TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
TX-90/1904-1F		

4. Title and Subtitle	5. Report Date
Estimated Economic Impact of the Proposed Improvement of State Highway 199 in Tarrant County, Texas	March 11, 1991
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Jesse L. Buffington, Laurence M. Crane, and Rohani Salleh	Research Report 1904-1F
9. Performing Organization Name and Address	10. Work Unit No.
Texas Transportation Institute Texas A&M University System College Station, Texas 77843-3135	11. Contract or Grant No. Study No. 2-2D-89/90-1904
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Texas State Department of Highways and Public Transportation; Transportation Planning Division P.O. Box 5051 Austin, Texas 78763	Final: September 1989 August 1990
	14. Sponsoring Agency Code

15. Supplementary Notes

Research Study Title: Estimated Economic Impact of the Proposed Improvement of State Highway 199 in Tarrant County, Texas.

16. Abstract

The State Department of Highways and Public Transportation's (SDHPT) District 2 personnel are in the process of evaluating the proposed improvement of State Highway 199 which is located in northwestern Tarrant County. This highway passes through four small "satellite" cities (Lakeside, Lake Worth, Sansom Park and River Oaks) as it leads into Fort Worth and terminates at Interstate Highway 30 near downtown Fort Worth. Presently, the highway is a four-lane facility with undivided and divided at-grade sections that have no restrictions on access. The proposed facility is a full limited access freeway with or without service roads. Three alternate routes are being studied, and all three will affect the four satellite cities, Fort Worth and the rural part of Tarrant County. The route alternatives are as follows: (1) the central route - follows the existing route which contains considerable strip commercial development sprinkled with random vacant land and would require the acquisition of additional land, located primarily on only one side of the existing right of way; (2) the north route would bypass Lake Worth and Sansom Park almost completely and pass mostly through a large portion of vacant land area as well as several residential neighborhoods. and (3) the south route would pass through parts of Sansom Park and Lake Worth and through vacant land and several residential neighborhoods. Most of the northern route and nearly half of the southern route would pass through the city of Fort Worth.

Each of the above route and design alternatives are evaluated to estimate the possible short-term and long-term economic impacts resulting from implementing each alternative. The results are needed as supporting information in the environmental impact statement (EIS) for State Highway 199.

The study objective is to estimate the economic impacts of the proposed route and/or design alternatives for State Highway 199. The following impacts are to be estimated: (1) impact on existing businesses, distinguishing between traffic-serving and other types of businesses, (2) impact on new development, (3) impact on employment, including that due to construction expenditures and loss of clientele, (4) impact on municipal tax revenues, and (5) impact on highway users.

17. Key Words	18. Distribution Statement
Economic impact; route alternatives; business gross sales impact; land value, land use; development impacts; employment impacts; highway user benefits-costs; highway and building construction impacts; city tax revenue impact.	No restrictions. This document is available to the public through the National Technical Information Service 5285 Port Royal Royal Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	196	

Form DOT F 1700.7 (8-69)

ESTIMATED ECONOMIC IMPACT OF THE PROPOSED IMPROVEMENT OF STATE HIGHWAY 199 IN TARRANT COUNTY, TEXAS

by

J.L. Buffington
L.M. Crane
R. Salleh

Research Report 1904-1F
Research Study 2-2D-89/90-1904

for

The Texas State Department of Highways
and Public Transportation

March 11, 1991

Texas Transportation Institute
Texas A&M University System
College Station, Texas

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	2.54	centimetres	cm
ft	feet	0.3048	metres	m
yd	yards	0.914	metres	m
mi	miles	1.61	kilometres	km
AREA				
in²	square inches	645.2	centimetres squared	cm ²
ft²	square feet	0.0929	metres squared	m²
yd²	square yards	0.836	metres squared	m²
mi²	square miles	2.59	kilometres squared	km²
ac	acres	0.395	hectares	ha
MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
VOLUME				
fl oz	fluid ounces	29.57	millilitres	mL
gal	gallons	3.785	litres	L
ft³	cubic feet	0.0328	metres cubed	m³
yd³	cubic yards	0.0765	metres cubed	m³

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

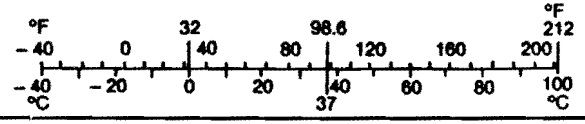
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi
AREA				
mm²	millimetres squared	0.0016	square inches	in²
m²	metres squared	10.764	square feet	ft²
km²	kilometres squared	0.39	square miles	mi²
ha	hectores (10 000 m²)	2.53	acres	ac
MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1 000 kg)	1.103	short tons	T
VOLUME				
mL	millilitres	0.034	fluid ounces	fl oz
L	litres	0.264	gallons	gal
m³	metres cubed	35.315	cubic feet	ft³
m³	metres cubed	1.308	cubic yards	yd³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

ACKNOWLEDGEMENTS

The authors want to thank Mr. Burton Clifton, District Planning Engineer of District 2 of the State Department of Highways and Public Transportation, for his valuable assistance to this study as its official contact representative. Other members of his staff, especially Ms. Jean Karkik, were very helpful in supplying data necessary for the study.

Other members of the Texas Transportation Institute's Transportation Economics Program gave valuable assistance to the study. Drs. W.F. McFarland and J.L. Memmott assisted with the highway user cost analysis. Ms. Linda Buzzingham helped with compiling and sorting the data base as well as with the report preparation. Ms. Margaret Chui assisted with the report preparation. Mr. John Hobbs helped with the illustrations for the report.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented within. The contents do not necessarily reflect the views or policies of the Texas Department of Transportation. This report does not constitute a standard, specification or regulation. It is not intended for construction, bidding or permit purposes. The report was prepared by Jesse L. Buffington, Laurence M. Crane and Rohani Salleh.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ESTIMATED ECONOMIC IMPACT OF THE PROPOSED IMPROVEMENT OF STATE HIGHWAY 199 IN TARRANT COUNTY, TEXAS

INTRODUCTION

Economic Impacts of Highway Improvements

General Assessment Overview

Highway improvements, whether they are for new highways or only improvements in old existing routes, create changes in the local economy and how it functions. Some of these changes are temporary, lasting only during the relatively short construction period, whereas, some of these functional changes are long term because they result from the characteristics of the new facility itself. These changes can be either beneficial, adverse, or both beneficial and adverse. Rarely is an economic impact clearly all positive or all negative within a community.

The economic impacts from highway changes and construction improvements are not easily measured. Of those that are measurable, some are easier to quantify. For example, the decrease in operating cost and travel time resulting from traveling a shorter new route is easier to quantify than the resulting impact on the abutting business and property values. Furthermore, because there are so many interacting relationships between different aspects of a highway improvement and the local and the general economies of the surrounding areas, it is infeasible to measure precisely the partial or total effects of any highway improvement. However, reasonable estimates can be obtained by looking at comparable

improvements at other locations and the effects they had on their economies.

Economic benefits that are generated from highway projects are divided into six general classifications. The six classifications are: (1) economic growth and development, (2) property values, (3) health and safety improvements, (4) improved efficiency in public and private services, (5) resource substitution, and (6) operational effects.

Growth and development is primarily concerned with the accessibility and the employment, income, and economies of scale that result from highway projects. Most of these benefits are direct benefits to the users of the system. The employment and income effects are both direct and indirect. Increases during the construction period are direct economic benefits, whereas, the multiplier effect that is felt by other nonusers of the system and over a longer period of time is considered an indirect effect.

Property values are composed of both land values and improvements. The change in the value of the land results from the improved accessibility and opportunity for using the land in a more productive way than it was in the past. Improvements do not change in value as a result of a highway, but the types of improvements appropriate for the land may change as the land is put to a better use. For example, two service stations that cost the same to build may not be priced the same. The difference in price would be attributed to the locational value of the lots or the land upon which these identical improvements were built. Furthermore, the value of the improvements would be affected only if the highway improvement created a situation where the value of the land had increased sufficiently that a service station was not the highest and best use for this property but some other type of business.

An indirect benefit to communities whose land values have been increased as a result of a highway improvement is the resulting increase in the value of the tax base, and the subsequent increase in the amount of tax revenue. Tax revenues will increase even if the assessment mill rate remains unchanged because of the higher property valuation of the land and the increase in improvements that are made to the land.

The benefits that result from improved health and safety, resource allocation, and from improved efficiency in providing public and private services are somewhat similar in nature. They are not explicitly measured in this report but mentioned here to acknowledge that there are benefits in these general areas that result from highway improvements. Presumably, the greatest of these benefits would be benefits resulting from the decrease in injury accidents and fatalities. These benefits are some of the most obvious and lasting. Safety savings include not only the immediate out-of-pocket costs for repairs and medical bills, but also the lost productivity cost of disabilities, long convalescent periods, and the inconveniences and sorrows that can last a life time. Other health benefits are those that result from improved delivery of health care services and improved access by fire and emergency services. These benefits are closely related to those benefits that result from increased public and private services such as, postal, public transit, education, disaster relief, and civil defense.

Resource substitution deals with the benefits to society that result from using materials in the construction of highways that otherwise would not be used, such as mining and demolition solid wastes. The operational effects of highway improvements include reduced congestion, effects on local street maintenance and repair, bypass and relocation

effects, and energy savings. Bypasses are those relatively short segments of new highway that reroute through traffic around a downtown area but leave the intercity route unchanged. There are two main effects that result from the construction of a bypass: (1) reduced congestion on local streets, and (2) the effects on the local businesses. The reduced congestion on local street is a long-run and indirect effect from the construction of a bypass. Less congestion results in an increase in convenience for the local patrons. There is less noise and pollution, more parking, shorter waits for service, fewer accidents, safer pedestrian conditions, and reduced risk of major dangers from hazardous materials traveling through the downtown area. Also, reduced traffic downtown usually results in a decrease in the local highway maintenance costs.

The effects felt by the local businesses are brought about by changes in accessibility when a bypass is constructed and diverts traffic away from the downtown area. These effects are not felt equally by the various establishments in the business community. Those businesses that cater to the transient motorist will be adversely affected, while those who cater to the local clientele will not be as adversely affected and may be benefit. Bypasses like any large development or capital improvement will affect some in a positive manner and others in a negative manner but ultimately are constructed because they provide net benefits to society as a whole.

Guidelines for Assessing Economic Impacts

In assessing the above mentioned impacts of highway improvements there are several important guidelines to follow:

1. *Consider all of the relevant highway and area characteristics in assessing the*

economic impacts. The design, location, capacity, and number of interchanges are important to know. The following area characteristics also need to be considered: population density, level of income, type of abutting and nearby land use, land use controls, adequacy of area's streets and roads and how they interact with the planned highway improvement, and distance to the central business district of a large city.

2. *Determine which of the above characteristics are significant variables in measuring economic impacts.* Some research studies have been conducted to sort out the most important variables to consider in trying to assess economic impacts that might be caused by a new highway improvement. All of the above mentioned characteristics have been found to be important to consider in estimating economic impacts.

3. *Consider the techniques available for estimating economic impacts.* Researchers have developed various techniques and models to measure and/or estimate the economic impacts of highway improvements. They have done land use, land value, user cost/benefit, and highway expenditure impact modeling. The majority of the economic impact type of measurement techniques utilize what is called the "before - after" approach. In this approach, economic data from a time period prior to the highway improvement are compared with similar data collected after the completion of the improvement to determine the amount of impact. The before and after approach used to measure land use and land value impacts is costly and time consuming. Consequently, it is not very practical for highway planners to conduct such studies, but they can apply the findings of these studies to comparable proposed highway improvements and estimate the impacts. The Texas Transportation Institute

(TTI) researchers are using the findings of previous before - after studies to estimate the economic impacts of the proposed improvements being evaluated here.

4. *Collect sufficient data on the characteristics of the proposed highway improvement to use in selecting the most comparable findings of prior studies to estimate economic impacts.* At a minimum, data from previous studies must be comparable in the following ways:

* type of highway improvement (design and route location),
* dominant abutting land use, and
* stage of land development in area (percent developed).

When ideally comparable case study findings can not be found, the highway planner may need to use judgement in adjusting the impact estimates of the proposed improvement that may be indicated by the findings of available studies.

5. *Adjust the findings of previous case studies to fit the proposed improvement area and route characteristics.* The approach used by real estate appraisers is a good approach to apply. They adjust their "comparable" sales data to the subject property. They adjust for differences in the location and property characteristics before arriving at a final estimate of value.

Problem Statement and Background

The State Department of Highways and Public Transportation's (SDHPT) District 2 personnel are in the process of evaluating the proposed improvement of State Highway 199 which is located in northwestern Tarrant County. This highway passes through four small "satellite" cities (Lakeside, Lake Worth, Sansom Park and River Oaks) as it leads into

Fort Worth and terminates at Interstate Highway 30 near downtown Fort Worth. Presently, the highway is a four-lane facility with undivided and divided at-grade sections that have no restrictions on access. The proposed facility is to be a full limited access freeway with or without service roads. Three alternate routes are being studied, and all three will affect the four satellite cities, Fort Worth and the rural part of Tarrant County, shown in Figure 1. The route alternatives are as follows: (1) the *Central Route* - follows the existing route which contains considerable strip commercial development sprinkled with random vacant land and would require the acquisition of additional land located primarily on one side of the existing right of way; (2) the *North Route* - would bypass Lake Worth and Sansom Park almost completely and pass through undeveloped land and several residential neighborhoods; and (3) the *South Route* - would bypass most of Lake Worth and would pass through a large portion of vacant land area as well as several residential neighborhoods. Most of the northern route and nearly half of the southern route would pass through the city of Fort Worth. Figure 1 shows the bounds of the study which are, from F.M. 1886 to the west to U.S. Highway 183 to the east. These are also the limits of the three route alternatives for comparative purposes.

The above route and design alternatives may affect existing route businesses and residences in varying amounts depending upon the alternative chosen. Displacement, relocation and loss of business clientele are the major concerns addressed. Also, the route and design alternatives may produce the potential for differing amounts of new residential, commercial and industrial development. Road user costs will vary according the route chosen. Construction, moving and relocation expenditures will impact the local area in

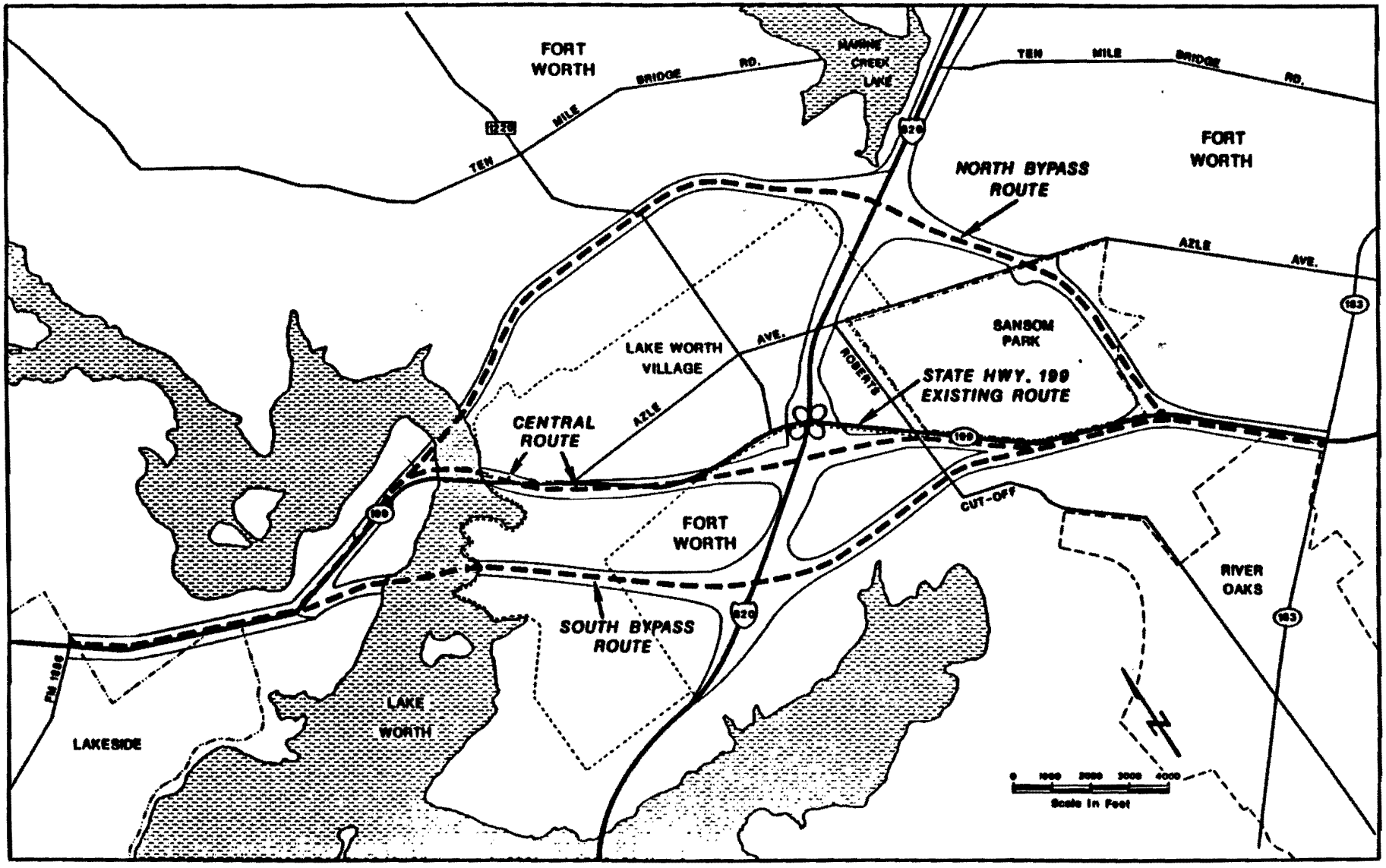


Figure 1. Map of Northwestern Tarrant County Texas, Showing Three Alternative Improvement Routes for State Highway 199, Between FM 1886 and State Highway 183.

varying amounts, depending upon the alternative chosen. Last, the municipal tax revenues will be affected differentially, depending on the route chosen to construct.

Each of the above route and design alternatives are evaluated to estimate the possible short-term and long-term economic impacts resulting from implementing each alternative. The results are needed as supporting information in the environmental impact statement (EIS) for State Highway 199.

Study Objective

The study objective is to estimate the economic impacts of the proposed route and/or design alternatives for State Highway 199. The following impacts are to be estimated:

1. Impact on existing businesses, distinguishing between traffic-serving and other types of businesses,
2. Impact on new development,
3. Impact on employment, including that due to construction expenditures and loss of clientele,
4. Impact on municipal tax revenues, and
5. Impact on highway users.

Data Sources and General Methodology

The primary data source are what is reported in the literature, supplemented by general observations of several areas impacted by highway improvements made in the Fort Worth/Dallas area about 15 years ago. Data already collected by the SDHPT's District 2 personnel, and the Texas Transportation Institute's (TTI) Arlington based personnel, are used as part of the data base for the study. Limited data were collected from other sources,

such as the U.S. Bureau of Census, Texas Almanac, chambers of commerce and city offices.

Before doing the literature search and review, "key" descriptive data were collected on the study area. The study area includes the existing and proposed routes and the affected cities. (The cities of Sansom Park Village and Lake Worth and part of Fort Worth). The descriptive data includes the design of existing and proposed routes, average daily traffic (ADT) of existing and proposed routes, number and types of existing route businesses, dominant abutting land use along exiting and proposed routes, distance to Fort Worth's central business district (CBD) and current populations of the three cities.

The above descriptive data was used in the literature search and review to select comparable case studies for use in estimating the various impacts described in this study. It was originally desired that enough comparable case studies could be found to reflect the varying lengths of time lapse between the date of construction and the date of study in order that short-term and long-term estimates could be made more directly. Unfortunately, this proved to be an unrealistic prospect. Also, minor updates were performed on the case study data to help make more accurate long-term impact projections.

Percentage changes in the number of businesses, amount of gross sales, property uses and values, etc. compiled from the comparable literature were used to estimate the various impacts. In the case of business impacts, separate estimates are made to indicate the impact on traffic-serving businesses and other nontraffic-serving retail/service businesses and also on business relocation.

The literature also contains general studies that estimate the relationship between highway construction expenditures and employment. Findings from the general studies

supplement further support the case study findings. Separate estimates are made to indicate the employment impact resulting from highway construction expenditures, replacement building expenditures and loss or gain of existing businesses' clientele.

The business and property impact estimates are used as the basis for estimating the impact on municipal tax revenues. The current tax rates are applied directly to these estimates. Separate estimates are made for each of the three alternative routes and for the five municipalities involved in the study area.

The traffic data obtained from the SDHPT's District personnel and TTI's Arlington personnel were used as input data to the Texas Ranking of Interchange Projects (TRIP) computer program to estimate the highway user costs projections of each alternative route. Then, the differentials between the alternatives were used to estimate the user cost impact of choosing one route over another. Also, the user cost impact of choosing the no-build option is calculated. More specific details of the data base and estimating methodology are presented in the respective impact sections.

STUDY HIGHWAY

Existing Route Characteristics

As described above, the existing route of S. H. 199 between F.M. 1886 and S.H. 183 has two mainlanes in each direction with divided and undivided sections on either side of Lake Worth bridge. Actually, the mainlanes are divided by a ditch on the west side of the bridge, and divided by a raised median in some sections on the east side of the bridge. Also, the existing route has frontage roads only on the west side of the bridge. The existing route presently carries about 40,000 vehicles per day and is projected to carry about 90,000 vehicles per day in 2012. Table 1 shows these and other characteristics of the existing route that were used in the literature review in selecting comparable study data.

Proposed Route Characteristics

There are three proposed route alternates being considered for improving the study section between F.M. 1886 and S.H. 183. One is called the "Central Route", and closely follows either side of the existing highway most of way between F.M. 1886 and S.H. 183. This proposed route would also have two main roadways of three or four lanes in each direction, and continuous two-lane frontage roads in each direction between the terminuses. Access to the mainlane would be limited to "on" ramps near interchanges. As shown in Table 1, the central route would be only slightly longer than the existing route and is expected to carry about 70,000 vehicles per day by 2012. These and other characteristics of this route are show in Table 1. Another proposed route alternative is called the "North Route" and would bypass a great portion of the existing route of S.H. 199. Like the central route, this route would have two main roadways in each direction with access limited to "on"

Table 1. Characteristics of State Highway 199 Proposed Route Alternatives.

CHARACTERISTIC	QUANTITY/DESCRIPTION BY ROUTE[1]			
	EXISTING	CENTRAL	NORTH	SOUTH
Main lanes	4	8	8	8
Divided/undivided	div & und	divided	divided	divided
Frontage roads (lanes)	part-2	2	2	2
Access (direct/limited)	mixed	limited	limited	limited
Length in miles	6.31	6.21	7.11	6.00
Greatest distance from existing route	N/A	0.20	1.30	0.80
Distance to Fort Worth CBD	7.14	7.13	7.85	6.53
Current ADT (1992)	34,035	N/A	N/A	N/A
Projected ADT (2012)	54,692	70,028	70,594	71,278
Dominant abutting land use	Comm	comm	vacant	vacant
Business displacements[2]	N/A	145	55	89
Residential displacements[3]	N/A	143	98	282

[1]Based on data furnished by the District 2 personnel and TTI personnel in the Arlington Office or from observation and city map calculations done by TTI research staff.

[2]Displacements which take the main building and/or whole property, thus requiring the business to relocate on another property or further back on the same property.

[3]Displacements which would move residents living in single family dwellings, apartment houses and trailer houses.

ramps at interchanges. However, unlike the central route, the north route would not have continuous frontage roads. On the bypass portion, it has frontage roads only between the intersections of I.H. 820 and S.H. 199, near the east end of the study section. Therefore, the abutting land along the remaining bypass portion would not have direct access to a frontage road. Also, this route is considerably longer than the existing or central route alternatives. The bypass portion is also expected to carry about 70,000 vehicles per day by 2012. These and other characteristics of this proposed route are shown in Table 1.

The last route alternative being considered is called the "South Route" (Alternative 3). This route also has two main roadways with access limited to "on" ramps at intersections. Unlike the proposed north route, the south route would have continuous service roads along nearly all of the portion that bypasses the existing S.H. 199. Therefore, most of the abutting land would have direct access to a frontage road. Table 1 shows these and other characteristics of this alternative route.

STUDY CITIES

Existing Characteristics

As mentioned in the introductory section, the proposed route improvements of S.H. 199 would affect five different cities besides an unincorporated part of Tarrant County. As shown in Table 2, the populations of these cities vary widely, with Lakeside having a population of only 809 in 1990, and Fort Worth having a 1990 population of 443,000. Likewise, Table 3 show that the number of utility connections for these cities varies widely. The four smaller cities are heavily built up with residential subdivisions and hence are considered "bedroom" towns on the fringe of Fort Worth. Also, Table 4 shows that the number of businesses located in these cities and the amount of gross dollar sales generated therefrom vary widely among these cities. And finally, Table 5 shows that the total appraised value of real property for tax purposes varies widely among these cities as well.

The above differences coupled with the location of the proposed routes would be expected to lead to significant differences in various types of impacts among affected cities. Therefore, the data base used in study was designed so that the impacts of each city could be determined. These differences in impact are documented in the next section of the report.

Historical and Projected Growth

According to Tables 2 and 4, all of the affected cities, except Fort Worth, have experienced uneven and slow growth in population and gross sales over the pass few years or decade. Sansom Park and River Oaks have actually experienced a decline in population. Also, Lakeside, Sansom Park and River Oaks have experienced a decline in gross sales

Table 2. Population of Cities Affected by the State Highway 199 Route Alternatives, 1960-1990.

CITY	POPULATION[1]			
	1960	1970	1980	1990[2]
Lakeside	651	988	957	809
Lake Worth	3,833	4,958	4,394	4,560
Sansom Park	4,175	4,771	3,921	3,992
River Oaks	8,444	8,193	6,890	6,550
Fort Worth	356,268	393,476	385,164	443,102

[1]From U.S. Bureau of Census reports.

[2]Tentative numbers released by U.S. Bureau of Census to city government officials.

Table 3. Utility Connections in Cities Affected by the State Highway 199 Routes,1989/90.[1]

CITY	NUMBER
Lakeside	
Residential	333
Commercial/Industrial	6
Lake Worth	
Residential	1,716
Commercial/Industrial	214
Sansom Park	
Residential	1,190
Commercia/Industrial	246
River Oaks	
Residential	2,840
Commercial/Industrial	173
Fort Worth	
Residential,1989	122,314
Commercial/Industrial	9,505

[1]Obtained from government officials of each city.

Table 4. Gross Sales of Retail, Service, Wholesale and Manufacturing Businesses in Cities Affected by the State Highway 199 Route Alternatives, 1985-1989.

CITY	GROSS SALES ($000)[1]				
	1985	1986	1987	1988	1989
Lakeside	3,149 (16)	3,130 (16)	2,942 (17)	2,806 (16)	2,963 (13)
Lake Worth	79,791 (158)	81,605 (159)	98,220 (169)	106,191 (175)	106,831 (158)
Sansom Park	31,359 (74)	42,933 (69)	43,023 (63)	19,138 (64)	21,506 (58)
River Oaks	32,261 (110)	31,163 (104)	29,369 (109)	30,706 (110)	30,233 (108)
Fort Worth	13,462,202 (9,381)	12,853,775 (9,452)	12,585,375 (9,863)	13,268,657 (10,398)	14,328,942 (9,614)

[1]From State Comptroller's Office. The number of reporting firms is in parentheses.

Table 5. Total Appraised Value of Real Property for Tax purposed in the Cities Affected by State Highway 199 Proposed Route Alternatives, 1990.[1]

CITY	NUMBER OF DOLLARS
Lakeside	3,572,274
Lake Worth	147,956,635
Sansom Park	55,975,869
River Oaks	122,000,000
Fort Worth	14,797,689,477

[1]Obtained from government officials in each city.

during the last five years. However, as shown in Table 6, four of the five cities are forecasted to grow in population and employment over the next 20 years. If one of the proposed alternative routes is constructed during this decade, these forecasts may be too low or too high for the four small cities affected.

Table 6. Population and Employment Forecasts for Cities Affected by the State Highway 199 Route Alternatives, 1986-2010.

CITY	NUMBER[1]			
	1986	1990	2000	2010
Lake Worth				
Population	4,330	4,890	5,200	5,660
Employment	1,460	1,640	2,560	3,070
Sansom Park				
Population	3,690	4,020	3,960	4,040
Employment	740	750	800	900
River Oaks				
Population	6,800	6,740	6,620	6,680
Employment	1,210	1,260	1,320	1,340
Fort Worth				
Population	445,800	477,110	526,580	563,090
Employment	309,220	332,840	400,250	477,580

[1]From North Central Texas Council of Governments' Regional Data Center, February 1989.

IMPACT ON BUSINESS ACTIVITY

Estimating Methodology

A review of the existing literature was conducted to help compile a range of impacts that have been experienced by the business communities in various Texas cities where highway improvements have been made. Primarily, there were two types of impacts that needed to be identified: (1) those that occurred *during* the construction period itself, and (2) those impacts that occurred *after* construction was completed and the new highway facility was operational. These two impacts, during and after construction, affect businesses differently, depending upon both location and business type classifications. For example, the impact on businesses where highway construction occurs on the highway in front of, or abutting their business, is different from the impact on businesses located such that the improvement occurred on a highway facility affecting only the accessibility of their business to potential customers. These impacts are complicated further depending upon whether the business is classified primarily as traffic serving or classified as another retail or service type of business.

The methodology most often used in the literature to measure these impacts was the before-and-after approach. Briefly, the before-and-after research procedure is to analyze an area under an original set of conditions, construct a highway improvement, and then reanalyze the area to determine the impact of the improvement. In the reviewed studies the before period includes a period two - seven years prior to the highways construction, and the after period includes a two - seven year period after construction is completed. In order to minimize the effect of factors external to the highway construction, a control area is often

used to measure the general economic effects that are occurring independent of the construction project. An effort was made to concentrate on those studies in the literature that were fortunate enough to have benefit of control in their research.

Table 7 is a summary of percentage impacts on gross sales that resulted from upgrading an existing highway system, as reported in the literature. The "during construction" column represents the percentage change in gross business sales that was determined to have occurred while the abutting highway facility was under construction. The "before vs after" column represents the impact that occurred after the construction was completed. In both cases mean and range values are reported. By viewing these columns, it should be clear there is considerable variation in the range of impacts, among comparable studies. Thus, it was not obvious what values of change are appropriate to apply to the business sales volume in this research study. Because these studies considered were not all closely comparable, it was concluded that the comparative weighted mean value was an appropriate measure to use in the calculation of estimated gross sales change in this report. The comparative weighted mean is based on a scaled judgement of the characteristics of the types of businesses involved on each route, and its comparability to the cases cited in each of the reports in the literature.

Likewise, Table 8 is a summary of the abutting business gross sales percentage impact resulting from bypassing an existing highway with a limited access freeway as reported in the literature and weighted as described above. There is a large body of published literature about the effect of bypasses on business communities, however the variation in the range of impacts is similarly large for the various studies.

Table 7. Summary of Abutting Business Gross Sales Impact Resulting from Upgrading an Existing Highway System, as Reported in the Literature.

STATUS AND TYPE OF BUSINESS ACTIVITY	PERCENTAGE CHANGE			
	DURING CONSTRUCTION[1]		BEFORE VS AFTER CONSTRUCTION[2]	
	RANGE	WEIGHTED MEAN	RANGE	WEIGHTED MEAN
Remaining Businesses				
Traffic serving	-46 to +15	-11	-26 to +27	-6
Other retail/service	-32 to +10	-5	-39 to +19	-5
Partially Displaced Businesses				
Traffic serving	-43 to +17	-12	-23 to +5	-11
Other retail/service	-35 to +31	-4	-97 to +73	-2
Displaced Businesses				
Traffic serving	N/A	N/A	N/A	N/A
Other retail/service	N/A	N/A	N/A	N/A
Closed Businesses				
Traffic serving	N/A	N/A	-43 to +17	-12
Other retail/service	N/A	N/A	-35 to 31	-4
New Businesses				
Traffic serving	-43 to +17	-12	-23 to +5	-11
Other retail/service	-35 to +31	-4	-97 to+73	-2

[1]Based on the following literature references: 12,17,18,19

[2]Based on the following literature references: 12,17,18,19

Table 8. Summary of Abutting Business Gross Sales Impact Resulting from Bypassing an Existing Highway With a Limited Access Freeway, as Reported in the Literature.

STATUS AND TYPE OF BUSINESS ACTIVITY	PERCENTAGE CHANGE			
	DURING CONSTRUCTION[1]		BEFORE VS AFTER CONSTRUCTION[2]	
	RANGE	WEIGHTED MEAN	RANGE	WEIGHTED MEAN
Bypassed Businesses				
Traffic serving	N/A	N/A	-65 to +39	-11
Other retail/service	N/A	N/A	-15 to +55	+10
Remaining Businesses				
Traffic serving	-46 to +15	-11	-13 to +49	+9
Other retail/service	-32 to +10	-5	-13 to +49	+9
Partially Displaced Businesses				
Traffic serving	-43 to +17	-12	-23 to +5	-11
Other retail/service	-35 to +31	-4	-97 to +73	-2
Displaced Businesses				
Traffic serving	N/A	N/A	N/A	N/A
Other retail/service	N/A	N/A	N/A	N/A
Closed Businesses				
Traffic serving	N/A	N/A	-13 to +49	+9
Other retail/service	N/A	N/A	-13 to +49	+9
New Businesses				
Traffic serving	N/A	N/A	-13 to +49	+9
Other retail/service	N/A	N/A	-13 to +49	+9

[1]Based on the following literature references: 12,17,18,19

[2]Based on the following literature references: 1,2,3,7,8,9,10,11,12,14,17,18,19.

An important component of the business analysis was to determine the number of businesses that would close and the number of new business ventures that would open. Moreover, the number of businesses that would be displaced, either partially or totally needed to be estimated. Table 9 is a summary of business status changes compiled from reviewing both FHWA and TTI published reports. The results from the research projects summarized in this table indicated a need to estimate the number of closing and opening businesses in this report for each site alternative. The more detailed TTI studies were used in preparing Table 10. This table was used to estimate the number of businesses that would close, and the number of new businesses that would open.

There was no clear procedure addressed in the literature with regard to determining how many of the opening businesses were new construction as opposed to existing businesses that were closed but began operating after the commencement of the study period. For this reason, it was assumed in this report that existing businesses that were closed remained closed throughout the study period. The only exception is for those businesses that were vacant or closed at the commencement of the study that would be totally displaced during the construction period. For obvious reasons, these closed business were subtracted from the *after* closed business totals. Therefore, those that were opening were truly new business constructions and not merely existing closed business that began operations or existing businesses that changed ownership.

As mentioned in the introductory section, these findings from the literature review would be relied on heavily in estimating the business impact of the proposed route alternates. Also as previously stated, the data from SDHPT, the State Comptroller's Office,

Table 9. Comparative Analysis of Change in Status of Previously Studied Businesses During Study Period for Combined Old and New Routes.

STATUS OF BUSINESS	PERCENT OF BEFORE CONSTRUCTION BUSINESSES	
	TTI[1]	FHWA
Remaining Businesses	85	79
Closing Businesses	15	21
Opening Businesses	35	63

[1]Based on following 8 Texas Transportation Institute (TTI) studies: 4,5,7,8,9,10,14 and 15.

Table 10. Comparative Analysis of Change in Status of Businesses Previously Studies by Route Location.[1]

TYPE AND STATUS OF BUSINESS	PERCENT OF BEFORE CONSTRUCTION BUSINESSES	
	RANGE	WEIGHTED MEAN
OLD ROUTE BUSINESSES		
Traffic Serving Businesses		
Remaining businesses	64-100	82
Closing businesses	0-36	18
Opening businesses	3-33	17
Nontraffic Serving Businesses		
Remaining businesses	75-100	87
Closing businesses	0-25	13
Opening businesses	0-86	34
NEW ROUTE BUSINESSES		
Traffic Serving Businesses		
Remaining businesses	0-3	.4
Closing businesses	0-3	.4
Opening businesses	0-27	11
Nontraffic Serving Businesses		
Remaining businesses	0-8	1
Closing businesses	0-8	1
Opening businesses	0-17	6
COMBINED ROUTE BUSINESSES		
Traffic Serving Businesses		
Remaining businesses	64-100	82
Closing businesses	0-36	18
Opening businesses	7-60	29
Nontraffic Serving Businesses		
Remaining businesses	75-100	88
Closed businesses	0-25	12
Opening businesses	0-88	40

[1]Based on following Texas Transportation Institute studies: 4,5,7,8,9,10,14 and 15.

and to a limited extent, U.S. Bureau of Census reports would be used to estimate the 1989 gross sales of existing businesses affected by the proposed route alternates. Accordingly, the estimating methodology contains several steps in estimating business gross sales impact as follows:

Step 1. The first step in estimating the impacts on gross business sales of constructing a new highway was to classify the businesses in the study according to business type. Business type refers to whether they were primarily traffic serving or primarily nontraffic serving retail and/or service oriented businesses. A business classification as either traffic serving or nontraffic serving was independent of the three proposed routes. The number of businesses located along S.H. 199 and/or in the right of way of the three proposed route alternates in each of the affected cities and county involved is classified according to SIC code. SDHPT District 2 personnel were very helpful in furnishing data for this step.

Step 2. The second step was to classify each business according to its location and to determine its comparability to the case studies in the literature. This was done for each of the three proposed routes. For instance, the status of each business is determined according to which route alternate is constructed. Some of the businesses would be bypassed completely if either the north or south route alternate was implemented. Others would remain abutting the new freeway. Still others would be displaced or partially displaced. Finally, others would still be closed. The list of businesses, aerial maps and proposed route design schematics furnished by the District 2 personnel was needed to complete this step.

Step 3. The third step was to estimate the average gross sales per business for all businesses of each SIC code for each of the cities involved. This was done by using 1989 gross sales data obtained from the State Comptroller' Office.

Step 4. In this step, the number of businesses by type and status for each city, as determined in Steps 1 and 2, is multiplied by the average gross sales per business of the corresponding type, as determined in Step 3, to generate the total gross sales of all businesses of that type and status.

Step 5. The next step was to adjust the gross sales amounts and number of businesses to account for closing businesses and for new opening businesses, as well as for those businesses either totally or partially displaced. The data summarized in Tables 9 and 10 were used to estimate these effects. The number of new businesses generated were allocated within each city according to existing sales volume and adjusted according to the lengths of the old and new highway segments in the specific cities.

Step 6. As the last step, the appropriate percentage change amounts from Tables 7 and 8 were then applied to these gross sales figures calculated in Steps 4 and 5. The result of these calculations was the estimated percentage changes and estimated actual amounts that would occur both during and after construction. This step was repeated for each business classification, each location, and each status classification. This was also completed for each route within each city.

Impact on Gross Sales of Retail and Service Businesses

The retail and service gross sales impacts are divided into two parts, namely, route

impacts and city impacts. The results of these two impacts are presented in the two subsections below.

Route Impact

The estimated route impacts are shown in Tables 11, 12, 13, 14, 15, and 16. All of these tables show the estimated total gross sales *before* construction of any proposed route alternative by the status and type of business in column 1. In these tables the "displaced businesses" category refers to those businesses which would have enough land and buildings taken for right of way, to completely remove them from their present location. If they have enough remaining abutting land, they could build a new building and begin operating again at the same address. It should be noted that in the business analysis and tax revenue analysis sections of this report, the displaced business category includes only those businesses that were open and operating at the beginning of the study. The number of displaced businesses, as reported in the parenthesis in the various tables, does not include those business facilities that were closed and not in operation when the study commenced, but were physically displaced as a result of the highway construction. The "partially displaced businesses" are those businesses which would have some property taken for right of way. It could be land only or land and buildings. Some of these businesses could continue to operate without moving back at the same location or moving to a new location. These and the other categories in the tables are more fully defined in the Definition of Terms section of this report.

Tables 11, 13, and 15 also show the estimated *during* construction gross sales in column 2, the actual or absolute amount of change *during* construction in column 3, and the

percentage change *during* construction in column 4. Table 11 reports this information for the central route. Table 13 reports this information for the north route. And, Table 15 reports this information for the south route. For instance, Table 11 summarizes the abutting business gross sales impact during construction on the central route by business type; Table 13 summarizes the abutting business gross sales impact during construction on the north route; and, Table 15 summarizes the abutting business gross sales impact during construction on the south route.

Tables 12, 14, and 16 show the estimated *after* construction gross sales in column 2, the actual or absolute amount of change *after* construction in column 3, and the percentage change *after* construction in column 4. Table 12 summarizes this information for the central route. Table 14 shows this information for the north route. And finally, Table 16 shows this information for the south route. Again, for illustration, Table 12 summarizes the abutting business gross sales impact after construction on the central route by business type; Table 14 summarizes the abutting business gross sales impact after construction on the north route; and, Table 16 summarizes the abutting business gross sales impact after construction on the south route. Tables 17 and 18 show the combined totals by type of business for each route alternative. Table 17 shows the before versus during construction estimated gross sales, and Table 18 shows the before versus after construction estimated gross sales. These two tables summarize the "All Business" totals at the bottom of Tables 11, 12, 13, 14, 15, and 16.

A review of these tables indicates that the before construction gross sales estimates for each route are about the same since nearly all of route businesses are affected by all

Table 11. Estimated Abutting Business Gross Sales Impact During Construction of a Limited Access Freeway Central Route Along State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Remaining Businesses				
Traffic serving	19,598(36)	15,641(33)	-3,957	-20
Other retail/service	91,405(143)	81,254(134)	-10,151	-11
Partially Displaced Businesses				
Traffic serving	7,281(10)	5,752(9)	-1,529	-21
Other retail/service	7,749(15)	6,974(14)	-775	-10
Displaced Businesses				
Traffic serving	11,581(16)	0(0)	-11,581	-100
Other retail/service	46,355(79)	0(0)	-46,355	-100
Closed Businesses				
Traffic serving	0(14)	0(12)		
Other retail/service	0(57)	0(24)		
New Businesses				
Traffic serving	0(0)	6,391(10)	+6,391	
Other retail/service	0(0)	28,806(47)	+28,806	
All Businesses				
Traffic serving	38,460(76)	27,784(64)	-10,676	-27
Other retail/service	145,479(204)	117,028(220)	-28,451	-20
Total	183,939(370)	144,812(284)	-39,127	-21

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7, 8, and 10.

Table 12. Estimated Abutting Business Gross Sales Impact After Construction of a Limited Access Freeway Central Route Along State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Remaining Businesses				
Traffic serving	19,598(36)	14,796(30)	-4,807	-24
Other retail/service	91,405(143)	74,206(126)	-17,199	-19
Partially Displaced Businesses				
Traffic serving	7,281(10)	5,170(8)	-2,111	-29
Other retail/service	7,749(15)	6,664(13)	-1,085	-14
Displaced Businesses				
Traffic serving	11,581(16)	00(0)	-11,581	-100
Other retail/service	46,355(79)	00(0)	-46,355	-100
Closed Businesses				
Traffic serving	0(14)	0(16)		
Other retail/service	0(57)	0(34)		
New Businesses				
Traffic serving	0(0)	11,583(18)	+11,583	
Other retail/service	0(0)	57,611(95)	+57,611	
All Businesses				
Traffic serving	38,460(76)	31,498(72)	-6,962	-18
Other retail/service	145,479(294)	138,469(268)	-7,010	-4
Total	183,939(370)	169,967(340)	-13,972	-7

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7, 8, and 10.

Table 13. Estimated Abutting Business Gross Sales Impact During Construction of a Limited Access Freeway Bypass North of State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	28,698(44)	26,013(40)	-2,685	-9
Other retail/service	101,345(170)	95,264(160)	-6,081	-6
Remaining Businesses				
Traffic serving	2,828(5)	2,262(5)	-566	-20
Other retail/service	19,780(27)	17,604(25)	-2,176	-11
Partially Displaced Businesses				
Traffic serving	3,394(4)	2,681(4)	-713	-21
Other retail/service	7,553(11)	6,798(10)	-755	-10
Displaced Businesses				
Traffic serving	4,427(13)	00(0)	-4,427	-100
Other retail/service	19,168(29)	00(0)	-19,168	-100
Closed Businesses				
Traffic serving	00(11)	00(14)		
Other retail/service	00(56)	00(58)		
New Businesses				
Traffic serving	00(0)	5,013(6)	+5,013	
Other retail/service	00(0)	31,048(40)	+31,048	
All Businesses				
Traffic serving	39,347(77)	36,072(68)	-3,275	-8
Other retail/service	147,846(293)	150,714(294)	+2,676	+2
Total	187,193(370)	186,786(362)	-407	0

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 8 and 10.

Table 14. Estimated Abutting Business Gross Sales Impact After Construction of a Limited Access Freeway Bypass North of State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	28,698(44)	17,301(36)	-11,397	-39
Other retail/service	101,345(170)	99,959(148)	-3,092	-3
Remaining Businesses				
Traffic serving	2,828(5)	2,573(4)	-255	-9
Other retail/service	19,780(27)	18,989(23)	-791	-4
Partially Displaced Businesses				
Traffic serving	3,394(4)	2,070(3)	-1,324	-39
Other retail/service	7,553(11)	6,420(10)	-1,133	-15
Displaced Businesses				
Traffic serving	4,427(13)	00(0)	-4,427	-100
Other retail/service	19,168(29)	00(0)	-19,168	-100
Closed Businesses				
Traffic serving	00(11)	00(19)		
Other retail/service	00(56)	00(73)		
New Businesses				
Traffic serving	00(0)	10,025(11)	+10,025	
Other retail/service	00(0)	63,574(80)	+63,574	
All Businesses				
Traffic serving	39,347(77)	32,175(73)	-7,172	-18
Other retail/service	147,846(293)	188,942(334)	+39,301	+27
	187,193(370)	219,462(407)	+32,269	+17

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2] Based on appropriate mean percentage impact shown in Tables 8, and 10.

Table 15. Estimated Abutting Business Gross Sales Impact During Construction of a Limited Access Freeway Bypass South of State Highway 199 in Study Area by Status and Type of Business.

STATUS AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	30,220(45)	28,090(41)	-2,919	-9
Other retail/service	93,748(146)	86,148(137)	-7,600	-8
Remaining Businesses				
Traffic serving	4,213(9)	3,370(8)	-843	-20
Other retail/service	31,312(52)	27,868(49)	-3,444	-11
Partially Displaced Businesses				
Traffic serving	0(0)	0(0)		0
Other retail/service	982(2)	884(2)	-98	-10
Displaced Businesses				
Traffic serving	4,824(8)	00(0)	-4,824	-100
Other retail/service	23,599(42)	00(0)	-23,599	-100
Closed Businesses				
Traffic serving	00(15)	00(14)		
Other retail/service	00(55)	00(34)		
New Businesses				
Traffic serving	00(0)	5,206(6)	+5,206	
Other retail/service	00(0)	31,005(41)	+31,005	
All Businesses				
Traffic serving	39,257(77)	36,667(69)	-2,590	-7
Other retail/service	149,641(297)	145,904(263)	-3,737	-2
	188,898(374)	182,571(332)	-6,327	-3

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 8, and 10.

Table 16. Estimated Abutting Business Gross Sales Impact After Construction of a Limited Access Freeway Bypass South of State Highway 199 in Study Area by Status and Type of Business.

STATUS AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	30,220(45)	18,714(37)	-12,295	-39
Other retail/service	93,748(146)	89,046(127)	-2,712	-3
Remaining Businesses				
Traffic serving	4,213(9)	3,834(7)	-379	-9
Other retail/service	31,312(52)	30,060(45)	-1,252	-4
Partially Displaced Businesses				
Traffic serving	0(0)	0(0)		0
Other retail/service	982(2)	835(2)	-147	-15
Displaced Businesses				
Traffic serving	4,824(8)	00(0)	-4,824	-100
Other retail/service	23,599(42)	00(0)	-23,599	-100
Closed Businesses				
Traffic serving	00(15)	00(19)		
Other retail/service	00(55)	00(48)		
New Businesses				
Traffic serving	00(0)	10,412(11)	+10,412	
Other retail/service	00(0)	63,490(83)	+63,490	
All Businesses				
Traffic serving	39,257(77)	32,960(74)	-6,297	-16
Other retail/service	149,145(297)	183,389(305)	+33,738	+23
Total	188,898(374)	216,350(378)	+27,451	+15

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 8, and 10.

three routes. Of course, the total gross sales estimates during and after construction are different due to the differential effects brought about by choosing a different route alternative. These differential effects are clearly shown in the summary tables, Tables 17 and 18. Table 17 shows that the proposed central route would be impacted more negatively than the other proposed routes. Traffic serving businesses would be affected more negatively than the nontraffic serving businesses, especially for the central and north routes.

As shown in Table 17, the north route would be expected to experience an 8% decrease in traffic serving retail sales, and a 2% increase in other retail and service sales, combining for an overall route effect of zero change in gross sales during construction. The south and central routes would both have overall negative impacts with the south route impact estimated to be a decrease of 3%, and the central route with an estimated decrease of 21%. These overall results in overall changes are presented graphically in Figure 2.

The after construction total impact as shown in Table 18 is much more positive for all the proposed route alternatives. The central route is expected to show a negative impact of only 7%, compared to the negative 21% decrease during construction just discussed. The north and south routes are expected to experience a positive 17 and 15%, respectively. However, the traffic serving businesses would be expected to experience a negative impact from all three route alternatives. Figure 3 graphically shows these after construction impact changes by route and business type classifications. In summary, the proposed north route would have the greatest positive impact on expected gross sales.

City Impact

The impact on the affected cities by the alternative routes was determined by using

Table 17. Estimated Abutting Business Gross Sales Impact During Construction of Limited Access Freeway for State Highway 199 in Study Area by Location Alternative and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Central Route Businesses				
Traffic serving	38,460(76)	27,784(64)	-10,676	-27
Other retail/service	145,479(294)	117,028(220)	-28,451	-20
Total	183,969(370)	144,818(284)	-39,151	-21
North Route Businesses				
Traffic serving	39,347(77)	36,072(68)	-3,275	-8
Other retail/service	147,846(293)	150,714(294)	+2,868	+2
Total	187,193(370)	186,786(362)	-407	0
South Route Businesses				
Traffic serving	39,257(77)	36,667(69)	-2,590	-7
Other retail/service	149,651(297)	145,904(263)	-3,737	-2
Total	188,898(374)	182,571(332)	-6,327	-3

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7, 8, 10, and 11.

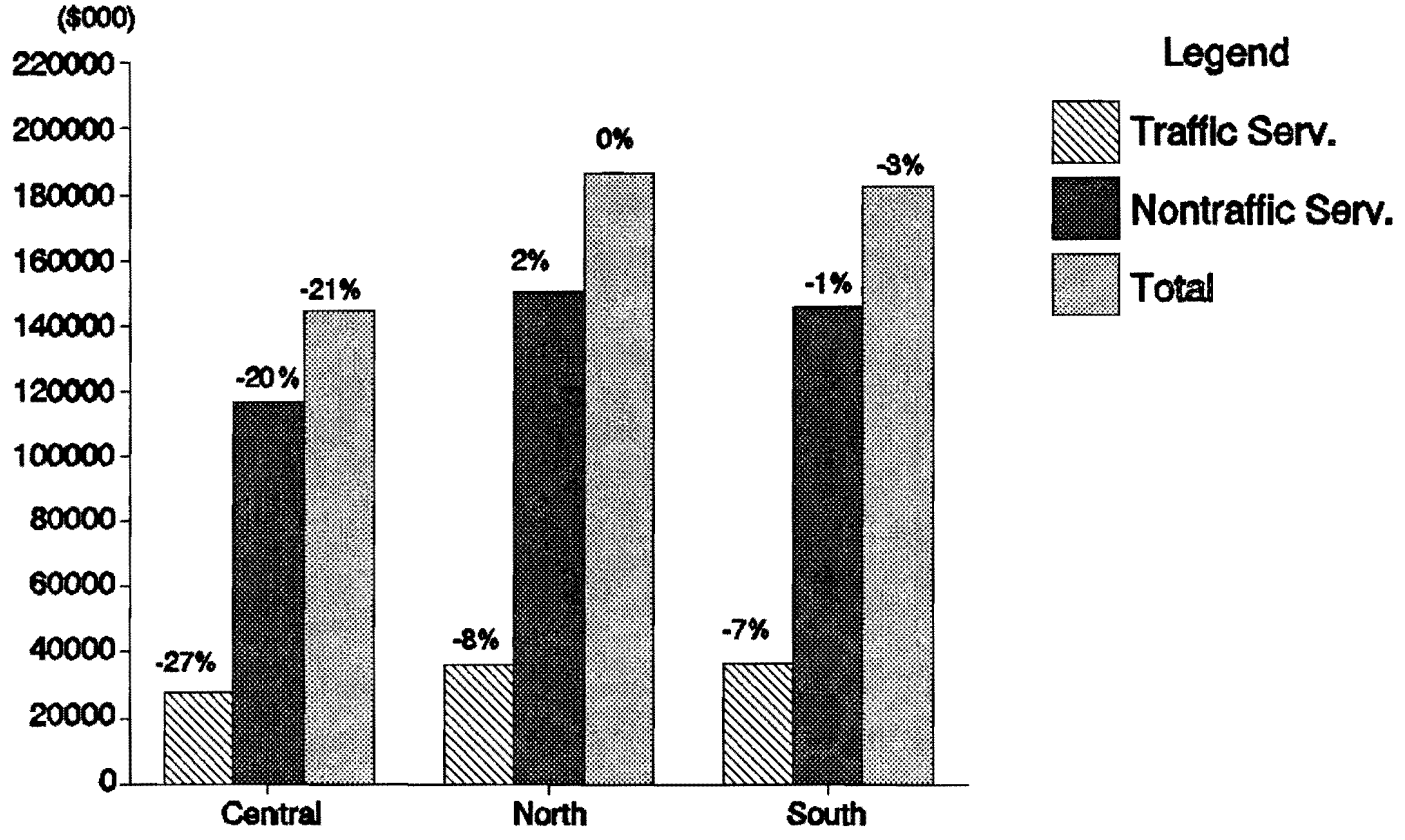
Table 18. Estimated Abutting Business Gross Sales Impact After Construction of a Limited Access Freeway for State Highway 199 by Location Alternative and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Central Route Businesses				
Traffic serving	38,460(76)	31,498(72)	-6,962	-18
Other retail/service	145,479(294)	138,469(268)	7,010	-4
Total	183,969(370)	169,967(340)	-13,972	-7
North Route Businesses				
Traffic serving	39,347(77)	32,175(73)	-7,172	-18
Other retail/service	147,846(293)	187,287(334)	+39,441	+27
Total	187,193(370)	219,462(407)	+32,269	+17
South Route Businesses				
Traffic serving	39,257(77)	39,960(74)	-6,297	-17
Other retail/service	149,651(297)	183,389(305)	+33,738	+23
Total	188,898(374)	216,350(378)	+27,451	+15

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7, 8, 10 and 11.

Figure 2. Estimated Annual Gross Sales (1989) Impact During Construction by Type of Business and Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

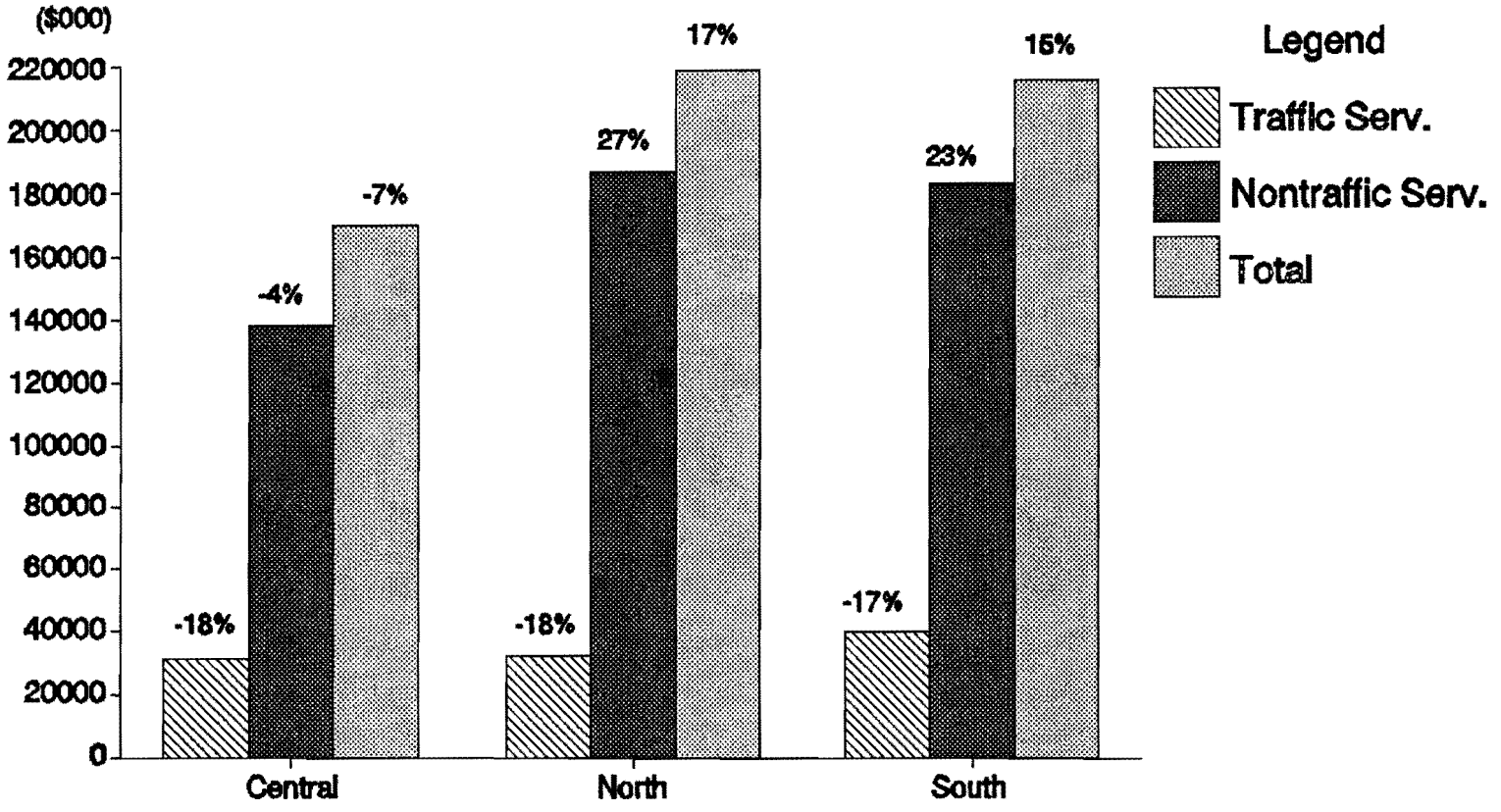
Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

the same data base and estimating procedures used in estimating the route impacts. Initially, the data were set designed to estimate each city's impact separately. The total 1989 gross sales for all retail and service businesses in each city and the rural part of Tarrant County are shown in Table 19. Also shown are 1989 estimated gross sales of the same types of businesses directly affected by all three of the proposed routes combined. In most cases these estimates are much smaller than the corresponding total sales for each city. In the case of Lake Worth, the combined route business estimated gross sales are almost as large as the total sales for the city as a whole. The numbers of businesses also show some inconsistencies. The apparent source of these inconsistencies is in how closed businesses were accounted for by the state Comptroller's office. For the study routes, all business facilities, both open and closed were included in the comprehensiveness of this report.

Tables 20, 21, 22, 23, 24, and 25 show the city and county impact results. Tables 20, 22, and 24 show the during construction gross sales impact estimates, and Tables 21, 23, and 25 show the after construction gross sales impact estimates. As might be expected the during construction estimated impacts are more negative than the after construction estimated impacts with the exception of Lake Worth. The impacts are very uneven among the cities affected by any of the proposed routes. The only exception to this is that the city of Fort Worth has the most positive impact on it, regardless of the route, than any of the other cities. Figures 4 - 9 graphically show the estimated annual gross sales impact after construction, by route, for the six individual cities.

For the north route, the cities are impacted from most positive to most negative in the following order. Fort Worth has the largest positive impact, Sansom Park is second,

Figure 3. Estimated Annual Gross Sales (1989) Impact After Construction by Type of Business and Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

Table 19. Comparison of Total City Versus Study Routes' Gross Sales of Retail and Service Businesses in 1989. [1]

CITY	GROSS SALES($000)	
	TOTAL CITY	STUDY ROUTES[2]
Fort Worth	3,857,265(7,196)	28,471(42)
Tarrant County(Rural)	97,631(1,219)[3]	16,940(44)
Lakeside	2,434(8)	2,226(3)
Lake Worth	104,690(135)	98,956(171)
Sansom Park	N/A[4]	33,123(100)
River Oaks	30,506(101)	4,230(10)
Total	4,092,516(8,659)	183,969(370)

[1]Based on 1989 sales data from the State Comptroller's Office.

[2]Estimates based on average sales per business of same type for all businesses in each city and includes only retail trade and service businesses along all study route alternatives.

[3]Based on 1987 U.S. Censuses of Retail Trade and Service Industries data which are updated to 1989.

[4]An acceptable value of the 1989 gross sales data and corresponding number of businesses for Sansom Park was not available.

Lake Worth is third, Lakeside is fourth, Tarrant County businesses are fifth, and River Oaks suffers the greatest loss in sales. This ordering remains the same both during and after the construction is completed. For the other two routes the ordering is different for both route and time (during and after) effects.

In summary, for the city of Lake Worth both during and after construction the south route alternative is the most desirable and the central route the least desirable. For Sansom Park Village, the north route alternative is the most desirable and the central route alternative the least desirable, both during and after construction. The central route would be the most desirable and the south route the least desirable, both during and after construction, for the businesses in Tarrant County and the businesses in the city of Fort Worth.

The cities of Lakeside and River Oaks are each located on one of the two ends of the proposed construction as can be seen in Figure 1. The construction will be the same in these two communities regardless of the route selected. Consequently, the impacts on these two business communities is essentially the same regardless of the route selected. However, conceptually it is possible for there to be some minor differences between the central route impact and the impact from either of the two bypass routes on these two cities. If the central route is selected, it is reasonable to assume that more new businesses would locate in either of these two cities than if one of the bypass routes is selected. The bypass routes would provide access to a larger area for new businesses to locate relative to the central route. For this reason it is conceptually possible for the central route impact to be less negative on these two cities than either of the bypass route alternatives.

Table 20. Estimated Abutting Business Gross Sales Impact During Construction of State Highway 199 Central Route in Study Area by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	23,312(41)	14,606(34)	-8,706	-37
Other retail/service	75,644(130)	53,640(105)	-22,004	-29
Total	98,956(171)	68,246(139)	-30,710	-31
Sansom Park Businesses				
Traffic serving	7,267(16)	5,828(12)	-1,439	-20
Other retail/service	25,856(84)	22,116(47)	-3,740	-14
Total	33,123(100)	27,945(59)	-5,178	-16
Fort Worth Businesses				
Traffic serving	2,828(7)	4,692(11)	+1,864	+66
Other retail/service	25,643(35)	30,343(46)	+4,700	+18
Total	28,471(42)	35,035(57)	+6,564	+23
River Oaks Businesses				
Traffic serving	1,115(5)	205(2)	-910	-82
Other retail/service	3,115(5)	1,314(2)	-1,873	-60
Total	4,230(10)	1,447(3)	-2,783	-66
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	2,226(3)	1,314(2)	-912	-41
Total	2,226(3)	1,314(2)	-912	-41
County Businesses				
Traffic serving	3,938(7)	2,452(5)	-1,486	-38
Other retail/service	13,002(37)	7,376(35)	-5,626	-43
Total	16,940(44)	9,829(40)	-7,111	-42

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7, 8, 9, and 10.

Table 21. Estimated Abutting Business Gross Sales Impact After Construction of State Highway 199 Central Route in Study Area by City and Type of Business

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	23,312(41)	13,883(43)	-9,429	-40
Other retail/service	75,644(130)	50,564(138)	-25,080	-33
Total	98,956(171)	64,446(181)	-34,510	-35
Sansom Park Businesses				
Traffic serving	7,267(16)	6,492(13)	-775	-11
Other retail/service	25,856(84)	25,932(55)	+76	0
Total	33,123(100)	32,424(68)	-699	-2
Fort Worth Businesses				
Traffic serving	2,828(7)	7,825(16)	+4,997	+177
Other retail/service	25,643(35)	47,493(76)	+21,850	+85
Total	28,471(42)	55,317(92)	+26,846	+94
River Oaks Businesses				
Traffic serving	1,115(5)	409(1)	-706	-63
Other retail/service	3,115(5)	2,543(3)	+572	-18
Total	4,230(10)	2,952(4)	-1,278	-30
Lakeside Businesses				
Traffic serving	00(0)	232(1)	+232	
Other retail/service	2,226(3)	1,682(2)	-544	-24
Total	2,226(3)	1,914(3)	-313	-14
County Businesses				
Traffic serving	3,938(7)	2,940(6)	-998	-25
Other retail/service	13,002(37)	10,886(23)	-2,116	-16
Total	16,940(44)	13,826(30)	-3,114	-18

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables

Table 22. Estimated Abutting Business Gross Sales During Construction of a Limited Access Freeway Bypass North of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	23,312(41)	22,283(42)	-1,029	-4
Other retail/service	76,934(130)	81,120(141)	+4,186	+5
Total	100,246(171)	103,403(184)	+3,157	+3
Sansom Park Businesses				
Traffic serving	7,344(17)	5,634(12)	-1,710	-23
Other retail/service	26,136(82)	29,628(87)	+3,492	+13
Total	33,480(99)	35,262(99)	+1,782	+5
Fort Worth Businesses				
Traffic serving	4,039(7)	5,683(9)	+1,644	+41
Other retail/service	25,643(37)	29,783(45)	+4,140	+16
Total	29,682(44)	35,466(54)	+5,784	+19
River Oaks Businesses				
Traffic serving	1,115(5)	205(1)	-910	-82
Other retail/service	3,115(5)	1,242(2)	-1,873	-60
Total	4,230(10)	1,447(3)	-2,783	-66
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	2,226(3)	1,314(2)	-912	-41
Total	2,226(3)	1,314(2)	-912	-41
County Businesses				
Traffic serving	3,537(7)	2,267(5)	-1,270	-36
Other retail/service	13,792(35)	7,627(17)	-5,702	-45
Total	17,329(43)	9,894(22)	-7,435	-43

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7,8,9 and 10.

Table 23. Estimated Abutting Business Gross Sales After Construction of a Limited Access Freeway Bypass North of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	23,312(41)	16,359(43)	-6,953	-30
Other retail/service	76,934(130)	92,649(153)	+15,715	+20
Total	100,246(171)	109,009(196)	+8,763	+9
Sansom Park Businesses				
Traffic serving	7,344(17)	4,750(13)	-2,594	-35
Other retail/service	26,136(82)	35,854(94)	+9,718	+37
Total	33,480(99)	40,604(106)	+7,124	+21
Fort Worth Businesses				
Traffic serving	4,039(7)	8,239(11)	+4,200	+104
Other retail/service	25,643(37)	43,369(60)	+17,726	+69
Total	29,682(44)	51,608(72)	+21,926	+74
River Oaks Businesses				
Traffic serving	1,115(5)	409(1)	-706	-63
Other retail/service	3,115(5)	2,543(3)	-572	-18
Total	4,230(10)	2,952(3)	-1,278	-30
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	2,226(3)	1,926(2)	-300	-13
Total	2,226(3)	1,926(2)	-300	-13
County Businesses				
Traffic serving	3,537(7)	2,417(5)	-1,120	-32
Other retail/service	13,792(35)	10,946(22)	-2,846	-21
Total	17,329(43)	13,363(27)	-3,966	-23

[1]Based on 1989 data,State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7,8,9, and 10.

Table 24. Estimated Abutting Business Gross Sales During Construction of a Limited Access Freeway Bypass South of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	23,312(41)	22,607(37)	-705	-3
Other retail/service	77,183(132)	81,805(127)	+4,622	+6
Total	100,495(173)	104,412(164)	+3,917	+4
Sansom Park Businesses				
Traffic serving	6,853(17)	5,952(12)	-901	-13
Other retail/service	26,884(85)	26,395(59)	-489	-2
Total	33,737(102)	32,347(71)	-1,390	-4
Fort Worth Businesses				
Traffic serving	4,039(7)	5,323(9)	+1,284	+32
Other retail/service	25,573(37)	28,301(44)	+2,728	+11
Total	29,612(44)	33,625(53)	+4,013	+14
River Oaks Businesses				
Traffic serving	1,115(5)	205(1)	-910	-82
Other retail/service	3,115(5)	1,242(2)	+1,873	+60
Total	4,230(10)	1,447(3)	-2,783	-66
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	2,226(3)	1,314(2)	-912	-41
Total	2,226(3)	1,314(2)	-912	-41
County Businesses				
Traffic serving	3,938(8)	2,579(5)	-1,359	-34
Other retail/service	14,660(35)	7,037(15)	-7,623	-52
Total	18,598(43)	9,616(19)	-8,982	-48

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7,8,9, and 10.

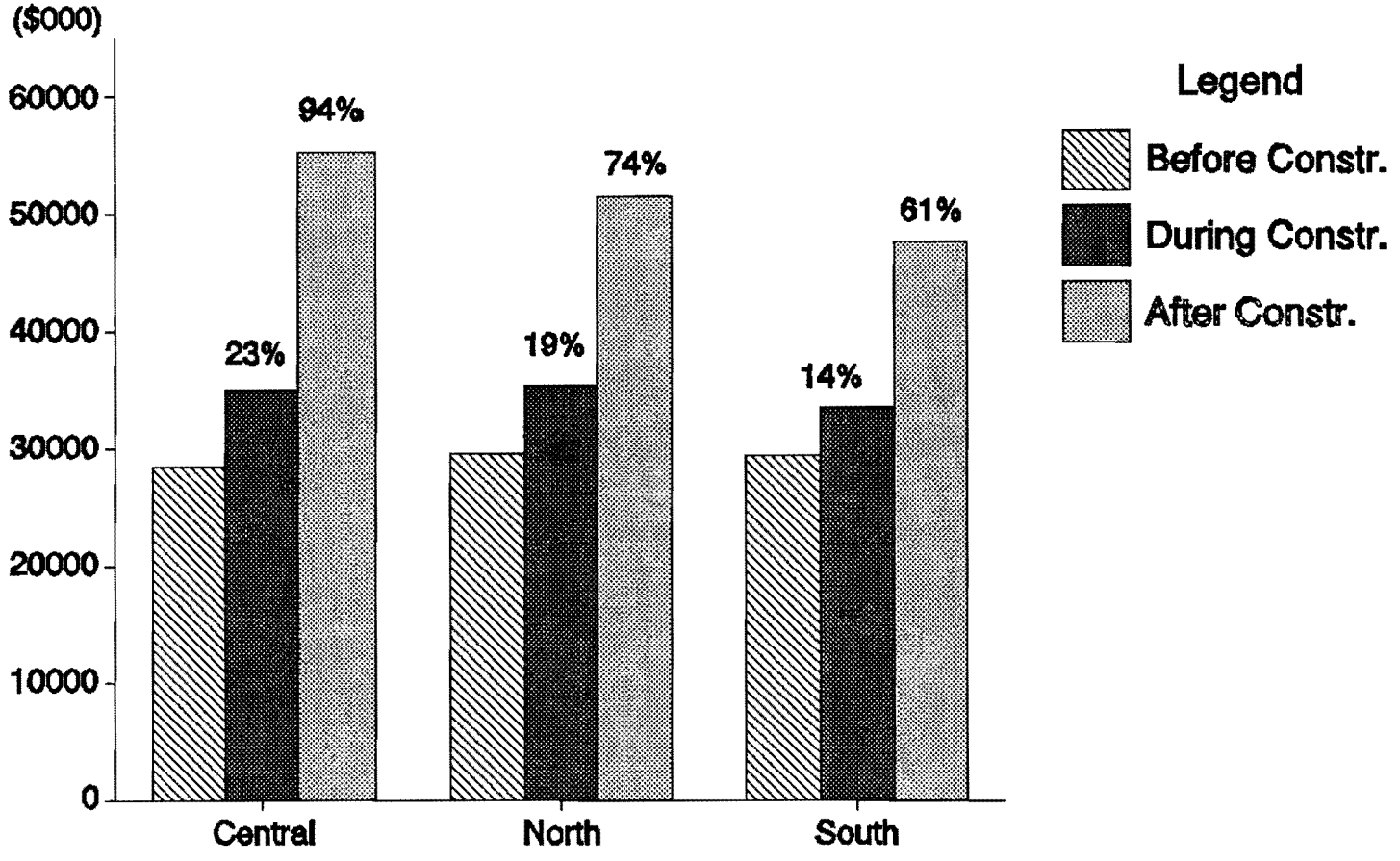
Table 25. Estimated Abutting Business Gross Sales After Construction of a Limited Access Freeway Bypass South of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	23,312(41)	17,007(44)	-6,305	-27
Other retail/service	77,183(132)	94,054(155)	+16,871	+22
Total	100,495(173)	111,060(199)	+10,565	+11
Sansom Park Businesses				
Traffic serving	6,853(17)	5,742(13)	-1,111	-16
Other retail/service	26,884(85)	33,595(66)	+6,701	+25
Total	33,737(102)	39,337(79)	+5,590	+17
Fort Worth Businesses				
Traffic serving	4,039(7)	7,230(11)	+3,191	+79
Other retail/service	25,573(37)	40,539(58)	+14,966	+59
Total	29,612(44)	47,769(69)	+18,157	+61
River Oaks Businesses				
Traffic serving	1,115(5)	409(1)	-706	-63
Other retail/service	3,115(5)	2,543(3)	-572	+18
Total	4,230(10)	2,952(4)	-1278	+2
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	2,226(3)	1,926(2)	-360	-13
Total	2,226(3)	1,926(2)	-300	-13
County Businesses				
Traffic serving	3,938(7)	2,518(5)	-1,420	-36
Other retail/service	14,660(35)	10,773(19)	-3,887	-27
Total	18,598(43)	13,290(24)	-5,308	-29

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

[2]Based on appropriate mean percentage impact shown in Tables 7,8,9, and 10.

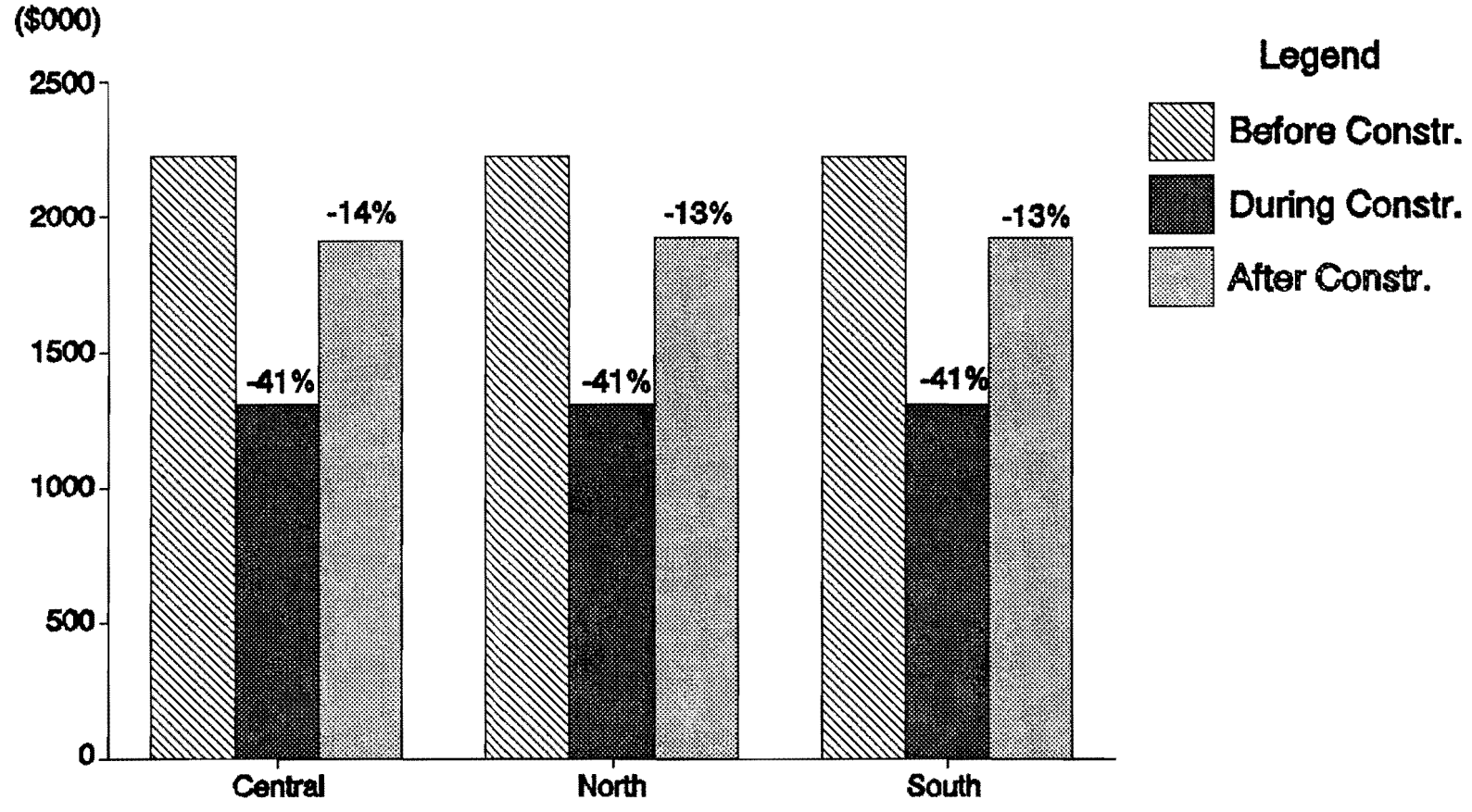
Figure 4. Estimated Annual Gross Sales (1989) Impact on Fort Worth Businesses During and After Construction by Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

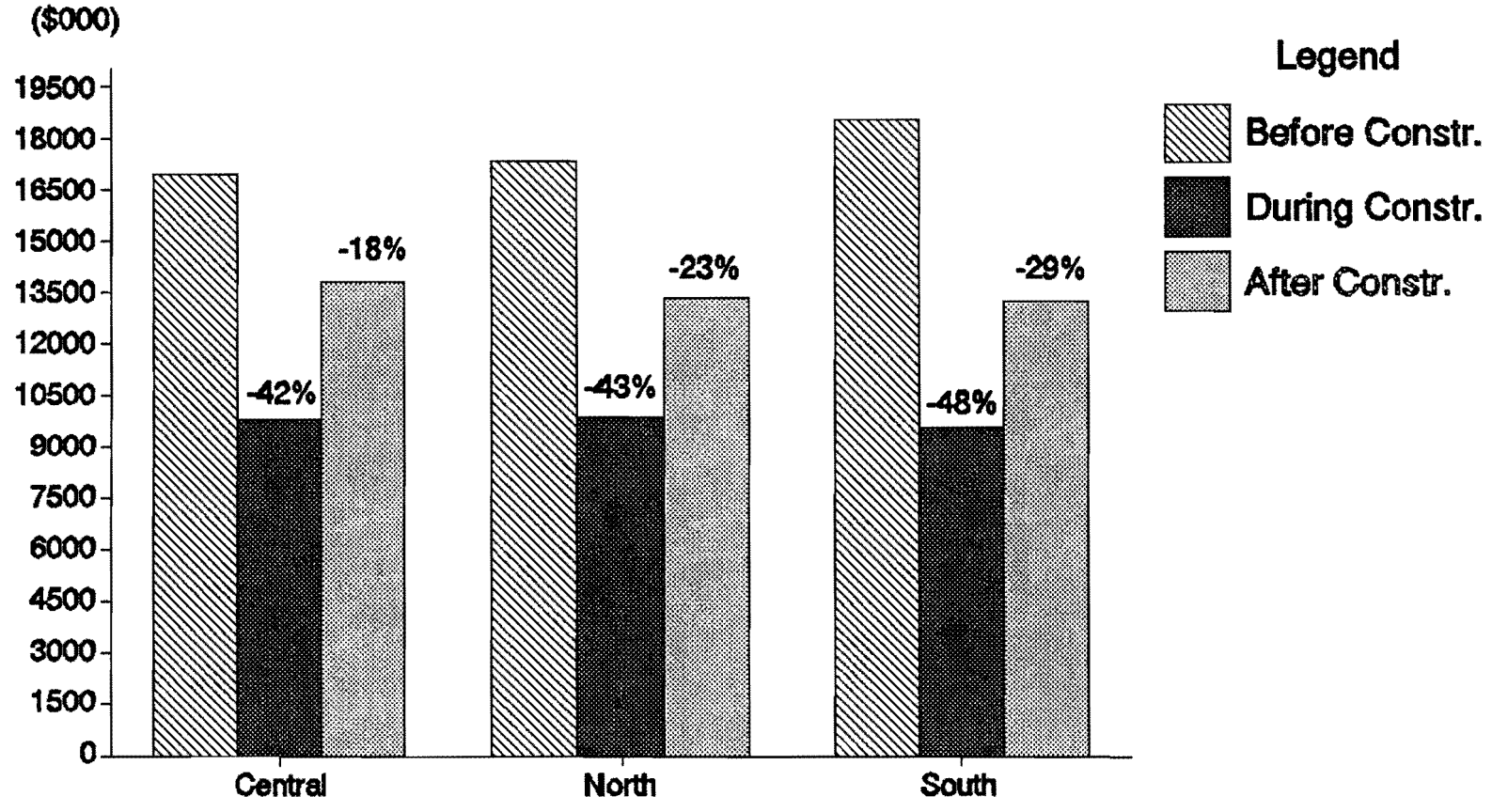
Figure 5. Estimated Annual Gross Sales (1989) Impact on Lakeside Businesses During and After Construction by Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

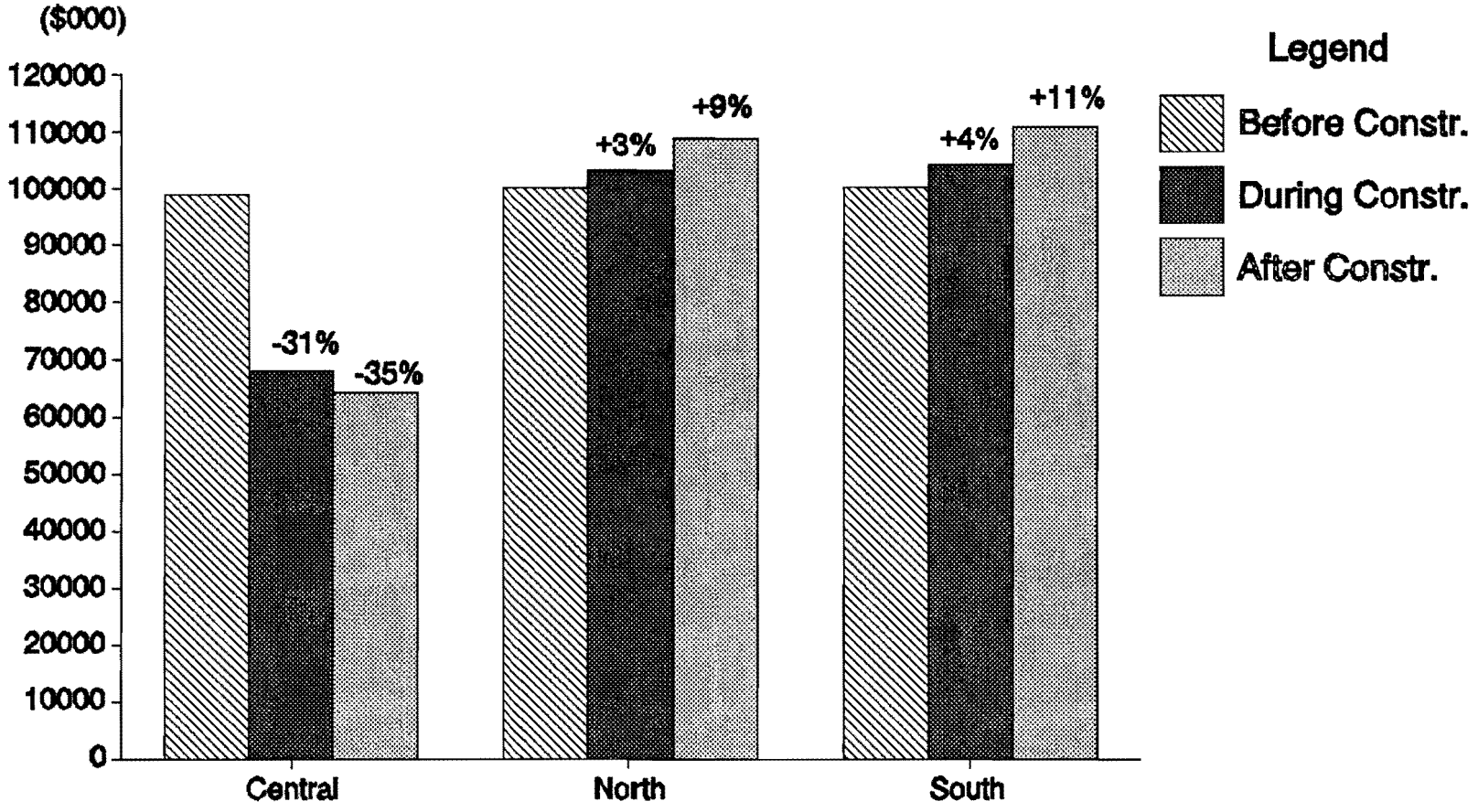
Figure 6. Estimated Annual Gross Sales (1989) Impact on County Businesses During and After Construction by Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

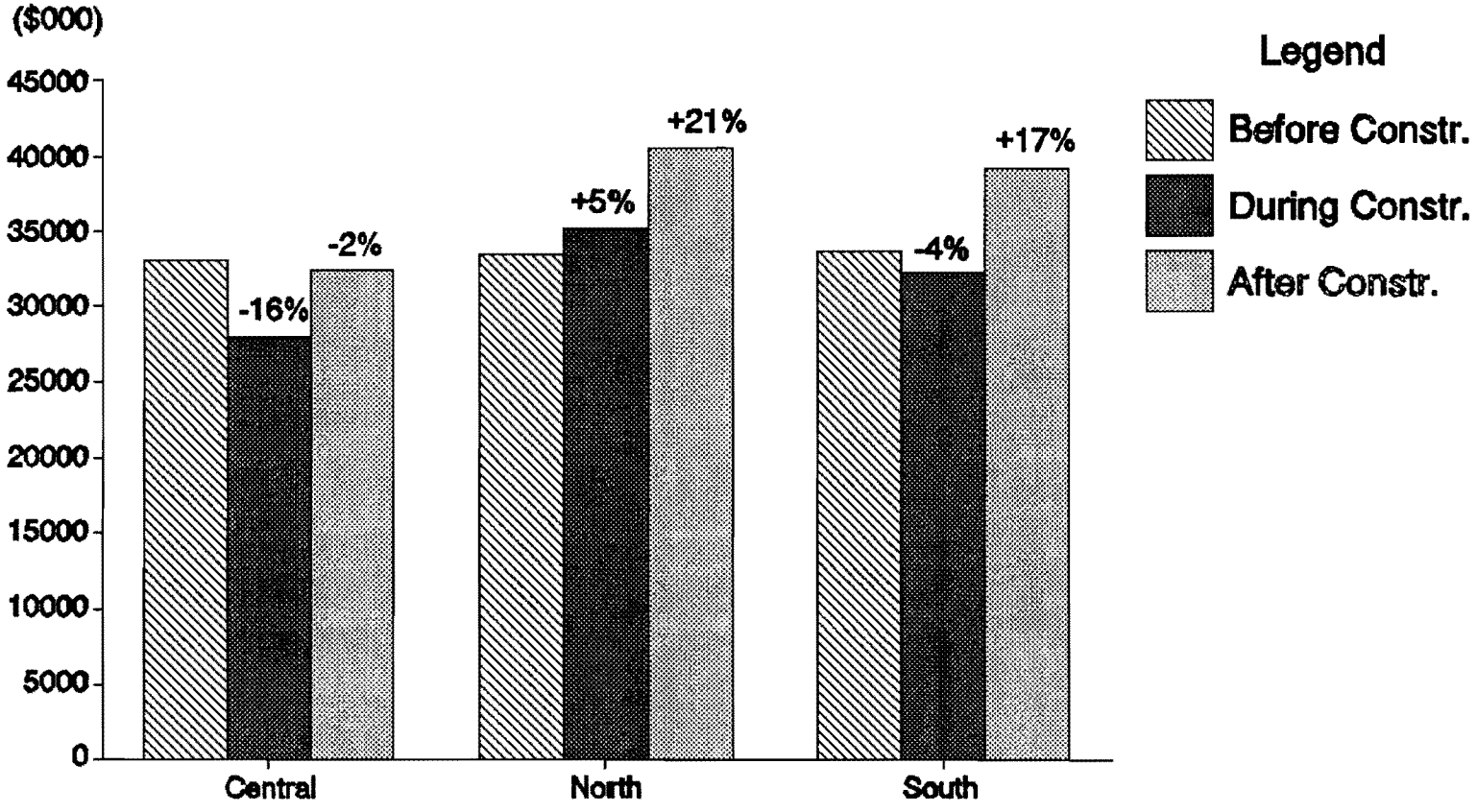
Figure 7. Estimated Annual Gross Sales (1989) Impact on Lake Worth Businesses During and After Construction by Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

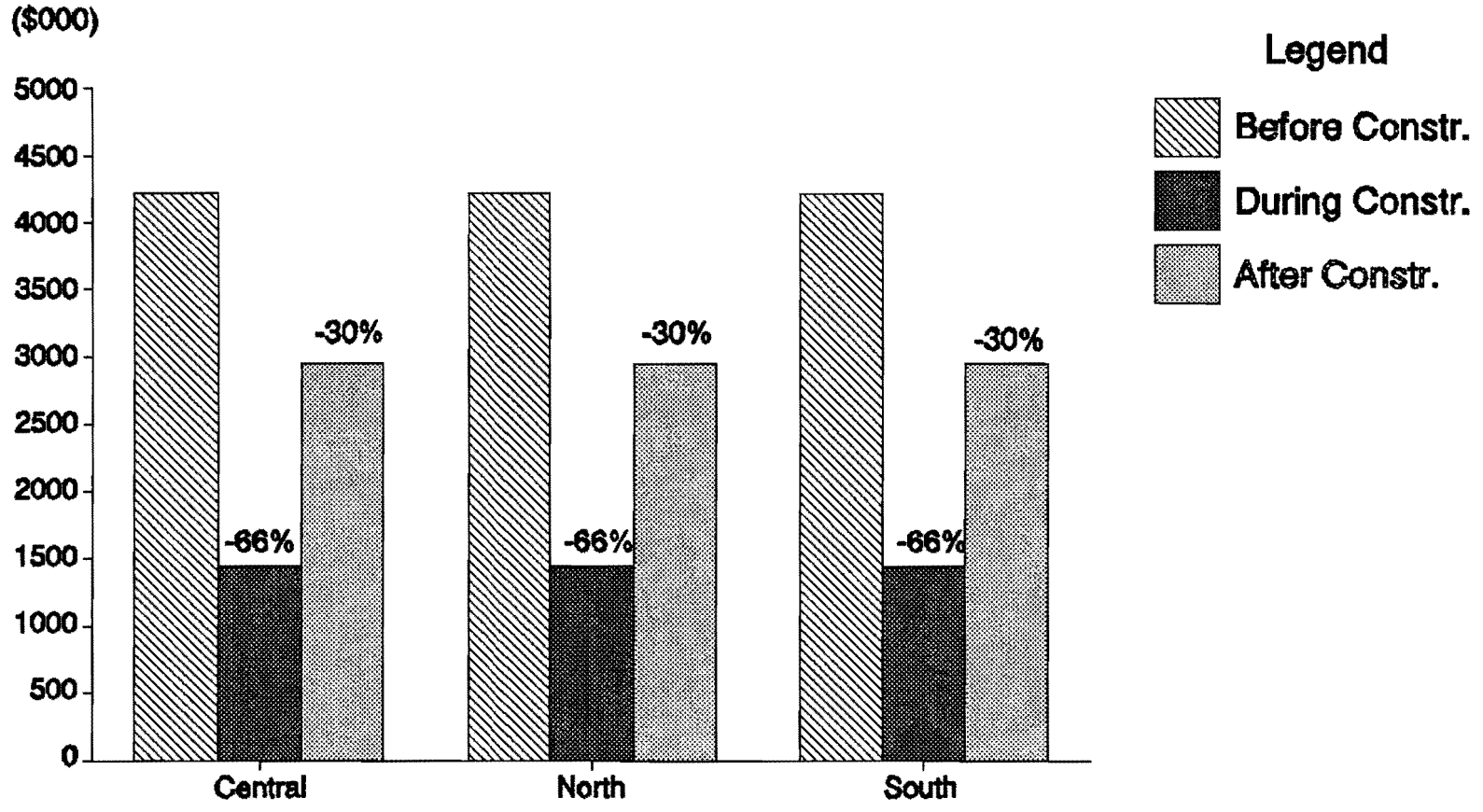
Figure 8. Estimated Annual Gross Sales (1989) Impact on Sansom Park Businesses During and After Construction by Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

Figure 9. Estimated Annual Gross Sales (1989) Impact on River Oaks Businesses During and After Construction by Proposed Route.



Note: Percent (%) represents percentage change based on before construction sales.

Source: Estimate based on average sales per firm in each SIC classification of each city affected by study route in question as reported by the State Comptroller Office.

Impact on Gross Sales of Wholesale and Manufacturing Businesses

In order to maintain privacy requirements and not disclose sales information for any given business establishment, it was necessary to combine the sales data from businesses such that the sales from individual businesses could not be distinguishable. Table 26 is the business activity comparison of total city versus study routes' gross sales of wholesale and manufacturing businesses. Table 27 and Table 28 summarize as much information as is possible, at the city level, about the impacts of construction on the wholesale and manufacturing firms in this study. By reviewing these tables it is possible for the reader to get a general impression about the relative size of the gross wholesale and manufacturing income from these businesses at the city level. Table 29 partially summarizes these impacts at the city level. Again, it is not possible due to legal requirements of confidentiality to report a detailed listing of the gross sales of these businesses at the city level. However at the route level of comparison it appears that the both the north and south routes have a highly positive impact on gross sales. The central route has a large negative impact on sales. It should be pointed out that the curse of small numbers along the central route is a major factor driving this result.

Table 26. Comparison of Total City Versus Study Routes' Gross Sales of Wholesale and Manufacturing Businesses in 1989.[1]

CITY AND TYPE OF BUSINESS	TOTAL CITY GROSS SALES($000)	STUDY ROUTE GROSS SALES($000)[2]
Fort Worth		
Wholesale/Manufacturing	10,471,676(2,411)	00(0)
Lakeside		
Wholesale/Manufacturing	529(5)	00(0)
Lake Worth		
Wholesale/Manufacturing	2,141(23)	* (2)
Sansom Park		
Wholesale/Manufacturing	10,671(13)	* (2)
River Oaks		
Wholesale/Manufacturing	50(3)	00(0)
Rural Part of Tarrant County		
Wholesale/Manufacturing	Not Determined	* (1)
All Cities		
Wholesale/Manufacturing	10,485,067(2,462)	2,742(5)

[1]Bases on 1989 data from the State Comptroller's Office.

[2]Estimates for each business based on data from the State Comptroller's Office. An asterisk (*) in front of the number means that gross sales cannot be shown due to too few reporting businesses.

Table 27. Estimated Gross Sales Impact on Abutting Wholesale and Manufacturing Firms During Construction of Limited Access Freeway for State Highway 199 in Study Area by Location Alternative and Status of Business.

ROUTE AND STATUS OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[2]	ACTUAL ($000)	PERCENT
Central Route Businesses				
Remaining	1,007 (3)	957 (3)	-50	-5
Displaced	1,735 (2)	0	-1,735	-100
New	0	93 (1)	+93	
Total	2,742 (5)	1,050 (4)	-1,642	-60
North Route Businesses				
Bypassed	1,828 (4)	1,772 (4)	-56	-3
Remaining				
Displaced	914 (1)		-914	-100
New	(0)	2,108 (4)	+2,108	
Total	2,742 (5)	3,880 (8)	+1,138	+42
South Route Businesses				
Bypassed	1,828 (3)	1,772 (3)	-56	-3
Remaining	914 (2)	867 (2)	+47	+3
New	(0)	1,054 (2)	+1,054	
Total	2,742 (5)	3,693 (7)	+1,045	+38

[1]Based on 1989 data reported by the State Comptroller's Office. The number of businesses are in parentheses ( ).

[2]Based on appropriate mean percentage impact shown in Tables 1 and 4. The number of new firms are based on findings on seven bypass studies conducted in Texas and summarized in reference [11].

Table 28. Estimated Gross Sales Impact on Abutting Wholesale and Manufacturing Firms After Construction of Limited Access Freeway for State Highway 199 in Study Area by Location Alternative and Status of Business.

ROUTE AND STATUS OF BUSINESS	GROSS SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER[2]	ACTUAL ($000)	PERCENT
Central Route Businesses				
Remaining	1,007 (3)	1,038 (3)	+31	+3
Displaced	1,735 (2)	0	-1,735	-100
New	0	1,667 (5)	+1,667	
Total	2,742 (5)	2,705 (8)	-37	-1
North Route Businesses				
Bypassed	1,828 (4)	1,900 (4)	+73	+4
Remaining				
Displaced	914 (1)	0	-914	-100
New		5,256 (9)	+5,256	
Total	2,742 (5)	7,156 (13)	+4,415	+161
South Route Businesses				
Bypassed	1,828 (2)	1,902 (2)	+74	+4
Remaining	914 (2)	941 (2)	+28	+3
New		5,259 (9)	+5,259	
Total	2,742 (7)	8,102 (14)	+5,361	+196

[1]Based on 1989 data reported by the State Comptroller's Office. The number of businesses are in Parentheses ().

[2]Based on appropriate mean percentage impact shown in Tables 7 and 8. The number of new firms are based on findings on seven bypass studies conducted in Texas and summarized in reference [11].

Table 29. Estimated Percentage Change in Gross Sales by City on Abutting Wholesale and Manufacturing Firms During and After Construction of a Limited Access Freeway for State Highway 199.

CITY	PERCENTAGE CHANGE BY ROUTE					
	CENTRAL		NORTH		SOUTH	
	DURING [1]	AFTER	DURING	AFTER	DURING	AFTER
Fort Worth	0	+[2]	+	+	+	+
Lakeside	0	0	0	0	0	+
Tarrant County	-100	0	-100	0	-3	+104
Lake Worth	+45	+103	-3	+4	-4	+54
Sansom Park	-52	+48	-3	+4	-4	+55
River Oaks	0	0	+	+	0	+
Total Change	-60	-1	+44	+161	+38	+196

[1]Based on the change in the gross sales of wholesale and manufacturing business in 1989 as reported by city in Tables 27 and 28. The gross sales amount is not reported because there were too few businesses reporting.

[2]A "+" sign indicates that a new business was created generating positive sales. Because there were no sales in the before period it is not possible to calculate a percentage of before sales to show for this new business.

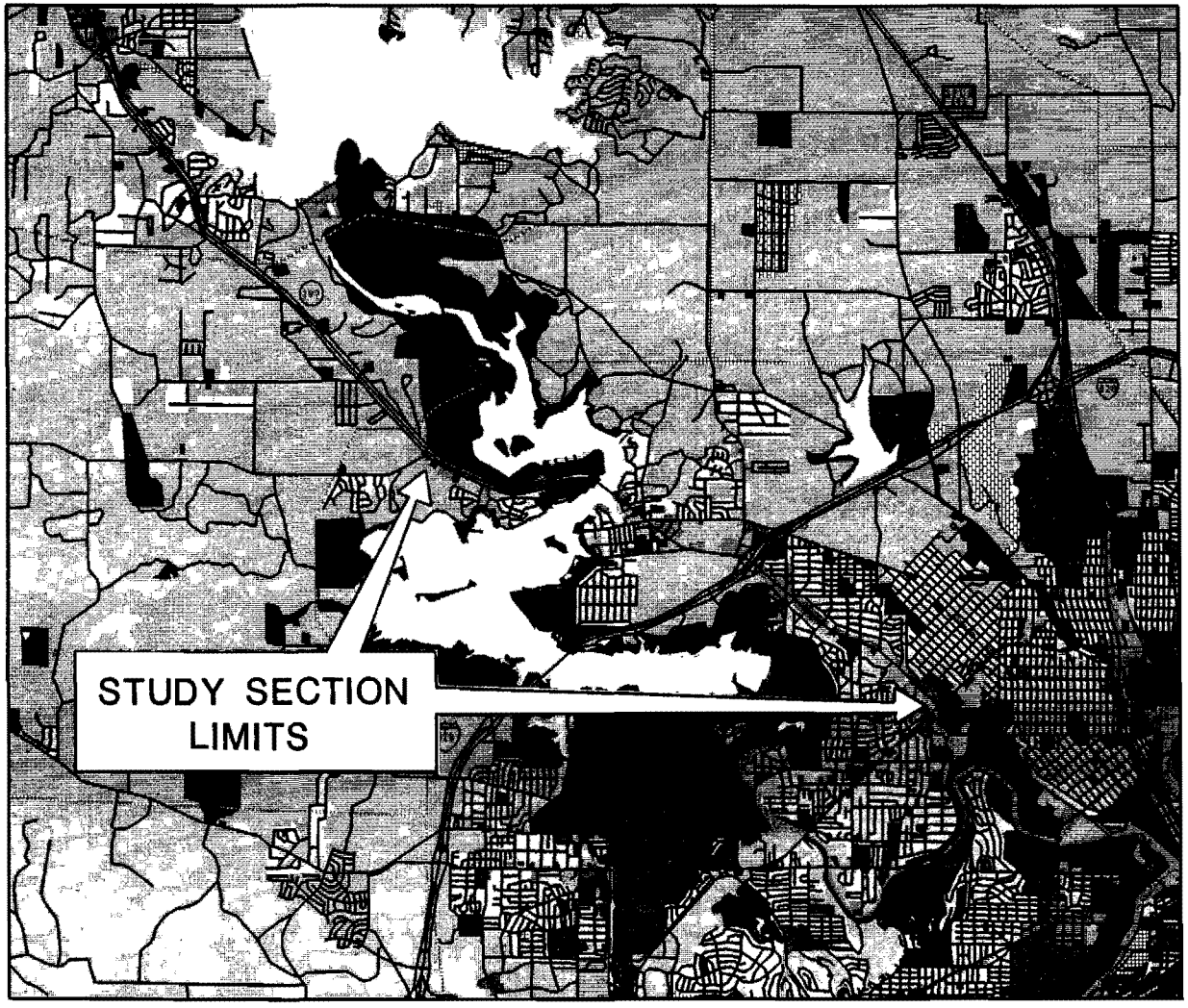
IMPACT ON LAND USE AND DEVELOPMENT

There is a very close relationship between land uses and land values. If land values change very much, land uses are likely to change too. Previous studies have proven that a new freeway in an area, whether located along the existing route of an existing highway or on a new location that bypasses or parallels the existing highway for some distance, will increase peoples's accessibility to the abutting or nearby property. The increased accessibility causes an increase in the during and after construction period land values which will ultimately cause a change in land uses. The speed of such a change will largely depend upon how densely the abutting and nonabutting properties are developed. Also, the presence of an adequate cross-street or road system that frequently interchanges with the new facility will heavily influence how far away from the new highway land values and land uses will be affected.

Estimating Methodology

Figures 10 and 11 show the 1970 and 1990 land uses abutting the existing S.H. 199, respectively, and also the land uses in the area where the proposed routes would be located. These maps were prepared by the North Central Texas Council of Governments. Table 30 shows the mileage of abutting land use of various types along existing and proposed routes in each city in 1990. By comparing the location of the proposed routes shown in Figure 1 with these land use maps, one can determine what types of land uses would be involved along each of the proposed routes. A comparison of the 1970 land use map with the 1990 land use map reveals little differences in land uses along each route and in the study area between the two study years. Therefore, this area has remained essentially the same, land

SH 199 CORRIDOR 1970 LANDUSE



- Single Family
- Multi-Family
- Mobile Home
- Group Quarters
- Hotel/Motel
- Office
- Retail
- Institutional
- Industrial
- Trans/Comm
- Roadway
- Landfill
- Flood Control
- Utilities
- Parks/Open Space
- Vacant
- Water
- Under Const.

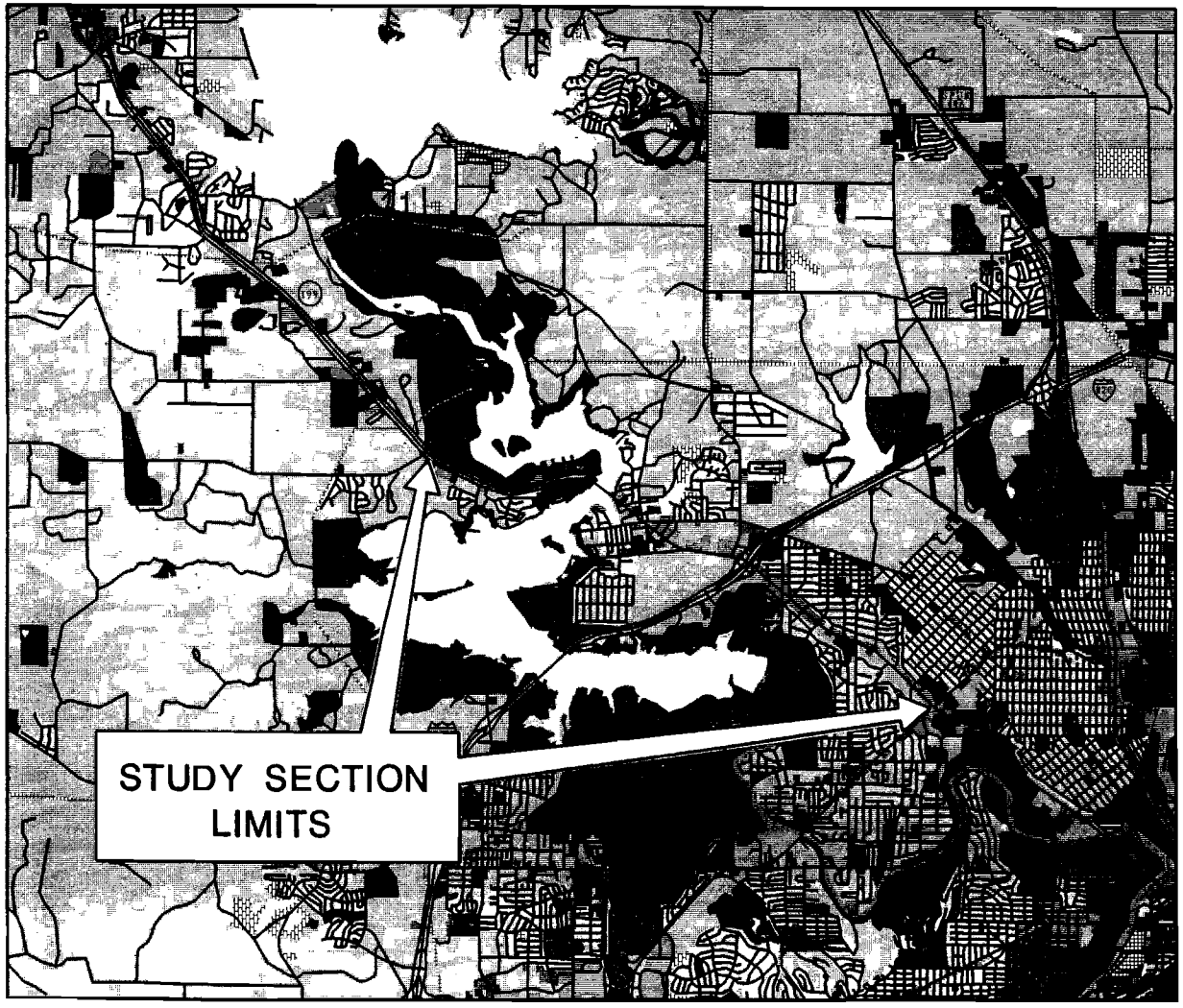
State Department of Highways and Public Transportation

Regional Planning Office

Scale 1:15280
August 29, 1990
Source: NCTCOG - Regional Data Center

Figure 10

SH 199 CORRIDOR 1990 LANDUSE



- Single Family
- Multi-Family
- Mobile Home
- Group Quarters
- Hotel/Motel
- Office
- Retail
- Institutional
- Industrial
- Trans/Comm
- Roadway
- Landfill
- Flood Control
- Utilities
- Parks/Open Space
- Vacant
- Water
- Under Const.

State Department of Highways and Public Transportation

Regional Planning Office

Scale 1:5280
AUGUST 25 1990
Source: NCTCOG - Regional Data Center

Figure 11

Table 30. Total Number of Lengths in Miles and Total Area in Acres of Abutting Land Use of Various Types Along Existing and Proposed Routes in Each City in 1990[1].

City and Type of Properties	Existing Route		Central Route		North Route		South Route	
	Total Length (miles)	Total Area (acres)	Total Length (miles)	Total Area (acres)	Total Length (miles)	Total Area (acres)	Total Length (miles)	Total Area (acres)
Fort Worth								
Comm/Industrial	.53	19.35	.59	21.60	.51	18.40	.41	15.05
Residential	.06	1.13	.27	4.98	2.44	44.40	.39	7.04
Public/Nonprofit	1.43	52	2.44	88.73	1.88	68.29	2.21	80.36
Vacant Land	.86	31.35	2.18	79.35	5.69	207.05	2.82	102.55
TOTAL	2.88	103.83	5.48	194.66	10.52	338.14	5.83	205.00
Lake Worth								
Comm/Industrial	2.47	89.85	1.04	37.75				
Residential	.13	2.25	.12	2.25			1.10	20.00
Public/Nonprofit	.56	20.44	.06	2.25			.38	13.82
Vacant Land	1.25	45.60	.78	28.33			.03	1.09
TOTAL	4.41	158.14	2.00	70.58	0.00	0.00	1.51	34.91
Sansom Park								
Comm/Industrial	1.71	62.29	1.53	55.64	.10	3.64	.75	27.27
Residential	.16	2.96	.29	5.27	.30	5.45	.86	15.67
Public/Nonprofit	.29	10.65	.23	8.36	.35	12.87	.34	12.44
Vacant Land	.29	10.47	.22	8.00	.55	20.00	.27	9.82
TOTAL	2.45	86.37	2.27	77.27	1.30	41.96	2.22	65.20
River Oaks								
Comm/Industrial	.61	22.18	.61	22.18	.61	22.18	.61	22.18
Residential								
Public/Nonprofit								
Vacant Land	.03	1.09	.03	1.09	.03	1.09	.03	1.09
TOTAL	0.64	23.27	0.64	23.27	0.64	23.27	0.64	23.27

[1]Based on North Texas Council of Governments' 1990 land use maps, Fort Worth street map and State Department of Highways and Public Transportation's route schematic map.

Table 30 (Continued)

Total Number of Lengths in Miles and Total Area in Acres of Abutting Land Use of Various Types Along Existing and Proposed Routes in Each City in 1990[1].

City and Type of Properties	Existing Route		Central Route		North Route		South Route	
	Total Length (miles)	Total Area (acres)	Total Length (miles)	Total Area (acres)	Total Length (miles)	Total Area (acres)	Total Length (miles)	Total Area (acres)
Lake Side								
Commm/Industrial	.31	11.35	.31	11.35	.31	11.35	.31	11.35
Residential								
Public/Nonprofit	.10	3.64	.10	3.64	.10	3.64	.10	3.64
Vacant Land	.07	2.55	.07	2.55	.07	2.55	.07	2.55
TOTAL	0.48	17.54	0.48	17.54	0.48	17.54	0.48	17.54
Tarrant County								
Comm/Industrial	.73	26.51	.73	26.51	.73	26.51	.21	7.71
Residential	.30	5.45	.30	5.45	.30	5.45	.50	9.09
Public/Nonprofit	.18	3.27	.18	6.54	.13	4.8	.20	7.27
Vacant Land	.33	5.91	.33	11.82	.33	11.82	.40	14.55
TOTAL	1.54	41.14	1.54	50.32	1.49	48.58	1.31	38.62
All Cities								
Comm/Industrial	6.37	231.53	4.81	175.02	2.26	82.07	2.30	83.56
Residential	.65	11.80	.99	17.96	3.04	55.31	2.85	51.80
Public/Nonprofit	2.57	90.00	3.01	109.53	2.46	89.60	3.23	117.53
Vacant Land	2.83	96.96	3.61	131.13	6.67	242.51	3.62	131.64
TOTAL	12.42	430.29	12.42	433.64	14.43	469.49	12.00	384.53

[1]Based on North Texas Council of Governments' 1990 land use maps, Fort Worth street map and State Department of Highways and Public Transportation's route schematic map.

use-wise during the past 20 years. The list of abutting businesses, residences, etc. furnished by the District 2 personnel is used to divide the properties in each use by location and status before and after the right of taking. These are the same business firms used to estimate the gross sales impact for each city by route. The number of new businesses abutting each route in each city is based on the of number of miles of each proposed route in each city. The number of new residences abutting each route in each city is based on the number of existing residences abutting each route in each city.

The land use impacts are based on the aggregative findings of several bypass and radial highway studies done in Texas in the 1960s [11,20].

Estimated Impact on Abutting Property Use

Route Impact

Tables 30-33 show the estimated impact that each of the proposed routes, respectively, would have on abutting commercial/industrial and residential land use, assuming that a five year after construction period had lapsed. Based on before versus after changes, the north route is the only route that would have a net increase in the total number of tracts in either commercial/industrial or residential use. Also, nearly all of this increase is would be due to commercial/industrial use. The primary reason for only one route having an increase in these two land uses is the large number of displaced and new business firms and residences for each of the respective routes. Not enough new firms and/or residences would be built to take the place of those that would be displaced.

City Impact

Tables 30-33 also show the estimated abutting land use impact on the respective

Table 31. Estimated Abutting Improved Land Use Impact of the Proposed Central Route in Each City by Type of Land Use.[1]

City and Type of Land Use	Number by Status				Before Vs. After	
	Before	Displaced	New	After	Actual	% of Change
Fort Worth						
Comm/Industrial	42	5	56	93	51	124
Residential	18	17	2	3	-15	-83
TOTAL	60	22	58	96	36	41
Tarrant County						
Comm/Industrial	45	26	15	31	-14	-31
Residential	28	10	3	21	-7	-25
TOTAL	73	36	18	52	-21	-56
Lake Side						
Comm/Industrial	3	2	2	3	0	0
Residential	0	0	0	0	0	0
TOTAL	3	2	2	3	0	0
Lake Worth						
Comm/Industrial	173	49	19	143	-30	-17
Residential	3	0	1	4	1	33
TOTAL	176	49	20	147	-29	16
Sansom Park						
Comm/Industrial	102	53	21	70	-32	-31
Residential	2	2	2	2	0	0
TOTAL	104	55	23	72	-32	-31
River Oaks						
Comm/Industrial	10	7	5	8	-2	-20
Residential	0	0	0	0	0	0
TOTAL	10.00	7.00	5.00	8.00	-2.00	-20
Central Route						
Comm/Industrial	375	145	118	348	-27	-7
Residential	51	29	8	30	-21	-41
TOTAL	426	174	126	378	-48	-48

[1]New Residences assumed to be single family type.

Table 32. Estimated Abutting Improved Land Use Impact of the Proposed North Route in Each City by Type of Land Use.[1]

City and Type of Land Use	Number by Status				Before Vs. After	
	Before	Displaced	New	After	Actual	% of Change
Fort Worth						
Comm/Industrial	44	8	42	78	34	77
Residential	74	30	11	55	-19	-26
TOTAL	118	38	53	133	15	13
Tarrant County						
Comm/Industrial	44	27	11	28	-16	-36
Residential	30	80	5	27	-3	-10
TOTAL	74	107	16	55	-19	-26
Lake Side						
Comm/Industrial	3	2	2	3	0	0
Residential	0	0	0	0	0	0
TOTAL	3	2	2	3	0	0
Lake Worth						
Comm/Industrial	171	0	25	196	25	15
Residential	0	0	0	0	0	0
TOTAL	171	0	25	196	25	15
Sansom Park						
Comm/Industrial	99	8	15	106	7	7
Residential	7	6	1	2	-5	-71
TOTAL	106	14	16	108	2	2
River Oaks						
Comm/Industrial	10	10	6	6	-4	-40
Residential	0	0	0	0	0	0
TOTAL	10	10	6	6	-4	-40
North Route						
Comm/Industrial	371	55	101	417	46	12
Residential	111	44	17	84	-27	-24
TOTAL	482	99	118	501	19	4

[1]New Residences assumed to be single family type.

Table 33. Estimated Abutting Improved Land Use Impact of the Proposed South Route in Each City by Type of Land Use.[1]

City and Type of Land Use	Number by Status				Before Vs. After	
	Before	Displaced	New	After	Actual	% of Change
Fort Worth						
Comm/Industrial	44	7	36	73	29	66
Residential	26	19	4	11	-15	-58
TOTAL	70	26	40	84	14	20
Tarrant County						
Comm/Industrial	44	29	11	26	-18	-41
Residential	13	11	3	5	-8	-62
TOTAL	57	40	14	31	-26	21
Lake Side						
Comm/Industrial	3	2	3	4	1	33
Residential	0	0	0	0	0	0
TOTAL	3	2	3	4	1	33
Lake Worth						
Comm/Industrial	174	2	29	201	27	16
Residential	100	100	4	4	-96	-96
TOTAL	274	102	33	205	-69	-25
Sansom Park						
Comm/Industrial	103	40	18	81	-22	-21
Residential	34	1	3	36	25	6
TOTAL	137	41	21	117	3	-15
River Oaks						
Comm/Industrial	9	9	5	5	-4	-44
Residential	0	0	0	0	0	0
TOTAL	9	9	5	5	-4	-44
South Route						
Comm/Industrial	377	89	102	390	13	3
Residential	173	131	14	56	-117	-68
TOTAL	550	220	116	446	-104	-19

[1]New Residences assumed to be single family type.

routes for each of the affected cities. Only the City of Fort Worth would experience a net total increase in these land uses for the central route. In the case of the north route, only Tarrant County would fail to experience an increase, and only Fort Worth and Lakeside would experience an increase for the south route. Again, the large number of displacements overcomes the increase in number of new firms and residences estimated for most of these cities.

Estimated Impact on Nonabutting Property Use

In general, abutting tracts change uses much more rapidly than do nonabutting tracts. This conclusion is supported by the cited Texas impact studies. In those studies, significant quantities of land not abutting the new bypass routes changed from agricultural or idle use to rural residential, urban residential or commercial/or industrial.

Since there is a considerable amount of vacant land not abutting the proposed north and south routes of the present study area, the development of much of this land is likely to be speeded up by either route. Such development will most likely occur near the major interchanges where there is cross-street access. New shopping centers and industrial firms would likely locate there.

IMPACT ON PROPERTY VALUES

This section of the report presents the detailed procedures used to estimate the impact of each of the S.H. 199 project's route alternatives on abutting property values in the study area as well as present the findings resulting from following such procedures. The primary data sources are essentially covered in the first section of the report. However, the sources of more specific data used, such as literature sources or references, types of data obtained from District 2 personnel, the cities and other state agencies are documented throughout this section in the report text and/or footnotes at the bottom of the tables.

Estimating Methodology

It is a real challenge to estimate the impact of a proposed highway improvement on property uses, values and land development. This is especially the case with the State Highway 199 study where the proposed central route is to be closely aligned with the existing route, except for one small section. On the other hand, the proposed north and south routes are to bypass a large section of the existing route , with each bypass starting at different places on either end of the project. Therefore, the before construction land uses and values of each bypassed section has to be estimated separately for each route alternative. The value of the existing abutting property is used as the base for estimating the proposed route impact on the section of State Highway 199 to be bypassed. On the other hand, the remaining value of the abutting property immediately after taking of right of way plus the estimated right of way cost is used as the base for estimating the impact of the proposed route alternative for the bypass portion as well as for each end where the proposed route closely follows the existing route. It is difficult to determine the after taking

use and value of the newly abutting properties, especially since some of these properties will be remainders of partial takings. A partial taking may be damaged in some way, requiring an adjustment to its value after taking. Complicating the analysis even more is the need to separate these impacts by city or political subdivision.

Taking the above things into consideration, the following procedures are used to estimate the existing/remaining abutting property impacts of each route alternate on the respective cities involved in the study:

Step 1. Estimate the present (1990) land value of the after taking abutting strip of land along each side of the proposed route and the corresponding bypassed portion of State Highway 199. For the bypassed portion, the existing right of way lines are used to determine the after taking strip of land. The width of the abutting strip is assumed to be 150 feet for residential use and 300 feet for all other uses. The 1990 land use map (Figure 11) is used to obtain linear footage of land in each use along the existing and proposed routes. The estimated square foot values of abutting land in each use, as shown in Table 34, is based on a compromise between the right of way cost estimates made by District 2 personnel and estimates made by several private appraisers and/or real estate sales persons. The abutting land values calculated following this step are shown in Table 30 in the previous chapter.

Step 2. Estimate the present (1990) improvement value of improved properties in each route's after taking abutting strip of land defined in Step 1 above. These estimates are based primarily on District 2's estimated whole taking building values. In the case of single family residences, an appropriate lot value is deducted from the

Table 34. Estimate Values of Land Located Abutting Each Route Alternative by City and Land Use[1].

City and Land Use	Land Value Per Square Foot							
	Existing Route		Central Route		North Route		South Route	
	West of Lake	East of Lake	West of Lake	East of Lake	West of Lake	East of Lake	West of Lake	East of Lake
Fort Worth								
Comm/Industrial	2.77	3.13	2.77	3.13	2.77	2.41	2.77	2.82
Residential	1.18	1.00	1.18	1.00	1.18	0.73	1.30	1.00
Public/Nonprofit	1.00	2.00	1.00	2.00	1.00	0.85	1.00	1.00
Vacant Land	1.00	2.00	1.00	2.00	1.00	0.85	1.00	1.00
Tarrant County								
Comm/Industrial	2.77	NA	2.77	NA	2.77	NA	2.77	NA
Residential	1.18	NA	1.18	NA	1.18	NA	1.30	NA
Public/Nonprofit	1.00	NA	1.00	NA	1.00	NA	1.00	NA
Vacant Land	1.00	NA	1.00	NA	1.00	NA	1.00	NA
Lake Worth								
Comm/Industrial	NA	3.24	NA	3.24	NA	NA	NA	2.83
Residential	NA	1.00	NA	1.00	NA	NA	NA	1.00
Public/Nonprofit	NA	2.00	NA	2.00	NA	NA	NA	1.25
Vacant Land	NA	2.00	NA	2.00	NA	NA	NA	1.25
Lake Side								
Comm/Industrial	2.77	NA	2.77	NA	2.77	NA	2.63	NA
Residential	1.18	NA	1.18	NA	1.18	NA	1.18	NA
Public/Nonprofit	1.00	NA	1.00	NA	1.00	NA	1.00	NA
Vacant Land	1.00	NA	1.00	NA	1.00	NA	1.00	NA
Sansom Park								
Comm/Industrial	NA	3.13	NA	3.13	NA	2.20	NA	2.69
Residential	NA	1.00	NA	1.00	NA	0.73	NA	1.00
Public/Nonprofit	NA	1.50	NA	1.50	NA	0.85	NA	1.25
Vacant Land	NA	1.50	NA	1.50	NA	0.85	NA	1.25
River Oaks								
Comm/Industrial	NA	3.13	NA	3.13	NA	2.20	NA	2.69
Residential	NA	1.00	NA	1.00	NA	1.00	NA	1.00
Public/Nonprofit	NA	1.50	NA	1.50	NA	1.50	NA	1.50
Vacant Land	NA	1.50	NA	1.50	NA	1.50	NA	1.50

[1]Based on estimate by District 2 Right of Way personnel and private real estate appraisers/sales people.

total value of each property. The improved values represent the average value for their property use group along each route within a city. The total number of properties in each after taking use group of the bypassing route is multiplied by the appropriate average improved value for whole property takings.

Step 3. Add the estimated land values of Step 1 to the estimated improvement values of Step 2 to obtain the total property values of the after taking abutting strip of properties.

Step 4. Repeat the same process to estimate the estimating total property values along the bypassed sections of State Highway 199, except that the estimated average value of a whole taking is multiplied by the total number of existing properties of the appropriate land use group along the existing right of lines.

Step 5. Adjust all of the above property values for estimated damage values due to small irregular partial takings left fronting on the new facility. This adjustment is made by adding damages in as part of the estimated right of way costs for each use in the respective cities for each route.

Step 6. Estimate the impact of each of the proposed routes on abutting land values in each city. The estimated number of new commercial/industrial firms are multiplied the average estimated value of existing commercial/industrial improvements to give the estimated value of buildings, assuming that such a value is a compromise between the value of a new building and a renovated existing building. Probably 50% of these new businesses would locate existing renovated buildings. The amount of vacant land needed is based on a typical sized

commercial/industrial tract (100 feet by 300 feet) along the existing route in the study area. The differential before construction period square foot value of these tracts is added to the new commercial/industrial improvement values due to the proposed route within each city. The estimate number of new residences is multiplied by the average value of existing residential improvements to be taken. The differential square foot value of each lot is added to the improvement value to arrive at a total increase in residential property value after construction of the highway improvement.

Tables 35 and 36 show the estimated percentage impacts expected during and after construction by type of land use and by location of the proposed route in relation to the existing route. These percentages are based primarily on the Texas studies referenced under each table. These tables show the range and average of percentage impacts on abutting property in each use between the before and after construction periods. The appropriate average percentages of impact obtained from the literature are deemed applicable to the bypassing portion the proposed north and south routes. These percentages of impact are adjusted downward by 50% for the central route. For the bypassed portion of the north and south route, the north and south route impact percentages are adjusted downward about 40%. For the bypassing portion of the central route, the percentages of impact for the bypassing portion of the central is adjusted downward by 10%. All of these percentage adjustments seem reasonable and are based on a general comparison of abutting and nonabutting impacts of bypass and radial highway impact studies. The appropriate

Table 35. Estimated Abutting Property Value Impacts Resulting from Building a Limited Access Freeway Along the Proposed Central Route.

LOCATION AND TYPE OF LAND USE	PERCENTAGE CHANGE[1]			
	DURING CONSTRUCTION		BEFORE VS AFTER CONSTRUCTION	
	RANGE	MEAN	RANGE	MEAN
Existing Bypassed Route				
Commercial/Industrial	+12 to +47	+7	+12 to +47	+14
Residential	+9 to +35	+5	+9 to +35	+10
Vacant Land	+72 to +384	+62	+72 to +384	+124
New Route[2]				
Commercial/Industrial	+12 to +47	+8	+12 to +47	+15
Residential[3]	+9 to +35	+6	+9 to +35	+11
Vacant Land	+72 to +384	+69	+72 to +384	+138

[1]Based on percentages of impact indicated in the following previous studies: [6,7,8,9,10,14,15] as presented in Table 35.

[2] Includes not only the new bypass route but also the improved portion of the existing route.

[3] Residential land tends to appreciate less than industrial and commercial land [13].

Table 36. Estimated Abutting Property Value Impacts Resulting from Building a Limited Access Freeway Along the Proposed North and South Route.

LOCATION AND TYPE OF LAND USE	PERCENTAGE CHANGE[1]			
	DURING CONSTRUCTION		BEFORE VS AFTER CONSTRUCTION	
	RANGE	MEAN	RANGE	MEAN
Existing Bypassed Route				
Commercial/Industrial	+12 to +47	+6	+12 to +47	+12
Residential	+9 to +35	+5	+9 to +35	+9
Vacant Land	+72 to +384	+52	+72 to +384	+104
New Route[2]				
Commercial/Industrial	+12 to +47	+15	+42 to +47	+30
Residential[3]	+9 to +35	+11	+9 to +35	+22
Vacant Land	+72 to +384	+138	+72 to +384	+276

[1]Based on percentages of impact indicated in the following previous studies: [6,7,8,9,10,14,15].

[2] Includes not only the new bypass route but also the improved portion of the existing route.

[3] Residential land tends to appreciate less than industrial and commercial land [13].

percentage then is multiplied by the total value of abutting property along the existing or proposed routes to arrive at the property value impact of the respective proposed improvements between the before and during construction periods and between the before and after construction periods.

Estimated Impact on Abutting Property

The abutting property impacts of the proposed routes and the cities involved are presented below. The route impacts are covered first and followed by the city impacts.

Route Impact

Tables 37-42 show the respective during and after construction property value impacts of the proposed central, north and south routes, consecutively. None of the proposed routes would experience an increase in the total property value of abutting property during the construction period. The primary reason for the total abutting property values not increasing, even during construction of the new route,is the estimated high cost of right of way. Even the total value of the new commercial and residential improvements could offset the cost of the right of way brought about by the large number of business and resident displacements. The south route has the highest estimated right of way cost and the north has the lowest. The central route would generate the greatest increase in property values due to new commercial and residential construction. Of the three proposed routes, the central route has the smallest decrease and the north route has the largest decrease. In the before versus after construction situation, total property values would experience a small net increase for all the proposed routes. The central route would experience a slightly higher percentage increase than the north and south routes.

Table 37. Estimated Abutting Property Value Impacts During Construction for the Proposed Central Route.

TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
Bypassed Property				
Commercial	12,435,330	13,305,803	870,473	7
Residential	0	0	0	0
Vacant	1,900,800	3,079,296	1,178,496	62
TOTAL	14,336,130	16,385,099	2,048,969	14
New Route Property				
Commercial	44,133,385	47,664,056	353,0671	8
Residential	21,896,685	23,210,486	1,313,801	6
Vacant	10,905,840	18,430,870	7,525,030	69
TOTAL	76,935,910	89,305,412	12,369,502	16
Right of Way Taken				
Commercial	17,039,197		-17,039,197	
Residential	3,357,700		-3,357,700	
Vacant	7,236,850		-7,236,850	
TOTAL	27,633,747		-27,633,747	
New Improvements				
Commercial		6,519,504	6,519,504	
Residential		75,796	75,796	
Vacant		0	0	
TOTAL		6,595,300	6,595,300	
All of Above				
Commercial	73,607,912	67,489,363	-6,118,549	-8
Residential	25,254,385	23,286,282	-1,968,103	-8
Vacant	20,043,490	21,510,166	1,466,676	7
TOTAL	118,905,787	112,285,811	-6,619,976	-6

Table 38. Estimated Abutting Property Value Impacts After Construction for the Proposed Central Route.

TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
Bypassed Property				
Commercial	12,435,330	14,176,276	1,740,946	14
Residential	0	0	0	0
Vacant	1,900,800	4,257,792	2,356,992	124
TOTAL	14,336,130	18,434,068	4,097,938	29
New Route Property				
Commercial	44,133,385	50,753,393	6,620,008	15
Residential	21,896,685	24,305,320	2,408,635	11
Vacant	10,905,840	25,955,899	15,050,059	138
TOTAL	76,935,910	101,014,612	24,078,702	31
Right of Way Taken				
Commercial	17,039,197		-17,039,197	
Residential	3,357,700		-3,357,700	
Vacant	7,236,850		-7,236,850	
TOTAL	27,633,747		-27,633,747	
New Improvements				
Commercial		13,054,768	13,054,768	
Residential		233,734	233,734	
Vacant		0	0	
TOTAL		13,288,502	13,288,502	
All of Above				
Commercial	73,607,912	77,984,437	4,376,525	6
Residential	25,254,385	24,539,054	-715,331	-3
Vacant	20,043,490	30,213,691	10,170,201	51
TOTAL	118,905,787	132,737,182	13,831,396	12

Table 39. Estimated Abutting Property Value Impacts During Construction for ththe Proposed North Route.

TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
Bypassed Property				
Commercial	53,696,704	56,918,506	3,221,802	6
Residential	2,641,708	2,773,793	132,085	5
Vacant	5,606,172	8,521,381	2,915,209	52
TOTAL	61,944,584	68,213,681	6,269,097	10
New Route Property				
Commercial	12,061,451	13,870,669	1,809,218	15
Residential	6,828,110	7,579,202	751,092	11
Vacant	1,437,480	3,421,202	1,983,722	138
TOTAL	20,327,041	24,871,073	4,544,032	22
Right of Way Taken				
Commercial	5,908,626		-5,908,626	
Residential	6,082,600		-6,082,600	
Vacant	13,569,150		-13,569,150	
TOTAL	25,560,376		-2,556,0376	
New Improvements				
Commercial		6,150,030	6,150,030	
Residential		373,142	373,142	
Vacant		0	0	
TOTAL		6,523,172	6,523,172	
All of Above				
Commercial	71,666,781	76,939,205	5,272,424	7
Residential	15,552,418	10,726,138	-4,826,281	-31
Vacant	20,612,802	11,942,584	-8,670,218	-42
TOTAL	10,783,000	99,607,926	-8,224,075	-76

Table 40. Estimated Abutting Property Value Impacts After Construction for the Proposed North Route.

TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
Bypassed Property				
Commercial	53,696,704	60,140,308	6,443,604	12
Residential	2,641,708	2,879,462	237,754	9
Vacant	5,606,172	11,436,591	5,830,419	104
TOTAL	61,944,584	74,456,361	12,511,777	20
New Route Property				
Commercial	12,061,451	15,679,886	3,618,435	30
Residential	6,828,110	8,330,294	1,502,184	22
Vacant	1,437,480	5,404,925	3,967,445	276
TOTAL	20,327,041	29,415,105	9,088,064	45
Right of Way Taken				
Commercial	5,908,626		-5,908,626	
Residential	6,082,600		-6,082,600	
Vacant	13,569,150		-13,569,150	
TOTAL	25,560,376		-25,560,376	
New Improvements				
Commercial		13,564,314	13,564,314	
Residential		881,655	881,655	
Vacant		0	0	
TOTAL		14,445,969	14,445,969	
All of Above				
Commercial	71,666,781	89,384,509	17,717,728	25
Residential	15,552,418	12,091,411	-3,461,007	-22
Vacant	20,612,802	16,841,516	-3771,286	-18
TOTAL	107,832,001	118,317,436	10,485,434	97

Table 41. Estimated Abutting Property Value Impacts During Construction for the Proposed South Route.

TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
Bypassed Property				
Commercial	49,689,890	52,671,283	2,981,393	6
Residential	3,173,375	3,332,044	158,669	5
Vacant	5,239,872	7,964,605	2,724,733	52
TOTAL	58,103,137	63,967,933	5,864,796	10
New Route Property				
Commercial	14,209,007	16,340,358	2,131,351	15
Residential	5,651,634	6,273,314	621,680	11
Vacant	5,876,640	13,986,403	8,109,763	138
TOTAL	25,737,281	36,600,075	1,0862,794	42
Right of Way Taken				
Commercial	9,126,372		-9,126,372	
Residential	8,314,600		-8,314,600	
Vacant	17,009,700		-17,009,700	
TOTAL	34,450,672		-34,450,672	
New Improvements				
Commercial		5,814,206	5,814,206	
Residential		245,710	245,710	
Vacant		0	0	
TOTAL		6,059,916	6,059,916	
All of Above				
Commercial	73,025,269	74,825,847	1,800,578	2
Residential	17,139,609	9,851,067	-7,288,542	-42
Vacant	28,126,212	21,951,009	-6,175,203	-22
TOTAL	118,291,090	106,627,923	-1,166,0000	-10

Table 42. Estimated Abutting Property Value Impacts After Construction for the Proposed South Route.

TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
Bypassed Property				
Commercial	49,689,890	55,652,677	5,962,787	12
Residential	3,173,375	3,458,979	285,603	8
Vacant	5,239,872	1,068,339	5,449,467	104
TOTAL	58,103,137	69,800,994	11,697,857	20
New Route Property				
Commercial	14,209,007	18,471,709	4,262,702	30
Residential	5,651,634	6,894,993	1,243,359	22
Vacant	5,876,640	22,096,166	16,219,526	276
TOTAL	25,737,281	47,462,869	21,725,588	84
Right of Way Taken				
Commercial	9,126,372		-9,126,372	
Residential	8,314,600		-8,314,600	
Vacant	17,009,700		-17,009,700	
TOTAL	34,450,672		-34,450,672	
New Improvements				
Commercial		12,400,616	12,400,616	
Residential		607,464	607,464	
Vacant		0	0	
TOTAL		13,008,080	13,008,080	
All of Above				
Commercial	73,025,269	86,525,002	13,499,733	18
Residential	17,139,609	10,961,436	-6,178,173	-36
Vacant	28,126,212	32,785,505	4,659,293	17
TOTAL	118,291,090	130,271,943	11,980,853	10

City Impact

Tables 43-54 show the respective during and after construction abutting property value impacts of each of the proposed routes for each of the affected cities and Tarrant County, consecutively. Only Fort Worth and Lakeside would experience an increase in total property value during the construction period with the proposed central route. On the otherhand, only Fort Worth and River Oaks would experience a decrease in total property values with the proposed north route. For the proposed south route, three cities experience a decrease and four experience an increase. Lakeside is the only city that would experience an increase in total during construction property values for all three routes. For the before versus after construction comparison, only the City of Lake Worth would experience a decrease in total property values for the central route alternative. On the otherhand, the City of Fort Worth would experience a decrease in total abutting property values for the north and south routes. Overall, only Fort Worth and Lake Worth would experience a decrease in total after construction property values for any of routes. Again, the primary reason that the total abutting property values would fail to experience large percentage increases is due to the large number of displacements causing the estimated right of way costs to be high for all three of the proposed routes.

Estimated Impact on Nonabutting Property

The value of nonabutting property is not estimated along the existing or proposed routes. Consequently, property value impacts on nonabutting property are not estimated. However, the Texas impact studies show that the value of unimproved nonabutting property within a 1000 feet of the new facility is impacted about 50% less than the impact on abutting property.

Table 43. Estimated Abutting Property Value Impacts During Construction for Each of the Proposed Routes in Fort Worth.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	1,648,904	1,324,342	-324,562	-20
Residential	1,916,873	739,443	-1,177,430	-61
Vacant Land	8,783,868	11,516,282	2,732,414	31
TOTAL	12,349,645	13,580,068	1,230,423	10
NORTH ROUTE				
Commercial/Industrial	4,628,696	6,147,099	1,518,403	32
Residential	10,877,009	6,254,008	-4,623,001	-43
Vacant Land	13,489,300	1,444,608	-12,040,000	-90
TOTAL	28,995,005	13,845,715	-15,150,000	-52
SOUTH ROUTE				
Commercial/Industrial	6,138,462	5,026,440	-1,112,022	-18
Residential	3,165,325	1,683,291	-1,482,034	-47
Vacant Land	20,608,880	10,631,174	-9,977,706	-49
TOTAL	29,912,667	17,340,905	-12,570,000	-42

Table 44. Estimated Abutting Property Value Impacts After Construction for Each of the Proposed Routes in Fort Worth.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	1,648,904	6,200,457	4,551,553	276
Residential	1,916,873	804,361	-1,112,512	-58
Vacant Land	8,783,868	16,218,196	7,434,328	85
TOTAL	12,349,645	23,223,014	10,873,369	88
NORTH ROUTE				
Commercial/Industrial	4,628,696	8,266,952	3,638,256	79
Residential	10,877,009	7,228,507	-3,648,502	-34
Vacant Land	13,489,300	1,938,816	-11,550,000	-86
TOTAL	28,995,005	17,434,275	-11,560,000	-40
SOUTH ROUTE				
Commercial/Industrial	6,138,462	6,804,468	666,006	11
Residential	3,165,325	1,926,817	-1,238,508	-40
Vacant Land	20,608,880	16,795,469	-3,813,411	-19
TOTAL	29,912,667	25,526,754	-4,385,913	-15

Table 45. Estimated Abutting Property Value Impacts During Construction for Each of the Proposed Routes in Tarrant County.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	5,427,274	4,602,509	-824,765	-15
Residential	1,249,924	1,318,130	68,206	5
Vacant Land	514,800	870,012	355,212	69
TOTAL	7,191,998	6,790,652	-401,346	-6
NORTH ROUTE				
Commercial/Industrial	5,800,069	5,322,842	-477,227	-8
Residential	1,539,182	1,354,770	-184,412	-12
Vacant Land	514,800	1,225,224	710,424	138
TOTAL	7,854,051	7,902,836	48,785	0.6
SOUTH ROUTE				
Commercial/Industrial	5,304,415	4,851,615	-452,800	-8
Residential	1,939,872	1,850,560	-89,312	-5
Vacant Land	1,267,200	2,471,040	1,203,840	95
TOTAL	851,1487	9,173,215	661,728	7

Table 46. Estimated Abutting Property Value Impacts After Construction for Each of the Proposed Routes in Tarrant County.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	5,427,274	5,386,585	-40,689	-0.7
Residential	1,249,924	1,446,219	196,295	16
Vacant Land	514,800	1,225,224	710,424	138
TOTAL	7,191,998	8,058,028	866,030	12
NORTH ROUTE				
Commercial/Industrial	5,800,069	6,518,185	718,116	12
Residential	1,539,182	1,583,829	44,647	3
Vacant Land	514,800	1,935,648	1,420,848	276
TOTAL	7,854,051	1,007,662	2,183,611	28
SOUTH ROUTE				
Commercial/Industrial	5,304,415	5,790,104	485,689	9
Residential	1,939,872	2,084,728	144,856	7
Vacant Land	1,267,200	3,674,880	2,407,680	190
TOTAL	8,511,487	11,549,712	3,038,225	36

Table 47. Estimated Abutting Property Value Impacts During Construction for Each of the Proposed Routes in Lake Side.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	1,901,956	2,032,272	130,317	7
Residential	0	0	0	0
Vacant Land	514,800	870,012	355,212	69
TOTAL	2,416,756	2,902,284	485,529	20
NORTH ROUTE				
Commercial/Industrial	1,786,956	1,850,299	63,343	4
Residential	26,071	28,939	2,868	11
Vacant Land	110,880	263,894	153,014	138
TOTAL	1,923,907	2,143,133	219,226	11
SOUTH ROUTE				
Commercial/Industrial	1,822,767	2,073,732	250,965	14
Residential	0	0	0	0
Vacant Land	110,880	263,894	153,014	138
TOTAL	1,933,647	2,337,626	403,980	21

Table 48. Estimated Abutting Property Value Impacts After Construction for Each of the Proposed Routes in Lake Side.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	1,901,956	2,318,299	416,343	22
Residential	0	0	0	0
Vacant Land	514,800	1,225,224	710,424	138
TOTAL	2,416,756	3,543,523	1,126,767	47
NORTH ROUTE				
Commercial/Industrial	1,786,956	2,421,643	634,687	36
Residential	26,071	31,807	5,736	22
Vacant Land	110,880	416,909	306,029	276
TOTAL	1,923,907	2,870,358	946,451	49
SOUTH ROUTE				
Commercial/Industrial	1,822,767	2,487,697	664,930	36
Residential	0	0	0	0
Vacant Land	110,880	416,909	306,029	276
TOTAL	1,933,647	2,904,606	970,959	50

Table 49. Estimated Abutting Property Value Impacts During Construction for Each of the Proposed Routes in Lake Worth.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	41,849,832	39,400,473	-2,449,359	-6
Residential	8,523,008	7,055,792	-1,467,216	-17
Vacant Land	8,999,622	7,250,000	-1,749,622	-19
TOTAL	59,372,462	53,706,265	-5,666,197	-9
NORTH ROUTE				
Commercial/Industrial	38,588,098	42,749,384	4,161,286	11
Residential	2,513,008	2,638,658	125,650	5
Vacant Land	3,972,672	6,038,461	2,065,789	52
TOTAL	45,073,778	51,426,504	6,352,726	14
SOUTH ROUTE				
Commercial/Industrial	38,550,188	41,936,512	3,386,324	9
Residential	9,446,708	4,877,565	-4,569,143	-48
Vacant Land	4,665,672	7,142,905	2,477,233	53
TOTAL	52,662,568	53,956,983	1,294,415	2

Table 50. Estimated Abutting Property Value Impacts After Construction for Each of the Proposed Routes in Lake Worth.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	41,849,832	41,325,039	-524,793	1
Residential	8,523,008	7,414,684	-1,108,324	-14
Vacant Land	8,999,622	10,131,327	1,131,705	13
TOTAL	59,372,462	58,871,050	-501,412	-0.8
NORTH ROUTE				
Commercial/Industrial	38,588,098	46,768,670	8,180,572	21
Residential	2,513,008	2,739,179	226,171	9
Vacant Land	3,972,672	8,104,251	4,131,579	104
TOTAL	45,073,778	57,612,099	12,538,321	28
SOUTH ROUTE				
Commercial/Industrial	38,550,188	46,621,464	8,071,276	20
Residential	9,446,708	5,290,793	-4,155,915	-44
Vacant Land	4,665,672	9,620,139	4,954,467	106
TOTAL	52,662,568	61,532,395	8,869,828	16

Table 51. Estimated Abutting Property Value Impacts During Construction for Each of the Proposed Routes in Sansom Park.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	16,973,546	16,622,910	-350,636	-2
Residential	13,564,580	14,172,916	608,336	4
Vacant Land	1,159,120	883,397	-275,723	-23
TOTAL	31,697,246	31,679,223	-18,023	-0.05
NORTH ROUTE				
Commercial/Industrial	15,834,034	17,300,433	1,466,399	9
Residential	597,148	449,762	-147,386	-25
Vacant Land	2,453,870	2,800,750	346,880	14
TOTAL	18,885,052	20,550,945	1,665,893	9
SOUTH ROUTE				
Commercial/Industrial	15,707,051	16,823,924	1,116,873	7
Residential	2,587,704	1,439,651	-1148,053	-44
Vacant Land	1,402,300	1,272,348	-129,952	-9
TOTAL	19697055	19,535,924	-161,131	-0.8

Table 52. Estimated Abutting Property Value Impacts After Construction for Each of the Proposed Routes in Sansom Park.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	16,973,546	18,672,576	1,699,030	10
Residential	13,564,580	14,873,791	1,309,211	10
Vacant Land	1,159,120	1,244,074	84,954	7
TOTAL	31,697,246	34,790,441	3,093,195	10
NORTH ROUTE				
Commercial/Industrial	15,834,034	19,271,932	3,437,898	22
Residential	597,148	508,090	-89,058	-15
Vacant Land	2,453,870	4,177,879	1,724,009	70
TOTAL	18,885,052	23,957,901	5,072,849	27
SOUTH ROUTE				
Commercial/Industrial	15,707,051	18,630,927	2,923,876	19
Residential	2,587,704	1,659,099	-928,605	-36
Vacant Land	1,402,300	2,010,096	607,796	43
TOTAL	19,697,055	22,300,122	2,603,067	13

Table 53. Estimated Abutting Property Value Impacts During Construction for Each of the Proposed Routes in River Oaks.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	DURING	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	5,806,400	3,506,856	-2,299,544	-40
Residential	0	0	0	0
Vacant Land	71,280	120,463	49,183	69
TOTAL	5,877,680	3,627,319	-2,250,361	-38
NORTH ROUTE				
Commercial/Industrial	5,028,928	3,569,147	-1,459,781	-29
Residential	0	0	0	0
Vacant Land	71,280	169,646	98,366	138
TOTAL	5,100,208	3,738,794	-1,361,414	-27
SOUTH ROUTE				
Commercial/Industrial	5,502,386	4,113,624	-1,388,762	-25
Residential	0	0	0	0
Vacant Land	71,280	169,646	98,366	138
TOTAL	5,573,666	4,283,270	-1,290,396	-23

Table 54. Estimated Abutting Property Value Impacts After Construction for Each of the Proposed Routes in River Oaks.

ROUTE AND TYPE OF LAND USE	PROPERTY VALUES		ESTIMATED CHANGE	
	BEFORE	AFTER	ACTUAL	PERCENT
CENTRAL ROUTE				
Commercial/Industrial	5,806,400	4,081,480	-1,724,920	30
Residential	0	0	0	0
Vacant Land	71,280	169,646	98,366	138
TOTAL	5,877,680	4,251,126	-1,626,554	28
NORTH ROUTE				
Commercial/Industrial	5,028,928	6,137,126	1,108,198	22
Residential	0	0	0	0
Vacant Land	71,280	268,013	196,733	276
TOTAL	5,100,208	6,405,139	1,304,931	26
SOUTH ROUTE				
Commercial/Industrial	5,502,386	6,190,342	687,956	13
Residential	0	0	0	0
Vacant Land	71,280	268,013	196,733	276
TOTAL	5,573,666	6,458,355	884,689	16

IMPACT ON TAX REVENUES

An indirect benefit to communities whose land values have been significantly increased as a result of highway improvements is the subsequent effect on the tax base and tax revenues. Similarly, communities whose gross business sales have been increased as a result of a highway improvement can enjoy the corresponding increase in sales tax revenues. However, during the construction period when business accessibility may be adversely affected the sales tax revenues could be decreased as a result in the decrease of taxable sales. Likewise, a community's long term sales tax revenues could be permanently affected if the highway improvement permanently decreased the volume of taxable sales within it's boundaries. It is important to point out to the reader however, that this report does not account for the possible increase in demand on tax revenues that may result to the various municipalities from an increase in growth and development caused by this highway improvement. Consequently, the tax effects in this report are gross impacts.

This section of the report presents the results from both the sales tax base and the property value tax base and revenue analysis for each of the three proposed route alternatives for each of the communities. A summary of the procedures and estimating methodology used to estimate the impact on the tax base and the corresponding tax revenues is also presented.

Estimating Methodology

The data used to estimate the gross taxable sales base is the same data that is used to generate the gross sales detailed in the business activity section of this report. The percent of gross sales that are taxable was obtained from the state comptroller's office for

each city and for each SIC code classification. The gross sales for each business was then multiplied by this percentage rate to arrive at the amount of retail sales that were taxable. This amount of taxable retail sales can then be multiplied by the tax rates for each city to estimate the dollar amount of tax revenue. Table 55 summarizes the sales and property tax rates for each city in the study area. The same procedure is followed to calculate the sales tax revenue generated from the wholesale and manufacturing firms operating within the parameters of the study routes.

A similar procedure is followed in estimating the property tax revenues. The data for the property tax calculations are the same as that used to calculate the impact on property values found in the property value chapter of this report. To estimate the property tax revenue, the property tax base found in the property values section of this report is multiplied by the property tax rate for each city. The property tax rates are listed by city in Table 55.

Sales Taxes

The estimated retail sales tax impacts are based on the impacts on the gross sales presented in Tables 11 - 25 of the Business Activity section of this report. The following several tables in this section of the report correspond closely to the Tables 11 - 25. The sales tax impacts are separated between retail trade and service sales, and wholesale and manufacturing sales. For the retail trade and service sales, results are presented on both a route and a city basis. However, for the wholesale and manufacturing sales tax impacts, only route information and results are presented in order to maintain privacy requirements, and not disclose sales information for any given business establishment.

Table 55. Sales and Property Taxes and Tax Rates For Each City, 1989.

CITY	Taxes Collected ($000)		Sales Tax Per $1.00	Property Tax Per $100 of Value
	Sales	Property		
Fort Worth	37,360.0	13,501,450.0	0.015	0.890
Tarrant Co	Unknown	Unknown	0.000[1]	0.300[2]
Lakeside	22.3	83.3	0.010	0.280
Lake Worth	677.0	380.7	0.010	0.313
Sansom Park	85.0	218.0	0.010	0.397
River Oaks	224.8	570.0	0.010	0.450

[1]Assumed none.

[2]Assumed to be $0.300.

Retail Sales Route Impact. Tables 56 - 63 report the impacts on taxable sales before, during, and after completion of the highway construction for the three different routes. For example, Table 56 reports the estimated abutting business gross taxable sales along the central route before and during construction of the proposed limited access freeway. Likewise Table 57 reports the estimated abutting business gross taxable sales along the central route before and after construction of the proposed freeway. In both cases the impacts are summarized for both business type (traffic serving or other retail/service) and status. Status refers to how the individual businesses are affected by the highway construction. The different status classifications are defined and explained in the appendix to this report.

All three routes experience an estimated decrease in taxable sales during construction. And as one may expect, these tables reveal that the central route experiences the greatest reduction in taxable sales during this period. The central route taxable sales decreases 26 percent, the south route 4 percent, and the north route only 1 percent. In the period after construction the central route is estimated to still have a decrease in taxable sales by 13 percent, whereas the north route is expected to enjoy an increase of 13 percent, and the south route an increase of 12 percent.

Another important measure of impact is the impact on retail sales tax revenue. Table 64 presents a summary of the estimated abutting retail sales and services tax revenue impacts before, during, and after construction. As can be observed from Table 64, while the impact on tax revenue for the central route is still negative in the after period, it is estimated that revenue will only decrease 4 percent while taxable sales decrease 13

Table 56. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact During Construction of a Limited Access Freeway Central Route Along State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING	ACTUAL ($000)	PERCENT
Remaining Businesses				
Traffic serving	11,858(36)	9,489(33)	-2,368	-20
Other retail/service	40,774(143)	36,288(134)	-4,485	-11
Partially Displaced Businesses				
Traffic serving	3,654(10)	2,887(9)	-767	-21
Other retail/service	3,732(15)	6,974(14)	-373	-10
Displaced Businesses				
Traffic serving	6,502(16)	0(0)	-6,502	-100
Other retail/service	27,174(79)	0(0)	-27,174	-100
Closed Businesses				
Traffic serving	0(14)	0(12)		
Other retail/service	0(57)	0(24)		
New Businesses				
Traffic serving	0(0)	3,137(10)	+3,137	
Other retail/service	0(0)	14,552(47)	+14,552	
All Businesses				
Traffic serving	22,014(76)	15,513(64)	-6,500	-29
Other retail/service	71,680(294)	54,199(220)	-17,481	-25
Total	93,694(370)	69,712(284)	-23,981	-26

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 57. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact After Construction of a Limited Access Freeway Central Route Along State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Remaining Businesses				
Traffic serving	11,858(36)	8,900(30)	-2,957	-24
Other retail/service	40,744(143)	33,486(126)	-7,257	-17
Partially Displaced Businesses				
Traffic serving	3,654(10)	2,594(8)	-1,060	-29
Other retail/service	3,732(15)	3,210(13)	-523	-14
Displaced Businesses				
Traffic serving	6,502(16)	0(0)	-6,502	-100
Other retail/service	27,174(79)	0(0)	-27,174	-100
Closed Businesses				
Traffic serving	0(14)	0(16)		
Other retail/service	0(57)	0(34)		
New Businesses				
Traffic serving	0(0)	5,430(18)	+5,430	
Other retail/service	0(0)	27,792(95)	+27,792	
All Businesses				
Traffic serving	22,014(76)	16,925(72)	-5,089	-23
Other retail/service	71,680(294)	64,488(268)	-7,162	-9
Total	93,694(370)	81,413(340)	-12,251	-13

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 58. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact During Construction of a Limited Access Freeway Bypass North of State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS TAXABLE SALES (000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	17,039(44)	15,505(40)	-1,533	-9
Other retail/service	49,403(170)	46,439(160)	-2,964	-6
Remaining Businesses				
Traffic serving	1,329(5)	1,063(5)	-266	-20
Other retail/service	10,088(27)	8,978(25)	-1,110	-11
Partially Displaced Businesses				
Traffic serving	1,986(4)	1,569(4)	-417	-21
Other retail/service	2,997(11)	2,697(10)	-300	-10
Displaced Businesses				
Traffic serving	2,205(13)	00(0)	-2,205	-100
Other retail/service	9,210(29)	00(0)	-9,210	-100
Closed Businesses				
Traffic serving	00(11)	00(14)		
Other retail/service	00(56)	00(58)		
New Businesses				
Traffic serving	00(0)	2,436(6)	+2,436	
Other retail/service	00(0)	14,109(40)	+14,109	
All Businesses				
Traffic serving	22,558(77)	20,573(68)	-1,986	-9
Other retail/service	71,697(293)	72,223(294)	+526	+1
Total	94,256(370)	92,796(362)	-1,460	-1

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 59. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact After Construction of a Limited Access Freeway Bypass North of State Highway 199 in Study Area.

STATUS AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	17,039(44)	10,394(36)	-6,645	-9
Other retail/service	49,403(170)	47,921(148)	-1,482	-6
Remaining Businesses				
Traffic serving	1,329(5)	1,210(4)	-120	-9
Other retail/service	10,088(27)	9,684(23)	-404	-4
Partially Displaced Businesses				
Traffic serving	1,986(4)	1,211(3)	-774	-39
Other retail/service	2,997(11)	2,547(10)	-450	-15
Displaced Businesses				
Traffic serving	2,205(13)	00(0)	-2,225	-100
Other retail/service	9,210(29)	00(0)	-9,210	-100
Closed Businesses				
Traffic serving	00(11)	00(19)		
Other retail/service	00(56)	00(73)		
New Businesses				
Traffic serving	00(0)	4,871(11)	+4,871	
Other retail/service	00(0)	28,890(80)	+28,890	
All Businesses				
Traffic serving	22,558(77)	17,685(73)	-4,873	-21
Other retail/service	71,697(293)	89,042(334)	+17,345	+24
	94,256(370)	106,728(407)	+12,472	+13

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 60. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact During Construction of a Limited Access Freeway Bypass South of State Highway 199 in Study Area by Status and Type of Business.

STATUS AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	17,759(45)	16,583(41)	-1,176	-9
Other retail/service	48,094(146)	44,244(137)	-3,850	-6
Remaining Businesses				
Traffic serving	2,049(9)	1,639(8)	-410	-20
Other retail/service	13,293(52)	11,831(49)	-1,462	-11
Partially Displaced Businesses				
Traffic serving	0(0)	0(0)		
Other retail/service	327(2)	294(2)	-33	-10
Displaced Businesses				
Traffic serving	2,740(8)	00(0)	-2,740	-100
Other retail/service	11,017(42)	00(0)	-11,017	-100
Closed Businesses				
Traffic serving	00(15)	00(14)		
Other retail/service	00(55)	00(34)		
New Businesses				
Traffic serving	00(0)	2,600(6)	+2,600	
Other retail/service	00(0)	14,132(41)	+14,132	
All Businesses				
Traffic serving	22,548(77)	20,822(69)	-1,726	-10
Other retail/service	72,731(297)	70,501(263)	-2,230	-2
	95,279(374)	91,323(332)	-3,956	-4

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 61. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact After Construction of a Limited Access Freeway Bypass South of State Highway 199 in Study Area by Status and Type of Business.

STATUS AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Bypassed Businesses				
Traffic serving	17,759(45)	11,116(37)	-6,643	-9
Other retail/service	48,094(146)	45,659(127)	-2,435	-6
Remaining Businesses				
Traffic serving	2,049(9)	1,865(7)	-184	-9
Other retail/service	13,293(52)	12,762(45)	-532	-4
Partially Displaced Businesses				
Traffic serving	0(0)	0(0)		
Other retail/service	327(2)	278(2)	-49	-15
Displaced Businesses				
Traffic serving	2,740(8)	00(0)	-2,740	-100
Other retail/service	11,017(42)	00(0)	-11,017	-100
Closed Businesses				
Traffic serving	00(15)	00(19)		
Other retail/service	00(55)	00(48)		
New Businesses				
Traffic serving	00(0)	5,200(11)	+5,200	
Other retail/service	00(0)	28,939(83)	+28,939	
All Businesses				
Traffic serving	22,548(77)	18,181(74)	-4,367	-21
Other retail/service	72,731(297)	87,637(305)	+14,906	+22
Total	95,279(374)	105,818(378)	+10,539	+12

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 62. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact During Construction of Limited Access Freeway for State Highway 199 in Study Area by Location Alternative and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING	ACTUAL ($000)	PERCENT
Central Route Businesses				
Traffic serving	22,014(76)	15,513(64)	-6,500	-29
Other retail/service	71,680(294)	54,199(220)	-17,481	-25
Total	93,694(370)	69,712(284)	-23,981	-26
North Route Businesses				
Traffic serving	22,558(77)	20,573(68)	-1,986	-9
Other retail/service	71,697(293)	72,223(294)	+526	+1
Total	94,256(370)	92,796(362)	-1,460	-1
South Route Businesses				
Traffic serving	22,548(77)	20,822(69)	-1,726	-10
Other retail/service	72,731(297)	70,501(263)	-2,230	-2
Total	95,279(374)	91,323(332)	-3,956	-4

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 63. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact After Construction of a Limited Access Freeway for State Highway 199 by Location Alternative and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Central Route Businesses				
Traffic serving	22,014(76)	16,925(72)	-5,089	-23
Other retail/service	71,680(294)	64,488(268)	-7,162	-9
Total	93,694(370)	81,413(340)	-12,251	-13
North Route Businesses				
Traffic serving	22,558(77)	17,685(73)	-4,873	-21
Other retail/service	71,697(293)	89,042(334)	+17,345	+24
Total	94,256(370)	106,728(407)	+12,472	+13
South Route Businesses				
Traffic serving	22,548(77)	18,181(74)	-4,367	-21
Other retail/service	72,731(297)	87,637(305)	+14,906	+22
Total	95,279(374)	105,818(378)	+10,539	+12

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 64. Estimated Abutting Retail/Service Sales Tax Revenue Impact Before, During, and After Construction of State Highway 199 in Study Area by Route and City.

ROUTE AND CITY	SALES TAX REVENUE[1] ($000)			CHANGE[2]	
	BEFORE	DURING	AFTER	ACTUAL ($000)	PERCENT
Central Route					
Lake Worth	551	362	342	-209	-38
Sansom Park	128	107	132	+4	+3
Fort Worth	206	251	379	+173	+84
River Oaks	23	7	15	-8	-15
Lakeside	9	5	8	-1	-22
Tarrant County	0	0	0	0	0
Total	918	732	876	-42	-5
North Route					
Lake Worth	552	568	592	+40	+7
Sansom Park	129	135	151	+22	+17
Fort Worth	203	253	358	+155	+76
River Oaks	23	7	15	-8	-35
Lakeside	9	5	8	-1	-11
Tarrant County	0	0	0	0	0
Total	916	967	1,124	+208	+23
South Route					
Lake Worth	554	574	604	+50	+9
Sansom Park	118	114	136	+18	+15
Fort Worth	202	242	334	+65	+65
River Oaks	23	7	15	-8	-16
Lakeside	9	5	8	-1	-1
Tarrant County	0	0	0	0	0
Total	906	942	1,097	+191	+22

[1]Based on 1989 data, State Comptroller's Office.

[2]Calculated as the actual and percent change between the before and after periods.

percent. This result would indicate that the negative construction impact is greater on those businesses whose portion of taxable gross sales is the largest.

Retail Sales City Impact. The impacts on the individual cities are summarized in Tables 65 - 70. It is interesting to compare the gross taxable income amounts in these tables with the corresponding city and route tables in the business activity report. With few exceptions, the negative impacts have been stronger and the positive impacts weaker on gross taxable sales than on gross sales.

The city of Fort Worth enjoys the most positive impact both during and after construction regardless of the route. And moreover, the impact on sales tax revenues for Fort Worth in Table 64 are also more positive than for any other community regardless of the route. Sales tax revenues for Tarrant County are zero because of the assumption that the county does not levy a sales tax.

Wholesale and Manufacturing Impact. In order to maintain privacy requirements, and not disclose sales information for any given business establishment, it was necessary to combine the sales data from businesses such that the sales from individual businesses could not be distinguishable. Table 26 in the business activity section is a comparison of total city versus study routes' gross sales of wholesale and manufacturing businesses. Table 27 and Table 28 summarize as much information as is possible, at the city level, about the impacts of construction on the wholesale and manufacturing firms in this study. By reviewing these tables it is possible for the reader to get a general impression about the relative size of the taxable income from these businesses at the city level. Again, it is not possible due to legal requirements of confidentiality to report a detailed listing of the gross sales of these

businesses at the city level.

The estimated abutting wholesale and manufacturing business sales tax revenue impact before, during, and after construction are summarized in Table 71 by route. It is obvious from this table that the most positive impact, an impact of a 358 percent increase, on sales tax revenue for these businesses is when the south route is constructed. The north route is estimated to increase wholesale and manufacturing sales tax revenue 298 percent and the central route an estimated increase of 13 percent.

Property Taxes

As explained above, the property tax rate by city in Table 55 is applied to the property values in the Impact on Property Values section of this report to calculate the estimated impact on property tax revenues. Table 72 summarizes these estimated abutting property tax revenue impacts before, during, and after construction of the proposed highway facility. These revenue impacts are reported by route and by city.

The construction of the freeway has the greatest positive impact on property tax revenues along the central route. The estimated impacts are a 22 percent increase in property tax revenues along the central route after the project is complete, a 3 percent increase along the south route after the project is complete, and a 5 percent decrease in property tax revenues along the north route after completion of the project.

Table 65. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact During Construction of State Highway 199 Central Route in Study Area by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	14,998(41)	9,308(34)	-5,689	-38
Other retail/service	40,131(130)	26,884(105)	-13,248	-33
Total	55,129(171)	36,192(139)	-18,937	-34
Sansom Park Businesses				
Traffic serving	3,794(16)	3,043(12)	-751	-20
Other retail/service	9,062(84)	7,608(47)	-1,454	-16
Total	12,855(100)	10,650(59)	-2,205	-17
Fort Worth Businesses				
Traffic serving	1,273(7)	2,014(11)	+742	+58
Other retail/service	12,464(35)	14,722(46)	+2,258	+18
Total	13,737(42)	16,736(57)	+3,000	+22
River Oaks Businesses				
Traffic serving	814(5)	149(2)	-665	-82
Other retail/service	1,464(5)	584(3)	-880	-60
Total	2,278(10)	733(5)	-545	-24
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	861(3)	419(2)	-442	-51
Total	861(3)	419(2)	-442	-51
County Businesses				
Traffic serving	2,069(7)	1,423(5)	-646	-31
Other retail/service	7,396(37)	3,460(35)	-3,936	-53
Total	9,465(44)	4,883(40)	-4,582	-48

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 66. Estimated Abutting Business Gross Taxable Retail and Service Sales Impact After Construction of State Highway 199 Central Route in Study Area by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	14,998(41)	8,863(34)	-6,135	-41
Other retail/service	40,131(130)	25,387(105)	-14,745	-37
Total	55,129(171)	34,249(139)	-20,880	-38
Sansom Park Businesses				
Traffic serving	3,794(16)	3,397(13)	-397	-10
Other retail/service	9,062(84)	9,800(55)	+739	+8
Total	12,855(100)	13,197(68)	+342	+3
Fort Worth Businesses				
Traffic serving	1,273(7)	3,294(16)	+2,022	+159
Other retail/service	12,464(35)	21,984(76)	+9,520	+76
Total	13,737(42)	25,278(92)	+11,542	+84
River Oaks Businesses				
Traffic serving	814(5)	299(3)	-515	-63
Other retail/service	1,464(5)	1,195(5)	-269	-18
Total	2,278(10)	1,494(8)	-784	-34
Lakeside Businesses				
Traffic serving	00(0)	90(1)	+90	
Other retail/service	861(3)	697(2)	-164	-19
Total	861(3)	697(3)	-164	-19
County Businesses				
Traffic serving	2,069(7)	1,654(6)	-414	-20
Other retail/service	7,396(37)	5,340(23)	-2,056	-28
Total	9,465(44)	6,994(30)	-2,470	-26

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 67. Estimated Abutting Business Gross Taxable Retail and Service Sales During Construction of a Limited Access Freeway Bypass North of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING[1]	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	14,453(41)	13,816(42)	-638	-4
Other retail/service	40,775(130)	42,994(141)	+2,219	+5
Total	55,228(171)	56,809(184)	+1,581	+3
Sansom Park Businesses				
Traffic serving	3,231(17)	2,653(12)	-578	-18
Other retail/service	9,673(82)	10,794(87)	+1,120	+12
Total	12,905(99)	13,446(99)	+542	+4
Fort Worth Businesses				
Traffic serving	1,983(7)	2,615(9)	+631	+32
Other retail/service	11,557(37)	14,271(45)	+2,713	+23
Total	13,540(44)	16,885(54)	+3,345	+25
River Oaks Businesses				
Traffic serving	814(5)	149(2)	-665	-82
Other retail/service	1,464(5)	584(3)	-880	-60
Total	2,278(10)	733(5)	-545	-24
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	861(3)	419(2)	-442	-51
Total	861(3)	419(2)	-442	-51
County Businesses				
Traffic serving	2,076(7)	1,345(5)	-731	-35
Other retail/service	7,367(36)	3,163(17)	-4,204	-57
Total	9,444(43)	4,508(22)	-4,936	-52

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 68. Estimated Abutting Business Gross Taxable Retail and Service Sales After Construction of a Limited Access Freeway Bypass North of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	14,453(41)	10,143(43)	-4,311	-30
Other retail/service	40,775(130)	49,104(153)	+8,329	+20
Total	55,228(171)	59,247(196)	+4,018	+7
Sansom Park Businesses				
Traffic serving	3,231(17)	2,178(13)	-1,054	-33
Other retail/service	9,673(82)	12,890(94)	+3,217	+33
Total	12,905(99)	15,068(106)	+2,163	+17
Fort Worth Businesses				
Traffic serving	1,983(7)	3,678(11)	+1,695	+85
Other retail/service	11,557(37)	20,220(60)	+8,663	+75
Total	13,540(44)	23,898(72)	+10,358	+76
River Oaks Businesses				
Traffic serving	814(5)	299(0)	-515	-63
Other retail/service	1,464(5)	1,195(3)	-269	-18
Total	2,278(10)	1,494(4)	-784	-34
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	861(3)	697(2)	-164	-19
Total	861(3)	697(2)	-164	-19
County Businesses				
Traffic serving	2,076(7)	1,398(5)	-678	-33
Other retail/service	7,367(36)	4,936(22)	-2,431	-33
Total	9,444(43)	6,334(27)	-3,109	-33

[1]Based on 1989 data,State Comptroller's Office. Number of businesses is in parentheses.

Table 69. Estimated Abutting Business Gross Taxable Retail and Service Sales During Construction of a Limited Access Freeway Bypass South of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	DURING	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	14,453(41)	14,016(37)	-437	-3
Other retail/service	40,929(132)	43,357(127)	+2,427	+6
Total	55,383(173)	57,373(164)	+1,990	+4
Sansom Park Businesses				
Traffic serving	3,170(17)	2,836(12)	-334	-11
Other retail/service	8,594(85)	8,531(59)	-63	-1
Total	11,764(102)	11,367(71)	-397	-3
Fort Worth Businesses				
Traffic serving	2,007(7)	2,503(9)	+496	+25
Other retail/service	11,487(37)	13,638(44)	+2,151	+19
Total	13,494(44)	16,141(53)	+2,647	+20
River Oaks Businesses				
Traffic serving	814(4)	149(2)	-665	-82
Other retail/service	1,464(5)	584(3)	+880	-60
Total	2,278(9)	733(2)	-545	-24
Lakeside Businesses				
Traffic serving	00(0)	00(0)		
Other retail/service	861(3)	419(2)	-442	-51
Total	961(3)	419(2)	-442	-51
County Businesses				
Traffic serving	1,991(8)	1,254(5)	-737	-37
Other retail/service	9,268(35)	3,981(15)	-5,287	-57
Total	11,259(43)	5,235(19)	-6,024	-54

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 70. Estimated Abutting Business Gross Taxable Retail and Service Sales After Construction of a Limited Access Freeway Bypass South of State Highway 199 by City and Type of Business.

CITY AND TYPE OF BUSINESS	GROSS TAXABLE SALES($000)		ESTIMATED CHANGE	
	BEFORE[1]	AFTER	ACTUAL ($000)	PERCENT
Lake Worth Businesses				
Traffic serving	14,453(41)	10,544(44)	-3,909	-27
Other retail/service	40,929(132)	49,849(155)	+8,919	+22
Total	55,383(173)	60,393(199)	+5,010	+9
Sansom Park Businesses				
Traffic serving	3,170(17)	2,676(13)	-494	-16
Other retail/service	8,594(85)	10,940(66)	+2,342	+27
Total	11,764(102)	13,616(79)	+1,849	+16
Fort Worth Businesses				
Traffic serving	2,007(7)	3,269(11)	+1,261	+63
Other retail/service	11,487(37)	19,007(58)	+7,520	+65
Total	13,494(44)	22,276(69)	+8,782	+65
River Oaks Businesses				
Traffic serving	814(4)	299(1)	-515	-63
Other retail/service	1,464(5)	1,195(3)	+269	+18
Total	2,278(9)	1,494(4)	-784	-34
Lakeside Businesses				
Traffic serving	00(0)	92(0)	+92	
Other retail/service	861(3)	697(3)	-164	-19
Total	861(3)	697(3)	-164	-19
County Businesses				
Traffic serving	1,991(8)	1,266(5)	-725	-36
Other retail/service	9,268(35)	5,934(19)	-3,334	-36
Total	11,259(43)	7,201(24)	-4,059	-36

[1]Based on 1989 data, State Comptroller's Office. Number of businesses is in parentheses.

Table 71. Estimated Abutting Wholesale and Manufacturing Business Sales Tax Revenue Impact Before, During, and After Construction of State Highway 199 in Study Area by Route.

ROUTE	SALES TAX REVENUE[1] ($)			CHANGE[2]	
	BEFORE	DURING	AFTER	ACTUAL	PERCENT
Central Route	1,828	1,050	2,075	+248	+13
North Route	1,828	4,671	7,231	+5,403	+298
South Route	1,828	2,382	8,322	+6,494	+358

[1]Based on 1989 data, State Comptroller's Office.

[2]Calculated as the actual and percent change between the before and after periods.

Table 72. Estimated Abutting Property Tax Revenue Impact Before, During, and After Construction of State Highway 199 in Study Area by Route and City.

ROUTE AND CITY	PROPERTY TAX REVENUE($)[1]			CHANGE[2]	
	BEFORE	DURING	AFTER	ACTUAL($)	PERCENT
Central Route					
Lake Worth	185,836	168,101	184,266	-1,570	-1
Sansom Park	125,838	125,767	138,118	+12,280	+10
Fort Worth	109,912	120,863	206,685	+96,773	+88
River Oaks	26,450	16,323	19,130	-7,320	-28
Lakeside	6,767	8,126	9,922	+3,150	+47
Tarrant County	21,576	20,372	24,174	+2,598	+12
Total	476,379	459,552	582,295	+105,916	+22
North Route					
Lake Worth	141,081	160,965	180,326	+39,245	+28
Sansom Park	74,974	81,587	95,113	+20,138	+27
Fort Worth	258,056	123,227	155,165	-102,891	-40
River Oaks	22,951	16,825	28,823	+5,872	+26
Lakeside	5,387	6,001	8,037	+2,650	+49
Tarrant County	23,562	23,709	30,113	+6,551	+28
Total	526,011	412,314	497,577	-28,434	-5
South Route					
Lake Worth	164,834	168,885	192,596	+27,762	+17
Sansom Park	78,197	77,558	88,531	+10,334	+13
Fort Worth	266,223	154,334	227,188	-39,035	-13
River Oaks	25,081	19,275	29,063	+3,982	+16
Lakeside	5,414	6,545	8,133	+2,719	+50
Tarrant County	25,534	27,520	34,649	+9,115	+36
Total	565,283	454,117	580,160	+14,877	+3

[1]Based on 1989 data, State Comptroller's Office.

[2]Calculated as the actual and percent change between the before and after periods.

IMPACT ON RELOCATION EMPLOYMENT AND INCOME

This section covers the impact of the proposed routes on relocation of businesses and residents and changes in employment and personal income. Each of these types of impact can have a significant effect on the businesses and residents located in the study area, especially those abutting the existing or proposed routes. They are discussed separately below.

Relocation Impact

Relocation costs and effects on those displaced by the right of way takings of any highway project are of major concern and need to be considered in any decision to select a route alternative to implement. The estimated relocation costs shown in Table 73 are supplied by the District 2 personnel. The number of relocatees are also shown in Table 73.

The relocation impacts are presented separately on a route and city basis. Not all of the relocatees of each type would have to move from their present location. Some of them would have minor buildings, signs, etc. relocated or purchased. However, most of the relocatees of each route or city would have to physically move. Also, the business relocatees include open and closed businesses.

Route

As can be seen in Table 73, anyone of the three route alternatives would have a considerable impact on businesses and/or residents abutting or in the path of the proposed right of way. The central route would displace the most businesses and the south route would displace the residents. All of the routes would either displace a large number of businesses or a large number of residents. The central and south routes would displace a

Table 73. Estimated Relocation Impact on Businesses, Residents and Other Relocatees for Each Route Alternative.[1]

ROUTE BY TYPE OF RELOCATEE	NUMBER OF RELOCATEES	ESTIMATED COST PER RELOCATEE	TOTAL COST OF RELOCATION
Central Route			
Business	156	11,072	1,727,168
S.F. Residents	21	19,762	415,000
M.F. Residents	81	5,284	428,000
Mobile Homes	41	5,073	208,000
Churches	3	11,143	33,428
Total	302	9,310	2,811,596
North Route			
Business	65	8,567	556,836
S.F. Residents	83	13,864	1,150,719
M.F. Residents	0		0
Mobile Homes	15	5,334	80,013
Churches	3	12,143	36,428
Total	166	10,988	1,823,996
South Route			
Business	96	16,151	1,550,460
S.F. Residents	144	8,472	1,220,000
M.F. Residents	138	9,275	1,280,000
Mobile Homes	3	5,000	15,00
Churches	4	8,134	32,536
Total	385	10,644	4,097,996

[1]Business relocatees include not only those losing a primary building open or closed for business but also those having signs, other buildings, etc. displaced or moved. Residential relocatees includes those displaced from single family dwellings, apartment houses and trailer houses.

significant number residents of mobile homes or apartment houses. According to Tables 31-33 on pages 70-72, the estimated number of new businesses and residences that might be built due to a new highway route would not be enough to offset the number displaced, except with the north route where commercial land uses would actually increase by twelve percent. There would be a eleven percent decline in commercial and residential land use with the central route improvement, and an even greater decline in those two uses combined for the south route.

The estimated effects of relocation are obtained from several previous relocation studies done in Texas [22,23,24,25,26]. Residential relocatees receive more financial assistance to relocate into safe, decent and sanitary housing. They not only receive adequate differential housing or rental supplements, but their moving expenses are paid in full. Most residential relocatees voluntarily upgrade into better quality dwellings. On the other hand, business relocatees receive only payment for their moving expenses. About 25% of the business relocatees choose not to relocate or to continue their businesses elsewhere, and another 10 percent close their business after relocating. Those that relocate their businesses lose a considerable amount of gross sales during and after they move, but over 75% of their customers are the same if they relocate in the same general area. Finally, most of the residential and business relocatees assume more debt than before they moved, with most of it due to upgrading their dwellings or businesses.

City Impact

Tables 74-76 show the city relocation costs for each route, respectively. Table 74 shows the city breakdown of relocation costs by type of relocatee for the central route. Lake Worth and Sansom Park would have the largest number of business relocatees. Fort

Table 74. Estimated Relocation impact on Business, Residents and Other Relocatees For the Central Route by City.

CITY AND TYPE OF RELOCATEE	NUMBER OF RELOCATEES	ESTIMATED COST PER RELOCATEE	ESTIMATED TOTAL COST
FORT WORTH			
Business	7	7,844	54,908
S.F. Residents	13	16,538	215,000
M.F. Residents	0		0
Mobile Homes	32	5,188	166,000
Churches	1	15,000	15,000
Total	53	8,508	450,908
TARRANT COUNTY			
Business	34	6,068	206,313
S.F. Residents	7	26,429	185,000
M.F. Residents	0		0
Mobile Homes	1	10,000	10,000
Churches	1	6,428	6,428
Total	43	9,482	407,741
LAKESIDE			
Business	3	5,000	15,000
S.F. Residents	0		0
M.F. Residents	0		0
Mobile Homes	0		0
Churches	0		0
Total	3	5,000	15,000
LAKE WORTH			
Business	60	13,969	838,115
S.F. Residents	0		0
M.F. Residents	81	5,284	428,000
Mobile Homes	0		0
Church	1	12,000	12,000
Total	142	9,001	1,278,115
SANSOM PARK			
Business	42	12,496	524,832
S.F. Residents	1	15,000	15,000
M.F. Residents	0		0
Mobile Homes	8	4,000	32,000
Church	0		0
Total	51	11,212	571,832
RIVER OAKS			
Business	10	8,800	88,000
S.F. Residents	0		0
M.F. Residents	0		0
Mobile Home	0		0
Churches	0		0
Total	10	8,800	88,059

Table 75. Estimated Relocation impact on Business, Residents and Other Relocatees For the North Route by City.

CITY AND TYPE OF RELOCATEE	NUMBER OF RELOCATEES	ESTIMATED COST PER RELOCATEE	ESTIMATED TOTAL COST
FORT WORTH			
Business	10	6,473	64,725
S.F. Residents	58	15,211	882,253
M.F. Residents	0		0
Mobile Homes	4	4,211	16,845
Churches	1	15,000	15,000
Total	72	13,595	978,823
TARRANT COUNTY			
Business	34	7,796	265,056
S.F. Residents	8	25,662	205,298
M.F. Residents	0		0
Mobile Homes	1	10,528	10,528
Churches	1	6,428	6,428
Total	44	11,075	487,310
LAKESIDE			
Business	3	5,000	15,000
S.F. Residents	0		0
M.F. Residents	0		0
Mobile Homes	0		0
Churches	0		0
Total	3	5,000	15,000
LAKE WORTH			
Business	0		0
S.F. Residents	0		0
M.F. Residents	0		0
Mobile Homes	0		0
Church	0		0
Total	0		0
SANSOM PARK			
Business	8	15,507	124,055
S.F. Residents	17	3,716	63,168
M.F. Residents	0		0
Mobile Homes	10	5,264	52,640
Church	1	1,500	15,000
Total	36	7,282	254,863
RIVER OAKS			
Business	10	8,800	88,000
S.F. Residents	0		0
M.F. Residents	0		0
All Others	0		0
Total	10	8,800	88,000

Table 76. Estimated Relocation impact on Business, Residents and Other Relocatees For the South Route by City.

CITY AND TYPE OF RELOCATEE	NUMBER OF RELOCATEES	ESTIMATED COST PER RELOCATEE	ESTIMATED TOTAL COST
FORT WORTH			
Business	15	62,619	939,282
S.F. Residents	24	15,833	380,000
M.F. Residents	66	758	50,000
Mobile Homes	3	5,000	15,000
Churches	0		0
Total	108	12,817	1,384,282
TARRANT COUNTY			
Business	31	6,239	193,419
S.F. Residents	5	15,000	75,000
M.F. Residents	0		0
Mobile Homes	0		0
Churches	1	6,428	6,428
Total	37	7,428	274,848
LAKESIDE			
Business	3	5,000	15,000
S.F. Residents	0		0
M.F. Residents	0		0
Mobile Homes	0		0
Churches	0		0
Total	3	5,000	15,000
LAKE WORTH			
Business	2	13,989	27,978
S.F. Residents	82	3,293	270,000
M.F. Residents	72	17,083	1,230,000
Mobile Homes	0	0	0
Church	2	9,554	19,108
Total	158	9,792	1,547,086
SANSOM PARK			
Business	35	8,194	286,780
S.F. Residents	33	15,000	495,000
M.F. Residents	0		0
Mobile Homes	0		0
Church	1	7,000	7,000
Total	69	11,432	788,780
RIVER OAKS			
Business	10	8,800	88,000
S.F. Residents	0		0
M.F. Residents	0		0
Mobile Homes	0		0
Churches	0		0
Total	10	8,800	88,000

Worth and Lake Worth would have the most residential relocatees. The relocation costs reflect about the same pattern as the number of relocatees and are distributed accordingly. Table 75 shows the city breakdown for the north route. It shows that most of the business relocatees would be located in Tarrant County, and most of the resident relocatees would be located in Fort Worth. Again the relocation costs are distributed accordingly. Table 76 shows the city breakdown for the south route, and shows that most of the business relocatees would be located in Samson Park and Tarrant County. Lake Worth and Fort Worth would have the vast majority of residential relocatees. The relocation costs like-wise are higher for those cities.

Employment Impact

Each of the proposed route alternatives would have a significant employment impact on the area under study. As a part of the total impact, a portion would be due to the net change (existing businesses before construction less displaced businesses plus new businesses after construction) in employment by businesses locating abutting the existing and proposed routes, and another portion would be employment resulting from construction expenditures by the highway contractor to build the new facility and from construction expenditures by building contractors to build new businesses and residences or renovate old business houses or residences abutting the existing and proposed routes. The abutting businesses and residences would be considered to be directly influenced in choosing that location due to the new highway route.

Estimating Methodology

To estimate the impact on business employment, the following steps are taken:

1. Separate the affected firms (existing, displaced or new) into two groups; commercial firms and industrial firms. Industrial firms usually have more employees than commercial firms, and so the employment of two groups have to be estimated separately .

2. Estimate the number of employees of the two groups of firms for the before and after construction periods by using the average number of employees per firm for each group of firms operating in the affected cities for each route computed from the latest U.S. Bureau of Census data. The numbers used in this study are from the 1987 Censuses of Retail Trade, Service Industries, Wholesale Trade and Manufacturers. Since this data source does not give the number of employees for non-payroll firms, it is assumed that each of the non-payroll commercial firms have only two employees, and industrial firms only have payroll employees.

3. Add the estimated number of employees of commercial firms to the number of employees of industrial firms by city for each route.

To estimate the employment impact of highway and residential and commercial/industrial building construction, the following steps should be taken:

1. Estimate the total construction cost of each city for each proposed route and the total construction cost of commercial/industrial buildings and single family residences of each city for each route. In this study, the District 2 personnel furnished route estimates all of the above costs. The route construction costs estimates are broken down by city based on the miles of each route in each city. In

the case of building costs, only whole building values are used to arrive at an average building value for commercial/industrial buildings and for single family residences. It is assumed that about half of the new businesses will occupy renovated buildings and half will occupy new buildings. Therefore, the average of whole existing structures is a reasonable compromise value for the buildings occupied by the new businesses. All of the new residential buildings are assumed to be single family structures.

2. Estimate the number of employees that might be generated in the Texas economy due to each of the above types of construction. The latest (1989) input-out model estimates of the "full effect" employment multipliers are obtained from a report published by the Texas Comptroller of Public Accounts [27]. These multipliers are adjusted by the Consumer Price Index so that the construction dollars spent represent 1986 dollar values, making the employment estimates more accurate. The appropriate adjusted multiplier, which represents the number of employees generated by each 1 million dollars of construction expenditures, is then multiplied by the corresponding total construction expenditures to obtain the estimated number of employees generated or required for all sectors of the Texas economy by expenditures. Caution should be exercised not to assume that all of the construction employment impact estimated by using the input-output multipliers will occur in the local area. If all of the funds for these expenditures come from outside the local communities involved and are spent in those communities to hire local labor and by materials produced locally, then most of the employment impact may occur in the

local area. The employment effects from locally generated funds for building construction is much harder to measure and trace through the economy.

Business Employment Impact

Table 77 shows the estimated employment impact on business employment in each affected city for each route. The number of firms are shown in parentheses beside the corresponded employment estimate, except in the percent change column where it is also a percent. According Table 77, the central route would generate the least amount of new business employment, whereas, the north route would generate the most amount of new business employment.

Of the cities impacted by the three route alternatives, Fort Worth is the only one that generates much new business employment due to any of the proposed routes. For the central route, most of the cities produce a net decrease in business employment. For the north route, all of the cities produce a net increase in business employment. Only Tarrant County would experience a decrease. For the south route, only Fort Worth and Lake Worth experience a net increase in business employment.

Construction Employment Impact

Table 78 shows the estimated construction employment impact for each of the proposed routes. The north route produces the greatest amount of highway and building construction employment. The south route runs a close second. The central route produces about 1300 fewer employees than the north route. Of the two types of construction expenditures, highway construction expenditures produce by far the most employment impact.

Tables 79-81 show the construction employment impact on each city for each route.

Table 77. Estimated Employment Impact on Businesses Directly Affected by Each Route Alternative by City.

CITY AND STATUS OF BUSINESS	NUMBER OF EMPLOYEES AND BUSINESS[2]		ESTIMATED CHANGE	
	BEFORE	AFTER	NUMBER	PERCENT
Central Route				
Fort Worth	233(42)	526(93)	293(51)	126(121)
Tarrant County	359(45)	249(31)	-110(-14)	-31(-31)
Lake Side	13(3)	13(3)	0(0)	0(0)
Lake Worth	1,756(173)	1,874(185)	118(-12)	-7(7)
Sansom Park	442(102)	303(70)	-139(-32)	-31(-31)
River Oaks	53(10)	21(4)	-32(-6)	-60(-60)
Total	2,856(375)	2,985(386)	130(11)	5(3)
North Route				
Fort Worth	244(44)	489(78)	245(34)	100(77)
Tarrant County	351(44)	225(28)	-126(-16)	-36(-36)
Lake Side	13(3)	9(2)	-4(-1)	31(33)
Lake Worth	1,740(171)	1,994(196)	254(25)	15(15)
Sansom Park	429(99)	460(106)	31(7)	7(7)
River Oaks	53(10)	58(5)	5(-5)	9(-50)
Total	2,830(371)	3,235(415)	405(44)	14(12)
South Route				
Fort Worth	244(44)	443(73)	199(29)	82(66)
Tarrant County	351(44)	215(26)	-136(-18)	-39(-41)
Lake Side	13(3)	13(3)	0(0)	(0)
Lake Worth	1,768(174)	2,041(201)	273(27)	15(16)
Sansom Park	446(103)	351(81)	-95(-22)	-21(-21)
River Oaks	53(10)	42(5)	-11(-5)	-21(-50)
Total	2,875(378)	3,105(389)	230(11)	8(3)

[2]Based on the number of payroll employees per firm adjusted to include an estimate on non-payroll employees reported in the 1987 Censuses of Retail Trade, Service Industries, Wholesale Trade and Manufactures. Each non-payroll business is assumed to have two (2) employees. The numbers and percentages of businesses are in parentheses.

Table 78. Estimated Impact of Highway and Building Construction Expenditures on Employment for Each Route.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	EMPLOYMENT MULTIPLIER[1] (PER MILL $)	EMPLOYEES REQUIRED (ALL SECTORS)
Central Route			
Highway Improvement	115,200	47.3325	5,453
Commercial/Industrial buildings	14,489	38.9937	565
Residential	196	33.3668	8
Total	129,885		6,026
North Route			
Highway Improvement	148,900	47.3325	7,048
Commercial/Industrial buildings	6,257	38.9937	243
Residential	772	33.3668	26
Total	155,929		7,319
South Route			
Highway Improvement	136,900	47.3325	6,480
Commercial/Industrial buildings	6,593	38.9937	256
Residential	530	33.3668	18
Total	144,023		6,754

[1]Based on multipliers in a report published in 1986 by the Texas Comptroller of Public Accounts [27].

Table 79. Estimated Impact of Highway and Building Construction Expenditures on Employment for Central Route by City.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	EMPLOYMENT MULTIPLIER (PER MILL $)	EMPLOYEES REQUIRED (ALL SECTORS)
Fort Worth			
Highway Improvement	50,926	47.3325	2,410
Commercial/Industrial buildings	1,680	38.9937	66
Residential	47	33.3668	2
Tarrant County			
Highway Improvement	14,230	47.3325	674
Commercial/Industrial buildings	624	38.9937	24
Residential	78	33.3668	3
Lake Side			
Highway Improvement	4,471	47.3325	212
Commercial/Industrial buildings	240	38.9937	9
Residential	0	33.3668	0
Lake Worth			
Highway Improvement	18,580	47.3325	879
Commercial/Industrial buildings	9,505	38.9937	371
Residential	23	33.3668	1
Sansom Park			
Highway Improvement	21,057	47.3325	997
Commercial/Industrial buildings	2,299	38.9937	90
Residential	47	33.3668	2
River Oaks			
Highway Improvement	5,937	47.3325	281
Commercial/Industrial buildings	141	38.9937	5
Residential	0	33.3668	0

Table 80. Estimated Impact of Highway and Building Construction Expenditures on Employment for North Route by City.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	EMPLOYMENT MULTIPLIER (PER MILL $)	EMPLOYEES REQUIRED (ALL SECTORS)
Fort Worth			
Highway Improvement	108,539	47.3325	5137
Commercial/Industrial buildings	1,260	38.9937	49
Residential	619	33.3668	21
Tarrant County			
Highway Improvement	15,332	47.3325	726
Commercial/Industrial buildings	536	38.9937	21
Residential	130	33.3668	4
Lake Side			
Highway Improvement	4,973	47.3325	235
Commercial/Industrial buildings	120	38.9937	5
Residential	0	33.3668	0
Lake Worth			
Highway Improvement	0	47.3325	0
Commercial/Industrial buildings	300	38.9937	12
Residential	0	33.3668	0
Sansom Park			
Highway Improvement	13,454	47.3325	637
Commercial/Industrial buildings	1,455	38.9937	57
Residential	22	33.3668	1
River Oaks			
Highway Improvement	6,603	47.3325	313
Commercial/Industrial buildings	2,586	38.9937	101
Residential	0	33.3668	0

Table 81. Estimated Impact of Highway and Building Construction Expenditures on Employment for South Route by City.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	EMPLOYMENT MULTIPLIER (PER MILL $)	EMPLOYEES REQUIRED (ALL SECTORS)
Fort Worth			
Highway Improvement	66,528	47.3325	3149
Commercial/Industrial buildings	1,080	38.9937	42
Residential	151	33.3668	5
Tarrant County			
Highway Improvement	14,968	47.3325	709
Commercial/Industrial buildings	516	38.9937	20
Residential	111	33.3668	4
Lake Side			
Highway Improvement	5,500	47.3325	260
Commercial/Industrial buildings	240	38.9937	9
Residential	0	33.3668	0
Lake Worth			
Highway Improvement	17,228	47.3325	815
Commercial/Industrial buildings	1,450	38.9937	56
Residential	170	33.3668	6
Sansom Park			
Highway Improvement	25,374	47.3325	1,201
Commercial/Industrial buildings	720	38.9937	28
Residential	98	33.3668	3
River Oaks			
Highway Improvement	7,302	47.3325	346
Commercial/Industrial buildings	2,587	38.9937	101
Residential	0	33.3668	0

All of the cities would be impacted by highway construction expenditures that produce new jobs. Fort Worth would receive a much greater impact than the other cities, regardless of route. The building construction expenditures would produce the greatest impact on Lake Worth for the central route alternative. River Oaks would receive the greatest impact from building construction expenditures for the north and south route alternatives.

Construction Expenditure Output Impact

Construction expenditures to build highway improvements and buildings for businesses and residences produce not only an employment impact but also an output or total demand effect. Total output multipliers have been developed to estimate these effects. As this construction money circulates through the local, state, and even national economy, they may produce three levels of impacts: (1) the direct impact of the actual expenditures, (2) the indirect impact in supply industries and (3) the induced impact of increased consumer spending. As in the case of the employment impacts, if the source of these expenditures is from the outside of the local area, most of the final demand output effects may be realized. The amount of the output impact received locally depends on how much is spend for local labor, services and supplies. Updated "full effect" output multipliers estimated by Texas Input-Output Model are used in this study to estimate the output impacts of the proposed highway construction expenditures and commercial/industrial and single family residential building expenditures. The appropriate multipliers are multiplied by the amount of expenditures of that type to yield the final output estimates.

Table 82 shows the estimated impact of highway and building construction expenditures on final output. The north route is estimated to produce the most construction

Table 82. Estimated Impact of Highway and Building Construction Expenditures on Output for Each Route.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	OUTPUT MULTIPLIER[1] (PER DOLLAR)	ADDITIONAL OUTPUT IN ($000)
Central Route			
Highway Improvement	115,200	3.6885	424,915
Commercial/Industrial buildings	14,489	3.2873	47,629
Residential	196	3.2435	637
Total	129,885		473,181
North Route			
Highway Improvement	148,900	3.6885	549,218
Commercial/Industrial buildings	6,257	3.2873	20,569
Residential	772	3.2435	2,503
Total	155,929		581,165
South Route			
Highway Improvement	136,900	3.6885	504,956
Commercial/Industrial buildings	6,593	3.2873	21,673
Residential	530	3.2435	1,719
Total	144,043		528,348

[1]Based on multipliers in a report published in 1986 by the Texas Comptroller of Public Accounts [27].

expenditure induced impact on final output, and the central route would produce the least.

Tables 83-85 show the amount of construction expenditures impact on final output for each city by route. Fort Worth is impacted the most regardless of route alternative, and River Oaks is impacted the least. Fort Worth, Lakeside, Sansom Park and River Oaks are impacted the most by the south route, and Lake Worth is impacted the most by the central route. Tarrant County is impacted the most by the north route. Also, Fort Worth, Tarrant County, Lakeside and River Oaks are impacted the least by the central route, and Lake Worth and Sansom Park are impacted the least by the north route.

Table 83. Estimated Impact of Highway and Building Construction Expenditures on Output for Central Route by City.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	OUTPUT MULTIPLIER (PER DOLLAR)	ADDITIONAL OUTPUT IN ($000)
Fort Worth			
Highway Improvement	50,926	3.6885	187,839
Commercial/Industrial buildings	1,680	3.2873	5,523
Residential	47	3.2435	153
Tarrant County			
Highway Improvement	14,230	3.6885	52,486
Commercial/Industrial buildings	624	3.2873	2,050
Residential	78	3.2435	254
Lake Side			
Highway Improvement	4,471	3.6885	16,492
Commercial/Industrial buildings	240	3.2873	789
Residential	0	3.2435	0
Lake Worth			
Highway Improvement	18,580	3.6885	68,533
Commercial/Industrial buildings	9,505	3.2873	31,249
Residential	23	3.2435	77
Sansom Park			
Highway Improvement	21,057	3.6885	77,667
Commercial/Industrial buildings	2,299	3.2873	7,555
Residential	47	3.2435	153
River Oaks			
Highway Improvement	5,937	3.6885	21,898
Commercial/Industrial buildings	141	3.2873	463
Residential	0	3.2435	0

Table 84. Estimated Impact of Highway and Building Construction Expenditures on Output for North Route by City.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	OUTPUT MULTIPLIER (PER DOLLAR)	ADDITIONAL OUTPUT IN ($000)
Fort Worth			
Highway Improvement	108,539	3.6885	400,344
Commercial/Industrial buildings	1,260	3.2873	4,142
Residential	619	3.2435	2,009
Tarrant County			
Highway Improvement	15,332	3.6885	56,551
Commercial/Industrial buildings	536	3.2873	1,761
Residential	130	3.2435	423
Lake Side			
Highway Improvement	4,973	3.6885	18,343
Commercial/Industrial buildings	120	3.2873	394
Residential	0	3.2435	0
Lake Worth			
Highway Improvement	0	3.6885	0
Commercial/Industrial buildings	300	3.2873	9,862
Residential	0	3.2435	0
Sansom Park			
Highway Improvement	13,454	3.6885	49,624
Commercial/Industrial buildings	1,455	3.2873	4,783
Residential	22	3.2435	71
River Oaks			
Highway Improvement	6,603	3.6885	24,356
Commercial/Industrial buildings	2,586	3.2873	8,502
Residential	0	3.2435	0

Table 85. Estimated Impact of Highway and Building Construction Expenditures on Output for South Route by City.

LOCATION AND TYPE OF CONSTRUCTION	TOTAL EXPENDITURES ($000)	OUTPUT MULTIPLIER (PER DOLLAR)	ADDITIONAL OUTPUT IN ($000)
Fort Worth			
Highway Improvement	66,528	3.6885	245,387
Commercial/Industrial buildings	1,080	3.2873	3,551
Residential	151	3.2435	491
Tarrant County			
Highway Improvement	14,968	3.6885	55,213
Commercial/Industrial buildings	516	3.2873	1,695
Residential	111	3.2435	360
Lake Side			
Highway Improvement	5,500	3.6885	20,284
Commercial/Industrial buildings	240	3.2873	790
Residential	0	3.2435	0
Lake Worth			
Highway Improvement	17,228	3.6885	63,546
Commercial/Industrial buildings	1,450	3.2873	4,767
Residential	170	3.2435	551
Sansom Park			
Highway Improvement	25,374	3.6885	93,593
Commercial/Industrial buildings	720	3.2873	2,367
Residential	98	3.2435	316
River Oaks			
Highway Improvement	7,302	3.6885	26,933
Commercial/Industrial buildings	2,587	3.2873	8,504
Residential	0	3.2435	0

IMPACT ON HIGHWAY USERS

Users of any segment of a highway system experience what is called highway user costs. These costs are traditionally classified into three types: (1) time or delay costs, (2) vehicle operating costs and (3) accident costs. One of the ways to justify improving a segment of an existing highway or bypassing the existing segment with a new segment is to be able to show that the money required to pay for and maintain the improvement will produce an even greater dollar amount of user cost savings. Therefore, the State Highway 199 proposed improvement project is being evaluated for the same reason in this study. The methodology, data requirements and the estimated impact on highway users of this segment of the highway are presented below.

Methodology and Data Requirements

The third version of Highway Economic Evaluation Model (HEEM-III) is used to estimate the use cost savings that might result from implementing either of the proposed routes, namely, the central route, the north route or the south route. HEEM-III, which is the SDHPT's official user cost estimating model is designed to effectively estimate the user costs of either widening the existing facility or bypassing the existing facility. This model is also equipped to handle induced traffic that is apparently occurring in this segment of SH 199.

Design and Traffic Data

The basic design and traffic volumes for the existing and proposed routes needed as model input data are presented in Table 1 of the introductory section of the report. Also, the total length of the existing and proposed routes is presented in Table 1. The other

detailed local and through traffic projections needed as model inputs were obtained from TTI's Arlington office. No detailed explanation is given in this report on the methods used to generate these traffic projections. However, they are based on 1988 peak hour machine and manual counts along the existing highway. An annual growth rate of 3% is used to make the 2012 projections for the existing and proposed routes in the improved state. The existing route volumes are split between local and through traffic as follows: local 32% and through 68%. The projections for the existing route remaining in the unimproved state are based on a historical series of SH 199 and intersectional counts dating back to 1963 and applying a 2.4% annual growth rate. The intersections analyzed by the model for each route are as follows:

Central Route

Surfside Drive, Foster Drive/Hodgkins Road, Merrett/Azle Avenue, Roberts Cut-off Road, Skyline Drive, Long Avenue and SH 183.

North Route

Existing SH 199 near Love Circle,Hodgkins Road, Boat Club Road, IH 820, Azle Avenue, McCandless Avenue, Existing SH 199 near Long Avenue and SH 183.

South Route

Existing SH 199 near Midland Drive, Surfside/Watercress, Charbonneau Road at Shawnee Trail, IH 820, Roberts Cut-off, SH 199 between Cheyenne Street and Skyline Drive, Long Avenue and SH 183.

Problem Assumptions

The problem assumptions for each of the proposed routes are listed in Table 86. Also, the HEEM-III unit costs are updated to 1990. the steam of user costs are discounted back to 1992, considered in the analysis as the current year. Table 87 gives a more detailed breakdown of the total construction costs, divided into construction, right of way and relocation costs. No additional alternate route besides the existing SH 199 is assumed in the model.

Highway User Cost Impact

The estimated highway user cost savings by route alternative are presented in Table 88. These savings are broken down into delay savings, operating cost savings and accident cost savings. Also given, are the savings of each type for Year 1, Year 20 and the 20 year total. The south route would produce the most delay cost, operating cost savings and accident cost savings over the 20 year life of the improvement. The central route would produce the least delay savings and accident cost savings.

To generate a benefit to cost ratio, the stream of benefits and costs over the 20 year period assumed to be the life of the improvement is discounted back to 1992, the first year that the improvement is assumed to be operational. The construction costs do not have maintenance costs included, so there are no construction costs that will be incurred during the life of improvement. Hence, these costs are not discounted. Table 89 shows the level of discounted user benefits for each route alternative. As can be seen, the proposed south route would produce the most user benefits and the proposed north route the least. On the otherhand, the proposed central route would cost the least to construct and the south route

Table 86. Problem Assumptions.

	CENTRAL	NORTH	SOUTH
Current Year	1992	1992	1992
Discount Rate (%)	8	8	8
Analysis Period	20	20	20
Type of Traffic Growth Rate	Constant	Constant	Constant
Car Value of Time per Person ($/hr)	8.58	8.58	8.58
Truck Value of Time per Person ($/hr)	20.39	20.39	20.39
Car Occupancy Rate	1.30	1.30	1.30
Truck Occupancy Rate	1.00	1.00	1.00
Percent Truck	10	10	10
Total Construction Cost	145,890,072	176,819,672	175,855,997
Year When Improvement Completed	1993	1993	1993
Operating Cost and Accident Cost Update Factor	1.00	1.00	1.00

Table 87. Estimated Construction, Right of Way and Relocation Costs of Each Route Alternative in 1992.[1]

TYPE OF COST	CENTRAL ROUTE	NORTH ROUTE	SOUTH ROUTE
Construction	115,200,000	148,900,000	136,900,000
Right of Way	27,878,476	26,095,676	34,988,000
Relocation	2,811,596	1,823,996	4,097,996
Total	145,890,072	176,819,672	175,855,997

[1]Estimates made by SDHPT District 2 personnel in 1991 and updated to 1992 based on a 6 % inflation rate. These costs represent the segment of existing or improved route between 0.45 mile east of FM 1886 and 0.06 mile east of SH 183.

Table 88. Estimated Highway User Cost Savings by Route Alternative.[2]

TYPE OF SAVINGS BY YEAR	CENTRAL ROUTE	NORTH ROUTE	SOUTH ROUTE
	(Thousand $)		
Delay Savings			
Year 1	23,004.78	21,155.94	23,056.57
Year 20	25,395.13	25,654.61	32,993.40
20 Year Total	512,658.70	501,914.40	580,910.60
Operating Cost Savings			
Year 1	4,109.93	2,047.46	4,906.36
Year 20	2,455.74	1,630.62	3,375.25
20 Year Total	65,054.77	37,977.03	81,178.98
Accident Cost Savings			
Year 1	360.85	393.86	404.72
Year 20	144.37	159.17	212.15
20 Year Total	4,742.72	5,198.41	5,850.16
Total Cost Savings			
Year 1	27,475.56	23,597.27	28,367.65
Year 20	27,995.24	27,444.40	36,580.79
20 Year Total	582,456.30	545,089.90	667,940.10

[2]Based on data furnished by TTI's Arlington personnel and analyzed in the HEEM-III Highway Economic Evaluation Model by comparing user costs of the existing route with each route alternate from 0.45 miles east of FM 1886 and 0.06 miles east of SH 183.

Table 89. Benefit-Cost Ratio.

	CENTRAL ROUTE	NORTH ROUTE	SOUTH ROUTE
Total Discounted User Benefits (Mill $)	582.46	545.09	667.94
Discounted Construction Cost (Mill $)	145.89	176.81	175.86
Benefit-Cost Ratio	3.99	3.08	3.80

would cost the most to construct. As a result, the benefit-to-cost ratio for the central route is the highest of three route alternatives, but it is only slightly higher than the one for the south route. The north route produces the lowest ratio. Since all three the ratios are above 1.0, they all are economically feasible.

An incremental benefit-cost analysis can be used to compare routes. The north route costs $30.82 million more than the central route but has $37.37 million less benefits, giving a negative incremental benefit-cost ratio of -1.21. Similarly, the north route costs $1 million more than the south route but has $123.32 million less benefits, giving a benefit cost ratio of -123.32 for the north-south comparison. From a benefit-cost analysis viewpoint, the north route is clearly inferior to both the central route and the south route since it costs more but gives less benefits (savings in user costs).

The south route costs $29.97 million more than the central route and has $85.48 more benefits for an incremental benefit-cost ratio of 2.85. This indicates, from a user cost savings viewpoint, that the extra investment required for the south route would be justified from a user cost viewpoint if sufficient funds were available for this increment of investment.

COMPARISON WITH PRIOR STATE HIGHWAY 10 PROJECT

State Highway 10 on the east side of Fort Worth traverses Hurst and Euless and was once the primary route for State Highway 183 until about 1970 when the new route, now known as Airport Freeway and SH 183, was opened for traffic. Since the new route ties in with the Loop IH 820 much of the traffic that formerly used the old route switched to the new route, thus effectively bypassing businesses and residents located along the old route. Most of the remaining traffic consisted of people employed by industry abutting the old route or local area traffic circulation.

Similarities and Dissimilarities of the Routes and Affected Areas

In some respects, what has happened to business activity along the old SH 183 (now SH 10) could provide an indication of what might happen if the north or south bypass route for SH 199 is built and bypasses many of the businesses located along the existing route in the cities of Lake Worth and Sansom Park. The professional real estate people interviewed know both areas and are divided as to the comparability of the two areas. One says that the two areas are not comparable and still another says that they are comparable. Another says that there some similarities and some dissimilarities between the two areas. There are indeed some similarities and some dissimilarities between the two projects and affected areas. The similarities are as follows:

1. The new route is a controlled access freeway.
2. The existing routes are have about the some capacity.
3. The existing routes have a large number of businesses.
4. The existing routes serve small bedroom cities.

5. The existing routes are intersected by Loop IH 820.
6. The affected areas served by the existing routes are associated with the west fork of the Trinity River.
7. The existing routes serve downtown Fort Worth.
8. A few large vacant tracts abut the existing routes.
9. Both areas experience about the some amount of airport noise.

The dissimilarities are as follows:

1. SH 199 is a wider divided highway through most of the affected area being compared.
2. The distance between the proposed north route and the existing route of SH 199 is less than half the distance between the new SH 183 bypass and the existing SH 10. For the proposed south route comparison, the differences in distance are even greater.
3. SH 199 is bridged across Lake Worth which does serve as a physical barrier near one end of the affected area.
4. No railroad parallels near the existing SH 199, as is the case with SH 10.
5. SH 199 does have large industrial plants abutting it in the affect area.
6. S.H. 199 serves an aesthetically more attractive area than does SH 10. There is a large city park fronting around Lake Worth. The mobile home parks in the area indicates that people are attracted to the lake and park area. However, the lake does serve as a barrier to development on the east side of the affected area.

7. The SH 199 area is almost equally divided by the Loop IH 820, giving the area very good access to other parts of the metroplex.
8. The SH 199 area is closer to downtown Fort Worth.
9. The SH 199 affected segment is over two miles shorter.
10. The before construction ADT is about one-third greater than that of SH 10.

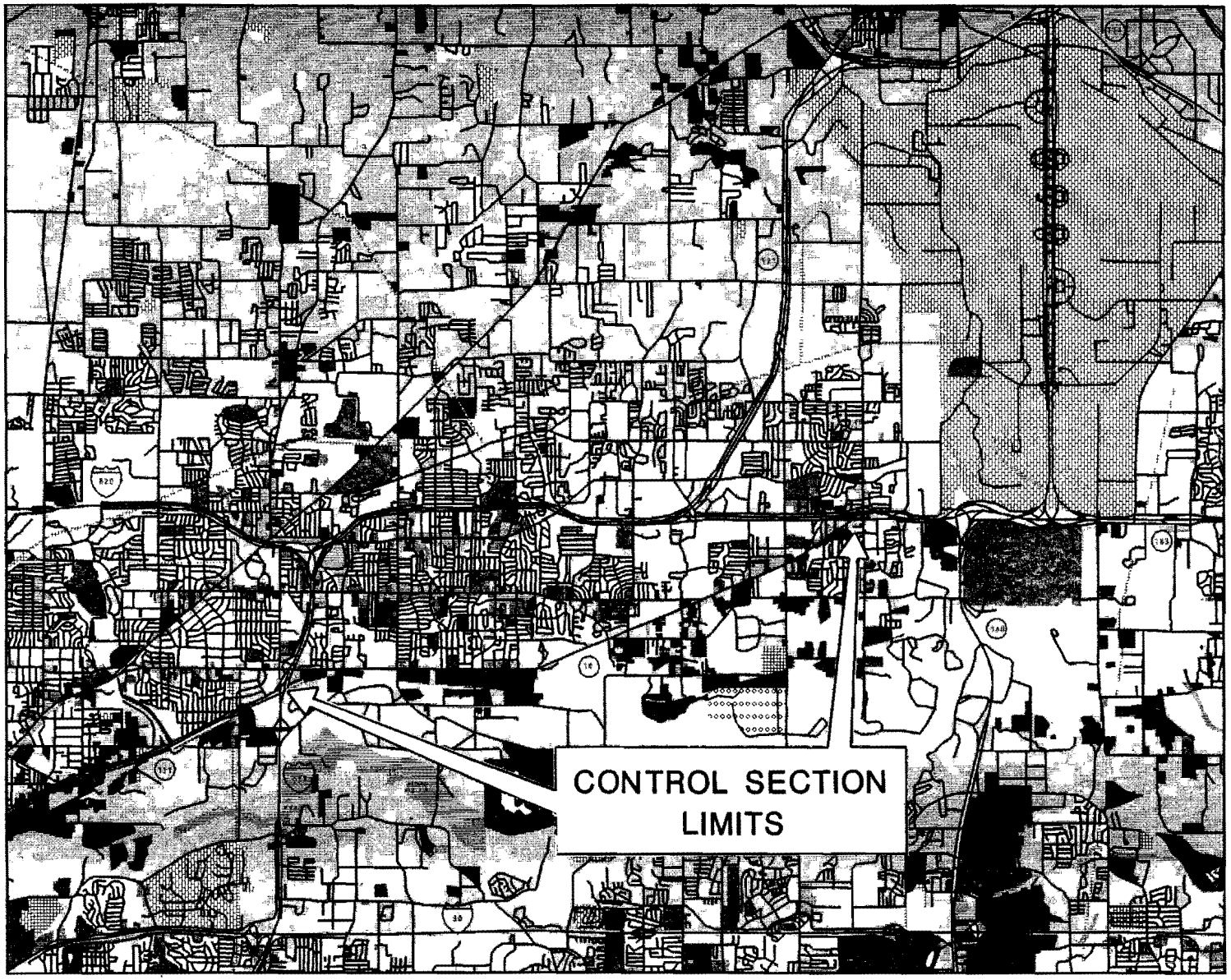
Comparative Analysis of Both Areas

Since over 20 years has lapsed since the new section of SH 183 was built and opened to traffic, thus bypassing the old route for SH 183, it is very hard to assemble certain data to make a meaningful comparison of the two projects and affected areas. For instance, no specific business data could be obtained along the old route segment of the then SH 183. Only current city directory data is available for the route. Therefore, no comparative analysis can be made on abutting business gross sales of the traffic and nontraffic serving types. However, some limited comparisons can be made of changes in abutting land uses and land values for the existing and bypass routes of SH 10 project. Changes in land uses along these routes are determined from 1970 and 1990 land use maps obtained from the North Central Texas Council of Governments. The land values of these routes are based on the profession opinions of seven real estate appraisal/sales firms, most of which knew real estate values in both areas back to 1970. Land use and land value changes reflected from these data sources can be compared to the land use and land value impacts estimated for the proposed SH 199 project that are based on former bypass studies.

Land Use Comparisons

Figures 12 and 13 show the 1970 and 1990 abutting land uses, respectively, of the SH

SH 10 CORRIDOR 1970 LANDUSE



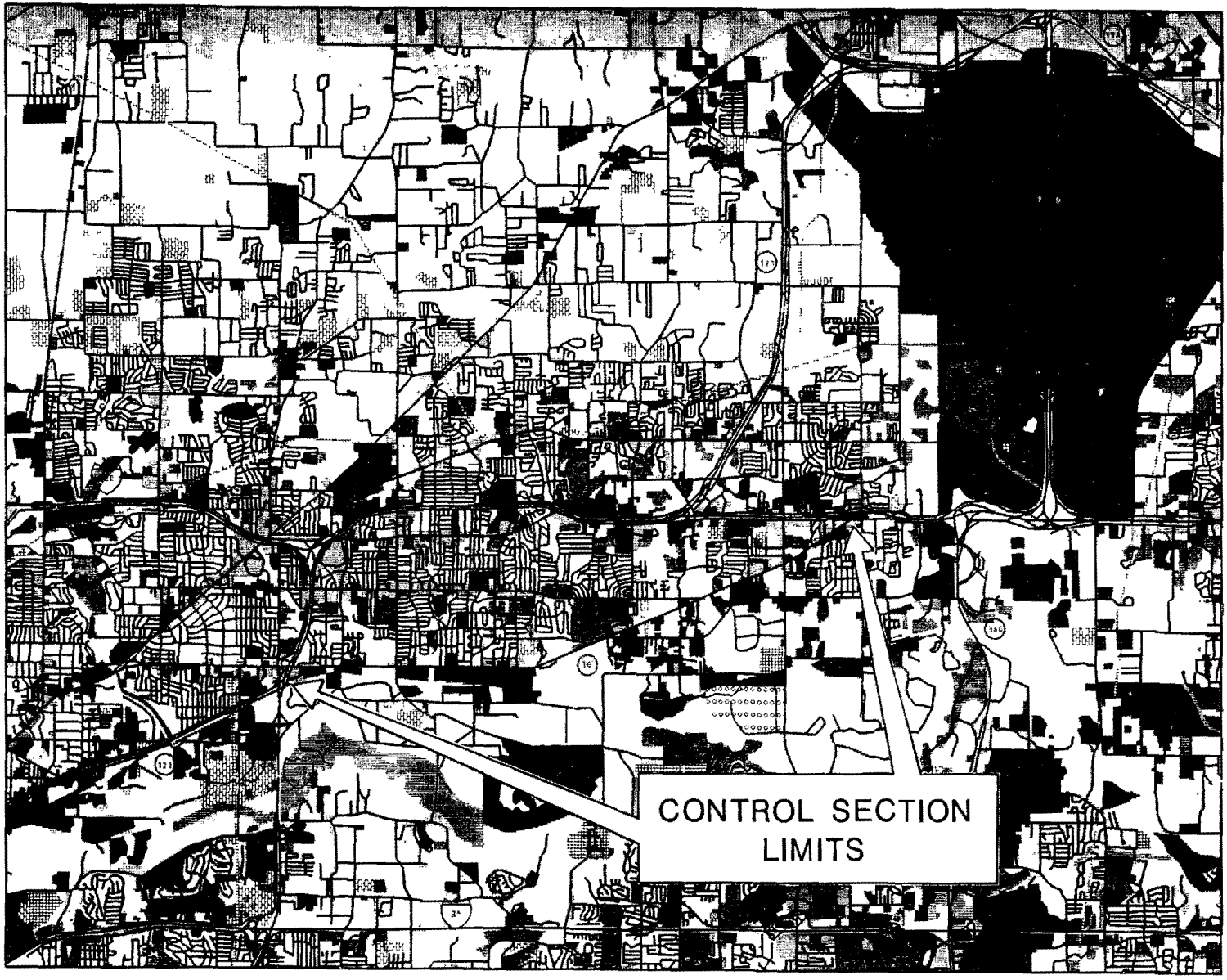
- Single Family
- Multi-Family
- Mobile Home
- Group Quarters
- Hotel/Motel
- Office
- Retail
- Institutional
- Industrial
- Trans/Comm
- Roadway
- Landfill
- Flood Control
- Utilities
- Parks/Open Space
- Vacant
- Water
- Under Const.

State Department of Highways and Public Transportation
Regional Planning Office

Scale 1:5280
August 29, 1990
Source: NCTCOG - Regional Data Center

Figure 12

SH 10 CORRIDOR 1990 LANDUSE



- Single Family
- Multi-Family
- Mobile Home
- Group Quarters
- Hotel/Motel
- Office
- Retail
- Institutional
- Industrial
- Trans/Comm
- Roadway
- Landfill
- Flood Control
- Utilities
- Parks/Open Space
- Vacant
- Water
- Under Const.

State Department of Highways and Public Transportation

Regional Planning Office

Scale 1:5280

August 17, 1990

Source: NCTCOG - Regional Data Center

Figure 13

10 and new Airport Freeway (SH 183) segments, as well as the nonabutting areas. Figures 10 and 11, presented earlier in this report, show the abutting SH 199 and area land uses for the same years. A quick visual comparison of the 1970 and 1990 land uses abutting the existing routes in both areas reveals little change in land use along either route during the last 20 years. However, in the case of the new S.H. 183, considerable development has occurred. By contrast, very few significant land use changes have occurred along the proposed north and south bypasses for SH 199.

Table 90 shows the before and after construction land use changes along the SH 10 or old route and the SH 183 or new route. The percentage changes in land use are quite different along the two routes. For instance, commercial land use has changed much more slowly along SH 10 than it has along SH 183. On the other hand, residential and public land uses have changed much more rapidly along SH 10 than along SH 183. Significantly, in the before period, about the same amount of abutting vacant land was available along both routes. However, the percentage changing to higher uses is much lower for SH 10 than for SH 183. Therefore, the slow rate of reduction in vacant land along SH 10 versus that for SH 183 could be an indication of negative bypass impact on abutting land use.

Comparing the availability of vacant land along SH 199 (see Table 30.) with that along SH 10 suggests that 20 years ago SH 10 had much more vacant land available for development than does the existing route of SH 199. The lack of available vacant land along SH 199 would keep the rate of development low along the existing route with or without a new bypass route or even with the central route. The presence of a nearby bypass facility would provide an alternate source of vacant land for development in the SH 199 area, thus

Table 90. Estimated Land Uses of Abutting Property Along SH 10 and SH 183 Before and After Construction of the new Route for SH 183.[1]

Highway and Land Use	Land Use (00.00 miles)[2]		Change in Use Between Periods	
	Before	After	0.0 mile	Percent
SH 10				
Commercial	6.61	7.26	0.65	10
Residential	0.52	1.32	0.80	154
Public	0.09	0.40	0.31	344
Vacant	7.57	5.81	-1.76	-23
SH 183				
Commercial	4.26	8.95	4.69	110
Residential	4.11	4.47	0.36	8
Public	1.25	2.29	1.04	83
Vacant	8.4	2.27	-6.13	-73

[1]Based on 1970 and 1990 land use maps obtained from the North Central Texas Council of Governments.

[2]Represents linear mileage along both sides of the above highways.

helping build an economic base.

Land Value Comparisons

Table 91 shows the estimated before and after construction land values along SH 10 and SH 183 that are based on the opinions of five professional real estate people who have known what is happening to land uses and values for over 20 years. The results of Table 91 suggest that land values along either route were about the same in the before period but are much different 20 years later. In fact, commercial land values along SH 10 have increased only 50% compared to 400% for the new route for SH 183 even though both route had about the same amount of vacant land available for future development. Obviously, something has suppressed the increase in land values along SH 10. A review of Tables 35 and 36 doesn't show estimated land values along the SH 199's proposed north and south bypasses increasing in value as much as that experienced by the new route for SH 183.

Table 92 shows a comparison of the amount of land value impact on the old route (SH 10) that is attributed to building of the new bypass for SH 183 versus the expected land value impact of building or not building a new route for SH 199. Again, these are the opinions of profession real estate people. Interestingly, the real estate professionals interviewed do not attribute very much of the depressed land values along SH 10 to the building of the new bypass route for SH 183. They say that the commercial land values were depressed only 5% due to building the new bypass and that residential land values were depressed 20%. As shown in Table 91, they say that land values along SH 10 increased about 50%, overcoming the negative effect of the new bypass. They attribute part of this increase to inflation and part to other factors such as extensive amounts of industry and

Table 91. Estimated Land Values of Abutting Property Along SH 10 and SH 183 Before and After Construction of the New Route for SH 183[1]

HIGHWAY AND LAND USE	LAND VALUE ($ PER S.F.)		CHANGE IN VALUE BETWEEN PERIODS	
	BEFORE	AFTER	$ PER S.F.	PERCENT
SH 10				
Commercial	1.88	2.81	0.93	49.5
Residential	0.40	0.60	0.20	50.0
SH 183				
Commercial	1.50	2.50	6.00	400.0
Residential	0.40	1.00	0.60	150.0

[1]Based on opinions of five real estate appraisal/sales firms knowledge about the area before the new facility was built. At least one person gave a positive or negative opinion in every cell, with most cells having two or three. Where actual percentages were given by more than one person, the percentages are averaged.

Table 92. Comparative Before Versus After Impacts on Land Values of Property Abutting of New/Proposed and Existing Routes for S.H. 183 and S.H. 199.[1]

HIGHWAY AND LAND USE	CHANGE IN VALUE BETWEEN PERIODS	
	$ PER S.F.	PERCENT
SH 10 (Old Route SH 183		
Commercial	- ?	- 5
Residential	- ?	- 20
SH 183 (New Route SH 183)		
Commercial	+ ?	+ 100
Residential	+ ?	+ 38
SH 199 (Existing no Change)		
Commercial	+ ?	+ 25
Residential	0	0
SH 199 (Central Route)		
Commercial	+ ?	+ 27
Residential	0	0
SH 199 (North Route)		
Commercial	+ ?	+ 150
Residential	- ?	- 10
SH 199 (South Route)		
Commercial	+ ?	+ 150
Residential	- ?	- 8

[1] Based opinions of seven real estate appraisal/sales firms knowledgeable about the area before the new facility was built. At least one person gave a positive or negative opinion in every cell, with most cells having two or three. Where actual percentage were given by more than one person, the percentages are averaged.

traffic along SH 10. When asked about how much building or not building a new freeway for SH 199 would affect abutting land values, they indicated that commercial land values would increase more with a new freeway than without. In the case of residential land values, they predicted that the building of a new bypass freeway would depress residential land values 8% to 10% in contrast to a negative 20% attributed to constructing the new bypass for SH 183.

The most mentioned reason given for SH 10 land values being depressed is that the SH 183 area has a much greater potential for growth in population, business development, etc. than does the SH 10 area. Another reason given is the decline in appearance of the SH 10 area.

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

Below is a summary of findings that covers all of the areas researched to fulfill the objectives of the study. It has been a difficult and time consuming effort, but hopefully the study procedures will be useful in estimating the different types of highway impacts for many other proposed highway improvements that would produce significant business, land use, land value, and etc. impacts. It is beneficial for a professional researcher to conduct a study like this, because he or she has to put on the hat of the highway planner in trying to estimate impacts with the aid of the findings of prior research studies. The proposed improvement of the study segment of SH 199 presents a very interesting and complex problem, that is, having to estimate the different impacts of three route alternatives on five cities and one county.

Estimating the city impacts is especially difficult. The results show that the different types of impacts estimated vary from city to city. Therefore, the reader is reminded again that even though the Cities of Lakeside and River Oaks would have the same before construction situation for all three route alternatives, the during and after construction impacts would not necessarily be the same for all route alternatives.

Tables 93 and 94 summarize the more general, before versus after construction, findings of the study. Table 93 summarizes the findings by route alternative, and Table 94 summarizes the findings for each route city by city. These findings are summarized and discussed under the appropriate headings below.

Table 93. Summary of Before Versus After Construction Impacts by Route Alternative Based on Prior Findings and Various Analyses[1]

TYPE OF IMPACT	CENTRAL	NORTH	SOUTH
Business gross sales ($000)	-13,972	+32,269	+27,451
Land Use (no. of improved properties)	-48	+19	-104
Land value ($000)	+13,831	+10,486	+11,981
City/County Tax Revenues ($000)	+68	+185	+212
Business Relocation ($000)	1,727	557	1,550
Resident Relocation ($000)	1,051	1,231	2,515
Business Employment (#)	+130	+405	+230
Construction Employment (#)	+6,026	+7,319	+6,754
Income to Economy ($000)	+473,181	+581,165	+528,348
Net Highway User Benefits ($Mill)	+437	+368	+492

[1] Impacts of abutting properties, businesses and residents and the general impacts resulting from highway construction expenditures and vehicular use of the highway. Nonabutting impacts are not estimated.

Table 94. Summary of Before Versus After Construction Impacts on Each City by Route Alternative Based on Prior Findings and Various Analyses.[1]

TYPE OF IMPACT	CENTRAL	NORTH	SOUTH
Business gross sales ($000)			
Lake Worth	-34,510	+8,763	+10,565
Sansom Park	-699	+7,124	+5,590
Fort Worth	+26,846	+21,926	+18,157
Tarrant County	-3,114	-3,966	-5,308
River Oaks	-1,278	-1,278	-1,278
Lakeside	-313	-300	-300
Land Use (no. of improved properties)			
Lake Worth	-29	+25	-69
Sansom Park	-32	+2	+3
Fort Worth	+36	+15	+14
Tarrant County	-21	-19	-26
River Oaks	-2	-4	-4
Lakeside	0	0	+1
Land value ($000)			
Lake Worth	-501	+12,538	+8,870
Sansom Park	+3,093	+5,073	+2,603
Forth Worth	+10,873	-11,560	-4,386
Tarrant County	+866	+2,184	+3,038
River Oaks	-1,627	+1,305	+885
Lakeside	+1,127	+946	+971
City/County Tax Revenues ($)			
Lake Worth	-209,570	+79,245	+77,762
Sansom Park	+16,280	+42,139	+28,334
Fort Worth	+269,773	+51,109	+96,965
Tarrant County	+2,598	+6,551	+9,115
River Oaks	-15,320	-2,128	-4,018
Lakeside	+2,155	+1,650	+1,719
Business Relocation ($000)			
Lake Worth	838	0	28
Sansom Park	524	124	287
Fort Worth	55	65	939
Tarrant County	206	265	193
River Oaks	88	88	88
Lakeside	15	15	15

Table 94. Continued

TYPE OF IMPACT	CENTRAL	NORTH	SOUTH
Resident Relocation ($000)			
Lake Worth	428	0	1500
Sansom Park	47	110	495
Fort Worth	381	899	445
Tarrant County	195	216	75
River Oaks	0	0	0
Lakeside	0	0	0
Business Employment (#)			
Lake Worth	-118	+254	+273
Sansom Park	-139	+31	-95
Fort Worth	+293	+245	+199
Tarrant County	-110	-126	-136
River Oaks	-32	+5	-11
Lakeside	0	-4	0
Construction Employment (#)			
Lake Worth	+1,251	+12	+877
Sansom Park	+1,089	+695	+1,232
Fort Worth	+2,478	+5,207	+3,196
Tarrant County	+701	+751	+733
River Oaks	+286	+414	+447
Lakeside	+221	+240	+269
Income to economy ($000)			
Lake Worth	+99,859	+9,862	+68,864
Sansom Park	+85,375	+54,478	+96,276
Fort Worth	+193,515	+406,495	+249,429
Tarrant County	+54,790	+58,735	+57,268
River Oaks	+22,361	+32,858	+35,437
Lakeside	+17,281	+18,737	+21,074

[1]Impacts of abutting properties, businesses and residents and general impacts resulting from highway construction expenditures and vehicular use of the highway. Nonabutting impacts are not estimated.

Impact on Business Activity

Estimates are made of the impact that each proposed route alternative is expected to have on the gross sales of abutting businesses during and after construction. The impacts on businesses of the retail and service types are separate from those of the wholesale and manufacturing types.

Impact on Retail and Service Businesses.

The gross sales of retail and service types of businesses are expected to be impacted most negatively by the proposed central route, especially the traffic serving type. The traffic serving businesses would be impacted the most during construction of the central route and after construction on both of the proposed bypass routes. During construction of the bypass, the traffic serving businesses would be negatively affected for various reasons, mainly inconvenience and disruption of easy access, parking etc. After construction is complete, these same businesses would be adversely affected to an even larger degree. Intuitively, this can be explained to mean that when the new bypass facility becomes operational, the traffic serving businesses are negatively impacted more than they were during construction because their customers are not just inconvenienced, as they were during construction, but are diverted away from their businesses. For each of the proposed bypass routes, clearly the bypassed group is the largest in the traffic serving category, and consequently, how they (the bypassed traffic serving group) are affected will be the dominate impact on the total traffic serving category for each bypass route.

The other retail/service category of businesses is by far the largest of the two categories and consequently how they are impacted will dominate the traffic serving category

and have the greatest influence on the overall retail sales and service businesses impact. Accordingly, the central route is expected to have the greatest negative impact both during and after construction of any of the three proposed routes. The proposed north route is expected to enjoy the greatest positive impact during and after the proposed construction.

However, the estimated impacts are very uneven among the cities affected by any of the proposed routes. The only exception is that the City of Fort Worth is expected to have the most positive impact on it, regardless of the route, of any of the other cities. Also, Fort Worth is the only city expected to experience a positive impact for the central route alternative. All of the other cities and Tarrant County are expected to experience a negative impact. For the north and south route alternatives, Lake Worth, Sansom Park and Fort Worth are expected to be impacted positively, whereas, River Oaks, Lakeside and Tarrant County are expected to be impacted negatively.

In summary, Fort Worth and Tarrant County are expected to be impacted most positively by the central route alternative. Sansom Park is expected to be impacted most positively by the north route alternative. Lake Worth is expected to be most positively impacted by the south route alternative. Lakeside is expected to be impacted most positively by either the north or south route alternative. River Oaks is expected to be impacted the same for all three route alternatives.

Impact on Wholesale and Manufacturing Businesses. In order to maintain privacy requirements and not disclose sales information for any given business establishment, it was necessary to combine the sales data from businesses such that the sales from individual businesses could not be distinguishable. Therefore, it is not possible to report a detailed

summary listing of the expected gross sales impacts of these businesses at the city level. However, at the route level of comparison both the south and north routes have a highly positive impact on gross sales, with the south route having the largest expected impact. The central route has an estimated large negative expected impact on wholesale and manufacturing sales.

Impact on Land Uses and Development

Estimates are made of the abutting land use impact of each route on the affected cities. This effort not only involves estimating future land use but also the reduction in the different land uses due to the taking of right of way to provide a path for the new highway improvement. All three of the proposed routes require a large amount of additional right of way. As a result, significant land use changes are mandated from the start. Even though new commercial and residential development is estimated, so much commercial and residential land would be taken that the new development would be completely absorbed causing a net reduction in those two land uses.

The route analysis summarized in Table 93 confirms the above finding, showing only the north route producing a net increase in these land uses in the after construction period. Also, the city analysis, summarized in Table 94, shows a net increase in commercial/industrial and residential land uses in only one city, Fort Worth, if the central route alternative is chosen. However, at least three cities would show a net increase in these uses if either the north or south route alternative was chosen. Only Tarrant County would show a decrease in these uses for all three route alternatives.

Impact on Property Values

Estimates are made of the abutting property value impacts of each route alternative. These estimates are also overshadowed by the estimated value of the additional right of way that would be required for any of the three routes. In fact, Tables 37, 39, and 41 show a decrease in abutting property values between the before and during construction periods for all three route alternatives. The estimated right of way costs are highest for the central route and the lowest for the north route. It is only between the before and after periods, as summarized in Table 93, that the new property would increase in value enough for the three routes to show an increase with the central route experiencing a slightly higher increase than the north and south routes.

The city impact analysis, summarized in Table 94, shows most of the affected cities experiencing an increase in abutting property values between the before and after period, regardless of route alternative. Only Lake Worth and River Oaks would experience a decrease in abutting land values if the central route alternative is chosen. Only Fort Worth would experience a decrease if the north or south route alternative is chosen.

Impact on Tax Revenues

An indirect benefit to communities whose land values have been significantly increased as a result of a highway improvement is the subsequent effect on the tax base and corresponding tax revenues. Similarly, communities whose gross business sales have been increased as a result of a highway improvement can enjoy the subsequent sales tax revenues. The tax effects are summarized by adding the sales tax effects and property tax effects together.

The route analysis, summarized in Table 93, shows that overall tax revenues are expected to increase, regardless of the route alternative chosen. The south route alternative is expected to generate the greatest tax revenue effect, and the central route is expected to generate the least tax revenue effect. The city analysis, summarized in Table 94, shows Fort Worth receiving the most positive tax revenue effect and Lake Worth receiving the most negative tax revenue effect if the central route alternative is chosen. Lake Worth would receive the most positive effect and River Oaks would receive the most negative effect if the north route alternative is chosen. Fort Worth would receive the most positive tax revenue effect and River Oaks would receive the most negative tax revenue effect if the south route is chosen.

Impact on Relocation, Employment and Income

Since so many businesses and residents would be displaced, the relocation costs, summarized in Table 93, are high, especially for the south route. All of the routes would either displace a large number of businesses or residents or both. The central route would displace the most businesses and the south route would displace the largest number of residents. The relocation costs, which includes moving expenses, would increase proportionately for these routes. The number of new businesses and residents brought into existence due each of the proposed routes would not be enough to replace all of those that were displaced. The city analysis, summarized in Table 94, shows Lake Worth would have the highest combined business and resident relocation costs if either the central or south route is chosen. Fort Worth would have the highest relocation costs if the north route is chosen.

The route analysis of new business employment, summarized in Table 93, shows all route alternatives experiencing an increase in abutting business employment. The north route alternative would experience the greatest increase in business employment, and the central route alternative would experience the least. The city analysis, summarized in Table 94, shows only Fort Worth experiencing an increase in business employment if the central route is chosen. All cities, except Lakeside, is expected to experience an increase in business employment if the north route is chosen. Only Lake Worth and Fort Worth would be expected to experience an increase in business employment if the south route is chosen. Tarrant County is expected to experience a decrease in business employment regardless of which route is chosen.

New employment resulting from the highway construction and new commercial/industrial and residential building construction expenditures is expected to be generated most by the north route and second most by the south route, as summarized in Table 93. The central route would generate the fewest new employees. In the city analysis summarized in Table 94, all cities are expected to experience an increase in construction employment, regardless of the route alternative chosen. Fort Worth is expected to experience the greatest increase in construction employment, regardless of route alternative chosen. Lakeside is expected to experience the least increase in this type of employment, regardless of the route alternative chosen.

Income to the economy is generated from construction expenditures to build the new highway and abutting buildings by producing an output or total demand effect on the general economy, part of which is local. As summarized in Table 93, construction

expenditures are expected to produce the greatest effect on output to the general economy if the north route alternative is chosen and least effect on output if the central route is chosen. Fort Worth is expected to receive the greatest output effect to the economy, regardless of the route alternative chosen, and Lakeside is expected to receive the least output effect. All of the cities and Tarrant County are expected to receive a positive effect on the general economy, regardless of route alternative chosen.

Impact on Highway User Costs

Highway user impacts are very important in deciding which route alternative to choose, if any. Time or delay costs, vehicle operating costs, and accident costs, are costs combined to makeup what is called highway user costs. If a particular highway improvement lowers any of these user costs, then user cost benefits are generated. According to the user cost analysis summarized in Table 93, the south route alternative would produce the most total benefits, and the north route alternative would produce the least benefits. However, the central route alternative would cost the least of three alternatives to build, and the north route alternative would be the most expensive to build. Consequently, the central route alternative would have the largest benefit-to-cost ratio and the north route alternative would have the smallest. Actually, all three of proposed route alternatives would produce enough user benefits to generate a benefit-to-cost ratio of 3 or more, making all of route alternatives economically feasible.

The incremental benefit-cost analysis indicates that the north route alternative would be clearly inferior, from a user cost viewpoint, to the central and south route alternatives since it costs more but gives less benefits (savings in user costs). The south route alternative

would cost $29.97 million more than the central route alternative, but has $85.48 million more benefits for an incremental benefit-cost ratio of 2.85. This indicates, from a user cost savings viewpoint, that the extra investment required for the south route alternative would be justified if sufficient funds are available for this increment of investment.

Comparison With SH 10 Project

A project somewhat comparable to the proposed SH 199 project is the SH 10 bypass which became the new route for the then SH 183 and bypassing the old SH 183, now SH 10. This project has been built and open to traffic more than 20 years. There are about as many similarities as there are dissimilarities between the two projects, but it might be helpful to draw a few comparisons to help decide which of the proposed SH 199 routes to implement.

A comparison of the 1970 and 1990 land use maps of the two projects and adjacent areas reveals little change in land use along the proposed SH 199 routes and the old route for SH 183, now SH 10. However, considerable land use change has occurred along the new bypass route SH 183. Commercial land use has changed much more slowly along SH 10 than along the new SH 183 even though both routes had a considerable amount of vacant land available for development. Residential and public land uses have changed faster along SH 10 than along the new bypass. A comparison of the two projects reveals a significant difference in the amount of vacant land abutting SH 199 in 1990 compared to SH 10 in 1970. If the central route is built along SH 199, or if it remains as it is now, the shortage of vacant land would keep the rate of development low. Only the selection of the north or south routes would provide enough vacant land to encourage a faster rate of development.

Based on the profession opinions of several real estate appraisers and sales persons, land values along SH 10 have changed little compared to the value of land abutting the new route SH 183. Interesting enough, the real estate professionals do not attribute very much of the depressed land values along SH 10 to the building of the new bypass route SH 183. They say that the new bypass depressed SH 10's commercial land values about 5% and residential land values about 20%.

When the real estate professionals were asked about how much building a new freeway for SH 199 would affect abutting land uses, they indicated that commercial land values would increase more with a new freeway than without. However, they predicted that a new bypass freeway would depress abutting residential land values 8 to 10% in contrast to a negative 20% for SH 183. The most mentioned reason given for SH 10 land values being depressed is that the new SH 183 bypass area has a much greater potential for growth in population and business development than did SH 10.

Conclusions and Recommendations

The following conclusions are reached from the study findings:

1. All of the proposed route alternatives would require a considerable amount of additional right of way which would lead to large numbers of displacements of businesses and residents.

2. The study findings indicate that the north route alternative would produce the greatest positive or least negative economic impact on the abutting businesses and residents. This route alternative would produce the most positive impacts on business sales, land use changes, right of way costs,

business relocation costs, new employment and income. The central route would produce the most positive impacts on land values and residential relocation costs. Also, the central route alternative would produce the highest conventional highway user benefits to costs ratio. The south route alternative would produce the most positive impact on city tax revenues. Also, the south route alternative would produce the highest amount of highway user benefits and would be the most economically feasible from an incremental point of view.

3. The findings of the study indicate that the north route alternative would produce the most positive or least negative economic impact on abutting businesses and residents in a majority of the affected cities. Also, the largest of the small towns, Lake Worth and Sansom Park, would be the most positively impacted by the north route alternative.

The recommendations are as follows:

1. The final selection of a route should place a great deal of emphasis on minimizing the total number of displacements.

2. Since residential relocatees are helped more than business relocatees, the number of business relocatees should be held to a minimum.

3. Considerable weight should be given to the route alternative that would minimize the negative economic impacts on abutting businesses and residents.

DEFINITION OF TERMS

1. *Bypassed Businesses* - are those businesses located on the existing route of State Highway 199 which would be completely bypassed by the proposed north or south route.

2. *Remaining Businesses* - are those businesses located on the existing route that would be abutting the proposed central, north, or south route during and after construction of the selected route.

3. *Partially Displaced Businesses* - are those businesses which would have some property taken for right of way. It could be land only or land and buildings. Some of these businesses could continue to operate without moving back at the same location or moving to a new location.

4. *Displaced Businesses* - are those businesses which would have enough land and buildings taken for right of way to completely remove them from their present location. If they have enough remaining abutting land, they could build a new building and begin operating again at the same address. It should be noted that in the business analysis and tax revenue analysis sections of this report, the displaced business category includes only those businesses that were open and operating at the beginning of the study. The number of displaced businesses, as reported in the parenthesis in the various tables, does not include those business facilities that were closed and not in operation when the study commenced, but were physically displaced as a result of the highway construction.

5. *Closed Businesses* - are those businesses that either closed before construction or closed during and remained closed after construction of one of the proposed routes.

6. *Traffic Serving Businesses* - are those businesses that generally receive a considerable amount of business from the traveling public. They are as follows: gasoline service stations (including the toll type), eating and drinking establishments, and motels, hotels and other temporary lodging places.

7. *Nontraffic Serving Businesses* - are all other retail trade and service industry businesses as classified by the U.S. Census Bureau.

REFERENCES

1. Horwood, E. M., Zellner, C. A., and Ludwig, R. L., "Community Consequences of Highway Improvement." NCHRP Report 18 (1965) 37pp.

2. Gample, H. B., and Davinroy, T. B., "Beneficial Effects Associated with Freeway Construction: Environmental, Social, and Economic.", NCHRP Report 193 (1978) 110pp.

3. Wooten, C. V. and H. G. Mueth. "Economic Impact Study, Temple, Texas." Texas Transportation Institute, Bulletin 14, 1960.

4. Buffington, J. L., and H. G. Mueth. "Economic Impact Restudy, Temple, Texas." Texas Transportation Institute, Bulletin 27, 1964.

5. Buffington, J. L. "Economic Impact Study, Rural Area East of Houston, Texas." Texas Transportation Institute, Bulletin 37, 1967.

6. Buffington, J. L. "Economic Impact Study, Chambers County, Texas." Texas Transportation Institute, Bulletin 39, 1967.

7. Buffington, J. L. "Economic Impact Study, Huntsville, Texas." Texas Transportation Institute, Bulletin 38, 1967.

8. Buffington, J. L. "Economic Impact Study, Conroe, Texas." Texas Transportation Institute, Bulletin 40, 1967.

9. Buffington, J. L. "Economic Impact Study, Waxahachie, Texas." Texas Transportation Institute, Bulletin 35, 1966.

10. Buffington, J. L. "Economic Impact Study, Merkel, Texas." Texas Transportation Institute, Bulletin 36, 1966.

11. Buffington, J. L. "The Economic Impact of Interstate Highway Bypasses." Texas Transportation Researcher, Vol. 4(1) 1968 p2-6.

12. Buffington, J. L., McFarland, W. F., Memmott, J. L., and Womack, K. N. "Estimated Impact of Widening U.S. Highway 80 (Marshall Avenue) in Longview, Texas." Texas Transportation Institute, Technical Report No. 1, Research Study 01990. (1987) 65pp.

13. Federal Highway Administration. Social and Economic Effects of Highways, U.S. Department of Transportation, (1976) pp250.

14. Buffington, J. L. "Economic Impact Study, Rockwall, Texas." Texas Transportation Institute, Bulletin 24, 1963.

15. Buffington, J. L. "Economic Impact Restudy, Austin, Texas." Texas Transportation Institute, Bulletin 26, 1964.

16. Skorpa, L., Dodge, R., Walton, C. M., and Huddleston, J. "Transportation Impact Research: A Review of Previous Studies and a Recommended Methodology for the Study of Rural Communities." Council for Advanced Transportation Studies, The University of Texas at Austin, 1984, 64pp.

17. Wooten, C.V., Mueth, H.G., Rowan, N.J., and Williams, T.G., "A Median Study in Baytown, Texas." Texas Transportation Institute, Bulletin No. 29, Research Report 8-1, 1964.

18. Wooten, C.V., Mueth, H.G., Rowan, N.J., and Williams, T.G., "A Median Study in Pleasanton, Texas." Texas Transportation Institute, Bulletin No. 30, Research Report 8-2, 1964.

19. Wooten, C.V., Mueth, H.G., Rowan, N.J., and Williams, T.G., "A Median Study in San Antonio, Texas." Texas Transportation Institute, Bulletin No. 31, Research Report 8-3, 1964.

20. Thompson, R.H.. and Adkins, W.G., "Some Economic Effects of the Suburban Portion of North Central Expressway, Dallas, Texas." Texas Transportation Institute, Bulletin No. 15, 1961.

21. Buffington, J.L., Burke, D., "Employment and Income Impacts of Highway Expenditures on Bypass, Loop and Radial Highway Improvements." Texas Transportation Institute, Research Report 1106-3, 1989.

22. Buffington, J.L., Herndon, C.W., and Weiss, M.E., "Non-User Impacts of Different Highway Designs as Measured by Land Use and Land Value Changes." Texas Transportation Institute, Research Report 225-2, 1978.

23. Buffington, J.L., Mueth, H.G., Schafer, D.L., Pledger, R., and Bullion, C., "Attitudes, Opinions, and Experiences of Residents Displaced by Highways Under the 1970 Relocation Assistance Program." Texas Transportation Institute, Research Report 159-1, 1974.

24. Buffington, J.L., Burke, D., Adkins, W.G., and Meuth, H.G., "Experiences and Opinions of Residents Along Elevated, Depressed, and On-Grade Freeway Sections in Houston, Texas." Texas Transportation Institute, Research Report 148-1, 1971.

25. Buffington, J.L.,Schafer, D.L.,and Bullion, C.,"Attitudes, Opinions, and Experiences of Business and Institutional Relocatees Displaced by Highways Under the 1970 Relocation Assistance Program." Texas Transportation Institute, Research Report 159-2, 1974.

26. Buffington, J.L.,"Consequences of Freeway Displacement to Urban Residents in Low Valued Housing." Texas Transportation Institute, Research Report 148-3, 1973.

27. Texas Comptroller of Public Accounts. The Texas Input-Output Model, 1986 Update, December 1989.

28. Palmquist, R.B., "Impact of Highway Improvements on Property Values in Washington State." Transportation Research Record 887, pp. 22-29, 1982.

29. Burkhardt., J.E., "Socioeconomic Reactions to Highway Development." Transportation Research Record 991, 1984.

30. Mullins III, J.A., Washington, E.J., and Stokes, R.W., "Land Use Impacts of the Houston Transitway System." Transportation Research Record 1237, 1989.

31. Langley Jr., C.J., "Adverse Impacts of the Washington Beltway on Residential Property Values." Land Economics, Vol. 52. No. 1, February 1976.