems. The only mention of distribution of revenues was that discounts given passengers for combined fares should be "shared between BART and the two surface systems in accordance with a discounting formula to be resolved among them". A tentative recommendation was made to create a "compact" between the three agencies to carry out transportation studies, provide joint promotional services and generally serve as a forum to solve the remaining problems of coordinating transit services. Neither BART nor AC Transit agreed with the proposed route configuration.

### Preliminary Proposals for Realignment of AC Transit Bus Routes

In 1970 AC Transit prepared a new set of preliminary plans for the realignment of its bus routes to serve BART stations. Published as a four-volume report (Source 15), the plan describes in detail the existing routes and proposed changes. Public comment was invited, and some modifications were made in response.

BART was not satisfied with AC Transit's proposed routing plan since it provided for the continuance of bus routes that duplicated BART service. In particular, AC Transit wished to maintain some of its transbay service over the bridge in direct competition with BART trains under the bay. Negotiations between the two agencies are still going on. BART recently used the services of a consultant to define ground rules for coordinating routes,



and the two agencies have discussed a revenue-sharing proposal for transfer passenger fares (Source 16).

A July 31, 1972 communication from BART indicated that:

"an interim transfer arrangement has been worked out with AC Transit. A BART rider using AC Transit feeder service will pay a one-way bus fare, a full BART fare, and receive a transfer good for a return bus fare. Under this agreement, BART and AC Transit have agreed to share the cost of the discount offered to their combined patrons. Thus BART will reimburse AC Transit 12.5¢ for each valid transfer used for a trip on AC Transit from a BART station."

This plan was implemented in September 1972.

### Current Studies

A portion of the \$2-million UMTA technical studies grant is being used to fund two current studies concerning coordination of BART services with existing transit systems.

Current plans for the coordination of BART and Muni rail service within San Francisco include the use of the BART tunnel under Market Street by both agencies. Two tracks will be used by BART rapid transit vehicles and two other tracks will accommodate Muni's new "semi-metro" (light rail) system. The existing Sunset and Twin Peaks tunnels will continue to be used, but other portions of the Muni system will operate on the surface. Figure 8 shows the proposed rail system.

The vehicles selected for Muni's new rail service are of an articulated design of the same gauge as the agency's existing streetcars. Seventy-five of these new cars are reportedly on order with a U. S. manufacturer.

Details of the BART-Muni study have not yet been obtained by INTERPLAN, but a proposal for the BART-AC Transit study provides the following information (Source 17). The total budget for the 15-month study will be \$180,000, with BART and AC Transit each contributing \$30,000 in matching funds. The project director is a member of the MTC staff, but most of the work will be carried out by a consulting engineer, with inputs from the two transit agencies and MTC. The study tasks include:

SHOP OR TOUR 10 TO 3  
the carfree way



Taken from Source 20.

Figure 8. Proposed Muni light rail services coordinated with BART (indicated by heavy lines).

1. specifying goals and evaluation criteria;
2. designing alternative routes and schedules;
3. estimating revenues and recommending alternatives for revenue sharing;
4. market analysis and evaluation of initial operations;
5. determining the effectiveness of the Plan C transfer procedure (already agreed upon by the two agencies);
6. selection among the alternatives proposed and adoption of a single plan by a board of control made up of three representatives each from BART, AC Transit and MTC; and
7. implementation of the plan by BART and AC Transit.

### Proposed Transit Coordination Program

On January 18, 1973, the Metropolitan Transportation Commission invited representatives of BART, AC Transit, Muni, the Golden Gate Authority and consultants to discuss a proposed program to coordinate public transit services on a regionwide basis. In the preliminary document circulated as a basis for discussion (Source 21) it states:

"There is considerable interest at the MTC in coordination of Bay Area transit services. The approach suggested is similar to that successfully employed in Hamburg, West Germany, where existing public and private carriers retain their individual identities but coordinate many of their activities, notably scheduling, routing, fares, information and marketing.

"The responsibility for providing public transportation services in the Bay Area is currently badly fragmented. There are presently more than a dozen different surface carriers providing scheduled services, both publicly and privately owned and ranging widely in size, quality of equipment, managerial expertise and consumer orientation. Some areas are relatively well-served; others have no service at all. The fragmentation of responsibility by area means that many trips involve use of two or more carriers, but there is relatively little provision for interface between carriers, resulting in inconvenience, waste of time, confusion, and higher costs for the consumer. The present situation is also inefficient for the operators in terms of flexibility, equipment and terminal utilization, availability of managerial skills, low volume purchases and wasteful duplication of certain services."

The document indicates the different areas in which coordination might be implemented and the level of operator involvement that each would require, ranging from minimal cooperation on a short term basis through significant



transfer of responsibilities of a permanent nature. The major areas of coordination are:

1. Public information
2. Advertising and promotion
3. Market research
4. Operations (i.e., operational integration)
5. Pricing/Ticketing
6. Direct selling
7. Identification of research and managerial skills.

The document recommends that early priority be given to measures that require no significant long-term commitments or administrative involvement on the part of the transit operators, nor any actual transfers of current responsibilities. Thus the initial action programs are directed primarily toward improving public information, while studies are proposed for more controversial measures.

Strong local interest in transit integration is revealed by this proposed program to coordinated services with the San Francisco Bay Region.

#### TRANSIT INTEGRATION THROUGH FEDERATION

Under this proposed approach, integration of transit in the San Francisco Bay Region would be achieved through the activities of a federation whose members were the several public agencies and privately owned companies now providing transit services in the nine counties. The major purposes of this federation would be:

1. Coordination of routes and schedules.
2. Establishment of a region-wide fare system and transfer procedures.
3. Distribution of revenues from fares.
4. Provision of convenient and comfortable transfer facilities.
5. Coordination of public information, promotion and ticket sales.
6. Coordination of research and planning activities.

The long-range goal in the development of a Bay Area transit federation would be to encompass all public agencies and private companies currently

serving the area within a single, region-wide integrated transit system. However, as Volume 2 points out, 5 years elapsed between the initial proposal for the Hamburg Transit Federation (HVV) and the signing of the agreement by the three original partners. Other members joined in the two subsequent years. Negotiations to form the Munich federation lasted 3 years. The development of a transit federation in the Bay Area must be expected to be subject to similar delays. However, significant improvements in public transit operations can be realized short of the ultimate goal by a smaller number of participants and by efforts directed toward selected functions.

The first part of this discussion of a federation for the Bay Area will describe the transit organization to be ultimately achieved. Factors affecting the current feasibility of realizing this goal will then be reviewed and finally suggestions will be made for tasks that could be undertaken in the short- and intermediate- range that would both improve the quality of existing transit operations and contribute to the final achievement of an integrated, region-wide public transit system.

#### The Proposed Transit Federation - Long-range Goal

The transit federation proposed here would provide an institutional mechanism through which participating operators could reach mutual agreement on their individual service obligations and revenue shares, and which could perform certain functions for the membership as a whole.

**DIVISION OF FUNCTIONS.** The division of functions between member operators and the federation might well follow the HVV example. Under this organization, the independent legal position and corporate form of the participants remains as it was before joining the federation, each member retaining ownership of its facilities and vehicles and continuing to conduct its own operations and cover its own expenditures. Each partner is also free to pursue other business, such as charter service, routes outside the regional service area, etc., external to the federation.

Specifically each federation partner is responsible for the following:

1. Providing transport vehicles and support facilities.

2. Conducting day-to-day operations.
3. Drafting duty rosters and detailed timetables.
4. Maintaining safety measures and responsibility for damages and claims.
5. Providing and supervising personnel.
6. Collecting fares.
7. Developing improved equipment and operating procedures.

The federation as a whole undertakes the following functions for the mutual benefit of its total membership:

1. Define regional transit goals and policies.
2. Transportation research and planning.
3. Allocating service responsibilities.
4. Preparing system-wide general timetables.
5. Developing a joint fare system.
6. Distributing revenues from combined operations.
7. Preparing applications for federal and state assistance.
8. Carrying out public relations and advertising.

MEMBERSHIP. The advantage of the division of functions under a transit federation is that it permits the coordination of transit services among a diverse membership. Both privately-owned companies and public agencies can be accommodated. An agency such as the Golden Gate Bridge, Highway and Transportation District, with a broad range of responsibilities in both public and private transport, can participate in selected areas of mutual concern to the federation. Also, large corporations, such as the Southern Pacific Railway and Greyhound Bus Lines can coordinate their intraregional commuter services with other federation partners without involving their long-distance passenger or goods transport operations. Finally, certain paratransit services that supplement public transit systems, such as the San Francisco Jitney Owners Association, C&C Transit in Pacifica, and the city-owned combined bus and jitney service of Santa Rosa, can be integrated in the region-wide system.

The federation form of transit organization can also accommodate changes in the status of its members. A merger between two or more operators, such as

has been suggested for BART, AC Transit and Muni, or the creation of a new sub-regional transit district, as has recently occurred in Santa Clara County, or the acquisition by municipal government of a previously privately-owned service, as has taken place in several Bay Area cities in response to the provisions of the S.B. 325, need not require the dissolution of the federation, but only a renegotiation of service responsibilities and revenue shares among the current membership.

INTERPLAN believes that it is particularly important that any new undertaking to integrate public transit in the San Francisco Bay Area be built on existing local institutions and programs. The Metropolitan Transportation Commission now serves as a focal point for efforts to coordinate transit services between operators and to make long-range plans for the balanced regional development of public and private modes of transportation. It is essential that the proposed transit federation have the benefit of this agency's regionwide multimodal authority and its now-considerable research and planning capability, even though MTC does not operate a public transit service.

Similarly, the proposed federation should, initially, incorporate existing intermodal-interagency arrangements between member operators for coordination of service and revenue sharing, so long as they are not in conflict with the overall goals of the federation. As the organization grows, these arrangements can be modified for the greater benefit of the total membership as well as the users of the regionwide integrated transit system.

**COORDINATION OF ROUTES AND SCHEDULES.** A detailed study should be undertaken to determine existing and projected demands for public transit, and how these demands are currently being met by individual operators. A routing plan should be developed that makes the best possible use of existing public transit resources. Duplications of service should be eliminated where competing lines cannot be supported by the existing ridership. Care should be taken, however, to preserve parallel routes that provide a different kind of service, such as express and local, and to consider the inconvenience to the transit user of repeated transfers from one vehicle to another.

With an optimum routing plan established, schedules for vehicles operating along these routes can be coordinated. Overall system standards should be set for maximum waiting time for different locations (e.g., residential areas, CBD), time of day (e.g., rush hour, evening), and at transfer points. Schedules for service should then be drawn up to reflect these standards.

Both operators and users should benefit from the improved allocation of routes and service schedules. Vehicles freed from unprofitable duplicate service would be available for areas not now being served or for increasing frequency of service along present routes. Reduction of waiting times at pick up and transfer points would promote greater ridership and more efficient use of vehicles.

The routing and schedule plan should be reviewed and modified periodically to accommodate changes in transit needs and inventories of available equipment. The acquisition of a fleet of minibuses, for example, might free a number of larger buses for service where higher seating capacity was needed. A new industrial complex or residential development will create new demands for public transit and perhaps lower service needs in older areas. Continued review and updating of routes and schedules would insure that maximum benefits were realized from the region's public transit resources.

**REGIONWIDE FARE SYSTEM.** Rationalization of routes and schedules among cooperating transit operators cannot be accomplished without a fare system that applies to the total service area and carries no penalties to the rider transferring from one carrier to another. Probably the major cause of existing duplications of service is that the user pays a lower fare if he continues to ride with the same operator than if he transfers to another system. Even where a graduated fare is in use, the initial charge is usually high in proportion to the incremental charges; a rider on one system may pay 30¢ plus an additional 10¢ for the next zone, but would have to pay two 30¢ fares if he made the same trip with two different carriers.

An analysis should be made of the fare structures of existing public transit services in the nine counties and the costs of providing these services. A



single, regionwide fare structure should be designed. Although an important social goal of integrating public transit is to equalize fares throughout the region, such factors as population density, average speed of operation, local wage scales and condition of rolling stock affect actual operating costs. The federation may find it necessary to vary the rate charged per unit of distance travelled to accommodate conditions in different localities and make the continuation of transit services feasible.

Transfer procedures should be developed that are as convenient as possible for both system users and transit personnel and minimize delays at transfer points.

REVENUE DISTRIBUTION. Concomitant with a system of joint fares is a system for an equitable distribution of revenues to the several operators participating in the federation. The Hamburg system described in detail in Section 3, Volume 2, offers one approach to revenue sharing that appears to be satisfactory to federation members. It is based on the principle that each partners profit-and-loss situation should remain approximately as it had been prior to the joint undertaking. Profit-making operations should continue to show a profit, while those subsidized should continue to require financial assistance from whatever source provided such subsidies in the past or from any new sources they can find. The agreed-upon formula is renegotiated only at the beginning of a new tariff period. As a result, any improvement in operating efficiency on the part of one of the members is reflected in increased profits for him, since his percentage revenue share remains constant. All members benefit from increased revenues, but the more efficient operator benefits most. Thus the federation partners continue to be motivated toward improved management practices.

The formula for revenue distribution is derived from the operator's past revenue-to-cost ratio and his estimated contribution to the combined service in terms of route-miles, passenger capacity, etc. and their unit costs. In the case of a new operator, such as BART, an appropriate revenue-to-cost ratio would have to be estimated, and then adjusted as necessary in the subsequent tariff period.\* Total revenue collected by the federation is then

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\*This procedure was followed during the first effective year of the Munich Transit Federation for all operators due to the complete restructuring of the transit network in conjunction with major additions to the U- and S-Bahn rail lines.

divided between all the member operators. The formula remains in effect throughout the agreed-upon tariff period, lasting one or more years and is renegotiated at the beginning of a new tariff period, at which time changes can be made in assignment of transit responsibilities to the different members. An example of the application of this formula to a U.S. urban area is given in the section on the Puget Sound Region.

**PROVISION OF TRANSFER FACILITIES.** The federation should also provide for the construction, operation and maintenance of intermodal, interagency transfer facilities. These will range from simple shelters to major terminals, such as that now underway for BART and Muni operations in downtown San Francisco. Facilities for transfer between vehicles of the same operator should continue to be the responsibility of the individual member, but should conform to agreed-upon standards for the system as a whole.

Location of transfer facilities would be determined by the routing plan. However, an optimum plan may be modified to make continued use of existing usable structures.

**PUBLIC INFORMATION, PROMOTION AND TICKET SALES.** A coordinated program of public information, promotion and ticket sales can be more effective and yield greater results for a smaller expenditure than can a number of separate programs carried on by individual operators. The federation could undertake these functions for the benefit of its entire membership.

Information on routes, schedules and fares could be prepared and distributed by a centralized public relations unit. In addition to a complete system-wide publication, pocket schedules for individual transit corridors could also be made available on all vehicles and at all transfer points. Publicity for the combined transit service could be disseminated by posters in the vehicles themselves, by radio, television, newspapers and other advertising media. The public relations unit could also promote editorial coverage of the system and its new services.

Ticket sales could also be coordinated by this unit. Selection of locations for sales outlets and vending machines, as well as testing and adopting successful marketing procedures would be among their major tasks. Efforts should be made to promote the use of multiple-ride tickets, commuter passes and devices that reduce the need for users and vehicle operators to handle money and tickets.

**RESEARCH AND PLANNING.** The federation as a whole could also provide a superior research and planning service than could be carried out by individual operators. An important function of the organization would be to continually monitor the effectiveness of current transit services and revise routes, schedules, fares and revenue-sharing formulas to reflect changing conditions. Technological developments could be evaluated for their potential value to the members at this central point, and demonstrations or experiments could be organized to test ones that appear feasible. Technical problems encountered by operators could also be brought to the federation research and planning unit, and where desired, assistance could be given to smaller or new managements in planning their day-to-day operations.

### Feasibility Considerations

**ATTITUDES OF LOCAL OPERATORS.** It cannot be expected that the region's 21 agencies and companies concerned with public transit would all immediately become members of a transit federation and be prepared to integrate their services, share revenues and support joint activities, such as the construction and operations of intermodal terminals. Some of the operators are in direct competition with each other and would be reluctant to give up advantageous routes. Almost all of the public agencies will require some modification of their existing legal authority to be able to participate in a program of joint fares and revenue sharing. Lack of capital now prevents most transit operators — public and private — from making investments in critically needed rolling stock and facilities, and they might be reluctant to commit themselves to expenditures for new joint facilities or programs. Federal and state assistance can help to overcome some of these problems.

These considerations suggest that although significant local interest in integration exists, the proposed federation would have to be developed in stages over a period of some years. Subprograms involving a broad membership in low-cost, low-conflict activities could establish a pattern for further cooperative action. Other subprograms could be directed toward coordinating transit services within a limited area, involving a smaller number of operators. Each of these subprograms could contribute to the final goal of a regionwide system by demonstrating the feasibility of cooperative action and the benefits that can be derived by both operators and the public.

DEPENDENCE ON DEVELOPMENT OF RAPID TRANSIT. BART is the core of all of the regional transportation plans developed in the Bay Area over the past ten years. Other transit services are visualized as providing localized services, part of which is to feed long-distance riders into the regionwide rail rapid transit system. The present technical difficulties and uncertain future development of BART will mean that plans for integrating its service with others must remain flexible, and interim solutions will have to be supplied.

FINANCIAL NEEDS. With the exception of the Golden Gate Authority whose bridge tolls can now be used to offset transit operating deficits, all of the existing public transit operations in the Bay Area are in need of financial assistance to bring their services up to a standard that can attract the public out of private automobiles and into mass transit. Several private firms have recently been acquired by local government to take advantage of new allocation of gasoline taxes to publicly-owned transit. Major capital expenditures for upgrading rolling stock and constructing new intermodal facilities will have to be made. Individual demonstrations in coordinating transit operations will require funding, and extensive expenditures will have to be devoted to both long-range and detailed planning of the new integrated system.

Stages in the development of the system will have to conform to the limitations of available funding. Caution should be exercised in drawing up detailed operating plans for activities not yet assured of implementation funds, as delays usually require reworking of such plans to meet external changes. Limited, discrete subprograms can be undertaken when major projects are not feasible, but discipline should be exercised to assure that allocation of financial resources to these activities is in the long-range interest of the total effort. Each proposal for a new undertaking should include a statement describing its anticipated contribution to achieving the goal of region-wide integration of transportation.

#### Broad-based Subprojects for Immediate Implementation

Two low-cost, low-conflict subprojects could be implemented in the near future to involve the total potential membership of the Bay Area transit federation. These subprojects are:

1. Development of a centralized public information service, including publication of region-wide timetables, telephone inquiry service and promotion.
2. Coordination of research on existing and projected demands for public transit throughout the region, and monitoring new technological developments that could be of use to member operators.

Both these functions are now being carried out individually by many transit agencies and companies. Others do not have resources to do so. All participants would benefit, however, by the superior work that could be accomplished in these areas through combined efforts. Both public information and research are functions successfully centralized under the Hamburg and London transit integration programs.

It is recommended that these subprograms be coordinated under the existing regional transportation agency, MTC, since it already serves as a coordinating body for inter-operator concerns, and its staff is currently engaged in area-wide research and planning.

**CENTRALIZED PUBLIC INFORMATION SERVICES.** The first task under this subproject would be to collect and organize information on the current routes and schedules of all public transit services in the region. Most operators will have this information available in the form of published timetables. Some smaller operators may have to develop it from their internal working orders.

These inputs would then be redrawn into a common format and published as a region-wide timetable. Special attention should be given to providing the document with an indexing and cross-referencing system that enables the user to plan a trip between any two locations in the region, transferring where necessary between different services. Pages should be designed so that segments of the region-wide timetable can be reproduced as pocket schedules. These could be distributed on individual lines, replacing the operator's privately-published schedules.

In many cases different operators will be using the same numbers to identify routes. Rather than attempting to design a new, regionwide route numbering system, it is suggested that the numbers currently in use be retained, prefixed by mnemonic abbreviations identifying the operators. Thus, "AC-7" might be used to identify AC Transit's route 7 as distinct from "MU-7" indicating Muni's route 7.

The desirability of selling advertising space in the publication should be considered as a means of covering part of the costs and lowering or eliminating the sales price to make it easily available to a broad range of transit users.

A centralized telephone information service could be developed from the same data base. Free telephone connection at major transfer points could also be provided, as is now being done by AC Transit.

Finally, promotion and public relations program should be initiated. Among the several purposes of this program would be: attracting new riders to public transit; obtaining public recognition and support of transit as an essential public service; providing commuters with emergency information and suggested alternative routings; and influencing ridership patterns to reduce rush-hour travel and promote off-peak use of idle equipment. A joint program, with the combined resources of the several members could provide a much more effective program than could be done by the individual operators.

COORDINATED RESEARCH SERVICES. The Metropolitan Transportation Commission is currently engaged in major program of data collection and analysis as a prerequisite to the development of a regional transportation plan for the Bay Area. This information would provide an excellent base for a coordinated research service of benefit to all potential federation members.

Operators participating in this program could make contributions of both funds and staff effort to insure a continuous updating of the data bank and improvement of analytical techniques. The resulting research capability would be far superior to that obtainable within the resources of any single operator.

Investigations of benefit to the broad membership could be selected by the participants as a group. Individual members' needs for research services could be met through a system commonly used by subscriber-supported services: research required under a prescribed number of man-hours or computer time would be provided free of charge; more extensive investigations would be subject to payment for time and costs.

Public transit operators are finding it increasingly difficult to keep up with innovations in equipment design and operating techniques. A centralized

information service could be of great benefit to all operators in the region, particularly to smaller ones where management is hard pressed to keep up with urgent day-to-day problems.

The Bay Area Rapid Transit District has an extensive transportation library. This library would be even more useful with an improved information retrieval system and a larger, specialized staff for indepth literature search and synthesis.

If this existing facility could be used as a nucleus for a regional inter-agency information center, contributions from the several member operators could support these increased services. In addition, the information center could publish and distribute to its members abstracts of new articles and books of special interest and reviews of significant technological developments.

Research staffs of individual agencies and companies could be called upon to contribute their special knowledge and skills to the centralized research and information programs. Those contributions might be in the form of short-term assignments to the central facility, review and criticism of research reports, or regular review and abstracting of recent publications in specialized fields. Whatever the role, research personnel in the separate transit operations will be stimulated by contacts with their opposite numbers, and this alone could be of great benefit to the development of public transit in the Bay Area.

#### Limited-Participation Subprojects

Three subprojects are suggested here involving a small number of transit operators and only a portion of the nine-county region. Two are recommended for immediate implementation: coordination of transit services in San Francisco between BART and Muni, and experiments in techniques of traffic control and parking regulation to promote a better balance of private and public transportation in congested areas of the downtown San Francisco area. The third subproject is the development of a core transit federation among the operators carrying commuters into and within the city. This undertaking would require extensive pre-project discussion among the potential members as to the level of cooperative activity they were willing to attempt and investigation of each operator's legal authority to participate in such activities. Some legislative changes may be necessary at the state and local level before the

program can be implemented. These preparatory steps could be undertaken immediately, but the federation itself could not be designed and organized until these were completed.

**COORDINATION OF BART AND MUNI SERVICES.** Both agencies have been involved with joint planning of public transit services over the past ten years, and are currently negotiating the coordination of their operations in expectation of BART's initiating trans-bay service within the coming year. Unfortunately, much of the detailed planning carried out in the past is no longer valid because of changes in the overall design of facilities and local needs for public transit. In spite of the considerable investments of time and funds already made in this area, much remains to be completed. Federal assistance should continue to be made available.

BART's recent achievements in coordinating transit services in the East Bay with AC Transit, as well as the long-term association of BART and Muni mean that both agencies bring considerable local experience to bear on this problem. It is possible, however, that some solutions could be provided by examples of recent European integration efforts. It is suggested, therefore, that contribution of the RD&D transit integration program be focussed on the application of European techniques to selected specific local problems. These can then be offered to the negotiating parties as options to existing proposals that have not met with satisfactory agreement.

**EXPERIMENTS TO ENCOURAGE BALANCED TRANSPORTATION.** Local government in San Francisco is currently showing an interest in exploring means of discouraging the use of private automobiles and promoting use of public transit in the city's congested areas. Under study are such actions as manipulating CBD parking taxes, traffic tolls for vehicles using congested streets, reserved lanes or streets for the exclusive use of transit vehicles, and no-fare transit rides. In connection with the last item, the feasibility is being considered of private sponsorship of the Muni system for single days of free ridership by different business concerns or merchants' associations.

INTERPLAN believes that with local government support and the strong public interest in solutions to congestion and pollution problems, San Francisco offers an excellent potential laboratory for experiments in such techniques through UMTA's demonstration program. Moreover, the concentrated configuration



of the city resembles that of many older cities in East and Midwest states, so that results of these experiments would be applicable to a number of other urban areas.

**CORE FEDERATION.** Eight public agencies and private operators provide transit services into and within San Francisco. These are:

1. San Francisco Municipal Railway
2. Bay Area Rapid Transit District
3. Alameda-Contra Costa Transit District
4. Golden Gate Bridge, Highway and Transit District
5. Southern Pacific Railway
6. Greyhound Lines - West
7. Harbor Carriers, Inc.
8. San Francisco Jitney Owners Association

If the proposed core federation is to serve the area significantly, it is essential that Muni, BART and the Golden Gate Authority become members. AC Transit should also participate if its Bay bridge buses will be continued after the initiation of BART transbay service.

Also of interest would be the participation of Southern Pacific and Greyhound as the first attempt in the United States to integrate public and private transit services without public acquisition of the privately-owned companies. The relatively small number of commuters using Harbor Carrier's Tiburon ferry service makes the inclusion of this operator less essential, though still desirable.

The opportunity for another significant experiment would be realized by participation of the Jitney Owners Association. The Bay Area itself has two other jitney operations, one of which is publicly owned. Throughout the country there has been renewal interest in the role that jitneys might perform in supplementing mass transit. Including San Francisco jitneys in a demonstration of transit integration would prove of great value to other areas now speculating about the relative benefits and costs of promoting similar services. UMTA is now sponsoring a study of para-transit which will investigate the potential of these forms of transit in more detail. Results of this work should be available for review in this effort.

Membership in this core federation could be concurrent with participation in other regionwide transportation programs, such as the coordinated promotion and research activities proposed above. Working arrangements between member operators such as BART and Muni can and should be expedited as needed; these can later be incorporated, with whatever modifications are necessary, into the integrated system of the entire service area.

The major tasks of the core federation would be to:

1. Coordinate routes and schedules.
2. Institute an area-wide fare system and revenue-sharing procedures.
3. Provide interservice transfer facilities.

These functions would be the same as those described above as long-range goals for regionwide federation, but would extend only to the limited service area of the demonstration. The core group would rely on the regional organization for assistance in the areas of research and promotion, as outlined under suggested subprojects for immediate implementation.

The experience gained would serve to guide the further development of transit federation not only throughout the remainder of the nine-county Bay Area, but also in other urban areas of the United States.

## TRANSIT INTEGRATION THROUGH MERGER

INTERPLAN believes that the integration of BART, AC Transit and Muni services can best be achieved in the long run through a unified transit district serving the entire three-county area. This district could have a centralized planning and management function, a centralized financial operation, including area-wide taxing authority, and a centralized public information and public relations activity. The different modes of public transit could be operated as separate departments within the district with responsibility for detailed planning of routes and schedules in conformity with over-all agency plans, maintenance of equipment, personnel management, day-to-day operation of the system.

### Role of the Transit District

The suggested Bay Area Transit District could function as an operating agency of the existing Metropolitan Transportation Commission. Within the

framework of the regional development plan adopted ABAG in 1970, MTC would define goals, policies and priorities for public transit services throughout the nine-county regions. It is assumed that these would be established by the regional transportation plan, scheduled for completion by MTC by June 30, 1973.

The Bay Area Transit District could be responsible for detailed planning and implementation of MTC plans for public transit, initially in the three-county area with the possibility of gradually expanding over the entire nine-county region. Its administration and support staff should be public transit professionals, insulated by the presence of MTC from political pressures. MTC might wish to follow the example of the Greater London Council which has a "standing order" precluding its considering at its meetings any items concerning the day-to-day management of the operating agency.\*

MTC would probably need to be responsible for financing the program which it expected the transit district to carry out. This would include not only its present functions of applying for Federal and State assistance in the form of grants and loans, but the additional function of determining appropriate levels of tax assessment for the support of public transit and contracting with local taxing agencies for their collection.

The transit district in turn would then work within the program and budget set by MTC and provide technical evaluation of proposed projects and budgets to assist MTC in drawing up a feasible public transit program. Constant interaction between the two bodies would strengthen the functions of both.

The public transit program could be further supported by MTC's influence over certain aspects of private transportation. MTC might negotiate with State and local governments to reserve exclusive bus lanes along heavily traveled roads and in CBDs, adjust bridge tolls, and regulate the supply of and charges for automobile parking. Even attempts to stagger working hours so that commuting periods are lengthened and peak loads lowered could be encouraged by MTC negotiations with government agencies and large private employers. These efforts could be supported by reduced rates for

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\*See description of London Transport in Section 2, Volume 2, page 49.

parking and bridge tolls for commuters traveling before or after the intense peak period. It would be hoped that if MTC becomes an agency of a metropolitan government, it would be given the additional authority to regulate, not just influence, these elements of urban transportation.

### Functions of the Transit District

The Bay Area Transit District could be so designed as to consist of a central administration and several divisions responsible for the operation of different modes of public transit. The central administration might carry out the following kinds of functions:

1. Coordination with MTC and other transit services, such as the Golden Gate District, Southern Pacific Railway and Greyhound Bus Lines.
2. Establishment of system-wide routes, schedules and fare structure.
3. Operation and maintenance of major terminals.
4. Financial management.
5. Labor union negotiations and provision of system-wide employee benefits (health, retirement, etc.)
6. Contracting for new construction, and purchase of new vehicles and major equipment (e.g., computers).
7. Research and development, including correlation of operating data, systems analysis, performance evaluation, technical studies and rider opinion surveys.
8. Public relations, including public information on routes, schedules and special services, advertising and publicity, and, in cooperation with MTC, preparation of material in support of desired political action.

Complementary functions of the divisions might then be:

1. Operation and maintenance of vehicles and facilities.
2. Personnel supervision.
3. Preparation of detailed routes and schedules in conformity with central administration directives.
4. Collection of fares.
5. Collection of detailed operating data for input to central administration records and analyses.

In taking over the existing public transit system in the three counties, there need initially be only two major operation divisions: 1) Rail, including rapid transit, streetcar and cable car; and 2) Bus, including CBD minibus and jitney. Trolleybuses should probably be included in the rail division, since their operation depends on fixed electric power lines.

At some later date, when the system expands with other areas, it may be necessary to add a third division for water transport which would include both conventional ferries and over-the-water craft, if the latter become operational in the Bay Area. It is suggested that the expansion of the transit authority into other counties correspond to the extension of the rail rapid transit system into these areas.

### STEPS TOWARD IMPLEMENTATION

Three major tasks would have to be undertaken by local agencies should they decide to form a single Bay Area Transit District:

1. Development of an organization plan for the proposed transit authority.
2. Passage of new legislation for State authorization of the new agency's functions and for the City and County of San Francisco as well as the State to transfer existing responsibility for public transit to the new district.
3. Development of an implementation plan for operating the total system and transferring the operations of the three existing agencies to the new transit district.

### Organization Plan

The organization plan should provide a detailed description of functions and responsibilities of the transit authority's central administration and operating divisions and define the functional relationship of the new agency of MTC and ABAG. The allocation of functions between the central administration and operating divisions described in the previous section would serve as a framework for the organization plan.

Effort might well be made to preserve those elements of the existing systems that work well, following the example of London Transit in resisting change for the sake of change. Initially, an independent evaluation might be sought by the existing agencies to determine the strengths and weaknesses of their organizations and practices. Those that prove useful and suited to the new authority could be adopted.

London Transport has found that decentralization of authority provides for more efficient day-to-day operation and counteracts some of the less desirable characteristics common to large organizations. Depots are managed independently, for example, and coordinated with other units of the system by the chief executive of the depot. Each of the modes of public transit involves different equipment and technical procedures. Each should have the benefit of the most efficient and practical internal operating scheme for its particular mode. Within the Rail Division, for example, rapid transit (exclusive right-of-way), street cars and cable cars could be operated by three separate administrations. It is recommended that the transit authority adopt the general policy that no function be allocated to a higher level of administration that can be performed adequately and efficiently by a lesser one.

### New Legislation

When the extent and character of functions for the new transit district have been defined within the organization plan, appropriate legislation can then be drawn up and submitted to the California State Legislature and to the City and County of San Francisco. The new transit district should be able to deal with future extensions of the service area, changes in the local political structure, such as the creation of metropolitan government, modifications in the federal transportation assistance program, and technological developments without having to go back to the legislature for additional authority.

At the same time complementary legislation could be submitted to extend the role of MTC to function through the transit authority as an operating as well as planning body and to allow it to levy taxes in the service area. Again, this legislation should allow for possible growth and changes in the operating environment.

Finally, legislation should be provided to dissolve the existing two transit districts and the city-owned transit service and transfer these functions as well as bonds, debts and other financial obligations to the new transit district.

### Implementation Plan

The first of the implementation plan's two parts would describe the public transit system that would provide the best possible service to the residents of the three-county area within available financial resources. Elements of the many detailed studies that have been and are being carried out for realignment of routes, provision of additional feeder service, and a system-wide fare structure could be selectively adopted into this plan. Additional services that were not previously economically feasible for individual agencies could also be incorporated. The second part of the plan could then describe the specific tasks and provide a schedule to carry out the transfer of functions from the three existing transit agencies to the new transit district. Special attention should be given to the continuance of services during the changeover period. It is important to future public support of the transit district that users of the existing systems do not find the service less satisfactory when the new system goes into operation.

INTERPLAN's London consultant, Mr. E. R. Ellen, Director of Transportation Planning, London Transport, makes the following evaluation of one of the factors contributing to its success:

"In the early years of development of London Transport after its formation in 1933, one important factor contributing to its success was that the amalgamation of the constituent undertakings into the new unified enterprise was by a process of evolution rather than revolution. Various departments within the new organisation were built up on the nucleus of a strong existing organisation such as the bus operating or engineering department of the old London General Omnibus Company or the tramway department of the London County Council. The object was to preserve the best of what already existed—both in personnel and methods—

whilst building up a new undertaking with a new overall image. There was no question of denigration of the pre-existing companies and other organisations, or of change purely for change's sake. Even the London Transport trademark (the 'bullseye' or 'roundel') was taken over from the old Underground 'Combine'. Similarly, in subsequent reorganisations in 1948, 1963 and 1970 the policy has been to interfere no more than was essential with the basic fabric of the organisation.

"In the result, there is a feeling of continuity and solidarity. In such a situation one must, of course, guard against the dangers of inflexibility and resistance to new ideas and methods, which can be a fault of a long-established organisation. But the lesson which could, perhaps, be learnt for the development of transport organisations in America is that the strengths and experiences of existing undertakings should not be undervalued. The object should be to preserve what is good and improve it rather than start again from 'scratch' simply because it is politically attractive to condemn something which already exists as useless."

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Table 18. Checklist of transit integration activities: San Francisco Bay Region.

INSTITUTIONAL

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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OPERATOR AND CITY/COUNTY/STATE PLANNING COORDINATION:

Set up Regional Planning Coordinating Organization

Legislated county/area commission for all regional planning	x			
Formally constituted and appointed independent committee			x	
Ad hoc coordinating regional planning committee with effective financial support and power to make recommendations			x	
*No coordinating agency for all regional planning			x	

Requirements for Successful Demonstrations

Thorough area trip demand study	x			
Formulate area transportation policy including goals for public transit	x			
Redefine public transportation region (e.g. extend transit district boundaries, etc.	x			

Set up Single Transportation/Transit Planning Authority

Agency responsible for planning and financing all regional transportation activity	x			
Agency responsible for overall planning, licensing and financing of all regional public transportation			x	
Transit district or single publicly owned operator handles public transit planning			x	
*No single public transit planning authority (individual operators or their associations handle public transit planning under either open competition or area franchise).			x	

OPERATOR/OPERATOR COORDINATION

Set up Coordinating Structure for Intra-Region Public Transit

Single regional operator for all public transit (by merger or transit district legislation)				x
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\*All unstarred items are recommended integration activities. Starred items are included to complete the coverage of the list for evaluating existing program status.

x: Status for whole region, all operators.  
s: Status for part of region, some operators.

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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One major operator, several smaller ones				X
Transit federation		X		
Transit community (separate agreements for joint tariff on routes, coordinated routes and schedules, some pooling)	S			
Tariff association (joint tariff and revenue distribution agreements)	S			
Route and schedule coordination agreements	S			
*No regional coordinating organization	X			

Set up Coordinating Structure for Inter-City Transportation

Out-of-region operator participation in intra-regional coordinating organization		X		
Coordinating committee of operators				X
Coordinating agreements between individual operators (e.g. airport or airlines, Greyhound and transit district)				X
Responsibility allocated internally within intra-area operator(s) for planning coordination with out-of-region/intercity demand		X		
*No comprehensive approach to considering out-of-region trips	X			

TRANSIT/PARA-TRANSIT OPERATOR COORDINATION

Set up Coordinating Structure

Para-transit operator participating in intra-regional coordinating organization		X		
Coordinating committee of operators				X
Coordinating agreements between individual operator(s)				X
*No coordinating organization	X			

PUBLIC TRANSIT FINANCING ARRANGEMENTS

Sources for Financing Capital Investment Other Than Rolling Stock

Revenue from fares	X			
Bond issue	S			

INSTITUTIONAL (continued)

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
Stock issue	S			
National loans				
Other debentures				
State grants	S			
National grants	X			
Specially designated local tolls	S			
Specially designated local sales taxes	X			
Specially designated local property taxes	S			
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes				X
Parking and park-and-ride fees		X		
Revenue from other services, e.g. leases of land and air rights, advertising	S	X		
Leasing arrangements (transfer to operating costs)				

Sources for Financing Rolling Stock and Buses

Revenue from fares	S			
Bond issue	S			
State loans				
Federal loans				
Other debentures				
State grants	S			
Federal grants	S	X		
Specially designated local tolls				
Specially designated local sales taxes	S			
Specially designated local property taxes	S			
Specially designated local other charges or taxes				
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes		X		
Equipment trust funds	S			
Revenue from other services	S	X		
Leasing arrangements (transfer to operating costs)				

Sources for Financing Operating Costs

Revenue from fares	X			
Specially designated local tolls	S			

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
------------------	-------------------	----------------	------------------------------

Specially designated local sales taxes	S		
Specially designated local property taxes	S		
Specially designated state tax other than license or fuel taxes			
State motor vehicle operator licensing fees			
State motor fuel taxes		X	
Revenue from other service	S	X	

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please describe)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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OPERATIONAL

ACTIVITIES REQUIRING COORDINATION WITH CITY/COUNTY/STATE AGENCIES

Auto Parking Policy in Major Activity Centers

Control of parking by higher charges	S	X		
Control of parking by graduated charges by distance from CBD or major activity center	S	X		
Control of parking by time of day restrictions	S	X		
Control of parking by street space restrictions		X		
Control of parking by open lot space restrictions		X		
Control of parking by in-building space restrictions				X
Encourage short-term parking and discourage long-term parking		X		
*No significant parking policy			X	

Auto Use Restriction Policy

User charges, taxes, tolls, road pricing, etc.	S	X		
Restriction of auto use by zone (auto-free areas)		X		
Restriction of auto use by time (auto-free areas); supplementary licensing, etc.)		X		
Restriction of automobile flow by traffic restraint schemes		X		
*No policy on auto use			X	

Traffic Management in Support of Public Transit

Total centralized traffic control within major activity centers				X
Signal synchronization	S			
Bus priority system at signals				X
One-way streets planned for transit flow	S			X
Reserved lanes for auto and bus use by time of day	S			
Reserved lanes for car pool and bus use by time of day	S			
Reserved lanes on city streets for bus only use by time of day	S			
Reserved lanes on city streets for bus only use all day				X
Reserved streets for bus only use				X
Reserved streets for minibus use and pedestrians				X

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Bus stop locations chosen for transit and vehicle flow improvement	X		
Offstreet docks for landing/unloading	S		
Parking restrictions to aid transit flow	S		
Exclusive freeway lanes	S	X	
Reserved bus ramps for freeway entry and exit			X
*No consideration by local authority of impact of motor vehicle flow on public transit		X	

ACTIVITIES REQUIRING COORDINATION WITH GOVERNMENT AGENCIES AND LOCAL BUSINESSES

Changing Transit Demand Characteristics

Staggered work hours			X
Sliding work hour system (flexitime)			X
Encourage extended shopping hours			X
Encourage multi-use development of major activity areas (office, shops, entertainment, apartments)	S		X
Encourage public transit user shopping trip orientation among merchants	S		X

ACTIVITIES REQUIRING OPERATOR COORDINATION

Basic System-wide Fare Structure

Zonal fare system	S		
Distance-graduated fare system (or time-on-system related)		X	
*Fare set by number of transfers			X
*Flat fare system	S		
*Nominal fare system	S		
*Free fare system (no fare)			X
Unlimited number of free transfers between routes of single mode only (restricted by time:			
interoperator			X
intraoperator			X
Unlimited number of intermodal free transfers:			
interoperator			X
intraoperator			X

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Limited number of free transfers between routes of single mode:		X	
interoperator			
intraoperator	X		
Limited number of intermodal free transfers:			
interoperator		X	
intraoperator	S		
*No free transfers			X

Supplementary Policies on Fare Structure

Special rates for socio-economic groups	X		
Special rates by time of day (off-peak, night)			X
Special rates by area of city (e.g. flat rate in CBD)	S		X
Special rates by part of week (e.g. Sunday)	S		X
Special rates by type of trip (e.g. tourist)			X
Daily system passes			X
Intermodal single trip combination passes		X	
Seasonal passes	S	X	
Free return trip in off-peak hours			X
*No supplementary policy on fares			X

Fare Collection Procedures†

*Token system			X
Scrip system (tickets)	S	X	
*Cash system	S		
*Exact fare system	S		
Pass system (including commuter rail)	S	X	
Honor system (including commuter rail)			X
Tickets sold on vehicles: Buses	S		
Light Rail	S		
Tickets sold off-vehicles: Buses	S	X	
Light Rail	S	X	
Automated machines on or off vehicles (including commuter rail)	S	X	
Driver collects fare	S		
Conductor collects fare	S		
*No fare			X

†Excludes commuter rail except as noted





OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Intermodal (with commuter rail) connection schedule coordination		X		
Rider oriented headways (reduced to no more than 15-20 minutes)	S	X		
Rider oriented schedule times (easily memorized)	S	X		
Out-of-region/intercity demand schedule coordination with airport	S			X
Out-of-region/intercity demand schedule coordination with mainline railroad service				X
Out-of-region/intercity demand schedule coordination with buses (Greyhound)		X		
Extend service times (into night hours)	S	X		

Public Information System

Produced easily understandable and available system-wide schedules with routes, route maps and fares	S	X		
Schedule information at bus stops	S	X		
Route maps at most stops		X		
Route maps on vehicles		X		
Labeling of stops and vehicles	S	X		
Public relations program	S	X		
System-wide information near fare collection areas		X		
System-wide information on rapid transit train platform	S	X		
Clearly labeled information areas in stations	S	X		
Multi-lingual information provision				

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please Describe)

PHYSICAL AND TECHNICAL

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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ACTIVITIES REQUIRING NEW TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Automated Operations

Computerized traffic control with bus locator				X
Freeway ramp metering				X
*Computerized traffic control, no transit priority	S			
Bus priority control equipment				X

ACTIVITIES REQUIRING NEW TECHNOLOGY WHICH CAN BE ADOPTED BY OPERATOR(S)

Automated Operations

Automatic train operation	X			
Dial-a-ride				X
Bus operation control with bus locator and radio communication				X

ACTIVITIES REQUIRING PROVEN TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Facility Provision

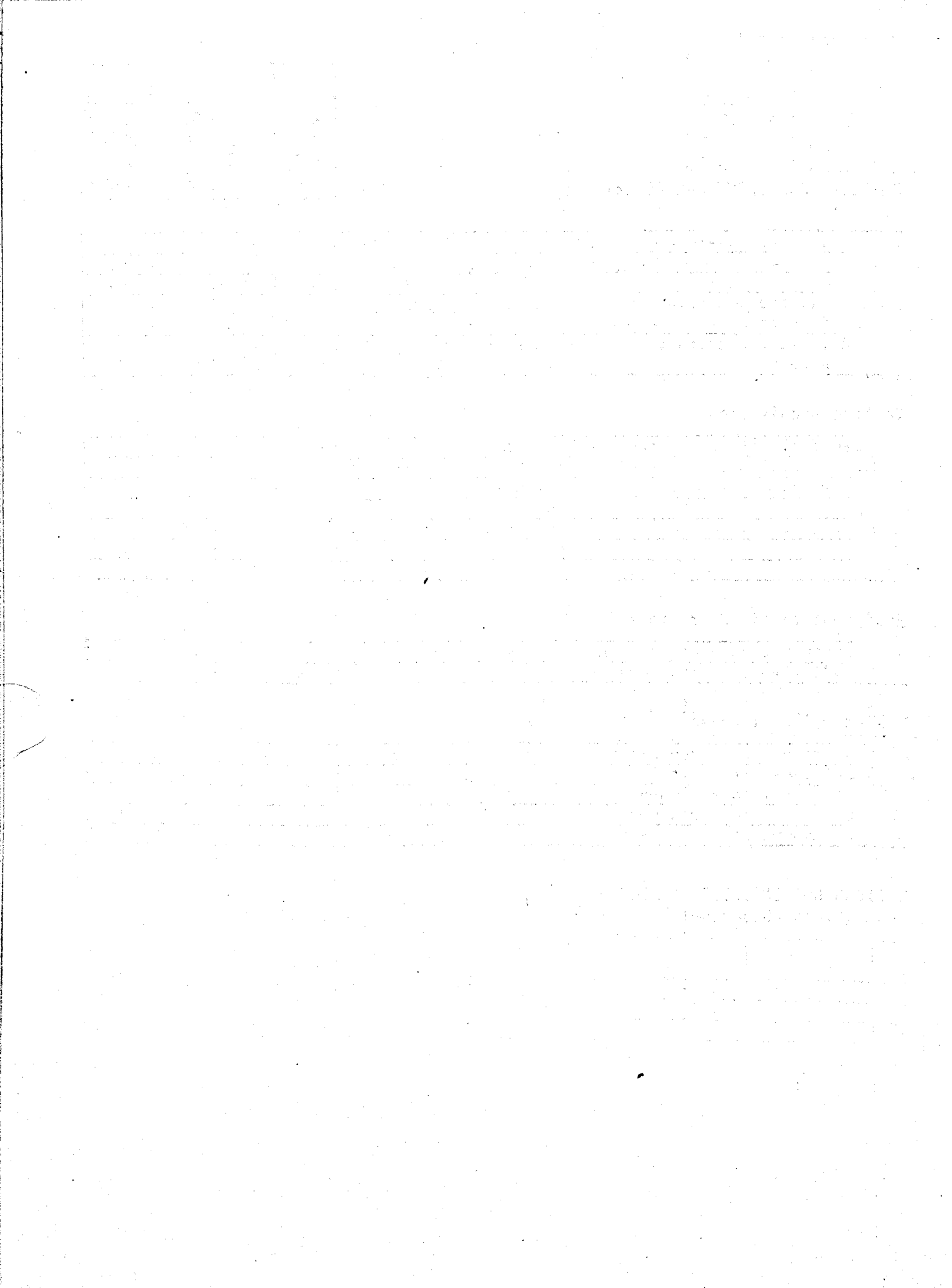
Grade-separated busways	X			
New and converted park-and-ride lots	S	X		
Park, ride, and shop lots near the CBD		X		
Pedestrian walks (sidewalks) and bicycle paths	S	X		
Extension of pedestrian malls		X		
Off-street loading/unloading docks	S	X		
Grade-separated pedestrian crossing	S	X		

ACTIVITIES REQUIRING PROVEN TECHNOLOGY WHICH CAN BE ACCOMPLISHED BY THE OPERATOR(S)

Facility Provision

Intermodal terminals	X			
Pedestrian facilities (escalators, moving sidewalks) in terminals	X			
Bus shelters	S	X		
Benches at bus stops	S			
Bike locks at bus stops				X





## SECTION 6

### SEATTLE AND THE PUGET SOUND REGION

#### SUMMARY OF PROPOSED APPROACH TO INTEGRATION

The approach proposed for the Puget Sound Region would involve inter-modal integration of ferry and bus systems to provide for continuous public transit from the residential areas on the west side of Puget Sound to the Seattle Metropolitan Area. Interagency integration would also be treated through the involvement of state, metropolitan and municipal governments as well as private operators, using some of the solutions suggested by the experience of the Hamburg Federation. This approach would encompass a full range of urban environments from low-density residential areas, through a single-access transportation corridor, to the high-density CBD. The public directly affected would number between 5,000 and 10,000, permitting intensive surveys and analysis of the impacts of the demonstration for evaluation purposes.

Specifically, this proposed plan would call for the integration of public transit of three geographical subareas: the City of Seattle, Puget Sound, and the residential areas of Kitsap County and Vashon Island. Such integration would cover:

- Formation of an association of participating operators
- Coordination of routes and schedules
- Convenient and comfortable transfer facilities
- Single fares for the total three-part journey
- Distribution of revenues from fares
- Coordination of public information, promotion, and ticket sales

At the same time, the study plan would include tasks directed toward improving service within each of the subareas so as to bring all elements up to a level of performance high enough to attract passengers to the total integrated system.

#### THE CITY AND ITS TRANSPORTATION REGION

Seattle, with its excellent harbor facilities in Puget Sound, is the third largest port on the West Coast. With a population of 530,860, it is

the major city of the Puget Sound Region, comprising portions of the counties of King, Kitsap, Pierce and Snohomish in the northwest corner of the State of Washington. (See Figure 9.) The total population of the Puget Sound Region is 1,934,621, of which over 60 percent lives in and adjacent to Seattle within the Boundaries of King County. The second largest city in the region is Tacoma, with a population of 154,689.\* (See Table 19.)

Table 19. Population in the Puget Sound Region, counties and cities over 50,000 in 1970.

SEATTLE-EVERETT SMSA		1,421,863
<i>King County</i>	1,156,632	
Bellevue	61,485	
Seattle	530,860	
<i>Snohomish County</i>	265,231	
Everett	53,869	
TACOMA SMSA		411,027
<i>Pierce County</i>	411,027	
Tacoma	154,689	
OUTSIDE SMSAS		101,731
<i>Kitsap County</i>	101,731	
TOTAL — 4 Counties		1,934,621
<u>Taken from Source 1.</u>		

The Puget Sound Region is a complex of mountains, islands and waterways connected by the Strait of San Juan de Fuca to the Pacific Ocean. The city itself lies along a steep, narrow hill between Puget Sound and Lake Washington, and the narrow waterways which join the two bodies of water at the city's north and south extremities make Seattle virtually an island. Two floating bridges connect the city to the suburban areas across Lake Washington, while ferries provide linkage to areas across Puget Sound.

\*The U.S. Bureau of the Census designate King and Snohomish Counties as the Seattle-Everett Standard Metropolitan Statistical Area (SMSA), and Pierce County as the Tacoma SMSA. Kitsap County is not included in any SMSA. However, the Puget Sound Governmental Conference carries out regional transportation planning for the four-county area, and this definition seems more appropriate to this analysis.

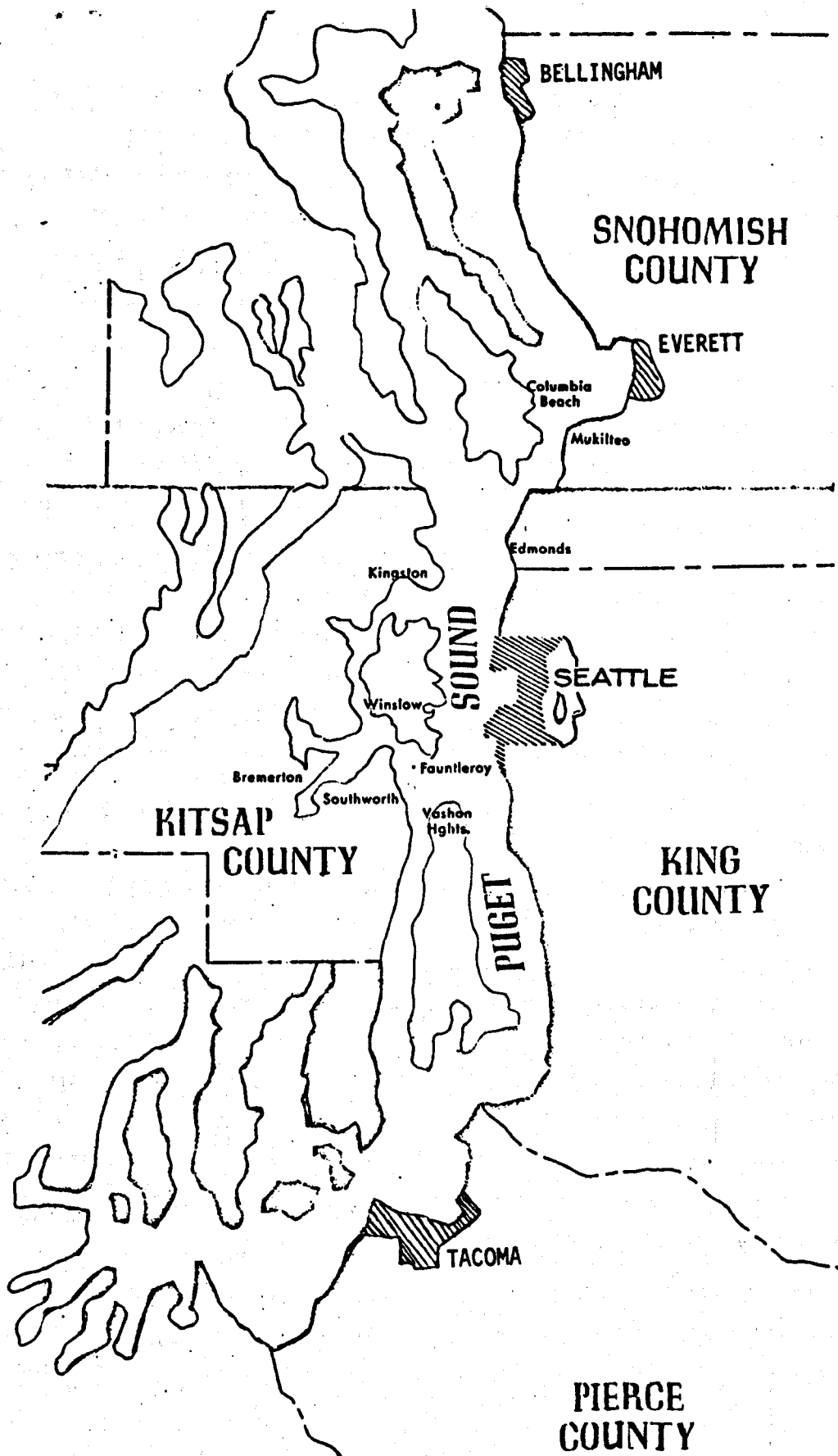


Figure 9. The Puget Sound Region.

Taken from Source 4.



Highway and rail systems run along a north-south corridor and development within the city follows the same axis. The CBD parallels the waterfront, but is separated from it physically by steep grades that discourage circulation between the two areas. The separation of the harbor facilities from the CBD has contributed to blight in the waterfront area.

To the north of the CBD is Seattle Center, the site of the successful 1962 World's Fair. Many of the buildings constructed for the fair are now being used for cultural and sports events. However, the area is primarily a tourist attraction and amusement park, not fully integrated into the mainstream of urban activities. It is connected to the city by a monorail system.

The Puget Sound Region has experienced three decades of consistent growth. Between 1960 and 1970 population increased at an average annual rate of 2.6 percent. During this period King County grew by 222,000, while the population of its central city, Seattle, decreased by 7,000. Forecasts of the Puget Sound Governmental Conference anticipate continued population growth for the region, reaching better than 3 million by 1990 (Source 2).

The early Puget Sound economy was based almost entirely on forest products and agriculture. Rapid industrial development since World War II led to a more industrialized economy, and the aerospace industry, represented almost exclusively by the Boeing Company, became the single largest source of jobs. Between 1960 and 1969, employment in the metropolitan area and in Seattle increased by 47 percent and 44 percent respectively. Total employment in the Seattle metropolitan area averaged 633,000 in 1969 and the aerospace industries employed about 14 percent of the total work force (Source 3). The number of other manufacturing jobs declined during this period, but the economy was simultaneously bolstered by a substantial increase in non-manufacturing employment. Most of the net increase in jobs came from the service sector.

Metropolitan Seattle has recently become an economically depressed area, due in part to the changing national priorities and a corresponding decline in the aerospace industry. Its current economic recession has

produced an unemployment rate of over 8 percent according to the 1970 Census of Population. In spite of the high unemployment rate, median income in the Seattle-Everett SMSA was \$11,676 in 1970, with only 5.2 percent having incomes below poverty level.

The Central Business District of Seattle extends over 200 acres and contains approximately 30 million square feet of floor space devoted to commercial offices, retail stores and government activities. CBD employment is currently estimated at 72,200, and is expected to grow to nearly 85,000 by 1980 (Source 3).

### TRANSPORTATION PLANNING

Four levels of government are actively involved in transportation planning for the Puget Sound Region: State, regional, metropolitan, and city. Cooperation and coordination of activities between these levels is remarkably good.

The State Highway Commission and its Department of Highways not only constructs and administers highways and bridges in the region, but also operates the extensive ferry system across Puget Sound. This agency is currently sponsoring a study by a local engineering-architectural firm, VTN-Washington, of the potential for route consolidation service.

The Puget Sound Governmental Conference, whose members are the several cities and counties of the Puget Sound Region, is the federally designated regional authority to review local applications for federal assistance in planning and development. Its Transportation Planning Division is concerned with both public and private transportation modes. PSGC is currently involved with a study to develop a public transit program for the metropolitan Seattle area, being carried out by Daniel, Mann, Johnson, & Mendenhall in association with Simpson & Curtin; Toner, Vandevanter and Associates; and Victor O. Grey and Company. The study is being carried out with the assistance of an UMTA Technical Studies grant.

The Municipality of Metropolitan Seattle (Metro) is an association of the cities, unincorporated areas, sewer districts and county government of King County. Metro is an operating as well as a planning agency. It currently administers the area-wide sewer system, and is intended to take on

more operating functions and become a true metropolitan government. In the primary election in September, the plan for the combined City of Seattle-King County Public Transit System was approved by the voters, along with a proposed sales tax of 0.3 percent to permit Metro to operate the combined system at no increase over present fares.

The City of Seattle currently operates the Seattle Transit System with responsibilities for planning routes and schedules and setting fares for the bus system. The city also owns the Seattle Monorail, which was constructed in 1961 to take visitors from downtown Seattle to the site of the World's Fair. The monorail is operated by Seattle Transit personnel.

## PUBLIC TRANSIT

Because of the geographical configuration of the Puget Sound Region, Seattle's CBD is the point through which nearly all regional private and public transportation flows. It is estimated that on an average weekday more than 250,000 person-trips are made to and from the CBD. About one-third of all CBD trips are made by public transit, while only 18 percent of city-wide trips are by public transit (Source 3). Seattle's public transit systems include the state-operated Puget Sound ferries, the Seattle Center CBD monorail, a wide network of diesel and trolley bus services provided by the municipally owned Seattle Transit System, and buses operated by Metropolitan Transit Company serving areas outside the city limits. Some intercity service is provided by Greyhound, Trailways, and other companies. Seattle is also served by three railroads: the Burlington Northern, the Union Pacific, and the Southern Pacific. On the west side of Puget Sound a city-owned bus system operates in and around Bremerton, while a private, one-bus company operates on Vashon Island.

### Washington State Ferries

At the present time, over 6 million one-way passenger trips are made by ferry annually between Seattle and communities across Puget Sound. Nearly 2.1 million are drivers of vehicles being transported with them on board the ferry. The remaining 3.9 million are predominantly riders accompanying drivers of private automobiles (Source 4).

The two major ferry routes, carrying more than 70 percent of the annual passengers, run from the communities of Bremerton and Winslow to the Seattle Ferry Terminal, which is adjacent to the CBD. A city-owned bus system of Bremerton, the major urban center of Kitsap County, provides access to the Bremerton terminal, but no public transit service is available on Bainbridge Island to bring passengers to the Winslow terminal. Table 20 provides a breakdown of passengers and vehicles by the four routes.

Table 20. Passengers and vehicles carried annually on existing ferry routes between Seattle and the west side of Puget Sound.

<u>Route</u>	<u>Passengers (exclusive of drivers of vehicles)</u>	<u>Vehicles and their drivers*</u>
Winslow - Seattle	1,820,000	944,000
Bremerton - Seattle	1,210,000	519,000
Vashon - Fauntleroy	636,000	632,000
Southworth - Fauntleroy	<u>226,000</u>	<u>203,000</u>
TOTAL	3,892,000	2,298,000

\*Vehicles and their drivers pay a combined fare. Additional riders in the cars purchase passenger tickets, therefore total passengers including drivers is the sum of the two columns.

Source: Washington State Highway Commission, State Toll Bridge Authority, June 1972, based on ticket sales.

Routes from Southworth and Vashon Heights carry the remaining one-third of annual passengers to Fauntleroy, a smaller port facility located at the south edge of the city of Seattle near the Seattle-Tacoma Airport and the major industrial area. The Boeing plant, Seattle's largest employer, is located in this area. The private one-bus company on Vashon Island offers three round trips daily for an average of 75 commuters, and a small parking lot is located at the Vashon Heights terminal. Southworth is not served by public transit at all.

The city-owned Seattle Transit System provides connections from both Seattle and Fauntleroy terminals to points throughout the city of Seattle.

Washington State Ferries is operated by the State Highway Department through its State Toll Bridge Authority. At present, the fleet consists

of 19 vessels, of which three are 100-car, 1000-passenger ferries and four are "superferries" with capacity for 2500 passengers. The ferries are designed for automobile transport, between 70 and 75 percent of capacity being allocated to this purpose.

Car pools are common among commuters using ferries into Seattle from Bremerton and Winslow, especially for groups all employed at the same location, or in the same general area. Students and industrial workers use car pools most often since their mainland points of destination are located out of the downtown Seattle area. The majority of pedestrian commuters (those who do not bring their car onto the ferry) coming into the downtown Seattle area are within walking distance of their employment as the Seattle Ferry Terminal is situated within blocks of most of downtown Seattle. Others who work farther out make connections with Seattle Transit buses or use taxis to reach their jobs.

The majority of pedestrian commuting is done on the Winslow-Seattle and the Bremerton-Seattle crossings. Inadequate vehicle parking near most other terminals and virtually no connecting bus service prevents full realization of pedestrian service. Present daily movement of foot passengers is approximately 7,000 one-way trips. This number increases in summer and drops during the winter months.

The ferry system, like all other means of commercial transportation, faces the problem of peak traffic periods. Because the ferries are used for pleasure as well as commerce, peaking is perhaps more of a problem for the ferry system than for other modes of transportation. There are peak days and months, as well as peak hours. The peak hours are those typically faced by transportation operations in general. There is the early morning rush (6:00 a.m. to 9:00 a.m.) caused by commuters going to work, and the higher peak evening loads (4:00 p.m. to 7:00 p.m.) caused by the combination of workers and shoppers returning at the same time. Pleasure traffic affects the weekly and seasonal peaks. Traffic Monday through Thursday is relatively stable, but on Friday, Saturday and Sunday, normal commuter traffic is augmented by people using the ferries to reach the recreational facilities of Puget Sound. These people then return home on Sunday evening, creating a heavy traffic load.

Washington State Ferries has already had some experience with inter-modal integration in connection with its service between Anacortes and Sidney, B. C. A four-part excursion ticket can be purchased for \$10.50 which covers a round trip by ferry between Anacortes, Washington, and Sidney, B.C. and a round trip by sight-seeing bus between Sidney and Victoria, B.C.

### Seattle Transit System

This service is currently operated by the Department of Transportation of the City of Seattle within the city limits. The main operating station, general offices, vehicle storage and maintenance facilities are located on the south side at Atlantic Street and Airport Way, convenient both to the downtown area and to various points on the south side by way of I-5 and I-90. The north side operating station is located at 5th Avenue North and Republican Street, close to the Seattle Center. This location is also convenient to the downtown area, as well as to most areas of the north side by way of I-5. Since Seattle transit operates a number of trolley buses, there is also a power plant division located at 14th and East Jefferson. In addition, there are several other power plant locations to serve the trolley lines.

Seattle Transit System does not recover operating expenses out of the fare box, but receives household and employment taxes assessed within the city, as well as revenues from general funds. In addition, the State provides funds from the State motor vehicle excise tax to match local tax money on a one-to-one basis.

Most major residential areas are served by several routes which connect them to the Seattle CBD. In areas north of downtown, there are crosstown services which span the entire width of the city. South of downtown, however, crosstown services are limited due to severe topographic constraints and are provided primarily by east-west sections of CBD-oriented routes. There are no lines which directly link the residential areas of West Seattle with those of the southwest sections of CBD-oriented routes.

In most areas, the proximity of several routes gives many residents a choice of services to take downtown. In some cases, however, the city's topography limits such alternatives, as routes which appear to run close to each other may be separated by steep grades.

Vehicles are generally in good condition and nearly all are now equipped with Environmental Improvement Packages (EIP).

Seattle Transit operates on a zone fare system with a base fare of 25¢ plus 5¢ for each additional zone traveled. A number of incentive fare programs are offered, including reduced cost passes for senior citizens and students. Exact fares are required and drivers do not carry change.

Most lines operate about every 10 to 15 minutes in the peak periods and the normal service interval during the rest of the service day is usually 30 minutes at the most. This is a good service, especially in light of the choice of routes that many people in the Seattle area are offered. The service day for most routes extends from 5:00 a.m. until 1:00 a.m. the following morning. As with most comparable transit systems, the night service is very lightly patronized, but is, of course, of considerable importance to those who do use it. Sunday service also is reasonably good on most lines.

Seattle Transit has instituted an express system which uses I-5 to speed movement from North Seattle to the downtown area. Eight lines operate over this "Blue Streak" route, collecting passengers locally in normal service areas and operating express to the CBD on I-5. Several of these lines also serve a large park-and-ride lot at Northgate, where transit patrons may park their cars free of charge and board transit for an express ride to the CBD. This lot is now over-filled daily, and plans are underway to construct a new lot in the same general area. No similar express service is provided by Seattle Transit to areas on the south side of the city (Source 2).

Both the Seattle and Fauntleroy ferry terminals are accessible by bus. Service between the Seattle terminal and downtown Seattle is available across the street from the terminal. Most points in the CBD can be reached by a 10-minute ride, and headways during peak periods run about 15 minutes. Service at the Fauntleroy terminal is less frequent, and the trip to the CBD takes 20 to 25 minutes.

### Seattle Monorail

The Seattle Monorail provides a two-minute ride over a one-mile route;

shuttle trains operate on each of two guideways. The monorail is currently owned by the city and operated by the municipal Seattle Transit System. Its operating hours are between 10:00 a.m. and 12:30 a.m. The basic fare is 25¢ for a one-way trip, except between 11:30 a.m. and 2:00 p.m. when the fare is reduced to 10¢ to encourage people in the CBD to spend their lunch hours at the Seattle Center. In 1969, the monorail reported patronage of 1,662,000 (4,000 to 5,000 per day) and gross receipts of \$344,000. The system is financially self-supporting. July, the month of heaviest patronage, shows over twice the average monthly load due to tourist visits (Source 3).

### Metropolitan Transit Corporation

Public transit service outside of the Seattle city limits is provided by Metropolitan Transit Corporation, a wholly-owned subsidiary of Chromalloy American Corporation of St. Louis, Missouri. The system serves the suburban areas of King County and communities in Snohomish and Pierce Counties.

Fare-box revenues are not sufficient to support the system, and the company has entered into a contract with King County to provide services to suburban areas with financial aid provided by communities served.

Metropolitan Transit Corporation operates basically a suburban service and is prohibited from providing local service within Seattle. This means that it operates as an express system through the city, providing suburban commuters relatively high-speed travel in the "closed door" portion of the route. Unfortunately, much of this speed advantage is lost as a result of circuitous routing in the local service area.

Frequency of service on metropolitan routes can range anywhere from 10-minutes to about one hour. However, each route has numerous intermediate turn-around points and variable routings. This results in headways at particular points along the route being markedly different. Under present service levels, buses in and out of Seattle rarely carry capacity loads and off-peak trips are usually less than half full.

Vehicles are in relatively poor condition; many are old, and most are usually not clean.



Base fare is 45¢ plus 5¢ for each additional zone (approximately one mile). Reduced fares are provided for students and children, as well as for commuters using round trip tickets and ticket books of 10 to 30 rides. (Source 2).

### Bus Service West of Puget Sound

The Bremerton Municipal Transit operates seven bus routes which serve the city of Bremerton and several small private companies serve surrounding communities. Generally, the routes have 30-minute headways during the morning peak, with service cut to 40-minute headways for the rest of the day. Operations on the route begin prior to the morning peak and continue until around 7:30 in the evening. No Sunday service is provided. Marking of bus stops is inconsistent and poorly done, but passenger comfort has been enhanced at many stops by bus shelters which were erected by a service club. The speed of operation on the Bremerton routes is low, never averaging more than 12 miles per hour. All routes in the system showed operating deficits for 1971.

Service to the Bremerton Ferry Terminal is provided by two routes. One serves the residential area west of the Naval Shipyard with a one-way loop which means a circuitous trip for passengers boarding near the start of the loop. One good-sized residential area just beyond this route has no bus service. The other route connects the terminal with the Naval housing development in west Bremerton. Transfers to these two lines from other routes in the Bremerton system can be made at several points (Source 5).

Bus service on Vashon Island is provided by Island Transit, a private company.

### CURRENT INTEGRATION EFFORTS

Under the sponsorship of the Puget Sound Governmental Conference and the Municipality of Metropolitan Seattle (Metro), two bills were passed in the 1971 State legislature that would permit the funding and operation of a King County-wide transit system, subject to voter approval in September 1972.\* The administering agency would be Metro, which since 1958 has operated a sewerage and waste disposal service for most of the county.

A study completed in May 1972 outlines the plan whereby the two existing transit services would be merged into a single operation under Metro. In upgrading the system with additional rolling stock, shelters, park-and-ride lots and allocation of exclusive lanes on both freeways and city streets, assistance is anticipated from both the Federal Highway Administration and UMTA.

Service to the Seattle Ferry Terminal will be enhanced by a new CBD shuttle system on 1st, 3rd, and 5th Avenues and a new "Entertainment Crescent" route along Alaskan Way where the terminal building is located (see Figure 10). Both local and arterial express buses will be available to ferry passengers at the Fauntleroy Terminal. These buses will connect with main express routes leading north to the city center and south to the airport and industrial area (see Figure 11). Metro will also provide service on Vashon Island.

The summary of the proposed transit plan provided in the notice of public hearing is as follows (Source 5):

"The proposed Metropolitan Area Transit Plan is a coordinated County-wide, all-bus transit system connecting major and secondary activity centers with high-speed express service. The plan further provides collector and local service on routes where significant patronage is estimated for such service and park-and-ride lots for automobile access to the multi-center express system. The plan provides for service to colleges, junior high and high schools, hospitals, major employment, commercial and cultural activity centers already established in the developed urban and sub-urban area.

"This plan includes the following major elements:

"Approximately 25 limited or non-stop express routes serving 650 two-way route miles.

"Approximately 100 local routes serving 850 two-way route miles.

"Parking for an estimated 12,000 vehicles at approximately 20 park-and-ride lots.

"Approximately 25 sheltered transfer points where local routes intersect with express service on Interstate and State highways at so-called 'Metro-Flyer' stops.

"Approximately 1,200 neighborhood bus shelters.

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\*Voters approved the tax measure on September 16, 1972.

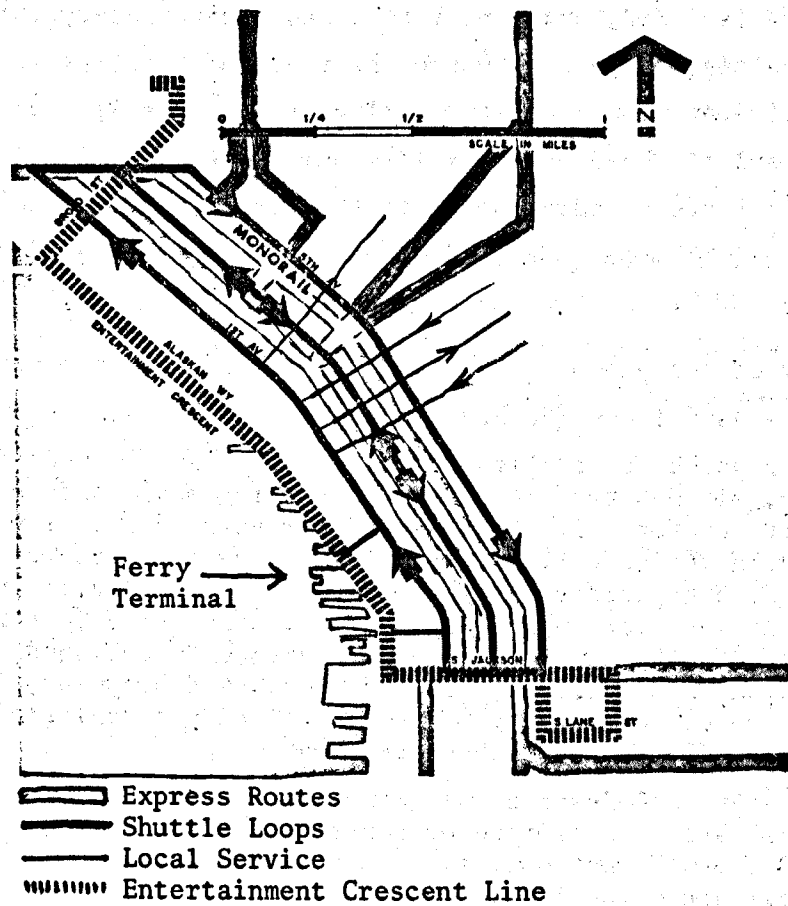


Figure 10. Service to Seattle Ferry Terminal proposed in the Metro Transit plan.

Source: INTERPLAN modification of figure taken from Source 2.

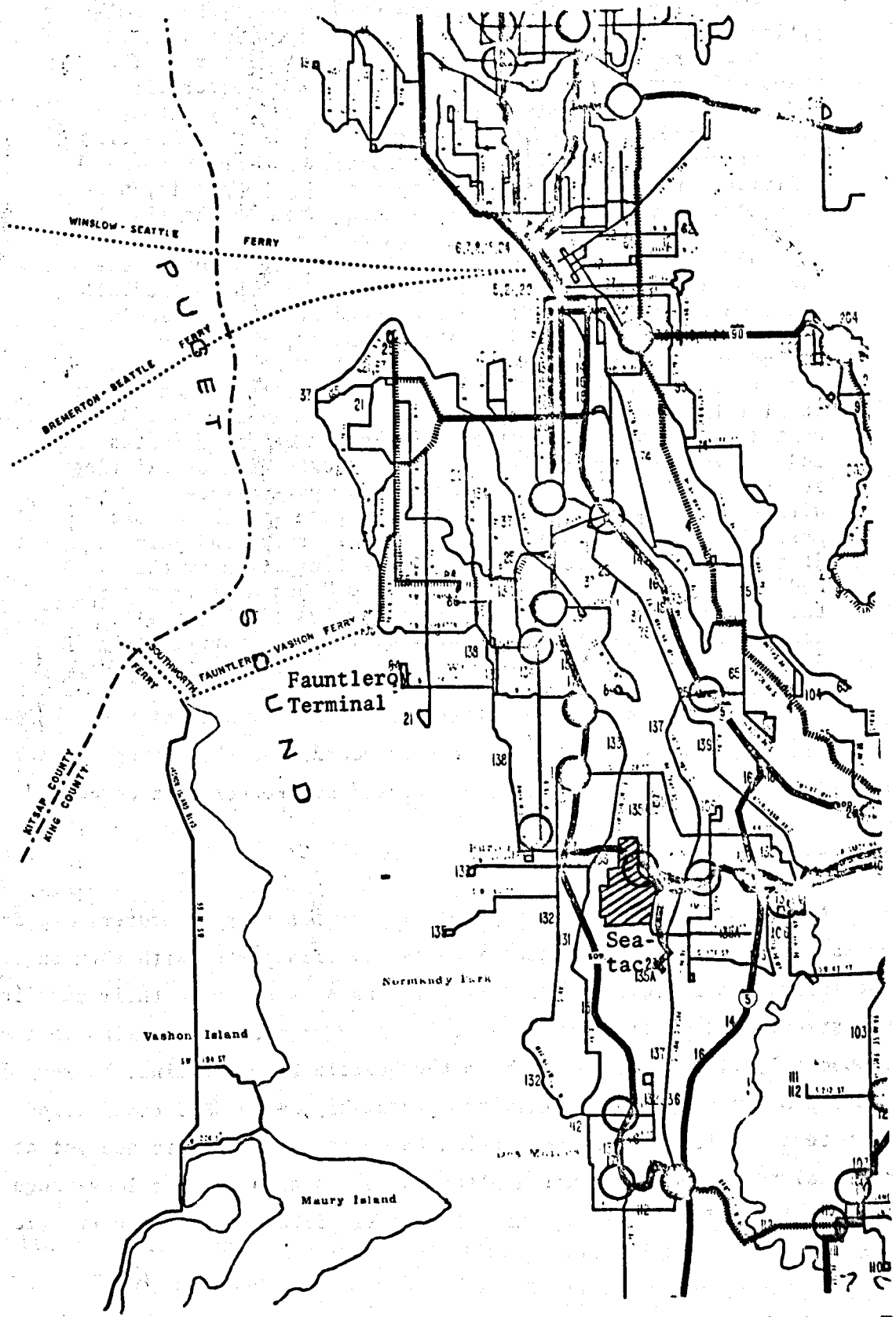


Figure 11. Service to Fauntleroy Ferry Terminal proposed in the Metro Transit Plan.

Source: INTERPLAN modification of a figure taken from Source 2.

"This improvement of services will require the acquisition of more than 100 additional buses immediately with growth and replacement requiring more in the future. The buses will run on existing or already planned arterials and streets. The proposed routes are essentially extensions and additions to those presently operated by Seattle Transit and the Metropolitan Transportation Company. The additional routes were selected by plotting hospitals, nursing homes and other institutions frequented by the elderly and handicapped and devising routes to serve those institutions. By 1980, new features will include exclusive bus lanes on I-90. Route 522 and the East approach to the Toll Plaza on the Evergreen Point Bridge and creation of exclusive bus lanes on certain existing streets, including Second and Fourth Avenues in the Seattle Central Business District. The capital cost of the above system is estimated at 91 million dollars. A base fare of 25 cents with a 5 cent zone charge is recommended. The selection of routes and service will generally be based on extension of existing services and patronage patterns. This 'pay-as-you-go' plan will be financed in part with a proposed three-tenths of one percent County-wide sales tax as well as fares and joint State and Federal grants. Federal participation by the Federal Highway Administration and the Urban Mass Transportation Administration will approximate 60% of the total capital costs, and the State will contribute approximately 25%."

Design standards for the integrated bus system are shown in Table 21. Comparisons are made between existing standards and those proposed for the new system. Time contours for the proposed system were not developed.

#### FURTHER NEEDS FOR INTEGRATION

At the present time, a large portion of the ferry commuters are drivers or passengers in private vehicles which are transported with them on board the ferry. On reaching the Seattle terminals, most drive their cars into CBD streets and parking lots. A 1970 survey of pedestrian trips in the CBD showed only 7100 trips to and from the Seattle Ferry Terminal between 7 a.m. and 7 p.m. on a typical weekday or, presumably, some 3550 round-trip walk-on commuters. While traffic congestion in downtown Seattle is not yet at the critical point, transportation planners in the area see the long-range desirability of eliminating this segment of private automobile traffic from the CBD.

Table 21. Design standards for the integrated Seattle bus system.

POLICY	PRESENT STANDARD SEATTLE TRANSIT SYSTEM	PROPOSED STANDARD METROPOLITAN SEATTLE TRANSIT SYSTEM			
		Population Density (Dwelling Units per Acre)			
		Auto Ownership	More than 10	6 to 10	1 to 6
1. Route spacing	One-half mile or greater depending on density	0 to 0.5 cars/HH	1,400	2,000	2,600
		0.5 to 1.5 cars/HH	2,000	2,600	5,280
		1.5 to 2.0 cars/HH	2,600	5,280	*
		More than 2.0 cars/HH	5,280	5,280	*
		* Special case requiring individual analysis			
2. Loading on Buses	Base "non-rush" 100% Transition period 115%-120% Peak "rush hour" 135%	Recommended Maximum Loading Standards (percent of seats provided)			
		Type of Service			
		Operating Period	Express	Arterial	Circulation/ Distribution
		Peak - 30 minutes	100%*	125%	150%
		Peak hour	100	100	125
		Base (non-peak)	75	75	100
		Night	75	75	75
		Saturday/Sunday	75	75	75
		*Passengers as a percent of seats provided for the designated time - standards may be exceeded for individual trips within the time period.			
3. Frequency of Service	Basic Standard Peak periods scheduled to carry 135% of seated capacity Base periods scheduled to carry 100% of seated capacity Policy Headways 30 min. on basic routes, 60 min. on outer multiple terminals	Adequate to accommodate passenger volume within loading standards			
		Type of Service			
		Express routes	Peak 10 min.	Base 30 min.	Night(if offered) 60 min.
		Arterial	30 min.	60 min.	60 min.
		Circulation/Distribution	5 min.	15 min.	*
		* Requires special analysis based on specific conditions			
4. On-Time Performance	Peak 70% or better Base & Night 90% or better	H E A D W A Y			
		Time Period	Less than 10 Minutes	10 to 30 Minutes	Special Services 1
		Peak Hour	75% <sup>1</sup>	85%	95%
		Off-Peak	80%	95%	95%
		Saturday/Sunday	80%	95%	95%
		<sup>1</sup> Trippers, etc. <sup>2</sup> 'On-Time' is defined as less than one minute early and five minutes late			
5. Bus Stop Spacing	Approximately every two blocks in residential areas (average spacing system wide = 678')	Residential areas in local routes - 700 to 1,360 feet depending on density. Destination areas to suit destination concentration. Express on Freeway - 1 mile min. Express on arterial - 1/4 mile min.			
6. Shelters	No policy	At all stops serving 100 or more boarding (or transferring) passengers per day			
7. Service Hours	5 a.m. to 1 a.m.	5 a.m. to 1 a.m.			

Taken from Source 2.

Population in the communities across Puget Sound has been growing rapidly with their increasing popularity as residential areas for Seattle commuters. As Table 22 shows, population in the area as a whole grew by 22 percent

Table 22. Population of the service area west of Puget Sound by Census County Subdivisions.

	<u>1970</u>	<u>1960</u>	<u>Percent Change</u>
King County			
Vashon Island Division	6,516	5,182	25.7
Kitsap County			
Division 1	2,153	1,811	18.9
Division 2	1,662	1,421	17.0
Division 3	8,282	6,401	29.4
<i>Poulsbo Town</i>	1,856	1,505	23.2
Division 4	5,585	3,614	54.5
Division 5	1,168	788	48.2
Division 6	6,518	7,373	-11.6
<i>Erlando Point</i>	1,017	--	--
<i>Navy Yard City</i>	2,827	3,341	-15.4
Division 7	1,733	3,385	-48.8
<i>Rocky Point</i>	1,733	--	--
Division 8	9,106	7,171	27.0
<i>Enetai</i>	2,878	2,539	13.4
<i>Tracyton</i>	1,413	--	--
Division 9*	2,846	1,948	46.1
Division 10*	3,942	3,170	24.4
<i>Winslow town</i>	1,461	919	59.0
Division 11*	1,706	1,286	32.7
Division 12	4,784	4,812	- 0.6
Division 14	7,449	4,488	66.0
Division 15	2,085	1,418	47.0
Division 16	3,502	2,822	24.1
Bremerton division	35,307	28,961	21.9
<i>Bremerton City</i>	35,307	28,961	21.9
Port Orchard division	3,904	2,778	40.5
<i>Port Orchard town</i>	3,904	2,778	40.5
TOTAL Kitsap County	101,732	84,176	20.9
TOTAL Service Area	108,248	89,358	21.1

\*Bainbridge Island.

Source 1.

between 1960 and 1970, while nine individual communities have grown between 40 to 66 percent. The 1970 census shows a total of 108,000 residents of Kitsap County and Vashon Island (part of King County) which make up the potential service area for a combined ferry-land transport public transit system across Puget Sound to Seattle. In addition, 19 percent of the service area's total population are school children under driving age (6-15), nearly 4 percent are persons age 75 and older, and slightly over 7 percent have incomes under the poverty level. These three population segments could be expected to benefit by the improvement of public transit within the service area itself.

In the interests of preserving existing environmental balances in Puget Sound, the present public attitude in the State of Washington is against the construction of new bridges, so the burden of transporting increasing numbers of people across Puget Sound must be borne totally by the ferry system. Statistics for the Washington State Ferry system as a whole, including four smaller routes to destinations other than Seattle, show a 52 percent increase in vehicles being handled over the 10-year period from 1957 to 1966. The increase in passengers other than drivers for the same period was only 18 percent. These statistics strongly suggest that public transit meeting the ferry at both ends of its route is inadequate to move ferry passengers between their initial origins and final destinations. A survey of ferry commuters conducted from Vashon Island in the spring of 1972 supports this position: one-third of those surveyed indicated that they would be willing to leave their cars behind if convenient public transportation were made available to them.

#### LOCAL ATTITUDES TOWARD INTEGRATING FERRY AND BUS SERVICE

All three principal agencies that would be concerned with integration of the ferry and bus services consider such a move essential to providing adequate transportation for the Seattle area. These agencies are the State Highway Commission, which operates the Washington State Ferries, the Puget Sound Governmental Conference, which directs local applications for federal assistance, and the Municipality of Metropolitan Seattle, which became the operator of Seattle's new county-wide public transit system effective January 1, 1973.



## State Highway Commission

In its report, Presenting Washington State Ferries (Source 4), the State Highway Commission argues in favor of intermodal integration as follows:

"Adequate passenger space exists on all regularly scheduled cross-Sound routes, and full passenger capacity is needed only during peak commuter hours, but is vital when required. The ferry system is in a position to accommodate increased foot passenger traffic on its various routes, provided there are means developed whereby total dependence on the automobile is not required once the passenger arrives at the other end of the crossing. Washington State Ferries, however, is handicapped in its efforts to promote greater foot passenger movement on commuter routes by the lack of available parking spaces at many terminal points. The system does not directly control existing parking facilities adjacent to most of the terminals. Previous enlargement of holding areas and increased size of entrance areas have virtually exhausted future property acquisitions for the ferry system in most terminal locations. Dependence on private or municipal operations of adjoining parking areas, with close cooperation and understanding of mutual problems, is important."

"The full development of the potential in mass-transit capabilities of the ferry system is essential to an orderly development of adequate public transportation in this region. Any mass-transit plans must provide for the inclusion of service to and from ferry terminals on the eastern shore. Because of the intricate and time-consuming nature of bus service currently serving these terminals, the automobile has become a requirement—if not in transit aboard ferries—to the extent of having an auto parked on opposite sides of Puget Sound, or utilizing taxi service on one side or the other. Few commuters use bus or taxi service because of the prohibitive costs involved when such fares are added to ferry fares. Inflexibility of mobility is an obvious unfavorable factor at present if a commuter does not have his automobile."

"At present, ferry transportation in the Puget Sound region appears to have more mass-transit characteristics than any other form of public transportation. The ferry system is in a position to increase [the number of foot passengers] should complementary shore-side transportation systems be developed, such as east-west, north-south transit. Many commuters then would no longer be required to depend solely upon the auto with its costly insurance, maintenance, and purchase requirements."

"Such transit developments ashore could conceivably return the nature of water transportation to that of the 'mosquito fleet' era of two generations past. It is not difficult to visualize a fleet of modern passenger-only vessels interconnecting the islands, peninsulas, and urban centers, especially in view of the rapid development in concept and design of passenger/vehicle vessels."

"With or without passenger-only vessels, a mainland rapid mass-transit operation would reverse the existing trend of near-total dependence on the automobile for the majority of ferry users on both sides of Puget Sound. The ferry system would welcome a reversal of this trend; for with existing vessels it is in a position to provide a high degree of efficiency in passenger transportation."

Interviews in May 1972 with administrators of Washington State Ferries and the State Toll Bridge Authority, which directs its operations, revealed a continuing strong desire to achieve the integration of ferry and bus systems.

#### Puget Sound Governmental Conference

An address by Mart Kask, the organization's executive director, to the Washington Association of State Highway Officials on July 21, 1971 (Source 7), indicated the following desire to promote transit integration:

"...The Seattle area—right today—is at a critical point in developing an 'approach' to multimodal, or inter-modal, transportation planning."

"...The three-part planning program that we are about to embark upon...offers a significant opportunity to bring the many (public transit) modes...into closer coordination and integration."

"To the greatest degree possible, we should outline the sequence of steps leading to a truly integrated transportation system for the Seattle area and the region."

An interview with PSGC's Director of Transportation in May 1972 indicated that, although the agency's major concern at present is the anticipated merger of Seattle Transit and Metropolitan Transit into a single county-wide transit system under Metro, the integration of ferry and bus services was considered both feasible and desirable.

## Municipality of Metropolitan Seattle

As a part of the detailed plans for the new Metro Transit System, improved service to both ferry terminals is expressly designated. Coordination of bus and ferry schedules is anticipated and is part of the recommended operating plan.

### THE PROPOSED INTEGRATION APPROACH

The proposed approach should result in the integration of public transit of the three geographical subareas: the Seattle Metropolitan Area, Puget Sound, and the residential areas of Kitsap County and Vashon Island. Such integration should cover:

- Formation of an association of participating operators
- Coordination of routes and schedules
- Convenient and comfortable transfer facilities
- Single fares for the total three-part journey
- Distribution of revenues from fares
- Coordination of public information, promotion, and ticket sales

At the same time, service within each of the subareas must be brought up to a sufficiently high level of performance to attract passengers to the total integrated system. This section will deal first with procedures for integration and then necessary improvements to the separate parts of the system.

#### Formation of an Association of Participating Operators

Essential to the functioning of an integrated public transit system is a formal association of participating operators through which the service obligations and revenue shares\* of members can be mutually agreed upon, and which can perform certain functions for membership as a whole.

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\*Participation in revenue sharing by Washington State Ferries and Metro may require modification of existing State legislation.

It is suggested that the division of functions between member operators and the transit association follow the pattern established by the Hamburg Transit Federation (HVV). Under this arrangement, the legal position and corporate form of each federation partner have remained unchanged in each case. Hence each partner retains its rights and obligations arising from the laws and permits under public law and each is still bound by the legal provisions applicable to its activities. Each federation partner retains ownership of its installations and transport media. Each continues to conduct its operations and cover expenditures as it did prior to joining the association. A partner is still responsible for the total assets, the technical and transport facilities, and management of its own operations.

Specifically the member operators are responsible for:

1. Provision of operating installations and vehicles.
2. Detailed drafting of the timetables and duty rosters.
3. Maintaining standards of operation.
4. Provision and management of personnel.
5. Supervision of operation.
6. Collection of fares.
7. Further development of technical and operating equipment.

The association undertakes the following functions for the membership as a whole:

1. Transport research and planning.
2. Preparation of timetables and allocation of services.
3. Drafting and further development of the joint fare system.
4. Distribution of traffic revenue taking into account the capacities and services of each partner.
5. Regular checking of vehicle use from an overall economic vantage point.
6. Public relations and advertising.

It is recommended that in Seattle a Puget Sound Transit Association be formed. Its principal members would be Washington State Ferries, the Municipality of Metropolitan Seattle and the Puget Sound Governmental Conference; other members would be the existing and newly created transit operations in Kitsap County. PSGC would provide regional planning for the association.

## Coordination of Routes and Schedules

Prior to the initiation of an integrated service, a survey should be made of ferry passengers to determine their travel requirements. Their origins and destinations and times of arrival and departure at these points can then be used to determine optimum routes and schedules for the system.

Users must be able to depend on making their connections between modes without having to wait too long between segments of the trip. Disembarking passengers should find the buses waiting for them, even if the ferry is delayed through some unusual circumstance. Since these buses would normally be full at least at the beginning of the trip, their delayed departure from the terminal would have little impact on overall bus service throughout the area.

Schedules for the overall system should be designed to get passengers to their ultimate destinations at appropriate times. If, for example, the trip to the CBD from the Seattle terminal takes 7 minutes, ferries should arrive at the terminal no later than 7:40 a.m. and 8:40 a.m. to accommodate commuters who must be at work in the CBD at 8:00 a.m. and 9:00 a.m. Similarly, ferry departures in the evening should be no earlier than 5:30 p.m. to accommodate workers who will leave their offices at 5:00 or a little after.

If the travel requirements survey indicates a sufficient ridership, special "ferry buses" reserved for users of the integrated system could be run on direct routes to and from the ferry and the CBD.

## Convenient and Comfortable Transfer Facilities

The Seattle area is subject to frequent rain in all but the summer months and usually experiences some snowfall during the winter. It is therefore essential that shelter from the weather be provided at intermodal transfer points.

Loading and unloading of buses at the terminals should be carried out under marquees; passengers should not be required to cross streets or walk from exposed bus loading zones to and from the terminal buildings.

The existing terminal building in downtown Seattle provides excellent passenger facilities including ticket and information windows, comfortable seating with attractive views of the harbor, restrooms, coin-operated vending machines for food, drinks and cigarettes, and a counter-service restaurant facility. A covered bus-loading area is not provided at present. Similar facilities should be provided on a smaller scale at the other terminals, with economic demand determining, for example, whether or not a food-service counter could be supported by terminal users.

### Single Fares for the Total Three-Part Journey

Current one-way fares for the four routes that would be involved in the demonstration are shown in Table 23. To quickly review other current rates the fare system proposed for the new Metro transit operation is 20¢ for the first zone plus 10¢ for additional zones. Most areas within the city can be reached for the basic 20¢ fare. Adult fare on the Bremerton system is 30¢. Special reduced rates on both bus systems are available for children, students and senior citizens.

Table 23. Current one-way adult fares for ferry routes.\*

<u>Route</u>	<u>Passengers</u>	<u>Auto Including Driver</u>	<u>Difference</u>
Winslow-Seattle	.85	2.20	1.35
Bremerton-Seattle	1.05	2.35	1.30
Vashon-Fauntleroy	.50**	1.50**	1.00
Southworth-Fauntleroy	.85	2.20	1.35

\* Children under 5 free, ages 5 - 11 half fare; commutation fares available at discount.

\*\* Half of round-trip toll collection

Taken from Source 8.

The difference between passenger and auto fares on the four ferry routes ranges from \$1.00 to \$1.35. It is assumed that most Seattle destinations would be reached within a 20¢ zone ride from the terminals, but service to the low-density residential areas across Puget Sound would require a higher

fare. For lack of past operating data, it is suggested that the fare to these areas be set initially at 50¢. The allowance of 50¢ for the home-to-ferry portion of the trip increases the probability of continuing an economically feasible service through the low-density residential areas after the demonstration is over. The proposed single fare for the three-part journey would then be 70¢ plus the cost of a ferry passenger ticket. Monthly passes and multiple-ride tickets should be made available to reduce time and effort involved in ticket sales. Special inducements to purchase passes might be added in the form of a free breakfast in the morning or a free drink in the evening on the ferry.

The difference of 60 to 75 cents between the ferry toll for an automobile and the new combined fare would not by itself constitute a strong inducement for commuters to leave their cars behind, because operating and parking costs form a large proportion of total cost to the commuter. However, the cost of travel is not the major factor in converting drivers to public transit use. Riders will be attracted not by savings but by the availability of convenient, comfortable and efficient service between home and work as an alternative to commuting by car. Nonetheless, efforts should be made to prevent increases in fares and reductions in service at the close of the demonstration; many promising experiments have failed to survive such actions. More efficient use of ferries by walk-on passengers may permit Washington State Ferries to insure the continuation of residential bus service through subsidy, if appropriate modification could be made to the State Constitution.

#### Distribution of Revenues from Fares

Revenue distribution in the Hamburg Transit Federation (HVV) is based on the principle that each partner's profit-and-loss situation should remain approximately as it had prior to joining the federation, so that profit-making agencies are assured continuation of their profit, while subsidized ones must continue to obtain financial assistance from whatever sources had provided such subsidies in the past. The formula is renegotiated and changed infrequently, only when very special reasons exist (such as a change in labor productivity, taxes, etc.). Consequently, improvement in operating efficiency

of a partner results in increased profits for him, since his expenses are reduced and revenues remain constant; recognition of efficiency is thus retained.

The formula for revenue redistribution provides that the share of total revenues due partner  $a$ , as explained in Section 3 of Volume 2, page 71-73 (Hamburg Transit Federation), is:

$$R_a = (R_t - C_h) \frac{\sum_{x=1}^5 I_{ax} A_{ax} c_x}{n \sum_{a=1} I_a \sum_{x=1}^5 A_{ax} c_x}$$

where:

$R_t$  = Total revenue collected by the HVV;

$C_h$  = Operating expenses of the HVV;

$I_a$  = "Historic index" of partner  $a$ , i.e., his revenue-to-cost ratio in the year prior to joining the HVV;

$A_{ax}$  = Quantities defining contribution of partner  $a$  to the operations of the system. The five quantities ( $X = I, \dots, 5$ ) entering computations reflect the effort of each partner through the following items: route miles of service, passenger seats in the vehicle fleet, locomotives (for DB's diesel operations only), seat-miles and train-miles of service provided;

$c_x$  = Unit costs or relative weights of respective quantities  $A_x$ ;

$n$  = Number of partners in the HVV.

The actual financial results of each carrier may deviate from the revenue-to-cost "historic index" contained in the above formula, depending both on the total actual receipts of the HVV within the tariff period and on changes in the carrier's operating costs. However, at the start of a tariff period, each carrier presumably performs according to his historic index.

The application of this method of revenue sharing to the proposed Seattle integration program can be illustrated by the following simplified example, in this case with reference to Washington State Ferries. Assume that:

$R_t$  = total revenue collected from the new integrated service = 500,000 passengers at an average fare of \$1.20 = \$600,000



$C_h$  = operating expenses for the centralized activities of the Association = \$50,000

$I_a$  = WSF revenue-to-cost ratio for the four routes in the year prior to joining the Association = 1.1

$A_{ax}$  = services WSF agrees to perform for the association as follows:

$A_{a1}$  = route miles for four routes = 400,000

$A_{a2}$  = passenger capacity = 1,000,000 seats

$A_{a3}$  = number of landings (independent of size of vessel) = 70,000

$A_{a4}$  = terminal facilities used (independent of size and number of vessels using facilities)  
= 6

$c_x$  = unit costs of providing services described above, based on prior WSF experience (includes only those portions of total costs allocated to the new integrated service), as follows:

$c_1$  = \$0.08 per passenger route mile

$c_2$  = \$0.02 per passenger seat

$c_3$  = \$3 per landing (cost independent of size of vessel)

$c_4$  = Operation of terminals: Seattle at \$14,000; Fauntleroy at \$8,000; four remaining terminals at \$4,000 each (costs independent of number and size of vessels using the facilities)

At the beginning of an agreed-upon tariff period when the service obligations for each member are set, cost to Washington State Ferries of providing its assigned services would be estimated as follows:

$$\begin{aligned}c_t &= (A_{a1} \cdot c_1) + (A_{a2} \cdot c_2) + (A_{a3} \cdot c_3) + (A_{a4} \cdot c_4) \\&= (400,000 \cdot 0.08) + (1,000,000 \cdot 0.02) + (70,000 \cdot 3) \\&\quad + (14,000 + 8,000 + 4 \cdot 4,000) \\&= \$300,000\end{aligned}$$

Applying the revenue-to-cost ratio normally derived from its operations, Washington State Ferries' share of revenues can be described by:

$$\begin{aligned} S_{WSF} &= I_a \cdot c_t \\ &= 1.1 \cdot 300,000 \\ &= \$330,000 \end{aligned}$$

Assume that similar calculations have been carried out for each of the remaining partners in the association and the sum of these ( $S_t$ ), including Washington State Ferries, equals \$550,000. The following ratio is then derived:

$$\frac{S_{WSF}}{S_t} = \frac{330,000}{550,000} = \frac{3}{5}$$

This ratio remains fixed throughout the agree-upon tariff period and is applied to all revenues actually derived from the new integrated service. Washington State Ferries' share of these is then calculated as follows:

$$\begin{aligned} R_{WSF} &= (R_t - C_h) \frac{S_{WSF}}{S_t} \\ &= (600,000 - 50,000) \frac{3}{5} \\ &= \$330,000 \end{aligned}$$

Since costs to Washington State Ferries of providing its share of the integrated service were estimated at \$300,000, its profit of \$30,000 is in keeping with its normal revenue-to-cost ratio of 1.1. However, it should be emphasized that actual operating costs incurred during the tariff period do not affect the revenue sharing formula. Thus, if Washington State Ferries can increase its efficiency of operation, it will realize increased profits. Similarly, it must absorb higher operating costs occasioned by such expenses as wage increases and suffer a loss of profits, just as it risked functioning independently of the association. Adjustments to the sharing ratio  $S_{WSF}/S_t$

are made only at the beginning of a new tariff period when the members re-negotiate their relative positions on the basis of their experience in the prior tariff period.

The revenue-sharing formula established at the beginning of the tariff period can be applied to any level of income from fares derived from the integrated service. For example, suppose that the Association believes that the new system should be introduced at a lower fare structure, so as to attract more riders. As a result, 610,000 passengers use the system, instead of 500,000, and pay an average fare of \$1.00 rather than \$1.20. Washington State Ferries' share of this would be:

$$\begin{aligned} R_{WSF} &= (R_t - C_h) \frac{S_{WSF}}{S_t} \\ &= (610,000 - 50,000) \frac{3}{5} \\ &= \$366,000 \end{aligned}$$

If Washington State Ferries found that it can handle these additional passengers at the same operating costs, its profit would be more than doubled. If additional personnel and facilities were needed, it would have to absorb these costs. Should a major addition to the services WSF contracted for with the Association appear necessary, as for example, supplementary ferry trips, the State Agency would renegotiate its service contribution and revenue share prior to the initiation of a new tariff period.

A modification of this system is recommended for Seattle, because newly created services will be involved. It is suggested that past profit-and-loss experience, item "I" in the formula, be applied to Washington State Ferries, Bremerton Municipal Transit and Island Transit, and estimates of initial operating costs and revenues calculated for the new Metro system. Supplementary systems developed for other communities in the residential service area will be evaluated individually for their expected profit-and-loss position.

Revenues should be shared only for those parts of the systems of each participant that are involved in providing integrated service. For example, revenues from ferry routes between origins and destinations outside the demonstration area should not be subject to sharing, nor should bus revenues

from transporting children to local schools. Such factors would be subject to detailed agreements between the participants at the beginning of the integration program.

#### Coordination of Public Information, Promotion and Ticket Sales

Information on routes, schedules and fares for all cooperating transit operations should be prepared and distributed by a centralized public relations unit. Not only should pocket schedules be available on all vehicles and at all transfer points, but schedules should be posted at all transfer points and major stops.

Publicity for the new combined service could be disseminated by advertisements in all vehicles of cooperating services, by radio, TV, newspapers, and flyers mailed to residents of the service area. Editorial coverage of the new system through television and newspapers should be promoted by the public relations unit.

This unit would also be responsible for coordinating the sale of tickets at convenient locations, as well as testing and adopting successful marketing procedures, such as multiple-ride tickets and commuter passes. Efforts should be made to reduce the need for passengers to carry and show tickets as they transfer between different legs of their journeys. Experiments with such techniques as reserved pedestrian corridors for those changing modes, automated fare collection devices, and procedures to permit passengers to omit one or the other of the bus portions of the trip could be carried out as part of the program.

#### Improvement of Bus Service in Seattle

Plans for the new Metro system appear to offer generally high quality public transit with regard to access, frequency, reliability, and comfort and no change to the system are suggested here. As mentioned above, however, the integrated ferry service may require special buses to shuttle ferry commuters from central places of employment (e.g., the CBD, the major industrial plants) to and from the two ferry terminals under marquees. Selection of routes and allocation of buses for "ferry specials" could be made on the basis of the origin-destination surveys conducted prior to the start of integrated service.

## Improvement of Ferry Service

The travel needs survey might show that existing runs could be rescheduled to better conform to users' needs. Vessels designed for carrying only passengers or a smaller number of vehicles might be substituted on some of the trips or used to supplement existing runs. Terminal facilities should be brought up to standards suggested above and provided with appropriate fare collection equipment.

## Improvement of Services in the Residential Areas of Kitsap County

Providing public transit in low-density areas at reasonable overall costs calls for different solutions than can be provided by traditional mass transit. The proposed integration offers an opportunity to experiment with some of these alternative forms of public transportation.

Again, the travel needs survey will help to define the kind of local service desired by ferry riders in different sections of the service area. Where densities are relatively high, such as Bremerton, the existing bus service might be augmented to provide more direct access from residential areas to the ferry terminal. Where clusters of commuters were identified, a cooperative bus might be used. Moderate-to-low density markets might be served by a pre-scheduled demand-responsive system for regular commuters. Small buses or jitney-type passenger cars could be operated during commuting hours by drivers employed in other activities during the remainder of the day. Schedules of school openings might be adjusted to permit school buses to operate on early morning pick-up service for ferry commuters prior to transporting the children; these buses could be easily available after school for the return-from-work run in the evening. In some areas, no form of public transit may appear to be feasible, and efforts should be directed toward providing adequate, convenient parking.

Each local community will present different travel needs, existing facilities and personnel available for adaptation into a service that would bring commuters on to the ferries without their cars. It would be essential to devise public transportation systems compatible with the individual characteristics of each locality. One of the criteria for adoption of any

of these systems should be its long-range economic viability beyond the time limits of the project when Federal support will no longer be available.

#### Expected Results of the Integration Program

Benefits that can be expected to result from integration are;

1. Increased profitability of ferry service through using available space to transport more passengers.
2. Increased frequency of ferry service through the use of smaller passenger vehicles.
3. Increased ridership of Seattle buses between the ferry terminals and major downtown locations.
4. Reduction of traffic congestion and demand for parking in downtown Seattle.
5. Improvement of public transportation throughout the west Puget Sound service area.
6. Increased efficiency of transfer between modes through single-fare tickets and monthly passes.

In the Hamburg experience it was found that operational savings of up to 20 percent were realized by some members, passenger increases ranged from 25 to 110 percent at some stations, and the percentage of passengers using weekly and monthly tickets increased from 42 to 54 percent, thus reducing vehicle delays and simplifying ticket sales.

An indirect result of the proposed integration might be to improve the desirability of the west Puget Sound service area as a residential area for Seattle commuters, which would in turn provide a larger market for the integrated system.

#### SOURCES :

1. 1970 Census of Population: General Population Characteristics; General Social and Economic Characteristics, U. S. Bureau of the Census, Washington, D. C., 1971.
2. A Transit Plan for the Metropolitan Area: Seattle and King County, prepared by the Puget Sound Governmental Conference for the Municipality of Metropolitan Seattle (Prime Consultant: Daniel, Mann, Johnson, and Mendenhall), Seattle, May 1972.
3. Arthur D. Little, Inc., City Center Transportation Project — Seattle, Washington, D. C., September 1970.

4. Washington State Highway Commission, Washington Toll Bridge Authority, Washington State Ferries, Presenting Washington State Ferries, undated.
5. "Notice of Public Hearing on Social and Economic Effects and Environmental Impact of Proposed Metropolitan Area Transit Plan," Seattle, June 1, 1972.
6. Simpson and Curtin, Puget Sound Regional Transit Study: Short-Range Regional Plan, February 1972.
7. Kask, Mart, "The Seattle Approach to Multi-modal Transportation," Address presented to the Washington State Association of State Highway Officials Planning Conference, Olympia, July 21, 1971.
8. Washington State Ferries, Ferry Schedule, Fall-Winter-Spring 1971-72, September 1971.

Table 24. Checklist of transit integration activities: Puget Sound Region.

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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**INSTITUTIONAL**

**OPERATOR AND CITY/COUNTY/STATE PLANNING COORDINATION:**

**Set up Regional Planning Coordinating Organization**

Legislated county/area commission for all regional planning	x			
Formally constituted and appointed independent committee			x	
Ad hoc coordinating regional planning committee with effective financial support and power to make recommendations			x	
*No coordinating agency for all regional planning			x	

**Requirements for Successful Demonstrations**

Thorough area trip demand study	x			
Formulate area transportation policy including goals for public transit	x			
Redefine public transportation region (e.g. extend transit district boundaries, etc.)	x			

**Set up Single Transportation/Transit Planning Authority**

Agency responsible for planning and financing all regional transportation activity	x			
Agency responsible for overall planning, licensing and financing of all regional public transportation			x	
Transit district or single publicly owned operator handles public transit planning	s			
*No single public transit planning authority (individual operators or their associations handle public transit planning under either open competition or area franchise).			x	

**OPERATOR/OPERATOR COORDINATION**

**Set up Coordinating Structure for Intra-Region Public Transit**

Single regional operator for all public transit (by merger or transit district legislation)				x
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\*All unstarred items are recommended integration activities. Starred items are included to complete the coverage of the list for evaluating existing program status.

x: Status for whole region, all operators.  
s: Status for part of region, some operators.



INSTITUTIONAL (continued)

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
One major operator, several smaller ones				X
Transit federation		X		
Transit community (separate agreements for joint tariff on routes, coordinated routes and schedules, some pooling)				X
Tariff association (joint tariff and revenue distribution agreements)				X
Route and schedule coordination agreements				X
*No regional coordinating organization	X			

Set up Coordinating Structure for Inter-City Transportation

Out-of-region operator participation in intra-regional coordinating organization		X		
Coordinating committee of operators				X
Coordinating agreements between individual operators (e.g. airport or airlines, Greyhound and transit district)				X
Responsibility allocated internally within intra-area operator(s) for planning coordination with out-of-region/intercity demand		X		
*No comprehensive approach to considering out-of-region trips	X			

TRANSIT/PARA-TRANSIT OPERATOR COORDINATION

Set up Coordinating Structure

Para-transit operator participating in intra-regional coordinating organization		X		
Coordinating committee of operators				X
Coordinating agreements between individual operator(s)				X
*No coordinating organization	X			

PUBLIC TRANSIT FINANCING ARRANGEMENTS

Sources for Financing Capital Investment Other Than Rolling Stock

Revenue from fares	S			
Bond issue	S			

INSTITUTIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Stock issue	S		
National loans			
Other debentures			
State grants	S		
National grants	S		
Specially designated local tolls	S		
Specially designated local sales taxes	S		
Specially designated local property taxes	S		
Specially designated state tax other than license or fuel taxes			
State motor vehicle operator licensing fees			
State motor fuel taxes	X		
Parking and park-and-ride fees	S		
Revenue from other services, e.g. leases of land and air rights, advertising	S		
Leasing arrangements (transfer to operating costs)			

Sources for Financing Rolling Stock and Buses

Revenue from fares	S		
Bond issue	S		
State loans			
Federal loans			
Other debentures			
State grants	S		
Federal grants	S		
Specially designated local tolls	S		
Specially designated local sales taxes	S		
Specially designated local property taxes	S		
Specially designated local other charges or taxes			
Specially designated state tax other than license or fuel taxes			
State motor vehicle operator licensing fees			
State motor fuel taxes	X		
Equipment trust funds			
Revenue from other services	S		
Leasing arrangements (transfer to operating costs)			

Sources for Financing Operating Costs

Revenue from fares	S		
Specially designated local tolls	S		

INSTITUTIONAL (continued)

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
Specially designated local sales taxes	S			
Specially designated local property taxes	S			
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes	X			
Revenue from other service	S			

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please describe)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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OPERATIONAL

ACTIVITIES REQUIRING COORDINATION WITH CITY/COUNTY/STATE AGENCIES

Auto Parking Policy in Major Activity Centers

Control of parking by higher charges		X		
Control of parking by graduated charges by distance from CBD or major activity center	S			
Control of parking by time of day restrictions		X		
Control of parking by street space restrictions		X		
Control of parking by open lot space restrictions		X		
Control of parking by in-building space restrictions				X
Encourage short-term parking and discourage long-term parking				X
*No significant parking policy			X	

Auto Use Restriction Policy

User charges, taxes, tolls, road pricing, etc.	S			
Restriction of auto use by zone (auto-free areas)				X
Restriction of auto use by time (auto-free areas); supplementary licensing, etc.)				X
Restriction of automobile flow by traffic restraint schemes				X
*No policy on auto use			X	

Traffic Management in Support of Public Transit

Total centralized traffic control within major activity centers				X
Signal synchronization	S			
Bus priority system at signals				X
One-way streets planned for transit flow	S			X
Reserved lanes for auto and bus use by time of day	S			
Reserved lanes for car pool and bus use by time of day				X
Reserved lanes on city streets for bus only use by time of day	S			
Reserved lanes on city streets for bus only use all day				X
Reserved streets for bus only use				X
Reserved streets for minibus use and pedestrians				X

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Bus stop locations chosen for transit and vehicle flow improvement	S	X	
Offstreet docks for landing/unloading	S		
Parking restrictions to aid transit flow	S		
Exclusive freeway lanes	S		
Reserved bus ramps for freeway entry and exit			X
*No consideration by local authority of impact of motor vehicle flow on public transit		X	

ACTIVITIES REQUIRING COORDINATION WITH GOVERNMENT AGENCIES AND LOCAL BUSINESSES

Changing Transit Demand Characteristics

Staggered work hours			X
Sliding work hour system (flexitime)			X
Encourage extended shopping hours			X
Encourage multi-use development of major activity areas (office, shops, entertainment, apartments)			X
Encourage public transit user shopping trip orientation among merchants			X

ACTIVITIES REQUIRING OPERATOR COORDINATION

Basic System-wide Fare Structure

Zonal fare system	S		
Distance-graduated fare system (or time-on-system related)		X	
*Fare set by number of transfers			X
*Flat fare system	S		
*Nominal fare system	S		
*Free fare system (no fare)			X
Unlimited number of free transfers between routes of single mode only (restricted by time:			
interoperator			X
intraoperator			X
Unlimited number of intermodal free transfers:			
interoperator			X
intraoperator			X

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Limited number of free transfers between routes of single mode:				
interoperator		X		
intraoperator	X			
Limited number of intermodal free transfers:				
interoperator		X		
intraoperator		X		
*No free transfers			X	

Supplementary Policies on Fare Structure

Special rates for socio-economic groups	S			X
Special rates by time of day (off-peak, night)				
Special rates by area of city (e.g. flat rate in CBD)	S			
Special rates by part of week (e.g. Sunday)	S			
Special rates by type of trip (e.g. tourist)	S			S
Daily system passes				
Intermodal single trip combination passes		X		
Seasonal passes		X		
Free return trip in off-peak hours				X
*No supplementary policy on fares			X	

Fare Collection Procedures†

*Token system			X	
Scrip system (tickets)	S	X		
*Cash system	S			
*Exact fare system	S			
Pass system (including commuter rail)		X		
Honor system (including commuter rail)				X
Tickets sold on vehicles: Buses	S			
Light Rail			X	
Tickets sold off-vehicles: Buses			X	
Light Rail			X	
Automated machines on or off vehicles (including commuter rail)		X		
Driver collects fare	S			
Conductor collects fare			X	
*No fare			X	

†Excludes commuter rail except as noted

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Coordinated Routes				
Eliminate duplicate routes:	interoperator		X	
	intraoperator	S	X	
Extend routes and plan new routes to improve level of service in region	S	X		
Extend and plan new bus/light rail routes for servicing out-of-region/intercity demand terminals (e.g. airport)	S	X		
Rail rapid transit routes for servicing intercity demand terminals				
Design bus routes as feeders to commuter rail and rapid transit:	interoperator		X	
	intraoperator		X	
Design bus express routes to take advantage of freeway network	S			
Use paratransit modes for providing feeder service to main bus or transit routes, e.g.	taxis		X	
	minibus/midibus	S	X	
	dial-a-ride			X
	jitneys		X	
	bicycles			X
Mini/midi bus routes in CBD	S			
Express rapid transit service			X	
Express bus services	S			
Rapid transit routes for certain times of day (if justified)			X	
Bus routes for certain times of day			X	
Park-and-ride commuter routes developed:	Bus/Light rail	S		
	Rapid transit		X	
	Commuter rail		X	

Coordinated Schedules

Bus route connection schedule coordination:	interoperator		X	
	intraoperator	S	X	
Intermodal (bus light rail-rapid transit) connection schedule coordination:	interoperator			X
	intraoperator			X

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Intermodal (with commuter rail) connection schedule coordination			x	
Rider oriented headways (reduced to no more than 15-20 minutes)	s	x		
Rider oriented schedule times (easily memorized)	s	x		
Out-of-region/intercity demand schedule coordination with airport	s	x		
Out-of-region/intercity demand schedule coordination with mainline railroad service				x
Out-of-region/intercity demand schedule coordination with buses (Greyhound)				x
Extend service times (into night hours)	s	x		

Public Information System

Produced easily understandable and available system-wide schedules with routes, route maps and fares	s	x		
Schedule information at bus stops	s	x		
Route maps at most stops	s	x		
Route maps on vehicles	s	x		
Labeling of stops and vehicles	s	x		
Public relations program	s	x		
System-wide information near fare collection areas		x		
System-wide information on rapid transit train platform			x	
Clearly labeled information areas in stations		x		
Multi-lingual information provision				

OPTIONS NOT INCLUDED IN ABOVE LIST

(Please Describe)

Coordination of Ferry-Bus Schedules

x



PHYSICAL AND TECHNICAL

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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ACTIVITIES REQUIRING NEW TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Automated Operations

Computerized traffic control with bus locator				X
Freeway ramp metering				X
*Computerized traffic control, no transit priority				X
Bus priority control equipment				X

ACTIVITIES REQUIRING NEW TECHNOLOGY WHICH CAN BE ADOPTED BY OPERATOR(S)

Automated Operations

Automatic train operation			X	
Dial-a-ride				X
Bus operation control with bus locator and radio communication				X

ACTIVITIES REQUIRING PROVEN TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Facility Provision

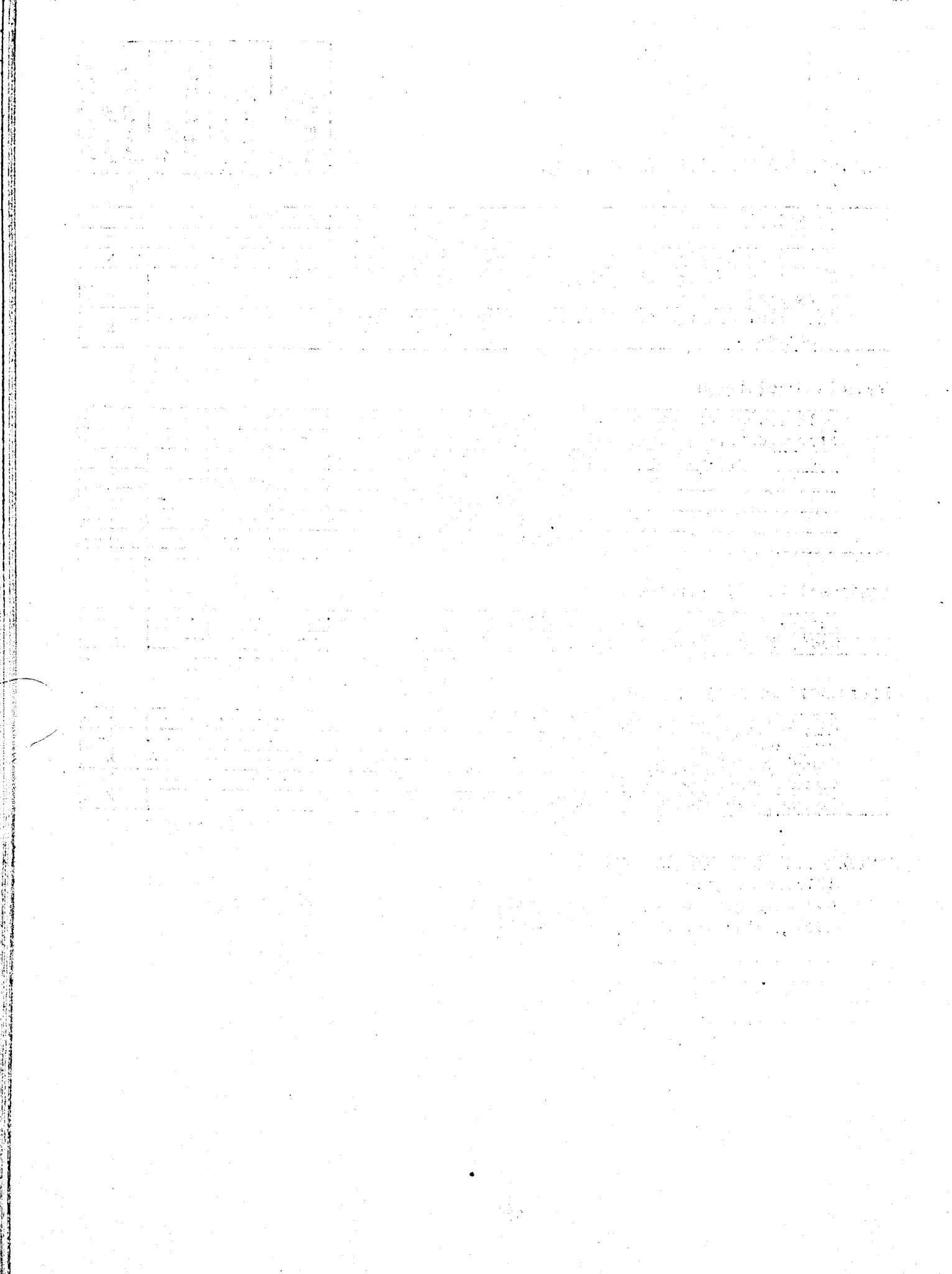
Grade-separated busways	S	X		
New and converted park-and-ride lots	S	X		
Park, ride, and shop lots near the CBD	S	X		
Pedestrian walks (sidewalks) and bicycle paths	S	X		
Extension of pedestrian malls		X		
Off-street loading/unloading docks	S			
Grade-separated pedestrian crossing	S	X		

ACTIVITIES REQUIRING PROVEN TECHNOLOGY WHICH CAN BE ACCOMPLISHED BY THE OPERATOR(S)

Facility Provision

Intermodal terminals			X	
Pedestrian facilities (escalators, moving sidewalks) in terminals	S	X		
Bus shelters	S	X		
Benches at bus stops	S	X		
Bike locks at bus stops				X





## SECTION 7

### MIDDLETOWN: A SMALLER URBAN AREA

#### INTRODUCTION

While the main thrust of an UMTA transit integration program would be in the largest SMSAs, UMTA is charged to provide assistance to all "urban areas." The enabling legislation defines an "urban area" as:

"... any area that includes a municipality or other built-up place which is appropriate, in the judgment of the Secretary, for a public transportation system to serve commuters or others . . ." (Section 12(c) (4), UMTA Act of 1964)

At the request of the UMTA Program Manager, INTERPLAN therefore considers in this section how a smaller urban area might apply the techniques of transit integration. Taken together with the more complex examples of the three larger cities presented in the previous sections of this volume, this section should help to provide a balanced picture of the usefulness of integration approaches to U.S. urban transit systems as a whole.

Specifically, this section is designed to accomplish three ends:

1. Describe the transit needs and options of smaller cities as they differ from those of the major SMSAs.

The major difference is that institutional integration, of great importance in large areas served by many agencies, is largely irrelevant in smaller cities, most of which are served by a single bus company. In these cities, the operational and physical aspects of integration are of the greatest interest.

2. Suggest to smaller cities now planning transit improvements how the concepts of integration discussed in Volume 1 and the experience of European transit systems contained in Volume 2 are relevant to their needs.
3. Provide UMTA with an example of how a smaller city might respond to an invitation to participate in a Federal transit integration program.

The subject of this section, "Middletown" is a hypothetical small urban area, designed to be representative of the 50,000-250,000 population group. This group is made up of the 120 smallest SMSAs; about 90 other SMSAs have populations of over 250,000 but fall below the one million population cutoff point used in the selection of three major urban areas in Section 2. Therefore Middletown can be taken to be typical of about half the SMSAs in the United States (see Appendix B for a listing of the 243 SMSAs and p. 9 for a definition of an SMSA).

While some readers may recognize certain of Middletown's features in their own cities, two disclaimers are important:

1. Middletown is an unscientifically assembled composite of an "average" American medium-sized to small city. It may still retain some "un-average" characteristics.
2. No true portrait of any specific city was intended. Any similarities to actual individuals, city institutions, transportation systems, or historical events is purely accidental.

#### SUMMARY OF PROPOSED APPROACH

The proposed approach for integration in Middletown would build on the existing public and para-transit networks to achieve a fully responsive transportation system with a minimum of financial and organizational effort. The approach has two main thrusts: operational integration of the existing publicly owned bus company with the privately owned cab company, and increased emphasis on the utilization of para-transit modes, walking and biking. A series of other institutional, operational and physical measures is also suggested in the description of the proposed integration program, presented following a description of the current status of Middletown's transportation system.

The suggested approaches to integration are those which might be undertaken by a small city which is served by a single bus company, and which has no other major mode of public transit. In cities such as Middletown, the changes required to promote integration may be less sweeping than in larger cities which are served by several modes of public transportation. However, the basic problems of auto congestion, air and noise pollution, and the need for a more effective public transportation system are the same, though on a smaller scale.

#### THE CITY AND ITS TRANSPORTATION REGION

Because of its natural attributes of climate and location, Middletown's economy is tourist and service oriented. During the past 5 years the city's population growth rate has been more than twice that of the state as a whole, and in the last decade its population has grown by 65 percent to a level of

140,000. The fastest growing area is that surrounding the state university and the city airport, both located 10 miles from the CBD. The city's rapid growth can be attributed to the influx of research-oriented firms which have located in Middletown, attracting thousands of new workers and residents to the area. Retired persons form another large segment of Middletown's population. They have the leisure time to enjoy the many attractions of the area, but they require public transportation because few own or operate cars.

In large areas of the city zoning ordinances stipulate large-lot, single-family detached housing, resulting in low density land use and a correspondingly low population density. These factors, combined with the high standard of living which has resulted from Middletown's service economy, tourist trade, and university-related research industries, have fostered a highly mobile society in which the private automobile is king. It is this automobile orientation which presents both the greatest challenge and the greatest threat to the public transportation system in Middletown.

#### TRANSPORTATION PLANNING

The planning of public transit service in Middletown is primarily the responsibility of the Middletown Metropolitan Transit District Board. In addition to this board, the various para-transit services such as taxis and airport limousines are governed by Public Utilities Code regulations. The Middletown Traffic Engineering Department is responsible for the planning of all bikeways, roads, and parking. It also maintains automobile and population density counts, and studies the flow of traffic as it changes due to new residential and business developments.

In 1966, citizens of Middletown voted the Middletown Metropolitan Transit District (MMTD) into existence by approving the passage of a Public Utilities Code statute, known as the "Middletown Metropolitan Transit District Act of 1966." This act created a transit district with a governing board of five members, and allowed the District to levy a property tax of up to \$.10 per \$100.00 of assessed valuation on properties within the transit district. The Metropolitan District Act specified that the board would consist of two members selected by the city council, two selected by

the county supervisors, and a fifth member selected by the four appointees. This board is charged with the responsibility of making the major decisions concerning the purchase of new equipment, new routes, and financial details of the bus company's operation. In addition to the board members, the MMTD has a full-time manager who assumes the responsibility of daily operations and serves as public relations liaison between the company and the public.

The Public Utilities Commission regulates many aspects of public transportation which affect the bus company, taxi company, airport limousines, and charter bus services. It sets fare limits, specifies jurisdiction of service for the different modes, and serves as a general "watchdog," making impromptu safety inspections and auditing financial reports.

These agencies work closely together in order to provide Middletown with the most efficient transportation network possible, while at the same time insuring maximum safety.

## PUBLIC TRANSIT

### Bus Service

The first bus company to operate in Middletown began service in 1943. It was owned and operated by a local couple and was profitable until 1959 when it was sold to a third party, "Mr. Jones." During the first year of Mr. Jones' management, the company reported substantial losses and the net worth of the company shrank to less than 5 percent of its original value. Because the company's outstanding debts were considerable, and Mr. Jones still owed most of the original purchase price, a bankruptcy action seemed inevitable. Thus, a suit for breach of contract and foreclosure of the pledge was brought against the company by the former owners. In the course of legal investigation, it was discovered that Mr. Jones had embezzled from the bus company money which had been withheld from the employees' wages for income tax. He had also charged off personal expenses for clothes and food to the bus company.

In 1961, the Middletown Transit Company was placed in receivership under the direction of an accountant, who then managed the company for a period of 10 months. This was followed by another era of private ownership

which resulted in further losses and eventual city subsidization at the rate of 60¢ per operating mile. This subsidization lasted until the Metropolitan Transit District was voted into existence and a publicly owned bus company was instituted with the help of a Federal DOT subsidy.

The Middletown Metropolitan Transit District presently owns and operates 12 buses which serve 8 routes covering the entire transit district. Headways range from 30 to 120 minutes; most are one hour long. Night service was offered when the MTD first began operation in 1968, but was discontinued due to lack of ridership. The night service had cost one-fifth of the total operating costs during the period it was offered, and it was determined that the company would incur an additional \$15,000 loss annually, were night service to be continued. Several of the existing routes are basically little-used "token" routes, planned to provide token service to transit district taxpayers in outlying areas. They run through wealthy automobile-oriented areas on the way to downtown. Seven of the eight routes are heavily losing money. One one—the ten-mile long corridor route between the downtown area and the university campus—is almost breaking even.

Many of the routes have stayed essentially the same since the days of Mr. Jones; they connect the older residential areas to the old CBD. However, during the last 10 years, numerous new housing developments have come into being, and two new shopping and employment centers have been constructed; these have created much larger population centers than the old residential areas or the old CBD. With the exception of one meandering route, the bus company has not recognized the growth of these new areas.

The buses carry over one million passengers annually. This service costs each property owner within the district \$.05 per \$100 of assessed valuation, or for the owner of a \$30,000 home, \$15 a year. The flat fare is 30 cents, with 5 cents for transfers. Bus ridership in Middletown is comprised mainly of senior citizens, the poor, and university students, nearly one-half of whom do not own cars.

The infrequent service, poor timekeeping record, and lack of evening services (no departures after 7 p.m.) all add up to a poor image and low level of patronage. The shiny appearance of new buses provided with an



UMTA grant is not enough to attract passengers. Despite the new buses, ridership increased only 3.5 percent during the first year that the company was publicly owned. Ridership has increased about 3 percent a year since then. During this same period of time, Middletown's population increased by over 50 percent. Table 25 lists key statistics for the system.

Table 25. Middletown: Key bus system statistics.

Number of employees	30
Number of buses	12 (1968 GM 4521)
Vehicles needed for peak service	10
Average age of vehicles	3½ years
Cost of new vehicles	\$29,000
Number of routes	8
Length of routes	190 miles
Percent of routes on exclusive rights-of-way	0
Typical service frequency	30-60 minutes
Yearly bus miles	40,000 (per bus)
Passengers per year (1971)	1,300,000
Revenue per year (FY1971)	\$260,000
Operating cost per vehicle mile	68¢
Amount of subsidy (from taxes)	\$185,000

The MMTD plans to purchase eight new mini-buses in 1974 which will be used to provide continuous loop service to major shopping areas and dial-a-bus service, and to serve residential areas where it is believed that they will be more acceptable than the present large diesel buses because of their smaller size and lower noise and air pollution levels.

#### Taxi Service

There is one taxi company operating in Middletown. It carried nearly as many passengers last year as did the bus company. It is a forward-thinking, innovative company interested in establishing new forms of service such as dial-a-ride and "transportation stamps" which would be available to the poor. The company already provides a variety of innovative services. It offers scheduled charter service at a 10-15 percent discount for schools,

commuters, and the general public. Charter service is defined by the taxi company as "scheduled pick-ups and deliveries on a regular basis." Cabs currently pick up handicapped children at one school and drive them to another for therapy every school day. Similar service is available for commuters who do not wish to maintain private automobiles or ride the bus. The taxi company provides commuter service scheduled at the convenience of the customer. In many cases, up to five individuals work out a "car pool" arrangement using taxis.

The entire cab fleet was converted to the utilization of natural gas in 1972. Since natural gas is less expensive and burns more efficiently compared to gasoline, fewer gallons of less expensive fuel are used. Since natural gas burns "cleaner," less frequent spark plug changes, oil changes, and engine tune-ups are necessary. The state tax which is levied on gasoline does not apply to natural gas, further reducing the company's expenditures for fuel. The money the company is saving by using natural gas is being applied to the acquisition of new taxis in order to upgrade the company's service level and the fleet's appearance.

Taxi ridership is fairly evenly distributed over the area served, with a large proportion of the riders being elderly citizens who prefer the door-to-door convenience of taxis to the less personalized service of the buses. Many elderly citizens utilize taxi service because they feel that the bus company's schedules and routes do not provide them with the service they require. The cab company collected 450,000 fares in 1971, with an average of two passengers per fare, thus providing transportation for nearly 1 million passengers last year at a profit.

Cab company management considers its fleet to have great potential as a multifaceted transportation service. Among the new ideas which are being implemented are dial-a-ride and a program for removing drunk drivers from the road. The drunk-driver program begins with advertisements placed in bars which read, "Relax and enjoy yourself at the (name of bar), and know a Yellow can take you home instead of a Black and White." Upon request, the cab company will dispatch one taxi with two drivers. The first driver takes the person home in the taxi, while the second driver drives the passenger's car home for him. For this service, the passenger pays a double fare. The

cab company would like the city to pay the fare for at least one of the drivers in order to keep drunk drivers off the road. This system would cost less than the jailing of drunk drivers and could reduce the number of alcohol-related accidents.

A dial-a-ride option begins in June, 1973. This service will enable an individual to call for a taxi, which will also pick up others in the area requesting dial-a-ride service. The cabs will then deliver the passengers to their respective destinations for a charge of \$1.00 per person. This multiple-passenger, multiple-destination service will reduce the cost of taxi service, provide more personalized service than do the buses, and cut down on the number of taxi trips required. An important aspect of the dial-a-ride program is that it is being funded by the taxi company without any city subsidization because the management believes it will offer the type of service not provided by the bus company at a lower fare than the single-person ride.

Taxi company management has also proposed three other special services ideas:

1. Serving the very elderly, crippled or poor in order to provide them with the transportation they need but cannot afford. The company would like to see this program handled through "transportation stamps" much like the food stamp program.
2. Adapting taxis to accommodate wheelchairs, so that individuals who are confined to wheel chairs have more mobility.
3. Integrating the cab company with the bus company in order to provide direct service to the doors of commuters who live long distances from the nearest bus stop. This service is similar to that planned by the MMTD in its new dial-a-bus and mini-bus programs. However, taxis have the advantage of being less expensive to operate and require no further capital expenditure since they are already available for use.

## Bikeways

Bicycles are a very important part of Middletown's transportation system. Bicycle use has always been high at the university campus located near Middletown, where most students do not own cars and must cover considerable distances. The use of bicycles has recently increased considerably in the city of Middletown as a result of a growing awareness of the presence of auto-caused pollution, and the mild climate which makes bicycling enjoyable most of the year. The experience of Middletown reflects the nationwide revival of bicycling,

which resulted in sales of 10 million bicycles in the U.S. in 1972.

The Middletown Traffic Engineering Department has established bikeways in many areas of the city, particularly along scenic routes and near schools. Studies are currently being carried out to determine the most predominant patterns of bicycle traffic in order to establish more bikeways along streets in the CBD and in surrounding areas.

### Airport Limousines

An airport limousine service has been in operation in Middletown for 2 years. It is privately owned and operated. The limousine provides three areas of Middletown with transportation to and from the airport, charging approximately half the cab fee for this trip. The area in which the limousine is allowed to operate is regulated by the Public Utilities Commission.

### Mini-Bus Charter Tours

A mini-bus charter company has been in operation in Santa Barbara for 2½ years. The owner and manager also acts as the driver. The company operates two 11-passenger cars which are available for sightseeing or travel charters. The charge for this service, set by the Public Utilities Commission, is based on either time or mileage.

## CURRENT INTEGRATION EFFORTS

Because Middletown has only one bus company and no other public transit such as rail rapid or streetcars, there is no need for integration between transit modes or operators. However, integration activities on all three levels, institutional, operational, and physical, are already taking place and are planned to improve bus service and to integrate bus and para-transit modes.

### Institutional Integration

Institutional integration of transit has always existed in Middletown because there has never been more than one bus company. The present public transit company, the Middletown Metropolitan Transit District, is managed by a five-man board chosen by the City Council and County Supervisors. This

board provides institutional coordination between the transit district and the city authorities in Middletown. An additional example of planning coordination in the city is the system of bikeways which parallel main thoroughfares in the city and surrounding areas. These bikeways were established as a result of the efforts of the city planning authorities and a group of bicycle enthusiasts known as Bikecology. Bikecology is an ecology-minded group whose goal is to create more bikeways so that pedestrians, bike riders and cars have separate rights-of-way, insuring safety for all three modes of transportation and facilitating bike travel.

### Operational Integration

The city has provided nine city-owned parking lots in the CBD which allow free parking for the first 90 minutes. This policy is intended to encourage the short-term parking of shoppers and discourage long-term commuter parking.

The bus fare structure encourages use by the elderly who may ride at a special rate of 15¢ per trip rather than the usual 30¢ fare, and provides special rates for school children. The fare is a flat rate anywhere within the city with a 5¢ transfer charge, and a 5¢ sur charge when traveling to or from one zone outside the city. Tokens are available for purchase at 3 for 85¢, and exact cash fares are not required.

The MMTD publishes a route schedule which is available on every bus, in some banks and supermarkets, and will be mailed upon request. These schedules are free to the public, being paid for by the advertising they contain.

Nearly all bus stops have signs which indicate they are bus stops, and many have benches, especially in downtown areas or at those stops which are heavily patronized. However, no information on routes or schedules is available at bus stops in spite of the fact that Middletown is host to thousands of tourists daily who do not know the city.

### Physical Integration

Physical integration encompasses two basic features:

1. the new mini-buses which will be purchased and begin operation in 1974;
2. the establishment of bikeways in many parts of the city.

Middletown has begun preparation for increasing its public transit service by the addition of mini-buses which will serve as dial-a-buses, feeder lines to main trunk lines, and continuous loop service for the CBD. As soon as suitable land is acquired for the terminal, these buses will be purchased.

#### PROPOSED INTEGRATION PROGRAM

A multi-faceted approach is suggested by INTERPLAN to accomplish complete intermodal integration of all existing forms of transportation in Middletown. Taken together, the four suggestions described below should result in a more effective and efficient transit system which will more completely serve the needs of Middletown residents and tourists. The expected environmental impact of the four suggestions would be that as public transit use increases, the number of private automobiles operated in Middletown should decrease, lowering levels of air and noise pollution and creating a transportation environment more in keeping with Middletown's relaxed life style.

First, the privately owned taxi company would be integrated operationally with the publicly owned bus company in order to provide transportation to areas which are inadequately served at present, as well as providing more hours of service at times when it is not financially feasible to operate the large diesel buses driven by nationally unionized drivers.

Secondly, bus and bicycle travel would be integrated under a bike-and-ride program which would include theft-proof bicycle stands at bus stops, bicycle storage inside buses which will permit individuals to take their bicycles along with them when they ride the bus, and the construction of an extensive bikeway system.

Thirdly, an auto-free zone would be created covering seven blocks of the main CBD thoroughfare, and a "package bus" would be provided to serve this pedestrian mall.

Fourthly, bus routes and schedules would be redesigned to increase service, and the area included in the MMTD would be extended. Table 26 outlines the programs which are recommended in order to accomplish a fully integrated system.\*

### Taxi-Bus Integration

Integration of bus and taxi service would permit taxis to take over many of the routes with low ridership in off-peak hours and in the suburbs, thereby cutting down operational expenses, reducing headways, providing better service and maximizing the usage of both buses and taxis. A survey would be made to determine which bus routes can be adequately served by the operation of one or more taxis. Since taxi operation is less expensive in terms of labor, fuel and initial purchase price, multiple taxis could be used at the same cost as one large bus. These taxis could then provide more frequent service. A jitney-type operation is not excluded.

Taxis would also be used as a feeder system to main bus lines and transfer points. The taxis would pick individuals up at their homes or the nearest corner, transport them to the main bus line, and return them home from the bus stops. Such service would promote commuter use of public transportation, increase service frequency in the suburbs, and free the larger buses to provide more comprehensive corridor-type service on the routes which have the greatest ridership.

A financial plan would be enacted in which the bus company would contract with the taxis at a rate per hour of taxi utilization. The owner of the taxi company would be made a member of the Metropolitan Transit District Board and would thus be able to voice an opinion concerning routes and other transportation issues pertinent to taxi operations.

The utilization of taxis would serve primarily the suburban areas of Middletown as well as providing the elderly, the young, and those who are unable to walk long distances with increased mobility. Since the suburban

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\*These and related secondary integration activities not fully described in the text are indicated in the checklist for Middletown (Table 27) at the end of the section.

Table 26. Summary of proposed integration activities in Middletown.

Basic	Additional
<b><u>INSTITUTIONAL</u></b>	
Integrate the use of bicycles with buses	Construct a pedestrian mall on the seven central blocks of Main Street
Change PUC regulations so that airport limousines may serve additional areas of the city	
Introduce a graduated fare system with free transfers	
Change existing Metropolitan Transit District boundaries to include other areas	
Include taxi company owner as non-voting member of MMTD Board	
<b><u>OPERATIONAL</u></b>	
Coordinate and change routes:	Integration of taxis with buses:
- Eliminate "token" routes	- Use taxis to provide transportation service to areas which are inadequately served at present
- Reduce all headways to no more than 15 minutes	
- Eliminate routes which closely parallel one another	New routes and route extensions
- Redesign the proposed minibus routes so they serve areas which are not auto-saturated	- Design routes which will serve a larger proportion of the community, extend service hours, and increase ridership
- Coordinate bus service with airport flights	- Begin commuter service to outlying areas
Systemwide information provision:	Provide a "package bus" similar to the one used in Hamburg to service the proposed Main Street mall
- Produce a new bilingual schedule which is easily understood	
- Distribute new schedules at prime locations	
<b><u>PHYSICAL</u></b>	
	Provide sheltered bus stops
	Provide areas in which bikes may be locked at bus stops
	Provide bike-and-ride facilities, i.e., storage facilities for bicycles inside buses
	Construct sidewalks on all city streets



areas comprise the primary source of commuter traffic, it is possible that some commuters will give up their private cars in favor of public transit as a result of this service. Such a reduction in auto traffic would have a beneficial environmental impact. Also, in many residential areas, the large buses, which are considered a nuisance, will be replaced with smaller, less obvious taxis, cutting down on both visual and noise pollution.

### Bike-and-Ride

The bike-and-ride program is intended to provide more mobility, increase bus ridership, and stabilize, if not reduce, the number of privately operated automobiles.

Bicycles are an integral part of Middletown's transportation system, and the "bicycle boom" is strongly in evidence. In order to integrate bicycles with bus service two main physical integrational actions must be undertaken:

1. The provision of bike stands at bus stops where passengers can leave their bicycles locked while they ride the bus to another destination.
2. The designing and installation of bicycle holders inside the buses, which will enable passengers riding the bus to take their bicycles with them in order to have the use of the bicycles at the end of the bus ride.

Certain stipulations would be made concerning the bicycles carried on the bus: the passengers would have to place them in the holders and remove them quickly, so that while the passengers entering the bus are paying their fares and seating themselves, the individuals who have transported their bicycles can install and remove their bikes from the bus, causing no delay in bus departure. The bicycle holders would be placed directly opposite the rear entrance of the bus in place of two or more bus seats. These holders would consist of wall clips for front and back wheels so that the bicycle would hang pointed upwards, with the rear wheel resting on the floor. This arrangement would allow room for two bicycles for every seat which is removed.

Installation of these stands and holders must be accompanied by the provision of more bikeways to ensure the safety of increased bicycle use. These additional bikeways could be created by banning street parking on one side of the street in large areas of the city.

The bike-and-ride program would serve mainly the younger segment of the population, although many older individuals could well be attracted by this service through adequate safety measures. The younger citizens are those who might not have to purchase a car if a bicycle could satisfy their mobility needs.

### Creation of an Auto-Free Zone

Creation of an auto-free pedestrian mall in the downtown shopping area served by a "package bus" would promote walking, leisurely shopping, and a more attractive city center. Mini-buses would provide shuttle service from the mall to parking lots and main bus stops. Such a zone would include the seven central blocks of the main CBD thoroughfare, along which are located the most popular shops of the CBD. The city has already banned parking on both sides of the street and has installed benches and fountains along the wide sidewalks. However, since cars are still permitted, air and noise pollution detracts from what should be primarily a pedestrian environment.

Shoppers would be aided by a "package bus" as experimented with in Hamburg, which would be an electrically driven, virtually noiseless vehicle on which shoppers can check their packages. The vehicle will then take the packages to two stations located at either end of the mall where the shoppers can collect all their purchases and catch a mini-bus to the main CBD bus stops, or to one of the nine city-owned parking lots. In addition, mini-buses will provide mall shoppers with transportation from ends of the mall to other shopping centers outside the CBD.

### Bus Route and Schedule Coordination

In order to fully utilize the 45-passenger diesel buses, the mini-buses, and taxis, and to increase ridership, it is necessary to have an in-depth study made of all the existing routes, and ascertain the changes which must be implemented in order to operate the buses more efficiently. The "token" routes which have the lowest ridership would be analyzed to determine whether or not taxis could be used to serve these areas rather than the larger buses. All headways should be reduced to no more than 15 minutes in order to provide acceptable service. Routes would be redesigned

so that most residents are within easy access of a bus stop, and those areas within the MMTD which currently have little or no bus service would be served by the provision of taxis, dial-a-buses or mini-buses.

Additionally, areas outside the present boundaries of the MMTD should be given the chance to be included in this expansion of service, which could result in the introduction of express commuter buses serving areas outside the present MMTD boundaries.

The present fare system would be analyzed as to its effectiveness in promoting bus ridership with the possibility of the initiation of a graduated fare combined with free transfers.

There should also be a re-examination of present Public Utility Commission regulations so that airport limousines which presently are allowed to serve only three areas of the city might be allowed to serve additional areas. Transportation to the airport should also be provided by bus routes which will more adequately serve the entire community than those now in service, and schedules must be designed to insure that buses will arrive in adequate time to permit airline passengers to purchase tickets and catch all flights. The location of the airport bus stop should be redesigned to coordinate bus movements with the flow of airport traffic and eliminate the present lengthy walk into the terminal from the stop.

These airport policies should increase ridership of buses and airport limousines, thereby cutting down on the number of parking spaces required at the airport and providing the entire community with a much needed service.

Route and schedule information should be provided at bus stops, in vehicles, at supermarkets, and at other public places so that any newcomer has ready access to easy-to-understand information on bus and taxi service and bike rentals without having to first become a bus passenger and ask the driver for a booklet. Bus schedules should be redesigned into a bilingual English-Spanish format or printed separately in English and Spanish in consideration of the Spanish-speaking minority in Middletown.

Table 27. Checklist for transit integration activities: Middletown.

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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INSTITUTIONAL

OPERATOR AND CITY/COUNTY/STATE PLANNING COORDINATION:

Set up Regional Planning Coordinating Organization

Legislated county/area commission for all regional planning				x
Formally constituted and appointed independent committee				x
Ad hoc coordinating regional planning committee with effective financial support and power to make recommendations		x		
*No coordinating agency for all regional planning	x			

Requirements for Successful Demonstrations

Thorough area trip demand study		x		
Formulate area transportation policy including goals for public transit		x		
Redefine public transportation region (e.g. extend transit district boundaries, etc.)		x		

Set up Single Transportation/Transit Planning Authority

Agency responsible for planning and financing all regional transportation activity			x	
Agency responsible for overall planning, licensing and financing of all regional public transportation			x	
Transit district or single publicly owned operator handles public transit planning	x			
*No single public transit planning authority (individual operators or their associations handle public transit planning under either open competition or area franchise).	x			

OPERATOR/OPERATOR COORDINATION

Set up Coordinating Structure for Intra-Region Public Transit

Single regional operator for all public transit (by merger or transit district legislation)	x			
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\*All unstarred items are recommended integration activities. Starred items are included to complete the coverage of the list for evaluating existing program status.

x: Status for whole region, all operators.  
s: Status for part of region, some Operators.

INSTITUTIONAL (continued)

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
One major operator, several smaller ones	X			
Transit federation			X	
Transit community (separate agreements for joint tariff on routes, coordinated routes and schedules, some pooling)			X	
Tariff association (joint tariff and revenue distribution agreements)			X	
Route and schedule coordination agreements			X	
*No regional coordinating organization	X			

Set up Coordinating Structure for Inter-City Transportation

Out-of-region operator participation in intra-regional coordinating organization			X	
Coordinating committee of operators			X	
Coordinating agreements between individual operators (e.g. airport or airlines, Greyhound and transit district)				X
Responsibility allocated internally within intra-area operator(s) for planning coordination with out-of-region/intercity demand		X		
*No comprehensive approach to considering out-of-region trips	X			

TRANSIT/PARA-TRANSIT OPERATOR COORDINATION

Set up Coordinating Structure

Para-transit operator participating in intra-regional coordinating organization		X		
Coordinating committee of operators			X	
Coordinating agreements between individual operator(s)			X	
No coordinating organization	X			

PUBLIC TRANSIT FINANCING ARRANGEMENTS

Sources for Financing Capital Investment Other Than Rolling Stock

Revenue from fares	X			
Bond issue				

**INSTITUTIONAL (continued)**

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
Stock issue				
National loans				
Other debentures				
State grants				
National grants				
Specially designated local tolls				
Specially designated local sales taxes				
Specially designated local property taxes	X			
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees	X			
State motor fuel taxes				
Parking and park-and-ride fees				
Revenue from other services, e.g. leases of land and air rights, advertising	X			
Leasing arrangements (transfer to operating costs)				

**Sources for Financing Rolling Stock and Buses**

Revenue from fares	X			
Bond issue				
State loans				
Federal loans				
Other debentures	X			
State grants				
Federal grants	X			
Specially designated local tolls				
Specially designated local sales taxes				
Specially designated local property taxes	X			
Specially designated local other charges or taxes				
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes	X			
Equipment trust funds				
Revenue from other services				
Leasing arrangements (transfer to operating costs)				

**Sources for Financing Operating Costs**

Revenue from fares	X			
Specially designated local tolls				

**INSTITUTIONAL (continued)**

	Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
Specially designated local sales taxes				
Specially designated local property taxes	x			
Specially designated state tax other than license or fuel taxes				
State motor vehicle operator licensing fees				
State motor fuel taxes				
Revenue from other service	x			

**OPTIONS NOT INCLUDED IN ABOVE LIST**  
(Please describe)

Change P.U.C. Regulations to extend Airport limousine coverage

x

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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### OPERATIONAL

#### ACTIVITIES REQUIRING COORDINATION WITH CITY/COUNTY/STATE AGENCIES

##### Auto Parking Policy in Major Activity Centers

Control of parking by higher charges				X
Control of parking by graduated charges by distance from CBD or major activity center			X	
Control of parking by time of day restrictions				X
Control of parking by street space restrictions	X			
Control of parking by open lot space restrictions			X	
Control of parking by in-building space restrictions			X	
Encourage short-term parking and discourage long-term parking	X			
*No significant parking policy			X	

##### Auto Use Restriction Policy

User charges, taxes, tolls, road pricing, etc.			X	
Restriction of auto use by zone (auto-free areas)		X		
Restriction of auto use by time (auto-free areas); supplementary licensing, etc.)			X	
Restriction of automobile flow by traffic restraint schemes				X
*No policy on auto use	X			

##### Traffic Management in Support of Public Transit

Total centralized traffic control within major activity centers				X
Signal synchronization				X
Bus priority system at signals				X
One-way streets planned for transit flow	X			
Reserved lanes for auto and bus use by time of day			X	
Reserved lanes for car pool and bus use by time of day			X	
Reserved lanes on city streets for bus only use by time of day			X	
Reserved lanes on city streets for bus only use all day			X	
Reserved streets for bus only use			X	
Reserved streets for minibus use and pedestrians		X		



OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
------------------	-------------------	----------------	------------------------------

Bus stop locations chosen for transit and vehicle flow improvement			x	
Offstreet docks for landing/unloading				x
Parking restrictions to aid transit flow	x			
Exclusive freeway lanes			x	
Reserved bus ramps for freeway entry and exit			x	
*No consideration by local authority of impact of motor vehicle flow on public transit	x			

ACTIVITIES REQUIRING COORDINATION WITH GOVERNMENT AGENCIES AND LOCAL BUSINESSES

Changing Transit Demand Characteristics

Staggered work hours			x	
Sliding work hour system (flexitime)				x
Encourage extended shopping hours	x			
Encourage multi-use development of major activity areas (office, shops, entertainment, apartments)			x	
Encourage public transit user shopping trip orientation among merchants				x

ACTIVITIES REQUIRING OPERATOR COORDINATION

Basic System-wide Fare Structure

Zonal fare system	x			
Distance-graduated fare system (or time-on-system related)				x
*Fare set by number of transfers			x	
*Flat fare system			x	
*Nominal fare system			x	
*Free fare system (no fare)			x	
Unlimited number of free transfers between routes of single mode only (restricted by time:				
interoperator			x	
intraoperator				x
Unlimited number of intermodal free transfers:				
interoperator			x	
intraoperator			x	

OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
------------------	-------------------	----------------	------------------------------

Limited number of free transfers between routes of single mode:				
interoperator			X	
intraoperator				X
Limited number of intermodal free transfers:				
interoperator			X	
intraoperator			X	
*No free transfers	X			

Supplementary Policies on Fare Structure

Special rates for socio-economic groups	X			
Special rates by time of day (off-peak, night) <sup>1</sup>			X	
Special rates by area of city (e.g. flat rate in CBD)			X	
Special rates by part of week (e.g. Sunday)				X
Special rates by type of trip (e.g. tourist)				X
Daily system passes				X
Intermodal single trip combination passes			X	
Seasonal passes			X	
Free return trip in off-peak hours			X	
*No supplementary policy on fares			X	

Fare Collection Procedures

*Token system	X			
Scrip system (tickets)			X	
*Cash system	X			
*Exact fare system			X	
Pass system (including commuter rail)	X			
Honor system (including commuter rail)			X	
Tickets sold on vehicles: Buses	X			
Light Rail			X	
Tickets sold off-vehicles: Buses			X	
Light Rail			X	
Automated machines on or off vehicles (including commuter rail)			X	
Driver collects fare	X			
Conductor collects fare			X	
*No fare			X	

†Excludes commuter rail except as noted

<sup>1</sup>Present system does not experience peaking of demand problems.



OPERATIONAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Intermodal (with commuter rail) connection schedule coordination			x	
Rider oriented headways (reduced to no more than 15-20 minutes)		x		
Rider oriented schedule times (easily memorized)				x
Out-of-region/intercity demand schedule coordination with airport		x		
Out-of-region/intercity demand schedule coordination with mainline railroad service			x	
Out-of-region/intercity demand schedule coordination with buses (Greyhound)				x
Extend service times (into night hours)		x		

Public Information System

Produced easily understandable and available system-wide schedules with routes, route maps and fares		x		
Schedule information at bus stops		x		
Route maps at most stops		x		
Route maps on vehicles	x			
Labeling of stops and vehicles	x			
Public relations program	x			
System-wide information near fare collection areas				x
System-wide information on rapid transit train platform			x	
Clearly labeled information areas in stations				x
Multi-lingual information provision				

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please Describe)

PHYSICAL AND TECHNICAL

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
------------------	-------------------	----------------	------------------------------

ACTIVITIES REQUIRING NEW TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Automated Operations

Computerized traffic control with bus locator			X	
Freeway ramp metering			X	
*Computerized traffic control, no transit priority			X	
Bus priority control equipment			X	

ACTIVITIES REQUIRING NEW TECHNOLOGY WHICH CAN BE ADOPTED BY OPERATOR(S)

Automated Operations

Automatic train operation			X	
Dial-a-ride		X		
Bus operation control with bus locator and radio communication			X	

ACTIVITIES REQUIRING PROVEN TECHNOLOGY AND COORDINATION WITH GOVERNMENT AGENCIES

Facility Provision

Grade-separated busways			X	
New and converted park-and-ride lots			X	
Park, ride, and shop lots near the CBD		X		
Pedestrian walks (sidewalks) and bicycle paths		X		
Extension of pedestrian malls		X		
Off-street loading/unloading docks		X		
Grade-separated pedestrian crossing				X

ACTIVITIES REQUIRING PROVEN TECHNOLOGY WHICH CAN BE ACCOMPLISHED BY THE OPERATOR(S)

Facility Provision

Intermodal terminals			X	
Pedestrian facilities (escalators, moving sidewalks) in terminals			X	
Bus shelters		X		
Benches at bus stops	X			
Bike locks at bus stops		X		

PHYSICAL AND TECHNICAL (continued)

Already Existing	Proposed Activity	Not Applicable	Eventually May Be Applicable
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Package check-in areas: Rapid transit terminals			X	
Park, ride, & shop areas			X	
In major activity centers near bus stops		X		
Rail line construction and extension for service in area			X	
Rail line construction and extension for airport access			X	

Vehicle Acquisition

Fulfillment of new routes and schedules		X		
Standardization of vehicles by single operator	X			
Special service vehicles: mini-bus		X		
midi-bus			X	
high capacity bus			X	
"package" bus		X		
"Bike-&-ride" buses		X		

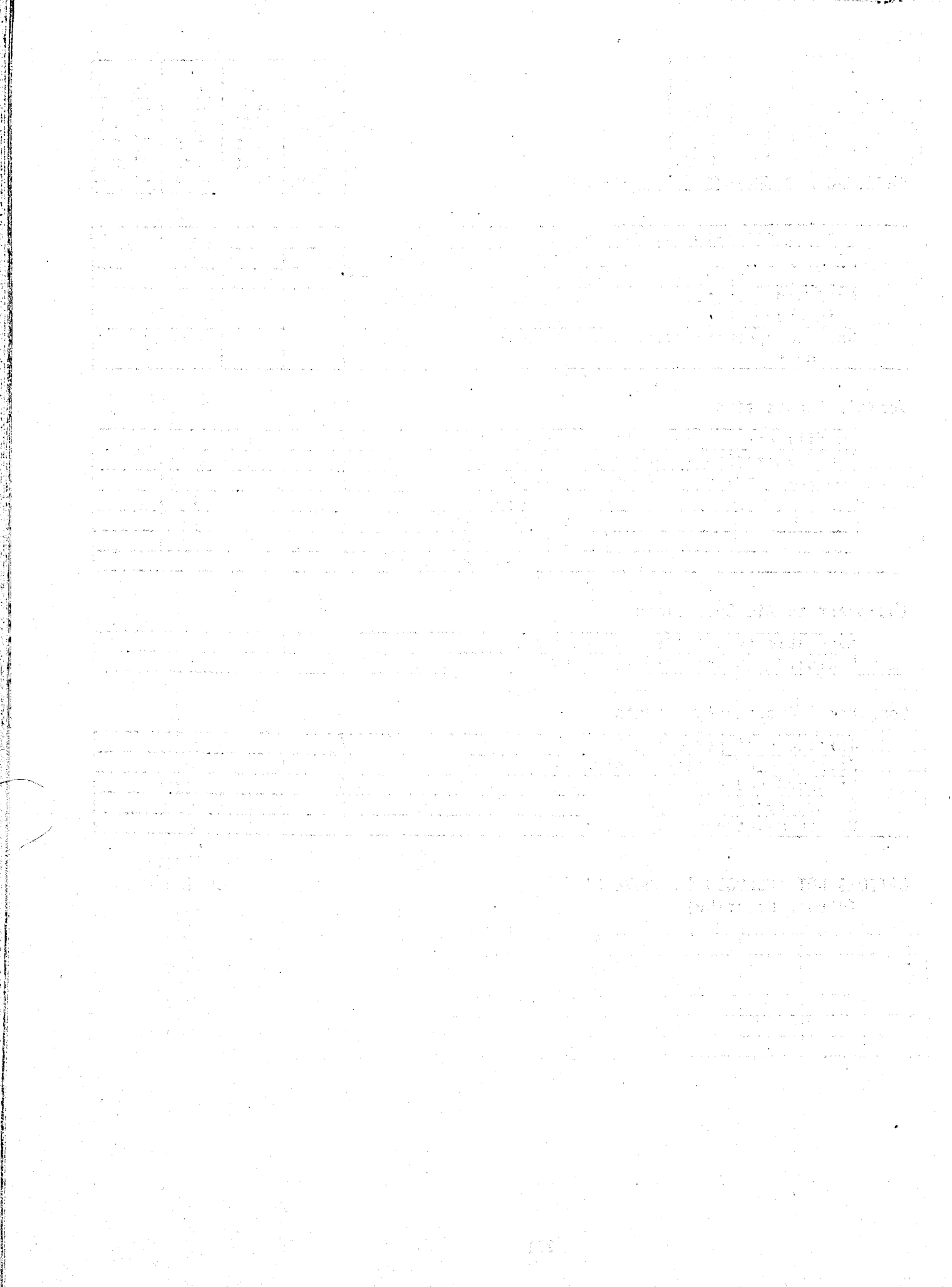
Equipment to Aid Operations

Automatic fare collection machines			X	
Radio/TV communications system			X	

Operators' Pooling Agreements

Joint use of personnel			X	
Joint use of capital equipment			X	
Standardized equipment			X	
Common spare parts pool			X	
Common maintenance facilities			X	

OPTIONS NOT INCLUDED IN ABOVE LIST  
(Please Describe)



**APPENDICES**



## APPENDIX A

### LIST OF CONTACTS WITH LOCAL TRANSIT OPERATORS AND PLANNING ORGANIZATIONS

Direct contact with communities and organizations concerned with public transit is an essential input to this study. Not only do such contacts provide a means of verifying and supplementing published information, but they also can provide valuable information on the political, economic and social environment that is critical to the selection of the best demonstration sites.

Local contacts made by INTERPLAN up to August 15, 1972 have included:

Atlanta	Alan F. Kiepper, General Manager, Metropolitan Atlanta Rapid Transit Authority.
Baltimore	Warren T. Anderson, Chief, Transportation Planning, Baltimore Planning Commission. Norman D. Hall, Director of Operations, Dept. of Transportation, State of Maryland. Edwin M. Kahoe, Vice President, ATE Management and Services, Inc. C. William Ochert, Chief of Transportation Planning, Regional Planning Council. Larry Reich, Director, Baltimore Planning Commission, Department of Planning, City of Baltimore. Siegbert Schachnies, Principal City Planner, Baltimore Planning Commission.
Buffalo	Joseph E. Ryan, Executive Director, Citizens' Advisory Committee on Community Improvement.
Chicago	Gerald B. Leonard, Senior Transit Planner, Transit Carriers/Coordinating Committee.
Cincinnati	Richard H. Bourque, Transportation Planning, Ohio-Kentucky-Indiana Regional Planning Authority. D. W. Gradison, President, Cincinnati Southern Railway. John Paul Jones, President, Cincinnati Transit, Inc. W. A. McClain, Acting City Manager, City of Cincinnati.
Cleveland	David N. Goss, Director, Research and Planning, Cleveland Transit System.

Dallas Ben E. Tonick, Assistant Manager, Operations, Dallas Transit System.

Denver David A. Pampu, Chief Planner, Denver Regional Council of Governments.

Detroit Thomas H. Lipscomb, General Manager, Southeastern Michigan Transportation Authority.

Hartford F. E. Coleman, Chief, Transportation Planning, Connecticut Department of Transportation.

Honolulu George C. Villegas, Traffic Director, City and County of Honolulu.

Indianapolis Michael Carroll, Director, Department of Metropolitan Development.  
 Edgar A. Claffey, President, Indianapolis Transit System, Inc.  
 James H. Cox, Chief Traffic Engineer, City of Indianapolis, Department of Transportation.  
 Ruth Miller, Manager Indianapolis Transit, Inc.  
 J. E. Morley, Vice President & General Manager, Fort Harrison Bus Lines, Inc.  
 Charles L. Whistler, President, Metropolitan Development Commission.

Kansas City Delbert F. Karmeier, Director of Transportation, Transportation, Kansas City.  
 P. S. Jenison, Director of Planning and Research, Kansas City Area Transportation Authority.

Los Angeles Peter Broy, Los Angeles Model Cities Program.  
 John Curtis, Soutner California Rapid Transit District.  
 King Cushman, Southern California Association of Governments.  
 William F. Farrell, Long Beach Public Transportation Co.  
 Peter J. Fielding, Orange County Transit District.  
 Jack R. Gilstrap, General Manager, Southern California Rapid Transit District.  
 Calvin S. Hamilton, Director of Planning, City of Los Angeles.  
 John F. Hutchison, Santa Monica Municipal Bus Lines.  
 David Schilling, Orange County Transit District.

Miami Dan Burns, Chairman, Palm Beach County Transportation Authority.  
 William K. Fowler, Chief, Bureau of Research and Development, Division of Mass Transit Operations, Department of Transportation, State of Florida.

R. A. Hauer, Vice President Metropolitan Dade County Transit Authority.

Houghton Miller, Executive Director, Broward County Transportation Authority.

Earl W. Morehouse, Assistant Operations Engineer, District IV Mass Transit, Florida Department of Transportation.

David Reynolds, Executive Secretary, Dade County Metropolitan Transit Authority.

David C. Rhinard, Transportation Planning Engineer, Metropolitan Dade County.

**Milwaukee**

E. R. Vogel, Traffic and Transit Engineer, Department of Public Works, Transportation Division, Milwaukee County.

**Minneapolis-St. Paul**

John R. Jamieson, Director of Transit Development, Twin Cities Area Metropolitan Transit Commission.

George Knapp, Owner, Bloomington Bus Co.

Helding Oslund, General Manager, Medicine Lake Bus Co.

**New Orleans**

W. R. Brooks, Urban Transportation and Planning Associates, Inc.

Philip C. Buhler, Manager, Westside Transit Lines, Inc.

Michael J. Cade, Senior Vice President, New Orleans Public Service, Inc.

Louis Costa, Chief Planner, Urban Transportation and Planning Associates, Inc.

Olin K. Dart, Traffic Engineer, Urban Transportation and Planning Associates, Inc.

Charles Y. Deknatel, Associate Planner, City of New Orleans.

Harold R. Katner, Director-Secretary, City Planning Commission, City of New Orleans.

A. E. Kern, New Orleans Public Service.

**New York**

John E. Mahoney, Director, Public Transportation Division, Tri-State Regional Planning Commission.

**Philadelphia**

Walter K. Johnson, Executive Director, Delaware Valley Regional Planning Commission.

James McConnon, Chairman of the Board, Southeastern Pennsylvania Transportation Authority (SEPTA).

Harold C. Juram, Assistant General Manager for Planning and Development, SEPTA.

Anthony Sloan, Manager of Planning and Market Research, SEPTA.

Edson Tennyson, Deputy Secretary for Area and Local Transportation, Pennsylvania Department of Transportation.

William Underwood, Director, Bureau of Mass Transit Systems, Pennsylvania Department of Transportation.

Nelson Slater, Assistant Commissioner of Public Transportation, New Jersey Department of Transportation.

John Kohl, Commissioner of Transportation, State of New Jersey.

J. M. Gilmore, Systems General Manager for Passenger Operations, Penn-Central Railroad.

Phoenix Edward M. Hall, Deputy City Manager, Community Development and Transportation, City of Phoenix.

Portland William S. Dirker, Transportation Coordinator, City of Portland.

St. Louis Col. R. E. Smyser, Jr. (ret.), Executive Director, Bi-State Development Agency, Missouri-Illinois Metropolitan District.

San Diego Hurvie Davis, San Diego Transit Corporation.

Walter H. Hegen, California Division of Highways, District II.

Everett I. Polanco, County of San Diego.

Herman R. Rosenthal, County of San Diego.

Andrew Schlaeffie, City of San Diego.

Jim Simmons, City of San Diego.

Robert L. Small, Administrator, Environmental Development Agency, County of San Diego.

San Francisco Dr. John M. Christensen, Jr., Assistant General Manager, Finance, Public Utilities Commission.

Jack Crowley, General Manager, San Francisco Public Utilities Commission.

Larry Dahms, Assistant Manager for Planning and Margaret Wheaton, Planning Department, Bay Area Rapid Transit District.

Y. Tito Sasaki, Transportation Planner, Golden Gate Bridge, Highway and Transportation District.

Larry Shields, District Engineer, Golden Gate Bridge Highway and Transportation District.

George M. Taylor, Assistant General Manager for Administration, AC Transit (Oakland).

Paul Watt, Executive Secretary, Metropolitan Transportation Commission.

Jack Wood, Director, San Francisco Municipal Railway.

Stuart Eurman, Regional Representative, Urban Mass Transit Administration, Region IX.

Joseph Bort, Chairman, Metropolitan Transportation Commission.

Paul Bay, Deputy Director, Metropolitan Transportation Commission.

Wolfgang S. Homburger, Institute of Transportation Engineering, University of California at Berkeley.

**Seattle**

Larry Coffman, Department of Transportation, Municipality of Metropolitan Seattle.

Michael L. Darland, Director, Transportation Planning Division, Puget Sound Governmental Conference.

Wallace A. Dela Barre, Daniel, Mann, Johnson, & Mendenhall.

C. Carey Donworth, Chairman, Municipality of Metropolitan Seattle (METRO).

C. C. Nichols, Assistant Director of Highways for Toll Facilities, Washington State Highway Department.

Henry J. Sonderland, Research Director, Seattle Transit System.

Roy P. Sorensen, Manager, Metropolitan Transit Corporation.

**Tampa**

Scott D. Wilson, Chief Regional Planner, Tampa Bay Regional Planning Council.

Washington, D.C. William I. Herman, Director, Office of Planning, Washington Metropolitan Area Transit Authority.

APPENDIX B  
QUESTIONNAIRE AND WISH LIST SENT TO 17 SELECTED METROPOLITAN AREAS

City \_\_\_\_\_

Agency or Operator \_\_\_\_\_

QUESTIONNAIRE

TRANSIT SYSTEM OPERATIONS  
INTEGRATION PROGRAM DESIGN

Urban Mass Transit Administration  
Department of Transportation

Contract No. DOT-UT-10018

INTERPLAN CORPORATION  
100 North Hope Avenue  
Santa Barbara, California 93110

Date mailed:

Date received:

1. THE CITY AND ITS TRANSPORTATION REGION

1.1 Location

1.11 City: \_\_\_\_\_

1.12 Standard Metropolitan Statistical Area: \_\_\_\_\_

1.13 Transportation Planning Region

Name: \_\_\_\_\_

Definition:(i.e., counties and cities included): \_\_\_\_\_

\_\_\_\_\_

1.2 Geographic Characteristics

1.21 Topography, water bodies, and weather influencing city form and transportation network: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1.22 General configuration of urban development (e.g., strongly centralized, many nuclei, no high density concentrations): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1.3 Historical factors influencing transportation (such as many historic areas, irregular street pattern, attitudes toward central city, parcelized transit franchises): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1.4 Demographic characteristics

1.41 Population and density:

	CBD	City	SMSA	Region
1960 population				
1970 population				
Area (sq.miles)				
Population density (persons/sq. mile) 1970				

1.42 Special population groups:

	Percent of total population	
	City	SMSA
Under 16 years of age		
Over 64 years of age		
Minority groups (identify):		

1.5 Economic characteristics

	CBD	City	SMSA	Region
1.51 Employment				
1.52 Median income				
1.53 % below poverty level				

1.54 Principal economic activities of the city and transportation planning regions:

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1.6 Political characteristics

1.61 Form of city or metropolitan government (mayor, council, city manager, etc.): \_\_\_\_\_

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1.62 Special jurisdictional problems (e.g., transportation planning region extends over more than one state): \_\_\_\_\_

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1.63 Special political conditions (e.g., active citizen groups, model cities program in progress, general plan calls for no growth or limited development): \_\_\_\_\_

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1.64 Political climate for innovations in public transit integration: \_\_\_\_\_

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1.65 Other relevant factors (e.g., state capital; position in relation to other cities, etc.): \_\_\_\_\_

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2. URBAN TRANSPORTATION

2.1 Auto and Transit\* Usage

	City	SMSA	Transit Service Area
2.11 Passenger car registration			
1960	_____	_____	_____
1970	_____	_____	_____
2.12 Population/car			
1960	_____	_____	_____
1970	_____	_____	_____
2.13 Annual transit* rides			
1960	_____	_____	_____
1970	_____	_____	_____
2.14 Annual transit* rides/capita			
1960	_____	_____	_____
1970	_____	_____	_____
2.15 Average length of trip: Auto _____ Public transit* _____			
2.16 Freeway network: Bypasses city center _____			
Runs through city center _____			
2.17 Modal split of trips to CBD			
2.171 Daily _____ % is by public transit*			
2.172 Peak period _____ % is by public transit*			
2.18 Peaking ratio _____			
Definition _____			
_____			

\*Bus, trolley bus, rail rapid transit, commuter rail, streetcar, and cable car; excludes minibus, jitney, taxi, and other para-transit modes.

2.2 Parking

2.21 CBD parking capacity: Curb \_\_\_\_\_; Off-street \_\_\_\_\_

2.22 What are typical parking rates in CBD:

First hour \_\_\_\_\_

Each additional hour \_\_\_\_\_

Daily maximum \_\_\_\_\_

Monthly rate \_\_\_\_\_

2.23 Who determines parking rates; what regulatory controls are there? \_\_\_\_\_

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2.24 Does the city plan, build and operate parking lots? \_\_\_\_\_

If so, what department? \_\_\_\_\_

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2.25 Is there park-and-ride or kiss-and-ride system? \_\_\_\_\_

If yes, how many spaces and at which modes? \_\_\_\_\_

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2.26 Who plans, builds and operates park-and-ride and kiss-and-ride facilities? \_\_\_\_\_

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2.3 Exclusive Right-of-Way for Public Transit

2.31 To what extent are transit vehicles operated on separate rights-of-way (miles or percent of total)? \_\_\_\_\_

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2.32 Are there any lanes on urban streets reserved for transit? \_\_\_\_\_

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2.4 Transit Planning

2.41 Which agencies of government or transit operators perform urban transportation planning? Does this planning include unified fares, coordination of services, integration of system?

Organization	Level of government	Unified fares	Coordination of service	System integration
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
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_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2.42 Is there a transportation plan for the area? \_\_\_\_\_

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2.43 Does it include both public and private modes of transportation? \_\_\_\_\_

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2.44 Does it provide for the coordination of public transit with parking and operating of private cars on highways? \_\_\_\_\_

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3. EXISTING PUBLIC TRANSIT

3.1 Operators and service areas

Name of Operator	Public or Private	Level of gov't if public	Service area (e.g., city, CBD)

3.2 Operating data

3.21 Name of Operator

3.22

Modes operated									
No. employees									
No. of routes									
Length of routes (miles)									
% on exclusive ROW									
No. of vehicles in fleet									
Needed for peak service									
Average age of vehicles									
Cost of new vehicle									
Make and model									
Total no. stops or stations									
Ave. distance between stops									
Typical headways—peak									
—off-peak									
—evening									
Ave. travel speed (mph)									
Reliability (%)									
Annual passenger miles									
Daily vehicle miles									
Daily capacity (seat miles)									
Operating cost/vehicle mile									
ROW construction cost/mi—at grade									
—above grade									
—below grade									

(continued on reverse)

3.3 Fares

Flat fare \_\_\_\_\_ ¢

Graduated fare: Base \_\_\_\_\_ ¢, Increment/zone \_\_\_\_\_ ¢, Maximum \_\_\_\_\_ ¢

Children \_\_\_\_\_ ¢

Students \_\_\_\_\_ ¢

Senior citizens \_\_\_\_\_ ¢

Multiple-ride tickets \$ \_\_\_\_\_ / \_\_\_\_\_ rides

Passes \$ \_\_\_\_\_ / \_\_\_\_\_ (e.g., \$3/mo.)

3.4 Financial data (for fiscal 1971)

Revenues \$ \_\_\_\_\_

Costs \$ \_\_\_\_\_ Operating costs \$ \_\_\_\_\_

Profit \$ \_\_\_\_\_ or Loss \$ \_\_\_\_\_

Subsidy \$ \_\_\_\_\_

Sources of subsidy \_\_\_\_\_



Capital expenditures for rolling stock \$ \_\_\_\_\_

Capital expenditures for construction \$ \_\_\_\_\_

Significant recent changes in financial status \_\_\_\_\_

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3.5 Information on routes, fares, schedules  
Ticket window \_\_\_\_\_ Shelters \_\_\_\_\_ Bus stops \_\_\_\_\_ Bus driver \_\_\_\_\_ Central switchboard \_\_\_\_\_ Other \_\_\_\_\_  
Printed matter \_\_\_\_\_  
Verbal information \_\_\_\_\_  
Is the service generally advertised through other public media such as TV, radio, or newspapers? \_\_\_\_\_

3.6 Existing coordination of service

For Individual Operator		Between Operators	
Within each mode	Between different modes	Within each mode	Between different modes

- 3.61 Are routes coordinated? \_\_\_\_\_
- 3.62 Are schedules coordinated? \_\_\_\_\_
- 3.63 Are fares coordinated? \_\_\_\_\_
- 3.64 Are transfers available? \_\_\_\_\_
- 3.65 Are transfer facilities (stations, shelters) provided? \_\_\_\_\_
- 3.66 Is information on routes, schedules, etc. available from one central source? \_\_\_\_\_
- 3.67 If transfers between operators are permitted, how are these revenues distributed among the operators? \_\_\_\_\_

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- 3.68 Are vehicles in each mode interchangeable between lines of different operators? \_\_\_\_\_
- If not, please explain why \_\_\_\_\_

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3.7 Employees

- 3.71 Do personnel of cooperating services receive the same wages and benefits? \_\_\_\_\_
- 3.72 Do they belong to the same labor organization? \_\_\_\_\_

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3.9 Who plans transit services for cooperating operators?

Each plans his own \_\_\_\_\_

One operator plans for all (identify) \_\_\_\_\_

Non-operating transportation authority plans for all (identify) \_\_\_\_\_

4. POTENTIAL FOR TRANSIT INTEGRATION

4.1 Is integration or coordination of transit services considered desirable?

By operators? \_\_\_\_\_

By transportation planning agency? \_\_\_\_\_

By citizen groups (please identify)? \_\_\_\_\_

By passengers? \_\_\_\_\_

4.2 If transit integration is desired, which of the following are involved?

Coordination of routes \_\_\_\_\_

Coordination of schedules \_\_\_\_\_

Coordination of fares \_\_\_\_\_

Intermodal transfers \_\_\_\_\_

Inter-operator transfers \_\_\_\_\_

Revenue-sharing \_\_\_\_\_

Coordination of public information \_\_\_\_\_

Multi-modal transfer facilities (stations, shelters) \_\_\_\_\_

Park-and-ride lots \_\_\_\_\_

Inter-operator use of rolling stock \_\_\_\_\_

Inter-operator use of maintenance facilities \_\_\_\_\_

Totally integrated management and operation under a single agency \_\_\_\_\_

Other (please describe) \_\_\_\_\_

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City \_\_\_\_\_  
Operator \_\_\_\_\_

WISH LIST FOR TRANSIT COMPANIES

TRANSIT SYSTEM OPERATIONS  
INTEGRATION PROGRAM DESIGN

Urban Mass Transit Administration  
Department of Transportation

Contract No. DOT-UT-10018

INTERPLAN CORPORATION  
100 North Hope Avenue  
Santa Barbara, California 93110

Date mailed:

Date received:



2. If your company were given a "no-strings attached" tax-free cash grant of \$1000 for every bus that you operate, how would you spend that money?

- (1) Liquidate (diminish) your debts?
- (2) Improve (invest in) physical plant?
- (3) Improve working conditions of employees?
- (4) Pay bonus to employees?
- (5) Improve service?
- (6) . . . . . ?

(Please mark ONE choice only.)

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3. If (5) if your choice, in what way (or ways) would you attempt to improve the service?

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4. If the grant stipulated "Research, Development, Planning, Demonstration," activities only, all aimed at "improving" the service, how would you spend it?

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5. If you had a free hand to improve further the public transit service in your area, what would you do?

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6. The following are some of the ideas suggested to INTERPLAN:

- (1) Separate bus lines in heavily congested access roads and downtown streets.
- (2) Prohibition of truck movement in heavily congested areas during morning and evening peak-traffic periods.
- (3) Significant increases in downtown parking rates.
- (4) Introduction of transit-bus (and car pool?) one-way streets during morning and evening peaks of traffic.

Jointly with some, or all, of the above:

- (5) Significant reduction of your own headways (say, 2 to 5 minutes during peaks, 10 minutes at all other times).
- (6) Intensification of express services from suburbs to CBDs.
- (7) Introduction of graduated fares.
- (8) Introduction of active ridership market research and transit ridership promotion program.
- (9) Intensification of public information system about your transit operations.
- (10) Introduction of "new blood" into your planning, scheduling, accounting, and operations department.
- (11) Modification of schedules and routes in response to recommendations arising from (10).

Which of the above ideas would you consider practicable?

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APPENDIX C

STANDARD METROPOLITAN STATISTICAL AREAS AND THEIR POPULATIONS: 1970

SMSA	Popu- lation	SMSA	Popu- lation	SMSA	Popu- lation
United States (243 areas).....	139,418,811	Augusta, Ga.-S.C.....	253,460	Brownsville-Harlingen-San Benito, Tex.....	140,368
Inside central cities...	63,796,943	Augusta city.....	59,864	Inside central cities...	101,201
Outside central cities..	75,621,868	Outside central city..	193,596	Brownsville.....	52,522
Abilene, Tex.....	113,959	Austin, Tex.....	295,514	Harlingen.....	33,503
Abilene city.....	89,653	Austin city.....	251,448	San Benito.....	15,176
Outside central city..	24,306	Outside central city..	43,068	Outside central cities	39,167
Akron, Ohio.....	679,239	Bakersfield, Calif.....	329,162	Bryan-College Station, Tex.....	57,978
Akron city.....	275,425	Bakersfield city.....	69,515	Inside central cities...	51,395
Outside central city..	403,814	Outside central city..	259,647	Bryan.....	33,719
Albany, Ga.....	89,639	Baltimore, Md.....	2,070,670	College Station.....	17,676
Albany city.....	72,623	Baltimore city.....	905,759	Outside central cities	6,583
Outside central city..	17,016	Outside central city..	1,164,911	Buffalo, N.Y.....	1,349,211
Albany-Schenectady-Troy, N.Y.....	721,910	Baton Rouge, La.....	285,167	Buffalo city.....	462,768
Inside central cities...	256,558	Baton Rouge city.....	165,963	Outside central city..	886,443
Albany.....	115,781	Outside central city..	119,204	Canton, Ohio.....	372,210
Schenectady.....	77,859	Bay City, Mich.....	117,339	Canton city.....	110,053
Troy.....	62,918	Bay City city.....	49,449	Outside central city..	262,157
Outside central cities	465,352	Outside central city..	67,890	Cedar Rapids, Iowa.....	163,213
Albuquerque, N. Mex.....	315,774	Beaumont-Port Arthur-Orange, Tex.....	315,943	Cedar Rapids city.....	110,642
Albuquerque city.....	243,751	Inside central cities...	197,747	Outside central city..	52,571
Outside central city..	72,023	Beaumont.....	115,919	Champaign-Urbana, Ill... Inside central cities...	163,281
Allentown-Bethlehem-Easton, Pa.-N.J.....	543,551	Orange.....	24,457	Champaign.....	89,332
Inside central cities...	212,469	Port Arthur.....	57,371	Champaign.....	56,532
Allentown.....	109,527	Outside central cities	118,196	Urbana.....	32,600
Bethlehem.....	72,686	Billings, Mont.....	87,367	Outside central cities	73,949
Easton.....	30,256	Billings city.....	61,581	Charleston, S.C.....	303,849
Outside central cities	331,082	Outside central city..	25,786	Charleston city.....	66,945
Altoona, Pa.....	135,356	Biloxi-Gulfport, Miss... Inside central cities...	134,582	Outside central city..	236,904
Altoona city.....	62,900	Biloxi.....	89,277	Charleston, W. Va.....	229,515
Outside central city..	72,456	Gulfport.....	48,486	Charleston city.....	71,503
Amarillo, Tex.....	144,398	Outside central cities	40,791	Outside central city..	158,010
Amarillo city.....	127,010	Binghamton, N.Y.-Pa. ...	302,672	Charlotte N.C.....	409,370
Outside central city..	17,388	Binghamton city.....	64,123	Charlotte city.....	241,178
Anaheim-Santa Ana-Garden Grove, Calif.....	1,420,366	Outside central city..	238,549	Outside central city..	168,192
Inside central cities...	445,828	Birmingham, Ala.....	739,274	Chattanooga, Tenn.-Ga... Chattanooga city.....	304,927
Anaheim.....	166,701	Birmingham city.....	300,910	Chattanooga city.....	119,082
Garden Grove.....	122,524	Outside central city..	438,364	Outside central city..	185,845
Santa Ana.....	156,601	Bloomington-Normal, Ill. Inside central cities...	104,389	Chicago, Ill.....	6,978,947
Outside central cities	974,560	Bloomington.....	66,388	Chicago city.....	3,366,957
Anderson, Ind.....	138,451	Normal.....	39,992	Outside central city..	3,611,990
Anderson city.....	70,787	Outside central cities	26,396	Cincinnati, Ohio-Ky.-Ind. Cincinnati city.....	1,384,851
Outside central city..	67,664	Boise City, Idaho.....	112,230	Cincinnati city.....	452,524
Ann Arbor, Mich.....	234,103	Boise City city.....	74,990	Outside central city..	932,327
Ann Arbor city.....	99,797	Outside central city..	37,240	Cleveland, Ohio.....	2,064,194
Outside central city..	134,306	Boston, Mass.....	2,753,700	Cleveland city.....	750,903
Appleton-Oshkosh, Wis... Inside central cities...	276,891	Boston city.....	641,071	Outside central city..	1,313,291
Appleton.....	110,364	Outside central city..	2,112,629	Colorado Springs, Colo.. Colorado Springs city...	235,972
Oshkosh.....	57,143	Bridgeport, Conn.....	389,153	Outside central city..	135,060
Outside central cities	53,221	Bridgeport city.....	158,542	Columbia, Mo.....	80,911
Asheville, N.C.....	145,056	Outside central city..	232,611	Columbia city.....	58,804
Asheville city.....	57,681	Bristol, Conn.....	65,808	Outside central city..	22,107
Outside central city..	87,375	Bristol city.....	55,487	Columbia, S.C.....	322,880
Atlanta, Ga.....	1,390,164	Outside central city..	10,321	Columbia city (urban part).....	113,542
Atlanta city.....	496,973	Brockton, Mass.....	189,820	Outside central city..	209,338
Outside central city..	893,191	Brockton city.....	89,040	Columbus, Ga.-Ala.....	236,584
Atlantic City, N.J.....	175,043	Outside central city..	100,780	Columbus city.....	154,168
Atlantic City city....	47,859	Brownsville-Harlingen-San Benito, Tex.....	140,368	Outside central city..	84,416
Outside central city..	127,184	Augusta, Ga.-S.C.....	253,460		



Table 2-18. (cont'd)

SMSA	Popu- lation	SMSA	Popu- lation	SMSA	Popu- lation
Columbus, Ohio.....	916,228	Fargo-Moorhead, N. Dak.- Minn.....	120,238	Greensboro--Winston- Salem--High Point, N.C.	603,895
Columbus city.....	539,577	Inside central cities.	83,052	Inside central cities.	340,193
Outside central city..	376,551	Fargo.....	53,365	Greensboro.....	144,076
Corpus Christi, Tex.....	284,832	Moorhead.....	29,687	High Point.....	63,204
Corpus Christi city....	204,523	Outside central cities	37,186	Winston-Salem.....	132,913
Outside central city..	80,307	Fayetteville, N.C.....	212,042	Outside central cities	263,702
Dallas, Tex.....	1,555,950	Fayetteville city.....	53,510	Greenville, S.C.....	292,502
Dallas city.....	844,401	Outside central city..	158,532	Greenville city.....	61,208
Outside central city..	711,549	Fitchburg-Leominster, Mass.....	97,164	Outside central city..	238,294
Danbury, Conn.....	78,405	Inside central cities.	76,282	Hamilton-Middletown, Ohio	226,207
Danbury city.....	50,781	Fitchburg.....	43,343	Inside central cities.	116,632
Outside central city..	27,624	Leominster.....	32,939	Hamilton.....	67,865
Davenport-Rock Island- Moline, Iowa-Ill.....	362,638	Outside central cities	20,882	Middletown.....	48,767
Inside central cities.	193,996	Flint, Mich.....	496,658	Outside central cities	109,575
Davenport (urban part).....	97,593	Flint city.....	193,317	Harrisburg, Pa.....	410,626
Moline.....	46,237	Outside central city..	303,341	Harrisburg city.....	68,061
Rock Island.....	50,166	Fort Lauderdale- Hollywood, Fla.....	620,100	Outside central city..	343,565
Outside central cities	168,642	Inside central cities.	246,463	Hartford, Conn.....	663,891
Dayton, Ohio.....	850,266	Fort Lauderdale.....	139,590	Hartford city.....	158,017
Dayton city.....	243,601	Hollywood.....	106,873	Outside central city..	505,874
Outside central city..	606,665	Outside central cities	373,637	Honolulu, Hawaii.....	629,176
Decatur, Ill.....	125,010	Fort Smith, Ark.-Okla... Fort Smith city.....	160,421	Honolulu city.....	324,871
Decatur city.....	90,397	Outside central city..	97,619	Outside central city..	304,305
Outside central city..	34,613	Fort Wayne, Ind.....	280,455	Houston, Tex.....	1,925,031
Denver, Colo.....	1,227,529	Fort Wayne city.....	177,671	Houston city (urban part).....	1,231,394
Denver city.....	514,678	Outside central city..	102,784	Outside central city..	752,637
Outside central city..	712,851	Fort Worth, Tex.....	762,086	Huntington-Ashland, W. Va.-Ky.-Ohio.....	253,743
Des Moines, Iowa.....	286,101	Fort Worth city.....	393,476	Inside central cities..	103,560
Des Moines city.....	200,587	Outside central city..	368,610	Ashland.....	29,245
Outside central city..	85,514	Fresno, Calif.....	413,053	Huntington.....	74,315
Detroit, Mich.....	4,199,931	Fresno city.....	165,972	Outside central cities.	150,183
Detroit city.....	1,511,482	Outside central city..	247,081	Huntsville, Ala.....	228,239
Outside central city..	2,688,449	Gadsden, Ala.....	94,144	Huntsville city.....	137,802
Dubuque, Iowa.....	90,609	Gadsden city.....	53,928	Outside central city...	90,437
Dubuque city.....	62,309	Outside central city..	40,216	Indianapolis, Ind.....	1,109,882
Outside central city..	28,300	Gainesville, Fla.....	104,764	Indianapolis city (urban part).....	743,155
Duluth-Superior, Minn.- Wis.....	265,350	Gainesville city.....	64,510	Outside central city...	366,727
Inside central cities.	132,815	Outside central city..	40,254	Jackson, Mich.....	143,274
Duluth.....	100,578	Galveston-Texas City, Tex.	169,812	Jackson city.....	45,484
Superior.....	32,237	Inside central cities.	100,309	Outside central city...	97,790
Outside central cities..	132,535	Galveston.....	61,809	Jackson, Miss.....	258,906
Durham, N.C.....	190,388	Texas City (urban part).....	38,500	Jackson city.....	153,968
Durham city.....	95,438	Outside central cities	69,503	Outside central city...	104,938
Outside central city..	94,950	Gary-Hammond-East Chicago, Ind.....	633,367	Jacksonville, Fla.....	528,865
El Paso, Tex.....	359,291	Inside central cities.	330,187	Jacksonville city (urban part).....	518,131
El Paso city.....	322,261	East Chicago.....	46,982	Outside central city...	10,734
Outside central city..	37,030	Gary.....	175,415	Jersey City, N.J.....	609,266
Erie, Pa.....	263,654	Hammond.....	107,790	Jersey City city.....	260,545
Erie city.....	129,231	Outside central cities	303,180	Outside central city...	348,721
Outside central city..	134,423	Grand Rapids, Mich.....	539,225	Johnstown, Pa.....	262,822
Eugene, Oreg.....	213,358	Grand Rapids city.....	197,649	Johnstown city.....	42,476
Eugene city.....	78,346	Outside central city..	341,576	Outside central city...	220,346
Outside central city..	137,012	Great Falls, Mont.....	81,804	Kalamazoo, Mich.....	201,550
Evansville, Ind.-Ky....	232,775	Great Falls city.....	60,091	Kalamazoo city.....	85,555
Evansville city.....	138,764	Outside central city..	21,713	Outside central city...	115,995
Outside central city..	94,011	Green Bay, Wis.....	158,214	Fall River, Mass.-R.I... Fall River city (urban part).....	96,569
Fall River, Mass.-R.I... Fall River city (urban part).....	149,976	Green Bay city.....	87,809	Outside central city..	53,407
Outside central city..	53,407	Outside central city..	70,435		

Table 2-18. (cont'd)

SMSA	Population	SMSA	Population	SMSA	Population
Kansas City, Mo.-Kans....	1,253,916	Little Rock-North Little Rock, Ark.....	323,296	Milwaukee, Wis.....	1,403,688
Kansas City city (urban part).....	501,859	Inside central cities..	192,523	Milwaukee city.....	717,099
Outside central city...	752,057	Little Rock.....	132,483	Outside central city...	686,589
Kenosha, Wis.....	117,917	North Little Rock...	60,040	Minneapolis-St. Paul, Minn.....	1,813,647
Kenosha city.....	78,805	Outside central cities	130,773	Inside central cities..	744,380
Outside central city...	39,112	Lorain-Elyria, Ohio.....	256,843	Minneapolis.....	434,400
Knoxville, Tenn.....	400,337	Inside central cities..	131,817	St. Paul.....	309,980
Knoxville city.....	174,587	Elyria.....	53,400	Outside central cities..	1,069,267
Outside central city...	225,750	Lorain.....	78,185	Mobile, Ala.....	376,690
La Crosse, Wis.....	80,468	Outside central cities	125,231	Mobile city.....	190,028
La Crosse city.....	51,153	Los Angeles-Long Beach, Calif.....	7,032,075	Outside central city...	186,664
Outside central city...	29,315	Inside central cities..	3,174,694	Modesto, Calif.....	194,506
Lafayette, La.....	109,716	Long Beach.....	358,633	Modesto city.....	61,712
Lafayette city.....	68,908	Los Angeles.....	2,816,061	Outside central city....	132,794
Outside central city...	40,808	Outside central cities	3,857,381	Monroe, La.....	115,387
Lafayette-West Lafayette, Ind.....	109,378	Louisville, Ky.-Ind.....	826,553	Monroe city.....	56,374
Inside central cities..	64,112	Louisville city.....	361,472	Outside central city...	59,013
Lafayette.....	44,955	Outside central city..	465,081	Montgomery, Ala.....	201,325
West Lafayette.....	19,157	Lovell, Mass.....	212,860	Montgomery city.....	133,386
Outside central cities..	45,266	Lowell city.....	94,239	Outside central city....	67,939
Lake Charles, La.....	145,415	Outside central city..	118,621	Muncie, Ind.....	129,219
Lake Charles city.....	77,998	Lubbock, Tex.....	179,295	Muncie city.....	69,080
Outside central city...	67,417	Lubbock city.....	149,101	Outside central city...	60,139
Lancaster, Pa.....	319,693	Outside central city..	30,194	Muskegon-Muskegon Heights, Mich.....	157,426
Lancaster city.....	57,690	Lynchburg, Va.....	123,474	Inside central cities..	61,935
Outside central city...	262,003	Lynchburg city.....	54,083	Muskegon.....	44,631
Lansing, Mich.....	378,423	Outside central city..	69,391	Muskegon Heights.....	17,204
Lansing city.....	131,546	Macon, Ga.....	206,342	Outside central cities..	95,491
Outside central city...	246,877	Macon city.....	122,423	Nashua, N.H.....	66,458
Laredo, Tex.....	72,859	Outside central city..	83,919	Nashua city.....	55,620
Laredo city.....	69,024	Madison, Wis.....	290,272	Outside central city...	10,838
Outside central city...	3,835	Madison city.....	173,258	Nashville-Davidson, Tenn.	541,108
Las Vegas, Nev.....	273,288	Outside central city..	117,014	Nashville-Davidson city (urban part).....	436,170
Las Vegas city.....	125,787	Manchester, N.H.....	108,461	Outside central city...	104,938
Outside central city...	147,501	Manchester city.....	87,754	New Bedford, Mass.....	152,642
Lawrence-Haverhill, Mass.-N.H.....	232,415	Outside central city..	20,707	New Bedford city.....	101,777
Inside central cities..	113,035	Mansfield, Ohio.....	129,997	Outside central city...	50,865
Haverhill.....	46,120	Mansfield city.....	55,047	New Britain, Conn.....	145,269
Lawrence.....	66,915	Outside central city..	74,950	New Britain city.....	83,441
Outside central cities	119,380	McAllen-Pharr-Edinburg, Tex.....	181,535	Outside central city...	61,828
Lawton, Okla.....	108,144	Inside central cities..	70,628	New Haven, Conn.....	355,838
Lawton city.....	74,470	Edinburg.....	17,163	New Haven city.....	137,707
Outside central city..	33,674	McAllen.....	37,636	Outside central city...	217,831
Leviston-Auburn, Maine..	72,474	Pharr.....	15,829	New London-Groton-Norwich, Conn.....	208,412
Inside central cities..	64,150	Outside central cities..	110,907	Inside central cities..	73,063
Auburn (urban part)..	22,371	Memphis, Tenn.-Ark.....	770,120	New London.....	31,630
Leviston.....	41,779	Memphis city (urban part).....	623,497	Norwich.....	41,433
Outside central cities	8,324	Outside central city...	146,623	Outside central cities	135,349
Lexington, Ky.....	174,323	Meriden, Conn.....	55,959	New Orleans, La.....	1,046,809
Lexington city.....	108,137	Meriden city.....	55,959	New Orleans city (urban part).....	591,502
Outside central city..	66,186	Outside central city...	...	Outside central city..	454,307
Lima, Ohio.....	171,472	Miami, Fla.....	1,267,792	New York, N.Y.....	11,571,899
Lima city.....	53,734	Miami city.....	334,859	New York city.....	7,894,862
Outside central city..	117,738	Outside central city...	932,933	Outside central city..	3,677,037
Lincoln, Nebr.....	167,972	Midland, Tex.....	65,433	Newark, N.J.....	1,856,556
Lincoln city.....	149,518	Midland city.....	59,463	Newark city.....	382,417
Outside central city..	18,454	Outside central city...	6,970	Outside central city..	1,474,139

Table 2-18. (cont'd)

SMSA	Popu- lation	SMSA	Popu- lation	SMSA	Popu- lation
Newport News-Hampton, Va.	292,159	Pine Bluff, Ark.....	85,329	Saginaw, Mich.....	219,743
Inside central cities.	258,956	Pine Bluff city.....	57,389	Saginaw city.....	91,849
Hampton.....	120,779	Outside central city...	27,940	Outside central city..	127,894
Newport News.....	138,177	Pittsburgh, Pa.....	2,401,245	St. Joseph, Mo.....	86,915
Outside central cities	33,203	Pittsburgh city.....	520,117	St. Joseph city.....	72,691
Norfolk-Portsmouth, Va..	690,600	Outside central city...	1,881,128	Outside central city..	14,224
Inside central cities.	4.8,914	Pittsfield, Mass.....	79,727	St. Louis, Mo.-Ill.....	2,363,017
Norfolk.....	307,951	Pittsfield city.....	57,020	St. Louis city.....	622,236
Portsmouth.....	110,963	Outside central city...	22,707	Outside central city..	1,740,781
Outside central cities	261,686	Portland, Maine.....	141,625	Salem, Oreg.....	186,658
Norwalk, Conn.....	120,099	Portland city.....	65,116	Salem city.....	68,298
Norwalk city.....	79,113	Outside central city...	76,509	Outside central city..	118,362
Outside central city..	40,986	Portland, Oreg.-Wash.....	1,009,129	Salinas-Monterey, Calif.	250,071
Odesa, Tex.....	91,805	Portland city.....	382,619	Inside central cities.	85,198
Odesa city.....	78,380	Outside central city...	626,510	Monterey.....	26,302
Outside central city..	13,425	Providence-Pawtucket-		Salinas.....	58,896
Ogden, Utah.....	126,278	Warwick, R.I.-Mass.....	910,781	Outside central cities	164,873
Ogden city.....	69,478	Inside central cities..	339,891	Salt Lake City, Utah....	557,635
Outside central city..	56,800	Pawtucket.....	76,984	Salt Lake City city...	175,885
Oklahoma City, Okla.....	640,889	Providence.....	179,213	Outside central city..	381,750
Oklahoma City city		Warwick.....	83,694	San Angelo, Tex.....	71,047
(urban part).....	356,661	Outside central cities.	570,890	San Angelo city.....	63,884
Outside central city..	284,228	Provo-Orem, Utah.....	137,776	Outside central city..	7,163
Omaha, Nebr.-Iowa.....	540,142	Inside central cities..	78,860	San Antonio, Tex.....	664,014
Omaha city.....	347,328	Orem.....	25,729	San Antonio city.....	654,153
Outside central city..	192,814	Provo.....	83,131	Outside central city..	209,861
Orlando, Fla.....	428,003	Outside central cities.	58,916	San Bernardino-Riverside-	
Orlando city.....	99,006	Pueblo, Colo.....	118,238	Ontario, Calif.....	1,143,146
Outside central city..	328,997	Pueblo city.....	97,453	Inside central cities.	308,458
Owensboro, Ky.....	79,486	Outside central city...	20,785	Ontario.....	64,118
Owensboro city.....	50,329	Racine, Wis.....	170,838	Riverside.....	140,089
Outside central city..	29,157	Racine city.....	95,162	San Bernardino.....	104,251
Oxnard-Ventura, Calif....	376,430	Outside central city..	75,676	Outside central cities	80,688
Inside central cities.	127,022	Raleigh, N.C.....	228,453	San Diego, Calif.....	1,357,854
Oxnard.....	71,225	Raleigh city.....	121,577	San Diego city (urban	
Ventura (San		Outside central city...	106,876	part).....	693,931
Buenaventura).....	55,797	Reading, Pa.....	296,382	Outside central city..	663,923
Outside central cities	249,408	Reading city.....	87,643	San Francisco-Oakland,	
Paterson-Clifton-Passaic		Outside central city...	208,739	Calif.....	3,109,519
N.J.....	1,358,794	Reno, Nev.....	121,068	Inside central cities.	1,077,235
Inside central cities.	282,385	Reno city.....	72,863	Oakland.....	361,561
Clifton.....	82,437	Outside central city...	48,205	San Francisco.....	715,674
Passaic.....	55,124	Richmond, Va.....	518,319	Outside central cities	2,032,284
Paterson.....	144,824	Richmond city.....	249,621	San Jose, Calif.....	1,064,714
Outside central cities	1,076,409	Outside central city...	268,698	San Jose city (urban	
Pensacola, Fla.....	243,075	Roanoke, Va.....	181,436	part).....	443,950
Pensacola city.....	59,507	Roanoke city.....	92,115	Outside central city..	620,764
Outside central city..	183,568	Outside central city...	89,321	Santa Barbara, Calif....	264,324
Peoria, Ill.....	341,979	Rochester, Minn.....	84,104	Santa Barbara city....	70,215
Peoria city.....	126,963	Rochester city.....	53,766	Outside central city..	194,109
Outside central city..	215,016	Outside central city...	30,338	Santa Rosa, Calif.....	204,885
Petersburg-Colonial		Rochester, N.Y.....	882,667	Santa Rosa city.....	50,006
Heights, Va.....	128,809	Rochester city.....	296,233	Outside central city..	154,879
Inside central cities..	51,200	Outside central city...	586,434	Savannah, Ga.....	187,767
Colonial Heights.....	15,097	Rockford, Ill.....	272,063	Savannah city.....	118,349
Petersburg.....	36,103	Rockford city.....	147,370	Outside central city..	69,418
Outside central cities.	77,609	Outside central city...	124,693	Scranton, Pa.....	234,107
Philadelphia, Pa.-N.J....	4,817,914	Sacramento, Calif.....	800,592	Scranton city.....	103,364
Philadelphia city.....	1,948,609	Sacramento city.....	254,413	Outside central city..	130,543
Outside central city...	2,869,305	Outside central city..	546,179		
Phoenix, Ariz.....	967,322				
Phoenix city.....	581,562				
Outside central city...	385,960				

Table 2-18. (cont'd)

SMSA	Popu- lation	SMSA	Popu- lation	SMSA	Popu- lation
Seattle-Everett, Wash...	1,421,869	Tampa-St. Petersburg, Fla.....	1,012,594	Waterloo, Iowa.....	132,916
Inside central cities..	584,453	Inside central cities..	493,999	Waterloo city (urban part).....	74,610
Everett.....	53,622	St. Petersburg.....	216,232	Outside central city..	58,306
Seattle.....	530,831	Tampa.....	277,767		
Outside central cities	837,416	Outside central cities	518,595	West Palm Beach, Fla....	348,753
Sherman-Denison, Tex....	83,225	Terre Haute, Ind.....	175,143	West Palm Beach city (urban part).....	57,290
Inside central cities..	53,984	Terre Haute city.....	70,286	Outside central city..	291,463
Denison.....	24,923	Outside central city..	104,857		
Sherman.....	29,061	Texarkana, Tex.-Ark....	101,498	Wheeling, W. Va.-Ohio...	182,712
Outside central cities	29,241	Inside central cities..	52,179	Wheeling city.....	48,188
Shreveport, La.....	294,703	Texarkana, Ark.....	21,682	Outside central city..	134,524
Shreveport city.....	182,064	Texarkana, Tex.....	30,497		
Outside central city..	112,639	Outside central cities	49,019	Wichita, Kans.....	389,352
Sioux City, Iowa-Nebr....	116,189	Toledo, Ohio-Mich.....	692,571	Wichita city.....	276,554
Sioux City city.....	85,925	Toledo city.....	383,818	Outside central city..	112,798
Outside central city..	30,264	Outside central city..	308,753		
Sioux Falls, S. Dak.....	95,209	Topeka, Kans.....	155,322	Wichita Falls, Tex.....	127,621
Sioux Falls city.....	72,486	Topeka city.....	125,011	Wichita Falls city....	97,564
Outside central city..	22,721	Outside central city..	30,311	Outside central city..	30,057
South Bend, Ind.....	280,031	Trenton, N.J.....	303,968	Wilkes-Barre--Hazleton, Pa.....	342,301
South Bend city.....	125,580	Trenton city.....	104,638	Inside central cities..	89,282
Outside central city..	154,451	Outside central city..	199,330	Hazleton.....	30,426
Spokane, Wash.....	287,487	Tucson, Ariz.....	351,667	Wilkes-Barre.....	58,856
Spokane city.....	170,516	Tucson city.....	262,933	Outside central cities	253,019
Outside central city..	116,971	Outside central city..	88,734	Wilmington, Del.-N.J.-Md.	499,493
Springfield, Ill.....	161,335	Tulsa, Okla.....	476,945	Wilmington city.....	80,386
Springfield city.....	91,753	Tulsa city (urban part).....	330,409	Outside central city..	419,107
Outside central city..	69,582	Outside central city..	146,536	Wilmington, N.C.....	107,219
Springfield, Mo.....	152,929	Tuscaloosa, Ala.....	116,029	Wilmington city.....	46,169
Springfield city.....	120,096	Tuscaloosa city.....	65,773	Outside central city..	61,050
Outside central city..	32,833	Outside central city..	50,256	Worcester, Mass.....	344,320
Springfield, Ohio.....	157,115	Tyler, Tex.....	97,096	Worcester city.....	176,572
Springfield city.....	81,926	Tyler city.....	57,770	Outside central city..	167,748
Outside central city..	75,139	Outside central city..	39,326	York, Pa.....	329,540
Springfield-Chicopee- Holyoke, Mass.-Conn....	529,922	Utica-Rome, N.Y.....	340,670	York city.....	30,335
Inside central cities..	280,693	Inside central cities..	139,266	Outside central city..	279,205
Chicopee.....	66,676	Rome (urban part)...	47,655	Youngstown-Warren, Ohio.	536,003
Holyoke.....	50,112	Utica.....	91,611	Inside central cities..	203,282
Springfield.....	163,905	Outside central cities	201,404	Warren.....	63,494
Outside central cities	249,229	Vallejo-Napa, Calif....	249,081	Youngstown.....	139,788
Stanford, Conn.....	206,419	Inside central cities..	102,711	Outside central cities	332,721
Stanford city.....	108,798	Napa.....	35,978	Puerto Rico (4 areas).....	1,191,746
Outside central city..	97,621	Vallejo.....	3,733	Inside central cities..	713,069
Stoubenville-Weirton, Ohio-W. Va.....	165,627	Outside central cities	146,370	Outside central cities..	478,677
Inside central cities..	57,902	Vineland-Millville- Bridgeton, N.J.....	121,374	Caguas.....	95,861
Stoubenville.....	30,771	Inside central cities..	88,937	Caguas city.....	63,215
Weirton.....	27,131	Bridgeton.....	20,435	Outside central city..	32,446
Outside central cities	107,725	Millville (urban part).....	21,103	Mayaguez.....	85,857
Stockton, Calif.....	290,208	Vineland (urban part).....	47,399	Mayaguez city.....	68,872
Stockton city.....	107,644	Outside central cities	32,437	Outside central city..	16,983
Outside central city..	182,564	Waco, Tex.....	147,553	Ponce.....	158,981
Syracuse, N.Y.....	636,507	Waco city.....	95,326	Ponce city.....	128,233
Syracuse city.....	197,208	Outside central city..	52,227	Outside central city..	30,748
Outside central city..	439,299	Washington, D.C.-Md.-Va.	2,861,123	San Juan.....	851,247
Tacoma, Wash.....	411,027	Washington city.....	758,510	San Juan city.....	452,749
Tacoma city.....	154,581	Outside central city..	2,104,613	Outside central city..	398,498
Outside central city..	256,446	Waterbury, Conn.....	208,956		
Tallahassee, Fla.....	103,047	Waterbury city.....	108,033		
Tallahassee city.....	71,897	Outside central city..	100,923		
Outside central city..	31,150				

Taken from Source 2.

APPENDIX D  
COMMENTARY ON TRANSIT INTEGRATION ACTIVITIES CHECKLIST

INTRODUCTION

This appendix describes individually most of the items on the checklist of transit integration activities (see Table 10, p. 52, also reproduced at the end of this appendix) in order to answer any questions that may arise as a result of differences in terminology in the rapidly evolving field of urban transportation. The checklist is used in this volume to tabulate suggested approaches to integration for three U.S. cities and a hypothetical small urban area, "Middletown."

As explained in Section 2 where the table is first introduced, INTERPLAN feels that this listing can be valuable in a number of ways beyond its use in the report:

- As a source of ideas for transit planners and operators;
- As a worksheet to be used during the planning and negotiating process;
- As a means of recording a final transit integration program or program proposal.

The listing is arranged under three major headings: institutional, operational, and physical.\* The activities are further grouped according to the kinds of organizations which must cooperate to implement them (government agencies, operators, local businesses), and the status of the technology required (new or proven). Individual activities may be mutually exclusive, such as fixed versus zonal fare systems, or they may be complementary, such as the various sources of financing indicated.

While the listing is intended to be exhaustive, it is hoped that it will also serve as a stimulus to further ideas. For this reason, space is left at the end of the three major sections for the notation of additional items.

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\* These and other concepts of transit integration are fully discussed in Volume 1, Section 3, pp. 27-47.

## INSTITUTIONAL

### Institutional Coordination with Government Agencies

One of the primary lessons which can be learned from INTERPLAN's study of successful European transit systems is that close coordination of regional planning and transit planning on the institutional level is required if transit integration is to be effective. Four mutually exclusive elements are given in this category. The difference between a *regional planning commission* and a formally *constituted committee* is essentially one of legal power to carry out decisions. A commission is thought of as having absolute authority in this area. A constituted committee has some powers but may have to defer implementation of its decisions to other organizations, such as the transit operators, who are not legally bound to follow them. And an *ad hoc committee* would only be allowed to make recommendations to its members or to other organizations. A checklist item indicating "*no coordinating agency*" is provided to aid in describing an already existing system.

Several activities are in some sense fundamental to the transit planning process; they would also be necessary to insure a successful demonstration. One of these is data on the area's *trip demand characteristics*. Though some origin-destination and trip purpose studies have been made in most urban areas, not all cities, especially middle-sized ones, have made a thorough study. Similarly, not all urban areas have formulated an explicit and sound *transportation policy* based on a thorough analysis of the area's future needs and values. Along with a transportation policy formulation there may have to be a *redefinition of the region* which will be served by a coordinated public transit system. This redefinition may require legal proceedings to extend transit district or other boundaries defining transportation operations. On the other hand, a reasonable transportation area may already have been legally defined but appropriate institutions for integrating transit operations may not have been established.

The next category on the list is that of a *transportation planning authority*, which includes four alternatives for different levels of integration of transit planning. Among the alternatives, *authority over all transportation planning* is intended to include highway planning. Also, *authority for "overall" planning for public transit* is intended to include the power to establish

routes to be served, the general level of service, i.e., frequency, and the general level of fares in an area. Again, the category of "*no single public transportation planning authority*" is provided to allow for description of existing systems.

### Institutional Coordination Among Operators

The strongest alternative for bringing about coordination among operators is the formation of a *single operator for the region* through the merger of various operators, with previously independent firms operating as subsidiaries or losing their identities altogether. The creation of a transit district is, in fact, a legally enforced merger. When merger is out of the question, as where one or more of the major transit agencies operates over an area much greater than the urban region under consideration, or where some operators are publicly owned and others privately owned, a *transit federation* is a feasible alternative. Members would delegate certain powers related to system planning, tariffs, and revenue distribution to the federation.

Some degree of institutional integration exists when *one major transit operator* in a region operates most service. But cooperation can never be as effective as when there is a single operator or a federation for the whole region, as there will be difficulties in reaching agreements with other smaller operators for coordinating services. This element is provided in the checklist not as a recommended action but to help in describing existing systems.

Some operator coordination can also be achieved through a transit community, a tariff association or coordination agreements. The first two are areawide in scope. A *transit community* maintains agreements for common tariffs and coordination of routes and schedules. There may also be some pooling or exchange of rolling stock. However, the basic power to plan routes and schedules would still remain in the hands of the individual operators. A *tariff association* is limited to contracts on joint tariffs and the distribution of jointly collected revenues. It is suitable in situations where there is no direct competition, except in some very small overlapping service areas, and where there is a large number of end-to-end connections. The final useful alternative is route and schedule *coordinating agreements* between individual operators covering certain routes. A "*no coordinating organization*" alternative is provided to describe existing systems.

*Coordination with out-of-region and intercity operators and coordination with para-transit operators* can be handled within some of the alternatives cited above, or else separate coordinating committees or agreements could be set up. Two alternatives which require no organizational coordination on the institutional level but which are included as descriptors of existing systems are the allocation of responsibility within the operator's organization for such coordination, or "no comprehensive approach."

## Financing Arrangements

Funds to finance capital projects, rolling stock, or operations may come from more than one source. The same source of funds might be used for several purposes, although some sources of financing would not usually be applied to certain expenses, e.g., bond issues would not be used to cover operating costs. The lists provided are intended to be fairly flexible in providing a profile of both existing and proposed transit finance measures.

## OPERATIONAL

### Operational Coordination with Local Government Agencies

There are two basic ways in which surface transit could be improved and which depend on factors under direct control of local government authorities: decreasing automobile traffic in major activity centers, and improving the flow of the existing surface traffic.

**PARKING POLICY.** Parking policy can be expressed by a *system of charges* or taxes for parking which would discourage regular parking and by the *restriction of spaces* available for parking. Pricing for parking can also be arranged to discourage the long-term parker through an increasing or constant additional charge with parking time, as opposed to the presently widely practiced decreasing charges. This would encourage the short-term parking and high parking turnover typical of the shopping trip.

If downtown parking rates were raised to the prohibitive level, automobile travel becomes less attractive and the merits of public transit are enhanced without intrinsic changes in either mode. Because parking rates are an out-of-pocket cost, they tend to function as a more direct deterrent to



automobile use than do gasoline taxes and registration fees. Care must be taken, however, to ensure that the public transportation system can adequately supply transportation needs for those potential riders it expects to convert from automobile use. If parking rates increase, but public transit remains so poor that it is not a viable alternative to driving, no positive change will be effected, and the commuter will suffer an undue hardship.

**AUTO USE POLICY.** While parking controls restrict autos only while they are parked, it would be more effective to prevent the use of the automobile altogether, since the moving auto takes up almost 12 times as much road space as a parked car. This restriction may be accomplished through some means of road pricing, the setting up of auto-free zones, or traffic restraint schemes, as has been proposed in London.

It would be convenient if some practical means of *road pricing* for cars could be instituted, similar to that long in practice for interstate trucks, which pay a mileage tax on distance traveled. Some road user tax is paid by motorists when they buy gasoline, but it is doubtful that at its present level this tax has any effect whatsoever on choice of mode. Another more drastic means of user charging would be the setting up of tolls at all entrances to a city. This would be easiest to implement where a city is located on an island or peninsula and much commuter traffic must enter over bridges. Tolls could be gradually increased to prohibitive levels while instituting good bus service and allowing toll reductions for cars with three or more passengers. In the long run, properly planned, gradual institution of toll stations at major entrances to a city might encourage switchovers to public transit, provided again that operators can offer full enough areawide transit coverage.

Auto use can also be forbidden in a zone completely, or during the major part of the day, thus creating an *auto-free area*. Auto use can also be restricted by supplementary licensing which will permit access to major activity centers during certain hours. Construction of many existing auto-free zones has been stimulated by an economic decline of the central business district or by renewal of redevelopment opportunities. In the future, Environmental Protection Agency regulations may be a significant stimulant to the creation of auto-free zones as an aid to control air and noise pollution in urban areas.

*Traffic restraint schemes* do not remove auto traffic from major areas but do restrict the flow. One approach, implemented permanently in Gothenburg, Sweden, and temporarily in Rome, Italy, blocks access to crosstown movement and forces drivers away from the city before they can get to the inner core.

The Institute of Traffic Engineers has also identified the following possible design treatments to improve transit conditions through restricting or eliminating auto traffic on street segments. Such measures are common in European cities.

- a. Modified Street: A conventional street, allowing for both pedestrian and vehicular movement, but with modifications particularly designed to facilitate pedestrian movement.
- b. Transitway: A street dedicated to pedestrians and transit riders, but from which all private vehicles are excluded except for emergencies or temporary construction work, with "transit lanes" set apart from pedestrian areas.
- c. Plazas or Interrupted Malls: Blocks which are given over to exclusive pedestrian use, with cross streets left open to vehicular traffic.

**TRAFFIC MANAGEMENT.** Traffic management can aid transit flow and reduce overall congestion by restructuring traffic-flow patterns. Most options are not costly. Some, like a totally centralized and *computerized traffic control* in major activity areas, would require major investments and imply a physical integration of the surface transit system into the control scheme as well. Some are familiar but are not found in many areas, as, for example, *signal synchronization* and more minimal parking restrictions to aid transit flow.

The *bus priority system* is designed to decrease the delay of buses at traffic signals by providing buses with control over traffic signals so as to minimize time spent waiting for lights. There are two types of signal preference systems:

1. The preempt system
2. The priority system.

The preempt technique senses the bus approaching a traffic signal and either: (1) holds the green light for the bus, or (2) actuates the green light as soon as possible. The priority technique senses the approaching bus and will hold the light green for a certain length of time, if the bus can go through the intersection in that time period. But it will not change a red light, hold the green for buses when traffic is backed up ahead, or

hold a green light when severe backup exists on side streets. Current experience, while limited, suggests that the reduction in running time with these techniques is not very substantial.

Other traffic management techniques include *reserving lanes* for auto and bus use, as opposed to trucks, or for car-pool and bus use during peak hours. Curbside lanes on city streets can be reserved for bus use during peak hours or all day. A newer version of this concept is to mark off the left-hand lane of a one-way street for use of buses traveling in the opposite direction—a reverse bus lane. This technique provides an uncongested exclusive busway on streets which, because they carry traffic moving in the opposite direction from peak period traffic, are likely to have underutilized capacity. It is true that cross traffic and other interruptions limit the average operating speed to a lower level than achievable on freeway-type service. Nonetheless, in some cities bus travel time delay may be most significant on the arterial portion of a trip; improved bus speeds on arterials may save more time than using a faster but indirect freeway routing.

A similar approach has been used on freeways to speed bus and carpool movement during peak hours by permitting these vehicles to use an *exclusive reserved freeway lane*. Two versions have been tried:

1. Reservation of a lane on the most heavily traveled side of the freeway. In this approach all or part of a lane of traffic is reserved for high occupancy vehicles, usually at the critical "bottleneck" portion of the freeway during the peak period. It may be sufficient to reserve lanes through very short bottleneck areas such as toll-booths or sections of the freeway where through lanes merge.
2. Use of an opposing lane. In this approach a lane in the least heavily traveled side of the urban freeway is reserved for high occupancy vehicles. For example, in the A.M. peak, a lane on the outbound portion of the freeway, usually next to the median strip, is reserved for high occupancy vehicles to travel inbound, against the traffic flow on the outbound lane. In this way, the exclusive use lane does not subtract from the total previously existing capacity on the congested portion of the freeway.

A number of experiments and tests of these principles have been performed. The results indicate the time savings for passengers in high-occupancy vehicles to be very substantial.

One of the main bottlenecks on freeways are the access and exit ramps. Flow during peak hours is sometimes improved by closing down some of these.

*Ramps* can also be reserved for buses. This strategy would be most effective when used in conjunction with exclusive freeway lanes.

Finally, traffic management would improve transit operations through a judicious choice of bus stop locations and the creation of offstreet docks for loading and unloading passengers.

#### Operational Coordination with Local Government Agencies and Local Businesses

CHANGING TRANSIT DEMAND CHARACTERISTICS. The requirement for designing transportation facilities to meet peak-hour demand and the disadvantages of this requirement are well documented. So are some of the possible solutions, such as staggered work hours and extended shopping hours, which require cooperation from the many private companies located in or near major activity centers. Opposition to such changes usually has two sources: the costs incurred by companies and individual living habits.

Application of the *staggered work hours* concept to U.S. cities is objectively a cost-free solution to peak-hour travel demand. Costs are in fact important, however, since labor unions may require wage differentials if hours are substantially changed. Should this occur, employers would be reluctant to cooperate with a staggered work hour program. Extended hours of operation in buildings with staggered staff hours would increase costs and diminish chances for managerial acceptance of such a plan.

While people tend to resist change in their living habits, they also tend to be highly susceptible to the persuasion of advertisement. Sophisticated marketing techniques which promote its advantages, such as reduced travel time and greater comfort and safety, might convince the public that the change is worthwhile.

More recent approaches include sliding work hours and "flexitime." Under *sliding work hours*, employees are free to report to work at any time within a given morning period, say between 7:00 and 10:00 a.m., and to leave when they have completed eight hours of work. The system is now being operated by some employers in Germany, who like the system and say that the response from employees is very favorable. The employees have to use time cards (which were not required previously) but do not seem to mind this too much.

"Flexitime", now in use by about half of Switzerland's banks and insurance companies, allows an employee to report to work any time between 6:30 and 8:00 a.m., take up to a 90-minute lunch hour, and leave between 4:00 and 6:00 p.m. during a five-day, 44-hour week. The system allows employees to accumulate a surplus or deficit of up to 15 hours a month that have to be recouped or idled off in the following months. Overtime is counted extra and has to be ordered by the management. Or an employee can determine a personal, fixed schedule which he must stick to for at least a month. This type of arrangement leaves a daily block of almost six hours during which all employees are in the office. Flexitime has been extremely popular in Switzerland, where it has been adopted by firms employing 20 percent of the country's industrial workers. It would appear to offer the advantages of staggered work hours without the disadvantages of these hours being fixed.

Other solutions to smoothing out peak-hour demand on public transit would be the encouragement of *multipurpose use of major activity centers* and the encouragement of the shopping trip by public transit. Different use purposes, e.g., work commuting, shopping, and entertainment, typically have different travel demand characteristics, specifically in terms of time of day. Different trip purposes also express themselves in choices of different modes. Therefore, encouraging the location of many kinds of activities close together, with major centers for different trip purposes, should also be accompanied by some way of encouraging a shift of modal split towards public transit. To encourage the use of using *public transit for shopping*, for example, would include cooperation from merchants in packaging purchases with the transit trip in mind, in rapid handling of customers with small purchases, and in keeping convenient shopping hours, in addition to other items such as the provision of park, ride, and shop lots, or the "package" buses (see Physical below).

#### Operational Coordination Among Operators

Operational coordination among operators in a region can cover fares, routes, schedules, and public information programs.

**BASIC SYSTEM-WIDE FARE STRUCTURE.** A unified system-wide fare structure means that there is an intermodal, interoperator transfer policy. In such a case the passenger pays his fare once, regardless of the number of times he

must transfer (transfers are free). If the fare is a *graduated* one, a unified fare further implies that the fare varies according to the distance traveled or time spent on the system, regardless of the number of lines ridden. A *zonal fare* would imply that the fare varies not directly with the distance traveled but with the number of times certain predefined geographical boundaries are crossed.

A unified fare may not be strictly necessary for some degree of transit operator coordination, but if fares are collected separately and retained by each operator, then each operator will be maximizing his own fare-box revenue rather than the total revenue of the system. It is true that fares could be collected separately and then pooled and redivided according to a predetermined formula. Nonetheless, a single fare with free transfer privileges need be collected only once, simplifying the operation for both passenger and operator. Particularly when combined with an honor system and time passes, a unified fare structure can substantially reduce the cost of fare collection, especially where many operators are involved.

It may be advisable to avoid two simple and extreme means of "unifying" fare structures: the *flat-rate* and the *no-fare* system. The *nominal fare* is similar to having no fare at all. Flat rates are common because they are easier to collect than graduated fares based on distance or zones. However, a flat-fare system places the heaviest burden on short distance travelers. In most instances, this group constitutes an important part of the operator's market and one which, at the same time, has the greatest possibility of substituting another means of travel. Thus, when fares are increased, short-distance travelers frequently abandon transit and as a result, the greatest loss is sustained in the group from which the highest proportion of the recovery of costs is expected.

The *no-fare* system alone can fail to produce the expected substantial increases in patronage and decreases in auto traffic. In Rome, Italy, for example, free buses at peak commuting hours this past summer carried 10 percent more riders, but automobile traffic showed no decrease. It is supposed that many pedestrians simply became bus riders. Transit planners have indicated that the Rome experiment may have failed because of poor overall service level. In San Diego, on the other hand, fares were reduced from 40¢ to 25¢ along with new routes and improved service. The system there has been

very successful in attracting new riders. Transit ridership appears most sensitive to a combination of the level of transit service, transit fare, and the competitive level of automobile service rather than to any single factor alone.

SUPPLEMENTARY POLICIES ON FARE STRUCTURE. Offering temporary *special rates for socio-economic groups* (senior citizens, students), *time of day* (off-peak hours), *weekly or seasonal periods* (commuter or general passes), *time of week* (excursion or weekend), or *trip purpose* (tourist or Christmas shopping with the family) serves to attract new riders, provide publicity, and test possible permanent changes in the fare structure.

FARE COLLECTION PROCEDURES. Whatever fare structure is used, the fare collection procedures which go with it can have a substantial effect on both cost to the operator and attractiveness of service to the rider. Required *tokens* dropped in a fare box or turnstile are popular because they require little operator involvement compared to a cash fare. An *honor ticket system* commonly in use in Europe for buses and rail systems alike involves no driver involvement whatsoever but may necessitate installation of ticket machines for single rides. The rider purchases a ticket which is cancelled as it is issued and enters the bus. Drivers take cash fares from riders at stops with no ticket machines. Periodic checks by inspectors and a high fine for violators assures general honesty. While the honor system may cost the operator a few free rides, it cuts cost by eliminating the inspection of tickets or collection of fares in vehicles and speeds rider entry.

An extension of this system is to issue weekly or monthly *commuter passes*. These passes have resulted in substantial savings in Hamburg, where 75-80 percent of those traveling during peak workweek hours are commuter pass holders, and issue of these tickets involves only 1-10 percent of the sales operation necessary for single tickets. Experience with these passes has been so favorable that the transit federation will now mail a commuter's ticket to him and deduct the cost from his bank account.

ROUTE COORDINATION. Coordinated complete area-wide coverage, whether provided by one carrier or many, requires a logically designed network whose routes follow area travel corridors. Where routes needlessly duplicate each other because two operators offer competing services or because a single firm lacks the equipment or resources to build up a complete network, institu-

tional integration should permit multiple operators to agree on a single service arrangement and single operators to work with local officials to resolve financing difficulties. In Hamburg, operators joining the federation essentially gave up the right to compete with each other. As a result, the federation was able to *eliminate all duplications of service*. Feeder bus lines to rail rapid transit stations were rerouted to the closest stations in the network rather than being limited to connections with lines of the same agency. In one case, rerouting a feeder bus line to a closer rail station operated by a previous competitor resulted in a 20 percent decrease in bus requirements and shortened the trip for riders.

Network rationalization and the necessary rescheduling to assure minimum transfer waiting time may be all that is needed if coverage is already good; otherwise, *new routes* should be designed and tested to bring neglected areas into the network. This particularly applies to feeder routes connecting outlying areas with transfer points on main lines. Such routes extend the "pulling power" of the main lines, and assure that patrons not within walking distance of the main line will still be able to use it. Innovative programs using para-transit modes to provide feeder service can also extend transit coverage. New and better *express services* can be developed, as well as *mini- and midi-bus routes* in major activity areas, and special routes served only during peak demand.

SCHEDULE COORDINATION. Schedule *coordination at connections* between routes of the same and of different modes in a region-wide transit system would minimize transfer waiting times and would contribute significantly to the acceptability of a rationalized route network. Yet schedule coordination concepts are not limited to the transit system's inter-route connections. Schedule coordination can and should be extended to *servicing out-of-region and intercity demand*. The increase in total ridership brought about by servicing out-of-region connections may be small but, for the small amount of resources typically required for it, the gain can be certain, effective, and a definite penetration of the ridership of competitive modes.

Another form of schedule coordination is demand responsiveness to the rider's trip planning needs. Such *rider orientation in scheduling* would evince itself in short, reliable headways which eliminate the problems the rider has in estimating his own waiting times. A maximum headway above which



this orientation probably ceases to apply is about 15 minutes. Another rider-oriented aspect of schedule coordination is to set up easily memorized schedule times. An example would be a vehicle or train arrival at major stops every 20 minutes starting on the hour. Extending service times into the late-night hours where demand is known to exist is yet another aspect of rider orientation in scheduling.

**PUBLIC INFORMATION SYSTEM.** A good public information program should exist for a region's public transit system regardless of the degree of coordination among individual operators. The greater the coordination, however, the more effective a public information program would be. A public information program comprises a number of varied activities. Among them are easily understood and available system *schedules* and *route maps*, easy to use *information aids* and signs for the rider entering or in the system, and a *public relations program* to inform potential areas of services that exist.

Information functions have been all too often forgotten by U.S. transit operators or limited to a notice in the local newspaper and in the vehicles themselves. With little investment, an effective information and public relations program can draw new ridership and, equally important, create the kind of positive image and public interest in transit that is essential if local taxpayers, businessmen, and voters are to support the transit companies' needs for financing.

Examples of practical, doable projects can be taken from the Hamburg Transit Federation and London Transport. In Hamburg the master timetable, a large paperback published twice a year and costing about 30¢, has perforated pages so that users can pull out schedules for individual lines. Maps are color-coded and easy to understand. When new lines are inaugurated or extended into new areas, each household in the area receives a pamphlet describing the new facility and its schedule and how to use it. Particular attention is given to the education of children. Materials for schools include large maps of the system, descriptions of the various vehicle types, decks of cards with pictures of transit vehicles (each suit is one of the system's major modes), and puzzles based on the transit network.

London Transport goes even further. Besides providing pocket folder maps covering all services, leaflets to help visitors find their way about London, and timetable booklets, it has produced guidebooks describing walks in the rural areas outside London and directions for getting to the starting point, historical pamphlets about the famous London Underground (subway), a series of color posters publicizing special transit services, and free film loans, in addition to the usual 24-hour telephone inquiry service.

Both London and Hamburg have graphic design and color schemes which clearly identify vehicles on all sides. Other visual aides often found in Europe but rare for U.S. bus systems are abbreviated, clearly labeled route maps printed on every bus stop, complete route maps inside the buses, and route and schedule sheets readily available from bus drivers, newsstands, and other common outlets.

In certain areas of the U.S. where there are non-English speaking minorities, similar publications can be printed in a multilingual format. A minor consideration like this is likely to result in an increased penetration of a market area very susceptible to using public transit.

## PHYSICAL AND TECHNICAL

### Physical Coordination with Local Government Agencies

Coordination with local government agencies in physical and technical activities may be classified by the state of the art of technology required. New technologies would require additional monies for research, development, and extensive testing and evaluation, including system demonstrations, of engineering aspects before a demonstration of the impact of the technology on transit level of service, ridership, and system integration could be designed and implemented. Already proven and well-known technologies, on the other hand, can be applied directly to transit integration demonstrations.

**NEW TECHNOLOGY.** The new technology seen to have a major impact on transit integration is automation—the use of *computers* and *remote sensors* to control and improve operation. One application of this technology is centralized surface traffic control. Local government agencies have authority over surface traffic flows, hence they can influence surface transit flow through improvements in traffic flow. In the application of such a control scheme,

public transit vehicles could be identified by a locator system and favored in the flow pattern.

Various forms of non-discriminatory *automated traffic control* can reduce congestion on city streets and freeways. These techniques can also have a substantial effect on reducing accident rates, but they are unlikely to have as marked an effect on transit efficiency as operational actions or as other transit-oriented technical actions. They also fall into the category of high-capital investments. Automated traffic control techniques include:

- Computerized traffic control system. Real-time traffic data is fed into a control center by traffic sensors, which enables the computer to select an optimum strategy for the operation of the system.
- Freeway ramp metering. Traffic signals are installed on freeway ramps, both inbound and outbound. Detectors collect traffic information on a real-time basis and the data is transmitted via telephone lines to a centrally located digital control computer. The display panel provides an overview of the status of the ramp control systems and shows the signal indicators in effect at each metered ramp.

**PROVEN TECHNOLOGY.** Local government agencies can more immediately aid transit operations through providing more conventional facilities like busways, park-and-ride lots, park, ride and shop lots near the CBD, pedestrian malls and grade-separated crossings, bicycle paths and offstreet loading and unloading bays at bus stops along major streets and arteries.

*Busways* involve building a grade-separated lane for buses, or permanently removing such a lane from other service, and building a separate ramp facility for bus use only. Bus speed can thereby be increased by about 50 percent, making bus travel more attractive to car drivers along the same route. Opportunities for converting existing freeway lanes during peak hours without having to construct new facilities (listed under Operational Coordination with Local Government Agencies) should be fully explored before turning to the design of such expensive facilities.

The first step in the provision of *park-and-ride facilities* might be for the city and operators to form an agreement with developers or owners of existing parking lots to lease them for park-and-ride. But in some cases expensive construction and land purchase for new lots may be unavoidable.

Hamburg has used some unusual ideas in building and promoting use of park-and-ride facilities. Lots have been built from revenues earned by parking

meters in the congested central city. Thus parking revenues have paid for parking facilities. This is notable because in most countries, including the U.S., parking meter revenues are invariably swallowed up as general funds. The Hamburg Transit Federation is also making arrangements to enfranchise an independent operating company to provide various personal services at the park-and-ride locations. A commuter might be able to have his car washed, lubricated, or fueled during the day, while he is at work in the city. Eventually, it may be possible for a housewife to leave a grocery list with a store at the park-and-ride location and return from her city shopping to find her order filled and locked in her car.

### Physical Integration Activities By Operators

Physical integration activities by operators can also be classified into those requiring new technology as opposed to those using proven and well-known technologies. Again the major *new technology* applicable to transit integration today is some form of computerized control. Examples are *automatic train operation*, *dial-a-ride operation for buses*, and bus operations control with a *vehicle locator system*.

More conventional integration activities would be made apparent through the provision of facilities, vehicles, or *equipment to aid operations* or through the *pooling of facilities* and resources among operators.

TERMINALS AND BUS STOPS. Construction of an *intermodal terminal facility* is generally justified only when a high level of transferring activity occurs between two or more modes, most likely including one inter-city mode such as railroad or airplane. Other functions provided by such a terminal include a location for ticket-issuing and baggage checking facilities, along with customer convenience such as restrooms, telephones, postal service, shops and newsstands. The need for such a terminal will arise only when successful integration of a city's transport mode has induced a high volume of traffic which is switching from one mode to another at the points where such transferring is most efficient.

The best examples of intermodal terminals in Europe illustrate this point. In Zurich, Switzerland, for example, the main train station is a transfer point for buses, tram lines, and the federal railroad, with special stands provided

for taxis. Airports in most U.S. cities are also intermodal terminals, with adequate car park space, and provision of waiting space for taxis, limousines, and airport buses. Stations are common in large U.S. cities with both commuter rail service and fixed rail rapid transit service.

Attention in U.S. cities might well be directed to making existing terminals which experience heavy traffic more pleasant and safer, taking advantage of their use as potential information centers for all modes of urban transport in the city, and assuring that they are served by the appropriate public transport modes.

Providing *shelters at bus stops* should be thought of as a means of providing information and good publicity for bus travel, and as a logical extension of provision of route information on bus stops and a good graphic design program. Bus shelters provide ample space for further displays of information on the entire network, and can be sure to improve the system's image by showing consideration for passenger discomfort. They are the ultimate means of "labeling" stops and making them clearly visible over a considerable distance. *Benches at bus stops* are another way of partially achieving these objectives.

**SPECIAL SERVICE VEHICLES.** Park, ride and shop areas would be part of an orientation of the major shopping areas toward the public transit user. Basically, the idea consists of supplying parking lots on the periphery of the CBD or other major area which has restrictive auto parking and use policy. The shoppers can then reach destinations by mini- or midi-buses. "*Package*" buses, similar to those in Hamburg, can tour the area to pick up shoppers' purchases which can be deposited at check-in areas by the parking lot for eventual pickup.

Another special service bus vehicle that may be interesting is the "*Bike-and-Ride*" bus. Bike-and-ride buses are an idea conceived for areas with an excellent year-round climate, like southern California, where bicycles are becoming a popular mode of transportation but where the distances to be covered are very long. These buses would have on-board racks for holding bicycles.

**EQUIPMENT TO SUPPORT OPERATIONS.** *Automatic fare collection* cuts down personnel requirements, is convenient for the passenger, and eliminates the possibility of free riders. Application of automatic fare collection in the

U.S. is questionable at this point in time. First of all, it is not economically justifiable for a flat fare system. This limits its use to those very few U.S. systems operating on a graduated fare structure. Secondly, since the initial investment in equipment is really too great for any one small operation, it does not become economical until there is a sizeable volume of passengers.

Sophisticated *radio and television communications* make it possible to respond more quickly to travelers' demands, to increase safety, and reduce delays. In London, a closed-circuit television system has been installed on the newest subway line and cut down substantially the number of platform personnel.

London Transport is at present also experimenting with radio communication between bus drivers and a route controller. The use of the radio has enabled adjustments to the service, when disrupted, to be made more effectively, and in particular has increased the bus drivers' morale and led to their greater cooperation in maintaining service regularity. It is envisaged that radio control will be extended to a large number of bus services in London, including most of those subject to severe traffic congestion.

POOLING AGREEMENTS. Just as operators can mutually benefit from combining their routes to arrive at a single, coordinated network, they may be able to pool some physical resources to their mutual advantage. Route coordination may well suggest consolidation or sharing of *joint terminal and maintenance facilities*; if more than one company's buses are working out of one facility, cooperative arrangements for *driver or vehicle substitution* between them could prevent sudden breakdowns or driver shortages from halting or delaying service. The feasibility of such arrangements would, of course, depend on the degree of standardization and interchangeability of personnel and equipment.

APPENDIX E  
METROPOLITAN TRANSPORTATION COMMISSION ACT  
ASSEMBLY BILL NO. 363

CHAPTER 891

*An Act to repeal Title 7.1 (commencing with Section 66500) of, and to add Title 7.1 (commencing with Section 66500) to, the Government Code, relating to the Metropolitan Transportation Commission.*

[Approved by Governor September 14, 1970. Filed with  
Secretary of State September 14, 1970.]

*The people of the State of California do enact as follows:*

Section 1. Title 7.1 (commencing with Section 66500) of the Government Code is repealed.

Sec. 2. Title 7.1 (commencing with Section 66500) is added to the Government Code, to read:

TITLE 7.1. METROPOLITAN TRANSPORTATION  
COMMISSION

66500. This title shall be known as the Metropolitan Transportation Commission Act.

66502. There is hereby created the Metropolitan Transportation Commission to provide comprehensive regional transportation planning for the region comprised of the City and County of San Francisco and the Counties of Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano, and Sonoma.

As used in this title, "region" means the region described in this section.

66503.. The commission shall consist of 19 members as follows:

(a) Two members each from the City and County of San Francisco and the Counties of Alameda, Contra Costa, San Mateo, and Santa Clara. With respect to the members from San Francisco, the mayor shall appoint one member and the board of supervisors shall appoint one member. With respect to the members from Alameda, Contra Costa, San Mateo, and Santa Clara Counties, the mayor's selection committee of each county shall appoint one member and the board of supervisors shall appoint one member.

(b) One member each from Marin, Napa, Solano, and Sonoma Counties. The mayor's selection committee of these counties shall furnish to the board of supervisors the names of three nominees and the board of supervisors shall appoint one of the nominees to represent the county.

(c) One representative each appointed by the Association of Bay Area Governments and the San Francisco Bay Conservation and Development Commission.

(d) One representative, who shall be a nonvoting member, appointed by the Secretary for Business and Transportation.

(e) One representative each appointed by the United States Department of Transportation and Department of Housing and Urban Development, provided such representatives shall serve only if the agencies they represent are amenable to such appointments. These representatives shall be nonvoting members.

Public officers, whether elected or appointed, may be appointed and serve as members of the commission during their terms of public office.

66504. The term of office of the members of the commission is four years. The basis for selection of the members shall be their special familiarity with the problems and issues in the field of transportation.

66505. The commission shall appoint an executive director who shall have charge of administering the affairs of the commission, subject to the direction and policies of the commission.

The executive director shall, subject to the approval of the commission, appoint such employees as may be necessary to carry out the functions of the commission.

66505. The commission may:

(a) Accept grants, contributions, and appropriations from any public agency, private foundation, or individual.

(b) Appoint committees from its membership and appoint advisory committees from other interested public and private groups.

(c) Contract for or employ any professional services required by the commission or for the performance of work and services which in its opinion cannot satisfactorily be performed by its officers and employees or by other federal, state, or local governmental agencies.

(d) Do any and all other things necessary to carry out the purposes of this title.

66507. The commission shall assume the planning and related responsibilities of the Bay Area Transportation Study Commission and its interim successor, the Regional Transportation Planning Committee. The files and planning data of the two organizations shall be transferred to the commission.

66508. The commission shall adopt, by June 30, 1973, a regional transportation plan for the region. Prior to the adoption of such a plan, the operation, construction, and modification of those transportation systems under the purview of the commission may be undertaken without the approval of the commission.

66509. In developing the regional transportation plan, the commission shall consider:

(a) The plan recommended by the Bay Area Transportation Study Commission, with such modifications recommended by the Regional Transportation Planning Committee.



(b) The ecological, economic, and social impact of existing and future regional transportation systems upon various facets of the region, including, but not limited to, housing, employment, recreation, environment, land-use policies, and the economically disadvantaged.

(c) The regional plan prepared and adopted by organizations concerned with policies and programs designed to meet the near- and long-term planning needs of the region. Such consideration by the commission shall include, but not be limited to, plans prepared and adopted by the Association of Bay Area Governments, the San Francisco Bay Conservation and Development Commission, and the State Office of Planning.

66510. The regional transportation plan shall include, but not be limited to, the following segments of the regional transportation system:

(a) The national system of interstate and defense highways, the California freeway and expressway system, and other highways within the state highway system.

(b) The transbay bridges.

(c) Mass transit systems.

The commission shall pay particular attention to the interfacing of the various modes of transportation.

66511. The regional transportation plan shall also include an estimate of the regional transportation needs during the ensuing 10 years and a schedule of priorities for the construction, modification, and maintenance of various segments of the regional transportation system on a project basis to meet such needs.

66512. In addition, the regional transportation plan shall include a financial plan for the regional transportation system. The financial plan shall include a proposal for each segment of the system, including the amount and sources of revenues necessary to construct and operate that segment.

In developing the financial plan, the commission shall consider various sources of revenues, without regard to any constraints imposed by law on expenditures from such sources, necessary to assure adequate financing of the system and, if necessary, recommend appropriate legislation to the Legislature to secure such financing.

66513. The regional transportation plan shall be subjected to continuous review by the commission, with revisions prepared as the need may arise. Revisions to the plan shall be adopted annually by the commission.

66514. The construction of any transbay bridge in the region shall not be commenced without the approval of the commission. This section shall not apply to (a) modifications of existing bridges, except modifications which provide for the construction of additional lanes of traffic facilities on existing bridges, or (b) new bridges where, after 1965 but prior to the effective date of this section, the Legislature has provided funds for preliminary work leading to the issuance of revenue bonds under the provisions of the California Toll Bridge Authority Act for the construction thereof.

66515. No public multicounty transit system using an exclusive right-of-way which is proposed to be constructed within the region on or after the effective date of this section shall be constructed or operated without the approval of the commission.

66516. Notwithstanding any other provision of this title, the San Francisco Bay Area Rapid transit District may plan, acquire, construct, and operate any and all works, structures, properties, rolling stocks, or other facilities of any kind which the district is authorized, prior to the adoption of the regional transportation plan required by Section 66508, to acquire, construct, or operate.

66517. The commission shall render all available assistance to transit systems operated within the region by any city or public agency to ensure adequate feeder service to public multicounty transit systems.

66518. When allocating funds for construction on the state highway system within the region, the California Highway Commission shall conform to the regional transportation plan and the schedule of priorities for such construction included therein. The California Highway Commission, however, may deviate from the regional transportation plan and the schedule of priorities established for construction on the interstate system and the state highway system within the region because of an overriding statewide interest.

66519. The commission shall study the role of harbors and airports within the region as they relate to surface transportation, and shall determine by June 30, 1973, their function in the regional transportation system as they relate to surface transportation.

The commission shall submit its findings and recommendations in a report to the Legislature by the fifth calendar day of the 1974 Regular Session of the Legislature.

66520. Any application to the federal or state government for any grant of money, whether an outright or a matching grant, by any county, city and county, city, or transportation district within the region shall, if it contains a transportation element, first be submitted to the commission for review as to its compatibility with the regional transportation plan. The commission shall approve and forward only those applications that are compatible with the plan.

Review by the commission, however, is not required where revenues derived from the Motor Vehicle Fuel License Tax Law are subvented to local governmental entities in accordance with statutory provisions.

66521. (a) It is the intention of the Legislature that the federal government, the state, and local agencies in the region will participate in support of the commission. The Legislature further intends that financial support of the activities of the commission will be made available from federal, state, and local sources which would normally be available for transportation and general planning purposes in the region.

(b) The commission and the Business and Transportation Agency shall negotiate contracts or agreements whereby federal-aid highway funds available for planning, and the necessary state matching funds from the State Highway Fund, may be made available for support of the activities of the commission insofar as they relate to highway, road, and street planning for the region.

(c) The commission shall also negotiate, either directly or through the State Office of Planning or other appropriate agency, with the United States Department of Housing and Urban Development for grants or contributions of federal funds which may be available to support the study and planning activities of the commission.

(d) The commission shall negotiate equitable agreements with the City and County of San Francisco, and other counties and cities within the region, the Association of Bay Area Governments, the San Francisco Bay Area Rapid Transit District, the Alameda-Contra Costa Transit District, and the Golden Gate Bridge and Highway District for the contribution of funds or services for the general support of the activities of the commission and for such required matching of federal funds as may be made available. Any county, city and county, or city may use its apportionments from the Motor Vehicle License Fee Fund for these purposes.

66522. The commission shall merge with or otherwise join any multi-functional regional government organization, if it has transportation planning responsibilities, within one year of the creation of such an organization.