

1970

# Tampa Bay Mass Transit: Planning for Tomorrow

TRW Systems Group

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tampa bay mass transit: **planning for tomorrow**

tampa bay regional planning council

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1970

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# TAMPA BAY MASS TRANSIT: PLANNING FOR TOMORROW

SUMMARY REPORT

Prepared for the  
Tampa Bay Regional Planning Council

April, 1970

The preparation of this report was financially aided through a Federal Grant from the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

by

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Summary Report

AUTHOR: Tampa Bay Regional Planning Council  
Consultant: TRW Systems Group

SUBJECT: o Analysis of Future Potential  
o Design of Study Program for Evaluating, Selecting,  
and Implementing Future Systems

DATE: April, 1970

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## ABSTRACT

The mass transit study described in this report was undertaken for the primary purpose of defining the "transit potential" of the Tampa Bay Region and constructing a Mass Transit Study Program to incrementally improve present transit service and to evaluate, select, and implement a new TBR transit system which will serve as one component of a balanced ground transportation system.

In the Transit Potential Study, several indicators of future need for mass transit were examined. In addition, a simplified rapid transit model was manipulated to determine the necessary conditions for implementing a successful regional rapid transit system in the 1980's.

The analyses indicate that, if development continues according to current trends, financial and planning aid to the transit operations will be necessary to improve transit service to the point where it can tap the substantial potential ridership that does exist in the Region. Implementation of a rapid transit system in the Region will hinge upon both public aid and also upon changes in development trends, towards higher density development and towards a highway system that would be complementary to rather than in competition with a new system.

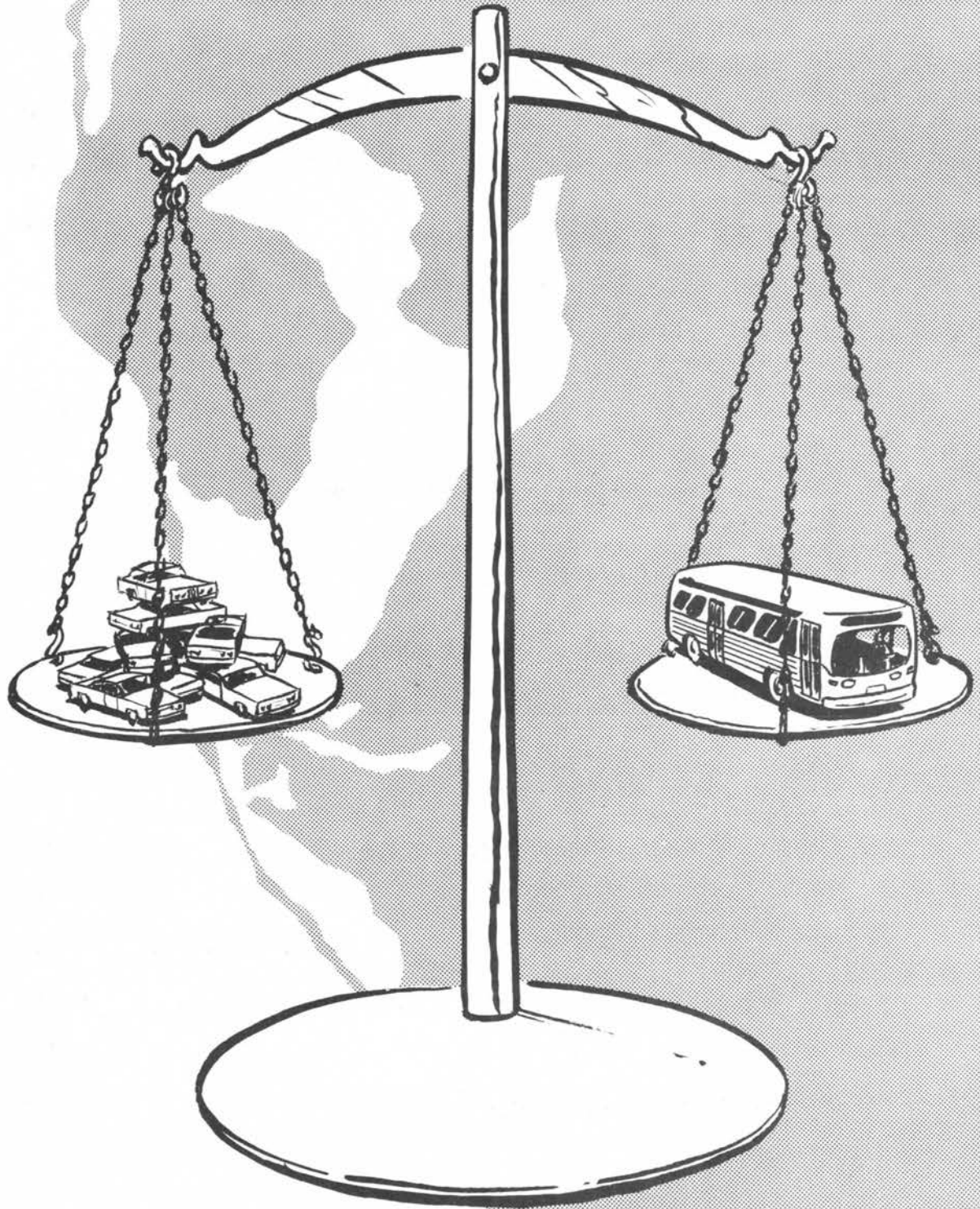
The Mass Transit Study Plan spans a 12-year period, with the first four years devoted solely to incrementally improving present service and to general planning for new transit systems. During the next four years, detailed planning and land acquisition will proceed on high priority links, while general planning continues on links which will support service at a more distant time. Demonstration projects, if appropriate, will be implemented in this and the next four-year period. The final four-year period will see the construction and implementation of the first complete stages of the selected systems (building upon demonstration projects already established), and continued general and detailed planning for future expansion of the system.





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## I. INTRODUCTION

In the past several decades, a series of complex and interrelated factors--the growth of the suburbs, the decline of central cities, the enormous extension of highway facilities, the advent of the five-day work week, and others--culminated in a severe decline in the fortunes of urban mass transit in America's cities. Americans stopped riding trolleys, trains, and buses and started driving automobiles. Faced with declining patronage, a lack of capital, and increased costs, transit operators were forced to cut back service which, in turn, led to an accelerating cycle of decreased patronage and still poorer service in many areas.

This phenomenon was understandable from a market standpoint; in most cases, the automobile had proved to be a more attractive means of transportation to the traveler than the competing transit services. However, the decline of transit has necessarily created hardships for certain groups in particular and society in general. In many American cities, the emissions from automobile engines have become the single greatest contributor to air pollution. Because of declining transit service, people who do not have access to automobiles--the urban poor, the handicapped, the young and the very old--are faced with severe restrictions on their mobility, and therefore on their economic, cultural, and recreational opportunities. Freeways have gouged out huge chunks of urban landscape, often rendering homeless those groups who can least afford the dislocation.

In recent years, there has arisen a substantial movement dedicated to reversing the trend to an automobile-dominated transportation system and reviving the fortunes of public transit. Although proposals for completely eliminating private automobile travel in all central cities (and substituting vast mass transit systems in their stead) have not been unknown, a more reasoned goal is required in light of present and future realities.

In a low density urban area such as the Tampa Bay Region, an excellent starting point for examining future regional transit requirements is the concept of a balanced ground transportation system. Such a concept, while accepting the major role of automobile travel, still recognizes the need for major transit facilities to both moderate the level of auto use and also to provide good mobility to the "captive transit riders" described above. Present transit facilities in the Region neither fulfill the needs of the captive riders nor exercise any appreciable influence on the level of automobile travel. Since the forecasted population growth of the Region shows a 140-percent increase from 1968 to 1985 ... to a total population of 3.1 million persons by 1985 ... it may be expected that the transportation needs of the Region will become significantly more severe in the near future. The Tampa Bay Regional Planning Council proposes to initiate a mass transit study program to evaluate and fulfill the Region's future need for mass transit.

The study summarized in this report examined the potential role of mass transit in the Tampa Bay Region in light of regional goals and objectives and the anticipated regional growth in the next decade and a half. Using the insight gained from this Transit Potential Study, the program, framework, and specific tasks and activities required for the preparation of a mass transit plan and implementation of a mass transit system were developed. This work was undertaken for the Planning Council's 1969 Work Program with the help of funds from the Federal Urban Planning Assistance Program.

## **II. TRANSIT POTENTIAL STUDY**

- **FINDINGS**

- **SOME SALIENT FEATURES**

## FINDINGS

1. There is a substantial potential transit ridership in the Tampa Bay Region.

2. Any significant improvement in local and regional bus service in the Region will require stimulation by financial and planning assistance\* and/or important changes in development patterns.

3. Improvement in service will offer the substantial group of "captive riders" an important benefit in the form of increased mobility and is therefore worthwhile from other than a purely traffic-oriented viewpoint.

4. Future automobile traffic problems, such as highway congestion and lack of parking facilities, can be largely avoided by an extensive road-building program\*\* and enactment of parking supply legislation (such as requiring builders of new office buildings in densely settled locations to provide minimum levels of multi-story parking).

5. However, the actions mentioned in finding 4 above will make it likely that any form of rapid transit system (or any significant extension of present transit service) will be highly dependent on public subsidy and will also be substantially under-utilized. To maximize patronage on future systems, it will be helpful to foster:

- a. fast and convenient service;
- b. higher density development in the system's service area;
- c. moderated competition from the automobile;

---

\*The Tampa Bay Regional Planning Council and local planning agencies are already providing some assistance of this type.

\*\*The Tampa Bay Region Major Highway Study forecasts the 1985 regional requirement to be an 872-million-dollar network of fully- and partially-controlled-access highways.

d. operation of all modes of travel--automobile, local bus, rapid transit--as an integrated system, with carefully coordinated interfaces between modes.

Under most conceivable circumstances, high volume CBD-oriented rapid transit systems will not be practical for the Region in the foreseeable future.

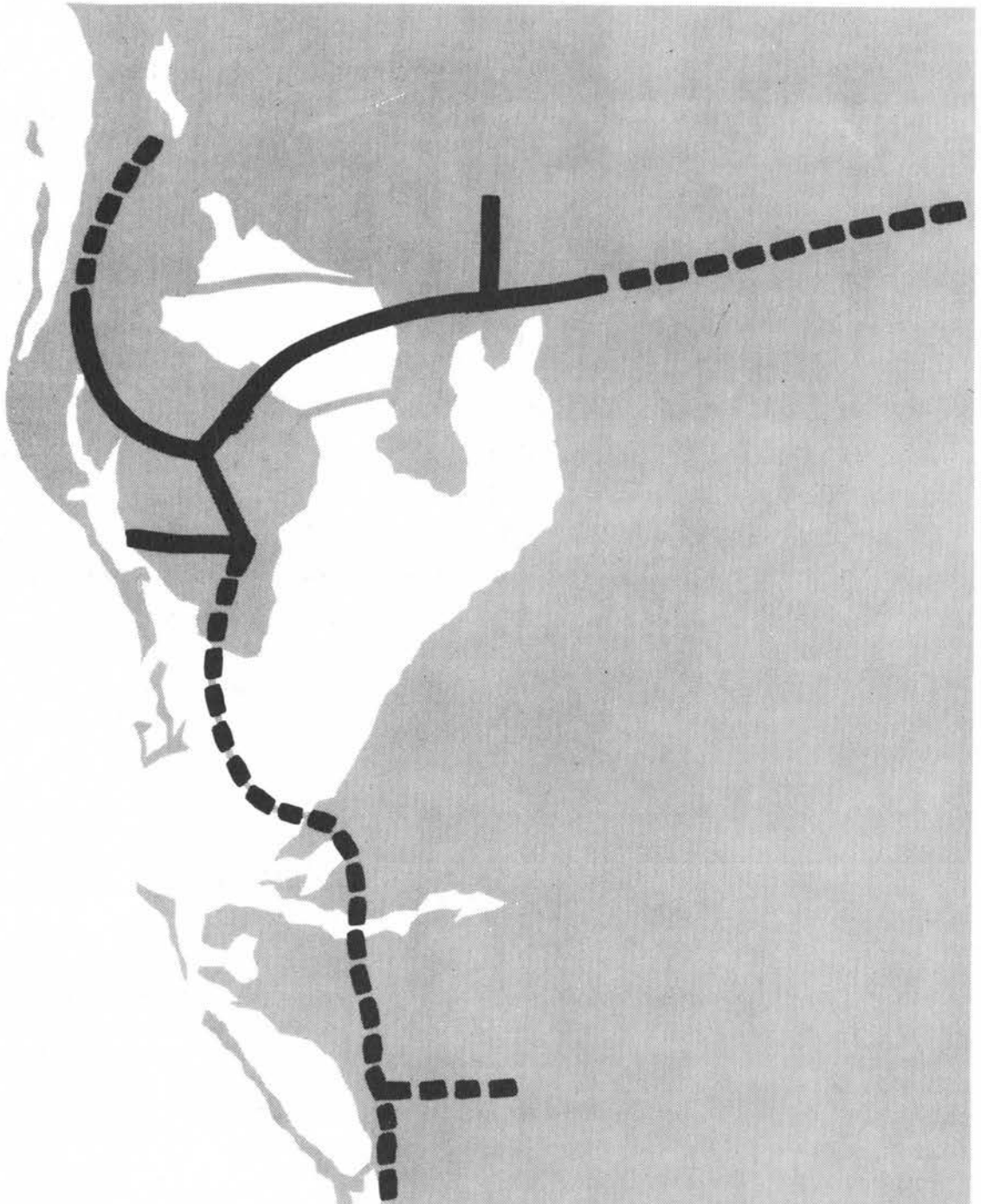
6. The possible conflicts between the provision of an efficient transit service and an extensive highway network make it imperative that the Tampa Bay Regional Planning Council carry out the recommended Mass Transit Study Program and Development Planning for a balanced transportation system which combines an adequate mix of travel modes and provides a high level of mobility to all citizens of the Region.

## **SOME SALIENT FEATURES**


The following pages highlight some topics discussed in detail in the Technical Report of this study:

- o identification of transit corridors;
- o parking;
- o conditions for CBD-oriented rail rapid transit;
- o rapid transit model.





**TRANSIT  
POTENTIAL CORRIDORS  
1985**

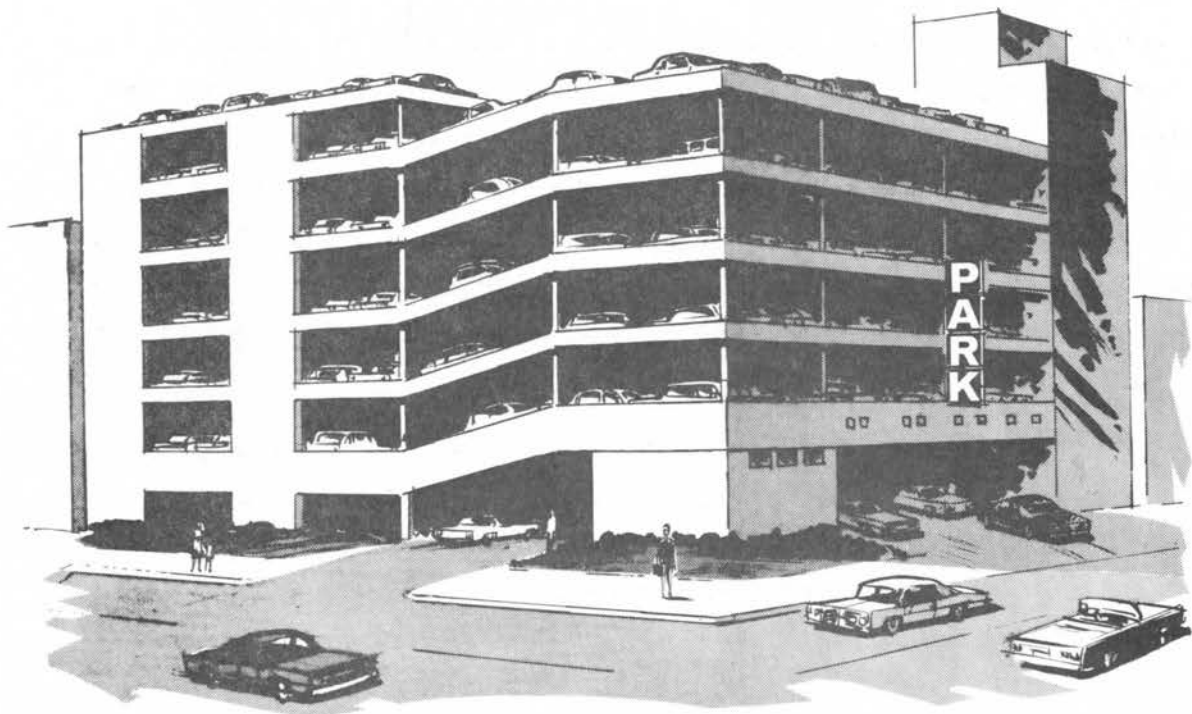
●●● denotes corridors which will develop at a later date than those represented by 

The preparation of this figure was financially aided through a Federal Grant from the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

### Transit Corridors

Certain variables are good indicators of the need for transit service and the percentage of travelers who will use transit. For example, the population density of those under 17 or over 65 years of age, and the number of automobiles compared to the number of adults, are measures of the presence of "captive riders" who depend on transit for mobility. High residential density and employment density indicate a high concentration of potential transit customers and therefore a high potential for transit service.

Forecasts of land use, population, and economic activity developed by the Tampa Bay Regional Planning Council provide estimates of the magnitude and distribution of these variables for the year 1985. These estimates were used to define "transit potential corridors," i.e., corridors which may support substantial transit services by 1985. These corridors are illustrated at the left. The Clearwater-St. Petersburg-Tampa corridor (solid black lines) will support substantial regional service at an earlier date than will other corridors in the Region (marked in broken lines).



## Parking

When parking demand is high, parking prices will tend to rise. Since parking costs are highly "visible" to the traveler, they influence his choice of transportation mode. High parking demand also leads to multi-story parking, street congestion ... and therefore increased travel time by car. Travel time, like parking cost, has also been shown to influence the traveler's mode choice.

Conclusion: Very high parking demand can significantly enhance transit's attractiveness to the traveler.

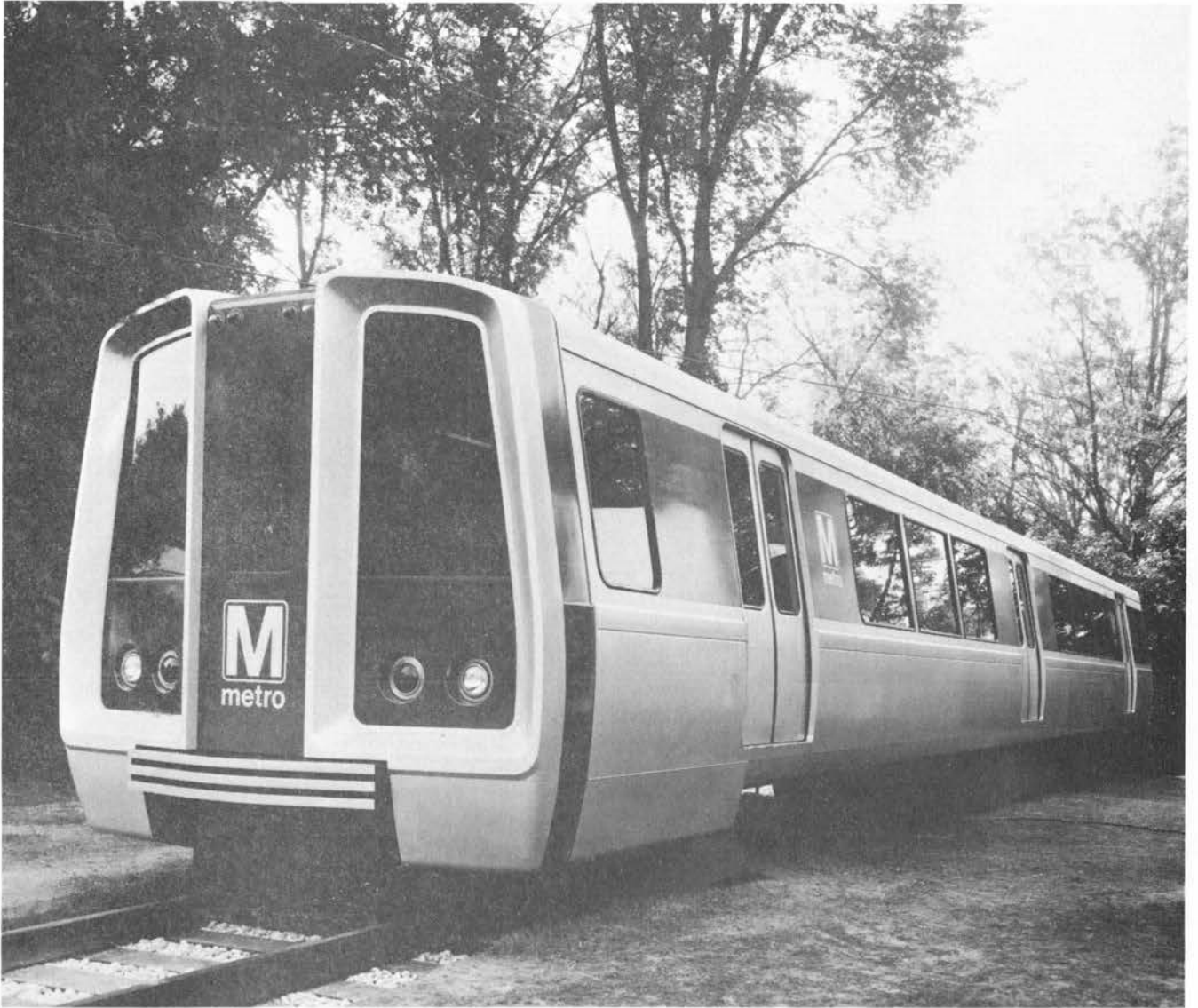
Future parking problem areas were identified by observing the projected 1985 traffic flow into the Region's central business districts. THE 1985 FORECASTS INDICATE A NEED FOR MULTI-STORY GARAGES IN THE TAMPA AND ST. PETERSBURG CBD'S TO PROVIDE PARKING FLOOR AREAS EQUAL TO HALF THE TOTAL LAND AREAS OF THESE DISTRICTS. THIS REQUIREMENT IS NOT EXTREMELY HIGH WHEN COMPARED TO THE REQUIREMENTS OF OTHER URBAN AREAS\* OUTSIDE THE REGION.

---

\*e.g.: Miami Central Business District

1985 Parking Requirement: 12-15 Million Square Feet

CBD Area: 7 Million Square Feet.



## Conditions for CBD-Oriented Rail Rapid Transit

A preliminary estimate of a city's need for a CBD-oriented rail system can be made by inspecting such factors as:

- o urban area population;
- o central city population;
- o central city population density;
- o high density corridor development;
- o trips to the CBD (per acre);
- o peak hour trips leaving the CBD using "traffic corridors";
- o CBD function --- is it regionally oriented?

These factors were calculated using forecasts of population growth and traffic for 1985. St. Petersburg fulfilled some of the minimum criteria\*:

- o urban area population greater than 1,000,000;
- o central city population greater than 500,000;
- o daily trips to the CBD greater than 240 per acre.

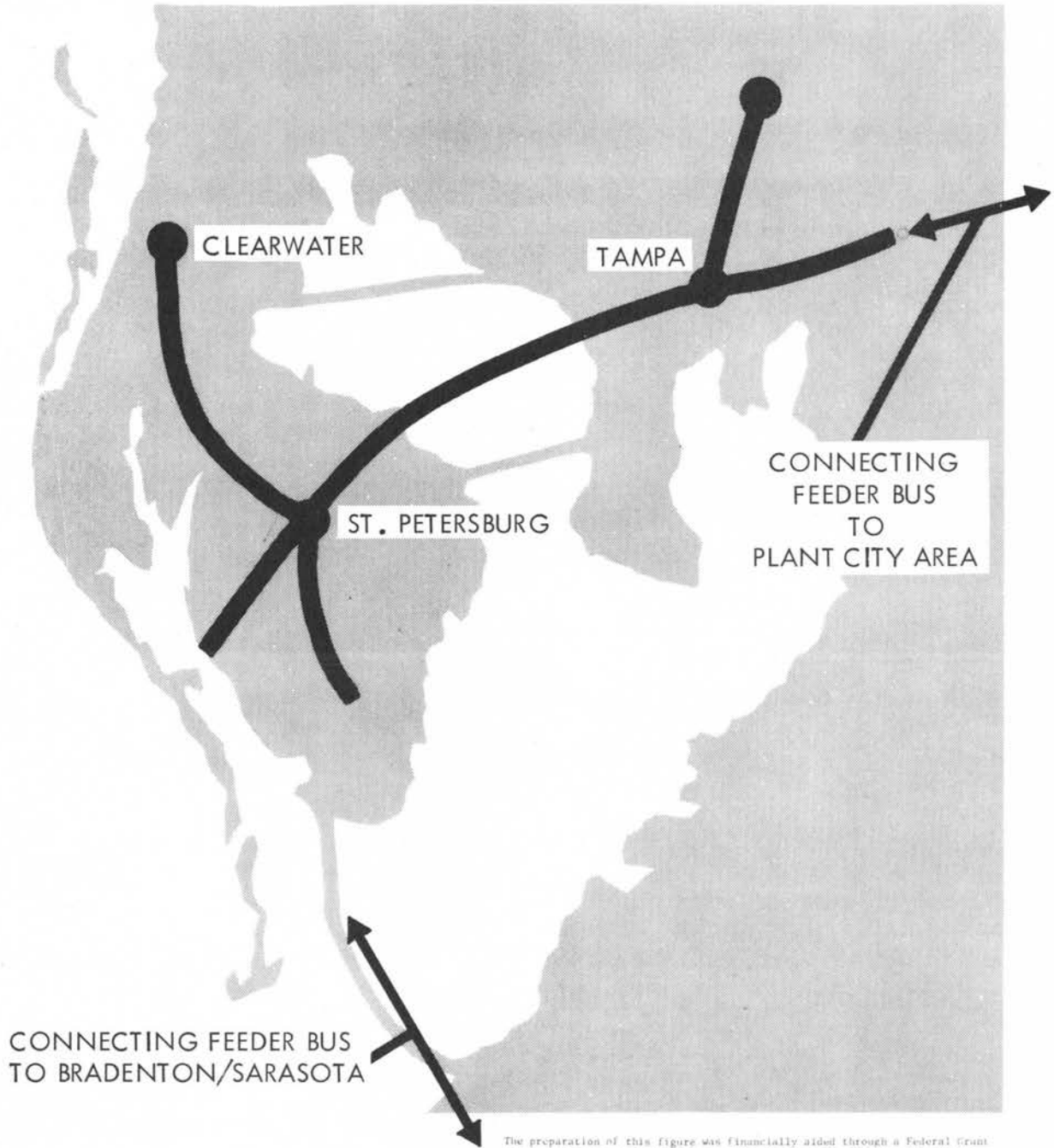
Tampa met only the criterion for daily trips to the CBD.

Conclusion: HIGH VOLUME CBD-ORIENTED RAIL SYSTEMS SHOULD NOT BE NECESSARY FOR THE CITIES OF THE TAMPA BAY REGION IN THE NEXT DECADE AND A HALF.

This conclusion does not negate the possibilities for a regionally-oriented transit system or for low-volume CBD-oriented "rapid-transit" systems (such as buses on exclusive highways).

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\*Adapted from "Transportation Planning" by Wilbur S. Smith, in the ASCE Urban Planning Guide.



The preparation of this figure was financially aided through a Federal Grant from the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

## RAPID TRANSIT NETWORK

### Rapid Transit Model

A rapid transit model was constructed to estimate the potential ridership and cost/revenue balance of a hypothetical Tampa Bay Regional Rapid Transit System. The system, illustrated on the opposing page, is restricted to the Clearwater-Tampa-St. Petersburg corridors for the purposes of the analysis, but could serve the entire Region through use of express feeder buses and be extended when continuing development reaches suitable magnitudes.

The analysis examined the effects of different Regional development and transportation policies. The following policies and system characteristics are necessary to insure maximum patronage on the system:

1. The system must be high speed and must not be affected by highway congestion on the "rapid" portion of the trip.
2. Transit service frequency must be high for maximum convenience.
3. Feeder bus service must be extremely efficient.
4. High density development must be encouraged near the terminals, especially at the business (and/or shopping, etc.) end of the trip.
5. Construction of competing automobile expressways must be kept at a moderate level, and parking prices should be allowed to rise in a competitive market.

The analysis indicates that public subsidies will probably be necessary for rapid transit operation. A decision on whether to build such a system must then depend on a careful analysis of the various benefits which rapid transit might bring to the Region: decreased requirements for new roads and parking facilities, greater mobility for the Region's "captive transit riders," greater safety for travelers, stimulation of development, etc. The Mass Transit Study Plan which follows provides the machinery for arriving at such a decision.



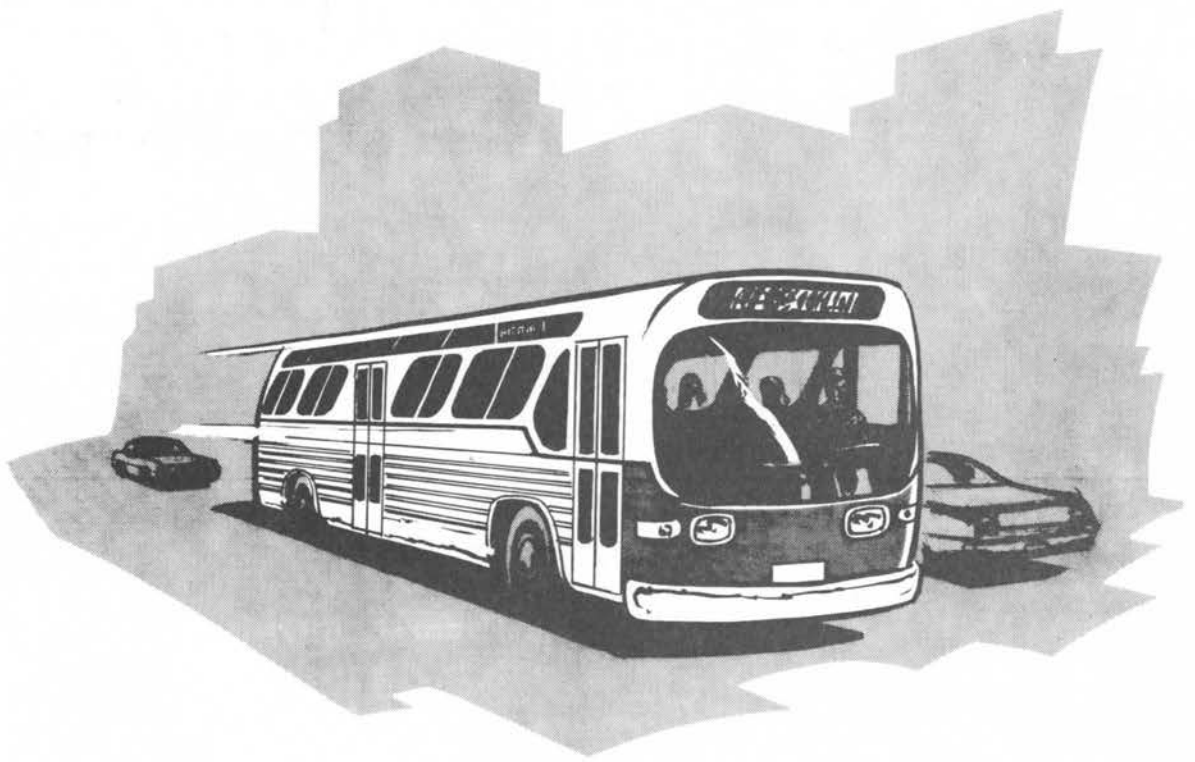


### III. MASS TRANSIT STUDY PLAN

RECOMMENDATION: THAT THE TAMPA BAY REGIONAL PLANNING COUNCIL UNDERTAKE A MASS TRANSIT STUDY PLAN IN ORDER TO EXAMINE THE TRANSPORTATION ALTERNATIVES AVAILABLE TO THE TAMPA BAY REGION AND TO SELECT AND IMPLEMENT A TRANSPORTATION PLAN WHICH BEST FULFILLS THE REGION'S GOALS AND OBJECTIVES.

The Study Plan consists of two major programs:

- o a short-term program to improve the level of existing transit service;
- o a long-range program to select and design a future transit system to serve as one component of a balanced regional transportation system.



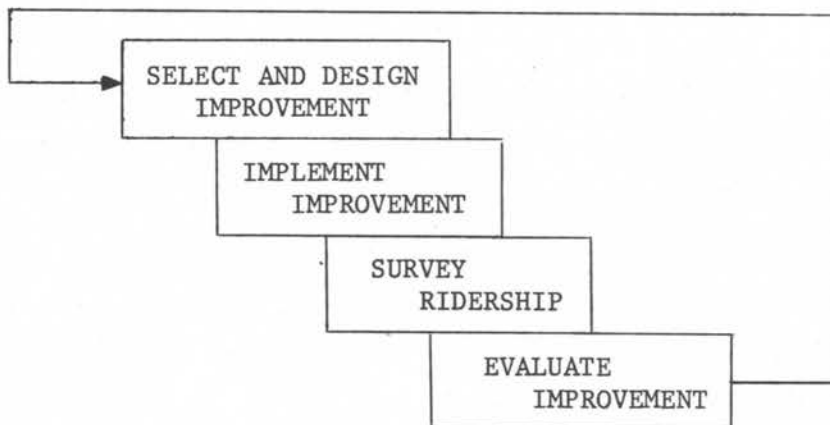
## SHORT-TERM PROGRAM

### Objective

The short-term program has a dual objective: first, to give the Region's "captive riders"--the young and old, the poor, the handicapped-- a degree of mobility they do not have today; and second, to give those who can drive a choice of transportation modes.

### Approach

Each contemplated improvement will be enacted in a four-part cycle:



The key to the success of the program is the judicious use of transit surveys which can accurately gauge the success of each improvement and point the way to further refinements or entirely new improvements.

## Areas of Improvement

Three major areas of improvement are presently contemplated:

### 1. Regional service:

The Tampa Bay Regional Planning Council Report, Rail, Bus, and Other Carriers in the Tampa Bay Region, notes that "service between and within the communities of the Region is fragmented and ... (provides) little opportunity for intra-regional movement."

The Study Plan therefore calls for:

a. coordination of facilities and services between long-haul operations such as Greyhound and the local bus operations providing intra-urban services, and

b. negotiating local bus service across existing jurisdictions such that more effective service between and within the four counties of the Tampa Bay Region may be achieved.

### 2. New technology and types of service:

This task is the exploration of the role that new transportation technology and new services might play in providing improved local and regional service. Study areas will include:

- o increased safety;
- o reduction of environmental effect of transit;
- o increased comfort/usability for older people;
- o demand-responsive systems;
- o special services such as recreation or shopping buses for retirement communities.

### 3. Expansion of routes:

The rapid pace of development in the Region will continually provide new opportunities for expanding present transit routes or creating new ones. This task provides for the identification of new transit routes and services in the Region using the results of the Transit Potential Study and the continuing flow of information on new

and changing development trends. New transit trip generation areas, i.e., areas where the socio-economic characteristics of the populace indicate that a need for transit exists and where transit service is presently not adequate, will be identified.

### Financing

Implementation of the above improvements in present transit service will require the provision of financial assistance to the local transit operators. Therefore, the success of the short-term program will depend upon the success of searching for and obtaining new sources of funds for transit improvements. The technical report of this study discusses some appropriate sources of planning and demonstration funds and the means to obtain them. The success of fund proposals is apparently dependent upon:

- o demonstration of need;
- o applicability of project to problems of other urban areas;
- o originality/uniqueness of project.

One task of the program will therefore be a vigorous effort to identify and compete for new funds.



## LONG-RANGE PROGRAM

### Objective

As the Tampa Bay Region continues to develop, there will be an increasing need for new transportation facilities to satisfy the accompanying growth in tripmaking. For example, the Major Highway Study predicts a fourfold increase in traffic between St. Petersburg and Tampa by 1985.

The objective of the long-range program is to provide a regional transit system consistent with the long-term goals, aspirations and growth of the Tampa Bay Region. The system should provide a choice of travel modes which will both reflect the true cost of travel to the tripmaker and to the Region and also provide adequate mobility to all of the Region's citizens.

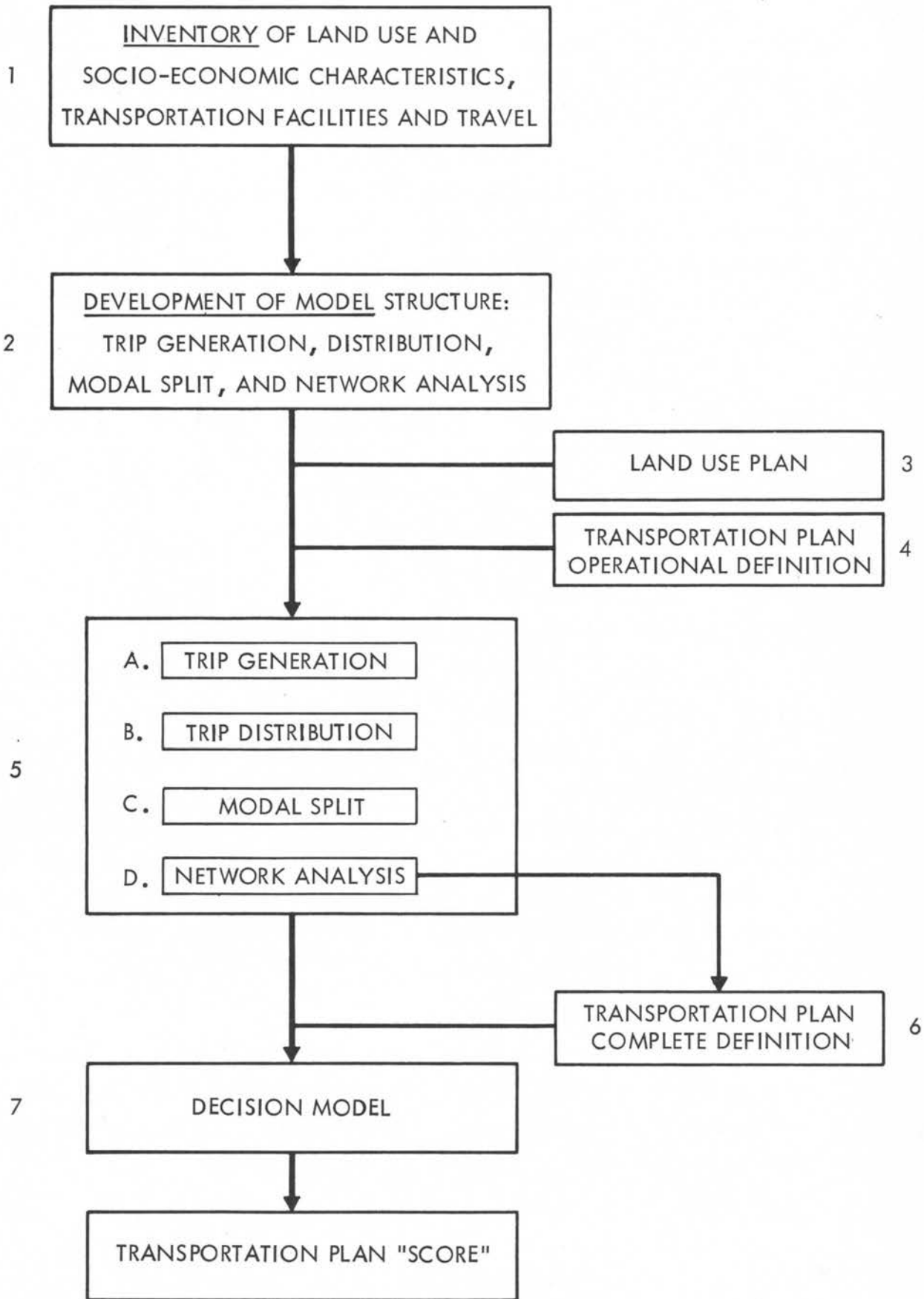
### Approach

The program is divided into three phases, each approximately four years in duration. In the first phase, which is discussed in more detail, general planning is done which results in the selection and preliminary design of the regional system. The preliminary design includes the identification of routes and approximate terminal locations, the system operational concept, demand forecasts and consequent desirable hardware characteristics, and a determination of funding requirements and possibilities of assistance. Feasible demonstration projects will be designed for early implementation and evaluation to prove out system concepts and maintain public interest.

In the second phase, detailed construction drawings are prepared, funding is secured and right-of-way and other long-lead time acquisitions accomplished for "high-priority" links; general planning continues for lower priority corridors.

In the third phase, the guideway is constructed, vehicles are acquired, and preliminary testing of the system commences (for high-priority links). General planning, detailed design, and land acquisition continue for lower priority links.





## General Planning/System Selection

The flow diagram on the opposing page illustrates the basic system selection process. In the figure, one transportation plan is evaluated in the context of one "possible future" of the Region. The process is repeated for several alternative transportation plans and possibly for several land use plans (in order to gauge the ability of each plan to operate successfully in a variety of environments and to avoid a plan which is too dependent on an exact progression of events in the development of the Region).

In this approach, the transit system cannot be considered separately from the highway system because the two compete with and influence each other.

The various components (tasks) of the planning process are as follows:

### 1. Inventory

The first step of the process involves taking an inventory of the following:

- a. The "state of the region" in terms of land use, population densities, income levels, etc.
- b. The "state of the transportation system" in terms of travel times, parking costs, tolls, etc.
- c. A "traffic picture" of the transportation network (both total flows and survey data of origins and destinations).

### 2. Model Development

Using this base year data, a statistical model is developed which calculates the "traffic picture" when given as input data the "state of the region" and the "state of the transportation system."

### 3. Land Use Plan (or Forecast)

The future "state of the region" is then either defined (according to a Regional Development Plan which visualizes a future desirable to the planner) or forecast according to current trends of development.

#### 4. Transportation Plan

Using preliminary transportation studies as a guide, several alternative transportation systems for the target year are operationally defined (i.e., fares, schedules, routes, etc., are specified).

#### 5. Model Implementation

The variables generated by the land use forecasting (3) and transportation system planning (4) tasks are input to the traffic model. The four subtasks of this task are:

##### a. Trip Generation:

- o calculates the number of trips made in each area of the Region ("trip productions");
- o calculates a relative measure of the trip attracting powers of each area ("trip attractions").

b. Trip Distribution - "distributes" trips so that each trip has an origin and a destination.

c. Modal Split - "splits" the trips into their different travel modes (transit, automobile, etc.).

d. Network Analysis - assigns the trips to precise routes so that capacity requirements of each branch of the transportation network can be determined.

#### 6. Transportation Plan Definition

A further definition of the transportation plan is then necessary for final evaluation. This definition includes:

a. preliminary definition of hardware;

b. system costs (using hardware definition and results of traffic analyses);

c. impact on urban environment --- noise, pollution, disruption of neighborhoods, etc.

## 7. Decision Model

The results of tasks 5(d) and 6 will then be input into an evaluation (decision) model which will assign a score to the transportation plan under consideration.

Repetition of this process utilizing various land use and transportation plans will continue until a transportation plan emerges which best satisfies regional goals and objectives under a reasonable range of possible futures.



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