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16. Abstract

The Texas Department of Transportation's (TxDOT) District 3 personnel are in the process of evaluating the proposed improvement of U.S. Highway 287 which is located in Wichita Falls, Texas. This highway passes through Wichita Falls a few blocks from the Central Business District and is a major route to Fort Worth to the east and Amarillo to the west. Presently, the highway is a freeway on each side of town. The two freeway sections end in the downtown area and traffic is routed onto two one-way streets for a distance of 0.65 mile or seven blocks before becoming a freeway again, thus causing a design gap in a principal highway system. Five route alternatives are evaluated, three being bypass alternatives, and the other two follow the existing route through the gap area. Of the latter, one is an elevated express lane section, and one is a depressed express lane section, both of which follow the two city streets that would become service roads. Two of the bypass alternative routes follow varying sections of State Highway 240 and tie into U.S. Highway 287 at major highway interchanges on each side of Wichita Falls. These two bypass alternatives would pass through strips of commercial and residential developments, but the other bypass alternative would be mostly on a new location in a sparsely populated area.

Each of the above route and design alternatives are evaluated to estimate the economic impacts resulting from implementing each alternative. The results are needed as supporting information in the environmental assessment (EA) for U.S. Highway 287.

The study objective is to estimate the economic impacts of the proposed route and/or design alternatives for U.S. Highway 287. The following impacts are 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 from previous studies, TxDOT, Texas State Comptroller's Office, and the City of Wichita Falls are used to estimate these impacts. Also abutting businesses, residents, public/nonprofit organizations, and real estate sales persons and appraisers were interviewed to obtain their opinions of the five route alternatives. A total economic benefit-cost ratio is developed.

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

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ECONOMIC ASSESSMENT OF THE PROPOSED IMPROVEMENT OF U.S. HIGHWAY 287 IN WICHITA FALLS, TEXAS

EXECUTIVE SUMMARY

by

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Research Report 1915-ES
Research Study 2-3D-89/90-1915

for

The Texas Department of Transportation

June 1, 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				
in^2	square inches	645.2	centimetres squared	cm^2
ft^2	square feet	0.0929	metres squared	m^2
yd^2	square yards	0.836	metres squared	m^2
mi^2	square miles	2.59	kilometres squared	km^2
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
ft^3	cubic feet	0.0328	metres cubed	m^3
yd^3	cubic yards	0.0765	metres cubed	m^3

NOTE: Volumes greater than 1000 L shall be shown in m^3.

TEMPERATURE (exact)

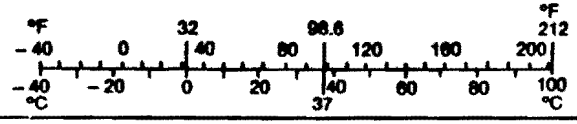
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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				
mm^2	millimetres squared	0.0016	square inches	in^2
m^2	metres squared	10.764	square feet	ft^2
km^2	kilometres squared	0.39	square miles	mi^2
ha	hectores (10 000 m^2)	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
m^3	metres cubed	35.315	cubic feet	ft^3
m^3	metres cubed	1.308	cubic yards	yd^3

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

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DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the facts and 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, Katie N. Womack and Rohani Salleh.

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Introduction

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 impacts 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 usually 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.

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 use than it was in the past. Improvements don't 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 higher 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 that result from improved efficiency in providing public and private services, are somewhat similar in nature. They are not explicitly measured in this study 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 lifetime. 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.

The operational effects of highway improvements includes 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 streets 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 most likely will not be as adversely affected, and may be affected beneficially. 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.

Existing Characteristics of Wichita Falls and Wichita County

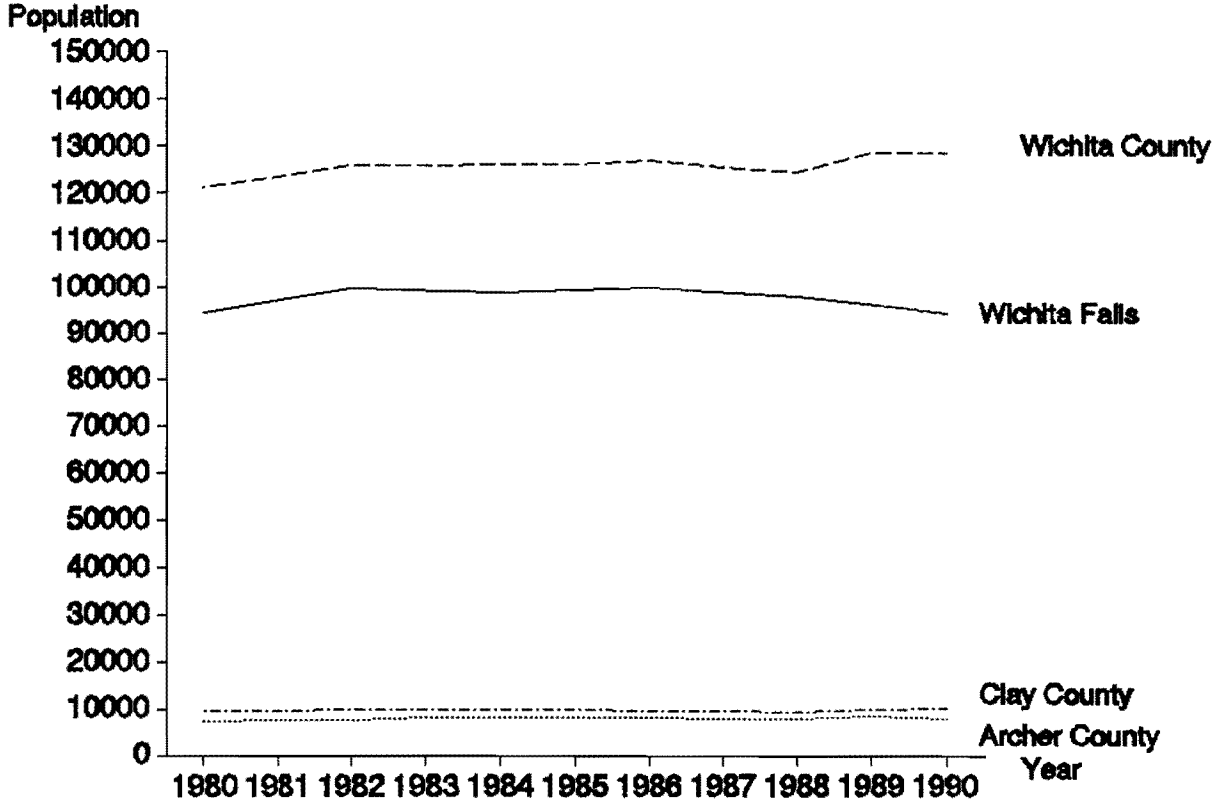
The City of Wichita Falls is located in the southeast corner of Wichita County. Wichita County is bordered by Archer County on the south, and Clay County on the east. Wichita Falls has long been the business center of retail and wholesale trade, services and employment of the tri-county region.

The population of Wichita Falls accounts for approximately 70 percent of the tri-county population. Figure S-1 shows that recent population trends for Wichita Falls and the above mentioned counties have remained relatively constant. However, since 1987, the population of Wichita County has trended more upwards while the population of Wichita Falls has trended more downwards. Recent trends in the city utility connections and county employment statistics are very similar to the city and county population trends. The trend in business gross retail sales for Wichita Falls has been more erratic, trending sharply downward during the middle 1980's and rebounding sharply upwards since 1987.

Existing Highway and Proposed Improvement Alternatives

The Texas Department of Transportation's (TxDOT) District 3 personnel are in the process of evaluating the proposed improvement of U.S. Highway 287 in Wichita Falls,

FIGURE S-1. POPULATION OF WICHITA, ARCHER, AND CLAY COUNTIES, AND THE CITY OF WICHITA FALLS.



Source: Growth Trends, 1990, and Tri-County Growth Trends, 1990, Planning Department, City of Wichita Falls, Texas.

Texas. Figure S-2 shows the location and type of five alternatives being proposed. Also, Table S-1 shows the characteristics of U.S. Highway 287 and the proposed route alternatives.

U.S. Highway 287 passes very close to the middle of the Midtown area and is improved as a freeway on the north and south ends. Interstate Highway 44 (IH 44) merges into U.S. Highway 287 from the north end, and U.S. Highways 82, 277 and 281 merges into U.S. Highway 287 from the south end. The two freeway sections of U.S. Highway 287 end suddenly in the Midtown area and the traffic is routed onto two city streets (Broad and Holliday) for a distance of .65 miles, or 7 blocks, before the highway becomes a freeway again. Therefore, a "design gap" exists in a principal highway system, creating serious traffic problems. Broad Street carries the northbound traffic and Holliday Street carries the southbound traffic with the traffic on both streets having to stop at several stop lights before it can get back on the freeway.

To further complicate matters, U.S. Highway 82 is being improved as a freeway and ties into U.S. Highway 287 at the south end of this gap. The average daily traffic (ADT) volume on U.S. Highway 287 is over 40,000 on each side of this gap. Travelling motorists don't expect to find such a gap in the highway system and tend to keep driving as if they are still on a freeway; that is, driving faster, weaving from lane to lane, running red lights, or not slowing enough to get into sequence with the stop lighting system used in this gap. Finally, a large number of heavy trucks use this highway and have a difficult time stopping at the first stop light encountered. These trucks also cause some of the increased weaving of the traffic.

The above described situation has caused a very large number of accidents on Broad and Holliday Streets and involve many of the local residents. Between 1986 and 1989, 659 accidents (one every other day) occurred. Those accidents have resulted in 323 injuries and 4 fatalities, the highest rate of injuries and fatalities in Wichita Falls. As traffic volumes increase, the accident rate in this gap continues to worsen. Also, the required slowing of traffic in this gap increases the travel time and vehicle operating costs to both through and local motorists alike. Even the abutting businesses may have been negatively impacted by the high rate of accidents and through motorists trying to speed and weave until they get through this gap in the highway system. The excessive amount of stopping and starting by

Figure S-2. Map of Wichita Falls, Texas, Showing Five Alternative Improvement Routes for U.S. Highway 287.

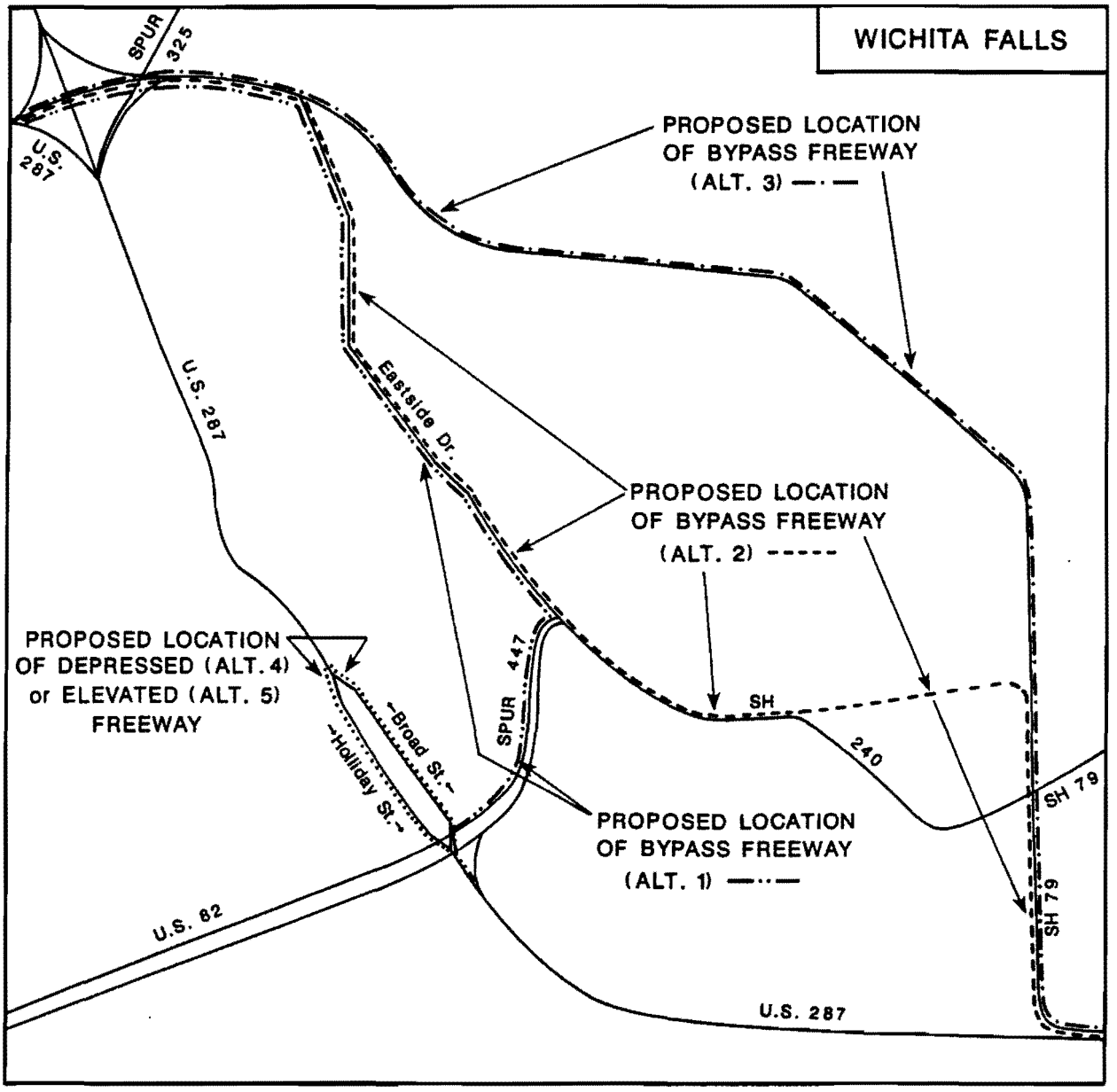


Table S-1. Characteristics of U.S. Highway 287 Proposed Route Alternatives.

CHARACTERISTIC	QUANTITY/DESCRIPTION BY ROUTE[1]					
		BYPASS ALTERNATIVES				
	EXISTING	1	2	3	4	5A, 5B, 5C
Main lanes	4 to 8	4 to 6	4 to 6	4 to 6	6	6
Divided/undivided	divided	divided	divided	divided	depressed	elevated
Frontage roads (lanes)	0-4	4	4	4	6	6
Access (direct/limited)	mixed	limited	limited	limited	limited	limited
Length in miles	7.85	9.32	8.40	8.59	7.85	7.85
Greatest distance from existing route	N/A	1.09	1.74	2.97	0	0
Distance to CBD	0.5	0.4	.04	2.25	0.5	0.5
Current ADT (1992)	44,460	26,670	31,120	31,120	44,460	44,460
Projected ADT (2012)	75,010	49,120	57,310	57,310	81,870	81,870
Dominant abutting land use	comm	comm	comm	vacant	comm	comm
Business displacements[2]	N/A	10	12	1	6	6, 6, 7
Residential displacements[2]	N/A	35	38	13	0	0

[1] Based on data furnished by the TxDOT District 3 personnel, from on site 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.

streets where possible, considerable right-of-way would have to be purchased and would displace some businesses and residences. Two of these bypass routes would follow along portions of State Highway 240 (Eastside Drive), while the third would be essentially all new location. The other two primary improvement alternatives would construct either a split depressed one-way section or an elevated one-way section on Holliday and Broad Streets to carry the through traffic, leaving part of the existing roadway of these streets to carry the local traffic.

Presently, Broad and Holliday Streets are 4-lane facilities with undivided, at-grade and one-way sections that have no restrictions on access. The elevated section alternative is broken down into three secondary alternatives that deal with whether or not to construct ramps to two cross streets (5th and 6th Streets) and with the potential effects of the alignment on the north end of the project on a park and on traffic control.

The above alternatives would impact motorists, businesses and properties, and the local community in varying amounts, depending upon the alternative chosen. Also, their cost and construction time would vary considerably.

Objective, Data Sources and General Methodology of Impact Study

The study objective is to estimate the economic impacts of the proposed route and/or design alternatives for U.S. Highway 287. Indirect and net effects are virtually impossible to measure, and costly to estimate. While acknowledging that there may be other indirect effects, they are assumed to be neutral across all of the possible mutually exclusive alternatives analyzed in this research study. Consequently, 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.

The primary data source is what is reported in the transportation economics literature, and publications by various departments of the City of Wichita Falls. Also, data collected by the TxDOT's District 3 personnel, and the Texas Transportation Institute's (TTI) personnel through personal interviews and mail questionnaires, 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 shown in Table S-1 were collected on the study area, including the existing and proposed routes. 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 Wichita Falls' central business district (CBD) and the current population.

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. Most of the relevant studies reflect 5-10 years of after construction impact.

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 and 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. Separate estimates are made for each of the alternative routes, and the current tax rate is applied directly to these estimates to calculate the revenue.

Historical traffic data obtained from the TxDOT's Division 10 and District 3 personnel, and TTI's personnel, were used to develop input data to the third version of The Highway Economic Evaluation Model (HEEM-III) 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 was calculated. More specific details of the data base and estimating methodology are presented in the respective impact sections of the full report [1].

A total economic benefit-cost ratio is calculated which includes all impacts estimated in dollars; including highway user benefits. This total economic benefit-cost ratio is helpful in comparing route alternatives of a particular highway improvement. Double counting is not a problem with this procedure.

A series of surveys were conducted to aid in the analysis of the proposed highway improvements. On site personal interviews with selected realtor/appraisal firms, businesses along Holliday and Broad streets, and with nonprofit organizations and institutions were conducted by TTI personnel. Mail questionnaires were sent to the other businesses that would be affected, and all residents located along the proposed routes to collect their opinions of how the proposed alternatives would affect them and their properties.

The results of the above analyses, interviews and questionnaires are summarized in the section to follow.

Summary of Findings

Below is a summary of findings that cover all of the areas researched to fulfill the objectives of the study. The findings represent only the direct effects on abutting property, businesses and residents for each of the proposed route alternatives evaluated. They do not represent the indirect and/or net effects on all other property, businesses and residents located in the City of Wichita Falls. Only the highway construction expenditure and user cost impacts would include some indirect effects. Hopefully, the study procedures developed

in this study will be useful to the TxDOT in estimating business, land use, land value, tax revenue, relocation and employment, highway user benefit-cost and total economic benefit-cost impacts of proposed highway improvements. The proposed improvement of the study segment of U.S. Highway 287 presents a very interesting and complex problem, that is, having to estimate the different impacts of five route alternatives, three of which are bypass alternatives and two are existing route (elevated versus depressed express lanes) alternatives. In addition, the elevated express lane alternative has three design options, elevated ramps and/or express lane tie-ins with the existing freeway at one end of the proposed improvement.

The findings of this study are summarized in two major parts. The first part is based on analyses using data from prior studies and various estimating procedures, and the second part is based on opinion surveys conducted in Wichita Falls.

Impacts Based on Prior Findings and Various Analytical Procedures

Tables S-2 and S-3 summarize the various impacts indicated from all of the analyses based on prior findings and various analytical procedures. These tables do not summarize in detail the various impacts estimated in this report, such as the before versus during or after construction period impacts, specific location of businesses, residents, and other abutting properties. However, some of these impacts will be discussed in general where necessary. The major types of impacts addressed in Table S-2 are discussed separately below:

Impact on Business Activity. Estimates are made of the impact that each proposed route alternative would have on the gross sales of abutting businesses during and after construction. Although the impacts on businesses of the retail and service types are analyzed separate from those of the wholesale and manufacturing types in the body of the report, the impacts of each route alternative on all types of businesses combined are summarized in Table S-2. This table shows that the three bypass route alternatives 1, 2, and 3, and the existing route alternative 5, would have a positive impact on business gross sales. On the other hand, existing route alternative 4 would have a negative impact. A new bypass, especially route alternative 3, would stimulate enough new business activity along the bypass and even along the existing route to offset the negative effects of some businesses

Table S-2. Summary of Before Versus After Construction Impacts by Type of Impact Route Alternative.

TYPE OF IMPACT	ALT. 1	ALT. 2	ALT. 3	ALT.4	ALT.5[1]
Business gross sales					
Dollar change ($ mil)	+8.5	+5.9	+17.1	-1.9	+1.2
Percentage change	+14	+10	+29	-3	+2
Land use (abutting)					
Impr. properties (no.)	-8	-10	+39	+14	+21
Impr. properties (%)	-3	-4	+18	+8	+12
Total acreage (no.)	-173	-257	-380	-3	-3
Total acreage (%)	-45	-54	-63	-2	-3
Land value (abutting)					
Dollar change ($ mil)	+35.4	+32.9	+37.3	+39.6	+41.7
Percent change	+30	+22	+32	+36	+37
Tax Revenues					
Gross sales ($ 000)	+14.4	+8.7	+47.9	-17.8	-0.1
Property ($ 000)	+194.7	+172.7	+199.1	+206.7	+239.7
Relocation					
Businesses (no.)	-10	-12	-1	-6	-7
Businesses (%)	-3	-9	NIL	-6	-7
Residents (no.)	-35	-38	-13	0	0
Residents (%)	-34	-35	-13	0	0
Employment					
Business (no.)	+183	+132	+199	+61	+101
Business (%)	+19	+14	+23	+10	+17
Hwy constr. (# 000)	+4.9	+6.7	+5.7	+3.6	+1.9
Bldg constr. (# 000)	+0.3	+0.3	+0.3	+0.3	+0.3
Income to economy					
Hwy constr. exp. ($ mil)	+381.4	+523.0	+447.0	+278.5	+194.3
Bldg constr. exp. ($ mil)	+26.2	+26.9	+20.9	+19.2	+29.9
Highway Users					
Benefits ($ mil)	+728	+658	+624	+952	+952
Benefit-cost ratio	6.4	4.1	5.0	12.2	22.7

[1]An average of alternatives 5A, 5B, and 5C.

Table S-3. Comparison of Total Selected Highway Benefits/Disbenefits Versus Costs by Type and Route Alternative.

TYPE OF BENEFITS/DISBENEFITS AND COSTS	ALT.1	ALT.2	ALT.3	ALT.4	ALT.5[1]
Benefits/Disbenefits[2]					
Business Sales ($ Mil.)	8.5	5.9	17.1	-1.9	1.2
Land Values ($ Mil.)	35.0	32.9	37.3	39.6	41.7
Sales Taxes ($ Mil.)	0.1	0.9	0.5	-0.2	Nil
Property Taxes ($ Mil.)	0.2	0.2	0.2	0.2	02
Income to Economy due to Hwy Constr. Exp. ($ Mil.)	381.4	523.0	447.0	278.5	194.3
Income to Economy due to Bldg. Constr. Exp. ($ Mil.)	27.2	26.9	20.9	19.2	29.9
Highway User ($ Mil.)	728.0	658.0	624.5	852.0	952.0
Total Economic Benefits/Disbenefits ($Mil)	1,179.4	1,247.8	1,147.5	1,287.4	1,219.3
Total Cost of Highway Improvement ($Mil)	113.9	159.3	125.3	78.1	42.1
Total Economic Benefit/Cost Ratio	10.35	7.83	9.16	16.48	28.98

[1] An average of alternatives 5A, 5B, and 5C.

[2]Benefits accruing directly to highway users.

being displaced and some being bypassed.

Generally, traffic serving businesses would be more negatively or positively impacted than the nontraffic serving businesses. Traffic serving businesses would be impacted the most during the construction period on the route where the highway is taking place and then after construction on a portion of the existing route being bypassed by a bypass route. During construction of the bypass, the traffic serving businesses are negatively affected for various reasons, mainly inconvenience and disruption of easy access, parking, etc. for their customers. The other businesses which are considered nontraffic serving businesses are usually larger in number than the traffic serving group, and, consequently, how they are impacted will dominate the total business sales for a particular route alternative. These types of businesses thrive more along thoroughfares that are not so congested with traffic mainly passing through town. Therefore, their increased sales help offset the loss of business by the displaced and bypassed traffic serving businesses.

Finally, it should be noted that the existing route's depressed freeway alternative 4 would produce the most negative effects on business sales. Also, the bypass alternative 3 (the out of town loop type of route) would impact overall business sales, especially from new business and the existing route's new nontraffic serving businesses, more positively than either of the other two bypass alternatives 1 and 2. More businesses would be displaced along the Eastside Drive bypass routes than by the outside loop bypass.

Impact on Land Uses and Development. Estimates are made of the abutting land use impact of each route alternative. This effort not only involves estimating future land use but also the reduction in the different land uses due to the taking right of way to provide a path for the new highway improvement. All three of the proposed bypass route alternatives 1, 2, and 3 would require a large amount of right of way. As a result, significant land use changes are mandated from the start. Even though significant 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 confirms this finding, as summarized in Table S-2, showing the existing route's alternative 4 and 5 faring best with respect to abutting land use impacts. Route alternative 5 would have an even more positive impact than route

alternative 4.

Impact on Property Values. Estimates are made of the abutting property value impacts of each route alternative. These estimates are affected greatly by the estimated value of the right of way that would be required for any of the three bypass route alternatives 1, 2, and 3. Between the before and after periods, new developments along these routes would add to property values enough to show an overall increase in land values. This is apparently what would happen to route alternatives 1, 2, and 3, and put them almost even with the existing route's alternatives 4 and 5, which has higher land values in the before construction period.

Once again, route alternative 5 has a slight edge over route alternative 4, as well as the three other route alternatives. This is the case for both the dollar increases and percentage increases.

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 for both sales tax effects and property tax effects.

Sales Tax Impact. The estimated retail sales tax impacts are based on the estimated impacts on the gross sales discussed above. The gross taxable sales impacts almost parallel those outlined for the impact on gross sales. The three bypass route alternatives 1, 2, and 3 would produce an increase in sales tax revenues, but the two existing route alternatives 4 and 5 would show a decrease in tax revenues from business gross sales. Route alternative 3 would produce the greatest increase and route alternative 4 would produce the greatest decrease in revenues from gross sales. Route alternative 5 would cause a slightly negative impact on sales tax revenues.

Property Tax Impact. The construction of one of the route alternatives would have the greatest positive impact on property tax revenues if route alternative 5 is selected and the least impact if route alternative 2 is selected. Route alternative 4 would produce about as much property tax revenues as route alternatives 1 and 3. The property tax revenue

impacts parallel closely those presented in the property value section of this report as explained above.

Impact on Relocation, Employment and Income. Since so many businesses and residents would be displaced on route alternatives 1 and 2, the relocation costs would be significant compared to such costs for route alternatives 3, 4 and 5. Even route alternative 3 would have quite a few rural residential displacements. Route alternatives 4 and 5 would have only business displacements, but not as many as route alternatives 1 and 2.

Relocation costs, which includes moving expenses, would increase in proportion to the number of relocatees along each route. The number of new businesses and residents brought into existence due to each of the proposed routes is more than enough to replace all of those that were displaced.

The new abutting businesses will bring about additional business employment for all five of the route alternatives. Table S-2 shows that there would be significantly more business employment in the after construction period than in the before construction period. Route alternative 3 would have the largest increase and route alternative 4 would have the smallest increase in business employment. Some additional employment would be generated from highway construction expenditures, and an insignificant amount would be added due to new and remodeled building construction. All of the route alternatives rank fairly evenly in helping bring about new employment, with route alternative 3 generating the most and route alternative 4 generating the least.

Construction expenditures to build the new highway and abutting buildings also would produce an output or total demand effect on the general economy, part of it local. For highway construction expenditures, route alternative 2 would produce the greatest effect on output to the economy, and route alternative 5 would produce the least amount of output to the economy. In fact, all of the bypass route alternatives would produce more output to the economy than the existing route alternatives. For building construction expenditures, route alternative 5 would produce the greatest impact on the economy and route alternative 4 would produce the least impact on the economy.

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 cost. If a particular highway improvement lowers any of these user costs, then user cost benefits are generated. The two existing route's alternatives 4 and 5 would produce the most total user benefits, and the bypass route alternative 3 produces the least of such benefits. Route alternative 5 would also cost the least to build and route alternative 2 would cost the most to build. Therefore, route alternative 5 is clearly the most economically feasible to build of the five route alternatives. Consequently, route alternative 5 would have the highest benefit-cost ratio, and the route alternative 2 would have the smallest benefit-cost ratio.

Total Economic Benefits Versus Costs. The estimated changes in abutting business gross sales, property values, tax revenues and income to the economy due to highway and building construction could be considered as economic benefits and/or disbenefits of each of the proposed route alternatives. At least, they could be considered as gross measures of such benefits or disbenefits. When added together and/or added to highway user benefits/disbenefits, there is a danger of double counting some of the benefits/disbenefits of a highway improvement. Yet, if different benefits accruing from the same sources are added together to compare the proposed alternatives for a particular highway improvement, such as U.S. Highway 287, double counting may not present a significant problem. Therefore, the above mentioned economic benefits/disbenefits, all measured in dollars, are added together and divided by the estimated total cost of the highway right of way, relocation and construction to generate a total economic benefit-cost ratio.

The results of this analysis are shown in Table S-3. The results show that route alternative 4 would produce the greatest amount of dollar benefits, and route alternative 3 would produce the least amount of such benefits. Although route alternative 4 would produce the most dollar benefits, route alternative 5 would cost the least. Therefore, route alternative 5 produces a much larger overall economic benefit-cost ratio. In fact, route alternative 5 produces the largest ratio, and route alternative 2 produces the smallest.

Impacts Based on Opinion Surveys

A brief summary is given here of the results from several interview and mail surveys conducted in Wichita Falls to obtain the opinions of directly affected businesses, residents and public and nonprofit organizations concerning the route alternatives for improving U.S.

Highway 287 in Wichita Falls. Also, several real estate sales persons and appraisers were interviewed to obtain their opinions of current property values along the proposed route alternatives, and also their opinions were solicited concerning trends in property values in Wichita Falls and probable impacts of the proposed route alternatives on abutting property values.

Table S-4 shows the answers given by the different types of interview or mail survey respondents to commonly asked questions. The findings presented in this table should provide the reader with a representative sample of answers given to appropriate questions concerning the before versus after construction of any of the proposed U.S. Highway 287 improvement alternatives. These findings are discussed below:

Preferred Route. Table S-4 shows the answers to a question asked the respondents concerning which route alternative that they preferred. As can be seen, the abutting businesses and residents are in close agreement in choosing the existing route alternative 5 (the elevated express lane option) as their preferred alternative. The public/nonprofit organizations leaned toward the depressed express lane alternative 4 or the outer bypass loop alternative 3.

Reduction of U.S. Highway 287 Traffic Volumes. The respondents were asked how each route alternative would affect traffic volumes on U.S. Highway 287. Again, the business and resident respondents were in agreement that the shortest bypass alternative 1 which follows part of Eastside Dr. would reduce traffic on U.S. Highway 287 more than the other route alternatives.

Impact on U.S. Highway 287 Business Sales. The respondents were asked how each route alternative would affect the U.S. Highway 287's business gross sales. Once again, Table S-4 shows that the business and resident respondents are in agreement that the existing route alternative 5 would decrease the gross sales of abutting businesses more than any other route alternative.

Impact on U.S. Highway 287 Property Values. The respondents were asked how each route alternative would affect U.S. Highway 287's abutting property values. All of the respondent types are in agreement that any of the proposed route alternatives would depress abutting property values.

Table S-4. Summary of Before Versus After Construction Impacts Based on Opinions of Those Interviewed or Surveyed by Mail.

TYPE OF IMPACT AND SURVEY	ALT.1	ALT.2	ALT.3	ALT.4	ALT.5[1]
Preferred Route (%)					
Bus. interviewed	18	14	14	0	23
Bus. mail respondents	16	10	7	19	48
Res. mail respondents	0	6	25	0	69
Pub/nonprofit interviewed	17	0	33	33	17
US 287 Traffic Volume Reduced %					
Bus. interviewed	NA	NA	NA	NA	NA
Bus. mail respondents	-72	-71	-71	-12	-12
Res. mail respondents	-54	-47	-18	-18	-29
US 287 Bus Sales (% Decreased)					
Bus. interviewed	-33	-32	-44	-42	-50
Bus. mail respondents	-32	-42	-34	-22	-22
Res. mail respondents	-53	-53	-41	-47	-65
US 287 Prop Val (% Change)					
Bus. interviewed	-67	-67	-71	-75	-75
Bus. mail respondents	-80	-45	-81	-91	-70
Res. mail respondents	-18	-23	-12	-18	-35
Real est sales/appraisers	-16	-21	-22	+28	+26
US 287 Noise Level Change (%)					
Bus. interviewed	NA	NA	NA	NA	NA
Bus. mail respondents	-28	-57	-65	-74	-68
Res. mail respondents	-6	-35	-65	-18	-23
Attractiveness of City Change (%)					
Bus. mail respondents	+29	+32	+19	+35	+45
Res. mail respondents	+48	+30	+30	+41	+24

[1]Includes alternatives 5a,5b and 5c.

Impact on U.S. Highway 287 Noise Level. The respondents were asked how each of the proposed route alternatives would reduce the noise level along U.S. Highway 287. Both the business and resident respondent thought that any of the route alternatives would reduce the noise level along U.S. Highway 287.

Impact on Attractiveness of the City of Wichita Falls. The respondents were asked how each of route alternatives would affect the general attractiveness of the City of Wichita Falls. Again, the business and resident respondents are in agreement that any of the proposed route alternatives would increase the attractiveness of the City of Wichita Falls.

Conclusions and Recommendations

The following conclusions are reached from the study findings:

1. All of the proposed bypass route alternatives 1, 2, and 3 require a considerable amount of right of way which would lead to large numbers of displacements of businesses and residents, especially the first and second route alternative.

2. The study findings give only mixed support for bypass route alternatives 1, 2, 3, and 4. The findings give the strongest support for the existing route alternative 5 which is the elevated express lane alternative. The findings indicate that this proposed route alternative would produce the most positive overall economic impact on highway users and abutting businesses and residents of any of the five route alternatives considered. Of the impacts estimated on each route alternative, land use, land value, relocation, building construction impact on the economy and highway user impacts favor route alternative 5. Also, the majority of the abutting businesses and residents favor this route alternative.

The recommendations are as follows:

1. Based on the findings of this study, route alternative 5, the elevated express lane alternative that would be built on the two existing one-way streets, is recommended for approval.

2. Heavy consideration should be give to selecting a route alternative that minimizes the taking of large amounts of right of way, especially alternatives that

would displace large numbers of abutting businesses and residents. The recommended route alternative meets this objective.

3. Of the three design options of route alternate 5, it is recommended that the design option which places elevated ramps to and from 5th and 6th streets be added.

4. If and when this highway improvement is approved and ready for construction, it is recommended that the project be studied to determine the actual construction and after construction economic impacts on abutting businesses and residents.

REFERENCES

1. Buffington, J.L., Crane, L.M., Womack, K.N., and Salleh, R. "Economic Assessment of the Proposed Improvement of U.S. Highway 287 in Wichita Falls, Texas." Research Report 1915-1F, Texas Transportation Institute, College Station, Texas, June 1. 1991.