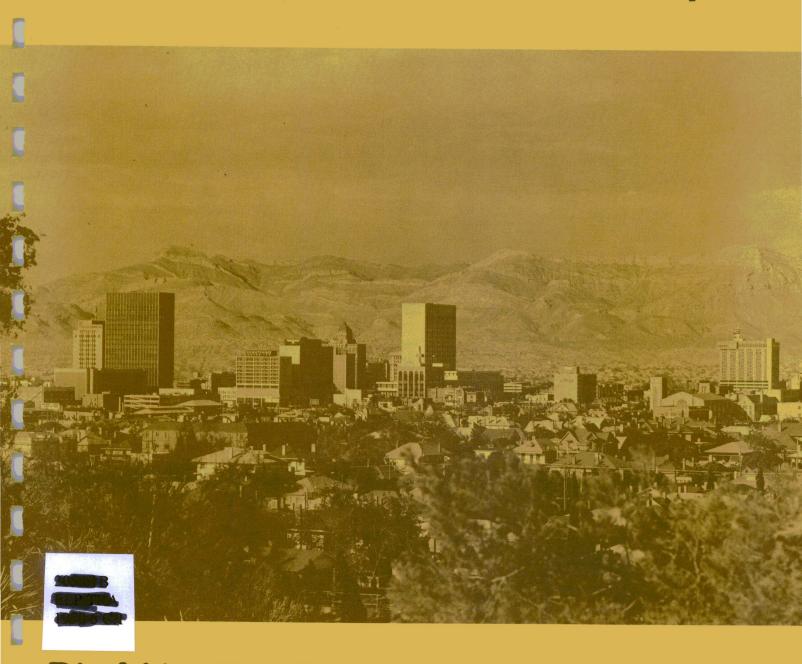
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Transportation Study



PLAN RE-EVALUATION 1970 Part 1 - Basic Elements

Transportation Study PLAN RE-EVALUATION Part 1 - Basic Elements Volume 6 1970

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Summary

This study is essentially a revision of the El Paso Transportation Study, Basic Elements and Plan, 1963-1985, based on the most current data available. The target date has been extended from 1985 to 1990.

The objective of the Study is to develop an integrated plan, embracing all pertinent transportation modes, for progressively improving the existing facilities and for making additions to the system on a timely basis so as to provide economically the facilities required to accommodate the growing traffic volumes efficiently and safely.

The analysis and forecast of the basic determinants of travel; population, economic activity and land use; indicate unabated growth in vehicular traffic volumes during the forecast period, 1970-1990. The economic study indicates that with reasonably favorable developments during the forecast period a population of approximately 500,000 can be supported in the study area in the target year 1990. This population correlates to a reasonable degree with the population study which indicates that the study area population will increase from 359,261 in 1970 to 520,000 in 1990. The population study also reveals that the population of El Paso's "Twin City" across the border, Juarez, Mexico, is expected to increase from 436,054 in 1970 to between 650,000 and 700,000 in 1990. The rapid population growth of the Juarez area coupled with the close cultural and economic ties between the two cities and the travel between the two areas will tend to increase the existing disproportionate share of travel which takes place within the study area.

The land use study indicates that desirable sites exist for commercial and industrial development in the southeast, northwest and the lower valley areas (see Figure II-2). These areas are being aggressively developed and desirable locations exist in these areas for single family and multiple unit housing and for trailer parks. An uptrend in the percentage of multiple housing units being constructed in all areas has been noted.

The expansion of the city in the three major but widely separated areas will tend to increase trip lengths and total travel on the principal arterials.

An examination of the 1970 and the estimated 1990 corridor vehicular traffic indicates that the average daily traffic through the four principal corridors will increase from 424,740 vehicles to more than double that figure. The average daily traffic through the Central City Corridor is expected to increase from 160,950 in 1970 to approximately double that figure in 1990. Provision of facilties required to handle the increase in traffic through this corridor represents one of the most challenging problems facing the city.

Improvement of bus transit is needed to support economical and desirable urban development and to effect more efficient use of facilities and a corresponding reduction of air pollution.

Based on past experience, it appears that between \$214,000,000 and \$440,000,000 should be available in resources for development of a plan.

Geographic Location

El Paso del Norte, the Pass of the North, was discovered by Cabeza de Vaca, a Spanish Explorer, in 1536, and became a focal point in the travel of the Spaniards in their colonization of New Mexico. By 1610 the pass that became El Paso was a regular stop on El Camino Real, The King's Highway, from Chihuahua to Santa Fe.

El Paso is now the fifth largest city in the State of Texas, and is the largest city on the southern border of the United States. It is the county seat of El Paso County, which is bounded on the north and west by the State of New Mexico, and on the south by Mexico. Ciudad Juarez, the fourth largest city in Mexico and the largest Mexican City on the Border, and El Paso, are international "twin cities". El Paso is a major gateway to Mexico and is the major trade and population center within a 200 mile radius. It is noted as one of the top military centers in the United States and has the largest copper refinery and custom smelter in the world, two major oil refineries, and a rapidly growing apparel industry.

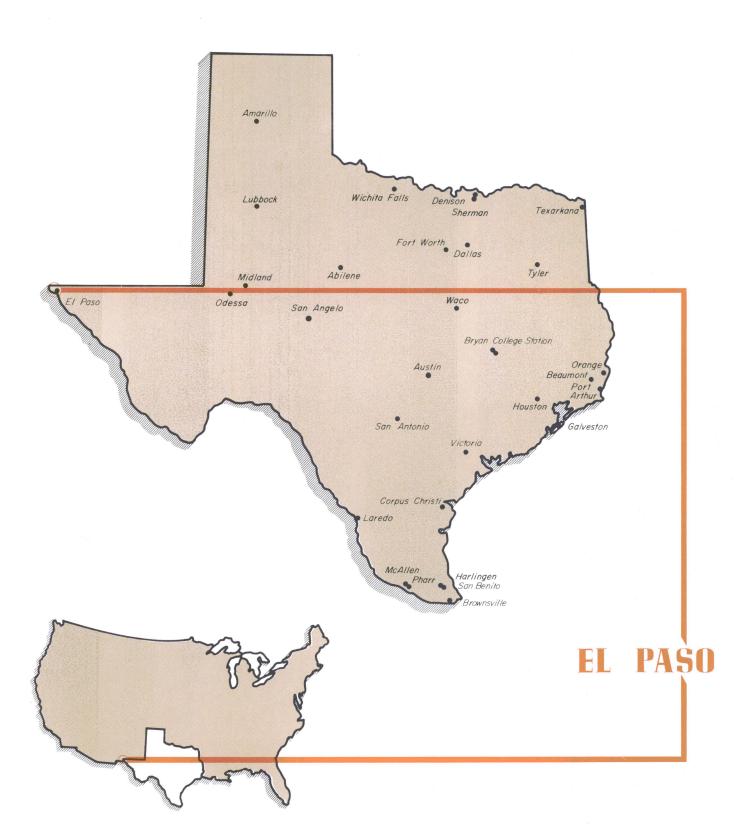
The most distinguishing characteristic of the geography of the city itself is the presence of the Franklin Mountains jutting down from the north and creating the narrow pass of the north between the Franklin Mountains and Sierra de Juarez (Juarez Mountains), through which the Rio Grande flows and through which east-west transportation routes must pass.

The geographic location of El Paso and the convergence of transportation routes has played and continues to play a dominant role in shaping the economy of the area.

The maps on the following pages illustrate:

- (1) The location of El Paso with respect to the State of Texas and the entire country, and
- (2) The regional setting of El Paso.

Geographical Location of



STUDY AREA & VICINITY



Introduction

The El Paso Metropolitan Area is a dynamic entity and the transportation planning process must be equally as dynamic. The plan for the future must reflect the continual changes taking place in the now of urban development if it is to provide timely, sound guidance for the development of transportation facilities. This means that the plan must be reappraised periodically. The depth and frequency of these reappraisals depend on the magnitude of the changes and the impact of these changes on transportation requirements.

Reappraisal is defined as the systematic sequence of activities directed at maintaining the planning process as a valid and effective metropolitan area program.

Three levels of reappraisal have been established to guide the planning effort.

- 1. Routine annual review to determine if changes are taking place in accordance with forecast.
- 2. Major review every five years to push the target year forward so that the planning process can produce twenty-year design data at all times and to update the priority program listing.
- 3. Plan reevaluation at least every ten years or when significant changes occur in technology, taxing powers, growth assumptions, or fiscal policy.

The Advisory Committee on May 7, 1971, after reviewing the 1970 Origin and Destination Survey, recommended that plan reevaluation be initiated by making use of basic data and trends presented in the preceding volumes of the El Paso Transportation Study which are still valid, thus limiting new studies to the areas in which significant changes have taken place. This would exceed Level 2 review and would accomplish the purpose of a Level 3 review.

Preceding volumes of the El Paso Transportation Study are:

Volume 1, Basic Elements and Plan, 1963-1985, published in 1969

Volume 2, Operations Plan, 1969, published in 1970

Volume 3, Progress Report, 1969, published in 1971

Volume 4, Traffic Operations Program to Increase Capacity and Safety (TOPICS) for El Paso, 1970, published in 1971

Volume 5, Origin and Destination Survey, 1970, published in May, 1971.

Basic data and trends established in these studies, which are still considered valid, have been drawn upon and not repeated in this report except in summary manner.

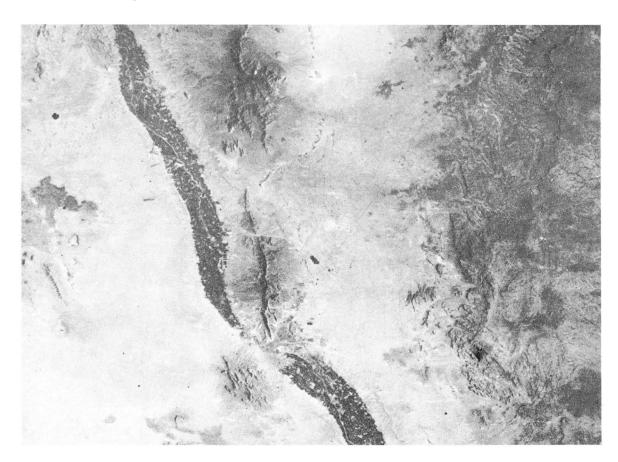
The purpose of this study is to reevaluate the Transportation Plan as established in Volume 1, El Paso Transportation Study, and revised in connection with Volume 3, and to push the target year forward five years. This has been done in the light of changes which have taken place and changes which can be predicted and the continually evolving transportation and land use planning technology. The "facts" have a way of changing

slightly over time. Likewise, planning techniques vary. Fortunately the planning process envisioned at the outset of the El Paso Transportation Study is flexible enough to accommodate these changes. The planning process which encompasses this study helps to see into the future and to anticipate transportation requirements. All modes of travel are being considered and will be reflected in the revised plan which will be published as Part II.

Transportation is closely related with population distribution, manufacturing, business and commerce. Thus transportation problems are related to all other problems in the urban area although the nature and closeness are not always well known. Transportation planning is, therefore, related to other planning and decision making of great importance to the community. A concerted effort has been made to coordinate this study with other planning efforts and to make use of various disciplines involved in the broad field of planning.

The Transportation Study Limits, Figure I, were extended in November, 1969, on recommendation of the Advisory Committee to include all of El Paso County. The old Study Area was expanded slightly to comprise the Intensive Study Area. This intensive study area covers the existing urbanized area plus the areas expected to become urbanized in the foreseeable future. This is the area on which this study focuses.

In order to present the basic data affecting transportation requirements while it is still current and at the same time allow more time for review and acceptance of the <u>Transportation Plan</u>, it was decided to publish the Plan Reevaluation in two parts. Part I presents Basic Elements and Part II presents the Recommended Transportation Plan and the Continuing Phase.





Chapter 1

ECONOMIC FACTORS



Economic Factors

PURPOSE OF THE STUDY

The purpose of re-evaluation of transportation plans is to detect and provide for changes from the conditions that were initially analyzed and forecasted. Reevaluation of the economic factors should produce an updating of the level of economic activity that is projected for the future.

The economic forecast provides a way to derive an independent estimate of future population. Such population forecast can be compared with a forecast based solely on demographic considerations to obtain the check of corroboration. Independent population forecast is a primary objective of this economic study.

Population forecast, economic forecast and land use forecast are interrelated and basic inputs for predicting the size and location of the travel demands of the future. Indirectly these forecasts help to determine the nature and extent of transportation facilities that will be needed in the future.



ACKNOWLEDGEMENTS

The analysis and forecast are based entirely on secondary source data, i.e., data which was not developed by the El Paso Transportation Study organization.

The population forecast made in this study employs a method described in publications of the U.S. Department of Commerce. $^{\rm l}$

An economic analysis of the El Paso Community was prepared with partial financing through a Community Renewal Program (CRP) grant from the Federal Department of Housing and Urban Development (HUD). The CRP analysis contains background information and provides an indication of the prospects for economic development under present conditions. In the CRP analysis future employment was derived from trend lines established by a "least square" fit to available data. The analysis which follows and the CRP analysis are in substantial agreement but at least two differences should be noted. The CRP views relative isolation and unskilled labor supply as reasons for the comparatively slower paced development of El Paso's economy vis-a-vis that of other metropolitan areas. The analysis which follows considers the dependence of the processing sectors on imported materials to be a more significant cause of the slower development. This analysis does not share the implicit though limited optimism of the CRP analysis about future developments. A satisfactory way to eliminate the need to import material factors of production cannot be foreseen. There is no great evidence of willingness or ability to diversify the comparatively narrow-based economy of El Paso.

The El Paso Chamber of Commerce compiled and reproduced a fact book to furnish the type of information that would be needed to reach a decision regarding location or expansion of industrial facilities to or within El Paso. This book contains the latest purely statistical data that is available. Data from the fact book was used to update information from other sources and to detect one-time events of economic significance, e.g., construction of a rod mill, construction of sulfur recovery facility.

The 1970 Statistical Abstract of the United States was the source of information about recent relationships which exist between government expenditures at the national level.⁴ This was also the source of trend data related to civilian employment and payrolls of the Federal government.

Several census publications were used to obtain information about population and its characteristics. Census publications were also the source of much information about business, manufacturers and government activity. Except for the data derived from the 1970 Census of Population, the census data was deficient in that it was not up-to-date. However, it was the most complete source of this type of information that was available.

The El Paso Economic Review, ⁶ a monthly publication of the Bureau of Business and Economic Research at The University of Texas at El Paso, was especially valuable in connection with two aspects of the economy. It appears that the Review was first to detect and analyze the recent out-migration of persons from El Paso's labor force. The Review also published an informative discussion of the impact of the "green-card holder", i.e., non-resident worker, for the economy. By virtue of its particular pertinence and its direct approach to its subjects the Review is one of the best sources of economic data available. Older issues of the Review contain statistics which are now outdated but they also suggest patterns and relationships which show a high degree of persistence.

The Bureau of Business and Economic Research at The University of Texas at El Paso has prepared a study, which is yet unpublished, of the 1967 economy of the region surrounding El Paso. This study derived a model which serves to describe the one-time relationships which existed between the various sectors of El Paso's economy in the study year. This model was both starting point and prototype for the inter-industry analysis contained herein. Dr. Edward Y. George of The University of Texas at El Paso was the Director of the study. Dr. Everett G. Dillman also of the University made important contributions to the Study and was particularly helpful in explaining the concept and techniques of inter-industry analysis to the writer. The analysis in hand

provides very little of the completeness and detail that is contained in the unpublished study. When this study becomes available it should be consulted by anyone wishing a fuller understanding of the intricacies of economic activity in the El Paso Region.

A Community Economic Analysis of the City of El Paso⁷ was prepared in 1966 to aid in the replanning made necessary by the Chamizal Treaty of 1963. Some of the data contained in that analysis is no longer timely but there is much to commend it to anyone seeking to understand the peculiarities of the economy of an "international" city. That analysis also contains data on an aspect of economy activity not covered herein, i.e., the area, space, and facility requirements of the economy. Land use forecast is a very important element in deriving transportation requirements. The cited analysis should be particularly helpful in deriving future land use.

Finally the subjectivity of this study results at least in part from ideas and attitudes derived from the news and analysis of the news provided throughout the years by many magazines and many papers. Such sources are those normally available to the layman. Except as noted above this analysis has not benefitted from the specialized journals of the economists' profession.

None of the sources identified here have responsibility for the findings or conclusions of the analysis which follows. The El Paso Transportation Study Group is responsible for this analysis and its use in planning transportation to meet the needs of the future.

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- 6. The El Paso Economic Review, The Bureau of Business and Economic Research, The School of Business Administration, The University of Texas at El Paso, Volume VIII Numbers 1-8. (The earlier volumes are also an excellent source of general information about economics as well as discussion of economic factors unique to El Paso.)
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 Prepared by Real Estate Research Corporation, Los Angeles, California, August 1966. Financially aided by grant under Urban Planning Assistance Program Authorized by Section 701 of the Housing Act of 1954, as amended.

METHO DO LOGY

The economic analysis and forecast which follow are based entirely on secondary source data. It was patently impossible to derive the requisite information from primary sources. It was both unnecessary and undesirable to ignore the many existent sources of pertinent facts and figures. The sources for the data used in this work are acknowledged in a separate section.

Initially it was intended to obtain the economic forecast as a system of trend line projections subjectively modified on the basis of "a feel for the problem". This method was hampered by the inadequacy of data to define valid trends. More importantly, as the data was studied, it appeared that the past was not a satisfactory model for the future in many aspects, e.g., devaluation of the dollar, the paradox of unemployment and inflation, massive military expenditures. These factors were problems not because they might be considered undesirable but because their continuation could lead to a state of indeterminable chaos. An extreme consequence of such continuation would be a collapse of the system under analysis.

In order to render the problem solvable it was necessary to assume limits for some of the parameters, such as, taxes, unemployment, and productivity. If the assumptions prove to be invalid, it will be comparatively easy to use new values to derive new forecasts.

Midway through the analysis it was discovered that an interindustry flow analysis had been prepared for the region of Texas which embrases El Paso. The City and County of El Paso so dominate this region that the analysis could be applied to the area of the El Paso Transportation Study with only minor changes. For example, the flow analysis treats a mining sector but the area of the Transportation Study has no significant mining. The relationships between sectors of the economy which were disclosed by the interindustry analysis were used as a basis for and a check of the projected relationships. A comprehensive discussion of the interindustry flow analysis is at Appendix A.

The methodology finally employed is a synthesis of several techniques. Supply and demand are inherently interdependent. For example, purchases by households depend on household income which depends on employment which depends on sales and the sales, in part, are the purchases by households. This type of interdependence required that the forecast of future activity be approached from the two sides simultaneously. Very simply the economic forecast was obtained through a "cut and try" balancing of supply and demand. The trial was a check for coherency and consistency with pertinent available data.

In the forecast, government and manufacturing were assigned the very evident dominance so observable in El Paso. Government activity in El Paso was made dependent on national government activity and national government activity was predicted on the basis of past activities as modified by a "sense of the future". This sense is a completely subjective outlook formed on the basis of the observations and judgments of a lay analyst. Essentially this outlook views government, particularly federal government, as an activity expanding itself at the expense of free enterprise. Government influence through monetary and fiscal measures is believed to preclude an unencumbered or free market operation.

Total government spending was viewed as a monotonically increasing activity which is used to justify increased tax revenues but which is probably sustained only with deficit spending. The pattern of government spending is expected to change in several respects. Identifiable military and foreign aid expenditures are expected to decline in partial deference to attitudes engendered in the public by Viet-Nam and other recent foreign policy. Government spending is expected to increase in the areas of environment protection and improvement. Government spending is expected to increase in the areas of earned and unearned social benefits. Federal spending is expected to undergo a comparative reduction as more public money is spent by states and cities. Governments are expected to increase their purchase of services from the processing sectors of the economy rather than increase the government's employment of civil servants.

Government spending trends were projected to 1990 and modified to be consistent with the outlook described above. Direct government payments to El Paso households were obtained by fitting together the national patterns of government spending with the El Paso patterns of incomes disclosed in the regional interindustry analysis. Total payments to households were obtained as a function of government payments on the basis of the pattern shown in the interindustry analysis. The total household income was proportioned to several sources to obtain the payments to households by the processing sectors of the economy. These payments formed the basis for an estimate of gross output. This gross output was compared with output previously derived from estimated changes in employment, productivity and inflation.

Household income was converted to estimated household purchases on the basis of estimates of disposable income and future propensity to spend. Household purchases were applied as demands upon the gross output of the processing sectors of the economy. To retain an analogy with the methods of the El Paso regional interindustry flow analysis, purchases of homes were treated separately as increases in private capital. The purchase of built-in household appliances was similarly treated. Capital increases within the processing sectors were treated as operating transactions between the processing sectors rather than as separate final demands.

Future government purchases were estimated on the basis of trends and patterns disclosed in available data. The forecasted purchases were adjusted to be consistent with previously described subjective judgments regarding future activities. Government spending was applied as demand against the processing sectors.

Inventory changes occur as adjustments to temporary imbalances between supply and demand. They are normal and necessary, e.g., raw materials with seasonal sources or stockpiling product against seasonal demand. However, these changes are only the tools of the economy, not its objectives. Too great reliance on inventory to balance economic activity would indicate a defective forecast. Consequently, the forecast makes no specific provision for inventory change. The existance of reasonable inventory changes in 1990 will in no way invalidate the essential forecast.

Export is recognized as the prime mover in the economic base concept. As independent estimate of exports in 1990 would require an integrated forecast of the future economy and buying patterns of El Paso's several markets. Such a forecast is beyond the scope of this analysis. Consequently, export transactions were assigned the total value needed to balance the interindustry flows and this value was checked to see if it seemed consistent and coherent with the other parts of the forecast.

Finally the forecast was balanced between the primary factors of production and the final demands. A detailed forecast of transactions between processing sectors was not made because of time-consuming mathematical manipulations that are required. However, a cursory study of the forecast disclosed no evidence of inability of the processing sectors to adapt to increased and changed demands which have been forecast.

Estimated future employment is based on the sectoral outputs required to satisfy balanced final demands. The values of the projected demand were adjusted to eliminate inflationary affects to obtain a better measure of the quantity of product required. The values of the sectoral outputs were adjusted to reflect assumed changes in productivity and obtain a better measure of the required contribution to the product by labor. Finally the required quantity of product was divided by the unit production of labor to obtain the number of employees needed.

The number of required workers was added to the number of workers estimated to be unemployed to obtain an estimate of the total work force. Past experience and assumed trends were used to estimate the percentage of the population which can reasonably be expected to enter the labor force, i.e., the labor force participation rate. Finally from the estimated labor force and the projected labor force participation rate an estimate of a future population was derived. The derived population is that which could be sustained at approximately the current standard of living if the actual future economic activity accords substantially with the estimate.

The population estimate derived from this study is almost independent of the usual demographic considerations. (Labor force participation rate is a function of the composition of the population mainly in terms of age but also in terms of sex, ethnic background and such things.) Because of its comparative independence this estimate can provide a check on population estimates derived through other techniques.

APOLOGIA

The preceding discussion of methodology is both implicit and explicit regarding the role of subjective judgment in the preparation of this analysis and forecast. This role is not acknowledged as fault or injury. However, the role of judgment in this case is defended in the comment which follows:

"Economics is a people-oriented science. As such, it is something less than precise; especially in the field of forecasting . . . Rather, it is better" (than to protest) "to realize that forecasting of any sort simply means good analysis of the best data available. . . This, in turn, involves the use of judgment . . . The quote that follows is designed to focus attention on the vital role judgment must play in forecasting." The quote which followed was taken from V. Lewis Bassie's Economic Forecasting, Copyright 1958 by the McGraw-Hill Book Company. Some of Mr. Bassie's more pertinent points are paraphrased as follows:

Such mundane devices as statistical formulae and lines on charts can produce only what is essentially a guess, dependent on the ability of the guesser. Contrasted with such pseudo-scientific procedures, common sense analysis of the important forces which make economic changes is the essence of a sound approach to forecasting. The nature of the problem precludes any guarantee of accuracy by any specified methodology or system of indicators. The future is always new in some significant aspect. The most that can reasonably be expected of an analyst is that he apply himself to his task with rules of conduct that best use his native intelligence.

References:

1. The comment and related paraphrase are contained in <u>The Role of Economic Studies</u> in <u>Urban Transportation Planning</u>, J. P. Meck, August 1965, U.S. Department of Commerce and reprinted in 1969 by U.S. Department of Transportation.

OVERVIEW OF THE ECONOMY

The Basic Elements and Plan, Volume I of this Study, explains the historic and geographic basis for El Paso's economic activity. Located athwart the valley of the Rio Grande at the lowest pass through the Rocky Mountains, El Paso was ordained by location to be a hub for transportation and trade. Later irrigation waters, exploitation of nearby deposits of copper and lead ores, and availability of low wage labor were to shape the economy of the area.

In the analysis which follows the key industrial sectors of El Paso's economy will be discussed briefly in order to point-up significant trends or developments not presented in earlier volumes of the Transportation Study. In total, these discussions of the different segments of El Paso's economy form a background against which any individual economic activity should be viewed. As a minimum any predicted activity should be subjected to the logic checks of coherency and consistency with the background data.

ECONOMIC BASE CONCEPT

The analysis which follows is guided and shaped by the concept of an "economic base". This concept can serve to furnish a criterion by which the operation of an economy can be judged.

The "economic base" concept considers that the basic economic activities of an area are those which produce goods or services for export and bring money into the area from the outside. In turn monies derived from export sales are used to maintain the non-basic and dependent activities needed to sustain the resident population of the area. Such monies may be exchanged in several transactions after their arrival in the area. There results a multiplicative or cascading affect which can spread throughout the area. A simple example suffices to illustrate --

A dollar's worth of trousers are sold to a market in New Jersey. Within El Paso the dollar is divided between the owner(s) of the plant, the worker(s) on the production line, the local government(s) and a part of the dollar leaves El Paso to pay for cloth, thread, and buttons. The plant owner spends his share to buy a part of a haircut, the worker spends his share to buy food and government spends its share to hire a part of an

engineer. In turn the barber, the grocer and the engineer will purchase some commodities with their shares of the dollar. In this example, two generations have produced six beneficiaries of a single export transaction and the initial dollar received from the export has produced non-basic transactions valued at about two dollars. (Payment for imported material has been ignored.)

The importance of export as prime generator is evident in this illustration.

Basic activity may be classified according to its place in the chain of production --

- a. Primary the activity concerned with removal of raw material from the lands of the area, e.g., mining or farming.
- b. Secondary the activity concerned with transforming raw materials into products more in demand, e.g., refining petroleum or canning foodstuffs.
- c. Tertiary the activity which provides the handling, transport and sales of the products. It furnishes associated supportive services.

The foregoing classifications serve to suggest the ramifications and complexity of economic activity.

Perhaps more than other places El Paso must be viewed as an area with a unique economy. Table I-l compares earnings in the various industrial sectors. A measure of El Paso's uniqueness is provided in the comparison with national earnings in comparable sectors.

Not all of the earnings shown in Table I-1 are directly attributable to El Paso's economic base. Many of these earnings result from operation of the supportive segments of the economy. Some of the significance of this partition of earnings will be discussed elsewhere in this study.

There are many indices of economic activity, e.g. employment, income labor force, wholesale and retail trade and income-consumption patterns. These factors relate to economic activity as causes or affects or both. In the discussions which follow such indices will be used to describe trends or to aid prediction.

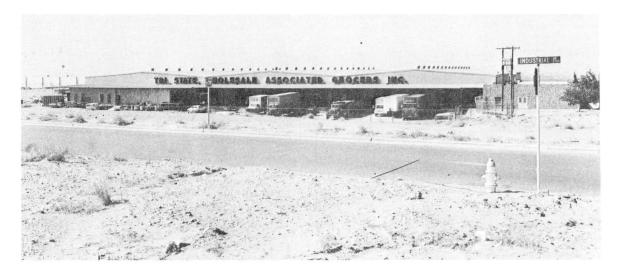


TABLE I-1

EARNINGS BY INDUSTRIAL SECTORS - 1968
(In Millions of Dollars)

Sector	El Paso	Percent	Nation	Percent
Farm	15.3	1.9	17,525	3.2
Government	336.4	41.0	93, 229	17.0
Manufacturing	113.7	13.8	161,184	29.4
Mining			5,464	1.0
Construction	36.0	4.4	32,812	6.0
Transportation- Commercial	71.8	8.7	37, 863	6.9
Trade, Wholesale & Retail	128.9	15.7	90, 198	16.4
Finance & Insurance	32.3	3.9	28,734	5.2
Services	85.5	10.4	80,014	14.6
Total	821.2	100.0	548,643	100.0

Source: Survey of Current Business, U.S. Department of Commerce, as contained in Economic Studies, City of El Paso, Community Renewal Program, Urban Research Group, Austin, Texas, March 1971.

AGRICULTURE

From the beginning the fertility of the soil favored agriculture but water was adequate only for small scale farming. The construction of dams on the Rio Grande at Elephant Butte and Caballo made dependable irrigation water available. Intensive farming became economically feasible.

While only about one-third of the irrigated acreage of the Rio Grande Project is located in El Paso County, the bulk of the remaining acreage is in Dona Ana and Sierra Counties of New Mexico and can be considered within the El Paso regional agricultural area.

Trends in crop values and in the size of areas irrigated by the waters of the Rio Grande are shown in Table I-2. Changes in agricultural employment are shown in Table I-3.

Agricultural production for 1969 is depicted in Table I-4. This data identifies only the most significant crops. Grapes, cabbage, melons, asparagus, and sweet potatoes are also grown commercially within the area but are of small economic value.

TABLE I-2

GROSS CROP VALUE AND AREA IRRIGATED
RIO GRANDE PROJECT, NEW MEXICO - TEXAS

1915 -1969
(In \$1,000's)

Year	Crop Value	Additional Payments	Total Value	Number of Acres Irrigated	Crop Value Per Acre
1969	\$33,233	\$4,347	\$37,580	140,937	\$267
1968	35, 182	4,770	39, 952	138, 863	288
1967	37,689	4,612	42,301	131,814	321
1966	32, 247	3,381	35,628	141,970	251
1965	34,771	217	34, 988	138, 127	253
1964	41,007	193	41,200	141, 999	290
1962	38,514	158	38,672	145,648	266
1960	39, 975	148	40,123	143,390	280
1955	.32, 318	128	32, 346	142,694	227
1950	44,649	133	44,782	158, 783	282
1945	22, 105	285	22,390	154, 775	145
1940	8,838	1,546	10,383	143, 111	73
1935	7,057	675	7,732	120,075	64
1930	8,185		8, 185	144,607	57
1925	10,676		10,676	130, 911	82
1920	4,527		4,527	81,945	46
1915	1,103		1,103	33, 876	33

Source: U.S. Bureau of Reclamation, Rio Grande Project.

As presented in the Community Economic Analysis prepared by
Urban Research Group, Austin, Texas, March 1, 1971 for El Paso
Community Renewal Program.

TABLE I-3

TOTAL CIVILIAN WORK FORCE
EL PASO METROPOLITAN AREA
1951 - 1970

Type of Employment	1951	1954	1957	1960	1962	1964	1966	1968	1970
Total Civilian Work Force	<u>69,550</u>	80,500	88,200	100,050	100,600	99,850	109,805	118, 315	126, 980
Civilian Employment	67, 250	77,200	84,650	94, 450	95,550	95, 200	104,855	113, 560	119,900
Agriculture	6,000	6,000	5,800	4,200	1,750	1,900	1,900	2,550	2, 680
Manufacturing	9,360	11,090	12,990	13,910	15,370	15,935	19,005	21,630	24,560
Construction	4,600	6,370	5,950	6,600	6,000	5,380	5,300	5,660	7,075
Wholesale & Retail Trade	15, 930	19,320	21,950	25, 760	26, 590	25,020	25, 915	28, 420	25, 095
Government*	6,575	6,430	7,860	13, 375	15,035	16,140	19,665	21,050	21,700
Others	24,785	27, 990	30,100	30,605	30,805	30,825	33,070	34,250	38, 790
Unemployment	2,300	3,300	3,550	5,600	5,050	4,650	4,950	4,755	6, 970
Percent of Total Civilian Work Force Unemployed	3, 3	4.1	4.0	5.6	5.0	4.7	4.5	4.0	5.5

^{*} Includes Local, State and Federal Civil Service employees but excludes military personnel.

Source: Texas Employment Commission. As presented in the Community Economic Analysis prepared by Urban Research Group, Austin, Texas, March 1, 1971 for El Paso Community Renewal Program.

^{**} Sharp increase partly reflects definition change in category of government employment.

^{***} Absence of significant increase due to definition change in category of government.

TABLE I-4

CROP PRODUCTION BY COMMODITY

RIO GRANDE PROJECT, NEW MEXICO - TEXAS

1969

Crop	Acres	Total Yield	Value of Crop
Cereals	14, 306	904,492 Bushels	\$ 936,009
Barley	4,832	293, 790	350,607
Corn	85	3, 332	5,485
Oats	18	1,593	1,529
Sorghum	9,364	605,357	577, 792
Wheat	7	420	596
Forage	24, 148	145,395 Tons	\$ 2,966,086
Alfalfa Hay	19,957	109,885	2,637,461
Hay (Other)	235	1,070	20,112
Irrigated Pasture	1,918	7, 528	160,766
Silage or Ensilage	2,038	26,912	147, 747
Cotton	81,603	90,806 Bales	\$11, 399, 175
Cotton, Lint (upland)	51,927	56,883 Bales	4,095,576
Cotton, Seed (upland)		22,611 Tons	1,130,550
Cotton, Lint (Am. Egypt)	29,676	33,923 Bales	5,529,449
Cotton, Seed (Am. Egypt)		12,872 Tons	643,666
Fruits	18	<u>97</u> Tons	\$ 10,957
Nuts	5,655	66,769 CWT	\$ 2,687,340
Pecans	5,655 5,655	66,769 CWT	2,687,340
Vegetables	14,339		\$15,070,843
Lettuce	7, 130	1,750,933 Crates	10,078,273
Onions, dry	3,489	1,101,839 CWT	3,744,526
Peppers (all)	3,053	357, 872 Bushels	971,772
Tomatoes (canning)	400	3,901 Tons	133,697
Other Vegetables	267		142,575

Source: 1969 Crop Reports - U.S. Bureau of Reclamation, Rio Grande Project. As presented in the Community Economic Analysis prepared by Urban Research Group, Austin, Texas, March 1, 1971 for El Paso Community Renewal Program.

Collectively vegetables comprised the most valuable crop in the area in 1969. In this same year cotton was the most valuable single crop. In spite of a yield which is often three and one-half to four times the national average, the comparative value of cotton is declining within the overall agricultural production of the area. In recent years allotments for cotton acreage have been reduced. In the presence of these controls the growers have switched to vegetable production for which the monetary return per acre is about seven to eight times greater than for cotton. Even in the absence of reduced cotton allotments it appears that growers are voluntarily

turning toward truck farming in response to the demands of the market and the probability of larger profits. The decline of cotton from constituting seventy-five percent of the agricultural value of the area in 1964 to thirty-four percent in 1969 illustrates this trend. As truck farming assumes some of the importance previously held by cotton, perishability will tend to limit the markets available for the fresh produce. Uncertainty about the future of farming is likely to discourage new or expanded canneries or other food processing plants. The agricultural sector of the economy will become less flexible and, although it will continue to produce a fairly stable level of value, its comparative importance and affect on El Paso's economy will lessen in the future.

The value of crops does not appear to correlate with agricultural employment. Significant relationship between irrigated acreage and agricultural employment is not evident. There is some indication that the shift to truck farming is accompanied by a small increase in the number of farm workers. This is consistent with the labor intensive nature of truck farming vis-a-vis the equipment intensive nature of cotton, forage, and cereal production.

In comparison with previous years the decline of irrigated acreage has been slowed down. Agricultural employment is showing small annual increases rather than the constant decrease previously reported. In its affect on the economic base, increased mechanization can offset decreased employment. Switching to crops with higher dollar per acre yields can compensate for reductions in cultivated acreage. On the basis of the foregoing it is concluded that agriculture will continue to make a fairly constant contribution to the economy for some years into the future. It will cease to do so when the agricultural lands are taken over for higher return non-agricultural uses.

GAIN, a program to improve agriculture by producing Greater Agricultural Income Now, has been developed by El Paso businessmen and agriculturalists. Program goals include more effective extension and research assistance, greater diversification, and maximum crop dollar yield. The effects of GAIN should be monitored to see if it produces any significant departures from the forecasts derived herein.

MINING

El Paso has no significant mining in the ordinarily accepted sense. However if mining is considered to embrace quarrying operations, then production of construction materials constitutes the second part of El Paso's primary economic activity. The chief products are stone, sand, gravel and cement. Demand for these products reacts to the stimuli from growth in the area. As urban and regional growth proceed, albeit at a slower pace than in the past, the production of construction materials should show stable growth and should exert a beneficial affect on the area's economy.

There are no economically significant deposits of ores in the El Paso Area. Drilling for oil has begun on a small scale within El Paso County but at this time it is too early to forecast any significant development in the oil production industry. However, copper ores are shipped in from the mountains of the Southwest and crude oils are shipped in from the Permian Basin of West Texas and New Mexico. Together these materials form a basis for an important extractive and refining industry in El Paso.

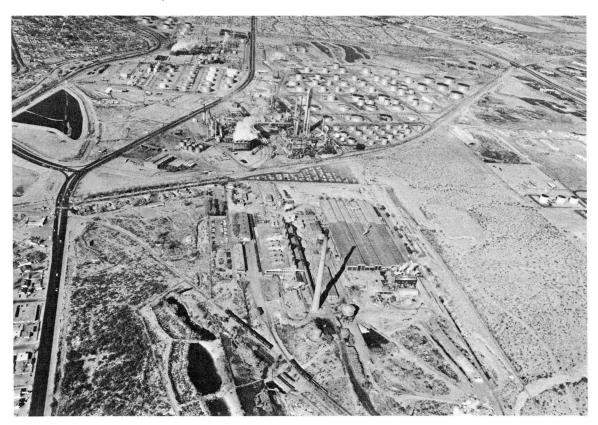
Because it would provide an important raw material and possibly reduce dependence on imports, the oil exploration and development merits continued close surveillance.

SMELTING AND REFINING

In El Paso the American Smelting and Refining Company (ASARCO) operates the nation's largest smelter as well as one of the oldest non-ferrous smelters in the country. Approximately twenty-three percent of the copper handled in the United States is refined at the El Paso works of the Phelps-Dodge Corporation. ASARCO and Phelps-Dodge are two of the top seven employers in the El Paso area.

The Bureau of Mines projects an annual growth of two to two and one-half percent in the domestic copper production up to the year 1990. The growth rate is expected to hold in spite of anticipated fluctuations in national demands. Because of its proximity to the sources of copper ores in New Mexico and because of the available plant, El Paso can expect to participate in the projected growth in copper production. The existing smelting and refining facilities have unused capacity so neither significant capital investment nor increased employment appear to be needed to provide increased production Phelps-Dodge has added a rod mill to supply the wire cable industry. This should gain for El Paso a portion of the southwest and west coast markets. ASARCO is constructing a seventeen million dollar plant to obtain marketable sulfur as a by-product of the elimination of sulfur dioxide emissions from the smelter. This will provide a new source of income to the area.

Standard Oil Company of Texas and Texaco, Inc., operate two refineries with combined capacity in excess of 81,000 barrels per day. Associated with refining is the operation of the pipelines to distribute the refined products to markets outside the area. Other pipelines distribute natural gas to markets in California and the Pacific Northwest while still others serve to bring gasoline and other refined petroleum products into El Paso from outside refineries.



The Bureau of Mines foresees an increase in oil production in Texas border counties by as much as twenty-five percent by 1990 with the major growth in the next several years. Oil production and refining are capital intensive industries with comparatively small labor demands. It appears that existing facilities have the capacity to handle the increased production and that the projected increase in production will generate little increase in employment.

CONSTRUCTION

Normally construction cannot be considered to produce an exportable commodity. However, in cases of construction contractors who work outside the local area, service and capital can be considered to be exported commodities. In instances in which local construction is purchased by federal or state government it functions as an export to bring outside money into the community.

Construction tends to be cyclic in nature with requirements accruing over a period, being satisfied over a period and repeating. But construction over a long period is very responsive to changes in urban growth and provides some measure of the economic activity of the area.

From the standpoint of employment, construction regained in 1970 the level that it held in 1961. In 1968 after a seven year decline, construction employment took an upturn to a record employment of 7,120 in 1970. However, averaged for the entire year 1970's employment was about 6,660, the same as in 1961. In 1970 a record of over \$97 million in building permits were granted. Of these about seventy-seven percent were non-public (tax producing) permits mainly for the construction of dwelling units. The permits provide evidence of a trend toward multiple dwelling units at the expense of single family structures. Private housing needs will occupy some additional construction workers through 1971. Included in these needs are about 3,000 units for which rehabilitation is planned and about 1,600 units to be constructed under a public housing program.

Through mid 1971 it appears that construction activity has continued to increase so that 1971 will surpass the record of 1970. A cursory look at the work in progress and permitted suggests that construction is at or near a cyclic high.

Future levels of construction activity are largely dependent on the future state of the overall economy. Population increases could generate a need for more housing but the need can only be met if money is available and this depends on the economy. Furthermore, no unusually large population increases appear likely. Some reason for short-term optimism may be found in the unfulfilled desire of people to upgrade their surroundings and particularly their homes. Personal incomes have risen and there is an evident willingness to spend for new private dwellings and apartment units. Currently there is equal evidence that capital is available to finance construction.

Assuming no massive changes in the economy of the country, construction in El Paso should continue at about the 1970-71 pace for at least five years, during which employment should hold at about 5,700. As a backlog of construction needs are met, there may be some decline in activity and employment. The construction industry has not been particularly reluctant to accept innovation. New technology suggests increased productivity with some decreased employment as a likely consequence. Fluctuation in employment seems likely but the overall trend is expected to result in some slight decrease in employment even while the value of construction increases. This expectation is the basis for forecasting the 1990 activity.

Construction is important for transportation planning not only because of its contribution to the overall economy but because it reflects land usage which is a major factor in traffic generation. The tables which follow reflect trends in the numbers, locations, and types of dwelling units being constructed.

Yearly fluctuations in the amount of residential construction are shown in Table I-5. Besides the general increase in the number of units constructed, the data also indicates the development of southeast El Paso as a residential area, a decline in the number of units being built in Central City, a slight drift from northeast El Paso and increased residential construction in the northwest part of the City. (Consideration of the City's street system will disclose how the major expressways and arterial streets will be stressed by this pattern of development.)



TABLE I-5
GROSS NUMBER OF DWELLING UNITS ADDED

	City		City Northeast Northwest			vest	Centra	l City	Southeast	
Year	Total	%	Total	%	Total	%	Total	%	Total	%
1960	2,399	100	974	40	265	12	315	13	845	35
1961	2,739	100	1,352	49	294	11	316	12	777	28
1962	1,778	100	437	25	232	13	438	25	671	37
1963	1,562	100	331	21	336	22	476	30	419	27
1964	2,266	100	609	27	311	14	839	37	507	22
1965	2,029	100	295	14	237	12	990	49	507	25
1966	1,481	100	239	16	261	18	565	38	416	28
1967	1,990	100	376	19	402	20	684	34	528	27
1968	2,852	100	660	23	487	17	963	34	742	26
1969	3,793	100	514	13	955	25	701	19	1,623	43
1970	3.863	100	665	17	963	25	447	12	1.788	46

^{*} A dwelling unit is a house, apartment, or other group of rooms, or a single room intended for occupancy as separate living quarters, and containing exclusive use cooking equipment. Mobile homes and Fort Bliss are excluded.

Table I-6 indicates the increase in numbers of multiple dwellings at the expense of single-family units. The trend toward apartment living will have the effect of loading the street system more rapidly and more heavily than when housing is more dispersed. This kind of loading is already very evident in the vicinity of apartment complexes on Alabama Street. It is also significant that the multi-family units are being constructed at widely separated areas. This is unlike the past when such units tended to cluster in and around Central City. Table I-7 indicates the dispersion of multi-family units.

TABLE I-6

NET GAIN IN DWELLING UNITS

Year	Total Units	Single Family Units	Two or More Family Units	Mobile Homes
1970	92,632	65,754	24,780	2,061
1960	78,515	55,953	20,738	1,824
% Increase	18.0%	17.5%	19.5%	13.0%

TABLE 1-7
HOUSING ACTIVITY BY AREAS - 1970

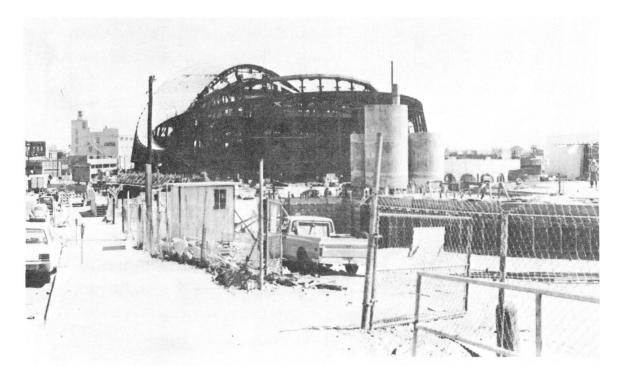
Type Units Constructed	Total	Northeast	Northwest	Southeast	Central City
Single Family Duplex	2,065 32	465 6	445 18	1,067 0	88 8
Multi Family	1,766	194	500	721	351

Source: General Housing Characteristics, Advance Report, as presented in El Paso
Area Fact Book, 1971-72 edition, published by El Paso Industrial Development Corporation, El Paso, Texas, July 1971, compiled and reproduced
by El Paso Chamber of Commerce.

Other construction is described below because it indicates diversity and because it seems to suggest that little desired construction is being deferred.

- 1. Mountain Bell Telephone Company building at 6045 Greims valued at \$662,766 (completed).
- 2. Nine story, 112 unit, Travelodge Motel in the CBD valued at over one million dollars (completed).
- 3. Eight hundred thousand dollar addition to Farah Manufacturing located at Gateway West and Hawkins Boulevard (completed).
- 4. Components, Inc., building valued at \$500,000 and located on Boeing Drive (completed). Components, Inc., is a transistor manufacturer.

- 5. State National Bank is building a twenty-two story bank and office building in the C.B.D., valued at \$7.5 million and an eight story 600-car parking garage with drive-in banking facilities valued at \$3.5 million.
- 6. The City of El Paso is building a civic and convention center in the C.B.D. Construction costs are estimated at \$11.7 million with a total cost estimated at \$17.1 million.
- 7. Hotel Dieu Hospital is building an eight story medical building valued at \$2.5 million. Building is located next to the existing Hotel Dieu Hospital.
- 8. The U.S. Army is building a new William Beaumont General Hospital valued at \$17.5 million at Alabama Street and Fred Wilson Road.
- 9. The University of Texas at El Paso is building a new residence hall complex valued at \$5.3 million on the campus.
- 10. The El Paso International Airport has been expanded. Expansion is to be dedicated in April, 1971. The construction was valued at \$3.2 million.
- 11. St. Joseph Hospital is building a new hospital at \$3 million near the existing facility.
- 12. Construction of the Downtown Holiday Inn has been completed at a cost of \$2 million.



The manufacturing facilities, the lodgings for transients and the convention center have a potential for expanding El Paso's economic base. The projects described not only produce economic activity during construction, but they serve as a measure of the optimism with which El Paso looks toward her future. Future construction activity should be closely monitored to detect any evidence of diminishing confidence or recessive behaviour on the part of investors.

An adjunct benefit of construction activity is an increase in the community's tax base. Trends in City and County property valuations are shown in Table I-8. The apparent decline in the County values between 1969 and 1970 resulted in no tax loss. In this time the assessed value increased from about \$313 million to about \$379 million.

TABLE I-8

APPRAISED VALUE OF PROPERTY

(In \$1,000's)

Year	City of El Paso	El Paso County
1950	\$ 186,192	\$ 440,738
1960	496, 679	1,127,206
1965	1,114,929	1, 356, 759
1966	1, 151, 508	1, 397, 440
1967	1, 191, 062	1, 434, 179
1968	1, 241, 629	1, 486, 378
1969	1,322,851	1,567,891
1970	1,423,000	1,517,452

Source: City of El Paso, Tax Department, El Paso County,
Tax Department. As presented in El Paso Area
Fact Book, 1971-72 Edition, compiled and reproduced
by El Paso Chamber of Commerce, published by
El Paso Industrial Corporation, July 1971.

WHOLESALE TRADE

Wholesale trade forms part of the tertiary phase of economic base activity. Consideration of this trade adds to an understanding of the manufacturing and production aspects of the economy.

Table I-9 shows that the products of El Paso are sold within a whole spectrum of markets. The nomenclature for markets is self-explanatory except for the Regional market which is made up of several states and the District market which is comprised of several counties. Because Mexico is contiguous to El Paso's city limits, International Markets assume a somewhat special meaning. As a practical matter El Paso's international market may be treated together with the national market. Together these markets occupy about seventy-seven percent of the persons employed in manufacturing and about twenty-four percent of the firms. Most plants produce for several different markets. Therefore, the effect of the national and international markets on El Paso's economy must not be over valued. Nevertheless, the increasing number of establishments engaged in producing for the outside markets and the increasing employment within these industries show a trend which must be considered beneficial in terms of the economic base concept. While the growth in the number of firms producing for outside markets is largely of recent origin, the bulk of the employment is with firms with beginnings back to 1940. The outside markets are not necessarily concomitants of the new manufacturing establishments. Rather the outside markets are being sought or developed by some of the older firms. The capacity of this older segment of the economy to grow has been demonstrated perhaps best by the clothing manufacturers. Apparel is the major product for international sales. Apparel, copper, and boots are the chief products for national sale.

TABLE I-9
EL PASO MANUFACTURERS' MARKETS - 1970

		Dat	e of Est	tablishn	nent				
Market	Pre- 1900	1901- 1920	1921 <i>-</i> 1940	1941 <i>-</i> 1950	1951- 1959	1960- 1970	Firms	Employees	Percent
Inter- national	1	3	3	5	0	7	19	9, 114	34
National	1	3	6	1	6	19	36	11,686	43
Regional	1	11	13	11	16	16	68	3,803	14
State	0	,1	0	1	1	1	4	211	1 .
District	1	2	10	7	6	4	30	.850	3
County	1	7	10	9	6	2	35	811	3
Local	_1_	0	_8	8	12	9	38	528	2
Total	6	27	50	42	47	58	230	27,003	100

Source: Constructed from 1970 Directory of Texas Manufacturers data and published in Community Economic Analysis prepared by Urban Research Group, Austin, Texas, March 1971 for El Paso Community Renewal Program.

Regional markets engage the largest number of firms but provide only the third highest employment. The chief products are cement, steel, dairy products and meat products. The perishability of foodstuffs and the transportation costs for cement and steel indicates that the regional markets for these products will not be enlarged significantly in the future. A comparison of past trade shows that Albuquerque, Lubbock, Odessa and Tucson have been expanding their wholesale trade at a greater rate than El Paso. This suggest that these producers might be encroaching on El Paso's regional sales areas.

Eighty-three percent of the persons producing for state markets are associated with steel.

The district provides a market mainly for dairy and bakery products. This segment provides comparatively stable employment with production being rather specialized and responsive to the demand of the district.

The suppliers to the county and local markets tend to be smaller operators who produce goods for household consumption, e.g. soft drinks, tortillas, tamales.

In 1970 three firms, new to El Paso, were added to produce for international markets. Hallicrafters; Components, Inc.; and the Monsanto Corporation plan to produce and assemble electric components or transistors. Nineteen seventy saw a boot processing and shipping facility open and a new apparel production plant being in one of the suburban areas.

The new firms noted in the preceding paragraph tend to corroborate the evidence offered by the older companies. El Paso manufacturing centers around labor intensive industries which can profit from a labor market which favors the employer.

El Paso's comparative isolation from potential markets does not favor market expansion. The intervention of other production centers betwen El Paso and its potential markets is unfavorable. The greatest factor to favor expansion of the markets for El Paso's products is the low cost labor. In a figurative sense it is labor which must be exploited to provide an expanding manufacturing sector for El Paso's economic base.

TABLE I-10

PERCENT CONTRIBUTION TO WHOLESALE ACTIVITY
EL PASO METROPOLITAN AREA

Category	1948	1958	1963	1967
Motor Vehicles, Auto Equipment	1.9%	16.1%	26.6%	18.86%
Drugs, Chemicals, Allied Products	1.6	2.0	2.0	2.45
Dry Goods, Apparel	1.6	0.7	0.5	1.69
Groceries and Related Products	18.1	17.7	17.9	14.90
Farm Products - Raw Materials	8.9	16.6	14.4	13.59
Electrical Goods	5.8	6.0	6.2	7.07
Hardware, Plumbing, Heating Supplies	6.9	8.6	3.4	3.83
Machinery, Equipment, Supplies	12.1	8.5	8.9	10.92
Metals, Minerals	2.2	*	1.1	本
Petroleum Bulk Stations	5.8	11.1	6. 7	8.65
Scrap, Waste Materials	0.8	1.0	0.7	2.42
Tobacco, Tobacco Products	2.8	*	1.2	*
Beer, Wine, Distributors Alcoholic				
Beverages	1.7	1.1	1.3	2.39
Paper Products	1.3	1.1	1.3	1.72
Furniture, Home Furnishings	0.3	0.7	1.1	3.12
Lumber, Construction Materials	2.3	3.1	3.2	2.67
Other	25.9	3.5	3.5	3.34
		2.2*		2.48*
Total	100.0%	100.0%	100.0%	100.0%

^{*} Withheld to prevent disclosure.

Note: 1954 data are for merchant wholesalers only and are therefore not comparable.

Source: U.S. Bureau of Census, Census of Business.

Data for 1948, 1958 and 1963 is presented in Community Economic

Analysis Chamizal Planning Program, El Paso, Texas, prepared for
the City of El Paso, Texas, by the Real Estate Research Corporation,
Los Angeles, California, August 1966. Data for 1967 was derived
from values in the El Paso Area Fact Book, 1971-72 Edition, published
by El Paso Industrial Development Corporation, El Paso, Texas. Compiled and printed by El Paso Chamber of Commerce, July 1971.

RETAIL TRADE

As defined by the Rand-McNally Commercial Atlas, El Paso's retail trade area embraces five counties of Texas, nine counties in New Mexico and Ciudad Juarez in Mexico. Within the area two factors chiefly determine the vitality of retail trade: the population and the levels of income. Census data for 1970 indicates that four of the counties in New Mexico and three in Texas sustained net population losses in the decade 1960-1970. Population gains in the other counties were not significant. Ciudad Juarez experienced a fifty-seven percent growth in population but because of low incomes and different patterns of consumption the Mexican population increase must be discounted as a factor for El Paso's retail trade. With allowances for its affectiveness in buying, El Paso's trade area population may be considered to have increased only eight percent during the census decade. This is in contrast to a State gain of seventeen percent and a national gain of twelve percent. Retail stores are being developed in Juarez to attract both Mexican and American buyers, e.g., the PRONAF Center. These stores constitute an encroachment on El Paso's retail trade area and their effects must be considered when assessing the potential of El Paso's retail trade.

Table I-11 indicates the trends in total retail sales for El Paso during the years from 1960 to 1969. Generally, the volume of retail sales has been rising but the increases are not supernormal. Neither unusually large population increases nor large increases in personal income can be foreseen. El Paso may anticipate increased retail sales in the future but these increases will be normal. A change to be expected is an increase in propensity to spend over the late 1960's and early 1970's. It seems reasonable that El Pasoans will approach the national average which is to spend about ninety percent of their disposable income.

TABLE I-11

MARKET DATA
RETAIL SALES

Year	Total Retail Sales City of El Paso	Total Retail Sales El Paso County
1960	\$340,945,000	\$360,718,000
1961	350,061,000	368, 919, 000
1962	359, 359, 000	377, 228, 000
1963*	353, 445, 000	373, 512, 000
1964	363, 407, 000	382, 983, 000
1965	384, 437, 000	404, 868, 000
1966	433, 167, 000	455, 455, 000
1967*	468, 619, 000	476, 964, 000
1968	494, 472, 000	518, 909, 000
1969	508, 194, 000	513, 656, 000

Source: Sales Management, Survey of Buying Power and *U. S. Census, Census of Business as presented in El Paso Area Fact Book, 1971-72 Edition, published by El Paso Industrial Development Corporation, El Paso, Texas, compiled and printed by El Paso Chamber of Commerce.

Increases in sales will not result in corresponding increases in employment within the retail trade. Since 1966 the ratio of employees to sales has tended to decrease. This trend is corroborated by the increasing use of the type of self-service provided by the discount houses. Not only are the discount houses selling increasing amounts of diverse types of goods, but the other businesses are employing self-service in efforts to remain competitive.

Assuming a continuation of the trend which existed between 1960 and 1969, a total retail sales of approximately \$917 million could be anticipated for 1990. On the basis of one employee per \$30 thousand in sales, retail employment of about 30,500 could be projected for 1990. If the trends are modified to reflect a subjective judgment of the future, the value of retail sales will be substantially lower than the trend indicates and employment will be slightly less than predicted from trends. These judgments have been made later in this analysis.

TOURISM

In the analysis which follows tourism as an entity is lost in the aggregation of services. Tourism embraces lodging, dining, entertainment, souvenirs and a host of other activities for support of visitors to the area. Tourism is currently benefiting El Paso's economy. It appears that tourism is being relied upon to provide greatly enlarged benefits in the future. Practically, convention trade and similar catering to transients can be considered a part of tourism. Optimism about the future of tourism is evident in the construction of a civic/convention center and in construction of many more hotel/motel units. There appears to be a similar growth in the cabaret/night club type of venture. The growth undoubtedly received impetus from changes in the laws governing sales of liquor by the drink. "Name" entertainers are being brought to clubs in El Paso. This provides competition for the Juarez entertainment spots which seemingly had a monopoly on this type of offering for many years. "Live" theatre is trying to establish itself in El Paso and if successful could be a supplemental attraction for visitors.

Some statistics about visitors will provide a sense of the benefits that tourism can provide. Visitors to Texas by auto are surveyed annually by the State Highway Department using written questionnaires and tag surveys and passenger counts in cities. Travellers who enter Texas by commercial carriers are tabulated by the Texas Tourist Council. The data which follows was derived by proportioning the statewide data for auto travellers in 1970.*

The average touring party consisted of 2.8 persons whose length of stay in Texas was 5.7 days. Personal spending in this time amounted to \$11.34 per person per day. About 5,393,602 touring parties entered Texas during 1970 and of these 6.1 percent or 329,010 parties gave E1 Paso as a destination. With spending averaged at \$31.75 per day per party, E1 Paso received revenue in the amount of \$10,446,068 from transit expenditures during the year. This amount was dispersed approximately as follows: Lodging - 26%, food - 26%, automobile - 21%, entertainment - 12% and miscellaneous - 15%. It is recognized that some of the spending was in Juarez. However, the estimate is probably conservative in that no value was ascribed for persons arriving by commercial carrier. Neither was there recognition of persons who remained in the E1 Paso area for more than one day.

It appears that at present tourism is sustained very largely by El Paso's proximity to Juarez. El Paso seems to serve as a way station enroute to the attractions of a foreign

^{*}The statistics shown were derived from data published in the March 1971 issue of Travel Log, a publication of the Texas Highway Department.

country. (Juarez offers attractions which appear exotic and foreign to many Americans.) In contrast with its Mexican sister-city, El Paso can provide few really unique attractions or entertainments. Customarily El Paso has served as a kind of "bed-room community" for tourists in providing lodging and some dining. This pattern is changing as Juarez builds motor hotel accommodations to luxury standards and operates them at attractive rates. Juarez benefits from an aggressiveness of the Mexican government in fostering tourism. If El Paso is not to lose transient trade to its Mexican neighbor, it must be equally or more aggressive in courting the tourist. Natural attractions are scarce and in some cases at unattractive distance from El Paso. Some examples are the Carlsbad Caverns of New Mexico, the winter sport area of Ruidoso, New Mexico and Elephant Butte Reservoir which offers aquatic sport. El Paso can be made to serve as a base or way station for visitors to the surrounding attractions. However, if tourism is to expand its contribution to the economy to any significiant degree, extraordinary imagination and enterprise will be required on the part of El Paso industry.



MANUFACTURING

Several measures of manufacturing activity in the 1948-1967 period are shown in Table I-12. This table also illustrates the increasing growth of manufacturing in El Paso's economy.

Value added by manufacture is derived by subtracting the total cost of materials (including materials, supplies, fuel, electric energy, cost of resales, and contract work done by others) from the value of shipments including resales and other receipts and adjusting the resulting amount by the net change in finished product and work-in-process inventories between the beginning and end of the year. (From the overall regional view-point only those materials, with inclusions as above, from extra-regional sources need to be subtracted.) From the standpoint of the total regional economy, value added equates to final payments which include payments to households, payments to governments and payments for depreciation of capital. Value added either by the manufacturing sector alone or value added by the total economic effort is an excellent indicator of the economic status of a community. The value added portion of the price of an exported product represents a direct contribution to the community by its economic base sectors. This contribution might be in the form of wages, rents, interests, etc. Value added and con-

TABLE I-12

INDUSTRIAL WAREHOUSING AND MANUFACTURING ACTIVITIES
EL PASO METROPOLITAN AREA
1947 - 1967

	1947	1954	1958	1963	1967
Value Added by Manufacture (in \$000's)	\$ 35,175	\$ 50,704	\$ 91,144	\$127,962	\$196,000
Number of Manufacturing Establishments	148	180	195	250	400-
Manufacturing Employment	6,176	9, 465	11,526	14,609	18,900
Manufacturing Payroll (in \$000's)	\$ 13,534	\$ 29,780	\$ 43,254	\$ 61,283	\$ 85,100
	1948	1954	1958	1963	1967
Wholesale Trade (in \$000's)	\$217, 261	\$291,269	\$502,133	\$505,166	\$540,760
Number of Wholesale Establishments	335	360	413	480	507
Wholesale Trade Payroll (in \$000's)	\$ 11,407	_	\$ 23,365	\$ 26,348	\$ 32,755

Source: U.S. Bureau of Census, Census of Manufactures and Census of Business.

Years 1947-1963 as contained in Community Economic Analysis, Chamizal

Planning Program, El Paso, Texas, prepared for the City of El Paso, Texas,

August 1966 by Real Estate Research Corporation, Los Angeles, California.

sequently community benefit is limited by absentee ownership or capitalization and by import of materials or labor.

A trend line based on a root mean square fit to the data shown in Table I-12 for 1954 to 1967 indicates that value added by manufacture in 1990 could amount to about \$570 million. Elsewhere 1990 value added directly by manufacturing has been estimated at about \$596 million. Through its purchases from the other processing sectors manufacturing probably will account indirectly for about \$127 million more added value. The disparity in forecasts probably results from assumption of greater spending by households and larger contributions to the product by households in the study which follows.

Employment projections based on data from either 1954 or 1958 to 1967 trend lines are slightly higher than derived elsewhere in this study. The difference can be attributed to changes in productivity in combination with change in demand for the product of manufacturing.

Since 1954 the value added to the product by each manufacturing employee has been increasing but at a slow rate. This slow rate of increase is consonant with the labor intensive nature of El Paso's manufacturing. This suggests that increased productivity, per se, will not significantly increase the manufacturing segment of the economic base. Past experience indicates that future growth will require increased numbers of plants and facilities and diversification of products.

Some factors favorable to the future of manufacturing in El Paso follow:

- a. The area provides an attractive source of labor which is willing to work for comparatively low wages. This labor is best suited to repetitive tasks or piecework operations but it is becoming increasingly skilled and the area has or can provide the training required to expand or improve the skill levels. Such labor is well employed in labor intensive processes, e.g., apparel manufacture, electronics manufacture and assembly and food processing.
- b. The attractiveness of the local labor supply is increased by operation of the "twin plant" concept. In this concept identifiable materials are shipped into the border areas of Mexico for performance of labor intensive processes, e.g., small component assembly and wood working. The partially or fully-finished products are returned to the United States for finishing and/or distribution. These imports are taxed only on the value added by the processing performed in Mexico. This program has resulted in about twenty companies locating plants in El Paso, employing about 1,500 people and paying wages and salaries of about \$5 million per year. Two developments could negate the advantage of the "twin plant" concept: first, the favorable import tax policy of the U.S. could change and second, wage demands in Mexico might decrease the attractiveness of labor. Neither of these developments appears imminent. However, a consideration of these possibilities might have a deterrent effect for industry which considers El Paso as a possible plant site. (In late 1971 an electronics manufacturer ceased plant operations in the Juarez-El Paso area. This company was a pioneer under the "twin plant" concept. Allegedly economic conditions in the United States were the reason for the action. In isolation this case is probably not critical. If other plant closures should occur, they must be viewed as adverse indicators for the future of the border economy,)
- c. Favorable prices for new plant space in industrial parks and for space in existing buildings are available to industries relocating to El Paso. (Under certain conditions some lands may be made available without cost to industry.) El Paso has no industrial development foundations, per se. However, builders and investors are available who

are both capable and inclined to help new industry to enter the area.

d. The advent of electronics manufacture and assembly is evidence of diversification and expansion of the manufacturing base. The product of this industry is both non-perishable and comparatively light in weight. The market for the product is limited only by the competition. The success or failure of this new industry in returning a profit may well indicate the future for manufacturing in El Paso.

In summary, it is concluded that low wage, low skilled but trainable labor is El Paso's greatest attraction for manufacturing. Isolation from markets is a great impediment to expansion manufacturing. In the future manufacturing will continue to grow, but the growth will be slower than in the past.



THE MILITARY

Federal government in El Paso forms a very important segment of the economic base. This importance is illustrated by the value of the military and Civil Service payrolls, local purchases, and local contracts. In 1970 this value amounted to 191.6 million dollars. Not all of this amount enters or remains in the El Paso economy but a significant portion of it does. The relative importance of this segment of the economy can be seen in the comparison with 1969's manufacturing payroll of \$100.3 million.

Table I-13 illustrates the categories of personnel who comprise the military contribution to the population and employment of the area. The table also furnishes the example of a single month to illustrate the fiscal impact from the military. Preliminary 1970 census data indicates that civil servants, retired military personnel and their dependents make up about seventeen percent of El Paso's population.

As shown in Figure I-1, military strengths are decreasing and there are associated reductions in the numbers of dependents and supporting civil servants. Uncertainty is inherent in dealing with force levels and plans to execute national policies. Consequently impact of the military on a community is beyond ordinary predictive ability.

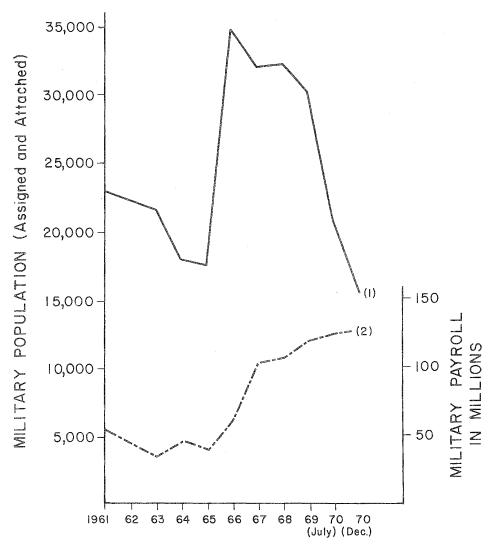
TABLE I-13
DISTRIBUTION OF MILITARY PERSONNEL AND DEPENDENTS
JULY, 1970

Classification		Number
Military		
Fort Bliss		\$ 14,933
Tenant Activities		2,716
WBG Hospital		1,791
Reserve Training		1,106
Allied Students		411
	Total	20,957
July 1970 Payroll		\$ 8,961,521.37
Civil Service		
Fort Bliss & Tenant		\$ 3,947
WBG Hospital		860
Post Exchange		548
Contract		593
Concessions		190
Teachers on Post		12
Postal Employees		27
Miscellaneous		<u>359</u>
	Total	6,536
July 1970 Payroll		\$ 3,215,402.20
Retired and Dependents		
Retired and Dependents		\$ 16,800
Dependents on Post		10,008
Dependents off Post		11,369
Unaccompanied		5,016
	Total	43, 193
July 1970 Local Contracts		
and Purchases		\$ 2,011,727.14
Total Fiscal Impact for Month		\$14, 188, 650. 71

Source: Fort Bliss Public Information Officer.

As published in Economic Studies, City of El Paso, Community Renewal Program, Urban Research Group, Austin, Texas, March 1971.

FORT BLISS-WILLIAM BEAUMOUNT MILITARY CONTINGENT AND EARNINGS 1961-1970



⁽I) Annual Averages Except for 1970.

Source: Military Information; As Published in <u>Economic Studies</u>, City of El Paso, Community Renewal Program, Urban Research Group, Austin, Texas, March 1971.

FIGURE 1-1

NUMBER OF MILITARY PERSONNAL EL PASO METROPOLITAN AREA SELECTED YEARS 1957-1970

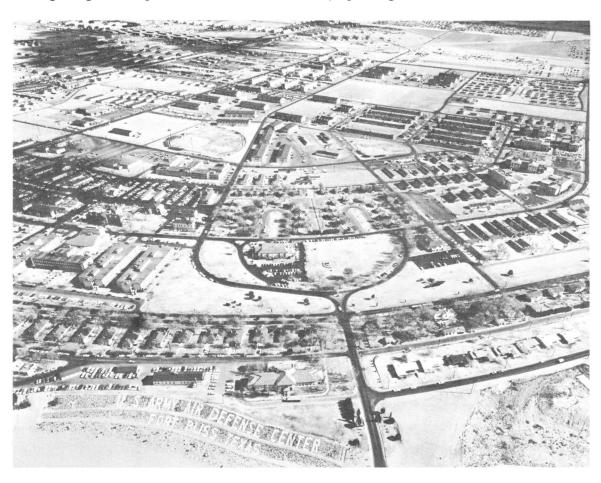
Year	Personnel
1957	27,500
1960	24,700
1963	25,100
1965	23,100
1968	32,336
1969	30,007
1970 (Summer)	20,957

⁽²⁾ Total Annual Payroll.

There are a few general observations which, with caution, might be used to visualize the future.

- a. Fort Bliss is the center of the U.S. Army's Air Defense Training Activities. Air defense appears to have a high degree of survivability in the changing technology, tactics and strategies of modern warfare.
- b. A multi-million dollar addition to the William Beaumont Army Hospital is presently under construction. This suggests that the authorities foresee the continuance of a significant dependent and military population in the area.
- c. Facilities for testing, firing, training and developing vehicles and supporting equipment for rocket propelled flight currently exist in the area. The El Paso area may well be a "fall-out beneficiary" of the space travel industry as well as future weaponry.

As strengths and spending decline, the comparative importance of the military for El Paso's economy must also decline. Both strengths and spending are subject to sudden drastic changes in response to congressional and executive action. However, the preceding observations strongly suggest that El Paso will not lose the military. Redirection of plans and policies will probably cause decreases in military spending. However, in comparison with other areas El Paso appears to have a better chance of retaining a significant part of the benefit of military spending.



EXTRA-REGIONAL ECONOMIC DEPENDENCY

El Paso's economy cannot be viewed in isolation. The following examples illustrate the great dependence on extra-regional factors.

- a. Imported goods and services account for 42.7 percent of the value of the output of all processing sectors so that value added amounts to only 57.3 percent of the output. Value added is only 1.34 times the value of the import.
- b. Direct payments by governments to households constitute the third largest force behind the economy. These payments are surpassed by household demands and manufacturing exports. However, household demands should be discounted because they depend not only on basic activity but on direct payments by government. In 1967 direct payments by governments represented 37.16 percent of all payments to households. These payments exceeded the payments to households by any other single sector of the economy. It seems pertinent that payments to households provide one measure of the quality of life that the region can offer its people.
- c. Exports account for about 46.33 percent of El Paso's Gross Regional Product. Purchases by households consumed about 33.33 percent of the Gross Regional Product. However, these purchases could not be maintained without exports and government spending.
- d. El Paso's economy relates directly to the economic health of its export market. This market can be expected to reflect in a general way the economic state of the rest of the country. The regional economy is directly related to the magnitude and pattern of government spending for purchases and for direct payments to households.

In view of the economic base concept the dominant roles of government and manufacturing merit emphasis. Manufacturing produces 41.03 percent of the Gross Regional Product, including 70.57 percent of all exported commodities. Government makes direct payments to the primary factors of production which are equal to 29.59 percent of the Gross Regional Product. Governments consume 12.72 percent of the goods and services produced by the processing sectors. Both government purchases and direct payments function as basic economic activities. Apart from government and manufacturing the other sectors of the economy have either comparatively small affects or else they comprise tertiary elements which are not prime movers of the economy. In the forecast of future economic activity manufacturing and government are treated as controlling elements.

As a starting point for forecasting El Paso's economic future the national economy was selected to provide a crude model for deriving external stimuli. The period 1958-1967 was chosen as the most representative of the periods for which data was available. Pertinent elements of the 1990 national economy were obtained as trends which were modified by judgements. Portions of the elements comprising the national economy were introduced to the El Paso economy, e.g., purchases, military employment, civilian employment. The interrelationships which can be expected to exist in the future between elements of El Paso's economy were derived on the basis of the relationships indicated by the Region I Interindustry Study. The multipliers and factors derived by the Study were not applied dogmatically to the future. Rather the methodology was accepted and the multipliers and factors were used as criteria against which to check the reasonableness of the forecasted transactions.

NATIONAL TRENDS AND FORECASTS

In the period 1958-1967 national income from all divisions of industry increased from \$367.8 billion to \$653.3 billion. This amounts to an average annual increase of about 8.63 percent. Three elements contribute to this increase: increased employment, increased productivity, and an apparent increase due to the declining value of the dollar.

Between 1958 and 1967 the number of employees nationally increased 20.58 percent or an average annual increase of about 2.29 percent per year. In the period 1958-1967 the value of the dollar declined about 16.3 percent as measured by the Consumers' Price Index (CPI) and about 6.1 percent as measured by the Wholesale Price Index (WPI). For simplicity it is assumed that during this period industrial transactions should be discounted about 1.8 percent per year due to inflation. In the last eighty years productivity has increased at an average rate of about 2.4 percent per year. Since World War II the increase has been about 3.2 percent per year. For the 1958-67 period productivity is estimated to have increased about 4.5 percent per year.

Recent shorter term trends, i.e., since 1967, must also be considered pertinent to future activity. The pertinency lies in the probable permanency of the affects of measures taken to alter these trends, e.g., wage-price controls, increased government spending, changes in tax base, protective taxing of imports. Some of the more significant trends which have evoked these measures are described as follows:

- a. Between 1967 and 1970 the CPI increased 16.3 percent and the WPI increased 10.4 percent based on the 1967 prices.
- b. Between 1965 and 1970 productivity in the United States increased at a rate of only 2.1 percent per year. More significantly the United States trails most of the industrial nations of the world in the growth of productivity, e.g., German productivity in the period increased twice as fast as the United States' and the Japanese increase was six times greater than the United States'. This loss of ground remains important even if allowances are made for comparative productivity in the base year.
- c. Between 1970 and 1971 U.S. unemployment increased from about four percent to almost six percent of the labor force.
- d. From about 1965 to 1970 wages in the United States were increasing at a rate of almost six percent per year. A comparison of the six percent wage increases with the 2.1 percent increases in productivity provides a large part of the explanation for the inflation which sent prices up twenty-five percent during the period.

It is judged that the U.S. economy cannot survive a continuance of the combination of recently experienced conditions, i.e., high costs, high rate of unemployment, increasing wages and declining productivity. If these conditions continue unchecked, the economic state of the country will become so chaotic as to invalidate any attempt at economic forecasting. Therefore, it is necessary to postulate such conditions as are needed for a reasonably healthy survival of the national economy. Some of these postulations are shown:

a. Productivity will increase at least 2.5 percent per year to year 1990.

- b. Inflationary affects will not exceed 1.5 percent per year to year 1990.
- c. Employment will increase at a rate not less than two percent per year to 1990.
- d. The total expenditures by all governments will increase approximately as they have from 1960 to 1968, i.e., about 10.86 percent per year. On this basis the 1990 expenditures by all governments can be expected to approximate \$675.295 billion.

For El Paso the patterns of future government spending will be as important as the amounts which are spent. Some of the more significant trends and projections are discussed in connection with forecasting the 1990 payments by governments to El Paso's households.

EMPLOYMENT

Total employment as well as unemployment in the El Paso area is shown in Table I-3. This table also illustrates the trends in employment within the major subdivisions of the economy.

Since 1951 total employment has increased at a rate of about 3.1 percent per year. Within this period manufacturing and government have exhibited constant gains in employment and these gains have been greater than the average for the city, i.e. manufacturing employment increased at an average rate of about 5.2 percent per year and government employment increased approximately 6.4 percent per year.

After an initial decline, agricultural employment rose slightly and appears to be leveling off. Construction exhibits a cyclic pattern for employment which is characteristic of this activity. Employment in the trade sector is leveling off.

Unemployment shows the usual covariance with employment but its significance lies in the fact that the percentage of the work force which is unemployed has continued to increase even as employment was expanding. Population changes in the period 1960-1970 may reflect a response to the continued unemployment. During this period El Paso experienced a net migration loss of 33,342 persons representing 10.6 percent of the 1960 population. The causes of this migration loss have not yet been fully analyzed; however, there is a reasonable implication that the expansion of the economic base was inadequate to sustain the natural growth of the area's population.

A trend-line fitted to the data for total employment by the root mean square method indicates that employment will rise to about 168,600 by 1990. The trend-line projection indicates that manufacturing will employ about 37,350 in 1990. These projections are not corroborated by the more complete analysis and forecast which follow.

Manufacturing and government employment merit careful surveillance in the future because of their dominant effect on total employment which in turn influences population and the usage of transport.

FINAL PAYMENTS

Final payments are the ultimate payments for the primary factors of production, i.e., land, labor and capital in which land includes materials, land use, etc. They represent

resources of the community which are transformed into commodities for export or for local consumption. Final payments is broadly interpreted to include payments made to governments by the processing sectors of the economy. In a sense these payments to governments are payments for use of a "climate" in which the processing sectors may function. The "climate" includes, for example, order, health, transportation facilities. This "climate" embraces all the exploited elements of the environment, including services, which are not privately held.

The term 'final' differentiates these payments from those made by purchasers to the processing sectors of the economy. Ultimately payments made to processors are passed to and distributed among the primary factors of production. The term 'final' also partly distinguishes these payments from those made by purchasers directly to the primary factors of production, that is, without recourse to intermediate agents, e.g., wages paid by households to other households for domestic service or wages and salaries paid to civil servants on government payrolls.

Table I-14 shows both the recipients and sources of final payments made in 1967. In this tabulation the values of transactions are shown as percentages of the total final payments made by all processing sectors. Dollar values for these transactions are shown in Table I-14. Ultimately people are the recipients of all final payments, however, the payments are categorized to be better understood. Households were the greatest beneficiary of the 1967 final payments in that they received over eighty percent of all such payments made by the processing sectors. Manufacturing made over a quarter of these payments to households and was followed in order of decreasing payments by the wholesale/retail trade sector, services sector and construction.

Federal, state, and local governments received almost twelve percent of all final payments with the Federal government getting the largest share or about seven percent of the payments. Together with direct payments to governments by households, e.g., taxes; these payments represent money removed from but subsequently reintroduced to the economy in the form of government purchases and direct payments to households by government. In transactions with governments El Pasoans fare very well. In 1967 payments to governments amounted to about \$320 million while payments by governments amounted to over \$620 million. This is added evidence of governments' importance for El Paso's economy. Speaking of governments in the abstract also tends to obscure the fact that people are, at least theoretically, the indirect beneficiaries of much government activity. Another aspect of government transactions in El Paso is noteworthy; here governments tend to deal directly with people rather than through the intermediate sectors of the economy. As an example, in 1967 direct payments to households by governments were more than twice the payments made by governments for commodities purchased from the processing sectors. The directness of these transactions help to explain why El Paso's economy is so highly responsive to government employment and spending in the area.

Final payments are almost completely determined by the final demands for the products of the region. Payments and demands can be linked through the gross output of the economy. Because of this interrelationship final payments to households will be considered in connection with discussion of gross output forecast for 1990.

TABLE I-14

1967 INTERINDUSTRY FLOW
ANALYSIS OF FINAL PAYMENTS MADE BY PROCESSING SECTORS**
(Percentages of Total Final Payments)*

Payments Payments Made By To	Agriculture	Mining	Construction	Manufacture	Transportation & Communications	Utilities	Wholesale & Retail Trade	Finance Insurance Real Estate (FIRE)	Services	Totals
Federal Government	0.144	0.361	0.436	2.146	0.681	0.750	1.510	0.424	0.749	7. 202
State Government	0.007	0.133	0.105	0.708	0.196	0.125	0.385	0.155	0.152	1.967
Local Government	0.505	0.013	0.131	0.346	0.190	0.378	0.567	0. 336	0.173	2.638
(All Government)	(0.656)	(0.507)	(0.672)	(3.200)	(1.067)	(1.253)	(2.462)	(0.915)	(1.074)	(11.807)
Households	1.386	2. 997	9.564	22.618	3. 813	3.541	18. 159	4.941	13.634	80.654
Depreciation	0.542	0.215	0.854	1.591	0.677	0.832	1.038	0.345	1.444	7.539
(All Final Payments)	(2, 584)	(3.719)	(11.090)	(27, 409)	(5.557)	(5.626)	(21.659)	(6, 201)	(16, 152)	(100.000)

^{*} Absolute values for the indicated transactions can be obtained by applying the indicated percentages to the \$835,662,000 value of the total payments.

^{**} By definition payments for imports and payments between processing sectors are excluded.

IMPORT-EXPORT RELATIONSHIPS WITHIN THE ECONOMY OF EL PASO

Table I-15 shows the relationships between imports, exports, and the gross output of the processing sectors of Region I. It is significant that in 1967 there existed markets for \$691,700,000 in exports from the region. Equally significant is that the processing sectors required imports valued at \$622,755,000 in order to meet all demands. Of these imports 61.86 percent were competitive and 38.14 percent were non-competitive. A total of \$107,287,000 in imports were consumed directly by government and households. In summary Region I had a net import balance in excess of \$38 million.

An inter-sectoral comparison shows that manufacturing was the largest importer with imports constituting 54.79 percent of the gross output. Next is agriculture in which 37.06 percent of the gross output is imported. Construction imports 31.75 percent of the gross output. (In absolute values construction imports are more than double those of agriculture.)

The magnitude of the imports suggests an area in which El Paso's economy might be improved. First, the imports are evidence of an existent demand which is presently unsatisfied within the economy. Second, the imports disclose other demands which are only partially satisfied within the economy.

The foregoing observations do not imply that El Paso's economy can or should substitute locally produced commodities for all imports. Some examples follow:

- a. The petroleum processing sector imports are valued at over seventy-six percent of its gross output. Most of these imports are crude oils. The El Paso Region has only insignificant proved resources of oil.
- b. Over fifty-one percent of the gross output of the textile/apparel processing sector represents imports. Cotton is the only fiber native to the area and local mills produce less than four percent of the required textiles in 1967. It appears economically infeasible to compete with established extra-regional mills.
- c. Residential construction imports forty-four percent of its input requirements. These imports consist largely of stoves, air conditioners, refrigerators and such appliances. On the national level these are products of fairly centralized and well established manufacturers. A local market alone does not appear to justify competition with the national manufacturers.

Imports suggest only a very broad area in which the local economy might be improved. Any specific changes in the composition of the base segment of the economy or in increased sectoral outputs must be determined on the basis of a very detailed analysis of costs and benefits. Cursory consideration suggests that expansion to eliminate the need for imports will face the same impediments which generally beset the economy, e.g., narrow base and lack of raw materials.

The imports consumed by the processing sectors in 1967 amounted to over forty-one percent of the Gross Regional Product. This seems to indicate that there is merit to continued study of ways to diminish the Region's dependence on imports.

TABLE I-15

EL PASO ECONOMIC AREA ANALYSIS OF IMPORT AND EXPORT IN RELATION TO GROSS OUTPUT OF PROCESSING SECTORS (1967) (\$1,000's)

				IMPORTS	5			E'X	PORTS
	Total Value	% of Gross Output	Competitive	% of Total Imports	% of Gross Output	Non Competitive	% of Total Imports	Total Value	% of Gross Output
Agriculture	26, 267	37.06	21,017	80.01	29.65	5,250	19.99	39, 181	55,28
Mining	6,524	15.64	5,309	81.38	12.73	1,215	18.62	33,573	80.49
Construction	69,845	31.75	26,746	38.29	12.16	43,099	61.71	21,576	9.81
Manufacturing	385,840	54. 79	288,614	74.80	40.99	97, 226	25. 20	488, 149	69. 32
Transportation and									
Communications	17, 325	20.48	4,722	27.26	5.58	12,603	72. 74	10,287	12.16
Utilities	15,094	19.49	10,418	69.02	13.44	4,676	30.98	7,908	10.20
Wholesale and									
Retail Trade	53,306	17, 83	13,771	25.83	4.61	39,535	74.17	64,384	21.54
FIRE*	12,436	15.91	1,250	10.05	1.60	11,186	89. 95	0	0
Services	36, 118	15.79	13, 388	37.07	5.85	22,730	62. 93	26, 642	11.64
TOTAL	622,755	34.51	385,235	61.86	21.35	237,520	38.14	691,700	38.33

^{*} Finance, Insurance and Real Estate.

1990 FINAL DEMAND FOR EL PASO'S PRODUCT

Final demand for the product of El Paso's processing sectors is divided between governments, households, and exports. For this study inventory change has been assumed to be zero, i.e., there will be neither an excess nor a deficiency of production capacity. Also in this study capital increase is considered to be mainly an increase in private capital. Corporate capital increases are reflected within the inter-sectoral transactions of the processing sectors. The increases in private capital represent construction of homes primarily. To maintain an analogy with the 1967 Inter-Industry Study both the construction purchased by households and the installed equipment within the construction are treated as increases in private capital. Except that these transactions would lose their identity, no great changes would result if increases in private capital were treated as and lumped together with household purchases.

Table I-16, which depicts estimated final payments shows that El Paso's households can expect to receive about \$1.465 billion from the processing sectors as their share of the value added by manufacture. These households can also expect to receive payments from governments with a value of about \$1.1573 billion. Based on 1967 experience households will earn about \$56.25 million from other households. The total income of households can be expected to amount to almost \$2.6789 billion in 1990.

TABLE I-16

ESTIMATE OF INTERMEDIATE DEMANDS, IMPORTS AND FINAL PAYMENTS
BY PROCESSING SECTORS, EL PASO, TEXAS

1990
(\$1,000's)

	Agriculture	Mining	Construction	Manufacture	Transportation & Communication	Utilities	Wholesale/ Retail Trade	F.I.R.E.	Services	Totals
Purchased from Processors	33,590	6,489	110,263	228,552	32,862	24,302	138,847	34,773	123,986	733,664
Imports	38,350	10,309	134,103	987,750	27,374	23,848	114,608	31,090	77,654	1,445,086
Government	8,008	6,691	10,788	68,452	14,089	16,546	44,236	19,108	19,301	207,219
Households	16,913	39,576	153,453	483,858	50,351	46,763	326,263	103,220	244,954	1,465,351
Depreciation	6,614	2,842	13,701	34,038	8,946	10,981	18,659	7,202	25,950	128,935
TOTAL	103,475	65,907	422,308	1,802,650	133,622	122,440	642,613	195,393	491,845	3,980,253

Because increased government spending has been assumed, so too, a tax increase to about twenty percent of the gross income has been postulated for El Paso's households in 1990. On this basis the disposable income of these households will amount to about \$2.14312 billion in 1990. A propensity to consume has been assumed to be about ninety percent in 1990. This means that the households can be expected to spend ninety percent of their income after taxes. This represents a significant increase over 1967 when only about 76.0 percent of the disposable income was spent. If increase in private capital were to be excluded, then the percentage of spending would be only about sixty-eight percent of the disposable income. The low propensity to spend is corroborated by banking records which show high demand deposits existing together with low bank clearings. A cursory analysis suggests that the low spending results from income which leaves El Paso in the form of wages to non-residents. Other spending may possibly be lost as purchases from the military commissaries and Post Exchanges. This latter factor is probably not significant because most such purchases have already been accounted for as government purchases for resale. It is believed reasonable to use a ninety percent propensity to consume in 1990 because by that time the law will very probably be altered to discourage if not preclude extra-national residences (and spending) by workers in El Paso. On the basis of the factors discussed it appears probable that in 1990 the households of El Paso will purchase goods and services then valued at about \$1.928808 billion.

In 1967 the increase in private capital was equal to about eleven percent of all purchases made by households. Construction increases have continued at an inordinately high rate through 1971. It is assumed that a part of this spurt in construction satisfied accumulated demands and that in the future construction of most types including residential construction will tend to consume a smaller part of the regional output. By 1990 it is assumed that households will be investing only about six percent of their expenditures in capital increase. This also appears to be consistent with the expected increase in the age of the population. Capital improvements purchased from manufacturers by households represent installed appliances, such as, ranges and refrigerators. The value of such improvements may reasonably be expected to equal about one percent of the value of the "constructed" improvements in which they are installed. Based on an estimated increase in private capital of about \$116 million the "manufactured" increases would be valued at about \$1.16 million. An additional reason for projecting a comparative decline in private spending for capital increase is that government seems to be taking actions which will tend to devalue private home ownership as something to be desired and sought.

Payments by households to households must equal the incomes from households previously assumed. This amounts to about \$56.25 million which is about 2.92 percent of all household expenditures. This represents a slightly smaller percentage of the household expenditures than in 1967 but this seems to be consistent with the assumed controls on the flow of money to Mexico.

In 1967 El Paso's households imported about 14.54 percent of all purchases. It is assumed that by 1990 these households will be spending about sixteen percent on imports. The basis for assuming an increase in the purchase of imports is that no significant diversification of El Paso's economy can be foreseen. As more money becomes available to be spent a smaller percentage of the people's wants can be satisfied locally. Import is here used in the sense of extra-regional source and not necessarily extra-national sources. A change in policy to limit spending in Mexico will not necessarily invalidate this assumption. "If Juarez doesn't get the trade, the mail order houses probably will."

The remaining purchases by El Paso's households will be made from the processing sectors. In 1990 these purchases are expected to amount to about \$1.448221 billion or about seventy-five percent of all household purchases.

In 1967 El Paso's processing sectors sold goods and services valued at \$185.58 million to governments. In that year these purchases represented 0.07198 percent of all government expenditures. For this study it has been assumed that in 1990 El Paso will account for about 0.08 percent of the total government expenditures. The slight increase is based on two considerations. One of these is the assumed survivability of air defense in periods of declining military forces. This preferential retention should bring a slightly larger part of the military spending to El Paso. Additionally it has been assumed that government will continue to increase its expenditures to upgrade the quality of life for certain elements of American society. In this area it seems that El Paso's need for assistance is slightly greater than many other areas of the country.

If the foregoing rationale and the 0.08 percent figures are accepted, in 1990 El Paso should be able to expect that governments will purchase about \$540.236 million from the processing sectors.

The gross output of El Paso's economy in 1990 has been estimated to be valued at about \$3.980253 billion of which about \$733.664 million is used to satisfy intermediate demands, i.e., sales and purchases between the processing sectors. Final demand is estimated to be about \$3.246589 billion. When accounting for this demand exports equal to \$1.141254 billion have been assumed. The assumed exports might be a very critical point of weakness in this analysis. These purchases by extra-regional buyers require a sound but expanding national economy. The optimum which permits the assumption of increased exports is more intuitive than rational. Implicit in the assumption is the idea that El Paso's product will remain sufficiently attractive and competitive to retain and increase its market. If the national economy declines with a reduction in private spending, El Paso will feel the pinch. It is improbable that manipulative federal spending could offset any significant recession of the economy.

Table I-17 indicates how the final demand sectors divided their purchases between El Paso's processing sectors in 1967. This matrix formed the starting point for preparing a similar matrix which would be the pattern of supply and demand forecast for 1990. In arriving at the 1990 matrix it was necessary to introduce the previously described assumptions regarding future demand and production. These assumptions were entered as changes to the elements of the 1967 matrix. Next the matrix was balanced in three manual reiterations. Finally the balanced matrix was examined to detect any gross departures from the factors suggested by a "sense of the future".

TABLE I-17

1967 PARTITIONING OF PURCHASES
FROM EL PASO'S PROCESSING SECTORS
(Expressed as Percentage of Purchasers' Total Demands)

Processing Sectors	Purchasing Sectors				
	Government	Households	Exports	Capital Increase	
Agriculture	8.50	0.606	5.664	None	
Mining	0.05	None	4.854	None	
Construction	40.00	1.096	3.119	99.00	
Manufacturing	15.00	20.757	70. 573	1.00	
Transportation & Communications	8.50	3.596	1.487	None	
Utilities	5.00	4.344	1.143	None	
Wholesale & Retail Trade	8.00	37.490	9.308	None	
F. I. R. E. *	1.00	5.169	None	None	
Services	13.95	26. 942	3.852	None	

^{*}Finance, Insurance and Real Estate.

The transactions between El Paso's processing sectors and the final demand sectors which are forecast for 1990 are shown in Table I-18. In this table the transactions are expressed as percentages of the total final demand. In Table I-19 these transactions are shown in terms of the forecasted dollar values.

TABLE I-18 FORECAST

SUPPLY AND DEMAND--FINAL TRANSACTIONS BETWEEN SECTORS OF EL PASO'S REGIONAL ECONOMY - 1990 (Transactions are all expressed as percentage of total final demand)

Supply Processing Sectors		Pur	Dema	nd Sector	s
	Government	Households	Exports	Capital Increase	Percentage of GRP + Imports
Agriculture	0.302	1.176	0.674	None	2. 152
Mining	0.237	1.000	0.535	None	1.772
Construction	1.713	1.778	3.653	3.564	10.708
Manufacture	7.983	21.767	18.605	0.036	48.391
Transportation & Communication	0.504	1.717	1.101	None	3. 322
Utilities	0.466	1.613	1.018	None	3.097
Whsle/Retail Trade	2.609	7.361	5.547	None	15.517
F. I. R. E. *	.0. 939	2.771	None	None	3.710
Services	1.887	5.424	4.020	None	11.331
% of Final Demand	16. 640	44.607	35. 153	3.600	100.000

^{*}Finance, Insurance and Real Estate.

TABLE I-19

FORECAST

FINAL DEMAND FOR PRODUCTS OF REGIONAL ECONOMY

EL PASO - 1990

(Transactions are all expressed as \$1,000,000's)

Processing Sectors		Purcha	sing Sect	ors	
	Government	Households	Exports	Capital Increase	Total
	dovermment	Tiousenoids	Exports	Increase	1 Ota 1
Agriculture	9.804	38.180	21.882	None	69. 866
Mining	7.694	32.466	17.369	None	57. 529
Construction	55.614	57.724	118.598	115.708	347. 644
Manufacture	259.177	706.686	604.028	1.169	1,571.060
Transportation					
& Communication	16.363	55.744	35.745	None	107.852
Utilities	15.129	52,367	33.050	None	100.546
Whsle/Retail Trade	84.704	238. 981	180.088	None	503.773
F. I. R. E. *	30.485	89.963	None	None	120.448
Services	61.263	176.095	130.513	None	367.871
Totals	540. 233	1,448.206	1,141.273	116.877	3, 246. 589

^{*} Finance, Insurance and Real Estate.

The check of the forecasted transactions started with a comparison with the transactions of 1967. This comparison was not made on the basis of dollar values which obscure relationships but rather on the basis of how purchases were divided between processing sectors and how the output of the processing sectors was distributed between the sectors comprising final demand. These partitionings of supply and demand were expressed as percentages of the pertinent intersectoral transactions. These partitionings are shown in Tables I-20 and I-21 for the 1990 forecast.

TABLE I-20
FORECAST

1990 DIVISION OF OUTPUT OF PROCESSING SECTORS BETWEEN PURCHASERS
(Purchases are expressed as percentages of the final demands
upon each processing sector)

Processing Sectors	Purchasing Sectors				
	Government	Households	Exports	Capital Increase	
Agriculture	14.033	54.647	31.320	None	
Mining	13.375	56.433	30. 192	None	
Construction	15.997	16.604	34. 115	33, 284	
Manufacture	16.497	44. 982	38. 447	0.074	
Transportation & Communications	15. 172	51.686	33.142	None	
Utilities	15.047	52.083	32.870	None	
Wholesale & Retail	16.814	47.438	35.748	None	
F. I. R. E. *	25.310	74.690	None	None	
Services	16.653	47.868	35.479	None	

^{*}Finance, Insurance and Real Estate.

TABLE I-21

FORECAST

1990 PARTITIONING OF PURCHASES FROM EL PASO'S PROCESSING SECTORS (Expressed as Percentage of Purchasers' Total Demands)

Processing Sectors	Purchasing Sectors				
	Government	Households	Exports	Capital Increase	
Agriculture	1.815	2.636	1.914	None	
Mining	1.424	2.242	1.522	None	
Construction	10.294	3.986	10.392	99.000	
Manufacture	47. 976	48.797	52.927	1.000	
Transportation & Communication	3.029	3.849	3.132	None	
Utilities	2.800	3.616	2.896	None	
Wholesale/Retail	15.679	16.502	15.781	None	
F. I. R. E. *	5.643	6.212	None	None	
Services	11.340	12.160	11.436	None	

^{*}Finance, Insurance and Real Estate.

The comparison of Table I-17 with Table I-21 discloses the change which can be anticipated in the demands placed on El Paso's processing sectors. The more significant changes with pertiment comment follow.

- a. In 1990 households are forecast to surpass both government and exports as consumers of the products of agriculture. This appears to be reasonable in view of the comparatively low expansion of agricultural output and greater propensity of households to spend. Also relevant are the anticipated trend toward truck farming with its higher yield, a reluctance to export if adequate local market exists, and a decreased willingness of government to meet prices that individual households would be willing to pay.
- b. The changes in demand for the products of construction are consistent with the anticipated decrease in government's requirements which are being met at present without significant deferrals. No very large governmental requirements can be foreseen for 1990. It is to be expected that needs, such as, freeways, civic facilities and municipal utilities will be met as they arise and will be a reasonably constant but moderate annual requirement in the future. Some larger Regional construction contractors are incorporating. It seems reasonable that these contractors will enter extra-regional markets to sell their service. Recent increases in the size and scope of local construction has provided experience which is

salable to extra-regional markets. It appears reasonable to exploit this asset.

- c. A change in the distribution of the products of manufacture has been forecasted primarily on the basis of a somewhat pessimestic view of El Paso's future export activity. To "safeside" the total forecast the projected value of manufactured exports was limited arbitrarily. To partially offset this it was necessary to assure some increased purchases by government and by households. The increases which were postulated for governments and households were made consistent with the total spending anticipated for these sectors. Inherent in this procedure is the assumption that government spends in an effort to influence the economy as well as to procure goods or services. El Paso appears to have a potential claim for such benevolent spending. It has been tacitly assumed that future federal policy will tend toward favoring domestic sources in matters of international trade. In the apparel field it seems both feasible and probable that El Paso's manufacturing sectors will diversify and expand at the expense of imports.
- d. The comparative decline in purchases of services from the intermediate sectors by government is offset by the increase in direct purchases of services by the government from El Paso's households. These transactions appear as direct payments to households in the forms of wages and salaries. Government usurpation of roles normal to private activities seems to be a normal concomitant of governmental expansion and a reasonable expectation for this study. The decline in the purchase of services by households is anticipated because some services will tend to price themselves out of the market and because other services, e.g., domestic employment, become stigmatized to the detriment of expansion. In El Paso some services might also decline as work by non-residents becomes more tightly controlled.

1990 GROSS OUTPUT OF EL PASO'S PROCESSING SECTORS

Collectively the processing sectors have made larger payments to El Paso's households than have governments. The magnitude of these payments in 1990 depend on several factors, the most obvious of these are the 1990 employment and the wages and salaries which prevail at that time. Because the employees of the processing sectors are also consumers of the products of these sectors employment and output (demand) are mutually dependent. For a first run either employment or demand might be assumed but the predicted transactions would be incomplete until the assumptions are proved to be consistent and coherent and probable. For the purpose of this analysis changes in employment, increases in productivity and declining value of the dollar are assumed in order to arrive at a gross output of the processing sectors. Next the gross output is examined to determine the nature of the demands necessary to consume the output. Finally the demands are checked to see if they are reasonable and likely on the basis of projected economic activity both within El Paso and within El Paso's market area.

Table I-22 records the assumptions regarding productivity, employment, and inflation which were employed in projecting the 1990 gross output of the aggregated sectors of El Paso's economy. Gross output includes purchases between the processing sectors. This table also records both the sectoral and total output as the absolute values of the transactions.

The sources of El Paso's 1990 gross output are shown in Table I-16. This estimate is based on the split between the contributors to each processing sector's gross output which existed in 1967. This split will remain reasonably valid if no significant technological changes develop and if there is no major change in El Paso's dependence

TABLE I-22
ESTIMATE OF 1990 GROSS OUTPUT OF PROCESSING SECTORS
EL PASO, TEXAS

	Estimated Annual Increase in Productivity %	Estimated Annual Increase in Employment %	Estimated Annual Increase in CPI-WPI %	Total Increase 1967 to 1990 %	1967 Gross Output (\$1,000's)	Estimated 1990 Gross Output (\$1,000's)
Agriculture	0,,5	0.0	1.5	146	70,873	103,475
Manufacture	2.5	2.8	1.5	256	704,160	1,802,650
Transportation & Communications	0.5	0.5	1.5	158	84,571	133,622
Public Utilities	0,5	0.5	1.5	158	77,494	122,440
Wholesale/ Retail Trade	2.5	1.0	1.5	215	298,890	642,613
F.I.R.E.*	2.0	3.0	1.5	250	78,157	195,393
Services	0.5	3.0	1.5	215	228,765	491,845
Mining	1.0	0.0	1.5	158	41,713	65,907
Construction	2.5	0.0	1.5	192	219,952	422,308
					TOTAL	3,980,253

*Finance, Insurance and Real Estate

on imports to feed the economy. Nothing foreseeable can decrease El Paso's dependence on imports because the area is simply deficient in the raw materials to feed its industry. Labor and, to a lesser extent, capital in the form of money are the only primary means of production locally available to El Paso.

1990 GOVERNMENT PAYMENTS TO HOUSEHOLDS IN EL PASO

Assuming no fundamental changes in governments' gross spending patterns the percentage representing general expenditures can be expected to decline at a rate of about 0.17 percent per year. The part representing utility and liquor store expenditures will decrease at a rate of about 0.06 percent per year. The compensating increase will be in insurance trust type expenditures which can be expected to increase at a rate of about 0.23 percent per year. On the basis of the assumed rates of changes the 1990 governmental expenditures can be expected to split very broadly as follows: general expenditures, 79.80 percent; utilities and liquor stores, 1.57 percent; and insurance trust expenditures, 18.63 percent. In 1990 total governmental expenditures are expected to amount to \$675.295 billion.

National defense expenditures are expected to decline slightly so that in 1990 they represent about twenty-five percent of all government expenditures or about \$168,824 billion.

The size of the military force of the United States can be expected to decline. (Defense will be bought with technology vis-a-vis manpower.) In 1990 military pay is expected to account for about fifteen percent of the defense spending rather than 19.10 percent as in 1968. The military payroll can be expected to be about \$25.324 billion for the country in 1990.

In 1967 El Paso accounted for 1.1389 percent of the total U.S. military earnings. In 1969 this percentage was 1.2122 percent. In the anticipated period of declining military forces the survivability of air defense should be slightly advantageous to El Paso. On this basis it is assured that in 1990 El Paso will account for about 1.5 percent of the total national military pay. El Paso's military payroll would be about \$379.8 million in 1990.

By 1990 a slight change in the partitioning of government expenditures between federal, state and local governments can be expected. Between 1960 and 1968 federal expenditures increased at a rate of 10.54 percent per year, state expenditures increased at a rate of 12.50 percent per year and local expenditures increased 10.65 percent per year. If these trends continue to 1990, the split then will be 57.06 percent - federal; 18.02 percent - state; and 24.92 percent - local. The amounts of these expenditures would be approximately as follows: federal - \$384.446 billion; state - \$117.501 billion; and local \$173.348 billion.

Between 1960 and 1968 payrolls for civilian employment have accounted for an average of 17.4 percent of the total federal expenditures. This percentage is expected to hold at about the same level. At 17.5 percent of the federal expenditures the 1990 federal civilian payroll will be about \$67.278 billion. Assuming no significant change El Paso should account for about 0.3 percent of the federal payroll or about \$202 million.

Nationwide payments to personnel have accounted for about forty-five to fifty percent of all state and local expenditures. The percentage is expected to increase slightly to about fifty-three percent in 1990. Therefore, in 1990 the nationwide state and local payrolls should amount to about \$91.874 billion. Of this El Paso's share will probably

decline very slightly to about 0.1 percent or about \$91.874 million in 1990. El Paso's share is expected to decline because state and local revenues are not expected to support the national average for expenditures.

In 1990 El Paso can expect government (military, federal, state and local) wages and salaries of about \$673.7 million. In 1967 wages and salaries accounted for about 76.28 percent of El Paso's total personal earnings. Assuming that this ratio continues, in 1990 El Paso's total personal earnings from all governments should be about \$883.159 million. In 1967 the difference between earned income and total payments to households was about \$262.846 million. The source of these payments must be either processing sectors, other households, or government. Government is the only sector which can be visualized as a source of unearned payments. If it is accepted that income earned from government sources represents only 76.31 percent of the total payments made by governments directly to households, then in 1990 it can be estimated that governments' total payments to households should amount to about \$1.1573 billion.

In 1967 payments were made to El Paso's households as follows: By processing sectors - 60.74 percent; by governments - 37.16 percent; by other households - 2.1 percent. Of these payments 76.31 percent were earnedfrom the sources indicated: wages and salaries, 76.28 percent; other labor, 2.66 percent; proprietors' income, 6.82 percent; property income, 10.17 percent; transfer payments, 6.99 percent. Contributions to social insurance had a negative effect of 2.92 percent. Of the total earnings government provided 33.99 percent and of the total payments to households government earnings represented 25.94 percent.

In addition to payments received directly from governments El Paso's households receive payments from the processing sectors for their contribution to the value of the region's economy. These payments are discussed as final payments.

FORECAST OF 1990 POPULATION-EL PASO ECONOMIC AREA

An economic forecast has many implications. If such forecast is accepted, its implications for transportation planning can be derived and studied. Transportation requirements can be linked to the economic forecast through population. The relationship is generally causal, i.e., required transportation depends largely on the size of the population and the size of the population depends on the ability of the economy to provide the necessities and amenities which the people demand. Population derived from economic analysis can be corroborated by separate and independent estimates, e.g., demographic projection. Such corroboration would seem to suggest accuracy in the economic forecast. Such corroboration cannot prove accuracy. For example, there are myriad ways in which compensating errors could occur. The following discussion will suggest where such errors might occur. The magnitude of the affects of such errors is very apparent in the relationship between participation rate and population which is described for a fixed labor force in the following discussion.

Projected employment was obtained by assuming an annual change in employment in each processing sector and by checking to determine that the projected employment was commensurate with the demands that were projected for 1990. The demand to be satisfied excluded inventory change, a device for smoothing the flow of products between the processing sectors and final demand. Inventory change is largely irrelevant to the economic base concept. In this study a perfect balance between production and consumption was forced. Table I-23 records the annual changes in employment as percentages of the 1967 employment and shows the employment in each sector which is projected for 1990. The table also shows the estimated total employment upon which

TABLE I-23
1990 EMPLOYMENT FORECAST

Sector	Annual Change (%)	Total Change 1967-90 (%)	1967 Em plo yment	1990 Employment
Agriculture	0.0	0.0	2, 275	2, 275
Manufacture	+2.8	64. 4	19,571	32, 175
Transportation & Public Utilities	+0.5	11.5	9,110	10, 158
Wholesale/ Retail Trade	+1.0	23.0	23, 985	29, 502
F. I. R. E.	+3.0	69.0	3, 472	5,868
Services	+3.0	69.0	6,710	11, 340
Government	+5.5	126.5	21, 315	48, 278
Mining	0.0	0.0	142	142
Construction	0.0	0.0	5,022	5, 022
Self Employed	0.5	11.5	18,703	21,602
Totals			110, 305	116, 362

the 1990 population would have to depend.

The population that can be sustained by the projected employment is obtained through the use of a "labor force participation rate." This rate is simply a factor which describes a relationship between some element of employment and some element of population. For the purpose of this study the rate relates total labor force to the total population as a percentage of the latter. The accuracy of the economic forecast does not appear to justify any more precise definition of labor force or population. The Basic Elements and Plan, Volume I of the study, records El Paso's Labor Force Participation Rate of 41.1 in 1950 and 37.6 in 1960. In the United States the corresponding rates were 39.9 and 39.0 respectively. On the basis of employment reported by the Texas Employment Commission and population disclosed by the 1970 Census, El Paso's 1970 participation rate was computed to be 40.32. Data is not yet available to determine whether the national downward trend from 1950 to 1960 was carried forward to 1970.

Several data suggest that El Paso's labor force participation rate will decline by 1990. Some examples follow:

a. In the censual decade 1960-1970 the percentage of El Paso's population which was five years of age or younger declined by 4.91 percent. The population aged fourteen and younger declined 3.63 percent. The population aged 15 to 45 declined 0.32 percent and the population aged forty-five and older increased 3.95 percent. An overall affect of the shift toward the higher age groups is that the median age in El Paso increased about 4 1/2 years.

- b. During the census period the percentage of El Paso's population which was sixty-five or older increased one percent. This seems to reaffirm the attractiveness of the area for retirees who are drawn by the climate and comparatively favorable costs of living.
- c. In the age group 25 34 there was a net loss of 4,141 males and 1,539 females. This represents 11.4 percent of this age group. This loss attains added significance because 25 34 is the prime age work group.

The decline in the numbers of infants and youths suggests that in 1990 there will be comparatively fewer persons entering the labor force. The increased numbers of older people indicates that reduction of the labor force due to retirements might be expected to accelerate. The persons who are attracted to El Paso in their "final" post-retirement period either will not enter the labor force or will remain in the force for only a comparatively short time.

For the purpose of this study it is estimated that by 1990 the labor force participation rate will be only about thirty-four, i.e., thirty-four percent of the population will be either employed or seeking employment.

The decline in the labor force participation rate, particularly insofar as it results from out-migration, has an important significance. This decline represents a loss of the only primary factor of proudction which El Paso possesses in any appreciable amount. El Paso has little to offer industry except attractive labor and the out-migration suggests that some labor is moving out. It is conceivable that through a reverberative or cascade effect El Paso would lose not only the labor but some of the industry which is attracted by the labor.

Subjectively it is judged that El Paso's low skilled population may need one or two generations to develop a degree of employability which matches national levels. On the basis of this judgment it appears that unemployment will not get below the two percent level even if the national rate goes below this. With the projected employment for 1990 representing ninety-eight percent of the labor force, this force should number about 169,757 persons.

Labor force participation rate defines the relationship between population and labor force. Labor force in turn is a function of employment and unemployment. To illustrate these relationships as well as to show a range of population projections, labor force has been made constant and participation rate and population are obtained as dependent variables. For a labor force of 169,757 persons these relationships follow:

Participation Rate	Total Populatio		
31	547,603		
33	514,415		
34	499,285		
35	485,020		
37	458,803		
39	435,249		
41	414,041		

In light of the many factors discussed in this analysis it is forecast that by 1990 E1 Paso's economy will be able to support a total population of about 500,000 persons.

OTHER ECONOMIC INDICATORS

In the economic base concept the tertiary sector provides service support to the producing workers. The amount and quality of this support can be factors in attracting or discouraging new industry. The supportive sectors, therefore, function both as causes and effects of economic activity.

Table I-24 shows some parameters by which economic activity in El Paso can be measured. The data pertains to both basic and supportive activity. The construction and utilities data suggest the ability to support new industry. The indicators show a generally expanding economy for the years 1965 to 1970 but toward the end of this period some small perturbations were evident. In 1970 there were downturns in air transportation, rail shipments and sales employment. At the risk of oversimplification, it appears that all downturns were at least partly caused by the slowdown of the national economy, particularly in the space and military support industries. In rail shipments the decline might be partly attributed to switches to truck transport. In wholesale and retail trade reduced employment is partly the result of increased self-service and mechanization.

Bank data in the 1971-72 El Paso Area Fact Book indicates that El Paso shared with the rest of the country the economic stagnation which led to the remedial control and tax measures of 1971. Between 1960 and 1970 the ratio of demand deposits to total deposits fell from 0.76 to 0.59. There was a corresponding increase in the amount of money held in time and savings deposits. These deposits represent money withdrawn from circulation and they work to curtail economic activity and in effect limit the "multiplier effects" which accompany basic economic activity.

In 1969 a decline in the absolute volume of bank clearings began and continued through 1970. This appears to have been a part of the nationwide economic malaise but bank activity bears watching to see if El Paso demonstrates any peculiar symptoms.



Since 1950 there has been a yearly increase in the total and per capita use of utilities, i.e., gas, electricity, water and telephones. Part of the increase results from new domestic use and part results from increased use by existing consumers. Overall utility gains have also been helped by expansion of manufacturing activity and general economic growth.

The data shown in Table I-24 is readily available. In the future this type of data may be adapted to furnish a corroborative check on forecasted economic activity.

TABLE I-24 ECONOMIC INDICATORS - A COMPARISON

	1965	1966	1967	1968	1969	1970	% Change 5 Yrs.
Bank Debits (000)	\$ 4,765,774	\$ 4,866,956	\$ 5,221,061	\$ 5,715,373	\$ 6,582,438	\$ 7,172,600	+ 50.5
Bank Clearings (000)	4,072,020	4, 240, 134	4,454,590	4,900,920	4,511,899	4,336,986	+ 6.5
App. Prop. Val. County (000)	1,356,759	1,397,440	1,434,179	1,486,378	1,567,891	1,517,452	+ 11.8
Rail Cars Loaded	N. R.	30, 355	19, 960	24,990	28,111	26,773	- 11.8
Air Shipments	28,453	28,500	29,035	32,185	34, 972	33,843	+ 18.9
Air Passengers Loaded	271,063	376, 365	414,597	484,378	524, 933	490,194	+ 80.8
Air Operations	229, 955	238, 125	250,456	241,430	253,042	227,681	- 1.0
Value Building Permits	57,358,080	59,807,857	58,839,183	67,680,047	86, 346, 276	97,017,541	+ 69.1
Value Non-Public Permits	50,410,603	53,461,627	54,667,043	56,632,390	64,736,045	74,814,289	+ 48.4
Residential Unit Starts	2,047	1,569	2, 263	2,816	3,523	3, 929	+ 91.9
Border Crossings	30, 937, 157	32,019,874	33, 289, 929	37,502,070	38,021,208	38, 633, 683	+ 24.9
Electric Customers	88,927	91,254	93,385	96,314	98,661	101,131	+ 13.7
Electric Consumption-MWH	1,193,210	1,278,403	1,342,115	1,480,323	1,663,683	1,749,514	+ 46.6
Gas Meters	77,434	78,555	80,346	82,329	84,083	85,148	+ 10.0
Postal Receipts	4,708,291	5,026,962	5, 264, 996	6,180,913	6,448,196	6,857,691	+ 45.7
Telephones	123, 237	131,746	138,582	147,173	156,463	167.163	+ 35.6
Water Meters	63,288	65,166	66,133	68,632	70,272	72,424	+ 14.4
New Vehicles	12,935	15,194	14,334	16,350	15,830	14,528	+ 12.3
Civilian Labor Force	105,100	113,600	115,300	118,450	123, 250	125, 150	+ 19.1
Total Employment	100,200	108,900	109,800	114,550	118,450	119,150	+ 18.9
Retail Employment	N. R.	21,200	22,170	22,780	22,790	22,180	+ 4.6
Wholesale Employment	N. R.	5, 990	6,100	6,250	6,350	6,330	+ 5.7
Manufacturing Employment	17,450	19,750	18,300	20,950	23,000	25,050	+ 43.6
Manufacturing Payroll*	65, 597, 259	72, 765, 660	75,875,717	87, 461, 929	100, 309, 610	109,007,526	+ 66.2
Value added by Mfg.*	113,652,000	161, 423, 200	166, 278, 730	198,085,240	221,649,880	246,371,960	+116.8

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^{*} ComputedN. R. Not Recorded

VEHICLE REGISTRATION

While transient vehicles comprise a large part of freeway/expressway traffic, the locally registered vehicles dominate the overall traffic picture. Now and in the future, requirements for streets and highways will be directly related to the number of vehicles operating in the area and most of these will be registered locally.

Table I-25 depicts the number of vehicles by type which have been registered in El Paso County since 1963. With but few exceptions the number of vehicles registered has increased annually. In 1970 there was a drop of about 1,000 in the registration of passenger cars. This is considered to be an isolated occurrence which resulted from three factors:

- a. The prolonged strike against General Motors Corporation
- b. A general downturn in the economy and employment
- c. A reduction in the number of military personnel at Fort Bliss.

TABLE I-25

VEHICLE REGISTRATION - EL PASO COUNTY

Year	1963	1964	1965	1966	1967	1968	1969	1970
Passenger	114,725	120,659	122, 302	124, 227	133,054	138,270	142, 936	141,876
Truck	15,845	16, 876	17,876	19,562	20,639	22,443	24,079	23,947
Truck Tractor	1,134	1,065	1,054	1,051	1,027	1,225	1,317	1,384
Trailers	6, 255	6, 158	6,669	6, 235	6,613	6,314	6,614	6,639
House Trailers	1,242	1,318	1,286	1,418	1,756	2, 113	2,513	2,882
Bus	186	172	200	181	209	189	196	188
Motorcycle	2,295	2,332	2,411	3,006	3,410	3,517	3,753	4,287
Factory Delivery	23	32	57	122	83	102	98	84
Dealer	575	593	611	629	647	665	670	670
Machinery	296	332	469	500	525	614	624	680
TOTAL	142,576	149,537	152, 935	156, 931	167,963	175,452	182,800	182,637
Annual Growth	4.9%	2.3%	2.6%	7.0%	4.5%	4,2%	-0.34%	
Average Annua	l Growth -	Percent 3.6						

Due to the presence of a large military population, the El Paso area contains a significant number of vehicles with out-of-state registration. In mid 1971 there were more than 5,500 vehicles in this category. These vehicles must be included when estimating transportation needs.

The dominance of Motor Vehicle and Auto Equipment Activity in the sector of whole-sale trade corroborates the importance of the automobile for El Paso's economy.

In 1963 such activity accounted for 26.6% and in 1967 it accounted for 18.9% of the wholesale trade. It was exceeded by no other type of wholesale trade activity.

Additionally, in 1965 automotive commodities accounted for the most retail sales in El Paso County and in 1969 automotive sales were second only to general merchandise. The percentages of total retail sale attributed to automotive sales for 1965 and 1969 were approximately 22% and 20.5% respectively.

Growth of vehicle registration during the period 1963-1970 averaged 3.6 percent per year.

WATER REQUIREMENTS AND RESCURCES

The amount of water consumed in 1967 and its source is shown in Table I-26 for Region I of the Inter-industry Study. Exclusive of agriculture for which needs are shown as irrigation water; mining, manufacturing and utilities are the only significant industrial users of water. In the El Paso Transportation Study Area there is no significant mining so this will not be considered further. Within the area of interest about seventy-five percent of the industrial water is used in the manufacturing sectors and about twenty-five percent is used in the utilities sector. On the basis of this division manufacturing used about 13,385 acre-feet and utilities used about 4,462 acre-feet in 1967. (One acre-foot is approximately equal to 325,850 gallons.)

TABLE I-26

1967 WATER SOURCES AND USES (ACRE-FEET)

	Consur	nption	S	ource	Surface Water
aram aram	Total Municipal	Total Industrial	Surface	Groundwater	for Irrigation
El Paso	78, 126	17,847	7,564	88,409	125, 599
Hudspeth	158	0	0	158	4,538
Culberson	403	485	0	888	0
Jeff Davis	153	6	119	40	2, 128
Presidio	1,126	0	0	1,126	20,752
Brewster	1,118	0	0	1,118	535
Terrell	173	28	0	201	160
Val Verde	6,764	0.	6,709	55	21,747
Kinney	597	O	295	302	4, 903
Maverick	2,427	0	2,427	0	135, 432
Dimmit	1,458	17	610	865	11, 441
LaSalle	716	206	4	918	2, 975
TOTALS	93, 219	18,589	17,728	94,080	330, 210

Source: Texas Water Development Board and Texas Water Rights Commission as published in 1970-71 Texas Almanac and State Industrial Guide.

Of the several factors of production, raw material probably offers the best correlation with water usage. Since El Paso has no significant raw materials of its own, imports seem to be the best measure of materials processed. In 1967 manufacturing used 3.469 x 10^{-5} acre-feet of water for each dollar's worth of imported commodity and utilities used about 2.956×10^{-4} acre-feet on the same basis. Previously it has been estimated that in 1990 manufacture will import commodities, essentially materials, valued at \$987.750 million and utilities will import about \$23.848 million worth of materials. To make these values more properly represent quantities of materials they are adjusted to compensate for the declining value of the wholesale dollar which is estimated at 0.5 percent per year, or 11.5 percent by 1990. By this adjustment manufacturing imports are revalued to \$885.87 million and utility imports to \$21.388 million both in 1967 wholesale dollars. At the 1967 rate of usage it is estimated that manufacturing will require 30.730 acre-feet in 1990 and utilities will require 6,322 acre feet.

In 1967 municipal consumption of water in El Paso amounted to about 0.226 acre-feet per inhabitant. This is an annual consumption of about 73,637 gallons per person or a daily per capita use of a little in excess of 200 gallons. In view of the many factors which influence water use, e.g., climate, air-conditioning, affluence, size of city, etc. El Paso's water consumption correlates well with a national average of about 160 gallons per day per person and a national per capita maximum of about 265 gallons per day. Based on the assumption of increased affluence and greater propensity to spend and on the continuing upgrading of dwelling units, by 1990 the per capita consumption can be expected to increase to about 240 gallons per day. Elsewhere in this study a 1990 population of about 500,000 has been forecast for El Paso. For 1990 El Paso's municipal consumption of water is estimated to about 134,400 acre-feet.

In El Paso County the needs of agriculture are served mainly by surface water allocated and distributed by U.S. Bureau of Reclamation. Based on the estimate of future agricultural activity no significant increase in this use of water is foreseen. In any event it is improbable that agriculture would ever make large demands against the area's reserves of ground water. For these reasons agriculture is not considered to be a significant factor when assessing the future adequacy of El Paso's water sources. (Irrigation at the La Tuna Correctional Institution is treated as an industrial user.)

Surface sources do not possess adequate reliability to assume their use in satisfying 1990's municipal and industrial requirement. The assessment is safe-sided by assuming that in 1990 El Paso will obtain all its water from the shallow and the deep water bearing formations near Canutillo and from the natural underground reservoir of the Hueco Bolson. Each of the two formations near Canutillo are estimated to be able to provide 15,000 acre-feet per year without depletion. The Hueco Bolson reservoir contains about 7 1/2 million acre-feet which can be removed by pumping. The annual replenishment of this source has been estimated to be 15,000 acre-feet.

In 1990 the total water requirement is estimated to be 171,452 acre-feet. Assuming uniformly increasing usage and constant replenishment at a rate of 45,000 acre feet per year the average depletion would be 95,726 acre-feet per year so that by 1990 the Hueco Reservoir would be reduced to about 5.4 million acre-feet. The life of this reservoir, which in fact is already being mined, depends on future usage. It will very probably last at least until the year 2020.

If, in the future, the requirement for irrigation water decreases and if the municipal and industrial requirements become sufficiently critical, it appears feasible to use the surface water of the Rio Grande for some of El Paso's non-agricultural require-

ments. If irrigation remains successful in the competition for water, it might be feasible to import water to meet unsatisfied demand. Based on the analogy to the import of any of the basic factors of production, it seems that the import of water would be only marginally beneficial to El Paso's economy. Import of a commodity so basic as water suggests itself as a survival measure. It does not suggest a basis for any growth or expansion of the economy.

The preceding discussion of water resources is derived from material furnished informally by the El Paso Water Utilities. The source material is reproduced as Appendix B.

SHORTCOMINGS AND PITFALLS

This analysis possesses many shortcomings and pitfalls. In the following discussion the most serious ones will be pointed out. The purpose of such self-criticism is to indicate areas in which future updatings or revisions of the analysis can produce better forecasts. It is also intended to point out developments which may contraindicate the use of the analysis for planning purposes.

In the Apologia the use of subjective judgment is defended. Such judgments have been expressed primarily as assumptions about the future. Some of these judgments have been essential to the forecast and refutation of these would invalidate the conclusions and necessitate a new methodology. Other assumptions had to do with quantities. If these assumptions are changed the methodology might be retained but all new computations would be needed.

The high degree of aggregation of processing sectors has caused loss of detail and the overall economy seems to reflect only the dominant industries, e.g., manufacturing, oil refining and copper smelting. In the future if time permits projections should be based on a more detailed treatment of all processing sectors.

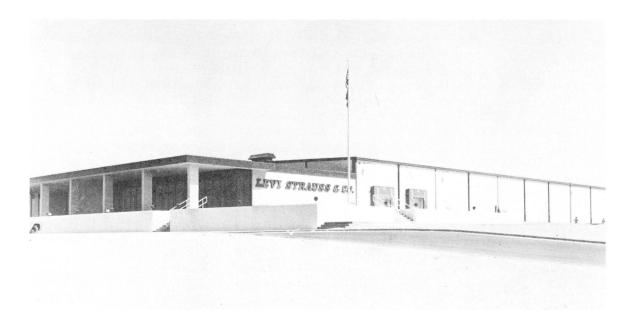
Any curtailment or reversal of governments' trend toward increased incursions into areas of private endeavor will largely invalidate the study. This is because government activity has been treated as a prime mover of El Paso's economy.

Control of inflation at about 1/2 percent per year has been assumed. At this time there is no conclusive evidence that this can be attained at an acceptable price.

The study has postulated an increasing market for El Paso's exports. Cities around the periphery of El Paso's trading area should be observed to see the extent, if any, of their encroachment on El Paso's market areas and sales.

There is in the study an implied assumption that El Paso's industries will remain basically labor intensive for some years to come. This ignores the role of capital expansion to improve productivity and increase profit. It also tends to ignore significant changes which labor might effect through wage demands.

Much of the product of El Paso's apparel industry consists of casual wear or leisure wear. Sales of this type of garb, which is more nice-to-have than essential, are particularly vulnerable to changes in disposable income or patterns of buying. This sector of the economy should be monitored for evidence of diversification as well as return to more conservative and more frugal buying habits.



This study has generally treated the El Paso metropolitan area and Region I of the Texas Interindustry Study as equivalents. At this time the simplification probably introduces no greatly significant error. The areas outside of El Paso should be closely watched in the future to assure that the dominance of El Paso justifies continuance of this type of treatment.

Annual checks based on available economic indicators are proposed to detect any gross departures from predicted activity. Complete quinquennial reevaluations of El Paso's economy are proposed to exploit the data derived in the national censuses of business, manufacture and government.

APPENDIX A - INTERINDUSTRY ANALYSIS OF THE EL PASO ECONOMY

The most comprehensive analysis of the operation of El Paso's economy to date was finalized in mid 1971 under the leadership of Dr. Edward Y. George and Dr. Everett G. Dillman, Director, Bureau of Business Research, both at The University of Texas at El Paso. This analysis will be integrated into a statewide analysis embracing nine regions which comprise the State of Texas. In the following discussion the El Paso analysis is identified as the Region I Interindustry Study.

Region I contains twelve counties in southwest Texas extending northwesterly from La Salle and Dimmit Counties generally along the Rio Grande River. Eighty-one percent of the population of Region I resides in El Paso. Most of the economic activity of the region, including more than eighty-five percent of the manufacturing plants, is in El Paso County. Therefore, it is considered that, for the purpose of this transportation study, no significant errors will be introduced if Region I and the transportation study area are treated as generally equivalent.

The present economic system is a highly complex association of very closely related but very specialized production and trade establishments. The best available method for describing this interrelationship and for measuring responses to changes in the component establishments is an "Input-Output Analysis".

The basic tool of the "Input-Output Analysis" is a rectangular array or matrix of the values of the transactions between the component sectors of the economy. An interindustry flow (input-output) matrix is shown in skeletal form in Figure I-1A. This figure helps to understand the explanation which follows.

The rows and columns of the matrix are identified by the names of the aggregated sectors being used in this study. The rows represent the producers or sellers of commodities or services and the columns represent the buyers, users, or consumers of the commodities and services. Each entry in the matrix is simultaneously a sale and a purchase. The matrix will be in balance when the total purchases equal the total sales. The economic system is not completely self-contained. Goods and services enter the system from outside, e.g., imports to feed the processing sectors. Goods and services are sold outside the system, e.g., exports or sales to a non-local buyer such as the Federal government. These transactions are treated algebraically to maintain the system balance.

EXAMPLE FORMAT

INTERINDUSTRY FLOW OF GOODS AND SERVICES

		INT	ER	ME	DIATE	<u> </u>	EMAI	NDS	-	FIN	NAL	DE	MA	NDS
Consuming (Buying) Sectors Producing (Selling) Sectors	Agriculture	Mining	Construction	Manufacturing	Transportation & Communication	Utilities	Wholesale & Retail Trade	F.I.R.E.*	Services	Government	Households	Capital Increase	Inventory Change	Exports
Agriculture										<u> </u>				
Mining														
Construction						İ 								
Manufacturing														
Transportation & Communication					A	7							150	
Utilities					al.						4			
Wholesale & Retail Trade														
F. I. R. E. *														
Services														
Imports * *														
Governments			- Nombre		Carpito									
Households														
Depreciation										63	E-Monte		40 0	

^{*} Finance, Insurance and Real Estate.

Summary columns and lines can be added to portray additional relationship and achieve greater usefulness.

FIGURE 1-1A

^{**} Imports can be excluded from the balance matrix if portrayal of a purely endogenous economy is desired.

The amount of detail included in the analysis depends on the extent of the division of the total economy into subordinate establishments or sectors. For example, a national analysis for 1963 treated 370 sectors. The Region I analysis which is being discussed considered seventy-three sectors, sixty-six of which were intermediate between the basic factors of production (land, labor, capital) and the final demands. For the purpose of this transportation study, the seventy-three sectors were further aggregated to nine intermediate sectors, three basic factor sectors, an import sector, and five final demand sectors. Successive aggregations produce increasing generalization. When more specific data is needed for the transportation study, reference can be made to the complete Region I analysis. Table I-1A defines the sectors used herein in the terms used in the Region I analysis.

When the sectors comprising the total economy are arrayed in the matrix they are grouped according to their functions in the economy. This grouping is accomplished by dividing the matrix into quadrants as follows:

Upper left (Quadrant I) depicts the intersector transactions between the local producing, servicing and marketing sectors. These sectors have no causative function outside their quadrant but rather they respond to the demands from the outside, i.e., Quadrant II.

Upper right (Quadrant II) shows the final demand for the goods or services produced by the activity in Quadrant I. In the economic base concept the sector which is primary in generating economic activity is exports.

In a sense non-local government demands might be considered to act like exports in their economic effects. However, this picture is not completely accurate because a government is the sum of its citizens. So only the government demand which is in excess to the local payments to government can be treated as export. As a factor in final demands households are the final consumers of the products needed to sustain the existant standards of living. Capital improvements, as used herein, refers to private capital increases, e.g., building of homes. Inventory changes are a measure to smooth the flow of commodities between producer and consumer. When demand is low capacity might be used to produce goods for storage until the demand increases. Conversely when demand exceeds plant capacity it might be met from the inventory. Inventory is the temporary designation for commodities which ultimately will be consumed in final demand. In effect inventory adjustment temporarily corrects imbalance between supply and demand. Inventories are maintained for raw materials, goods in process and finished goods.

Lower left (Quadrant III) reflects the contributions made by the primary factors of production. These contributions are measured in terms of the payments made for them. Households furnish labor, capital and land and receive payment in wages, salaries, dividends, interests, and rental or sales fees. Government represents the taxes paid by the producing sectors. These taxes are apart from production but without them production would be altered, e.g., without gasoline taxes there would be fewer roads or roads of lower quality. A decline in movement of commodities between producing sectors would result and a decline in production would ultimately result from the impediment of inadequate transportation.

Imports are treated as material or labor inputs to the system for which payment is made outside the system. It is possible to isolate imports algebraically in the analysis so that a regionally endogeneous economy may be studied and the effect of import activity can be assessed. In the analysis herein import is recorded separately but totalled within the gross input and totally distributed both directly and indirectly to final demand. A bottle of rum purchased in Juarez by and consumed by an El Paso family is an import directly consumed. Cloth imported, processed into apparel and then sold to a local fam-

TABLE I-1A

TRANSPORTATION STUDY SECTORS AND COMPARABLE SECTORS IN THE REGION I INTERINDUSTRY ANALYSIS

Transportation Study Sector	Region I Analysis Sectors With Sector Numbers	Transportation Study Sector	Region I Analysis Sectors With Sector Numbers	Transportation Study Sector	Region I Analysis Sectors With Sector Numbers
Agriculture	1 - Irrigated Grops 2 - Livestock, Dairy & Poultry 3 - Agricultural Supply	Transportation, Communications & Utilities	27 - Railroad Transportation 28 - Intercity & Motor Freight 29 - Trucking & Warehousing 30 - Air Transportation	<u>Finance, Insurance, Real</u> <u>Estate</u>	53 - Banking & Credit Agencies 54 - Insurance Carriers 55 - Fire, n.e.C.
Mining_	4 - Agricultural Serv. 5 - All Mining		31 - All Other Transportation 32 - Telephone & Telegraph 33 - Radio, TV & Other Com-	<u>Services</u>	56 - Legal & Accounting 57 - Lodging Services 58 - Personal & Photographic Serv.
Construction	6 - Residential Construc.		munications 34 - Gas Utility		59 - Advertising 60 - Motion Picture & Recreation
	7 - Commercial Construc. 8 - Industrial Construc. 9 - Facility Construc.		35 - Electric Utility 36 - Water Utility	e E	Services 61 - Auto Rental & Parking Serv. 62 - Electrical & Misc. Repairs
Manufacturing	10 - Maintenance & Repair 11 - Food Pricessing	Wholesale Trade	37 - Auto Parts & Supplies 38 - Wholesale Groc. & Related Prod.		63 - Medical Services 64 - Educational Services 65 - Engineering & Architectural
	12 - Textile & Apparel 13 - Lumber 14 - Furniture		39 - Wholesale Farm Products 40 - Wholesale Livestock 41 - Wholesale Machinery		Services 66 - All Other Professional Services
	15 - Boxes & Paper Contur. 16 - Printing & Publishing 17 - Chemicals		42 - Wholesale Petroleum 43 - General Wholesale	Final Payments	67 - Imports 68 - Federal Government 69 - State Government
	18 - Petroleum 19 - Rubber & Leather 20 - Glass, Stone & Clay	Retail Trade	44 - Lumber Yards & Hdware 45 - Dept. & Mail Order Houses 46 - Food Stores		70 - Local Government 71 - Households 72 - Depreciation
	21 - Cement & Goncrete 22 - Primary Metals 23 - Fabricated Metals	-	47 - Auto.Dirs. & Repair Shops 48 - Gas Service Stations 49 - Apparel & Accessory Stores	Final Demand	67 - Exports 68 - Federal Government
	24 - Machinery 25 - Scientific Instrumts. 20 - All Other Mfg.		50 - Furniture Stores 51 - Eating & Drinking Places 52 - All Other Retail		69 - State Government 70 - Local Government 71 - Households
	La mar donar mag.		Ja - Mar State Metall		72 - Inventory Change 73 - Capital Formation

ily or sold elsewhere is an import indirectly consumed. The value of imports does not contribute to the value added by the local processing. It does not add to the gross regional product and payment for imports must be treated apart from payment for the other primary factors of production.

Quadrant IV represents transactions directly between the primary factors of production and final demands. In the context of the foregoing discussion imports have been directly distributed in this quadrant with adequate provision to isolate and identify them. Within this quadrant domestic service is reflected as a household to household transaction and government pensions, etc., are treated as government to household payments.

The basic data forming the input to the transactions in Quadrant I was obtained by a survey of a sample of the establishments comprising the total economic community. The Texas Employment Commission identified the establishments constituting the universe. The universe was classified in accordance with Standard Industrial Codes and stratified as follows: 9-19 employees, 20 - 249 employees, and 250 and over employees. One hundred percent of the largest establishments were sampled. The sample size for the two strata with less employment was made a function of the distribution of the establishments between strata and between classifications. After size of sample was determined the sample and alternates were randomly selected. Weighingthe sample size in favor of the largest employers, i.e., 100 percent sample, minimized errors due to sampling.

In its entirety the survey employed sound, well prepared techniques. Questionnaires were well designed to elicit the information needed for the interindustry analysis. The questionnaire was pretested and revamped as required. Interviewers were trained in techniques of interviews and were made knowledgeable regarding desired end product and the characteristics of the pertinent industrial sectors. Firms to be interviewed were prepared to be receptive and cooperative with the interview. Notes were taken and the interviewer guided the efforts to obtain completeness and accuracy. The interviewer was debriefed while his memory of the interview was still fresh and the results of the interview were checked for completeness, internal consistency, and general accord with the corroborative data from other sources. The reliability of the data obtained was rated. Incomplete and inconsistent data was flagged for subsequent correction or explanation. Unresolvably bad interviews were jettisoned in favor of using alternate firms. Very obviously the success of the technique depended on the good faith and assistance of firms being interviewed. In a large measure this was obtained by improving the businessman's understanding of the interindustry analysis, by demonstrating the values of the analysis and by assuring him that his responses would be held in confidence.

The valid questionnaires were balanced, edited and encoded for computer processing. All transactions were normalized on the basis of dollar values. Producer's prices were used. Subsequent adjustments provided for trade margins.

Regional survey data was entered for the first time in the statewide analysis. The result was a computer display of the regional survey data and sets of production/purchase coefficients, sales coefficients and import coefficients. Trade margins were introduced for the wholesale and retail sectors and merchandise purchased for resale was included. The coefficients were identified by state sector numbers. To distinguish from other coefficients later developed by the analysis these are identified as first run or crude input coefficients.

To produce an integrated whole, statewide totals for the involved sectors were established as controls. These control totals were based on prior data, particularly the 1967 Census of Manufacturers and the 1967 Census of Business. Construction and households were

excepted sectors in this procedure. Preliminary regional dollar flow transactions were obtained as the product of the regional sector coefficient times the control total for the sector. Transactions classified according to state model sectors were aggregated to yield transactions according to the regionally classified sectors. Imports were isolated and separated into competitive and noncompetitive. Thus far in the procedures the input and output transactions have remained separate.

The crude input coefficients derived on the basis of producers' prices are inherently conducive to transaction imbalance. This condition was adjusted by making allowances for trade margins and reallocating the merchandise purchased for resale. Other appropriate reallocations to producing sectors were made and sets of new adjusted or augmented input coefficients were derived. Adjusted transaction values were computed and the new tables for sales and purchase transactions were readied for balancing the matrix.

Sales to households were obtained by survey of the sellers but households were not surveyed to obtain purchase data. Consequently household purchases were derived values based on a Federal analysis of personal income in 1967. Briefly, the total income for the El Paso Standard Metropolitan Statistical Area was extended to cover Region I. Disposable income was obtained by deducting tax payments. An average propensity to consume was assumed to be eighty-seven percent. Applied to the disposable income this yielded total purchases and the total purchases were allocated on the basis of a national pattern. Purchases from wholesale and retail were adjusted to reflect material purchased for resale and trade margins.

The transaction data entered in each cell of the interindustry matrix is normally derived from two sources: the buyer and the seller. Lack of agreement between the two sources or the complete absence of data from one source requires resolution. For the Region I interindustry analysis resolution took the form of balancing the matrix by application of reliability quotients (factors) to the entering data. The reliability quotient is an inverse function of the comparative coverage of the sector by the entering sample in terms of sales, wages, and employment. It is an inverse function of the homogeneity of the output of the entering sector and it is an inverse function of the reliability ascribed to the entering firm's response. (Lower quotient indicates more acceptable data.) In the initial balancing run single source data was accepted. Choice of the data from the source with the lower reliability quotient was made when the disagreement between data was not too great. When the data was in wide disagreement preliminary adjustment was made by reallocation to the smaller data from the appropriate unallocated cell. (This is a temporary holding cell which is ultimately exhausted by reallocation for balancing, with residuals, if any, allocated to households.) The procedure is reiterated until balance is obtained and no significant unallocated data remains. Two matrices were balanced: in one, imports were charged to counterpart processing sectors and in the other only local transactions were considered. Balance of the processing sector automatically balanced final demand and final payment.

A condensed version of the final transaction flow matrix for Region I is shown in Table I-2A. The complete matrix for Region I is too comprehensive for inclusion in this study but it is available for study as a reference.

The transaction flow matrix provides a picture of the economy at a single point in time. The amount of detail provided by the matrix depends on the extent to which the sectors are subdivided. In itself, the matrix indicates no trends and furnishes no forecasts. However, used in combination with trend data or projections the matrix helps to furnish fuller understanding of future economic activity.

TABLE I-2A

AGGREGATED INTERINDUSTRY FLOW MATRIX FOR THE REGION OF EL PASO (Values in \$1,000's)

			Activities of the second section of	Dem	ands by Pro	veccina S	ectore						Vinel	Demands	**************************************		- Con Pil V., Swager
Consuming Sectors Producing Sectors	Agriculture	Mining	Construction	Manufactur- ing	Transportation and Communication	Utilities	Wholesale and Retail Trade	Finance Insurance and Real Estate	Services	Sales to Intermediate Demands	Governments	Households	Capital Increases	Inventory	Exports	Total Final Demands	Gross Output
Agriculture Mining Construction Manufacturing Transportation and Communication Utilities Wholesale and Retail Trade Fire Services	6,479 2 587 4,721 1,240 1,979 4,556 2,945 498	0 0 11 830 668 1,357 1,098 52 91	8 5,184 1,153 32,263 2,033 907 4,121 6,336 5,424	4,659 2,739 8,089 34,966 10,745 9,193 3,694 9,085 6,108	0 12 1,110 4,653 4,014 2,074 3,560 2,947 2,429	0 0 505 663 548 10,952 763 1,337 613	1,487 103 1,696 7,994 15,159 6,574 7,218 12,434 11,915	0 0 561 482 1,062 2,013 862 5,309 3,620	87 5 1,527 4,923 6,668 5,035 9,703 10,807 18,912	(12,720) (8,045) (15,239) (91,495) (42,138) (40,084) (35,575) (51,252) (49,610)	15,951 95 97,702 18,603 14,224 7,852 12,103 1,143 17,907	3,021 0 5,461 103,442 17,922 21,650 186,828 25,762 134,266	0 0 79,974 641 0 0	0 0	21,576 488,149 10,287 7,908 64,384 0	(58,153) (33,668) (204,713) (612,665) (42,433) (37,410) (263,315) (26,905) (179,155)	70,873 41,713 219,952 704,160 84,571 77,494 298,890 78,157 228,765
Purchased from Processors	(23,007)	(4,107)	(57,429)	(89,278)	(20,799)	(15,381)	(64,580)	(13,909)	(57,668)	(346,158)	185,580	498,352	80,615	2,170	691,700	(1,458,417)	(1,804,575)
Imports	26,267	6,524	69,845	385,840	17,325	15,094	53,306	12,436	36,118	622,755					<u> </u>	···	
Tagovernments ui Governments ui Governments u Boughton	5,485 11,584 4,530	4,235 25,048 1,799	5,619 79,923 7,136	26,739 189,007 13,296	8,917 31,868 5,662	10,472 29,597 6,950	20,575 151,750 8,679	7,643 41,288 2,881	8,977 111,932 12,070	98,662 673,997 63,003					by the pri Table I-3	imary factors	
Gross Input (Incl. Imports and Inter- mediate Sales)	70,873	41,713	219,952	704,160	84,571	77,494	298,890	78,157	228,765	1,804,575					·		

If the matrix is to be used as an ancillary tool for forecasting, certain assumptions are essential -- these follows:

- a. The relationships displayed by the matrix will remain stable.
- b. Sector outputs are not interchangeable either in meeting final demands or as inputs to other sectors.
- c. The system contains only a single source of supply for a commodity. (Imports are excepted or treated specially.)
- d. Inputs to the system are determined solely by demand (output).
- e. The total effect of production is the sum of the effects of the producing sectors.
- f. Within the processing sectors supply and demand are equated by the lateral shifting and reallocation of demand in response to changed production by the supported sectors rather than through price changes.

The effect of the assumptions is to produce a closed, stable, well-defined system within which the transactions of the economy are rendered determinable. The reliability of the transaction flow data for future use depends on the soundness of the assumptions at the time of use.

The statement of transactions in dollar values obscures the relationships which hold between the sectors of the matrix. The significance of the data must be extracted by analysis and presented in a more easily understood form.

The Region I Interindustry Study employs two tools as a starting point or first look at the analysis of the economy. These tools admittedly lead to crude results but, in the

TABLE I-3A

TOTAL TRANSACTION SUMMARY - 1967
(\$1,000's)

			Final	Dema	n d			
	Intermediate Demands and Final Payments	Governments	Households	Capital Increases	Inventory Change	Exports	Direct Demands	Gross Demands
Processing Industries	346, 158	185,580	498, 352	80,615	2,170	691,700		1,804,575
Governments	98,662	29, 217	192,373	0	0	0	221,590	320,252
Households	673,997	412,317	23,400	0	. 0	0	435,717	1,109,714
Depreciation	63,003	0	0	0	0	0	0	63,003
Direct Imports	622, 755	4,924	102, 363	0	0	0	107,287	730,042
Gross Totals	1,804,575	632,038	816, 488	80,615	2,170	691, 700	(764, 591)	4,027,586
Gross Totals Less Imports	1,181,820	627,114	714, 125	80,615	2, 170	691,700	(657, 307)	3, 297, 544

absence of more sophisticated analysis, they should benefit the transportation study. The first of these devices is the Location Quotient (L.Q.) which is defined as follows:

 $L_*Q_*i = \frac{\text{Percentage of all local employment that is employed in Sector i}}{\text{Percentage of all national employment that is employed in Sector i}}.$

The L.Q. concept assumes that consumption and production patterns and standards are normally uniform, i.e., local patterns are the same as national patterns. The concept assumes that when the regional L.Q. is equal to one, the regional economy is in balance. The economy is self sustained without import or export. An L.Q. greater than one implies an export economy and an L.Q. less than one implies an import economy. The crudity of the L.Q. as a tool of analysis lies in the imperfect validation of the assumptions. It does furnish a starting point and an initial direction for more refined analysis. L.Q.'s for El Paso are shown in Table I-4A.

Table I-2A represents a gross analysis of the economy. In fact, the aggregation of processing sectors causes the scope of basic activity in El Paso to be underestimated. For example, if manufacturing were segregated into sub-sectors the Location Quotients for six of the thirteen sub-sectors are indicative of export activity. In 1958 for example, 49.45 percent of those employed in manufacturing were engaged in basic activity while in 1967 this percentage had grown to 57.22 percent.

Other factors also tend to obscure the distinction between basic and non-basic segments of the economy. One such factor is that about thirty percent of the sales revenue in down-town El Paso is obtained from Mexican Nationals and should be treated as export. Another factor is that local educational and medical facilities serve an extra-regional area (New Mexico and Mexico) and some portion of their trade is export in nature. With allowances for these several factors it is estimated that about forty percent of El Paso's employment is engaged in production for export while sixty percent provide for domestic consumption.

With the assumption that the employment split is stable, the second tool of analysis becomes available. This tool is an employment multiplier. The forty percent-sixty percent employment split for El Paso implies that for every person employed in the basic sectors of the economy, 1-1/2 persons will be employed in the non-basic or supportive sectors. Stated another way it may be estimated that total employment in the area will be 2-1/2 times the employment in the basic sectors. One and one-half and two and one-half are termed multipliers and they can be used to predict changes in non-basic, basic, and total employment when a change in any one is shown.

The multipliers described above yield gross results which differentiate inadequately between external stimuli to the economy and internal responses. Analysis of the transaction flow data yields other multipliers which provide more detailed assessments of the economic relationships and activities. In very broad terms, the derivation of these multipliers will be described and a brief description of their uses will be presented.

The assumptions which are inherent to the transaction flow matrix permit the balance between transactions to be described by the following equation.

The total INTERMEDIATE PURCHASES made by a sector from all processing sectors + the IMPORTS made by the sector + the FINAL PAYMENTS by the sector = the AD-JUSTED GROSS OUTPUT of the sector = TOTAL FINAL DEMANDS for the output of the sector plus the TOTAL INTERMEDIATE SALES made by the sector to all processing sectors. (Adjustment of the gross output makes provision for changes in inventory.)

TABLE I-4A

SECTORAL EMPLOYMENT AND LOCATION QUOTIENTS
EL PASO AND UNITED STATES
1958-1967

		E1	Paso			United	States				Percentag	e Employed
Sector	1958 Employment	1967 Employment	1958 % of Total	1967 % of Total	1958 Employment	1967 Employment	1958 % of Total	1967 % of Total	1958 L.Q.	1967 L.Q.	in Basic 1958	Sectors 1967
Agriculture	3,998	2,275	5.36	2.05	5,558,000	3,844,000	8.93	5.13	.607	. 340		
Manufacturing	13,151	19,571	17.63	17.71	15,468,000	19,339,000	24.85	25.79	.709	.687		
Transportation and Public Utilities	9,925	9,110	13.31	8.25	3,903,000	4,262,000	6.27	5.68	2.123	1.452	7.04**	2.59**
Wholesale and Retail Trade	19,029	23,985	25.51	21.71	11,141,000	13,672,000	17.90	18.23	1.425	1.191	7.61**	3.52**
Finance, Insurance and Real Estate	2,260	3,472	3.03	3.14	2,374,000	3,228,000	3.81	4.30	.795	•730		
Services	5,421	6,710	7.25	6.07	6,395,000	10,071,000	10.27	13.43	.706	• 452		
Government	7,639	21,315	10.24	19.29	7,893,000	11,616,000	12.68	15.49	.808	1.481	10.24*	19.32*
Mining	211	142	0.28	0.13	721,000	613,000	1.16	0.82	• 341	. 159		
Contract Construction	5,371	5,022	7.20	4.54	2,648,000	3,264,000	4.25	4.35	1.694	1.044	2.95**	0.20**
Self Employed	7,578	12,333	10.18	10.16	6,140,000	5,081,000	9.86	6.77	1.032	1.501	0.30**	4.41**
Medical and Professional	N/A	6,370	N/A	5•76	N/A	N/A						
Totals	74,583	110,305	99.99	98.81	62,241,000	74,990,000	99.98	99.99			28.28	30.03

^{*} All government employment is considered to be basic.

 $[\]ensuremath{\text{**}\text{Only}}$ employment in excess to that required for regional balance is considered.

The transaction matrix is made more easily understood by converting the transactions to coefficients by normalizing them on the basis of a unit (one dollar) change in demand (output). In essence the procedure is to introduce the changes, solve the equation to find the primary effects, distribute the primary effects according to the patterns disclosed by the matrix, detect secondary effects, distribute secondary effects, and reiterate until the "reverberation effect" reduces to insignificance. Procedures employing matrix algebra have been adapted to computers to facilitate the mathematical manipulations.

Some of the coefficients (multipliers) which can derive from the transaction matrix follow:

- a. The Sectoral Multiplier shows the total additional output, direct and indirect, which is required of all processing sectors to meet an increase of one dollar in the final demand for the product of a single processing sector.
- b. The Simple Income Multiplier (Type I) accounts for the direct and indirect changes in income which result from an increase of one dollar in the output of all industries in the processing sectors.
- c. The Overall Income Multiplier (Type II) accounts for the direct, indirect and induced changes in income which result from an increase of one dollar in the output of all industries in the processing sector. (To obtain the multiplier, households are included in and balanced within the processing sectors. Thus households share in the inter-sectoral multiplier effects between processing sectors.)
- d. Technical Coefficients show directly the value of the goods or commodities which one sector requires from the supportive processing sectors in order for the first sector to produce one dollar's worth of its own output.
- e. Interdependency coefficients show how a change in final demand impacts both directly and indirectly on the processing sectors of the economy. These coefficients provide for the multiplier effects between processing sectors.

The rectangular array of Technical Coefficients which is analogous to the transaction array is called the Structural Matrix. The corresponding array of Interdependency Coefficients is called the Total Change Matrix. For Region One each of these matrices consists of about 4,500 cells each of which contains a six digit decimal coefficient. These matrices are neither reproduced nor condensed for the purpose of the Transportation Study. However, they are available in the Region I Interindustry Study if needed for transportation planning.

The El Paso Transportation Study adapts the concepts and technique of the interindustry flow analysis to forecast relationships between elements of the economy in 1990. The forecast is vulnerable to the effects of error in the inherent assumptions of the method. The forecast will suffer from the shortcomings that extensive aggregation produces. In spite of these drawbacks, no method of economic analysis is known to the writer which is both fundamentally different from and superior to the interindustry flow technique.

The Region I Interindustry Study prepared by Doctors George and Dillman is highly recommended to anyone seeking a fuller understanding of the functioning of El Paso's economy.

APPENDIX B - EL PASO'S WATER RESOURCES

El Paso uses water from two underground reservoir formations to supplement the water which it is allocated from the Rio Grande. During 1968, water from the Rio Grande accounted for over 10 percent of its requirements, with underground wells in the Canutillo area providing about 25 percent, and wells in the area east of the Franklin Mountains providing about 65 percent.

The amount of water which the City can remove from the Rio Grande is limited by contract with the Irrigation District, and this water is available only during the irrigation season.

In the vicinity of Canutillo, the Water Utility has a well field that produces from two different water bearing formations. Studies by the U.S. Geological Survey indicate that the shallow water has a potential of 15,000 acre feet annually. This water is conveyed in the river bed to the Water Treatment Plant during the irrigation season since it requires treatment. The water in the deeper formations is of high quality, and pumpage from this formation indicates that it will have an indefinite life when water is removed at the rate of 15,000 acre feet annually. Neither of these two sources has been developed to its full potential.

The remaining water supply needs that cannot be furnished by the Rio Grande or the Canutillo Field are supplied from wells drilled east of the Franklin Mountains. Extensive studies have been conducted by the Ground Water Branch of the U.S. Geological Survey in cooperation with the City of El Paso. These studies resulted in an analog model study of the water resource potential of this area which extends from the Franklin Mountains east to approximately the east city limits of the City of El Paso, and from the Rio Grande to the New Mexico state line. The study was published in 1966 and reveals that there are approximately 15 million acre feet of fresh water stored in this area, of which approximately 7 1/2 million acre feet can be removed by pumping. The study further indicates that there is an annual average replenishment to this formation of approximately 15,000 acre feet. To fully realize the magnitude of this underground reservoir, one must realize that the present rate of withdrawal from this formation for municipal, industrial, and military needs is approximately 80,000 acre feet annually. Considering the amount of replenishment which occurs, there is presently a net rate of depletion of 65,000 acre feet annually, or about 1 percent of the stored volume of available water.

Even with the continued growth and development in the El Paso area, these three sources of water supply will be adequate to satisfy the needs of El Paso until at least the year 2000. The Texas Water Plan proposes to provide imported water for the municipal and industrial needs of El Paso when the local supply can no longer sustain the water requirements.

TABLE I-1B

GROUNDWATER PRODUCTION (One Gallon Units) 1970

Hueco Bolson Water Table	
Municipal:	
El Paso	11, 196, 818, 300
Fabens	127, 560, 500
Horizon City	262, 049, 120
Tornillo	11,619,070
Fort Bliss	1,706,293,000
Industrial:	
El Paso Natural Gas Co. (Hueco)	45,929,090
El Paso Natural Gas Co. (Newman)	130, 792, 600
Ashleys, Inc.	17,750,000
Standard Oil	880, 469, 000
El Paso Electric Company (Newman)	987,571,000
Peyton Packing	2, 250, 000
Price's Dairy (Newman)	1,900,000
Hueco Bolson (Artesian)	
Municipal:	
El Paso	1,820,732,000
Industrial:	
Ashleys, Inc.	17,750,000
Standard Oil	880, 469, 000
Peyton Packing	2, 250, 000
Phelps Dodge	515,726,000
Price's Dairy (North Loop)	135,000,000
Texaco	466, 718, 000
Canutillo Well Field	
Municipal:	
El Paso	
Deep	3, 078, 996, 000
Intermediate	1,267,079,000
Shallow	1,781,222,500
Anthony	85,026,000
La Tuna	148,640,000
Westway	20, 007, 100
Industrial:	
La Tuna (Irrigation)	629, 856, 000



Chapter 2 POPULATION STUDIES



Population Studies

The membership of the population is constantly changing. Some people are born each year and others die. There may also be a net gain or loss by migration. The growth or decline of the population depends primarily upon these three variable factors. This chapter analyzes and projects the population of the study area. Since a population is subject to constant change, it must be analyzed with reference to some particular time.

EL PASO COUNTY 1873-1970

In 1873 when the City of El Paso was incorporated, the County of El Paso had some 3,700 inhabitants and an area of almost 9,500 square miles. By 1920, nearly half a century later, the population had increased to more than 100,000, despite the fact that the county had lost nearly seven-eights of its area. The subsequent formation of new counties left El Paso County with 1,054 square miles.

During the next thirty years, the County's population almost doubled; in 1950, El Paso County contained 194,948 residents. An increase of 61 percent during the next decade brought the 1960 total to 314,070. It was a 14.4 percent increase during the 1960-1970 period that expanded the population to 359,291.

In 1873, one out of every 200 Texas inhabitants lived in El Paso County. In 1910, one in 70 Texans resided in this County, and by 1960 the proportion was one to every 30. Reversing the trend of the previous 100 years, the ratio in 1970 was 1 to 31. The County's percentage of the state population also declined by .1 percent.

TABLE II-1

RELATIONSHIP BETWEEN POPULATION OF EL PASO COUNTY

AND THE STATE OF TEXAS, 1873-1970

Year	State of Texas	County o Number	f El Paso State (% of)
1873	773, 200	3, 700	0.5
1900	3,048,710	24,886	0.8
1910	3,896,542	52,599	1.3
1920	4,663,228	101,877	2.2
1930	5,824,715	131,597	2.3
1940	6,404,824	131,067	2.0
1950	7,711,194	194,968	2.5
1960	9, 579, 677	314,070	3.3
1970	11, 196, 730	359, 291	3, 2

Sources: 1. Texas Highway Department, et al., El Paso
Transportation Study, Vol. 1, 1963-1985,
Austin, Texas, pg. 52

2. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population: Number of Inhabitants, PC (1)-A45 Texas, pg. 33

CITY OF EL PASO 1873-1970

From a city containing 764 people within an area of 7.2 square miles in 1873, El Paso grew to a population of 77,560 in an area of 25.8 square miles in 1920. By 1950, the City's area had increased to 29.0 square miles with a population of 130,485. During the next ten year period, the City of El Paso expanded to encompass a population of 276,687 residing in 114.8 square miles. The City grew in area to 117.96 square miles and in population by 16.5 percent to 322,261 between 1960 and 1970.

TABLE II-2
CITY-COUNTY POPULATION RELATIONSHIPS
1873-1970

	City o	of El Paso	County Population
Year	Number	% of County	Outside City
1873	764	20.7	2,936
1900	15,096	60.7	9,787
1910	39, 279	74.7	13,320
1920	77,560	76.1	24, 317
1930	102,421	77.8	29,176
1940	96,810	73.9	34,257
1950	130,485	66.9	64,483
1960	276,687	88.1	37, 383
1970	322, 261	89.7	37,070

Sources: 1. Texas Highway Department, et al., <u>Transportation Study</u>, Vol. 1, 1963-1985, pg. 51.

2. Bureau of the Census, Number of Inhabitants, pg. 33.

In 1873, the City of El Paso had only one-fifth of the County population. By 1910, three out of four of the County's inhabitants lived within the city limits. For the next thirty years until 1940, the relationship remained rather constant. During the following decade, 1940-1950, urban developments north and east of the City caused this ratio to drop to two-thirds. Growth during the next twenty years significantly altered the City-County population relationship.

POPULATION TRENDS 1960-1970

In the past there has been little association either in degree or direction between the population growth rates of the State and the El Paso metropolitan area. The 1960-1970 decade marked the first ten-year period in forty years that the population growth rate of the County closely approximated that of the State.

During the past decade, the rates of growth of the State and the County were more closely related than at any previous period. This anomaly may have been caused by the fact that the State, as a whole, experienced positive net migration of 146,017 and the County sustained negative net migration of 33,342. As might be expected, growth rates of the County and City have consistently been in the same direction. During four of the past

TABLE II-3

GROWTH RATES OF THE STATE OF TEXAS, EL PASO COUNTY
AND THE CITY OF EL PASO, 1900-1970

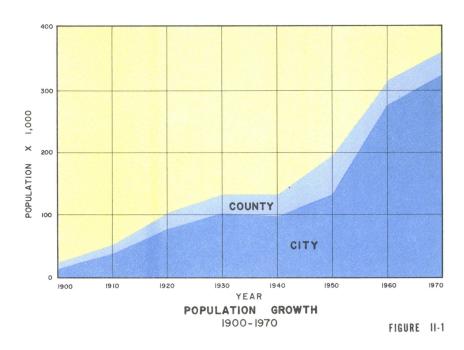
Year	State of Number	Texas Rate*	El Paso Number	County Rate	City of Number	El Paso Rate
1900	3,048,710		24,886		15,096	
1910	3,896,542	1.278	52,599	2.114	39, 279	2.601
1920	4,663,228	1.197	101,877	1.937	77,560	1.975
1930	5,824,715	1.249	131,597	1.292	102, 421	1.321
1940	6,404,824	1.100	131,067	. 995	96,810	. 945
1950	7,711,194	1.204	194,968	1.488	130,485	1.348
1960	9,579,677	1.242	314,070	1.611	276,687	2.120
1970	11, 196, 730	1.169	359, 291	1.144	322, 261	1.165

^{*} A ratio of 1.000 indicates perfect correspondence. A higher ratio indicates an increase; a lower ratio indicates a decrease.

Sources: 1. Texas Highway Department, et al., <u>Transportation Study</u>, Vol. 1, 1963-1985, pg. 51-52.

2. Bureau of the Census, Number of Inhabitants, pg. 33.

seven decades, they were relatively close in rates of growth. During all decades except those ending in 1940 and 1950, the City experienced higher rates of growth. For the 1960-1970 decade, the City's rate of growth was more closely related to that of the County and the State than at any previous period. Figure II-1 shows graphically the historical population growth of the City and the County.



There were wide variances in the growth rates among the communities within the study area. To facilitate this and subsequent analysis, the City of El Paso has been divided into five geographic areas. (See Figure II-2, Planning Areas.) This division has taken into consideration the existing natural and man-made barriers separating the areas. The other civilian communities of the study area lie on the periphery of the City with the highest population concentrations to the northwest and southeast. The Fort Bliss Military Reservation penetrates deeply into the heart of the City.

In 1960, nearly sixty percent of the City's population resided in the Central area. Less than eight percent of the population resided in the Northwest and Southeast sections. The 1960-1970 decade brought about a major redistribution of the City's residents. During the 1960-1970 decade, the population more than tripled in the Southeast section and nearly doubled in the Northwest. Significant growth occurred in the Northeast and Lower Valley sections, and the Central area experienced a substantial decline.

TABLE II-4

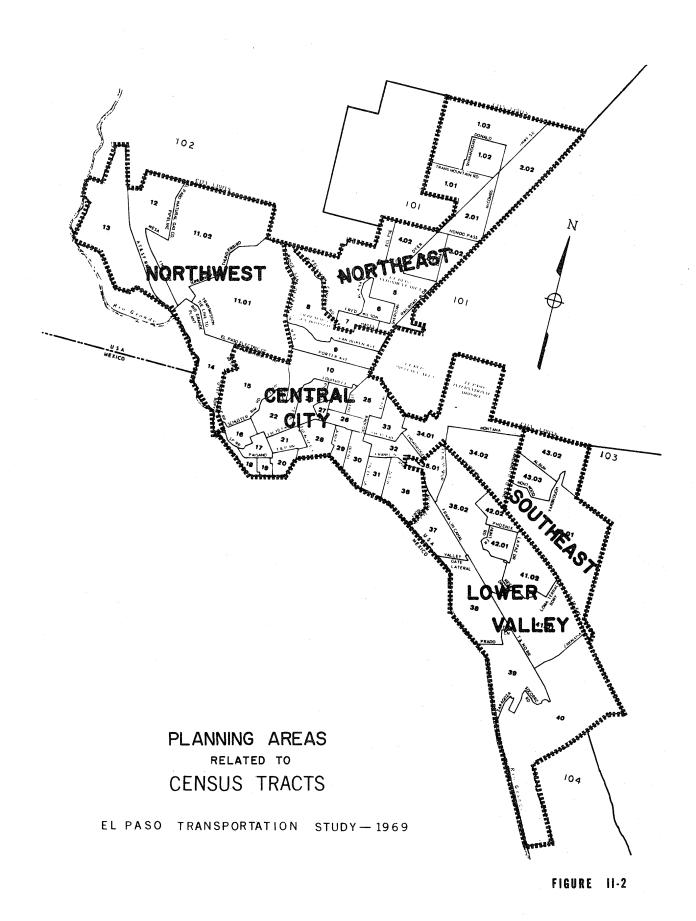
STUDY AREA POPULATION GROWTH AND DISTRIBUTION 1960-1970

	1960	1970	Growth Rate
City of El Paso	276, 687	322, 261	1.165
Northeast	35, 705	55, 337	1.549
Northwest	9, 995	19,425	1.941
Central	163, 971	143,907	. 878
Southeast	10,178	33, 698	3.310
Lower Valley	56, 838	69,894	1.230
Canutillo-Borderland	3, 948	4, 311	1.091
Westway (a)		614	
Pioneer-Desert View	30	30	1.000
Moon-Buford-Horizon (a) Socorro	432	2,878	6.662
San Elizario-Clint	4,560	4,081	. 894
U.S. Highway 62 & 180 (b)	9	56	6.222
Fort Bliss	21,571	17,514	. 811
Total study area	307, 237	351,745	1.145

- (a) Residential construction began in Horizon City and Westway in 1960.
- (b) Scattered Residences:

Sources: 1. Bureau of the Census, <u>U.S. Census of Population and Housing:</u>
1960, Census Tracts of El Paso, Texas Standard Metropolitan
Statistical Area, PHC (1)-43, 1961, pg. 13-16.

2. Ibid., General Characteristics of Population: 1970, Census
Tracts of El Paso, Texas, Standard Metropolitan Statistical
Area, 1971, pg. P-1 - P-5.



The 1960-1970 population growth rate for the City of El Paso was higher than that of the study area as a whole and the Canutillo-Borderland and Socorro-San Elizario-Clint regions. The large increase that occurred in the Moon-Buford-Horizon area can be attributed mainly to the growth in Moon City and Buford. In 1970, the Horizon City population had reached a total of about 300.

The population decline in the Socorro-San Elizario-Clint area may have been caused by the drop in agricultural production. However, the consistent increases in the agricultural segment of the labor force since 1968 indicate the probability of future positive population growth in this region.

The drop in the Forth Bliss population was a major contributor to the negative net migration for the County during the past decade.

TABLE II-5

NATURAL GROWTH IN EL PASO COUNTY
1960-1970

Year	Births	Deaths	Growth	Yearly Difference
1960	13,003	1,981	11,022	- -
1961	12,463	1,855	10,608	- 414
1962	12,201	1,978	10, 223	- 385
1963	11,817	1,950	9,867	- 356
1964	11,075	1,908	9,167	- 700
1965	10, 158	1,998	8,160	-1007
1966	9,922	2,100	7,822	- 338
1967	9,997	2,128	7,869	+ 47
1968	10,310	2, 251	8,059	+ 190
1969	11,054	2,358	8,696	+ 637
1970	11,731	2,419	9,312	+ 616
1971*	11,616	2,350	9, 266	- 46

^{*} Estimate based upon projection of ten month average.

Source: El Paso City-County Health Department, November, 1971.

Following the directional change in natural growth in 1967, there were significant gains in 1969 and 1970. It appears that the growth for 1971 will be numerically close to that of the previous year, suggesting quantitative stabilization. Natural growth was the most important factor contributing to the 1960-1970 population growth in the County, as can be seen in the comparison of 1960 and 1970 cohorts.

The 1960 population of 314,070, minus the net loss of 33,655 for ages 10 and over, plus 78,876 children under 10 years of age reported in the census, equal the 1970 population of 359,291. All of the 1960 cohorts except the 10-14 category had decreased by 1970.

The direction of the distribution changes correlates with statewide changes in five of the six cohorts. The State experienced a slight negative change in the 5-14 age group. The magnitude of the changes was significantly greater in three categories. Nearly identical positive changes occurred in the 15-24 classification, and the State had a one percent

TABLE II-6

COMPARISON OF EL PASO COUNTY COHORTS*

1960 and 1970

Age 1960	Census 1960	Age 1970	Census 1970	Change
Under 5	47,465	10-14	43,844	- 3,621
5-9	39,806	15-19	37,677	- 2,129
10-14	31,333	20-24	35, 923	+ 4,590
15-24	52,081	25-34	43,885	- 8,196
25-34	49,559	35-44	42,907	- 6,652
35-44	39,514	45-54	34,070	- 5,444
45-49	13,433	55-59	11,807	- 1,626
50-54	10,938	60-64	9,666	- 1,272
55-64	15,709	65-74	13, 279	- 2,430
65 and over	14,232	75 and over	7, 357	<u>- 6,875</u>
			Total Change	-33,655

^{*} A cohort is the group of people born during a given period, identified in a census as an age group.

Sources: 1. Bureau of the Census, <u>Census Tracts El Paso, Texas</u>, SMSA, 1961, pg. 13-16.

TABLE II-7
EL PASO COUNTY AGE DISTRIBUTION
1960 and 1970

	19	60	19	70	Percent
Age	Number	Percent	Number	Percent	Change
Under 5	47, 465	15.1	36,639	10.2	-4.9
5-14	71,139	22.6	86,078	23.9	+1.3
15-24	52,081	16.6	73,559	20.5	+3.9
25-44	89,073	28.4	86, 731	24. 1	-4.3
45-64	40,080	12.8	55,565	15.5	+2.7
65 and over	14,232	4.5	20,719	5.8	+1.3
Total	314,070	100.0	359, 291	100.0	

Source: Bureau of the Census, 1970 Census of Population and Housing, PHC (2)-45 Texas, pg. 35.

^{2.} Ibid., Census Tracts, El Paso, Texas, SMSA, 1971, pg. P-1 - P-5.

positive change in the 65 and over age group.

Two factors influenced the relatively high negative change in the under 5 cohort. First, there were about 15 percent fewer total births from 1965 through 1969 than during the previous five-year period. Second, the decline in this category is related to the high negative change in the 25-44 classification.

TABLE II-8

COMPARISON OF STATE AND COUNTY

IN AGE DISTRIBUTION

1960-1970 (in percentages)

	1	960	19	70
Age	State	County	State	County
Under 5	12.1	15.1	9.0	10.2
5-14	21.0	22.6	20.8	23.9
15-24	14.3	16.6	18.3	20.5
25-44	26. 1	28.4	24.0	24.1
45-64	18.7	12.8	19.1	15.5
65 and over	7.8	4.5	8.8	5.8
Total	100.0	100.0	100.0	100.0

Source: Bureau of the Census, 1970 Census of Population and Housing, pg. 35.

Although the variance narrowed in the under 5 cohort, it widened in the 5-14 category. The close agreement in the 25-44 classification represents a significant State and County relationship. The County's 45-64 group moved somewhat closer to the statewide percentage. In 1960, 74.5 percent of the State population was under 45 years of age, compared to 82.7 percent of the County. By 1970, this relationship had changed to 72.1 and 78.7 respectively.

Table II-9, Age and Sex Distribution, 1970, shows a comparison of age and sex distribution for the City and County as obtained in the 1970 census. As mentioned in Chapter I, these data, when compared with the 1960 census data, indicate an increase in the percentage of population above thirty-five years of age and also an increase in the median age.

POPULATION PROJECTIONS

The projection of the population for the study area necessitated the establishment of valid growth rate factors for the ensuing years. The 1960-1970 rate was not considered to be reliable because of its wide variance with past decades and unusual correlation with State growth. There have also been recent developments which suggest higher

TABLE II-9

AGE AND SEX DISTRIBUTION
1970

	C	ity of	El Paso				County of El Paso				
	Male		Fema	Female		Male		Fema	le	% of	
Age Group	Number	%	Number	%	Total	Number	%	Number	%	Total	
Under 5 yrs.	16, 621	51.2	15,863	48.8	10.1	18, 722	51.1	17, 917	48. 9	10.2	
5 to 14 yrs.	39, 493	50.2	38,756	49.5	24.3	43, 373	50.4	42,705	49.6	24.0	
15 to 17 yrs.	10,798	49.6	10,992	50.4	6.8	11,725	49.8	11,831	50.2	6.5	
18 to 20 yrs.	8,285	45.5	9,940	54.5	5.7	11, 386	51.2	10,860	48.8	6.2	
21 to 24 yrs.	10, 268	47.5	11,346	52.5	6.7	14, 983	54.0	12,774	46.0	7.7	
25 to 34 yrs.	17,884	46.2	20,787	53.8	12.0	20, 794	47.4	23,085	52.6	12.2	
35 to 44 yrs.	18, 266	46.3	21,164	53.7	12.2	20, 175	47.1	22,677	52.9	11.9	
45 to 54 yrs.	15,443	48.1	16,636	51.9	9.9	16, 443	48.3	17,602	51.7	9. 5	
55 to 59 yrs.	5, 257	47.4	5,829	52.6	3.4	5,618	47.6	6, 192	52.4	3.3	
60 to 64 yrs.	4, 122	45.0	5,041	55.0	2.8	4,402	45.3	5,308	54.7	2.7	
65 to 74 yrs.	5,305	42.6	7,161	57.4	3.9	5, 687	42.8	7,600	57.2	3.7	
75 yrs. and over	2,759	39.4	4, 245	60.6	2.2	2,969	39.9	4,463	60.1	2.1	
TOTAL	154, 501	47.9	167,760	52.1	100.0	176, 277	49.1	183,014	50.9	100.0	
	Male	Э	Fema	le	Total	Male	Male		ıle	Total	
Median Age 1960						22. 2	22. 2		. 0	22.6	
1970	26.7	7	28.	4	27.6	26.3	3	28	. 1	27.2	
Percent of											
Population - 19	60					28.	7	31	. 1	29.9	
Over 35 yrs 197	70 33.	Į.	35.	3	34.5	31,4	4	34.9		33.2	

rates of future growth. Since the expansion or decline of the population depends primarily upon natural growth and migration, these variables were analyzed to observe their impact upon population growth from August, 1970 to August, 1971. This period will be referred to as the observation period.

During the observation period, there were 11, 953 births and 2,340 deaths in El Paso County resulting in a natural growth of 9,613. As previously mentioned, the migratory processes have positive and negative effects upon this type of growth.

With the presently available data collection systems, in-migration can be most accurately measured by analyzing residential construction activities. Because of the many relocations within the County, housing construction provides only a general indication of population expansion. In view of this limitation, three steps were taken to examine the impact of housing construction upon population growth.

First, a comparison was made between the number of building permits issued in 1970 and 1971. Through September, 1970, permits had been issued for the construction of 2,664 residential units. Through the same period in 1971, 4,280 permits had been issued, representing a 61 percent increase. The legal time limit for the execution of these permits is six months. Many permits are never executed. Nevertheless, the large increase in number of construction authorizations signifies some degree of population growth.

The second step involved the determination of an execution percentage for the housing permits. The comparison of 1960 and 1970 census data and building authorizations from 1960 through 1969 indicated an execution rate of 83 percent. The application of this percentage to the 4,691 residential permits issued from September, 1970, through August, 1971, produced 3,894 housing units.

Finally, to determine the number of these units that would probably be occupied by incoming families, a sample of home buyers was taken from the County deed rolls.

TABLE II-10

SAMPLE OF HOME DEED TRANSACTIONS
JANUARY - APRIL, 1971

	Location of Property Inside City Outside City*								
Buyer	Number	Percent	Number	Percent					
Out-of-Town Local	51 151	25 <u>75</u>	4 <u>4</u>	50 _50					
Total	202	100	8	100					

^{*} Excluding Horizon Properties.

Source: El Paso County Deed Rolls, 322, 323, 331 and 337 January - April, 1971.

This sample suggests that most of the out-of-town buyers purchase property inside of the City and that relatively few residents of the City are moving to the outlying areas. The high percentage of local buyers of property inside the City indicates that there is substantial internal shifting of the population. The Horizon Properties were excluded from the analysis because of the speculative nature of this land, and many of

the transactions are for investment purposes only. Nevertheless, the sample included 60 out-of-town purchasers and one local purchaser of property in the Horizon area.

Based upon the relationship reflected in the sample, it has been assumed that 25 percent of the newly constructed homes are occupied by incoming families. The application of this percentage to the 3,894 added housing units suggested the probable number of incoming families to be 974. Since there are 3.6 persons per occupied housing unit within the City, the in-migration was estimated at 3,506. It has been further assumed that since 7 percent of the out-of-town buyers purchased property outside of the City, the total in-migration was 3,770.

The projection of the estimated annual average out-migration for the 1960-1970 decade provided the assumed out-migration for the observation period. The net negative migration for the County for the past decade is known to be 33,342 (98,584 births minus 20,021 deaths minus census increase 45,221). The in-migration for the 1960-1970 period was estimated to be 23,301 (25 percent of 21,889 added housing units times 3.6 occupancy factor). The annual average of the sum of these two elements, 5,644 was assumed to be the out-migration for the observation period.

In summary, natural growth (9,613), plus in-migration (3,770), minus out-migration (5,664), equal the estimated population growth for the observation period (7,719 or 8,000). This represents a growth rate of 1.022 which was used as the basic factor in the population projection.

The 1970 population is shown along with population projections to year 2000 in Table II-11, aggregated by geographic areas (Figure II-2).

TABLE II-11
POPULATION PROJECTION
1970-2000

	19	70	19	75	198	80
Geographic Area	D.U.	POP.	D. U.	POP.	D. U.	POP.
Northeast	15,678	55, 337	18,857	66,000	22,437	76,000
Northwest	5,927	19,425	9,091	30,000	11,471	39,000
Central City	45,120	143,907	46,331	140,000	47,490	139,000
Southeast	9, 474	33,698	12,857	45,000	16,669	60,000
Lower Valley	16,505	69,894	19,831	79,000	21, 921	83,000
Subtotal	92,704	322, 261	106, 967	360,000	119, 988	397,000
Canutillo-Vinton-Westway	1,434	4,925	1,647	5,600	1,853	6,300
Pioneer-Desert View	7	30	29	100	58	200
Fort Bliss	2,957	17,514	2,957	17,500	2,957	17,500
Montana-Moon-Horizon	766	2,878	1,324	4,900	1,568	5,800
Clint-Socorro-San Elizario	1,054	4,081	1,184	4,500	1,317	5, 200
Subtotal	6,218	29, 248	7,141	32,600	7,753	35,000
Anthony	793	2,154	813	2,600	938	3,000
Futureland-Newman	62	211	88	300	118	400
Montana-Hwy, 62-180	15	56	27	100	27	100
S. Clint-Fabens-Tornillo	1,432	5, 361	1,588	5, 400	<u>1,667</u>	<u>5,500</u>
Subtotal	2,302	7,782	2,506	8,400	2,750	9,000
Total outside city limits		37, 030		41,000	·	44,000
Total County	101, 224	359, 261	116,624	401,000	130, 491	441,000

TABLE II-11 (Continued)

	19	85	19	90	19	95	2000		
Geographic Area	D, U.	POP.	D.U.	POP.	D. U.	POP.	D. U.	POP.	
Northeast	25, 294	86,000	27, 941	95,000	30, 294	103,000	32, 353	110,000	
Northwest	13,529	46,000	15,900	54,000	18,788	62,000	21, 212	70,000	
Central City	48,297	140,000	49,521	141,000	49,866	142,000	49,310	143,000	
Southeast	20,555	74,000	23, 243	86,000	25,789	98,000	28,684	109,000	
Lower Valley	24,159	88,000	26, 289	95,000	28,639	103,000	31, 113	112,000	
Subtotal	131,834	434,000	142,894	471,000	153, 376	508,000	162, 672	544,000	
Canutillo-Vinton-Westway	2,030	6,700	2, 121	7,000	2,250	7, 200	2,313	7,400	
Pioneer-Desert View	76	300	91	400	125	450	156	50	
Fort Bliss	2,960	17,500	2,960	17,500	2,960	17,500	2,960	17,50	
Montana-Moon-Horizon	1,703	7,300	1,889	8,200	2,167	8,300	2,514	8,80	
Clint-Socorro-San Elizario	1,382	5,800	1,486	6,000	1,540	6, 150	1,667	6,10	
Subtotal	8,151	37,600	8,547	39, 100	9,042	39, 700	9,610	40,30	
Anthony	1,031	3, 300	1, 161	3,600	1,226	3,800	1, 333	4,00	
Futureland-Newman	132	450	152	500	167	550	180	60	
Montana-Highway 62-180	42	150	56	200	86	300	114	40	
S. Clint-Fabens-Tornillo	1,719	5,500	1,750	5,600	1,823	5,650	1,839	5,70	
Subtotal	2,924	9,400	3, 119	9, 900	3,302	10, 300	3, 474	10,70	
Subtotal County		47,000		49,000		50,000		51,00	
Total County	142,909	481,000	154,560	520,000	165,720	558,000	175, 748	595,00	

Computed by the Department of Planning and Research, City of El Paso, Texas, November, 1971.

The current and projected population is also shown by Census Tracts (Figure II-3) in Table II-12.

The 1970 and projected population distribution is shown by Census Tract in Figure II-4 and Figure II-5 respectively.

(The Planning Survey Division, Texas Highway Department, has developed from the Third Count Census Summary Tapes, using an equivalency table prepared for the El Paso Transportation Study, a computer tabulation of the following information for each Survey Zone (from the 1970 O&D Survey) in the El Paso SMSA:

Total dwelling units, occupied dwelling units, population, persons per total dwelling units, persons per occupied dwelling units, dwelling unit values, and contract rent. This tabulation will be of considerable value to the continuing planning effort.)

The application of the growth rate of 1.022 in the exponential function equation P2=P1rt produced the County projection for 1975 (P1=1970 population; r=annual growth rate; t=projected number of years; P2=1975 population.

359,291 x 1.116 (Value of .022x5 obtained from table of exponential functions) 401,000.

The populations for the subareas of the County were computed through the projections of percentile relationships. For example, the City's percentage of the County population has steadily increased and is expected to continue to do so. The Fort Bliss population declined during the past decade but should be relatively stable in the future.

It is anticipated that the quantitative increase in the County population will be comparatively constant throughout the period. This assumption is based upon the stability of natural growth, prospective economic developments, and expected migratory trends. A constant quantitative increase will produce a slightly declining rate of growth.

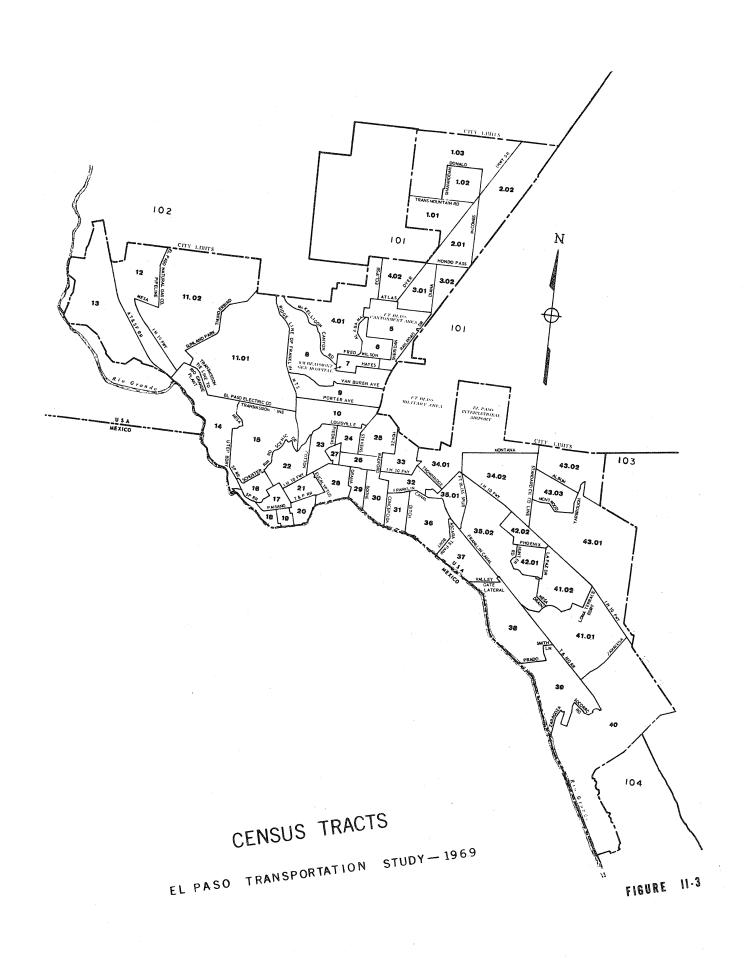


TABLE II-12

TRANSPORTATION STUDY POPULATION AND DWELLING UNITS PROJECTIONS Department of Planning and Research 1970 to 2000

CENSUS	19	70	197	75	19	80	19	85	19	90	1995		20	000
TRACT	D.U.	POP.	D.U.	POP.	D.U.	POP.	D.U.	POP.	D. U.	POP.	D.U.	POP.	D.U.	POP.
Northeast														
1.01	1,260	4,621	1,460	5,130	1,545	5,662	1,545	5,662	1,545	5,662	1,545	5,662	1,545	5,662
1.02	2,140	8,121	2,340	8,821	2,457	9,091	2,457	9,091	2,457	9,091	2,457	9,091	2,457	9,091
1.03	2,270	8,431	3,019	11,230	3,925	14,030	4, 977	17,405	6,550	22,476	8,303	28, 231	10, 362	35,230
2.01	2,459	8,537	2,759	9,381	3,240	10,692	3,656	12,064	3,656	12,064	3,656	12,064	3,656	12,065
2.02	1,322	5,319	1,722	6,888	2,674	10,307	3,026	11,498	3,479	13,220	3,779	13, 982	3,779	13, 982
3.01	1,899	5,954	2,299	7,127	2,506	7,518	2,712	8,136	2,922	8,766	2,922	8,766	2,922	8,766
3.02	1,657	6,161	1,857	6,871	2,063	7,427	2,216	7,756	2,216	7,756	2,216	7,756	2,216	7,756
4.01	1,047	3,608	1,321	4,591	1,595	5, 263	1,869	5,980	2,056	6, 785	2,156	7,115	2,156	7, 115
4.02	1,624	4,585	2,080	5,961	2,432	6,010	2,836	8,408	3,060	9,180	3, 260	10,333	3, 260	10,333
Totals	15,678	55,337	18,857	66,000	22, 437	76,000	25, 294	86,000	27, 941	95,000	30, 294	103,000	32, 353	110,000
Northwest														
1.01	1,592	4,668	2,659	8,436	3,259	10,428	3,885	12,432	4,509	14,503	5,133	15,912	5,757	18,993
1.02	2,103	7,119	3,170	10,461	3,621	11, 949	4,253	14, 125	5,200	17, 160	7,168	23,078	8,968	29, 992
12.0	587	1,931	1,000	3,000	1,500	4,950	1,800	6,120	2,000	6,674	2,296	7, 347	2,296	7, 347
13.0*	1,183	3,971	1,700	5,780	2,500	8, 250	3,000	9,:900	3,600	12, 240	3,600	12, 240	3,600	12, 245
14.0	462	1,736	562	2,023	591	3, 423	591	3,423	591	3,423	591	3, 423	591	3, 423
Totals	5, 927	19,425	9,091	30,000	11,471	39,000	13,529	46,000	15,900	54,000	18,788	62,000	21,212	70,000

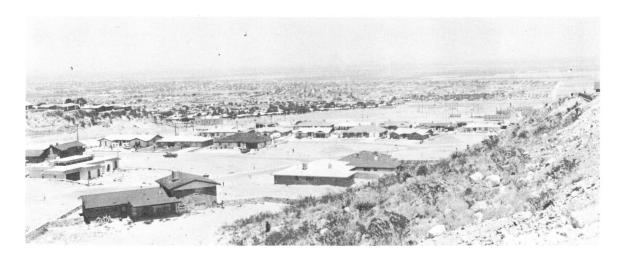
^{*}Includes 9 DU and 27 pop. for 1970 which is actually in Census Tract 102.

TABLE II-12 (Continued)

CENSUS	19	970	19'	75	19	980	19	985	1	990	19	995	20	000
TRACT	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.
5	741	3, 227	841	3,200	941	3,100	941	2,800	941	2,800	941	2,795	941	2, 72
6	1,324	4,289	1,424	4,314	1,465	4,214	1,465	4,202	1,465	4,202	1,465	4,202	1,465	4,348
7	177	691	182	700	182	650	182	650	182	6 25	182	600	182	52
8	2,324	6, 190	2,374	6,209	2,380	6,457	2,380	6,644	2,380	6,664	2,380	6,800	2,380	6, 90
9	2,419	6,865	2,469	6,913	2,506	6,913	2,506	7,016	2,506	7,016	2,506	7,166	2,506	7,26
10	2,701	8,047	2,801	8,081	2,885	8,081	2,885	8,081	2,886	8,081	2,886	8,274	2,885	8,36
15	2,837	7,682	3,040	7,861	3,230	8,500	3,286	9,200	3,286	9,200	3,286	9,528	3,286	9, 52
16	2,636	6,346	2,736	6,466	2,789	6,600	2,874	7,047	2,874	7,647	2,874	7, 947	2,886	8, 36
17	1,368	2,580	1,068	1,529	1,000	1,393	1,381	3,027	1,381	3,860	1,382	3,970	1,386	4,01
18	1,270	3,759	1,320	3,828	1,350	3,828	1,378	3,846	1,378	3,856	1,378	3,958	1,386	4,01
19	1,936	6,552	1,985	6,592	2,022	6,592	2,088	6,301	2,085	6,038	2,085	6,038	2,086	6,04
20	1,316	5,110	1,251	4,378	1,398	4,338	1,400	4,300	1,485	4,358	1,485	4,358	1,486	4,30
21	1,244	3,109	1,594	3,264	1,594	3,657	1,586	4,200	1,586	4,440	1,588	4,604	1,588	4,60
22	3,169	8,892	3,238	8,966	3,338	9,100	3,439	9,200	3,638	10,186	3,740	10,621	3,838	11, 12
23	1,936	5,973	1,900	5,700	1,978	5,700	2,043	5,700	2,943	-5,720	2,943	5,820	2,100	6,08
24	1,315	4,022	1,320	4,022	1,326	3,992	1,326	3,992	1,415	3, 992	1,515	4,242	1,600	4,63
25	2,092	6,784	2,192	6,814	2,209	6,842	2,309	6,865	2,250	6,865	2,350	6,880	2,400	6,95
26	939	3,381	942	3, 291	944	3,127	944	2,943	944	2,760	986	2,760	1,000	2, 89
27	351	936	300	680	275	680	275	680	250	700	250	700	250	72
28	2,252	8,297	2,264	7,900	2,264	7,507	2,260	7,328	2,260	6,928	2,260	6,728	2,260	6,55
29	1,249	4,959	890	3,471	865	3, 101	860	2,908	860	2,708	850	2,580	850	2,46
30	1,489	6.157	1.449	5,551	1,449	5,251	1,449	4,832	1,440	4,632	1,430	4,404	1,430	4, 14
31	986	4,666	1,221	4,895	1,221	4,907	1,221	4,448	1,267	4,548	1,285	3,918	1,300	3,77
32	1,170	5,022	1,200	5,022	1,264	4,265	1,204	4,371	1,204	3,918	1,204	3,771	1,204	3,49
33	2,033	6,144	2,038	6,150	2,038	5,906	2,038	5,906	2,038	5,806	2,038	5,910	2,038	5, 91
34.01	1,454	5,162	1,754	5,514	1,954	5,614	1,954	5,614	1,954	5, 571	9, 154	5,667	1,954	5, 66
35.01	16	84	23	84	23	80	23	79	23	79	23	79	23	7
36	2,376	8, 981	2,515	8,605	2,600	8,105	2,600	7,800	2,600	7,800	2,600	7,680	2,600	7, 55
otals	45,120	143, 907	46,331	140,000	47,490	139,000	48,297	140,000	49,521	141,000	49,866	142,000	49,310	143,00

TABLE II-12 (Continued)

CENSUS	19	70	19	75	19	80	19	85	19	90	10	995	20	000
TRACT	D.U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.	D. U.	POP.
Lower Valleý														
35, 02	2,232	7,668	2,532	8,607	2,832	9,062	3,032	10,309	3,332	11,362	3,382	11,362	3,435	12,366
37.00	2,689	11,601	2,939	12,057	3,123	12,492	3,223	12,892	3,223	12,892	3,223	12,892	3,223	12,892
38.00	2,318	9,645	2,918	11,595	3,418	12,464	3,818	13,363	4,018	14,467	4,216	14,756	4,216	14,756
39.00	1,950	8,057	2,350	9,164	2,800	10,360	3,200	11,520	3,500	12,250	3,700	12,950	3,950	13,825
40.00	545	2,770	900	3,510	1,033	3,822	1,671	5,107	2,479	7,680	3,716	12,519	5,209	17,047
41.01	1,325	5,264	1,845	7, 195	2,045	7,567	2,345	8,442	2,745	9,543	3,410	11,715	4,088	14,308
41.02	2,047	9,340	2,847	11,102	3,047	11,274	3, 247	11,689	3, 369	12, 128	3,369	12, 128	3,369	12, 128
42.01	1,743	8,371	1,800	8,460	1,855	8,533	1,855	7,606	1,855	7,606	1,855	7,606	1,855	7,606
42.02	1,656	7,178	1,700	7,310	1,768	7,426	1,768	7,072	1,768	7,072	1,768	7,072	1,768	7,072
Sub-Total	16,505	69,894	19,831	79,000	21,921	83,000	24, 159	88,000	26,289	95,000	28,639	103,000	21,113	112,000
Southeast														
34.02	3,557	12,624	4,157	14,550	4,659	16,716	5,210	18,756	5,210	19,277	5,210	19,798	5,210	19,798
43.01	1,517	5,431	3,150	11,025	5,274	18,875	8,409	30,088	11,025	40,793	13,071	49,670	15, 283	58,075
43.02	2,239	7,958	3,339	11,686	4,439	15, 953	4,639	16,700	4,711	17,431	5,211	19,802	5,894	22,397
43.03	2,161	7,685	2,211	7,739	2, 297	8,456	2, 297	8,456	2,297	8,499	2,297	8,730	2,297	8,730
Sub-Total	9,474	33,698	12,857	45,000	16,669	60,000	20,555	74,000	23, 243	86,000	25,789	98,000	28,684	109,000



This projection does not reflect the impact of possible alterations in the status of commuters from Juarez. There are approximately 13,000 Mexican citizens who commute daily from Juarez to El Paso. These commuters have been legally authorized to reside in the United States but have chosen to maintain their domicile in Mexico. In addition to this group, there are approximately 5,000 United States citizens who work in El Paso but maintain lodgings in Juarez. The discontinuance of the right to commute could result in a population increase of approximately 50,000 for El Paso County.

Although the City experienced a substantial loss of population, it was not directly proportional to the City-County population relationship. The City contains nearly ninety percent of the County population, but only about seventy-four percent of the County's loss can be attributed to the City.

TABLE II-13

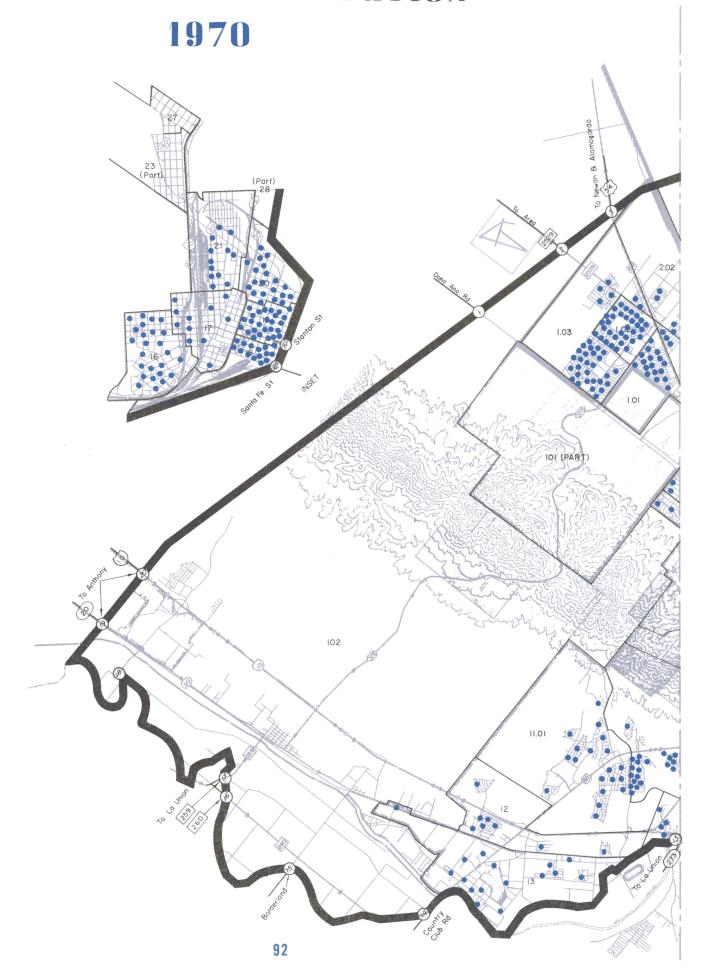
COMPARISON OF CITY COHORTS
1960 and 1970

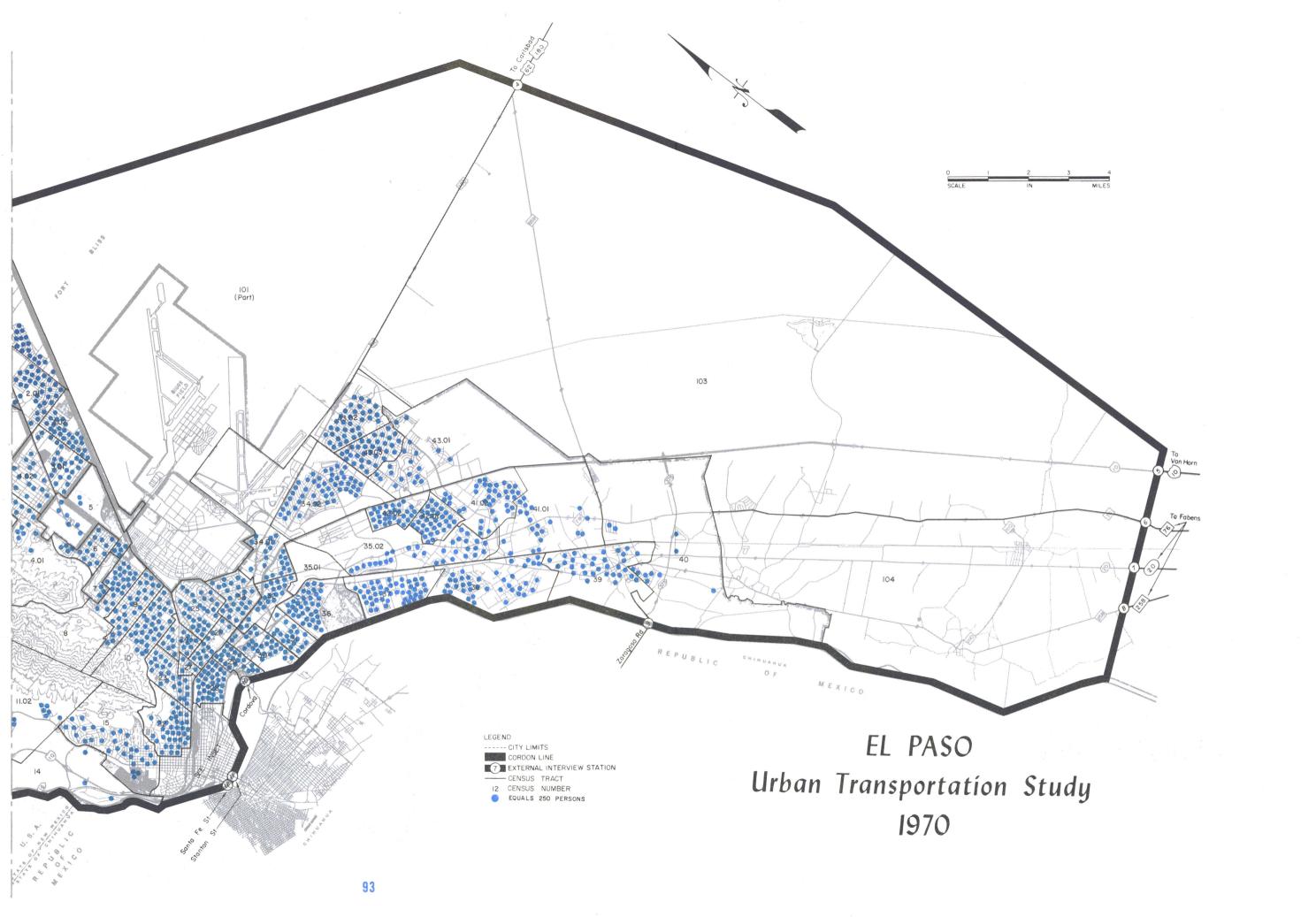
1960)	1970		
Age	Census	Age	Census	Change
Under 5	42,160	10-14	40,115	-2,045
5-9	35,590	15-19	33,938	-1,652
10-14	28, 242	20-24	27,712	- 530
15-24	41,913	25-34	38,680	-3,233
25-34	42,728	35-44	39, 458	-3,270
35-44	35, 334	45-54	32, 119	-3,215
45-49	12,378	55-59	11,090	-1,288
50-54	10,232	60-64	9,120	-1,112
55-64	14,759	65-74	12,458	-2,301
65 and over	13, 351	75 and over	6, 935	-6,416
		Т	otal Change	-25,062

Sources: 1. Bureau of the Census, <u>Census Tracts El Paso</u>, Texas, SMSA, 1961, pg. 13-16.

2. Ibid., Census Tracts, El Paso, Texas, SMSA, 1971, pg. P-1 - P-5.

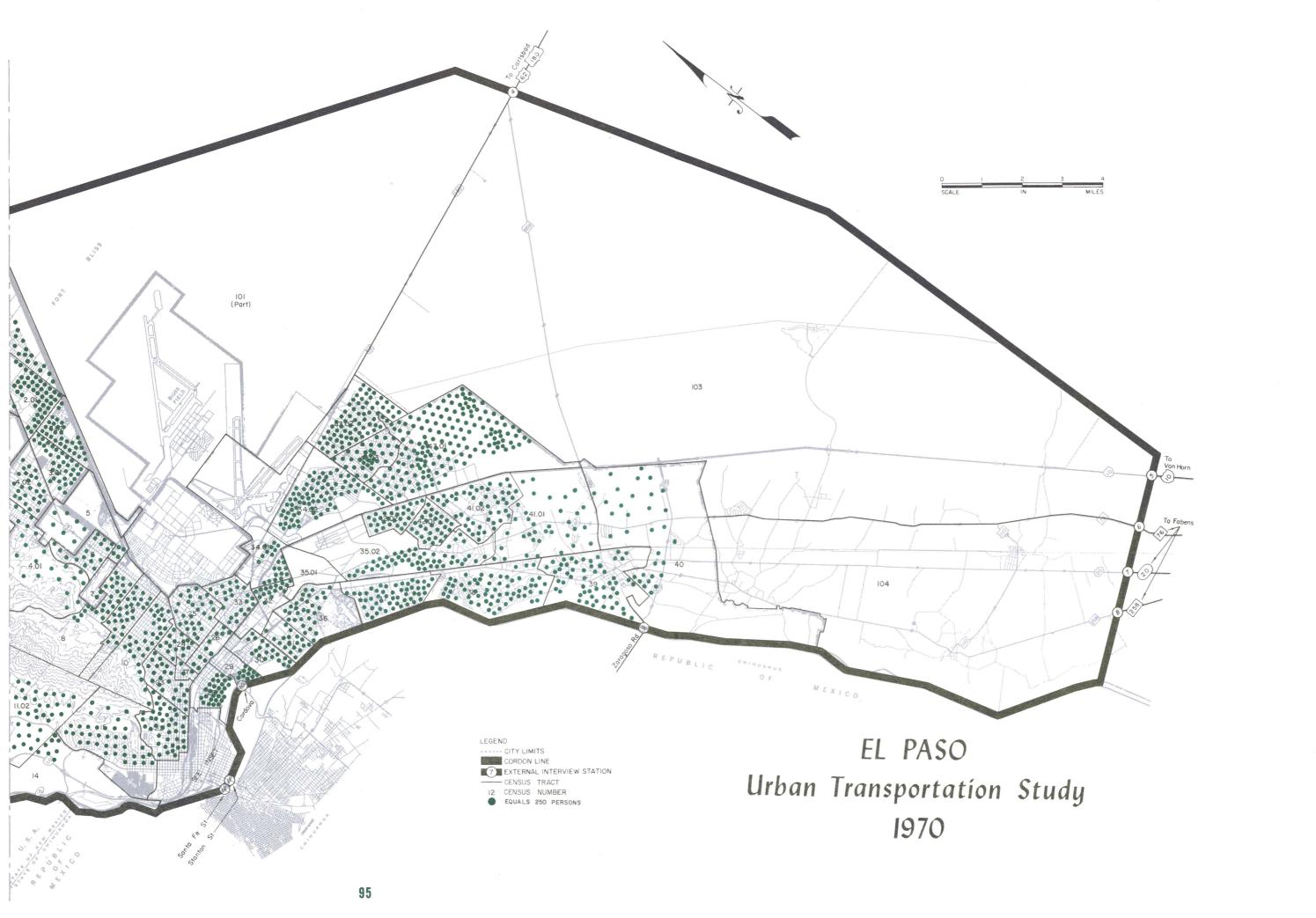
POPULATION DISTRIBUTION





POPULATION DISTRIBUTION





The 1960 City population of 276,687, minus the net loss of 25,062 for ages 10 and over, plus the 70,636 under 10 years of age reported in the census, equal the 1970 population of 322,261. While there was a gain for the 10-14 cohort for the County, the City lost population in all categories. Within the City, the loss was greater among males than females except the 65 and over cohort. Two female cohorts, 5-9 and 10-14, realized slight gains.

Of the five outlying regions of the County, two experienced migratory gains:

Census Tract	Ch	anges in 1960 Popula	ıtion
101 (Fort Bliss)		-7, 356	
102 (Anthony-Canutillo-Border	·land)	+ 461	
103 (Moon-Buford-Horizon)		+1,705	
104 (Socorro-San Elizario-Clir	nt)	-1,693	
105 (Fabens-Tornillo)	-1,710	<u>-1,710</u>	
	Net Ch	ange -8,593	

In addition to the City, population expansion occurred in two of the outlying regions of the County during the 1960-1970 decade: Census tracts 102 and 103. Migratory growth was a major factor in only one region, census tract 103.

POPULATION OF JUAREZ, MEXICO

The population growth of the Juarez area over the past forty years is reflected in the following tabulation.

Year	Population
1930	43, 138
1940	55,024
1950	131, 308
1960	276, 995
1970	436, 054

Source: State of Chihuahua Department of Industry and El Paso Area Fact Book, 1971-72.

Of particular significance is the rapid rate of growth during the last decade which amounted to a fifty-seven percent increase during the period. It is expected that Juarez will continue to grow at a very rapid rate and the 1990 population is expected to reach 650,000 to 700,000.

References:

- 1. Texas Highway Department, et al., El Paso Transportation Study, <u>Basic Elements</u> and Plan, Volume 1, 1963-1985 (1969)
- 2. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population and Housing, (1971)
- 3. U.S. Department of Commerce, Bureau of the Census, 1960 Census of Population and Housing (1961)
- 4. El Paso City-County Health Department (1971)
- 5. El Paso County Deed Rolls (1971)
- 6. Department of Planning, City of El Paso, Texas
- 7. State of Chihuahua, Department of Industry
- 8. El Paso Chamber of Commerce, El Paso Area Fact Book, 1971-1972 Edition



Chapter 3

LAND USE



Land Use

Land use distribution governs the origin and destination of a large portion of trips, that is, where they will start and where they will terminate. For this reason, a land use study is an essential element of any urban transportation study. Residences of people dictate the starting points of much of the daily travel. Similarly, the destinations of many trips are controlled by the location of employment, shopping, cultural, and recreational areas. In turn, the location of these land uses is influenced to a marked degree by transportation facilities. A delicate balance of these two factors is essential.

CURRENT LAND USE

The current land use was determined by updating the study made in connection with the 1969-1970 Origin and Destination Survey. The study area consists of 422 square miles or 269,980 acres of land, of which 129.13 square miles or 75,476.6 acres are within the city limits of El Paso. Current land use is analyzed for the City as a whole initially and then broken down into specific planning areas (Figure II-2) -- Northeast, Central City, Northwest, and Southeast (including Lower Valley) -- for the purpose of area relationships and comparisons.

In most cases, a certain amount of land is zoned for a specific land use, however, only a certain percentage of that area is being used at the present time for that specific purpose. The percentages and figures given are for actual land use at the present time.

The single largest category of land use in the City is public and quasi-public, with 22.16 percent of the total City area being used for this purpose. A large percentage of this total is taken up by Ascarate Park, The University of Texas at El Paso, the El Paso International Airport and schools.

The second largest user of land is residential, including apartments and mobile homes. Residential areas and their related land uses are generally low in density, thus occupy a large area. This requirement for large acreage means these uses cannot compete with business and industry for central locations. New residential growth, therefore, takes place on the outskirts or on bypassed acreage where land is less expensive and more readily available. The 1970 census showed there were 96,632 dwelling units in the City or an average of 6.9 dwelling units per acre of residential land. 15,499.9 acres of land, or 20.53 percent of the City land area, are used for residential purposes. The influence of this residential land is actually greater than the 20.53 percent, since a large portion of the streets, public uses, and commercial activities serve it exclusively. If these supporting uses were included, about thirty-five percent of the developed land would be residential in character.

Commercial land encompasses a variety of activities and a variety of locational characteristics. In addition to retail stores, this category includes personal and business services, offices, automotive and allied services, and some contracting and building trades. Even with this broad coverage, commercial land uses occupy only 6,614.8 acres or 8.74 percent of the developed land. Despite its small area, according to the O-D Survey, over twenty-three percent of all person trips are destined for the areas in commercial use, thus making it the most intensively used land from a traffic standpoint.

The next highest land use in the City is agriculture. 6,305.6 acres or 8.35 percent of the City land use is in agriculture. The majority of this land is located in the upper and lower Rio Grande Valley. Cotton and alfalfa are the principal crops.

Industrial uses, including utilities, were next with some 3,553.1 acres or 4.69 percent of the total City area. Although the percentage is low, the number employed in these land uses is over twenty-eight percent of the total employment. Therefore, this land use becomes an important factor as a focal point of travel.

The land use of the remaining 26,766.3 acres or 35.53 percent of the total city land is as follows: 7,936.9 acres (10.60%) is accounted for in streets, alleys, canals, drainage ditches and ways; and 18,829.4 acres (24.93%) is vacant land. Included in the vacant land is about 5,000 acres which is in the Franklin Mountains and is considered to be undevelopable.

The following tables show land use data both for the City as a whole and for the individual study areas. Table III-1 summarizes current (1970) land use by acres, and Table III-2 gives the percentage of the total area used for a specific type land use. Figure III-1 shows the existing land use graphically.

TABLE III-1
CURRENT LAND USE
(Acres)

	Total City	Central	Northwest	Northeast	Southeas
Residential	13, 918. 0	4, 157. 5	2, 212. 5	2, 242. 8	5, 305. 2
Apartments	1,488.0	789.6	29.2	69.3	600.6
Motels-Hotels	245.2	135.1	14.2	41.4	54.5
Mobile Home Parks	93.9	20.6	1.5	34.1	37.7
Offices	663.4	399.7	27.4	70.1	166, 2
Commercial Services	2,488.6	1,013.4	145.4	262.1	1,067.7
Commercial Retail	2,794.0	573.0	922.9	660.3	637.8
Commercial Heavy	423.6	193.6	62.1	48.2	119.7
Industrial	2,014.6	764.7	805.0	47.5	397.4
Utilities	1,538.5	804.1	319.0	181.6	233.8
Public	16,051.1	7, 927. 6	3, 372.7	1, 669. 1	3,381.7
Quasi-Public	685.1	261.9	60.8	141.2	221.2
Agriculture	6,305.6	2.4	988.3	20.2	5,294.
Vacant	18,829.4	3,708.4	5,117.0	4,197.8	5,806.
Totals	67,539.7	20, 451.6	14,078.0	9,685.7	23, 324.
Streets, Alleys,					
Canals, Drainage					
Ditches and Ways	7, 936. 9				
TOTAL CITY AREA	75, 476.6				

TABLE III-2

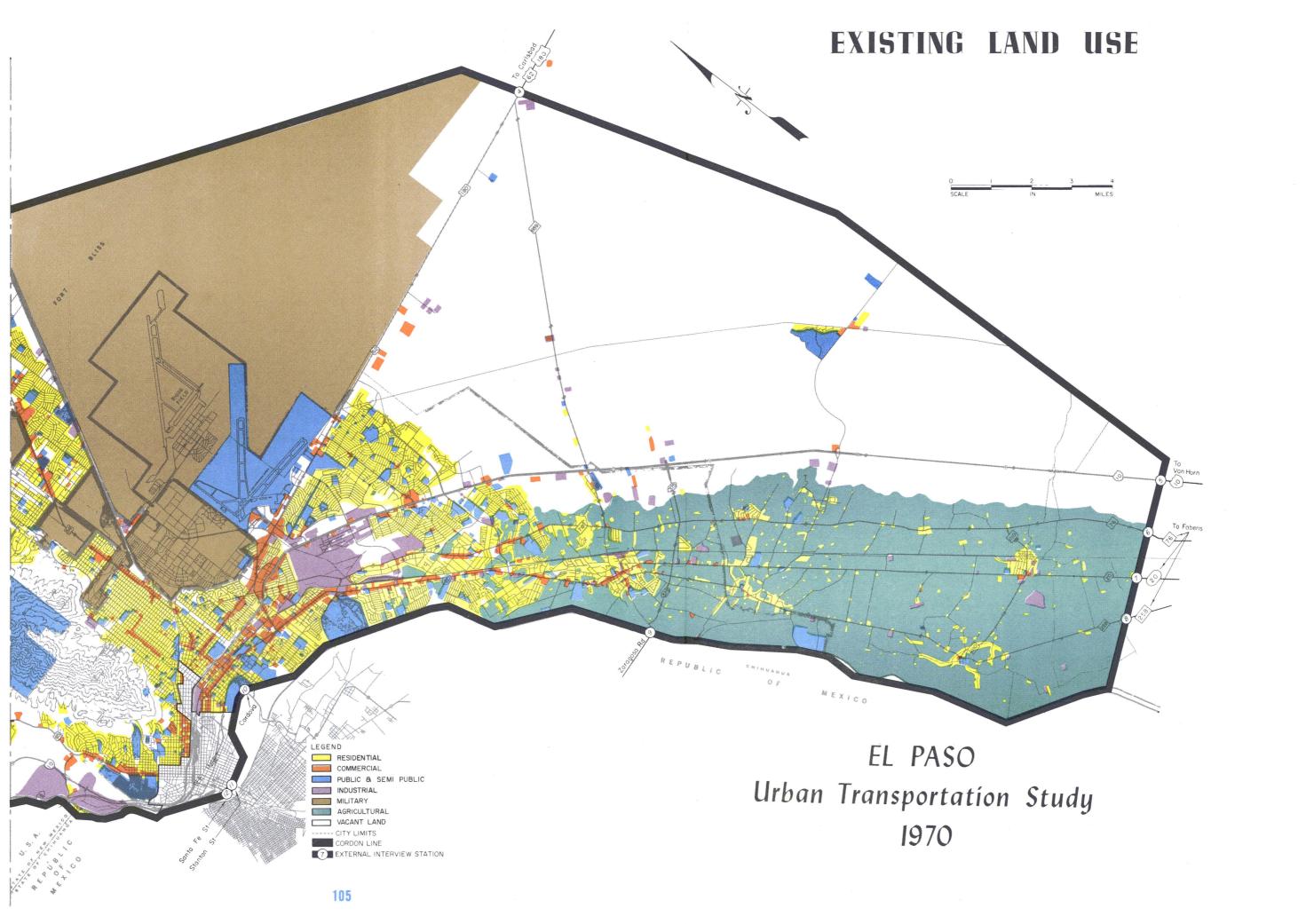
CURRENT LAND USE
(% of Total Area)

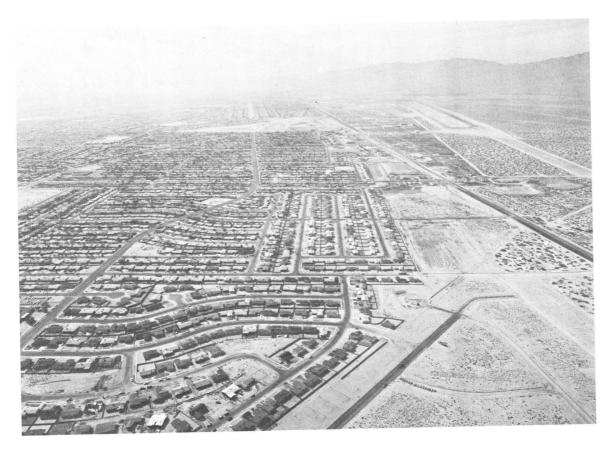
	Total City	Central	Northwest	Northeast	Southeast
Residential	18.44	20.23	15.71	23.15	22.80
Apartments	1.97	3.76	0.21	0.71	2.65
Motels-Hotels	0.32	0.66	0.12	0.43	0.23
Mobile Home Parks	0.12	0.01	0.01	0.34	0.16
Offices	0.87	1.95	0.14	0.72	0.71
Commercial Services	3.29	4.85	1.03	2.71	4.57
Commercial	3.70	2.80	6.55	6.82	2. 73
Commercial Heavy	0.56	0.94	0.44	0.50	0.51
Industrial	2.66	3.70	5.72	0.49	1.70
Utilities	2.03	3.93	2. 27	1.87	1.00
Public	21.26	38.26	23.95	17.23	14.50
Quasi-Public	0.90	1.28	0.43	1.46	0.95
Agriculture	8.35	0.001	7.02	0.21	22. 70
Vacant	24. 93	17.63	36.35	43.35	24.89
Totals	89.40	100.00	100.00	100.00	100.00
Streets, Alleys, Canals, Drainage					
Ditches, Ways	10.60				
TOTAL CITY AREA	100.00				

The northeast area had an unusually high percent of residential land use as compared with the other areas of the City. This is due in part to the fact that this area has large amounts of flat vacant land which can be easily developed. The convenient location with respect to military installations has contributed to the development in this area.

In industrial land use, the northwest area of the City had a considerably larger amount of industry than the rest of the City. ASARCO, Vowell Construction, and Southwestern Portland Cement Plant take up a considerable amount of land in this part of the City.









In public land use, as might be expected, the central area had 38.26 percent of its total area taken up by this use. The University of Texas at El Paso, Ascarate Park, most governmental buildings, and the Civic Center are all located in this portion of the City.

In agriculture, the southeast area had the highest percentage of land use for this purpose. A good majority of El Paso's cotton and alfalfa is grown in this area of the City.

Table III-3 shows the trips generated by the various land uses as determined by the 1970 Origin and Destination Survey. Understandably, residential use was the largest generator with 46.4 percent of all person trips. Commercial, retail, and services accounted for 23.4 percent; public and quasi-public for 13.0 percent; manufacturing and industry for 4.4 percent; and 13.3 percent for others.

TABLE III-3
INTERNAL TRIPS BY LAND USE

Land Use	Total Person Trips	Percentage
Residential	426, 564	46.4
Industrial	19,412	2.1
Utilities, Transportation and Wholesale Trade	20,832	2.3
Commercial	214, 935	23.4
Military	86,911	9. 5
Public	119,560	13.0
Other	31,276	3.3
TOTALS	919, 490	100.0

PROJECTED LAND USE

Before any projection of land uses could be undertaken, it was necessary to determine the probable increase in population.

After these estimates were made, a forecast was made of the housing needed to satisfy the increasing population. Studies of housing needs explored the residential density pattern of El Paso -- both today and as expected in 1990 -- the location of these various densities as related to work areas, the actual number of people that are expected to be within these residential areas. Basic land use information about existing properties offered a guide to developing policies and designs for densities and desired locations of new residential development and work areas.

The second step in the housing study was to determine the possible locations for future development. Again, a study of the basic land use data was made to reveal the number of

vacant lots within any given area, and the number of acres that are available for development. "Available land" here means the land that is usable which is either vacant or is used for agricultural purposes.

After the process of assigning housing units has been completed, the location of related land uses such as shopping areas, schools, parks and playgrounds, and various other public facilities was determined.

Thus, through past development studies and future development design, land use projections were made. The projections may then be related to traffic requirements. Transportation facilities may then be planned for progressive development as required to satisfy the future land use and traffic requirements generated by the land use.

The northeast area of the City is basically the land between the Franklin Mountains and the Fort Bliss Military Reservation north of the Logan Heights Military Training Area. This area contains 20.840 square miles, of which 5.980 square miles are in mountainous terrain and can be used for park purposes only. Of the total area, 8.005 square miles or 38.4 percent is developed. Assuming no change in the housing unit density, it is expected that 91.3 percent of the developable land or 13.57 square miles will be developed by 1990. The growth of this area will be significantly influenced by the North-South Freeway.

The development of the Wilderness Park, expansion of activities of White Sands, the North-South Freeway extension to the New Mexico State Line, and the subsequent develop-



ment of related industrial and commercial development in the area will induce growth in the area outside of the city limits. The population in Pioneer, Desert View, Futureland, and Newman communities grew from fifty-two people in 1960 to 241 in 1970 for an increase of 465.4 percent. The military land area east of the North-South Freeway is expected to be developed for residential, recreational, and public purposes.

The northwest area is north of the Piedmont-Mission Hills Subdivision and includes all of the land between the Franklin Mountains and the State boundary line. This area contains 27.55 square miles, of which 6.40 are in mountainous terrain and not suitable for development. Twenty-two percent (6.06 square miles) of the area has been developed and 15.25 square miles are vacant. Due to the topography, which varies from rough terrain in the foothills of the mountains to the almost level bottom land of the valley floor, there were only 1,150 housing units per square mile in 1970. Large tracts of the valley land are used for agricultural purposes.

By 1990, it is expected that 65.9 percent of the developable land or 13.82 square miles of land will be developed. The rate of development will be relatively slow because of the high cost of land in the foothills, the topography, and the relative isolation of the area from major employment centers. Another factor is that there is a large supply of vacant land available in other areas that can be developed cheaper than the vacant land in the northwest section. In the future when the other less expensive vacant land is exhausted, construction in this area will increase.

The rate of population growth in the area outside the City, but adjacent thereto, will increase especially if water service is provided. The population in this area increased from 3,948 in 1960 to 4,925 in 1970, an increase of 24.7 percent.

The central area includes part of the Franklin Mountains. It is bordered on the east by the Fort Bliss Military Reservation, on the southeast by the Cielo Vista subdivision and Ascarate Park, on the south by the Mexico - U.S. Boundary, and on the northwest by the Piedmont-Mission Hills area. This area contains 31.880 square miles, of which 8.745 square miles are mountainous terrain and unsuitable for development except for park purposes. The .784 square miles of vacant buildable land are scattered in small parcels.

The 1960-1970 population in the Central Area dropped by 20,000 whereas the dwelling units dropped by 3,734. This means that the population per dwelling unit dropped as a whole and is expected to continue to do so in the future. Much of the present housing is expected to be replaced. Old, outdated housing will be demolished. Many multi-family, duplex, and single family units will be removed to accommodate proposed public housing construction. Apartments will be substituted for some of the smaller structures. By 1990, the central area will be completely developed, and new units will be constructed on existing commercial or industrial sites which will be vacated in the near future.

If the privilege of alien commutation were abolished, many of the alien commuters and U.S. citizens who reside in Juarez would move to El Paso. A large percentage would probably settle first in the central area and then move to other areas.

The southeast is the area east of Cielo Vista and north of Interstate Highway 10. It includes the Scotsdale, Eastwood, and Vista del Sol subdivisions. The area contains 12.14 square miles; all of this land is developable. There are 5.013 square miles of developed land or 37.2 percent of the whole area. There are 1859.03 housing units per square mile, but this density will increase as more apartment units are constructed. This is the area which will continue to lead in the construction of new housing units, and it is anticipated that some land south of Highway 62-180 will be annexed in order to meet the housing demand.

By 1990, the southeast section will be completely developed along with some of the adjacent area, but as development continues eastward farther away from the central business district, the rate of construction will decline.

The Lower Valley is the area south of Interstate Highway 10 and southeast of Ascarate Park. This area contains 28.920 square miles; 3.251 square miles are controlled by the International Boundary Commission and are suitable for recreational purposes only, leaving 25.670 square miles of developable land. Thirty-seven percent or 10.780 square miles of the area have been developed. Primarily due to tract subdivision, there were 1,695.44 housing units per square mile in 1970. There are 15.370 square miles of vacant land, most of which is agricultural land. It is projected that by 1990, 15.560 square miles or 60.6 percent of the total area will be developed. Figure III-2 illustrates the projected land use for 1990 for the entire city.

The Lower Valley area is experiencing a great boom in subdivision development that will spread into the existing agricultural lands. There will be some land under cultivation but in very small plots. The opening of the Border Highway (Loop 375) and Lee Trevino Drive in the near future will induce subdivision and housing development. The adjacent area outside of the city limits is already experiencing increased population growth. If this area receives water service, the population will increase at a much greater rate than that shown in the projection for the year 1990. However, this growth will represent a shifting of population from within the City to the County rather than an addition to the County population. Figure III-3 shows subdivision activity outside the City Limits but within a 5 mile limit.

SUMMARY

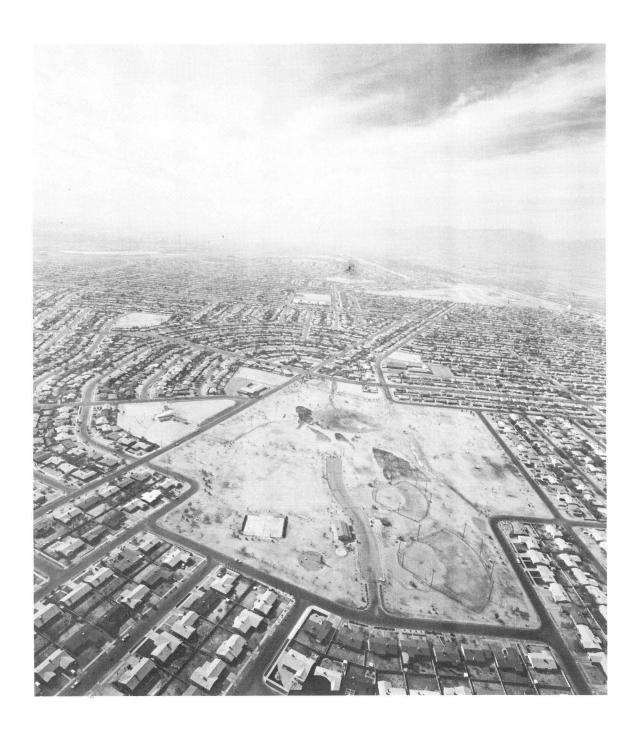
In summarizing, the following major changes are expected for the El Paso area:

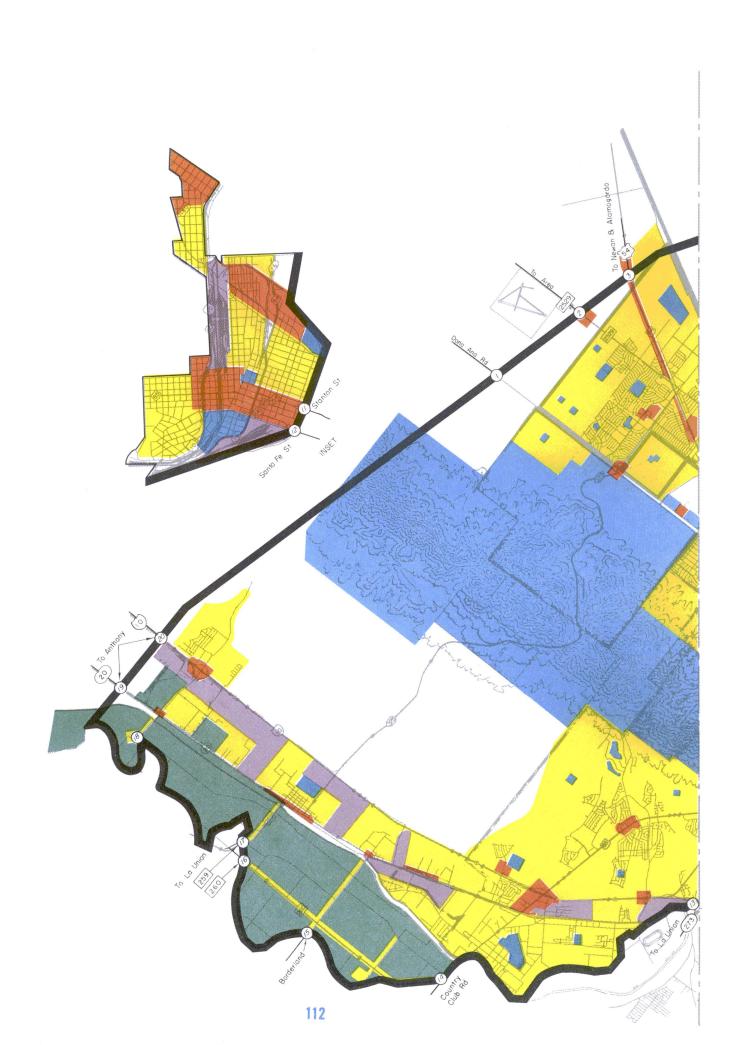
- (1) The development of the North-South Freeway and the subsequent development of related industrial and commercial development in the area will induce growth in northeast El Paso up to and beyond the city limits.
- (2) By 1990, the central area will be completely developed, and new apartment units will be constructed on existing commercial or industrial sites which will be vacated in the near future.
- (3) The southeast area will continue to lead in the construction of new housing units, and it is anticipated that some land south of U.S. Highway 62 and U.S. Highway 180 will be annexed in order to meet the housing demand.
- (4) In the Lower Valley, the opening of the Border Highway (Loop 375) and Lee Trevino Drive will induce subdivision and housing that will spread into the existing agricultural lands.

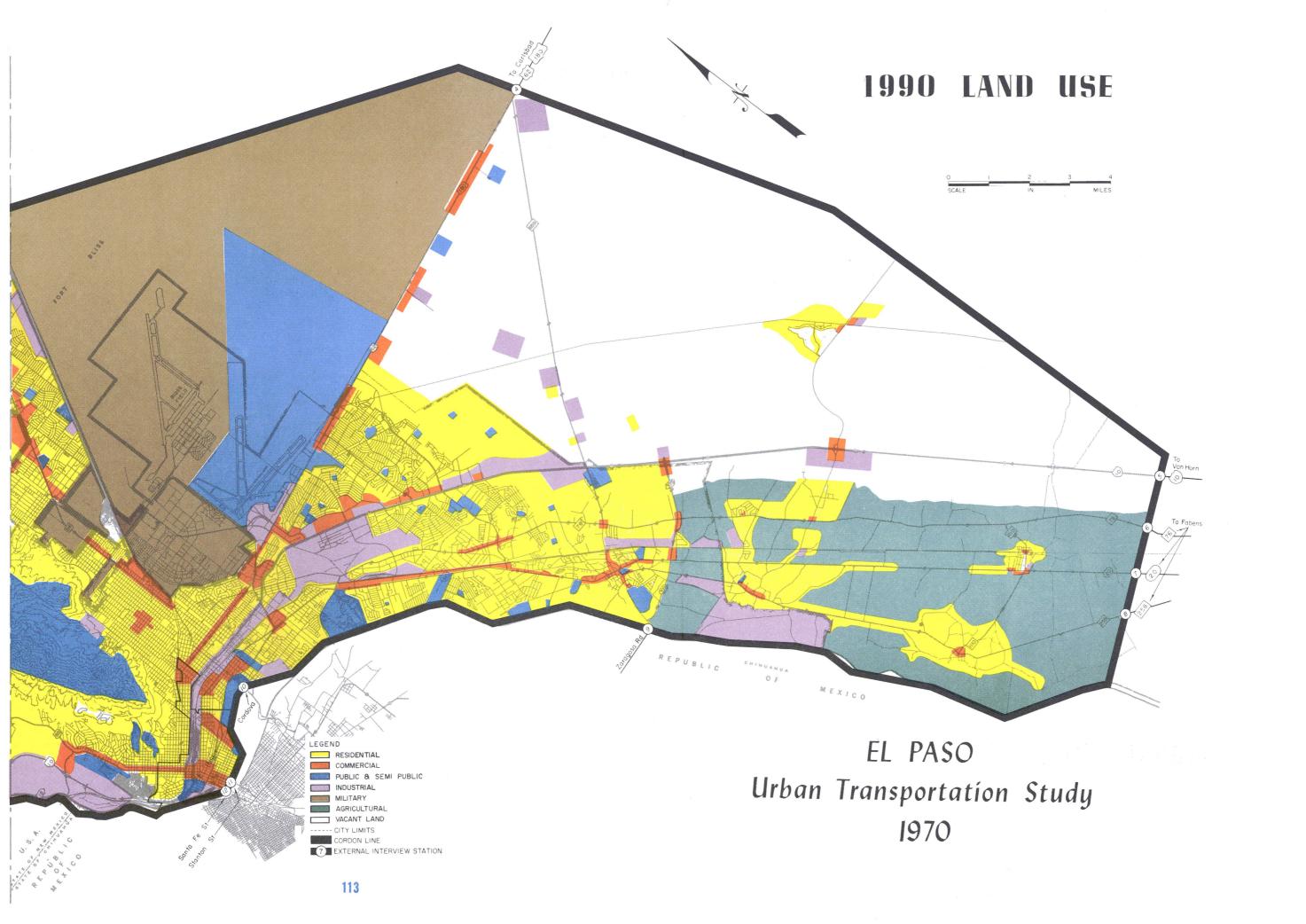
References:

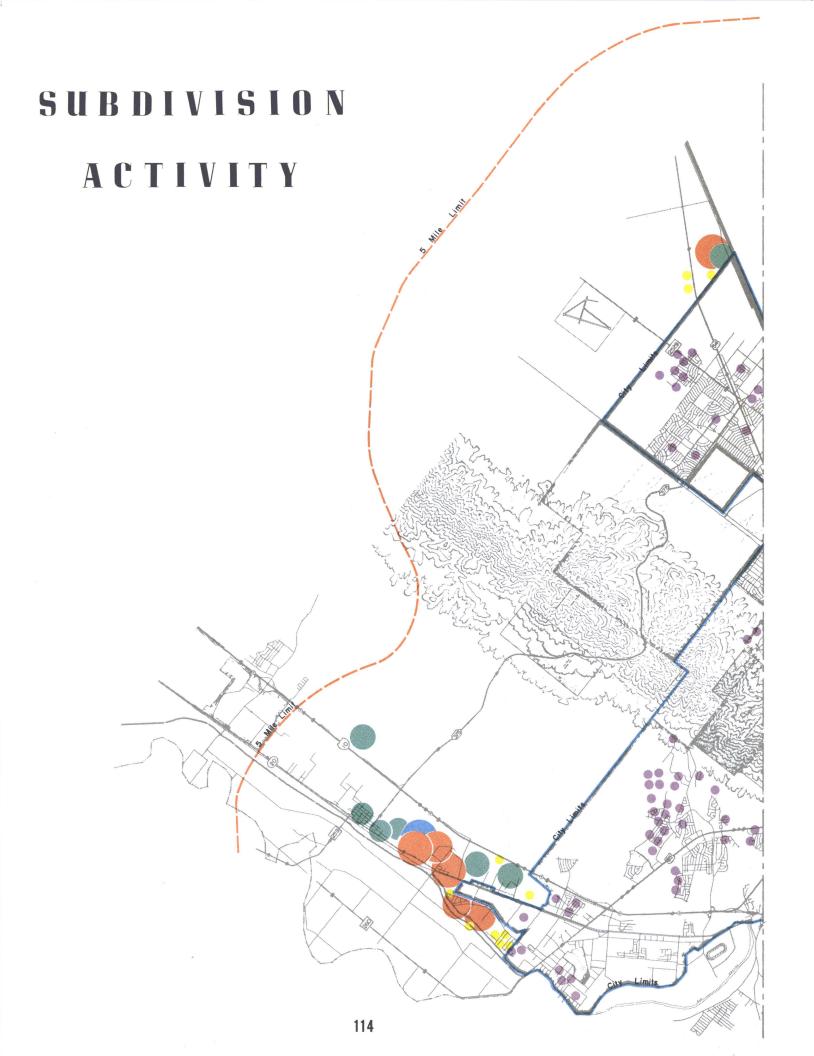
- 1. El Paso Transportation Study, Origin and Destination Survey, 1970, Volume 5.
- 2. Procedure Manual, Origin-Destination and Land Use, Public Administration Service, Chicago, Illinois.

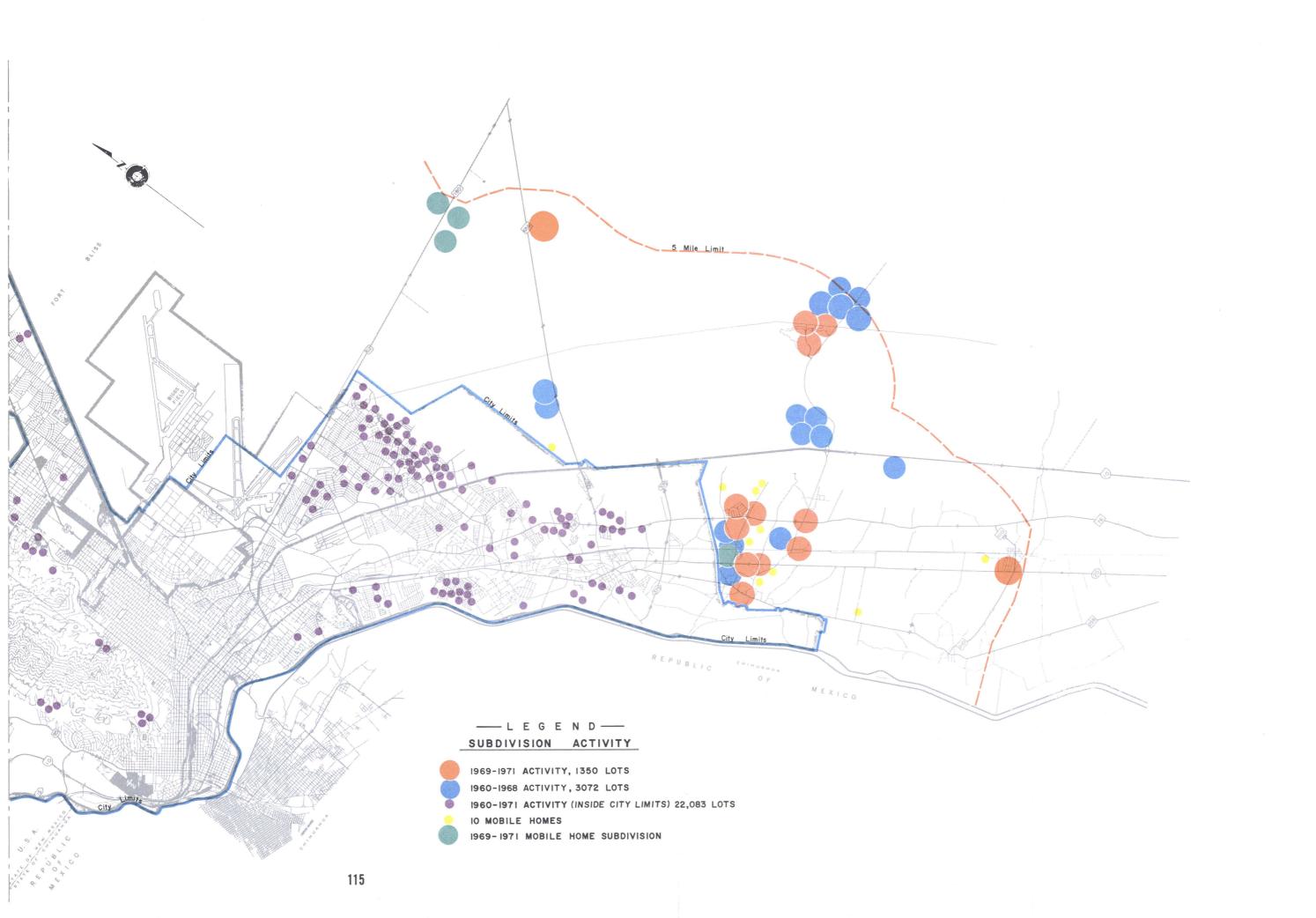
- 3. Second Urban Transportation Planning Seminar, Urban Section, Texas Highway Department.
- 4. Land Use and Zoning Inventory, Department of Planning and Research City of El Paso, 1971.













Chapter 4

TRANSPORTATION FACILITIES



Transportation Facilities

Before the community's needs for immediate or long range changes in the transportation system can be determined, it is necessary to inventory and analyze the existing facilities. This inventory must include not only the physical features of the facilities, but the traffic volumes, their level of service and their capacity. Since safety is a prime consideration in transportation planning, an accident study is also necessary. The existing mass transit situation should also be analyzed to give a complete picture of the transportation facilities.

EXISTING STREET USE

There were approximately 1,040 miles of streets and highways within the City of El Paso as of September, 1970. These streets were classified according to their function in concord with the 1968 National Functional Classification Manual (1) which established the following classification system:

- (1) Principal Arterial System
- (2) Minor Arterial System
- (3) Collector Street System
- (4) Local Street System

These systems are described as follows:

Principal Arterial System

In every urban environment there exists a system of streets and highways which can be identified as unusually significant to the area in which it lies in terms of the nature and composition of travel it serves.

This system of streets and highways should serve the major centers of activity of the metropolitan area, the highest traffic volume corridors, and the longest trip desires; and should carry a high proportion of the total urban area travel on a minimum of mileage. The system should be integrated, both internally and between major rural connections.

The principal arterial system should carry the major portion of trips entering and leaving the urban area, as well as the majority of through movements desiring to bypass the central city. In addition, significant intra-area travel, such as between central business districts and outlying residential areas, between major inner city communities, or between major suburban centers should be served by this class of facilities. Frequently the principal arterial system will carry important intraurban as well as intercity bus routes. Finally, this system in urbanized areas should provide continuity for all rural arterials which intercept the urban boundary.

The sytem is stratified as follows:

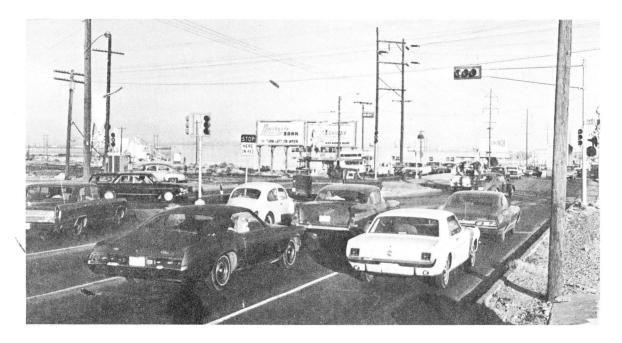
(1) Interstate

- (2) Other Freeways and Expressways
- (3) Other Principal Arterials (with no control of access)

Minor Arterial System

The minor arterial street system should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than major arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system.

The minor arterial street system includes all arterials not classified as principal and contains facilities that place more emphasis on land access than the higher system, and offer a lower level of traffic mobility. Such facilities may carry local bus routes and provide intracommunity continuity, but ideally should not penetrate identifiable neighborhoods. This system should include urban connections to rural collector roads where such connections have not been classified for internal reasons as urban principal arterials.



Collector Street System

The collector street system differs from the arterial systems in that facilities on the collector system may penetrate neighborhoods, distributing trips from the arterials through the area to the ultimate destination which may be on a local or collector street. Conversely, the collector street also collects traffic from local streets in the neighborhood and channels it into the arterial systems. In some cases, due to the design of the overall street system, a minor amount of through traffic may be carried on some collector streets.

The collector system provides both land access service and for local traffic movements within residential neighborhoods, commercial areas and industrial areas. Such facilities contain the collector portion of some bus routes.

Urban Local Street System

The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through traffic movement usually is deliberately discouraged.

Figure IV-1 presents an existing street use map of El Paso which shows the classification of all the streets according to their existing use. The function which a street is actually performing may be different from that which its physical characteristics might suggest or from their ultimate use in the 1990 Transportation Plan. This map is not the transportation plan. It should be considered only as the starting point or base from which the transportation plan is developed. Additionally this map furnishes base data for studies of accidents, travel time, capacity and traffic volumes. Table IV-1 shows the mileage of the existing streets by category and the percent each is of the total.

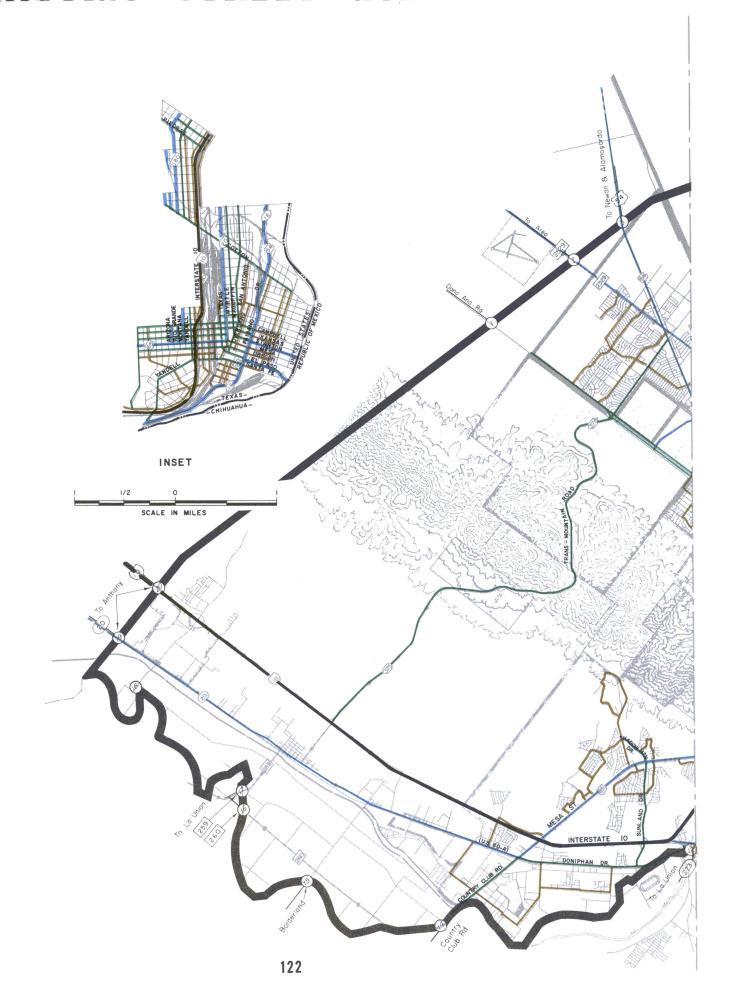


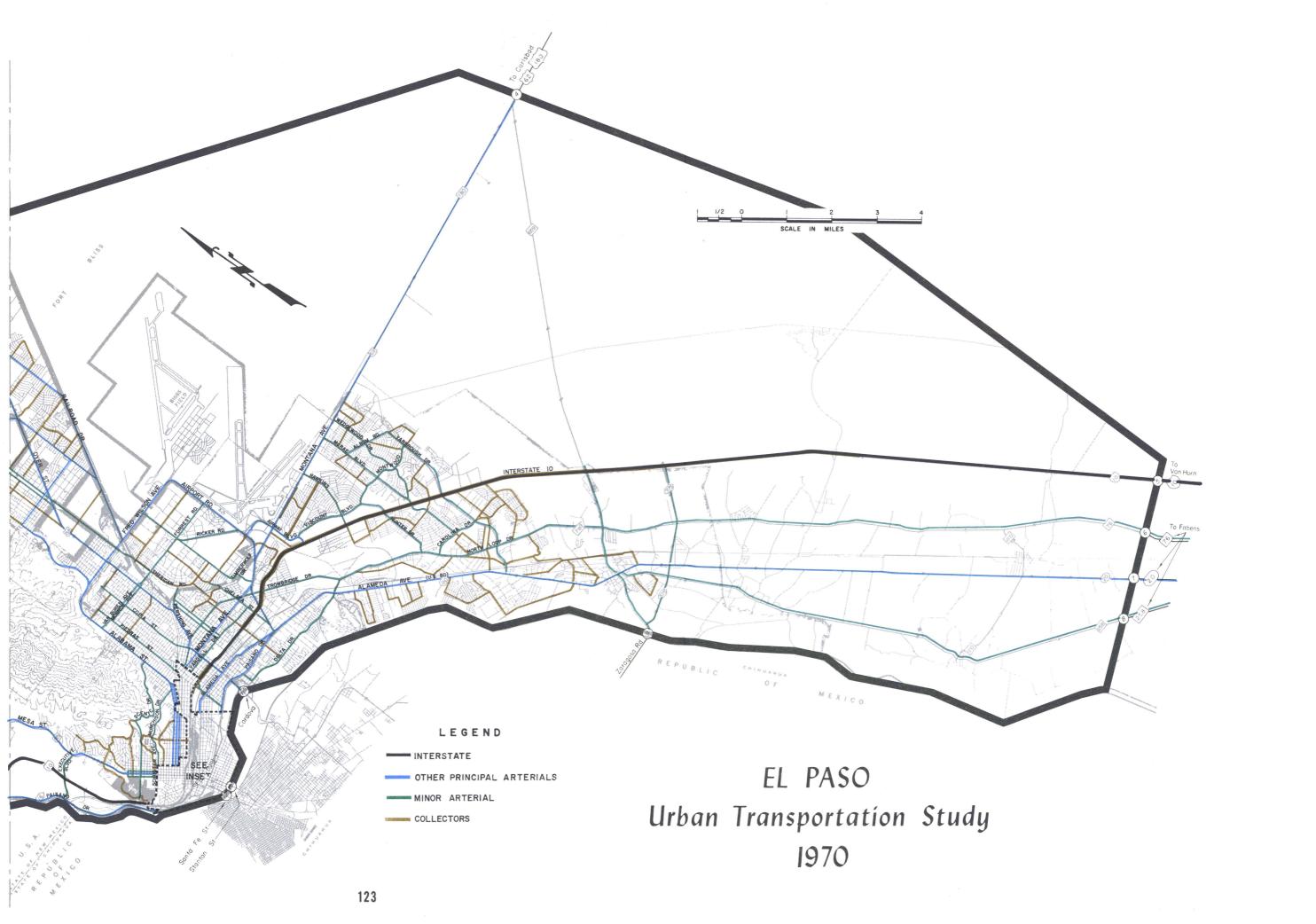
TABLE IV-1
CITY OF EL PASO

STREET CLASSIFICATION
1970

Classification	Miles	% of Total
Freeways and Expressways	24.56	2.36
Other Principal Arterials	87.81	8.44
Minor Arterials	121.80	11.71
Collector Streets	149.58	14.38
Local Streets	656.38	63.11
TOTAL MILEAGE	1,040.13	100.00

EXISTING STREET USE





INTERSECTION CAPACITY STUDY

In the analysis of the traffic carrying capabilities of a street system, there are many factors which must be considered. Traffic volume counts and average driving speed figures give a good indication where traffic congestion problems may exist. Traffic congestion, in many cases, begins at signalized intersections which usually have a lower traffic volume capacity than the approaching roadway. This usually results in lower driving speeds, stacking up of traffic, an increase in minor accidents and driver inconvenience and delay. Poor control of traffic at intersections can sometimes result in congestion with traffic volumes not exceeding the street design capacity. An intersection capacity study of the high density intersection will show which intersections have deficient controls, those which operate effectively, but are subjected to traffic volumes greater than their capacity, and those which are adequate under present traffic volumes.

The signalized intersections were analyzed in 1970 by the Traffic and Transportation Department, City of El Paso, in accordance with requirements set forth in the <u>Highway Capacity Manual</u>, 1965 Edition, published by the Highway Research Board, National Academy of Science, Washington, D. C. The computer program for intersection capacities developed by May, Alborn and Collins, Institute of Transportation and Traffic Engineering, University of California, Berkeley, was used.

The analysis was normalized for a load factor of 0.70 at which traffic approached unstable flow, i.e., level of service D. Service volume was computed as a function of approach volume per hour of green time based on approach width and load factor and the ratio of green phase time to cycle time with adjustments for metropolitan area size, peak hour factor, percentage of turns according to direction, percent of trucks, local bus usage of intersection and type of bus stops.

This capacity study was made to determine the present degree of congestion on the high density streets within the major thoroughfare system and to indicate which intersections are likely to become congested due to increased traffic volumes. This study, along with others, will point out needed intersection improvements or a need for additional facilities and also help to determine the priority for future projects.

As all these features are correlated into the capacity calculations, a change in any one of them will change the capacity of the intersection. All capacity calculations were based on conditions during peak hours and were made by use of a digital computer.

A comparison was made between the computed capacity and the actual number of vehicles which are presently using a facility to determine a ratio which is referred to as the capacity/volume ratio. Peak hour traffic volumes were used to reflect the maximum congestion at any facility. As the capacity/volume ratio decreased this indicates drivers are experiencing more delay. Those intersections that have a low capacity/volume ratio should be studied further and visually observed as the ratio value is strictly theoretical and has its limitations.

Volume 4, <u>Traffic Operations Program to Increase Capacity and Safety</u> (TOPICS) for El Paso, 1970, lists 108 intersection approaches with a capacity/volume ratio less than 1.00. Of these, seven had a capacity/volume ratio less than 0.50. This report also lists recommended improvements for each of the 108 approaches.

The seven intersection approaches with a capacity/volume ratio of less than 0.50, as

mentioned in the above study, are listed here for quick reference. Also listed are the recommended improvements.

Intersection	Approach	Capacity/ Volume Ratio	Recommended Improvements
Hunter Road at North Loop	N	0.37	Redesign intersection to provide two turning lanes (left turn)
Gateway West at Geronimo	E	0.37	Provide two turning lanes (left turn) (installed May, 1971)
Marshall at Fred Wilson	S	0.39	Construct free right- turn lanes from Fred Wilson
Paisano at Val Verde	N	0.42	Widen Val Verde to fifty feet and remove parking
Raynolds at Montana	S	0.43	Widen Raynolds to fifty feet and remove parking
Railroad Drive at Fred Wilson	N	0.47	Construct grade separation
Fred Wilson at Dyer	E	0.49	Redesign intersection to improve alignment and replace single dial pretimed controller with actuated control equipment complete with background cycle.

These intersections are the most congested intersections in the Study Area.

As the traffic volumes increase, other intersections will become congested and other improvements will have to be made. With this information, future plans for traffic movement can be coordinated with recommendations to reduce the congestion and increase the capacity of the signalized intersections.

TRAVEL TIME

One of the principal factors taken into consideration by a driver when making his choice of routes is the travel time. Travel time from the driver's point of view is the "fastest way to get there". Travel time as referred to in this report is defined as the amount of time required to drive from a point of origin to a destination.

Normally persons traveling from their homes or places of employment are not primarily interested in the monetary costs involved in travel; their principal concern is over the elapsed time to get to their destination.

The travel time study provides the means for determining the level of service of the street system. Such a study also provides a means from which future analysis of level of service may evolve.

The travel time study for the El Paso Transportation Study is based on data obtained from a time-delay study conducted during the 1970 OD Survey. In this time-delay study, the "floating car" method was used to derive the actual speed of travel and to measure the delays encountered along the various routes selected for study.

A team consisting of two men (driver and observer) drove over each route, using a graphic data compiler to record the running speed and time of travel. The observer recorded various observations on the compiler record relative to the location of control streets, causes of delays and other pertinent data. In making the runs, the "floating car" method was used, which required the driver to travel with the general traffic stream, regardless of the posted speed limit. When there was no traffic stream per se, the posted speed limit was observed.

A minimum of three runs were made for each route traveled. Each run was checked and if extreme variations in the time or unusual delays were encountered, additional runs were made until three "typical" runs were provided.

Runs were divided into two classes depending on time of day. Peak hour runs were made between 7:00 and 9:00 a.m. and 4:00 and 6:00 p.m. "Off-peak" runs were made during the intervening daylight hours. "Off-peak" hour runs were made on ninety-five selected routes for a total mileage of 377.87 miles. "Peak hour" runs were made on thirty of these routes. The average speed for peak hour runs were twenty-five miles per hour and the off-peak hour runs was twenty-three miles per hour.

Each route was subdivided into control sections. With only a few exceptions, the limits for the control sections were all streets on the transportation plan. Time and distance measurements relative to the control sections were made from centerline to centerline of these intersecting streets.

Table IV-2 shows the peak hour routes selected for study by control section and gives the distance, time in minutes and average speed for both peak and off-peak runs.

Figure IV-2 is an isochronal chart of peak hour travel times. The isochronal lines on this chart connect points reached by equal travel times from a common point of origin (Mesa Street and Mills Avenue) in the central business district. These lines are spaced at two-minute intervals.

TABLE IV-2
TIME AND DELAY STUDY

					Peak		ak
Doute	Sect		Distance	Time	Average	Time	Average
Route	From	То	in Miles	in Min.	Speed	in Min.	Speed
Alameda Ave. (US 80)	2. 3 Mi. East	FM 1110	2, 32	3.15	44	3,38	41
	FM 1110	Loop 375	8.17	10.50	47	11.35	43
	Loop 375	Old Pueblo Dr.	1.10	1.78	37	1.85	36
	Old Pueblo Dr.	Zaragosa Rd.	. 10	1.73	3	. 63	9
	Zaragosa Rd.	Yarbrough Dr.	2.63	5.57	28	5.52	29
	Yarbrough Dr.	Carolina Dr.	2.09	4.08	31	4.18	30
	Carolina Dr.	Delta Dr.	1.94	4.20	28	4.65	25
	Delta Dr.	Clark Dr.	. 97	2.65	22	2.50	24
	Clark Dr.	Paisano Dr.	. 74	2.25	20	2.05	22
	Paisano Dr.	Raynolds St.	, 41	1.20	21	1.18	21
	Raynolds St.	Hammett Blvd.	1.29	2.52	31	2.55	30
	Hammett Blvd.	Copia St.	. 28	1.23	14	1.37	12
	Copia St.	Magoffin Ave.	. 48	1.87	15	1.83	16
	Magoffin Ave.	Piedras St.	. 16	. 75	13	. 87	11
	TOTAL		22.68	43.48	31	43.92	31
North Loop Rd.	3.00 Mi. East	FM 1110	3,00	4.90	37		
(FM 76)	FM 1110	Loop 375	7.61	9.70	47		
,	Loop 375	Zaragosa Rd.	1.74	2.92	36	3.02	35
	Zaragosa Rd.	Lomaland Dr.	2.19	3.85	34	4.15	32
	Lomaland Dr.	Yarbrough Dr.	. 37	. 68	32	. 72	31
	Yarbrough Dr.	Mauer Dr.	. 37	.75	30	. 85	26
	Mauer Dr.	Emerson St.	, 31	. 63	29	. 73	25
	Emerson St.	Carolina Dr.	. 70	2.00	21	2.02	21
	Carolina Dr.	Hunter Rd.	. 39	. 88	26	.87	27
	Hunter Rd.	Delta Dr.	2.03	4.13	29	5. 27	23
	TOTAL		18.71	30.45	37	17.62	28
Interstate 10	10. 95 Mi. East	Loop 375	10.95	12, 12	54	11.87	55
	Loop 375	Zaragosa Rd.	1.78	2.05	52	1.93	55
	Zaragosa Rd.	Lomaland Dr.	2.32	2.63	53	2,53	55
	Lomaland Dr.	Yarbrough Dr.	1.32	1.15	69	1.13	70
	Yarbrough Dr.	Sumac Dr.	. 33	. 40	50	.38	52
	Sumac Dr.	McRae Blvd.	. 44	. 57	47	.50	53
	McRae Blvd.	Viscount Blvd.	. 63	. 75	50	.75	50
	Viscount Blvd.	Hawkins Blvd.	. 91	1.07	51	1.07	51
	Hawkins Blvd.	Airway Blvd.	1.03	1.23	50	1.20	52
	Airway Blvd.	Geronimo Dr.	. 94	1.20	47	1.15	49
	Geronimo Dr.	Trowbridge Dr.	. 66	.78	51	.82	49
	Trowbridge Dr.	Yandell Dr.	. 12	. 17	43	. 17	43
	Yandell Dr.	Paisano Dr.	. 20	. 23	51	. 27	45
	Paisano Dr.	Chelsea St.	. 19	. 27	43	, 25	46
	Chelsea St.	Raynolds St.	.46	. 50	55	. 53	52
	Raynolds St.	Copia St.	1.09	1. 27	52	1.27	52
	Copia St.	Piedras St.	.54	. 67	49	. 68	47
	Piedras St.	Cotton St.	. 94	1.10	51	1.03	55 51
	Cotton St.	Missouri Ave.	. 94	1.12	51 58	1.12	51 58
	Missouri Ave.	Wyoming Ave.	. 08 . 09	. 08 . 10	58 54	. 08 . 10	54
	Wyoming Ave. Campbell St.	Campbell St. Kansas St.	. 05	.07	45	. 07	45
	Kansas St.	Stanton St.	.05	.07	45	. 07	45
	Stanton St.	Mesa St.	.08	. 08	58	. 08	58
	Mesa St.	Oregon St.	.06	, 08	43	. 08	43
	Oregon St.	Santa Fe St.	, 23	, 27	52	.28	49
	Santa Fe St.	Main Dr.	. 60	. 08	43	. 58	62
	Main Dr.	Porfirio Diaz	. 36	. 53	41	. 38	56
	Porfirio Diaz	Yandell Dr.	. 21	. 28	44	, 27	47
	Yandell Dr.	Executive Center					
		Blvd.	2.40	2,63	55	2.62	55
	Executive Cente Blvd.	r Paisano Dr.	2.39	2,62	55	2,52	57
		Sunland Park Dr.		. 60	41	. 57	43
	Paisano Dr.						

TABLE IV-2 (Continued)

	G - 41		D:-1 .		Peak		ak
Route	<u>Secti</u> From		Distance in Miles	Time in Min,	Average Speed	Time in Min	Averag Speed
To (1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	D. ' D'-	C -11 D1- D-	4.7	40	41	c 7	4.2
Interstate 10 (Cont.)	Paisano Dr. Sunland Park Dr.	Sunland Park Dr.	. 41	. 60	41 51	. 57	43
			2.11	2.47		2.28	55
	Mesa St.	Thorn Drive	94	1.10	51	1.03	55 57
	Thorn Dr.	Loop 375	3.96	4. 45	53	4.27	56
	Loop 375	4.47 Mi. West	4.47	4.92	55	4.67	57
	TOTAL		44,28	49.70	53	48.60	55
Montana Ave. (US-180)	8,60 Mi. East	Wedgewood Dr.	8.60	9.62	54	9.33	55
	Wedgewood Dr.	McRae Blvd.	.48	. 63	46	. 68	42
	McRae Blvd.	Hawkins Blvd.	. 94	1.17	48	1.27	45
	Hawkins Blvd.	Airway Blvd.	1.45	3,57	24	2.67	33
	Airway Blvd.	Airport Rd.	. 87	1.85	28	2.98	17
	Airport Rd.	Geronimo Dr.	. 24	. 62	23	. 92	16
	Geronimo Dr.	Paisano Dr.	.34	. 88	23	1.07	19
	Paisano Dr.	Trowbridge Dr.	. 30	. 57	32	. 95	19
	Trowbridge Dr.	Chelsea St.	. 14	. 70	12	1.07	8
	Chelsea St.	Raynolds St.	. 45	1.12	24	1.27	21
	Raynolds St.	Radford St.	. 26	. 78	20	. 95	25
	Radford St.	Copia St.	. 79	1.87	25	2.02	24
	Copia St.	Piedras St.	. 63	2.58	15	2.40	16
			. 52	1.43	22	1.47	21
	Piedras St.	Pershing Dr.					
	Pershing Dr.	Cotton St.	. 38	1.20	19	1.65	14
	Cotton St.	Brown St.	. 58	1.75	20	1.78	20
	Brown St.	Campbell St.	. 58	1,52	23	1.82	19
	Campbell St.	Kansas St.	.06	. 23	15	. 25	14
	Kansas St.	Stanton St.	. 06	. 70	5	. 70	5
	Stanton St. Mesa St.	Mesa St. Oregon St.	. 06 . 07	. 73 . 32	5 13	. 50 . 58	7 7
	TOTAL		17.80	33.83	32	36, 32	29
Dyer St. (US 54)	1.72 Mi. North	Sun Valley Dr.	1.72	2.27	46	2.07	50
	Sun Valley Dr.	McCombs St.	. 67	. 95	42	. 93	43
	McCombs St.	Fairbanks Dr.	. 11	. 23	28	, 22	30
	Fairbanks Dr.	Loop 375	. 12	. 60	12	. 53	14
	Loop 375	Rushing Dr	1.03	2.05	30	2.00	31
	Rushing Dr.	Threadgill Ave.	. 14	. 28	30	. 62	14
	Threadgill Ave.	Wren Ave.	.51	2.02	15	1.28	24
	Wren Ave.	Diana Dr.	. 10	.53	11	. 43	14
	Diana Dr.	Hondo Pass Dr.	. 58	1.15	30	1.32	26
	Hondo Pass Dr.	Hercules Ave.	1.20	2.93	25	2.67	27
	Hercules Ave.	Sheridan St.	.21	. 67	20	. 68	18
	Sheridan St.	Leo Dr.	. 65	1.33	29	1.12	35
	Leo Dr.	Fred Wilson Rd.	1.32	3.40	23	1.12	35
	Fred Wilson Rd.	Hayes Ave.	. 29	. 83	20	2.97	27
	Hayes Ave.	Pierce Ave.	. 24	. 67	22	.63	27
	Pierce Ave.	Van Buren Ave.	. 38	1.23	18	.45	32
	Van Buren Ave.	Monroe Ave.	. 06	. 15	24	. 98	23
	Monroe Ave.	Tompkins Rd.	. 32	.77	25	. 23	15
	Tompkins Rd.	Fort Blvd.	.11	. 25	26	1.22	16
	Fort Blvd.	Pershing Dr.	. 54	_1.25	26	1.43	21
	TOTAL		10.30	23.57	26	21.78	28
Mesa St. (US 80)	4.47 Mi. West	Loop 375	4.47	6.03	44	5.97	45
	Loop 375	Mulberry Ave.	3.90	4.92	48	4.62	51
	Mulberry Ave.	Thorn Dr.	. 31	52	37	.48	39
	Thorn Dr.	Country Club Rd.	. 66	1.23	32	1.20	33
	Country Club Rd.		.58	1.07	33	1.03	34
	I-10	Thunderbird Dr.	2.36	3.72	38	4.05	35
	Thunderbird Dr.		.10	. 30	20	. 20	30
	Balboa Rd.	Sunland Park Dr.	. 24	. 50	29	. 70	21
		Pedregal (Propose					
	Sumano Park Dr.	Street)	su 4.34	3.78	37	4.08	34
	Pedregal (Propos Street)		1 11	47	40	4.0	20
	Executive Ctr.	Executive Ctr. Blvd Mesita Dr.	144 .77	. 67 1. 4 3	40 32	. 68 1. 63	39 28

TABLE IV-2 (Continued)

	Secti	o.n	Distance	Off- Time	Peak Average	Time	a k Averag
Route	From	To	in Miles	in Min.	Speed	in Min.	Averag Speed
Mesa St. (US 80)							
(Cont.)	Mesita Dr.	Robinson Ave.	. 72	1.30	33	1.57	28
•	Robinson Ave.	University Ave.	. 25	. 68	22	. 58	26
	University Ave.	Rim Rd.	. 26	. 85	18	. 52	30
	Rim Rd.	Schuster Ave.	. 06	. 20	18	.13	27
	Schuster Ave.	Cliff Dr.	.13	. 30	26	.30	26
	Cliff Dr.	Arizona Ave.	. 26	. 88	18	. 70	22
	Arizona Ave.	Rio Grande Ave.	.07	. 20	21	. 42	10
	Rio Grande Ave.	Montana Ave.	. 06	. 20	18	. 32	11
	Montana Ave.	Yandell Ave.	. 06	. 18	20	. 20	18
	Yandell Ave.	I-10	. 04	. 13	18	. 13	18
	I-10	Wyoming Ave.	.03	. 13	14	, 50	4
	Wyoming Ave.	Missouri Ave.	. 06	1.18	3	1.00	4
	Missouri Ave.	Mills Ave.	. 20	3.02	4	1.33	9
	Mills Ave.	Texas Ave.	.06	. 33	11	.50	7
	Texas Ave.	San Antonio Ave,	.04	1,77	1	. 73	3
	San Antonio Ave.	Paisano Dr.	. 21	1.95	6	1.68	7
	Paisano Dr.	Fifth Ave.	.19	1.53	7	1.33	9
	Fifth Ave.	Sixth Ave.	.06	. 47	8	. 35	10
	Sixth Ave.	Seventh Ave,	. 06	. 38	9	. 30	12
	Seventh Ave.	Stanton St.	. 06	. 85	4	1.25	3
	TOTAL		19.03	40.72	25	38.50	27
Texas Ave. (US 80)	Oregon St.	Mesa St.	. 07	1.10	4	2.87	1
, ,	Mesa St.	Stanton St.	.06	. 73	5	1.13	4
	Stanton St.	Kansas St.	.08	. 28	17	.72	7
	Kansas St.	Campbell St.	. 05	. 68	4	1.32	2
	Campbell St.	Cotton St.	.84	2,62	19	2.67	19
	Cotton St.	Piedras St.	. 86	2.63	20	3.85	13
	TOTAL		1.96	8.05	15	12,55	9
Trans-mountain Rd.	McCombs St.	Dyer St.	. 11	1.72	4	1.23	5
		•	. 22	.75	18	1.13	12
(Loop 375)	Dyer St. Alcan Dr.	Alcan Dr.	.50	1.37	22	1. 13	22
		Rushing Dr. War Rd.	1.23	2,65	28	2.72	27
	Rushing Dr. War Rd.		10.92	14. 95	44	14.48	45
		Interstate 10	1.03	2. 20	28	1. 98	31
	Interstate 10	US 80 (Doniphan)	1.03	2.20	40	1.90	31
	TOTAL		14.01	23.62	36	22. 92	37
McRae Blvd. (FM	Montana Ave.	Edgemere Blvd.	. 47	, 83	34	. 83	34
2316)	Edgemere Blvd.	Montwood Dr.	1.16	2, 25	31	2.15	32
•	Montwood Dr.	Wedgewood Dr.	. 86	1.77	29	1.67	31
	Wedgewood Dr.	Interstate 10	. 16	1.27	8	. 63	15
	TOTAL		2.65	6.12	25	5.28	30
Airways Blvd.	Interstate 10	Viscount Blvd.	. 22	. 55	24	. 85	16
,	Viscount Blvd.	Edgemere Blvd.	. 32	. 60	32	, 63	30
	Edgemere Blvd.	Montana Ave.	. 39	1, 25	19	2.03	12
	Montana Ave.	Airport Terminal		3, 68	19	4.03	17
	Airport Terminal		. 29	1.10	16	1.20	15
	TOTAL		2.36	7.18	20	8.75	16
Airport Rd.	Montana Ave.(US 180)	Airways Blvd.	. 69	1.95	21	2.48	17
	Airways Blvd.	Forrest Rd.	1.21	2. 27	32	2.28	32
	Forrest Rd.	Fred Wilson Rd.	1.00	1.75	3.4	1.70	35
	TOTAL		2. 90	5.97	29	6. 47	27
Trombridge Dr	North Loop Dr						
TIOMBITURE DI.		Geronimo Dr	1.28	3, 38	23	6,93	11
							29
							12
Trowbridge Dr.	North Loop Dr. (FM 76) Geronimo Dr. Clark Dr.	Geronimo Dr. Clark Dr. I-10	1.28 .21 .37	3.38 .77 2.13	23 16 10	6.93 .43 1.78	

TABLE IV-2 (Continued)

	G			Off-		P e	
	Section		Distance	Time	Average	Time	Average
Route	From	То	in Miles	in Min.	Speed	in Min.	Speed
Trowbridge Dr.	I-10	Paisano Dr.	. 20	. 62	19	1.10	11
(Cont.)	Paisano Dr.	Montana Ave.	. 21	. 55	23	. 58	22
V = - · · · /,	Montana Ave.	Chelsea St.	. 21	. 48	26	. 78	16
	Chelsea St.	Howze St.	. 44	1.28	21	1.28	21
	Howze St.	Raynolds St.	.09	. 35	15	. 35	15
	Raynolds St.	Radford St.	. 27	. 83	19	.82	20
	Radford St.	Pershing Dr.	. 67	2.03	20	2.05	20
	TOTAL		3.95	12.43	19	16.12	15
D-: D /I	Montana Ave.	manaharidan Da	1.0	. 73	1.2		16
Paisano Dr. (Loop 16)	Trowbridge Dr.	Trowbridge Dr. Yandell Ave.	. 15 . 13	. 13	12 8	.55 .45	17
10)	Yandell Ave.	I-10	. 20	. 45	27	1.47	8
	I-10	Chelsea St.	.51	1.12	27	1.70	18
	Chelsea St.	Alameda Ave.	.18	. 55	20	.52	21
	Alameda Ave.	Val Verde (Rayno		1.35	19	1.70	15
	Val Verde	Hammett Blvd.	.85	1.63	31	1.87	27
	Hammett Blvd.	Copia St.	.30	1.23	15	1.27	14
	Copia St.	Piedras St.	, 67	1.43	28	1.68	23
	Piedras St.	Cotton St.	, 90	2.12	26	2, 27	24
	Cotton St.	St. Vrain St.	. 36	1.00	22	1.25	17
	St. Vrain St.	Campbell St.	. 27	. 63	26	.73	22
	Campbell St.	Kansas St.	.06	. 20	18	. 18	20
	Kansas St.	Stanton St.	. 07	. 58	7	. 42	10
	Stanton St.	Mesa St.	. 06	. 72	5	. 43	9
	Mesa St.	Oregon St.	.06	. 25	14	. 58	6
	Oregon St.	El Paso St.	.07	. 58	7	, 33	13
	El Paso St.	Santa Fe St.	.07	. 45	9	.35	12
	Santa Fe St.	San Antonio Ave.	.37	. 92	24	. 97	23
	San Antonio Ave.	Main Dr.	, 14	. 25	34	. 25	34
	Main Dr.	Executive Ctr.Blv		4.60	41	4.43	42
	Executive Ctr.		.,			.,	
	Blvd.	Anapra Rd. (NM 2		1.85	42	1.75	45
	Anapra Rd. (NM 27)	3) I-10	. 53	. 88	36	. 75	43
	TOTAL		10.79	23.85	27	25.88	25
Chelsea St. , Pleasan-	Paisano Dr. (Lp.16)	I-10	. 47	1.78	16	1.90	15
ton Rd., and Sheri-	I-10	Yandell Ave.	21	. 57	22	.52	24
dan Rd.	Yandell Ave.	Montana Ave.	. 23	1.87	7	.78	18
	Montana Ave,	Trowbridge Dr.	.12	. 75	10	.85	8
	Trowbridge Dr.	Timberwolf Dr.	.43	1.53	17	1.12	23
	Timberwolf Dr.	Robert E. Lee Rd.	. 29	. 98	18	. 93	19
	Robert E. Lee Rd.	Howze St.	. 50	2.13	14	2.08	14
	Howze St.	Pershing Dr.	.37	1.55	14	1.42	16
	Pershing Dr.	Tompkins Rd.	. 74	3.43	13	2.78	16
	Tompkins Rd.	Fred Wilson Rd.	, 95	3.98	14	3.53	16
	Fred Wilson Rd.	Dyer St.	1.91	4.62	25	4.27	27
	Dyer St.	Hercules Ave.	. 21	1.47	9	1.42	9
	TOTAL		6, 43	24.67	16	21.60	18
Fred Wilson Rd.	Alabama St.	Dyer St.	. 66	1.87	.21	1.87	21
LIGH WILDON AU.	Dyer St.	Sheridan Rd.	. 36	1.87	15		
	Sheridan Rd.	Railroad Dr.	. 36	. 52	28	1.50	14 22
	Railroad Dr.	J.E.B. Stuart Rd.	. 81	3.12	28 16	. 65 3. 02	22 16
	J.E.B. Stuart Rd.	Airport Rd.	. 88	1.58	33	3.02 1.87	28
	TOTAL		2. 95	8.48	21	8.90	20
Pailmond D-		Diana D-					
Railroad Dr	Fred Wilson Rd. Diana Dr.	Diana Dr. Hercules Ave.	1.58	2.78	34	2.50	38
McCombs St.			. 78	1.23	38	1.18	40
McCombs St.	Lionaulas A	Hondo Pass Dr.	1.18	1.90 1.02	37	1.80	39
McCombs St.	Hercules Ave.	Wren Are			31	. 98	32
McCombs St.	Hondo Pass Dr. Wren Ave.	Wren Ave. Threadgill Ave.	. 53 . 50	. 98	31	1.00	30
McCombs St.	Hondo Pass Dr.	Threadgill Ave. Trans-mountain	.50 Rd.	. 98	31		
McCombs St.	Hondo Pass Dr. Wren Ave. Threadgill Ave.	Threadgill Ave. Trans-mountain (Loop 375)	.50 Rd. 1.01	. 98 1. 90	31 32	1.85	33
McCombs St.	Hondo Pass Dr. Wren Ave. Threadgill Ave. Trans-mountain Rd.	Threadgill Ave. Trans-mountain (Loop 375) Fairbanks Dr.	.50 Rd. 1.01 .08	. 98 1. 90 . 15	31 32 32	1.85 .13	33 36
McCombs St.	Hondo Pass Dr. Wren Ave. Threadgill Ave. Trans-mountain Rd. Fairbanks Dr.	Threadgill Ave. Trans-mountain (Loop 375) Fairbanks Dr. Dyer St.	.50 Rd. 1.01 .08 .17	. 98 1. 90 . 15 . 55	31 32 32 19	1.85 .13 .58	33 36 17
McCombs St.	Hondo Pass Dr. Wren Ave. Threadgill Ave. Trans-mountain Rd. Fairbanks Dr. Dyer St.	Threadgill Ave. Trans-mountain (Loop 375) Fairbanks Dr. Dyer St. Sun Valley Dr.	.50 Rd. 1.01 .08 .17 .55	. 98 1. 90 . 15 . 55 1. 57	31 32 32 19 21	1.85 .13 .58 1.17	33 36 17 28
McCombs St.	Hondo Pass Dr. Wren Ave. Threadgill Ave. Trans-mountain Rd. Fairbanks Dr.	Threadgill Ave. Trans-mountain (Loop 375) Fairbanks Dr. Dyer St.	.50 Rd. 1.01 .08 .17	. 98 1. 90 . 15 . 55	31 32 32 19	1.85 .13 .58	33 36 17

TABLE IV-2 (Continued)

				Off-	Peak	P.	eak
	Section		Distance	Time	Average	Time	Avera
Route	From	То	in Miles	in Min.	Speed	in Min.	Speed
Magnetic St. , Ala-	City Timeita	Hercules Ave.	. 95	2,55	22	1, 95	29
	City Limits Hercules Ave.	Fred Wilson Rd.	2.20	3, 92	34	3, 62	36
oama Ave.,&							
Arizona Ave.	Fred Wilson Rd.	Van Buren Ave.	1.25	2.32	32	2, 25	33
	Van Buren Ave.	Fort Blvd.	. 56	1.63	21	1.35	25
	Fort Blvd.	Richmond Ave.	. 70	1.70	25	1.88	23
	Richmond Ave.	Ingersoll Way	. 78	2.02	23	1.77	26
	Ingersoll Way	Dakota St.	. 26	. 48	32	. 50	31
	Dakota St.	Cotton St.	. 40	. 93	26 -	. 85	28
	Cotton St.	Cliff St.	. 24	. 48	30	. 47	31
	Cliff St.	Brown St.	. 46	1.13	24	1.13	24
	Brown St.	Campbell St.	. 60	1.67	22	1.98	18
	Campbell St.	Kansas St.	. 07	. 18	23	, 73	6
	Kansas St.	Stanton St.	. 06	. 22	17	. 53	7
	Stanton St.	Mesa St.	.07	. 92	5	. 92	5
							7
	Mesa St.	Oregon St.	06	1.23	3		,
	TOTAL		8.66	21.38	24	20.45	25
Piedras St.	Diama Arra	Van Buron Arro	. 37	1.20	10	1.18	19
icuias Di,	Pierce Ave.	Van Buren Ave.			19		
	Van Buren Ave.	Monroe Ave.	. 06	. 17	22	. 32	11
	Monroe Ave.	Fort Blvd.	. 45	1.13	24	1.40	19
	Fort Blvd.	Altura Ave.	.64	2.00	19	1.77	22
	Altura Ave.	Richmond Ave.	. 07	. 20	21	. 25	17
	Richmond Ave.	Grant Ave.	. 68	1.78	23	1.83	22
	Grant Ave.	Pershing Dr.	. 12	1.05	7	. 90	8
	Pershing Dr.	Montana	. 13	. 85	9	. 67	12
	Montana Ave.	Yandell Dr.	.07	. 40	11	1.35	3
	Yandell Dr.	Wyoming Ave.	.07	1.27	3	. 98	4
	Wyoming Ave.	Missouri Ave.	. 07	. 25	17	. 52	8
							9
	Missouri Ave.	I-10	. 07	. 43	10	. 47	7
	I-10	Alameda Ave.	. 37	. 97	23	3,13	
	Alameda Ave.	Magoffin Ave.	. 11	. 75	9	2.03	3
Magoffin TOTAL	Magoffin Ave.	Paisano Dr.	.39	2.45	10 . •	2,67	9
	TOTAL		3.67	14.90	15	19.47	11
Pershing Dr.	Sheridan Rd.	Radford St.	.10	. 48	12	.37	16
	Radford St.	Dyer St.	. 49	1.37	22	1.15	26
	Dyer St.	Altura Ave.	. 26	. 62	25	. 92	17
	Altura Ave.	Hastings Dr.	.08	. 20	24	. 18	26
	Hastings Dr.	Trowbridge Dr.	.38	1.28	18	1.13	20
	Trowbridge Dr.	Copia St.	. 22	1.17	11	. 78	17
	Copia St.	Piedras St.	.64	2, 37	16	2.50	15
	Piedras St.	Montana Ave.	.60	2, 37	16	1.93	19
	TOTAL		2,77	9.80	17	8.97	19
Rio Grande-Grant	Oregon St.	Mesa St.	.06	. 33	11	1.08	3
ve.	Mesa St.	Stanton St.	. 07	. 18	23	. 20	21
	Stanton St.	Kansas St.	. 06	1.37	3	.18	20
	Kansas St.	Campbell St.	.06	. 22	17	. 17	22
	Campbell St.	Brown St.	. 62	1.35	28	1.35	28
	Brown St.	Cotton St.	. 62	1.78	21	1.92	19
	Cotton St.	Dakota St.	.51	1.10	28	1.02	30
	Dakota St.	Ingersoll Way	. 18	. 43	25	. 45	24
	Ingersoll Way	Piedras St.	. 31	2.08	9	1.65	11
	TOTAL		2.49	8. 85	17	8.02	19
Yandell Dr.	Interstate 10	Paisano Dr.(Lp.16		.65	8	1.25	4
. wardell Lat.	Paisano Dr.(Lp.16)	Chelsea St.	.29	. 88	20	1.10	16
						1.42	19
	Chelsea St.	Raynolds St.	. 44	1.60	17		
	Raynolds St.	Copia St.	1.07	2.93	22	2.98	22
	Copia St.	Piedras St.	. 63	1.95	19	2.48	15
	Piedras St.	Cotton St.	. 90	2.28	24	2.13	25
	Cotton St.	Brown St.	.54	1.53	21	1.27	26
	Brown St.	Campbell St.	.60	2.63	14	1.97	18
	Campbell St.	Kansas St.	.07	1.55	3	1.33	3
	Kansas St.	Stanton St.	.06	. 40	9	. 38	9
	Stanton St.	Mesa St.	. 06	. 22	17	. 22	17
			07	. 1.8	2.3	. 60	7
	Mesa St. Oregon St.	Oregon St. Santa Fe St.	.07	.18 .37	23 21	. 60 . 98	7 8

TABLE IV-2 (Continued)

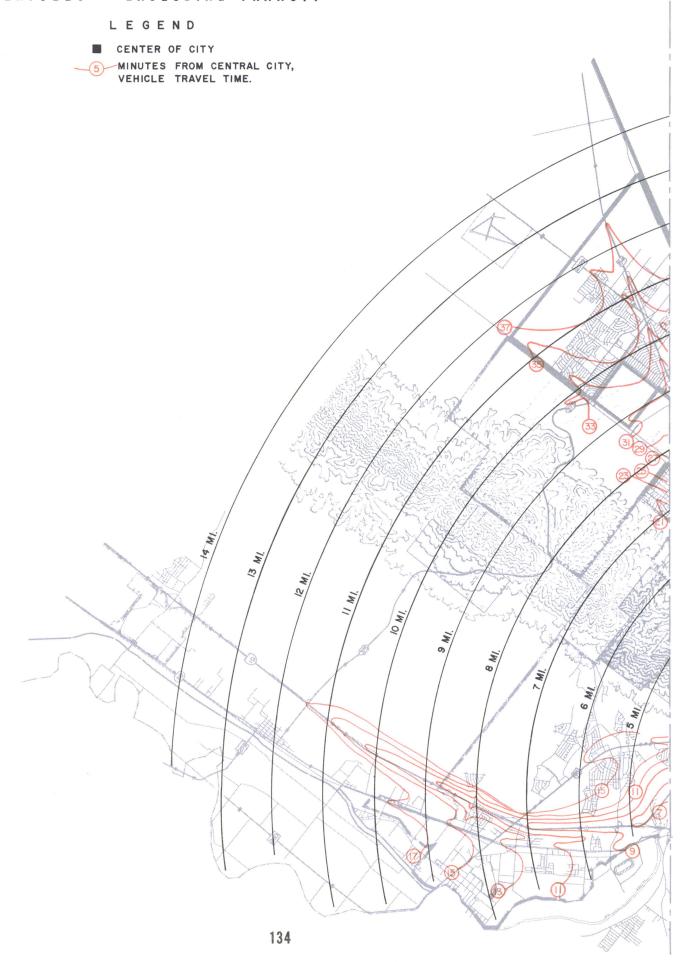
	Sectio	n	Distance	Off-Peak Time Average		Time	a k Averag
Route	From	То	in Miles	in Min.	Speed	in Min.	Speed
Vandall Dr. (Cant.)	I as Angeles De	Hamilton De	22	0.5	1.4	F.O.	2.4
Yandell Dr. (Cont.)	Los Angeles Dr. Hawthorn Dr.	Hawthorn Dr. Porfirio Diaz	. 23 . 06	. 85 . 50	16 7	. 58 . 38	24
	Porfirio Diaz	Sun Bowl Rd.	. 16		12		9
	Sunbowl Rd.	I-10	. 08	. 78	36	. 47 . 08	21 58
	I-10	Paisano Dr.	. 28	.62	27	.72	23
	1-10	raisano bi.			21	- 12	23
	TOTAL		5.97	20,65	17	20.90	1.7
Myrtle Ave.	Alameda Ave.	Cotton St.	. 82	2.88	17	2.32	21
	Cotton St.	Campbell St.	.79	2.78	17	2.57	18
	Campbell St.	Kansas St.	.06	. 55	7	. 20	18
	Kansas St.	Stanton St.	.07	.83	5	. 85	5
	TOTAL		1.74	7.05	15	5.93	18
Magoffin Ave,	Alameda Ave.	Piedras St.	. 17	1.57	7	1,23	8
	Piedras St.	Cotton St.	.90	2,75	20	2.40	23
	Cotton St.	San Antonio Ave.		2.52	16	1.93	20
	TOTAL		1.73	6.83	15	5.57	19
an Antonio Ave.	Paisano Dr.	Santa Fe St.	. 28	2.17	8	2.08	8
	Santa Fe St.	El Paso St.	. 09	. 43	12	1.77	3
	El Paso St.	Oregon St.	. 06	. 45	8	1.43	3
	Oregon St.	Mesa St.	. 07	. 33	13	. 92	5
	Mesa St.	Stanton St.	. 06	. 28	. 13	.18	20
	Stanton St.	Myrtle Ave.	. 03	. 17	11	.55	3
	Myrtle Ave.	Kansas St.	.04	. 15	16	. 77	3
	Kansas St.	Campbell St.	.06	1.00	4	.88	4
	Campbell St.	Magoffin Ave.	.07	. 30	14	.20	21
	Magoffin Ave.	St. Vrain St.	.18	. 60	18	. 45	24
	St. Vrain St.	Cotton St.	. 41	2. 25	11	1.38	18
	TOTAL		1.35	8.13	10	10.62	8
Campbell St.	Sixth Ave.	Fifth Ave.	.06	. 30	12	. 25	14
_	Fifth Ave.	Paisano Dr.	. 20	1.07	11	1.03	12
	Paisano Dr.	San Antonio Ave.	. 20	1.35	9	1.73	7
	San Antonio Ave.	Myrtly Ave.	.06	. 95	4	. 23	15
	Myrtle Ave.	Texas Ave.	.06	. 33	11	, 22	17
	Texas Ave.	Mills Ave.	. 07	, 23	18	. 43	10
	Mills Ave.	Missouri Ave.	.19	1.00	11	. 97	12
	Missouri Ave.	Wyoming Ave.	.04	.12	21	. 08	29
	Wyoming Ave.	I-10	.04	. 10	24	.10	24
	I-10	Yandell Dr.	. 05	. 88	3	. 52	6
	Yandell Dr.	Montana Ave.	. 07	. 20	21	.60	7
	Montana Ave.	Rio Grande Ave.	. 06	. 97	4	.65	6
	Rio Grande Ave.	Arizona Ave.	.00	, 22	19	. 93	5
	Arizona Ave.	Cliff Dr.	. 26	.70	22	. 68	23
	TOTAL		1.43	8.42	10	8. 43	10
Kansas St.	Cliff Dr.	Arizona Ave.	. 25	1,03	15	. 97	16
	Arizona Ave.	Rio Grande Ave.	.06	. 20	18	. 42	9
	Rio Grande Ave.	Montana Ave.	. 07	. 82	5	. 25	17
	Montana Ave.	Yandell Dr.	. 07	. 85	5	1.43	3
	Yandell Dr.	I-10	. 04	. 13	18	. 13	18
	I-10	Wyoming Ave.	. 03	. 10	18	.12	15
	Wyoming Ave.	Missouri Ave.	. 06	. 20	18	.18	20
	Missouri Ave.	Mills Ave.	. 24	1.67	9	1.17	12
	Mills Ave.	Texas Ave.	.02	1.02	1	.55	.2
	Texas Ave.	Myrtle Ave.	.06	. 33	11	1.07	3
	Myrtle Ave.	San Antonio Ave,	.06		11		
		Paisano Dr.		. 17		.15	16
	San Antonio Ave. Paisano Dr.		, 20	1.72	. 7	1.85	6
	Fifth Ave.	Fifth Ave. Sixth Ave.	. 19 . 07	. 68 . 25	17 17	. 67 . 22	17 19
	TOTAL						
	TOTAL		1.40	9.17	9	9.17	9

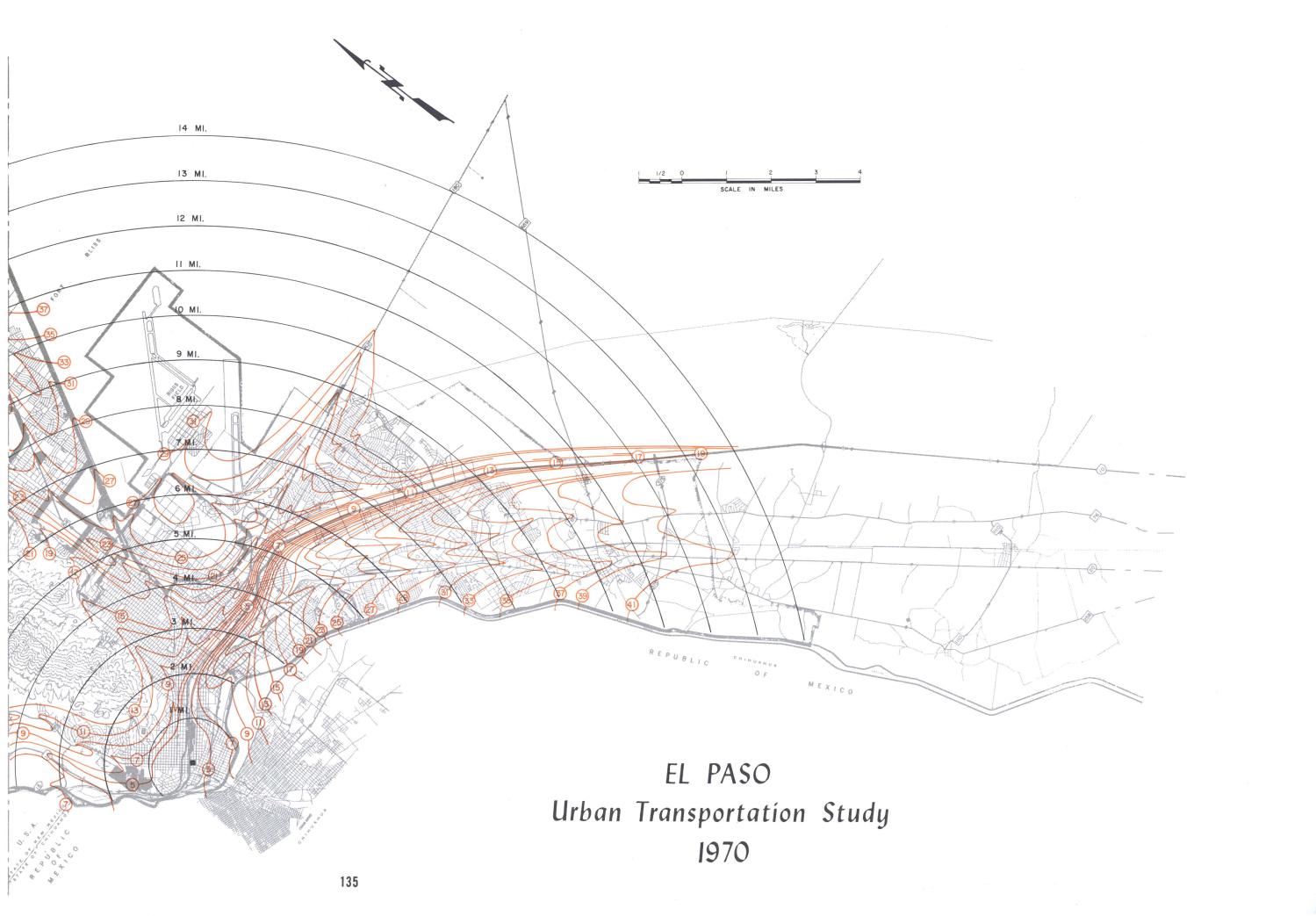
TABLE IV-2 (Continued)

					Peak		ak
Route	Section From	To	Distance in Miles	Time in Min.	Average Speed	Tim e in Min.	Average Speed
Stanton St.	International Bridge	Seventh Ave	. 16	1.08	9	. 78	12
bunton bt.	Seventh Ave.	Sixth Ave.	.06	. 25	14	. 42	9
	Sixth Ave.	Fifth Ave.	.07	. 27	16	. 38	11
	Fifth Ave.	Paisano Dr.	.19	. 97	12	1.72	7
	Paisano Dr.	San Antonio Ave.		2.50	5	3.93	3
	San Antonio Ave.	Texas Ave.	. 07	. 30	14	.40	11
	Texas Ave.	Mills Ave.	. 07	. 58	7	.43	10
	Mills Ave.	Missouri Ave.	. 19	2, 02	6	2.82	4
	Missouri Ave.	Wyoming Ave.	. 06	.55	. 7	.20	18
	Wyoming Ave.	I-10	.03	. 08	22	. 07	27
	I-10	Yandell Dr.	.03	. 47	5	. 12	21
	Yandell Dr.	Montana Ave.	. 04	.75	5	. 60	6
	Montana Ave.	Rio Grande Ave.	. 07	. 20	21	. 20	13
	Rio Grande Ave.	Arizona Ave.	. 06	. 47	8	. 63	6
	Arizona Ave.	Cliff Dr.	. 25	. 93	16	, 83	18
	Cliff Dr.	Schuster Ave.	. 13	. 77	10	1.03	18
	Schuster Ave.	Rim Rd.	. 07	. 57	7	. 45	9
	Rim Rd.	University Ave.	. 25	. 65	23	, 57	26
	University Ave.	Robinson Rd.	. 25	. 70	22	. 80	20
	TOTAL		2,28	14.10	10	16.38	8
Oregon St.	Robinson Ave.	University Ave.	, 25	1.15	13	1.47	10
	University Ave.	Rim Rd.	. 26	. 97	16	. 70	22
	Rim Rd.	Schuster Ave.	.06	1.50	2	. 28	13
	Schuster Ave.	Cliff Dr.	. 03	. 40	20	.33	23
	Cliff Dr.	Arizona Ave.	. 25	1.52	10	1.05	14
	Arizona Ave.	Rio Grande Ave.	. 04	.18	13	.18	13
	Rio Grande Ave.	Montana Ave.	.09	. 28	19	. 90	6
	Montana Ave.	Yandell Dr.	. 06	. 22	17	.18	20
	Yandell Dr.	I-10	.05	. 12	26	. 10	30
	1-10	Wyoming Ave.	. 02	1.25	1	.87	1
	Wyoming Ave.	Missouri Ave.	. 06	, 22	17	.21	17
	Missouri Ave.	Mills Ave.	.19	2.00	6	1.33	9
	Mills Ave.	Texas Ave.	. 07	. 73	6	. 55	8
	Texas Ave.	San Antonio Ave.		. 42	3	. 45	3
	San Antonio Ave.	Paisano Dr.	. 19	1,17	10	1.28	9
	Paisano Dr.	Fifth Ave.	.19	1,02	11	1.28	9
	Fifth Ave.	Sixth Ave.	.07	. 70	6	,55	8
	r itti 21vc.	DIXIII 11VC.					
	TOTAL		1.90	13.83	9	11.73	10
El Paso St Mills	Port of Entry	Sixth Ave.	. 08	. 17	29	.20	24
Ave.	Sixth Ave.	Fifth Ave.	.07	. 30	14	. 18	23
	Fifth Ave.	Paisano Dr.	.10	1.33	5	1.68	4
	Paisano Dr.	San Antonio Ave.		2.88	4	2.57	4
	San Antonio Ave.	Oregon St.	. 06	.83	4	1.35	3
	Oregon St.	Mesa St.	.10	2.20	3	. 93	7
	Mesa St.	Stanton St.	. 07	1.42	3	1.05	4
	Stanton St.	Kansas St.	.06	. 57	6	. 23	15
	Kansas St.	Campbell St.	.07	1.13	4	1.50	3
•	TOTAL		.80	10.83	4	9.70	5
Santa Fe St.	El Paso St.	Paisano Dr.	. 45	1.45	19	1.90	I 4
	Paisano Dr.	San Antonio Ave.		. 75	14	2,27	5
	San Antonio Ave.	Franklin Ave.	. 19	2.43	5	1.72	7
	Franklin Ave.	Missouri Ave.	. 08	. 18	26	. 18	26
	Missouri Ave.	Wyoming Ave.	.04	. 47	5	. 18	13
	Wyoming Ave.	I-10	. 02	,10	12	. 15	8
	I-10	Yandell Dr.	.05	. 13	23	. 13	23
	TOTAL		1.00	5.52	11	6, 53	9

ISOCHRONAL CHART

VEHICLES - EXCLUDING TRANSIT





The value of travel time as a criterion for measuring level of service has been indicated previously. Table IV-3 shows travel times as a function of lengths of trips. These travel times were compiled by the National Committee on Urban Transportation as desirable objectives. In keeping with the greater concern of drivers for travel time vis-a-vis trip length, the lengths are shown in air distances. In the absence of contradictory standards, Table IV-3 provides an acceptable standard for comparison of overall travel times in El Paso. The time-delay study is a valuable tool for locating deficient route sections. Within limits the average speeds permit comparisons between sections.

TABLE IV-3

DESIRABLE MAXIMUM AUTO TRAVEL TIME (3)

FOR TRIPS OF VARIOUS LENGTHS

Average W	Average Weekday Peak Hour									
Length of Trip	Maximum Travel Time									
2 Miles	7 Minutes									
4 Miles	12 Minutes									
6 Miles	16 Minutes									
8 Miles	20 Minutes									
10 Miles	24 Minutes									
12 Miles	28 Minutes									

A somewhat cursory comparison was made of the speeds that prevailed during off-peak hours in 1965 and 1970 on selected major arterials. Generally, as expected because of the increased traffic, the average speeds over significant route segments tended to decrease. For example, speed on Dyer Street dropped from thirty-four to twenty-six miles per hour, on Mesa from thirty to twenty miles per hour and on Paisano from thirty-one to twenty-eight miles per hour. As exceptions, speeds on arterials to the east and northeast tended to increase slightly. This seems to be attributable to the increased use of Interstate 10 in this corridor because during the period there was what seems to be an offsetting decrease in the speeds on the Interstate.

Travel times on selected radial streets in El Paso are shown in Table IV-4. A comparison with the travel times proposed by the National Committee on Urban Transportation suggests that the service is marginal on some of its principal arterials in the main traffic corridors of the City. It appears that close ramp spacings and traffic volumes will preclude attainment of the lower travel times which are seemingly afforded by the design speeds and standards built into Interstate Highway 10. This is consistent with other urban areas where the nature of traffic is an impediment to normal Interstate speeds.

This report provides no discussion of the time consumed in the area of the trip destination in parking the vehicle and in getting from the vehicle to the "real" destination; e.g. an

office, a shop, a work place or an amusement area. These considerations are factors which shape the travellers' appraisal of the service afforded by a route. These considerations are properly a subject for future studies, probably in connection with parking facilities.

TABLE IV-4

TRAVEL TIMES ON SELECTED

STREETS RADIATING FROM THE C. B. D.

(Average Weekday Peak)

	Travel Times (Minutes)								
Facility	2 Mi.	4 Mi.	6 Mi.	8 Mi.	10 Mi.	12 Mi.			
Alabama St.	9.0	14.3	18.5						
Alameda Ave.	9.0	18.5	25.0	30.5	36.4	41.2			
Doniphan Dr. *			10.0	14.0					
Dyer St.		16.2	23.8	27.8	32.0	36.0			
Interstate 10 - Eastbound	2.6	5.3	8.0	11.5	14.3	17.0			
Interstate 10 - Westbound	2.6	6.0	8.0	10.2	12.8				
Mesa St.	7. 2	12.0	15.2		/= =				
Montana Ave.	8.0	14.8	22.0	25.8	29.5				
Paisano Dr Eastbound	9.0								
Paisano Dr Westbound*	5.0	8.2							
Railroad Dr. / McCombs St.			25.5	28.8	33.0	37.2			

^{*} Doniphan Drive and Paisano Drive West form a single radial route from the CBD.

ACCIDENT ANALYSIS

Although the gross number of accidents in El Paso showed an increase for 1970, the number of fatal accidents and the number of fatalities showed a decrease from 1969. There was also a decrease in the fatality rate. The fatality rate for 1969 was approximately 5.89 deaths per one hundred million vehicle miles traveled versus the 4.37 deaths per one hundred million vehicle miles traveled for 1970. The comparable rate for 1964 was 4.58.

Table IV-5 depicts the accident data for the City of El Paso for the period 1961 to 1970. In order that the data may be compared internally as well as nationally, the statistics for fatalities were converted to rates which were normalized on the basis of population and also on the basis of vehicle registration. These rates are essentially as used by the National Safety Council in compiling the annual Accident Facts report.

TABLE IV-5

ACCIDENT SUMMARY CITY OF EL PASO 1961-1970

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Fatal Accidents	37	33	24	35	43	50	. 56	60	68	54
Injury Only Accidents	1,505	1,571	1,880	1,945	2,097	2,286	2,928	2,810	2,860	2,943
Total All Accidents	7,020	7,097	7,336	7,729	8,400	9,010	10,022	10,251	10,492	10,840
Total Persons Killed	. 40	36	25	44	49	54	63	68	77	61
Total Persons Injured	2,135	2, 261	2,715	2,802	3,031	3,323	4,599	4,130	4,259	4,410
<u>Fatalities</u> *										
Rate 10,000 Registered Vehicles			2.34	3.93	4.28	4.61	5.02	5.20	5.66	4.50
Fatalities**										
Rate 100,000 Inhabitants	14.2	12,6	9. 7	15.0	16.4	17.8	20.5	21.8	24.2	18.9

^{*} Based on 76% of all vehicles registered in El Paso County except House Trailers, Factory Delivery, Dealer and Machinery.

Source: City of El Paso, Police Department.

The Texas Transportation Institute at Texas A & M University, conducted a study of the 1969 motor vehicle accidents, for the State of Texas, to determine accident costs. Through their research project they found that the average direct costs for fatal accidents involving two or more vehicles was \$13,781. They also found that injury only accidents cost on the average \$1,955 and property damage only accidents cost \$318.(4)

Not considering any increase in these average accident costs, they were applied to the 1970 accident data for El Paso. From this it was determined that fatal accidents cost \$744,174, injury only accidents cost \$5,753,565, and property damage only accidents cost \$2,494,074. This made a total of \$8,991,813 lost in motor vehicle accidents. Of course, this does not include the sorrow or inconvenience caused the victim or families.

During 1970, there were 116 intersections which had ten or more accidents. From these 116 intersections there were a total of 1,980 accidents, of which 560 were injury accidents and five were fatal accidents. These 116 intersections also had an accident rate of 1.95 accidents per million vehicles. It was noted that at these 116 intersection, the rear end collision was the most common type of collision and following too close was the most common type of violation. Table IV-6 lists the 116 intersections with ten or more accidents in decreasing order of accident rate. It also shows the total number of accidents, property damage only accidents, injury only accidents and fatal accidents.

Ideally the elimination of all traffic accidents is a theoretical objective of transportation planning. Practically somewhat lesser objectives must be accepted. A reasonable minimum objective is to limit El Paso's fatalities to rates which do not exceed the cor-

^{**} The population of the City of El Paso was assumed to increase exponentially during the intercensal years to provide the population change reflected in the Census.

TABLE IV-6

1970 INTERSECTION ACCIDENT ANALYSIS BY ACCIDENT RATE

	Intersection	Fatal Accidents	Injury Accidents	Property Damage Accidents	Total Accidents	Accident Rate Per Mil.Veh.
1.	Dallas St. & Missouri Ave.		3	7	10	7.82
2.	Carolina Dr. & Yarbrough Dr.	1	10	9	20	7.39
3.	No. Loop Dr. & Zaragosa Rd.		4	7	11	6.02
4.	Mesa St. & Missouri Ave.		15	19	34	5.95
5.	Gateway East & Giles Rd.	1	1	40	42	5.50
6.	Clark Dr. & El Paso Dr.		6	10	16	4.96
7.	Kansas St. & Missouri Ave.		5	18	23	4.86
*8.	Gateway Blvd. & Piedras St.		7	33	40	4.62
9.	Doniphan Dr. & Sunland Park		5	7	12	4.03
10.	Diana Dr. & Hercules Ave.		15	7	22	3.92
11.	Mesa St. & Rio Grande Ave.		7	19	26	3.70
12.	Gateway East & Hunter Rd.		4	20	24	3.63
13.	Edgemere Blvd. & Geronimo Dr.		4	13	17	3.54
*14.	Airways Blvd. & Gateway Blvd.		3	36	39	3.44
15.	Montana Ave. & Wedgewood Dr.		2	8	10	3.41
16.	Dyer St. & McCombs St.		5	14	19	3.39
17.	Kansas St. & Main Dr.			13	13	3.37
18.	Gateway West & McRae Blvd.		4	27	31	3.34
19.	Chelsea St. & El Paso Dr.		3	9	12	3. 29
20.	Missouri Ave. & Stanton St.		3	7	10	3.26
21.	El Paso St. & Fourth Ave.		3	7	10	3.04
22.	Hunter Rd. & No. Loop Dr.		6	14	20	2.79
*23.	Gateway Blvd. & Hawkins Blvd.		1	22	23	2.70
24.	Paisano Dr. & Val Verde St.		13	23	36	2.64
25.	Campbell St. & Texas Ave.		4	16	20	2.59
26.	Dyer St. & Trans-Mountain Rd.		7	8	15	2.59
27.	Montana Ave. & Magruder St.		11	18	29	2.55
28.	I-10 Acc. & Mesa St.		1	9	16	2.55

TABLE IV-6 (Continued)

	Intersection	Fatal Accidents	Injury Accidents	Property Damage Accidents	Total Accidents	Accident Rate Per Mil. Veh.
29.	Altura Ave. & Piedras St.		I	9	10	2.55
30.	Mesa St. & Schuster Ave.		11	13	24	2.54
31.	Altura Ave. & Copia St.		3	10	13	2.49
32.	Alameda Ave. & Delta Dr. (No. Loop)		13	19	32	2.47
33.	Diana Dr. & Dyer St. (War Rd.)		7	28	35	2.40
34.	Main Dr. & Mesa St.		2	12	14	2.40
35.	Balboa Rd. & Mesa St.		5	7	12	2.38
36.	Dyer St. & Hercules Ave.	1	11	24	36	2.36
37.	Paisano Dr. & Stanton St.		. 8	13	21	2.36
38.	Mesa St. & Mills Ave.			12	12	2.36
39.	El Paso St. & Paisano Dr.		2	15	17	2.35
40.	No. Loop Dr. & Yarbrough Dr.		3	9	12	2.35
41.	Paisano Dr. & Santa Fe St.		2	10	12	2.35
42.	Alameda Ave. & Carolina Dr.		11	10	21	2.33
43.	Mesa St. & Wyoming Ave.		4	9	13	2.33
44.	Campbell St. & Rio Grande Ave.		5	10	15	2.25
45.	Kansas St. & Yandell Ave.		4	6	10	2.23
46.	Mesa St. & Sunland Park (Shadow Mtn.)		8	9	17	2.19
47.	Hammett Blvd. & Paisano Dr.		14	29	43	2.18
48.	Airways Blvd. & Montana Ave.		4	30	34	2.16
49.	Copia St. & Montana Ave.		10	14	24	2.15
50.	Alameda Ave. & Buena Vista St.		6	14	20	2.14
51.	Alameda Ave. & Copia St.		4	17	21	2.12
52.	Alameda Ave. & Little Flower Rd.		13	8	21	2.11
*53.	Gateway Blvd. & Geronimo Dr.		3	20	23	2.09
54.	Alameda Ave. & Clark Dr.		12	8	20	2.08
*55.	Gateway Blvd. & Raynor St.		6	6	12	2.08
56.	Alameda Ave. & Yarbrough Dr.		7	6	13	2.07
57.	Hawkins Blvd. & Montana Ave.		5	10	15	2.00
58.	Mesa St. & Montana Ave.		2	14	16	1.99
59.	Copia St. & Pershing Dr.		2	17	19	1.98
60.	Dyer St. & Tetons Dr.		5	16	21	1.87
61.	Cotton St. & Montana Ave.		8	8	16	1.81
62.	Diana Dr. & Hondo Pass Dr.		4	6	10	1.79
63.	Montana Ave. & Piedras St.		6	8	14	1.78

TABLE IV-6 (Continued)

	Intersection	Fatal Accidents	Injury Accidents	Property Damage Accidents	Total Accidents	Accident Rate Per Mil. Veh.
64.	Carolina Dr. & No. Loop Dr.		2	10	12	1.78
65.	Dyer St. & Wren Ave.		1	18	19	1.76
66.	Alameda Ave. & Raynolds St. (Val Verde)		3	12	15	1.75
67.	Kansas St. & Montana Ave.		3	9	12	1.75
68.	Paisano Dr. & Piedras St.		12	12	24	1.74
69.	Fred Wilson Rd. & Railroad Dr.		7	17	24	1.71
70.	Dyer St. & Van Buren Ave.		4	11	15	1.71
71.	Mesa St. & Yandell Ave.	1	2	7	10	1.71
72.	Franklin Ave. & Mesa St.		2	8	10	1.69
73.	Cotton St. & Texas Ave.		4	9	12	1.67
74.	Fred Wilson Rd. & Sheridan St.		6	10	16	1.63
75.	El Paso Dr. & Paisano Dr.		6	7	13	1.60
76.	Alameda Ave. & Hammett Blvd.		2	11	13	1.60
77.	Mesa St. & University Ave.		1	12	13	1.60
78.	Airways Blvd. & Viscount Blvd.		2	10	12	1.53
79.	Kansas St. & Texas Ave.		3	9	12	1.50
*80.	Gateway Blvd. & Raynolds St.		4	17	21	1.49
81.	Dyer St. & Ellerthorpe Ave.		9	4	13	1.48
82.	Dyer St. & Memphis Ave.		2	8	10	1.47
83.	Pershing Dr. & Piedras St.		2	10	12	1.46
84.	Alameda Ave. & Concepcion (El Paso Dr.	.)	1	11	12	1.45
85.	Dyer St. & Thomason Ave.		5	8	13	1.43
86.	Geronimo Dr. & Montana Ave.		5	15	20	1.40
87.	Alabama St. & Fred Wilson Rd.		8	4	12	1.39
88.	Alabama St. & Richmond Ave.		6	8	14	1.37
89.	Chelsea St. & Montana Ave.		4	8	12	1.35
90.	Mesa St. & Paisano Dr.		2	. 9	11	1.33
91.	Cotton St. & Rio Grande Ave. (Grant)		4	7	11	1.31
92.	No. Loop Dr. & Trowbridge Dr.		3	7	10	1.30
93.	Baltimore Dr. & Mesa St.		2	11	13	1.29
94.	Dyer St. & Fillmore Ave.		5	6	11	1.26
95.	Dyer St. & Hayes Ave.		7	6	13	1.25
96.	Montana Ave. & Raynolds St.		4	8	12	1.24
97.	Mescalero Dr. & Montana Ave.		1	13	14	1.23
98.	Campbell St. & Montana Ave.		10	2	12	1,23

TABLE IV-6 (Continued)

		Fatal cidents	Property Injury Accidents	Damage Accidents	Total Accidents	Accident Rate Per Mil. Veh.
99.	Mesa St. & Mesita Dr.(Sun Bowl)		3	9	12	1.22
100.	Dyer St. & Fred Wilson Rd.		5	19	24	1.20
101.	Dyer St. & Hondo Pass Dr.	1	4	10	15	1.19
*102.	Gateway Blvd. & Paisano Dr.		5	14	19	1.18
103.	Pershing Dr. & Trowbridge Dr.		2	. 8	10	1.17
104.	Dyer St. & Rushing Dr.		1	1 1	12	1.15
105.	Boone St. & Paisano Dr.		5	6	11	1.15
*106.	Gateway Blvd. & Trowbridge Dr.		3	12	15	1.13
107.	Alameda Ave. & Piedras St.		5	9	14	1.12
108.	Montana Ave. & Trowbridge Dr.		2	11	13	1.12
109.	Montana Ave. & Sioux Dr.		1	9	10	1.06
110.	Coles St. & Paisano Dr.		3	7	10	1.05
111.	Alameda Ave. & Paisano Dr.		8	9	17	1.02
112.	Cotton St. & Missouri Ave.		2	- 8	10	. 98
113.	Paisano Dr. & Trowbridge Dr.		2	8	10	. 87
114.	Airport Rd. & Airways Blvd. (Robert E. Lee)		1	9	10	. 85
*115.	Copia St. & Gateway Blvd.		2	9	11	. 75
116.	Delta Dr. & Hammett Blvd.		3	7	10	<u>. 60</u>
Name of the Control o	TOTAL	5	570	1,405	1,980	1.95

^{*} Includes both directions of the frontage roads (Gateway East and Gateway West).

Source: City of El Paso, Police Department.

responding rates derived by the National Safety Council for the nation and for other cities of comparable size. The National Safety Council publishes its analysis of traffic accidents annually in <u>Accident Facts</u>. This publication contains accident statistics which will be used as criteria for assessing the effectiveness of the accident prevention program and for detecting areas where additional work would be needed.



TRANSIT STUDY

Bus transit in the El Paso Urban Area performs a vital role in the movement of people and is an integral element of the overall transportation system for the area. As such, it must be investigated in any comprehensive transportation study and its peculiar requirements incorporated in the transportation plan.

Mass transit patronage has declined on a nationwide basis since World War II. This, however, is not the case in El Paso where there has been an absolute increase in transit passengers. The above average patronage of transit in El Paso will probably continue for the same primary reason that has sustained it thus far. That is, the lower than average median income and the large number of Mexican Nationals who reside in Mexico and are employed as laborers or as domestics in El Paso. The trade and social interchange between citizens of the two counties also supports transit use.

Although there has been an absolute increase in transit passengers, there has been a decrease in relation to population and number of trips. The principal factor contributing to this is the increase in automobile ownership. Other factors which have contributed to this relative decline are growth of low density neighborhoods, development of suburban shopping centers, decentralization of business and industry, changes in economic conditions that have influenced consumer tastes and habits and improvement of street network.

Table IV-7 shows the trends in Transit Riding in El Paso. As can be seen in the table, the number of passengers has been fluctuating from year to year as has the passengers per capita.

TABLE IV-7
TRENDS IN TRANSIT RIDING
El Paso, Texas

Year	Total (5) Passengers	Total (6) Population	Passengers Per Capita
1960	17, 966, 764	276, 687	64.9
1961	17, 708, 278	281,000	63.0
1962	18, 335, 602	285,600	64.2
1963	18, 756, 926	290, 200	64.6
1964	20, 220, 763	294,800	68.6
1965	18, 987, 573	299, 300	63.4
1966	19, 295, 503	303, 900	63.5
1967	22, 383, 809	308, 400	72.6
1968	21, 943, 195	313,000	70.1
1969	22, 497, 716	317, 500	70.9
1970	18,578,500	322, 261	57.7

Population based on straight line between 1960 and 1970.

Currently there are four bus companies operating in El Paso. These four companies are: (1) Country Club Bus Lines, (2) El Paso City Lines, (3) Lower Valley Bus Lines, and (4) The Autobuses Internacionales. Each of the companies cover a specific area within the city and each converge to the Central Business District. The total route length is approximately 280 miles and the four companies carry a combined average of 50,900 passengers daily.

The Country Club Bus Lines operate in the northwest area of the city. It operates four buses on two routes. The average route length is 14 miles and the company averages some 1500 passengers daily.

The El Paso City Lines, the largest of the four, operate in the central city, northeast and eastern areas of the city. It operates 46 buses on 13 routes. The averge route length is 8 miles and the company averages 31,200 passengers daily. This company also operates a streetcar line between the C.B.D.'s of El Paso and Juarez, Mexico. The length of this line is 1.6 miles and it operates 9 streetcars daily carrying about 10,000 passengers daily.

The Lower Valley Bus Lines operate in the southeast area of the city and the Lower Valley. It operates 25 buses on 9 routes with an average route length of 15 miles. The company averages some 7,000 passengers daily.

Autobuses Internacionales is a Mexican owned bus line and operates between Juarez, Mexico, and the El Paso C.B.D. It enters and exits at the Cordova Port of Entry and goes directly to the C.B.D. via Paisano Drive. The company operates 21 buses on one route which is 7.27 miles long and averages about 1,200 passengers daily.

Table IV-8 gives a more detailed analysis of the bus companies and shows the information by route. (5) Figure IV-3 shows the current bus routes by each company and the area of coverage (1/4 mile each side of the route). This map also shows the locations of the existing schools and industrial areas.

TABLE IV-8

TRANSIT STUDY 1970

EL PASO CITY LINES, INC.

Route No.	Route Description	Fare	(Miles) Route Length	No. Of Buses Used	Seating Capacity/ Bus	Hea Max.	dway Min,	Average Daily Pass.	Maximum Passenger Location	Load Time
. 1.	El Paso-Juarez Street car	10¢	1.6	9	64	4	30	10,000	6th & Stanton El Paso - Paisano	PM Rush AM Rush
2.	Fort Bliss	15¢ or 2/25*	10.3	4	51	30	30	2,410	Cotton & Texas	PM Rush AM Rush
3.	Sun Valley Express	25¢	18.0	4	51	30	60	1,875	Five Points	PM Rush AM Rush
4,	Beaumont	15¢ or 2/25*	7.5	5	45	15	30/60	3,365	In: Montana-St. Vrain Out: Yandell-St. Vrain	PM Rush AM Rush
5,	Government Hill	15¢ or 2/25*	7.1	3	45	20	30/60	2,260	In: Montana-St. Vrain Out: Yandell-St. Vrain	PM Rush AM Rush
6.	Highland-Sunset	15¢ or 2/25*	7.3	3	45	20	60	2, 136	In: Florence-Arizona Out: Florence-Rio Grande	PM Rush AM Rush
7.	Second Ward	15¢ or 2/25*	1.7	2	36	15	30	1,090	Paísano-Oregon	PM Rush AM Rush
8.	Mesita	15¢ or 2/25*	6.4	4	45	20	60	3, 438	Mesa-Rio Grande	PM Rush AM Rush
10.	Paisano	15¢ or 2/25*	5.5	4	51	15	50	3,673	Paisano-Stanton	PM Rush AM Rush
11.	Park	15¢ or 2/25*	5.9	5	51	12	30	6, 587	In: Cotton-Myrtle Out: Cotton-Magoffin	PM Rush AM Rush
12.	Grandview	15¢ or 2/25*	9. 3	5	51	15	35	2, 362	Piedras-Wyoming	PM Rush AM Rush
13.	Cielo Vista	15¢ or 2/25*	9. 1	3	51	30	60	700	In: Cotton-Myrtle Out: Cotton-Magoffin	PM Rush
14.	Medical Center	15¢ or 2/25*	2.3	1	36	30	30	658	Arizona-Florence	PM Rush AM Rush
15.	Eastwood Express	25¢	14.2	3	51	30	50	625	Bassett Center	PM Rush AM Rush

^{*} Tokens (two for twenty-five cents.)

COUNTRY CLUB BUS LINES

1		Country Club	10,20 25¢	11	2	36	30	60	787	Paisano and Union Station	AM Rush PM Rush
2	: .	Coronado	20,25¢	16	2	35	30	60	735	Mesa and Executive	AM Rush PM Rush

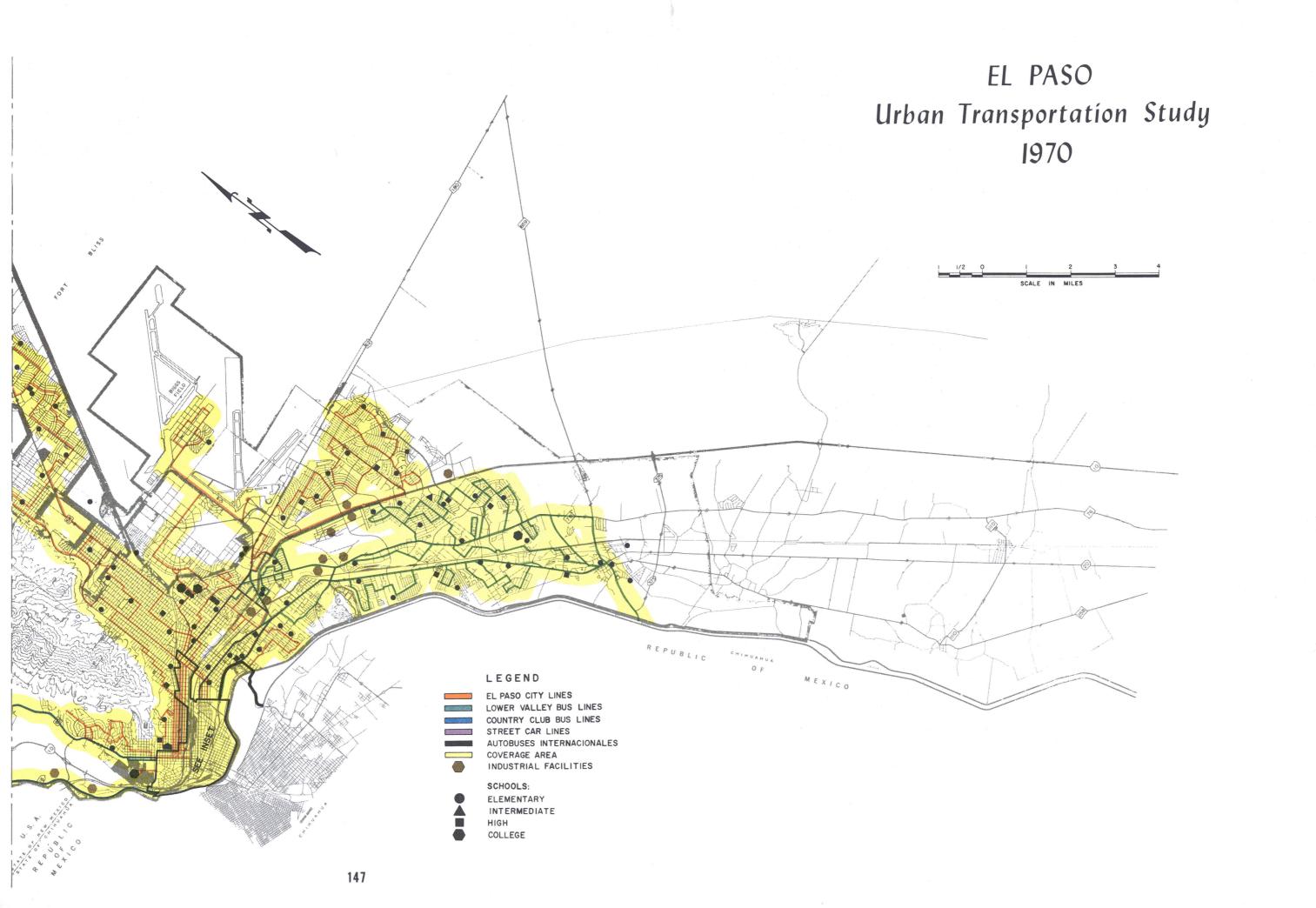
AUTOBUSES INTERNACIONALES, S. R. L.

		,								
1.	Juarez, El Paso	0.18	7. 27	10	40	10	6	1,207	Overland and El Paso	5:00 PM
LOWER	VALLEY BUSLINE									
	Highway 80	20,30	16.4	4	45	30	60	1,939	Concepcion and Alameda	5:25 PM
	Ranchland-Del Norte	20,30	15.9	4	45	30	60	1,614	Concepcion and Alameda	5:25 PM
	Hacienda Heights	20,30	18.2	2	33	60	60	276	Concepcion and Alameda	5:25 PM
	Hacienda-Montana	20,30	17.7.	2	33	60	60	200	Bassett Center	5:25 PM
	Lakeside-Pasodale	20,30	15.6	4	33	30	30	1,151	Concepcion and Alameda	5:45 PM
	Marion Manor	20, 30	14.5	2	30	60	60	355	Concepcion and Alameda	5:00 PM
	Tejas-Montana	20	7.0	. 1	45	60	60	245	Tejas Addition	6:10 PM
	Tigua	20,30	15.1	2	33	60	60	230	Concepcion and Alameda	5:25 PI
	Loma Terrace	20, 30	17.8	4	36	30	30	1,080	Concepcion and Alameda	5:25 PN

Current bus fares:
Zone 1 - 20¢
Zone 2 - 30¢
Fares established 1-8-70

TRANSIT MAP





The Origin-Destination Survey, which was completed in April 1970, showed that of the 919,490 daily person trips, 7 percent or 60,991 were made as bus passengers. Figure 32 in Volume 5, Origin & Destination Survey, 1970, shows the desire lines of bus passengers. It shows that the desire is predominately between the C.B.D. and the Lower Valley. For more information on distribution of bus passenger trips, the reader is referred to the tables at the end of Volume 5, Origin and Destination Survey, 1970.

Bus transit is a basic necessity for a large number of urban residents; students under driving age, elderly persons, those excluded from driving for reasons of health or physical handicap, and those unable to afford private transportation.

The improvement and extension of bus transit is needed to support economical and desirable urban development and to effect more efficient use of the street network, particularly to reduce overloading of the highways and arterial streets during peak travel hours. Improvement is also needed to effect a reduction of air pollution and to keep space requirements for parking in the downtown area and other major centers at manageable levels. With this in view, the City of El Paso has requested a grant from the Department of Transportation to aid in the conduct of a short-range transit study aimed at improving and upgrading the existing bus system. The City plans to follow this study up with a long-range comprehensive transit study aimed at development of mass transit facilities and service needed to serve the area as it grows in size and population. This is in consonance with the recommendations of the Transportation Advisory Committee. These studies will be developed in coordination with the continuing transportation effort.

Taxicab service and automobile rental, as they affect transportation planning, has not changed appreciably since Volume 1, Basic Elements and Plan, 1963-1985.

Rail transit is still nonexistant in the El Paso area, however, a consultant has determined that a monorail connecting the C.B.D.'s of Juarez, Mexico, and El Paso is highly feasible and would provide an efficient crossing for the busiest port of entry on the U.S. border.

References:

- 1. 1968 National Functional Classification Study Manual, U.S. Department of Transportation, Federal Highway Administration, April 1969.
- 2. Highway Capacity Manual, 1965, Highway Research Board
- 3. National Committee on Urban Transportation, Standards for Street Facilities and Services, Procedure Manual 7A, Public Administration Service, Chicago, Illinois, 1958.
- 4. Highway Accident Costs and Rates, Research Report 144-IF, Texas Transportation Institute, Texas A&M University, College Station, Texas.
- 5. Each of the respective bus companies.
- 6. 1960 and 1970 Bureau of Census Reports.







Chapter 5

TRAVEL PATTERNS



Travel Patterns

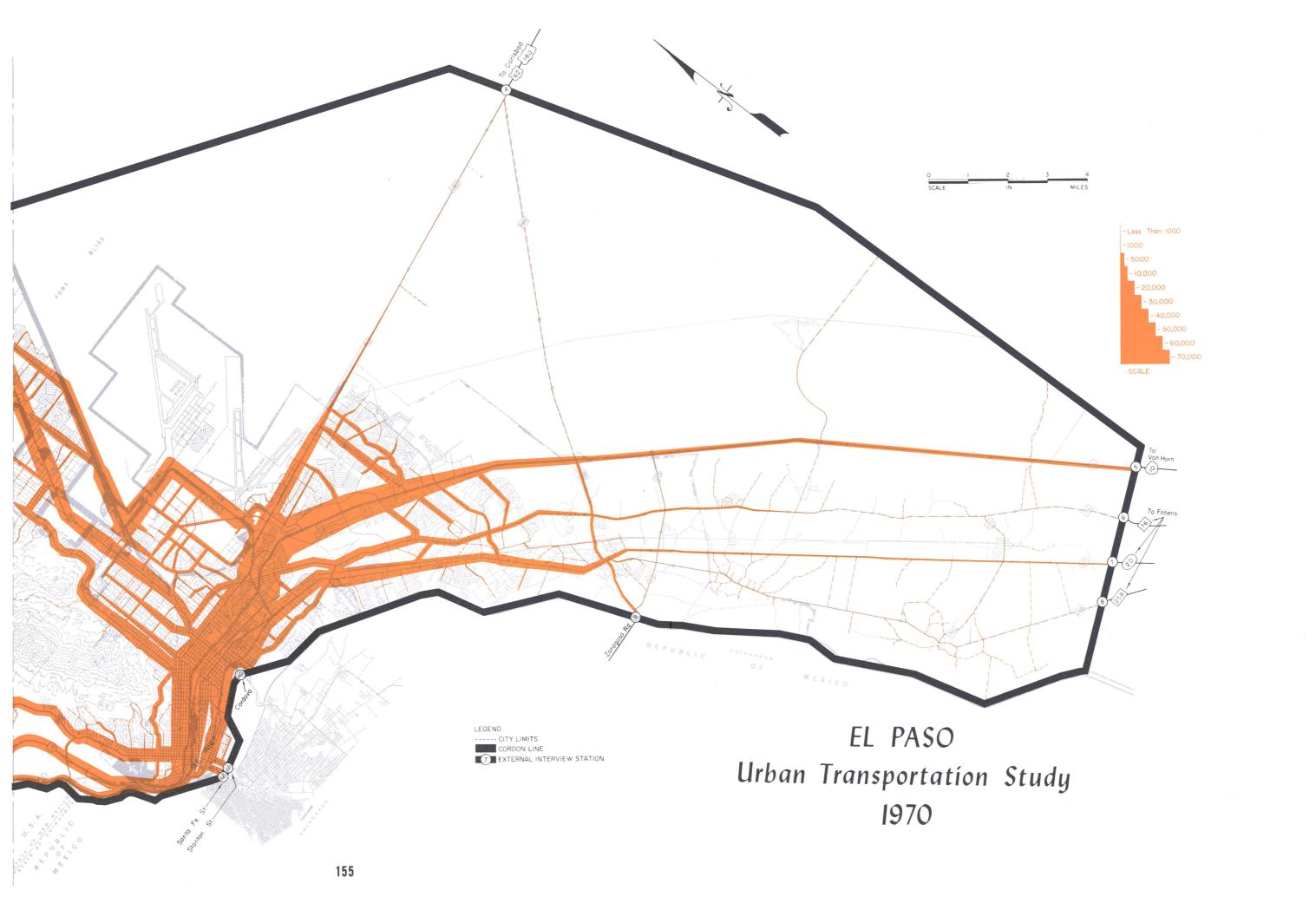
The 1970 Origin and Destination Survey published in May, 1971, as Volume 5, of the El Paso Transportation Study, covers this subject in some detail. For this reason, the coverage herein has been limited to selected items and the reader is referred to the 1970 Origin Destination Survey for additional information on this subject. Such studies conducted throughout the country have found that a definite and consistent pattern of travel exists in urban areas. This travel pattern develops in accordance with the distribution of population, land use, and major traffic generators and reflects their relationship to the street network.

The basic data for the 1970 Origin and Destination Survey was conducted during the period October, 1969 - March, 1970. The traffic volumes were recorded on major streets during the period January 27 - March 19, 1970. These traffic volumes are shown herein on the Traffic Volume Map, Figure V-1.



TRAFFIC VOLUME MAP





The last prior Origin and Destination Study for the area was conducted in 1958. This Study was updated on a limited basis in connection with the El Paso Transportation Study, Volume 1, Basic Elements and Plan, 1963-1985.

A ten year comparison of the average annual daily traffic (AADT) obtained from the five permanent recorders in the area is presented in Table V-1.

TABLE V-1

TRAFFIC VOLUMES (AADT)

AT PERMANENT RECORDER STATIONS
1960-1970

		S	tation Num	ber	
Year	A010	S070	S123	S162	S168
1960	6,085	1,041	3,006		
1961	6,063	1,047	3,330		
1962	5,559	1,022	4,260		
1963	5,244	1,058	4,848		
1964	4,490	1,063	6,405		
1965	4,476	1,066	6,952		
1966	4,472	1,106	7,426		
1967	4,679	1,133	7,592		
1968	4,845	1,178	8,184		
1969	4,860	1,200	9,034	41,851	
1970	4,984	1,200	10, 926	51,305	2,07
% Change					
1960-					
1970	-18.1	15.3	263.5		
The perm	anent recor	der locations	are shown belo	ow.	
Station					
Number	Location				
A010	SH-20, 0.	3 Miles S. of	Loop 375, El 1	Paso	
S070			f US 80, Ysleta		
S123			oop 375, El Pas		
	•		S 54, El Paso		
S162	III-IU, U.	O TATE MY OF C	O 51, 11 1 400		

Source: THD Annual Report, 1970, Permanent Auto. Traffic Recorders.

Due to El Paso's unique geological features, most all vehicle movement east or west must pass through a narrow corridor, formed by the Franklin Mountains on the north and the International Border on the south. To record the vehicular movement through this corridor, a screenline has been established and is counted annually. Table V-2 lists the screenline stations and shows an annual comparison of traffic volumes.

TABLE V-2 SCREENLINE TRAFFIC VOLUMES, 24 HR. WEEKDAY COUNT

	Stations			Year	3			% Change
No.	Location	1963	1966	1967	1968	1969	1970	1963-1970
1	Paisano Dr. between Eucalyptus and Laurel	36,700	34,600	38,340	31,520	29, 710	27, 140	- 26.0
2	Olive Ave. between Eucalyptus and Laurel	1,780	1,960	1,970	1,860	1,810	1,690	- 5.1
3	Magoffin Ave. between Eucalyptus and Laurel	4,460	5,920	6,140	4,790	4,630	5,030	12.8
4	Bassett Ave. between Eucalyptus and Laurel	2,450	2,690	2,720	2,240	2,320	2,770	13.1
5	Myrtle Ave. between Eucalyptus and Laurel	5,640	4,900	4,780	3,830	3,720	4,250	- 24.6
6	Texas Ave. between Eucalyptus and Laurel		14,400	12,610	11,090	11,560	10,110	- 10.7
7	Mills Ave. between Eucalyptus and Laurel	720	. 800	720	750	810	1,000	38.91
8	IH-10 W. of Walnut (Missouri)		Under Const.	8,160	37,780	47,170	50,410	517.8 ¹
9	Missouri East of Laurel						4,650	
10	Wyoming Ave. between Willow and Walnut	7,680	12,420	11,510	6,060	5,700	5,860	- 23.7
11	Yandell between Willow and Walnut	13,150	14,330	12,940	4,550	3,660	3,560	- 72.9
12	Montana Ave. between Willow and Walnut	15,380	15,400	15,320	15,290	12,990	12,380	- 19.5
13	Grant Ave. between Willow and Walnut	13,690	13,830	13,350	12,460	11,160	10,750	- 21.5
14	Arizona Ave. between Willow and Walnut	9,520	9,870	8,990	8,580	8,390	10,810	13.6
15	Atlanta Ave. between Cotton and Walnut						270	
16	Cotton St. between Atlanta and Arizona	4,350	4,010	4,200	3,980	4,340	3,790	- 12.9
17	Idaho St. between Atlanta and Grandview	380	1,070	730	760	750		
18	Murchison St. W. of Cotton between Detroit & Ga. Pl.				6,210	6, 460	5,750	- 7.4 ²
19	Scenic Dr. at Murchison Park	4,820	4,870	4,240	4,200	4,170	3,390	- 29.7
20	Loop 375 between I-10 and War Rd.11						1,580	
	TOTAL ADT	135,550	141,070	146,720	155,950	159,350	165,190	21.9

¹Percent change between 1967 and 1970 ²Percent change between 1968 and 1970

Traffic volumes at the screenlines during the O-D Survey showed that volumes were higher on Tuesday than on any other day of the week, accounting for 16.7 percent of the weekly total. Monday followed with 16.3 percent, then Friday with 15.6 percent, Thursday with 15.1 percent, Saturday with 14.0 percent, Wednesday with 13.2 percent and Sunday was low with 9.1 percent.

Hourly variation on the screenline showed a morning peak between 7:00 and 8:00 a.m. with 7.4 percent of the twenty-four hour volume and an after-noon peak between 4:00 and 5:00 with 9.2 percent. A slight peak also occurred during the noon hour with 6.4 percent of the twenty-four hour volume.

At the twenty external stations, a total of 89,420 vehicles were recorded entering or leaving the study area. Trips across the four external stations into or out of Mexico amounted to sixty-one percent of the total. Figure V-2 shows the volumes and locations of the twenty external stations as used in the O-D Survey. Table V-3 compares the volumes at the external stations as used in Volume 1, <u>Basic Elements and Plan</u>, 1963-1985.

TABLE V-3
EXTERNAL STATION TRAFFIC VOLUMES, ADT

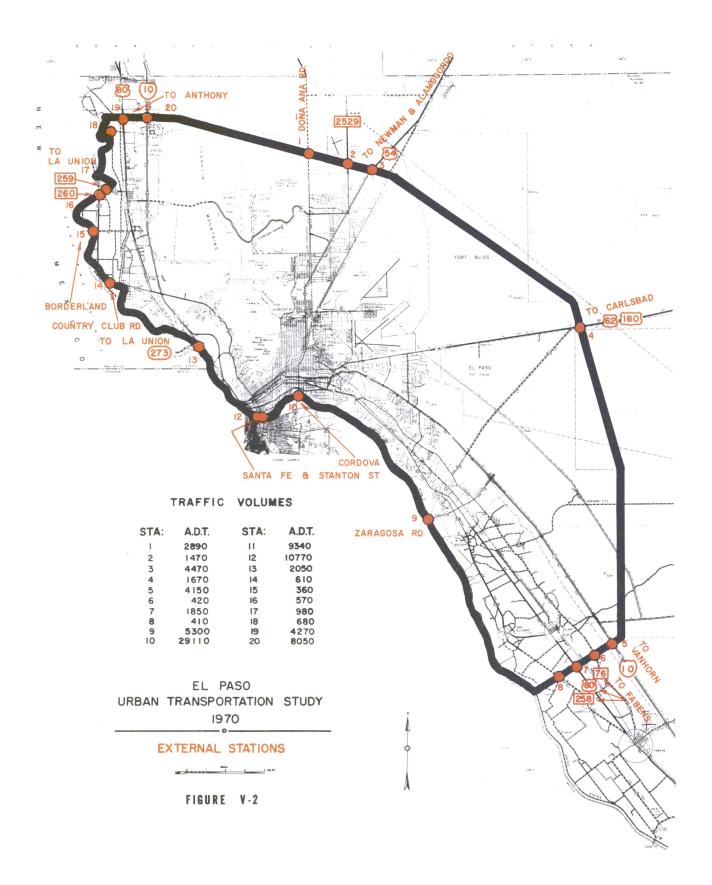
	Station			Year			% Change
No.	Locations	1963	1966	1967	1968	1969	1963-1969
1	Cordova Port of Entry		20,930	24, 360	26,700	29,110	39.1
2	Stanton St. Bridge	11,260	7,830	7,630	9,130	9,340	- 17.1
3	Santa Fe St. Bridge	9,260	10,750	11,930	10,460	10,770	16.3
4	Anapra Rd. at N. M. SH-273	2,580	2,110	1,950	2,060	2,050	- 20.5
5	FM 260 at Rio Grande River	1,000	1,150	1,150	1,290	1,350	35.0
6	FM 260, 0.5 Mi.W. of H120 A-E	960	850	900	920	1,000	4.2
7	FM 260, at Tex-N.M. State Line	290	390	410	520	570	96.6
8 .	FM 259 at Tex-N. M. State Line	980	1,010	950	970	980	0.0
9	US 80 & SR 20, 1.8 Mi. N. of FM 259	4,500	3,510	3,450	3,890	3,860	- 14.2
10	IH-10, 2.5 Mi. N. of Loop 375	4,900	7,160	7,540	7,930	8,600	75.5
11	War Rd. 1.8 Mi.S. of FM 2529		2,760	3, 140	2,990	2,890	4.7 ¹
12	FM 2529, 3.5 Mi. N. of US 54	870	1,370	1,300	1,320	1,360	56.3
13	US 54, 4.5 Mi. NE of FM 2529	2,950	3,870	3,920	4,150	4,300	45.8
14	US 54, 2 Mi. NE of FM 2529	3,320	3,910	3,950	4,590	4,750	43.1
15	US 62 & 180, 2 Mi. E. of FM 2316	2,040	1,680	1,960	1,940	1,990	- 2.5
16	FM 659, 3.5 Mi. NE of IH-10	270	420	480	520	600	122.2
17	IH-10, O.8 Mi.SE of FM 659	2,520	4,380	4,400	4,890	5,030	99.6
18	FM 76, 3.5 Mi. SE of Loop 375	890	770	740	820	810	- 9.0
19	US 80, 3.5 Mi.SE of Loop 375	2,660	2,830	2,470	2,500	2,650	- 0.4
20	FM 258, 0.4 Mi.W. of Vineyard Rd.	1,030	1,090	1,190	1,170	1,290	25.2
	TOTAL ²	52,280	55,080	56, 320	59,070	61,300	17.3

^{1 %} of change is from 1966 to 1969

TRIP DISTRIBUTION

Internal district to district movement accounted for 76.3 percent of the 789,569 total daily vehicle trips. Intradistrict movements accounted for 13.0 percent, trips interchanging between points inside and outside the study area accounted for 0.6 percent. Figure 12 in Volume 5, O&D Survey, shows the number of origins and destinations by district.

² Stations 1 and 11 are omited from totals. Not counted in 1963.



DESIRE LINES

Desire lines of travel between districts are shown in three figures in Volume 5, O&D Survey, 1970. Figure 30 shows Total Vehicle Movements, Figure 31 shows Auto, Truck and Taxi Passenger Movements and Figure 32 shows Bus Passenger Movements. Relative volumes are indicated by scaled bands of varying widths representing trip desire.

A "desire line" is an imaginary straight line between stations, districts, or zones connecting a trip origin with the destination. It is drawn to scale without regard to existing streets or routes of travel. The desire lines indicate graphically the principal demand for traffic movements between stations, districts, or zones.

INTERNATIONAL TRAVEL

Since El Paso and Juarez, Mexico, are closely related both historically and geographically, it is desirable to show travel data on movements across the international border. As previously mentioned, there are four crossings into or out of Mexico. Two stations serve as a one-way pair and two serve two-way traffic.

Table V-4 shows the data obtained during the O-D Survey on the border crossings. It shows the number of border crossings (northbound) by station location and mode of travel. Of the 90,915 total crossings for all modes through all stations, 46,203 (50.9%) were auto movements, 6,581 (7.2%) were by commercial vehicle, 18,940 (20.8%) were pedestrain movements, 19,099 (20.1%) were by local bus passengers, and ninety-two (0.1%) were by international bus passengers.

It was also found that the predominant trip purpose of the pedestrian movement was for shopping (58.4%), followed by business (15.6%), and work (11.4%).

TABLE V-4
BORDER CROSSINGS (1970)
BY MODE OF TRAVEL

(24 Hr. Period)

Mode of Travel	All Locations	Stanton-Santa Fe	Cordova	Zaragosa
Automobile	46, 203	17,043	24,838	4, 322
% of Total	50.9%	31.2%	79.7%	82.4%
Commercial Vehicle	6, 581	2, 191	3,582	808
% of Total	7.2%	4.0%	11.5%	15.4%
Pedestrian	18, 940	18,604	223	113
% of Total	20.8%	34.1%	0.7%	2.2%
Local Bus Passenger	19,099	16,580	2,519	
% of Total	20.1%	30.5%	8.1%	
Intercontinental Bus Pass.	92	92		
% of Total	0.1%	0.2%		
Total All Modes	90, 915	54, 510	31, 162	5, 243



Figure V-3 shows graphically the annual border crossings (northbound) and shows a comparison by year for the period 1960-1970. As shown in the graph, border crossings increased from 30,009,788 in 1960 to 38,633,683 in 1970 or a 28.7 percent increase for the period. Traffic projections indicate that in 1990 the average daily vehicular traffic across the border will be 122,000.

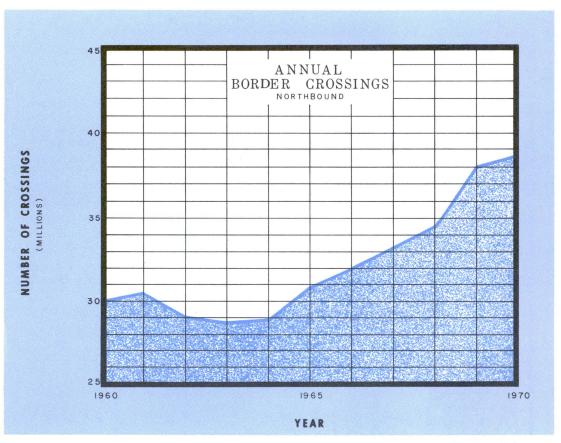


FIGURE V-3

Completion of Interstate 10 through the City in October, 1969 and the related changes in the directional flow of traffic on Montana and Yandell Avenues has had significant impact on traffic through the central city corridor. The attraction of traffic to Interstate 10 has served to maintain or improve the quality of service on the streets that formerly carried this traffic.

The opening of Loop 375 from McCombs Street, in the northwestern section of El Paso, to Canutillo in 1969, with the completion of the Trans-mountain Section, made it possible for traffic to move between the northeastern and western sections of the City without having to pass through the central city corridor.

Other than the changes occasioned by the opening of the two facilities mentioned above, there has been no significant change in the general pattern of traffic. Trips have become longer with the further extension of development to the Southeast, Northeast and West. Corridor volumes have shown a corresponding increase.

The opening of U.S. 54 and I-110 comprising the North-South Freeway from Loop 375 in northeast El Paso, to the Cordova Port of Entry (projected for 1975) will have a very significant impact on the pattern of travelfrom the Northeast Section to all other sections of the City.

The opening of the section of Loop 375, the Border Highway, from Santa Fe Street, in downtown El Paso, to Zaragosa (projected for 1975) will have an impact on traffic moving through the valley area served.

It appears that travel and travel patterns in the area are developing essentially as fore-casted in the El Paso Transportation Study, Volume 1, Basic Elements and Plan.

FUTURE TRAVEL PATTERNS

Trip Generation

Future travel projection is affected basically by population density and land use development associated with the study area's population and their activities.

As a basis for projection, the origin and destination survey data and the employment inventory data were examined, by serial zone, for travel characteristics. These characteristics are referred to as dependent and independent trip generating variables. Using multiple regression technique and running various subproblems, a trip generation model was selected for each trip purpose. Variables associated with each model were projected for the target year and by substitution in the trip generation model equation, the target year productions and attractions were obtained for each serial zone for each trip purpose.

Seven models were selected and the following items were forecasted:

- 1. Total dwelling units
- 2. Total population
- 3. Relative family income
- 4. Labor force
- 5. Employment
- 6. School enrollment
- 7. School attendance

Trip Distribution and Traffic Assignment

After determining the number of trips produced or attracted in each serial zone, some manner of zonal trip distribution is necessary. A mathematical model known as the Texas Distribution Model was utilized. This model used parameters obtained from the basic travel data along with a measure of spatial separation developed from the existing network. Once the trip distribution process is complete, the assignment of the trip matrices is needed. The traffic assignment utilized in this urban area was the incremental loading volume restraint technique. The first iteration, the minimum time path, is available, as well as the fourth iteration, which is the restraint or multi-path assignment.

The traffic assignment process in being fully exploited in the development of the recommended plan.

During the twenty year period, 1970 to 1990, vehicle miles of travel on the arterial system, including expressways and freeways, is expected to increase from 3,828,223 vehicle miles per day in 1970 to more than 2.5 times that number of vehicular miles per day in 1990.

TABLE V-5

RELATIONSHIP BETWEEN TRAVEL, POPULATION,
DWELLING UNITS AND AUTO OWNERSHIP
1970 to 1990

Item	1970	1990	Increase
Dwelling Units	105,893	154,732	46%
Population	362,794	507,722	40%
Auto Ownership	135,301	251,533	86%
Vehicle Miles	3,828,223	10,311,164	169%





Chapter 6

TERMINAL AND TRANSFER FACILITIES



Terminal and Transfer Facilities

The effectiveness and efficiency of the urban transportation system is dependent to a large measure upon the availability of adequate terminal and transfer facilities at trip origins and destinations. Agood transportation system is one in which all facilities, terminals as well as streets and highways, are in balance. Excessive walking distance from a parking space as well as unreasonable time spent searching for a place to park detract from the overall efficiency of the transportation system.

This chapter includes an analysis of El Paso's principal parking generator, the Central Business District (CBD), and limited consideration of other major terminal points, such as, shopping centers, schools, and parks. It also reviews the important railroad, airport, bus, and truck transportation terminals.

PARKING

The problem of providing adequate parking space within the CBD is one of the most urgent and difficult problems facing any cities throughout the United States today. The parking problem is especially important because it affects everyone, not only the individual drivers but the downtown merchants and businessmen as well.

The demand for more spaces will increase as the city grows but the supply will remain constant unless the parking problem is met with positive action. In fact, the supply of parking spaces may decrease due to new development within the confines of the CBD. When parking conditions are ignored, the CBD ceases to function efficiently as the city's business center and becomes a crowded, congested area of slow moving traffic with few available parking spaces, offering the prospective business patron little incentive to venture therein.

On the other hand, if parking conditions are analyzed periodically and timely corrective action is taken, the situation can be improved even if not completely solved.

The last complete parking study was conducted in 1965 (see Volume I. Basic Elements and Plan, 1963-1985).

Information related to parking requirements presented in the 1970 Origin and Destination Survey based on Central Business District Cordon count from 7:00 a.m. to 6:00 p.m. is summarized as follows:

- 1. 114,271 vehicles crossed the Cordon. 101,923 (89%) were passenger cars and 12,348 (11%) were commercial vehicles. Of the total, 58,688 were inbound and 55,583 were outbound.
- 2. The peak accumulation based on inbound-outbound flow of traffic, occured between 1:30 and 2:00 p.m. with an accumulation of 7,690 vehicles. This included 7,178 passenger cars and 512 commercial vehicles. 1,644 vehicles were in the area when the count began at 7:00 a.m.
- 3. 253,305 persons entered or left the area during the count period. 173,037 (68.3%) of these were auto, truck and taxi passengers; 41,844 (16.5%) were pedestrians; and 38,424 (15.2%) were bus passengers.

- 4. During the peak vehicular accumulation period, (1:30-2:00 p.m.) a total of 17,091 persons were within the area.
- 5. The CBD was the origin or destination of 81,747 internal and external vehicle trips per day.
 - 6. There were 29,441 auto drivers whose destination was the CBD. Of these:

13,154 (45%) parked in lots

1,882 (6%) parked in garages

9,560 (32%) parked in curb spaces, and

4,229 (14%) did not park



7. The purpose of these 29,441 auto driver trips were as follows:

12,307 (42%) were work trips

7,221 (25%) were personal business trips,

4,404 (15%) were to serve passenger and

2,293 (8%) were shopping trips

For further amplification of the preceding data please refer to the El Paso Transportation Study, Volume 5, 1970 Origin And Destination Survey and in particular to Figures 26 and 27 and Tables 8A and 8B and 9A, B and C of that Survey.

No direct comparison of the above data can be made with that obtained in 1965 because the two CBD areas are not comparable and because of the changes in travel patterns which have taken place in the interim period. These changes were occasioned primarily by the completion of Interstate Highway 10 through the area. This made it possible for traffic to stay out of the CBD unless it specifically wanted to go there. This tended to reduce the number of vehicles entering and leaving the CBD but had little or no affect on accumulation or parking requirements which have continued to grow.

Table VI-1 presents comparative inventory data on parking spaces for 1965, 1969, and 1970 based on CBD limits established for the 1970 origin and destination survey. An examination of these data indicated that the parking supply in the comparable area decreased between 1965 and 1969 by 2.33% or 179 spaces. This is due primarily to removal of curb parking on many streets within the CBD. For the one year period 1969-1970, the supply increased by 1,405, part of which is attributable to an expansion of the fringe area during the period.

TABLE VI-1
PARKING SUMMARY
1965-1970

	1965			1 '	969			197	0	
Type Parking Facility	CBD	%	CBD	%	Fringe	Total	CBD	%	Fringe	Total
CURB PARKING										
Metered	1,142	14.9	1,243	16.5	586	1,829	1,295	16.0	486	1,781
Signed-Restricted & time limit	N/A		36	0.5	292	328	80	1.0	328	408
Non-restricted	624	8.1	358	4.8	2,268	2,626	354	4.3	2, 475	2,829
TOTAL CURB PARKING	1,766	23.0	1,637	21.8	3,146	4,783	1,729	21.3	3, 289	5,018
ALLEY PARKING-PRIVATE	414	5.4	266	3.5	75	341	185	2, 3	259	444
OFF-STREET PARKING										
Lot-Free	385	5.0	14	0.2	151	165	14	0.2	204	218
Lot-Private	868	11.3	1,429	19.1	2,333	3,762	1,566	19.3	2,589	4,155
Lot-Commercial	2,229	29.0	2,035	27.1	398	2, 433	2,260	27.9	573	2,83
Sub-total Lot	3,482	45.3	3,478	46.4	2,882	6,360	3,840	47.4	3,366	7, 206
Garage-Private	29	0.4	160	2.1	80	240	486	6.0	80	566
Garage-Commercial	1, 995	25.9	1,966	26.2	210	2,176	1,861	23.0	210	2,07
Sub-total Garage	2,024	26. 3	2, 126	28.3	290	2, 416	2,347	29.0	290	2,63
TOTAL OFF-STREET PARKING	5,506	71.6	5,604	74.7	3, 172	8, 776	6, 187	76.4	3,656	9,84
TOTAL AVAILABLE PARKING SPACES	7, 686	100.0	7,507	100.0	6,393	13,900	8,101	100.0	7,204	15,30

NA - Not Available

Figure VI-1 shows the location of parking spaces by type.

The results of an extensive examination of transportation studies published since 1960 are presented in A Report on CBD Parking, Highway Planning Technical Report No. 23, April 1971, U.S. Department of Transportation, Federal Highway Administration. This study indicates that:

- 1. The average hourly accumulation of vehicles in the CBD from 1:00 to 2:00 p.m. represents 70 percent of the parking spaces required.
- 2. The average parking supply in the cities studied in the 250,000 to 500,000 population range was 12,300 spaces representing 34 spaces per 1,000 population. The distribution of these spaces was as follows:

Curb - 19.51 percent

Lot - 64.23 percent

Garage - 16.26 percent

3. The traffic volumes for the period 10:00 a.m. to 6:00 a.m. for the six cities examined are compared with those for El Paso below:

COMPARISON OF CBD CORDON TRAFFIC VOLUMES (10:00 a.m. to 6:00 p.m.)

TRAFFIC VOLUMES

Area	IN	OUT	Peak Hour IN	Peak Hour OUT	Outbound Per 1000 Population
6 Cities Studied	64,000	71,000	15,000	18,000	200
El Paso	42,528	43,965	6,594	7,636	136

The cities studied contained an average of 99 blocks in the CBD. The El Paso study CBD contained 73 blocks. This in part accounts for the lower volume shown for El Paso.

On the basis of Paragraph 1 above and an accumulation of 7,690 vehicles, the indicated parking space requirement to serve the CBD in 1970 was 10,986 spaces.

On the basis of 34 spaces per 1,000 population indicated in Paragraph 2 above and a 1970 population of 322,261, El Paso should have had at that time 10,957 parking spaces to serve the CBD.

Recommended parking spaces are presented in two separate tables (Tables VI-2 and -3). Recommendation No. 1 is based on the <u>Parking Guide for Cities</u>, 1956, U.S. Bureau of Public Roads. Recommendation No. 2 is based on <u>A Report on CBD Parking</u>, Highway Planning Technical Report No. 23, April 1971, U.S. Department of Transportation.

This page replaces an oversized map titled: *Parking Facilities*.

Digitization of this map is pending.

-- CTR Library Digitization Team



TABLE VI-2

RECOMMENDED PARKING SPACES FOR THE CBD* **RECOMMENDATION NO. 1 1970-1990

		197	70			1990
	A	Actual **Recommended			**Recommended	
	%	Number	%	Number	Difference	Number
Curb	21.8	1,729	28, 0	2,797	-1,068	3, 910
Lot	48.5	3,840	57.0	5,694	-1,854	7,960
Garage	29.7	2, 347	15.0	1,499	848	2,095
Total Off-street	78.2	6,187	72.0	7, 193	-1,006	10,055
TOTAL PARKING SPACES	100.0	*7,916	100.0	9, 990	-2,074	13,965

^{*}Omits 185 alley parking spaces.

TABLE VI-3

RECOMMENDED PARKING SPACES FOR THE CBD* **RECOMMENDATION NO. 2 1970-1990

	1970							
	A	Actual		mmended		**Recommended		
	%	Number	%	Number	Difference	Number		
Curb	21.8	1,729	19.5	2,137	- 408	2,792		
Lot	48.5	3,840	64.2	7,034	-3,194	9, 192		
Garage	29.7	2,347	16.3	1,786	561	2,333		
Total Off-street	78.2	6, 187	80.5	8,820	-2, 633	11,525		
TOTAL PARKING SPACES	100.0	*7,916	100.0	10,957	-3,041	14, 317		

^{*}Omits 185 alley parking spaces.

In view of the current pace of CBD development and the momentum expected therefrom, it is recommended that the larger of the two recommendations be accepted for planning purposes.

The location and type of parking facilities are very important factors in the development of aparking program. Trip purpose, accumulation by trip purpose and walking distance provide general guides in this respect.

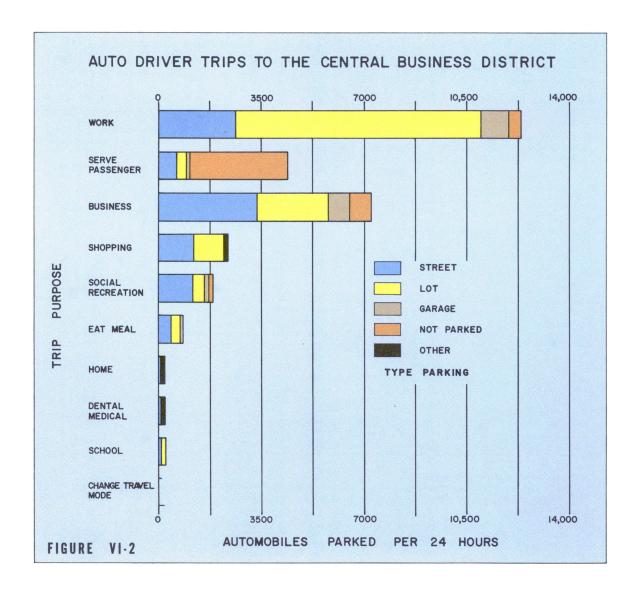
^{**}The recommended parking spaces are based on Parking Guide for Cities, 1956, U.S. Bureau of Public Roads, Washington, D. C.

^{**}Based on 34 spaces per 1,000 population as found in A Report on CBD Parking, Highway Planning
Technical Report No. 23, April 1971, U.S. Department of Transportation, Federal Highway
Administration.

The trip purpose generally determines the duration of the trip which, in turn, affects the type facility used and the acceptable walking distances.

Figure VI-2 shows the auto driver trips by purpose related to type parking. (This data was extracted from the 1970 O&D Survey.)

Data presented in this figure indicates that business, shopping and social recreation rely heavily on curb parking with shopping and social recreation using street parking to satisfy over 50 percent of their parking requirements. On the other hand, workers relied largely on lot parking because of the longer duration trips.



Data on parking accumulation by trip purpose was not collected. A Report on CBD Parking, previously mentioned, presents accumulation data on cities in the 250,000-500,000 population range by three trip purposes. It is believed that these data, which are presented in Table VI-4, could be used as a general guide.

TABLE VI-4
PARKING ACCUMULATION BY TRIP PURPOSE

Trip Purpose	10 AM	11 AM	12 PM	l PM	2 PM	3 PM	4 PM	5 PM	6 PM
Shop	1,020	1,520	1,620	1,630	1,570	1,380	1,080	840	280
Business	2,700	3, 100	2,900	2,840	2,900	2,650	2,400	1,800	800
Work	10,000	10,200	10,100	10,000	9, 900	9,700	8,500	4, 400	1,250

Data presented in Volume 1 indicated that:

- 1. 57.7% of the shopping trips had a walking distance of 500'-700'.
- 2. 67.5% of the business trips had a walking distance of 300'-500'.
- 3. 73.5% of the work trips had a walking distance of 500'-700'.

A Report on CBD Parking, previously referred to, indicated that for the four cities in the 250,000-500,000 population range studies average walking distances by trip purpose were:

Shop 570'

Business 450'

Work 670'

Based on these data it was concluded that work trips, which are of longer duration, have higher average walking distances.

The actual selection of a parking facility also considers cost. This has not been investigated but cost may affect the selection more than trip purpose or duration.

To assist the City with its enforcement of parking regulations, with emphasis on double parking and "meter feeding", a meter maid program was established in February of 1970. As a result of the apparent success of the program, double parking and "meter feeding" in the CBD are at an all time low. The all day parkers have been driven to either commercial lots or to the fringe area and have made parking spaces available to the public without the need to circle block after block hunting for an available space. It is believed that these efforts by the parking enforcement program will greatly reduce the accident potentials associated with double parking and hunting for available parking spaces.

Approximately 1,520 off-street parking spaces are planned in connection with the Civic Center. Most of these spaces will be metered for public use. Several business firms in the downtown area are in the process of negotiating for land with the view of developing additional off-street parking facilities. The City plans to extend its control of on-street parking farther out into the fringe areas. This program should add three hundred more meter controlled spaces during 1971.

The foregoing actions will substantially improve the parking situation in the CBD. Continued efforts, however, will be needed to keep the supply of parking spaces in balance with the growing demand.

Parking problems outside the CBD have not been studied in detail. The City ordinance adopted in 1963 requires that supporting off-street parking be provided for new construction. As a result, the supply of parking in the newer areas is generally adequate. Parking in much of the older area of the City remains a critical problem. It has been the City's policy to remove curb parking on critical routes wherever feasible when the basic street capacity to handle traffic becomes critical. The evils of curb parking both the capacity robbing and accident producing aspects of curb parking-are fully realized, the possibility of removing curb parking is given priority consideration in any studies relating to capacity and/or safety.

Recommendations:

It is recommended that planning for CBD parking be based on a 1990 requirement of 6,400 additional spaces. Location of additional facilities should take into consideration a reasonable walking distance for the trip purpose to be served.

SHOPPING CENTERS

Shopping centers represent major traffic generators and are terminal points for many trips. For this reason, shopping centers are generally located along the major routes of travel. Shopping centers contain not only merchandising outlets but restaurants, business establishments, and in many cases, recreational facilities. They must be considered in the analysis of terminal and transfer facilities.

Shopping centers generally fall into three types or classes: Neighborhood, community, and regional. The neighborhood center provides convenience goods, such as, foods, drugs, and personal services. Its size varies up to 75,000 square feet of floor space and usually serves up to 5,000 persons. The regional center provides the convenience goods found in smaller shopping centers plus general merchandise, apparel, furniture, and home furnishings. As a minimum, it usually has 200,000 square feet of floor space and serves over 100,000 persons. The community shopping center falls in between the other two.

El Paso shopping centers range from small groups of specialty shops to larger shopping complexes containing theaters, branches of long-established downtown firms, banks, restaurants, and one-of-a-kind stores. The largest shopping center is Bassett Shopping Center with forty-seven businesses and a total of 450,000 square feet of floor space. Table VI-5 shows the eleven largest shopping centers with their respective floor space, number of stores and location.

The complex of stores which has developed on both sides of McRae Boulevard north of I-10 represents a major shopping attraction. Grant City, which is located west of McRae, consists of three stores with 135,000 square feet of floor space. Eastwood Knolls is located on Wedgewood Street at the intersection with McRae Boulevard and has eight small specialty shops with an aggregate area of 18,660 square feet. K-Mart and seven other stores are

located east of McRae Boulevard with an aggregate area of 152,000 square feet.

There are several single major stores which represent major attractions. Examples

TABLE VI-5
EL PASO SHOPPING CENTERS
(11 Largest)

S	shopping Center	Location	Number of Stores	Sq. Ft. of Floor Space
1.	Bassett	6000 Montana Ave.	47	450,000
2.	Northgate	9400 Dyer St.	38	375,000
3.	McRae Complex	McRae at I-10	19	305,660
4.	Fox Plaza	Alameda at Paisano	33	235,000
5.	Chelmont	5000 Montana Ave.	35	221,700
6.	Hondo Pass	Hondo Pass at Dyer	28	205,000
7.	Sunrise	8500 Dyer St.	42	175,000
8.	Ranchland	Hunter Rd. at I-10	11	150,000
9.	Coronado	6000 Mesa St.	20	132,000
10.	Lakeside	7000 Alameda Ave.	15	118,000
11.	Rushfair	Rushing at Fairbanks	19	112,500

are Sears at the intersection of Piedras and Montana; Globe at Sioux and Montana; Fed Mart at Airways and Montana; and Cashway's Building Supply Center on Airways Boulevard at Edgemere Boulevard.

Three regional shopping centers are being planned for the near future. Two will be located in the northwest area of the City and the other in the southeast. Each is expected to be larger than Bassett Center.

With the current zoning ordinance in force, adequate parking is being provided at each of the shopping centers.



SCHOOLS

Schools are covered in some detail in other chapters of this report. The locations of the schools are shown in Figure IV-3, Transit Map. Enrollment figures are shown in Table IX-2 in the Community Value Factors Chapter.

AIR LINES

The El Paso International Airport ranks forty-sixth in the number of passengers handled (1970). A multi-million dollar expansion program is currently being concluded which will provide the region with one of the most modern terminals in the country for handling both passengers and cargo.

Four airlines currently provide over 110 scheduled arrivals and departures daily with direct or connecting flights to anywhere in the world. Table VI-6 shows the trend in air operations at the airport for the period 1960-1970. As can be seen, passenger service has more than doubled since 1960 and air freight tonnage has increased over five times.

TABLE VI-6
EL PASO INTERNATIONAL AIRPORT
AIR OPERATIONS
1960-1970

	Passe	ngers	Air Freig	ght (Tons)	Mail (Tons)	Aircraft
Year	Enplaned	Deplaned	Enplaned	Deplaned	Enplaned	Movements
1960	203,867	247, 477	771.17	348.81	759.9	215, 139
1961	186, 201	201,895	698, 20	349, 27	899.5	192,632
1962	168,844	167, 339	601.10	364.05	645.7	190,566
1963	195,818	191,791	689. 90	466.28	467.9	196, 524
1964	261,024	222, 226	883.60	679.17	501.7	226,036
1965	271,063	261,177	1,015.60	696.80	644.0	229, 955
1966	376, 365	335, 910	1,125.70	227. 90	754.0	240,622
1967	414,597	393, 205	1,101.20	814.60	1,411.9	241,556
1968	484, 378	452, 913	1,373.90	2,552.40	994.2	241, 430
1969	524, 933	488,560	2,085.00	3,165.60	952.6	253, 042
1970	490,194	486, 496	2,716.00	3,555.70	1,236.2	227, 681

Source: Manager, El Paso International Airport

Table VI-7 shows the projected aircraft operations for the next twenty-years, at five year increments. These projections were furnished by the El Paso International Airport.

TABLE VI-7

AIRCRAFT OPERATION FORECASTS
El Paso International Airport
1970-1990

	1970	1975	1980	1985	1990
Enplaned Passengers	490,194	900,000	1,300,000	1,850,000	2, 330, 000
Enplaned Air Freight (Tons)	2,716	3,400	4, 200	5, 200	6,600
Enplaned Mail (Tons)	1,236	1,800	2,150	2,440	2,750
Aircraft Movements	227,681	293,700	355, 400	390, 900	436, 400

Source: Manager, El Paso International Airport

RAILROADS

El Paso is served by the Santa Fe, Southern Pacific Company, Texas and Pacific, National Railways of Mexico, and Chihuahua-Pacific Railroad. The latter two carriers operate from Ciudad Juarez to the interior of Mexico and to the west coast of Mexico. All El Paso rail connections are main line operations. Connections and yards are available to effect car interchanges between United States and Mexican railroads.

The only rail passenger service in El Paso is provided by the Sunset Limited of the Southern Pacific Company. The Sunset Limited is operated three times a week in each direction between New Orleans and Los Angeles under the National Rail Passenger Network Plan. Full sleeping cars, food service, and food service facilities are provided. Other stops in Texas include Houston, Beaumont, San Antonio, Del Rio, Alpine, and Sanderson. The passenger treminal is located at the Union Depot near the new Civic Center.

Each of the railroads serving El Paso operates separate freight terminals and yards. These terminals have been modified in recent years to accommodate the latest type of freight handling equipment and techniques. Table VI-8 shows the trend in number of carloads of freight forwarded for the period 1960-1970.

TABLE VI-8

RAILROAD FREIGHT STATISTICS
1960-1970

Carloads												
Year	Forwarded	Year	Forwarded									
1960	31,711	1966	30, 355									
1961	32, 311	1967	19, 960									
1962	30, 385	1968	24,990									
1963	27, 471	1969	28, 111									
		1970	26,773									

Source: El Paso Chamber of Commerce.

INTERCITY BUS SERVICE

Intercity bus service to El Paso is provided by eight bus lines: Continental Trailways; Country Club Bus Lines, Inc.; Greyhound Bus Lines; New Mexico Transportation Co., Inc.; Texas, New Mexico, and Oklahoma Coaches, Inc.; Whitfield Bus Lines, Inc.; Flecha Roja Omnibuses de Mexico; and Transportes Chihuahuenses S.A., DECV. The latter two are Mexican bus lines serving the interior of Mexico.

Two separate bus terminals are used: The Continental Trailways Terminal and the Union Depot. The latter is serving as an interim bus terminal pending construction of a new terminal near the new Civic-Convention Center.

TRUCK SERVICE

Industry in the El Paso area is served by sixteen regular route motor freight common carriers providing interstate and intrastate services. These firms maintain terminals in El Paso and provide direct one-line service to most major cities in the United States. El Paso is not a congested gateway and freight flows freely inbound and outbound. This is conducive to low rates on established commodity movements.

All the truck terminal facilities are well located with respect to the street system. All are easily accessible and not any is located in areas of congested traffic.

All have adequate space for present operations and offer adequate parking facilities. Most of the lines also have space available for future expansion.

Statistics on freight tonnage handled by the truck lines is not available. Growth of the motor freight service will doubtless continue and it appears to be flexible enough to meet anticipated growth.



References:

- 1. A Report on CBD Parking, Highway Planning Technical Report No. 23, April 1971, U.S. Department of Transportation, Federal Highway Administration.
- 2. Parking Guide for Cities, Bureau of Public Roads, 1956.
- 3. <u>Conducting a Comprehensive Parking Study</u>, Procedure Manual 3D, Public Administration Service, 1957.
- 4. Parking Analysis, Highway Research Record No. 317, Highway Research Board, National Research Council, 1970.
- 5. Shopping Centers and Parking, Highway Research Record No. 130, Highway Research Board, National Research Council, 1966.
- 6. Parking in the City Center, Wilbur Smith and Associates, Under Commission of the Automobile Manufacturers' Association, 1965.



Chapter 7

TRAFFIC ENGINEERING FEATURES



Traffic Engineering Features

"Traffic engineering is that phase of engineering which deals with the planning, geometric design and traffic operations of roads, streets and highways, their networks, terminals, abutting lands and relationships with other modes of transportation for the achievement of safe, efficient and convenient movement of persons and goods." 1

Improving the operating efficiency and safety of the existing street system through the application of traffic engineering principles is generally a very necessary and rewarding endeavor. For instance, the use of traffic control measures either as an extensive application of one measure or a combination of several measures can form a significant improvement. The cost of traffic engineering improvements is relatively small when compared with the cost of major physical improvements and the cost-benefit-ratio is generally more favorable.

The El Paso Transportation Study, Volume IV, Traffic Operations Program to Increase Capacity and Safety (TOPICS), represents an extension of the basic study in the area of Traffic Operations Improvements. Chapter II of that study covers Factors Affecting Traffic Operations. The TOPICS Study was based on 1970 traffic data. Information presented in that study is, therefore, considered current and is not repeated herein.



SIGNALIZED INTERSECTIONS

The Texas Highway Department and the City of El Paso both maintain progressive programs which provide for signalization of intersections on their respective facilities when warranted, also for the improvement of existing installations. The results of these programs are reflected in Table VII-1 and Table VII-2. Additional improvements planned in the near future are shown on Table VII-3.

Signal installations on the Pershing - Dyer Street route between Copia Street and Sun Valley Drive will be improved as outlined in the TOPICS Program.

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TABLE VII-1

CITY OF EL PASO TRAFFIC SIGNAL INSTALLATIONS PR SYSTEM

DATE: June 11, 1971

		Type of Control										Mo	unting				Date in Service
1			Vehicle				. #	9.1	ď	4			Litting	Γ	1	'	Marco Lin Dell'acco
		Pre- timed	Ac	tuated			er.	Central System	, g	LT.	ds Y						· · · · · · · · · · · · · · · · · · ·
],,]		5 4		١	Vol.		14 8	ys en	ig.	ii ii	a fi		_	Mast		12"	
No.	Intersections	10, 11	Semi	Full	Den	PR	HO	ပ်က်	A W	E 0	F- 0	Susp	Post	Arm	Lens	Lens	Remarks
1	Campbell-Overland	ľ				Х	x			l x l			х		x		
2	Campbell-San Antonio					X			Х				X		X		
3	Campbell-Myrtle					X	X		Х				X		X		
4	Campbell-Texas					X							X		X		
5	Campbell-Mills					Х	X		X				Х		X		
6	Campbell-Main					Х			X				Х	X	Х		
7	Campbell-Franklin					Х			X				X	X	X	X	
- 8	Campbell-Missouri					X	Х		Х				Х	Х	X	X	
9	Campbell-Yandell					Х	Х		X				X	X	X	X	Installed mast arm for northbound Campbell
	A						- 32										10/21/70; for westbound Yandell 9/17/69
10	Campbell-Montana	ļ				X			Х				Х	X	X		Installed overhead indicators 1/15/71
11	Campbell-Rio Grande	 				X		\vdash	X				X	ļ <u></u> -	X	-	
12	Campbell-Arizona	 	ļ			X		\vdash	X				X	X	X		
13	El Paso-Overland					X							X	X	X		
	El Paso-San Antonio	-	 			X	X		X	-			Х	X	х,		
	El Paso-San Francisco		-			X	X	\vdash	X				X	X	X	17	No. of the last of
16	El Paso-Yandell El Paso-Missouri	+			-			 	Х				X	X ·	X	X	New intersection design - THD - 5/5/69
						X		-					X		X	_	
	El Paso-Wyoming	-			-		X		Х				Х	Х	Х	X	New intersection design - THD - 5/5/69
	Kansas-Overland					Х		-					X		X		
	Kansas-San Antonio	ļ				X			X				X		X		
	Kansas-Myrtle	-					X		X				Х	Х	X		
	Kansas-Texas					X	X		X				X		Х.	-	
	Kansas-Mills		_		-	X	X		X				X		X		
	Kansas-Main	-				X	X		X				Х		X		
	Kansas-Franklin	-				X	X		X				X		X		
	Kansas-Missouri Kansas-Wyoming					X		-	X	-			X	77			N
	Kansas-Wyoming Kansas-Yandell					X	X		X				X	X	X	X	New intersection design - THD - 5/5/69
	Kansas-Montana	-	Λ_				X	_	X						X	, X	New intersection design - THD - 5/5/69
		-			-	X							X	X	X		
	Kansas-Rio Grande Kansas-Arizona	-			-	X.	X		X				X	X	X	-	
	Mesa-Overland				l	X	X		X				X	Α	X	-	
	Mesa-San Antonio				-	- -	X		X				X		X		
	Mesa-Texas				-	- X	X		Ŷ				X		X	-	
	Mesa-Mills	-				X	X		X				X		X		
	Mesa-Main					X	X	-	X				X		X		
37	Mesa-Franklin	-			\vdash	- X	X		^				X		X	 	
38	Mesa-Missouri	-	-	-	\vdash	- X	X	-		-			X		X	-	
39	Mesa-Wyoming		х		+	X	X	-	X	_			X	Х	X	X	New intersection design - THD
40	Mesa-Yandell	_	x		\vdash	X	X	-	X	-			X	X	·X	X	New intersection design - THD New intersection design - THD - 5/5/69; installed special
10	11004-1414011		Α.							1						-	type of lens for westbound Yandell and Freeway off-ramp
									- 1	1							6/30/70
41	Mesa-Montana					Х	X						X	х	Х		
42	Mesa-Rio Grande			_		X		1	Х		-		X	X	X		
43	Mesa-Arizona					X	X	-	X	_			X	X	X	1	
	Mesa-Schuster					X	X	-	-	-			X	X	X	X	
	Mesa-University		X			X			X	_				X	X	X	Installed loop detector east side 4/24/69
46	Montana-Virginia					X	X		-	\neg			Х	X	X	X	***************************************
47	Oregon-Overland					X	X		Х				X		Х		
48	Oregon-Mills					X	X		X		$\neg \uparrow$		X	X	X		
49	Oregon-Main					X			X	$\neg \uparrow$	$\neg \neg$		X		X		
50	Oregon-Franklin					Х	X						X		X		
	Oregon-Missouri					X	X						X		X		
51																	

TABLE VII-1 (Continued)

	Type of Control						-		-			M	ountin	a			Date in Service	
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No.	Intersections	Pr.	Semi	Full	Den	PR	H S	S &	Si.	SE	[등 등	Susp	Post	Arm .	Lens	Lens	Remarks	
53	Oregon-Yandell					X	X		X				Х	X	X	X	New intersection design - THD - 5/5/69	
54	Oregon-Montana					X	X		X				Х	X	X			
55	Oregon-Arizona					X	Х		X				Х	X	X		·	
56	Oregon-San Antonio					X	Х		X				X		X			
57	Oregon-Schuster					X	Х						Х	X	X	X		
58	Oregon-University					X	X							Х	X	X		
59	Paisano-Cotton					Х	X						X	X	X	Х		
60	Paisano-St. Vrain		,			X	X						X	X	X	X		
61	Paisano-Campbell					Х	X						X	X	X	X		
62	Paisano-Kansas					X	X						X	X	X	X		
63	Paisano-Stanton					X	X						X	X	X	X		
64	Paisano-Mesa					Х	X						X	X	X	X		
65	Paisano-Oregon					X	X						X	X	X	X		
66	Paisano-El Paso					X	X						X	X	X.	X		
67	Paisano-Santa Fe					Х	Х						X	X	X	X		
68	Santa Fe-Overland					X	X						X	X	X			
69	Santa Fe-San Antonio					Х	X						X		X			
70	Santa-Fe-San Francisco					Х	X		Х	_			X	X	X			
71	Santa Fe-Main					Х	Х				L		X	X	Х			
72	Santa Fe-Wyoming		X			Х	X		X				. X	Х	X	X	New intersection design - THD - 5/5/69	
73	Santa Fe-Yandell		Х			X	X		X				X	X	X	X	New intersection design - THD - 5/5/69	
74	Stanton-Schuster					X	X						X	X	X	X		
75	Stanton-Overland					X	X		X				X		X			
76	Stanton-San Antonio					X	X		X				X	X	X	X		
77	Stanton-Texas					Х	X		Х				X		X			
78	Stanton-Mills					X	X		X				X		X			
79	Stanton-Main					Х	X						Х		X			
80	Stanton-Franklin					Х	X						X		Х			
81	Stanton-Missouri					Х	X						X		X			
82	Stanton-Wyoming					X	X		X				Х	Х	Х	Х	New intersection design - THD - 5/5/69	
83	Stanton-Yandell	1				Х	Х		Х				X	X	X	X	New intersection design - THD - 5/5/69	
84	Stanton-Montana					X	X						X	X	X			
85	Stanton-Rio Grande					X	X		X				X	X.	X	-		
86	Stanton-Arizona					X	Х		X				Х	X	X			
87	Stanton-University					X	X						Χ	X	X	Х		

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TABLE VII-2

CITY OF EL PASO TRAFFIC SIGNAL INSTALLATIONS OUTSIDE SYSTEM

June	11, 1971																
				of Cont	rol		T			1			unting			T	Date in Service
İ				ehicle			1 . #	2.	ι Ω				Τ	T	1		
l		, 7	A	ctuated		1	Inter- connect	7 9	ja]	1 a H	42 /	ļ			i		
i		Pre.	ľ		Vol		4 6	ris r	d g	14 4	L)	1	1	Mast	8"	12"	
No.	Intersections	D. 4	Semi	Full	Den	PR	14 8	ပြိတ်	S P	E 5	- E 0	Susp	Post	Arm	Lens	Lens	Remarks
									-								
1	Airport-Forrest		Х										X	Х	Х	X	
2	Airport-Robert E. Lee			Х									Х	Х	Х	X	
3	Airway-Gateway East			X					X				Х	Х	Х	X	
	Airway-Gateway West		ļ	Х					Χ				Х	Х	Х	X	
<u>.5</u>	Alabama-Fort Blvd. Alabama-Nashville		X	ļ		-	X		X				X	X	X	X	
	Alabama-Richmond		X				X		X		-		X	X	X	X	
	Alabama-Wheeling		X	-	-	-	Х.		X				X	X	X	X	
9	Alameda-Fisk	_	X	 			Α.	-	X	-			X	X	X	X	
10	Alameda-Lafayette		X			i			<u> </u>					X	X		Cadwallader School
	Alameda-Carolina	-	 -	Х	 				Х	 			х	X	X	X	773117112111111111111111111111111111111
	Alameda-George Orr		Х		-	_	X							X	X	 	Ascarate School, installed signal 1/19/71
13	Alameda-Little Flower		X			 -			X				X	X	X	х	and and and and and and and and and and
	Alameda-Delta	Х					X					X		X	Х	Х	
15	Alameda-El Paso Dr.	X					Х					Х	X		Х	X	,
	Alameda-Clark		X				X		X				Х	X	X		
	Alameda-Collingsworth		X						Х			X	Х		Х		Cooley School
18	Alameda-Buena Vista	X	<u> </u>				X		X				X	X	X		
19	Alameda-Old Pueblo Rd.	X					X		Х				X	X	X		
	Alameda-Zaragosa	X					X			-			X	X ·	X	Х	,
	Alameda-Harris	Х	77	<u> </u>	-	-	X		X				X	X	X	Х	
	Alameda-Old County Rd. Alameda-Paisano		X				х			-			X	X	X		Ysleta
	Alameda-Parsano Alameda-Concepcion	X		<u> </u>			X		X				X	X	· X	X	
25	Alameda-Val Verde	X					X		X				X	X	X	X	
	Alameda-Texas	X		-			X				\vdash		X		X		
	Alameda-McCarthy		Х						X				X	Х	X	Х	
	Alameda-Magoffin		1				Х		X				X	Х	X	X	
	Alameda-Yarbrough		1	Х										Х	Х	Х	
	Chelsea-Gateway East	X					X		X					Х	Х	X	
31	Chelsea-Gateway West	X					Х		X					X	X	X	
32	Copia-Fort Blvd.	X												X	X		
33	Copia-Altura		X				Х						X		X		
34	Copia-Aurora		Х				Х					х	X		Х		
35	Copia-Pershing	x					Х								- 77	75	
36	Copia-Hueco	X					X			-				X	X	X	
37	Copia-Montana	X	-	ļ			X		X					X	X	X	
38	Copia-Yandell	X	<u> </u>				X		ΛL	-				X	X	X	
39	Copia-Missouri	X		-			X				\vdash			X	X	X	
	Copia-Alameda	i x					X			-				X	X	X	
	Copia-Gateway East	X		-			x		X					X	X	X	
42	Copia-Gateway West																
43	Cotton-Grant	X					Х		Х				X	Х	X	Х	
	Cotton-Montana	X					Х							Х	Х	Х	
	Cotton-Yandell	X					Х						Х	Х	Х	Х	
46	Cotton-Wyoming	X					X							Х	Х	X	
	Cotton-Missouri	X		<u> </u>			X						X	X	X	X	Modified signals to allow dual left turn 11/16/69
	Cotton-Texas	X					X			-				X	X	X	
49	Cotton-Myrtle	X					X				\vdash		X	X	X	X	
	Cotton-Magoffin	X					X			<u> </u>			X	-X	X	X	
51 52	Cotton-Arizona Delta-Feliz	X					А.		х			x	X	Λ.	X		
	Delta-Hammett	+^-		X					- <u>X</u>			X	- <u>x</u>	х	X	х	
	Delta-Val Verde	-	Х	Λ.					X	-	\vdash	-	x	X	X	X	
, o-±	Deligated Agide		41						21.						-A-	Α.	

TABLE VII-2 (Continued)

-		-	THE PERSON NAMED IN		ecine proces	neusskye ywa	yanna yan		-	por transmission.	-	an and a second	-			open man	
1		1		of Cont	rol							Mo	unting	· 	1	ĺ	Date in Service
1			, Ve	ehicle	,	1	1 7	Central System	138	7	انا	Susp		l		1	
		l i g	A	ruatec	Vol	1	er	tr.	- E	t e	y.			Mast	8"	12"	
No.	Intersections	18.5	Semi	Full	Den	PR	15 2	ye de	Sic	11.0	1,5	Suan	Post	Arm	Lens	Lens	Remarks
NO.	Three Beecholds	+	Denti	- 411	Den	-11		0 01	/ III 02	140	HO	qand	FUSL	TIII	nerra	Terra	Remarks
55	Delta-Buena Vista	1	x	1			i i	ĺ	77								
56	Diana-Hondo Pass		X	+				 	X					X	X	X	
57	Dyer-Rushing	+	1-	X	-				X				Х	X	X	Х	
58	Dyer-Diana	+	-		X				Α			X	Α	Λ.	X	<u>^</u>	
59	Dyer-Hondo Pass	+	+	+	X				X		-	X		-	X	-	
60	Dyer-Tetons	 	X						122			X			X		
61	Dver-Hercules	+	1	X	 			-	X			X			X	х	
62	Dyer-Atlas	-	+	1	X				X			X		-	X	-	
63	Dver-Fifth	Х	+										Х	X	X	X	
64	Dyer-Thomason	X	1-		-		X				_		X	X	X		
65	Dyer-Fred Wilson	X	1	T			X		ļ			Х			X	T	
66	Dyer-Hayes	Х					Х							X	Х		And the state of t
67	Dyer-Fillmore	X		T			X							X	Х		
68.	Dyer-Van Buren	X		T .			X		T					X	Х		
69	Dyer-McKinley	Х					X							X	X		
70	Dyer-Tompkins	X					X							X	Х		·
71	Dyer-Trans-mountain	X							X				Х	X		X	
72	Dyer-Sanders	1		X					X					X	X	Х	
7.3	Dyer-Wren			X			X		X				X	X	X	X	
*74	Fred Wilson-Sheridan				Х								X	X	X	X	*See end of table for County signals on route and signal
75					Х								X	X	X	X	at Marshall.
76	Raynolds-Gateway East	X		<u> </u>			X							X	X	X	
77.	Raynolds-Gateway West	X		ļ			X							_X	X	X	
78	Geronimo-Gateway East	X					Х		Х				Х	X		X	
				ļ			1,5										
79	Geronimo-Gateway West	X					X		X					X	75	X	
80 81	Paisano-El Paso Drive Hawkins-Gateway East	X		77					Х	-				X	X	X	
82		X	 	X	_				Y					X	X	X	
	Mesa-Doniphan	<u> </u>	 	x			-					v			X		
84	Mesa-Balboa	 	X	 ^ -			-						Х	X	X	Х	
	Mesa-Baltimore	+	X		-				X				X	X	X	X	
	Mesa-Crestmont-Crown Point	+	1	X					X					X	X	X	
	Montana-Sioux	X					X		X				х	X	X	X	
88	Montana-Magruder	X			-		X				_			X	X	X	· · · · · · · · · · · · · · · · · · ·
89	Montana-Mescalero	X					X		X				X	X	X	X	,
90	Montana-Geronimo	X					X							X	X	Х	
91	Montana-Trowbridge	X	 				X							X		X	
92	Montana-Chelsea	X					X							X	X	X	,
93	Montana-Huckleberry	X					X			$\neg \neg$			X	Х	X		
94	Montana-Raynolds	X					X						X	Х	Х	Х	,
95	Montana-Raynor	X											Х		X		
96	Montana-Honeysuckle		X						X				X	X	Х	X	
97	Montana-Airways				Х								Х	Х	Х	Х	
98	McRae-Wedgewood			Х			Х		Х					X	Х	X	Protected left turn phase provided for northbound and south-
		1															bound McRae
99	McRae-Gateway East	X					X		X					X	X	X	
100	McRae-Gateway West	Х					X		X					X	X	Х	
101	North Loop-Emerson	Х							X				X	X	Х		
102	North Loop-West	X							Χ.			_X	X		X	<u> </u>	
103	North Loop-Carolina	+	X											X	X	X	
104	North Loop-Hunter	1	X						X				75	X	X	X	
105	North Loop-Trowbridge	X					X						Х	X	X	X	
106	North Loop-Yarbrough	Х							77				 -	X	X	X	
107	Paisano-Hammett	1		ļ	Х		v		X				X	X	_X	X	
108	Paisano-Val Verdé	X					X		X				Х	Х	Х	X	

TABLE VII-2 (Continued)

				of Con	trol							Мс	ounting	ı			Date in Service
				ehicle			Inter- connect	E E	18	10,	Flash Only						
1		, g	A	ctuated			er	tre	• E	t e	y sh					1 . 1	
	~ · · · · · ·	Pre- timed	Semi	Full	Vol	PR	nt	ys ys	ed iig	ir i	1, 5			Mast		12"	D
No.	Intersections	щ +	Senu	rull	Den.	PR	П	0 01	PH 01	Щ О	н О	Susp	Post	Arm	Lens	Lens	Remarks
162	McRae-Cosmos		.								х						
163	Pershing-Northgate-Southgate			X			Х		X					Х	X	Х	
164	Alameda-Troy										X						
165	Alameda-San Marcial										Х						
166	Alameda-Fullan										Х						417
167	Dyer-McCombs	X					X					Х				X	Installed advance warning flasher 10/7/70
168	Dver-Southgate			X			X		X					X	Х	Х	Installed signal - THD - 10/20/70
169	Dyer-Northgate			X			Х		X					Х	X	Х	Installed signal - THD - 10/20/70
170	Dver-Monroe	X					Х		X					X	X	Х	
171	Montana-Northgate-Southgate	Х					Х		X					X	X	X	
172	Montana-Hawkins			X								Х		Х		X	
173	Montana-Radford										Х						
174	Montana-Newman										Х						
175	Mesa-Brentwood			X			X		X		•			X	X	X	Interconnect Mesita and Executive Center 3/26/71
176	Mesa-Sunland Park			Х			Х		Х					Х	X	Х	Interconnect with Mesa-Balboa, Mesa-Crestmont-Crown Point, and Mesa-Mesita 3/71
100	Mesa-Executive Center			x			Х		х					X	X	X	Interconnect with Brentwood and Mesita on Mesa 3/5/71
177	Paisano Tornillo						Λ.		X					X	X	Ŷ	Interconnect with Brentwood and Resita on Resa 3/3//1
178	Paisano Tornillo Paisano-Executive Center										X						
179				x			X		Х		_^_			X	v	x	Installed signal - THD - 10/20/70
180 181	Hercules-Southgate Hercules-Northgate	-		X			X		-X					X	X	X	Installed signal - THD - 10/20/70
		X		^_			X		X	-	-			X	X	X	INStalled Signal = Inb = 10/20/70
182	Edgemere-Geronimo	Λ	X			~	X		X					X	X	X	
183	Delta-Ascarate Park Hunter-Gateway East and West		_^	х			_A_		X	-				X	X	X	Installed signal - THD - 10/20/70
184	Altura-Northgate and Southgate	x					X		<u>x</u>					X	X	x	Installed signal - THD - 10/20/70
185	Airways-Viscount	Δ.		x			X		X	-				_ <u>x</u>	X	X	INSIGILED SIGNAL - IND - 10/20/70
186	I-110 - Loop 16 Interchange			Λ			Δ.										
187	All Ouadrants	x					x		х	ļ)			х		x	
188	McRae-Montana	^		X					X					X	X	x	
198	rickae-riontana			_ ^	<u> </u>				Λ.		لسيبسا				^_		
ADDED) :																
	Fred Wilson-Marshall			Х										Х		Х	Added in 1970
	Fred Wilson-Jeb Stuart		X										X		X		County signal installation
	Fred Wilson-Chaffee		X										X		Х		County signal installation

TABLE VII-3

CITY OF EL PASO PROPOSED FUTURE IMPROVEMENTS TRAFFIC SIGNAL INSTALLATIONS OUTSIDE SYSTEM

Date: June 11, 1971

No.	Intersections	Remarks and Date in Service
10	Alameda-Lafayette	Replace control unit from fixed time to semi-actuated 8/71
13	Alameda-Little Flower	Replace control unit and interconnect
7.5	Name de Pa De la Designa	to Alameda and Delta 7/71 Replace control unit 11/71
15	Alameda-El Paso Drive Alameda-Clark	Replace control unit and interconnect
16	Alameda-Clark	to Alameda and Buena Vista 6/71
18	Alameda-Buena Vista	Improve signal visibility 11/71
29	Alameda-Yarbrough	Replace control unit 12/71
32	Copia-Fort Blvd.	Replace control unit from fixed time to traffic actuated 7/71.
33	Copia-Altura	Install overhead indications, install new control unit and interconnect with Copia and Aurora 7/71
52	Delta-Feliz	Replace control unit from fixed time to semi-actuated 8/71
54	Delta-Val Verde	Interconnect with Delta and Buena Vista 11/71
55	Delta-Buena Vista	Interconnect with Delta and Val Verde 11/71
68	Dyer-Van Buren	Improve signal visibility and replace control unit 8/71
84	Mesa-Balboa	Interconnect with Mesa-Crestmont-Crown Point and with Mesa at Sunland Park 9/71
85	Mesa-Baltimore	Improve signal visibility 2/72
86	Mesa-Crestmont-Crown Point	Interconnect with Mesa at Balboa and Mesa at Sunland Park 9/71
101	North Loop-Emerson	Replace control unit and interconnect with Carolina and West on North Loop 9/71
102	North Loop-West	West of North Loop 9/71 Replace control and interconnect with Emerson and Carolina on North Loop 9/71
103	North Loop-Carolina	Replace control and interconnect with Emerson and West on North Loop 8/71
104	North Loop-Hunter	Interconnect with North Loop and Carolina 8/71
106	North Loop-Yarbrough	Replace control unit from fixed time to fully traffic actua ted signal 12/71
111	Paisano-Piedras	Replace control unit 11/71
115	Piedras-Fort Blvd.	Replace control from fixed time to semi-actuated signal 10/71
116	Piedras-Altura	Replace control and interconnect with Richmond and Aurora on Piedras 11/71
117	Piedras-Richmond	Replace control and interconnect with Altura and Aurora on Piedras 10/71
118	Piedras-Aurora	Replace control and interconnect with Altura and Richmond o Piedras 11/71
135	Trowbridge-Howze	Replace fixed time controller to semi-actuated and inter- connect 2/72
	Fred Wilson at Northgate and Southgate (Frontage Roads to U.S. 54)	
	U.S. 54 interchange at Monroe- Van Buren	
	Stanton-Sixth	Install signal 2/72
	McRae-Montwood	Install signal 12/71
	Dyer-Monroe	Replace control unit; improve signal visibility 8/71
		7. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
	Hercules-Diana	I Install Signal IU//I
	Hercules-Diana Airway-Edgemere	Install signal 10/71 Install signal 1972

PR SYSTEM

17	El Paso-Missouri	Install mast arm-8" and 12" lens 4/72
25	Kansas-Franklin	Install mast arm-8" and 12" lens 3/72
26	Kansas-Missouri	Install mast arm-8" and 12" lens 3/72
37	Mesa-Franklin	Install mast arm-8" and 12" lens 3/72
38	Mesa-Missouri	Install mast arm-8" and 12" lens 3/72
50	Oregon-Franklin	Install mast arm-8" and 12" lens 4/72
80	Stanton-Franklin	Install mast arm-8" and 12" lens 3/72
81	Stanton-Missouri	Install mast arm48" and 12" lens 3/72
	Missouri-Oregon	Install mast arm-8" and 12" lens 4/72
	Missouri-El Paso	Install mast arm-8" and 12" lens 4/72
	Paisano-Coles	Install signal 6/71
	Paisano-Tornillo	Install signal 7/71
	Cotton-Second	Install signal 6/71

STREET AND HIGHWAY IMPROVEMENT PROGRAM:

- 1. Improvements to the highway system
 - A. Recently completed:
 - (1) Construction of a two-way left-turn lane on Montana from Oakdale Street to the east city limits.
 - (2) Construction of a two-way left-turn lane on Alameda Avenue from Abraham Court to Snelson Drive.
 - (3) School flashers have been installed at the following locations:
 - (a) Socorro High School
 - (b) Socorro Grade School
 - (c) Clint High School
 - (d) Clint Grade School
 - (4) The signal at the intersection of SH 20 and FM 1905 has been rebuilt and is now semi-traffic actuated.
 - (5) The signal at the intersection of SH 20 and FM 76 at Fabens has been rebuilt and is now a semi-traffic actuated signal.
 - (6) Paisano Drive (Loop 16) has been improved in that the median has been increased to sixteen feet in certain areas to accommodate installation of left-turn bays at principal intersections.
 - (7) Overhead sign bridges have been constructed at the following locations:
 - (a) Two are constructed at Racetrack Drive and Loop 16.
 - (b) At Loop 16 and Alameda Avenue four sign bridges are in place.
 - (c) At the Cordova Port of Entry, three sign bridges are in place.
 - (d) One sign bridge is in place on Loop 16 at the Main Street Viaduct.
 - B. Approved projects for which plans, specifications and estimates are being prepared:
 - (1) Extension of the Interstate Highway 10 Frontage Roads, Gateway East and Gateway West, across the Southern Pacific Transportation Company's Spur Tract serving Fort Bliss and connections with Robert E. Lee Road has been approved and plans, specifications and estimates are being prepared.
 - (2) Construction of ramps needed to make a full interchange at I-10 and Yarbrough Drive has been approved and is scheduled for letting in November, 1971. This project also includes:
 - (a) Modification of the median on Yarbrough Drive south of I-10 to improve

the alignment of Yarbrough Drive with the undercrossing.

- (b) Addition of right-turn lane on Gateway East with free right turn to Yarbrough Drive.
- (c) Construction of a free right turn from Yarbrough to Gateway East.
- (d) Signalization with pre-timed controller.
- (e) Sign Bridges.
- (3) The improvements to Loop 478 (Pershing Drive and Dyer Street) from Copia Street to Sun Valley under the TOPICS Program are summarized as follows:
 - (a) Improvement of alignment at the following locations:

Between Chester Avenue and Hastings Drive; North of Ellerthorpe in the vicinity of Leo Street.

(b) Improvement of intersections as follows:

Realign western leg of Altura Avenue to correct misalignment at Pershing Drive and widen to provide left-turn lane.

- (c) Improve Pershing Drive from intersection of Dyer Street to beginning of improved section at North-South Freeway.
- (d) Improve alignment of Monroe and Van Buren Streets at intersection with Dyer Street and widen Monroe from Dyer to Partello (one block).
- (e) Improve alignment of Fred Wilson Road at Dyer Street. Widen western leg of Fred Wilson Road to provide left-turn lane and construct free right turns.
- (f) Improve alignment of Will Ruth with Rushing Boulevard at Dyer Street and provide for turning movements at Dyer.
- (g) Widen War Road at Dyer to provide two turning lanes to the south.
- (h) Improve transition from eighty-eight foot roadway to sixty-eight foot roadway between Kemp Street and First Street.
- (i) Upgrade traffic signal system and interconnect all signalized intersections into systems needed to optimize progression and platooning of vehicles.
- (j) Upgrade illumination. The existing four hundred watt street lights along with the overhead service is to be replaced with fifty foot steel poles, underground service and one thousand watt luminaries. No fixtures will be permitted in the median area.
- (k) Pavement Markings: Left turn lanes will be provided on the section between Sacramento and Kemp Streets.

- (1) Overhead signs will be provided at the following intersections: Sacramento, Fort Boulevard, Jefferson, Taylor, Hayes, Keltner, and Kemp.
- (m) The necessary level will be made up with asphaltic concrete and the roadway, within the project limits, will be overlaid with 110 LB/SY Type D Asphaltic Concrete to obliterate all old pavement markings, provide a uniform wearing surface and preserve and extend the life of the pavement structure.
- (n) Widen U.S. 62-180 from the East City Limits to FM 659.
- (o) Improve FM 659 from North Loop to I-10.

C. Projects for future development:

- (1) Sign bridges will be constructed for all off ramps in connection with the North-South Freeway.
- (2) The North-South Freeway (U.S. 54) will be continuously illuminated within the city limits of El Paso.
- (3) Continuous illumination of Interstate 10 between Schuster Avenue and Yarbrough Drive. (To be jointly developed.)
- (4) Illumination of the following intersections:
 - (a) I-10 and Sunland Park Drive
 - (b) I-10 and Loop 16
 - (c) Loop 16 and Racetrack Drive.

2. Improvements to the Arterial Street System

A. Recently completed or underway:

- (1) Cotton Street Railroad Grade Separation a TOPICS Project on a Primary Type II street (opened June 21, 1971).
- (2) The following are improvements related to the Cotton Street Railroad Overpass which are needed to upgrade Cotton Street to Arterial Standards and to facilitate the flow of traffic in the area served.
 - (a) Widen Cotton Street between north end of grade separation project at San Antonio Street and Texas Avenue to provide four traffic lanes.
 - (b) Improve alignment of Cotton Street at Arizona.
 - (c) Widen Delta-Second Street between Tornillo and Cotton Street.
 - (d) Reconstruct Coles Street between Delta Drive Second Street and Loop 16 to provide fifty foot paved street.

(e) Signalize the following intersections and interconnect with signal included in the Cotton Street overpass project:

Loop 16 at Tornillo Street

Second Ave. at Tornillo Street

Second Ave. at Coles Street

Loop 16 at Coles Street.

- (3) Construction of right-turn lane on Airways Boulevard with free right turn into Viscount Boulevard.
- (4) Construction of left turn lane on Montana east approach to Magruder Street.
- B. Projects for future development:
 - (1) Projects listed in the TOPICS program by priority and those listed for future consideration.
 - (2) Bus turnouts on Paisano Drive at Eucalyptus Street, Hammett Boulevard and Boone Street.
 - (3) Pedestrian overpasses across Paisano Drive at Boone Street and a pedestrian overpass across Paisano Drive at Piedras Street as listed in the TOPICS Program.

CONGESTED INTERSECTIONS AND RECOMMENDED IMPROVEMENTS

Two hundred and thirty-nine signalized intersections were analyzed in connection with the TOPICS Program to determine the capacity and degree of congestion on a total of 761 approaches. The degree of congestion is expressed as a capacity/volume ratio, i.e., ratio of the capacity of the approach to the actual approach volume. A capacity/volume ratio less than 1.00 indicates an overloaded or congested condition.

One hundred and eight of the approaches were found to be deficient in varying degrees. Recommended improvements of these intersections to improve their capacity were listed. These improvements constitute the proposed intersection capacity improvement program.

It is noted that, with minor exceptions, the intersection improvement program set forth in Volume 1 has been completed.

INTERSECTION IMPROVEMENTS TO REDUCE ACCIDENTS

Accident data for intersections having tenor more accidents is listed in the accident study in the Transportation Facilities Chapter. This study listed 116 intersections with tenor more accidents. Forty-five of these intersections are listed in the TOPICS Study (Volume 4) as being capacity deficient. Twelve of the forty-five deficient intersections are included in the TOPICS Improvement Program along with twenty-seven others. This makes a total of thirty-nine of the 116 intersections which are included in the TOPICS Program.

Seven additional intersections are involved in other improvement projects. They are:

- (1) Hammett Boulevard at Delta Drive
- (2) Hammett Boulevard at Paisano Drive
- (3) Hammett Boulevard at Alameda
- (4) Montana Avenue at Hawkins
- (5) Montana Avenue at Wedgewood Drive
- (6) Edgemere at Geronimo (May, 1971)
- (7) Paisano at Coles (June, 1971)

Hammett Boulevard at Delta Drive, at Paisano Drive and at Alameda will be improved in connection with the development of the Border Highway and the interchange with U.S. 54. Montana at Hawkins and at Wedgewood has been improved by the widening of Montana (January, 1971). The Montana - Hawkins intersection was also signalized. The City has signalized Edgemere at Geronimo and Paisano at Coles (June, 1971). The latter was done in connection with the Cotton Street TOPICS improvement.

This leaves thirty-seven intersections for which no prior recommendation have been made. These intersections were included in an unpublished study prepared by the El Paso Department of Traffic and Transportation with cooperation of the El Paso Police Department. Pertinent suggestions from this study for improvement of the intersections are shown in Table VII-4.

TABLE VII-4

SUGGESTED INTERSECTION IMPROVEMENTS

- 1. Airport Rd. & Airways Blvd. Accidents 10 Rate * 0.85

 Recommend further study.
- 2. Airways Blvd. & Viscount Blvd. Accidents 12 Rate * 1.53

Signalization and redesign of intersection during 1971 should reduce the accident frequency.

3. Alabama St. & Fred Wilson Rd. Accidents - 12 Rate * - 1.39

This intersection is a recommended improvement project on the Federal-Aid Urban System. The construction of a grade separation and interchange is recommended.

- 4. Alameda Ave. & Little Flower Rd. Accidents 21 Rate * 2.11
 - a. Provide left-turn phase in signal for Alameda Ave.
 - Interconnect signals along Alameda Ave. to provide a progressive signal system.
 - c. Relocate Little Flower detectors closer to the intersection.

TABLE VII-4 (Continued)

5.	Alameda Ave. & Paisano Dr.	Accidents - 17	Rate * - 1.02
	Interconnect signals along Alameda system.	a to provide a progres	sive signal
6,	Alameda Ave. & Piedras St.	Accidents - 14	Rate * - 1.12
	Interconnect signals along Alameda signal system.	a Ave. to provide a pr	ogressive
7.	Alameda Ave. & Yarbrough Dr.	Accidents - 13	Rate * - 2.07
	Interconnect signals along Alameda signal system.	a Ave. to provide a pr	ogressive
8.	Altura Ave. & Copia St.	Accidents - 13	Rate * - 2.49
	Interconnect signals along Copia St system.	. to provide a progres	ssive signal
9.	Altura Ave. & Piedras St.	Accidents - 10	Rate * - 2.55
	a. Widen Altura Ave. west of Pieb. Interconnect signals along Pie		
10.	Balboa Rd. & Mesa St.	Accidents - 12	Rate * - 2.38
	Recent signal interconnection along system should reduce the accident		
11.	Baltimore Rd. & Mesa St.	Accidents - 13	Rate * - 1.29
	Recent signal interconnection along system should reduce the accident	-	
12.	Boone St. & Paisano Dr.	Accidents - 11	Rate * - 1.15
	Install a signal and interconnect al	ong Paisano Dr.	
13.	Carolina Ave. & No. Loop Rd.	Accidents - 12	Rate * - 1.78
	Convert signal to three phase oper turns on North Loop Road.	ation to provide prote	cted left
14.	Carolina Ave. & Yarbrough Dr.	Accidents - 20	Rate * - 7.39
	Install traffic actuated signal.		
15.	Chelsea St. & El Paso Dr.	Accidents - 12	Rate * - 3.29
	Recommend further study.		
16.	Chelsea St. & Montana Ave.	Accidents - 12	Rate * - 1.35
	Recommend further study.		

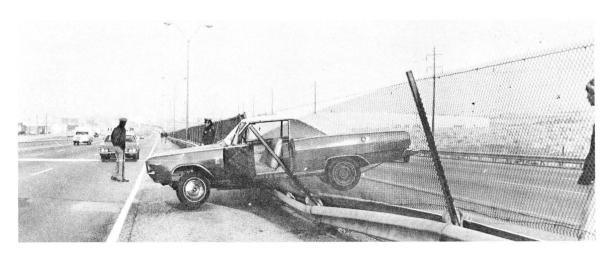
TABLE VII-4 (Continued)

17.	Clark Dr. & El Paso Dr.	Accidents - 16	Rate * - 4.96
	Change to a four-way stop with advan	ce warning,	
18.	Cotton St. & Missouri Ave.	Accidents - 10	Rate * - 0.98
	Provide protected left-turn movement Ave. (westbound only).	t from Cotton St. to I	Missouri
19.	Cotton St. & Montana Ave.	Accidents - 16	Rate * - 1.81
	Provide for protected left-turn mover	ments.	
20.	Cotton St. & Rio Grande Ave.	Accidents - 11	Rate * - 1.31
	Remove traffic island to allow two the	ough lanes of travel.	
21.	Dallas St. & Missouri Ave.	Accidents - 10	Rate * - 7.82
	Recommend further study.		
22.	Delta Dr.,& Trowbridge Dr.	Accidents - 10	Rate * - 1.30
	Recommend further study.	er.	
23.	Diana Dr. & Hercules Ave.	Accidents - 22	Rate * - 3.92
	Install traffic signal.		
24.	Diana Dr. & Hondo Pass	Accidents - 10	Rate * - 1.79
	Interconnect signals along Diana Dr.		
25.	Doniphan Dr. & Sunland Park Rd.	Accidents - 12	Rate * - 4.03
	a. Widen Sunland Park Rd. west ofb. Install traffic actuated signal.	Doniphan Dr.	
26.	El Paso Dr. & Paisano Dr.	Accidents - 13	Rate * - 1.60
	Recommend further study.		
27.	El Paso St. & Fourth Ave.	Accidents - 10	Rate * - 3.04
	Recommend further study.		
28.	Gateway Blvd. & Hunter Rd.	Accidents - 24	Rate * - 3.63
	Recent reconstruction of intersection frequency at this location.	should reduce the ac	ccident
29.	Gateway Blvd. & Raynor St.	Accidents - 12	Rate * - 2.08
	Recommend further study.		

TABLE VII-4 (Continued)

30.	Mesa St. & Interstate 10 Off-ramp	Accidents - 16	Rate * - 2,55
	Install signal and interconnect to Mes	sa signal system.	
31.	Mesa St. & Mesita Ave.	Accidents - 12	Rate * - 1.22
	Recommend further study.		
32.	Mesa St. & Sunland Park Dr.	Accidents - 17	Rate * - 2.19
	Recommend further study.		
33.	Montana Ave. & Piedras St.	Accidents - 14	Rate * - 1.78
	Recommend further study.		
34.	No. Loop Rd. & Yarbrough Dr.	Accidents - 12	Rate * - 2.35
	Provide for left-turn phases for both Road.	Yarbrough Dr. and	No. Loop
35.	No. Loop Rd. & Zaragosa Rd.	Accidents - 11	Rate * - 6.02
	Change intersection to four-way stop flashing red signal at the intersection		ng a nd a
36.	Paisano Dr. & Piedras St.	Accidents - 24	Rate * - 1.74
	a. Left-turn holding lane on Paisan approximately 120 feet.b. Interconnect signals along Paisa		nded
37.	Paisano Dr. & Trowbridge Dr.	Accidents - 10	Rate * - 0.87
	Provide for protected left-turn move	ements.	

st Rate is number of accidents per one million vehicles.



The unpublished study tended generally to corroborate existent data regarding the types of accidents and their probable causes. The study found that rear-end collisions were the most prevalent type of accident and that sideswipe from improper turning was the next most prevalent type. The type of accidents suggests the seemingly valid conclusion that driver error was the greatest causative factor in the accidents. The errors most directly contributing to the accidents were following too closely, improper lane changing, and failure to look ahead.

It follows from the preceding discussion that driver education should be a major factor in accident prevention. Driver education might take the form of formal Defensive Driving Courses, expansion of driver education in the high schools, remedial education and training for traffic offenders, and educational announcements by the various media of communities.

An additional recommendation of the unpublished study is that enforcement of traffic laws be improved and increased. In El Paso this recommendation is being carried out through operation of a program for Selective Traffic Enforcement by Police (STEP). This program became operable 1 January, 1972 and in effect it will concentrate enforcement effort in proportion to the frequency of violations. This program should induce an awareness of driving errors in drivers, should engender caution and prudence and optimistically should reduce the frequency of accidents.

Recommendations for engineering measures to be applied are contained in Table VII-4 as well as in Chapter IV and the Areawide TOPICS Plan, 1970. Additional as well as more refined recommendations in this area are contingent on additional survey and analysis of the problem locations.



SAFETY

A Safety Engineer has been added to the staff of the City Traffic and Transportation Department. He has an active agressive informational and educational program under way in cooperation with the State Traffic Safety Administrator. This is a joint effort to reduce the number of accidents and fatalities.

Additionally an experimental project in corrective driver education has been initiated using a \$43,800 Department of Transportation grant. This is intended to serve as a pilot project for other Texas communities. The program will be administered by Region XIX Education Center.

Two types of programs will be used. One will be used with multiple violators and the second will be used with accident repeaters. Enrollees will be provided by the municipal courts from those drivers up for adminstrative hearings on license revocation. Voluntary participants will be allowed in these courses.

The courts will assign drivers under twenty-one years of age with two or more traffic violations in a one-year period, also those over twenty-one who have received their fourth citation for a moving violation.

The El Paso Safety Director estimates that 640 violators will be assigned for the training. The results of the training will be evaluated and recommendations made regarding future use in El Paso and elsewhere.

In addition to the above program, El Paso has been selected for a federally financed selective traffic enforcement program. The U.S. Department of Transportation grant is \$1.2 million for a three-year period.

The program grant will provide funds for hiring of an additional twenty-nine police officers and for a comprehensive study of traffic hazards, public information, driver education and pedestrian safety.

The objectives of the program will include public information to promote better citizen relationships with traffic officers and municipal courts, upgrade ambulance and emergency medical services, and research hazards in all areas of traffic enforcement in an effort to reduce accidents and save lives.

References:

- A Career in Traffic Engineering, Institute of Traffic Engineers, Washington, D. C., 1968.
- 2. Improved Street Utilization Through Traffic Engineering, Highway Research Board, Special Report 93, 1967.
- 3. Traffic Engineering Handbook, Third Edition, John E. Braerwold, Institute of Traffic Engineers, 1965.
- 4. <u>Fundamentals of Traffic Engineering</u>, 7th Edition, Kennedy, Kell, and Hamburger, The Institute of Transportation and Traffic Engineering, University of California, 1969.
- 5. Highway Capacity Manual, Special Report 87, Highway Research Board, 1965.



Chapter 8

COMMUNITY CONTROLS



Community Controls

Community Controls are essential to assure orderly and desirable development in conformity with the City's long-range goals and objectives. The exercise of these controls is a governmental function, However, in a real sense the planning and building of a community is a joint responsibility, shared by those in public office and the citizens of the community. A two-way channel of communication must, therefore, be kept open at all times. In this connection there are currently some sixteen self-supporting, non-profit agencies each focusing on some specific area of interest through which the citizenry may work on worthwhile projects or through which they may voice their concerns and recommendations.

The degree of citizen involvement in community affairs and in improving the quality of life in the City was recognized by the National Municipal League and Look Magazine in their selection of El Paso, along with ten other cities, to receive their award as an All American City, March 1, 1970. To be eligible for consideration for the award a city must:

- 1. Show major civic achievements of benefit to the community as a whole
- 2. Give evidence that these achievements resulted from "Citizen Action" and
- 3. Complete the major part of the specifications actions in 1969.

The official agencies of government in the City of El Paso which have a major impact on transportation planning are:

- 1. Mayor and City Council
- 2. City Plan Commission
- 3. Department of Planning and Research
- 4. Department of Public Works
- 5. City Engineer
- 6. Department of Traffic and Transportation
- 7. Traffic Safety Council
- 8. Parks and Recreation Board
- 9. El Paso Independent School District
- 10. Ysleta Independent School District
- 11. El Paso Housing Authority

The function of the City Plan Commission, because of the central role it plays in community development, is discussed below along with the functions of other related departments and agencies.

The El Paso City Plan Commission is an advisory body to the City Council on matters pertaining to City development and zoning. The Commission is charged with the responsibility of forumlating and periodically reviewing the City's General Plan, including the Capital Improvements Program. State law requires that all requests to change the official zoning map must be referred to the City Plan Commission before Council action. The Council may or may not accept the recommendations of the Plan Commission. The City Plan Commission under Texas law is given the full responsibility for reviewing and accepting subdivision maps. The Commission also has subdivision jurisdiction within a five-mile radius outside the City limits. Thus, the City Plan Commission, through zoning and subdivision control guides the location, size and intensity of development as well as the type of land use.

The City Plan Commission is supported by the Department of Planning and Research. The Department is charged with preparing and co-ordinating current and long-range plans. It is the responsibility of the Department to collect data from original sources and from various City Departments for the purpose of presenting to the City Plan Commission and the City Council a total picture of present and future requirements, including capital improvements. This information is presented in part by subject matter and in total as a document called the General Plan.

As a research agency, the Department undertakes formal and official research projects and is called upon to do specialized research and prepare special studies at the request of the Mayor, the City Plan Commission, other City Departments, other governmental agencies and citizen organizations.

Co-ordination is an important function of the Department. In 1970, the City Council recommended that the Department of Planning and Research strengthen its capability to co-ordinate the planning undertaken by other agencies. The Department was given overall responsibility for planning the City's community development and renewal activity.

During 1970, the Council also recommended that a development co-ordinating committee be established to promote the interchange of information among affected departments and to jointly plan and co-ordinate public improvements.

The Mayor appointed a Development Co-ordinating Committee with the Director of the Department of Planning and Research serving as chairman. The Committee meets weekly. Membership includes:

- 1. Director, Planning and Research
- 2. Director, Public Works
- 3. Director, Community Development
- 4. City Engineer
- 5. Director, Traffic and Transportation
- 6. Director, Parks and Recreation
- 7. Manager, El Paso Water Utilities
- 8. City-County Health Officer

The Department of Planning and Research co-ordinates functions in two other important areas - zoning changes and subdivision approval.

Subdivision review and approval is the responsibility of the City Plan Commission. A member of the Department of Planning staff acts as Subdivision Co-ordinator. He presents subdivision proposals to the Subdivision Co-ordinating Committee which is an officially recognized group made up of representatives from governmental organizations and public utility companies which have an interest in land development and public rights of way. This committee reviews proposed subdivision plats, public improvements, location and relocation of public utility easements, and acquisition of park and school sites. Their findings and recommendations are forwarded to the City Plan Commission.

Regional controls:

The El Paso Council of Governments was formed in January, 1967, under a 1965 State law that provided for "Regional Planning Commissions.". The El Paso Council of Governments is an association of individual governmental units. Its jurisdictional area includes six counties - - El Paso, Hudspeth, Culberson, Jeff Davis, Presidio and Brewster; two cities -- El Paso and Anthony; two school districts -- El Paso and Ysleta; and other special districts and public boards.

The Council has several prime functions:

- 1. To review and comment on all applications for Federal or State aid submitted by governmental agencies in the six-county Upper Rio Grande Planning Region.
- 2. To co-ordinate Federal aid grants and programs in metropolitan areas.
- 3. To co-ordinate projects proposed by each of the individual agencies within the region; and
- 4. To assist local governments in providing services.
- 5. To develop overall, long-range plans for the entire region.

Its overall purpose is to further the physical, economic and social well-being of the region.

In addition to the agencies previously listed there are several agencies which are jointly sponsored by the City and agencies of the Federal government.

These are listed under the agency responsible for funding as follows:

- 1. Office of Economic Opportunity
 - a. El Paso Community Action Program, Project BRAVO (Building Resources and Economic Opportunities)
 - b. MACHOS, Inc. (Mexican-American Committee on Honor, Opportunity and Service)

Purpose: To assist low income Mexican-American residents to improve their condition into life by organizing self-help projects and facilities for education in all areas.

c. Operation SER (Service, Employment Rehabilitation)

Purpose: To provide greater employment opportunity through remedial education, vocational on-the-job training and direct job placement.

d. VISTA - MMP (Volunteers in Service to America Minority Mobilization Program)

Purpose: To assist residents in South El Paso to remove the obstacles to poverty through a self help program using local volunteers.

- 2. Department of Health, Education and Welfare
 - a. El Paso Community Action Program, Project BRAVO (Building Resources and Vocational Opportunity)

Purpose: Previously described

b. Health Referral Service

Purpose: To provide medical services and supplies to meet health needs in South El Paso.

3. Department of Labor

a. El Paso Community Action Program, Project BRAVO (Building Resources and Vocational Opportunity)

Purpose: Previously described

b. El Paso Residential Manpower Program

Purpose: To provide vocational and educational opportunities for the youth of this area and assist in their recruitment and job placement.

c. Operation SER (Service, Employment Rehabilitation)

Purpose: Previously described

From the foregoing it appears that community controls are adequate to guide the development of the City and thus assure the preservation of a desirable environment and the enhancement of that environment for the welfare of its citizens.

References:

- 1. Annual Report, the forty-fifth, El Paso City Plan Commission, Department of Planning and Research, Zoning Board of Adjustment, City of El Paso, Texas, 1971.
- 2. Annual Report, 1969, El Paso Council of Governments, El Paso, Texas, January 13, 1970.
- 3. <u>Public Agencies and Service Organizations</u>, Community Renewal Program, Department of Planning, Research and Development, City of El Paso, 1971.
- 4. Legal Aspects of Community Renewal and Blight Elimination, Community Renewal Program, Department of Planning, Research and Development, City of El Paso, 1971.



Chapter 9

COMMUNITY VALUE FACTORS



Community Value Factors

A transportation system must be an integral and positive part of the Comprehensive Plan for El Paso. It must be planned to serve the needs and desires of the people in the area efficiently and economically. The design and function of the transportation network should also enhance the appearance and livability of the area. For these reasons, transportation planners must be attuned to the values and goals of the community.

El Paso has a tradition of planning for and with its citizens. In the 1920's, the City Plan Commission, the City Plan Engineer and a prominent planning consultant prepared El Paso's first comprehensive plan. This plan set forth principles and guidelines which formed a strong foundation for subsequent urban planning and, therefore, for transportation planning, based on goals, aspirations and values of the citizens.

In El Paso, values of the community have been an important part of the policies related to urban growth not only in the area of the thoroughfare planning but in every aspect of community improvement. The most recent Comprehensive Plan for the City of El Paso was adopted by the City Council in 1968 after hearing from many public officials and private citizens. Since that time, various citizen groups and advisory committees have been appointed by each administration to make recommendations on goals and objectives desirable for the community. One of the most recent groups, appointed by the City Plan Commission to study Open Space needs and goals, reported on the broad environmental and urban development goals that should be sought by the community and its officials. The Open Space Committee highlighted the environmental aspects of urban development in their recommendations. They recommended the development of an Open Space Program which would accomplish these objectives:

Satisfy a hierarchy of demands on existing open space for: flood control; traffic and pedestrian circulation; recreation; urban design; population; pollution control; conservation; greenbelt areas; future development needs; definition of the physical structure of the community.

Preserve the unique natural and cultural setting of the community.

Protect the choices of lifestyles available to El Pasoans (i.e. high density apartments, single family houses, low density with rural atmosphere).

Provide the open space necessary to support urban life ecologically, socially, and biologically as well as functionally.

Ensure an attractive economy necessary to a sound economy.

Achieve a balance between developed areas and open space in all parts of El Paso.

Some of their specific recommendations bear directly on transportation planning.

Explore potentialities of the local street, especially in high density areas, for uses other than vehicular circulation.

Encourage limited access arterials free from conflicting local traffic movement.

Require some landscaping in strategic areas along minor arterials.

Undertake a study to find programs, including funding, for purchase of scenic easements and other buffer strips alongside major arterials.

Study alternative ways in which pedestrians may move about within the Central Business District without conflict with vehicular traffic. Consider Central Business District transportation and parking problems as part of such a study.



Goals for Texas, Phase II, Office of the Governor, September 1970, presents goals for the twenty-one State Planning Regions. El Paso is embraced in the Upper Rio Grande State Planning Region which includes the following counties: El Paso, Hudspeth, Culberson, Jeff Davis, Presidio, and Brewster. This publication sets forth goals within the following categories: education, the economy, general government, housing, human resources, recreation and open space, public protection, and transportation.

These goals, particularly the transportation goals, which are summarized in the following table, were reviewed in formulating goals and objectives for the transportation study area.

Obviously, one of the important community values is environmental protection and enhancement. At the same time, values relating to efficient transportation facilities are given a high priority. Since the primary purpose of urban transportation planning is to develop a transportation system which is best suited to the needs and desires of the community, both of these major values - environmental protection and efficient transportation must be given consideration.

TABLE IX-1

TRANSPORTATION GOALS (From Goals for Texas Phase Two)

10 Year Goal	6 Year Goal	2 Year Goal
Develop the system of express- ways, arterial streets and col- lectors described in the El Paso	Construct one additional lane in each direction on Interstate 10 from Yarbrough Dr. to	Implement the recommendations for accomplishing intermediate and short range objectives in the El Paso Trans-
Transportation Plan to fulfill new or revised requirements and	Loop 375.	portation Study.
facilitate planning with an incre- mented orderly schedule of	Plan and coordinate rural high- way construction and rural	Secure technical assistance in planning and coordinating rural highway con-
attainment.	transportation services.	struction and methods of encouraging rural transportation services.
Increase the use of mass transit	Continue to implement the	
as a means for obtaining more efficient utilization of the existing and future streets and roads.	Traffic Operations Program to Increase Capacity and Safety on existing arterial streets, and	Encourage the use of close-in, off- street parking for short duration trips.
T	seek to ease the procedural	Continue development and enforcement
Increase the level of attractive bus service in terms of improved passenger satisfaction and con-	problems between the Federal government and the Texas Highway Department.	of ordinances to require and encourage off-street parking.
venience to increase the use of		Improve the comfort and convenience
buses.	Eliminate on-street parking on traffic congested streets.	provided by transit bus equipment.
Provide adequate transportation services for rural and agricul-	Toronto and the content of sometimes and	Select bus routes to facilitate speed.
tural areas at fair rates.	Improve the arterial system on a timely basis as needed to meet	Expand express bus services and express
Develop a balanced transporta-	the developing needs of the El Paso Metropolitan Area.	bus lanes on the freeway.
tion system for the regions by		Extend bus service to new residential
combining various modes of	Provide additional parking spaces	subdivisions and develop new subdivi-
travel and technologies for the maximum convenience and effi- ciency and minimum confusion	to include 1650 off-street spaces conveniently located for short duration parkers.	sions to facilitate efficient and convenient transit routings.
and congestion in the movement	duration parkers.	Expand limited-stop bus services.
of people and goods.	Urge the completion, construc-	
	tion or development of Loop 375	
	as a circumferential limited	
	access highway including the section from U.S. 62 and 180 to	
	McCombs Drive and the section	
	from Santa Fe Street to I-10; of	
	an additional east-west expressway	
	along the Montana-Trowbridge	
	Route to connect with the North-	
	South Freeway; of an arterial route to connect Fred Wilson	
	Road with Shadow Mountain Dr.	
	Minimize the number of bus trans- fers required between the trave-	
	ler's origin and destination to	
	include due consideration for the "desired lines of travel."	
	Optimize routings to limit walking distance to bus stops and to	
	reduce the time spent waiting for a bus.	
	Introduce new bus services to satisfy the desires created by the developing urban pattern.	

With this balance of values in mind, the following goals and objectives have been established by the Advisory Committee to guide the development of the El Paso Transportation Plan.

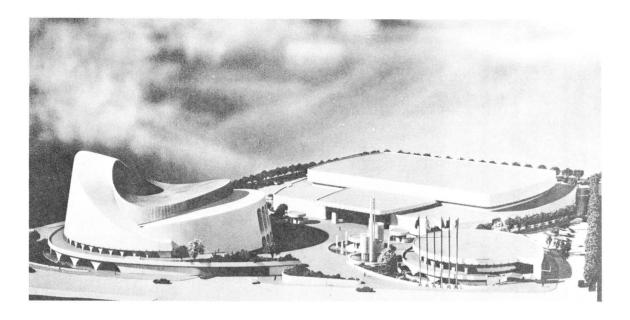
- 1. To provide safe transportation
- a. Reduce fatalities and injuries.
- b. Reduce accidents.
- c. Reduce hazards of railroad crossings.
- 2. To provide efficient and economical transportation
- Improve the major arterial system to carry increased traffic volumes.
- b. Minimize system costs.
- c. Reduce user costs.
- d. Reduce travel time.
- e. Minimize congestion.
- f. Minimize parking deficiencies.
- To enhance environmental, sociological, and aesthetic values
- a. Reduce through travel on residential streets.
- Reduce relocations of businesses and residences.
- Promote cohesiveness of neighborhoods.
- d. Enhance the view of and from the highway.
- e. Preserve open space.
- f. Promote public participation in land use planning.
- g. Minimize contribution to air pollution.
- h. Undertake cooperative studies with public and private agencies to initiate methods for reducing peak hour traffic volumes, thus reducing conjection.
- i. Search for long-range alternatives to freeway construction.
- 4. To provide the ability to move about without an automobile.
- a. Improve existing mass transit systems.
- Improve provisions for pedestrians and bicyclists along and across arterials.
- c. Study new traffic control and roadway design techniques which would facilitate the movement of multi-passenger vehicles.
- d. Utilize Federal programs to undertake innovative Rapid Transit Demonstration projects.

The City of El Paso and the Texas Highway Department have established an enviable record of effective cooperation. Their rapport, moreover, is reflected not only in friendly negotiation and coordinated planning, but also in results clearly apparent to El Paso residents. The City's concern with the aesthetics of public construction, for example, has been accompanied by a similar concern by the Highway Department. A comparison of recent building with that of a decade ago dramatically demonstrates this point. Moreover, the City and the Highway Department share a determination to provide the public with maximum utilization of land acquired for public purposes. The land

beneath the Paisano (Darbyshire) overpass, for example, has been released to the City for development as a park and recreation area, and the Department has encouraged the City to make similar use of the land beneath the Interstate 110 interchange at Alameda Street.

The values of a community are best reflected in the actions taken by the public and private sectors. Some recent major actions and establishments which demonstrate the community's system of values are mentioned here.

CONSTRUCTION OF A CIVIC AND CONVENTION CENTER. El Paso voters passed a \$15 million bond issue in 1968 authorizing the City to build a civic and convention center. Included in the complex which is currently under construction and is expected to be completed in 1972, is a theater-auditorium, assembly-exhibition hall and the Chamber of Commerce headquarters. The new complex is located in the Central Business District. It will also provide some 1,520 parking spaces for the downtown area.



The approved TOPICS project to construct a railroad overpass to connect Buchanan and Durango Streets as an essential element of the street system serving the Civic Center and the general area around this Center is a prime example of cooperation involving Federal, State, and City governments.

ESTABLISHMENT OF THE ELPASORESIDENTIAL MANPOWER PROGRAM. The purpose of this program is to train and educate the youth of the El Paso area and assist the Texas Employment Commission in recruitment and placement. One of the program's main objectives is to design, establish, and implement a program through which the enrollees can be prepared to become responsible, employable and productive citizens.

EDUCATIONAL EXPANSION. In 1971, the Texas Legislature approved funds to establish a junior college in El Paso. The El Paso Community College opened in the fall of 1971 with an enrollment of 800 students. Classes are being held at high schools throughout the City. Plans are being made for a multi-campus Community College with branches in the major population centers of the City.

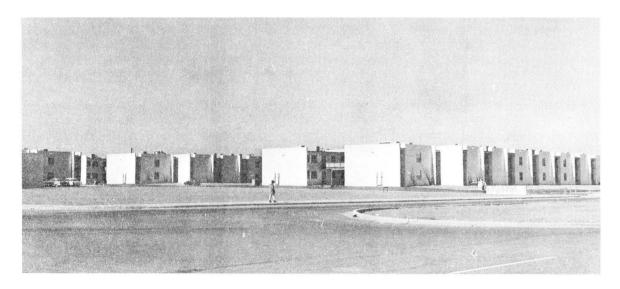
OPEN SPACE. Progress is being made by the City of El Paso to acquire and develop

22,000 acres of the Franklin Mountains as a wilderness park. The first phase of development will include development of hiking trails and provide picnic units and landscaping. The completion of the Trans-Mountain Highway (Loop 375) in 1969 provided access to many spectacular recreation and wilderness areas in Fusselman Canyon on the western slopes of the Franklin Mountains. The park system for the City has been growing along with the population and housing supply. In 1969, there were fifty city parks and in 1970 there were seventy-three. In addition to the new parks, many of the existing parks and traffic medians were improved through beautification programs which included installing lighting systems, picnic facilities, landscaping and parking. The City also purchased two large park sites in the Lower Valley in 1970.

DEVELOPMENT OF THE CENTRAL BUSINESS DISTRICT.

- a. A Civic and Convention Center is being built at a cost estimated to be around \$18 million. This complex will also provide off-street parking for some 1,520 cars.
- b. The old Southern Pacific Building was remodeled in 1969 to become the American Bank of Commerce Building.
- c. Mountain Bell Telephone Company constructed a new building in the Central Business District.
- d. The San Jacinto Plaza has been remodeled and Eighth Street in South El Paso has been converted to a Paseo.
- e. The Holiday Inn has 200 rooms with garage parking for over three hundred cars. Two new multistory hotels will provide over one hundred rooms each.
- f. State National Bank is building a twenty-two story bank and office building and an eight-story, six hundred car parking garage with drive-in banking facilities. The office building will have over 200,000 square feet of floor space.

PUBLIC HOUSING CONSTRUCTION. Within the next ten years, 3,756 new family apartment units are scheduled for construction at various locations throughout the city. Funds committed to carry out these projects are estimated at \$56.4 million. In the past year, the Public Housing Authority completed two housing projects for the elderly totalling 394 units.



Non-profit groups have sponsored projects for low and moderate income housing. Three civic groups have constructed separate apartment complexes for low and moderate income families. A total of 438 units were constructed at various sites in the City. Two other groups have expressed their intention to construct apartment projects of 100 units each. Seven additional projects with a total of 1,084 units for moderate-income families are expected to be completed in 1972 and 1973.

El Paso is systematically attempting to keep up with its growth problems. Between 1960 and 1970, the citizens of El Paso approved \$55 million for municipal bonds and \$61.7 million in school bonds. The City has also received \$3.3 million from Federal and State funds for public works improvements. It also inaugurated programs to alleviate the conditions of the poor at a cost of more than \$17.5 million. One of these programs is the Community Renewal Program to study the causes and incidences of blight in the City and propose solutions.

Providing an adequate inventory of standard low and moderate income housing is a major goal for any city interested not only in growth but in improvement of its existing facilities. El Paso, through its Community Renewal Program, has thoroughly and realistically appraised its housing resources and suggested practical programs for both large scale rehabilitation and new housing construction. The two-year program is nearing completion. Programs for Action are being formulated and presented to City officials and the public for discussion and action.

INDUSTRIAL EXPANSION AND DEVELOPMENT. El Paso has systematically encouraged industrial development in order to provide a solid economic foundation for its growth. Recent examples of its diversified industrial expansion include the following:

- a. The Farah Manufacturing facility on Gateway West at Hawkins Boulevard was expanded. This facility is just one of Farah Manufacturing Company's four plants located in El Paso and is the largest slacks factory in the world.
- b. Mann Manufacturing Company built two new facilities in southeast El Paso north of I-10.
- c. A transistor manufacturer, Components, Inc., constructed a building in east El Paso on Boeing Drive.
- d. Development of the Eastside Industrial District now includes warehouses, moving and storage companies, and wholesale distributors.

Development of the "Twin-Plant Concept" came about in the mid 1960's. This "Twin-Plant Concept" involved facilities on each side of the United States-Mexico Border. U.S. raw materials are converted in the United States Plant to identifiable parts that are delivered to the Mexico plant for assembly into a finished or semi-finished product. The product is then returned to the United States plant for additional operations such as inspection, finishing, packaging and distribution. Currently there are twenty-five industrial operations in Juarez that operate under this program and eighteen in El Paso. Three thousand persons are employed in Juarez and fifteen hundred in El Paso.

Some of the major industrial companies participating in the "Twin-Plant Program" are:

- a. Coilcraft Television and radio coils.
- b. Components, Inc. Electronic components (transistors)

- c. Cowtown Boot Company -Boots.
- d. Free Breeze Camper Trailers,
- e. A.C. Nielson Commercial coupons.
- f. Paper Novelty Company Christmas decorations.
- g. RCA Electronic components.
- h. Sanders Boot Maker Western boots.

THE WAR ON POVERTY. In the spring of 1965, El Paso obtained a grant to establish El Paso's Community Action Program, Project BRAVO. In June, 1965, a Board of Directors was established, the program was funded, and the administrative offices were set up. Established as a non-profit corporation, Project BRAVO (Building Resources and Vocational Opportunity) has amended its by-laws from time to time in accordance with Federal requirements and has become an independent, City-sponsored program. The purpose of this project is to mobilize all kinds of resources to fight poverty so that low-income families and low-income individuals of all ages, in rural and urban areas, can attain the skills, knowledge, and motivation and secure the opportunities needed for them to become fully self-sufficient.

LIBRARY SERVICE. The E1 Paso Public Library System has greatly expanded its facilities since 1960. During 1960 the system included the main library, two branch libraries and two bookmobiles with a circulation of some 990,000 books. By 1970 the facilities had been expanded to include the main library, five branch libraries, and two bookmobiles with a circulation of some 813,000 books. Circulation trends now show decreases because of increased popularity in paperbacks, public school libraries, and the more flexible hours maintained by the University library. Approximately two-thirds of the 355,000 volumes in the system are located at the main library.

EDUCATION FACILITIES. There are two independent school districts serving the City of El Paso (El Paso School District and Ysleta School District), a State university (UTEP) and several private and parochial educational institutes and systems. The study area has three additional independent school districts, Canutillo, Socorro, and San Elizario School Districts.

The University of Texas at El Paso (UTEP), formerly Texas Western College, was established in 1913. It became part of the University of Texas System in 1967. The University offers excellent programs leading to bachelors' and advanced degrees in science, engineering, business, liberal arts, and education. Enrollment has increased from 4,140 in 1960-61 to 11,517 for 1970-71, a 182 percent increase. The enrollment is expected to double in the next ten years. The number of degrees awarded has also been increasing rapidly. During 1960 there were 385 bachelor degrees and 42 advanced degrees awarded. This increased to 1,022 bachelor degrees and 260 advanced degrees awarded in 1970. The faculty which was composed of 185 in 1960 has increased to over 500 in 1970. The University also has a well equipped library with over 250,000 books. Due to the increased activity at the University, it is currently engaged in an extensive remodeling and building program.

The public school system for the intensive study area is composed of the El Paso and Ysleta school districts within the City of El Paso, and the Canutillo, Socorro and San Elizario School Districts in the remainder of the intensive study area.

Table IX-2 shows a comparison of school enrollment, number of schools, number of classrooms, and average daily attendance. Table IX-3 shows the trends in student enrollment from 1951-1971 in the El Paso, Ysleta, and San Elizario School Districts. The increase in the number of school age children shows the need for expansion of the school system.

TABLE IX-2
PUBLIC SCHOOL STATISTICS
1970-1971

		S	chool Dist	ricts		
	El Paso	Ysleta	Canutillo	Socorro	San Elizario	Total Study Are
Number of Schools						
High School	8	6		1		15
Intermediate	4	2				6
Elementary	48	26		1	1	76
TOTAL	60	34	1*	2	1	98*
Number of Classrooms	2,459	972	53	64	10	3,558
School Enrollment						
High School	17,045	7,932		435		25,412
Intermediate	15,128	5,218				20,346
Elementary	28,759	17,959		1,300	300	48,318
TOTAL	60, 932	31, 109	1,650*	1,735	300	95,726*
Average Daily Attendance	55,365	29, 255	1,507	1,670	281	88,078
Percent	90.9%	94.0%	91.3%	96.3%	93.7%	92.0%
Average Cost Per Student	\$607	N/A	\$440	N/A	N/A	N/A

^{*} School in Canutillo serves grades 1-12.

TABLE IX-3

SCHOLASTIC ENROLLMENT TRENDS
IN SELECTED SCHOOL DISTRICTS
1951-1971

	E1	Paso	Y s l	eta	San E	lizario	Total		
	Number	Percent Change	Number	Percent Change	Number	Percent Change	Number	Percent Change	
1951-1952	26,809		5,814		368		32, 991		
1960-1961	52,622	96.3	18,369	215.9	328	-10.9	71,319	116.2	
1970-1971	60,932	15.8	31,109	69.4	300	- 8.5	92, 341	29.5	

The private and parochial school system in El Paso is composed of fifteen elementary schools, five high schools, and a junior college. This system also includes numerous kindergartens, three seminaries, and three schools which include all grades. The enrollment at the elementary level was 4,779 for 1970 with an average daily attendance of 95.5 percent. The enrollment in the high schools was 1,948 with an average daily at-

N/A - Not Available.

tendance of 94.6 percent. The enrollment in the seminaries was 128 students, and seventy in the junior college.

In addition, there are twenty-five private technical and professional schools and colleges providing a variety of vocational courses. One of these is the Hotel Dieu School of Nursing of the University of Texas system, which has an enrollment of some 176 students.



CIVIC AND CULTURAL LIFE. The El Paso Museum of Art continues to play an active role enriching community life. The Museum houses the Kress collection and sponsors other exhibits by local and nationally known artists. It also offers classes in creative art and art appreciation. The museum, which is a three-story structure, has some 25,000 feet of floor space and has an annual attendance of approximately 67,000 persons. In addition, El Paso is served by the Centennial Museum of The University of Texas at El Paso which features exhibits on the natural history, anthropology and social history of the Southwest. The Centennial Museum sponsors exhibits of work by local artists and craftsmen.

El Paso supports a symphony orchestra, providing a full concert season with outdoor concerts in the summer. The El Paso Symphony Orchestra was recently elevated to Metropolitan Orchestra status by the American Symphony Orchestra League.

El Paso has 273 churches representing more than twenty-four denominations.

As a result of the Chamizal Border Agreement, 193 acres of the disputed area were acquired by the United States. The Chamizal National Memorial Park and Bowie Technical High School will be constructed on this land. Both are expected to be completed in 1973. The new technical high school is expected to cost in excess of six million dollars and will be El Paso's largest and most modern high school. It will accommodate approximately 2,500 students.

COMMERCIAL LIFE. In addition to a healthy central business district, the primary location of retail, office, and financial activity, El Paso supports twenty shopping centers with more planned. Five of the shopping centers have over thirty businesses, and the largest, Bassett Center, has forty-seven business establishments. Located in the central business district and major shipping centers are banks with annual clearings of about \$4.337 billion.

Adjacent to both Mexico and New Mexico and the largest city in West Texas, El Paso offers residents and visitors the attractiveness of international variety and a well balanced combination of metropolitan advantages.

References:

- 1. Annual Report, the forty-fifth, El Paso City Plan Commission, Department of Planning and Research, Zoning Board of Adjustment, City of El Paso, 1971.
- 2. Open Space Goals for El Paso, Texas by the Comprehensive Space Program Committee appointed by the City Plan Commission, El Paso, Texas, published April 23, 1971.
- 3. Goals for Texas, Phase Two, Office of the Governor, Austin, Texas, 1970.
- 4. Annual Report, 1969, El Paso Council of Governments, El Paso, Texas, January 13, 1970.
- 5. <u>Public Agencies and Service Organizations</u>, Community Renewal Program, Department of Planning, Research and Development, City of El Paso, 1971.
- 6. Legal Aspects of Community Renewal and Blight Elimination, Community Renewal Program, Department of Planning, Research and Development, City of El Paso, 1971.





Chapter 10

FINANCIAL RESOURCES



Finanical Resources

One of the prime factors in selecting a workable transportation plan is the availability of financial resources. The capabilities of each governmental agency involved should be carefully analyzed by reviewing their past expenditures for street and highway facilities along with their present available resources. In this manner, the future financial capabilities can be established within a reasonable range.

Past expenditures for right-of-way, construction, and maintenance were obtained from the City of El Paso, El Paso County, and District 24 of the Texas Highway Department for the streets and highways within the study area. These expenditures were obtained for the period 1960 through 1970. Tables X-1 through X-5 show the trend in expenditures for the 1960-1970 period. Figure X-1 shows what percentage right-of-way, construction, and maintenance is of the total for the period 1960-1970. The figure also shows what percentage the City of El Paso, El Paso County, and the State and Federal government contributed to the total expenditures for the period 1960-1970.

The total expenditures for 1970 were slightly higher than the predicted average of \$16.6 million. The slight increase is probably due to the construction on the North-South Freeway and Interstate 110. Expenditures on these projects were in excess of two million dollars each. These projects are: (1) The three-level interchange at Interstate 110 and Paisano Drive (\$2.1 million); (2) the Yandell, Montana, and Trowbridge overpasses (2.2 million); and (3) the four-level interchange at Interstates 10 and 110 (\$2.9 million). The first two projects were completed during 1970 and the third project is under construction and is expected to cost over fifteen million dollars when completed in 1973.

As indicated in the preceding tables and charts, the average annual expenditure has been \$13,295,794 (1960-1970), with \$10,700,335 going for right-of-way and construction and \$2,595,459 for maintenance. Since this amount of money has been available on an annual basis for the past eleven years, it is reasonable to assume at least this much should be available in the future. Based on this conservative projection \$214,006,700 would become available over the next twenty years for right-of-way and construction.

A review of the past expenditures also revealed that an annual average increase in expenditures has occurred at a rate of \$1,411,459 per year. It is logical to assume that this rate of increase will continue into the future. Based on this assumption the average annual expenditure of \$13,295,794 coupled with the annual average rate of increase of \$1,411,459 will provide funds to support an average annual expenditure of \$28,116,110, which will produce an estimated \$562,322,200 in resources over the next twenty year period, 1971-1990. Of this amount it is reasonable to assume that approximately \$440,000,000 would become available for right-of-way and construction.

Although the current rate of expenditures exceeds the trend established in the 1963 study, consideration of estimated expenditures for the next five years indicates that the projections made in the 1963 study are still valid. This trend, as shown in Figure X-2, has, therefore, been extended to 1990. Based on this trend, an estimated \$499,550,000 will be available in financial resources for the next twenty years. Of this amount, approximately \$397,000,000 would become available for right-of-way and construction.

It is, therefore, concluded that the available resources to 1990 should fall between \$214,000,000 and \$440,000,000 for development of the Transportation Plan.

TABLE X-1

RIGHT-OF-WAY, CONSTRUCTION AND MAINTENANCE EXPENDITURES

CITY OF EL PASO

	1960 \$	1961 \$	1962 	1963 \$	1964 	1965 <u>\$</u>	1966 \$	1967 \$	1968 	1969 	1970 \$	Total \$
Right-of-Way*	25	a	ce	69	ės:	co		C)	em e	-	2,099,997	
Construction	1,727,252	1,578,412	1,087,394	260,274	698,360	1,863,172	5,389,569	2,890,249	3,317,520	2,488,140	411,175	23,811,514
Maintenance	1,682,064	1,795,438	1,860,292	1,860,815	1,794,876	1,982,567	1,933,591	2,201,897	2,631,456	1,973,592	2,721,939	22,438,527
TOTAL	3,409,316	3,373,850	2,947,686	2,121,089	2,493,236	3,845,739	7,323,160	5,092,146	5,948,976	4,461,732	5,233,111	46,250,041

^{*}Right-of-way is combined in construction costs for the years 1960-1969 and the total.

TABLE X-2

RIGHT-OF-WAY, CONSTRUCTION AND MAINTENANCE EXPENDITURES

COUNTY OF EL PASO

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	Total
Right-of-Way	\$ 44,256	\$ 17,869	\$ 2,791	\$ 1,087	\$ 975	\$ 93,113	\$136,215	\$ 1,500	\$ 4,218	ėv	\$ 1,500	\$ 303,524
Construction	134,084	516,313	192,710	31,806	63,355	73,300	68,193	64,793	64,432	68,703	25,108	1,302,797
Maintenance	190,379	139,816	327,697	230,905	295,312	298,631	277,038	287,668	289,365	259,946	204,384	2,801,141
TOTAL	\$368,719	\$673,998	\$523,198	\$263,798	\$359,642	\$465,044	\$481,446	\$353,961	\$358,015	\$328,649	\$230,992	\$4,407,462

TABLE X-3

RIGHT-OF-WAY, CONSTRUCTION AND MAINTENANCE EXPENDITURES

STATE AND FEDERAL

	1960 \$	1961 \$	1962 \$_	1963	1964 	1965 	1966 <u>\$</u>	1967 <u>\$</u>	1968 \$_	1969 	1970 \$_	Total
Right-of-Way	505,578	660,708	1,555,257	2,831,869	1,994,465	3,697,200	2,734,204	3,110,143	2,753,696	4,366,391	3,636,196	27,845,707
Construction	3,081,392	2,758,119	2,758,516	4,275,490	1,740,170	2,747,557	4,950,082	8,847,174	11,403,174	10,012,516	11,865,961	64,440,151
Maintenance	162,553	202,804	237,910	283,035	232,177	286,535	270,267	278,949	332,075	348,188	675,891	3,310,384
TOTAL	3,749,523	3,621,631	4,551,683	7,390,394	3,966,812	6,731,292	7,954,553	12,236,266	14,488,945	14,727,095	16,178,048	95,596,242

TABLE X-4

RIGHT-OF-WAY, CONSTRUCTION AND MAINTENANCE EXPENDITURES
ALL GOVERNMENTAL AGENCIES

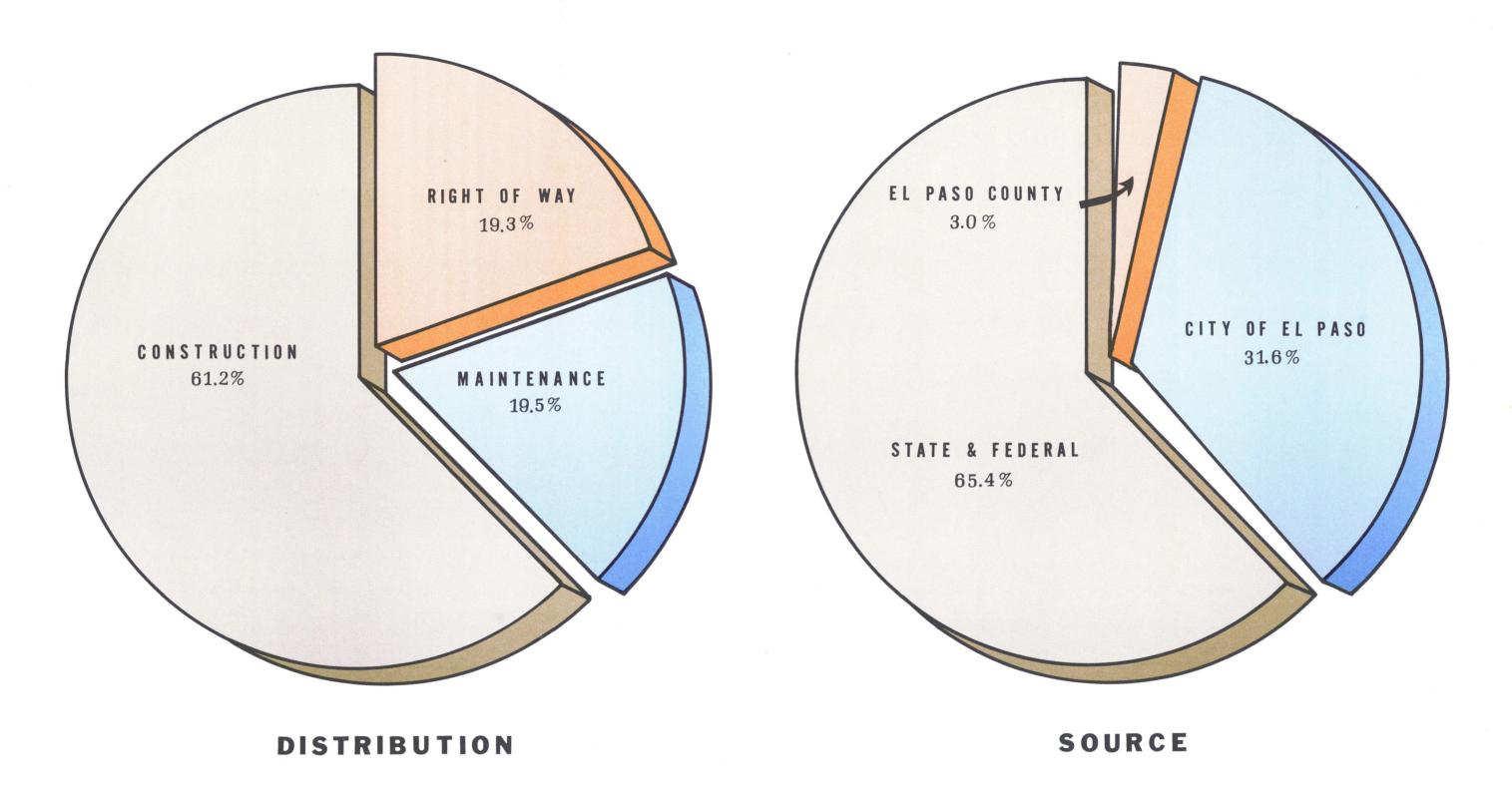
	1960 \$	1961 \$_	1962 	1963 	1964 \$	1965 \$_	1966 \$	1967 \$	1968 \$	1969 \$	1970 \$	Total \$
Right-of-Way*	549,834	678 , 577	1,558,048	2,832,956	1,995,440	3,790,313	2,870,419	3,111,643	2,757,914	4,366,391	3,637,696	28,149,231
Construction	4,942,728	4,852,844	4,038,620	4,567,570	2,501,885	4,684,029	10,407,844	11,802,216	14,785,126	12,569,359	14,402,241	89,554,462
Maintenance	2,034,996	2,138,058	2,425,899	2,374,755	2,322,365	2,567,733	2,480,896	2,768,514	3,252,896	2,581,726	3,602,214	28,550,052
TOTAL	7,527,558	7,669,479	8,022,567	9,775,281	6,819,690	11,042,075	15,759,159	17,682,373	20,795,936	19,517,476	21,642,151	146,253,745

^{*}Right-of-way is combined with construction for the City of El Paso.

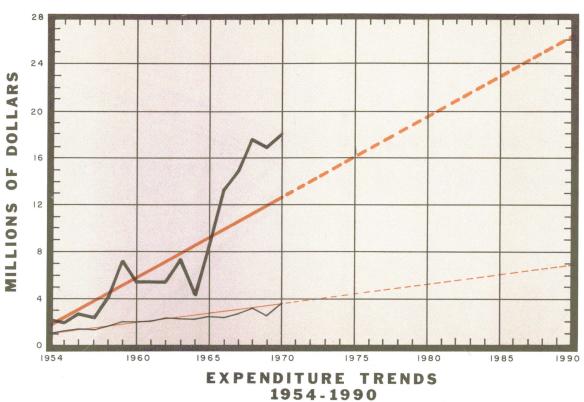
TABLE X-5

EXPENDITURE TRENDS
1960-1970

	City of E	l Paso	County of E	El Paso	State and E	ederal	Total		
Year	Expenditures	% Change	Expenditures	% Change	Expenditures	% Change	Expenditures	% Change	
1960	\$ 3,409,316	-	\$ 368,719	-	\$ 3,749,523	-	\$ 7,527,558	-	
1961	3, 373, 850	- 1.0	673,998	82.8	3,621,631	- 3.4	7,669,479	1.9	
1962	2,947,686	-12.6	523,198	-22.4	4,551,683	25.7	8, 022, 567	4.6	
1963	2,121,089	-28.0	263, 798	-49.6	7, 390, 394	62.4	9, 775, 281	21.8	
1964	2, 493, 236	17.5	359,642	36.3	3, 966, 812	- 46.3	6, 819, 690	- 30.2	
1965	3,845,739	54.2	465,044	29.3	6, 731, 292	69.7	11,042,075	61.9	
1966	7,321,160	90.4	481,446	3.5	7, 954, 553	18.2	15, 759, 159	42.7	
1967	5,092,146	-30.4	353,961	-26.5	12, 236, 266	53.8	17, 682, 373	12.2	
1968	5,948,976	16.8	358,015	1.1	14, 488, 945	18.4	20, 795, 936	17.6	
1969	4,461,732	-25.0	328,649	- 8.2	14, 727, 095	1.6	19, 517, 476	- 6.1	
1970	5, 233, 111	17.3	230, 992	-29.7	16, 178, 048	9.9	21,642,151	- 10.9	
TOTAL	\$46, 250, 041	-	\$4,407,462	-	\$95,596,242	-	\$146, 253, 745	-	
Percent Change 1960-1970 53.5		53.5		-37.4		331.5		187.5	



STREET & HIGHWAY EXPENDITURES 1960 - 1971 TOTAL \$ 143,045,159



ACTUAL MAINTENANCE EXPENDITURE ACTUAL R.O.W. AND CONSTRUCTION EXPENDITURE MAINTENANCE EXPENDITURE TREND AND PROJECTION R.O.W. AND CONSTRUCTION EXPENDITURE TREND AND PROJECTION

FIGURE X - 2