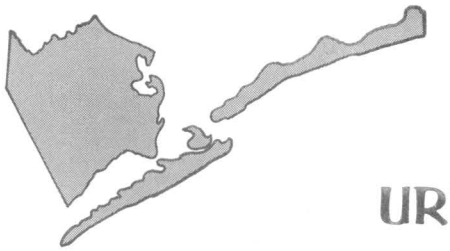
Volume 3

GALVESTON COUNTY TRANSPORTATION PLAN

TRANSPORTATION FACILITIES · TERMINAL & TRANSFER FACILITIES
TRAFFIC CONTROL FEATURES · TRAVEL PATTERNS
FINANCIAL RESOURCES · RECOMMENDED THOROUGHFARE & EXPRESSWAY PLAN
RECOMMENDED PROGRAM OF DEVELOPMENT · RECOMMENDED PROGRAM FOR CONTINUATION

1964 - 1985



GALVESTON COUNTY URBAN TRANSPORTATION STUDY

January, 1970

STUDY DIRECTOR
Oliver F. Stork
Urban Planning Engineer
and
STUDY OFFICE STAFF
TEXAS HIGHWAY DEPARTMENT
P. O. Box 187
Houston, Texas 77001
Phone: 869-3211
Area Code 713

Volume 3 Report
Summary Series

City and County Officials
of Galveston County and Other
Interested Groups and Individuals

Because of your interest in the continued development of an adequate transportation system for Galveston County and because of your interest in earlier reports concerning the above transportation study, a copy of the subject report is transmitted herewith.

The report is the last in this series and contains the study elements not previously covered in the series as well as the recommended plan and program for development for the street and highway system to the year 1985. The report also contains recommendations for continuation of the planning process which will insure coordination with and allowance for unforeseen developments through periodic updating in implementing those portions of the plan thus affected.

It is hoped that you will find this report worthy of your attention. Your comments and continued interest and support will be appreciated.

Yours very truly,

Oliver F. Stork, P. E.

OFS:ebk

Sponsored by Galveston County, the Cities of Galveston County, and the Texas Highway Department in cooperation with the U. S. Bureau of Public Roads

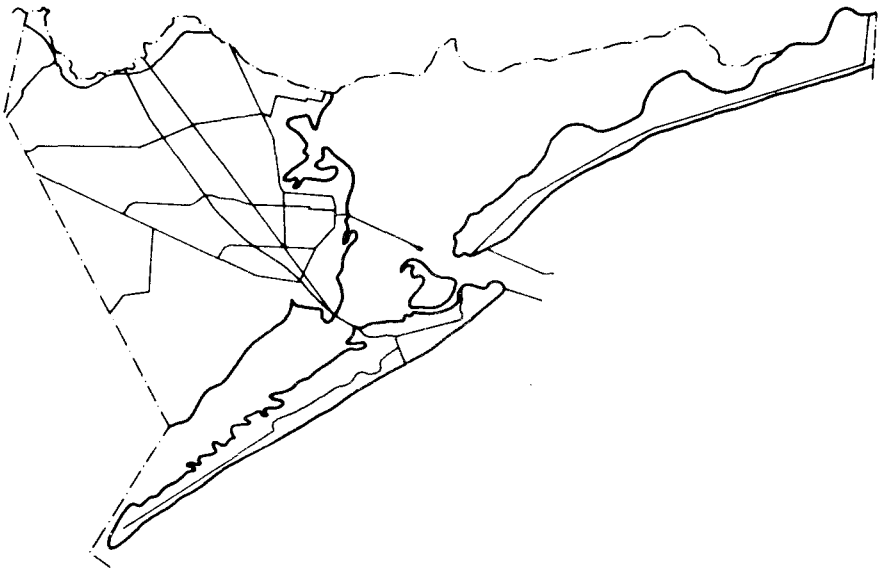
PREPARED BY

GALVESTON COUNTY URBAN TRANSPORTATION STUDY OFFICE

P.O. BOX 187 HOUSTON, TEXAS 77001

1968 - 1969

GALVESTON COUNTY TRANSPORTATION PLAN



Volume 3

Transportation Facilities
Terminal & Transfer Facilities · Traffic Control Features
Travel Patterns · Financial Resources
Recommended Thoroughfare & Expressway Plan
Recommended Program Of Development
Recommended Program For Continuation

1964 - 1985

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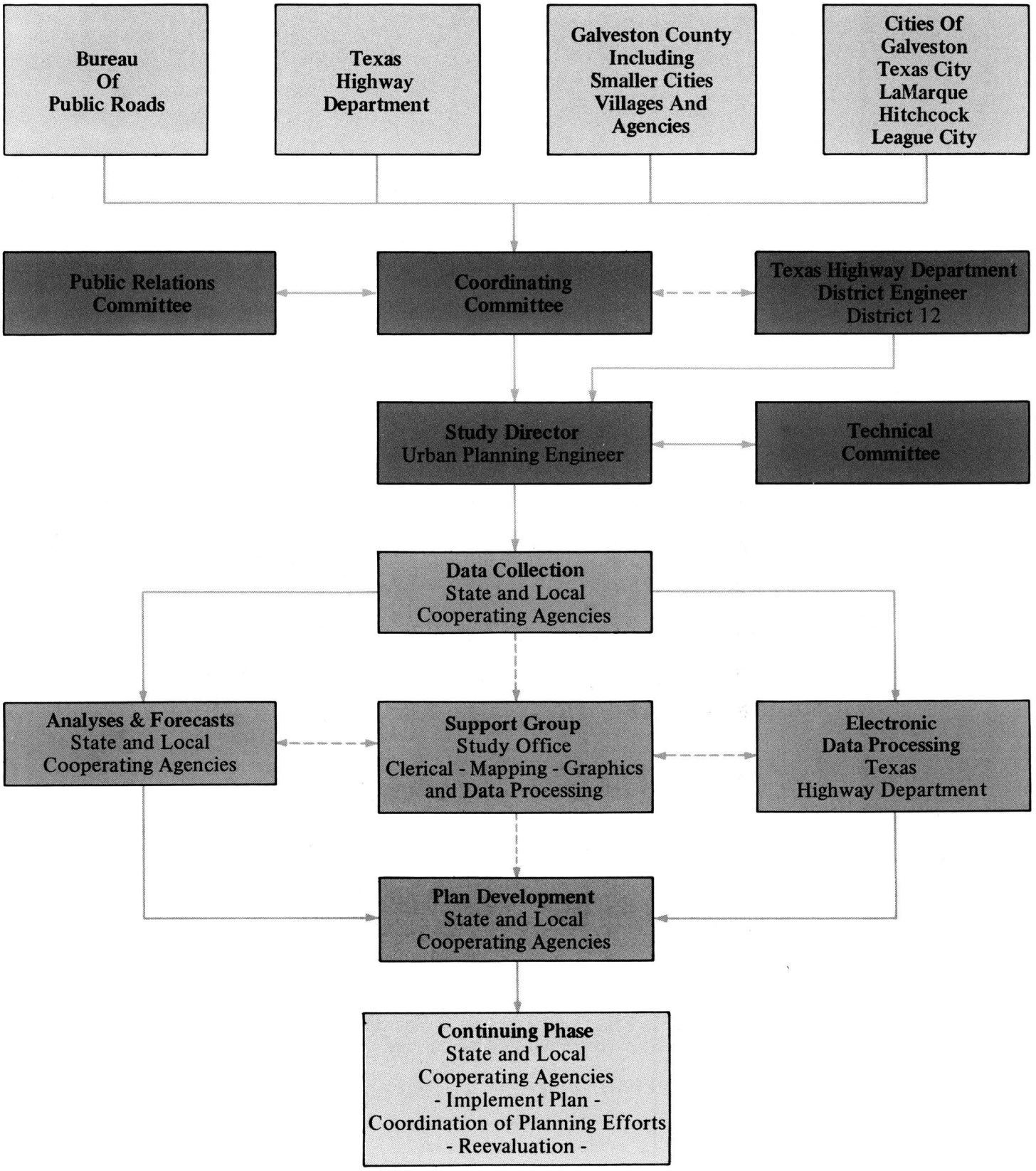
GALVESTON COUNTY URBAN TRANSPORTATION STUDY



Study Organization List

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City of League City

James L. Baker *
District Designing Engineer
Texas Highway Department
Houston

Henry M. Bremer *
Planning and Research Engineer
Bureau of Public Roads
Austin

Lloyd Campbell *
City Engineer-Planner
City of Texas City

E. Dean Carlson
Planning and Research Engineer
Bureau of Public Roads
Austin

Jose J. Correa*
Supervising Designing Engineer
Texas Highway Department
Houston

Clive C. Curry
Director of Public Works
City of Texas City

Pete Delesandri *
Commissioner
City of Hitchcock

Walter F. Frey
Engineer of Urban Planning (D-8)
Texas Highway Department
Austin

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City of LaMarque

Paul Hopkins
Commissioner, Precinct No. 3
County of Galveston

Joe N. Impey *
Director of Planning and Traffic
City of Galveston

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Supervising Resident Engineer
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Richard J. Kabat
Supervising Designing Engineer
Texas Highway Department
Houston

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Director of Public Works
City of Texas City

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Director of Traffic
City of Galveston

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Texas Highway Department
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Director of Public Works
City of Hitchcock

Virgil D. Schultz *
County Engineer
County of Galveston

Wayne Sherrell *
Director of Traffic
City of Galveston

Roger Williams *
Mayor
City of Hitchcock

Wilson Windle*
Director of Public Works
City of Texas City

J.E. Wright
Director
Planning Survey Division (D-10)
Texas Highway Department
Austin

*No Longer Serving

Study Director
Oliver F. Stork
Urban Planning Engineer

TECHNICAL COMMITTEE

Tom L. Alford
Planning Engineer (D-8)
Texas Highway Department
Austin

Bob Blair **
Engineering Representative
City of League City

R. E. Bowen
President
Galveston Transit Company
Galveston

Jose J. Correa *
Supervising Designing Engineer
Texas Highway Department
Houston

Kenneth G. Crawford
Traffic Manager (D-10T)
Texas Highway Department
Austin

William N. Dale
Chief, Airports Branch
Federal Aviation Administration
Houston

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Director of Public Works
City of LaMarque

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County Engineer
County of Galveston

Owen Holzheuser
Director of Public Works
City of Galveston

James W. Horton
County Road Administrator
County of Galveston

Jack L. Housworth *
Senior Planning Engineer (D-8)
Texas Highway Department
Austin

Andrew D. Jones *
Supervising Planning Engineer (D-8)
Texas Highway Department
Austin

Richard J. Kabat
Supervising Designing Engineer
Texas HIghway Department
Houston

T. Spence Love, P.E.
Engineering Representative
City of League City

John R. Pinkston
Senior Resident Engineer
Texas Highway Department
LaMarque

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Representative
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County Engineer
County of Galveston

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Planning Director
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Houston

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Preface

The Galveston County Urban Transportation Study initiated early in 1964, is being conducted by the Texas Highway Department in cooperation with Galveston County, the various cities in the county, and the Bureau of Public Roads of the Federal Highway Administration of the U. S. Department of Transportation. The study is in accordance with the Federal Aid Highway Act of 1962 which required, as a condition for receiving Federal Aid, a comprehensive, cooperatively developed, and continuing transportation planning process in this and other urbanized areas.

This volume is the third of a series of three summary-type publications that have been prepared for release to provide information concerning the purpose for and the procedures followed in developing a recommended long-range transportation plan for Galveston County.

Volume 1, released in February, 1966, contained basic statistical data obtained from the Origin-Destination Survey conducted in 1964. It revealed, for the first time, the complexity of the average weekday highway and street traffic movements and travel characteristics, by the various modes, of residents of the Galveston County Study Area. Volume 2, released in June, 1967, presented a discussion of five of the ten basic elements that are required and accepted as essential factors in the planning process as follows: economic factors, population, land use, community control ordinances, and community value factors.

Volume 3, Part 1- Basic Elements, presents a discussion of the remaining essential components as follows: transportation facilities including those for mass transportation, terminal and transfer facilities, traffic control features, travel patterns, and financial resources. Part 2- Long-Range Transportation Plan, includes chapters dealing with the recommended thoroughfare and expressway plan, the recommended program of development, and the recommended program for continuing study.

It is hoped that as various segments of the transportation plan are implemented, it will be demonstrated that transportation facilities can play an important role in properly shaping and adequately serving the future expanding urbanization of this area.

The transportation plan, as presented in this report, was developed by a cooperative effort between the local governments and the Texas Highway Department. It is recommended that the local governments and the State Highway Commission accept this plan as a long-range broad-stroke transportation plan to be used as a guide for future development and improvement of the transportation system. The plan is based primarily on projected traffic needs, cooperatively determined by the several governmental agencies, and with careful consideration of the effect on other facets of the total environment by such a transportation system. This plan can be accomplished in stages as funds become available. It is recognized that the planning process must be continuous, that revisions of the plan as necessary to adjust to unanticipated

developments are to be expected, and that such revisions will be cooperatively developed.

The agreed upon plan was developed to serve the present and future needs of this area. No attempt was made to assign responsibilities for financing or implementation of the various recommended facilities. This study does not change the traditional financial or administrative responsibilities of the various agencies regarding these matters, and the determination as to how a particular recommended facility is to be financed will be made by the officials charged with such responsibility. It is hoped that the data herein will aid the responsible public officials in establishing policies and in formulating attainable capital improvement programs in anticipation of community needs. Also, it is hoped that the plan will serve as a guide to private individuals and groups in their planning decisions which can be important factors in the pattern of future development.

It must be emphasized that the locations of the various facilities shown as a part of the agreed upon plan are not exact. The alignments as shown represent general routes for the various facilities. In many instances, considerable additional detailed study will be necessary prior to the determination of the exact locations of these facilities. The timing of detailed study and selection of the exact locations will be done at a later date depending upon the priority of the future facility and other considerations. In the instance of a low priority facility

to be constructed possibly fifteen years or more in the future, the determination of the exact route may not be made for several years.

Summary Of Findings

An inventory and classification by function and by responsible agency of the existing highway and street system throughout Galveston County was conducted by the Study in 1964. This inventory provides the base from which all future comparisons will be measured as the system is expanded.

The inventory revealed that there was a total of 1,133.1 miles of all types of surfaced streets which was comprised of 24.1 miles of Expressways, 245.4 miles of Arterial Streets, 37.8 miles of Collector Streets, and 825.8 miles of Local Streets maintained by the various agencies.

Traffic volume data were collected at about 700 locations throughout the system to better recognize existing demand, to assist in evaluating capacity and deficiencies, to determine need for control devices, and to assist in developing adequate solutions to problems. When the volume flow data were related to the mileage of roads, an indication of the actual usage was obtained, which showed that the roads and streets in Galveston County, exclusive of local streets, carried a total of 1,421,365 vehicle miles of daily travel. Of this total, the expressways handled 22 percent of the travel, the arterial streets handled 74 percent, and the collectors handled 4 percent.

The seasonal influence in travel variations was found to be an especially important consideration in the southern-most part of Galves-

ton County. Because of summertime recreational and vacation travel, the traffic increases at the Galveston Causeway about 16 percent between May and June and decreases about 19 percent between August and September. In addition, the usual normal annual increase in travel has been noted to be increasing at a more than normal rate during the last few years.

Undesirable congestion was found to be probable under normal existing traffic conditions in peak hours at 17 intersections out of 95 such intersections studied throughout the county.

Average running speeds below recommended minimums during off-peak hours were found to exist in 30 roadway sections of various streets. Average speeds below recommended minimums during peak hours were found in an additional 15 sections.

Considerable attention was given to the study of accidents which indicated that the majority occurred in the City of Galveston. A total of 24 intersections in the county were found to have a high incidence of collisions and 25 control sections of various streets were found to have excessive accident rates.

A study of mass transportation revealed that 12 percent of all passenger trips were made on buses, which includes school as well as bus transit operations. The present route coverage and operation of the private bus company in the City of Galveston, which is the only such operation in the County, is considered good with some 66 route miles

giving convenient access to more than 95 percent of the residents.

An inventory and analysis of parking spaces was made in the Galveston Central Business District (CBD), the Texas City CBD, and at the Galveston Medical Center. A summary of curb and off-street space revealed a total of 5,097, 2,755, and 4,201 spaces, respectively. Except for the Galveston CBD, no critical parking problems are foreseen for these areas. The Study recommends the addition of 1,100 spaces by 1985 in the Galveston CBD.

Commercial terminal and transfer facilities were found to be adequately served by the existing street network, however, constant surveillance of changing conditions is recommended to prevent possible future conflicts.

Another part of the study was concerned with the use of traffic control devices in developing the inherent capacity of the existing street system to its fullest potential. A number of relatively inexpensive solutions are recommended to accomplish this objective.

A major part of the study was concerned with the study and evaluation of travel patterns on highways and streets in order to develop the input factors needed for the evolution of a plan for the future. Considering these factors, with emphasis on major traffic generators in the area, future trip generations and distributions were forecasted. A comparison of 1985 projected vehicle trip ends with 1964 vehicle trip ends indicates an increase in all types of trips of 265 percent. The assignment of

these forecasted trip movements to various simulated road systems produced, after many adjustments, the recommended thoroughfare and expressway plan (see Chapter 8).

The financial feasibility for accomplishing the recommended plan was another important part of the study which indicated that about $248,000,000 in revenues should be available through 1985 from all agencies, including federal aid, state, county, and city funds. This figure is based on a projection of the past trend in spending for right-of-way and construction of roads and streets. Total annual cost, including maintenance and debt service, would average $66.87 per capita or 1.22 cents per vehicle mile of travel over a twenty-year period.

Estimates of the cost of implementing the ultimate plan recommended show that nearly $72,000,000 in additional funds will be needed and it is recommended that most of this could be deferred until after 1985 until about 1990.

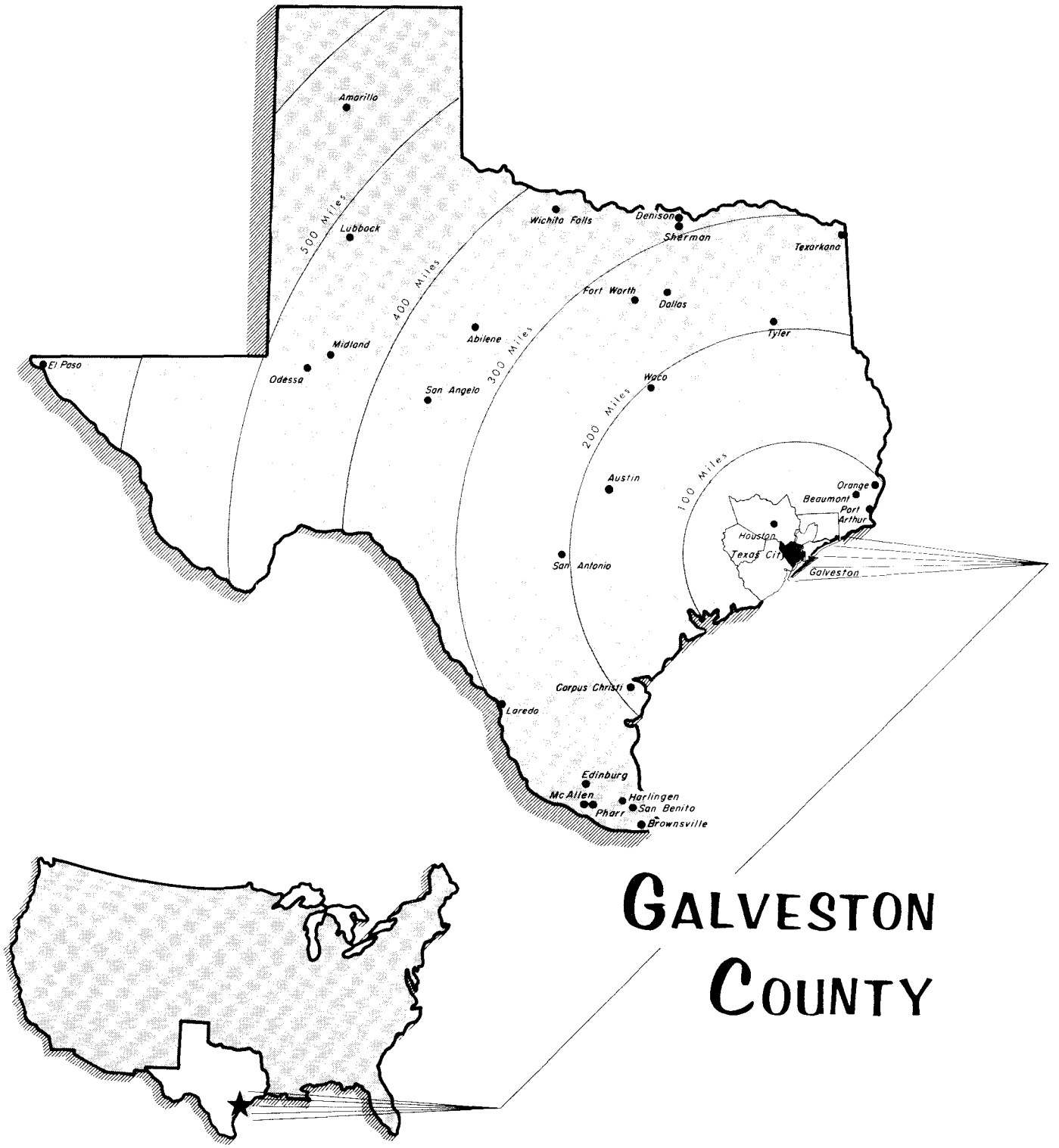
The recommended plan for 1985 calls for the addition of 391.00 miles to the 307.30 mile 1964 system. The classifications of the recommended additions are as follows: 41.80 miles of expressways, 289.45 miles of major arterials, and 59.75 miles of collectors.

It is recommended that local agencies adopt capital improvement programs that are realistic, comprehensive, and long-range, using the program of development outlined in Chapter 9 as a guide. All agencies then will be assured that an equally efficient or balanced highway and

street system for the entire county will result.

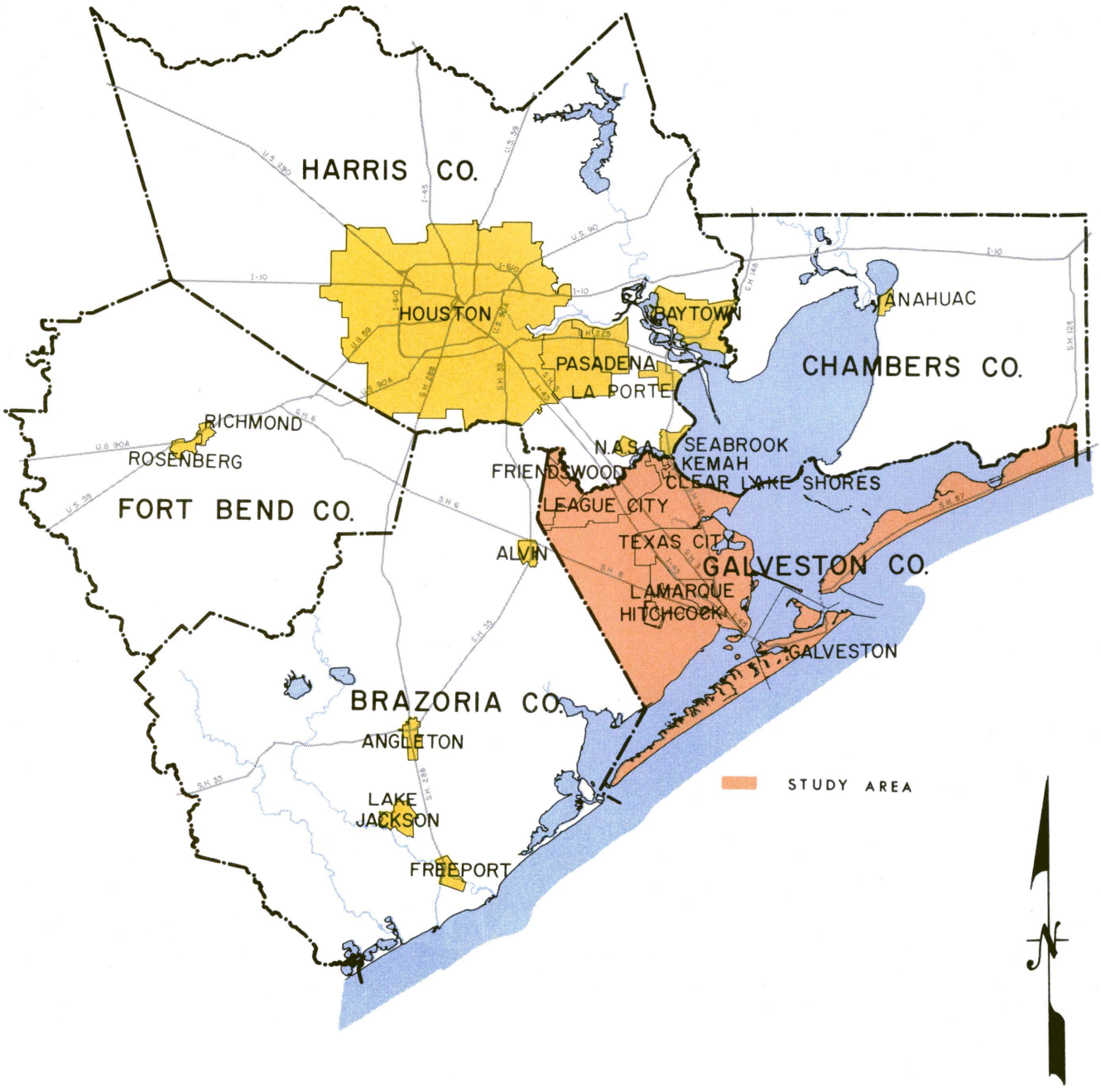
Continuing surveillance and study in order to keep the plan current with existing conditions, is recommended as the key to the ultimate realization of the recommended plan. To remain useful, the plan must be implemented with a degree of flexibility which will allow for revision and modification as the constantly changing process of urban development occurs.

Geographical Location of

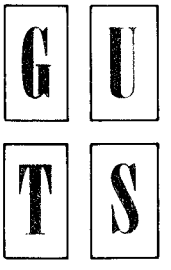


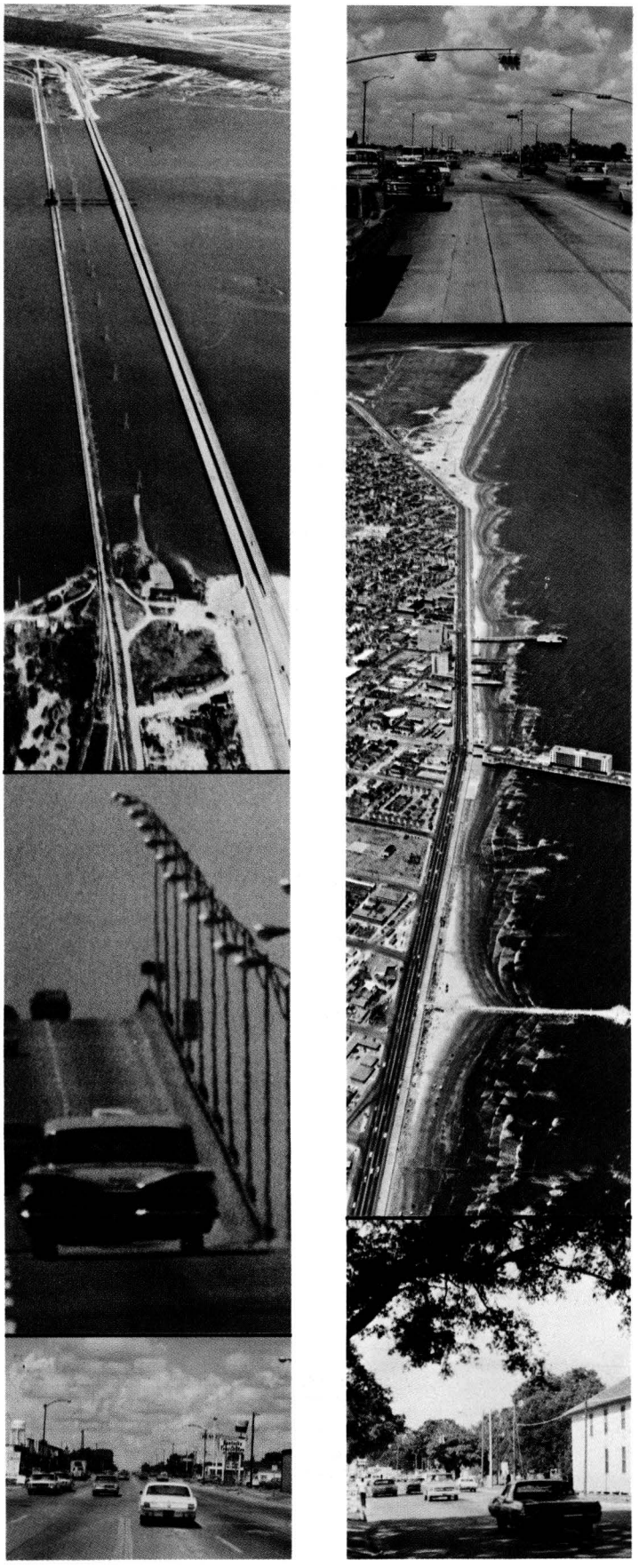
GALVESTON COUNTY

Study Area And Vicinity



Part 1 ■ Basic Elements





Chapter 1

Transportation Facilities - Physical Features

Transportation Facilities - Physical Features

INTRODUCTION

In 1964 there were 1,133 miles of roadway in Galveston County. Citizens of the county and tourists to the area depend on these facilities for access to property, businesses, and recreation. This study will take inventory of and analyze the existing transportation facilities in the county.

CLASSIFICATION

To begin the study, it was necessary to determine the classification of each roadway and the level of service it provided. The National Committee on Urban Transportation (NCUT) recommends four categories of street classification. They are: (1) Expressway, (2) Major Arterial, (3) Collector, and (4) Local. The NCUT description of these classifications assisted in the determination of each roadway within the study area.

> FREEWAY OR EXPRESSWAY - This class of facilities is devoted entirely to the task of traffic movement, and performs little or no land service function. Thus, it is characterized by at least some degree of access control. This classification should be reserved for multilane, divided roads with few, if any, intersections at grade. Expressways provide for the movement of large volumes of traffic at relatively high speeds and are primarily intended to serve long trips. Freeways provide the same services as the expressway but have full control of access with grade separations at intersections. The term expressway will be used for both freeways and expressways in this report.
>
> MAJOR ARTERIAL - This class of facilities brings traffic to and from the expressway and serves those major movements of traffic within or through the metropolitan area not served by expressways. Major

arterials interconnect the principal traffic generators within the city and the important rural routes. They handle trips between different areas of the city and should form a reasonable integrated system. The length of the typical trip on the system should exceed one mile. Truck and bus routes, as well as state and federal numbered routes, are usually located on major arterials. Commuting and work trips which tend to be longer than shopping trips also concentrate on these routes. This concentration of through traffic, in most cases, results in having these streets designated as through streets and provided with such traffic aids as progressive traffic signal systems and lane markings. Although traffic volumes should not be used as the only criteria, these routes are often the most heavily used in the city, and daily volumes usually exceed 3,500-5,000.

Major arterials mainly serve to move traffic, but they normally also perform a secondary land service function. It is necessary to restrict or prohibit parking and loading at times to improve capacity.

COLLECTOR - This class of street serves the internal traffic movement within an area of the city, such as a subdivision, and connects this area with the major arterial system. Collectors do not handle long through trips, and are not necessarily of necessity continuous for any great length. A street of several miles in length may be serving as a collector rather than a major arterial if the predominant use is to reach and turn off at the next junction with a major arterial.

The principal difference between collector and major arterial streets is the length of the trip they accommodate. Collectors rarely carry state or federal numbered routes, although they may connect less important rural roads with the major arterial system. Collectors may be used for bus or truck movements to penetrate an area and give direct service to that area, but they are rarely used for through routes.

The collector street is intended to supply abutting property with the same degree of land service as a local street, while at the same time serving local traffic movement.

LOCAL - Local streets are those streets whose sole function is to provide access to immediately adjacent land. They make up a large percentage of the total street mileage of the city, but carry a small proportion of the vehicle-miles of travel. In and around the Central Business District, local streets may carry traffic volumes measured in the thousands of vehicles, but this is an exception to the rule. Local residential streets, in most cases, would carry daily volumes of 1,000-1,500 or less.

Within the local street classification, three subclasses are established to indicate the type of area served: residential, industrial, and business. These more specific designations emphasize different types of service demands placed on these streets.

The existing major arterial system does not necessarily represent the desired major arterial system. Because of finances, private development or other conditions that temporarily limit the completion of a major artery, other existing roadways sometimes must carry the burden of heavy volumes and congestion, although the primary design of the street

was that of a collector or in some cases a local street.

The National Committee on Urban Transportation has suggested the division of street classification for cities in different population groups. Table 1-1 shows the percentages of a typical classification plan as obtained from NCUT studies. These percentages are offered only as a guide, and it should be realized that each city and metropolitan area has its own peculiar system.

TABLE 1-1

DIVISION OF STREET MILEAGE

Population of Metropolitan Areas	Percent of Total Mileage		
	Freeways or Expressways	Major Arterials and Collectors	Local
Under 25,000	*	25 - 35	65 - 75
25,000 to 150,000	*	20 - 30	70 - 80
150,000 to 500,000	*2 - 5	20 - 25	75 - 80
Over 500,000	*5 - 8	20 - 25	75 - 80

*The percentage of Expressway mileage will vary from city to city depending upon amount of through traffic, the deficiencies in the street systems, topography, population density, and other factors.

Galveston County is in the rather unusual position of having several cities and towns making up the metropolitan area with no one city being the dominant hub of county activity. This is mostly attributable to the geographical characteristics that have shaped the development of the economy of the county. Each city and town generates a certain amount of traffic destined to another city or town for the purpose of work, business, or pleasure. Trips of this nature create more cross-county activity than metropolitan areas with only one central business area. Information

obtained from the Origin-Destination Survey has shown the desires of the persons making trips daily. In relating the trip desires to the existing street system, it becomes apparent why some streets are being used in some other classification than was originally intended.

The combination of the urban developments and the suburban or fringe areas of the county brought about the consideration of a dual set of criteria to be used in determining street use. The data establishing the urban street system were primarily based on the NCUT recommendations, but the fringe network in the street system has not been so clearly defined in published reports. To catalogue the existing streets into the four general classifications, as mentioned earlier, it was necessary to establish a guide that would satisfy the urban needs as well as the suburban needs. The requirements for building county roads and the design standards of the highway department were studied to eliminate any duplication or contradiction in the data. The guide shown in Table 1-2 was used in determining the classification of streets in the county.

TABLE 1-2

CRITERIA FOR CLASSIFICATION OF EXISTING STREET SYSTEM

Facility	Freeway or Expressway		Major Arterial		Collector		Local	
Area	Urban	Suburban	Urban	Suburban	Urban	Suburban	Urban	Suburban
Movement	Primary	Primary	Primary	Primary	Equal	Equal	Primary	Primary
Access	Full Control	Partial Control	Secondary	Secondary	Equal	Equal	Primary	Primary
Trip Length	Over 3 Mi.	Over 3 Mi.	Over 1 Mi.	Over 2 Mi.	Less Than 1 Mi.	Less Than 2 Mi.	Less Than ½ Mi.	Less Than 1 Mi.
Administrator	State	State	City-County-State	County-State	City	County-State	City	County
Spacing	1-4 Mi.	3-6 Mi.	1 Mi.	2 Mi.	½ Mi.	1 Mi.	Random	Random
R. O. W.	300'-350'	200' +	80'-120'	120'	60'-70'	80'-120'	60'	60'-80'
Volume	1500/ Ln./Pk.Hr.	600/ Ln./Pk.Hr.	3500+ ADT	1300+	1000-3500 ADT	300-1300	1000- ADT	300-

To ignore the presence and necessity of the suburban network would compound the problem of street planning. The fringe areas should be developed in such a way that when the urban sprawl envelopes the area, the street network could then easily be incorporated into urban thoroughfares. The major thoroughfare plan should at the same time consider the existing uses of the streets in the fringe areas of the county, as well as the street system in the more urban areas of the county. The discussion of the development of the major thoroughfare plan will be taken up in more detail in a later chapter of this report.

STREET USE

In 1964 all roadways in Galveston County were grouped by the way they fitted into the criteria for classification. The street system, except the local streets, were divided into segments or "control sections" to collect data. Each control section had generally uniform design, land usage, and traffic demand along its length.

The governmental agency responsible for maintaining each roadway segment was determined. Table 1-3 shows the mileage by street classification for which each agency has maintenance responsibility.

Control section limits are shown in the Appendix. The 825.8 miles of local streets were excluded from detailed inventory in this study. The existing freeway, expressway and major street system discussed in this report will be referred to as the major arterial system throughout

the remainder of this report. The "major thoroughfare" map based on classification and usage is shown in Figure 1-1. It includes 7.2 miles of freeway, 16.9 miles of expressway, 245.4 miles of arterials, and 37.8 miles of collectors.

TABLE 1-3

1964 STREET SYSTEM

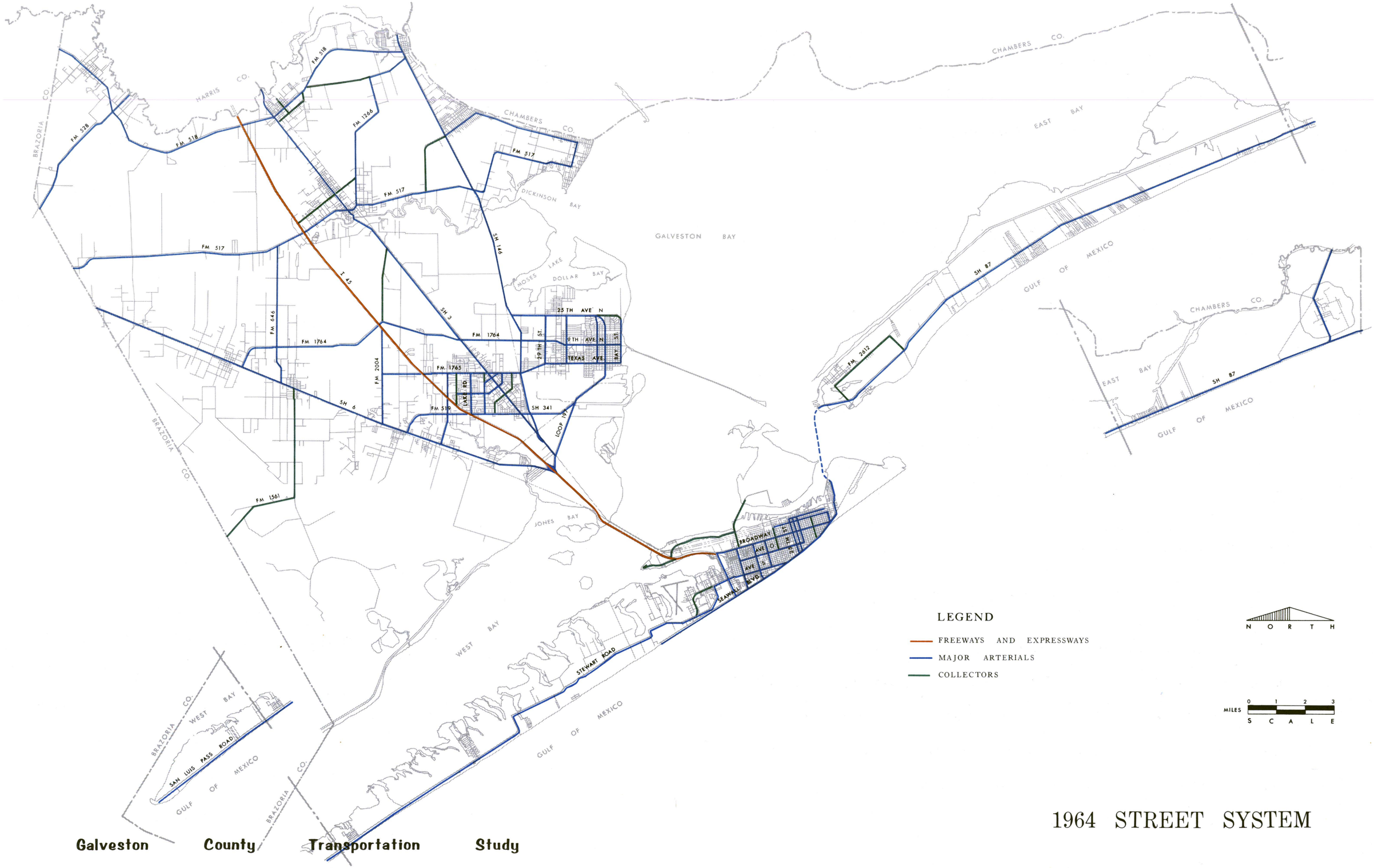
Locality	Controlled Facilities State Maintained		Arterial Streets Maintained By			Collector Streets Maintained By			Local Streets Maintained By*	Total Miles
	Freeways	Expressways	State	County	City	State	County	City		
Galveston	4.4	---	6.9	7.8	18.7	0.6	---	8.0	153.6	200.0
Texas City	---	4.2	33.8	---	8.6	2.7	---	2.5	128.1	179.9
La Marque	---	5.7	18.3	---	6.9	---	---	3.3	62.6	96.8
League City	---	4.7	10.8	---	---	---	---	4.9	33.8	54.2
Hitchcock	---	---	7.2	---	0.7	---	---	---	38.5	46.4
Friendswood	---	---	3.9	---	---	---	---	---	17.7	21.6
Clear Lake Shores	---	---	---	---	---	---	---	---	6.2	6.2
County	2.8	2.3	102.8	19.0	---	13.2	2.6	---	385.3	528.0
Total Miles	7.2	16.9	183.7	26.8	34.9	16.5	2.6	18.7	825.8	1,133.1
SYSTEM MILEAGE	24.1		245.4			37.8			825.8	1,133.1
MAJOR THOROUGHFARE SYSTEM			307.3							

* ASSUMED TO BE MAINTAINED BY LOCAL GOVERNMENT

EXISTING CONDITIONS

Street use not only depends upon length and spacing, but also upon the geometrics of the facility. The composition of roadways discussed here will be limited to right-of-way, pavement widths, surface material, parking regulations, and traffic control. These elements are capable of restricting the vehicle movement to the extent that motorists will seek other routes to their destination.

FIGURE 1 - 1



LEGEND

- FREEWAYS AND EXPRESSWAYS
- MAJOR ARTERIALS
- COLLECTORS

N O R T H

MILES 0 1 2 3
S C A L E

1964 STREET SYSTEM

Galveston County Transportation Study

RIGHT-OF-WAY

The street classification guide (Table 1-2) recommends right-of-way widths for each class of roadway. A map of the existing major arterial system based on this guide was prepared to show deficiencies in Galveston County rights-of-way (Figure 1-2).

PAVEMENT WIDTH

Roadway capacity and curbside parking are dependent on pavement width. Studies have found that widening the pavement as little as four feet has in some cases increased capacity and also reduced the accident rate as much as 46.6 percent.[1] Careful consideration should be given to the width of streets whenever new ones are planned or the improvement of old ones is contemplated.

SURFACE MATERIAL

Part of the street system inventory determined the type of surface material on each road (Table 1-4). It was felt that indicating the miles of surface type maintained by the city, county, and state would be beneficial in determining future budget requirements. The map in Figure 1-3 combines pavement width with surface type. Both the county and state maintain certain segments of roadway within several city boundaries. The inventory of street conditions should be kept current so that excessive travel delays and maintenance can be minimized.

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[1] Traffic Accident Experience-Before and After Pavement Widening, A. J. Cope, Traffic Engineering, December, 1955.

FIGURE 1 - 2

LEGEND

INADEQUATE RIGHT OF WAY

N O R T H

MILES 0 1 2 3

S C A L E

1964 STREET SYSTEM

INADEQUATE RIGHT OF WAY

Galveston County Transportation Study

TABLE I - 4

1964 MILEAGE OF SURFACE MATERIAL BY RESPONSIBLE GOVERNMENTAL AGENCY

Responsible Agency	Surface Material			Total Miles
	Concrete	Bituminous	Shell	
Clear Lake Shores	---	5.0	1.2	6.2
Friendswood	0.6	3.6	13.5	17.7
Galveston	7.7	155.5	18.8	182.0
Hitchcock	2.2	16.5	20.5	39.2
La Marque	4.4	57.0	11.4	72.8
League City	1.6	18.2	18.9	38.7
Texas City	43.3	61.3	37.3	141.9
County	4.5	123.1	287.1	414.7
State	47.2	172.7	---	219.9
Total Miles	111.5	612.9	408.7	1,133.1

PARKING

Curbside parking affects travel time and usually results in higher accident rates than on roadways prohibiting parking. In suburban areas, parking is normally permitted on shoulders for short periods except where congestion prevents it. The more urbanized areas of the county have more vehicle owners, business activity, and traffic congestion. Therefore, more restrictions are required limiting the amount and time of roadway parking in these areas.

The Texas City Central Business District (CBD), Galveston CBD, and the Medical Center are the three critical urban parking areas in Galveston County. Off-street and curb parking in these areas will be

discussed in more detail in a later chapter.

TRAFFIC CONTROL

A street system inventory cannot be complete without data on traffic control devices and regulations required for safe and efficient traffic movement. Data presented here will help analyze the system in the chapter on Traffic Control Features.

The larger cities in the study area provided all available records, maps, and data for studying their control devices and regulations. Of major importance in this discussion is the location and function of traffic signal lights and four-way stop signs. At the time of inventory there were 114 signalized intersections located throughout the county. Approaches to 95 of the intersections were examined for deficiencies. The remaining 19 locations did not warrant capacity study. Four intersections operated only during the morning and afternoon periods when school opened and closed. Three intersections had signal lights primarily for pedestrian movement, and three signalized locations were under construction. Further discussion and analysis of the signalized intersections can be found in the capacity study portion of this report.

There were 26 four-way stop intersections in the county. Galveston had twenty and Texas City had four. La Marque had two locations until recently when they were replaced by signal lights. Three intersections operated with red and amber flashing beacons, and four locations had amber flashing beacons.

FIGURE 1 - 3

Galveston County Transportation Study

1964 STREET SYSTEM

SURFACE MATERIAL AND PAVEMENT WIDTH

LEGEND

- CONCRETE
- ASPHALT
- SHELL
- (20') PAVEMENT WIDTH

N O R T H

MILES 0 1 2 3

S C A L E

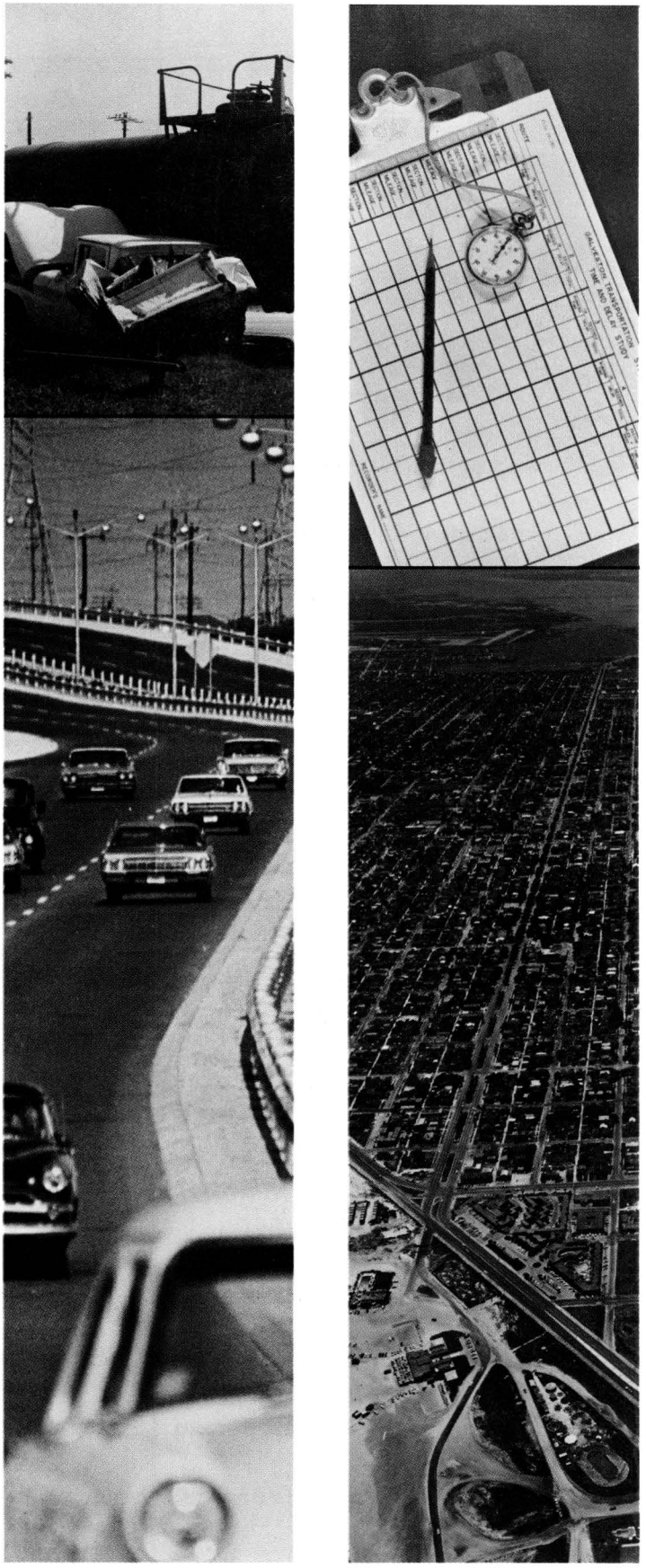
Another form of control device is the use of pavement markings. The street inventory brought out, that of the 307.3 miles of the major arterial system, 93.3 miles or 30 percent of the street mileage did not have center lines or lane lines.

The National Joint Committee on Uniform Traffic Control Devices prepared the Manual on Uniform Traffic Control Devices for Streets and Highways as the approved standard for the warrant, design, and installation of all traffic control devices in the United States. This manual has been adopted by the Texas Highway Commission for interim use until the state manual has been accepted. Sec. 31(a)Art. 6701d of Vernon's Civil Statutes of the State of Texas establishes policy for local agencies. The section states:

> "Local authorities, in their respective jurisdiction, may place and maintain any traffic-control devices upon any highway under their jurisdiction as they may deem necessary to indicate and carry out the provisions of this Act, or local traffic ordinances, or regulate, warn or guide traffic. All such traffic-control devices hereafter erected shall conform to the State Highway Department's manual and specifications."

Although it is not mandatory that each governmental agency within the study area follow the manual, the law does require that those control devices installed shall conform with the manual. The Coordinating Committee strongly recommends that all of the control devices under

the jurisdiction of each governmental agency be reviewed periodically due to changes in travel patterns and traffic demands.



Chapter 2

Transportation Facilities - Traffic Service

Transportation Facilities - Traffic Service

INTRODUCTION

The governmental agencies involved in building and maintaining roadways in Galveston County spend 10 to 11 million dollars each year to accommodate the needs and safety of the motoring public. The agencies keep current on the activity of the motorists through such programs as traffic volume counting, capacity and level of service studies, travel time measurements, and maintenance of accident records.

TRAFFIC VOLUMES

TRAFFIC COUNTS

Traffic volumes are a good tool to use in recognizing present demand, evaluating capacity and deficiencies, determining need for control devices, and assisting in street design.

Volume data can be taken in various ways including recording-machine counts, nonrecording-machine counts, and manual counts. During the data collection phase of this study, all three forms were used. Traffic volume data were collected at about 700 locations involving 900 collections from machine counters in addition to one permanent machine location on the Gulf Freeway (IH 45) north of the Galveston Causeway. The counter at this location automatically records vehicles 24 hours a day all year long. The number of temporary 24-hour machine

counts that were collected in each of the cities were: Friendswood - 18, Galveston - 334, Hitchcock - 14, La Marque - 81, League City - 31, and Texas City - 249. The remaining 187 counts were made in unincorporated areas of the county. It is recommended that local agencies continue traffic count programs to establish trends in vehicular movement.

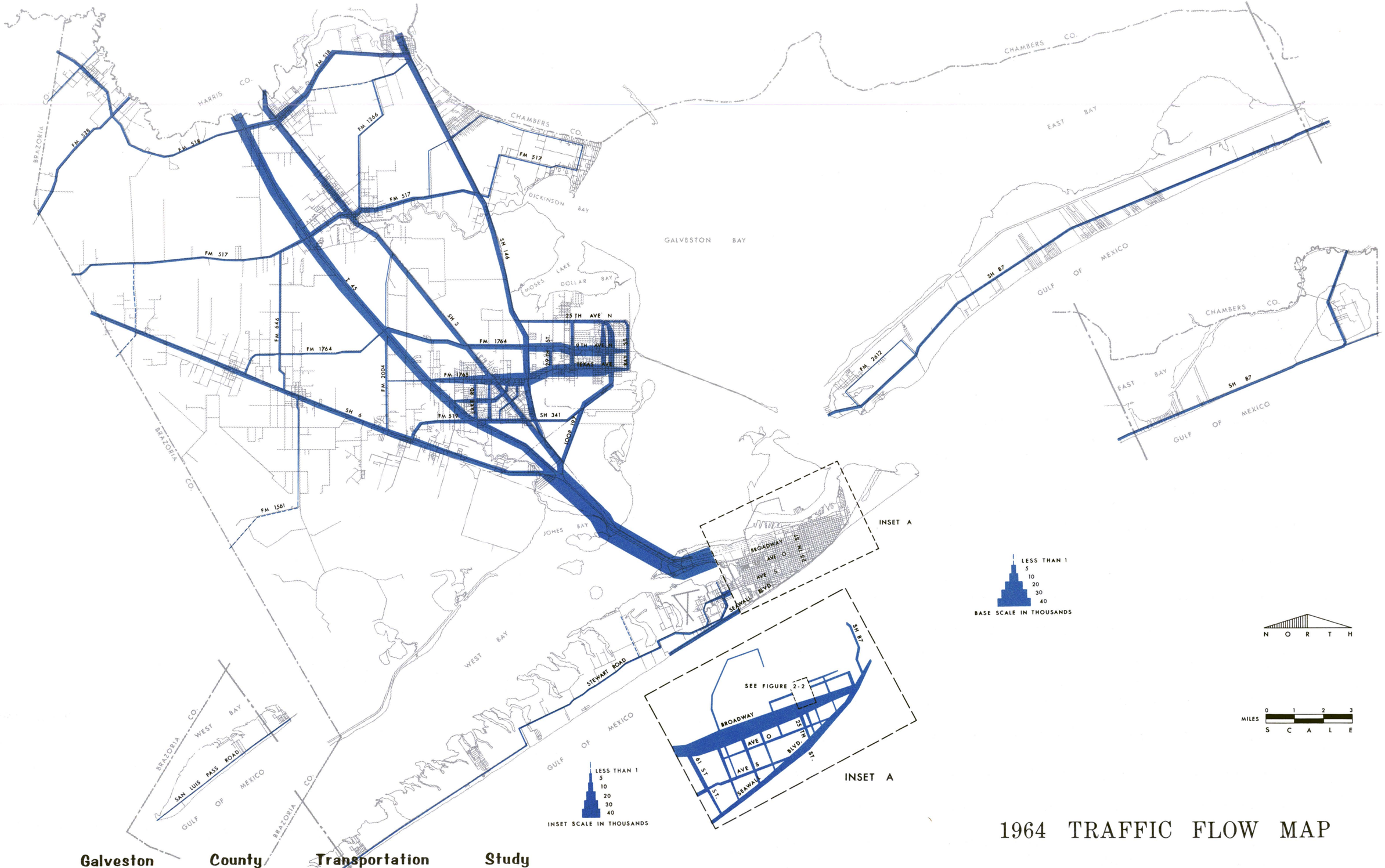
Flow band maps display traffic volumes throughout Galveston County, Figure 2-1, and the Galveston Central Business District, Figure 2-2. Band width corresponds to the volume of traffic passing through points on a length of roadway.

When the volume flow is related to the mileage of roads, the result is an indication of the actual usage of the total arterial and expressway system. The expressway system accounted for 320,030 vehicle miles (VM) or 22 percent of the daily travel. The arterial system accumulated 1,048,047 VM for 74 percent, while the collector system had 53,288 VM or 4 percent. Except for the local streets, Galveston County roads and streets amassed a total of 1,421,365 VM of daily travel.

TRAFFIC VARIATIONS

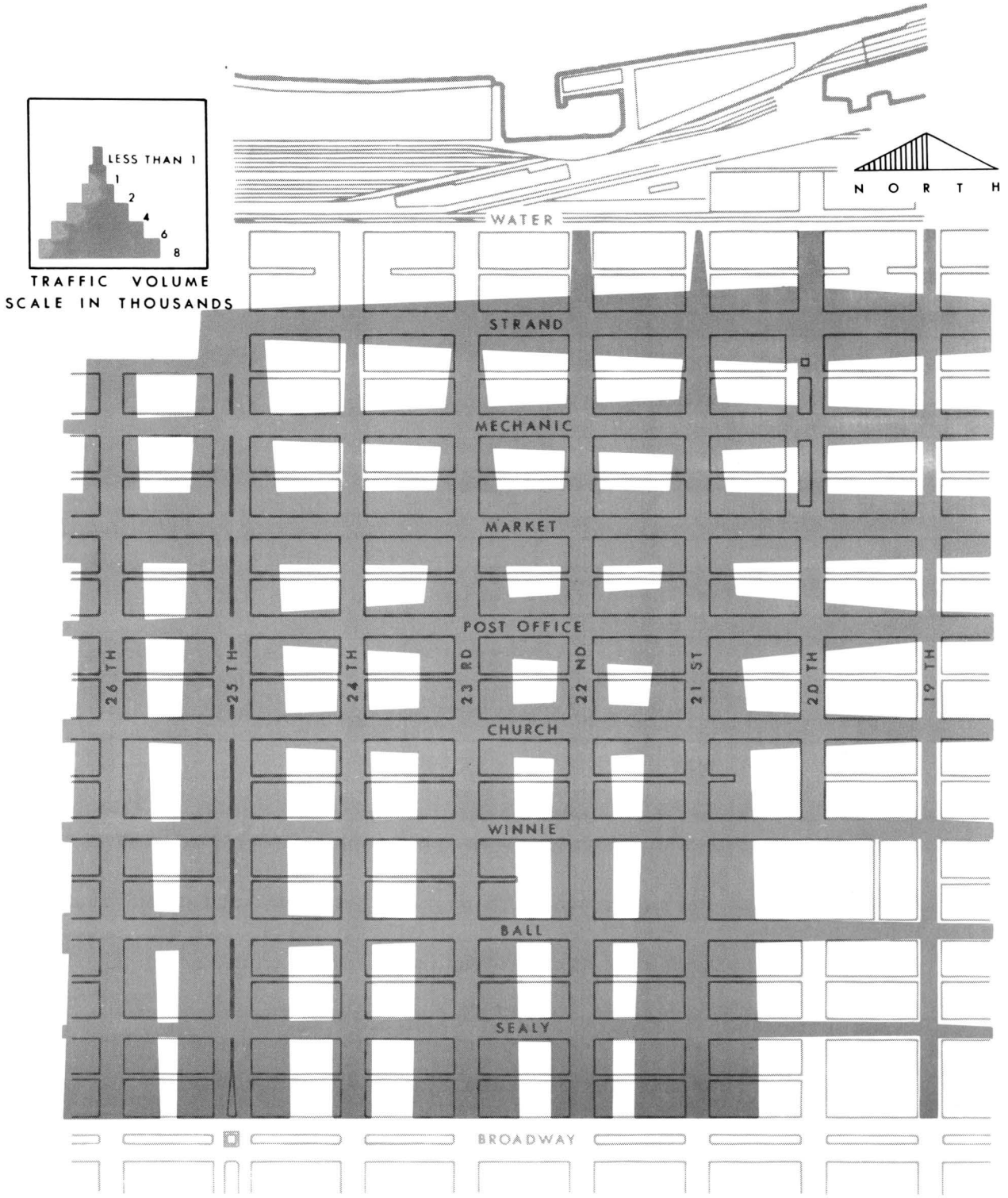
The analysis of data recorded at the permanent location revealed the daily, weekly, and seasonal variations in the traffic flow entering and leaving Galveston Island. To illustrate the significance of summertime or vacation type traffic, a comparison was made between a location on the Katy Freeway in Houston, and the permanent location being discussed.

FIGURE 2 - 1



1964 TRAFFIC FLOW MAP

Galveston County Transportation Study

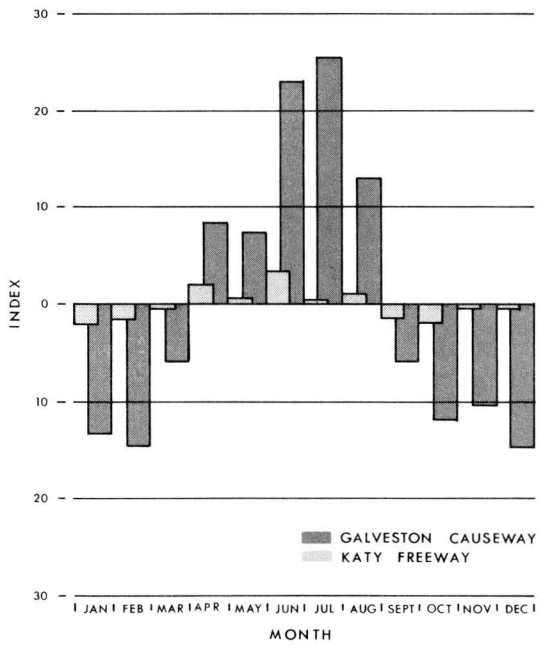


1964 TRAFFIC FLOW

GALVESTON CENTRAL BUSINESS DISTRICT

Galveston County Transportation Study

FIGURE 2 - 2

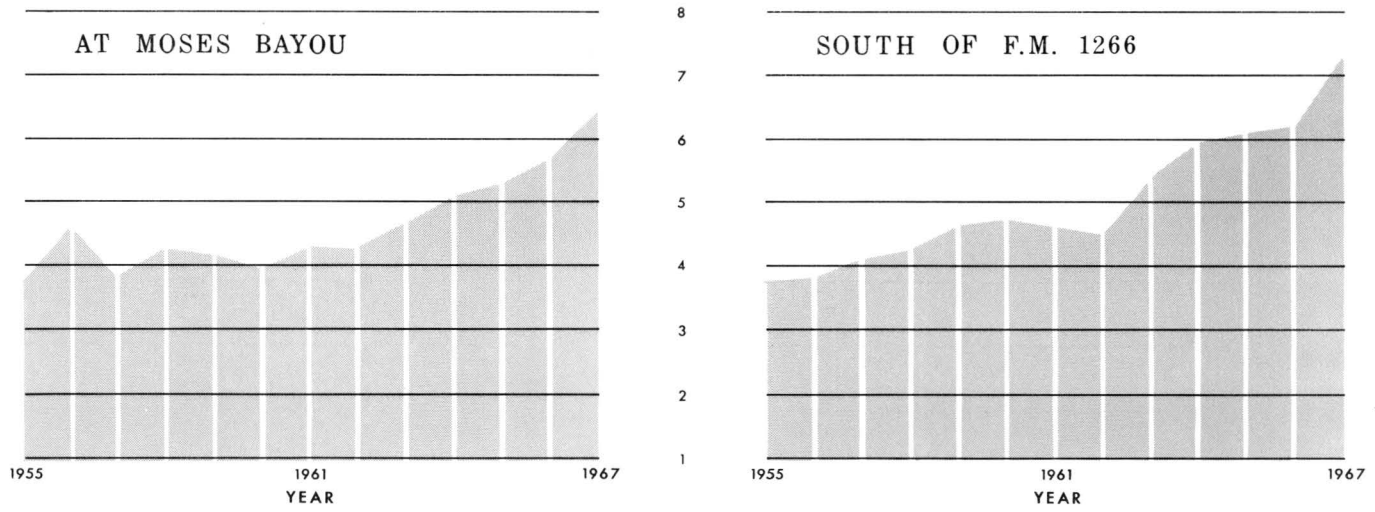


SEASONAL INFLUENCE INDEX

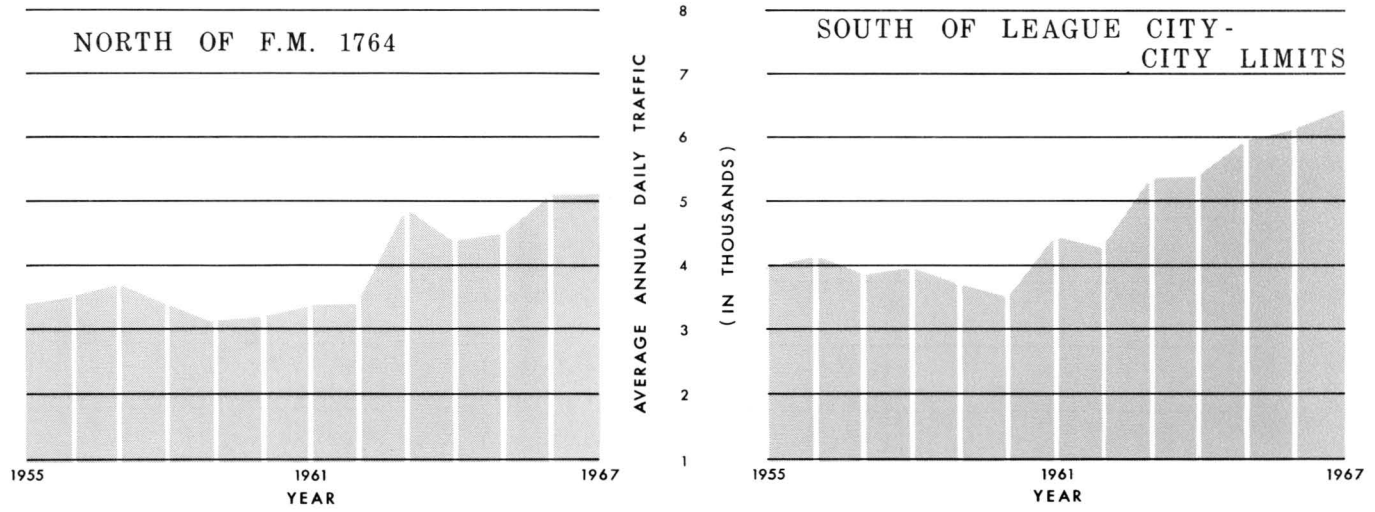
FIGURE 2-3

Figure 2-3 shows the relationship of relative seasonal influence between Houston, not strongly influenced by sudden changes, and Galveston, readily affected by the weather and recreational activity. A 16 percent traffic increase occurred between May and June, and a 19 percent decrease took place between August and September at the Galveston Causeway location. The most abrupt increase in Houston was 3 percent between May and June while the greatest decrease was 2.5 percent between August and September.

Although it may appear that traffic increases only during the summer, as indicated in Figure 2-3, it must be noted that traffic has steadily increased over the past 13 years since 1955. Figures 2-4 and 2-5 show trend lines that were developed for 12 selected locations throughout the county. These locations were divided generally into north and south bound roads, and east and west bound roads. The selected locations all show that substantial increases have occurred during the past several years, and barring any major adverse changes, the same steady growth can be expected during the next ten years.



S. H. 146



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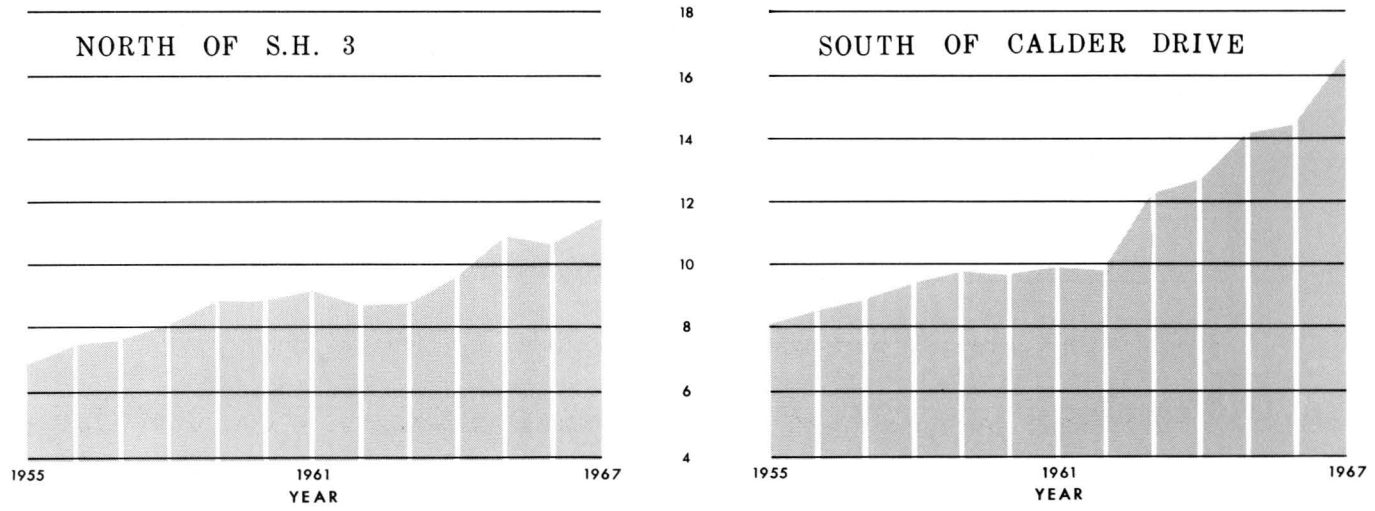
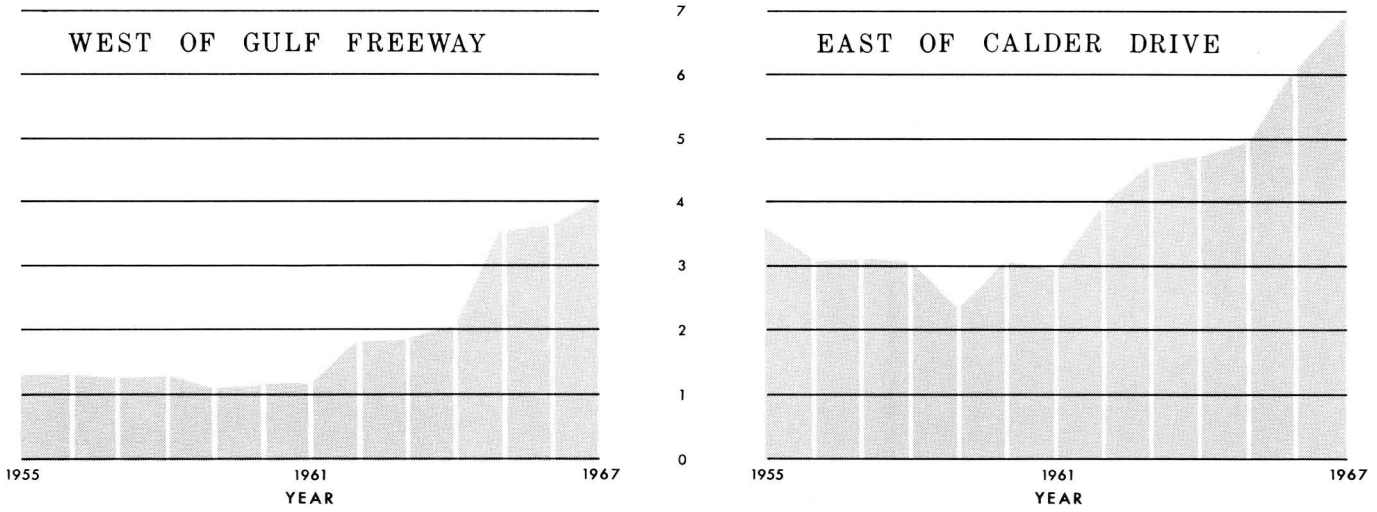
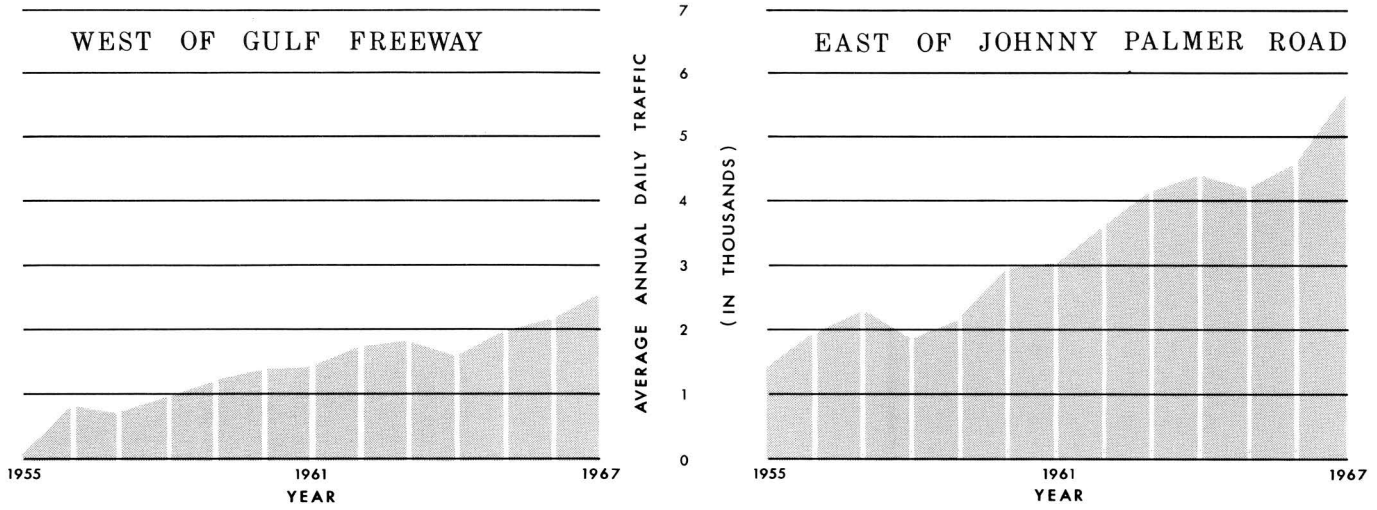


I. H. 45

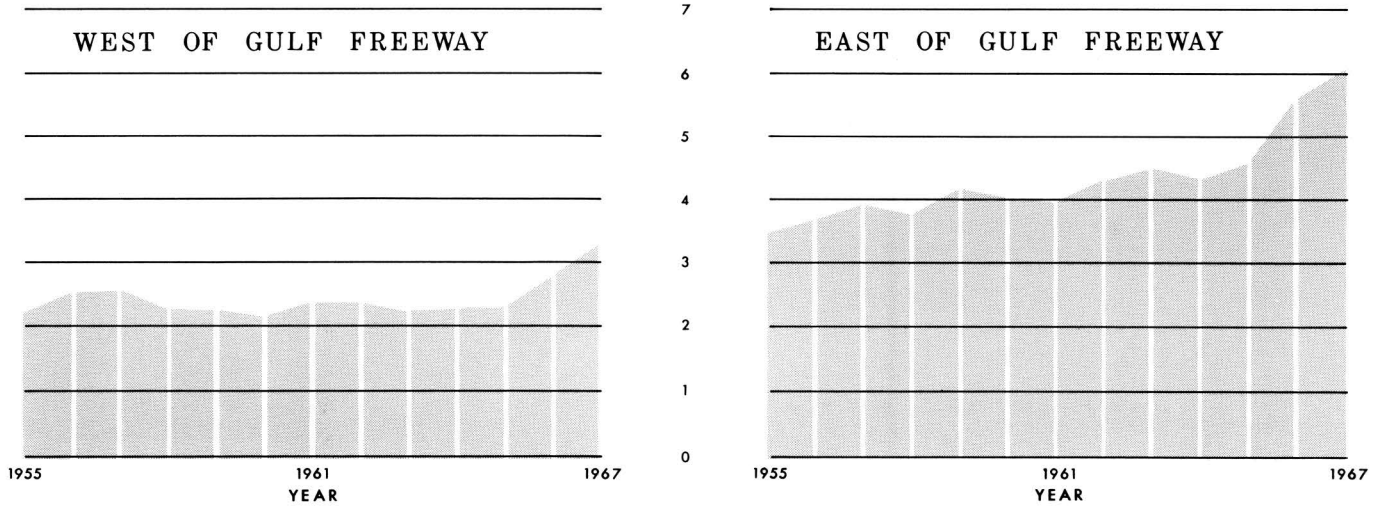
VOLUME TRENDS



F. M. 518



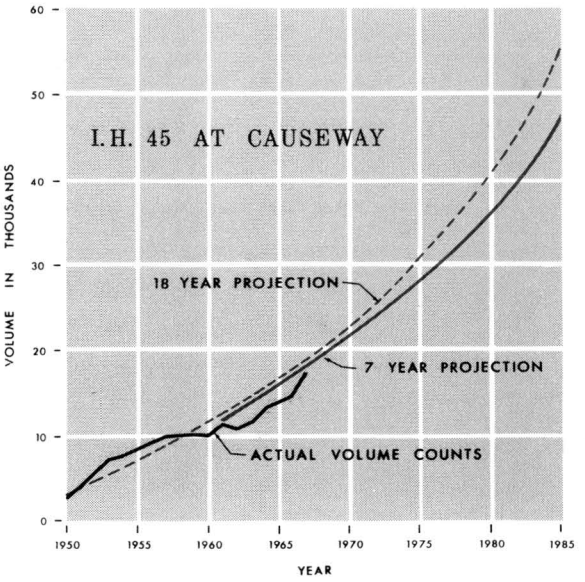
F. M. 1764



F. M. 519

VOLUME TRENDS

The data also revealed that on an average day in 1964 the counter at the Causeway recorded about 23,000 vehicles. This was an overall increase of 7.87 percent over 1963. Annual increases of 2.81 percent (1964-1965), 2.73 percent (1965-1966), and 10.79 percent (1966-1967) have taken place since then. This amounts to an average annual increase of 4.81 percent for the five-year period. The graph in Figure 2-6 shows the trend of traffic at the Causeway location. Projecting the line to 1985 shows the increase during the next twenty years if development takes place at the same rate in the future as it has since 1950. A second line was plotted showing the increases in traffic since 1961 because of the intensified development in and adjacent to the county since that year.

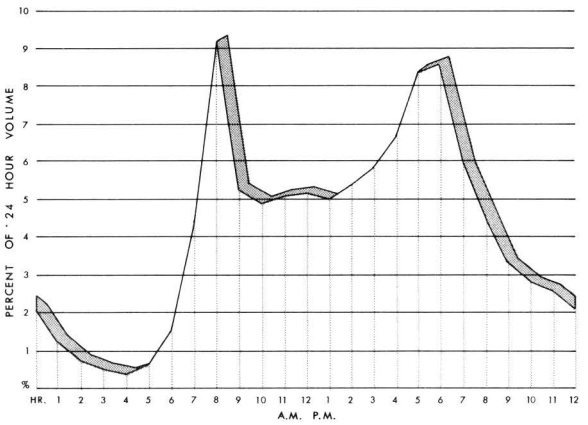


VOLUME PROJECTION

FIGURE 2-6

Daily traffic data from the Causeway location indicated 14.50 percent of the vehicles crossed the Causeway during the 7-9 a.m. peak and 16.96 percent crossed during the 4-6 p.m. peak. The percentage of daily traffic by the hour is shown in Figure 2-7. It shows that 73.80 percent of the traffic moved during the daylight hours, 6 a.m. to 6 p.m., while 26.20 percent moved between 6 p.m. and 6 a.m.

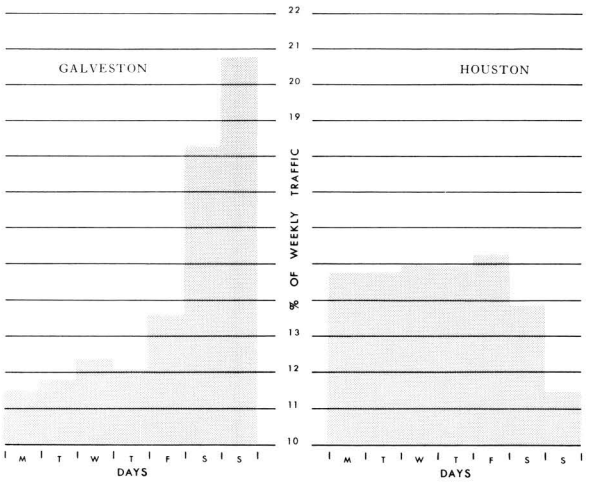
To show the increase in summer recreation traffic on Galveston Island, a counter was placed on Seawall Boulevard west of 45th Street for about one month in May, 1964. Seawall Boulevard is located adjacent and parallel to Galveston beach. The counter was located beyond the concentrated beach activities because of the large number of sightseers moving back and forth in that area. In three weeks the weekly volume increased 26 percent. Figure 2-8 shows how the Saturday and Sunday traffic flow increases in this recreational area. A typical location in Houston is also shown in the figure to relate the traffic movement on a major street not greatly influenced by recreational activity.



AVERAGE HOURLY VOLUME

FIGURE 2-7

These observations show that consideration must be given to the weekend and summertime traffic in the southern-most part of Galveston County. Close observation should continue on land use development. If tourist facilities, summer homes, and



RECREATIONAL INFLUENCE ON DAILY TRAFFIC FLOW

FIGURE 2-8

other recreational activities begin to expand and attract more people, some method should be developed to finance improvements for handling short peak traffic conditions while maintaining an acceptable tax structure for permanent Galveston County residents.

Generally the traffic pattern from the City of La Marque north to the county line seems to be more stable. The gradual increase in volumes over the past years has allowed time for thorough planning of new facilities. But the area adjacent to Clear Lake will need to be kept under close observation for intensified activity due to the influence of the Manned Spacecraft Center and the Bayport Industrial development on the north side of the lake in Harris County.

CAPACITY AND LEVEL OF SERVICE

The term "highway and street capacity" deals with the limitations of facilities in handling traffic under prevailing conditions. Capacity is divided into two broad categories: (1) Uninterrupted flow which occurs on a roadway where interference at intersections or roadside development is relatively insignificant, and (2) Interrupted flow which occurs on urban streets or at intersections where interference to traffic is common.

Six levels of service, designated A through F, from best to worst, were established in the 1965 Highway Capacity Manual for identifying the operating conditions existing under various speed and volume situa-

tions on roadways. The six conditions are:

Level of Service	Operating Conditions
A	Free flow, low volume and high speeds little or no delay
B	Stable flow, reasonable speed reduction and few traffic restrictions.
C	Stable flow, a relatively satisfactory operating speed is still obtained.
D	Unstable flow, with tolerable operating speeds.
E	Unstable flow, lower operating speeds, with volumes at or near the capacity.
F	Forced flow, speeds reduced substantially and stoppages occur.

Capacity studies determine the maximum number of vehicles per hour which can be carried with reasonable expectation. They also determine the theoretical volume range which can be handled by a facility while maintaining an acceptable level of service; this is usually of more interest in planning.

This discussion outlines the investigations made of the present levels of service at intersections and on roadways. Recommended design volume ranges for the future are also presented.

INTERSECTION CAPACITY AND LEVEL OF SERVICE

Intersections are usually the bottleneck points which limit the overall capacity of a roadway. The intersections investigated by the Study Office

for capacity analysis were signalized intersections where traffic volume is ordinarily high and restriction of traffic flow is most likely to occur. There were 114 signalized intersections within the study area when the study was made in 1965. The types of traffic control at the intersections are sumarized in Table 2-1.

TABLE 2-1

SUMMARY OF SIGNALIZED INTERSECTIONS

Type	No. Locations
Interconnected Fixed-Time Signals	22*
Independent Fixed-Time Signals, on normal traffic streets	71*
Independent Fixed-Time Signals, on streets under construction	3
Traffic-Actuated Signals, normal traffic on both streets	2*
Traffic-Actuated Signals, very light traffic on side streets	3
Pedestrian-Controlled Signals	3
Flashing Beacons	10
Total	114

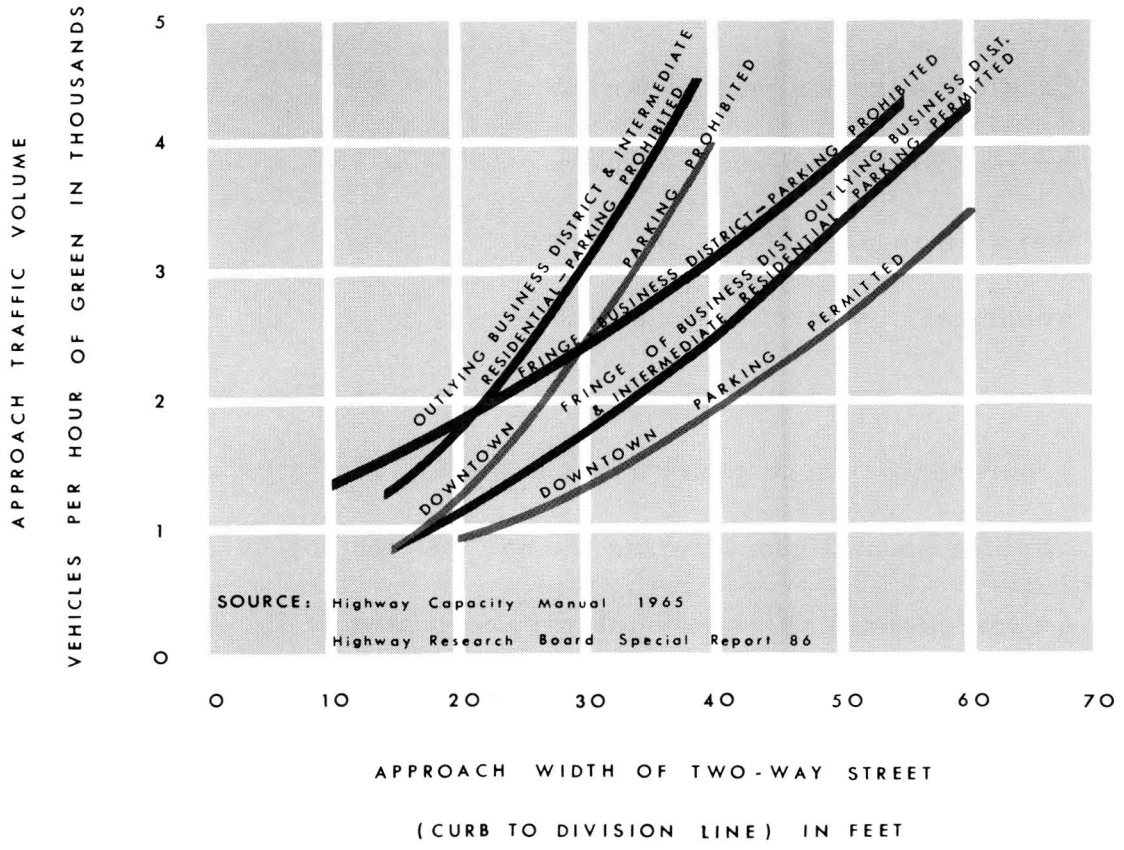
* Intersections studied

Of these 114 intersections, approaches to 95 where the traffic flow situation was generally normal were studied. The others were disregarded because of the abnormal street and traffic conditions occurring at intersections where either construction was in progress or where pedestrians and school children crossed frequently at some special hours during the day and flashing beacons were installed for caution. Of the 95 intersections studied, 70 were located in the City of Galveston, 20 in Texas City, 3 in La Marque, 1 in the Dickinson area, and 1 in League City.

Many factors affect the intersection capacity and levels of service, including physical and operating conditions of the roadways, environmental factors which are related to the experience and actions of the driver in different cities of different sizes, and traffic control measures. Information regarding physical features of the streets and traffic control devices was partly supplied by cities; other information was obtained

by field measurement and on-the-ground inspection. Data concerning the traffic volume passing through the intersection, the percentage of turning and through movements, and the composition of traffic were obtained at p.m. peak hours by personnel from the Study Office.

Practical capacities from the updated curves of the 1950 Highway Capacity Manual for intersection approaches are shown in Figure 2-9.



INTERSECTION CAPACITIES

FIGURE 2-9

The traffic flow efficiency of each intersection approach in Galveston County was determined by a "congestion index" which is the ratio of the practical capacity to the actual peak-hour approach volume. A

congestion index below 1.00 indicates that undesirable congestion is probable under normal existing traffic conditions in peak hours. Table 2-2 lists all intersection approaches where undesirable congestion is likely to exist.

TABLE 2 - 2

MOST CONGESTED INTERSECTIONS

Intersection	City	Direction of Approach	Peak Hour Practical Capacity	Peak Hour Approach Volume	Congestion Index
SH 3-FM 518	League City	N	320	398	0.80
9th St.-9th Ave.N.	Texas City	S	321	442	0.73
SH 146-SH 348 (5th Ave.S.)	Texas City	N	208	217	0.96
SH 146-SH 348	Texas City	S	212	370	0.57
SH 146-SH 348	Texas City	E	735	810	0.91
SH 3-Texas Ave.	La Marque	E	414	536	0.77
Broadway-6th St., Seawall	Galveston	N	362	535	0.68
Broadway-27th St.	Galveston	E	1,600	1,765	0.91
Broadway-29th St.	Galveston	E	1,651	1,826	0.90
Broadway-31st St.	Galveston	E	1,548	1,920	0.81
Broadway-33rd St.	Galveston	E	1,592	1,714	0.93
Broadway-35th St.	Galveston	E	1,554	1,871	0.83
Broadway-37th St.	Galveston	E	1,560	1,854	0.84
Broadway-39th St.	Galveston	E	1,515	1,827	0.83
Broadway-43rd St.	Galveston	E	1,696	1,780	0.95
Broadway-46th St.	Galveston	E	1,501	1,553	0.97
Broadway-51st St.	Galveston	E	1,517	1,562	0.97

In the City of Galveston, Broadway is a long section of roadway which carries the heaviest traffic flow in the study area. Broadway has

good progressive synchronization of traffic signals. East approaches at signalized intersections from 8th to 59th Street were analyzed during the evening peak hour.

Although parking is permitted on Broadway, the influence of parking on this section does not greatly impede traffic. If "no parking" restrictions were introduced on the section, however, only five approaches would give a congestion index below 1.00, whereas eleven approaches indicate congestion when parking is present.

Weekday afternoon peak-hour traffic during the school months in 1965 at east approaches to intersections amounted to 1,000 to 1,300 vehicles per lane per hour of green signal time along a two-mile stretch of Broadway. With modification, Broadway may be able to handle 1,500 vehicles per lane per hour of green signal time while still maintaining a tolerable level of service to motorists. It is recommended that left turn lanes be built into intersection approaches handling more than 100 left turns per hour.

ROADWAY CAPACITY AND LEVEL OF SERVICE

Roadway capacity refers to conditions on long sections of road rather than at localized intersections.

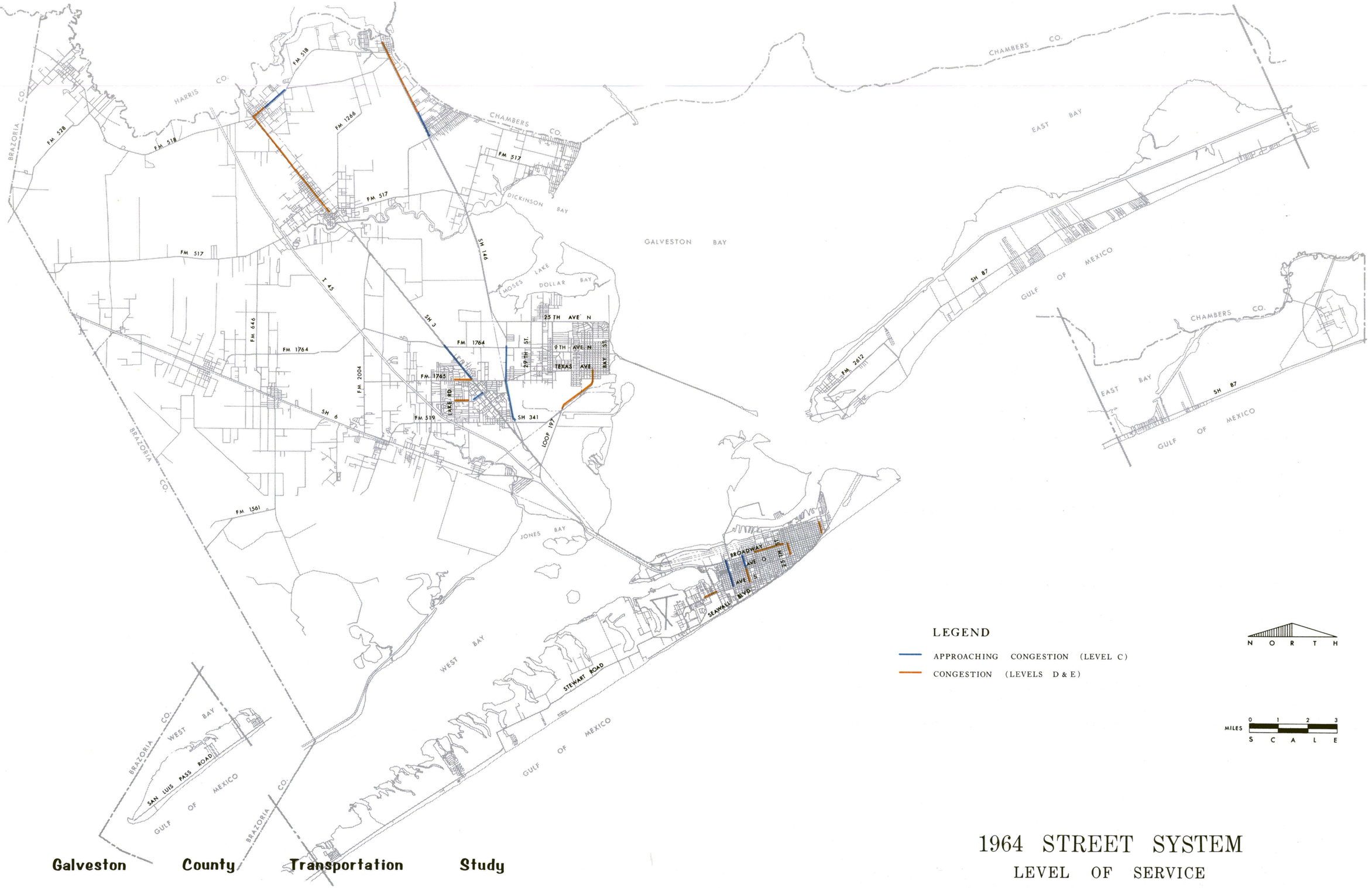
For level of service studies, major highways were classified either as freeways or as expressways. Freeways have full control of access and grade separations at intersections; expressways may have only partial control and separations. The Gulf Freeway is the only highway in the

study area to fall into either category.

For these highways, level of service is measured by operating speed and a service volume-capacity ratio. Operating speed on the Gulf Freeway within Galveston County is above 55 mph and the maximum directional hourly service volume ever recorded along the four-lane section was about 1,000 vehicles per hour and 3,000 vph through the six-lane section. The volumes correspond with volume/capacity ratios of .50 and .60 respectively. These are equivalent to a B level of service to users in the study area during the peak hour, but are approaching the C level as volume steadily increases.

Highways without access control required different level-of-service evaluation criteria. Consideration was given to four types of uncontrolled access highways: (1) Multilane highways in outlying areas, (2) Two-lane rural highways, (3) Urban and suburban arterials, (4) Streets in central business district areas. In the study area, all roadways were studied with emphasis placed on two-lane roadways because of their susceptibility to congestion and accidents. The map in Figure 2-10 reveals the control sections with two lanes found to be providing substandard (D, E, and F) levels of service and those sections approaching substandard (D) level of service. The only multilane facility providing a substandard level of service was Broadway from Rosenberg to 39th Street in the City of Galveston.

FIGURE 2 - 10



LEGEND

APPROACHING CONGESTION (LEVEL C)

CONGESTION (LEVELS D & E)

NORTH

MILES 0 1 2 3

SCALE

1964 STREET SYSTEM

LEVEL OF SERVICE

Galveston County Transportation Study

DESIGN CAPACITY AND LEVEL OF SERVICE

Levels of service are indicators of different operating conditions that roadways give when accommodating various traffic volumes. The operating conditions include speed and travel time, traffic interruptions, freedom to maneuver, driver comfort and convenience; and, indirectly, safety and operating costs. Level of service can be high or low depending upon the relationship between the physical characteristics of a highway and the traffic stream. One purpose of this part of the study is to guide design work by establishing levels of service adequate for the study area's roads.

"Average running speed", which corresponds to "level of service", is used by the designer to describe the desired operating conditions he expects to provide. From previous nationwide trends in the average running speed, coupled with continual improvements in vehicles and highways, it can be anticipated that the average running speed in 20 years may be substantially faster than it is now.

Based on this assumption and to accommodate driver desire, the following ranges of average running speed and corresponding levels of service are recommended for roadway design:

Type of Facility	Traffic Flow Characteristics	Suburban		Urban	
		Average Peak-Hour Speed	Level of Service	Average Peak-Hour Speed	Level of Service
Freeway, Expressway & Rural Arterials	Uninterrupted	50-55	B	40-45	C
Urban & Suburban Arterial, Streets	Interrupted	30-35	B	25-30	B

It is believed that highway users find these running speeds and levels of service acceptable under conditions of peak-hour traffic. It is generally not economical to design a facility that will allow higher levels of service during the peak hours.

Traffic capacity standards used in the study area for design purposes are shown in Table 2-3.

TABLE 2 - 3

RECOMMENDED CAPACITY STANDARDS

Number of Lanes	Highway Type	Capacity Standards In ADT, Both Directions
2	Arterial	6,800 - 9,000
4	Arterial	12,000 - 20,000
	Expressway	17,500 - 28,000
	Freeway	30,000 - 52,000
6	Arterial	16,000 - 28,000
	Expressway	27,000 - 42,000
	Freeway	50,000 - 75,000

Note: Capacity range results from different developed areas

TRAVEL TIME

It is difficult to express the value that should be placed on a person's travel time but the traffic engineer must consider this element whenever proposals for new facilities or improvements of existing ones are planned.

In other chapters of this report each study deals with a part of the major street system. Travel time, however, deals with the complete system; it analyzes the time it takes a vehicle to travel from one point to another. After the service level of the system is established, a guide should be formulated to assist in deciding whether or not the street is being used efficiently.

A specially equipped car made traffic runs to collect travel time data on major thoroughfares in Galveston County mainly during off-peak

hours. In addition, peak morning and afternoon runs were made on selected streets primarily in the Galveston Central Business District.

On each run the delay and running times were recorded. Off-peak and peak-hour averages were determined for each direction on the selected routes. Travel times were also calculated for segments within each route.

Table 2-4 shows the standard speeds and rates of motion recommended by the NCUT Manual 7A.[1]

TABLE 2-4

DESIRABLE OPERATING STANDARDS

Type of Facility	Over-All Speed (MPH) Peak Hour	Over-All Speed (MPH) Off-Peak Hour	Rate of Motion (Min./Mi.) Peak Hour	Rate of Motion (Min./Mi.) Off-Peak Hour
Expressway	35	35-50	1.71	1.71-1.20
Major Arterial	25	25-35	2.40	2.40-1.71
Collector	20	20-25	3.00	3.00-2.40
Local	10	10-20	6.00	6.00-3.00

With Table 2-4 as a guide, the delay rate can be calculated. The delay rate represents the difference between the recommended standard rate of motion and the actual rate measured in Galveston County; the higher the rate, the poorer the street functions. The hourly vehicle volume can be multiplied by the delay rate to determine the time lost

[1] National Committee on Urban Transportation, Standards for Street Facilities and Services, Procedure Manual 7A. Public Administration Service, 1958, (Ann Arbor, Michigan: Cushing Malloy Inc.)

TABLE 2 - 5
AVERAGE SPEEDS BELOW RECOMMENDED MINIMUMS, OFF - PEAK

STREET LOCATION AND NAME	SECTION LIMITS	EXPRESSWAY (35-50 MPH)*	MAJOR ARTERIAL (25-35 MPH)*	COLLECTOR (20-25 MPH)*	LOCAL (10-20 MPH)*	DELAY RATES (MIN./MILE)
A. MAINLAND						
Ninth Ave. N. (F.M. 1764)	6th St. to 9th St.		19			0.81
Main St. (F.M. 519)	SH 146 to SH 3		20			0.60
State Highway 3	Texas Ave. to 1st		21			0.42
Texas Ave. (S.H. 348)	6th St. to 9th St.		21			0.48
Pine Dr. (F.M. 517)	SH 3 to FM 1266		21			0.44
First St.	Bayou Rd. to Texas Ave.		22			0.32
Cedar Dr.	SH 3 to Bayou Dr.		24			0.10
Ninth St.	Texas Ave. to 9th Ave. N		24			0.14
Ninth St.	9th Ave. N. to 25th Ave. N		24			0.10
Deats Rd.	FM 1266 to SH 3		24			0.14
Main St. (F.M. 518)	Kansas Ave. to SH 3		24			0.05
B. ISLAND						
Rosenberg (25th St.)	Strand to Broadway		17			1.68
University Blvd.(6th St.)	Market to Broadway		18			1.15
Ave. O	33rd St. to 39th St.		18			0.94
Market (Ave. D)	University Blvd. to 19th St.		19			0.79
Ave. O	21st St. to 33rd St.		19			0.75
Rosenberg (25th St.)	Broadway to Seawall Blvd.		20			0.66
45th St.	Ave. S to Seawall Blvd.		20			0.64
53rd St.	Broadway to Ave. S		22			0.39
Ave. S	Seawall to 39th St.		22			0.37
39th St.	Ave. O to Ave. S		22			0.36
Broadway Blvd.	Rosenberg to 39th St.		22			0.34
45th St.	Ave. O to Ave. S		23			0.30
39th St.	Broadway to Ave. O		23			0.30
Ave. O	39th St. to 45th St.		23			0.17
Ave. S	45th St. to 53rd St.		23			0.14
Broadway Blvd.	Seawall Blvd. to 14th		23			0.14
53rd St.	Ave. S to Seawall Blvd.		23			0.14
Broadway Blvd.	14th St. to Rosenberg		24			0.11
Ave. O	45th St. to 53rd St.		24			0.02

*Desirable Operating Speeds

traveling the control section during that hour. Table 2-5 shows the control sections with excessive off-peak delays. Additional segments with excessive delay rates during the peak hours are listed in Table 2-6.

TABLE 2 - 6
AVERAGE SPEEDS BELOW RECOMMENDED MINIMUMS, PEAK HOUR

STREET LOCATION AND NAME	SECTION LIMITS	EXPRESSWAY (35-50 MPH)*	MAJOR ARTERIAL (25-35 MPH)*	COLLECTOR (20-25 MPH)*	LOCAL (10-20 MPH)*	DELAY RATES (MIN/MILE)
A. MAINLAND						
Bay St.	Texas Ave. to 9th Ave. N		17			1.06
Texas Ave.	Bay St. to 6th St.		17			1.06
Texas Ave. (SH 348)	6th St. to 9th St.		21			0.39
B. ISLAND						
Market (Ave. D)	19th St. to Rosenberg				8	4.71
Kempner (22nd St.)	Water to Market				6	4.25
Broadway Blvd.	Rosenberg to 39th St.		18			0.85
Tremont (23rd St.)	Market to Broadway				6	0.69
Broadway Blvd.	14th St. to Rosenberg		20			0.64
Broadway Blvd.	45th St. to 53rd St.		21			0.58
Broadway Blvd.	6th St. to Seawall Blvd.		23			0.30
Broadway Blvd.	61st St. to 53rd St.		23			0.26
Broadway Blvd.	Port Industrial to 61st St.	31				0.25
Broadway Blvd.	39th St. to 45th St.		23			0.22
Seawall Blvd.	Broadway to Ferry Rd.		24			0.16
Moody (21st St.)	Strand to Broadway				10	0.15

*Desirable Operating Speeds

Certain beneficial control techniques such as adjustments in signal timing, added turning lanes, one-way operation, parking restrictions, and diversions of traffic flow to adjacent parallel routes should be considered to relieve these control sections. Remedial considerations will be discussed in a later chapter.

Travel time from various places in Galveston County is illustrated on the Travel Time Contour Map in Figure 2-11. The contour lines (isochrones) connect points of equal travel time and also show the distance that can be reached in any direction during a given time.

ACCIDENTS

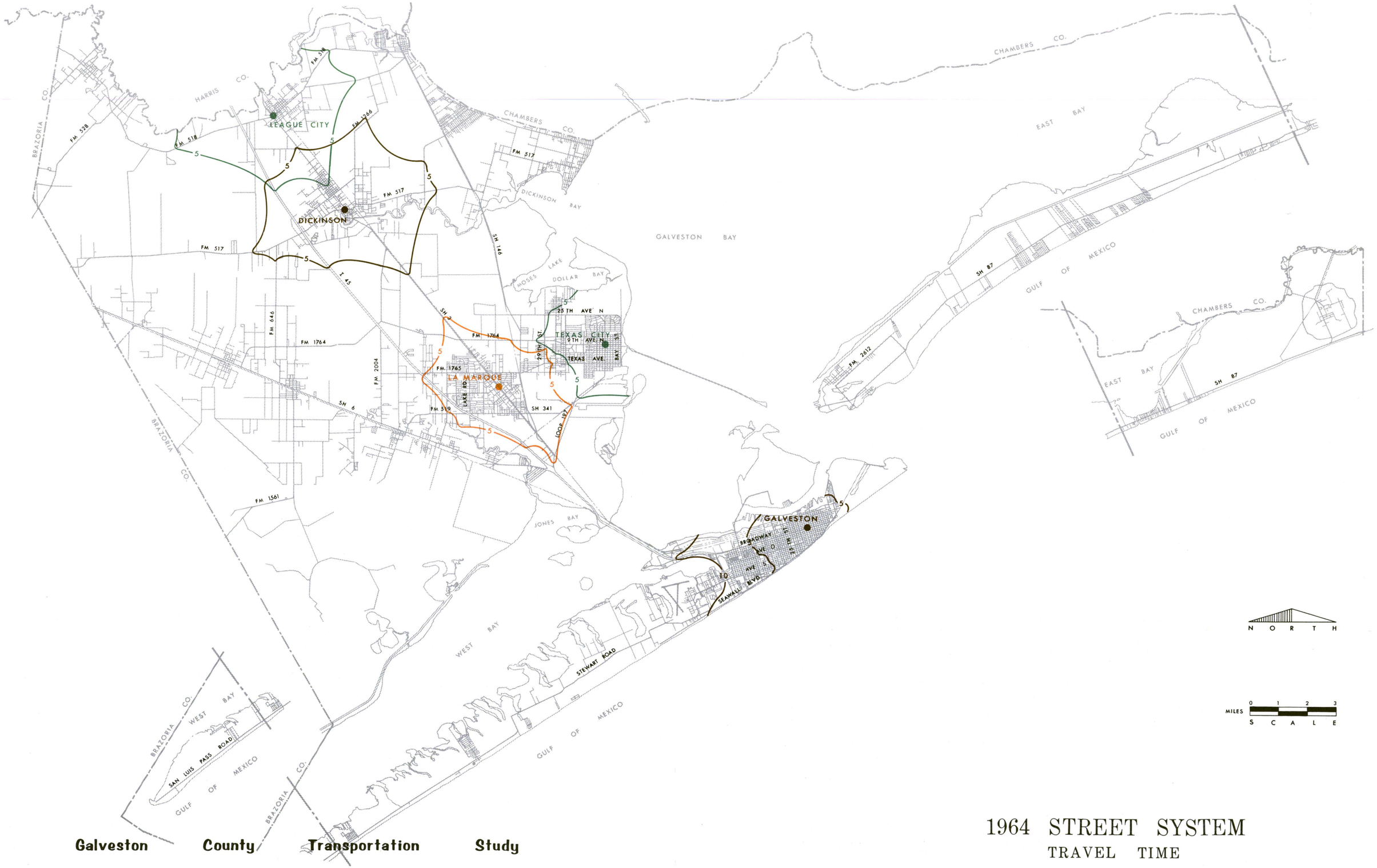
Traffic accidents are the most publicized factors associated with inadequacies in the existing level of street service.

A basic purpose in analyzing traffic accidents is to develop an official awareness of the problem so that it may be attacked using modern engineering techniques to help eliminate as many accidents as possible.

This investigation of Galveston County points out locations in the existing street system which have unusually high traffic accident rates. Corrective measures or techniques that may be applied to these locations to make them safer will be included in the chapter on Traffic Control Features.

The State of Texas requires the submission of a written report on all accidents involving personal injury or property damage of $25.00

FIGURE 2 - II



Galveston County Transportation Study

1964 STREET SYSTEM

TRAVEL TIME

NORTH

MILES 0 1 2 3

SCALE

or more. These mandatory reports were compiled by the Study Office and were used as the base data for this study.

However, the reports compiled from the Sheriff's Department, Highway Patrol, and various police departments in Galveston County, were not uniformly reliable because a wide variation existed in the written reports made by the reporting officials. Nevertheless, the majority of the data were satisfactory for the purpose of analyzing accident problem spots in the road and street network of Galveston County.

Only major street intersection accident information was collected for 1962 and 1963. All recorded accidents in 1964 within the county were collected for analysis, and all recorded accidents in the City of Galveston in 1965 were gathered. The list in Table 2-7 indicates the governmental agencies and the number of accidents occurring within their jurisdiction during 1964.

TABLE 2-7

SUMMARY 1964 ACCIDENTS

Jurisdiction	Property Damage	Injury	Fatal	Total
Galveston	2,061	478	11	2,550
Texas City	504	107	3	614
La Marque	215	91	2	308
Hitchcock	67	30	1	98
League City	47	17	-	64
Kemah	39	16	-	55
Friendswood	17	5	-	22
County	291	106	-	397
Total	3,241	850	17	4,108

The 1964 accidents for this part of the discussion were classified into two categories – accidents occurring at intersections not included in the control section study, and accidents occurring along control sections. For the control section study, the intersections included were

all of those lying within the terminals of that control section, but not the terminal intersections. When an intersection was in intersecting sections, but not the terminal of either, half of the accidents of the intersection were recorded in each control section. If an intersection was the terminal of a control section, but not the terminal of an intersecting section, the accidents were studied with the intersecting section. Table 2-8 shows 1962 through 1964 high collision intersections. Control section analysis

TABLE 2 - 8

1962 - 1964 HIGH COLLISION INTERSECTIONS

LOCATION		ACCIDENTS			
INTERSECTION	CITY	1962	1963	1964	TOTAL
Palmer Hwy. (F.M. 1764) and S.H. 3	Texas City	27	21	34	82
Broadway Blvd. and 53rd St.	Galveston	28	32	20	80
Broadway Blvd. and Rosenberg (25th St.)	Galveston	21	27	22	70
Texas Ave. (S.H. 348) and S.H. 146	Texas City	17	23	22	62
9th Ave. N. (F.M. 1764) and 9th St.	Texas City	11	21	18	50
Broadway Blvd. and 39th St.	Galveston	8	20	21	49
Broadway Blvd. and 45th St.	Galveston	11	23	12	46
Texas Ave. (S.H. 348) and 6th St. (Loop 197)	Texas City	8	18	18	44
Palmer Hwy. (F.M. 1764) and S.H. 3	Texas City	13	9	18	40
Texas Ave. (S.H. 348) and 21st St.	Texas City	11	16	11	38
Seawall Blvd. and 61st St. (Spur 342)	Galveston	17	9	6	32
Seawall Blvd. and Rosenberg (25th St.)	Galveston	10	9	12	31
Palmer Hwy. (F.M. 1764) and Center St. (29th St.)	Texas City	4	12	9	25
Broadway Blvd. and University Blvd. (6th St.)	Galveston	2	6	15	23
Seawall Blvd. and 14th St.	Galveston	7	11	4	22
9th Ave. N. (F.M. 1764) and 21st St.	Texas City	4	5	13	22
Texas Ave. (S.H. 348) and 9th St.	Texas City	8	2	9	19
Texas Ave. (S.H. 348) and S.H. 3	La Marque	1	6	11	18
9th Ave. N. (F.M. 1764) and 6th St. (Loop 197)	Texas City	4	3	7	14
S.H. 146 and 25th Ave. N. (Loop 197)	Texas City	4	-	10	14
Texas Ave. (S.H. 348) and Center St. (29th St.)	Texas City	2	5	7	14
61st St. (Spur 342) and Ave. S	Galveston	-	10	3	13
Seawall Blvd. and Ferry Rd. (S.H. 87)	Galveston	-	-	11	11
Texas Ave. (S.H. 348) and 5th Ave. S	Texas City	1	2	8	11

involved rating each section for the accidents per mile and accidents per million vehicle miles. The ratings were then evaluated to determine a common list of the most destructive locations in the county, which are shown in Table 2-9. From these two tables, it is evident that the majority of accidents in Galveston County occurred in the City of Galveston. Therefore, a more detailed study of this city was desired.

TABLE 2 - 9

1964 EXCESSIVE ACCIDENT RATES BY CONTROL SECTION

STREET NAME	LOCATION SECTION LIMITS	CITY	ACCIDENTS PER MILE	ACCIDENTS PER MILLION VEHICLE MILES
9th Ave. N. (F.M. 1764)	6th St. to 9th St.	Texas City	78.57	22.74
14th St.	Market to Broadway	Galveston	15.79	19.57
Moody (21st St.)	Strand to Broadway	Galveston	49.02	19.46
33rd St.	Market to Broadway	Galveston	23.68	19.42
39th St.	Ave. O to Ave. S	Galveston	20.00	18.26
Ave. S	45th St. to 53rd St.	Galveston	28.81	17.64
Texas Ave.	Bay St. to 6th St.	Texas City	25.00	17.12
Ave. S	39th St. to 45th St.	Galveston	27.27	16.69
14th St.	Broadway to Seawall Blvd.	Galveston	13.33	16.44
Ave. S	53rd St. to 61st St.	Galveston	31.67	16.42
Ave. O	39th St. to 45th St.	Galveston	22.73	16.31
Moody (21st St.)	Broadway to Ave. O	Galveston	24.44	15.53
Ave. S	Seawall Blvd. to 39th St.	Galveston	15.00	14.85
Market (Ave. D)	19th St. to Rosenberg	Galveston	24.44	14.76
Market (Ave. D)	University Blvd. to 19th St.	Galveston	20.21	13.55
Tremont (23rd St.)	Strand to Broadway	Galveston	25.49	13.14
Rosenberg (25th St.)	Strand to Broadway	Galveston	33.33	12.22
Market (Ave. D)	Rosenberg to 33rd St.	Galveston	20.55	12.16
Rosenberg (25th St.)	Broadway to Seawall Blvd.	Galveston	17.28	11.73
6th St. (Loop 197)	Texas Ave. to 9th Ave. N	Texas City	35.94	11.71
State Highway 3	16th St. to Deats Rd.	Dickinson	26.67	11.54
Ave. O	33rd St. to 39th St.	Galveston	18.18	11.54
Strand (Ave. B)	10th St. to Rosenberg	Galveston	17.43	11.01
Broadway Blvd.	Rosenberg to 39th St.	Galveston	144.55	10.89
Texas Ave. (S.H. 348)	6th St. to 9th St.	Texas City	39.29	10.54

In the City of Galveston twenty-three intersections had five or more accidents in 1964; by 1965 there were fifty-two of these intersections. Table 2-10 shows 1965 high-accident intersections and the type of intersection control.

The twenty control sections in the City of Galveston studied earlier were investigated using 1965 accidents. Total accidents on those control sections increased 34 percent over 1964 accidents. Since a regular volume counting program has not been established in the city, a three percent increase was applied to the 1964 traffic volume in each section. This corresponds satisfactorily with the 1964-1966 annual increase recorded by the daily volume counting machine near the causeway on the Gulf Freeway (IH 45). Accidents per million vehicle miles increased from thirteen to seventeen for a 31 percent greater accident incidence

TABLE 2 - 10

1965 HIGH ACCIDENT INTERSECTIONS -

CITY OF GALVESTON

INTERSECTION	ACCIDENTS 1964	ACCIDENTS 1965	1965 ACCIDENT ANALYSIS Property Damage	Personal Injury	Fatality	TRAFFIC CONTROLS
Broadway Blvd. and Rosenberg (25th St.)	22	31	26	5		Traffic Signal
Broadway Blvd., Seawall Blvd. and University Blvd. (6th St.)	17	29	21	8		Traffic Signal
Broadway Blvd. and 59th St.	20	22	16	6		Traffic Signal
Broadway Blvd. and Moody (21st St.)	13	19	17	2		Traffic Signal
Broadway Blvd. and 53rd St.	20	19	17	2		Traffic Signal
Broadway Blvd. and 31st St.	4	15	13	2		Traffic Signal
Broadway Blvd. and 43rd St.	12	15	11	4		Traffic Signal
Broadway Blvd. and 45th St.	12	15	13	2		Traffic Signal
Broadway Blvd. and 35th St.	7	14	9	4	1	Traffic Signal
Broadway Blvd. and 39th St.	21	14	11	3		Traffic Signal
Broadway Blvd. and 51st St.	11	14	12	2		Traffic Signal
Broadway Blvd. and Tremont (23rd St.)	13	12	11	1		Traffic Signal
Broadway Blvd. and 33rd St.	8	12	11	1		Traffic Signal
Broadway Blvd. and 27th St.	8	11	7	4		Traffic Signal
Broadway Blvd. and 27th St.	8	11	7	4		Traffic Signal
Broadway Blvd. and 29th St.	14	9	7	2		Traffic Signal
Broadway Blvd. and 34th St.	2	9	7	2		Stop Sign
Ave. O½ and 19th St.	6	8	5	3		No Traffic Control
Winnie (Ave. G), and 10th St.	4	7	6	1		No Traffic Control
Market (Ave. D), and Rosenberg (25th St.)	2	7	5	2		Traffic Signal
Seawall Blvd. and 14th St.	4	7	6	1		Traffic Signal
Seawall Blvd. and 53rd St.	4	7	5	2		Traffic Signal
Seawall Blvd. and Rosenberg (25th St.)	12	7	6	1		Traffic Signal
Seawall Blvd. and Moody (21st St.)	12	6	6			Traffic Signal
Seawall Blvd. and Tremont (23rd St.)	3	6	4	2		Traffic Signal
Seawall Blvd. and 39th St.	1	6	5	1		Traffic Signal
Seawall Blvd. and 61st St. (Spur 342)	6	6	4	2		Traffic Signal
Sealy (Ave. I), and Moody (21st St.)	1	6	6			Stop Sign
Ave. S and 57th St.	0	6	3	3		Blinking Caution
Ave. S and 61st St. (Spur 342)	3	6	3	2	1	Traffic Signal
Broadway Blvd. and 18th St.	10	5	4	1		Traffic Signal
Broadway Blvd. and Kempner (22nd St.)	1	5	4	1		Stop Sign
Broadway Blvd. and 26th St.	7	5	5			Stop Sign
Broadway Blvd. and 44th St.	0	5	3	2		Stop Sign
Broadway Blvd. and 46th St.	4	5	3	1	1	Stop Sign
Market (Ave. D) and 16th St.	2	5	2	3		Stop Sign
Post Office (Ave. E) and Rosenberg (25th St.)	0	5	4	1		Traffic Signal
Post Office (Ave. E) and 28th St.	1	5	5			No Traffic Control
Church (Ave. F) and 5th St.	1	5	3	2		No Traffic Control
Church (Ave. F) and 18th St.	1	5	4	1		Stop Sign
Church (Ave. F) and 28th St.	6	5	4	1		No Traffic Control
Church (Ave. F) and 29th St.	4	5	4	1		Stop Sign
Ball (Ave. H) and Rosenberg (25th St.)	2	5	5			Traffic Signal
Ball (Ave. H) and 35th St.	3	5	3	2		Stop Sign
Ave. L and 17th St.	2	5	3	2		No Traffic Control
Ave. O and 43rd St.	4	5	3	2		Stop Sign
Ave. P and 39th St.	2	5	3	2		Stop Sign
Ave. P½ and 61st St. (Spur 342)	2	5	5			Traffic Signal
Ave. R and 30th St.	0	5	4	1		No Traffic Control
Seawall Blvd. and 17th St.	3	5	5			Stop Sign
Seawall Blvd. and 29th St.	3	5	2	3		Stop Sign
Seawall Blvd. and Ferry Rd. (SH 87)	11	5	4	1		Traffic Signal

over 1964. Table 2-11 shows the 1964 and 1965 accident comparisons.

The most accident-prone streets in Galveston are Broadway Boulevard and Seawall Boulevard. Together, these two streets acounted for a little more than a third of the city's annual vehicle accidents each year from 1963 to 1965:

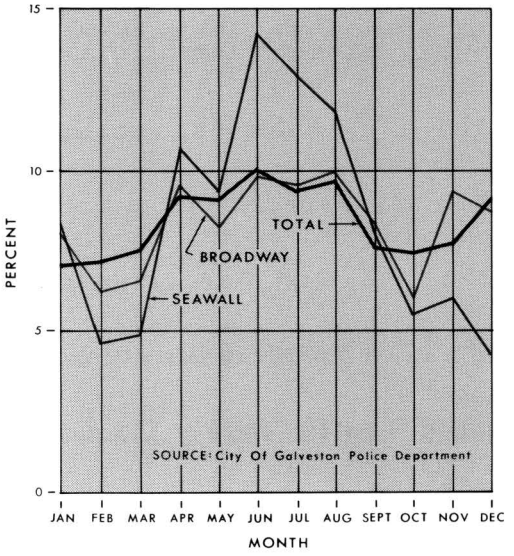
Year	Broadway Blvd. Accidents	Seawall Blvd. Accidents	City of Galveston Accidents
1963	591	207	2,372
1964	711	244	2,550
1965	612	289	2,537

TABLE 2 - 11

CONTROL SECTION ACCIDENT RATE COMPARISON
(HIGHEST 20 SECTIONS CITY OF GALVESTON)

STREET NAME	SECTION LIMITS	ACCIDENTS/MILE 1964	1965	± %	ACCIDENTS/MVM 1964	1965	± %
Broadway Blvd.	Rosenberg to 39th St.	145	186	+28	11	14	+27
Fourteenth St.	Market to Broadway	6	7	+17	20	22	+10
	Broadway to Seawall	6	6	-	16	16	-
Market (Ave. D)	University to 19th St.	20	35	+75	20	23	+15
	19th St. to Rosenberg	24	33	+38	15	20	+33
	Rosenberg to 33rd St.	21	33	+57	12	19	+58
Ave. O	33rd St. to 39th St.	18	36	+100	11	22	+100
	39th St. to 45th St.	23	18	-22	16	13	-19
Ave. S	Seawall Blvd. to 39th St.	15	22	+47	15	21	+40
	39th St. to 45th St.	27	34	+26	17	20	+18
	45th St. to 53rd St.	29	20	-31	18	12	-33
	53rd St. to 61st St.	32	35	+9	16	16	-
Strand (Ave. B)	10th St. to Rosenberg	15	28	+87	11	20	+82
Thirty-Third St.	Market to Broadway	24	34	+42	19	27	+42
Thirty-Ninth St.	Ave. O to Ave. S	20	22	+10	18	20	+11
Moody (21st St.)	Strand to Broadway	49	53	+8	19	20	+5
	Broadway to Ave. O	24	53	+121	16	33	+106
Tremont (23rd St.)	Strand to Broadway	26	49	+88	13	25	+92
Rosenberg (25th St.)	Strand to Broadway	33	31	-6	12	11	-8
	Broadway to Seawall	17	24	+41	12	15	+25

Figure 2-12 compares 1965 monthly accident fluctuations for Broadway and Seawall. Seawall has a sharp accident increase during the warm months which probably can be attributed to the influx of tourists attracted to the nearby beaches. Broadway is not near any major recreational area and has a steadier accident rate throughout the year.



1965 MONTHLY ACCIDENT FLUCTUATIONS

FIGURE 2 - 12

A complete summary of the

vehicle accidents for 1963 through 1965 for the City of Galveston is shown in Table 2-12.

TABLE 2 - 12

SUMMARY OF 1963 - 1965 CITY OF GALVESTON ACCIDENTS

	1963	1964	1965
Total Accidents	2,372	2,550	2,537
Total Personal Injuries	700	875	806
Total Personal Injury Accidents	441	478	457
Total Fatalities	9	16	13
Total Fatal Auto Accidents	3	11	8*
Total Pedestrian Accidents	71	88	67
Total Fatal Pedestrian Accidents	3	3	1
Total Auto-Bicycle Accidents (Injury)	20	28	22
Total Fatal Bicycle Accidents	0	1	0
Total Fatal Motorcycle Accidents	0	1	0

Source: 1965 Monthly City of Galveston Police Reports

* 1 Fatality was not listed due to being ruled a suicide

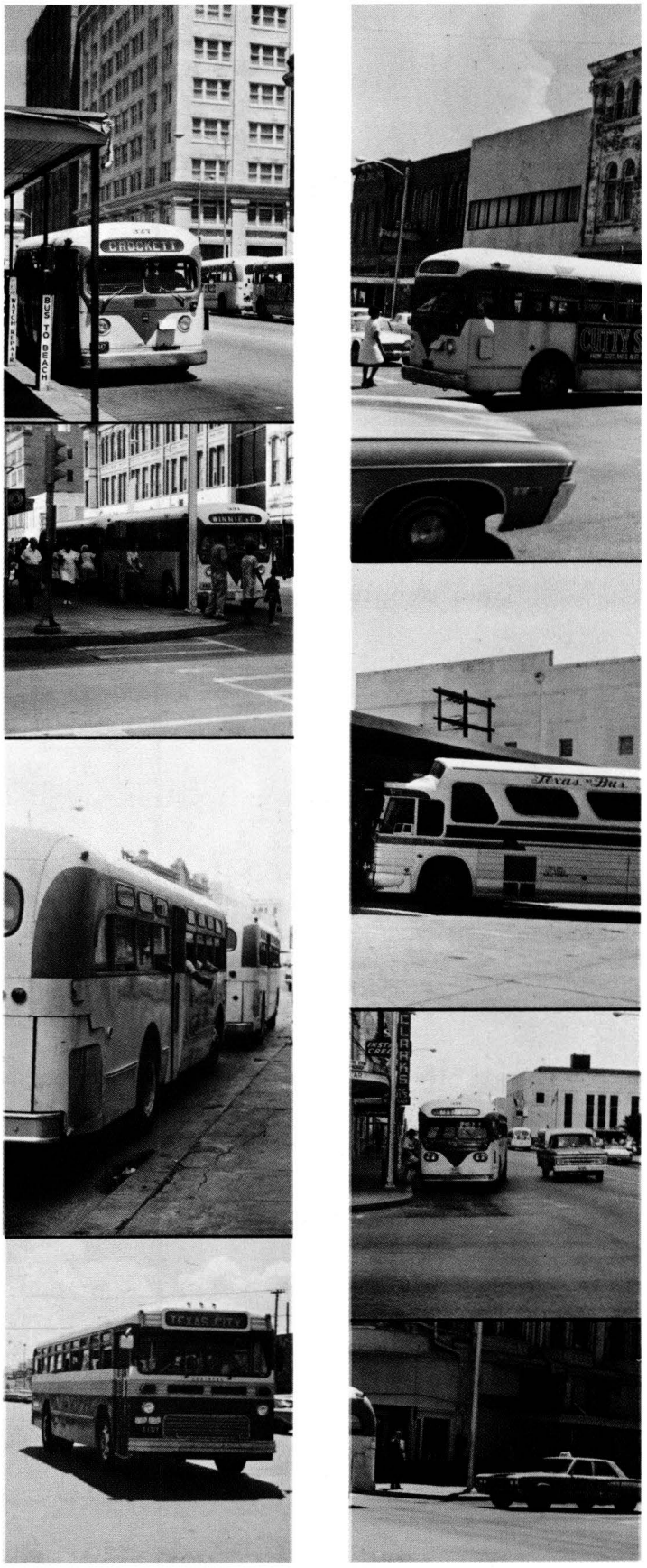
Even though the number of traffic accidents did not rise steadily from 1963 through 1965, property damage resulting from the accidents showed a steady increase. In 1963 damage amounted to $785,000; it rose to $871,000 in 1964 and reached $1,000,000 during the following year.

CONCLUSIONS AND RECOMMENDATIONS

Considerable attention has been given to highway safety in the past several years on the national level, through the office of the President of the United States, which resulted in congressional action dealing with many aspects of the problem. This attention has permeated to the State level, and was given major emphasis by the Governor's office, which also resulted in some worthwhile legislation. Many cities have created Traffic Safety Councils or Commissions to arouse the people, who are generally apathetic to the traffic safety problem.

It is recommended by the Coordinating Committee that programs on both the State and local level are needed to attack the traffic toll,

and that such programs should be given strong support. Also, each municipal government within the county could benefit by developing more conclusive accident reports and submitting the data to the National Safety Council for analysis. The Council requires uniform reporting standards in order to make comparisons between cities of the same size.



Chapter 3

Transportation Facilities - Mass Transit

Transportation Facilities - Mass Transit

INTRODUCTION

A problem confronting transportation planners in the larger metropolitan areas throughout the nation is rapidly nearing the critical stage. The problem deals with the movement of persons. At the present time, people enjoy several modes of travel for the long distance intercity trips, but they are more restricted in their choice of modes within the city or metropolitan area.

This chapter will primarily discuss the mass transit system within a local area, the City of Galveston. Public mass transit is defined as a system of common carrier facilities for the movement of persons, offering transportation service on a payment basis and operating on established schedules along designated routes and at designated stops. The operation within the city is either publicly owned and operated, or privately owned and operated under a franchise of the city.

The Galveston County Urban Transportation Study inventoried the county for transit usage. It was determined that all of the school districts maintain buses for student service, there are several private bus clubs operating out of the refineries, and a private company is operating in the City of Galveston. The other cities of the county do not have a public mass transit system. The transit system in the City of Galveston is owned by the Galveston Transit Company and is operating under a

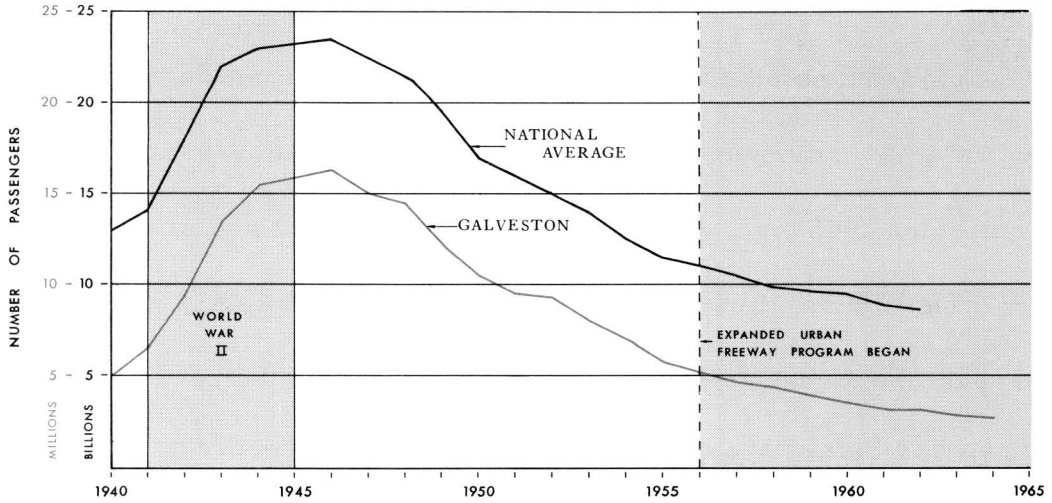
current franchise granted by the city in 1948. The company has provided service to the city since 1868.

TRANSIT CHARACTERISTICS

GROWTH TRENDS

After a steep plunge in urban mass transit partonage following World War II, transit riding trends have leveled off in recent years. Figure 3-1 indicates the national and Galveston trends since 1940. Note the rising trend prior to the war and sharp increase during the war. The decrease in transit riders after the expanded urban freeway program began cannot be attributed to that program because the rate of decrease beforehand was greater than after the program began. In reality, the program was far from completion even in 1964 when this study began.

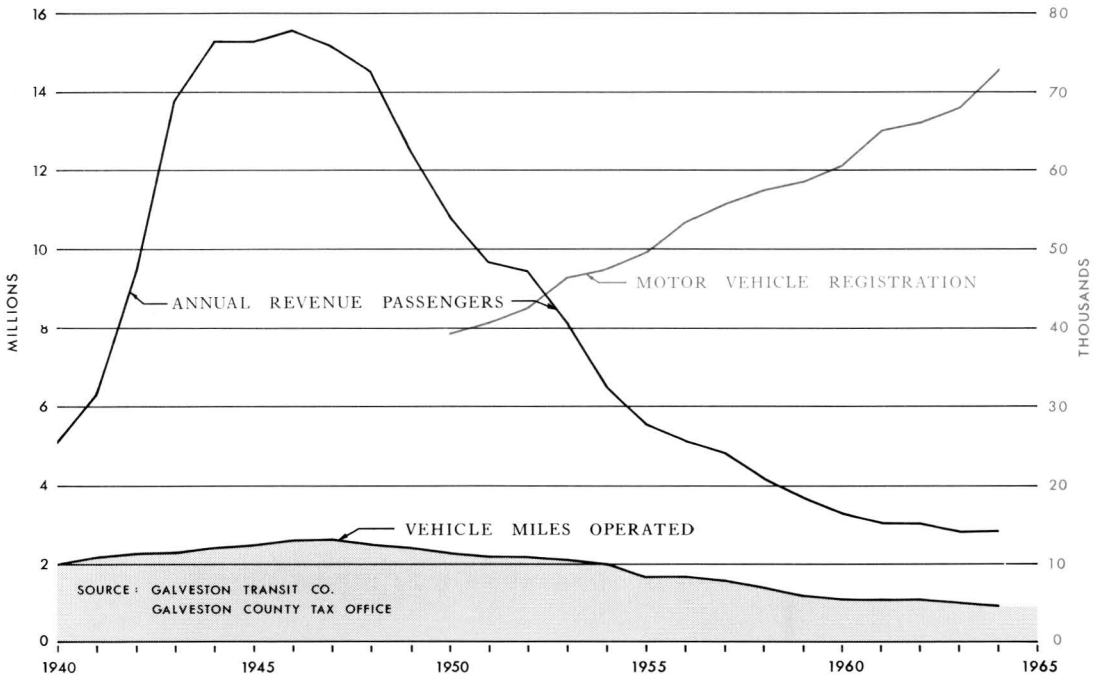
The Galveston Transit System experienced the same national trend.



TRANSIT PATRONAGE 1940 - 1964

FIGURE 3 - 1

Figure 3-2 shows the transit operations for the past 24 years. The downward trend in annual bus passengers is almost as sharp as the upward trend of motor vehicle registrations. Figure 3-2 also shows the annual vehicle miles operated by the transit company.



GALVESTON TRANSIT COMPANY OPERATIONS

FIGURE 3 - 2

It should be noted that bus route mileage has not decreased at the same rate as revenue passengers. Currently the revenue is only 18 percent of the 1946 high, while vehicle miles operated are still 38 percent of the 1946 figure. Bus service, then, is not completely responsive to lower patronage because it must maintain adequate frequency to be of utility to remaining patrons.

A potential asset to the company is the increasing population density in the City of Galveston. The density of 3,020 persons per square mile

already ranks it as one of the highest density cities in Texas. There are also increasing opportunities for profitable charter trips.

The remainder of this chapter will analyze the service provided by the 836 daily trips of the Galveston Transit Company, and the travel pattern characteristics obtained from interviews during the Origin-Destination Survey of 1964. Intercity bus operations will also be discussed.

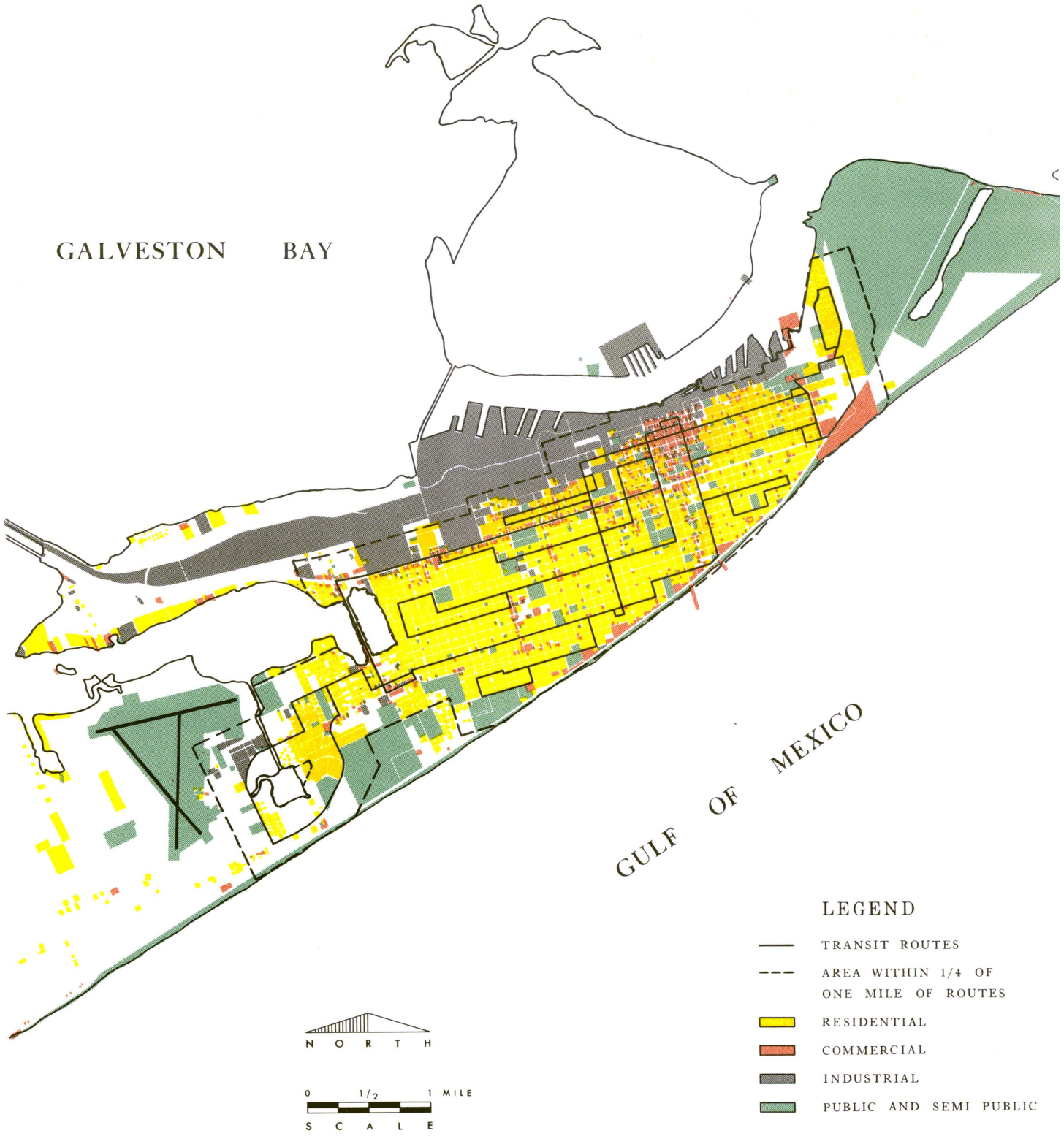
TRANSIT SERVICE

ROUTES AND COVERAGE

The 65.7 route miles operated by the Galveston Transit Company are shown in Figure 3-3 superimposed on a 1964 land use map. The dotted line encloses an area which is within one-fourth mile, or about three minute's walking time, of a bus route. The map demonstrates that more than 95 percent of the residents in the area have convenient access to public transit. Those persons on the extreme south end of 57th Street require a little more walking time to reach bus stops.

FREQUENCY OF SERVICE AND PASSENGER LOADING

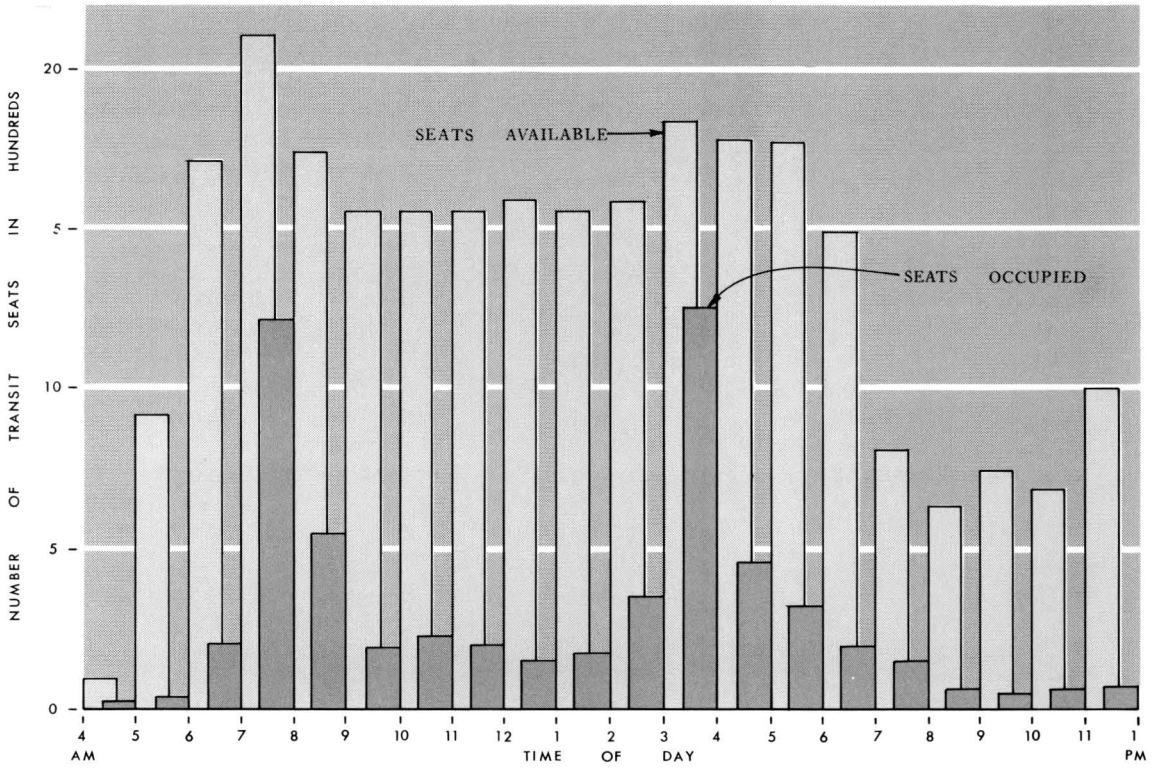
The elapsed time between buses is a critical factor to the person deciding whether to use the transit system or another mode of travel. Headways, the time between buses, in the City of Galveston vary with the time of day. Figure 3-4 shows the hours of greatest bus usage and the number of seats available during those hours. Some bus routes



AREA SERVED BY PUBLIC TRANSIT

Galveston County Transportation Study

FIGURE 3 - 3



BUS OCCUPANCY

FIGURE 3 - 4

probably experience congested conditions during peak hours (6 to 9 a.m. and 3 to 6 p.m.). Table 3-1 shows each route by service type and headway periods.

A difficult decision confronting bus company officials is deciding whether to lengthen headways by removing buses to increase loads or continue short headway times with fewer passengers per bus. Galveston officials have tried to keep high service frequency even though passenger usage has fallen off on some lines.

Passenger load checks assist the company in determining passenger volume along a route. Load checks are normally made according to a scheduled program at predesignated points where the maximum passen-

TABLE 3 - 1

TRANSIT ROUTE HEADWAYS

Route	Service	Peak	Off Peak	Night
Winnie & O-West	Reg.	10 Min.	20 Min.	40 Min.
Winnie & O-East	Reg.	15 Min.	30 Min.	60 Min.
West End	Reg.	20 Min.	40 Min.	None
Broadway & M-West	Reg.	7½ Min.	15 Min.	30 Min.
Broadway & M-East	Reg.	15 Min.	30 Min.	60 Min.
Crockett	Reg.	10 Min.	20 Min.	40 Min.
Market	Reg.	3½ Min.	7 Min.	15 Min.
33rd Street	Shuttle	15 Min.	None	None
Bayou	Shuttle	60 Min.	None	None
Lindale	Shuttle	30 Min.	None	None

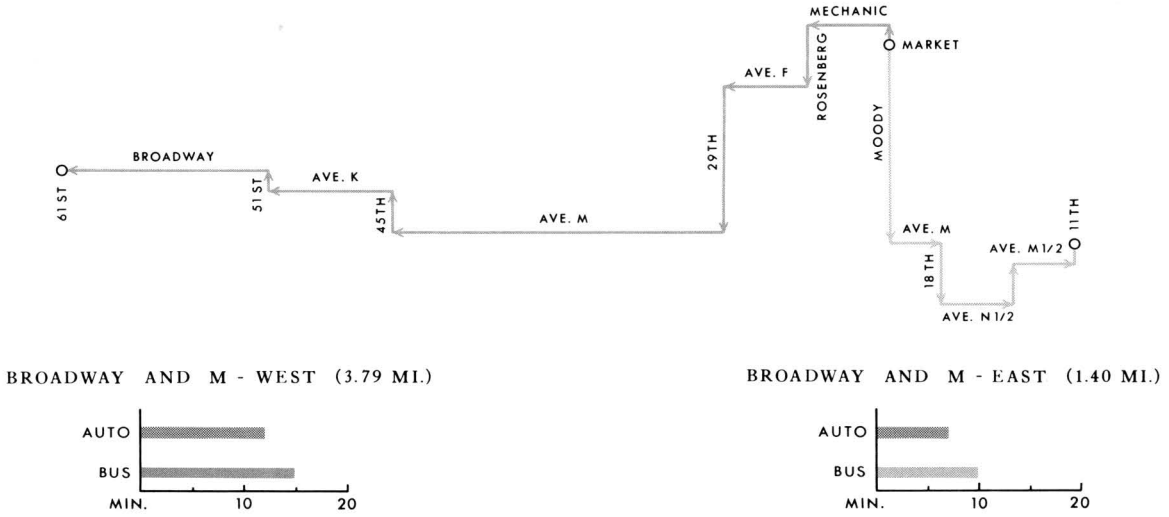
ger loads occur. Although passenger load checks are not regularly recorded, special checks are made when necessary.

The only designated bus stops in the City of Galveston are located at the curb in the Central Business District, and in the Medical Center area. Three stops are at Market and 21st Street, two stops at Mechanic and 22nd Street, and one each at Church and 21st Street, and Church and 25th Street. There is one bus stop on University Boulevard north of Market Street. The general procedure of the bus company is to stop for passengers at any point along the line.

RUNNING TIME AND SPEED AND DELAY

Transit running time or the overall speed of operation is another important measure of convenience to the public. Generally speaking, the

overall average speed of all the routes is faster than 15 mph, which is above the recommended national standard for local service.[1] Two routes were selected to compare the time required to travel the same distance on the same route by both bus and private automobile. The travel times were calculated for the buses by using the scheduled running times established by the company. The travel times of the automobiles were determined from the results of speed and delay studies. Figure 3-5 shows the results of this comparison which indicates bus travel times relate favorably with the auto times.



COMPARATIVE TRAVEL TIME

FIGURE 3 - 5

TRAVEL ANALYSIS

The Origin-Destination Survey made in 1964 revealed that on an average weekday 512,281 person trips were made within the study area.

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[1] Better Transportation for Your City, National Committee on Urban Transportation, Public Administration Service, 1958.

The drivers of all types of vehicles accounted for 63 percent and passengers accounted for 37 percent of all person trips. Automobile drivers alone tallied 53 percent of the total internal trips. Bus passengers made up 12 percent of all passenger trips, including school as well as bus transit operations.

The trip data have been separated into those trips Island-oriented, and those on the Mainland. Several modes of travel have been selected for comparison. The trips are shown in Table 3-2. Commercial and Taxi driver trips were not included in this tabulation.

TABLE 3-2

MODES OF TRAVEL

Type Mode	Island Trips	Island %	Mainland Trips	Mainland %	Total Trips	Total %
Walk	1,493	0.8	291	0.1	1,784	0.4
Auto Driver	113,518	60.2	156,609	57.4	270,127	58.5
Auto Passenger	62,963	33.4	101,450	37.1	164,413	35.6
Mass Tran. Pass.	8,768	4.7	3,266	1.2	12,034	2.6
Taxi Passenger	806	0.4	435	0.2	1,241	0.3
Truck Passenger	604	0.3	1,021	0.4	1,625	0.4
School Bus Pass.	373	0.2	9,915	3.6	10,288	2.2
Total	188,525	100.0	272,987	100.0	461,512	100.0

It was necessary to isolate the Island trip data in order to obtain a more realistic view of the CBD-oriented transit movement on Galveston Island. Bus passenger movements accounted for 2,980 trips or 19.3 percent of all the passenger trips to the Galveston CBD. Automobile passengers accounted for 78 percent of the trips. The remaining 2.7

percent of the passenger trips were made in trucks and taxis.

Although 34.2 percent of the 8,768 total bus passenger movements were oriented to the Galveston CBD, another 13.4 percent of the trips were attracted by the Galveston Medical Center. The remainder of the bus movements were dispersed throughout the Island, primarily attracted to areas where schools are located.

A hypothetical situation will point out the relationship of transit trips to the automobile trips. If the transit system on the Island were paralyzed, these conditions could arise:

1. The 8,768 bus trips would be converted to automobile trips. If each bus patron made two bus trips, there would be 4,384 people requiring transportation.

2. Assuming the 4,384 persons acquired automobiles in line with the average of .52 vehicles per person, then 2,280 more vehicles would be owned.

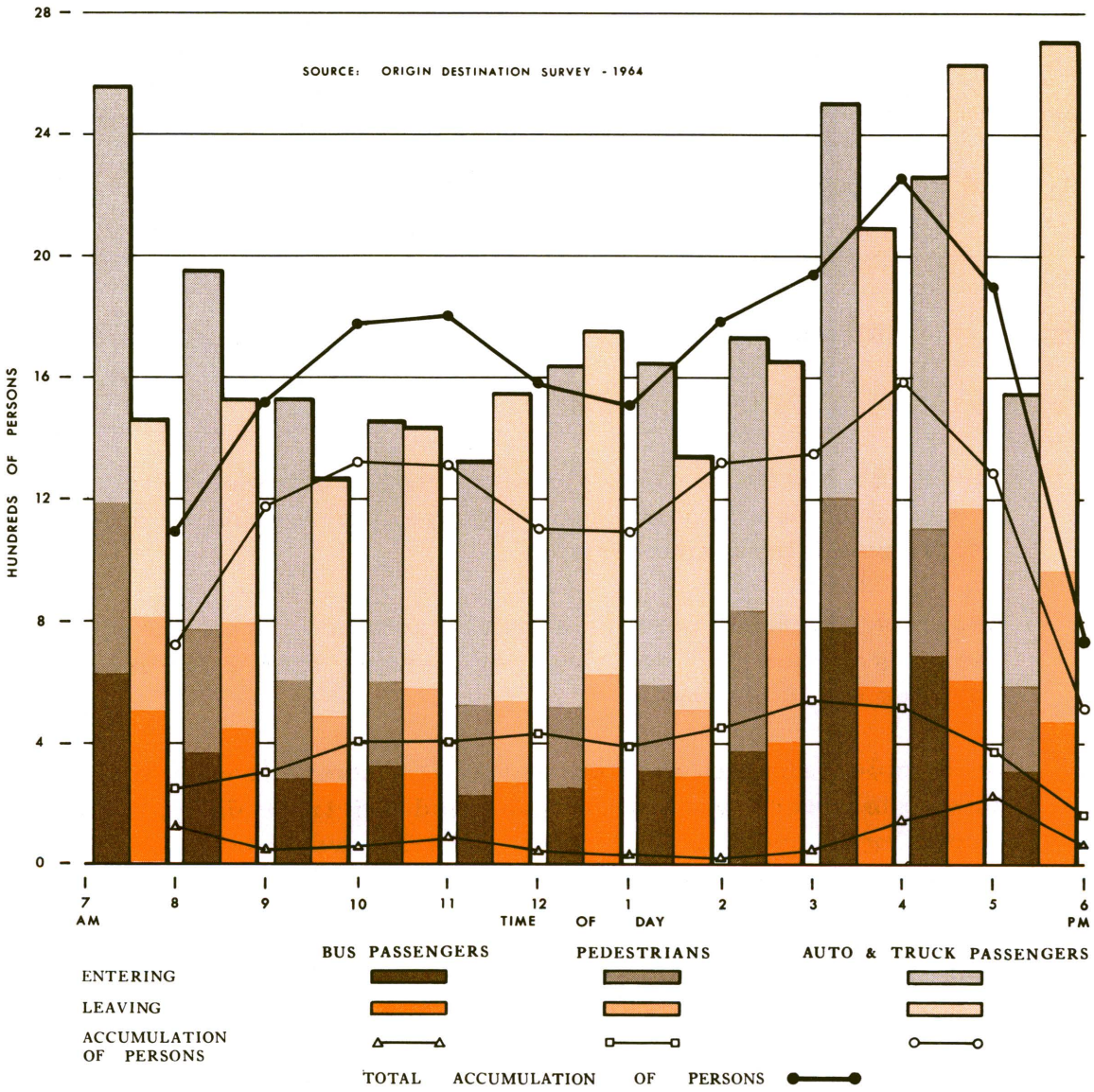
3. By simple calculations from the O-D Survey, it was determined that each automobile averaged 4.5 trips daily. This would mean about 10,300 additional trips would be made, an increase of 24 percent over the 8,768 transit trips.

4. The 10,300 trips would increase automobile trips about 10 percent.

5. Review of the operating efficiency of the street system indicated the 10 percent increase in automobile trips could be absorbed into the existing system without difficulty except during peak periods on a few sections of the major arterial system.

Figure 3-6 shows the number of persons entering and leaving the Galveston CBD each hour during the business day (October, 1964). The high population immediately surrounding the Galveston CBD may

explain the sizeable pedestrian movement which indicates that worker and shopper may walk between home and the CBD.



VEHICLE PASSENGERS AND PEDESTRIAN TRAVEL TO GALVESTON C.B.D.

FIGURE 3 - 6

INTERCITY TRANSIT

Data tabulated in Table 3-2 revealed that bus transit riders on the Mainland accounted for 27 percent of all bus transit trips in the study

area. These Mainland trips are made by persons riding scheduled intercity bus lines and private bus club vehicles. It was found after all interview data had been collected that several groups working in the industrial complexes of Texas City had formed bus clubs. The clubs are chartered by the State on a nonprofit basis and operated solely by the members. The membership depends on the area each club serves and the working force of the company. When a company lays off personnel, the clubs usually lose members.

Bus clubs serve each work shift. Members take the bus to work when workers from an earlier shift are getting off duty who then ride the bus home. Members divide the operating cost.

TRANSIT PROJECTIONS

The past activity of the transit industry does not indicate any booming success in sight for future transit operations. With constant vigilance by transit officials and city administrators, the operational equilibrium in Galveston should continue on a sound basis for many years.

The rapid decline in transit riding experienced since 1946 has leveled off considerably since 1960. It will be necessary to follow the transit operation closely for the next few years in an effort to determine if transit riding has stabilized. Future population projections disclose that the City of Galveston should have a density of 3,580 persons per square mile by 1970, and 5,840 by 1985. Studies have shown bus riding

to be higher in the more densely populated cities. The projected increase in population density should encourage bus officials and city administrators to provide attractive service.

The route coverage in Galveston is good even though it does not extend into a small area between 57th and 61st Streets near Seawall Boulevard. It is doubtful that this area could support the extension of a line.

Although schedule times and running speeds are presently in line with or above acceptable standards, and automobile travel times are good, it is reasonable to consider adding bus stops at selected locations around the City. Later studies of the Galveston County Transportation Study may reveal streets that could gain traffic efficiency by establishing these stops.

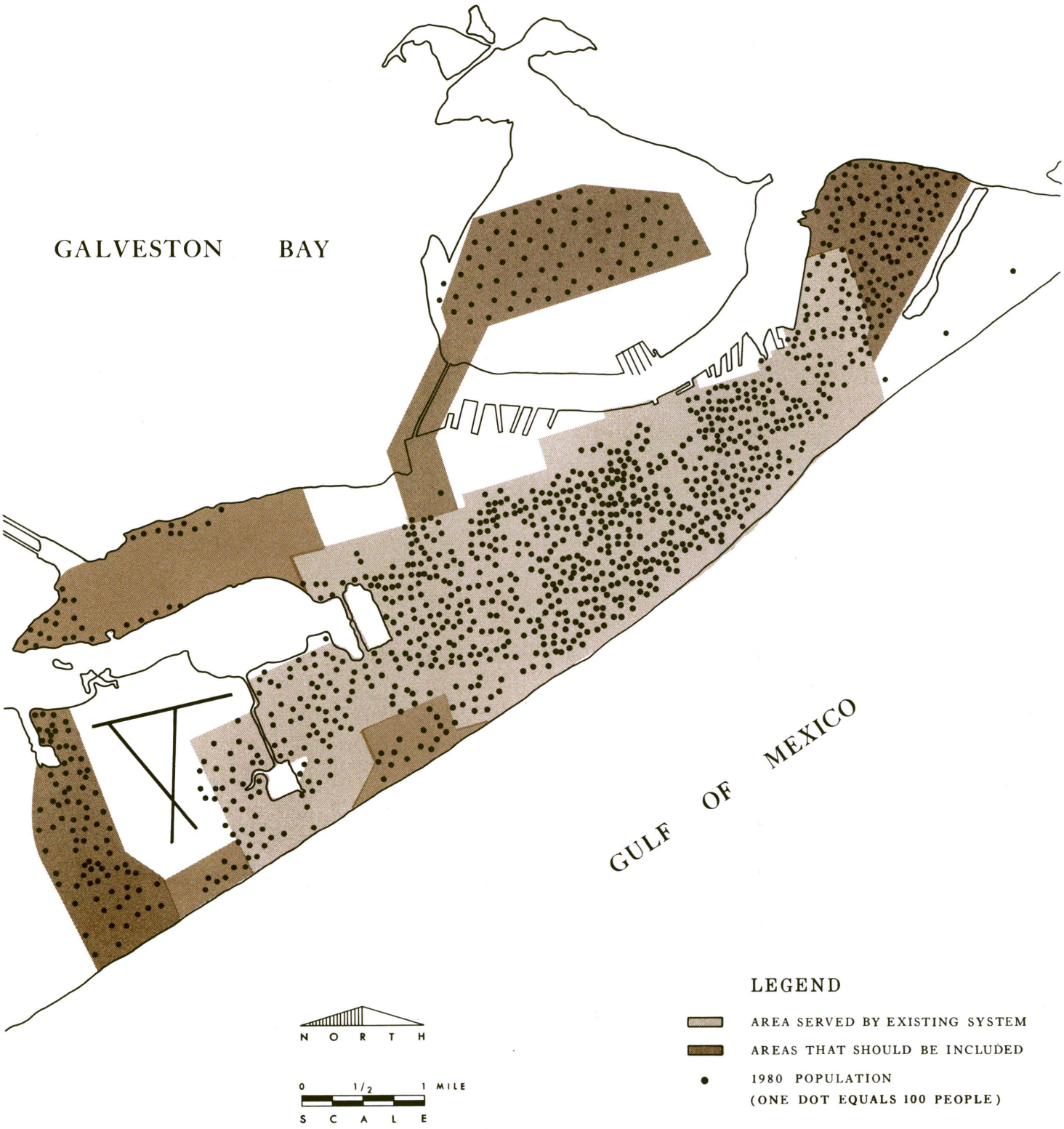
The installation of bus stops normally removes curb parking spaces. When it is felt that bus stops are needed, careful study should be given to the location and length of the proposed zones. Inadequate bus zones can deter traffic as much as having no zones at all.

A look at the population projections for Galveston indicates that the present bus system should be able to accommodate the increased density projected for the currently developed areas of the city. In areas where there is little or no current residential development, such as Pelican Island, the eastern end of Galveston Island, and the western fringe of the city, the extension of lines or establishment of shuttle service can

be introduced as the company and city determine feasibility. The areas shaded in Figure 3-7 should be considered for future routes if the land develops as projected. It would be unrealistic to propose service into areas that could not justify a reasonable profit to the company unless the service was subsidized by the city or other agencies.

The transit operation on the Galveston Mainland is diversified and specialized. The independent bus clubs are adequately filling their purpose, and the school districts are accommodating their school children. Recently, a residential subdivision in the northern part of the county began a trial bus operation by providing service between the subdivision and the Manned Spacecraft Center area. It would be difficult to attempt any consolidation of all these Mainland operations and at the same time maintain adequate and economical service.

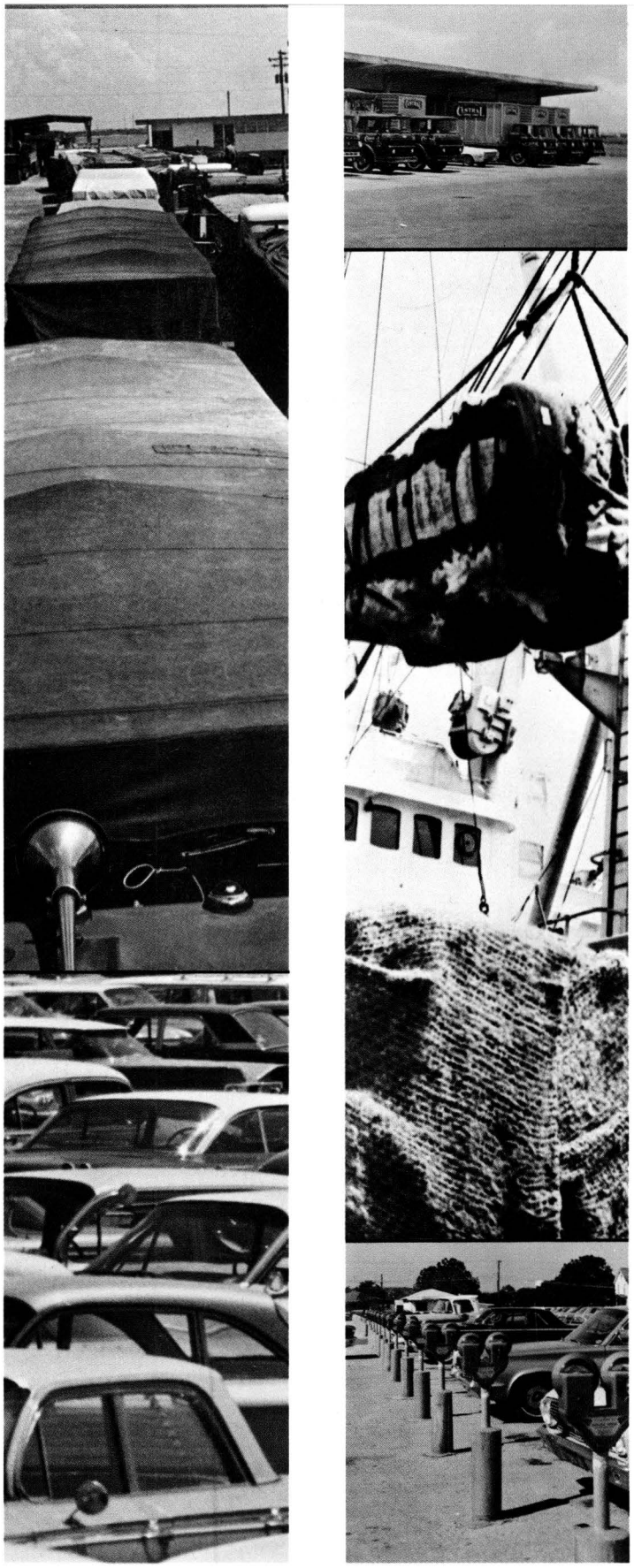
The second phase of the comprehensive transportation planning program will be continuation of studies in greater detail and updating the proposed plan. As the studies are accumulated, standards of operation may be established. These standards can serve as guides for the transit company and the city officials to determine the level of service that is being provided to the public. It would be beneficial to all responsible agencies to keep well informed on current transit operations in the event that traffic conditions become critical and require relief.



AREAS FOR FUTURE ROUTES

Galveston County Transportation Study

FIGURE 3 - 7



Chapter 4

Terminal & Transfer Facilities

Terminal & Transfer Facilities

CRITICAL PARKING AREAS

INTRODUCTION

The population growth in recent years has resulted in a very rapid increase in motor vehicle registration and usage. Congestion has also resulted, especially in places of intense economic and social activity. Inadequate parking facilities make a distinct contribution toward congestion.

Increased traffic and inadequate parking can threaten the economy of communities by strangling the traffic flow of consumers. As a community grows the functions of the Central Business District (CBD) shift from emphasis on everyday shopping needs to emphasis on business, finance, and larger specialized services over a wider geographic area. As a specialized center, it is essential that the CBD remain accessible and commercially attractive through adequate parking and good traffic movement. A medical center also requires adequate parking and a good vehicular circulation pattern for employees, patients, and visitors.

This chapter will summarize the findings of the Technical Report on Parking published by the Study Office in August, 1966. The report covered:

1. Parking characteristics of the Galveston and Texas City CBDs and Galveston Medical Center.

2. Recommendations for preventing inadequate parking conditions.

3. Estimates of future parking needs.

PARKING INVENTORY

In the spring of 1965, an inventory was conducted by type of parking at all curb and off-street parking facilities in the three critical areas.

Figure 4-1 shows the type and location of all parking facilities in the Galveston CBD. Table 4-1 gives a statistical summary of parking spaces in the CBD.

TABLE 4-1
PARKING SPACE SUMMARY - GALVESTON CBD

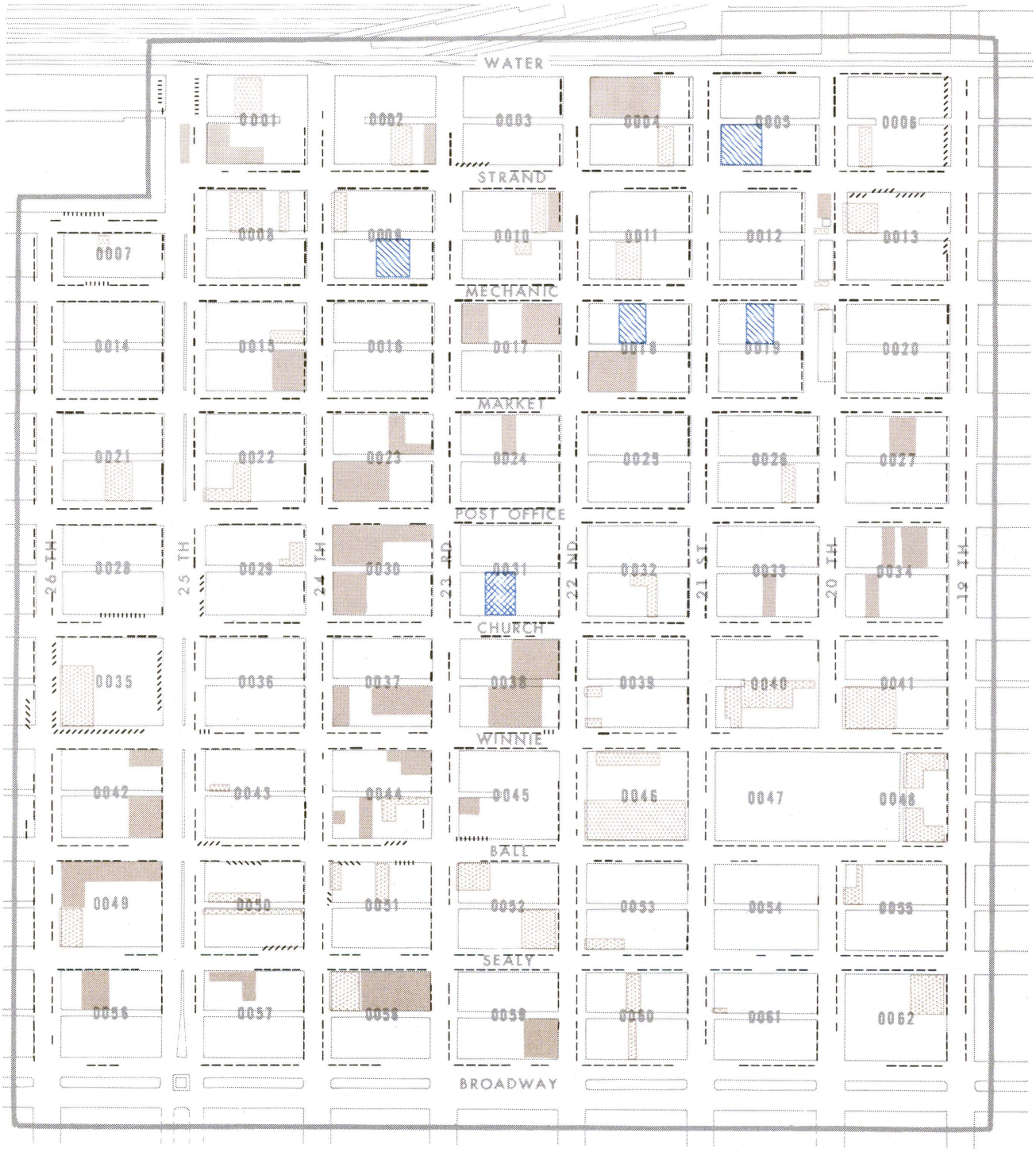
Type Parking	No. Spaces	Percent of Total
Curb		
Meter	1,013	19.9
Posted	134	2.6
Unrestricted	1,381	27.1
Total Curb	**2,528**	**49.6**
Off Street		
Lot Public	1,317	25.8
Lot Private	950	18.6
Garage Public	100	2.0
Garage Private	202	4.0
Total Off Street	**2,569**	**50.4**
Total Parking Spaces	**5,097**	**100.0**

The 26-block Texas City CBD was inventoried in the same manner as Galveston. Figure 4-2 shows the location of different curb and off-street facilities. Table 4-2 summarizes parking spaces in the Texas City CBD. The Master Plan of Texas City 1958-1983 report discussed the CBD. Comparison of the present CBD study and the area discussed in 1958 would be difficult because recent business developments have shifted from the area considered in 1958.

TABLE 4-2
PARKING SPACE SUMMARY - TEXAS CITY CBD

Type Parking	No. Spaces	Percent of Total
Curb		
Meters	382	13.87
Unrestricted	1,368	49.65
Total Curb	**1,750**	**63.52**
Off Street		
Lot Public	733	26.61
Lot Private	272	9.87
Garages	0	.00
Total Off Street	**1,005**	**36.48**
Total Parking Spaces	**2,755**	**100.00**

The parking space inventory at the Medical Center in Galveston



PARKING SPACE INVENTORY

Galveston Central Business District

CORDON LINE

ZONE NUMBER 0007

PARALLEL PARKING

ANGLE PARKING

LOADING

GARAGE - PUBLIC

GARAGE - PRIVATE

LOTS - PUBLIC

LOTS - PRIVATE

NORTH

0 200 400

SCALE IN FEET

Galveston County Transportation Study

FIGURE 4-1

PARKING SPACE INVENTORY

Texas City Central Business District

CORDON LINE

ZONE NUMBER 0007

PARALLEL PARKING

ANGLE PARKING

LOADING

LOTS - PUBLIC

LOTS - PRIVATE

NORTH

0 200 400

SCALE IN FEET

Galveston County Transportation Study

FIGURE 4 - 2

helped establish base data for more detailed studies at a later date. Figure 4-3 shows curb and off-street parking facilities at the Center. Table 4-3 summarizes parking space statistics at this location.

A complete listing of the number and type of parking spaces in all three study areas is shown in the Technical Report.

TABLE 4 - 3

PARKING SPACE SUMMARY - GALVESTON MEDICAL CENTER

Type Parking	No. Spaces	Percent of Total
Curb		
Meters	312	7.43
Unrestricted	2,708	64.46
Total Curb	3,200	71.89
Off Street		
Lot Public	40	.95
Lot Private	928	22.09
Garage Public	213	5.09
Garage Private	0	.00
Total Off Street	1,181	28.11
Total Parking Spaces	4,201	100.00

TRIP CHARACTERISTICS

Internal parking trips (trips within the urban areas destined for the CBD) were classified according to purpose for the Galveston and Texas City CBDs in the 1964 Origin and Destination (O-D) Survey.[1] Work trips generated the largest percentage of parking trips to the Galveston CBD, 37.1 percent of the total. This indicates healthy economic activity. Shopping trips were 12.4 percent of the total trips to the Galveston CBD.

The Texas City CBD is not as work-oriented as Galveston as 41.9 percent of the parking trips to the Texas City CBD were for shopping while only 17.5 percent were for work.

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[1] Galveston County Transportation Plan, Volume 1 Origin - Destination Survey 1964, A Report Prepared by the Galveston County Urban Transportation Study in Cooperation with the U. S. Department of Commerce, Bureau of Public Roads. Austin: Texas Highway Department, 1964.

PARKING SPACE INVENTORY
Galveston Medical Center

CORDON LINE	▬▬	LOTS - PUBLIC	
ZONE NUMBER	0092	LOTS - PRIVATE	
BLOCK NUMBER	0075	GARAGE - PUBLIC	
PARALLEL PARKING	---		
ANGLE PARKING	\\\\\\		
LOADING	---		

N O R T H

0 200 400
SCALE IN FEET

Galveston County Transportation Study

FIGURE 4 - 3

In both CBDs, off-street parking is used more than in other cities of comparable sizes. However, there is still considerable desire to park at the curb.

The 1964 origin-destination data were projected 20 years into the future. In 1964 there was an average of 20,991 daily vehicle trip destinations to the Galveston CBD. Twenty-year forecasts show more than 31,000 daily vehicle trips to the CBD from all areas of the county. Forecast trips were not made for the Texas City CBD or the Medical Center since the Coordinating Committee's primary objective was to establish only base data in these areas. The investigation of existing facilities in these two areas showed sufficient parking for considerable growth.

VEHICLE ACCUMULATION

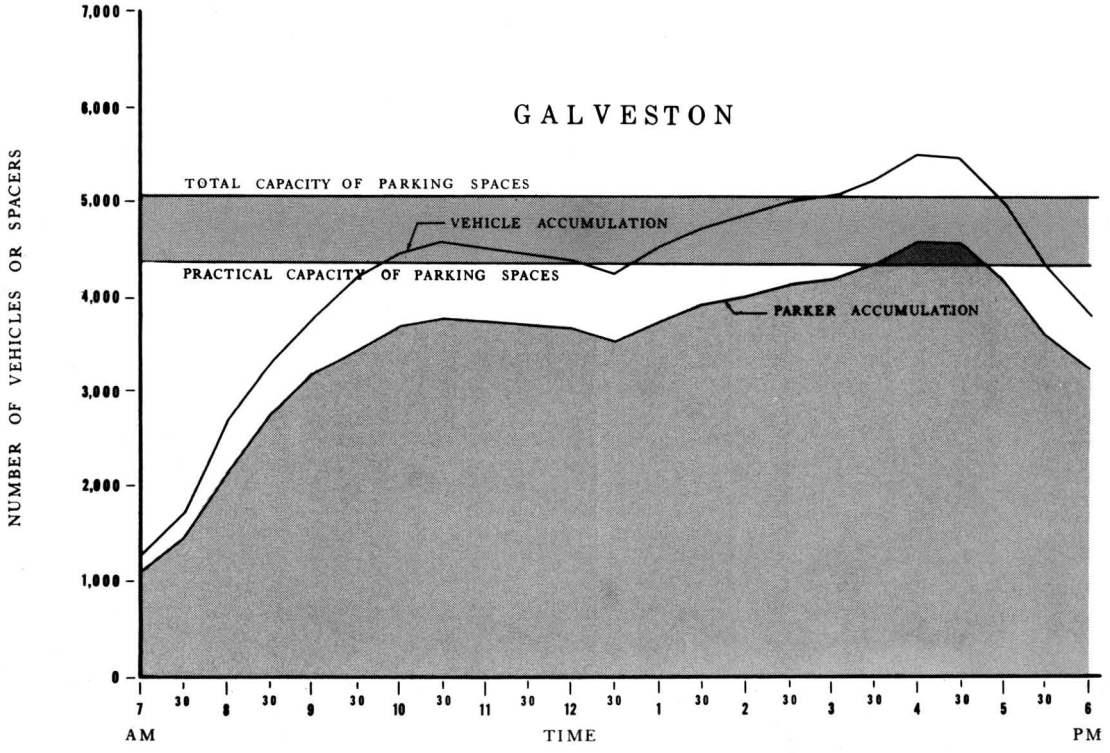
In the 1964 O-D Survey, afternoon vehicle accumulation in the Galveston CBD was greater than in comparable cities and surpassed the number of CBD parking spaces by 377 vehicles between 3:30 p.m. and 4:00 p.m. when 5,474 vehicles were recorded in the CBD during that half hour.

Trip data, however, revealed that 16.5 percent of the CBD trips did not park. Also, since spaces beyond acceptable walking distance reduced the number of desirable spaces, an 85 percent usage factor was assumed for this report.

PARKER ACCUMULATION

The term parker accumulation is referred to in this report as meaning the total number of vehicles actually parked at any given time.

Figure 4-4 shows total parking spaces, 85 percent practical capacity or usage, and total vehicle accumulation in the Galveston CBD. The graph indicates that if all vehicles wanted to park, assuming a practical usage of 85 percent of total spaces, the CBD would lack parking spaces for most of the day. But adjusting for vehicles not intending to park, the graph shows that parker accumulation is greater than practical capacity from only 3 to 5 p.m.



PARKER ACCUMULATION

FIGURE 4 - 4

Maximum vehicle accumulation in the Texas City CBD was 1,546 between 10:30 a.m. and 11 a.m. The 2,324 practical parking spaces indicate that there are presently sufficient parking facilities in the CBD.

ANALYSIS OF PARKING SUPPLY AND DEMAND

An analysis of parking supply and demand locates deficient parking areas. Standards developed by the Bureau of Public Roads[2] allocate average parking time for each trip purpose. The 1964 Galveston County O-D Survey recorded the number of trip purposes to each zone. Data from the two sources were used to determine parking space demand in the three critical areas.

Available parking space hours were also calculated. Table 4-4 summarizes parking space supply and demand in the three study areas.

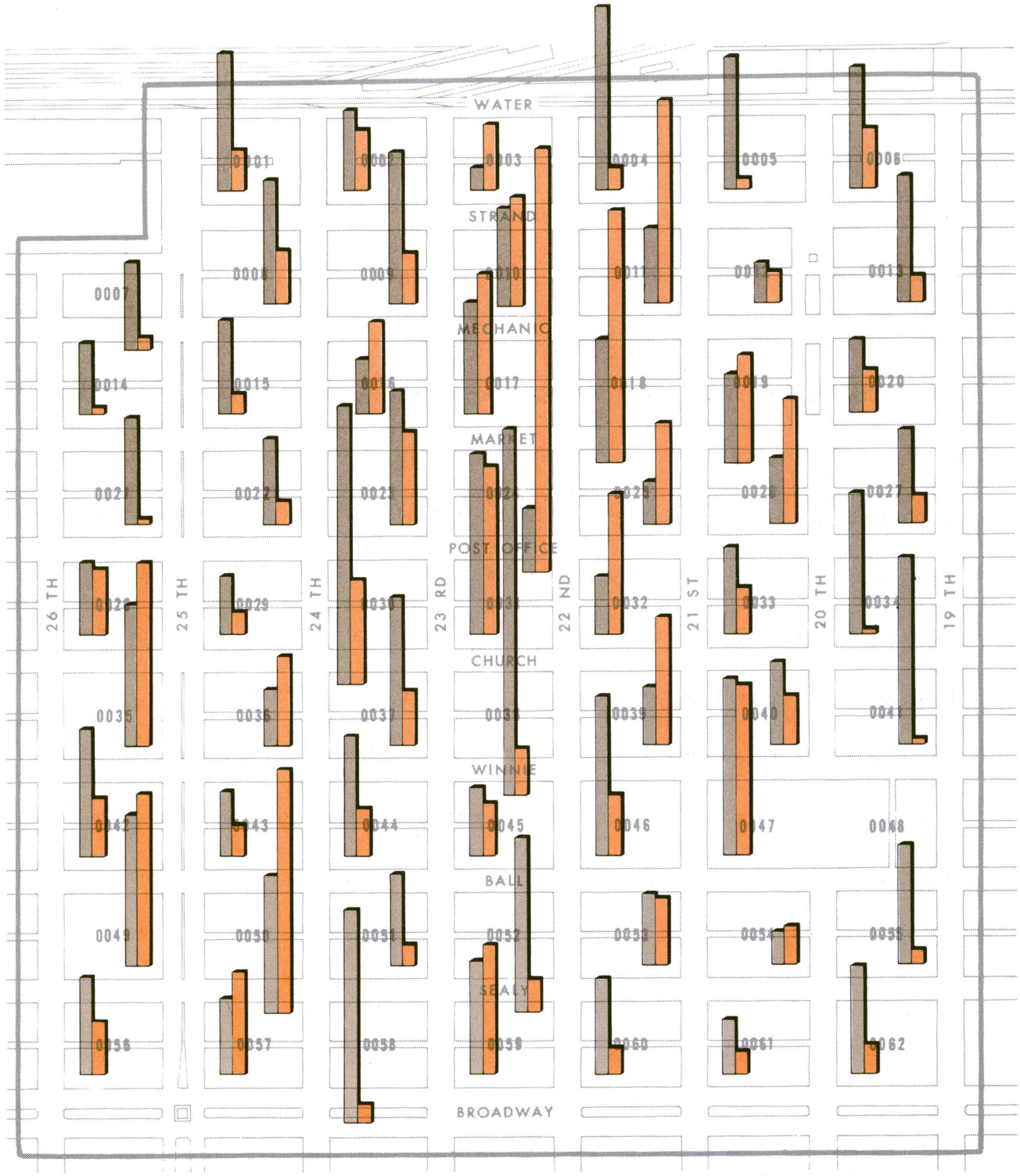
TABLE 4 - 4

SUMMARY OF SPACE HOUR SUPPLY AND DEMAND

Area	Total Supply (Sp.Hrs.)	Practical Supply (Sp.Hrs.)	Total Demand (Sp.Hrs.)	Surplus Practical Supply Sp. Hrs.	%
Galveston CBD	40,776	34,660	28,686	5,975	17
Texas City	22,040	18,734	11,292	7,441	40
Medical Center	33,608	28,567	11,525	17,042	60

Figure 4-5 shows the space hour demand and supply for the Galveston CBD. Even though there is ample parking supply within two blocks of

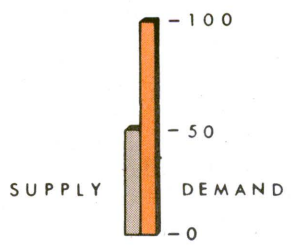
[2] Parking Guide for Cities, U. S. Department of Commerce, Bureau of Public Roads, Washington, D. C., 1956.

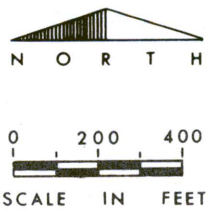


1965 SPACE HOUR SUPPLY AND DEMAND
Galveston Central Business District

CORDON LINE

ZONE NUMBER 0007





Galveston County Transportation Study

FIGURE 4 - 5

any large demand, there are several areas where demand exceeds supply. This is due mainly to short duration shopping trips in which shoppers desire parking spaces within one block of their destinations.

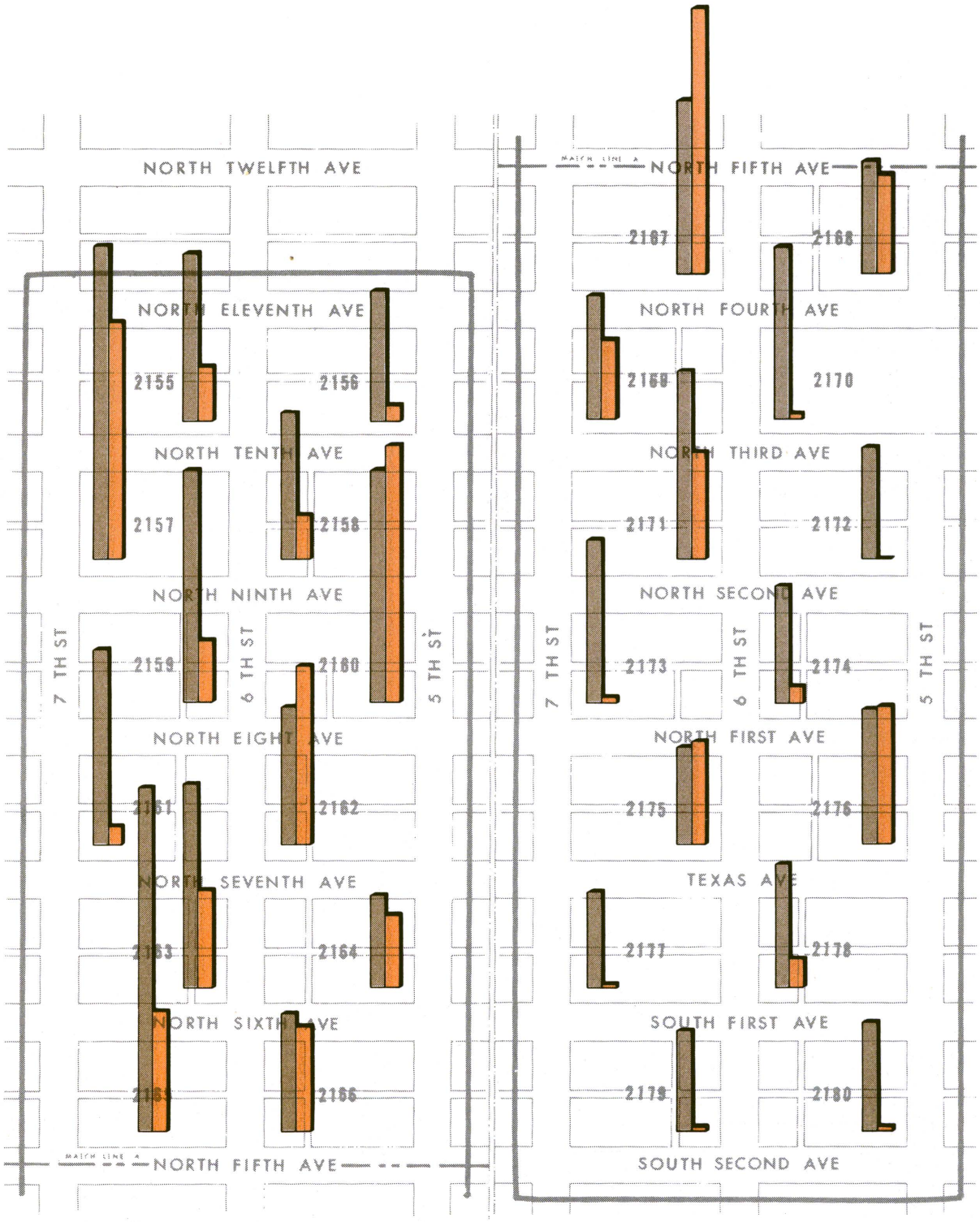
Figure 4-6 shows the space hour supply and demand for the Texas City CBD. Like the Galveston CBD, there are areas with greater demand than spaces available; however, this does not reflect a deficient supply. The areas of great demand are within one block of ample parking supply. The total space hour demand for Texas City is 11,292 or 60.2 percent of the total practical space hour supply so there appears to be no present inadequacy in parking supply within the Texas City CBD.

There is some parking demand in the Medical Center 24 hours a day. Although the supply was calculated for an eight-hour period, Figure 4-7 shows that it is adequate to offset 24-hour demands in the area.

Unrestricted curb parking accounts for almost two thirds of total off-street and curb parking spaces in the Medical Center area. Medical students and employees walk several blocks to take advantage of unrestricted parking. As the Medical Center expands and traffic increases in the area, pedestrian and vehicle congestion may create serious traffic and accident problems as more of the curb space is utilized.

GENERAL PARKING SUPPLY NEEDS

Parkers in the Texas City CBD and the Medical Center have adequate parking facilities, but the situation in the Galveston CBD was such that additional investigation was desired.



1965 SPACE HOUR SUPPLY AND DEMAND

Texas City Central Business District

CORDON LINE

ZONE NUMBER 0007

SUPPLY 100 50 0 DEMAND

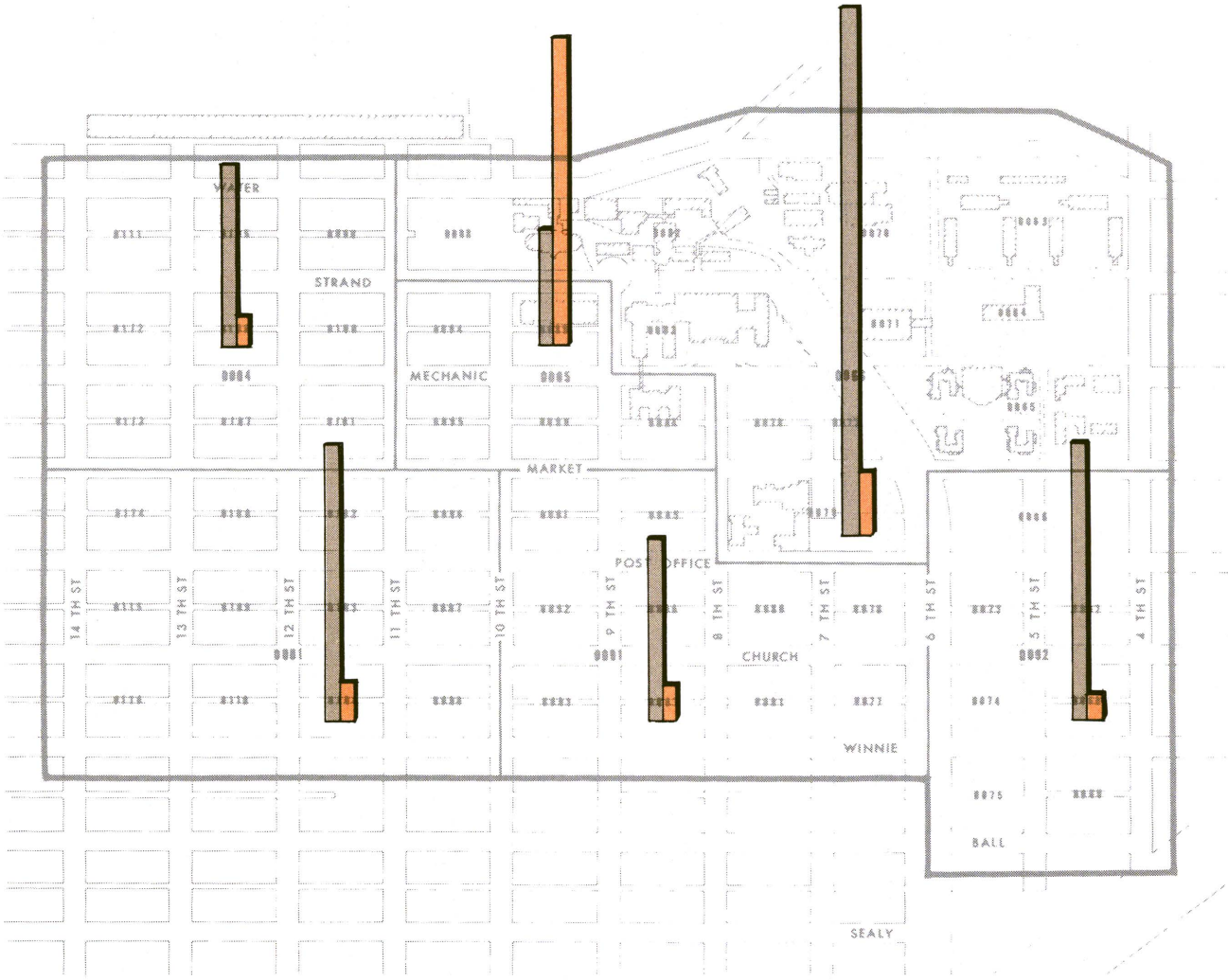
NORTH

0 200 400

SCALE IN FEET

Galveston County Transportation Study

FIGURE 4 - 6



1965 SPACE HOUR SUPPLY AND DEMAND
Galveston Medical Center

CORDON LINE

ZONE NUMBER 0092

BLOCK NUMBER 0075

SUPPLY 100 50 0 DEMAND

NORTH

0 200 400
SCALE IN FEET

Galveston County Transportation Study

FIGURE 4 - 7

A formula described in the technical report determined desirable, tolerable, and minimum levels of parking space supply necessary to serve the 20,991 daily CBD vehicle trips excluding transit. Based on 1964 trip data, the results are:

Desirable parking - 4,156 spaces
Tolerable parking - 3,778 spaces
Minimum parking - 3,443 spaces

Figure 4-8 shows that about 1,000 of the 5,097 CBD parking spaces are beyond acceptable walking distance. It should also be noted that about 1,000 spaces within walking distance are for private use and can be considered only partially helpful in satisfying demands. Currently, the Galveston CBD parking supply is a little above the tolerable level.

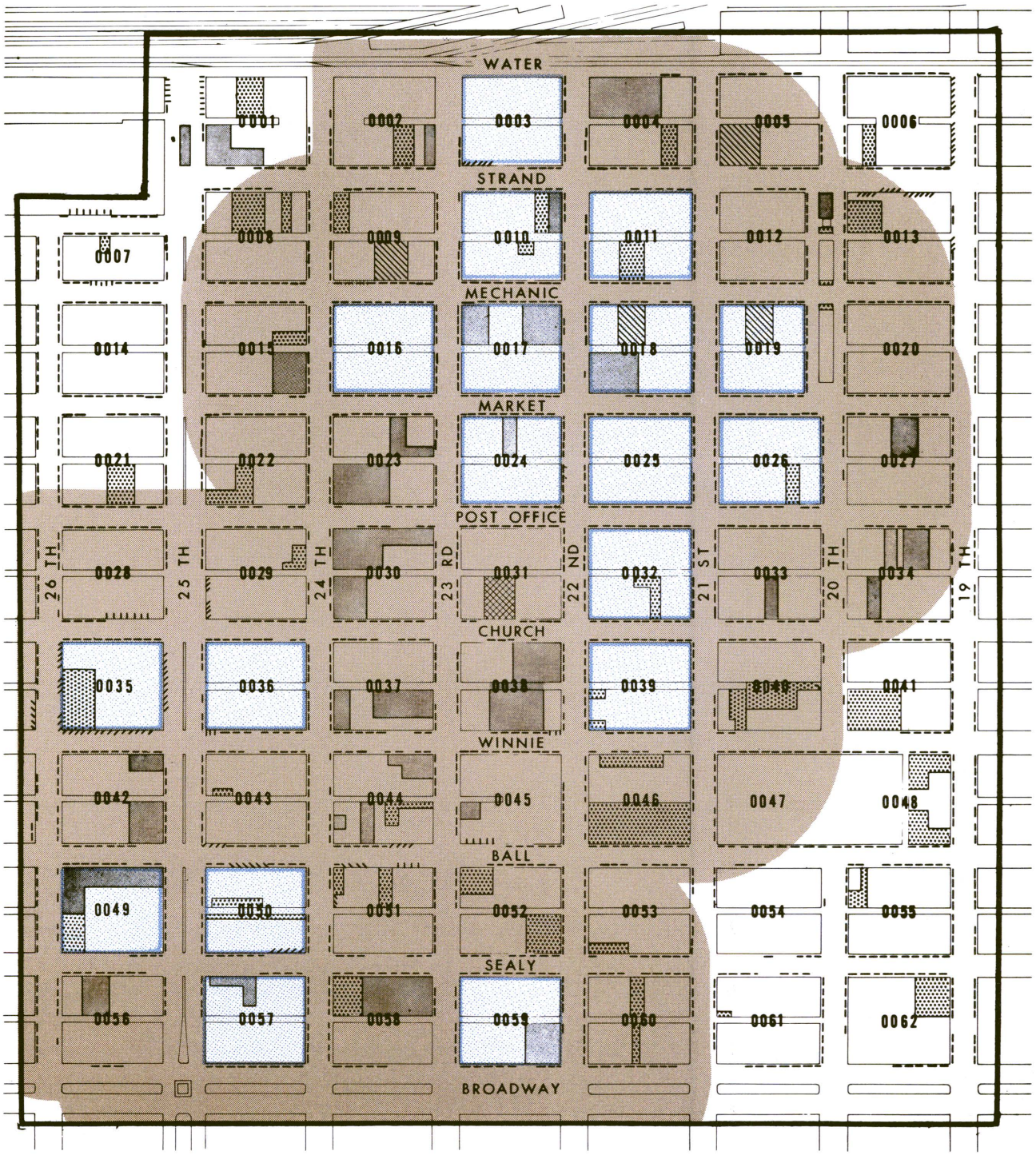
FUTURE NEEDS

The expected growth of the Galveston CBD should increase worker and business-type trips. These trips are of longer duration than any other type. This type of parker is also willing to walk longer distances to find available parking. It is forecasted that in 20 years the total daily vehicle trip destinations to the CBD will be more than 31,000.

Applying this trip volume to the parking need formula, it was determined that by 1985 parking requirements will be:

6,200 spaces for desirable parking
5,600 spaces for tolerable parking
5,100 spaces for minimum parking

According to these projections, the 5,097 existing total spaces will give only minimum parking conditions in 20 years.



FACILITIES BEYOND ACCEPTABLE WALKING DISTANCE

CORDON LINE
ZONE NUMBER 0047
PARALLEL PARKING
ANGLE PARKING
LOADING
DEFICIENT AREAS

LOTS - PRIVATE
LOTS - PUBLIC
GARAGE - PRIVATE
GARAGE - PUBLIC
AREA WITHIN ACCEPTABLE WALKING DISTANCE
(Based on 400' Max. Walking Distance)

NORTH

0 200 400
SCALE IN FEET

Galveston County Transportation Study

FIGURE 4 - 8

CONCLUSIONS

The basic data used in this parking study were adequate for a survey of the general situation and determination of overall parking deficiencies. In some respects parking practice in both Galveston and Texas City is better than in most cities of similar population range. There is good usage of off-street spaces and an acceptance of reasonable walking distances. These practices should be encouraged.

No existing parking deficiencies were found in Texas City, and the supply is adequate for considerable growth. In both the Texas City CBD and the Medical Center, the majority of the available parking space is located at the curb. Although there seems to be no requirement at this time, it is conceivable that sometime in the future traffic demands could necessitate the removal of some of these parking spaces.

In the Galveston CBD existing deficiencies, though not as critical as in many cities, discourage traffic from entering the CBD and result in congestion and failure of some drivers to find satisfactory parking spaces. A part of the 1964 Comprehensive Plan for the City of Galveston dealt with parking in the Central Business District. The deficient areas of that study correspond closely with the findings of this study. Therefore, the detailed parking needs outlined in the Plan should be conclusive.

Findings of this report brought out the presence of sufficient parking in the Medical Center area, but the majority of the existing supply is on street spaces and many of these involve unacceptable walking dis-

tances. While this is true under present conditions, the current plans for several million dollars of expansion, with the resulting increased activity and demand for parking, could bring about the deterioration of the traffic movement within the Medical Center area unless properly located off-street parking is provided.

COMMERCIAL TRANSPORTATION FACILITIES

INTRODUCTION

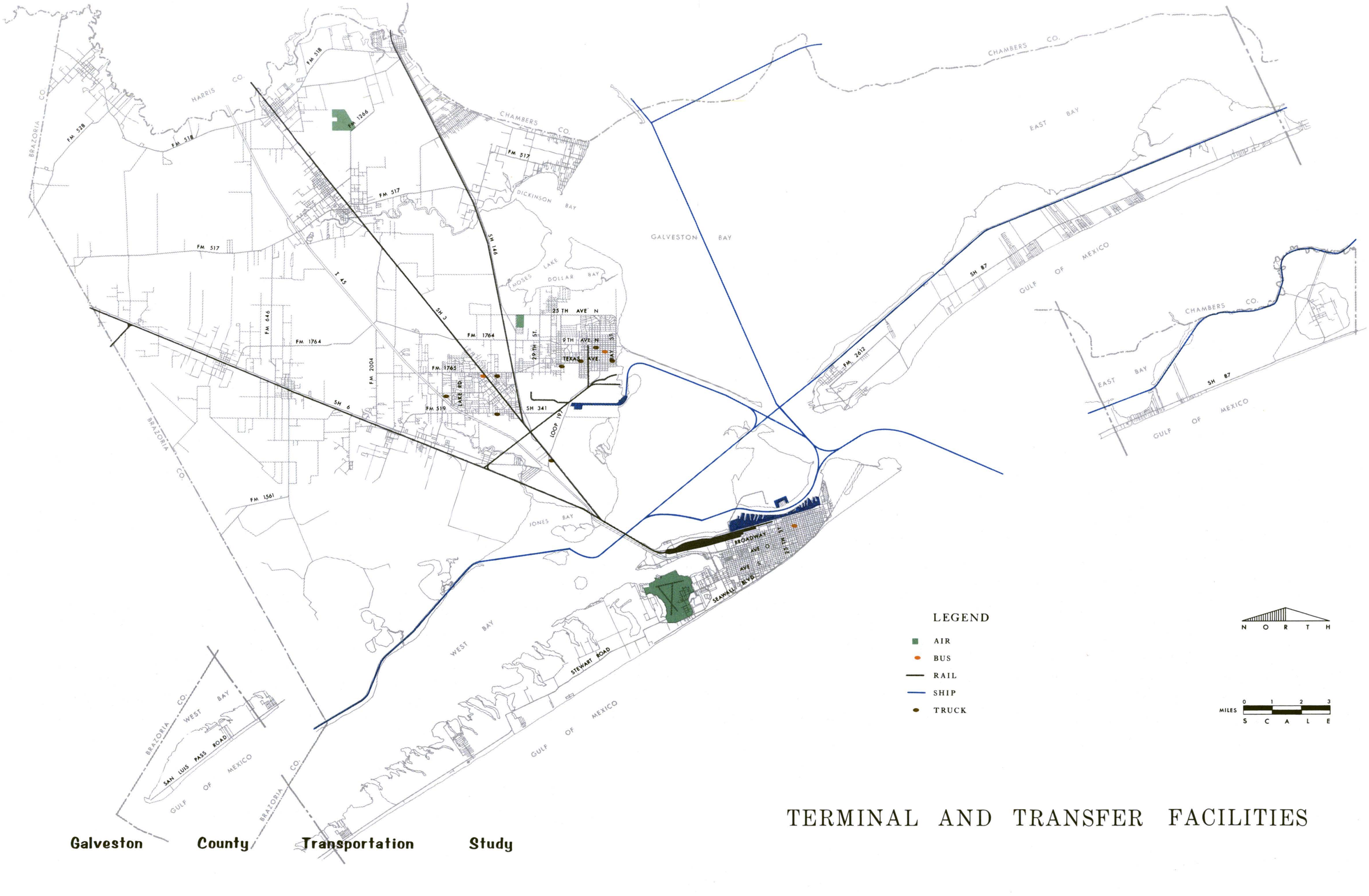
Transportation facilities include all modes used to transport persons and goods. Aside from water traffic, most commercial transportation activity in Galveston County is linked to Houston which is both the primary market and the main source of supply for the county. Figure 4-9 locates rail, water, air, bus, and major trucking facilities in Galveston County.

RAIL

Galveston County is served by six of the nation's leading railroads using three mainline tracks. Southern Pacific Lines; Gulf, Colorado and Santa Fe Railway; Missouri Pacific Lines; Missouri-Kansas and Texas Railroad; Burlington Lines; and Chicago, Rock Island and Pacific Railroad primarily serve the port and industrial area in Texas City and port facilities in Galveston.

The City of Galveston is a terminal point for the railroads and has a large number of tracks for storage and switching when making up

FIGURE 4 - 9



Galveston County Transportation Study

TERMINAL AND TRANSFER FACILITIES

trains. Both the Port of Galveston and Port of Texas City operate their own railway switching system to handle traffic within the port areas. In 1964, according to the Association of American Railroads, the Port of Galveston was second only to Portland, Oregon in the number of rail grain cars unloaded; Houston was third.

Recently, the Santa Fe Railway discontinued the last scheduled passenger train service in Galveston County. Before service was discontinued, one passenger train left Galveston for Houston each morning and one returned in the afternoon.

WATER

The port facilities in Galveston County are located in Texas City and Galveston. Both ports are capable of docking large ocean-bound vessels. These ports have access to the 6,000 mile Intracoastal Waterway System and the Mississippi River tributary system. Both ports can ship and receive cargoes by barges that use the tributary system via the protected intracoastal waterways.

The two ports differ in several respects. The Galveston Port is municipally owned, and the Texas City Port is privately owned. The Texas City Port is regarded primarily as a liquid or wet cargo port, while the Galveston Port handles more dry cargo. Texas City relies on the industrial complex in the immediate area for its cargo, but in Galveston most cargo must be shipped onto or off the Island.

Both ports are planning expansion. Galveston plans call for liquid

cargo facilities. In Texas City construction is underway on a $300,000 wet cargo dock capable of handling a 1,000-foot tanker. These activities indicate an awareness of business expansion along the Gulf Coast. As facilities expand, additional traffic loads can be expected on roadways. Both ports generate large amounts of traffic not only from their employees but also from trucks that deliver and pick up goods.

TRUCKS

Trucks have contributed to the rapid growth of transportation facilities in Galveston County. In 1963 the Texas Highway Department recorded 9,652 truck registrations in the county. Trucking lines, combined with efforts of the ports and railways, have achieved a high standard of service for the area. An example is the unique Seatrain Operation.

Seatrain Lines, Inc., has a combination trucking and shipping operation. Goods are transported to ports in trailer-trucks where the van is uncoupled from the truck bed and loaded onto a ship for delivery to another port where the van is unloaded onto a trailer-truck for final shipment to its destination. Until recently, the port in Texas City handled the operation in Galveston County. Each week about 80 vans were unloaded for trucking to other points. If the operation resumes, it is possible that congestion may occur on the street system.

BUS

Texas Bus Lines maintains scheduled service throughout Galveston County including the small rural communities and Bolivar Peninsula.

It also provides frequent service to Houston which has connecting buses departing in all directions. In addition, the company offers express service and operates limousines to the Galveston airport.

Bus express performs a valuable service for shippers by carrying small cargoes on scheduled passenger runs; small shipments of moderate distance can be delivered in a matter of hours with this service.

AIR

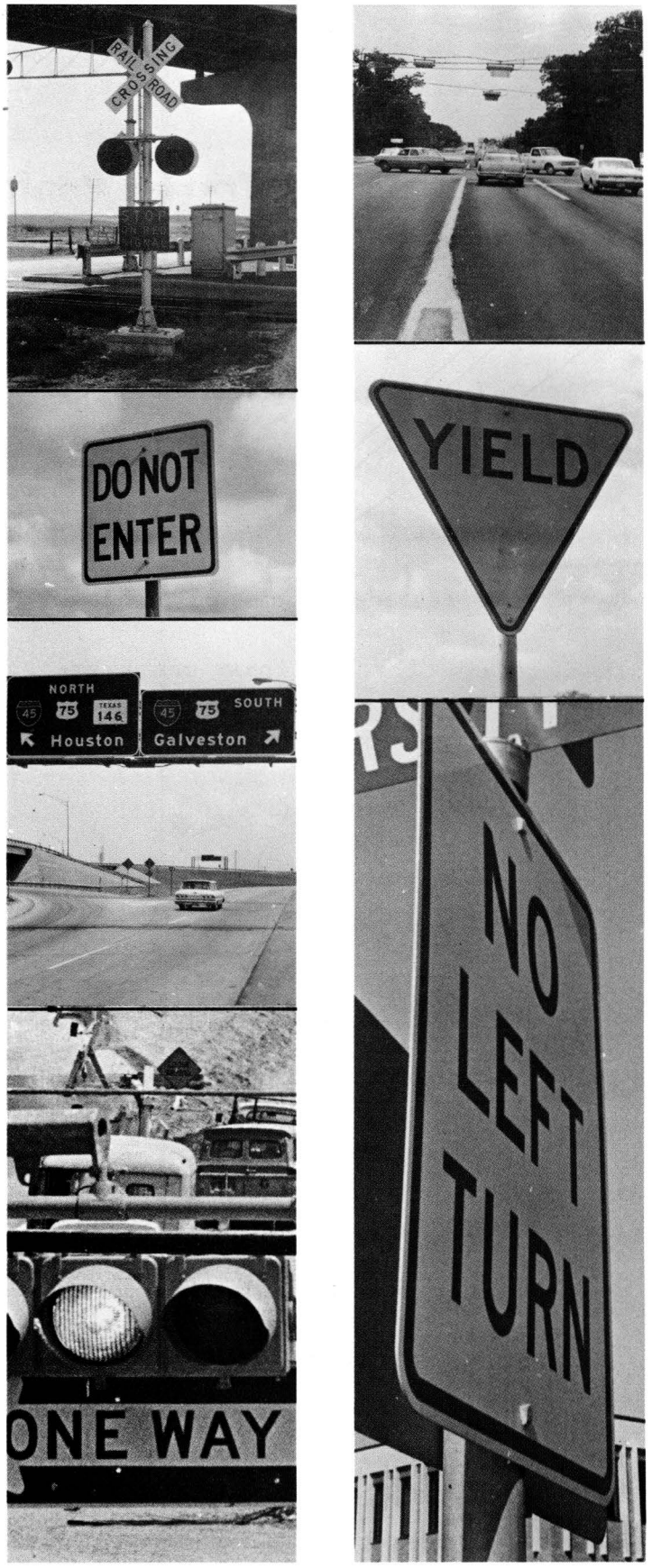
The county has three airfields. One in Texas City and a new facility in League City are privately owned and operated. Galveston has a municipal field with three 6,000-foot runways. Texas International Airlines, formerly Trans-Texas Airways, flies between Galveston and Houston with two arrivals and two departures on weekdays and one flight each way on Saturdays and Sundays. The airline also has one flight each way between Galveston and Beaumont on weekdays. Most of Galveston County's air freight is handled through the William P. Hobby (Houston International) Airport which provides service to many destinations.

PIPELINES

Galveston County is spotted with many oil wells which feed a complex network of pipelines serving the petro-chemical industry of the county. Many pipelines are within the right-of-way necessary for street widening and future highway construction. Owners will need to confer with highway officials whenever pipeline reroutings or modifications are required for highway development.

RELATION TO STREET SYSTEM

Commercial terminal and transfer facilities in Galveston County are being adequately served by the existing street network with no major traffic problems. However, there still remains the need for constant attention to prevent possible future conflicts.



Chapter 5

Traffic Control Features

Traffic Control Features

INTRODUCTION

In earlier chapters, detailed examination was made of the nature and scope of the day to day traffic problems in Galveston County. The physical features of the road system were inventoried, terminal facilities located, transit operations analyzed, and traffic operations investigated. Through these many areas of discussion, the segments of the existing streets and roads that have been causing difficulties for the motorist emerged.

The several factors used to evaluate the existing street and road system often indicate locations where multiple deficiencies exist. It is the intent in this chapter to group the most outstanding deficiencies in the county so that overall corrective measures may be recommended. The use of known traffic engineering techniques can, in most cases, improve the efficiency and overall operation of the street system involving for the most part relatively minor expenditures and little or no construction. The inherent capacity of the existing street system should be fully utilized by applying such techniques as improved signal operations, turning movement controls, parking restrictions, unbalanced lane operations, one-way street operations, through street systems, signs and markings, simple channelization, street lighting, and pedestrian controls, coupled with enforcement of regulations.

GENERAL DEFICIENCIES

A common shortcoming facing the cities and county is the inability to adequately investigate traffic problems and take corrective action. Throughout the county, at the time of inventory in 1965, there was a noticeable lack of warranted signs, signals, and street markings. Also, many locations had control devices that either did not warrant installation in the first place or had fulfilled their needs and should be restudied and modified to fit changed conditions. The inventory of the existing conditions in 1965 revealed twenty-six four-way stop intersections in the county. Of the twenty that were in the City of Galveston, fourteen of the locations have been restudied and the signs removed.

Another problem confronting all agencies of government pertains to the maintenance of traffic control devices. Existing control devices in all parts of the county were generally in need of repair or repainting. Many signs had lost portions of the legend or reflectivity to the extent that noncompliance with these signs was common. In an earlier chapter, it was noted that 30 percent of the existing major arterial system did not have centerline or lane pavement markings. It should also be pointed out that the 214 miles of roadway that are marked require periodic inspection in the daytime and nighttime for signs of deterioration. Significant improvement has not been accomplished since the study began, with the exception for the City of Galveston's painting program which

has been in progress the last years, and some painting in Texas City's CBD.

Texas law states that local authorities may install and maintain control devices within their jurisdictions so long as not to conflict with the controls established in the state manual on traffic control devices. The use of an accepted manual cannot be over emphasized. At the time of this report, the state is preparing to distribute copies to all local agencies of the 1967 Texas Manual on Uniform Traffic Control Devices For Streets and Highways prepared by the Texas Highway Department, Division of Maintenance operations. Warrants and guidelines for the use of control devices have been developed in the manual to assist in standardizing procedures throughout the State of Texas. Uniformity of design, application, operation, and maintenance of traffic control devices has long been recognized as an essential element in the programs of accident prevention and facilitation of the orderly movement of traffic. As an element in the endeavor to achieve uniformity on a national, as well as statewide scale, the new Texas Manual is based on earlier manuals, etc., prepared by the National Joint Committee on Uniform Traffic Control Devices[1] and the American Association of State Highway Officials.

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[1] Committee members represent the American Association of State Highway Officials, Institute of Traffic Engineers, National Committee on Uniform Traffic Laws and Ordinances, National Association of County Officials, & National League of Cities.

SPECIFIC DEFICIENCIES

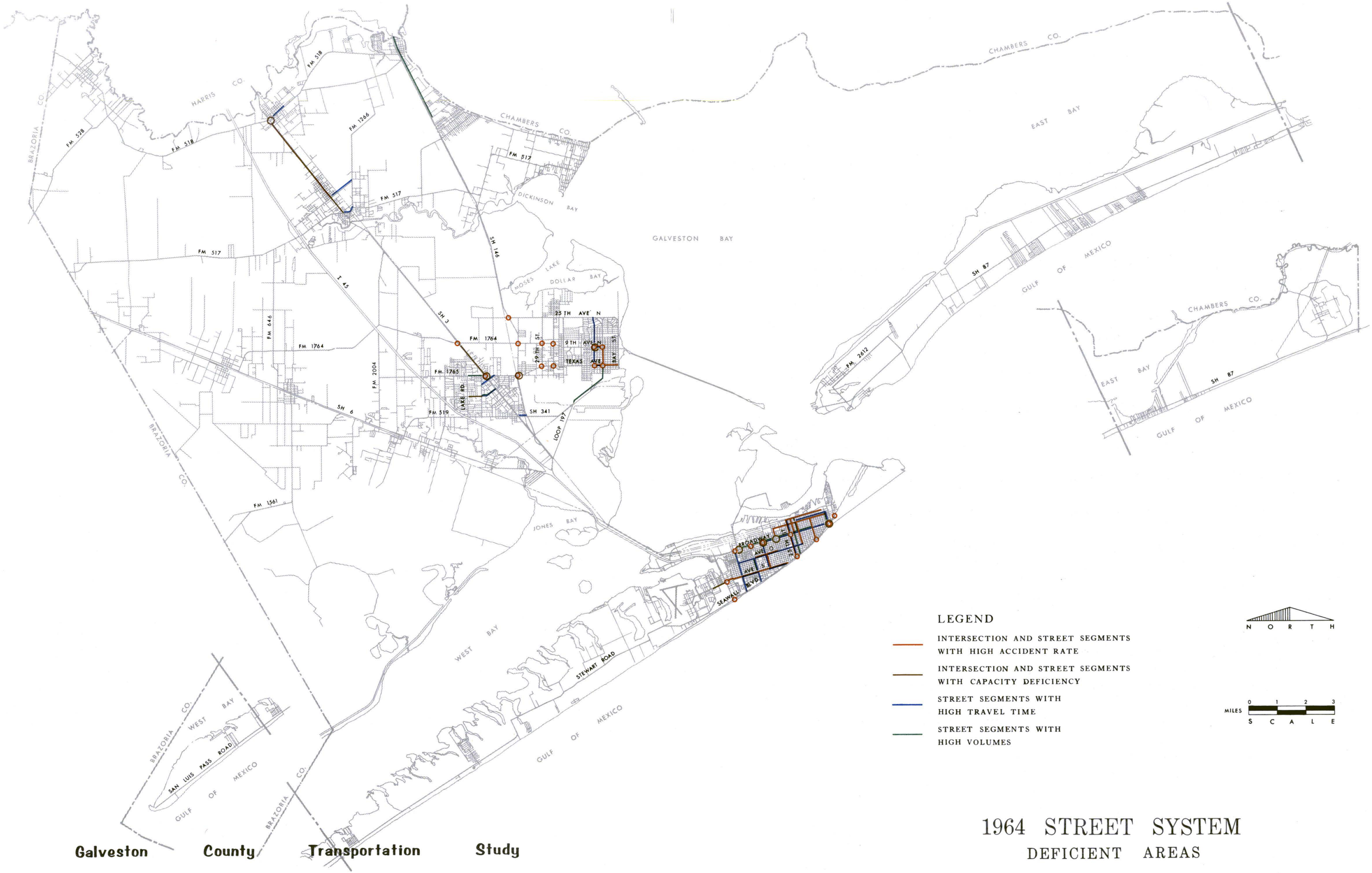
The investigation of the several parts of the operational characteristics of the existing major arterial system brought out several segments of roadway and intersections that may be classified as possible problem areas. The discussion in earlier chapters dealt only with the deficiencies of the individual traffic function. Since any one operational characteristic can influence other operations, the Study Office felt that by grouping all of the deficiencies, a better analysis could be made. Therefore, the map shown in Figure 5-1 shows a composite presentation of the deficiencies pointed out in earlier chapters.

For ease of identifying the locations, the control sections and isolated intersections, were divided into Group I - Galveston Island, and Group II - Galveston Mainland. Tables 5-1 and 5-2 show the deficient street sections, problems, and recommendations for improvements.

CONCLUSIONS

Each time a person drives a motor vehicle, he is confronted with the rules of driving. Traffic control devices are used to regulate, warn, and guide a person to his destination. Proper installation and adequate maintenance of control devices are two of the most important activities associated with traffic engineering. Efficient traffic flow becomes more and more important as vehicle volumes increase on existing streets.

FIGURE 5 - 1



LEGEND

- INTERSECTION AND STREET SEGMENTS WITH HIGH ACCIDENT RATE
- INTERSECTION AND STREET SEGMENTS WITH CAPACITY DEFICIENCY
- STREET SEGMENTS WITH HIGH TRAVEL TIME
- STREET SEGMENTS WITH HIGH VOLUMES

NORTH

MILES 0 1 2 3
SCALE

1964 STREET SYSTEM
DEFICIENT AREAS

Galveston County Transportation Study

As suggested earlier, street facilities can be improved to accommodate more vehicles at little additional cost by the proper use of control devices.

The U. S. Department of Transportation (DOT) has recognized the importance of obtaining the maximum utilization of the existing street system. After detailed study, DOT has issued an instructional memorandum on guidelines for a Traffic Operations Program for Increasing Capacity and Safety (TOPICS). Several minor problems require interpretation before the TOPICS program can be fully implemented, but all possible efforts should be made to be prepared for the program.

TABLE 5-1

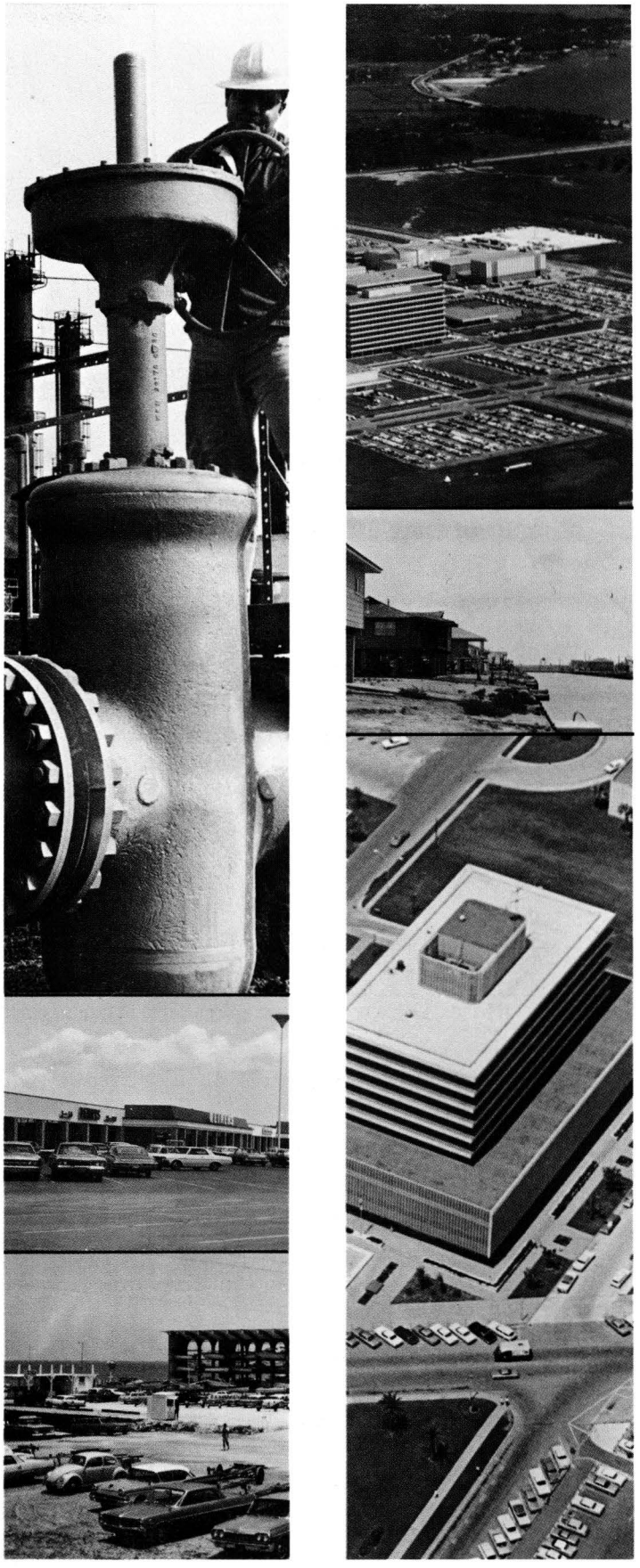
STREET DEFICIENCIES - GALVESTON ISLAND

STREET NAME AND SECTIONS	PROBLEMS OR DEFICIENCIES	RECOMMENDATIONS
Broadway Blvd.		
Seawall Blvd. to 14th St.	Low travel speeds.	New interconnected traffic signals have been installed since this study began. Construct left turn lanes at selected locations, prohibit other left turns. Shrubbery trimmed or removed at median openings for improved visibility. Encourage use of proposed Ave. O traffic corridor. Consider restriction of parking during peak hours, and increasing right turn radii.
14th St. to Rosenberg	Low travel speeds, high 24 hour volumes.	
Rosenberg to 39th St.	Low travel speeds, high 24 hour volumes, high accident occurrence capacity deficient intersections.	
39th St. to 53rd St.	High 24 hour volumes, capacity deficiency and high accident occurrence at intersections.	
Moody (21st St.)		
Strand to Broadway Blvd.	High accident occurrence, high 24 hour volumes.	Convert to one-way street between Strand and Broadway Blvd., restrict parking during peak hours, provide bus stop zones, and remove angle parking.
Broadway Blvd. to Ave. O	High accident occurrence.	
Market (Ave. D)		
University Blvd. to 19th St.	High accident occurrence, low travel speeds.	1) Restrict parking during peak hours (Option: Restrict parking on the side which is serving predominant flow of traffic during peak hours). Or 2) Convert Market and/or adjoining streets to a one-way street system.
19th St. to 33rd St.	High accident occurrence.	
O Avenue		
Moody to 33rd St.	Low travel speeds, high accident rate.	1) Restrict parking during peak hours (Option: Restrict parking on the side which is serving predominant flow of traffic during peak hours). Install interconnected progressive traffic signal system. Prohibit parking near signalized intersections and paint for turning movements. Or 2) Convert to one-way street coupled with Ave. P
33rd St. to 53rd St.	Low travel speeds.	
Rosenberg (25th St.)		
Strand to seawall Blvd.	Low travel speeds, high accident rate.	The removal of angle parking and shrubbery plus the painting of lane lines and channelization has been accomplished since this study began.
S. Avenue		
Seawall Blvd. to 39th St.	High accident rate, low travel speeds.	Seawall Blvd. to 57th St.: 1) Restrict parking during peak hours (Option: Restrict parking on the side which is serving predominant flow of traffic during peak hours). Remove visibility obstructions near signalized intersections and paint for left turns. Or 2) Convert to one-way street coupled with Ave. R½. 57th St. to 61st St.: Widening to 4 lanes and channelization has been accomplished since this study began. 61st St. to Stewart Rd.: Improvements require major construction (Widening to 4 lane divided thoroughfare has been included in City of Galveston Capital Improvement Program 1968-1973).
39th St. to 45th St.	High accident rate.	
45th St. to 53rd St.	High accident rate, low travel speeds.	
53rd St. to 61st St.	High accident rate.	
61st St. to Stewart Rd.	Capacity deficiency.	
Seawall Blvd.		
2nd St. to 61st St.	High accident occurrence at intersections.	Painting of median and left turn lanes has been accomplished since this study began. Block all angle streets to eliminate hazardous intersections with Seawall Blvd. as recommended in Galveston Comprehensive Plan. Redesign the intersection at Broadway Blvd./University Blvd.
Strand		
10th St. to Rosenberg	High accident occurrence.	Remove angle parking, and prohibit parking near major intersections and paint for left turn movements. Consider parking restrictions during peak hours. Painting of center line has been accomplished since this study began.
Tremont (23rd St.)		
Strand to Broadway Blvd.	High accident occurrence.	Prohibit parking near major intersections, and paint for left turn movements. Restrict parking during peak hours, remove angle parking and provide bus stop zones. Painting of center line has been accomplished since this study began. Strand to Broadway Blvd.: Convert to one-way street if proposed Mall is created on Post Office St. between Tremont and Moody.
Broadway Blvd. to Ave. O	High 24 hour volumes, capacity deficiency.	
Ave. O to Seawall Blvd.	High 24 hour volumes.	
University Blvd. (6th St.)		
Market to Broadway Blvd.	Low travel speeds, high 24 hour volumes, capacity deficient intersections.	Contract is to be let for construction of a 4 lane divided thoroughfare (Approx. date Jan. 1969). Consider a separate right turn lane on the north approach to Broadway Blvd. with a "yield" sign for control.
14th St.		
Market to Seawall Blvd.	High accident occurrence	Prohibit angle parking, restrict parking near signalized intersections, and paint for left turn movements. Consider restriction of parking on the side which is serving predominant flow of traffic during peak hours. Painting of center line has been accomplished.
33rd St.		
Market to Broadway Blvd.	High accident occurrence.	Restrict parking near intersections, and install adequate street illumination to improve visibility. Painting of center line has been accomplished.
39th St.		
Broadway Blvd. to Ave. O	Low travel speeds.	Remove angle parking, prohibit parking near signalized intersections and paint for left turn movements. Painting of center line has been accomplished.
Ave. O to Ave. S	Low travel speeds, high accident rate.	
45th St.		
Ave. O to Ave. S	Low travel speeds, high 24 hour volume.	Remove angle parking, prohibit parking near signalized intersections and paint for left turn movements. Trim or remove bushes near intersections. Painting of center line has been accomplished. Consider restriction of parking during peak hours.
Ave. S to Seawall Blvd.	Low travel speeds.	
53rd St.		
Broadway Blvd. to Seawall Blvd.	Low travel speeds.	Prohibit parking and trim shrubbery near major intersections. Painting of center line and left turn lanes has been accomplished since this study began.

TABLE 5-2

STREET DEFICIENCIES - GALVESTON MAINLAND

STREET NAME AND SECTIONS	PROBLEMS OR DEFICIENCIES	RECOMMENDATIONS
DICKINSON		
Deats Rd.		
F.M. 1266 to S.H 3	Low travel speeds, poor pavement.	Improve pavement.
F.M. 517 (Pine Dr.)		
F.M. 1266 to S.H. 3	Low travel speeds.	Paint for 4 lanes between S.H. 3 and G.H.&H.RR, and restrict parking during peak hours. Further improvements will require major construction and will be covered in Chapter 8.
State Highway 3		
16th St. to Deats Rd.	Capacity deficiency, high accident rate.	Improvements require major construction and will be covered in Chapter 8.
Deats Rd. to F.M. 517	Capacity deficiency.	
KEMAH		
State Highway 146		
Clear Creek to Gordy Rd.	High 24 hour traffic volumes.	Improvements require major construction and will be covered in Chapter 8.
LA MARQUE		
Cedar Dr.		
S.H. 3 to Bayou Rd.	Low travel speeds, high 24 hour traffic volumes.	Prohibit parking near major intersections, paint for left turn movements. Surface needs new topping.
Bayou Rd. to Lake Dr.	Capacity deficiency, poor pavement.	
First St.		
Texas Ave. to Bayou Rd.	Low travel speeds, poor pavement.	Eliminate angle parking and prohibit parking near major intersections,and paint center line and paint for left turn. movements. Upgrading of First Street to major thoroughfare standard is recommended in City of La Marque's Budget 1968-69.
Main St. (S.H. 341)		
S.H. 146 to S.H. 3	Low travel speeds.	Main St. has been upgraded to a 4 lane thoroughfare since this study began.
State Highway 3		
Texas Ave. to First St.	Low travel speeds.	Improvements require major construction and will be covered in Chapter 8.
Texas Ave. (F.M. 1765)		
S.H. 3 to Lake Dr.	High 24 hour traffic volumes.	Improvements require major construction and will be covered in Chapter 8.
LEAGUE CITY		
F.M. 518 (Main St.)		
Kansas Ave. to S.H. 3	Low travel speeds.	Paint for 4 lanes and restrict parking during peak hours. Further improvements require major construction and will be covered in Chapter 8.
State Highway 3		
F.M. 518 to 16th St.	Capacity deficiency	Improvements require major construction. The contract for upgrading to a 6 lane divided facility from Harris County Line to Beaumont St. extension and to a 4 lane divided facility for the remainder of the section will be let in Jan. 1969.
TEXAS CITY		
Loop 197		
S.H. 341 to Texas Ave.	High 24 hour traffic volumes.	Improvements require major construction and will be covered in Chapter 8.
Ninth Ave. N. (F.M. 1764)		
6th St. to 9th St.	Low travel speeds, high accident occurrence and capacity deficiency at intersections.	Restriction of parking near signalized intersections and painting for left turn movements has been accomplished since this study began.
Ninth St.		
Texas Ave. to 25th Ave. N	Low travel speeds.	Paint for 4 lanes, and paint for left turn movements at signalized intersections. The intersection with 9th Ave. N has been painted since this study began.
Sixth St.		
Texas Ave. to 9th Ave. N	High accident occurrence.	The prohibition of parking near signalized intersections and painting for left turn movements has been accomplished since this study began.
State Highway 3		
F.M. 1764 to Texas Ave.	Capacity deficiency, high accident occurrence at intersections.	A new traffic actuated signal with 12" signal heads has been installed at F.M. 1764 since this study began. Construction of a grade separation at F.M. 1764 is now in progress. Further improvements require major construction and will be covered in Chapter 8.
State Highway 146		
Texas Ave. to 25th Ave. N	High accident occurrence at intersections. Capacity deficiency at the intersection with Texas Ave.	A new traffic actuated signal with 12" heads has been installed at F.M. 1764 since this study began. Recommend new 12" heads in flashing beacon at 25th Ave. N. on S.H. 146. Provide for left turn slots on S.H. 146 at signalized intersections and a separate right turn lane on the south approach to Texas Ave. Further improvements require major construction and will be covered in Chapter 8.
Texas Ave. (S.H. 348)		
Bay St. to 6th St.	High accident occurrence.	Prohibit parking near signalized intersections and paint for left turn movements. Remove angle parking.
6th St. to 9th St.	High accident occurrence, low travel speeds.	
9th St. to S.H. 146	High accident occurrence at intersections.	



Chapter 6

Travel Patterns

Travel Patterns

INTRODUCTION

An integral part of the overall transportation planning process is the study and evaluation of travel patterns on highways and streets. To draft an efficient, well balanced, transportation plan, it is necessary to investigate the past and present travel characteristics, the production of future trips, and the travel desires, as they are related to present and future traffic patterns.

EXISTING TRIP CHARACTERISTICS

A valuable tool used to obtain trip characteristics within a study area is an origin-destination survey. Shortly after this transportation study was organized, a survey was started. Much of the data referred to in this chapter came from the results of that survey published in Volume 1 by the Galveston County Urban Transportation Study Office. Later references to the survey will be referred to as the O-D Survey.

Within the 366-square mile portion of Galveston County covered by the O-D Survey, the survey revealed that 167,842 persons were residing in a total of 53,885 dwelling units. It was also reported that there was an ownership of 57,805 automobiles. Internal (having both the origin and destination inside the study area) vehicular and passenger trips accounted for 512,281 or 92.4 percent of all person trips (excluding

walking trips). External trips (having one terminal outside the study area) accounted for 42,187 or 7.6 percent of the total trips.

An analysis of the data collected for the study area indicated the following:

Persons Per Square Mile	.458
Persons Per Dwelling Unit	3.11
Persons Per Automobile	2.90
Automobiles Per Dwelling Unit	1.07
Internal Person Trips Per Person	3.05
Internal Person Trips Per Dwelling Unit	9.51
Internal Person Trips Per Automobile	8.86
Internal Auto Trips Per Auto	4.67

To determine the type of trips that are made on an average weekday, home interviews in the study area classified the purpose of trips into ten categories. The mode of travel was also ascertained. The analysis of the data shown in Table 6-1 revealed that auto drivers made 270,127 trips or 52.7 percent of all internal person trips, and commercial vehicle operators made 52,553 trips or 10.3 percent. Auto passengers made 164,413 trips or 32.1 percent of the trips, while bus passengers

TABLE 6-1

INTERNAL TRIPS BY MODE AND PURPOSE

MODE	PURPOSE										TOTAL
	Home	Work	Business	Social	Shopping	School	Eat	Med-Den	Chng. Mode	Serve-Pass	
Auto Driver	97,761	40,474	25,534	30,190	33,498	1,437	5,284	2,298	137	33,514	270,127
Auto Passenger	64,459	10,396	7,900	46,600	19,315	9,624	2,158	1,850	161	1,950	164,413
Bus Passenger	10,679	2,181	577	421	457	7,647	45	177	138	-	22,322
Truck Passenger	583	526	123	207	96	55	22	-	13	-	1,625
Taxi Passenger	499	267	101	119	43	22	11	101	78	-	1,241
Subtotal	173,981	53,844	34,235	77,537	53,409	18,785	7,520	4,426	527	35,464	459,728
Commercial Vehicle Operators											52,553
TOTAL											512,281

* Walking trips not included

accounted for 22,322 trips or 4.4 percent, truck passengers 1,625 trips or 0.4 percent, and taxi passengers 1,241 trips or 0.3 percent of the total 512,281 internal person trips. Further comparisons showed that 86.7 percent of all internal passenger trips were made in automobiles compared to 11.8 percent of the trips made by bus passengers.

The mode of conveyance selected by persons making trips has definite bearing on the type of facilities to be provided in the future. The O-D Survey classified seven modes of travel. They were walking trips, auto driver trips, auto passenger trips, bus passenger trips, taxi passenger trips, truck passenger trips, and school bus passenger trips.

In the chapter discussing bus transit, an analysis was made of that mode of travel by separating the county into the Mainland Area, and the Island Area. Since the only intracity transit operation is located on the island, it was felt that a realistic analysis of this mode could be made by using only the Island Area.

On Galveston Island there was a total of 188,525 internal person trips. Auto drivers made 113,518 trips, auto passengers made 62,963 trips, bus passengers made 8,768 trips, taxi passengers made 806 trips, truck passengers made 604 trips, and school bus passengers made 373 trips. The remaining 1,493 trips were made by persons walking. According to the data there were 176,481 or 94 percent of the island person trips associated with the private automobile while 8,768 or five percent were bus passenger trips. The remaining one percent

consisted of the passengers in taxis, trucks, school buses and persons walking.

Evaluation of trip generation (production and attraction) is another element required in the determination of travel patterns. Internal and external vehicle trip ends from the O-D Survey were used for the evaluation. Census Tracts of the area were subzoned or divided into survey districts and further split into traffic survey zones for ease of analysis. Most of the analysis was concerned with the survey zones which were later rearranged into serial zones for traffic assignment study. A map showing the 1964 trip end generation by serial zone is shown in Figure 6-1. As would be expected, the highest trip generations were located in the Galveston Medical Center, the Galveston Central Business District (CBD), and the Texas City CBD. Vehicular trip ends on the mainland accounted for 60 percent or 411,059 of the total 684,044 trip ends, and island trip ends totaled 272,985.

TRAFFIC GENERATORS

Another phase of travel pattern analysis is the investigation of traffic generators. These are relatively small areas which attract large volumes of traffic because of intensely developed land. These areas require attention because conflicts may occur regarding parking facilities and pedestrian and vehicular movements. Major traffic generators to be discussed include schools, commercial shopping areas, CBDs, industrial areas, a medical center and recreational facilities.

FIGURE 6 - 1

INSET A
LEAGUE CITY

INSET B
DICKINSON

INSET C
TEXAS CITY

INSET D
LA MARQUE

INSET E
GALVESTON

GRAPHIC SCALE

1964 TRIP ENDS IN THOUSANDS

LEGEND

201 SERIAL ZONE NUMBERS

SERIAL ZONE LINES

1964 EXISTING TRIP ENDS

N O R T H

MILES 0 1 2 3

S C A L E

1964 VEHICLE TRIP END GENERATION

Galveston County Transportation Study

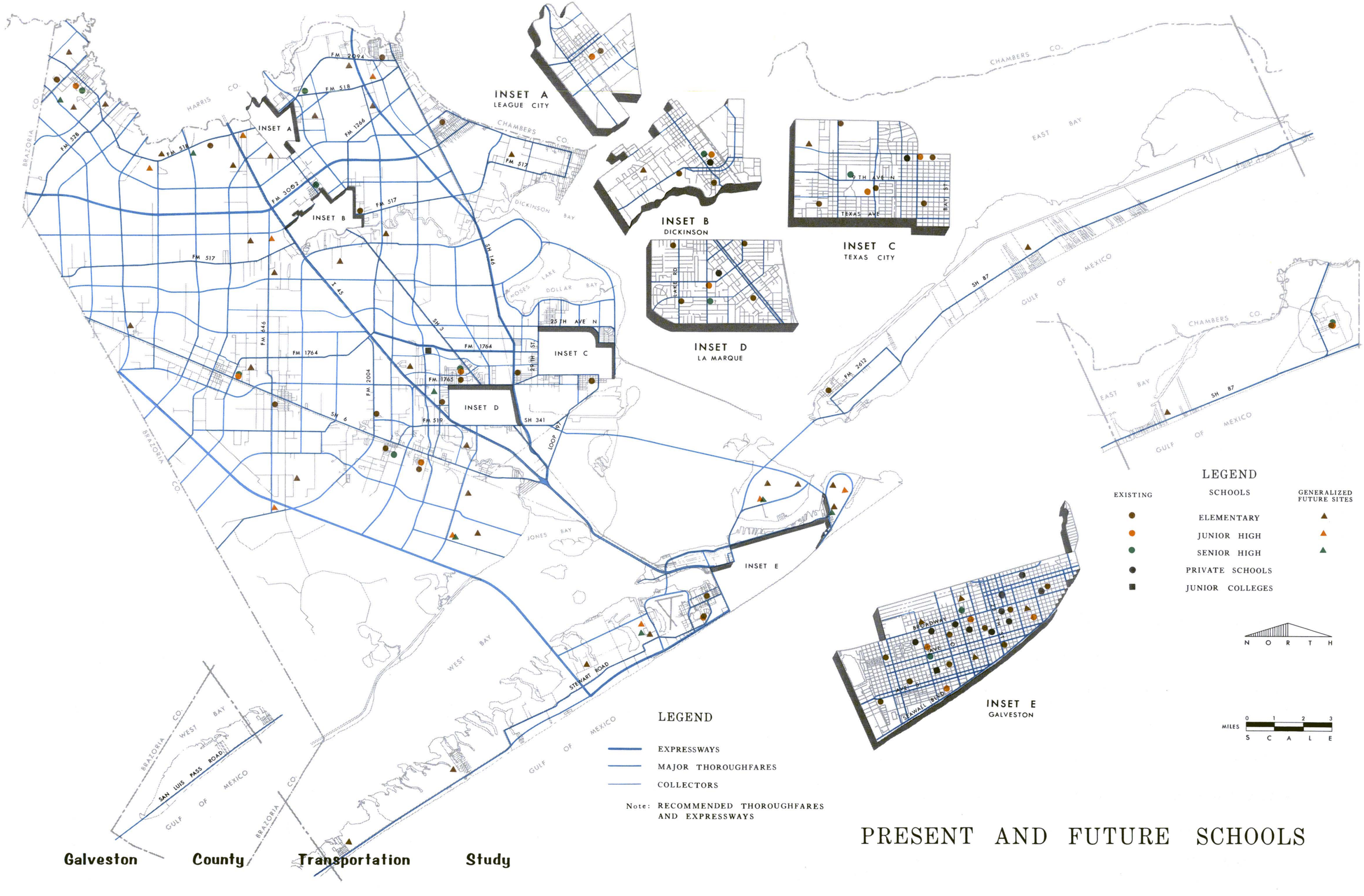
Schools. In recent years, schools have become central focal points in the life of every community. Figure 6-2 shows the locations of present and anticipated future schools within Galveston County. Locations of new schools and life expectancies of present ones will depend upon the general arrangement and stability of land use projected for future development and upon the location of such facilities as major thoroughfares, parks and other planned land uses. It is necessary to investigate present, as well as future, school sites to determine the necessary trip patterns, and possible conflicts between pedestrians and vehicular movement.

Well-planned elementary school locations are usually within communities or neighborhoods where the number of primary school age children is 250 to 750. These neighborhoods should be bounded by major thoroughfares to form the boundary for the school service area. The elementary school building should be located on a collector street so as not to produce conflicts between pedestrian movement to school and vehicular movement on major thoroughfares.

Junior high schools serve a larger area than elementary schools; however, the sites of these schools should, like the elementary schools, be located on the secondary street system, but very close to an intersection of two arterial streets.

High schools and colleges are more properly located directly on major thoroughfares because of the wide area they serve. This location allows easy accessibility by the students and faculty. The new junior

FIGURE 6 - 2



Galveston County Transportation Study

PRESENT AND FUTURE SCHOOLS

college located on the Mainland, and the junior college on the Island should be closely observed as they develop into major traffic generators which will place additional burdens on the existing thoroughfares.

Each type of school creates its distinctive traffic movements. Therefore, the specific traffic patterns at each installation require investigation. The average elementary school in Galveston County generates about 1,000 person trips daily, while the junior high schools generate about 1,900 trips and the senior high schools approximately 3,300. Vehicular and pedestrian movement will probably grow and should be observed continually in order to provide a safe and efficient pattern of movement.

Commercial Shopping Areas. There are three types of commercial shopping facilities defined by the Community Builders Council[1]: the neighborhood shopping center, the community shopping center, and the regional shopping center.

The neighborhood shopping center is primarily for the sale of convenience items and personal services. The leading shop in such centers may be a supermarket or a small chain store, such as a drive-in grocery store, with the remainder of the center being composed of facilities usually catering to personal services. This type of shopping facility requires an area of about four to eight acres, generally near the intersections of collector streets or collectors and major thoroughfares.

[1] Community Builders Handbook, Executive Edition, 1960, page 217.

In Galveston County these areas are too numerous to report on individually; therefore, an overall observation was made.

These neighborhood shopping centers, usually ranging from five to twenty stores with a gross floor area between 30,000 to 75,000 sq. ft., generally provide adequate off-street parking; this eliminates most of the conflicts between parking and vehicular movement along streets. However, off-street parking does not eliminate the conflicts arising from vehicles entering and leaving the traffic stream adjacent to shopping centers. Careful attention to location and design of such entrances and exits is warranted.

Community shopping centers serve many of the same functions as the neighborhood centers. But they also contain variety stores, hardware stores, appliance stores, etc. They are generally composed of 15 to 40 stores requiring 10 to 30 acres of land. Their locations are generally at the intersections of major streets and occasionally on freeways. These prime locations tend to provide accessibility for the 24,000 to 60,000 people necessary to support a center of this size.

The most prominent community shopping centers have been identified in Figure 6-3 to give an idea of their locations with respect to the surrounding area. The Central Business Districts of Texas City and Galveston are also included because of the concentration of shopping facilities. In addition to the major community shopping centers, there are smaller shopping centers which generate from 3,000 to 3,500 person

FIGURE 6 - 3

Galveston County Transportation Study

1964 TRAFFIC GENERATORS

trip ends. By definition, these latter areas are closely related to neighborhood shopping centers; however, because of their location and functional purpose they are classified as community shopping centers.

Regional shopping centers contain one or more large department stores, supermarkets, variety stores, personal service facilities, etc., and are generally located at the intersections of major thoroughfares and freeways. These facilities require 40 to 100 acres or more. While Galveston County does not contain such a center, one is being developed in Texas City at Palmer Highway (FM 1764) and SH 146, and another is under construction in Galveston at 61st Street and Broadway (IH 45). In Houston there are many such centers; the closest to Galveston County and a typical example of the type of center under discussion is Almeda Mall on the Gulf Freeway (IH 45). Regional shopping centers attract customers from a broad area due to the wide variety of merchandise available and because of their convenience especially with regard to parking.

CBD Shopping Generators. The Central Business Districts of both Galveston and Texas City generate large volumes of shoppers but with different degrees of economic significance. Galveston CBD generates for shopping only an average of 17,800 person trip ends daily while Texas City averages 18,800 shopping trip ends.

Because Texas City is only a little more than half as populous as Galveston, its CBD is relatively more important as a shopping area

and actually functions as one large shopping center. Galveston, however, has more outlying neighborhood shopping centers which tend to serve the everyday needs of its larger population and reduce the number of shopping trips to the more distant CBD.

A major function of the Galveston CBD is as a center for the specialized services of banking, business, and commerce. These services generate an average of 14,000 daily CBD person trip ends in the Galveston CBD compared to only 5,400 in the Texas City CBD.

The Galveston CBD illustrates a normal urban pattern; as a city grows the CBD tends to become more specialized with less emphasis on everyday shopping needs. Many of these needs are serviced by residential shopping centers which can thrive in a limited market area. The CBD becomes the center for banking, finance, and business services which must draw on a larger geographic area for support because relatively few persons utilize such services in a single neighborhood. Businesses offering these services also tend to benefit from the close proximity to one another in the CBD for carrying on interoffice transactions.

Industrial Areas. The areas shown in Figure 6-3 are of primary concern due to the large number of trips they generate. Both the Texas City and the Port of Galveston industrial areas are large traffic generators. The industrial area of Texas City generates about 19,200 person trip ends daily, while the Port of Galveston facilities generate about

7,200 trip ends daily. The relationship of size and type of industry plays an important role in the number of generated trips. The fact that most of the industries located in Texas City work on three eight-hour shifts tends to create secondary peak-hour traffic loads apart from the normal hours. At present, these areas are being adequately served by existing street systems but may require improved roadways with future growth.

Medical Center. The University of Texas Medical Branch and the John Sealy Hospital make up the major portion of traffic activity in the Galveston Medical Center. The more than 3,000 employees plus students, patients, visitors, doctors, and other related service people create one of the largest traffic generators in the county. Findings in the Origin-Destination Survey revealed that approximately 15,400 person trip ends were generated daily in the area. Like the industrial complex in Texas City, the Medical Center operates 24 hours a day which spreads the traffic movement over a long period of time. Although most of the traffic movement takes place during the daytime, the work shifts and random movement of patients and visitors tends to spread some trip-making throughout the off-peak hours.

On the Mainland, the Galveston County Memorial Hospital generated about 2,600 person trips daily in 1964. This hospital has recently undergone a large expansion program which increased the number of available beds from 233 in 1964 to 315 in 1967. Due to the expansion, street

facilities in this area should be kept under close observation.

Recreation. The City of Galveston's beachfront is one of the major and most distinctive features of the city and has a great potential for attracting an increasing volume of tourists, vacationers, conventioners, and residents. On an average weekday in the summer, the beaches attract about 8,500 trips.

Another major traffic generator in Galveston County is the Texas City Dike which generates about 3,400 person trips daily. Although the Texas City Dike is a project of the U. S. Corps of Engineers and was built to protect the Texas City Ship Channel, it is also a tremendous recreational area.

A general trend toward more leisure time could accelerate the number of persons making trips to recreational areas. Since Galveston Island is one of the best known recreational areas along the Texas Gulf Coast, it would be desirable to study in depth the facets involved in recreational trip making.

FUTURE TRIP GENERATION AND DISTRIBUTION

The study and understanding of existing trip generation and distribution provides valuable knowledge in forecasting future trips and travel patterns. Projected changes in population and land use will affect the future travel patterns. Increases in population will cause more trips to be distributed throughout the county. These trips are normally influ-

enced by the socioeconomic developments on the land.

Volume I of this report established trip generation and distribution to the existing land uses. Volume 2 expressed the predicted uses of the land and population estimates thereby creating the base data for forecasting the future trip making process.

All of the six hundred traffic survey zones were reviewed and condensed into two hundred homogeneous serial zones. Each serial zone was analyzed for the projected changes in land use, population, income, trips by purpose and trips by type of land use. The surrounding area of each serial zone was studied to determine the effects of external growth expected near the zone. An example is in the northern part of the county where the influence of the Manned Spacecraft Center in adjoining Harris County is affecting development.

It is assumed for this study that trip generation characteristics will tend to remain constant into the forecast year for each of the different land uses. Trips by residents were recorded for home-work, home-other, and non-home based trips. In addition to residential trip analyses, tabulations were prepared for trips attracted to other land uses, such as commercial, industrial, and public and semi-public.

Forecasting was accomplished by using these criteria to determine the growth and to project the number of trips emitting from each serial zone. Much of the O-D Survey was conducted during the summer, therefore the trip forecasting process recognized the summer weekday

conditions. The summertime population was included in the forecasts since many of the commercial activities on the Island are expected to rely on recreational business.

The results of the forecasting revealed that the internal vehicle trip ends should increase 239 percent by 1985. Due to the external influences from Harris County and the expected industrial developments in Brazoria County, the external trips were forecasted to increase by 575 percent. Table 6-2 shows the 1964 vehicle trip ends compared with

TABLE 6-2

VEHICLE TRIP END INCREASE IN GALVESTON COUNTY

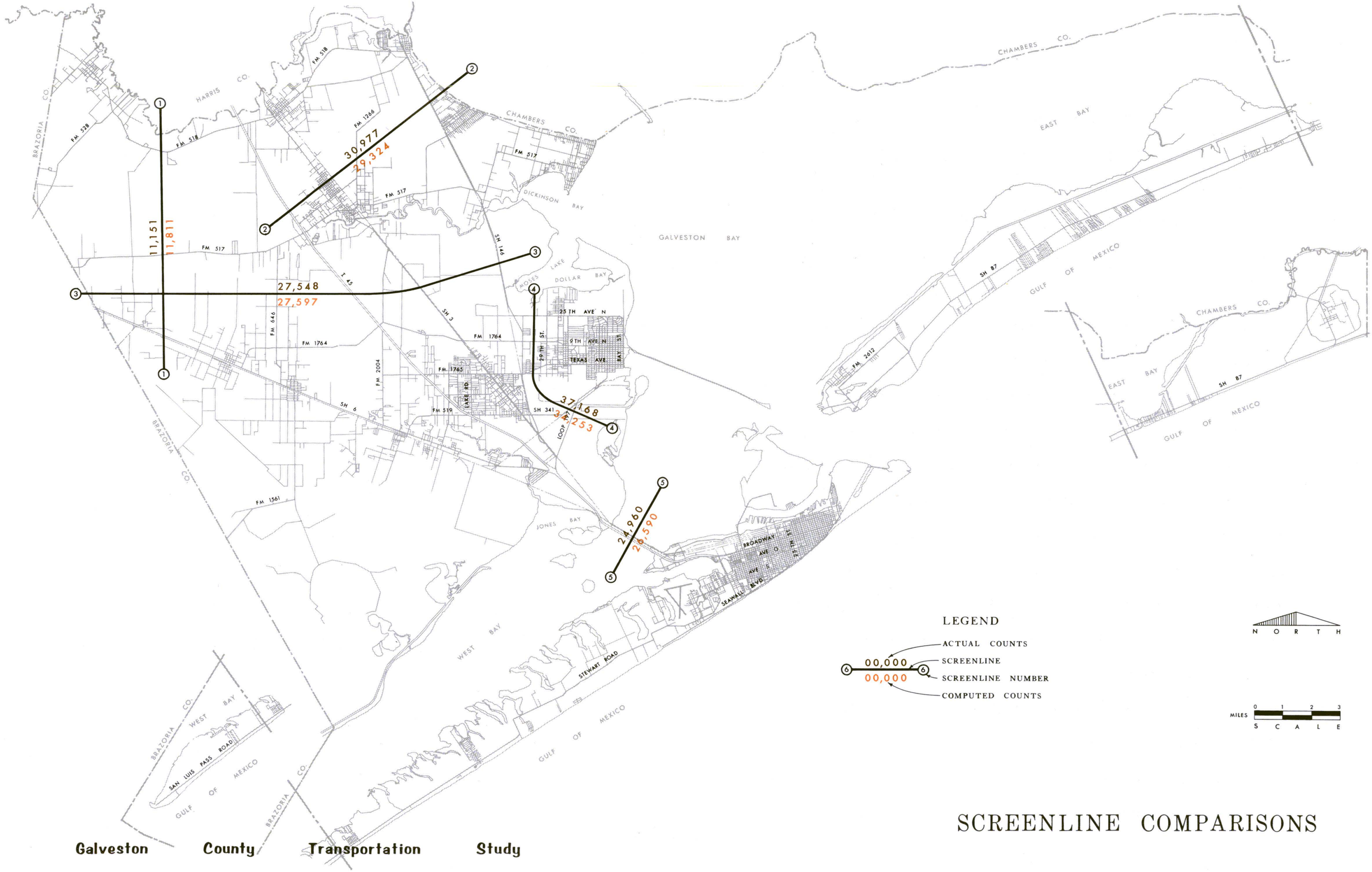
Trip Purpose	1964	1985	% Increase
Home-Work	92,592	258,610	179.3
Home-Other	302,284	1,051,758	247.9
Non-Home	289,168	1,185,080	309.8
Total	684,044	2,495,448	264.8

the projected 1985 data. Figure 6-4 compares the 1964 trip end generation with the 1985 projected trip end generation. The bars express the anticipated growth in terms of vehicle trip ends for each serial zone throughout the County.

TRAVEL ASSIGNMENTS

The mathematical process used to distribute zone to zone trip movements involves simulating the road system in computer language and assigning the trip data to that system. To achieve this process,

FIGURE 6 - 4



SCREENLINE COMPARISONS

Galveston County Transportation Study

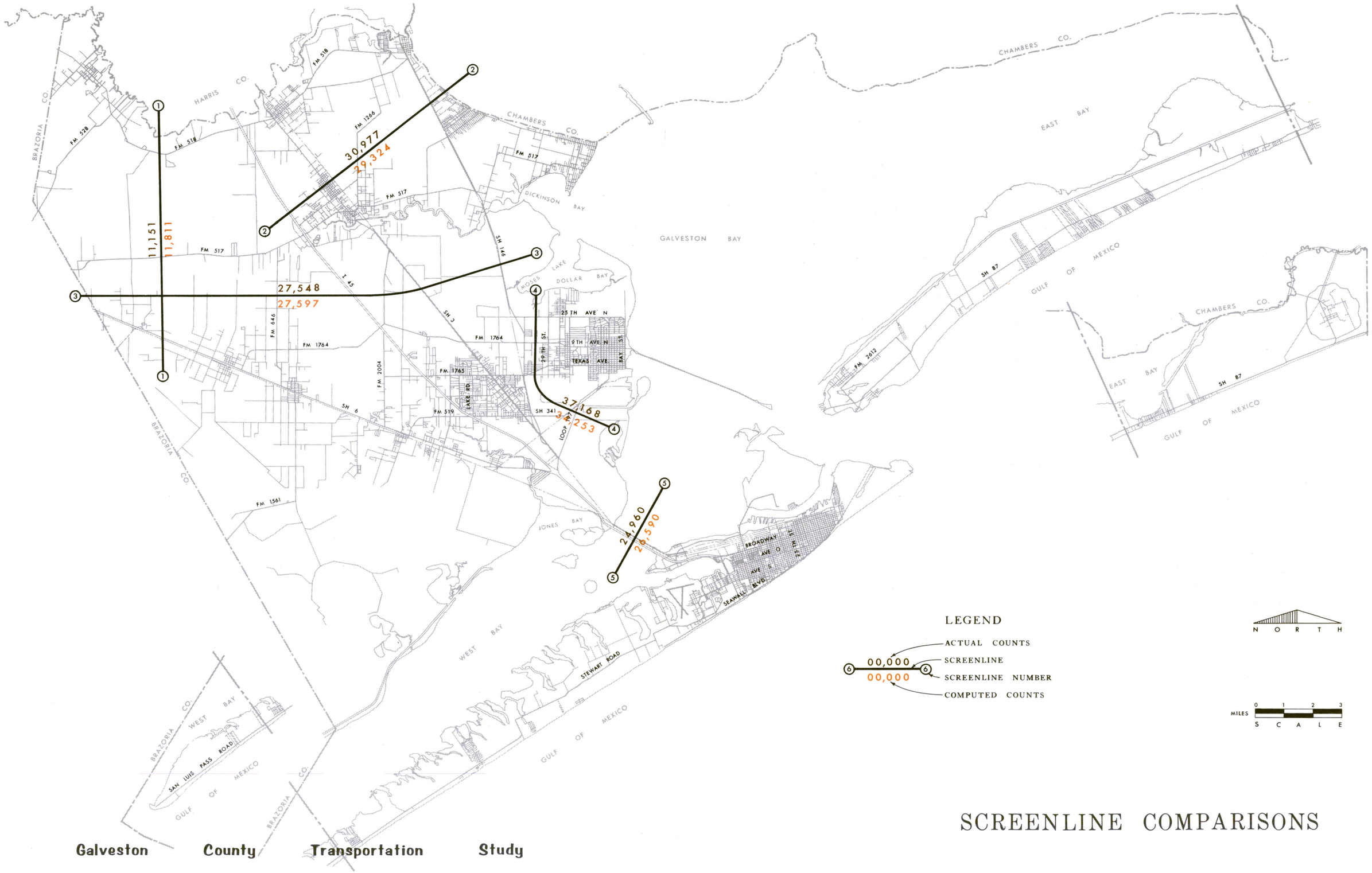
several steps must be accomplished to attain acceptance of the procedures.

The first step in balancing the system was to load the 1964 trip data and the 1964 major street network into the computer. The resulting trip distribution on the 1964 street network revealed link volumes (total nondirectional trips assigned to a particular link or street segment) that could be used in comparison with the actual volume count along that same segment of roadway. These locations of comparisons are known as screenlines and several screenline comparison counts were taken as illustrated in Figure 6-5. Each of the screenline locations produced a reasonable accuracy check. Screenline one was within 6 percent of the ground count, screenline two was within 5 percent of the ground count, screenline three revealed only 49 vehicles difference in the two counts. Screenline four was within 8 percent of the ground count, and screenline five resulted within 7 percent of the ground count.

Correlating these data with elements discussed in other chapters, such as growth factors based on population and land use projections, etc., desired vehicle trip movements for the year 1985 were developed.

Another step in the assignment process was to determine if the desired vehicle trip movements in 1985 changed appreciably from the 1964 movements. This was done by superimposing the 1985 vehicle trip movements on the 1964 vehicle trip movements as shown in Figure 6-6. After reviewing the future desires of vehicle trip makers, a net-

FIGURE 6 - 5



LEGEND

00,000 — ACTUAL COUNTS

6 — SCREENLINE

6 — SCREENLINE NUMBER

00,000 — COMPUTED COUNTS

NORTH

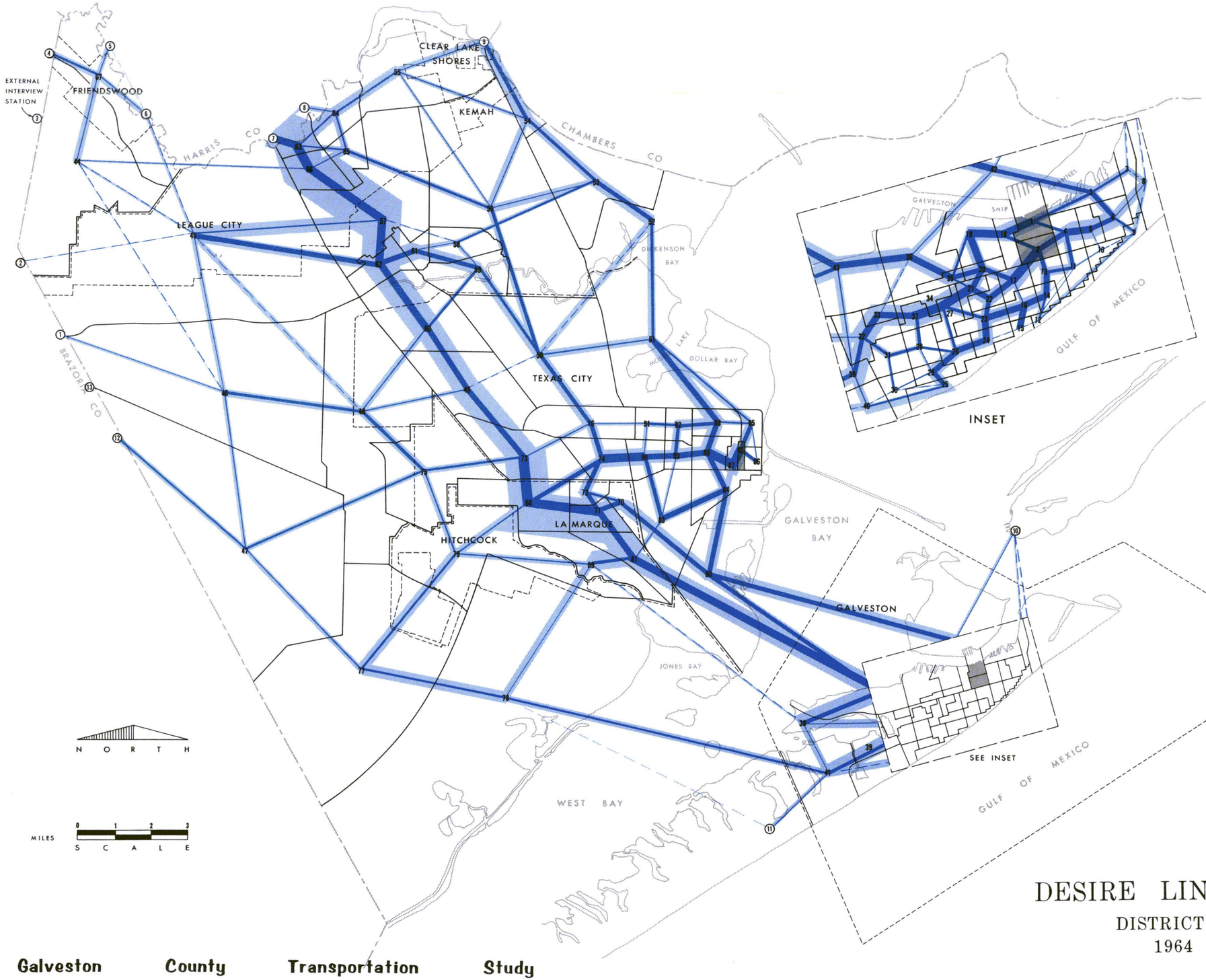
MILES 0 1 2 3

SCALE

SCREENLINE COMPARISONS

Galveston County Transportation Study

FIGURE 6 - 6



DESIRE LINES OF TRAVEL

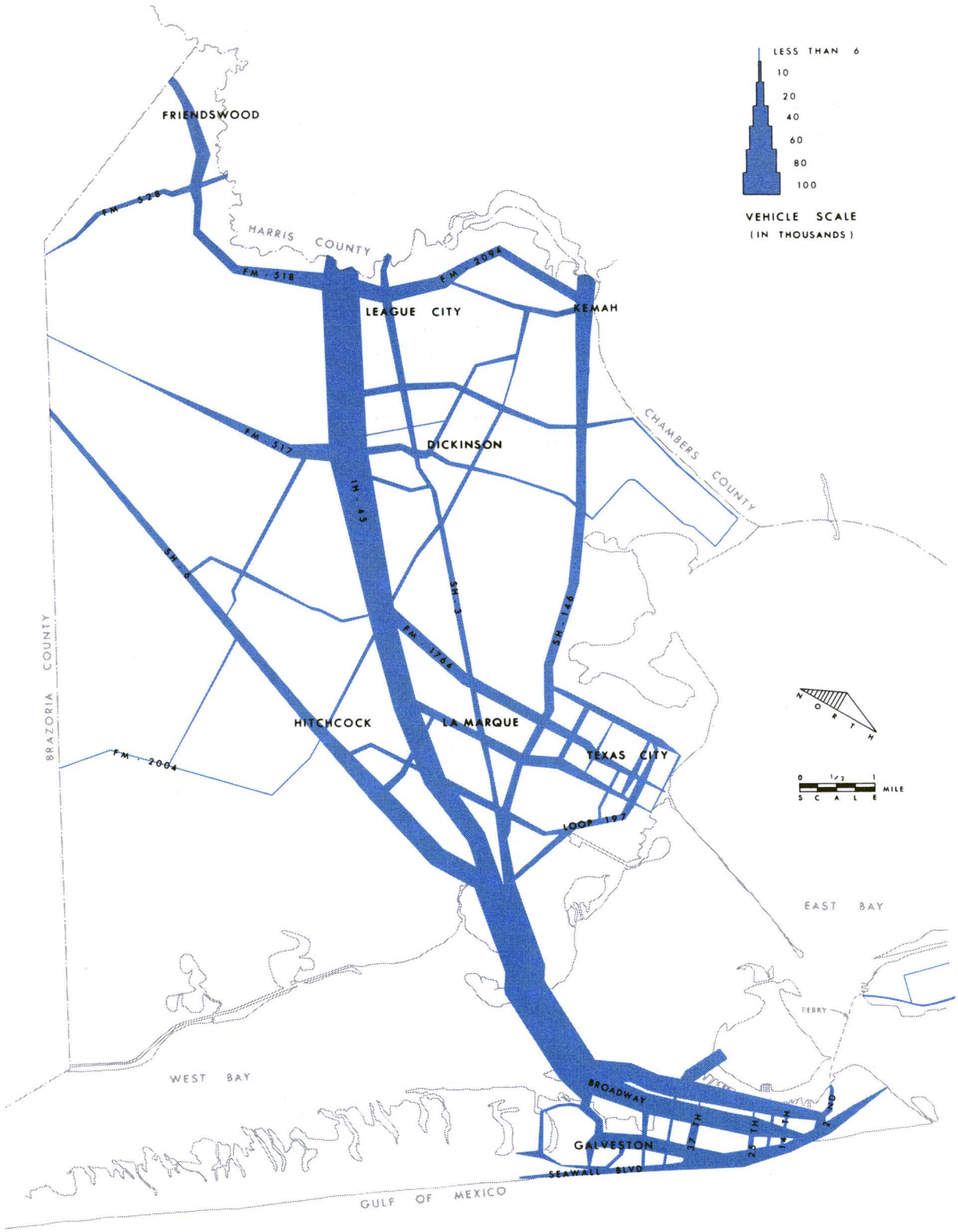
DISTRICT TO DISTRICT
1964 AND 1985

Galveston County Transportation Study

work of roads required to accommodate these desires was developed.

The development of a reasonable future network of roads based on the existing roads and future desires created the necessity of simulating several variations of the network in the computer. This was accomplished by loading a future street network into the computer together with the 1985 trip data mentioned earlier. Distribution of the trip interchanges was made by the computer and assigned to the various segments of the particular system being tested by using the minimum time path method. Some of the more significant alternate networks are shown in Figures 6-7 through 6-11. The changes in trip movements are expressed in colored bands representing volume on the maps.

Analysis of the several alternate networks brought about what the Coordinating Committee felt was a reasonable and workable Major Thoroughfare and Expressway Plan. Further discussion of the plan will be included in a later chapter.



1985 TRAFFIC FLOW ON A PROPOSED 1970 SYSTEM

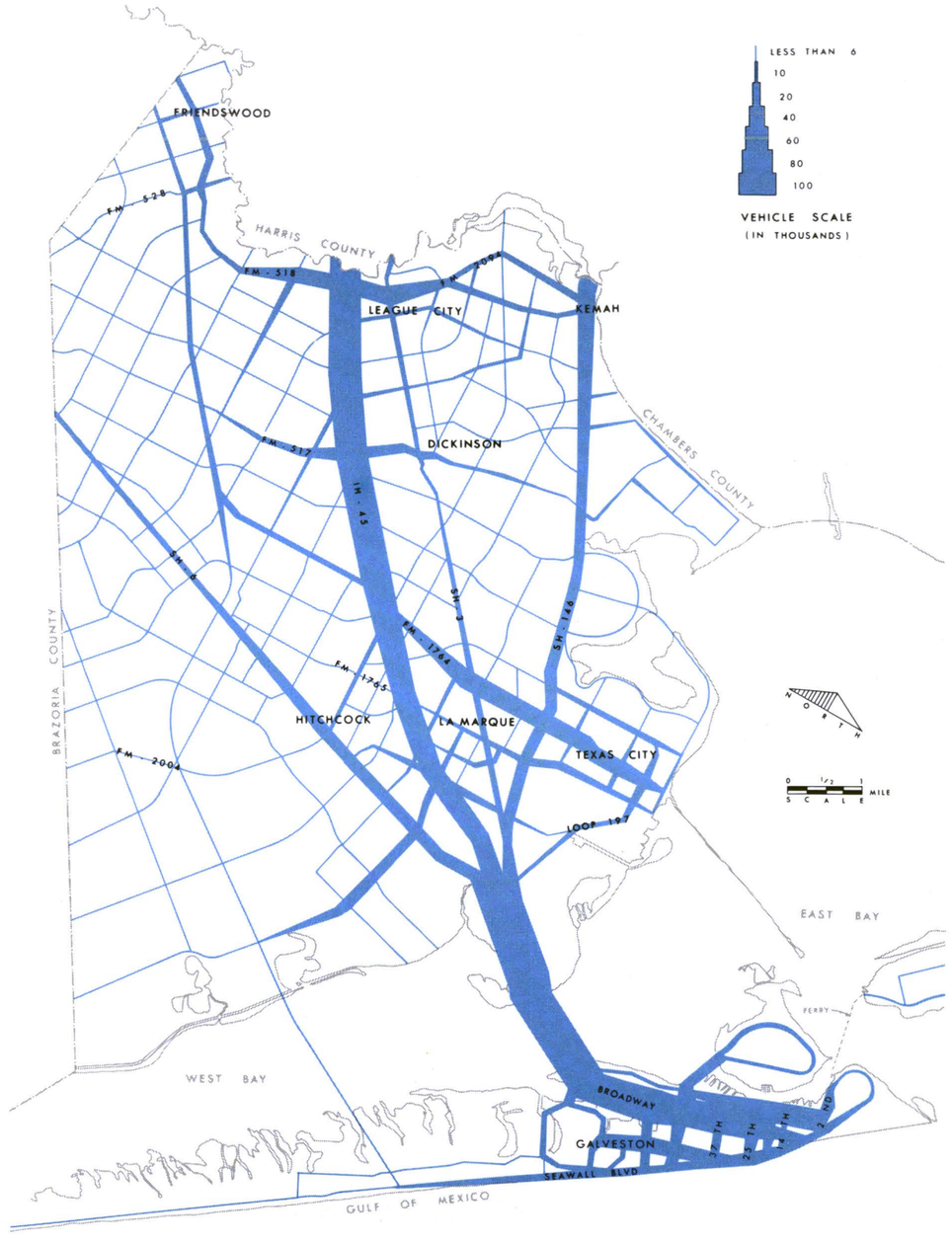
FIGURE 6-7

ALTERNATE NETWORKS

FIGURE 6 - 8

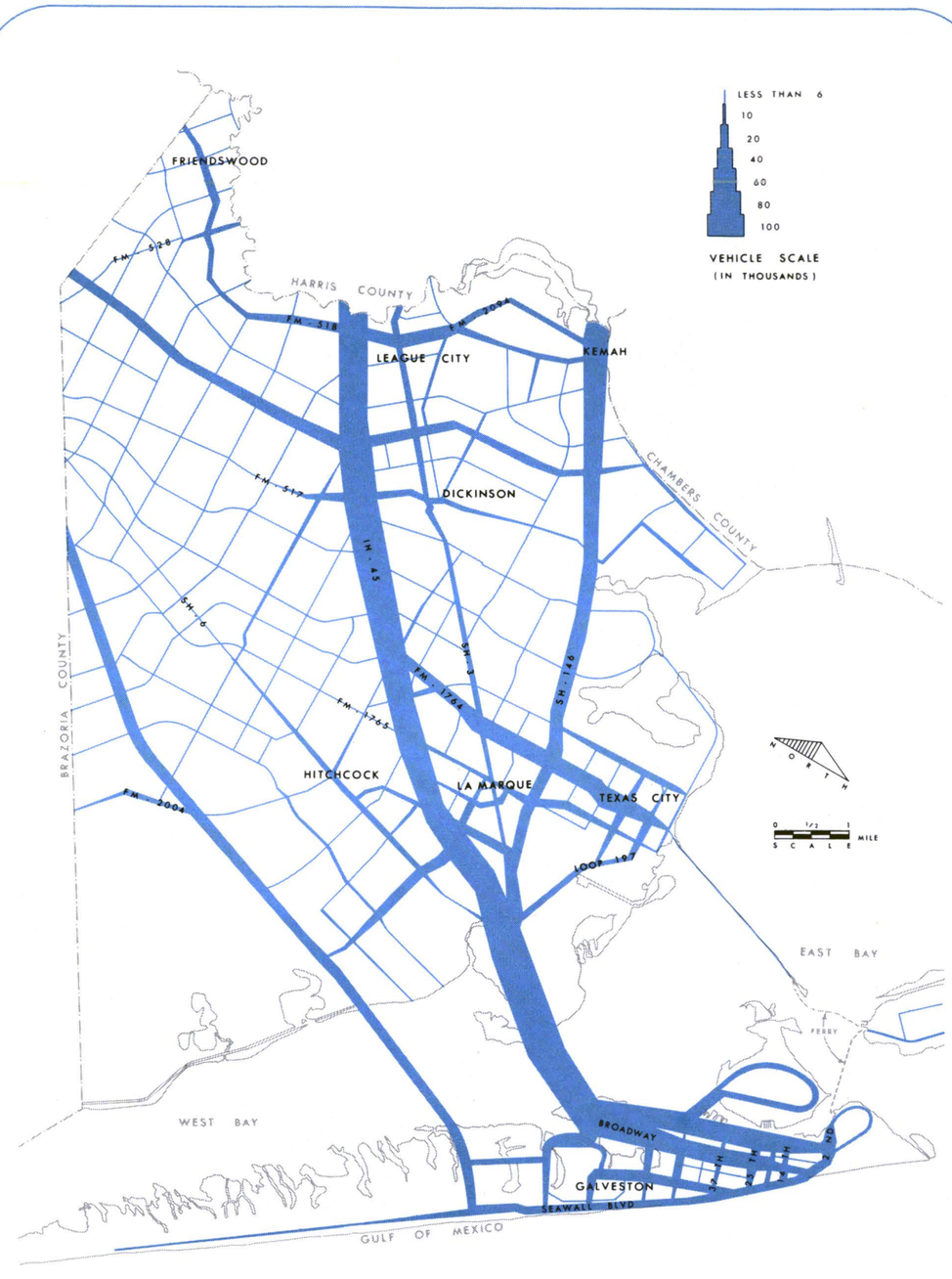
&

FIGURE 6 - 9



1985 TRAFFIC FLOW ON A PROPOSED 1985 SYSTEM

FIGURE 6 - 8



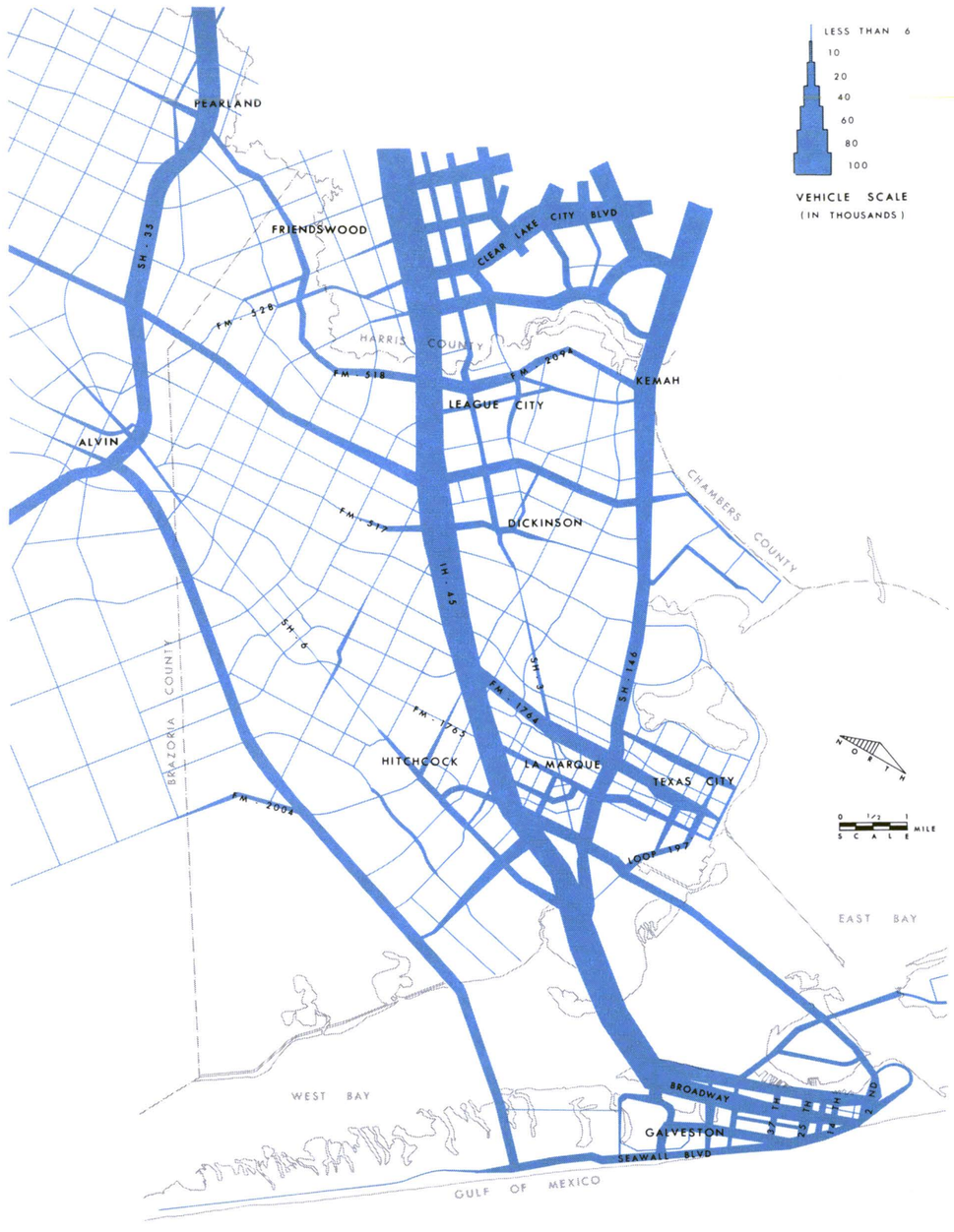
1985 TRAFFIC FLOW ON A PROPOSED 1985 SYSTEM

FIGURE 6 - 9

FIGURE 6 - 10

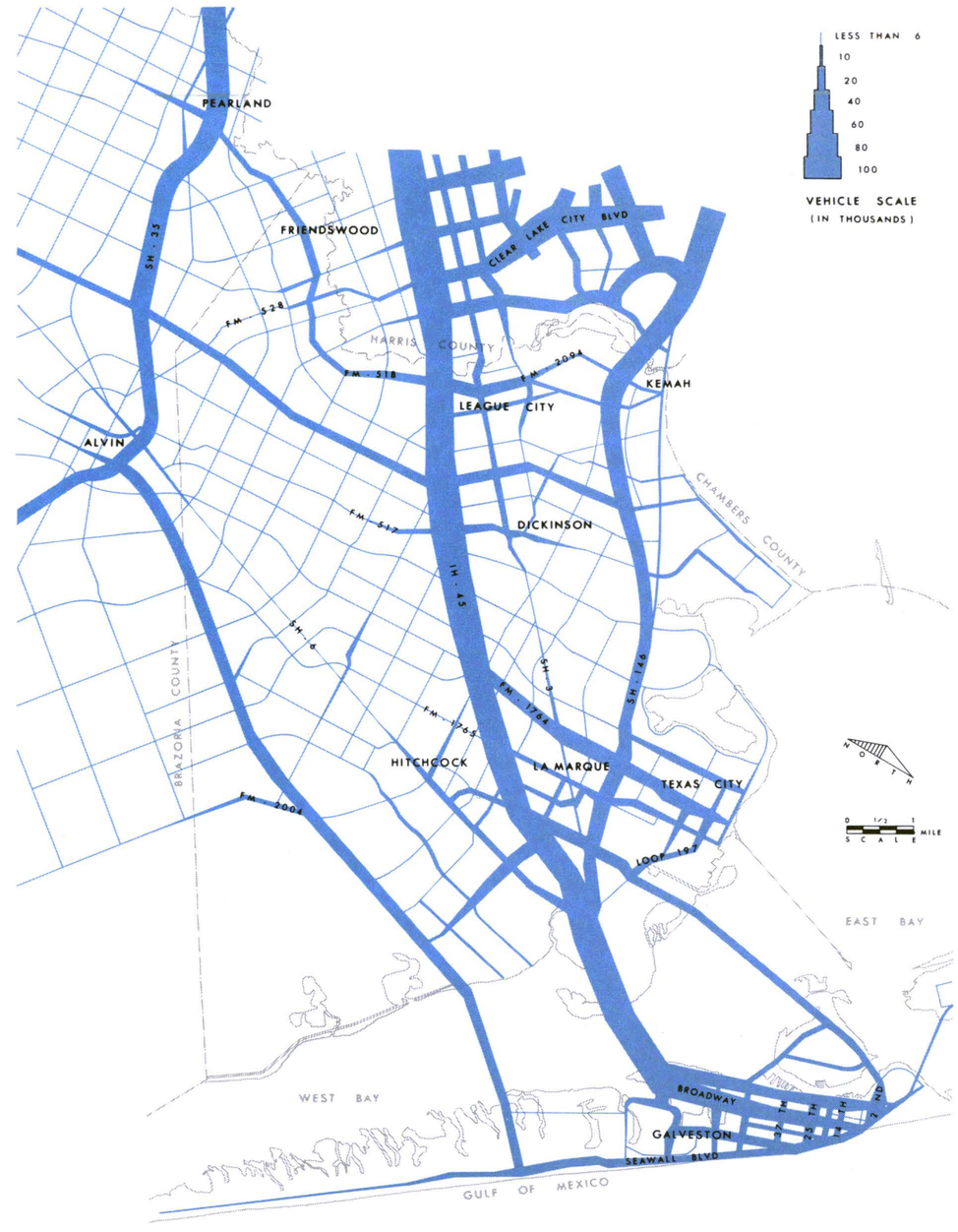
&

FIGURE 6 - 11



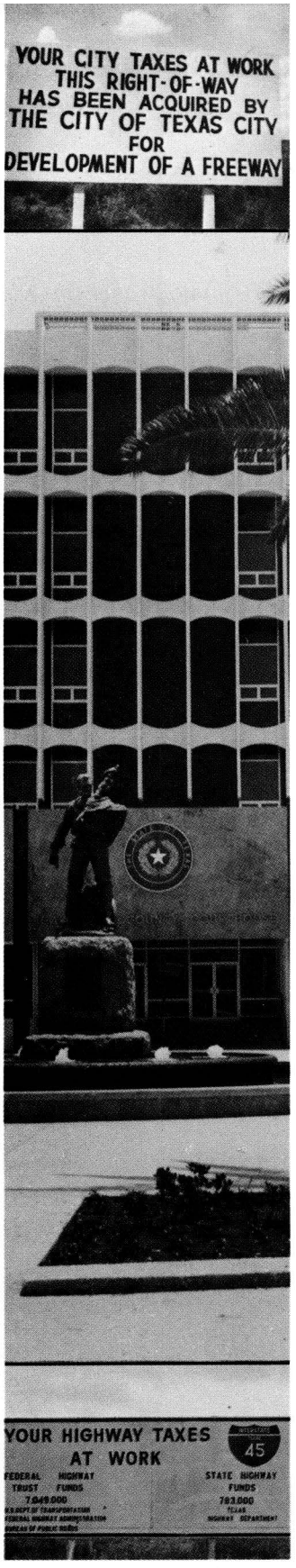
1985 TRAFFIC FLOW ON A PROPOSED 1985 SYSTEM

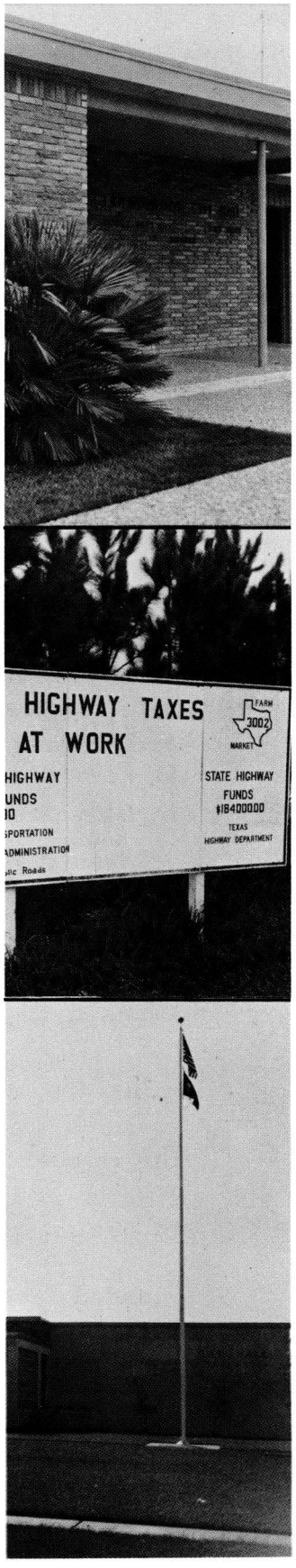
FIGURE 6 - 10



1985 TRAFFIC FLOW ON THE RECOMMENDED 1985 SYSTEM

FIGURE 6 - 11





Chapter 7

Financial Resources

Financial Resources

INTRODUCTION

The ability of the various levels of government to finance transportation improvements will strongly affect the outcome of the recommended system.

The intent of this chapter is to analyze the past, present, and future ability of the affected governmental units to finance transportation improvements. This analysis is based on an inventory of past expenditures in Galveston County for highway and street right-of-way, construction, and maintenance over the past ten years by three levels of government: State (including Federal aid), County, and City.

Other elements of the transportation planning process helped determine the recommended transportation system and estimates of its future cost are presented elsewhere in this volume. No attempt is made to assign ultimate responsibility for financing of the various recommended facilities. This transportation study does not change the traditional financial responsibilities of each governmental agency. How and when a particular recommended facility is finally financed will continue to be determined by the officials charged with this responsibility. Nevertheless, planning the use of financial resources for roads can be a valuable aid for increasing common interests and for reducing conflicts arising from over-lapping jurisdiction of legislative bodies,

administrative officials and business leaders.

Much of Galveston County is expected to urbanize rapidly in the next 20 years necessitating closer coordination and stronger regulations for highway and street development. Additional restrictions worth considering are: more rigid construction specifications for subdivision street builders, wider right-of-way purchases, ample building setbacks from streets, and broader use of special charges against property owners adjacent to road improvements. Such restrictions would help maintain an orderly transportation system and insure public accessibility to urbanized land.

Segments of the recommended road system should be constructed at the appropriate time to give user benefits that would be worth more than the construction cost during the life of a facility. If this is not done and money is spent elsewhere on the system, each construction dollar would bring progressively less user benefit. Such a low cost-benefit ratio is usually difficult to justify. It is important to keep a locally acceptable level of service for the road user within realistic limits of spending. Presently, more than 90 percent of the arterial roads in Galveston County are meeting local standards by adequately handling traffic movement.

TEXAS HIGHWAY DEPARTMENT

In the more than 50-year history of the Texas Highway Department,

Texas has become a leader in highway administration, construction, and maintenance. As of August 31, 1968, Texas had a State road network of 68,774 miles. This system links all parts of the State with modern highways, furnishes major cities with safe and time-saving freeways, and provides rural areas with roads to move products to market.

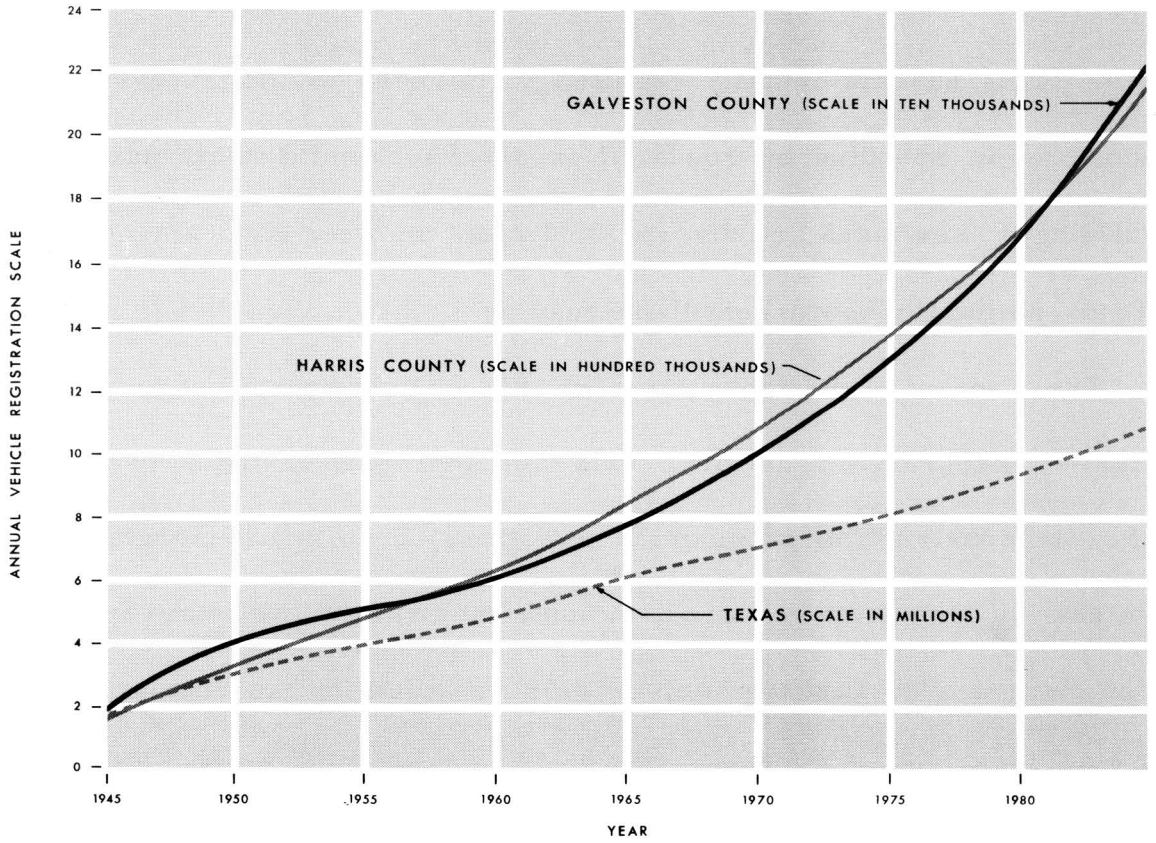
Despite the achievements of the past, Texas faces a challenging task in meeting the needs of the years ahead as more vehicles, more drivers, and more vehicle miles of travel are recorded each year with growing competition for revenues. To meet these growth demands, Texas spent 75 percent of all highway money for right-of-way and new road construction during the fiscal year ending August 31, 1968.

The principal sources of income for State Highway construction and maintenance come from these user taxes: Federal Aid (39 percent), State Motor Fuel Taxes (33 percent), State Motor Vehicle License Fees (22 percent), and miscellaneous sources (6 percent), for the fiscal year 1967/68.

The State Motor Fuel Tax (five cents per gallon on gasoline) approximate distribution is summarized as follows:

24 percent is diverted for use by public schools.
19 percent is distributed to the Farm-to-Market road system.
49 percent is made available to the State Highway Fund for use on the remaining State road system.
8 percent is allocated to retire old county bonds assumed by the State, for refunds on tax exempt equipment, and for comptroller's department fees, etc.

The amount of the license fee is based on the weight of the vehicle. The law provides for each county to retain the first $50,000 collected and 50 percent of the next $250,000 until it has retained a net of $175,000. The remainder goes to the State Highway Fund. All registration rates were raised 10 percent, effective August 22, 1957, to help provide funds for the State's portion of right-of-way costs. This was the first change in passenger car registration rates since January 1, 1930, and in commercial vehicle rates since April 10, 1941. In 1967, the 60th Legislature simplified the registration fee structure providing for a fixed fee for several broad weight groups, to be effective in 1968. Figure 7-1



VEHICLE REGISTRATION

FIGURE 7 - 1

compares past and projected vehicle registrations for Galveston County, Harris County, and the State of Texas.

The State Highway Fund receives over 75 percent of the total revenue obtained from motor vehicle license fees. The remainder, except for a small percentage for commissions and refunds, is retained by the counties for their use on county roads.

The Federal Government collects excise taxes (user taxes) on the sale of oils, gasoline and diesel fuel, tires, tubes, automobile parts, and on the sale of new automobiles, trucks, and buses.

Not every government function can be feasibly financed by means of appropriate user taxes, but the financing of roads through motor vehicle user taxes has historically resulted in fairness to the taxpayers and economy in spending on roads. It is always harmful to efficient road building if user taxes are diverted and spent on other government functions--no matter how urgent those may be.

The Federal Aid Highway Act of 1956 launched the most ambitious highway program in history. This act appropriated funds to start a 15-year construction program of a National System of Interstate and Defense Highways, to be more commonly known as the Interstate System. The Federal Aid Highway Act of 1956 provided that appropriations of money from a Federal Trust Fund would be made to each state based on a series of Interstate System Needs Studies. The Federal Government would provide 90 percent of the funds required for the acquisition

of right-of-way and construction of the system; the remaining 10 percent would be provided by the states.

For construction of the primary, secondary, and urban systems, federal and state funds are matched on an equal basis (fifty-fifty). Allocations of federal aid are based on mathematical formulas employing such factors as population, land area, and road mileage. Right-of-way finance varies for these systems with either the city or the county handling the acquisition and being reimbursed by the State for 50 percent of the cost. Farm-to-Market highway right-of-way acquisition is accomplished by the local governments without any reimbursement by the State.

The flow of federal aid to Texas varies slightly from year to year because of fluctuations in the national economy and demands of other federal programs, particularly defense. Recently federal aid has averged 39 percent of State Highway income but 16 percent of federal user taxes collected in Texas has been diverted to less fortunate states. However, less diversion may be expected in the future due to increased attention being given to the needs of urbanized areas. Since Texas is already significantly urbanized, it should expect to benefit from federal funds.

State and federal expenditures by the Texas Highway Department for highways within Galveston County for the past ten years are shown in Table 7-1. Prior to 1956, the Department depended upon cities and

TABLE 7 - 1

STATE AND FEDERAL EXPENDITURES AND REVENUES

YEARS	PAST EXPENDITURES				Total Annual Cost	
	Right-Of-Way	Construction	Maintenance*	Total	Per Capita	Per Vehicle Mile
1956 - 1960	$ 146,000	$ 8,769,000	$1,802,000	$10,717,000	$15.38	0.47¢
1961 - 1965	$1,248,000	$21,845,000	$3,079,000	$26,172,000	$33.25	0.89¢
	FORECASTED AVAILABLE REVENUES**					
1966 - 1970	$ 28,800,000		$ 7,190,000	$ 35,990,000	$37.10	0.88¢
1971 - 1975	$ 37,100,000		$ 9,280,000	$ 46,380,000	$40.30	0.80¢
1976 - 1980	$ 45,500,000		$11,400,000	$ 56,900,000	$38.44	0.69¢
1981 - 1985	$ 53,700,000		$13,400,000	$ 67,100,000	$36.51	0.58¢
20-Year Projection	$165,100,000		$41,270,000	$206,370,000	$37.94	0.69¢

* Past Maintenance does not include operation of the Bolivar Ferry which totaled $4,440,000 in the past ten years.

** Based on Interstate program and travel in vehicle miles.

counties to provide right-of-way for highways. Since 1956, the Department has increased its participation in this regard, as explained earlier.

Texas Highway Department expenditures within Galveston County for the five-year period 1961-1965 were more than double the expenditures for the five-year period 1956-1960. State spending in 1966 within Galveston County was $3,010,000. This $3,010,000 does not include ferry operation of approximately $580,000 annually (fiscal year ending August 31, 1966). Annual spending is expected to increase rapidly between now and 1970. In the past ten years 52 percent of all right-of-way and construction money has been spent on upgrading the Gulf Freeway in order to meet Interstate System standards. This is the only Interstate route in Galveston County. The Gulf Freeway was originally constructed with Federal-State matching on a fifty-fifty basis and with right-of-way provided by Galveston County. It was opened in 1952 and its cost was about $8,000,000. In the county there were 224 miles of State System

roads open to traffic in 1964; 28 miles of these were U. S. or Interstate Highways, 98 miles were State Highways, and the remaining 98 miles were Farm to Market Roads.

Table 7-1 also indicates an anticipated future available highway revenue of $206,000,000 for the next twenty years (1966-1985) based partly on amount of travel forecasted and partly on Interstate program commitments. This projected available revenue is also based partly on the assumption that federal aid will continue at the level established by the Interstate program in Texas even after its completion, although the ratios of apportionment to the various aid programs may change. The ten-year inventory indicated an average of 13 percent of total State Highway expenditures was used for maintenance, which is expected to increase to 20 percent. Therefore, the remaining estimated State Highway revenue, (including federal aid) for the right-of-way and construction of the State portions of the major thoroughfare system will be about $165,000,000 for the next twenty years. It is anticipated that 64 percent of this ($105,000,000), will be spent for freeways, expressways, railroad grade separations and other major bridges. The Gulf Freeway alone will consume approximately $20,000,000 in improvement costs for the five-year period from 1968 through 1972 inclusive.

GALVESTON COUNTY

The County Road System is constructed and maintained exclusively

by the county under the supervision of the Commissioners' Court. This system is financed by property taxes (62 percent); miscellaneous fines and fees (14 percent); and a share of the motor vehicle license plate fees (24 percent), which is $175,000 annually for Galveston County. Galveston County is divided into four precincts, each with a separate annual budget administered by its respective County Commissioner. In January, 1969, the county will change to the Unit Road System as provided by the Optional Road Law of 1947. Under this system of administration, county road work and funds will be managed by a single central administrator.

Past spending on county roads in Galveston County (excluding special district bridges) has been somewhat lower per capita than in adjoining Harris County. Table 7-2 gives a ten-year (1956-1965) analysis of the expenditures used to construct and maintain the entire County Road System, which is composed partly of major thoroughfares and partly of local streets. Spending on roads and bridges by the Galveston Island

TABLE 7 - 2

COUNTY EXPENDITURES AND REVENUES

YEARS	PAST EXPENDITURES					Total Annual Cost	
	Right-Of-Way	Construction	Maintenance	Debt Interest	Total	Per Capita	Per Vehicle Mile
1956 - 1960	$534,000	$ 731,000	$2,402,000	$285,000	$3,952,000	$5.85	0.173¢
1961 - 1965	$251,000	$2,660,000	$2,838,000	$382,000	$6,131,000	$7.79	0.209¢
	FORECASTED AVAILABLE REVENUES*						
1966 - 1970	$ 4,520,000		$ 4,520,000		$ 9,040,000	$ 9.32	0.222¢
1971 - 1975	$ 6,420,000		$ 6,420,000		$12,840,000	$11.17	0.222¢
1976 - 1980	$ 8,320,000		$ 8,320,000		$16,640,000	$11.23	0.202¢
1981 - 1985	$10,240,000		$10,240,000		$20,480,000	$11.12	0.176¢
20-Year Projection	$29,500,000		$29,500,000		$59,000,000	$10.84	0.198¢

* Based on 0.47 - 0.59 percent of projected assessed property values.

Navigation District and by the Galveston Island Road District has not been included in this table, because this spending was primarily derived from borrowing nearly $6,000,000 for the construction of the Pelican Island Bridge and borrowing nearly $3,000,000 for the construction of San Luis Pass - Vacek Toll Bridge to Freeport. Future borrowing by special districts is forecast to be very limited. Average borrowing by the County Government is expected to be about $800,000 annually for roads while principal repayment on road debt will be at the rate of about $400,000 annually in the ensuing 20 years. Approximately 60 percent of the total expenditure of the past ten years was spent for maintenance. Table 7-2 also compares the analysis of the past ten-year county expenditures with the projected available revenue. The total projected available revenue is expected to be $59,000,000 during the next twenty years, based on 0.47 percent to 0.59 percent of projected assessed property values annually. This revenue will average 0.123 percent of market valuations annually. Of this total, 50 percent is expected to continue to be used for maintenance of the major and local streets and reconstruction of the local streets, which are not a part of the thoroughfare system. Therefore, the remaining estimated revenue of $29,500,000 could be used for the right-of-way and construction of the county portions of the major thoroughfare system during the next twenty years.

CITIES OF GALVESTON COUNTY

In the cities of Galveston County about 40 percent of the general funds are financed by property taxes, 40 percent by utility profits, and 20 percent by miscellaneous fines and fees. Street funds are allocated from the general fund. Construction of the most important major thoroughfares is financed through general obligation bonds authorized by public bond elections.

Cities do not usually allocate revenue directly for streets, as the counties are required to do. Each city sets its own tax rates and assessment ratios. City street financing is in fierce competition for funds with schools and city government functions, especially utility capital improvements, health, and welfare.

Table 7-3 shows a ten-year analysis of expenditures to construct and maintain the city street systems, of Galveston, Texas City, La Marque, and Hitchcock. The Cities of Friendswood, League City, and

TABLE 7 - 3

INCORPORATED CITIES EXPENDITURES AND REVENUES

YEARS	PAST EXPENDITURES					Total Annual Cost	
	Right-Of-Way	Construction	Maintenance	Debt Interest	Total	Per Capita	Per Vehicle Mile
1956 - 1960	$ 2,000	$2,608,000	$4,004,000	$ 652,000	$ 7,266,000	$13.20	0.317¢
1961 - 1965	$934,000	$4,984,000	$4,801,000	$1,085,000	$11,804,000	$18.90	0.402¢
	FORECASTED AVAILABLE REVENUES*						
1966 - 1970	$ 8,510,000		$ 7,100,000		$15,610,000	$20.00	0.384¢
1971 - 1975	$10,896,000		$ 9,450,000		$20,346,000	$19.70	0.350¢
1976 - 1980	$14,484,000		$12,400,000		$26,884,000	$21.30	0.326¢
1981 - 1985	$19,678,000		$16,250,000		$35,928,000	$24.20	0.308¢
20-Year Projection	$53,568,000		$45,200,000		$98,768,000	$21.70	0.332¢

* Based on twenty percent of expected annual city budgets for all departments, including borrowing.

the Village of Kemah were not incorporated until 1960, 1961, and 1965, respectively, so the trend of expenditures for street construction is not firmly established. Spending on streets by the larger cities of Galveston County, although fluctuating considerably from year to year, compares favorably with the Cities of Pasadena and Baytown in neighboring Harris County on a per capita basis. The combined cities' borrowing for roads is expected to be at an annual rate of $1,200,000 with principal redemption of the road debt at approximately $600,000 annually. Table 7-3 also compares the past ten-year expenditures with the projected 20-year available revenue. The total projected available revenue is expected to be $98,800,000 during the next twenty years, based on twenty percent of the cities' projected general annual budgets and borrowings and compared with other levels of government by means of per capita amounts. Approximately 46 percent of the total revenue is expected to continue to be spent on the reconstruction and maintenance of the local street system (which is not a part of the thoroughfare system) and maintenance of the arterial street system. The remaining estimated money for the right-of-way and construction of the cities' portions of the major thoroughfare system will be about $53,568,000 for the next twenty years.

ALL LEVELS OF GOVERNMENT COMBINED

Road financing by Federal, State, County, and Municipal levels of

government has long proven itself necessary.

Table 7-4 combines the data from the State of Texas, County of Galveston, and Cities' tables. This table analyzes the total expenditures for the past ten years and summarizes the projected total revenues to be available for the next twenty years. The grand total of all projected

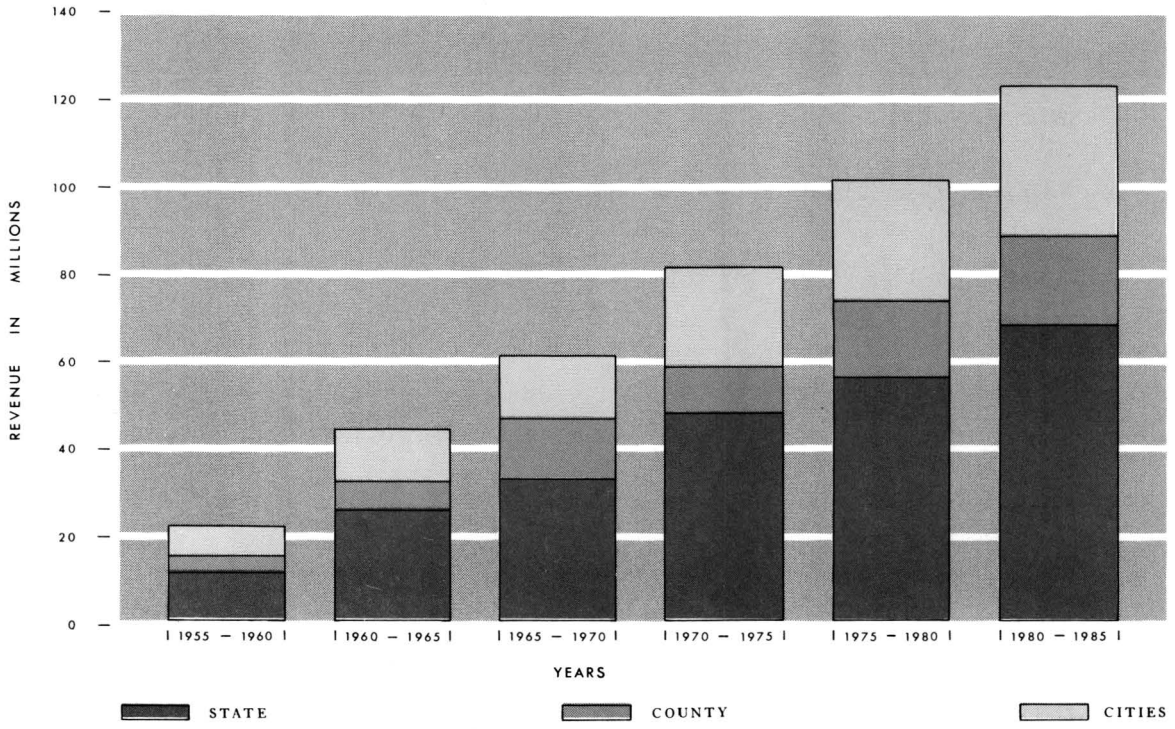
TABLE 7-4

COMBINED LEVELS OF GOVERNMENT EXPENDITURES AND REVENUES

YEARS	PAST EXPENDITURES					Total Annual Cost	
	Right-Of-Way	Construction	Maintenance	Debt Interest	Total	Per Capita	Per Vehicle Mile
1956 - 1960	$ 682,000	$12,108,000	$ 8,208,000	$ 937,000	$21,935,000	$32.50	0.98¢
1961 - 1965	$2,433,000	$29,489,000	$10,718,000	$1,467,000	$44,107,000	$56.00	1.54¢
	FORECASTED AVAILABLE REVENUES						
1966 - 1970	$ 41,830,000		$ 18,810,000		$ 60,640,000	$62.48	1.49¢
1971 - 1975	$ 54,416,000		$ 25,150,000		$ 79,566,000	$69.23	1.37¢
1976 - 1980	$ 68,304,000		$ 32,120,000		$100,424,000	$67.88	1.22¢
1981 - 1985	$ 83,618,000		$ 39,890,000		$123,508,000	$67.15	1.06¢
20-Year Projection	$248,168,000		$115,970,000		$364,138,000	$66.87	1.22¢

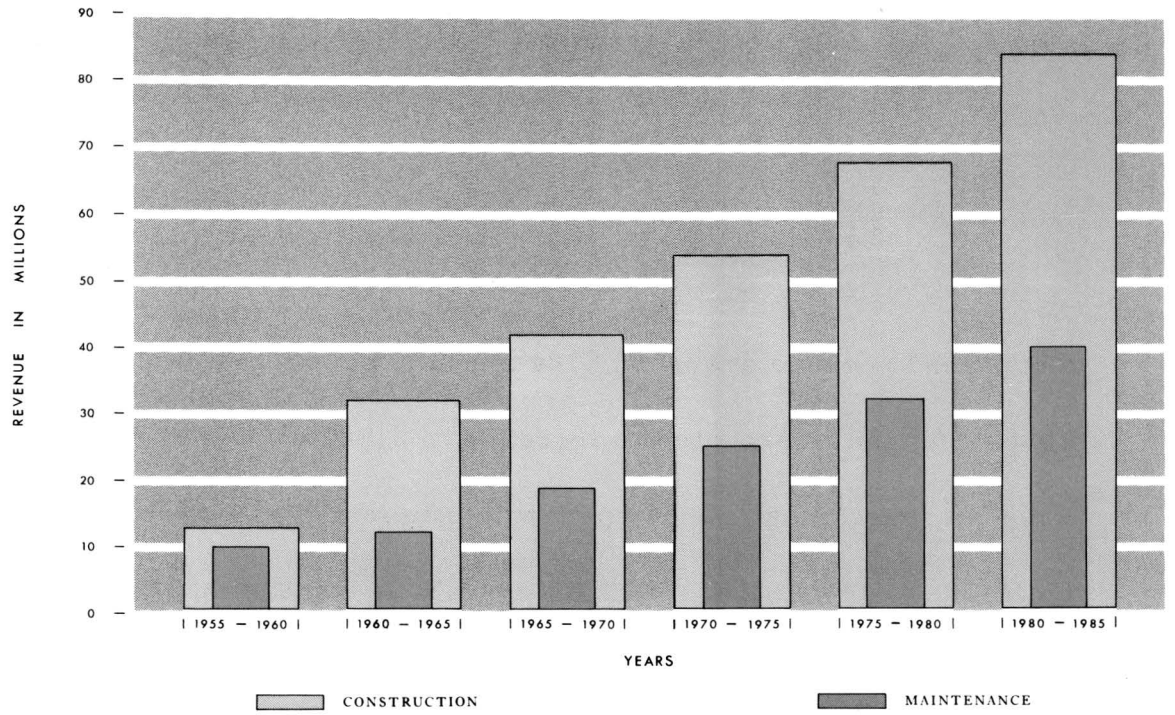
available revenue is $364,000,000. There should be $248,168,000 for right-of-way and construction of the major thoroughfare system from 1966 through 1985; $20,000,000 of this is expected to be borrowed by the county and cities. Figures 7-2 and 7-3 also illustrate the combined data of all levels of government. Spending on roads by all levels of government in 1965 was 3.2 percent of the disposable income[1] of the population of Galveston County. Revenue is forecast to increase in the future but the percentage of disposable income available for roads is expected to decrease to 2.7 percent in the year 1985. In the coming

[1] The U. S. Department of Commerce concept of disposable income is money available for spending on goods and services, and money available for voluntary saving.



SOURCE OF REVENUE

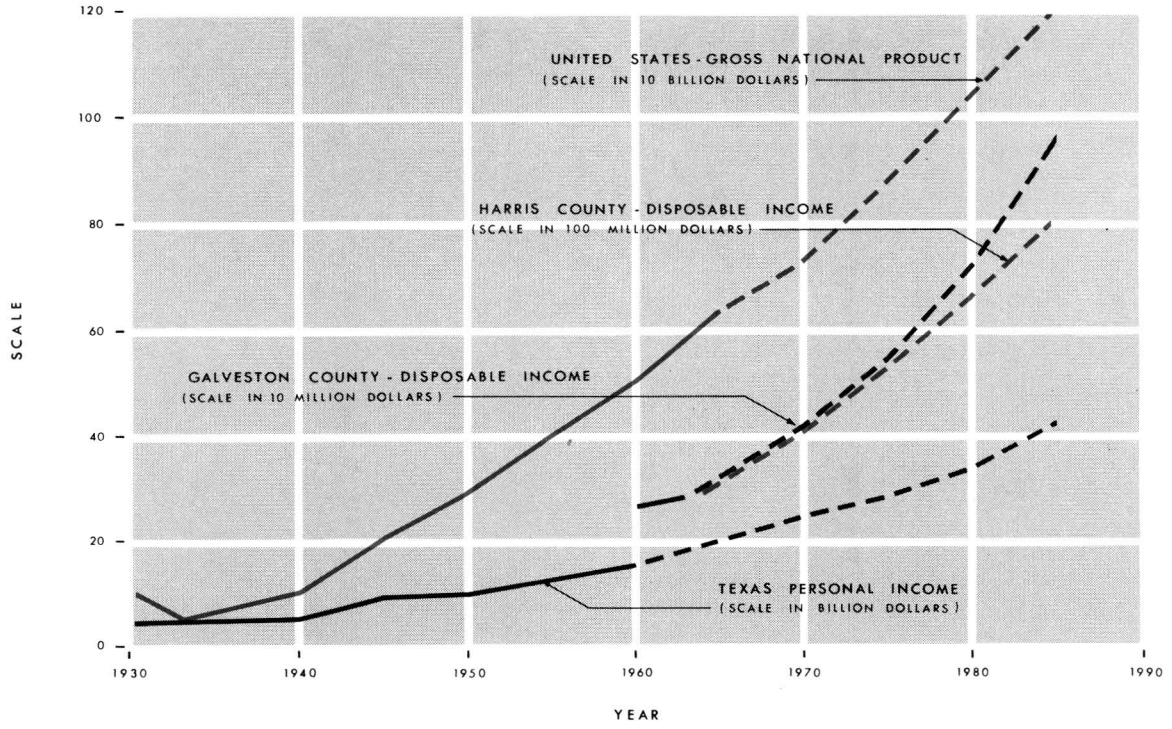
FIGURE 7 - 2



ALLOCATION OF REVENUE

FIGURE 7 - 3

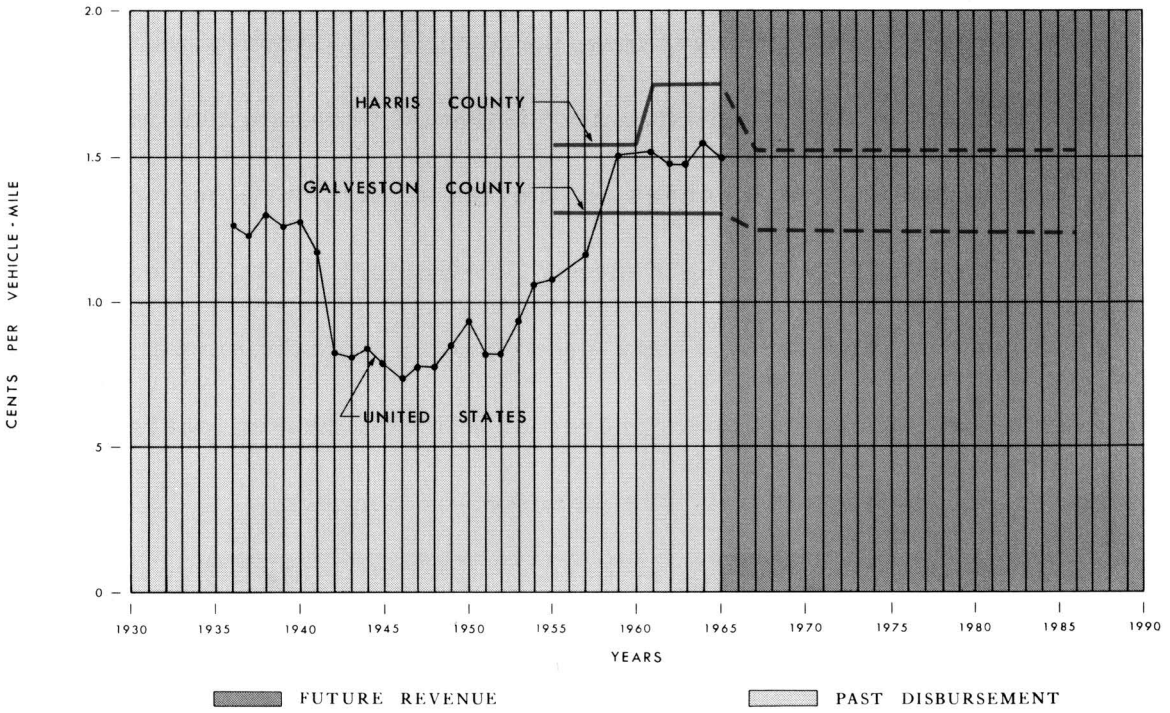
twenty years, per capita road revenue should increase 17 percent, but per capita disposable income is predicted to increase 40 percent. Figure 7-4 illustrates the economic growth comparisons of Galveston County to Harris County, the State of Texas, and to the United States.



ECONOMIC GROWTH INDICATORS

FIGURE 7 - 4

Total road revenue averaged $104 annually per vehicle during the period 1956-1965 and is expected to increase to $130 for the period 1966-1985. This increase must be coupled with efficient road building in order to build adequate facilities for rising vehicle ownership and more travel per vehicle. Figure 7-5 illustrates the previous nationwide disbursement of road funds. It also shows past disbursement and anticipated future revenue for Galveston and Harris County.



FUTURE REVENUE AND PAST DISBURSEMENT

FIGURE 7 - 5

SUMMARY AND COMMENTS

A continuing financial planning program promises to yield growing benefits for the future. The State, County, and each City should conduct studies leading to the adoption of five-year Capital Improvement Programs in as many fields as feasible within Galveston County. Capital Improvement Programs should be realistic, comprehensive, and long-range, so that implementation of planning will be accelerated and the continuing phases of road planning will be more meaningful.

With the improvement and expansion of the transportation system, funds will be needed in ever increasing amounts and will continue to

come partly from the governing bodies of the Galveston County Area. As the need for money increases, there will be a corresponding increase in the need to set up an attractive financial program that will promote public acceptance of changes in the tax structure. Closer cooperation will be needed between the Federal Government, State of Texas, County of Galveston, and various city governments to make sure that tax programs for transportation improvements do not weaken local government nor tax any group unfairly whether user or nonuser.

A change in emphasis in federal aid for roads for 1975-1985 was proposed recently by the American Association of State Highway Officials. Under the proposal, federal aid for the 10-year period would amount to about $54 billion.

The proposal puts more emphasis on urban roads and bypasses, and on the rural primary network. The Interstate System, scheduled for completion about 1975, will receive less attention than in the past; only upgrading and limited extensions are planned.

Assuming the new urban emphasis goes into effect, certain major thoroughfares in cities and counties will be developed with federal aid. The remaining thoroughfares plus all local and collector streets will continue under local administration.

Local initiative has always been a necessity for making community projects a success. Implementing the thoroughfare plan developed from this study will be primarily up to local officials and their agencies and

to interested groups of citizens.

Appendix

Appendix

EXISTING MAJOR THOROUGHFARE CONTROL SECTIONS

Street or Highway	Section Limits
	Expressways
Gulf Freeway (IH 45)	Clear Creek to FM 518
	FM 518 to FM 517
	FM 517 to FM 1764
	FM 1764 to FM 1765
	FM 1765 to Vauthier Rd.
	Vauthier Rd. to FM 519
	FM 519 to SH 6
	SH 6 to Causeway (North End)
	Mainland to Galveston Island
	Causeway (South End) to 59th St.
	Major Arterials
Bay Street	Texas Ave. to Ninth Ave. N.
	Ninth Ave. N. to 25th Ave. N.
Bayou Road	1st St. to Cedar Dr.
	Cedar Dr. to FM 519
Broadway Blvd.	Seawall Blvd. to 14th St.
	14th St. to 25th St.
	25th St. to 39th St.
	39th St. to 45th St.
	45th St. to 53rd St.
	53rd St. to 59th St.
Camp Wallace Road (FM 2004)	Gulf Fwy. to FM 1765
	FM 1765 to Oak St.
	Oak St. to SH 6
Cedar Drive	FM 1765 to SH 3
	SH 3 to Bayou Rd.
	Bayou Rd. to Lake Rd.
	Lake Rd. to Westward Ave.

Fairwood Road	Highland Bayou to SH 6
FM 517	SH 146 to Oasis Rd. Oasis Rd. to California Ave. California Ave. to FM 1266 FM 1266 to SH 3 SH 3 to Gulf Fwy. Gulf Fwy. to FM 646 FM 646 to Algoa-Friendswood Rd. Algoa-Friendswood Rd. to Brazoria County Line
FM 518	SH 146 to Lakeside Rd. Lakeside Rd. to Texas Ave. Texas Ave. to Kansas Ave. Kansas Ave. to SH 3 SH 3 to Gulf Fwy. Gulf Fwy. to Magnolia Creek Magnolia Creek to FM 528 FM 528 to Brazoria County Line
FM 519	Marchand Bayou to SH 6
FM 528	Clear Creek to FM 518 FM 518 to Brazoria County Line
FM 646	FM 517 to FM 1764 FM 1764 to SH 6
FM 1266	SH 146 to Kemah Cut-Off Rd. Kemah Cut-Off Rd. to Deats Rd. Deats Rd. to FM 517
FM 1764	SH 146 to SH 3 SH 3 to Gulf Fwy. Gulf Fwy. to Rice Canal Rice Canal to FM 646 FM 646 to SH 6
Fifty-third Street	Broadway Blvd. to Ave. S Ave. S to Seawall Blvd.
First Street	FM 1765 to Bayou Rd.

Forty-fifth Street	Broadway Blvd. to Ave. O Ave. O to Ave. S Ave. S to Seawall Blvd.
Grand Avenue (FM 517)	Park Ave. to SH 146
J Avenue (FM 517)	9th St. to 24th St. 24th St. to 29th St.
Lake Road	FM 1765 to Cedar Drive Cedar Drive to FM 519
Loop 197	FM 1765 to FM 519 FM 519 to SH 146
Main Street (FM 519)	Loop 197 to SH 146 SH 146 to SH 3 SH 3 to Bayou Rd. Bayou Rd. to Gulf Fwy. Gulf Fwy. to Vauthier Rd. Vauthier Rd. to Marchand Bayou
Market (Avenue D)	6th St. to 19th St. 19th St. to 25th St. 25th St. to 33rd St.
Ninth Avenue North	Bay St. to 6th St. 6th St. to 9th St. 9th St. to 14th St. 14th St. to 21st St.
Ninth Street	FM 1765 to 9th Ave. N. 9th Ave. N. to 25th Ave. N.
O Avenue	21st St. to 33rd St. 33 rd St. to 39th St. 39th St. to 45th St. 45th St. to 53rd St.
Palmer Highway (FM 1764)	21st St. to 29th St. 29th St. to SH 146

Park Avenue (FM 517)	9th St. to 24th St. 24th St. to Grand Ave.
S Avenue	Seawall Blvd. to 39th St. 39th St. to 45th St. 45th St. to 53rd St. 53rd St. to 61st St.
San Luis Pass Road	13 Mile Rd. to Buccaneer Rd. Buccaneer Rd. to San Jacinto Dr. San Jacinto Dr. to Termini Dr.
Seawall Blvd.	2nd St. to Broadway Blvd. Broadway Blvd. to 14th St. 14th St. to 25th St. 25th St. to Ave. S Ave. S to 45th St. 45th St. to 53rd St. 53rd St. to 61st St. 61st St. to 81st St. 81st St. to 107th St.
Second Street (SH 87)	Seawall Blvd. to Ferry
Sixth Street	Market St. to Broadway Blvd.
Sixth Street (Loop 197)	FM 1765 to 9th Ave. N. 9th Ave. N. to 19th Ave. N. 19th Ave. N. to 9th St. (at 25th Ave. N.)
Sixty-first Street	Broadway to Ave. S Ave. S to Seawall Blvd.
State Highway 3	Clear Creek to FM 518 FM 518 to 16th St. 16th St. to Deats Rd. Deats Rd. to FM 517 FM 517 to FM 2004 FM 2004 to FM 1764 FM 1764 to FM 1765 FM 1765 to First St. First St. to Ross Ave.

State Highway 3 Cont.	Ross Ave. to FM 519 FM 519 to SH 146
State Highway 6	Brazoria County Line to FM 1764 FM 1764 to FM 646 FM 646 to Mecom Ranch Rd. Mecom Ranch Rd. to FM 2004 FM 2004 to FM 519 FM 519 to Fairwood Fairwood to TCT RR TCT RR to Gulf Fwy.
State Highway 87	Ferry to FM 2612 (East Intersec.) FM 2612 (East intersec.) to Monkhouse Dr. Monkhouse Dr. to Gateway Dr. Gateway Dr. to Rollover Pass Bridge Rollover Pass Bridge to SH 124
State Highway 124	SH 87 to G.C. & S.F. RR G.C. & S.F. RR to County Line
State Highway 146	Clear Creek to FM 518 FM 518 to Gordy Rd. Gordy Rd. to Grand Ave. (Oasis) Grand Ave. (Oasis) to FM 517 FM 517 to Dickinson Bayou Dickinson Bayou to 25th Ave. N. 25th Ave. N. to Palmer Hwy. Palmer Hwy. to FM 1765 FM 1765 to FM 519 FM 519 to SH 3 SH 3 to Gulf Fwy.
Stewart Road	61st St. to 69th St. 69th St. to 81st St. 81st St. to Galveston City Limits Galveston City Limits to Anderson Way Rd. Anderson Way Rd. to 13 Mile Rd.
Strand (Avenue B)	10th St. to 25th St.

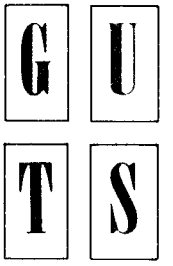
Texas Avenue (FM 1765)	Bay St. to Sixth St. Sixth St. to Ninth St. Ninth St. to 21st St. 21st St. to 29th St. 29th St. to SH 146 SH 146 to Cedar Drive Cedar Drive to SH 3 SH 3 to Lake Rd. Lake Rd. to Westward Ave. Westward Ave. to Gulf Fwy. Gulf Fwy. to FM 2004
Thirteen Mile Road	Stewart Rd. to San Luis Pass Rd.
Thirty-ninth Street	Broadway Blvd. to Ave. O Ave. O to Ave. S
Twenty-first Street (Galveston)	Strand to Broadway Blvd. Broadway Blvd. to Ave. O
Twenty-first Street (Texas City)	FM 1765 to Ninth Ave. N. Ninth Ave. N. to Loop 197
Twenty-third Street	Strand to Broadway Blvd. Broadway Blvd. to Seawall Blvd.
Twenty-fifth Street	Strand to Broadway Blvd. Broadway Blvd. to Seawall Blvd.
Twenty-fifth Avenue North (Loop 197)	9th St. to 21st St. 21st St. to 29th St. 29th St. to SH 146
Twenty-ninth Street	FM 1765 to Palmer Hwy. Palmer Hwy. to Loop 197
Twenty-ninth Street (FM 517)	Ave. J to SH 146
Vauthier Road	FM 1765 to Gulf Fwy. Gulf Fwy. to Highland Bayou

Collectors

Bayou Road	FM 1765 to 1st St.
Camp Wallace Road (FM 2004)	SH 3 to FM 1764
Deats Road	FM 1266 to SH 3 SH 3 to Gulf Fwy.
Eighty-first St.	Jones Rd. to Stewart Rd.
FM 646	SH 6 to McElmoyle Rd. McElmoyle Rd. to Brazoria Co. Line
FM 2612 (Port Bolivar Loop)	SH 87 to SH 87
Fifty-first Street	Broadway to Port Industrial Rd. Port Industrial Rd. to Pelican Island
Fourteenth Street (Galveston)	Market St. to Broadway Blvd. Broadway Blvd. to Seawall Blvd.
Fourteenth Street (Texas City)	8th Ave. S to FM 1765 FM 1765 to 9th Ave. N 9th Ave. N to 16th Ave. N
Howell Street	Ross Ave. to FM 519
Jones Road	69th St. to 81st St.
Kansas Avenue	Fourth St. to FM 518 FM 518 to Walker
Kemah Cut-Off Road	FM 1266 to FM 518
Oasis Road (FM 517)	SH 146 to FM 517
Port Industrial Road	51st St. to Gulf Fwy.
Ross Avenue	FM 1765 to SH 3 SH 3 to Howell St.
Teichman Road (FM 188)	Gulf Fwy. to Teichman's Point
Texas Avenue	FM 518 to Walker St.

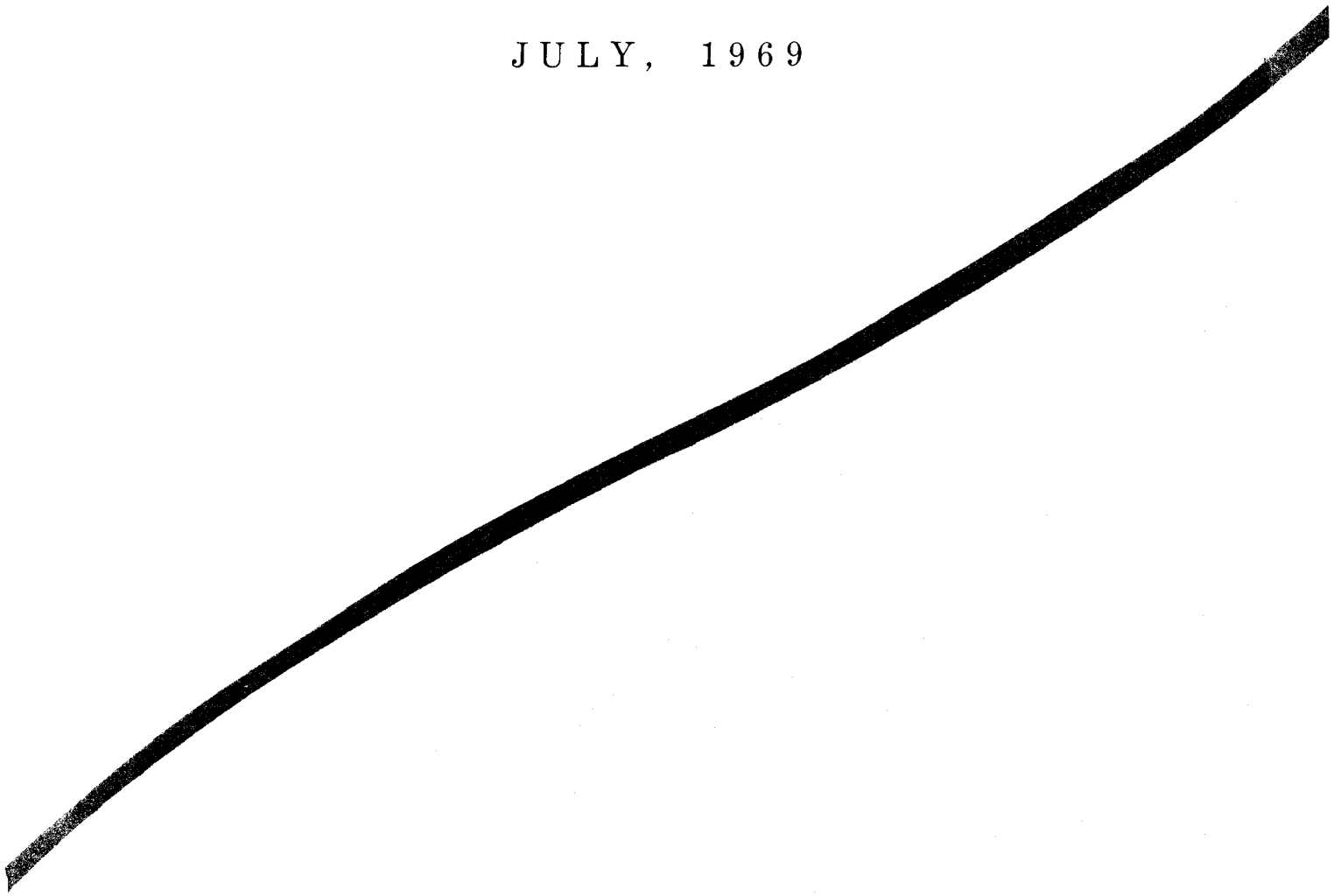
Thirty-third Street	Market St. to Broadway Blvd. Broadway Blvd. to Ave. O
Twenty-fifth Avenue North	Bay St. to 9th St.
Walker Street	SH 3 to Texas Ave.
Westward Avenue	FM 1765 to Cedar Dr. Cedar Dr. to Gulf Fwy.

Part 2 ■ Long - Range Transportation Plan



RECOMMENDED THOROUGHFARE AND EXPRESSWAY PLAN

JULY, 1969



Galveston County Transportation Study

Chapter 8

Recommended Thoroughfare & Expressway Plan

Recommended Thoroughfare & Expressway Plan

INTRODUCTION

The preceding chapters of this volume, along with the volumes published earlier, have described in considerable detail the many important interrelated factors affecting highway and street transportation as found by the study in urbanizing Galveston County. Several years of concentrated effort involving data collection and analysis, forecasting and projection of trends, and evaluation of various alternative solutions to problems, have gone into the development of the long-range recommended transportation plan presented in this chapter.

The active support and participation of many people, such as representatives of the various governmental agencies and interested citizens throughout Galveston County, have been important factors in the development of the recommended plan. The most active roles, however, were assumed by members of the Coordinating, Technical, and Public Relations Committees as outlined at the beginning of this volume.

After carefully evaluating all of the factual information developed during the study, the Coordinating Committee is recommending the proposed plan as the one, of several alternatives studied, that will most satisfactorily meet the anticipated future needs and desires of the traveling public. The Committee further recommends that all agencies concerned accept this plan as a long-range transportation plan to be used

RECOMMENDED
THOROUGHFARE AND EXPRESSWAY PLAN
FOR
GALVESTON COUNTY
JULY 1969

Galveston County Transportation Study

LEGEND

- EXISTING FREEWAY
- PLANNED FOR UPGRADING TO EXPRESSWAY OR FREEWAY STANDARD (Adequate Right Of Way)
- PLANNED FOR UPGRADING TO EXPRESSWAY OR FREEWAY STANDARD (Inadequate Right Of Way)
- RECOMMENDED EXPRESSWAY, PARKWAY, OR FREEWAY
- EXISTING MAJOR ARTERIAL (Adequate Right Of Way)
- EXISTING MAJOR ARTERIAL (Inadequate Right Of Way)
- RECOMMENDED MAJOR ARTERIAL
- EXISTING COLLECTOR (Adequate Right Of Way)
- EXISTING COLLECTOR (Inadequate Right Of Way)
- RECOMMENDED COLLECTOR
- EXISTING INTERCHANGE OR GRADE SEPARATION
- APPROVED INTERCHANGE OR GRADE SEPARATION
- RECOMMENDED INTERCHANGE OR GRADE SEPARATION
- EXISTING RIGHT OF WAY
- RECOMMENDED RIGHT OF WAY

NOTE: Usual Right Of Way widths required for the type of facility recommended are indicated Variations in width may be required due to special circumstances. Some of the streets shown as existing collectors or arterials may not be presently functioning as such but will require additional right of way and/or upgrading. Also, many of the recommendations shown will, out of necessity, be developed in stages in accordance with the ultimate plan for each facility Meanwhile the rights-of-way should be protected by building lines, by regulation of subdivisions, or by acquisition.

NOTE:
THIS PLAN SHOWS GENERAL LOCATIONS ONLY WHICH ARE SUBJECT TO MODIFICATION TO FIT LOCAL CONDITIONS. RESPONSIBILITIES FOR DESIGN AND CONSTRUCTION HAVE NOT BEEN ASSIGNED TO ANY AGENCY.

as a guide for future development and improvement of the transportation system. A sound planning process must be continuous, so if revisions of this recommended plan become necessary due to unanticipated development, such revisions will be a cooperative endeavor.

The land use forecasts as developed by this study indicate a continuation of the present pattern of development with predominately single family and garden-type apartment residences, widely dispersed places of employment, shopping centers, schools, and recreational areas. Therefore, the recommended plan has been logically designed to accommodate the "rubber tired" vehicle which has the flexibility to best serve such anticipated low-density type development. The study indicated that while there does exist a small demand for public mass transportation, it will only be of the magnitude that can best be served by a mode with maximum flexibility, such as the bus. Since the recommended plan is a system of thoroughfares and expressways that will allow for travel to widely dispersed points in a minimum amount of time, a flexible mode of mass transportation, such as the bus, seems appropriate.

DEVELOPMENT OF THE PLAN

It is an accepted fact that transportation facilities and land use are interdependent and basic to all travel relationships. One of the initial steps taken by the study, after the data were available from the Origin-Destination Survey and the Land Use Survey, was to merge and make a

coordinated analysis of the data on a small area or zonal basis. This produced a keen understanding of the travel characteristics, relationships, and patterns that existed in 1964. These established patterns and travel characteristics, along with data obtained from the economic base and population studies combined with the considered judgment of those persons closely associated with the study area, enabled the Study Office to develop a land use forecast to the target year 1985. From this land use forecast, direct relationships were established for the trip generation for each traffic serial zone. The interchange or distribution of trips between zones, with the accompanying assignment of trips to a system of thoroughfares and expressways was accomplished with the aid of the electronic computer. A more detailed explanation of the procedures used has been given in Chapter 6 - Travel Patterns.

Traffic assignments were made to nineteen variations of a proposed network of roads, taking into consideration the long-range goals for overall development and transportation in the area. Actually, these nineteen variations can be reduced to essentially five alternate plans, which will be discussed later in this chapter, and for which maps indicating the Traffic Flows were shown in Chapter 6 - Figures 6-7 through 6-11.

Another important step was to classify each facility for both the existing and future systems and to establish certain standards for each class of facility such as typical cross sections and the level of service

desired for the future transportation system. In developing a system of thoroughfares and expressways for Galveston County, it was assumed that almost complete urbanization of the area would eventually occur and that the system should be designed for ultimate development.

For the reader's reference, the plan that has evolved as recommended by the Coordinating Committee, is included in an envelope inserted at the beginning of this chapter. It should be noted that although no system has been included on the plan for the low-lying area of Southwest Galveston County, the system has been designed so it can be extended easily to serve the area if unforeseen development does occur.

Initially, all known existing plans were utilized as a basis for developing the ultimate countywide plan. Coordination with the existing comprehensive plans for the cities of Galveston, Texas City, La Marque, and Alvin was therefore the first step. Although the City of Alvin is not in Galveston County, its close proximity to the study area required coordination of planning. Also, the Major Thoroughfare and Freeway Plan of Houston and Harris County was an important consideration, as well as the Thoroughfare Plan for the City of Pearland in Brazoria County west of the City of Friendswood. Recently, the Cities of Friendswood and Seabrook prepared comprehensive plans assisted with funds granted by the Department of Housing and Urban Development (HUD). Both of these cities published reports which have been coordinated with the Transportation Study Office.

When the various existing plans were merged some adjustment in each individual plan was inevitable. Also, the "testing" procedures that followed, in making the various traffic assignments, introduced new proposed expressway facilities. These proposals required further adjustment of existing plans to provide a completely coordinated system of collector and arterial streets that would be adequately balanced from a functional standpoint. Basically, the identity of each existing plan has been retained to the maximum extent possible.

Additional important considerations in developing the plan were certain proposals specifically requested to be studied by the Galveston County Commissioners' Court in a resolution accepting the State Highway Commission Minute Order authorizing this cooperative Urban Transportation Study. The proposals were as follows:

1. Bridge from Galveston over the ship channel to Bolivar.
2. A bridge or other water crossing from Bolivar and/or Pelican Island over the ship channel to Texas City.
3. A bridge from FM 528 (now NASA 1) in Harris County in the vicinity of the Manned Spacecraft Center Complex to Galveston County, with connecting highways and bridges to FM 2004 and SH 146.
4. A bridge from Galveston County to Chambers County across the Intracoastal canal on SH 124.

A prime consideration in developing a plan for an adequate system of roads for the future was the realization, indicated from all of the accumulated facts, that almost the entire length of both the Gulf Free-

way throughout the county and Broadway Boulevard in the City of Galveston would be inadequate before the target year 1985. In fact, Broadway Boulevard is presently carrying almost its capacity volume between 25th and 61st Streets. Even though upgrading of the Gulf Freeway to meet Interstate Highway System standards is underway, it was not considered practical or desirable to provide enough capacity to handle the anticipated traffic on this facility alone. Improvement or development of other facilities would disperse traffic and provide more efficient service to not only this vital corridor but to other areas as well.

During the early stages of the study, some relief was authorized by the State for the Mainland portion of the Gulf Freeway, which provided for the upgrading of SH 3 throughout its entire length to a minimum of four lanes. Also, SH 146 has received authorization for upgrading of its entire length in Galveston County with provision for a minimum of four lanes south of FM 1764 in Texas City and for an eventual freeway north of FM 1764. These far reaching steps, however, did not provide any relief for the causeway connecting Galveston Island to the Mainland or for Broadway Boulevard in Galveston, nor did they provide long-range relief for the Mainland portion of the Gulf Freeway.

One major project recently completed and worthy of mention, which should give some temporary relief to a portion of Broadway Boulevard, was the improvement of 61st Street (Spur 342) between Broadway Boulevard and Seawall Boulevard in Galveston.

The first alternate solution that was considered and is shown in Figure 6-7, Chapter 6, assumed a 1970 system of roads, most of which were committed for development or for which development seemed probable. The 1970 and the 1985 forecasted traffic was loaded separately on this so-called 1970 system to "test" it for its adequacy under the expected loading conditions.

If the 1970 system had been indicated adequate through 1985, no more roads would need to have been added. However, a number of roads that would be inadequate were indicated for the year 1985, with the Gulf Freeway considerably overloaded. Neither did the 1970 system give adequate land service to enough area to accommodate the expected 1985 population increase.

It should be noted that this first trial solution recognized the need for an additional facility in the City of Galveston to relieve Broadway Boulevard by providing for the proposed improvement of The Strand (Port Industrial Boulevard) - a facility of expressway proportions west of the Galveston CBD. This feature of the plan has been retained in all of the various trial solutions considered, because it logically appeared to be the only practical means of solving this particular problem. Therefore, it is given high priority for implementation in the recommended program of development which follows in Chapter 9.

Another notable feature, included and retained with variations throughout the numerous trial solutions, is a proposed crossing of Offats

Bayou and a loop road around the Galveston Municipal Airport. This planning was specifically coordinated by the Technical and Coordinating Committees with the Federal Aviation Administration. However, any thoroughfare development is subject to adjustment in accordance with usual procedures to meet their requirements for proper clearances, etc., in effect at the time of implementation.

The logical solution for the indicated future overload on the Gulf Freeway seemed to be the development of an additional expressway-type facility for the entire distance beginning in Houston and ending on Galveston Island. Figure 6-8 indicates the next alternate system considered which was a 1985 or ultimate system with 1985 loading of traffic. The major significance of this scheme was the trial of an expressway, which diverged from the proposed Houston to Alvin Freeway at a point east of Pearland, passing through west central Galveston County from Friendswood southward across West Bay to the rapidly growing West Galveston Island recreational developments. Also, one variation of the several crossings "tested" at Clear Lake is shown.

Next, this scheme was modified as shown in Figure 6-9 for the following reasons. FM 518 and FM 517, east-west arteries in northern Galveston County needed relief. A Grand Parkway Loop around the Houston Metropolitan Region had been proposed which would logically pass through the northern portion of the county, midway between League City and Dickinson or FM 518 and FM 517, respectively.

A parkway is a type of arterial highway providing for noncommercial traffic, with full or partial control of access, and usually located within a park or a ribbon of park-like development. Even where it is designed for partial access control, its location within a park strip or area increases the degree of access control. Usually there is special attention in design to features, such as flat and rounded slopes, preservation of native ground cover, landscaping, scenic overlooks, etc.[1]

The proposed Grand Parkway would also serve the southern part of the City of Friendswood. The northern end of the expressway through west central Galveston County and Friendswood was no longer necessary, since the proposed Houston to Alvin Freeway could serve the northern part of the City of Friendswood. The southern end of the Expressway was still needed and it was found to be expedient to extend it to the Alvin Area, thereby giving relief to an indicated eventual overload on SH 6 throughout Galveston County. At Alvin, the expressway would connect to the existing Alvin Bypass (SH 35) which is planned to be a link in the proposed Houston to Alvin Freeway mentioned before. The City of Alvin in Brazoria County is a rapidly developing satellite-type hub of the Houston-Galveston region, and is an industrial, commercial, and educational center, as well as the permanent residence of many people employed in Galveston and Harris Counties. In this manner the hub of

[1] American Association of State Highway Officials. A Policy on Arterial Highways In Urban Areas, Chapter B, "Parkways". Washington, D.C.: Published by the Association General Offices, 1957, page 72.

Alvin with a portion of its supporting hinterland, can be served as well as the longer trip maker from Houston to Galveston.

This scheme also "tested" another variation of a Clear Creek crossing, located about one mile east of SH 3 which was studied in considerable detail and is the one recommended in the plan. See Figure 6-10 and 6-11 for subsequent refinements of the system with regard to this particular facility. This crossing was selected as being the most feasible and because it would best serve concentrations of existing development on both sides of Clear Creek. Most important too, in selecting an appropriate location, was the concern for preserving the character and dimensions of the natural environmental setting of Clear Lake, to the east of the recommended location, so that the present inspirational water scene will not become cluttered and fragmented with man-made facilities.

A crossing from Bolivar Peninsula to the Texas City Dike was also "tested" in the scheme shown in Figure 6-9. It was assumed that whatever service was provided would be equivalent to the service provided at the crossing from Bolivar Peninsula to Galveston Island. Based on this assumption, it was found that trip desires were such that almost half of the traffic would use the connection to Texas City. If the assumptions were changed so that a superior facility, such as a bridge, was to be provided from Bolivar to Galveston Island, accompanied by a comparatively inferior facility, such as a ferry connecting to the Texas

City Dike, almost all of the traffic would use the superior facility.

Thus far, none of the variations "tested" sufficiently relieved the existing Galveston Causeway. The remainder of the system was gradually refined and balanced to provide a workable plan. To produce the plan first recommended shown in Figure 6-10, it was necessary to introduce another crossing to the east of the causeway which would connect the Texas City - La Marque concentration of trip generators directly to the east end of Galveston Island via Pelican Island and such major generators as the Medical Center, the Galveston Central Business District (CBD), and East Beach. From this main stem, a spur to Bolivar Peninsula from Pelican Island was chosen as the most logical location to serve the nearly equal travel desires of the Texas City - La Marque area and the City of Galveston area. In addition, the plan provided for circulation between Galveston Island and Pelican Island by means of the existing 51st Street connection and a proposed Pelican Island Loop road. The Galveston Comprehensive Plan, prepared in 1965, provided the basis for this plan. The connection to Texas City - La Marque was added by the Transportation Study. Without the link from Pelican Island to the Mainland, it would be difficult to find economic justification for any additional connections to Pelican Island and the problem of the overloaded causeway would have to be solved in some other fashion. Most likely, the causeway facility itself would have to be expanded, which would unduly concentrate traffic in a narrow corri-

dor that would be most difficult to handle from the standpoint of collecting and distributing traffic within the City of Galveston. The two additional bay crossings to Galveston Island recommended by this plan are both located about four miles from the existing crossing, thereby providing for dispersion of traffic by means of suitable access and distribution points. The four-mile spacing is in accordance with authoritative recommended spacing for major facilities of the type proposed.[2]

The final variation "tested" in producing the plan recommended by both the Technical and Coordinating Committees is shown in Figure 6-11. This involved a change in the location of the connection to Bolivar Peninsula shown in Figure 6-10. Also, coordination with the comprehensive plans of the Cities of Friendswood and Seabrook, mentioned earlier in this chapter, required changes that were highly desirable. The Seabrook plan proposes the relocation of SH 146 west of its present location to form a loop around Seabrook and Kemah. These changes in configuration affect the financing and development program of the plan as recommended by the Transportation Study Coordinating Committee.

Considerable recent attention and study has been focused on the link between Galveston Island and Bolivar Peninsula in response to a request to the Texas Highway Commission by a delegation from the the City

[2] Institute of Traffic Engineers. System Considerations for Urban Freeways. Washington, D.C.: Published by Institute of Traffic Engineers, October, 1967, pages, 3-11.

and County of Galveston proposing a bridge between Galveston Island and Port Bolivar. The Texas Highway Commission subsequently notified the Galveston County Judge that, although immediate availability of funds is not foreseen, the Highway Commission, under certain conditions, could justify a contribution of $25,000,000 on behalf of the State toward a four-lane, toll-free structure estimated to cost $30,000,000, or in this ratio if the cost is greater or less, provided that the bridge is located in such a manner that the existing ferry system will be discontinued permanently.

In recognition of this action, which took into account community goals and the practical aspects of connecting to a more adequate system of existing roads for the least initial expenditure, the Technical and Coordinating Committees have concurred by recommending this plan as a basis for preparing the program of development outlined in Chapter 9. When definite details involving this particular link to Bolivar Peninsula are formulated, it is recommended that if any adjustment is required in the recommended plan or program of development that it be a part of the continuing phase planning operation.

Earlier in this chapter, a proposal for a new bridge across the Intracoastal Canal from Galveston County to Chambers County on SH 124 was mentioned. This project is in the process of implementation with advanced planning authorized for its installation.

The foregoing discussion has described, as briefly as possible, only

the major determinants in how the recommended plan was developed. Not discussed were the many other significant links in the total system. Without these links, portions of the system would not adequately function. These facilities are included with the complete listing in Chapter 9, Recommended Program of Development. Neither has there been a discussion of the accompanying economic evaluations and the relation of the plan to the anticipated funds available for its implementation.

Chapter 7, Financial Resources, attempted to project the trends of the past ten years (1956-1965) in spending for roads and streets by all levels of government in Galveston County, and indicated that about $248,000,000 should be available for right-of-way and construction during the 20-year period 1966-1985. Estimates of the cost of implementing the ultimate plan recommended show that nearly $72,000,000 in additional funds will be needed. It is recommended that projects costing $67,591,000 could be postponed until after 1985 to about 1990, but this requires that $4,281,000 will need to be made available from other sources to complete the plan recommended for 1985. Table 8-1

TABLE 8 - 1

FINANCIAL FEASIBILITY OF RECOMMENDED MAJOR THOROUGHFARE AND EXPRESSWAY PLAN

	1966 - 1970	1971 - 1975	1976 - 1980	1981 - 1985	SUM 1966-85	POSTPONED*
Estimated Cost of Recommended Major Thoroughfare and Expwy. Plan	42,000,000	56,382,000	69,699,000	84,368,000	252,449,000	67,591,000
Forecasted Available Revenues	41,830,000	54,416,000	68,304,000	83,618,000	248,168,000	No Forecast
Additional Funds Required	170,000	1,966,000	1,395,000	750,000	4,281,000	Not Calc.

* Estimated Cost of Projects Deferred to After 1985

shows the financial feasibility of the recommended plan broken down into five-year programs. The recommended program of development is discussed and shown in more detail in Chapter 9.

Table 8-2 gives a mileage summary of the classified recommended system. The recommended plan provides for 41.80 miles of express-

TABLE 8 - 2

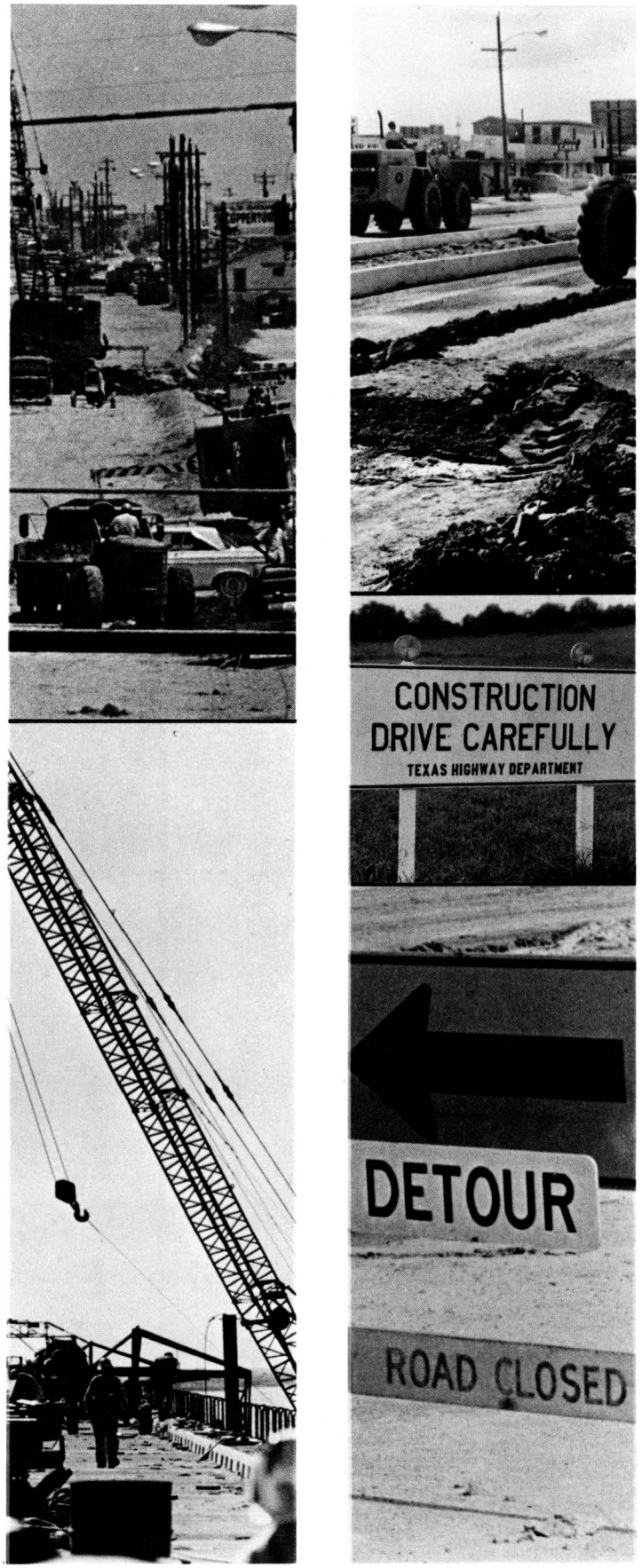
SUMMARY OF EXPRESSWAY AND MAJOR THOROUGHFARE SYSTEM MILEAGE BY CLASSIFICATION 1964 - 1985

	EXPRESSWAYS	MAJOR ARTERIALS	COLLECTORS	TOTAL
Existing System (1964)	24.10	245.40	37.80	307.30
To Be Improved or Retained	24.10	201.00	8.95	234.05
To Be Added	41.80	289.45	59.75	391.00
1985 System	65.90	490.45	68.70	625.05
To Be Added After 1985	25.90*	54.85**	15.35	69.45
Recommended Expressway and Major Thoroughfare System	91.80	519.40	83.30	694.50

* Reclassification from Major Arterials
** Includes 0.75 Miles of Reclassification from Collectors to Major Arterials

ways, 289.45 miles of major arterials, and 59.75 miles of collectors to be added to the system by all agencies by 1985. The complete plan, including those portions to be deferred until after 1985, recommends a total system of 91.80 miles of expressways, 519.40 miles of major arterials and 83.30 miles of collectors, which is an increase over the 1964 system in each respective classification as follows: 381 percent, 212 percent, and 220 percent. The permanent population increase during the same period for Galveston County was projected to be 243 percent. The vehicle registration is expected to increase by 306 percent, and the vehicle miles of travel by 540 percent between 1964 and 1985.

The reader is referred again to the preface of this volume for emphasis on the important considerations and qualifications given in developing this recommended plan and how it is to be implemented by cooperative effort on the part of all agencies concerned.



Chapter 9

Recommended Program Of Development

Recommended Program Of Development

INTRODUCTION

This chapter expands on the general discussion of the recommended thoroughfare and expressway plan presented in the preceding Chapter 8. It is the formal synthesis of the entire study bringing into systematic form all of the recommendations previously developed.

Each road or street in the entire system has been broken into sections or links that will each most likely comprise a useful or feasible project. These have been classified and placed for general priority of development into five-year recommended programs consistent with anticipated traffic volumes and the proper level of service needed at that point in time. Existing and proposed rights-of-way, pavement conditions, cross sections, staging, and specific recommendations and costs for the various projects are tabulated or graphically presented.

With this interrelated outline for a guide, provided that it is updated periodically to adjust for unforeseen developments, the various responsible agencies can move forward with assurance that an equally efficient or balanced highway and street system for the entire county will result from the expenditure of the limited money that appears to be available.

Galveston County is presently preparing a bond program which, if approved by the voters, will implement many of the projects recom-

mended in the early stages.

DISCUSSION

The recommended thoroughfare and expressway plan, included in the envelope inserted at the beginning of Chapter 8, has been broken into four five-year programs covering the period from 1966 through 1985. The reason for selecting five-year programs as a means of priority rating instead of a numerical priority list, is the difficulty of determining an accurate timing of the priorities in an area where ten different governmental bodies are involved in the implementation of one plan.

Figure 9-1 presents the classification of the existing system in 1964. Figures 9-2 through 9-5 show the subsequent additions to the system by the end of each five-year period, and finally Figure 9-6 shows the Recommended Thoroughfare and Expressway System, which includes projects deferred to after 1985 for lack of adequate funds. The project numbers indicated on Figures 9-2 through 9-6 are keyed to Table 9-1 which tabulates the descriptive data for each project to form a complete Recommended Street Improvement Program. The program lists 264 projects, many of which are further divided into sections reflecting certain physical conditions and variations. In addition, and in order to make a complete listing of the existing system, some 33 streets or highways, which were either retained unchanged or dropped from the thoroughfare system after 1964, were added to Table 9-1.

The cross sections referred to in Table 9-1 are shown in Figures 9-7 through 9-19. The typical cross sections are designed for either rural or urban conditions. The recommended cross sections shown conform to present minimum standards for streets and highways, but should be considered as minimum only, and are not intended to restrict the designer from using good practice and the latest design standards when implementing the plan. The existing cross sections are also shown so a complete list of all streets and highways can be established.

The number of lanes and the various features of each recommended cross section have been dictated by the anticipated future requirements of the system while providing for staged development in conformance therewith in many instances. Staged construction is recommended where a proper balanced level of service can be provided allowing for an accompanying balance in the distribution of funds to the entire area of needs.

Acquisition of adequate rights-of-way for new facilities should be accomplished as early as practical and it is recommended that full right-of-way width be obtained prior to the installation of any pavement in the case of staged construction.

Table 9-2 lists the total estimated cost of each project in the recommended street improvement program and also breaks the cost down into various five-year programs to indicate the financial staging necessary to carry out the overall program.

It must be pointed out that the cost estimates have been made on the basis of average construction costs per mile including right-of-way. These estimates, while general in nature, have taken into consideration the varying construction costs associated with elevated, depressed or surface-type construction for the various classifications of highways and streets. The cost of new local street construction is usually the responsibility of developers and therefore this cost is not included in estimates in this plan. However, allowance was made in the projections in the chapter on Financial Resources for maintenance and reconstruction of the local street system.

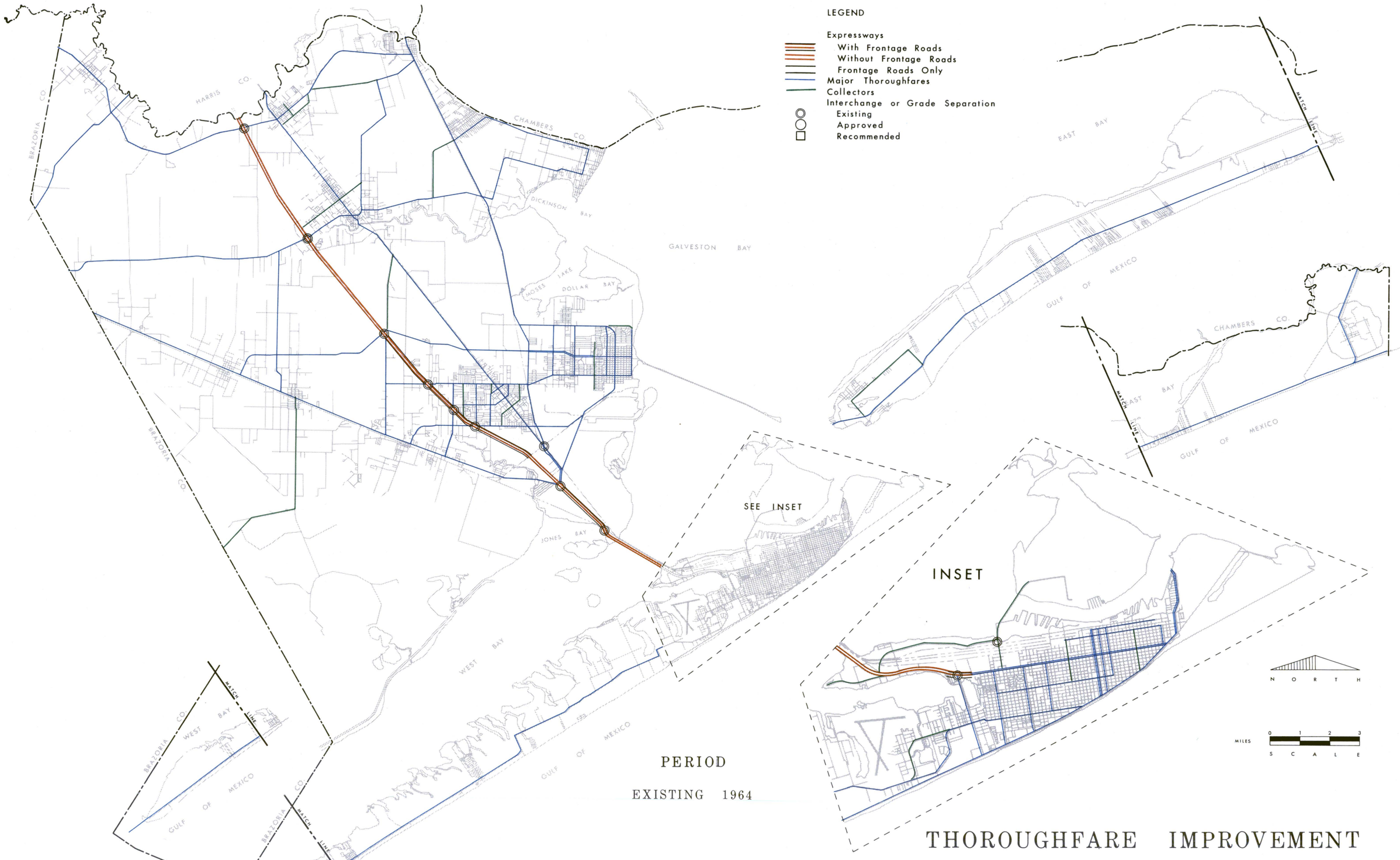
No attempt has been made to allow for future inflation in the estimates which would result in decreased buying power of the dollar and at worst a delay in the program. It was felt that cost estimates for such a long-range construction program cannot be that exact anyway, and that the continuing phase of the study could account for such shortcomings in future updating of the plan. However, the estimates based on present costs are nevertheless useful indicators of the general feasibility and ramifications of each project as well as the overall plan.

A detailed breakdown of the recommended system mileage by classification, number of lanes, and years is shown in Table 9-3. In the existing system - local streets excluded - only eleven percent of the total mileage consisted of facilities with divided roadways, and multi-

lane facilities (more than one traffic lane in each direction) made up some twenty-two percent of the system. In the Recommended Thoroughfare and Expressway System these percentages will increase to 47.5 and 60.5 for facilities with divided roadways and for multilane facilities, respectively.

As definite plans for individual projects are formulated in the future, it will undoubtedly be necessary to adjust the program that has been recommended. This reevaluation is recognized as a necessity of the continuing planning process. However, it is felt that the expenditure necessary for achievement of the overall program represents a reasonable goal and one which the various participating agencies responsible for implementation of the plan can attain.

FIGURE 9 - 1



PERIOD

EXISTING 1964

Galveston County Transportation Study

THOROUGHFARE IMPROVEMENT PROGRAM

FIGURE 9 - 2

LEGEND

- Expressways
  - With Frontage Roads
  - Without Frontage Roads
  - Frontage Roads Only
- Major Thoroughfares
- Collectors
- Interchange or Grade Separation
  - Existing
  - Approved
  - Recommended
- 333 Project Numbers (Described in Table 9-1)

Dark Colors Denote Current Improvement Program
Light Colors Denote Previous Improvement Program

BRAZORIA CO.
HARRIS CO.
CHAMBERS CO.
GALVESTON BAY
DICKINSON BAY
TEXAS CITY
LA MARQUE
GALVESTON
IMOSES LAKE
DOLLAR BAY
JONES BAY
WEST BAY
EAST BAY
GULF OF MEXICO
SEE INSET
MATCH LINE

INSET

NORTH

MILES 0 1 2 3
SCALE

PERIOD

1966 - 1970

THOROUGHFARE IMPROVEMENT PROGRAM

Galveston County Transportation Study

FIGURE 9 - 3

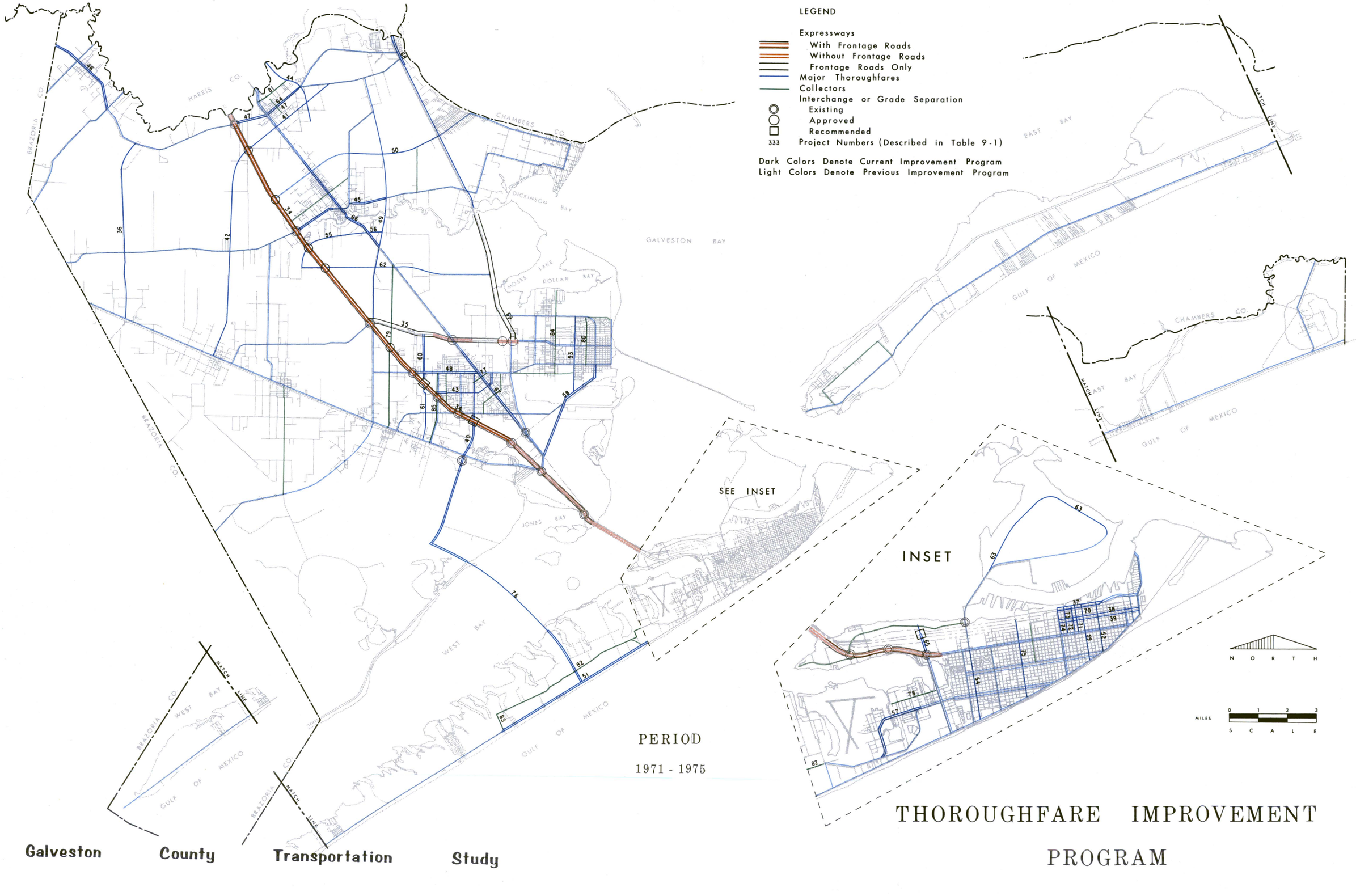

LEGEND
Expressways
With Frontage Roads
Without Frontage Roads
Frontage Roads Only
Major Thoroughfares
Collectors
Interchange or Grade Separation
Existing
Approved
Recommended
333 Project Numbers (Described in Table 9-1)
Dark Colors Denote Current Improvement Program
Light Colors Denote Previous Improvement Program
BRAZORIA CO.
HARRIS CO.
CHAMBERS CO.
GALVESTON BAY
DICKINSON BAY
MOSES LAKE
DOLLAR BAY
JONES BAY
WEST BAY
EAST BAY
GULF OF MEXICO
SEE INSET
INSET
MATCH LINE
NORTH
MILES
SCALE
PERIOD
1971 - 1975
THOROUGHFARE IMPROVEMENT
PROGRAM
Galveston County Transportation Study

FIGURE 9 - 4

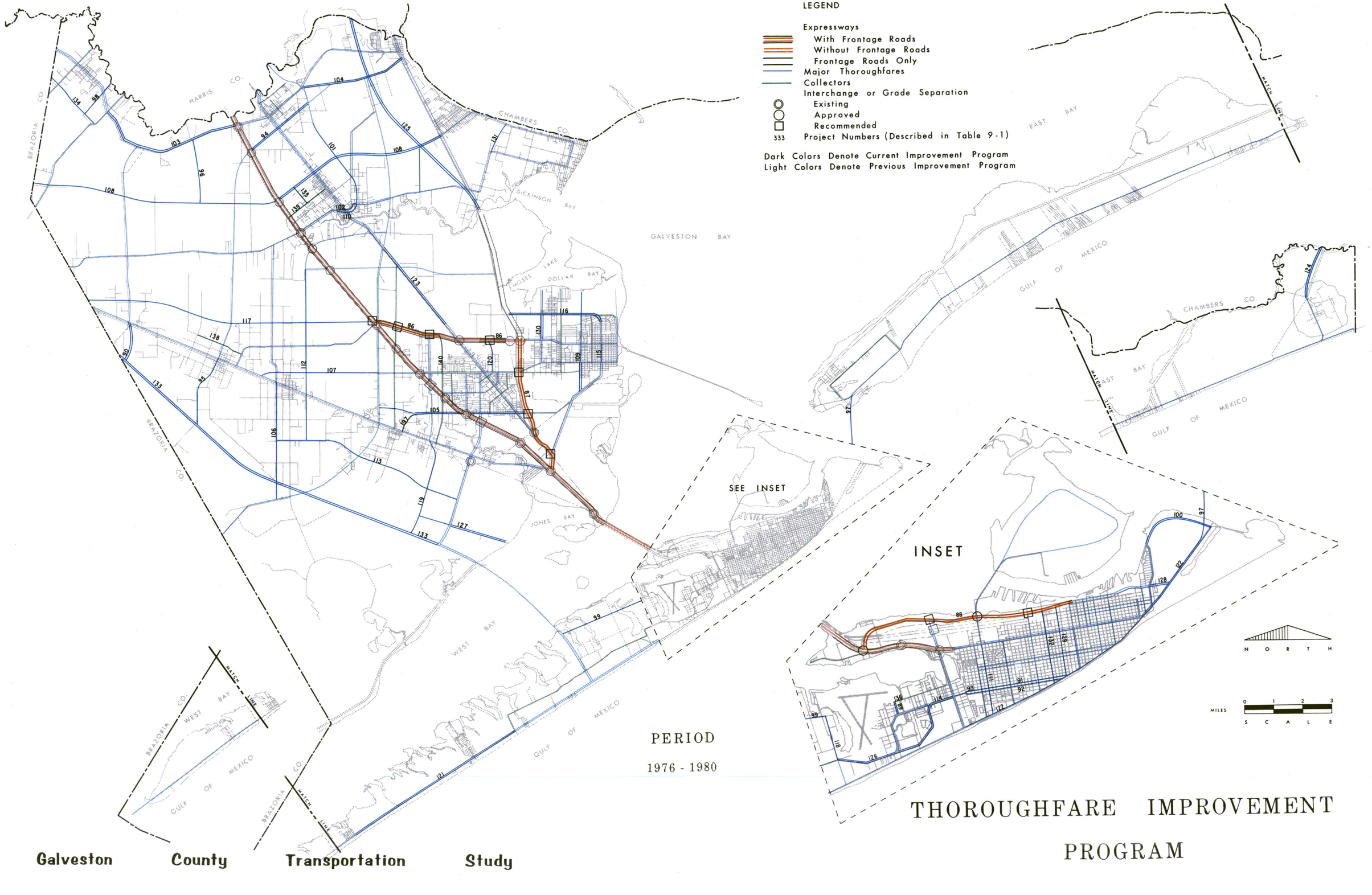

LEGEND
Expressways
With Frontage Roads
Without Frontage Roads
Frontage Roads Only
Major Thoroughfares
Collectors
Interchange or Grade Separation
Existing
Approved
Recommended
333 Project Numbers (Described in Table 9-1)
Dark Colors Denote Current Improvement Program
Light Colors Denote Previous Improvement Program
HARRIS CO.
BRAZORIA CO.
CHAMBERS CO.
GALVESTON BAY
DICKINSON BAY
MOSES LAKE
DOLLAR BAY
JONES BAY
WEST BAY
EAST BAY
GULF OF MEXICO
SEE INSET
INSET
MATCH LINE
NORTH
MILES
SCALE
0 1 2 3
PERIOD
1976 - 1980
THOROUGHFARE IMPROVEMENT
PROGRAM
Galveston County Transportation Study

FIGURE 9 - 5

LEGEND

- Expressways
  - With Frontage Roads
  - Without Frontage Roads
  - Frontage Roads Only
- Major Thoroughfares
- Collectors
- Interchange or Grade Separation
  - Existing
  - Approved
  - Recommended
- 333 Project Numbers (Described in Table 9-1)

Dark Colors Denote Current Improvement Program
Light Colors Denote Previous Improvement Program

BRAZORIA CO. HARRIS CO. CHAMBERS CO. GALVESTON BAY DICKINSON BAY MOSES LAKE DOLLAR BAY JONES BAY WEST BAY GULF OF MEXICO EAST BAY

SEE INSET

INSET

MATCH LINE

N O R T H

MILES 0 1 2 3

S C A L E

PERIOD

1981 - 1985

THOROUGHFARE IMPROVEMENT PROGRAM

Galveston County Transportation Study

FIGURE 9 - 6

LEGEND

- Expressways
  - With Frontage Roads
  - Without Frontage Roads
  - Frontage Roads Only
- Major Thoroughfares
- Collectors
- Interchange or Grade Separation
  - Existing
  - Approved
  - Recommended
- 333 Project Numbers (Described in Table 9-1)

Dark Colors Denote Current Improvement Program
Light Colors Denote Previous Improvement Program

HARRIS CO.
CHAMBERS CO.
BRAZORIA CO.
GALVESTON BAY
DICKINSON BAY
LAKE JACKSON
DOLLAR BAY
JONES BAY
WEST BAY
EAST BAY
GULF OF MEXICO
SEE INSET
MATCH LINE

INSET

NORTH

MILES 0 1 2 3
SCALE

PERIOD
AFTER-1985

THOROUGHFARE IMPROVEMENT PROGRAM

Galveston County Transportation Study

TABLE 9-1

RECOMMENDED STREET IMPROVEMENT PROGRAM

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
1	Gulf Fwy. (IH 45)							
	65th St. to 89th St.	I	E	200'	2x22'Conc.	U-6	U-3	Widening-Grade Separations-Continuous
	89th St. to Galveston Causeway	I	E	250'-500'	2x22'Asph.	U-6	U-3	Frontage Roads. Completed #
2	Gulf Fwy. (IH 45)							
	SH 6/SH 3 to T.C.T. RR	I	E	300'	2x24'Conc.	R-6	R-3	Widening-Grade Separations-Frontage Rds. Completed #
3	Gulf Fwy. (IH 45)							
	T.C.T. RR to FM 519	I	E	300'	2x24'Conc.	R-5	U-2	
	FM 519 to FM 1764	I	E	300'	2x24'Conc.	R-5	U-2	New Frontage Roads with Curb & Gutter
	FM 1764 to FM 518	I	E	300'	2x24'Conc.	R-6	U-2	
	FM 518 to Harris Co. Line	I	E	300'	2x24'Conc.	R-6	U-1A	Widening-New Frontage Roads with Curb & Gutter
4	Gulf Fwy. (IH 45)							
	At 61st St. (59th to 65th)	I	E	200'	2x24'Conc.	U-5	U-1B	Realignment and Widening of Overpass
5	Palmer Highway (FM 1764)							
	At SH 3	I	E	340'	24'Asph.	R-13B	R-1B	Grade Separations with SH 3 and G.H.&H. RR
	SH 146 to S.P. RR	I	E	340'	24'Asph.	R-13B	R-1B	Grade Separations with SH 146 and S.P. RR
	S.P. RR to SH 3	I	A-D	340'	24'Asph.	R-13B	R-1C	Frontage Roads
6	Ave. O (Alternate Ave. Q)							
	Seawall Blvd. to 53rd St.	I	A-0	70'	38'Asph.	U-13F	Exist.	
7	Ave. P							Convert to One-Way Streets
	Seawall Blvd. to 53rd St.	I	A-0	70'	38'Asph.	U-30	U-13F	
8	Ave. R½							
	37th St. to 38th St.	I	A-0	-	-	-	U-12E	New Location
	Seawall Blvd. to 37th St.	I	A-0	70'	38'Asph.	U-30	U-13F	
	38th St. to Ave. S at Saladia	I	A-0	70'	38'Asph.	U-30	U-13F	Convert to One-Way Street coupled with Ave. S
9	Ave. S							
	57th St. to 61st St.	I	A	50'	30'Asph.	R-13F	U-12C	Widening-Curb & Gutter. Completed
10	Ave. S							
	Seawall Blvd. to Saladia	I	A-0	70'	38'Asph.	U-13F	Exist.	Convert to One-Way Street coupled with Ave. R½
11	Broadway Blvd.							
	University Blvd. to 59th St.	I	A-D	150'	2x48'Asph.	U-10B	Exist.	Progressive Signal System Installed. Construct left turn slots-Redesign at Seawall Blvd.
12	FM 518 (Kemah Cut-Off Road)							
	FM 2094 to FM 1266	I	A	60'	22'Shell	R-21B	R-13D	Widening Completed
13	FM 2004							
	Brazoria Co. Line to FM 646	I	A	120'	24'Asph.	R-21C	R-13D	Reclassified as a Major Arterial
	FM 646 to SH 6	I	A	-	-	-	R-13D	New Location. 180' ROW Acquired. Completed
14	FM 2351							
	FM 518 to Harris Co. Line	I	A	100'	20'Asph.	R-30	R-12C	Completed (26' Asph. Pvmt.)
	FM 518 to Brazoria Co. Line	I	A	100'	20'Asph.	R-30	R-13C	Classify as a Major Arterial
15	FM 3002							
	IH 45 to FM 1266	I	A	-	-	-	R-12C	New Location
16	FM 3005 (Ext. of Seawall Blvd.)							
	103rd St. to West Bay Fwy.	I	A	-	-	-	R-4D	New Location
	West Bay Fwy. to 13 Mile Road	I	A	-	-	-	R-10D	New Location - Acquire 200' ROW
17	4th St.							
	Seawall Blvd. to The Strand	I	A	80'	48'Asph.	U-30	U-12B	Reconstruct
18	51st St.							
	Broadway Blvd. to Pelican Br.	I	A	80'	48'Asph.	U-20C	U-12E	Reclassify (Note: 24' Pvmt. on Railyard Overpass)
19	Jones Drive							
	61st St. to Stewart Road	I	A-D	50'-100'	30'Asph.	R-13F	U-10D	Reconstruct - Curb & Gutter
20	99th St. (Six Mile Road)							
	Seawall Blvd. to Stewart Rd.	I	A	50'	-	-	U-10F	New Location
21	Pelican Bridge							
	51st St. to Pelican Loop	I	A	150'	24'Conc.	Br.	Exist.	Classify as a Major Arterial
22	Pelican Loop South							
	Pelican Bridge to "Todd" Rd.	I	A	80'	26'Asph.	R-30	R-13C	Classify as a Major Arterial-Acquire 120' ROW
	"Todd" Road to "Shell" Road	I	A	-	-	-	R-13C	Completed (26' Asph. Pvmt.) - Acquire 120' ROW
	"Shell" Road to Pelican Park	I	A	-	-	-	R-13C	New Location
23	Seawall Blvd.							
	Broadway Blvd./6th to 39th St.	I	A	150'	69'Asph.	U-13B	U-13C	Painting of Continuous Left Turn Lane
	39th St. to 53rd St.	I	A	100'	72'Asph.	U-13B	U-13C	Completed-Improve Signal System(Traffic
	53rd St. to 103rd St.	I	A	250'	72'Asph.	U-13B	U-13C	and Pedestrian Actuators)
24	61st St. (Spur 342)							
	Seawall Blvd. to IH 45	I	A-D	100'-120'	32'Asph.	R-13F	U-10C	Reconstruction Completed
25	SH 3							
	At T.C.T. RR/SH 146	I	A-D	100'	20'Conc.	R-13B	R-10C	Grade Separations at SH 146-Widening
26	SH 3							
	At Palmer Hwy. (FM 1764)	I	A-D	100'	20'Conc.	R-13B	R-10C	Widening
27	SH 3							
	Harris Co. Line to Coryell	I	A-D	90'	20'Conc.	R-13B	U-10E	
	Coryell to Beaumont St. Ext.	I	A-D	100'	20'Conc.	R-13B	U-10C	Widening-Curb & Gutter
	Beaumont St.-League City C.L.	I	A-D	100'	20'Conc.	R-13B	U-10E	
28	SH 6							
	IH 45 to Highland Bayou	I	A-D	120'	48'Asph.	R-12B	R-10C	Project Completed #
29	The Strand (Ave. A)							
	2nd St. to 14th St.	I	A-D	70'	38'Asph.	U-30	U-10D	Project Completed

1) Number Keyed to Figures 9-1 through 9-6
2) A = Period (I = 1966-1970, II = 1971-1975, III = 1976-1980, IV = 1981-1985, and V = After 1985 (Approx. 1986-1990))
3) B = Classification (E = Expressway, A-D = Major Arterial Divided, A-0 = Major Arterial One-Way, A = Other Major Arterial, and C = Collector)
4) 1964
5) C = Previous or Existing Cross-Section
6) D = New Cross-Section
\# Completed between 1964 and 1966. (These Projects are not included in Cost Analysis)

(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
30	29th St. (Texas City)							
	FM 1765 to FM 1764	I	A	60'	22'Asph.	R-13F	U-13F	Project Completed (43' Conc. Pvmt.)
31	University Blvd. (6th St.)							
	Broadway Blvd. to Ave. D	I	A-D	160'	54'Asph.	U-12C	U-10E	Reconstruct. Sell Excess ROW
32	5th Ave. South							
	FM 1765 to 21st St.	I	C	50'	24'Conc.	R-30	R-21B	Classify as a Collector - Acquire 100' ROW
	21st to 14th At 4th Ave. S	I	C	-	-	-	R-21C	New Location. Completed (32' Pvmt. + 3' Shoulders)
33	14th St.							
	8th Ave. to Loop 197 S.	I	C	80'	-	-	R-21B	New Location. Completed (24' Asph. Pvmt.)
34	Gulf Fwy. (IH 45)							
	T.C.T. RR to FM 518	II	E	*	*	U-2	U-1A	Grade Separations-Widening
35	Palmer Highway (FM 1764)							
	W. of SH 3 to IH 45	II	A-D	260'	24'Asph.	R-13B	R-1C	Frontage Roads
36	Algoa-Friendswood Road							
	SH 6 to FM 517	II	A	50'	24'Shell	R-30	R-12C	Improve
	FM 517 to FM 518	II	A	50'	18'Shell	R-30	R-12C	Improve
37	Ave. A (Part of The Strand)							
	12th St. to 16th St.	II	A-O	70'	38'Asph.	U-30	U-12D	Reconstruct
	16th St. to 26th St.	II	A-O	70'	-	-	U-12D	New Location - Alternate U-8
38	Ave. E(Post Office St.)Alt.Ave.D							
	2nd St. to 6th St.	II	A-O	70'	-	-	U-12E	New Location
	6th St. to 26th St.	II	A-O	70'	38'Asph.	U-30	U-13F	Classify as a Major Arterial (Exist. One-Way St.)
39	Ave. F (Church St.)							
	2nd St. to 6th St.	II	A-O	70'	-	-	U-12E	New Location
	6th St. to 26th St.	II	A-O	70'	38'Asph.	U-30	U-13F	Classify as a Major Arterial (Exist. One-Way St.)
40	Bayou Road							
	West Bay Fwy. to Sunset Blvd.	II	A-D	-	-	-	R-10B	New Location
	Sunset Blvd. to SH 6	II	A-D	120'	24'Asph.	R-10D	U-10D	Widen-Curb & Gutter (Flamingo Isles Blvd.)
	SH 6 to IH 45	II	A-D	-	-	-	U-10D	New Location (60' ROW, dirt road partly exist.)
	IH 45 to FM 519	II	A-D	60'	20'Asph.	R-30	U-10D	Reconstruct-Curb & Gutter
	FM 519 to Cedar Drive	II	A	60'	40'Asph.	U-13F	U-13D	Prohibit Parking
	Cedar Dr.-FM 1765(Texas Ave.)	II	A	60'	44'Conc.	U-13F	U-13D	Prohibit Parking
41	Beaumont St.							
	IH 45 to Dickinson Ave.	II	A	-	-	-	U-10F	New Location
	Dickinson Ave. to Texas Ave.	II	A	60'	18'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
	Texas Ave. to El Camino Real	II	A	-	-	-	U-10F	New Location
	El Camino Real to FM 518	II	A	-	-	-	R-10D	New Location
42	Bishop-Cemetery Road							
	SH 6 to Pine St.	II	A	50'	20'Shell	R-30	U-10F	Reconstruct-Curb & Gutter
	Pine St. to FM 517	II	A	50'	20'Shell	R-30	R-10D	Improve
	FM 517 to IH 45	II	A	-	-	-	R-10D	New Location
43	Cedar Drive							
	FM 1765 (Texas Ave.) to SH 3	II	A-D	75'-80'	24'Asph.	R-13F	U-10E	Reconstruct-Curb & Gutter
	SH 3 to Westward Ave.	II	A	75'-80'	45'Asph.	U-13F	U-13D	Prohibit Parking
	Westward Ave. to Vauthier Rd.	II	A-D	60'	20'Asph.	R-30	U-10E	Reconstruct-Curb & Gutter
44	El Camino Real							
	Harris Co. Line to Austin St.	II	A	-	-	-	U-10F	New Location
45	FM 517							
	IH 45 to Timber Dr.	II	A-D	90'-100'	24'Asph.	R-13D	U-10E	Reconstruct-Curb & Gutter
	Timber Dr. to FM 1266	II	A	60'-80'	42'Asph.	U-13F	U-13D	Restrict Parking
	FM 1266-El Camino(Kansas Ave.)	II	A	80'	22'Asph.	R-13B	U-12C	Reconstruct-Curb & Gutter
	El Camino Real to FM 2004	II	A-D	80'	22'Asph.	R-13B	U-10E	Reconstruct-Curb & Gutter
46	FM 518							
	Brazoria Co. Line to FM 528	II	A-D	100'	24'Asph.	R-13B	U-10D	Reconstruct-Curb & Gutter
47	FM 518							
	IH 45 to SH 3	II	A-D	100'	24'Asph.	R-13B	U-10C	Reconstruct-Curb & Gutter
	SH 3 to Kansas Ave.	II	A-O	60'-80'	42'Asph.	U-13F	U-13E	Restrict Parking-Convert to One-Way Street
	Kansas Ave. to FM 2094	II	A-O	80'	42'Asph.	R-13A	U-12D	Reconstruct-One-Way Street
48	FM 1765 (Texas Ave.)							
	IH 45 to SH 3	II	A-D	100'	20'Asph.	R-13B	U-10D	Reconstruct-Curb & Gutter
49	FM 2004							
	FM 1764 to SH 3	II	A	120'	24'Asph.	R-21C	R-13D	Reclassify as a Major Arterial
	SH 3 to FM 1266	II	A	-	-	-	R-10D	New Location
50	FM 3002							
	FM 1266 to FM 517(Oasis Rd.)	II	A	-	-	-	R-4D	New Location
	FM 517 to SH 146	II	A	100'	28'Asph.	R-21B	R-10D	Improve
51	FM 3005							
	103rd St. to West Bay Fwy.	II	A-D	*	*	R-4D	R-4C	Widen
	West Bay Fwy. to 13 Mile Rd.	II	A-D	*	*	R-10D	R-10B	Widen
52	14th St. (Galveston)							
	Seawall Blvd. to Ave. D	II	A	80'	48'Asph.	U-20C	U-12E	Reclassify as a Major Arterial
	Ave. D to The Strand	II	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial
53	14th St. (Texas City)							
	Loop 197 S. to 8th Ave. S	II	A	*	*	R-21B	R-13F	Reclassify as a Major Arterial
	8th Ave. S. to FM 1765	II	A	70'	24'Conc.	R-21C	R-13C	
	FM 1765 to 16th Ave. N.	II	A	70'	34'Conc.	U-21	U-13G	
	16th Ave. N.to Loop 197 N.	II	A	70'	-	-	U-12E	New Location(34' Conc. Curb & Gutter partly exist.)
54	51st St.							
	Seawall Blvd. to Ave. U	II	A	80'	-	-	U-12E	New Location
	Ave. U to Broadway Blvd.	II	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial

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3) B = Classification (E = Expressway, A-D = Major Arterial Divided, A-O = Major Arterial One-Way, A = Other Major Arterial, and C = Collector)
4) 1964
5) C = Previous or Existing Cross-Section
6) D = New Cross-Section

* Project previously changed from existing condition.

(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
55	Hughes Road							
	Pan-American to IH 45	II	A	-	-	-	R-10D	New Location
	IH 45 to HL&P Line	II	A	60'	24'Shell	R-30	R-10D	Improve
	HL&P Line to SH 3	II	A	-	-	-	R-10D	New Location
56	Humble Road							
	SH 3 to FM 2004	II	A	45'-55'	20'Asph.	R-30	R-10D	Improve (Existing surface, partly 24' shell)
57	Jones Drive							
	Stewart Rd. at 69th-79th St.	II	A-D	80'-100'	30'Asph.	R-21B	U-10D	Reconstruct-Curb & Gutter
	79th St.-Stewart Rd. at 81st	II	A-D	100'	30'Asph.	R-21B	U-10D	
	Stewart Rd. - Seawall Blvd.	II	A-D	50'	24'Asph.	R-30	U-10D	
58	Loop 197 (South)							
	SH 3 to 14th St.	II	A-D	100'	22'Conc.	R-13C	R-10C	Widen
	14th St. to FM 1765	II	A-D	100'	22'Conc.	R-13C	U-10E	Reconstruct-Curb & Gutter
59	19th St.							
	Seawall Blvd. to The Strand	II	A	80'	48'Asph.	U-30	U-12B	Reconstruct
60	Oasis (Amburn Road)							
	FM 1765 to Montecello	II	A-D	60'	20'Asph.	R-30	U-10D	Reconstruct-Curb & Gutter
	Montecello to FM 1764	II	A-D	-	-	-	U-10D	New Location
61	Oasis (Newman Road)							
	SH 6 to Highland Bayou	II	A	-	-	-	U-10F	New Location (Partly 50' ROW, 24' shell on Bell)
	Highland Bayou to IH 45	II	A	60'	18'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
	IH 45 to FM 1765	II	A-D	50'	18'Asph.	R-30	U-10D	Reconstruct-Curb & Gutter
62	Pan American							
	Hughes Road to IH 45	II	A	50'	16'Shell	R-30	R-10D	Improve
	IH 45 to Exist. Humble Rd.	II	A	-	-	-	R-10D	New Location
	Humble Road to SH 146	II	A	60'	24'Asph.	R-30	R-10D	Improve (Existing surface, partly 24' shell)
63	Pelican Loop (North & East)							
	Pelican Bridge to Pelican Park	II	A	-	-	-	R-10D	New Location
64	2nd St. (FM 518)							
	FM 518 to SH 3	II	A-0	-	-	-	U-12D	New Location-One-Way Street
	SH 3 to Houston Ave.	II	A-0	50'	20'Asph.	R-30	U-12D	Reconstruct-Curb & Gutter-One-Way Street
	Houston Ave. to Railroad Ave.	II	A-0	-	-	-	U-12D	New Location-One-Way Street
	Railroad Ave. to Alabama Ave.	II	A-0	70'	20'Asph.	R-30	U-12D	Reconstruct-Curb & Gutter-One-Way Street
	Alabama Ave. to FM 2094	II	A-0	-	-	-	U-12D	New Location-One-Way Street
65	61st St.							
	IH 45 to The Strand	II	A	-	-	-	U-10E	New Location-2 Lanes on RR Overpass
66	SH 3							
	League City S.C.L.-Sunset Dr.	II	A-D	100'	20'Conc.	R-13B	R-10C	Widen
	Sunset Dr. to Dickinson Bayou	II	A-D	100'	20'Conc.	R-13B	U-10C	Reconstruct-Curb & Gutter
	Dickinson Bayou to FM 2004	II	A-D	100'	20'Conc.	R-13B	R-10C	Widen
67	SH 3							
	S. of FM 1764 to S. of FM 519	II	A-D	100'	20'Conc.	R-13B	U-10C	Reconstruct-Curb & Gutter
	FM 519 to SH 146	II	A-D	100'	20'Conc.	R-13B	R-10C	Widen
68	SH 146							
	Harris Co. Line to FM 518	II	A-D	120'	24'Conc.	R-13B	U-10C	Reconstruct-Curb & Gutter + 2nd 2 Lane Bridge
	FM 518 to Dickinson Bayou	II	A	120'	24'Asph.	R-13B	R-12B	Widen
69	SH 146 Fwy.							
	Dickinson Bayou to FM 1764	II	A-D	120'	24'Asph.	R-13B	R-1C	Frontage Roads
70	Strand(Ave.B)Part of The Strand							
	12th St. at Ave. A to 26th St.	II	A-0	80'	48'Asph.	U-12E	U-12D	One-Way Street coupled with Ave. A
71	21st Street (Moody)							
	Broadway Blvd. to Ave. A	II	A-0	80'	48'Asph.	U-12E	U-12D	Convert to One-Way Street
72	22nd St.(Kemphner)-Alt.23rd St.							
	Broadway Blvd. to Ave. A	II	A-0	80'	48'Asph.	U-30	U-12D	Classify as a Major Arterial.(Exist. One-Way St.)
73	24th St.							
	Broadway Blvd. to Ave. A	II	A-0	80'	48'Asph.	U-30	U-12D	Classify as a Major Arterial.(Exist. One-Way St.)
74	26th St.							
	Broadway Blvd.-Santa Fe Place	II	A-0	80'	48'Asph.	U-30	U-12D	Classify as a Major Arterial.(Exist. One-Way St.)
	Santa Fe Place to The Strand	II	A-0	-	-	-	U-12D	New Location
75	37th St.							
	Seawall Blvd. to the Strand	II	A	80'	48'Asph.	U-30	U-12B	Reconstruct
76	West Bay Fwy.							
	FM 3005 to West Bay	II	A-D	-	-	-	R-2D	New Location
	Galveston Island-The Mainland	II	A	-	-	-	R-7B	
	West Bay to Bayou Road	II	A-D	-	-	-	R-2D	
77	1st St.							
	Bayou Road to FM 1765	II	C	60'	44'Asph.	U-13F	U-20C	New Pvmt.
78	Heards Lane							
	61st St. to 75th St.	II	C	50'	30'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
79	Johnny Palmer/Delaney							
	SH 6 to Highland Bayou	II	C	60'	20'Asph.	R-30	R-20B	Improve
	Highland Bayou to Temple Dr.	II	C	50'	14'Asph.	R-30	R-20B	Improve
	Temple Dr. to IH 45	II	C	50'	20'Shell	R-30	R-20B	Improve
	IH 45 to FM 1764	II	C	60'	20'Shell	R-30	U-20C	Widen
	FM 1764 to SH 3	II	C	60'	20'Shell	R-30	R-20B	Improve
80	9th St.							
	FM 1765 to 9th Ave. N.	II	C	100'	42'Conc.	U-13F	U-20A	Widen
	9th Ave. N.to 19th Ave. N.	II	C	100'	42'Conc.	U-13F	U-20C	Reclassify as a Collector
	19th Ave. N. to Loop 197	II	C	80'	42'Conc.	U-13F	U-20C	Reclassify as a Collector

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(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
81	7th St.							
	SH 3 to G.H.&H. RR	II	C	-	-	-	U-20C	New Location
	G.H.&H. RR to Kansas Ave.	II	C	70'	12'Shell	R-30	U-20C	Reconstruction-Curb & Gutter
	Kansas Ave. to Landrum Ave.	II	C	-	-	-	U-20C	New Location
	Landrum Ave. to El Camino Real	II	C	50'	18'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
82	Stewart Road							
	6 Mile Road to 13 Mile Road	II	C	100'	20'Asph.	R-13F	R-20B	Reclassify as a Collector-Improve-120' ROW Acquired
83	13 Mile Road							
	Stewart Road to FM 3005	II	C	50'-100'	24'Asph.	R-13F	R-20B	Reclassify as a Collector-Improve-120 ROW Acquired
84	21st Street(20th,N. of 36th Ave.)							
	5th Ave. S to FM 1765	II	C	70'	24'Conc.	R-30	R-20B	Classify as a Collector, Acquire 100' ROW
	FM 1765 to FM 1764	II	C	80'	43'Conc.	U-13F	U-20C	Reclassify as a Collector
	FM 1764 to Loop 197	II	C	70'	43'Conc.	U-13F	U-20C	Reclassify as a Collector
	Loop 197 to 36th Ave. N	II	C	-	-	-	U-20C	New Location
	36th Ave. N to Dollar Bay	II	C	60'	20'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
85	Vauthier Road (Fairwood Rd.)							
	SH 6 to FM 1765	II	C	60'-70'	24'Asph.	R-13F	R-20B	Classify as Collector-Improve
86	Palmer Highway (FM 1764)							
	IH 45 to W. of SH 3	III	E	*	*	R-1C	R-1B	Main Lanes-Grade Sep. at IH 45, Johnny
	W. of SH 146 to E. of SH 3	III	E	*	*	R-1C	R-1B	Palmer, Oasis and Pine
87	SH 146 Exwy.							
	IH 45 to SH 3	III	E	200'	2x24'Asph.	R-10C	R-4A	Grade Sep. at Loop 197-Widen Pvmt.
	SH 3 to FM 519	III	E	120'	24'Asph.	R-13B	R-4B	Widen
	FM 519 to FM 1764	III	E	120'	24'Asph.	R-13B	U-4C	Reconst.-Grade Sep. at FM 519 & FM 1765
88	The Strand(Port Industrial Rd.)							
	IH 45 to 51st St.	III	E	80'-120'	24'Conc.	R-20A	U-4B	Reconstr.-New Grade Sep. at 61st St.,Improve Grade Separations at IH 45 & 51st
	51st St. to 26th St.	III	E	-	-	-	U-7	New Location-Elevated-Exit & Entry Ramps at 37th
89	Airport Road (79th St.)							
	Jones Dr. to Heards Lane	III	A-D	50'	18'Asph.	R-30	U-10D	Reconstruct-Curb & Gutter
90	Algoa-Friendswood Road							
	West Bay Fwy. to SH 6	III	A-D	-	-	-	R-10C	New Location
91	Ave. R½							
	Seawall Blvd. to Saladia	III	A-0	*	*	U-13F	U-12D	Widen
92	Ave. S							
	Seawall Blvd. to Saladia	III	A-0	*	*	U-13F	U-12D	Widen
93	Ave. S							
	Saladia to 61st St.	III	A-D	*	*	U-12C	U-12A	Widen
94	Beaumont Street							
	IH 45 to El Camino Real	III	A-D	*	*	U-10F	U-10D	Widen
95	Bishop-Cemetery Road (Scott)							
	West Bay Fwy. to Powers Rd.	III	A	60'	22'Shell	R-30	R-10D	Reconstruct
	Powers Rd. to FM 1765 Ext.	III	A	-	-	-	R-10D	New Location
	FM 1765 Ext. to SH 6	III	A	60'	14'Shell	R-30	U-10F	Reconstruct-Curb & Gutter
96	Blackhawk							
	FM 3002 to FM 518	III	A	-	-	-	R-10D	New Location
97	Bolivar Bridge							
	Seawall Blvd. to SH 87	III	A	-	-	-	Br.	Four Lanes
98	Briarmeadow Ave.							
	Westfield Ln. to Windingway	III	A	70'	20'Shell	R-30	U-10F	Reconstruct-Curb & Gutter
	Windingway-Whispering Pine	III	A	-	-	-	U-10F	New Location
	Whispering Pine-Clear Creek	III	A	50'	20'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
99	Cloud Road							
	West Bay Fwy. to Airport Rd.	III	A	-	-	-	R-10D	New Location
100	East Loop							
	Ferry Rd. to Seawall Blvd.	III	A-D	-	-	-	U-10E	New Location
101	El Camino Real							
	Austin St.-30th St. at Kansas	III	A	-	-	-	R-10D	New Location
	30th St. to FM 517	III	A	60'	16'Shell	R-30	U-10F	Reconstruct-C & G (Exist. street not contineous)
102	FM 517							
	Timber Dr. to FM 1266	III	A-0	*	*	U-13D	U-13E	Convert to One-Way Street
	FM 1266 to El Camino Real	III	A-0	*	*	U-12C	U-12D	
103	FM 518							
	FM 528 to IH 45	III	A-D	100'	24'Asph.	R-13B	R-10B	Widen
104	FM 518							
	FM 2094 to FM 1266	III	A-D	*	*	R-13D	R-10C	Widen
	FM 1266 to SH 146 in Kemah	III	A-D	80'	24'Asph.	R-13C	R-10C	
105	FM 519							
	FM 2004 to Volney	III	A	-	-	-	R-10D	New Location
	Volney to IH 45	III	A-D	80'	20'Asph.	R-13C	U-10E	Reconstruct-Curb & Gutter
	IH 45 to SH 3	III	A-D	80'	20'Asph.	R-13C	U-10C	Reconstruct-Curb & Gutter
106	FM 646 (Ave. M)							
	FM 2004 to Jay Rd.	III	A	-	-	-	R-10D	New Location(45' ROW, 18' shell road partly exist.)
	Jay Rd. to McElmoyle	III	A	50'	20'Shell	R-30	R-10D	Improve
	McElmoyle to SH 6	III	A	40'	16'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
107	FM 1765 Ext.							
	SH 6 to Hughes Rd.	III	A	-	-	-	U-10F	New Location
	Hughes Rd. to FM 2004	III	A	-	-	-	R-10D	

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4) 1964
5) C = Previous or Existing Cross-Section
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(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
108	FM 3002 (Grand Pkwy.)							
	Brazoria Co. Line to IH 45	III	A	-	-	-	R-4D	New Location
	IH 45 to FM 1266	III	A-D	*	*	R-12C	R-4C	Widen
	FM 1266 to SH 146 Fwy.(FM 517)	III	A-D	*	*	R-4D	R-4C	Widen
	FM 517 to Old SH 146	III	A-D	*	*	R-10D	R-10C	Widen
109	14th St.							
	Loop 197 S. to 8th Ave. S	III	A-D	*	*	R-13F	U-10E	Reconstruct-Curb & Gutter
	8th Ave. S to FM 1765	III	A-D	*	*	R-13C	U-10E	Reconstruct-Curb & Gutter
	FM 1765 to Loop 197	III	A	*	*	U-13G	U-12C	Widen
	Loop 197 to Dollar Bay	III	A	-	-	-	U-10F	New Location
110	44th St. (FM 517)							
	Timber Dr. to Goar St.	III	A-0	40'-60'	18'Asph.	R-30	U-12D	Reconstruct-Curb & Gutter-One-Way
	Goar St. to El Camino Real	III	A-0	-	-	-	U-12D	New Location-Curb & Gutter-One-Way
111	51st St.							
	Seawall Blvd.-Broadway Blvd.	III	A	*	*	U-12E	U-12C	Restrict Parking
112	Hughes Road (Ave. F,S. of SH 6)							
	Jay Rd. to McElmoyle	III	A	-	-	-	R-10D	New Location
	McElmoyle to SH 6	III	A	50'	16'Shell	R-30	U-10F	Reconstruct-Curb & Gutter
	SH 6 to FM 1765	III	A	-	-	-	U-10F	New Location
	FM 1765 to Pan-American	III	A	-	-	-	R-10D	New Location
113	Jay Road (32nd St.)							
	FM 646(Ave. M) to Main Ave.	III	A	50'	20'Shell	R-30	R-12C	Improve
	Main Ave. (Old FM 646)-Ave. B	III	A	50'	18'Asph.	R-30	R-12C	Improve
	Ave. B to Bayou Rd.	III	A	-	-	-	R-10D	New Location(90' ROW, 18' Asph. Road partly exist.)
114	Jones Drive							
	61st St. to Stewart at 69th	III	A-D	*	*	U-10D	U-10C	Widen
115	Loop 197 (6th St.)							
	FM 1765(Texas Ave.)-9th Ave.N	III	A	100'	64'Asph.	U-13B	U-13A	Restrict Parking-Widen at Major Intersect.
116	Loop 197(25th Ave. N)							
	SH 146 to 9th St.	III	A-D	100'	22'Asph.	R-13C	U-10C	Reconstruct-Curb & Gutter
	9th St. to 19th Ave. N at 6th	III	A-D	100'	22'Asph.	R-13C	U-10E	Reconstruct-Curb & Gutter
117	McKay Road(Palmer Hwy. Ext.)							
	Brazoria Co. Line to IH 45	III	A	-	-	-	R-10D	New Location
118	99th St. (6 Mile Road)							
	Stewart Rd. to Air Travel Rd.	III	A	50'	24'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
	Air Travel Rd. to Cloud Rd.	III	A	50'	16'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
119	Oasis (Congress)							
	West Bay Fwy.-Basford Bayou	III	A	-	-	-	R-10D	New Location
	Basford Bayou to SH 6	III	A	50'	-	-	R-10D	Dirt road existing
120	Pine Road							
	FM 1765 to 5th Ave. N	III	A	50'	20'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
	5th Ave. N to FM 1764	III	A	-	-	-	R-10D	New Location
121	San Luis Pass Road							
	13 Mile Rd. to San Jacinto Dr.	III	A-D	120'	20'Asph.	R-13F	R-10B	Reconstruct
122	Seawall Blvd							
	Boddecker Dr.-Bolivar Bridge	III	A	200'	40'Asph.	R-30	R-13A	Classify as a Major Arterial
	Bolivar Bridge to 2nd St.	III	A-D	200'	40'Asph.	R-30	U-10C	Reconstruct
	2nd St. to Broadway Blvd.	III	A-D	250'	72'Asph.	U-13B	U-10C	Improve
	Broadway Blvd. to 61st St.	III	A	*	*	U-13C	U-12A	Prohibit Parking
123	SH 3							
	FM 2004 to N. of FM 1764	III	A-D	100'	20'Conc.	R-13B	R-10C	Widen
124	SH 124							
	Chambers Co.Line-A.T.&S.F. RR	III	A-D	-	-	-	R-10C	Relocation-4 Lane Bridge
125	SH 146 Fwy.							
	Dickinson Bayou-Harris Co.Line	III	A-D	-	-	-	R-2C	New Location- Bridge across Clear Lake-420' ROW
126	Stewart Road							
	Jones Dr. at 69th to 6 Mi. Rd.	III	A-D	100'	30'Asph.	R-13F	U-10E	Reconstruct-Curb & Gutter
127	Sunset Blvd.							
	Jones Bay to Bayou Rd.	III	A-D	120'	24'Asph.	R-10D	U-10E	Widen - Curb & Gutter
	Bayou Rd. to Oasis Rd.	III	A	-	-	-	U-10F	New Location
128	The Strand							
	Seawall Blvd. to 2nd St.	III	A-D	-	-	-	U-10D	New Location
129	29th St. (Galveston)							
	Seawall Blvd. to The Strand	III	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial
130	29th St. (Texas City)							
	FM 1765 to FM 1764	III	A	*	*	U-13F	U-13D	Prohibit Parking
	FM 1764 to Loop 197	III	A-D	60'	20'Asph.	R-13F	U-10E	Reconstruct-Curb & Gutter
	Loop 197 to Dollar Bay	III	A	60'	24'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter (Partly 24' shell surface)
131	29th St. (San Leon)							
	FM 517(Ave. J) to Ave. H	III	A	50'	20'Asph.	R-30	R-12C	Improve
	Ave. H to FM 517(Ave. B)	III	A	-	-	-	R-12C	New Location
132	33rd St.							
	Seawall Blvd. to Ave. O	III	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial
	Ave. O to Ave. D	III	A	80'	48'Asph.	U-20C	U-12E	Reclassify as a Major Arterial
	Ave. D to The Strand	III	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial
133	West Bay Fwy.							
	Bayou Road-Brazoria Co. Line	III	A-D	-	-	-	R-2D	New Location
134	Westfield Lane (Moore Rd.)							
	FM 528 to FM 2351	III	A	-	-	-	U-10F	New Location(75' ROW, 18' shell road partly exist.)
	FM 2351 to Brazoria Co. Line	III	A	50'	18'Shell	R-30	U-10F	Reconstruct-Curb & Gutter

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4) 1964
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(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
135	Belmont							
	Sunset Dr. to FM 3002	III	C	60'	18'Asph.	R-30	R-20B	Improve
136	Heards Lane							
	75th St. to Airport Rd.	III	C	-	-	-	U-20C	New Location
137	Main St. (Exist. FM 519)							
	SH 6 to Volney	III	C	80'	20'Asph.	R-13C	R-20B	Reclassify as a Collector
138	Pine St.							
	FM 1764 to Blackhawk	III	C	-	-	-	U-20C	New Location (50' ROW, 14' shell road partly exist.)
139	Sunset Drive							
	IH 45 to Magnolia Bayou	III	C	70'	18'Shell	R-30	U-20C	Reconstruct - Curb & Gutter
	Magnolia Bayou to SH 3	III	C	70'	18'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
140	Vauthier Road							
	FM 1765 to Nightingale Circle	III	C	100'	24'Conc.	U-30	U-21	Classify as a Collector
	Nightingale Circle to FM 1764	III	C	-	-	-	U-20C	New Location
141	SH 146 Fwy.							
	FM 1764 to Dickinson Bayou	IV	E	*	*	R-1C	R-1A	Main Lanes-Grade Sep.-Br. at Dickinson Bayou
	Dickinson Bayou-Harris Co.Line	IV	E	*	*	R-2C	R-2A	Grade Separations
142	West Bay Fwy.							
	Causeway to Brazoria Co. Line	IV	E	*	*	R-2D	R-2B	Grade Separations
143	Airport Road							
	Heards Ln. to Offats Bayou Br.	IV	A-D	-	-	-	R-10C	New Location
	Offats Bayou Br. to Cloud Rd.	IV	A-D	-	-	-	R-10B	New Location
144	Algoa-Friendswood Road							
	FM 518 to Harris Co. Line	IV	A	-	-	-	R-10D	New Location-Bridge across Clear Creek
145	Ave. E							
	43rd St. to 53rd St.	IV	A	70'	38'Asph.	U-30	U-12E	Improve
146	Ave. O (Alternate Ave. Q)							
	Seawall Blvd. to 53rd St.	IV	A-0	*	*	U-13F	U-12D	Widen
147	Ave. P							
	Seawall Blvd. to 53rd St.	IV	A-0	*	*	U-13F	U-12D	Widen
148	Bay St.							
	25th Ave.N to Dollar Bay Blvd.	IV	A	60'	24'Asph.	R-30	R-13F	Classify as a Major Arterial
149	Bayou Road							
	SH 6 to FM 519	IV	A-D	*	*	U-10D	U-10C	Widen
150	Bishop-Cemetery Road							
	FM 3002 to IH 45	IV	A-D	*	*	R-10D	R-10C	Widen
151	Blackhawk							
	Brazoria Co.Line-FM 1765 Ext.	IV	A	-	-	-	R-10D	New Location
	FM 1765 to Pine St.	IV	A	50'-60'	24'Shell	R-30	U-10F	Reconstruct-Curb & Gutter
	Pine St. to FM 3002	IV	A	-	-	-	R-10D	New Location (50' ROW, 16' shell road partly exist.)
152	Blackhawk							
	Harris co. Line-Harris Co.Line	IV	A	-	-	-	R-10D	New Location
153	Briarmeadow Ave.							
	Westfield Ln.-Brazoria Co.Line	IV	A	-	-	-	R-10D	New Location
154	Broadway Blvd.							
	19th St. to 59th St.(Gulf Fwy.)	IV	A-D	*	*	U-10B	U-10A	Prohibit Parking - Widen at intersections
155	Dollar Bay Blvd.							
	Bay St. to Pan-American	IV	A	-	-	-	R-10D	New Location
156	El Camino Real							
	Austin St. to 7th St.	IV	A-D	*	*	U-10F	U-10E	Widen
157	FM 517							
	Bishop-Cemetery Rd. to IH 45	IV	A-D	100'	28'Asph.	R-13F	R-10C	Widen
158	FM 517(San Leon Loop)							
	SH 146 at Grand-Park (Ave. B)	IV	A	100'	24'Asph.	R-12C	R-12B	Widen
	Grand to Ave. I at 9th St.	IV	A	100'	24'Asph.	R-12C	R-12B	Widen
	9th St.to Ave. P at 29th St.	IV	A	100'	20'Asph.	R-12C	R-12B	Widen
	Ave. P to W. of SH 146 Fwy.	IV	A-D	-	-	-	R-10C	Relocate
159	FM 518							
	FM 2351 to FM 528	IV	A-D	*	*	U-10D	U-10C	Widen
160	FM 519							
	SH 3 to SH 146	IV	A-D	80'	44'Asph.	R-13A	R-10A	Reconstruct
	SH 146 to T.C.T. RR	IV	A-D	100'	44'Asph.	R-13A	R-10A	Reconstruct
	T.C.T. RR to Loop 197 South	IV	A-D	-	-	-	R-10A	New Location
161	FM 528							
	Harris Co. Line to FM 518	IV	A-D	100'	24'Asph.	R-13B	U-10E	Reconstruct-Curb & Gutter
	FM 518 to Westfield Lane	IV	A-D	100'	18'Asph.	R-13C	U-10E	Reconstruct-Curb & Gutter
162	FM 646							
	FM 517 to FM 3002	IV	A	-	-	-	R-10D	New Location
163	FM 1765 Ext.							
	Algoa-Friendswood to Blackhawk	IV	A	-	-	-	R-10D	New Location
	Blackhawk to FM 1764	IV	A	-	-	-	U-10F	Reconstruct Partly Exist. Street-Curb & Gutter
	FM 1764 to SH 6	IV	A	-	-	-	U-10F	New Location-Curb & Gutter
164	FM 1765 (Texas Ave.)							
	SH 146 to 29th St.	IV	A-D	120'	48'Asph.	U-12C	U-10C	Reconstruct
	29th St. to 6th St.	IV	A	100'	62'Asph.	U-13B	U-13A	Prohibit Parking
165	FM 2094							
	Old SH 146 to SH 146 Fwy.	IV	A-D	80'	24'Asph.	R-13D	U-10D	Reconstruct-Curb & Gutter
166	FM 2351							
	FM 518 to Westfield Lane	IV	A-D	*	*	R-13D	U-10D	Reconstruct-Curb & Gutter

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(TABLE 9-1 Continued)

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167	FM 3002							
	Brazoria Co. Line to IH 45	IV	A-D	*	*	R-4D	R-4C	Widen
168	14th St.							
	Seawall Blvd. to The Strand	IV	A	*	*	U-12E	U-12B	Widen
169	43rd St.							
	Seawall Blvd. to Ave. E	IV	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial
170	53rd St.							
	Broadway Blvd. to Ave. E	IV	A	80'	48'Asph.	U-30	U-12E	Classify as a Major Arterial
171	Gordy/Bayshore Drive							
	FM 517 (Grand) to Gordy	IV	A	60'	20'Asph.	R-30	R-12C	Improve
	Bayshore Dr. to Old SH 146	IV	A	60'	18'Asph.	R-30	R-12B	Widen
172	Hallowy Road (Faa Road)							
	FM 3002 to FM 518	IV	A	-	-	-	R-10D	New Location
173	Humble Road							
	FM 2004 to End of Exist. Road	IV	A	55'	20'Shell	R-30	R-12C	Improve
	End of Exist. Road to SH 146	IV	A	-	-	-	R-12C	New Location
174	Jay Road							
	Bayou Rd. to Jones Bay	IV	A-D	-	-	-	U-10E	New Location
175	McElmoyle (28th St.)							
	Bishop Cemetery to Powers Rd.	IV	A	-	-	-	R-12C	New Location
	Powers Rd. to FM 646 (Ave. M)	IV	A	60'	20'Shell	R-30	R-12C	Improve
	FM 646 to SH 6	IV	A	50'	18'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
176	McKay Road(Ext. of Palmer Hwy.)							
	Brazoria Co. Line to IH 45	IV	A-D	*	*	R-10D	R-10C	Widen
177	Moore Road							
	FM 528 to Bishop Cemetery Rd.	IV	A	-	-	-	R-12C	New Location - Grade Sep. at IH 45
	Bishop Cemetery to El Camino	IV	A	-	-	-	U-10F	
	El Camino Real to Old SH 146	IV	A	-	-	-	R-12C	
178	99th Street							
	Seawall Blvd. to Cloud Rd.	IV	A-D	*	*	U-10F	U-10D	Widen
179	Oasis Road							
	FM 1764 to SH 3	IV	A	-	-	-	R-10D	New Location
180	Offats Bayou Bridge & Approaches							
	IH 45 to Airport Rd.	IV	A-D	-	-	-	R-10A	New Location - 6 Lane Bridge
181	Pan American							
	FM 646 to Hughes Rd.	IV	A	-	-	-	R-10D	New Location
182	Pan American/Humble Loop							
	SH 146 to SH 146	IV	A	-	-	-	R-10D	New Location
183	Park Ave.							
	FM 2004 to Old SH 146	IV	A	-	-	-	R-12C	New Location
184	Pelican Loop(South,East&North)							
	Pelican Br. to Pelican Park	IV	A-D	*	*	R-13C	R-10C	Widen
	Pelican Park to Texas City Br.	IV	A-D	*	*	R-10D	R-10B	
	Texas City Br. to Pelican Br.	IV	A-D	*	*	R-10D	R-10C	
185	Pelican Tunnel							
	Ferry Rd. to Pelican Loop	IV	A	-	-	-	Tun.	2 Lanes
186	Pine Road							
	FM 1764 to Humble Road	IV	A	-	-	-	R-10D	New Location
187	San Luis Pass Road							
	San Jacinto Dr. to Termini Rd.	IV	A-D	120'	20'Asph.	R-13F	R-10B	Reconstruct
188	SH 87							
	Bolivar Bridge to SH 124	IV	A-D	120'	24'Asph.	R-13D	R-10C	Widen
	SH 124 to Chambers Co. Line	IV	A-D	120'	24'Asph.	R-13C	R-10C	Widen
189	SH 124							
	SH 87 to A.T. & S.F. RR	IV	A-D	100'	20'Asph.	R-13C	R-10C	Widen
190	Sunset Drive							
	SH 3 to Hill Ave.	IV	A	70'	18'Asph.	R-30	U-10F	Reconstruct-Curb & Gutter
	Hill Ave. to FM 2004	IV	A	-	-	-	U-10F	New Location (70' ROW, 18' shell road partly exist.)
	FM 2004 to Old SH 146	IV	A	-	-	-	R-12C	New Location
191	Texas City Causeway(Ext.of FM519)							
	Loop 197 S. to Galveston Bay	IV	A-D	-	-	-	R-10A	New Location
	Mainland to Pelican Loop	IV	A	-	-	-	R-7B	
192	The Strand							
	2nd St. to 12th St.	IV	A-D	*	*	U-10D	U-10C	Widen
193	25th Ave. North							
	IH 45 to Pine Rd.	IV	A	-	-	-	R-10D	New Location
	Pine Rd. to SH 146	IV	A	50'	16'Shell	R-30	R-10D	Improve (Private Road)
194	25th Ave. North							
	9th St. to Bay St.	IV	A-D	100'	24'Asph.	R-21B	U-10E	Reconstruct-Curb & Gutter
195	25th St. (Rosenberg)							
	Seawall Blvd. to Broadway Blvd.	IV	A-D	110'	2x36'Conc.	U-11B	U-11A	Prohibit Parking
196	Volney							
	West Bay Fwy. to Hacker Rd.	IV	A	-	-	-	R-12C	New Location
	Hacker Rd. to S.F. RR	IV	A	70'	18'Shell	R-30	R-10D	Improve (Ave. A)
	S.F. RR to IH 45	IV	A	-	-	-	U-10F	New Location
197	Ave. B							
	McElmoyle to Jay Rd.	IV	C	50'	20'Asph.	R-30	R-20B	Improve
198	Austin St.							
	FM 518(Main St.)-Louisiana Ave.	IV	C	-	-	-	U-20C	Partly New-Partly Upgrading of Local Street-C & G

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199	Carver Ave.(Jones,Mentor & Evelyn)							
	IH 45 to Noble	IV	C	-	-	-	U-20C	New Location
	Noble to Amburn Rd.	IV	C	60'	20'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter (Jones)
	Amburn Rd. to Vauthier Rd.	IV	C	-	-	-	U-20C	New Location
	Vauthier Rd. to SH 3	IV	C	60'	22'Conc.	R-30	U-20C	Widen-C. & G. (Carver Ave. & Mentor Dr.)
	SH 3 to 5th Ave. N	IV	C	60'	20'Asph.	R-30	U-20C	Reconstruct-C. & G. (Evelyn St.-Not Contineous)
200	Cherry Ave. (16th Ave. N)							
	36th St. to 31st St.	IV	C	55'	20'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
	31st St. to 23rd St.	IV	C	-	-	-	U-20C	New Location-Curb & Gutter
	23rd St. to 21st St.	IV	C	60'	24'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
	21st St. to 10th St.	IV	C	60'	26'Conc.	U-30	U-20C	Widen
	10th St. to 6th St.	IV	C	80'	42'Asph.	U-30	U-20C	Classify as a Collector
	6th St. to Bay St.	IV	C	80'	20'Conc.	R-30	U-20C	Widen-Curb & Gutter
201	5th Avenue North							
	Johnny Palmer Rd. to SH 3	IV	C	-	-	-	U-20C	New Location(100' ROW,20'Asph. exist. on Montecello)
	SH 3 to 25th St.	IV	C	60'	-	-	U-20C	New Location
	25th St. to 21st St.	IV	C	70'	30'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
	21st St. to Bay St.	IV	C	85'	42'Conc.	U-30	U-20C	Classify as a Collector
202	1st St.							
	Bayou Rd. to FM 1765	IV	C	*	*	U-20C	U-20B	Prohibit Parking
203	FM 1266							
	FM 2004 to FM 518	IV	C	80'	24'Asph.	R-13C	R-20B	Improve
204	Johnny Palmer Road							
	IH 45 to FM 1764	IV	C	*	*	U-20C	U-20B	Prohibit Parking
205	Lake Road							
	FM 519 to Cedar Drive	IV	C	60'	21'Asph.	R-13F	U-20C	Reconstruct-Curb & Gutter
	Cedar Drive to FM 1765	IV	C	60'	27'Asph.	R-13F	U-20C	Reconstruct-Curb & Gutter
	SH 6 to FM 519	IV	C	-	-	-	U-20C	New Location
206	Louisiana Ave.							
	Moore Rd. to Webster St.	IV	C	-	-	-	U-20C	New Location
	Webster St. to FM 518	IV	C	60'	18'Shell	R-30	U-20C	Reconstruct-Curb & Gutter
	FM 518 to FM 2094	IV	C	-	-	-	U-20C	New Location
207	Magnolia							
	IH 45 to Ross Ave.	IV	C	60'	24'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
208	9th St.							
	9th Ave. N to 25th Ave. N	IV	C	-	-	U-20C	U-20B	Restrict Parking-Widen at Major Intersec.
209	6th St.							
	19th Ave. N to 25th Ave. N	IV	C	70'	28'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
	25th Ave. N to Dollar Bay Blvd.	IV	C	-	-	-	U-20C	New Location
210	21st St.							
	FM 1765 to FM 1764	IV	C	*	*	U-20C	U-20B	Restrict Parking-Widen at Major Intersec.
211	34th St.							
	FM 1764 to Cherry Ave.	IV	C	55'	20'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter
	Cherry Ave. to Dollar Bay Blvd.	IV	C	-	-	-	U-20C	New Location
212	North of FM 2351							
	Brazoria Co. Line to Blackhawk	IV	C	-	-	-	U-20C	New Location
213	Grand Parkway (FM 3002)							
	Brazoria Co. Line-SH 146 Fwy.	V	E	*	*	R-4C	R-4B	Grade Separations-Impr. Interchange at IH 45
214	Gulf Fwy. (IH 45)							
	At Intersections	V	E					Impr. Interchanges at FM 518 & FM 519/Bayou Road New Grade Sep. at 25th Ave. N
215	Palmer Highway (FM 1764)							
	SH 146 to IH 45	V	E	*	*	R-1B	R-1A	Widen-Impr. Interchanges at IH 45 & SH 146
216	Seawall Blvd. (FM 3005)							
	61st St. to 103rd St.	V	E	*	*	U-13C	U-4A	Reconstruct-Grade Sep. at 61st,81st,99th & 8 Mi. Rd.
	103rd St. to West Bay Fwy.	V	E	*	*	R-4C	R-4A	
217	West Bay Fwy.							
	Causeway	V	E	*	*	R-7B	R-7A	Widen (New Parallel Causeway)
	FM 3005 to Causeway	V	E	*	*	R-2D	R-2A	Widen-Grade Sep. at Cloud Rd.,Stewart Rd. and FM 3005
	Causeway to Bayou Rd.	V	E	*	*	R-2B	R-2A	Widen
218	Ave. E (Alternate Ave. D)							
	2nd St. to 6th St.	V	A-0	*	*	U-12E	U-12D	Restrict Parking One Side
	6th St. to 26th St.	V	A-0	*	*	U-13F	U-12D	Widen Pvmt.
219	Ave. F							
	2nd St. to 6th St.	V	A-0	*	*	U-12E	U-12D	Restrict Parking One Side
	6th St. to 26th St.	V	A-0	*	*	U-13F	U-12D	Widen Pvmt.
220	Bayou Rd.(Flamingo Isles Blvd.)							
	West Bay Fwy. to Sunset Blvd.	V	A-D	*	*	R-10B	R-10A	Widen
	Sunset Blvd. to SH 6	V	A-D	*	*	U-10D	U-10C	Widen
221	Bay Street							
	Texas Ave. to 9th Ave. N	V	A	100'	35'Asph.	R-13F	U-12C	
	9th Ave. N to 25th Ave. N	V	A-D	100'	35'Asph.	R-13F	U-10E	Reconstruct-Curb & Gutter
	25th Ave. N to Dollar Bay Blvd.	V	A-D	*	*	R-13F	U-10E	
	Dollar Bay Blvd. to Pan-American/Humble Loop	V	A	-	-	-	R-12C	New Location(20'Asph. road exist. on top of seawall)
222	Beaumont Street							
	El Camino Real to FM 518	V	A-D	*	*	R-10D	R-10C	Widen
223	Bishop-Cemetery Road							
	Brazoria Co. Line-West Bay Fwy.	V	A	60'	22'Shell	R-30	R-12C	Improve

1) Number Keyed to Figures 9-1 through 9-6
2) A = Period (I = 1966-1970, II = 1971-1975, III = 1976-1980, IV = 1981-1985, and V = After 1985 (Approx. 1986-1990))
3) B = Classification (E = Expressway, A-D = Major Arterial Divided, A-0 = Major Arterial One-Way, A = Other Major Arterial, and C = Collector)
4) 1964
5) C = Previous or Existing Cross-Section
6) D = New Cross-Section

* Project previously changed from existing condition.

(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
224	Blackhawk (Palomino Dr.)							
	FM 518 to Harris Co. Line	V	A	50'	-	-	R-10D	Bridge at Clear Creek(12'Shell road partly exist.)
225	Briarmeadow Avenue							
	Westfield Ln.-Harris Co. Line	V	A-D	*	*	U-10F	U-10E	Widen
226	Cloud Road							
	Airport Rd. to West Bay Fwy.	V	A-D	*	*	R-10D	R-10C	Widen
227	Dixie-Friendswood Road							
	Brazoria Co. Line-Brazoria Co. Line	V	A	-	-	-	R-12C	New Location
228	FM 517							
	FM 2004 to W. of SH 146 Fwy.	V	A-D	80'	20'Asph.	R-13F	R-10C	Improve
229	FM 528							
	Westfield Ln.-Brazoria Co.Line	V	A-D	100'	18'Asph.	R-13C	R-10C	Widen
230	FM 646							
	FM 1764 to SH 6	V	A-D	90'-100'	20'Asph.	R-13C	U-10E	Reconstruct-Curb & Gutter
	McElmoyle to SH 6	V	A-D	*	*	U-10F	U-10E	Widen
231	FM 1764 Ext.							
	Brazoria Co.Line-FM 1765 Ext.	V	A	-	-	-	R-12C	New Location-Grade Sep. at West Bay Fwy.
	FM 1765 Ext. to SH 6	V	A	60'	16'Shell	R-30	U-10F	Reconstruct-Curb & Gutter
232	FM 2004							
	Brazoria Co. to West Bay Fwy.	V	A-D	*	*	R-12C	R-4C	Widen
	West Bay Fwy. to SH 6	V	A-D	*	*	R-12C	R-10B	Widen
	SH 6 to SH 3	V	A-D	120'	24'Asph.	R-13D	R-10C	Widen
	SH 3 to SH 146 Fwy./Park Ave.	V	A-D	*	*	R-10D	R-10C	Widen
233	FM 2094							
	FM 518 to SH 146 Fwy.	V	A-D	80'	24'Asph.	R-13D	R-10C	Widen
234	14th St.							
	Loop 197 to Dollar Bay Blvd.	V	A-D	*	*	U-10F	U-10E	Widen
235	51st St.							
	Seawall Blvd. to Ave. E	V	A	*	*	U-12E	U-12B	Widen Pavement
236	Friendswood-Link Road							
	Brazoria Co.Line-Harris Co.	V	A	-	-	-	R-12C	New Location
237	Hallowy Road (Faa Road)							
	FM 1765 Ext. to N. of SH 6	V	A	50'	24'Shell	R-30	R-12C	Improve
	N. of SH 6 to FM 3002	V	A	-	-	-	R-12C	New Location
238	Hughes Road							
	Pan American to SH 3	V	A-D	*	*	R-10D	R-10C	Widen
239	Jay Road							
	FM 2004 to Bayou Rd.	V	A-D	*	*	R-10D	R-10C	Widen
240	Jay Road							
	Brazoria Co.Line to FM 646	V	A	-	-	-	R-12C	New Location-Grade Sep. at West Bay Fwy.
241	McElmoyle							
	SH 6 to McKay	V	A	-	-	-	R-12C	New Location
242	Moore Road							
	Bishop-Cemetery to El Camino	V	A-D	*	*	U-10F	U-10E	Widen
243	Oasis Road(Newman Rd., Congress)							
	SH 6 to IH 45	V	A-D	*	*	U-10F	U-10E	Widen
	West Bay Fwy. to SH 6	V	A-D	*	*	R-10D	R-10C	Widen
244	Oasis Road							
	SH 3 to FM 517	V	A	-	-	-	R-12C	New Location
	FM 517 to Sunset Dr.	V	A	100'	24'Asph.	R-21C	R-12C	Improve
245	Pan American							
	Brazoria Co.Line to FM 646	V	A	-	-	-	R-10D	New Location
246	Pan American							
	IH 45 to SH 146	V	A-D	*	*	R-10D	R-10C	Widen
247	Pelican Bridge							
	The Strand to Pelican Loop	V	A-D	*	*	Br.	Br.	Widen(New Parallel 2 Lane Bridge)
248	Pelican Loop East							
	Pelican Tunnel-Texas City Br.	V	A-D	*	*	R-10B	R-10A	Widen
249	Pelican Tunnel							
	Ferry Rd. to Pelican Loop	V	A-D	*	*	Tun.	Tun.	Widen to 4 Lanes
250	SH 6							
	Highland Bayou to FM 519	V	A-D	120'	48'Asph.	R-12B	U-10C	Reconstruct-Curb & Gutter
	FM 519 to FM 2004	V	A-D	120'	60'Asph.	R-12A	U-10C	Reconstruct-Curb & Gutter(12' Painted Median)
251	Sunset Blvd.							
	Bayou Rd. to Oasis Rd.	V	A-D	*	*	U-10F	U-10E	Widen
252	Sunset Drive							
	Brazoria Co. Line FM 646	V	A	-	-	-	R-12C	New Location
253	Texas Avenue							
	Bay St. to 3rd St.	V	A	100'	32'Asph.	R-13F	U-12C	Reconstruct-Curb & Gutter
254	29th St.							
	Loop 197 to Dollar Bay Blvd.	V	A-D	*	*	U-10F	U-10E	Widen
255	Anders Lane							
	FM 3002 to Park Ave.	V	C	-	-	-	R-20B	New Location
	Park Ave. to FM 518	V	C	40'	20'Shell	R-30	R-20B	Improve
	FM 518 to FM 2094	V	C	-	-	-	U-20C	New Location
256	Cherry Avenue							
	SH 146 to SH 3	V	C	-	-	-	R-20B	New Location
257	Oak Street							
	FM 519 to FM 1764	V	C	60'	18'Asph.	R-30	U-20C	Reconstruct-Curb & Gutter

1) Number Keyed to Figures 9-1 through 9-6
2) A = Period (I = 1966-1970, II = 1971-1975, III = 1976-1980, IV = 1981-1985, and V = After 1985 (Approx. 1986-1990))
3) B = Classification (E = Expressway, A-D = Major Arterial Divided, A-O = Major Arterial One-Way, A = Other Major Arterial, and C = Collector)
4) 1964
5) C = Previous or Existing Cross-Section
6) D = New Cross-Section

* Project previously changed from existing condition.

(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
258	Ross Avenue							
	Magnolia to SH 3	V	C	75'	30'Conc.	U-21	U-20C	Widen
	SH 3 to FM 1765	V	C	60'	24'Asph.	R-21B	U-20C	Reconstruct-Curb & Gutter
259	Sunset Dr.							
	FM 646 to IH 45	V	C	-	-	-	R-20B	New Location
260	21st St.							
	FM 1764 to Loop 197	V	C	*	*	U-20C	U-20B	Restrict Parking
261	24th St. (San Leon)							
	FM 517 to FM 517	V	C	60'	18'Asph.	R-30	R-20B	Improve
262	25th Ave. N							
	Bishop-Cemetery to IH 45	V	C	-	-	-	R-20B	New Location-Grade Sep. at IH 45
263	Vauthier Road							
	SH 6 to FM 1765	V	C	*	*	R-20B	U-20C	Curb & Gutter-Widen
	FM 1765 to Nightingale Circle	V	C	*	*	U-21	U-20C	Widen
264	Westward Ave.							
	IH 45 to Cedar Dr.	V	C	80'	20'Asph.	R-21B	U-20C	Reconstruct-Curb & Gutter
	Cedar Dr. to FM 1765	V	C	80'	28'Asph.	R-21B	U-20C	
**	Gulf Fwy. (IH 45)							
	Galveston Island to Mainland	-	E	500'	2x40'Conc	R-7A	Exist.	No Emergency Shoulders on Causeway
	Causeway to SH 6 / SH 3	-	E	300'-365'	2x36'Conc	R-5	Exist.	Option: Improve to U-1
**	FM 517							
	Brazoria Co. to Bishop-Cemetery	-	A	100'	28'Asph.	R-13F	Exist.	Option: Acquire 120'-150'ROW for Future Widening
**	FM 519							
	Loop 197 to Texas City Bridge	-	A	100'	44'Asph.	R-13A	Exist.	Option: Improve to R-12B
**	FM 646							
	FM 1764 to FM 517	-	A	90'-100'	22'Asph.	R-13C	Exist.	Option: Acquire 120'-150' ROW for Future Widening
**	FM 1266							
	El Camino Real to FM 2004	-	A	80'	24'Asph.	R-13C	Exist.	Option: Acquire 120'-150' ROW for Future Widening
**	FM 1764							
	SH 6 to IH 45	-	A	120'	24'Asph.	R-13B	Exist.	Option: U-10E from SH 6 to Pine St.
	SH 146 to 14th St.	-	A	100'	2x33'Conc	U-11A	Exist.	16' Median-Option: Widen at Major Intersec.
**	FM 1765							
	FM 2004 to IH 45	-	A	100'	22'Asph.	R-13D	Exist.	Option: Improve to U-10E
	SH 3 to SH 146	-	A	100'	62'Asph.	U-13B	Exist.	-
**	Ferry Road							
	Seawall Blvd. to The Strand	-	A	80'	2x24'Asph	U-11C	Exist.	-
	The Strand to Ferry	-	A	100'	2x24'Asph	U-11C	Exist.	-
**	53rd St.							
	Seawall Blvd. to Broadway Blvd.	-	A	80'	48'Asph.	U-12E	Exist.	-
**	Loop 197 (6th St.)							
	9th Ave. N to 19th Ave. N	-	A	100'	64'Asph.	U-13B	Exist.	-
**	9th Ave. N							
	14th St. to Bay St.	-	A	100'	62'Conc.	U-13B	Exist.	-
**	SH 6							
	FM 2004 to FM 646 (Main Ave.)	-	A	120'	48'Asph.	R-12B	Exist.	-
	FM 646(Main) to FM 646 (Ave.M)	-	A	120'	60'Asph.	R-12A	Exist.	-
	FM 646(Ave M) to Brazoria Co.	-	A	120'	48'Asph.	R-12B	Exist.	-
**	SH 87							
	FM 2612 to Bolivar Bridge	-	A	120'	24'Asph.	R-13F	Exist.	-
**	Texas Ave.							
	3rd St. to 6th St.	-	A	100'	62'Asph.	U-13B	Exist.	-
**	25th St.(Rosenberg)							
	Broadway to The Strand	-	A	120'	2x48'Conc	U-10B	Exist.	4'Median
**	FM 188 (Teichman Road)							
	IH 45 to Teichman's Point	-	C	100'	24'Asph.	R-20B	Exist.	-
**	FM 2612 (Port Bolivar Loop)							
	SH 87 to SH 87	-	C	80'-120'	24'Asph.	R-21C	Exist.	-
**	Howell St.							
	FM 519 to Ross Ave.	-	C	60'	42'Asph.	R-21A	Exist.	Option: Improve to U-20C
***	Ave. B (Strand)							
	10th St. to 12th St.	II	A	80'	48'Asph.	U-12E	U-30	Declassify
***	Ave. D (Market St.)							
	University Blvd. to 19th St.	II	A	70'	38'Asph.	U-13F	U-30	
	19th St. to 26th St.	II	A	70'	50'Asph.	U-12E	U-30	Declassify
	26th St. to 33rd St.	II	A	70'	38'Asph.	U-13F	U-30	
***	FM 517							
	SH 146 Fwy. to SH 146	IV	A	80'	22'Asph.	R-13B	R-30	
	SH 146 to Ave. P	IV	A	100'	22'Asph.	R-13B	R-30	Declassify
***	FM 1266							
	FM 517 to El Camino Real	III	A	80'	24'Asph.	R-13C	R-30	Declassify
***	45th St.							
	Seawall Blvd. to Broadway Blvd.	IV	A	80'	48'Asph.	U-12E	U-30	Declassify
***	SH 87							
	Ferry to FM 2612	III	A	120'	24'Asph.	R-13F	R-30	Declassify
***	21st St. (Moody)							
	Ave. O to Broadway Blvd.	II	A	80'	48'Asph.	U-12E	U-30	Declassify
***	23rd St. (Tremont)							
	Seawall Blvd. to Ave. B	II	A	80'	48'Asph.	U-12E	U-30	Declassify
***	39th St.							
	Ave. S to Broadway Blvd.	II	A	80'	48'Asph.	U-12E	U-30	Declassify

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4) 1964
5) C = Previous or Existing Cross Section
6) D = New Cross Section

* Project previously changed from existing condition.
** Major Thoroughfare retained with no change of Cross Section or Classification. Not included in cost analysis.
*** Street dropped from the Major Thoroughfare System. Not included in cost analysis.

(TABLE 9-1 Continued)

NO[1]	STREET NAME AND SECTION LIMITS	A[2]	B[3]	EXISTING[4] ROW	CONDITION PVMT	C[5]	D[6]	RECOMMENDATIONS AND COMMENTS
***	Deats Road							
	IH 45 to FM 1266	III	C	70'	16'Asph.	R-21B	R-30	Declassify
***	FM 517 (Oasis Rd.)							
	Sunset Dr. to FM 3002	IV	C	100'	24'Asph.	R-21C	R-30	Declassify
***	FM 646 (Main Ave.)							
	FM 2004 to SH 6	III	C	80'	24'Asph.	R-21B	R-30	Declassify
***	Kansas Ave.							
	4th to Walker St.	IV	C	50'	22'Asph.	R-21B	R-30	Declassify
***	Texas Ave.							
	FM 518 to Walker St.	II	C	50'	18'Asph.	R-21B	R-30	Declassify
***	Walker St.							
	SH 3 to Texas Ave.	II	C	40'	20'Asph.	R-21B	R-30	Declassify

1) Number Keyed to Figures 9-1 through 9-6
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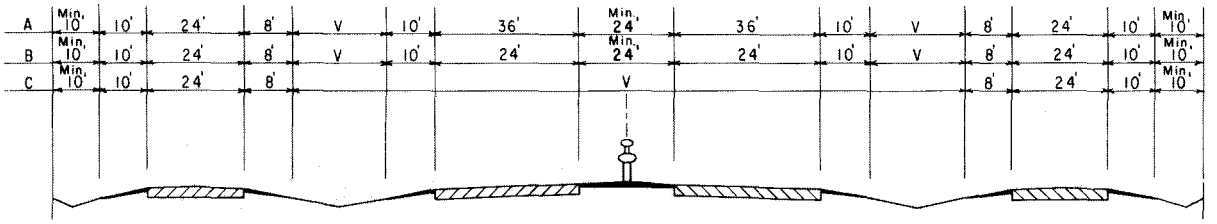
3) B = Classification (E = Expressway, A-D = Major Arterial Divided, A-O = Major Arterial One-Way, A = Other Major Arterial, and C = Collector)
4) 1964
5) C = Previous or Existing Cross Section
6) D = New Cross Section

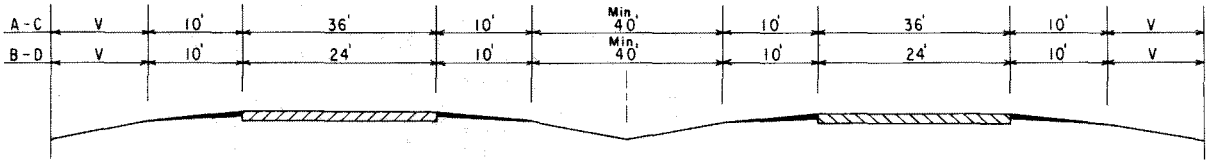
* Project previously changed from existing condition.
** Major Thoroughfare retained with no change of Cross Section or Classification. Not included in cost analysis.
*** Street dropped from the Major Thoroughfare System. Not included in cost analysis.

RURAL CROSS SECTIONS



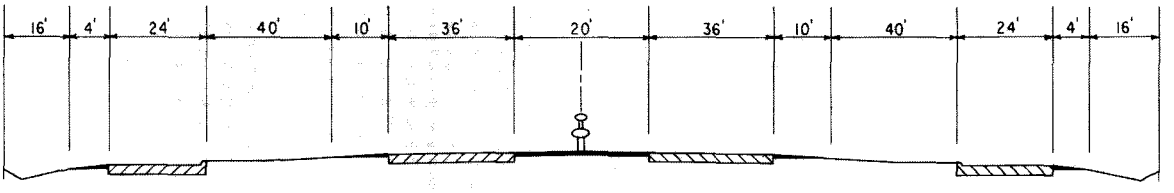
R-1 DESIRABLE CROSS SECTIONS - WITH FRONTAGE ROADS

* A: 6 Lanes, Min. 340' R.O.W.
* B: 4 Lanes, Min. 340' R.O.W.
C: Frontage Roads Only
* FOR FUTURE PROJECTS MIN. 350' R.O.W.



R-2 DESIRABLE CROSS SECTIONS - NO FRONTAGE ROADS

A: 6 Lanes, Min. 400' R.O.W.
B: 4 Lanes, Min. 400' R.O.W.
* C: 6 Lanes, Min. 400' R.O.W.
* D: 4 Lanes, Min. 400' R.O.W.
* NO GRADE SEPARATIONS, STAGE IN FUTURE FREEWAY DEVELOPMENT



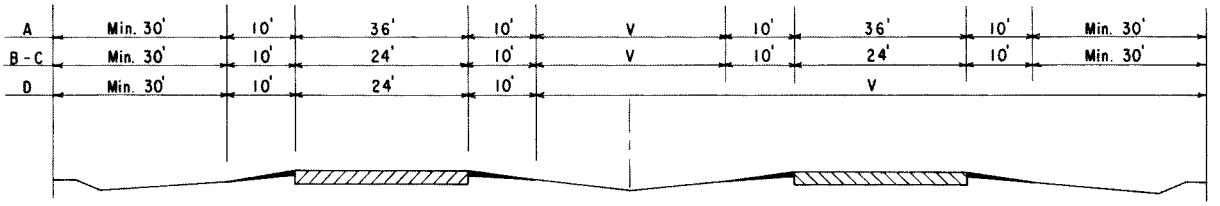
* R-3 EXISTING (COMPLETED AFTER 1964) CROSS SECTION

6 Lanes, 300' R.O.W.
* NOT RECOMMENDED FOR FUTURE PROJECTS

TYPICAL SECTIONS - FREEWAYS

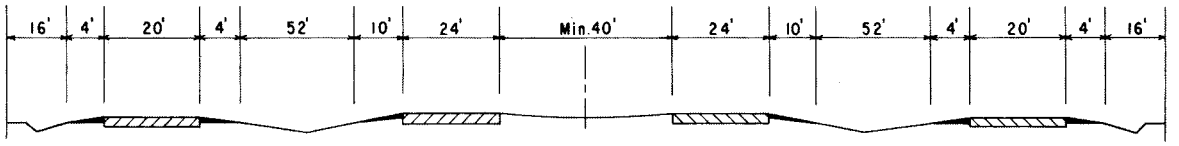
FIGURE 9 - 7

RURAL CROSS SECTIONS



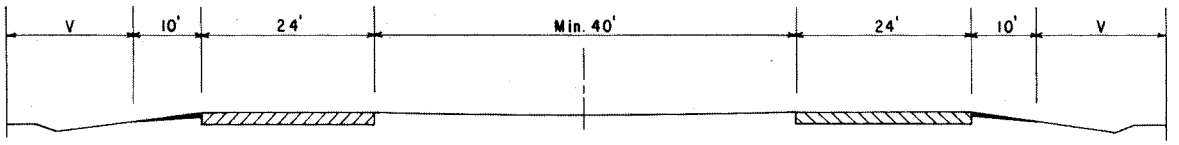
R-4 DESIRABLE CROSS SECTIONS - EXPRESSWAYS & PARKWAYS

A: 6 Lane Expressway, 250' R.O.W. (Acceptable Min. 200' R.O.W.)
B: 4 Lane Expressway, 250' R.O.W. (Acceptable Min. 200' R.O.W.)
4 Lane Parkway, Min. 400' R.O.W.
C: 4 Lanes (No Grade Sep., Stage In Future Exwy. Dev.) 250' R.O.W. (Acceptable Min., 200' R.O.W.)
4 Lanes (No Grade Sep., Stage In Future Pkwy. Dev.) Min. 400' R.O.W.
D: 2 Lanes (Stage In Future Exwy. Dev.), 250' R.O.W. (Acceptable Min., 200' R.O.W.)
2 Lanes (Stage In Future Pkwy Dev), Min. 400' R.O.W.



*R-5 EXISTING CROSS SECTION - EXPRESSWAY WITH FRONTAGE ROADS

4 Lanes, 300' R.O.W.
* NOT RECOMMENDED FOR FUTURE PROJECTS

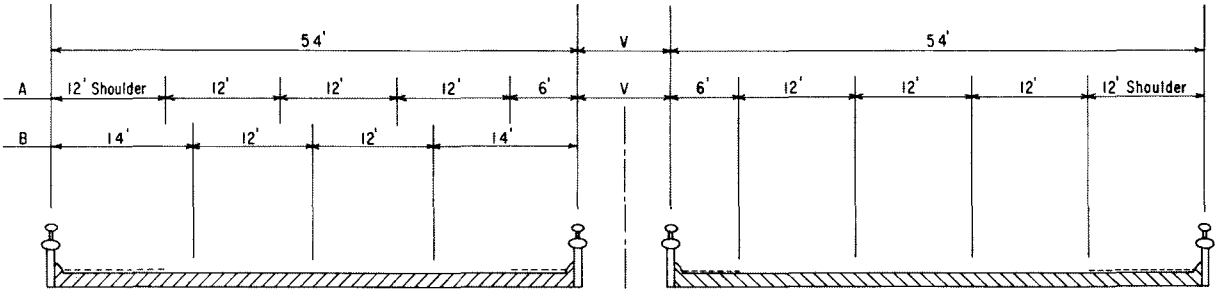


*R-6 EXISTING CROSS SECTION - EXPRESSWAY, NO FRONTAGE ROADS

4 Lanes, 300' R.O.W.
* NOT RECOMMENDED FOR FUTURE PROJECTS

TYPICAL SECTIONS - EXPRESSWAYS & PARKWAYS FIGURE 9-8

RURAL CROSS SECTIONS

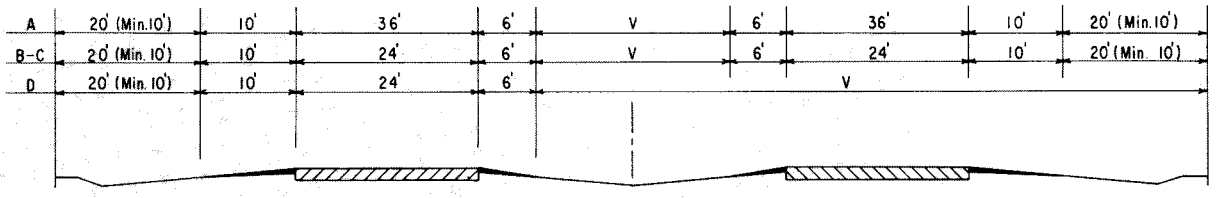


R-7 DESIRABLE CROSS SECTIONS

A: 6 Lanes With Emergency Shoulders
B: 4 Lanes (Stage 1)

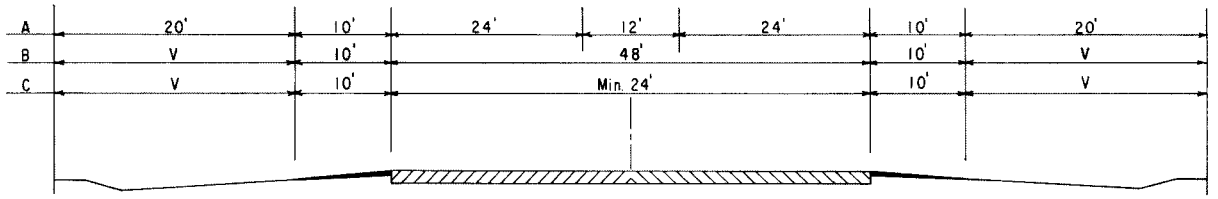
TYPICAL SECTIONS - CAUSEWAYS FIGURE 9-9

RURAL CROSS SECTIONS



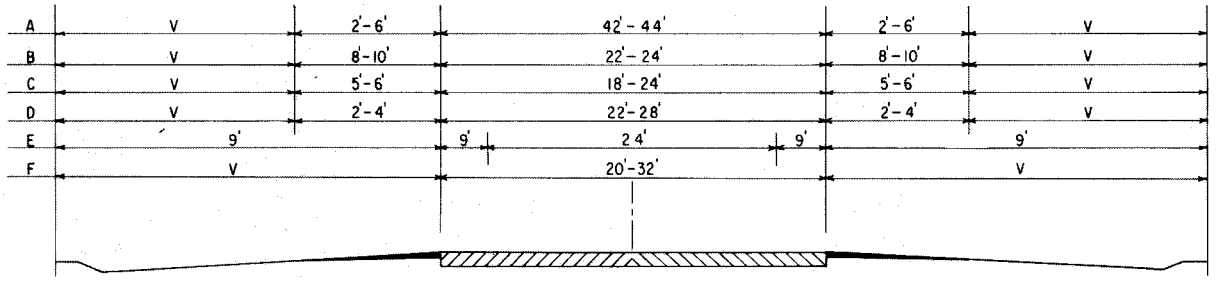
R-10 DESIRABLE CROSS SECTIONS – DIVIDED MAJOR ARTERIALS

A: 6 Lanes, 200' R.O.W. (Acceptable Min., 150' R.O.W.)
B: 4 Lanes, 200' R.O.W. (Acceptable Min., 150' R.O.W.) Future Widening To 6 Lanes
C: 4 Lanes, 150' R.O.W. (Acceptable Min., 120' R.O.W.)
D: 2 Lanes, 150' R.O.W. (Acceptable Min., 120' R.O.W.) Future Widening To 4 Lanes



R – 12 DESIRABLE CROSS SECTIONS – UNDIVIDED MAJOR ARTERIALS

A: 4 Lanes, 120' R.O.W. Painted or Traversable Type Median / Left Turn Lane
B: 4 Lanes, 120' R.O.W. (Acceptable Min 100' R.O.W.)
C: 2 Lanes, 120' R.O.W (Acceptable Min 100' R.O.W.)



*R – 13 EXISTING CROSS SECTIONS – UNDIVIDED MAJOR ARTERIALS

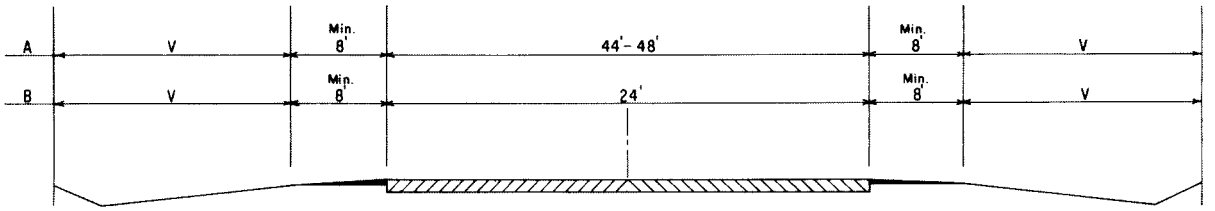
A: 4 Lanes, 60' – 100' R.O.W.
B: 2 Lanes + 8' – 10' Shoulders, 80' – 120' R.O.W.
C: 2 Lanes + 5' – 6' Shoulders, 80' – 100' R.O.W.
D: 2 Lanes + 2' – 4' Shoulders, 80' – 120' R.O.W.
E: 2 Lanes + Parking, 60' R.O.W.
F: 2 Lanes, 40' – 120' R.O.W.

* NOT RECOMMENDED FOR FUTURE PROJECTS

TYPICAL SECTIONS - MAJOR ARTERIALS

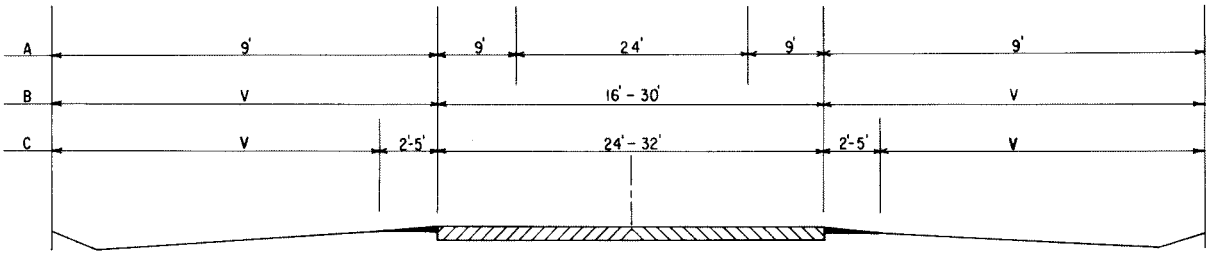
FIGURE 9-10

RURAL CROSS SECTIONS



R-20 DESIRABLE CROSS SECTIONS

A: 4 Lanes, Min. 100' R.O.W.
B: 2 Lanes, Min. 100' R.O.W.

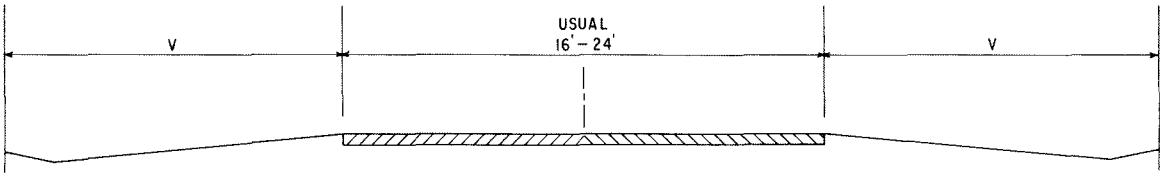


R-21 EXISTING CROSS SECTIONS

A: 2 Lanes + Parking 60' R.O.W.
B: 2 Lanes, 40'-100' R.O.W.
C: 2 Lanes, 2'-5' Shoulders 80'-120' R.O.W.

TYPICAL SECTIONS - COLLECTORS FIGURE 9-11

RURAL CROSS SECTIONS



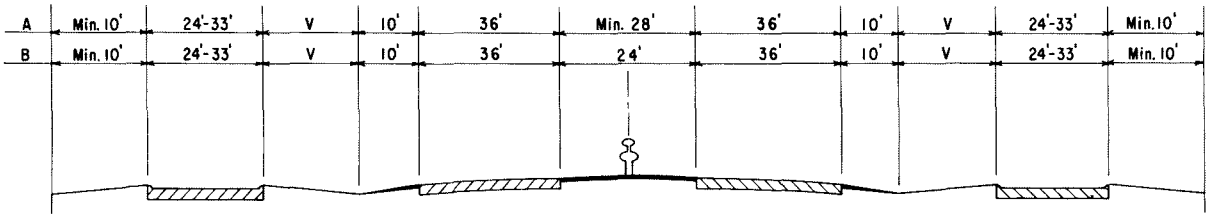
* R-30 EXISTING CROSS SECTIONS

2 Lanes, Usual 40'-60' R.O.W.

* NOTE, NO RECOMMENDATIONS IN THIS REPORT FOR LOCAL STREETS. THIS TYPICAL SECTION IS SHOWN IN ORDER TO ESTABLISH A COMPLETE LISTING OF ALL SECTIONS IN THE STUDY AREA.

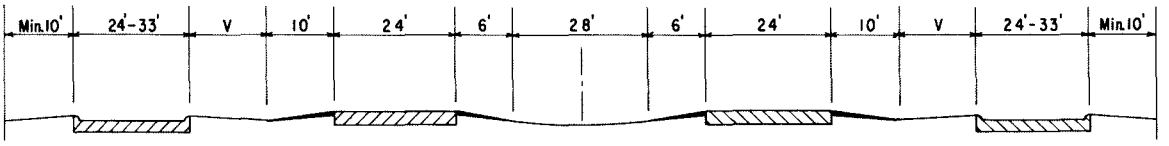
TYPICAL SECTION - LOCAL STREETS FIGURE 9-12

URBAN CROSS SECTIONS



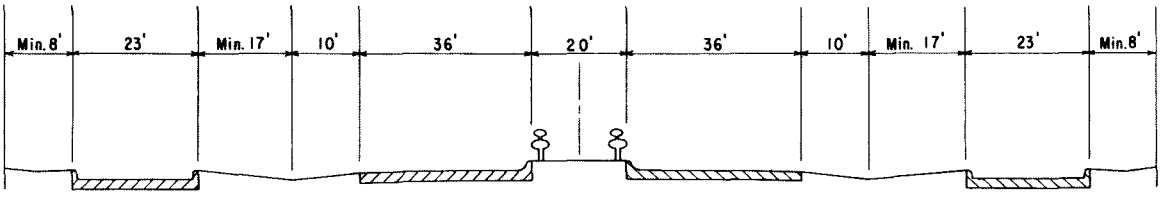
U-1 DESIRABLE CROSS SECTIONS

A: 6 Lanes, Min. 300' R.O.W.
B: 6 Lanes, 250' R.O.W. (Restricted R.O.W.)



U-2 UNDER CONSTRUCTION OR COMMITTED TO BE CONSTRUCTED

4 Lanes, Min. 300' R.O.W. - Construction of Frontage Roads Only in This Stage of Fwy. Dev.

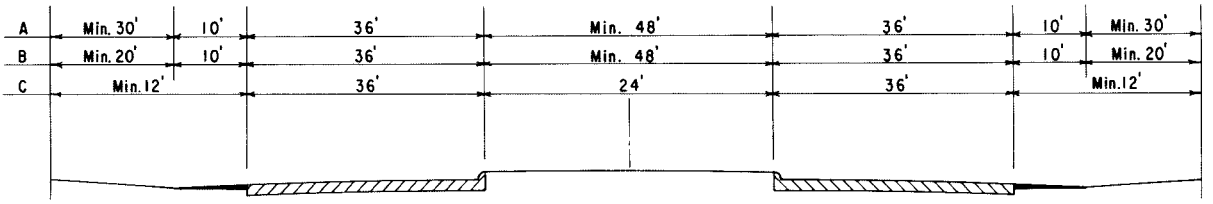


*U-3 EXISTING (COMPLETED AFTER 1964) CROSS SECTION

6 Lanes, Min. 250' R.O.W.
* NOT RECOMMENDED FOR FUTURE PROJECTS

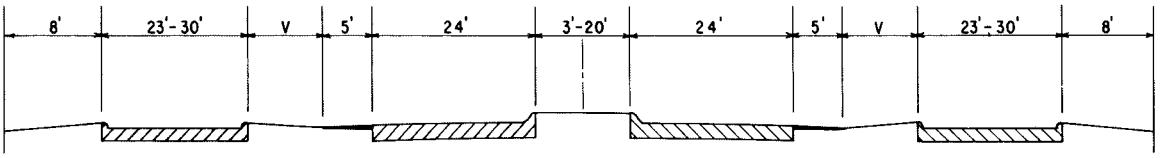
TYPICAL SECTIONS - FREEWAYS FIGURE 9-13

URBAN CROSS SECTIONS



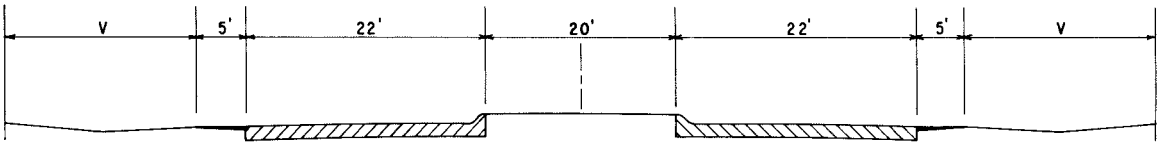
U – 4 DESIRABLE CROSS SECTIONS

A: 6 Lanes, Min. 250' R.O.W.
B: 6 Lanes, 200' R.O.W. (Acceptable Min. 180' R.O.W.)
C: 6 Lanes, Min. 120' R.O.W., No Shoulders



*U – 5 EXISTING CROSS SECTION – WITH FRONTAGE ROADS

4 Lanes, 200' R.O.W.
*NOT RECOMMENDED FOR FUTURE PROJECTS

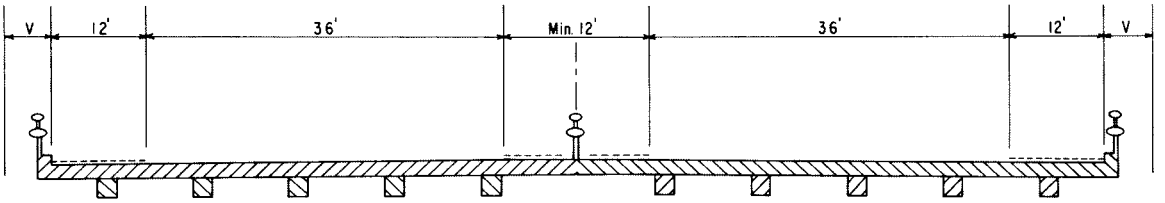


*U – 6 EXISTING CROSS SECTION – NO FRONTAGE ROADS

4 Lanes, Min. 200' R.O.W.
*NOT RECOMMENDED FOR FUTURE PROJECTS

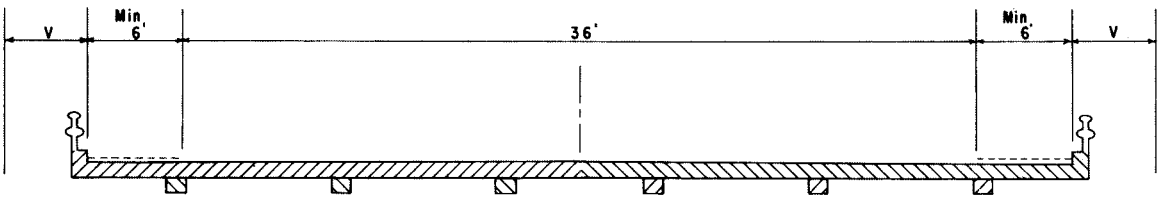
TYPICAL SECTIONS - EXPRESSWAYS FIGURE 9 - 14

URBAN CROSS SECTIONS



U – 7 ELEVATED WITH EMERGENCY SHOULDERS

6 Lanes, Min. 150' R.O.W.

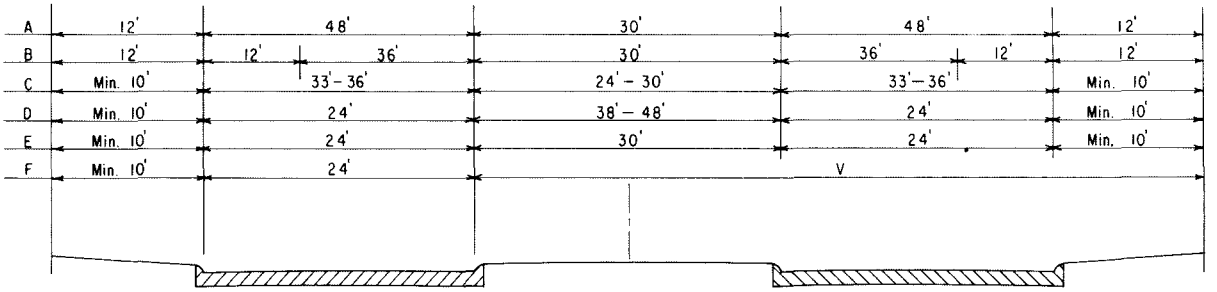


U-8 ONE WAY ELEVATED

3 Lanes, Min. 70' R.O.W.

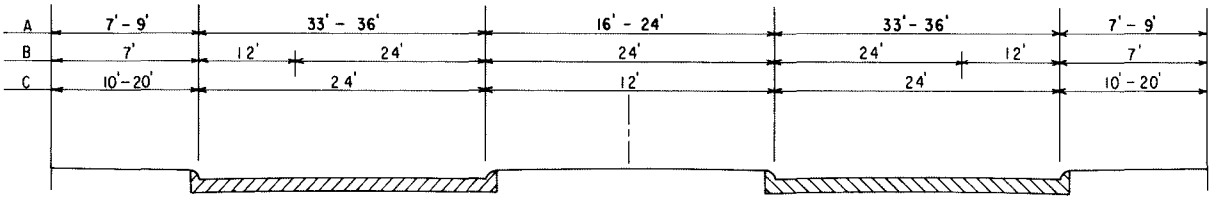
TYPICAL SECTIONS - ELEVATED ROADWAYS FIGURE 9-15

URBAN CROSS SECTIONS



U-10 DESIRABLE CROSS SECTIONS

A: 8 Lanes, 150' R.O.W.
B: 6 Lanes + Parking, 150' R.O.W.
C: 6 Lanes, 120' R.O.W. (Acceptable Min., 110' R.O.W.)
D: 4 Lanes, 120' R.O.W. (Acceptable Min., 110' R.O.W.) – Future Widening to 6 Lanes
E: 4 Lanes, 120' R.O.W. (Acceptable Min., 100' R.O.W.)
F: 2 Lanes, 120' R.O.W. (Acceptable Min., 100' R.O.W.) – Future Widening to 4 Lanes

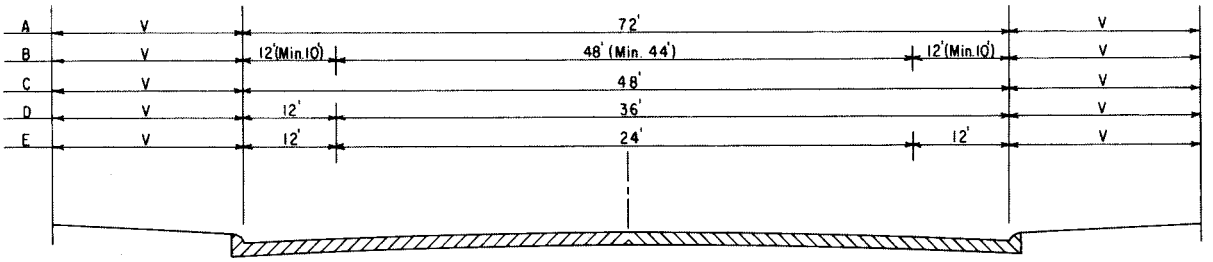


*U-11 EXISTING CROSS SECTIONS

A: 6 Lanes, 100'-120' R.O.W.
B: 4 Lanes + Parking, 110' R.O.W.
C: 4 Lanes, 80'-100' R.O.W.
*NOT RECOMMENDED FOR FUTURE PROJECTS

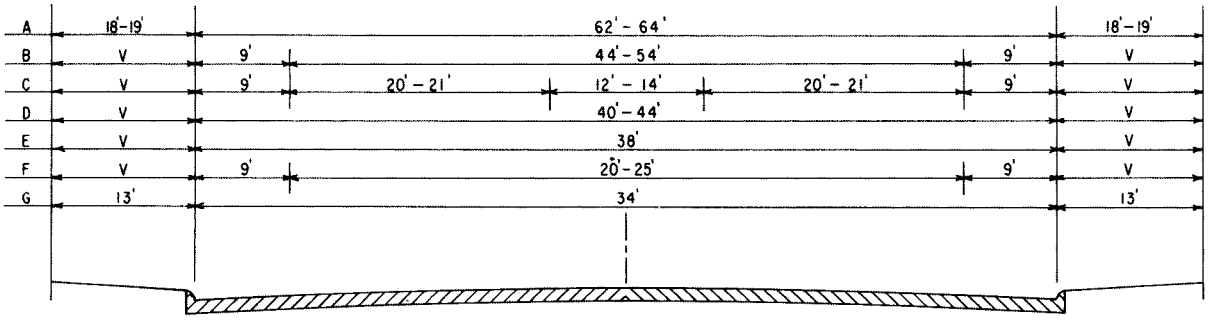
TYPICAL SECTIONS - DIVIDED MAJOR ARTERIALS FIGURE 9-16

URBAN CROSS SECTIONS



U-12 DESIRABLE CROSS SECTIONS

A: 6 Lanes, Min. 100' R.O.W.
B: 4 Lanes + Parking, 100' R.O.W. (Acceptable Min., 80' R.O.W.)
C: 4 Lanes, 80' R.O.W. (Acceptable Min., 70' R.O.W.)
D: 3 Lanes + Parking One Side, 80' R.O.W. (Acceptable Min., 70' R.O.W.), One Way Only
E: 2 Lanes + Parking, 80' R.O.W. (Acceptable Min., 70' R.O.W.)

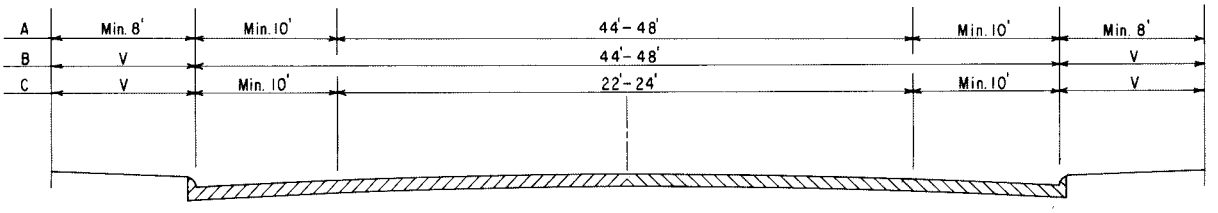


* U-13 EXISTING CROSS SECTIONS

A: 6 Lanes, 100' R.O.W.
B: 4 Lanes + Parking, Min. 100' R.O.W.
C: 4 Lanes + Parking + Continuous Left Turn Lane, Min. 100' R.O.W.
D: 4 Lanes, 60'-100' R.O.W.
E: 3 Lanes, 70' R.O.W., One Way Only
F: 2 Lanes + Parking, 60'-100' R.O.W.
G: 2 Lanes, 60' R.O.W.
* NOT RECOMMENDED FOR FUTURE PROJECTS

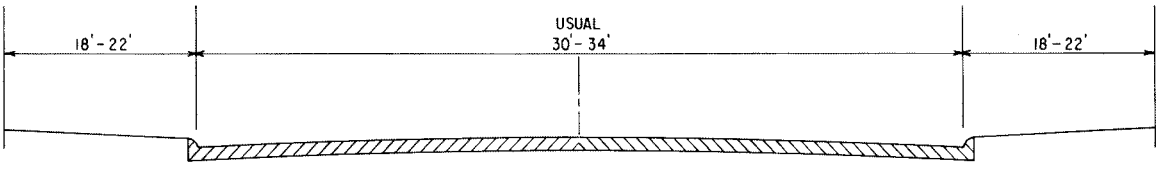
TYPICAL SECTIONS - UNDIVIDED MAJOR ARTERIALS FIGURE 9-17

URBAN CROSS SECTIONS



U – 20 DESIRABLE CROSS SECTIONS

A: 4 Lanes + Parking, Min. 80' R.O.W.
B: 4 Lanes, Min. 70' R.O.W.
C: 2 Lanes + Parking, Min. 70' R.O.W.



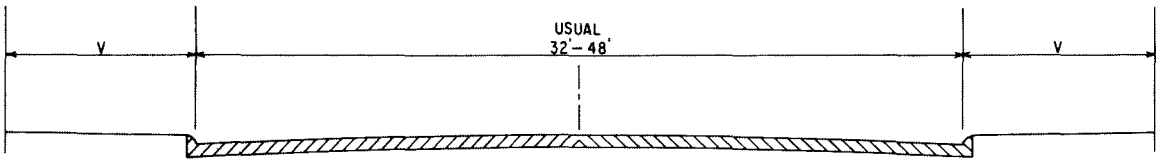
* U – 21 EXISTING CROSS SECTIONS

2 Lanes, 70' – 75' R.O.W.

* NOT RECOMMENDED FOR FUTURE PROJECTS

TYPICAL SECTIONS - COLLECTORS FIGURE 9-18

URBAN CROSS SECTIONS



*U-30 EXISTISTING CROSS SECTIONS

2 Lanes + Parking Usual 50'-80' R.O.W.

* NO RECOMMENDATIONS IN THIS REPORT FOR LOCAL STREETS. THIS TYPICAL SECTION IS SHOWN IN ORDER TO ESTABLISH A COMPLETE LISTING OF ALL SECTIONS IN THE STUDY AREA.

TYPICAL SECTION - LOCAL STREETS FIGURE 9 - 19

TABLE 9-2

ESTIMATED COST OF RECOMMENDED STREET IMPROVEMENT PROGRAM

PROJECT DESCRIPTION	C[1]	1966-1970	1971-1975	1976-1980	1981-1985	SUM 1966-85	AFTER '85[2]	TOTAL
Grand Parkway (FM 3002)								
Brazoria Co. Line-SH 146 Fwy.	E*	1,938,000	1,066,000	3,104,000	2,505,000	8,613,000	3,800,000	12,413,000
Gulf Freeway (IH 45)								
59th St. to 65th St.	E	1,175,000	-	-	-	1,175,000	-	1,175,000
T.C.T. RR to Harris Co. Line	E	14,478,000	4,670,000	-	-	19,148,000	4,000,000	23,148,000
Palmer Highway (FM 1764)								
SH 146 to IH 45	E	3,597,000	1,380,000	1,520,000	-	6,497,000	1,492,000	7,989,000
Seawall Blvd. Expwy. (FM 3005)								
61st St. to West Bay Fwy.	E*	575,000	500,000	-	-	1,075,000	2,830,000	3,905,000
SH 3/SH 146 Expressway								
IH 45 to SH 146 Expwy.	E	-	-	550,000	-	550,000	-	550,000
SH 146 Expressway								
SH 3 to FM 1764	E	-	1,000,000	1,470,000	-	2,470,000	-	2,470,000
SH 146 Freeway								
FM 1764 to Harris Co. Line	E	2,120,000	1,140,000	15,240,000	16,550,000	35,050,000	-	35,050,000
The Strand								
26th St. to IH 45	E	1,090,000	2,520,000	3,470,000	-	7,080,000	-	7,080,000
West Bay Freeway								
Bayou Rd. to Brazoria Co. Line	E	650,000	1,000,000	5,620,000	2,400,000	9,670,000	-	9,670,000
FM 3005 to Bayou Rd.	E*	600,000	12,500,000	-	-	13,100,000	15,100,000	28,200,000
Airport Road								
Jones Dr. to Cloud Rd.	A	139,000	-	83,000	583,000	805,000	-	805,000
Algoa-Friendswood Road								
Brazoria Co. to Harris Co.	A	163,000	551,000	130,000	345,000	1,189,000	-	1,189,000
Ave. E (Post Office St.)-Alt. Ave.D								
2nd St. to 26th St.	A	-	50,000	-	-	50,000	230,000	280,000
43rd St. to 53rd St.	A	-	-	-	105,000	105,000	-	105,000
Ave. F (Church St.)								
2nd St. to 26th St.	A	-	50,000	-	-	50,000	230,000	280,000
Ave. O (Alternate Ave. Q)								
Seawall Blvd. to 53rd St.	A	20,000	-	-	412,000	432,000	-	432,000
Ave. P								
Seawall Blvd. to 53rd St.	A	20,000	-	-	375,000	395,000	-	395,000
Ave. R½								
Seawall Blvd. to Saladia	A	45,000	-	315,000	-	360,000	-	360,000
Ave. S								
Seawall Blvd. to Saladia	A	20,000	-	285,000	-	305,000	-	305,000
Saladia to 61st St.	A	159,000	-	68,000	-	227,000	-	227,000
Bay St.								
Texas Ave. to Dollar Bay Blvd.	A	-	-	9,000	5,000	14,000	190,000	204,000
Dollar Bay to Pan-American	A	-	-	-	105,000	105,000	550,000	655,000
Bayou Road								
West Bay Fwy. to FM 1765	A	235,000	892,000	-	200,000	1,327,000	340,000	1,667,000
Beaumont St.								
IH 45 to FM 518	A	183,000	472,000	390,000	-	1,045,000	131,000	1,176,000
Bishop-Cemetery Road								
Brazoria Co. Line to IH 45	A	288,000	760,000	202,000	200,000	1,450,000	83,000	1,533,000
Blackhawk								
Brazoria Co. to Harris Co.	A	124,000	-	522,000	713,000	1,359,000	242,000	1,601,000
Harris Co. to Harris Co.	A	84,000	-	-	244,000	328,000	-	328,000
Bolivar Bridge								
Seawall Blvd. to SH 87	A	300,000	11,000,000	19,000,000	-	30,300,000	-	30,300,000
Briarmeadow Ave.								
Brazoria Co. to Harris Co.	A	144,000	-	218,000	225,000	587,000	181,000	768,000
Broadway Blvd.								
University Blvd. to 59th St.	A	180,000	-	-	120,000	300,000	-	300,000
Cedar Drive								
Vauthier Rd. to FM 1765	A	77,000	208,000	-	-	285,000	-	285,000
Cloud Road								
West Bay Fwy. to Airport Rd.	A	140,000	-	525,000	-	665,000	525,000	1,190,000
Dixie-Friendswood Road								
Brazoria Co. to Brazoria Co.	A	-	310,000	-	-	310,000	775,000	1,085,000
Dollar Bay Blvd.								
Bay St. to Pan-American	A	255,000	-	-	637,000	892,000	-	892,000
East Loop								
Ferry Rd. to Seawall Blvd.	A	72,000	-	585,000	-	657,000	-	657,000
El Camino Real								
Harris Co. Line to FM 517	A	353,000	1,500,000	415,000	312,000	2,580,000	-	2,580,000
FM 517								
Brazoria Co. Line to SH 3	A	114,000	363,000	-	450,000	927,000	-	927,000
SH 3 to El Camino Real	A	50,000	90,000	10,000	-	150,000	-	150,000
El Camino Real-W. of SH 146 Fwy.	A	30,000	300,000	-	-	330,000	600,000	930,000
FM 517 (San Leon Loop)								
W. of SH 146 Fwy. to SH 146	A	-	63,000	-	1,547,000	1,610,000	-	1,610,000
FM 518								
Brazoria Co. Line to FM 528	A	376,000	462,000	-	208,000	1,046,000	-	1,046,000
FM 528 to SH 3	A	234,000	290,000	936,000	-	1,460,000	-	1,460,000
SH 3 to FM 2094	A	139,000	110,000	-	-	249,000	-	249,000
FM 2094 to SH 146	A	257,000	45,000	656,000	-	958,000	-	958,000
FM 519								
FM 2004 to Loop 197	A	127,000	146,000	1,229,000	400,000	1,902,000	-	1,902,000

1) Classification(E = Expressway, A = Major Arterial, C = Collector)
2) Postponed Projects
* Will Not Reach Expressway Status Until After 1985

(TABLE 9-2 Continued)

PROJECT DESCRIPTION	C[1]	1966-1970	1971-1975	1976-1980	1981-1985	SUM 1966- 85	AFTER '85[2]	TOTAL
FM 528								
Brazoria Co. to Harris Co.	A	52,000	-	-	456,000	508,000	740,000	1,248,000
FM 646								
FM 2004 to FM 1764	A	85,000	75,000	518,000	-	678,000	464,000	1,142,000
FM 517 to FM 3002	A	56,000	-	-	240,000	296,000	-	296,000
FM 1764 Ext.								
Brazoria Co. Line to SH 6	A	76,000	-	-	100,000	176,000	710,000	886,000
FM 1765								
IH 45 to 6th St. (Loop 197)	A	55,000	1,074,000	-	570,000	1,699,000	-	1,699,000
FM 1765 Ext.								
Algoa-Friendswood Rd. to FM 2004	A	208,000	-	542,000	754,000	1,504,000	-	1,504,000
FM 2004								
Brazoria Co. Line to FM 1266	A	540,000	520,000	-	140,000	1,200,000	2,813,000	4,013,000
FM 2094								
FM 518 to SH 146	A	127,000	-	-	363,000	490,000	560,000	1,050,000
FM 2351								
Brazoria Co. to Harris Co.	A	202,000	-	-	200,000	402,000	-	402,000
FM 3002 (Fm 517)								
Oasis Rd. to SH 146	A	26,000	100,000	100,000	-	226,000	-	226,000
FM 3005								
West Bay Fwy. to 13 Mile Rd.	A	561,000	363,000	-	-	924,000	-	924,000
4th St.								
Seawall Blvd. to The Strand	A	250,000	-	-	-	250,000	-	250,000
14th St. (Galveston)								
Seawall Blvd. to The Strand	A	-	10,000	-	300,000	310,000	-	310,000
14th St. (Texas City)								
Loop 197 S. to Dollar Bay Blvd.	A	108,000	181,000	591,000	-	880,000	100,000	980,000
43rd St.								
Seawall Blvd. to Ave. E	A	-	-	-	15,000	15,000	-	15,000
44th St. (FM 517)								
Timber Dr. to El Camino Real	A	70,000	-	240,000	-	310,000	-	310,000
51st St.								
Seawall Blvd. to Pelican Br.	A	13,000	81,000	3,000	-	97,000	593,000	690,000
53rd St.								
Broadway Blvd. to Ave. E	A	-	-	-	3,000	3,000	-	3,000
Friendswood-Link Road								
Brazoria Co. to Harris Co.	A	-	-	-	285,000	285,000	665,000	950,000
Gordy-Bayshore Drive								
FM 517 to SH 146	A	-	-	-	208,000	208,000	-	208,000
Hallowy Road (Faa Road)								
FM 1765 to FM 518	A	-	-	-	456,000	456,000	502,000	958,000
Hughes Road								
Jay Road to SH 3	A	90,000	319,000	901,000	-	1,310,000	450,000	1,760,000
Humble Road								
SH 3 to SH 146	A	20,000	35,000	-	369,000	424,000	-	424,000
Jay Road								
Brazoria Co. Line to Jones Bay	A	149,000	-	590,000	792,000	1,531,000	1,040,000	2,571,000
Jones Drive								
61st St. to Seawall Blvd.	A	276,000	466,000	69,000	-	811,000	-	811,000
Loop 197								
SH 3 to SH 146 at 25th Ave. N	A	584,000	335,000	1,045,000	-	1,964,000	-	1,964,000
McElmoyle								
Bishop-Cemetery Rd. to McKay Rd.	A	-	-	-	814,000	814,000	427,000	1,241,000
McKay Road (Palmer Hwy. Ext.)								
Brazoria Co. Line to IH 45	A	-	200,000	1,200,000	1,000,000	2,400,000	-	2,400,000
Moore Road								
FM 528 to SH 146	A	-	197,000	-	1,775,000	1,972,000	495,000	2,467,000
19th St.								
Seawall Blvd. to The Strand	A	-	345,000	-	-	345,000	-	345,000
99th St. (6 Mile Road)								
Seawall Blvd. to Cloud Rd.	A	120,000	36,000	175,000	125,000	456,000	-	456,000
Oasis Road								
West Bay Fwy. to Sunset Dr.	A	210,000	905,000	345,000	298,000	1,758,000	1,024,000	2,782,000
Offats Bayou Bridge								
IH 45 to Airport Rd.	A	-	-	-	1,500,000	1,500,000	-	1,500,000
Pan-American								
Brazoria Co. Line to SH 146	A	126,000	660,000	-	154,000	940,000	1,667,000	2,607,000
Pan-American/Humble Loop								
SH 146 to SH 146	A	-	-	-	672,000	672,000	-	672,000
Park Ave. Ext.								
SH 146 Fwy. to SH 146	A	-	-	-	245,000	245,000	-	245,000
Pelican Bridge								
The Strand to Pelican Loop	A	-	-	-	-	-	6,000,000	6,000,000
Pelican Loop								
North, South and East Loop	A	195,000	352,000	-	627,000	1,174,000	160,000	1,334,000
Pelican Tunnel								
Ferry Rd. to Pelican Loop	A	-	-	-	12,500,000	12,500,000	12,000,000	24,500,000
Pine Road								
FM 1765 to Humble Rd.	A	58,000	163,000	-	553,000	774,000	-	774,000
San Louis Pass Road								
13 Mile Rd. to San Louis Pass	A	200,000	-	1,230,000	1,278,000	2,708,000	-	2,708,000
Seawall Blvd.								
Boddecker Dr. to 61st St.	A	23,000	-	93,000	-	116,000	-	116,000

1) Classification (E = Expressway, A = Major Arterial, C = Collector)
2) Postponed Projects

(TABLE 9-2 Continued)

PROJECT DESCRIPTION	C[1]	1966-1970	1971-1975	1976-1980	1981-1985	SUM 1966-85	AFTER '85[2]	TOTAL
2nd St. (FM 518)								
SH 3 to FM 2094	A	114,000	510,000	-	-	624,000	-	624,000
61st St. (Spur 342)								
Seawall Blvd. to IH 45	A	725,000	-	-	-	725,000	-	725,000
IH 45 to The Strand	A	98,000	530,000	-	-	628,000	-	628,000
SH 3								
SH 146 to Harris Co. Line	A	2,697,000	2,152,000	720,000	-	5,569,000	-	5,569,000
SH 6								
IH 45 to FM 2004	A	-	-	-	-	-	1,790,000	1,790,000
SH 87								
Bolivar Br. to Chambers Co.	A	-	-	-	5,031,000	5,031,000	-	5,031,000
SH 124								
SH 87 to Chambers Co. Line	A	170,000	-	1,859,000	700,000	2,729,000	-	2,729,000
SH 146								
Dickinson Bayou to Harris Co.	A	646,000	950,000	-	-	1,596,000	-	1,596,000
Stewart Road								
Jones Dr. at 69th to 6 Mile Rd.	A	-	-	780,000	-	780,000	-	780,000
Strand(Ave. B)-Part of The Strand								
12th St. at Ave. A to 26th St.	A	-	15,000	-	-	15,000	-	15,000
Sunset Blvd.								
Oasis Rd. to Jones Bay	A	-	-	120,000	-	120,000	120,000	240,000
Sunset Drive								
SH 3 to SH 146	A	197,000	-	-	642,000	839,000	-	839,000
Brazoria Co. Line to FM 646	A	-	-	-	322,000	322,000	805,000	1,127,000
Texas Ave.								
Bay St. to 3rd St.	A	-	-	-	-	-	100,000	100,000
Texas City Causeway (FM 519 Ext.)								
Loop 197 to Pelican Loop	A	-	-	-	14,200,000	14,200,000	-	14,200,000
The Strand (Ave. A)								
Seawall Blvd. to 26th St.	A	340,000	400,000	180,000	158,000	1,078,000	-	1,078,000
21st St. (Moody)								
Broadway Blvd. to The Strand	A	-	10,000	-	-	10,000	-	10,000
22nd St.(Kemphner)-Alt. 23rd St.								
Broadway Blvd. to The Strand	A	-	10,000	-	-	10,000	-	10,000
24th St.								
Broadway Blvd. to The Strand	A	-	10,000	-	-	10,000	-	10,000
25th Ave. N								
Bay St. to 9th St. (Loop 197)	A	-	27,000	-	225,000	252,000	-	252,000
IH 45 to SH 146	A	-	-	-	754,000	754,000	-	754,000
25th St. (Rosenberg)								
Seawall Blvd. to Broadway Blvd.	A	-	-	-	13,000	13,000	-	13,000
26th St.								
Broadway Blvd. to The Strand	A	20,000	25,000	-	-	45,000	-	45,000
29th St. (Galveston)								
Seawall Blvd. to The Strand	A	-	-	15,000	-	15,000	-	15,000
29th St. (San Leon)								
FM 517 to FM 517	A	51,000	-	106,000	-	157,000	-	157,000
29th St. (Texas City)								
FM 1765 to Dollar Bay Blvd.	A	162,000	102,000	399,000	-	663,000	85,000	748,000
33rd St.								
Seawall Blvd. to The Strand	A	-	-	10,000	-	10,000	-	10,000
37th St.								
Seawall Blvd. to The Strand	A	385,000	102,000	-	-	487,000	-	487,000
University Blvd. (6th St.)								
Broadway Blvd. to Ave. D	A	150,000	-	-	-	150,000	-	150,000
Westfield Lane								
FM 528 to Brazoria Co. Line	A	90,000	-	394,000	-	464,000	-	464,000
Volney								
West Bay Fwy. to IH 45	A	-	-	-	946,000	946,000	-	946,000
Anders Lane								
FM 3002 to FM 2094	C	-	-	-	145,000	145,000	443,000	588,000
Ave. B								
McElmoyle to Fay Rd.	C	-	-	-	63,000	63,000	-	63,000
Austin St.								
FM 518 to Louisiana Ave.	C	-	57,000	-	487,000	544,000	-	544,000
Belmont St.								
Sunset Dr. to FM 3002	C	-	-	110,000	-	110,000	-	110,000
Carver Ave.								
IH 45 to 5th Ave. N	C	99,000	-	-	487,000	586,000	-	586,000
Cherry Ave. (16th Ave. N)								
SH 3 to Bay St.	C	247,000	-	-	459,000	706,000	235,000	941,000
FM 1266								
FM 2004 to FM 518	C	-	-	-	54,000	54,000	-	54,000
1st St.								
Bayou Rd. to FM 1765	C	-	97,000	-	-	97,000	-	97,000
5th Ave. N								
Johnny Palmer Rd. to Bay St.	C	-	-	-	1,763,000	1,763,000	-	1,763,000
5th Ave. S								
FM 1765 to 14th St. at 4th Ave.	C	60,000	-	-	70,000	130,000	-	130,000
Heards Lane								
61st St. to Airport Rd.	C	51,000	190,000	172,000	-	413,000	-	413,000
Johnny Palmer/Delaney Road								
SH 6 to SH 3	C	203,000	361,000	-	-	564,000	-	564,000

1) Classification (E = Expressway, A = Major Arterial, C = Collector)
2) Postponed Projects

(TABLE 9-2 Continued)

PROJECT DESCRIPTION	C[1]	1966-1970	1971-1975	1976-1980	1981-1985	SUM 1966-85	AFTER '85[2]	TOTAL
Lake Road								
SH 6 to FM 1765	C	111,000	-	-	691,000	802,000	-	802,000
Louisiana Ave.								
Moore Rd. to FM 2094	C	104,000	-	-	429,000	533,000	-	533,000
Magnolia/Ross Ave.								
IH 45 to FM 1765	C	-	80,000	-	285,000	365,000	247,000	612,000
Main St. (FM 519)								
Volney to SH 6	C	-	-	10,000	-	10,000	-	10,000
9th St.								
FM 1765 to Loop 197 N	C	-	43,000	-	20,000	63,000	-	63,000
Oak St.								
FM 519 to FM 1764	C	-	-	-	91,000	91,000	496,000	587,000
Pine St.								
FM 1764 to Blackhawk	C	51,000	-	340,000	-	391,000	-	391,000
6th St.								
19th Ave. N to Dollar Bay Blvd.	C	-	54,000	-	256,000	310,000	-	310,000
7th St.								
SH 3 to El Camino Real	C	-	287,000	-	-	287,000	-	287,000
Stewart Road								
6 Mile Rd. to 13 Mile Rd.	C	100,000	128,000	-	-	228,000	-	228,000
Sunset Drive								
FM 646 to SH 3	C	50,000	-	250,000	-	300,000	66,000	366,000
13 Mile Road								
San Louis Pass Rd. to Stewart	C	-	20,000	-	-	20,000	-	20,000
21st St.								
5th Ave. S to Dollar Bay Blvd.	C	48,000	225,000	-	20,000	293,000	10,000	303,000
24th St.								
FM 517 to FM 517	C	-	-	-	-	-	50,000	50,000
25th Ave. N								
Bishop-Cemetery Rd. to IH 45	C	-	-	-	-	-	619,000	619,000
34th St.								
FM 1764 to Dollar Bay Blvd.	C	-	-	-	357,000	357,000	-	357,000
Vauthier Road (Fairwood Road)								
SH 6 to FM 1764	C	-	74,000	150,000	-	224,000	606,000	830,000
Westward Ave.								
IH 45 to FM 1765	C	-	-	-	-	-	210,000	210,000
North of FM 2351								
Brazoria Co. Line to Blackhawk	C	-	-	-	325,000	325,000	-	325,000
SUBTOTAL EXPRESSWAYS	**E**	**26,223,000**	**25,776,000**	**30,974,000**	**21,455,000**	**104,428,000**	**27,222,000**	**131,650,000**
SUBTOTAL MAJOR ARTERIALS	**A**	**14,653,000**	**28,990,000**	**37,774,000**	**56,911,000**	**138,247,000**	**37,387,000**	**175,634,000**
SUBTOTAL COLLECTORS	**C**	**1,124,000**	**1,616,000**	**1,032,000**	**6,002,000**	**9,774,000**	**2,982,000**	**12,756,000**
GRAND TOTAL		**42,000,000**	**56,382,000**	**69,699,000**	**84,368,000**	**252,449,000**	**67,591,000**	**320,040,000**

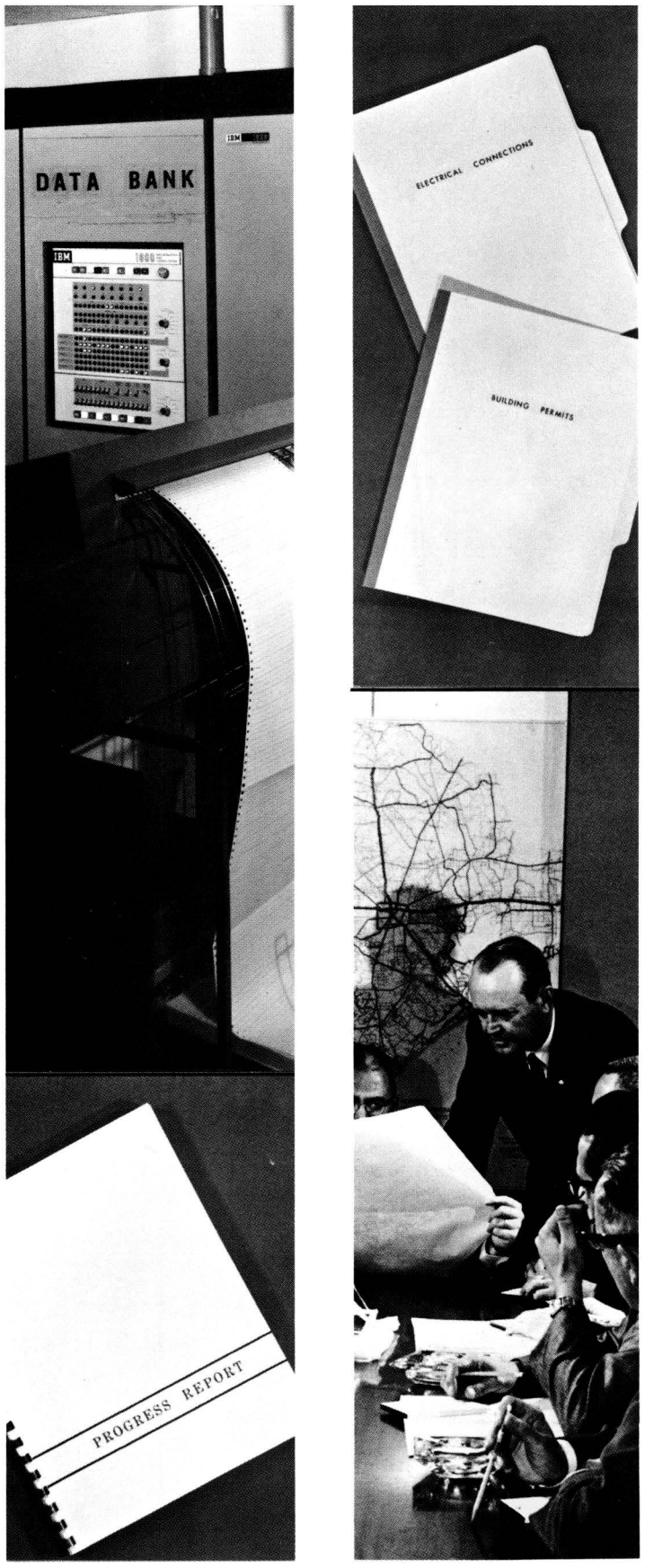
1) Classification (E = Expressway, A = Major Arterial, C = Collector)
2) Postponed Projects

TABLE 9-3

EXPRESSWAY AND MAJOR THOROUGHFARE SYSTEM MILEAGE BY CLASSIFICATION, NUMBER OF LANES*, AND YEARS

CLASSIFICATION		NO. OF LANES	MILEAGE BY THE YEAR 1964	1970	1975	1980	1985	AFTER '85[1]
EXPRESSWAYS		4L	9.70	6.65	1.65	6.05	20.55	28.60
		6L	4.40	9.10	24.10	32.35	45.35	63.20
		TOTAL	24.10	25.75	25.75	38.40	65.90	91.80
MAJOR ARTERIALS	Divided Roadways	4L	3.30	10.80	51.85	105.95	159.15	198.80
		6L	6.65	9.15	15.70	28.00	25.75	36.00
		8L	-	-	-	-	3.90	3.90
		TOTAL	9.95	19.95	87.55	133.95	188.80	238.70
	Undivided Roadways	2L	201.30	221.75	210.50	221.25	211.00	196.55
		3L[2]	-	-	7.05	12.60	17.85	21.25
		4L	34.15	34.00	50.75	52.45	65.45	55.55
		6L	-	-	-	5.25	7.35	7.35
		TOTAL	235.45	255.75	268.30	291.55	301.65	280.70
	TOTAL MAJOR ARTERIALS		245.40	275.70	345.85	425.50	490.45	519.40
COLLECTORS		2L	37.80	33.60	44.70	41.35	64.90	78.50
		4L	-	-	0.65	0.65	3.80	4.80
		TOTAL	37.80	33.60	45.35	42.00	68.70	83.30
GRAND TOTAL			307.30	335.05	406.95	505.90	625.05	694.50

* Parking Lanes Not Included
1) Recommended System, Approximately 1990
2) One-Way Streets Only



Chapter 10

Recommended Program For Continuation

Recommended Program For Continuation

The various elements of the comprehensive planning process have been discussed in the preceding chapters of this report. These elements are essential factors in the development of an adequate transportation system for Galveston County, and are the bases of the initial phase of the transportation study. However, in order for transportation planning to be effective, the planning must be a continuous process, which is one of the provisions of federal aid to transportation stipulated by the Federal Aid Highway Act of 1962.

The first step in providing for the continuing phase of the Galveston County Urban Transportation Study is that of reaching a formal agreement between the cities, the county, and the state. Similar to the agreement formalizing the initial phase of the study, the agreement for the continuing phase or for an expanded regional study must provide for the financial and operational responsibilities of the various cooperating and participating agencies.

Items analyzed in the initial phase should continue to provide the basic data for the continuing phase and should be kept current or updated as necessary. Forecasts should be reevaluated at least every five years, and new forecasts made for the next five and twenty years.

Guidance for the continuing phase of the transportation study should be furnished by a Coordinating Committee and other Committees

composed of the same or similar memberships as the ones now serving for the initial phase of the study, or as appropriate if the study is expanded.

The continuing phase of the planning process is the key to the ultimate realization of the recommended plan. Without continual review and updating required to keep the plan current with existing conditions, the plan will become just another report. To remain useful, the plan must be implemented with a degree of flexibility which will allow for revision and modification as the constantly changing process of urban development occurs.

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